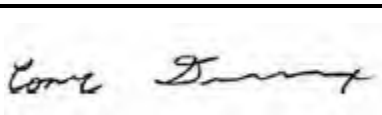
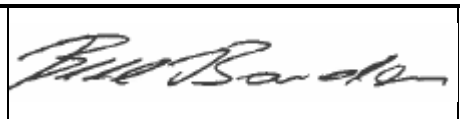
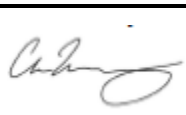
BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

2018 ENVIRONMENT AND CLIMATE CHANGE CANADA
METAL AND DIAMOND MINING EFFLUENT REGULATIONS
ANNUAL REPORT

2019-03-31	0			
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Date	**Rev.**	**Prepared By**		**Reviewed By**

TABLE 0 – REPORT SUBMISSION SUMMARY

Reporting Period:	2018
Annual Report Submission Date:	March 31, 2019
Name and Operator of the Mine:	**Baffinland Iron Mines - Mary River Project** **Baffinland Iron Mines Corporation**
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SECTION 1.0 - INTRODUCTION

In accordance with the Metal and Diamond Mining Effluent Regulations (MDMER), this report has been prepared to summarize the monitoring and controlled discharges that occurred at Baffinland Iron Mines Corporation's (Baffinland) Mary River Project (Project) during 2018 from surface water management ponds regulated under the MDMER at the Project's Mary River Mine Site (Mine Site).

The Project is focused on developing several high grade iron ore deposits in the Qikiqtani Region of Baffin Island, Nunavut. During 2018, Baffinland continued to increase mining operations at the Project's Deposit No. 1, located at the Mine Site, approximately 100 kilometres south of Milne Inlet. Mining at Deposit No. 1 is an open pit operation that involves blasting, crushing and screening of high grade iron ore. Due to the iron ore's high grade, iron ore generated by crushing and screening operations at the Mine Site is considered market ready and requires no further milling or processing. Throughout the year, ore generated at the Mine Site is transported by ore haul trucks and stockpiled at a port site on Milne Inlet, referred to as Milne Port. Ore is transported to Milne Port from the Mine Site using a 100 kilometre road known as the Milne Inlet Tote Road (Tote Road). Ore stockpiled at Milne Port throughout the year is shipped to European and Asian markets from Milne Inlet during the open water season (July to October).

On July 10, 2015, the Project became subject to the MMER under the *Fisheries Act* as a result of the discharge of effluent in excess of 50 cubic metres (m^3) from the Project's Waste Rock Facility (WRF) surface water management pond (WRF pond) located at the Mine Site, referred to as effluent monitoring station MS-08.

On June 18, 2016, Baffinland provided Environment and Climate Change Canada (ECCC) with notification and pertinent information regarding the addition of a second effluent monitoring location under MMER for the Project's Crusher Facility surface water management pond (CF pond), referred to as effluent monitoring station MS-06.

On June 2, 2017, Baffinland notified ECCC of changes to the final discharge point (FDP) locations for both MS-08 and MS-06. The new coordinates provided in the notification improved the accuracy of the FDPs for both MS-06 and MS-08 and reflect the locations where Baffinland is no longer in control of the effluent discharged to the receiving environment from monitoring locations.

On June 1, 2018, the Metal Mining Effluent Regulations (MMER) were amended, and became the Metal and Diamond Mining Effluent Regulations (MDMER).

On July 3, 2018, Baffinland notified ECCC of changes to the final discharge point (FDP) location for MS-08. The new coordinates reflect the commissioning of the water treatment plant (WTP) and the location of the treatment pond effluent where Baffinland is no longer in control of the effluent discharged to the receiving environment.

On July 30, 2018, as per subsection 37(1) of the MDMER referred to in paragraph 8(2)(c), Baffinland provided ECCC with information regarding the design-rated capacity of the mine. The design rated capacity of Baffinland's Mary River Mine Site is projected at 6 million tonnes (Mt) of Iron Ore and 3 Mt of waste rock, annually. Mine capacity is determined from equipment estimation, with loading unit rates matched to specific source destination haulage parameters. Geological reserve models are used for material sequencing and quantities.

1.1 WASTE ROCK FACILITY POND (MS-08)

The Waste Rock Facility (WRF) was constructed to support Deposit No. 1 mining operations and is located approximately one kilometer northeast of the Deposit No. 1 open pit (map included in Appendix A). Seepage and storm water runoff originating from the WRF is intercepted by the Facility's perimeter collection ditches and directed to the WRF pond. The WRF pond is a high-density polyethylene (HDPE) lined earthen walled basin with an approximate capacity of 9,200 m^3 and a surface area of 11,000 square metres (m^2). A transfer pump (located at Latitude 71° 20' 41.7" Longitude 79° 14' 21.2") pumps water from the sedimentation pond through approximately 330 metres (m) of 8" layflat hose to the water treatment plant (WTP). The WTP consists of physical-chemical treatment for pH adjustment, chemical precipitation and removal of solids by physical barrier. The water treatment processes include coagulation, pH adjustment and precipitation, flocculation and filtration. The WTP effluent is discharged via a Gorman-Rupp 6" pump and sections of lay-flat hose. The FDP for MS-08 is a sampling port after the discharge pump. Coordinates for the MS-08 FDP and MS-08 Discharge Line Outflow are provided below. Following the FDP, effluent passes through approximately 475 m of layflat hose and is discharged to the tundra of the approved receiving environment, the Mary River watershed.

Final Discharge Point MS-08:	Latitude: 71° 20' 41.6"	Longitude: 79° 13' 44.5"
MS-08 Discharge Line Outflow:	Latitude: 71° 20' 41.7"	Longitude: 79° 13' 00.4"

The WTP was constructed in 2018 and has a design treatment rate of 280 m^3/hr capacity, consisting of two 140 m^3/hr treatment trains. For each train, the water flow rate and pH in Reactor tanks 1 and 2 is continuously monitored. Ferric sulfate and polymer is added based on flow rate, while the lime dosage is based on pH in the reactor tank 1. The chemical dose rate is adjusted by the plant operator in the PLC to meet the targets. The Waste Pond Water Treatment Plant Operating Manual is provided in Appendix B, which includes the operating instructions as well as an overview of the treatment process, General Arrangement Drawings, and Process and Instruments Diagrams. Monitoring of the treated effluent at various stages of the treatment system is conducted to monitor the treatment system's performance. In 2018, the water treatment system was commissioned prior to freshet and operated from June to September discharging over 70,000 m^3 with no non-compliant discharges from the system's effluent. Effluent discharge

volumes are monitored and recorded during periods of discharge through the use of a Krohne Enviromag 6" Magnetic Flow Meter. The frequency and volume of effluent discharges from the WTP is dictated by the pond's capacity, weather, air logistics, sample holding times, and treatment requirements. As such, effluent is discharged intermittently on an as-needed basis from approximately late-June to early/mid-September. Consequently, the implementation of MDMER effluent and water quality monitoring is restricted to periods of effluent discharge rather than throughout the year due to Project constraints (details provided in Appendix C). Since the Project became subject to MDMER, volume and effluent quality monitoring at the MS-08 FDP is initiated and conducted during periods of effluent discharge.

Effluent from the end of the lay-flat hose is discharged overland (no defined channel) and flows east-northeast over boulder-cobble till material for approximately 475 m before entering a headwater depression that contains intermittent natural flow. The gradient of the depression continues eastward, eventually forming a clearly defined channel approximately 1,170 m down gradient of the end of the lay-flat hose line. This defined channel drains southeast approximately 740 m before discharging into a Mary River tributary referred to as Mary River Tributary-F (MRTF). From this confluence, MRTF flows south approximately 3.3 kilometres (km) before discharging into the Mary River. MRTF is non-fish bearing, due to the combination of complete freeze up during winter, relatively higher stream gradient and the presence of natural in-stream fish barriers near its confluence with the Mary River. Thus, the Mary River represents the primary fish bearing waters reached by mine effluent, and is the Project's receiving water body for the fish monitoring program required by the environmental effects monitoring (EEM) under MDMER.

The Phase 1 EEM Interpretive Report was prepared by Minnow Environmental Inc. (Minnow) and submitted to ECCC in January, 2018 (Appendix D). The field component of the Phase 1 EEM study was conducted in 2017, focusing on two (2) effluent-exposed watercourses, MRTF and Mary River. In summary, parameters below water quality guidelines and no observed effluent-related influences on benthic invertebrate community endpoints suggested that factors other than effluent accounted for the observed difference in non-YOY arctic charr condition between the effluent-exposed and reference areas of Mary River.

Two (2) water monitoring stations have been established on the Mary River for the purpose of MDMER water quality monitoring, including an upstream reference station (MS-08-US) and an effluent-exposed downstream station (MS-08-DS). Coordinates for the Mary River water monitoring stations are provided below.

MS-08-US (Reference)	Latitude: 71° 18' 37.8"	Longitude: 79° 11' 13.5"
MS-08-DS (Effluent-Exposed)	Latitude: 71° 18' 38.9"	Longitude: 79° 12' 09.4"

1.2 CRUSHING FACILITY POND (MS-06)

The Crusher Facility at the Mine Site consists of a pad that houses three (3) crusher spreads as well as associated run-of-mine, lump and fines ore stockpiles. Ditches along the perimeter of the pad directs storm water runoff from the pad to the CF pond. The CF pond is a HDPE lined earthen walled basin with an approximate capacity of 4,500 m^3. Runoff (i.e. effluent) collected in the pond is treated for solids removal via pond-based settling (map included in Appendix A). Effluent from the pond is pumped to the approved Mary River outfall discharge location located approximately 1.3 km southeast of the pond using the Mine Site's treated sewage effluent pipeline, originating at the Mine Site sewage treatment plant. Coordinates for the MS-06 FDP are provided below.

Final Discharge Point MS-06:	Latitude: 71° 18' 41.0"	Longitude: 79° 16' 51.1"

When effluent discharges are required at MS-06, effluent is pumped and transferred via the treated sewage effluent pipeline to the outfall location near Mary River. The FDP for MS-06 is a sample port located after the pump and before the connection to the sewage effluent pipeline.

Mary River is a fish bearing waterbody at the location that receives effluent discharged from MS-06, as well as being the receiving waterbody for monitoring of potential effects from effluent discharged from MS-08. As previously stated, two stations have been established on Mary River for the purpose of MDMER water quality monitoring, the MS-08 reference station (MS-08-US) and the MS-08 effluent-exposed station (MS-08-DS), associated with effluent discharges from the WRF Pond (MS-08). An additional receiving environment water quality monitoring station has been established on Mary River to monitor influences from MS-06 effluent discharge (MS-06-DS). Coordinates for the Mary River water quality monitoring stations are provided below.

MS-08-US (Reference):	Latitude: 71° 18' 37.8"	Longitude: 79° 11' 13.5"
MS-08-DS (Effluent-Exposed):	Latitude: 71° 18' 38.9"	Longitude: 79° 12' 09.4"
MS-06-DS (Effluent-Exposed):	Latitude: 71° 18' 01.5"	Longitude: 79° 15' 32.8"

A figure showing the location of all sampling points is provided in Appendix A of this report.

SECTION 2.0 - EFFLUENT AND WATER QUALITY MONITORING

The following section discusses the effluent and water quality monitoring of discharges from MS-08 and MS-06 during 2018. Frequency of sampling was dictated by dates of discharge in addition to shipping-related logistical constraints and parameter holding time requirements.

2.1 SUMMARY OF DELETERIOUS SUBSTANCES MONITORING

Deleterious substance monitoring was performed twelve (12) times during the discharge of effluent from MS-08 and twelve (12) times during the discharge of effluent from MS-06 in 2018. The detection limits, mean monthly averages, and mean monthly limits for MS-08 and MS-06 effluent are presented below in Table 1 and 2, respectively, along with the results for sample analyses performed. All Certificates of Analyses (CoA) are provided in Appendix E. The daily and monthly cumulative volumes of effluent discharged from MS-08 and MS-06 for 2018 are displayed in Table 3 and 4, respectively. The last date of discharge in 2018 was September 7, 2018 from MS-08 and August 28, 2018 from MS-06.

Table 1 - Analytical Results of Effluent Deleterious Substances - MS-08

Month	As (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	Lowest pH	Highest pH	Effluent Volume (m^3)
Detection Limits*	0.001	0.01	0.0005	0.005	0.03	2	0.0062*	0.1	0.1	--
January	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
February	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
March	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
April	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
May	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
June	0.0005	0.005	0.00025	0.0153	0.015	6.40	0.048	8.89	8.89	931.1
July	0.0005	0.008	0.00025	0.0287	0.015	5.75	0.02575	8.28	9.16	30719.9
August	0.0005	0.0192	0.00025	0.0359	0.015	10.5	0.0294	8.57	9.23	39347.8
September	0.005	0.05	0.0025	0.025	0.15	10.8	0.032	8.76	8.76	2625.8
October	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
November	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
December	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
Mean Monthly Limit	0.5	0.3	0.2	0.5	0.5	15	0.37	--	--	--

*Radium Detection Limits vary; 0.0062, 0.0079, 0.011, 0.0043, 0.0061, 0.019, 0.0053, 0.0075, 0.0073, 0.0081, 0.0074, 0.0055 from June to September
**September 4 detection limits differ; Arsenic 0.01 mg/L, Copper 0.10 mg/L, Lead 0.005 mg/L, Nickel 0.05 mg/L, Zinc 0.3 mg/L
Averages calculated by using half of the value of the detection limits
Mean Monthly Limit outlined in MDMER Schedule 4

Table 2 - Analytical Results of Effluent Deleterious Substances - MS-06

Month	As (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	Lowest pH	Highest pH	Effluent Volume (m^3)
Detection Limits**	0.0001	0.001	0.00005	0.0005	0.003	2	0.0057*	0.1	0.1	--
January	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
February	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
March	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
April	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
May	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
June	0.000118	0.000925	0.000152	0.009218	0.007	4.2	0.009325	7.52	7.65	621.6
July	0.000205	0.001625	0.000118	0.008075	0.00805	2.9	0.0136	7.55	7.78	1582.3
August	0.000095	0.0032	0.000162	0.015093	0.00405	2.55	0.009825	6.84	7.46	783.4
September	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
October	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
November	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
December	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP	NDEP
Mean Monthly Limit	0.5	0.3	0.2	0.5	0.5	15	0.37	--	--	--

*Radium Detection Limits vary; 0.0062, 0.0079, 0.011, 0.0043, 0.0061, 0.019, 0.0053, 0.0075, 0.0073, 0.0081, 0.0074, 0.0055 from June to September
**June 13 Lead Detection Limit is 0.0001 mg/L and July 26 detection limits differ; Arsenic 0.001 mg/L, Copper 0.010 mg/L, Lead 0.0005 mg/L, Nickel 0.005 mg/L, Zinc 0.03 mg/L
Averages calculated by taking the value of the detection limits
Mean Monthly Limit outlined in MDMER Schedule 4

Table 3 - Volumes of Effluent Discharged MS-08

Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)
1-Jun-18	0.0	1-Jul-18	931.2	01-Aug-18	1018.5	1-Sep-18	0.0
2-Jun-18	0.0	2-Jul-18	1374.8	02-Aug-18	2071.4	2-Sep-18	0.0
3-Jun-18	0.0	3-Jul-18	265.0	03-Aug-18	4648.7	3-Sep-18	0.0
4-Jun-18	0.0	4-Jul-18	529.6	04-Aug-18	2348.6	4-Sep-18	285.2
5-Jun-18	0.0	5-Jul-18	3826.4	05-Aug-18	4916.1	5-Sep-18	952.5
6-Jun-18	0.0	6-Jul-18	805.8	06-Aug-18	3872.4	6-Sep-18	1136.5
7-Jun-18	0.0	7-Jul-18	80.0	07-Aug-18	2315.1	7-Sep-18	251.7
8-Jun-18	0.0	8-Jul-18	1043.8	08-Aug-18	1126.9	8-Sep-18	0.0
9-Jun-18	0.0	9-Jul-18	0.0	09-Aug-18	33.6	9-Sep-18	0.0
10-Jun-18	0.0	10-Jul-18	2073.9	10-Aug-18	481.8	10-Sep-18	0.0
11-Jun-18	0.0	11-Jul-18	1043.0	11-Aug-18	1937.4	11-Sep-18	0.0
12-Jun-18	0.0	12-Jul-18	1403.7	12-Aug-18	2238.6	12-Sep-18	0.0
13-Jun-18	0.0	13-Jul-18	2387.1	13-Aug-18	1817.3	13-Sep-18	0.0
14-Jun-18	0.0	14-Jul-18	905.9	14-Aug-18	1626.0	14-Sep-18	0.0
15-Jun-18	0.0	15-Jul-18	1469.9	15-Aug-18	843.7	15-Sep-18	0.0
16-Jun-18	0.0	16-Jul-18	1618.1	16-Aug-18	769.4	16-Sep-18	0.0
17-Jun-18	0.0	17-Jul-18	1631.9	17-Aug-18	907.0	17-Sep-18	0.0
18-Jun-18	0.0	18-Jul-18	0.0	18-Aug-18	279.1	18-Sep-18	0.0
19-Jun-18	0.0	19-Jul-18	253.0	19-Aug-18	1186.9	19-Sep-18	0.0
20-Jun-18	0.0	20-Jul-18	621.7	20-Aug-18	284.0	20-Sep-18	0.0
21-Jun-18	0.0	21-Jul-18	1442.4	21-Aug-18	562.0	21-Sep-18	0.0
22-Jun-18	0.0	22-Jul-18	945.7	22-Aug-18	0.0	22-Sep-18	0.0
23-Jun-18	0.0	23-Jul-18	433.2	23-Aug-18	0.0	23-Sep-18	0.0
24-Jun-18	0.0	24-Jul-18	555.6	24-Aug-18	0.0	24-Sep-18	0.0
25-Jun-18	0.0	25-Jul-18	801.3	25-Aug-18	0.4	25-Sep-18	0.0
26-Jun-18	0.0	26-Jul-18	1007.8	26-Aug-18	1662.9	26-Sep-18	0.0
27-Jun-18	0.0	27-Jul-18	0.0	27-Aug-18	825.0	27-Sep-18	0.0
28-Jun-18	0.0	28-Jul-18	0.0	28-Aug-18	0.0	28-Sep-18	0.0
29-Jun-18	0.0	29-Jul-18	0.0	29-Aug-18	912.8	29-Sep-18	0.0
30-Jun-18	931.11	30-Jul-18	0.3	30-Aug-18	618.0	30-Sep-18	0.0
		31-Jul-18	3268.8	31-Aug-18	44.4		
June	**931.11**	**July**	**30719.86**	**August**	**39347.79**	**September**	**2625.82**

Table 4 - Volumes of Effluent Discharged MS-06

Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)
1-Jun-18	0.0	1-Jul-18	0.0	01-Aug-18	53.2
2-Jun-18	0.0	2-Jul-18	39.0	02-Aug-18	52.2
3-Jun-18	0.0	3-Jul-18	83.1	03-Aug-18	99.1
4-Jun-18	0.0	4-Jul-18	46.3	04-Aug-18	48.6
5-Jun-18	0.0	5-Jul-18	78.4	05-Aug-18	49.0
6-Jun-18	0.0	6-Jul-18	56.0	06-Aug-18	0.0
7-Jun-18	0.0	7-Jul-18	56.5	07-Aug-18	180.2
8-Jun-18	0.0	8-Jul-18	0.0	08-Aug-18	142.7
9-Jun-18	0.0	9-Jul-18	0.0	09-Aug-18	128.6
10-Jun-18	0.0	10-Jul-18	0.0	10-Aug-18	0.0
11-Jun-18	0.9	11-Jul-18	2.0	11-Aug-18	20.1
12-Jun-18	2.8	12-Jul-18	57.8	12-Aug-18	0.0
13-Jun-18	60.8	13-Jul-18	0.0	13-Aug-18	0.0
14-Jun-18	57.9	14-Jul-18	57.6	14-Aug-18	0.0
15-Jun-18	61.0	15-Jul-18	44.5	15-Aug-18	0.0
16-Jun-18	0.0	16-Jul-18	73.7	16-Aug-18	0.0
17-Jun-18	69.2	17-Jul-18	70.8	17-Aug-18	6.7
18-Jun-18	8.2	18-Jul-18	58.9	18-Aug-18	0.0
19-Jun-18	78.6	19-Jul-18	74.2	19-Aug-18	0.0
20-Jun-18	39.4	20-Jul-18	76.9	20-Aug-18	0.0
21-Jun-18	0.0	21-Jul-18	112.4	21-Aug-18	0.0
22-Jun-18	22.7	22-Jul-18	75.8	22-Aug-18	0.0
23-Jun-18	0.0	23-Jul-18	14.2	23-Aug-18	0.0
24-Jun-18	88.4	24-Jul-18	83.8	24-Aug-18	0.0
25-Jun-18	0.0	25-Jul-18	90.7	25-Aug-18	0.0
26-Jun-18	0.0	26-Jul-18	96.0	26-Aug-18	0.0
27-Jun-18	0.0	27-Jul-18	97.0	27-Aug-18	0.0
28-Jun-18	0.0	28-Jul-18	66.1	28-Aug-18	3.2
29-Jun-18	49.0	29-Jul-18	0.0	29-Aug-18	0.0
30-Jun-18	82.9	30-Jul-18	0.0	30-Aug-18	0.0
		31-Jul-18	70.5	31-Aug-18	0.0
June	**621.59**	**July**	**1582.25**	**August**	**783.41**

2.2 ACUTE TOXICITY

Acute toxicity samples were collected and analyzed for MS-08 effluent on July 3rd, August 10th, and September 4th, 2018. Initial samples collected from MS-08 in July and August were confirmed to be acutely non-lethal for both Rainbow Trout and *Daphnia magna*, whereas the sample on September 4th was demonstrated to be acutely lethal for *Daphnia magna*. Acute toxicity samples were collected and analyzed for MS-06 effluent on June 24th, July 26th, and August 1st, 2018. All three samples collected from MS-06 were confirmed to be acutely non-lethal for both Rainbow Trout and *Daphnia magna*. Results of these acute toxicity samples are summarized in Table 5 and 6; Refer to Appendix E for Certificates of Analyses.

Table 5 - Results of Acute Lethality Tests and *Daphnia magna* Tests MS-08

Sample Number	Sample ID	Date Sample Collected	Results for Rainbow Trout Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for *Daphnia magna* Monitoring Tests (mean percentage mortality in 100% effluent test concentration)	Results for Threespine Stickleback Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)
55446	**MS-08**	**3-Jul-18**	0	3.3	N/A
55875	**MS-08**	**10-Aug-18**	0	0	N/A
56171	**MS-08**	**4-Sep-18**	20	100	N/A

Table 6 - Results of Acute Lethality Tests and *Daphnia magna* Tests MS-06

Sample Number	Sample ID	Date Sample Collected	Results for Rainbow Trout Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for *Daphnia magna* Monitoring Tests (mean percentage mortality in 100% effluent test concentration)	Results for Threespine Stickleback Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)
55406	**MS-06**	**24-Jun-18**	0	0	N/A
55725	**MS-06**	**26-Jul-18**	0	0	N/A
56099	**MS-06**	**28-Aug-18**	0	0	N/A

2.3 EFFLUENT CHARACTERIZATION

Effluent characterization sampling was conducted at the MS-08 and MS-06 FDP and Mary River water quality monitoring stations MS-08-DS, MS-06-DS and MS-08-US during effluent discharges. Parameters required to be reported under MDMER are presented in Tables 4 to 9 below. More details of these results and the optional site-specific parameters measured can be found in the Certificates of Analyses in Appendix E of this report. The Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life for long term exposure (CCME LT WQG) are included as supplementary information in Tables 4 to 9.

Table 7 - Results from Effluent Characterization MS-08

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits - July	10	10	3.0	--	--	--	0.05	0.00005	0.1	0.00001	0.0005	0.0005	0.02	0.5	0.005	0.001	0.3	0.0001	0.0001	0.03	0.005	0.1
Detection Limits - August	10	10	3.0	--	--	--	0.05	0.00005	0.1	0.00001	0.0005	0.0005	0.2	5	0.005	0.001	3	0.0001	0.0001	0.003	0.005	0.1
03-Jul-18	2520	37	3360	9.6	55	6.64	<0.050	<0.000050	1.66	<0.000010	<0.00050	0.0043	6.5	6.51	<0.0050	0.0341	2340	0.00015	0.00014	<0.030	5.59	2.9
10-Aug-18	4120	57	5010	6.8	52.6	6.28	0.088	<0.000050	4.04	<0.000010	<0.00050	0.00956	18.7	12	<0.0050	0.0271	4930	0.00017	0.00073	<0.0030	6.92	2.98

Table 8 - Results from Effluent Characterization MS-06

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits - June	10	10	--	--	--	--	0.01	0.00001	0.05	0.00001	0.00005	0.00005	0.02	0.5	0.005	0.001	0.3	0.00001	0.00001	0.03	0.0005	0.02
Detection Limits - July	10	10	3.0	--	--	--	0.05	0.00005	0.1	0.00001	0.0005	0.0005	0.02	0.5	0.005	0.001	0.3	0.0001	0.0001	0.03	0.005	0.02
13-Jun-18	385	31	--	7.2	104.4	--	0.154	0.000027	0.509	<0.000010	0.000501	0.000899	4.06	12.8	--	--	314	0.00002	0.00191	<0.030	1.11	0.308
26-Jul-18	644	41	1160	5.6	101.2	12.71	<0.050	<0.000050	0.11	<0.000010	0.00082	0.00126	6.17	21.5	<0.0050	0.0037	572	<0.00010	0.0013	1.74	1.6	0.042

Table 9 - Results from Effluent Characterization MS-08 Effluent-Exposure Area

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits	10	10	3.0	--	--	--	0.005	0.000005	0.01	0.00001	0.00005	0.00005	0.02	0.5	0.0005	0.0001	0.3	0.00001	0.00001	0.003	0.0005	0.02
03-Jul-18	20	16	41.2	6.7	98.6	12.07	0.283	<0.0000050	0.331	--	0.000067	<0.000050	<0.020	0.78	0.00064	0.00013	2.31	<0.000010	0.000222	0.0075	0.00548	<0.020
10-Aug-18	42	33	94.1	7.6	97.4	11.64	0.266	<0.0000050	0.196	<0.000010	0.000231	<0.000050	<0.020	2.31	<0.00050	<0.00010	2.53	<0.000010	0.00105	0.0074	0.0023	<0.020
WQG (mg/L)	--	--	--	--	--	6.5/9.5	0.1	0.00009	0.3	0.000026	0.073	0.001	13	120	0.0089	0.001*	Variable**	0.0008	0.015	0.03*	Variable**	Variable

Canadian Environment Water Quality Guideline for the long term protection of aquatic life (CCME1999, 2017) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected criteria are the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994 indicated by a *) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2013 indicated by a **), as available.

Sulphate guideline is hardness (mg/L CaCO3) 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.

Manganese guideline is hardness (mg/L CaCO3) dependent, and calculated using the equation Mn (ug/L) = 0.0044 * (hardness) + 0.605.

Table 10 - Results from Effluent Characterization MS-06 Effluent-Exposure Area

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits	10	10	3.0	--	--	--	0.01	0.00001	0.05	0.00001	0.00005	0.00005	0.02	0.5	0.0005	0.0001	0.3	0.00001	0.00001	0.003	0.0005	0.02
13-Jun-18	22	21	--	1.6	99.1	--	1.29	0.000039	1.64	0.00001	0.000231	<0.000050	0.863	2.88	--	--	6.46	0.000025	0.00066	0.0383	0.0356	0.023
26-Jul-18	58	49	127	5.4	96.6	12.2	0.146	<0.0000050	0.147	<0.000010	0.000373	<0.000050	0.079	3.91	<0.00050	<0.00010	8.71	<0.000010	0.00139	0.0034	0.00224	0.02
WQG (mg/L)	--	--	--	--	--	6.5/9.5	0.1	0.00009	0.3	0.000026	0.073	0.001	13	120	0.0089	0.001*	Variable**	0.0008	0.015	0.03*	Variable**	Variable

Canadian Environment Water Quality Guideline for the long term protection of aquatic life (CCME1999, 2017) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected criteria are the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994 indicated by a *) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2013 indicated by a **), as available.

Sulphate guideline is hardness (mg/L CaCO3) 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.
Manganese guideline is hardness (mg/L CaCO3) dependent, and calculated using the equation Mn (ug/L) = 0.0044 * (hardness) + 0.605.

Table 11 - Results from Effluent Characterization MS-08 Effluent-Reference Area

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits	10	10	3.0	--	--	--	0.005	0.000005	0.01	--	0.00005	0.00005	0.02	0.5	0.0005	0.0001	0.3	0.00001	0.00001	0.003	0.0005	0.1
03-Jul-18	16	15	33	6.4	96.4	11.87	0.146	<0.0000050	0.112	--	0.000063	<0.000050	<0.020	0.86	<0.00050	<0.00010	0.5	<0.000010	0.000167	0.0062	0.00182	<0.020
10-Aug-18	41	34	89.3	8.3	96.2	11.32	0.365	<0.0000050	0.233	<0.000010	0.00024	<0.000050	<0.020	2.37	0.00058	<0.00010	0.9	<0.000010	0.0011	0.0049	0.00247	<0.020
WQG (mg/L)	--	--	--	--	--	6.5/9.5	0.1	0.00009	0.3	0.000026	0.073	0.001	13	120	0.0089	0.001*	Variable**	0.0008	0.015	0.03*	Variable**	Variable

Canadian Environment Water Quality Guideline for the long term protection of aquatic life (CCME1999, 2017) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected criteria are the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994 indicated by a *) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2013 indicated by a **), as available.

Sulphate guideline is hardness (mg/L CaCO3) 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.

Manganese guideline is hardness (mg/L CaCO3) dependent, and calculated using the equation Mn (ug/L) = 0.0044 * (hardness) + 0.605.

Table 12 - Results from Effluent Characterization MS-06 Effluent-Reference Area

Date	Hardness (mg/L)	Alkalinity (mg/L)	Electrical Conductivity (µmhos/cm)	Temperature °C	Dissolved Oxygen %	Dissolved Oxygen (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Selenium (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Sulphate (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Phosphorus (mg/L)	Manganese (mg/L)	Ammonia (mg/L)
Detection Limits - June	10	10	3.0	--	--	--	0.01	0.00001	0.05	0.00001	0.00005	0.00005	0.02	0.5	0.0005	0.0001	0.3	0.00001	0.00001	0.003	0.0005	0.02
Detection Limits - July	10	10	3.0	--	--	--	0.005	0.000005	0.01	0.00001	0.0005	0.00005	0.02	0.5	0.0005	0.0001	0.3	0.00001	0.00001	0.003	0.0005	0.02
13-Jun-18	11	<10	--	2.1	99.8	--	0.056	<0.00001	0.053	<0.00001	0.00005	<0.00005	0.054	0.77	--	--	0.47	<0.00001	0.00018	0.0083	0.00329	<0.020
26-Jul-18	56	49	122	5.6	98	12.33	0.115	<0.000005	0.092	<0.00001	0.000204	<0.00005	0.023	3.88	<0.00050	<0.0001	7.52	<0.00001	0.00137	0.0053	0.0014	<0.020
WQG (mg/L)	--	--	--	--	--	6.5/9.5	0.1	0.00009	0.3	0.000026	0.073	0.001	13	120	0.0089	0.001*	Variable**	0.0008	0.015	0.03*	Variable**	Variable

Canadian Environment Water Quality Guideline for the long term protection of aquatic life (CCME1999, 2017) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected criteria are the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994 indicated by a *) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2013 indicated by a **), as available.

Sulphate guideline is hardness (mg/L CaCO3) 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.

Manganese guideline is hardness (mg/L CaCO3) dependent, and calculated using the equation Mn (ug/L) = 0.0044 * (hardness) + 0.605.

2.4 SUB-LETHAL TOXICITY TESTING

Sub-lethal toxicity testing as per MDMER Schedule 5, Part 1, Section 5 was performed twice during 2018 at MS-08, July 3rd and August 21st. Sub-lethal toxicity results for 2018 effluent discharges from MS-08 are provided in Tables 13 and 14 below. The Certificates of Analyses for the sub-lethal toxicity results are provided in Appendix E.

Table 13 - Results from Sub-Lethal Toxicity Testing EC_{25} or IC_{25} MS-08

Date	Species Tested	Sub-lethal Test Type	Sample Method	Lab	EC_{25} or IC_{25}*	Lower 95% C.L	Upper 95% C.L	Notes
03-Jul-18	*Pimephales promelas*	Growth	Grab	Aquatox	>100.00%	--	--	
03-Jul-18	*Ceriodaphnia dubia*	Reproduction	Grab	Aquatox	35.10%	0.06%	41.20%	The lower 95% confidence limit is less than the lowest concentration tested.
03-Jul-18	*Lemna minor*	Growth (fond weight)	Grab	Aquatox	80.00%	54.10%	109.00%	In the case of effluents, an upper 95% confidence limit of 97% is inferred, since a concentration greater than 97% is not possible. Statistically, however, a confidence limit which is greater than 97% effluent is valid.
03-Jul-18	*Lemna minor*	Growth (fond number)	Grab	Aquatox	35.50%	25.60%	46.40%	
03-Jul-18	*Pseudokirchneriella subcapitata*	Cell yield	Grab	Aquatox	>90.91%	--	--	
21-Aug-18	*Pimephales promelas*	Growth	Grab	Aquatox	>100.00%	--	--	
21-Aug-18	*Ceriodaphnia dubia*	Reproduction	Grab	Aquatox	39.50%	34.60%	41.50%	
21-Aug-18	*Lemna minor*	Growth (fond weight)	Grab	Aquatox	>97.00%	--	--	
21-Aug-18	*Lemna minor*	Growth (fond number)	Grab	Aquatox	>97.00%	--	--	
21-Aug-18	*Pseudokirchneriella subcapitata*	Cell yield	Grab	Aquatox	>90.91%	--	--	

* EC_{25} represents the concentration at which a 25 percent effect has occurred.
IC_{25} represents the concentration that demonstrates a 25 percent reduction in toxicity.
All results in 2018 were IC_{25}.

Table 14 - Results from Sub-Lethal Toxicity Testing LC_{50} MS-08

Date	Species Tested	Sub-lethal Test Type	Sample Method	Lab	LC_{50}	Lower 95% C.L.	Upper 95% C.L.
03-Jul-18	*Pimephales promelas*	Growth	Grab	Aquatox	>100.00%	--	--
03-Jul-18	*Ceriodaphnia dubia*	Reproduction	Grab	Aquatox	>100.00%	--	--
21-Aug-18	*Pimephales promelas*	Growth	Grab	Aquatox	>100.00%	--	--
21-Aug-18	*Ceriodaphnia dubia*	Reproduction	Grab	Aquatox	>100.00%	--	--

*LC_{50} represents the concentration at which 50 percent lethality has occurred.

SECTION 3.0 - SAMPLING METHODOLOGY

3.1 SAMPLING PROGRAM – QUALITY ASSURANCE AND QUALITY CONTROL PLAN

Baffinland has developed a Surface Water Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001) as a requirement of Part I, Item 16 of Water Licence No. 2AM-MRY1325. This Surface Water Sampling Program (QA/QC) has been prepared following the general recommendations presented in *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licences in Meeting SNP Requirements and for Submission of a QA/QC Plan* (INAC, 1996) and *Guidance Document for the Sampling and Analysis of Metal Mining Effluents* (ECCC, 2001). This Plan is included in Appendix F.

The QA/QC objectives of this Plan are designed to provide guidance to field staff and analytical laboratories in order to maintain a high level of confidence in the water quality data generated by the Project.

QA/QC samples taken in 2018 included sample duplicates. QA/QC samples taken at MS-08 and MS-06 and the analytical results are provided in Table 15 and 16, respectively. Certificates of Analyses for the QA/QC samples are provided in Appendix E.

Table 15 - Results from QAQC Analyses MS-08

		Date	30-Jun-18	30-Jun-18	RPD (%)	11-Jul-18	11-Jul-18	RPD (%)	21-Jul-18	21-Jul-18	RPD (%)	24-Jul-18	24-Jul-18	RPD (%)	10-Aug-18	10-Aug-18	RPD (%)	21-Aug-18	21-Aug-18	RPD (%)
		Sample ID	MS-08	MS-0801		MS-08	MS-0801		MS-08	MS-0801		MS-08	MS-0801		MS-08	MS-0801		MS-08	MS-0801	
Parameter	Units	Detection Limits																		
Conductivity	µmhos/cm	3.0	3170	3180	0.32	3160	3210	1.58	3420	3430	0.29	3450	3460	0.29	5010	5030	0.40	3890	3960	1.80
Hardness	mg/L	10	-	-	-	-	-	-	-	-	-	-	-	-	4120	4310	4.61	2760	2550	7.61
pH	pH units	0.1	8.89	8.89	0.00	9.16	9.16	0	8.53	8.64	1.29	8.28	8.28	0.00	9.23	9.27	0.43	8.83	8.85	0.23
TSS	mg/L	2	6.4	8	25.0	3.6	2.4	33.3	12.4	13.6	9.68	14.8	6.8	54.1	19.3	14.9	22.8	7.2	6	16.67
Alkalinity	mg/L	10	-	-	-	-	-	-	-	-	-	-	-	-	57	55	3.51	48	50	4.17
Ammonia	mg/L	0.1	-	-	-	-	-	-	2.02	2.07	2.48	1.94	2.02	4.12	2.98	2.99	0.34	1.52	1.58	3.95
Chloride	mg/L	0.5	-	-	-	-	-	-	-	-	-	-	-	-	12	10.1	15.8	7.9	8.6	8.86
Nitrate	mg/L	0.02	-	-	-	-	-	-	-	-	-	-	-	-	18.7	15.6	16.6	9.76	10.3	5.53
Phosphorus	mg/L	0.003	-	-	-	-	-	-	-	-	-	-	-	-	<0.0030	<0.0030	-	<0.030	<0.030	-
Sulfate	mg/L	0.3	-	-	-	-	-	-	-	-	-	-	-	-	4930	4100	16.8	2700	2830	4.81
Aluminum	mg/L	0.05	0.058	<0.050	-	<0.050	<0.050	-	0.08	0.08	0.00	<0.05	<0.05	-	0.088	0.091	3.41	0.057	0.06	5.26
Arsenic	mg/L	0.001	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	-
Cadmium	mg/L	0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Chromium	mg/L	0.005	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Cobalt	mg/L	0.001	0.0119	0.0119	0.00	0.0083	0.008	3.61	0.0439	0.0445	1.37	0.0155	0.0152	1.94	0.0271	0.0284	4.80	0.0189	0.0191	1.06
Copper	mg/L	0.01	<0.010	<0.010	-	<0.010	<0.010	-	<0.01	<0.01	-	<0.010	<0.010	-	0.034	0.034	0.00	0.012	0.012	0.00
Iron	mg/L	0.1	2.19	2.15	1.83	0.73	0.73	0	4.31	4.42	2.55	1.23	1.12	8.94	4.04	4.18	3.47	1.71	1.7	0.58
Lead	mg/L	0.0005	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.0005	<0.0005	-	<0.0005	<0.00050	-	<0.00050	<0.00050	-	<0.0005	<0.0005	-
Manganese	mg/L	0.005	3.21	3.25	1.25	3.7	3.59	2.97	8.88	8.83	0.56	4.54	4.71	3.74	6.92	7.07	2.17	5.61	5.72	1.96
Mercury	mg/L	0.00001	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Molybdenum	mg/L	0.0005	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.00050	<0.00050	-	0.00063	0.00057	9.52
Nickel	mg/L	0.005	0.0153	0.0145	5.23	0.0114	0.0112	1.75	0.056	0.0558	0.36	0.0201	0.0193	3.98	0.028	0.0297	6.07	0.0242	0.0247	2.07
Selenium	mg/L	0.0005	0.00336	0.00395	17.6	0.00403	0.00381	5.46	0.00523	0.00496	5.16	0.00494	0.00491	0.61	0.00956	0.00935	2.20	0.0062	0.0066	6.45
Thallium	mg/L	0.0001	0.00011	<0.00015	-	0.00011	0.00011	0.00	<0.00020	0.0001	-	0.00011	0.00012	9.09	0.00017	0.00017	0.00	<0.00010	<0.00010	-
Uranium	mg/L	0.0001	0.00024	0.00025	4.17	0.00056	0.00053	5.36	0.00057	0.0006	5.26	0.00037	0.00039	5.41	0.00073	0.00066	9.59	0.00061	0.00063	3.28
Zinc	mg/L	0.03	<0.030	<0.030	-	<0.030	<0.030	-	<0.03	<0.03	-	<0.03	<0.03	-	<0.030	<0.030	-	<0.03	<0.03	-
Ra 226	Bq/L	0.0062*	0.048	0.029	39.6	0.021	0.015	28.6	0.018	0.039	116	0.017	0.03	76.5	0.041	0.045	9.76	0.02	0.026	30.0

Table 16 - Results from QAQC Analyses MS-06

		Date	13-Jun-18	13-Jun-18	RPD (%)	11-Jul-18	11-Jul-18	RPD (%)
		Sample ID	MS-08-US	MS-08-US01		MS-06	MS-0601	
Parameter	Units	Detection Limits**						
Conductivity	µmhos/cm	3.0	-	-	-	1040	5460	425
Hardness	mg/L	10	11	11	0.00	-	-	-
pH	pH units	0.1	7.32	7.22	1.37	7.78	7.77	0.13
TSS	mg/L	2	<2.0	<2.0	-	4	4.4	10.0
Alkalinity	mg/L	10	<10	13	-	-	-	-
Ammonia	mg/L	0.02	<0.020	<0.020	-	-	-	-
Chloride	mg/L	0.5	0.77	0.77	0.00	-	-	-
Nitrate	mg/L	0.02	0.054	0.052	3.70	-	-	-
Phosphorus	mg/L	0.003	0.0083	0.0065	21.7	-	-	-
Sulfate	mg/L	0.3	0.47	0.46	2.13	-	-	-
Aluminum	mg/L	0.01	0.056	0.053	5.36	0.051	0.0468	8.24
Arsenic	mg/L	0.0001	<0.00010	<0.00010	-	0.00014	0.00014	0.00
Cadmium	mg/L	0.00001	<0.000010	<0.000010	-	0.000035	0.0000409	16.9
Chromium	mg/L	0.0005	-	-	-	<0.00050	<0.00050	-
Cobalt	mg/L	0.0001	-	-	-	0.00453	0.00455	0.44
Copper	mg/L	0.001	<0.0010	<0.0010	-	<0.001	<0.001	-
Iron	mg/L	0.05**	0.053	<0.050	-	0.159	0.15	5.66
Lead	mg/L	0.0001	<0.00010	<0.00010	-	0.000055	0.000061	10.9
Manganese	mg/L	0.0005	0.00329	0.00323	1.82	1.71	1.74	1.75
Mercury	mg/L	0.00001	<0.000010	<0.000010	-	-	-	-
Molybdenum	mg/L	0.00005	<0.000050	<0.000050	-	0.000875	0.000967	10.5
Nickel	mg/L	0.0005	<0.00050	<0.00050	-	0.00789	0.00879	11.4
Selenium	mg/L	0.00005	<0.000050	<0.000050	-	0.0012	0.0012	0.00
Thallium	mg/L	0.00001	<0.000010	<0.000010	-	0.00003	0.000032	6.67
Uranium	mg/L	0.00001	0.00018	0.000185	2.78	0.00158	0.00163	3.16
Zinc	mg/L	0.003	<0.0030	<0.0030	-	0.0039	0.004	2.56
Ra 226	Bq/L	0.0045*	<0.0068	<0.0045	-	0.019	0.042	121

*Radium Detection Limits differ; 0.0045, 0.0045, 0.0067, 0.0067

**July 11 Detection Limit for Aluminum is 0.005 mg/L, Cadmium is 0.000005 mg/L, Iron is 0.01 mg/L, Lead is 0.00005 mg/L

SECTION 4.0 - NON-COMPLIANCE INFORMATION

In response to the concerns identified and non-compliant discharges in 2017, Baffinland developed and implemented several immediate corrective actions in 2017 to ensure compliance regarding effluent from the WRF. These actions were summarized and provided to ECCC in the Project's *2018 Environment and Climate Change Canada Metal Mining Effluent Regulations Annual Report*. During 2018, Baffinland continued to implement corrective actions to address ongoing concerns, including:

- The successful installation and operation of a dedicated WTP at the WRF to ensure effluent water quality compliance under the MDMER during controlled discharges;
- Development of a MDMER Emergency Response Plan to: clarify roles & responsibilities; clarify emergency spill response procedures; and outline the controls in place to ensure effluent water quality compliance at the Project under MDMER.

During 2018, controlled effluent discharges from the WRF pond (MS-08) began in late June and continued until early September discharging over 70,000 m^3 with no non-compliant discharges from the system's effluent. Controlled discharges from the WRF pond involved pumping effluent from the WRF pond to the WTP for treatment, then to the final discharge point (MS-08-FDP) established under the MDMER.

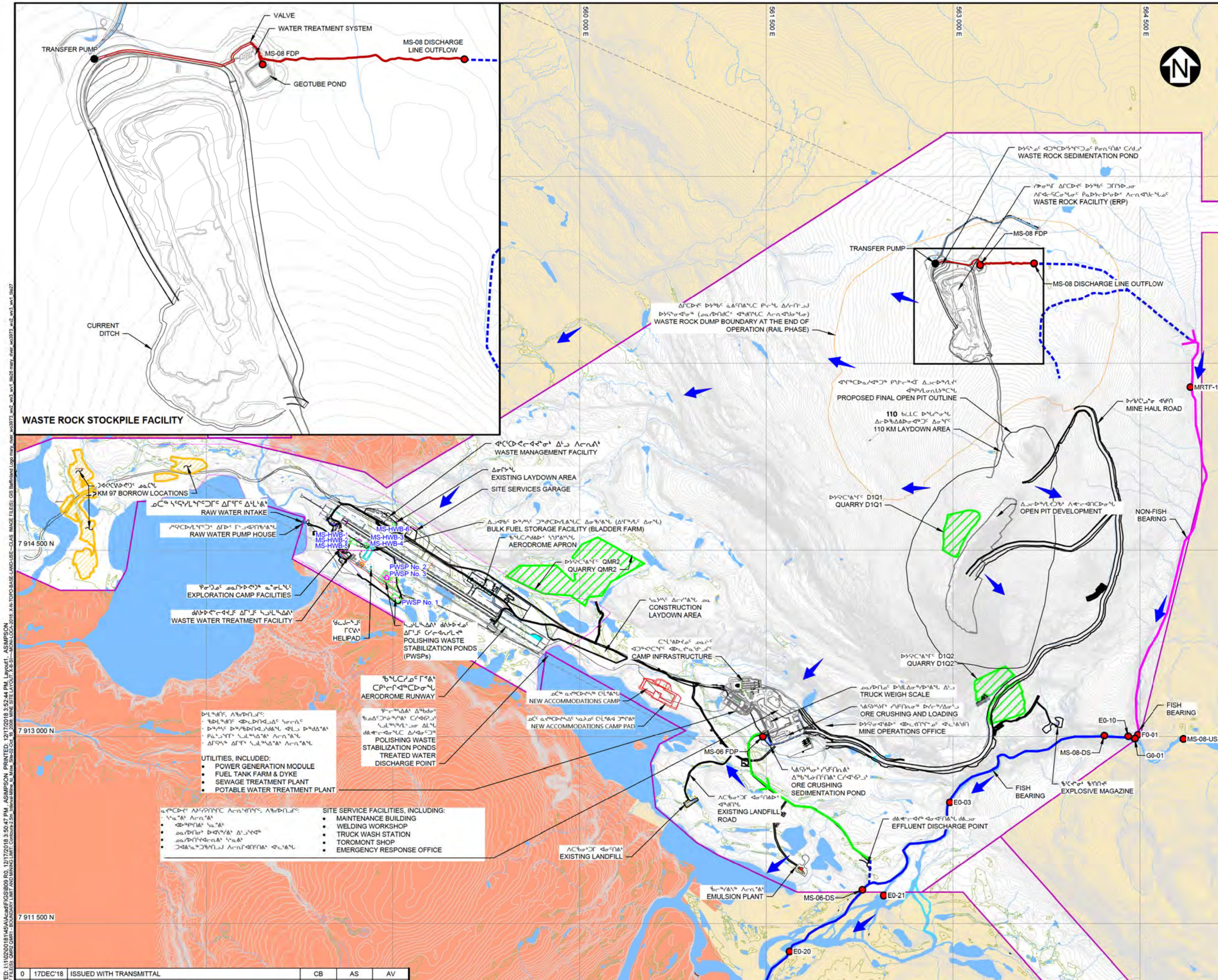
During a routine inspection of the WRF on June 19, 2018, an overflow and release of non-compliant runoff was discovered along the WRF's west perimeter ditch. The cause of the overflow was determined to be a result of insufficient sizing of the perimeter ditch combined with increased flows during freshet. In discovering the release, Baffinland personnel responded quickly and stopped the release within an hour of its discovery. To prevent similar incidents from reoccurring in the future, the capacity of the west perimeter ditch was expanded shortly after the release.

Water quality sampling conducted immediately downstream of the overflow point at the time of the release suggested that the pH of the non-compliant runoff was below the pH criterion stipulated by the MDMER and ranged between a pH of 5.32 and 7.32. The overflow was reported by Baffinland to relevant regulators and is documented in NT-NU Spill Report 18-244 (spill report included in Appendix G).

Baffinland remains committed to addressing the identified concerns and maintaining compliance in the management of waste rock and effluent at the WRF. Industry best practices and procedures planned for the WRF to maintain compliance are detailed in the Project's most recent revisions of the Interim Waste Rock Management Plan and MDMER Emergency Response Plan (Appendix H). Key corrective actions planned for 2019 include the continued operation of the WTP, expansion and repair of the WRF and additional waste rock studies to further optimize the Project's waste rock and ARD/ML management strategies.

APPENDIX A

MONITORING LOCATION MAPS



VALVE
WATER TREATMENT SYSTEM
TRANSFER PUMP
MS-08 FDP
MS-08 DISCHARGE LINE OUTFLOW
GEOTUBE POND
CURRENT DITCH
WASTE ROCK STOCKPILE FACILITY
560 000 E
561 500 E
563 000 E
564 500 E
7 914 500 N
7 913 000 N
7 911 500 N
WASTE ROCK SEDIMENTATION POND
WASTE ROCK FACILITY (ERP)
MS-08 FDP
TRANSFER PUMP
MS-08 DISCHARGE LINE OUTFLOW
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
110 KM LAYDOWN AREA
MINE HAUL ROAD
MRTF-1
QUARRY D1Q1
OPEN PIT DEVELOPMENT
NON-FISH BEARING
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
SITE SERVICES GARAGE
KM 97 BORROW LOCATIONS
RAW WATER INTAKE
RAW WATER PUMP HOUSE
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
MS-HWB-1
MS-HWB-2
MS-HWB-3
MS-HWB-4
MS-HWB-5
MS-HWB-6
PWSP No. 1
PWSP No. 2
PWSP No. 3
QUARRY QMR2
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
CONSTRUCTION LAYDOWN AREA
CAMP INFRASTRUCTURE
QUARRY D1Q2
AERODROME RUNWAY
NEW ACCOMMODATIONS CAMP
NEW ACCOMMODATIONS CAMP PAD
TRUCK WEIGH SCALE
ORE CRUSHING AND LOADING
MINE OPERATIONS OFFICE
POLISHING WASTE STABILIZATION PONDS TREATED WATER DISCHARGE POINT
UTILITIES, INCLUDED:
POWER GENERATION MODULE
FUEL TANK FARM & DYKE
SEWAGE TREATMENT PLANT
POTABLE WATER TREATMENT PLANT
MS-06 FDP
ORE CRUSHING SEDIMENTATION POND
EXISTING LANDFILL ROAD
SITE SERVICE FACILITIES, INCLUDING:
MAINTENANCE BUILDING
WELDING WORKSHOP
TRUCK WASH STATION
TOROMONT SHOP
EMERGENCY RESPONSE OFFICE
EXISTING LANDFILL
EFFLUENT DISCHARGE POINT
EMULSION PLANT
MS-06-DS
E0-21
E0-20
E0-03
FISH BEARING
EXPLOSIVE MAGAZINE
MS-08-DS
E0-10
F0-01
G0-01
MS-08-US
FISH BEARING

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)
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- LAY FLAT HOSE
- FISH BEARING WATER
- NON-FISH BEARING WATER
- HDPE PIPE
- OVERLAND SURFACE WATER FLOW
- WATER QUALITY MONITORING LOCATION
- PUMP
- DRAINAGE DIRECTION

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.

SCALE A 300 150 0 500 1000 1500 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	17DEC'18	ISSUED WITH TRANSMITTAL	CB	AS	AV

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT AND MDMER / WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

P/A NO. NB102-181/45 | REF NO. NB18-00875

FIGURE 1 REV 0

APPENDIX B

WASTE POND WATER TREATMENT PLANT OPERATIONS

Baffinland Iron Mines Corporation

Waste Pond Water Treatment Plant Operations

Rev 1.0

Prepared By: Chet Fong
Department: Mine Operations
Title: Senior Mining Engineer
Date: 17/08/2018
Signature:

Approved By: Simon Fleury
Department: Mine Operations
Title: Mine Manager
Date: 17/08/2018
Signature: Simon L. Fleury

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
08/17/18	V1.0	CF		Initial

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1 PURPOSE

This document outlines the basic procedure to safely operate the Water Treatment Plant

2 SCOPE

This document will cover the basic operations of the plant, including start up and shut down, monitoring, treatment, and emergency protocols and procedures for at risk activities at the Water Treatment Plant.

2.1 EXEMPTIONS

This document does not include instructions related to water treatment, which can be found in the plant Operations and Maintenance Manual.

3 RESPONSIBILITES

Any visitor shall request permission to the plant operator prior to entering the work area. In the absence of an operator, permission shall be requested to the mine supervisor.

The Plant operator shall ensure that everyone working in the plant wears the requisite PPE according to the activities being performed (e.g. chemical handling).

4 PROCEDURES

The information in this section is intended as a summary of plant operations. In the case of a discrepancy between this document and the Operations and Maintenance Manual, the latter will take precedence.

For full details on design and plant operation, refer to the operator's manual. In standard operations, the WTP is intended to draw water from the Waste Dump Pond and treat the intake water in 3 steps inside the WTP structure. The water is then discharged to a Geotube Settling Pond, where a fourth treatment step of settlement will occur, before water is either discharged into the environment or, if not compliant, recirculated back to the Waste Dump Pond.

The three steps of treatment involve the injection of chemical into temporary storage tanks.

- Step 1 – Iron Precipitation
- Step 2 – Hydroxide Precipitation and pH Adjustment

- Step 3 – Flocculation
- Step 4 - Filtration

Steps 1-3 occur inside the WTP structure, with the 4th step taking place in the Geotube Settling Pond.

4.1 PLANT OPERATIONS

Plant operations consists primarily of managing flow, dosage and water levels across the pond, sump, and tanks. Flow is managed with a combination of control panel adjustments and manual valve manipulations.

The plant consists of the following components:

1. Intake Pump – pulls water from the Waste Dump Pond into the WTP
2. Onion tanks – water is stored for treatment prior to discharge. There are two trains, which can be run independently or concurrently.
3. Control panel – use to remotely manage pumps – can be set for automatic and manual operations
4. Dosing pumps – use to inject chemical into onion tanks at a fixed rate
5. Dosing tanks – mixing tanks from which chemicals (Lime, Polymer) is depleted at a configurable rate
6. Transfer pumps – used to take treated water from the plant out to the Geotube Pond
7. Geotube Pond – discharge from the plant is deposited here for particulate settlement prior to final discharge.
8. Discharge pump – used to pull treated water from the Geotube Pond to either be discharged into the environment or recirculated back to the Waste Dump Pond.
9. Blower motors – used to agitate water in onion tanks during treatment to ensure more even dispersion of chemicals.

Once the Plant is operational, the operator will commence with monitoring the measured levels of pH and suspended solids with built in instrumentations and gauges. These readings may be corroborated with manual instrumentations such as a YSI meter.

When readings indicate pH readings at the desired values, the operator shall then initiate discharging of water into the Geotube Pond. This water is allowed to percolate through the Geotube, which catches particulates as a filter. Once in the Sump, where any remaining particulates are then captured and settle into the bottom of the pond.

Water is discharged from this Geotube Pond, either directly into the environment or back into the Waste Dump Pond. The maximum flow rate for these discharging is 1200 gal/min, this limit imposed by the flowmeter installed.

At design capacity, the intake pump(s) should be able to pull water into the WTP for treatment at an equal rate to the discharge pump. The plant effectively runs continuously with dosing in-stream.

4.2 Plant Start up

The following steps should be undertaken when starting up the WTP.

1. Ensure blower motors are activated.
2. Ensure all the Valves to the Geotube Sump are open.
3. Ensure the transfer pumps are switched to automatic
4. Check that all the intake valves are open
5. Keep valves open between tanks on each train
6. Start up intake pump and adjust pressure accordingly. To do this, adjust the following:
    a. Rpm of the pump
    b. Valve openings
7. Start Ferric Sulphate Dosing system. Ensure intake is in the Ferric Sulphate barrels, and there are no leaks present. Pumps should be activated.
8. Start Lime Dosing system. Dosing pumps should be activated.
9. Start up Polymer Dosing System. Dosing pumps should be activated

Plant operations can now commence.

4.3 Plant Shut Down

Plant shut down can be undertaken when it is to be unmanned for a longer period of time (eg. More than 2 shifts) within the same system (for winter decommissioning, procedure XXX). To run a plant shut down

1. Shut all intake valves
2. Shut all Ferric Sulphate dosing equipment
3. Shut all Lime dosing equipment
4. shut all Polymer dosing equipment
5. Rinse Lime lines (reference other procedure)

Plant can now be shut down. This procedure can be utilized with the onion tanks full. This should also be done before any interruptions in power due to generator maintenance or other causes.

4.4 Discharging

Discharging be undertaken whenever the plant is running. It is most efficient to run the discharge when there is moderate to high water levels in the Geotube Sump. The intake hose for the Geotube Sump should utilize the ring to ensure that drawn water is from the top of the water surface.

Discharging requires the manual operation of the valves to discharge the water either to the environment or back to the Waste Dump Pond. Readings should also be checked and logged on the flowmeter when discharge begins using the totalizer values.

NOTE: discharge flow rate should be kept below 1200 gal/min, as flow greater than this will not be measureable.

To discharge, the following steps should be undertaken:

1. Ensure enough water to discharge. Water levels should be at least 50 centimetres from the bottom of the sump prior to beginning discharge.
2. Ensure valve on re-circulation line is closed. This will enable the water to discharge into the environment. Where re-circulation is required, close the valve on the discharge line and open the valve on the re-circulation line.
3. If discharging to the environment, check the totalizer reading on the flowmeter prior to discharge. This is not required if re-circulating.
4. On the control panel, Set discharge to "on"
5. While discharging, check discharge pH and Turbidity with sampling tap periodically. Samples can be collected and tested using YSI instrument.
6. When discharging is complete or to be disabled, go to control panel and set discharge to "off"

4.5 CHEMICAL DOSING

Chemical dosing is performed as part of the treatment process. The primary drivers for chemical dosing is:

1. Reduce the pH
2. Reduce the suspended solids

Prior to discharging water back into the environment.

As dosing quantities will vary depending on flow rate and water qualities, refer to user manual for dosing quantities.

Dosing procedures will vary slightly between the stages of treatment. The three stages that require chemical intervention are Ferric Sulphate, Lime, and Polymer.

4.5.1 FERRIC SULPHATE – LIQUID

PPE Required: long chemical resistant gloves, apron, face shield, standard PPE

- Prepare a barrel for dosing by placing the barrel into the duck pond by the ferric sulphate dosing area and removing the top seal.
- Put 2 dosing pumps into 1 barrel (1 per train)
- Switch on dosing pump on the control panel
- On the pump, check frequency and stroke length to ensure dosage is as expected.
- To change barrels, switch off on the dosing pump and change barrel

4.5.2 LIME – BAGS

PPE Required: long chemical resistant gloves, respirator, face shield, respirator, standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add lime to water

4.5.3 POLYMER – BAGS

PPE Required: standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add polymer to water

4.6 SYSTEM AUTOMATION

For instruction on System Automation, please refer to the Operations and Maintenance Manual.

4.7 TROUBLE SHOOTING

For issue identification, please refer to the checklists in the Operations and Maintenance Manual.

4.8 ACCIDENT RESPONSE

As the WTP involves the handling of a number of chemicals that may be harmful, precautions must be taken to ensure all personnel who are in the work area are informed of the hazards and the preventative and treatment measures.

4.8.1 RESPONSE EQUIPMENT AVAILABLE

The WTP is equipped with a stationary emergency shower, 2 portable emergency shower stations and eyewash stations (dual purpose), 2 fire extinguishers, and 1 stationary eyewash station.

Additionally, the WTP is equipped with spare PPE, face shields, respirators, chemical resistant gloves, hearing protection, and spill kits.

There are also patch kits for the onion tanks, hose and fitting replacements, tools, and a base station radio available at the WTP.

In the event that an incident occurs that requires emergency response, same basic steps should be immediately undertaken. The following lists some of the possible situations and a brief of the response steps.

4.8.2 SPILLS ON THE GROUND

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.8.3 SPILLS ON PERSON

- Proceed to stationary emergency shower
- Notify secondary operator
- Secondary operator activates pump switch
- Pull handle and rinse for 10 mins
- If unable to proceed to stationary emergency shower, refer to “emergency response procedure”

4.8.4 LIME IN EYES

- If possible, proceed immediately to emergency eyewash station
- Activate emergency eyewash and rinse for 10 mins.
- Repeat if required
- Notify secondary operator
- If unable to proceed to emergency eyewash station, refer to “emergency response procedure”

4.8.5 LIME SPILL

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.9 APPENDICIES

Appendix A – Operations and Maintenance Manual for Mary River Mine Waste Rock Pile Water Treatment Plant

APPENDIX A – OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE WASTE ROCK PILE WATER TREATMENT PLANT
20180817_v02

OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE WASTE ROCK PILE WATER TREATMENT PLANT 20180817_v02

Baffinland Iron Mines Corporation

Prepared by:

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Project No. 137-0001

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Page

1.0 INTRODUCTION

This documents outlines the Operations Manual for Baffinland Iron Mine Corporation's (BIM) Mary River Mine Waste Rock Pile water treatment plant (WTP).

2.0 PLANT OVERVIEW

2.1 General Process Description

The WTP employs a process of coagulation, pH adjustment, flocculation, and filtration to treat acid rock surface runoff collected in the pond at the base of the waste rock pile. The objective of the system operation is to treat water to within the parameters outlined in the Metal Mining Effluent Regulations (MMER), as specified to McCue by BIM, and summarized in Table 1.

Table 1: MMER Effluent Limits

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentrations in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic	mg/L	0.5	0.75	1.00
Copper	mg/L	0.3	0.45	0.60
Cyanide	NTU	1.00	1.50	2.00
Lead	mg/L	0.20	0.30	0.40
Nickel	mg/L	0.50	0.75	1.00
Zinc	mg/L	0.50	0.75	1.00
Total Suspended Solids	mg/L	15.00	22.50	30.00
Radium 226	Bq/L	0.37	0.74	1.11
pH	SU	6-9.5	6-9.5	6-9.5

The treatment steps are described in Section 2.2. Refer to drawings in Appendix A:

2.2 Brief Process Overview

2.2.1 *System Inlet*

Water is collected at an inlet storage pond (P-001) where it is held for treatment. Two diesel powered centrifugal trash pumps (PU-100A/B) are used to transfer water from the storage pond to an equipment enclosure where the WTP is housed.

At the WTP, the flow can be divided into two separate treatment trains (1 and 2), with each train having a flow meter on the inlet line to monitor flow.

Water is directed into two reactor tanks (TA-110 and TA-210) for processing.

2.2.2 *Step 1 – Iron Precipitation*

Ferric sulphate solution is injected into TA-110 and TA-210 to promote coagulation and precipitation of some heavy metals.

As of system commissioning in June 2018, ferric sulphate liquid solution (12% Fe) is used and injected directly into the process. Each process train utilizes an independent chemical pump to introduce chemical into the system.

The WTS also includes a ferric sulphate make down system, including a holding tank and mixer to allow for makeup of solution using dry ferric sulphate.

Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.3 *Step 2 – Hydroxide Precipitation and pH Adjustment*

Water flows by gravity from TA-110 and TA-210 to TA-120 and TA-220 respectively. Here, hydrated lime is injected into the process to increase pH and aid in further precipitation of some metals through hydroxide precipitation.

Hydrated lime solution is made manually by adding dry hydrated lime and raw influent water to a mixing tank (TA-020). A mixer is run continuously to ensure the hydrated lime slurry does not solidify.

One hydrated lime chemical pump is utilized to dose each reactor tank with chemical. Two motorized valves (MV-120 and MV-220) are used to control the flow of lime to each reactor tank. Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.4 *Step 3 – Flocculation*

Water flows by gravity from TA-120 and TA-220 to TA-130 and TA-230 respectively. Here, polymer is injected into the process to aid in flocculation of suspended solids prior to filtration.
Polymer solution is made manually by adding dry polymer and raw influent water to a mixing tank (TA-030). A mixer is run continuously to ensure uniformity of the polymer solution.

Two polymer chemical pumps are utilized to provide polymer dosing to each train. Polymer can be dosed directly into each reactor tank, or inline through a static mixer located directly downstream of the reactor tank.

2.2.5 *Step 4 – Filtration*

Water from TA-130 and TA-230 is pumped to a geotube pond via two diesel powered centrifugal trash pumps (PU-200A/B).

Water is directed to a manifold where it can be distributed to two geotube bags for solids filtration. Two additional geotube bags can be deployed in the pond once the currently operating geotube bags have reached capacity. These spare geotubes are currently stored in a warehouse for future use.

Filtered water leaves the geotube bags and is directed to a collection point at the North West corner of the pond. From here, water is pumped via one diesel trash pump (PU-300) to the Mary River discharge point, or recycled back to the inlet pond. A flow meter is installed on the discharge line to Mary River to allow for data logging of flow.

2.3 Major Equipment List

The WTP layout is provided in appendix A. A list of major equipment is provided in Table 2.

Table 2: Major WTP Equipment

Equipment	Description	Qty	Drawing Reference (If Available)
Pond Transfer Pump	Model: Prime Aire PA4A60-404ST Power: Diesel Driven Capacity: 140m3/hr	2	PU-100 A / PU-100 B
Inlet Flow Meter	Model: GF Signet 3-2551-P1-42	2	FT-100 / FT-200
Ferric Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-110 / TA-210
Lime Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-120 / TA-220
Polymer Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-130 / TA-230
Aeration Blowers	Gast R7100A-3 Blower • 208 V / 3 HP / 60 Hz	2	BL-100A / BL-100B
pH Controller and Sensors	Model: Walchem W900 (Controller) Model: Walchem WEL-PHF-NN (Sensors)	1	pH-110/120/210/220
Motorized Ball Valve	Hayward 1” Ball Valve Model: HRSN2	2	MV-120 and MV-220
Level Transmitter	Model: Echosonic 11 LU27	2	LT-130 / LT-230
Bag Filter	Model: FTI830-2P-150-CS-BS-P13-DP Bag Size: 5 Micron	1	FIL-100
Ferric Chemical Pump	Model: Walchem EHE31E1-VC Power: 115 VAC/1hp/60Hz Capacity: 1 LPM @ 105m TDH	2	PU-010A / PU-010B
Lime Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 9.5 LPM @ 105 m TDH	1	PU-020
Polymer Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 16.5 LPM @ 105 m TDH	2	PU-030A / PU-030B
Ferric Mixing Tank	Material: Polyurethane Size: Ø 1.2m x 1.3m Height	1	TA-010
Lime Mixing Tank	Material: Polyurethane Size: Ø 1.8m x 1.7m Height	1	TA-020
Polymer Mixing Tank	Material: Polyurethane Size: Ø 1.6m x 1.6m Height	1	TA-030
Coarse Bubble Diffusers	Model: Maxair 24” SS	24	-

2.4 System Automation

The system is automated through a main control panel located in the system enclosure. The system P&ID is provided in Appendix A. Operation is outlined in Table 3.

Table 3: Control Panel Automation

Equipment ID	Equipment Description	Control Logic	PID Control Reference	Controls	Panel Indication
PU – 100 A/B	Inlet Pond Pump	Units can be controlled in Hand or in Auto. Pump will turn on in Hand in Auto or in Hand.	-	-	Pump icon will indicate run status
		Pump will turn off if high level is measured in TA-110 or TA-210	LSH-110 / LSH-210	Auto	High level alarm at panel
		Pump will turn off if high level measured in TA-130 or TA-230	LIT-130 / LIT-230	Auto - High level settable at panel	High level alarm at panel
BL-100 A/B	Blower	Units can be controlled in Hand or in Auto Blower will turn on in Auto or in Hand	-	-	Blower icon will indicate run status
		BL-100 A will turn off if low level is measured by LIT-130	LIT-130	Auto – Low level settable at panel	Low level alarm
		BL-100 B will turn off if low level is measured by LIT-230	LIT-230	Auto – Low level settable at panel	Low level alarm
pH-110	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC
pH-210	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC

pH-210	pH Sensor	If pH>9.5, close MV-120 - Alarm	MV-120	Auto – pH set point settable at panel	Display pH on PLC
pH-220	pH Dosage	If pH>9, close MV-220 - Alarm	MV-220	Auto – pH set point settable at panel	Display pH on PLC
PU-010A	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-100 measures flow, PU-010A energizes.	FIT-100	Auto	Display run status on PLC
PU-010B	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-200 measures flow, PU-010B energizes.	FIT-100	Auto	Display run status on PLC
PU-020	Lime Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Speed Control (1 train only) If pH-120> 8.5, PU-020 will reduce speed. If pH < 8, pump will increase pump speed. If pH is between 8 to 8.5, pump will maintain pump speed.	pH-110 / pH-120	Auto – pH set point adjustable at panel	Display run status on PLC
		Speed Control Disabled If flow is detected by both trains, speed control is disabled.	FIT-100 / FIT-200	Auto	Display run status on PLC
PU-030 A	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status

		Polymer pump energizes if PU-200 A is on	PU-200A	-	Display run status on PLC
PU-030 B	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Polymer pump energizes if PU-200 B is on	PU-200B	-	Display run status on PLC
PU-200 A	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-130 measures < 3', PU-200A off. If LT-130 measures >3', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-130 measures >4.5', PU-200A off. If LT-130<4.5', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-200 B	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-230 measures < 3', PU-200B off. If LT-230 measures >3', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-230 measures >4.5', PU-200B off. If LT-230<4.5', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-300	Discharge Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Pump off at LSL-200	LSL-200	-	Level indicator on panel

		Pump on at LSH-200	LSH-200	-	Level indicator on panel
		High Level Alarm at LSHH-200	LSHH-200	-	High Level Alarm
MX-010 /020/030	Mixer	Units can be controlled on/off manually	-	-	-

3.0 GENERAL STARTUP PROCEDURE

3.1 After Dormancy Pre-start-up Procedures

The following steps shall be taken after extended periods of dormancy, prior to general startup of the WTP.

Task	Check
Perform a visual inspection of the system enclosure for signs of water/snow ingress.	☐
Inspect hose and pipe for signs of leaks, abrasion, or other physical damage.	☐
Inspect Reactor tanks as follows: • Signs of leaks, abrasion, or other physical damage. • Tank connections for signs of strain or stress. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Blowers as follows: • Signs of abrasion, or other physical damage on all external accessories such as relief valves, gauges and filters. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Diesel Pumps as follows: • Signs of leaks, abrasion, or other physical damage. • Check for and tighten loose attaching hardware. • Make sure that valves at the inlet and outlet are opened. • Check oil levels and lubricate as necessary.	☐
Inspect Ferric Sulphate pump as follows • Signs of leaks, abrasion, or other physical damage. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Hydrated Lime pumps as follows • Signs of leaks, abrasion, or other physical damage. • Inspect condition of internal pump hose. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Polymer pump as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect condition of internal pump hose. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Level Transmitter as follows: • Monitor debris and ensure the sensor is level and mounted perpendicular to water level. • Check and roughly compare measurement on the PLC with the real on the field.	☐
Inspect pH sensors as follows: • Monitor debris and deposition of scaling on the transmitter. Perform a cleaning of the sensors as necessary.	☐

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Insect Bag Filter vessel as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect filter bag and replace as necessary	☐
Inspect Inlet Flow Meter as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect flow sensor for scaling. Clean as necessary.	☐
Inspect Geotube Bag as follows: • Ensure inlet connection points are securely attached. • Ensure height of bag does not exceed recommended limits. If so, decommission geotube bag. • Clean geotube surface of sediment and scaling to prevent fouling using a push broom, or gentle pressure washing.	☐

3.2 Commissioning

After pre-start-up procedures are completed, the system can be energized. The following procedure reflects a high level overview of equipment checks to be performed. Detailed instructions can be found in the product specific manuals. Before any mechanical intervention, disconnect the electrical supply.

3.2.1 *Hydrated Lime Pump / Polymer Pump*

Task	Check
Ensure that all protections (cover, cover window, ventilator hood, coupling protection) are in place before operating the pump.	☐
Check the direction of rotation of the pump.	☐
Make sure that valves at the inlet and outlet are opened.	☐
Start the pump by checking its direction of rotation through the cover window.	☐
Check the flow and discharge pressure and adjust rollers if these figures don't match the pump specifications.	☐

IMPORTANT: Ensure lime pump valves remains open during operation. Should valves be left in the closed position, the process line can over pressurize, leading to a rupture of the chemical hose.

3.2.2 *Blowers*

Task	Check
Ensure impeller rotation is correct.	☐
Check filters and inspect for signs of fouling. Replace if necessary.	☐

-

Ambient temperature – Check room and discharge air temperatures. Exhaust air should not exceed 135ºC.	☐
Working pressure and vacuum values – Adjust relief valve pressure or vacuum setting, if needed.	☐
Motor current – Check that the supply current matches recommended current rating on product nameplate.	☐
Electrical overload cutout – Check that the current matches the rating on product nameplate.	☐

3.2.3 *Ferric Pump*

Task	Check
Ensure pump is energized.	☐
Make sure that valves at the inlet and outlet are opened.	☐
Start the pump manually, in order to prime and adjust dosing rates.	☐
Prime the pump. See manual for details.	☐
Adjust dosing according to inlet water flow rate. See below.	☐
Check dosing rate with calibration cylinder.	☐

3.2.4 *Motorized Valve*

Task	Check
Ensure valve is energized.	☐
Ensure valve opens/closes reliably in manual mode:	☐

3.2.5 *Diesel Pumps*

Task	Check
Check fuel level and oil levels in the engine, air compressor, pump bearings and seal housing.	☐
Consult engine operations manual before attempting to start the unit.	☐
Allow pump to prime.	☐
Adjust engine speed to desired output.	☐

3.2.6 *pH Sensors*

Task	Check
Ensure sensor is calibrated.	☐
Ensure the pH reading displayed locally at the Walchem panel is transmitted correctly to PLC.	☐

3.2.7 *Geotube*

Task	Check
Ensure surface is clean of sediment and debris.	☐
Ensure all inlet valve are open.	☐
Ensure height of geotube does not exceed manufacturer recommended limit.	☐

4.0 OPERATION

4.1 General Operating Instructions

Operation of the WTP will consist of ensuring major equipment (blowers, dosing pumps, motorized valves, level transmitters) is running correctly, and ensuring influent/effluent monitoring and sampling are conducted on schedule.

The drivers for pH adjustment and TSS treatment are operation of the Ferric Sulfate, Hydrated Lime and Polymer Pump, along with the proper performance of the aeration blowers and diffusers equipment.

The unit will run manually. During short term dormancy, the unit can be operated in a “Sleep Mode” where the system is run in a re-cycle status using two submersible pumps inside TA-130 and TA-230 to recirculate water from the end of each train to the beginning of each train. Chemical injection is disabled during dormancy, however, the lime mixer should remain on to maintain suspension of the hydrated lime slurry. Blowers will also remain on to ensure suspension of solids within the reactor tanks.

Parameters to be measured and recorded daily include temperature, pH (typical values are between 6.5 and 9), and TSS. The system must be monitored regularly to ensure pH does not drop below the low level set point or raise above the level set point.

The pH reading should be recorded daily. The pH should be cross referenced regularly with a hand held device. Should the pH differ from the hand held reading, the operator should clean the pH electrodes using a 2-5% solution of hydrochloric acid.

System data can be recorded in the spreadsheet provided in Appendix B. Regular daily monitoring of parameters such as pH, temperature, TSS, and Geotube height must be recorded to ensure proper operation.

4.2 Operating Procedure

The following section will outline the step-by-step procedures for operating the treatment system.

4.2.1 *Standard Operation*

Inlet

The inlet pond level should be checked and recorded prior to start up. Two pond pumps can be utilized to transfer raw water to the treatment system. Usage will depend on the volume of treatment required. At low pond levels, one pond pump and one process train can be utilized. At high levels, both pumps can be utilized to increase the treatment volume.

All pump discharge valves must be opened. The pumps (PU-100 A/B) shall be placed in “Hand” at the PLC. This will energize the pumps and begin transfer of water to the treatment system. The pumps will only turn on if a high level is measured by LSH-110/210 or LT-130/230.

Operators must ensure the inlet pond level is monitored, as the pumps do not include a low level shut off.

Ferric Pumps (PU-010 A/B)

Water is transferred from the inlet pond to two reactor tanks (TA-110 and TA-210) where ferric sulphate is injected. The dosage rate of the ferric pumps is determined by the inlet quality of the raw water and can range from 0 to 20 mg/l. The dosage rate is to be determined by the operator.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The ferric pumps, PU-010 A and PU-010 B, will energize when flow is detected by FIT-100 and FIT-200 respectively.

Before starting the pumps, all discharge valves must be opened.

Lime Pump (PU-020)

After coagulant addition, water flows by gravity to TA-120 and TA-220 where hydrated lime is injected into the process. The dosage rate of the Lime pump is determined by the inlet quality of raw water and the pH required, and can range from 0 to 300 mg/l. The dosage rate is to be determined by the operator.

In manual mode, the speed of the pump can be set at the pump VFD, located on the lime pump stand.

Pump speed will be dependent on the pH measured by pH-120, and the pH set point entered into the panel (adjustable by an operator). At a setpoint of 8.5, the pump will increase speed if pH-120 measures a pH below 8. If pH-120 measures a pH above 9, pump speed will decrease. If pH is measured between 8 to 8.5, the dosage rate will remain the same.

-

At a pH above 9.5, MV-120 and MV-220 will close.

The lime pump will operate continuously, with chemical consistently recirculated to the lime mixing tank (TA-020). This is done to ensure the lime slurry does not settle and solidify in the piping system. At the end of every shift, clean water must be flushed through the piping in order to prevent fouling. Flushing may be required more frequently depending on operational conditions.

Due to the possibility of fouling, the lime pump system must be monitored for pressure consistently.

Lime Solution Make Up

Hydrated lime solution is made manually, with the solution concentration ranging from 5-10% depending on volume of raw water to be treated. A concentration of 5% is recommended to minimize line fouling caused by the lime slurry. Higher concentrations can be made, but more frequent line flushing will be required.

The lime tank mixer is operated from the panel, and should be operated continuously to prevent the slurry from solidifying.

Polymer Pumps (PU-030 A/B)

The dosage rate of the ferric pumps is determined by the inlet quality and can range from 0 to 3 mg/l.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The polymer pumps, PU-020 A and PU-020 B, will energize when the transfer pumps, PU-200 A and PU-200 B are energized.

Before starting the pumps, all discharge valves must be opened.

Polymer Solution Make Up

Polymer solution is made manually, with concentration ranging from 0.1 to 0.25% depending on volume to be treated.

The polymer tank mixer is operated from the panel, and should be kept on at all times to maintain uniformity of the solution.

Blowers

The blowers are operated from the panel, and should be energized at all times when raw water is being processed in the reactor tanks.

Both blowers (BL-100A and BL-100B) can be set in “Auto” at the panel, at which point they will run continuously until the water level in TA-130 and TA-230 is measured to be less than 6”. This level is settable at the panel.

Raw Water Bag Filter

The bag filter provides filtration of water required for chemical makeup. The filter bags should be replaced periodically when differential pressure across the filter exceeds approximately 20 psi.

Geotube Bags

Water is transferred from the final reactor tanks (TA-130 and TA-230) by diesel generated trash pumps (PU-200 A and PU-200 B) to the geotube pond. The transfer pumps, PU-200A and PU-200B are operated based on the level measured by the reactor tank level transmitters, LT-130 and LT-230 respectively. These set points are adjustable at the panel.

The height of the geotube bags must be monitored regularly.

4.3 Daily Operator Checklist

The following steps outline day-to-day operational procedures for the WTS.

Standard Operation

Task	Check
Check inlet pond and record water level	☐
Check lime and polymer solutions, make up additional solution as required.	☐
Place PU-100 A (and PU-100 B if necessary) in Hand mode at the control panel.	☐
Set Ferric Sulphate pump (PU-010 A / B) dose rate and place pump in Auto at control panel. Ensure pump energizes when flow is detected by FIT-100 or FIT-200.	☐
Turn on hydrated lime pump (PU-020 A) manually. Adjust dose rate based on flow measured by inlet flow meters.	☐
Monitor hydrated lime pump pressure gauge. If pressure gauge is showing a pressure greater than 15 psi, flush line with water.	☐
Set polymer pump dose rate at panel. Set in “remote” mode. Set pump to auto at panel. Pump will turn on when PU-200A/B energize.	☐
Set Blowers (BL-100 A / BL-100B) to Hand.	☐
Once onion tanks are full, set PU-200A/B to Auto (if using both trains). Ensure downstream valves to geotube bags are open.	☐

Observe reactor tank water levels to ensure inlet and outlet flows are balanced.	☐
Observe and record height of geotube bags. Height must not exceed 6 feet.	☐
Set PU-300 to auto in the panel. Once the water in the pond reaches the operating float switch, the pump will be energized.	☐
Discharge vales must be set manually to allow for discharge to the creek, or recycle back to the inlet pond. Set valves in correct position.	☐

Daily Shutdown

Task	**Check**
Set inlet pump to Off position	
Allow reactor tanks to be pumped down to ¼ volume.	☐
Turn off chemical pumps.	☐
Flush lime line with water	☐
Keep lime mixer (Mix-020) on to ensure hydrated lime slurry remains in liquid form.	☐
If tanks are lowered, blowers can be turned off. If tanks are kept full, energize recirculation pumps.	☐
Check lime and polymer solutions, make up additional solution if required.	☐
Turn transfer pumps (PU-200 A/B) and discharge diesel pump (PU-300) off.	☐

APPENDIX A –DRAWINGS

NOTES:

PU-200A/B- Transfer Pump
PU-300- Discharge Pump
FT-300- Flow Meter
LS- Level Switch
-LSHH 200
-LSH 200
-LSL 200

Process lines
Instrumentation lines

Process based on conceptual desgin by Golder Associates

REVISION TABLE

No.	DESCRIPTION	DATE
0	Original Issue	2018/04/30
1	Record Drawing	2018/07/31

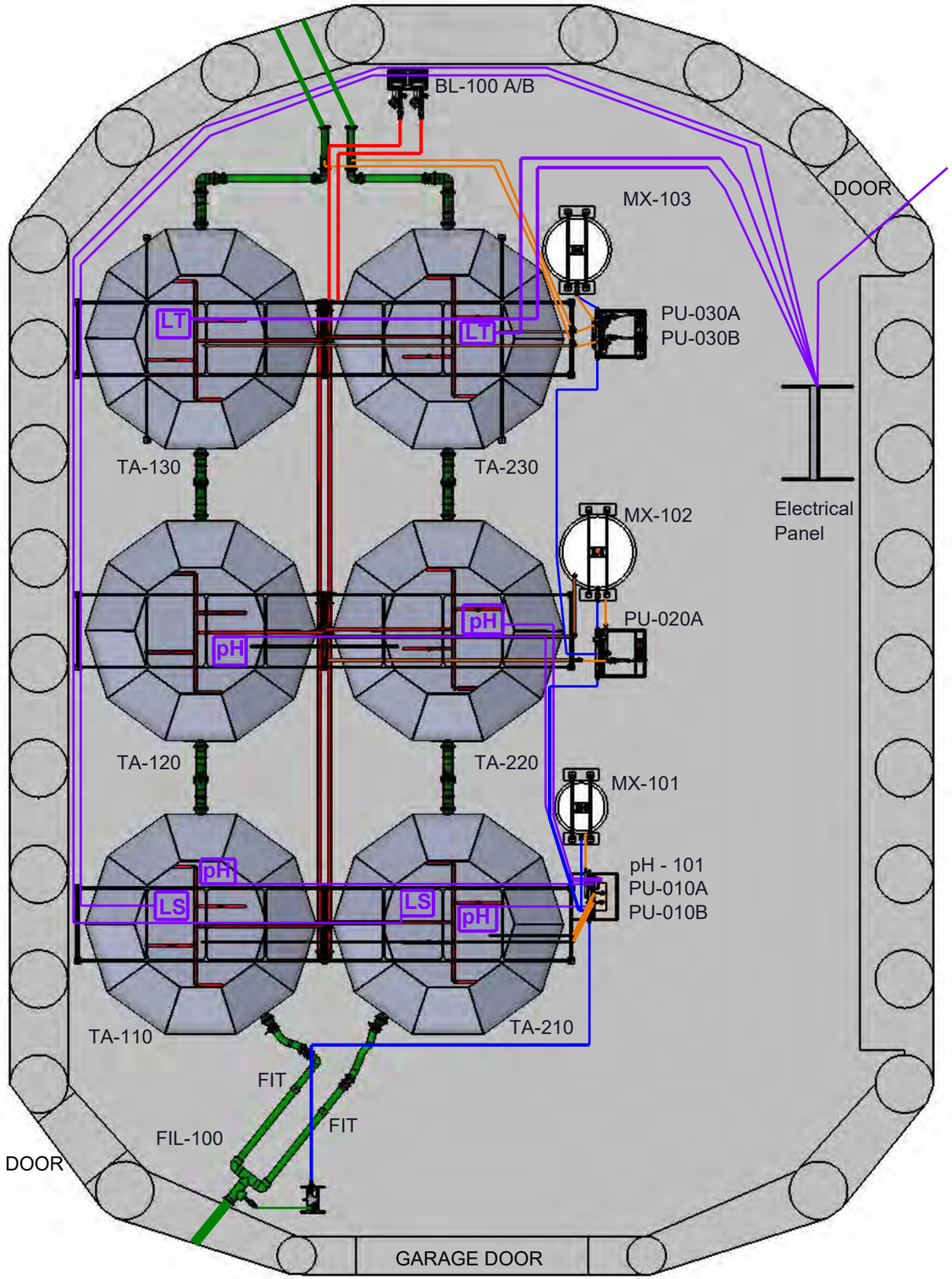
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

FULL SITE LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-001



LEGEND

BL-100 A/B - Blower
FIL-100 - Bag Filter
MX-101 - Ferric Mixing Station
MX-102 - Lime Mixing Station
MX-103 - Polymer Mixing Station
PU-010 A/B - Ferric Pump
PU-020 - Lime Pump
PU-030 A/B - Polymer Pump
TA-110 - Ferric Process Tank (Train 1)
TA-210 - Ferric Process Tank (Train 2)
TA-120 - Lime Process Tank (Train 1)
TA-220 - Lime Process Tank (Train 2)
TA-130 - Polymer Process Tank (Train 1)
TA-230 - Polymer Process Tank (Train 2)
pH-101 - pH Controller
FIT - Flow Meter
pH - pH Sensor
LS - Level Switch
LT - Level Transmiter

Notes:

- Process Lines
- Water Make-up Lines
- Chemical Lines
- Air Lines
- Instrumentation Line

Process based on conceptual design by Golder Associates

REVISION TABLE		
No.	DESCRIPTION	DATE
0	Original Issue	2018/05/01
1	Record Drawing	2018/08/17

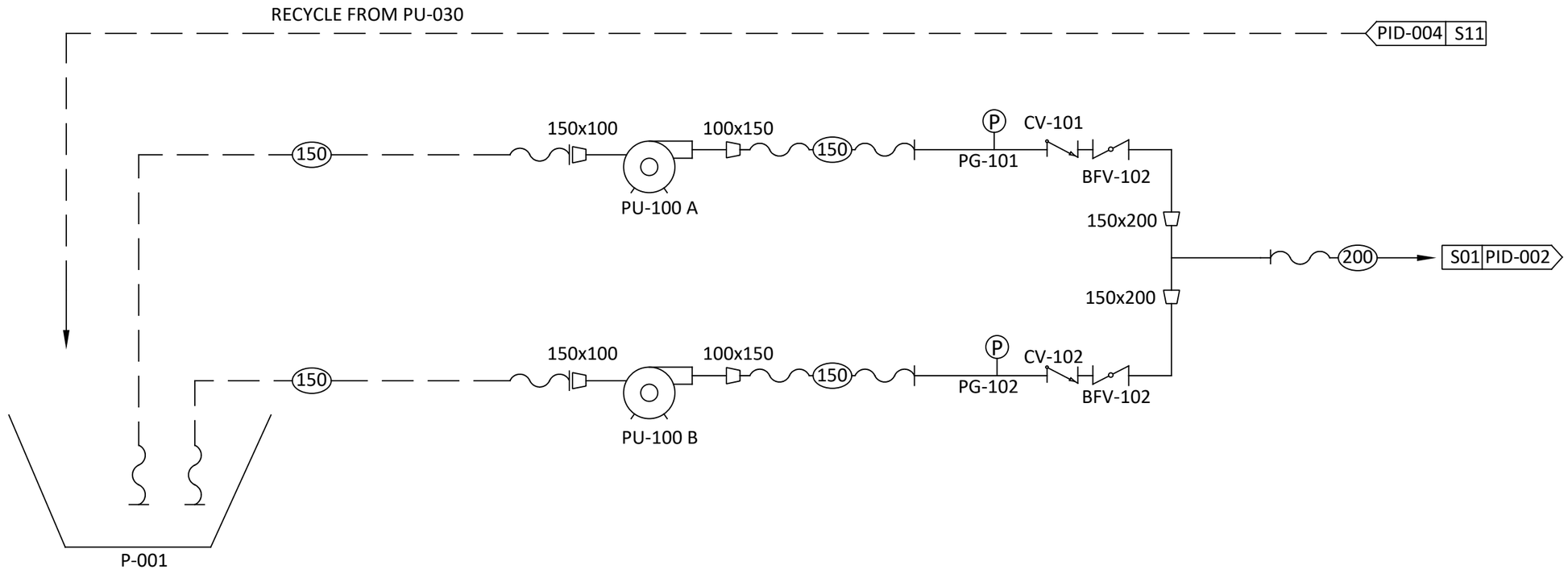
McCUE ENGINEERING CONTRATORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

BUILDING LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant

DATE: August 17, 2018	SCALE: AS SHOWN
DATA BY: R.B	JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-002



P-001
Inlet Storage Pond

PU-100 A/B
Pond Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

LEGEND :

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

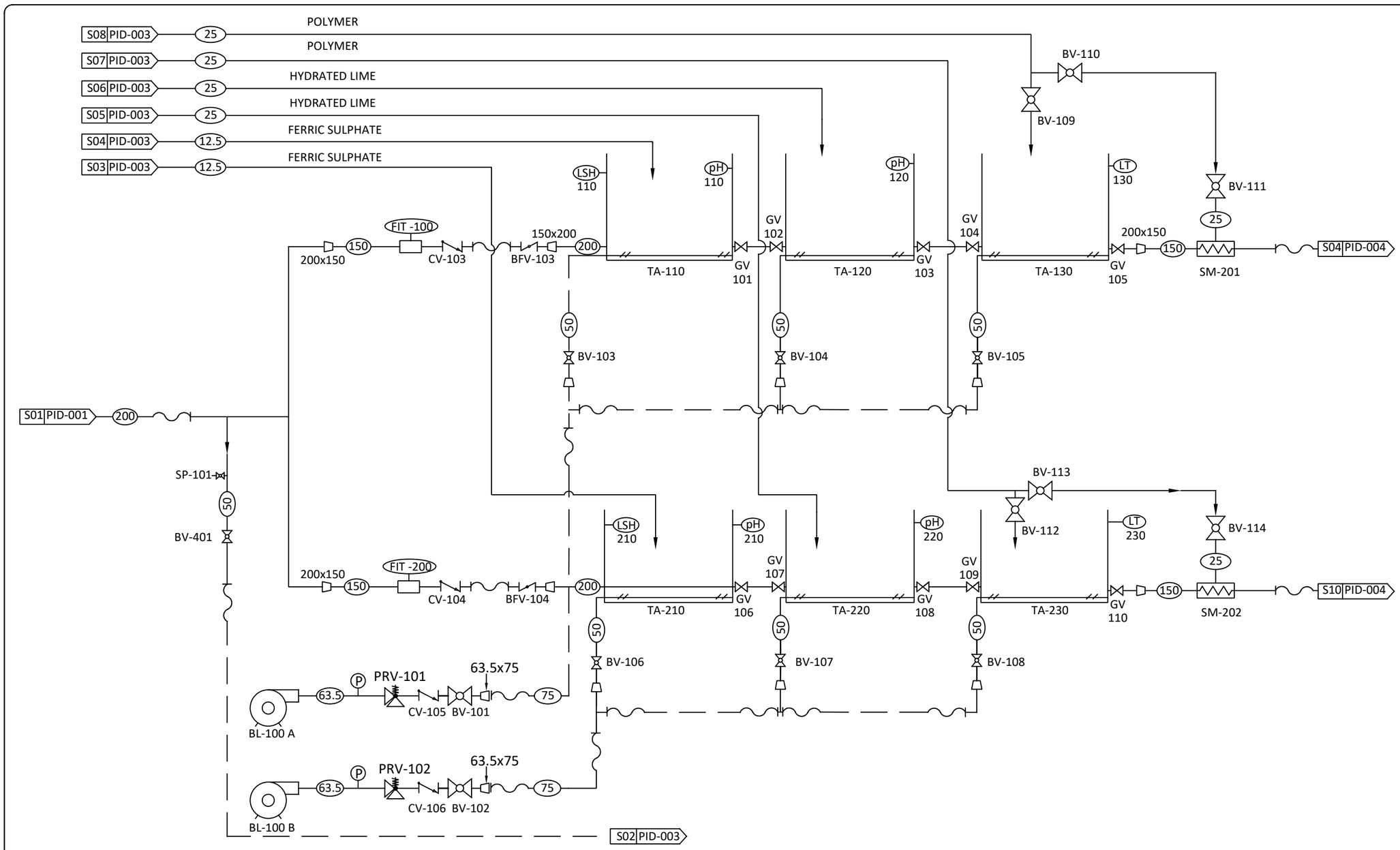
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

Waste Rock Water Storage Pond
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0001



BL-100 A/B
Blower
Model: Gast R7100A-3
Power: 208V/3hp/60Hz
Capacity: 500m³/hr @ 1.9m TDH

TA-110/210
Ferric Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-120/220
Lime Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-130/230
Polymer Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

FT-100/200
Influent Flow Meter
Model: GF Signet 3-2551-P1-41

LT-130/230
Level Transmitter
Model: Echosonic 11 LU27

pH-110/120/210/220
pH Meter
Model: Walchem WEL-PHF-NN

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge
- Static Mixer
- Gate Valve
- Pressure Relief Valve
- Ball Valve
- Sample Port
- Flow Meter
- Level Switch
- pH Sensor
- Level Transmitter

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

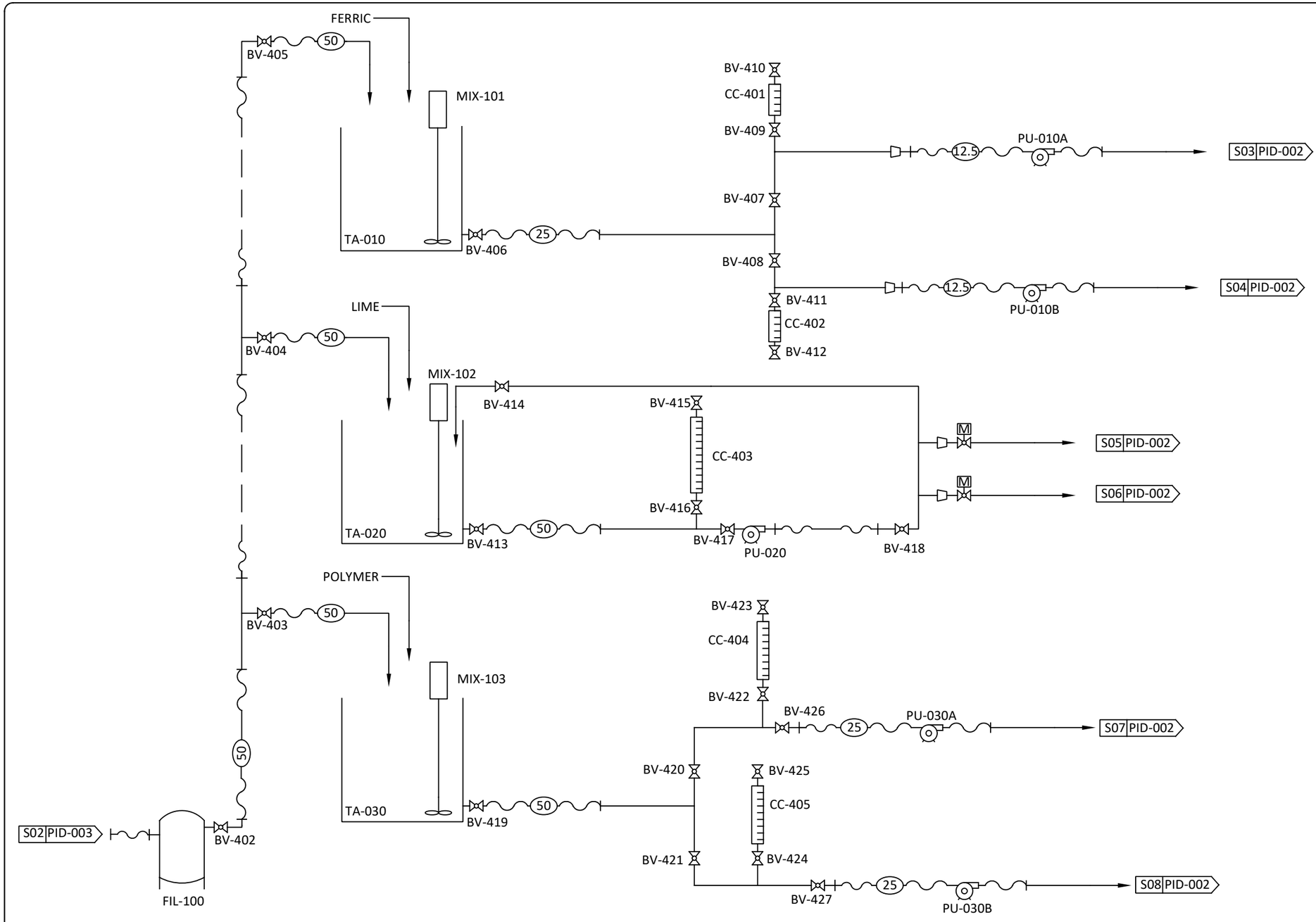
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

REACTION TANKS
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0002



FIL-100
Bag Filter
Model: FTI 830-2P-150-CS-BS-P13-DP
Bag Size: 5 Micron

PU-010A/B
Ferric Chemical Pump
Model: Welchmen EHE31E1-VC
Power: 115 VAC/1hp/60Hz
Capacity: 21 LPM @ 106m TDH

PU-020
Lime Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 570 LPM @ 42m TDH

PU-030
Polymer Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 990 LPM @ 42m TDH

MIX-101
Ferric Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 41" Long

MIX-102
Lime Mixer
Model: Dynamix DMX-5505K-2
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 52" Long

MIX-103
Polymer Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 49" Long

TA-010
Ferric Mixing Tank
Material: Polyurethane
Size: Ø 1.2m x 1.3m Height

TA-020
Lime Mixing Tank
Material: Polyurethane
Size: Ø 1.8m x 1.7m Height

TA-030
Polymer Mixing Tank
Material: Polyurethane
Size: Ø 1.6m x 1.6m Height

CC-401/402/403/404/405
Calibration Column

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Ball Valve
- Reducer
- Motorized Ball Valve

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

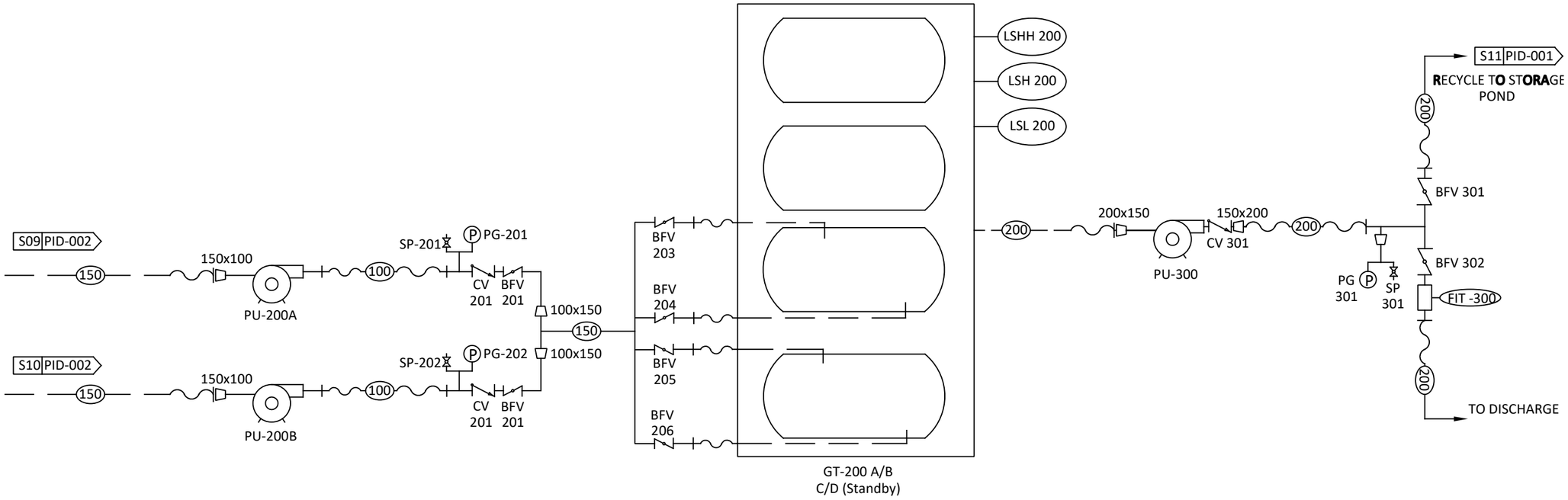
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

CHEMICAL MAKEUP
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-003



LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- (P) Pressure Gauge
- SP Sample Port
- (LS) Level Switch

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

GEOTUBE FIELD PROCESS & INSTRUMENTATION DIAGRAM

Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-004

PU-200A/B
Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

GT-200 A/B/C/D
Geotube
Model: Tencare GT500
Dimensions: 60' Circumference x 100' Long

PU-300
Discharge Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 280m³/hr

FT-300
Flow Meter
Model: Toshiba GFG32

APPENDIX B - MONITORING

McCUE ENGINEERING CONTRACTORS EST. 2000

BROWNFIELDS TO GOLD MINES

Monitoring Spreadsheet

Project Name: BaffinLand Iron Mine
Waste Pile Water Treatment

			Inlet Quality			Train 1						Train 2						Discharge							
Date	Time	OP	Temp ºC	Inlet pH	Inlet TSS mg/L	FIT-100 (L/s)	pH-110	pH-120	Ferric Dosage Stroke/Speed	Lime Dosage Hz	Polymer Dosage Hz	FIT-200 (L/s)	pH-210	pH-220	Ferric Dosage Stroke/Speed	Lime Dosage Hz	Polymer Dosage Hz	FIT-300 (gpm)	FIT-300 Totalizer (gpm)	Geotube Pond pH	Geobag 1 Height (m)	Geobag 2 Height (m)	Discharge pH	Discharge Turbidity NTU	Discharge TSS (mg/L)

Observations

Chemical Availability	Week #1 Date:	Week #2 Date:	Week #3 Date:	Week #4 Date:
Ferric Sulphate				
Hydrated Lime				
Polymer				

APPENDIX C

MMER SAMPLING AND REPORTING REQUIREMENTS MEMORANDUM

Memorandum

Date: May 20, 2015

To: Jim Millard (Baffinland Iron Mines Corp.)

c.c.: Oliver Curran (Baffinland Iron Mines Corp.), Cynthia Russel and Pierre Stecko (Minnow Environmental Inc.).

From: Paul LePage (Minnow Environmental Inc.)

RE: Overview of MMER Sampling and Reporting

The Mary River Project is expected to become subject to the Metal Mining Effluent Regulations (MMER) under Canada's *Fisheries Act* in June 2015 upon the release of a cumulative amount of greater than 50 cubic meters (m^3) of effluent per day to the receiving environment. As a result, under the MMER, Baffinland Iron Mines Corporation (Baffinland) will be required to initiate Effluent and Water Quality Monitoring studies.

Minnow Environmental Inc. (Minnow) has prepared this memorandum to provide an overview of the information that must be submitted to Environment Canada once the Mary River Project becomes subject to the MMER. This memorandum has been organized according to the timeline for which the ensuing monitoring information is initially due to Environment Canada to meet Baffinland's MMER obligations.

Information Required Within 60 Days of Initiation of Effluent Discharge

Information that must be submitted to Environment Canada within 60 days following the release of effluent above the trigger level (i.e., 50 m^3/day) includes the following:

- Name and address of the mine owner and operator;
- Name and address of the mine parent company;
- Final discharge point(s) plans, specifications, and general description;
- Final discharge point(s) coordinates, reported in latitude and longitude degrees, minutes and seconds; and,
- Name of water body receiving final effluent discharge(s).

For the Mary River Project, the final discharge points may initially include MS-09 (East Pond) and MS-06 (Ore Stockpile Runoff) locations. The MS-09 pond will collect runoff

from the Early Revenue Phase (ERP) waste rock stockpile, whereas the MS-06 pond will collect surface runoff from mine site infrastructure and treated sewage water. Notably, effluent from sewage treatment facilities is not required to be monitored/reported under the MMER, but there may be requirements for monitoring to meet Baffinland's territorial (permitting) obligations. It is also noteworthy that records regarding effluent flow monitoring equipment (e.g., model numbers and year, manufacturer specifications for key equipment/components) and a calibration log must be maintained by the mine, but this information is not required to be routinely reported to Environment Canada.

The information indicated above must be submitted to the Environment Canada MMER Authorization Officer assigned to the Mary River Project, as follows:

Ms. Susanne Forbrich, Regional Director
Environmental Protection Operations Directorate
Prairie and Northern Region
Eastgate Offices
9250 – 49th Street
Edmonton, AB T6B 1K5
Susanne.forbrich@ec.gc.ca
(780) 951 - 8866

Sampling Required Following Initiation of Effluent Discharge

Effluent and water quality monitoring must be initiated upon the mine becoming subject to the MMER, and consists of:

- effluent deleterious substances monitoring;
- effluent acute toxicity testing;
- effluent volume monitoring;
- effluent characterization;
- effluent sublethal toxicity testing; and,
- receiving environment water quality.

Effluent deleterious substance (and pH) monitoring must be conducted weekly, at least 24 hours apart, at the final effluent discharge point during periods of effluent discharge. Analytical parameters measured for deleterious substance monitoring, required laboratory detection limits, and monthly mean limits are provided in Table 1. Baffinland will not be required to monitor effluent cyanide concentrations, as long as this substance is not used as a process reagent within the operations area. In addition, the monitoring frequency for radium-226 may be reduced in the event that concentrations are below 0.037 Bq/L for 10 consecutive sampling events.

Table 1: Effluent monitoring frequency and parameters associated with deleterious substances, acute toxicity and characterization monitoring components under the MMER.

Monitoring Component	Monitoring Frequency	Substance	Method Detection Limit[a]	Mean Monthly Limit
Deleterious Substances	weekly	Arsenic	0.010 mg/L	0.50 mg/L
		Copper	0.010 mg/L	0.30 mg/L
		Lead	0.010 mg/L	0.20 mg/L
		Nickel	0.010 mg/L	0.50 mg/L
		Zinc	0.010 mg/L	0.50 mg/L
		Total Suspended Solids	2.0 mg/L	15.0 mg/L
		Radium-226[b]	0.01 Bq/L	0.37 Bq/L
		pH	-	-
Acute Toxicity	Monthly	Rainbow Trout – Pass/Fail	-	-
		Daphnia magna – Pass-Fail	-	-
Effluent Characterization	four-times per year	Aluminum	0.05 mg/L	-
		Cadmium	0.00001 mg/L	-
		Iron	0.1 mg/L	-
		Mercury[b]	0.001 mg/L	-
		Molybdenum	0.005 mg/L	-
		Ammonia	0.05 mg/L	-
		Nitrate	0.05 mg/L	-
		Hardness	1 mg/L	-
		Alkalinity	2 mg/L	-
		Specific Conductance	-	-
Effluent Sublethal Toxicity	two-times per year	Fathead minnow	-	-
		Ceriodaphnia	-	-
		Duckweed	-	-
		Green alga	-	-

[a] Method detection limits for deleterious substances stipulated under the MMER, whereas those for effluent characterization are recommended by Minnow to allow comparison to relevant guidelines (e.g., Canadian Water Quality Guidelines)

[b] Sampling frequency can be reduced once the mine can demonstrate radium-226 concentrations less than 0.037 Bq/L over 10 consecutive sampling events, and mercury concentrations less than 0.0001 mg/L over 12 consecutive sampling events.

Acute toxicity testing must be conducted monthly, during periods of effluent discharge, to assess the influence of mine effluent on rainbow trout and *Daphnia magna* based on 'Pass/Fail' endpoints. Should samples be shown to be acutely lethal (i.e., ≥50% mortality), sampling frequency must be increased.

Effluent volume must be monitored in cubic meters (m^3), and reported in m^3/day, m^3/month and m^3/year, as appropriate. The effluent volume data will be used to calculate monthly loadings for each of the deleterious substances.

Effluent characterization must be conducted four times each calendar year, not less than one month (30 days) apart, while the mine is depositing effluent. In the event that effluent is discharged for only short periods each calendar year, the monitoring frequency will be reduced. It is recommended that effluent characterization be conducted at the same time as monitoring for deleterious substances and, if possible, receiving environment water quality monitoring. The list of substances required for effluent characterization is included in Table 1.

Effluent sublethal toxicity sampling must initially be conducted two-times annually using the effluent that contributes the greatest loadings of deleterious substances to the receiving environment. For each sampling event, sublethal toxicity tests must be conducted using fathead minnow (*Pimephales promelas*; 7-day survival and growth test), a cladoceran invertebrate (*Ceriodaphnia dubia*; 7-day survival and reproduction test), duckweed (*Lemna minor*; 7-day growth inhibition test), and a green alga (*Psuedokirchneriella subcapitata*; 3-day growth inhibition test) using standard test methods (Environment Canada 2007a,b,c, 2011).

Receiving environment water quality monitoring must be conducted four times each calendar year, not less than one month (30 days) apart, while the mine is depositing effluent. At a minimum, the sampling areas for receiving environment water quality monitoring at the Mary River Project must include an effluent-exposed station situated downstream of the effluent discharge(s) and a reference station located upstream of any mine effluent-related influences. Monitoring requirements for the receiving environment monitoring include field measurements of water temperature, dissolved oxygen, pH and specific conductance, as well as sampling for the substances required for deleterious substance and effluent characterization monitoring (see Table 1).

In terms of initiation of effluent and receiving environment water quality sampling, the following schedule is indicated in the MMER:

Deleterious Substances:	Within one week of the mine becoming subject to MMER.
Effluent Acute Toxicity:	Within one month of the mine becoming subject to MMER.
Effluent Volume:	Within one week of the mine becoming subject to MMER.

Effluent Characterization: Within six months of the mine becoming subject to MMER.
Effluent Sublethal Toxicity: Within six months of the mine becoming subject to MMER.
Receiving Water Monitoring: Within six months of the mine becoming subject to MMER.

For practicality, effluent volume should be monitored daily. In addition, given that effluent is likely to be discharged over a relatively short period of ice-free conditions from approximately June to September at the Mary River Project, the effluent characterization, effluent sublethal toxicity and receiving environment water quality monitoring must all be completed within six months of the Mary River Project becoming subject to the MMER. Thus, Baffinland must be prepared to organize and conduct this sampling in the summer 2015 open-water period.

Reporting Schedule and Content

Effluent monitoring reports are due to the Environment Canada Authorization Officer for all tests and monitoring conducted during each calendar quarter not later than 45 days after the end of the quarter, and annually not later than March 31st of the following calendar year. The quarterly reports will include all information related to effluent deleterious substances and pH (concentration and monthly mean concentration data), the number of days effluent was discharged and the volume of effluent discharged (monthly), mass loadings estimates from effluent for the deleterious substances, effluent acute toxicity data, effluent characterization data, effluent sublethal toxicity data and receiving environment water quality monitoring data. These reports will generally be provided electronically, with the analytical data also required to be entered into the Regulatory Information Submission System (RISS) database. A hypothetical schedule for sampling and reporting, based on an initial effluent discharge date of 30 June 2015, is provided as Table 2.

For the annual effluent and water quality monitoring report, key information that should be provided to the Authorization Officer includes:

a) The dates on which each sample was collected for effluent characterization, sublethal toxicity testing and water quality monitoring:

- four dates for effluent characterization (4 times per calendar year and not less than 1 month apart), while the mine is depositing effluent;
- four dates for water quality monitoring (4 times per calendar year and not less than 1 month apart), while the mine is depositing effluent;
- dates for sublethal toxicity testing (2 times each calendar year for 3 years and once each year after the third year, with the first testing to occur on an effluent sample collected not later than 6 months after the mine becomes subject to the MMER). The sublethal toxicity testing date(s) should match the date(s) for

Table 2: Example sampling and reporting schedule for Baffinland's Mary River Project under a hypothetical effluent discharge date of June 30, 2015.

Component		Sampling Initiation	Sampling Frequency (when discharging)	Year 1 Reporting Period				
				First Quarter Report	Second Quarter Report	Third Quarter Report	Fourth Quarter Report	Annual Report
				July, Aug, Sept 2015	Oct, Nov, Dec 2015	Jan, Feb, Mar 2016	Apr, May, Jun 2016	Jun 30 to Dec 31 2015
Effluent	Deleterious Substances and pH	July 1st - 8th, 2015	every week[a]	13 weeks of data; 3 monthly averages	13 weeks of data; 3 monthly averages	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	26 weeks of data; 6 monthly averages
	Acute Toxicity	July 1st - 8th, 2015	every month	3 sampling events	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events
	Effluent Volume (datalogger?)	July 1st - 8th, 2015	daily	continuous data 3 monthly averages	continuous data for Oct monthly averages	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	3 months of continuous data; 4 monthly averages
	Effluent Characterization Sampling	July 2015	four times annually[b]	3 sampling events[b]	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events[b]
	Sub-lethal toxicity	July 2015	twice annually[b]	2 sampling events	none required	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	2 sampling events
Receiving Environment	Downstream (effluent-exposed) Station	July 2015	four times annually[b]	3 sampling events[b]	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events[b]
	Upstream (reference) Station	July 2015	four times annually[b]	3 sampling events[b]	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events[b]
MMER Reporting	Reporting Date	-	-	due by Nov. 14, 2015	due by Feb. 14, 2016	due by May 15, 2016	due by July 15, 2016	due by Mar 31, 2016

[a] Weekly monitoring samples must be collected a minimum of 24 hours apart

[b] Sampling events must be spaced at least one month (30 days) apart from one another, and thus fewer than four sampling events may occur in instances in which effluent is discharged over short periods.

effluent characterization, as the sublethal toxicity sample must be an aliquot of the effluent characterization sample; and,

- if the required number of tests were not conducted, indicate the reason why (i.e., the number of days that the effluent was being discharged or the habitat conditions that prevented the collection of effluent characterization and/or water quality monitoring samples).

b) The locations of the final discharge points from which samples were collected for effluent characterization, noting that effluent characterization is conducted at all identified final discharge points (FDPs).

c) The location of the final discharge point from which samples were collected for sublethal toxicity testing and the data on which the selection of the final discharge point was based:

- Indicate from which FDP the effluent was collected for the sublethal toxicity testing and why that FDP was chosen for mines with more than one FDP (e.g., effluent that discharges into a sensitive receiving environment, has the greatest mass loading).

d) The latitude and longitude of sampling areas for receiving environment water quality monitoring, in degrees, minutes and seconds, and a description that is sufficient to identify the location of the sampling areas (possibly supplemented with maps).

e) The results of effluent characterization, sublethal toxicity testing and water quality monitoring:

- Include the results from all analyses completed on effluent (chemical and physical parameters), sublethal toxicity testing and receiving environment water quality monitoring.
- Include results from all required parameters, as well as any optional site-specific parameters that were measured.
- For sublethal toxicity testing, the laboratory reports should be included as an appendix in the annual report.

f) The methodologies used to conduct effluent characterization and water quality monitoring, and the related method detection limits:

- Some sampling methods are outlined in the Guidance Document for the Sampling and Analysis of Metal Mining Effluent: Final Report available at http://dsp-psd.pwgsc.gc.ca/Collection/En49-24-1-39E.pdf.

- Indicate the methodology used (e.g., inductively coupled plasma combined with mass spectrometry [ICP-MS], graphite furnace atomic absorption spectrometry [GFAAS]) for effluent characterization and water quality monitoring.
- Indicate the method detection limits for the methodology used—for MMER deleterious substances, the method detection limits identified in Table 1 should be met. Note that the Canadian Council of Ministers of the Environment's Canadian Environmental Quality Guidelines (e.g., Water Quality Guidelines for the Protection of Aquatic Life) or additional territorial/site-specific water quality guidelines should also be considered for comparisons of the receiving environment water quality monitoring.

g) A description of quality assurance and quality control measures that were implemented and the data related to the implementation of those measures:

Conclusions

I trust the information provided in this memorandum provides you with sufficient overview of the MMER sampling and reporting that Baffinland will be required to fulfil to meet its MMER obligations. Once organized, Minnow would be happy to review your monitoring schedules to verify that MMER compliance will be met. Should you require further details or wish to discuss any aspect of this information, please do not hesitate to contact me at your convenience.

Paul LePage, M.Sc.
Senior Project Manager / Aquatic Biologist
Minnow Environmental Inc.
2 Lamb Street
Georgetown, ON L7G 3M9
Tel : (905) 873-3371 ext. 226
Fax: (905) 873-6370

References

Environment Canada. 2007a. Biological Test Method: Test of Reproduction and Survival Using the Cladoceran *Ceriodaphnia dubia*. Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report EPS 1/RM/21. Second Edition. February 2007.

Environment Canada. 2007b. Biological Test Method: Growth Inhibition Test Using a Freshwater Alga. Environmental Technology Centre, Ottawa, Ontario. Report EPS 1/RM/25. Second Edition. March 2007.

Environment Canada. 2007c. Biological Test Method: Test for Measuring the Inhibition of Growth Using the Freshwater Macrophyte *Lemna minor*. Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report 1/RM/37. Second Edition. January 2007.

Environment Canada. 2011. Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows. Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report 1/RM/22. Second Edition.

APPENDIX D

EEM INTERPRETIVE REPORT

Mary River Project Phase 1
Environmental Effects Monitoring (2017)
Interpretive Report

Prepared for:
Baffinland Iron Mines Corporation
Oakville, Ontario

Prepared by:
Minnow Environmental Inc.
Georgetown, Ontario

January 2018

Mary River Project Phase 1
Environmental Effects Monitoring (2017)
Interpretive Report

Paul LePage, M.Sc.
Project Manager

Pierre Stecko, M.Sc.
Senior Project Advisor

EXECUTIVE SUMMARY

The Mary River Project is an operating high-grade iron mine located in the Qikiqtani Region of northern Baffin Island, Nunavut. Owned and operated by Baffinland Iron Mines Corporation (Baffinland), the mine began commercial operation in 2015. Mining activities at the Mary River Project include open pit ore extraction, ore haulage, stockpiling, crushing, and screening, followed by transport by truck to Milne Port for subsequent seasonal loading onto bulk carrier ships for transfer to European markets. No milling or additional processing of the ore is conducted on-site and therefore no tailings are produced at the Mary River Project. Mine waste management facilities at the Mary River Project thus consist simply of a mine waste rock stockpile and surface runoff collection/containment ponds currently situated near the mine waste rock stockpile and ore stockpile areas.

The Mary River Project became subject to the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act* in July 2015. The MMER outline requirements for routine effluent and water quality monitoring and for biological monitoring, collectively referred to as Environmental Effects Monitoring (EEM) studies. The objective of EEM is to determine whether mine effluent is causing an effect on the fish population, the use of fisheries resources (i.e., mercury accumulation in fish tissues) and/or fish habitat (benthic invertebrate communities). A Study Design for the initial phase of biological EEM at the Mary River Project was submitted to, and following comments and discussions, approved by Environment and Climate Change Canada (ECCC). The field component of the Phase 1 EEM biological study at Mary River Project was implemented in August 2017 using the approach outlined in the approved study design, focusing on the evaluation of effects at effluent-exposed areas of two watercourses, Mary River Tributary-F and Mary River. In accordance with MMER requirements, this Interpretive Report provides a summary of effluent and water quality monitoring data and the results of the Mary River Project Phase 1 EEM biological study.

Effluent from the Mary River Project primary discharge (MS-08) met all MMER limits during normal mine operations in 2015, 2016 and, with the exception of the discharge of effluent with low pH and elevated mean monthly Total Suspended Solids (TSS) concentrations in August and/or September, also met MMER limits in 2017. The mine effluent was non-acutely lethal to rainbow trout and *Daphnia magna* in each of 2015 and 2016, but was acutely toxic to both test species in an August 2017 test and to *D. magna* in a September 2017 test. Due diligence and corrective actions related to these non-compliant discharges were undertaken by Baffinland in 2017 (Appendix B). Sublethal toxicity tests conducted using final effluent samples showed no effects on survival or growth of fathead minnow or on growth of green algae over the Phase 1 EEM period. Occasional effects on survival and/or reproduction of planktonic invertebrates and more

consistent growth inhibition to duckweed were shown in effluent sublethal toxicity tests conducted from 2015 to 2017. However, effects to these test organisms were observed at effluent concentrations higher than those typically expected within the mine receiving environment, suggesting limited potential for similar sublethal toxicity effects within the immediate Mary River Tributary-F effluent-exposed area. Effluent concentrations estimated for the immediate receiving waters of Mary River Tributary-F were less than 1% after complete mixing based on extrapolation of field specific conductance measures and hydrological gauging station data in 2017.

Water chemistry at effluent-exposed areas of Mary River Tributary-F showed slightly elevated ammonia, nitrate and/or sulphate concentrations compared to reference conditions during periods of effluent discharge in 2016 and 2017, but concentrations of these parameters were consistently well below applicable water quality guidelines (WQG). Within the effluent-exposed area of Mary River, average nitrate concentrations were slightly elevated compared to the applicable reference area, but only in 2017 and concentrations remained well below WQG, suggesting that the elevated nitrate concentrations were not ecologically meaningful.

The benthic invertebrate community survey indicated no significant differences in primary EEM endpoints of density, richness, Simpson's Evenness and Bray-Curtis Index between effluent-exposed and reference areas of Mary River Tributary-F. In turn, this suggested no adverse influences to the benthic invertebrate community of Mary River Tributary-F associated with exposure to mine effluent. The fish population survey indicated no substantial differences in community species composition between the effluent-exposed and reference areas of Mary River, but potentially higher abundance of fish at the effluent-exposed area due to natural habitat factors. The Mary River arctic charr (*Salvelinus alpinus*) population showed no significant difference in size (length-frequency) structure, and no significant difference in proportion of young-of-the-year (YOY) individuals between the effluent-exposed and reference areas. In addition, length and weight of non-YOY arctic charr did not differ significantly between populations sampled at the effluent-exposed and reference areas of Mary River. Although non-YOY arctic charr captured at the effluent-exposed area had significantly lower condition (length-at-weight relationship) than those captured at the reference area, the magnitude of this difference was small (i.e., -4.5%) and within the applicable fish condition Critical Effect Size of ±10% used for EEM studies, suggesting that this difference was not ecologically meaningful.

Overall, the Mary River Project Phase 1 EEM indicated very low effluent concentrations within the immediate Mary River Tributary-F receiving environment. Commensurately, only minor effluent-related influences on water quality of this watercourse and farther downstream at Mary River during periods of effluent discharge were indicated, with pH and concentrations of all parameters potentially associated with the mine effluent consistently meeting applicable WQG in both

watercourses. Although Mary River non-YOY arctic charr had lower condition at the effluent-exposed area than at the reference area, concentrations of mine-related parameters well below WQG and no effluent-related influences on primary EEM benthic invertebrate community endpoints closer to the effluent discharge at Mary River Tributary-F suggested that factors other than mine-effluent accounted for this difference in non-YOY arctic charr condition.

Based on the prescribed EEM frequency under the MMER, the Study Design for the next Mary River Project EEM biological study must be submitted to ECCC no later than six months prior to implementing field collections in 2020. Using the EEM framework, the next phase of biological monitoring (Phase 2) will require an effects assessment, in part, to determine whether the occurrence of the difference in fish condition indicated in this initial Phase 1 EEM is consistent. The corresponding Interpretive Report will be required to be submitted to ECCC by January 10th, 2021.

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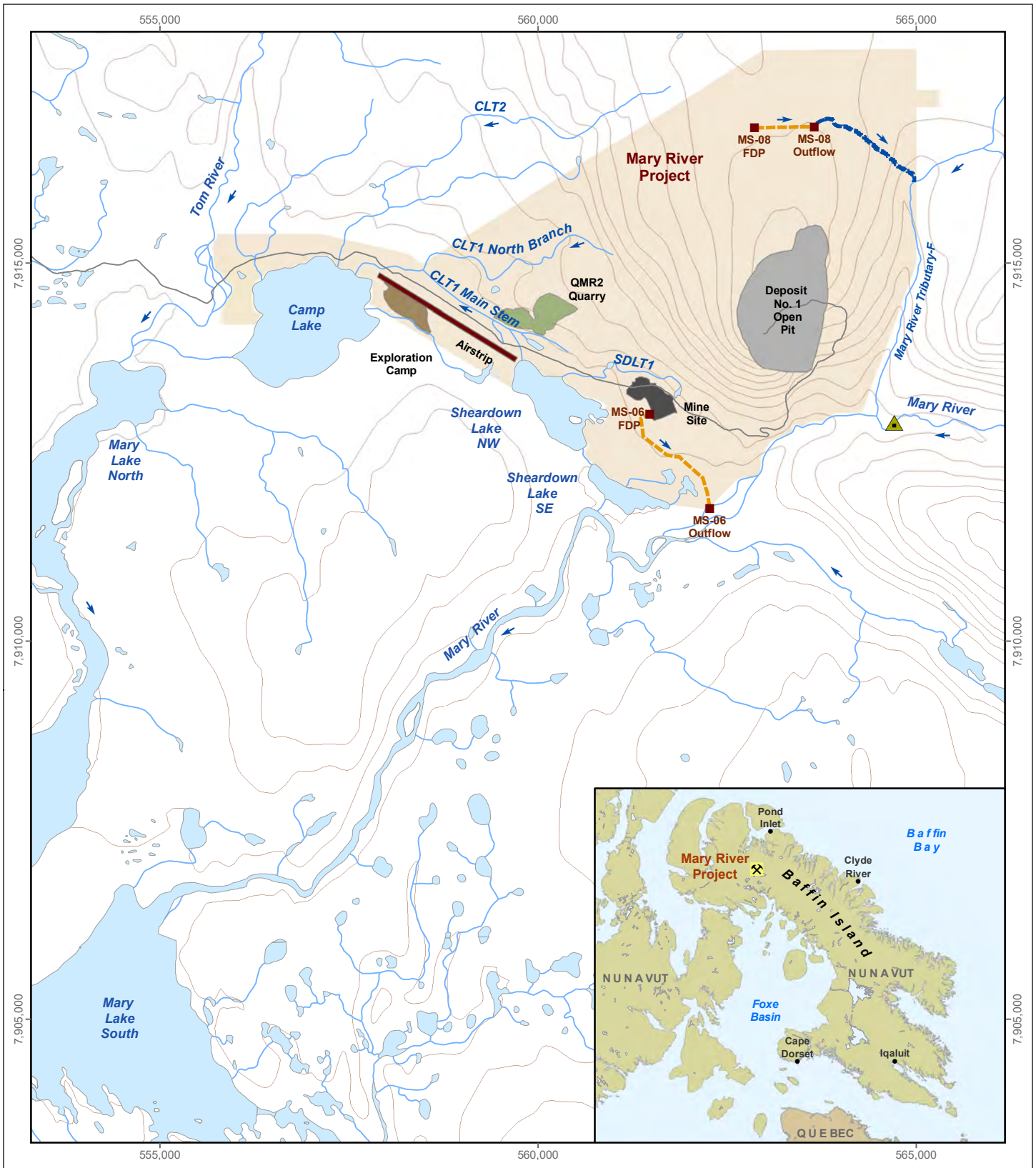
1 INTRODUCTION

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). Open pit mining, including pit bench development, ore haulage and stockpiling, and the crushing and screening of high-grade iron ore, commenced at the Mary River Project in mid-September 2014. No milling or additional ore processing is conducted on-site. For the initial mining stages at the Mary River Project, as much as 4.2 million tonnes (Mt) of crushed/screened ore is transported annually by truck to Milne Port, which is located approximately 100 km north of the mine site. 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 mine waste management facilities at the Mary River Project include a mine waste rock stockpile and surface runoff collection ponds currently situated near the mine waste rock stockpile and ore stockpile areas.

The Mary River Project became subject to the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act* in July 2015 as a result of the discharge of effluent in excess of 50 cubic meters (m^3) per day from a temporary mine waste rock settling pond. The MMER outline requirements for routine effluent and water quality monitoring and for biological monitoring, collectively referred to as Environmental Effects Monitoring (EEM) studies, as a condition governing the authority to discharge effluent (Environment Canada 2012; Government of Canada 2017). The objective of EEM is to determine whether mine effluent is causing an effect on the fish population, the use of fisheries resources (i.e., mercury accumulation in fish tissues) and/or fish habitat (benthic invertebrate communities; Environment Canada 2012). In August 2016, a Study Design for the initial phase of biological EEM at the Mary River Project (herein referred to as the Mary River Project Phase 1 EEM) was provided to Environment and Climate Change Canada (ECCC; Minnow 2016a). Approval of the study design was received from ECCC following comment and discussions conducted at the site on August 16th and 17th, 2017 (Appendix A). The field component of the initial Phase 1 EEM biological study at the Mary River Project was implemented in August 2017 with no deviations from the approved Study Design. In accordance with MMER requirements, this Interpretive Report provides a summary of effluent and water quality monitoring data and the methods, results and conclusions of the Mary River Project Phase 1 EEM biological study.



LEGEND

- Final Discharge Point (FDP)
- Mary River Cascade Barrier
- Discharge Line
- Overland Effluent Channel
- QMR2 Quarry
- Airstrip
- Exploration Camp
- Mine Site
- Open Pit
- Mary River Project

Baffinland Iron Mines Corporation, Mary River Project Location

0 1 2 4 km

Map Projection: UTM Zone 17N NAD 1983

Date: January 2018
Project 177202.0033

minnow environmental inc.

Figure 1.1

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2 METHODS

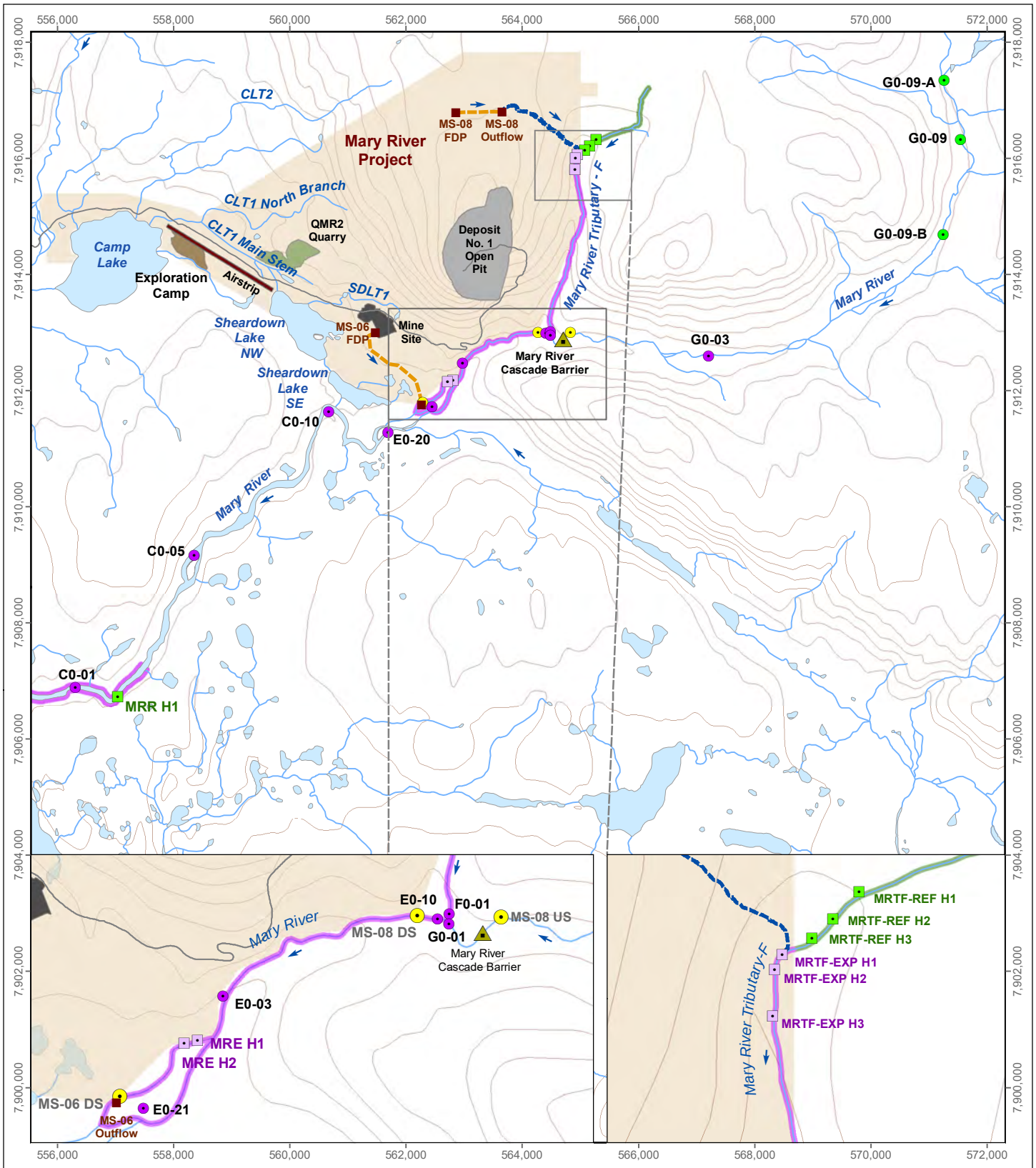
2.1 Overview

The EEM program consists of effluent and receiving environment water quality studies and biological studies (Government of Canada 2017). Effluent characterization, effluent sublethal toxicity testing, and receiving environment water quality monitoring was conducted by Baffinland environment department personnel during periods of effluent discharge in accordance with EEM requirements (Environment Canada 2012) over the 2015 to 2017 Phase 1 EEM period. Additional receiving environment water quality data were also collected at the same time as implementation of the biological monitoring field study. The Mary River Project Phase 1 EEM biological study, including a benthic invertebrate community survey and a fish population survey, was implemented from August 24th to 28th, 2017 led by Minnow Environmental Inc. (Minnow) biologists. The Phase 1 EEM biological field study also included collection of habitat information to support the interpretation of benthic invertebrate community and fish population data (Appendix C). Effluent total mercury concentrations were consistently below 0.10 µg/L since the mine became subject to the MMER in July 2015, and therefore no fish tissue survey was required as part of the Mary River Project Phase 1 EEM biological study in accordance with the MMER statutes (Environment Canada 2012; Minnow 2016a). Each EEM study component incorporated a data quality program to provide checks for sample collection and analysis, and to allow for data quality to be assessed in the context of the study objectives. A description of the Mary River Project Phase 1 EEM study areas and the methods used for sample collection, sample processing and data analysis for each study component are described in the sub-sections below.

2.2 Study Area Locations and Habitat Characterization

Wastewater management at the Mary River Project includes the collection of surface and seepage water originating from the mine waste rock stockpile into a containment pond. Following solids removal via pond-based settling and verification that effluent quality is compliant with applicable territorial and federal limits, effluent is piped to a Final Discharge Point (FDP) located approximately 875 m southeast of the containment pond, referred to as Station MS-08 (Figure 2.1). At the MS-08 FDP, mine effluent is released overland (i.e., no defined channel) into a depression that then meets with an unnamed tributary to the Mary River, herein referred to as Mary River Tributary-F, approximately 2.2 km southeast of the discharge point. From this confluence, Mary River Tributary-F flows south approximately 3.3 km before discharging into Mary River (Figure 2.1).

For the purposes of the Phase 1 EEM biological study, Mary River Tributary-F downstream of the effluent confluence and Mary River extending approximately 2 km downstream of the Mary River



LEGEND

- Final Discharge Point (FDP)

Habitat Station

- Effluent-Exposed
- Reference

CREMP Water Quality Monitoring Station

- Mine Exposed
- Reference

- EEM Water Quality Monitoring Station
- Discharge Line
- Overland Effluent Channel
- EEM Effluent-Exposed Area
- EEM Reference Area

Mary River Project Water Quality Monitoring and Field Study Habitat Stations

0 1.5 3 6 km

Map Projection: UTM Zone 17N NAD 1983

N W E S

Date: January 2018
Project No 177202.0033

minnow environmental inc.

Figure 2.1

Document Path: S:\Projects\177202\177202.0033 - Baffinland 2017\2 - Mapping\Interpretive Report\17-33 Fig 2.1 Mary River CREMP and EEM WQ Stations.mxd

Tributary-F confluence served as the mine effluent-exposed areas for the benthic invertebrate community survey and fish population survey, respectively (Figure 2.1). Reference areas for the 2017 EEM study included Mary River Tributary-F upstream of the effluent channel for the benthic invertebrate community survey, and Mary River just upstream of Mary Lake for the fish population survey (Figure 2.1). Separate reference areas were required for the benthic invertebrate and fish community surveys because in part, as confirmed during the Phase 1 EEM biological study, fish are naturally absent from Mary River Tributary-F. Similarly, an approximately 20 m high cascade located on Mary River just upstream of the Mary River Tributary-F confluence acts as an impassable barrier to fish migration, contributing to the natural absence of fish from areas located upstream of this confluence and precluding its use as a reference area. Following consultation with ECCC during meetings held on August 16th and 17th, 2017, it was agreed that Mary River upstream of Mary Lake would serve as an appropriate reference area for the fish population survey given known differences in water quality at other candidate reference areas (e.g., Tom River) and authorized fish collection permit conditions.

Habitat characterization was conducted at the Phase 1 EEM study areas to allow evaluation of comparability in abiotic and biotic features between the effluent-exposed and reference study areas used for the benthic invertebrate community and fish population surveys (Figure 2.1). At each study area, a general characterization of riffle habitat was conducted at one to three stations[1] that included transect measurements of wetted and bankfull channel width (m), water depth (cm), water velocity (m/s) and substrate size (intermediate axis diameter in mm). In addition, determination of stream gradient, and qualitative estimates for features including stream morphology, relative substrate composition, instream vegetation (e.g., algae and/or macrophytes) and relative amounts of functional instream fish cover structure was conducted at each station. At each transect, channel width was determined using a measuring tape, and water depth and velocity were measured from 3 – 19 points[1] using a standard wading rod and a Hach FH950 Velocity Flow Meter with electromagnetic sensor (Hach, Loveland, CO), respectively. Gradient was determined using a Suunto PM-5/360 PC clinometer (Suunto, Vantaa, Finland). The habitat characterization data formed the basis for habitat descriptions for each study area, which are appended in this report (Appendix C). Where station replication allowed (i.e., minimum of three stations per area), quantitative data were compared statistically between the effluent-exposed

[1] Habitat characterization was conducted at three stations from each benthic invertebrate community study area, two stations at the effluent-exposed fish population study area, and one station at the reference fish population study area. The number of stations, and number of sampling points along transects, varied based on channel width, habitat complexity and relative ease of sampling (as dictated by depth, water velocity and safety concerns associated with these variables).

and reference areas. These results, as well as the general comparisons of qualitative features, were taken into consideration during interpretation of the EEM biological data.

2.3 Effluent and Water Quality Monitoring

Effluent monitoring (effluent volume, chemical characterization, and sub-lethal toxicity) and receiving environment water quality monitoring (chemical characterization) were conducted at the Mary River Project in accordance with MMER requirements (Environment Canada 2012). As part of its EEM requirements, Baffinland must provide an annual effluent and receiving environment water quality monitoring report to ECCC by March 31st of the following year that includes sampling locations, dates, methods and results together with information on quality assurance and quality control (QA/QC) for this sampling (Government of Canada 2017). Only a summary of routine effluent and water quality monitoring data need be included in the EEM interpretive report, and therefore the following paragraphs provide a brief overview of the effluent and receiving environment water quality monitoring methods. Additional receiving environment water quality samples were collected at the same time as the biological study to support interpretation of the benthic invertebrate community and fish population data, and therefore more detailed methods pertaining to the collection and analyses of these samples are provided below.

2.3.1 Effluent Quality

Effluent quality monitoring included routine monitoring for MMER deleterious substances, effluent characterization, and effluent sub-lethal toxicity sampling and testing. During periods of discharge, effluent volume and chemistry samples for routine MMER sampling and chemical characterization were collected at two final discharge points of compliance, referred to as Station MS-08 and Station MS-06 (Figure 2.1). Volumes of effluent discharged from the final discharge points monitored continuously in cubic metres per day (m^3/day) were compared using monthly averages and cumulative totals (in m^3) by year. In addition to MMER deleterious substances (total suspended solids, arsenic, copper, lead, nickel, zinc and radium-226) and pH, effluent characterization included analysis of temperature, conductivity, hardness, alkalinity, ammonia, nitrate, sulphate and other metals required for EEM (i.e., aluminum, cadmium, iron, mercury, molybdenum and selenium). Effluent characterization samples were collected up to four times per calendar year at intervals of not less than 30 days apart from the final effluent discharge point in accordance with the MMER[2]. Monthly means were calculated for each of the monitored parameters, with those for deleterious substances and mercury compared to MMER limits and to

[2] Because effluent is discharged intermittently over the course of a relatively short open-water period (i.e., approximately 3 – 4 months), the requirement that effluent characterization and sublethal toxicity samples be collected not less than 30 days apart can result in a frequency of sampling events lower than four and two times per year, respectively.

the EEM fish tissue survey trigger limit (i.e., 0.1 µg/L), respectively. The monthly mean data were also compared over the Phase 1 EEM period as a means to track changes in effluent quality over time.

Effluent samples were collected monthly for acute lethality testing, and up to two times per calendar year for sublethal toxicity testing using effluent collected at Station MS-08[2]. Final effluent samples were collected into pre-labelled plastic containers provided by the toxicity laboratory, put on ice inside coolers, and shipped to the toxicity laboratory where they arrived within 48 hours of collection. Acute toxicity tests were conducted using rainbow trout (*Oncorhynchus mykiss*) and the invertebrate *Daphnia magna* in accordance with standard Environment Canada (1990, 2000) protocols. Sublethal toxicity tests were conducted using fathead minnow (*Pimephales promelas;* 7-day survival and growth test), a cladoceran invertebrate (*Ceriodaphnia dubia;* 7-day survival and reproduction test), duckweed (*Lemna minor*; 7-day growth inhibition test), and a green alga (*Pseudokirchneriella subcapitata*; 3-day growth inhibition test) using standard test methods (i.e., Environment Canada 2007a,b,c; 2011). For fathead minnow and *C. dubia* tests, an LC_{50} (i.e., lethal concentration to 50% of test organisms) was calculated from the mortality data by laboratory personnel. Chronic toxicity test IC_{25} (inhibitory concentration that reduced larval fathead minnow growth by 25%, reduced the number of *C. dubia* neonates produced by 25%, inhibited *P. subcapitata* and *L. minor* growth and/or frond production by 25%) values were calculated from the growth or reproductive data. Reference toxicant testing was employed to ensure that all test systems met protocol criteria during effluent testing. All IC_{25} data were derived by the toxicity laboratory using non-linear regression models or linear interpolation, as appropriate, aided by Comprehensive Environmental Toxicity Information System (CETIS) software (Tidepool Scientific Software, McKinleyville, CA). As required under the MMER, the sub-lethal toxicity data were reported to ECCC as part of Baffinland quarterly and annual reporting for the Mary River Project, the results of which are summarized in this report.

2.3.2 Receiving Environment Water Quality

2.3.2.1 Sample Collection and Laboratory Analysis

Receiving environment water quality monitoring included collection of *in situ* measurements and samples for water chemistry analysis. During biological monitoring, *in situ* water temperature, dissolved oxygen, pH and specific conductance (i.e., temperature standardized measurement of conductivity) was measured near the bottom of the water column at all benthic invertebrate community (benthic) stations and fish population study areas. These measurements were made using a calibrated YSI ProDSS (Digital Sampling System) meter equipped with a 4-Port sensor (YSI Inc., Yellow Springs, OH). Additional supporting water quality information, including

observations of water colour and clarity, were also recorded at each benthic station during EEM biological sampling.

Receiving environment water quality monitoring data were collected routinely by Baffinland personnel at two designated MMER-EEM stations located on Mary River. Water sampling for EEM is conducted at an effluent-exposed station located downstream of the Mary River Tributary-F confluence on Mary River (Station MS-08-DS), and at a reference station situated upstream of the cascade barrier and Mary River Tributary-F confluence on Mary River (Station MS-08-US; Figure 2.1). In accordance with the MMER, the routine receiving environment water samples were collected during periods of effluent discharge not less than 30 days between sampling events up to four times per calendar year[3]. In addition to the sampling stations indicated above, routine water quality monitoring is conducted on Mary River Tributary-F (Station FO-01) and additional reference (GO series stations), effluent-exposed (EO series stations) and other (CO series stations) locations on Mary River (Figure 2.1) to meet environmental regulatory requirements outside of the MMER. Water chemistry samples were collected by hand from mid-column directly into labelled sample bottles pre-dosed with required chemical preservatives or into collection bottles triple-rinsed with ambient water for analyses not requiring sample preservation using methods consistent with Baffinland standard operating procedures. Following collection, the water quality samples were placed in coolers and maintained at cool temperatures during shipment to the analytical laboratory. Water quality samples collected during the biological field study were shipped to ALS Global (Waterloo, ON) for analysis. The water chemistry samples were analyzed for the same parameters indicated previously for routine effluent monitoring and effluent characterization using standard laboratory methods. Although holding times for water chemistry samples were generally adhered to, logistical constraints related to the remoteness of the Mary River Project occasionally resulted in the analysis of parameters such as pH that were outside of recommended holding times.

2.3.2.2 Data Analysis

In situ water quality measurements were compared statistically between Mary River Tributary-F effluent-exposed and reference benthic study areas, and between Mary River fish population survey study areas using Analysis-of-Variance (ANOVA). Prior to conducting the ANOVA tests, data were $\log_{10}$ transformed as required to meet assumptions of normality and homogeneity of variance. In instances where normality could not be achieved through data transformation, non-parametric Mann-Whitney U-tests were used to validate the statistical results from the ANOVA

[3] Because effluent is discharged intermittently over the course of a relatively short open-water period (i.e., approximately 3 – 4 months), the requirement that receiving environment water chemistry samples be collected not less than 30 days apart can result in a frequency of sampling events lower than four times per year.

tests. Similarly, in instances in which variances of normal data could not be homogenized by transformation, pair-wise comparisons were conducted using Student's t-tests assuming unequal variance to validate the statistical findings of the ANOVA tests. All statistical comparisons were conducted using SPSS Version 12.0 software (SPSS Inc., Chicago, IL). In addition to these comparisons, dissolved oxygen and pH data from each station were compared to applicable Water Quality Guidelines for the protection of aquatic life (WQG)[4]. Effluent concentration in the mine receiver at the time of EEM biological sampling was estimated through extrapolation of field measured specific conductance at the benthic effluent-exposed and reference areas and daily average specific conductance of the MS-08 effluent discharge from August 30th to September 5th, 2017 (i.e., 2,658 µS/cm) as described in Environment Canada (2012).

Water chemistry data were compared between the mine effluent-exposed and reference areas and to applicable WQG. To simplify the discussion of results, the magnitude of difference in parameter concentrations was calculated as the effluent-exposed area concentration divided by the respective reference area concentration. The magnitude of difference in parameter concentrations was qualitatively assigned as slightly, moderately or highly elevated compared to concentrations measured at the reference area using the categorization described in Table 2.1.

Table 2.1: Magnitude of Difference Categorizations for Water Chemistry Comparisons

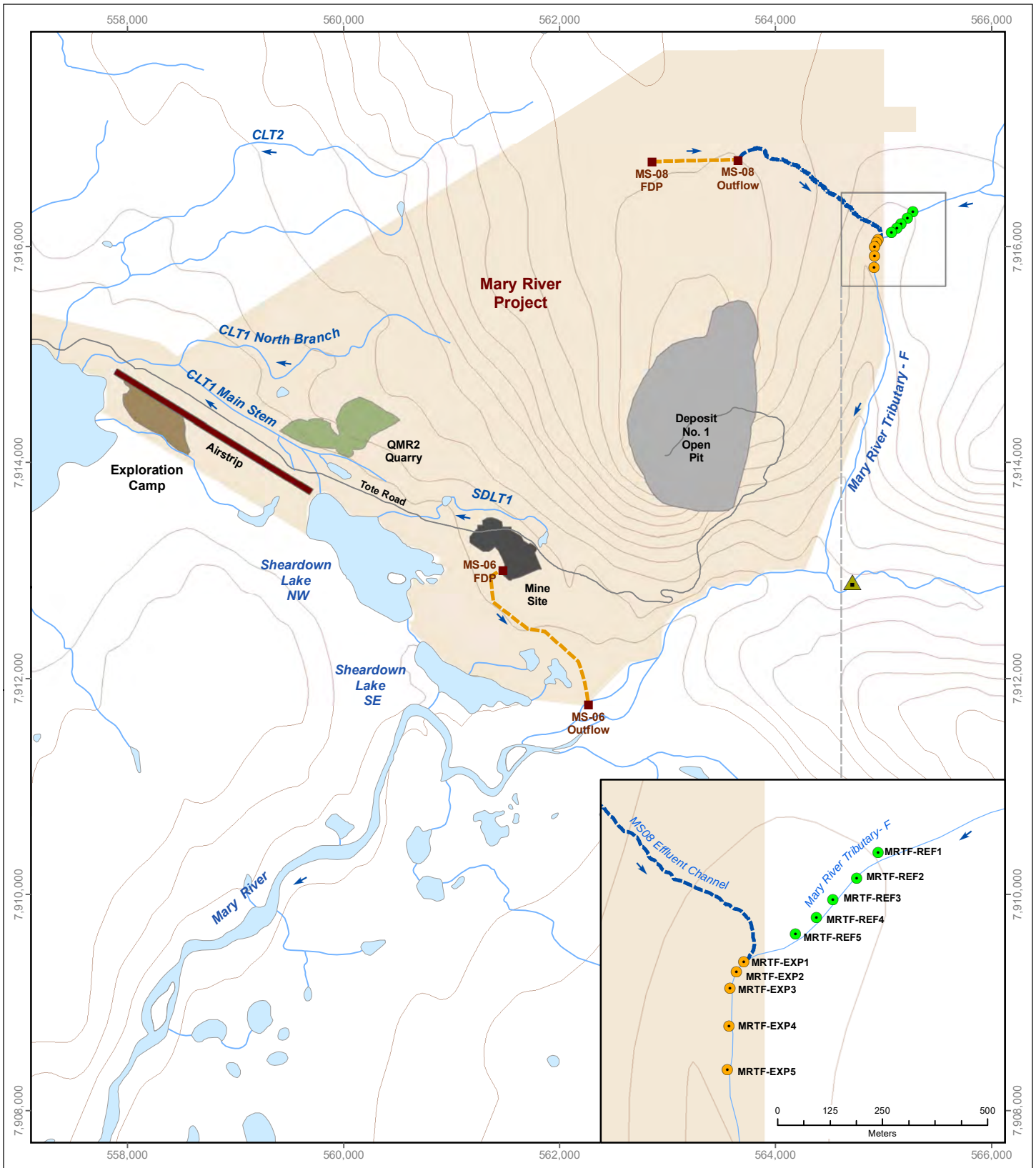
Categorization	Magnitude of Difference Criterion
Slightly elevated	Concentration 3-fold to 5-fold higher at effluent-exposed area versus the reference area.
Moderately elevated	Concentration 5-fold to 10-fold higher at effluent-exposed area versus the reference area.
Highly elevated	Concentration ≥ 10-fold higher at effluent-exposed area versus the reference area.

2.4 Benthic Invertebrate Community Survey

2.4.1 Overview

A standard EEM benthic invertebrate community (benthic) survey was conducted for the Mary River Project Phase 1 EEM (Minnow 2016a). The benthic survey employed a Control-Impact design with sampling conducted at Mary River Tributary-F downstream (MRTF-EXP; effluent-exposed) and upstream (MRTF-REF; reference) of the channel receiving effluent from the MS-08 FDP (Figure 2.2). Five stations were sampled at each study area to provide adequate statistical

[4] Canadian Environmental Quality Guidelines (CCME 1999, 2017) were used as the primary source for WQG. For parameters in which no CCME guideline was available, Ontario Provincial Water Quality Objectives (OMOEE 1994) or British Columbia Water Quality Guidelines (BCMOE 2017) were used as WQG.



LEGEND

Benthic Invertebrate Station

- Effluent-Exposed
- Reference
- Final Discharge Point (FDP)
- Mary River Cascade Barrier
- Discharge Line
- Overland Effluent Channel

Benthic Invertebrate Community Station Locations for the Mary River Project EEM, August 2017

0 0.75 1.5 3 km

Map Projection: UTM Zone 17N NAD 1983

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Date: January 2018
Project No 177202.0033

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Figure 2.2

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power to detect differences in benthic metrics of ± two standard deviations at an α and β of 0.10, which is consistent with EEM guidance (Environment Canada 2012). Habitat features including sampling depth and physical properties of the substrate were standardized among stations and between areas, to the extent possible, to minimize natural habitat influences as a factor contributing to benthic invertebrate community differences between study areas.

2.4.2 Sample Collection and Laboratory Analysis

Shallow (≤0.3 m) riffle-run habitat characterized by cobble-gravel substrate (i.e., erosional habitat) was targeted for benthic sampling at study areas within the Mary River Tributary-F (MRTF) system. Water depths in riffle habitat at MRTF study areas at the time of the August 2017 EEM field study were typically less than 10 cm (Appendix C) and at least 15 cm of water is required to effectively sample with a Hess sampler. Water depths as little as 3 cm can be sampled using a Surber sampler and therefore, following consultation with ECCC, the collection equipment for the EEM benthic invertebrate community survey was changed to a Surber sampler rather than a Hess sampler as indicated in the original Minnow (2016a) study design[5]. The Surber sampler used to collect the benthic samples had a sampling area 0.093 m^2 and was equipped with 500-µm mesh. At each station, one sample representing a composite of three sub-samples (i.e., 0.279 m^2 total area), was collected to ensure a representative sample. Each sub-sample was collected by carefully placing the sampler on undisturbed substrate and subsequently scrubbing all coarse material within the sampler area (to a depth of approximately 10 cm) while allowing the current to carry all dislodged organisms into the sampler net. After all substrate within the sampler was completely washed, the sampler was moved to the next sub-sample location and the procedure repeated. Following collection of the third sub-sample using the above procedure, all material and organisms retained in the collection net were carefully transferred into pre-labeled wide-mouth plastic jars. As a precautionary measure, internal sample labels were also used to ensure correct sample identification at the lab. Supporting information collected at each station included measurement of sampling depth (cm), water velocity (m/s), and substrate size (intermediate axis diameter in mm), qualitative estimates of substrate embeddedness (%) and vegetation presence (type and %), general habitat notes (e.g., presence of oxyhydroxide precipitate/deposition), *in situ* surface water quality at the sediment-water interface (see Section 2.3.2), and global positioning system (GPS) coordinates (recorded in latitude and longitude decimal degrees and based on the North America Datum of 1983 [NAD 83]).

The benthic samples were preserved to a level of 10% buffered formalin in ambient water following collection. At the conclusion of the field study, the benthic samples were submitted to

[5] The change is sampling equipment was requested through, and granted by, Erik Allen (ECCC, Prairie and Northern Regions) via e-mail correspondence on August 24, 2017.

Zeas Inc. (Nobleton, ON) for analysis following standard sorting methods and incorporating recommended Environment Canada (2012) QA/QC procedures for assessing sub-sampling error and sorting recovery checks (Appendix E). Upon arrival at the laboratory, a biological stain was added to each benthic invertebrate community 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 a 70% ethanol solution according to major taxonomic groups (e.g., phyla, orders). A senior taxonomist later enumerated and identified the benthic organisms to the lowest practical level (typically to genus or species) using up-to-date taxonomic keys. Following identification, representative specimens of each taxon were preserved in a 75% ethanol/3% glycerol solution, placed in separately labeled vials, and stored as part of a voucher collection for potential future reference for the Mary River Project EEM.

2.4.3 Data Analysis

Analysis of benthic invertebrate community data was completed at both family level (FL) and lowest practical level (LPL) of taxonomic identification. Although statistical analysis of the data was conducted at both levels of taxonomy (Appendix E), FL taxonomy was used as the basis for evaluation of 'effects' as this level of taxonomy is recommended for EEM (Environment Canada 2012), with the LPL taxonomy used to provide more comprehensive evaluation of the benthic data. Benthic invertebrate communities were assessed using EEM primary metrics of mean taxonomic richness (number of taxa), mean invertebrate abundance (or "density"; average number of organisms per m^2), Simpson's Evenness Index (E) and the Bray-Curtis Index of Dissimilarity as required under the MMER (Table 2.2; Environment Canada 2012). Simpson's E and Bray-Curtis indices were calculated separately for FL and LPL taxonomy using formula provided by Environment Canada (2012). Additional comparisons were conducted using absolute densities and the percent composition of dominant/indicator taxa, functional feeding groups and habitat preference groups (calculated as the abundance of each respective taxon group relative to the total number of organisms in the sample). Dominant/indicator taxon groups were defined as those groups representing greater than 10% of the community at any one station and/or an average of greater than 5% of the community at any one study area, or any groups considered to be 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) designations for each taxon.

All required and supplementary benthic invertebrate community endpoints were summarized by separately reporting mean, median, minimum, maximum, standard deviation, standard error and

Table 2.2: Required and Supporting Endpoints to be Examined for EEM Benthic Invertebrate Community Survey

Response	Endpoint	Critical Effect Size
Effects on Benthic Invertebrates [a]	Organism density (number of invertebrates·m^2)	± 2 reference standard deviations of the mean
	Taxonomic richness (number of taxa)	± 2 reference standard deviations of the mean
	Simpson's Evenness	± 2 reference standard deviations of the mean
	Bray-Curtis Index of dissimilarity	± 2 reference standard deviations of the mean
Supporting Response Variables [b]	Proportion of dominant groups	-
	Proportion of metal-sensitive groups	-
	Proportion of Functional Feeding Groups (FFG)	-
	Shannon-Wiener Diversity	-
	Proportion of Habitat Preference Groups (HPG)	-

[a] Endpoints to be used for determining "effects" as designated by statistically significant differences between effluent-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).

sample size for each study area. Differences between the effluent-exposed and reference areas were preferentially tested using ANOVA and untransformed, normally distributed data. However, in the event that data were determined to be non-normal, a suite of transformations including $\log_{10}$, square root, fourth root, and power_2 was applied to the data and evaluated for normality. The transformation that resulted in normal data with lowest skew and kurtosis values was then used for statistical testing using ANOVA. In instances where normality could not be achieved through data transformation, non-parametric Mann-Whitney U-tests were used to validate the statistical results from the ANOVA tests. All statistical comparisons were conducted using R programming (R Foundation for Statistical Computing, Vienna, Austria). An effect on the benthic invertebrate community was defined as a statistically significant difference in taxon richness, density, Simpson's E or Bray-Curtis Index, calculated at FL taxonomy, between the effluent-exposed area and the reference area at an alpha level of 0.10 (Environment Canada 2012).

In addition to statistical comparisons, the magnitude of difference between effluent-exposed and reference area means was calculated for each benthic invertebrate community metric where a significant difference was detected. The benthic invertebrate community survey was designed to have sufficient power to detect a difference (effect size) of ± two standard deviations (SD), and

therefore, the magnitude of the difference was calculated to reflect the number of reference mean SD (SD_{REF}) using equations provided by Environment Canada (2012). A Critical Effect Size for the benthic invertebrate community survey (CES_{BIC}) of ± 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 any anthropogenic inputs (i.e., between pristine reference areas; see Munkittrick et al. 2009; Environment Canada 2012). If a significant difference between areas was not detected for a benthic invertebrate community metric, then the minimum effect size that would be detectable was calculated using the mean square error generated from the ANOVA as an estimate of variability, with alpha and beta equal to 0.10. The minimum detectable effect size was calculated using equations provided by Environment Canada (2012), which are based on the minimum number of reference area standard deviations.

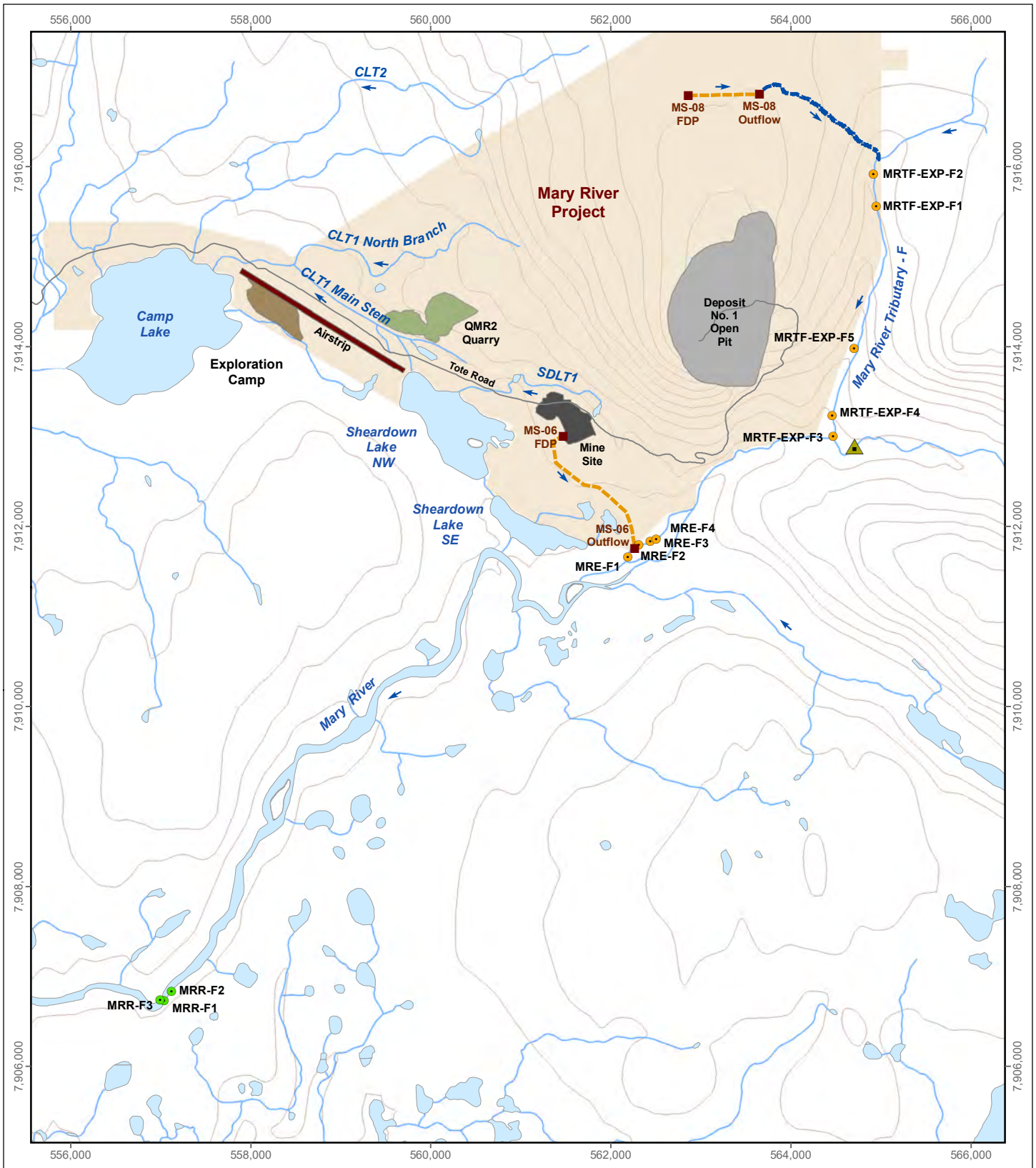
2.5 Fish Population Survey

2.5.1 Overview

The Mary River Project Phase 1 EEM fish population survey employed a non-lethal sampling approach targeting arctic charr (*Salvelinus alpinus*) at representative effluent-exposed and reference study areas (Minnow 2016a). Initial fish sampling conducted at Mary River Tributary-F study areas that were used for benthic sampling indicated that fish were absent at these areas, as well as the entire length of Mary River Tributary-F extending to Mary River (Appendix F). The absence of fish at Mary River Tributary-F is believed to reflect the combination of complete freezing overwinter, a relatively higher stream gradient, and the presence of natural in-stream barriers. An average gradient of 12% was documented through the lower approximate 750 m of Mary River Tributary-F during EEM fish population sampling. In addition, an approximately 1.75 m high step-drop over large boulder habitat occurred approximately 50 m upstream of Mary River on Mary River Tributary-F (Appendix Photo Plate C.1), presenting an impassable barrier for upstream migration by fish. As a result of the natural absence of fish from Mary River Tributary-F, two areas of Mary River were sampled for the EEM fish population survey. A safely-accessible reach on Mary River, located near the confluence with Mary River Tributary-F, and a downstream reach, located near the Mary River outlet to Mary Lake, served as effluent-exposed and reference study areas, respectively, for the fish population survey as agreed upon during meetings held between Baffinland, ECCC and Minnow on August 16th and 17th, 2017 (Figure 2.3)[6].

The targeting of only arctic charr for the Mary River Project EEM, as opposed to two species normally recommended for EEM (Environment Canada 2012), reflected the fact that only this species had been captured in the Mary River system previously (Baffinland 2014). A non-lethal

[6] See Section 2.2 for additional details regarding selection of study areas for the fish population survey.



LEGEND

Fish Survey Sampling Location

- Reference
- Effluent-Exposed
- Final Discharge Point (FDP)
- Mary River Cascade Barrier
- Discharge Line
- Overland Effluent Channel

Fish Survey Sampling Locations for the Mary River Project EEM, August 2017

0 1 2 4 km

Map Projection: UTM Zone 17N NAD 1983

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Project 177202.0033

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Figure 2.3

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sampling approach was implemented, in part, because typically only juvenile arctic charr migrate upstream from lakes into rivers and creeks of the Mary River Project region as the latter freeze entirely in the winter (NSC 2015; Minnow 2016a). Moreover, adult arctic charr spawn only every two to three years at latitudes similar to those of the Mary River Project and thus, for those few adults that migrate upstream in rivers, less than half would be expected to be in sufficient reproductive condition, resulting in unacceptable sacrifice to support a lethal sampling approach (Minnow 2016a)[7]. Consistent with EEM sample size requirements for EEM, a minimum of 100 arctic charr juveniles older than young-of-the-year (YOY; referred to as non-YOY herein) were targeted from each study area. Habitat features including sampling depth and physical properties of the substrate were standardized as much as possible between areas during fish population sampling to minimize natural habitat influences as a factor contributing to differences in fish population endpoints between study areas.

2.5.2 Sample Collection and Field and Laboratory Processing

Sampling for the fish population survey was conducted by an electrofishing team consisting of a backpack electrofisher operator and a single netter. At Mary River effluent-exposed and reference study areas, 'open station' sampling was conducted in an upstream direction at four side-channel stations and three shoreline stations, respectively (Figure 2.3). Fish captured at each station were placed into buckets containing aerated water. At the conclusion of sampling at each station, total shocking effort (i.e., electrofishing seconds) was recorded to allow calculation of time-standardized catch, station upstream and downstream boundaries were georeferenced using a handheld GPS unit, and habitat notes pertinent to the fish population survey were recorded. All captured fish were identified, enumerated and with the exception of arctic charr retained for subsequent body measurements (see description below), released at the area of capture. Following the collection of body measurements, arctic charr were released to the waters from which they were captured with the exception of individuals sacrificed for age structure removal.

All retained arctic charr were transported to a dedicated field laboratory for measurements, general observations, and collection of age determination samples required for EEM as timely as possible following collection (Environment Canada 2012). Initial observations conducted at the outset of the processing of individual fish included external condition evaluation for abnormalities and presence/incidence of parasites. For each fish, fork and total length were measured to the nearest millimetre using a standard measuring board, and weight was measured to the nearest

[7] Approximately 39% of arctic charr in the 'adult' size range sampled in August 2015 from Mary River Project area lakes contained sufficiently developed gonads suitable for assessment of reproductive endpoints, of which almost all (97%) of those showing sufficient gonad development were female (Minnow 2016b).

milligram using a digital balance outfitted with a surrounding draft shield. A subset of individuals spanning the entire size range of captured fish was sacrificed for age determination (i.e., approximately 10% of the total number of fish sampled from each study area). These fish were placed in labelled plastic bags following collection of all required morphometric data, and then frozen upon return from the field, for later removal of otoliths for age determination.

Aging samples were shipped frozen to AAE Tech Services Inc. (LaSalle, Manitoba) for otolith removal and processing at the completion of the field program. Pectoral fin rays and/or scales were used as backup aging structures for age determinations. Otoliths were prepared for aging using a "crack and burn" method. If fin rays were used, each was cleaned, embedded in epoxy resin and, after the epoxy hardened, sectioned using a Buehler Isomet (Lake Bluff, IL) low-speed diamond saw. Each otolith or fin ray sample was then 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. Age determinations for half of the otolith samples were also conducted by a second independent analyst to satisfy recommended QA/QC for EEM studies that suggest age confirmation be conducted on a minimum of 10% of samples (Environment Canada 2012).

2.5.3 Data Analysis

Fish community data from respective Mary River effluent-exposed and reference study areas were compared based on total fish species richness, total catch, and total catch-per-unit-effort (CPUE), the latter calculated as the number of fish captured per electrofishing minute. The fish population survey data analysis initially included calculation of mean, median, minimum, maximum, standard deviation, standard error and sample size statistics for arctic charr length, weight and age measurement data by study area, separating YOY from non-YOY (juvenile/adult) life history stages where applicable. These data were used as the basis for evaluating four response categories (survival, growth, reproduction and energy storage; Table 2.3) according to the procedures outlined for a non-lethal, small-bodied fish assessment (Environment Canada 2012). Length-frequency distributions were compared using a non-parametric two-sample Kolmogorov-Smirnov (K-S) goodness of fit test. The size-frequency distributions and confirmatory aging were used to distinguish YOY (age-0) fish from non-YOY age classes, which were then subject to separate evaluation of health endpoints between study areas.

Potential differences in reproductive success between EEM study areas was based on evaluation of the relative proportion of arctic charr YOY between the effluent-exposed and reference areas, and by comparing the results of KS tests conducted with and without YOY individuals included in the data sets. Mean length and body weight were compared between the effluent-exposed and reference study areas using ANOVA, with data evaluated for normality and homogeneity of

Table 2.3: Endpoints to be Examined for EEM Lethal and Non-Lethal Fish Population Survey

Response			Endpoint	Statistical Test[c,d,e]	Critical Effect Size
Lethal Comparisons	Effects on Fish[a]	Survival	Age	ANOVA	± 25%
			Age-frequency distribution	K-S Test	-
		Growth	Size-at-age (body weight against age)	ANCOVA	± 25%
		Reproduction	Relative gonad size (gonad weight against body weight)	ANCOVA	± 25%
		Energy Storage	Condition (body weight against length)	ANCOVA	± 10%
			Relative liver size (liver weight against body weight)	ANCOVA	± 25%
	Supporting Response Variables[b]	Growth	Size-at-age (length against age)	ANCOVA	± 25%
		Reproduction	Relative fecundity (# of eggs against body weight)	ANCOVA	± 25%
		Energy Storage	Relative egg size (mean egg weight against body weight)	ANCOVA	± 25%
Non-Lethal Comparisons	Effects on Fish[a]	Survival	Length-frequency distribution	K-S Test	-
		Growth	Length	ANOVA	± 25%
			Weight	ANOVA	± 25%
		Reproduction	Relative abundance of YOY (% composition)	None	-
		Energy Storage	Condition (body weight against length)	ANCOVA	± 10%

[a] Endpoints to be used for determining "effects" as designated by statistically significant differences between exposure 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-parametric data, where Mann Whitney U-test may be used to verify the results by ANOVA.

[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).

variance before applying parametric statistical procedures. In cases where data did not meet the assumptions of ANOVA despite transformation, a non-parametric Mann-Whitney U-test was performed to test for/validate significant differences between study areas indicated by the ANOVA. Differences in non-YOY arctic charr condition (weight-at-length relationship) between the effluent-exposed and reference areas were assessed using Analysis of Covariance (ANCOVA) according to methods recommended for EEM by Environment Canada (2012).

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 effluent-exposed and reference area groups, 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 effluent-exposed and/or reference areas, then the ANCOVA was not performed.

Once it was determined that ANCOVA could be used for statistical analysis, the first step in the ANCOVA analysis was to test whether the slopes of the regression lines for the reference and exposure areas 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 areas 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 calculation was estimated at both the minimum and maximum overlap of covariate variables between areas (Environment Canada 2012). In this event of a statistically significant interaction effect (slopes are not equal), the calculation of the magnitude of difference at the minimum and maximum values of covariate overlap was not assigned statistical difference as it would under 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 populations. 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 area differences, the magnitude of difference between reference and exposure areas 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 areas, the minimum detectable effect size was calculated as a percent difference from the reference mean for ANOVA or adjusted reference 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 the formula provided by Environment Canada (2012). If outliers or leverage values were observed in a data set(s) upon examination of scatter plots and residuals, then the values were removed and ANOVA or ANCOVA tests were repeated with the reduced data, with both sets of results then provided. Similar to the Critical Effect Sizes (CES) applied to the benthic invertebrate community survey, a fish population survey CES magnitude of difference of ± 25% was applied to general endpoints (CES_G) of survival, growth, reproduction and relative liver size, and a magnitude of difference of ± 10% was applied for condition (CES_C) to define any ecologically relevant differences, consistent with those recommended for EEM (Table 2.3; Munkittrick et al. 2009; Environment Canada 2012).

Finally, an *a priori* power analysis was completed to determine appropriate fish sample sizes for future surveys as recommended by Environment Canada (2012). These analyses were completed based on the mean square error values generated during the ANOVA or ANCOVA procedures and were calculated with alpha and beta set equally at 0.10 for the analysis. Two main assumptions served as the basis for the power analysis. The first assumption was that the fish caught in each of the effluent-exposed and reference areas were representative of the population at large (i.e., similar distribution and variance with respect to the parameters examined). The second assumption was that the characteristics of the populations as a whole would not change substantially prior to the next study. Results were reported as the minimum sample size (number of fish/area) required to detect a given magnitude of difference (effect size) between the effluent-exposed and reference area populations for each endpoint. The magnitude of the difference was presented as a percentage of the reference mean for each endpoint as measured during the fish population study.

3 EFFLUENT QUALITY AND SUBLETHAL TOXICITY

3.1 Effluent Volume and Quality

Effluent discharge from the MS-08 Final Discharge Point (FDP) over the Phase 1 EEM period occurred in July and August in 2015, and from July to September in each of 2016 and 2017 (Figure 3.1), corresponding to the usual open-water period for non-coastal areas of the Mary River Project region. The total monthly volume of effluent discharge ranged from approximately 517 to 7,429 cubic metres (m^3) over this period (Figure 3.1). Notably, effluent was released intermittently on an as-needed basis (i.e., to attempt to maintain sufficient capacity for a 1 in 10-year storm event in the containment pond), typically for a duration of one to three days but up to a maximum of 14 days (Appendix Table D.1). Monthly and cumulative volumes of effluent discharged to the receiving environment were considerably higher in 2017 than in the previous two years of the Phase 1 EEM period (Figure 3.1). Relatively high amounts of effluent released in 2017, on both a daily and cumulative basis (Figure 3.1; Appendix Table D.1), reflected the discharge of site waters stored from the previous season and upgrades to the waste management infrastructure at the Mary River Project between the open water periods of 2016 and 2017. Effluent was discharged from the MS-06 FDP on only a single day in 2016, on September 12th, when approximately 86 m^3 of effluent was discharged from the MS-06 FDP directly to Mary River (Appendix Table D.6).

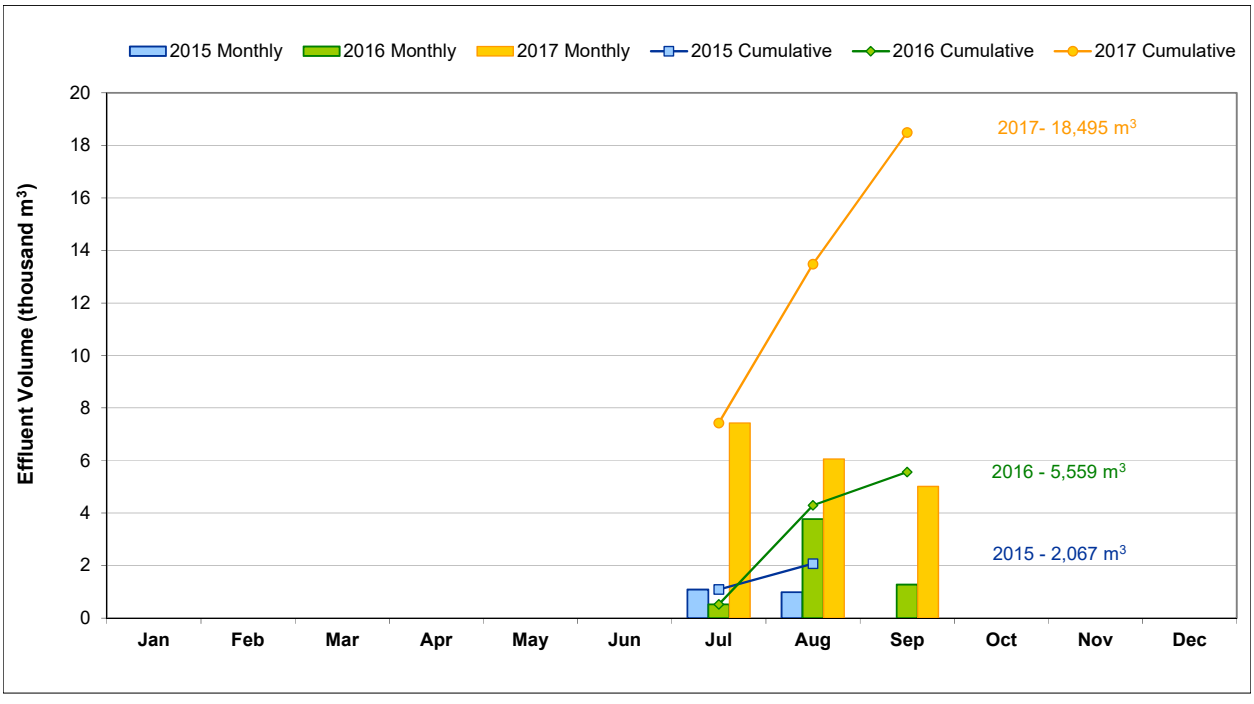

Figure 3.1: Mary River Project Average Monthly and Cumulative Effluent Discharge (Station MS-08) for the Phase 1 EEM Period (2015 - 2017)

Final effluent at MS-08 met MMER authorized pH limits and monthly mean and grab-sample concentration limits in 2015 and 2016 (Table 3.1; Appendix Tables D.2 and D.3). With the exception of pH below the MMER range limit in August and September, and a total suspended solids (TSS) concentration above the MMER monthly mean concentration limit (August) the MS-08 final effluent met all MMER deleterious substance concentration grab limits in 2017 (Table 3.1; Appendix Table D.4). Additional information regarding the non-compliant discharges are appended (Appendix B). Effluent characterization indicated that individual grab-sample mercury concentrations were well below the 0.10 µg/L trigger for an EEM fish tissue survey throughout the Phase 1 EEM period (Appendix Tables D.2 to D.4). On average, MS-08 effluent alkalinity, conductivity, hardness and concentrations of ammonia, cadmium, iron, nickel, nitrate and zinc were higher in August and September 2017 than corresponding monthly averages in 2015 and 2016 (Table 3.1). Higher concentrations of these parameters in 2017 was potentially related to additional containment pond treatment to raise effluent pH (e.g., use of soda ash, Na_2CO_3) and adsorption to suspended particles associated with TSS concentrations (Appendix B). Higher concentrations of some of these parameters (e.g., metals) may have also reflected changes in water chemistry sourcing from the waste rock stockpile in association with upgrades to the waste management infrastructure over the 2016 – 2017 winter period. Final effluent at MS-06 met MMER authorized pH limits and grab-sample concentration limits for the single discharge event in September 2016 (Appendix Table D.6).

Final effluent at MS-08 was consistently non-lethal to rainbow trout (*Oncorhynchus mykiss*) and *Daphnia magna* from July 2015 to July 2017 (n = 6 for both test species; Table 3.1; Appendix Table D.5). However, acutely lethal test results occurred for both test organisms using effluent samples collected August 1st, and for *D. magna* using an effluent sample collected September 5th, in 2017 (Appendix Table D.5). Review of effluent chemistry data for the 2017 samples resulting in acute toxicity suggested a potential causal link with low pH and/or one or more of the parameters indicated above that were shown to be elevated in August and September 2017 (Table 3.1).

3.2 Effluent Sublethal Toxicity

Sublethal toxicity tests conducted using MS-08 final effluent samples over the Phase 1 EEM period showed no adverse effects on survival or growth of fathead minnow (*Pimephales promelas*), or on growth of the green alga, *Pseudokirchneriella subcapitata* (Table 3.2). Survival and reproduction of *Ceriodaphnia dubia* was generally not affected in tests conducted from 2015 through July 2017 (Table 3.2). However, *C. dubia* survival and reproduction was affected at effluent effect concentrations of 20% and 6.5%, respectively, for the effluent sample collected in August 2017. Effluent iron and nickel concentrations were notably higher in the August 2017

Table 3.1: Summary of Routine MMER and Effluent Characterization Data (Station MS-08)[a] for the Mary River Project Phase 1 EEM period, 2015 to 2017

	Analyte	Units	MMER Monthly Mean Limit [d]	2015		2016		2017		
				July	August	July	August	July	August	September
Routine Monitoring [b]	pH (lab)	pH units	6.0 - 9.5	7.51	7.61	7.38	7.05	6.93	6.25	5.75
	Total Suspended Solids	mg/L	15	11.0	7.2	7.3	5.4	3.9	16.8	13.2
	Arsenic (As)	mg/L	0.5	0.0004	0.0001	0.0001	0.0001	0.0001	0.0010	0.0010
	Copper (Cu)	mg/L	0.3	0.0012	0.0013	0.0045	0.0023	0.0048	0.0163	0.0100
	Lead (Pb)	mg/L	0.2	0.0006	0.0002	0.0005	0.0002	0.0004	0.0030	0.0005
	Nickel (Ni)	mg/L	0.5	0.0116	0.0226	0.0118	0.0638	0.0275	0.2643	0.3980
	Zinc (Zn)	mg/L	0.5	0.0037	0.0033	0.0104	0.0070	0.0084	0.0340	0.0320
	Radium-226	Bq/L	0.37	0.010	0.013	0.010	0.015	0.011	0.023	-
Acute Toxicity	Rainbow trout [e]	Pass/Fail	NL	NL (n=1)	NL (n=1)	NL (n=1)	NL (n=2)	NL (n=1)	L (n=1), NL (n=1)	NL (n=1)
	Daphnia magna [e]	Pass/Fail	-	NL (n=1)	NL (n=1)	NL (n=1)	NL (n=2)	NL (n=1)	L (n=2), NL (n=1)	L (n=1)
Effluent Characterization [c]	Specific Conductance (lab)	µS/cm	-	948	1,320	63	1,270	656	3,330	-
	Hardness	mg/L	-	465	724	25	701	318	1,990	-
	Alkalinity	mg/L	-	31.7	44.0	11.0	18.5	10.0	82.0	-
	Ammonia (NH_3)	mg/L	-	0.40	0.47	0.02	0.71	0.43	1.67	-
	Nitrate (NO_3)	mg/L	-	3.8	4.9	0.2	5.1	2.5	8.0	-
	Aluminum (Al)	mg/L	-	0.3120	0.1165	0.6600	0.0385	0.0363	0.0500	-
	Cadmium (Cd)	mg/L	-	0.000070	0.000161	0.000010	0.000182	0.000057	0.000380	-
	Iron (Fe)	mg/L	-	0.47	0.33	0.77	0.30	0.48	7.10	-
	Mercury (Hg)	mg/L	0.0001	0.000010	0.000010	0.000010	0.000010	-	0.000010	-
	Molybdenum (Mo)	mg/L	-	0.0002	0.0003	0.0005	0.0001	0.0001	0.0005	-
	Selenium (Se)	mg/L	-	0.0014	0.0026	0.0001	0.0020	0.0012	0.0047	-

Indicates monthly mean value above applicable limit for deleterious substances, mercury concentration above fish usability assessment trigger value *or* acute toxicity test failure based on individual test result.

[a] In cases where analyte concentrations were less than Method Detection Limits (MDL), the MDL was used for calculation of mean values. Appendix C provides raw data.

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2017).

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2017).

[d] Limits indicated refer to maximum authorized monthly mean concentrations as per MMER except mercury, where the limit provided is the grab concentration trigger for conducting a fish tissue survey for EEM.

[e] Indicates that all acute toxicity tests must 'pass' test criteria (i.e., an effluent at 100% concentration that kills less than 50% of test organisms over a 96-hour [rainbow trout] or 48-hour [*D. magna*] period when tested in accordance with Environment Canada protocols). "NL" refers to a non-lethal 'pass' test result, "L" refers to a lethal 'failure' test result.

Table 3.2: Sublethal Toxicity Test Effluent Effect Concentration Results (% effluent)[a] using Mary River Project Final Effluent (Station MS-08), 2015 - 2017

Study Period	Sample Date	Fathead Minnow		*Ceriodaphnia dubia*		*Lemna minor*		*Pseudokirchneriella subcapitata*
		Survival LC_{50}	Growth IC_{25}	Survival LC_{50} [a]	Reproduction IC_{25} [a]	Dry Weight IC_{25}	Frond Increase IC_{25}	Growth IC_{25}
EEM Phase 1	11-Aug-15	>100	> 100	> 100	> 100	2.6 (1.3 - 4.2)	8.5 (6.0 - 11.7)	> 91
	19-Jul-16	>100	> 100	> 100	91 (60 - 97)	> 97	> 97	> 91 [b]
	30-Aug-16	>100	> 100	> 100	> 100	21.5 (6.9 - 75)	7.9 (5.5 - 9.7)	> 91 [b]
	25-Jul-17	>100	> 100	> 100	> 100	56.2 (33 - 89)	22.8 (16 - 28)	> 91
	24-Aug-17	>100	> 100	20 (9.0 - 100)	6.5 (3.4 - 10)	3.9 (1.7 - 6.1)	1.7 (0.8 - 4.3)	> 91
	Geometric mean	**100**	**100**	**72**	**57**	**16**	**12**	**> 91**

[a] LC_{50} is the effluent concentration causing 50% mortality among tested organisms; IC_{25} is the effluent concentration causing a 25% inhibition/reduction in endpoint compared to the control group for the organism tested.

[b] Significant stimulation of *P. subcapitata* growth was exhibited for tests conducted using final effluent in 2016.

sample compared to effluent used in all previous sublethal toxicity tests, suggesting a causal link. Because cladoceran invertebrates can be sensitive to high dissolved solids concentrations (Mount et al. 1997; Soucek and Kennedy 2005), greater major ion concentrations (e.g., hardness) in the August 2017 effluent sample potentially also contributed to greater sublethal toxicity to this test species than during previous testing. Duckweed (*Lemna minor*) growth inhibition was observed in most tests using the MS-08 effluent, with reduced frond weight and frond production occurring at effluent effect concentrations ranging from approximately 3% to 56% and 2% to 23%, respectively, in all tests conducted except the July 2016 sample in which no toxicity occurred (Table 3.2).

Maximum concentrations of MS-08 effluent at Mary River Tributary-F and Mary River were previously estimated as 1.7% and 0.04%, respectively, based on extrapolation of effluent discharge volumes and watershed hydrology data collected in 2015 (Minnow 2016a). Because the minimum effluent effect concentration for *C. dubia* (i.e., 6.5%) was well above the concentration of effluent expected in Mary River Tributary-F, no toxicity to representative planktonic invertebrates was likely in the MS-08 effluent receiving environment. However, the lowest effluent effect concentrations shown for duckweed were similar to maximum effluent concentrations estimated for Mary River Tributary-F immediately downstream of the MS-08 channel confluence in two of the five tests[8] conducted over the Phase 1 EEM period (Table 3.2). The latter suggested a low potential for effects on growth of a representative aquatic plant species within the immediate Mary River Tributary-F receiving environment. Notably, no aquatic vascular plants were observed at effluent-exposed and reference areas of both Mary River Tributary-F and Mary River during the EEM field study (Appendix C).

[8] This statement takes the 95% confidence limits of the sublethal toxicity test results into account.

4 WATER QUALITY

4.1 Mary River Tributary-F

In situ water temperature was significantly lower at the effluent-exposed area than at the reference area of Mary River Tributary-F at the time of the August 2017 EEM biological field study (Figure 4.1), likely reflecting natural influences of warming ambient air temperature between morning effluent-exposed area and afternoon reference area sampling, respectively, on the day of sampling. Dissolved oxygen (DO) concentrations did not differ significantly between the Mary River Tributary-F effluent-exposed and reference study areas, and were well above the WQG[9] lowest acceptable concentration for sensitive, early life stages of cold water biota (i.e., 9.5 mg/L) at both study areas (Figure 4.1). Although pH was significantly higher at the effluent-exposed area than at the reference area of Mary River Tributary-F, the mean incremental difference in pH between areas was very small (i.e., 0.012 units) and pH values were well within the WQG acceptable range for the protection of aquatic life (Figure 4.1). As a result, the difference in pH between the Mary River Tributary-F effluent-exposed and reference areas was not likely to be ecologically meaningful.

Specific conductance was significantly higher at the effluent-exposed area than at the reference area of Mary River Tributary-F at the time of the August 2017 EEM field study, with the small incremental difference between study areas (i.e., approximately 4 µS/cm) suggesting a slight effluent-related influence on water quality of the tributary (Figure 4.1). Notably, a substantial step increase in specific conductance was observed approximately 1.9 km downstream of the MS-08 effluent channel confluence on Mary River Tributary-F at the time of the August 2017 field study (Appendix Figure D.1). Specific conductance also became elevated at the same location in Mary River Tributary-F (relative to upstream) during reconnaissance sampling in August 2015. The higher specific conductance at this location and farther downstream in Mary River Tributary-F was attributed to the receipt of surface runoff from areas at which chloride salts (e.g., $CaCl_2$) were used to assist with exploratory/operational drilling through material exhibiting subsurface permafrost and/or natural variation in geological properties.

Extrapolation of field measured specific conductance at the benthic invertebrate community effluent-exposed and reference areas and daily average specific conductance of the MS-08 effluent discharge from August 30th to September 5th, 2017 (i.e., 2,658 µS/cm) was used to provide an estimate of effluent concentration in the immediate receiving environment. The corresponding

[9] Canadian Environmental Quality Guidelines (CCME 1999, 2017) were used as the primary source for WQG. For parameters in which no CCME guideline was available, Ontario Provincial Water Quality Objectives (OMOEE 1994) or British Columbia Water Quality Guidelines (BCMOE 2017) were used as WQG.

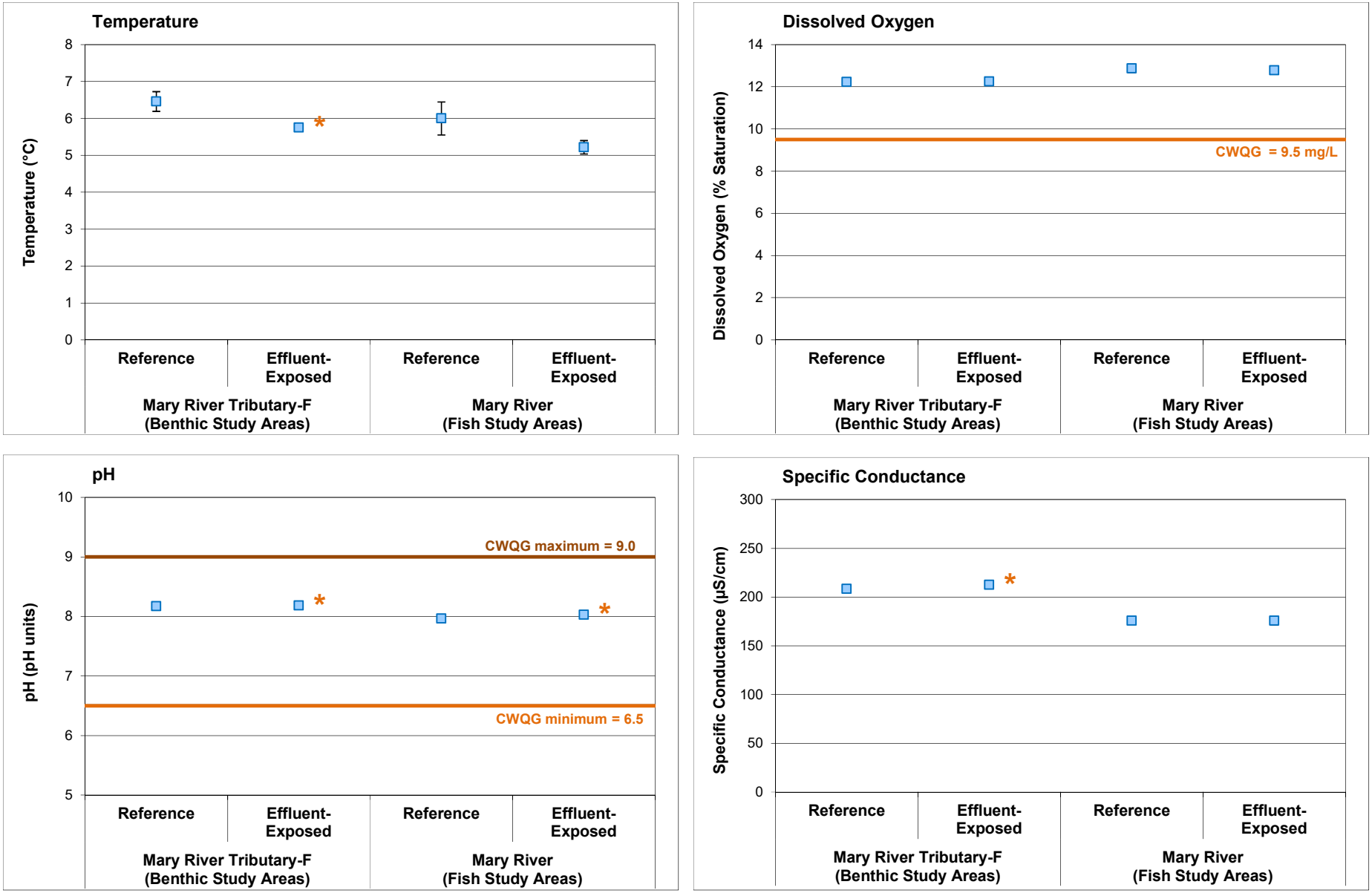

Figure 4.1: Comparison of *In Situ* Water Quality Variables (mean ± SE; n = 5) Measured at Mary River Tributary-F Benthic Stations and Mary River Fish Population Study Areas, Mary River Project Phase 1 EEM, August 2017

Note: An asterisk (*) next to effluent-exposed area data point indicates that the mean value differed significantly from that of the applicable reference area.

proportion of effluent at the Mary River Tributary-F effluent-exposed area immediately below the effluent channel confluence was estimated as 0.17%. Notably, the average daily effluent volume released from MS-08 on August 24th and 25th (i.e., 373 m^3/day) from which this effluent proportion at Mary River Tributary-F was estimated was approximately one-fifth the maximum MS-08 effluent discharge over the EEM Phase 1 period (Appendix Table D.1). The effluent concentration of 0.17% was within the effluent concentration range of 0.03 and 1.3% estimated by Minnow (2016a) for the immediate mine receiving environment using watershed discharge rates pro-rated from six Mary River Project mine site stream gauging stations and average volume of MS-08 discharged in 2015. Although a hydrological station was established within Mary River Tributary-F in 2017, a data logger malfunction resulted in the collection of flow data from June 27th to July 30th, of which only three days overlapped with that of the MS-08 effluent discharge. Using the same extrapolation approach used by Minnow (2016a), the effluent concentration estimated at Mary River Tributary-F immediately downstream of the MS-08 channel confluence ranged from 0.34% to 0.89% over a period of three days in late June 2017. Therefore, these data corroborated previous estimates that suggest effluent concentrations generally remain below 1% in Mary River Tributary-F.

Water quality monitoring conducted to meet regulatory requirements outside of EEM indicated that, on average, only ammonia, nitrate and/or sulphate concentrations were slightly elevated (i.e., three- to five-fold higher) at Mary River Tributary-F (Stations MRTF-1 and F0-01) compared to Mary River upstream reference conditions during periods of effluent discharge in 2016 and 2017 (Appendix Tables D.11 and D.12). However, concentrations of these parameters were consistently well below applicable WQG at Mary River Tributary-F (Appendix Tables D.11 and D.12). Although total concentrations of aluminum and iron were occasionally above respective WQG at effluent-exposed stations within Mary River Tributary-F in 2016 and 2017, similar or higher concentrations of these metals were observed at the Mary River upstream reference stations during any given sampling event (Appendix Tables D.11 and D.12), indicating natural elevation of total aluminum and iron concentrations in regional watercourses. Overall, the MS-08 effluent discharge resulted in only a marginal elevation in ammonia, nitrate and/or sulphate concentrations at Mary River Tributary-F.

4.2 Mary River

In situ water temperature and DO concentrations at the Mary River effluent-exposed area did not differ significantly from those measured at the Mary River reference area at the time of the August 2017 EEM fish population field study (Figure 4.1). In addition, DO concentrations at each of these study areas were well above the WQG lowest acceptable concentration for early life stages of cold water biota (i.e., 9.5 mg/L; Figure 4.1). Similar to differences between the Mary River

Tributary-F benthic study areas, pH was significantly higher at the Mary River fish population survey effluent-exposed area than at the reference area, but the mean incremental difference in pH between areas was very small (i.e., 0.06 units). The effluent-exposed area pH was also well within the WQG range considered protective of aquatic life (Figure 4.1). Thus, the difference in pH between the Mary River fish population survey effluent-exposed and reference study areas was not likely to be ecologically meaningful. No significant difference in specific conductance was indicated between the Mary River fish population survey effluent-exposed and reference study areas at the time of the EEM biological field study (Figure 4.1). The occurrence of highly comparable specific conductance between the Mary River study areas was consistent with previous estimates of effluent concentrations in Mary River, which indicated that effluent was likely to constitute less than 0.1% of flow in Mary River (Minnow 2016a).

Water quality monitoring at Mary River EEM stations indicated very similar annual average water chemistry upstream and downstream of the Mary River Tributary-F confluence over the Phase 1 EEM period (i.e., 2015 – 2017; Table 4.1). Although annual average concentrations of aluminum and iron were higher at the Mary River EEM effluent-exposed water quality station than at the upstream reference station in 2016, the magnitude of this difference was less than 1.5 times higher and a similar elevation was not observed in either 2015 or 2017 (Table 4.1). On average, total concentrations of aluminum and iron were above respective WQG at the Mary River effluent-exposed station from 2015 to 2017, but similar annual average concentrations of these metals were observed at the Mary River upstream reference station during any given sampling event (Table 4.1), indicating natural elevation of aluminum and iron concentrations in Mary River. Notably, of those parameters shown to be elevated at Mary River Tributary-F, only average concentrations of nitrate were elevated at the Mary River EEM effluent-exposed station compared to the respective reference station, and only in 2017 (Table 4.1; Appendix Tables D.10 – D.12). However, nitrate concentrations were consistently well below WQG at the Mary River effluent-exposed station, suggesting that the slight elevation in 2017 was not ecologically meaningful. Within the Mary River effluent-exposed area, water chemistry was consistently very similar between the EEM water quality station (i.e., MS-08-DS) and farther downstream at the fish population survey study area (i.e., Station E0-21[10]) during periods of effluent discharge in 2016 and 2017 (Appendix Tables D.11 and D.12). This suggested similar mine effluent exposure to fish inhabiting the Mary River EEM fish population survey effluent-exposed area and those inhabiting the effluent-exposed area closer to the Mary River Tributary-F confluence validating the use of the former area as a safe alternative sampling location.

[10] Water chemistry is monitored at Station EO-21 to meet Baffinland Core Receiving Environment Monitoring Program (CREMP) requirements, outside of sampling required by Baffinland to meet the MMER.

Table 4.1: Annual Average Water Chemistry at Mary River EEM Stations during Periods of Effluent Discharge, 2015 to 2017

Parameters		Units	Water Quality Guideline (WQG)[a]	Mary River Upstream (MS-08-US)			Mary River Downstream (MS-08-DS)		
				2015	2016	2017	2015	2016	2017
Conventionals	Conductivity (lab)	umho/cm	-	75	130	93	78	133	97
	pH (lab)	pH	6.5 - 9.0	8.07	7.99	8.35	7.96	8.09	8.15
	Hardness (as $CaCO_3$)	mg/L	-	52	56	42	55	57	44
	Total Suspended Solids (TSS)	mg/L	-	2.0	2.9	2.7	2.0	4.4	2.8
	Total Dissolved Solids (TDS)	mg/L	-	78		76	80		43
	Alkalinity (as $CaCO_3$)	mg/L	-	51	53	41	52	56	43
Nutrients and Anions	Total Ammonia	mg/L	variable[c]	0.05	0.02	0.02	0.05	0.02	0.02
	Nitrate	mg/L	13	0.02	0.02	0.02	0.02	0.02	0.05
	Total Organic Carbon	mg/L	-	1.0		1.4	1.0		1.5
	Total Phosphorus	mg/L	0.020[α]	0.0058		0.0046	0.0051		0.0053
	Chloride (Cl)	mg/L	120	3.81		3.86	3.72		3.87
	Sulphate (SO_4)	mg/L	218[β]	3.26		2.44	3.19		2.97
Total Metals	Aluminum (Al)	mg/L	0.100	0.312	0.343	0.122	0.305	0.440	0.122
	Antimony (Sb)	mg/L	0.020[α]	0.0001		0.0001	0.0001		0.0001
	Arsenic (As)	mg/L	0.005	0.00010	0.00011	0.00010	0.00010	0.00012	0.00010
	Barium (Ba)	mg/L	-	0.00758		0.00907	0.00755		0.00949
	Cadmium (Cd)	mg/L	0.00012	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
	Calcium (Ca)	mg/L	-	11.3		13.1	11.3		13.2
	Chromium (Cr)	mg/L	0.0089	0.0005		0.0005	0.0005		0.0005
	Cobalt (Co)	mg/L	0.0009[α]	0.0001		0.0001	0.0001		0.0001
	Copper (Cu)	mg/L	0.002	0.0010	0.0013	0.0010	0.0010	0.0013	0.0010
	Iron (Fe)	mg/L	0.30	0.184	0.271	0.102	0.166	0.368	0.097
	Lead (Pb)	mg/L	0.001	0.00018	0.00024	0.00011	0.00016	0.00030	0.00009
	Lithium (Li)	mg/L	-	0.001		0.001	0.001		0.001
	Magnesium (Mg)	mg/L	-	6.3		6.9	6.4		7.3
	Manganese (Mn)	mg/L	0.935[β]	0.0019		0.0019	0.0020		0.0011
	Mercury (Hg)	mg/L	0.000026	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
	Molybdenum (Mo)	mg/L	0.073	0.00035	0.00032	0.00020	0.00035	0.00032	0.00020
	Nickel (Ni)	mg/L	0.025	0.0008	0.0006	0.0006	0.0008	0.0008	0.0005
	Potassium (K)	mg/L	-	1.02		1.04	1.02		1.06
	Selenium (Se)	mg/L	0.001	0.00053	0.00005	0.00005	0.00053	0.00005	0.00005
	Silicon (Si)	mg/L	-	1.4		0.99	1.39		1.02
	Silver (Ag)	mg/L	0.00025	0.00001		0.00005	0.00001		0.00005
	Sodium (Na)	mg/L	-	1.8		2.2	1.8		2.1
	Strontium (Sr)	mg/L	-	0.0077		0.0125	0.0077		0.0133
	Thallium (Tl)	mg/L	0.0008	0.00006		0.00001	0.00006		0.00001
	Titanium (Ti)	mg/L	-	0.012		0.006	0.011		0.005
	Uranium (U)	mg/L	0.015	0.0020		0.0023	0.0019		0.0024
	Vanadium (V)	mg/L	0.006[α]	0.001		0.0005	0.001		0.0005
	Zinc (Zn)	mg/L	0.030	0.003	0.003	0.003	0.003	0.003	0.003

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 2017) except those indicated by α (Ontario Provincial Water Quality Objective; OMOEE 1994) and β (British Columbia Water Quality Guideline; BCMOE 2017).

Indicates parameter concentration above applicable Water Quality Guideline.

5 BENTHIC INVERTEBRATE COMMUNITY SURVEY

Benthic invertebrate density, richness, Simpson's Evenness and Bray-Curtis Index[11] did not differ significantly between the Mary River Tributary-F effluent-exposed and reference study areas during the August 2017 survey (Figure 5.1; Table 5.1). Direct comparison of dominant benthic invertebrate community groups[12] indicated a subtle difference in community composition between the effluent-exposed and reference areas of Mary River Tributary-F that was driven entirely by significantly greater density of Simuliidae (blackflies) at the effluent-exposed study area (Figure 5.2; Table 5.1). Because blackflies exhibit a filter-feeding, clinging mode of existence in aquatic habitats (Merritt et al. 2008), differences in filterer FFG and clinger HPG densities between the Mary River Tributary-F effluent-exposed and reference study areas (Figure 5.2; Table 5.1) reflected the difference in blackfly densities shown between areas. Notably, with the removal of Simuliidae from the data set, no significant differences in any of the primary EEM benthic invertebrate community metrics of density, richness, Simpson's Evenness and Bray-Curtis Index, calculated at family-level and lowest-practical-level taxonomy, were indicated between the effluent-exposed and reference areas (Appendix Table E.7). In addition, no significant differences in any of the supporting taxonomic group, FFG and HPG metrics except the proportion of collector-gatherer FFG, were indicated between Mary River Tributary-F effluent-exposed and reference study areas with the removal of Simuliidae from the data set (Appendix Table E.7).

Higher densities of blackflies generally occur at the outlets of tributaries and in larger-sized streams (Carlsson 1967; Grillet and Barrera 1997; Pramul and Wongpakum 2010), possibly due to greater inputs of suspended organic matter, the predominant food source for blackflies, at these habitats (Carlsson et al. 1977). Therefore, a greater density of blackflies downstream of the MS-08 effluent channel confluence on Mary River Tributary-F may have reflected increased food resources originating from the effluent-channel. Notably, blackfly larval densities do not appear to be strongly influenced by plankton abundance (Carlsson 1967), suggesting that non-living organic matter received from runoff potentially accounted for higher densities of blackflies at the effluent-exposed area. No significant differences in densities of metal-sensitive chironomids were indicated between the Mary River Tributary-F effluent-exposed and reference study areas, suggesting that between-area differences in metal concentrations did not affect the composition of the benthic invertebrate community at the effluent-exposed area. In addition, no significant differences in sample replicate water velocity, substrate size, or substrate embeddedness were

[11] Unless otherwise indicated, primary EEM benthic invertebrate community metrics of richness, Simpson's Evenness and Bray-Curtis Index discussed in this section were calculated using family-level (FL) taxonomy.

[12] Dominant groups included taxonomic, functional feeding, or habitat preference groups representing ≥10% of the community at any one station, and/or an average ≥5% of the community at any one study area (Appendix Table E.5).

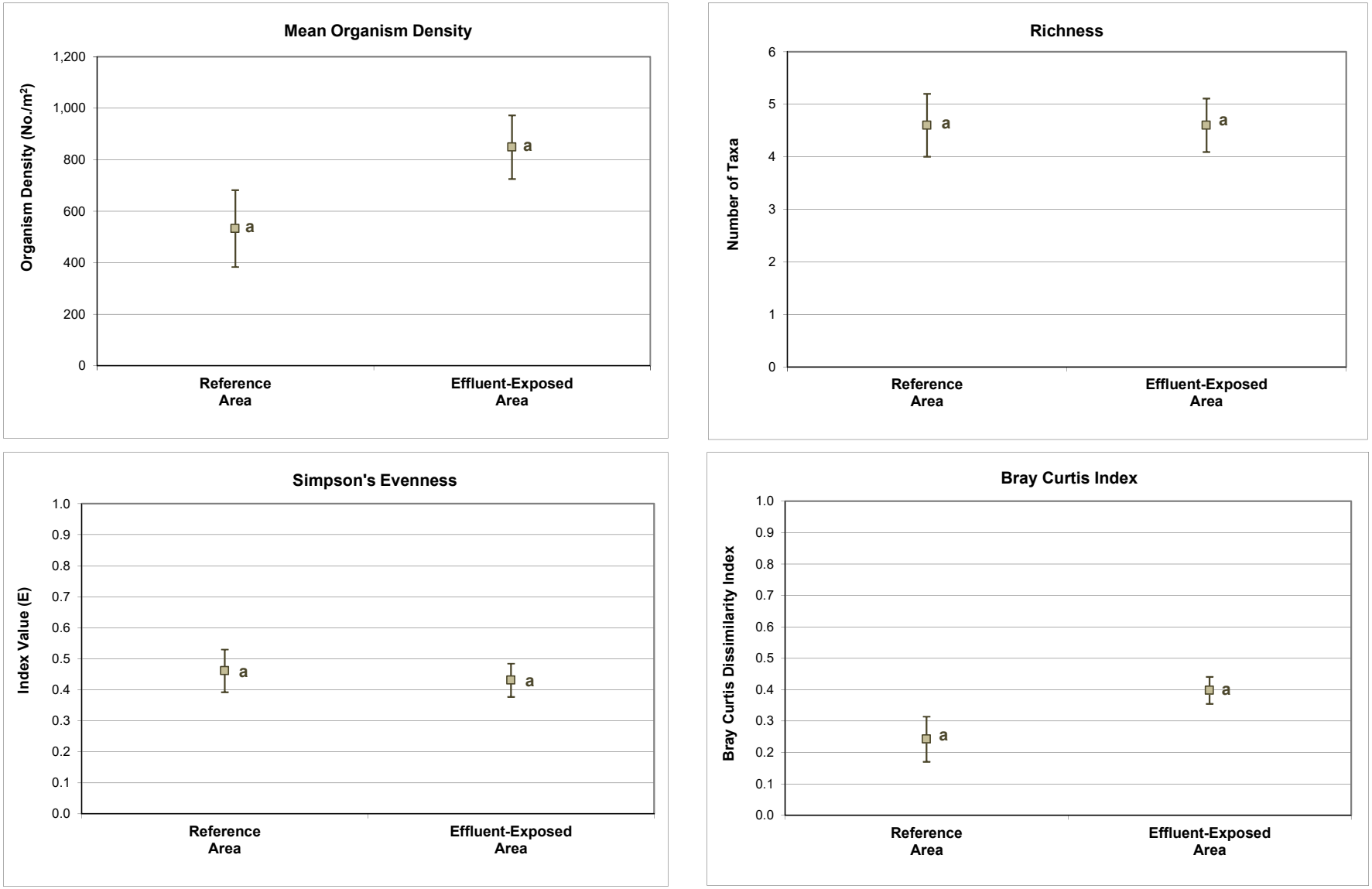

Figure 5.1: Comparison of Benthic Invertebrate Community Primary EEM Endpoints (mean ± SE, n = 5; calculated using Family Level taxonomy) for Mary River Tributary-F Effluent-Exposed and Reference Study Areas

Note: Data points with the same letter do not differ significantly.

Table 5.1: Benthic Invertebrate Community Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Study Areas Calculated for Primary EEM Metrics (Family Level Taxonomy) and Dominant Taxa, FFG and HPG

Metric	Two-Sample Comparison					Summary Statistics						
	Significant Difference Among Areas?	Trans-formation	Test	p-value	Magnitude of Difference [a] (No. of SD)	Area	Median	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Density (Individuals/m^2)	NO	fourth root	ANOVA	0.1238	~	Reference	474	533	334	149	188	1,058
						Effluent-Exposed	855	849	276	123	448	1,175
Richness (Number of Taxa)	NO	fourth root	ANOVA	0.9727	~	Reference	4.0	4.6	1.3	0.6	3.0	6.0
						Effluent-Exposed	5.0	4.6	1.1	0.5	3.0	6.0
Simpson's Evenness	NO	log_{10}	ANOVA	0.7872	~	Reference	0.430	0.461	0.154	0.069	0.297	0.689
						Effluent-Exposed	0.379	0.430	0.120	0.054	0.338	0.637
Bray-Curtis Index	NO	none	ANOVA	0.1006	~	Reference	0.204	0.242	0.161	0.072	0.069	0.439
						Effluent-Exposed	0.423	0.398	0.096	0.043	0.291	0.491
Chironomidae (No. per m^2)	NO	none	ANOVA	0.8030	~	Reference	241	309	170	76	102	531
						Effluent-Exposed	284	283	139	62	133	426
Metal Sensitive Chironomidae	NO	none	ANOVA	0.8397	~	Reference	107	121	59	27	40	199
						Effluent-Exposed	112	114	34	15	70	155
Simuliidae (No. per m^2)	YES	none	ANOVA	0.0137	2.0	Reference	161	205	169	75	75	487
						Effluent-Exposed	552	540	169	75	297	706
Collector-gatherers (No. per m^2)	NO	none	ANOVA	0.7417	~	Reference	240	310	173	77	102	532
						Effluent-Exposed	277	277	132	59	133	416
Filterers (No. per m^2)	YES	none	ANOVA	0.0137	2.0	Reference	161	205	169	75	75	487
						Effluent-Exposed	552	540	169	75	297	706
Clingers (No. per m^2)	YES	none	ANOVA	0.0151	2.0	Reference	165	212	175	78	79	505
						Effluent-Exposed	563	558	179	80	308	763
Sprawlers (No. per m^2)	NO	none	ANOVA	0.7510	~	Reference	240	305	166	74	102	517
						Effluent-Exposed	277	274	130	58	133	412

[a] Magnitude calculated by comparing the difference between the reference area and effluent-exposed area means divided by the reference area standard deviation.

Highlighted values indicates significant difference between study areas based on a p-value less than 0.10.

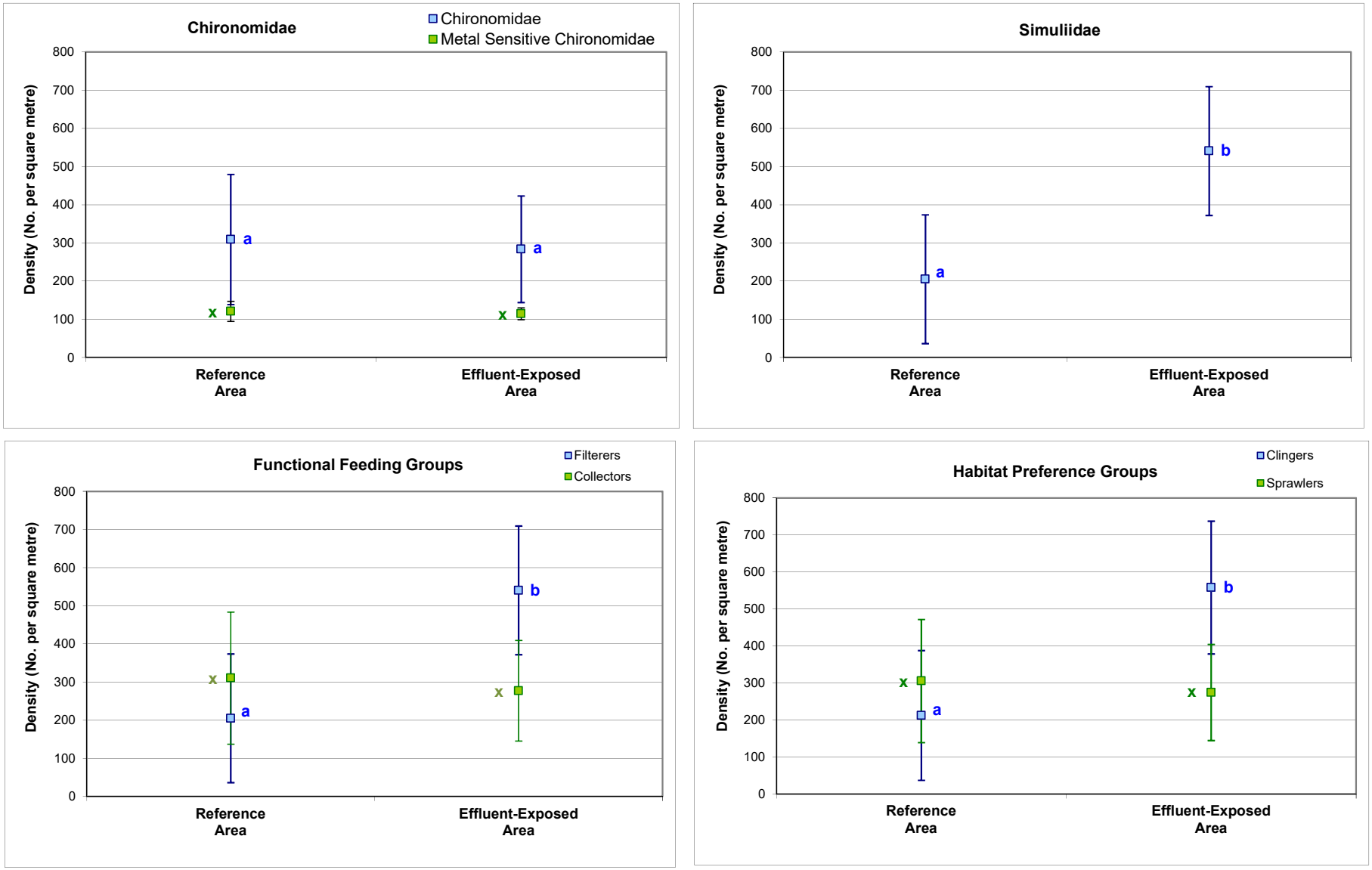

Figure 5.2: Comparison of Dominant Benthic Invertebrate Community Compositional Groups (density in m^2) between Mary River Tributary-F EEM Study Areas (mean ± SE, n = 5), Mary River Project Phase 1 EEM, August 2017

Note: Data points with the same, like-coloured letters do not differ significantly.

indicated between the Mary River Tributary-F effluent-exposed and reference study areas (Appendix Table E.3), suggesting that the difference in blackfly density between these areas was unrelated to these variables.

Overall, statistical similarity in primary EEM metrics of density, richness, Simpson's Evenness and Bray-Curtis Index between effluent-exposed and reference areas of Mary River Tributary-F indicated no effluent-related effects on the benthic invertebrate community in the receiving environment downstream of the MS-08 effluent discharge.

6 FISH POPULATION SURVEY

6.1 Fish Community

No fish were captured within Mary River Tributary-F either downstream or upstream of the MS-08 effluent discharge channel during the August 2017 fish population survey (Table 6.1; Appendix Table F.1). Fish sampling was conducted at reaches extending from the outlet to upstream of the effluent discharge (Figure 2.3), and therefore the lack of fish captures indicated that fish were naturally absent through the entire Mary River Tributary-F system. The natural absence of fish from Mary River Tributary-F presumably reflected the combination of complete freezing overwinter and an inability of fish to colonize the tributary due to relatively high stream gradient and the presence of natural in-stream barriers. An average gradient of 12% was documented through the lower 750 m of Mary River Tributary-F during the EEM fish population survey. In addition, an approximately 1.75 m high step-drop over large boulder habitat occurred approximately 50 m upstream of Mary River on Mary River Tributary-F (Appendix Photo Plate C.1), representing an impassable barrier for upstream migration by fish under the flow conditions observed at the time of the EEM fish population survey.

Table 6.1: Summary of Fish Catches at Mary River Project Phase 1 EEM Fish Population Study Areas, August 2017

Study Area	Total Effort		Summary Statistic Endpoint	Fish Species			Catch Summary	
	Distance Sampled (m)	Electrofishing Seconds		Arctic Charr		Ninespine Stickleback	Totals	Total No. Species
				YOY [b]	Non-YOY [b]			
Mary River Tributary-F Efffluent-Exposed	678	4,157	Total No. Caught	0	0	0	**0**	**0**
			CPUE[a]	0.0	0.0	0.0	**0.0**	
Mary River Effluent-Exposed	388	4,587	Total No. Caught	0	100	0	**100**	**1**
			CPUE[a]	0	1.30	0	**1.30**	
Mary River Reference	708	8,340	Total No. Caught	2	103	3	**108**	**2**
			CPUE[a]	0.01	0.75	0.02	**0.78**	

[a] Electrofishing catch-per-unit-effort (CPUE) represents number of fish captured per minute of electrofishing.

[b] Young-of-the-year (YOY).

The fish community at the effluent-exposed area of Mary River was represented only by arctic charr (*Salvelinus alpinus*), which differed slightly from that of the Mary River reference area where low numbers of ninespine stickleback (*Pungitius pungitius*) were captured in addition to arctic charr (Table 6.1; Appendix Table F.1). Arctic charr catch-per-unit-effort (CPUE) was substantially higher at the effluent-exposed area than at the reference area (Table 6.1), suggesting greater abundance of arctic charr at the effluent-exposed area. The between-area difference in arctic charr abundance may have reflected natural differences in the type of habitat sampled between the effluent-exposed and reference areas. At the effluent-exposed area, the predominant habitat consists of side and braided channels characterized by variable water velocity and large, loosely embedded cobble substrate, whereas at the reference area, habitat is dominated by a single main channel characterized by relatively deep, fast flowing water over highly embedded boulder substrate (Appendix Table C.4; Appendix Photo Plate C.2). These habitat features allowed fish sampling to be conducted throughout side-channels at the effluent-exposed area, but limited the sampling to shoreline areas at the reference area as a result of improved fish catch efficiencies potentially related to the field study team sampling mobility and commensurate safety concerns. Overall, no effluent-related influences on fish community composition and arctic charr abundance were apparent within the Mary River receiving environment.

6.2 Arctic Charr Population Evaluation

Non-lethal measurements of length and weight were collected from 102 and 100 arctic charr at Mary River effluent-exposed and reference study areas, respectively, for the assessment of EEM fish population endpoints (Appendix Tables F.2 and F.3). Arctic charr YOY were distinguishable from non-YOY individuals at a fork length of 50 mm based on evaluation of length-frequency distributions coupled with supporting age determinations (Figure 6.1). Based on this cut-off value, no YOY were captured at the effluent-exposed area, and only two YOY were captured at the reference area (i.e., approximately 2% of arctic charr population). As a result, the arctic charr population assessment focused on non-YOY individuals.

Arctic charr length-frequency distributions did not differ significantly between the effluent-exposed and reference areas of Mary River, regardless of whether YOY were included or excluded from the data set (Table 6.2; Figure 6.1; Appendix Figure F.1). Because the inclusion of YOY did not change the outcome of the length-frequency distribution statistical comparison, no difference in the proportion of YOY was indicated between the effluent-exposed and reference study areas (Table 6.2). Among non-YOY arctic charr, no separation of age (i.e., cohorts) was possible for either study area using the length-frequency distribution and confirmatory aging results (Figure 6.1). Nevertheless, visual evaluation of the plotted data suggested a similar arctic charr length-at-age relationship between the effluent-exposed and reference areas (Figure 6.1). Fork

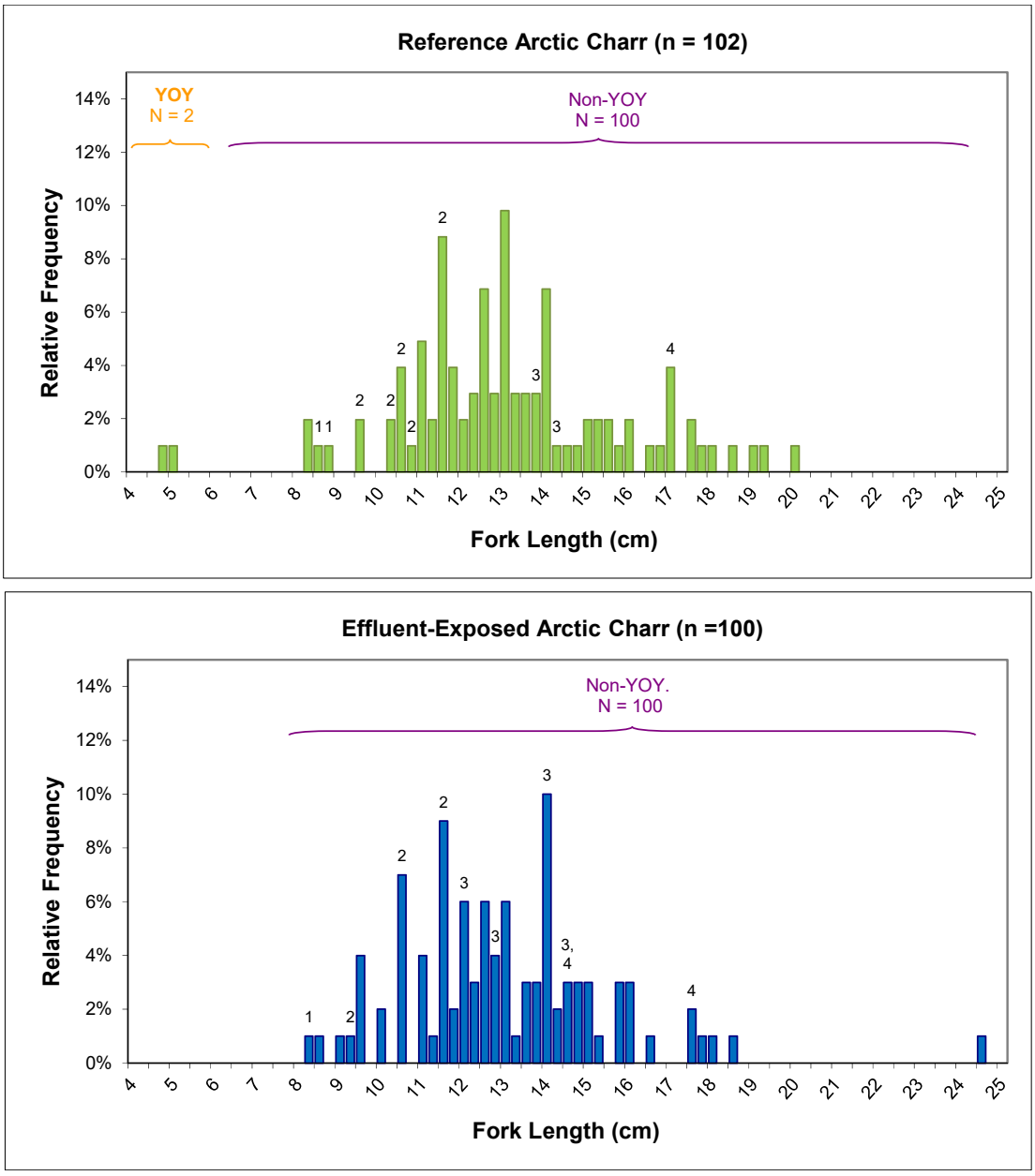

Figure 6.1: Length-frequency Distributions for Arctic Charr Collected at Mary River Project Phase 1 EEM Effluent-Exposed and Reference Study Areas, August 2017

Note: Numbers above bars represent individual fish ages, where available.

length and body weight of non-YOY arctic charr captured at the effluent-exposed area did not differ significantly from those captured at the reference area (Table 6.2; Appendix Figures F.2 and F.3). Although condition (i.e., weight-at-length relationship) of non-YOY individuals was significantly lower at the Mary River effluent-exposed area than at the reference area, the

magnitude of this difference was within applicable CES (i.e., ±10%; Table 6.2; Figure 6.2; Appendix Table F.4) suggesting that this difference was not ecologically meaningful. No externally-visible abnormalities or parasitic infections were observed on any arctic charr captured at the Mary River effluent-exposed area (Appendix Table F.3). Overall, no significant, ecologically meaningful differences in arctic charr non-YOY health endpoints were indicated between the effluent-exposed and reference areas, suggesting limited influence of the MS-08 effluent on the health of this species at Mary River in 2017.

Table 6.2: Summary of Arctic Charr Population Statistical Comparison Results between Effluent-Exposed and Reference Areas of Mary River, August 2017

Endpoint		Significant Difference		Magnitude of Difference (%)
		Yes/No	p-value	
Survival – Length Frequency Distribution	All Fish	No	0.936	-
	Non-YOY only	No	0.906	-
Growth	Non-YOY length	No	0.523	-
	Non-YOY weight	No	0.200	-
Energy Storage	Non-YOY condition	Yes	<0.001	-4.5
Reproduction	YOY Proportion	No		

Figure 6.2: Comparison of Condition (Weight-at-Fork Length Relationship) for Arctic Charr Non-Young-of-the-Year (Non-YOY) Collected at Mary River Effluent-Exposed and Reference Areas, August 2017

7 CONCLUSIONS

The objective of the Mary River Project Phase 1 EEM biological study was to provide an initial evaluation of the influence of mine effluent on biota of the mine receiver. To meet this objective, effluent quality, receiving environment water quality, and habitat characterization data were used to support the interpretation of benthic invertebrate community and fish population survey data collected at effluent-exposed areas and respective reference areas of Mary River Tributary-F and Mary River. The principal conclusions from the Phase 1 EEM study are:

- Effluent from the Mary River Project primary discharge (MS-08) met all MMER limits during normal mine operations in 2015, 2016 and, with the exception of the discharge of effluent with low pH in some grab samples collected in August and September, and elevated mean monthly TSS concentrations in August, also met MMER limits in 2017. Mine effluent was non-acutely lethal to rainbow trout and *Daphnia magna* in 2015 and 2016, but was acutely lethal to one or both test species during individual tests conducted on August 1st and September 5th, 2017. Baffinland reported these non-compliances through the appropriate stakeholders and regulatory bodies and implemented corrective actions to mitigate effects and prevent future occurrences. Sublethal toxicity tests conducted using final effluent samples showed no effects on survival or growth of fathead minnow or on growth of green algae over the Phase 1 EEM period. Occasional effects on survival and/or reproduction of *Ceriodaphnia dubia* planktonic invertebrates and more consistent growth inhibition to duckweed were shown in effluent sublethal toxicity tests conducted from 2015 to 2017. However, effects to these test organisms were generally observed at effluent concentrations higher than those typically expected within the mine receiving environment, suggesting limited potential for similar sublethal toxicity effects within the immediate Mary River Tributary-F effluent-exposed area.
- Effluent concentrations estimated for the immediate receiving waters of Mary River Tributary-F were less than 1% based on extrapolation of field specific conductance measures (0.17% in August) and hydrological gauging station data (0.34% – 0.89% in late July) in 2017. The 2017 effluent concentration estimates were consistent with previous estimates for Mary River Tributary-F, which suggested that effluent concentrations range from 0.03% to 1.3% within the watercourse.
- Water chemistry at effluent-exposed areas of Mary River Tributary-F showed slightly elevated ammonia, nitrate and/or sulphate concentrations compared to reference conditions during periods of effluent discharge in 2016 and 2017, but concentrations of these parameters were consistently well below applicable WQG within the watercourse.

Within the effluent-exposed area of Mary River, average nitrate concentrations were slightly elevated compared to the applicable reference area, but only in 2017 and concentrations remained well below WQG, suggesting that the elevation in nitrate concentration was not ecologically meaningful.

- The benthic invertebrate community survey indicated no significant differences in primary EEM endpoints of density, richness, Simpson's Evenness and Bray-Curtis Index between effluent-exposed and reference areas of Mary River Tributary-F. In turn, this suggested no adverse influences to the benthic invertebrate community of Mary River Tributary-F associated with exposure to mine effluent.
- The fish population survey indicated no substantial differences in community species composition between the effluent-exposed and reference areas of Mary River, but potentially higher abundance of fish at the effluent-exposed area due to natural habitat factors. The Mary River arctic charr population showed no significant difference in size (length-frequency) structure, and no significant difference in proportion of YOY individuals between the effluent-exposed and reference areas. In addition, length and weight of non-YOY arctic charr did not differ significantly between populations sampled at the effluent-exposed and reference areas of Mary River. Although non-YOY arctic charr captured at the effluent-exposed area had significantly lower condition (length-at-weight relationship) than those captured at the reference area, the magnitude of this difference was small (i.e., -4.5%) and within the applicable fish condition Critical Effect Size of ±10% used for EEM studies, suggesting that this difference was not ecologically meaningful.

Overall, the Mary River Project Phase 1 EEM indicated very low effluent concentrations within the immediate Mary River Tributary-F receiving environment and commensurately, only minor effluent-related influences on water quality of this watercourse and farther downstream at Mary River during periods of effluent discharge. Although Mary River non-YOY arctic charr had lower condition at the effluent-exposed area than at the reference area, concentrations of mine-related parameters well below WQG and no effluent-related influences on primary EEM benthic invertebrate community endpoints closer to the effluent discharge at Mary River Tributary-F. In turn, this suggested that factors other than mine-effluent accounted for the difference in non-YOY arctic charr condition between the effluent-exposed and reference areas of Mary River.

Based on the prescribed EEM frequency under the MMER, the Study Design for the next Mary River Project EEM biological study must be submitted to Environment and Climate Change Canada (ECCC) no later than six months prior to implementing field collections in 2020. Using the EEM framework, the next phase of biological monitoring (Phase 2) will require an effects assessment, in part, to determine whether the occurrence of significantly lower arctic charr

condition shown in the current EEM is consistent over study phases. The corresponding Phase 2 EEM Interpretive Report must be submitted to ECCC by January 10th, 2021.

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APPENDIX A

STUDY DESIGN APPROVAL CORRESPONDENCE

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Prairie & Northern Region
Environmental Protection Operations Directorate
9250 – 49th Street NW
Edmonton, AB T6B 1K5

February 28, 2017

via email to: jim.millard@baffinland.com

James Millard
Environmental Manager
Baffinland Iron Mines
2275 Upper Middle Road East, Suite 300
Oakville,ON L6H 0C3

Dear Mr. Millard:

Subject: Metal Mining Effluent Regulations – Evaluation of 1st Environmental Effects Monitoring Study Design, Mary River Project, NU

This letter is to advise you that Environment and Climate Change Canada has reviewed your Environmental Effects Monitoring (EEM) biological study design report entitled "Mary River Project Environmental Effects Monitoring Phase 1 Study Design", received July 8, 2016. The review of study design reports takes into account information requirements in the *Metal Mining Effluent Regulations (MMER)* of the *Fisheries Act* and also offers comments on the study based on the EEM Technical Guidance Document and generally accepted standards of good scientific practice.

The compiled review comments and recommendations are attached. Comments in bold indicate where further information is required to meet regulatory requirements and should be addressed for the review of the report to be completed.

Should you have any questions or concerns regarding the EEM program or wish to discuss the review of the study design, please do not hesitate to contact me at (780) 717-4884 or at erik.allen@canada.ca.

Sincerely,

Erik Allen
Environmental Effects Monitoring Coordinator

cc:	Susanne Forbrich	Environment and Climate Change Canada, Edmonton
	Cristina Ruiu	Environment and Climate Change Canada, Regina
	Paula Siwik	Environment and Climate Change Canada, Edmonton
	Curtis Didham	Environment and Climate Change Canada, Iqaluit

Canada

Attachment: Review Comments and Recommendations on 'Mary River Project Environmental Effects Monitoring Phase 1 Study Design', July 2016 submission

Review Comments and Recommendations on 'Mary River Project Environmental Effects Monitoring Phase 1 Study Design', submitted July 2016

The following comments and recommendations are based on the review of the report by a Technical Advisory Panel (TAP) consisting of representatives from Environment and Climate Change Canada (ECCC), Nunavut Water Board (NWB) and Indigenous and Northern Affairs Canada (INAC).

Action items

1. p. 1, Section 1.1. The NWB currently has on file a copy of Baffinland Iron Mines Corporation's (BIMC) Aquatic Effect Monitoring Plan (AEMP) (Rev 2), which includes a Draft EEM Cycle Study Design as a subset of the AEMP. As the NWB is currently in the process of considering BIMC's AEMP for Approval, confirmation is required from BIMC on the extent to which changes included in the current EEM Study Design, which superseded the Draft EEM study design, may impact the NWB's ability to potentially approve the current version of the AEMP.
2. p. 7. The study design includes a description of how effluent mixes in the exposure area, based on extrapolated stream discharge volumes for Tributary-F. It would appear that daily effluent discharge was compared to a stream flow estimate based on annual average flows from nearby streams, however the methods were unclear. Please provide further details on how the stream discharge and effluent concentrations were estimated.
    a. Were extrapolated values based on the average flows from similarly-sized watersheds listed in Table A2? Were the watersheds similar to Tributary-F in elevation, gradient, and aspect?
    b. Was the extrapolated discharge for Tributary F based on 2015 data only?
    c. Were monthly and annual variations in streamflow considered in the estimates of effluent concentration?
    d. Where along Tributary-F do the estimates of effluent concentration apply (e.g., at the confluence with the effluent stream, or downstream at the confluence with Mary River)?
3. p. 12. The proponent is recommended to verify effluent concentrations with in-stream conductivity measurements during effluent discharge periods in 2017. Please provide details on an approach to assess effluent concentrations based on effluent and stream conductivity in the receiving environment, including sampling locations and calculations (refer to the Metal Mining EEM Guidance Technical Document (TGD), Sections 2.2.1.1 and 2.2.1.2).
4. p. 12, Section 2.3.4. It is recommended that the proponent provide details regarding measures implemented and monitoring that may be conducted to determine whether or not the effluent discharged from MS-08 may have any negative impact on the receiving environment, preceding the final discharge point.
5. Figure 2.4. The legend in Figure 2.4 indicates that 2015 data were used to estimate monthly discharge for the Mary River and Tributary-F. Table A-2 presents monthly discharge data for several stations from 2006 to 2014, but there are no 2015 data. Please provide the missing data.

6. p. 18. The study design did not describe methods for the collection of sediment samples for particle size and total organic carbon analyses, which are required if the study is conducted in an area where it is possible to sample sediment (MMER, Sched. 5, s. 16(a)(iii)). The description of the sampling areas (erosional habitat with gravel/cobble substrate) would suggest that sediment sampling will not be possible; please confirm or provide the missing information.

7. **p. 21. The study design suggests that low effluent concentration in the Mary River would exempt the proponent from the requirement to conduct a fish study, should no fish be collected from Tributary-F. The MMER require a fish population study if the effluent concentration in the exposure area is greater than 1% in the area located within 250 m of the final discharge point (FDP) (Sched. 5, s. 9(b)). Based on the information provided, the fish survey exemption does not apply to the proposed study. The fish survey should be initially conducted in Tributary-F as proposed, and if fish are determined to be absent or in low abundance, field crews should sample progressively downstream into the Mary River, where fish may be more abundant. Please provide information on potential reference sites for the Mary River exposure area. Given concerns over low fish abundance, the proponent is recommend to identify several reference site options for the Tributary-F and Mary River exposure areas.**

8. p. 21. The report indicates that mine effluent represented 0.02% - 0.035% of flow in the Mary River. On p.7, the effluent percentage of flow in the Mary River was given as 0.03% and 0.065%; please clarify.

9. p. 25. The study design indicates that stream velocity and channel dimensions will be measured, will discharge volumes be calculated?

10. p. 26. Please briefly describe field preservation and shipping protocols for water samples to ensure laboratory sample hold times are met, given the remote location of the study area.

11. p. 14. Section 3.5.6 It is recommended that the proponent provide details regarding further or continued monitoring and/or analyses that may be conducted to determine the extent to which mining activities may be contributing to the differences, over time, in results observed in the water quality parameters measured at Tributary F and the Mary River Up-stream Reference Station.

12. p. 26. Section 3.5. It is recommended that details regarding the exposure and reference areas to be monitored be confirmed in the EEM Study Design in the context of BIMC's recommended discontinuation of monitoring for several stations potentially related to exposure and/or reference areas, based on the correspondence accompanying the AEMP (Rev 2).

13. **The proponent previously notified the authorization officer of the addition of a second FDP (MS-06) for the Mary River Project (letter from J. Millard to S. Forbrich, June 18, 2016). The MS-06 FDP was not described in the current study design. The MMER require a description of the manner in which the effluent mixes within the exposure area for each final discharge point (MMER, Sched. 5, s. 11(a)). Please provide any available information regarding effluent mixing from MS-06, and a description of plume delineation methods to be implemented in 2017 (as requested for MS-08; see comment #3).**

For mines with multiple effluent discharges, it is recommended that biological monitoring be conducted on the discharge with the greatest potential to have an adverse effect on the receiving environment, based on mass loading of deleterious substances, effluent mixing, and sensitivity of the receiving environment (TGD, Section 2.2.2.1). Potential confounding factors should also be considered. Based on the information provided to date, the TAP would support biological monitoring of the MS-08 FDP as proposed; however, additional information and rationale should be provided to demonstrate that MS-08 is most suitable for biological monitoring.

Please note that MMER requirements for annual effluent characterization and water quality monitoring apply to all FDPs (Sched. 5, s. 4, 7). Requirements for sublethal toxicity testing apply to the FDP with potentially the most adverse environmental impact on the environment, taking into the account the mass loadings of deleterious substances and the manner in which effluent mixes in the exposure area (Sched. 5, s. 5).

14. The MS-06 FDP will discharge to the Mary River through a treated sewage pipeline; will mine effluent and treated sewage be discharged concurrently?
15. Appendix A, Table A.4. Please indicate the location of stream sampling sites listed in Table A.4. Was there a noticeable difference in water chemistry between upstream and downstream sites on Tributary-F?

Other items

16. Fig. 2-4. The figure caption should refer to mean monthly stream discharge, not effluent discharge; please confirm.
17. p. 14. The proponent is recommended to conduct annual water quality monitoring in Tributary F near the confluence with the effluent discharge, and a comparable reference stream, in addition to proposed monitoring in the Mary River.
18. p. 15. The report states that ninespine stickleback have been captured in low abundance in the Mary River area, but later states that arctic charr are the only species captured in Mary River. Have ninespine stickleback been located in any of the streams identified for the biological monitoring study?
19. p. 22. The proponent is advised to plan for up to 7 days of sampling per area to meet sample size targets for the fish survey.
20. p. 23. Please be advised that the TGD recommends independent confirmation of fish ageing for 10% of samples.
21. Table 3.2. The table indicates no statistical analysis for the reproduction endpoint. Please note that the non-lethal reproduction endpoint (relative abundance of YOY) can be analyzed by comparing exposure and reference length frequency distributions with the Kolmogorov-Smirnov test, with and without YOY. If the inclusion of YOY changes the outcome of statistical comparison, the proportion of YOY is considered to be different between sampling areas (TGD, Section 3.4.2.2).
22. p. 25. Please ensure collection of trip and field blanks for water chemistry QA/QC, as recommended by the TGD (Section 5.8.4).
23. An overview document outlining the amendments proposed for the MMER was shared with stakeholders in December 2016. If you have not received this

document and would like a copy, please contact Erik Allen. The proposed amendments are expected to be published in Canada Gazette, Part 1 in spring of 2017. Canada Gazette, Part II publication would likely occur 12 to 18 months following Canada Gazette Part 1 publication.

Minor comments and errata

p.1. The report refers to “Surface (contour strip) mining at the Mary River Project”. Please note that strip mining is not used at Mary River Project.

Figure 1.1. Baffinland Iron Mines Corporation, Mary River Project Location Map. For future reports, labelling Mary River Tributary-F (as in Figures 2.1 and 3.1) would help highlight the tributary and its flow direction.

p.3. The report states: “This mine closure EEM site characterization summarizes …”. It is unclear why EEM site characterization is referred to as ‘mine closure’.

p.4, 9. “The Mary River Project area (is situated/lies) within the Committee Belt” – this should refer to Committee Bay Belt.

p.9. “The belt … is divided into five main assemblages: the Archean, the Mary River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation (Aker Kvaerner 2008).” Please note that the Archean is not an assemblage but a geological eon. Suggest replacing with the Penrhyn Group, or some other assemblage found at/near the Project site.

August 10th, 2017

Mr. Erik Allen
Environmental Effects Monitoring Coordinator
Prairie and Northern Region
Environmental Protection Operations Directorate
9250 – 49th Street NW
Edmonton, Alberta T6B 1K5

Dear Mr. Allen,

Re: Response to ECCC Action Items and Comments on the Mary River Project 1st Environmental Effects Monitoring Study Design

Environment and Climate Change Canada (ECCC) reviewed the Mary River Project First Environmental Effects Monitoring (EEM) Study Design report submitted by Baffinland Iron Mines Corporation (Baffinland) and provided specific action items and comments applicable to the study as outlined in their letter dated February 28th, 2017. Baffinland has prepared this detailed response to address the fifteen action items and eight 'other items' provided by ECCC stemming from their review of the study design. As follow-up to this response, it is suggested that resolution to any potential outstanding issues can be achieved either through a teleconference arranged between ECCC and Baffinland prior to implementation of the field study (August 2017), or during the ECCC site visit to the Mary River Project from August 15th – 17th, 2017.

Sincerely,
Baffinland Iron Mines Corporation

Laura Taylor
Environmental Superintendent

Cc: William Bowden, Environmental Superintendent, Baffinland
Paul LePage, Minnow Environmental Inc.

Baffinland Iron Mines Corporation: Response to ECCC Comments on the Mary River Project 1st Environmental Effects Monitoring Study Design

PART A - Action Items

Action Item 1: "*p. 1, Section 1.1. The NWB currently has on file a copy of Baffinland Iron Mines Corporation's (BIMC) Aquatic Effect Monitoring Plan (AEMP) (Rev 2), which includes a Draft EEM Cycle Study Design as a subset of the AEMP. As the NWB is currently in the process of considering BIMC's AEMP for Approval, confirmation is required from BIMC on the extent to which changes included in the current EEM Study Design, which superseded the Draft EEM study design, may impact the NWB's ability to potentially approve the current version of the AEMP.*"

Response: The (2014) EEM study design presented as part of the Rev 2 AEMP had assumed a total of four Final Discharge Points (FDP) operating under full capacity of the Mary River Project as described in the Baffinland (2012) Final Environmental Impact Assessment. Currently, only two FDP are intermittently active (MS-08 East Pond, MS-06 Ore Stockpile Runoff). In addition, to date, annual effluent discharge rates from each of these FDP have been much lower than the discharge rates estimated in the Rev 2 AEMP EEM study design (i.e., 2,217 m^3 in 2015 versus 3,133,000 m^3/year estimated in the Rev 2 EEM study design for Station MS-08; 86 m^3 in 2016 versus 110,000 m^3/year estimated in the Rev 2 EEM study design for Station MS-06).

The current (2016) EEM study design better reflects conditions of existing mine operations, focusing on those watercourses that currently receive mine effluent under the more limited effluent flow rates. Specifically, biological sampling will focus on Mary River Tributary-F under the current (2016) EEM study design. Under the (2014) Rev 2 AEMP EEM Study Design, sampling areas were concentrated on Mary River and Camp Lake Tributary 1. However, intensive sampling, similar to that conducted for the EEM program, is currently conducted at both Mary River and Camp Lake Tributary 1 under Baffinland's Core Receiving Environment Monitoring Program (CREMP), which has been conducted annually following the commencement of mine operations. For instance, three and two mine-exposed biological monitoring areas have been established/ sampled on Mary River and Camp Lake Tributary 1, respectively, in addition to comparable reference areas. These same areas were proposed for sampling under the former (2014) Rev 2 AEMP EEM Study Design. The benthic invertebrate community survey and fish population survey approaches were very similar between the former (2014) Rev 2 AEMP EEM study design and the current (2016) EEM study design.

Therefore, through the additional focus on the watercourse most likely to be influenced by mine effluent (i.e., Mary River Tributary-F), the current (2016) EEM study design enhances the overall

spatial coverage of environmental monitoring at the Mary River Project relative to the former (2014) Rev 2 AEMP EEM study design. Moreover, because the current CREMP included biological sampling at those areas proposed for monitoring under the former (2014) Rev 2 AEMP EEM study design, the changes between the 2014 and 2016 EEM study designs will not detract from the overall objectives of the AEMP (e.g., to evaluate short- and long-term effects of the Mary River Project on aquatic ecosystems) and will actually enhance the overall program (i.e., through the addition of Mary River Tributary-F as a sampling area).

Action Item 2: "*p. 7. The study design includes a description of how effluent mixes in the exposure area, based on extrapolated stream discharge volumes for Tributary-F. It would appear that daily effluent discharge was compared to a stream flow estimate based on annual average flows from nearby streams, however the methods were unclear. Please provide further details on how the stream discharge and effluent concentrations were estimated.*

a. Were extrapolated values based on the average flows from similarly-sized watersheds listed in Table A2? Were the watersheds similar to Tributary-F in elevation, gradient, and aspect?

b. Was the extrapolated discharge for Tributary F based on 2015 data only?

c. Were monthly and annual variations in streamflow considered in the estimates of effluent concentration?

***d. Where along Tributary-F do the estimates of effluent concentration apply (e.g., at the confluence with the effluent stream, or downstream at the confluence with Mary River)?*"**

Response: Streamflow of Tributary-F was estimated using average per unit watershed area flow data (m^3/day/km^2) from six nearby watercourses for the months of July and August collected in 2015. These average flow data were multiplied by the watershed area of Tributary F (in this case, 6.8 km^2 at the confluence with the effluent discharge) to determine the percent effluent following complete mixing using the average and maximum effluent discharge rate (148 and 293 m^3/day, respectively) over the period of effluent discharge in July/August 2015. The formula used to determine the percentage of effluent at the Tributary F/ effluent discharge confluence was as follows:

- effluent discharge (m^3/day) / [stream flow (m^3/day for the 6.8 km^2 area) + effluent discharge (m^3/day)]

This value was calculated separately for July and August, and then averaged to arrive at an extrapolated average effluent concentration during the period of mine effluent discharge. The

same method was used to determine the percentage of effluent at the Mary River confluence with Tributary F (watershed area of 232.6 km^2).

a. Extrapolated values were taken from the six watershed sizes indicated in Appendix Table A.2, which ranged from 3.6 – 250 km^2. As indicated above, the average discharge per unit area (m^3/day/km^2) for these six watercourses was used to extrapolate the percentage of effluent at Tributary F and Mary River. In general, watercourses with smaller watershed sizes (i.e., under 10 km^2) more closely mirrored the elevation, gradient and aspect of Tributary F than watercourses with larger watersheds at the Baffinland hydrological monitoring stations.

b. Stream discharge data from 2015 became available for incorporation into the Study Design document in the later stages of preparation. Unfortunately, changes applicable to some of the text in the effluent dilution (Section 2.2.4) and fish population survey (Section 3.2.1) portions of the report were not consistently updated/adjusted to reflect the addition of the 2015 data. Text from the first paragraph of Section 2.2.4 should have read as follows (in bold):

Estimates of effluent dilution in the mine receiving environment were conducted using the 2015 final effluent discharge data together with watershed discharge rates pro-rated using data from six Mary River Project mine site stream gauging stations over the 2015 open-water period. Based on estimated annual average flow by watershed and average daily effluent discharge (i.e., 148 m^3/day during periods of discharge; see Section 2.2.2), the MS-08 effluent was estimated to constitute an average of 1.3% and 0.03% of flow during periods of effluent discharge in 2015 (i.e., July and August) at the effluent stream confluence with Mary River Tributary-F and Mary River, respectively (Figure 2.3). Assuming the maximum daily effluent volume discharged in 2015 (i.e., 293 m^3 on July 12, 2015), the MS-08 effluent was estimated to constitute approximately 2.5% and 0.065% of flow at the effluent stream confluence with Mary River Tributary-F and Mary River, respectively, during the July-August period of discharge in 2015, assuming average regional monthly flow conditions on the day of maximum discharge (Figure 2.3).

c. Based on the monthly 2015 streamflow data, average and maximum effluent concentrations were 1.3 ± 0.5% and 2.5 ± 0.9%, respectively, for the months of July/August at the Tributary-F confluence with the effluent channel based on the streamflow data from all six watercourses. Similarly, average and maximum effluent concentrations were 0.033 ± 0.019% and 0.065 ± 0.038%, respectively, for the months of July/August at the Mary River confluence with Tributary-F based on the 2015 streamflow data from the Mary River gauging station.

d. Effluent concentrations on Tributary F that were indicated on p. 7 applied to the confluence with the effluent stream (i.e., the initial mixing zone).

Action Item 3: "*p. 12. The proponent is recommended to verify effluent concentrations with in-stream conductivity measurements during effluent discharge periods in 2017. Please provide details on an approach to assess effluent concentrations based on effluent and stream conductivity in the receiving environment, including sampling locations and calculations (refer to the Metal Mining EEM Guidance Technical Document (TGD), Sections 2.2.1.1 and 2.2.1.2)*"

Response: Effluent concentrations within Tributary F and Mary River will be determined at the time of biological sampling in August 2017 using the approach suggested in the Metal Mining EEM TGD. Together with effluent specific conductance measured at the time of biological sampling, specific conductance measurements at reference and effluent-exposed benthic invertebrate community/fish monitoring stations will be used as the basis for determination of effluent concentrations at Tributary F and Mary River, as applicable. During site reconnaissance conducted by Minnow in 2015, a specific conductance survey conducted to estimate effluent concentrations along Tributary-F was confounded by runoff received from areas subject to drilling and/or hauling activity which resulted in higher aqueous specific conductivity in Tributary-F. Notably, calcium chloride ($CaCl_2$) is used to aid with drilling through permafrost at Baffinland, which was believed to result in elevated specific conductance in runoff feeding into Tributary-F at the time of the 2015 specific conductance survey.

Action Item 4: "*p. 12, Section 2.3.4. It is recommended that the proponent provide details regarding measures implemented and monitoring that may be conducted to determine whether or not the effluent discharged from MS-08 may have any negative impact on the receiving environment, preceding the final discharge point"*

Response: It is unclear as to the recommended location referred to in this Action Item (i.e, "preceding the final discharge point"). If referring to the lower 740 m length of channel that drains into Tributary-F, no monitoring is proposed for this portion of the system, with the exception of *in situ* water quality measurements conducted at the time of biological monitoring in August 2017. Flow in this intermittent section of the channel is likely to be represented entirely by effluent in August, and we believe there is very low likelihood that benthic invertebrate communities become well established in watersheds of this small size, confounding the ability to assess biological influences of the mine effluent on biota. The photograph below illustrates the portion of the channel just upstream of Tributary-F in August 2016 during effluent discharge. In this photo, the channel width is approximately 30 cm and water depths reach a maximum of approximately 5 cm.

Action Item 5: "*Figure 2.4. The legend in Figure 2.4 indicates that 2015 data were used to estimate monthly discharge for the Mary River and Tributary-F. Table A-2 presents monthly discharge data for several stations from 2006 to 2014, but there are no 2015 data. Please provide the missing data.*"

Response: As indicated in the response to Action Item 2, stream discharge data from 2015 became available for incorporation into the Study Design document in the later stages of preparation. Appendix Table A.2 has been updated to include the 2015 data and is presented at the end of this response.

Action Item 6: "*p. 18. The study design did not describe methods for the collection of sediment samples for particle size and total organic carbon analyses, which are required if the study is conducted in an area where it is possible to sample sediment (MMER, Sched. 5, s. 16(a)(iii)). The description of the sampling areas (erosional habitat with gravel/cobble substrate) would suggest that sediment sampling will not be possible; please confirm or provide the missing information.*"

Response: Correct. Sediment sampling will not be collected concurrent with benthic invertebrate community samples given the presence of only erosional habitat (boulder with interspersed gravel/cobble) in Tributary-F. The photo below illustrates habitat typical of Tributary-F.

Action Item 7: "*p. 21. The study design suggests that low effluent concentration in the Mary River would exempt the proponent from the requirement to conduct a fish study, should no fish be collected from Tributary-F. The MMER require a fish population study if the effluent concentration in the exposure area is greater than 1% in the area located within 250 m of the final discharge point (FDP) (Sched. 5, s. 9(b)). Based on the information provided, the fish survey exemption does not apply to the proposed study. The fish survey should be initially conducted in Tributary-F as proposed, and if fish are determined to be absent or in low abundance, field crews should sample progressively downstream into the Mary River, where fish may be more abundant. Please provide information on potential reference sites for the Mary River exposure area. Given concerns over low fish abundance, the proponent is recommend to identify several reference site options for the Tributary-F and Mary River exposure areas."*

Response: From our consultant's perspective, greater clarity on the MMER definition of a "final discharge point (FDP)" is required in cases in which an overland effluent discharge point is concerned. Effluent concentrations in Tributary-F, the first 'permanent' flowing watercourse that the effluent meets during the open-water period (approximately late June to early September), appears to be approximately 1% within 250 m of the confluence with the effluent channel, on average. Extrapolation using maximum effluent flow data suggested that effluent concentrations in Tributary-F may periodically be greater than 1% within 250 m of the confluence with the effluent channel. Despite this, the ecological relevance of conducting a fish survey at Mary River, where effluent concentrations are estimated to be well less than 1% (i.e., average and maximum of 0.02% and 0.035%, respectively, based on data collected from 2006 – 2015, assuming continual effluent discharge), is questionable. Attributing potential differences in fish population endpoints between reference and effluent-exposed areas of Mary River to mine effluent exposure (the intent of the MMER) does not seem scientifically defensible in cases where the maximum effluent concentration is so low. Furthermore, the evaluation of effluent-related effects on Arctic charr populations of Mary River (and other watercourses in the Mary River Project region) is further limited by the fact that liquid water is generally present (and fish possibly present) only from early July through mid-September, and that mine effluent is only discharged intermittently (e.g., 16 days in 2015). Thus, very low effluent concentrations coupled with limited exposure period will preclude definitive assessment of mine effluent-related effects to fish populations of Mary River.

It is suggested that resolution of this Action Item occur through teleconference prior to implementation of the field study (August 2017) or during the ECCC site visit to the Mary River Project from August 15th – 17th, 2017.

Action Item 8: "*p. 21. The report indicates that mine effluent represented 0.02% - 0.035% of flow in the Mary River. On p.7, the effluent percentage of flow in the Mary River was given as 0.03% and 0.065%; please clarify.*"

Response: On page 21, average and maximum concentrations of mine effluent in Mary River were 0.02% - 0.035%, respectively, based on average streamflow at the Baffinland Mary River hydrological station over the period of 2006-2015. On page 7, average and maximum concentrations of mine effluent in Mary River were 0.03% - 0.065%, respectively, based on average streamflow at the Baffinland Mary River hydrological station only in 2015 (July/August period). Please see response to Action Item 2 for additional clarity.

Action Item 9: "*p. 25. The study design indicates that stream velocity and channel dimensions will be measured, will discharge volumes be calculated?*"

Response: No, discharge volumes will not be calculated from the stream water velocity and channel dimension data collected for EEM. These data will be collected to provide general

information on habitat characteristics of each study area to assist with the interpretation of biological data. The number of monitoring points along each transect, and the in-stream transect locations, are not intended to be sufficient for accurate discharge volume calculation.

Action Item 10: "*p. 26. Please briefly describe field preservation and shipping protocols for water samples to ensure laboratory sample hold times are met, given the remote location of the study area.*"

Response: Please refer to the attached Standard Operating Procedure (SOP) developed for water sampling at the Mary River Project.

Action Item 11: "*p. 14. Section 3.5.6 It is recommended that the proponent provide details regarding further or continued monitoring and/or analyses that may be conducted to determine the extent to which mining activities may be contributing to the differences, over time, in results observed in the water quality parameters measured at Tributary F and the Mary River Up-stream Reference Station*"

Response: Baffinland will conduct water quality monitoring at established EEM and AEMP (CREMP) stations at frequencies required under each respective approved monitoring plan. The locations and frequencies of sampling appear to be sufficient for monitoring spatial differences between mine-exposed and reference areas, and temporal changes over time, in water quality of Tributary-F and Mary River.

Action Item 12: "*p. 26. Section 3.5. It is recommended that details regarding the exposure and reference areas to be monitored be confirmed in the EEM Study Design in the context of BIMC's recommended discontinuation of monitoring for several stations potentially related to exposure and/or reference areas, based on the correspondence accompanying the AEMP (Rev 2).*"

Response: Because approval for changes suggested in correspondence accompanying the AEMP (Rev 2) has not been received from regulators and other stakeholders, no changes to stations will be implemented within the time period of the first EEM study

Action Item 13: "*The proponent previously notified the authorization officer of the addition of a second FDP (MS-06) for the Mary River Project (letter from J. Millard to S. Forbrich, June 18, 2016). The MS-06 FDP was not described in the current study design. The MMER require a description of the manner in which the effluent mixes within the exposure area for each final discharge point (MMER, Sched. 5, s. 11(a)). Please provide any available information regarding effluent mixing from MS-06, and a description of plume delineation methods to be implemented in 2017 (as requested for MS-08; see comment #3).*"

Response: Discharge of effluent from the MS-06 FDP was limited to a single day (September 12) in 2016, during which 86 m^3 of effluent was released. Because the EEM study design was required to be submitted by July 10, 2016, data pertaining to the MS-06 FDP effluent release were not provided. It is anticipated that effluent release from the MS-06 FDP discharge will occur rarely, and for very brief periods of time. To the extent possible, given potential safety concerns associated with high water velocities, water depths greater than 1 m, and large boulder substrate (safe footing issues), Baffinland will conduct a specific conductance survey as indicated in the response to Action Item 3 above within the Mary River receiver at the time of effluent release to characterize mixing features. Because a hydrological station is established on Mary River, extrapolation of effluent concentrations in Mary River can also be conducted on a daily basis, as required, following download of the data at the end of the open-water season.

As suggested in the response to Action Item 1, the MS-08 FDP is likely to release greater volume of effluent than the MS-06 FDP in any given year (e.g., 2,217 m^3 was released at MS-08 in 2015, and 86 m^3 was released at MS-06 in 2016). Therefore, the MS-08 FDP will served as the focus for biological studies in the current EEM phase.

Action Item 14: "*The MS-06 FDP will discharge to the Mary River through a treated sewage pipeline; will mine effluent and treated sewage be discharged concurrently?"*

Response: Although it is unlikely that the MS-06 FDP will discharge concurrently with the discharge of treated sewage, in the event that unusually high amounts of runoff, there may be periods in which both are discharged concurrently. Please note that it is currently anticipated that discharge from the MS-06 FDP will occur very rarely (a few days per year) on an intermittent basis.

Action Item 15: "*Appendix A, Table A.4. Please indicate the location of stream sampling sites listed in Table A.4. Was there a noticeable difference in water chemistry between upstream and downstream sites on Tributary-F?"*

Response: A map showing the locations of the CREMP lotic sampling sites indicated on Appendix Table A.4 accompanies this response. No difference in water chemistry has been indicated between Mary River stations located upstream and downstream of the Tributary-F confluence.

PART B – Other Items

Comment 16: "*Fig. 2-4. The figure caption should refer to mean monthly stream discharge, not effluent discharge; please confirm."*

Response: Correct. The caption for Figure 2.4 should refer to mean monthly stream discharge, not effluent discharge. Sorry for any confusion.

Comment 17: "*p. 14. The proponent is recommended to conduct annual water quality monitoring in Tributary F near the confluence with the effluent discharge, and a comparable reference stream, in addition to proposed monitoring in the Mary River.*"

Response: Acknowledged. Annual water quality monitoring will be conducted in Tributary-F near the confluence with the effluent discharge, and a comparable reference stream, in addition to proposed monitoring in the Mary River.

Comment 18: "*p. 15. The report states that ninespine stickleback have been captured in low abundance in the Mary River area, but later states that arctic charr are the only species captured in Mary River. Have ninespine stickleback been located in any of the streams identified for the biological monitoring study?*"

Response: To our knowledge, no ninespine stickleback have been captured in the Mary River or in any of the streams identified for the EEM biological study. However, because this species is known to inhabit streams, rivers and lakes, there is some potential for ninespine stickleback presence in streams and rivers of the Mary River Project area. It is anticipated that if present, ninespine stickleback are likely to be present in low abundance in area lotic habitats given low numbers captured in lentic habitat near the mine.

Comment 19: "*p. 22. The proponent is advised to plan for up to 7 days of sampling per area to meet sample size targets for the fish survey.*"

Response: Stream backpack electrofishing is the proposed method of fish capture for the EEM study. Given the relatively small size of Tributary-F, the determination of whether fish are present within this tributary will likely require less than a day by an experienced electrofishing team. It is proposed that, in the event that fish are determined to be absent in Tributary-F through the initial sampling, ECCC will be contacted to determine the best course of action. Continuing to conduct active sampling for a full seven days in the absence of fish is not considered practical or cost efficient. It is suggested that resolution of this item occur through teleconference prior to implementation of the field study (August 2017) or during the ECCC site visit to the Mary River Project from August 15th – 17th, 2017.

Comment 20: "*p. 23. Please be advised that the TGD recommends independent confirmation of fish ageing for 10% of samples.*"

Response: Acknowledged. Independent confirmation of fish ageing will be conducted on 10% of submitted samples.

Comment 21: "*Table 3.2. The table indicates no statistical analysis for the reproduction endpoint. Please note that the non-lethal reproduction endpoint (relative abundance of YOY) can be analyzed by comparing exposure and reference length frequency distributions with the Kolmogorov-Smirnov test, with and without YOY. If the inclusion of YOY changes the outcome of statistical comparison, the proportion of YOY is considered to be different between sampling areas (TGD, Section 3.4.2.2).*"

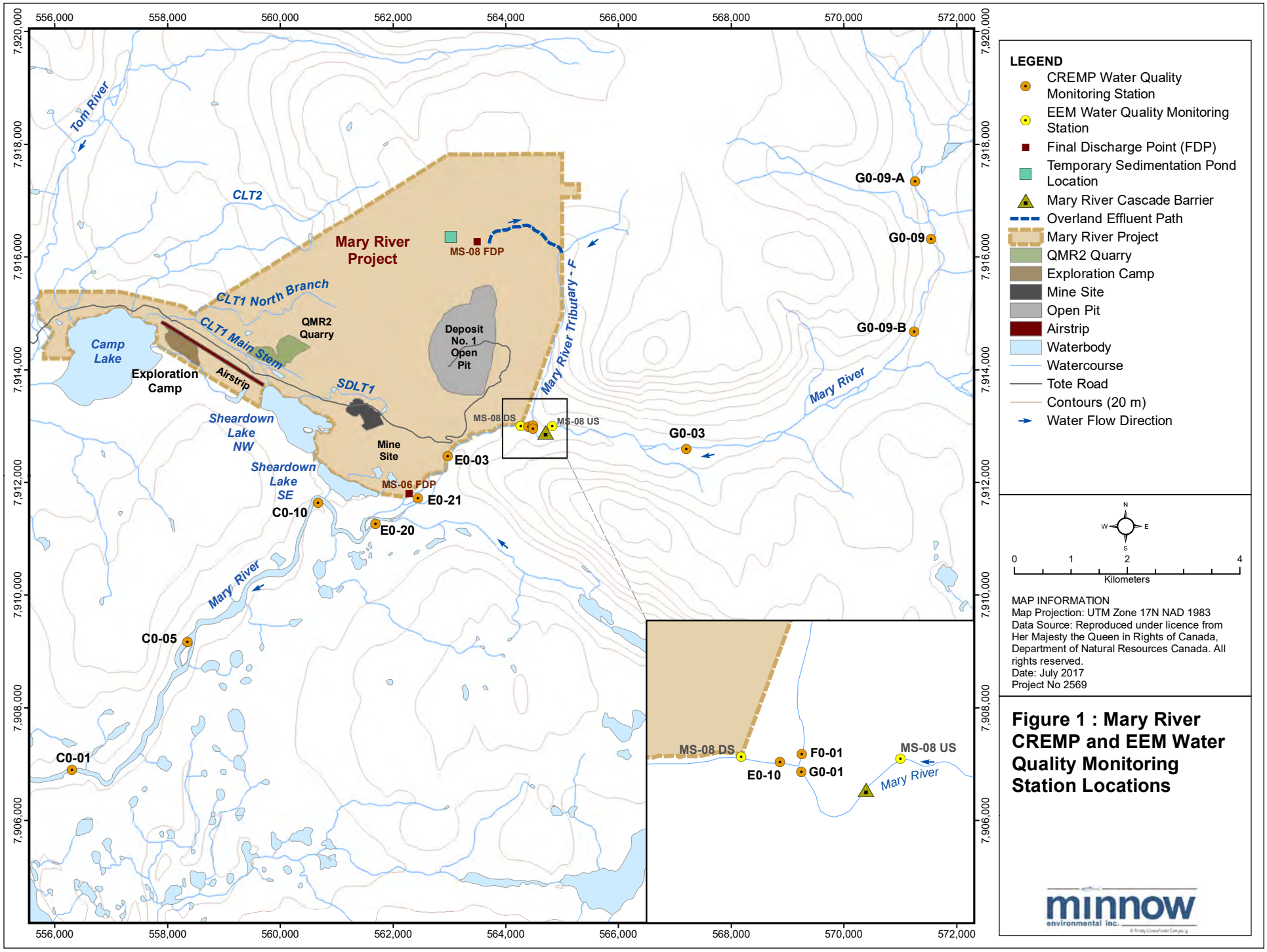
Response: Acknowledged.

Comment 22: "*p. 25. Please ensure collection of trip and field blanks for water chemistry QA/QC, as recommended by the TGD (Section 5.8.4).*"

Response: Acknowledged. Water chemistry trip and field blanks will be collected.

Comment 23: "*An overview document outlining the amendments proposed for the MMER was shared with stakeholders in December 2016. If you have not received this document and would like a copy, please contact Erik Allen. The proposed amendments are expected to be published in Canada Gazette, Part 1 in spring of 2017. Canada Gazette, Part II publication would likely occur 12 to 18 months following Canada Gazette Part 1 publication.*"

Response: Thank you for letting us know. We had received a copy of the overview document early in 2017.



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.
Date: July 2017
Project No 2569

Figure 1 : Mary River CREMP and EEM Water Quality Monitoring Station Locations

minnow environmental inc.

Table A.2: Average monthly discharge data (m^3/s) collected from Mary River Project hydrological gauging stations, 2006 - 2015.

Year	Montth	Hydrological Station					
		H1 Phillips Creek Tributary (250 km^2)	H2 Tom River (210 km^2)	H4 Camp Lake Tributary2 (8.3 km^2)	H5 Camp Lake Tributary1 (5.3 km^2)	H6 Mary River (250 km^2)	H11 Sheardown Lake Trib1 (3.6 km^2)
2006	June	-	5.05	-	-	-	-
	July	14.65	19.20	0.83	0.38	26.64	-
	August	5.46	5.37	0.29	0.15	15.03	-
	September	7.42	3.07	0.29	0.17	24.01	-
2007	June	10.94	4.42	0.25	0.31		-
	July	6.93	7.78	0.21	0.10	11.68	-
	August	3.77	4.04	0.13	0.10	6.54	-
	September	1.62	1.14	0.07	0.05	4.22	-
2008	June	12.20	-	1.56	0.42	26.06	-
	July	10.31	-	0.38	0.22	16.96	-
	August	7.44	-	0.25	0.22	8.21	-
	September	5.33	-	0.17	0.12	7.06	-
2010	June	-	33.25	-	0.78	39.55	-
	July	-	14.34	-	0.19	18.76	-
	August	-	2.34	-	0.08	3.69	-
	September	-	5.42	-	0.14	7.13	-
2011	June	13.70	-	0.44	0.30	27.41	0.07
	July	3.11	-	0.07	0.05	5.29	0.02
	August	1.25	-	0.03	0.02	2.32	0.02
	September	1.56	-	0.03	0.02	1.89	0.02
2012	June	24.24	35.76	0.88	0.81	32.23	0.12
	July	7.49	13.42	0.39	0.22	11.63	0.07
	August	2.36	4.82	0.16	0.10	5.47	0.06
	September	3.90	-	0.28	0.17	8.00	0.08
2013	June	10.80	18.04	-	0.32	19.75	0.14
	July	9.74	17.95	0.09	0.25	20.98	0.12
	August	-	2.88	0.07	0.08	4.63	0.05
	September	-	-	0.05	0.06	3.07	0.06
2014	June	7.03	6.35	-	0.28	-	0.12
	July	13.42	21.28	-	0.42	31.09	0.09
	August	7.18	9.08	-	0.20	9.83	0.09
	September	2.14	1.90	-	0.05	1.88	0.04
2015	June	15.70	14.50	0.41	0.13	18.60	0.03
	July	8.80	6.00	0.20	0.06	9.20	0.04
	August	3.50	2.30	0.20	0.08	3.80	0.06
	September	-	0.90	0.03	0.03	1.10	0.03
Average	June	13.52	16.77	0.71	0.42	27.27	0.09
	July	9.31	14.28	0.31	0.21	16.91	0.07
	August	4.42	4.41	0.16	0.12	6.61	0.06
	September	3.66	2.49	0.13	0.09	6.48	0.04

Environment and Climate Change Canada
Environnement et Changement climatique Canada

Prairie & Northern Region
Environmental Protection Operations Directorate
9250 – 49th Street NW
Edmonton, AB T6B 1K5

August 22, 2017

via email to: wayne.mcphee@baffinland.com

Wayne McPhee
Director Sustainable Development
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville,ON L6H 0C3

Dear Mr. McPhee:

Subject: Metal Mining Effluent Regulations – Evaluation of 1st Environmental Effects Monitoring Study Design, Mary River Project, NU

This letter is to advise you that Environment and Climate Change Canada has reviewed your Environmental Effects Monitoring (EEM) biological study design report entitled "Mary River Project Environmental Effects Monitoring Phase 1 Study Design", received July 8, 2016 and an addendum to the report, received August 10, 2017. The review of study design reports takes into account information requirements in the *Metal Mining Effluent Regulations (MMER)* of the *Fisheries Act* and also offers comments on the study based on the EEM Technical Guidance Document and generally accepted standards of good scientific practice.

Review comments and recommendations are attached. No further response is required.

Regulated facilities are now required to submit reports to the Environmental Effects Monitoring Electronic Reporting system (EEMER). It is no longer necessary to submit electronic or paper copies directly to the authorization officer.

Environment and Climate Change Canada looks forward to receiving your interpretive report no later than January 10, 2018. Should you have any questions or concerns regarding the EEM program or wish to discuss the review of the study design, please do not hesitate to contact Erik Allen at (780) 717-4884 or at erik.allen@canada.ca.

Sincerely,

Susanne Porbrich
Regional Director
Regional Authorization Officer

Canada

cc:	William Bowden	Baffinland Iron Mines Corporation
	Laura Taylor	Baffinland Iron Mines Corporation
	Reg Ejeckam	Environment and Climate Change Canada, Winnipeg
	Paula Siwik	Environment and Climate Change Canada, Edmonton
	Erik Allen	Environment and Climate Change Canada, Edmonton
	Curtis Didham	Environment and Climate Change Canada, Iqaluit
	Sean Joseph	Nunavut Water Board, Vancouver
	Sarah Forté	Indigenous and Northern Affairs Canada, Iqaluit

Attachment: Review Comments and Recommendations on "Response to ECCC Comments on the Mary River Project 1st Environmental Effects Monitoring Study Design" (submitted August 10, 2017)

Review Comments and Recommendations on "Response to ECCC Comments on the Mary River Project 1st Environmental Effects Monitoring Study Design" (submitted August 10, 2017)

7. Regarding the fish survey, it was agreed during a meeting with the proponent and their consultant (Aug. 16/17) that fish sampling will be attempted in the Mary River near the confluence with Tributary-F, if no fish are located in the tributary. A downstream reach of the Mary River will be sampled as a reference area to the upstream Mary River exposure area, if needed. If fish sampling in Mary River is determined to be impractical, the facility is recommended to provide supporting information in the interpretative report.

19. With respect to the level of effort for the fish survey, the response suggests that less than a day would be needed to determine if fish are present in Tributary-F. During a meeting with the proponent and consultant (Aug. 16/17), ECCC noted that 7 days is the recommended level of effort to achieve target sample sizes, but that it could take less time to determine the presence or absence of fish. The sampling crew is recommended to apply an adequate level of effort to achieve the objective of the fish survey. Supporting information should be provided in the report to justify the level of effort.

APPENDIX B

2017 MS-08 DISCHARGE SUPPLEMENTAL INFORMATION

November 21, 2017

Curtis Didham
Enforcement Officer
Environment and Climate Change Canada
933 Mivvik Street
Iqaluit, Nunavut
X0A 0H0

Dear Mr. Didham,

Re: Investigation under subsection 36(3) of the Fisheries Act in regards to an effluent seepage and controlled discharges from the Waste Rock Stockpile Sedimentation Pond (WRSSP) located at Baffinland's Mary River Project (the Project).

Please find below a summary response prepared by Baffinland Iron Mines Corporation (Baffinland) in response to the investigation under the Fisheries Act and Metal Mining Effluent Regulations (MMER) initiated by Environment and Climate Change Canada (ECCC) on September 13, 2017.

Project Development

Baffinland proposed to develop the Project in a phased approach, and began construction for the Early Revenue Phase (ERP) in 2013, followed by the initial mining of Deposit 1 in September 2014. Prior to the development of Deposit 1, Baffinland had retained AMEC in 2012 to conduct water quality modelling of runoff and seepage originating from the Deposit 1 waste rock stockpile. The report concluded that, with the exception of total suspended solids (TSS), the water quality of runoff and seepage would meet the MMER discharge requirements. To address the estimated solids loading from the runoff and seepage and facilitate the monitoring of discharges, sedimentation ponds downstream of the waste rock stockpile(s) were proposed. In 2014, Baffinland retained AMEC to investigate the metal leaching and acid rock drainage (ML/ARD) potential of waste rock generated from ERP operations on Deposit 1. Results from AMEC's investigation were presented in a technical memo titled "Mary River Deposit 1, 5-Year Pit ML/ARD Characterization". AMEC had determined that approximately 85% of waste rock samples had neutralization potential ratios (NPR) greater than 2 pH and were classified as non-potentially acid generating and were unlikely to generate acidic drainage. Approximately 10% of the samples had NPR values of less than 1 pH, and 5% of the samples were classified as having uncertain acid generating potential (1<NPR<2). Humidity cell testing for historical samples of the Waste Rock Stockpile has stayed relatively consistent previous to 2017, indicating stable conditions in the majority of cells

Construction of the current WRSSP commenced in September 2015 and became operational in May 2016. A Construction Summary Report (CSR) produced by Hatch Ltd. (Hatch) for the current sedimentation pond, which was included in the 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual

Report for Operations, was signed off by Baffinland in January 2017 and provided to regulators and stakeholders on March 31, 2017.

Under Part D, Item 18, of Baffinland's Type "A" Water License 2AMMRY1325 Amendment No. 1 (Water License), two annual geotechnical inspections are performed on water and waste retention structures. Barry H. Martin Consulting Engineer and Architect conducted two inspections in 2017. The Aug 1-10th bi-annual inspection did not identify integrity or containment issues concerning the WRSSP. Additionally, inspections of the facility from ECCC and Indigenous and Northern Affairs Canada (INAC) in 2016 and spring/early summer 2017 also did not identify seepage from the WRSSP or identify water quality concerns associated with the system. Internal compliance inspections are completed bi-monthly during the open water season on this facility and daily monitoring is completed during discharge which focuses on monitoring water quality in accordance with Baffinland's Water License and Schedule 4 of the MMER, as well as overall WRSSP conditions and operations. There were no issues of compliance with water quality limits in 2016 or in the first half of 2017.

The following summarizes the four incidents that occurred in August and September and remediation measures undertaken.

Spill Report 17-289

A heavy rain event was experienced over a period of several days in late July increasing the runoff into the pond and led to the requirement to de-water and maintain suitable pond freeboard. The pH results leading up to August 1st, which were measured by both YSI meter field readings and the ALS laboratory analyses, were consistently greater than 6.40. In early August low pH water was discharged to the environment on August 1st and 3rd. On August 1st, water chemistry and toxicity testing occurred. Results received indicated the pH of the water was below 6.0 which resulted in a toxicity failure for both Daphnia Magna and Rainbow Trout. No discharge to the environment occurred after receiving official ALS laboratory results.

August 10th - 24th:

- pH adjustment treatment of the WRSSP was planned with Wood Group PLC (formally AMEC Foster Wheeler) to determine the most effective treatment of the WRSSP with resources on site. On August 22-24th, batch treatment of the WRSSP was completed using sodium carbonate to effectively raise the pH from approximately 4 to 7.
- Golder Associates Ltd. (Golder) was consulted to commence work on increasing the storage capacity of the WRSSP.

Spill Report 17-312

On August 23, 2017 during an inspection of the WRSSP with ECCC and INAC, seepage was observed originating from the central toe of the WRSSP in approximately four discrete but closely clustered locations. Water quality samples were taken from the seepages occurring at the toe of the WRSSP in concert with ECCC and INAC on August 23rd and 24th during their on-site inspection and external

analytical results indicated that, aside from nickel and TSS, water quality was compliant under the MMER and Water License.

August 25th:

- Construction of an emergency containment ditch downstream of the seepage.

September 1st:

- Hatch was consulted to explore options to stop the seepage from the toe of the WRSSP and identify potential remedial activities to the facility.
- Hatch recommended the placement of a till blanket upstream of the WRSSP liner key-in to allow for proper re-grading in an effort to reduce pooling on the inlet, as well as constructing two sumps to tie into the emergency containment ditch downstream of the WRSSP seepage.

September 2nd:

- Baffinland submitted a notification to regulators detailing the plan to mitigate the ongoing seepage at the WRSSP.

September 7th - 17th

- Construction of the till blanket and sumps were completed to the design specifications provided by Hatch from September 7th to 17th.

On September 26th, during an inspection of the WRSSP and down gradient seepage area, discoloured water was observed outside of the emergency containment ditch under ice and snow. Water quality sampling was conducted, which included acute toxicity testing. Analytical results showed nickel and TSS above applicable guidelines, though the acute toxicity test passed.

October 4th - 24th:

- Golder and Le Groupe Desfor (LGD) consulted to assess the situation and provide expert advice on locating the source and identifying potential remedial solutions.
- LGD Director of Civil Works concluded that the origin of the seepage could not be determined at that time under the existing conditions.
- Principal Geochemist from Golder conducted a detailed hydrological assessment and concluded that the pond design appears appropriate for its intended use.

October 19th:

- Story Environmental was contacted to provide recommendations for the utilization and implementation of using rhodamine dye to determine whether the WRSSP was the potential source of the seepage.
- Monitoring of the seepage for the presence of rhodamine occurred using a YSI meter with a rhodamine sensor. Rhodamine was detected in seepage grab samples indicating that the WRSSP liner's integrity may have been compromised. Current conditions limit the ability to confirm this to be true and further investigations into the matter are required when conditions allow.

October 21st – November 06:

- Construction of a new berm was completed around the outside perimeter of the emergency containment ditch to increase the ditch's containment capacity.
- Water was pumped from the containment ditch back to the WRSSP in order to effectively place ¾ inch rock at the base of the ditch to arrest further seepage.

Spill Report 17-328 and 17-361

On August 27th, visual observations of the turbidity of the WRSSP prompted the discharge to be shut down. Samples later confirmed that the TSS exceeded the Water License and MMER guidelines for an approximate 14-hour period. Discharge resumed again on August 28th after the pond had settled and TSS criteria was found to be below guidelines.

August 24th – 28th

- An Environment Effects Monitoring (EEM) study was performed by Minnow Environmental (Minnow). No exceedances were observed or recorded under applicable guidelines in discharge exposed Tributary F or Mary River except for aluminum. The aluminum is not exposure-related as aluminum was found to be present in the reference sites and is related to known historical turbidity-related colloidal effects in Mary River. The discharge from the WRSSP travels approximately 2.2 km from the Final Discharge Point (FDP) to where Tributary F becomes a defined channel which is non-fish bearing. The confluence with Mary River is located approximately 3 kilometers in distance from that location.

Discharging to the environment continued from August 30th to September 6th and water samples analyzed using the on-site ALS laboratory equipment run by Baffinland personnel were found to be compliant up to September 6th under the MMER and Water License discharge criteria for pH. In addition to the on-site laboratory results, samples were also shipped offsite to ALS Waterloo. The pH results received from the ALS laboratory in Waterloo from September 1st to 6th were below the MMER and Water License criteria. In consultation with the ALS Environmental Technical Director, it was determined that the initial pH measurements from the on-site laboratory taken by Baffinland Staff (within one to four hours of sampling) should be the most reliable and defensible pH measurements representing the conditions of the samples at time of sampling, rather than test results measured by ALS Waterloo which represent the pH of the sample after several days of potential acid rock drainage related redox reactions. The discharge to the environment was stopped on September 6th.

September 1st:

- Aquatic Effects Monitoring Plan (AEMP) data for stations at the confluence of the tributary, (Tributary F) that receives WRSSP effluent and the nearest fish bearing waters, were examined and did not show readily detectable influence from the discharge, exhibiting pH of approximately 8.

Additional Mitigation Measures

Additional mitigation measures were taken to address deficiencies identified with internal environmental systems, protocols and procedures:

- An Emergency Response Plan has been revised for the WRSSP in accordance with MMER requirements outlined in Section 30.
- A Working Near Water Containment Facilities Procedure has been drafted to provide a set of operational standards to ensure work is conducted in a safe and environmentally-compliant manner.

- The Site Environment team reporting structure was changed to include a Site Environmental Manager that will provide leadership and oversight to all site activities.

Additional mitigation measures that are in progress or planned are:

- Initiate a geochemical review of the waste rock dump layout and materials to develop a better understanding of low pH conditions observed on site and, if necessary, develop supplemental mitigation measures to reduce or eliminate production of acidic water from entering the WRSP.
- Review on-site equipment and consider whether additional equipment could more efficiently treat and discharge water from the WRSSP.
- Revise Waste Rock Management Plan to incorporate discharge and ARD mitigation measures
- Resource additional certified ALS Technician(s) and testing equipment during the summer season
- Evaluate and source appropriate coagulants if treatment required.
- Long Term - Design and implement fit for purpose AMD containment and treatment technology for prevention, source control and remediation.

Overall no impacts were observed in the receiving water bodies as shown through Baffinland's EEM and AEMP studies. Engineered mitigation measures to address water quality, seepage and pond capacity issues are currently being reviewed. Through the rhodamine testing early indications are that the source of the seepage is related to the integrity of the WRSSP liner, although further investigations are required to confirm these findings and upon confirmation we will immediately act upon.

Regards,

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APPENDIX C

HABITAT CHARACTERIZATION INFORMATION

APPENDIX C HABITAT CHARACTERIZATION

C.1 Introduction

Habitat characterization provides information integral to the interpretation of effluent-related influences on benthic invertebrate communities and fish populations residing within aquatic environments that receive mine discharge. At Mary River Project, effluent is released overland into an intermittent channel that meets Mary River Tributary-F approximately 2 km east-northeast of the effluent discharge point. From this confluence, Mary River Tributary-F flows south approximately 3.3 km before discharging into Mary River. Mary River Tributary-F downstream of the effluent confluence and Mary River extending approximately 2.5 km downstream of the Mary River Tributary-F confluence served as the mine effluent-exposed areas for the benthic invertebrate community survey and fish population survey, respectively (Figure 2.1). Reference areas for the 2017 EEM study included Mary River Tributary-F upstream of the effluent channel for the benthic invertebrate community survey, and Mary River just upstream of Mary Lake for the fish population survey (Figure 2.1). Aquatic habitat characterization information collected at the Mary River Project EEM study areas (Table C.1) are summarized and contrasted herein to evaluate the degree to which natural habitat influences potentially contributed to differences in biological endpoints between like effluent-exposed and reference areas.

C.2 Mary River Tributary-F

Mary River Tributary-F occurs as a seasonally-flowing, second-order stream draining a watershed of approximately 6.8 square kilometres (km^2) at the confluence with the MS-08 mine effluent channel and 11.6 km^2 near the mouth at Mary River. Mary River Tributary-F exhibits a moderate gradient through the headwaters and mid-reaches, averaging approximately 4.5% and 6.3% at EEM benthic invertebrate community study areas located upstream and downstream of the MS-08 channel confluence, respectively (Table C.2; Photo Plate C.1). High gradients of approximately 10 to 12% are exhibited within approximately 0.8 km of the outlet to Mary River on Mary River Tributary-F (Photo Plate C.1). The channel of Mary River Tributary-F is typically well defined, exhibiting a slight meander, but areas of interstitial flow and/or channel braiding are not uncommon particularly in the upper and mid-reaches of the watercourse. Stream morphology of Mary River Tributary-F consists predominantly of riffle-run sequences separated by scour pools and rapids within the upper and mid-reaches (Table C.2), whereas riffle-cascade habitat is more prevalent at high gradient areas of the lower portion of the system. The combination of complete freezing overwinter, a relatively higher stream gradient, and the presence of natural in-stream barriers including an approximately

1.75 m high step-drop over large boulder habitat about 50 m upstream of the outlet to Mary River (Photo Plate C.1) are likely key factors contributing to the naturally fishless condition of Mary River Tributary-F (see Section 6).

The wetted and bankfull width of Mary River Tributary-F were greater immediately downstream of the MS-08 channel confluence than upstream at the time of the August 2017 field study, although only bankfull width differed significantly between areas (Tables C.2 and C.3). Notably, the determination of overall wet channel features was partly confounded by the occurrence of interstitial flow through boulder and/or large cobble substrate at these study areas. On average, water depths and water velocities were greater downstream than upstream of the MS-08 effluent channel confluence during the August 2017 sampling events, but the differences between areas were not significant (Tables C.2 and C.3). Maximum water depth of riffle habitat at both these areas was less than 10 cm deep, precluding the use of a Hess sampler for the sampling of benthic invertebrates during the August 2017 field study (see Section 2.4).

The substrate of Mary River Tributary-F is composed primarily of cobble and boulder (average of 54% and 35%, respectively, of in-stream substrate; Table C.2). Pebbles (i.e., 2 – 5 cm diameter material) and gravel constituted the remainder of in-stream substrate material during the August 2017 field study. Medium to coarse sand was observed only in trace amounts, and was primarily confined to areas of quiescent flow along channel banks and/or immediately downstream of large boulders. On average, substrate diameter (intermediate axis) was slightly larger downstream than upstream of the MS-08 effluent channel confluence on Mary River Tributary-F, although the difference in substrate diameter between these areas was not significant (Tables C.2 and C.3). In-stream vegetation was limited to a thin layer of periphyton (biofilms) attached to rocks not of sandstone or conglomerate origin based on visible and/or tactile assessment. No marked differences in periphyton growth were apparent between the Mary River Tributary-F effluent-exposed and reference study areas at the time of the August 2017 EEM field study (Table C.2).

C.3 Mary River

Mary River is a moderate gradient system (i.e., average gradient of 0.9%) characterized mainly by riffle-run morphology with some rapid/cascade habitat that includes an approximately 20 m high natural cascade located approximately 400 m upstream of the confluence with Mary River Tributary-F (Figure 2.1). At the confluence with Mary River Tributary-F, the Mary River flows through a deep gorge (Photo Plate C.1). The wetted channel width of Mary River decreases from an average of approximately 47 m to 19 m from upstream to downstream of this cascade, respectively, under typical late summer flow conditions. Commensurate with these changes

in wetted width, average stream depth and water velocity were lower upstream of the cascade than downstream (0.30 and 0.48 m deep, and 0.43 and 0.85 m/s water velocity, respectively), based on sampling conducted in August 2015 (Minnow 2016). At the confluence with Mary River Tributary-F, Mary River has a watershed area of approximately 233 km^2.

The area of Mary River located a short distance downstream of the gorge served as the effluent-exposed area for the EEM fish population survey (Figure 2.3). At this location, Mary River occurs as a series of well defined, braided channels. Stream morphology of the braid sampled for the fish population survey consisted almost entirely of riffle habitat, with rapids also occurring in limited amounts (Table C.4). The wetted width and depth of this Mary River braid averaged approximately 20 m and 32 cm, respectively, at the time of the August 2017 field study (Table C.4). The substrate at the Mary River fish population survey effluent-exposed area is composed primarily of cobble (88% of in-stream habitat, on average; Table C.4; Photo Plate C.2). Similar to Mary River Tributary-F, medium to coarse sand was observed in trace amounts at this area of Mary River, and was limited primarily to locations with quiescent flow such as along channel banks and/or immediately downstream of large boulders. Substrate diameter (intermediate axis) averaged approximately 12 cm at the Mary River fish population survey effluent-exposed area (Table C.4).

Lower Mary River, near the outlet to Mary Lake, served as the reference area for the EEM fish population survey (Figure 2.3). At this area, Mary River occurs as a single, well-defined channel characterized mainly by riffle habitat and a minor amount of rapid habitat (Table C.4; Photo Plate C.2). The wetted width and depth of 73 m and 47 cm, respectively, at the Mary River reference area were much greater than the effluent-exposed area, reflecting braided channel dimensions at the latter, at the time of the August 2017 field study (Table C.4). Unlike the effluent-exposed area, the substrate at the Mary River reference area is composed primarily of boulders (75% of in-stream habitat) embedded in coarse sand rather than cobble (Table C.4). On average, the substrate diameter (intermediate axis) was 56 cm at the Mary River fish population survey reference area, which was much larger than at the corresponding effluent-exposed area (Table C.4). Overall, some differences in habitat features were apparent between the Mary River effluent-exposed and reference areas used for the fish population survey, including the occurrence of shallower mean depth and smaller substrate diameter (i.e., predominance of cobble versus boulder substrate) at the effluent-exposed area than at the reference area.

1) Mary River Tributary-F Benthic Reference Area.

2) Mary River Tributary-F Benthic Effluent-Exposed Area.

3) Mary River Tributary-F step-drop cascade barrier.

4) Mary River downstream of Mary River Tributary-F confluence.

Photo Plate C.1: Photographs of Mary River Tributary-F and Mary River at Gorge Area, August 2017

1) Mary River Fish Population Effluent-Exposed Area.

2) Mary River Fish Population Effluent-Exposed Area Substrate.

3) Mary River Fish Population Reference Area.

4) Mary River Fish Population Reference Area Substrate.

Photo Plate C.2: Photographs of Mary River Fish Population Survey Effluent-Exposed and Reference Areas, August 2017

Table C.1: Coordinates of Habitat Characterization Transect Stations Used for the Mary River Project Phase 1 EEM, August 2017

Study Area	Station	Date Sampled	Latitude (dd mm ss.s)[a]	Longitude (ddd mm ss.s)[a]
Mary River Tributary-F Reference	MRTF-REF H1	24-Aug-17	N 71 20 24.606	W 79 10 18.960
	MRTF-REF H2	24-Aug-17	N 71 20 21.098	W 79 10 30.182
	MRTF-REF H3	24-Aug-17	N 71 20 18.540	W 79 10 39.399
Mary River Tributary-F Effluent-Exposed	MRTF-EXP H1	24-Aug-17	N 71 20 16.499	W 79 10 52.095
	MRTF-EXP H2	24-Aug-17	N 71 20 14.465	W 79 10 55.513
	MRTF-EXP H3	24-Aug-17	N 71 20 08.213	W 79 10 56.806
Mary River Fish Reference	MRR H1	28-Aug-17	N 71 15 22.745	W 79 24 34.144
Mary River Fish Effluent-Exposed	MRE H1	27-Aug-17	N 71 18 13.014	W 79 14 39.495
	MRE H2	27-Aug-17	N 71 18 12.677	W 79 14 48.484

[a] Coordinates presented as dd mm ss.s (d-degrees, m-minutes, s-seconds) using 1983 North American Datum (NAD 83).

Table C.2: Summary of Habitat Features at Watercourses Evaluated as part of the Mary River Project EEM Benthic Invertebrate Community Survey, August 2017

Habitat Characteristic		Mary River Tributary-F Reference			Mary River Tributary-F Effluent-Exposed		
		MRTF-REF1	MRTF-REF3	MRTF-REF5	MRTF-EXP1	MRTF-EXP3	MRTF-EXP5
Mean Width (m)	Wetted	4.2	4.1	4.7	7.7	9.6	4.4
	Bankfull	20	20	21	25	25	23
Mean Depth (cm)	Average	4.8	5.4	5.6	6.8	7.4	13.8
Mean Velocity (m/s)	Average	0.05	0.07	0.07	0.04	0.10	0.10
Stream Morphology	% Pool	10	20	10	40	10	5
	% Rapid	10	5	5	10	10	15
	% Riffle	45	25	85	15	60	50
	% Run	35	50	-	35	20	20
	% Gradient	4.5	5	6	7	5	7
Substrate (% areal coverage)		0% bedrock 55% boulder 40% cobble 5% pebble 0% gravel 0% sand	0% bedrock 35% boulder 50% cobble 10% pebble 5% gravel 0% sand	0% bedrock 25% boulder 65% cobble 10% pebble 0% gravel 0% sand	0% bedrock 30% boulder 60% cobble 10% pebble 0% gravel 0% sand	0% bedrock 20% boulder 65% cobble 10% pebble 5% gravel 0% sand	0% bedrock 45% boulder 45% cobble 10% pebble 0% gravel 0% sand
Mean Substrate Size (cm)		12.9	9.7	6.7	12.5	10.7	16.8
Aquatic Vegetation (% areal coverage)	Periphyton Description	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks
	Macrophyte Coverage	none observed	none observed	none observed	none observed	none observed	none observed

Table C.3: Habitat Data Summary and Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Study Areas, August 2017

Channel Feature	Two-Area Comparison			Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test					Lower Bound	Upper Bound		
Wetted Width (m)	NO	0.1310	α	Reference	4.3	0.3	0.2	3.5	5.1	4.1	4.7
				Effluent-Exposed	7.2	2.6	1.5	0.7	13.8	4.4	9.6
Bankfull Width (m)	YES	0.0058	β , ζ	Reference	20.3	0.6	0.3	18.9	21.8	20.0	21.0
				Effluent-Exposed	24.3	1.2	0.7	21.5	27.2	23.0	25.0
Water Depth (cm)	NO	0.1427	α , η	Reference	5.3	0.4	0.2	4.2	6.3	4.8	5.6
				Effluent-Exposed	9.3	3.8	2.2	-0.2	18.9	6.8	13.8
Water Velocity (m/s)	NO	0.4191	α , η	Reference	0.06	0.01	0.01	0.04	0.08	0.05	0.07
				Effluent-Exposed	0.08	0.03	0.02	0.00	0.16	0.04	0.10
Stream Gradient (% slope)	NO	0.1145	β , ζ	Reference	4.8	0.6	0.3	3.4	6.3	4.5	5.5
				Effluent-Exposed	6.3	1.2	0.7	3.5	9.2	5.0	7.0
Substrate Size (cm)	NO	0.2359	α	Reference	9.8	3.1	1.8	2.1	17.4	6.7	12.9
				Effluent-Exposed	13.3	3.2	1.8	5.5	21.2	10.7	16.8

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.05.

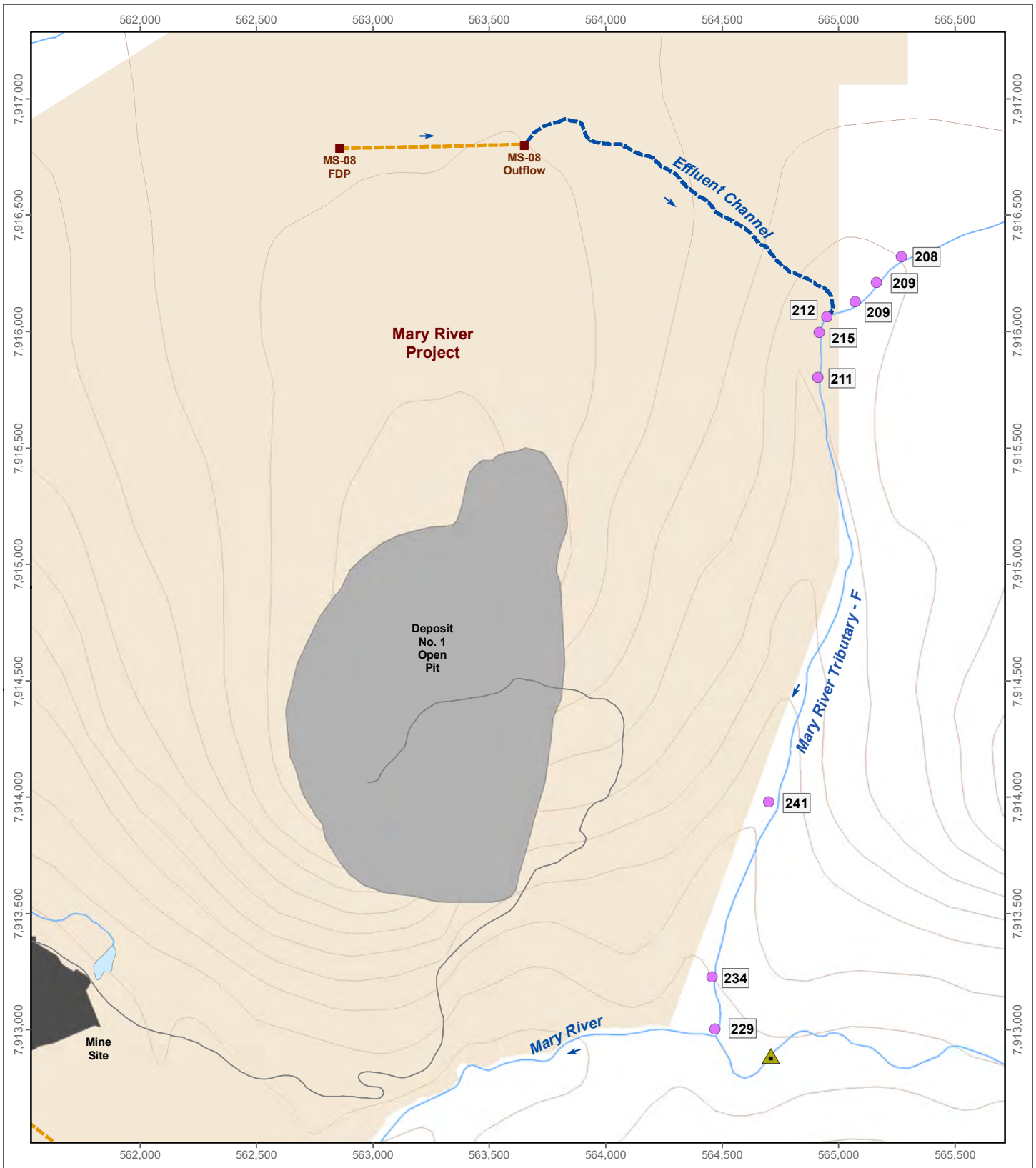
[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log-transformed, single factor ANOVA test conducted; γ - Mann-Whitney U-test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - single factor ANOVA test validated using t-test assuming unequal variance.

Table C.4: Summary of Habitat Features at Mary River Study Areas Used as part of the Mary River Project EEM Fish Population Survey, August 2017

Habitat Characteristic		Mary River Reference	Mary River Effluent-Exposed	
		Transect 1	Transect 1	Transect 2
Mean Width (m)	Wetted	72.9	14.8	25.8
Mean Depth (cm)	Average	47.7	29.7	35.1
Mean Velocity (m/s)	Average	0.30	-	-
Stream Morphology	% Pool	0	0	0
	% Rapid	10	20	0
	% Riffle	90	80	100
	% Run	0	0	0
Substrate (% areal coverage)		0% bedrock 75% boulder 15% cobble 5% pebble 0% gravel 5% sand	0% bedrock 5% boulder 85% cobble 10% pebble 0% gravel 0% sand	0% bedrock 5% boulder 90% cobble 5% pebble 0% gravel 0% sand
Mean Substrate Size (cm)		55.9	10.3	13.5
Aquatic Vegetation (% areal coverage)	Periphyton Description	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks	<0.5 mm thick of attached algae/periphyton on rocks
	Macrophyte Coverage	none observed	none observed	none observed

APPENDIX D

EFFLUENT AND WATER QUALITY DATA



LEGEND

- Sampling Location
- Final Discharge Point (FDP)
- Mary River Cascade Barrier
- Discharge Line
- Overland Effluent Channel
- 229 Specific Conductance (uS/cm)

Specific Conductance Data for Mary River Tributary-F During the EEM Field Study

0 0.25 0.5 1 km

Map Projection: UTM Zone 17N NAD 1983

N W E S

Date: January 2018
Project 177202.0033

minnow environmental inc.

Figure D.1

Document Path: S:\Projects\177202\177202.0033 - Baffinland 2017\2 - Mapping\Interpretive Report\17-33 Fig D.1 Specific Conductance Data.mxd

Table D.1: Station MS-08 Effluent Daily Discharge Volumes, 2015 - 2017

Year	Date	Volume Discharged (m^3)
2015	9-Jul-15	47
	10-Jul-15	64
	11-Jul-15	196
	12-Jul-15	293
	13-Jul-15	0.4
	20-Jul-15	80
	21-Jul-15	59
	27-Jul-15	203
	30-Jul-15	144
	5-Aug-15	124
	6-Aug-15	257
	7-Aug-15	149
	9-Aug-15	150
	10-Aug-15	150
	20-Aug-15	150
2016	20-Jul-16	135
	21-Jul-16	253
	22-Jul-16	129
	6-Aug-16	309
	7-Aug-16	656
	8-Aug-16	303
	17-Aug-16	84
	18-Aug-16	567
	19-Aug-16	767
	29-Aug-16	567
	30-Aug-16	232
	31-Aug-16	286
	1-Sep-16	585
	2-Sep-16	687
2017	2-Jul-17	1,716
	3-Jul-17	936
	8-Jul-17	12
	17-Jul-17	767
	18-Jul-17	20
	19-Jul-17	1,339
	20-Jul-17	249
	21-Jul-17	826
	29-Jul-17	335
	30-Jul-17	882
	31-Jul-17	346
	1-Aug-17	466
	3-Aug-17	369
	24-Aug-17	369
	25-Aug-17	376
	26-Aug-17	874
	27-Aug-17	523
	28-Aug-17	235
	29-Aug-17	604
	30-Aug-17	1,230
	31-Aug-17	1,008
	1-Sep-17	754
	2-Sep-17	437
	3-Sep-17	1,186
	4-Sep-17	794
	5-Sep-17	977
	6-Sep-17	864

Table D.2: Effluent Quality Monitoring Data for Mary River Project Station MS-08, 2015

Variable		Units	MMER Grab Limit [a]	July			August	
				9-Jul-15	20-Jul-15	30-Jul-15	6-Aug-15	11-Aug-15
Routine Monitoring [b]	Volume	m^3/day	-	47	80	144	257	150
	pH	pH units	-	7.13	7.51	7.90	7.44	7.77
	TSS	mg/L	30	27	4	2	12	2
	Arsenic (As)	mg/L	1.00	0.0002	<0.00010	<0.0010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.60	0.0020	0.0005	<0.0010	0.0014	0.0011
	Lead (Pb)	mg/L	0.40	0.00082	0.00044	<0.00050	0.00023	0.00015
	Nickel (Ni)	mg/L	1.00	0.010	0.012	0.013	0.025	0.021
	Zinc (Zn)	mg/L	1.00	0.0051	<0.0030	<0.0030	0.0035	0.0031
	Radium-226	Bq/L	1.11	-	<0.0100	<0.0100	<0.0100	0.0160
Effluent Characterization [c]	Conductivity	µS/cm	-	-	948	-	1,320	-
	Hardness	mg/L (as $CaCO_3$)	-	223	495	678	667	780
	Alkalinity	mg/L (as $CaCO_3$)	-	18	32	45	-	44
	Ammonia (NH_4^+)	mg/L	-	0.36	0.44	0.38	-	0.47
	Nitrate (NO_3)	mg/L	-	1.9	4.0	5.5	-	4.9
	Aluminum (Al)	mg/L	-	0.804	0.065	0.067	0.115	0.118
	Cadmium (Cd)	mg/L	-	0.00005	0.00007	<0.000090	0.00018	0.00014
	Iron (Fe)	mg/L	-	1.120	0.164	0.138	0.479	0.178
	Mercury (Hg)	mg/L	0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010
	Molybdenum (Mo)	mg/L	-	0.0001	0.0001	<0.00050	0.0002	<0.00050
	Selenium (Se)	mg/L	-	0.0007	0.0014	0.0021	0.0025	0.0027

Indicates grab sample concentration above applicable limit for deleterious substances *or* grab sample mercury concentration that exceeded fish usability assessment trigger value.

[a] Limits indicated refer to maximum authorized grab sample concentrations as per Schedule 4 of the MMER (Government of Canada 2016) except the limit for mercury, which has been included as a fish usability assessment trigger limit based on a grab sample concentration of 0.0001 mg/L.

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2016).

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2016).

Table D.3: Effluent Quality Monitoring Data for Mary River Project Station MS-08, 2016

Variable		Units	MMER Grab Limit [a]	July		August				
				19-Jul-16	26-Jul-16	8-Aug-16	9-Aug-16	16-Aug-16	22-Aug-16	30-Aug-16
Routine Monitoring [b]	Volume	m^3/day	-	-	-	303	-	-	-	232
	pH	pH units	-	7.31	7.45	7.19	6.92	7.03	6.89	7.21
	TSS	mg/L	30	10	4	18	2	2	2	3
	Arsenic (As)	mg/L	1.0	0.00011.	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	Copper (Cu)	mg/L	0.6	0.0053	0.0036	0.0018	0.0047	0.0022	0.0016	0.0010
	Lead (Pb)	mg/L	0.4	0.00061	0.00030	0.00044	0.00010	0.00010	0.00010	0.00010
	Nickel (Ni)	mg/L	1.0	0.002	0.021	0.034	0.071	0.074	0.073	0.067
	Zinc (Zn)	mg/L	1.0	0.0050	0.0157	0.0052	0.0079	0.0078	0.0069	0.0070
	Radium-226	Bq/L	1.11	0.0100	0.0100	0.0100	0.0280	0.0140	0.0100	0.0110
Effluent Characterization [c]	Conductivity	µS/cm	-	63	-	-	-	1,240	-	1,300
	Hardness	mg/L (as $CaCO_3$)	-	25	-	-	-	683	-	718
	Alkalinity	mg/L (as $CaCO_3$)	-	11	-	-	-	21	-	16
	Ammonia (NH_4^+)	mg/L	-	0.02	-	-	-	0.69	-	0.72
	Nitrate (NO_3)	mg/L	-	0.2	-	-	-	5.0	-	5.2
	Aluminum (Al)	mg/L	-	0.660	-	-	-	0.020	-	0.057
	Cadmium (Cd)	mg/L	-	0.00001	-	-	-	0.00019	-	0.00017
	Iron (Fe)	mg/L	-	0.774	-	-	-	0.333	-	0.268
	Mercury (Hg)	mg/L	0.000010	0.00001	-	-	-	0.00001	-	0.00001
	Molybdenum (Mo)	mg/L	-	0.0005	-	-	-	0.0001	-	0.0001
	Selenium (Se)	mg/L	-	0.0001	-	-	-	-	-	0.0020

Indicates grab sample concentration above applicable limit for deleterious substances *or* grab sample mercury concentration that exceeded fish usability assessment trigger value.

[a] Limits indicated refer to maximum authorized grab sample concentrations as per Schedule 4 of the MMER (Government of Canada 2016) except the limit for mercury, which has been included as a fish usability assessment trigger limit based on a grab sample concentration of 0.0001 mg/L.

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2017).

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2017).

Table D.4: Effluent Quality Monitoring Data for Mary River Project Station MS-08, 2017

Variable		Units	MMER Grab Limit [a]	July		August			September
				18-Jul-17	21-Jul-17	1-Aug-17	24-Aug-17	30-Aug-17	4-Sep-17
Routine Monitoring [b]	Volume	m^3/day	-	20	826	466	369	1,230	794
	pH	pH units	6.0 - 9.5	6.93	6.92	5.25	6.99	6.50	5.75
	TSS	mg/L	30	6	<2.0	11	13	26	13
	Arsenic (As)	mg/L	1.00	<0.00010	<0.00010	<0.0010	<0.0010	<0.0010	<0.0010
	Copper (Cu)	mg/L	0.60	0.0026	0.0070	0.0290	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	0.40	0.00033	0.00049	0.00764	<0.00050	0.00080	<0.00050
	Nickel (Ni)	mg/L	1.00	0.027	0.028	0.215	0.317	0.261	0.398
	Zinc (Zn)	mg/L	1.00	0.0067	0.0100	0.0420	<0.030	<0.030	0.0320
	Radium-226	Bq/L	1.11	0.0120	0.0100	0.0150	0.0300	-	-
Effluent Characterization [c]	Conductivity	µS/cm	-	-	656	-	3,330	-	-
	Hardness	mg/L (as $CaCO_3$)	-	-	318	-	1,990	-	-
	Alkalinity	mg/L (as $CaCO_3$)	-	-	10	-	82	-	-
	Ammonia (NH_4^+)	mg/L	-	-	0.43	-	1.67	-	-
	Nitrate (NO_3)	mg/L	-	-	2.5	-	8.0	-	-
	Aluminum (Al)	mg/L	-	-	0.036	-	<0.050	-	-
	Cadmium (Cd)	mg/L	-	-	0.00006	-	0.00038	-	-
	Iron (Fe)	mg/L	-	-	0.477	-	7.100	-	-
	Mercury (Hg)	mg/L	0.000010	-	-	-	<0.000010	-	-
	Molybdenum (Mo)	mg/L	-	-	<0.000050	-	<0.00050	-	-
	Selenium (Se)	mg/L	-	-	0.0012	-	0.0047	-	-

Indicates grab sample concentration above applicable limit for deleterious substances *or* grab sample mercury concentration that exceeded fish usability assessment trigger value.

[a] Limits indicated refer to maximum authorized grab sample concentrations as per Schedule 4 of the MMER (Government of Canada 2017) except the limit for mercury, which has been included as a fish usability assessment trigger limit based on a grab sample concentration of 0.0001 mg/L.

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2017).

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2017).

Table D.5: Mary River Project Effluent (Station MS-09) Acute Lethality Results for Tests Conducted on Rainbow Trout and *Daphnia magna*, 2015 - 2017

Year	Date Sample Collected	Rainbow Trout (percent mortality in 100% effluent)	*Daphnia magna* (percent mortality in 100% effluent)
2015	-	0	0
	11-Aug-15	0	0
2016	19-Jul-16	0	0
	16-Aug-16	10	0
	30-Aug-16	0	0
2017	27-Jun-17	0	0
	11-Jul-17	0	0
	1-Aug-17	100	100
	24-Aug-17	0	6.7
	5-Sep-17	30	100

Table D.6: Effluent Quality Monitoring Data for Mary River Project Station MS-06, 2016

Variable		Units	MMER Grab Limit [a]	MS-06
				12-Sep-16
Routine Monitoring [b]	Volume	m^3/day	-	86
	pH	pH units	-	7.98
	TSS	mg/L	30	4
	Arsenic (As)	mg/L	1.00	0.00014
	Copper (Cu)	mg/L	0.60	<0.0010
	Lead (Pb)	mg/L	0.40	0.00013
	Nickel (Ni)	mg/L	1.00	<0.00050
	Zinc (Zn)	mg/L	1.00	<0.0030
	Radium-226	Bq/L	1.11	0.0150
Effluent Characterization [c]	Conductivity	µS/cm	-	318
	Hardness	mg/L (as $CaCO_3$)	-	133
	Alkalinity	mg/L (as $CaCO_3$)	-	57
	Ammonia (NH_4^+)	mg/L	-	<0.020
	Nitrate (NO_3)	mg/L	-	0.7
	Aluminum (Al)	mg/L	-	0.078
	Cadmium (Cd)	mg/L	-	<0.000010
	Iron (Fe)	mg/L	-	0.110
	Mercury (Hg)	mg/L	0.000010	<0.000010
	Molybdenum (Mo)	mg/L	-	0.0039
	Selenium (Se)	mg/L	-	0.0001
Other Parameters	Total Dissolved Solids	mg/L	-	183
	Turbidity	NTU	-	7.5
	Chloride (Cl)	mg/L	-	9.9
	Fluoride (F)	mg/L	-	0.0880
	Total Kjeldahl Nitrogen	mg/L	-	0.4
	Phosphorus, Total	mg/L	-	0.0099
	Sulfate (SO4)	mg/L	-	78.4
	Dissolved Organic Carbon	mg/L	-	4.7
	Total Organic Carbon	mg/L	-	4.5
	Calcium (Ca)	mg/L	-	25.4
	Magnesium (Mg)	mg/L	-	16.9
	Manganese (Mn)	mg/L	-	0.0066
	Potassium (K)	mg/L	-	9.4
	Sodium (Na)	mg/L	-	4.0
	Thallium (Tl)	mg/L	-	0.000017
	Uranium (U)	mg/L	-	0.0037

Indicates grab sample concentration above applicable limit for deleterious substances *or* mercury concentration that exceeded fish usability trigger value.

[a] Limits indicated refer to maximum authorized grab sample concentrations as per Schedule 4 of the MMER (Government of Canada 2017) except the limit for mercury, which has been included as a fish usability assessment trigger limit based on a grab sample concentration of 0.0001 mg/L.

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2017).

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2017).

Table D.7: ***In Situ*** **Water Quality Measurements Collected at Benthic Invertebrate Community Stations and Fish Population Study Areas for the Mary River Project EEM, August 2017**

Study Area		Station	Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Mary River Tributary-F	Reference	MRTF-REF1	25-Aug-17	7.1	11.94	98.7	8.19	209
		MRTF-REF2	25-Aug-17	6.9	12.20	100.4	8.18	207
		MRTF-REF3	25-Aug-17	6.6	12.12	98.9	8.17	208
		MRTF-REF4	25-Aug-17	6.0	12.34	99.3	8.16	209
		MRTF-REF5	25-Aug-17	5.7	12.52	99.0	8.16	209
	Mine-exposed	MRTF-EXP1	25-Aug-17	5.8	12.23	97.9	8.19	212
		MRTF-EXP2	25-Aug-17	5.7	12.30	98.1	8.18	211
		MRTF-EXP3	25-Aug-17	5.8	12.28	98.0	8.18	215
		MRTF-EXP4	25-Aug-17	5.6	12.25	98.2	8.19	214
		MRTF-EXP5	25-Aug-17	5.9	12.22	97.9	8.18	211
Mary River	Reference	EF-REF-1	28-Aug-17	7.0	13.60	103.9	7.98	173
		EF-REF-2	28-Aug-17	7.1	12.50	102.7	7.99	172
		EF-REF-3	28-Aug-17	5.7	12.80	102.1	7.97	167
		EF-REF-4	28-Aug-17	5.3	12.71	100.4	7.94	184
		EF-REF-4	28-Aug-17	4.9	12.72	99.4	7.94	182
	Mine-exposed	EF-EXP-1	27-Aug-17	5.6	12.75	101.4	8.07	176
		EF-EXP-2	27-Aug-17	5.7	12.61	100.4	8.02	173
		EF-EXP-3	27-Aug-17	5.1	12.84	100.9	8.07	190
		EF-EXP-4	27-Aug-17	4.9	12.88	100.5	8.00	174
		EF-EXP-5	27-Aug-17	4.8	12.80	99.8	7.98	165

Table D.8: *In Situ* Water Quality Data Summary and Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Benthic Study Areas, August 2017

Metric	Two-Sample Comparison			Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test					Lower Bound	Upper Bound		
Water Temperature (°C)	YES	0.0304	α , η	Reference	6.5	0.6	0.3	5.7	7.2	5.7	7.1
				Effluent-Exposed	5.8	0.1	0.1	5.6	5.9	5.6	5.9
Dissolved Oxygen (mg/L)	NO	0.7558	α , η	Reference	12.22	0.22	0.10	11.95	12.50	11.94	12.52
				Effluent-Exposed	12.26	0.03	0.02	12.21	12.30	12.22	12.30
Dissolved Oxygen (% saturation)	YES	0.0037	α	Reference	99.26	0.67	0.30	98.42	100.10	98.70	100.40
				Effluent-Exposed	98.02	0.13	0.06	97.86	98.18	97.90	98.20
pH (units)	YES	0.0804	α	Reference	8.17	0.01	0.01	8.16	8.19	8.16	8.19
				Effluent-Exposed	8.18	0.01	0.00	8.18	8.19	8.18	8.19
Specific Conductance (µS/cm)	YES	0.0017	α , η	Reference	208	1	0	207	210	207	209
				Effluent-Exposed	213	2	1	210	215	211	215

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log-transformed, single factor ANOVA test conducted; γ - Mann-Whitney U-test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - single factor ANOVA test validated using t-test assuming unequal variance.

Table D.9: *In Situ* Water Quality Data Summary and Statistical Comparison Results between Mary River Effluent-Exposed and Reference Fish Population Study Areas, August 2017

Metric	Two-Sample Comparison			Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test					Lower Bound	Upper Bound		
Water Temperature (°C)	NO	0.1451	α , η	Reference	6.0	1.0	0.4	4.8	7.2	4.9	7.1
				Effluent-Exposed	5.2	0.4	0.2	4.7	5.7	4.8	5.7
Dissolved Oxygen (mg/L)	NO	0.6579	α	Reference	12.87	0.43	0.19	12.34	13.39	12.50	13.60
				Effluent-Exposed	12.78	0.10	0.05	12.65	12.91	12.61	12.88
Dissolved Oxygen (% saturation)	NO	0.2310	α , η	Reference	101.70	1.80	0.81	99.46	103.94	99.40	103.90
				Effluent-Exposed	100.60	0.60	0.27	99.86	101.34	99.80	101.40
pH (units)	YES	0.0158	α	Reference	7.96	0.02	0.01	7.94	7.99	7.94	7.99
				Effluent-Exposed	8.03	0.04	0.02	7.98	8.08	7.98	8.07
Specific Conductance (µS/cm)	NO	1.0000	α	Reference	176	7	3	167	184	167	184
				Effluent-Exposed	176	9	4	164	187	165	190

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log-transformed, single factor ANOVA test conducted; γ - Mann-Whitney U-test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - single factor ANOVA test validated using t-test assuming unequal variance.

Table D.10: Water Chemistry at Mary River Tributary-F and Mary River Stations during Periods of Effluent Discharge in 2015

	Variable	Units	CWQG [a]	MS-08-US Mary River Reference		MS-08-DS Mary River Effluent-Exposed	
				20-Jul-15	11-Aug-15	20-Jul-15	11-Aug-15
Routine Monitoring [b]	pH	pH units	6.0 - 9.5	7.98	8.16	7.97	7.95
	TSS	mg/L	-	<2.0	<2.0	<2.0	<2.0
	Arsenic (As)	mg/L	0.005	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0008	0.0011	0.0008	0.0011
	Lead (Pb)	mg/L	0.001	0.00022	0.00014	0.00019	0.00013
	Nickel (Ni)	mg/L	0.025	<0.00050	<0.0010	<0.00050	<0.0010
	Zinc (Zn)	mg/L	0.030	<0.0030	<0.0030	<0.0030	<0.0030
	Radium-226	Bq/L	-	<0.0100	<0.0100	<0.0100	<0.0100
Effluent Characterization [c]	Conductivity	µS/cm	-	75	-	78	-
	Hardness	mg/L (as $CaCO_3$)	-	36	68	38	71
	Alkalinity	mg/L (as $CaCO_3$)	-	36	65	38	66
	Ammonia (NH_4^+)	mg/L	-	<0.050	<0.050	<0.050	<0.050
	Nitrate (NO_3)	mg/L	13	<0.020	<0.020	<0.020	<0.020
	Aluminum (Al)	mg/L	0.100	0.390	0.233	0.383	0.227
	Cadmium (Cd)	mg/L	0.00012	<0.000010	<0.000010	<0.000010	<0.000010
	Iron (Fe)	mg/L	0.3	0.208	0.159	0.187	0.144
	Mercury (Hg)	mg/L	0.000026	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	0.0002	<0.00050	0.0002	<0.00050
	Selenium (Se)	mg/L	0.001	<0.0010	<0.000050	<0.0010	<0.000050
Other Parameters	Turbidity	NTU	-	-	4.4	-	2.0
	Total Dissolved Solids	mg/L	-	-	78	-	80
	Dissolved Organic Carbon	mg/L	-	-	<1.0	-	<1.0
	Total Organic Carbon	mg/L	-	-	<1.0	-	<1.0
	Total Kjeldahl Nitrogen	mg/L	-	-	0.21	-	<0.15
	Total Phosphorus	mg/L	0.02	-	0.0058	-	0.0051
	Fluoride (F)	mg/L	-	-	0.025	-	0.024
	Chloride (Cl)	mg/L	120	-	3.81	-	3.72
	Sulfate (SO4)	mg/L	218	-	3.26	-	3.19
	Antimony (Sb)-Total	mg/L	0.02	<0.00010	-	<0.00010	-
	Barium (Ba)-Total	mg/L	-	0.0076	-	0.0076	-
	Beryllium (Be)-Total	mg/L	0.011	<0.00050	-	<0.00050	-
	Bismuth (Bi)-Total	mg/L	-	<0.00050	-	<0.00050	-
	Boron (B)-Total	mg/L	-	<0.010	-	<0.010	-
	Calcium (Ca)-Total	mg/L	-	7.5	15.1	7.9	14.8
	Chromium (Cr)-Total	mg/L	0.0089	<0.00050	-	<0.00050	-
	Cobalt (Co)-Total	mg/L	-	<0.00010	-	<0.00010	-
	Lithium (Li)-Total	mg/L	-	<0.0010	-	<0.0010	-
	Magnesium (Mg)-Total	mg/L	-	4.23	8.38	4.44	8.44
	Manganese (Mn)-Total	mg/L	0.935	0.0019	0.0020	0.0022	0.0018
	Potassium (K)-Total	mg/L	-	0.93	1.11	0.94	1.10
	Silicon (Si)-Total	mg/L	-	1.40	-	1.39	-
	Silver (Ag)-Total	mg/L	0.00025	<0.000010	-	<0.000010	-
	Sodium (Na)-Total	mg/L	-	1.11	2.46	1.11	2.43
	Strontium (Sr)-Total	mg/L	-	0.0077	-	0.0077	-
	Thallium (Tl)-Total	mg/L	0.0008	<0.00010	<0.000010	<0.00010	<0.000010
	Titanium (Ti)-Total	mg/L	0.00010	0.012	-	0.011	-
	Uranium (U)-Total	mg/L	0.015	0.0008	0.0032	0.0008	0.0031
	Vanadium (V)-Total	mg/L	0.006	<0.0010	-	<0.0010	-

Indicates value above applicable Canadian Water Quality Guideline for the protection of aquatic life.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CWQG; CCME 1999, 2016).

[b] Deleterious substances and pH as defined under Schedule 4 of the MMER (Government of Canada 2016) applicable to effluent quality

[c] Required effluent characterization and site-specific parameters as defined under Schedule 5 of the MMER (Government of Canada 2016) applicable to effluent quality.

Table D.11: Water Chemistry at Mary River Tributary-F and Mary River Stations during Periods of Effluent Discharge in 2016

Parameters		Units	Water Quality Guideline (WQG)[a]	Mary River Tributary-F	Mary River Upstream			Mary River Downstream				
				FO-01	MS-08-US	MS-08-US	G0-01	E0-10	MS-08-DS	MS-08-DS	EO-21	CO-01
				20-Aug-2016	20-Jul-2016	29-Aug-2016	20-Aug-2016	20-Aug-2016	20-Jul-2016	29-Aug-2016	19-Aug-2016	19-Aug-2016
Conventionals	Conductivity (lab)	umho/cm	-	261	70.5	189	174	186	73.5	193	172	170
	pH (lab)	pH	6.5 - 9.0	8.28	7.81	8.16	8.14	8.14	8	8.18	8.17	8.15
	Hardness (as $CaCO_3$)	mg/L	-	131	32	80	79	84	32	82	80	79
	Total Suspended Solids (TSS)	mg/L	-	3	<2.0	3.8	2.5	2.9	<2.0	6.8	3.4	2.5
	Total Dissolved Solids (TDS)	mg/L	-	141			69	102			86	89
	Alkalinity (as $CaCO_3$)	mg/L	-	118	33	72	75	82	37	75	68	72
Nutrients and Anions	Total Ammonia	mg/L	variable[c]	<0.020	0.02	0.02	<0.020	<0.020	0.02	0.02	0.026	0.022
	Nitrate	mg/L	13	0.096	0.02	0.02	<0.020	<0.020	0.02	0.022	<0.020	<0.020
	Total Organic Carbon	mg/L	-	1.4			1.5	2.3			1.5	1.6
	Total Phosphorus	mg/L	0.020[α]	0.0112			0.0098	0.0117			0.0157	0.0102
	Chloride (Cl)	mg/L	120	5.57			6.92	6.74			6.08	6.1
	Sulphate (SO_4)	mg/L	218[β]	14.3			4.59	5.01			4.19	4.03
Total Metals	Aluminum (Al)	mg/L	0.100	0.251	0.211	0.475	0.484	0.418	0.308	0.572	0.431	0.32
	Antimony (Sb)	mg/L	0.020[α]	<0.00010			<0.00010	<0.00010			<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.00015	<0.00010	0.00012	0.00013	0.00014	<0.00010	0.00013	0.00014	0.00013
	Barium (Ba)	mg/L	-	0.0148			0.0142	0.0143			0.0143	0.0129
	Beryllium (Be)	mg/L	0.011[α]	<0.00010			<0.00010	<0.00010			<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	<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
	Cadmium (Cd)	mg/L	0.00012	<0.000010	0.00001	0.00001	<0.000010	<0.000010	0.00001	0.00001	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	27			16.9	17.5			16.9	15.8
	Chromium (Cr)	mg/L	0.0089	0.00108			0.0011	0.00112			0.00108	0.00086
	Cobalt (Co)	mg/L	0.0009[α]	0.00024			0.00023	0.00022			0.00022	0.00018
	Copper (Cu)	mg/L	0.002	0.0019	<0.0010	0.0015	0.0016	0.0016	<0.0010	0.0015	0.0016	0.0017
	Iron (Fe)	mg/L	0.30	0.325	0.170	0.372	0.471	0.437	0.251	0.484	0.442	0.356
	Lead (Pb)	mg/L	0.001	0.00042	0.00016	0.00032	0.00041	0.0004	0.00019	0.0004	0.00039	0.00033
	Lithium (Li)	mg/L	-	0.0011			0.0011	<0.0010			<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	15.9			9.18	10.2			9.4	9.17
	Manganese (Mn)	mg/L	0.935[β]	0.00498			0.00547	0.00531			0.00541	0.00526
	Mercury (Hg)	mg/L	0.000026	<0.000010	0.00001	0.00001	<0.000010	<0.000010	0.00001	0.00001	<0.000010	<0.000010
	Molybdenum (Mo)	mg/L	0.073	0.000337	0.000172	0.000471	0.000457	0.000425	0.000174	0.000465	0.000534	0.000463
	Nickel (Ni)	mg/L	0.025	0.00148	<0.00050	0.00076	0.00102	0.00111	<0.00050	0.00104	0.00117	0.00114
	Potassium (K)	mg/L	-	1.46			1.42	1.44			1.4	1.38
	Selenium (Se)	mg/L	0.001	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	1.25			1.73	1.56			1.66	1.41
	Silver (Ag)	mg/L	0.00025	<0.000050			<0.000050	<0.000050			<0.000050	<0.000050
	Sodium (Na)	mg/L	-	2.2			3.69	3.54			3.35	3.33
	Strontium (Sr)	mg/L	-	0.0197			0.0184	0.0188			0.0179	0.0165
	Thallium (Tl)	mg/L	0.0008	0.000013			0.000014	0.000015			0.000015	0.000013
	Tin (Sn)	mg/L	-	<0.00010			<0.00010	<0.00010			<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	0.0156			0.0271	0.0245			0.0248	0.0185
	Uranium (U)	mg/L	0.015	0.00353			0.00468	0.0043			0.00406	0.00364
	Vanadium (V)	mg/L	0.006[α]	0.00078			0.00104	0.00101			0.00098	0.00082
	Zinc (Zn)	mg/L	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0034	<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).

Indicates parameter concentration above applicable Water Quality Guideline.

Table D.12: Water Chemistry at Mary River Tributary-F and Mary River Stations during Periods of Effluent Discharge in 2017

Parameters		Units	Water Quality Guideline (WQG)[a]	Mary River Tributary-F			Mary River Upstream				Mary River Downstream						
				MRTF-1	FO-01	FO-01	MS-08-US	MS-08-US	GO-01	G0-01	E0-10	MS-08-DS	MS-08-DS	EO-21	E0-21	CO-01	CO-01
				24-Aug-2017	8-Jul-2017	1-Sep-2017	21-Jul-2017	24-Aug-2017	8-Jul-2017	1-Sep-2017	1-Sep-2017	21-Jul-2017	24-Aug-2017	8-Jul-2017	1-Sep-2017	8-Jul-2017	27-Aug-2017
Conventionals	Conductivity (lab)	umho/cm	-	196	51.4	266	49.8	136	29.8	151	157.5	52.9	141	30.1	164	32.2	143
	pH (lab)	pH	6.5 - 9.0	8.12	7.57	8.22	7.62	8.06	7.22	8.08	8.095	7.63	8.04	7.32	8.04	7.44	8.01
	Hardness (as $CaCO_3$)	mg/L	-	96	27	134	22	61	13	70	74	24	63	13	78	14	72
	Total Suspended Solids (TSS)	mg/L	-	<2.0	7.3	5.2	3.4	<2.0	3.9	<2.0	<2.0	3.6	<2.0	<2.0	<2.0	3.4	3.3
	Total Dissolved Solids (TDS)	mg/L	-	106	35	136	-	76	19	74	76	-	43	17	79	25	71
	Alkalinity (as $CaCO_3$)	mg/L	-	97	22	107	24	58	11	66	69	24	61	10	69	14	63
Nutrients and Anions	Total Ammonia	mg/L	variable[c]	0.177	<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	0.116	<0.020	0.134	<0.020	<0.020	<0.020	<0.020	0.035	0.075	<0.020	<0.020	0.058	<0.020	0.07
	Total Organic Carbon	mg/L	-	<1.0	0.95	1	<1.0	1.4	1.25	1.1	1.15	<1.0	1.5	1.46	1.1	1.24	1.3
	Total Phosphorus	mg/L	0.020[α]	<0.0030	0.0112	0.0067	0.0065	0.0046	0.0078	0.0036	0.0038	0.011	0.0053	0.0088	0.0037	0.0103	0.0066
	Chloride (Cl)	mg/L	120	1.26	<0.50	5.37	1.05	3.86	0.73	4.61	4.65	1.52	3.87	0.75	4.7	0.73	4.1
	Sulphate (SO_4)	mg/L	218[β]	2.8	1.23	25.3	0.62	2.44	0.32	2.93	4.34	0.73	2.97	0.39	7.53	0.61	3.79
Total Metals	Aluminum (Al)	mg/L	0.100	0.0573	0.133	0.187	0.0908	0.154	0.0986	0.0586	0.07085	0.0948	0.150	0.101	0.0704	0.123	0.219
	Antimony (Sb)	mg/L	0.020[α]	0.00043	<0.00010	<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	<0.00010	<0.00010	<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	-	0.0076	0.00355	0.0138	0.00386	0.00907	0.00299	0.00895	0.009345	0.00367	0.00949	0.0028	0.00973	0.003	0.0101
	Beryllium (Be)	mg/L	0.011[α]	<0.00010	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00010
	Bismuth (Bi)	mg/L	-	<0.000050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<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	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	<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	-	20.7	5.11	26.5	4.58	13.1	2.76	13.7	14.9	4.78	13.2	2.81	15.7	2.98	13.9
	Chromium (Cr)	mg/L	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]	<0.00010	0.00011	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013
	Copper (Cu)	mg/L	0.002	<0.0010	0.00061	0.00096	<0.0010	0.001	0.00052	0.00084	0.00081	<0.0010	<0.0010	0.00053	0.00085	0.00053	0.0011
	Iron (Fe)	mg/L	0.30	<0.050	0.189	0.237	0.09	0.114	0.071	0.043	0.0525	0.102	0.091	0.083	0.053	0.09	0.237
	Lead (Pb)	mg/L	0.001	0.000051	0.000225	0.000253	0.000112	0.000103	0.000087	<0.000050	0.0000565	0.000095	0.000089	0.000087	0.000073	0.000109	0.000175
	Lithium (Li)	mg/L	-	<0.0010	<0.0010	0.0015	<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	-	11.5	3.21	16.4	2.67	6.9	1.56	8.01	8.87	2.96	7.34	1.65	8.94	1.78	8.17
	Manganese (Mn)	mg/L	0.935[β]	0.00052	0.00333	0.00675	0.00164	0.00186	0.00177	0.000579	0.000985	0.00163	0.00105	0.00173	0.0051	0.00205	0.00536
	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	0.000186	<0.000050	0.000255	0.000089	0.00031	<0.000050	0.00027	0.000255	0.000089	0.000315	0.00005	0.000556	0.000051	0.000323
	Nickel (Ni)	mg/L	0.025	<0.00050	0.00051	0.00068	0.0006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	0.0005	<0.00050	0.00078
	Potassium (K)	mg/L	-	0.902	0.37	1.38	0.469	1.04	0.35	0.92	0.965	0.455	1.06	0.35	0.98	0.37	1.11
	Selenium (Se)	mg/L	0.001	<0.000050	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.000050
	Silicon (Si)	mg/L	-	0.88	0.5	1.23	0.64	0.99	0.5	0.99	1.02	0.64	1.02	0.57	1.01	0.56	1.11
	Silver (Ag)	mg/L	0.00025	<0.000050	<0.000010	<0.000010	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000050
	Sodium (Na)	mg/L	-	0.9	0.254	1.76	0.68	2.23	0.458	2.32	2.28	0.62	2.07	0.43	2.26	0.455	2.38
	Strontium (Sr)	mg/L	-	0.0108	0.00286	0.0191	0.0045	0.0125	0.00261	0.0132	0.0134	0.0044	0.0133	0.00259	0.0156	0.00265	0.0129
	Thallium (Tl)	mg/L	0.0008	<0.000010	<0.00010	<0.00010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.000010	<0.000010	<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	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	<0.00030	<0.010	0.014	0.00504	0.00572	<0.010	<0.010	<0.010	0.00538	0.00503	<0.010	<0.010	<0.010	0.0113
	Uranium (U)	mg/L	0.015	0.00251	0.000198	0.00261	0.000275	0.00231	0.000137	0.00278	0.00276	0.000269	0.00237	0.000142	0.00266	0.000154	0.00208
	Vanadium (V)	mg/L	0.006[α]	<0.00050	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	0.00055
	Zinc (Zn)	mg/L	0.030	0.0038	<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).

Indicates parameter concentration above applicable Water Quality Guideline.

APPENDIX E

BENTHIC INVERTEBRATE COMMUNITY DATA

Table E.1: Coordinates of Benthic Invertebrate Community Sampling Stations Used for the Mary River Project Phase 1 EEM, August 2017

Study Area	Station	Date Sampled	Latitude (dd mm ss.s)[a]	Longitude (ddd mm ss.s)[a]
Mary River Tributary-F Reference	MRTF-REF1	25-Aug-17	N 71 20 24.606	W 79 10 18.960
	MRTF-REF2	25-Aug-17	N 71 20 22.656	W 79 10 24.287
	MRTF-REF3	25-Aug-17	N 71 20 21.098	W 79 10 30.182
	MRTF-REF4	25-Aug-17	N 71 20 19.717	W 79 10 34.246
	MRTF-REF5	25-Aug-17	N 71 20 18.540	W 79 10 39.399
Mary River Tributary-F Effluent-Exposed	MRTF-EXP1	25-Aug-17	N 71 20 16.499	W 79 10 52.095
	MRTF-EXP2	25-Aug-17	N 71 20 15.709	W 79 10 53.884
	MRTF-EXP3	25-Aug-17	N 71 20 14.465	W 79 10 55.513
	MRTF-EXP4	25-Aug-17	N 71 20 11.597	W 79 10 56.085
	MRTF-EXP5	25-Aug-17	N 71 20 08.213	W 79 10 56.806

[a] Coordinates presented as dd mm ss.s (d-degrees, m-minutes, s-seconds) using 1983 North American Datum (NAD 83).

Table E.2: Replicate Habitat Measurements Collected at Benthic Invertebrate Community Stations, Mary River Project Phase 1 EEM, August 2017

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 Tributary-F Reference	MRTF-REF1	6	7	6	0.27	0.25	0.26	6.6	6.4	6.8	0%	38%	13%
	MRTF-REF2	4	4	4	0.28	0.14	0.18	6.6	6.1	6.8	25%	13%	38%
	MRTF-REF3	3	3	3	0.19	0.14	0.15	6.7	6.1	4.9	13%	0%	13%
	MRTF-REF4	4	5	6	0.12	0.19	0.15	6.7	4.1	8.0	0%	25%	25%
	MRTF-REF5	4	4	4	0.13	0.11	0.29	6.2	5.5	5.0	25%	25%	38%
Mary River Tributary-F Effluent-Exposed	MRTF-EXP1	4	4	4	0.11	0.18	0.26	5.6	6.1	4.7	13%	25%	13%
	MRTF-EXP2	6	6	6	0.17	0.23	0.22	5.2	5.7	6.5	0%	25%	50%
	MRTF-EXP3	6	7	7	0.29	0.17	0.13	7.0	6.9	7.0	13%	13%	13%
	MRTF-EXP4	7	7	6	0.30	0.14	0.19	7.8	6.4	6.8	13%	38%	0%
	MRTF-EXP5	8	9	6	0.29	0.23	0.17	6.7	5.9	7.2	13%	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 6 - 8 measurements per replicate grab, with a mean of 6.2 for the entire 2017 stream sampling program.

Table E.3: Replicate Station Habitat Feature Summary and Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Study Areas, August 2017

Channel Feature	Two-Area Comparison			Study Area	Mean	Standard Deviation	Standard Error	95% Confidence Interval for Mean		Minimum	Maximum
	Significant Difference between Areas?	p-value	Statistical Test					Lower Bound	Upper Bound		
Water Depth (cm)	YES	0.0706	α	Reference	4.5	1.3	0.6	2.9	6.0	3.0	6.3
				Effluent-Exposed	6.2	1.4	0.6	4.5	7.9	4.0	7.7
Water Velocity (cm/s)	NO	0.4811	α	Reference	19.0	4.3	1.9	13.7	24.3	15.3	26.0
				Effluent-Exposed	20.5	1.7	0.8	18.4	22.7	18.3	23.0
Substrate Size (cm)	NO	0.6103	α	Reference	6.2	0.4	0.2	5.6	6.7	5.6	6.6
				Effluent-Exposed	6.4	0.7	0.3	5.5	7.2	5.5	7.0
Substrate Embeddedness (%)	NO	0.8480	α	Reference	19.2	8.1	3.6	9.1	29.3	8.3	29.2
				Effluent-Exposed	18.3	4.8	2.1	12.4	24.2	12.5	25.0

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.1.

[a] Data analysis included: α - data untransformed, single factor ANOVA test conducted; β - data log-transformed, single factor ANOVA test conducted; γ - Mann-Whitney U-test conducted; ζ - single factor ANOVA test validated using Mann-Whitney U-test; η - single factor ANOVA test validated using t-test assuming unequal variance.

Table E.4: Benthic Invertebrate Community Data (Densities Expressed in Number of Organisms per Square Metre) for Mary River Tributary-F Study Areas, August 2017

Taxa	Reference Area					Effluent-Exposed Area				
	1	2	3	4	5	1	2	3	4	5
ROUNDWORMS										
P. Nemata	7	-	-	-	-	-	-	4	-	-
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	4	-	-	4	-	-	-	-	7	4
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Sperchonidae										
Sperchon	-	7	-	7	4	7	-	4	18	-
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
immature	-	-	-	4	-	-	-	-	-	-
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	18	4	-	14	14	-	4	4	4	-
S.F. Diamesinae										
Diamesa	75	29	22	86	36	22	50	100	133	97
Pseudokiefferiella	57	-	11	68	36	14	4	-	7	11
S.F. Orthocladiinae										
Chaetocladius	14	-	-	14	-	7	-	4	-	-
Corynoneura	-	-	7	-	-	-	-	-	-	-
Cricotopus/Orthocladius	-	4	-	7	-	-	7	7	32	-
Diplocladius	11	-	4	4	-	7	4	4	7	-
Eukiefferiella	208	104	47	280	100	39	168	247	222	43
Krenosmittia	14	75	7	39	29	32	39	39	14	4
Limnophyes	18	7	-	4	-	4	-	-	-	-
Metriocnemus	-	-	-	7	-	-	-	-	-	-
Parakiefferiella	-	11	-	-	-	-	-	-	-	-
Paraphaenocladius	4	-	-	-	-	-	-	-	-	-
Tokunagaia	11	7	4	-	25	4	4	14	7	-
Tvetenia	-	-	-	-	-	-	4	-	-	-
Vivacricotopus	-	-	-	4	-	-	-	-	-	-
indeterminate	-	-	-	4	-	4	-	-	-	-
F. Empididae										
Clinocera	-	-	-	-	-	4	-	-	7	-
pupae	4	-	-	-	-	-	-	-	-	-
F. Simuliidae										
Gymnopais	161	219	82	480	75	297	462	552	706	685
Prosimulium/Helodon	-	-	-	7	-	-	-	-	-	-
F. Tipulidae										
Tipula	7	7	4	25	11	7	4	36	11	11
Density (No. organisms per m^2)	613	474	188	1,058	330	448	750	1,015	1,175	855
Richness[a]	6	4	3	6	4	5	3	5	6	4
Simpson's Evenness (E)[a]	0.297	0.529	0.689	0.359	0.430	0.379	0.637	0.428	0.338	0.370
Bray-Curtis Index[a]	0.204	0.069	0.378	0.439	0.121	0.291	0.302	0.423	0.481	0.491

[a] Metrics calculated using Family Level (FL) taxonomy.

Table E.5: Supporting Benthic Invertebrate Community Metrics for Mary River Tributary-F Effluent-Exposed and Reference Study Area Replicate Stations, Mary River Project Phase 1 EEM, August 2017

Supportng Metric	Reference Area					Effluent-Exposed Area				
	1	2	3	4	5	1	2	3	4	5
Family Level Taxonomy										
Simpson's Diversity (FL) [a]	0.439	0.528	0.516	0.536	0.418	0.472	0.477	0.533	0.507	0.324
Shannon-Wiener Diversity (FL)[a]	1.108	1.191	1.121	1.251	1.061	1.162	1.001	1.239	1.216	0.818
Lowest Practical Level Taxonomy										
Richness (LPL) [b]	14	10	9	16	8	12	10	11	12	7
Simpson's Evenness (LPL)[b]	0.319	0.339	0.406	0.211	0.626	0.182	0.228	0.246	0.202	0.217
Bray-Curtis Index (LPL) [b]	0.249	0.200	0.385	0.460	0.160	0.312	0.387	0.493	0.557	0.580
Simpson's Diversity (LPL) [b]	0.776	0.705	0.726	0.704	0.800	0.542	0.561	0.631	0.588	0.342
Shannon-Wiener Diversity (LPL)[b]	2.655	2.213	2.332	2.322	2.581	1.918	1.667	1.919	1.849	1.063
Dominant Taxa Groups										
% Chironomidae	70.1%	50.8%	54.3%	50.2%	72.7%	29.7%	37.9%	41.3%	36.3%	18.1%
% Metal Sensitive Chironomidae	24.8%	22.2%	21.3%	18.8%	32.4%	15.6%	12.5%	13.8%	13.2%	13.1%
% Simuliidae	26.3%	46.2%	43.6%	46.0%	22.7%	66.3%	61.6%	54.4%	60.1%	80.1%
% Tipulidae	1.1%	1.5%	2.1%	2.4%	3.3%	1.6%	0.5%	3.5%	0.9%	1.3%
Functional Feeding Groups										
% Collector Gatherers	71.9%	50.0%	54.3%	50.3%	72.7%	29.7%	36.9%	41.0%	34.1%	18.6%
% Filterers	26.3%	46.2%	43.6%	46.0%	22.7%	66.3%	61.6%	54.4%	60.1%	80.1%
% Shredders	1.1%	2.3%	2.1%	3.0%	3.3%	1.6%	1.5%	4.2%	3.7%	1.3%
Habitat Preference Groups										
% Clingers	26.9%	48.5%	43.6%	47.7%	23.9%	68.8%	62.5%	55.5%	64.9%	80.1%
% Sprawlers	70.1%	50.0%	54.3%	48.9%	72.7%	29.7%	36.9%	40.6%	33.5%	18.1%
% Burrowers	2.9%	1.5%	2.1%	3.4%	3.3%	1.6%	0.5%	3.9%	1.5%	1.8%
Dominant Taxa Groups										
Density Chironomidae	430	241	102	531	240	133	284	419	426	155
Density Metal Sensitive Chironomidae	152	105	40	199	107	70	94	140	155	112
Density Simuliidae	161	219	82	487	75	297	462	552	706	685
Density Tipulidae	7	7	4	25	11	7	4	36	11	11
Functional Feeding Groups										
Density Collector Gatherers	441	237	102	532	240	133	277	416	401	159
Density Filterers	161	219	82	487	75	297	462	552	706	685
Density Shredders	7	11	4	32	11	7	11	43	43	11
Habitat Preference Groups										
Density Clingers	165	230	82	505	79	308	469	563	763	685
Density Sprawlers	430	237	102	517	240	133	277	412	394	155
Density Burrowers	18	7	4	36	11	7	4	40	18	15

[a] Metrics calculated using Family Level (FL) taxonomy.

[b] Metrics calculated using Lowest Practical Level (LPL) taxonomy.

Table E.6: Benthic Invertebrate Community Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Study Areas Calculated for EEM Metrics Calculated at Lowest Practical Level Taxonomy and Relative Abundance of Dominant Taxa, FFG and HPG

Metric	Two-Sample Comparison					Summary Statistics						
	Significant Difference Among Areas?	Trans-formation	Test	p-value	Magnitude of Difference [a] (No. of SD)	Area	Median	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Richness (LPL Taxa)	NO	log_{10}	ANOVA	0.6633	~	Reference	10	11.4	3.4	1.5	8.0	16.0
						Effluent-Exposed	11	10.4	2.1	0.9	7.0	12.0
Simpson's Evenness LPL	YES	log_{10}	ANOVA	0.0238	-1.1	Reference	0.339	0.380	0.154	0.069	0.211	0.626
						Effluent-Exposed	0.217	0.215	0.024	0.011	0.182	0.246
Bray-Curtis Index (LPL)	YES	log_{10}	ANOVA	0.0525	1.4	Reference	0.249	0.291	0.127	0.057	0.160	0.460
						Effluent-Exposed	0.493	0.466	0.114	0.051	0.312	0.580
Chironomidae (% of community)	YES	none	ANOVA	0.0029	-2.5	Reference	54.3	59.6	10.9	4.9	50.2	72.7
						Effluent-Exposed	36.3	32.7	9.2	4.1	18.1	41.3
Metal-Sensitive Chironomidae (%)	YES	log_{10}	ANOVA	<0.001	-2.0	Reference	22.2	23.9	5.2	2.3	18.8	32.4
						Effluent-Exposed	13.2	13.6	1.2	0.5	12.5	15.6
Simuliidae (% of community)	YES	none	ANOVA	0.0035	2.4	Reference	43.6	37.0	11.5	5.1	22.7	46.2
						Effluent-Exposed	61.6	64.5	9.7	4.3	54.4	80.1
Collector-gatherers (% of community)	YES	none	ANOVA	0.0025	-2.4	Reference	54.3	59.8	11.5	5.1	50.0	72.7
						Effluent-Exposed	34.1	32.1	8.6	3.8	18.6	41.0
Filterers (% of community)	YES	none	ANOVA	0.0035	2.4	Reference	43.6	37.0	11.5	5.1	22.7	46.2
						Effluent-Exposed	61.6	64.5	9.7	4.3	54.4	80.1
Clingers (% of community)	YES	none	ANOVA	0.0029	2.4	Reference	43.6	38.1	11.8	5.3	23.9	48.5
						Effluent-Exposed	64.9	66.4	9.1	4.1	55.5	80.1
Sprawlers (% of community)	YES	none	ANOVA	0.0026	-1.8	Reference	54.3	59.2	11.4	5.1	48.9	72.7
						Effluent-Exposed	33.5	31.8	8.6	3.9	18.1	40.6

[a] Magnitude calculated by comparing the difference between the reference area and effluent-exposed area means divided by the reference area standard deviation.

Highlighted values indicates significant difference between study areas based on a p-value less than 0.10.

Table E.7: Benthic Invertebrate Community Statistical Comparison Results between Mary River Tributary-F Effluent-Exposed and Reference Study Areas Upon Removal of Simuliidae from the Data Set

Metric	Two-Sample Comparison					Summary Statistics					
	Significant Difference Among Areas?	Trans-formation	Test	p-value	Magnitude of Difference [a] (No. of SD)	Area	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Density	NO	none	ANOVA	0.8590	~	Reference	327.8	183.3	82.0	106.0	571.0
						Effluent-Exposed	308.2	153.3	68.6	151.0	469.0
Richness (FL Taxa)	NO	none	ANOVA	1.0000	~	Reference	3.6	1.3	0.6	2.0	5.0
						Effluent-Exposed	3.6	1.1	0.5	2.0	5.0
Simpson's Evenness FL	NO	none	ANOVA	0.9209	~	Reference	0.348	0.131	0.058	0.221	0.540
						Effluent-Exposed	0.356	0.105	0.047	0.242	0.514
Bray-Curtis Index (FL)	NO	none	ANOVA	0.8490	~	Reference	0.223	0.202	0.090	0.006	0.414
						Effluent-Exposed	0.242	0.088	0.039	0.093	0.304
Richness (LPL Taxa)	NO	none	ANOVA	0.6454	~	Reference	10.2	3.1	1.4	7.0	14.0
						Effluent-Exposed	9.4	2.1	0.9	6.0	11.0
Simpson's Evenness LPL	NO	none	ANOVA	0.7570	~	Reference	0.389	0.143	0.064	0.231	0.577
						Effluent-Exposed	0.362	0.121	0.054	0.275	0.551
Bray-Curtis Index (LPL)	NO	none	ANOVA	0.2641	~	Reference	0.303	0.155	0.069	0.063	0.428
						Effluent-Exposed	0.401	0.096	0.043	0.273	0.498
Chironomidae (% of community)	NO	none	ANOVA	0.1760	~	Reference	94.6	1.2	0.5	93.0	96.2
						Effluent-Exposed	91.8	4.0	1.8	88.1	98.6
Metal-Sensitive Chironomidae (%)	NO	none	ANOVA	0.5999	~	Reference	37.9	3.7	1.7	33.6	42.0
						Effluent-Exposed	41.6	15.0	6.7	30.2	65.9
Collector-gatherers (% of community)	YES	none	ANOVA	0.0829	-2.1	Reference	94.8	2.0	0.9	92.9	97.6
						Effluent-Exposed	90.6	4.3	1.9	85.5	96.2
Filterers (% of community)	NO	none	ANOVA	1.0000	~	Reference	0.0	0.0	0.0	0.0	0.0
						Effluent-Exposed	0.0	0.0	0.0	0.0	0.0
Clingers (% of community)	NO	none	ANOVA	0.2503	~	Reference	2.0	1.7	0.8	0.0	4.3
						Effluent-Exposed	4.8	4.9	2.2	0.0	12.2
Sprawlers (% of community)	NO	none	ANOVA	0.1019	~	Reference	93.8	2.2	1.0	90.5	96.2
						Effluent-Exposed	89.7	4.5	2.0	84.0	96.2

[a] Magnitude calculated by comparing the difference between the reference area and effluent-exposed area means divided by the reference area standard deviation.

Highlighted values indicates significant difference between study areas based on a p-value less than 0.10.

Data Quality Review

APPENDIX E BENTHIC DATA QUALITY REVIEW

E.1 Introduction

Quality Assurance/Quality Control (QA/QC) implemented for the Mary River Project Phase 1 EEM included a Data Quality Review (DQR) of the benthic invertebrate community data to provide an evaluation of how well laboratory data quality compared to prescribed goals (i.e., Data Quality Objectives [DQO]) established *a priori*. This DQR report provides a comparison of target data quality to actual data quality, subsequently discussing the consequences of any failures to meet DQO. By completing this step, the quality of the data for the program can be effectively evaluated and demonstrated.

E.2 Quality Control Measures and DQO

During laboratory processing, all benthic invertebrate community sample material was examined in its entirety (i.e., no sub-sampling was conducted; Table E-DQR.2) and therefore only one type of QC was applied in the laboratory for the benthic invertebrate community study component:

- **Organism Recovery Check.** Organism recovery checks for 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 on a minimum of 10% of the samples submitted for the study by an analyst not involved during the original processing so as to reduce any bias. This check allows the determination of accuracy through assessment of recovery efficiency. The DQO for organism recovery checks was ≥90%.

E.3 Benthic Invertebrate Community Sample DQA Results

Organism recovery for the two benthic invertebrate community samples evaluated was high, averaging 99% (Table E-DQR.1) and meeting the sorting efficiency DQO of ≥ 90% recovery. Therefore, the benthic invertebrate community sample recovery was considered acceptable. Overall, the benthic invertebrate community sample data were of acceptable quality, meeting the established accuracy (percent recovery) QC criteria.

Table E-DQR.1: Organism Recovery Rates for Benthic Invertebrate Community Samples

Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
MRTF-REF-1	171	171	100.0%
MRTF-EXP-4	326	328	99.4%
		Average % Recovery	99.7%

Table E-DQR.2: Sample Fractions Sorted for Benthic Invertebrate Community Samples

Station	Fraction Sorted (500 um)
MRTF-REF1	Whole
MRTF-REF2	Whole
MRTF-REF3	Whole
MRTF-REF4	Whole
MRTF-REF5	Whole
MRTF-EXP1	Whole
MRTF-EXP2	Whole
MRTF-EXP3	Whole
MRTF-EXP4	Whole
MRTF-EXP5	Whole

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.

APPENDIX F

FISH POPULATION SURVEY DATA

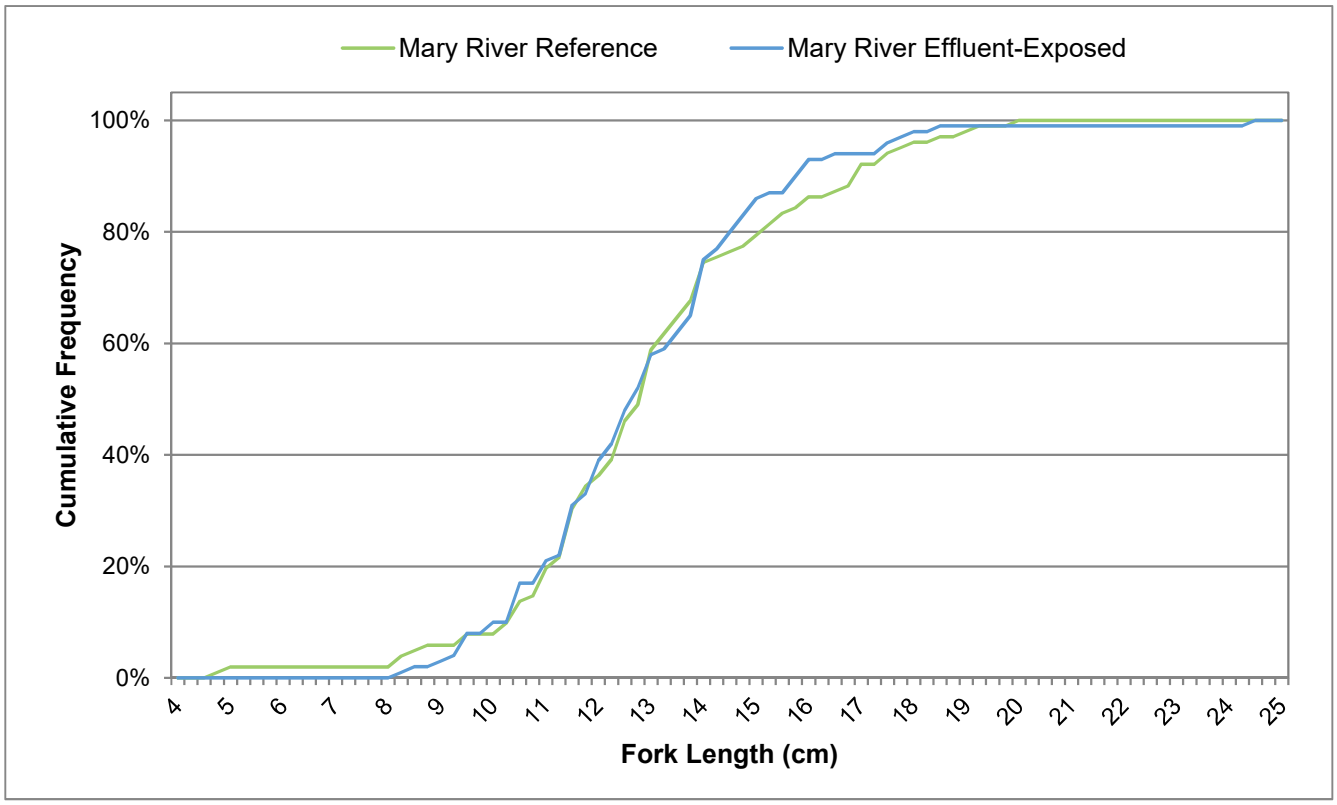
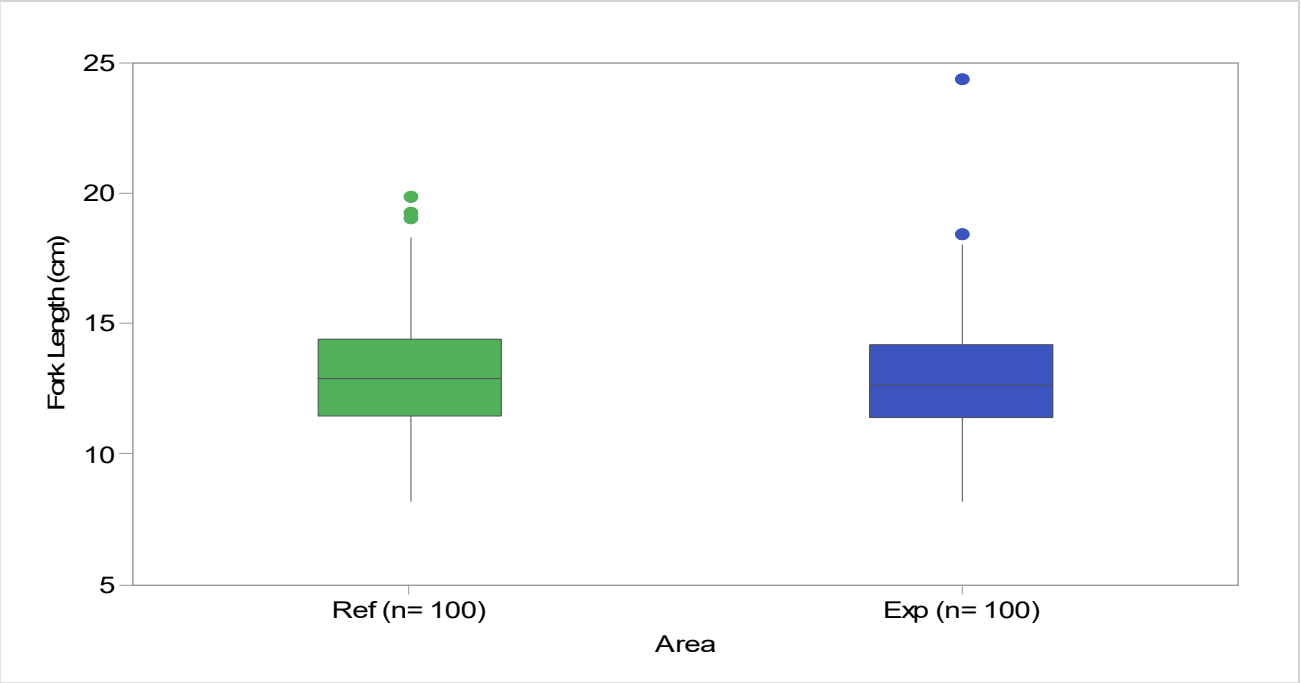


Figure F.1: Cumulative Length-frequency Distributions for Arctic Charr Captured at Mary River Project Phase 1 EEM Effluent-Exposed and Reference Study Areas, August 2017



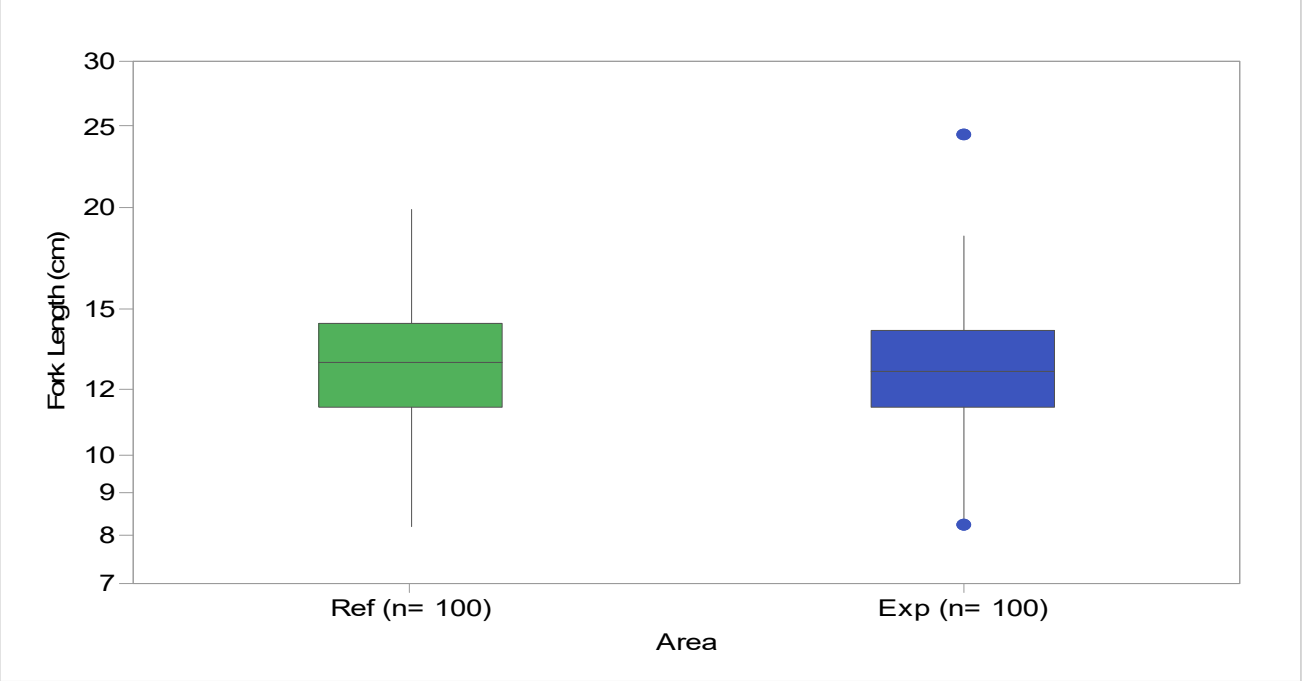
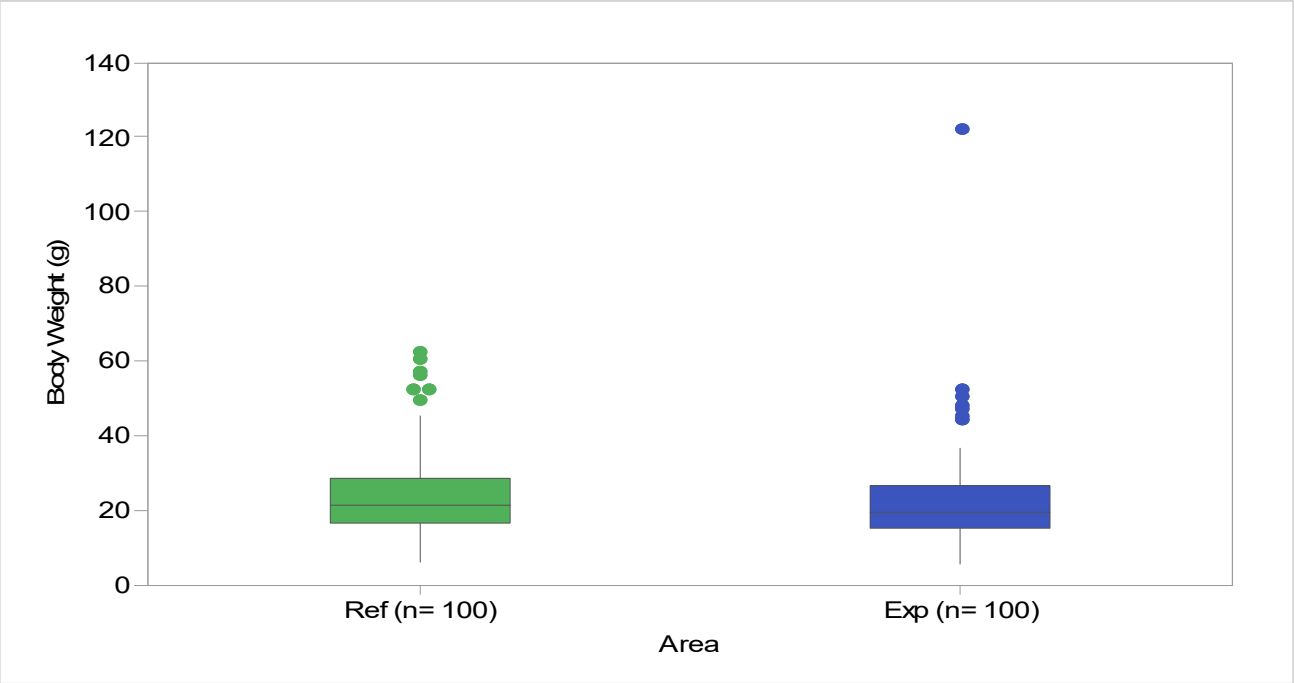


Figure F.2: Boxplot of Fork Length by Area with Unscaled and log_{10}-scaled Axes for Arctic Charr Collected at Mary River Project Phase 1 EEM Effluent-Exposed (Exp) and Reference (Ref) Study Areas, August 2017

Note: Statistical analyses were conducted on log_{10}-transformed data so boxplots are also displayed on the log_{10} scale to show the data distributions used for statistical comparisons



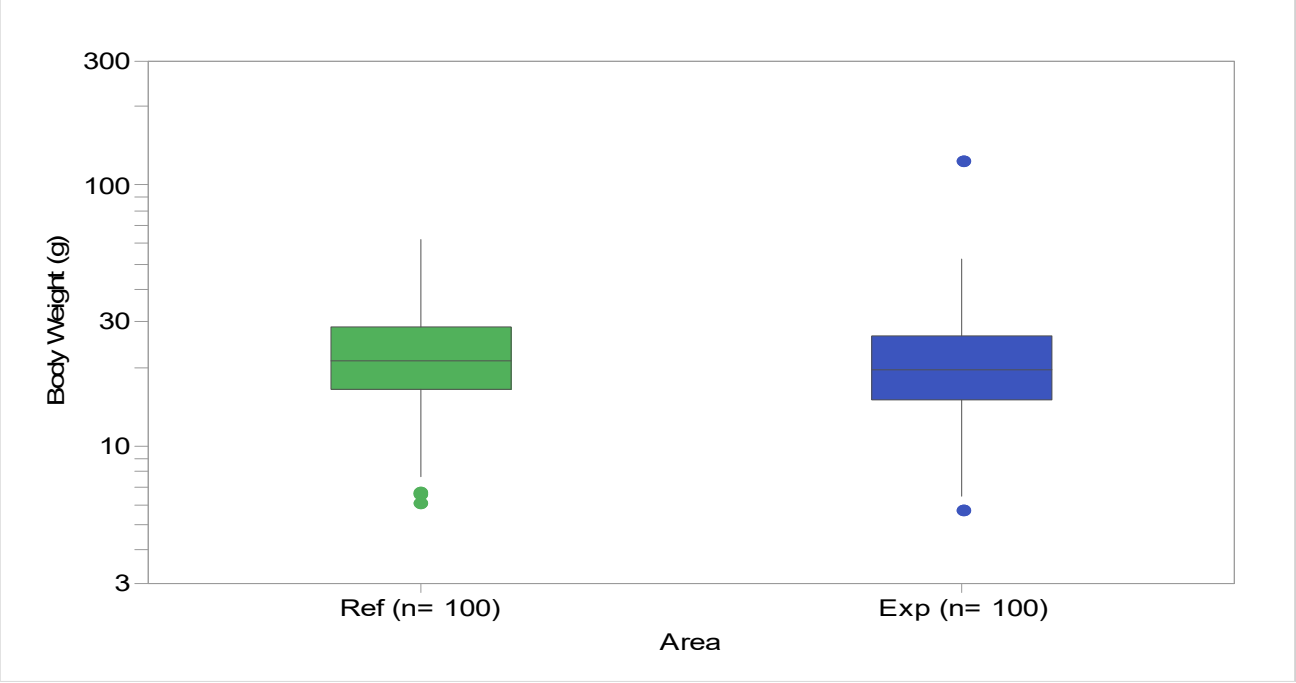


Figure F.3: Boxplot of Body Weight by Area with Unscaled and log_{10}-scaled Axes for Arctic Charr Collected at Mary River Project Phase 1 EEM Effluent-Exposed (Exp) and Reference (Ref) Study Areas, August 2017

Note: Statistical analyses were conducted on log_{10}-transformed data so boxplots are also displayed on the log_{10} scale to show the data distributions used for statistical comparisons

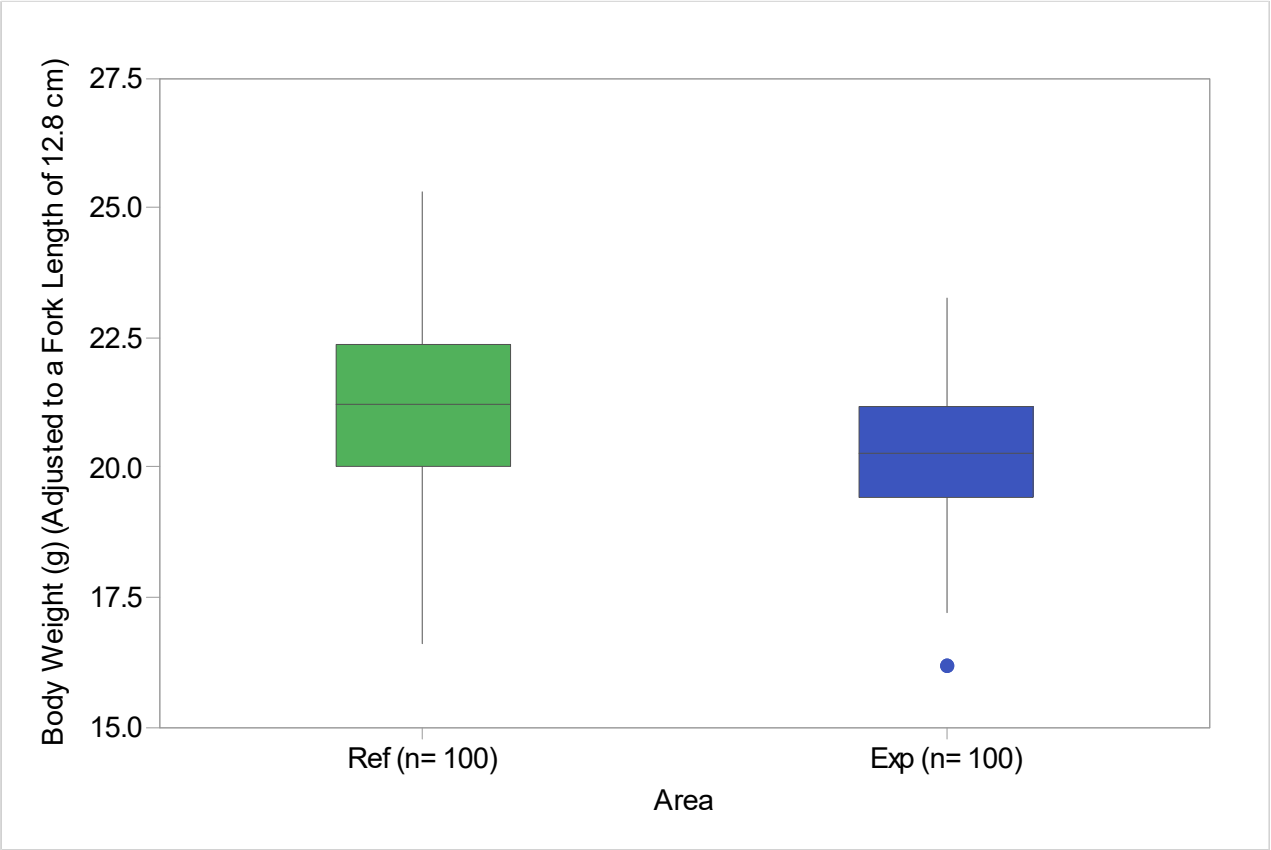


Figure F.4: Boxplot of Body Weight (Adjusted to a Fork Length of 12.8 cm Based on the Parallel Slope ANCOVA Model) by Area for Arctic Charr Collected from Mary River Project Phase 1 EEM Effluent-Exposed (Exp) and Reference (Ref) Fish Population Survey Study Areas, August 2017

Table F.1: Electrofishing Catch Record for the Mary River Project Phase 1 EEM, August 2017

Watercourse	Station ID	Date	Location			Effort (seconds)	Fish Species				Total (all species)	
			Coordinates		Station Length (m)		Arctic Charr		Ninespine Stickleback			
			Latitude	Longitude			Catch	CPUE	Catch	CPUE	Total Catch	CPUE
Mary River Tributary-F	MRTF-EXP-F1	26-Aug-17	71 20 10.212	79 10 54.129	167	1,254	0	0.00	0	0.00	0	0.00
	MRTF-EXP-F2	26-Aug-17	71 20 11.857	79 10 56.262	193	730	0	0.00	0	0.00	0	0.00
	MRTF-EXP-F3	26-Aug-17	71 18 38.276	79 11 49.646	55	355	0	0.00	0	0.00	0	0.00
	MRTF-EXP-F4	26-Aug-17	71 18 45.579	79 11 50.276	125	866	0	0.00	0	0.00	0	0.00
	MRTF-EXP-F5	26-Aug-17	71 19 09.571	79 11 23.362	138	952	0	0.00	0	0.00	0	0.00
					Total	**4,157**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**
Mary River Effluent-Exposed	MR-EXP-F1	27-Aug-17	71 17 57.136	79 15 43.125	129	2,086	40	1.15	0	0.00	40	1.15
	MR-EXP-F2	27-Aug-17	71 18 01.379	79 15 30.567	55	481	7	0.87	0	0.00	7	0.87
	MR-EXP-F3	27-Aug-17	71 18 02.390	79 15 17.695	133	1,093	26	1.43	0	0.00	26	1.43
	MR-EXP-F4	27-Aug-17	71 18 03.265	79 15 11.074	71	927	27	1.75	0	0.00	27	1.75
					Total	**4,587**	**100**	**1.30**	**0**	**0.00**	**100**	**1.30**
Mary River Reference	MR-REF-F1	28-Aug-17	71 15 22.745	79 24 34.144	159	1,754	27	0.92	0	0.00	27	0.92
	MR-REF-F2	28-Aug-17	71 15 25.935	79 24 25.750	331	2,794	22	0.47	2	0.04	24	0.52
	MR-REF-F3	28-Aug-17	71 15 23.139	79 24 38.731	218	3,792	56	0.89	1	0.02	57	0.90
					Total	**8,340**	**105**	**0.76**	**3**	**0.02**	**108**	**0.78**

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per electrofishing minute.

Table F.2: Arctic Charr Measurements from Fish Captured at the Mary River Reference Area by Electrofishing, Mary River Project Phase 1 EEM, August 2017

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
MRR-AC-01	14.5	15.7	29.707	-	0.974
MRR-AC-02	12.4	13.4	20.865	-	1.094
MRR-AC-03	15.9	17.3	40	-	0.995
MRR-AC-04	12.9	14.0	17.009	-	0.792
MRR-AC-05	19.8	21.5	62	-	0.799
MRR-AC-06	15.9	17.2	37	-	0.920
MRR-AC-07	12.5	13.6	19.920	-	1.020
MRR-AC-08	12.7	13.7	20.811	-	1.016
MRR-AC-09	13.1	14.2	26.242	-	1.167
MRR-AC-10	13.6	14.6	26.714	-	1.062
MRR-AC-11	13.8	14.9	24.405	-	0.929
MRR-AC-12	10.3	11.0	11.707	-	1.071
MRR-AC-13	13.9	15.0	25.934	-	0.966
MRR-AC-14	12.4	13.4	22.428	-	1.176
MRR-AC-15	11.5	12.4	16.697	-	1.098
MRR-AC-16	15.0	16.2	31.273	-	0.927
MRR-AC-17	12.8	14.0	21.380	-	1.019
MRR-AC-18	10.5	11.3	11.128	-	0.961
MRR-AC-19	9.3	10.0	8.654	-	1.076
MRR-AC-20	10.9	11.7	13.423	-	1.037
MRR-AC-21	11.4	12.3	17.076	-	1.153
MRR-AC-22	13.5	14.6	22.042	-	0.896
MRR-AC-23	11.7	12.7	18.479	-	1.154
MRR-AC-24	12.2	13.2	16.414	-	0.904
MRR-AC-25	11.5	12.6	17.321	-	1.139
MRR-AC-26	10.9	11.6	13.475	-	1.041
MRR-AC-27	11.3	12.2	15.022	-	1.041
MRR-AC-28	13.1	14.1	23.621	-	1.051
MRR-AC-29	12.9	14.0	20.777	-	0.968
MRR-AC-30	19.0	20.6	57	-	0.831
MRR-AC-31	11.1	12.0	14.529	-	1.062
MRR-AC-32	15.2	16.5	30.388	-	0.865
MRR-AC-33	16.9	18.4	45	-	0.932
MRR-AC-34	19.2	20.8	60	-	0.848
MRR-AC-35	11.7	12.8	15.888	-	0.992
MRR-AC-36	13.0	14.2	23.379	-	1.064
MRR-AC-37	13.8	14.8	27.605	-	1.050
MRR-AC-38	13.8	14.9	26.785	-	1.019
MRR-AC-39	14.6	15.7	26.954	-	0.866
MRR-AC-40	11.8	12.7	18.854	-	1.148
MRR-AC-41	10.4	11.2	12.919	2	1.148
MRR-AC-42	11.6	12.5	16.920	-	1.084
MRR-AC-43	12.3	13.2	18.558	-	0.997
MRR-AC-44	11.5	12.6	18.175	-	1.195
MRR-AC-45	11.4	12.4	16.587	-	1.120
MRR-AC-46	13.9	15.0	28.827	-	1.073
MRR-AC-47	11.2	12.0	13.942	-	0.992
MRR-AC-48	8.2	8.8	6.579	-	1.193
MRR-AC-49	13.0	14.0	22.087	-	1.005
MRR-AC-50	11.5	12.3	16.566	-	1.089
MRR-AC-51	12.2	13.2	17.889	-	0.985
MRR-AC-52	13.9	15.0	28.129	-	1.047
MRR-AC-53	10.9	11.9	14.052	-	1.085
MRR-AC-54	15.5	16.8	29.487	-	0.792
MRR-AC-55	15.5	16.9	36.551	-	0.982
MRR-AC-56	12.2	13.1	21.402	-	1.179
MRR-AC-57	12.6	13.6	19.925	-	0.996
MRR-AC-58	13.0	14.0	22.926	-	1.044
MRR-AC-59	15.0	16.5	30.585	-	0.906

Table F.2: Arctic Charr Measurements from Fish Captured at the Mary River Reference Area by Electrofishing, Mary River Project Phase 1 EEM, August 2017

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
MRR-AC-60		11.3	12.1	15.386	-	1.066
MRR-AC-61		12.4	13.4	22.403	-	1.175
MRR-AC-62		15.6	16.9	32.972	-	0.869
MRR-AC-63		13.0	13.9	20.955	-	0.954
MRR-AC-64		12.5	13.5	23.753	-	1.216
MRR-AC-65		13.1	14.1	27.020	-	1.202
MRR-AC-66		11.6	12.5	16.457	-	1.054
MRR-AC-67		18.3	19.8	56	-	0.914
MRR-AC-68		8.2	8.8	6.518	-	1.182
MRR-AC-69		16.3	17.7	36.480	-	0.842
MRR-AC-70		13.0	14.0	20.302	-	0.924
MRR-AC-71		10.2	11.0	12.626	-	1.190
MRR-AC-72		13.0	14.1	23.922	-	1.089
MRR-AC-73		13.7	14.8	25.515	-	0.992
MRR-AC-74		17.3	18.6	49	-	0.946
MRR-AC-75		12.4	13.3	18.645	-	0.978
MRR-AC-76		13.3	14.3	21.957	-	0.933
MRR-AC-77		13.3	14.4	22.383	-	0.951
MRR-AC-78		12.9	13.9	20.245	-	0.943
MRR-AC-79		10.4	11.2	13.070	-	1.162
MRR-AC-80		17.8	19.4	52	-	0.922
MRR-AC-81		12.0	13.0	20.633	-	1.194
MRR-AC-82		12.6	13.6	19.636	-	0.982
MRR-AC-83		17.6	19.0	45	-	0.825
MRR-AC-84		16.8	18.0	37	-	0.780
MRR-AC-85		17.4	18.9	52	-	0.987
MRR-AC-86		15.2	16.5	30.117	-	0.858
MRR-AC-87		16.7	18.1	35	-	0.751
MRR-AC-88		13.8	14.8	23.499	-	0.894
MRR-AC-89		16.8	18.5	42	-	0.886
MRR-AC-90		10.9	11.6	14.225	-	1.098
MRR-AC-91		11.0	11.8	15.461	-	1.162
MRR-AC-92		11.4	12.2	16.260	2	1.098
MRR-AC-93		10.1	10.8	10.986	2	1.066
MRR-AC-94		8.6	9.2	7.659	1	1.204
MRR-AC-95		9.5	10.2	9.949	2	1.160
MRR-AC-96		16.8	18.3	44	4	0.928
MRR-AC-97		14.1	15.3	28.108	3	1.003
MRR-AC-98		13.6	14.6	22.804	3	0.907
MRR-AC-99		10.6	11.3	11.906	2	1.000
MRR-AC-100		8.3	8.7	5.963	1	1.043
Overall Catch Summary	**total number**	**100**	**100**	**100**	**10**	**100**
	average	**13.1**	**14.2**	**24.198**	**2.2**	**1.014**
	median	**12.9**	**14.0**	**21.391**	**2.0**	**1.011**
	standard deviation	**2.5**	**2.7**	**12.116**	**0.9**	**0.114**
	standard error	**0.2**	**0.3**	**1.212**	**0.3**	**0.011**
	minimum	**8.2**	**8.7**	**5.963**	**1**	**0.751**
	maximum	**19.8**	**21.5**	**62.000**	**4**	**1.216**

Table F.3: Arctic Charr Measurements from Fish Captured at the Mary River Effluent-Exposed Area by Electrofishing, Mary River Project Phase 1 EEM, August 2017

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
MRE-AC-01	12.6	13.7	19.174	-	0.959
MRE-AC-02	12.4	13.4	16.362	-	0.858
MRE-AC-03	14.4	15.5	25.868	-	0.866
MRE-AC-04	13.0	13.9	18.810	-	0.856
MRE-AC-05	10.9	11.7	13.933	-	1.076
MRE-AC-06	11.9	12.7	16.775	-	0.995
MRE-AC-07	11.3	12.3	15.096	-	1.046
MRE-AC-08	10.5	11.5	10.572	-	0.913
MRE-AC-09	15.7	17.2	35.921	-	0.928
MRE-AC-10	10.0	10.8	10.311	-	1.031
MRE-AC-11	10.4	11.1	11.483	-	1.021
MRE-AC-12	12.6	13.9	17.439	-	0.872
MRE-AC-13	11.0	11.9	14.160	-	1.064
MRE-AC-14	13.1	14.3	21.184	-	0.942
MRE-AC-15	11.4	12.3	15.075	-	1.018
MRE-AC-16	15.7	17.0	33.560	-	0.867
MRE-AC-17	13.7	14.8	23.778	-	0.925
MRE-AC-18	11.5	12.5	14.966	-	0.984
MRE-AC-19	12.3	13.2	16.097	-	0.865
MRE-AC-20	14.7	15.9	30.004	-	0.945
MRE-AC-21	13.8	14.6	24.608	-	0.936
MRE-AC-22	9.9	10.6	10.375	-	1.069
MRE-AC-23	13.8	15.1	25.628	-	0.975
MRE-AC-24	14.9	16.2	34.875	-	1.054
MRE-AC-25	14.0	15.2	23.108	-	0.842
MRE-AC-26	17.7	19.2	50	-	0.902
MRE-AC-27	18.0	19.5	45	-	0.772
MRE-AC-28	12.2	13.2	19.444	-	1.071
MRE-AC-29	13.8	14.9	24.217	-	0.921
MRE-AC-30	13.0	14.0	20.587	-	0.937
MRE-AC-31	11.8	12.9	16.323	-	0.993
MRE-AC-32	12.3	13.3	19.558	-	1.051
MRE-AC-33	11.5	12.5	13.621	-	0.896
MRE-AC-34	8.3	8.9	6.450	-	1.128
MRE-AC-35	12.3	13.3	16.185	-	0.870
MRE-AC-36	16.4	17.9	44	-	0.998
MRE-AC-37	11.0	11.9	13.349	-	1.003
MRE-AC-38	11.7	12.5	15.999	-	0.999
MRE-AC-39	10.9	11.8	14.006	-	1.082
MRE-AC-40	9.4	10.1	7.783	-	0.937
MRE-AC-41	15.2	16.5	35.126	-	1.000
MRE-AC-42	13.5	14.6	25.016	-	1.017
MRE-AC-43	12.3	13.5	20.696	-	1.112
MRE-AC-44	14.8	16.0	28.649	-	0.884
MRE-AC-45	14.0	15.2	24.043	-	0.876
MRE-AC-46	10.5	11.3	11.822	-	1.021
MRE-AC-47	10.3	11.1	10.947	-	1.002
MRE-AC-48	13.8	14.9	22.302	-	0.849
MRE-AC-49	14.0	15.4	28.457	-	1.037
MRE-AC-50	16.0	17.4	36.283	-	0.886
MRE-AC-51	14.7	15.9	33.098	-	1.042
MRE-AC-52	15.8	17.2	36.468	-	0.925
MRE-AC-53	9.3	9.8	7.393	-	0.919
MRE-AC-54	13.9	14.7	26.469	-	0.986
MRE-AC-55	15.0	16.3	33.729	-	0.999
MRE-AC-56	11.2	12.1	15.798	-	1.124
MRE-AC-57	12.9	14.1	21.952	-	1.023
MRE-AC-58	12.1	13.1	18.452	-	1.042
MRE-AC-59	11.5	12.3	13.467	-	0.885

Table F.3: Arctic Charr Measurements from Fish Captured at the Mary River Effluent-Exposed Area by Electrofishing, Mary River Project Phase 1 EEM, August 2017

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
MRE-AC-60		18.4	19.9	47	-	0.754
MRE-AC-61		8.2	8.7	5.649	1	1.025
MRE-AC-62		13.4	14.4	24.484	-	1.018
MRE-AC-63		13.7	15.0	23.966	-	0.932
MRE-AC-64		15.9	16.9	34.709	-	0.863
MRE-AC-65		11.7	12.7	15.638	-	0.976
MRE-AC-66		9.0	9.5	7.509	-	1.030
MRE-AC-67		9.3	10.0	7.918	-	0.984
MRE-AC-68		14.2	15.3	25.522	-	0.891
MRE-AC-69		24.3	26.2	122	-	0.850
MRE-AC-70		10.4	11.2	12.021	-	1.069
MRE-AC-71		11.3	12.5	14.909	-	1.033
MRE-AC-72		12.6	13.3	16.920	-	0.846
MRE-AC-73		12.6	13.6	18.579	3	0.929
MRE-AC-74		14.2	15.5	29.376	-	1.026
MRE-AC-75		9.5	10.3	8.864	-	1.034
MRE-AC-76		13.6	14.5	22.717	-	0.903
MRE-AC-77		12.8	13.9	20.361	-	0.971
MRE-AC-78		11.9	12.9	16.975	-	1.007
MRE-AC-79		11.5	12.6	16.252	-	1.069
MRE-AC-80		12.9	14.0	21.412	-	0.997
MRE-AC-81		13.9	15.0	25.734	-	0.958
MRE-AC-82		14.6	15.8	30.065	-	0.966
MRE-AC-83		12.1	13.0	17.180	-	0.970
MRE-AC-84		17.4	18.9	48	-	0.911
MRE-AC-85		12.8	13.8	19.908	-	0.949
MRE-AC-86		13.5	14.6	24.067	-	0.978
MRE-AC-87		10.5	11.3	12.084	-	1.044
MRE-AC-88		15.6	16.9	36.058	-	0.950
MRE-AC-89		12.0	13.1	17.858	-	1.033
MRE-AC-90		12.0	12.8	13.647	3	0.790
MRE-AC-91		10.5	11.2	11.712	2	1.012
MRE-AC-92		9.1	10.0	8.578	2	1.138
MRE-AC-93		11.4	21.3	15.316	2	1.034
MRE-AC-94		17.3	18.7	52	4	1.004
MRE-AC-95		14.3	15.4	28.430	3	0.972
MRE-AC-96		13.9	15.0	24.611	3	0.916
MRE-AC-97		14.4	15.6	28.965	4	0.970
MRE-AC-98		11.5	12.5	16.483	-	1.084
MRE-AC-99		11.8	12.7	16.841	-	1.025
MRE-AC-100		12.4	13.4	20.578	-	1.079
Overall Catch Summary	**total number**	**100**	**100**	**100**	**10**	**100**
	average	**12.9**	**14.0**	**22.567**	**2.7**	**0.971**
	median	**12.6**	**13.8**	**19.501**	**3.0**	**0.981**
	standard deviation	**2.4**	**2.8**	**14.264**	**0.9**	**0.081**
	standard error	**0.2**	**0.3**	**1.426**	**0.3**	**0.008**
	minimum	**8.2**	**8.7**	**5.649**	**1**	**0.754**
	maximum	**24.3**	**26.2**	**122.000**	**4**	**1.138**

Table F.4: Non-Lethal Endpoint Statistical Comparison Results for Arctic Charr Collected from Mary River Effluent-Exposed (Exp) and Reference (Ref) Study Areas, Mary River Project Phase 1 EEM, August 2017

Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Statistics			Summary Statistics			Test *P*-value (Area)	Magnitude of Difference (%)[a]	Estimated Minimum Detectable Difference (% Relative to Reference) with α=β=0.1	
		Response	Covariate	Ref Area	Exp Area		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons							
							Interaction P-value	Covariate P-value		Statistic	Ref Area	Exp Area			Decrease	Increase
Survival/ Recruitment	Length Frequency Distribution All Fish	Fork Length (cm)	n/a	102	100	K-S	-	-	-	-	-	-	0.936	-	-	-
	Length Frequency Distribution Non-YOY only	Fork Length (cm)	n/a	100	100	K-S	-	-	-	-	-	-	0.906	-	-	-
Body Size	Fork Length (Non-YOY)	log_{10}[Fork Length (cm)]	n/a	100	100	t-test	-	-	-	Geometric Mean	12.9	12.7	0.523	-1.6	-7.4	8.0
	Body Weight (Non-YOY)	log_{10}[Body Weight (g)]	n/a	100	100	t-test	-	-	-	Geometric Mean	21.6	19.7	0.200	-8.7	-19	23
Energy Storage	Condition (Non-YOY)	log_{10}[Body Weight (g)]	log_{10}[Fork Length (cm)]	100	100	ANCOVA	0.001[b]	<0.001	12.8	Adjusted Mean	21.1	20.1	<0.001	-4.5	-2.3	2.3

= P-value < 0.05 for ANCOVA interaction and covariate terms and P-value < 0.1 for overall test for area

[a] For ANCOVA: Calculated as the difference in adjusted mean between areas (effluent-exposed minus reference), expressed as a percentage of the reference area mean

[b] The R^2 of the interaction model was 0.9766 and the R^2 of the parallel slope model was 0.9753 (difference of 0.13%) so the ANCOVA proceeded under the assumption that the slopes are practically parallel, as per Environment Canada (2012) guidance.

Table F.5: Estimated Minimum Sample Sizes to Detect Various Effect Sizes for Arctic Charr Health Endpoints between Mary River Reference and Effluent-Exposed Areas Based on the Observed Variability in the Phase 1 EEM Study, 2017

Indicator	Endpoint	Variables		Sample Size		Model	S[a]	Minimum Sample Size to Detect an Effect Size (% Increase [i] or Decrease [d] Relative to Reference) with α=β=0.1							
		Response	Covariate	Ref	Exp			i=5%	i=10%	i=20%	i=25%	i=30%	i=40%	i=50%	i=100%
								d=5%	d=9%	d=17%	d=20%	d=23%	d=29%	d=33%	d=50%
Body Size	Fork Length	log_{10}[Fork Length (cm)]	n/a	100	100	t-test	0.0803	247	66	19	13	10	6	5	3
	Body Weight	log_{10}[Body Weight (g)]	n/a	100	100	t-test	0.2161	1,782	468	129	86	63	39	27	10
Energy Storage	Condition	log_{10}[Body Weight (g)]	log_{10}[Fork Length (cm)]	100	100	ANCOVA	0.0342	46	13	5	4	3	3	2	2

[a] Pooled standard deviation of the residuals.

Data Quality Review

APPENDIX F FISH SURVEY DATA QUALITY REVIEW

F.1 Introduction

Quality Assurance/Quality Control (QA/QC) implemented for the Mary River Project Phase 1 EEM included a Data Quality Review (DQR) of the fish population survey tissue collection data to provide an evaluation of how well laboratory data quality compared to prescribed goals (i.e., Data Quality Objectives [DQO]) established *a priori*. This DQR report provides a comparison of target data quality to actual data quality, subsequently discussing the consequences of any failures to meet DQO. By completing this step, the quality of the data for the program can be effectively evaluated and demonstrated.

F.2 Quality Control Measures and DQO

A single type of QC was applied in the laboratory for the fish population survey component of the Mary River Project Phase 1 EEM:

- **Aging Precision Check**. An aging precision check involves the reprocessing of previously aged structure to ensure that the initial age determination was accurate. Aging precision checks are completed on a minimum of 10% fish age structure samples, randomly selected from the project, that had been previously subject to age determination. Using the same structure originally subject to age determination, the sample is re-evaluated by an independent analyst not involved during the original age determination to reduce any bias. The DQO for the aging precision check was ±1 year of the original age determination.

F.3 Fish Population Survey Tissue Sample DQA Results

Aging precision checks were conducted on 10 of the 20 arctic charr (*Salvelinus alpinus*) samples submitted to AEE Tech Services Inc. (La Salle, MB). Age estimates for all arctic charr met the DQO of ±1 year when separately assessed by a second, independent professional (Table F-DQR.1). Therefore, the fish population survey fish age precision was considered acceptable. Overall, the fish population survey fish age data were of acceptable quality, meeting the established QC precision criterion.

Table F-DQR.1: Laboratory Fish Aging Precision Check Results for Arctic Charr Sampled for the Mary River Project Phase 1 EEM, August 2017

Sample Identification	Structure Type	Age Assigned by Primary Ager (KM)	Age Assigned by QA Manager (MM)	Difference (years)
MRE-AC-73	Otolith	3	3	0
MRE-AC-91	Otolith	2	2	0
MRE-AC-93	Otolith	2	2	0
MRE-AC-95	Otolith	3	3	0
MRE-AC-97	Otolith	4	4	0
MRR-AC-92	Otolith	2	2	0
MRR-AC-94	Otolith	1	1	0
MRR-AC-96	Otolith	4	4	0
MRR-AC-98	Otolith	3	3	0
MRR-AC-100	Otolith	1	1	0

Indicates independent age determination was outside of the DQO of ±1 year of age.

APPENDIX E

CERTIFICATES OF ANALYSES

Baffinland Iron Mine's Corporation (Oakville)
ATTN: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 30-JUN-18
Report Date: 26-JUL-18 13:37 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2122068

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2122068-1 MS-08 Sampled By: RB/DS/BW on 30-JUN-18 @ 15:40 Matrix: Water							
Physical Tests							
Conductivity	3170		3.0	umhos/cm		05-JUL-18	R4112997
pH	8.89		0.10	pH units		30-JUN-18	R4108022
Total Suspended Solids	6.4		2.0	mg/L		01-JUL-18	R4108021
Total Dissolved Solids	3220		20	mg/L		02-JUL-18	R4108492
Turbidity	12.5		0.10	NTU		30-JUN-18	R4108048
Cyanides							
Cyanide, Total	0.0063		0.0020	mg/L		04-JUL-18	R4113260
Total Metals							
Aluminum (Al)-Total	0.058	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.0186	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	223	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.0119	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	2.19	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	0.054	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	393	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	3.21	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.0153	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	3.86	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.0075	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	0.00336	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	6.54	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.476	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	705	DLHC	5.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	0.00011	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2122068-1 MS-08 Sampled By: RB/DS/BW on 30-JUN-18 @ 15:40 Matrix: Water							
Total Metals							
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.00024	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	0.048		0.0062	Bq/L	10-JUL-18	23-JUL-18	R4070789
L2122068-2 MS-0801 Sampled By: RB/DS/BW on 30-JUN-18 @ 15:40 Matrix: Water							
Physical Tests							
Conductivity	3180		3.0	umhos/cm		05-JUL-18	R4112997
pH	8.89		0.10	pH units		30-JUN-18	R4108022
Total Suspended Solids	8.0		2.0	mg/L		01-JUL-18	R4108021
Total Dissolved Solids	3140		20	mg/L		02-JUL-18	R4108492
Turbidity	12.7		0.10	NTU		30-JUN-18	R4108048
Cyanides							
Cyanide, Total	0.0063		0.0020	mg/L		04-JUL-18	R4113260
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.0191	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	221	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.0119	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	2.15	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	0.051	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	391	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	3.25	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.0145	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	3.91	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2122068-2 MS-0801 Sampled By: RB/DS/BW on 30-JUN-18 @ 15:40 Matrix: Water							
Total Metals							
Rubidium (Rb)-Total	0.0073	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	0.00395	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	6.57	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.471	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	725	DLHC	5.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	<0.00015	DLUI	0.00015	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.00025	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	0.029		0.0053	Bq/L	10-JUL-18	23-JUL-18	R4070789

* 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	Aluminum (Al)-Total	MS-B	L2122068-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2122068-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2122068-1, -2
Matrix Spike	Silicon (Si)-Total	MS-B	L2122068-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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

Workorder: L2122068 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4113260								
WG2813533-24 DUP		**L2122693-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	05-JUL-18
WG2813533-22 LCS								
Cyanide, Total			90.4		%		80-120	04-JUL-18
WG2813533-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	04-JUL-18
WG2813533-23 MS		**L2122693-1**						
Cyanide, Total			90.4		%		70-130	05-JUL-18
EC-WT	**Water**							
Batch R4112997								
WG2814283-4 DUP		**WG2814283-3**						
Conductivity		1800	1810		umhos/cm	0.1	10	05-JUL-18
WG2814283-2 LCS								
Conductivity			101.7		%		90-110	05-JUL-18
WG2814283-1 MB								
Conductivity			<3.0		umhos/cm		3	05-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Aluminum (Al)-Total		0.146	0.145		mg/L	0.8	20	04-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Total		0.00319	0.00309		mg/L	3.4	20	04-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Total		3.30	3.36		mg/L	1.9	20	04-JUL-18
Chromium (Cr)-Total		<0.00050	0.00051	RPD-NA	mg/L	N/A	20	04-JUL-18
Cesium (Cs)-Total		0.000018	0.000020		mg/L	8.4	20	04-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Iron (Fe)-Total		0.112	0.118		mg/L	5.8	20	04-JUL-18
Lead (Pb)-Total		0.000120	0.000119		mg/L	1.1	20	04-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Magnesium (Mg)-Total		1.82	1.82		mg/L	0.1	20	04-JUL-18
Manganese (Mn)-Total		0.00182	0.00197		mg/L	7.6	20	04-JUL-18
Molybdenum (Mo)-Total		0.000063	0.000059		mg/L	6.6	20	04-JUL-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Total		0.384	0.391		mg/L	1.8	20	04-JUL-18
Rubidium (Rb)-Total		0.00092	0.00095		mg/L	3.5	20	04-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Silicon (Si)-Total		0.66	0.63		mg/L	4.0	20	04-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Total		0.383	0.390		mg/L	1.9	20	04-JUL-18
Strontium (Sr)-Total		0.0032	0.0032		mg/L	0.2	20	04-JUL-18
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	25	04-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thorium (Th)-Total		0.00014	0.00014		mg/L	2.7	25	04-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Total		0.00693	0.00704		mg/L	1.5	20	04-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Total		0.000167	0.000162		mg/L	3.3	20	04-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814071-2 LCS								
Aluminum (Al)-Total			96.0		%		80-120	04-JUL-18
Antimony (Sb)-Total			101.1		%		80-120	04-JUL-18
Arsenic (As)-Total			98.3		%		80-120	04-JUL-18
Barium (Ba)-Total			98.0		%		80-120	04-JUL-18
Beryllium (Be)-Total			93.2		%		80-120	04-JUL-18
Bismuth (Bi)-Total			100.2		%		80-120	04-JUL-18
Boron (B)-Total			85.6		%		80-120	04-JUL-18
Cadmium (Cd)-Total			98.2		%		80-120	04-JUL-18
Calcium (Ca)-Total			94.0		%		80-120	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-2 LCS								
Chromium (Cr)-Total			94.8		%		80-120	04-JUL-18
Cesium (Cs)-Total			103.7		%		80-120	04-JUL-18
Cobalt (Co)-Total			94.0		%		80-120	04-JUL-18
Copper (Cu)-Total			95.0		%		80-120	04-JUL-18
Iron (Fe)-Total			92.0		%		80-120	04-JUL-18
Lead (Pb)-Total			103.2		%		80-120	04-JUL-18
Lithium (Li)-Total			94.7		%		80-120	04-JUL-18
Magnesium (Mg)-Total			96.8		%		80-120	04-JUL-18
Manganese (Mn)-Total			96.5		%		80-120	04-JUL-18
Molybdenum (Mo)-Total			96.5		%		80-120	04-JUL-18
Nickel (Ni)-Total			95.0		%		80-120	04-JUL-18
Phosphorus (P)-Total			94.2		%		70-130	04-JUL-18
Potassium (K)-Total			96.1		%		80-120	04-JUL-18
Rubidium (Rb)-Total			104.5		%		80-120	04-JUL-18
Selenium (Se)-Total			98.5		%		80-120	04-JUL-18
Silicon (Si)-Total			93.3		%		60-140	04-JUL-18
Silver (Ag)-Total			99.8		%		80-120	04-JUL-18
Sodium (Na)-Total			93.9		%		80-120	04-JUL-18
Strontium (Sr)-Total			97.5		%		80-120	04-JUL-18
Sulfur (S)-Total			83.4		%		80-120	04-JUL-18
Thallium (Tl)-Total			99.9		%		80-120	04-JUL-18
Tellurium (Te)-Total			99.0		%		80-120	04-JUL-18
Thorium (Th)-Total			99.5		%		70-130	04-JUL-18
Tin (Sn)-Total			98.1		%		80-120	04-JUL-18
Titanium (Ti)-Total			94.8		%		80-120	04-JUL-18
Tungsten (W)-Total			101.5		%		80-120	04-JUL-18
Uranium (U)-Total			103.7		%		80-120	04-JUL-18
Vanadium (V)-Total			98.0		%		80-120	04-JUL-18
Zinc (Zn)-Total			93.4		%		80-120	04-JUL-18
Zirconium (Zr)-Total			95.6		%		80-120	04-JUL-18
WG2814071-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	04-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	04-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	04-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	04-JUL-18
WG2814071-5 MS		**WG2814071-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	04-JUL-18
Antimony (Sb)-Total			102.3		%		70-130	04-JUL-18
Arsenic (As)-Total			100.4		%		70-130	04-JUL-18
Barium (Ba)-Total			97.4		%		70-130	04-JUL-18
Beryllium (Be)-Total			95.7		%		70-130	04-JUL-18
Bismuth (Bi)-Total			99.9		%		70-130	04-JUL-18
Boron (B)-Total			89.0		%		70-130	04-JUL-18
Cadmium (Cd)-Total			97.2		%		70-130	04-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	04-JUL-18
Chromium (Cr)-Total			97.5		%		70-130	04-JUL-18
Cesium (Cs)-Total			109.4		%		70-130	04-JUL-18
Cobalt (Co)-Total			95.5		%		70-130	04-JUL-18
Copper (Cu)-Total			96.9		%		70-130	04-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	04-JUL-18
Lead (Pb)-Total			101.6		%		70-130	04-JUL-18
Lithium (Li)-Total			102.8		%		70-130	04-JUL-18
Magnesium (Mg)-Total			89.3		%		70-130	04-JUL-18
Manganese (Mn)-Total			95.0		%		70-130	04-JUL-18
Molybdenum (Mo)-Total			104.0		%		70-130	04-JUL-18
Nickel (Ni)-Total			98.4		%		70-130	04-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	04-JUL-18
Potassium (K)-Total			99.4		%		70-130	04-JUL-18
Rubidium (Rb)-Total			106.0		%		70-130	04-JUL-18
Selenium (Se)-Total			101.2		%		70-130	04-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	04-JUL-18
Silver (Ag)-Total			104.0		%		70-130	04-JUL-18
Sodium (Na)-Total			92.0		%		70-130	04-JUL-18
Strontium (Sr)-Total			101.4		%		70-130	04-JUL-18
Sulfur (S)-Total			93.6		%		70-130	04-JUL-18
Thallium (Tl)-Total			99.1		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Tellurium (Te)-Total			106.2		%		70-130	04-JUL-18
Thorium (Th)-Total			98.6		%		70-130	04-JUL-18
Tin (Sn)-Total			97.1		%		70-130	04-JUL-18
Titanium (Ti)-Total			96.9		%		70-130	04-JUL-18
Tungsten (W)-Total			101.0		%		70-130	04-JUL-18
Uranium (U)-Total			96.9		%		70-130	04-JUL-18
Vanadium (V)-Total			101.1		%		70-130	04-JUL-18
Zinc (Zn)-Total			93.1		%		70-130	04-JUL-18
Zirconium (Zr)-Total			99.1		%		70-130	04-JUL-18
PH-BF	**Water**							
Batch R4108022								
WG2811878-2 DUP		**L2122069-2**						
pH		7.74	7.73	J	pH units	0.01	0.2	30-JUN-18
WG2811878-1 LCS								
pH			6.99		pH units		6.9-7.1	30-JUN-18
SOLIDS-TDS-BF	**Water**							
Batch R4108492								
WG2811792-3 DUP		**L2122069-2**						
Total Dissolved Solids		752	753		mg/L	0.0	20	02-JUL-18
WG2811792-2 LCS								
Total Dissolved Solids			96.5		%		85-115	02-JUL-18
WG2811792-1 MB								
Total Dissolved Solids			<20		mg/L		20	02-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4108021								
WG2811879-3 DUP		**L2122066-3**						
Total Suspended Solids		8.0	7.2		mg/L	11	25	01-JUL-18
WG2811879-2 LCS								
Total Suspended Solids			99.6		%		85-115	01-JUL-18
WG2811879-1 MB								
Total Suspended Solids			<2.0		mg/L		2	01-JUL-18
TURBIDITY-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-BF	**Water**							
Batch R4108048								
WG2811896-3 DUP		**L2122066-3**						
Turbidity		15.4	15.2		NTU	1.3	15	30-JUN-18
WG2811896-2 LCS								
Turbidity			112.0		%		85-115	30-JUN-18
WG2811896-1 MB								
Turbidity			<0.10		NTU		0.1	30-JUN-18

Quality Control Report

Workorder: L2122068 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Tuesday, July 24, 2018

Wayne Smith
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807080
Project Name:
Project Number: L2122068

Dear Mr. Smith:

Two water samples were received from ALS Environmental, on 7/6/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

for

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807080

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807080
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2122068
Client PO Number: L2122068

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2122068-1	1807080-1		WATER	30-Jun-18	
L2122068-2	1807080-2		WATER	30-Jun-18	

ALS Environmental

L2122068

WATERLOO

1807080

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2122068*
ALS requires QC data to be provided with your final results.

2 CA 3 x 950mL

Please see enclosed 2 sample(s) in 2 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1 **L2122068-1 MS-08**		6/30/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/19/2018	
2 **L2122068-2 MS-0801**		6/30/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/19/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 7.6.18 1320

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1807080

Project Manager: KMO Initials: JE Date: 7.6.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1
Temperature (°C):	~~AMB~~ 13.1
No. of custody seals on cooler:	1
DOT Survey/ Acceptance Information — External µR/hr reading:	9
Background µR/hr reading:	13

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

Additional Information: Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:

14 & 15) ice melted upon arrival

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/7/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807080

EXPRESS WORLDWIDE **WPX** DHL

2018-07-06 MYDHL+ 1.0 / *30-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : **ALS Environmental Fort Collins**
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

9-1

80524 FORT COLLINS CO
United States of America

US – DEN – DEN

C [redacted] Day Time

Ref:

Pcs/Shpt Weight: **30.6 lbs** Piece: **1/1**

Contents: Water Samples

WAYBILL 13 9029 0915

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*24-Jul-18*
Project:	L2122068	**Work Order:**	1807080
Sample ID:	L2122068-1	**Lab ID:**	1807080-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/30/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**
Ra-226	**0.048 (+/- 0.016)**		**0.0062**	**BQ/l**	NA	7/23/2018 13:26
Carr: BARIUM	*93.7*		*40-110*	*%REC*	DL = NA	7/23/2018 13:26

Client:	ALS Environmental	**Date:**	*24-Jul-18*
Project:	L2122068	**Work Order:**	1807080
Sample ID:	L2122068-2	**Lab ID:**	1807080-2
Legal Location:		**Matrix:**	WATER
Collection Date:	6/30/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**
Ra-226	**0.029 (+/- 0.011)**		**0.0053**	**BQ/l**	NA	7/23/2018 13:26
Carr: BARIUM	*94.2*		*40-110*	*%REC*	DL = NA	7/23/2018 13:26

Client:	ALS Environmental	**Date:**	*24-Jul-18*
Project:	L2122068	**Work Order:**	1807080
Sample ID:	L2122068-2	**Lab ID:**	1807080-2
Legal Location:		**Matrix:**	WATER
Collection Date:	6/30/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180710-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 14:09**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.85 (+/- 0.463)	0.0109	1.772		105	67-120					P,M3
Carr: BARIUM	16200		17170		94.2	40-110					

LCSD Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 14:09**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.74 (+/- 0.437)	0.0122	1.772		98.3	67-120		1.85	0.2	2.1	P,M3
Carr: BARIUM	16100		17170		93.5	40-110		16200			

MB Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 13:26**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00061 (+/- 0.0041)	0.008									U
Carr: BARIUM	16400		17170		95.4	40-110					

The following samples were analyzed in this batch: 1807080-1 1807080-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2 commercial@baffinland.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☑ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only) L2122068 | **ALS Contact:** | **Sampler:** RB/DS/BW

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 - MMER - DEL	Number of Containers
	MS-08	30-Jun-18	15:40	Water	E1	4
	MS-0801	30-Jun-18	15:40	Water	E1	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 by clicking on the drop-down list below (electronic COC only)

Gen chem's tested on site.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		
17					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date:30-Jun-18	Time: 17:24	Received by:	Date:	Time:	Received by: F.Khalili	Date: 30-Jun-18	Time: 17:00

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 03-JUL-18
Report Date: 21-AUG-18 08:24 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2122725

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2122725-1 MS-08 Sampled By: BW/DS/BB on 03-JUL-18 @ 15:15 Matrix: Water							
Physical Tests							
Conductivity	3360		3.0	umhos/cm		05-JUL-18	R4112997
Hardness (as CaCO3)	2520		10	mg/L		04-JUL-18	
pH	8.88		0.10	pH units		03-JUL-18	R4110996
Total Suspended Solids	3.6		2.0	mg/L		03-JUL-18	R4111014
Total Dissolved Solids	3950		20	mg/L		05-JUL-18	R4112945
Anions and Nutrients							
Acidity (as CaCO3)	2.2		2.0	mg/L		06-JUL-18	R4114779
Alkalinity, Total (as CaCO3)	37		10	mg/L		05-JUL-18	R4113116
Ammonia, Total (as N)	2.90	DLHC	0.10	mg/L		05-JUL-18	R4113387
Chloride (Cl)	6.51		0.50	mg/L		04-JUL-18	R4113310
Fluoride (F)	0.053		0.020	mg/L		04-JUL-18	R4113310
Nitrate (as N)	6.50		0.020	mg/L		04-JUL-18	R4113310
Total Kjeldahl Nitrogen	3.41		0.15	mg/L	04-JUL-18	05-JUL-18	R4113724
Phosphorus, Total	<0.030	DLM	0.030	mg/L	04-JUL-18	05-JUL-18	R4112888
Sulfate (SO4)	2340		0.30	mg/L		04-JUL-18	R4113310
Cyanides							
Cyanide, Total	0.0093		0.0020	mg/L		04-JUL-18	R4113260
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.60		0.50	mg/L		05-JUL-18	R4112868
Total Organic Carbon	1.87		0.50	mg/L		05-JUL-18	R4112869
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.0183	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	287	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.0341	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	0.011	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	1.66	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	0.067	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	440	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	5.59	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		05-JUL-18	R4113146
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.0390	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2122725-1 MS-08 Sampled By: BW/DS/BB on 03-JUL-18 @ 15:15 Matrix: Water							
Total Metals							
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	4.01	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.0086	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	0.00430	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	5.43	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.592	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	834	DLHC	5.0	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	0.00015	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.00014	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					05-JUL-18	R4113044
Dissolved Metals Filtration Location	FIELD					04-JUL-18	R4112764
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112794
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Barium (Ba)-Dissolved	0.0175	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112794
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112794
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	04-JUL-18	04-JUL-18	R4112794
Calcium (Ca)-Dissolved	287	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112794
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112794
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112794
Cobalt (Co)-Dissolved	0.0258	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Copper (Cu)-Dissolved	0.0087	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112794
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	04-JUL-18	04-JUL-18	R4112794
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112794
Lithium (Li)-Dissolved	0.070	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112794
Magnesium (Mg)-Dissolved	438	DLHC	0.050	mg/L	04-JUL-18	04-JUL-18	R4112794
Manganese (Mn)-Dissolved	5.59	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112794
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	05-JUL-18	05-JUL-18	R4113145

* 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
L2122725-1 MS-08 Sampled By: BW/DS/BB on 03-JUL-18 @ 15:15 Matrix: Water							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112794
Nickel (Ni)-Dissolved	0.0307	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112794
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112794
Potassium (K)-Dissolved	4.06	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112794
Rubidium (Rb)-Dissolved	0.0085	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112794
Selenium (Se)-Dissolved	0.00391	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112794
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112794
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	04-JUL-18	04-JUL-18	R4112794
Sodium (Na)-Dissolved	5.49	DLHC	0.50	mg/L	04-JUL-18	04-JUL-18	R4112794
Strontium (Sr)-Dissolved	0.609	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112794
Sulfur (S)-Dissolved	857	DLHC	5.0	mg/L	04-JUL-18	04-JUL-18	R4112794
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	04-JUL-18	04-JUL-18	R4112794
Thallium (Tl)-Dissolved	0.00015	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112794
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112794
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	04-JUL-18	04-JUL-18	R4112794
Uranium (U)-Dissolved	<0.00010	DLHC	0.00010	mg/L	04-JUL-18	04-JUL-18	R4112794
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	04-JUL-18	04-JUL-18	R4112794
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	04-JUL-18	04-JUL-18	R4112794
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	04-JUL-18	04-JUL-18	R4112794
Radiological Parameters							
Ra-226	0.029		0.0079	Bq/L	10-JUL-18	23-JUL-18	R4070789

* 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	Chloride (Cl)	MS-B	L2122725-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2122725-1
Matrix Spike	Boron (B)-Dissolved	MS-B	L2122725-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2122725-1
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2122725-1
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2122725-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2122725-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2122725-1
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2122725-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2122725-1
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2122725-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2122725-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2122725-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2122725-1
Matrix Spike	Aluminum (Al)-Total	MS-B	L2122725-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2122725-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2122725-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2122725-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2122725-1
Matrix Spike	Nitrate (as N)	MS-B	L2122725-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

Reference Information

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA

Reference Information

TB BF

ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2122725 Report Date: 21-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4114779								
WG2815636-5 LCS								
Acidity (as CaCO3)			101.0		%		85-115	06-JUL-18
WG2815636-4 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	06-JUL-18
ALK-WT	**Water**							
Batch R4113116								
WG2814543-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			101.1		%		80-120	05-JUL-18
WG2814543-8 DUP		**L2123439-1**						
Alkalinity, Total (as CaCO3)		27	31		mg/L	13	20	05-JUL-18
WG2814543-6 LCS								
Alkalinity, Total (as CaCO3)			99.2		%		85-115	05-JUL-18
WG2814543-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	05-JUL-18
C-DIS-ORG-WT	**Water**							
Batch R4112868								
WG2814189-3 DUP		**L2123439-1**						
Dissolved Organic Carbon		0.86	0.82		mg/L	4.2	20	05-JUL-18
WG2814189-2 LCS								
Dissolved Organic Carbon			96.3		%		80-120	05-JUL-18
WG2814189-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-JUL-18
WG2814189-4 MS		**L2123439-1**						
Dissolved Organic Carbon			93.0		%		70-130	05-JUL-18
CL-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Chloride (Cl)		283	283		mg/L	0.2	20	04-JUL-18
WG2813442-22 LCS								
Chloride (Cl)			101.8		%		90-110	04-JUL-18
WG2813442-21 MB								
Chloride (Cl)			<0.50		mg/L		0.5	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Chloride (Cl)			N/A	MS-B	%		-	04-JUL-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4113260								
WG2813533-24 DUP		**L2122693-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	05-JUL-18
WG2813533-22 LCS								
Cyanide, Total			90.4		%		80-120	04-JUL-18
WG2813533-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	04-JUL-18
WG2813533-23 MS		**L2122693-1**						
Cyanide, Total			90.4		%		70-130	05-JUL-18
EC-WT	**Water**							
Batch R4112997								
WG2814283-4 DUP		**WG2814283-3**						
Conductivity		1800	1810		umhos/cm	0.1	10	05-JUL-18
WG2814283-2 LCS								
Conductivity			101.7		%		90-110	05-JUL-18
WG2814283-1 MB								
Conductivity			<3.0		umhos/cm		3	05-JUL-18
F-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Fluoride (F)		0.074	0.074		mg/L	0.2	20	04-JUL-18
WG2813442-22 LCS								
Fluoride (F)			100.5		%		90-110	04-JUL-18
WG2813442-21 MB								
Fluoride (F)			<0.020		mg/L		0.02	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Fluoride (F)			99.6		%		75-125	04-JUL-18
HG-D-CVAA-WT	**Water**							
Batch R4113145								
WG2814491-3 DUP		**L2122725-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	05-JUL-18
WG2814491-2 LCS								
Mercury (Hg)-Dissolved			105.0		%		80-120	05-JUL-18
WG2814491-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	05-JUL-18
WG2814491-4 MS		**L2122725-1**						
Mercury (Hg)-Dissolved			101.2		%		70-130	05-JUL-18
HG-T-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R4113146								
WG2814498-3 DUP		**L2122725-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	05-JUL-18
WG2814498-2 LCS								
Mercury (Hg)-Total			103.0		%		80-120	05-JUL-18
WG2814498-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	05-JUL-18
WG2814498-4 MS		**L2122907-1**						
Mercury (Hg)-Total			98.1		%		70-130	05-JUL-18
MET-D-CCMS-WT	**Water**							
Batch R4112794								
WG2814057-4 DUP		**WG2814057-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Dissolved		0.0175	0.0171		mg/L	2.0	20	04-JUL-18
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Dissolved		287	278		mg/L	3.1	20	04-JUL-18
Cesium (Cs)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	04-JUL-18
Cobalt (Co)-Dissolved		0.0258	0.0253		mg/L	2.2	20	04-JUL-18
Copper (Cu)-Dissolved		0.0087	0.0085		mg/L	2.1	20	04-JUL-18
Iron (Fe)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	04-JUL-18
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Lithium (Li)-Dissolved		0.070	0.064		mg/L	8.9	20	04-JUL-18
Magnesium (Mg)-Dissolved		438	434		mg/L	0.9	20	04-JUL-18
Manganese (Mn)-Dissolved		5.59	5.55		mg/L	0.7	20	04-JUL-18
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Nickel (Ni)-Dissolved		0.0307	0.0310		mg/L	1.0	20	04-JUL-18
Phosphorus (P)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Dissolved		4.06	4.09		mg/L	0.6	20	04-JUL-18
Rubidium (Rb)-Dissolved		0.0085	0.0083		mg/L	2.3	20	04-JUL-18
Selenium (Se)-Dissolved		0.00391	0.00370		mg/L	5.4	20	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4112794								
WG2814057-4 DUP		**WG2814057-3**						
Silicon (Si)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	04-JUL-18
Silver (Ag)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Dissolved		5.49	5.53		mg/L	0.7	20	04-JUL-18
Strontium (Sr)-Dissolved		0.609	0.576		mg/L	5.6	20	04-JUL-18
Sulfur (S)-Dissolved		857	819		mg/L	4.6	20	04-JUL-18
Tellurium (Te)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thallium (Tl)-Dissolved		0.00015	0.00011	J	mg/L	0.00003	0.0002	04-JUL-18
Thorium (Th)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tin (Sn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Tungsten (W)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814057-2 LCS								
Aluminum (Al)-Dissolved			98.5		%		80-120	04-JUL-18
Antimony (Sb)-Dissolved			100.7		%		80-120	04-JUL-18
Arsenic (As)-Dissolved			103.1		%		80-120	04-JUL-18
Barium (Ba)-Dissolved			102.6		%		80-120	04-JUL-18
Beryllium (Be)-Dissolved			100.4		%		80-120	04-JUL-18
Bismuth (Bi)-Dissolved			103.3		%		80-120	04-JUL-18
Boron (B)-Dissolved			93.5		%		80-120	04-JUL-18
Cadmium (Cd)-Dissolved			98.6		%		80-120	04-JUL-18
Calcium (Ca)-Dissolved			101.1		%		80-120	04-JUL-18
Cesium (Cs)-Dissolved			107.6		%		80-120	04-JUL-18
Chromium (Cr)-Dissolved			97.6		%		80-120	04-JUL-18
Cobalt (Co)-Dissolved			98.4		%		80-120	04-JUL-18
Copper (Cu)-Dissolved			101.6		%		80-120	04-JUL-18
Iron (Fe)-Dissolved			96.9		%		80-120	04-JUL-18
Lead (Pb)-Dissolved			107.9		%		80-120	04-JUL-18
Lithium (Li)-Dissolved			105.4		%		80-120	04-JUL-18
Magnesium (Mg)-Dissolved			98.2		%		80-120	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4112794								
WG2814057-2 LCS								
Manganese (Mn)-Dissolved			101.8		%		80-120	04-JUL-18
Molybdenum (Mo)-Dissolved			104.4		%		80-120	04-JUL-18
Nickel (Ni)-Dissolved			100.2		%		80-120	04-JUL-18
Phosphorus (P)-Dissolved			99.5		%		80-120	04-JUL-18
Potassium (K)-Dissolved			106.5		%		80-120	04-JUL-18
Rubidium (Rb)-Dissolved			106.9		%		80-120	04-JUL-18
Selenium (Se)-Dissolved			100.9		%		80-120	04-JUL-18
Silicon (Si)-Dissolved			100.9		%		60-140	04-JUL-18
Silver (Ag)-Dissolved			102.2		%		80-120	04-JUL-18
Sodium (Na)-Dissolved			101.9		%		80-120	04-JUL-18
Strontium (Sr)-Dissolved			104.2		%		80-120	04-JUL-18
Sulfur (S)-Dissolved			89.9		%		80-120	04-JUL-18
Tellurium (Te)-Dissolved			99.0		%		80-120	04-JUL-18
Thallium (Tl)-Dissolved			106.5		%		80-120	04-JUL-18
Thorium (Th)-Dissolved			103.4		%		80-120	04-JUL-18
Tin (Sn)-Dissolved			99.8		%		80-120	04-JUL-18
Titanium (Ti)-Dissolved			98.8		%		80-120	04-JUL-18
Tungsten (W)-Dissolved			108.6		%		80-120	04-JUL-18
Uranium (U)-Dissolved			107.9		%		80-120	04-JUL-18
Vanadium (V)-Dissolved			103.8		%		80-120	04-JUL-18
Zinc (Zn)-Dissolved			96.8		%		80-120	04-JUL-18
Zirconium (Zr)-Dissolved			101.9		%		80-120	04-JUL-18
WG2814057-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	04-JUL-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	04-JUL-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4112794								
WG2814057-1 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	04-JUL-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	04-JUL-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	04-JUL-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	04-JUL-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	04-JUL-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	04-JUL-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	04-JUL-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	04-JUL-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	04-JUL-18
WG2814057-5 MS		**WG2814057-3**						
Aluminum (Al)-Dissolved			98.3		%		70-130	04-JUL-18
Antimony (Sb)-Dissolved			104.2		%		70-130	04-JUL-18
Arsenic (As)-Dissolved			107.2		%		70-130	04-JUL-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Beryllium (Be)-Dissolved			96.3		%		70-130	04-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4112794								
WG2814057-5 MS		**WG2814057-3**						
Bismuth (Bi)-Dissolved			98.9		%		70-130	04-JUL-18
Boron (B)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Cadmium (Cd)-Dissolved			101.8		%		70-130	04-JUL-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Cesium (Cs)-Dissolved			108.8		%		70-130	04-JUL-18
Chromium (Cr)-Dissolved			104.4		%		70-130	04-JUL-18
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Iron (Fe)-Dissolved			87.1		%		70-130	04-JUL-18
Lead (Pb)-Dissolved			105.8		%		70-130	04-JUL-18
Lithium (Li)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Molybdenum (Mo)-Dissolved			102.8		%		70-130	04-JUL-18
Nickel (Ni)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Phosphorus (P)-Dissolved			108.8		%		70-130	04-JUL-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Selenium (Se)-Dissolved			99.5		%		70-130	04-JUL-18
Silver (Ag)-Dissolved			103.4		%		70-130	04-JUL-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	04-JUL-18
Tellurium (Te)-Dissolved			102.3		%		70-130	04-JUL-18
Thallium (Tl)-Dissolved			103.6		%		70-130	04-JUL-18
Thorium (Th)-Dissolved			103.7		%		70-130	04-JUL-18
Tin (Sn)-Dissolved			103.1		%		70-130	04-JUL-18
Titanium (Ti)-Dissolved			102.1		%		70-130	04-JUL-18
Tungsten (W)-Dissolved			109.6		%		70-130	04-JUL-18
Uranium (U)-Dissolved			86.1		%		70-130	04-JUL-18
Vanadium (V)-Dissolved			109.8		%		70-130	04-JUL-18
Zinc (Zn)-Dissolved			92.1		%		70-130	04-JUL-18
Zirconium (Zr)-Dissolved			100.4		%		70-130	04-JUL-18
MET-T-CCMS-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Aluminum (Al)-Total		0.146	0.145		mg/L	0.8	20	04-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Total		0.00319	0.00309		mg/L	3.4	20	04-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Total		3.30	3.36		mg/L	1.9	20	04-JUL-18
Chromium (Cr)-Total		<0.00050	0.00051	RPD-NA	mg/L	N/A	20	04-JUL-18
Cesium (Cs)-Total		0.000018	0.000020		mg/L	8.4	20	04-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Iron (Fe)-Total		0.112	0.118		mg/L	5.8	20	04-JUL-18
Lead (Pb)-Total		0.000120	0.000119		mg/L	1.1	20	04-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Magnesium (Mg)-Total		1.82	1.82		mg/L	0.1	20	04-JUL-18
Manganese (Mn)-Total		0.00182	0.00197		mg/L	7.6	20	04-JUL-18
Molybdenum (Mo)-Total		0.000063	0.000059		mg/L	6.6	20	04-JUL-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Total		0.384	0.391		mg/L	1.8	20	04-JUL-18
Rubidium (Rb)-Total		0.00092	0.00095		mg/L	3.5	20	04-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Silicon (Si)-Total		0.66	0.63		mg/L	4.0	20	04-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Total		0.383	0.390		mg/L	1.9	20	04-JUL-18
Strontium (Sr)-Total		0.0032	0.0032		mg/L	0.2	20	04-JUL-18
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	25	04-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thorium (Th)-Total		0.00014	0.00014		mg/L	2.7	25	04-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010		mg/L			04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Total		0.00693	0.00704		mg/L	1.5	20	04-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Total		0.000167	0.000162		mg/L	3.3	20	04-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814071-2 LCS								
Aluminum (Al)-Total			96.0		%		80-120	04-JUL-18
Antimony (Sb)-Total			101.1		%		80-120	04-JUL-18
Arsenic (As)-Total			98.3		%		80-120	04-JUL-18
Barium (Ba)-Total			98.0		%		80-120	04-JUL-18
Beryllium (Be)-Total			93.2		%		80-120	04-JUL-18
Bismuth (Bi)-Total			100.2		%		80-120	04-JUL-18
Boron (B)-Total			85.6		%		80-120	04-JUL-18
Cadmium (Cd)-Total			98.2		%		80-120	04-JUL-18
Calcium (Ca)-Total			94.0		%		80-120	04-JUL-18
Chromium (Cr)-Total			94.8		%		80-120	04-JUL-18
Cesium (Cs)-Total			103.7		%		80-120	04-JUL-18
Cobalt (Co)-Total			94.0		%		80-120	04-JUL-18
Copper (Cu)-Total			95.0		%		80-120	04-JUL-18
Iron (Fe)-Total			92.0		%		80-120	04-JUL-18
Lead (Pb)-Total			103.2		%		80-120	04-JUL-18
Lithium (Li)-Total			94.7		%		80-120	04-JUL-18
Magnesium (Mg)-Total			96.8		%		80-120	04-JUL-18
Manganese (Mn)-Total			96.5		%		80-120	04-JUL-18
Molybdenum (Mo)-Total			96.5		%		80-120	04-JUL-18
Nickel (Ni)-Total			95.0		%		80-120	04-JUL-18
Phosphorus (P)-Total			94.2		%		70-130	04-JUL-18
Potassium (K)-Total			96.1		%		80-120	04-JUL-18
Rubidium (Rb)-Total			104.5		%		80-120	04-JUL-18
Selenium (Se)-Total			98.5		%		80-120	04-JUL-18
Silicon (Si)-Total			93.3		%		60-140	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-2 LCS								
Silver (Ag)-Total			99.8		%		80-120	04-JUL-18
Sodium (Na)-Total			93.9		%		80-120	04-JUL-18
Strontium (Sr)-Total			97.5		%		80-120	04-JUL-18
Sulfur (S)-Total			83.4		%		80-120	04-JUL-18
Thallium (Tl)-Total			99.9		%		80-120	04-JUL-18
Tellurium (Te)-Total			99.0		%		80-120	04-JUL-18
Thorium (Th)-Total			99.5		%		70-130	04-JUL-18
Tin (Sn)-Total			98.1		%		80-120	04-JUL-18
Titanium (Ti)-Total			94.8		%		80-120	04-JUL-18
Tungsten (W)-Total			101.5		%		80-120	04-JUL-18
Uranium (U)-Total			103.7		%		80-120	04-JUL-18
Vanadium (V)-Total			98.0		%		80-120	04-JUL-18
Zinc (Zn)-Total			93.4		%		80-120	04-JUL-18
Zirconium (Zr)-Total			95.6		%		80-120	04-JUL-18
WG2814071-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	04-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	04-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	04-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	04-JUL-18
WG2814071-5 MS		**WG2814071-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	04-JUL-18
Antimony (Sb)-Total			102.3		%		70-130	04-JUL-18
Arsenic (As)-Total			100.4		%		70-130	04-JUL-18
Barium (Ba)-Total			97.4		%		70-130	04-JUL-18
Beryllium (Be)-Total			95.7		%		70-130	04-JUL-18
Bismuth (Bi)-Total			99.9		%		70-130	04-JUL-18
Boron (B)-Total			89.0		%		70-130	04-JUL-18
Cadmium (Cd)-Total			97.2		%		70-130	04-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	04-JUL-18
Chromium (Cr)-Total			97.5		%		70-130	04-JUL-18
Cesium (Cs)-Total			109.4		%		70-130	04-JUL-18
Cobalt (Co)-Total			95.5		%		70-130	04-JUL-18
Copper (Cu)-Total			96.9		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Iron (Fe)-Total			N/A	MS-B	%		-	04-JUL-18
Lead (Pb)-Total			101.6		%		70-130	04-JUL-18
Lithium (Li)-Total			102.8		%		70-130	04-JUL-18
Magnesium (Mg)-Total			89.3		%		70-130	04-JUL-18
Manganese (Mn)-Total			95.0		%		70-130	04-JUL-18
Molybdenum (Mo)-Total			104.0		%		70-130	04-JUL-18
Nickel (Ni)-Total			98.4		%		70-130	04-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	04-JUL-18
Potassium (K)-Total			99.4		%		70-130	04-JUL-18
Rubidium (Rb)-Total			106.0		%		70-130	04-JUL-18
Selenium (Se)-Total			101.2		%		70-130	04-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	04-JUL-18
Silver (Ag)-Total			104.0		%		70-130	04-JUL-18
Sodium (Na)-Total			92.0		%		70-130	04-JUL-18
Strontium (Sr)-Total			101.4		%		70-130	04-JUL-18
Sulfur (S)-Total			93.6		%		70-130	04-JUL-18
Thallium (Tl)-Total			99.1		%		70-130	04-JUL-18
Tellurium (Te)-Total			106.2		%		70-130	04-JUL-18
Thorium (Th)-Total			98.6		%		70-130	04-JUL-18
Tin (Sn)-Total			97.1		%		70-130	04-JUL-18
Titanium (Ti)-Total			96.9		%		70-130	04-JUL-18
Tungsten (W)-Total			101.0		%		70-130	04-JUL-18
Uranium (U)-Total			96.9		%		70-130	04-JUL-18
Vanadium (V)-Total			101.1		%		70-130	04-JUL-18
Zinc (Zn)-Total			93.1		%		70-130	04-JUL-18
Zirconium (Zr)-Total			99.1		%		70-130	04-JUL-18
NH3-WT	**Water**							
Batch R4113387								
WG2814410-3 DUP		**L2122725-1**						
Ammonia, Total (as N)		2.90	2.92		mg/L	0.8	20	05-JUL-18
WG2814410-2 LCS								
Ammonia, Total (as N)			100.1		%		85-115	05-JUL-18
WG2814410-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	05-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R4113387								
WG2814410-4 MS		**L2122725-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	05-JUL-18
NO3-IC-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Nitrate (as N)		2.90	2.90		mg/L	0.2	25	04-JUL-18
WG2813442-22 LCS								
Nitrate (as N)			101.1		%		70-130	04-JUL-18
WG2813442-21 MB								
Nitrate (as N)			<0.020		mg/L		0.02	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Nitrate (as N)			N/A	MS-B	%		-	04-JUL-18
P-T-COL-WT	**Water**							
Batch R4112888								
WG2813737-3 DUP		**L2121111-1**						
Phosphorus, Total		0.0048	0.0039	J	mg/L	0.0010	0.006	05-JUL-18
WG2813737-2 LCS								
Phosphorus, Total			89.1		%		80-120	05-JUL-18
WG2813737-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	05-JUL-18
WG2813737-4 MS		**L2121111-1**						
Phosphorus, Total			87.1		%		70-130	05-JUL-18
PH-BF	**Water**							
Batch R4110996								
WG2813161-2 DUP		**L2122707-1**						
pH		7.03	6.98	J	pH units	0.05	0.2	03-JUL-18
WG2813161-1 LCS								
pH			6.95		pH units		6.9-7.1	03-JUL-18
SO4-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Sulfate (SO4)		56.1	56.4		mg/L	0.5	20	04-JUL-18
WG2813442-22 LCS								
Sulfate (SO4)			102.4		%		90-110	04-JUL-18
WG2813442-21 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-25 MS		**WG2813442-23**						
Sulfate (SO4)			96.5		%		75-125	04-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4112945								
WG2813188-3 DUP		**L2122725-1**						
Total Dissolved Solids		3950	3640		mg/L	8.0	20	05-JUL-18
WG2813188-2 LCS								
Total Dissolved Solids			95.3		%		85-115	05-JUL-18
WG2813188-1 MB								
Total Dissolved Solids			<20		mg/L		20	05-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4111014								
WG2813178-3 DUP		**L2122722-1**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	03-JUL-18
WG2813178-2 LCS								
Total Suspended Solids			100.4		%		85-115	03-JUL-18
WG2813178-1 MB								
Total Suspended Solids			<2.0		mg/L		2	03-JUL-18
TKN-WT	**Water**							
Batch R4113724								
WG2813852-3 DUP		**L2122725-1**						
Total Kjeldahl Nitrogen		3.41	3.44		mg/L	1.1	20	05-JUL-18
WG2813852-2 LCS								
Total Kjeldahl Nitrogen			104.3		%		75-125	05-JUL-18
WG2813852-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	05-JUL-18
WG2813852-4 MS		**L2122725-1**						
Total Kjeldahl Nitrogen			103.0		%		70-130	05-JUL-18
TOC-WT	**Water**							
Batch R4112869								
WG2814190-3 DUP		**L2123447-2**						
Total Organic Carbon		1.16	1.16		mg/L	0.1	20	05-JUL-18
WG2814190-2 LCS								
Total Organic Carbon			95.7		%		80-120	05-JUL-18
WG2814190-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4112869								
WG2814190-4 MS		**L2123447-2**						
Total Organic Carbon			93.1		%		70-130	05-JUL-18

Quality Control Report

Workorder: L2122725 Report Date: 21-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Tuesday, July 24, 2018

Wayne Smith
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807079
Project Name:
Project Number: L2122725

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 7/6/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

for
ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807079

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807079
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2122725
Client PO Number: L2122725

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2122725-1	1807079-1		WATER	03-Jul-18	

ALS Environmental

L2122725

WATERLOO

1807079

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2122725*
ALS requires QC data to be provided with your final results.

1x 950mL

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2122725-1 MS-08		7/ 3/ 2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/23/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 7-6-18 1320

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1807079

Project Manager: KMO Initials: JE Date: 7.6.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
~~8.7~~ 6.8 Temperature (°C):	~~4.0~~ 3.1							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	9							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

14 & 15) ice melted upon arrival

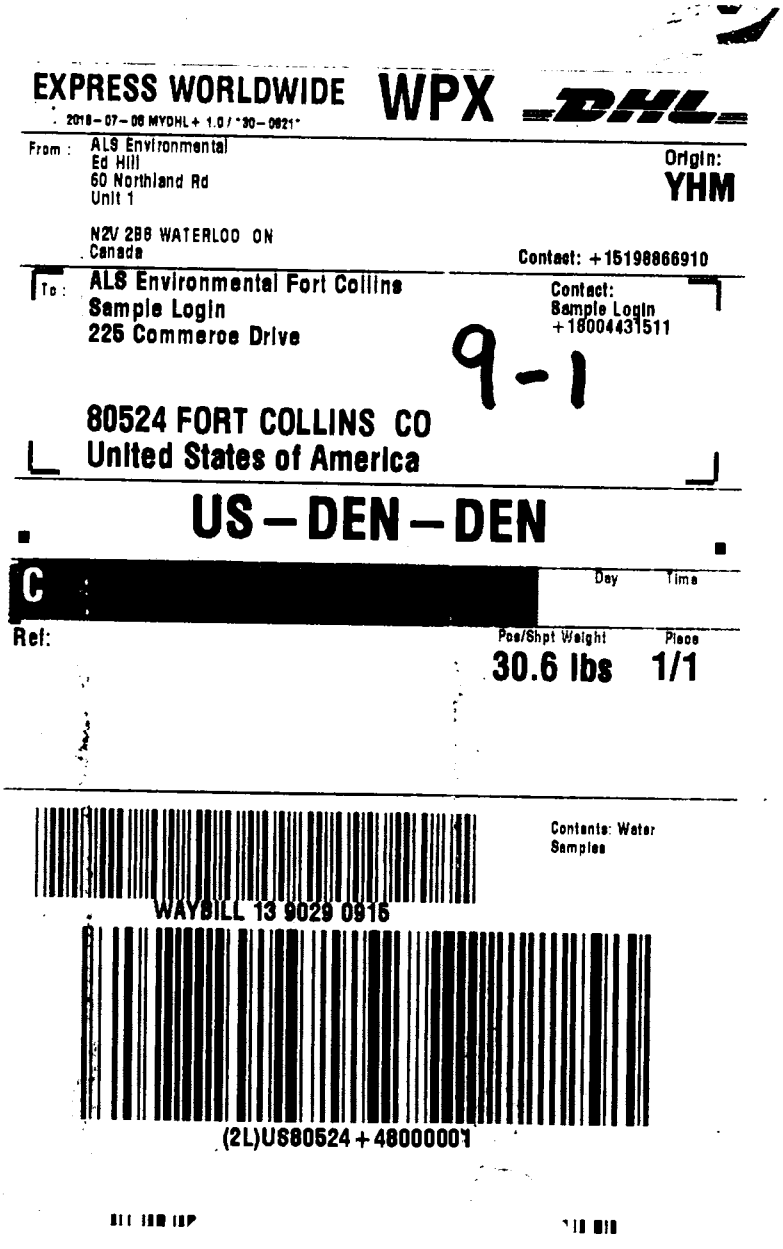
If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/7/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807079



EXPRESS WORLDWIDE **WPX** DHL

2018-07-06 MYDHL+ 1.0 / *30-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : **ALS Environmental Fort Collins**
Sample Login
225 Commerce Drive

Contact:
Sample Login
+16004431511

9-1

80524 FORT COLLINS CO
United States of America

US-DEN-DEN

C [redacted] Dey Time

Ref:

Pcs/Shpt Weight: **30.6 lbs** Piece: **1/1**

Contents: Water Samples

WAYBILL 13 9029 0916

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*24-Jul-18*
Project:	L2122725	**Work Order:**	1807079
Sample ID:	L2122725-1	**Lab ID:**	1807079-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/3/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **7/10/2018**	PrepBy: **LOW**
Ra-226	**0.029 (+/- 0.011)**		**0.0079**	**BQ/l**	NA	7/23/2018 13:26
Carr: BARIUM	*94.9*		*40-110*	*%REC*	DL = NA	7/23/2018 13:26

Client:	ALS Environmental	**Date:**	*24-Jul-18*
Project:	L2122725	**Work Order:**	1807079
Sample ID:	L2122725-1	**Lab ID:**	1807079-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/3/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180710-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 14:09**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.85 (+/- 0.463)	0.0109	1.772		105	67-120					P,M3
Carr: BARIUM	16200		17170		94.2	40-110					

LCSD Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 14:09**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.74 (+/- 0.437)	0.0122	1.772		98.3	67-120		1.85	0.2	2.1	P,M3
Carr: BARIUM	16100		17170		93.5	40-110		16200			

MB Sample ID: **RE180710-1** Units: **BQ/l** Analysis Date: **7/23/2018 13:26**

Client ID: Run ID: **RE180710-1A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00061 (+/- 0.0041)	0.008									U
Carr: BARIUM	16400		17170		95.4	40-110					

The following samples were analyzed in this batch: 1807079-1

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Fathead minnow
EPS 1/RM/22

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Sampled By :	BB/RB/BW
Job Number :	L2122725	Date Collected :	2018-07-03
Substance :	L2122725 - MS-08	Time Collected :	15:15
Sampling Method :	Grab	Date Received :	2018-07-04
Temp. on arrival :	17.0°C	Time Received :	14:00
Sample Description :	Clear, yellow, odourless	Date Tested :	2018-07-05
Test Method :	Test of Larval Growth and Survival Using Fathead Minnows. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/22 , 2nd ed. (February 2011).		

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth from Biomass)	>100%	-	-
LC50	>100%	-	-

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-07-04	Analyst(s) :	MW, RD, CCM, RK, AS, CZN, SEW
Organism Batch :	Fm18-07	Test Duration :	7 days
IC25 Growth (from Biomass) :	0.92 g/L	LC50 :	0.96 g/L
95% Confidence Limits :	0.48 - 1.37 g/L	95% Confidence Limits :	0.70 - 1.30 g/L
Statistical Method :	Non-Linear Regression (CETIS)[a]	Statistical Method :	Nonlinear Interpolation (Stephan)[c]
Historical Mean IC25 :	0.93 g/L	Historical Mean LC50 :	1.11 g/L
Warning Limits (± 2SD) :	0.69 - 1.25 g/L	Warning Limits (± 2SD) :	0.94 - 1.32 g/L

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

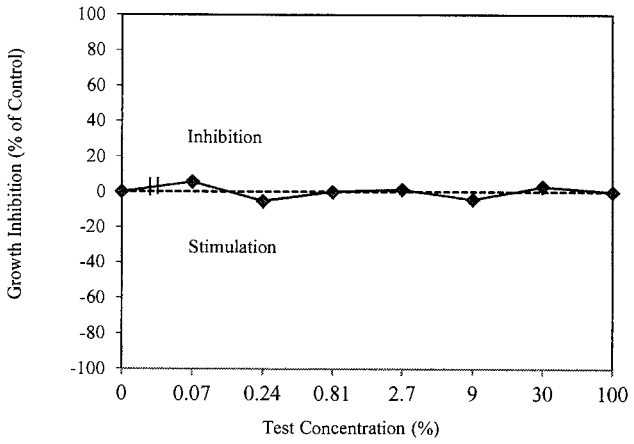
Test Organism :	*Pimephales promelas*	Test Type :	Static Renewal
Organism Batch :	Fm18-07	Control/Dilution Water :	Well water (no chemicals added)
Organism Age :	~07:00 - 21:35 h at start of test	Test Volume / Replicate :	300 mL
Source :	In-house culture	Test Vessel :	420 mL polystyrene beaker
Culture Mortality/Diseased :	0.53 % (previous 7 days)	Depth of Test Solution :	8 cm
pH Adjustment :	None	Organisms per Replicate :	10
Sample Filtration :	None	Number of Replicates :	3
Hardness Adjustment :	None	Daily Renewal Method :	80-85% syphoned and replaced
Test Aeration :	None	Test Method Deviation(s):	None

COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.
•No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.
•Inflated swim bladders were confirmed in all test organisms used in this test.

Work Order : 236558
Sample Number : 55446

Fathead Minnow Growth Inhibition (based on Biomass)



REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

[b] Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics, 11*:1-21.

[c] Stephan, C. E. 1977. Methods for calculating an LC50. pp 65-84 in : P. L. Mayer and J. L. Hamelink (eds.), Aquatic Toxicology and Hazard Evaluation. Amer. Soc. Testing and Materials, Philadelphia PA. ASTM STP 634.

Date : 2018-08-20
yyyy-mm-dd

Approved By : *Project Manager*

Work Order : 236558
Sample Number : 55446

CUMULATIVE DAILY CONTROL MORTALITY AND IMPAIRMENT (±SD)

Date :	2018-07-05	2018-07-06	2018-07-07	2018-07-08	2018-07-09	2018-07-10	2018-07-11	2018-07-12
	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)

FATHEAD MINNOW CUMULATIVE DAILY MORTALITY

Initiation Time : 13:50
Initiation Date : 2018-07-05
Completion Date : 2018-07-12

		Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Treatment
Date :		2018-07-05		2018-07-06		2018-07-07		2018-07-08		2018-07-09		2018-07-10		2018-07-11		2018-07-12		Mean Mortality (± SD)
Analyst(s):		XD		CCM(RD)		CCM(RD)		MR		MW(RD)		MR		CCM(RD)		CCM(RD)		
Concentration		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	%
(%)	**Replicate**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	Dead	**Dead**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
Control	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**0.00 (±0.00)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
0.07	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	1	**10**	**3.33 (±5.77)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
0.24	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**0.00 (±0.00)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
0.81	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**0.00 (±0.00)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
2.7	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	1	**10**	**3.33 (±5.77)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
9	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**0.00 (±0.00)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	1	**10**	1	**10**	
30	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**6.67 (±5.77)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	1	**10**	
	A	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	
100	B	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	**0.00 (±0.00)**
	C	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	0	**0**	

Aberrant behaviour or swimming impairment : None

Data Reviewed By: VC
Date : 2018-08-07

Work Order : 236558
Sample Number : 55446

FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

Concentration (%)	Replicate	Number of Larvae Exposed	Replicate Mean Dry Weight (mg)	Treatment Mean Biomass (mg)	Standard Deviation
Control	A	10	1.043	1.023	0.038
	B	10	1.047		
	C	10	0.980[1]		
0.07	A	10	0.857	0.965	0.094
	B	10	1.030		
	C	10	1.008		
0.24	A	10	1.149	1.076	0.073
	B	10	1.075		
	C	10	1.003		
0.81	A	10	1.157	1.023	0.124
	B	10	0.911		
	C	10	1.002		
2.7	A	10	1.081	1.009	0.071
	B	10	0.939		
	C	10	1.007		
9	A	10	1.123	1.067	0.070
	B	10	0.989		
	C	10	1.088		
30	A	10	0.945	0.992	0.049
	B	10	1.042		
	C	10	0.990		
100	A	10	1.076	1.024	0.047
	B	10	0.984		
	C	10	1.013		

NOTES :

- [1]Outlier according to Grubbs Test[b]. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.
- Control average dry weight per surviving organism = 1.023 mg

Data Reviewed By: VC

Date : 2018-08-07

Work Order : 236558
Sample Number: 55446

Fathead Minnow Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	7.3	8.5	3680	1010

		Day 0 - 1 2018-07-05	Day 1 - 2 2018-07-06	Day 2 - 3 2018-07-07	Day 3 - 4 2018-07-08	Day 4 - 5 2018-07-09	Day 5 - 6 2018-07-10	Day 6 - 7 2018-07-11
Sub-sample Used		1	1	1	2	2	3	3
Temperature (°C)		25.0	25.0	25.0	24.0	24.0	24.0	24.0
Dissolved Oxygen (mg/L)		7.3	8.1	8.9	8.3	8.9	8.4	8.7
Dissolved Oxygen % Sat.[2]		89	98	106	99	105	100	105
pH		8.5	8.3	8.1	8.2	7.9	8.2	8.0
Pre-aeration Time (min)[3]		0	0	20	0	20	0	20
Analyst(s) :	Initial	MV(RD)	MV(RD)	CCM(RD)	CZN	MV(RD)	SEW	CCM(RD)
	Final	CCM(RD)	CCM(RD)	MR	MW(RD)	MR	CCM(RD)	CCM(RD)
Control (0%)								
Temp.(°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0	25.0
	Final	24.0	24.0	24.0	24.5	25.0	25.0	24.0
DO % Sat.[2]	Initial	100	99	100	99	101	98	100
DO (mg/L)	Initial	8.2	8.1	8.3	8.2	8.5	8.0	8.3
	Final	7.7	7.3	7.1	6.9	6.9	6.9	6.6
pH	Initial	8.4	8.4	8.4	8.4	8.4	8.4	8.4
	Final	8.3	8.2	8.1	8.0	8.0	8.0	7.9
Cond. (µmhos/cm)	Initial	658	654	672	669	680	676	665
0.07 %								
Temp.(°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0	25.0
	Final	24.0	24.0	24.0	24.5	25.0	25.0	24.0
DO (mg/L)	Initial	8.1	8.0	8.3	8.4	8.1	8.0	8.3
	Final	7.7	7.5	7.3	7.0	7.1	6.9	6.8
pH	Initial	8.4	8.4	8.4	8.4	8.4	8.4	8.4
	Final	8.3	8.2	8.2	8.1	8.0	8.0	8.0
Cond. (µmhos/cm)	Initial	661	661	677	689	688	683	665
9 %								
Temp.(°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0	25.0
	Final	24.0	24.0	24.0	24.5	25.0	25.0	24.0
DO (mg/L)	Initial	8.1	8.1	8.2	8.3	7.9	8.1	8.3
	Final	7.7	7.4	7.1	6.9	7.2	6.6	6.8
pH	Initial	8.3	8.3	8.3	8.4	8.3	8.3	8.3
	Final	8.2	8.1	8.0	7.9	7.9	7.9	7.9
Cond. (µmhos/cm)	Initial	1017	1015	1031	1028	1034	1034	1018
100 %								
Temp.(°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0	25.0
	Final	24.0	24.0	24.0	24.5	25.0	25.0	24.0
DO (mg/L)	Initial	7.8	8.2	8.4	8.3	8.3	8.2	8.5
	Final	7.6	7.4	6.6	6.8	7.1	6.9	6.6
pH	Initial	8.4	8.1	8.0	8.2	8.2	8.1	8.1
	Final	7.3	7.0	6.9	6.9	7.0	6.8	6.8
Cond. (µmhos/cm)	Initial	3700	3700	3690	3670	3690	3690	3680

"–" = not measured

[2] % saturation (adjusted for actual temperature and barometric pressure)

[3] ≤100 bubbles/minute

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TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Date Collected :	2018-07-03
Substance :	L2122725 - MS-08	Time Collected :	15:15
Sampling Method :	Grab	Date Received :	2018-07-04
Sampled By :	BB/RB/BW	Time Received :	14:00
Temp. on arrival :	17.0°C	Date Tested :	2018-07-05
Sample Description :	Clear, yellow, odourless		

Test Method : Test of Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/21, 2nd ed. (February 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
LC50	>100%	-	-
IC25 (Reproduction)	35.1%	0.06*-41.2	Linear Interpolation (CETIS) a

The results reported relate only to the sample tested and as received.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-07-04	Analyst(s) :	CCM, JL, XD, RD
Organism Batch :	Cd18-07	Test Duration :	6 days
IC25 Reproduction :	1.37 g/L	LC50 :	2.23 g/L
95% Confidence Limits :	0.91 - 1.54 g/L	95% Confidence Limits :	2.01 - 2.49 g/L
Statistical Method :	Linear Interpolation (CETIS)[a]	Statistical Method :	Linear Regression (MLE) (CETIS)[a]
Historical Mean IC25 :	1.31 g/L	Historical Mean LC50 :	2.21 g/L
Warning Limits (± 2SD) :	1.00 - 1.71 g/L	Warning Limits (± 2SD) :	1.87 - 2.62 g/L

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

Sample Filtration :	None	Test Volume per Replicate :	15 mL
Test Aeration :	None	Test Vessel :	19 mL polystyrene vial
pH Adjustment :	None	Depth of Test Solution :	4.8 cm
Hardness Adjustment :	None	Organisms per Replicate :	1
Daily Renewal Method :	Transferred to fresh solutions	Number of Replicates :	10
Control/Dilution Water :	Well water (no chemicals added)	Test Method Deviation(s) :	None

COMMENTS

*The lower 95% confidence limit is less than the lowest concentration tested.
•All test validity criteria as specified in the test method cited above were satisfied.
•Statistical analysis could not be performed using non linear regression, since a suitable model could not be found. Therefore, test results were calculated using Linear Interpolation (CETIS)[a]. In test concentrations where reproduction was stimulated (greater than the control), data were replaced with control values for the purposes of statistical analysis, as recommended by Environment Canada (2005).

Work Order : 236558
Sample Number : 55446

TEST ORGANISMS

Test Organism :	*Ceriodaphnia dubia*	Range of Age (at start of test) :	20:15 h - 23:10 h
Organism Batch :	Cd18-07	Mean Brood Organism Mortality :	0%
Organism Origin :	Single in-house mass culture	Ephippia in Culture :	No
Test Organism Origin :	Individual in-house cultures		

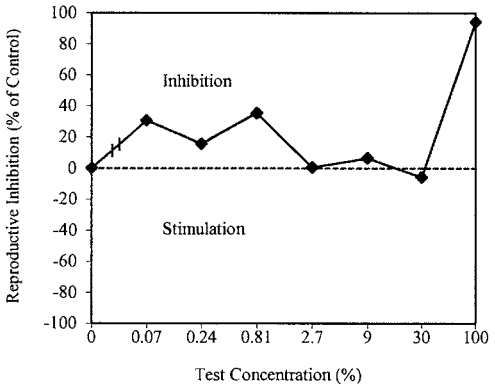
Brood Organism Neonate Production

Replicate :	1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subsequent brood):	11	13	14	11	13	15	14	14	15	10	13.0
Total (first three broods):	20	22	20	20	21	22	22	23	23	21	21.4

No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.

TEST DATA

***Ceriodaphnia dubia* Reproductive Inhibition**



Cumulative Daily Test Organism Mortality (%)

		Test Concentration (%)							
Date	**Test Day**	Control	0.07	0.24	0.81	2.7	9	30	100
2018-07-06	1	0	0	0	0	0	0	0	30
2018-07-07	2	0	0	0	0	0	0	0	30
2018-07-08	3	0	0	0	0	0	0	0	30
2018-07-09	4	0	20	0	0	0	0	0	30
2018-07-10	5	0	20	0	10	0	0	0	30
2018-07-11	6	0	20	0	10	0	0	0	40
Total Mortality (%)		0	20	0	10	0	0	0	40

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Environment Canada, 2005. Guidance Document on Statistical Methods for Environmental Toxicity Tests. Environmental Protection Series, Ottawa, Ont., Rept. EPS 1/RM/46.

Date : 2018-08-20
yyyy-mm-dd

Approved By : _____
Project Manager

Work Order : 236558
Sample Number : 55446

***Ceriodaphnia dubia* Survival and Reproduction**

Test Initiation Date : 2018-07-05
Initiation Time : 9:45
Test Completion Date : 2018-07-11

Concentration (%)		Replicate										Mean Young	Analyst(s)
Control	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)	
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0	RD
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0	MR
2018-07-08	**3**	4	0	3	3	0	4	4	0	5	4	2.7	MR
2018-07-09	**4**	9	8	8	8	9	9	5	0	12	9	7.7	SEW
2018-07-10	**5**	0	0	0	0	0	0	0	0	0	0	0	MR
2018-07-11	**6**	11	14	12	14	13	15	10	11	13	15	12.8	XD
Total		**24**	**22**	**23**	**25**	**22**	**28**	**19**	**11**	**30**	**28**	**23.2 (±5.4)**	

Concentration (%)		Replicate										Mean Young
2.7	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	2	5	1	6	0	1	5	5	2	4	3.1
2018-07-09	**4**	5	10	1	8	0	7	5	10	10	8	6.4
2018-07-10	**5**	0	0	0	0	13	0	0	0	0	0	1.3
2018-07-11	**6**	9	12	10	13	12	15	14	10	12	16	12.3
Total		**16**	**27**	**12**	**27**	**25**	**23**	**24**	**25**	**24**	**28**	**23.1 (±5.1)**

Concentration (%)		Replicate										Mean Young
0.07	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	0	2	3	4	1	0	0	0	0	0	1
2018-07-09	**4**	2	7	9	10	5 x	8	0 x	7	5	6	5.9
2018-07-10	**5**	2	0	0	0	0	5	0	4	0	5	1.6
2018-07-11	**6**	2	6	13	15	0	14	0	6	8	12	7.6
Total		**6**	**15**	**25**	**29**	**6**	**27**	**0**	**17**	**13**	**23**	**16.1 (±9.9)**

Concentration (%)		Replicate										Mean Young
9	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	0	4	0	4	0	6	3	0	3	3	2.3
2018-07-09	**4**	0	10	8	10	3	9	8	10	10	8	7.6
2018-07-10	**5**	3	0	5	0	0	0	0	7	0	0	1.5
2018-07-11	**6**	0	15	14	11	0	16	9	15	11	12	10.3
Total		**3**	**29**	**27**	**25**	**3**	**31**	**20**	**32**	**24**	**23**	**21.7 (±10.5)**

Concentration (%)		Replicate										Mean Young
0.24	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	0	3	1	4	0	5	**4**	0	4	5	2.6
2018-07-09	**4**	8	7	6	7	8	5	10	4	0	9	6.4
2018-07-10	**5**	4	0	0	0	5	0	0	4	0	0	1.3
2018-07-11	**6**	9	9	12	8	8	11	14	12	0	10	9.3
Total		**21**	**19**	**19**	**19**	**21**	**21**	**28**	**20**	**4**	**24**	**19.6 (±6.1)**

Concentration (%)		Replicate										Mean Young
30	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	4	4	4	0	5	0 *	4	4	4	6	3.9
2018-07-09	**4**	9	10	8	4	10	0	7	8	9	9	8.2
2018-07-10	**5**	0	0	0	7	0	0	0	0	0	13	2.2
2018-07-11	**6**	12	8	13	11	13	0	12	13	10	–	10.2
Total		**25**	**22**	**25**	**22**	**28**	**0**	**23**	**25**	**23**	**28**	**24.6 (±2.3)**

Concentration (%)		Replicate										Mean Young
0.81	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0	0	0	0	0	0	0	0	0	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	0	0	0	0	0	0	0	0	4	5	0.9
2018-07-09	**4**	0	1	3	7	6	7	7	0	8	8	4.7
2018-07-10	**5**	4	4 x	3	5	0	0	0	0	0	0	1.6
2018-07-11	**6**	2	0	5	13	11	10	8	0	14	15	7.8
Total		**6**	**5**	**11**	**25**	**17**	**17**	**15**	**0**	**26**	**28**	**15.0 (±9.5)**

Concentration (%)		Replicate										Mean Young
100	**Day**	1	2	3	4	5	6	7	8	9	10	(±SD)
2018-07-06	**1**	0	0 x	0 x	0	0	0	0	0	0	0 x	0
2018-07-07	**2**	0	0	0	0	0	0	0	0	0	0	0
2018-07-08	**3**	0	0	0	0	0	0	0	0	0	0	0
2018-07-09	**4**	0	0	0	0	0	0	0	0	0	0	0
2018-07-10	**5**	0	0	0	0	3	4	0	0	3	0	1
2018-07-11	**6**	0	0	0	0	2	0	0 x	1	0	0	0.3
Total		**0**	**0**	**0**	**0**	**5**	**4**	**0**	**1**	**3**	**0**	**1.3 (±1.9)**

NOTES : •All young produced by a test organism during its fourth and subsequent broods were discarded and not included in the above counts. The presence of two or more neonates in any test chamber, during any given day of the test, constitutes a brood.

•No outlying data points were detected according to Grubbs Test (CETIS)[a].

* 2018-07-08: Vial for replicate 30-6 found empty with a crack in the bottom. The adult test organism could not be recovered, resulting in an accidental mortality (MR). Therefore, this replicate was excluded from all calculations and statistical analyses. Test endpoints were calculated from a total of 9 test organisms exposed in the 30% concentration (VC).

•2018-07-09: Dead neonates were observed in replicate Control-8 (SEW). Dead neonates have been excluded from the above counts and from statistical analysis for the reproduction endpoint (VC).

"x"= test organism mortality
"*"= accidental test organism mortality
"–"=4th brood (see 'NOTES')

Data Reviewed By : JL
Date : 2018-08-20

Work Order : 236558
Sample Number: 55446

Ceriodaphnia dubia Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	7.3	8.5	3680	1010

Date :		Day 0 - 1 2018-07-05	Day 1 - 2 2018-07-06	Day 2 - 3 2018-07-07	Day 3 - 4 2018-07-08	Day 4 - 5 2018-07-09	Day 5 - 6 2018-07-10
Sub-sample Used		1	1	1	2	2	3
Temperature (°C)		25.0	25.0	25.0	24.0	24.0	24.0
Dissolved Oxygen (mg/L)		7.3	8.1	8.9	8.3	8.9	8.4
Dissolved Oxygen % Sat.[1]		89	98	106	99	105	100
pH		8.5	8.3	8.1	8.2	7.9	8.2
Pre-aeration Time (min)[2]		0	0	20	0	20	0
Analyst(s)	Initial	MV(RD)	MV(RD)	CCM(RD)	CZN	MV(RD)	SEW
	Final	RD	MR	MR	SEW	MR	XD
Control (0%)							
Temp. (°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0
	Final	24.0	24.0	24.0	25.0	24.0	24.0
DO % Sat.[1]	Initial	100	99	100	99	101	98
DO (mg/L)	Initial	8.2	8.1	8.3	8.2	8.5	8.0
	Final	7.5	7.6	7.7	7.3	7.5	7.6
pH	Initial	8.4	8.4	8.4	8.4	8.4	8.4
	Final	8.3	8.3	8.3	8.2	8.1	8.1
Cond. (µmhos/cm)	Initial	658	654	672	669	680	676
0.07 %							
Temp. (°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0
	Final	24.0	24.0	24.0	25.0	24.0	24.0
DO (mg/L)	Initial	8.1	8.0	8.3	8.4	8.1	8.0
	Final	7.4	7.7	7.6	7.3	7.4	7.6
pH	Initial	8.4	8.4	8.4	8.4	8.4	8.4
	Final	8.3	8.3	8.3	8.2	8.1	8.2
Cond. (µmhos/cm)	Initial	661	661	677	689	688	683
9 %							
Temp. (°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0
	Final	24.0	24.0	24.0	25.0	24.0	24.0
DO (mg/L)	Initial	8.1	8.1	8.2	8.3	7.9	8.1
	Final	7.3	7.6	7.6	7.3	7.6	7.7
pH	Initial	8.3	8.3	8.3	8.4	8.3	8.3
	Final	8.2	8.2	8.2	8.1	8.1	8.1
Cond. (µmhos/cm)	Initial	1017	1015	1031	1028	1034	1034
100 %							
Temp. (°C)	Initial	25.0	25.0	25.0	25.0	24.0	25.0
	Final	24.0	24.0	24.0	25.0	24.0	24.0
DO (mg/L)	Initial	7.8	8.2	8.4	8.3	8.3	8.2
	Final	7.4	7.6	7.6	7.4	7.4	7.6
pH	Initial	8.4	8.1	8.0	8.2	8.2	8.1
	Final	7.2	7.3	7.4	7.2	7.3	7.3
Cond. (µmhos/cm)	Initial	3700	3700	3690	3670	3690	3690

"–" = not measured

[1] % saturation (adjusted for actual temperature and barometric pressure)

[2] ≤100 bubbles/minute

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TOXICITY TEST REPORT

Lemna minor
EPS 1/RM/37

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	BB/RB/BW
Location :	Waterloo ON	Date Collected :	2018-07-03
Job Number :	L2122725	Time Collected :	15:15
Substance :	L2122725 - MS-08	Date Received :	2018-07-04
Sampling Method :	Grab	Time Received :	14:00
Temp. on arrival :	17.0°C	Date Tested :	2018-07-06
Sample Description :	Clear, yellow, odourless		

Test Method : Test for Measuring the Inhibition of Growth using the Freshwater Macrophyte, *Lemna minor*. Method Development and Application Section, Environmental Technology Centre, Environment Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Weight)	80.0%	54.1-109*	Nonlinear Regression (CETIS) a
IC25 (Frond Production)	35.5%	25.6-46.4	Nonlinear Regression (CETIS) a

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-07-18	Historical Geometric Mean IC25 :	2.07 g/L
Test Duration :	7 days	Warning Limits (± 2SD) :	1.62 - 2.66 g/L
IC25 (Frond Production) :	1.47 g/L**	Growth Medium :	Modified APHA
95% Confidence Limits :	1.15 - 1.80 g/L	Analyst(s) :	MA
Statistical Method :	Non-Linear Regression (CETIS)[a]		

The reference toxicant test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

Test Organism :	*Lemna minor* L., Strain 7730	Test Type :	Static (no sub-samples required)
Organism Batch :	Lm18-06	Control/Dilution Medium :	Modified APHA
Culture Origin :	UTCC 492	Medium Preparation Water :	Distilled Water
Test Organism Source :	Axenic in-house culture	Source of Water :	Morning Mist
Culture Medium :	Modified Hoaglands E+	Medium Preparation Chemicals :	Modified APHA stocks A, B, C (10 mL/L)
Age (on Test Day 0) :	10 days	Nutrient Spiking of Sample :	Modified APHA stocks A, B, C (10 mL/L)
Health Criteria (in APHA) :	21-fold frond increase in 7 days	Replicates per Concentration :	4
Organism Acclimation :	19:30 h in APHA medium	Test Volume per Replicate :	100 mL
Inoculum (Test Day 0) :	2 plants (3 fronds per plant)	Test Vessel :	250 mL glass Erlenmeyer flask
Sample Filtration :	1 µm (Whatman GF/C)	Depth of Test Solution :	4.0 cm
Sample Pre-aeration :	20 min. at ≤100 bubbles/min.	Photoperiod/Light Intensity :	Continuous, 4160 - 5250 lux
pH Adjustment :	None	Test Method Deviation(s) :	None
Hardness Adjustment :	None		

COMMENTS

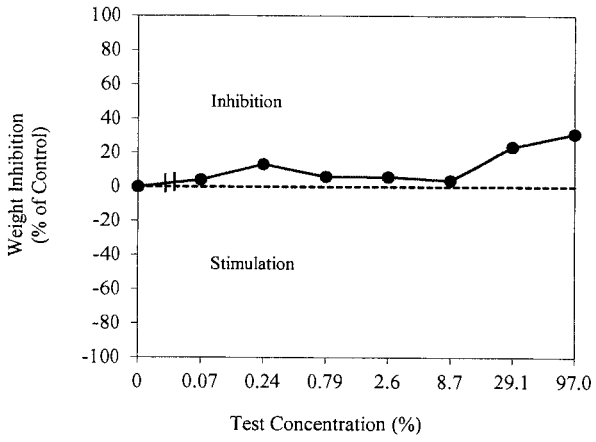
•All test validity criteria as specified in the test method cited above were satisfied.

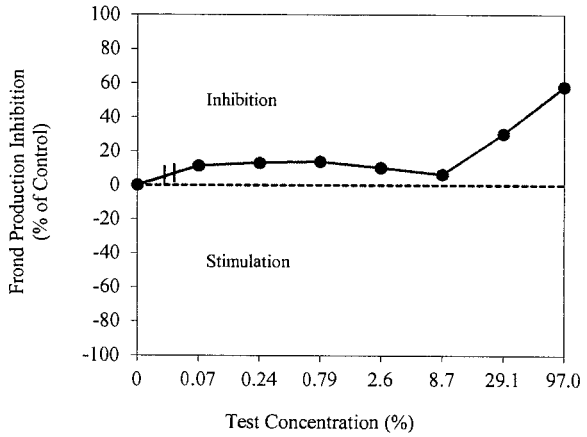
*Note: In the case of effluents, an upper 95% confidence limit of 97% is inferred, since a concentration greater than 97% is not possible. Statistically, however, a confidence limit which is greater than 97% effluent is valid.

**Note: The reference toxicant test result exceeded the 95% warning limits for historical data. Approximately 5% of the results would be expected to fall outside the warning limits. No other unusual circumstances were observed and therefore the test result is considered acceptable.

Work Order : 236558
Sample Number : 55446

Lemna minor Growth Inhibition





TEST MONITORING

Initiation Date : 2018-07-06
Intitiation Time : 11:15
Initiated By : MA

Termination Date : 2018-07-13
Termination Time : 11:00
Terminated By : MDS(SEW)

Temperature Monitoring

Test Day	Date	Temperature (°C)
0 (unmodified sample)	2018-07-06	25.0
0	2018-07-06	25.0
1	2018-07-07	25.5
2	2018-07-08	26.0
3	2018-07-09	25.5
4	2018-07-10	25.0
5	2018-07-11	25.0
6	2018-07-12	25.0
7	2018-07-13	25.5

pH Monitoring

Concentration (%)	Day 0	Day 7
100 (unmodified sample)	8.5	–
Control	8.4	8.4
0.07	8.4	8.4
0.24	–	–
0.79	–	–
2.6	8.3	8.4
8.7	–	–
29.1	–	–
97.0	7.9	8.2

"–" = not required

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Date : 2018-08-20
yyyy-mm-dd

Approved By: *Project Manager*

Work Order : 236558
Sample Number : 55446

Lemna minor Frond Increase

Test Concentration (%)	Replicate	Frond Count Day 0*	Frond Count Day 7	Frond Increase	Mean Frond Increase	Standard Deviation	CV (%)	Frond/Root Appearance (Day 7)
Control	A	6	115	109	110.00	11.17	10.2	Fronds healthy, appearance normal in all replicates.
	B	6	132	126				
	C	6	110	104				
	D	6	107	101				
0.07	A	6	86	80	97.50	16.46	16.9	Fronds healthy, appearance normal in all replicates.
	B	6	116	110				
	C	6	119	113				
	D	6	93	87				
0.24	A	6	79	73	95.50	16.05	16.8	Fronds healthy, appearance normal in all replicates.
	B	6	116	110				
	C	6	109	103				
	D	6	102	96				
0.79	A	6	88	82	94.75	12.12	12.8	Fronds healthy, appearance normal in all replicates.
	B	6	109	103				
	C	6	93	87				
	D	6	113	107				
2.6	A	6	99	93	98.75	8.92	9.0	Fronds healthy, appearance normal in all replicates.
	B	6	100	94				
	C	6	118	112				
	D	6	102	96				
8.7	A	6	119	113	103.00	6.78	6.6	A few pale green/yellowed fronds present in all replicates.
	B	6	104	98				
	C	6	106	100				
	D	6	107	101				
29.1	A	6	81	75	76.75	4.35	5.7	Some pale green/yellowed fronds present in all replicates.
	B	6	79	73				
	C	6	82	76				
	D	6	89	83				
97.0	A	6	60	54	46.25	9.67	20.9	Many pale green/yellowed fronds present in all replicates.
	B	6	40	34				
	C	6	60	54				
	D	6	49	43				

NOTES: *No unusual appearance or treatment of culture prior to testing. Test inoculated with healthy plants.
•No stimulation of frond increase compared to the control was observed at any test level.
•A 19.3-fold increase in frond number was observed in the control over the testing period.
•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not available/not required

Test Data Reviewed By: VC
Date: 2018-08-09

Work Order : 236558
Sample Number : 55446

Lemna minor Frond Weight Data

Test Concentration (%)	Replicate	Dry Weight of Fronds (mg)	Treatment Mean Dry Weight (mg)	Standard Deviation
Control	A	10.47	9.89	0.71
	B	10.32		
	C	9.88		
	D	8.90		
0.07	A	8.18	9.49	1.12
	B	10.62		
	C	10.19		
	D	8.95		
0.24	A	7.68	8.58	0.92
	B	9.84		
	C	8.20		
	D	8.61		
0.79	A	8.76	9.30	0.54
	B	9.91		
	C	8.93		
	D	9.60		
2.6	A	9.30	9.32	0.60
	B	9.03		
	C	10.16		
	D	8.79		
8.7	A	10.35	9.53	0.69
	B	9.15		
	C	8.81		
	D	9.81		
29.1	A	7.32	7.58	0.34
	B	7.36		
	C	7.57		
	D	8.07		
97.0	A	6.96	6.83	0.62
	B	6.13		
	C	7.60		
	D	6.63		

NOTES :
- No stimulation of weight compared to the control was observed at any test level.
- No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not available/not required

Test Data Reviewed By : VC
Date : 2018-08-09

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TOXICITY TEST REPORT

Pseudokirchneriella subcapitata
EPS 1/RM/25

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Date Collected :	2018-07-03
Job Number :	L2122725	Time Collected :	15:15
Substance :	L2122725 - MS-08	Date Received :	2018-07-04
Sampling Method :	Grab	Time Received :	14:00
Sampled By :	BB/RB/BW	Date Tested :	2018-07-05
Sample Description :	Clear, yellow, odourless	Temp. on arrival :	17.0°C

Test Method : Growth Inhibition Test Using a Freshwater Alga. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/25, 2nd ed. (March 2007).

72-h TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	>90.91%	-	-

The results reported relate only to the sample tested and as received.

ZINC (AS ZINC SULPHATE) REFERENCE TOXICANT DATA

Date Tested :	2018-07-03	Statistical Method :	Non-linear Regression (CETIS)[a]
Organism Batch :	Ps18-07	Historical Mean IC25 :	10.1 µg/L
Test Duration :	72 hours	Warning Limits (± 2SD) :	4.5 - 22.9 µg/L
IC25 Growth :	11.2 µg/L	Analyst(s) :	MA, AS
95% Confidence Limits :	8.1 - 14.3 µg/L		

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST ORGANISM

Test Organism :	*Pseudokirchneriella subcapitata*	Source :	In-house culture
Culture Origin :	University of Waterloo, Waterloo ON	Cell Density at 0-h :	10273 cells/mL
Strain Number :	CPCC 37	Inoculum Prepared :	00:15 h prior to test initiation
Organism Batch :	Ps18-07	Age (at start of test) :	3 days (in exponential growth)

•Algal growth curve is determined at least twice per year as required by the test method cited above.

•No unusual appearance or treatment of culture prior to testing.

TEST CONDITIONS

Test Type :	Static	Volume per Replicate :	220 µL
Test Duration :	72 hours	Control Replicates:	10
Mean Temperature (± SD) :	24.4°C (± 0.3)	Test Replicates :	4
Sample Pre-aeration :	None	Concentrations Tested :	10 + Control
Sample Filtration :	0.45 µm preconditioned filter	Photoperiod :	Continuous light
Volume Filtered:	≥10 mL	Light Intensity :	3910-4360 lux
Control/Dilution Water :	Millipore Milli-Q (no chemicals added)	pH Adjustment :	None
Enrichment Medium :	Stock 2B: EDTA reduced to 25%	Hardness Adjustment :	None
Test Vessel :	U-shaped polystyrene microplate	Test Method Deviation(s) :	None

COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.

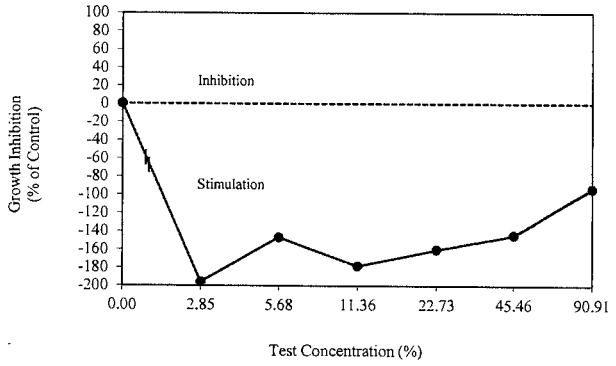
AQUATOX

TOXICITY TEST REPORT

Pseudokirchneriella subcapitata
EPS 1/RM/25

Work Order : 236558
Sample Number : 55446

***Pseudokirchneriella subcapitata* Growth Inhibition**



CELL ENUMERATION AT 72-HOURS

Initiated By : MA/CZN
Completion/Enumeration Date : 2018-07-08
Enumerated By : AS
Enumeration Method : Manual (haemocytometer)

Sample pH (at 0 hours) : 8.5
Control pH (at 0 hours) : 7.0
Control pH (at 72 hours) : 7.0
Control Cell Increase Factor : 28.9 times growth

Concentration	Cell Concentration (x 10000 cells/mL) Replicate								Cell Yield (x 10000 cells/mL) Mean	Standard Deviation	CV (%)	Stimulation (% of control)**
(%)	1	2	3	4	7	8	9	10				
Control	30.0	30.5	22.0	30.0	33.0	26.5	39.5	26.0	28.66	5.22	18.22	–
0.18	–	–	–	–	–	–	–	–	–	–	–	–
0.35	–	–	–	–	–	–	–	–	–	–	–	–
0.71	–	–	–	–	–	–	–	–	–	–	–	–
1.42	–	–	–	–	–	–	–	–	–	–	–	–
2.85	83.0	81.5	93.0	–	–	–	–	–	84.81	6.25	7.37	195.90
5.68	72.5	77.0	66.0	–	–	–	–	–	70.81	5.53	7.81	147.05
11.36	98.5	75.5	68.5	–	–	–	–	–	79.81	15.70	19.67	178.46
22.73	74.0	82.0	71.0	–	–	–	–	–	74.64	5.69	7.62	160.43
45.46	64.0	68.5	81.0	–	–	–	–	–	70.14	8.81	12.56	144.73
90.91	60.5	55.5	53.5	–	–	–	–	–	55.47	3.61	6.50	93.55

NOTES : **Statistically significant stimulation, according to ANOVA/Dunnett Multiple Comparison Test (CETIS)[a], (a=0.05).
•Control replicates 5 and 6 used for pH measurement.
•The Mann-Kendall test shows that there is no inhibitory gradient (α=0.05).
•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not enumerated/not required

Data Reviewed By : VC
Date : 2018-08-07

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Date : 2018-08-20
yyyy-mm-dd

Approved By : *Project Manager*

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 236558

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number: 4500040417
Field Sampler Name (print): BB/RB/BW
Signature:
Affiliation: Baffinland/ALS Env
Sample Storage (prior to shipping):
Custody Relinquished by: BW
Date/Time Shipped: 04-Jul-18

Client: ALS Enironmental
Waterloo
Q# 162705399-18

Phone: (519) 886-6910
Fax: (519) 886-9047
Contact: Wayne Smith/Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name (ALS # L2122725)	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-07-03	15:15	MS-08	55446	17.0	✔		✔		✔	✔	✔	✔	✔		✔		1 Pail
																	3 bladders
																	1X2L Bottle

For Lab Use Only
Received By: MA
Date: 2018-07-04
Time: 1400
Storage Location:
Storage Temp.(°C)

Please list any special requests or instructions:
Email Disturbution:
Wayne.smith@alsglobal.com
rick.hawthorne@alsglobal.com
bimcore@alsglobal.com
Rush Final
Daily Updates pH
MMER Toxicity for Sublethal W RISS Reporting
Temp of bucket = 20.0°C, bladders = 17.0°C - MA 2018-07-04

AquaTox Testing & Consulting Inc.
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TOXICITY TEST REPORT
Daphnia magna

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	BB/RB/BW
Location :	Waterloo ON	Time Collected :	15:15
Job Number :	L2122725	Date Collected :	2018-07-03
Substance :	L2122725 - MS-08	Date Received :	2018-07-04
Sampling Method :	Grab	Date Tested :	2018-07-04
Sample Description :	Clear, yellow, odourless	Temp. on arrival :	17.0° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	3.3 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.1 g/L
Date Tested :	2018-06-26	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.2 g/L	Organism Batch :	Dm18-12
95% Confidence Limits :	6.0 - 6.4 g/L	Analyst(s) :	TZL, CZN, SEW
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	9.2 days	Mean Young Per Brood :	28.9
Culture Mortality :	2.6% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-12	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2018-07-09
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 236558
Sample Number: 55446

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	>1000	None	8.4	8.5	3530	21.0	100	0:00

0 hours

Date & Time 2018-07-04 14:55
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	8.4	8.5	3530	21.0	100	>1000
100B	0	0	8.4	8.5	3530	21.0	100	>1000
100C	0	0	8.4	8.5	3530	21.0	100	>1000
Control A	0	0	8.5	8.7	747	21.0	100	230
Control B	0	0	8.5	8.7	747	21.0	100	230
Control C	0	0	8.5	8.7	747	21.0	100	230

Notes:

24 hours

Date & Time 2018-07-05 14:55
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2018-07-06 14:55
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	7.3	8.3	3560	20.0
100B	0	0	7.3	8.3	3560	20.0
100C	1	0	7.4	8.4	3550	20.0
Control A	0	0	8.5	8.5	762	20.0
Control B	0	0	8.5	8.6	761	20.0
Control C	0	0	8.5	8.5	761	20.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-12

Number immobile does not include number of mortalities.

– = not measured/not required
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: EJS
Date: 2018-07-09

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TOXICITY TEST REPORT
Rainbow Trout

Work Order : 236558
Sample Number : 55446

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	BB/RB/BW
Location :	Waterloo ON	Time Collected :	15:15
Job Number :	L2122725	Date Collected :	2018-07-03
Substance :	L2122725 - MS-08	Date Received :	2018-07-04
Sampling Method :	Grab	Date Tested :	2018-07-04
Sample Description :	Clear, yellow, odourless	Temp. on arrival :	17.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-15	Date Tested :	2018-07-01
LC50 :	3566 mg/L	Historical Mean LC50 :	3691 mg/L
95% Confidence Limits :	3192 - 3968 mg/L	Warning Limits (± 2SD) :	3038 - 4484 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	FS, TA, TL

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0.1 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.53 ± 0.28 g	Mean Fish Fork Length (± 2 SD) :	38.1 ± 6.3 mm
Range of Weights :	0.30 - 0.74 g	Range of Fork Lengths (mm) :	33 - 43 mm
Fish Loading Rate :	0.3 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	17
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-07-09
yyyy-mm-dd

Approved by: _____
Project Manager

Work Order: 236558
Sample Number: 55446

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	8.6	8.7	3552	16.0	–
	Chemistry after 30min air:	8.6	8.7	3531	16.0	95

0 hours

Date & Time 2018-07-04 16:10
Technician: TA(TL)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	8.6	8.7	3531	16.0	95
Control	0	0	8.1	9.4	827	15.5	99

Notes:

24 hours

Date & Time 2018-07-05 16:10
Technician: MW(TL)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	6.6	8.6	3566	16.0
Control	0	0	–	–	–	16.0

Notes:

48 hours

Date & Time 2018-07-06 16:10
Technician: TA(TL)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	6.5	8.3	3567	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2018-07-07 16:10
Technician: TL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	6.6	8.9	3568	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2018-07-08 16:10
Technician: TL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	6.7	8.8	3568	15.5
Control	0	0	8.2	9.2	822	15.5

Notes:

Control organisms showing stress: 0
Organism Batch : T18-15

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: EJS
Date: 2018-07-09

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 236558

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	BB/RB/BW
Signature:	
Affiliation:	Baffinland/ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	BW
Date/Time Shipped:	04-Jul-18

Client:	ALS Enironmental Waterloo Q# 162705399-18
Phone:	(519) 886-6910
Fax:	(519) 886-9047
Contact:	Wayne Smith/Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name (ALS # L2122725)	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-07-03	15:15	MS-08	55446	17.0	✔		✔		✔	✔	✔	✔	✔		✔		1 Pail
																	3 bladders
																	1X2L Bottle

For Lab Use Only	
Received By:	MA
Date:	2018-07-04
Time:	1400
Storage Location:	
Storage Temp.(°C)	

Please list any special requests or instructions:

Email Disturbution: Rush Final
Wayne.smith@alsglobal.com Daily Updates pH
rick.hawthorne@alsglobal.com
bimcore@alsglobal.com MMER Toxicity for Sublethal W RISS Reporting
Temp of bucket = 20.0°C, bladders = 17.0°C - MA 2018-07-04

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☑
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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 commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only) L2122725 | **ALS Contact:** | **Sampler:** BW/DS/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-MMER-WT	Group 3	Sublethal Toxicity	Number of Containers
	MS-08	3-Jul-18	15:15	Water	E0	E0	E0	11

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 by clicking on the drop-down list below (electronic COC only)

Gen chem's tested on site.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		
15					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 03-Jul-18	Time: 17:50	Received by: F.Khalili	Date: 3-Jul-18	Time: 16:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 04-JUL-18
Report Date: 30-JUL-18 10:39 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2123447

Project P.O. #: 4500040417
Job Reference: MS-08 EFFLUENT CHARACTERIZATION
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2123447-1 MS-08-US Sampled By: BW/DS/BB on 03-JUL-18 @ 16:40 Matrix: WATER							
Physical Tests							
Conductivity	33.0		3.0	umhos/cm		05-JUL-18	R4112997
Hardness (as CaCO3)	16	HTC	10	mg/L		04-JUL-18	
pH	7.69	PEHR	0.10	pH units		05-JUL-18	R4113012
Total Suspended Solids	<2.0		2.0	mg/L	05-JUL-18	05-JUL-18	R4113300
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	15		10	mg/L		05-JUL-18	R4113116
Ammonia, Total (as N)	<0.020		0.020	mg/L		05-JUL-18	R4113387
Chloride (Cl)	0.86		0.50	mg/L		04-JUL-18	R4113310
Fluoride (F)	<0.020		0.020	mg/L		04-JUL-18	R4113310
Nitrate (as N)	<0.020		0.020	mg/L		04-JUL-18	R4113310
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	04-JUL-18	05-JUL-18	R4113724
Phosphorus, Total	0.0062		0.0030	mg/L	04-JUL-18	05-JUL-18	R4112888
Sulfate (SO4)	0.50		0.30	mg/L		04-JUL-18	R4113310
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.02		0.50	mg/L		05-JUL-18	R4112868
Total Organic Carbon	1.16		0.50	mg/L		05-JUL-18	R4112869
Total Metals							
Aluminum (Al)-Total	0.146		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.00319		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	<0.010		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	3.30		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	0.000018		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	0.112		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	0.000120		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	1.82		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	0.00182		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	0.000063		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.050		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	0.384		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.00092		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	0.66		0.10	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2123447-1 MS-08-US Sampled By: BW/DS/BB on 03-JUL-18 @ 16:40 Matrix: WATER							
Total Metals							
Silver (Ag)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	0.383		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.0032		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	<0.50		0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	0.00014		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Titanium (Ti)-Total	0.00693		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.000167		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	0.0069		0.0065	Bq/L	10-JUL-18	24-JUL-18	R4070789
L2123447-2 MS-08-DS Sampled By: BW/DS/BB on 03-JUL-18 @ 16:20 Matrix: WATER							
Physical Tests							
Conductivity	41.2		3.0	umhos/cm		05-JUL-18	R4112997
Hardness (as CaCO3)	20	HTC	10	mg/L		04-JUL-18	
pH	7.61	PEHR	0.10	pH units		05-JUL-18	R4113012
Total Suspended Solids	3.9		2.0	mg/L	05-JUL-18	05-JUL-18	R4113300
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	16		10	mg/L		05-JUL-18	R4113116
Ammonia, Total (as N)	<0.020		0.020	mg/L		05-JUL-18	R4113387
Chloride (Cl)	0.78		0.50	mg/L		04-JUL-18	R4113310
Fluoride (F)	<0.020		0.020	mg/L		04-JUL-18	R4113310
Nitrate (as N)	<0.020		0.020	mg/L		04-JUL-18	R4113310
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	04-JUL-18	05-JUL-18	R4113724
Phosphorus, Total	0.0075		0.0030	mg/L	04-JUL-18	05-JUL-18	R4112888
Sulfate (SO4)	2.31		0.30	mg/L		04-JUL-18	R4113310
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.04		0.50	mg/L		05-JUL-18	R4112868
Total Organic Carbon	1.16		0.50	mg/L		05-JUL-18	R4112869
Total Metals							
Aluminum (Al)-Total	0.283		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.00450		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2123447-2 MS-08-DS Sampled By: BW/DS/BB on 03-JUL-18 @ 16:20 Matrix: WATER							
Total Metals							
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	<0.010		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	3.94		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	0.000040		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	0.00064		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.00013		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	0.331		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	0.000275		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	2.36		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	0.00548		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	0.000067		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.00057		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.050		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	0.480		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.00139		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	0.86		0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	0.370		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.0036		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	0.75		0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	0.00017		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Titanium (Ti)-Total	0.0170		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.000222		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	0.00062		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	<0.0066		0.0066	Bq/L	10-JUL-18	24-JUL-18	R4070789

* 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	Chloride (Cl)	MS-B	L2123447-1, -2
Matrix Spike	Aluminum (Al)-Total	MS-B	L2123447-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2123447-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2123447-1, -2
Matrix Spike	Silicon (Si)-Total	MS-B	L2123447-1, -2
Matrix Spike	Ammonia, Total (as N)	MS-B	L2123447-1, -2
Matrix Spike	Nitrate (as N)	MS-B	L2123447-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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). Holdtime for samples under this regulation is 28 days

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

Reference Information

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

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: L2123447 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R4113116								
WG2814543-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			101.1		%		80-120	05-JUL-18
WG2814543-8 DUP		**L2123439-1**						
Alkalinity, Total (as CaCO3)		27	31		mg/L	13	20	05-JUL-18
WG2814543-6 LCS								
Alkalinity, Total (as CaCO3)			99.2		%		85-115	05-JUL-18
WG2814543-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	05-JUL-18
C-DIS-ORG-WT	**Water**							
Batch R4112868								
WG2814189-3 DUP		**L2123439-1**						
Dissolved Organic Carbon		0.86	0.82		mg/L	4.2	20	05-JUL-18
WG2814189-2 LCS								
Dissolved Organic Carbon			96.3		%		80-120	05-JUL-18
WG2814189-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-JUL-18
WG2814189-4 MS		**L2123439-1**						
Dissolved Organic Carbon			93.0		%		70-130	05-JUL-18
CL-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Chloride (Cl)		283	283		mg/L	0.2	20	04-JUL-18
WG2813442-22 LCS								
Chloride (Cl)			101.8		%		90-110	04-JUL-18
WG2813442-21 MB								
Chloride (Cl)			<0.50		mg/L		0.5	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Chloride (Cl)			N/A	MS-B	%		-	04-JUL-18
EC-WT	**Water**							
Batch R4112997								
WG2814283-4 DUP		**WG2814283-3**						
Conductivity		1800	1810		umhos/cm	0.1	10	05-JUL-18
WG2814283-2 LCS								
Conductivity			101.7		%		90-110	05-JUL-18
WG2814283-1 MB								
Conductivity			<3.0		umhos/cm		3	05-JUL-18
F-IC-N-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Fluoride (F)		0.074	0.074		mg/L	0.2	20	04-JUL-18
WG2813442-22 LCS								
Fluoride (F)			100.5		%		90-110	04-JUL-18
WG2813442-21 MB								
Fluoride (F)			<0.020		mg/L		0.02	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Fluoride (F)			99.6		%		75-125	04-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Aluminum (Al)-Total		0.146	0.145		mg/L	0.8	20	04-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Total		0.00319	0.00309		mg/L	3.4	20	04-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Total		3.30	3.36		mg/L	1.9	20	04-JUL-18
Chromium (Cr)-Total		<0.00050	0.00051	RPD-NA	mg/L	N/A	20	04-JUL-18
Cesium (Cs)-Total		0.000018	0.000020		mg/L	8.4	20	04-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Iron (Fe)-Total		0.112	0.118		mg/L	5.8	20	04-JUL-18
Lead (Pb)-Total		0.000120	0.000119		mg/L	1.1	20	04-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Magnesium (Mg)-Total		1.82	1.82		mg/L	0.1	20	04-JUL-18
Manganese (Mn)-Total		0.00182	0.00197		mg/L	7.6	20	04-JUL-18
Molybdenum (Mo)-Total		0.000063	0.000059		mg/L	6.6	20	04-JUL-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Total		0.384	0.391		mg/L	1.8	20	04-JUL-18
Rubidium (Rb)-Total		0.00092	0.00095		mg/L	3.5	20	04-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Silicon (Si)-Total		0.66	0.63		mg/L	4.0	20	04-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Total		0.383	0.390		mg/L	1.9	20	04-JUL-18
Strontium (Sr)-Total		0.0032	0.0032		mg/L	0.2	20	04-JUL-18
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	25	04-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thorium (Th)-Total		0.00014	0.00014		mg/L	2.7	25	04-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Total		0.00693	0.00704		mg/L	1.5	20	04-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Total		0.000167	0.000162		mg/L	3.3	20	04-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814071-2 LCS								
Aluminum (Al)-Total			96.0		%		80-120	04-JUL-18
Antimony (Sb)-Total			101.1		%		80-120	04-JUL-18
Arsenic (As)-Total			98.3		%		80-120	04-JUL-18
Barium (Ba)-Total			98.0		%		80-120	04-JUL-18
Beryllium (Be)-Total			93.2		%		80-120	04-JUL-18
Bismuth (Bi)-Total			100.2		%		80-120	04-JUL-18
Boron (B)-Total			85.6		%		80-120	04-JUL-18
Cadmium (Cd)-Total			98.2		%		80-120	04-JUL-18
Calcium (Ca)-Total			94.0		%		80-120	04-JUL-18
Chromium (Cr)-Total			94.8		%		80-120	04-JUL-18
Cesium (Cs)-Total			103.7		%		80-120	04-JUL-18
Cobalt (Co)-Total			94.0		%		80-120	04-JUL-18
Copper (Cu)-Total			95.0		%		80-120	04-JUL-18
Iron (Fe)-Total			92.0		%		80-120	04-JUL-18
Lead (Pb)-Total			103.2		%		80-120	04-JUL-18
Lithium (Li)-Total			94.7		%		80-120	04-JUL-18
Magnesium (Mg)-Total			96.8		%		80-120	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-2 LCS								
Manganese (Mn)-Total			96.5		%		80-120	04-JUL-18
Molybdenum (Mo)-Total			96.5		%		80-120	04-JUL-18
Nickel (Ni)-Total			95.0		%		80-120	04-JUL-18
Phosphorus (P)-Total			94.2		%		70-130	04-JUL-18
Potassium (K)-Total			96.1		%		80-120	04-JUL-18
Rubidium (Rb)-Total			104.5		%		80-120	04-JUL-18
Selenium (Se)-Total			98.5		%		80-120	04-JUL-18
Silicon (Si)-Total			93.3		%		60-140	04-JUL-18
Silver (Ag)-Total			99.8		%		80-120	04-JUL-18
Sodium (Na)-Total			93.9		%		80-120	04-JUL-18
Strontium (Sr)-Total			97.5		%		80-120	04-JUL-18
Sulfur (S)-Total			83.4		%		80-120	04-JUL-18
Thallium (Tl)-Total			99.9		%		80-120	04-JUL-18
Tellurium (Te)-Total			99.0		%		80-120	04-JUL-18
Thorium (Th)-Total			99.5		%		70-130	04-JUL-18
Tin (Sn)-Total			98.1		%		80-120	04-JUL-18
Titanium (Ti)-Total			94.8		%		80-120	04-JUL-18
Tungsten (W)-Total			101.5		%		80-120	04-JUL-18
Uranium (U)-Total			103.7		%		80-120	04-JUL-18
Vanadium (V)-Total			98.0		%		80-120	04-JUL-18
Zinc (Zn)-Total			93.4		%		80-120	04-JUL-18
Zirconium (Zr)-Total			95.6		%		80-120	04-JUL-18
WG2814071-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	04-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	04-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	04-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	04-JUL-18
WG2814071-5 MS		**WG2814071-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	04-JUL-18
Antimony (Sb)-Total			102.3		%		70-130	04-JUL-18
Arsenic (As)-Total			100.4		%		70-130	04-JUL-18
Barium (Ba)-Total			97.4		%		70-130	04-JUL-18
Beryllium (Be)-Total			95.7		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Bismuth (Bi)-Total			99.9		%		70-130	04-JUL-18
Boron (B)-Total			89.0		%		70-130	04-JUL-18
Cadmium (Cd)-Total			97.2		%		70-130	04-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	04-JUL-18
Chromium (Cr)-Total			97.5		%		70-130	04-JUL-18
Cesium (Cs)-Total			109.4		%		70-130	04-JUL-18
Cobalt (Co)-Total			95.5		%		70-130	04-JUL-18
Copper (Cu)-Total			96.9		%		70-130	04-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	04-JUL-18
Lead (Pb)-Total			101.6		%		70-130	04-JUL-18
Lithium (Li)-Total			102.8		%		70-130	04-JUL-18
Magnesium (Mg)-Total			89.3		%		70-130	04-JUL-18
Manganese (Mn)-Total			95.0		%		70-130	04-JUL-18
Molybdenum (Mo)-Total			104.0		%		70-130	04-JUL-18
Nickel (Ni)-Total			98.4		%		70-130	04-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	04-JUL-18
Potassium (K)-Total			99.4		%		70-130	04-JUL-18
Rubidium (Rb)-Total			106.0		%		70-130	04-JUL-18
Selenium (Se)-Total			101.2		%		70-130	04-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	04-JUL-18
Silver (Ag)-Total			104.0		%		70-130	04-JUL-18
Sodium (Na)-Total			92.0		%		70-130	04-JUL-18
Strontium (Sr)-Total			101.4		%		70-130	04-JUL-18
Sulfur (S)-Total			93.6		%		70-130	04-JUL-18
Thallium (Tl)-Total			99.1		%		70-130	04-JUL-18
Tellurium (Te)-Total			106.2		%		70-130	04-JUL-18
Thorium (Th)-Total			98.6		%		70-130	04-JUL-18
Tin (Sn)-Total			97.1		%		70-130	04-JUL-18
Titanium (Ti)-Total			96.9		%		70-130	04-JUL-18
Tungsten (W)-Total			101.0		%		70-130	04-JUL-18
Uranium (U)-Total			96.9		%		70-130	04-JUL-18
Vanadium (V)-Total			101.1		%		70-130	04-JUL-18
Zinc (Zn)-Total			93.1		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Zirconium (Zr)-Total			99.1		%		70-130	04-JUL-18
NH3-WT	**Water**							
Batch R4113387								
WG2814410-3 DUP		**L2122725-1**						
Ammonia, Total (as N)		2.90	2.92		mg/L	0.8	20	05-JUL-18
WG2814410-2 LCS								
Ammonia, Total (as N)			100.1		%		85-115	05-JUL-18
WG2814410-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	05-JUL-18
WG2814410-4 MS		**L2122725-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	05-JUL-18
NO3-IC-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Nitrate (as N)		2.90	2.90		mg/L	0.2	25	04-JUL-18
WG2813442-22 LCS								
Nitrate (as N)			101.1		%		70-130	04-JUL-18
WG2813442-21 MB								
Nitrate (as N)			<0.020		mg/L		0.02	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Nitrate (as N)			N/A	MS-B	%		-	04-JUL-18
P-T-COL-WT	**Water**							
Batch R4112888								
WG2813737-3 DUP		**L2121111-1**						
Phosphorus, Total		0.0048	0.0039	J	mg/L	0.0010	0.006	05-JUL-18
WG2813737-2 LCS								
Phosphorus, Total			89.1		%		80-120	05-JUL-18
WG2813737-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	05-JUL-18
WG2813737-4 MS		**L2121111-1**						
Phosphorus, Total			87.1		%		70-130	05-JUL-18
PH-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R4113012								
WG2814285-6 DUP		**WG2814285-5**						
pH		7.60	7.60	J	pH units	0.00	0.2	05-JUL-18
WG2814285-4 LCS								
pH			6.99		pH units		6.9-7.1	05-JUL-18
SO4-IC-N-WT	**Water**							
Batch R4113310								
WG2813442-24 DUP		**WG2813442-23**						
Sulfate (SO4)		56.1	56.4		mg/L	0.5	20	04-JUL-18
WG2813442-22 LCS								
Sulfate (SO4)			102.4		%		90-110	04-JUL-18
WG2813442-21 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	04-JUL-18
WG2813442-25 MS		**WG2813442-23**						
Sulfate (SO4)			96.5		%		75-125	04-JUL-18
SOLIDS-TSS-WT	**Water**							
Batch R4113300								
WG2814297-3 DUP		**L2123645-2**						
Total Suspended Solids		46.2	41.8		mg/L	10	20	05-JUL-18
WG2814297-2 LCS								
Total Suspended Solids			98.5		%		85-115	05-JUL-18
WG2814297-1 MB								
Total Suspended Solids			<2.0		mg/L		2	05-JUL-18
TKN-WT	**Water**							
Batch R4113724								
WG2813852-3 DUP		**L2122725-1**						
Total Kjeldahl Nitrogen		3.41	3.44		mg/L	1.1	20	05-JUL-18
WG2813852-2 LCS								
Total Kjeldahl Nitrogen			104.3		%		75-125	05-JUL-18
WG2813852-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	05-JUL-18
WG2813852-4 MS		**L2122725-1**						
Total Kjeldahl Nitrogen			103.0		%		70-130	05-JUL-18
TOC-WT	**Water**							
Batch R4112869								
WG2814190-3 DUP		**L2123447-2**						
Total Organic Carbon		1.16	1.16		mg/L	0.1	20	05-JUL-18
WG2814190-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4112869								
WG2814190-2 LCS								
Total Organic Carbon			95.7		%		80-120	05-JUL-18
WG2814190-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-JUL-18
WG2814190-4 MS		**L2123447-2**						
Total Organic Carbon			93.1		%		70-130	05-JUL-18

Quality Control Report

Workorder: L2123447 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, July 26, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807083
Project Name:
Project Number: L2123447

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/6/2018. The samples were scheduled for the following analysis:

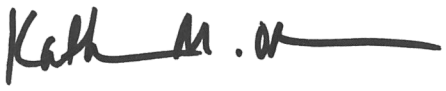
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807083

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807083
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2123447
Client PO Number: L2123447

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2123447-1	1807083-1		WATER	24-Jun-18	
L2123447-2	1807083-2		WATER	24-Jun-18	

ALS Environmental

L2123447

WATERLOO

1807083

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2123447*
ALS requires QC data to be provided with your final results.

2x 250mL

Please see enclosed 2 sample(s) in 2 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1 **L2123447-1 MS-08-US**		6/24/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/23/2018	
2 **L2123447-2 MS-08-DS**		6/24/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/23/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 7-10-18 1320

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1807083

Project Manager: KMO Initials: JE Date: 7.6.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES / NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES / NO
3.	Are custody seals on **sample** containers intact?	NONE	YES / NO
4.	Is there a COC (chain-of-custody) present?		YES / NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES / NO
6.	Are short-hold samples present?		YES / NO
7.	Are all samples within holding times for the requested analyses?		YES / NO
8.	Were all sample containers received intact? (not broken or leaking)		YES / NO
9.	Is there sufficient sample for the requested analyses?		YES / NO
10.	Are all samples in the proper containers for the requested analyses?		YES / NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES / NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES / NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES / NO
14.	Were the samples shipped on ice?		YES / NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 / #3 / #4	RAD ONLY	YES / NO

Cooler #:	1							
Temperature (°C):	~~4.0~~ 13.1							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	9							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

Additional Information: Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:

14 & 15) ice melted upon arrival

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/7/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807083

EXPRESS WORLDWIDE **WPX** DHL

2018-07-05 MYDHL+ 1.0 / *30-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : **ALS Environmental Fort Collins**
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

9-1

80524 FORT COLLINS CO
United States of America

US – DEN – DEN

C [redacted] Day Time

Ref:

Pce/Shpt Weight: **30.6 lbs** Piece: **1/1**

Contents: Water Samples

WAYBILL 13 9029 0915

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2123447	**Work Order:**	1807083
Sample ID:	L2123447-1	**Lab ID:**	1807083-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**	
Ra-226	0.0069 (+/- 0.0051)	Y1,LT	0.0065	BQ/l	NA	7/24/2018 14:05
Carr: BARIUM	*102*	Y1	*40-110*	*%REC*	DL = NA	7/24/2018 14:05

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2123447	**Work Order:**	1807083
Sample ID:	L2123447-2	**Lab ID:**	1807083-2
Legal Location:		**Matrix:**	WATER
Collection Date:	6/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**	
Ra-226	0.0031 (+/- 0.0041)	U	0.0066	BQ/l	NA	7/24/2018 14:05
Carr: BARIUM	*87.6*		*40-110*	*%REC*	DL = NA	7/24/2018 14:05

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2123447	**Work Order:**	1807083
Sample ID:	L2123447-2	**Lab ID:**	1807083-2
Legal Location:		**Matrix:**	WATER
Collection Date:	6/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180710-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.69 (+/- 0.420)	0.00695	1.772		95.6	67-120					P
Carr: BARIUM	16300		16620		98.2	40-110					

LCSD Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.80 (+/- 0.447)	0.00677	1.772		102	67-120		1.69	0.2	2.1	P
Carr: BARIUM	16500		16610		99.4	40-110		16300			

MB Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0033)	0.0065									Y1,U
Carr: BARIUM	17700		16620		107	40-110					Y1

The following samples were analyzed in this batch: 1807083-1 1807083-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2 commercial@baffinland.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☑

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08 Effluent Characterization
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: **Sampler:** BW/DS/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-MMER-EFF	Number of Containers
	MS-08-US	3-Jul-18	16:40	Water	E0	7
	MS-08-DS	3-Jul-18	16:20	Water	E0	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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 03-Jul-18	Time: 17:50	Received by:	Date:	Time:	Received by:	Date:	Time:

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 13-JUL-18
Report Date: 14-AUG-18 16:40 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2127393

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2127393-1 MS-08 Sampled By: KB/JH on 11-JUL-18 @ 10:50 Matrix: WATER							
Physical Tests							
Conductivity	3160		3.0	umhos/cm		13-JUL-18	R4124229
pH	9.16		0.10	pH units		11-JUL-18	R4122758
Total Suspended Solids	3.6		2.0	mg/L		12-JUL-18	R4123583
Total Dissolved Solids	3220		20	mg/L		13-JUL-18	R4124563
Turbidity	6.78		0.10	NTU		12-JUL-18	R4123497
Cyanides							
Cyanide, Total	0.0081		0.0020	mg/L		13-JUL-18	R4127453
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	13-JUL-18	13-JUL-18	R4124974
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Barium (Ba)-Total	0.0141	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	13-JUL-18	13-JUL-18	R4124974
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	13-JUL-18	13-JUL-18	R4124974
Calcium (Ca)-Total	196	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Cobalt (Co)-Total	0.0083	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Iron (Fe)-Total	0.73	DLHC	0.10	mg/L	13-JUL-18	13-JUL-18	R4124974
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Lithium (Li)-Total	0.054	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Magnesium (Mg)-Total	451	DLHC	0.050	mg/L	13-JUL-18	13-JUL-18	R4124974
Manganese (Mn)-Total	3.70	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Nickel (Ni)-Total	0.0114	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Potassium (K)-Total	3.57	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Rubidium (Rb)-Total	0.0075	DLHC	0.0020	mg/L	13-JUL-18	13-JUL-18	R4124974
Selenium (Se)-Total	0.00403	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	13-JUL-18	13-JUL-18	R4124974
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Sodium (Na)-Total	51.5	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Strontium (Sr)-Total	0.305	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Sulfur (S)-Total	800	DLHC	5.0	mg/L	13-JUL-18	13-JUL-18	R4124974
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	13-JUL-18	13-JUL-18	R4124974
Thallium (Tl)-Total	0.00011	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974

* 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
L2127393-1 MS-08 Sampled By: KB/JH on 11-JUL-18 @ 10:50 Matrix: WATER							
Total Metals							
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	13-JUL-18	13-JUL-18	R4124974
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Uranium (U)-Total	0.00056	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	13-JUL-18	13-JUL-18	R4124974
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	13-JUL-18	13-JUL-18	R4124974
Radiological Parameters							
Ra-226	0.021	DLRC	0.011	Bq/L	27-JUL-18	08-AUG-18	R4160854
L2127393-2 MS-0801 Sampled By: KB/JH on 11-JUL-18 @ 10:50 Matrix: WATER							
Physical Tests							
Conductivity	3210		3.0	umhos/cm		13-JUL-18	R4124229
pH	9.16		0.10	pH units		11-JUL-18	R4122758
Total Suspended Solids	2.4		2.0	mg/L		12-JUL-18	R4123583
Total Dissolved Solids	3260		20	mg/L		13-JUL-18	R4124563
Turbidity	5.90		0.10	NTU		12-JUL-18	R4123497
Cyanides							
Cyanide, Total	0.0085		0.0020	mg/L		13-JUL-18	R4127453
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	13-JUL-18	13-JUL-18	R4124974
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Barium (Ba)-Total	0.0140	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	13-JUL-18	13-JUL-18	R4124974
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	13-JUL-18	13-JUL-18	R4124974
Calcium (Ca)-Total	195	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Cobalt (Co)-Total	0.0080	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Iron (Fe)-Total	0.73	DLHC	0.10	mg/L	13-JUL-18	13-JUL-18	R4124974
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Lithium (Li)-Total	0.053	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Magnesium (Mg)-Total	448	DLHC	0.050	mg/L	13-JUL-18	13-JUL-18	R4124974
Manganese (Mn)-Total	3.59	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Nickel (Ni)-Total	0.0112	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Potassium (K)-Total	3.57	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974

* 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
L2127393-2 MS-0801 Sampled By: KB/JH on 11-JUL-18 @ 10:50 Matrix: WATER							
Total Metals							
Rubidium (Rb)-Total	0.0078	DLHC	0.0020	mg/L	13-JUL-18	13-JUL-18	R4124974
Selenium (Se)-Total	0.00381	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	13-JUL-18	13-JUL-18	R4124974
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	13-JUL-18	13-JUL-18	R4124974
Sodium (Na)-Total	52.5	DLHC	0.50	mg/L	13-JUL-18	13-JUL-18	R4124974
Strontium (Sr)-Total	0.309	DLHC	0.010	mg/L	13-JUL-18	13-JUL-18	R4124974
Sulfur (S)-Total	804	DLHC	5.0	mg/L	13-JUL-18	13-JUL-18	R4124974
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	13-JUL-18	13-JUL-18	R4124974
Thallium (Tl)-Total	0.00011	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	13-JUL-18	13-JUL-18	R4124974
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	13-JUL-18	13-JUL-18	R4124974
Uranium (U)-Total	0.00053	DLHC	0.00010	mg/L	13-JUL-18	13-JUL-18	R4124974
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	13-JUL-18	13-JUL-18	R4124974
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	13-JUL-18	13-JUL-18	R4124974
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	13-JUL-18	13-JUL-18	R4124974
Radiological Parameters							
Ra-226	0.015		0.0060	Bq/L	27-JUL-18	08-AUG-18	R4160854

* 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	Aluminum (Al)-Total	MS-B	L2127393-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2127393-1, -2
Matrix Spike	Boron (B)-Total	MS-B	L2127393-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2127393-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2127393-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2127393-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2127393-1, -2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2127393-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2127393-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2127393-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2127393-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLRC	Detection Limit Raised for RadioChemistry test due to sample matrix (e.g. high TDS) or instrument detector conditions.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Reference Information

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: L2127393 Report Date: 14-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4127453								
WG2823701-3 DUP		**WG2823701-5**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	13-JUL-18
WG2823701-2 LCS								
Cyanide, Total			88.8		%		80-120	13-JUL-18
WG2823701-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	13-JUL-18
WG2823701-4 MS		**WG2823701-5**						
Cyanide, Total			87.9		%		70-130	13-JUL-18
EC-WT	**Water**							
Batch R4124229								
WG2821653-4 DUP		**WG2821653-3**						
Conductivity		3210	3240		umhos/cm	0.9	10	13-JUL-18
WG2821653-2 LCS								
Conductivity			97.9		%		90-110	13-JUL-18
WG2821653-1 MB								
Conductivity			<3.0		umhos/cm		3	13-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-4 DUP		**WG2822252-3**						
Aluminum (Al)-Total		0.118	0.110		mg/L	7.0	20	13-JUL-18
Antimony (Sb)-Total		0.00051	0.00050		mg/L	1.5	20	13-JUL-18
Arsenic (As)-Total		0.00095	0.00091		mg/L	4.5	20	13-JUL-18
Barium (Ba)-Total		0.0618	0.0628		mg/L	1.6	20	13-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-JUL-18
Boron (B)-Total		0.080	0.082		mg/L	1.6	20	13-JUL-18
Cadmium (Cd)-Total		0.0000335	0.0000274	J	mg/L	0.0000061	0.00001	13-JUL-18
Calcium (Ca)-Total		46.9	47.5		mg/L	1.3	20	13-JUL-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-JUL-18
Cesium (Cs)-Total		0.000109	0.000108		mg/L	1.0	20	13-JUL-18
Cobalt (Co)-Total		0.00012	0.00012		mg/L	0.3	20	13-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	13-JUL-18
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-JUL-18
Lead (Pb)-Total		0.000073	0.000068		mg/L	8.1	20	13-JUL-18
Lithium (Li)-Total		0.0074	0.0074		mg/L	0.3	20	13-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-4 DUP		**WG2822252-3**						
Magnesium (Mg)-Total		16.3	16.1		mg/L	1.0	20	13-JUL-18
Manganese (Mn)-Total		0.0229	0.0227		mg/L	0.9	20	13-JUL-18
Molybdenum (Mo)-Total		0.00684	0.00695		mg/L	1.7	20	13-JUL-18
Nickel (Ni)-Total		0.00507	0.00505		mg/L	0.3	20	13-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	13-JUL-18
Potassium (K)-Total		5.12	5.00		mg/L	2.3	20	13-JUL-18
Rubidium (Rb)-Total		0.00980	0.00965		mg/L	1.6	20	13-JUL-18
Selenium (Se)-Total		0.000221	0.000228		mg/L	2.8	20	13-JUL-18
Silicon (Si)-Total		0.42	0.43		mg/L	1.0	20	13-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-JUL-18
Sodium (Na)-Total		55.7	54.8		mg/L	1.5	20	13-JUL-18
Strontium (Sr)-Total		0.437	0.431		mg/L	1.5	20	13-JUL-18
Sulfur (S)-Total		24.2	24.5		mg/L	1.2	25	13-JUL-18
Thallium (Tl)-Total		0.000011	0.000010		mg/L	2.8	20	13-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	13-JUL-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	13-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-JUL-18
Titanium (Ti)-Total		0.00033	0.00032		mg/L	3.1	20	13-JUL-18
Tungsten (W)-Total		0.00022	0.00022		mg/L	2.3	20	13-JUL-18
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-JUL-18
Vanadium (V)-Total		0.00071	0.00065		mg/L	8.9	20	13-JUL-18
Zinc (Zn)-Total		0.0032	<0.0030	RPD-NA	mg/L	N/A	20	13-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	13-JUL-18
WG2822252-2 LCS								
Aluminum (Al)-Total			99.0		%		80-120	13-JUL-18
Antimony (Sb)-Total			103.2		%		80-120	13-JUL-18
Arsenic (As)-Total			99.1		%		80-120	13-JUL-18
Barium (Ba)-Total			97.3		%		80-120	13-JUL-18
Beryllium (Be)-Total			99.0		%		80-120	13-JUL-18
Bismuth (Bi)-Total			99.4		%		80-120	13-JUL-18
Boron (B)-Total			95.2		%		80-120	13-JUL-18
Cadmium (Cd)-Total			98.3		%		80-120	13-JUL-18
Calcium (Ca)-Total			97.7		%		80-120	13-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-2 LCS								
Chromium (Cr)-Total			97.3		%		80-120	13-JUL-18
Cesium (Cs)-Total			95.1		%		80-120	13-JUL-18
Cobalt (Co)-Total			96.6		%		80-120	13-JUL-18
Copper (Cu)-Total			97.3		%		80-120	13-JUL-18
Iron (Fe)-Total			92.0		%		80-120	13-JUL-18
Lead (Pb)-Total			99.6		%		80-120	13-JUL-18
Lithium (Li)-Total			92.9		%		80-120	13-JUL-18
Magnesium (Mg)-Total			103.3		%		80-120	13-JUL-18
Manganese (Mn)-Total			99.1		%		80-120	13-JUL-18
Molybdenum (Mo)-Total			98.3		%		80-120	13-JUL-18
Nickel (Ni)-Total			98.3		%		80-120	13-JUL-18
Phosphorus (P)-Total			100.5		%		70-130	13-JUL-18
Potassium (K)-Total			93.3		%		80-120	13-JUL-18
Rubidium (Rb)-Total			100.8		%		80-120	13-JUL-18
Selenium (Se)-Total			101.9		%		80-120	13-JUL-18
Silicon (Si)-Total			100.6		%		60-140	13-JUL-18
Silver (Ag)-Total			100.1		%		80-120	13-JUL-18
Sodium (Na)-Total			99.6		%		80-120	13-JUL-18
Strontium (Sr)-Total			92.5		%		80-120	13-JUL-18
Sulfur (S)-Total			96.6		%		80-120	13-JUL-18
Thallium (Tl)-Total			99.2		%		80-120	13-JUL-18
Tellurium (Te)-Total			102.8		%		80-120	13-JUL-18
Thorium (Th)-Total			94.2		%		70-130	13-JUL-18
Tin (Sn)-Total			97.2		%		80-120	13-JUL-18
Titanium (Ti)-Total			95.6		%		80-120	13-JUL-18
Tungsten (W)-Total			98.0		%		80-120	13-JUL-18
Uranium (U)-Total			95.5		%		80-120	13-JUL-18
Vanadium (V)-Total			99.99		%		80-120	13-JUL-18
Zinc (Zn)-Total			95.1		%		80-120	13-JUL-18
Zirconium (Zr)-Total			92.2		%		80-120	13-JUL-18
WG2822252-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	13-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	13-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	13-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	13-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	13-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	13-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	13-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	13-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	13-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	13-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	13-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	13-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	13-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	13-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	13-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	13-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	13-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	13-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	13-JUL-18
WG2822252-5 MS		**WG2822252-6**						
Aluminum (Al)-Total			N/A	MS-B	%		-	13-JUL-18
Antimony (Sb)-Total			99.2		%		70-130	13-JUL-18
Arsenic (As)-Total			98.6		%		70-130	13-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	13-JUL-18
Beryllium (Be)-Total			97.9		%		70-130	13-JUL-18
Bismuth (Bi)-Total			92.1		%		70-130	13-JUL-18
Boron (B)-Total			N/A	MS-B	%		-	13-JUL-18
Cadmium (Cd)-Total			96.2		%		70-130	13-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	13-JUL-18
Chromium (Cr)-Total			100.2		%		70-130	13-JUL-18
Cesium (Cs)-Total			91.0		%		70-130	13-JUL-18
Cobalt (Co)-Total			97.2		%		70-130	13-JUL-18
Copper (Cu)-Total			95.0		%		70-130	13-JUL-18
Iron (Fe)-Total			89.8		%		70-130	13-JUL-18
Lead (Pb)-Total			90.7		%		70-130	13-JUL-18
Lithium (Li)-Total			91.6		%		70-130	13-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	13-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	13-JUL-18
Molybdenum (Mo)-Total			96.0		%		70-130	13-JUL-18
Nickel (Ni)-Total			95.2		%		70-130	13-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	13-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	13-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	13-JUL-18
Selenium (Se)-Total			98.0		%		70-130	13-JUL-18
Silicon (Si)-Total			98.0		%		70-130	13-JUL-18
Silver (Ag)-Total			92.3		%		70-130	13-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	13-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	13-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	13-JUL-18
Thallium (Tl)-Total			88.5		%		70-130	13-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4124974								
WG2822252-5 MS		**WG2822252-6**						
Tellurium (Te)-Total			91.6		%		70-130	13-JUL-18
Thorium (Th)-Total			92.1		%		70-130	13-JUL-18
Tin (Sn)-Total			97.9		%		70-130	13-JUL-18
Titanium (Ti)-Total			98.4		%		70-130	13-JUL-18
Tungsten (W)-Total			95.5		%		70-130	13-JUL-18
Uranium (U)-Total			91.9		%		70-130	13-JUL-18
Vanadium (V)-Total			103.1		%		70-130	13-JUL-18
Zinc (Zn)-Total			93.2		%		70-130	13-JUL-18
Zirconium (Zr)-Total			92.6		%		70-130	13-JUL-18
PH-BF	**Water**							
Batch R4122758								
WG2819764-2 DUP		**L2127561-2**						
pH		7.77	7.79	J	pH units	0.02	0.2	11-JUL-18
WG2819764-1 LCS								
pH			6.98		pH units		6.9-7.1	11-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4124563								
WG2819902-3 DUP		**L2127998-1**						
Total Dissolved Solids		3370	3310		mg/L	1.8	20	13-JUL-18
WG2819902-2 LCS								
Total Dissolved Solids			99.7		%		85-115	13-JUL-18
WG2819902-1 MB								
Total Dissolved Solids			<20		mg/L		20	13-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4123583								
WG2820846-3 DUP		**L2127393-2**						
Total Suspended Solids		2.4	2.0		mg/L	18	25	12-JUL-18
WG2820846-2 LCS								
Total Suspended Solids			99.4		%		85-115	12-JUL-18
WG2820846-1 MB								
Total Suspended Solids			<2.0		mg/L		2	12-JUL-18
TURBIDITY-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-BF	**Water**							
Batch R4123497								
WG2820485-3 DUP		**L2127998-1**						
Turbidity		5.76	5.83		NTU	1.2	15	12-JUL-18
WG2820485-2 LCS								
Turbidity			114.0		%		85-115	12-JUL-18
WG2820485-1 MB								
Turbidity			<0.10		NTU		0.1	12-JUL-18

Quality Control Report

Workorder: L2127393 Report Date: 14-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Monday, August 13, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807307
Project Name:
Project Number: L2127393

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/17/2018. The samples were scheduled for the following analysis:

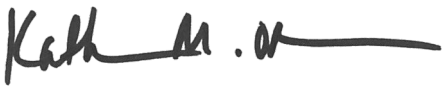
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807307

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807307
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2127393
Client PO Number: L2127393

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2127393-1	1807307-1		WATER	11-Jul-18	
L2127393-2	1807307-2		WATER	11-Jul-18	

ALS Environmental

L2127393

WATERLOO

Subcontract Request Form

1807357

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2127393*
ALS requires QC data to be provided with your final results.

Please see enclosed 2 sample(s) in 2 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L2127393-1 MS-08**		7/ 11/ 2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/30/2018	
(2) **L2127393-2 MS-0801**		7/ 11/ 2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/30/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: [signature] Date Received: 7/17/18 920

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807307

Project Manager: KO Initials: AJ Date: 7/17/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
2.	Are custody seals on **shipping** containers intact?	NONE	(YES)	NO
3.	Are custody seals on **sample** containers intact?	NONE	(YES)	NO
4.	Is there a COC (chain-of-custody) present?		(YES)	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		(YES)	NO
6.	Are short-hold samples present?		YES	(NO)
7.	Are all samples within holding times for the requested analyses?		(YES)	NO
8.	Were all sample containers received intact? (not broken or leaking)		(YES)	NO
9.	Is there sufficient sample for the requested analyses?		(YES)	NO
10.	Are all samples in the proper containers for the requested analyses?		(YES)	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	(YES)	NO
12.	Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	(N/A)	YES	NO
14.	Were the samples shipped on ice?		YES	(NO)
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	(RAD ONLY)	YES	NO

Cooler #:	1
Temperature (°C):	Ambient
No. of custody seals on cooler:	1
DOT Survey/Acceptance Information — External µR/hr reading:	6
Background µR/hr reading:	12

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/18/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807307

Sender

ALS Environmental
Ed Hill
60 Northland Rd
Unit 1
WATERLOO, N2V 2B8
ON
Canada
Phone Nr.: +15198866910 Fax: +15196669047
Tax ID/VAT No.:
EORI:

Commercial Invoice

Date: 2018-07-16 Waybill Number: 8466471314
Invoice Number:

Exporter ID:
Exporter Code:

Receiver

ALS Environmental Fort Collins
Sample Login
225 Commerce Drive
FORT COLLINS, 80524
CO
United States of America
Phone Nr.: +18004431511 Fax:
Tax ID/VAT No.: Email:

Bank Details

INN: OGRN:
KPP: OKPO:
Settlement account (USD/EUR):
Settlement account (RUR):
Bank Name:

Billed to

Phone Nr.: Fax:
Tax ID/VAT no:

Shipment Reference:
Receiver Reference:

Other Remarks:

Full Description of Goods	Commodity Code	Qty	Unit Value	Sub-total Value	Net Weight	Gross Weight	Country of Origin
Water Sample		1.00 PCS	1.00 CAD	1.00 CAD	20.4 lb	0.0 lb	CANADA

Total Goods Value:	1.00	Total Net Weight:	20.4 lb
Total line items:	1	Total Gross Weight:	0.0 lb
Number of pallets:	0	Currency code:	CAD
Total units:	1.0	Terms of Payment:	
Reason for Export:	Sample	Payer of GST/VAT:	
Type of Export:	Permanent	Duty/taxes acct:	Receiver Will Pay
Terms of Trade:	Delivered at Place	Requiere Pedimento:	No
Other charges:	0.00	Duty/tax billing service:	
Freight cost (if paid by sender):	0.00	Carrier:	DHL
Insurance cost (if paid by sender):	0.00	Ultimate Consignee:	
		Exemption Citation:	

I/We hereby certify that the information contained in the invoice is true and correct and that the contents of this shipment are as stated above.

Name: William McMurchy **Signature:** **Company Stamp:**
Position:
Date of signature:

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127393	**Work Order:**	1807307
Sample ID:	L2127393-1	**Lab ID:**	1807307-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **7/27/2018**	PrepBy: **CXW**
Ra-226	**0.021 (+/- 0.011)**	M3	**0.011**	**BQ/l**	NA	8/8/2018 13:11
Carr: BARIUM	*61.1*		*40-110*	*%REC*	DL = NA	8/8/2018 13:11

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127393	**Work Order:**	1807307
Sample ID:	L2127393-2	**Lab ID:**	1807307-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **7/27/2018**	PrepBy: **CXW**
Ra-226	**0.015 (+/- 0.0070)**		**0.006**	**BQ/l**	NA	8/8/2018 13:51
Carr: BARIUM	*98.2*		*40-110*	*%REC*	DL = NA	8/8/2018 13:51

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127393	**Work Order:**	1807307
Sample ID:	L2127393-2	**Lab ID:**	1807307-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180727-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/8/2018 13:51**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.91 (+/- 0.472)	0.00637	1.771		108	67-120					P
Carr: BARIUM	16000		16860		95.1	40-110					

LCSD Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/13/2018 12:30**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.85 (+/- 0.468)	0.0182	1.771		104	67-120		1.91	0.1	2.1	P,M3
Carr: BARIUM	11400		16860		67.5	40-110		16000			

MB Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/8/2018 13:51**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00040 (+/- 0.0021)	0.0044									Y1,U
Carr: BARIUM	17000		16860		101	40-110					Y1

The following samples were analyzed in this batch: 1807307-1 1807307-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2127393-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution		Turnaround Time (TAT) Requested
Company:	Baffinland Iron Mines Corp.	Select Report Format:	PDF ☑ EXCEL ☑ EDD (DIGITAL) ☑	Please confirm all E&P TATs with your AM - surcharges will apply
Contact:	William Bowden and Connor Devereaux	Quality Control (QC) Report with Report	YES ☑ NO ☐	Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply
Phone:	647-253-0596 EXT 6016	☐ Compare Results to Criteria on Report - provide details below if box checked		PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☑
	Company address below will appear on the final report	Select Distribution:	EMAIL ☑ MAIL ☐ FAX ☐	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	2275 Upper Middle Rd. E., Suite #300	Email 1 or Fax	bimcore@alsglobal.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Oakville, ON	Email 2	bimww@alsglobal.com	
Postal Code:	L6H 0C3	Email 3		
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution		
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	EMAIL ☑ MAIL ☐ FAX ☐	
Company:		Email 1 or Fax	ap@baffinland.com	
Contact:		Email 2	commercial@baffinland.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	23642 /Q42455	AFE/Cost Center:	PO#
Job #:	MS-08	Major/Minor Code:	Routing Code:
PO / AFE:	4500040417	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L2127393	ALS Contact:	Sampler: KB/JH

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-MMER-DEL	Number of Containers
	MS-08	11-Jul-18	10:50	Water	E0	5
	MS-0801	11-Jul-18	10:50	Water	E0	5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			16.7	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 11-Jul-18	Time: 12:15	Received by:	Date:	Time:	Received by: AP	Date: 13-7-18	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 24-JUL-18
Report Date: 17-AUG-18 12:49 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2130194

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2130194-1 MS-08 Sampled By: KB/JH on 16-JUL-18 @ 14:30 Matrix: WATER							
Physical Tests							
Conductivity	3410		3.0	umhos/cm		24-JUL-18	R4139140
pH	8.33		0.10	pH units		16-JUL-18	R4129428
Total Suspended Solids	<2.0		2.0	mg/L		17-JUL-18	R4131578
Total Dissolved Solids	3740		20	mg/L		17-JUL-18	R4130396
Turbidity	14.3		0.10	NTU		17-JUL-18	R4130310
Cyanides							
Cyanide, Total	<0.20	DLM	0.20	mg/L		24-JUL-18	R4139362
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Barium (Ba)-Total	0.0177	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	24-JUL-18	24-JUL-18	R4139112
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Calcium (Ca)-Total	197	DLHC	0.50	mg/L	24-JUL-18	24-JUL-18	R4139112
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Chromium (Cr)-Total	0.0069	DLHC	0.0050	mg/L	24-JUL-18	24-JUL-18	R4139112
Cobalt (Co)-Total	0.0345	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Copper (Cu)-Total	0.011	DLHC	0.010	mg/L	24-JUL-18	24-JUL-18	R4139112
Iron (Fe)-Total	3.31	DLHC	0.10	mg/L	24-JUL-18	24-JUL-18	R4139112
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Lithium (Li)-Total	0.057	DLHC	0.010	mg/L	24-JUL-18	24-JUL-18	R4139112
Magnesium (Mg)-Total	524	DLHC	0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Manganese (Mn)-Total	7.94	DLHC	0.0050	mg/L	24-JUL-18	24-JUL-18	R4139112
Molybdenum (Mo)-Total	0.00285	DLHC	0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Nickel (Ni)-Total	0.0442	DLHC	0.0050	mg/L	24-JUL-18	24-JUL-18	R4139112
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	24-JUL-18	24-JUL-18	R4139112
Potassium (K)-Total	4.02	DLHC	0.50	mg/L	24-JUL-18	24-JUL-18	R4139112
Rubidium (Rb)-Total	0.0084	DLHC	0.0020	mg/L	24-JUL-18	24-JUL-18	R4139112
Selenium (Se)-Total	0.00380	DLHC	0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	24-JUL-18	24-JUL-18	R4139112
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Sodium (Na)-Total	16.8	DLHC	0.50	mg/L	24-JUL-18	24-JUL-18	R4139112
Strontium (Sr)-Total	0.369	DLHC	0.010	mg/L	24-JUL-18	24-JUL-18	R4139112
Sulfur (S)-Total	872	DLHC	5.0	mg/L	24-JUL-18	24-JUL-18	R4139112
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	24-JUL-18	24-JUL-18	R4139112
Thallium (Tl)-Total	0.00013	DLHC	0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112

* 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
L2130194-1 MS-08 Sampled By: KB/JH on 16-JUL-18 @ 14:30 Matrix: WATER							
Total Metals							
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	24-JUL-18	24-JUL-18	R4139112
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Uranium (U)-Total	0.00045	DLHC	0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	24-JUL-18	24-JUL-18	R4139112
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	24-JUL-18	24-JUL-18	R4139112
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	24-JUL-18	24-JUL-18	R4139112
Radiological Parameters							
Ra-226	0.036		0.0043	Bq/L	07-AUG-18	14-AUG-18	R4160854

* 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	Barium (Ba)-Total	MS-B	L2130194-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2130194-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2130194-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2130194-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2130194-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2130194-1
Matrix Spike	Potassium (K)-Total	MS-B	L2130194-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2130194-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2130194-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2130194-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2130194-1
Matrix Spike	Uranium (U)-Total	MS-B	L2130194-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Reference Information

BF

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: L2130194 Report Date: 17-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4139362								
WG2830989-3 DUP		**L2130194-1**						
Cyanide, Total		<0.20	<0.0020	RPD-NA	mg/L	N/A	20	24-JUL-18
WG2830989-2 LCS								
Cyanide, Total			85.0		%		80-120	24-JUL-18
WG2830989-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	24-JUL-18
WG2830989-4 MS		**L2130194-1**						
Cyanide, Total			82.4		%		70-130	24-JUL-18
EC-WT	**Water**							
Batch R4139140								
WG2830506-8 DUP		**WG2830506-7**						
Conductivity		1760	1780		umhos/cm	1.0	10	24-JUL-18
WG2830506-6 LCS								
Conductivity			99.2		%		90-110	24-JUL-18
WG2830506-5 MB								
Conductivity			<3.0		umhos/cm		3	24-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-4 DUP		**WG2831295-3**						
Aluminum (Al)-Total		0.0200	0.0226		mg/L	13	20	24-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Arsenic (As)-Total		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	24-JUL-18
Barium (Ba)-Total		0.0149	0.0147		mg/L	1.7	20	24-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-JUL-18
Boron (B)-Total		0.034	0.033		mg/L	2.0	20	24-JUL-18
Cadmium (Cd)-Total		0.0000456	0.0000448		mg/L	1.8	20	24-JUL-18
Calcium (Ca)-Total		57.8	59.2		mg/L	2.4	20	24-JUL-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUL-18
Cesium (Cs)-Total		0.000012	0.000012		mg/L	0.8	20	24-JUL-18
Cobalt (Co)-Total		0.00556	0.00559		mg/L	0.7	20	24-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	24-JUL-18
Iron (Fe)-Total		0.072	0.082		mg/L	13	20	24-JUL-18
Lead (Pb)-Total		0.000059	0.000064		mg/L	7.1	20	24-JUL-18
Lithium (Li)-Total		0.0214	0.0201		mg/L	5.9	20	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-4 DUP		**WG2831295-3**						
Magnesium (Mg)-Total		113	113		mg/L	0.6	20	24-JUL-18
Manganese (Mn)-Total		1.95	1.94		mg/L	0.3	20	24-JUL-18
Molybdenum (Mo)-Total		0.000967	0.000958		mg/L	0.9	20	24-JUL-18
Nickel (Ni)-Total		0.00879	0.00882		mg/L	0.3	20	24-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-JUL-18
Potassium (K)-Total		11.0	11.0		mg/L	0.1	20	24-JUL-18
Rubidium (Rb)-Total		0.00888	0.00896		mg/L	0.9	20	24-JUL-18
Selenium (Se)-Total		0.00142	0.00129		mg/L	9.2	20	24-JUL-18
Silicon (Si)-Total		0.29	0.29		mg/L	1.4	20	24-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-JUL-18
Sodium (Na)-Total		7.16	7.19		mg/L	0.3	20	24-JUL-18
Strontium (Sr)-Total		0.0869	0.0871		mg/L	0.3	20	24-JUL-18
Sulfur (S)-Total		192	187		mg/L	2.6	25	24-JUL-18
Thallium (Tl)-Total		0.000034	0.000033		mg/L	4.5	20	24-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	24-JUL-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	24-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Titanium (Ti)-Total		0.00035	0.00060	J	mg/L	0.00025	0.0006	24-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Uranium (U)-Total		0.00157	0.00155		mg/L	1.0	20	24-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUL-18
Zinc (Zn)-Total		0.0084	0.0087		mg/L	2.9	20	24-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	24-JUL-18
WG2831295-2 LCS								
Aluminum (Al)-Total			100.6		%		80-120	24-JUL-18
Antimony (Sb)-Total			102.7		%		80-120	24-JUL-18
Arsenic (As)-Total			101.0		%		80-120	24-JUL-18
Barium (Ba)-Total			102.4		%		80-120	24-JUL-18
Beryllium (Be)-Total			102.8		%		80-120	24-JUL-18
Bismuth (Bi)-Total			106.0		%		80-120	24-JUL-18
Boron (B)-Total			96.7		%		80-120	24-JUL-18
Cadmium (Cd)-Total			105.3		%		80-120	24-JUL-18
Calcium (Ca)-Total			101.6		%		80-120	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-2 LCS								
Chromium (Cr)-Total			101.6		%		80-120	24-JUL-18
Cesium (Cs)-Total			100.4		%		80-120	24-JUL-18
Cobalt (Co)-Total			99.4		%		80-120	24-JUL-18
Copper (Cu)-Total			100.4		%		80-120	24-JUL-18
Iron (Fe)-Total			99.0		%		80-120	24-JUL-18
Lead (Pb)-Total			102.9		%		80-120	24-JUL-18
Lithium (Li)-Total			104.4		%		80-120	24-JUL-18
Magnesium (Mg)-Total			100.0		%		80-120	24-JUL-18
Manganese (Mn)-Total			101.9		%		80-120	24-JUL-18
Molybdenum (Mo)-Total			105.0		%		80-120	24-JUL-18
Nickel (Ni)-Total			100.3		%		80-120	24-JUL-18
Phosphorus (P)-Total			101.3		%		70-130	24-JUL-18
Potassium (K)-Total			99.3		%		80-120	24-JUL-18
Rubidium (Rb)-Total			103.4		%		80-120	24-JUL-18
Selenium (Se)-Total			100.6		%		80-120	24-JUL-18
Silicon (Si)-Total			105.8		%		60-140	24-JUL-18
Silver (Ag)-Total			98.2		%		80-120	24-JUL-18
Sodium (Na)-Total			103.3		%		80-120	24-JUL-18
Strontium (Sr)-Total			103.9		%		80-120	24-JUL-18
Sulfur (S)-Total			99.6		%		80-120	24-JUL-18
Thallium (Tl)-Total			98.8		%		80-120	24-JUL-18
Tellurium (Te)-Total			96.9		%		80-120	24-JUL-18
Thorium (Th)-Total			102.1		%		70-130	24-JUL-18
Tin (Sn)-Total			98.1		%		80-120	24-JUL-18
Titanium (Ti)-Total			93.9		%		80-120	24-JUL-18
Tungsten (W)-Total			95.9		%		80-120	24-JUL-18
Uranium (U)-Total			102.5		%		80-120	24-JUL-18
Vanadium (V)-Total			103.6		%		80-120	24-JUL-18
Zinc (Zn)-Total			93.6		%		80-120	24-JUL-18
Zirconium (Zr)-Total			100.9		%		80-120	24-JUL-18
WG2831295-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	24-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	24-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	24-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	24-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	24-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	24-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	24-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	24-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	24-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	24-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	24-JUL-18
WG2831295-5 MS		**WG2831295-3**						
Aluminum (Al)-Total			94.4		%		70-130	24-JUL-18
Antimony (Sb)-Total			101.7		%		70-130	24-JUL-18
Arsenic (As)-Total			98.3		%		70-130	24-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	24-JUL-18
Beryllium (Be)-Total			94.3		%		70-130	24-JUL-18
Bismuth (Bi)-Total			96.2		%		70-130	24-JUL-18
Boron (B)-Total			81.2		%		70-130	24-JUL-18
Cadmium (Cd)-Total			100.8		%		70-130	24-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	24-JUL-18
Chromium (Cr)-Total			98.9		%		70-130	24-JUL-18
Cesium (Cs)-Total			100.1		%		70-130	24-JUL-18
Cobalt (Co)-Total			92.9		%		70-130	24-JUL-18
Copper (Cu)-Total			95.0		%		70-130	24-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	24-JUL-18
Lead (Pb)-Total			93.9		%		70-130	24-JUL-18
Lithium (Li)-Total			N/A	MS-B	%		-	24-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	24-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	24-JUL-18
Molybdenum (Mo)-Total			102.2		%		70-130	24-JUL-18
Nickel (Ni)-Total			92.8		%		70-130	24-JUL-18
Phosphorus (P)-Total			93.0		%		70-130	24-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	24-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	24-JUL-18
Selenium (Se)-Total			102.8		%		70-130	24-JUL-18
Silicon (Si)-Total			98.0		%		70-130	24-JUL-18
Silver (Ag)-Total			92.3		%		70-130	24-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	24-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	24-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	24-JUL-18
Thallium (Tl)-Total			92.9		%		70-130	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-5 MS		**WG2831295-3**						
Tellurium (Te)-Total			89.5		%		70-130	24-JUL-18
Thorium (Th)-Total			97.4		%		70-130	24-JUL-18
Tin (Sn)-Total			97.8		%		70-130	24-JUL-18
Titanium (Ti)-Total			96.7		%		70-130	24-JUL-18
Tungsten (W)-Total			96.2		%		70-130	24-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	24-JUL-18
Vanadium (V)-Total			102.7		%		70-130	24-JUL-18
Zinc (Zn)-Total			83.6		%		70-130	24-JUL-18
Zirconium (Zr)-Total			98.9		%		70-130	24-JUL-18
PH-BF	**Water**							
Batch R4129428								
WG2824318-2 DUP		**L2129928-1**						
pH		7.77	7.72	J	pH units	0.05	0.2	16-JUL-18
WG2824318-1 LCS								
pH			6.98		pH units		6.9-7.1	16-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4130396								
WG2824309-3 DUP		**L2130194-1**						
Total Dissolved Solids		3740	3650		mg/L	2.6	20	17-JUL-18
WG2824309-2 LCS								
Total Dissolved Solids			101.8		%		85-115	17-JUL-18
WG2824309-1 MB								
Total Dissolved Solids			<20		mg/L		20	17-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4131578								
WG2825402-3 DUP		**L2130765-2**						
Total Suspended Solids		<2.0	2.0	RPD-NA	mg/L	N/A	25	17-JUL-18
WG2825402-2 LCS								
Total Suspended Solids			102.0		%		85-115	17-JUL-18
WG2825402-1 MB								
Total Suspended Solids			<2.0		mg/L		2	17-JUL-18
TURBIDITY-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-BF	**Water**							
Batch R4130310								
WG2824312-3 DUP		**L2129602-1**						
Turbidity		10.3	10.3		NTU	0.0	15	17-JUL-18
WG2824312-2 LCS								
Turbidity			99.7		%		85-115	17-JUL-18
WG2824312-1 MB								
Turbidity			<0.10		NTU		0.1	17-JUL-18

Quality Control Report

Workorder: L2130194 Report Date: 17-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 15, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807499
Project Name:
Project Number: L2130194

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 7/25/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807499

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807499
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2130194
Client PO Number: L2130194

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2130194-1	1807499-1		WATER	16-Jul-18	

ALS Environmental

L2130194

WATERLOO

1807499

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2130194*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2130194-1 MS-08		7/ 16/ 2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/14/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 7-25-18 1200

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807499

Project Manager: KMO Initials: JC Date: 7-26-18

1. Are airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
2. Are custody seals on **shipping** containers intact?	NONE	(YES)	NO
3. Are custody seals on **sample** containers intact?	(NONE)	YES	NO
4. Is there a COC (chain-of-custody) present?		(YES)	NO
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		(YES)	NO
6. Are short-hold samples present?		YES	(NO)
7. Are all samples within holding times for the requested analyses?		(YES)	NO
8. Were all sample containers received intact? (not broken or leaking)		(YES)	NO
9. Is there sufficient sample for the requested analyses?		(YES)	NO
10. Are all samples in the proper containers for the requested analyses?		(YES)	NO
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	(YES)	NO
12. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	(N/A)	YES	NO
14. Were the samples shipped on ice?		(YES)	NO
15. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#1) #3 #4	(RAD ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	17.0							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	13							
Background µR/hr reading:	11							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

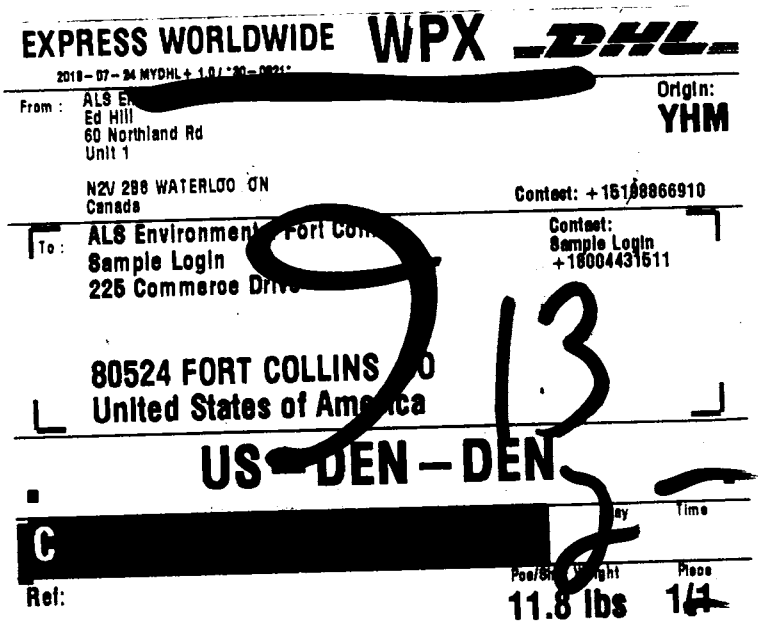
If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: _____

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807499


EXPRESS WORLDWIDE WPX DHL

2018-07-24 MYDHL+ 1.0 *20-0221*

From : ALS E[redacted]
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : ALS Environment[redacted] Fort Col[redacted]
Sample Login
225 Commerce Driv[redacted]

Contact:
Sample Login
+16004431511

80524 FORT COLLINS [redacted]O
United States of Amer[redacted]ca

9 13

US-DEN-DEN

2

[redacted]

Day Time

Ref:

Pce/Skid Weight 11.8 lbs

Piece 1/1

ICE melted 1720

WAYBILL 61 4523 0926

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*15-Aug-18*
Project:	L2130194	**Work Order:**	1807499
Sample ID:	L2130194-1	**Lab ID:**	1807499-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/16/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/7/2018**	PrepBy: **CXW**
Ra-226	**0.036 (+/- 0.011)**	Y1	**0.0043**	**BQ/l**	NA	8/14/2018 15:25
Carr: BARIUM	*103*	Y1	*40-110*	*%REC*	DL = NA	8/14/2018 15:25

Client:	ALS Environmental	**Date:**	*15-Aug-18*
Project:	L2130194	**Work Order:**	1807499
Sample ID:	L2130194-1	**Lab ID:**	1807499-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/16/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180807-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.84 (+/- 0.461)	0.0191	1.771		104	67-120					P,M3
Carr: BARIUM	15500		15910		97.6	40-110					

LCSD Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.92 (+/- 0.483)	0.0108	1.771		109	67-120		1.84	0.1	2.1	P,M3
Carr: BARIUM	15500		15900		97.6	40-110		15500			

MB Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00043 (+/- 0.0029)	0.0057									Y1,U
Carr: BARIUM	16100		15910		101	40-110					Y1

The following samples were analyzed in this batch: 1807499-1

Chain of Custody (COC) / Analytica Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2130194-COFC

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	
ALS Lab Work Order # (lab use only)	L2130194 AP

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: KB/JH

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☑
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-DEL	Number of Containers
	MS-08	16-Jul-18	14:30	Water	E0	5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	For Internal Purposes Only: Sample was taken in a previously labelled Gen Chem bottle, and was transferred to a new bottle before being submitted to the lab

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☒ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12.9°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: 16-Jul-18	Date: 16-Jul-18	Time: 17:00	Received by:	Date:	Time:	Received by:	Date: July 24/18	Time: 11:35

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 26-JUL-18
Report Date: 24-AUG-18 09:29 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2133777

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2133777-1 MS-08 Sampled By: CW/CM on 21-JUL-18 @ 13:55 Matrix: WATER							
Physical Tests							
Conductivity	3420		3.0	umhos/cm		26-JUL-18	R4144160
pH	8.53		0.10	pH units		21-JUL-18	R4139669
Total Suspended Solids	12.4		2.0	mg/L		22-JUL-18	R4137991
Total Dissolved Solids	3860		20	mg/L		22-JUL-18	R4138074
Turbidity	19.4		0.10	NTU		21-JUL-18	R4138027
Anions and Nutrients							
Ammonia, Total (as N)	2.02	DLHC	0.10	mg/L		27-JUL-18	R4145127
Cyanides							
Cyanide, Total	0.0053		0.0020	mg/L		31-JUL-18	R4151370
Total Metals							
Aluminum (Al)-Total	0.080	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Barium (Ba)-Total	0.0195	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	27-JUL-18	27-JUL-18	R4145099
Calcium (Ca)-Total	180	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Cobalt (Co)-Total	0.0439	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Iron (Fe)-Total	4.31	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Lithium (Li)-Total	0.052	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Magnesium (Mg)-Total	547	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Manganese (Mn)-Total	8.88	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Nickel (Ni)-Total	0.0560	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Potassium (K)-Total	4.39	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Rubidium (Rb)-Total	0.0083	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Selenium (Se)-Total	0.00523	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Sodium (Na)-Total	16.9	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Strontium (Sr)-Total	0.279	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Sulfur (S)-Total	953	DLHC	5.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Thallium (Tl)-Total	<0.00020	DLUI	0.00020	mg/L	27-JUL-18	27-JUL-18	R4145099
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099

* 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
L2133777-1 MS-08 Sampled By: CW/CM on 21-JUL-18 @ 13:55 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Uranium (U)-Total	0.00057	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	27-JUL-18	27-JUL-18	R4145099
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Radiological Parameters							
Ra-226	0.018		0.0061	Bq/L	09-AUG-18	21-AUG-18	R4160854
L2133777-2 MS-0801 Sampled By: CW/CM on 21-JUL-18 @ 13:55 Matrix: WATER							
Physical Tests							
Conductivity	3430		3.0	umhos/cm		26-JUL-18	R4144160
pH	8.64		0.10	pH units		21-JUL-18	R4139669
Total Suspended Solids	13.6		2.0	mg/L		22-JUL-18	R4137991
Total Dissolved Solids	3860		20	mg/L		22-JUL-18	R4138074
Turbidity	19.1		0.10	NTU		21-JUL-18	R4138027
Anions and Nutrients							
Ammonia, Total (as N)	2.07	DLHC	0.10	mg/L		27-JUL-18	R4145127
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		31-JUL-18	R4151370
Total Metals							
Aluminum (Al)-Total	0.080	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Barium (Ba)-Total	0.0210	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	27-JUL-18	27-JUL-18	R4145099
Calcium (Ca)-Total	183	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Cobalt (Co)-Total	0.0445	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Copper (Cu)-Total	0.010	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Iron (Fe)-Total	4.42	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Lithium (Li)-Total	0.051	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Magnesium (Mg)-Total	555	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Manganese (Mn)-Total	8.83	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099

* 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
L2133777-2 MS-0801 Sampled By: CW/CM on 21-JUL-18 @ 13:55 Matrix: WATER							
Total Metals							
Nickel (Ni)-Total	0.0558	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Potassium (K)-Total	4.50	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Rubidium (Rb)-Total	0.0089	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Selenium (Se)-Total	0.00496	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Sodium (Na)-Total	16.9	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Strontium (Sr)-Total	0.274	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Sulfur (S)-Total	982	DLHC	5.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Thallium (Tl)-Total	0.00010	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Uranium (U)-Total	0.00060	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	27-JUL-18	27-JUL-18	R4145099
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Radiological Parameters							
Ra-226	0.039		0.0063	Bq/L	09-AUG-18	21-AUG-18	R4160854

* 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	Barium (Ba)-Total	MS-B	L2133777-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2133777-1, -2
Matrix Spike	Cobalt (Co)-Total	MS-B	L2133777-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2133777-1, -2
Matrix Spike	Lithium (Li)-Total	MS-B	L2133777-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2133777-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2133777-1, -2
Matrix Spike	Nickel (Ni)-Total	MS-B	L2133777-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2133777-1, -2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2133777-1, -2
Matrix Spike	Silicon (Si)-Total	MS-B	L2133777-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2133777-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2133777-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2133777-1, -2
Matrix Spike	Uranium (U)-Total	MS-B	L2133777-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2133777 Report Date: 24-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4151370								
WG2837175-14 DUP		**L2135184-1**						
Cyanide, Total		0.0037	0.0038		mg/L	0.5	20	31-JUL-18
WG2837175-12 LCS								
Cyanide, Total			85.3		%		80-120	31-JUL-18
WG2837175-11 MB								
Cyanide, Total			<0.0020		mg/L		0.002	31-JUL-18
WG2837175-13 MS		**L2135184-1**						
Cyanide, Total			74.9		%		70-130	31-JUL-18
EC-WT	**Water**							
Batch R4144160								
WG2832840-20 DUP		**WG2832840-19**						
Conductivity		190	190		umhos/cm	0.1	10	26-JUL-18
WG2832840-24 DUP		**WG2832840-23**						
Conductivity		3430	3430		umhos/cm	0.0	10	26-JUL-18
WG2832840-18 LCS								
Conductivity			98.1		%		90-110	26-JUL-18
WG2832840-22 LCS								
Conductivity			98.3		%		90-110	26-JUL-18
WG2832840-17 MB								
Conductivity			<3.0		umhos/cm		3	26-JUL-18
WG2832840-21 MB								
Conductivity			<3.0		umhos/cm		3	26-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-4 DUP		**WG2834048-3**						
Aluminum (Al)-Total		0.080	0.074		mg/L	7.9	20	27-JUL-18
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Barium (Ba)-Total		0.0195	0.0193		mg/L	1.2	20	27-JUL-18
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Bismuth (Bi)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	27-JUL-18
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-JUL-18
Calcium (Ca)-Total		180	180		mg/L	0.2	20	27-JUL-18
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-JUL-18
Cesium (Cs)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-4 DUP		**WG2834048-3**						
Cobalt (Co)-Total		0.0439	0.0439		mg/L	0.1	20	27-JUL-18
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-JUL-18
Iron (Fe)-Total		4.31	4.27		mg/L	0.8	20	27-JUL-18
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Lithium (Li)-Total		0.052	0.050		mg/L	4.1	20	27-JUL-18
Magnesium (Mg)-Total		547	540		mg/L	1.5	20	27-JUL-18
Manganese (Mn)-Total		8.88	8.86		mg/L	0.3	20	27-JUL-18
Molybdenum (Mo)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Nickel (Ni)-Total		0.0560	0.0560		mg/L	0.0	20	27-JUL-18
Phosphorus (P)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	27-JUL-18
Potassium (K)-Total		4.39	4.37		mg/L	0.6	20	27-JUL-18
Rubidium (Rb)-Total		0.0083	0.0090		mg/L	7.6	20	27-JUL-18
Selenium (Se)-Total		0.00523	0.00491		mg/L	6.3	20	27-JUL-18
Silicon (Si)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-18
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Sodium (Na)-Total		16.9	17.1		mg/L	1.1	20	27-JUL-18
Strontium (Sr)-Total		0.279	0.281		mg/L	0.8	20	27-JUL-18
Sulfur (S)-Total		953	926		mg/L	2.8	25	27-JUL-18
Thallium (Tl)-Total		0.00013	0.00011		mg/L	15	20	27-JUL-18
Tellurium (Te)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	27-JUL-18
Thorium (Th)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	25	27-JUL-18
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Titanium (Ti)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	27-JUL-18
Tungsten (W)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Uranium (U)-Total		0.00057	0.00059		mg/L	3.7	20	27-JUL-18
Vanadium (V)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-JUL-18
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	27-JUL-18
Zirconium (Zr)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	27-JUL-18
WG2834048-2 LCS								
Aluminum (Al)-Total			105.4		%		80-120	27-JUL-18
Antimony (Sb)-Total			103.5		%		80-120	27-JUL-18
Arsenic (As)-Total			103.6		%		80-120	27-JUL-18
Barium (Ba)-Total			109.3		%		80-120	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-2 LCS								
Beryllium (Be)-Total			104.7		%		80-120	27-JUL-18
Bismuth (Bi)-Total			103.4		%		80-120	27-JUL-18
Boron (B)-Total			99.5		%		80-120	27-JUL-18
Cadmium (Cd)-Total			98.0		%		80-120	27-JUL-18
Calcium (Ca)-Total			101.5		%		80-120	27-JUL-18
Chromium (Cr)-Total			104.4		%		80-120	27-JUL-18
Cesium (Cs)-Total			100.6		%		80-120	27-JUL-18
Cobalt (Co)-Total			102.0		%		80-120	27-JUL-18
Copper (Cu)-Total			101.3		%		80-120	27-JUL-18
Iron (Fe)-Total			100.6		%		80-120	27-JUL-18
Lead (Pb)-Total			101.0		%		80-120	27-JUL-18
Lithium (Li)-Total			103.8		%		80-120	27-JUL-18
Magnesium (Mg)-Total			106.6		%		80-120	27-JUL-18
Manganese (Mn)-Total			102.9		%		80-120	27-JUL-18
Molybdenum (Mo)-Total			101.4		%		80-120	27-JUL-18
Nickel (Ni)-Total			102.0		%		80-120	27-JUL-18
Phosphorus (P)-Total			100.3		%		70-130	27-JUL-18
Potassium (K)-Total			100.3		%		80-120	27-JUL-18
Rubidium (Rb)-Total			105.7		%		80-120	27-JUL-18
Selenium (Se)-Total			99.96		%		80-120	27-JUL-18
Silicon (Si)-Total			107.5		%		60-140	27-JUL-18
Silver (Ag)-Total			102.5		%		80-120	27-JUL-18
Sodium (Na)-Total			106.9		%		80-120	27-JUL-18
Strontium (Sr)-Total			102.7		%		80-120	27-JUL-18
Sulfur (S)-Total			101.9		%		80-120	27-JUL-18
Thallium (Tl)-Total			101.3		%		80-120	27-JUL-18
Tellurium (Te)-Total			97.8		%		80-120	27-JUL-18
Thorium (Th)-Total			100.2		%		70-130	27-JUL-18
Tin (Sn)-Total			99.2		%		80-120	27-JUL-18
Titanium (Ti)-Total			100.8		%		80-120	27-JUL-18
Tungsten (W)-Total			101.4		%		80-120	27-JUL-18
Uranium (U)-Total			98.9		%		80-120	27-JUL-18
Vanadium (V)-Total			103.8		%		80-120	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-2 LCS								
Zinc (Zn)-Total			101.6		%		80-120	27-JUL-18
Zirconium (Zr)-Total			98.7		%		80-120	27-JUL-18
WG2834048-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	27-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	27-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	27-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	27-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	27-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	27-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	27-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	27-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	27-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	27-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	27-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	27-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	27-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	27-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-1 MB								
Thorium (Th)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	27-JUL-18
WG2834048-5 MS		**WG2834048-3**						
Aluminum (Al)-Total			109.2		%		70-130	27-JUL-18
Antimony (Sb)-Total			109.6		%		70-130	27-JUL-18
Arsenic (As)-Total			107.2		%		70-130	27-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	27-JUL-18
Beryllium (Be)-Total			106.4		%		70-130	27-JUL-18
Bismuth (Bi)-Total			103.8		%		70-130	27-JUL-18
Boron (B)-Total			88.8		%		70-130	27-JUL-18
Cadmium (Cd)-Total			104.9		%		70-130	27-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	27-JUL-18
Chromium (Cr)-Total			105.8		%		70-130	27-JUL-18
Cesium (Cs)-Total			106.3		%		70-130	27-JUL-18
Cobalt (Co)-Total			N/A	MS-B	%		-	27-JUL-18
Copper (Cu)-Total			103.5		%		70-130	27-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	27-JUL-18
Lead (Pb)-Total			103.8		%		70-130	27-JUL-18
Lithium (Li)-Total			N/A	MS-B	%		-	27-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	27-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	27-JUL-18
Molybdenum (Mo)-Total			103.7		%		70-130	27-JUL-18
Nickel (Ni)-Total			N/A	MS-B	%		-	27-JUL-18
Phosphorus (P)-Total			105.5		%		70-130	27-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	27-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	27-JUL-18
Selenium (Se)-Total			105.4		%		70-130	27-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834048-5 MS		**WG2834048-3**						
Silver (Ag)-Total			106.6		%		70-130	27-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	27-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	27-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	27-JUL-18
Thallium (Tl)-Total			102.4		%		70-130	27-JUL-18
Tellurium (Te)-Total			87.8		%		70-130	27-JUL-18
Thorium (Th)-Total			99.4		%		70-130	27-JUL-18
Tin (Sn)-Total			103.5		%		70-130	27-JUL-18
Titanium (Ti)-Total			102.2		%		70-130	27-JUL-18
Tungsten (W)-Total			102.8		%		70-130	27-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	27-JUL-18
Vanadium (V)-Total			109.1		%		70-130	27-JUL-18
Zinc (Zn)-Total			85.6		%		70-130	27-JUL-18
Zirconium (Zr)-Total			99.97		%		70-130	27-JUL-18
NH3-WT	**Water**							
Batch R4145127								
WG2834298-3 DUP		**L2136112-1**						
Ammonia, Total (as N)		0.294	0.283		mg/L	3.7	20	27-JUL-18
WG2834298-2 LCS								
Ammonia, Total (as N)			96.3		%		85-115	27-JUL-18
WG2834298-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	27-JUL-18
WG2834298-4 MS		**L2136112-1**						
Ammonia, Total (as N)			82.4		%		75-125	27-JUL-18
PH-BF	**Water**							
Batch R4139669								
WG2831691-2 DUP		**L2133639-1**						
pH		7.72	7.71	J	pH units	0.01	0.2	21-JUL-18
WG2831691-1 LCS								
pH			6.96		pH units		6.9-7.1	21-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4138074								
WG2829962-3 DUP		**L2133640-1**						
Total Dissolved Solids		3700	3760		mg/L	1.8	20	22-JUL-18
WG2829962-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-BF	**Water**							
Batch R4138074								
WG2829962-2 LCS								
Total Dissolved Solids			100.8		%		85-115	22-JUL-18
WG2829962-1 MB								
Total Dissolved Solids			<20		mg/L		20	22-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4137991								
WG2829940-3 DUP		**L2133777-2**						
Total Suspended Solids		13.6	12.4		mg/L	9.2	25	22-JUL-18
WG2829940-2 LCS								
Total Suspended Solids			101.4		%		85-115	22-JUL-18
WG2829940-1 MB								
Total Suspended Solids			<2.0		mg/L		2	22-JUL-18
TURBIDITY-BF	**Water**							
Batch R4138027								
WG2828831-3 DUP		**L2133449-1**						
Turbidity		7.76	7.99		NTU	2.9	15	21-JUL-18
WG2828831-2 LCS								
Turbidity			99.7		%		85-115	21-JUL-18
WG2828831-1 MB								
Turbidity			<0.10		NTU		0.1	21-JUL-18

Quality Control Report

Workorder: L2133777 Report Date: 24-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 22, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807561
Project Name:
Project Number: L2133777

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/27/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807561

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807561
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2133777
Client PO Number: L2133777

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2133777-1	1807561-1		WATER	21-Jul-18	
L2133777-2	1807561-2		WATER	21-Jul-18	

ALS Environmental

1807561

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# L2133777
ALS requires QC data to be provided with your final results.

Please see enclosed 2 sample(s) in 2 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1	L2133777-1 MS-08		7/21/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/15/2018	
2	L2133777-2 MS-0801		7/21/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/15/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____
Received By: VTD Date Received: 7/27/18 14:10
Verified By: _____ Date Verified: _____
Temperature: _____
Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807561

Project Manager: KO Initials: NG Date: 7/28/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	PAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	16.6							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/30/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807561

EXPRESS WORLDWIDE WPX DHL

2018-07-26 MYDHL+ 1.0/*30-0921*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198666910

To : ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

80524 FORT COLLINS CO
United States of America

10

US-DEN-DEN

Day Time

C

Ref:

Pce/Shpt Weight 17.0 lbs

Piece 1/1

Ice

Contents: Water
Sampl

16.6

WAYBILL 12 9763 2744

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-1	**Lab ID:**	1807561-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **8/9/2018**	PrepBy: **CXW**
Ra-226	**0.018 (+/- 0.0085)**		**0.0061**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*96.1*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-2	**Lab ID:**	1807561-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/9/2018**	PrepBy: **CXW**
Ra-226	**0.039 (+/- 0.013)**		**0.0063**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*98.6*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-2	**Lab ID:**	1807561-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180809-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.67 (+/- 0.415)	0.00848	1.771		94.5	67-120					P
Carr: BARIUM	15100		16030		94.1	40-110					

MB Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0035)	0.0069									U
Carr: BARIUM	15500		16030		96.7	40-110					

The following samples were analyzed in this batch: 1807561-1 1807561-2

Wednesday, August 22, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807561
Project Name:
Project Number: L2133777

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/27/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807561

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807561
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2133777
Client PO Number: L2133777

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2133777-1	1807561-1		WATER	21-Jul-18	
L2133777-2	1807561-2		WATER	21-Jul-18	

ALS Environmental

1807561

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# L2133777
ALS requires QC data to be provided with your final results.

Please see enclosed 2 sample(s) in 2 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1	L2133777-1 MS-08		7/21/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/15/2018	
2	L2133777-2 MS-0801		7/21/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/15/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____
Received By: VTD Date Received: 7/27/18 14:10
Verified By: _____ Date Verified: _____
Temperature: _____
Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807561

Project Manager: KO Initials: NG Date: 7/28/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	PAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	16.6							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/30/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807561

EXPRESS WORLDWIDE WPX DHL

2018-07-26 MYDHL+ 1.0/*30-0921*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198666910

To : ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

80524 FORT COLLINS CO
United States of America

10

US-DEN-DEN

Day Time

C

Ref:

Pce/Shpt Weight 17.0 lbs

Piece 1/1

Ice

Contents: Water
Sampl

16.6

WAYBILL 12 9763 2744

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-1	**Lab ID:**	1807561-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **8/9/2018**	PrepBy: **CXW**
Ra-226	**0.018 (+/- 0.0085)**		**0.0061**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*96.1*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-2	**Lab ID:**	1807561-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/9/2018**	PrepBy: **CXW**
Ra-226	**0.039 (+/- 0.013)**		**0.0063**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*98.6*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2133777	**Work Order:**	1807561
Sample ID:	L2133777-2	**Lab ID:**	1807561-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/21/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180809-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.67 (+/- 0.415)	0.00848	1.771		94.5	67-120					P
Carr: BARIUM	15100		16030		94.1	40-110					

MB Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0035)	0.0069									U
Carr: BARIUM	15500		16030		96.7	40-110					

The following samples were analyzed in this batch: 1807561-1 1807561-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2133777-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2133777 AP

ALS Contact: **Sampler:** CW/CM

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-DEL	Total Ammonia expressed as nitrogen (N)	Number of Containers
	MS-08	21-Jul-18	13:55	Water	R	R	6
	MS-0801	21-Jul-18	13:55	Water	R	R	6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			14.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Sten Sundin	Date: 18 07 22	Time: 10:35	Received by:	Date:	Time:	Received by: AP	Date: 26-7-18	Time: 12:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 26-JUL-18
Report Date: 24-AUG-18 09:38 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2136309

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2136309-1 MS-08 Sampled By: TB/CW on 24-JUL-18 @ 08:50 Matrix: WATER							
Physical Tests							
Conductivity	3450		3.0	umhos/cm		26-JUL-18	R4144160
pH	8.28		0.10	pH units		26-JUL-18	R4144160
Total Suspended Solids	14.8		2.0	mg/L	27-JUL-18	30-JUL-18	R4146811
Total Dissolved Solids	3780	DLDS	20	mg/L		26-JUL-18	R4144890
Turbidity	10.1	PEHR	0.10	NTU		26-JUL-18	R4143449
Anions and Nutrients							
Ammonia, Total (as N)	1.94	DLHC	0.040	mg/L		27-JUL-18	R4145127
Cyanides							
Cyanide, Total	0.0050		0.0020	mg/L		31-JUL-18	R4151370
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Barium (Ba)-Total	0.0178	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	27-JUL-18	27-JUL-18	R4145099
Calcium (Ca)-Total	195	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Cobalt (Co)-Total	0.0155	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Iron (Fe)-Total	1.23	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Lithium (Li)-Total	0.054	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Magnesium (Mg)-Total	551	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Manganese (Mn)-Total	4.54	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Nickel (Ni)-Total	0.0201	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Potassium (K)-Total	4.46	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Rubidium (Rb)-Total	0.0085	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Selenium (Se)-Total	0.00494	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Sodium (Na)-Total	17.0	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Strontium (Sr)-Total	0.295	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Sulfur (S)-Total	951	DLHC	5.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Thallium (Tl)-Total	0.00011	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099

* 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
L2136309-1 MS-08 Sampled By: TB/CW on 24-JUL-18 @ 08:50 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Uranium (U)-Total	0.00037	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	27-JUL-18	27-JUL-18	R4145099
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Radiological Parameters							
Ra-226	0.017		0.0051	Bq/L	09-AUG-18	21-AUG-18	R4160854
L2136309-2 MS-0801 Sampled By: TB/CW on 24-JUL-18 @ 08:50 Matrix: WATER							
Physical Tests							
Conductivity	3460		3.0	umhos/cm		26-JUL-18	R4144160
pH	8.28		0.10	pH units		26-JUL-18	R4144160
Total Suspended Solids	6.8		2.0	mg/L	27-JUL-18	30-JUL-18	R4146811
Total Dissolved Solids	3790	DLDS	20	mg/L		26-JUL-18	R4144890
Turbidity	8.69	PEHR	0.10	NTU		26-JUL-18	R4143449
Anions and Nutrients							
Ammonia, Total (as N)	2.02	DLHC	0.10	mg/L		27-JUL-18	R4145127
Cyanides							
Cyanide, Total	0.0051		0.0020	mg/L		31-JUL-18	R4151370
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Barium (Ba)-Total	0.0180	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	27-JUL-18	27-JUL-18	R4145099
Calcium (Ca)-Total	198	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Cobalt (Co)-Total	0.0152	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Iron (Fe)-Total	1.12	DLHC	0.10	mg/L	27-JUL-18	27-JUL-18	R4145099
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Lithium (Li)-Total	0.056	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Magnesium (Mg)-Total	573	DLHC	0.050	mg/L	27-JUL-18	27-JUL-18	R4145099
Manganese (Mn)-Total	4.71	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099

* 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
L2136309-2 MS-0801 Sampled By: TB/CW on 24-JUL-18 @ 08:50 Matrix: WATER							
Total Metals							
Nickel (Ni)-Total	0.0193	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Potassium (K)-Total	4.66	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Rubidium (Rb)-Total	0.0088	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Selenium (Se)-Total	0.00491	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	27-JUL-18	27-JUL-18	R4145099
Sodium (Na)-Total	17.2	DLHC	0.50	mg/L	27-JUL-18	27-JUL-18	R4145099
Strontium (Sr)-Total	0.305	DLHC	0.010	mg/L	27-JUL-18	27-JUL-18	R4145099
Sulfur (S)-Total	981	DLHC	5.0	mg/L	27-JUL-18	27-JUL-18	R4145099
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	27-JUL-18	27-JUL-18	R4145099
Thallium (Tl)-Total	0.00012	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	27-JUL-18	27-JUL-18	R4145099
Uranium (U)-Total	0.00039	DLHC	0.00010	mg/L	27-JUL-18	27-JUL-18	R4145099
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	27-JUL-18	27-JUL-18	R4145099
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	27-JUL-18	27-JUL-18	R4145099
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	27-JUL-18	27-JUL-18	R4145099
Radiological Parameters							
Ra-226	0.030		0.0052	Bq/L	09-AUG-18	21-AUG-18	R4160854

* 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	Barium (Ba)-Total	MS-B	L2136309-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2136309-1, -2
Matrix Spike	Cobalt (Co)-Total	MS-B	L2136309-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2136309-1, -2
Matrix Spike	Lithium (Li)-Total	MS-B	L2136309-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2136309-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2136309-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2136309-1, -2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2136309-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2136309-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2136309-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2136309-1, -2
Matrix Spike	Uranium (U)-Total	MS-B	L2136309-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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). Holdtime for samples under this regulation is 28 days

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

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: L2136309 Report Date: 24-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4151370								
WG2837175-16 LCS								
Cyanide, Total			85.4		%		80-120	31-JUL-18
WG2837175-15 MB								
Cyanide, Total			<0.0020		mg/L		0.002	31-JUL-18
EC-WT	**Water**							
Batch R4144160								
WG2832840-20 DUP		**WG2832840-19**						
Conductivity		190	190		umhos/cm	0.1	10	26-JUL-18
WG2832840-18 LCS								
Conductivity			98.1		%		90-110	26-JUL-18
WG2832840-17 MB								
Conductivity			<3.0		umhos/cm		3	26-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-4 DUP		**WG2834045-3**						
Aluminum (Al)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-JUL-18
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Barium (Ba)-Total		0.0178	0.0171		mg/L	4.0	20	27-JUL-18
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Bismuth (Bi)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	27-JUL-18
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	27-JUL-18
Calcium (Ca)-Total		195	192		mg/L	1.6	20	27-JUL-18
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-JUL-18
Cesium (Cs)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	27-JUL-18
Cobalt (Co)-Total		0.0155	0.0154		mg/L	0.7	20	27-JUL-18
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	27-JUL-18
Iron (Fe)-Total		1.23	1.23		mg/L	0.0	20	27-JUL-18
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Lithium (Li)-Total		0.054	0.053		mg/L	2.3	20	27-JUL-18
Magnesium (Mg)-Total		551	541		mg/L	1.7	20	27-JUL-18
Manganese (Mn)-Total		4.54	4.51		mg/L	0.7	20	27-JUL-18
Molybdenum (Mo)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Nickel (Ni)-Total		0.0201	0.0196		mg/L	2.3	20	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-4 DUP		**WG2834045-3**						
Phosphorus (P)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	27-JUL-18
Potassium (K)-Total		4.46	4.36		mg/L	2.1	20	27-JUL-18
Rubidium (Rb)-Total		0.0085	0.0080		mg/L	6.7	20	27-JUL-18
Selenium (Se)-Total		0.00494	0.00532		mg/L	7.4	20	27-JUL-18
Silicon (Si)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-18
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	27-JUL-18
Sodium (Na)-Total		17.0	16.9		mg/L	0.5	20	27-JUL-18
Strontium (Sr)-Total		0.295	0.303		mg/L	2.6	20	27-JUL-18
Sulfur (S)-Total		951	949		mg/L	0.3	25	27-JUL-18
Thallium (Tl)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	27-JUL-18
Tellurium (Te)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	27-JUL-18
Thorium (Th)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	25	27-JUL-18
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Titanium (Ti)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	27-JUL-18
Tungsten (W)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-JUL-18
Uranium (U)-Total		0.00037	0.00038		mg/L	3.6	20	27-JUL-18
Vanadium (V)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	27-JUL-18
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	27-JUL-18
Zirconium (Zr)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	27-JUL-18
WG2834045-2 LCS								
Aluminum (Al)-Total			108.5		%		80-120	27-JUL-18
Antimony (Sb)-Total			105.4		%		80-120	27-JUL-18
Arsenic (As)-Total			103.8		%		80-120	27-JUL-18
Barium (Ba)-Total			101.8		%		80-120	27-JUL-18
Beryllium (Be)-Total			109.9		%		80-120	27-JUL-18
Bismuth (Bi)-Total			104.2		%		80-120	27-JUL-18
Boron (B)-Total			102.2		%		80-120	27-JUL-18
Cadmium (Cd)-Total			97.7		%		80-120	27-JUL-18
Calcium (Ca)-Total			102.9		%		80-120	27-JUL-18
Chromium (Cr)-Total			104.0		%		80-120	27-JUL-18
Cesium (Cs)-Total			103.5		%		80-120	27-JUL-18
Cobalt (Co)-Total			101.2		%		80-120	27-JUL-18
Copper (Cu)-Total			100.1		%		80-120	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-2 LCS								
Iron (Fe)-Total			101.2		%		80-120	27-JUL-18
Lead (Pb)-Total			103.0		%		80-120	27-JUL-18
Lithium (Li)-Total			113.1		%		80-120	27-JUL-18
Magnesium (Mg)-Total			108.5		%		80-120	27-JUL-18
Manganese (Mn)-Total			102.5		%		80-120	27-JUL-18
Molybdenum (Mo)-Total			100.8		%		80-120	27-JUL-18
Nickel (Ni)-Total			101.5		%		80-120	27-JUL-18
Phosphorus (P)-Total			106.5		%		70-130	27-JUL-18
Potassium (K)-Total			104.7		%		80-120	27-JUL-18
Rubidium (Rb)-Total			104.0		%		80-120	27-JUL-18
Selenium (Se)-Total			99.1		%		80-120	27-JUL-18
Silicon (Si)-Total			110.7		%		60-140	27-JUL-18
Silver (Ag)-Total			104.4		%		80-120	27-JUL-18
Sodium (Na)-Total			106.6		%		80-120	27-JUL-18
Strontium (Sr)-Total			101.9		%		80-120	27-JUL-18
Sulfur (S)-Total			112.0		%		80-120	27-JUL-18
Thallium (Tl)-Total			103.3		%		80-120	27-JUL-18
Tellurium (Te)-Total			102.1		%		80-120	27-JUL-18
Thorium (Th)-Total			99.9		%		70-130	27-JUL-18
Tin (Sn)-Total			99.7		%		80-120	27-JUL-18
Titanium (Ti)-Total			105.0		%		80-120	27-JUL-18
Tungsten (W)-Total			102.2		%		80-120	27-JUL-18
Uranium (U)-Total			99.4		%		80-120	27-JUL-18
Vanadium (V)-Total			104.9		%		80-120	27-JUL-18
Zinc (Zn)-Total			97.8		%		80-120	27-JUL-18
Zirconium (Zr)-Total			97.8		%		80-120	27-JUL-18
WG2834045-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	27-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-1 MB								
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	27-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	27-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	27-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	27-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	27-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	27-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	27-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	27-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	27-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	27-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	27-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	27-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	27-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	27-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	27-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-JUL-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	27-JUL-18
WG2834045-5 MS		**WG2834045-3**						
Aluminum (Al)-Total			101.9		%		70-130	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-5 MS		**WG2834045-3**						
Antimony (Sb)-Total			106.4		%		70-130	27-JUL-18
Arsenic (As)-Total			106.4		%		70-130	27-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	27-JUL-18
Beryllium (Be)-Total			107.0		%		70-130	27-JUL-18
Bismuth (Bi)-Total			100.3		%		70-130	27-JUL-18
Boron (B)-Total			94.8		%		70-130	27-JUL-18
Cadmium (Cd)-Total			97.7		%		70-130	27-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	27-JUL-18
Chromium (Cr)-Total			93.8		%		70-130	27-JUL-18
Cesium (Cs)-Total			102.9		%		70-130	27-JUL-18
Cobalt (Co)-Total			N/A	MS-B	%		-	27-JUL-18
Copper (Cu)-Total			101.9		%		70-130	27-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	27-JUL-18
Lead (Pb)-Total			99.8		%		70-130	27-JUL-18
Lithium (Li)-Total			N/A	MS-B	%		-	27-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	27-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	27-JUL-18
Molybdenum (Mo)-Total			103.5		%		70-130	27-JUL-18
Nickel (Ni)-Total			104.6		%		70-130	27-JUL-18
Phosphorus (P)-Total			97.5		%		70-130	27-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	27-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	27-JUL-18
Selenium (Se)-Total			99.2		%		70-130	27-JUL-18
Silicon (Si)-Total			109.2		%		70-130	27-JUL-18
Silver (Ag)-Total			102.0		%		70-130	27-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	27-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	27-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	27-JUL-18
Thallium (Tl)-Total			99.9		%		70-130	27-JUL-18
Tellurium (Te)-Total			97.3		%		70-130	27-JUL-18
Thorium (Th)-Total			94.0		%		70-130	27-JUL-18
Tin (Sn)-Total			99.4		%		70-130	27-JUL-18
Titanium (Ti)-Total			97.7		%		70-130	27-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4145099								
WG2834045-5 MS		**WG2834045-3**						
Tungsten (W)-Total			99.4		%		70-130	27-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	27-JUL-18
Vanadium (V)-Total			108.2		%		70-130	27-JUL-18
Zinc (Zn)-Total			100.6		%		70-130	27-JUL-18
Zirconium (Zr)-Total			94.1		%		70-130	27-JUL-18
NH3-WT	**Water**							
Batch R4145127								
WG2834298-11 DUP		**L2136306-2**						
Ammonia, Total (as N)		0.046	<0.040	RPD-NA	mg/L	N/A	20	27-JUL-18
WG2834298-10 LCS								
Ammonia, Total (as N)			95.8		%		85-115	27-JUL-18
WG2834298-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	27-JUL-18
WG2834298-12 MS		**L2136306-2**						
Ammonia, Total (as N)			79.6		%		75-125	27-JUL-18
PH-WT	**Water**							
Batch R4144160								
WG2832840-20 DUP		**WG2832840-19**						
pH		7.84	7.90	J	pH units	0.06	0.2	26-JUL-18
WG2832840-18 LCS								
pH			7.01		pH units		6.9-7.1	26-JUL-18
SOLIDS-TDS-WT	**Water**							
Batch R4144890								
WG2833331-3 DUP		**L2134741-1**						
Total Dissolved Solids		777	790		mg/L	1.7	20	26-JUL-18
WG2833331-2 LCS								
Total Dissolved Solids			97.8		%		85-115	26-JUL-18
WG2833331-1 MB								
Total Dissolved Solids			<10		mg/L		10	26-JUL-18
SOLIDS-TSS-WT	**Water**							
Batch R4146811								
WG2834183-3 DUP		**L2136863-2**						
Total Suspended Solids		40.4	40.9		mg/L	1.3	20	30-JUL-18
WG2834183-2 LCS								
Total Suspended Solids			101.1		%		85-115	30-JUL-18
WG2834183-1 MB								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R4146811								
WG2834183-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-JUL-18
TURBIDITY-WT	**Water**							
Batch R4143449								
WG2833627-3 DUP		**L2136320-1**						
Turbidity		0.31	0.30		NTU	2.0	15	26-JUL-18
WG2833627-2 LCS								
Turbidity			104.0		%		85-115	26-JUL-18
WG2833627-1 MB								
Turbidity			<0.10		NTU		0.1	26-JUL-18

Quality Control Report

Workorder: L2136309 Report Date: 24-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Quality Control Report

Workorder: L2136309 Report Date: 24-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	24-JUL-18 08:50	26-JUL-18 17:00	48	56	hours	EHTR
	2	24-JUL-18 08:50	26-JUL-18 17:00	48	56	hours	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 L2136309 were received on 26-JUL-18 12:00.

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.

Wednesday, August 22, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807562
Project Name:
Project Number: L2136309

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/27/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807562

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807562
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2136309
Client PO Number: L2136309

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2136309-1	1807562-1		WATER	24-Jul-18	
L2136309-2	1807562-2		WATER	24-Jul-18	

ALS Environmental

1807562

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2136309*
ALS requires QC data to be provided with your final results.

Please see enclosed 2 sample(s) in 2 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1	**L2136309-1 MS-08**		7/24/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/20/2018	
2	**L2136309-2 MS-0801**		7/24/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/20/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 7/27/18 14:10

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807562

Project Manager: KO Initials: NJ Date: 7/25/18

1. Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2. Are custody seals on **shipping** containers intact?	NONE	YES	NO
3. Are custody seals on **sample** containers intact?	NONE	YES	NO
4. Is there a COC (chain-of-custody) present?		YES	NO
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6. Are short-hold samples present?		YES	NO
7. Are all samples within holding times for the requested analyses?		YES	NO
8. Were all sample containers received intact? (not broken or leaking)		YES	NO
9. Is there sufficient sample for the requested analyses?		YES	NO
10. Are all samples in the proper containers for the requested analyses?		YES	NO
11. Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12. Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14. Were the samples shipped on ice?		YES	NO
15. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1						
Temperature (°C):	16.6						
No. of custody seals on cooler:	2						
DOT Survey/ Acceptance Information — External µR/hr reading:	10						
Background µR/hr reading:	10						

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/30/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807562

EXPRESS WORLDWIDE WPX DHL

2018-07-26 MYDHL+ 1.0 / *30-0021*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

10

80524 FORT COLLINS CO
United States of America

US-DEN-DEN

C [redacted]

Day Time

Ref:

Pce/Shpt Weight
17.0 lbs

Piece
1/1

ice

Contents: Water
Sample

16.6

WAYBILL 12 9763 2744

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136309	**Work Order:**	1807562
Sample ID:	L2136309-1	**Lab ID:**	1807562-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/9/2018**		PrepBy: **CXW**
Ra-226	**0.017 (+/- 0.0075)**		**0.0051**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*98.2*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136309	**Work Order:**	1807562
Sample ID:	L2136309-2	**Lab ID:**	1807562-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/9/2018**	PrepBy: **CXW**
Ra-226	**0.030 (+/- 0.011)**		**0.0052**	**BQ/l**	NA	8/21/2018 11:29
Carr: BARIUM	*96*		*40-110*	*%REC*	DL = NA	8/21/2018 11:29

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136309	**Work Order:**	1807562
Sample ID:	L2136309-2	**Lab ID:**	1807562-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180809-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.67 (+/- 0.415)	0.00848	1.771		94.5	67-120					P
Carr: BARIUM	15100		16030		94.1	40-110					

MB Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0035)	0.0069									U
Carr: BARIUM	15500		16030		96.7	40-110					

The following samples were analyzed in this batch: 1807562-1 1807562-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2136309-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / L
Company:	Baffinland Iron Mines Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Contact:	Wiliam Bowden and Connor Devereaux	Quality Control (QC) Report with Report ☑ YES ☐ NO
Phone:	647-253-0596 EXT 6016	☐ Compare Results to Criteria on Report - provide details below if box checked
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Street:	2275 Upper Middle Rd. E., Suite #300	Email 1 or Fax bimcore@alsglobal.com
City/Province:	Oakville, ON	Email 2 bimww@alsglobal.com
Postal Code:	L6H 0C3	Email 3
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax ap@baffinland.com
Contact:		Email 2 commercial@baffinland.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	23642 /Q42455	AFE/Cost Center:	PO#
Job #:	MS-08	Major/Minor Code:	Routing Code:
PO / AFE:	4500040417	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L2136309	ALS Contact:	Sampler: TB/CW

Confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-DEL	Total Ammonia expressed as nitrogen (N)	Number of Containers
	MS-08	24-Jul-18	8:50	Water	R	R	6
	MS-0801	24-Jul-18	8:50	Water	R	R	6

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 by clicking on the drop-down list below (electronic COC only)

For Internal Purposes Only: Sample was taken in a previously labelled Gen Chem bottle, and was transferred to a new bottle before being submitted to the lab

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			14.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Sten Sundin	Date: 18 07 24	Time: 15:55	Received by:	Date:	Time:	Received by:	Date: 26-7-18	Time: 12:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 01-AUG-18
Report Date: 30-AUG-18 09:48 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2139794

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139794-1 MS-08 Sampled By: SS/BW on 01-AUG-18 @ 08:55 Matrix: WATER							
Physical Tests							
Conductivity	2360		3.0	umhos/cm		03-AUG-18	R4159132
pH	8.83		0.10	pH units		01-AUG-18	R4153087
Total Suspended Solids	4.4		2.0	mg/L		02-AUG-18	R4153088
Total Dissolved Solids	2580		20	mg/L		02-AUG-18	R4153152
Turbidity	4.91		0.10	NTU		02-AUG-18	R4154539
Anions and Nutrients							
Ammonia, Total (as N)	1.32		0.040	mg/L		07-AUG-18	R4160290
Cyanides							
Cyanide, Total	0.0121		0.0020	mg/L		03-AUG-18	R4160067
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Barium (Ba)-Total	0.0221	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	03-AUG-18	03-AUG-18	R4159686
Cadmium (Cd)-Total	0.000142	DLHC	0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Calcium (Ca)-Total	109	DLHC	0.50	mg/L	03-AUG-18	03-AUG-18	R4159686
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	03-AUG-18	03-AUG-18	R4159686
Cobalt (Co)-Total	0.0317	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	03-AUG-18	03-AUG-18	R4159686
Iron (Fe)-Total	1.16	DLHC	0.10	mg/L	03-AUG-18	03-AUG-18	R4159686
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Lithium (Li)-Total	0.030	DLHC	0.010	mg/L	03-AUG-18	03-AUG-18	R4159686
Magnesium (Mg)-Total	346	DLHC	0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Manganese (Mn)-Total	7.27	DLHC	0.0050	mg/L	03-AUG-18	03-AUG-18	R4159686
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Nickel (Ni)-Total	0.0436	DLHC	0.0050	mg/L	03-AUG-18	03-AUG-18	R4159686
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	03-AUG-18	03-AUG-18	R4159686
Potassium (K)-Total	4.13	DLHC	0.50	mg/L	03-AUG-18	03-AUG-18	R4159686
Rubidium (Rb)-Total	0.0057	DLHC	0.0020	mg/L	03-AUG-18	03-AUG-18	R4159686
Selenium (Se)-Total	0.00413	DLHC	0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	03-AUG-18	03-AUG-18	R4159686
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Sodium (Na)-Total	6.89	DLHC	0.50	mg/L	03-AUG-18	03-AUG-18	R4159686
Strontium (Sr)-Total	0.146	DLHC	0.010	mg/L	03-AUG-18	03-AUG-18	R4159686
Sulfur (S)-Total	542	DLHC	5.0	mg/L	03-AUG-18	03-AUG-18	R4159686
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	03-AUG-18	03-AUG-18	R4159686
Thallium (Tl)-Total	<0.00010	DLHC	0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686

* 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
L2139794-1 MS-08 Sampled By: SS/BW on 01-AUG-18 @ 08:55 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	03-AUG-18	03-AUG-18	R4159686
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Uranium (U)-Total	0.00033	DLHC	0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	03-AUG-18	03-AUG-18	R4159686
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	03-AUG-18	03-AUG-18	R4159686
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	03-AUG-18	03-AUG-18	R4159686
Radiological Parameters							
Ra-226	0.019		0.0053	Bq/L	20-AUG-18	28-AUG-18	R4160854

* 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	Cyanide, Total	MS-B	L2139794-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2139794-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2139794-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2139794-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2139794-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2139794-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2139794-1
Matrix Spike	Potassium (K)-Total	MS-B	L2139794-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2139794-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2139794-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2139794-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2139794-1
Matrix Spike	Uranium (U)-Total	MS-B	L2139794-1

Sample Parameter Qualifier key listed:

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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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

Reference Information

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2139794 Report Date: 30-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4160067								
WG2842580-3 DUP		**L2139486-1**						
Cyanide, Total		0.69	0.70		mg/L	1.8	20	03-AUG-18
WG2842580-2 LCS								
Cyanide, Total			87.0		%		80-120	03-AUG-18
WG2842580-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	03-AUG-18
WG2842580-4 MS		**L2139486-1**						
Cyanide, Total			N/A	MS-B	%		-	03-AUG-18
EC-WT	**Water**							
Batch R4159132								
WG2840553-20 DUP		**WG2840553-19**						
Conductivity		810	809		umhos/cm	0.1	10	03-AUG-18
WG2840553-18 LCS								
Conductivity			95.7		%		90-110	03-AUG-18
WG2840553-17 MB								
Conductivity			<3.0		umhos/cm		3	03-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-4 DUP		**WG2841323-3**						
Aluminum (Al)-Total		0.0250	0.0250		mg/L	0.3	20	03-AUG-18
Antimony (Sb)-Total		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	03-AUG-18
Arsenic (As)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Barium (Ba)-Total		0.0141	0.0144		mg/L	2.7	20	03-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Boron (B)-Total		0.030	0.031		mg/L	1.4	20	03-AUG-18
Cadmium (Cd)-Total		0.0000289	0.0000329		mg/L	13	20	03-AUG-18
Calcium (Ca)-Total		54.0	55.0		mg/L	1.8	20	03-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-AUG-18
Cesium (Cs)-Total		0.000014	0.000011	J	mg/L	0.000003	0.00002	03-AUG-18
Cobalt (Co)-Total		0.00664	0.00671		mg/L	1.0	20	03-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	03-AUG-18
Iron (Fe)-Total		0.171	0.171		mg/L	0.1	20	03-AUG-18
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Lithium (Li)-Total		0.0199	0.0199		mg/L	0.1	20	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-4 DUP		**WG2841323-3**						
Magnesium (Mg)-Total		103	106		mg/L	3.1	20	03-AUG-18
Manganese (Mn)-Total		1.44	1.46		mg/L	1.6	20	03-AUG-18
Molybdenum (Mo)-Total		0.000129	0.000124		mg/L	3.6	20	03-AUG-18
Nickel (Ni)-Total		0.0118	0.0118		mg/L	0.6	20	03-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-AUG-18
Potassium (K)-Total		9.99	10.0		mg/L	0.3	20	03-AUG-18
Rubidium (Rb)-Total		0.00895	0.00924		mg/L	3.1	20	03-AUG-18
Selenium (Se)-Total		0.00113	0.00118		mg/L	4.3	20	03-AUG-18
Silicon (Si)-Total		0.17	0.17		mg/L	1.5	20	03-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Sodium (Na)-Total		6.24	6.45		mg/L	3.3	20	03-AUG-18
Strontium (Sr)-Total		0.0761	0.0788		mg/L	3.5	20	03-AUG-18
Sulfur (S)-Total		182	189		mg/L	3.6	25	03-AUG-18
Thallium (Tl)-Total		0.000034	0.000035		mg/L	3.4	20	03-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	03-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	03-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Titanium (Ti)-Total		<0.00070	<0.00070	RPD-NA	mg/L	N/A	20	03-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Uranium (U)-Total		0.000451	0.000443		mg/L	1.9	20	03-AUG-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-AUG-18
Zinc (Zn)-Total		0.0034	<0.0030	RPD-NA	mg/L	N/A	20	03-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	03-AUG-18
WG2841323-2 LCS								
Aluminum (Al)-Total			104.7		%		80-120	03-AUG-18
Antimony (Sb)-Total			108.8		%		80-120	03-AUG-18
Arsenic (As)-Total			102.3		%		80-120	03-AUG-18
Barium (Ba)-Total			99.9		%		80-120	03-AUG-18
Beryllium (Be)-Total			103.2		%		80-120	03-AUG-18
Bismuth (Bi)-Total			102.0		%		80-120	03-AUG-18
Boron (B)-Total			93.2		%		80-120	03-AUG-18
Cadmium (Cd)-Total			101.3		%		80-120	03-AUG-18
Calcium (Ca)-Total			99.99		%		80-120	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-2 LCS								
Chromium (Cr)-Total			100.5		%		80-120	03-AUG-18
Cesium (Cs)-Total			107.9		%		80-120	03-AUG-18
Cobalt (Co)-Total			99.0		%		80-120	03-AUG-18
Copper (Cu)-Total			100.1		%		80-120	03-AUG-18
Iron (Fe)-Total			98.8		%		80-120	03-AUG-18
Lead (Pb)-Total			103.8		%		80-120	03-AUG-18
Lithium (Li)-Total			106.7		%		80-120	03-AUG-18
Magnesium (Mg)-Total			100.0		%		80-120	03-AUG-18
Manganese (Mn)-Total			102.8		%		80-120	03-AUG-18
Molybdenum (Mo)-Total			102.7		%		80-120	03-AUG-18
Nickel (Ni)-Total			99.8		%		80-120	03-AUG-18
Phosphorus (P)-Total			103.7		%		70-130	03-AUG-18
Potassium (K)-Total			99.4		%		80-120	03-AUG-18
Rubidium (Rb)-Total			106.9		%		80-120	03-AUG-18
Selenium (Se)-Total			97.5		%		80-120	03-AUG-18
Silicon (Si)-Total			103.3		%		60-140	03-AUG-18
Silver (Ag)-Total			107.5		%		80-120	03-AUG-18
Sodium (Na)-Total			103.0		%		80-120	03-AUG-18
Strontium (Sr)-Total			103.4		%		80-120	03-AUG-18
Sulfur (S)-Total			97.7		%		80-120	03-AUG-18
Thallium (Tl)-Total			102.0		%		80-120	03-AUG-18
Tellurium (Te)-Total			105.8		%		80-120	03-AUG-18
Thorium (Th)-Total			102.6		%		70-130	03-AUG-18
Tin (Sn)-Total			101.6		%		80-120	03-AUG-18
Titanium (Ti)-Total			100.6		%		80-120	03-AUG-18
Tungsten (W)-Total			102.1		%		80-120	03-AUG-18
Uranium (U)-Total			104.6		%		80-120	03-AUG-18
Vanadium (V)-Total			102.7		%		80-120	03-AUG-18
Zinc (Zn)-Total			98.8		%		80-120	03-AUG-18
Zirconium (Zr)-Total			100.1		%		80-120	03-AUG-18
WG2841323-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	03-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	03-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	03-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	03-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	03-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	03-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	03-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	03-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	03-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	03-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	03-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	03-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	03-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	03-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	03-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	03-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	03-AUG-18
WG2841323-5 MS		**WG2841323-3**						
Aluminum (Al)-Total			92.1		%		70-130	03-AUG-18
Antimony (Sb)-Total			96.6		%		70-130	03-AUG-18
Arsenic (As)-Total			94.2		%		70-130	03-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	03-AUG-18
Beryllium (Be)-Total			90.0		%		70-130	03-AUG-18
Bismuth (Bi)-Total			90.2		%		70-130	03-AUG-18
Boron (B)-Total			81.1		%		70-130	03-AUG-18
Cadmium (Cd)-Total			91.7		%		70-130	03-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	03-AUG-18
Chromium (Cr)-Total			89.5		%		70-130	03-AUG-18
Cesium (Cs)-Total			96.4		%		70-130	03-AUG-18
Cobalt (Co)-Total			85.1		%		70-130	03-AUG-18
Copper (Cu)-Total			86.4		%		70-130	03-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	03-AUG-18
Lead (Pb)-Total			90.0		%		70-130	03-AUG-18
Lithium (Li)-Total			N/A	MS-B	%		-	03-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	03-AUG-18
Manganese (Mn)-Total			N/A	MS-B	%		-	03-AUG-18
Molybdenum (Mo)-Total			95.0		%		70-130	03-AUG-18
Nickel (Ni)-Total			86.6		%		70-130	03-AUG-18
Phosphorus (P)-Total			96.9		%		70-130	03-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	03-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	03-AUG-18
Selenium (Se)-Total			92.2		%		70-130	03-AUG-18
Silicon (Si)-Total			92.2		%		70-130	03-AUG-18
Silver (Ag)-Total			93.0		%		70-130	03-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	03-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	03-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	03-AUG-18
Thallium (Tl)-Total			90.4		%		70-130	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-5 MS		**WG2841323-3**						
Tellurium (Te)-Total			95.3		%		70-130	03-AUG-18
Thorium (Th)-Total			92.5		%		70-130	03-AUG-18
Tin (Sn)-Total			91.5		%		70-130	03-AUG-18
Titanium (Ti)-Total			90.6		%		70-130	03-AUG-18
Tungsten (W)-Total			91.4		%		70-130	03-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	03-AUG-18
Vanadium (V)-Total			94.0		%		70-130	03-AUG-18
Zinc (Zn)-Total			82.0		%		70-130	03-AUG-18
Zirconium (Zr)-Total			91.9		%		70-130	03-AUG-18
NH3-WT	**Water**							
Batch R4160290								
WG2842823-3 DUP		**L2139790-1**						
Ammonia, Total (as N)		0.024	<0.020	RPD-NA	mg/L	N/A	20	07-AUG-18
WG2842823-2 LCS								
Ammonia, Total (as N)			103.3		%		85-115	07-AUG-18
WG2842823-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	07-AUG-18
WG2842823-4 MS		**L2139790-1**						
Ammonia, Total (as N)			105.5		%		75-125	07-AUG-18
PH-BF	**Water**							
Batch R4153087								
WG2839335-2 DUP		**L2139794-1**						
pH		8.83	8.80	J	pH units	0.03	0.2	01-AUG-18
WG2839335-1 LCS								
pH			6.98		pH units		6.9-7.1	01-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4153152								
WG2839337-3 DUP		**L2139681-1**						
Total Dissolved Solids		586	645		mg/L	9.6	20	02-AUG-18
WG2839337-2 LCS								
Total Dissolved Solids			100.8		%		85-115	02-AUG-18
WG2839337-1 MB								
Total Dissolved Solids			<20		mg/L		20	02-AUG-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4153088								
WG2839336-3 DUP		**L2139681-1**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	02-AUG-18
WG2839336-2 LCS								
Total Suspended Solids			100.4		%		85-115	02-AUG-18
WG2839336-1 MB								
Total Suspended Solids			<2.0		mg/L		2	02-AUG-18
TURBIDITY-BF	**Water**							
Batch R4154539								
WG2839789-3 DUP		**L2139633-1**						
Turbidity		11.6	11.5		NTU	0.9	15	02-AUG-18
WG2839789-2 LCS								
Turbidity			112.0		%		85-115	02-AUG-18
WG2839789-1 MB								
Turbidity			<0.10		NTU		0.1	02-AUG-18

Quality Control Report

Workorder: L2139794 Report Date: 30-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 29, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808151
Project Name:
Project Number: L2139794

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 8/8/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808151

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808151
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2139794
Client PO Number: L2139794

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2139794-1	1808151-1		WATER	01-Aug-18	

ALS Environmental

180857

L2139794

WATERLOO

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2139794*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L2139794-1 MS-08**		8/ 1/ 2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/23/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumble Date Received: 8-8-18 1015

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS-Waterloo Workorder No: 1808151

Project Manager: Kmo Initials: dd Date: 8.8.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	14							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	11							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/9/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

Sender

ALS Environmental
Ed Hill
60 Northland Rd
Unit 1
WATERLOO, N2V 2B8
ON
Canada
Phone Nr.: +15198866910 Fax: +15198869047
Tax ID/VAT No.:
EORI:

1808151

[redacted]

Date: 2018-08-07 Waybill Number: 2762834620
Invoice Number:

Exporter ID:
Exporter Code:

Receiver

ALS Environmental Fort Collins
Sample Login
225 Commerce Drive
FORT COLLINS, 80524
CO
United States of America
Phone Nr.: +18004431511 Fax:
Tax ID/VAT No.: Email:

Bank Details

INN: OGRN:
KPP: OKPO:
Settlement account (USD/EUR):
Settlement account (RUR):
Bank Name:

Billed to

Phone Nr.: Fax:
Tax ID/VAT no:

Shipment Reference:
Receiver Reference:

Other Remarks:

Full Description of Goods	Commodity Code	Qty	Unit Value	Sub-Total Value	Net Weight	Gross Weight	Country of Origin
Water Samples		1.00 PCS	2.00 CAD	2.00 CAD	10.8 lb	0.0 lb	CANADA

Total Goods Value: 2.00
Total line items: 1
Number of pallets: 0
Total units: 1.0
Reason for Export: Sample
Type of Export: Permanent
Terms of Trade: Delivered at Place
Other charges: 0.00
Freight cost (if paid by sender): 0.00
Shipment protection (if paid by sender): 0.00

Total Net Weight: 10.8 lb
Total Gross Weight: 0.0 lb
Currency code: CAD
Terms of Payment:
Payer of GST/VAT:
Duty/taxes acct: Receiver Will Pay
Requiere Pedimento: No
Duty/tax billing service:
Carrier: DHL
Ultimate Consignee:
Exemption Citation/License Nr:

10-0
14°

I/We hereby certify that the information contained in the invoice is true and correct and that the contents of this shipment are as stated above.

Name: William McMurchy Signature: Company Stamp:
Position:
Date of signature:

Client:	ALS Environmental	**Date:**	*29-Aug-18*
Project:	L2139794	**Work Order:**	1808151
Sample ID:	L2139794-1	**Lab ID:**	1808151-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/20/2018**		PrepBy: **CXW**
Ra-226	**0.019 (+/- 0.0084)**		**0.0053**	**BQ/l**	NA	8/28/2018 12:26
Carr: BARIUM	*97.2*		*40-110*	*%REC*	DL = NA	8/28/2018 12:26

Client:	ALS Environmental	**Date:**	*29-Aug-18*
Project:	L2139794	**Work Order:**	1808151
Sample ID:	L2139794-1	**Lab ID:**	1808151-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180820-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.86 (+/- 0.465)	0.0184	1.771		105	67-120					P,M3
Carr: BARIUM	15300		16240		94	40-110					

LCSD Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.87 (+/- 0.468)	0.0201	1.771		106	67-120		1.86	0.02	2.1	P,Y1,M3
Carr: BARIUM	16900		16240		104	40-110		15300			Y1

MB Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0010 (+/- 0.0033)	0.0063									U
Carr: BARIUM	14600		16240		90	40-110					

The following samples were analyzed in this batch: 1808151-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2139794-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	
ALS Lab Work Order # (lab use only)	L2139794

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: SS/BW

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☑
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-DEL	Number of Containers
	MS-08	1-Aug-18	8:55	Water	E0	6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)		
Released by: Ben Widdowson	Date: 18 08 01	Time: 10:38

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 11-AUG-18
Report Date: 07-SEP-18 12:58 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2145073

Project P.O. #: 4500040417
Job Reference: MS-08 EFFLUENT CHARACTERIZATION
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2145073-1 MS-08 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Physical Tests							
Conductivity	5010		3.0	umhos/cm		11-AUG-18	R4165327
Hardness (as CaCO3)	4120		10	mg/L		13-AUG-18	
pH	9.23		0.10	pH units		10-AUG-18	R4175328
Total Suspended Solids	19.3		2.0	mg/L		10-AUG-18	R4175329
Total Dissolved Solids	6370		20	mg/L		10-AUG-18	R4175334
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		16-AUG-18	R4172207
Alkalinity, Total (as CaCO3)	57		10	mg/L		13-AUG-18	R4168138
Ammonia, Total (as N)	2.98	DLHC	0.10	mg/L		13-AUG-18	R4167708
Chloride (Cl)	12.0	DLDS	5.0	mg/L		11-AUG-18	R4167215
Fluoride (F)	<0.20	DLDS	0.20	mg/L		11-AUG-18	R4167215
Nitrate (as N)	18.7	DLDS	0.20	mg/L		11-AUG-18	R4167215
Total Kjeldahl Nitrogen	3.50		0.15	mg/L	13-AUG-18	13-AUG-18	R4168095
Phosphorus, Total	<0.0030		0.0030	mg/L	13-AUG-18	15-AUG-18	R4169436
Sulfate (SO4)	4930	DLDS	3.0	mg/L		11-AUG-18	R4167215
Cyanides							
Cyanide, Total	0.0220		0.0020	mg/L		13-AUG-18	R4167987
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.04		0.50	mg/L		12-AUG-18	R4166247
Total Organic Carbon	2.40		0.50	mg/L		12-AUG-18	R4166231
Total Metals							
Aluminum (Al)-Total	0.088	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Barium (Ba)-Total	0.0201	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Calcium (Ca)-Total	321	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cobalt (Co)-Total	0.0271	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Copper (Cu)-Total	0.034	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Iron (Fe)-Total	4.04	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Lithium (Li)-Total	0.061	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Magnesium (Mg)-Total	800	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Manganese (Mn)-Total	6.92	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		11-AUG-18	R4164488
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Nickel (Ni)-Total	0.0280	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701

* 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
L2145073-1 MS-08 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Potassium (K)-Total	4.76	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Rubidium (Rb)-Total	0.0092	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4164701
Selenium (Se)-Total	0.00956	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	11-AUG-18	11-AUG-18	R4164701
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Sodium (Na)-Total	4.75	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Strontium (Sr)-Total	0.655	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Sulfur (S)-Total	1530	DLHC	5.0	mg/L	11-AUG-18	11-AUG-18	R4164701
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4164701
Thallium (Tl)-Total	0.00017	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Uranium (U)-Total	0.00073	DLHC	0.00010	mg/L	11-AUG-18	13-AUG-18	R4164701
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	11-AUG-18	11-AUG-18	R4164701
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					11-AUG-18	R4164388
Dissolved Metals Filtration Location	FIELD					11-AUG-18	R4164547
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4166670
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Barium (Ba)-Dissolved	0.0206	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4166670
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	11-AUG-18	11-AUG-18	R4166670
Calcium (Ca)-Dissolved	316	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Cobalt (Co)-Dissolved	0.0047	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Copper (Cu)-Dissolved	0.0323	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4166670
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Lithium (Li)-Dissolved	0.054	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Magnesium (Mg)-Dissolved	809	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4166670
Manganese (Mn)-Dissolved	6.33	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164489

* 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
L2145073-1 MS-08 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Nickel (Ni)-Dissolved	0.0060	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Potassium (K)-Dissolved	4.66	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Rubidium (Rb)-Dissolved	0.0087	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Selenium (Se)-Dissolved	0.00859	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Sodium (Na)-Dissolved	4.74	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Strontium (Sr)-Dissolved	0.616	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Sulfur (S)-Dissolved	1460	DLHC	5.0	mg/L	11-AUG-18	11-AUG-18	R4166670
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Thallium (Tl)-Dissolved	0.00016	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4166670
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Uranium (U)-Dissolved	0.00036	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4166670
Radiological Parameters							
Ra-226	0.041		0.0075	Bq/L	27-AUG-18	05-SEP-18	R4203163
L2145073-2 MS-0801 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Physical Tests							
Conductivity	5030		3.0	umhos/cm		11-AUG-18	R4165327
Hardness (as CaCO3)	4310		10	mg/L		13-AUG-18	
pH	9.27		0.10	pH units		10-AUG-18	R4175328
Total Suspended Solids	14.9		2.0	mg/L		10-AUG-18	R4175329
Total Dissolved Solids	5040		20	mg/L		10-AUG-18	R4175334
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		16-AUG-18	R4172207
Alkalinity, Total (as CaCO3)	55		10	mg/L		13-AUG-18	R4168138
Ammonia, Total (as N)	2.99	DLHC	0.10	mg/L		13-AUG-18	R4167708
Chloride (Cl)	10.1	DLDS	5.0	mg/L		11-AUG-18	R4167215
Fluoride (F)	<0.20	DLDS	0.20	mg/L		11-AUG-18	R4167215
Nitrate (as N)	15.6	DLDS	0.20	mg/L		11-AUG-18	R4167215
Total Kjeldahl Nitrogen	3.86		0.15	mg/L	13-AUG-18	13-AUG-18	R4168095
Phosphorus, Total	<0.0030		0.0030	mg/L	13-AUG-18	15-AUG-18	R4169436
Sulfate (SO4)	4100	DLDS	3.0	mg/L		11-AUG-18	R4167215

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2145073-2 MS-0801 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Anions and Nutrients							
Cyanides							
Cyanide, Total	0.0234		0.0020	mg/L		13-AUG-18	R4167987
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.90		0.50	mg/L		12-AUG-18	R4166247
Total Organic Carbon	2.75		0.50	mg/L		12-AUG-18	R4166231
Total Metals							
Aluminum (Al)-Total	0.091	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Barium (Ba)-Total	0.0206	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Calcium (Ca)-Total	330	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cobalt (Co)-Total	0.0284	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Copper (Cu)-Total	0.034	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Iron (Fe)-Total	4.18	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Lithium (Li)-Total	0.058	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Magnesium (Mg)-Total	829	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Manganese (Mn)-Total	7.07	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		11-AUG-18	R4164488
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Nickel (Ni)-Total	0.0297	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Potassium (K)-Total	4.78	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Rubidium (Rb)-Total	0.0091	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4164701
Selenium (Se)-Total	0.00935	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	11-AUG-18	11-AUG-18	R4164701
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Sodium (Na)-Total	4.78	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Strontium (Sr)-Total	0.667	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Sulfur (S)-Total	1500	DLHC	5.0	mg/L	11-AUG-18	11-AUG-18	R4164701
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4164701
Thallium (Tl)-Total	0.00017	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2145073-2 MS-0801 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Total Metals							
Uranium (U)-Total	0.00066	DLHC	0.00010	mg/L	11-AUG-18	13-AUG-18	R4164701
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	11-AUG-18	11-AUG-18	R4164701
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					11-AUG-18	R4164388
Dissolved Metals Filtration Location	FIELD					11-AUG-18	R4164547
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4166670
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Barium (Ba)-Dissolved	0.0194	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4166670
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	11-AUG-18	11-AUG-18	R4166670
Calcium (Ca)-Dissolved	328	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Cobalt (Co)-Dissolved	0.0049	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Copper (Cu)-Dissolved	0.0331	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	11-AUG-18	11-AUG-18	R4166670
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Lithium (Li)-Dissolved	0.060	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Magnesium (Mg)-Dissolved	846	DLHC	0.050	mg/L	11-AUG-18	11-AUG-18	R4166670
Manganese (Mn)-Dissolved	6.50	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164489
Molybdenum (Mo)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Nickel (Ni)-Dissolved	0.0065	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Potassium (K)-Dissolved	4.79	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Rubidium (Rb)-Dissolved	0.0094	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Selenium (Se)-Dissolved	0.00846	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	11-AUG-18	11-AUG-18	R4166670
Sodium (Na)-Dissolved	4.83	DLHC	0.50	mg/L	11-AUG-18	11-AUG-18	R4166670
Strontium (Sr)-Dissolved	0.650	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Sulfur (S)-Dissolved	1460	DLHC	5.0	mg/L	11-AUG-18	11-AUG-18	R4166670
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	11-AUG-18	11-AUG-18	R4166670
Thallium (Tl)-Dissolved	0.00017	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670

* 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
L2145073-2 MS-0801 Sampled By: LM/KB/DS on 10-AUG-18 @ 13:55 Matrix: WATER							
Dissolved Metals							
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4166670
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	11-AUG-18	11-AUG-18	R4166670
Uranium (U)-Dissolved	0.00033	DLHC	0.00010	mg/L	11-AUG-18	11-AUG-18	R4166670
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	11-AUG-18	11-AUG-18	R4166670
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	11-AUG-18	11-AUG-18	R4166670
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	11-AUG-18	11-AUG-18	R4166670
Radiological Parameters							
Ra-226	0.045		0.0044	Bq/L	27-AUG-18	05-SEP-18	R4203163
L2145073-3 MS-08-US Sampled By: LM/KB/DS on 10-AUG-18 @ 15:25 Matrix: WATER							
Physical Tests							
Conductivity	89.3		3.0	umhos/cm		11-AUG-18	R4165327
Hardness (as CaCO3)	41	HTC	10	mg/L		13-AUG-18	
pH	7.96		0.10	pH units		10-AUG-18	R4175328
Total Suspended Solids	<2.0		2.0	mg/L		10-AUG-18	R4175329
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	34		10	mg/L		13-AUG-18	R4168138
Ammonia, Total (as N)	<0.020		0.020	mg/L		13-AUG-18	R4167708
Chloride (Cl)	2.37		0.50	mg/L		11-AUG-18	R4167215
Fluoride (F)	0.026		0.020	mg/L		11-AUG-18	R4167215
Nitrate (as N)	<0.020		0.020	mg/L		11-AUG-18	R4167215
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	13-AUG-18	13-AUG-18	R4168095
Phosphorus, Total	0.0049		0.0030	mg/L	13-AUG-18	15-AUG-18	R4169436
Sulfate (SO4)	0.90		0.30	mg/L		11-AUG-18	R4167215
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.41		0.50	mg/L		12-AUG-18	R4166247
Total Organic Carbon	1.70		0.50	mg/L		12-AUG-18	R4166231
Total Metals							
Aluminum (Al)-Total	0.365		0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Arsenic (As)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Barium (Ba)-Total	0.00724		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Boron (B)-Total	<0.010		0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Calcium (Ca)-Total	8.58		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cesium (Cs)-Total	0.000039		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Chromium (Cr)-Total	0.00058		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Copper (Cu)-Total	0.0010		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2145073-3 MS-08-US Sampled By: LM/KB/DS on 10-AUG-18 @ 15:25 Matrix: WATER							
Total Metals							
Iron (Fe)-Total	0.233		0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Lead (Pb)-Total	0.000208		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Lithium (Li)-Total	<0.0010		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Magnesium (Mg)-Total	4.72		0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Manganese (Mn)-Total	0.00247		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		11-AUG-18	R4164488
Molybdenum (Mo)-Total	0.000240		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Nickel (Ni)-Total	0.00053		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Phosphorus (P)-Total	<0.050		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Potassium (K)-Total	0.784		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Rubidium (Rb)-Total	0.00188		0.00020	mg/L	11-AUG-18	11-AUG-18	R4164701
Selenium (Se)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Silicon (Si)-Total	1.48		0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Silver (Ag)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Sodium (Na)-Total	1.12		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Strontium (Sr)-Total	0.0091		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Sulfur (S)-Total	<0.50		0.50	mg/L	11-AUG-18	11-AUG-18	R4164701
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-AUG-18	11-AUG-18	R4164701
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Thorium (Th)-Total	0.00029		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Tin (Sn)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Titanium (Ti)-Total	0.0147		0.00030	mg/L	11-AUG-18	11-AUG-18	R4164701
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Uranium (U)-Total	0.00110		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Vanadium (V)-Total	0.00071		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Zirconium (Zr)-Total	0.00058		0.00030	mg/L	11-AUG-18	11-AUG-18	R4164701
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					11-AUG-18	R4164388
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164489
Radiological Parameters							
Ra-226	<0.0068		0.0068	Bq/L	27-AUG-18	05-SEP-18	R4203163
L2145073-4 MS-08-DS Sampled By: LM/KB/DS on 10-AUG-18 @ 14:45 Matrix: WATER							
Physical Tests							
Conductivity	94.1		3.0	umhos/cm		11-AUG-18	R4165327
Hardness (as CaCO3)	42	HTC	10	mg/L		13-AUG-18	
pH	7.99		0.10	pH units		10-AUG-18	R4175328
Total Suspended Solids	<2.0		2.0	mg/L		10-AUG-18	R4175329
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	33		10	mg/L		13-AUG-18	R4168138

* 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
L2145073-4 MS-08-DS Sampled By: LM/KB/DS on 10-AUG-18 @ 14:45 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		13-AUG-18	R4167708
Chloride (Cl)	2.31		0.50	mg/L		11-AUG-18	R4167215
Fluoride (F)	0.025		0.020	mg/L		11-AUG-18	R4167215
Nitrate (as N)	<0.020		0.020	mg/L		11-AUG-18	R4167215
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	13-AUG-18	13-AUG-18	R4168095
Phosphorus, Total	0.0074		0.0030	mg/L	13-AUG-18	15-AUG-18	R4169436
Sulfate (SO4)	2.53		0.30	mg/L		11-AUG-18	R4167215
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.34		0.50	mg/L		12-AUG-18	R4166247
Total Organic Carbon	1.85		0.50	mg/L		12-AUG-18	R4166231
Total Metals							
Aluminum (Al)-Total	0.266		0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Arsenic (As)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Barium (Ba)-Total	0.00722		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Boron (B)-Total	<0.010		0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Calcium (Ca)-Total	8.94		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cesium (Cs)-Total	0.000032		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Copper (Cu)-Total	<0.0010		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Iron (Fe)-Total	0.196		0.010	mg/L	11-AUG-18	11-AUG-18	R4164701
Lead (Pb)-Total	0.000173		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Lithium (Li)-Total	<0.0010		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Magnesium (Mg)-Total	4.89		0.0050	mg/L	11-AUG-18	11-AUG-18	R4164701
Manganese (Mn)-Total	0.00230		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		11-AUG-18	R4164488
Molybdenum (Mo)-Total	0.000231		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Nickel (Ni)-Total	0.00053		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Phosphorus (P)-Total	<0.050		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Potassium (K)-Total	0.750		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Rubidium (Rb)-Total	0.00170		0.00020	mg/L	11-AUG-18	11-AUG-18	R4164701
Selenium (Se)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Silicon (Si)-Total	1.25		0.10	mg/L	11-AUG-18	11-AUG-18	R4164701
Silver (Ag)-Total	<0.000050		0.000050	mg/L	11-AUG-18	11-AUG-18	R4164701
Sodium (Na)-Total	1.06		0.050	mg/L	11-AUG-18	11-AUG-18	R4164701
Strontium (Sr)-Total	0.0092		0.0010	mg/L	11-AUG-18	11-AUG-18	R4164701
Sulfur (S)-Total	0.50		0.50	mg/L	11-AUG-18	11-AUG-18	R4164701

* 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
L2145073-4 MS-08-DS Sampled By: LM/KB/DS on 10-AUG-18 @ 14:45 Matrix: WATER							
Total Metals							
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-AUG-18	11-AUG-18	R4164701
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Thorium (Th)-Total	0.00023		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Tin (Sn)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Titanium (Ti)-Total	0.0112		0.00030	mg/L	11-AUG-18	11-AUG-18	R4164701
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-AUG-18	11-AUG-18	R4164701
Uranium (U)-Total	0.00105		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164701
Vanadium (V)-Total	0.00061		0.00050	mg/L	11-AUG-18	11-AUG-18	R4164701
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	11-AUG-18	11-AUG-18	R4164701
Zirconium (Zr)-Total	0.00047		0.00030	mg/L	11-AUG-18	11-AUG-18	R4164701
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					11-AUG-18	R4164388
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	11-AUG-18	11-AUG-18	R4164489
Radiological Parameters							
Ra-226	<0.0045		0.0045	Bq/L	27-AUG-18	05-SEP-18	R4203163

* 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	Cyanide, Total	MS-B	L2145073-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Boron (B)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2145073-1, -2
Matrix Spike	Aluminum (Al)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Boron (B)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Iron (Fe)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Lithium (Li)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Potassium (K)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Silicon (Si)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Sulfur (S)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Uranium (U)-Total	MS-B	L2145073-1, -2, -3, -4
Matrix Spike	Ammonia, Total (as N)	MS-B	L2145073-1, -2, -3, -4

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
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**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Reference Information

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

Reference Information

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2145073 Report Date: 07-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4172207								
WG2851175-2 LCS								
Acidity (as CaCO3)			95.8		%		85-115	16-AUG-18
WG2851175-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	16-AUG-18
ALK-WT	**Water**							
Batch R4168138								
WG2847976-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			88.0		%		80-120	13-AUG-18
WG2847976-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.1		%		80-120	13-AUG-18
WG2847976-4 DUP		**L2145073-1**						
Alkalinity, Total (as CaCO3)		57	57		mg/L	0.9	20	13-AUG-18
WG2847976-8 DUP		**L2144541-2**						
Alkalinity, Total (as CaCO3)		263	259		mg/L	1.6	20	13-AUG-18
WG2847976-2 LCS								
Alkalinity, Total (as CaCO3)			100.2		%		85-115	13-AUG-18
WG2847976-6 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	13-AUG-18
WG2847976-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	13-AUG-18
WG2847976-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	13-AUG-18
C-DIS-ORG-WT	**Water**							
Batch R4166247								
WG2847360-3 DUP		**L2145073-1**						
Dissolved Organic Carbon		2.04	1.96		mg/L	4.2	20	12-AUG-18
WG2847360-2 LCS								
Dissolved Organic Carbon			100.2		%		80-120	12-AUG-18
WG2847360-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	12-AUG-18
WG2847360-4 MS		**L2145073-1**						
Dissolved Organic Carbon			100.4		%		70-130	12-AUG-18
CL-IC-N-WT	**Water**							
Batch R4167215								
WG2846994-14 DUP		**L2144087-1**						
Chloride (Cl)		29.0	28.9		mg/L	0.1	20	11-AUG-18
WG2846994-12 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-WT	**Water**							
Batch R4167215								
WG2846994-12 LCS								
Chloride (Cl)			100.6		%		90-110	11-AUG-18
WG2846994-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	11-AUG-18
WG2846994-13 MS		**L2144087-1**						
Chloride (Cl)			101.4		%		75-125	11-AUG-18
CN-TOT-WT	**Water**							
Batch R4167987								
WG2847826-3 DUP		**L2144857-1**						
Cyanide, Total		12.1	12.1		mg/L	0.1	20	13-AUG-18
WG2847826-2 LCS								
Cyanide, Total			89.2		%		80-120	13-AUG-18
WG2847826-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	13-AUG-18
WG2847826-4 MS		**L2144857-1**						
Cyanide, Total			N/A	MS-B	%		-	13-AUG-18
EC-WT	**Water**							
Batch R4165327								
WG2846723-28 DUP		**WG2846723-11**						
Conductivity		2120	2130		umhos/cm	0.5	10	11-AUG-18
WG2846723-10 LCS								
Conductivity			97.1		%		90-110	11-AUG-18
WG2846723-9 MB								
Conductivity			<3.0		umhos/cm		3	11-AUG-18
F-IC-N-WT	**Water**							
Batch R4167215								
WG2846994-14 DUP		**L2144087-1**						
Fluoride (F)		0.664	0.663		mg/L	0.1	20	11-AUG-18
WG2846994-12 LCS								
Fluoride (F)			101.6		%		90-110	11-AUG-18
WG2846994-11 MB								
Fluoride (F)			<0.020		mg/L		0.02	11-AUG-18
WG2846994-13 MS		**L2144087-1**						
Fluoride (F)			100.8		%		75-125	11-AUG-18
HG-D-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	**Water**							
Batch R4164489								
WG2846758-3 DUP		**L2145073-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-AUG-18
WG2846758-2 LCS								
Mercury (Hg)-Dissolved			98.8		%		80-120	11-AUG-18
WG2846758-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	11-AUG-18
WG2846758-4 MS		**L2145073-2**						
Mercury (Hg)-Dissolved			98.6		%		70-130	11-AUG-18
HG-T-CVAA-WT	**Water**							
Batch R4164488								
WG2846757-3 DUP		**L2145073-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-AUG-18
WG2846757-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	11-AUG-18
WG2846757-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	11-AUG-18
WG2846757-4 MS		**L2145073-2**						
Mercury (Hg)-Total			96.9		%		70-130	11-AUG-18
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-4 DUP		**WG2846820-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-AUG-18
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Barium (Ba)-Dissolved		0.0206	0.0203		mg/L	1.7	20	11-AUG-18
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	11-AUG-18
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-AUG-18
Calcium (Ca)-Dissolved		316	334		mg/L	5.7	20	11-AUG-18
Cesium (Cs)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-18
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	11-AUG-18
Cobalt (Co)-Dissolved		0.0047	0.0047		mg/L	0.1	20	11-AUG-18
Copper (Cu)-Dissolved		0.0323	0.0331		mg/L	2.2	20	11-AUG-18
Iron (Fe)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	11-AUG-18
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-4 DUP		**WG2846820-3**						
Lithium (Li)-Dissolved		0.054	0.057		mg/L	5.6	20	11-AUG-18
Magnesium (Mg)-Dissolved		809	814		mg/L	0.6	20	11-AUG-18
Manganese (Mn)-Dissolved		6.33	6.31		mg/L	0.4	20	11-AUG-18
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Nickel (Ni)-Dissolved		0.0060	0.0060		mg/L	0.6	20	11-AUG-18
Phosphorus (P)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	11-AUG-18
Potassium (K)-Dissolved		4.66	4.83		mg/L	3.5	20	11-AUG-18
Rubidium (Rb)-Dissolved		0.0087	0.0091		mg/L	3.9	20	11-AUG-18
Selenium (Se)-Dissolved		0.00859	0.00814		mg/L	5.4	20	11-AUG-18
Silicon (Si)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	11-AUG-18
Silver (Ag)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Sodium (Na)-Dissolved		4.74	4.84		mg/L	1.9	20	11-AUG-18
Strontium (Sr)-Dissolved		0.616	0.645		mg/L	4.7	20	11-AUG-18
Sulfur (S)-Dissolved		1460	1450		mg/L	0.6	20	11-AUG-18
Tellurium (Te)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	11-AUG-18
Thallium (Tl)-Dissolved		0.00016	0.00018		mg/L	8.7	20	11-AUG-18
Thorium (Th)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Tin (Sn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Titanium (Ti)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-AUG-18
Tungsten (W)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Uranium (U)-Dissolved		0.00036	0.00038		mg/L	5.9	20	11-AUG-18
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	11-AUG-18
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-AUG-18
Zirconium (Zr)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-AUG-18
WG2846820-2 LCS								
Aluminum (Al)-Dissolved			103.3		%		80-120	11-AUG-18
Antimony (Sb)-Dissolved			95.0		%		80-120	11-AUG-18
Arsenic (As)-Dissolved			101.5		%		80-120	11-AUG-18
Barium (Ba)-Dissolved			102.7		%		80-120	11-AUG-18
Beryllium (Be)-Dissolved			103.1		%		80-120	11-AUG-18
Bismuth (Bi)-Dissolved			104.3		%		80-120	11-AUG-18
Boron (B)-Dissolved			98.7		%		80-120	11-AUG-18
Cadmium (Cd)-Dissolved			102.5		%		80-120	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-2 LCS								
Calcium (Ca)-Dissolved			102.3		%		80-120	11-AUG-18
Cesium (Cs)-Dissolved			99.6		%		80-120	11-AUG-18
Chromium (Cr)-Dissolved			101.3		%		80-120	11-AUG-18
Cobalt (Co)-Dissolved			101.7		%		80-120	11-AUG-18
Copper (Cu)-Dissolved			102.1		%		80-120	11-AUG-18
Iron (Fe)-Dissolved			100.5		%		80-120	11-AUG-18
Lead (Pb)-Dissolved			105.9		%		80-120	11-AUG-18
Lithium (Li)-Dissolved			104.3		%		80-120	11-AUG-18
Magnesium (Mg)-Dissolved			100.1		%		80-120	11-AUG-18
Manganese (Mn)-Dissolved			101.0		%		80-120	11-AUG-18
Molybdenum (Mo)-Dissolved			102.9		%		80-120	11-AUG-18
Nickel (Ni)-Dissolved			101.6		%		80-120	11-AUG-18
Phosphorus (P)-Dissolved			103.4		%		80-120	11-AUG-18
Potassium (K)-Dissolved			100.5		%		80-120	11-AUG-18
Rubidium (Rb)-Dissolved			101.8		%		80-120	11-AUG-18
Selenium (Se)-Dissolved			100.6		%		80-120	11-AUG-18
Silicon (Si)-Dissolved			105.9		%		60-140	11-AUG-18
Silver (Ag)-Dissolved			101.8		%		80-120	11-AUG-18
Sodium (Na)-Dissolved			103.9		%		80-120	11-AUG-18
Strontium (Sr)-Dissolved			101.5		%		80-120	11-AUG-18
Sulfur (S)-Dissolved			90.3		%		80-120	11-AUG-18
Tellurium (Te)-Dissolved			100.7		%		80-120	11-AUG-18
Thallium (Tl)-Dissolved			106.8		%		80-120	11-AUG-18
Thorium (Th)-Dissolved			104.6		%		80-120	11-AUG-18
Tin (Sn)-Dissolved			99.3		%		80-120	11-AUG-18
Titanium (Ti)-Dissolved			101.2		%		80-120	11-AUG-18
Tungsten (W)-Dissolved			108.6		%		80-120	11-AUG-18
Uranium (U)-Dissolved			107.5		%		80-120	11-AUG-18
Vanadium (V)-Dissolved			103.3		%		80-120	11-AUG-18
Zinc (Zn)-Dissolved			97.2		%		80-120	11-AUG-18
Zirconium (Zr)-Dissolved			99.7		%		80-120	11-AUG-18
WG2846820-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	11-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	11-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	11-AUG-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	11-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-AUG-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	11-AUG-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	11-AUG-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	11-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	11-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	11-AUG-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	11-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	11-AUG-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	11-AUG-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	11-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	11-AUG-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	11-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	11-AUG-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	11-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	11-AUG-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-AUG-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	11-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	11-AUG-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	11-AUG-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	11-AUG-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	11-AUG-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	11-AUG-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	11-AUG-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-1 MB								
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	11-AUG-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	11-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	11-AUG-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	11-AUG-18
WG2846820-5 MS		**WG2846820-3**						
Aluminum (Al)-Dissolved			83.9		%		70-130	11-AUG-18
Antimony (Sb)-Dissolved			88.7		%		70-130	11-AUG-18
Arsenic (As)-Dissolved			93.4		%		70-130	11-AUG-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Beryllium (Be)-Dissolved			90.3		%		70-130	11-AUG-18
Bismuth (Bi)-Dissolved			89.8		%		70-130	11-AUG-18
Boron (B)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Cadmium (Cd)-Dissolved			92.6		%		70-130	11-AUG-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Cesium (Cs)-Dissolved			92.1		%		70-130	11-AUG-18
Chromium (Cr)-Dissolved			88.6		%		70-130	11-AUG-18
Copper (Cu)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Iron (Fe)-Dissolved			82.8		%		70-130	11-AUG-18
Lead (Pb)-Dissolved			93.0		%		70-130	11-AUG-18
Lithium (Li)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Molybdenum (Mo)-Dissolved			98.3		%		70-130	11-AUG-18
Phosphorus (P)-Dissolved			78.9		%		70-130	11-AUG-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Selenium (Se)-Dissolved			78.3		%		70-130	11-AUG-18
Silver (Ag)-Dissolved			92.2		%		70-130	11-AUG-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Tellurium (Te)-Dissolved			94.7		%		70-130	11-AUG-18
Thallium (Tl)-Dissolved			92.8		%		70-130	11-AUG-18
Thorium (Th)-Dissolved			94.3		%		70-130	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4166670								
WG2846820-5 MS		**WG2846820-3**						
Tin (Sn)-Dissolved			94.1		%		70-130	11-AUG-18
Titanium (Ti)-Dissolved			89.2		%		70-130	11-AUG-18
Tungsten (W)-Dissolved			97.4		%		70-130	11-AUG-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	11-AUG-18
Vanadium (V)-Dissolved			94.2		%		70-130	11-AUG-18
Zinc (Zn)-Dissolved			85.5		%		70-130	11-AUG-18
Zirconium (Zr)-Dissolved			95.4		%		70-130	11-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-4 DUP		**WG2846823-3**						
Aluminum (Al)-Total		0.162	0.174		mg/L	7.3	20	11-AUG-18
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Barium (Ba)-Total		0.0172	0.0174		mg/L	0.8	20	11-AUG-18
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Bismuth (Bi)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Boron (B)-Total		0.14	0.15		mg/L	0.9	20	11-AUG-18
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-AUG-18
Calcium (Ca)-Total		50.4	50.7		mg/L	0.5	20	11-AUG-18
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	11-AUG-18
Cesium (Cs)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-18
Cobalt (Co)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-AUG-18
Iron (Fe)-Total		0.16	0.19		mg/L	19	20	11-AUG-18
Lead (Pb)-Total		0.00076	0.00074		mg/L	2.0	20	11-AUG-18
Lithium (Li)-Total		0.015	0.015		mg/L	0.6	20	11-AUG-18
Magnesium (Mg)-Total		19.8	19.7		mg/L	0.2	20	11-AUG-18
Manganese (Mn)-Total		0.115	0.117		mg/L	2.3	20	11-AUG-18
Molybdenum (Mo)-Total		0.0123	0.0125		mg/L	1.8	20	11-AUG-18
Nickel (Ni)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	11-AUG-18
Phosphorus (P)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	11-AUG-18
Potassium (K)-Total		11.5	11.6		mg/L	0.2	20	11-AUG-18
Rubidium (Rb)-Total		0.0119	0.0122		mg/L	2.2	20	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-4 DUP		**WG2846823-3**						
Selenium (Se)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Silicon (Si)-Total		3.5	3.6		mg/L	5.2	20	11-AUG-18
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-18
Sodium (Na)-Total		48.5	48.2		mg/L	0.5	20	11-AUG-18
Strontium (Sr)-Total		0.153	0.155		mg/L	0.8	20	11-AUG-18
Sulfur (S)-Total		6.3	6.7		mg/L	5.7	25	11-AUG-18
Thallium (Tl)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-18
Tellurium (Te)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	11-AUG-18
Thorium (Th)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	25	11-AUG-18
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-AUG-18
Titanium (Ti)-Total		<0.0030	0.0037	RPD-NA	mg/L	N/A	20	11-AUG-18
Tungsten (W)-Total		0.0014	0.0014		mg/L	0.7	20	11-AUG-18
Uranium (U)-Total		0.272	0.271		mg/L	0.3	20	11-AUG-18
Vanadium (V)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	11-AUG-18
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	11-AUG-18
Zirconium (Zr)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-AUG-18
WG2846823-2 LCS								
Aluminum (Al)-Total			94.4		%		80-120	13-AUG-18
Antimony (Sb)-Total			102.8		%		80-120	13-AUG-18
Arsenic (As)-Total			97.7		%		80-120	13-AUG-18
Barium (Ba)-Total			97.9		%		80-120	13-AUG-18
Beryllium (Be)-Total			91.4		%		80-120	13-AUG-18
Bismuth (Bi)-Total			93.7		%		80-120	13-AUG-18
Boron (B)-Total			86.6		%		80-120	13-AUG-18
Cadmium (Cd)-Total			99.5		%		80-120	13-AUG-18
Calcium (Ca)-Total			94.2		%		80-120	13-AUG-18
Chromium (Cr)-Total			96.4		%		80-120	13-AUG-18
Cesium (Cs)-Total			99.7		%		80-120	13-AUG-18
Cobalt (Co)-Total			95.2		%		80-120	13-AUG-18
Copper (Cu)-Total			96.8		%		80-120	13-AUG-18
Iron (Fe)-Total			97.5		%		80-120	13-AUG-18
Lead (Pb)-Total			98.9		%		80-120	13-AUG-18
Lithium (Li)-Total			88.2		%		80-120	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-2 LCS								
Magnesium (Mg)-Total			101.8		%		80-120	13-AUG-18
Manganese (Mn)-Total			98.9		%		80-120	13-AUG-18
Molybdenum (Mo)-Total			96.1		%		80-120	13-AUG-18
Nickel (Ni)-Total			96.6		%		80-120	13-AUG-18
Phosphorus (P)-Total			97.4		%		70-130	13-AUG-18
Potassium (K)-Total			99.5		%		80-120	13-AUG-18
Rubidium (Rb)-Total			99.6		%		80-120	13-AUG-18
Selenium (Se)-Total			98.1		%		80-120	13-AUG-18
Silicon (Si)-Total			95.6		%		60-140	13-AUG-18
Silver (Ag)-Total			102.0		%		80-120	13-AUG-18
Sodium (Na)-Total			94.5		%		80-120	13-AUG-18
Strontium (Sr)-Total			96.3		%		80-120	13-AUG-18
Sulfur (S)-Total			97.0		%		80-120	13-AUG-18
Thallium (Tl)-Total			97.3		%		80-120	13-AUG-18
Tellurium (Te)-Total			95.2		%		80-120	13-AUG-18
Thorium (Th)-Total			101.5		%		70-130	13-AUG-18
Tin (Sn)-Total			99.4		%		80-120	13-AUG-18
Titanium (Ti)-Total			92.0		%		80-120	13-AUG-18
Tungsten (W)-Total			99.9		%		80-120	13-AUG-18
Uranium (U)-Total			103.4		%		80-120	13-AUG-18
Vanadium (V)-Total			97.6		%		80-120	13-AUG-18
Zinc (Zn)-Total			92.9		%		80-120	13-AUG-18
Zirconium (Zr)-Total			95.5		%		80-120	13-AUG-18
WG2846823-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	11-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	11-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	11-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	11-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	11-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-1 MB								
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	11-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	11-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	11-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	11-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	11-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	11-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	11-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	11-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	11-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	11-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	11-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	11-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	11-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	11-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	11-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	11-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	11-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	11-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	11-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	11-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	11-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	11-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	11-AUG-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	11-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	11-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	11-AUG-18
WG2846823-5 MS		**WG2846823-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	11-AUG-18
Antimony (Sb)-Total			95.4		%		70-130	11-AUG-18
Arsenic (As)-Total			96.6		%		70-130	11-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	11-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-5 MS		**WG2846823-3**						
Beryllium (Be)-Total			95.9		%		70-130	11-AUG-18
Bismuth (Bi)-Total			104.5		%		70-130	11-AUG-18
Boron (B)-Total			N/A	MS-B	%		-	11-AUG-18
Cadmium (Cd)-Total			95.4		%		70-130	11-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	11-AUG-18
Chromium (Cr)-Total			96.3		%		70-130	11-AUG-18
Cesium (Cs)-Total			93.4		%		70-130	11-AUG-18
Cobalt (Co)-Total			96.5		%		70-130	11-AUG-18
Copper (Cu)-Total			96.9		%		70-130	11-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	11-AUG-18
Lead (Pb)-Total			103.6		%		70-130	11-AUG-18
Lithium (Li)-Total			N/A	MS-B	%		-	11-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	11-AUG-18
Manganese (Mn)-Total			N/A	MS-B	%		-	11-AUG-18
Molybdenum (Mo)-Total			96.7		%		70-130	11-AUG-18
Nickel (Ni)-Total			93.8		%		70-130	11-AUG-18
Phosphorus (P)-Total			103.0		%		70-130	11-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	11-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	11-AUG-18
Selenium (Se)-Total			95.3		%		70-130	11-AUG-18
Silicon (Si)-Total			N/A	MS-B	%		-	11-AUG-18
Silver (Ag)-Total			92.8		%		70-130	11-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	11-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	11-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	11-AUG-18
Thallium (Tl)-Total			106.3		%		70-130	11-AUG-18
Tellurium (Te)-Total			89.5		%		70-130	11-AUG-18
Thorium (Th)-Total			96.7		%		70-130	11-AUG-18
Tin (Sn)-Total			92.2		%		70-130	11-AUG-18
Titanium (Ti)-Total			101.4		%		70-130	11-AUG-18
Tungsten (W)-Total			103.2		%		70-130	11-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	11-AUG-18
Vanadium (V)-Total			96.4		%		70-130	11-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4164701								
WG2846823-5 MS		**WG2846823-3**						
Zinc (Zn)-Total			85.9		%		70-130	11-AUG-18
Zirconium (Zr)-Total			84.5		%		70-130	11-AUG-18
NH3-WT	**Water**							
Batch R4167708								
WG2847596-7 DUP		**L2145073-1**						
Ammonia, Total (as N)		2.98	3.00		mg/L	0.8	20	13-AUG-18
WG2847596-6 LCS								
Ammonia, Total (as N)			100.4		%		85-115	13-AUG-18
WG2847596-5 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	13-AUG-18
WG2847596-8 MS		**L2145073-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	13-AUG-18
NO3-IC-WT	**Water**							
Batch R4167215								
WG2846994-14 DUP		**L2144087-1**						
Nitrate (as N)		0.304	0.305		mg/L	0.2	25	11-AUG-18
WG2846994-12 LCS								
Nitrate (as N)			99.9		%		70-130	11-AUG-18
WG2846994-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	11-AUG-18
WG2846994-13 MS		**L2144087-1**						
Nitrate (as N)			101.1		%		70-130	11-AUG-18
P-T-COL-WT	**Water**							
Batch R4169436								
WG2848191-3 DUP		**L2145374-1**						
Phosphorus, Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	15-AUG-18
WG2848191-2 LCS								
Phosphorus, Total			99.9		%		80-120	15-AUG-18
WG2848191-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	15-AUG-18
WG2848191-4 MS		**L2145374-1**						
Phosphorus, Total			91.9		%		70-130	15-AUG-18
PH-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R4175328								
WG2852745-2 DUP		**WG2852745-3**						
pH		7.96	7.95	J	pH units	0.01	0.2	10-AUG-18
WG2852745-1 LCS								
pH			7.00		pH units		6.9-7.1	10-AUG-18
SO4-IC-N-WT	**Water**							
Batch R4167215								
WG2846994-14 DUP		**L2144087-1**						
Sulfate (SO4)		25.5	25.5		mg/L	0.0	20	11-AUG-18
WG2846994-12 LCS								
Sulfate (SO4)			101.2		%		90-110	11-AUG-18
WG2846994-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	11-AUG-18
WG2846994-13 MS		**L2144087-1**						
Sulfate (SO4)			101.7		%		75-125	11-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4175334								
WG2852765-3 DUP		**L2145073-1**						
Total Dissolved Solids		6370	6340		mg/L	0.6	20	10-AUG-18
WG2852765-2 LCS								
Total Dissolved Solids			102.4		%		85-115	10-AUG-18
WG2852765-1 MB								
Total Dissolved Solids			<20		mg/L		20	10-AUG-18
SOLIDS-TSS-BF	**Water**							
Batch R4175329								
WG2852754-3 DUP		**L2145073-1**						
Total Suspended Solids		19.3	20.2		mg/L	4.5	25	10-AUG-18
WG2852754-2 LCS								
Total Suspended Solids			100.6		%		85-115	10-AUG-18
WG2852754-1 MB								
Total Suspended Solids			<2.0		mg/L		2	10-AUG-18
TKN-WT	**Water**							
Batch R4168095								
WG2847379-3 DUP		**L2145073-1**						
Total Kjeldahl Nitrogen		3.50	3.76		mg/L	7.0	20	13-AUG-18
WG2847379-2 LCS								
Total Kjeldahl Nitrogen			94.4		%		75-125	13-AUG-18
WG2847379-1 MB								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R4168095								
WG2847379-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	13-AUG-18
WG2847379-4 MS		**L2145073-1**						
Total Kjeldahl Nitrogen			94.9		%		70-130	13-AUG-18
TOC-WT	**Water**							
Batch R4166231								
WG2847359-3 DUP		**L2145073-1**						
Total Organic Carbon		2.40	2.71		mg/L	12	20	12-AUG-18
WG2847359-2 LCS								
Total Organic Carbon			99.4		%		80-120	12-AUG-18
WG2847359-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	12-AUG-18
WG2847359-4 MS		**L2145073-1**						
Total Organic Carbon			99.5		%		70-130	12-AUG-18

Quality Control Report

Workorder: L2145073 Report Date: 07-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, September 06, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808256
Project Name:
Project Number: L2145073

Dear Mr. Hawthorne:

Four water samples were received from ALS Environmental, on 8/14/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808256

Radium-226:

The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808256
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2145073
Client PO Number: L2145073

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2145073-1	1808256-1		WATER	10-Aug-18	
L2145073-2	1808256-2		WATER	10-Aug-18	
L2145073-3	1808256-3		WATER	10-Aug-18	
L2145073-4	1808256-4		WATER	10-Aug-18	

ALS Environmental

1808257

L2145073
WATERLOO

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2145073*
ALS requires QC data to be provided with your final results.

4x950mL HDPE @ HNO_3.

Please see enclosed 4 sample(s) in 4 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1)	**L2145073-1 MS-08**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/10/2018 8/30/2018	E2
(2)	**L2145073-2 MS-0801**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/10/2018 8/30/2018	E2
(3)	**L2145073-3 MS-08-US**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/10/2018 8/30/2018	(F) E2
(4)	**L2145073-4 MS-08-DS**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/10/2018 8/30/2018	(F) E2

CS.

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: Andrea C. Date Shipped: 11-AUG-18
Received By: C. Trumbl Date Received: 8-14-18 0945
Verified By: _____ Date Verified: _____
Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1808254

Project Manager: KMO Initials: DEJ Date: 8/14/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
2.	Are custody seals on **shipping** containers intact?	NONE	(YES)	NO
3.	Are custody seals on **sample** containers intact?	(NONE)	YES	NO
4.	Is there a COC (chain-of-custody) present?		(YES)	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		(YES)	NO
6.	Are short-hold samples present?		YES	(NO)
7.	Are all samples within holding times for the requested analyses?		(YES)	NO
8.	Were all sample containers received intact? (not broken or leaking)		(YES)	NO
9.	Is there sufficient sample for the requested analyses?		(YES)	NO
10.	Are all samples in the proper containers for the requested analyses?		(YES)	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	(YES)	NO
12.	Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	(N/A)	YES	NO
14.	Were the samples shipped on ice?		(YES)	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	(YES)	NO

Cooler #:	1							
Temperature (°C):	6							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/15/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

ORIGIN ID:YBYA (604) 253-4188
HARJIT GILL
ALS ENVIRONMENTAL LAB GROUP
LOUGHEED HIGHWAY

BURNABY, BC V5A1W9
CANADA CA

SHIP DATE: 13AUG18
ACTWGT: 20.00 LB MAN
CAD: 0347419/CAFE3210

BILL SENDER

1808252
wo 8/11/10

TO **SAMPLE RECEVING**
ALS ENVIRONMANTAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524 (US)
(970) 490-1511 REF: SUBLETS

DEPT: SUBLET

10
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80524
CO-US **DEN**

1808256

After printing this label:
CONSIGNEE COPY - PLEASE PLACE IN FRONT OF POUCH
1. Fold the printed page along the horizontal line.
2. Place label in shipping pouch and affix it to your shipment.

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AGREEMENT TO TERMS. By giving us your shipment, you agree, regardless of whether you sign the front of this Air Waybill, for yourself and as agent for and on behalf of any other person having an interest in this shipment, to all terms on this NON-NEGOTIABLE Air Waybill. In any applicable tariff, and in our current Service Guide or Standard Conditions of Carriage, copies of which are available upon request. If there is a conflict between this Air Waybill and either the tariff, Service Guide or Standard Conditions then in effect, the tariff and the terms of any customer automation agreement between the shipper and Federal Express will control(the Service Guide or Standard Conditions have secondary priority). No one is authorized to alter or modify the terms of our agreement. This Air Waybill shall be binding on us when the shipment is accepted.
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NO WARRANTIES. We make no warranties, express or implied.
CLAIM FOR LOSS, DAMAGE FOR DELAY. ALL CLAIMS MUST BE NOTIFIED TO US WITHIN 15 DAYS AFTER DELIVERY OF THE SHIPMENT FAILING WHICH NO ACTION FOR DAMAGES MAY BE BROUGHT. All claims for loss, non-delivery or mis-delivery must be received by us within 90 days after the shipment is accepted by us. The right to damages against us shall be extinguished unless an action is brought within two years from the date of delivery of the shipment or from date on which the shipment should have been delivered. Within 30 days after notification to us (of) the claim, it must be documented by sending us all relevant information about it. We are not obligated to act on any claim until all transportation charges have been paid; the claim amount may not be deducted from those charges. If the recipient accepts the shipment without noting any damage on the delivery record, we will assume the shipment was delivered in good condition. In order for us to consider s claim for damages, the content(s), original shipping cartons, and packing must be available to us for inspection.
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CUSTOMS CLEARANCE. It is your responsibility to provide proper customs documentation and confirmation, where required.
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Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2145073	**Work Order:**	1808256
Sample ID:	L2145073-1	**Lab ID:**	1808256-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/10/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/27/2018**	PrepBy: **CXW**
Ra-226	**0.041 (+/- 0.014)**		**0.0075**	**BQ/l**	NA	9/5/2018 12:42
Carr: BARIUM	*95.8*		*40-110*	*%REC*	DL = NA	9/5/2018 12:42

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2145073	**Work Order:**	1808256
Sample ID:	L2145073-2	**Lab ID:**	1808256-2
Legal Location:		**Matrix:**	WATER
Collection Date:	8/10/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **8/27/2018**	PrepBy: **CXW**
Ra-226	**0.045 (+/- 0.015)**		**0.0044**	**BQ/l**	NA	9/5/2018 12:42
Carr: BARIUM	*87.1*		*40-110*	*%REC*	DL = NA	9/5/2018 12:42

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2145073	**Work Order:**	1808256
Sample ID:	L2145073-3	**Lab ID:**	1808256-3
Legal Location:		**Matrix:**	WATER
Collection Date:	8/10/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/27/2018**	PrepBy: **CXW**	
Ra-226	0.0063 (+/- 0.0050)	U	0.0068	BQ/l	NA	9/5/2018 12:42
Carr: BARIUM	*96*		*40-110*	*%REC*	DL = NA	9/5/2018 12:42

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2145073	**Work Order:**	1808256
Sample ID:	L2145073-4	**Lab ID:**	1808256-4
Legal Location:		**Matrix:**	WATER
Collection Date:	8/10/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/27/2018**	PrepBy: **CXW**	
Ra-226	0.0043 (+/- 0.0038)	U	0.0045	BQ/l	NA	9/5/2018 12:42
Carr: BARIUM	*94.4*		*40-110*	*%REC*	DL = NA	9/5/2018 12:42

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2145073	**Work Order:**	1808256
Sample ID:	L2145073-4	**Lab ID:**	1808256-4
Legal Location:		**Matrix:**	WATER
Collection Date:	8/10/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
LT - Result is less than requested MDC but greater than achieved MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180827-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**
Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.81 (+/- 0.454)	0.0111	1.771		102	67-120					P,M3
Carr: BARIUM	15800		16150		98	40-110					

LCSD Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**
Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.49 (+/- 0.374)	0.0142	1.771		84.1	67-120		1.81	0.5	2.1	P,Y1,M3
Carr: BARIUM	16700		16150		103	40-110		15800			Y1

MB Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**
Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	-0.0010 (+/- 0.0025)	0.0062									U
Carr: BARIUM	16000		16150		99.2	40-110					

The following samples were analyzed in this batch: 1808256-1 1808256-2 1808256-3 1808256-4

AQUATOX
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Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 236894
Sample Number : 55875

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	K.B.
Location :	Waterloo ON	Time Collected :	13:55
Job Number :	L2145073	Date Collected :	2018-08-10
Substance :	MS-08	Date Received :	2018-08-11
Sampling Method :	Grab	Date Tested :	2018-08-11
Sample Description :	Cloudy, orange, odourless.	Temp. on arrival :	16.5° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments), with deviation(s) as noted below.

48-h TEST RESULTS

Substance	Effect	Value
	<u>*INVALID</u>	
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.0 g/L
Date Tested :	2018-08-09	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.1 g/L	Organism Batch :	Dm18-15
95% Confidence Limits :	5.8 - 6.3 g/L	Analyst(s) :	MJT, NK, AW, MDS
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	8.75 days	Mean Young Per Brood :	28.8
Culture Mortality :	0.4% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-15	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	Yes (see below)

Noted Deviation(s): Due to technical error, the test was accidentally terminated at ~30 hours, and is therefore invalid.

Date: 2018-08-17
yyyy-mm-dd

Approved by: _____
Project Manager

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 236894
Sample Number: 55875

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	>1000	None	8.9	8.4	5390	21.0	100	0:00

0 hours

Date & Time 2018-08-11 9:45
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	8.9	8.4	5390	21.0	100	>1000
100B	0	0	8.9	8.4	5390	21.0	100	>1000
100C	0	0	8.9	8.4	5390	21.0	100	>1000
Control A	0	0	8.4	8.4	675	21.0	99	230
Control B	0	0	8.4	8.4	675	21.0	99	230
Control C	0	0	8.4	8.4	675	21.0	99	230

Notes:

24 hours

Date & Time 2018-08-12 9:45
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	*	–	–	–	21.0
100B	–	*	–	–	–	21.0
100C	–	*	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes: *Sediment at the bottom of the 100% test concentration makes it difficult to view test organisms. (MDS)

30 hours

Date & Time 2018-08-12 15:45
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	7.6	8.2	5410	21.0
100B	0	0	7.6	8.2	5400	21.0
100C	0	0	7.7	8.2	5400	21.0
Control A	0	0	8.5	8.2	681	21.0
Control B	0	0	8.5	8.3	681	21.0
Control C	0	0	8.5	8.3	687	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-15

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: SF
Date: 2018-08-17

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Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 236894
Sample Number : 55875

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	K.B.
Location :	Waterloo ON	Time Collected :	13:55
Job Number :	L2145073	Date Collected :	2018-08-10
Substance :	MS-08	Date Received :	2018-08-11
Sampling Method :	Grab	Date Tested :	2018-08-13
Sample Description :	Cloudy, orange, odourless.	Temp. on arrival :	16.5° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*. Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments), with deviation(s) as noted below.

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.0 g/L
Date Tested :	2018-08-09	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.1 g/L	Organism Batch :	Dm18-15
95% Confidence Limits :	5.8 - 6.3 g/L	Analyst(s) :	MJT, NK, AW, MDS
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	8.75 days	Mean Young Per Brood :	27.7
Culture Mortality :	2.7% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-15	Organism Loading Rate :	11.5 mL/organism
		Test Method Deviation(s) :	Yes (see below)

Noted Deviation(s): Technical error resulted in the test having to be reset. Due to insufficient volume of sample, the loading density of one daphnid per 15 mL as specified by the test method cited above was exceeded.

Date: 2018-08-17
yyyy-mm-dd

Approved by: _____
Project Manager

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 236894
Sample Number: 55875

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	>1000	None	7.6	10.2	5350	21.0	121	0:30

0 hours

Date & Time 2018-08-13 10:50
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.5	8.9	5310	21.0	103	>1000
100B	0	0	7.5	8.9	5310	21.0	103	>1000
100C	0	0	7.5	8.9	5310	21.0	103	>1000
Control A	0	0	8.5	8.7	676	21.0	100	220
Control B	0	0	8.5	8.7	676	21.0	100	220
Control C	0	0	8.5	8.7	676	21.0	100	220

Notes:

24 hours

Date & Time 2018-08-14 10:50
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2018-08-15 10:50
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	7.5	8.1	4970	21.0
100B	0	0	7.5	8.1	4970	21.0
100C	0	0	7.5	8.2	5040	21.0
Control A	0	0	8.4	8.3	645	21.0
Control B	0	0	8.4	8.3	641	21.0
Control C	0	0	8.4	8.3	645	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-15

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: SF
Date: 2018-08-17

AQUATOX

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TOXICITY TEST REPORT
Rainbow Trout

Work Order : 236894
Sample Number : 55875

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	K.B.
Location :	Waterloo ON	Time Collected :	13:55
Job Number :	L2145073	Date Collected :	2018-08-10
Substance :	MS-08	Date Received :	2018-08-11
Sampling Method :	Grab	Date Tested :	2018-08-11
Sample Description :	Cloudy, orange, odourless.	Temp. on arrival :	16.5°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-19	Date Tested :	2018-08-13
LC50 :	3005 mg/L	Historical Mean LC50 :	3636 mg/L
95% Confidence Limits :	2359 - 3417 mg/L	Warning Limits (± 2SD) :	3001 - 4405 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	TA, MW

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.49 ± 0.20 g	Mean Fish Fork Length (± 2 SD) :	37.4 ± 5.4 mm
Range of Weights :	0.36 - 0.68 g	Range of Fork Lengths (mm) :	34 - 42 mm
Fish Loading Rate :	0.3 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	18
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-08-17
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 236894
Sample Number: 55875

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	8.9	8.4	5445	15.0	–
	Chemistry after 30min air:	9.0	8.6	5436	15.0	90

0 hours

Date & Time 2018-08-11 10:00
Technician: TA(MW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	9.0	8.6	5436	15.0	90
Control	0	0	8.1	9.4	848	15.5	100

Notes:

24 hours

Date & Time 2018-08-12 10:00
Technician: TA(MW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	9.2	9.1	5443	14.5
Control	0	0	–	–	–	14.5

Notes:

48 hours

Date & Time 2018-08-13 10:00
Technician: MV(MW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	8.1	9.0	5444	14.5
Control	0	0	–	–	–	14.5

Notes:

72 hours

Date & Time 2018-08-14 10:00
Technician: TA(MW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	9.1	5444	14.5
Control	0	0	–	–	–	14.5

Notes:

96 hours

Date & Time 2018-08-15 10:00
Technician: TA(MW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.5	9.2	5445	14.5
Control	0	0	8.3	9.4	827	14.5

Notes:

Control organisms showing stress: 0
Organism Batch : T18-19

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: SF
Date: 2018-08-17

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No.: 236894

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500640417
Field Sampler Name (print):	
Signature:	
Affiliation:	
Sample Storage (prior to shipping):	
Custody Relinquished by:	
Date/Time Shipped:	

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	~~Wayne Smither~~ / Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-08-10	13:55	L2145073-1 MS-08	55875	6.5	X		X									1

For Lab Use Only

Received By	MA/RD
Date	2018-08-11
Time	0805
Storage Location	
Storage Temp (°C)	

MK

Please list any special requests or instructions:

~~Regular~~ Biofinland Toxicity Tests (RUSH)
Saturday Morning Courier Delivery
Rush Final Report
Daily Updates Please
Daily Parameter Updates Please (O2, pH)

Distribution List:
rick.hawthorne@alsglobal.com
bimcore@alsglobal.com

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2145073-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Baffinland Iron Mines Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Wiliam Bowden and Connor Devereaux	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☑
Phone:	647-253-0596 EXT 6016	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	2275 Upper Middle Rd. E., Suite #300	Email 1 or Fax bimcore@alsglobal.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Oakville, ON	Email 2 bimww@alsglobal.com	
Postal Code:	L6H 0C3	Email 3	Analysis Request
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:		Email 1 or Fax ap@baffinland.com	
Contact:		Email 2 commercial@baffinland.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	23642 /Q42455	AFE/Cost Center:	PO#
Job #:	MS-08 Effluent Characterization	Major/Minor Code:	Routing Code:
PO / AFE:	4500040417	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2145073 11A

ALS Contact: Sampler: LM/KB/DS

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-MMER-WT	BIM-MMER-EFF	Group 3	Number of Containers
1	MS-08	10-Aug-18	13:55	Water	E0		E0	10
2	MS-0801	10-Aug-18	13:55	Water	E0			9
3	MS-08-US	10-Aug-18	15:25	Water		E0		7
4	MS-08-DS	10-Aug-18	14:45	Water		E0		7

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Please hold 1 x 1L General Chemistry bottle unless needed for analysis
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			9.4	10.9	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 10-Aug-18	Time: 16:00	Received by:	Date:	Time:	Received by:	Date: 10-Aug-18	Time: 19:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 17-AUG-18
Report Date: 12-SEP-18 14:51 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2148404

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2148404-1 MS-08 Sampled By: DZ/DS on 15-AUG-18 @ 17:00 Matrix: WATER							
Physical Tests							
Conductivity	5290		3.0	umhos/cm		17-AUG-18	R4175855
pH	8.57		0.10	pH units		15-AUG-18	R4174956
Total Suspended Solids	12.0		2.0	mg/L		16-AUG-18	R4174964
Total Dissolved Solids	7000		20	mg/L		17-AUG-18	R4175865
Turbidity	13.0		0.10	NTU		17-AUG-18	R4179816
Anions and Nutrients							
Ammonia, Total (as N)	3.49	DLHC	0.20	mg/L		06-SEP-18	R4204262
Cyanides							
Cyanide, Total	0.48	DLM	0.10	mg/L		24-AUG-18	R4185109
Total Metals							
Aluminum (Al)-Total	0.072	DLHC	0.050	mg/L	21-AUG-18	21-AUG-18	R4179823
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Barium (Ba)-Total	0.0220	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	21-AUG-18	21-AUG-18	R4179823
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	21-AUG-18	21-AUG-18	R4179823
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	21-AUG-18	21-AUG-18	R4179823
Calcium (Ca)-Total	365	DLHC	0.50	mg/L	21-AUG-18	21-AUG-18	R4179823
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	21-AUG-18	21-AUG-18	R4179823
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	21-AUG-18	21-AUG-18	R4179823
Cobalt (Co)-Total	0.0348	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Copper (Cu)-Total	0.027	DLHC	0.010	mg/L	21-AUG-18	21-AUG-18	R4179823
Iron (Fe)-Total	2.71	DLHC	0.10	mg/L	21-AUG-18	21-AUG-18	R4179823
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	21-AUG-18	21-AUG-18	R4179823
Lithium (Li)-Total	0.063	DLHC	0.010	mg/L	21-AUG-18	21-AUG-18	R4179823
Magnesium (Mg)-Total	986	DLHC	0.050	mg/L	21-AUG-18	21-AUG-18	R4179823
Manganese (Mn)-Total	10.5	DLHC	0.0050	mg/L	21-AUG-18	21-AUG-18	R4179823
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	21-AUG-18	21-AUG-18	R4179823
Nickel (Ni)-Total	0.0402	DLHC	0.0050	mg/L	21-AUG-18	21-AUG-18	R4179823
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	21-AUG-18	21-AUG-18	R4179823
Potassium (K)-Total	5.60	DLHC	0.50	mg/L	21-AUG-18	21-AUG-18	R4179823
Rubidium (Rb)-Total	0.0095	DLHC	0.0020	mg/L	21-AUG-18	21-AUG-18	R4179823
Selenium (Se)-Total	0.0100	DLHC	0.00050	mg/L	21-AUG-18	21-AUG-18	R4179823
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	21-AUG-18	21-AUG-18	R4179823
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	21-AUG-18	21-AUG-18	R4179823
Sodium (Na)-Total	5.81	DLHC	0.50	mg/L	21-AUG-18	21-AUG-18	R4179823
Strontium (Sr)-Total	0.751	DLHC	0.010	mg/L	21-AUG-18	21-AUG-18	R4179823
Sulfur (S)-Total	1780	DLHC	5.0	mg/L	21-AUG-18	21-AUG-18	R4179823
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	21-AUG-18	21-AUG-18	R4179823
Thallium (Tl)-Total	0.00017	DLHC	0.00010	mg/L	21-AUG-18	21-AUG-18	R4179823
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823

* 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
L2148404-1 MS-08 Sampled By: DZ/DS on 15-AUG-18 @ 17:00 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	21-AUG-18	21-AUG-18	R4179823
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	21-AUG-18	21-AUG-18	R4179823
Uranium (U)-Total	0.00061	DLHC	0.00010	mg/L	21-AUG-18	21-AUG-18	R4179823
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	21-AUG-18	21-AUG-18	R4179823
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	21-AUG-18	21-AUG-18	R4179823
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	21-AUG-18	21-AUG-18	R4179823
Radiological Parameters							
Ra-226	0.033		0.0073	Bq/L	05-SEP-18	11-SEP-18	R4211673

* 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	Barium (Ba)-Total	MS-B	L2148404-1
Matrix Spike	Boron (B)-Total	MS-B	L2148404-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2148404-1
Matrix Spike	Cobalt (Co)-Total	MS-B	L2148404-1
Matrix Spike	Copper (Cu)-Total	MS-B	L2148404-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2148404-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2148404-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2148404-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2148404-1
Matrix Spike	Nickel (Ni)-Total	MS-B	L2148404-1
Matrix Spike	Potassium (K)-Total	MS-B	L2148404-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2148404-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2148404-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2148404-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2148404-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2148404-1
Matrix Spike	Uranium (U)-Total	MS-B	L2148404-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2148404-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

Reference Information

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2148404 Report Date: 12-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4185109								
WG2858819-3 DUP		**L2150587-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	24-AUG-18
WG2858819-2 LCS								
Cyanide, Total			91.2		%		80-120	24-AUG-18
WG2858819-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	24-AUG-18
WG2858819-4 MS		**L2150587-1**						
Cyanide, Total			89.2		%		70-130	24-AUG-18
EC-WT	**Water**							
Batch R4175855								
WG2852103-23 DUP		**WG2852103-22**						
Conductivity		1360	1360		umhos/cm	0.4	10	17-AUG-18
WG2852103-21 LCS								
Conductivity			93.7		%		90-110	17-AUG-18
WG2852103-20 MB								
Conductivity			<3.0		umhos/cm		3	17-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-4 DUP		**WG2854938-3**						
Aluminum (Al)-Total		0.072	0.073		mg/L	1.6	20	21-AUG-18
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-AUG-18
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-AUG-18
Barium (Ba)-Total		0.0220	0.0223		mg/L	1.3	20	21-AUG-18
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-AUG-18
Bismuth (Bi)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	21-AUG-18
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	21-AUG-18
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-AUG-18
Calcium (Ca)-Total		365	360		mg/L	1.5	20	21-AUG-18
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	21-AUG-18
Cesium (Cs)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-AUG-18
Cobalt (Co)-Total		0.0348	0.0360		mg/L	3.3	20	21-AUG-18
Copper (Cu)-Total		0.027	0.027		mg/L	0.9	20	21-AUG-18
Iron (Fe)-Total		2.71	2.80		mg/L	3.4	20	21-AUG-18
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	21-AUG-18
Lithium (Li)-Total		0.063	0.056		mg/L	12	20	21-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-4 DUP		**WG2854938-3**						
Magnesium (Mg)-Total		986	987		mg/L	0.2	20	21-AUG-18
Manganese (Mn)-Total		10.5	10.8		mg/L	2.1	20	21-AUG-18
Molybdenum (Mo)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	21-AUG-18
Nickel (Ni)-Total		0.0402	0.0408		mg/L	1.5	20	21-AUG-18
Phosphorus (P)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	21-AUG-18
Potassium (K)-Total		5.60	5.65		mg/L	0.8	20	21-AUG-18
Rubidium (Rb)-Total		0.0095	0.0101		mg/L	6.0	20	21-AUG-18
Selenium (Se)-Total		0.0100	0.0102		mg/L	1.4	20	21-AUG-18
Silicon (Si)-Total		<1.0	<1.0	RPD-NA	mg/L	N/A	20	21-AUG-18
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	21-AUG-18
Sodium (Na)-Total		5.81	5.78		mg/L	0.4	20	21-AUG-18
Strontium (Sr)-Total		0.751	0.750		mg/L	0.2	20	21-AUG-18
Sulfur (S)-Total		1780	1770		mg/L	0.6	25	21-AUG-18
Thallium (Tl)-Total		0.00017	0.00017		mg/L	1.7	20	21-AUG-18
Tellurium (Te)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	21-AUG-18
Thorium (Th)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	25	21-AUG-18
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-AUG-18
Titanium (Ti)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	21-AUG-18
Tungsten (W)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	21-AUG-18
Uranium (U)-Total		0.00061	0.00061		mg/L	0.8	20	21-AUG-18
Vanadium (V)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	21-AUG-18
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	21-AUG-18
Zirconium (Zr)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	21-AUG-18
WG2854938-2 LCS								
Aluminum (Al)-Total			99.7		%		80-120	21-AUG-18
Antimony (Sb)-Total			100.6		%		80-120	21-AUG-18
Arsenic (As)-Total			99.5		%		80-120	21-AUG-18
Barium (Ba)-Total			104.2		%		80-120	21-AUG-18
Beryllium (Be)-Total			96.6		%		80-120	21-AUG-18
Bismuth (Bi)-Total			98.0		%		80-120	21-AUG-18
Boron (B)-Total			90.5		%		80-120	21-AUG-18
Cadmium (Cd)-Total			101.5		%		80-120	21-AUG-18
Calcium (Ca)-Total			96.8		%		80-120	21-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-2 LCS								
Chromium (Cr)-Total			101.1		%		80-120	21-AUG-18
Cesium (Cs)-Total			97.6		%		80-120	21-AUG-18
Cobalt (Co)-Total			98.8		%		80-120	21-AUG-18
Copper (Cu)-Total			100.4		%		80-120	21-AUG-18
Iron (Fe)-Total			95.0		%		80-120	21-AUG-18
Lead (Pb)-Total			94.8		%		80-120	21-AUG-18
Lithium (Li)-Total			90.2		%		80-120	21-AUG-18
Magnesium (Mg)-Total			110.0		%		80-120	21-AUG-18
Manganese (Mn)-Total			98.8		%		80-120	21-AUG-18
Molybdenum (Mo)-Total			97.0		%		80-120	21-AUG-18
Nickel (Ni)-Total			99.4		%		80-120	21-AUG-18
Phosphorus (P)-Total			98.8		%		70-130	21-AUG-18
Potassium (K)-Total			103.1		%		80-120	21-AUG-18
Rubidium (Rb)-Total			101.4		%		80-120	21-AUG-18
Selenium (Se)-Total			99.2		%		80-120	21-AUG-18
Silicon (Si)-Total			99.2		%		60-140	21-AUG-18
Silver (Ag)-Total			97.6		%		80-120	21-AUG-18
Sodium (Na)-Total			105.7		%		80-120	21-AUG-18
Strontium (Sr)-Total			101.1		%		80-120	21-AUG-18
Sulfur (S)-Total			102.3		%		80-120	21-AUG-18
Thallium (Tl)-Total			93.5		%		80-120	21-AUG-18
Tellurium (Te)-Total			97.4		%		80-120	21-AUG-18
Thorium (Th)-Total			95.5		%		70-130	21-AUG-18
Tin (Sn)-Total			95.6		%		80-120	21-AUG-18
Titanium (Ti)-Total			97.4		%		80-120	21-AUG-18
Tungsten (W)-Total			90.9		%		80-120	21-AUG-18
Uranium (U)-Total			95.5		%		80-120	21-AUG-18
Vanadium (V)-Total			102.4		%		80-120	21-AUG-18
Zinc (Zn)-Total			91.1		%		80-120	21-AUG-18
Zirconium (Zr)-Total			92.9		%		80-120	21-AUG-18
WG2854938-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	21-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	21-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	21-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	21-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	21-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	21-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	21-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	21-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	21-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	21-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	21-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	21-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	21-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	21-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	21-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	21-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	21-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	21-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	21-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	21-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	21-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	22-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	21-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	21-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	21-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	21-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	21-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	21-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	21-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	21-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	21-AUG-18
WG2854938-5 MS		**WG2854938-3**						
Aluminum (Al)-Total			91.2		%		70-130	21-AUG-18
Antimony (Sb)-Total			97.9		%		70-130	21-AUG-18
Arsenic (As)-Total			101.2		%		70-130	21-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	21-AUG-18
Beryllium (Be)-Total			92.3		%		70-130	21-AUG-18
Bismuth (Bi)-Total			91.4		%		70-130	21-AUG-18
Boron (B)-Total			N/A	MS-B	%		-	21-AUG-18
Cadmium (Cd)-Total			96.0		%		70-130	21-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	21-AUG-18
Chromium (Cr)-Total			103.0		%		70-130	21-AUG-18
Cesium (Cs)-Total			98.6		%		70-130	21-AUG-18
Cobalt (Co)-Total			N/A	MS-B	%		-	21-AUG-18
Copper (Cu)-Total			N/A	MS-B	%		-	21-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	21-AUG-18
Lead (Pb)-Total			90.0		%		70-130	21-AUG-18
Lithium (Li)-Total			N/A	MS-B	%		-	21-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	21-AUG-18
Manganese (Mn)-Total			N/A	MS-B	%		-	21-AUG-18
Molybdenum (Mo)-Total			102.8		%		70-130	21-AUG-18
Nickel (Ni)-Total			N/A	MS-B	%		-	21-AUG-18
Phosphorus (P)-Total			103.2		%		70-130	21-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	21-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	21-AUG-18
Selenium (Se)-Total			105.3		%		70-130	21-AUG-18
Silicon (Si)-Total			N/A	MS-B	%		-	21-AUG-18
Silver (Ag)-Total			92.4		%		70-130	21-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	21-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	21-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	21-AUG-18
Thallium (Tl)-Total			89.6		%		70-130	21-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4179823								
WG2854938-5 MS		**WG2854938-3**						
Tellurium (Te)-Total			97.0		%		70-130	21-AUG-18
Thorium (Th)-Total			93.1		%		70-130	21-AUG-18
Tin (Sn)-Total			95.7		%		70-130	21-AUG-18
Titanium (Ti)-Total			98.3		%		70-130	21-AUG-18
Tungsten (W)-Total			92.8		%		70-130	21-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	21-AUG-18
Vanadium (V)-Total			106.4		%		70-130	21-AUG-18
Zinc (Zn)-Total			91.0		%		70-130	21-AUG-18
Zirconium (Zr)-Total			95.5		%		70-130	21-AUG-18
NH3-WT	**Water**							
Batch R4204262								
WG2869813-3 DUP		**L2155697-1**						
Ammonia, Total (as N)		39.1	40.1		mg/L	2.6	20	06-SEP-18
WG2869813-2 LCS								
Ammonia, Total (as N)			105.4		%		85-115	06-SEP-18
WG2869813-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	06-SEP-18
WG2869813-4 MS		**L2155697-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	06-SEP-18
PH-BF	**Water**							
Batch R4174956								
WG2852317-2 DUP		**L2148404-1**						
pH		8.57	8.54	J	pH units	0.03	0.2	15-AUG-18
WG2852317-1 LCS								
pH			7.03		pH units		6.9-7.1	15-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4175865								
WG2853319-3 DUP		**L2148404-1**						
Total Dissolved Solids		7000	7010		mg/L	0.2	20	17-AUG-18
WG2853319-2 LCS								
Total Dissolved Solids			93.5		%		85-115	17-AUG-18
WG2853319-1 MB								
Total Dissolved Solids			<20		mg/L		20	17-AUG-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4174964								
WG2852329-3 DUP		**L2148404-1**						
Total Suspended Solids		12.0	10.4		mg/L	14	25	16-AUG-18
WG2852329-2 LCS								
Total Suspended Solids			98.0		%		85-115	16-AUG-18
WG2852329-1 MB								
Total Suspended Solids			<2.0		mg/L		2	16-AUG-18
TURBIDITY-BF	**Water**							
Batch R4179816								
WG2856153-3 DUP		**L2148672-1**						
Turbidity		14.4	14.6		NTU	1.4	15	17-AUG-18
WG2856153-2 LCS								
Turbidity			109.0		%		85-115	17-AUG-18
WG2856153-1 MB								
Turbidity			<0.10		NTU		0.1	17-AUG-18

Quality Control Report

Workorder: L2148404 Report Date: 12-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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

L2148404-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2: commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2148404

ALS Contact:

Sampler: DZ/DS

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐		1 Business day [E1] ☐
	3 day [P3]	☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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	F/P	MMER-DEL (with Total ammonia expressed as Nitrogen)	Number of Containers
	MS-08	15-Aug-18	17:00	Water	R		6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			15.8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 15-Aug-18	Time: 18:00	Received by:	Date:	Time:	Received by: XP	Date: 17-8-18	Time: 11:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 21-AUG-18
Report Date: 01-OCT-18 14:00 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2150213

Project P.O. #: 4500040417
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2150213-1 MS-08 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Physical Tests							
Conductivity	3890		3.0	umhos/cm		23-AUG-18	R4181021
Hardness (as CaCO3)	2760		10	mg/L		23-AUG-18	
pH	8.83		0.10	pH units		22-AUG-18	R4180879
Total Suspended Solids	7.2		2.0	mg/L		22-AUG-18	R4180880
Total Dissolved Solids	3920		20	mg/L		22-AUG-18	R4180217
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		24-AUG-18	R4182657
Alkalinity, Total (as CaCO3)	48		10	mg/L		23-AUG-18	R4181226
Ammonia, Total (as N)	1.52	DLHC	0.040	mg/L		23-AUG-18	R4181433
Chloride (Cl)	7.9	DLDS	5.0	mg/L		22-AUG-18	R4181346
Fluoride (F)	<0.20	DLDS	0.20	mg/L		22-AUG-18	R4181346
Nitrate (as N)	9.76	DLDS	0.20	mg/L		22-AUG-18	R4181346
Total Kjeldahl Nitrogen	2.19		0.15	mg/L	22-AUG-18	23-AUG-18	R4181444
Phosphorus, Total	<0.030	DLM	0.030	mg/L	22-AUG-18	23-AUG-18	R4180833
Sulfate (SO4)	2700	DLDS	3.0	mg/L		22-AUG-18	R4181346
Cyanides							
Cyanide, Total	<0.020	DLM	0.020	mg/L		23-AUG-18	R4181387
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.94		0.50	mg/L		22-AUG-18	R4180854
Total Organic Carbon	3.18		0.50	mg/L		22-AUG-18	R4180855
Total Metals							
Aluminum (Al)-Total	0.057	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Barium (Ba)-Total	0.0182	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180887
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Calcium (Ca)-Total	206	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Cobalt (Co)-Total	0.0189	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Copper (Cu)-Total	0.012	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Iron (Fe)-Total	1.71	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180887
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Lithium (Li)-Total	0.040	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Magnesium (Mg)-Total	617	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Manganese (Mn)-Total	5.61	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-18	R4181260
Molybdenum (Mo)-Total	0.00063	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Nickel (Ni)-Total	0.0242	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887

* 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
L2150213-1 MS-08 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Potassium (K)-Total	4.99	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Rubidium (Rb)-Total	0.0070	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180887
Selenium (Se)-Total	0.00620	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	22-AUG-18	22-AUG-18	R4180887
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Sodium (Na)-Total	4.76	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Strontium (Sr)-Total	0.379	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Sulfur (S)-Total	1010	DLHC	5.0	mg/L	22-AUG-18	22-AUG-18	R4180887
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180887
Thallium (Tl)-Total	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180887
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Uranium (U)-Total	0.00061	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	22-AUG-18	22-AUG-18	R4180887
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180887
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-AUG-18	R4180894
Dissolved Metals Filtration Location	FIELD					22-AUG-18	R4180721
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180884
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Barium (Ba)-Dissolved	0.0155	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180884
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	22-AUG-18	22-AUG-18	R4180884
Calcium (Ca)-Dissolved	194	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Cobalt (Co)-Dissolved	0.0060	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Copper (Cu)-Dissolved	0.0103	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180884
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Lithium (Li)-Dissolved	0.040	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Magnesium (Mg)-Dissolved	553	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180884
Manganese (Mn)-Dissolved	4.47	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	23-AUG-18	23-AUG-18	R4181262

* 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
L2150213-1 MS-08 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	0.00062	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Nickel (Ni)-Dissolved	0.0091	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Potassium (K)-Dissolved	4.56	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Rubidium (Rb)-Dissolved	0.0067	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Selenium (Se)-Dissolved	0.00571	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Sodium (Na)-Dissolved	4.38	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Strontium (Sr)-Dissolved	0.355	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Sulfur (S)-Dissolved	913	DLHC	5.0	mg/L	22-AUG-18	22-AUG-18	R4180884
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Thallium (Tl)-Dissolved	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180884
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Uranium (U)-Dissolved	0.00036	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180884
Radiological Parameters							
Ra-226	0.020		0.0081	Bq/L	20-SEP-18	30-SEP-18	R4252755
L2150213-2 MS-0801 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Physical Tests							
Conductivity	3960		3.0	umhos/cm		23-AUG-18	R4181021
Hardness (as CaCO3)	2550		10	mg/L		23-AUG-18	
pH	8.85		0.10	pH units		22-AUG-18	R4180879
Total Suspended Solids	6.0		2.0	mg/L		22-AUG-18	R4180880
Total Dissolved Solids	3800		20	mg/L		22-AUG-18	R4180217
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		24-AUG-18	R4182657
Alkalinity, Total (as CaCO3)	50		10	mg/L		23-AUG-18	R4181226
Ammonia, Total (as N)	1.58	DLHC	0.040	mg/L		23-AUG-18	R4181433
Chloride (Cl)	8.6	DLDS	5.0	mg/L		22-AUG-18	R4181346
Fluoride (F)	<0.20	DLDS	0.20	mg/L		22-AUG-18	R4181346
Nitrate (as N)	10.3	DLDS	0.20	mg/L		22-AUG-18	R4181346
Total Kjeldahl Nitrogen	2.17		0.15	mg/L	22-AUG-18	23-AUG-18	R4181444
Phosphorus, Total	<0.030	DLM	0.030	mg/L	22-AUG-18	23-AUG-18	R4180833
Sulfate (SO4)	2830	DLDS	3.0	mg/L		22-AUG-18	R4181346

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2150213-2 MS-0801 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Anions and Nutrients							
Cyanides							
Cyanide, Total	0.0145		0.0020	mg/L		23-AUG-18	R4181387
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.00		0.50	mg/L		22-AUG-18	R4180854
Total Organic Carbon	3.08		0.50	mg/L		22-AUG-18	R4180855
Total Metals							
Aluminum (Al)-Total	0.060	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Barium (Ba)-Total	0.0178	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180887
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Calcium (Ca)-Total	214	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Cobalt (Co)-Total	0.0191	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Copper (Cu)-Total	0.012	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Iron (Fe)-Total	1.70	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180887
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Lithium (Li)-Total	0.041	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Magnesium (Mg)-Total	620	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Manganese (Mn)-Total	5.72	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-18	R4181260
Molybdenum (Mo)-Total	0.00057	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Nickel (Ni)-Total	0.0247	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Potassium (K)-Total	5.05	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Rubidium (Rb)-Total	0.0072	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180887
Selenium (Se)-Total	0.00660	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	22-AUG-18	22-AUG-18	R4180887
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Sodium (Na)-Total	4.78	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Strontium (Sr)-Total	0.390	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Sulfur (S)-Total	1030	DLHC	5.0	mg/L	22-AUG-18	22-AUG-18	R4180887
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180887
Thallium (Tl)-Total	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180887
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2150213-2 MS-0801 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Total Metals							
Uranium (U)-Total	0.00063	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	22-AUG-18	22-AUG-18	R4180887
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180887
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-AUG-18	R4180894
Dissolved Metals Filtration Location	FIELD					22-AUG-18	R4180721
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180884
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Barium (Ba)-Dissolved	0.0144	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180884
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	22-AUG-18	22-AUG-18	R4180884
Calcium (Ca)-Dissolved	177	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Cobalt (Co)-Dissolved	0.0054	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Copper (Cu)-Dissolved	0.0092	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	22-AUG-18	22-AUG-18	R4180884
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Lithium (Li)-Dissolved	0.034	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Magnesium (Mg)-Dissolved	512	DLHC	0.050	mg/L	22-AUG-18	22-AUG-18	R4180884
Manganese (Mn)-Dissolved	4.09	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	23-AUG-18	23-AUG-18	R4181262
Molybdenum (Mo)-Dissolved	0.00063	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Nickel (Ni)-Dissolved	0.0080	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Potassium (K)-Dissolved	4.05	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Rubidium (Rb)-Dissolved	0.0062	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Selenium (Se)-Dissolved	0.00504	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	22-AUG-18	22-AUG-18	R4180884
Sodium (Na)-Dissolved	3.96	DLHC	0.50	mg/L	22-AUG-18	22-AUG-18	R4180884
Strontium (Sr)-Dissolved	0.324	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Sulfur (S)-Dissolved	848	DLHC	5.0	mg/L	22-AUG-18	22-AUG-18	R4180884
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	22-AUG-18	22-AUG-18	R4180884
Thallium (Tl)-Dissolved	<0.00010	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884

* 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
L2150213-2 MS-0801 Sampled By: BW/LM/TB on 21-AUG-18 @ 09:00 Matrix: WATER							
Dissolved Metals							
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180884
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	22-AUG-18	22-AUG-18	R4180884
Uranium (U)-Dissolved	0.00033	DLHC	0.00010	mg/L	22-AUG-18	22-AUG-18	R4180884
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	22-AUG-18	22-AUG-18	R4180884
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	22-AUG-18	22-AUG-18	R4180884
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	22-AUG-18	22-AUG-18	R4180884
Radiological Parameters							
Ra-226	0.026		0.0070	Bq/L	20-SEP-18	30-SEP-18	R4252755

* 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	Barium (Ba)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Boron (B)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2150213-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2150213-1, -2
Matrix Spike	Boron (B)-Total	MS-B	L2150213-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2150213-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2150213-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2150213-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2150213-1, -2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2150213-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2150213-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2150213-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2150213-1, -2
Matrix Spike	Ammonia, Total (as N)	MS-B	L2150213-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

Reference Information

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2150213 Report Date: 01-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4182657								
WG2859041-3 DUP		**L2151245-1**						
Acidity (as CaCO3)		43.6	42.2		mg/L	3.3	20	24-AUG-18
WG2859041-2 LCS								
Acidity (as CaCO3)			93.2		%		85-115	24-AUG-18
WG2859041-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	24-AUG-18
ALK-WT	**Water**							
Batch R4181226								
WG2857768-11 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			95.8		%		80-120	23-AUG-18
WG2857768-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			90.1		%		80-120	23-AUG-18
WG2857768-12 DUP		**L2150213-1**						
Alkalinity, Total (as CaCO3)		48	51		mg/L	5.3	20	23-AUG-18
WG2857768-4 DUP		**L2150580-3**						
Alkalinity, Total (as CaCO3)		446	443		mg/L	0.6	20	23-AUG-18
WG2857768-10 LCS								
Alkalinity, Total (as CaCO3)			100.2		%		85-115	23-AUG-18
WG2857768-2 LCS								
Alkalinity, Total (as CaCO3)			100.0		%		85-115	23-AUG-18
WG2857768-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	23-AUG-18
WG2857768-9 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	23-AUG-18
C-DIS-ORG-WT	**Water**							
Batch R4180854								
WG2857242-3 DUP		**L2150213-1**						
Dissolved Organic Carbon		2.94	2.75		mg/L	6.5	20	22-AUG-18
WG2857242-2 LCS								
Dissolved Organic Carbon			109.3		%		80-120	22-AUG-18
WG2857242-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-AUG-18
WG2857242-4 MS		**L2150213-1**						
Dissolved Organic Carbon			105.4		%		70-130	22-AUG-18
CL-IC-N-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-WT	**Water**							
Batch R4181346								
WG2856380-20 DUP		**L2150259-3**						
Chloride (Cl)		<2.0	<2.0	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2856380-17 LCS								
Chloride (Cl)			101.6		%		90-110	22-AUG-18
WG2856380-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-AUG-18
WG2856380-19 MS		**L2150259-3**						
Chloride (Cl)			102.5		%		75-125	22-AUG-18
CN-TOT-WT	**Water**							
Batch R4181387								
WG2857418-3 DUP		**L2150213-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	23-AUG-18
WG2857418-2 LCS								
Cyanide, Total			90.1		%		80-120	23-AUG-18
WG2857418-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	23-AUG-18
WG2857418-4 MS		**L2150213-1**						
Cyanide, Total			77.1		%		70-130	23-AUG-18
EC-WT	**Water**							
Batch R4181021								
WG2857499-4 DUP		**WG2857499-3**						
Conductivity		3960	3960		umhos/cm	0.0	10	23-AUG-18
WG2857499-2 LCS								
Conductivity			101.1		%		90-110	23-AUG-18
WG2857499-1 MB								
Conductivity			<3.0		umhos/cm		3	23-AUG-18
F-IC-N-WT	**Water**							
Batch R4181346								
WG2856380-20 DUP		**L2150259-3**						
Fluoride (F)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2856380-17 LCS								
Fluoride (F)			102.4		%		90-110	22-AUG-18
WG2856380-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-AUG-18
WG2856380-19 MS		**L2150259-3**						
Fluoride (F)			101.1		%		75-125	22-AUG-18
HG-D-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	**Water**							
Batch R4181262								
WG2857476-4 DUP		**WG2857476-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-AUG-18
WG2857476-2 LCS								
Mercury (Hg)-Dissolved			97.9		%		80-120	23-AUG-18
WG2857476-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	23-AUG-18
WG2857476-6 MS		**WG2857476-5**						
Mercury (Hg)-Dissolved			98.8		%		70-130	23-AUG-18
HG-T-CVAA-WT	**Water**							
Batch R4181260								
WG2857474-3 DUP		**L2150213-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	23-AUG-18
WG2857474-2 LCS								
Mercury (Hg)-Total			99.5		%		80-120	23-AUG-18
WG2857474-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	23-AUG-18
WG2857474-4 MS		**L2150213-2**						
Mercury (Hg)-Total			104.0		%		70-130	23-AUG-18
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-4 DUP		**WG2857194-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-AUG-18
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Barium (Ba)-Dissolved		0.0155	0.0150		mg/L	3.1	20	22-AUG-18
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-AUG-18
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	22-AUG-18
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-18
Calcium (Ca)-Dissolved		194	186		mg/L	4.1	20	22-AUG-18
Cesium (Cs)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-AUG-18
Cobalt (Co)-Dissolved		0.0060	0.0053		mg/L	11	20	22-AUG-18
Copper (Cu)-Dissolved		0.0103	0.0093		mg/L	10	20	22-AUG-18
Iron (Fe)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	22-AUG-18
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-4 DUP		**WG2857194-3**						
Lithium (Li)-Dissolved		0.040	0.035		mg/L	15	20	22-AUG-18
Magnesium (Mg)-Dissolved		553	528		mg/L	4.8	20	22-AUG-18
Manganese (Mn)-Dissolved		4.47	4.06		mg/L	9.5	20	22-AUG-18
Molybdenum (Mo)-Dissolved		0.00062	0.00057		mg/L	8.5	20	22-AUG-18
Nickel (Ni)-Dissolved		0.0091	0.0084		mg/L	8.0	20	22-AUG-18
Phosphorus (P)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	22-AUG-18
Potassium (K)-Dissolved		4.56	4.18		mg/L	8.7	20	22-AUG-18
Rubidium (Rb)-Dissolved		0.0067	0.0060		mg/L	11	20	22-AUG-18
Selenium (Se)-Dissolved		0.00571	0.00542		mg/L	5.1	20	22-AUG-18
Silicon (Si)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	22-AUG-18
Silver (Ag)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-AUG-18
Sodium (Na)-Dissolved		4.38	4.07		mg/L	7.4	20	22-AUG-18
Strontium (Sr)-Dissolved		0.355	0.330		mg/L	7.3	20	22-AUG-18
Sulfur (S)-Dissolved		913	860		mg/L	6.0	20	22-AUG-18
Tellurium (Te)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	22-AUG-18
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Thorium (Th)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Tin (Sn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Titanium (Ti)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-AUG-18
Tungsten (W)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Uranium (U)-Dissolved		0.00036	0.00035		mg/L	3.8	20	22-AUG-18
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-AUG-18
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-AUG-18
Zirconium (Zr)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2857194-2 LCS								
Aluminum (Al)-Dissolved			107.5		%		80-120	22-AUG-18
Antimony (Sb)-Dissolved			101.4		%		80-120	22-AUG-18
Arsenic (As)-Dissolved			104.2		%		80-120	22-AUG-18
Barium (Ba)-Dissolved			107.2		%		80-120	22-AUG-18
Beryllium (Be)-Dissolved			107.4		%		80-120	22-AUG-18
Bismuth (Bi)-Dissolved			102.4		%		80-120	22-AUG-18
Boron (B)-Dissolved			98.1		%		80-120	22-AUG-18
Cadmium (Cd)-Dissolved			101.2		%		80-120	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-2 LCS								
Calcium (Ca)-Dissolved			106.4		%		80-120	22-AUG-18
Cesium (Cs)-Dissolved			101.4		%		80-120	22-AUG-18
Chromium (Cr)-Dissolved			105.7		%		80-120	22-AUG-18
Cobalt (Co)-Dissolved			104.0		%		80-120	22-AUG-18
Copper (Cu)-Dissolved			104.8		%		80-120	22-AUG-18
Iron (Fe)-Dissolved			104.3		%		80-120	22-AUG-18
Lead (Pb)-Dissolved			101.5		%		80-120	22-AUG-18
Lithium (Li)-Dissolved			102.3		%		80-120	22-AUG-18
Magnesium (Mg)-Dissolved			108.1		%		80-120	22-AUG-18
Manganese (Mn)-Dissolved			102.5		%		80-120	22-AUG-18
Molybdenum (Mo)-Dissolved			101.2		%		80-120	22-AUG-18
Nickel (Ni)-Dissolved			106.2		%		80-120	22-AUG-18
Phosphorus (P)-Dissolved			111.4		%		80-120	22-AUG-18
Potassium (K)-Dissolved			103.4		%		80-120	22-AUG-18
Rubidium (Rb)-Dissolved			107.1		%		80-120	22-AUG-18
Selenium (Se)-Dissolved			105.0		%		80-120	22-AUG-18
Silicon (Si)-Dissolved			104.4		%		60-140	22-AUG-18
Silver (Ag)-Dissolved			104.4		%		80-120	22-AUG-18
Sodium (Na)-Dissolved			113.1		%		80-120	22-AUG-18
Strontium (Sr)-Dissolved			107.0		%		80-120	22-AUG-18
Sulfur (S)-Dissolved			109.0		%		80-120	22-AUG-18
Tellurium (Te)-Dissolved			105.6		%		80-120	22-AUG-18
Thallium (Tl)-Dissolved			98.4		%		80-120	22-AUG-18
Thorium (Th)-Dissolved			99.8		%		80-120	22-AUG-18
Tin (Sn)-Dissolved			100.2		%		80-120	22-AUG-18
Titanium (Ti)-Dissolved			101.5		%		80-120	22-AUG-18
Tungsten (W)-Dissolved			98.3		%		80-120	22-AUG-18
Uranium (U)-Dissolved			102.7		%		80-120	22-AUG-18
Vanadium (V)-Dissolved			107.3		%		80-120	22-AUG-18
Zinc (Zn)-Dissolved			102.6		%		80-120	22-AUG-18
Zirconium (Zr)-Dissolved			95.8		%		80-120	22-AUG-18
WG2857194-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-AUG-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	22-AUG-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-AUG-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-1 MB								
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	22-AUG-18
WG2857194-5 MS		**WG2857194-3**						
Aluminum (Al)-Dissolved			83.8		%		70-130	22-AUG-18
Antimony (Sb)-Dissolved			94.7		%		70-130	22-AUG-18
Arsenic (As)-Dissolved			98.9		%		70-130	22-AUG-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Beryllium (Be)-Dissolved			97.3		%		70-130	22-AUG-18
Bismuth (Bi)-Dissolved			91.7		%		70-130	22-AUG-18
Boron (B)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Cadmium (Cd)-Dissolved			98.6		%		70-130	22-AUG-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Cesium (Cs)-Dissolved			94.7		%		70-130	22-AUG-18
Chromium (Cr)-Dissolved			98.8		%		70-130	22-AUG-18
Iron (Fe)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Lead (Pb)-Dissolved			92.9		%		70-130	22-AUG-18
Lithium (Li)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Molybdenum (Mo)-Dissolved			91.1		%		70-130	22-AUG-18
Phosphorus (P)-Dissolved			106.1		%		70-130	22-AUG-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Selenium (Se)-Dissolved			91.7		%		70-130	22-AUG-18
Silver (Ag)-Dissolved			93.2		%		70-130	22-AUG-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Tellurium (Te)-Dissolved			94.1		%		70-130	22-AUG-18
Thallium (Tl)-Dissolved			90.9		%		70-130	22-AUG-18
Thorium (Th)-Dissolved			92.2		%		70-130	22-AUG-18
Tin (Sn)-Dissolved			93.2		%		70-130	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4180884								
WG2857194-5 MS		**WG2857194-3**						
Titanium (Ti)-Dissolved			96.7		%		70-130	22-AUG-18
Tungsten (W)-Dissolved			93.5		%		70-130	22-AUG-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	22-AUG-18
Vanadium (V)-Dissolved			100.5		%		70-130	22-AUG-18
Zinc (Zn)-Dissolved			82.6		%		70-130	22-AUG-18
Zirconium (Zr)-Dissolved			89.6		%		70-130	22-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-4 DUP		**WG2856952-3**						
Aluminum (Al)-Total		0.0071	0.0071		mg/L	0.4	20	22-AUG-18
Antimony (Sb)-Total		0.00042	0.00043		mg/L	0.8	20	22-AUG-18
Arsenic (As)-Total		0.00045	0.00045		mg/L	0.9	20	22-AUG-18
Barium (Ba)-Total		0.0653	0.0653		mg/L	0.0	20	22-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-18
Boron (B)-Total		0.075	0.074		mg/L	1.5	20	22-AUG-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	22-AUG-18
Calcium (Ca)-Total		45.0	44.0		mg/L	2.3	20	22-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-AUG-18
Cesium (Cs)-Total		0.000216	0.000224		mg/L	3.9	20	22-AUG-18
Cobalt (Co)-Total		0.00037	0.00037		mg/L	0.9	20	22-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Iron (Fe)-Total		0.122	0.125		mg/L	2.3	20	22-AUG-18
Lead (Pb)-Total		0.000051	0.000051		mg/L	0.2	20	22-AUG-18
Lithium (Li)-Total		0.0076	0.0075		mg/L	1.4	20	22-AUG-18
Magnesium (Mg)-Total		15.1	15.3		mg/L	1.2	20	22-AUG-18
Manganese (Mn)-Total		0.00573	0.00579		mg/L	1.0	20	22-AUG-18
Molybdenum (Mo)-Total		0.00618	0.00608		mg/L	1.8	20	22-AUG-18
Nickel (Ni)-Total		0.00211	0.00206		mg/L	2.6	20	22-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-AUG-18
Potassium (K)-Total		5.13	5.08		mg/L	1.0	20	22-AUG-18
Rubidium (Rb)-Total		0.0124	0.0122		mg/L	1.4	20	22-AUG-18
Selenium (Se)-Total		0.000079	0.000099	J	mg/L	0.000019	0.0001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-4 DUP		**WG2856952-3**						
Silicon (Si)-Total		0.36	0.37		mg/L	2.5	20	22-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-18
Sodium (Na)-Total		59.2	60.2		mg/L	1.7	20	22-AUG-18
Strontium (Sr)-Total		0.435	0.420		mg/L	3.4	20	22-AUG-18
Sulfur (S)-Total		21.8	22.1		mg/L	1.4	25	22-AUG-18
Thallium (Tl)-Total		0.000057	0.000047		mg/L	19	20	22-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	22-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Uranium (U)-Total		0.000028	0.000026		mg/L	6.3	20	22-AUG-18
Vanadium (V)-Total		0.00052	0.00056		mg/L	6.8	20	22-AUG-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2856952-2 LCS								
Aluminum (Al)-Total			100.7		%		80-120	22-AUG-18
Antimony (Sb)-Total			104.9		%		80-120	22-AUG-18
Arsenic (As)-Total			101.8		%		80-120	22-AUG-18
Barium (Ba)-Total			103.9		%		80-120	22-AUG-18
Beryllium (Be)-Total			100.3		%		80-120	22-AUG-18
Bismuth (Bi)-Total			100.5		%		80-120	22-AUG-18
Boron (B)-Total			92.6		%		80-120	22-AUG-18
Cadmium (Cd)-Total			97.8		%		80-120	22-AUG-18
Calcium (Ca)-Total			100.9		%		80-120	22-AUG-18
Chromium (Cr)-Total			100.5		%		80-120	22-AUG-18
Cesium (Cs)-Total			99.1		%		80-120	22-AUG-18
Cobalt (Co)-Total			99.1		%		80-120	22-AUG-18
Copper (Cu)-Total			100.6		%		80-120	22-AUG-18
Iron (Fe)-Total			98.8		%		80-120	22-AUG-18
Lead (Pb)-Total			100.1		%		80-120	22-AUG-18
Lithium (Li)-Total			93.3		%		80-120	22-AUG-18
Magnesium (Mg)-Total			104.7		%		80-120	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-2 LCS								
Manganese (Mn)-Total			99.4		%		80-120	22-AUG-18
Molybdenum (Mo)-Total			99.0		%		80-120	22-AUG-18
Nickel (Ni)-Total			100.5		%		80-120	22-AUG-18
Phosphorus (P)-Total			105.6		%		70-130	22-AUG-18
Potassium (K)-Total			96.9		%		80-120	22-AUG-18
Rubidium (Rb)-Total			99.8		%		80-120	22-AUG-18
Selenium (Se)-Total			100.4		%		80-120	22-AUG-18
Silicon (Si)-Total			100.7		%		60-140	22-AUG-18
Silver (Ag)-Total			101.5		%		80-120	22-AUG-18
Sodium (Na)-Total			107.4		%		80-120	22-AUG-18
Strontium (Sr)-Total			100.3		%		80-120	22-AUG-18
Sulfur (S)-Total			95.1		%		80-120	22-AUG-18
Thallium (Tl)-Total			96.6		%		80-120	22-AUG-18
Tellurium (Te)-Total			99.2		%		80-120	22-AUG-18
Thorium (Th)-Total			98.3		%		70-130	22-AUG-18
Tin (Sn)-Total			98.7		%		80-120	22-AUG-18
Titanium (Ti)-Total			98.2		%		80-120	22-AUG-18
Tungsten (W)-Total			97.4		%		80-120	22-AUG-18
Uranium (U)-Total			97.1		%		80-120	22-AUG-18
Vanadium (V)-Total			102.7		%		80-120	22-AUG-18
Zinc (Zn)-Total			93.5		%		80-120	22-AUG-18
Zirconium (Zr)-Total			94.4		%		80-120	22-AUG-18
WG2856952-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	22-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	22-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	22-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	22-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	22-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	22-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	22-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	22-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	22-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	22-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	22-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-AUG-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	22-AUG-18
WG2856952-5 MS		**WG2856952-6**						
Aluminum (Al)-Total			113.7		%		70-130	22-AUG-18
Antimony (Sb)-Total			98.7		%		70-130	22-AUG-18
Arsenic (As)-Total			99.8		%		70-130	22-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	22-AUG-18
Beryllium (Be)-Total			101.0		%		70-130	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-5 MS		**WG2856952-6**						
Bismuth (Bi)-Total			92.5		%		70-130	22-AUG-18
Boron (B)-Total			N/A	MS-B	%		-	22-AUG-18
Cadmium (Cd)-Total			96.5		%		70-130	22-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	22-AUG-18
Chromium (Cr)-Total			99.7		%		70-130	22-AUG-18
Cesium (Cs)-Total			94.3		%		70-130	22-AUG-18
Cobalt (Co)-Total			97.4		%		70-130	22-AUG-18
Copper (Cu)-Total			97.5		%		70-130	22-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	22-AUG-18
Lead (Pb)-Total			91.7		%		70-130	22-AUG-18
Lithium (Li)-Total			89.8		%		70-130	22-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-AUG-18
Manganese (Mn)-Total			108.8		%		70-130	22-AUG-18
Molybdenum (Mo)-Total			93.0		%		70-130	22-AUG-18
Nickel (Ni)-Total			94.8		%		70-130	22-AUG-18
Phosphorus (P)-Total			112.3		%		70-130	22-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	22-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	22-AUG-18
Selenium (Se)-Total			97.7		%		70-130	22-AUG-18
Silicon (Si)-Total			104.0		%		70-130	22-AUG-18
Silver (Ag)-Total			93.2		%		70-130	22-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	22-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	22-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	22-AUG-18
Thallium (Tl)-Total			89.3		%		70-130	22-AUG-18
Tellurium (Te)-Total			89.7		%		70-130	22-AUG-18
Thorium (Th)-Total			91.2		%		70-130	22-AUG-18
Tin (Sn)-Total			94.8		%		70-130	22-AUG-18
Titanium (Ti)-Total			102.2		%		70-130	22-AUG-18
Tungsten (W)-Total			93.8		%		70-130	22-AUG-18
Uranium (U)-Total			93.4		%		70-130	22-AUG-18
Vanadium (V)-Total			103.0		%		70-130	22-AUG-18
Zinc (Zn)-Total			111.2		%		70-130	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-5 MS		**WG2856952-6**						
Zirconium (Zr)-Total			87.8		%		70-130	22-AUG-18
NH3-WT	**Water**							
Batch R4181433								
WG2858035-3 DUP		**L2150213-1**						
Ammonia, Total (as N)		1.52	1.54		mg/L	1.0	20	23-AUG-18
WG2858035-2 LCS								
Ammonia, Total (as N)			94.2		%		85-115	23-AUG-18
WG2858035-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	23-AUG-18
WG2858035-4 MS		**L2150213-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	23-AUG-18
NO3-IC-WT	**Water**							
Batch R4181346								
WG2856380-20 DUP		**L2150259-3**						
Nitrate (as N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	22-AUG-18
WG2856380-17 LCS								
Nitrate (as N)			101.0		%		70-130	22-AUG-18
WG2856380-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-AUG-18
WG2856380-19 MS		**L2150259-3**						
Nitrate (as N)			101.8		%		70-130	22-AUG-18
P-T-COL-WT	**Water**							
Batch R4180833								
WG2857101-3 DUP		**L2151250-2**						
Phosphorus, Total		0.0037	0.0040		mg/L	9.6	20	23-AUG-18
WG2857101-2 LCS								
Phosphorus, Total			92.7		%		80-120	23-AUG-18
WG2857101-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	23-AUG-18
WG2857101-4 MS		**L2151250-2**						
Phosphorus, Total			92.4		%		70-130	23-AUG-18
PH-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R4180879								
WG2857442-2 DUP		**L2150213-2**						
pH		8.85	8.87	J	pH units	0.02	0.2	22-AUG-18
WG2857442-1 LCS								
pH			6.98		pH units		6.9-7.1	22-AUG-18
SO4-IC-N-WT	**Water**							
Batch R4181346								
WG2856380-20 DUP		**L2150259-3**						
Sulfate (SO4)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2856380-17 LCS								
Sulfate (SO4)			102.4		%		90-110	22-AUG-18
WG2856380-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-AUG-18
WG2856380-19 MS		**L2150259-3**						
Sulfate (SO4)			103.6		%		75-125	22-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4180217								
WG2855220-3 DUP		**L2150018-7**						
Total Dissolved Solids		<20	<20	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2855220-2 LCS								
Total Dissolved Solids			102.9		%		85-115	22-AUG-18
WG2855220-1 MB								
Total Dissolved Solids			<20		mg/L		20	22-AUG-18
SOLIDS-TSS-BF	**Water**							
Batch R4180880								
WG2857450-3 DUP		**L2150213-2**						
Total Suspended Solids		6.0	6.8		mg/L	13	25	22-AUG-18
WG2857450-2 LCS								
Total Suspended Solids			99.8		%		85-115	22-AUG-18
WG2857450-1 MB								
Total Suspended Solids			<2.0		mg/L		2	22-AUG-18
TKN-WT	**Water**							
Batch R4181444								
WG2857082-3 DUP		**L2151250-1**						
Total Kjeldahl Nitrogen		0.28	0.33		mg/L	18	20	23-AUG-18
WG2857082-2 LCS								
Total Kjeldahl Nitrogen			88.1		%		75-125	23-AUG-18
WG2857082-1 MB								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R4181444								
WG2857082-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	23-AUG-18
WG2857082-4 MS		**L2151250-1**						
Total Kjeldahl Nitrogen			87.1		%		70-130	23-AUG-18
TOC-WT	**Water**							
Batch R4180855								
WG2857246-3 DUP		**L2150213-1**						
Total Organic Carbon		3.18	3.16		mg/L	0.3	20	22-AUG-18
WG2857246-2 LCS								
Total Organic Carbon			109.7		%		80-120	22-AUG-18
WG2857246-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-AUG-18
WG2857246-4 MS		**L2150213-1**						
Total Organic Carbon			103.8		%		70-130	22-AUG-18

Quality Control Report

Workorder: L2150213 Report Date: 01-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
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Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Fathead minnow
EPS 1/RM/22

Work Order : 236993
Sample Number : 56007

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Sampled By :	BW, LM, TB
Job Number :	L2150213-1	Date Collected :	2018-08-21
Substance :	MS-08	Time Collected :	09:00
Sampling Method :	Grab	Date Received :	2018-08-22
Temp. on arrival :	10.0°C	Time Received :	16:00
Sample Description :	Clear, brown, mild odour	Date Tested :	2018-08-23
Test Method :	Test of Larval Growth and Survival Using Fathead Minnows. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/22 , 2nd ed. (February 2011).		

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth from Biomass)	>100%	-	-
LC50	>100%	-	-

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-08-28	Analyst(s) :	MV, RD, MA
Organism Batch :	Fm18-08	Test Duration :	7 days
IC25 Growth (from Biomass) :	0.90 g/L	LC50 :	1.03 g/L
95% Confidence Limits :	0.81 - 0.97 g/L	95% Confidence Limits :	0.96 - 1.11 g/L
Statistical Method :	Non-Linear Regression (CETIS)[a]	Statistical Method :	Linear Regression (MLE) (CETIS)[a]
Historical Mean IC25 :	0.93 g/L	Historical Mean LC50 :	1.09 g/L
Warning Limits (± 2SD) :	0.71 - 1.23 g/L	Warning Limits (± 2SD) :	0.91 - 1.30 g/L

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

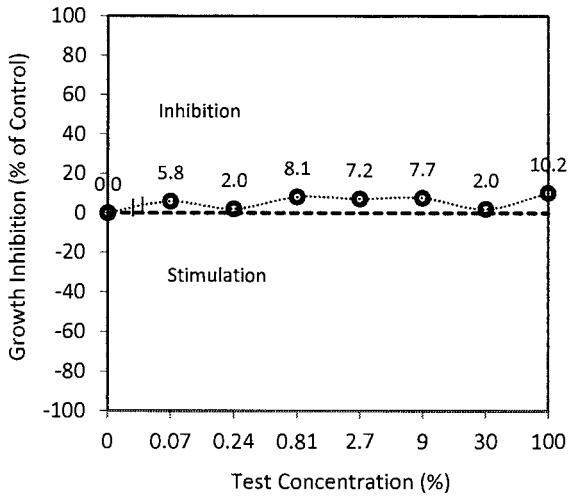
Test Organism :	*Pimephales promelas*	Test Type :	Static Renewal
Organism Batch :	Fm18-08	Control/Dilution Water :	Well water (no chemicals added)
Organism Age :	~07:00 - 22:30 h at start of test	Test Volume / Replicate :	300 mL
Source :	In-house culture	Test Vessel :	420 mL polystyrene beaker
Culture Mortality/Diseased :	0.77 % (previous 7 days)	Depth of Test Solution :	8 cm
pH Adjustment :	None	Organisms per Replicate :	10
Sample Filtration :	None	Number of Replicates :	3
Hardness Adjustment :	None	Daily Renewal Method :	80-85% syphoned and replaced
Test Aeration :	None	Test Method Deviation(s):	None

COMMENTS

- All test validity criteria as specified in the test method cited above were satisfied.
- No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.
- Inflated swim bladders were confirmed in all test organisms used in this test.

Work Order : 236993
Sample Number : 56007

Fathead Minnow Growth Inhibition (based on Biomass)



REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Softwa McKinleyville, CA 95519 [Program on disk and printed User's Guide].

[b] Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics, 11* :1-21.

Date : 2018-09-27
yyyy-mm-dd

Approved By : JMdaz
Project Manager

Work Order : 236993
Sample Number : 56007

CUMULATIVE DAILY CONTROL MORTALITY AND IMPAIRMENT (±SD)

Date :	2018-08-23	2018-08-24	2018-08-25	2018-08-26	2018-08-27	2018-08-28	2018-08-29	2018-08-30
	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)

FATHEAD MINNOW CUMULATIVE DAILY MORTALITY

Initiation Time : 15:40
Initiation Date : 2018-08-23
Completion Date : 2018-08-30

		Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Treatment
Date :		2018-08-23		2018-08-24		2018-08-25		2018-08-26		2018-08-27		2018-08-28		2018-08-29		2018-08-30		Mean Mortality (± SD)
Analyst(s):		CCM(RD)		RK(VC)		XD		NK		MA		CZN		XD		RK(VC)		
Concentration		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	%
(%)	Replicate	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	
Control	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0.07	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0.24	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	3.33 (±5.77)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0.81	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2.7	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
30	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Aberrant behaviour or swimming impairment : None

Data Reviewed By: VC
Date : 2018-09-17

Work Order : 236993
Sample Number : 56007

FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

Concentration (%)	Replicate	Number of Larvae Exposed	Replicate Mean Dry Weight (mg)	Treatment Mean Biomass (mg)	Standard Deviation
Control	A	10	0.888	0.867	0.025
	B	10	0.839		
	C	10	0.875		
0.07	A	10	0.786	0.817	0.029
	B	10	0.822		
	C	10	0.843		
0.24	A	10	0.786	0.850	0.056
	B	10	0.876		
	C	10	0.888		
0.81	A	10	0.818	0.797	0.034
	B	10	0.757[1]		
	C	10	0.815		
2.7	A	10	0.779	0.805	0.025
	B	10	0.828		
	C	10	0.808		
9	A	10	0.784	0.800	0.020
	B	10	0.823		
	C	10	0.794		
30	A	10	0.904	0.850	0.047
	B	10	0.817		
	C	10	0.830		
100	A	10	0.771	0.779	0.010
	B	10	0.790		
	C	10	0.776		

NOTES :

- [1]Outlier according to Grubbs Test[b]. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.
- Control average dry weight per surviving organism = 0.867 mg

Data Reviewed By: VC

Date : 2018-09-17

Work Order : 236993
Sample Number: 56007

Fathead Minnow Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	9.0	8.6	3530	1810

		Day 0 - 1 2018-08-23	Day 1 - 2 2018-08-24	Day 2 - 3 2018-08-25	Day 3 - 4 2018-08-26	Day 4 - 5 2018-08-27	Day 5 - 6 2018-08-28	Day 6 - 7 2018-08-29
Sub-sample Used		1	1	1	2	2	3	3
Temperature (°C)		25.0	24.0	24.0	24.0	24.0	24.0	24.0
Dissolved Oxygen (mg/L)		9.0	9.0	9.4	9.4	9.8	9.3	9.5
Dissolved Oxygen % Sat.[2]		112	108	113	112	115	113	115
pH		8.6	8.4	8.4	8.5	8.5	8.4	8.4
Pre-aeration Time (min)[3]		20	20	20	20	20	20	20
Analyst(s) :	Initial	CCM(RD)	CCM(RD)	VC	NK	CCM(RD)	CCM(RD)	TZL(SEW)
	Final	TL	EJS	NK	MA	CZN	XD	RK(VC)
Control (0%)								
Temp.(°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0	25.0
	Final	25.0	24.5	24.5	25.0	25.0	24.0	24.5
DO % Sat.[2]	Initial	102	99	100	99	100	100	99
DO (mg/L)	Initial	8.6	8.2	8.3	8.1	8.2	8.1	8.1
	Final	6.9	7.3	7.0	6.6	6.6	6.5	7.4
pH	Initial	8.4	8.4	8.3	8.3	8.4	8.2	8.2
	Final	8.1	8.1	8.1	8.0	7.9	7.9	8.1
Cond. (µmhos/cm)	Initial	631	597	598	660	661	678	672
0.07 %								
Temp.(°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0	25.0
	Final	25.0	24.5	24.5	25.0	25.0	24.0	24.5
DO (mg/L)	Initial	8.5	8.3	8.4	8.1	8.2	8.3	8.1
	Final	7.2	7.3	6.9	6.7	6.7	6.5	7.6
pH	Initial	8.3	8.4	8.2	8.4	8.4	8.3	8.3
	Final	8.1	8.0	8.0	8.0	8.0	8.0	8.1
Cond. (µmhos/cm)	Initial	634	600	603	668	666	682	682
9 %								
Temp.(°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0	25.0
	Final	25.0	24.5	24.5	25.0	25.0	24.0	24.5
DO (mg/L)	Initial	8.4	8.3	8.4	8.2	8.2	8.4	8.2
	Final	7.0	7.2	7.1	6.7	6.7	6.5	7.5
pH	Initial	8.3	8.3	8.1	8.3	8.3	8.2	8.3
	Final	8.0	8.1	8.0	8.0	7.9	7.9	8.1
Cond. (µmhos/cm)	Initial	983	946	941	1005	1001	1020	1003
100 %								
Temp.(°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0	25.0
	Final	25.0	24.5	24.5	25.0	25.0	24.0	24.5
DO (mg/L)	Initial	8.6	8.8	8.9	8.7	8.9	8.8	8.6
	Final	7.3	7.5	7.1	6.7	6.7	6.3	7.6
pH	Initial	8.4	8.3	8.3	8.3	8.3	8.1	8.0
	Final	7.5	7.3	7.2	7.2	7.2	7.1	7.3
Cond. (µmhos/cm)	Initial	3560	3530	3540	3540	3530	3550	3550

"–" = not measured

[2] % saturation (adjusted for actual temperature and barometric pressure)

[3] ≤100 bubbles/minute

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TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

Work Order : 236993
Sample Number : 56007

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Sampled By :	BW, LM, TB
Job Number :	L2150213-1	Date Collected :	2018-08-21
Substance :	MS-08	Time Collected :	09:00
Sampling Method :	Grab	Date Received :	2018-08-22
Temp. on arrival :	10.0°C	Time Received :	16:00
Sample Description :	Clear, brown, mild odour	Date Tested :	2018-08-23

Test Method : Test of Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/21, 2nd ed. (February 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
LC50	>100%	-	-
IC25 (Reproduction)	39.5%	34.6-41.5	Linear Interpolation (CETIS) a

The results reported relate only to the sample tested and as received.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-08-28	Analyst(s) :	MW, MA
Organism Batch :	Cd18-08	Test Duration :	6 days
IC25 Reproduction :	1.46 g/L	LC50 :	2.32 g/L
95% Confidence Limits :	0.98 - 1.82 g/L	95% Confidence Limits :	1.80 - 3.00 g/L
Statistical Method :	Linear Interpolation (CETIS)[a]	Statistical Method :	Binomial (CETIS)[a]
Historical Mean IC25 :	1.30 g/L	Historical Mean LC50 :	2.23 g/L
Warning Limits (± 2SD) :	0.98 - 1.73 g/L	Warning Limits (± 2SD) :	1.84 - 2.70 g/L

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

Sample Filtration :	None	Test Volume per Replicate :	15 mL
Test Aeration :	None	Test Vessel :	19 mL polystyrene vial
pH Adjustment :	None	Depth of Test Solution :	4.8 cm
Hardness Adjustment :	None	Organisms per Replicate :	1
Daily Renewal Method :	Transferred to fresh solutions	Number of Replicates :	10
Control/Dilution Water :	Well water (no chemicals added)	Test Method Deviation(s) :	None

COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.
•Statistical analysis could not be performed using non linear regression, since a suitable model could not be found. Therefore, test results were calculated using Linear Interpolation (CETIS)[a]. In test concentrations where reproduction was stimulated (greater than the control), data were replaced with control values for the purposes of statistical analysis, as recommended by Environment Canada (2005).

Work Order : 236993
Sample Number : 56007

TEST ORGANISMS

Test Organism :	*Ceriodaphnia dubia*	Range of Age (at start of test) :	20:15 h - 23:45 h
Organism Batch :	Cd18-08	Mean Brood Organism Mortality :	2.5%
Organism Origin :	Single in-house mass culture	Ephippia in Culture :	No
Test Organism Origin :	Individual in-house cultures		

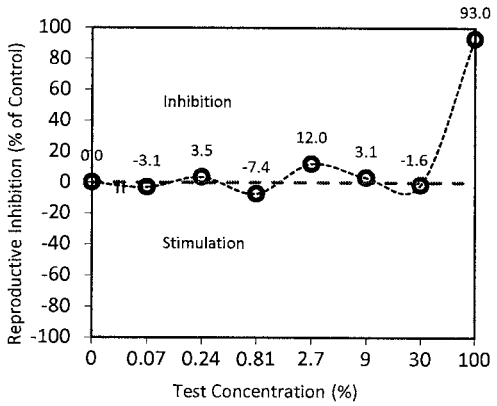
Brood Organism Neonate Production

Replicate :	1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subsequent brood):	11	13	14	18	17	15	15	16	14	13	14.6
Total (first three broods):	19	23	22	24	23	18	25	19	21	20	21.4

No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.

TEST DATA

***Ceriodaphnia dubia* Reproductive Inhibition**



Cumulative Daily Test Organism Mortality (%)

		Test Concentration (%)							
Date	**Test Day**	Control	0.07	0.24	0.81	2.7	9	30	100
2018-08-24	1	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0
2018-08-26	3	0	0	0	0	0	0	0	0
2018-08-27	4	0	0	0	0	0	0	0	0
2018-08-28	5	0	0	0	0	10	0	0	0
2018-08-29	6	0	0	0	0	10	0	0	0
Total Mortality (%)		0	0	0	0	10	0	0	0

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Environment Canada, 2005. Guidance Document on Statistical Methods for Environmental Toxicity Tests. Environmental Protection Series, Ottawa, Ont., Rept. EPS 1/RM/46.

Date : 2018-09-27
yyyy-mm-dd

Approved By : _____
Project Manager

AQUATOX

TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

Work Order : 236993
Sample Number : 56007

Ceriodaphnia dubia Survival and Reproduction

Test Initiation Date : 2018-08-23
Initiation Time : 14:15
Test Completion Date : 2018-08-29

Concentration (%) Control	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)	Analyst(s)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0	TL
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0	FS
2018-08-26	3	5	4	4	5	3	5	4	6	3	3	4.2	XD
2018-08-27	4	0	0	0	0	0	5	0	0	0	0	0.5	MA
2018-08-28	5	12	12	10	10	11	6	10	11	10	11	10.3	CZN
2018-08-29	6	10	11	10	14	9	–	13	17	13	11	10.8	CCM(VC)
Total		**27**	**27**	**24**	**29**	**23**	**16**	**27**	**34**	**26**	**25**	**25.8 (±4.6)**	

Concentration (%) 2.7	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	5	6	6	4	5	5	5	4	5	5	5
2018-08-27	4	0	0	0	0	0	0	0	0	0	0	0
2018-08-28	5	10	10	0	x	11	11	10	5	9	5	7	7.8
2018-08-29	6	10	10	0	8	12	13	14	13	10	9	9.9
Total		**25**	**26**	**6[1]**	**23**	**28**	**28**	**24**	**26**	**20**	**21**	**22.7 (±6.4)**

Concentration (%) 0.07	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	6	5	4	5	6	3	3	2	2	5	4.1
2018-08-27	4	7	0	0	0	0	1	0	0	0	0	0.8
2018-08-28	5	0	11	11	9	12	8	9	8	8	9	8.5
2018-08-29	6	14	13	16	11	15	10	10	14	14	15	13.2
Total		**27**	**29**	**31**	**25**	**33**	**22**	**22**	**24**	**24**	**29**	**26.6 (±3.8)**

Concentration (%) 9	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	2	4	5	4	6	5	5	4	6	3	4.4
2018-08-27	4	0	0	0	0	0	0	0	0	0	0	0
2018-08-28	5	8	9	8	8	8	6	7	10	10	11	8.5
2018-08-29	6	11	11	10	11	12	11	17	11	13	14	12.1
Total		**21**	**24**	**23**	**23**	**26**	**22**	**29**	**25**	**29**	**28**	**25.0 (±2.9)**

Concentration (%) 0.24	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	6	5	3	6	3	3	4	5	3	3	4.1
2018-08-27	4	0	0	0	0	0	1	0	0	0	0	0.1
2018-08-28	5	10	12	10	10	10	4	7	11	10	8	9.2
2018-08-29	6	14	12	11	11	12	12	11	12	13	7	11.5
Total		**30**	**29**	**24**	**27**	**25**	**20**	**22**	**28**	**26**	**18**	**24.9 (±3.9)**

Concentration (%) 30	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	4	6	4	6	4	5	5	6	4	5	4.9
2018-08-27	4	0	0	0	0	0	0	0	0	0	0	0
2018-08-28	5	10	11	11	11	11	10	8	9	9	7	9.7
2018-08-29	6	8	13	11	14	12	12	9	11	14	12	11.6
Total		**22**	**30**	**26**	**31**	**27**	**27**	**22**	**26**	**27**	**24**	**26.2 (±3.0)**

Concentration (%) 0.81	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	6	4	5	7	5	5	6	6	5	5	5.4
2018-08-27	4	0	0	0	14	0	13	0	0	0	0	2.7
2018-08-28	5	9	12	10	0	10	0	7	11	8	10	7.7
2018-08-29	6	9	10	12	15	12	14	15	12	10	10	11.9
Total		**24**	**26**	**27**	**36**	**27**	**32**	**28**	**29**	**23**	**25**	**27.7 (±3.9)**

Concentration (%) 100	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)
2018-08-24	1	0	0	0	0	0	0	0	0	0	0	0
2018-08-25	2	0	0	0	0	0	0	0	0	0	0	0
2018-08-26	3	0	0	0	0	0	0	0	0	0	0	0
2018-08-27	4	0	0	0	0	0	0	0	0	0	0	0
2018-08-28	5	2	2	0	3	0	2	3	1	0	3	1.6
2018-08-29	6	0	0	0	2	0	0	0	0	0	0	0.2
Total		**2**	**2**	**0**	**5**	**0**	**2**	**3**	**1**	**0**	**3**	**1.8 (±1.6)**

NOTES : •All young produced by a test organism during its fourth and subsequent broods were discarded and not included in the above counts. The presence of two or more neonates in any test chamber, during any given day of the test, constitutes a brood.

•[1] Outlier according to Grubbs Test (CETIS)[a]. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.

"x"= test organism mortality
"*"= accidental test organism mortality
"–"=4th brood (see 'NOTES')

Data Reviewed By : VC
Date : 2018-09-17

Work Order : 236993
Sample Number: 56007

***Ceriodaphnia dubia* Water Chemistry Data**

	Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
		25.0	9.0	8.6	3530	1810

Date :		Day 0 - 1 2018-08-23	Day 1 - 2 2018-08-24	Day 2 - 3 2018-08-25	Day 3 - 4 2018-08-26	Day 4 - 5 2018-08-27	Day 5 - 6 2018-08-28
Sub-sample Used		1	1	1	2	2	3
Temperature (°C)		25.0	24.0	24.0	24.0	24.0	24.0
Dissolved Oxygen (mg/L)		9.0	9.0	9.4	9.4	9.8	9.3
Dissolved Oxygen % Sat.[2]		112	108	113	112	115	113
pH		8.6	8.4	8.4	8.5	8.5	8.4
Pre-aeration Time (min)[3]		20	20	20	20	20	20
Analyst(s)	Initial	CCM(RD)	CCM(RD)	VC	NK	CCM(RD)	CCM(RD)
	Final	TL	EJS	XD	MA	CZN	CCM(RD)
Control (0%)							
Temp. (°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0
	Final	24.0	24.0	24.0	24.0	25.0	24.0
DO % Sat.[2]	Initial	102	99	100	99	100	100
DO (mg/L)	Initial	8.6	8.2	8.3	8.1	8.2	8.1
	Final	7.5	7.4	7.2	7.4	7.2	7.3
pH	Initial	8.4	8.4	8.3	8.3	8.4	8.2
	Final	8.2	8.1	8.1	8.2	8.1	8.1
Cond. (µmhos/cm)	Initial	631	597	598	660	661	678
0.07 %							
Temp. (°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0
	Final	24.0	24.0	24.0	24.0	25.0	24.0
DO (mg/L)	Initial	8.5	8.3	8.4	8.1	8.2	8.3
	Final	7.5	7.4	7.3	7.4	7.2	7.5
pH	Initial	8.3	8.4	8.2	8.4	8.4	8.3
	Final	8.2	8.1	8.1	8.2	8.1	8.1
Cond. (µmhos/cm)	Initial	634	600	603	668	666	682
9 %							
Temp. (°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0
	Final	24.0	24.0	24.0	24.0	25.0	24.0
DO (mg/L)	Initial	8.4	8.3	8.4	8.2	8.2	8.4
	Final	7.5	7.3	7.2	7.2	7.2	7.3
pH	Initial	8.3	8.3	8.1	8.3	8.3	8.2
	Final	8.1	8.1	8.1	8.1	8.0	8.1
Cond. (µmhos/cm)	Initial	983	946	941	1005	1001	1020
100 %							
Temp. (°C)	Initial	24.0	25.0	24.0	25.0	25.0	25.0
	Final	24.0	24.0	24.0	24.0	25.0	24.0
DO (mg/L)	Initial	8.6	8.8	8.9	8.7	8.9	8.8
	Final	7.1	7.4	7.2	7.2	7.2	7.3
pH	Initial	8.4	8.3	8.3	8.3	8.3	8.1
	Final	7.5	7.5	7.5	7.4	7.4	7.4
Cond. (µmhos/cm)	Initial	3560	3530	3540	3540	3530	3550

"–" = not measured

[2] % saturation (adjusted for actual temperature and barometric pressure)

[3] ≤100 bubbles/minute

AQUATOX
AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Lemna minor
EPS 1/RM/37

Work Order : 236993
Sample Number : 56007

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Date Collected :	2018-08-21
Location :	Waterloo ON	Time Collected :	09:00
Substance :	MS-08	Date Received :	2018-08-22
Job Number :	L2150213-1	Time Received :	16:00
Sampling Method :	Grab	Temp. on arrival :	10.0°C
Sampled By :	BW, LM, TB	Date Tested :	2018-08-24
Sample Description :	Clear, brown, mild odour		

Test Method : Test for Measuring the Inhibition of Growth using the Freshwater Macrophyte, *Lemna minor*. Method Development and Application Section, Environmental Technology Centre, Environment Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Weight)	>97.0%	-	-
IC25 (Frond Production)	>97.0%	-	-

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2018-08-15	Statistical Method :	Non-Linear Regression (CETIS)[a]
Organism Batch :	Lm18-08	Historical Geometric Mean IC25 :	2.04 g/L
Test Duration :	7 days	Warning Limits (± 2SD) :	1.52 - 2.74 g/L
IC25 (Frond Production) :	2.16 g/L	Growth Medium :	Modified APHA
95% Confidence Limits :	1.95 - 2.39 g/L	Analyst(s) :	MA, CZN

The reference toxicant test was performed under the same experimental conditions as those used with the test sample.

TEST CONDITIONS

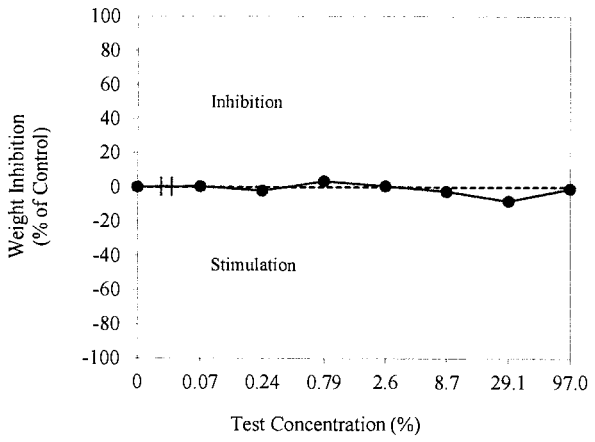
Test Organism :	*Lemna minor* L., Strain 7730	Test Type :	Static (no sub-samples required)
Organism Batch :	Lm18-08	Control/Dilution Medium :	Modified APHA
Culture Origin :	UTCC 492	Medium Preparation Water :	Distilled Water
Test Organism Source :	Axenic in-house culture	Source of Water :	Morning Mist
Culture Medium :	Modified Hoaglands E+	Medium Preparation Chemicals :	Modified APHA stocks A, B, C (10 mL/L)
Age (on Test Day 0) :	10 days	Nutrient Spiking of Sample :	Modified APHA stocks A, B, C (10 mL/L)
Health Criteria (in APHA) :	18.5-fold frond increase in 7 days	Replicates per Concentration :	4
Organism Acclimation :	18:20 h in APHA medium	Test Volume per Replicate :	100 mL
Inoculum (Test Day 0) :	2 plants (3 fronds per plant)	Test Vessel :	250 mL glass Erlenmeyer flask
Sample Filtration :	1 µm (Whatman GF/C)	Depth of Test Solution :	4.0 cm
Sample Pre-aeration :	20 min. at ≤100 bubbles/min.	Photoperiod/Light Intensity :	Continuous, 4280 - 5080 lux
pH Adjustment :	None	Test Method Deviation(s) :	None
Hardness Adjustment :	None		

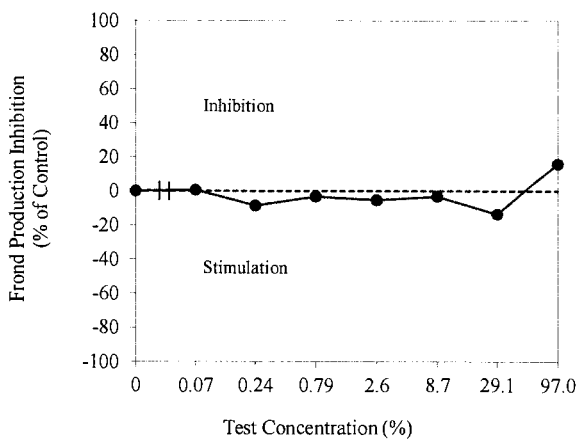
COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.

Work Order : 236993
Sample Number : 56007

Lemna minor Growth Inhibition





TEST MONITORING

Initiation Date : 2018-08-24
Intitiation Time : 10:30
Initiated By : MDS

Termination Date : 2018-08-31
Termination Time : 11:00
Terminated By : CCM/AS

Temperature Monitoring

Test Day	Date	Temperature (°C)
0 (unmodified sample)	2018-08-24	25.0
0	2018-08-24	25.0
1	2018-08-25	24.5
2	2018-08-26	25.0
3	2018-08-27	25.0
4	2018-08-28	25.0
5	2018-08-29	25.0
6	2018-08-30	25.0
7	2018-08-31	25.0

pH Monitoring

Concentration (%)	Day 0	Day 7
100 (unmodified sample)	8.8	–
Control	8.3	8.4
0.07	8.3	8.4
0.24	–	–
0.79	–	–
2.6	8.3	8.4
8.7	–	–
29.1	–	–
97.0	8.1	8.3

"–" = not required

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Date : 2018-09-27
yyyy-mm-dd

Approved By: *Project Manager*

Work Order : 236993
Sample Number : 56007

Lemna minor Frond Increase

Test Concentration (%)	Replicate	Frond Count Day 0*	Frond Count Day 7	Frond Increase	Mean Frond Increase	Standard Deviation	CV (%)	Frond/Root Appearance (Day 7)
Control	A	6	93	87	85.50	4.20	4.9	Fronds healthy, appearance normal in all replicates.
	B	6	96	90				
	C	6	86	80				
	D	6	91	85				
0.07	A	6	85	79	85.00	4.90	5.8	Fronds healthy, appearance normal in all replicates.
	B	6	95	89				
	C	6	89	83				
	D	6	95	89				
0.24	A	6	98	92	92.75	8.62	9.3	Fronds healthy, appearance normal in all replicates.
	B	6	98	92				
	C	6	110	104				
	D	6	89	83				
0.79	A	6	100	94	88.25	9.39	10.6	Fronds healthy, appearance normal in all replicates.
	B	6	92	86				
	C	6	82	76				
	D	6	103	97				
2.6	A	6	99	93	90.00	4.08	4.5	Fronds healthy, appearance normal in all replicates.
	B	6	97	91				
	C	6	90	84				
	D	6	98	92				
8.7	A	6	90	84	88.25	12.07	13.7	Fronds healthy, appearance normal in all replicates.
	B	6	90	84				
	C	6	112	106				
	D	6	85	79				
29.1	A	6	116	110	97.00	9.59	9.9	Fronds healthy, appearance normal in all replicates.
	B	6	94	88				
	C	6	98	92				
	D	6	104	98				
97.0	A	6	75	69	72.00	15.25	21.2	Fronds healthy, appearance normal in all replicates.
	B	6	72	66				
	C	6	65	59				
	D	6	100	94				

NOTES: *No unusual appearance or treatment of culture prior to testing. Test inoculated with healthy plants.

•No significant stimulation (α=0.05) of frond increase was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.

•A 15.3-fold increase in frond number was observed in the control over the testing period.

•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not available/not required

Test Data Reviewed By : EJS
Date : 2018-09-13

Work Order : 236993
Sample Number : 56007

Lemna minor Frond Weight Data

Test Concentration (%)	Replicate	Dry Weight of Fronds (mg)	Treatment Mean Dry Weight (mg)	Standard Deviation
Control	A	9.27	8.96	0.50
	B	9.49		
	C	8.42		
	D	8.66		
0.07	A	8.55	8.93	0.52
	B	9.65		
	C	8.53		
	D	8.97		
0.24	A	8.79	9.15	0.33
	B	9.56		
	C	9.26		
	D	8.99		
0.79	A	8.68	8.65	0.60
	B	8.66		
	C	7.89		
	D	9.35		
2.6	A	9.21	8.92	0.24
	B	8.62		
	C	8.88		
	D	8.95		
8.7	A	8.64	9.18	1.10
	B	8.92		
	C	10.79		
	D	8.36		
29.1	A	10.66	9.68	0.71
	B	8.97		
	C	9.44		
	D	9.63		
97.0	A	9.19	9.04	0.69
	B	8.31		
	C	8.74		
	D	9.92		

NOTES :
- No significant stimulation (α=0.05) of frond weight was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.
- No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not available/not required

Test Data Reviewed By : EJS
Date : 2018-09-13

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Pseudokirchneriella subcapitata
EPS 1/RM/25

Work Order : 236993
Sample Number : 56007

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Sampled By :	BW, LM, TB
Job Number :	L2150213-1	Date Collected :	2018-08-21
Substance :	MS-08	Time Collected :	09:00
Sampling Method :	Grab	Date Received :	2018-08-22
Temp. on arrival :	10.0 °C	Time Received :	16:00
Sample Description :	Clear, brown, mild odour	Date Tested :	2018-08-24
Test Method :	Growth Inhibition Test Using a Freshwater Alga. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/25, 2nd ed. (March 2007).		

72-h TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	>90.91%	-	-

The results reported relate only to the sample tested and as received.

ZINC (AS ZINC SULPHATE) REFERENCE TOXICANT DATA

Date Tested :	2018-08-21	Statistical Method :	Non-Linear Regression (CETIS)[a]
Organism Batch :	Ps18-08	Historical Mean IC25 :	10.4 µg/L
Test Duration :	72 hours	Warning Limits (± 2SD) :	4.9 - 22.3 µg/L
IC25 Growth :	8.8 µg/L	Analyst(s) :	AS, MDS, CZN
95% Confidence Limits :	7.5 - 10.2 µg/L		

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

TEST ORGANISM

Test Organism :	*Pseudokirchneriella subcapitata*	Source :	In-house culture
Culture Origin :	University of Waterloo, Waterloo ON	Cell Density at 0-h :	9545 cells/mL
Strain Number :	CPCC 37	Inoculum Prepared :	00:10 h prior to test initiation
Organism Batch :	Ps18-08	Age (at start of test) :	4 days (in exponential growth)

•Algal growth curve is determined at least twice per year as required by the test method cited above.
•No unusual appearance or treatment of culture prior to testing.

TEST CONDITIONS

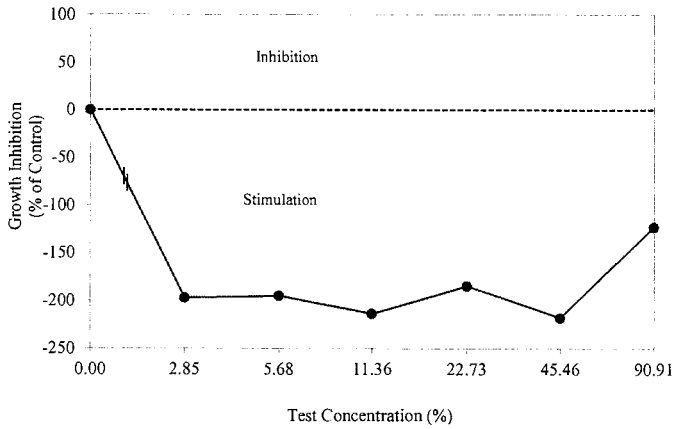
Test Type :	Static	Volume per Replicate :	220 µL
Test Duration :	72 hours	Control Replicates:	10
Mean Temperature (± SD):	24.0°C (± 0.0)	Test Replicates :	4
Sample Pre-aeration :	None	Concentrations Tested :	10 + Control
Sample Filtration :	0.45 µm preconditioned filter	Photoperiod :	Continuous light
Volume Filtered:	≥10 mL	Light Intensity :	4110-4380 lux
Control/Dilution Water :	Millipore Milli-Q (no chemicals added)	pH Adjustment :	None
Enrichment Medium :	Stock 2B: EDTA reduced to 25%	Hardness Adjustment :	None
Test Vessel :	U-shaped polystyrene microplate	Test Method Deviation(s) :	None

COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.

Work Order : 236993
Sample Number : 56007

***Pseudokirchneriella subcapitata* Growth Inhibition**



CELL ENUMERATION AT 72-HOURS

Initiated By :	CZN	Sample pH (at 0 hours) :	8.8
Completion/Enumeration Date :	2018-08-27	Control pH (at 0 hours) :	7.0
Enumerated By :	MDS	Control pH (at 72 hours) :	7.5
Enumeration Method :	Manual (haemocytometer)	Control Cell Increase Factor :	17.9 times growth

Concentration	Cell Concentration (x 10000 cells/mL) Replicate								Cell Yield (x 10000 cells/mL) Mean	Standard Deviation	CV (%)	Stimulation (% of control)**
(%)	1	2	3	4	7	8	9	10				
Control	13.0	14.0	19.0	19.0	21.0	16.5	20.5	14.0	16.17	3.17	19.61	–
0.18	–	–	–	–	–	–	–	–	–	–	–	–
0.35	–	–	–	–	–	–	–	–	–	–	–	–
0.71	–	–	–	–	–	–	–	–	–	–	–	–
1.42	–	–	–	–	–	–	–	–	–	–	–	–
2.85	47.0	49.0	51.0	–	–	–	–	–	48.05	2.00	4.16	197.12
5.68	56.0	50.0	40.0	–	–	–	–	–	47.71	8.08	16.94	195.06
11.36	45.0	59.5	50.5	–	–	–	–	–	50.71	7.32	14.43	213.61
22.73	51.5	50.0	39.5	–	–	–	–	–	46.05	6.54	14.20	184.75
45.46	54.0	51.0	52.0	–	–	–	–	–	51.38	1.53	2.97	217.73
90.91	36.0	44.0	31.0	–	–	–	–	–	36.05	6.56	18.19	122.91

NOTES : **Statistically significant stimulation, according to ANOVA/Dunnett Multiple Comparison Test

- Control replicates 5 and 6 used for pH measurement.
- The Mann-Kendall test shows that there is no inhibitory gradient (α=0.05).
- No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not enumerated/not required

Data Reviewed By : JL
Date : 2018-09-28

REFERENCES

[a] CETIS™, © 2000-2018. V.1.9.4.7. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Date : 2018-09-28
yyyy-mm-dd

Approved By : *Project Manager*

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 236993

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500044047
Field Sampler Name (print):	BW/LM/TB
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	22-Aug-18

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	L2150213-1 Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)		Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-08-21	0900	MS-08	56007	10.0	[redacted]		[redacted]		X	X	X	X	X RISS				3 [redacted] Bladders, 1 Jug, 1 Bucket.
					↳ Confirmed No RISS at Daphnia												

For Lab Use Only	
Received By:	CN
Date:	2018-08-22
Time:	16:00
Storage Location:	
Storage Temp (°C):	

Please list any special requests or instructions:

~~Regular Bioassay Testing~~

Biofinland Sublethal Submission (2nd)
MMER w/ RISS Reporting

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2150213-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / D.	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2150213

ALS Contact: Sampler: BW/LM/TB

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☑

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-WT	Sublethal	Number of Containers
	MS-08	21-Aug-18	9:00	Water	E0	E0	13
	MS-0801	21-Aug-18	9:00	Water	E0		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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ 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: Ben Widdowson	Date: 21-Aug-18	Time: 11:10	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 30-AUG-18
Report Date: 01-OCT-18 15:31 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2153611

Project P.O. #: 4500040417
Job Reference: MS-08 DEL
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2153611-1 MS-08 Sampled By: CW/LM on 27-AUG-18 @ 11:05 Matrix: WATER							
Physical Tests							
Conductivity	5460		3.0	umhos/cm		30-AUG-18	R4195064
pH	8.78		0.10	pH units		27-AUG-18	R4186033
Total Suspended Solids	9.6		2.0	mg/L		28-AUG-18	R4186792
Total Dissolved Solids	6710		20	mg/L		28-AUG-18	R4186793
Turbidity	1.81		0.10	NTU		28-AUG-18	R4190189
Anions and Nutrients							
Ammonia, Total (as N)	2.89	DLHC	0.10	mg/L		31-AUG-18	R4195163
Cyanides							
Cyanide, Total	<0.020	DLM	0.020	mg/L		31-AUG-18	R4195468
Total Metals							
Aluminum (Al)-Total	0.116	DLHC	0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Barium (Ba)-Total	0.0209	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	31-AUG-18	31-AUG-18	R4195543
Cadmium (Cd)-Total	0.000055	DLHC	0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Calcium (Ca)-Total	304	DLHC	0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cobalt (Co)-Total	0.0344	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Copper (Cu)-Total	0.018	DLHC	0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Iron (Fe)-Total	3.57	DLHC	0.10	mg/L	31-AUG-18	31-AUG-18	R4195543
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Lithium (Li)-Total	0.067	DLHC	0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Magnesium (Mg)-Total	931	DLHC	0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Manganese (Mn)-Total	9.44	DLHC	0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Molybdenum (Mo)-Total	<0.00050	DLHC	0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Nickel (Ni)-Total	0.0437	DLHC	0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Potassium (K)-Total	5.43	DLHC	0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Rubidium (Rb)-Total	0.0097	DLHC	0.0020	mg/L	31-AUG-18	31-AUG-18	R4195543
Selenium (Se)-Total	0.0108	DLHC	0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	31-AUG-18	31-AUG-18	R4195543
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Sodium (Na)-Total	5.37	DLHC	0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Strontium (Sr)-Total	0.576	DLHC	0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Sulfur (S)-Total	1620	DLHC	5.0	mg/L	31-AUG-18	31-AUG-18	R4195543
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	31-AUG-18	31-AUG-18	R4195543
Thallium (Tl)-Total	0.00015	DLHC	0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543

* 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
L2153611-1 MS-08 Sampled By: CW/LM on 27-AUG-18 @ 11:05 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	31-AUG-18	31-AUG-18	R4195543
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Uranium (U)-Total	0.00055	DLHC	0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	31-AUG-18	31-AUG-18	R4195543
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	31-AUG-18	31-AUG-18	R4195543
Radiological Parameters							
Ra-226	0.034		0.0074	Bq/L	20-SEP-18	30-SEP-18	R4252755

* 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	Calcium (Ca)-Total	MS-B	L2153611-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2153611-1
Matrix Spike	Potassium (K)-Total	MS-B	L2153611-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2153611-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2153611-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2153611-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2153611-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2153611-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Reference Information

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: L2153611 Report Date: 01-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4195468								
WG2865302-3 DUP		**L2153611-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	31-AUG-18
WG2865302-2 LCS								
Cyanide, Total			84.7		%		80-120	31-AUG-18
WG2865302-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	31-AUG-18
WG2865302-4 MS		**L2153611-1**						
Cyanide, Total			76.5		%		70-130	31-AUG-18
EC-WT	**Water**							
Batch R4195064								
WG2863795-12 DUP		**WG2863795-11**						
Conductivity		484	486		umhos/cm	0.4	10	30-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-4 DUP		**WG2864910-3**						
Aluminum (Al)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	31-AUG-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Barium (Ba)-Total		0.0104	0.0108		mg/L	3.2	20	31-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Boron (B)-Total		0.039	0.039		mg/L	1.6	20	31-AUG-18
Cadmium (Cd)-Total		0.0000073	0.0000060		mg/L	20	20	31-AUG-18
Calcium (Ca)-Total		90.8	92.7		mg/L	2.0	20	31-AUG-18
Chromium (Cr)-Total		0.00052	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	31-AUG-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	31-AUG-18
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	31-AUG-18
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Lithium (Li)-Total		0.0012	0.0012		mg/L	2.9	20	31-AUG-18
Magnesium (Mg)-Total		16.0	16.7		mg/L	4.0	20	31-AUG-18
Manganese (Mn)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-4 DUP		**WG2864910-3**						
Nickel (Ni)-Total		0.00514	0.00504		mg/L	1.8	20	31-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	31-AUG-18
Potassium (K)-Total		3.23	3.40		mg/L	5.0	20	31-AUG-18
Rubidium (Rb)-Total		0.00082	0.00089		mg/L	7.6	20	31-AUG-18
Selenium (Se)-Total		0.000193	0.000173		mg/L	11	20	31-AUG-18
Silicon (Si)-Total		3.11	3.04		mg/L	2.3	20	31-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Sodium (Na)-Total		85.0	89.3		mg/L	4.9	20	31-AUG-18
Strontium (Sr)-Total		0.155	0.145		mg/L	6.7	20	31-AUG-18
Sulfur (S)-Total		10.2	10.1		mg/L	0.8	25	31-AUG-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	31-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	31-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	31-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	31-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	31-AUG-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	31-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	31-AUG-18
WG2864910-2 LCS								
Aluminum (Al)-Total			105.2		%		80-120	31-AUG-18
Antimony (Sb)-Total			104.2		%		80-120	31-AUG-18
Arsenic (As)-Total			101.9		%		80-120	31-AUG-18
Barium (Ba)-Total			102.7		%		80-120	31-AUG-18
Beryllium (Be)-Total			104.6		%		80-120	31-AUG-18
Bismuth (Bi)-Total			99.5		%		80-120	31-AUG-18
Boron (B)-Total			95.8		%		80-120	31-AUG-18
Cadmium (Cd)-Total			100.1		%		80-120	31-AUG-18
Calcium (Ca)-Total			101.9		%		80-120	31-AUG-18
Chromium (Cr)-Total			100.8		%		80-120	31-AUG-18
Cesium (Cs)-Total			101.5		%		80-120	31-AUG-18
Cobalt (Co)-Total			100.4		%		80-120	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-2 LCS								
Copper (Cu)-Total			100.3		%		80-120	31-AUG-18
Iron (Fe)-Total			99.98		%		80-120	31-AUG-18
Lead (Pb)-Total			103.5		%		80-120	31-AUG-18
Lithium (Li)-Total			103.5		%		80-120	31-AUG-18
Magnesium (Mg)-Total			106.1		%		80-120	31-AUG-18
Manganese (Mn)-Total			104.7		%		80-120	31-AUG-18
Molybdenum (Mo)-Total			104.2		%		80-120	31-AUG-18
Nickel (Ni)-Total			100.8		%		80-120	31-AUG-18
Phosphorus (P)-Total			106.4		%		70-130	31-AUG-18
Potassium (K)-Total			100.2		%		80-120	31-AUG-18
Rubidium (Rb)-Total			104.9		%		80-120	31-AUG-18
Selenium (Se)-Total			102.6		%		80-120	31-AUG-18
Silicon (Si)-Total			102.6		%		60-140	31-AUG-18
Silver (Ag)-Total			101.1		%		80-120	31-AUG-18
Sodium (Na)-Total			102.0		%		80-120	31-AUG-18
Strontium (Sr)-Total			104.2		%		80-120	31-AUG-18
Sulfur (S)-Total			99.1		%		80-120	31-AUG-18
Thallium (Tl)-Total			100.7		%		80-120	31-AUG-18
Tellurium (Te)-Total			99.7		%		80-120	31-AUG-18
Thorium (Th)-Total			100.8		%		70-130	31-AUG-18
Tin (Sn)-Total			101.3		%		80-120	31-AUG-18
Titanium (Ti)-Total			100.0		%		80-120	31-AUG-18
Tungsten (W)-Total			100.8		%		80-120	31-AUG-18
Uranium (U)-Total			100.6		%		80-120	31-AUG-18
Vanadium (V)-Total			103.7		%		80-120	31-AUG-18
Zinc (Zn)-Total			97.5		%		80-120	31-AUG-18
Zirconium (Zr)-Total			102.7		%		80-120	31-AUG-18
WG2864910-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	31-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	31-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	31-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	31-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	31-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	31-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	31-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	31-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	31-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	31-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	31-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	31-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	31-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	31-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	31-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	31-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	31-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	31-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	31-AUG-18
WG2864910-5 MS		**WG2864910-6**						

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-5 MS		**WG2864910-6**						
Aluminum (Al)-Total			99.2		%		70-130	31-AUG-18
Antimony (Sb)-Total			101.8		%		70-130	31-AUG-18
Arsenic (As)-Total			100.0		%		70-130	31-AUG-18
Barium (Ba)-Total			95.8		%		70-130	31-AUG-18
Beryllium (Be)-Total			98.7		%		70-130	31-AUG-18
Bismuth (Bi)-Total			91.9		%		70-130	31-AUG-18
Boron (B)-Total			84.2		%		70-130	31-AUG-18
Cadmium (Cd)-Total			101.2		%		70-130	31-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	31-AUG-18
Chromium (Cr)-Total			98.0		%		70-130	31-AUG-18
Cesium (Cs)-Total			98.1		%		70-130	31-AUG-18
Cobalt (Co)-Total			95.7		%		70-130	31-AUG-18
Copper (Cu)-Total			92.0		%		70-130	31-AUG-18
Iron (Fe)-Total			93.9		%		70-130	31-AUG-18
Lead (Pb)-Total			93.3		%		70-130	31-AUG-18
Lithium (Li)-Total			92.3		%		70-130	31-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	31-AUG-18
Manganese (Mn)-Total			98.3		%		70-130	31-AUG-18
Molybdenum (Mo)-Total			102.9		%		70-130	31-AUG-18
Nickel (Ni)-Total			92.8		%		70-130	31-AUG-18
Phosphorus (P)-Total			105.1		%		70-130	31-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	31-AUG-18
Rubidium (Rb)-Total			96.9		%		70-130	31-AUG-18
Selenium (Se)-Total			99.5		%		70-130	31-AUG-18
Silicon (Si)-Total			N/A	MS-B	%		-	31-AUG-18
Silver (Ag)-Total			92.9		%		70-130	31-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	31-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	31-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	31-AUG-18
Thallium (Tl)-Total			94.1		%		70-130	31-AUG-18
Tellurium (Te)-Total			96.9		%		70-130	31-AUG-18
Thorium (Th)-Total			96.9		%		70-130	31-AUG-18
Tin (Sn)-Total			98.6		%		70-130	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864910-5 MS		**WG2864910-6**						
Titanium (Ti)-Total			101.6		%		70-130	31-AUG-18
Tungsten (W)-Total			99.6		%		70-130	31-AUG-18
Uranium (U)-Total			99.4		%		70-130	31-AUG-18
Vanadium (V)-Total			103.5		%		70-130	31-AUG-18
Zinc (Zn)-Total			88.0		%		70-130	31-AUG-18
Zirconium (Zr)-Total			103.0		%		70-130	31-AUG-18
NH3-WT	**Water**							
Batch R4195163								
WG2865146-3 DUP		**L2153611-1**						
Ammonia, Total (as N)		2.89	2.92		mg/L	1.2	20	31-AUG-18
WG2865146-2 LCS								
Ammonia, Total (as N)			105.5		%		85-115	31-AUG-18
WG2865146-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	31-AUG-18
WG2865146-4 MS		**L2153611-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	31-AUG-18
PH-BF	**Water**							
Batch R4186033								
WG2860708-2 DUP		**L2153381-1**						
pH		8.23	8.22	J	pH units	0.01	0.2	27-AUG-18
WG2860708-1 LCS								
pH			6.97		pH units		6.9-7.1	27-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4186793								
WG2861419-3 DUP		**L2153381-1**						
Total Dissolved Solids		740	775		mg/L	4.6	20	28-AUG-18
WG2861419-2 LCS								
Total Dissolved Solids			101.6		%		85-115	28-AUG-18
WG2861419-1 MB								
Total Dissolved Solids			<20		mg/L		20	28-AUG-18
SOLIDS-TSS-BF	**Water**							
Batch R4186792								
WG2860720-3 DUP		**L2153384-1**						
Total Suspended Solids		72.0	70.0		mg/L	2.8	25	28-AUG-18
WG2860720-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4186792								
WG2860720-2 LCS								
Total Suspended Solids			100.8		%		85-115	28-AUG-18
WG2860720-1 MB								
Total Suspended Solids			<2.0		mg/L		2	28-AUG-18
TURBIDITY-BF	**Water**							
Batch R4190189								
WG2862570-3 DUP		**L2153585-1**						
Turbidity		0.20	0.20		NTU	3.0	15	28-AUG-18
WG2862570-2 LCS								
Turbidity			104.0		%		85-115	28-AUG-18
WG2862570-1 MB								
Turbidity			<0.10		NTU		0.1	28-AUG-18

Quality Control Report

Workorder: L2153611 Report Date: 01-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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

L2153611-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Baffinland Iron Mines Corp.	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Wiliam Bowden and Connor Devereaux	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☑
Phone:	647-253-0596 EXT 6016	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	2275 Upper Middle Rd. E., Suite #300	Email 1 or Fax bimcore@alsglobal.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Oakville, ON	Email 2 bimww@alsglobal.com	Analysis Request
Postal Code:	L6H 0C3	Email 3	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:		Email 1 or Fax ap@baffinland.com	
Contact:		Email 2 commercial@baffinland.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	23642 /Q42455	AFE/Cost Center:	PO#:
Job #:	MS-08 DEL	Major/Minor Code:	Routing Code:
PO / AFE:	4500040417	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L2153611	ALS Contact:	Sampler: CW/LM

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-MMER-DEL	Number of Containers
	MS-08	27-Aug-18	11:05	Water	E0	5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			14.8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 27-Aug-18	Time: 12:10	Received by:	Date:	Time:	Received by:	Date: 30-8-18	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 05-SEP-18
Report Date: 09-OCT-18 14:32 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2158111

Project P.O. #: 4500040417
Job Reference: MS-08 WT TOX
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2158111-1 MS-08 Sampled By: KB/MK on 04-SEP-18 @ 17:00 Matrix: WATER							
Physical Tests							
Conductivity	8970		3.0	umhos/cm		06-SEP-18	R4204131
Hardness (as CaCO3)	9570		13	mg/L		11-SEP-18	
pH	8.76		0.10	pH units		05-SEP-18	R4201728
Total Suspended Solids	10.8		2.0	mg/L		05-SEP-18	R4202847
Total Dissolved Solids	12700		20	mg/L		06-SEP-18	R4203592
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		07-SEP-18	R4205419
Alkalinity, Total (as CaCO3)	79		10	mg/L		07-SEP-18	R4204607
Ammonia, Total (as N)	4.29	DLHC	0.20	mg/L		06-SEP-18	R4204262
Chloride (Cl)	23	DLDS	10	mg/L		06-SEP-18	R4204679
Fluoride (F)	<0.40	DLDS	0.40	mg/L		06-SEP-18	R4204679
Nitrate (as N)	29.9	DLDS	0.40	mg/L		06-SEP-18	R4204679
Total Kjeldahl Nitrogen	4.32		0.15	mg/L	06-SEP-18	07-SEP-18	R4204702
Phosphorus, Total	<0.0030		0.0030	mg/L	06-SEP-18	07-SEP-18	R4204420
Sulfate (SO4)	10600	DLDS	6.0	mg/L		06-SEP-18	R4204679
Cyanides							
Cyanide, Total	<0.20	DLM	0.20	mg/L		07-SEP-18	R4205042
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.1	RRR	2.5	mg/L		07-SEP-18	R4204502
Total Organic Carbon	3.5	DLM	2.5	mg/L		07-SEP-18	R4204506
Total Metals							
Aluminum (Al)-Total	<0.50	DLHC	0.50	mg/L	06-SEP-18	07-SEP-18	R4206169
Antimony (Sb)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Arsenic (As)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Barium (Ba)-Total	0.021	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Beryllium (Be)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Bismuth (Bi)-Total	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	07-SEP-18	R4206169
Boron (B)-Total	<1.0	DLHC	1.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Cadmium (Cd)-Total	<0.00050	DLHC	0.00050	mg/L	06-SEP-18	07-SEP-18	R4206169
Calcium (Ca)-Total	623	DLHC	5.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Cesium (Cs)-Total	<0.0010	DLHC	0.0010	mg/L	06-SEP-18	07-SEP-18	R4206169
Chromium (Cr)-Total	<0.050	DLHC	0.050	mg/L	06-SEP-18	07-SEP-18	R4206169
Cobalt (Co)-Total	0.020	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Copper (Cu)-Total	<0.10	DLHC	0.10	mg/L	06-SEP-18	07-SEP-18	R4206169
Iron (Fe)-Total	1.9	DLHC	1.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Lead (Pb)-Total	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	10-SEP-18	R4206169
Lithium (Li)-Total	<0.10	DLHC	0.10	mg/L	06-SEP-18	07-SEP-18	R4206169
Magnesium (Mg)-Total	1930	DLHC	0.50	mg/L	06-SEP-18	07-SEP-18	R4206169
Manganese (Mn)-Total	19.5	DLHC	0.050	mg/L	06-SEP-18	07-SEP-18	R4206169
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		07-SEP-18	R4204929
Molybdenum (Mo)-Total	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	07-SEP-18	R4206169
Nickel (Ni)-Total	<0.050	DLHC	0.050	mg/L	06-SEP-18	07-SEP-18	R4206169

* 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
L2158111-1 MS-08 Sampled By: KB/MK on 04-SEP-18 @ 17:00 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<5.0	DLHC	5.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Potassium (K)-Total	6.8	DLHC	5.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Rubidium (Rb)-Total	<0.020	DLHC	0.020	mg/L	06-SEP-18	07-SEP-18	R4206169
Selenium (Se)-Total	0.0161	DLHC	0.0050	mg/L	06-SEP-18	07-SEP-18	R4206169
Silicon (Si)-Total	<10	DLHC	10	mg/L	06-SEP-18	07-SEP-18	R4206169
Silver (Ag)-Total	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	07-SEP-18	R4206169
Sodium (Na)-Total	7.8	DLHC	5.0	mg/L	06-SEP-18	07-SEP-18	R4206169
Strontium (Sr)-Total	1.15	DLHC	0.10	mg/L	06-SEP-18	07-SEP-18	R4206169
Sulfur (S)-Total	3070	DLHC	50	mg/L	06-SEP-18	07-SEP-18	R4206169
Tellurium (Te)-Total	<0.020	DLHC	0.020	mg/L	06-SEP-18	07-SEP-18	R4206169
Thallium (Tl)-Total	<0.0010	DLHC	0.0010	mg/L	06-SEP-18	07-SEP-18	R4206169
Thorium (Th)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Tin (Sn)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Titanium (Ti)-Total	<0.030	DLHC	0.030	mg/L	06-SEP-18	07-SEP-18	R4206169
Tungsten (W)-Total	<0.010	DLHC	0.010	mg/L	06-SEP-18	07-SEP-18	R4206169
Uranium (U)-Total	0.0025	DLHC	0.0010	mg/L	06-SEP-18	07-SEP-18	R4206169
Vanadium (V)-Total	<0.050	DLHC	0.050	mg/L	06-SEP-18	07-SEP-18	R4206169
Zinc (Zn)-Total	<0.30	DLHC	0.30	mg/L	06-SEP-18	07-SEP-18	R4206169
Zirconium (Zr)-Total	<0.030	DLHC	0.030	mg/L	06-SEP-18	07-SEP-18	R4206169
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					07-SEP-18	R4204552
Dissolved Metals Filtration Location	FIELD					06-SEP-18	R4203671
Aluminum (Al)-Dissolved	<0.50	DLHC	0.50	mg/L	06-SEP-18	06-SEP-18	R4203847
Antimony (Sb)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Arsenic (As)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Barium (Ba)-Dissolved	0.022	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Beryllium (Be)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Bismuth (Bi)-Dissolved	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	06-SEP-18	R4203847
Boron (B)-Dissolved	<1.0	DLHC	1.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Cadmium (Cd)-Dissolved	<0.00050	DLHC	0.00050	mg/L	06-SEP-18	06-SEP-18	R4203847
Calcium (Ca)-Dissolved	609	DLHC	5.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Cesium (Cs)-Dissolved	<0.0010	DLHC	0.0010	mg/L	06-SEP-18	06-SEP-18	R4203847
Chromium (Cr)-Dissolved	<0.050	DLHC	0.050	mg/L	06-SEP-18	06-SEP-18	R4203847
Cobalt (Co)-Dissolved	0.013	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Copper (Cu)-Dissolved	0.032	DLHC	0.020	mg/L	06-SEP-18	06-SEP-18	R4203847
Iron (Fe)-Dissolved	<1.0	DLHC	1.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Lead (Pb)-Dissolved	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	06-SEP-18	R4203847
Lithium (Li)-Dissolved	<0.10	DLHC	0.10	mg/L	06-SEP-18	06-SEP-18	R4203847
Magnesium (Mg)-Dissolved	1950	DLHC	0.50	mg/L	06-SEP-18	06-SEP-18	R4203847
Manganese (Mn)-Dissolved	20.3	DLHC	0.050	mg/L	06-SEP-18	06-SEP-18	R4203847
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	07-SEP-18	07-SEP-18	R4204938

* 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
L2158111-1 MS-08 Sampled By: KB/MK on 04-SEP-18 @ 17:00 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	06-SEP-18	R4203847
Nickel (Ni)-Dissolved	<0.050	DLHC	0.050	mg/L	06-SEP-18	06-SEP-18	R4203847
Phosphorus (P)-Dissolved	<5.0	DLHC	5.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Potassium (K)-Dissolved	6.4	DLHC	5.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Rubidium (Rb)-Dissolved	<0.020	DLHC	0.020	mg/L	06-SEP-18	06-SEP-18	R4203847
Selenium (Se)-Dissolved	0.0173	DLHC	0.0050	mg/L	06-SEP-18	06-SEP-18	R4203847
Silicon (Si)-Dissolved	<5.0	DLHC	5.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Silver (Ag)-Dissolved	<0.0050	DLHC	0.0050	mg/L	06-SEP-18	06-SEP-18	R4203847
Sodium (Na)-Dissolved	7.5	DLHC	5.0	mg/L	06-SEP-18	06-SEP-18	R4203847
Strontium (Sr)-Dissolved	1.15	DLHC	0.10	mg/L	06-SEP-18	06-SEP-18	R4203847
Sulfur (S)-Dissolved	3130	DLHC	50	mg/L	06-SEP-18	06-SEP-18	R4203847
Tellurium (Te)-Dissolved	<0.020	DLHC	0.020	mg/L	06-SEP-18	06-SEP-18	R4203847
Thallium (Tl)-Dissolved	<0.0010	DLHC	0.0010	mg/L	06-SEP-18	06-SEP-18	R4203847
Thorium (Th)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Tin (Sn)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Titanium (Ti)-Dissolved	<0.030	DLHC	0.030	mg/L	06-SEP-18	06-SEP-18	R4203847
Tungsten (W)-Dissolved	<0.010	DLHC	0.010	mg/L	06-SEP-18	06-SEP-18	R4203847
Uranium (U)-Dissolved	0.0023	DLHC	0.0010	mg/L	06-SEP-18	06-SEP-18	R4203847
Vanadium (V)-Dissolved	<0.050	DLHC	0.050	mg/L	06-SEP-18	06-SEP-18	R4203847
Zinc (Zn)-Dissolved	<0.10	DLHC	0.10	mg/L	06-SEP-18	06-SEP-18	R4203847
Zirconium (Zr)-Dissolved	<0.030	DLHC	0.030	mg/L	06-SEP-18	06-SEP-18	R4203847
Radiological Parameters							
Ra-226	0.032		0.0055	Bq/L	27-SEP-18	04-OCT-18	R4252755
Report Remarks : DLM: Detection Limit Adjusted due to sample matrix effects (e.g Chemical Interference, Colour, Turbidity)- DOC DTC: Dissolved Concentration exceeds total. Results were confirmed by re-analysis- DOC							

* 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	Chloride (Cl)	MS-B	L2158111-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2158111-1
Matrix Spike	Boron (B)-Dissolved	MS-B	L2158111-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2158111-1
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2158111-1
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L2158111-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2158111-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2158111-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2158111-1
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2158111-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2158111-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2158111-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2158111-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2158111-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2158111-1
Matrix Spike	Boron (B)-Total	MS-B	L2158111-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2158111-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2158111-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2158111-1
Matrix Spike	Potassium (K)-Total	MS-B	L2158111-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2158111-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2158111-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2158111-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2158111-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2158111-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2158111-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with

Reference Information

detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT Water Conductivity APHA 2510 B
Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT Water Fluoride in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT Water Hardness APHA 2340 B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC Water Ra226 by Alpha Scint, MDC=0.01 Bq/L EPA 903.1

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-Norg D
This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT Water Total Organic Carbon APHA 5310B
Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized

Reference Information

to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2158111 Report Date: 09-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4205419								
WG2870608-2 LCS								
Acidity (as CaCO3)			98.8		%		85-115	07-SEP-18
WG2870608-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	07-SEP-18
ALK-WT	**Water**							
Batch R4204607								
WG2870359-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			95.4		%		80-120	07-SEP-18
WG2870359-4 DUP		**L2158111-1**						
Alkalinity, Total (as CaCO3)		79	81		mg/L	2.3	20	07-SEP-18
WG2870359-2 LCS								
Alkalinity, Total (as CaCO3)			96.5		%		85-115	07-SEP-18
WG2870359-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	07-SEP-18
C-DIS-ORG-WT	**Water**							
Batch R4204502								
WG2870127-3 DUP		**L2157808-1**						
Dissolved Organic Carbon		4.46	4.34		mg/L	2.7	20	07-SEP-18
WG2870127-2 LCS								
Dissolved Organic Carbon			97.8		%		80-120	07-SEP-18
WG2870127-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-SEP-18
WG2870127-4 MS		**L2157808-1**						
Dissolved Organic Carbon			93.6		%		70-130	07-SEP-18
CL-IC-N-WT	**Water**							
Batch R4204679								
WG2869293-20 DUP		**WG2869293-18**						
Chloride (Cl)		172	172		mg/L	0.1	20	06-SEP-18
WG2869293-17 LCS								
Chloride (Cl)			100.4		%		90-110	06-SEP-18
WG2869293-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	06-SEP-18
WG2869293-19 MS		**WG2869293-18**						
Chloride (Cl)			N/A	MS-B	%		-	06-SEP-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4205042								
WG2870822-3 DUP		**L2158111-1**						
Cyanide, Total		<0.20	<0.20	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2870822-2 LCS								
Cyanide, Total			93.0		%		80-120	07-SEP-18
WG2870822-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	07-SEP-18
WG2870822-4 MS		**L2158111-1**						
Cyanide, Total			75.2		%		70-130	07-SEP-18
EC-WT	**Water**							
Batch R4204131								
WG2869075-8 DUP		**WG2869075-7**						
Conductivity		1870	1860		umhos/cm	0.4	10	06-SEP-18
WG2869075-6 LCS								
Conductivity			103.8		%		90-110	06-SEP-18
WG2869075-5 MB								
Conductivity			<3.0		umhos/cm		3	06-SEP-18
F-IC-N-WT	**Water**							
Batch R4204679								
WG2869293-20 DUP		**WG2869293-18**						
Fluoride (F)		0.065	0.065		mg/L	0.6	20	06-SEP-18
WG2869293-17 LCS								
Fluoride (F)			99.4		%		90-110	06-SEP-18
WG2869293-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	06-SEP-18
WG2869293-19 MS		**WG2869293-18**						
Fluoride (F)			102.0		%		75-125	06-SEP-18
HG-D-CVAA-WT	**Water**							
Batch R4204938								
WG2870319-4 DUP		**WG2870319-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2870319-2 LCS								
Mercury (Hg)-Dissolved			112.0		%		80-120	07-SEP-18
WG2870319-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	07-SEP-18
WG2870319-6 MS		**WG2870319-5**						
Mercury (Hg)-Dissolved			117.7		%		70-130	07-SEP-18
HG-T-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R4204929								
WG2870316-3 DUP		**L2158111-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2870316-2 LCS								
Mercury (Hg)-Total			119.0		%		80-120	07-SEP-18
WG2870316-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	07-SEP-18
WG2870316-4 MS		**L2157498-1**						
Mercury (Hg)-Total			118.0		%		70-130	07-SEP-18
MET-D-CCMS-WT	**Water**							
Batch R4203847								
WG2869315-4 DUP		**WG2869315-3**						
Aluminum (Al)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	06-SEP-18
Antimony (Sb)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Arsenic (As)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Barium (Ba)-Dissolved		0.022	0.021		mg/L	3.6	20	06-SEP-18
Beryllium (Be)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Bismuth (Bi)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-SEP-18
Boron (B)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	06-SEP-18
Cadmium (Cd)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-SEP-18
Calcium (Ca)-Dissolved		609	626		mg/L	2.8	20	06-SEP-18
Cesium (Cs)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-SEP-18
Chromium (Cr)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	06-SEP-18
Cobalt (Co)-Dissolved		0.013	0.012		mg/L	5.4	20	06-SEP-18
Copper (Cu)-Dissolved		0.032	0.032		mg/L	2.7	20	06-SEP-18
Iron (Fe)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	06-SEP-18
Lead (Pb)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-SEP-18
Lithium (Li)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	06-SEP-18
Magnesium (Mg)-Dissolved		1950	1990		mg/L	1.7	20	06-SEP-18
Manganese (Mn)-Dissolved		20.3	20.3		mg/L	0.1	20	06-SEP-18
Molybdenum (Mo)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-SEP-18
Nickel (Ni)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	06-SEP-18
Phosphorus (P)-Dissolved		<5.0	<5.0	RPD-NA	mg/L	N/A	20	06-SEP-18
Potassium (K)-Dissolved		6.4	6.5		mg/L	2.7	20	06-SEP-18
Rubidium (Rb)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	06-SEP-18
Selenium (Se)-Dissolved		0.0173	0.0204		mg/L	17	20	06-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4203847								
WG2869315-4 DUP		**WG2869315-3**						
Silicon (Si)-Dissolved		<5.0	<5.0	RPD-NA	mg/L	N/A	20	06-SEP-18
Silver (Ag)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-SEP-18
Sodium (Na)-Dissolved		7.5	7.6		mg/L	1.1	20	06-SEP-18
Strontium (Sr)-Dissolved		1.15	1.21		mg/L	4.4	20	06-SEP-18
Sulfur (S)-Dissolved		3130	3150		mg/L	0.4	20	06-SEP-18
Tellurium (Te)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	06-SEP-18
Thallium (Tl)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-SEP-18
Thorium (Th)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Tin (Sn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Titanium (Ti)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	06-SEP-18
Tungsten (W)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-SEP-18
Uranium (U)-Dissolved		0.0023	0.0021		mg/L	8.2	20	06-SEP-18
Vanadium (V)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	06-SEP-18
Zinc (Zn)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	06-SEP-18
Zirconium (Zr)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	06-SEP-18
WG2869315-2 LCS								
Aluminum (Al)-Dissolved			100.1		%		80-120	06-SEP-18
Antimony (Sb)-Dissolved			97.6		%		80-120	06-SEP-18
Arsenic (As)-Dissolved			102.9		%		80-120	06-SEP-18
Barium (Ba)-Dissolved			103.1		%		80-120	06-SEP-18
Beryllium (Be)-Dissolved			99.5		%		80-120	06-SEP-18
Bismuth (Bi)-Dissolved			100.9		%		80-120	06-SEP-18
Boron (B)-Dissolved			91.3		%		80-120	06-SEP-18
Cadmium (Cd)-Dissolved			103.1		%		80-120	06-SEP-18
Calcium (Ca)-Dissolved			98.6		%		80-120	06-SEP-18
Cesium (Cs)-Dissolved			98.0		%		80-120	06-SEP-18
Chromium (Cr)-Dissolved			101.8		%		80-120	06-SEP-18
Cobalt (Co)-Dissolved			101.7		%		80-120	06-SEP-18
Copper (Cu)-Dissolved			101.6		%		80-120	06-SEP-18
Iron (Fe)-Dissolved			101.9		%		80-120	06-SEP-18
Lead (Pb)-Dissolved			101.6		%		80-120	06-SEP-18
Lithium (Li)-Dissolved			93.7		%		80-120	06-SEP-18
Magnesium (Mg)-Dissolved			105.7		%		80-120	06-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4203847								
WG2869315-2 LCS								
Manganese (Mn)-Dissolved			103.4		%		80-120	06-SEP-18
Molybdenum (Mo)-Dissolved			100.3		%		80-120	06-SEP-18
Nickel (Ni)-Dissolved			102.7		%		80-120	06-SEP-18
Phosphorus (P)-Dissolved			97.0		%		80-120	06-SEP-18
Potassium (K)-Dissolved			104.1		%		80-120	06-SEP-18
Rubidium (Rb)-Dissolved			107.8		%		80-120	06-SEP-18
Selenium (Se)-Dissolved			103.8		%		80-120	06-SEP-18
Silicon (Si)-Dissolved			98.6		%		60-140	06-SEP-18
Silver (Ag)-Dissolved			97.6		%		80-120	06-SEP-18
Sodium (Na)-Dissolved			105.1		%		80-120	06-SEP-18
Strontium (Sr)-Dissolved			97.9		%		80-120	06-SEP-18
Sulfur (S)-Dissolved			93.0		%		80-120	06-SEP-18
Tellurium (Te)-Dissolved			102.5		%		80-120	06-SEP-18
Thallium (Tl)-Dissolved			104.3		%		80-120	06-SEP-18
Thorium (Th)-Dissolved			101.8		%		80-120	06-SEP-18
Tin (Sn)-Dissolved			98.0		%		80-120	06-SEP-18
Titanium (Ti)-Dissolved			101.1		%		80-120	06-SEP-18
Tungsten (W)-Dissolved			101.2		%		80-120	06-SEP-18
Uranium (U)-Dissolved			103.0		%		80-120	06-SEP-18
Vanadium (V)-Dissolved			103.6		%		80-120	06-SEP-18
Zinc (Zn)-Dissolved			99.3		%		80-120	06-SEP-18
Zirconium (Zr)-Dissolved			96.4		%		80-120	06-SEP-18
WG2869315-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	06-SEP-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	06-SEP-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	06-SEP-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	06-SEP-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4203847								
WG2869315-1 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	06-SEP-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-SEP-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	06-SEP-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-SEP-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	06-SEP-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	06-SEP-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	06-SEP-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-SEP-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	06-SEP-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	06-SEP-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	06-SEP-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	06-SEP-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	06-SEP-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	06-SEP-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-SEP-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	06-SEP-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-SEP-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	06-SEP-18
WG2869315-5 MS		**WG2869315-3**						
Antimony (Sb)-Dissolved			86.0		%		70-130	06-SEP-18
Arsenic (As)-Dissolved			97.2		%		70-130	06-SEP-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Beryllium (Be)-Dissolved			89.1		%		70-130	06-SEP-18
Bismuth (Bi)-Dissolved			92.0		%		70-130	06-SEP-18

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4203847								
WG2869315-5 MS		**WG2869315-3**						
Boron (B)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Cadmium (Cd)-Dissolved			98.3		%		70-130	06-SEP-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Cesium (Cs)-Dissolved			91.3		%		70-130	06-SEP-18
Chromium (Cr)-Dissolved			92.0		%		70-130	06-SEP-18
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Copper (Cu)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Lead (Pb)-Dissolved			89.2		%		70-130	06-SEP-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Molybdenum (Mo)-Dissolved			89.8		%		70-130	06-SEP-18
Phosphorus (P)-Dissolved			97.0		%		70-130	06-SEP-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Selenium (Se)-Dissolved			73.2		%		70-130	06-SEP-18
Silver (Ag)-Dissolved			84.3		%		70-130	06-SEP-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Tellurium (Te)-Dissolved			92.6		%		70-130	06-SEP-18
Thallium (Tl)-Dissolved			90.7		%		70-130	06-SEP-18
Thorium (Th)-Dissolved			91.1		%		70-130	06-SEP-18
Tin (Sn)-Dissolved			87.4		%		70-130	06-SEP-18
Titanium (Ti)-Dissolved			79.7		%		70-130	06-SEP-18
Tungsten (W)-Dissolved			91.0		%		70-130	06-SEP-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	06-SEP-18
Vanadium (V)-Dissolved			92.2		%		70-130	06-SEP-18
Zirconium (Zr)-Dissolved			88.4		%		70-130	06-SEP-18
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-4 DUP		**WG2869806-3**						
Aluminum (Al)-Total		0.0059	<0.0050	RPD-NA	mg/L	N/A	20	07-SEP-18
Antimony (Sb)-Total		0.00049	0.00049		mg/L	0.8	20	07-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-4 DUP		**WG2869806-3**						
Arsenic (As)-Total		0.00053	0.00050		mg/L	5.5	20	07-SEP-18
Barium (Ba)-Total		0.103	0.107		mg/L	4.0	20	07-SEP-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-18
Boron (B)-Total		0.087	0.088		mg/L	1.5	20	07-SEP-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	07-SEP-18
Calcium (Ca)-Total		41.4	42.5		mg/L	2.7	20	07-SEP-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-18
Cesium (Cs)-Total		0.000288	0.000290		mg/L	0.4	20	07-SEP-18
Cobalt (Co)-Total		0.00034	0.00035		mg/L	2.9	20	07-SEP-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-18
Iron (Fe)-Total		0.101	0.093		mg/L	7.8	20	07-SEP-18
Lead (Pb)-Total		0.000091	0.000098		mg/L	7.7	20	10-SEP-18
Lithium (Li)-Total		0.0082	0.0080		mg/L	1.8	20	07-SEP-18
Magnesium (Mg)-Total		14.7	15.0		mg/L	2.2	20	07-SEP-18
Manganese (Mn)-Total		0.00454	0.00450		mg/L	0.8	20	07-SEP-18
Molybdenum (Mo)-Total		0.00690	0.00676		mg/L	2.0	20	07-SEP-18
Nickel (Ni)-Total		0.00178	0.00180		mg/L	1.3	20	07-SEP-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	07-SEP-18
Potassium (K)-Total		5.67	5.62		mg/L	0.8	20	07-SEP-18
Rubidium (Rb)-Total		0.0169	0.0172		mg/L	1.7	20	07-SEP-18
Selenium (Se)-Total		0.000090	0.000090		mg/L	0.4	20	07-SEP-18
Silicon (Si)-Total		0.51	0.50		mg/L	1.6	20	07-SEP-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	07-SEP-18
Sodium (Na)-Total		56.7	57.5		mg/L	1.4	20	07-SEP-18
Strontium (Sr)-Total		0.423	0.429		mg/L	1.3	20	07-SEP-18
Sulfur (S)-Total		20.4	20.4		mg/L	0.0	25	07-SEP-18
Thallium (Tl)-Total		0.000054	0.000052		mg/L	4.7	20	07-SEP-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	07-SEP-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	07-SEP-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-18
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-18
Tungsten (W)-Total		<0.00010	<0.00010		mg/L			07-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-4 DUP		**WG2869806-3**						
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-18
Uranium (U)-Total		0.000014	0.000014		mg/L	0.6	20	07-SEP-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2869806-2 LCS								
Aluminum (Al)-Total			98.5		%		80-120	07-SEP-18
Antimony (Sb)-Total			100.3		%		80-120	07-SEP-18
Arsenic (As)-Total			100.5		%		80-120	07-SEP-18
Barium (Ba)-Total			102.4		%		80-120	07-SEP-18
Beryllium (Be)-Total			99.0		%		80-120	07-SEP-18
Bismuth (Bi)-Total			101.0		%		80-120	07-SEP-18
Boron (B)-Total			93.6		%		80-120	07-SEP-18
Cadmium (Cd)-Total			97.2		%		80-120	07-SEP-18
Calcium (Ca)-Total			100.8		%		80-120	07-SEP-18
Chromium (Cr)-Total			98.2		%		80-120	07-SEP-18
Cesium (Cs)-Total			95.5		%		80-120	07-SEP-18
Cobalt (Co)-Total			96.3		%		80-120	07-SEP-18
Copper (Cu)-Total			97.8		%		80-120	07-SEP-18
Iron (Fe)-Total			95.6		%		80-120	07-SEP-18
Lead (Pb)-Total			103.0		%		80-120	07-SEP-18
Lithium (Li)-Total			96.9		%		80-120	07-SEP-18
Magnesium (Mg)-Total			99.9		%		80-120	07-SEP-18
Manganese (Mn)-Total			98.2		%		80-120	07-SEP-18
Molybdenum (Mo)-Total			102.0		%		80-120	07-SEP-18
Nickel (Ni)-Total			98.2		%		80-120	07-SEP-18
Phosphorus (P)-Total			97.0		%		70-130	07-SEP-18
Potassium (K)-Total			95.9		%		80-120	07-SEP-18
Rubidium (Rb)-Total			103.1		%		80-120	07-SEP-18
Selenium (Se)-Total			99.0		%		80-120	07-SEP-18
Silicon (Si)-Total			98.0		%		60-140	07-SEP-18
Silver (Ag)-Total			98.2		%		80-120	07-SEP-18
Sodium (Na)-Total			99.8		%		80-120	07-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-2 LCS								
Strontium (Sr)-Total			99.1		%		80-120	07-SEP-18
Sulfur (S)-Total			90.3		%		80-120	07-SEP-18
Thallium (Tl)-Total			97.6		%		80-120	07-SEP-18
Tellurium (Te)-Total			96.3		%		80-120	07-SEP-18
Thorium (Th)-Total			99.7		%		70-130	07-SEP-18
Tin (Sn)-Total			93.9		%		80-120	07-SEP-18
Titanium (Ti)-Total			95.8		%		80-120	07-SEP-18
Tungsten (W)-Total			102.1		%		80-120	07-SEP-18
Uranium (U)-Total			98.7		%		80-120	07-SEP-18
Vanadium (V)-Total			99.0		%		80-120	07-SEP-18
Zinc (Zn)-Total			94.0		%		80-120	07-SEP-18
Zirconium (Zr)-Total			97.7		%		80-120	07-SEP-18
WG2869806-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	07-SEP-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-SEP-18
Boron (B)-Total			<0.010		mg/L		0.01	07-SEP-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	07-SEP-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-SEP-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	07-SEP-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	07-SEP-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	07-SEP-18
Iron (Fe)-Total			<0.010		mg/L		0.01	07-SEP-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-SEP-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-SEP-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-SEP-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	07-SEP-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	07-SEP-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-SEP-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	07-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-1 MB								
Potassium (K)-Total			<0.050		mg/L		0.05	07-SEP-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	07-SEP-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	07-SEP-18
Silicon (Si)-Total			<0.10		mg/L		0.1	07-SEP-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	07-SEP-18
Sodium (Na)-Total			<0.050		mg/L		0.05	07-SEP-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	07-SEP-18
Sulfur (S)-Total			<0.50		mg/L		0.5	07-SEP-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	07-SEP-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	07-SEP-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	07-SEP-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	07-SEP-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	07-SEP-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	07-SEP-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-SEP-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	07-SEP-18
WG2869806-5 MS		**WG2869806-6**						
Aluminum (Al)-Total			93.0		%		70-130	07-SEP-18
Antimony (Sb)-Total			101.0		%		70-130	07-SEP-18
Arsenic (As)-Total			97.0		%		70-130	07-SEP-18
Barium (Ba)-Total			N/A	MS-B	%		-	07-SEP-18
Beryllium (Be)-Total			99.3		%		70-130	07-SEP-18
Bismuth (Bi)-Total			92.4		%		70-130	07-SEP-18
Boron (B)-Total			N/A	MS-B	%		-	07-SEP-18
Cadmium (Cd)-Total			94.2		%		70-130	07-SEP-18
Calcium (Ca)-Total			N/A	MS-B	%		-	07-SEP-18
Chromium (Cr)-Total			94.1		%		70-130	07-SEP-18
Cesium (Cs)-Total			91.3		%		70-130	07-SEP-18
Cobalt (Co)-Total			91.6		%		70-130	07-SEP-18
Copper (Cu)-Total			90.7		%		70-130	07-SEP-18
Iron (Fe)-Total			N/A	MS-B	%		-	07-SEP-18
Lead (Pb)-Total			94.3		%		70-130	07-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4206169								
WG2869806-5 MS		**WG2869806-6**						
Lithium (Li)-Total			102.5		%		70-130	07-SEP-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	07-SEP-18
Manganese (Mn)-Total			91.3		%		70-130	07-SEP-18
Molybdenum (Mo)-Total			104.4		%		70-130	07-SEP-18
Nickel (Ni)-Total			91.5		%		70-130	07-SEP-18
Phosphorus (P)-Total			99.6		%		70-130	07-SEP-18
Potassium (K)-Total			N/A	MS-B	%		-	07-SEP-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	07-SEP-18
Selenium (Se)-Total			95.5		%		70-130	07-SEP-18
Silicon (Si)-Total			N/A	MS-B	%		-	07-SEP-18
Silver (Ag)-Total			93.6		%		70-130	07-SEP-18
Sodium (Na)-Total			N/A	MS-B	%		-	07-SEP-18
Strontium (Sr)-Total			N/A	MS-B	%		-	07-SEP-18
Sulfur (S)-Total			N/A	MS-B	%		-	07-SEP-18
Thallium (Tl)-Total			85.9		%		70-130	07-SEP-18
Tellurium (Te)-Total			96.0		%		70-130	07-SEP-18
Thorium (Th)-Total			93.4		%		70-130	07-SEP-18
Tin (Sn)-Total			92.3		%		70-130	07-SEP-18
Titanium (Ti)-Total			92.1		%		70-130	07-SEP-18
Tungsten (W)-Total			96.2		%		70-130	07-SEP-18
Uranium (U)-Total			91.9		%		70-130	07-SEP-18
Vanadium (V)-Total			96.6		%		70-130	07-SEP-18
Zinc (Zn)-Total			92.0		%		70-130	07-SEP-18
Zirconium (Zr)-Total			96.3		%		70-130	07-SEP-18
NH3-WT	**Water**							
Batch R4204262								
WG2869813-7 DUP		**L2158111-1**						
Ammonia, Total (as N)		4.29	4.30		mg/L	0.2	20	06-SEP-18
WG2869813-6 LCS								
Ammonia, Total (as N)			106.2		%		85-115	06-SEP-18
WG2869813-5 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	06-SEP-18
WG2869813-8 MS		**L2158111-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	06-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	**Water**							
Batch R4204679								
WG2869293-20 DUP		**WG2869293-18**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	06-SEP-18
WG2869293-17 LCS								
Nitrate (as N)			99.9		%		70-130	06-SEP-18
WG2869293-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	06-SEP-18
WG2869293-19 MS		**WG2869293-18**						
Nitrate (as N)			101.0		%		70-130	06-SEP-18
P-T-COL-WT	**Water**							
Batch R4204420								
WG2869995-3 DUP		**L2158111-1**						
Phosphorus, Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2869995-2 LCS								
Phosphorus, Total			100.7		%		80-120	07-SEP-18
WG2869995-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	07-SEP-18
WG2869995-4 MS		**L2158111-1**						
Phosphorus, Total			95.0		%		70-130	07-SEP-18
PH-BF	**Water**							
Batch R4201728								
WG2868154-2 DUP		**L2158111-1**						
pH		8.76	8.80	J	pH units	0.04	0.2	05-SEP-18
WG2868154-1 LCS								
pH			7.00		pH units		6.9-7.1	05-SEP-18
SO4-IC-N-WT	**Water**							
Batch R4204679								
WG2869293-20 DUP		**WG2869293-18**						
Sulfate (SO4)		17.6	17.6		mg/L	0.1	20	06-SEP-18
WG2869293-17 LCS								
Sulfate (SO4)			101.6		%		90-110	06-SEP-18
WG2869293-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	06-SEP-18
WG2869293-19 MS		**WG2869293-18**						
Sulfate (SO4)			103.9		%		75-125	06-SEP-18
SOLIDS-TDS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-BF	**Water**							
Batch R4203592								
WG2868264-3 DUP		**L2158111-1**						
Total Dissolved Solids		12700	13000		mg/L	1.9	20	06-SEP-18
WG2868264-2 LCS								
Total Dissolved Solids			100.2		%		85-115	06-SEP-18
WG2868264-1 MB								
Total Dissolved Solids			<20		mg/L		20	06-SEP-18
SOLIDS-TSS-BF	**Water**							
Batch R4202847								
WG2868255-3 DUP		**L2158111-1**						
Total Suspended Solids		10.8	9.2		mg/L	16	25	05-SEP-18
WG2868255-2 LCS								
Total Suspended Solids			98.8		%		85-115	05-SEP-18
WG2868255-1 MB								
Total Suspended Solids			<2.0		mg/L		2	05-SEP-18
TKN-WT	**Water**							
Batch R4204702								
WG2869715-3 DUP		**L2158111-1**						
Total Kjeldahl Nitrogen		4.32	4.54		mg/L	5.1	20	07-SEP-18
WG2869715-2 LCS								
Total Kjeldahl Nitrogen			99.9		%		75-125	07-SEP-18
WG2869715-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-SEP-18
WG2869715-4 MS		**L2158111-1**						
Total Kjeldahl Nitrogen			86.3		%		70-130	07-SEP-18
TOC-WT	**Water**							
Batch R4204506								
WG2870151-3 DUP		**L2155809-1**						
Total Organic Carbon		0.53	<0.50	RPD-NA	mg/L	N/A	20	07-SEP-18
WG2870151-2 LCS								
Total Organic Carbon			98.7		%		80-120	07-SEP-18
WG2870151-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-SEP-18
WG2870151-4 MS		**L2155809-1**						
Total Organic Carbon			95.2		%		70-130	07-SEP-18

Quality Control Report

Workorder: L2158111 Report Date: 09-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Friday, October 05, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1809119
Project Name:
Project Number: L2158111

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 9/7/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1809119

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1809119
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2158111
Client PO Number: L2158111

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2158111-1	1809119-1		WATER	04-Sep-18	

ALS Environmental

1809119

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2158111*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2158111-1 MS-08		9/4/2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/26/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: [signature] Date Received: 9/7/18 1215

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1909119

Project Manager: Ken Initials: Ken Date: 9/7/19

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1								
Temperature (°C):	4.4								
No. of custody seals on cooler:	0								
DOT Survey/ Acceptance Information — External µR/hr reading:	12								
Background µR/hr reading:	10								

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

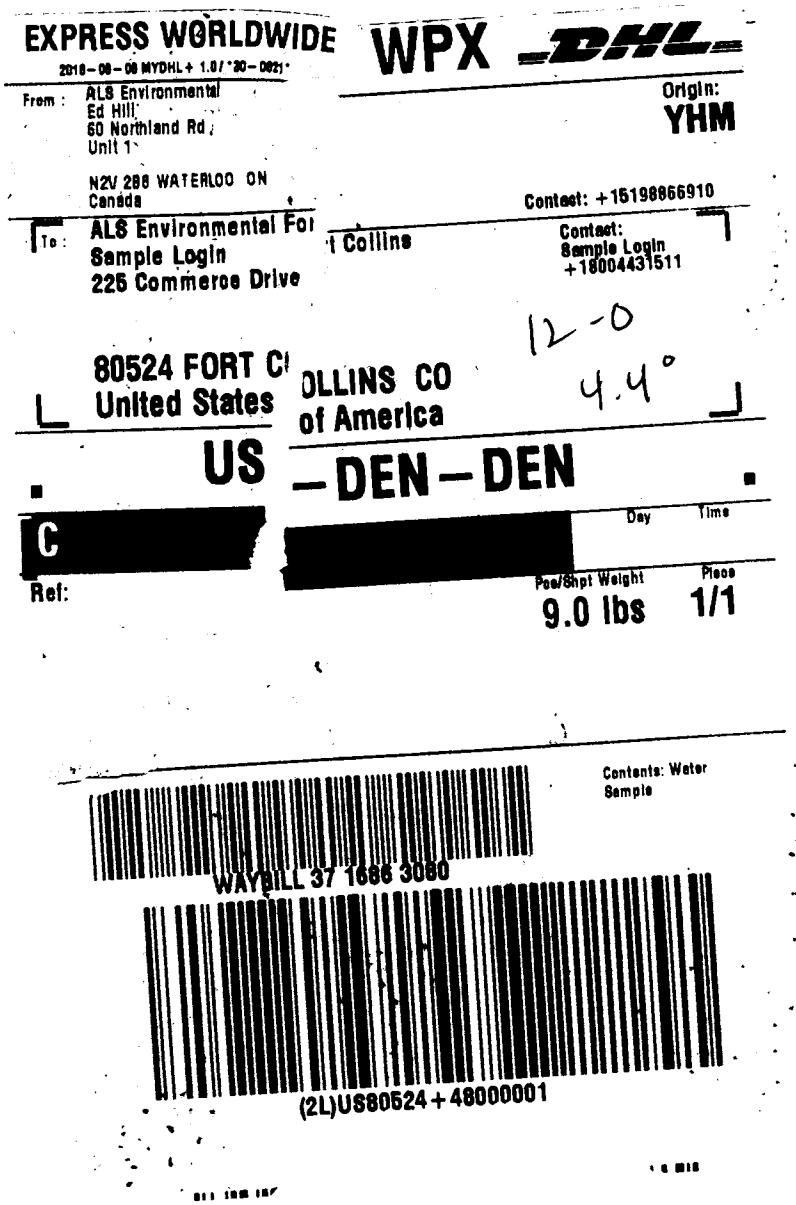
If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 9/7/19

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1209119


EXPRESS WORLDWIDE
WPX
DHL
From : ALS Environmental
Ed Hill
60 Northland Rd,
Unit 1
N2V 2B8 WATERLOO ON
Canada
Origin:
YHM
Contact: +15198866910
To : ALS Environmental Fo
Sample Login
225 Commerce Drive
t Collins
Contact:
Sample Login
+18004431511
12-0
4.4°
80524 FORT C
United States
OLLINS CO
of America
US
-DEN-DEN
C
Day
Time
Ref:
Pce/Shpt Weight
9.0 lbs
Piece
1/1
Contents: Water
Sample
WAYBILL 37 1666 3080
(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2158111	**Work Order:**	1809119
Sample ID:	L2158111-1	**Lab ID:**	1809119-1
Legal Location:		**Matrix:**	WATER
Collection Date:	9/4/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **9/27/2018**	PrepBy: **ASZ**
Ra-226	**0.032 (+/- 0.011)**		**0.0055**	**BQ/l**	NA	10/4/2018 13:45
Carr: BARIUM	*95.9*		*40-110*	*%REC*	DL = NA	10/4/2018 13:45

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2158111	**Work Order:**	1809119
Sample ID:	L2158111-1	**Lab ID:**	1809119-1
Legal Location:		**Matrix:**	WATER
Collection Date:	9/4/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180927-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180927-1** Units: **BQ/l** Analysis Date: **10/4/2018 13:45**

Client ID: Run ID: **RE180927-1A** Prep Date: **9/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.72 (+/- 0.430)	0.00892	1.771		96.9	67-120					P
Carr: BARIUM	16100		16600		97	40-110					

MB Sample ID: **RE180927-1** Units: **BQ/l** Analysis Date: **10/4/2018 13:45**

Client ID: Run ID: **RE180927-1A** Prep Date: **9/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00084 (+/- 0.0027)	0.005									U
Carr: BARIUM	15600		16600		94	40-110					

The following samples were analyzed in this batch: 1809119-1

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 237119
Sample Number : 56171

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	KB, MK
Location :	Waterloo ON	Time Collected :	17:00
Job Number :	L2158111	Date Collected :	2018-09-04
Substance :	L2158111-1 MS-08	Date Received :	2018-09-06
Sampling Method :	Not provided	Date Tested :	2018-09-06
Sample Description :	Clear, light brown, mild odour	Temp. on arrival :	24.0° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	100.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.0 g/L
Date Tested :	2018-09-04	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.0 g/L	Organism Batch :	Dm18-17
95% Confidence Limits :	5.7 - 6.3 g/L	Analyst(s) :	AW, EJS
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	7 days	Mean Young Per Brood :	30.1
Culture Mortality :	0.4% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-17	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2018-09-12
yyyy-mm-dd

Approved by: *Project Manager*

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 237119
Sample Number: 56171

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	>1000	None	8.3	8.1	10020	21.0	97	0:00

0 hours

Date & Time 2018-09-06 14:15
Technician: MJT(EJS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	8.3	8.1	10020	21.0	97	>1000
100B	0	0	8.3	8.1	10020	21.0	97	>1000
100C	0	0	8.3	8.1	10020	21.0	97	>1000
Control A	0	0	8.4	8.4	830	21.0	100	230
Control B	0	0	8.4	8.4	830	21.0	100	230
Control C	0	0	8.4	8.4	830	21.0	100	230

Notes:

24 hours

Date & Time 2018-09-07 14:15
Technician: TZL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	10	–	–	–	21.0
100B	–	10	–	–	–	21.0
100C	–	10	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes: Some test organisms floating in 100% test concentration. TZL

48 hours

Date & Time 2018-09-08 14:15
Technician: AW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	10	0	7.6	8.5	10000	21.0
100B	10	0	7.6	8.3	10130	21.0
100C	10	0	7.6	8.4	10050	21.0
Control A	0	0	8.5	8.7	835	21.0
Control B	0	0	8.5	8.7	852	21.0
Control C	0	0	8.5	8.7	844	21.0

Notes: Some test organisms floating in the 100% test concentration. AW.

Control organisms showing stress: 0
Organism Batch : Dm18-17

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JC
Date: 2018-09-10

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 237119
Sample Number : 56171

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	KB, MK
Location :	Waterloo ON	Time Collected :	17:00
Job Number :	L2158111	Date Collected :	2018-09-04
Substance :	L2158111-1 MS-08	Date Received :	2018-09-06
Sampling Method :	Not provided	Date Tested :	2018-09-06
Sample Description :	Clear, light brown, mild odour	Temp. on arrival :	24.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	20.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-23	Date Tested :	2018-09-08
LC50 :	3373 mg/L	Historical Mean LC50 :	3689 mg/L
95% Confidence Limits :	2996 - 3797 mg/L	Warning Limits (± 2SD) :	3012 - 4517 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	TA, FS, MW

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.64 ± 0.38 g	Mean Fish Fork Length (± 2 SD) :	40.4 ± 7.7 mm
Range of Weights :	0.35 - 0.85 g	Range of Fork Lengths (mm) :	35 - 46 mm
Fish Loading Rate :	0.4 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	18
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-09-12
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 237119
Sample Number: 56171

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	8.6	8.3	9781	16.0	–
	Chemistry after 30min air:	8.6	8.5	9784	16.0	87

0 hours

Date & Time 2018-09-06 14:20
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	8.6	8.5	9784	16.0	87
Control	0	0	8.1	9.5	837	15.0	100

Notes:

24 hours

Date & Time 2018-09-07 14:20
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	8.6	9562	15.0
Control	0	0	–	–	–	15.0

Notes:

48 hours

Date & Time 2018-09-08 14:20
Technician: TA(FS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.1	9.2	9792	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2018-09-09 14:20
Technician: TA(FS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	1	7.2	8.7	9806	14.5
Control	0	0	–	–	–	14.5

Notes:

96 hours

Date & Time 2018-09-10 14:20
Technician: MW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	2	0	7.3	9.0	9828	15.0
Control	0	0	8.3	8.9	805	15.0

Notes:

Control organisms showing stress: 0
Organism Batch : T18-23

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JC
Date: 2018-09-10

CHAIN OF CUSTODY RECORD

Rush!

AQUATOX

AquaTox Work Order No: 237119

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	KB/MK
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	6 Sep 18

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name: L2158111-1	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-09-04	1700	MS-08	56171	24.0	X		X									Pail

For Lab Use Only

Received By:	MJT/EJS
Date:	2018-09-06
Time:	12:10
Storage Location:	
Storage Temp.(°C)	

Please list any special requests or instructions:

~~Regular Baffinland Toxicity Tests~~
Rush Baffinland Report
Please provide Daily Updates w/ ph + O2 parameter updates
emails to: rick.hawthorne@alsglobal.com, bimcore@alsglobal.com

JR

ALS Environmental

L2158111

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L2158111*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2158111-1 MS-08		**9/ 4/ 2018**	**E**
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	9/11/2018	
	Special Request Aquatox (SPECIAL REQUEST-AQT 14)	9/11/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2158111-COFC

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☑ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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: commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-08 WT TOX
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#:

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): L2158111

ALS Contact:

Sampler: KB/MK

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-MMER-WT	Group 3	Number of Containers
)	MS-08	4-Sep-18	17:00	Water	E1	E1	11

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 by clicking on the drop-down list below (electronic COC only)

1 Gen chem tested on site (Baffinland). ALS Baffinland pH results must be on the same sample results as the rest of the BIM-MMER-WT parameter results. ALS Waterloo pH results must be a separate sample result.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			15.6		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 4-Sep-18	Time: 19:30	Received by:	Date:	Time:	Received by: MH	Date: 6 Sep 18	Time: 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 15-JUN-18
Report Date: 16-AUG-18 15:02 (MT)
Version: FINAL REV. 3

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2113176

Project P.O. #: 4500040417
Job Reference: MS-06 EFFLUENT CHARACTERIZATION
C of C Numbers:
Legal Site Desc:

Comments:
16-AUG-2018 ID changed for sample 1 and 2 as per request.

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2113176-1 MS-08-US Sampled By: BL/CP/RB on 13-JUN-18 @ 13:10 Matrix: WATER							
Physical Tests							
Hardness (as CaCO3)	11		10	mg/L		20-JUN-18	
pH	7.32		0.10	pH units		19-JUN-18	R4088245
Total Suspended Solids	<2.0		2.0	mg/L	19-JUN-18	20-JUN-18	R4091414
Total Dissolved Solids	16		10	mg/L		20-JUN-18	R4093936
Turbidity	1.31		0.10	NTU		16-JUN-18	R4084526
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		20-JUN-18	R4094285
Ammonia, Total (as N)	<0.020		0.020	mg/L		19-JUN-18	R4089552
Chloride (Cl)	0.77		0.50	mg/L		19-JUN-18	R4091849
Fluoride (F)	<0.020		0.020	mg/L		19-JUN-18	R4091849
Nitrate (as N)	0.054		0.020	mg/L		19-JUN-18	R4091849
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-JUN-18	20-JUN-18	R4092213
Phosphorus, Total	0.0083		0.0030	mg/L	19-JUN-18	20-JUN-18	R4090308
Sulfate (SO4)	0.47		0.30	mg/L		19-JUN-18	R4091849
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.3		1.0	mg/L		18-JUN-18	R4090268
Total Organic Carbon	2.8		1.0	mg/L		19-JUN-18	R4094653
Total Metals							
Aluminum (Al)-Total	0.056		0.010	mg/L	18-JUN-18	19-JUN-18	R4086232
Arsenic (As)-Total	<0.00010		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Calcium (Ca)-Total	2.21		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Copper (Cu)-Total	<0.0010		0.0010	mg/L	18-JUN-18	18-JUN-18	R4086232
Iron (Fe)-Total	0.053		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Lead (Pb)-Total	<0.00010		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Magnesium (Mg)-Total	1.36		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Manganese (Mn)-Total	0.00329		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		19-JUN-18	R4089225
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Potassium (K)-Total	0.379		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Selenium (Se)-Total	<0.000050		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Sodium (Na)-Total	<0.50		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Uranium (U)-Total	0.000180		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	18-JUN-18	18-JUN-18	R4086232
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-JUN-18	R4086370
Dissolved Metals Filtration Location	FIELD					19-JUN-18	R4088109
Aluminum (Al)-Dissolved	0.0104		0.0050	mg/L	19-JUN-18	19-JUN-18	R4090493
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-JUN-18	19-JUN-18	R4090493
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493

* 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
L2113176-1 MS-08-US Sampled By: BL/CP/RB on 13-JUN-18 @ 13:10 Matrix: WATER							
Dissolved Metals							
Calcium (Ca)-Dissolved	2.13		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Copper (Cu)-Dissolved	0.00031		0.00020	mg/L	19-JUN-18	19-JUN-18	R4090493
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-JUN-18	19-JUN-18	R4090493
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Magnesium (Mg)-Dissolved	1.39		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Manganese (Mn)-Dissolved	0.00271		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-JUN-18	19-JUN-18	R4089226
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Potassium (K)-Dissolved	0.369		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Sodium (Na)-Dissolved	<0.50		0.50	mg/L	19-JUN-18	19-JUN-18	R4090493
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Uranium (U)-Dissolved	0.000139		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	19-JUN-18	19-JUN-18	R4090493
Radiological Parameters							
Ra-226	<0.0068		0.0068	Bq/L	22-JUN-18	05-JUL-18	R4121687
L2113176-2 MS-08-US01 Sampled By: BL/CP/RB on 13-JUN-18 @ 13:10 Matrix: WATER							
Physical Tests							
Hardness (as CaCO3)	11		10	mg/L		20-JUN-18	
pH	7.22		0.10	pH units		19-JUN-18	R4088245
Total Suspended Solids	<2.0		2.0	mg/L	19-JUN-18	20-JUN-18	R4091414
Total Dissolved Solids	23		10	mg/L		20-JUN-18	R4093936
Turbidity	1.59		0.10	NTU		16-JUN-18	R4084526
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	13		10	mg/L		20-JUN-18	R4094285
Ammonia, Total (as N)	<0.020		0.020	mg/L		19-JUN-18	R4089552
Chloride (Cl)	0.77		0.50	mg/L		19-JUN-18	R4091849
Fluoride (F)	<0.020		0.020	mg/L		19-JUN-18	R4091849
Nitrate (as N)	0.052		0.020	mg/L		19-JUN-18	R4091849
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-JUN-18	20-JUN-18	R4092213
Phosphorus, Total	0.0065		0.0030	mg/L	19-JUN-18	20-JUN-18	R4090308
Sulfate (SO4)	0.46		0.30	mg/L		19-JUN-18	R4091849
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.2		1.0	mg/L		18-JUN-18	R4090268
Total Organic Carbon	2.7		1.0	mg/L		19-JUN-18	R4094653
Total Metals							
Aluminum (Al)-Total	0.053		0.010	mg/L	18-JUN-18	19-JUN-18	R4086232
Arsenic (As)-Total	<0.00010		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232

* 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
L2113176-2 MS-08-US01 Sampled By: BL/CP/RB on 13-JUN-18 @ 13:10 Matrix: WATER							
Total Metals							
Calcium (Ca)-Total	2.13		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Copper (Cu)-Total	<0.0010		0.0010	mg/L	18-JUN-18	18-JUN-18	R4086232
Iron (Fe)-Total	<0.050		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Lead (Pb)-Total	<0.00010		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Magnesium (Mg)-Total	1.36		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Manganese (Mn)-Total	0.00323		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		19-JUN-18	R4089225
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Potassium (K)-Total	0.386		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Selenium (Se)-Total	<0.000050		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Sodium (Na)-Total	<0.50		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Uranium (U)-Total	0.000185		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	18-JUN-18	18-JUN-18	R4086232
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-JUN-18	R4086370
Dissolved Metals Filtration Location	FIELD					19-JUN-18	R4088109
Aluminum (Al)-Dissolved	0.0109		0.0050	mg/L	19-JUN-18	19-JUN-18	R4090493
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-JUN-18	19-JUN-18	R4090493
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Calcium (Ca)-Dissolved	2.22		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Copper (Cu)-Dissolved	0.00032		0.00020	mg/L	19-JUN-18	19-JUN-18	R4090493
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-JUN-18	19-JUN-18	R4090493
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Magnesium (Mg)-Dissolved	1.41		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Manganese (Mn)-Dissolved	0.00281		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-JUN-18	19-JUN-18	R4089226
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Potassium (K)-Dissolved	0.382		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Sodium (Na)-Dissolved	<0.50		0.50	mg/L	19-JUN-18	19-JUN-18	R4090493
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Uranium (U)-Dissolved	0.000140		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	19-JUN-18	19-JUN-18	R4090493
Radiological Parameters							
Ra-226	<0.0045		0.0045	Bq/L	22-JUN-18	05-JUL-18	R4121687
L2113176-3 MS-06-DS Sampled By: BL/CP/RB on 13-JUN-18 @ 13:55 Matrix: WATER							
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
L2113176-3 MS-06-DS Sampled By: BL/CP/RB on 13-JUN-18 @ 13:55 Matrix: WATER							
Physical Tests							
Hardness (as CaCO3)	22		10	mg/L		20-JUN-18	
pH	7.45		0.10	pH units		19-JUN-18	R4088245
Total Suspended Solids	36.2		2.0	mg/L	19-JUN-18	20-JUN-18	R4091414
Total Dissolved Solids	46	DLDS	13	mg/L		20-JUN-18	R4093936
Turbidity	27.9		0.10	NTU		16-JUN-18	R4084526
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	21		10	mg/L		20-JUN-18	R4094285
Ammonia, Total (as N)	0.023		0.020	mg/L		19-JUN-18	R4089552
Chloride (Cl)	2.88		0.50	mg/L		19-JUN-18	R4091849
Fluoride (F)	<0.020		0.020	mg/L		19-JUN-18	R4091849
Nitrate (as N)	0.863		0.020	mg/L		19-JUN-18	R4091849
Total Kjeldahl Nitrogen	0.18		0.15	mg/L	20-JUN-18	20-JUN-18	R4092213
Phosphorus, Total	0.0383		0.0030	mg/L	19-JUN-18	20-JUN-18	R4090308
Sulfate (SO4)	6.46		0.30	mg/L		19-JUN-18	R4091849
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.2		1.0	mg/L		18-JUN-18	R4090268
Total Organic Carbon	2.1		1.0	mg/L		19-JUN-18	R4094653
Total Metals							
Aluminum (Al)-Total	1.29		0.010	mg/L	18-JUN-18	19-JUN-18	R4086232
Arsenic (As)-Total	0.00017		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Cadmium (Cd)-Total	0.000039		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Calcium (Ca)-Total	4.32		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Copper (Cu)-Total	0.0027		0.0010	mg/L	18-JUN-18	18-JUN-18	R4086232
Iron (Fe)-Total	1.64		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Lead (Pb)-Total	0.00121		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Magnesium (Mg)-Total	3.53		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Manganese (Mn)-Total	0.0356		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		19-JUN-18	R4089225
Molybdenum (Mo)-Total	0.000231		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Nickel (Ni)-Total	0.00341		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Potassium (K)-Total	1.31		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Selenium (Se)-Total	<0.000050		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Sodium (Na)-Total	3.84		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Thallium (Tl)-Total	0.000025		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Uranium (U)-Total	0.000660		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Zinc (Zn)-Total	0.0069		0.0030	mg/L	18-JUN-18	18-JUN-18	R4086232
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-JUN-18	R4086370
Dissolved Metals Filtration Location	FIELD					19-JUN-18	R4088109
Aluminum (Al)-Dissolved	0.0151		0.0050	mg/L	19-JUN-18	19-JUN-18	R4090493
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-JUN-18	19-JUN-18	R4090493
Cadmium (Cd)-Dissolved	0.000034		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493

* 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
L2113176-3 MS-06-DS Sampled By: BL/CP/RB on 13-JUN-18 @ 13:55 Matrix: WATER							
Dissolved Metals							
Calcium (Ca)-Dissolved	4.25		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Copper (Cu)-Dissolved	0.00105		0.00020	mg/L	19-JUN-18	19-JUN-18	R4090493
Iron (Fe)-Dissolved	0.016		0.010	mg/L	19-JUN-18	19-JUN-18	R4090493
Lead (Pb)-Dissolved	0.000175		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Magnesium (Mg)-Dissolved	2.82		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Manganese (Mn)-Dissolved	0.00919		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-JUN-18	19-JUN-18	R4089226
Molybdenum (Mo)-Dissolved	0.000106		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Nickel (Ni)-Dissolved	0.00089		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Potassium (K)-Dissolved	0.927		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Sodium (Na)-Dissolved	3.94		0.50	mg/L	19-JUN-18	19-JUN-18	R4090493
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Uranium (U)-Dissolved	0.000362		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L	19-JUN-18	19-JUN-18	R4090493
Radiological Parameters							
Ra-226	<0.0066		0.0066	Bq/L	22-JUN-18	05-JUL-18	R4121687
L2113176-4 MS-06 Sampled By: BL/CP/RB on 13-JUN-18 @ 14:55 Matrix: WATER							
Physical Tests							
Hardness (as CaCO3)	385		10	mg/L		20-JUN-18	
pH	7.65		0.10	pH units		19-JUN-18	R4088245
Total Suspended Solids	5.5		2.0	mg/L	19-JUN-18	20-JUN-18	R4091414
Total Dissolved Solids	518	DLDS	20	mg/L		20-JUN-18	R4093936
Turbidity	15.8		0.10	NTU		16-JUN-18	R4084526
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	31		10	mg/L		20-JUN-18	R4094285
Ammonia, Total (as N)	0.308		0.020	mg/L		19-JUN-18	R4089552
Chloride (Cl)	12.8		0.50	mg/L		19-JUN-18	R4091849
Fluoride (F)	0.035		0.020	mg/L		19-JUN-18	R4091849
Nitrate (as N)	4.06		0.020	mg/L		19-JUN-18	R4091849
Total Kjeldahl Nitrogen	0.61		0.15	mg/L	20-JUN-18	20-JUN-18	R4092213
Phosphorus, Total	<0.030	DLM	0.030	mg/L	20-JUN-18	22-JUN-18	R4094659
Sulfate (SO4)	314		0.30	mg/L		19-JUN-18	R4091849
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		22-JUN-18	R4096544
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.7		1.0	mg/L		18-JUN-18	R4090268
Total Organic Carbon	1.5		1.0	mg/L		19-JUN-18	R4094653
Total Metals							
Aluminum (Al)-Total	0.154		0.010	mg/L	18-JUN-18	19-JUN-18	R4086232

* 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
L2113176-4 MS-06 Sampled By: BL/CP/RB on 13-JUN-18 @ 14:55 Matrix: WATER							
Total Metals							
Arsenic (As)-Total	0.00013		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Cadmium (Cd)-Total	0.000027		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Calcium (Ca)-Total	26.5		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Copper (Cu)-Total	0.0012		0.0010	mg/L	18-JUN-18	18-JUN-18	R4086232
Iron (Fe)-Total	0.509		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Lead (Pb)-Total	0.00028		0.00010	mg/L	18-JUN-18	18-JUN-18	R4086232
Magnesium (Mg)-Total	70.2		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Manganese (Mn)-Total	1.11		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		19-JUN-18	R4089225
Molybdenum (Mo)-Total	0.000501		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Nickel (Ni)-Total	0.00976		0.00050	mg/L	18-JUN-18	18-JUN-18	R4086232
Potassium (K)-Total	8.51		0.050	mg/L	18-JUN-18	18-JUN-18	R4086232
Selenium (Se)-Total	0.000899		0.000050	mg/L	18-JUN-18	18-JUN-18	R4086232
Sodium (Na)-Total	5.39		0.50	mg/L	18-JUN-18	18-JUN-18	R4086232
Thallium (Tl)-Total	0.000020		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Uranium (U)-Total	0.00191		0.000010	mg/L	18-JUN-18	18-JUN-18	R4086232
Zinc (Zn)-Total	0.0035		0.0030	mg/L	18-JUN-18	18-JUN-18	R4086232
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-JUN-18	R4086370
Dissolved Metals Filtration Location	FIELD					19-JUN-18	R4088109
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	19-JUN-18	19-JUN-18	R4090493
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-JUN-18	19-JUN-18	R4090493
Cadmium (Cd)-Dissolved	0.000025		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Calcium (Ca)-Dissolved	28.6		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Copper (Cu)-Dissolved	0.00054		0.00020	mg/L	19-JUN-18	19-JUN-18	R4090493
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-JUN-18	19-JUN-18	R4090493
Lead (Pb)-Dissolved	0.000077		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Magnesium (Mg)-Dissolved	76.1		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Manganese (Mn)-Dissolved	1.14		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-JUN-18	19-JUN-18	R4089226
Molybdenum (Mo)-Dissolved	0.000483		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Nickel (Ni)-Dissolved	0.00940		0.00050	mg/L	19-JUN-18	19-JUN-18	R4090493
Potassium (K)-Dissolved	9.20		0.050	mg/L	19-JUN-18	19-JUN-18	R4090493
Selenium (Se)-Dissolved	0.000908		0.000050	mg/L	19-JUN-18	19-JUN-18	R4090493
Sodium (Na)-Dissolved	5.53		0.50	mg/L	19-JUN-18	19-JUN-18	R4090493
Thallium (Tl)-Dissolved	0.000018		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Uranium (U)-Dissolved	0.00152		0.000010	mg/L	19-JUN-18	19-JUN-18	R4090493
Zinc (Zn)-Dissolved	0.0033		0.0010	mg/L	19-JUN-18	19-JUN-18	R4090493
Radiological Parameters							
Ra-226	0.017		0.0046	Bq/L	22-JUN-18	05-JUL-18	R4121687

* 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	Iron (Fe)-Total	MS-B	L2113176-1, -2, -3, -4
Matrix Spike	Phosphorus, Total	MS-B	L2113176-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT Water Cyanide, Total ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

F-IC-N-WT Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT Water Hardness APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT Water Ammonia, Total as N EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

Reference Information

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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). Holdtime for samples under this regulation is 28 days

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

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: L2113176 Report Date: 16-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R4094285								
WG2802364-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.1		%		80-120	20-JUN-18
WG2802364-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			94.7		%		80-120	20-JUN-18
WG2802364-4 DUP		**L2113171-1**						
Alkalinity, Total (as CaCO3)		187	184		mg/L	1.7	20	20-JUN-18
WG2802364-8 DUP		**L2113176-2**						
Alkalinity, Total (as CaCO3)		13	13		mg/L	0.8	20	20-JUN-18
WG2802364-2 LCS								
Alkalinity, Total (as CaCO3)			97.2		%		85-115	20-JUN-18
WG2802364-6 LCS								
Alkalinity, Total (as CaCO3)			98.3		%		85-115	20-JUN-18
WG2802364-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	20-JUN-18
WG2802364-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	20-JUN-18
C-DIS-ORG-WT	**Water**							
Batch R4090268								
WG2800497-3 DUP		**L2113176-1**						
Dissolved Organic Carbon		2.3	2.2		mg/L	3.0	20	18-JUN-18
WG2800497-2 LCS								
Dissolved Organic Carbon			96.3		%		80-120	18-JUN-18
WG2800497-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-JUN-18
WG2800497-4 MS		**L2113176-1**						
Dissolved Organic Carbon			94.8		%		70-130	18-JUN-18
CL-IC-N-WT	**Water**							
Batch R4091849								
WG2800808-14 DUP		**WG2800808-15**						
Chloride (Cl)		2.00	2.00		mg/L	0.3	20	19-JUN-18
WG2800808-12 LCS								
Chloride (Cl)			100.4		%		90-110	19-JUN-18
WG2800808-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	19-JUN-18
WG2800808-13 MS		**WG2800808-15**						
Chloride (Cl)			98.8		%		75-125	19-JUN-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4096544								
WG2804704-3 DUP		**L2113121-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804704-2 LCS								
Cyanide, Total			88.6		%		80-120	22-JUN-18
WG2804704-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	22-JUN-18
WG2804704-4 MS		**L2113121-1**						
Cyanide, Total			93.1		%		70-130	22-JUN-18
F-IC-N-WT	**Water**							
Batch R4091849								
WG2800808-14 DUP		**WG2800808-15**						
Fluoride (F)		0.941	0.942		mg/L	0.1	20	19-JUN-18
WG2800808-12 LCS								
Fluoride (F)			100.9		%		90-110	19-JUN-18
WG2800808-11 MB								
Fluoride (F)			<0.020		mg/L		0.02	19-JUN-18
WG2800808-13 MS		**WG2800808-15**						
Fluoride (F)			100.6		%		75-125	19-JUN-18
HG-D-CVAA-WT	**Water**							
Batch R4089226								
WG2800101-3 DUP		**L2113176-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-18
WG2800101-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	19-JUN-18
WG2800101-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-18
WG2800101-4 MS		**L2113176-2**						
Mercury (Hg)-Dissolved			105.2		%		70-130	19-JUN-18
HG-T-CVAA-WT	**Water**							
Batch R4089225								
WG2800098-3 DUP		**L2113176-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-18
WG2800098-2 LCS								
Mercury (Hg)-Total			106.0		%		80-120	19-JUN-18
WG2800098-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	19-JUN-18
WG2800098-4 MS		**L2113176-2**						

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R4089225								
WG2800098-4 MS		**L2113176-2**						
Mercury (Hg)-Total			104.4		%		70-130	19-JUN-18
MET-D-CCMS-WT	**Water**							
Batch R4090493								
WG2800547-4 DUP		**WG2800547-3**						
Aluminum (Al)-Dissolved		0.0104	0.0105		mg/L	0.7	20	19-JUN-18
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-JUN-18
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	19-JUN-18
Calcium (Ca)-Dissolved		2.13	2.17		mg/L	2.2	20	19-JUN-18
Copper (Cu)-Dissolved		0.00031	0.00032		mg/L	3.2	20	19-JUN-18
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-JUN-18
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUN-18
Magnesium (Mg)-Dissolved		1.39	1.40		mg/L	0.1	20	19-JUN-18
Manganese (Mn)-Dissolved		0.00271	0.00273		mg/L	1.0	20	19-JUN-18
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUN-18
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-JUN-18
Potassium (K)-Dissolved		0.369	0.367		mg/L	0.5	20	19-JUN-18
Selenium (Se)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-JUN-18
Sodium (Na)-Dissolved		0.344	0.343		mg/L	0.4	20	19-JUN-18
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-JUN-18
Uranium (U)-Dissolved		0.000139	0.000145		mg/L	4.1	20	19-JUN-18
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	19-JUN-18
WG2800547-2 LCS								
Aluminum (Al)-Dissolved			104.8		%		80-120	19-JUN-18
Arsenic (As)-Dissolved			102.2		%		80-120	19-JUN-18
Cadmium (Cd)-Dissolved			98.7		%		80-120	19-JUN-18
Calcium (Ca)-Dissolved			101.6		%		80-120	19-JUN-18
Copper (Cu)-Dissolved			101.4		%		80-120	19-JUN-18
Iron (Fe)-Dissolved			102.0		%		80-120	19-JUN-18
Lead (Pb)-Dissolved			98.8		%		80-120	19-JUN-18
Magnesium (Mg)-Dissolved			104.2		%		80-120	19-JUN-18
Manganese (Mn)-Dissolved			105.5		%		80-120	19-JUN-18
Molybdenum (Mo)-Dissolved			101.7		%		80-120	19-JUN-18
Nickel (Ni)-Dissolved			102.2		%		80-120	19-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4090493								
WG2800547-2 LCS								
Potassium (K)-Dissolved			99.3		%		80-120	19-JUN-18
Selenium (Se)-Dissolved			103.1		%		80-120	19-JUN-18
Sodium (Na)-Dissolved			108.9		%		80-120	19-JUN-18
Thallium (Tl)-Dissolved			102.8		%		80-120	19-JUN-18
Uranium (U)-Dissolved			97.3		%		80-120	19-JUN-18
Zinc (Zn)-Dissolved			99.97		%		80-120	19-JUN-18
WG2800547-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	19-JUN-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	19-JUN-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-JUN-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-JUN-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-JUN-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUN-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUN-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUN-18
WG2800547-5 MS		**WG2800547-3**						
Aluminum (Al)-Dissolved			98.9		%		70-130	19-JUN-18
Arsenic (As)-Dissolved			102.1		%		70-130	19-JUN-18
Cadmium (Cd)-Dissolved			99.6		%		70-130	19-JUN-18
Calcium (Ca)-Dissolved			91.7		%		70-130	19-JUN-18
Copper (Cu)-Dissolved			101.8		%		70-130	19-JUN-18
Iron (Fe)-Dissolved			96.8		%		70-130	19-JUN-18
Lead (Pb)-Dissolved			96.9		%		70-130	19-JUN-18
Magnesium (Mg)-Dissolved			101.8		%		70-130	19-JUN-18
Manganese (Mn)-Dissolved			101.4		%		70-130	19-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4090493								
WG2800547-5 MS		**WG2800547-3**						
Molybdenum (Mo)-Dissolved			94.2		%		70-130	19-JUN-18
Nickel (Ni)-Dissolved			99.6		%		70-130	19-JUN-18
Potassium (K)-Dissolved			96.6		%		70-130	19-JUN-18
Selenium (Se)-Dissolved			105.1		%		70-130	19-JUN-18
Sodium (Na)-Dissolved			102.6		%		70-130	19-JUN-18
Thallium (Tl)-Dissolved			99.3		%		70-130	19-JUN-18
Uranium (U)-Dissolved			94.0		%		70-130	19-JUN-18
Zinc (Zn)-Dissolved			101.6		%		70-130	19-JUN-18
MET-T-CCMS-WT	**Water**							
Batch R4086232								
WG2799534-4 DUP		**WG2799534-3**						
Aluminum (Al)-Total		0.0484	0.0501		mg/L	3.5	20	18-JUN-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-JUN-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	18-JUN-18
Calcium (Ca)-Total		2.21	2.20		mg/L	0.4	20	18-JUN-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-JUN-18
Iron (Fe)-Total		0.053	0.050		mg/L	4.9	20	18-JUN-18
Lead (Pb)-Total		0.000068	0.000069		mg/L	1.5	20	18-JUN-18
Magnesium (Mg)-Total		1.36	1.36		mg/L	0.4	20	18-JUN-18
Manganese (Mn)-Total		0.00329	0.00329		mg/L	0.2	20	18-JUN-18
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-JUN-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-JUN-18
Potassium (K)-Total		0.379	0.384		mg/L	1.3	20	18-JUN-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-JUN-18
Sodium (Na)-Total		0.339	0.341		mg/L	0.5	20	18-JUN-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-JUN-18
Uranium (U)-Total		0.000180	0.000186		mg/L	3.2	20	18-JUN-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	18-JUN-18
WG2799534-2 LCS								
Aluminum (Al)-Total			101.9		%		80-120	18-JUN-18
Arsenic (As)-Total			102.7		%		80-120	18-JUN-18
Cadmium (Cd)-Total			100.6		%		80-120	18-JUN-18
Calcium (Ca)-Total			101.3		%		80-120	18-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4086232								
WG2799534-2 LCS								
Copper (Cu)-Total			101.7		%		80-120	18-JUN-18
Iron (Fe)-Total			101.3		%		80-120	18-JUN-18
Lead (Pb)-Total			103.2		%		80-120	18-JUN-18
Magnesium (Mg)-Total			100.8		%		80-120	18-JUN-18
Manganese (Mn)-Total			102.7		%		80-120	18-JUN-18
Molybdenum (Mo)-Total			103.6		%		80-120	18-JUN-18
Nickel (Ni)-Total			102.6		%		80-120	18-JUN-18
Potassium (K)-Total			99.5		%		80-120	18-JUN-18
Selenium (Se)-Total			100.1		%		80-120	18-JUN-18
Sodium (Na)-Total			103.2		%		80-120	18-JUN-18
Thallium (Tl)-Total			103.6		%		80-120	18-JUN-18
Uranium (U)-Total			104.9		%		80-120	18-JUN-18
Zinc (Zn)-Total			97.0		%		80-120	18-JUN-18
WG2799534-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	19-JUN-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-JUN-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	18-JUN-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-JUN-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	18-JUN-18
Iron (Fe)-Total			<0.010		mg/L		0.01	18-JUN-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-JUN-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-JUN-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	18-JUN-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-JUN-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-JUN-18
Potassium (K)-Total			<0.050		mg/L		0.05	18-JUN-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-JUN-18
Sodium (Na)-Total			<0.050		mg/L		0.05	18-JUN-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-JUN-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-JUN-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-JUN-18
WG2799534-5 MS		**WG2799534-3**						
Aluminum (Al)-Total			101.2		%		70-130	18-JUN-18
Arsenic (As)-Total			103.5		%		70-130	18-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4086232								
WG2799534-5 MS		**WG2799534-3**						
Cadmium (Cd)-Total			100.9		%		70-130	18-JUN-18
Calcium (Ca)-Total			97.1		%		70-130	18-JUN-18
Copper (Cu)-Total			102.8		%		70-130	18-JUN-18
Iron (Fe)-Total			N/A	MS-B	%		-	18-JUN-18
Lead (Pb)-Total			105.1		%		70-130	18-JUN-18
Magnesium (Mg)-Total			100.2		%		70-130	18-JUN-18
Manganese (Mn)-Total			102.0		%		70-130	18-JUN-18
Molybdenum (Mo)-Total			106.3		%		70-130	18-JUN-18
Nickel (Ni)-Total			103.7		%		70-130	18-JUN-18
Potassium (K)-Total			98.7		%		70-130	18-JUN-18
Selenium (Se)-Total			106.0		%		70-130	18-JUN-18
Sodium (Na)-Total			103.5		%		70-130	18-JUN-18
Thallium (Tl)-Total			102.5		%		70-130	18-JUN-18
Uranium (U)-Total			110.1		%		70-130	18-JUN-18
Zinc (Zn)-Total			99.7		%		70-130	18-JUN-18
NH3-WT	**Water**							
Batch R4089552								
WG2800675-11 DUP		**L2113563-4**						
Ammonia, Total (as N)		0.057	0.069		mg/L	18	20	19-JUN-18
WG2800675-10 LCS								
Ammonia, Total (as N)			91.4		%		85-115	19-JUN-18
WG2800675-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	19-JUN-18
WG2800675-12 MS		**L2113563-4**						
Ammonia, Total (as N)			85.9		%		75-125	19-JUN-18
NO3-IC-WT	**Water**							
Batch R4091849								
WG2800808-14 DUP		**WG2800808-15**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	19-JUN-18
WG2800808-12 LCS								
Nitrate (as N)			99.96		%		70-130	19-JUN-18
WG2800808-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	19-JUN-18
WG2800808-13 MS		**WG2800808-15**						
Nitrate (as N)			97.4		%		70-130	19-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	**Water**							
Batch R4090308								
WG2801364-3 DUP		**L2112651-2**						
Phosphorus, Total		0.146	0.161		mg/L	10	20	19-JUN-18
WG2801364-2 LCS								
Phosphorus, Total			94.8		%		80-120	20-JUN-18
WG2801364-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	20-JUN-18
WG2801364-4 MS		**L2112651-2**						
Phosphorus, Total			N/A	MS-B	%		-	19-JUN-18
Batch R4094659								
WG2802380-3 DUP		**L2113499-1**						
Phosphorus, Total		0.0192	0.0185		mg/L	3.8	20	22-JUN-18
WG2802380-2 LCS								
Phosphorus, Total			93.3		%		80-120	22-JUN-18
WG2802380-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	22-JUN-18
WG2802380-4 MS		**L2113499-1**						
Phosphorus, Total			81.8		%		70-130	22-JUN-18
PH-WT	**Water**							
Batch R4088245								
WG2798979-4 DUP		**WG2798979-3**						
pH		6.91	6.98	J	pH units	0.07	0.2	19-JUN-18
WG2798979-2 LCS								
pH			6.99		pH units		6.9-7.1	19-JUN-18
SO4-IC-N-WT	**Water**							
Batch R4091849								
WG2800808-14 DUP		**WG2800808-15**						
Sulfate (SO4)		7.71	7.70		mg/L	0.2	20	19-JUN-18
WG2800808-12 LCS								
Sulfate (SO4)			101.0		%		90-110	19-JUN-18
WG2800808-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	19-JUN-18
WG2800808-13 MS		**WG2800808-15**						
Sulfate (SO4)			98.0		%		75-125	19-JUN-18
SOLIDS-TDS-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	**Water**							
Batch R4093936								
WG2801770-3 DUP		**L2113176-1**						
Total Dissolved Solids		16	16		mg/L	1.6	20	20-JUN-18
WG2801770-2 LCS								
Total Dissolved Solids			95.7		%		85-115	20-JUN-18
WG2801770-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-JUN-18
SOLIDS-TSS-WT	**Water**							
Batch R4091414								
WG2801079-3 DUP		**L2113321-2**						
Total Suspended Solids		1860	1870		mg/L	0.2	20	20-JUN-18
WG2801079-2 LCS								
Total Suspended Solids			101.5		%		85-115	20-JUN-18
WG2801079-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-JUN-18
TKN-WT	**Water**							
Batch R4092213								
WG2801806-3 DUP		**L2112968-2**						
Total Kjeldahl Nitrogen		<0.15	<0.15	RPD-NA	mg/L	N/A	20	20-JUN-18
WG2801808-3 DUP		**L2113501-2**						
Total Kjeldahl Nitrogen		0.21	0.20		mg/L	4.3	20	20-JUN-18
WG2801806-2 LCS								
Total Kjeldahl Nitrogen			86.1		%		75-125	20-JUN-18
WG2801808-2 LCS								
Total Kjeldahl Nitrogen			88.9		%		75-125	20-JUN-18
WG2801806-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-JUN-18
WG2801808-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-JUN-18
WG2801806-4 MS		**L2112968-2**						
Total Kjeldahl Nitrogen			98.3		%		70-130	20-JUN-18
WG2801808-4 MS		**L2113501-2**						
Total Kjeldahl Nitrogen			80.3		%		70-130	20-JUN-18
TOC-WT	**Water**							
Batch R4094653								
WG2801685-3 DUP		**L2113386-1**						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	19-JUN-18
WG2801685-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4094653								
WG2801685-2 LCS								
Total Organic Carbon			95.0		%		80-120	19-JUN-18
WG2801685-1 MB								
Total Organic Carbon			<1.0		mg/L		1	19-JUN-18
WG2801685-4 MS		**L2113386-1**						
Total Organic Carbon			92.6		%		70-130	19-JUN-18
TURBIDITY-WT	**Water**							
Batch R4084526								
WG2798999-3 DUP		**L2113176-1**						
Turbidity		1.31	1.26		NTU	3.9	15	16-JUN-18
WG2798999-2 LCS								
Turbidity			104.0		%		85-115	16-JUN-18
WG2798999-1 MB								
Turbidity			<0.10		NTU		0.1	16-JUN-18

Quality Control Report

Workorder: L2113176 Report Date: 16-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Quality Control Report

Workorder: L2113176 Report Date: 16-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Turbidity							
	1	13-JUN-18 13:10	16-JUN-18 00:00	48	59	hours	EHTL
	2	13-JUN-18 13:10	16-JUN-18 00:00	48	59	hours	EHTL
	3	13-JUN-18 13:55	16-JUN-18 00:00	48	58	hours	EHTL
	4	13-JUN-18 14:55	16-JUN-18 00:00	48	57	hours	EHTL
pH							
	1	13-JUN-18 13:10	19-JUN-18 00:00	4	5	days	EHT
	2	13-JUN-18 13:10	19-JUN-18 00:00	4	5	days	EHT
	3	13-JUN-18 13:55	19-JUN-18 00:00	4	5	days	EHT
	4	13-JUN-18 14:55	19-JUN-18 00:00	4	5	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 L2113176 were received on 15-JUN-18 09:45.

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.

Tuesday, July 10, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1806421
Project Name:
Project Number: L2113176

Dear Mr. Hawthorne:

Four water samples were received from ALS Environmental, on 6/19/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1806421

Radium-226:

The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1806421
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2113176
Client PO Number: L2113176

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2113176-1	1806421-1		WATER	13-Jun-18	
L2113176-2	1806421-2		WATER	13-Jun-18	
L2113176-3	1806421-3		WATER	13-Jun-18	
L2113176-4	1806421-4		WATER	13-Jun-18	

ALS Environmental

L2113176

WATERLOO

1806421

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2113176*
ALS requires QC data to be provided with your final results.

Please see enclosed 4 sample(s) in 4 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2113176-1 MS-06-US		6/13/2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	6/22/2018	
L2113176-2 MS-06-US01		6/13/2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	6/22/2018	
L2113176-3 MS-06-DS		6/13/2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	6/22/2018	
L2113176-4 MS-06		6/13/2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	6/22/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: VTJ Date Received: 6/19/18 12:30

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Water100 Workorder No: 1806421

Project Manager: KO Initials: KO Date: 6/19/18

1. Does this project require any special handling in addition to standard ALS procedures?		YES	(NO)
2. Are custody seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
5. Are the COC and bottle labels complete and legible?		(YES)	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount of sediment: X dusting ____ moderate ____ heavy	Amount N/A	(YES)	NO
16. Were the samples shipped on ice?		(YES)	NO
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 (#3) #4	RAD ONLY	YES	(NO)

Cooler #:	1							
Temperature (°C):	9.2							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

- Samples 3 and 4 contain a light dusting

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 6/20/18

Form 201r25.xls
(02/12/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1806421

EXPRESS WORLDWIDE **WPX** DHL

2016-08-16 MYDHL+ 1.0 / *3G-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198666910

To : **ALS Environmental Fort Collins**
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

80524 FORT COLLINS CO
United States of America

US-DEN-DEN

C [redacted] Day Time

Ref:

Pcs/Shpt Weight: **29.6 lbs** Piece: **1/1**

9.2

Contents: Water Samples

WAYBILL 82 7733 8985

(2L)US80524+43000001

Client:	ALS Environmental	**Date:**	*06-Jul-18*
Project:	L2113176	**Work Order:**	1806421
Sample ID:	L2113176-1	**Lab ID:**	1806421-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/13/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **6/22/2018**	PrepBy: **LOW**	
Ra-226	0.0050 (+/- 0.0047)	U	0.0068	BQ/l	NA	7/5/2018 13:10
Carr: BARIUM	*91.5*		*40-110*	*%REC*	DL = NA	7/5/2018 13:10

Client:	ALS Environmental	**Date:**	*06-Jul-18*
Project:	L2113176	**Work Order:**	1806421
Sample ID:	L2113176-2	**Lab ID:**	1806421-2
Legal Location:		**Matrix:**	WATER
Collection Date:	6/13/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **6/22/2018**	PrepBy: **LOW**	
Ra-226	0.0042 (+/- 0.0038)	U	0.0045	BQ/l	NA	7/5/2018 13:10
Carr: BARIUM	*90.5*		*40-110*	*%REC*	DL = NA	7/5/2018 13:10

Client:	ALS Environmental	**Date:**	*06-Jul-18*
Project:	L2113176	**Work Order:**	1806421
Sample ID:	L2113176-3	**Lab ID:**	1806421-3
Legal Location:		**Matrix:**	WATER
Collection Date:	6/13/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **6/22/2018**	PrepBy: **LOW**
Ra-226	0.0042 (+/- 0.0044)	U	0.0066	BQ/l	NA	7/5/2018 13:10
Carr: BARIUM	*95.7*		*40-110*	*%REC*	DL = NA	7/5/2018 13:10

Client:	ALS Environmental	**Date:**	*06-Jul-18*
Project:	L2113176	**Work Order:**	1806421
Sample ID:	L2113176-4	**Lab ID:**	1806421-4
Legal Location:		**Matrix:**	WATER
Collection Date:	6/13/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **6/22/2018**	PrepBy: **LOW**
Ra-226	**0.017 (+/- 0.0078)**		**0.0046**	**BQ/l**	NA	7/5/2018 13:10
Carr: BARIUM	*71.5*		*40-110*	*%REC*	DL = NA	7/5/2018 13:10

Client:	ALS Environmental	**Date:**	*06-Jul-18*
Project:	L2113176	**Work Order:**	1806421
Sample ID:	L2113176-4	**Lab ID:**	1806421-4
Legal Location:		**Matrix:**	WATER
Collection Date:	6/13/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180622-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180622-1** Units: **BQ/l** Analysis Date: **7/5/2018 13:10**

Client ID: Run ID: **RE180622-1A** Prep Date: **6/22/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.89 (+/- 0.468)	0.00649	1.772		107	67-120					P
Carr: BARIUM	16000		16770		95.6	40-110					

LCSD Sample ID: **RE180622-1** Units: **BQ/l** Analysis Date: **7/5/2018 13:56**

Client ID: Run ID: **RE180622-1A** Prep Date: **6/22/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.42 (+/- 0.353)	0.00806	1.772		80.3	67-120		1.89	0.8	2.1	P
Carr: BARIUM	15700		16770		93.9	40-110		16000			

MB Sample ID: **RE180622-1** Units: **BQ/l** Analysis Date: **7/5/2018 13:10**

Client ID: Run ID: **RE180622-1A** Prep Date: **6/22/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0017 (+/- 0.0030)	0.0053									U
Carr: BARIUM	16200		16770		96.6	40-110					

The following samples were analyzed in this batch: 1806421-1 1806421-2 1806421-3 1806421-4

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2113176-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / L	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06 Effluent Characterization
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2113176

ALS Contact:

Sampler: BL/CP/RB

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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	Group 7	Radium-223	Cyanide	Number of Containers
	MS-06-US	13-Jun-18	13:10	Water	R	R		8
	MS-06-US01	13-Jun-18	13:10	Water	R	R		8
	MS-06-DS	13-Jun-18	13:55	Water	R	R		8
	MS-06	13-Jun-18	14:55	Water	R	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 site MQ-C-D Oil and Grease bottle half full due to leak

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			9.1		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Bryan Lukeman	Release Date: 13-Jun-18	Time: 18:10	Received by:	Date:	Time:	Received by:	Date: 15-JUN-18	Time: 945

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 22-JUN-18
Report Date: 26-JUL-18 13:26 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2117069

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2117069-1 MS-06 Sampled By: RL on 19-JUN-18 @ 12:00 Matrix: WATER							
Physical Tests							
Conductivity	836		3.0	umhos/cm		22-JUN-18	R4095609
Hardness (as CaCO3)	430		10	mg/L		25-JUN-18	
pH	7.61		0.10	pH units		22-JUN-18	R4095609
Total Suspended Solids	2.7		2.0	mg/L	25-JUN-18	25-JUN-18	R4096411
Total Dissolved Solids	648	DLDS	20	mg/L		24-JUN-18	R4096256
Anions and Nutrients							
Acidity (as CaCO3)	2.8		2.0	mg/L		28-JUN-18	R4100667
Alkalinity, Total (as CaCO3)	31		10	mg/L		22-JUN-18	R4095238
Ammonia, Total (as N)	0.444		0.020	mg/L		22-JUN-18	R4095060
Chloride (Cl)	15.3		0.50	mg/L		22-JUN-18	R4096635
Fluoride (F)	0.042		0.020	mg/L		22-JUN-18	R4096635
Nitrate (as N)	4.66		0.020	mg/L		22-JUN-18	R4096635
Total Kjeldahl Nitrogen	0.81		0.15	mg/L	25-JUN-18	25-JUN-18	R4096608
Phosphorus, Total	<0.0030		0.0030	mg/L	22-JUN-18	25-JUN-18	R4096094
Sulfate (SO4)	387		0.30	mg/L		22-JUN-18	R4096635
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		22-JUN-18	R4096544
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.5		1.0	mg/L		24-JUN-18	R4096117
Total Organic Carbon	1.7		1.0	mg/L		24-JUN-18	R4096121
Total Metals							
Aluminum (Al)-Total	0.0628		0.0050	mg/L	22-JUN-18	22-JUN-18	R4094871
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Arsenic (As)-Total	0.00012		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Barium (Ba)-Total	0.0106		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Boron (B)-Total	0.025		0.010	mg/L	22-JUN-18	22-JUN-18	R4094871
Cadmium (Cd)-Total	0.0000420		0.0000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Calcium (Ca)-Total	34.7		0.050	mg/L	22-JUN-18	22-JUN-18	R4094871
Cesium (Cs)-Total	0.000012		0.000010	mg/L	22-JUN-18	22-JUN-18	R4094871
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	22-JUN-18	22-JUN-18	R4094871
Cobalt (Co)-Total	0.00601		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Copper (Cu)-Total	<0.0010		0.0010	mg/L	22-JUN-18	22-JUN-18	R4094871
Iron (Fe)-Total	0.206		0.010	mg/L	22-JUN-18	22-JUN-18	R4094871
Lead (Pb)-Total	0.000138		0.000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Lithium (Li)-Total	0.0150		0.0010	mg/L	22-JUN-18	22-JUN-18	R4094871
Magnesium (Mg)-Total	82.1		0.0050	mg/L	22-JUN-18	22-JUN-18	R4094871
Manganese (Mn)-Total	1.41		0.00050	mg/L	22-JUN-18	22-JUN-18	R4094871
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		22-JUN-18	R4095093
Molybdenum (Mo)-Total	0.000669		0.000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Nickel (Ni)-Total	0.00891		0.00050	mg/L	22-JUN-18	22-JUN-18	R4094871

* 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
L2117069-1 MS-06 Sampled By: RL on 19-JUN-18 @ 12:00 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<0.050		0.050	mg/L	22-JUN-18	22-JUN-18	R4094871
Potassium (K)-Total	9.77		0.050	mg/L	22-JUN-18	22-JUN-18	R4094871
Rubidium (Rb)-Total	0.00504		0.00020	mg/L	22-JUN-18	22-JUN-18	R4094871
Selenium (Se)-Total	0.00103		0.000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Silicon (Si)-Total	0.45		0.10	mg/L	22-JUN-18	22-JUN-18	R4094871
Silver (Ag)-Total	<0.000050		0.000050	mg/L	22-JUN-18	22-JUN-18	R4094871
Sodium (Na)-Total	6.22		0.050	mg/L	22-JUN-18	22-JUN-18	R4094871
Strontium (Sr)-Total	0.0571		0.0010	mg/L	22-JUN-18	22-JUN-18	R4094871
Sulfur (S)-Total	136		0.50	mg/L	22-JUN-18	22-JUN-18	R4094871
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-JUN-18	22-JUN-18	R4094871
Thallium (Tl)-Total	0.000023		0.000010	mg/L	22-JUN-18	22-JUN-18	R4094871
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Tin (Sn)-Total	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Titanium (Ti)-Total	<0.00080	DLUI	0.00080	mg/L	22-JUN-18	22-JUN-18	R4094871
Tungsten (W)-Total	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4094871
Uranium (U)-Total	0.00190		0.000010	mg/L	22-JUN-18	22-JUN-18	R4094871
Vanadium (V)-Total	<0.00050		0.00050	mg/L	22-JUN-18	22-JUN-18	R4094871
Zinc (Zn)-Total	0.0089		0.0030	mg/L	22-JUN-18	22-JUN-18	R4094871
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	22-JUN-18	22-JUN-18	R4094871
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					22-JUN-18	R4094952
Dissolved Metals Filtration Location	FIELD					22-JUN-18	R4095230
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	22-JUN-18	22-JUN-18	R4096144
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Barium (Ba)-Dissolved	0.0103		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Boron (B)-Dissolved	0.024		0.010	mg/L	22-JUN-18	22-JUN-18	R4096144
Cadmium (Cd)-Dissolved	0.0000334		0.0000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Calcium (Ca)-Dissolved	33.6		0.050	mg/L	22-JUN-18	22-JUN-18	R4096144
Cesium (Cs)-Dissolved	0.000012		0.000010	mg/L	22-JUN-18	22-JUN-18	R4096144
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	22-JUN-18	22-JUN-18	R4096144
Cobalt (Co)-Dissolved	0.00567		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Copper (Cu)-Dissolved	0.00047		0.00020	mg/L	22-JUN-18	22-JUN-18	R4096144
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	22-JUN-18	22-JUN-18	R4096144
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Lithium (Li)-Dissolved	0.0151		0.0010	mg/L	22-JUN-18	22-JUN-18	R4096144
Magnesium (Mg)-Dissolved	84.1		0.0050	mg/L	22-JUN-18	22-JUN-18	R4096144
Manganese (Mn)-Dissolved	1.40		0.00050	mg/L	22-JUN-18	22-JUN-18	R4096144
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	22-JUN-18	22-JUN-18	R4095096

* 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
L2117069-1 MS-06 Sampled By: RL on 19-JUN-18 @ 12:00 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	0.000654		0.000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Nickel (Ni)-Dissolved	0.00859		0.00050	mg/L	22-JUN-18	22-JUN-18	R4096144
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	22-JUN-18	22-JUN-18	R4096144
Potassium (K)-Dissolved	10.2		0.050	mg/L	22-JUN-18	22-JUN-18	R4096144
Rubidium (Rb)-Dissolved	0.00507		0.00020	mg/L	22-JUN-18	22-JUN-18	R4096144
Selenium (Se)-Dissolved	0.00101		0.000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Silicon (Si)-Dissolved	0.365		0.050	mg/L	22-JUN-18	22-JUN-18	R4096144
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	22-JUN-18	22-JUN-18	R4096144
Sodium (Na)-Dissolved	6.42		0.050	mg/L	22-JUN-18	22-JUN-18	R4096144
Strontium (Sr)-Dissolved	0.0559		0.0010	mg/L	22-JUN-18	22-JUN-18	R4096144
Sulfur (S)-Dissolved	142		0.50	mg/L	22-JUN-18	22-JUN-18	R4096144
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	22-JUN-18	22-JUN-18	R4096144
Thallium (Tl)-Dissolved	0.000023		0.000010	mg/L	22-JUN-18	22-JUN-18	R4096144
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	22-JUN-18	22-JUN-18	R4096144
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	22-JUN-18	22-JUN-18	R4096144
Uranium (U)-Dissolved	0.00174		0.000010	mg/L	22-JUN-18	22-JUN-18	R4096144
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	22-JUN-18	22-JUN-18	R4096144
Zinc (Zn)-Dissolved	0.0085		0.0010	mg/L	22-JUN-18	22-JUN-18	R4096144
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	22-JUN-18	22-JUN-18	R4096144
Radiological Parameters							
Ra-226	0.012		0.0057	Bq/L	05-JUL-18	18-JUL-18	R4070789

* 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	Calcium (Ca)-Dissolved	MS-B	L2117069-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2117069-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2117069-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2117069-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2117069-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

Reference Information

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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). Holdtime for samples under this regulation is 28 days

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, 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

Workorder: L2117069 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4100667								
WG2809185-2 LCS								
Acidity (as CaCO3)			102.8		%		85-115	28-JUN-18
WG2809185-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	28-JUN-18
ALK-WT	**Water**							
Batch R4095238								
WG2804602-15 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			91.8		%		80-120	22-JUN-18
WG2804602-16 DUP		**L2116590-12**						
Alkalinity, Total (as CaCO3)		85	83		mg/L	2.8	20	22-JUN-18
WG2804602-14 LCS								
Alkalinity, Total (as CaCO3)			94.0		%		85-115	22-JUN-18
WG2804602-13 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	22-JUN-18
C-DIS-ORG-WT	**Water**							
Batch R4096117								
WG2805746-7 DUP		**L2117340-1**						
Dissolved Organic Carbon		2.3	1.9		mg/L	20	20	24-JUN-18
WG2805746-6 LCS								
Dissolved Organic Carbon			95.5		%		80-120	24-JUN-18
WG2805746-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	24-JUN-18
WG2805746-8 MS		**L2117340-1**						
Dissolved Organic Carbon			107.8		%		70-130	24-JUN-18
CL-IC-N-WT	**Water**							
Batch R4096635								
WG2804351-19 DUP		**L2117049-4**						
Chloride (Cl)		8.34	8.33		mg/L	0.0	20	22-JUN-18
WG2804351-17 LCS								
Chloride (Cl)			100.8		%		90-110	22-JUN-18
WG2804351-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUN-18
WG2804351-20 MS		**L2117049-4**						
Chloride (Cl)			100.5		%		75-125	22-JUN-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4096544								
WG2804704-7 DUP		**L2114546-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804704-6 LCS								
Cyanide, Total			88.4		%		80-120	22-JUN-18
WG2804704-5 MB								
Cyanide, Total			<0.0020		mg/L		0.002	22-JUN-18
WG2804704-8 MS		**L2114546-1**						
Cyanide, Total			85.6		%		70-130	22-JUN-18
EC-WT	**Water**							
Batch R4095609								
WG2804119-20 DUP		**WG2804119-19**						
Conductivity		836	833		umhos/cm	0.4	10	22-JUN-18
WG2804119-18 LCS								
Conductivity			96.7		%		90-110	22-JUN-18
WG2804119-17 MB								
Conductivity			<3.0		umhos/cm		3	22-JUN-18
F-IC-N-WT	**Water**							
Batch R4096635								
WG2804351-19 DUP		**L2117049-4**						
Fluoride (F)		0.032	0.033		mg/L	1.9	20	22-JUN-18
WG2804351-17 LCS								
Fluoride (F)			100.7		%		90-110	22-JUN-18
WG2804351-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUN-18
WG2804351-20 MS		**L2117049-4**						
Fluoride (F)			99.9		%		75-125	22-JUN-18
HG-D-CVAA-WT	**Water**							
Batch R4095096								
WG2804471-3 DUP		**L2117049-2**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804471-2 LCS								
Mercury (Hg)-Dissolved			98.5		%		80-120	22-JUN-18
WG2804471-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-18
WG2804471-4 MS		**L2117049-4**						
Mercury (Hg)-Dissolved			100.1		%		70-130	22-JUN-18
HG-T-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R4095093								
WG2804468-4 DUP		**WG2804468-3**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804468-2 LCS								
Mercury (Hg)-Total			99.3		%		80-120	22-JUN-18
WG2804468-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	22-JUN-18
WG2804468-6 MS		**WG2804468-5**						
Mercury (Hg)-Total			102.0		%		70-130	22-JUN-18
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-4 DUP		**WG2804692-3**						
Aluminum (Al)-Dissolved		0.0109	0.0102		mg/L	6.4	20	22-JUN-18
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Barium (Ba)-Dissolved		0.00497	0.00501		mg/L	0.8	20	22-JUN-18
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-JUN-18
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	22-JUN-18
Calcium (Ca)-Dissolved		7.45	7.63		mg/L	2.4	20	22-JUN-18
Cesium (Cs)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Copper (Cu)-Dissolved		0.00127	0.00128		mg/L	0.6	20	22-JUN-18
Iron (Fe)-Dissolved		0.017	0.017		mg/L	1.8	20	22-JUN-18
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Lithium (Li)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-JUN-18
Magnesium (Mg)-Dissolved		5.12	5.15		mg/L	0.7	20	22-JUN-18
Manganese (Mn)-Dissolved		0.00135	0.00126		mg/L	6.9	20	22-JUN-18
Molybdenum (Mo)-Dissolved		0.000330	0.000316		mg/L	4.3	20	22-JUN-18
Nickel (Ni)-Dissolved		0.00051	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-JUN-18
Potassium (K)-Dissolved		1.03	1.02		mg/L	0.2	20	22-JUN-18
Rubidium (Rb)-Dissolved		0.00254	0.00257		mg/L	1.3	20	22-JUN-18
Selenium (Se)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-4 DUP		**WG2804692-3**						
Silicon (Si)-Dissolved		0.417	0.418		mg/L	0.2	20	22-JUN-18
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Sodium (Na)-Dissolved		1.07	1.07		mg/L	0.5	20	22-JUN-18
Strontium (Sr)-Dissolved		0.0056	0.0057		mg/L	2.9	20	22-JUN-18
Sulfur (S)-Dissolved		0.85	0.81		mg/L	4.6	20	22-JUN-18
Tellurium (Te)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-JUN-18
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
Thorium (Th)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-JUN-18
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Uranium (U)-Dissolved		0.000766	0.000767		mg/L	0.1	20	22-JUN-18
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-JUN-18
Zirconium (Zr)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804692-2 LCS								
Aluminum (Al)-Dissolved			101.8		%		80-120	22-JUN-18
Antimony (Sb)-Dissolved			91.4		%		80-120	22-JUN-18
Arsenic (As)-Dissolved			100.3		%		80-120	22-JUN-18
Barium (Ba)-Dissolved			98.8		%		80-120	22-JUN-18
Beryllium (Be)-Dissolved			93.5		%		80-120	22-JUN-18
Bismuth (Bi)-Dissolved			104.7		%		80-120	22-JUN-18
Boron (B)-Dissolved			89.5		%		80-120	22-JUN-18
Cadmium (Cd)-Dissolved			97.4		%		80-120	22-JUN-18
Calcium (Ca)-Dissolved			93.3		%		80-120	22-JUN-18
Cesium (Cs)-Dissolved			97.0		%		80-120	22-JUN-18
Chromium (Cr)-Dissolved			102.1		%		80-120	22-JUN-18
Cobalt (Co)-Dissolved			100.5		%		80-120	22-JUN-18
Copper (Cu)-Dissolved			100.6		%		80-120	22-JUN-18
Iron (Fe)-Dissolved			99.6		%		80-120	22-JUN-18
Lead (Pb)-Dissolved			101.4		%		80-120	22-JUN-18
Lithium (Li)-Dissolved			101.5		%		80-120	22-JUN-18
Magnesium (Mg)-Dissolved			101.7		%		80-120	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-2 LCS								
Manganese (Mn)-Dissolved			104.3		%		80-120	22-JUN-18
Molybdenum (Mo)-Dissolved			98.7		%		80-120	22-JUN-18
Nickel (Ni)-Dissolved			100.6		%		80-120	22-JUN-18
Phosphorus (P)-Dissolved			96.8		%		80-120	22-JUN-18
Potassium (K)-Dissolved			98.3		%		80-120	22-JUN-18
Rubidium (Rb)-Dissolved			106.8		%		80-120	22-JUN-18
Selenium (Se)-Dissolved			101.1		%		80-120	22-JUN-18
Silicon (Si)-Dissolved			100.5		%		60-140	22-JUN-18
Silver (Ag)-Dissolved			96.7		%		80-120	22-JUN-18
Sodium (Na)-Dissolved			101.5		%		80-120	22-JUN-18
Strontium (Sr)-Dissolved			99.7		%		80-120	22-JUN-18
Sulfur (S)-Dissolved			90.7		%		80-120	22-JUN-18
Tellurium (Te)-Dissolved			95.9		%		80-120	22-JUN-18
Thallium (Tl)-Dissolved			104.9		%		80-120	22-JUN-18
Thorium (Th)-Dissolved			102.2		%		80-120	22-JUN-18
Tin (Sn)-Dissolved			95.4		%		80-120	22-JUN-18
Titanium (Ti)-Dissolved			99.6		%		80-120	22-JUN-18
Tungsten (W)-Dissolved			100.7		%		80-120	22-JUN-18
Uranium (U)-Dissolved			103.5		%		80-120	22-JUN-18
Vanadium (V)-Dissolved			104.1		%		80-120	22-JUN-18
Zinc (Zn)-Dissolved			97.4		%		80-120	22-JUN-18
Zirconium (Zr)-Dissolved			94.4		%		80-120	22-JUN-18
WG2804692-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	22-JUN-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-JUN-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	22-JUN-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-JUN-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-1 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-JUN-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-JUN-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-JUN-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-JUN-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	22-JUN-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-JUN-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	22-JUN-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-JUN-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-JUN-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	22-JUN-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	22-JUN-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	22-JUN-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-JUN-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-JUN-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	22-JUN-18
WG2804692-5 MS		**WG2804692-3**						
Aluminum (Al)-Dissolved			98.6		%		70-130	22-JUN-18
Antimony (Sb)-Dissolved			88.3		%		70-130	22-JUN-18
Arsenic (As)-Dissolved			101.7		%		70-130	22-JUN-18
Barium (Ba)-Dissolved			91.6		%		70-130	22-JUN-18
Beryllium (Be)-Dissolved			94.0		%		70-130	22-JUN-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-5 MS		**WG2804692-3**						
Bismuth (Bi)-Dissolved			87.4		%		70-130	22-JUN-18
Boron (B)-Dissolved			86.1		%		70-130	22-JUN-18
Cadmium (Cd)-Dissolved			98.3		%		70-130	22-JUN-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	22-JUN-18
Cesium (Cs)-Dissolved			96.5		%		70-130	22-JUN-18
Chromium (Cr)-Dissolved			99.6		%		70-130	22-JUN-18
Cobalt (Co)-Dissolved			99.0		%		70-130	22-JUN-18
Copper (Cu)-Dissolved			98.6		%		70-130	22-JUN-18
Iron (Fe)-Dissolved			92.4		%		70-130	22-JUN-18
Lead (Pb)-Dissolved			95.3		%		70-130	22-JUN-18
Lithium (Li)-Dissolved			102.5		%		70-130	22-JUN-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	22-JUN-18
Manganese (Mn)-Dissolved			99.5		%		70-130	22-JUN-18
Molybdenum (Mo)-Dissolved			92.9		%		70-130	22-JUN-18
Nickel (Ni)-Dissolved			98.8		%		70-130	22-JUN-18
Phosphorus (P)-Dissolved			107.3		%		70-130	22-JUN-18
Potassium (K)-Dissolved			102.2		%		70-130	22-JUN-18
Rubidium (Rb)-Dissolved			102.2		%		70-130	22-JUN-18
Selenium (Se)-Dissolved			107.7		%		70-130	22-JUN-18
Silicon (Si)-Dissolved			96.6		%		70-130	22-JUN-18
Silver (Ag)-Dissolved			95.2		%		70-130	22-JUN-18
Sodium (Na)-Dissolved			101.2		%		70-130	22-JUN-18
Strontium (Sr)-Dissolved			99.0		%		70-130	22-JUN-18
Sulfur (S)-Dissolved			102.5		%		70-130	22-JUN-18
Tellurium (Te)-Dissolved			94.7		%		70-130	22-JUN-18
Thallium (Tl)-Dissolved			99.1		%		70-130	22-JUN-18
Thorium (Th)-Dissolved			93.9		%		70-130	22-JUN-18
Tin (Sn)-Dissolved			93.0		%		70-130	22-JUN-18
Titanium (Ti)-Dissolved			98.2		%		70-130	22-JUN-18
Tungsten (W)-Dissolved			97.7		%		70-130	22-JUN-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	22-JUN-18
Vanadium (V)-Dissolved			102.8		%		70-130	22-JUN-18
Zinc (Zn)-Dissolved			97.9		%		70-130	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4096144								
WG2804692-5 MS		**WG2804692-3**						
Zirconium (Zr)-Dissolved			89.2		%		70-130	22-JUN-18
MET-T-CCMS-WT	**Water**							
Batch R4094871								
WG2804392-4 DUP		**WG2804392-3**						
Aluminum (Al)-Total		0.0163	0.0174		mg/L	6.2	20	22-JUN-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Barium (Ba)-Total		0.00462	0.00461		mg/L	0.1	20	22-JUN-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-JUN-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	22-JUN-18
Calcium (Ca)-Total		6.79	6.76		mg/L	0.5	20	22-JUN-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Copper (Cu)-Total		0.0013	0.0013		mg/L	0.3	20	22-JUN-18
Iron (Fe)-Total		0.032	0.032		mg/L	1.0	20	22-JUN-18
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-JUN-18
Magnesium (Mg)-Total		4.15	4.34		mg/L	4.6	20	22-JUN-18
Manganese (Mn)-Total		<0.00050	0.00053	RPD-NA	mg/L	N/A	20	22-JUN-18
Molybdenum (Mo)-Total		0.000217	0.000206		mg/L	5.1	20	22-JUN-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-JUN-18
Potassium (K)-Total		0.812	0.818		mg/L	0.8	20	22-JUN-18
Rubidium (Rb)-Total		0.00239	0.00245		mg/L	2.2	20	22-JUN-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Silicon (Si)-Total		0.41	0.43		mg/L	4.8	20	22-JUN-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-JUN-18
Sodium (Na)-Total		0.395	0.403		mg/L	2.1	20	22-JUN-18
Strontium (Sr)-Total		0.0038	0.0038		mg/L	1.4	20	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4094871								
WG2804392-4 DUP		**WG2804392-3**						
Sulfur (S)-Total		0.84	0.81		mg/L	4.2	25	22-JUN-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUN-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-JUN-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	22-JUN-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Titanium (Ti)-Total		0.00060	0.00045	J	mg/L	0.00015	0.0006	22-JUN-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-JUN-18
Uranium (U)-Total		0.000215	0.000203		mg/L	5.3	20	22-JUN-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUN-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-JUN-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-JUN-18
WG2804392-2 LCS								
Aluminum (Al)-Total			99.0		%		80-120	22-JUN-18
Antimony (Sb)-Total			102.8		%		80-120	22-JUN-18
Arsenic (As)-Total			99.5		%		80-120	22-JUN-18
Barium (Ba)-Total			97.0		%		80-120	22-JUN-18
Beryllium (Be)-Total			91.6		%		80-120	22-JUN-18
Bismuth (Bi)-Total			103.8		%		80-120	22-JUN-18
Boron (B)-Total			88.4		%		80-120	22-JUN-18
Cadmium (Cd)-Total			98.5		%		80-120	22-JUN-18
Calcium (Ca)-Total			93.2		%		80-120	22-JUN-18
Chromium (Cr)-Total			97.5		%		80-120	22-JUN-18
Cesium (Cs)-Total			98.4		%		80-120	22-JUN-18
Cobalt (Co)-Total			98.5		%		80-120	22-JUN-18
Copper (Cu)-Total			99.3		%		80-120	22-JUN-18
Iron (Fe)-Total			99.4		%		80-120	22-JUN-18
Lead (Pb)-Total			100.4		%		80-120	22-JUN-18
Lithium (Li)-Total			97.6		%		80-120	22-JUN-18
Magnesium (Mg)-Total			97.6		%		80-120	22-JUN-18
Manganese (Mn)-Total			99.7		%		80-120	22-JUN-18
Molybdenum (Mo)-Total			98.4		%		80-120	22-JUN-18
Nickel (Ni)-Total			98.8		%		80-120	22-JUN-18
Phosphorus (P)-Total			99.2		%		70-130	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4094871								
WG2804392-2 LCS								
Potassium (K)-Total			97.3		%		80-120	22-JUN-18
Rubidium (Rb)-Total			107.2		%		80-120	22-JUN-18
Selenium (Se)-Total			99.8		%		80-120	22-JUN-18
Silicon (Si)-Total			100.7		%		60-140	22-JUN-18
Silver (Ag)-Total			96.3		%		80-120	22-JUN-18
Sodium (Na)-Total			96.0		%		80-120	22-JUN-18
Strontium (Sr)-Total			99.8		%		80-120	22-JUN-18
Sulfur (S)-Total			91.2		%		80-120	22-JUN-18
Thallium (Tl)-Total			99.9		%		80-120	22-JUN-18
Tellurium (Te)-Total			96.0		%		80-120	22-JUN-18
Thorium (Th)-Total			99.4		%		70-130	22-JUN-18
Tin (Sn)-Total			96.8		%		80-120	22-JUN-18
Titanium (Ti)-Total			96.8		%		80-120	22-JUN-18
Tungsten (W)-Total			100.4		%		80-120	22-JUN-18
Uranium (U)-Total			102.9		%		80-120	22-JUN-18
Vanadium (V)-Total			101.2		%		80-120	22-JUN-18
Zinc (Zn)-Total			96.4		%		80-120	22-JUN-18
Zirconium (Zr)-Total			93.7		%		80-120	22-JUN-18
WG2804392-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	22-JUN-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-JUN-18
Boron (B)-Total			<0.010		mg/L		0.01	22-JUN-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	22-JUN-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-JUN-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	22-JUN-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	22-JUN-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	22-JUN-18
Iron (Fe)-Total			<0.010		mg/L		0.01	22-JUN-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4094871								
WG2804392-1 MB								
Lithium (Li)-Total			<0.0010		mg/L		0.001	22-JUN-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-JUN-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	22-JUN-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-JUN-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-JUN-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	22-JUN-18
Potassium (K)-Total			<0.050		mg/L		0.05	22-JUN-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	22-JUN-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-JUN-18
Silicon (Si)-Total			<0.10		mg/L		0.1	22-JUN-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	22-JUN-18
Sodium (Na)-Total			<0.050		mg/L		0.05	22-JUN-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	22-JUN-18
Sulfur (S)-Total			<0.50		mg/L		0.5	22-JUN-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-JUN-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	22-JUN-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-JUN-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	22-JUN-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-JUN-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-JUN-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-JUN-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	22-JUN-18
WG2804392-5 MS		**WG2804392-3**						
Aluminum (Al)-Total			94.2		%		70-130	22-JUN-18
Antimony (Sb)-Total			94.8		%		70-130	22-JUN-18
Arsenic (As)-Total			95.7		%		70-130	22-JUN-18
Barium (Ba)-Total			90.5		%		70-130	22-JUN-18
Beryllium (Be)-Total			89.2		%		70-130	22-JUN-18
Bismuth (Bi)-Total			100.2		%		70-130	22-JUN-18
Boron (B)-Total			85.1		%		70-130	22-JUN-18
Cadmium (Cd)-Total			94.8		%		70-130	22-JUN-18
Calcium (Ca)-Total			N/A	MS-B	%		-	22-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4094871								
WG2804392-5 MS		**WG2804392-3**						
Chromium (Cr)-Total			96.3		%		70-130	22-JUN-18
Cesium (Cs)-Total			94.6		%		70-130	22-JUN-18
Cobalt (Co)-Total			95.4		%		70-130	22-JUN-18
Copper (Cu)-Total			95.9		%		70-130	22-JUN-18
Iron (Fe)-Total			80.2		%		70-130	22-JUN-18
Lead (Pb)-Total			97.0		%		70-130	22-JUN-18
Lithium (Li)-Total			95.7		%		70-130	22-JUN-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-JUN-18
Manganese (Mn)-Total			96.9		%		70-130	22-JUN-18
Molybdenum (Mo)-Total			96.6		%		70-130	22-JUN-18
Nickel (Ni)-Total			95.8		%		70-130	22-JUN-18
Phosphorus (P)-Total			96.0		%		70-130	22-JUN-18
Potassium (K)-Total			95.6		%		70-130	22-JUN-18
Rubidium (Rb)-Total			100.8		%		70-130	22-JUN-18
Selenium (Se)-Total			97.8		%		70-130	22-JUN-18
Silicon (Si)-Total			93.5		%		70-130	22-JUN-18
Silver (Ag)-Total			93.5		%		70-130	22-JUN-18
Sodium (Na)-Total			96.7		%		70-130	22-JUN-18
Strontium (Sr)-Total			94.9		%		70-130	22-JUN-18
Sulfur (S)-Total			86.0		%		70-130	22-JUN-18
Thallium (Tl)-Total			93.6		%		70-130	22-JUN-18
Tellurium (Te)-Total			90.8		%		70-130	22-JUN-18
Thorium (Th)-Total			98.3		%		70-130	22-JUN-18
Tin (Sn)-Total			92.2		%		70-130	22-JUN-18
Titanium (Ti)-Total			92.4		%		70-130	22-JUN-18
Tungsten (W)-Total			95.9		%		70-130	22-JUN-18
Uranium (U)-Total			93.6		%		70-130	22-JUN-18
Vanadium (V)-Total			97.5		%		70-130	22-JUN-18
Zinc (Zn)-Total			90.2		%		70-130	22-JUN-18
Zirconium (Zr)-Total			92.4		%		70-130	22-JUN-18
NH3-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R4095060								
WG2804208-15 DUP		**L2116962-6**						
Ammonia, Total (as N)		0.130	0.105	J	mg/L	0.025	0.04	22-JUN-18
WG2804208-14 LCS								
Ammonia, Total (as N)			110.1		%		85-115	22-JUN-18
WG2804208-13 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	22-JUN-18
WG2804208-16 MS		**L2116962-6**						
Ammonia, Total (as N)			91.5		%		75-125	22-JUN-18
NO3-IC-WT	**Water**							
Batch R4096635								
WG2804351-19 DUP		**L2117049-4**						
Nitrate (as N)		1.07	1.07		mg/L	0.0	25	22-JUN-18
WG2804351-17 LCS								
Nitrate (as N)			101.3		%		70-130	22-JUN-18
WG2804351-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-JUN-18
WG2804351-20 MS		**L2117049-4**						
Nitrate (as N)			101.9		%		70-130	22-JUN-18
P-T-COL-WT	**Water**							
Batch R4096094								
WG2804955-3 DUP		**L2114873-4**						
Phosphorus, Total		0.0173	0.0161		mg/L	7.2	20	25-JUN-18
WG2804955-2 LCS								
Phosphorus, Total			96.6		%		80-120	25-JUN-18
WG2804955-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	25-JUN-18
WG2804955-4 MS		**L2114873-4**						
Phosphorus, Total			88.8		%		70-130	24-JUN-18
PH-WT	**Water**							
Batch R4095609								
WG2804119-20 DUP		**WG2804119-19**						
pH		7.61	7.64	J	pH units	0.02	0.2	22-JUN-18
WG2804119-18 LCS								
pH			6.99		pH units		6.9-7.1	22-JUN-18
SO4-IC-N-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	**Water**							
Batch R4096635								
WG2804351-19 DUP		**L2117049-4**						
Sulfate (SO4)		5.35	5.26		mg/L	1.6	20	22-JUN-18
WG2804351-17 LCS								
Sulfate (SO4)			101.4		%		90-110	22-JUN-18
WG2804351-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUN-18
WG2804351-20 MS		**L2117049-4**						
Sulfate (SO4)			100.2		%		75-125	22-JUN-18
SOLIDS-TDS-WT	**Water**							
Batch R4096256								
WG2805553-3 DUP		**L2115027-1**						
Total Dissolved Solids		283	283		mg/L	0.2	20	24-JUN-18
WG2805553-2 LCS								
Total Dissolved Solids			97.2		%		85-115	24-JUN-18
WG2805553-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-JUN-18
SOLIDS-TSS-WT	**Water**							
Batch R4096411								
WG2805823-3 DUP		**L2116953-3**						
Total Suspended Solids		913	992		mg/L	8.3	20	25-JUN-18
WG2805823-2 LCS								
Total Suspended Solids			99.6		%		85-115	25-JUN-18
WG2805823-1 MB								
Total Suspended Solids			<2.0		mg/L		2	25-JUN-18
TKN-WT	**Water**							
Batch R4096608								
WG2805804-3 DUP		**L2117049-2**						
Total Kjeldahl Nitrogen		<0.15	<0.15	RPD-NA	mg/L	N/A	20	25-JUN-18
WG2805804-2 LCS								
Total Kjeldahl Nitrogen			98.8		%		75-125	25-JUN-18
WG2805804-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	25-JUN-18
WG2805804-4 MS		**L2117049-2**						
Total Kjeldahl Nitrogen			109.6		%		70-130	25-JUN-18
TOC-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4096121								
WG2805747-3 DUP		**L2117049-2**						
Total Organic Carbon		2.1	2.1		mg/L	3.1	20	24-JUN-18
WG2805747-2 LCS								
Total Organic Carbon			94.6		%		80-120	24-JUN-18
WG2805747-1 MB								
Total Organic Carbon			<1.0		mg/L		1	24-JUN-18
WG2805747-4 MS		**L2117049-2**						
Total Organic Carbon			95.3		%		70-130	24-JUN-18

Quality Control Report

Workorder: L2117069 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, July 19, 2018

Wayne Smith
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1806738
Project Name:
Project Number: L2117069

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 6/28/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

for

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1806738

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1806738
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2117069
Client PO Number: L2117069

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2117069-1	1806738-1		WATER	19-Jun-18	

ALS Environmental

L2117069

WATERLOO

1806738

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2117069*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2117069-1 MS-06		6/19/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/11/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 6.28.18 1505

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1806738

Project Manager: KMO Initials: KG Date: 6/29/18

1.	Does this project require any special handling in addition to standard ALS procedures?		YES	NO
2.	Are custody seals on shipping containers intact?	NONE	YES	NO
3.	Are Custody seals on sample containers intact?	NONE	YES	NO
4.	Is there a COC (Chain-of-Custody) present or other representative documents?		YES	NO
5.	Are the COC and bottle labels complete and legible?		YES	NO
6.	Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		YES	NO
7.	Were airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
8.	Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	NO
9.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
10.	Is there sufficient sample for the requested analyses?		YES	NO
11.	Were all samples placed in the proper containers for the requested analyses?		YES	NO
12.	Are all samples within holding times for the requested analyses?		YES	NO
13.	Were all sample containers received intact? (not broken or leaking, etc.)		YES	NO
14.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	N/A	YES	NO
15.	Do any water samples contain sediment? Amount Amount of sediment: X dusting ____ moderate ____ heavy	N/A	YES	NO
16.	Were the samples shipped on ice?		YES	NO
17.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	AMB							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	12							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

2) ALS security tape around cooler - unbroken

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 6/29/18

Form 201r25.xls
(02/12/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1804738

EXPRESS WORLDWIDE **WPX**

2018-08-27 MYDHL+ 1.0/*30-0621*

From: ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

10-0

Contact:

To: ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

80524 FORT COLLINS CO
United States of America

US-DEN-DEN

Ref:

Pce/Shpt Weight
3.2 lbs

WAYBILL 95 1494 7284

(2L)US80524

Client:	ALS Environmental	**Date:**	*19-Jul-18*
Project:	L2117069	**Work Order:**	1806738
Sample ID:	L2117069-1	**Lab ID:**	1806738-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/19/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **7/5/2018**	PrepBy: **LOW**
Ra-226	**0.012 (+/- 0.0061)**		**0.0057**	**BQ/l**	NA	7/18/2018 12:11
Carr: BARIUM	*96.1*		*40-110*	*%REC*	DL = NA	7/18/2018 12:11

Client:	ALS Environmental	**Date:**	*19-Jul-18*
Project:	L2117069	**Work Order:**	1806738
Sample ID:	L2117069-1	**Lab ID:**	1806738-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/19/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180705-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:42**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.56 (+/- 0.386)	0.00633	1.772		88.2	67-120					P,Y1
Carr: BARIUM	16400		16350		100	40-110					Y1

LCSD Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:42**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.75 (+/- 0.433)	0.00888	1.772		98.9	67-120		1.56	0.3	2.1	P,Y1
Carr: BARIUM	16500		16360		101	40-110		16400			Y1

MB Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:11**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0011 (+/- 0.0030)	0.0057									U
Carr: BARIUM	16300		16340		99.5	40-110					

The following samples were analyzed in this batch: 1806738-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2117069-COFC

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Select Service Level Below - Contact your AM to confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☑
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2117069

ALS Contact: | Sampler: BL

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-MMER-WT	Number of Containers
	MS-06	19-Jun-18	12:00	Water	E1	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 site ~~MG-6-D Oil and Grease bottle half full due to leak~~

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			3.8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Release Date: 22-Jun-18	Time: 12:00	Received by:	Date:	Time:	Received by:	Date: 22-JUN-18	Time:

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 26-JUN-18
Report Date: 26-JUL-18 13:31 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2118828

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2118828-1 MS-06 Sampled By: WB/BW on 24-JUN-18 @ 17:30 Matrix: WATER							
Physical Tests							
Conductivity	943		3.0	umhos/cm		28-JUN-18	R4103189
Hardness (as CaCO3)	463		10	mg/L		29-JUN-18	
pH	7.52		0.10	pH units		26-JUN-18	R4097996
Total Suspended Solids	7.6		2.0	mg/L		27-JUN-18	R4097999
Total Dissolved Solids	700		20	mg/L		29-JUN-18	R4103108
Anions and Nutrients							
Acidity (as CaCO3)	3.2		2.0	mg/L		02-JUL-18	R4110497
Alkalinity, Total (as CaCO3)	33		10	mg/L		28-JUN-18	R4101190
Ammonia, Total (as N)	0.440		0.020	mg/L		28-JUN-18	R4100447
Chloride (Cl)	16.7		0.50	mg/L		28-JUN-18	R4104567
Fluoride (F)	0.044		0.020	mg/L		28-JUN-18	R4104567
Nitrate (as N)	4.88		0.020	mg/L		28-JUN-18	R4104567
Total Kjeldahl Nitrogen	0.88		0.15	mg/L	29-JUN-18	29-JUN-18	R4104930
Phosphorus, Total	<0.015	DLM	0.015	mg/L	28-JUN-18	29-JUN-18	R4102510
Sulfate (SO4)	426		0.30	mg/L		28-JUN-18	R4104567
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		29-JUN-18	R4104149
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.2		1.0	mg/L		28-JUN-18	R4102418
Total Organic Carbon	1.8		1.0	mg/L		28-JUN-18	R4102518
Total Metals							
Aluminum (Al)-Total	0.0389		0.0050	mg/L	28-JUN-18	28-JUN-18	R4102567
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Arsenic (As)-Total	0.00011		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Barium (Ba)-Total	0.0121		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Boron (B)-Total	0.032		0.010	mg/L	28-JUN-18	28-JUN-18	R4102567
Cadmium (Cd)-Total	0.0000442		0.0000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Calcium (Ca)-Total	44.8		0.050	mg/L	28-JUN-18	28-JUN-18	R4102567
Cesium (Cs)-Total	0.000013		0.000010	mg/L	28-JUN-18	28-JUN-18	R4102567
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	28-JUN-18	28-JUN-18	R4102567
Cobalt (Co)-Total	0.00603		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Copper (Cu)-Total	0.0015		0.0010	mg/L	28-JUN-18	28-JUN-18	R4102567
Iron (Fe)-Total	0.127		0.010	mg/L	28-JUN-18	28-JUN-18	R4102567
Lead (Pb)-Total	0.000120		0.000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Lithium (Li)-Total	0.0181		0.0010	mg/L	28-JUN-18	28-JUN-18	R4102567
Magnesium (Mg)-Total	98.2		0.0050	mg/L	28-JUN-18	28-JUN-18	R4102567
Manganese (Mn)-Total	1.58		0.00050	mg/L	28-JUN-18	28-JUN-18	R4102567
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		29-JUN-18	R4103910
Molybdenum (Mo)-Total	0.000789		0.000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Nickel (Ni)-Total	0.00939		0.00050	mg/L	28-JUN-18	28-JUN-18	R4102567

* 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
L2118828-1 MS-06 Sampled By: WB/BW on 24-JUN-18 @ 17:30 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<0.050		0.050	mg/L	28-JUN-18	28-JUN-18	R4102567
Potassium (K)-Total	10.7		0.050	mg/L	28-JUN-18	28-JUN-18	R4102567
Rubidium (Rb)-Total	0.00549		0.00020	mg/L	28-JUN-18	28-JUN-18	R4102567
Selenium (Se)-Total	0.00110		0.000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Silicon (Si)-Total	0.49		0.10	mg/L	28-JUN-18	28-JUN-18	R4102567
Silver (Ag)-Total	<0.000050		0.000050	mg/L	28-JUN-18	28-JUN-18	R4102567
Sodium (Na)-Total	7.05		0.050	mg/L	28-JUN-18	28-JUN-18	R4102567
Strontium (Sr)-Total	0.0630		0.0010	mg/L	28-JUN-18	28-JUN-18	R4102567
Sulfur (S)-Total	168		0.50	mg/L	28-JUN-18	28-JUN-18	R4102567
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	28-JUN-18	28-JUN-18	R4102567
Thallium (Tl)-Total	0.000029		0.000010	mg/L	28-JUN-18	28-JUN-18	R4102567
Thorium (Th)-Total	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Tin (Sn)-Total	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Titanium (Ti)-Total	<0.00040	DLUI	0.00040	mg/L	28-JUN-18	28-JUN-18	R4102567
Tungsten (W)-Total	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4102567
Uranium (U)-Total	0.00199		0.000010	mg/L	28-JUN-18	28-JUN-18	R4102567
Vanadium (V)-Total	<0.00050		0.00050	mg/L	28-JUN-18	28-JUN-18	R4102567
Zinc (Zn)-Total	0.0103		0.0030	mg/L	28-JUN-18	28-JUN-18	R4102567
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	28-JUN-18	28-JUN-18	R4102567
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-JUN-18	R4100573
Dissolved Metals Filtration Location	FIELD					28-JUN-18	R4100269
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	28-JUN-18	28-JUN-18	R4101647
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Barium (Ba)-Dissolved	0.0112		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Boron (B)-Dissolved	0.028		0.010	mg/L	28-JUN-18	28-JUN-18	R4101647
Cadmium (Cd)-Dissolved	0.0000418		0.0000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Calcium (Ca)-Dissolved	40.6		0.050	mg/L	28-JUN-18	28-JUN-18	R4101647
Cesium (Cs)-Dissolved	0.000012		0.000010	mg/L	28-JUN-18	28-JUN-18	R4101647
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	28-JUN-18	28-JUN-18	R4101647
Cobalt (Co)-Dissolved	0.00529		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Copper (Cu)-Dissolved	0.00050		0.00020	mg/L	28-JUN-18	28-JUN-18	R4101647
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	28-JUN-18	28-JUN-18	R4101647
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Lithium (Li)-Dissolved	0.0173		0.0010	mg/L	28-JUN-18	28-JUN-18	R4101647
Magnesium (Mg)-Dissolved	87.8		0.0050	mg/L	28-JUN-18	28-JUN-18	R4101647
Manganese (Mn)-Dissolved	1.45		0.00050	mg/L	28-JUN-18	28-JUN-18	R4101647
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	28-JUN-18	29-JUN-18	R4103927

* 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
L2118828-1 MS-06 Sampled By: WB/BW on 24-JUN-18 @ 17:30 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	0.000800		0.000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Nickel (Ni)-Dissolved	0.00845		0.00050	mg/L	28-JUN-18	28-JUN-18	R4101647
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	28-JUN-18	28-JUN-18	R4101647
Potassium (K)-Dissolved	10.4		0.050	mg/L	28-JUN-18	28-JUN-18	R4101647
Rubidium (Rb)-Dissolved	0.00578		0.00020	mg/L	28-JUN-18	28-JUN-18	R4101647
Selenium (Se)-Dissolved	0.00116		0.000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Silicon (Si)-Dissolved	0.387		0.050	mg/L	28-JUN-18	28-JUN-18	R4101647
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	28-JUN-18	28-JUN-18	R4101647
Sodium (Na)-Dissolved	6.26		0.050	mg/L	28-JUN-18	28-JUN-18	R4101647
Strontium (Sr)-Dissolved	0.0655		0.0010	mg/L	28-JUN-18	28-JUN-18	R4101647
Sulfur (S)-Dissolved	157		0.50	mg/L	28-JUN-18	28-JUN-18	R4101647
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	28-JUN-18	28-JUN-18	R4101647
Thallium (Tl)-Dissolved	0.000032		0.000010	mg/L	28-JUN-18	28-JUN-18	R4101647
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	28-JUN-18	28-JUN-18	R4101647
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	28-JUN-18	28-JUN-18	R4101647
Uranium (U)-Dissolved	0.00192		0.000010	mg/L	28-JUN-18	28-JUN-18	R4101647
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	28-JUN-18	28-JUN-18	R4101647
Zinc (Zn)-Dissolved	0.0091		0.0010	mg/L	28-JUN-18	28-JUN-18	R4101647
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	28-JUN-18	28-JUN-18	R4101647
Radiological Parameters							
Ra-226	<0.0075		0.0075	Bq/L	05-JUL-18	18-JUL-18	R4070789

* 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	Calcium (Ca)-Dissolved	MS-B	L2118828-1
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2118828-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2118828-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2118828-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2118828-1
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2118828-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2118828-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2118828-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2118828-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2118828-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2118828-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2118828-1
Matrix Spike	Copper (Cu)-Total	MS-B	L2118828-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2118828-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2118828-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2118828-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2118828-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2118828-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2118828-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2118828-1
Matrix Spike	Uranium (U)-Total	MS-B	L2118828-1
Matrix Spike	Zinc (Zn)-Total	MS-B	L2118828-1
Matrix Spike	Sulfate (SO4)	MS-B	L2118828-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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

Reference Information

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2118828 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4110497								
WG2811902-2 LCS								
Acidity (as CaCO3)			102.6		%		85-115	02-JUL-18
WG2811902-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	02-JUL-18
ALK-WT	**Water**							
Batch R4101190								
WG2809810-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			93.4		%		80-120	28-JUN-18
WG2809810-4 DUP		**L2118828-1**						
Alkalinity, Total (as CaCO3)		33	34		mg/L	4.7	20	28-JUN-18
WG2809810-2 LCS								
Alkalinity, Total (as CaCO3)			97.9		%		85-115	28-JUN-18
WG2809810-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	28-JUN-18
C-DIS-ORG-WT	**Water**							
Batch R4102418								
WG2810133-3 DUP		**L2117612-2**						
Dissolved Organic Carbon		4.9	3.3	J	mg/L	1.6	2	28-JUN-18
WG2810133-2 LCS								
Dissolved Organic Carbon			98.0		%		80-120	28-JUN-18
WG2810133-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	28-JUN-18
WG2810133-4 MS		**L2117612-2**						
Dissolved Organic Carbon			82.2		%		70-130	28-JUN-18
CL-IC-N-WT	**Water**							
Batch R4104567								
WG2809480-15 DUP		**WG2809480-13**						
Chloride (Cl)		57.3	57.3		mg/L	0.1	20	28-JUN-18
WG2809480-12 LCS								
Chloride (Cl)			101.6		%		90-110	28-JUN-18
WG2809480-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	28-JUN-18
WG2809480-14 MS		**WG2809480-13**						
Chloride (Cl)			98.4		%		75-125	28-JUN-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4104149								
WG2810596-3 DUP		**L2118828-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	29-JUN-18
WG2810596-2 LCS								
Cyanide, Total			93.7		%		80-120	29-JUN-18
WG2810596-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	29-JUN-18
WG2810596-4 MS		**L2118828-1**						
Cyanide, Total			93.9		%		70-130	29-JUN-18
EC-WT	**Water**							
Batch R4103189								
WG2809110-8 DUP		**WG2809110-7**						
Conductivity		2280	2260		umhos/cm	0.9	10	28-JUN-18
WG2809110-6 LCS								
Conductivity			99.9		%		90-110	28-JUN-18
WG2809110-5 MB								
Conductivity			<3.0		umhos/cm		3	28-JUN-18
F-IC-N-WT	**Water**							
Batch R4104567								
WG2809480-15 DUP		**WG2809480-13**						
Fluoride (F)		0.300	0.301		mg/L	0.4	20	28-JUN-18
WG2809480-12 LCS								
Fluoride (F)			101.6		%		90-110	28-JUN-18
WG2809480-11 MB								
Fluoride (F)			<0.020		mg/L		0.02	28-JUN-18
WG2809480-14 MS		**WG2809480-13**						
Fluoride (F)			96.1		%		75-125	28-JUN-18
HG-D-CVAA-WT	**Water**							
Batch R4103927								
WG2809695-3 DUP		**L2118828-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	29-JUN-18
WG2809695-2 LCS								
Mercury (Hg)-Dissolved			100.0		%		80-120	29-JUN-18
WG2809695-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	29-JUN-18
WG2809695-4 MS		**L2120315-1**						
Mercury (Hg)-Dissolved			97.9		%		70-130	29-JUN-18
HG-T-CVAA-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R4103910								
WG2809691-3 DUP		**L2118828-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	29-JUN-18
WG2809691-2 LCS								
Mercury (Hg)-Total			98.6		%		80-120	29-JUN-18
WG2809691-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	29-JUN-18
WG2809691-4 MS		**L2120315-1**						
Mercury (Hg)-Total			95.9		%		70-130	29-JUN-18
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-4 DUP		**WG2809607-3**						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	28-JUN-18
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Barium (Ba)-Dissolved		0.0112	0.0114		mg/L	1.7	20	28-JUN-18
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUN-18
Boron (B)-Dissolved		0.028	0.028		mg/L	2.1	20	28-JUN-18
Cadmium (Cd)-Dissolved		0.0000418	0.0000405		mg/L	3.2	20	28-JUN-18
Calcium (Ca)-Dissolved		40.6	41.5		mg/L	2.3	20	28-JUN-18
Cesium (Cs)-Dissolved		0.000012	0.000011		mg/L	5.2	20	28-JUN-18
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-JUN-18
Cobalt (Co)-Dissolved		0.00529	0.00525		mg/L	0.9	20	28-JUN-18
Copper (Cu)-Dissolved		0.00050	0.00051		mg/L	1.9	20	28-JUN-18
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-JUN-18
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUN-18
Lithium (Li)-Dissolved		0.0173	0.0169		mg/L	2.6	20	28-JUN-18
Magnesium (Mg)-Dissolved		87.8	88.1		mg/L	0.3	20	28-JUN-18
Manganese (Mn)-Dissolved		1.45	1.46		mg/L	0.4	20	28-JUN-18
Molybdenum (Mo)-Dissolved		0.000800	0.000828		mg/L	3.5	20	28-JUN-18
Nickel (Ni)-Dissolved		0.00845	0.00855		mg/L	1.2	20	28-JUN-18
Phosphorus (P)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-JUN-18
Potassium (K)-Dissolved		10.4	10.1		mg/L	3.1	20	28-JUN-18
Rubidium (Rb)-Dissolved		0.00578	0.00566		mg/L	2.1	20	28-JUN-18
Selenium (Se)-Dissolved		0.00116	0.00108		mg/L	7.1	20	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-4 DUP		**WG2809607-3**						
Silicon (Si)-Dissolved		0.387	0.375		mg/L	3.1	20	28-JUN-18
Silver (Ag)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUN-18
Sodium (Na)-Dissolved		6.26	6.25		mg/L	0.2	20	28-JUN-18
Strontium (Sr)-Dissolved		0.0655	0.0654		mg/L	0.1	20	28-JUN-18
Sulfur (S)-Dissolved		157	157		mg/L	0.2	20	28-JUN-18
Tellurium (Te)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	28-JUN-18
Thallium (Tl)-Dissolved		0.000032	0.000025	J	mg/L	0.000006	0.00002	28-JUN-18
Thorium (Th)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Titanium (Ti)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-JUN-18
Tungsten (W)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Uranium (U)-Dissolved		0.00192	0.00184		mg/L	4.3	20	28-JUN-18
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-JUN-18
Zinc (Zn)-Dissolved		0.0091	0.0090		mg/L	0.9	20	28-JUN-18
Zirconium (Zr)-Dissolved		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-JUN-18
WG2809607-2 LCS								
Aluminum (Al)-Dissolved			95.4		%		80-120	28-JUN-18
Antimony (Sb)-Dissolved			96.9		%		80-120	28-JUN-18
Arsenic (As)-Dissolved			100.7		%		80-120	28-JUN-18
Barium (Ba)-Dissolved			100.5		%		80-120	28-JUN-18
Beryllium (Be)-Dissolved			96.5		%		80-120	28-JUN-18
Bismuth (Bi)-Dissolved			99.7		%		80-120	28-JUN-18
Boron (B)-Dissolved			93.4		%		80-120	28-JUN-18
Cadmium (Cd)-Dissolved			97.6		%		80-120	28-JUN-18
Calcium (Ca)-Dissolved			99.4		%		80-120	28-JUN-18
Cesium (Cs)-Dissolved			100.5		%		80-120	28-JUN-18
Chromium (Cr)-Dissolved			96.0		%		80-120	28-JUN-18
Cobalt (Co)-Dissolved			95.8		%		80-120	28-JUN-18
Copper (Cu)-Dissolved			96.7		%		80-120	28-JUN-18
Iron (Fe)-Dissolved			95.9		%		80-120	28-JUN-18
Lead (Pb)-Dissolved			103.0		%		80-120	28-JUN-18
Lithium (Li)-Dissolved			102.0		%		80-120	28-JUN-18
Magnesium (Mg)-Dissolved			91.1		%		80-120	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-2 LCS								
Manganese (Mn)-Dissolved			97.6		%		80-120	28-JUN-18
Molybdenum (Mo)-Dissolved			105.1		%		80-120	28-JUN-18
Nickel (Ni)-Dissolved			95.0		%		80-120	28-JUN-18
Phosphorus (P)-Dissolved			100.3		%		80-120	28-JUN-18
Potassium (K)-Dissolved			95.1		%		80-120	28-JUN-18
Rubidium (Rb)-Dissolved			103.3		%		80-120	28-JUN-18
Selenium (Se)-Dissolved			98.1		%		80-120	28-JUN-18
Silicon (Si)-Dissolved			95.1		%		60-140	28-JUN-18
Silver (Ag)-Dissolved			99.7		%		80-120	28-JUN-18
Sodium (Na)-Dissolved			92.5		%		80-120	28-JUN-18
Strontium (Sr)-Dissolved			105.4		%		80-120	28-JUN-18
Sulfur (S)-Dissolved			92.2		%		80-120	28-JUN-18
Tellurium (Te)-Dissolved			95.9		%		80-120	28-JUN-18
Thallium (Tl)-Dissolved			104.5		%		80-120	28-JUN-18
Thorium (Th)-Dissolved			101.0		%		80-120	28-JUN-18
Tin (Sn)-Dissolved			99.2		%		80-120	28-JUN-18
Titanium (Ti)-Dissolved			94.1		%		80-120	28-JUN-18
Tungsten (W)-Dissolved			101.2		%		80-120	28-JUN-18
Uranium (U)-Dissolved			103.8		%		80-120	28-JUN-18
Vanadium (V)-Dissolved			99.2		%		80-120	28-JUN-18
Zinc (Zn)-Dissolved			93.4		%		80-120	28-JUN-18
Zirconium (Zr)-Dissolved			111.2		%		80-120	28-JUN-18
WG2809607-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	28-JUN-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-JUN-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	28-JUN-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-1 MB								
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-JUN-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-JUN-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-JUN-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	28-JUN-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-JUN-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-JUN-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	28-JUN-18
WG2809607-5 MS		**WG2809607-3**						
Aluminum (Al)-Dissolved			96.4		%		70-130	28-JUN-18
Antimony (Sb)-Dissolved			96.5		%		70-130	28-JUN-18
Arsenic (As)-Dissolved			105.1		%		70-130	28-JUN-18
Barium (Ba)-Dissolved			96.4		%		70-130	28-JUN-18
Beryllium (Be)-Dissolved			92.7		%		70-130	28-JUN-18

Quality Control Report

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Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-5 MS		**WG2809607-3**						
Bismuth (Bi)-Dissolved			96.1		%		70-130	28-JUN-18
Boron (B)-Dissolved			80.3		%		70-130	28-JUN-18
Cadmium (Cd)-Dissolved			97.2		%		70-130	28-JUN-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Cesium (Cs)-Dissolved			99.1		%		70-130	28-JUN-18
Chromium (Cr)-Dissolved			97.8		%		70-130	28-JUN-18
Cobalt (Co)-Dissolved			93.8		%		70-130	28-JUN-18
Copper (Cu)-Dissolved			95.3		%		70-130	28-JUN-18
Iron (Fe)-Dissolved			93.8		%		70-130	28-JUN-18
Lead (Pb)-Dissolved			100.9		%		70-130	28-JUN-18
Lithium (Li)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Molybdenum (Mo)-Dissolved			99.6		%		70-130	28-JUN-18
Nickel (Ni)-Dissolved			93.4		%		70-130	28-JUN-18
Phosphorus (P)-Dissolved			102.3		%		70-130	28-JUN-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Selenium (Se)-Dissolved			111.0		%		70-130	28-JUN-18
Silicon (Si)-Dissolved			94.0		%		70-130	28-JUN-18
Silver (Ag)-Dissolved			82.1		%		70-130	28-JUN-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Tellurium (Te)-Dissolved			106.2		%		70-130	28-JUN-18
Thallium (Tl)-Dissolved			103.4		%		70-130	28-JUN-18
Thorium (Th)-Dissolved			102.7		%		70-130	28-JUN-18
Tin (Sn)-Dissolved			98.9		%		70-130	28-JUN-18
Titanium (Ti)-Dissolved			97.9		%		70-130	28-JUN-18
Tungsten (W)-Dissolved			105.2		%		70-130	28-JUN-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	28-JUN-18
Vanadium (V)-Dissolved			102.8		%		70-130	28-JUN-18
Zinc (Zn)-Dissolved			92.4		%		70-130	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4101647								
WG2809607-5 MS		**WG2809607-3**						
Zirconium (Zr)-Dissolved			100.5		%		70-130	28-JUN-18
MET-T-CCMS-WT	**Water**							
Batch R4102567								
WG2809474-4 DUP		**WG2809474-3**						
Aluminum (Al)-Total		0.0143	0.0142		mg/L	1.0	20	28-JUN-18
Antimony (Sb)-Total		0.00022	0.00025		mg/L	11	20	28-JUN-18
Arsenic (As)-Total		0.00054	0.00055		mg/L	2.7	20	28-JUN-18
Barium (Ba)-Total		0.0212	0.0212		mg/L	0.3	20	28-JUN-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUN-18
Boron (B)-Total		0.024	0.024		mg/L	0.8	20	28-JUN-18
Cadmium (Cd)-Total		0.000174	0.000160		mg/L	8.3	20	28-JUN-18
Calcium (Ca)-Total		37.1	36.1		mg/L	2.7	20	28-JUN-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-JUN-18
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-JUN-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Copper (Cu)-Total		0.509	0.501		mg/L	1.4	20	28-JUN-18
Iron (Fe)-Total		0.208	0.212		mg/L	1.5	20	28-JUN-18
Lead (Pb)-Total		0.00114	0.00111		mg/L	2.6	20	28-JUN-18
Lithium (Li)-Total		0.0022	0.0022		mg/L	0.7	20	28-JUN-18
Magnesium (Mg)-Total		9.57	9.03		mg/L	5.8	20	28-JUN-18
Manganese (Mn)-Total		0.0669	0.0653		mg/L	2.5	20	28-JUN-18
Molybdenum (Mo)-Total		0.000857	0.000851		mg/L	0.7	20	28-JUN-18
Nickel (Ni)-Total		0.0105	0.0103		mg/L	2.4	20	28-JUN-18
Phosphorus (P)-Total		0.288	0.281		mg/L	2.3	20	28-JUN-18
Potassium (K)-Total		1.67	1.66		mg/L	0.8	20	28-JUN-18
Rubidium (Rb)-Total		0.00091	0.00097		mg/L	5.5	20	28-JUN-18
Selenium (Se)-Total		0.000091	0.000116	J	mg/L	0.000024	0.0001	28-JUN-18
Silicon (Si)-Total		0.59	0.57		mg/L	3.4	20	28-JUN-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUN-18
Sodium (Na)-Total		15.2	15.3		mg/L	0.4	20	28-JUN-18
Strontium (Sr)-Total		0.178	0.177		mg/L	0.4	20	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4102567								
WG2809474-4 DUP		**WG2809474-3**						
Sulfur (S)-Total		9.80	9.90		mg/L	0.9	25	28-JUN-18
Thallium (Tl)-Total		0.000013	0.000012		mg/L	3.3	20	28-JUN-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	28-JUN-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	28-JUN-18
Tin (Sn)-Total		0.00012	0.00013		mg/L	5.5	20	28-JUN-18
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-JUN-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUN-18
Uranium (U)-Total		0.000418	0.000408		mg/L	2.3	20	28-JUN-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-JUN-18
Zinc (Zn)-Total		0.660	0.641		mg/L	2.9	20	28-JUN-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	28-JUN-18
WG2809474-2 LCS								
Aluminum (Al)-Total			101.8		%		80-120	28-JUN-18
Antimony (Sb)-Total			101.8		%		80-120	28-JUN-18
Arsenic (As)-Total			99.0		%		80-120	28-JUN-18
Barium (Ba)-Total			104.2		%		80-120	28-JUN-18
Beryllium (Be)-Total			103.0		%		80-120	28-JUN-18
Bismuth (Bi)-Total			93.9		%		80-120	28-JUN-18
Boron (B)-Total			99.9		%		80-120	28-JUN-18
Cadmium (Cd)-Total			93.4		%		80-120	28-JUN-18
Calcium (Ca)-Total			100.3		%		80-120	28-JUN-18
Chromium (Cr)-Total			98.8		%		80-120	28-JUN-18
Cesium (Cs)-Total			95.3		%		80-120	28-JUN-18
Cobalt (Co)-Total			97.3		%		80-120	28-JUN-18
Copper (Cu)-Total			97.1		%		80-120	28-JUN-18
Iron (Fe)-Total			92.9		%		80-120	28-JUN-18
Lead (Pb)-Total			91.7		%		80-120	28-JUN-18
Lithium (Li)-Total			102.5		%		80-120	28-JUN-18
Magnesium (Mg)-Total			103.7		%		80-120	28-JUN-18
Manganese (Mn)-Total			98.2		%		80-120	28-JUN-18
Molybdenum (Mo)-Total			101.8		%		80-120	28-JUN-18
Nickel (Ni)-Total			96.9		%		80-120	28-JUN-18
Phosphorus (P)-Total			96.7		%		70-130	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4102567								
WG2809474-2 LCS								
Potassium (K)-Total			98.4		%		80-120	28-JUN-18
Rubidium (Rb)-Total			98.7		%		80-120	28-JUN-18
Selenium (Se)-Total			98.6		%		80-120	28-JUN-18
Silicon (Si)-Total			104.9		%		60-140	28-JUN-18
Silver (Ag)-Total			96.0		%		80-120	28-JUN-18
Sodium (Na)-Total			100.6		%		80-120	28-JUN-18
Strontium (Sr)-Total			95.0		%		80-120	28-JUN-18
Sulfur (S)-Total			101.5		%		80-120	28-JUN-18
Thallium (Tl)-Total			95.9		%		80-120	28-JUN-18
Tellurium (Te)-Total			104.2		%		80-120	28-JUN-18
Thorium (Th)-Total			93.4		%		70-130	28-JUN-18
Tin (Sn)-Total			94.0		%		80-120	28-JUN-18
Titanium (Ti)-Total			97.7		%		80-120	28-JUN-18
Tungsten (W)-Total			93.3		%		80-120	28-JUN-18
Uranium (U)-Total			93.4		%		80-120	28-JUN-18
Vanadium (V)-Total			98.8		%		80-120	28-JUN-18
Zinc (Zn)-Total			93.6		%		80-120	28-JUN-18
Zirconium (Zr)-Total			99.0		%		80-120	28-JUN-18
WG2809474-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	28-JUN-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-JUN-18
Boron (B)-Total			<0.010		mg/L		0.01	28-JUN-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	28-JUN-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	28-JUN-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	28-JUN-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	28-JUN-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	28-JUN-18
Iron (Fe)-Total			<0.010		mg/L		0.01	28-JUN-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4102567								
WG2809474-1 MB								
Lithium (Li)-Total			<0.0010		mg/L		0.001	28-JUN-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-JUN-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	28-JUN-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-JUN-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	28-JUN-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	28-JUN-18
Potassium (K)-Total			<0.050		mg/L		0.05	28-JUN-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	28-JUN-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	28-JUN-18
Silicon (Si)-Total			<0.10		mg/L		0.1	28-JUN-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	28-JUN-18
Sodium (Na)-Total			<0.050		mg/L		0.05	28-JUN-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	28-JUN-18
Sulfur (S)-Total			<0.50		mg/L		0.5	28-JUN-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-JUN-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	28-JUN-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-JUN-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	28-JUN-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-JUN-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	28-JUN-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-JUN-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	28-JUN-18
WG2809474-5 MS		**WG2809474-3**						
Aluminum (Al)-Total			102.5		%		70-130	28-JUN-18
Antimony (Sb)-Total			103.3		%		70-130	28-JUN-18
Arsenic (As)-Total			103.8		%		70-130	28-JUN-18
Barium (Ba)-Total			N/A	MS-B	%		-	28-JUN-18
Beryllium (Be)-Total			105.7		%		70-130	28-JUN-18
Bismuth (Bi)-Total			96.8		%		70-130	28-JUN-18
Boron (B)-Total			100.1		%		70-130	28-JUN-18
Cadmium (Cd)-Total			103.3		%		70-130	28-JUN-18
Calcium (Ca)-Total			N/A	MS-B	%		-	28-JUN-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4102567								
WG2809474-5 MS		**WG2809474-3**						
Chromium (Cr)-Total			101.4		%		70-130	28-JUN-18
Cesium (Cs)-Total			97.9		%		70-130	28-JUN-18
Cobalt (Co)-Total			100.7		%		70-130	28-JUN-18
Copper (Cu)-Total			N/A	MS-B	%		-	28-JUN-18
Iron (Fe)-Total			N/A	MS-B	%		-	28-JUN-18
Lead (Pb)-Total			93.5		%		70-130	28-JUN-18
Lithium (Li)-Total			102.6		%		70-130	28-JUN-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	28-JUN-18
Manganese (Mn)-Total			N/A	MS-B	%		-	28-JUN-18
Molybdenum (Mo)-Total			102.7		%		70-130	28-JUN-18
Nickel (Ni)-Total			96.4		%		70-130	28-JUN-18
Phosphorus (P)-Total			102.8		%		70-130	28-JUN-18
Potassium (K)-Total			103.0		%		70-130	28-JUN-18
Rubidium (Rb)-Total			104.1		%		70-130	28-JUN-18
Selenium (Se)-Total			103.2		%		70-130	28-JUN-18
Silicon (Si)-Total			N/A	MS-B	%		-	28-JUN-18
Silver (Ag)-Total			96.8		%		70-130	28-JUN-18
Sodium (Na)-Total			N/A	MS-B	%		-	28-JUN-18
Strontium (Sr)-Total			N/A	MS-B	%		-	28-JUN-18
Sulfur (S)-Total			N/A	MS-B	%		-	28-JUN-18
Thallium (Tl)-Total			99.3		%		70-130	28-JUN-18
Tellurium (Te)-Total			101.7		%		70-130	28-JUN-18
Thorium (Th)-Total			96.6		%		70-130	28-JUN-18
Tin (Sn)-Total			102.0		%		70-130	28-JUN-18
Titanium (Ti)-Total			101.2		%		70-130	28-JUN-18
Tungsten (W)-Total			98.1		%		70-130	28-JUN-18
Uranium (U)-Total			N/A	MS-B	%		-	28-JUN-18
Vanadium (V)-Total			105.1		%		70-130	28-JUN-18
Zinc (Zn)-Total			N/A	MS-B	%		-	28-JUN-18
Zirconium (Zr)-Total			97.9		%		70-130	28-JUN-18
NH3-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R4100447								
WG2809224-11 DUP		**L2120224-5**						
Ammonia, Total (as N)		0.347	0.320		mg/L	8.2	20	28-JUN-18
WG2809224-10 LCS								
Ammonia, Total (as N)			104.6		%		85-115	28-JUN-18
WG2809224-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	28-JUN-18
WG2809224-12 MS		**L2120224-5**						
Ammonia, Total (as N)			99.2		%		75-125	28-JUN-18
NO3-IC-WT	**Water**							
Batch R4104567								
WG2809480-15 DUP		**WG2809480-13**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	28-JUN-18
WG2809480-12 LCS								
Nitrate (as N)			101.0		%		70-130	28-JUN-18
WG2809480-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	28-JUN-18
WG2809480-14 MS		**WG2809480-13**						
Nitrate (as N)			97.9		%		70-130	28-JUN-18
P-T-COL-WT	**Water**							
Batch R4102510								
WG2810132-3 DUP		**L2120955-6**						
Phosphorus, Total		0.0576	0.0617		mg/L	6.9	20	29-JUN-18
WG2810132-2 LCS								
Phosphorus, Total			93.6		%		80-120	29-JUN-18
WG2810132-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	29-JUN-18
WG2810132-4 MS		**L2120955-6**						
Phosphorus, Total			101.7		%		70-130	29-JUN-18
PH-BF	**Water**							
Batch R4097996								
WG2807986-2 DUP		**L2118758-2**						
pH		8.15	8.09	J	pH units	0.06	0.2	26-JUN-18
WG2807986-1 LCS								
pH			6.96		pH units		6.9-7.1	26-JUN-18
SO4-IC-N-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	**Water**							
Batch R4104567								
WG2809480-15 DUP		**WG2809480-13**						
Sulfate (SO4)		137	137		mg/L	0.1	20	28-JUN-18
WG2809480-12 LCS								
Sulfate (SO4)			102.3		%		90-110	28-JUN-18
WG2809480-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	28-JUN-18
WG2809480-14 MS		**WG2809480-13**						
Sulfate (SO4)			N/A	MS-B	%		-	28-JUN-18
SOLIDS-TDS-BF	**Water**							
Batch R4103108								
WG2809668-3 DUP		**L2120660-3**						
Total Dissolved Solids		284	295		mg/L	3.7	20	29-JUN-18
WG2809668-2 LCS								
Total Dissolved Solids			99.7		%		85-115	29-JUN-18
WG2809668-1 MB								
Total Dissolved Solids			<20		mg/L		20	29-JUN-18
SOLIDS-TSS-BF	**Water**							
Batch R4097999								
WG2807989-3 DUP		**L2118739-4**						
Total Suspended Solids		17.2	18.0		mg/L	4.5	25	27-JUN-18
WG2807989-2 LCS								
Total Suspended Solids			99.0		%		85-115	27-JUN-18
WG2807989-1 MB								
Total Suspended Solids			<2.0		mg/L		2	27-JUN-18
TKN-WT	**Water**							
Batch R4104930								
WG2810336-3 DUP		**L2118828-1**						
Total Kjeldahl Nitrogen		0.88	0.86		mg/L	2.4	20	29-JUN-18
WG2810336-2 LCS								
Total Kjeldahl Nitrogen			100.4		%		75-125	29-JUN-18
WG2810336-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	29-JUN-18
WG2810336-4 MS		**L2118828-1**						
Total Kjeldahl Nitrogen			109.0		%		70-130	29-JUN-18
TOC-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4102518								
WG2810135-3 DUP		**L2117262-5**						
Total Organic Carbon		7.1	7.4		mg/L	4.2	20	28-JUN-18
WG2810135-2 LCS								
Total Organic Carbon			98.0		%		80-120	28-JUN-18
WG2810135-1 MB								
Total Organic Carbon			<1.0		mg/L		1	28-JUN-18
WG2810135-4 MS		**L2117262-5**						
Total Organic Carbon			92.2		%		70-130	28-JUN-18

Quality Control Report

Workorder: L2118828 Report Date: 26-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, July 19, 2018

Wayne Smith
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1806803
Project Name:
Project Number: L2118828

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 6/29/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

for
ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1806803

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1806803
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2118828
Client PO Number: L2118828

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2118828-1	1806803-1		WATER	24-Jun-18	

1806803

ALS Environmental

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2118828*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2118828-1 MS-06		6/ 24/ 2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	6/29/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____
Received By: _____ Date Received: 6/29/18 13:20
Verified By: _____ Date Verified: _____
Temperature: _____
Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Water100 Workorder No: 1806803

Project Manager: KO Initials: ND Date: 6/29/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?	ND	~~YES~~	NO
7.	Are all samples within holding times for the requested analyses?	6/29/18	YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	Amb							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	12							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 6/30/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

EXPRESS WORLDWIDE WPX DHL

2018-08-29 MYDHL+ 1.0 / *30-0021*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Contact: +15199866910

Origin:
YHM

To: ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

80524 FORT COLLINS CO
United States of America

12-1 Amb

US-DEN-DEN

Ref:

Day Time

Pce/Shpt Weight Piece
10.4 lbs 1/1

Contents: Water
Samples

WAYBILL 95 1611 8116

(2L)US60524+48000001

1806803

Client:	ALS Environmental	**Date:**	*19-Jul-18*
Project:	L2118828	**Work Order:**	1806803
Sample ID:	L2118828-1	**Lab ID:**	1806803-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/5/2018**	PrepBy: **LOW**
Ra-226	0.00057 (+/- 0.0038)	U	0.0075	BQ/l	NA	7/18/2018 12:11
Carr: BARIUM	*89.4*		*40-110*	*%REC*	DL = NA	7/18/2018 12:11

Client:	ALS Environmental	**Date:**	*19-Jul-18*
Project:	L2118828	**Work Order:**	1806803
Sample ID:	L2118828-1	**Lab ID:**	1806803-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/24/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180705-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:42**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.56 (+/- 0.386)	0.00633	1.772		88.2	67-120					P,Y1
Carr: BARIUM	16400		16350		100	40-110					Y1

LCSD Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:42**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.75 (+/- 0.433)	0.00888	1.772		98.9	67-120		1.56	0.3	2.1	P,Y1
Carr: BARIUM	16500		16360		101	40-110		16400			Y1

MB Sample ID: **RE180705-2** Units: **BQ/l** Analysis Date: **7/18/2018 12:11**

Client ID: Run ID: **RE180705-2A** Prep Date: **7/5/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0011 (+/- 0.0030)	0.0057									U
Carr: BARIUM	16300		16340		99.5	40-110					

The following samples were analyzed in this batch: 1806803-1

AQUATOX
AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 236528
Sample Number : 55406

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	WB/BW
Location :	Waterloo ON	Time Collected :	17:30
Job Number :	L2118828-1	Date Collected :	2018-06-24
Substance :	L2118828-1 MS-06	Date Received :	2018-06-28
Sampling Method :	Grab	Date Tested :	2018-06-28
Sample Description :	Clear, light orange, odourless	Temp. on arrival :	20.0° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.1 g/L
Date Tested :	2018-06-26	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.2 g/L	Organism Batch :	Dm18-12
95% Confidence Limits :	6.0 - 6.4 g/L	Analyst(s) :	TZL, CZN, SEW
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	9.2 days	Mean Young Per Brood :	30.8
Culture Mortality :	2.1% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-12	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2018-07-03
yyyy-mm-dd

Approved by: *Project Manager*

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 236528
Sample Number: 55406

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	340	None	7.7	8.9	945	21.0	103	0:30

0 hours

Date & Time 2018-06-28 14:20
Technician: TZL/MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.8	8.8	954	21.0	102	340
100B	0	0	7.8	8.8	954	21.0	102	340
100C	0	0	7.8	8.8	954	21.0	102	340
Control A	0	0	8.5	8.6	740	21.0	100	220
Control B	0	0	8.5	8.6	740	21.0	100	220
Control C	0	0	8.5	8.6	740	21.0	100	220

Notes:

24 hours

Date & Time 2018-06-29 14:20
Technician: MDS(NK)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	20.0
100B	–	0	–	–	–	20.0
100C	–	0	–	–	–	20.0
Control A	–	0	–	–	–	20.0
Control B	–	0	–	–	–	20.0
Control C	–	0	–	–	–	20.0

Notes:

48 hours

Date & Time 2018-06-30 14:20
Technician: TZL(NK)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	8.0	8.4	958	21.0
100B	0	0	8.0	8.4	958	21.0
100C	0	0	7.9	8.5	960	21.0
Control A	0	0	8.4	8.4	750	21.0
Control B	0	0	8.5	8.4	747	21.0
Control C	0	0	8.5	8.4	748	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-12

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: CZN
Date: 2018-07-03

AQUATOX

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 236528
Sample Number : 55406

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	WB/BW
Location :	Waterloo ON	Time Collected :	17:30
Job Number :	L2118828-1	Date Collected :	2018-06-24
Substance :	L2118828-1 MS-06	Date Received :	2018-06-28
Sampling Method :	Grab	Date Tested :	2018-06-28
Sample Description :	Clear, light orange, odourless	Temp. on arrival :	20.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-14	Date Tested :	2018-06-08
LC50 :	3308 mg/L	Historical Mean LC50 :	3710 mg/L
95% Confidence Limits :	3012 - 3772 mg/L	Warning Limits (± 2SD) :	3074 - 4476 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	FS, TA, AW

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.46 ± 0.29 g	Mean Fish Fork Length (± 2 SD) :	37.9 ± 8.7 mm
Range of Weights :	0.27 - 0.70 g	Range of Fork Lengths (mm) :	30 - 45 mm
Fish Loading Rate :	0.3 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	14
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-07-03
yyyy-mm-dd

Approved by _____
Project Manager

Work Order: 236528
Sample Number: 55406

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	7.5	8.9	962	15.5	–
	Chemistry after 30min air:	7.5	8.9	959	16.0	96

0 hours

Date & Time 2018-06-28 13:45
Technician: TA/MW(FS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.5	8.9	959	16.0	96
Control	0	0	7.9	9.6	836	15.5	100

Notes:

24 hours

Date & Time 2018-06-29 13:45
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

48 hours

Date & Time 2018-06-30 13:45
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2018-07-01 13:45
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2018-07-02 13:45
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.4	9.3	964	15.5
Control	0	0	8.2	9.4	801	15.5

Notes:

Control organisms showing stress: 0
Organism Batch : T18-14

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JL
Date: 2018-07-03

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 236528

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	WB / BW
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RR
Date/Time Shipped:	28-Jun-18

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested									Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	L2118828-1 Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-06-24	1730	MS-06	55406	20.0	X		X							X**		1 Pail

For Lab Use Only	
Received By:	MA/RK
Date:	2018-06-28
Time:	1115
Storage Location:	
Storage Temp (°C)	

Please list any special requests or instructions:

~~Regular Biotinland Toxicity Tests~~
Rush Final w/ Daily Updates
to Rick and Binscore ~~ecalsglobal.com~~

Reports
wayne.smith
rick.hawthorne
binscore
ecalsglobal.com

*As per label. MA 2018-06-28

ALS Environmental

L2118828

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L2118828*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2118828-1 MS-06		6/ 24/ 2018	**E**
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	7/2/2018	
	Special Request Aquatox (SPECIAL REQUEST-AQT 14)	7/2/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2118828-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2 commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	
ALS Lab Work Order # (lab use only)	L2118828

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: WB/BW

TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☑

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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	Group 3	BIM-MMER-WT	Number of Containers
	MS-06	24-Jun-18	17:30	Water	E0	E0	10

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

Daily Tox Report
Rushed Final Results

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			21.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Release Date: 21-Jun-18	Time: 10:05	Received by:	Date:	Time:	Received by:	Date: 21 Jun 18	Time: 1000

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 29-JUN-18
Report Date: 30-JUL-18 10:32 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2121631

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2121631-1 MS-06 Sampled By: BW/RB/CW on 29-JUN-18 @ 10:00 Matrix: Water							
Physical Tests							
Conductivity	1000		3.0	umhos/cm		05-JUL-18	R4112997
pH	7.61		0.10	pH units		29-JUN-18	R4106628
Total Suspended Solids	<2.0		2.0	mg/L		30-JUN-18	R4106607
Total Dissolved Solids	760		20	mg/L		02-JUL-18	R4108492
Turbidity	8.66		0.10	NTU		29-JUN-18	R4106627
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		04-JUL-18	R4113260
Total Metals							
Aluminum (Al)-Total	0.0274		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	0.00011		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.0125		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	0.030		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	0.0000406		0.0000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	44.5		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	0.000014		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.00514		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	0.066		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	0.000070		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	0.0186		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	94.0		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	1.52		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	0.000916		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.00881		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.050		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	10.9		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.00625		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	0.00121		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	0.45		0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Sodium (Na)-Total	7.03		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.0724		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	162		0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	0.000029		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2121631-1 MS-06 Sampled By: BW/RB/CW on 29-JUN-18 @ 10:00 Matrix: Water							
Total Metals							
Titanium (Ti)-Total	<0.00055	DLUI	0.00055	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.00180		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	0.0053		0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	<0.0091		0.0091	Bq/L	10-JUL-18	24-JUL-18	R4070789

* 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	Aluminum (Al)-Total	MS-B	L2121631-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2121631-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2121631-1
Matrix Spike	Silicon (Si)-Total	MS-B	L2121631-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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

Workorder: L2121631 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4113260								
WG2813533-24 DUP		**L2122693-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	05-JUL-18
WG2813533-22 LCS								
Cyanide, Total			90.4		%		80-120	04-JUL-18
WG2813533-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	04-JUL-18
WG2813533-23 MS		**L2122693-1**						
Cyanide, Total			90.4		%		70-130	05-JUL-18
EC-WT	**Water**							
Batch R4112997								
WG2814283-4 DUP		**WG2814283-3**						
Conductivity		1800	1810		umhos/cm	0.1	10	05-JUL-18
WG2814283-2 LCS								
Conductivity			101.7		%		90-110	05-JUL-18
WG2814283-1 MB								
Conductivity			<3.0		umhos/cm		3	05-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Aluminum (Al)-Total		0.146	0.145		mg/L	0.8	20	04-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Total		0.00319	0.00309		mg/L	3.4	20	04-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Total		3.30	3.36		mg/L	1.9	20	04-JUL-18
Chromium (Cr)-Total		<0.00050	0.00051	RPD-NA	mg/L	N/A	20	04-JUL-18
Cesium (Cs)-Total		0.000018	0.000020		mg/L	8.4	20	04-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Iron (Fe)-Total		0.112	0.118		mg/L	5.8	20	04-JUL-18
Lead (Pb)-Total		0.000120	0.000119		mg/L	1.1	20	04-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Magnesium (Mg)-Total		1.82	1.82		mg/L	0.1	20	04-JUL-18
Manganese (Mn)-Total		0.00182	0.00197		mg/L	7.6	20	04-JUL-18
Molybdenum (Mo)-Total		0.000063	0.000059		mg/L	6.6	20	04-JUL-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Total		0.384	0.391		mg/L	1.8	20	04-JUL-18
Rubidium (Rb)-Total		0.00092	0.00095		mg/L	3.5	20	04-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Silicon (Si)-Total		0.66	0.63		mg/L	4.0	20	04-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Total		0.383	0.390		mg/L	1.9	20	04-JUL-18
Strontium (Sr)-Total		0.0032	0.0032		mg/L	0.2	20	04-JUL-18
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	25	04-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thorium (Th)-Total		0.00014	0.00014		mg/L	2.7	25	04-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Total		0.00693	0.00704		mg/L	1.5	20	04-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Total		0.000167	0.000162		mg/L	3.3	20	04-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814071-2 LCS								
Aluminum (Al)-Total			96.0		%		80-120	04-JUL-18
Antimony (Sb)-Total			101.1		%		80-120	04-JUL-18
Arsenic (As)-Total			98.3		%		80-120	04-JUL-18
Barium (Ba)-Total			98.0		%		80-120	04-JUL-18
Beryllium (Be)-Total			93.2		%		80-120	04-JUL-18
Bismuth (Bi)-Total			100.2		%		80-120	04-JUL-18
Boron (B)-Total			85.6		%		80-120	04-JUL-18
Cadmium (Cd)-Total			98.2		%		80-120	04-JUL-18
Calcium (Ca)-Total			94.0		%		80-120	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-2 LCS								
Chromium (Cr)-Total			94.8		%		80-120	04-JUL-18
Cesium (Cs)-Total			103.7		%		80-120	04-JUL-18
Cobalt (Co)-Total			94.0		%		80-120	04-JUL-18
Copper (Cu)-Total			95.0		%		80-120	04-JUL-18
Iron (Fe)-Total			92.0		%		80-120	04-JUL-18
Lead (Pb)-Total			103.2		%		80-120	04-JUL-18
Lithium (Li)-Total			94.7		%		80-120	04-JUL-18
Magnesium (Mg)-Total			96.8		%		80-120	04-JUL-18
Manganese (Mn)-Total			96.5		%		80-120	04-JUL-18
Molybdenum (Mo)-Total			96.5		%		80-120	04-JUL-18
Nickel (Ni)-Total			95.0		%		80-120	04-JUL-18
Phosphorus (P)-Total			94.2		%		70-130	04-JUL-18
Potassium (K)-Total			96.1		%		80-120	04-JUL-18
Rubidium (Rb)-Total			104.5		%		80-120	04-JUL-18
Selenium (Se)-Total			98.5		%		80-120	04-JUL-18
Silicon (Si)-Total			93.3		%		60-140	04-JUL-18
Silver (Ag)-Total			99.8		%		80-120	04-JUL-18
Sodium (Na)-Total			93.9		%		80-120	04-JUL-18
Strontium (Sr)-Total			97.5		%		80-120	04-JUL-18
Sulfur (S)-Total			83.4		%		80-120	04-JUL-18
Thallium (Tl)-Total			99.9		%		80-120	04-JUL-18
Tellurium (Te)-Total			99.0		%		80-120	04-JUL-18
Thorium (Th)-Total			99.5		%		70-130	04-JUL-18
Tin (Sn)-Total			98.1		%		80-120	04-JUL-18
Titanium (Ti)-Total			94.8		%		80-120	04-JUL-18
Tungsten (W)-Total			101.5		%		80-120	04-JUL-18
Uranium (U)-Total			103.7		%		80-120	04-JUL-18
Vanadium (V)-Total			98.0		%		80-120	04-JUL-18
Zinc (Zn)-Total			93.4		%		80-120	04-JUL-18
Zirconium (Zr)-Total			95.6		%		80-120	04-JUL-18
WG2814071-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	04-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	04-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	04-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	04-JUL-18
WG2814071-5 MS		**WG2814071-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	04-JUL-18
Antimony (Sb)-Total			102.3		%		70-130	04-JUL-18
Arsenic (As)-Total			100.4		%		70-130	04-JUL-18
Barium (Ba)-Total			97.4		%		70-130	04-JUL-18
Beryllium (Be)-Total			95.7		%		70-130	04-JUL-18
Bismuth (Bi)-Total			99.9		%		70-130	04-JUL-18
Boron (B)-Total			89.0		%		70-130	04-JUL-18
Cadmium (Cd)-Total			97.2		%		70-130	04-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	04-JUL-18
Chromium (Cr)-Total			97.5		%		70-130	04-JUL-18
Cesium (Cs)-Total			109.4		%		70-130	04-JUL-18
Cobalt (Co)-Total			95.5		%		70-130	04-JUL-18
Copper (Cu)-Total			96.9		%		70-130	04-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	04-JUL-18
Lead (Pb)-Total			101.6		%		70-130	04-JUL-18
Lithium (Li)-Total			102.8		%		70-130	04-JUL-18
Magnesium (Mg)-Total			89.3		%		70-130	04-JUL-18
Manganese (Mn)-Total			95.0		%		70-130	04-JUL-18
Molybdenum (Mo)-Total			104.0		%		70-130	04-JUL-18
Nickel (Ni)-Total			98.4		%		70-130	04-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	04-JUL-18
Potassium (K)-Total			99.4		%		70-130	04-JUL-18
Rubidium (Rb)-Total			106.0		%		70-130	04-JUL-18
Selenium (Se)-Total			101.2		%		70-130	04-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	04-JUL-18
Silver (Ag)-Total			104.0		%		70-130	04-JUL-18
Sodium (Na)-Total			92.0		%		70-130	04-JUL-18
Strontium (Sr)-Total			101.4		%		70-130	04-JUL-18
Sulfur (S)-Total			93.6		%		70-130	04-JUL-18
Thallium (Tl)-Total			99.1		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Tellurium (Te)-Total			106.2		%		70-130	04-JUL-18
Thorium (Th)-Total			98.6		%		70-130	04-JUL-18
Tin (Sn)-Total			97.1		%		70-130	04-JUL-18
Titanium (Ti)-Total			96.9		%		70-130	04-JUL-18
Tungsten (W)-Total			101.0		%		70-130	04-JUL-18
Uranium (U)-Total			96.9		%		70-130	04-JUL-18
Vanadium (V)-Total			101.1		%		70-130	04-JUL-18
Zinc (Zn)-Total			93.1		%		70-130	04-JUL-18
Zirconium (Zr)-Total			99.1		%		70-130	04-JUL-18
PH-BF	**Water**							
Batch R4106628								
WG2811329-2 DUP		**L2121913-4**						
pH		9.26	9.29	J	pH units	0.03	0.2	29-JUN-18
WG2811329-1 LCS								
pH			6.93		pH units		6.9-7.1	29-JUN-18
SOLIDS-TDS-BF	**Water**							
Batch R4108492								
WG2811792-3 DUP		**L2122069-2**						
Total Dissolved Solids		752	753		mg/L	0.0	20	02-JUL-18
WG2811792-2 LCS								
Total Dissolved Solids			96.5		%		85-115	02-JUL-18
WG2811792-1 MB								
Total Dissolved Solids			<20		mg/L		20	02-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4106607								
WG2811331-3 DUP		**L2121913-2**						
Total Suspended Solids		3.2	3.6		mg/L	12	25	30-JUN-18
WG2811331-2 LCS								
Total Suspended Solids			100.6		%		85-115	30-JUN-18
WG2811331-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-JUN-18
TURBIDITY-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-BF	**Water**							
Batch R4106627								
WG2810355-3 DUP		**L2121160-1**						
Turbidity		44.3	43.4		NTU	2.1	15	29-JUN-18
WG2810355-2 LCS								
Turbidity			115.0		%		85-115	29-JUN-18
WG2810355-1 MB								
Turbidity			<0.10		NTU		0.1	29-JUN-18

Quality Control Report

Workorder: L2121631 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, July 26, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807081
Project Name:
Project Number: L2121631

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 7/6/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807081

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807081
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2121631
Client PO Number: L2121631

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2121631-1	1807081-1		WATER	29-Jun-18	

ALS Environmental

L2121631

WATERLOO

1807081

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2121631*
ALS requires QC data to be provided with your final results.

1x950mL

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2121631-1 MS-06		6/29/2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/20/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 7-6-18 1320

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1807081

Project Manager: KMO Initials: JE Date: 7.6.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES / NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES / NO
3.	Are custody seals on **sample** containers intact?	NONE	YES / NO
4.	Is there a COC (chain-of-custody) present?		YES / NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES / NO
6.	Are short-hold samples present?		YES / NO
7.	Are all samples within holding times for the requested analyses?		YES / NO
8.	Were all sample containers received intact? (not broken or leaking)		YES / NO
9.	Is there sufficient sample for the requested analyses?		YES / NO
10.	Are all samples in the proper containers for the requested analyses?		YES / NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES / NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES / NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES / NO
14.	Were the samples shipped on ice?		YES / NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES / NO

Cooler #:	1							
Temperature (°C):	~~4.0~~ 13.1							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information: External µR/hr reading:	9							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

Additional Information: Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:

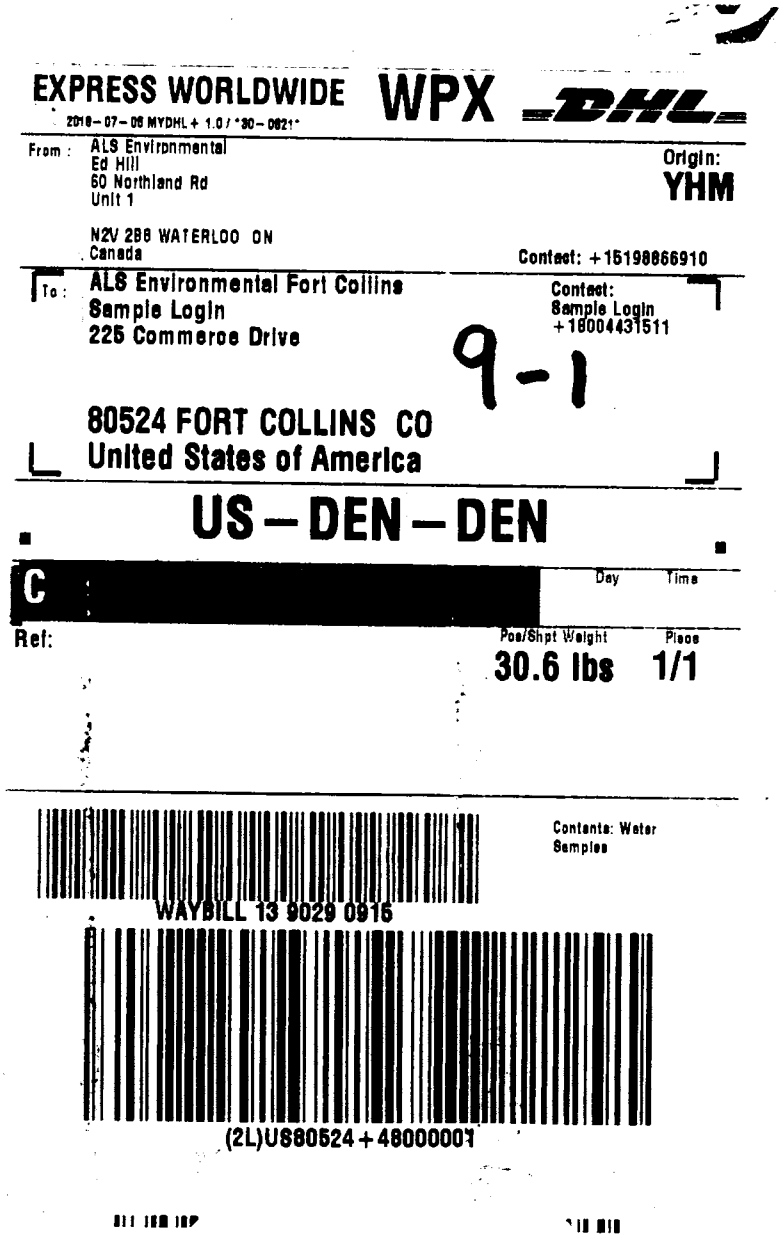
14 & 15) ice melted upon arrival

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/7/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002



EXPRESS WORLDWIDE WPX DHL

2016-07-06 MYDHL+ 1.0 / *30-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

9-1

80524 FORT COLLINS CO
United States of America

US-DEN-DEN

C [redacted] Day Time

Ref:

Pce/Shpt Weight 30.6 lbs

Piece 1/1

Contents: Water Samples

WAYBILL 13 9029 0915

(2L)U880524+48000007

180781

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2121631	**Work Order:**	1807081
Sample ID:	L2121631-1	**Lab ID:**	1807081-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/29/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**
Ra-226	0.0043 (+/- 0.0057)	U	0.0091	BQ/l	NA	7/24/2018 13:28
Carr: BARIUM	*97.6*		*40-110*	*%REC*	DL = NA	7/24/2018 13:28

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2121631	**Work Order:**	1807081
Sample ID:	L2121631-1	**Lab ID:**	1807081-1
Legal Location:		**Matrix:**	WATER
Collection Date:	6/29/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180710-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.69 (+/- 0.420)	0.00695	1.772		95.6	67-120					P
Carr: BARIUM	16300		16620		98.2	40-110					

LCSD Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.80 (+/- 0.447)	0.00677	1.772		102	67-120		1.69	0.2	2.1	P
Carr: BARIUM	16500		16610		99.4	40-110		16300			

MB Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0033)	0.0065									Y1,U
Carr: BARIUM	17700		16620		107	40-110					Y1

The following samples were analyzed in this batch: 1807081-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	
ALS Lab Work Order # (lab use only)	L2121631

Oil and Gas Required Fields (client use)		
AFE/Cost Center:	PO#	
Major/Minor Code:	Routing Code:	
Requisitioner:		
Location:		
ALS Contact:	Sampler:	BW/RB/CW

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY		
	4 day [P4]	☐		1 Business day [E1]	☑
	3 day [P3]	☐		Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐			

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-DEL	Number of Containers
	MS-06	29-Jun-18	10:00	Water	E1	4

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
15			7.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 29-Jun-18	Time: 14:45	Received by: F.Khalili	Date: 29-Jun-18	Time: 15:30	Received by: AP	Date: 4-7-18	Time: 14:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 02-JUL-18
Report Date: 30-JUL-18 10:36 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2122094

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2122094-1 MS-06-RECIRC Sampled By: BW/DZ/KRR on 02-JUL-18 @ 10:45 Matrix: Water							
Physical Tests							
pH	7.78		0.10	pH units		02-JUL-18	R4110993
Total Suspended Solids	2.4		2.0	mg/L		02-JUL-18	R4111008
Total Dissolved Solids	768		20	mg/L		05-JUL-18	R4112945
Turbidity	17.6		0.10	NTU		02-JUL-18	R4110989
L2122094-2 MS-06 Sampled By: BW/DZ/KRR on 02-JUL-18 @ 12:20 Matrix: Water							
Physical Tests							
Conductivity	1050		3.0	umhos/cm		05-JUL-18	R4112997
pH	7.68		0.10	pH units		02-JUL-18	R4110993
Total Suspended Solids	2.8		2.0	mg/L		02-JUL-18	R4111008
Total Dissolved Solids	763	DLDS	20	mg/L		05-JUL-18	R4113968
Turbidity	17.9		0.10	NTU		02-JUL-18	R4110989
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		04-JUL-18	R4113260
Total Metals							
Aluminum (Al)-Total	0.0497		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Arsenic (As)-Total	0.00013		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Barium (Ba)-Total	0.0135		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Boron (B)-Total	0.029		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Cadmium (Cd)-Total	0.0000410		0.0000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Calcium (Ca)-Total	47.1		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cesium (Cs)-Total	0.000017		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Cobalt (Co)-Total	0.00528		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Copper (Cu)-Total	<0.0010		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Iron (Fe)-Total	0.175		0.010	mg/L	04-JUL-18	04-JUL-18	R4112807
Lead (Pb)-Total	0.000089		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Lithium (Li)-Total	0.0185		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Magnesium (Mg)-Total	96.7		0.0050	mg/L	04-JUL-18	04-JUL-18	R4112807
Manganese (Mn)-Total	1.58		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Molybdenum (Mo)-Total	0.000952		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Nickel (Ni)-Total	0.00899		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Phosphorus (P)-Total	<0.050		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Potassium (K)-Total	11.0		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Rubidium (Rb)-Total	0.00686		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Selenium (Se)-Total	0.00125		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807
Silicon (Si)-Total	0.43		0.10	mg/L	04-JUL-18	04-JUL-18	R4112807
Silver (Ag)-Total	<0.000050		0.000050	mg/L	04-JUL-18	04-JUL-18	R4112807

* 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
L2122094-2 MS-06 Sampled By: BW/DZ/KRR on 02-JUL-18 @ 12:20 Matrix: Water							
Total Metals							
Sodium (Na)-Total	6.96		0.050	mg/L	04-JUL-18	04-JUL-18	R4112807
Strontium (Sr)-Total	0.0722		0.0010	mg/L	04-JUL-18	04-JUL-18	R4112807
Sulfur (S)-Total	164		0.50	mg/L	04-JUL-18	04-JUL-18	R4112807
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	04-JUL-18	04-JUL-18	R4112807
Thallium (Tl)-Total	0.000031		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Thorium (Th)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Tin (Sn)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Titanium (Ti)-Total	<0.0007	DLUI	0.00070	mg/L	04-JUL-18	04-JUL-18	R4112807
Tungsten (W)-Total	<0.00010		0.00010	mg/L	04-JUL-18	04-JUL-18	R4112807
Uranium (U)-Total	0.00161		0.000010	mg/L	04-JUL-18	04-JUL-18	R4112807
Vanadium (V)-Total	<0.00050		0.00050	mg/L	04-JUL-18	04-JUL-18	R4112807
Zinc (Zn)-Total	0.0061		0.0030	mg/L	04-JUL-18	04-JUL-18	R4112807
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	04-JUL-18	04-JUL-18	R4112807
Radiological Parameters							
Ra-226	0.016		0.0075	Bq/L	10-JUL-18	24-JUL-18	R4070789

* 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	Aluminum (Al)-Total	MS-B	L2122094-2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2122094-2
Matrix Spike	Iron (Fe)-Total	MS-B	L2122094-2
Matrix Spike	Silicon (Si)-Total	MS-B	L2122094-2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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

Workorder: L2122094 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4113260								
WG2813533-3 DUP		**L2119623-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2813533-2 LCS								
Cyanide, Total			81.9		%		80-120	04-JUL-18
WG2813533-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	04-JUL-18
WG2813533-4 MS		**L2119623-1**						
Cyanide, Total			83.5		%		70-130	04-JUL-18
EC-WT	**Water**							
Batch R4112997								
WG2814283-4 DUP		**WG2814283-3**						
Conductivity		1800	1810		umhos/cm	0.1	10	05-JUL-18
WG2814283-2 LCS								
Conductivity			101.7		%		90-110	05-JUL-18
WG2814283-1 MB								
Conductivity			<3.0		umhos/cm		3	05-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Aluminum (Al)-Total		0.146	0.145		mg/L	0.8	20	04-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Barium (Ba)-Total		0.00319	0.00309		mg/L	3.4	20	04-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-JUL-18
Calcium (Ca)-Total		3.30	3.36		mg/L	1.9	20	04-JUL-18
Chromium (Cr)-Total		<0.00050	0.00051	RPD-NA	mg/L	N/A	20	04-JUL-18
Cesium (Cs)-Total		0.000018	0.000020		mg/L	8.4	20	04-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18
Iron (Fe)-Total		0.112	0.118		mg/L	5.8	20	04-JUL-18
Lead (Pb)-Total		0.000120	0.000119		mg/L	1.1	20	04-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-4 DUP		**WG2814071-3**						
Magnesium (Mg)-Total		1.82	1.82		mg/L	0.1	20	04-JUL-18
Manganese (Mn)-Total		0.00182	0.00197		mg/L	7.6	20	04-JUL-18
Molybdenum (Mo)-Total		0.000063	0.000059		mg/L	6.6	20	04-JUL-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUL-18
Potassium (K)-Total		0.384	0.391		mg/L	1.8	20	04-JUL-18
Rubidium (Rb)-Total		0.00092	0.00095		mg/L	3.5	20	04-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Silicon (Si)-Total		0.66	0.63		mg/L	4.0	20	04-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-JUL-18
Sodium (Na)-Total		0.383	0.390		mg/L	1.9	20	04-JUL-18
Strontium (Sr)-Total		0.0032	0.0032		mg/L	0.2	20	04-JUL-18
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	25	04-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	04-JUL-18
Thorium (Th)-Total		0.00014	0.00014		mg/L	2.7	25	04-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Titanium (Ti)-Total		0.00693	0.00704		mg/L	1.5	20	04-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-JUL-18
Uranium (U)-Total		0.000167	0.000162		mg/L	3.3	20	04-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	04-JUL-18
WG2814071-2 LCS								
Aluminum (Al)-Total			96.0		%		80-120	04-JUL-18
Antimony (Sb)-Total			101.1		%		80-120	04-JUL-18
Arsenic (As)-Total			98.3		%		80-120	04-JUL-18
Barium (Ba)-Total			98.0		%		80-120	04-JUL-18
Beryllium (Be)-Total			93.2		%		80-120	04-JUL-18
Bismuth (Bi)-Total			100.2		%		80-120	04-JUL-18
Boron (B)-Total			85.6		%		80-120	04-JUL-18
Cadmium (Cd)-Total			98.2		%		80-120	04-JUL-18
Calcium (Ca)-Total			94.0		%		80-120	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-2 LCS								
Chromium (Cr)-Total			94.8		%		80-120	04-JUL-18
Cesium (Cs)-Total			103.7		%		80-120	04-JUL-18
Cobalt (Co)-Total			94.0		%		80-120	04-JUL-18
Copper (Cu)-Total			95.0		%		80-120	04-JUL-18
Iron (Fe)-Total			92.0		%		80-120	04-JUL-18
Lead (Pb)-Total			103.2		%		80-120	04-JUL-18
Lithium (Li)-Total			94.7		%		80-120	04-JUL-18
Magnesium (Mg)-Total			96.8		%		80-120	04-JUL-18
Manganese (Mn)-Total			96.5		%		80-120	04-JUL-18
Molybdenum (Mo)-Total			96.5		%		80-120	04-JUL-18
Nickel (Ni)-Total			95.0		%		80-120	04-JUL-18
Phosphorus (P)-Total			94.2		%		70-130	04-JUL-18
Potassium (K)-Total			96.1		%		80-120	04-JUL-18
Rubidium (Rb)-Total			104.5		%		80-120	04-JUL-18
Selenium (Se)-Total			98.5		%		80-120	04-JUL-18
Silicon (Si)-Total			93.3		%		60-140	04-JUL-18
Silver (Ag)-Total			99.8		%		80-120	04-JUL-18
Sodium (Na)-Total			93.9		%		80-120	04-JUL-18
Strontium (Sr)-Total			97.5		%		80-120	04-JUL-18
Sulfur (S)-Total			83.4		%		80-120	04-JUL-18
Thallium (Tl)-Total			99.9		%		80-120	04-JUL-18
Tellurium (Te)-Total			99.0		%		80-120	04-JUL-18
Thorium (Th)-Total			99.5		%		70-130	04-JUL-18
Tin (Sn)-Total			98.1		%		80-120	04-JUL-18
Titanium (Ti)-Total			94.8		%		80-120	04-JUL-18
Tungsten (W)-Total			101.5		%		80-120	04-JUL-18
Uranium (U)-Total			103.7		%		80-120	04-JUL-18
Vanadium (V)-Total			98.0		%		80-120	04-JUL-18
Zinc (Zn)-Total			93.4		%		80-120	04-JUL-18
Zirconium (Zr)-Total			95.6		%		80-120	04-JUL-18
WG2814071-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	04-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	04-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	04-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	04-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	04-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	04-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	04-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	04-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	04-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	04-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	04-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	04-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	04-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	04-JUL-18
WG2814071-5 MS		**WG2814071-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	04-JUL-18
Antimony (Sb)-Total			102.3		%		70-130	04-JUL-18
Arsenic (As)-Total			100.4		%		70-130	04-JUL-18
Barium (Ba)-Total			97.4		%		70-130	04-JUL-18
Beryllium (Be)-Total			95.7		%		70-130	04-JUL-18
Bismuth (Bi)-Total			99.9		%		70-130	04-JUL-18
Boron (B)-Total			89.0		%		70-130	04-JUL-18
Cadmium (Cd)-Total			97.2		%		70-130	04-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	04-JUL-18
Chromium (Cr)-Total			97.5		%		70-130	04-JUL-18
Cesium (Cs)-Total			109.4		%		70-130	04-JUL-18
Cobalt (Co)-Total			95.5		%		70-130	04-JUL-18
Copper (Cu)-Total			96.9		%		70-130	04-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	04-JUL-18
Lead (Pb)-Total			101.6		%		70-130	04-JUL-18
Lithium (Li)-Total			102.8		%		70-130	04-JUL-18
Magnesium (Mg)-Total			89.3		%		70-130	04-JUL-18
Manganese (Mn)-Total			95.0		%		70-130	04-JUL-18
Molybdenum (Mo)-Total			104.0		%		70-130	04-JUL-18
Nickel (Ni)-Total			98.4		%		70-130	04-JUL-18
Phosphorus (P)-Total			96.5		%		70-130	04-JUL-18
Potassium (K)-Total			99.4		%		70-130	04-JUL-18
Rubidium (Rb)-Total			106.0		%		70-130	04-JUL-18
Selenium (Se)-Total			101.2		%		70-130	04-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	04-JUL-18
Silver (Ag)-Total			104.0		%		70-130	04-JUL-18
Sodium (Na)-Total			92.0		%		70-130	04-JUL-18
Strontium (Sr)-Total			101.4		%		70-130	04-JUL-18
Sulfur (S)-Total			93.6		%		70-130	04-JUL-18
Thallium (Tl)-Total			99.1		%		70-130	04-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4112807								
WG2814071-5 MS		**WG2814071-3**						
Tellurium (Te)-Total			106.2		%		70-130	04-JUL-18
Thorium (Th)-Total			98.6		%		70-130	04-JUL-18
Tin (Sn)-Total			97.1		%		70-130	04-JUL-18
Titanium (Ti)-Total			96.9		%		70-130	04-JUL-18
Tungsten (W)-Total			101.0		%		70-130	04-JUL-18
Uranium (U)-Total			96.9		%		70-130	04-JUL-18
Vanadium (V)-Total			101.1		%		70-130	04-JUL-18
Zinc (Zn)-Total			93.1		%		70-130	04-JUL-18
Zirconium (Zr)-Total			99.1		%		70-130	04-JUL-18
PH-BF	**Water**							
Batch R4110993								
WG2813159-2 DUP		**L2122094-1**						
pH		7.78	7.74	J	pH units	0.04	0.2	02-JUL-18
WG2813159-1 LCS								
pH			6.97		pH units		6.9-7.1	02-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4112945								
WG2813188-3 DUP		**L2122725-1**						
Total Dissolved Solids		3950	3640		mg/L	8.0	20	05-JUL-18
WG2813188-2 LCS								
Total Dissolved Solids			95.3		%		85-115	05-JUL-18
WG2813188-1 MB								
Total Dissolved Solids			<20		mg/L		20	05-JUL-18
SOLIDS-TDS-WT	**Water**							
Batch R4113968								
WG2814600-3 DUP		**L2122094-2**						
Total Dissolved Solids		763	779		mg/L	2.0	20	05-JUL-18
WG2814600-2 LCS								
Total Dissolved Solids			101.9		%		85-115	05-JUL-18
WG2814600-1 MB								
Total Dissolved Solids			<10		mg/L		10	05-JUL-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4111008								
WG2813183-3 DUP		**L2122691-2**						
Total Suspended Solids		21.6	21.6		mg/L	0.0	25	02-JUL-18
WG2813183-2 LCS								
Total Suspended Solids			102.2		%		85-115	02-JUL-18
WG2813183-1 MB								
Total Suspended Solids			<2.0		mg/L		2	02-JUL-18
TURBIDITY-BF	**Water**							
Batch R4110989								
WG2813191-4 DUP		**L2122691-2**						
Turbidity		33.7	33.5		NTU	0.6	15	02-JUL-18
WG2813191-2 LCS								
Turbidity			105.0		%		85-115	02-JUL-18
WG2813191-1 MB								
Turbidity			<0.10		NTU		0.1	02-JUL-18

Quality Control Report

Workorder: L2122094 Report Date: 30-JUL-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, July 26, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807084
Project Name:
Project Number: L2122094

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 7/6/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807084

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807084
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2122094
Client PO Number: L2122094

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2122094-2	1807084-1		WATER	02-Jul-18	

ALS Environmental

L2122094

WATERLOO

1807084

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2122094*
ALS requires QC data to be provided with your final results.

1x950mL

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2122094-2 MS-06		7/ 2/ 2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/19/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: KELI-JEAN SMITH Date Received: 7.6.18 1320

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1807084

Project Manager: KMO Initials: JE Date: 7.6.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES / NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES / NO
3.	Are custody seals on **sample** containers intact?	NONE	YES / NO
4.	Is there a COC (chain-of-custody) present?		YES / NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES / NO
6.	Are short-hold samples present?		YES / NO
7.	Are all samples within holding times for the requested analyses?		YES / NO
8.	Were all sample containers received intact? (not broken or leaking)		YES / NO
9.	Is there sufficient sample for the requested analyses?		YES / NO
10.	Are all samples in the proper containers for the requested analyses?		YES / NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES / NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES / NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES / NO
14.	Were the samples shipped on ice?		YES / NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES / NO

Cooler #:	1							
Temperature (°C):	~~4.0~~ 3.1							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	9							
Background µR/hr reading:	13							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? YES / NO / NA (If no, see Form 008.)

Additional Information: Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:

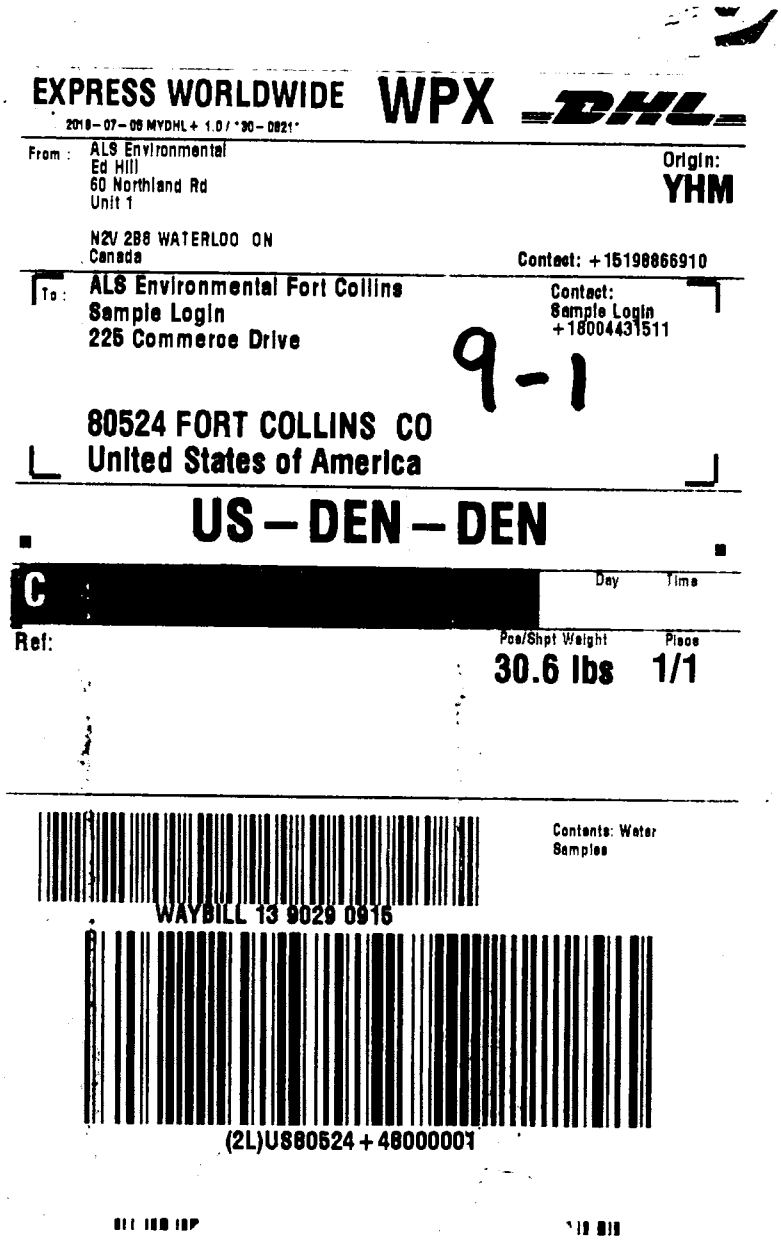
14 & 15) ice melted upon arrival

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/7/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002



EXPRESS WORLDWIDE WPX DHL

2018-07-06 MYDHL+ 1.0 / *30-0821*

From : ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

9-1

80524 FORT COLLINS CO
United States of America

US – DEN – DEN

C [redacted]

Day Time

Ref:

Pce/Shpt Weight 30.6 lbs

Piece 1/1

Contents: Water Samples

WAYBILL 13 9029 0916

(2L)US80524+48000001

1807084

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2122094	**Work Order:**	1807084
Sample ID:	L2122094-2	**Lab ID:**	1807084-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/2/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/10/2018**	PrepBy: **LOW**
Ra-226	**0.016 (+/- 0.0076)**		**0.0075**	**BQ/l**	NA	7/24/2018 14:05
Carr: BARIUM	*94.7*		*40-110*	*%REC*	DL = NA	7/24/2018 14:05

Client:	ALS Environmental	**Date:**	*26-Jul-18*
Project:	L2122094	**Work Order:**	1807084
Sample ID:	L2122094-2	**Lab ID:**	1807084-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/2/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC
U or ND - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
W - DER is greater than Warning Limit of 1.42
* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit
M - Requested MDC not met.
LT - Result is less than requested MDC but greater than achieved MDC.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).
U or ND - Indicates that the compound was analyzed for but not detected.
E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
M - Duplicate injection precision was not met.
N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.
Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.
* - Duplicate analysis (relative percent difference) not within control limits.
S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.
B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.
E - Analyte concentration exceeds the upper level of the calibration range.
J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).
A - A tentatively identified compound is a suspected aldol-condensation product.
X - The analyte was diluted below an accurate quantitation level.
* - The spike recovery is equal to or outside the control criteria used.
+ - The relative percent difference (RPD) equals or exceeds the control criteria.
G - A pattern resembling gasoline was detected in this sample.
D - A pattern resembling diesel was detected in this sample.
M - A pattern resembling motor oil was detected in this sample.
C - A pattern resembling crude oil was detected in this sample.
4 - A pattern resembling JP-4 was detected in this sample.
5 - A pattern resembling JP-5 was detected in this sample.
H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.
L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.
Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180710-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.69 (+/- 0.420)	0.00695	1.772		95.6	67-120					P
Carr: BARIUM	16300		16620		98.2	40-110					

LCSD Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.80 (+/- 0.447)	0.00677	1.772		102	67-120		1.69	0.2	2.1	P
Carr: BARIUM	16500		16610		99.4	40-110		16300			

MB Sample ID: **RE180710-2** Units: **BQ/l** Analysis Date: **7/24/2018 14:05**

Client ID: Run ID: **RE180710-2A** Prep Date: **7/10/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0033)	0.0065									Y1,U
Carr: BARIUM	17700		16620		107	40-110					Y1

The following samples were analyzed in this batch: 1807084-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	William Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	ap@baffinland.com
Email 2	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2122094

ALS Contact: | Sampler: BW/DZ/KRR

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☑
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

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	pH, Turbidity, TSS, TDS	BIM-MMER-DEL	Number of Containers
	MS-06-Recirc	2-Jul-18	10:45	Water	E1		1
	MS-06	2-Jul-18	12:20	Water		E1	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 by clicking on the drop-down list below (electronic COC only)

DEL Gen Chem tested on site

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			4.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 02-Jul-18	Time: 14:50	Received by:	Date:	Time:	Received by: AP	Date: 4-7-18	Time: 14:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 13-JUL-18
Report Date: 14-AUG-18 16:41 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2127561

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2127561-1 MS-06 Sampled By: KB/JH on 11-JUL-18 @ 15:10 Matrix: WATER							
Physical Tests							
Conductivity	1040		3.0	umhos/cm		13-JUL-18	R4124944
pH	7.78		0.10	pH units		11-JUL-18	R4122758
Total Suspended Solids	4.0		2.0	mg/L		12-JUL-18	R4123089
Total Dissolved Solids	814		20	mg/L		13-JUL-18	R4124563
Turbidity	13.2		0.10	NTU		12-JUL-18	R4123497
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		17-JUL-18	R4131573
Total Metals							
Aluminum (Al)-Total	0.0510		0.0050	mg/L	14-JUL-18	14-JUL-18	R4125302
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Arsenic (As)-Total	0.00014		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Barium (Ba)-Total	0.0132		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Boron (B)-Total	0.032		0.010	mg/L	14-JUL-18	14-JUL-18	R4125302
Cadmium (Cd)-Total	0.0000350		0.0000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Calcium (Ca)-Total	51.4		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Cesium (Cs)-Total	0.000015		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Cobalt (Co)-Total	0.00453		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Copper (Cu)-Total	<0.0010		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Iron (Fe)-Total	0.159		0.010	mg/L	14-JUL-18	14-JUL-18	R4125302
Lead (Pb)-Total	0.000055		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Lithium (Li)-Total	0.0196		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Magnesium (Mg)-Total	108		0.0050	mg/L	14-JUL-18	14-JUL-18	R4125302
Manganese (Mn)-Total	1.71		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Molybdenum (Mo)-Total	0.000875		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Nickel (Ni)-Total	0.00789		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Phosphorus (P)-Total	<0.050		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Potassium (K)-Total	11.1		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Rubidium (Rb)-Total	0.00792		0.00020	mg/L	14-JUL-18	14-JUL-18	R4125302
Selenium (Se)-Total	0.00120		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Silicon (Si)-Total	0.37		0.10	mg/L	14-JUL-18	14-JUL-18	R4125302
Silver (Ag)-Total	<0.000050		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Sodium (Na)-Total	7.36		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Strontium (Sr)-Total	0.0742		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Sulfur (S)-Total	199		0.50	mg/L	14-JUL-18	14-JUL-18	R4125302
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	14-JUL-18	14-JUL-18	R4125302
Thallium (Tl)-Total	0.000030		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Thorium (Th)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Tin (Sn)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302

* 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
L2127561-1 MS-06 Sampled By: KB/JH on 11-JUL-18 @ 15:10 Matrix: WATER							
Total Metals							
Titanium (Ti)-Total	0.00045		0.00030	mg/L	14-JUL-18	14-JUL-18	R4125302
Tungsten (W)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Uranium (U)-Total	0.00158		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Vanadium (V)-Total	<0.00050		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Zinc (Zn)-Total	0.0039		0.0030	mg/L	14-JUL-18	14-JUL-18	R4125302
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	14-JUL-18	14-JUL-18	R4125302
Radiological Parameters							
Ra-226	0.019		0.0067	Bq/L	27-JUL-18	08-AUG-18	R4160854
L2127561-2 MS-0601 Sampled By: KB/JH on 11-JUL-18 @ 15:10 Matrix: WATER							
Physical Tests							
Conductivity	5460		3.0	umhos/cm		13-JUL-18	R4124944
pH	7.77		0.10	pH units		11-JUL-18	R4122758
Total Suspended Solids	4.4		2.0	mg/L		12-JUL-18	R4123089
Total Dissolved Solids	832		20	mg/L		17-JUL-18	R4130396
Turbidity	13.5		0.10	NTU		12-JUL-18	R4123497
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		17-JUL-18	R4131573
Total Metals							
Aluminum (Al)-Total	0.0468		0.0050	mg/L	14-JUL-18	14-JUL-18	R4125302
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Arsenic (As)-Total	0.00014		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Barium (Ba)-Total	0.0132		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Boron (B)-Total	0.032		0.010	mg/L	14-JUL-18	14-JUL-18	R4125302
Cadmium (Cd)-Total	0.0000409		0.0000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Calcium (Ca)-Total	50.1		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Cesium (Cs)-Total	0.000013		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Cobalt (Co)-Total	0.00455		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Copper (Cu)-Total	<0.0010		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Iron (Fe)-Total	0.150		0.010	mg/L	14-JUL-18	14-JUL-18	R4125302
Lead (Pb)-Total	0.000061		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Lithium (Li)-Total	0.0189		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Magnesium (Mg)-Total	106		0.0050	mg/L	14-JUL-18	14-JUL-18	R4125302
Manganese (Mn)-Total	1.74		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Molybdenum (Mo)-Total	0.000937		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Nickel (Ni)-Total	0.00783		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Phosphorus (P)-Total	<0.050		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Potassium (K)-Total	10.8		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302

* 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
L2127561-2 MS-0601 Sampled By: KB/JH on 11-JUL-18 @ 15:10 Matrix: WATER							
Total Metals							
Rubidium (Rb)-Total	0.00786		0.00020	mg/L	14-JUL-18	14-JUL-18	R4125302
Selenium (Se)-Total	0.00120		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Silicon (Si)-Total	0.37		0.10	mg/L	14-JUL-18	14-JUL-18	R4125302
Silver (Ag)-Total	<0.000050		0.000050	mg/L	14-JUL-18	14-JUL-18	R4125302
Sodium (Na)-Total	7.22		0.050	mg/L	14-JUL-18	14-JUL-18	R4125302
Strontium (Sr)-Total	0.0764		0.0010	mg/L	14-JUL-18	14-JUL-18	R4125302
Sulfur (S)-Total	201		0.50	mg/L	14-JUL-18	14-JUL-18	R4125302
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	14-JUL-18	14-JUL-18	R4125302
Thallium (Tl)-Total	0.000032		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Thorium (Th)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Tin (Sn)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Titanium (Ti)-Total	0.00058		0.00030	mg/L	14-JUL-18	14-JUL-18	R4125302
Tungsten (W)-Total	<0.00010		0.00010	mg/L	14-JUL-18	14-JUL-18	R4125302
Uranium (U)-Total	0.00163		0.000010	mg/L	14-JUL-18	14-JUL-18	R4125302
Vanadium (V)-Total	<0.00050		0.00050	mg/L	14-JUL-18	14-JUL-18	R4125302
Zinc (Zn)-Total	0.0040		0.0030	mg/L	14-JUL-18	14-JUL-18	R4125302
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	14-JUL-18	14-JUL-18	R4125302
Radiological Parameters							
Ra-226	0.042		0.0075	Bq/L	27-JUL-18	08-AUG-18	R4160854

* 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	Barium (Ba)-Total	MS-B	L2127561-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2127561-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2127561-1, -2
Matrix Spike	Lithium (Li)-Total	MS-B	L2127561-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2127561-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2127561-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2127561-1, -2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2127561-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2127561-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2127561-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L2127561-1, -2
Matrix Spike	Uranium (U)-Total	MS-B	L2127561-1, -2

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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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

Workorder: L2127561 Report Date: 14-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4131573								
WG2824260-3 DUP		**L2123675-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	17-JUL-18
WG2824260-2 LCS								
Cyanide, Total			86.1		%		80-120	17-JUL-18
WG2824260-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	17-JUL-18
WG2824260-4 MS		**L2123675-1**						
Cyanide, Total			87.2		%		70-130	17-JUL-18
EC-WT	**Water**							
Batch R4124944								
WG2821390-32 DUP		**WG2821390-31**						
Conductivity		779	781		umhos/cm	0.3	10	13-JUL-18
WG2821390-30 LCS								
Conductivity			99.7		%		90-110	13-JUL-18
WG2821390-29 MB								
Conductivity			<3.0		umhos/cm		3	13-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-4 DUP		**WG2822457-3**						
Aluminum (Al)-Total		0.0510	0.0544		mg/L	6.5	20	14-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-JUL-18
Arsenic (As)-Total		0.00014	0.00014		mg/L	2.6	20	14-JUL-18
Barium (Ba)-Total		0.0132	0.0135		mg/L	2.5	20	14-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	14-JUL-18
Boron (B)-Total		0.032	0.033		mg/L	1.3	20	14-JUL-18
Cadmium (Cd)-Total		0.0000350	0.0000367		mg/L	4.7	20	14-JUL-18
Calcium (Ca)-Total		51.4	52.0		mg/L	1.1	20	14-JUL-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	14-JUL-18
Cesium (Cs)-Total		0.000015	0.000013		mg/L	17	20	14-JUL-18
Cobalt (Co)-Total		0.00453	0.00453		mg/L	0.1	20	14-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-JUL-18
Iron (Fe)-Total		0.159	0.183		mg/L	14	20	14-JUL-18
Lead (Pb)-Total		0.000055	0.000061		mg/L	9.8	20	14-JUL-18
Lithium (Li)-Total		0.0196	0.0190		mg/L	3.0	20	14-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-4 DUP		**WG2822457-3**						
Magnesium (Mg)-Total		108	109		mg/L	1.3	20	14-JUL-18
Manganese (Mn)-Total		1.71	1.70		mg/L	0.5	20	14-JUL-18
Molybdenum (Mo)-Total		0.000875	0.000858		mg/L	2.0	20	14-JUL-18
Nickel (Ni)-Total		0.00789	0.00795		mg/L	0.8	20	14-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	14-JUL-18
Potassium (K)-Total		11.1	11.0		mg/L	0.9	20	14-JUL-18
Rubidium (Rb)-Total		0.00792	0.00799		mg/L	0.9	20	14-JUL-18
Selenium (Se)-Total		0.00120	0.00120		mg/L	0.7	20	14-JUL-18
Silicon (Si)-Total		0.37	0.36		mg/L	1.0	20	14-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	14-JUL-18
Sodium (Na)-Total		7.36	7.24		mg/L	1.6	20	14-JUL-18
Strontium (Sr)-Total		0.0742	0.0736		mg/L	0.7	20	14-JUL-18
Sulfur (S)-Total		199	198		mg/L	0.3	25	14-JUL-18
Thallium (Tl)-Total		0.000030	0.000033		mg/L	7.3	20	14-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	14-JUL-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	14-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-JUL-18
Titanium (Ti)-Total		0.00045	0.00049		mg/L	7.3	20	14-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	14-JUL-18
Uranium (U)-Total		0.00158	0.00160		mg/L	1.7	20	14-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	14-JUL-18
Zinc (Zn)-Total		0.0039	0.0042		mg/L	6.3	20	14-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	14-JUL-18
WG2822457-2 LCS								
Aluminum (Al)-Total			104.4		%		80-120	14-JUL-18
Antimony (Sb)-Total			98.8		%		80-120	14-JUL-18
Arsenic (As)-Total			98.3		%		80-120	14-JUL-18
Barium (Ba)-Total			97.7		%		80-120	14-JUL-18
Beryllium (Be)-Total			91.8		%		80-120	14-JUL-18
Bismuth (Bi)-Total			101.2		%		80-120	14-JUL-18
Boron (B)-Total			91.4		%		80-120	14-JUL-18
Cadmium (Cd)-Total			96.8		%		80-120	14-JUL-18
Calcium (Ca)-Total			96.0		%		80-120	14-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-2 LCS								
Chromium (Cr)-Total			101.2		%		80-120	14-JUL-18
Cesium (Cs)-Total			97.4		%		80-120	14-JUL-18
Cobalt (Co)-Total			98.4		%		80-120	14-JUL-18
Copper (Cu)-Total			97.1		%		80-120	14-JUL-18
Iron (Fe)-Total			95.6		%		80-120	14-JUL-18
Lead (Pb)-Total			102.3		%		80-120	14-JUL-18
Lithium (Li)-Total			86.5		%		80-120	14-JUL-18
Magnesium (Mg)-Total			106.0		%		80-120	14-JUL-18
Manganese (Mn)-Total			99.8		%		80-120	14-JUL-18
Molybdenum (Mo)-Total			98.8		%		80-120	14-JUL-18
Nickel (Ni)-Total			97.6		%		80-120	14-JUL-18
Phosphorus (P)-Total			104.2		%		70-130	14-JUL-18
Potassium (K)-Total			106.2		%		80-120	14-JUL-18
Rubidium (Rb)-Total			102.3		%		80-120	14-JUL-18
Selenium (Se)-Total			91.1		%		80-120	14-JUL-18
Silicon (Si)-Total			103.3		%		60-140	14-JUL-18
Silver (Ag)-Total			97.8		%		80-120	14-JUL-18
Sodium (Na)-Total			99.9		%		80-120	14-JUL-18
Strontium (Sr)-Total			95.4		%		80-120	14-JUL-18
Sulfur (S)-Total			96.2		%		80-120	14-JUL-18
Thallium (Tl)-Total			101.9		%		80-120	14-JUL-18
Tellurium (Te)-Total			90.7		%		80-120	14-JUL-18
Thorium (Th)-Total			101.9		%		70-130	14-JUL-18
Tin (Sn)-Total			97.2		%		80-120	14-JUL-18
Titanium (Ti)-Total			96.8		%		80-120	14-JUL-18
Tungsten (W)-Total			100.9		%		80-120	14-JUL-18
Uranium (U)-Total			105.5		%		80-120	14-JUL-18
Vanadium (V)-Total			101.6		%		80-120	14-JUL-18
Zinc (Zn)-Total			94.8		%		80-120	14-JUL-18
Zirconium (Zr)-Total			95.3		%		80-120	14-JUL-18
WG2822457-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	14-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	14-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	14-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	14-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	14-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	14-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	14-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	14-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	14-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	14-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	14-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	14-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	14-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	14-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	14-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	14-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	14-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	14-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	14-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	14-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	14-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	14-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	14-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	14-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	14-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	14-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	14-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	14-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	14-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	14-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	14-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	14-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	14-JUL-18
WG2822457-5 MS		**WG2822457-3**						
Aluminum (Al)-Total			105.0		%		70-130	14-JUL-18
Antimony (Sb)-Total			99.6		%		70-130	14-JUL-18
Arsenic (As)-Total			99.5		%		70-130	14-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	14-JUL-18
Beryllium (Be)-Total			96.8		%		70-130	14-JUL-18
Bismuth (Bi)-Total			93.7		%		70-130	14-JUL-18
Boron (B)-Total			91.8		%		70-130	14-JUL-18
Cadmium (Cd)-Total			96.9		%		70-130	14-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	14-JUL-18
Chromium (Cr)-Total			99.0		%		70-130	14-JUL-18
Cesium (Cs)-Total			97.5		%		70-130	14-JUL-18
Cobalt (Co)-Total			94.6		%		70-130	14-JUL-18
Copper (Cu)-Total			93.8		%		70-130	14-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	14-JUL-18
Lead (Pb)-Total			91.9		%		70-130	14-JUL-18
Lithium (Li)-Total			N/A	MS-B	%		-	14-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	14-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	14-JUL-18
Molybdenum (Mo)-Total			99.3		%		70-130	14-JUL-18
Nickel (Ni)-Total			92.9		%		70-130	14-JUL-18
Phosphorus (P)-Total			105.7		%		70-130	14-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	14-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	14-JUL-18
Selenium (Se)-Total			99.9		%		70-130	14-JUL-18
Silicon (Si)-Total			101.5		%		70-130	14-JUL-18
Silver (Ag)-Total			92.9		%		70-130	14-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	14-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	14-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	14-JUL-18
Thallium (Tl)-Total			91.8		%		70-130	14-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4125302								
WG2822457-5 MS		**WG2822457-3**						
Tellurium (Te)-Total			92.6		%		70-130	14-JUL-18
Thorium (Th)-Total			95.2		%		70-130	14-JUL-18
Tin (Sn)-Total			96.1		%		70-130	14-JUL-18
Titanium (Ti)-Total			104.6		%		70-130	14-JUL-18
Tungsten (W)-Total			96.2		%		70-130	14-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	14-JUL-18
Vanadium (V)-Total			104.3		%		70-130	14-JUL-18
Zinc (Zn)-Total			90.0		%		70-130	14-JUL-18
Zirconium (Zr)-Total			96.6		%		70-130	14-JUL-18
PH-BF	**Water**							
Batch R4122758								
WG2819764-2 DUP		**L2127561-2**						
pH		7.77	7.79	J	pH units	0.02	0.2	11-JUL-18
WG2819764-1 LCS								
pH			6.98		pH units		6.9-7.1	11-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4124563								
WG2819902-3 DUP		**L2127998-1**						
Total Dissolved Solids		3370	3310		mg/L	1.8	20	13-JUL-18
WG2819902-2 LCS								
Total Dissolved Solids			99.7		%		85-115	13-JUL-18
WG2819902-1 MB								
Total Dissolved Solids			<20		mg/L		20	13-JUL-18
Batch R4130396								
WG2824309-3 DUP		**L2130194-1**						
Total Dissolved Solids		3740	3650		mg/L	2.6	20	17-JUL-18
WG2824309-2 LCS								
Total Dissolved Solids			101.8		%		85-115	17-JUL-18
WG2824309-1 MB								
Total Dissolved Solids			<20		mg/L		20	17-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4123089								
WG2819840-3 DUP		**L2127561-2**						
Total Suspended Solids		4.4	5.6		mg/L	24	25	12-JUL-18
WG2819840-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4123089								
WG2819840-2 LCS								
Total Suspended Solids			99.0		%		85-115	12-JUL-18
WG2819840-1 MB								
Total Suspended Solids			<2.0		mg/L		2	12-JUL-18
TURBIDITY-BF	**Water**							
Batch R4123497								
WG2820485-3 DUP		**L2127998-1**						
Turbidity		5.76	5.83		NTU	1.2	15	12-JUL-18
WG2820485-2 LCS								
Turbidity			114.0		%		85-115	12-JUL-18
WG2820485-1 MB								
Turbidity			<0.10		NTU		0.1	12-JUL-18

Quality Control Report

Workorder: L2127561 Report Date: 14-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Monday, August 13, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807308
Project Name:
Project Number: L2127561

Dear Mr. Hawthorne:

Two water samples were received from ALS Environmental, on 7/17/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807308

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807308
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2127561
Client PO Number: L2127561

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2127561-1	1807308-1		WATER	11-Jul-18	
L2127561-2	1807308-2		WATER	11-Jul-18	

ALS Environmental

L2127561

WATERLOO

1807308

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2127561*
ALS requires QC data to be provided with your final results.

Please see enclosed 2 sample(s) in 2 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L2127561-1 MS-06**		7/ 11/ 2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/6/2018	
(2) **L2127561-2 MS-0601**		7/ 11/ 2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/6/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: [signature] Date Received: 7/17/18 920

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807308

Project Manager: KO Initials: ABD Date: 7/17/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #: 1

Temperature (°C): Ambient

No. of custody seals on cooler: 1

DOT Survey/ Acceptance Information

External µR/hr reading: 6

Background µR/hr reading: _____

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

1807308-2 bt| 1 was not preserved, preservative added in house to pH <2

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/19/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127561	**Work Order:**	1807308
Sample ID:	L2127561-1	**Lab ID:**	1807308-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **7/27/2018**	PrepBy: **CXW**
Ra-226	**0.019 (+/- 0.0082)**		**0.0067**	**BQ/l**	NA	8/8/2018 13:51
Carr: BARIUM	*89.5*		*40-110*	*%REC*	DL = NA	8/8/2018 13:51

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127561	**Work Order:**	1807308
Sample ID:	L2127561-2	**Lab ID:**	1807308-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **7/27/2018**	PrepBy: **CXW**
Ra-226	**0.042 (+/- 0.014)**		**0.0075**	**BQ/l**	NA	8/8/2018 13:51
Carr: BARIUM	*93.3*		*40-110*	*%REC*	DL = NA	8/8/2018 13:51

Client:	ALS Environmental	**Date:**	*13-Aug-18*
Project:	L2127561	**Work Order:**	1807308
Sample ID:	L2127561-2	**Lab ID:**	1807308-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/11/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180727-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/8/2018 13:51**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.91 (+/- 0.472)	0.00637	1.771		108	67-120					P
Carr: BARIUM	16000		16860		95.1	40-110					

LCSD Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/13/2018 12:30**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.85 (+/- 0.468)	0.0182	1.771		104	67-120		1.91	0.1	2.1	P,M3
Carr: BARIUM	11400		16860		67.5	40-110		16000			

MB Sample ID: **RE180727-1** Units: **BQ/l** Analysis Date: **8/8/2018 13:51**

Client ID: Run ID: **RE180727-1A** Prep Date: **7/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00040 (+/- 0.0021)	0.0044									Y1,U
Carr: BARIUM	17000		16860		101	40-110					Y1

The following samples were analyzed in this batch: 1807308-1 1807308-2

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2127561-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to 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
Email 3	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply			
Regular [R]	☑ Standard TAT if received by 3 pm - business days - no surcharges apply		
PRIORITY (Business Days)	4 day [P4] ☐	EMERGENCY	1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		
Date and Time Required for all E&P TATs		dd-mm-yy hh:mm	
For tests that can not be performed according to the service level selected, you will be contacted.			

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	commercial@baffinland.com

Project Information	
ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2127561

ALS Contact: | Sampler: KB/JH

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-MMER-DEL	Number of Containers
	MS-06	11-Jul-18	15:10	Water	R	5
	MS-0601	11-Jul-18	15:10	Water	R	5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			16.7		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 11-Jul-18	Time: 16:10	Received by:	Date:	Time:	Received by: XP	Date: 13-7-18	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 18-JUL-18
Report Date: 17-AUG-18 12:52 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2132032

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2132032-1 MS-06 @ 0935 Sampled By: CW/JH/KB on 18-JUL-18 @ 09:35 Matrix: WATER							
Physical Tests							
pH	7.78		0.10	pH units		18-JUL-18	R4132930
Total Suspended Solids	2.4		2.0	mg/L		19-JUL-18	R4133084
Total Dissolved Solids	935		20	mg/L		19-JUL-18	R4133107
Turbidity	5.16		0.10	NTU		18-JUL-18	R4132935
L2132032-2 MS-06 @ 1410 Sampled By: CW/JH/KB on 18-JUL-18 @ 14:10 Matrix: WATER							
Physical Tests							
Conductivity	1140		3.0	umhos/cm		25-JUL-18	R4140211
pH	7.76		0.10	pH units		18-JUL-18	R4132930
Total Suspended Solids	2.8		2.0	mg/L		19-JUL-18	R4133084
Total Dissolved Solids	919		20	mg/L		19-JUL-18	R4133107
Turbidity	5.54		0.10	NTU		18-JUL-18	R4132935
Anions and Nutrients							
Ammonia, Total (as N)	0.159		0.020	mg/L		25-JUL-18	R4140052
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		25-JUL-18	R4140189
Total Metals							
Aluminum (Al)-Total	0.0162		0.0050	mg/L	24-JUL-18	24-JUL-18	R4139112
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Arsenic (As)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Barium (Ba)-Total	0.0145		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Boron (B)-Total	0.034		0.010	mg/L	24-JUL-18	24-JUL-18	R4139112
Cadmium (Cd)-Total	0.0000439		0.0000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Calcium (Ca)-Total	60.3		0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Cesium (Cs)-Total	0.000012		0.000010	mg/L	24-JUL-18	24-JUL-18	R4139112
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Cobalt (Co)-Total	0.00524		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Copper (Cu)-Total	<0.0010		0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Iron (Fe)-Total	0.061		0.010	mg/L	24-JUL-18	24-JUL-18	R4139112
Lead (Pb)-Total	0.000079		0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Lithium (Li)-Total	0.0201		0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Magnesium (Mg)-Total	116	DLHC	0.050	mg/L	24-JUL-18	25-JUL-18	R4139112
Manganese (Mn)-Total	1.97		0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Molybdenum (Mo)-Total	0.000993		0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Nickel (Ni)-Total	0.00842		0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Phosphorus (P)-Total	<0.050		0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Potassium (K)-Total	11.3		0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Rubidium (Rb)-Total	0.00915		0.00020	mg/L	24-JUL-18	24-JUL-18	R4139112
Selenium (Se)-Total	0.00132		0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112

* 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
L2132032-2 MS-06 @ 1410 Sampled By: CW/JH/KB on 18-JUL-18 @ 14:10 Matrix: WATER							
Total Metals							
Silicon (Si)-Total	0.26		0.10	mg/L	24-JUL-18	24-JUL-18	R4139112
Silver (Ag)-Total	<0.000050		0.000050	mg/L	24-JUL-18	24-JUL-18	R4139112
Sodium (Na)-Total	7.24		0.050	mg/L	24-JUL-18	24-JUL-18	R4139112
Strontium (Sr)-Total	0.0894		0.0010	mg/L	24-JUL-18	24-JUL-18	R4139112
Sulfur (S)-Total	190		0.50	mg/L	24-JUL-18	24-JUL-18	R4139112
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	24-JUL-18	24-JUL-18	R4139112
Thallium (Tl)-Total	0.000032		0.000010	mg/L	24-JUL-18	24-JUL-18	R4139112
Thorium (Th)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Tin (Sn)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	24-JUL-18	24-JUL-18	R4139112
Tungsten (W)-Total	<0.00010		0.00010	mg/L	24-JUL-18	24-JUL-18	R4139112
Uranium (U)-Total	0.00153		0.000010	mg/L	24-JUL-18	24-JUL-18	R4139112
Vanadium (V)-Total	<0.00050		0.00050	mg/L	24-JUL-18	24-JUL-18	R4139112
Zinc (Zn)-Total	0.0072		0.0030	mg/L	24-JUL-18	24-JUL-18	R4139112
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	24-JUL-18	24-JUL-18	R4139112
Radiological Parameters							
Ra-226	0.013		0.0057	Bq/L	07-AUG-18	14-AUG-18	R4160854

* 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	Cyanide, Total	MS-B	L2132032-2
Matrix Spike	Barium (Ba)-Total	MS-B	L2132032-2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2132032-2
Matrix Spike	Iron (Fe)-Total	MS-B	L2132032-2
Matrix Spike	Lithium (Li)-Total	MS-B	L2132032-2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2132032-2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2132032-2
Matrix Spike	Potassium (K)-Total	MS-B	L2132032-2
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2132032-2
Matrix Spike	Sodium (Na)-Total	MS-B	L2132032-2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2132032-2
Matrix Spike	Sulfur (S)-Total	MS-B	L2132032-2
Matrix Spike	Uranium (U)-Total	MS-B	L2132032-2

Sample Parameter Qualifier key listed:

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.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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

Reference Information

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2132032 Report Date: 17-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4140189								
WG2830716-3 DUP		**L2131703-1**						
Cyanide, Total		1.06	1.06		mg/L	0.1	20	25-JUL-18
WG2830716-2 LCS								
Cyanide, Total			86.6		%		80-120	25-JUL-18
WG2830716-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	25-JUL-18
WG2830716-4 MS		**L2131703-1**						
Cyanide, Total			N/A	MS-B	%		-	25-JUL-18
EC-WT	**Water**							
Batch R4140211								
WG2831640-4 DUP		**WG2831640-3**						
Conductivity		1130	1130		umhos/cm	0.1	10	25-JUL-18
WG2831640-2 LCS								
Conductivity			99.5		%		90-110	25-JUL-18
WG2831640-1 MB								
Conductivity			<3.0		umhos/cm		3	25-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-4 DUP		**WG2831295-3**						
Aluminum (Al)-Total		0.0200	0.0226		mg/L	13	20	24-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Arsenic (As)-Total		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	24-JUL-18
Barium (Ba)-Total		0.0149	0.0147		mg/L	1.7	20	24-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-JUL-18
Boron (B)-Total		0.034	0.033		mg/L	2.0	20	24-JUL-18
Cadmium (Cd)-Total		0.0000456	0.0000448		mg/L	1.8	20	24-JUL-18
Calcium (Ca)-Total		57.8	59.2		mg/L	2.4	20	24-JUL-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUL-18
Cesium (Cs)-Total		0.000012	0.000012		mg/L	0.8	20	24-JUL-18
Cobalt (Co)-Total		0.00556	0.00559		mg/L	0.7	20	24-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	24-JUL-18
Iron (Fe)-Total		0.072	0.082		mg/L	13	20	24-JUL-18
Lead (Pb)-Total		0.000059	0.000064		mg/L	7.1	20	24-JUL-18
Lithium (Li)-Total		0.0214	0.0201		mg/L	5.9	20	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-4 DUP		**WG2831295-3**						
Magnesium (Mg)-Total		113	113		mg/L	0.6	20	24-JUL-18
Manganese (Mn)-Total		1.95	1.94		mg/L	0.3	20	24-JUL-18
Molybdenum (Mo)-Total		0.000967	0.000958		mg/L	0.9	20	24-JUL-18
Nickel (Ni)-Total		0.00879	0.00882		mg/L	0.3	20	24-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-JUL-18
Potassium (K)-Total		11.0	11.0		mg/L	0.1	20	24-JUL-18
Rubidium (Rb)-Total		0.00888	0.00896		mg/L	0.9	20	24-JUL-18
Selenium (Se)-Total		0.00142	0.00129		mg/L	9.2	20	24-JUL-18
Silicon (Si)-Total		0.29	0.29		mg/L	1.4	20	24-JUL-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-JUL-18
Sodium (Na)-Total		7.16	7.19		mg/L	0.3	20	24-JUL-18
Strontium (Sr)-Total		0.0869	0.0871		mg/L	0.3	20	24-JUL-18
Sulfur (S)-Total		192	187		mg/L	2.6	25	24-JUL-18
Thallium (Tl)-Total		0.000034	0.000033		mg/L	4.5	20	24-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	24-JUL-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	24-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Titanium (Ti)-Total		0.00035	0.00060	J	mg/L	0.00025	0.0006	24-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUL-18
Uranium (U)-Total		0.00157	0.00155		mg/L	1.0	20	24-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUL-18
Zinc (Zn)-Total		0.0084	0.0087		mg/L	2.9	20	24-JUL-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	24-JUL-18
WG2831295-2 LCS								
Aluminum (Al)-Total			100.6		%		80-120	24-JUL-18
Antimony (Sb)-Total			102.7		%		80-120	24-JUL-18
Arsenic (As)-Total			101.0		%		80-120	24-JUL-18
Barium (Ba)-Total			102.4		%		80-120	24-JUL-18
Beryllium (Be)-Total			102.8		%		80-120	24-JUL-18
Bismuth (Bi)-Total			106.0		%		80-120	24-JUL-18
Boron (B)-Total			96.7		%		80-120	24-JUL-18
Cadmium (Cd)-Total			105.3		%		80-120	24-JUL-18
Calcium (Ca)-Total			101.6		%		80-120	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-2 LCS								
Chromium (Cr)-Total			101.6		%		80-120	24-JUL-18
Cesium (Cs)-Total			100.4		%		80-120	24-JUL-18
Cobalt (Co)-Total			99.4		%		80-120	24-JUL-18
Copper (Cu)-Total			100.4		%		80-120	24-JUL-18
Iron (Fe)-Total			99.0		%		80-120	24-JUL-18
Lead (Pb)-Total			102.9		%		80-120	24-JUL-18
Lithium (Li)-Total			104.4		%		80-120	24-JUL-18
Magnesium (Mg)-Total			100.0		%		80-120	24-JUL-18
Manganese (Mn)-Total			101.9		%		80-120	24-JUL-18
Molybdenum (Mo)-Total			105.0		%		80-120	24-JUL-18
Nickel (Ni)-Total			100.3		%		80-120	24-JUL-18
Phosphorus (P)-Total			101.3		%		70-130	24-JUL-18
Potassium (K)-Total			99.3		%		80-120	24-JUL-18
Rubidium (Rb)-Total			103.4		%		80-120	24-JUL-18
Selenium (Se)-Total			100.6		%		80-120	24-JUL-18
Silicon (Si)-Total			105.8		%		60-140	24-JUL-18
Silver (Ag)-Total			98.2		%		80-120	24-JUL-18
Sodium (Na)-Total			103.3		%		80-120	24-JUL-18
Strontium (Sr)-Total			103.9		%		80-120	24-JUL-18
Sulfur (S)-Total			99.6		%		80-120	24-JUL-18
Thallium (Tl)-Total			98.8		%		80-120	24-JUL-18
Tellurium (Te)-Total			96.9		%		80-120	24-JUL-18
Thorium (Th)-Total			102.1		%		70-130	24-JUL-18
Tin (Sn)-Total			98.1		%		80-120	24-JUL-18
Titanium (Ti)-Total			93.9		%		80-120	24-JUL-18
Tungsten (W)-Total			95.9		%		80-120	24-JUL-18
Uranium (U)-Total			102.5		%		80-120	24-JUL-18
Vanadium (V)-Total			103.6		%		80-120	24-JUL-18
Zinc (Zn)-Total			93.6		%		80-120	24-JUL-18
Zirconium (Zr)-Total			100.9		%		80-120	24-JUL-18
WG2831295-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	24-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	24-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	24-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	24-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	24-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	24-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	24-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	24-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	24-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	24-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	24-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	24-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	24-JUL-18
WG2831295-5 MS		**WG2831295-3**						
Aluminum (Al)-Total			94.4		%		70-130	24-JUL-18
Antimony (Sb)-Total			101.7		%		70-130	24-JUL-18
Arsenic (As)-Total			98.3		%		70-130	24-JUL-18
Barium (Ba)-Total			N/A	MS-B	%		-	24-JUL-18
Beryllium (Be)-Total			94.3		%		70-130	24-JUL-18
Bismuth (Bi)-Total			96.2		%		70-130	24-JUL-18
Boron (B)-Total			81.2		%		70-130	24-JUL-18
Cadmium (Cd)-Total			100.8		%		70-130	24-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	24-JUL-18
Chromium (Cr)-Total			98.9		%		70-130	24-JUL-18
Cesium (Cs)-Total			100.1		%		70-130	24-JUL-18
Cobalt (Co)-Total			92.9		%		70-130	24-JUL-18
Copper (Cu)-Total			95.0		%		70-130	24-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	24-JUL-18
Lead (Pb)-Total			93.9		%		70-130	24-JUL-18
Lithium (Li)-Total			N/A	MS-B	%		-	24-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	24-JUL-18
Manganese (Mn)-Total			N/A	MS-B	%		-	24-JUL-18
Molybdenum (Mo)-Total			102.2		%		70-130	24-JUL-18
Nickel (Ni)-Total			92.8		%		70-130	24-JUL-18
Phosphorus (P)-Total			93.0		%		70-130	24-JUL-18
Potassium (K)-Total			N/A	MS-B	%		-	24-JUL-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	24-JUL-18
Selenium (Se)-Total			102.8		%		70-130	24-JUL-18
Silicon (Si)-Total			98.0		%		70-130	24-JUL-18
Silver (Ag)-Total			92.3		%		70-130	24-JUL-18
Sodium (Na)-Total			N/A	MS-B	%		-	24-JUL-18
Strontium (Sr)-Total			N/A	MS-B	%		-	24-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	24-JUL-18
Thallium (Tl)-Total			92.9		%		70-130	24-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4139112								
WG2831295-5 MS		**WG2831295-3**						
Tellurium (Te)-Total			89.5		%		70-130	24-JUL-18
Thorium (Th)-Total			97.4		%		70-130	24-JUL-18
Tin (Sn)-Total			97.8		%		70-130	24-JUL-18
Titanium (Ti)-Total			96.7		%		70-130	24-JUL-18
Tungsten (W)-Total			96.2		%		70-130	24-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	24-JUL-18
Vanadium (V)-Total			102.7		%		70-130	24-JUL-18
Zinc (Zn)-Total			83.6		%		70-130	24-JUL-18
Zirconium (Zr)-Total			98.9		%		70-130	24-JUL-18
NH3-WT	**Water**							
Batch R4140052								
WG2831727-3 DUP		**L2132163-1**						
Ammonia, Total (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	25-JUL-18
WG2831727-2 LCS								
Ammonia, Total (as N)			104.6		%		85-115	25-JUL-18
WG2831727-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	25-JUL-18
WG2831727-4 MS		**L2132163-1**						
Ammonia, Total (as N)			95.1		%		75-125	25-JUL-18
PH-BF	**Water**							
Batch R4132930								
WG2825821-2 DUP		**L2131286-15**						
pH		7.95	7.96	J	pH units	0.01	0.2	18-JUL-18
WG2825821-1 LCS								
pH			7.00		pH units		6.9-7.1	18-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4133107								
WG2826070-3 DUP		**L2131286-15**						
Total Dissolved Solids		174	160		mg/L	8.3	20	19-JUL-18
WG2826070-2 LCS								
Total Dissolved Solids			100.0		%		85-115	19-JUL-18
WG2826070-1 MB								
Total Dissolved Solids			<20		mg/L		20	19-JUL-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4133084								
WG2826122-3 DUP		**L2131286-15**						
Total Suspended Solids		4.4	4.8		mg/L	8.7	25	19-JUL-18
WG2826122-2 LCS								
Total Suspended Solids			99.4		%		85-115	19-JUL-18
WG2826122-1 MB								
Total Suspended Solids			<2.0		mg/L		2	19-JUL-18
TURBIDITY-BF	**Water**							
Batch R4132935								
WG2825863-3 DUP		**L2131286-15**						
Turbidity		3.45	3.36		NTU	2.6	15	18-JUL-18
WG2825863-2 LCS								
Turbidity			114.0		%		85-115	18-JUL-18
WG2825863-1 MB								
Turbidity			<0.10		NTU		0.1	18-JUL-18

Quality Control Report

Workorder: L2132032 Report Date: 17-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 15, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807498
Project Name:
Project Number: L2132032

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 7/25/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807498

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807498
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2132032
Client PO Number: L2132032

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2132032-2	1807498-1		WATER	18-Jul-18	

ALS Environmental

L2132032

WATERLOO

1807498

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2132032*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 sample(s) in 1 Container(s)

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L2132032-2 MS-06 @ 1410**		**7/18/2018**	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/16/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: Rick.Hawthorne@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 7/25/18 12:00

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807498

Project Manager: KMO Initials: JC Date: 7-26-18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#1) #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	17.0							
No. of custody seals on cooler:	2							
DOT Survey/ Acceptance Information — External µR/hr reading:	13							
Background µR/hr reading:	11							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

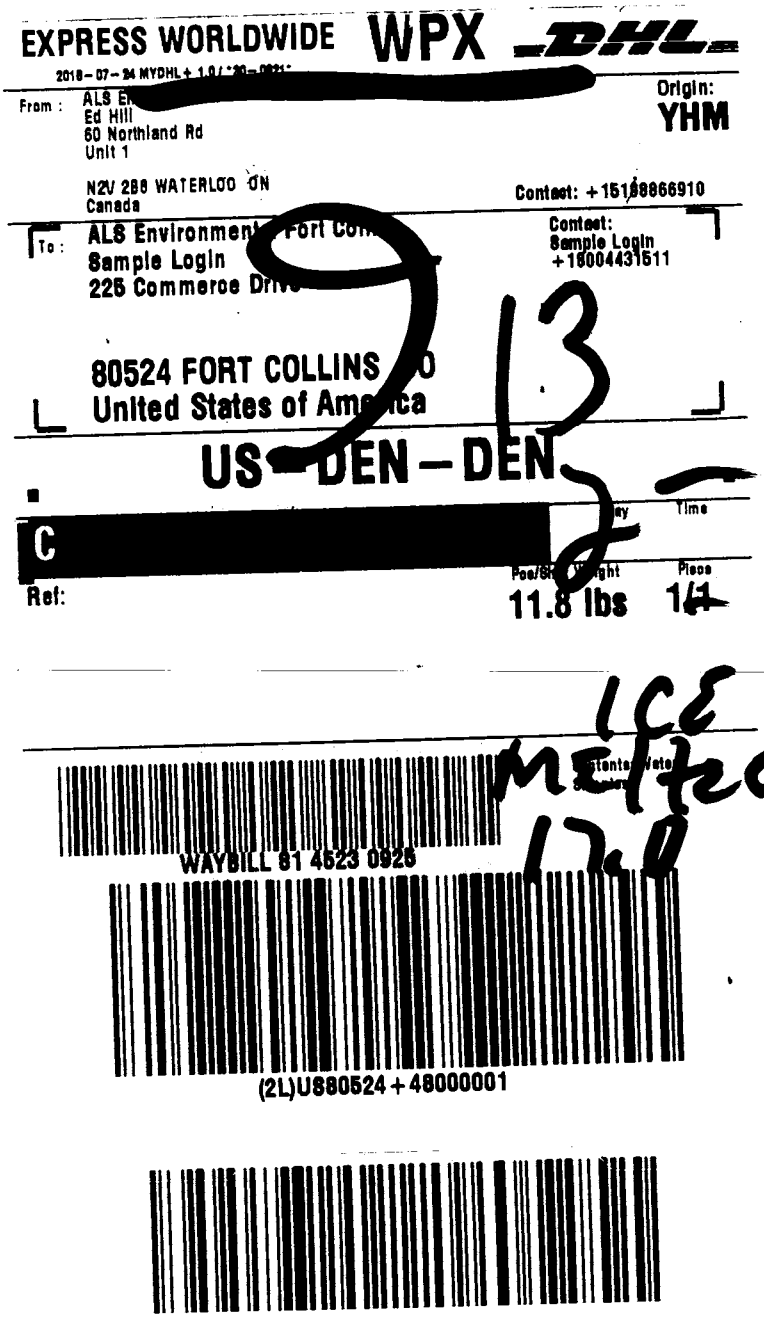
If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 7/26/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807498



ice melted 12.2

Client:	ALS Environmental	**Date:**	*15-Aug-18*
Project:	L2132032	**Work Order:**	1807498
Sample ID:	L2132032-2	**Lab ID:**	1807498-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/18/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/7/2018**		PrepBy: **CXW**
Ra-226	**0.013 (+/- 0.0063)**		**0.0057**	**BQ/l**	NA	8/14/2018 15:25
Carr: BARIUM	*91.2*		*40-110*	*%REC*	DL = NA	8/14/2018 15:25

Client:	ALS Environmental	**Date:**	*15-Aug-18*
Project:	L2132032	**Work Order:**	1807498
Sample ID:	L2132032-2	**Lab ID:**	1807498-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/18/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180807-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.84 (+/- 0.461)	0.0191	1.771		104	67-120					P,M3
Carr: BARIUM	15500		15910		97.6	40-110					

LCSD Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.92 (+/- 0.483)	0.0108	1.771		109	67-120		1.84	0.1	2.1	P,M3
Carr: BARIUM	15500		15900		97.6	40-110		15500			

MB Sample ID: **RE180807-1** Units: **BQ/l** Analysis Date: **8/15/2018 12:24**

Client ID: Run ID: **RE180807-1A** Prep Date: **8/7/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00043 (+/- 0.0029)	0.0057									Y1,U
Carr: BARIUM	16100		15910		101	40-110					Y1

The following samples were analyzed in this batch: 1807498-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2132032-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2 commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2132032

ALS Contact: **Sampler:** CW/JH/KB

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☐
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☑
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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	pH, Turbidity, TSS, TDS	BIM-MMER-DEL	Total Ammonia expressed as nitrogen (N)	Number of Containers
1	MS-06	18-Jul-18	9:35	Water	E0			1
2	MS-06	18-Jul-18	14:10	Water		R	R	6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12.4°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 18-Jul-18	Time: 15:15	Received by:	Date:	Time:	Received by:	Date: Jul 24/18	Time: 11:35

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 26-JUL-18
Report Date: 27-AUG-18 07:14 (MT)
Version: FINAL REV. 2

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2136756

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Comments:

27-AUG-2018 ID revised for sample 2.

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2136756-1 MS-06 Sampled By: DS/TB on 26-JUL-18 @ 11:30 Matrix: WATER							
Physical Tests							
Conductivity	1160		3.0	umhos/cm		30-JUL-18	R4150468
Hardness (as CaCO3)	644		10	mg/L		30-JUL-18	
pH	7.55		0.10	pH units		26-JUL-18	R4143688
Total Suspended Solids	2.0		2.0	mg/L		27-JUL-18	R4144152
Total Dissolved Solids	895		20	mg/L		26-JUL-18	R4144155
Anions and Nutrients							
Acidity (as CaCO3)	2.5		2.0	mg/L		31-JUL-18	R4152371
Alkalinity, Total (as CaCO3)	41		10	mg/L		30-JUL-18	R4148291
Ammonia, Total (as N)	0.042		0.020	mg/L		30-JUL-18	R4148629
Chloride (Cl)	21.5		0.50	mg/L		29-JUL-18	R4150968
Fluoride (F)	0.060		0.020	mg/L		29-JUL-18	R4150968
Nitrate (as N)	6.17		0.020	mg/L		29-JUL-18	R4150968
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	30-JUL-18	31-JUL-18	R4151694
Phosphorus, Total	1.74	DLM	0.030	mg/L	30-JUL-18	31-JUL-18	R4150147
Sulfate (SO4)	572		0.30	mg/L		29-JUL-18	R4150968
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		31-JUL-18	R4151370
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.21		0.50	mg/L		29-JUL-18	R4146127
Total Organic Carbon	1.31		0.50	mg/L		29-JUL-18	R4150148
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Barium (Ba)-Total	0.0162	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Beryllium (Be)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Bismuth (Bi)-Total	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	30-JUL-18	30-JUL-18	R4149728
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Calcium (Ca)-Total	60.6	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Cesium (Cs)-Total	<0.00010	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Cobalt (Co)-Total	0.0037	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Iron (Fe)-Total	0.11	DLHC	0.10	mg/L	30-JUL-18	30-JUL-18	R4149728
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Lithium (Li)-Total	0.022	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Magnesium (Mg)-Total	120	DLHC	0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Manganese (Mn)-Total	1.60	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		30-JUL-18	R4147850
Molybdenum (Mo)-Total	0.00082	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Nickel (Ni)-Total	0.0070	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728

* 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
L2136756-1 MS-06 Sampled By: DS/TB on 26-JUL-18 @ 11:30 Matrix: WATER							
Total Metals							
Phosphorus (P)-Total	<0.50	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Potassium (K)-Total	12.0	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Rubidium (Rb)-Total	0.0105	DLHC	0.0020	mg/L	30-JUL-18	30-JUL-18	R4149728
Selenium (Se)-Total	0.00126	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Silicon (Si)-Total	<1.0	DLHC	1.0	mg/L	30-JUL-18	30-JUL-18	R4149728
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Sodium (Na)-Total	7.69	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Strontium (Sr)-Total	0.087	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Sulfur (S)-Total	207	DLHC	5.0	mg/L	30-JUL-18	30-JUL-18	R4149728
Tellurium (Te)-Total	<0.0020	DLHC	0.0020	mg/L	30-JUL-18	30-JUL-18	R4149728
Thallium (Tl)-Total	<0.00010	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Thorium (Th)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	30-JUL-18	30-JUL-18	R4149728
Tungsten (W)-Total	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Uranium (U)-Total	0.00130	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Vanadium (V)-Total	<0.0050	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	30-JUL-18	30-JUL-18	R4149728
Zirconium (Zr)-Total	<0.0030	DLHC	0.0030	mg/L	30-JUL-18	30-JUL-18	R4149728
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-JUL-18	R4147852
Dissolved Metals Filtration Location	FIELD					30-JUL-18	R4146110
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	30-JUL-18	30-JUL-18	R4148088
Antimony (Sb)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Barium (Ba)-Dissolved	0.0159	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Beryllium (Be)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Bismuth (Bi)-Dissolved	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4148088
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	30-JUL-18	30-JUL-18	R4148088
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	30-JUL-18	30-JUL-18	R4148088
Calcium (Ca)-Dissolved	58.9	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4148088
Cesium (Cs)-Dissolved	<0.00010	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4148088
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4148088
Cobalt (Co)-Dissolved	0.0035	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	30-JUL-18	30-JUL-18	R4148088
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	30-JUL-18	30-JUL-18	R4148088
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4148088
Lithium (Li)-Dissolved	0.019	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4148088
Magnesium (Mg)-Dissolved	121	DLHC	0.050	mg/L	30-JUL-18	30-JUL-18	R4148088
Manganese (Mn)-Dissolved	1.54	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4148088
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	30-JUL-18	30-JUL-18	R4147867

* 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
L2136756-1 MS-06 Sampled By: DS/TB on 26-JUL-18 @ 11:30 Matrix: WATER							
Dissolved Metals							
Molybdenum (Mo)-Dissolved	0.00089	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4148088
Nickel (Ni)-Dissolved	0.0072	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4148088
Phosphorus (P)-Dissolved	<0.50	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4148088
Potassium (K)-Dissolved	12.0	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4148088
Rubidium (Rb)-Dissolved	0.0108	DLHC	0.0020	mg/L	30-JUL-18	30-JUL-18	R4148088
Selenium (Se)-Dissolved	0.00116	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4148088
Silicon (Si)-Dissolved	<0.50	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4148088
Silver (Ag)-Dissolved	<0.00050	DLHC	0.00050	mg/L	30-JUL-18	30-JUL-18	R4148088
Sodium (Na)-Dissolved	7.71	DLHC	0.50	mg/L	30-JUL-18	30-JUL-18	R4148088
Strontium (Sr)-Dissolved	0.084	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4148088
Sulfur (S)-Dissolved	205	DLHC	5.0	mg/L	30-JUL-18	30-JUL-18	R4148088
Tellurium (Te)-Dissolved	<0.0020	DLHC	0.0020	mg/L	30-JUL-18	30-JUL-18	R4148088
Thallium (Tl)-Dissolved	<0.00010	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4148088
Thorium (Th)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Tin (Sn)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Titanium (Ti)-Dissolved	<0.0030	DLHC	0.0030	mg/L	30-JUL-18	30-JUL-18	R4148088
Tungsten (W)-Dissolved	<0.0010	DLHC	0.0010	mg/L	30-JUL-18	30-JUL-18	R4148088
Uranium (U)-Dissolved	0.00114	DLHC	0.00010	mg/L	30-JUL-18	30-JUL-18	R4148088
Vanadium (V)-Dissolved	<0.0050	DLHC	0.0050	mg/L	30-JUL-18	30-JUL-18	R4148088
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	30-JUL-18	30-JUL-18	R4148088
Zirconium (Zr)-Dissolved	<0.0030	DLHC	0.0030	mg/L	30-JUL-18	30-JUL-18	R4148088
Radiological Parameters							
Ra-226	0.0065		0.0058	Bq/L	09-AUG-18	21-AUG-18	R4160854
L2136756-2 MS-08-US Sampled By: DS/TB on 26-JUL-18 @ 14:20 Matrix: WATER							
Physical Tests							
Conductivity	122		3.0	umhos/cm		30-JUL-18	R4150468
Hardness (as CaCO3)	56	HTC	10	mg/L		30-JUL-18	
pH	7.93		0.10	pH units		26-JUL-18	R4143688
Total Suspended Solids	<2.0		2.0	mg/L		27-JUL-18	R4144152
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	49		10	mg/L		30-JUL-18	R4148291
Ammonia, Total (as N)	<0.020		0.020	mg/L		30-JUL-18	R4148629
Chloride (Cl)	3.88		0.50	mg/L		29-JUL-18	R4150968
Fluoride (F)	<0.020		0.020	mg/L		29-JUL-18	R4150968
Nitrate (as N)	0.023		0.020	mg/L		29-JUL-18	R4150968
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	30-JUL-18	31-JUL-18	R4151694
Phosphorus, Total	0.0053		0.0030	mg/L	30-JUL-18	31-JUL-18	R4150147
Sulfate (SO4)	7.52		0.30	mg/L		29-JUL-18	R4150968
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.15		0.50	mg/L		29-JUL-18	R4146127

* 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
L2136756-2 MS-08-US Sampled By: DS/TB on 26-JUL-18 @ 14:20 Matrix: WATER							
Organic / Inorganic Carbon							
Total Organic Carbon	1.21		0.50	mg/L		29-JUL-18	R4150148
Total Metals							
Aluminum (Al)-Total	0.115		0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Arsenic (As)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Barium (Ba)-Total	0.00803		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Boron (B)-Total	<0.010		0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Calcium (Ca)-Total	11.3		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Cesium (Cs)-Total	0.000013		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Copper (Cu)-Total	<0.0010		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Iron (Fe)-Total	0.092		0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Lead (Pb)-Total	0.000093		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Lithium (Li)-Total	<0.0010		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Magnesium (Mg)-Total	6.66		0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Manganese (Mn)-Total	0.00140		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		30-JUL-18	R4147850
Molybdenum (Mo)-Total	0.000204		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Phosphorus (P)-Total	<0.050		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Potassium (K)-Total	0.802		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Rubidium (Rb)-Total	0.00137		0.00020	mg/L	30-JUL-18	30-JUL-18	R4149728
Selenium (Se)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Silicon (Si)-Total	0.85		0.10	mg/L	30-JUL-18	30-JUL-18	R4149728
Silver (Ag)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Sodium (Na)-Total	1.36		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Strontium (Sr)-Total	0.0105		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Sulfur (S)-Total	2.78		0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	30-JUL-18	30-JUL-18	R4149728
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Thorium (Th)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Tin (Sn)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Titanium (Ti)-Total	0.00424		0.00030	mg/L	30-JUL-18	30-JUL-18	R4149728
Tungsten (W)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Uranium (U)-Total	0.00137		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Vanadium (V)-Total	<0.00050		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	30-JUL-18	30-JUL-18	R4149728

* 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
L2136756-2 MS-08-US Sampled By: DS/TB on 26-JUL-18 @ 14:20 Matrix: WATER							
Total Metals							
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	30-JUL-18	30-JUL-18	R4149728
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-JUL-18	R4147852
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	30-JUL-18	30-JUL-18	R4147867
Radiological Parameters							
Ra-226	0.0051		0.0041	Bq/L	09-AUG-18	21-AUG-18	R4160854
L2136756-3 MS-06-DS Sampled By: DS/TB on 26-JUL-18 @ 13:30 Matrix: WATER							
Physical Tests							
Conductivity	127		3.0	umhos/cm		30-JUL-18	R4150468
Hardness (as CaCO3)	58	HTC	10	mg/L		30-JUL-18	
pH	7.95		0.10	pH units		26-JUL-18	R4143688
Total Suspended Solids	<2.0		2.0	mg/L		27-JUL-18	R4144152
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	49		10	mg/L		30-JUL-18	R4148291
Ammonia, Total (as N)	<0.020		0.020	mg/L		30-JUL-18	R4148629
Chloride (Cl)	3.91		0.50	mg/L		29-JUL-18	R4150968
Fluoride (F)	<0.020		0.020	mg/L		29-JUL-18	R4150968
Nitrate (as N)	0.079		0.020	mg/L		29-JUL-18	R4150968
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	30-JUL-18	31-JUL-18	R4151694
Phosphorus, Total	0.0034		0.0030	mg/L	30-JUL-18	31-JUL-18	R4150147
Sulfate (SO4)	8.71		0.30	mg/L		29-JUL-18	R4150968
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.27		0.50	mg/L		29-JUL-18	R4146127
Total Organic Carbon	1.22		0.50	mg/L		29-JUL-18	R4150148
Total Metals							
Aluminum (Al)-Total	0.146		0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Arsenic (As)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Barium (Ba)-Total	0.00817		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Boron (B)-Total	<0.010		0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Calcium (Ca)-Total	11.8		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Cesium (Cs)-Total	0.000014		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Copper (Cu)-Total	<0.0010		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Iron (Fe)-Total	0.147		0.010	mg/L	30-JUL-18	30-JUL-18	R4149728
Lead (Pb)-Total	0.000104		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728

* 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
L2136756-3 MS-06-DS Sampled By: DS/TB on 26-JUL-18 @ 13:30 Matrix: WATER							
Total Metals							
Lithium (Li)-Total	<0.0010		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Magnesium (Mg)-Total	6.88		0.0050	mg/L	30-JUL-18	30-JUL-18	R4149728
Manganese (Mn)-Total	0.00224		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		30-JUL-18	R4147850
Molybdenum (Mo)-Total	0.000373		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Nickel (Ni)-Total	0.00054		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Phosphorus (P)-Total	<0.050		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Potassium (K)-Total	0.883		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Rubidium (Rb)-Total	0.00155		0.00020	mg/L	30-JUL-18	30-JUL-18	R4149728
Selenium (Se)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Silicon (Si)-Total	0.92		0.10	mg/L	30-JUL-18	30-JUL-18	R4149728
Silver (Ag)-Total	<0.000050		0.000050	mg/L	30-JUL-18	30-JUL-18	R4149728
Sodium (Na)-Total	1.64		0.050	mg/L	30-JUL-18	30-JUL-18	R4149728
Strontium (Sr)-Total	0.0114		0.0010	mg/L	30-JUL-18	30-JUL-18	R4149728
Sulfur (S)-Total	3.19		0.50	mg/L	30-JUL-18	30-JUL-18	R4149728
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	30-JUL-18	30-JUL-18	R4149728
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Thorium (Th)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Tin (Sn)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Titanium (Ti)-Total	0.00594		0.00030	mg/L	30-JUL-18	30-JUL-18	R4149728
Tungsten (W)-Total	<0.00010		0.00010	mg/L	30-JUL-18	30-JUL-18	R4149728
Uranium (U)-Total	0.00139		0.000010	mg/L	30-JUL-18	30-JUL-18	R4149728
Vanadium (V)-Total	<0.00050		0.00050	mg/L	30-JUL-18	30-JUL-18	R4149728
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	30-JUL-18	30-JUL-18	R4149728
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	30-JUL-18	30-JUL-18	R4149728
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-JUL-18	R4147852
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	30-JUL-18	30-JUL-18	R4147867
Radiological Parameters							
Ra-226	<0.0075		0.0075	Bq/L	09-AUG-18	21-AUG-18	R4160854

* 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	Barium (Ba)-Dissolved	MS-B	L2136756-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2136756-1
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2136756-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2136756-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2136756-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2136756-1
Matrix Spike	Rubidium (Rb)-Dissolved	MS-B	L2136756-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2136756-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2136756-1
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L2136756-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2136756-1
Matrix Spike	Aluminum (Al)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Iron (Fe)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Sulfur (S)-Total	MS-B	L2136756-1, -2, -3
Matrix Spike	Uranium (U)-Total	MS-B	L2136756-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

Reference Information

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

Reference Information

TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2136756 Report Date: 27-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4152371								
WG2837497-3 DUP		**L2136756-1**						
Acidity (as CaCO3)		2.5	2.2		mg/L	13	20	31-JUL-18
WG2837497-2 LCS								
Acidity (as CaCO3)			99.0		%		85-115	31-JUL-18
WG2837497-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	31-JUL-18
ALK-WT	**Water**							
Batch R4148291								
WG2836077-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			88.8		%		80-120	30-JUL-18
WG2836077-4 DUP		**L2135767-1**						
Alkalinity, Total (as CaCO3)		177	175		mg/L	1.1	20	30-JUL-18
WG2836077-2 LCS								
Alkalinity, Total (as CaCO3)			100.4		%		85-115	30-JUL-18
WG2836077-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	30-JUL-18
C-DIS-ORG-WT	**Water**							
Batch R4146127								
WG2835791-3 DUP		**L2136756-1**						
Dissolved Organic Carbon		1.21	1.04		mg/L	15	20	29-JUL-18
WG2835791-2 LCS								
Dissolved Organic Carbon			99.7		%		80-120	29-JUL-18
WG2835791-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-JUL-18
WG2835791-4 MS		**L2136756-1**						
Dissolved Organic Carbon			98.6		%		70-130	29-JUL-18
CL-IC-N-WT	**Water**							
Batch R4150968								
WG2835790-19 DUP		**WG2835790-18**						
Chloride (Cl)		3.92	3.93		mg/L	0.3	20	29-JUL-18
WG2835790-17 LCS								
Chloride (Cl)			99.7		%		90-110	29-JUL-18
WG2835790-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	29-JUL-18
WG2835790-20 MS		**WG2835790-18**						
Chloride (Cl)			101.5		%		75-125	29-JUL-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4151370								
WG2837175-3 DUP		**L2134948-2**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	31-JUL-18
WG2837175-5 DUP		**L2137553-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	31-JUL-18
WG2837175-2 LCS								
Cyanide, Total			86.4		%		80-120	31-JUL-18
WG2837175-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	31-JUL-18
WG2837175-4 MS		**L2134948-2**						
Cyanide, Total			79.2		%		70-130	31-JUL-18
WG2837175-6 MS		**L2137553-1**						
Cyanide, Total			82.9		%		70-130	31-JUL-18
EC-WT	**Water**							
Batch R4150468								
WG2836507-4 DUP		**WG2836507-3**						
Conductivity		1800	1800		umhos/cm	0.0	10	30-JUL-18
WG2836507-2 LCS								
Conductivity			100.0		%		90-110	30-JUL-18
WG2836507-1 MB								
Conductivity			<3.0		umhos/cm		3	30-JUL-18
F-IC-N-WT	**Water**							
Batch R4150968								
WG2835790-19 DUP		**WG2835790-18**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	29-JUL-18
WG2835790-17 LCS								
Fluoride (F)			102.0		%		90-110	29-JUL-18
WG2835790-16 MB								
Fluoride (F)			<0.020		mg/L		0.02	29-JUL-18
WG2835790-20 MS		**WG2835790-18**						
Fluoride (F)			104.1		%		75-125	29-JUL-18
HG-D-CVAA-WT	**Water**							
Batch R4147867								
WG2836335-3 DUP		**L2136756-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	30-JUL-18
WG2836335-2 LCS								
Mercury (Hg)-Dissolved			99.9		%		80-120	30-JUL-18
WG2836335-1 MB								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	**Water**							
Batch R4147867								
WG2836335-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	30-JUL-18
WG2836335-4 MS		**L2136756-2**						
Mercury (Hg)-Dissolved			96.0		%		70-130	30-JUL-18
HG-T-CVAA-WT	**Water**							
Batch R4147850								
WG2836329-3 DUP		**L2136756-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	30-JUL-18
WG2836329-2 LCS								
Mercury (Hg)-Total			104.0		%		80-120	30-JUL-18
WG2836329-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	30-JUL-18
WG2836329-4 MS		**L2136756-2**						
Mercury (Hg)-Total			95.5		%		70-130	30-JUL-18
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-4 DUP		**WG2835807-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-JUL-18
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Barium (Ba)-Dissolved		0.0159	0.0161		mg/L	1.3	20	30-JUL-18
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-JUL-18
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	30-JUL-18
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-JUL-18
Calcium (Ca)-Dissolved		58.9	58.4		mg/L	0.8	20	30-JUL-18
Cesium (Cs)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-JUL-18
Cobalt (Co)-Dissolved		0.0035	0.0035		mg/L	0.3	20	30-JUL-18
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	30-JUL-18
Iron (Fe)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	30-JUL-18
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-JUL-18
Lithium (Li)-Dissolved		0.019	0.018		mg/L	6.4	20	30-JUL-18
Magnesium (Mg)-Dissolved		121	123		mg/L	1.9	20	30-JUL-18
Manganese (Mn)-Dissolved		1.54	1.55		mg/L	0.5	20	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-4 DUP		**WG2835807-3**						
Molybdenum (Mo)-Dissolved		0.00089	0.00094		mg/L	5.7	20	30-JUL-18
Nickel (Ni)-Dissolved		0.0072	0.0069		mg/L	4.2	20	30-JUL-18
Phosphorus (P)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-JUL-18
Potassium (K)-Dissolved		12.0	12.1		mg/L	0.8	20	30-JUL-18
Rubidium (Rb)-Dissolved		0.0108	0.0103		mg/L	4.5	20	30-JUL-18
Selenium (Se)-Dissolved		0.00116	0.00124		mg/L	7.0	20	30-JUL-18
Silicon (Si)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-JUL-18
Silver (Ag)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-JUL-18
Sodium (Na)-Dissolved		7.71	7.68		mg/L	0.4	20	30-JUL-18
Strontium (Sr)-Dissolved		0.084	0.083		mg/L	1.0	20	30-JUL-18
Sulfur (S)-Dissolved		205	205		mg/L	0.3	20	30-JUL-18
Tellurium (Te)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	30-JUL-18
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Thorium (Th)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Tin (Sn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Titanium (Ti)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	30-JUL-18
Tungsten (W)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Uranium (U)-Dissolved		0.00114	0.00114		mg/L	0.1	20	30-JUL-18
Vanadium (V)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-JUL-18
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-JUL-18
Zirconium (Zr)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	30-JUL-18
WG2835807-2 LCS								
Aluminum (Al)-Dissolved			107.2		%		80-120	30-JUL-18
Antimony (Sb)-Dissolved			98.9		%		80-120	30-JUL-18
Arsenic (As)-Dissolved			103.8		%		80-120	30-JUL-18
Barium (Ba)-Dissolved			104.6		%		80-120	30-JUL-18
Beryllium (Be)-Dissolved			101.1		%		80-120	30-JUL-18
Bismuth (Bi)-Dissolved			98.9		%		80-120	30-JUL-18
Boron (B)-Dissolved			97.0		%		80-120	30-JUL-18
Cadmium (Cd)-Dissolved			99.7		%		80-120	30-JUL-18
Calcium (Ca)-Dissolved			101.6		%		80-120	30-JUL-18
Cesium (Cs)-Dissolved			100.9		%		80-120	30-JUL-18
Chromium (Cr)-Dissolved			99.8		%		80-120	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-2 LCS								
Cobalt (Co)-Dissolved			100.9		%		80-120	30-JUL-18
Copper (Cu)-Dissolved			101.5		%		80-120	30-JUL-18
Iron (Fe)-Dissolved			102.1		%		80-120	30-JUL-18
Lead (Pb)-Dissolved			101.3		%		80-120	30-JUL-18
Lithium (Li)-Dissolved			101.2		%		80-120	30-JUL-18
Magnesium (Mg)-Dissolved			101.6		%		80-120	30-JUL-18
Manganese (Mn)-Dissolved			103.8		%		80-120	30-JUL-18
Molybdenum (Mo)-Dissolved			100.2		%		80-120	30-JUL-18
Nickel (Ni)-Dissolved			101.7		%		80-120	30-JUL-18
Phosphorus (P)-Dissolved			108.6		%		80-120	30-JUL-18
Potassium (K)-Dissolved			106.8		%		80-120	30-JUL-18
Rubidium (Rb)-Dissolved			106.5		%		80-120	30-JUL-18
Selenium (Se)-Dissolved			98.2		%		80-120	30-JUL-18
Silicon (Si)-Dissolved			105.5		%		60-140	30-JUL-18
Silver (Ag)-Dissolved			104.0		%		80-120	30-JUL-18
Sodium (Na)-Dissolved			101.8		%		80-120	30-JUL-18
Strontium (Sr)-Dissolved			100.4		%		80-120	30-JUL-18
Sulfur (S)-Dissolved			104.2		%		80-120	30-JUL-18
Tellurium (Te)-Dissolved			99.6		%		80-120	30-JUL-18
Thallium (Tl)-Dissolved			101.8		%		80-120	30-JUL-18
Thorium (Th)-Dissolved			101.4		%		80-120	30-JUL-18
Tin (Sn)-Dissolved			99.8		%		80-120	30-JUL-18
Titanium (Ti)-Dissolved			103.6		%		80-120	30-JUL-18
Tungsten (W)-Dissolved			100.3		%		80-120	30-JUL-18
Uranium (U)-Dissolved			102.3		%		80-120	30-JUL-18
Vanadium (V)-Dissolved			105.1		%		80-120	30-JUL-18
Zinc (Zn)-Dissolved			97.7		%		80-120	30-JUL-18
Zirconium (Zr)-Dissolved			100.2		%		80-120	30-JUL-18
WG2835807-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	30-JUL-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-1 MB								
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	30-JUL-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	30-JUL-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	30-JUL-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	30-JUL-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	30-JUL-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	30-JUL-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	30-JUL-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	30-JUL-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	30-JUL-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	30-JUL-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	30-JUL-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	30-JUL-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	30-JUL-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	30-JUL-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	30-JUL-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	30-JUL-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	30-JUL-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	30-JUL-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	30-JUL-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	30-JUL-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	30-JUL-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	30-JUL-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	30-JUL-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	30-JUL-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	30-JUL-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	30-JUL-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	30-JUL-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	30-JUL-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	30-JUL-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-1 MB								
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	30-JUL-18
WG2835807-5 MS		**WG2835807-3**						
Aluminum (Al)-Dissolved			95.1		%		70-130	30-JUL-18
Antimony (Sb)-Dissolved			93.0		%		70-130	30-JUL-18
Arsenic (As)-Dissolved			99.5		%		70-130	30-JUL-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Beryllium (Be)-Dissolved			95.9		%		70-130	30-JUL-18
Bismuth (Bi)-Dissolved			95.7		%		70-130	30-JUL-18
Cadmium (Cd)-Dissolved			98.7		%		70-130	30-JUL-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Cesium (Cs)-Dissolved			95.2		%		70-130	30-JUL-18
Chromium (Cr)-Dissolved			96.4		%		70-130	30-JUL-18
Cobalt (Co)-Dissolved			71.2		%		70-130	30-JUL-18
Copper (Cu)-Dissolved			93.8		%		70-130	30-JUL-18
Iron (Fe)-Dissolved			85.8		%		70-130	30-JUL-18
Lead (Pb)-Dissolved			96.1		%		70-130	30-JUL-18
Lithium (Li)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Molybdenum (Mo)-Dissolved			88.4		%		70-130	30-JUL-18
Phosphorus (P)-Dissolved			105.0		%		70-130	30-JUL-18
Potassium (K)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Rubidium (Rb)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Selenium (Se)-Dissolved			93.7		%		70-130	30-JUL-18
Silicon (Si)-Dissolved			76.7		%		70-130	30-JUL-18
Silver (Ag)-Dissolved			97.5		%		70-130	30-JUL-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Sulfur (S)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Tellurium (Te)-Dissolved			92.8		%		70-130	30-JUL-18
Thallium (Tl)-Dissolved			96.6		%		70-130	30-JUL-18
Thorium (Th)-Dissolved			97.5		%		70-130	30-JUL-18
Tin (Sn)-Dissolved			96.8		%		70-130	30-JUL-18
Titanium (Ti)-Dissolved			95.5		%		70-130	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4148088								
WG2835807-5 MS		**WG2835807-3**						
Tungsten (W)-Dissolved			98.0		%		70-130	30-JUL-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	30-JUL-18
Vanadium (V)-Dissolved			100.5		%		70-130	30-JUL-18
Zinc (Zn)-Dissolved			82.8		%		70-130	30-JUL-18
Zirconium (Zr)-Dissolved			93.5		%		70-130	30-JUL-18
MET-T-CCMS-WT	**Water**							
Batch R4149728								
WG2835812-4 DUP		**WG2835812-3**						
Aluminum (Al)-Total		0.146	0.144		mg/L	1.7	20	30-JUL-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Barium (Ba)-Total		0.00817	0.00840		mg/L	2.7	20	30-JUL-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-JUL-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-JUL-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	30-JUL-18
Calcium (Ca)-Total		11.8	11.8		mg/L	0.2	20	30-JUL-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-JUL-18
Cesium (Cs)-Total		0.000014	0.000016		mg/L	11	20	30-JUL-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Iron (Fe)-Total		0.147	0.140		mg/L	4.7	20	30-JUL-18
Lead (Pb)-Total		0.000104	0.000100		mg/L	4.0	20	30-JUL-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-JUL-18
Magnesium (Mg)-Total		6.88	6.96		mg/L	1.2	20	30-JUL-18
Manganese (Mn)-Total		0.00224	0.00221		mg/L	1.1	20	30-JUL-18
Molybdenum (Mo)-Total		0.000373	0.000357		mg/L	4.2	20	30-JUL-18
Nickel (Ni)-Total		0.00054	0.00051		mg/L	4.9	20	30-JUL-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-JUL-18
Potassium (K)-Total		0.883	0.886		mg/L	0.4	20	30-JUL-18
Rubidium (Rb)-Total		0.00155	0.00151		mg/L	2.3	20	30-JUL-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-JUL-18
Silicon (Si)-Total		0.92	0.92		mg/L	0.3	20	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4149728								
WG2835812-4 DUP		**WG2835812-3**						
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-JUL-18
Sodium (Na)-Total		1.64	1.71		mg/L	4.5	20	30-JUL-18
Strontium (Sr)-Total		0.0114	0.0113		mg/L	0.6	20	30-JUL-18
Sulfur (S)-Total		3.19	3.18		mg/L	0.6	25	30-JUL-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	30-JUL-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	30-JUL-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	30-JUL-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Titanium (Ti)-Total		0.00594	0.00550		mg/L	7.7	20	30-JUL-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-JUL-18
Uranium (U)-Total		0.00139	0.00140		mg/L	0.7	20	30-JUL-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-JUL-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	30-JUL-18
Zirconium (Zr)-Total		<0.00030	0.00045	RPD-NA	mg/L	N/A	20	30-JUL-18
WG2835812-2 LCS								
Aluminum (Al)-Total			108.2		%		80-120	30-JUL-18
Antimony (Sb)-Total			104.1		%		80-120	30-JUL-18
Arsenic (As)-Total			104.5		%		80-120	30-JUL-18
Barium (Ba)-Total			105.3		%		80-120	30-JUL-18
Beryllium (Be)-Total			106.2		%		80-120	30-JUL-18
Bismuth (Bi)-Total			101.2		%		80-120	30-JUL-18
Boron (B)-Total			101.4		%		80-120	30-JUL-18
Cadmium (Cd)-Total			101.5		%		80-120	30-JUL-18
Calcium (Ca)-Total			104.7		%		80-120	30-JUL-18
Chromium (Cr)-Total			102.0		%		80-120	30-JUL-18
Cesium (Cs)-Total			100.7		%		80-120	30-JUL-18
Cobalt (Co)-Total			103.0		%		80-120	30-JUL-18
Copper (Cu)-Total			102.6		%		80-120	30-JUL-18
Iron (Fe)-Total			100.9		%		80-120	30-JUL-18
Lead (Pb)-Total			102.9		%		80-120	30-JUL-18
Lithium (Li)-Total			108.6		%		80-120	30-JUL-18
Magnesium (Mg)-Total			103.9		%		80-120	30-JUL-18
Manganese (Mn)-Total			105.2		%		80-120	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4149728								
WG2835812-2 LCS								
Molybdenum (Mo)-Total			102.4		%		80-120	30-JUL-18
Nickel (Ni)-Total			103.1		%		80-120	30-JUL-18
Phosphorus (P)-Total			104.9		%		70-130	30-JUL-18
Potassium (K)-Total			109.2		%		80-120	30-JUL-18
Rubidium (Rb)-Total			107.3		%		80-120	30-JUL-18
Selenium (Se)-Total			100.2		%		80-120	30-JUL-18
Silicon (Si)-Total			107.4		%		60-140	30-JUL-18
Silver (Ag)-Total			103.6		%		80-120	30-JUL-18
Sodium (Na)-Total			105.6		%		80-120	30-JUL-18
Strontium (Sr)-Total			102.6		%		80-120	30-JUL-18
Sulfur (S)-Total			108.5		%		80-120	30-JUL-18
Thallium (Tl)-Total			100.5		%		80-120	30-JUL-18
Tellurium (Te)-Total			101.7		%		80-120	30-JUL-18
Thorium (Th)-Total			104.2		%		70-130	30-JUL-18
Tin (Sn)-Total			102.1		%		80-120	30-JUL-18
Titanium (Ti)-Total			104.2		%		80-120	30-JUL-18
Tungsten (W)-Total			103.0		%		80-120	30-JUL-18
Uranium (U)-Total			102.8		%		80-120	30-JUL-18
Vanadium (V)-Total			105.7		%		80-120	30-JUL-18
Zinc (Zn)-Total			99.3		%		80-120	30-JUL-18
Zirconium (Zr)-Total			100.2		%		80-120	30-JUL-18
WG2835812-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	30-JUL-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	30-JUL-18
Boron (B)-Total			<0.010		mg/L		0.01	30-JUL-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	30-JUL-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	30-JUL-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	30-JUL-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	30-JUL-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4149728								
WG2835812-1 MB								
Copper (Cu)-Total			<0.0010		mg/L		0.001	30-JUL-18
Iron (Fe)-Total			<0.010		mg/L		0.01	30-JUL-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	30-JUL-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	30-JUL-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	30-JUL-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	30-JUL-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	30-JUL-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	30-JUL-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	30-JUL-18
Potassium (K)-Total			<0.050		mg/L		0.05	30-JUL-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	30-JUL-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	30-JUL-18
Silicon (Si)-Total			<0.10		mg/L		0.1	30-JUL-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	30-JUL-18
Sodium (Na)-Total			<0.050		mg/L		0.05	30-JUL-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	30-JUL-18
Sulfur (S)-Total			<0.50		mg/L		0.5	30-JUL-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	30-JUL-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	30-JUL-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	30-JUL-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	30-JUL-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	30-JUL-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	30-JUL-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-JUL-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	30-JUL-18
WG2835812-5 MS		**WG2835812-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	30-JUL-18
Antimony (Sb)-Total			100.7		%		70-130	30-JUL-18
Arsenic (As)-Total			104.2		%		70-130	30-JUL-18
Barium (Ba)-Total			99.7		%		70-130	30-JUL-18
Beryllium (Be)-Total			101.5		%		70-130	30-JUL-18
Bismuth (Bi)-Total			101.0		%		70-130	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4149728								
WG2835812-5 MS		**WG2835812-3**						
Boron (B)-Total			98.7		%		70-130	30-JUL-18
Cadmium (Cd)-Total			105.6		%		70-130	30-JUL-18
Calcium (Ca)-Total			N/A	MS-B	%		-	30-JUL-18
Chromium (Cr)-Total			103.1		%		70-130	30-JUL-18
Cesium (Cs)-Total			98.6		%		70-130	30-JUL-18
Cobalt (Co)-Total			100.8		%		70-130	30-JUL-18
Copper (Cu)-Total			99.7		%		70-130	30-JUL-18
Iron (Fe)-Total			N/A	MS-B	%		-	30-JUL-18
Lead (Pb)-Total			104.3		%		70-130	30-JUL-18
Lithium (Li)-Total			102.2		%		70-130	30-JUL-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	30-JUL-18
Manganese (Mn)-Total			102.5		%		70-130	30-JUL-18
Molybdenum (Mo)-Total			102.4		%		70-130	30-JUL-18
Nickel (Ni)-Total			101.0		%		70-130	30-JUL-18
Phosphorus (P)-Total			101.8		%		70-130	30-JUL-18
Potassium (K)-Total			103.1		%		70-130	30-JUL-18
Rubidium (Rb)-Total			103.1		%		70-130	30-JUL-18
Selenium (Se)-Total			101.0		%		70-130	30-JUL-18
Silicon (Si)-Total			N/A	MS-B	%		-	30-JUL-18
Silver (Ag)-Total			102.5		%		70-130	30-JUL-18
Sodium (Na)-Total			97.8		%		70-130	30-JUL-18
Strontium (Sr)-Total			94.3		%		70-130	30-JUL-18
Sulfur (S)-Total			N/A	MS-B	%		-	30-JUL-18
Thallium (Tl)-Total			102.2		%		70-130	30-JUL-18
Tellurium (Te)-Total			100.4		%		70-130	30-JUL-18
Thorium (Th)-Total			105.6		%		70-130	30-JUL-18
Tin (Sn)-Total			101.0		%		70-130	30-JUL-18
Titanium (Ti)-Total			99.2		%		70-130	30-JUL-18
Tungsten (W)-Total			104.3		%		70-130	30-JUL-18
Uranium (U)-Total			N/A	MS-B	%		-	30-JUL-18
Vanadium (V)-Total			104.0		%		70-130	30-JUL-18
Zinc (Zn)-Total			99.4		%		70-130	30-JUL-18
Zirconium (Zr)-Total			101.0		%		70-130	30-JUL-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R4148629								
WG2836549-3 DUP		**L2136756-1**						
Ammonia, Total (as N)		0.042	0.041		mg/L	0.9	20	30-JUL-18
WG2836549-2 LCS								
Ammonia, Total (as N)			98.7		%		85-115	30-JUL-18
WG2836549-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	30-JUL-18
WG2836549-4 MS		**L2136756-1**						
Ammonia, Total (as N)			95.4		%		75-125	30-JUL-18
NO3-IC-WT	**Water**							
Batch R4150968								
WG2835790-19 DUP		**WG2835790-18**						
Nitrate (as N)		0.078	0.079		mg/L	0.4	25	29-JUL-18
WG2835790-17 LCS								
Nitrate (as N)			99.2		%		70-130	29-JUL-18
WG2835790-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	29-JUL-18
WG2835790-20 MS		**WG2835790-18**						
Nitrate (as N)			101.4		%		70-130	29-JUL-18
P-T-COL-WT	**Water**							
Batch R4150147								
WG2836766-3 DUP		**L2137148-9**						
Phosphorus, Total		0.0204	0.0198		mg/L	3.2	20	31-JUL-18
WG2836766-2 LCS								
Phosphorus, Total			89.2		%		80-120	31-JUL-18
WG2836766-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	31-JUL-18
WG2836766-4 MS		**L2137148-9**						
Phosphorus, Total			93.7		%		70-130	31-JUL-18
PH-BF	**Water**							
Batch R4143688								
WG2833736-2 DUP		**L2136697-1**						
pH		7.64	7.69	J	pH units	0.05	0.2	26-JUL-18
WG2833736-1 LCS								
pH			6.94		pH units		6.9-7.1	26-JUL-18
SO4-IC-N-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	**Water**							
Batch R4150968								
WG2835790-19 DUP		**WG2835790-18**						
Sulfate (SO4)		8.69	8.68		mg/L	0.2	20	29-JUL-18
WG2835790-17 LCS								
Sulfate (SO4)			100.4		%		90-110	29-JUL-18
WG2835790-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	29-JUL-18
WG2835790-20 MS		**WG2835790-18**						
Sulfate (SO4)			106.0		%		75-125	29-JUL-18
SOLIDS-TDS-BF	**Water**							
Batch R4144155								
WG2833762-3 DUP		**L2136697-1**						
Total Dissolved Solids		895	885		mg/L	1.1	20	26-JUL-18
WG2833762-2 LCS								
Total Dissolved Solids			98.2		%		85-115	26-JUL-18
WG2833762-1 MB								
Total Dissolved Solids			<20		mg/L		20	26-JUL-18
SOLIDS-TSS-BF	**Water**							
Batch R4144152								
WG2833748-3 DUP		**L2136756-1**						
Total Suspended Solids		2.0	2.4		mg/L	18	25	27-JUL-18
WG2833748-2 LCS								
Total Suspended Solids			101.0		%		85-115	27-JUL-18
WG2833748-1 MB								
Total Suspended Solids			<2.0		mg/L		2	27-JUL-18
TKN-WT	**Water**							
Batch R4151694								
WG2836306-3 DUP		**L2136756-1**						
Total Kjeldahl Nitrogen		<0.15	0.29	RPD-NA	mg/L	N/A	20	31-JUL-18
WG2836306-2 LCS								
Total Kjeldahl Nitrogen			93.3		%		75-125	31-JUL-18
WG2836306-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	31-JUL-18
WG2836306-4 MS		**L2136756-1**						
Total Kjeldahl Nitrogen			100.6		%		70-130	31-JUL-18
TOC-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	**Water**							
Batch R4150148								
WG2835792-3 DUP		**L2136756-1**						
Total Organic Carbon		1.31	1.29		mg/L	2.0	20	29-JUL-18
WG2835792-2 LCS								
Total Organic Carbon			102.1		%		80-120	29-JUL-18
WG2835792-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	29-JUL-18
WG2835792-4 MS		**L2136756-1**						
Total Organic Carbon			96.5		%		70-130	29-JUL-18

Quality Control Report

Workorder: L2136756 Report Date: 27-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 22, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1807608
Project Name:
Project Number: L2136756

Dear Mr. Hawthorne:

Three water samples were received from ALS Environmental, on 7/31/2018. The samples were scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1807608

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1807608
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2136756
Client PO Number: L2136756

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2136756-1	1807608-1		WATER	26-Jul-18	
L2136756-2	1807608-2		WATER	26-Jul-18	
L2136756-3	1807608-3		WATER	26-Jul-18	

ALS Environmental

L2136756

WATERLOO

1807608

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2136756*
ALS requires QC data to be provided with your final results.

4x 1L HDPE (w nitric).

Please see enclosed 3 sample(s) in 4 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1	**L2136756-1 MS-06**		7/ 26/ 2018	E
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/17/2018	
2	**L2136756-2 MS-06-US**		7/ 26/ 2018	E
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/17/2018	
3	**L2136756-3 MS-06-DS**		7/ 26/ 2018	E
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/17/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 7/31/18 12:50

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1807608

Project Manager: KMD Initials: JG Date: 7-31-18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
2.	Are custody seals on **shipping** containers intact?	NONE	(YES)	NO
3.	Are custody seals on **sample** containers intact?	(NONE)	YES	NO
4.	Is there a COC (chain-of-custody) present?		(YES)	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		(YES)	NO
6.	Are short-hold samples present?		(YES)	NO
7.	Are all samples within holding times for the requested analyses?		(YES)	NO
8.	Were all sample containers received intact? (not broken or leaking)		(YES)	NO
9.	Is there sufficient sample for the requested analyses?		(YES)	NO
10.	Are all samples in the proper containers for the requested analyses?		(YES)	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	(YES)	NO
12.	Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	(N/A)	YES	NO
14.	Were the samples shipped on ice?		(YES)	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#1) #3 #4	(RAD ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	11.4							
No. of custody seals on cooler:	4							
DOT Survey/ Acceptance Information — External µR/hr reading:	11							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/1/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1807603

EXPRESS WORLDWIDE **WPX** DHL

2018-07-30 MYDHL+ 1.0 / *30-0621*

From : ALS Environmental
Ed Hill
60 Northland Rd.
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To : **ALS Environmental Fort Collins**
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

11-4

80524 FORT COLLINS CO
United States of America

11.4

US-DEN-DEN

C [redacted] Day Time

Ref:

Pce/Shpt Weight
16.6 lbs

Piece
1/1

Contents: Water Samples

WAYBILL 47 3424 7862

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136756	**Work Order:**	1807608
Sample ID:	L2136756-1	**Lab ID:**	1807608-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/9/2018**		PrepBy: **CXW**
Ra-226	0.0065 (+/- 0.0048)	LT	0.0058	BQ/l	NA	8/21/2018 12:03
Carr: BARIUM	*95.6*		*40-110*	*%REC*	DL = NA	8/21/2018 12:03

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136756	**Work Order:**	1807608
Sample ID:	L2136756-2	**Lab ID:**	1807608-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/9/2018**		PrepBy: **CXW**
Ra-226	0.0051 (+/- 0.0039)	LT	0.0041	BQ/l	NA	8/21/2018 12:03
Carr: BARIUM	*96.8*		*40-110*	*%REC*	DL = NA	8/21/2018 12:03

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136756	**Work Order:**	1807608
Sample ID:	L2136756-3	**Lab ID:**	1807608-3
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/9/2018**		PrepBy: **CXW**
Ra-226	0.0021 (+/- 0.0043)	U	0.0075	BQ/l	NA	8/21/2018 12:03
Carr: BARIUM	*88.4*		*40-110*	*%REC*	DL = NA	8/21/2018 12:03

Client:	ALS Environmental	**Date:**	*22-Aug-18*
Project:	L2136756	**Work Order:**	1807608
Sample ID:	L2136756-3	**Lab ID:**	1807608-3
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180809-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

DUP Sample ID: **1807608-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:03**

Client ID: **L2136756-1** Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0050 (+/- 0.0052)	0.0079						0.0065	0.2	2.1	U
Carr: BARIUM	14600		16040		91.2	40-110		15300			

LCS Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.67 (+/- 0.415)	0.00848	1.771		94.5	67-120					P
Carr: BARIUM	15100		16030		94.1	40-110					

MB Sample ID: **RE180809-1** Units: **BQ/l** Analysis Date: **8/21/2018 12:34**

Client ID: Run ID: **RE180809-1A** Prep Date: **8/9/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00046 (+/- 0.0035)	0.0069									U
Carr: BARIUM	15500		16030		96.7	40-110					

The following samples were analyzed in this batch: 1807608-1 1807608-2 1807608-3

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 236778
Sample Number : 55725

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	DS/TB
Location :	Waterloo ON	Time Collected :	13:30
Job Number :	L2136756-1	Date Collected :	2018-07-26
Substance :	L2136756-1 MS-06	Date Received :	2018-07-30
Sampling Method :	Grab	Date Tested :	2018-07-30
Sample Description :	Clear, colourless, odourless, some fine settled solids.	Temp. on arrival :	8.0 °C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.0 g/L
Date Tested :	2018-07-23	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	6.3 g/L	Organism Batch :	Dm18-14
95% Confidence Limits :	5.8 - 6.8 g/L	Analyst(s) :	MDS
Statistical Method :	Binomial		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	9.2 days	Mean Young Per Brood :	30.4
Culture Mortality :	2.2% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-14	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2018-08-04
yyyy-mm-dd

Approved by: *Project Manager*

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 236778
Sample Number: 55725

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	640	None	7.8	10.0	1178	21.0	118	0:30

0 hours

Date & Time 2018-07-30 11:00
Technician: AW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.9	9.1	1178	21.0	106	640
100B	0	0	7.9	9.1	1178	21.0	106	640
100C	0	0	7.9	9.1	1178	21.0	106	640
Control A	0	0	8.5	8.5	778	21.0	100	230
Control B	0	0	8.5	8.5	778	21.0	100	230
Control C	0	0	8.5	8.5	778	21.0	100	230

Notes:

24 hours

Date & Time 2018-07-31 11:00
Technician: TZL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	20.0
100B	–	0	–	–	–	20.0
100C	–	0	–	–	–	20.0
Control A	–	0	–	–	–	20.0
Control B	–	0	–	–	–	20.0
Control C	–	0	–	–	–	20.0

Notes:

48 hours

Date & Time 2018-08-01 11:00
Technician: AW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	7.9	8.4	1189	21.0
100B	0	0	7.9	8.3	1188	21.0
100C	0	0	7.8	8.3	1192	21.0
Control A	0	0	8.5	8.5	790	21.0
Control B	0	0	8.5	8.3	787	21.0
Control C	0	0	8.5	8.4	789	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-14

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: [signature]
Date: 2018-08-04

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 236778
Sample Number : 55725

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	DS/TB
Location :	Waterloo ON	Time Collected :	13:30
Job Number :	L2136756-1	Date Collected :	2018-07-26
Substance :	L2136756-1 MS-06	Date Received :	2018-07-30
Sampling Method :	Grab	Date Tested :	2018-07-30
Sample Description :	Clear, colourless, odourless, some fine settled solids.	Temp. on arrival :	8.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-18	Date Tested :	2018-07-24
LC50 :	3277 mg/L	Historical Mean LC50 :	3622 mg/L
95% Confidence Limits :	2734 - 3616 mg/L	Warning Limits (± 2SD) :	2978 - 4405 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	TA, FS, MV

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0.1 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.43 ± 0.28 g	Mean Fish Fork Length (± 2 SD) :	35.2 ± 5.8 mm
Range of Weights :	0.27 - 0.67 g	Range of Fork Lengths (mm) :	32 - 40 mm
Fish Loading Rate :	0.2 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	18
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-08-04
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 236778
Sample Number: 55725

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
2:00	**Initial Water Chemistry:**	7.5	10.7	1190	14.0	–
	Chemistry after 30min air:	7.4	10.4	1183	14.0	107

0 hours

Date & Time 2018-07-30 14:55
Technician: MV(AW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.4	10.2	1175	15.5	103
Control	0	0	8.1	9.5	891	14.5	100

Notes:

24 hours

Date & Time 2018-07-31 14:55
Technician: TA(AW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	9.5	–	14.0
Control	0	0	–	–	–	14.0

Notes:

48 hours

Date & Time 2018-08-01 14:55
Technician: TA(AW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	9.4	–	14.5
Control	0	0	–	–	–	14.5

Notes:

72 hours

Date & Time 2018-08-02 14:55
Technician: MV(AW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	9.5	–	14.5
Control	0	0				14.5

Notes:

96 hours

Date & Time 2018-08-03 14:55
Technician: MV(AW)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.2	9.6	1191	14.5
Control	0	0	8.0	9.5	850	14.5

Notes:

Control organisms showing stress: 0
Organism Batch : T18-18

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JC
Date: 2018-08-04

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No.: 236778

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	DS/TB
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	Rick H /ALS
Date/Time Shipped:	30-Jul-18

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name (L2136756-1)	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	Daphnia magna Single Concentration	Daphnia magna LC50	Fathead Minnow Survival & Growth	Ceriodaphnia dubia Survival & Reproduction	Lemna minor Growth	Pseudokirchneriella subcapitata Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-07-26	1330	MS-06	55725	8.0	X		X									R1

For Lab Use Only	
Received By:	TZ
Date:	2018-07-30
Time:	0850
Storage Location:	
Storage Temp.(°C)	

Please list any special requests or instructions:

Regular Rainbow Trout Toxicity Tests

Rush Rainbow Trout.

Daily Updates please.

Daily Parameter (pH/DO) please.

X GRAB AS PER LABEL (TZ)

Results to bimcrea@alsglobal.com
rekhawthorne@alsglobal.com
wayne.smith@alsglobal.com

L2136756

WATERLOO

ALS Environmental

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L2136756*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2136756-1 MS-06		7/ 26/ 2018	E
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	8/2/2018	
	Special Request Aquatox (SPECIAL REQUEST-AQT 14)	8/2/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910

Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2136756-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2 commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only) L2136756

ALS Contact: **Sampler:** DS/TB

E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☑ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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-MMER-WT	Acute Toxicity	BIM-MMER-EFF	Total Ammonia expressed as nitrogen (N)	Number of Containers
1	MS-06	26-Jul-18	13:30	Water	E1	E1		E1	11
2	MS-06-US	26-Jul-18	14:20	Water			E1		7
3	MS-06-DS	26-Jul-18	13:30	Water			E1		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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Please note that there is a separate nutirents for Ionized Ammonia.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ 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: Ben Widdowson	Date: 18 07 26	Time: 16:15	Received by:	Date:	Time:	Received by:	Date:	Time:

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 01-AUG-18
Report Date: 30-AUG-18 09:46 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2139790

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2139790-1 MS-06 Sampled By: CM on 01-AUG-18 @ 11:55 Matrix: WATER							
Physical Tests							
Conductivity	1140		3.0	umhos/cm		04-AUG-18	R4159188
pH	7.46		0.10	pH units		01-AUG-18	R4153087
Total Suspended Solids	<2.0		2.0	mg/L		02-AUG-18	R4153088
Total Dissolved Solids	645		20	mg/L		02-AUG-18	R4153152
Turbidity	4.85		0.10	NTU		02-AUG-18	R4154539
Anions and Nutrients							
Ammonia, Total (as N)	0.024		0.020	mg/L		07-AUG-18	R4160290
Cyanides							
Cyanide, Total	<0.020	DLM	0.020	mg/L		07-AUG-18	R4160334
Total Metals							
Aluminum (Al)-Total	0.0250		0.0050	mg/L	03-AUG-18	03-AUG-18	R4159686
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Arsenic (As)-Total	0.00011		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Barium (Ba)-Total	0.0141		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Boron (B)-Total	0.030		0.010	mg/L	03-AUG-18	03-AUG-18	R4159686
Cadmium (Cd)-Total	0.0000289		0.0000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Calcium (Ca)-Total	54.0		0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Cesium (Cs)-Total	0.000014		0.000010	mg/L	03-AUG-18	03-AUG-18	R4159686
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Cobalt (Co)-Total	0.00664		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Copper (Cu)-Total	<0.0010		0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Iron (Fe)-Total	0.171		0.010	mg/L	03-AUG-18	03-AUG-18	R4159686
Lead (Pb)-Total	<0.000050		0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Lithium (Li)-Total	0.0199		0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Magnesium (Mg)-Total	103	DLHC	0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Manganese (Mn)-Total	1.44		0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Molybdenum (Mo)-Total	0.000129		0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Nickel (Ni)-Total	0.0118		0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Phosphorus (P)-Total	<0.050		0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Potassium (K)-Total	9.99		0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Rubidium (Rb)-Total	0.00895		0.00020	mg/L	03-AUG-18	03-AUG-18	R4159686
Selenium (Se)-Total	0.00113		0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Silicon (Si)-Total	0.17		0.10	mg/L	03-AUG-18	03-AUG-18	R4159686
Silver (Ag)-Total	<0.000050		0.000050	mg/L	03-AUG-18	03-AUG-18	R4159686
Sodium (Na)-Total	6.24		0.050	mg/L	03-AUG-18	03-AUG-18	R4159686
Strontium (Sr)-Total	0.0761		0.0010	mg/L	03-AUG-18	03-AUG-18	R4159686
Sulfur (S)-Total	182		0.50	mg/L	03-AUG-18	03-AUG-18	R4159686
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	03-AUG-18	03-AUG-18	R4159686
Thallium (Tl)-Total	0.000034		0.000010	mg/L	03-AUG-18	03-AUG-18	R4159686
Thorium (Th)-Total	<0.00010		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686

* 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
L2139790-1 MS-06 Sampled By: CM on 01-AUG-18 @ 11:55 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.00010		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Titanium (Ti)-Total	<0.00070	DLUI	0.00070	mg/L	03-AUG-18	03-AUG-18	R4159686
Tungsten (W)-Total	<0.00010		0.00010	mg/L	03-AUG-18	03-AUG-18	R4159686
Uranium (U)-Total	0.000451		0.000010	mg/L	03-AUG-18	03-AUG-18	R4159686
Vanadium (V)-Total	<0.00050		0.00050	mg/L	03-AUG-18	03-AUG-18	R4159686
Zinc (Zn)-Total	0.0034		0.0030	mg/L	03-AUG-18	03-AUG-18	R4159686
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	03-AUG-18	03-AUG-18	R4159686
Radiological Parameters							
Ra-226	0.011		0.0055	Bq/L	20-AUG-18	28-AUG-18	R4160854

* 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	Barium (Ba)-Total	MS-B	L2139790-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2139790-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2139790-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2139790-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2139790-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2139790-1
Matrix Spike	Potassium (K)-Total	MS-B	L2139790-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2139790-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2139790-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2139790-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2139790-1
Matrix Spike	Uranium (U)-Total	MS-B	L2139790-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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:

Reference Information

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2139790 Report Date: 30-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4160334								
WG2842663-3 DUP		**L2139790-1**						
Cyanide, Total		<0.020	<0.0020	RPD-NA	mg/L	N/A	20	07-AUG-18
WG2842663-2 LCS								
Cyanide, Total			88.7		%		80-120	07-AUG-18
WG2842663-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	07-AUG-18
WG2842663-4 MS		**L2139790-1**						
Cyanide, Total			77.5		%		70-130	07-AUG-18
EC-WT	**Water**							
Batch R4159188								
WG2841535-4 DUP		**WG2841535-3**						
Conductivity		1140	1140		umhos/cm	0.2	10	04-AUG-18
WG2841535-2 LCS								
Conductivity			96.7		%		90-110	04-AUG-18
WG2841535-1 MB								
Conductivity			<3.0		umhos/cm		3	04-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-4 DUP		**WG2841323-3**						
Aluminum (Al)-Total		0.0250	0.0250		mg/L	0.3	20	03-AUG-18
Antimony (Sb)-Total		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	03-AUG-18
Arsenic (As)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Barium (Ba)-Total		0.0141	0.0144		mg/L	2.7	20	03-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Boron (B)-Total		0.030	0.031		mg/L	1.4	20	03-AUG-18
Cadmium (Cd)-Total		0.0000289	0.0000329		mg/L	13	20	03-AUG-18
Calcium (Ca)-Total		54.0	55.0		mg/L	1.8	20	03-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-AUG-18
Cesium (Cs)-Total		0.000014	0.000011	J	mg/L	0.000003	0.00002	03-AUG-18
Cobalt (Co)-Total		0.00664	0.00671		mg/L	1.0	20	03-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	03-AUG-18
Iron (Fe)-Total		0.171	0.171		mg/L	0.1	20	03-AUG-18
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Lithium (Li)-Total		0.0199	0.0199		mg/L	0.1	20	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-4 DUP		**WG2841323-3**						
Magnesium (Mg)-Total		103	106		mg/L	3.1	20	03-AUG-18
Manganese (Mn)-Total		1.44	1.46		mg/L	1.6	20	03-AUG-18
Molybdenum (Mo)-Total		0.000129	0.000124		mg/L	3.6	20	03-AUG-18
Nickel (Ni)-Total		0.0118	0.0118		mg/L	0.6	20	03-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-AUG-18
Potassium (K)-Total		9.99	10.0		mg/L	0.3	20	03-AUG-18
Rubidium (Rb)-Total		0.00895	0.00924		mg/L	3.1	20	03-AUG-18
Selenium (Se)-Total		0.00113	0.00118		mg/L	4.3	20	03-AUG-18
Silicon (Si)-Total		0.17	0.17		mg/L	1.5	20	03-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	03-AUG-18
Sodium (Na)-Total		6.24	6.45		mg/L	3.3	20	03-AUG-18
Strontium (Sr)-Total		0.0761	0.0788		mg/L	3.5	20	03-AUG-18
Sulfur (S)-Total		182	189		mg/L	3.6	25	03-AUG-18
Thallium (Tl)-Total		0.000034	0.000035		mg/L	3.4	20	03-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	03-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	03-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Titanium (Ti)-Total		<0.00070	<0.00070	RPD-NA	mg/L	N/A	20	03-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	03-AUG-18
Uranium (U)-Total		0.000451	0.000443		mg/L	1.9	20	03-AUG-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	03-AUG-18
Zinc (Zn)-Total		0.0034	<0.0030	RPD-NA	mg/L	N/A	20	03-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	03-AUG-18
WG2841323-2 LCS								
Aluminum (Al)-Total			104.7		%		80-120	03-AUG-18
Antimony (Sb)-Total			108.8		%		80-120	03-AUG-18
Arsenic (As)-Total			102.3		%		80-120	03-AUG-18
Barium (Ba)-Total			99.9		%		80-120	03-AUG-18
Beryllium (Be)-Total			103.2		%		80-120	03-AUG-18
Bismuth (Bi)-Total			102.0		%		80-120	03-AUG-18
Boron (B)-Total			93.2		%		80-120	03-AUG-18
Cadmium (Cd)-Total			101.3		%		80-120	03-AUG-18
Calcium (Ca)-Total			99.99		%		80-120	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-2 LCS								
Chromium (Cr)-Total			100.5		%		80-120	03-AUG-18
Cesium (Cs)-Total			107.9		%		80-120	03-AUG-18
Cobalt (Co)-Total			99.0		%		80-120	03-AUG-18
Copper (Cu)-Total			100.1		%		80-120	03-AUG-18
Iron (Fe)-Total			98.8		%		80-120	03-AUG-18
Lead (Pb)-Total			103.8		%		80-120	03-AUG-18
Lithium (Li)-Total			106.7		%		80-120	03-AUG-18
Magnesium (Mg)-Total			100.0		%		80-120	03-AUG-18
Manganese (Mn)-Total			102.8		%		80-120	03-AUG-18
Molybdenum (Mo)-Total			102.7		%		80-120	03-AUG-18
Nickel (Ni)-Total			99.8		%		80-120	03-AUG-18
Phosphorus (P)-Total			103.7		%		70-130	03-AUG-18
Potassium (K)-Total			99.4		%		80-120	03-AUG-18
Rubidium (Rb)-Total			106.9		%		80-120	03-AUG-18
Selenium (Se)-Total			97.5		%		80-120	03-AUG-18
Silicon (Si)-Total			103.3		%		60-140	03-AUG-18
Silver (Ag)-Total			107.5		%		80-120	03-AUG-18
Sodium (Na)-Total			103.0		%		80-120	03-AUG-18
Strontium (Sr)-Total			103.4		%		80-120	03-AUG-18
Sulfur (S)-Total			97.7		%		80-120	03-AUG-18
Thallium (Tl)-Total			102.0		%		80-120	03-AUG-18
Tellurium (Te)-Total			105.8		%		80-120	03-AUG-18
Thorium (Th)-Total			102.6		%		70-130	03-AUG-18
Tin (Sn)-Total			101.6		%		80-120	03-AUG-18
Titanium (Ti)-Total			100.6		%		80-120	03-AUG-18
Tungsten (W)-Total			102.1		%		80-120	03-AUG-18
Uranium (U)-Total			104.6		%		80-120	03-AUG-18
Vanadium (V)-Total			102.7		%		80-120	03-AUG-18
Zinc (Zn)-Total			98.8		%		80-120	03-AUG-18
Zirconium (Zr)-Total			100.1		%		80-120	03-AUG-18
WG2841323-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	03-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	03-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	03-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	03-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	03-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	03-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	03-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	03-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	03-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	03-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	03-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	03-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	03-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	03-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	03-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	03-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	03-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	03-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	03-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	03-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	03-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	03-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	03-AUG-18
WG2841323-5 MS		**WG2841323-3**						
Aluminum (Al)-Total			92.1		%		70-130	03-AUG-18
Antimony (Sb)-Total			96.6		%		70-130	03-AUG-18
Arsenic (As)-Total			94.2		%		70-130	03-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	03-AUG-18
Beryllium (Be)-Total			90.0		%		70-130	03-AUG-18
Bismuth (Bi)-Total			90.2		%		70-130	03-AUG-18
Boron (B)-Total			81.1		%		70-130	03-AUG-18
Cadmium (Cd)-Total			91.7		%		70-130	03-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	03-AUG-18
Chromium (Cr)-Total			89.5		%		70-130	03-AUG-18
Cesium (Cs)-Total			96.4		%		70-130	03-AUG-18
Cobalt (Co)-Total			85.1		%		70-130	03-AUG-18
Copper (Cu)-Total			86.4		%		70-130	03-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	03-AUG-18
Lead (Pb)-Total			90.0		%		70-130	03-AUG-18
Lithium (Li)-Total			N/A	MS-B	%		-	03-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	03-AUG-18
Manganese (Mn)-Total			N/A	MS-B	%		-	03-AUG-18
Molybdenum (Mo)-Total			95.0		%		70-130	03-AUG-18
Nickel (Ni)-Total			86.6		%		70-130	03-AUG-18
Phosphorus (P)-Total			96.9		%		70-130	03-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	03-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	03-AUG-18
Selenium (Se)-Total			92.2		%		70-130	03-AUG-18
Silicon (Si)-Total			92.2		%		70-130	03-AUG-18
Silver (Ag)-Total			93.0		%		70-130	03-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	03-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	03-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	03-AUG-18
Thallium (Tl)-Total			90.4		%		70-130	03-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4159686								
WG2841323-5 MS		**WG2841323-3**						
Tellurium (Te)-Total			95.3		%		70-130	03-AUG-18
Thorium (Th)-Total			92.5		%		70-130	03-AUG-18
Tin (Sn)-Total			91.5		%		70-130	03-AUG-18
Titanium (Ti)-Total			90.6		%		70-130	03-AUG-18
Tungsten (W)-Total			91.4		%		70-130	03-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	03-AUG-18
Vanadium (V)-Total			94.0		%		70-130	03-AUG-18
Zinc (Zn)-Total			82.0		%		70-130	03-AUG-18
Zirconium (Zr)-Total			91.9		%		70-130	03-AUG-18
NH3-WT	**Water**							
Batch R4160290								
WG2842823-3 DUP		**L2139790-1**						
Ammonia, Total (as N)		0.024	<0.020	RPD-NA	mg/L	N/A	20	07-AUG-18
WG2842823-2 LCS								
Ammonia, Total (as N)			103.3		%		85-115	07-AUG-18
WG2842823-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	07-AUG-18
WG2842823-4 MS		**L2139790-1**						
Ammonia, Total (as N)			105.5		%		75-125	07-AUG-18
PH-BF	**Water**							
Batch R4153087								
WG2839335-2 DUP		**L2139794-1**						
pH		8.83	8.80	J	pH units	0.03	0.2	01-AUG-18
WG2839335-1 LCS								
pH			6.98		pH units		6.9-7.1	01-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4153152								
WG2839337-3 DUP		**L2139681-1**						
Total Dissolved Solids		586	645		mg/L	9.6	20	02-AUG-18
WG2839337-2 LCS								
Total Dissolved Solids			100.8		%		85-115	02-AUG-18
WG2839337-1 MB								
Total Dissolved Solids			<20		mg/L		20	02-AUG-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4153088								
WG2839336-3 DUP		**L2139681-1**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	02-AUG-18
WG2839336-2 LCS								
Total Suspended Solids			100.4		%		85-115	02-AUG-18
WG2839336-1 MB								
Total Suspended Solids			<2.0		mg/L		2	02-AUG-18
TURBIDITY-BF	**Water**							
Batch R4154539								
WG2839789-3 DUP		**L2139633-1**						
Turbidity		11.6	11.5		NTU	0.9	15	02-AUG-18
WG2839789-2 LCS								
Turbidity			112.0		%		85-115	02-AUG-18
WG2839789-1 MB								
Turbidity			<0.10		NTU		0.1	02-AUG-18

Quality Control Report

Workorder: L2139790 Report Date: 30-AUG-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Wednesday, August 29, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808150
Project Name:
Project Number: L2139790

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 8/8/2018. The sample was scheduled for the following analysis:

Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808150

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808150
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2139790
Client PO Number: L2139790

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2139790-1	1808150-1		WATER	01-Aug-18	

ALS Environmental

1808150

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2139790*
ALS requires QC data to be provided with your final results.

1x950mL HDPE.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2139790-1 MS-06		8/ 1/ 2018	**E**
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/23/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumbl Date Received: 8-8-18 1015

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Waterloo Workorder No: 1808150

Project Manager: Lucy Initials: LL Date: 8.8.18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1
Temperature (°C):	14
No. of custody seals on cooler:	0
DOT Survey/ Acceptance Information — External µR/hr reading:	10
Background µR/hr reading:	11

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: _____ 8/9/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

Sender

ALS Environmental
Ed Hill
60 Northland Rd
Unit 1
WATERLOO, N2V 2B8
ON
Canada
Phone Nr.: +15198866910 Fax: +15198869047
Tax ID/VAT No.:
EORI:

1808152

Date: 2018-08-07 Waybill Number: 2762834620
Invoice Number:

Exporter ID:
Exporter Code:

Receiver

ALS Environmental Fort Collins
Sample Login
225 Commerce Drive
FORT COLLINS, 80524
CO
United States of America
Phone Nr.: +18004431511 Fax:
Tax ID/VAT No.: Email:

Bank Details

INN: OGRN:
KPP: OKPO:
Settlement account (USD/EUR):
Settlement account (RUR):
Bank Name:

Billed to

Phone Nr.: Fax:
Tax ID/VAT no:

Shipment Reference:
Receiver Reference:

Other Remarks:

Full Description of Goods	Commodity Code	Qty	Unit Value	Sub-Total Value	Net Weight	Gross Weight	Country of Origin
Water Samples		1.00 PCS	2.00 CAD	2.00 CAD	10.8 lb	0.0 lb	CANADA

Total Goods Value: 2.00
Total line items: 1
Number of pallets: 0
Total units: 1.0
Reason for Export: Sample
Type of Export: Permanent
Terms of Trade: Delivered at Place
Other charges: 0.00
Freight cost (if paid by sender): 0.00
Shipment protection (if paid by sender): 0.00

Total Net Weight: 10.8 lb
Total Gross Weight: 0.0 lb
Currency code: CAD
Terms of Payment:
Payer of GST/VAT:
Duty/taxes acct:Receiver Will Pay
Requiere Pedimento: No
Duty/tax billing service:
Carrier: DHL
Ultimate Consignee:
Exemption Citation/License Nr:

10-0
14°

I/We hereby certify that the information contained in the invoice is true and correct and that the contents of this shipment are as stated above.

Name: William McMurchy **Signature:** **Company Stamp:**
Position:
Date of signature:

Client:	ALS Environmental	**Date:**	*29-Aug-18*
Project:	L2139790	**Work Order:**	1808150
Sample ID:	L2139790-1	**Lab ID:**	1808150-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **8/20/2018**	PrepBy: **CXW**
Ra-226	**0.011 (+/- 0.0057)**		**0.0055**	**BQ/l**	NA	8/28/2018 12:26
Carr: BARIUM	*99.2*		*40-110*	*%REC*	DL = NA	8/28/2018 12:26

Client:	ALS Environmental	**Date:**	*29-Aug-18*
Project:	L2139790	**Work Order:**	1808150
Sample ID:	L2139790-1	**Lab ID:**	1808150-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

Batch ID: **RE180820-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.86 (+/- 0.465)	0.0184	1.771		105	67-120					P,M3
Carr: BARIUM	15300		16240		94	40-110					

LCSD Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.87 (+/- 0.468)	0.0201	1.771		106	67-120		1.86	0.02	2.1	P,Y1,M3
Carr: BARIUM	16900		16240		104	40-110		15300			Y1

MB Sample ID: **RE180820-2** Units: **BQ/l** Analysis Date: **8/28/2018 13:09**

Client ID: Run ID: **RE180820-2A** Prep Date: **8/20/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.0010 (+/- 0.0033)	0.0063									U
Carr: BARIUM	14600		16240		90	40-110					

The following samples were analyzed in this batch: 1808150-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2139790-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax ap@baffinland.com

Email 2 commercial@baffinland.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☑

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	
ALS Lab Work Order # (lab use only)	L2139790

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: CM

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-MMER-DEL	Number of Containers
	MS-06	1-Aug-18	11:55	Water	E0	6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			15.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 18 08 01	Time: 12:30	Received by:	Date:	Time:	Received by:	Date: 9 Aug 18	Time: 0900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 08-AUG-18
Report Date: 07-SEP-18 12:54 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2142460

Project P.O. #: 4500040417
Job Reference: MS-06
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2142460-1 MS-06 Sampled By: MK/MA/KRR on 07-AUG-18 @ 17:30 Matrix: WATER							
Physical Tests							
Conductivity	921		3.0	umhos/cm		11-AUG-18	R4165327
pH	7.30		0.10	pH units		08-AUG-18	R4161281
Total Suspended Solids	2.8		2.0	mg/L		08-AUG-18	R4162188
Total Dissolved Solids	740		20	mg/L		08-AUG-18	R4162180
Turbidity	11.0		0.10	NTU		08-AUG-18	R4161286
Anions and Nutrients							
Ammonia, Total (as N)	<0.020		0.020	mg/L		14-AUG-18	R4168946
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		20-AUG-18	R4178995
Total Metals							
Aluminum (Al)-Total	0.0442		0.0050	mg/L	13-AUG-18	13-AUG-18	R4167350
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Arsenic (As)-Total	0.00011		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Barium (Ba)-Total	0.0133		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Boron (B)-Total	0.024		0.010	mg/L	13-AUG-18	13-AUG-18	R4167350
Cadmium (Cd)-Total	0.0000222		0.0000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Calcium (Ca)-Total	45.3		0.050	mg/L	13-AUG-18	13-AUG-18	R4167350
Cesium (Cs)-Total	0.000013		0.000010	mg/L	13-AUG-18	13-AUG-18	R4167350
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	13-AUG-18	13-AUG-18	R4167350
Cobalt (Co)-Total	0.00448		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Copper (Cu)-Total	<0.0010		0.0010	mg/L	13-AUG-18	13-AUG-18	R4167350
Iron (Fe)-Total	0.176		0.010	mg/L	13-AUG-18	13-AUG-18	R4167350
Lead (Pb)-Total	<0.000050		0.000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Lithium (Li)-Total	0.0148		0.0010	mg/L	13-AUG-18	13-AUG-18	R4167350
Magnesium (Mg)-Total	92.9		0.0050	mg/L	13-AUG-18	13-AUG-18	R4167350
Manganese (Mn)-Total	1.09		0.00050	mg/L	13-AUG-18	13-AUG-18	R4167350
Molybdenum (Mo)-Total	0.000200		0.000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Nickel (Ni)-Total	0.00827		0.00050	mg/L	13-AUG-18	13-AUG-18	R4167350
Phosphorus (P)-Total	<0.050		0.050	mg/L	13-AUG-18	13-AUG-18	R4167350
Potassium (K)-Total	8.77		0.050	mg/L	13-AUG-18	13-AUG-18	R4167350
Rubidium (Rb)-Total	0.00831		0.00020	mg/L	13-AUG-18	13-AUG-18	R4167350
Selenium (Se)-Total	0.00105		0.000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Silicon (Si)-Total	0.15		0.10	mg/L	13-AUG-18	13-AUG-18	R4167350
Silver (Ag)-Total	<0.000050		0.000050	mg/L	13-AUG-18	13-AUG-18	R4167350
Sodium (Na)-Total	5.62		0.050	mg/L	13-AUG-18	13-AUG-18	R4167350
Strontium (Sr)-Total	0.0664		0.0010	mg/L	13-AUG-18	13-AUG-18	R4167350
Sulfur (S)-Total	181		0.50	mg/L	13-AUG-18	13-AUG-18	R4167350
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	13-AUG-18	13-AUG-18	R4167350
Thallium (Tl)-Total	0.000027		0.000010	mg/L	13-AUG-18	13-AUG-18	R4167350
Thorium (Th)-Total	<0.00010		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350

* 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
L2142460-1 MS-06 Sampled By: MK/MA/KRR on 07-AUG-18 @ 17:30 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.00010		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Titanium (Ti)-Total	<0.00070	DLUI	0.00070	mg/L	13-AUG-18	13-AUG-18	R4167350
Tungsten (W)-Total	<0.00010		0.00010	mg/L	13-AUG-18	13-AUG-18	R4167350
Uranium (U)-Total	0.000314		0.000010	mg/L	13-AUG-18	13-AUG-18	R4167350
Vanadium (V)-Total	<0.00050		0.00050	mg/L	13-AUG-18	13-AUG-18	R4167350
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	13-AUG-18	13-AUG-18	R4167350
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	13-AUG-18	13-AUG-18	R4167350
Radiological Parameters							
Ra-226	0.0053		0.0052	Bq/L	27-AUG-18	05-SEP-18	R4203163

* 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	Barium (Ba)-Total	MS-B	L2142460-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2142460-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2142460-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2142460-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2142460-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2142460-1
Matrix Spike	Potassium (K)-Total	MS-B	L2142460-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2142460-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2142460-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2142460-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2142460-1
Matrix Spike	Uranium (U)-Total	MS-B	L2142460-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
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**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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

Reference Information

FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2142460 Report Date: 07-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4178995								
WG2854322-3 DUP		**L2148009-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-AUG-18
WG2854322-2 LCS								
Cyanide, Total			95.6		%		80-120	20-AUG-18
WG2854322-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	20-AUG-18
WG2854322-4 MS		**L2148009-1**						
Cyanide, Total			91.5		%		70-130	20-AUG-18
EC-WT	**Water**							
Batch R4165327								
WG2846723-28 DUP		**WG2846723-11**						
Conductivity		2120	2130		umhos/cm	0.5	10	11-AUG-18
WG2846723-10 LCS								
Conductivity			97.1		%		90-110	11-AUG-18
WG2846723-9 MB								
Conductivity			<3.0		umhos/cm		3	11-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-4 DUP		**WG2847352-3**						
Aluminum (Al)-Total		0.0442	0.0433		mg/L	2.2	20	13-AUG-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-AUG-18
Arsenic (As)-Total		0.00011	0.00011		mg/L	2.9	20	13-AUG-18
Barium (Ba)-Total		0.0133	0.0133		mg/L	0.1	20	13-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-AUG-18
Boron (B)-Total		0.024	0.024		mg/L	0.7	20	13-AUG-18
Cadmium (Cd)-Total		0.0000222	0.0000258		mg/L	15	20	13-AUG-18
Calcium (Ca)-Total		45.3	47.8		mg/L	5.4	20	13-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-AUG-18
Cesium (Cs)-Total		0.000013	0.000012		mg/L	7.3	20	13-AUG-18
Cobalt (Co)-Total		0.00448	0.00445		mg/L	0.7	20	13-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	13-AUG-18
Iron (Fe)-Total		0.176	0.171		mg/L	3.0	20	13-AUG-18
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-AUG-18
Lithium (Li)-Total		0.0148	0.0145		mg/L	2.2	20	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-4 DUP		**WG2847352-3**						
Magnesium (Mg)-Total		92.9	94.4		mg/L	1.6	20	13-AUG-18
Manganese (Mn)-Total		1.09	1.08		mg/L	0.7	20	13-AUG-18
Molybdenum (Mo)-Total		0.000200	0.000186		mg/L	7.3	20	13-AUG-18
Nickel (Ni)-Total		0.00827	0.00828		mg/L	0.1	20	13-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	13-AUG-18
Potassium (K)-Total		8.77	8.82		mg/L	0.5	20	13-AUG-18
Rubidium (Rb)-Total		0.00831	0.00832		mg/L	0.1	20	13-AUG-18
Selenium (Se)-Total		0.00105	0.00100		mg/L	4.6	20	13-AUG-18
Silicon (Si)-Total		0.15	0.15		mg/L	0.8	20	13-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-AUG-18
Sodium (Na)-Total		5.62	5.61		mg/L	0.2	20	13-AUG-18
Strontium (Sr)-Total		0.0664	0.0653		mg/L	1.7	20	13-AUG-18
Sulfur (S)-Total		181	182		mg/L	0.4	25	13-AUG-18
Thallium (Tl)-Total		0.000027	0.000027		mg/L	0.7	20	13-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	13-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	13-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-AUG-18
Titanium (Ti)-Total		0.00064	0.00066		mg/L	3.0	20	13-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-AUG-18
Uranium (U)-Total		0.000314	0.000321		mg/L	2.3	20	13-AUG-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-AUG-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	13-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	13-AUG-18
WG2847352-2 LCS								
Aluminum (Al)-Total			100.3		%		80-120	13-AUG-18
Antimony (Sb)-Total			96.9		%		80-120	13-AUG-18
Arsenic (As)-Total			98.0		%		80-120	13-AUG-18
Barium (Ba)-Total			102.6		%		80-120	13-AUG-18
Beryllium (Be)-Total			92.4		%		80-120	13-AUG-18
Bismuth (Bi)-Total			97.1		%		80-120	13-AUG-18
Boron (B)-Total			86.2		%		80-120	13-AUG-18
Cadmium (Cd)-Total			96.2		%		80-120	13-AUG-18
Calcium (Ca)-Total			95.9		%		80-120	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-2 LCS								
Chromium (Cr)-Total			96.5		%		80-120	13-AUG-18
Cesium (Cs)-Total			95.4		%		80-120	13-AUG-18
Cobalt (Co)-Total			98.0		%		80-120	13-AUG-18
Copper (Cu)-Total			97.6		%		80-120	13-AUG-18
Iron (Fe)-Total			97.2		%		80-120	13-AUG-18
Lead (Pb)-Total			96.1		%		80-120	13-AUG-18
Lithium (Li)-Total			87.9		%		80-120	13-AUG-18
Magnesium (Mg)-Total			104.7		%		80-120	13-AUG-18
Manganese (Mn)-Total			100.7		%		80-120	13-AUG-18
Molybdenum (Mo)-Total			99.7		%		80-120	13-AUG-18
Nickel (Ni)-Total			97.7		%		80-120	13-AUG-18
Phosphorus (P)-Total			97.2		%		70-130	13-AUG-18
Potassium (K)-Total			98.4		%		80-120	13-AUG-18
Rubidium (Rb)-Total			101.8		%		80-120	13-AUG-18
Selenium (Se)-Total			100.9		%		80-120	13-AUG-18
Silicon (Si)-Total			98.6		%		60-140	13-AUG-18
Silver (Ag)-Total			94.9		%		80-120	13-AUG-18
Sodium (Na)-Total			97.1		%		80-120	13-AUG-18
Strontium (Sr)-Total			99.9		%		80-120	13-AUG-18
Sulfur (S)-Total			99.4		%		80-120	13-AUG-18
Thallium (Tl)-Total			99.1		%		80-120	13-AUG-18
Tellurium (Te)-Total			93.5		%		80-120	13-AUG-18
Thorium (Th)-Total			94.2		%		70-130	13-AUG-18
Tin (Sn)-Total			94.8		%		80-120	13-AUG-18
Titanium (Ti)-Total			93.6		%		80-120	13-AUG-18
Tungsten (W)-Total			95.9		%		80-120	13-AUG-18
Uranium (U)-Total			97.4		%		80-120	13-AUG-18
Vanadium (V)-Total			99.3		%		80-120	13-AUG-18
Zinc (Zn)-Total			94.0		%		80-120	13-AUG-18
Zirconium (Zr)-Total			95.3		%		80-120	13-AUG-18
WG2847352-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	13-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	13-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	13-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	13-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	13-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	13-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	13-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	13-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	13-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	13-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	13-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	13-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	13-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	13-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	13-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	13-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	13-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	13-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	13-AUG-18
WG2847352-5 MS		**WG2847352-3**						
Aluminum (Al)-Total			103.8		%		70-130	13-AUG-18
Antimony (Sb)-Total			101.0		%		70-130	13-AUG-18
Arsenic (As)-Total			102.9		%		70-130	13-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	13-AUG-18
Beryllium (Be)-Total			99.3		%		70-130	13-AUG-18
Bismuth (Bi)-Total			96.3		%		70-130	13-AUG-18
Boron (B)-Total			92.0		%		70-130	13-AUG-18
Cadmium (Cd)-Total			94.6		%		70-130	13-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	13-AUG-18
Chromium (Cr)-Total			102.8		%		70-130	13-AUG-18
Cesium (Cs)-Total			101.3		%		70-130	13-AUG-18
Cobalt (Co)-Total			99.8		%		70-130	13-AUG-18
Copper (Cu)-Total			100.2		%		70-130	13-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	13-AUG-18
Lead (Pb)-Total			95.2		%		70-130	13-AUG-18
Lithium (Li)-Total			N/A	MS-B	%		-	13-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	13-AUG-18
Manganese (Mn)-Total			N/A	MS-B	%		-	13-AUG-18
Molybdenum (Mo)-Total			102.7		%		70-130	13-AUG-18
Nickel (Ni)-Total			98.7		%		70-130	13-AUG-18
Phosphorus (P)-Total			107.7		%		70-130	13-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	13-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	13-AUG-18
Selenium (Se)-Total			110.5		%		70-130	13-AUG-18
Silicon (Si)-Total			106.2		%		70-130	13-AUG-18
Silver (Ag)-Total			96.9		%		70-130	13-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	13-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	13-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	13-AUG-18
Thallium (Tl)-Total			96.3		%		70-130	13-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4167350								
WG2847352-5 MS		**WG2847352-3**						
Tellurium (Te)-Total			95.8		%		70-130	13-AUG-18
Thorium (Th)-Total			96.0		%		70-130	13-AUG-18
Tin (Sn)-Total			94.5		%		70-130	13-AUG-18
Titanium (Ti)-Total			103.4		%		70-130	13-AUG-18
Tungsten (W)-Total			98.1		%		70-130	13-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	13-AUG-18
Vanadium (V)-Total			106.7		%		70-130	13-AUG-18
Zinc (Zn)-Total			94.9		%		70-130	13-AUG-18
Zirconium (Zr)-Total			98.3		%		70-130	13-AUG-18
NH3-WT	**Water**							
Batch R4168946								
WG2848735-20 DUP		**L2142460-1**						
Ammonia, Total (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	14-AUG-18
WG2848735-18 LCS								
Ammonia, Total (as N)			96.2		%		85-115	14-AUG-18
WG2848735-17 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	14-AUG-18
WG2848735-19 MS		**L2142460-1**						
Ammonia, Total (as N)			97.8		%		75-125	14-AUG-18
PH-BF	**Water**							
Batch R4161281								
WG2844178-2 DUP		**L2142460-1**						
pH		7.30	7.35	J	pH units	0.05	0.2	08-AUG-18
WG2844178-1 LCS								
pH			6.99		pH units		6.9-7.1	08-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4162180								
WG2844203-3 DUP		**L2142460-1**						
Total Dissolved Solids		740	750		mg/L	1.3	20	08-AUG-18
WG2844203-2 LCS								
Total Dissolved Solids			102.4		%		85-115	08-AUG-18
WG2844203-1 MB								
Total Dissolved Solids			<20		mg/L		20	08-AUG-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4162188								
WG2844194-3 DUP		**L2142460-1**						
Total Suspended Solids		2.8	2.8		mg/L	0.0	25	08-AUG-18
WG2844194-2 LCS								
Total Suspended Solids			100.4		%		85-115	08-AUG-18
WG2844194-1 MB								
Total Suspended Solids			<2.0		mg/L		2	08-AUG-18
TURBIDITY-BF	**Water**							
Batch R4161286								
WG2844186-3 DUP		**L2142460-1**						
Turbidity		11.0	11.3		NTU	2.7	15	08-AUG-18
WG2844186-2 LCS								
Turbidity			115.0		%		85-115	08-AUG-18
WG2844186-1 MB								
Turbidity			<0.10		NTU		0.1	08-AUG-18

Quality Control Report

Workorder: L2142460 Report Date: 07-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Thursday, September 06, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808255
Project Name:
Project Number: L2142460

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 8/14/2018. The sample was scheduled for the following analysis:

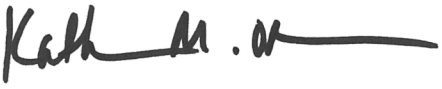
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808255

Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808255
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2142460
Client PO Number: L2142460

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2142460-1	1808255-1		WATER	07-Aug-18	

ALS Environmental

1808255

L2142460
WATERLOO

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2142460*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L2142460-1 MS-06**		8/ 7/ 2018	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/31/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumbl Date Received: 8-14-18 0545

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1808255

Project Manager: KMO Initials: AFJ Date: 8/14/18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	6							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/15/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

ORIGIN ID:YBYA (604) 253-4188
HAR JIT GILL
ALS ENVIRONMENTAL LAB GROUP
LOUGHEED HIGHWAY

BURNABY, BC V5A1W9
CANADA CA

SHIP DATE: 13AUG18
ACTWGT: 20.00 LB MAN
CAD: 0347419/CAFE3210

BILL SENDER

TO SAMPLE RECEVING
ALS ENVIRONMANTAL
225 COMMERCE DRIVE

FORT COLLINS CO 80524
(970) 490-1511
REF: SUBLETS

DEPT: SUBLET

10 of 10

(US)

551C1/8309/104C

FedEx Express

10:30A
INTL PRIORITY

TRK# 4432 4287 7009
0430

XH FTCA

80524
CO-US DEN

1908255

ICE
11.7

After printing this label:
CONSIGNEE COPY - PLEASE PLACE IN FRONT OF POUCH
1. Fold the printed page along the horizontal line.
2. Place label in shipping pouch and affix it to your shipment.

DEFINITIONS: On the Air Waybill "we", "our", "us" and "FedEx" refer to Federal Express Corporation, its subsidiaries and branches and their respective employees, agents and independent contractors. "You" and "your" refer to the shipper, its employees, principals and agents. If your shipment originates outside the United States, your contract of carriage is with the Federal Express subsidiary, branch or independent contractor who originally accepts the shipment from you. "Package" means any container or envelope that is accepted by us for delivery, including any such items tendered by you utilizing our automated systems, meters, manifests or waybills. Shipment means all packages, which are tendered to and accepted by us on a single Air Waybill.

AGREEMENT TO TERMS. By giving us your shipment, you agree, regardless of whether you sign the front of this Air Waybill, for yourself as an agent for and on behalf of any other person having an interest in this shipment, to all terms on this NON-NEGOTIABLE Air Waybill, in any applicable law, and in our current Service Guide or Standard Conditions of Carriage, copies of which are available upon request. If there is a conflict between this Air Waybill and either the law, Service Guide or Standard Conditions then in effect, the law and terms in any customer automation agreement between the shipper and Federal Express will control (the Service Guide or Standard Conditions have secondary priority). No one is authorized to alter or modify the terms or our agreement. This Air Waybill shall be binding on us when the shipment is accepted.

YOUR OBLIGATIONS. You warrant that each article in the shipment is properly described on this Air Waybill and is acceptable for transport by us, and that the shipment is properly marked, addressed (including postal codes) and packaged to ensure safe transportation with ordinary care in handling.

NOTE CONCERNING LIMITATIONS OF LIABILITY. Air Carriage Notice. If the carriage of your shipment by air involves an ultimate destination or stop in a country other than the country of departure, the Warsaw Convention, as international treaty relating to international carriage by air, may be applicable, which treaty would then govern and in most cases limit our liability for loss or delay of or damage to your shipment in the U.S. the Warsaw Convention limits our liability to U.S. $9.07 per pound (U.S. $20.38 per kilogram). Unless you declare a higher value for carriage as described below. The interpretation of the Warsaw Convention liability limits may vary in other countries. There are no stopping places which are agreed at the time of tender of the shipment and we reserve the right to route shipments in anyway we deem appropriate.

Road Transport Notice. Shipments transported partly or solely by road be it explicit agreement to do so or not-to, to, from a country which is party to the Convention on the Contract for the International Carriage of Goods by Road (the 'CMR') are subject to the terms and conditions of the CMR, notwithstanding any other provisions of this Agreement to the contrary. For these shipments transported solely by road, if a conflict arises between the provisions of the CMR and this Air Waybill the terms of the CMR shall prevail.

Limitation of Liability. If not governed by the Warsaw Convention or the CMR as described above, our maximum liability for loss, damage or delay is limited by this Air Waybill to U.S. $100 per shipment or U.S. $9.07 per pound (U.S. $20.38 per kilo) (or equivalent local currency), whichever is greater, unless you declare a higher value for carriage as described below FedEx does not provide cargo liability or all-risk insurance, but you may pay an additional charge to each additional U.S. $100 (or equivalent local currency) of described value for carriage. If a higher value for carriage is declared and the additional charge is paid, FedEx maximum liability will be the lesser of the declared value for carriage or your actual damages.

LIABILITIES NOT ASSUMED. IN ANY EVENT, WE WON'T BE LIABLE FOR ANY DAMAGES WHETHER DIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, IN EXCESS OF THE DECLARED VALUE FOR CARRIAGE (INCLUDING BUT NOT LIMITED TO LOSS OF INCOME OR PROFITS) WHETHER OR NOT WE HAD ANY KNOWLEDGE THAT SUCH DAMAGES MIGHT BE INCURRED, UNLESS SUCH DAMAGES WERE CAUSED BY OUR OWN WILLFUL MICONDUCT OR GROSS NEGLIGENCE.

We won't be liable for your actions or omissions, including but not limited to incorrect declaration of cargo, improper or insufficient packing, securing, marking or addressing of the shipment, or for the acts or omissions of the recipient or anyone else with an interest in the shipment. Also we won't be liable if you (or) the recipient violate any of the terms of our agreement. We won't be liable for loss or damage to shipments of cash, currency or other prohibited items. We won't be liable for loss, damages or delay caused by events we cannot control, including but not limited to acts of God, perils of the air, weather conditions mechanical delays, acts of public enemies, war, strikes, civil commotions, or acts or omissions of public authorities (including customs and health officials) with actual or apparent authority.

NO WARRANTIES. We make no warranties, express or implied.

CLAIM FOR LOSS, DAMAGE FOR DELAY. ALL CLAIMS MUST BE NOTIFIED TO US WITHIN 15 DAYS AFTER DELIVERY OF THE SHIPMENT FAILING WHICH NO ACTION FOR DAMAGES MAY BE BROUGHT. All claims for loss, non-delivery of misdelivery must be received by us within 60 days after the shipment is accepted by us. The right to damages against us shall be extinguished unless an action is brought within two years from the date of delivery of the shipment or from date on which the shipment should have been delivered. Within 30 days after notification to us (of) the claim, it must be documented by sending us all relevant information about it. We are not obligated to act on any claim until all transportation charges have been paid; the claim amount may be deducted from those charges. If the recipient accepts the shipment without noting any damage on the delivery record, we will assume the shipment was delivered in good condition. In order for us to consider a claim for damages, the container(s), original shipping cartons, and packing must be available to us for inspection.

RIGHT TO INSPECT. Your shipment may, at our option or at the request of governmental authorities, be opened and inspected by us or such authorities or us at any time.

CUSTOMS CLEARANCE. It is your responsibility to provide proper customs documentation and confirmation, where required.

EXPORT CONTROL. You authorize Federal Express to act as forwarding agent for you for export control and customs purposes. You hereby certify that all statements and information contained in this air waybill relating to exportation are true and correct. Furthermore, you understand that civil and criminal penalties, including forfeiture and sale, may be imposed for making false or fraudulent statements or for the violation of any United States laws on exportation, including but not limited to, 13 USC Sec. 305; 22 USC Sec 401; 18 USC Sec. 1001; 50 USC app. 2410.

MANDATORY LAW. In order any provision contained or referred to in this air Waybill may be contrary to any applicable international treaty, law governmental regulations, orders or requirements such provision shall remain in effect as a part of our agreement to the extent that it is not overridden. The invalidity or unenforceability of any provision shall not affect any other part of this Air Waybill. Unless otherwise indicated the Sender's address indicated on the face of this Waybill is the place of execution and the place of departure, and Recipient's address listed on the face of this Waybill is the place of destination. Unless otherwise indicated Federal Express Corporation, P.O. Box 727, Memphis, TN 38194 USA is the first carrier of this shipment.

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2142460	**Work Order:**	1808255
Sample ID:	L2142460-1	**Lab ID:**	1808255-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/7/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**		Prep Date: **8/27/2018**		PrepBy: **CXW**
Ra-226	0.0053 (+/- 0.0042)	LT	0.0052	BQ/l	NA	9/5/2018 12:42
Carr: BARIUM	*97.2*		*40-110*	*%REC*	DL = NA	9/5/2018 12:42

Client:	ALS Environmental	**Date:**	*06-Sep-18*
Project:	L2142460	**Work Order:**	1808255
Sample ID:	L2142460-1	**Lab ID:**	1808255-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/7/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180827-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**

Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.81 (+/- 0.454)	0.0111	1.771		102	67-120					P,M3
Carr: BARIUM	15800		16150		98	40-110					

LCSD Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**

Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.49 (+/- 0.374)	0.0142	1.771		84.1	67-120		1.81	0.5	2.1	P,Y1,M3
Carr: BARIUM	16700		16150		103	40-110		15800			Y1

MB Sample ID: **RE180827-1** Units: **BQ/l** Analysis Date: **9/5/2018 12:42**

Client ID: Run ID: **RE180827-1A** Prep Date: **8/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	-0.0010 (+/- 0.0025)	0.0062									U
Carr: BARIUM	16000		16150		99.2	40-110					

The following samples were analyzed in this batch: 1808255-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2142460-COFC

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to 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
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax ap@baffinland.com
Email 2 commercial@baffinland.com

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2142460
ALS Contact:
Sampler: MK/MA/KRR

All E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐
EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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	MMER-DEL	Number of Containers
	MS-06	7-Aug-18	17:30	Water	R	6

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kendra Button	Date: 8-Aug-18	Time: 7:20	Received by:	Date:	Time:	Received by: XP	Date: 10-8-18	Time: 10:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 22-AUG-18
Report Date: 26-SEP-18 14:49 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2151324

Project P.O. #: 4500040417
Job Reference: MS-06 DEL
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2151324-1 MS-06 Sampled By: LM/CM on 18-AUG-18 @ 17:10 Matrix: WATER							
Physical Tests							
Conductivity	1120		3.0	umhos/cm		23-AUG-18	R4181021
pH	6.84		0.10	pH units		19-AUG-18	R4185313
Total Suspended Solids	2.4		2.0	mg/L		19-AUG-18	R4185328
Total Dissolved Solids	878		20	mg/L		22-AUG-18	R4185367
Turbidity	9.77		0.10	NTU		19-AUG-18	R4185334
Anions and Nutrients							
Ammonia, Total (as N)	0.030		0.020	mg/L		23-AUG-18	R4181433
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		23-AUG-18	R4181387
Total Metals							
Aluminum (Al)-Total	0.0171		0.0050	mg/L	22-AUG-18	22-AUG-18	R4180887
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Arsenic (As)-Total	0.00011		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Barium (Ba)-Total	0.0175		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Boron (B)-Total	0.032		0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Cadmium (Cd)-Total	0.0000685		0.0000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Calcium (Ca)-Total	59.9		0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Cesium (Cs)-Total	0.000014		0.000010	mg/L	22-AUG-18	22-AUG-18	R4180887
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Cobalt (Co)-Total	0.0168		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Copper (Cu)-Total	<0.0010		0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Iron (Fe)-Total	2.09		0.010	mg/L	22-AUG-18	22-AUG-18	R4180887
Lead (Pb)-Total	<0.000050		0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Lithium (Li)-Total	0.0190		0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Magnesium (Mg)-Total	109	DLHC	0.050	mg/L	22-AUG-18	23-AUG-18	R4180887
Manganese (Mn)-Total	1.90		0.00050	mg/L	22-AUG-18	23-AUG-18	R4180887
Molybdenum (Mo)-Total	0.000084		0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Nickel (Ni)-Total	0.0235		0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Phosphorus (P)-Total	<0.050		0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Potassium (K)-Total	10.3		0.050	mg/L	22-AUG-18	22-AUG-18	R4180887
Rubidium (Rb)-Total	0.0108		0.00020	mg/L	22-AUG-18	22-AUG-18	R4180887
Selenium (Se)-Total	0.00103		0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Silicon (Si)-Total	0.13		0.10	mg/L	22-AUG-18	22-AUG-18	R4180887
Silver (Ag)-Total	<0.000050		0.000050	mg/L	22-AUG-18	22-AUG-18	R4180887
Sodium (Na)-Total	6.13		0.050	mg/L	22-AUG-18	23-AUG-18	R4180887
Strontium (Sr)-Total	0.0770		0.0010	mg/L	22-AUG-18	22-AUG-18	R4180887
Sulfur (S)-Total	221		0.50	mg/L	22-AUG-18	22-AUG-18	R4180887
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-18	22-AUG-18	R4180887
Thallium (Tl)-Total	0.000038		0.000010	mg/L	22-AUG-18	22-AUG-18	R4180887
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887

* 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
L2151324-1 MS-06 Sampled By: LM/CM on 18-AUG-18 @ 17:10 Matrix: WATER							
Total Metals							
Tin (Sn)-Total	<0.00010		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	22-AUG-18	22-AUG-18	R4180887
Tungsten (W)-Total	<0.00010		0.00010	mg/L	22-AUG-18	22-AUG-18	R4180887
Uranium (U)-Total	0.000196		0.000010	mg/L	22-AUG-18	22-AUG-18	R4180887
Vanadium (V)-Total	<0.00050		0.00050	mg/L	22-AUG-18	22-AUG-18	R4180887
Zinc (Zn)-Total	0.0040		0.0030	mg/L	22-AUG-18	22-AUG-18	R4180887
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	22-AUG-18	22-AUG-18	R4180887
Radiological Parameters							
Ra-226	0.012		0.0097	Bq/L	12-SEP-18	24-SEP-18	R4203163

* 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	Barium (Ba)-Total	MS-B	L2151324-1
Matrix Spike	Boron (B)-Total	MS-B	L2151324-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2151324-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2151324-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2151324-1
Matrix Spike	Potassium (K)-Total	MS-B	L2151324-1
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2151324-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2151324-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2151324-1
Matrix Spike	Sulfur (S)-Total	MS-B	L2151324-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L2151324-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** 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

Reference Information

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2151324 Report Date: 26-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4181387								
WG2857418-3 DUP		**L2150213-1**						
Cyanide, Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	23-AUG-18
WG2857418-2 LCS								
Cyanide, Total			90.1		%		80-120	23-AUG-18
WG2857418-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	23-AUG-18
WG2857418-4 MS		**L2150213-1**						
Cyanide, Total			77.1		%		70-130	23-AUG-18
EC-WT	**Water**							
Batch R4181021								
WG2857499-4 DUP		**WG2857499-3**						
Conductivity		3960	3960		umhos/cm	0.0	10	23-AUG-18
WG2857499-2 LCS								
Conductivity			101.1		%		90-110	23-AUG-18
WG2857499-1 MB								
Conductivity			<3.0		umhos/cm		3	23-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-4 DUP		**WG2856952-3**						
Aluminum (Al)-Total		0.0071	0.0071		mg/L	0.4	20	22-AUG-18
Antimony (Sb)-Total		0.00042	0.00043		mg/L	0.8	20	22-AUG-18
Arsenic (As)-Total		0.00045	0.00045		mg/L	0.9	20	22-AUG-18
Barium (Ba)-Total		0.0653	0.0653		mg/L	0.0	20	22-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-18
Boron (B)-Total		0.075	0.074		mg/L	1.5	20	22-AUG-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	22-AUG-18
Calcium (Ca)-Total		45.0	44.0		mg/L	2.3	20	22-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-AUG-18
Cesium (Cs)-Total		0.000216	0.000224		mg/L	3.9	20	22-AUG-18
Cobalt (Co)-Total		0.00037	0.00037		mg/L	0.9	20	22-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-AUG-18
Iron (Fe)-Total		0.122	0.125		mg/L	2.3	20	22-AUG-18
Lead (Pb)-Total		0.000051	0.000051		mg/L	0.2	20	22-AUG-18
Lithium (Li)-Total		0.0076	0.0075		mg/L	1.4	20	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-4 DUP		**WG2856952-3**						
Magnesium (Mg)-Total		15.1	15.3		mg/L	1.2	20	22-AUG-18
Manganese (Mn)-Total		0.00573	0.00579		mg/L	1.0	20	22-AUG-18
Molybdenum (Mo)-Total		0.00618	0.00608		mg/L	1.8	20	22-AUG-18
Nickel (Ni)-Total		0.00211	0.00206		mg/L	2.6	20	22-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-AUG-18
Potassium (K)-Total		5.13	5.08		mg/L	1.0	20	22-AUG-18
Rubidium (Rb)-Total		0.0124	0.0122		mg/L	1.4	20	22-AUG-18
Selenium (Se)-Total		0.000079	0.000099	J	mg/L	0.000019	0.0001	22-AUG-18
Silicon (Si)-Total		0.36	0.37		mg/L	2.5	20	22-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-18
Sodium (Na)-Total		59.2	60.2		mg/L	1.7	20	22-AUG-18
Strontium (Sr)-Total		0.435	0.420		mg/L	3.4	20	22-AUG-18
Sulfur (S)-Total		21.8	22.1		mg/L	1.4	25	22-AUG-18
Thallium (Tl)-Total		0.000057	0.000047		mg/L	19	20	22-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	22-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	22-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-18
Uranium (U)-Total		0.000028	0.000026		mg/L	6.3	20	22-AUG-18
Vanadium (V)-Total		0.00052	0.00056		mg/L	6.8	20	22-AUG-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2856952-2 LCS								
Aluminum (Al)-Total			100.7		%		80-120	22-AUG-18
Antimony (Sb)-Total			104.9		%		80-120	22-AUG-18
Arsenic (As)-Total			101.8		%		80-120	22-AUG-18
Barium (Ba)-Total			103.9		%		80-120	22-AUG-18
Beryllium (Be)-Total			100.3		%		80-120	22-AUG-18
Bismuth (Bi)-Total			100.5		%		80-120	22-AUG-18
Boron (B)-Total			92.6		%		80-120	22-AUG-18
Cadmium (Cd)-Total			97.8		%		80-120	22-AUG-18
Calcium (Ca)-Total			100.9		%		80-120	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-2 LCS								
Chromium (Cr)-Total			100.5		%		80-120	22-AUG-18
Cesium (Cs)-Total			99.1		%		80-120	22-AUG-18
Cobalt (Co)-Total			99.1		%		80-120	22-AUG-18
Copper (Cu)-Total			100.6		%		80-120	22-AUG-18
Iron (Fe)-Total			98.8		%		80-120	22-AUG-18
Lead (Pb)-Total			100.1		%		80-120	22-AUG-18
Lithium (Li)-Total			93.3		%		80-120	22-AUG-18
Magnesium (Mg)-Total			104.7		%		80-120	22-AUG-18
Manganese (Mn)-Total			99.4		%		80-120	22-AUG-18
Molybdenum (Mo)-Total			99.0		%		80-120	22-AUG-18
Nickel (Ni)-Total			100.5		%		80-120	22-AUG-18
Phosphorus (P)-Total			105.6		%		70-130	22-AUG-18
Potassium (K)-Total			96.9		%		80-120	22-AUG-18
Rubidium (Rb)-Total			99.8		%		80-120	22-AUG-18
Selenium (Se)-Total			100.4		%		80-120	22-AUG-18
Silicon (Si)-Total			100.7		%		60-140	22-AUG-18
Silver (Ag)-Total			101.5		%		80-120	22-AUG-18
Sodium (Na)-Total			107.4		%		80-120	22-AUG-18
Strontium (Sr)-Total			100.3		%		80-120	22-AUG-18
Sulfur (S)-Total			95.1		%		80-120	22-AUG-18
Thallium (Tl)-Total			96.6		%		80-120	22-AUG-18
Tellurium (Te)-Total			99.2		%		80-120	22-AUG-18
Thorium (Th)-Total			98.3		%		70-130	22-AUG-18
Tin (Sn)-Total			98.7		%		80-120	22-AUG-18
Titanium (Ti)-Total			98.2		%		80-120	22-AUG-18
Tungsten (W)-Total			97.4		%		80-120	22-AUG-18
Uranium (U)-Total			97.1		%		80-120	22-AUG-18
Vanadium (V)-Total			102.7		%		80-120	22-AUG-18
Zinc (Zn)-Total			93.5		%		80-120	22-AUG-18
Zirconium (Zr)-Total			94.4		%		80-120	22-AUG-18
WG2856952-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	22-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	22-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	22-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	22-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	22-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	22-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	22-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	22-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	22-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	22-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	22-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	22-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	22-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	22-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	22-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	22-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	22-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	22-AUG-18
WG2856952-5 MS		**WG2856952-6**						
Aluminum (Al)-Total			113.7		%		70-130	22-AUG-18
Antimony (Sb)-Total			98.7		%		70-130	22-AUG-18
Arsenic (As)-Total			99.8		%		70-130	22-AUG-18
Barium (Ba)-Total			N/A	MS-B	%		-	22-AUG-18
Beryllium (Be)-Total			101.0		%		70-130	22-AUG-18
Bismuth (Bi)-Total			92.5		%		70-130	22-AUG-18
Boron (B)-Total			N/A	MS-B	%		-	22-AUG-18
Cadmium (Cd)-Total			96.5		%		70-130	22-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	22-AUG-18
Chromium (Cr)-Total			99.7		%		70-130	22-AUG-18
Cesium (Cs)-Total			94.3		%		70-130	22-AUG-18
Cobalt (Co)-Total			97.4		%		70-130	22-AUG-18
Copper (Cu)-Total			97.5		%		70-130	22-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	22-AUG-18
Lead (Pb)-Total			91.7		%		70-130	22-AUG-18
Lithium (Li)-Total			89.8		%		70-130	22-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-AUG-18
Manganese (Mn)-Total			108.8		%		70-130	22-AUG-18
Molybdenum (Mo)-Total			93.0		%		70-130	22-AUG-18
Nickel (Ni)-Total			94.8		%		70-130	22-AUG-18
Phosphorus (P)-Total			112.3		%		70-130	22-AUG-18
Potassium (K)-Total			N/A	MS-B	%		-	22-AUG-18
Rubidium (Rb)-Total			N/A	MS-B	%		-	22-AUG-18
Selenium (Se)-Total			97.7		%		70-130	22-AUG-18
Silicon (Si)-Total			104.0		%		70-130	22-AUG-18
Silver (Ag)-Total			93.2		%		70-130	22-AUG-18
Sodium (Na)-Total			N/A	MS-B	%		-	22-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	22-AUG-18
Sulfur (S)-Total			N/A	MS-B	%		-	22-AUG-18
Thallium (Tl)-Total			89.3		%		70-130	22-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4180887								
WG2856952-5 MS		**WG2856952-6**						
Tellurium (Te)-Total			89.7		%		70-130	22-AUG-18
Thorium (Th)-Total			91.2		%		70-130	22-AUG-18
Tin (Sn)-Total			94.8		%		70-130	22-AUG-18
Titanium (Ti)-Total			102.2		%		70-130	22-AUG-18
Tungsten (W)-Total			93.8		%		70-130	22-AUG-18
Uranium (U)-Total			93.4		%		70-130	22-AUG-18
Vanadium (V)-Total			103.0		%		70-130	22-AUG-18
Zinc (Zn)-Total			111.2		%		70-130	22-AUG-18
Zirconium (Zr)-Total			87.8		%		70-130	22-AUG-18
NH3-WT	**Water**							
Batch R4181433								
WG2858035-11 DUP		**L2151114-1**						
Ammonia, Total (as N)		11.6	11.5		mg/L	0.9	20	23-AUG-18
WG2858035-10 LCS								
Ammonia, Total (as N)			99.6		%		85-115	23-AUG-18
WG2858035-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	23-AUG-18
WG2858035-12 MS		**L2151114-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	23-AUG-18
PH-BF	**Water**							
Batch R4185313								
WG2861003-2 DUP		**WG2861003-3**						
pH		8.74	8.73	J	pH units	0.01	0.2	19-AUG-18
WG2861003-1 LCS								
pH			6.98		pH units		6.9-7.1	19-AUG-18
SOLIDS-TDS-BF	**Water**							
Batch R4185367								
WG2861006-3 DUP		**WG2861006-4**						
Total Dissolved Solids		<20	<20	RPD-NA	mg/L	N/A	20	22-AUG-18
WG2861006-2 LCS								
Total Dissolved Solids			102.9		%		85-115	22-AUG-18
WG2861006-1 MB								
Total Dissolved Solids			<20		mg/L		20	22-AUG-18
SOLIDS-TSS-BF	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R4185328								
WG2861005-3 DUP		**WG2861005-4**						
Total Suspended Solids		15.6	14.0		mg/L	11	25	19-AUG-18
WG2861005-2 LCS								
Total Suspended Solids			99.8		%		85-115	19-AUG-18
WG2861005-1 MB								
Total Suspended Solids			<2.0		mg/L		2	19-AUG-18
TURBIDITY-BF	**Water**							
Batch R4185334								
WG2861009-3 DUP		**WG2861009-4**						
Turbidity		4.64	4.56		NTU	1.7	15	19-AUG-18
WG2861009-2 LCS								
Turbidity			113.0		%		85-115	19-AUG-18
WG2861009-1 MB								
Turbidity			<0.10		NTU		0.1	19-AUG-18

Quality Control Report

Workorder: L2151324 Report Date: 26-SEP-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Tuesday, September 25, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808529
Project Name:
Project Number: L2151324

Dear Mr. Hawthorne:

One water sample was received from ALS Environmental, on 8/27/2018. The sample was scheduled for the following analysis:

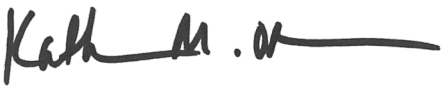
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808529

Radium-226:
The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808529
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2151324
Client PO Number: L2151324

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2151324-1	1808529-1		WATER	18-Aug-18	

ALS Environmental

L2151324

WATERLOO

1808529

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2151324*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 1 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2151324-1 MS-06		8/18/2018	E
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/10/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: KELLY-JEAN SMITH Date Received: 8-27-18 1330

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS WATERLOO Workorder No: 1808529

Project Manager: KMO Initials: KG Date: 8-27-18

1.	Are airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1						
Temperature (°C):	AMB						
No. of custody seals on cooler:	0						
DOT Survey/ Acceptance Information — External µR/hr reading:	11						
DOT Survey/ Acceptance Information — Background µR/hr reading:	11						

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES** / NO / NA (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

If applicable, was the client contacted? **YES** / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 8/28/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

180529

EXPR ...LDWIDE WPX DHL

Origin: YHM

11-0

...
60 Northland R...
Unit 1
N2... 2B6 WATERL... ON
Canada

Contact: +15198866910

To: ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+18004431511

80524 FORT COLLINS CO
United States of America

US – DEN – DEN

C [redacted] Day Time

Ref:

Pce/Shpt Weight 14.4 lbs

Piece 1/1

ALS
Environmental
alsglobal.com

Contents: Water Samples

WAYBILL 18 8621 9871

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*25-Sep-18*
Project:	L2151324	**Work Order:**	1808529
Sample ID:	L2151324-1	**Lab ID:**	1808529-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/18/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **9/12/2018**	PrepBy: **CXW**
Ra-226	**0.012 (+/- 0.0081)**		**0.0097**	**BQ/l**	NA	9/24/2018 13:48
Carr: BARIUM	*70.1*		*40-110*	*%REC*	DL = NA	9/24/2018 13:48

Client:	ALS Environmental	**Date:**	*25-Sep-18*
Project:	L2151324	**Work Order:**	1808529
Sample ID:	L2151324-1	**Lab ID:**	1808529-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/18/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180912-3-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180912-3** Units: **BQ/l** Analysis Date: **9/24/2018 14:26**

Client ID: Run ID: **RE180912-3A** Prep Date: **9/12/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.95 (+/- 0.485)	0.00902	1.771		110	67-120					P
Carr: BARIUM	16800		17410		96.3	40-110					

MB Sample ID: **RE180912-3** Units: **BQ/l** Analysis Date: **9/24/2018 14:26**

Client ID: Run ID: **RE180912-3A** Prep Date: **9/12/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	-0.0014 (+/- 0.0033)	0.0072									U
Carr: BARIUM	16200		17410		92.8	40-110					

The following samples were analyzed in this batch: 1808529-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L2151324-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2: commercial@baffinland.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☑ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MMER
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2151324

ALS Contact:

Sampler: LM/CM

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-MMER-DEL	Number of Containers
	MS-06	18-Aug-18	17:10	Water	E1	5

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			10.8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Ben Widdowson	Date: 19-Aug-18	Time: 10:35	Received by:	Date:	Time:	Received by:	Date: 20-8-18	Time: 15:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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: William Bowden/Connor Devereaux
2275 Upper Middle Rd. E.
Suite #300
Oakville ON L6H 0C3

Date Received: 30-AUG-18
Report Date: 09-OCT-18 14:30 (MT)
Version: FINAL

Client Phone: 647-253-0596

Certificate of Analysis

Lab Work Order #: L2154892

Project P.O. #: 4500040417
Job Reference: MS-06 TOX EFF
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2154892-1 MS-08-US Sampled By: BW/KR/LK on 28-AUG-18 @ 16:15 Matrix: WATER							
Physical Tests							
Conductivity	138		3.0	umhos/cm		30-AUG-18	R4195064
Hardness (as CaCO3)	64	HTC	10	mg/L		01-SEP-18	
pH	8.03		0.10	pH units		29-AUG-18	R4192090
Total Suspended Solids	<2.0		2.0	mg/L		30-AUG-18	R4194006
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	60		10	mg/L		31-AUG-18	R4195535
Ammonia, Total (as N)	<0.020		0.020	mg/L		11-SEP-18	R4211788
Chloride (Cl)	5.65		0.50	mg/L		03-SEP-18	R4200607
Fluoride (F)	0.027		0.020	mg/L		03-SEP-18	R4200607
Nitrate (as N)	<0.020		0.020	mg/L		03-SEP-18	R4200607
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	10-SEP-18	11-SEP-18	R4210669
Phosphorus, Total	<0.0030		0.0030	mg/L	12-SEP-18	13-SEP-18	R4214797
Sulfate (SO4)	1.76		0.30	mg/L		03-SEP-18	R4200607
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.80		0.50	mg/L		13-SEP-18	R4217287
Total Organic Carbon	1.58		0.50	mg/L		18-SEP-18	R4225532
Total Metals							
Aluminum (Al)-Total	0.142		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Barium (Ba)-Total	0.00905		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Boron (B)-Total	<0.010		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Calcium (Ca)-Total	13.4		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cesium (Cs)-Total	0.000015		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Copper (Cu)-Total	<0.0010		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Iron (Fe)-Total	0.079		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Lead (Pb)-Total	0.000075		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Lithium (Li)-Total	<0.0010		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Magnesium (Mg)-Total	7.35		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Manganese (Mn)-Total	0.00087		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		04-SEP-18	R4198396
Molybdenum (Mo)-Total	0.000310		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Phosphorus (P)-Total	<0.050		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Potassium (K)-Total	0.881		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Rubidium (Rb)-Total	0.00164		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Selenium (Se)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543

* 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
L2154892-1 MS-08-US Sampled By: BW/KR/LK on 28-AUG-18 @ 16:15 Matrix: WATER							
Total Metals							
Silicon (Si)-Total	0.99		0.10	mg/L	31-AUG-18	31-AUG-18	R4195543
Silver (Ag)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Sodium (Na)-Total	1.85		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Strontium (Sr)-Total	0.0131		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Sulfur (S)-Total	0.64		0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Thorium (Th)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Tin (Sn)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Titanium (Ti)-Total	0.00446		0.00030	mg/L	31-AUG-18	31-AUG-18	R4195543
Tungsten (W)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Uranium (U)-Total	0.00243		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Vanadium (V)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-AUG-18	31-AUG-18	R4195543
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	31-AUG-18	31-AUG-18	R4195543
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					03-SEP-18	R4196511
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	03-SEP-18	03-SEP-18	R4196652
Radiological Parameters							
Ra-226	<0.0056		0.0056	Bq/L	27-SEP-18	04-OCT-18	R4252755
L2154892-2 MS-06-DS Sampled By: BW/KR/LK on 28-AUG-18 @ 15:50 Matrix: WATER							
Physical Tests							
Conductivity	208		3.0	umhos/cm		30-AUG-18	R4195064
Hardness (as CaCO3)	87	HTC	10	mg/L		01-SEP-18	
pH	8.14		0.10	pH units		29-AUG-18	R4192090
Total Suspended Solids	<2.0		2.0	mg/L		30-AUG-18	R4194006
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	67		10	mg/L		31-AUG-18	R4195535
Ammonia, Total (as N)	<0.020		0.020	mg/L		11-SEP-18	R4211788
Chloride (Cl)	7.09		0.50	mg/L		03-SEP-18	R4200607
Fluoride (F)	0.028		0.020	mg/L		03-SEP-18	R4200607
Nitrate (as N)	1.42		0.020	mg/L		03-SEP-18	R4200607
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	10-SEP-18	11-SEP-18	R4210669
Phosphorus, Total	0.0044		0.0030	mg/L	12-SEP-18	13-SEP-18	R4214797
Sulfate (SO4)	21.7		0.30	mg/L		03-SEP-18	R4200607
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.20		0.50	mg/L		13-SEP-18	R4217287
Total Organic Carbon	1.86		0.50	mg/L		18-SEP-18	R4225532
Total Metals							
Aluminum (Al)-Total	0.129		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543

* 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
L2154892-2 MS-06-DS Sampled By: BW/KR/LK on 28-AUG-18 @ 15:50 Matrix: WATER							
Total Metals							
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Barium (Ba)-Total	0.0114		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Boron (B)-Total	<0.010		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Cadmium (Cd)-Total	0.0000120		0.0000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Calcium (Ca)-Total	17.1		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cesium (Cs)-Total	0.000017		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cobalt (Co)-Total	0.00017		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Copper (Cu)-Total	0.0013		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Iron (Fe)-Total	0.088		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Lead (Pb)-Total	0.000124		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Lithium (Li)-Total	0.0013		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Magnesium (Mg)-Total	10.9		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Manganese (Mn)-Total	0.00658		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		04-SEP-18	R4198396
Molybdenum (Mo)-Total	0.000573		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Nickel (Ni)-Total	0.00103		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Phosphorus (P)-Total	<0.050		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Potassium (K)-Total	1.40		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Rubidium (Rb)-Total	0.00193		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Selenium (Se)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Silicon (Si)-Total	0.99		0.10	mg/L	31-AUG-18	31-AUG-18	R4195543
Silver (Ag)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Sodium (Na)-Total	5.43		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Strontium (Sr)-Total	0.0186		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Sulfur (S)-Total	7.31		0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Thorium (Th)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Tin (Sn)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Titanium (Ti)-Total	0.00487		0.00030	mg/L	31-AUG-18	31-AUG-18	R4195543
Tungsten (W)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Uranium (U)-Total	0.00242		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Vanadium (V)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	31-AUG-18	31-AUG-18	R4195543
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	31-AUG-18	31-AUG-18	R4195543
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					03-SEP-18	R4196511

* 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
L2154892-2 MS-06-DS Sampled By: BW/KR/LK on 28-AUG-18 @ 15:50 Matrix: WATER							
Dissolved Metals							
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	03-SEP-18	03-SEP-18	R4196652
Radiological Parameters							
Ra-226	<0.0062		0.0062	Bq/L	27-SEP-18	04-OCT-18	R4252755
L2154892-3 MS-06 Sampled By: BW/KR/LK on 28-AUG-18 @ 16:25 Matrix: WATER							
Physical Tests							
Conductivity	1060		3.0	umhos/cm		30-AUG-18	R4195064
Hardness (as CaCO3)	574		10	mg/L		01-SEP-18	
pH	7.37		0.10	pH units		29-AUG-18	R4192090
Total Suspended Solids	4.0		2.0	mg/L		30-AUG-18	R4194006
Total Dissolved Solids	900		20	mg/L		30-AUG-18	R4194011
Anions and Nutrients							
Acidity (as CaCO3)	3.0		2.0	mg/L		25-SEP-18	R4241791
Alkalinity, Total (as CaCO3)	24		10	mg/L		31-AUG-18	R4195535
Ammonia, Total (as N)	0.040		0.020	mg/L		11-SEP-18	R4211788
Chloride (Cl)	15.3		0.50	mg/L		03-SEP-18	R4200607
Fluoride (F)	0.044		0.020	mg/L		03-SEP-18	R4200607
Nitrate (as N)	4.35		0.020	mg/L		03-SEP-18	R4200607
Total Kjeldahl Nitrogen	<0.15	TKNI	0.15	mg/L	10-SEP-18	11-SEP-18	R4210669
Phosphorus, Total	<0.030	DLM	0.030	mg/L	21-SEP-18	24-SEP-18	R4234932
Sulfate (SO4)	539		0.30	mg/L		03-SEP-18	R4200607
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		05-SEP-18	R4203792
Organic / Inorganic Carbon							
Dissolved Organic Carbon	0.85		0.50	mg/L		13-SEP-18	R4217287
Total Organic Carbon	1.01		0.50	mg/L		18-SEP-18	R4225532
Total Metals							
Aluminum (Al)-Total	0.0842		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Arsenic (As)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Barium (Ba)-Total	0.0170		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Boron (B)-Total	0.023		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543
Cadmium (Cd)-Total	0.0000553		0.0000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Calcium (Ca)-Total	49.7		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cesium (Cs)-Total	0.000016		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Cobalt (Co)-Total	0.00903		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Copper (Cu)-Total	0.0113		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Iron (Fe)-Total	0.333		0.010	mg/L	31-AUG-18	31-AUG-18	R4195543

* 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
L2154892-3 MS-06 Sampled By: BW/KR/LK on 28-AUG-18 @ 16:25 Matrix: WATER							
Total Metals							
Lead (Pb)-Total	0.000572		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Lithium (Li)-Total	0.0142		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Magnesium (Mg)-Total	101		0.0050	mg/L	31-AUG-18	31-AUG-18	R4195543
Manganese (Mn)-Total	1.62		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		04-SEP-18	R4198396
Molybdenum (Mo)-Total	0.000123		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Nickel (Ni)-Total	0.0168		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Phosphorus (P)-Total	<0.050		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Potassium (K)-Total	8.84		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Rubidium (Rb)-Total	0.0114		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Selenium (Se)-Total	0.000870		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Silicon (Si)-Total	0.19		0.10	mg/L	31-AUG-18	31-AUG-18	R4195543
Silver (Ag)-Total	<0.000050		0.000050	mg/L	31-AUG-18	31-AUG-18	R4195543
Sodium (Na)-Total	5.02		0.050	mg/L	31-AUG-18	31-AUG-18	R4195543
Strontium (Sr)-Total	0.0714		0.0010	mg/L	31-AUG-18	31-AUG-18	R4195543
Sulfur (S)-Total	181		0.50	mg/L	31-AUG-18	31-AUG-18	R4195543
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	31-AUG-18	31-AUG-18	R4195543
Thallium (Tl)-Total	0.000035		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Thorium (Th)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Tin (Sn)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Titanium (Ti)-Total	<0.0035	DLUI	0.0035	mg/L	31-AUG-18	31-AUG-18	R4195543
Tungsten (W)-Total	<0.00010		0.00010	mg/L	31-AUG-18	31-AUG-18	R4195543
Uranium (U)-Total	0.000130		0.000010	mg/L	31-AUG-18	31-AUG-18	R4195543
Vanadium (V)-Total	<0.00050		0.00050	mg/L	31-AUG-18	31-AUG-18	R4195543
Zinc (Zn)-Total	0.0073		0.0030	mg/L	31-AUG-18	31-AUG-18	R4195543
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	31-AUG-18	31-AUG-18	R4195543
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					03-SEP-18	R4196511
Dissolved Metals Filtration Location	FIELD					30-AUG-18	R4194629
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	30-AUG-18	30-AUG-18	R4196136
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Barium (Ba)-Dissolved	0.0163		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Bismuth (Bi)-Dissolved	<0.000050		0.000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Boron (B)-Dissolved	0.024		0.010	mg/L	30-AUG-18	31-AUG-18	R4196136
Cadmium (Cd)-Dissolved	0.0000568		0.0000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Calcium (Ca)-Dissolved	54.9		0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Cesium (Cs)-Dissolved	0.000013		0.000010	mg/L	30-AUG-18	30-AUG-18	R4196136
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	30-AUG-18	30-AUG-18	R4196136
Cobalt (Co)-Dissolved	0.00867		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136

* 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
L2154892-3 MS-06 Sampled By: BW/KR/LK on 28-AUG-18 @ 16:25 Matrix: WATER							
Dissolved Metals							
Copper (Cu)-Dissolved	0.00038		0.00020	mg/L	30-AUG-18	30-AUG-18	R4196136
Iron (Fe)-Dissolved	0.013		0.010	mg/L	30-AUG-18	30-AUG-18	R4196136
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Lithium (Li)-Dissolved	0.0156		0.0010	mg/L	30-AUG-18	30-AUG-18	R4196136
Magnesium (Mg)-Dissolved	106	DLHC	0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Manganese (Mn)-Dissolved	1.54		0.00050	mg/L	30-AUG-18	30-AUG-18	R4196136
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	03-SEP-18	03-SEP-18	R4196652
Molybdenum (Mo)-Dissolved	0.000096		0.000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Nickel (Ni)-Dissolved	0.0162		0.00050	mg/L	30-AUG-18	30-AUG-18	R4196136
Phosphorus (P)-Dissolved	<0.050		0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Potassium (K)-Dissolved	9.37		0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Rubidium (Rb)-Dissolved	0.0111		0.00020	mg/L	30-AUG-18	30-AUG-18	R4196136
Selenium (Se)-Dissolved	0.000880		0.000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Silicon (Si)-Dissolved	<0.050		0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Silver (Ag)-Dissolved	<0.000050		0.000050	mg/L	30-AUG-18	30-AUG-18	R4196136
Sodium (Na)-Dissolved	5.34		0.050	mg/L	30-AUG-18	30-AUG-18	R4196136
Strontium (Sr)-Dissolved	0.0705		0.0010	mg/L	30-AUG-18	30-AUG-18	R4196136
Sulfur (S)-Dissolved	196		0.50	mg/L	30-AUG-18	30-AUG-18	R4196136
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	30-AUG-18	30-AUG-18	R4196136
Thallium (Tl)-Dissolved	0.000031		0.000010	mg/L	30-AUG-18	30-AUG-18	R4196136
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Tin (Sn)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	30-AUG-18	30-AUG-18	R4196136
Tungsten (W)-Dissolved	<0.00010		0.00010	mg/L	30-AUG-18	30-AUG-18	R4196136
Uranium (U)-Dissolved	0.000091		0.000010	mg/L	30-AUG-18	30-AUG-18	R4196136
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	30-AUG-18	30-AUG-18	R4196136
Zinc (Zn)-Dissolved	0.0047		0.0010	mg/L	30-AUG-18	30-AUG-18	R4196136
Zirconium (Zr)-Dissolved	<0.00030		0.00030	mg/L	30-AUG-18	30-AUG-18	R4196136
Radiological Parameters							
Ra-226	0.011		0.0068	Bq/L	27-SEP-18	04-OCT-18	R4252755

* 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	Arsenic (As)-Dissolved	MS-B	L2154892-3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2154892-3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2154892-3
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2154892-3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2154892-3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2154892-3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2154892-3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2154892-3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2154892-3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2154892-3
Matrix Spike	Aluminum (Al)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Iron (Fe)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Uranium (U)-Total	MS-B	L2154892-1, -2, -3
Matrix Spike	Ammonia, Total (as N)	MS-B	L2154892-1, -2, -3
Matrix Spike	Phosphorus, Total	MS-B	L2154892-1, -2
Matrix Spike	Phosphorus, Total	MS-B	L2154892-3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLUI	Detection Limit Raised: Unknown Interference generated an apparent false positive test result.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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).

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

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).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** 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

Reference Information

WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, 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: L2154892 Report Date: 09-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3

Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R4241791								
WG2885863-3 DUP		**L2154892-3**						
Acidity (as CaCO3)		3.0	2.7		mg/L	11	20	25-SEP-18
WG2885863-2 LCS								
Acidity (as CaCO3)			98.4		%		85-115	25-SEP-18
WG2885863-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	25-SEP-18
ALK-WT	**Water**							
Batch R4195535								
WG2865169-11 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			95.2		%		80-120	31-AUG-18
WG2865169-12 DUP		**L2154892-3**						
Alkalinity, Total (as CaCO3)		24	23		mg/L	6.0	20	31-AUG-18
WG2865169-10 LCS								
Alkalinity, Total (as CaCO3)			97.7		%		85-115	31-AUG-18
WG2865169-9 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	31-AUG-18
C-DIS-ORG-WT	**Water**							
Batch R4217287								
WG2876302-3 DUP		**L2154892-1**						
Dissolved Organic Carbon		1.80	1.91		mg/L	5.7	20	13-SEP-18
WG2876302-2 LCS								
Dissolved Organic Carbon			99.8		%		80-120	13-SEP-18
WG2876302-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	13-SEP-18
WG2876302-4 MS		**L2154892-1**						
Dissolved Organic Carbon			95.5		%		70-130	13-SEP-18
CL-IC-N-WT	**Water**							
Batch R4200607								
WG2866628-4 DUP		**WG2866628-3**						
Chloride (Cl)		5.62	5.91		mg/L	5.0	20	03-SEP-18
WG2866628-2 LCS								
Chloride (Cl)			100.5		%		90-110	03-SEP-18
WG2866628-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	03-SEP-18
WG2866628-5 MS		**WG2866628-3**						
Chloride (Cl)			106.3		%		75-125	03-SEP-18
CN-TOT-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R4203792								
WG2867942-3 DUP		**L2156654-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	05-SEP-18
WG2867942-2 LCS								
Cyanide, Total			87.9		%		80-120	05-SEP-18
WG2867942-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	05-SEP-18
WG2867942-4 MS		**L2156654-1**						
Cyanide, Total			78.6		%		70-130	05-SEP-18
EC-WT	**Water**							
Batch R4195064								
WG2863795-16 DUP		**WG2863795-15**						
Conductivity		5970	5970		umhos/cm	0.0	10	30-AUG-18
WG2863795-20 DUP		**WG2863795-19**						
Conductivity		1060	1060		umhos/cm	0.0	10	30-AUG-18
WG2863795-14 LCS								
Conductivity			99.4		%		90-110	30-AUG-18
WG2863795-18 LCS								
Conductivity			99.8		%		90-110	30-AUG-18
WG2863795-13 MB								
Conductivity			<3.0		umhos/cm		3	30-AUG-18
WG2863795-17 MB								
Conductivity			<3.0		umhos/cm		3	30-AUG-18
F-IC-N-WT	**Water**							
Batch R4200607								
WG2866628-4 DUP		**WG2866628-3**						
Fluoride (F)		0.026	0.026		mg/L	1.8	20	03-SEP-18
WG2866628-2 LCS								
Fluoride (F)			99.9		%		90-110	03-SEP-18
WG2866628-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	03-SEP-18
WG2866628-5 MS		**WG2866628-3**						
Fluoride (F)			102.2		%		75-125	03-SEP-18
HG-D-CVAA-WT	**Water**							
Batch R4196652								
WG2866607-3 DUP		**L2153983-9**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	03-SEP-18
WG2866607-2 LCS								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	**Water**							
Batch R4196652								
WG2866607-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	03-SEP-18
WG2866607-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-18
WG2866607-4 MS		**L2153983-10**						
Mercury (Hg)-Dissolved			102.6		%		70-130	03-SEP-18
HG-T-CVAA-WT	**Water**							
Batch R4198396								
WG2866627-4 DUP		**WG2866627-3**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-SEP-18
WG2866627-2 LCS								
Mercury (Hg)-Total			102.0		%		80-120	04-SEP-18
WG2866627-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	04-SEP-18
WG2866627-6 MS		**WG2866627-5**						
Mercury (Hg)-Total			101.9		%		70-130	04-SEP-18
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-4 DUP		**WG2864503-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-AUG-18
Antimony (Sb)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Arsenic (As)-Dissolved		0.0829	0.0817		mg/L	1.5	20	30-AUG-18
Barium (Ba)-Dissolved		0.218	0.212		mg/L	2.7	20	30-AUG-18
Beryllium (Be)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-AUG-18
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	31-AUG-18
Cadmium (Cd)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	30-AUG-18
Calcium (Ca)-Dissolved		64.0	59.5		mg/L	7.3	20	30-AUG-18
Cesium (Cs)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-AUG-18
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-AUG-18
Cobalt (Co)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	30-AUG-18
Iron (Fe)-Dissolved		3.96	3.93		mg/L	0.6	20	30-AUG-18
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-AUG-18
Lithium (Li)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-4 DUP		**WG2864503-3**						
Magnesium (Mg)-Dissolved		8.60	8.57		mg/L	0.3	20	30-AUG-18
Manganese (Mn)-Dissolved		0.170	0.168		mg/L	1.2	20	30-AUG-18
Molybdenum (Mo)-Dissolved		0.00271	0.00266		mg/L	2.1	20	30-AUG-18
Nickel (Ni)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-AUG-18
Phosphorus (P)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-AUG-18
Potassium (K)-Dissolved		1.85	1.88		mg/L	1.6	20	30-AUG-18
Rubidium (Rb)-Dissolved		0.0031	0.0028		mg/L	8.8	20	30-AUG-18
Selenium (Se)-Dissolved		0.00060	<0.00050	RPD-NA	mg/L	N/A	20	30-AUG-18
Silicon (Si)-Dissolved		9.05	8.99		mg/L	0.7	20	30-AUG-18
Silver (Ag)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-AUG-18
Sodium (Na)-Dissolved		860	902		mg/L	4.8	20	30-AUG-18
Strontium (Sr)-Dissolved		0.168	0.161		mg/L	3.9	20	30-AUG-18
Sulfur (S)-Dissolved		<5.0	<5.0	RPD-NA	mg/L	N/A	20	30-AUG-18
Tellurium (Te)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	30-AUG-18
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-AUG-18
Thorium (Th)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Tin (Sn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Titanium (Ti)-Dissolved		0.0057	0.0054		mg/L	4.0	20	30-AUG-18
Tungsten (W)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-18
Uranium (U)-Dissolved		0.00031	0.00030		mg/L	4.7	20	30-AUG-18
Vanadium (V)-Dissolved		0.0071	0.0070		mg/L	1.3	20	30-AUG-18
Zinc (Zn)-Dissolved		0.016	<0.010	RPD-NA	mg/L	N/A	20	30-AUG-18
Zirconium (Zr)-Dissolved		0.0048	0.0046		mg/L	3.9	20	30-AUG-18
WG2864503-2 LCS								
Aluminum (Al)-Dissolved			94.6		%		80-120	30-AUG-18
Antimony (Sb)-Dissolved			95.8		%		80-120	30-AUG-18
Arsenic (As)-Dissolved			91.2		%		80-120	30-AUG-18
Barium (Ba)-Dissolved			87.8		%		80-120	30-AUG-18
Beryllium (Be)-Dissolved			97.6		%		80-120	30-AUG-18
Bismuth (Bi)-Dissolved			98.3		%		80-120	30-AUG-18
Boron (B)-Dissolved			93.5		%		80-120	31-AUG-18
Cadmium (Cd)-Dissolved			98.6		%		80-120	30-AUG-18
Calcium (Ca)-Dissolved			99.0		%		80-120	30-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-2 LCS								
Cesium (Cs)-Dissolved			98.0		%		80-120	30-AUG-18
Chromium (Cr)-Dissolved			92.2		%		80-120	30-AUG-18
Cobalt (Co)-Dissolved			92.0		%		80-120	30-AUG-18
Copper (Cu)-Dissolved			91.3		%		80-120	30-AUG-18
Iron (Fe)-Dissolved			92.2		%		80-120	30-AUG-18
Lead (Pb)-Dissolved			98.0		%		80-120	30-AUG-18
Lithium (Li)-Dissolved			99.2		%		80-120	30-AUG-18
Magnesium (Mg)-Dissolved			93.4		%		80-120	30-AUG-18
Manganese (Mn)-Dissolved			91.5		%		80-120	30-AUG-18
Molybdenum (Mo)-Dissolved			101.2		%		80-120	30-AUG-18
Nickel (Ni)-Dissolved			93.1		%		80-120	30-AUG-18
Phosphorus (P)-Dissolved			93.7		%		80-120	30-AUG-18
Potassium (K)-Dissolved			89.3		%		80-120	30-AUG-18
Rubidium (Rb)-Dissolved			96.2		%		80-120	30-AUG-18
Selenium (Se)-Dissolved			101.8		%		80-120	30-AUG-18
Silicon (Si)-Dissolved			102.0		%		60-140	30-AUG-18
Silver (Ag)-Dissolved			93.9		%		80-120	30-AUG-18
Sodium (Na)-Dissolved			93.7		%		80-120	30-AUG-18
Strontium (Sr)-Dissolved			101.0		%		80-120	30-AUG-18
Sulfur (S)-Dissolved			102.3		%		80-120	30-AUG-18
Tellurium (Te)-Dissolved			96.7		%		80-120	30-AUG-18
Thallium (Tl)-Dissolved			94.1		%		80-120	30-AUG-18
Thorium (Th)-Dissolved			97.4		%		80-120	30-AUG-18
Tin (Sn)-Dissolved			97.6		%		80-120	30-AUG-18
Titanium (Ti)-Dissolved			87.1		%		80-120	30-AUG-18
Tungsten (W)-Dissolved			95.8		%		80-120	30-AUG-18
Uranium (U)-Dissolved			99.8		%		80-120	30-AUG-18
Vanadium (V)-Dissolved			93.6		%		80-120	30-AUG-18
Zinc (Zn)-Dissolved			89.7		%		80-120	30-AUG-18
Zirconium (Zr)-Dissolved			97.3		%		80-120	30-AUG-18
WG2864503-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	30-AUG-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-1 MB								
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	30-AUG-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	31-AUG-18
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	30-AUG-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	30-AUG-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	30-AUG-18
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	30-AUG-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	30-AUG-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	30-AUG-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	30-AUG-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	30-AUG-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	30-AUG-18
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	30-AUG-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	30-AUG-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	30-AUG-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	30-AUG-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	30-AUG-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	30-AUG-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	30-AUG-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	30-AUG-18
Silver (Ag)-Dissolved			<0.000050		mg/L		0.00005	30-AUG-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	30-AUG-18
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	30-AUG-18
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	30-AUG-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	30-AUG-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	30-AUG-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	30-AUG-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	30-AUG-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	30-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-1 MB								
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	30-AUG-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	30-AUG-18
Zirconium (Zr)-Dissolved			<0.00030		mg/L		0.0003	30-AUG-18
WG2864503-5 MS		**WG2864503-3**						
Aluminum (Al)-Dissolved			71.5		%		70-130	30-AUG-18
Antimony (Sb)-Dissolved			94.7		%		70-130	30-AUG-18
Arsenic (As)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Barium (Ba)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Beryllium (Be)-Dissolved			90.9		%		70-130	30-AUG-18
Bismuth (Bi)-Dissolved			86.9		%		70-130	30-AUG-18
Cadmium (Cd)-Dissolved			100.4		%		70-130	30-AUG-18
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Cesium (Cs)-Dissolved			92.7		%		70-130	30-AUG-18
Chromium (Cr)-Dissolved			78.3		%		70-130	30-AUG-18
Cobalt (Co)-Dissolved			85.7		%		70-130	30-AUG-18
Copper (Cu)-Dissolved			83.8		%		70-130	30-AUG-18
Iron (Fe)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Lead (Pb)-Dissolved			88.1		%		70-130	30-AUG-18
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Molybdenum (Mo)-Dissolved			76.7		%		70-130	30-AUG-18
Nickel (Ni)-Dissolved			87.6		%		70-130	30-AUG-18
Phosphorus (P)-Dissolved			94.4		%		70-130	30-AUG-18
Selenium (Se)-Dissolved			91.1		%		70-130	30-AUG-18
Silicon (Si)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Silver (Ag)-Dissolved			78.7		%		70-130	30-AUG-18
Sodium (Na)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	30-AUG-18
Tellurium (Te)-Dissolved			82.6		%		70-130	30-AUG-18
Thallium (Tl)-Dissolved			83.9		%		70-130	30-AUG-18
Thorium (Th)-Dissolved			90.5		%		70-130	30-AUG-18
Tin (Sn)-Dissolved			95.8		%		70-130	30-AUG-18
Tungsten (W)-Dissolved			89.6		%		70-130	30-AUG-18
Uranium (U)-Dissolved			N/A	MS-B	%		-	30-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R4196136								
WG2864503-5 MS		**WG2864503-3**						
Vanadium (V)-Dissolved			71.2		%		70-130	30-AUG-18
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864912-4 DUP		**WG2864912-3**						
Aluminum (Al)-Total		0.142	0.132		mg/L	7.1	20	31-AUG-18
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Barium (Ba)-Total		0.00905	0.00871		mg/L	3.8	20	31-AUG-18
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	31-AUG-18
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	31-AUG-18
Calcium (Ca)-Total		13.4	13.7		mg/L	2.7	20	31-AUG-18
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Cesium (Cs)-Total		0.000015	0.000014		mg/L	6.1	20	31-AUG-18
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	31-AUG-18
Iron (Fe)-Total		0.079	0.080		mg/L	1.2	20	31-AUG-18
Lead (Pb)-Total		0.000075	0.000073		mg/L	2.7	20	31-AUG-18
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	31-AUG-18
Magnesium (Mg)-Total		7.35	7.48		mg/L	1.8	20	31-AUG-18
Manganese (Mn)-Total		0.00087	0.00089		mg/L	1.3	20	31-AUG-18
Molybdenum (Mo)-Total		0.000310	0.000309		mg/L	0.4	20	31-AUG-18
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	31-AUG-18
Potassium (K)-Total		0.881	0.859		mg/L	2.6	20	31-AUG-18
Rubidium (Rb)-Total		0.00164	0.00155		mg/L	5.8	20	31-AUG-18
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Silicon (Si)-Total		0.99	0.99		mg/L	0.6	20	31-AUG-18
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	31-AUG-18
Sodium (Na)-Total		1.85	1.78		mg/L	3.9	20	31-AUG-18
Strontium (Sr)-Total		0.0131	0.0131		mg/L	0.7	20	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864912-4 DUP		**WG2864912-3**						
Sulfur (S)-Total		0.64	0.66		mg/L	2.7	25	31-AUG-18
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	31-AUG-18
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	31-AUG-18
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	31-AUG-18
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Titanium (Ti)-Total		0.00446	0.00475		mg/L	6.4	20	31-AUG-18
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	31-AUG-18
Uranium (U)-Total		0.00243	0.00241		mg/L	0.9	20	31-AUG-18
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	31-AUG-18
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	31-AUG-18
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	31-AUG-18
WG2864912-2 LCS								
Aluminum (Al)-Total			101.4		%		80-120	31-AUG-18
Antimony (Sb)-Total			102.8		%		80-120	31-AUG-18
Arsenic (As)-Total			101.6		%		80-120	31-AUG-18
Barium (Ba)-Total			101.2		%		80-120	31-AUG-18
Beryllium (Be)-Total			98.0		%		80-120	31-AUG-18
Bismuth (Bi)-Total			105.8		%		80-120	31-AUG-18
Boron (B)-Total			90.7		%		80-120	31-AUG-18
Cadmium (Cd)-Total			106.0		%		80-120	31-AUG-18
Calcium (Ca)-Total			95.9		%		80-120	31-AUG-18
Chromium (Cr)-Total			100.3		%		80-120	31-AUG-18
Cesium (Cs)-Total			98.8		%		80-120	31-AUG-18
Cobalt (Co)-Total			100.6		%		80-120	31-AUG-18
Copper (Cu)-Total			101.5		%		80-120	31-AUG-18
Iron (Fe)-Total			97.4		%		80-120	31-AUG-18
Lead (Pb)-Total			100.4		%		80-120	31-AUG-18
Lithium (Li)-Total			99.7		%		80-120	31-AUG-18
Magnesium (Mg)-Total			104.1		%		80-120	31-AUG-18
Manganese (Mn)-Total			100.1		%		80-120	31-AUG-18
Molybdenum (Mo)-Total			102.5		%		80-120	31-AUG-18
Nickel (Ni)-Total			101.7		%		80-120	31-AUG-18
Phosphorus (P)-Total			98.1		%		70-130	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864912-2 LCS								
Potassium (K)-Total			92.9		%		80-120	31-AUG-18
Rubidium (Rb)-Total			102.0		%		80-120	31-AUG-18
Selenium (Se)-Total			103.5		%		80-120	31-AUG-18
Silicon (Si)-Total			98.8		%		60-140	31-AUG-18
Silver (Ag)-Total			98.1		%		80-120	31-AUG-18
Sodium (Na)-Total			101.8		%		80-120	31-AUG-18
Strontium (Sr)-Total			101.3		%		80-120	31-AUG-18
Sulfur (S)-Total			95.2		%		80-120	31-AUG-18
Thallium (Tl)-Total			102.6		%		80-120	31-AUG-18
Tellurium (Te)-Total			101.4		%		80-120	31-AUG-18
Thorium (Th)-Total			103.4		%		70-130	31-AUG-18
Tin (Sn)-Total			98.6		%		80-120	31-AUG-18
Titanium (Ti)-Total			95.8		%		80-120	31-AUG-18
Tungsten (W)-Total			100.6		%		80-120	31-AUG-18
Uranium (U)-Total			102.9		%		80-120	31-AUG-18
Vanadium (V)-Total			101.3		%		80-120	31-AUG-18
Zinc (Zn)-Total			94.2		%		80-120	31-AUG-18
Zirconium (Zr)-Total			96.1		%		80-120	31-AUG-18
WG2864912-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	31-AUG-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Boron (B)-Total			<0.010		mg/L		0.01	31-AUG-18
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	31-AUG-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	31-AUG-18
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Copper (Cu)-Total			<0.0010		mg/L		0.001	31-AUG-18
Iron (Fe)-Total			<0.010		mg/L		0.01	31-AUG-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864912-1 MB								
Lithium (Li)-Total			<0.0010		mg/L		0.001	31-AUG-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	31-AUG-18
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	31-AUG-18
Potassium (K)-Total			<0.050		mg/L		0.05	31-AUG-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	31-AUG-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Silicon (Si)-Total			<0.10		mg/L		0.1	31-AUG-18
Silver (Ag)-Total			<0.000050		mg/L		0.00005	31-AUG-18
Sodium (Na)-Total			<0.050		mg/L		0.05	31-AUG-18
Strontium (Sr)-Total			<0.0010		mg/L		0.001	31-AUG-18
Sulfur (S)-Total			<0.50		mg/L		0.5	31-AUG-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	31-AUG-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	31-AUG-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	31-AUG-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	31-AUG-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	31-AUG-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	31-AUG-18
Zirconium (Zr)-Total			<0.00030		mg/L		0.0003	31-AUG-18
WG2864912-5 MS		**WG2864912-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	31-AUG-18
Antimony (Sb)-Total			96.3		%		70-130	31-AUG-18
Arsenic (As)-Total			102.6		%		70-130	31-AUG-18
Barium (Ba)-Total			88.2		%		70-130	31-AUG-18
Beryllium (Be)-Total			99.5		%		70-130	31-AUG-18
Bismuth (Bi)-Total			98.4		%		70-130	31-AUG-18
Boron (B)-Total			92.3		%		70-130	31-AUG-18
Cadmium (Cd)-Total			107.3		%		70-130	31-AUG-18
Calcium (Ca)-Total			N/A	MS-B	%		-	31-AUG-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4195543								
WG2864912-5 MS		**WG2864912-3**						
Chromium (Cr)-Total			103.1		%		70-130	31-AUG-18
Cesium (Cs)-Total			98.3		%		70-130	31-AUG-18
Cobalt (Co)-Total			100.1		%		70-130	31-AUG-18
Copper (Cu)-Total			101.7		%		70-130	31-AUG-18
Iron (Fe)-Total			N/A	MS-B	%		-	31-AUG-18
Lead (Pb)-Total			95.9		%		70-130	31-AUG-18
Lithium (Li)-Total			97.5		%		70-130	31-AUG-18
Magnesium (Mg)-Total			N/A	MS-B	%		-	31-AUG-18
Manganese (Mn)-Total			100.7		%		70-130	31-AUG-18
Molybdenum (Mo)-Total			104.1		%		70-130	31-AUG-18
Nickel (Ni)-Total			100.9		%		70-130	31-AUG-18
Phosphorus (P)-Total			102.7		%		70-130	31-AUG-18
Potassium (K)-Total			90.1		%		70-130	31-AUG-18
Rubidium (Rb)-Total			101.3		%		70-130	31-AUG-18
Selenium (Se)-Total			102.9		%		70-130	31-AUG-18
Silicon (Si)-Total			N/A	MS-B	%		-	31-AUG-18
Silver (Ag)-Total			96.1		%		70-130	31-AUG-18
Sodium (Na)-Total			96.8		%		70-130	31-AUG-18
Strontium (Sr)-Total			N/A	MS-B	%		-	31-AUG-18
Sulfur (S)-Total			101.5		%		70-130	31-AUG-18
Thallium (Tl)-Total			96.9		%		70-130	31-AUG-18
Tellurium (Te)-Total			99.1		%		70-130	31-AUG-18
Thorium (Th)-Total			99.5		%		70-130	31-AUG-18
Tin (Sn)-Total			96.4		%		70-130	31-AUG-18
Titanium (Ti)-Total			94.5		%		70-130	31-AUG-18
Tungsten (W)-Total			96.7		%		70-130	31-AUG-18
Uranium (U)-Total			N/A	MS-B	%		-	31-AUG-18
Vanadium (V)-Total			102.6		%		70-130	31-AUG-18
Zinc (Zn)-Total			93.3		%		70-130	31-AUG-18
Zirconium (Zr)-Total			98.4		%		70-130	31-AUG-18
NH3-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R4211788								
WG2873602-3 DUP		**L2157808-1**						
Ammonia, Total (as N)		1.36	1.27		mg/L	6.7	20	11-SEP-18
WG2873602-2 LCS								
Ammonia, Total (as N)			105.7		%		85-115	11-SEP-18
WG2873602-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	11-SEP-18
WG2873602-4 MS		**L2157808-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	11-SEP-18
NO3-IC-WT	**Water**							
Batch R4200607								
WG2866628-4 DUP		**WG2866628-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	03-SEP-18
WG2866628-2 LCS								
Nitrate (as N)			100.6		%		70-130	03-SEP-18
WG2866628-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	03-SEP-18
WG2866628-5 MS		**WG2866628-3**						
Nitrate (as N)			102.9		%		70-130	03-SEP-18
P-T-COL-WT	**Water**							
Batch R4214797								
WG2875119-3 DUP		**L2162344-1**						
Phosphorus, Total		0.805	0.821		mg/L	1.9	20	13-SEP-18
WG2875119-2 LCS								
Phosphorus, Total			97.7		%		80-120	13-SEP-18
WG2875119-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	13-SEP-18
WG2875119-4 MS		**L2162344-1**						
Phosphorus, Total			N/A	MS-B	%		-	13-SEP-18
Batch R4234932								
WG2883307-3 DUP		**L2167606-1**						
Phosphorus, Total		10.6	10.5		mg/L	0.9	20	24-SEP-18
WG2883307-2 LCS								
Phosphorus, Total			93.0		%		80-120	24-SEP-18
WG2883307-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	24-SEP-18
WG2883307-4 MS		**L2167606-1**						
Phosphorus, Total			N/A	MS-B	%		-	24-SEP-18

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R4192090								
WG2863197-2 DUP		**L2154892-3**						
pH		7.37	7.32	J	pH units	0.05	0.2	29-AUG-18
WG2863197-1 LCS								
pH			6.98		pH units		6.9-7.1	29-AUG-18
SO4-IC-N-WT	**Water**							
Batch R4200607								
WG2866628-4 DUP		**WG2866628-3**						
Sulfate (SO4)		1.75	1.88		mg/L	7.1	20	03-SEP-18
WG2866628-2 LCS								
Sulfate (SO4)			101.7		%		90-110	03-SEP-18
WG2866628-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	03-SEP-18
WG2866628-5 MS		**WG2866628-3**						
Sulfate (SO4)			106.2		%		75-125	03-SEP-18
SOLIDS-TDS-BF	**Water**							
Batch R4194011								
WG2863422-3 DUP		**L2155654-1**						
Total Dissolved Solids		500	510		mg/L	2.0	20	30-AUG-18
WG2863422-2 LCS								
Total Dissolved Solids			100.8		%		85-115	30-AUG-18
WG2863422-1 MB								
Total Dissolved Solids			<20		mg/L		20	30-AUG-18
SOLIDS-TSS-BF	**Water**							
Batch R4194006								
WG2863371-3 DUP		**L2153983-2**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	30-AUG-18
WG2863371-2 LCS								
Total Suspended Solids			101.8		%		85-115	30-AUG-18
WG2863371-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-AUG-18
TKN-WT	**Water**							
Batch R4210669								
WG2871975-3 DUP		**L2160104-5**						
Total Kjeldahl Nitrogen		1.31	1.40		mg/L	7.1	20	11-SEP-18
WG2871975-2 LCS								
Total Kjeldahl Nitrogen			103.0		%		75-125	11-SEP-18
WG2871975-1 MB								

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R4210669								
WG2871975-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	11-SEP-18
WG2871975-4 MS		**L2160104-5**						
Total Kjeldahl Nitrogen			111.6		%		70-130	11-SEP-18
TOC-WT	**Water**							
Batch R4225532								
WG2880299-3 DUP		**L2154892-1**						
Total Organic Carbon		1.58	1.72		mg/L	8.4	20	18-SEP-18
WG2880299-2 LCS								
Total Organic Carbon			98.0		%		80-120	18-SEP-18
WG2880299-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	18-SEP-18
WG2880299-4 MS		**L2154892-1**						
Total Organic Carbon			96.1		%		70-130	18-SEP-18

Quality Control Report

Workorder: L2154892 Report Date: 09-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Quality Control Report

Workorder: L2154892 Report Date: 09-OCT-18

Client: Baffinland Iron Mine's Corporation (Oakville)
2275 Upper Middle Rd. E. Suite #300
Oakville ON L6H 0C3
Contact: William Bowden/Connor Devereaux

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Acidity							
	3	28-AUG-18 16:25	25-SEP-18 11:18	14	28	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 L2154892 were received on 30-AUG-18 09:00.

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.

Friday, October 05, 2018

Rick Hawthorne
ALS Environmental
60 Northland Rd, Unit 1
Waterloo Canada, ON N2V 2B8

Re: ALS Workorder: 1808630
Project Name:
Project Number: L2154892

Dear Mr. Hawthorne:

Three water samples were received from ALS Environmental, on 8/31/2018. The samples were scheduled for the following analysis:

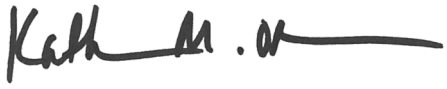
Radium-226

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,



ALS Environmental
Katie M. OBrien
Project Manager

ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO000782008A
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	2976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

1808630

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1808630
Client Name: ALS Environmental
Client Project Name:
Client Project Number: L2154892
Client PO Number: L2154892

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L2154892-1	1808630-1		WATER	28-Aug-18	
L2154892-2	1808630-2		WATER	28-Aug-18	
L2154892-3	1808630-3		WATER	28-Aug-18	

ALS Environmental

L2154892

WATERLOO

1808630

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
225 COMMERCE DRIVE
FORT COLLINS,CO 80524

NOTES: Please reference on final report and invoice: PO# *L2154892*
ALS requires QC data to be provided with your final results.

Please see enclosed 3 sample(s) in 3 Container(s)

	SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
1	**L2154892-1 MS-08US**		8/28/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/21/2018	
2	**L2154892-2 MS-06DS**		8/28/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/21/2018	
3	**L2154892-3 MS-06**		8/28/2018	
		Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/21/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 8/31/18 12:00

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Water 100 Workorder No: 1808630

Project Manager: KMO Initials: JE Date: 8/31/18

1.	Are airbills / shipping documents present and/or removable? 8	DROP OFF	YES	NO
2.	Are custody seals on **shipping** containers intact?	NONE	YES	NO
3.	Are custody seals on **sample** containers intact?	NONE	YES	NO
4.	Is there a COC (chain-of-custody) present?		YES	NO
5.	Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		YES	NO
6.	Are short-hold samples present?		YES	NO
7.	Are all samples within holding times for the requested analyses?		YES	NO
8.	Were all sample containers received intact? (not broken or leaking)		YES	NO
9.	Is there sufficient sample for the requested analyses?		YES	NO
10.	Are all samples in the proper containers for the requested analyses?		YES	NO
11.	Are all aqueous samples preserved correctly, if required? (excluding volatiles)	N/A	YES	NO
12.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
13.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) free of bubbles > 6 mm (1/4 inch) diameter? (i.e. size of green pea)	N/A	YES	NO
14.	Were the samples shipped on ice?		YES	NO
15.	Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #1 #3 #4	RAD ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	14.2							
No. of custody seals on cooler:	1							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **YES / NO / NA** (If no, see Form 008.)

Additional Information: **Please provide details here for any NO responses to gray-shaded boxes above, or any other issues noted:**

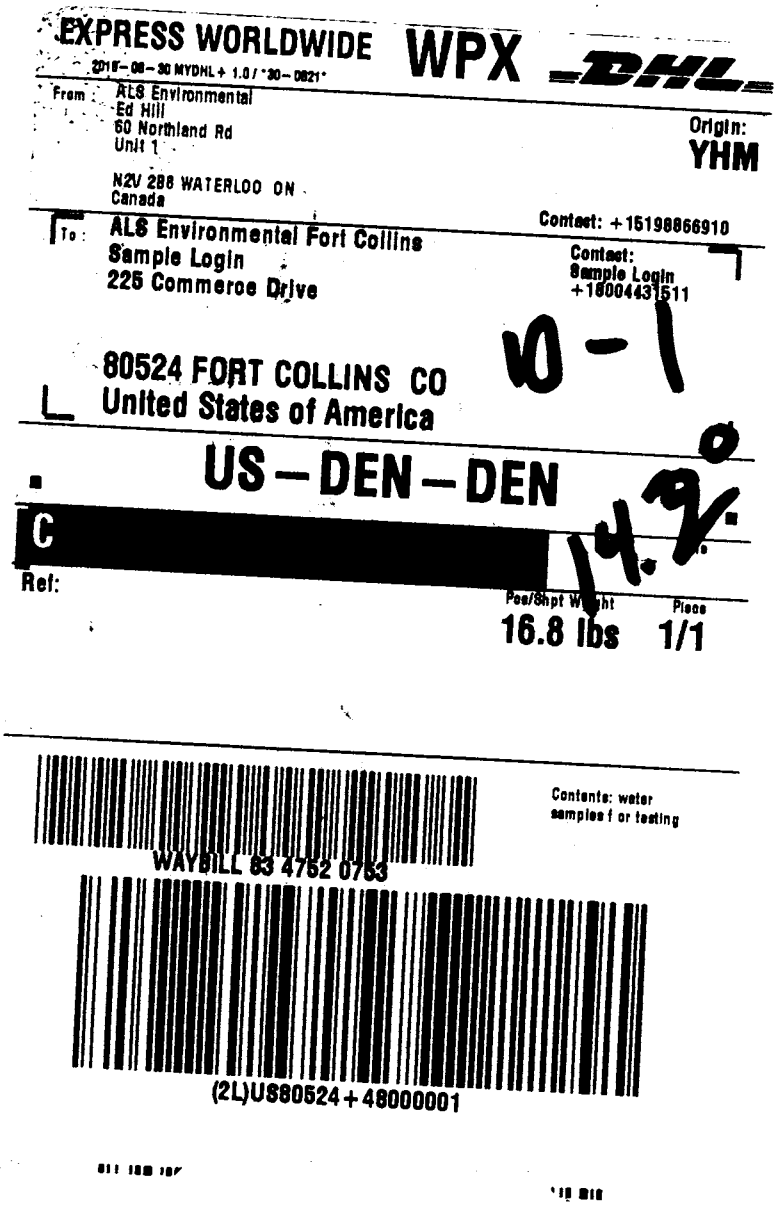
If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 9/4/18

Form 201r26.xls
(06/29/2018)

*IR Gun #1, VWR SN 170560549
*IR Gun #3, VWR SN 170647571
*IR Gun #4, Oakton, SN 2372220101-0002

1808629
1808630



EXPRESS WORLDWIDE WPX DHL

2215-08-30 MYDHL+ 1.0/*30-0821*

From: ALS Environmental
Ed Hill
60 Northland Rd
Unit 1

N2V 2B8 WATERLOO ON
Canada

Origin:
YHM

Contact: +15198866910

To: ALS Environmental Fort Collins
Sample Login
225 Commerce Drive

Contact:
Sample Login
+16004431511

80524 FORT COLLINS CO
United States of America

10-1

US-DEN-DEN

14.90

C [redacted]

Ref:

Pce/Shpt Weight: 16.8 lbs
Piece: 1/1

Contents: water samples for testing

WAYBILL 83 4752 0753

(2L)US80524+48000001

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2154892	**Work Order:**	1808630
Sample ID:	L2154892-1	**Lab ID:**	1808630-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/28/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **9/27/2018**	PrepBy: **ASZ**
Ra-226	0.0023 (+/- 0.0034)	U	0.0056	BQ/l	NA	10/4/2018 12:51
Carr: BARIUM	*96.4*		*40-110*	*%REC*	DL = NA	10/4/2018 12:51

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2154892	**Work Order:**	1808630
Sample ID:	L2154892-2	**Lab ID:**	1808630-2
Legal Location:		**Matrix:**	WATER
Collection Date:	8/28/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **9/27/2018**	PrepBy: **ASZ**
Ra-226	0.0029 (+/- 0.0039)	U	0.0062	BQ/l	NA	10/4/2018 12:51
Carr: BARIUM	*90.1*		*40-110*	*%REC*	DL = NA	10/4/2018 12:51

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2154892	**Work Order:**	1808630
Sample ID:	L2154892-3	**Lab ID:**	1808630-3
Legal Location:		**Matrix:**	WATER
Collection Date:	8/28/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			**SOP 783**		Prep Date: **9/27/2018**	PrepBy: **ASZ**
Ra-226	**0.011 (+/- 0.0062)**		**0.0068**	**BQ/l**	NA	10/4/2018 12:51
Carr: BARIUM	*96.9*		*40-110*	*%REC*	DL = NA	10/4/2018 12:51

Client:	ALS Environmental	**Date:**	*05-Oct-18*
Project:	L2154892	**Work Order:**	1808630
Sample ID:	L2154892-3	**Lab ID:**	1808630-3
Legal Location:		**Matrix:**	WATER
Collection Date:	8/28/2018	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
G - Sample density differs by more than 15% of LCS density.
D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE180927-1-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE180927-1** Units: **BQ/l** Analysis Date: **10/4/2018 13:45**

Client ID: Run ID: **RE180927-1A** Prep Date: **9/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.72 (+/- 0.430)	0.00892	1.771		96.9	67-120					P
Carr: BARIUM	16100		16600		97	40-110					

MB Sample ID: **RE180927-1** Units: **BQ/l** Analysis Date: **10/4/2018 13:45**

Client ID: Run ID: **RE180927-1A** Prep Date: **9/27/2018** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	0.00084 (+/- 0.0027)	0.005									U
Carr: BARIUM	15600		16600		94	40-110					

The following samples were analyzed in this batch: 1808630-1 1808630-2 1808630-3

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 237069
Sample Number : 56099

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	BW/KR/LK
Location :	Waterloo ON	Time Collected :	16:25
Job Number :	L2154892	Date Collected :	2018-08-28
Substance :	MS-06 L2154892	Date Received :	2018-08-30
Sampling Method :	Grab	Date Tested :	2018-08-31
Sample Description :	Clear, light grey, odourless with settled solids.	Temp. on arrival :	22.0° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	3.3 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.1 g/L
Date Tested :	2018-08-21	Warning Limits (± 2SD) :	5.6 - 6.5 g/L
LC50 :	5.8 g/L	Organism Batch :	Dm18-16
95% Confidence Limits :	5.3 - 6.2 g/L	Analyst(s) :	MJT, CZN, AW
Statistical Method :	Linear Regression (MLE)		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	8 days	Mean Young Per Brood :	25.3
Culture Mortality :	11.2% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-16	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2018-09-11
yyyy-mm-dd

Approved by: _____
Project Manager

AQUATOX

TOXICITY TEST REPORT
Daphnia magna

Work Order: 237069
Sample Number: 56099

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	684	None	7.8	8.7	1115	20.0	100	0:00

0 hours

Date & Time 2018-08-31 12:00
Technician: MJT(CZN)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.8	8.7	1115	20.0	100	684
100B	0	0	7.8	8.7	1115	20.0	100	684
100C	0	0	7.8	8.7	1115	20.0	100	684
Control A	0	0	8.4	8.7	763	21.0	100	210
Control B	0	0	8.4	8.7	763	21.0	100	210
Control C	0	0	8.4	8.7	763	21.0	100	210

Notes:

24 hours

Date & Time 2018-09-01 12:00
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2018-09-02 12:00
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	1	7.6	8.3	1119	21.0
100B	0	0	7.6	8.4	1118	21.0
100C	0	0	7.8	8.5	1118	21.0
Control A	0	0	8.3	8.4	772	21.0
Control B	0	0	8.3	8.5	772	21.0
Control C	0	0	8.3	8.4	777	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-16

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: EJS
Date: 2018-09-05

AQUATOX

AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 237069
Sample Number : 56099

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	BW/KR/LK
Location :	Waterloo ON	Time Collected :	16:25
Job Number :	L2154892	Date Collected :	2018-08-28
Substance :	MS-06 L2154892	Date Received :	2018-08-30
Sampling Method :	Grab	Date Tested :	2018-08-31
Sample Description :	Clear, light grey, odourless with settled solids.	Temp. on arrival :	22.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-21	Date Tested :	2018-08-24
LC50 :	3975 mg/L	Historical Mean LC50 :	3634 mg/L
95% Confidence Limits :	3644 - 4336 mg/L	Warning Limits (± 2SD) :	2950 - 4476 mg/L
Statistical Method :	Spearman-Kärber	Analyst(s) :	MV, AW, FS, TA

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0.1 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.52 ± 0.38 g	Mean Fish Fork Length (± 2 SD) :	37.8 ± 9.4 mm
Range of Weights :	0.24 - 0.85 g	Range of Fork Lengths (mm) :	30 - 45 mm
Fish Loading Rate :	0.3 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	18
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-09-13
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 237069
Sample Number: 56099

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	7.2	8.5	1082	15.5	–
	Chemistry after 30min air:	7.3	8.6	1084	15.5	91

0 hours

Date & Time 2018-08-31 9:40
Technician: TA(FS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.3	8.6	1084	15.5	91
Control	0	0	8.2	9.4	891	15.0	99

Notes:

24 hours

Date & Time 2018-09-01 9:40
Technician: CN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.5
Control	0	0	–	–	–	15.5

Notes:

48 hours

Date & Time 2018-09-02 9:40
Technician: CN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.5
Control	0	0	–	–	–	15.5

Notes:

72 hours

Date & Time 2018-09-03 9:40
Technician: CN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2018-09-04 9:40
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.3	9.3	1091	15.0
Control	0	0	8.1	9.4	843	15.0

Notes:

Control organisms showing stress: 0
Organism Batch : T18-21

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: EJS
Date: 2018-09-12

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 237069

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	BW/KR/LK
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	Bucket
Custody Relinquished by:	Amy Proulx
Date/Time Shipped:	30-8-18 PM

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
18-08-28	16.25	MS-06 L2154892	36099	22.0	X		X							X		1 x Pail

→ As per label on Pail 2018-08-30 CZN

For Lab Use Only	
Received By:	CZN
Date:	~~15.15~~ 2018-08-30
Time:	15:15
Storage Location:	
Storage Temp.(°C)	

NK

Please list any special requests or instructions:
Regular Baffinland Toxicity Tests

ALS Environmental

L2154892

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L2154892*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2154892-3 MS-06		8/28/2018	
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	9/21/2018	
	Special Request Aquatox (SPECIAL REQUEST-AQT 14)	9/21/2018	

Subcontract Info Contact: Mary-Lynn Pike (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: CZN Date Received: 2018-08-30 @ 15:15

Verified By: _____ Date Verified: _____

Temperature: 22.0°C

Sample Integrity Issues: _____

Sample # 56099
WO# 237069.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2154892-COFC

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Baffinland Iron Mines Corp.
Contact:	Wiliam Bowden and Connor Devereaux
Phone:	647-253-0596 EXT 6016
	Company address below will appear on the final report
Street:	2275 Upper Middle Rd. E., Suite #300
City/Province:	Oakville, ON
Postal Code:	L6H 0C3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to 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

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@baffinland.com

Email 2: commercial@baffinland.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☑
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	23642 /Q42455
Job #:	MS-06 Tox EFF
PO / AFE:	4500040417
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2154892

ALS Contact: | Sampler: BW/KR/LK

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	MMER-EFF	Group 3	MMER-WT	Number of Containers
	MS-08US	28-Aug-18	16:15	Water	R			7
	MS-06DS	28-Aug-18	15:50	Water	R			7
	MS-06	28-Aug-18	16:25	Water		R	R	10

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ 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: Ben Widdowson	Date: 28-AUG-18	Time: 17:50	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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.

APPENDIX F

SURFACE WATER SAMPLING PROGRAM – QA AND QC CONTROL PLAN

Baffinland Iron Mines Corporation

Surface Water Sampling Program – Quality Assurance and Quality Control Plan

BAF-PH1-830-P16-0001

Rev 2

Prepared By: Katherine Babin
Department: Environment
Title: Environmental Coordinator
Date: March 29, 2017
Signature: Andrew Vermeer on behalf of KB

Approved By: Wayne McPhee
Department: Sustainable Development
Title: Director Sustainable Development
Date: March 29, 2017
Signature:

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
01/15/2014	0	JM	EM	Approved for Use
03/14/16	1	WB	EM	Approved for Use
03/29/17	2	KB	WM	Approved For Use

TRACK CHANGES TABLE

A review and update of the Surface Water Sampling Program – Quality Assurance and Quality Control Plan has been undertaken, with the following salient revisions to the March 14, 2016 version **(BAF-PH1-830-P16-0001**, Rev 1).

Index of Major Changes/Modifications in Revision 2

Item No.	Description of Change	Relevant Section
1	Addition of MMER sampling protocol and clarification of QA/QC definitions	Section 4 Section 7

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Appendix A - Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan (INAC, 1996).

Appendix B - COC Example Forms

Appendix C - Analytical Laboratory Accreditation and Licencing

Appendix D - Laboratory Analytical Methods

Appendix E - Analytical Laboratory QA/QC Procedures

1 INTRODUCTION

As required by Baffinland Iron Mines Corporation's (Baffinland) Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Type A Water Licence) and Type B Water Licence No. 2BE-MRY1421 (Type B Water Licence) for the Mary River Project (Project), a review of Project Environmental Management and Monitoring Plans (EEMPs) was completed. This Quality Assurance and Quality Control (QA/QC) Plan was updated to meet the requirements of the Type A and B water licences. Further and continual modifications and revisions to this Plan shall be completed based on changes to operations, QA/QC procedures, and protocols. Updates to this Plan shall be completed in accordance to the terms and conditions of Baffinland's water licences, QIA Commercial Lease – Q13C301, issued September 6, 2013, the amended Project Certificate No. 005 issued by the Nunavut Impact Review Board (NIRB) and any subsequent requirements which may be issued.

This QA/QC Plan has been reviewed to fulfill the requirement of Part I, Item 16 of License No. 2AM-MRY1325 Amendment No. 1 approved by the Nunavut Water Board to Baffinland Iron Mines Corporation (Baffinland) on July 21, 2015.

In accordance with the stipulations of the Type A Water Licence No. 2AM-MRY1325 Amendment No. 1, this QA/QC Plan has been prepared following the general recommendations presented in *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan (*INAC, 1996). A copy of the guidelines is included in Appendix A.

1.1 PURPOSE AND SCOPE

The purpose of this Plan is to identify Baffinland's framework for accurate and effective QA/QC management by providing instruction for standardised field sampling and laboratory analytical procedures.

For the purposes of this report, QA/QC is defined as:

- ***Quality Assurance*** - System of activities used to achieve quality control.
- ***Quality Control*** - Set of best practice methods and procedures used to ensure quality of data in terms of precision, accuracy and reliability.

The QA/QC best practices outlined in this management plan are designed to provide guidance to field staff and analytical laboratories in order to maintain a high level of confidence in the water quality, soil, and benthic data generated from Project Sites.

1.2 REGULATORY REQUIRMENTS

Baffinland's QA/QC Plan is regulated by the Nunavut Water Board (NWB) and is subject to Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 which provides specific Terms and Conditions for the management of QA/QC procedures at the Project Sites.

Both federal and territorial legislation regulates water and soil quality and benthic communities in Nunavut. This legislation expects a professional standard and level of confidence when evaluating these parameters and therefore apply to this QA/QC management plan.

1.3 RELATIONSHIPS TO OTHER MANAGEMENT PLANS

This Plan is intended for use in conjunction with the following Plans:

1. Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002)
2. Aquatic Effects and Monitoring Plan (BAF-PH1-830-P16-0039)
3. Environmental Protection Plan (BAF-PH1-830-P16-0008)
4. Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010)
5. Hazardous Materials and Hazardous Waste Management Plan (BHF-PH1-830-P16-0011)
6. Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012)
7. Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026)
8. Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027)
9. Waste Management Plan (BAF-PH1-830-P16-0028)

2 BAFFINLAND POLICIES

2.1 HEALTH, SAFETY AND ENVIRONMENT POLICY

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

1. Continual improvement of safety, occupational health and environmental performance
2. Meeting or exceeding the requirements of regulations and company policies
3. Integrating sustainable development principles into our decision-making processes
4. Maintaining an effective Health, Safety and Environmental Management System
5. Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
6. Engaging stakeholders through open and transparent communication.
7. Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
8. Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto “Safety First, Always” and our actions Health and safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.

Brian Penney
Chief Executive Officer
March 2017

2.2 SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights and ArcelorMittal's Human Rights Policy which applies to all employees and affiliates globally.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The Sustainable Development and Human Rights Policy is communicated to the public, all employees and contractors and it will be reviewed and revised as necessary on a regular basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is "Safety First, Always".
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.

- Baffinland applies the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices.
- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met.

3.0 UPHOLDING HUMAN RIGHTS OF STAKEHOLDERS

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit.
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed.
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance.

4.0 TRANSPARENT GOVERNANCE

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

4.1 FURTHER INFORMATION

Please refer to the following policies and documents for more information on Baffinland's commitment to operating in an environmentally and socially responsible manner:

Health, Safety and Environment Policy
Workplace Conduct Policy
Inuktitut in the Workplace Policy
Site Access Policy
Hunting and Fishing (Harvesting) Policy
Annual Report to Nunavut Impact Review Board
ArcelorMittal Canada Sustainability and Corporate Responsibility Report

If you have questions about Baffinland's commitment to upholding human rights, please direct them to contact@baffinland.com.

Brian Penney
Chief Executive Officer
March 2017

3 ENVIRONMENTAL RESPONSIBILITIES

3.1 ROLES AND RESPONSIBILITIES

The Baffinland Environmental Team is organised into two parts, on site as well as off site. The organisational structure for the Mary River Project in relation to the environment discipline is shown in Table 3-1 and 3-2 below.

TABLE 3-1: BAFFINLAND SENIOR MANAGEMENT

Baffinland Senior Management	
Position	**Responsibilities and Accountabilities**
Chief of Operations	- Reports to Baffinland's CEO - Overall accountability for the operation of the Project - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during operation - Accountable for on-site environmental, health and safety performance during operation
VP Sustainable Development	- Reports to Baffinland's CEO - Establish corporate environmental policies and objectives - Monitors and reports on Baffinland's performance related to environmental policies and objectives - Liaise with regulatory authorities - Obtains necessary permits and authorizations - Monitors compliance with terms and conditions of permits and licences
Chief Procurement Officer	- Reports to Baffinland's CEO - Accountable for procurement and purchasing - Ensure that environmental commitments, policies and objectives are included in all contract documents

Baffinland Senior Management	
Position	**Responsibilities and Accountabilities**
Director Inuit, Government and Stakeholder Relations	- Reports to VP Sustainable Development - Accountable for external communication (Governments, media, NGO, others) related to Baffinland's press release and overall communication of site incidents/events - Community liaisons report to position
Director of Sustainable Development	- Reports directly to VP Sustainable Development and indirect reporting and coordination with Chief of Operations - Liaises with the senior management, regulators and stakeholders - Ensures effective monitoring and auditing of environmental performance of departments and contractors on site and identifies opportunities for improvement - Monitors compliance with permits, licenses and authorizations - Ensures all regulatory environmental monitoring and reporting requirements (monthly, annual) are met - Leads and coordinates site permitting requirements. - Initiates and oversees environmental studies

Baffinland's Project Environmental Department provides direction and oversight for environmental activities on-site. Project departmental accountabilities and responsibilities are identified in Table 3-2.

TABLE 3-2: BAFFINLAND PROJECT ENVIRONMENTAL DEPARTMENT (ONSITE)

Baffinland Project Environmental Department (Onsite)	
Position	**Responsibilities and Accountabilities**
Environmental Superintendent	- Reports to Director of Sustainable Development and indirect reporting and coordination with Chief of Operations - Overall accountability for environmental staff and performance at site - Coordinates implementation and monitors the performance of the Environmental Management System at site - Serves as the liaison for regulators during onsite inspections and visits - Provides ongoing environmental education and environmental awareness training to all employees and contract workers - Oversees investigations and reporting of environmental incidents to regulatory bodies, stakeholders and senior management - Reviews updates for management plans
Environmental Coordinator	- Reports to the Environmental Superintendent - Specific accountabilities for environmental monitoring and reporting - Provides day to day direction to Environmental staff onsite - Serves as a liaison for regulators during onsite inspections and visits. - Provides ongoing environmental education and environmental awareness training to all employees and contract workers

Baffinland Project Environmental Department (Onsite)	
Position	**Responsibilities and Accountabilities**
	- Assists with environmental database management - Prepare updates for management plans - Assist with monitoring and sampling activities as per the project's management plans
Environmental Monitor and Technician	- Reports to the Environmental Superintendent or designate - Assists with environmental database management - Assists with monitoring and sampling activities as per the Project's management plans
QIA Monitor	- Works alongside the Baffinland Environment Department to ensure the proper implementation of all environmental management and monitoring plans - Acts as the QIA liaison for onsite environmental matters
Environmental Support Groups (Consultants, etc.)	- Assists with sampling, monitoring and reporting activities as required by permits, licenses and environmental management plans - Provides technical expertise to various environmental studies

3.2 TRAINING AND AWARENESS

All site personnel (including contractors) are required to obtain a general level of environmental awareness and understanding of their obligations regarding compliance with regulatory requirements, commitments and best practices. Site personnel receive prescribed environmental training as part of Baffinland's Mary River Project Site Orientation.

Environment personnel performing environmental monitoring programs are required to understand and be proficient with the QA/QC procedures outlined in this management plan.

4 WATER SAMPLE COLLECTION

4.1 GENERAL

The samples will be collected following the general recommendations presented in *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan* (INAC, 1996). A copy of the guidelines is included in Appendix A.

A summary of recommended water sample containers, sample volumes, sample preservatives and maximum sample holding times is presented in Table 9.1. Laboratory parameters such as pH, turbidity, BOD, nitrite, nitrate, total phosphorus, faecal coliforms, chlorophyll-a and pheophytin typically have maximum sample storage times varying from four (4) to 72 hours. Due to the remoteness of the site, it may not always be possible to get laboratory analysis done within the sample holding time window. Every effort will be made to get samples analysed within the preferred holding time window.

Every effort will be made to prevent accidental freezing of water samples (due to on-site climatic conditions) which could affect analytical results for parameters.

For a complete list of the required sample analyses at each monitoring station, please refer to the following documents:

- Baffinland's Type A Water Licence No. 2AM-MRY1325
- Baffinland's Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039)
- Metal Mining Effluent Regulations (Environment and Climate Change Canada)

4.2 WATER QUALITY MONITORING LOCATIONS

The QA/QC Plan addresses the collection of freshwater surface water quality samples related to monitoring programs being carried out in support of Baffinland's Mary River Project, namely:

1. Collection of environmental surface water samples from area lakes, streams and rivers.
2. Collection of effluent samples from the current and future wastewater treatment facilities located at the Mine Site, Milne Port and Steensby Port.
3. Collection of drinking water samples from camp potable water sources.
4. Collection of surface water discharges from ore stockpiles and waste rock dumps.
5. Collection of surface water discharges from future bulk sample open pits.
6. Collection of water samples from fuel berms and dispensing facilities.
7. Collection of water samples from land-farm facilities and maintenance shops.
8. Collection of effluent samples from oily water treatment systems.
9. Collection of surface water discharges from landfill facilities at the Mine Site.

10. Collection of water samples representative of general site drainage before, during and after construction on Project Sites and the Tote Road.
11. Collection of water samples downstream of active Quarry locations
12. Measurement of water sample field parameters (e.g. pH, conductivity, temperature etc.).

Exact locations and sampling frequency for designated monitoring stations are presented in Baffinland's Type A Water Licence No. 2AM-MRY1325 and Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039).

4.3 WATER SAMPLING METHODS AND EQUIPMENT

Water samples specified under Baffinland's Type A Water Licence, Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039) and the Federal Metal Mining Effluent Regulations are characterised by the following procedures.

4.3.1 GENERAL SAMPLING PROCEDURES

Generally, sampling procedures will consist of the following:

1. Sampler will wear a fresh pair of disposable nitrile gloves for each sampling event.
2. A fresh sample bottle(s) will be used at each monitoring station. Sample bottles will not be re-used.
3. Sampling will be carried out by either: i) rinsing the sample bottle with source water three times before immersing the sample bottle to fill it (after which preservative is added, as required), or ii) if the sample bottles are provided pre-charged with preservatives then it is generally convenient to transfer water samples from the source to the sample bottle using a 1-2L plastic jug. Plastic jugs will be rinsed in the source water three times before filling the sample bottle. A dedicated jug will be used for different sample types (e.g. sewage effluent, hydrocarbon impacted stormwater). Sample jugs will be replaced on a regular basis.
4. Rinse water will be disposed of so that it does not contaminate the source water where the sample will be collected e.g. downstream of the sampling location, or on the shore or berm edge.
5. Bottles labeled as "certified sterile" do not need to be rinsed.
6. For samples requiring preservatives, the sample bottle will be filled to the top (or to the indicator line marked on the bottle), the preservative will be added and the bottle securely sealed. Note that for some volatile contaminants (e.g. BTEX), the sample bottle must be filled with zero headspace.
7. Care will be taken to avoid disturbance of sediments and inclusion of disturbed suspended solids in the sample.
8. Sample details e.g. date, sample ID and analysis will be clearly marked on the bottle in permanent ink.
9. For dissolved metals analyses, if possible, the water sample will be filtered in the field immediately after sampling using a 0.45µm disposable filter and syringe. A fresh syringe and filter must be used at each monitoring station.

10. All samples will be sealed by ensuring their lids are tightly secured before placing the bottles into the coolers. Glass bottles will be protected with bubble wrap or other cushioning material.
11. All field parameters, notes, photo references and general observations shall be recorded in a notebook or log sheet to later be uploaded to Baffinland's environmental database.
12. All samples will be placed in an iced cooler as soon as possible after collection.

4.3.1.1 SAMPLE PRESERVATION

Sample bottles and preservative will be stored under clean conditions on site. Sample bottles will have the appropriate volume of preservative added in the field immediately after sample collection to minimize chemical alterations. Alternatively, sample bottles will be supplied by the analytical laboratory with preservatives already added. Ensure that the preservative container does not come in contact with the sample or inside of the sample bottle/lid. If a water sample requires filtration (e.g., analysis of dissolved metals), preservative must be added following filtration.

4.3.2 LAKE SAMPLING

For monitoring of water quality arising from vertical stratification in lakes, a depth sampler will be used (e.g. a 'Van Dorn' or 'Kemmerer'). Generally, depth samplers consist of a clear polycarbonate sample tube with two spring mounted rubber bungs, one located at each end. The depth sampler is lowered to the correct depth attached to a cord, whereupon a metal weight is released. The weight slides down the cord and strikes a release mechanism button which releases the two bungs which then seal both ends of the tube. The water sample is then pulled back to the surface.

Regardless of the brand, water samplers that are used will be suitable for collection of water samples for ultra-low metals analyses i.e. will have acrylic or PVC construction and silicone seals.

For depth sampling, the following considerations will be taken into account to ensure sample QA/QC:

1. Sampling station locations will be dependent upon the monitoring program objectives and the lake dimensions. When sampling from a watercraft all efforts will be made to anchor the boat stationary. Map coordinates for lake sampling stations will be recorded using a handheld GPS unit.
2. A vertical stratification profile (if required), profiling in-situ water quality measurements (e.g pH, temperature, dissolved oxygen, conductivity and turbidity), will be determined using a water quality multi-meter (e.g. YSI Sonde) equipped with a long cord with metre intervals marked on it.
3. Depending upon the purpose of the monitoring program, water quality samples may be collected from the different stratified layers. The depth sampler must be slowly lowered in the 'open' position (i.e. to let water enter it) until it reaches the required depth.
4. The depth sampler will be held at this depth temporarily to allow flushing of water inside the apparatus.
5. The metal weight (messenger) will be released (to activate the closing mechanism) and the depth sampler will be pulled back to the surface. Field measurements can be taken at depth or by filling a bottle with the sampled water and taking measurements from that immediately after sampling.

6. When collecting samples close to the lake bed care must be taken to ensure that the depth sampler does not disturb lake bed sediments (which could contaminate the sample).
7. Depending upon the lake area and depth, multiple sampling stations will likely be required to adequately characterize lake water quality.

4.3.3 RIVER SAMPLING

Depending upon the size of the water body, river sampling methods are the same as those presented in Sections 4.3.1 and 4.3.2. To avoid inclusion of floating detritus in the sample, the sample bottle must be fully immersed in the river water. Care will be taken to ensure that disturbed sediments are not included in the sample.

For river sampling, the additional following considerations will be taken into account to ensure sample QA/QC:

1. Grasp the bottle well below the neck and remove the lid, taking care not to touch the inside of the lid.
2. Facing upstream, plunge the bottle beneath the surface of the water to a depth of 20 cm (if possible) with the opening facing downward, then tilt the bottle opening upward into the current to fill.
3. Once the bottle is full, remove the bottle from the water in one motion by forcing the opening upward and into the current and seal the bottle securely.

When selecting water quality monitoring station locations on rivers, care will be taken where a tributary joins a river, since complete mixing of the two waters may not be achieved within several hundred metres downstream of the confluence (or further). When in doubt, vertical profile monitoring across the river's width using a field parameter such as pH, temperature or conductivity will be used to assess if complete mixing has occurred.

4.3.4 METAL MINING EFFLUENT REGULATIONS (MMER)

Water samples from stations that fall under MMER must be taken from a designated sampling port which the mine does no longer exercise control over the quality of discharge. Samples taken from these designated ports can be composite samples or grab samples.

The general sampling procedures of section 4.3.1 should be followed, and the additional considerations will be taken into account to ensure MMER QA/QC is met:

1. MMER sampling should be performed by trained personnel, and if possible a second person should be present for verification purposes.
2. Notification must be given ahead of time to a certified laboratory to ensure MMER acute lethality and sub-lethal toxicity samples can be analysed.
3. In-situ water quality monitoring will accompany all external samples taken (Refer to Section 4.3.6)

4. After collecting samples and preserving as needed, a chain of custody (COC) seal shall be applied to each bottle cap.
5. All sampling activities, notes, flow volumes, photo references and general observations shall be kept in a dedicated MMER field log book.
6. MMER samples shall be sent to the ALS lab with their own COC and should not be combined with samples from other monitoring programs.

For more information and technical guidance, Environment and Climate Change Canada's 2001 *Guidance Document for the Sampling and Analysis of Metal Mining Effluents* should be consulted.

4.3.5 SAMPLING FOR TOXICITY TESTING

Sampling for lethal toxicity testing is a condition of Baffinland's Type A Water Licence for various monitoring programs. Sub-lethal toxicity testing is a condition of Environmental Effects Monitoring (EEM) and Metal Mining Effluent Regulations (MMER). Depending on the regulatory and analysis requirements, one or more 4L effluent samples are required. Depending upon the objectives of the toxicity testing, variables that will require confirmation prior to testing include:

- Type of effluent sample to be collected e.g. instantaneous grab sample, or composite sample collected over a period of time
- Type of dilution water to be used by the testing laboratory e.g. standard synthetic laboratory dilution water, receiving water collected upstream of the discharge etc.
- Preferred test organism e.g. *Daphnia magna* and/or rainbow trout

Details concerning laboratory methods are presented in Appendix D. For further details concerning acute lethality testing refer to Environment Canada (2002) and USEPA (2002). For further details concerning sub-lethal testing refer to Environment Canada (2012)

4.3.6 IN-SITU WATER QUALITY

Measurement of field parameters (e.g. temperature, pH, conductivity, redox potential, or dissolved oxygen, etc.), where warranted, will be carried out for each sample at the time of sampling. The required set of field parameters will vary according to sample type and monitoring objectives. The exact methods used for monitoring field parameters will depend upon the type of monitoring probes being used. Field staff will read and be familiar with the instruction manual for the equipment being used on site, and follow manufacturer's instructions for specifics on proper calibration, use, storage, and maintenance.

Field staff will rinse the monitoring probe three times with the water to be monitored before immersing the probe in the water. Generally, the user will ensure that the probe being used has had sufficient time to equilibrate in the water before the reading is taken. This is generally regarded as the point at which the reading has stabilized.

Field parameter data will be recorded in notebooks, or preferably in a custom form designed for this purpose. A copy of the data should be retained on site.

4.3.6.1 MONITORING PROBE CALIBRATION

Monitoring probes will be stored and calibrated in accordance with manufacturers' instructions. All probes will be calibrated regularly per sampling program requirements and a written record of the calibration results will be maintained on site. Field staff will ensure that calibration solutions are of the correct specification and that they have not passed their expiry date (if applicable). Monitoring probes will be stored as per manufacturers' recommendations.

5 SEDIMENT SAMPLE COLLECTION

For a complete list of the required sample analyses at pre-established monitoring station, please refer to Baffinland's Type A Water Licence and the Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039). Every effort will be made to get samples analysed within the preferred holding time window conforming to the specified protocols for sediment sampling. A summary of recommended sediment sample containers, sample volumes, and maximum sample holding times is presented in Table 9.1. Field observations and parameters if warranted should be recorded during the collection of sediment samples.

5.1 SEDIMENT MONITORING LOCATIONS

The QA/QC Plan addresses the collection of sediment samples related to monitoring programs being carried out in support of Baffinland's Mary River Project, namely:

1. Collection of environmental sediment samples from area lakes, streams and rivers.
2. Collection of sediment samples from fuel berms and dispensing facilities.
3. Collection of sediment samples from landfarm facilities.
4. Collection of sediment samples from remediation and reclamation projects.
5. Collection of sediment samples evaluating spills and releases.

5.2 SEDIMENT SAMPLING METHODS AND EQUIPMENT

Sediment samples specified under Baffinland's Type A Water Licence and Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039) are characterised by the following procedures.

5.2.1 GENERAL SAMPLING PROCEDURES

Generally, sampling procedures will consist of the following:

1. Sampler will wear a fresh pair of disposable nitrile gloves for each sampling event.
2. A fresh sample bottle(s) will be used at each monitoring station. Sample bottles will not be re-used.
3. Sample details e.g. date, sample ID and analysis will be clearly marked on the sample jar in permanent ink.
4. All samples will be sealed by ensuring their lids are tightly secured before placing the bottles into the coolers.
5. All samples will be placed in an iced cooler as soon as possible after collection.

5.2.2 RIVER AND GRAB SAMPLING

The collection of river and grab samples will follow the general procedures stated in 5.2.1 and will entail the following additional QA/QC considerations:

1. Sampling station locations will be dependent upon the monitoring program objectives and the sample location.
2. A clean spatula or spoon will be utilized to obtain a representative sample of the sediment for analyses.
3. If composite samples are required by the monitoring program, a sterile container will be utilised to deposit and homogenize the subsamples, until the composite sample is fully mixed. The composite sample will then be transferred to the identified sample jars by alternating aliquots.
4. The quantity and holding time of samples obtained will depend on the prescribed analysis.

5.2.3 LAKE SAMPLING

For monitoring of sediment character and quality in lakes, a depth sampler will be used. The preferred sample apparatus for lake sediment samples are gravity percussion corers, since they allow for retrieval and analysis of sediment profiles. A *Petite Ponar* can also be used but will not provide sediment profiles. Generally, forms of gravity percussion corers consist of a clear polycarbonate sample core tube attached to a weighted upper head assembly and a seal mechanism. The top two centimeters of sediment from the core samples will be retained for laboratory analysis unless sampling objectives state otherwise.

Sediment lake sampling procedures will follow the general procedures stated in Section 5.2.1 and the following additional QA/QC considerations for a gravity percussion corer:

1. Sampling station locations will be dependent upon the monitoring program objectives and the lake dimensions. When sampling from a watercraft all efforts will be made to anchor the boat stationary. Map coordinates for all lake sampling station locations will be recorded using a handheld GPS unit.

2. The corer will be positioned perpendicular to the water surface prior to release. The penetration depth of the core tube is affected by the depth of water, angle of corer deployment and substrate type.
3. Once the corer is embedded in the substrate, the stainless steel messenger will be sent down the corer rope to release the ball-type seal. This seal creates a vacuum in the core tube, retaining the sampled sediment.
4. Upon retrieval, the bottom of the core tube will be plugged using an extruding plug prior to breaking the air-water interface. This procedure will prevent sample loss.
5. An extruding apparatus will be used to force the extruding plug through the core tube moving the sediment sample to the end of tube allowing the top two centimetres to be scooped out and placed in a clean stainless steel bowl for sample homogenisation.
6. Multiple core samples (generally three or more) are required per sample station to obtain the required sample volume. The multiple core samples are homogenized in the stainless steel bowl, removing any excess water or debris.
7. The sample containers will be filled by alternating aliquots between each of the containers.
8. After the top two centimeters are retained, the remaining, unused sediments within the core tube will be placed into a bucket and only released once all core sampling is complete at that particular station.
9. Depending upon the lake area and depth, multiple sampling stations will likely be required to adequately characterize lake sediment quality.

6 BENTHIC INVERTEBRATES SAMPLE COLLECTION

For a complete list of required analyses at pre-established monitoring stations, see Baffinland's Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039). Samples will be submitted to an analytical laboratory for processing and taxonomic identification. Laboratory methods for benthic invertebrate samples will be in accordance with guidance provided by EC, 2012. Field observations and parameters if warranted should be recorded during the collection of benthic invertebrate samples.

6.1 BENTHIC INVERTEBRATE MONITORING LOCATIONS

This QA/QC Plan addresses the collection of benthic invertebrate samples related to monitoring programs being carried out in support of Baffinland's Mary River Project, namely:

- Collection of benthic invertebrate samples from Project area and reference lakes, streams and rivers to determine potential mine related effects on benthic invertebrate communities.

6.2 BENTHIC INVERTEBRATE SAMPLING METHODS AND EQUIPMENT

Benthic Invertebrate samples follow the same general procedures outlined in Section 5.2.1. Benthic invertebrates can be collected from either depositional (lake) or erosional (stream) sample locations. A

Petite Ponar is utilised when sampling depositional environments while a *Surber sampler* is utilised when sampling erosional environments. For a complete list of depositional and erosional sample methods see Baffinland's Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039). Benthic invertebrate samples will be carefully sieved through 500 µm mesh. All materials, including invertebrates, retained by the mesh will be transferred to labelled plastic jars and fixed with 10% buffered formalin. Fixed and labelled samples will be shipped to an analytical laboratory for processing and archiving.

7 QA/QC

For monitoring of QA/QC during sample collection and shipping, a set of QA/QC samples will be routinely submitted for analysis from prescribed sampling programs. Sampling programs will each have separate QA/QC samples submitted with the regular water samples. Descriptions of the QA/QC samples that will be used are presented on Table 7.1. Ten percent of all samples will consist of field blanks, travel blanks and field duplicates. For example, a monitoring program with 30 samples would consist of 27 monitoring samples and 3 QA/QC samples. Equipment blanks, if required, are performed on an as needed basis to ensure sampling equipment is properly maintained and free of contaminants, and do not count towards the ten percent of QA/QC samples.

7.1 SAMPLING PROGRAMS WITH MULTIPLE SAMPLING STATIONS

For sampling programs with multiple sampling locations (SNP, AEMP) QA/QC samples will be performed randomly to avoid bias, and care will be taken to ensure that the same stations are not sampled repeatedly for QA/QC samples.

7.2 SAMPLING PROGRAMS WITH LIMITED SAMPLING STATIONS

Sampling programs with limited sampling stations (e.g. MMER) will require at least one QA/QC sample per sampling round. A field duplicate, field blank or travel blank must be taken during each sampling session. This may result in over sampling for QA/QC, but will ensure there is sufficient data to identify any anomalies.

7.3 QA/QC ANALYSIS

In the interest of transparency, the analytical laboratories will also be instructed to report the results of their own in-house QA/QC testing (e.g. results of random replicate analyses of submitted samples).

The results of QA/QC analyses will be routinely reviewed by Baffinland or their designate, and any anomalous results will be promptly investigated with the assistance of the analytical laboratory. Once the reason for the anomalous results is identified, Baffinland will ensure that operating procedures of field staff and/or the analytical laboratory will be altered in order to address the issue. Compliance monitoring and data management for water license sampling will be conducted by Baffinland, with the assistance of a designate as required.

TABLE 7-1: Purpose, Description and Frequency of QA/QC Samples

QA/QC Plan	Purpose	Description	Frequency	Prepared By
Field blank	Identification of potential contaminants arising from sample collection. The field blank bottle is prefilled with laboratory deionized water and is handled in the same way as regular sample bottles (i.e., opened and closed during the sample collection). The bottle is submitted as a routine sample.	Bottle contains prefilled deionized water. Bottle is handled the same as one would handle the samples.	Ten percent of all samples collected will be QA/QC.	Analytical laboratory
Travel blank	Identification of potential contaminants arising from sample storage, shipping and laboratory handling. The travel blank accompanies the samples to the laboratory but is not taken out into the field, or opened.	Sealed bottle containing deionized water provided by analytical laboratory.	Ten percent of all samples collected will be QA/QC.	Analytical laboratory
Field duplicate	Assesses sample variability and precision of laboratory analytical methods. Collected from a randomly selected location, split from a homogenized sample and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory.	Duplicate sample selected at random. A large sterile bottle is used to collect the water. Water is then poured equally into two sets of pre-labelled bottles.	Ten percent of all samples collected will be QA/QC.	Field Staff
Equipment blank	Assesses cross contamination from field water sampling equipment (e.g. Kemmerer). Rinse deionized water through water sampling equipment and transfer to sample bottles.	Bottle contains deionized water that has been rinsed through the sampling equipment.	Collected prior and after completion of sampling program (if required/ as needed). Not included in the ten percent calculation of other QA/QC samples.	Field Staff

8 SAMPLE MANAGEMENT

8.1 SAMPLE LABELING

Accurate sample labelling is essential for subsequent interpretation of field data. Ensure that labels are legible and written with permanent ink (pen, marker, etc.). For a complete list of the predetermined sample labels at monitoring station, please refer to Baffinland's Type A Water Licence and the Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039).

A consistent format for identifying samples must be followed if a predetermined sample label does not exist in order to facilitate accurate sample tracking and to ensure sample labels are interpreted in the same manner by all personnel involved in the program.

Samples must be uniquely identified with the following information:

- Sample ID
- Collection date and time
- Project identifier
- Company name

QA/QC samples will be labeled by the following conventions:

- Field Duplicate: 01 following the sample label
- Field Blank: 02 following the sample label
- Travel Blank: 03 following the sample label
- Equipment Blank: 04 following the sample label

8.2 SAMPLE STORAGE AND HANDLING

Physical, chemical and biochemical reactions may take place in the sample container between the time of sample collection and laboratory analysis. Samples will be placed in iced coolers and shipped to the analytical laboratory as soon as possible after collection, consulting stipulated analytical holding times, to minimize these changes. Care will be taken to ensure that bottles are stored upright and are packed securely within the cooler; glass bottles should be wrapped in bubble wrap. Preferably, leak-proof ice packs will be used for cooling the samples. If loose ice is used, ice should be securely sealed in plastic bags to prevent leakage of melt water.

Biological samples (e.g. benthic invertebrates) preserved using formalin or Lugol's solution can be held at room temperature until submission to the analytical laboratory.

8.3 SAMPLE SUBMISSION AND CHAIN OF CUSTODY

A chain of custody (COC) form will accompany all samples being submitted to ensure that the required analyses are completed, and to confirm receipt of samples by the laboratory (see example form presented in Appendix B). Prior to shipment, samples should be carefully prepared for shipping and sample bottles listed on the COC must be reconciled with what has physically been placed in the shipping container. The collection of samples that are time sensitive needs to coincide with shipping schedules, travel time to the laboratory, and laboratory business hours. A record of all COCs submitted for analysis must be kept on site. Information on the COC form will include:

1. Project name and project assignment number.

2. Address of analytical laboratory, name of contact person and contact details.
3. Contact details and name of sampler.
4. Date and time of sampling.
5. Whether the sample has been filtered, or whether laboratory filtration is required.
6. List of sample I.D.'s, sample type (e.g. lake water, sewage effluent, etc.), number of sample bottles per sample and analysis requested.
7. Urgency of analysis (e.g. rush or normal). For rush samples the analytical laboratory should be notified ahead of time.
8. Whether sample contains preservative and if so, what preservative and when it was added.
9. Submission date and time.
10. Comments on any unusual conditions and other important information.

9 LABORATORY ANALYSIS

9.1 LABORATORY ACCREDITATION

Laboratory analysis of samples is performed by an on-site accredited analytical laboratory and an off-site accredited analytical laboratory. The on-site laboratory is operated by ALS Canada LTD. and is located at the Mine Site. A select set of basic analytical parameters (e.g. pH, TSS, turbidity etc.), are performed by the on-site laboratory. The off-site laboratory, ALS Environmental, located in Waterloo, ON, run by ALS Canada Ltd. performs the majority of analyse required. Toxicity testing is performed by Aquatox Testing & Consulting Inc, located in Guelph, ON. Details of ALS analytical laboratory licencing and accreditation are presented in Appendices C.

9.2 ANALYTICAL DETECTION LIMITS

ALS Limits of Reporting (LORs) are established using rigorous experimental and statistical procedures that begin with the determination of the Method Detection Limit (MDL) at 99%confidence. When detected at or above the MDL, ALS test results are considered to be qualitatively accurate, and a parameter can be reported with 99% confidence as being present in the sample.

It should be noted that on occasion, a loss of analytical sensitivity can be encountered due to excessively high concentrations of parameters within a sample or lack of provided sample matrix. If this is encountered, Baffinland or their designate will work with the analytical laboratory to try and resolve the problem and new samples will be taken if required. The detection limits on ALS analytical reports contains the LOR. The LOR may be the MDL as calculated, or a higher value. Required analytical laboratory detection limits are provided in Appendix D.

9.3 LABORATORY ANALYTICAL METHODS

Analytical methods used by the analytical laboratories for water analyses generally conform to the standard methods outlined in *Standard Methods for the Examination of Water and Wastewater* (APHA et al, 1989). Standard analytical methods for available analyses through ALS Environmental are provided in Appendix D.

9.4 ANALYTICAL LABORATORY QA/QC PROCEDURES

ALS Environmental adheres to a designated QA/QC Management System which includes documentation and document control, staff training and internal audits. The practices exceed accreditation requirements for high confidence in data reliability utilising but not limited to:

- Use of calibration verification standards and drift control standards.
- Use of surrogate standards and internal standards.
- Replicate analyses and blanks on submitted samples.
- Use of standard reference materials (SRM's) and matrix spikes.
- Standards Data Quality objectives are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal

  Further details on the analytical laboratories in-house QA/QC protocols are presented in Appendix E.

9.5 SUMMARY OF ANALYTICAL PROCEDURES

TABLE 9-1: Summary of Analytes, Water and Soil Sample Volumes, Preservatives and Sample Storage Time for ALS Environmental

Inorganics	Analysis [1]	Water Container	Water Preservation	Additional Notes	Soil Container	Water / Soil Hold Time
ROUTINE INORGANICS AND PHYSICALS	Acidity and Alkalinity	0.5-1 L Plastic			125-250 mL Jar or Bag	14 Days / NA
	Anions (Br, Cl, SO4, F) and Electrical Conductivity	0.5-1 L Plastic			125-250 mL Jar or Bag	28 Days [7] / Unlimited
	Bromate[19], Chlorate and Chlorite	125 mL Plastic	EDA (Ethylenediamine)		NA	28 Days (Chlorite 14 Days) / NA
	BOD, Colour and Turbidity	0.5-1 L Plastic			NA	2-4 Days [8] / NA
	COD and Phenols (4AAP)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
	Cyanide, Total ,Weak Acid Dissociable,Free	145 mL Plastic	6N NaOH		125-250 mL Jar or Bag	14 Days / 14 Days
	Dissolved Oxygen	300 mL BOD bottle	1 each; $MnSO_4$ & alkaline iodide azide pillows		NA	8 Hours[20] / NA
	Dissolved or Total Inorganic Carbon (DIC or TIC)	125-250 mL Glass	.	Field Filter for Dissolved	125-250 mL Jar or Bag	14 Days / 28 Days
	Dissolved or Total Organic Carbon (DOC or TOC)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Flashpoint	2 x 100-250 mL Amber Glass		Zero Headspace	125-250 mL Jar	7 Days / 7 Days
	pH	0.5-1 L Plastic			125-250 mL Jar or Bag	0.25 Hours / 30 Days [9]
	Solids (TS, TSS, TDS)	0.5-1 L Plastic			NA	7 Days / NA
	Sulfide	125 - 150 mL Plastic	Zinc Acetate & 6N NaOH		125-250 mL Jar or Bag	7 Days / 7 Days
	Sulfite	125 mL Plastic			NA	0.25 Hours / NA
NUTRIENTS	Ammonia Nitrogen	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		125-250 mL Jar or Bag	28 Days / 72 Hours
	Nitrate or Nitrite Nitrogen (and Ammonia unpreserved)	0.5-1 L Plastic			NA	2-7 Days [10] / 72 Hours
	Nitrogen, Kjeldahl, Organic, Total or Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Nutrients, Available (N,P,K,S)	NA			125-250 mL Jar or Bag	NA / 3 Days [11]
	Phosphorus, Reactive (orthophosphate)	0.5-1 L Plastic			NA	2-7 Days [12] / NA
	Phosphorus, Total Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Phosphorus, Total	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
METALS	Chromium VI (Hexavalent)	125 mL Plastic	50 % NaOH (BC MoE) or 6N NaOH + Ammonium Buffer (OMoE)		125-250 mL Jar or Bag	28 Days / 30 Days
	Mercury, Methyl	250 mL FLPE	1:1 Hydrochloric Acid (HCl)[21]	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 28 Days
	Mercury, Total or Dissolved	40 mL Glass Vial	1:1 Hydrochloric Acid (HCl)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Metals, Total or Dissolved	125-250 mL Plastic	1:3 Nitric Acid (HNO_3) to pH<2	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 6 Months
Organics						
HYDRO-CARBONS	F1, Volatile Organic Compounds (VOCs), THMs, 1,4-Dioxane, Volatile Petroleum Hydrocarbons (VPH)	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Field Methanol Kit [6]	14 Days / 40 Days [13]
		2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Hermetic Sampler kit [6]	14 Days / 48 Hours
	CCME CWS F1, BTEX	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	125 - 500 mL Jar	14 Days / 7 Days
	CCME CWS F2-F4	2 x 60 mL Amber Glass Vials [3]	Sodium Bisulfate		125 - 500 mL Jar	14 Days [14] / 14 Days
	EPH or LEPH/HEPH	2 x 250 mL Amber Glass with Septa Cap	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Polycyclic Aromatic Hydrocarbons (PAHs)	2 x 0.25 - 1 L Amber Glass [5]	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Oil & Grease or Mineral Oil & Grease	2 x 0.25 - 1 L Glass	1:1 HCl or H_2SO_4		125 - 500 mL Jar	28 Days / 28 Days
TRACE ORGANICS	Alcohols	2 x 40 mL Glass Vials		Zero Headspace	125 - 500 mL Jar	7 Days / 7 Days
	Alkanolamines (MEA, DEA, DIPA)	250 mL Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	AOX	40 - 250 mL Amber Glass	1:3 Nitric Acid (HNO_3) to pH<2		125 - 500 mL Jar	6 months [15] / 28 Days
	C1 - C5 Gases	3 x 40 mL Blue Septa Vials	Sodium Bisulfate [4]	Zero Headspace	NA	14 Days / NA
	Dioxins and Furans, PBDE and PBB	2 x 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited
	Formaldehyde/Aldehydes	2 x 40 mL Amber Glass Vials [2]	Ammonium Chloride+Copper Sulfate	Zero Headspace	125 - 500 mL Jar	7 Days / 5 Days
	Glycols	2 x 40 mL Amber Glass Vials			125 - 500 mL Jar	7 Days / 14 Days
	Hormones and Steroids	1 L Plastic			NA	28 Days / NA
	Naphthenic Acids	2 x 250 mL Amber Glass			125 - 500 mL Jar	14 Days / 14 Days
	Nitroaromatics and Nitrosamines (Explosives)	1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Nonylphenol & Ethoxylates, Bisphenol A (BPA)	1 L Amber Glass			125 - 500 mL Jar	28 Days / 14 Days
	PCB	2 x 0.25 - 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited [16]

	Perfluorinated Chemicals (PFCs), PFOS, PFOA	1 L Plastic (PTFE free)			125-250 mL Jar or Bag	14 Days / 14 Days
	Phenolics, Chlorinated and Non-Chlorinated	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Priority Pollutants (EPA 625 list) or SVOCs	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days [17]
	Resin Acids & Fatty Acids	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & NaOH		125 mL Jar	14 Days / 14 Days
	Sulfolane	2 x 0.5 - 1 L Amber Glass	Sodium Bisulfate [4]		125 mL Jar	14 Days / 14 Days
PESTICIDE RESIDUES	Carbamate Pesticides	1 L Amber Glass	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	7 Days / 14 Days
	Glyphosate / AMPA	1 L Plastic	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	14 Days / 14 Days
	Herbicides, Acidic	2 x 1 L Amber Glass	Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Organochlorine or Organophosphate Pesticides	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Soil Sterilant Scan	1 L Amber Glass			250 g Poly Bag	7 Days / 14 Days
Micro						
MICRO-BIOLOGICAL	Coliforms-Fecal, Total, E-coli & HPC	100 - 300 mL Sterilized Plastic	Sodium Thiosulfate		500 mL Sterilized Jar	24-48 Hours [18] (24 - HPC) / NA
	Microtox	1 L Amber Glass			125-250 mL Jar or Bag	3 Days / 3 Days

1. Additional analyses with the same container type and preservation may be possible - consult the lab for details.

2. The number of 40 mL glass vials required (2 or 3) for BTEX & VOC varies by lab based on instrumentation. Consult the lab for details.

3. Please fill to the top of the marked line on the 60 mL Amber Glass Vials.

4. Use Sodium Thiosulfate instead of Sodium Bisulfate if sample is chlorinated.

5. OMoE has no preservation requirement for PAHs. 2 X 250 mL Amber Glass required for BC MoE and OMoE. For AB and SK and for Alkylated PAHs, ALS requires 2 x 1 L Amber Glass.

6. Soil sampling options depend on soil location and condition of soil. Field Methanol Kit consists of one 5g TerraCore® sampler or similar sampling device, two pre-weighed 40 mL glass vials with methanol preservative and a 125mL soil jar for moisture. Hermetic sampler kit consists of a T-handle, two 5g hermetic samplers and a 125mL soil jar for moisture. One additional parameter, such as metals or hydrocarbons can also be obtained from the 125mL soil jar.

7. 4 Days hold time for Electrical Conductivity only as per Ontario MISA.

8. 3 Days hold time for British Columbia as per BC Ministry of Environment (BC MoE), 4 Days hold time as per OMoE.

9. pH in water should be taken in the field as per BC MoE, 4 Days hold time for Ontario MISA and 28 Days hold time for OMoE. 30 Days hold time as received for pH in soil as per OMoE. One year hold time once soil is dried.

10. 3 Days hold time as per BC MoE, 5 Days hold time as per Ontario MISA and 7 Days hold time as per OMoE.

11. 3 Days hold time until received. Unlimited hold time once soil is dried.

12. 3 Days hold time as per BC MoE and 7 Days hold time as per OMoE.

13. 40 Days hold time as per BC MoE and 14 Days hold time as per OMoE. Recovered methanol extract from laboratory has a 40 Days hold time as per OMoE.

14. 40 Days hold time as per OMoE.

15 14 Days hold time as per Ontario MISA.

16. 14 Days hold time as per OMoE. Consult lab for container size if limited sample volume is available.

17. 14 Days hold time for water and 60 Days hold time for soil as per OMoE. Ontario labs require 2 x 250 mL Amber Glass + 500 mL Amber Glass.

18. 30 Hours hold time as per BC Drinking Water Regulation and 48 Hours as per OMoE.

19. Bromate alone does not require preservative.

20. 15 Minutes hold time as per OMoE - Field measurement by meter is recommended.

21. Use 1:1 Sulfuric Acid (H_2SO_4) for preservation of marine or brackish samples.

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10 DATA MANAGEMENT AND REPORTING

10.1 DATA MANAGEMENT

All sample data collected by Baffinland or designate consultants from the various environmental programs required on Project sites will be stored electronically in a spreadsheet database (Microsoft Excel) or using alternative software designed specifically for environmental data management.

QA/QC measures relating to data validation will include the following**:**

1. Designation of a suitable person to act as the Database Manager (DM).
2. Upon receipt, laboratory analytical data will be reviewed by the DM to check for completeness, typos, outlying values, etc. The analytical laboratory will be immediately notified of any anomalous results.
3. At a suitable frequency (e.g. once per month) the spreadsheet database should be updated by the DM using: i) results provided in electronic format by the analytical laboratories, and ii) copies of the field parameter monitoring records forwarded from site
4. The DM will be responsible for ensuring that a third party (e.g. another staff member) carries out a QA/QC check on a minimum of ten percent of newly entered data.

10.2 REPORTING

All documents prepared by Baffinland or their designate for submission to the regulators will be reviewed by senior staff and Baffinland prior to issue, as per the company's standard practice and quality management system.

11 REFERENCES

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6. INAC, 1996. Quality Assurance (QA) and Quality Control (QC) Guidelines for Use by Class "A" Licenses in Meeting SNP Requirements and for Submission of a QA/QC Plan. Prepared by Department of Indian and Northern Affairs Canada Water Resources Division and the Northwest Territories Water Board, July 1996.
7. Nunavut Water Board, 2013. Baffinland Iron Mines Corp. – Class A Water License No: 2AM-MRY1325. Issued by the Nunavut Water Board, 2013.
8. USEPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms; 5th Ed., USEPA, ref. No. EPA-821-R-02-012.

Appendix A

Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan (INAC, 1996).

QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC)

GUIDELINES

FOR USE BY CLASS "A" LICENSEES IN MEETING SNP REQUIREMENTS

AND FOR SUBMISSION OF A QA/QC PLAN

JULY 1996

DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS CANADA
WATER RESOURCES DIVISION
AND THE
NORTHWEST TERRITORIES WATER BOARD

Table of Contents

1.0 Introduction and Definitions

In order to assist Licensees in completing their Quality Assurance and Quality Control (QA/QC) Plan, the following guidelines are provided, which indicates the minimum information that should be included.

These Guidelines are divided into three sections:

1) Field Sampling
2) Lab Analysis
3) Reporting Requirements

It is recognized that there may be different interpretations as to what is covered by "Quality Assurance/Control" due to the fact that certain Licensees have their own laboratories, while others only use commercial laboratories. For licence purposes, "Quality Assurance" and "Quality Control" refer to the following:

Quality Assurance: is the system of activities designed to better ensure that quality control is done effectively; while

Quality Control: is the use of established procedures to achieve standards of measurement for the three principal components of quality: precision, accuracy and reliability.

2.0 Field Sampling

2.1 Sample Collection

2.1.1 Location

A QA/QC plan must identify the locations of all sampling stations and the markers used to identify the stations. If the Surveillance Network Program (SNP) of the Water Licence does not specify sampling locations, locations should be chosen with help from an Inspector.

Buoys and landmarks identify sampling stations in tailings ponds and lakes, while sign post positioning usually marks stream sample stations. Stations should be used repeatedly, with the same personnel and techniques to reduce operational error. The use of Global Positioning System (GPS) to identify Latitude and Longitude for sampling stations is recommended.

2.1.2 Sampling Equipment

The Plan must include a detailed section on the equipment used for sampling, the rationale behind the choices of equipment, and descriptions of how the equipment is maintained and calibrated. Equipment and bottles should be selected so that they do not contaminate or otherwise alter the concentrations of parameters of interest.

Sampling devices, sample bottles and filtration devices should be constructed of non-metallic material. Most samples are now collected in containers constructed of high density polyethylene plastic. However, there are some exceptions, when testing for oil and grease or phenols glass containers are to be used. When conducting a fish bioassay, plastic drums are used while hydrocarbon based containers are not to be used for the collection of organic samples.

This section should also identify whether new or used bottles are used for each sample analysis. New bottles are preferred,

but sample containers may be used repeatedly with proper handling measures.

If old bottles are used, a detailed description should be included, noting how they are maintained, stored and cleaned. Usually, this will closely resemble the product manufacturer's instructions. An example of how bottles should be cleaned is outlined below:

- Rinse well with hot tap water for one minute or more.
- Empty bottle and add 30% HNO_3 to approximately 1/3 container capacity. Shake well for three to four minutes.
- Rinse vigorously with hot tap water for two minutes.
- Rinse thoroughly three times with tap water and three times with distilled water.
- Store with 0.2% HNO_3 for a minimum of one week.
- Rinse again with distilled water at least three times.

Bottles that are to be used for bacteria testing should be acid washed or autoclaved if possible.

Note: Additional information on bottle washing is also available from Water Resources Division.

2.1.3 Sampling Methods

This Section will include details on methods for sample collection and the equipment that is to be used for each station.

In lakes and ponds, regular sample bottles are used the majority of the time, but Van Dorn samples are often utilized. The sample or the sample bottle is usually lowered to mid

depth and washed three times before collecting the sample on the fourth submersion. Approximately 2% of the sample container capacity should remain to provide for mixing, preservative addition and thermal expansion.

Stream water sampling is usually done by plunging a sample bottle toward the current and allowing it to fill. Once again, the bottle should be rinsed three times before filling and room should be left for preservative addition and mixing.

A glass bottle should be used when sampling for oil and grease with the sample being collected during the first submersion and not rinsed three times first.

This section should also describe how often field blanks and replicate samples will be collected. Field blanks are samples of distilled/deionized water that are to be treated in exactly the same manner as the other samples. Blanks should therefore be taken to the field and handled and preserved as part of the sample program. They indicate when a sample may be contaminated and are indicative of general sample integrity. Replicate samples (duplicates and triplicates) are two or three samples collected from the same station at the same time. They help to ensure sample precision at the laboratory.

2.2 Sample Handling

2.2.1 Preservation

After collection, most samples must be preserved in order to prevent chemical or biochemical changes to the sample. The QA/QC plan must describe how samples from each station are to be preserved.

Preservation is generally done by the addition of certain chemicals into the bottle immediately after the sample is collected. **Table 1** is a general guide to preservatives and their appropriate concentrations. The QA/QC plan should contain more detailed information on the concentrations and amount of preservatives that will be used.

2.2.2 Sample Identification

The plan should include a description of the system used to identify samples. The system must provide positive sample identification and ensure that the identification is maintained. It is advisable to keep a logbook of samples that have already been delivered.

The identification can be maintained by marking the bottle itself or a label, with a water resistant, non-smear felt pen. The information should be clear to persons uninvolved in the sampling and may include such details as company name, sample area, SNP number, time and date.

2.2.3 Transportation

The section on transportation will describe how sample integrity will be ensured from the time of collection to completion of delivery. Delivery to the lab should be done as soon as possible after the samples have been collected.

Usually, samples are sealed and stored upright in a box with other samples to provide a snug, immobile storage space during transfer. Any samples that require refrigeration for preservation should be kept cool during transport.

3.0 Lab Analysis

Because certain Class "A" Licensees have their own analytical laboratory and others rely on commercial laboratories, this section of the Guidelines is divided accordingly.

3.1 Outside Laboratories

3.1.1 Lab Accreditation

The Licensee will identify in the plan the name of the commercial laboratory that will be conducting the analyses. A letter must be provided from the commercial lab indicating that they are accredited to conduct analyses on each of the required sampling parameters. Ideally, the lab should be accredited by the Canadian Associated for Environmental Analytical Laboratories (C.A.E.A.L.) and should provide a certificate stating parameters for which they are accredited.

3.1.2 Detection Limits

Detection limits for the commercial lab should be identified for all parameters and should be reported when any SNP data is submitted.

3.1.3 Methodology

Descriptions should be included for any methods of analysis used that are not outlined in "Standard Methods for the Examination of Water and Wastewater".

3.2 In House Laboratories

3.2.1 Identification of Analytical Laboratory/Detection Limits

Licensees using in-house labs shall identify their detection limits for all parameters and report them when any SNP data is submitted. The Licensee shall also identify the commercial lab they use to check for quality control.

3.2.2 For Overall Analytical Methods, Precision and Accuracy

The plan must describe how the Licensee will ensure precision and accuracy in their analytical methods. This includes what action will be taken if any sample results are found to be outside the appropriate ranges.

All analyses should be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater" or by other approved methods. In addition, the lab should analyze standard reference material for each parameter measured. For each parameter (group) to be measured, a complete description of the sampling procedure must be documented and adhered to.

If any sample results are outside the appropriate QA/QC ranges, attempts should be made to correct the problem and the sample shall be immediately re-analyzed. If any analysis indicates a violation of a licence condition, an Inspector shall be notified of the violation, any corrective action taken, and the results of retests.

3.2.3 Accuracy Requirements

The plan should document how the Licensee will go about

ensuring accuracy in the laboratory. Accuracy is the measurement of how closely a value approximates a standard, or true value. The Licensee should identify the frequency at which certified or reference standards will be analyzed during each sampling period.

3.2.4 Precision Requirements

Precision is a measure of the closeness or repeatability of a set of values. This section will describe how and when replicate samples are taken to ensure lab precision. It is recommended that the Licensee take triplicates at one SNP station during each sampling period. If daily sampling is required at only one station, a duplicate sample should be taken each time, with a triplicate sample taken one a week.

3.2.5 Methodology

Descriptions should be included of any methods of analysis that are not taken from "Standard Methods for the Examination of Waste and Wastewater." Standard methods should be referenced.

4.0 Reporting Requirements

4.1 General Submission

The QA/QC plan will contain a section outlining what information will be reported in the monthly SNP reports. Any control charts or graphs which display the precision and accuracy of the methods used to analyze the samples should be submitted with the report. This includes warning and control limits used to determine acceptability of the data.

4.2 Outside Laboratories

The Licensee shall outline the number of replicate samples that will be collected and submitted with each SNP report. It is recommended that one set of duplicates or triplicates from an assigned SNP site, as well as the results from field blanks, be submitted with each required SNP report. This would serve as an internal/external check for the Licensee and the commercial lab.

4.3 In-House Laboratories

The Licensee shall outline the number of results from replicate samples that will be included with each required SNP report. It is recommended that two duplicate sets be collected per month at an assigned SNP site, with one set being sent to a commercial lab while the other is to be analyzed by the Licensee's lab. Analytical results from both labs should be submitted with each required SNP report. This would serve as an external check for the lab. Any results from a commercial lab should be presented on the lab's letterhead.

FOR FURTHER INFORMATION, CONTACT THE WATER RESOURCES DIVISION AT:

Box 1500
Yellowknife, NWT
X1A 2R3
(867) 669-2654 Phone
(867) 669-2716 Fax

Appendix 1
Table 1: General Summary of Special Sampling or Handling Techniques

Determination	Container	Minimum Sample Size (ml)	Preservation	Maximum Storage Recommended
BOD	Sterile polyethylene	1000	Refrigerate 4°C	24 hours
Conductivity	Polyethylene	500	Refrigerate 4°C	28 days
Total Cyanide	Polyethylene	500	Add NaOH to raise pH>12 refrigerate in dark	24 hours
Hardness	Polyethylene	100	Add Conc. HNO_3 to lower pH<2 OR (*) unpreserved	6 months
Metals, General	Polyethylene	250	For dissolved metals filter immediately, add Conc. $HN0_3$ to pH<2	6 months
Mercury	Glass (rinsed with 1 + 1 HNO_3)	500	Add Conc. HNO_3 or pH<2 or H_2SO_4 + 1 ml of 5% $K_2Cr_2O_7$, refrigerate 4°C	28 days
Nitrogen:				
Ammonia	Polyethylene	500	Analyze as soon as possible or add H_2S0_4 to pH<2, refrigerate OR (*) unpreserved	7 days
Nitrate	Polyethylene	100	Analyze as soon as possible or refrigerate	48 hours
Oil and Grease	Glass or wide-mouth calibrated	1000	Add H_2S0_4 to pH<2, refrigerate	28 days
pH	Polyethylene	--	Analyze immediately	2 hours
Suspended Solids	Polyethylene	--	Refrigerate	7 days
Temperature	Polyethylene	--	Analyze immediately	0
Turbidity	Polyethylene	--	Analyze same day; store in dark up to 24 hours, refrigerate	24 hours
Bacteria	Polyethylene (sterilized)	--	None: Keep cool	6 - 48 hours

(*) Unpreserved = check with lab that will be analyzing the samples

Appendix 2

References:

Gilbert, Andrew (1993). "Echo Bay Mines Ltd. Environmental Laboratory Quality Assurance Plan".

Soniassy, R. (1980). "A Guide for the Collection of Water and Effluent Samples"; pp 1-16; INAC

"Standard Methods for the Examination of Water and Wastewater" (1989); AHPA, AWWA and WPCF, 17th edition.

Water Resources Division, Indian and Northern Affairs Canada (1990). "Generic Quality Assurance (QA) Plan Guidelines for Use by the Licensees in Meeting SNP Requirements for Submission of a QA Plan"; INAC.

Appendix B

COC Example Forms

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	
Contact:	
Phone:	
	Company address below will appear on the final report
Street:	
City/Province:	
Postal Code:	

Report Format / Distribution	
Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☐ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	
Email 3	

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	
Email 2	

Project Information	
ALS Account # / Quote #:	
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		**1 Business day [E1]** ☐
	3 day [P3] ☐		**Same Day, Weekend or Statutory holiday [E0]** ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

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**	Number of Containers

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 by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

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

OCTOBER 2015 FRONT

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**.

Appendix C

Analytical Laboratory Accreditation and Licencing

Canadian Association for Laboratory Accreditation Inc.

CALA

Certificate of Accreditation

ALS Environmental (Waterloo)
ALS Canada Ltd.
60 Northland Rd. Unit 1
Waterloo, Ontario

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation No.: A3149
Issued On: July 29, 2016
Accreditation Date: January 3, 2005
Expiry Date: January 27, 2019

President & CEO

ilac-MRA CALA

Ministry of the Environment and Climate Change

Safe Drinking Water Branch
Laboratory Licensing and Compliance Program

125 Resources Rd.
Etobicoke ON M9P 3V6
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Fax: (416) 235 - 6519

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction du contrôle de la qualité de l'eau potable
Programme de délivrance des permis et de conformité des laboratoires

125, Chemin Resources
Etobicoke ON M9P 3V6
Tél: (416) 235 - 6370
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Ontario

Drinking-Water Testing Licence

Under the Drinking-Water Testing Services Regulation, O. Reg. 248/03 and the Safe Drinking Water Act, 2002

Licence #: 2290
This supercedes licence issued: Sep 06, 2016
Licensee: ALS Canada Ltd.

Located at: 60 Northland Rd. Unit #1
Waterloo ON N2V 2B8
Canada

The licensee is authorized to conduct the following drinking-water tests at the laboratory:

Class: Inorganic	Technique - Sub-Technique:
4AAP-phenolics	Colourimetry
Lab Method Code: WT-TM-1027	**Appendix #:** C009
Alkalinity	Titrimetry-Manual
Lab Method Code: WT-TM-1012	**Appendix #:** C070
Alkalinity	Colourimetry
Lab Method Code: WT-TM-1032	**Appendix #:** C094
Aluminum	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Aluminum	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Ammonia	Colourimetry
Lab Method Code: WT-TM-1013	**Appendix #:** C095
Antimony	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Antimony	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Arsenic	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032

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Class: Inorganic	Technique - Sub-Technique:
Arsenic	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Barium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Barium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Beryllium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Beryllium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Bismuth	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Bismuth	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Boron	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Boron	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Bromate	LC-MS-MS
Lab Method Code: WT-TM-1503	**Appendix #:** C114
Bromide	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Cadmium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Cadmium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Calcium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032

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Class: Inorganic	Technique - Sub-Technique:
Calcium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Carbon; dissolved organic	Combustion
Lab Method Code: WT-TM-1024	**Appendix #:** C047
Carbon; total organic	Combustion
Lab Method Code: WT-TM-1024	**Appendix #:** C047
Chloride	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Chlorine; residual	Colourimetry
Lab Method Code: WT-TM-1021	**Appendix #:** C074
Chlorine; total	Colourimetry
Lab Method Code: WT-TM-1021	**Appendix #:** C074
Chromium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Chromium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Chromium VI	IC-UV/VIS
Lab Method Code: WT-TM-1035	**Appendix #:** C157
Cobalt	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Cobalt	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Copper	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Copper	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Cyanate	ISE
Lab Method Code: WT-TM-1036	**Appendix #:** C161

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Class: Inorganic	Technique - Sub-Technique:
Cyanide; free	Colourimetry-WAD-CFA
Lab Method Code: NA-TM-1003	**Appendix #:** C004
Cyanide; free	Colourimetry-CFA
Lab Method Code: NA-TM-1003	**Appendix #:** C004
Cyanide; total	Colourimetry-SAD-CFA
Lab Method Code: NA-TM-1003	**Appendix #:** C004
Fluoride	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Iron	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Iron	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Lead	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Lead	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Lithium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Lithium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Magnesium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Magnesium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Manganese	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Manganese	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005

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Téléc: (416) 235 - 6519

Ontario

Class: Inorganic	Technique - Sub-Technique:
Mercury	Spectrophotometric-CVAAS
Lab Method Code: NA-TM-1005; NA-TP-2012	**Appendix #:** C049
Molybdenum	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Molybdenum	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Nickel	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Nickel	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Nitrate (as nitrogen)	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Nitrilotriacetic acid	Colourimetry
Lab Method Code: WT-TM-1007	**Appendix #:** C036
Nitrite (as nitrogen)	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Nitrogen; ammonia+ammonium	Colourimetry
Lab Method Code: WT-TM-1013	**Appendix #:** C095
Nitrogen; nitrate+nitrite	Calculation-IC
Lab Method Code: NA-TM-1001	**Appendix #:** N/A
Nitrogen; total Kjeldahl	Colourimetry-Digestion-Aquakem
Lab Method Code: WT-TM-1041	**Appendix #:** C099
o-Phosphate	Colourimetry-Total (non-filtered)(non-digested)
Lab Method Code: WT-TM-1025	**Appendix #:** C098
Organic nitrogen	Calculation-Colourimetry-Digestion-Aquakem
Lab Method Code: WT-TM-1041	**Appendix #:** N/A
Perchlorate	LC-MS-MS
Lab Method Code: WT-TM-1505	**Appendix #:** C168

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Class: Inorganic	Technique - Sub-Technique:
Phosphorus	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Phosphorus	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Phosphorus; total	Colourimetry-Total (non-filtered) (digested)
Lab Method Code: WT-TM-1025	**Appendix #:** C011
Potassium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Potassium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Selenium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Selenium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Silicon	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Silicon	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Silver	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Silver	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Sodium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Sodium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Solids; volatile suspended	Gravimetry
Lab Method Code: WT-TM-1011	**Appendix #:** C010

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Ontario

Class: Inorganic	Technique - Sub-Technique:
Strontium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Strontium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Sulphate	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Sulphide	Colourimetry
Lab Method Code: WT-TM-1003	**Appendix #:** C012
Sulphur	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Sulphur	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Thallium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Thallium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Tin	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Tin	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Titanium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Titanium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Tungsten	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Tungsten	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005

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Class: Inorganic	Technique - Sub-Technique:
Uranium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Uranium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Vanadium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Vanadium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Zinc	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Zinc	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Zirconium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Zirconium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032

Class: Microbiological	Technique - Sub-Technique:
E. coli	MPN--24 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C183
E. coli	MF-mFC-BCIG
Lab Method Code: WT-TM-1200	**Appendix #:** C052
E. coli	MPN--18 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C183
Fecal coliforms	MPN--18 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C185
Fecal coliforms	MF-mFC
Lab Method Code: WT-TM-1200	**Appendix #:** C051
HPC	MF-HPC
Lab Method Code: WT-TM-1200	**Appendix #:** C030

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Class: Microbiological	Technique - Sub-Technique:
HPC	MPN--44 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C184
Pseudomonas aeruginosa	MF-mPAC
Lab Method Code: WT-TM-1203	**Appendix #:** C091
Total coliform	MPN--24 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C183
Total coliform	MF-mEndo
Lab Method Code: WT-TM-1200	**Appendix #:** C002
Total coliform	MPN--18 hrs, Quanti-Tray
Lab Method Code: NATM1300	**Appendix #:** C183
Total coliform background	MF-mEndo
Lab Method Code: WT-TM-1200	**Appendix #:** C002

Class: Organic	Technique - Sub-Technique:
1,1,1,2-tetrachloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,1,1-trichloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,1,2,2-tetrachloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,1,2-trichloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,1-dichloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,1-dichloroethene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
1,2,4-trichlorobenzene	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
1,2-dibromoethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113

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Class: Organic	Technique - Sub-Technique:	
1,2-dichlorobenzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
1,2-dichloroethane	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
1,2-dichloropropane	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
1,2-propanediol	GC-FID	
Lab Method Code: WT-TM-1601		**Appendix #:** C090
1,3-dichlorobenzene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
1,3-dichlorobenzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
1,3-propanediol	GC-FID	
Lab Method Code: WT-TM-1601		**Appendix #:** C090
1,4-dichlorobenzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
1,4-dioxane	HSGC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C172
1-chloronaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
1-methylnaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,3,4,5-tetrachlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,3,4,6-tetrachlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,3,4-trichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015

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Class: Organic	Technique - Sub-Technique:	
2,3,5,6-tetrachlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,3,5-trichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4,5-T	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
2,4,5-trichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4,6-trichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4-D	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
2,4-dichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4-dimethylphenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4-dinitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,4-dinitrotoluene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,6-dichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2,6-dinitrotoluene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2-chloronaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2-chlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015

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Class: Organic	Technique - Sub-Technique:	
2-hexanone	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
2-methyl-4,6-dinitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2-methylnaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
2-nitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
3,3'-dichlorobenzidine	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
4-bromophenyl phenyl ether	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
4-chloro-3-methylphenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
4-chlorophenyl phenyl ether	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
5-nitroacenaphthene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
a-BHC	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Acenaphthene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Acenaphthylene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Acetone	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
a-Chlordane	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019

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Class: Organic	Technique - Sub-Technique:	
Acridine	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Alachlor	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Aldicarb	LC-MS-MS	
Lab Method Code: WT-TM-1502		**Appendix #:** C135
Aldrin	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Aldrin+Dieldrin	Calculation-GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** N/A
Anthracene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Aroclor 1242	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1248	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1254	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1260	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Atrazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Atrazine + N-dealkylated metabolites	Calculation-GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** N/A
Azinphos-methyl	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
b-BHC	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019

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Ontario

Class: Organic	Technique - Sub-Technique:	
Bendiocarb	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Benzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Benzo(a)anthracene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzo(a)pyrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzo(b)fluoranthene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzo(g,h,i)perylene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzo(k)fluoranthene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzyl butyl phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Biphenyl	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Bis(2-chloroethoxy)methane	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Bis(2-chloroethyl)ether	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Bis(2-chloroisopropyl)ether	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Bis(2-ethylhexyl)phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Bisphenol A	LC-MS-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116

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Class: Organic	Technique - Sub-Technique:
Bromochloroacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Bromodichloroacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Bromodichloromethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Bromoform	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Bromomethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Bromoxynil	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Camphene	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
Carbaryl	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Carbofuran	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Carbon disulfide	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Carbon tetrachloride	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Chlordane; total	Calculation-GC-MS
Lab Method Code: WT-TM-1102/WT-TM-1302	**Appendix #:** N/A
Chlorodibromoacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Chloroethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113

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Class: Organic	Technique - Sub-Technique:	
Chloroform	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Chloromethane	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Chlorpyrifos	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Chrysene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
cis-1,2-dichloroethene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
cis-1,3-dichloropropene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Cyanazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Dalapon	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163
d-BHC	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
DDT & Metabolites	Calculation-GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** N/A
de-Ethylated atrazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Diazinon	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Dibenzo(a,h)anthracene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Dibromoacetic acid	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163

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Class: Organic	Technique - Sub-Technique:
Dibromochloromethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Dicamba	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Dichloroacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Dichlorodifluoromethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Dichloromethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Diclofop-methyl	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Dieldrin	GC-MS
Lab Method Code: WT-TM-1102/WT-TM-1302	**Appendix #:** C019
Diethyl phthalate	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
Diethylene glycol	GC-FID
Lab Method Code: WT-TM-1601	**Appendix #:** C090
Dimethoate	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Dimethyl phthalate	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
di-n-butyl phthalate	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
di-n-octyl phthalate	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
Dinoseb	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023

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Class: Organic	Technique - Sub-Technique:	
Diphenyl ether	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Diphenylamine	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Diquat	LC-MS-MS	
Lab Method Code: WT-TM-1506		**Appendix #:** C134
Diuron	LC-MS-MS	
Lab Method Code: WT-TM-1502		**Appendix #:** C135
Endosulphan I	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Endosulphan II	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Endosulphan sulphate	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Endrin	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Endrin aldehyde	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Ethane	GC-Headspace	
Lab Method Code: WT-TM-1602		**Appendix #:** C062
Ethene	GC-Headspace	
Lab Method Code: WT-TM-1602		**Appendix #:** C062
Ethylbenzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Ethylene glycol	GC-FID	
Lab Method Code: WT-TM-1601		**Appendix #:** C090
Extractable petroleum hydrocarbons (F2: C10 to C16)	GC-FID	
Lab Method Code: NA-TM-1110		**Appendix #:** C068

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Ontario

Class: Organic	Technique - Sub-Technique:	
Extractable petroleum hydrocarbons (F3: C16 to C34)	GC-FID	
Lab Method Code: NA-TM-1110		**Appendix #:** C068
Extractable petroleum hydrocarbons (F4: C34 to C50)	GC-FID	
Lab Method Code: NA-TM-1110		**Appendix #:** C068
Fluoranthene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Fluorene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Formaldehyde	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1603		**Appendix #:** C162
g-Chlordane	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Glyphosate	LC-MS-MS	
Lab Method Code: WT-TM-1504		**Appendix #:** C133
Heavy hydrocarbon (F4 Gravimetric)	GC-FID	
Lab Method Code: WT-TM-1307/WT-TM-1112		**Appendix #:** C069
Heptachlor	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Heptachlor epoxide	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Heptachlor+Heptachlor Epoxide	Calculation-GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** N/A
Hexachlorobenzene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Hexachlorobutadiene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Hexachlorocyclopentadiene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015

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Ontario

Class: Organic	Technique - Sub-Technique:	
Hexachloroethane	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Hexane	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Indeno(1,2,3-c,d)pyrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Indole	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Isophorone	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Lindane; total	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
m/p-Cresol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
m/p-Xylene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Malathion	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
MCPA	GC-MS-Extraction	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Methane	GC-Headspace	
Lab Method Code: WT-TM-1602		**Appendix #:** C062
Methoxychlor	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Methyl ethyl ketone	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Methyl isobutyl ketone	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113

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Ontario

Class: Organic	Technique - Sub-Technique:	
Metolachlor	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Metribuzin	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Mirex	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Monobromoacetic acid	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163
Monochloroacetic acid	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163
Monochlorobenzene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
MTBE	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Naphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Nitrobenzene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
n-Nitroso-di-n-propylamine	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Nonylphenol	LC-MS-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Nonylphenol Diethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Nonylphenol Monoethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
o,p'-DDD	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019

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Ontario

Class: Organic	Technique - Sub-Technique:	
o,p'-DDE	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o,p'-DDT	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o-Cresol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Octylphenol	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Octylphenol diethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Octylphenol monoethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Oxychlordane	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o-Xylene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
p,p'-DDD	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
p,p'-DDE	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
p,p'-DDT	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Paraquat	LC-MS-MS	
Lab Method Code: WT-TM-1506		**Appendix #:** C134
Parathion	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
p-chloroaniline	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015

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Ontario

Class: Organic	Technique - Sub-Technique:	
Pentachlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Perylene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Petroleum hydrocarbons (F1: C6 to C10)	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C111
Phenanthrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Phenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Phorate	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Picloram	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
p-nitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Polychlorinated biphenyls	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Prometryn	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Pyrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Simazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Styrene	GC-MS/FID	
Lab Method Code: WT-TM-1406		**Appendix #:** C113
Temephos	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023

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Ontario

Class: Organic	Technique - Sub-Technique:
Terbufos	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Tetrachloroethylene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Tetraethyl Lead	GC-MS
Lab Method Code: WT-TM-1308	**Appendix #:** C159
Toluene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Total Haloacetic acids	Calculation-GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** N/A
trans-1,2-dichloroethene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
trans-1,3-dichloropropene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Triallate	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Tribromoacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Trichloroacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	**Appendix #:** C163
Trichloroethylene	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Trichlorofluoromethane	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Trifluralin	GC-MS
Lab Method Code: WT-TM-1107/WT-TM-1302	**Appendix #:** C023
Trihalomethanes; total	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113

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Ontario

Class: Organic	Technique - Sub-Technique:
Vinyl chloride	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113
Xylene; total	GC-MS/FID
Lab Method Code: WT-TM-1406	**Appendix #:** C113

Class: Physical/Others	Technique - Sub-Technique:
Apparent colour	Colourimetry
Lab Method Code: WT-TM-1014	**Appendix #:** C097
BOD (5 Day)	Meter-D.O
Lab Method Code: WT-TM-1002	**Appendix #:** C001
CBOD (5 Day)	Meter-D.O
Lab Method Code: WT-TM-1002	**Appendix #:** C001
COD	Colourimetry-Reflux
Lab Method Code: WT-TM-1006	**Appendix #:** C035
Conductivity	Potentiometry
Lab Method Code: WT-TM-1028	**Appendix #:** C108
Conductivity	Potentiometry
Lab Method Code: WT-TM-1010	**Appendix #:** C048
Hardness (as CaCO3)	Calculation-ICP-MS
Lab Method Code: NA-TM-1002	**Appendix #:** NA
Oil and Grease; mineral	Gravimetry-Extraction
Lab Method Code: WT-TM-1100	**Appendix #:** C033
Oil and Grease; total	Gravimetry-Extraction
Lab Method Code: WT-TM-1100	**Appendix #:** C033
pH	Potentiometry
Lab Method Code: WT-TM-1001	**Appendix #:** C026
pH	Potentiometry
Lab Method Code: WT-TM-1028	**Appendix #:** C106
Solids; total	Gravimetry
Lab Method Code: WT-TM-1011	**Appendix #:** C056

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Ontario

Class: Physical/Others	Technique - Sub-Technique:	
Solids; total dissolved	Gravimetry	
Lab Method Code: NA-TM-1004		**Appendix #:** C056
Solids; total suspended	Gravimetry	
Lab Method Code: WT-TM-1011		**Appendix #:** C010
Solids; total volatile	Gravimetry	
Lab Method Code: WT-TM-1011		**Appendix #:** C056
True colour	Colourimetry	
Lab Method Code: WT-TM-1014		**Appendix #:** C097
Turbidity	Nephelometry	
Lab Method Code: WT-TM-1004		**Appendix #:** C024

Subject to the following terms and conditions:
Terms and conditions are specified in Appendix 1.

Expiry Date: Sep 30, 2018

October 12, 2016
Date Issued

Director

Licence Number: 2290
Date Issued: October 12, 2016

Appendix 1 - Conditions

Pursuant to the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32, and the regulations made thereunder, this drinking-water testing services licence is issued subject to the following conditions.

Part I: Definitions

1.1 In this licence, unless the context otherwise requires, words and phrases shall be given the same meaning as those set out in the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32 and any regulations made in accordance with that Act.

1.2 In this licence

"accreditation body" means any body designated or established pursuant to section 64 of the SDWA;

"director" means a director appointed pursuant to s. 6 of the SDWA for the purposes of Part VII of the SDWA;

"laboratory" means the drinking-water testing laboratory located at 60 Northland Road, Unit #1, Waterloo, ON;

"licence" means this entire drinking water testing licence document, issued in accordance with Part VII of the SDWA, and includes this appendix, any schedules to it, and the application and other supporting documents listed in schedule "A" that are attached to and form part of this licence, except as otherwise specified in the conditions contain herein;

"licensee" means ALS Environmental (Waterloo);

"Ministry" means the Ministry of the Environment & Climate Change;

"protocol" means the document published by and available from the Ministry entitled "Protocol of Accepted Drinking-Water Testing Methods", Version 2.0 dated May 31, 2010.

"provincial officer" means a provincial officer designated pursuant to s. 8 of the SDWA;

"SDWA" means the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32, as amended.

Part II – Authorized Tests

2.1 Subject to the conditions of this licence, the licensee is authorized to provide a drinking-water testing service at the laboratory.

2.2 The licensee is only authorized to conduct drinking-water tests at the laboratory for the class and for the parameters set out in the licence.

2.3 Subject to conditions 2.4 and 2.5, the licensee shall only conduct drinking water tests at the laboratory for parameters using the methods that were listed in the application, and approved by this licence.

[Where applicable]

2.4 Despite condition 2.3, where the licensee listed a method for a parameter in the application for this licence, but the method is not designated as an acceptable testing method for that parameter in the protocol, the licensee is not authorized to use the method listed in the application for this licence, unless the method is specifically authorized under condition 2.5.

[Where applicable]

2.5 The licensee is specifically authorized to conduct drinking-water tests for the parameters listed below using the corresponding method listed below, despite the method not being designated as an acceptable testing method for that parameter in the protocol:

None

Accreditation

2.6 Except as authorized by condition 2.7, the licensee shall only conduct a drinking-water test if the laboratory is accredited by an accreditation body for the conduct of that test.

Non-accredited Tests [Where applicable]

2.7 In accordance with section 74 of the SDWA, the licensee is authorized to conduct the following tests for which the laboratory is not accredited by an accreditation body, using the method specified.

None

Part III: Operational Requirements

3.1. A copy of this licence shall be made readily available for reference by all persons responsible for all or part of the operation of the drinking-water testing laboratory.

3.2. A copy of this licence shall be made readily available to laboratory clients and for Ministry inspection.

3.3. The Certificate of Drinking Water Testing Licence shall be conspicuously displayed in a location at the laboratory which maximizes the likelihood of a client seeing it upon entry to the laboratory's sample receiving area.

Part IV: General

Compliance

4.1 The licensee shall operate the laboratory in accordance with the SDWA, including the statutory conditions enumerated in 75(3), any applicable regulations made thereunder, and this licence.

4.2 The licensee shall ensure that any person authorized to carry out a drinking-water test or any aspect of a drinking-water test at a laboratory has been informed of the SDWA, all applicable regulations made in accordance with that Act, and this licence and shall take all reasonable measures to ensure any such person complies with the same.

Interpretation

4.3 Where there is a conflict between the provisions of this licence and any other document, the following hierarchy shall be used to determine the provision that takes precedence:

i. the SDWA;
ii. any regulation made under the SDWA;
iii. this licence;
iv. any application or supporting documents listed in Schedule "A".

4.4 The conditions of this licence are severable. If any requirement of this licence, or the application of any requirement of this licence to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this licence shall not be affected thereby.

Other Legal Obligations

4.5 The issuance of, and compliance with the conditions of, this licence does not:

i. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
ii. limit in any way the authority of the ministry to require certain steps be taken or to require the licensee to furnish any further information related to compliance with this licence.

Change of Licensee's Information

4.6 The licensee shall notify the director, in writing, of any of the following changes within 30 days of the change occurring,

i. change of address of the laboratory; or
ii. change of business name, and the notification shall include a copy of the most recent documentation filed under the *Business Names Act*, R.S.O. 1990, c. B17 or *Corporations Information Act*, R.S.O. 1990, c. C.39.

4.7 The licensee shall notify the director, in writing, of any changes to the following personnel identified on the licence application form whenever staffing changes are made

(a) Owner of the Laboratory;
(b) Laboratory Administrator;
(c) Laboratory Operator;
(d) Laboratory Director, and
(e) Laboratory Director Designate

4.8 As per section 73(6) of the SDWA this licence is not transferable without the consent of the Director.

Information

4.9 Any information requested, by the Ministry, concerning the drinking-water testing laboratory and its operation under this licence, including but not limited to any records required to be kept by this licence shall be provided to the Ministry, upon request.

4.10 Records required by or created in accordance with the SDWA, any regulations under the SDWA, or this licence shall be retained for at least 5 years in a location where a provincial officer who is inspecting the laboratory can conveniently view them.

4. 11 The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this licence or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as an approval, waiver, or justification by the Ministry of any act or omission of any person that contravenes any term or condition of this approval or any statute, regulation or other legal requirement.

Part V: Special Conditions

1 . Pursuant to subsection 10(1), clause (d) of O. Reg. 248/03, the chain of custody procedures submitted by the licensee as part of the application for this licence are approved.

2. When a sample is submitted to the licensee for a drinking-water test for a microbiological parameter, the licensee shall ensure that the test is conducted in a standardized timely manner and that microbiological plates are processed and read without extended overnight refrigerated incubation.

3. The licensee is authorized to report the results of more than one parameter (such as total THMs) as an aggregate result in order to comply with reporting requirements provided that that licensee conducts a separate test for each parameter using a method otherwise authorized by this licence, and the means by which the aggregate is calculated is documented and kept available for inspection by the Ministry.

4. The licensee shall not filter drinking water samples prior to analyses unless dictated by non-routine analytical contingencies.

4.1 The licensee shall collect and handle drinking water samples in accordance with the Ministry's Protocol.

5. Licensed laboratories shall report all adverse water quality results as per the drinking water legislation without any regard to calculated uncertainty estimations.

6. Due to short holding time and the requirement for immediate analyses of residual chlorine, the data from the determination of residual chlorine cannot be used for the purposes of the SDWA, unless holding times are met.

Note to the Licensee Regarding Reviewable Decisions

All or part of this licence may be reviewable in accordance with the provisions of Part X of the SDWA. *In accordance with Section 129(1) of the SDWA, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal.* ***Section 129(2) sets out a procedure upon which the 15 days may be extended by the Tribunal.*** *Section 129(3) of the SDWA provides that the Notice requiring the hearing shall state:*

1. The aspect of the decision, including the portion of the permit, licence, approval, order or notice of administrative penalty in respect of which the hearing is required; and
2. The grounds for review to be relied on by the person at the hearing.

Except with leave of the Tribunal, a person requiring a hearing in relation to a reviewable decision is not entitled to,

(a) a review of an aspect of the decision other than that stated in the notice requiring the hearing; or

(b) a review of the decision other than on the grounds stated in the notice

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The Licence number;
4. The date of the Licence;
5. The name of the Director;

The Notice should be signed and dated by the appellant. This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Part VII, Safe Drinking Water Act, 2002
Safe Drinking Water Branch
Ministry of Environment & Climate Change
125 Resources Road
Toronto, Ontario
M9P 3V6

** If the Director believes that a reviewable decision that he or she is about to make in respect of a drinking-water testing licence, if stayed by an appeal, would endanger, or likely endanger, public health, the Director shall include in the decision the reasons for his or her belief and shall also serve a copy of the decision on the Chief Medical Officer of Health. In the case of a reviewable decision in respect of a drinking-water testing licence, if the Chief Medical Officer of Health advises the Tribunal, the licensee and the Director that in his or her opinion the staying of the decision would endanger, or likely endanger, public health, the Tribunal may not stay the operation of a reviewable decision.*

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

Schedule "A"
Application and Supporting Documentation

The following documents are incorporated into and constitute part of this licence:

1. Application received by the Director on 07/23/08, 06/01/09, 06/12/09, 08/26/09, 11/03/11, 03/12/12 05/23/12, 05/29/12, 11/05/12, 01/09/13, 07/30/13, 01/19/15, 08/14/15, 09/03/15, 10/20/15, 11/17/15, 01/04/16, 01/28/16 and 07/26/16.

Appendix D

Laboratory Analytical Methods

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Misc.-Field Tests			
Air volume	HYGIENE METHOD	0	
Waste-Sample Preparation			
Final pH	EPA 1311	0.10	pH units
Initial pH	EPA 1311	0.10	pH units
Water-Physical Tests			
Color, Apparent	APHA 2120	1.0	C.U.
Conductivity	APHA 2510 B	3.0	umhos/cm
Hardness (as CaCO3)	APHA 2340 B	10	mg/L
pH	APHA 4500 H-Electrode	0.10	pH units
Total Dissolved Solids	APHA 2540C	20	mg/L
Total Suspended Solids	APHA 2540 D-Gravimetric	2.0	mg/L
Turbidity	APHA 2130 B	0.10	NTU
Soil-Physical Tests			
% Moisture	Gravimetric: Oven Dried	0.10	%
Soil-Particle Size			
% Clay (<2um)	Forestry Canada (1991) p. 46-53	0.10	%
% Sand (2.0mm - 0.05mm)	Forestry Canada (1991) p. 46-53	0.10	%
% Silt (0.05mm - 2um)	Forestry Canada (1991) p. 46-53	0.10	%
Texture	Forestry Canada (1991) p. 46-53		
Filter-Particulates			
Particulates Analysis	SEE SUBLET LAB'S REPORT		
Dustfall-Particulates			
Fixed Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Total Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Volatile Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Air-Asbestos/Quartz/Other Fibres			
Cristobalite	NIOSH 7500		
Soil-Leachable Anions & Nutrients			
Nitrate-N	EPA 300.0	1.0	ug/g
Nitrite-N	EPA 300.0	1.0	ug/g
Total Kjeldahl Nitrogen	APHA 4500-N	200	mg/kg
Water-Anions and Nutrients			
Alkalinity, Bicarbonate (as CaCO3)	EPA 310.2	10	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Alkalinity, Carbonate (as CaCO3)	EPA 310.2	10	mg/L
Alkalinity, Hydroxide (as CaCO3)	EPA 310.2	10	mg/L
Alkalinity, Total (as CaCO3)	EPA 310.2	10	mg/L
Ammonia, Total (as N)	EPA 350.1	0.050	mg/L
Bromide (Br)	EPA 300.0 (IC)	0.10	mg/L
Chloride	EPA 300.0 (IC)	2.0	mg/L
Chloride (Cl)	EPA 300.0 (IC)	2.0	mg/L
Fluoride	EPA 300.0 (IC)	0.10	mg/L
Nitrate and Nitrite as N	APHA 4110 B	0.10	mg/L
Nitrate-N (NO3-N)	EPA 300.0 (IC)	0.10	mg/L
Nitrite-N	EPA 300.1 (Modified)	0.0010	mg/L
Sulphate	EPA 300.0 (IC)	2.0	mg/L
Sulphate (SO4)	EPA 300.0 (IC)	2.0	mg/L
Total Kjeldahl Nitrogen	APHA 4500-N	0.15	mg/L
Total Phosphorus	APHA 4500-P B E	0.0030	mg/L
Soil-Anions and Nutrients			
Nitrate and Nitrite as N	APHA 4110 B	1.0	ug/g
Water-Cyanides			
Cyanide, Free	ASTM 7237	0.0050	mg/L
Water-Organic / Inorganic Carbon			
Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL	1.0	mg/L
Total Organic Carbon	APHA 5310B	1.0	mg/L
Soil-Organic / Inorganic Carbon			
Fraction Organic Carbon	CARTER 21.2	0.0010	g/g
Total Organic Carbon	CARTER 21.2	0.10	%
Water-Bacteriological Tests			
E. Coli	SM 9222D	0	CFU/100 mL
Fecal Coliforms	SM 9222D	0	CFU/100 mL
Total Coliforms	SM 9222B	0	CFU/100 mL
Soil-Metals			
Aluminum (Al)	EPA 200.2/6020A	50	ug/g
Arsenic (As)	EPA 200.2/6020A	0.2	ug/g
Arsenic (As)	EPA 200.2/6020A	1	ug/g
Barium (Ba)	EPA 200.2/6020A	1	ug/g
Cadmium (Cd)	EPA 200.2/6020A	0.5	ug/g
Calcium (Ca)	EPA 200.2/6020A	100	ug/g

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Chromium (Cr)	EPA 200.2/6020A	1	ug/g
Copper (Cu)	EPA 200.2/6020A	1	ug/g
Iron (Fe)	EPA 200.2/6020A	50	ug/g
Lead (Pb)	EPA 200.2/6020A	1	ug/g
Magnesium (Mg)	EPA 200.2/6020A	20	ug/g
Manganese (Mn)	EPA 200.2/6020A	1	ug/g
Mercury (Hg)	SW846 3050B/7471	0.010	ug/g
Sodium (Na)	EPA 200.2/6020A	100	ug/g
Uranium (U)	EPA 200.2/6020A	1	ug/g
Zinc (Zn)	EPA 200.2/6020A	5	ug/g
Dustfall-Metals			
Aluminum (Al)-Total	EPA 6020A	0.0030	mg/dm2.day
Antimony (Sb)-Total	EPA 6020A	0.00010	mg/dm2.day
Arsenic (As)-Total	EPA 6020A	0.00010	mg/dm2.day
Barium (Ba)-Total	EPA 6020A	0.000050	mg/dm2.day
Beryllium (Be)-Total	EPA 6020A	0.00050	mg/dm2.day
Bismuth (Bi)-Total	EPA 6020A	0.00050	mg/dm2.day
Boron (B)-Total	EPA 6020A	0.010	mg/dm2.day
Cadmium (Cd)-Total	EPA 6020A	0.000050	mg/dm2.day
Calcium (Ca)-Total	EPA 6020A	0.020	mg/dm2.day
Chromium (Cr)-Total	EPA 6020A	0.00050	mg/dm2.day
Cobalt (Co)-Total	EPA 6020A	0.00010	mg/dm2.day
Copper (Cu)-Total	EPA 6020A	0.00050	mg/dm2.day
Interval	EPA 245.7	1	days
Interval	EPA 6020A	1	days
Lead (Pb)-Total	EPA 6020A	0.000050	mg/dm2.day
Lithium (Li)-Total	EPA 6020A	0.0050	mg/dm2.day
Magnesium (Mg)-Total	EPA 6020A	0.0050	mg/dm2.day
Manganese (Mn)-Total	EPA 6020A	0.000050	mg/dm2.day
Mercury (Hg)-Total	EPA 245.7	0.000050	mg/dm2.day

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Molybdenum (Mo)-Total	EPA 6020A	0.000050	mg/dm2.day
Nickel (Ni)-Total	EPA 6020A	0.00050	mg/dm2.day
Potassium (K)-Total	EPA 6020A	0.050	mg/dm2.day
Selenium (Se)-Total	EPA 6020A	0.0010	mg/dm2.day
Silver (Ag)-Total	EPA 6020A	0.000010	mg/dm2.day
Sodium (Na)-Total	EPA 6020A	0.050	mg/dm2.day
Strontium (Sr)-Total	EPA 6020A	0.00010	mg/dm2.day
Thallium (Tl)-Total	EPA 6020A	0.00010	mg/dm2.day
Tin (Sn)-Total	EPA 6020A	0.00010	mg/dm2.day
Uranium (U)-Total	EPA 6020A	0.000010	mg/dm2.day
Vanadium (V)-Total	EPA 6020A	0.0010	mg/dm2.day
Zinc (Zn)-Total	EPA 6020A	0.0030	mg/dm2.day
Water-Total Metals			
Aluminum (Al)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.003	mg/L
Aluminum (Al)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Aluminum (Al)-Total	EPA 200.8	0.01	mg/L
Antimony (Sb)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Total	EPA 200.8	0.001	mg/L
Barium (Ba)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Barium (Ba)-Total	EPA 200.8	0.002	mg/L
Beryllium (Be)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Bismuth (Bi)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Boron (B)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Cadmium (Cd)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Cadmium (Cd)-Total	EPA 200.8	0.00009	mg/L
Calcium (Ca)-Total	EPA 200.8	0.5	mg/L
Calcium (Ca)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Chromium (Cr)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Chromium (Cr)-Total	EPA 200.8	0.0005	mg/L
Cobalt (Co)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Copper (Cu)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Copper (Cu)-Total	EPA 200.8	0.001	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Iron (Fe)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Iron (Fe)-Total	EPA 200.8	0.05	mg/L
Lead (Pb)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Lead (Pb)-Total	EPA 200.8	0.0005	mg/L
Lithium (Li)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Magnesium (Mg)-Total	EPA 200.8	0.5	mg/L
Magnesium (Mg)-Total	EPA SW-846 3005A/6010B	0.1	mg/L
Manganese (Mn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Manganese (Mn)-Total	EPA 200.8	0.001	mg/L
Mercury (Hg)-Total	EPA SW846 7470A	0.000010	mg/L
Molybdenum (Mo)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Nickel (Ni)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Phosphorus (P)-Total	EPA SW-846 3005A/6010B	0.3	mg/L
Potassium (K)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Selenium (Se)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Silicon (Si)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Silver (Ag)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Sodium (Na)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Sodium (Na)-Total	EPA 200.8	0.5	mg/L
Strontium (Sr)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Thallium (Tl)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Tin (Sn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Titanium (Ti)-Total	EPA SW-846 3005A/6010B	0.01	mg/L
Uranium (U)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Uranium (U)-Total	EPA 200.8	0.001	mg/L
Vanadium (V)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Zinc (Zn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.003	mg/L
Zinc (Zn)-Total	EPA 200.8	0.003	mg/L
Water-Dissolved Metals			
Aluminum (Al)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Antimony (Sb)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Barium (Ba)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Beryllium (Be)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Bismuth (Bi)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Boron (B)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Cadmium (Cd)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Calcium (Ca)-Dissolved	EPA 200.8	0.5	mg/L
Chromium (Cr)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Cobalt (Co)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Copper (Cu)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Dissolved Metals Filtration Location	EPA 200.8		
Iron (Fe)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Lead (Pb)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Lithium (Li)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Magnesium (Mg)-Dissolved	EPA 200.8	0.5	mg/L
Manganese (Mn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Molybdenum (Mo)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Nickel (Ni)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Potassium (K)-Dissolved	EPA SW-846 3005A/6020A	0.05	mg/L
Selenium (Se)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Silver (Ag)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Sodium (Na)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Strontium (Sr)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Thallium (Tl)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Tin (Sn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Titanium (Ti)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Uranium (U)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Vanadium (V)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Zinc (Zn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Waste-TCLP Metals			
Arsenic (As)	EPA 200.8	0.001	mg/L
Barium (Ba)	EPA 200.8	0.01	mg/L
Cadmium (Cd)	EPA 200.8	0.0001	mg/L
Chromium (Cr)	EPA 200.8	0.001	mg/L
Lead (Pb)	EPA 200.8	0.001	mg/L
Mercury (Hg)	SW846 7470A	0.00010	mg/L
Water-Aggregate Organics			
BOD	APHA 5210 B	2.0	mg/L
COD	APHA 5220 D	10	mg/L
Oil and Grease, Total	APHA 5520 B	2.0	mg/L
Mineral Oil and Grease	APHA 5520 B	1.0	mg/L
Phenols (4AAP)	EPA 9066	0.0010	mg/L
Soil-Aggregate Organics			
Oil and Grease, Total	APHA 5520 B	500	mg/kg
Water-Volatile Organic Compounds			
1,4-Difluorobenzene	SW846 8260 (HEADSPACE)	1	

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
4-Bromofluorobenzene	SW846 8260 (HEADSPACE)	1	
Benzene	SW846 8260 (HEADSPACE)	0.5	ug/L
Ethyl Benzene	SW846 8260 (HEADSPACE)	0.5	ug/L
Toluene	SW846 8260 (HEADSPACE)	0.5	ug/L
Water-Hydrocarbons			
2-Bromobenzotrifluoride	MOE DECPH-E3421/CCME TIER 1	1	
3,4-Dichlorotoluene	E3421/CCME (HS)	1	
Chrom. to baseline at nC50	MOE DECPH-E3421/CCME TIER 1		
F2-Naphth	CCME CWS-PHC DEC-2000 - PUB# 1310-L	100	ug/L
F3-PAH	CCME CWS-PHC DEC-2000 - PUB# 1310-L	250	ug/L
F2 (C10-C16)	MOE DECPH-E3421/CCME TIER 1	100	ug/L
F3 (C16-C34)	MOE DECPH-E3421/CCME TIER 1	250	ug/L
F4 (C34-C50)	MOE DECPH-E3421/CCME TIER 1	250	ug/L
Total Hydrocarbons (C6-C50)	CCME CWS-PHC DEC-2000 - PUB# 1310-L	250	ug/L
F1 (C6-C10)	E3421/CCME (HS)	100	ug/L
F1-BTEX	CCME CWS-PHC DEC-2000 - PUB# 1310-L	100	ug/L
Soil-Hydrocarbons			
2-Bromobenzotrifluoride	MOE DECPH-E3398/CCME TIER 1	1	
3,4-Dichlorotoluene	E3398/CCME TIER 1-HS	1	
Chrom. to baseline at nC50	MOE DECPH-E3398/CCME TIER 1		
F2-Naphth	CCME CWS-PHC DEC-2000 - PUB# 1310-S	10	ug/g
F3-PAH	CCME CWS-PHC DEC-2000 - PUB# 1310-S	50	ug/g
F2 (C10-C16)	MOE DECPH-E3398/CCME TIER 1	10	ug/g
F3 (C16-C34)	MOE DECPH-E3398/CCME TIER 1	50	ug/g
F4 (C34-C50)	MOE DECPH-E3398/CCME TIER 1	50	ug/g
Total Hydrocarbons (C6-C50)	CCME CWS-PHC DEC-2000 - PUB# 1310-S	50	ug/g
F1 (C6-C10)	E3398/CCME TIER 1-HS	5.0	ug/g
F1-BTEX	CCME CWS-PHC DEC-2000 - PUB# 1310-S	10	ug/g
Water-Organic Parameters			
Chlorophyll a	EPA 445.0 ACET	0.10	ug/L
Phaeophytin a	EPA 445.0 ACET	0.10	ug/L
Misc.-Miscellaneous			
Special Request	SEE SUBLET LAB RESULTS		

Methodology

Product	Matrix	Product Description	Analytical Method Reference
AIR VOLUME-ED	Misc.	Air volume (L)	HYGIENE METHOD

NOTE: When air concentrations of analytes are reported, they are based on air sampling information (air volume, sampling time, sampling flow rate) supplied by the client.

ALK-SPEC-WT	Water	Speciated Alkalinity	EPA 310.2
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS3-WT	Water	Cl, F, SO4	EPA 300.0 (IC)
BOD-WT	Water	BOD	APHA 5210 B

Diluted and seeded samples are filled in an airtight bottle and incubated at a specified temperature for 5 days.

BR-WT	Water	Bromide	EPA 300.0 (IC)
BTX-HS-WT	Soil	BTEX by Headspace	SW846 8260 (HEADSPACE)

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

BTX-HS-WT	Water	BTEX by Headspace	SW846 8260 (HEADSPACE)

BTX is determined by analyzing by headspace-GC/MS.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET

This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

CL-WT	Water	Chloride	EPA 300.0 (IC)
CN-FREE-CFA-WT	Water	Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

COD-BF	Water	Chemical Oxygen Demand	APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
COLOUR-WT	Water	Colour	APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

DUSTFALLS-INS.DM2-VA	Dustfall	Dustfalls Insoluble (mg/dm2.day)	BCMOE DUSTFALLS

Dustfall analysis is carried out in accordance with procedures published by the B.C. Ministry of Environment Laboratory.

EC-BF	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

EC-MF-WT	Water	E. coli	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5±0.2°C for 24±2h. Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-HARDNESS-CALC-WT	Water	Hardness (as CaCO3)	APHA 2340 B
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
F-WT	Water	Fluoride	EPA 300.0 (IC)
F1-F4-CALC-WT	Soil	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

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.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-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.

F1-HS-WT	Soil	F1 (O.Reg.153/04)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT	Soil	F2-F4 (O.Reg.153/04)	MOE DECPH-E3398/CCME TIER 1

A sub-sample of the solid sample is extracted with a solvent mixture. Following extraction, the sample extract is treated in situ with Silica Gel analyzed by GC/FID.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FILTER-NC-WT	Water	Lab Filtered and Preserved (as required)	
HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-R511-WT	Soil	Mercury-O.Reg 153/04 (July 2011)	SW846 3050B/7471

Solid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

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).

HG-T-L-CVAA-WT	Water	Total Mercury in Water by CVAAS (Low)	EPA SW846 7470A

Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-D-MS-WT	Water	Dissolved Metals in Water by ICPMS	EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

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).

MET-DIS-MS-VA	Water	Dissolved Metals by ICPMS	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Methodology

Product	Matrix	Product Description	Analytical Method Reference
MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A

Sample is vigorously digested with nitric and hydrochloric acid. Analysis is conducted by ICP/MS.

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).

MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-L-IC-WP	Water	Nitrite as N by Ion Chromatography	EPA 300.1 (Modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO2-WT	Soil		EPA 300.0

NO3-WT	Soil	Nitrate in Soil	EPA 300.0

NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calculation	CALCULATION

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-TOT-WT	Soil	Oil and Grease, Total	APHA 5520 B

Sample is extracted with an acetone:hexane mixture followed, extract is then evaporated and residue is weighed to determine total oil and grease.

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

Sample is extracted with hexane, extract is then evaporated and the residue is weighed to determine total oil and grease.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E

This analysis is carried by out an discrete colorimetric auto-analyzer using procedures adapted from APHA Method 4500-P "Phosphorus".

PARTICULATE-0.10-SLT	Filter	Respirable Dust N0600	SEE SUBLET LAB'S REPORT

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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).

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

PHEOA-ACET-FLUORO-WP	Water	Pheophytin a by fluorometry	EPA 445.0 ACET

This analysis is done using procedures modified from EPA method 445.0. Pheopigments present in the sample are determined collectively as Pheophytin a by a 90% (v/v) acetone extraction followed with analysis by fluorometry using the acidification procedure.

PREP-DUSTFALL-VA	Dustfall	Dustfall Sample Preparation	

Methodology

Product	Matrix	Product Description	Analytical Method Reference
PSA-3-SK	Soil	Particle size - Pipette removal OM & CO3	Forestry Canada (1991) p. 46-53

Dry, < 2 mm soil is treated hydrochloric acid top remove carbonates, then hydrogen peroxide to remove organic matter. The remaining soil is treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. The homogenized suspension is allowed to settle in accordance with Stoke's Law so that only clay particles remain in suspension.To determine the clay fraction, an aliquot of the clay suspension is removed, then dried and weighed. The sand fraction is determined by wet sieving the remaining suspension, then drying and weighing the sand retained on the sieve. The silt fraction is determined by calculation where % Silt = 100 - (%Sand+%Clay)

Reference:
Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

SAMPLE-DISPOSAL-WT	Misc.	Sample Handling and Disposal Fee	
SHIPPING-WT	Misc.	Shipping Charge	
SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105±5°C overnight and then 180±10°C for 1hr.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105±5°C overnight and then 180±10°C for 1hr.

SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105±5°C for a minimum of four hours or until a constant weight is achieved.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105±5°C for a minimum of four hours or until a constant weight is achieved.

SPECIAL REQUEST-SLT	Misc.	Special Request Datachem Salt Lake	SEE SUBLET LAB RESULTS
TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35±0.5°C for 24±2h. Method ID: WT-TM-1200

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2
TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

Appendix E

Analytical Laboratory QA/QC Procedures

ALS Quality Management System Summary

ALS is a global diversified testing services organization with a presence on every continent, offering a broad range of services to leading global companies.

The following report summarizes standard practices routinely employed by the ALS Environmental Division in Canada. Our practices exceed accreditation requirements and have been built to meet the needs of our customers and to give them confidence in the reliability of our test data.

Additional information is available on request from the Quality Department. Customers are invited to audit or tour ALS facilities at their convenience.

Services to Customers

ALS cooperates closely with its customers to ensure their testing needs are understood, and allows them reasonable access to relevant work areas of the laboratories to audit the management system or to witness test work undertaken on their behalf.

All client issues are logged into our tracking system to ensure each issue is addressed completely and appropriately. Local and national oversight and initiatives ensure that identified improvements are incorporated in the Canadian laboratories so that customers receive the same level of service regardless of which location performs the testing.

Documentation and Document Control

Test methods and support procedures are documented in detail to ensure consistency of application, repeatability of test results and traceability of analyses.

Test method requirements include but are not limited to sample handling, sample storage, minimizing interference, sample preparation, reagent and standard specifications, equipment, supplies, calibration requirements, instrumental measurement procedures, quality control requirements, data quality objectives and corrective actions, calculations, reporting requirements, reference information, hazards and their preventive measures.

Administrative support procedures are also documented where needed to ensure quality system procedures and customer services are provided in a controlled, approved manner consistent with ALS policies and client needs.

All procedures are authorized prior to use by the signing authority, ensuring adequate technical and quality oversight.

Distribution of documents is controlled to ensure only the most recent version is available for use. Authorized documents are reviewed periodically by the signing authority to ensure they continue to meet ALS requirements and customer needs.

Test methods and support procedures are available for client viewing on-site.

Internal Audits

Internal audits are scheduled and performed by qualified Quality and Technical staff for all routine analytical procedures and Quality System elements. Such audits ensure that procedures are implemented as intended, that test methods are scientifically defensible and technically sound, and that policies, procedures and records continue to meet the Quality System objectives.

Quality staff may periodically initiate unscheduled audits in response to proficiency testing program results, client feedback, requests from managers or any other circumstance that warrants investigation.

Quality Control (QC)

ALS has established QC procedures for monitoring the validity of tests performed by its laboratories. Individual test methods specify quality control requirements, frequency of use, and Data Quality Objectives (DQOs).

The type of quality control elements used for process monitoring is dependent on the test performed, but typically includes (as appropriate): Calibration Verification Standards, Continuing Calibration Verifications, Instrument Blanks, Method Blanks, Laboratory Control Samples, Reference Materials, Matrix Spikes, Surrogate Spikes, and Internal Standards.

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs.

Test results for selected QC samples are available on test reports. Please contact your Account Manager for more information.

Control Charts

Control charts are used to provide a graphical representation of QC results and test method performance over time. Control charts graphically display DQOs as well as the statistically derived mean and ± 2 and 3 standard deviations ("sigma") around the mean, calculated from recent historical QC results. ALS applies advanced trend monitoring algorithms to identify outliers and non-random data distributions (trends) that may indicate undesirable changes in test method performance. The trend monitoring process has been automated within our LIMS. Upon data entry, each QC result is checked against programmed limits and trends. If a trend is identified, a notification is e-mailed to the analyst and their supervisor, so that it can be investigated and corrected.

Continuous Improvement

ALS is committed to continuously improving its processes and services. The Quality System feeds into a continuous cycle of review, implementation, and monitoring so that improvements are actively sought and adopted where needed.

Data Validation

ALS analytical data proceeds through several reviews prior to the release of final reports. The ALS data validation process includes test result validation, inter-parameter validation and report validation. Test result validation involves an independent peer review of raw and calculated test results. Inter-parameter validation occurs when all department specific parameters for a sample are completed, and involves an overall review of test results within each sample for consistency among any related test parameters. Report validation occurs when all the requested test results for a work order are completed, and involves a review of the final report before it is sent to the customer.

ALS maintains laboratory records in a traceable manner for five years.

Method Validation

Customers rely on ALS to select test methods that are appropriate to meet their needs. Wherever possible, ALS references the latest versions of published standard methods developed by organizations such as American Public Health Association, United States Environmental Protection Agency, NIOSH, Environment Canada, and other international, regional or regulatory organizations, or equipment manufacturers.

Method validations are conducted to confirm that our test methods are fit for their intended use. The validations are as extensive as necessary to meet the needs of the given application. The extent depends on the source of the method. Test methods are revalidated periodically to ensure continued suitability and fitness for purpose.

Method Detection Limits and Limits of Reporting

ALS Limits of Reporting (LORs) are established using rigorous experimental and statistical procedures that begin with the determination of the Method Detection Limit (MDL) at 99% confidence. The MDL takes into account several factors, like long term Method Blanks, low level Sample Duplicates, and low level Spiked Samples. When detected at or above the MDL, ALS test results are considered to be qualitatively accurate, and a parameter can be reported with 99% confidence as being present in the sample.

$$MDL = (s_0 \times t_{n-1}) + |MBlk|$$

Where:
- s_0 = the standard deviation derived from the analysis of blank or low level samples, whichever gives a higher standard deviation,
- t_{n-1} = the Student's t-distribution with n-1 degrees of freedom for the one-sided 99% confidence interval.
- |MBlk|= the absolute value of the mean method blank.

ALS takes a conservative approach to detection limits. Our goal is to minimize false positives, because we recognize that any false positive results can be damaging for our clients. Where possible, we establish LORs at levels well-above the statistical MDL, and ideally at the LOQ_5. This improves the accuracy and precision of results near the detection limit, and reduces the chance of false positives due to sample-specific issues. At or above the LOQ_5, test results are considered to be quantitatively accurate. A reported parameter at the LOQ_5 is considered to be within 40% of the true value 95% of the time.

$$LOQ_5 = 5s_0 + |MBlk|$$

Where:
- s_0 = the standard deviation used in the MDL calculation,
- |MBlk| = the absolute value of the mean method blank.

The D. L. column on ALS analytical reports contains the LOR. The LOR may be the MDL as calculated above, or a higher value. ALS does not report LORs that are less than the calculated MDL.

Measurement Uncertainty (MU)

ALS procedures for calculating measurement uncertainty are based on accepted practices of identifying components contributing to uncertainty, compiling data that represents or includes these components, evaluating the data using appropriate statistical calculations, and reporting in a manner that prevents misunderstanding of the result. The Type A method of calculating measurement uncertainty is followed, however additional factors are considered to ensure the best and most complete information is derived from our evaluation of test method performance.

The ALS model describes the dependency of uncertainty on three factors. The first is a constant contribution to uncertainty attributable to s_0, the standard deviation of the method for concentrations that approach zero. The second is a constant relative uncertainty associated with higher parameter concentrations. The third is a constant contribution to uncertainty attributable to the mean long-term method blank value where it is significant. The following is the ALS equation for measurement uncertainty, using an expansion factor of k=2:

Expanded 95% Uncertainty as a Function of Concentration

$$U(c) = 2 * [\sqrt{ \{ s_0^2 + (\Theta c)^2 \} }] + |MBlk_{LT}|$$

Where:
- **U(c)** = The expanded uncertainty at concentration c. The range c ± U(c) represents approximately the 95% confidence interval (two standard deviations).
- **c** = Measured concentration of parameter in the sample.
- s_0 = A constant contribution to standard uncertainty represented by the standard deviation at zero concentration, which is related to the method detection limit.
- **Θ** = Combined relative standard uncertainty, excluding MDL and Method Blank contributions. Theta has no units.
- $|MBlk_{LT}|$ = Absolute value of the mean long-term Method Blank value, where significant (i.e. if > 1/5 s_0). [Note that the Method Blank term is not expanded because it represents a constant bias, not a variance.]

Uncertainty values obtained from this procedure must be regarded as estimates. Primarily, this is because all environmental samples are different, especially with regard to matrix effects and heterogeneity. It is our intent with this procedure to arrive at an estimate of a 95% confidence level uncertainty value that can be assumed to apply to 95% (or more) of the samples that a laboratory receives for a given test. It follows that for samples where undetected matrix effects or interferences occur, or for samples that are atypically heterogeneous, uncertainty estimates may be low.

Another aspect of reporting MU is the reporting of test method bias. Bias occurs in a small number of test methods that cannot recover 100% of a parameter from a sample. In these cases ALS reports bias along with the MU to aid with the interpretation of the test result.

Participation in Interlaboratory Proficiency Testing (PT) Programs

ALS locations participate in an extensive variety of proficiency testing programs. Where available, formal programs operated by outside agencies are used. When not available, ALS utilizes less formal proficiency testing studies. Root cause analysis is initiated and corrective action plans are developed when PT program results indicate a decline in test method performance.

Staff Training

Formal training procedures are in place to ensure all staff are trained in ALS polices and analytical procedures prior to performing analyses. A staff orientation program communicates ALS polices to newly hired staff. Task specific training is performed, and analyst proficiency is demonstrated and documented before staff are authorized to work independently. On-going analyst proficiency is monitored using proficiency testing programs. Records are maintained in training logs issued to staff upon hiring.

As well, ALS Canada promotes continuing education and learning by offering advanced courses covering technical and quality functions.

Employee Agreements

ALS protects its customers' confidential information and proprietary rights. We require all employees to review and sign a Code of Conduct policy that communicates the ALS confidentiality policy. It is ALS practice to never disclose information about a client's analysis to a third party without prior consent of the client, or unless compelled to by law. If we are obligated by law to disclose such information, we will inform the client prior to doing so.

Our employees avoid involvement in activities that would diminish confidence in their competence, impartiality, judgment, or integrity by complying with the ALS Code of Conduct and Data Integrity Policy.

Sample Tracking

Procedures are in place to track samples from receipt at the lab through to final reporting. A data management system (LIMS – Laboratory Information Management System) is used to generate a work order number for each sample submission, and a unique identification number is generated for each sample within the work order. The system is then used to assign specific analyses for the samples, to identify methods to be used, and to assign due dates for the results. The system is used to manage analytical workloads and track the status of all samples in-house. LIMS is a secure system that can only be accessed using login passwords. Controlling the level of access according to staff needs provides additional security.

When requested by the client, legal sample protocols are implemented to ensure chain of custody defensibility in a court of law. Contact the lab for legal sampling and transportation instructions if this service is needed.

Equipment Calibration

Measuring and testing equipment used by ALS laboratories that can have a significant effect on the accuracy or validity of test results is calibrated using established procedures. The procedures ensure traceability through an unbroken chain of calibrations or comparisons to national measurement standards. Where traceability of measurements to SI units is not possible and/or not relevant, traceability is provided by the use of certified reference materials and/or consensus standards.

Management Reviews (MR)

Management conducts a review at least annually to ensure the management system is effective, and continues to be suitable for its operations, and to identify necessary changes or improvements. Senior management is included in the review process for all locations.

ALS Quality Control Protocols

08 May, 2012

Quality control samples are introduced into batches of samples at critical points of sample handling, preparation and analysis to demonstrate the processes are performing as expected. In general, quality control samples are considered either Instrument QC or Method QC.

Instrument QC:

Instrument QC samples demonstrate control for the instrumental portion of a method. Instrument QC requirements must be successfully met before the analysis of Method QC or samples may proceed.

- Verification of initial calibration - criteria varies with each test.
- 2nd source Calibration Verification Standard (CVS) – at minimum, with each initial calibration.
- Continuing Calibration Verification (CCV) – frequency varies by test.
- Instrument Blanks – usage and frequency varies by test.

Method QC:

Method QC samples encompass the entire method and are initiated at the earliest point of the method where appropriate. Refer to the QC Definitions below. One set of Method QC is included for each batch of up to 20 client samples. Each set includes:

- 1 Method Blank.
- 1 Sample Duplicate. *
- 1 Lab Control Sample.
- 1 Reference Material or Matrix Spike. **
- Surrogate Compounds.

* Duplicate analyses are not performed where sub-sampling is not possible – e.g. most tests for organics in water.
** Spikes and Reference Materials are unavailable for Microbiology tests.

Method QC must be successfully analyzed before sample results are approved. Method QC results are normally reported to ALS clients with data reports.

Data Quality Objectives (DQOs):

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs. Current DQOs are available upon request.

Detailed descriptions of how DQOs are evaluated for different types of Quality Control samples are described on the following pages.

Types of Quality Control – Definitions and Evaluation Protocols

Method Blank (MB) - A blank sample prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of Method Blanks provide an estimate of the within batch variability of the blank response and an indication of bias introduced by the analytical procedure.

Except in special cases (as outlined in ALS DQO summary documents) the ALS DQO for Method Blanks is for all results to lie below the Limit of Reporting (LOR).

Laboratory Sample Duplicate (DUP) - A second portion of sample taken from the same container as the sub-sample used for the primary analysis, that is analyzed independently through all steps of the laboratory's sampling and analytical procedures. Duplicate samples are used to assess variance of the total method including sampling and analysis.

Duplicate precision is normally measured as Relative Percent Difference (RPD), where RPD = |(Result2 - Result1) / Mean| * 100. Duplicate samples should normally agree to within the ALS Precision DQO for the test and parameter (expressed as RPD), or within ± 2 x the LOR (for low level results). Refer to the ALS DQOs for Precision for specific limits for any given test.

ALS does not establish DQOs for Field Sample Duplicates. However, it is generally understood and accepted that the variability of Field Sample Duplicates is significantly more than what is observed with Laboratory Sample Duplicates.[1]

Laboratory Control Sample (LCS) - A known matrix spiked with compound(s) representative of the target analytes. An LCS is used to verify the accuracy of the laboratory's performance of the test.

LCS accuracy is calculated as the measured amount divided by the target concentration, and is normally expressed as percent recovery. LCS recoveries should normally lie within the ALS Accuracy DQOs for the test and parameter. For a low level LCS, the result should lie within ± 1 x the LOR of the target concentration. Refer to the ALS Accuracy DQOs for specific limits for any given test.

Reference Material (RM) – A material or substance, one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. An RM is similar to an LCS, but encompasses a representative sample matrix. Similar to an LCS, an RM is used to verify the accuracy of the laboratory's performance of the test, but including the challenges of a complex sample matrix.

RM accuracy is calculated, expressed, and evaluated similarly to LCS accuracy. Refer to ALS Accuracy DQOs for specific limits for any given test.

Matrix Spike (MS) - A sample prepared by adding a known amount of a target analyte to a specified amount of a sample for which an independent estimate of the target analyte concentration is available. Spiked samples are used, for example, to determine the effect of the sample matrix on a method's recovery efficiency.

Matrix Spike results are calculated and expressed as percent recovery, by dividing the measured result (minus any analyte contribution from the unspiked sample) by the target analyte concentration. Matrix Spike results should normally lie within the ALS Accuracy DQOs for Matrix

[1] Depending on the type of Field Sample Duplicates being evaluated (e.g. Co-located versus Split Sample Duplicates), ALS recommends DQOs for Field Sample Duplicates that are between 1.5 – 2.0 times higher than our Laboratory Sample Duplicate DQOs. Co-located Sample Duplicates generally require higher DQOs than Split Sample Duplicates.

Spikes. Matrix Spike results cannot be calculated or reported in cases where the background concentration of the test parameter in the sample is too high relative to the spike level.

Surrogate Compounds (SURR) – Surrogate Compounds are added to every sample where applicable (organics tests only). They are substances with properties that mimic the analyte of interest, and which are unlikely to be found in environmental samples. They are added at known concentration to samples to establish that the analytical method has been properly performed.

Surrogate results are calculated and expressed as percent recovery, by dividing the measured result against the expected target concentration. Refer to ALS Accuracy DQOs for specific limits for any given test.

Automated Relational Checks

In addition to all our standard Quality Control checks, ALS also employs dozens of "Relational Checks", which are programmed into our Laboratory Information Systems (LIMS) to automatically highlight any situations where the expected relationships between different test parameters are violated, which can often point to errors. Such errors may originate with field sampling, or from laboratory processes, but should always be identified and pro-actively investigated.

Total versus Dissolved Metals ("D > T" Check) – One of the most important and common relational checks we do is a check for situations where Dissolved Metal concentrations significantly exceed Total Metal concentrations. By definition, this situation should not occur. However, there are a few reasons why this can occur:

i) Circumstances where Dissolved Metals slightly exceed Total Metals are expected in a small percentage of samples, simply due to normal random variability. In fact, when all metals in a test sample exist in the dissolved form, we expect that Dissolved Metals measurements will numerically exceed Total Metals measurements exactly half the time (by a small margin), simply due to random chance.

ii) Samples to be analyzed for Dissolved Metals must be filtered, which is normally done in the field. Filtration processes are a common source of low level metals contaminants. Contamination of a sample during filtration is the most common source of significant D > T issues.

iii) Field samples for Dissolved and Total Metals are normally collected independently, so variability of the sampling process is another common cause of D > T issues.

If none of the above causes can explain a situation where Dissolved Metals exceed Total Metals, then another type of error may be indicated, either with the collection of the sample in the field, or with sample containers or preservatives, or with the laboratory testing process.

ALS automatically highlights and investigates all circumstances where a Dissolved Metal result exceeds the Total Metal result by 20% RPD or more, but only if the absolute difference between the two results is greater than the sum of the Limits of Reporting (Detection Limits) of the two results.

The mechanism of this relational check is derived from the ALS Duplicate DQOs for Metals in Water.

All D > T relational checks that violate the rule above are flagged internally, and are investigated by ALS before sample results will be released to our clients. In most cases, results will be re-analyzed to confirm or correct the anomalous relationship. If results are confirmed by re-analysis, the following data qualifier is applied:

DTC: Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Other Important Relational Checks Conducted by ALS

ALS employs dozens of other relational checks to highlight anomalous relationships between test parameters. Some of more common checks include the following:

- *Total Ammonia should not exceed Total Kjeldahl Nitrogen*
- *Weak Acid Dissociable Cyanide should not exceed Total Cyanide*
- *E. coli should not exceed Fecal Coliforms*
- *Nitrate + Nitrite should not exceed Total Nitrogen*
- *Hexavalent Chromium should not exceed Total Chromium*
- *True Colour should not exceed Apparent Colour*
- *Mineral Oil and Grease should not exceed Total Oil and Grease*
- *Reactive Phosphorus should not exceed Total Phosphorus*

Quality Control Report Guide

Matrix is the substance type of the QC sample.

Common matrices are water, soil, and tissue.

The **Reference** column contains:

a) Lab sample number (L#) or work group number (WG#) of samples that were used for duplicates or matrix spikes - this information is for internal tracking purposes.

b) Test results for actual samples that were duplicated for QC purposes.

Result from analyzing the QC sample.

% Recovery is calculated for QC samples with known target values (e.g. Spikes or CRMs).

Actual (absolute) test results are reported for the second aliquot of a duplicate pair and method blanks.

A **Qualifier** is used to communicate important information about the QC sample test results.

Sample parameter qualifiers used in the report are defined near the end of the Quality Control Report.

Also refer to the *Sample Parameter Qualifier Definitions* on the next page.

Units of the QC sample test results.

Test results are reported in % recovery for samples with known target values.

Actual (absolute) concentration units are used for reporting duplicate sample and Method Blank test results.

The calculated **Relative % Difference** between duplicate pairs.

RPD is calculated as follows:
|{(Sample Result - Duplicate Result) / [Mean]}| x 100

Duplicate pairs with test results that are < 5 x LOR are reported in sample concentration units (absolute units) and are accompanied by a J qualifier.

The Control **Limit** for the QC sample (ALS Data Quality Objective (DQO)).

QC samples must fall within Control Limits or appropriate action is taken, such as reanalysis where possible, or the data is qualified.

QC samples with known target values have a range for % recovery (eg) 85-115%.

Duplicates have a ± RPD range (e.g. ± 20 RPD). The RPD is reported as an absolute value (e.g. 20 RPD).

Method Blank control limit is the parameter Detection Limit (DL), also known as the Limit of Reporting (LOR).

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-WP	**Water**							
Batch R2179887								
WG1269694-3 DUP		L997018-4						
Sulfate		60.1	62.0		mg/L	3.1	20	21-APR-11
WG1269674-2 LCS								
Sulfate			100		%		85-115	21-APR-11
WG1269674-1 MB								
Sulfate			<0.50		mg/L		0.5	21-APR-11
WG1269674-4 MS		L997018-4						
Sulfate			N/A	MS-B	%		-	21-APR-11
WG1269674-5 CVS								
Sulfate			103		%		85-115	21-APR-11
WG1269674-6 CRM								
Sulfate			95		%		80-120	21-APR-11

Test Code: Sulfate (SO4), analyzed by Ion Chromatography (IC), in ALS Winnipeg (WP).

DUP: Laboratory Sample Duplicate - a second portion of sample taken from the same container as the sub-sample used for the primary analysis. Assesses variance of the total method including lab sub-sampling and analysis.

The results for this duplicate pair are 60.1 and 62.0 mg/L. The RPD is 3.1 and the control limits are ± 20 RPD.

LCS: Laboratory Control Sample – a known matrix spiked with target analytes. Verifies the accuracy of the performance of the test.

The recovery for this LCS is 100%, with control limits of 85 to 115% recovery.

MB: Method Blank – a blank matrix taken through the entire test method. Monitors variability of the blank response and bias of the test method.

The result for this MB is less than 0.50 mg/L. The control limit for the MB is equal to the LOR.

MS: Matrix Spike – a known amount of target analytes are added to a client sample. Measures the effect of the sample matrix on a method's recovery efficiency.

In this example, the recovery of the MS could not be calculated. The qualifier explains why – refer to the *Sample Parameter Qualifier Definitions*.

CVS: Calibration Verification Standard - a second source reference standard containing known concentrations of target analytes. Confirms the accuracy and stability of the calibration standards.

This CVS has a recovery of 103% and control limits of 85 to 115% recovery.

CRM/IRM: Certified or Internal Reference Material – a homogeneous sample whose analyte values have been well characterized.

This CRM has a 95% recovery and control limits of 80 to 120% recovery.

Quality Control Report Guide

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

Legend: explains acronyms that may be used in the QC Report.

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

Qualifiers: QC sample qualifiers are listed and explained here.

The three examples are common qualifiers. They explain unusual or special circumstances that pertain to the QC sample results.

Quality Control Report Guide

Parameters and sample numbers that had Hold Time exceedances are listed in this table.

Hold Times are tracked from sampling date and time to the date and time when the sample was processed in the lab.

The recommended Hold Times.

See the Notes* section for sources of recommendations.

Hold time exceedance Qualifiers are explained in the *Legend and Qualifiers Definitions* section below.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Transmittance, UV (254 nm)	1	19-APR-11 14:00	25-APR-11 08:16	48	38	hours	EHTL
pH	1	19-APR-11 14:00	10-MAY-11 09:32	0.25	499	hours	EHTR-FM

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).

Explanations for the Qualifiers listed above.

See also the additional Notes below.

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 L997206 were received on 21-APR-11 07:30.

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 predetermined 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.

APPENDIX G

NT-NU SPILL 18-244 INITIAL AND FOLLOW UP REPORTS

July 20, 2018

Jonathan Mesher, Resource Management Officer
Nunavut Field Operations
Iqaluit Office
Indigenous Affairs and Northern Development Canada
Box 100
Iqaluit, NU X0A 0H0

Curtis Didham, Enforcement Officer
David MacDonald, Enforcement Officer
Environment and Climate Change Canada
933 Mivvik Street
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #18-244, Reported on June 20, 2018, Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On June 19th, personnel monitoring the Waste Rock Stockpile Pond (MS-08) and facility's ditching, observed an overflow of water from the west drainage ditch of the facility. This water under normal operating conditions reports the Waste Rock Stockpile Pond. Upon investigation, the overflow was resultant of specific berm walls being insufficient to contain the surface water flow sourcing from the stockpile and reporting to the Waste Rock Stockpile Pond at a crossing where a culvert was installed which resulted in pooling water and overflow.

Baffinland took immediate action and arrested the overflow. The capacity of the west drainage ditch was increased to eliminate pooling within the ditch at the culvert and the overflow was contained. The perimeter emergency ditch was extended to contain overflow runoff still located at the spill location and as a future preventative action. The overflow water was tested and determined to have pH levels below 6.0 after the incident was initially identified. However, follow up water quality monitoring of the over flow spill location indicated pH levels above 6, having returned to above applicable MMER and Water licence criteria. The overflow occurred on a flat IOL tundra plateau >5km away from the nearest fisheries receiving water bodies of Camp Lake and Camp Lake Tributary. Water quality monitoring results down gradient of the spill location and further downstream in potential receiving environments are presented in this follow-up report.

As per MMER Reporting section 31(1)
31(2)

(a) Waste rock surface water runoff overflowed the west drainage ditch at one discrete location, which reports to the Waste Rock Stockpile Pond. Monitoring of the overflow indicates water quality was below applicable pH guidelines on initial onset of the incident.
(b) The estimated quantity of the deposit is unknown, however was arrested within the hour of being identified. Monitoring of the Waste Rock facility the previous day to the incident occurring had not identified the overflow occurring.
(c) Exceedances of pH concentrations were deposited at the overflow location identified on the west drainage ditch.
(d) No deleterious substances were deposited through the Final Discharge Point.
(e) Camp Lake and Camp Lake Tributary would be the ultimate receiving body of water. It is located >5km away from the seepage
(f) An Acute lethality test was conducted downstream on Camp Lake Tributary, a potential fisheries receiving water body, and is presented in this follow up as sample ID L1-02.
(g) N/A
(h) See summary above for circumstances of deposit. The west drainage ditch berm wall was increased in size and the capacity of the drainage ditch increased to eliminate potential pooling water. The emergency containment ditch down gradient of the spill was extended to capture overflow water in the immediate spill location down gradient of the west ditch overflow.

Baffinland

Immediate and Follow-Up Action:

The overflow was arrested upon discovery and monitoring of the over flow location was initiated. The west drainage ditch berm wall was increased in size and the capacity of the drainage ditch was increased to eliminate pooling within the ditch and promote flow from the ditch into the Waste Rock Stockpile Pond. Overflow water was captured by extending the emergency ditch around the west perimeter of the pond and culvert overflow location.

Recommendations:

Ensure effective drainage ditching flow path into the Waste Rock Stockpile Pond with earth works as required. Continued daily monitoring of both the drainage ditch and emergency ditches that are resident of the Waste Rock Stockpile Facility to safeguard against future incidents. .

Current Status:

The West drainage ditch is flowing as intended and no further overflow has been observed from either drainage ditch resident of the facility during daily monitoring.

Should you require further information or clarification on the above noted spill, please feel free to contact William Bowden or Connor Devereaux at (647) 253-0596 x6016.

Prepared by:

William Bowden
Environmental Superintendent

Reviewed by:

Simon Fleury
Mine Manager

Attach: Photos, Map, Monitoring Results, NT-NU Spill Report

cc. Tim Sewell, Grant Goddard, Sylvain Proulx, Gerald Rogers, Francois Gaudreau, Connor Devereaux (Baffinland), Stephen Bathory (QIA), Ian Parsons, Jeremy Fraser (INAC)

Photo 1. June 19th, 2018 -Heavy equipment support upon discovery to arrest over flow from West Drainage Ditch.

Photo 2. June 20th, 2018 – West drainage ditch inflow into the Waste Rock Stockpile Pond following berm reinforcement.

2275 Upper Middle Road East, Suite 300 | Oakville, ON, Canada L6H 0C3
Main: 416.364.8820 | Fax: 416.364.0193 | www.baffinland.com

Figure 1 – Overview map of overflow location

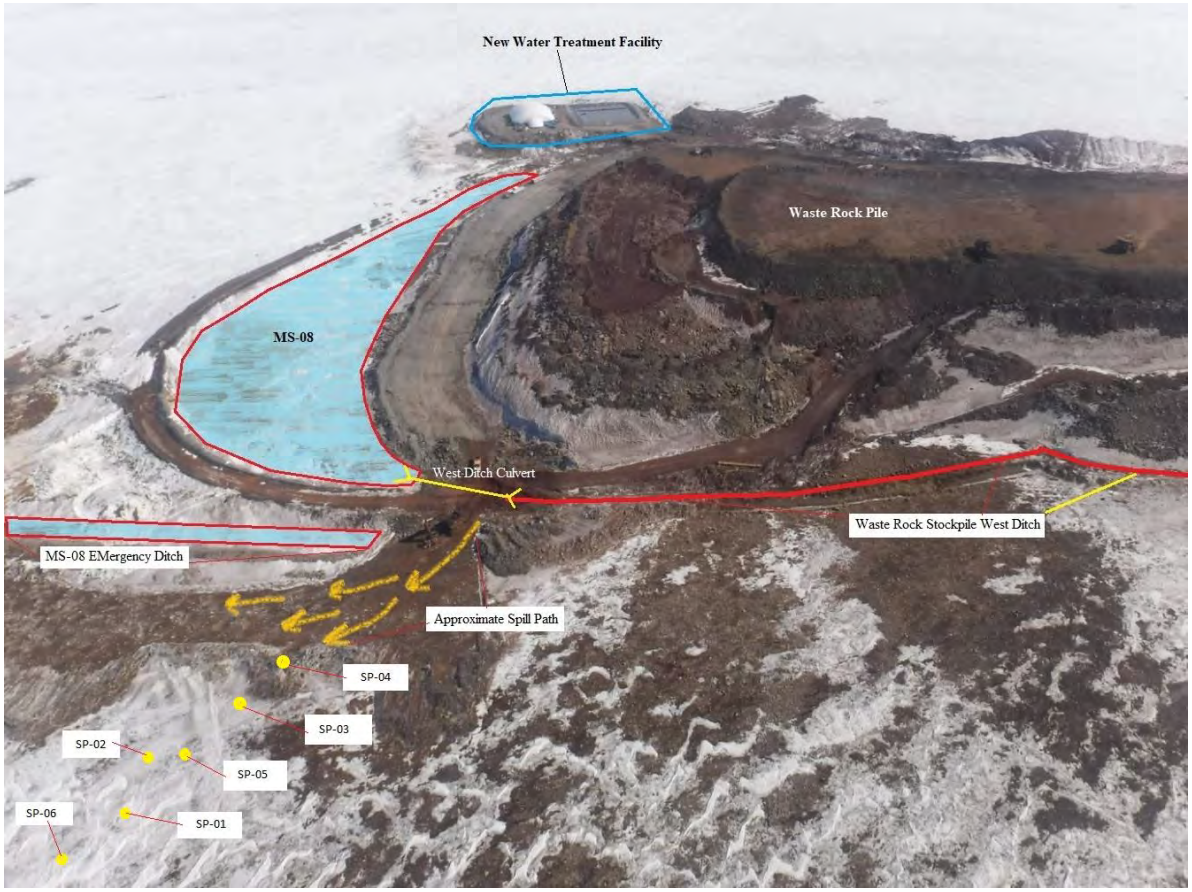

Figure 2 – Detailed map of spill location

Overflow In-Situ Monitoring Data

Date	Sample ID	Sample Time	pH	Temp. (^{O}C)	Specific Conductivity (µs/cm)	Dissolved Oxygen (%)	Turbidity (NTU)	GPS Location
19-Jun-18	SP-01	18:20	5.32	4.3	3168	85.1	52.33	71˚20'41"N 79˚14' 36"E
19-Jun-18	SP-02	18:30	5.4	5.5	3170	86.9	12.8	71˚20' 42"N 79˚14' 43"E
19-Jun-18	SP-03	18:35	6.03	5.5	2695	79.2	0.29	71˚20' 43"N 79˚14' 51"E
19-Jun-18	SP-04	18:40	6.38	5.7	2142	86.24	53.02	71˚20' 44"N 79˚14' 54"E
19-Jun-18	SP-05	18:55	5.77	6.1	2964	5.77	5.7	71˚20' 42"N 79˚14' 44"E
19-Jun-18	SP-06	19:05	5.49	5.1	3117	79	50.1	71˚20' 39"N 79˚14' 30"E
20-Jun-18	SP-01	12:25	6.07	7.5	2663	53.6	105	71˚20' 41"N 79˚14' 36"E
20-Jun-18	SP-03	12:45	6.67	4.5	1873	90.1	0	71˚20' 43"N 79˚14' 51"E
20-Jun-18	SP-04	12:55	6.81	5.5	1983	100.6	0.72	71˚20' 44"N 79˚14' 54"E
20-Jun-18	SP-05	13:00	6.57	7.6	1865	85.8	1.03	71˚20' 42"N 79˚14' 44"E
22-Jun-18	SP-01	1:16	6.34	2.7	816	85.2	2.09	71˚20' 41"N 79˚14' 36"E
22-Jun-18	SP-02	1:25	6.5	3.5	1374	78.3	13.04	71˚20' 42"N 79˚14' 43"E
22-Jun-18	SP-03	1:30	6.62	2.7	1593	79.7	1.15	71˚20' 43"N 79˚14' 51"E
22-Jun-18	SP-04	1:37	7.32	3.3	1119	91.1	1.05	71˚20' 44"N 79˚14' 54"E
22-Jun-18	SP-05	1:43	7.15	3.8	1165	87.5	2.2	71˚20' 42"N 79˚14' 44"E
22-Jun-18	SP-06	1:50	6.81	3.2	915	72.8	32.95	71˚20' 39"N 79˚14' 30"E

ALS		Sample ID	L1-02
7/20/2018		ALS ID	L2122777-4
L2122777		Date Sampled	7/3/2018 11:50:00 AM
Analyte	Units	LOR	Water
Conductivity	umhos/cm	3	105
Hardness (as CaCO3)	mg/L	10	51
pH	pH units	0.1	7.95
Total Suspended Solids	mg/L	2	<2.0
Total Dissolved Solids	mg/L	10	49 *
Turbidity	NTU	0.1	0.72
Alkalinity, Total (as CaCO3)	mg/L	10	48
Ammonia, Total (as N)	mg/L	0.02	<0.020
Bromide (Br)	mg/L	0.1	<0.10
Chloride (Cl)	mg/L	0.5	0.91
Nitrate and Nitrite as N	mg/L	0.021	0.022
Nitrate (as N)	mg/L	0.02	0.022
Nitrite (as N)	mg/L	0.005	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.15	<0.15
Phosphorus, Total	mg/L	0.003	0.0036
Sulfate (SO4)	mg/L	0.3	5.51
Dissolved Organic Carbon	mg/L	0.5	1.94
Total Organic Carbon	mg/L	0.5	2.16
Mercury (Hg)-Total	mg/L	0.00001	<0.000010
Aluminum (Al)-Total	mg/L	0.003	0.0112
Antimony (Sb)-Total	mg/L	0.0001	<0.00010
Arsenic (As)-Total	mg/L	0.0001	<0.00010
Barium (Ba)-Total	mg/L	0.00005	0.0072
Beryllium (Be)-Total	mg/L	0.0005	<0.00050
Bismuth (Bi)-Total	mg/L	0.0005	<0.00050
Boron (B)-Total	mg/L	0.01	<0.010
Cadmium (Cd)-Total	mg/L	0.00001	<0.000010
Calcium (Ca)-Total	mg/L	0.05	10.5
Chromium (Cr)-Total	mg/L	0.0005	<0.00050
Cobalt (Co)-Total	mg/L	0.0001	<0.00010
Copper (Cu)-Total	mg/L	0.0005	0.00167
Iron (Fe)-Total	mg/L	0.03	<0.030
Lead (Pb)-Total	mg/L	0.00005	<0.000050
Lithium (Li)-Total	mg/L	0.001	<0.0010
Magnesium (Mg)-Total	mg/L	0.05	6.44
Manganese (Mn)-Total	mg/L	0.00007	0.000293
Molybdenum (Mo)-Total	mg/L	0.00005	0.000274
Nickel (Ni)-Total	mg/L	0.0005	0.00053
Potassium (K)-Total	mg/L	0.2	1.19
Selenium (Se)-Total	mg/L	0.001	<0.0010
Silicon (Si)-Total	mg/L	0.1	0.58
Silver (Ag)-Total	mg/L	0.00001	<0.000010
Sodium (Na)-Total	mg/L	0.05	0.601

ALS		Sample ID	L1-02
7/20/2018		ALS ID	L2122777-4
L2122777		Date Sampled	7/3/2018 11:50:00 AM
Analyte	Units	LOR	Water
Strontium (Sr)-Total	mg/L	0.0001	0.00532
Thallium (Tl)-Total	mg/L	0.0001	<0.00010
Tin (Sn)-Total	mg/L	0.0001	<0.00010
Titanium (Ti)-Total	mg/L	0.01	<0.010
Uranium (U)-Total	mg/L	0.00001	0.000472
Vanadium (V)-Total	mg/L	0.001	<0.0010
Zinc (Zn)-Total	mg/L	0.003	<0.0030
Aluminum (Al)-Dissolved	mg/L	0.003	0.0062
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.00010
Arsenic (As)-Dissolved	mg/L	0.0001	<0.00010
Barium (Ba)-Dissolved	mg/L	0.00005	0.00717
Beryllium (Be)-Dissolved	mg/L	0.0005	<0.00050
Bismuth (Bi)-Dissolved	mg/L	0.0005	<0.00050
Boron (B)-Dissolved	mg/L	0.01	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.00001	<0.000010
Calcium (Ca)-Dissolved	mg/L	0.05	10.2
Chromium (Cr)-Dissolved	mg/L	0.0005	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.0001	<0.00010
Copper (Cu)-Dissolved	mg/L	0.0005	0.00159
Iron (Fe)-Dissolved	mg/L	0.03	<0.030
Lead (Pb)-Dissolved	mg/L	0.00005	<0.000050
Lithium (Li)-Dissolved	mg/L	0.001	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.05	6.29
Manganese (Mn)-Dissolved	mg/L	0.00007	0.000165
Mercury (Hg)-Dissolved	mg/L	0.00001	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.000293
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.00050
Potassium (K)-Dissolved	mg/L	0.2	1.21
Selenium (Se)-Dissolved	mg/L	0.001	<0.0010
Silicon (Si)-Dissolved	mg/L	0.1	0.55
Silver (Ag)-Dissolved	mg/L	0.00001	<0.000010
Sodium (Na)-Dissolved	mg/L	0.05	0.607
Strontium (Sr)-Dissolved	mg/L	0.0001	0.00521
Thallium (Tl)-Dissolved	mg/L	0.0001	<0.00010
Tin (Sn)-Dissolved	mg/L	0.0001	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.01	<0.010
Uranium (U)-Dissolved	mg/L	0.00001	0.000456
Vanadium (V)-Dissolved	mg/L	0.001	<0.0010
Zinc (Zn)-Dissolved	mg/L	0.003	<0.0030
Phenols (4AAP)	mg/L	0.001	0.0016
Chlorophyll a	ug/L	0.1	0.18
Phaeophytin a	ug/L	0.1	0.18

AQUATOX
AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Daphnia magna

Work Order : 236482
Sample Number : 55347

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	Not provided
Location :	Waterloo ON	Time Collected :	16:20
Job Number :	L2117340	Date Collected :	2018-06-20
Substance :	L2117340-1 L1-02	Date Received :	2018-06-22
Sampling Method :	Not provided	Date Tested :	2018-06-22
Sample Description :	Clear, light yellow, odourless.	Temp. on arrival :	19.0° C

Test Method : Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

REFERENCE TOXICANT DATA

Toxicant :	Sodium Chloride	Historical Mean LC50 :	6.0 g/L
Date Tested :	2018-06-12	Warning Limits (± 2SD) :	5.6 - 6.4 g/L
LC50 :	6.6 g/L*	Organism Batch :	Dm18-11
95% Confidence Limits :	6.3 - 6.9 g/L	Analyst(s) :	MDS, SEW, AW
Statistical Method :	Spearman-Kärber		

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	7 days	Mean Young Per Brood :	28.7
Culture Mortality :	2.2% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm18-11	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

*Note: The reference toxicant test result exceeded the 95% warning limits for historical data. No other unusual circumstances were observed and therefore the test result is considered acceptable.

Date: 2018-06-26
yyyy-mm-dd

Approved by: Nancy Hughes
Project Manager

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 236482
Sample Number: 55347

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	48	None	8.1	9.5	85	20.0	109	0:30

0 hours

Date & Time 2018-06-22 13:50
Technician: CZN/TZL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	8.1	9.2	99	20.0	106	48
100B	0	0	8.1	9.2	99	20.0	106	48
100C	0	0	8.1	9.2	99	20.0	106	48
Control A	0	0	8.6	8.6	769	20.0	100	240
Control B	0	0	8.6	8.6	769	20.0	100	240
Control C	0	0	8.6	8.6	769	20.0	100	240

Notes:

24 hours

Date & Time 2018-06-23 13:50
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	20.0
100B	–	0	–	–	–	20.0
100C	–	0	–	–	–	20.0
Control A	–	0	–	–	–	20.0
Control B	–	0	–	–	–	20.0
Control C	–	0	–	–	–	20.0

Notes:

48 hours

Date & Time 2018-06-24 13:50
Technician: MDS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	8.1	8.5	92	21.0
100B	0	0	8.2	8.4	99	21.0
100C	0	0	8.3	8.5	95	21.0
Control A	0	0	8.6	8.4	780	21.0
Control B	0	0	8.6	8.4	777	21.0
Control C	0	0	8.6	8.3	777	21.0

Notes:

Control organisms showing stress: 0
Organism Batch : Dm18-11

Number immobile does not include number of mortalities.

– = not measured/not required

* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JL
Date: 2018-06-26

AQUATOX
AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Rd.
Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 236482
Sample Number : 55347

SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	Not provided
Location :	Waterloo ON	Time Collected :	16:20
Job Number :	L2117340	Date Collected :	2018-06-20
Substance :	L2117340-1 L1-02	Date Received :	2018-06-22
Sampling Method :	Not provided	Date Tested :	2018-06-22
Sample Description :	Clear, light yellow, odourless.	Temp. on arrival :	19.0°C

Test Method : Reference Method for Determining Acute Lethality of Liquid Effluents to Rainbow Trout. Environment Canada, EPS 1/RM/13 (2nd Edition, December 2000, with May 2007 and February 2016 amendments).

96-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested and as received.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T18-14	Date Tested :	2018-06-08
LC50 :	3308 mg/L	Historical Mean LC50 :	3710 mg/L
95% Confidence Limits :	3012 - 3772 mg/L	Warning Limits (± 2SD) :	3074 - 4476 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	FS, TA, AW

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.39 ± 0.20 g	Mean Fish Fork Length (± 2 SD) :	36.7 ± 6.9 mm
Range of Weights :	0.21 - 0.52 g	Range of Fork Lengths (mm) :	30 - 40 mm
Fish Loading Rate :	0.2 g/L		

TEST CONDITIONS

Test Organism :	*Oncorhynchus mykiss*	Volume Tested (L) :	19
Sample Treatment :	None	Number of Replicates :	1
pH Adjustment :	None	Organisms Per Replicate :	10
Test Aeration :	Yes	Total Organisms Per Test Level :	10
Pre-aeration/Aeration Rate :	6.5 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2018-06-26
yyyy-mm-dd

Approved by: Nancy Meays
Project Manager

Work Order: 236482
Sample Number: 55347

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	7.7	9.1	84	16.0	–
	Chemistry after 30min air:	7.7	9.3	86	16.0	99

0 hours

Date & Time 2018-06-22 13:50
Technician: TA

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.7	9.3	86	16.0	99
Control	0	0	8.1	9.7	872	14.5	99

Notes:

24 hours

Date & Time 2018-06-23 13:50
Technician: TA(SF)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	14.0
Control	0	0	–	–	–	14.0

Notes:

48 hours

Date & Time 2018-06-24 13:50
Technician: TA(SF)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	14.0
Control	0	0	–	–	–	14.0

Notes:

72 hours

Date & Time 2018-06-25 13:50
Technician: MW(FS)

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2018-06-26 13:50
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.9	8.8	89	15.0
Control	0	0	8.1	9.5	821	15.0

Notes:

Control organisms showing stress: 0
Organism Batch : T18-14

"–" = not measured/not required
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: JC
Date: 2018-06-26

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 236482.

Shipping Address: AquaTox Testing & Consulting Inc.
B-11 Nicholas Beaver Road
Puslinch, Ontario Canada N0B 2J0

Voice: (519) 763-4412 **Fax:** (519) 763-4419

P.O. Number:	4500040417
Field Sampler Name (print):	
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	22-Jun-18

Client:	ALS Environmental Waterloo Q# 162705399-18
Phone:	519 -886 - 6910
Fax:	519 - 886 - 9047
Contact:	Wayne Smith / Rick Hawthorne

Sample Identification					Analyses Requested									Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name: L2117340-1	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2018-06-20	1620	L1 - 02	55347	19.0	X		X									1 Pail

For Lab Use Only	
Received By:	RD
Date:	2018 06-22
Time:	11:30
Storage Location:	
Storage Temp.(°C)	

Please list any special requests or instructions:
~~Regular~~ Rainbow Trout Toxicity Tests
Rush w/ ~~daily~~ updates

ALS Environmental

L2117340

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L2117340*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L2117340-1 L1-02		**6/20/2018**	**E**
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	6/28/2018	
	Special Request Aquatox (SPECIAL REQUEST-AQT 14)	6/28/2018	

Subcontract Info Contact: Sarah Houm (519) 886-6910
Analysis and reporting info contact: Rick Hawthorne
60 NORTHLAND ROAD, UNIT 1
WATERLOO,ON N2V 2B8
Phone: (519) 886-6910 Email: Rick.Hawthorne@alsglobal.com

Please email confirmation of receipt to: **Rick.Hawthorne@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

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 06-20-2018	REPORT TIME 19:00	[X] ORIGINAL SPILL REPORT OR [ ] UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER 18 244
B	OCCURRENCE DATE: MONTH – DAY – YEAR 06-19-2018	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 20 SECONDS 38	LONGITUDE DEGREES 79 MINUTES 14 SECONDS 19		
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 Surface Water	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES Unquantifiable	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 Waste Rock Stockpile	SPILL CAUSE High overland flow	AREA OF CONTAMINATION IN SQUARE METRES N/A	
J	FACTORS AFFECTING SPILL OR RECOVERY Drainage to tundra	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 June 19th, Environmental personnel monitoring the Waste Rock Stockpile Pond (MS-08), observed water seeping out of the west drainage ditch. The seepage was tested and determined to have pH levels below 6.0. The capacity of the drainage ditch was increased to eliminate pooling within ditch and seepage contained. The perimeter emergency ditch was also extended to contain seepage runoff. Preliminary testing indicates impacted water was in the immediate vicinity of the waste rock stockpile. Water quality monitoring results and corrective actions will be presented in the follow-up report. The seepage occurred on IOL located > 3 km from nearest fish bearing water. This spill is being reported as required by the conditions of water license no. 2AM-MRY1325, Part H , item 9(b); under the Fisheries Act as required by section 31 of the Metal Mining Effluent Regulations; and as required by the Government of Nunavut's, Environmental Protection Act paragraph 5.1(a).

L	REPORTED TO SPILL LINE BY Connor Devereaux	POSITION Env. Superintendent	EMPLOYER Baffinland	LOCATION CALLING FROM 416-364-8820	TELEPHONE ext. 6016
M	ANY ALTERNATE CONTACT Tim Sewell	POSITION Head of Environment	EMPLOYER Baffinland	ALTERNATE CONTACT LOCATION 416-364-8820	ALTERNATE TELEPHONE ext. 6054

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

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 **06-20-2018**	REPORT TIME **19:00**	[X] ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **18 - 244**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **06-19-2018**	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 **20** SECONDS **38**	LONGITUDE DEGREES **79** MINUTES **14** SECONDS **19**
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 **Surface Water**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantifiable**	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 **Waste Rock Stockpile**	SPILL CAUSE **High overland flow**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Drainage to tundra**	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 June 19th, Environmental personnel monitoring the Waste Rock Stockpile Pond (MS-08), observed water seeping out of the west drainage ditch. The seepage was tested and determined to have pH levels below 6.0. The capacity of the drainage ditch was increased to eliminate pooling within ditch and seepage contained. The perimeter emergency ditch was also extended to contain seepage runoff. Preliminary testing indicates impacted water was in the immediate vicinity of the waste rock stockpile. Water quality monitoring results and corrective actions will be presented in the follow-up report. The seepage occurred on IOL located > 3 km from nearest fish bearing water. This spill is being reported as required by the conditions of water license no. 2AM-MRY1325, Part H , item 9(b); under the Fisheries Act as required by section 31 of the Metal Mining Effluent Regulations; and as required by the Government of Nunavut's, Environmental Protection Act paragraph 5.1(a).

L	REPORTED TO SPILL LINE BY **Connor Devereaux**	POSITION **Env. Superintendent**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **416-364-8820**	TELEPHONE **ext. 6016**
M	ANY ALTERNATE CONTACT **Tim Sewell**	POSITION **Head of Environment**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **416-364-8820**	ALTERNATE TELEPHONE **ext. 6054**

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 H

METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN

Baffinland Iron Mines Corporation

METAL AND DIAMOND MINING EFFLUENT REGULATIONS EMERGENCY RESPONSE PLAN

BAF-PH1-830-P16-0047

Rev 2

Prepared By: Connor Devereaux
Department: Environment
Title: Environmental Superintendent
Date: February 27, 2019

Signature:

Approved By: Gerald Rogers
Department: Operations
Title: General Manager
Date: February 27, 2019

Signature:

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
01/15/18	0	BW	WB	Use
01/30/18	1	BW	GR	Use
02/27/19	2	CD	GR	Use

TABLE OF CONTENTS

LIST OF TABLES

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1 PURPOSE

In accordance with Part 3, Section 30 of the Metal and Diamond Mining Effluent Regulations (MDMER), Baffinland Iron Mines Corporation (Baffinland) has prepared an MDMER Emergency Response Plan.

Revisions to this plan shall be completed based on future modifications to the work scope, emergency and spill response procedures, and the associated approvals. Updates to this Plan shall be completed in accordance with: the terms and conditions of Metal and Diamond Mining Effluent Regulations, Baffinland's water licenses, QIA Commercial Lease (Q13C301; issued September 6, 2013), the amended Project Certificate No. 005 [issued May 28, 2014 by the Nunavut Impact Review Board (NIRB)] and any subsequent requirements that may be issued.

2 SCOPE

Baffinland's Emergency Response Plan (ERP) (BAF-PH10840-P16-0002 r2) identifies potential environmental, health, and safety emergencies that could arise during the construction and operation phases of the Mary River Project. The ERP establishes the framework for responding to these situations, and applies to all facets of the Mary River Project. It defines requisite organizational roles and responsibilities for project personnel, internal and external contact information, training, resources, and reporting requirements. All Baffinland employees and project contractors are required to comply with the ERP.

Baffinland has two ponds subject to the MDMER, both located at the Mine Site. Baffinland identifies the Waste Rock Facility (WRF) Pond as 'MS-08' and the Crusher Facility (CF) Pond as 'MS-06' for MDMER reporting purposes. Both the WRF Pond (MS-08) and the CF Pond (MS-06) are subject to Metal and Diamond Mining Effluent Regulations (MDMER; Appendix B).

The WRF at the Mine Site is located approximately one kilometre east of the Deposit 1 mine (Appendix A), and is the storage location for the mine area's waste rock and overburden. Seepage and runoff from the WRF is intercepted by the drainage diversion ditches and directed downstream into the WRF Pond. Water from the WRF Pond is pumped into the Water Treatment Plant (WTP) for pH adjustment, and subsequently discharged into a Geotube adjacent to the WTP for solids removal via filtering and settling (as per the Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048). The MDMER regulated Final Discharge Point (FDP) for MS-08 is a sampling port located after the discharge pump (Appendix A). Following the FDP, effluent passes through approximately 475 metres (m) of layflat hose and is discharged to the tundra of the approved receiving environment, the Mary River watershed.

The WTP consists of physical-chemical treatment for pH adjustment, chemical precipitation and removal of solids by physical barrier. The water treatment processes include coagulation, pH adjustment and precipitation, flocculation and filtration. Water from the WRF pond is pumped to the first reactor tank

and mixed by an aeration system. Lime and coagulant (ferric sulfate) solutions are added and pH adjusted to a desired value to assist the precipitation of heavy metals. The intent of coagulation is to neutralize the electric charge on colloidal particles, and assist with precipitation of heavy metals. The coagulated water then enters a second reactor tank to provide additional mixing and retention time for reactions to occur. The pH adjusted water then flows to the third reactor in which polymer is added for flocculation. Flocculation creates flocs to assist with the separation of solids and liquids in subsequent stages. The overflow from the third reactor tank is pumped to the geotube to facilitate the removal of solids via a membrane. The filtered final effluent from the geotubes is then collected in the sump and discharged via layflat hose to the receiving environment if internal effluent water quality is in compliance with the applicable discharge criteria. Effluent that does not comply with the applicable discharge criteria is recirculated to the WRF pond for further treatment.

The treatment system has a 280 m3/hr treatment capacity consisting of two 140 m3/hr treatment trains. For each train, the water flow rate and pH in Reactor tanks 1 and 2 is continuously monitored. Ferric sulfate and polymer is added based on flow rate, while the lime dosage is based on pH in the reactor tank 1. The chemical dose rate is adjusted by the plant operator in the PLC to meet the targets. Monitoring of the treated effluent at various stages of the treatment system is conducted to monitor the treatment system's performance. Effluent discharge volumes are monitored and recorded during periods of discharge through the use of a Krohne Enviromag 6" Magnetic Flow Meter. The frequency and volume of effluent discharges from the WTP is dictated by the pond's capacity, weather, air logistics, sample holding times and treatment requirements. As such, effluent is discharged intermittently on an as-needed basis from approximately late-June to early September. Consequently, the implementation of MDMER effluent and water quality monitoring is restricted to periods of effluent discharge rather than throughout the year due to Project constraints.

The CF is located approximately four kilometres from the WRF (Appendix A). The CF at the Mine Site consists of a pad that houses three (3) crusher spreads as well as associated run-of-mine, lump and fines ore stockpiles. The CF Pond, which collects storm water runoff diverted with drainage diversion ditches around the CF, is located east of the CF. Water from the CF Pond is treated for solids removal via pond-based settling. The MDMER regulated FDP is a sampling port located after the discharge pump to the North of the CF Pond, and before the connection to the sewage effluent pipeline (Appendix A). Following the FDP, effluent from the pond is pumped to the approved Mary River outfall discharge location located approximately 1.3 km southeast of the pond using the Mine Site's treated sewage effluent pipeline, originating at the Mine Site sewage treatment plant. The frequency and volume of effluent discharges from the CF pond is also dictated by the pond's capacity, weather, air logistics, sample holding times and settling requirements. As such, effluent is discharged intermittently on an as-needed basis from approximately late-June to early September. Consequently, the implementation of MDMER effluent and

water quality monitoring is restricted to periods of effluent discharge rather than throughout the year due to Project constraints.

This MDMER Emergency Response Plan provides a guide for preventing and controlling the release of water outside of the normal course of events for the WRF Pond and CF Pond operations. This Plan has been prepared in accordance with MDMER (Fisheries Act. 2002-2018), and is to be used in conjunction with Baffinland's Emergency Response Plan (BAF-PH1-830-P16-0007) and the Spill Contingency Plan (BAF-PH1-830-P16-0036). Copies of these Plans can be obtained from:

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3
Tel: (416) 364-8820
Fax: (416) 364-0193

TABLE 2-1 EXTERNAL CONTACT LIST FOR NOTIFICATION OF A RELEASE

Department of Environment - Environmental Protection Division PO Box 1000 Station 200 Iqaluit, Nunavut X0A 0H0 Tel : (877) 212-6638, (867) 975-6000 Fax : (867) 975-6099	**Environment Climate Change Canada** Enforcement Officer 933 Mivvik Street, Suite 301-Qiliaut Building P.O. Box 1870 Iqaluit, Nunavut X0A 0H0 Tel:(867)-975-4644 Cell: (867)-222-1925 Fax: (867)-975-4594
Qikiqtani Inuit Association Igluvut Building, 2nd Floor PO Box 1340 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-8400, 1-800-667-2742 Fax : (867) 979-3238	**Indigenous and Northern Affairs Canada** Field Operations Division PO Box 2200 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-4295 (Field Operations Manager) Cell: (867) 222-8458 Fax : (867) 975-6445
Crown-Indigenous Relations and Northern Affairs Canada – Water Resources Division Building 918, PO BOX 100 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-4517 (Water Resources Manager) Fax (867) 975-4560	**Mittimatalik Hunters and Trappers Organization** PO Box 189 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8856 Fax : (867) 899-8095
Nunavut Impact Review Board 29 Mitik Street PO Box 1360 Cambridge Bay, Nunavut X0B 0C0 Tel : 1-866-233-3033 Fax : (867) 983-2594, (867) 983-2574	**Nunavut Water Board** PO Box 119 Gjoa Haven, Nunavut X0B 1J) Tel : (867) 360-6338 Fax : (867) 360-6369

Hamlet of Pond Inlet PO Box 180 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8934, (867) 899-8935 Fax : (867) 899-8940	**Department of Fisheries and Oceans** Central and Arctic Region 520 Exmouth Street Sarnia, Ontario N7T 8B1 Tel : (519) 383-1813, 1-866-290-3731 Fax : (519) 464-5128

Baffinland requires all site personnel to be trained on the specific spill response initiation and reporting procedures. Reference Table B: Internal Distribution List for the Emergency Response Plan in the ERP (BAF-PH1-840-P16-0002) for key internal contact information if a spill is discovered. All site personnel must comply with the following procedure upon initiation of a spill response involving a regulated substance:

1. Immediately warn other personnel working near the spill area.
2. Evacuate the area if the health and safety of personnel is threatened.
3. In the absence of danger, and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain, and identify the nature of the spill.
4. Notify the Environment and Health and Safety department and the department who owns the facility, who will initiate further spill response operations.

Upon initiation of spill response, as directed by the Head of Health, Safety and Environment or designate, the following procedure shall be completed by the spill response team:

Source Control – If safe to do so, reduce or stop the flow of product. This may be accomplished with simple actions such as: turning off a pump; closing a valve; sealing a punctured liner with readily available materials; raising a leaking or discharging hose to stop flow; or transferring product from a leaking container (if required activate Baffinland's Emergency Response Plan BAF-PH1-840-P16-0002).

Contain and Control the Free Product – If safe to do so, prevent or minimize the spread of the spilled product. Accumulate/concentrate spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop flow of liquid. Barriers can consist of absorbent booms and pads, dykes, berms, fences, and/or trenches (dug in the ground, snow or ice).

Protection – Evaluate the risk of the impacted area to the surrounding environment. Protect sensitive ecosystems (i.e. fish-bearing streams) and/or natural resources that are at risk by isolating the area and/or diverting the spilled material to a less sensitive area. Protection/isolation may be achieved through the use of the above mentioned barriers.

Spill Clean-up – Recover and dispose of as much product as possible.

Report the Spill – Record information about the spill such as: date and time of occurrence; location and approximate size; type and amount of discharge product; photographic records; actions already taken to stop and contain the spill; ambient conditions; and any perceived threat to humans or the environment. Reports shall be completed as per Baffinland's Incident Investigation Form (BAF-PH1-810-FOR-0005).

2.1 CROSS-REFERENCE OF MDMER REGULATIONS, 30 (1) TO 30(2), TO THIS MDMER EMERGENCY RESPONSE PLAN

MDMER Reference	Description	Emergency Response Plan Reference
30(1)	The owner or operator of a mine shall prepare an emergency response plan that describes the measures to be taken in respect of a deleterious substance within the meaning of subsection 34(1) of the Act to prevent any deposit out of the normal course of events of such a substance or to mitigate the effects of such a deposit.	Entirety of Document
30 (2)(a)	The identification of any deposit out of the normal course of events that can reasonably be expected to occur at the mine and that can reasonably be expected to result in damage or danger to fish habitat or fish or the use by man of fish, and the identification of the damage or danger;	Pages 12 to 16
30 (2)(b)	a description of the measures to be used to prevent, prepare for and respond to a deposit identified under paragraph (a);	Pages 12 to 17
30 (2)(c)	a list of the individuals who are to implement the plan in the event of a deposit out of the normal course of events, and a description of their roles and responsibilities;	Pages 9 to 10
30 (2)(d)	the identification of the emergency response training required for each of the individuals listed under paragraph (c);	Pages 17 to 20
30 (2)(e)	a list of the emergency response equipment included as part of the plan, and the equipment's location; and	Appendix D
30 (2)(f)	alerting and notification procedures including the measures to be taken to notify members of the public who may be adversely affected by a deposit identified under Section 30 paragraph 2(a).	Table 2-1

3 RESPONSIBILITIES

In the event of an emergency associated with the WRF Pond or CF Pond it will be necessary for multiple departments to work in conjunction with each other. The following outlines the specific responsibilities of those departments.

3.1 GENERAL MANAGER

The General Manager (GM) is responsible for ensuring that each departmental Manager/Superintendent understands the contents of the plan and follows its requirements. The GM is responsible for ensuring that departments contact the appropriate external authorities as per this Plan and the Baffinland Emergency Response Plan (BAF-PH1-840-P16-0002).

3.2 MINE OPERATIONS

3.2.1 MINE OPERATIONS MANAGER

The Mine Operations Manager or designate is responsible for implementing the Plan within their department and area of operation. They must ensure that their personnel understand the contents of this Plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and to apply corrective actions in the event of identified non-compliances, non-conformances, and/or issues of concern.

3.2.1.1 MINE OPERATIONS SUPERVISOR

The Mine Operations Supervisor is responsible for the following:

- The health and safety of all persons while managing and directing activities associated with the working around the WRF Pond.
- Ensuring all workers and operators are trained and understand this Plan.
- Assist in approved discharging activities.
- Inspections of the WRF and WRF Pond for movement, settlement, or liner damage.
- Inspection of the drainage ditches.

3.2.1.2 MINE OPERATIONS OPERATORS

The Mine Operations Operators have the following responsibilities:

- Report all spills and/ or non-compliances to their supervisor.
- Follow procedures outlined in Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048.
- Understand and follow detailed instructions when assisting with discharging and working around the WRF Pond.
- Ensuring the WRF Pond access road is kept clear of snow during winter months.

3.2.1.3 WRF WTP OPERATORS

The WRF WTP Operators have the following responsibilities:

- Report all spills and/ or non-compliances to their supervisor.
- Follow procedures outlined in Waste Pond Water Treatment Plant Operations BAF-PH1-340-PRO-048.
- Understand and follow detailed instructions when assisting with discharging and working around the WRF Pond.
- Ensure the internal plant process parameters and field effluent parameters are recorded in the log book daily

3.3 CRUSHER OPERATIONS

3.3.1 CRUSHER OPERATIONS MANAGER

The Crusher Operations Manager or designate is responsible for implementing the Plan within their department and area of operation. They must ensure that their personnel understand the contents of the plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and to apply corrective actions in the event of identified non-compliances, non-conformances, and/or issues of concern.

3.3.1.1 CRUSHER OPERATIONS SUPERVISOR

The Crusher Operations Supervisor is responsible for the following:

- The health and safety of all persons while managing and directing activities associated with the working around the CF Pond.
- Ensuring all workers and operators are trained and understand this plan.
- Assist in approved discharging activities.
- Inspections of the CF area and CF Pond for movement, settlement, or liner damage.

3.3.1.2 CRUSHER OPERATIONS OPERATORS

The Crusher Operations Operators have the following responsibilities:

- Report all spills to their supervisor.
- Understand and follow detailed instructions when assisting with discharging and working around the CF Pond.
- Ensuring the CF Pond access road is kept clear of snow during winter months.

3.4 ENVIRONMENT

3.4.1 ENVIRONMENTAL SUPERINTENDENT

The Environmental Superintendent or designate is responsible for implementing the Plan within their department. They must ensure that their personnel understand the contents of the plan and follow its requirements. They are responsible for implementing an inspection program to ensure that the Plan is being fully implemented and advise on how best to evaluate, contain and remediate and/or recover a spill if one should occur associated with the CF Pond and WRF Pond. The Environmental Superintendent is also responsible for all required reporting to regulators regarding WRF Pond and CF Pond water quality, discharging, and spills (Section 6.2) (MDMER, 2018).

3.4.2 ENVIRONMENTAL COORDINATORS AND TECHNICIANS

The Environmental Coordinators and Technicians have the following responsibilities:

- Reviewing and understanding all the applicable plans and procedures.
- Contacting their immediate supervisor if uncertain about any of the tasks.
- Inspections of the CF Pond, WRF Pond, and surrounding tundra for:
    - Signs of instability (i.e. collapsing berm, settlement, erosion, cracks, seepage, movement, settlement)
    - Damage to the liner (i.e. tears)
    - Ditches unobstructed and functioning as per design
- Monitoring and sampling of the Final Discharge Point (FDP) during discharge of the CF Pond and WRF Pond as per BIM Environment's Water Sampling and Flow Measurement SOP and Working Near Water Containment Facilities SOP.
- Respond to spills that are associated with the CF Pond and WRF Pond in conjunction with the Emergency Response Team and the Department responsible for the facility.

4 DEFINITIONS

4.1 SPILL

A spill in this ERP is defined as the uncontrolled release of a deleterious substance from its containment into a receiving environment. A deleterious substance is defined as any acutely lethal effluent or any substance that does not meet the criteria in Table 6-2. Under MDMER (2018), Schedule 4 outlines the discharge limits for substances that must be prevented from depositing into the receiving environment. Such releases are potentially hazardous to humans, vegetation, water resources, and aquatic and terrestrial wildlife, both directly and through food web interaction. The severity of impact varies depending on several factors, including: the type and quantity of spilled material; the location of the spill; and the time of year. MDMER discharge limits are used as the standards for risk analysis of CF Pond and

WRF Pond releases to the environment. As a result, additional levels of spill response have been developed for spills that exceed these MDMER limits. Additional products with the potential for release include hydrocarbon fuels, anti-freeze, or lubricants from machinery.

4.2 SPILL PREVENTION

Spill prevention is an effective means of maintaining the safety of site personnel and the environment. Spills are less likely to occur when adhering to the criteria listed below. Inspections of the CF Pond and WRF Pond are conducted by the Mine Operations, Crusher Operations, and the Environmental Department when it is safe to do so. The conditions of the surrounding environment and current understood risk will determine the frequency of inspections, such as: freshet melt; heavy rain events; increasing reservoir levels (with limited freeboard space); and/or changing water quality conditions

4.3 FINAL DISCHARGE POINT

The Final Discharge Point (FDP) is the "identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent" (MDMER, 2018). Baffinland has two designated FDPs, one at the WRF Pond and one at the CF Pond where Baffinland has identified that they no longer exercise control over the effluent of the respective pond.

4.4 ACUTE LETHALITY

Baffinland's effluent is determined to be acutely lethal if "the effluent at 100% concentration kills more than 50% of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1" (MDMER, 2018). This acute lethality test is conducted with effluent from the WRF Pond and CF Pond on a monthly basis.

4.5 DELETERIOUS SUBSTANCES

Deleterious substances under the MDMER consist of the following:

- Arsenic;
- Copper;
- Cyanide;
- Lead;
- Nickel;
- Zinc;
- Suspended solids; and
- Radium 226.

5 LEVELS OF EMERGENCY SPILL RESPONSE

To effectively manage emergency responses, Baffinland has adopted a tiered emergency classification scheme (Figure 5-1). Each level of emergency, based on its severity, require varying degrees of response, effort, and support. Each level has distinct effects on normal business operations, as well as requirements for investigation and reporting. The ERP details each level of emergency; levels of classification specific to spill response are as follows:

Level 1 (Low) – Minor accidental release of a deleterious substance with:

- No threat to public safety; and/or
- Negligible environmental impact to receiving environment.

Level 2 (Medium) – Major accidental release of a deleterious substance with:

- Some threat to public safety; and/or
- Potential Moderate environmental impact to receiving environment

Level 3 (High) – Uncontrolled hazard which:

- Jeopardizes project personnel safety: and/or
- Potential significant environmental impacts to receiving environment

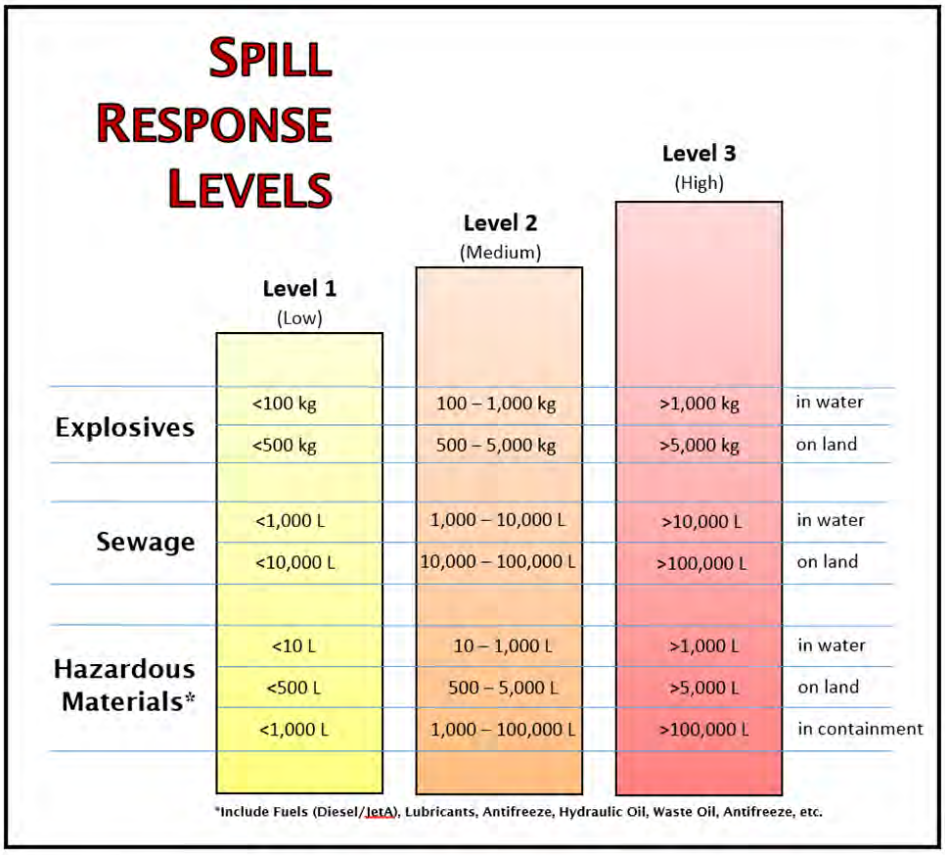

FIGURE 5-1 EMERGENCY SPILL RESPONSE LEVELS

6 PROTOCOL

6.1 EMERGENCY SPILL RESPONSE PROCEDURES

6.1.1 WATERFOWL LANDING IN PONDS

Migratory birds use the Mary River project area during open-water season in their migration routes. The presence of open water in the WRF and CF Pond mimics the natural habitat of some of these birds. This creates the risk of migratory birds landing in the WRF or CF Pond. During occasions when the WRF Pond and CF Pond contain non-compliant water (i.e. low pH), that water poses a hazard to migratory birds if they were to land in the ponds. Harming migratory birds is prohibited under the Migratory Birds Convention Act (1994).

Prevention techniques must be employed to prevent birds from landing in the ponds. These deterrent techniques may include human/ predatory bird effigies or acoustic devices. If birds do land in the ponds, all reasonable efforts must be focused on deterring and removing birds from area. If birds are impacted by any hydrocarbons, dish detergent will be used to clean the birds. In addition, a Wildlife biologist will be consulted further in an event of contamination of birds.

6.1.2 SPILLS ON LAND

The main control techniques for spills on land are the use of barriers such as dykes, trenches, booms and fences. Such barriers slow the progression of the spill and also serve as containment to facilitate spill recovery. They should be placed down gradient from the source of the spill, and as close as possible to the source. Depending on the volume spilled, the site of the spill, as well as available material, a dyke may be built with soil, booms, lumber, snow, etc. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V shaped or U-shaped). Trenches are useful in the presence of permeable soil and when the spilled product is potentially migrating below the ground surface to facilitate spill recovery and/ or containment.

6.1.3 BERM INTEGRITY FAILURE

Runoff collected in the CF Pond and WRF Pond can be released into the receiving environment if the integrity of the pond's berm structure(s) is compromised. Factors that can compromise berm integrity include: construction activities; rainfall; berm design; frost heaving; and poor management. If signs of berm failure are noticed during an inspection, Operations, Environment and Health and Safety must be contacted immediately.

In the event of failure of a CF/ WRF Pond berm, a Code 1 should be called immediately, dependent upon the extent. The Emergency Response Team will deploy the emergency spill truck and personnel to help set up pumps, manage water, and help stop/prevent further uncontrolled release of water into the receiving environment. Operations will provide personnel and equipment necessary to seal or hold the

breach. Departmental Managers and Superintendents of Operations and Environment will provide direction following such an occurrence.

6.1.4 DRAINAGE DITCH INTEGRITY FAILURE

In the event of high flows during freshet and heavy rainfalls, the capacity of the drainage diversion ditches that collect runoff from the WRF and CF may be compromised. There is the potential for the water levels in the diversion ditches to rise over the ditch berm height, resulting in an uncontrolled overflow into the receiving environment. A potential result of high water levels in a ditch, even if the ditch berm walls aren't breached, is the seepage of the ditch water through the permeable berms into the surrounding environment (further discussed in Section 6.1.5).

In such an event, immediate corrective actions must aim to ensure all water in the ditches reports to the pond. Controlled pumping from the ditches into the pond may alleviate the volume of water required to be contained by the ditches, and emergency dykes/ berms can be constructed to increase the capacity of the ditch berm. Any water that overflows and does not report to the pond must be sampled with a full suite of water samples.

Preventative efforts must include daily inspections of the drainage diversion ditches at both the WRF and CF. These inspections must include any culvert crossings to ensure water can flow unimpeded through them. Personnel must notify their supervisors of impending overflow situations to enable an effective emergency response.

6.1.5 EMERGENCY SPILLWAY

In the event that runoff inflows to the CF Pond and WRF Pond exceed the rate that can be intentionally discharged, for a prolonged period of time, pond water levels may reach an elevation that results in water being released to the receiving environment via the pond's engineered emergency spillway. In such an event, the first mitigation measure that will be implemented to prevent such occurrence will involve performing an emergency controlled discharge. The plan to conduct an emergency controlled discharge will be formulated by the Operations and Environmental Managers/Superintendents. If the controlled emergency discharge does not lower the level of water contained in the pond(s), the emergency spillway will be used, as designed, to release volumes of water that exceeds the capacity of the pond and prevent the failure of the pond's berm structures. In such an occurrence, close monitoring of the pond and spillway is required to assess any erosional degradation of the pond, spillway and surrounding tundra. Monitoring to be conducted in the event that the emergency spillway is used will include inspecting pond infrastructure and adjacent tundra area for cracks, slumping, movement and/or sinkholes. As the level of control is significantly less utilising the emergency spillway, a controlled emergency discharge is the first and preferred measure to be undertaken. If signs of instability or erosional degradation are noticed during a spillway discharge, the Mine Operations, Crushing and Environmental Superintendents should be notified immediately.

In the event of a controlled emergency or spillway discharge, a full suite sample set (BIM-MMER-WT) group and acute toxicity sample (Group 3) will be collected to determine the quality of the water being discharged to the receiving environment. Volumes of water released during such an event will be measured using a flowmeter or suitable estimation method (i.e. flowrate extrapolation) and recorded.

6.1.6 SEEPAGE

The potential exists that excessive precipitation and runoff at the WRF or CF could saturate the underlying substrate and result in the release of seepage outside of the containment areas via active-layer groundwater flow that does not report to the ponds. This groundwater flow could not be captured by the keyed in pond liner and therefore flow through the substrate to the surrounding environment. Another potential effect of excessive precipitation and runoff is high water levels in the drainage diversion ditches, allowing water to seep through permeable berm walls into the surrounding environment.

Close monitoring of the areas surrounding the WRF and CF will be conducted during the open water season. Inspections will look to identify newly formed wet areas, flowing water, and/or areas of pooling. If suspected seepage is observed, the Operations and Environmental Superintendents will be notified immediately. If seepage is confirmed, all reasonable and safe emergency containment methods must be implemented to capture the seepage and/or minimize the extent of seepage migration. For example, an emergency containment ditch and sumps may be utilized to capture observed seepage. This seepage must be pumped back into the pond, and any seepage that can't be contained will be sampled with a full suite sample set to determine potential impacts on the receiving environment.

6.1.7 SPILLS INTO CONTAINMENT FACILITY

If hazardous products (i.e. hydrocarbons, etc.) are released into the CF Pond and WRF Pond, spill response should be initiated as outlined in Section 2 of this Plan. To determine the best method for spill clean-up/ recovery, the Environmental Superintendent or their designate should be consulted. Responses to a spill in a pond can include various containment and recovery techniques, including skimming and booming, in concert with water treatment. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be utilized, as required.

6.1.8 SPILLS AT THE WRF WATER TREATMENT PLANT

The water from the WRF Pond is treated in the WTP in a three step process involving the injection of chemical into temporary storage tanks, and a final step of filtration in the Geotube. Further protocols on plant operation and management can be found in Appendix F Waste Rock Pile Water Treatment Plant Operations (BAF-PH1-340-PRO-048). The water is first treated in the temporary storage tanks using iron precipitation, hydroxide precipitation and flocculation, with pH readings monitored to indicate when the pH has reached desired values. With a desired pH value, the water is discharged from the WTP into the Geotube for further treatment of suspended solids. The water from the Geotube sump can be discharged

either back into the WRF Pond if deemed non-compliant after settling, or out into the receiving environment if compliant (refer to section 6.3.1 and 6.3.2 for guidance on this decision).

Chemicals used during the treatment of the WRF Pond water include ferric sulphate, lime and polymer. Additionally, there is fuel and other hydrocarbon products present at the plant for heating and power purposes. These hazardous products would necessitate spill response if released into the environment. Figure 5-1 should be consulted to determine the level of Emergency Spill Response.

6.2 REPORTING REQUIREMENTS IN THE EVENT OF A SPILL

In the event of a spill of deleterious substances from one of WRF or CF ponds, the spill report submitted by the Environmental Superintendent to applicable regulators (Table 6-1) must contain the following information:

- "The name, description and concentration of the deleterious substance deposited;
- The estimated quantity of the spill and how this estimate was achieved;
- The day on which, and hour at which, the deposit occurred;
- The quantity of the deleterious substance that was deposited at a place other than through a final discharge point and the identification of that place, including the location by latitude and longitude and, if applicable, the civic address;
- The quantity of the deleterious substance that was deposited through a final discharge point and the identification of that discharge point;
- The name of the receiving body of water, if there is a name, and the location by latitude and longitude where the deleterious substance entered the receiving body of water;
- The results of the acute lethality tests conducted under subsection 31.1(1) or a statement indicating that acute lethality tests were not conducted but that notification was given under subsection 31.1(2);
- The circumstances of the deposit, the measures that were taken to mitigate the effects of the deposit and, if the emergency response plan was implemented, details concerning its implementation; and
- The measures that were taken, or that are intended to be taken, to prevent any similar occurrence of an unauthorized deposit." (MDMER, 2018)

TABLE 6-1 CONTACT LIST FOR MDMER NOTIFICATION OF A RELEASE

Name	Location	Phone Number	Purpose
Environmental Superintendent and Head of Health, Safety, Environment & Security	Mary River Mine site	416-364-8820 x6016	All spills, leaks and releases of hazardous materials will be reported to the Environment Department immediately and documented by submitting the necessary documentation within 4 hours of the spill.
Environment and Climate Change Canada	933 Mivvik Street, Suite 301-Qiliaut Building P.O. Box 1870 Iqaluit, Nunavut X0A 0H0	Tel: (867)-975-4644 Cell: (867)-222-1925 Fax: (867)-975-4594	Any release of a deleterious substance or acute toxicity failure will trigger notification.
Crown Indigenous Relations and Northern Affairs Canada	Water Resources Officer, P.O. Box 100, Iqaluit, NU X0A 0H0	1-867-975-4550	Spills greater than 100 liters require notification to the regulators within 24 hours of the spill.
NT-NU 24-hr Spill Report Line	Iqaluit, NU	1-867-920-8130	Spills greater than 100 liters or deposit of a deleterious substance as outlined in MDMER Section 34 require notification to the spill line and documentation submitted within 24 hours of the spill.

6.3 ENSURING NO ACCIDENTAL DISCHARGE OF NON-COMPLIANT WATER

6.3.1 PROCEDURE FOR DISCHARGING CONTAINMENT PONDS

All personnel must adhere to the following procedure when planning to discharge a containment pond. If personnel are unsure of a task at any time, the work must cease, and the worker must contact their supervisor.

1. Prior to sampling, the YSI calibration much be checked and the results of this check recorded in the log book.
2. Obtain full-suite pre-discharge samples from pond if discharge is not immediately required to avoid overflow.
3. If pre-discharge sample results are compliant, notify applicable regulators of planned discharge. The sampling date for the monthly acute toxicity sample must be selected and recorded not less than 30 days in advance of collecting the acute toxicity sample.
4. Obtain approval from the Environmental Superintendent or Manager to begin discharging.
5. Prior to pumping, record totalizer values on the flow meter, as well as the time of pump start-up, in the appropriate log book. This is the standard requirement before any pumping occurs.

Note: Baffinland is required to report the total volume of effluent discharged daily and monthly from containment ponds as per the Water License and MDMER.

6. Effluent sampling frequency must adhere to MDMER and Water License Criteria utilizing accredited laboratory analysis, with accompanying field parameters, while discharging.
   a. All discharge samples must be taken from the particular pond's FDP.
   b. YSI readings must accompany all samples, and the BIM assigned YSI equipment number recorded in the field log.
   c. All Acute Toxicity samples must be collected with a BIM-MMER-WT sample set.
7. The containment pond must be inspected daily while discharging.
8. Ensure the appropriate field log is completed daily while discharging. There is one designated field book for each pond, and all notes must be recorded in this.
9. After sample collection, the following actions must be completed as soon as possible:
   a. Photographs of discharge activities and scans of field notes must be documented and the discharge log updated.
   b. Samples are to be stored in the lab refrigerator, or in a cooler with ice.

6.3.2 ENSURING NO DISCHARGE OF NON-COMPLIANT WATER

Water discharged to the receiving environment from containment ponds must adhere to MDMER and Baffinland's Water License discharge limits (Table 6-2). Historically, the WRF Pond has contained low pH (acidic) water as result of impacted runoff from the Waste Rock Stockpile. In cases where water contained in the WRF Pond or CF Pond is determined to be non-compliant with applicable discharge limits, water contained in the pond(s) must be treated as per Baffinland's Waste Rock Management Plan (BAF-PH1-830-P16-0029) and Waste Pond Water Treatment Plant Operations (BAF-PH1-340-PRO-048) to ensure compliance with the applicable discharge limits.

It is the responsibility of both the supervisor and the worker to discontinue discharging the ponds, and to notify their supervisor immediately, for any of the following reasons. A re-evaluation of the water quality is required prior to further discharge.

Reasons to discontinue discharging:

1. If external lab results for MS-06 (CF Pond) or MS-08 (WRF Pond) effluent are received that exceed the maximum concentrations listed in the 'BIM Internal Limits' column in Table 6-2. These limits are a threshold of conservatism to ensure regulated discharge limits are not exceeded (Table 6-2).

TABLE 6-2 BIM STANDARDS FOR EFFLUENT QUALITY DISCHARGE LIMITS FOR MS-06 AND MS-08

Parameter	Maximum Authorized Monthly Mean Concentration, as per MDMER	Maximum Concentration In A Grab Sample, as per BIM Internal Limits
Total Arsenic	0.50 mg/L	0.40 mg/L
Total Copper	0.30 mg/L	0.24 mg/L
Total Lead	0.20 mg/L	0.16 mg/L
Total Nickel	0.50 mg/L	0.40 mg/L
Total Zinc	0.50 mg/L	0.40 mg/L
TSS	15.0 mg/L	15.0 mg/L
Cyanide	1.00 mg/L	
Radium 226	0.37 Bq/L	
pH	Between 6.0 and 9.5	Between 6.5 and 9.0
Toxicity	Not acutely toxic (<50% mortality)	

2. If field pH measurements (i.e. YSI) fall outside the range/limits outlined in the 'BIM Internal Limits' column of Tables 6-2. These field readings are real-time measurements that characterize the water quality of effluent being discharged at that instance. As such, if measured field parameters fall outside of the 'BIM Internal Limits' outlined in Table 6-2, the discharge of effluent to the receiving environment must cease and the worker's supervisor notified.
3. Pumping must stop for at least 12 hours following heavy precipitation or wind events to allow for the pond water to stabilize, any suspended sediments to settle and be re-sampled, unless advised otherwise by the Environmental Superintendent.

If non-compliant water is accidently discharged to the receiving environment, Operations and Environment Departments will work collaboratively to mitigate, evaluate and document possible effects. In the case of the accidental release of non-compliant water, pumping of effluent to the receiving environment must seize immediately and the Head of Health, Safety, Environment and Security, Mine Manager and the Environmental Superintendent must to be notified immediately. In the event of a release of non-compliant water to the receiving environment, all notes, photographs, pumping/discharge times, and water quality data must be compiled for the investigation and the scene of the incident shut down until further instruction.

In the occurrence of an acute toxicity test determining the effluent to be acutely lethal, Baffinland will cease discharge immediately. The inspector will be notified of this non-compliance without delay. Water quality data collected when the acute toxicity sample was collected will be reviewed, and an additional BIM-MMER-WT sample set will be collected with the discharge pump set in recirculation mode. Additionally, reference and exposure area samples will be collected to monitor any impacts on the receiving environment. Reference area sample site for both ponds is MS-08-US, and the exposure area sample site is MS-08-DS for the WRF Pond, and MS-06-DS for the CF Pond. This is outlined in Section 15 of the MDMER. If discharge is not ceased increased frequency of acute lethality testing will occur as per

Section 15 of the MDMER. In most cases the pond will be recirculated until water quality is confirmed to be compliant before discharge to the receiving environment occurs.

6.4 TRAINING FOR SPILL RESPONSE

Emergency spill responses often occur in conjunction with other emergency responses (i.e. an overturned fuel tanker on the Tote Road); to facilitate an efficient response to an emergency, personnel trained to respond to health and safety emergencies shall also be trained in spill response. Baffinland's ERT Coordinator, with support from the Environmental Superintendents, will identify training and resource requirements for personnel involved with emergency spill responses. Emergency spill response training required by this Plan shall be reviewed in conjunction with Baffinland's ERP. Emergency and spill response training shall be updated throughout the lifecycle of Project to ensure the following requirements are fulfilled:

- The requirements of NWT/Nunavut Mines Health and Safety Regulations are met or exceeded.
- Emergency responders can competently operate the equipment employed for spills and other emergencies.
- Emergency responders will undertake practices, drills, and full scale exercises, for responding to emergencies that are plausible on site.

6.4.1 DRILLS AND EXERCISES

While drills and exercises can be used for training purposes, their primary function for this Plan is to provide the means of testing the adequacy of the Plan's provisions and the level of readiness of response personnel. The Emergency Response Trainer and Environmental Superintendents are responsible for coordinating the development of and assisting in conducting drills and exercises annually. The following section outlines the types of drills and exercises that can be practiced:

6.4.1.1 TABLE TOP EXERCISES

Table top exercises involve presenting a simulated emergency situation to key emergency response personnel in informal settings to elicit constructive discussions as the participants examine and resolve problems based on this Plan. These exercises shall be performed during ERT training sessions conducted throughout the year.

6.4.1.2 FUNCTIONAL DRILLS

Functional drills are practical exercises designed to evaluate the capability of personnel to perform a specific function (i.e. communications, first aid, and spill response). Deficiencies and competencies identified during functional drills are documented as per Section 30(4) of MDMER, and used as effective development tools in the preparation of response procedures required for full-scale exercises.

6.4.1.3 FULL-SCALE EXERCISES

Full scale exercises are intended to evaluate the operational capability of Baffinland's emergency response and preparedness. Full-scale exercises require sufficient notice to allow for the preparation of effective emergency response procedures and to identify and correct deficiencies in advance. Examples of mock full scale exercises at Baffinland include: non-compliant water discharge, berm breach, controlled discharge, seepage observed, and migratory waterfowl landing in ponds. Deficiencies and competencies identified during full scale exercises are documented as per Section 30(4) of MDMER, and used as effective development tools in the preparation of response procedures required for full-scale exercises.

7 REFERENCES AND RECORDS

Baffinland, (2014). EPP: BAF-PH1-840-P16-0002 Emergency Response Plan.

Baffinland, (2014). BAF-PH1-830-P16-0008 Environmental Protection Plan.

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Golder, (2018). Interim Waste Rock Management Plan.

Baffinland, (2017). BAF-PH1-830-P16-0036 Spill Contingency Plan.

Baffinland, (2018). BAF-PH1-340-PRO-048 Waste Pond Water Treatment Plant Operations.

Environment and Climate Change Canada, (2018).

Fisheries Act, (1985). (R.S.C., 1985, c. F-14).

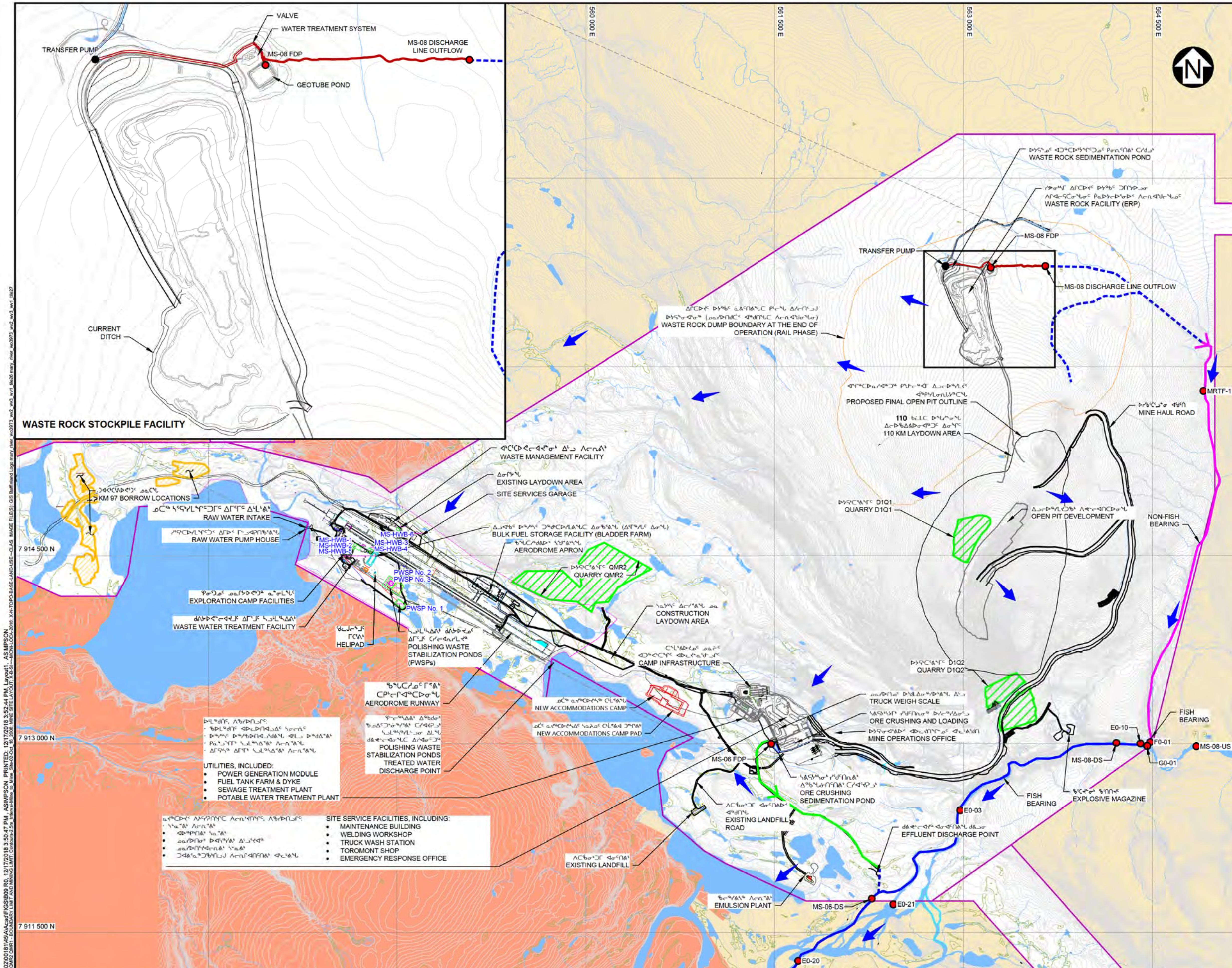
Metal and Diamond Mining Effluent Regulations. (SOR/2002-222).

Migratory Birds Convention Act, (1994). (S.C. 1994, c. 22).

Nunavut Water Board (2013): Water License NO: 2AM–MRY1325 Type “A”.

APPENDICES

APPENDIX A
SITE LAYOUT AND WATER LICENCE/ MDMER MONITORING LOCATIONS



VALVE
WATER TREATMENT SYSTEM
TRANSFER PUMP
MS-08 FDP
MS-08 DISCHARGE LINE OUTFLOW
GEOTUBE POND
CURRENT DITCH
WASTE ROCK STOCKPILE FACILITY
560 000 E
561 500 E
563 000 E
564 500 E
7 914 500 N
7 913 000 N
7 911 500 N
WASTE ROCK SEDIMENTATION POND
WASTE ROCK FACILITY (ERP)
MS-08 FDP
TRANSFER PUMP
MS-08 DISCHARGE LINE OUTFLOW
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
PROPOSED FINAL OPEN PIT OUTLINE
110 KM LAYDOWN AREA
MINE HAUL ROAD
MRTF-1
QUARRY D1Q1
OPEN PIT DEVELOPMENT
NON-FISH BEARING
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
SITE SERVICES GARAGE
KM 97 BORROW LOCATIONS
RAW WATER INTAKE
RAW WATER PUMP HOUSE
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
MS-HWB-1
MS-HWB-2
MS-HWB-3
MS-HWB-4
MS-HWB-6
QUARRY QMR2
PWSP No. 2
PWSP No. 3
PWSP No. 1
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
CONSTRUCTION LAYDOWN AREA
CAMP INFRASTRUCTURE
QUARRY D1Q2
AERODROME RUNWAY
NEW ACCOMMODATIONS CAMP
NEW ACCOMMODATIONS CAMP PAD
TRUCK WEIGH SCALE
ORE CRUSHING AND LOADING
MINE OPERATIONS OFFICE
POLISHING WASTE STABILIZATION PONDS TREATED WATER DISCHARGE POINT
UTILITIES, INCLUDED:
POWER GENERATION MODULE
FUEL TANK FARM & DYKE
SEWAGE TREATMENT PLANT
POTABLE WATER TREATMENT PLANT
MS-06 FDP
ORE CRUSHING SEDIMENTATION POND
EXISTING LANDFILL ROAD
FISH BEARING
EXPLOSIVE MAGAZINE
MS-08-DS
E0-10
F0-01
G0-01
MS-08-US
FISH BEARING
E0-03
EFFLUENT DISCHARGE POINT
SITE SERVICE FACILITIES, INCLUDING:
MAINTENANCE BUILDING
WELDING WORKSHOP
TRUCK WASH STATION
TOROMONT SHOP
EMERGENCY RESPONSE OFFICE
EXISTING LANDFILL
EMULSION PLANT
MS-06-DS
E0-21
E0-20

0	17DEC'18	ISSUED WITH TRANSMITTAL	CB	AS	AV
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED

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)
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- LAY FLAT HOSE
- FISH BEARING WATER
- NON-FISH BEARING WATER
- HDPE PIPE
- OVERLAND SURFACE WATER FLOW
- WATER QUALITY MONITORING LOCATION
- PUMP
- DRAINAGE DIRECTION

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.

SCALE A: 300 150 0 500 1000 1500 m

Baffinland

MARY RIVER PROJECT

MINE SITE LAYOUT AND MDMER / WATER LICENCE MONITORING LOCATIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/45	NB18-00875

FIGURE 1 — REV 0

SAVED: I:\102\00181\45\A\Acad\FIGS\B09 R0, 12/17/2018 3:50:47 PM, ASIMPSON PRINTED: 12/17/2018 3:52:44 PM, Layout1, ASIMPSON

APPENDIX B
METAL AND DIAMOND MINING EFFLUENT REGULATIONS

CANADA

CONSOLIDATION

CODIFICATION

Metal and Diamond Mining Effluent Regulations

Règlement sur les effluents des mines de métaux et des mines de diamants

SOR/2002-222

DORS/2002-222

Current to July 5, 2018

Last amended on June 1, 2018

À jour au 5 juillet 2018

Dernière modification le 1 juin 2018

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OFFICIAL STATUS OF CONSOLIDATIONS

Subsections 31(1) and (3) of the *Legislation Revision and Consolidation Act*, in force on June 1, 2009, provide as follows:

Published consolidation is evidence
31 (1) Every copy of a consolidated statute or consolidated regulation published by the Minister under this Act in either print or electronic form is evidence of that statute or regulation and of its contents and every copy purporting to be published by the Minister is deemed to be so published, unless the contrary is shown.

...

Inconsistencies in regulations
(3) In the event of an inconsistency between a consolidated regulation published by the Minister under this Act and the original regulation or a subsequent amendment as registered by the Clerk of the Privy Council under the *Statutory Instruments Act*, the original regulation or amendment prevails to the extent of the inconsistency.

NOTE

This consolidation is current to July 5, 2018. The last amendments came into force on June 1, 2018. Any amendments that were not in force as of July 5, 2018 are set out at the end of this document under the heading "Amendments Not in Force".

CARACTÈRE OFFICIEL DES CODIFICATIONS

Les paragraphes 31(1) et (3) de la *Loi sur la révision et la codification des textes législatifs*, en vigueur le 1er juin 2009, prévoient ce qui suit :

Codifications comme élément de preuve
31 (1) Tout exemplaire d'une loi codifiée ou d'un règlement codifié, publié par le ministre en vertu de la présente loi sur support papier ou sur support électronique, fait foi de cette loi ou de ce règlement et de son contenu. Tout exemplaire donné comme publié par le ministre est réputé avoir été ainsi publié, sauf preuve contraire.

[...]

Incompatibilité — règlements
(3) Les dispositions du règlement d'origine avec ses modifications subséquentes enregistrées par le greffier du Conseil privé en vertu de la *Loi sur les textes réglementaires* l'emportent sur les dispositions incompatibles du règlement codifié publié par le ministre en vertu de la présente loi.

NOTE

Cette codification est à jour au 5 juillet 2018. Les dernières modifications sont entrées en vigueur le 1 juin 2018. Toutes modifications qui n'étaient pas en vigueur au 5 juillet 2018 sont énoncées à la fin de ce document sous le titre « Modifications non en vigueur ».

TABLE OF PROVISIONS

Metal and Diamond Mining Effluent Regulations

TABLE ANALYTIQUE

Règlement sur les effluents des mines de métaux et des mines de diamants

Registration
SOR/2002-222 June 6, 2002

FISHERIES ACT

Metal and Diamond Mining Effluent Regulations

P.C. 2002-987 June 6, 2002

Her Excellency the Governor General in Council, on the recommendation of the Minister of Fisheries and Oceans, pursuant to subsections 34(2), 36(5) and 38(9) of the *Fisheries Act*, hereby makes the annexed *Metal Mining Effluent Regulations*.

Enregistrement
DORS/2002-222 Le 6 juin 2002

LOI SUR LES PÊCHES

Règlement sur les effluents des mines de métaux et des mines de diamants

C.P. 2002-987 Le 6 juin 2002

Sur recommandation du ministre des Pêches et des Océans et en vertu des paragraphes 34(2), 36(5) et 38(9) de la *Loi sur les pêches*, Son Excellence la Gouverneure générale en conseil prend le *Règlement sur les effluents des mines de métaux*, ci-après.

Metal and Diamond Mining Effluent Regulations

Règlement sur les effluents des mines de métaux et des mines de diamants

PART 1

General

Interpretation

1 (1) The following definitions apply in these Regulations.

Act means the *Fisheries Act*. (*Loi*)

acute lethality test [Repealed, SOR/2018-99, s. 2]

acutely lethal, in respect of an effluent, means that the effluent at 100% concentration kills

(a) more than 50% of the rainbow trout subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.1; or

(b) more than 50% of the threespine stickleback subjected to it for a period of 96 hours, when tested in accordance with the acute lethality test set out in section 14.2. (*létalité aiguë*)

acutely lethal effluent [Repealed, SOR/2018-99, s. 2]

authorization officer [Repealed, SOR/2018-99, s. 2]

commercial operation, in respect of a mine, means an average rate of production equal to or greater than 10% of the design-rated capacity of the mine over a period of 90 consecutive days. (*exploitation commerciale*)

composite sample means

(a) a quantity of effluent consisting of not less than three equal volumes or three volumes proportionate to flow that have been collected at approximately equal time intervals over a sampling period of not less than seven hours and not more than 24 hours; or

(b) a quantity of effluent collected continuously at a constant rate or at a rate proportionate to the rate of flow of the effluent over a sampling period of not less than seven hours and not more than 24 hours. (*échantillon composite*)

PARTIE I

Dispositions générales

Définitions et interprétation

1 (1) Les définitions qui suivent s'appliquent au présent règlement.

agent d'autorisation [Abrogée, DORS/2018-99, art. 2]

autorisation transitoire [Abrogée, DORS/2018-99, art. 2]

chantier [Abrogée, DORS/2018-99, art. 2]

concentration moyenne mensuelle La valeur moyenne des concentrations mesurées dans les échantillons composites ou instantanés prélevés de chaque point de rejet final chaque mois où il y a rejet de substances nocives. (*monthly mean concentration*)

dépôt de résidus miniers [Abrogée, DORS/2006-239, art. 1]

eau de drainage superficiel [Abrogée, DORS/2018-99, art. 2]

échantillon composite

a) Soit le volume d'effluent composé d'au moins trois parties égales ou de trois parties proportionnelles au débit, prélevées à intervalles sensiblement égaux, pendant une période d'échantillonnage d'au moins sept heures et d'au plus vingt-quatre heures;

b) soit le volume d'effluent prélevé de façon continue à un débit constant ou à un débit proportionnel à celui de l'effluent, pendant une période d'échantillonnage d'au moins sept heures et d'au plus vingt-quatre heures. (*composite sample*)

échantillon instantané [Abrogée, DORS/2018-99, art. 2]

effluent S'entend, selon le cas :

a) de l'effluent de bassins de traitement, de l'effluent d'eau de mine, de l'effluent des dépôts de résidus miniers, de l'effluent d'installations de préparation du

Daphnia magna monitoring test [Repealed, SOR/2018-99, s. 2]

deleterious substance [Repealed, SOR/2018-99, s. 2]

diamond mine means any work or undertaking that is designed or is used, or has been used, in connection with a mining or milling activity to produce a diamond or an ore from which a diamond may be produced. It includes any cleared or disturbed area that is adjacent to such a work or undertaking. (*mine de diamants*)

effluent means any of the following:

(a) hydrometallurgical facility effluent, milling facility effluent, mine water effluent, tailings impoundment area effluent, treatment pond effluent or treatment facility effluent other than effluent from a sewage treatment facility; or

(b) any seepage or surface runoff containing any deleterious substance that flows over, through or out of the site of a mine. (*effluent*)

final discharge point, in respect of an effluent, means an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent. (*point de rejet final*)

grab sample [Repealed, SOR/2018-99, s. 2]

hydrometallurgical facility effluent means effluent from the acidic leaching, solution concentration and recovery of metals by means of aqueous chemical methods, tailings slurries, and all other effluents deposited from a hydrometallurgical facility. (*effluent d'installations d'hydrométallurgie*)

hydrometallurgy means the production of a metal by means of aqueous chemical methods for acidic leaching, solution concentration and recovery of metals from metal-bearing minerals other than metal-bearing minerals that have been thermally pre-treated or blended with metal-bearing minerals that have been thermally pre-treated. (*hydrométallurgie*)

metal mine means any work or undertaking that is designed or is used, or has been used, in connection with a mining, milling or hydrometallurgical activity to produce a metal or a metal concentrate or an ore from which a metal or a metal concentrate may be produced, as well as any cleared or disturbed area that is adjacent to such a work or undertaking. It includes any work or undertaking, such as a smelter, pelletizing plant, sintering plant, refinery or acid plant, if its effluent is combined with the effluent from a mining, milling or hydrometallurgical minerai, de l'effluent d'installations d'hydrométallurgie ou de l'effluent d'installations de traitement à l'exclusion de l'effluent d'installations de traitement d'eaux résiduaires;

b) des eaux d'exfiltration et des eaux de ruissellement qui contiennent une substance nocive et qui coulent sur le site d'une mine ou en proviennent. (*effluent*)

effluent à létalité aiguë [Abrogée, DORS/2018-99, art. 2]

effluent d'eau de mine Dans le cadre d'activités minières, l'eau pompée d'ouvrages souterrains, de compartiments d'extraction par solution ou de mines à ciel ouvert ou l'eau s'écoulant de ceux-ci. (*mine water effluent*)

effluent d'installations de préparation du minerai Boues de stériles, effluent des lixiviats de terrils, effluent de l'extraction par solution et tout autre effluent rejeté à partir d'une installation de préparation du minerai. (*milling facility effluent*)

effluent d'installations de traitement Eau des bassins de polissage, des bassins de traitement, des bassins de décantation, des stations de traitement de l'eau et de toute installation de traitement des effluents miniers. (*treatment facility effluent*)

effluent d'installations d'hydrométallurgie Effluent rejeté à partir d'une installation d'hydrométallurgie, notamment effluent de lixiviation acide, de concentration de solution et de récupération de métal par procédés chimiques aqueux et boues de résidus miniers. (*hydrometallurgical facility effluent*)

essai de détermination de la létalité aiguë [Abrogée, DORS/2018-99, art. 2]

essai de suivi avec bioessais sur la Daphnia magna [Abrogée, DORS/2018-99, art. 2]

exploitant Personne qui exploite une mine, qui en a le contrôle ou la garde, ou qui en est responsable. (*operator*)

exploitation commerciale Le taux de production moyen d'une mine qui, au cours d'une période de quatre-vingt-dix jours consécutifs, est égal ou supérieur à 10 % de la capacité nominale de la mine. (*commercial operation*)

exploitation des placers Exploitation minière où le minerai ou les métaux sont extraits de sédiments de cours

activity whose purpose is to produce a metal or a metal concentrate or an ore from which a metal or a metal concentrate may be produced. (*mine de métaux*)

milling means any of the following activities for the purpose of producing a diamond, metal or metal concentrate:

(a) the crushing or grinding of ore or kimberlite;

(b) the processing of uranium ore or uranium enriched solution; or

(c) the processing of tailings. (*préparation du minerai*)

milling facility effluent means tailing slurries, heap leaching effluent, solution mining effluent and all other effluent deposited from a milling facility. (*effluent d'installations de préparation du minerai*)

mine [Repealed, SOR/2018-99, s. 2]

mine under development [Repealed, SOR/2018-99, s. 2]

mine water effluent means, in respect of mining activities, water that is pumped from or flows out of any underground works, solution chambers or open pits. (*effluent d'eau de mine*)

monthly mean concentration means the average value of the concentrations measured in all composite or grab samples collected from each final discharge point during each month when a deleterious substance is deposited. (*concentration moyenne mensuelle*)

new mine [Repealed, SOR/2018-99, s. 2]

operations area [Repealed, SOR/2018-99, s. 2]

operator means any person who operates, has control or custody of or is in charge of a mine. (*exploitant*)

placer mining means a mining operation that extracts minerals or metals from stream sediments by gravity or magnetic separation. (*exploitation des placers*)

recognized closed mine [Repealed, SOR/2018-99, s. 2]

Reference Method EPS 1/RM/10 means *Biological Test Method: Reference Method for Determining Acute Lethality Using Threespine Stickleback*, published in December 2017 by the Department of the Environment, as amended from time to time. (*méthode de référence SPE 1/RM/10*)

d'eau par gravité ou par séparation magnétique. (*placer mining*)

hydrométallurgie La production d'un métal par des procédés chimiques aqueux de lixiviation acide, concentration de solution et récupération de métal à partir de minéraux métallifères n'ayant pas subi de prétraitement thermique ou n'ayant pas été mélangés à des minéraux métallifères qui ont subi un prétraitement thermique. (*hydrometallurgy*)

létalité aiguë S'agissant d'un effluent à l'état non dilué, la capacité de provoquer, selon le cas, la mort de :

a) plus de 50 % des truites arc-en-ciel qui y sont exposées pendant une période de quatre-vingt-seize heures au cours de l'essai de détermination de la létalité aiguë visé à l'article 14.1;

b) plus de 50 % des épinoches à trois épines qui y sont exposés pendant une période de quatre-vingt-seize heures au cours de l'essai de détermination de la létalité aiguë visé à l'article 14.2. (*acutely lethal*)

Loi La *Loi sur les pêches*. (*Act*)

matières en suspension Toutes matières solides présentes dans un effluent et retenues sur un papier-filtre dont les pores mesurent 1,5 micron lorsque l'effluent est soumis à un essai conforme aux exigences analytiques prévues au tableau 1 de l'annexe 3. (*suspended solids*)

méthode de référence SPE 1/RM/10 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la létalité aiguë à l'aide de l'épinoche à trois épines*, publiée en décembre 2017 par le ministère de l'Environnement, avec ses modifications successives. (*Reference Method EPS 1/RM/10*)

méthode de référence SPE 1/RM/13 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la létalité aiguë d'effluents chez la truite arc-en-ciel* (Méthode de référence SPE 1/RM/13), publiée en juillet 1990 par le ministère de l'Environnement, dans sa version modifiée en décembre 2000 et avec ses modifications successives. (*Reference Method EPS 1/RM/13*)

méthode de référence SPE 1/RM/14 La publication intitulée *Méthode d'essai biologique : méthode de référence pour la détermination de la létalité aiguë d'effluents chez Daphnia magna* (Méthode de référence SPE 1/RM/14), publiée en juillet 1990 par le ministère de l'Environnement, dans sa version modifiée en décembre 2000 et avec ses modifications successives. (*Reference Method EPS 1/RM/14*)

Reference Method EPS 1/RM/13 means *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout* (Reference Method EPS 1/RM/13), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time. (*méthode de référence SPE 1/RM/13*)

Reference Method EPS 1/RM/14 means *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna* (Reference Method EPS 1/RM/14), July 1990, published by the Department of the Environment, as amended in December 2000, and as may be further amended from time to time. (*méthode de référence SPE 1/RM/14*)

reopened mine [Repealed, SOR/2018-99, s. 2]

surface drainage [Repealed, SOR/2018-99, s. 2]

suspended solids means any solid matter contained in an effluent that is retained on a 1.5 micron pore filter paper when the effluent is tested in compliance with the analytical requirements set out in Table 1 of Schedule 3. (*matières en suspension*)

tailings impoundment area [Repealed, SOR/2006-239, s. 1]

total suspended solids [Repealed, SOR/2018-99, s. 2]

transitional authorization [Repealed, SOR/2018-99, s. 2]

treatment facility effluent means water from a polishing pond, treatment pond, settling pond or water treatment plant or from any mine effluent treatment facility. (*effluent d'installations de traitement*)

mine [Abrogée, DORS/2018-99, art. 2]

mine de diamants Ouvrage ou entreprise qui est conçu ou qui est ou a été utilisé dans le cadre d'activités d'extraction ou de préparation du minerai visant à produire un diamant ou un minerai à partir duquel un diamant peut être produit ainsi que toute zone déboisée ou perturbée qui y est adjacente. (*diamond mine*)

mine de métaux Ouvrage ou entreprise qui est conçu ou qui est ou a été utilisé dans le cadre d'activités d'extraction, d'hydrométallurgie ou de préparation du minerai visant à produire un métal, un concentré de métal ou un minerai à partir duquel un métal ou un concentré de métal peut être produit ainsi que toute zone déboisée ou perturbée qui y est adjacente. La présente définition comprend tout ouvrage ou entreprise, telles les fonderies, usines de bouletage, usines de frittage, affineries et usines d'acide, dont l'effluent est combiné aux effluents provenant d'activités d'extraction, d'hydrométallurgie ou de préparation du minerai visant à produire un métal, un concentré de métal ou un minerai à partir duquel un métal ou un concentré de métal peut être produit. (*metal mine*)

mine en développement [Abrogée, DORS/2018-99, art. 2]

mine fermée reconnue [Abrogée, DORS/2018-99, art. 2]

mine remise en exploitation [Abrogée, DORS/2018-99, art. 2]

nouvelle mine [Abrogée, DORS/2018-99, art. 2]

point de rejet final Le point de rejet de l'effluent d'une mine qui est repérable et au-delà duquel l'exploitant de la mine n'agit plus quant à la qualité de l'effluent. (*final discharge point*)

préparation du minerai S'entend des activités ci-après effectuées en vue de la production d'un diamant, d'un métal ou d'un concentré de métal :

a) le concassage ou le broyage d'un minerai ou de kimberlite;

b) le traitement du minerai d'uranium ou de solutions uranifères;

c) le traitement de résidus miniers. (*milling*)

rejet Est assimilée au rejet l'immersion au sens du paragraphe 34(1) de la Loi. (*French version only*)

substance nocive [Abrogée, DORS/2018-99, art. 2]

(2) [Repealed, SOR/2018-99, s. 2]

SOR/2006-239, s. 1; SOR/2009-156, s. 1; SOR/2012-22, s. 1; SOR/2018-99, s. 2.

Application

2 (1) These Regulations apply in respect of the following mines:

(a) metal mines that, at any time on or after June 6, 2002,

(i) exceed an effluent flow rate of 50 m^3 per day, based on the effluent deposited from all the final discharge points of the mine, and

(ii) deposit a deleterious substance in any water or place referred to in subsection 36(3) of the Act; and

(b) diamond mines that, at any time on or after June 1, 2018,

(i) exceed an effluent flow rate of 50 m^3 per day, based on the effluent deposited from all the final discharge points of the mine, and

(ii) deposit a deleterious substance in any water or place referred to in subsection 36(3) of the Act.

(2) However, these Regulations do not apply in respect of

(a) placer mining;

(b) a metal mine that stopped commercial operation before June 6, 2002, unless it returns to commercial operation on or after that date; and

(c) a diamond mine that stopped commercial operation before June 1, 2018, unless it returns to commercial operation on or after that date.

(3) Despite subsection (1), sections 4 to 31 do not apply in respect of a mine that is a recognized closed mine under subsection 32(2) unless it returns to commercial operation, in which case it ceases to be a recognized closed mine.

SOR/2012-22, s. 2; SOR/2018-99, s. 3.

total des solides en suspension [Abrogée, DORS/2018-99, art. 2]

(2) [Abrogé, DORS/2018-99, art. 2]

DORS/2006-239, art. 1; DORS/2009-156, art. 1; DORS/2012-22, art. 1; DORS/2018-99, art. 2.

Champ d'application

2 (1) Le présent règlement s'applique à l'égard des mines suivantes :

a) les mines de métaux qui, à un moment quelconque, le 6 juin 2002 ou après cette date :

(i) d'une part, ont un débit d'effluent supérieur à 50 m^3 par jour, déterminé d'après les rejets d'effluent à partir de tous leurs points de rejet final,

(ii) d'autre part, rejettent une substance nocive dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi;

b) les mines de diamants qui, à un moment quelconque, le 1er juin 2018 ou après cette date :

(i) d'une part, ont un débit d'effluent supérieur à 50 m^3 par jour, déterminé d'après les rejets d'effluent à partir de tous leurs points de rejet final,

(ii) d'autre part, rejettent une substance nocive dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi.

(2) Toutefois, le présent règlement ne s'applique pas à l'égard :

a) des exploitations des placers;

b) des mines de métaux dont l'exploitation commerciale a pris fin avant le 6 juin 2002, à moins que l'exploitation commerciale ne reprenne le 6 juin 2002 ou après cette date;

c) des mines de diamants dont l'exploitation commerciale a pris fin avant le 1er juin 2018, à moins que l'exploitation commerciale ne reprenne le 1er juin 2018 ou après cette date.

(3) Malgré le paragraphe (1), les articles 4 à 31 ne s'appliquent pas à l'égard d'une mine qui est une mine fermée reconnue en application du paragraphe 32(2), à moins que l'exploitation commerciale ne reprenne, auquel cas elle cesse d'être une mine fermée reconnue.

DORS/2012-22, art. 2; DORS/2018-99, art. 3.

Prescribed Deleterious Substances

3 For the purpose of the definition *deleterious substance* in subsection 34(1) of the Act, the following substances or classes of substances are prescribed as deleterious substances:

(a) arsenic;

(b) copper;

(c) cyanide;

(d) lead;

(e) nickel;

(f) zinc;

(g) suspended solids; and

(h) radium 226.

SOR/2018-99, s. 3.

Substances nocives désignées

3 Pour l'application de la définition de *substance nocive* au paragraphe 34(1) de la Loi, sont désignées comme substances nocives et les substances ou les catégories de substance suivantes :

a) l'arsenic;

b) le cuivre;

c) le cyanure;

d) le plomb;

e) le nickel;

f) le zinc;

g) les matières en suspension;

h) le radium 226.

DORS/2018-99, art. 3.

Authority to Deposit in Water or Place Referred to in Subsection 36(3) of Act

4 (1) For the purposes of paragraph 36(4)(b) of the Act, the owner or operator of a mine is authorized to deposit, or to permit the deposit of, an effluent containing any deleterious substance that is prescribed in section 3 in any water or place referred to in subsection 36(3) of the Act if

(a) the concentration of the deleterious substance in the effluent does not exceed the maximum authorized concentrations that are set out in columns 2, 3 and 4 of Schedule 4;

(b) the pH of the effluent is equal to or greater than 6.0 but is not greater than 9.5; and

(c) the effluent is not acutely lethal.

(2) The authority in subsection (1) is conditional on the owner or operator complying with sections 6 to 27.

SOR/2018-99, s. 3.

Rejet autorisé dans les eaux ou lieux visés au paragraphe 36(3) de la Loi

4 (1) Pour l'application de l'alinéa 36(4)b) de la Loi, le propriétaire ou l'exploitant d'une mine est autorisé à rejeter ou à permettre que soit rejeté un effluent contenant l'une ou l'autre des substances nocives désignées à l'article 3 dans les eaux ou les lieux visés au paragraphe 36(3) de la Loi, si les conditions suivantes sont réunies :

a) la concentration de la substance nocive dans l'effluent ne dépasse pas les concentrations maximales permises qui sont établies aux colonnes 2, 3 et 4 de l'annexe 4;

b) le pH de l'effluent est égal ou supérieur à 6,0 mais ne dépasse pas 9,5;

c) l'effluent ne présente pas de létalité aiguë.

(2) Le propriétaire ou l'exploitant d'une mine ne peut se prévaloir de l'autorisation que lui confère le paragraphe (1) que s'il respecte les conditions prévues aux articles 6 à 27.

DORS/2018-99, art. 3.

Authority to Deposit in Tailings Impoundment Areas

5 (1) Despite section 4, the owner or operator of a mine may deposit or permit the deposit of waste rock, acutely

Autorisation de rejeter dans un dépôt de résidus miniers

5 (1) Malgré l'article 4, le propriétaire ou l'exploitant d'une mine peut rejeter — ou permettre que soient

lethal effluent or effluent of any pH and containing any concentration of a deleterious substance that is prescribed in section 3 into a tailings impoundment area that is either

(a) a water or place set out in Schedule 2; or

(b) a disposal area that is confined by anthropogenic or natural structures or by both, other than a disposal area that is, or is part of, a natural water body that is frequented by fish.

(2) The authority in subsection (1) is conditional on the owner or operator complying with sections 7 to 28.

(3) For the purposes of this section, any acutely lethal effluent is prescribed as a deleterious substance.

SOR/2006-239, s. 2; SOR/2018-99, s. 5.

rejetés — des stériles, un effluent à létalité aiguë ou tout autre effluent, quel que soit le pH de l'effluent ou sa concentration en substances nocives désignées à l'article 3, dans l'un ou l'autre des dépôts de résidus miniers suivants :

a) les eaux et lieux mentionnés à l'annexe 2;

b) toute aire de décharge circonscrite par une formation naturelle ou un ouvrage artificiel, ou les deux, à l'exclusion d'une aire de décharge qui est un plan d'eau naturel où vivent des poissons ou qui en fait partie.

(2) Le propriétaire ou l'exploitant d'une mine ne peut se prévaloir de l'autorisation que lui confère le paragraphe (1) que s'il respecte les conditions prévues aux articles 7 à 28.

(3) Pour l'application du présent article, tout effluent à létalité aiguë est désigné comme une substance nocive.

DORS/2006-239, art. 2; DORS/2018-99, art. 5.

PART 2

Conditions Governing Authority to Deposit

DIVISION 1

General

Prohibition on Diluting Effluent

6 The owner or operator of a mine shall not combine effluent with water or any other effluent for the purpose of diluting effluent before it is deposited.

Environmental Effects Monitoring

7 (1) The owner or operator of a mine shall conduct environmental effects monitoring studies in accordance with the requirements and within the periods set out in Schedule 5.

(2) The studies shall be conducted using documented and validated methods, and their results interpreted and reported on in accordance with generally accepted standards of good scientific practice at the time that the studies are conducted.

PARTIE 2

Conditions régissant l'autorisation de rejeter

SECTION 1

Dispositions générales

Interdiction de diluer

6 Il est interdit au propriétaire ou à l'exploitant d'une mine de combiner un effluent avec de l'eau ou avec tout autre effluent dans le but de le diluer avant son rejet.

Études de suivi des effets sur l'environnement

7 (1) Le propriétaire ou l'exploitant d'une mine effectue des études de suivi des effets sur l'environnement selon les exigences et dans les délais prévus à l'annexe 5.

(2) Il effectue les études selon des méthodes éprouvées et validées et évalue et présente leurs résultats conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques au moment de l'étude.

(3) The owner or operator shall record the results of the studies and submit to the Minister of the Environment, in accordance with the requirements set out in Schedule 5, the reports and information required by that Schedule.

SOR/2006-239, s. 3; SOR/2018-99, s. 6.

Identifying Information

8 (1) The owner or operator of a mine shall submit in writing to the Minister of the Environment the information referred to in subsection (2) not later than 60 days after the day on which any of the following occur:

(a) the mine becomes subject to these Regulations;

(b) ownership of the mine is transferred; and

(c) the mine returns to commercial operation after it has become a recognized closed mine.

(2) The information that shall be submitted is

(a) the name and address of both the owner and the operator of the mine;

(b) the name and address of any parent company of the owner and the operator; and

(c) the design-rated capacity of the mine, expressed as tonnes per year, and a description and rationale of how the design-rated capacity was determined.

(3) The owner or operator shall submit in writing to the Minister of the Environment any change in the information not later than 60 days after the change occurs.

SOR/2018-99, ss. 7, 36.

Final Discharge Points

9 The owner or operator of a mine shall identify each final discharge point and submit in writing to the Minister of the Environment, not later than 60 days after the day on which the mine becomes subject to these Regulations, the following information:

(a) plans, specifications and a general description of each final discharge point together with its location by latitude and longitude;

(b) a description of how each final discharge point is designed and maintained in respect of the deposit of deleterious substances; and

(3) Il enregistre les résultats des études et présente au ministre de l'Environnement, selon les exigences prévues à l'annexe 5, les rapports et les renseignements visés à cette annexe.

DORS/2006-239, art. 3; DORS/2018-99, art. 6.

Renseignements d'identification

8 (1) Le propriétaire ou l'exploitant d'une mine présente par écrit au ministre de l'Environnement les renseignements mentionnés au paragraphe (2) :

a) dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent règlement;

b) dans les soixante jours suivant le transfert de la propriété de la mine;

c) s'agissant d'une mine fermée reconnue, dans les soixante jours suivant la date à laquelle l'exploitation commerciale reprend.

(2) Les renseignements à présenter sont :

a) les nom et adresse du propriétaire et de l'exploitant;

b) les nom et adresse de toute société mère du propriétaire et de l'exploitant;

c) la capacité nominale de la mine, exprimée en tonne par année, ainsi qu'une description et une explication de la façon dont elle a été établie.

(3) Le propriétaire ou l'exploitant présente par écrit au ministre de l'Environnement des précisions sur tout changement des renseignements dans les soixante jours suivant le changement.

DORS/2018-99, art. 7 et 36.

Points de rejet final

9 Le propriétaire ou l'exploitant d'une mine détermine chaque point de rejet final et fournit par écrit au ministre de l'Environnement, dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent règlement, les renseignements suivants :

a) les plans, les spécifications et une description générale de chaque point de rejet final, ainsi que la latitude et la longitude de son emplacement;

b) la façon dont chacun des points de rejet final est conçu et entretenu en ce qui a trait au rejet de substances nocives;

(c) the name of the receiving body of water, if there is a name.

SOR/2006-239, s. 4; SOR/2018-99, ss. 8, 36.

c) le nom du milieu aquatique récepteur, si ce nom existe.

DORS/2006-239, art. 4; DORS/2018-99, art. 8 et 36.

10 (1) The owner or operator of a mine shall submit in writing to the Minister of the Environment the information required by section 9, for

(a) any final discharge point that is identified by an inspector, and that was not identified as required by section 9, within 30 days after the discharge point is identified; and

(b) each new final discharge point, at least 60 days before depositing effluent from that new final discharge point.

10 (1) Le propriétaire ou l'exploitant d'une mine présente par écrit au ministre de l'Environnement les renseignements visés à l'article 9 relativement à :

a) tous les points de rejet final que désigne l'inspecteur et qui n'ont pas été déterminés en application de l'article 9, dans les trente jours suivant leur désignation;

b) tout nouveau point de rejet final, au moins soixante jours avant qu'un effluent en soit rejeté.

(2) The owner or operator shall submit in writing to the Minister of the Environment the information on any proposed change to a final discharge point at least 60 days before the change is to be made.

SOR/2018-99, s. 36.

(2) Il présente par écrit au ministre de l'Environnement des précisions sur toute modification proposée d'un point de rejet final au moins soixante jours avant que la modification soit apportée.

DORS/2018-99, art. 36.

Monitoring Equipment Information

11 The owner or operator of a mine shall keep records relating to effluent monitoring equipment that contain

(a) a description of the equipment and, if applicable, the manufacturer's specifications and the year and model number of the equipment; and

(b) the results of the calibration tests of the equipment.

Renseignements sur l'équipement de surveillance

11 Le propriétaire ou l'exploitant d'une mine tient un registre concernant l'équipement de surveillance des effluents et y consigne :

a) la description de l'équipement et, le cas échéant, les spécifications du fabricant ainsi que l'année et le numéro du modèle de l'équipement;

b) les résultats des essais d'étalonnage de l'équipement.

DIVISION 2

Effluent Monitoring Conditions

Deleterious Substance and pH Testing

12 (1) The owner or operator of a mine shall, not less than once per week and at least 24 hours apart, collect from each final discharge point a grab sample or composite sample of effluent and record the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of the deleterious substances prescribed in section 3.

SECTION 2

Conditions portant sur le suivi de l'effluent

Essais concernant le pH et les substances nocives

12 (1) Au moins une fois par semaine et à au moins vingt-quatre heures d'intervalle, le propriétaire ou l'exploitant d'une mine prélève, à partir de chaque point de rejet final, un échantillon instantané ou un échantillon composite d'effluent dont il enregistre le pH au moment du prélèvement ainsi que, sans délai après celui-ci, les concentrations des substances nocives désignées à l'article 3.

(2) Testing conducted under subsection (1) shall comply with the analytical requirements set out in Table 1 of Schedule 3 and shall be done in accordance with generally accepted standards of good scientific practice at the time of the sampling using documented and validated methods.

(3) Despite subsection (1), the owner or operator of a mine is not required to collect samples for the purpose of recording the concentrations of cyanide if cyanide has never been used as a process reagent at the mine.

SOR/2006-239, s. 5; SOR/2018-99, s. 9.

13 (1) The owner or operator of a mine may reduce the frequency of conducting tests relating to the concentrations of arsenic, copper, cyanide, lead, nickel or zinc at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one month apart, if that substance's monthly mean concentration at that final discharge point is less than 10% of the value set out in column 2 of Schedule 4 for 12 consecutive months.

(2) The owner or operator of a mine, other than an uranium mine, may reduce the frequency of conducting tests relating to the concentration of radium 226 at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one month apart, if the concentration of radium 226 at that final discharge point is less than 0.037 Bq/L for 10 consecutive weeks.

(3) The owner or operator of a mine shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at a final discharge point to the frequency prescribed in section 12

(a) in the case of a deleterious substance mentioned in subsection (1), if that substance's monthly mean concentration at that final discharge point is equal to or greater than 10% of the value set out in column 2 of Schedule 4; and

(b) in the case of radium 226, if the concentration of radium 226 at that final discharge point is equal to or greater than 0.037 Bq/L.

(4) The owner or operator of a mine shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at all final discharge points to the frequency prescribed in section 12 for all the substances mentioned in subsections (1) and (2) if the owner or operator

(a) fails to perform a test required under those subsections in accordance with the prescribed frequency; or

(2) Les essais effectués en application du paragraphe (1) doivent satisfaire aux exigences analytiques prévues au tableau 1 de l'annexe 3 et doivent être effectués conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques au moment de l'échantillonnage et selon des méthodes éprouvées et validées.

(3) Malgré le paragraphe (1), le propriétaire ou l'exploitant d'une mine n'a pas à prélever d'échantillon afin d'enregistrer la concentration de cyanure si cette substance n'a jamais été utilisée comme réactif de procédé à la mine.

DORS/2006-239, art. 5; DORS/2018-99, art. 9.

13 (1) Le propriétaire ou l'exploitant d'une mine peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration d'arsenic, de cuivre, de cyanure, de plomb, de nickel ou de zinc à au moins une fois par trimestre civil, chaque essai étant effectué à au moins un mois d'intervalle, si la concentration moyenne mensuelle de la substance à ce point de rejet final est inférieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4 pendant douze mois consécutifs.

(2) Le propriétaire ou l'exploitant d'une mine autre qu'une mine d'uranium peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration de radium 226 à au moins une fois par trimestre civil, chaque essai étant effectué à au moins un mois d'intervalle, si la concentration à ce point de rejet final est inférieure à 0,037 Bq/L pendant dix semaines consécutives.

(3) Le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives ci-après à celle prévue à l'article 12, à un point de rejet final, si :

a) dans le cas d'une substance nocive énumérée au paragraphe (1), la concentration moyenne mensuelle de cette substance, à ce point de rejet final, est égale ou supérieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4;

b) dans le cas du radium 226, la concentration de cette substance, à ce point de rejet final, est égale ou supérieure à 0,037 Bq/L.

(4) Le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives énumérées aux paragraphes (1) et (2) à celle prévue à l'article 12, à tous les points de rejet final, s'il omet :

a) soit d'effectuer les essais visés à ces paragraphes selon la fréquence requise;

(b) fails to submit a report required under subsection 21(1) or section 22 within the prescribed time.

(5) If the owner or operator of a mine changes the location of a final discharge point, the owner or operator shall increase the frequency of conducting tests relating to the concentration of a deleterious substance at that final discharge point to the frequency prescribed in section 12 for all the deleterious substances mentioned in subsections (1) and (2).

(6) The owner or operator of a mine who reduces the frequency of conducting tests under subsection (1) or (2) shall

(a) notify the Minister of the Environment, in writing, at least 30 days in advance, of that fact;

(b) select and record the sampling dates not less than 30 days in advance of collecting the samples of effluent; and

(c) collect the sample on the selected day except if, owing to unforeseen circumstances, they cannot sample on that day, in which case, they shall do so as soon as practicable after that day.

SOR/2006-239, s. 6; SOR/2018-99, s. 9.

Acute Lethality Testing

General

14 (1) Subject to section 15, the owner or operator of a mine shall collect, once a month, a grab sample of effluent from each final discharge point and determine whether the effluent is acutely lethal by conducting acute lethality tests on aliquots of each effluent sample in accordance with sections 14.1 and 14.2.

(2) For the purposes of subsection (1), the owner or operator of a mine

(a) shall select and record the sampling date not less than 30 days in advance of collecting the grab sample;

(b) shall collect the sample on the selected day except if, owing to unforeseen circumstances, they cannot sample on that day, in which case, they shall do so as soon as practicable after that day; and

(c) shall collect the grab samples not less than 15 days apart.

b) soit de présenter le rapport visé au paragraphe 21(1) ou à l'article 22 dans les délais prescrits.

(5) Si un point de rejet final est déplacé, le propriétaire ou l'exploitant d'une mine porte la fréquence des essais concernant la concentration des substances nocives, à ce point de rejet final, à celle prévue à l'article 12 pour toutes les substances nocives énumérées aux paragraphes (1) et (2).

(6) Le propriétaire ou l'exploitant d'une mine qui réduit la fréquence des essais en vertu des paragraphes (1) ou (2) prend les mesures suivantes :

a) il avise par écrit le ministre de l'Environnement de la réduction de la fréquence des essais, au moins trente jours avant celle-ci;

b) il choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

c) il prélève l'échantillon ce jour-là ou, si des circonstances imprévues l'en empêchent, le plus tôt possible après ce jour.

DORS/2006-239, art. 6; DORS/2018-99, art. 9.

Essai de détermination de la létalité aiguë

Généralités

14 (1) Sous réserve de l'article 15, le propriétaire ou l'exploitant d'une mine prélève une fois par mois un échantillon instantané d'effluent à chaque point de rejet final et détermine si cet effluent présente une létalité aiguë en effectuant des essais de détermination de la létalité aiguë sur des portions aliquotes de chaque échantillon conformément aux articles 14.1 et 14.2.

(2) Pour l'application du paragraphe (1), le propriétaire ou l'exploitant d'une mine :

a) choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

b) prélève l'échantillon ce jour-là ou, si des circonstances imprévues l'en empêchent, le plus tôt possible après ce jour;

c) prélève les échantillons instantanés à au moins quinze jours d'intervalle.

(3) When collecting a grab sample of effluent for the purposes of subsection (1), the owner or operator of a mine shall collect a sufficient volume of effluent to enable the owner or operator to comply with paragraph 15(1)(a).

SOR/2006-239, s. 7; SOR/2011-92, s. 4; SOR/2012-22, s. 3; SOR/2018-99, s. 10.

(3) Lors du prélèvement des échantillons instantanés en application du paragraphe (1), le propriétaire ou l'exploitant d'une mine prélève un volume d'effluent suffisant pour lui permettre de se conformer à l'alinéa 15(1)a).

DORS/2006-239, art. 7; DORS/2011-92, art. 4; DORS/2012-22, art. 3; DORS/2018-99, art. 10.

Acute Lethality Test — Rainbow Trout

14.1 Unless the salinity value of the effluent is equal to or greater than ten parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/13.

SOR/2018-99, s. 10.

Essai de détermination de la létalité aiguë — Truite arc-en-ciel

14.1 Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à dix parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/13.

DORS/2018-99, art. 10.

Acute Lethality Test — Threespine Stickleback

14.2 If the salinity value of the effluent is equal to or greater than ten parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/10.

SOR/2018-99, s. 10.

Essai de détermination de la létalité aiguë — Épinoche à trois épines

14.2 Si la salinité de l'effluent est égale ou supérieure à dix parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/10.

DORS/2018-99, art. 10.

Increased Frequency of Acute Lethality Testing

15 (1) If an effluent sample is determined to be acutely lethal by an acute lethality test, the owner or operator of a mine shall

(a) without delay, conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample collected under subsection 14(1) and record the concentrations of the deleterious substances prescribed in section 3;

(b) collect, from the final discharge point from which the effluent sample that was determined to be acutely lethal was collected, a grab sample twice a month and, without delay after collecting the sample, conduct the acute lethality test that determined the effluent sample to be acutely lethal on each grab sample in accordance with the procedure set out in section 6 of the applicable reference method and, if the sample is determined to be acutely lethal, then conduct the effluent characterization set out in subsection 4(1) of

Fréquence accrue des essais de détermination de la létalité aiguë

15 (1) S'il est établi qu'un échantillon d'effluent présente une létalité aiguë après un essai de détermination de la létalité aiguë, le propriétaire ou l'exploitant d'une mine :

a) sans délai, effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané prélevé en application du paragraphe 14(1) et enregistre les concentrations des substances nocives désignées à l'article 3;

b) deux fois par mois, prélève un échantillon instantané à partir du point de rejet final d'où l'échantillon d'effluent qui présente une létalité aiguë a été prélevé et effectue sans délai après le prélèvement, sur chacun de ces échantillons, selon le mode opératoire prévu à la section 6 de la méthode de référence, l'essai de détermination de la létalité aiguë à partir duquel la létalité aiguë de l'échantillon a été établie. S'il est ainsi établi que l'échantillon présente une létalité aiguë, le

Schedule 5 and record the concentrations of the deleterious substances prescribed in section 3; and

(c) collect the grab samples not less than seven days apart.

(2) The owner or operator may resume sampling and testing at the frequency prescribed in section 14 if the effluent is determined not to be acutely lethal in three consecutive tests conducted under paragraph (1)(b).

SOR/2006-239, s. 8; SOR/2018-99, s. 12.

Reduced Frequency of Acute Lethality Testing

16 (1) The owner or operator of a mine may reduce the frequency of conducting an acute lethality test at a final discharge point to once in each calendar quarter if the effluent from that final discharge point is determined not to be acutely lethal by that acute lethality test for 12 consecutive months.

(2) For the purpose of determining whether that effluent is acutely lethal for the 12-month period referred to in subsection (1), the owner or operator of a mine shall use the results of the acute lethality tests conducted under subsection 14(1).

(3) The owner or operator of a mine shall notify the Minister of the Environment in writing at least 30 days before the reduction of the frequency of acute lethality testing.

(4) The owner or operator who reduces the frequency of conducting acute lethality testing under subsection (1) shall

(a) select and record the sampling date not less than 30 days in advance of collecting the grab samples; and

(b) collect the grab samples not less than 45 days apart.

(5) If a grab sample is determined to be acutely lethal by an acute lethality test when the owner or operator of a mine is testing at the frequency prescribed in subsection (1), the owner or operator shall increase the frequency of conducting that test to the frequency prescribed in section 15 and conduct that test in accordance with that section.

(6) If the location of a final discharge point is changed, the owner or operator of a mine shall, at that final discharge point, increase the frequency of conducting all the acute lethality tests to the frequency prescribed in

propriétaire ou l'exploitant d'une mine effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 et enregistre les concentrations des substances nocives désignées à l'article 3;

c) prélève les échantillons instantanés à au moins sept jours d'intervalle.

(2) Il peut recommencer à effectuer l'échantillonnage et les essais à la fréquence fixée à l'article 14 si l'effluent ne présente pas de létalité aiguë dans trois essais consécutifs effectués selon l'alinéa (1)b).

DORS/2006-239, art. 8; DORS/2018-99, art. 12.

Fréquence réduite des essais de détermination de la létalité aiguë

16 (1) Le propriétaire ou l'exploitant d'une mine peut réduire à une fois par trimestre civil la fréquence d'un essai de détermination de la létalité aiguë à un point de rejet final si, pendant douze mois consécutifs, l'effluent à ce point de rejet final ne présente pas de létalité aiguë selon cet essai.

(2) Pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe (1), le propriétaire ou l'exploitant d'une mine se fonde sur les résultats obtenus aux termes du paragraphe 14(1).

(3) Le propriétaire ou l'exploitant d'une mine avise par écrit le ministre de l'Environnement de la réduction de la fréquence des essais au moins trente jours avant celle-ci.

(4) Le propriétaire ou l'exploitant qui réduit la fréquence des essais en application du paragraphe (1) prend les mesures suivantes :

a) il choisit et enregistre, au moins trente jours à l'avance, la date de l'échantillonnage;

b) il prélève les échantillons instantanés à au moins quarante-cinq jours d'intervalle.

(5) S'il est établi qu'un échantillon instantané d'effluent présente une létalité aiguë selon un essai de détermination de la létalité aiguë alors que cet essai est effectué à la fréquence prévue au paragraphe (1), le propriétaire ou l'exploitant d'une mine porte la fréquence de cet essai à celle prévue à l'article 15 et effectue cet essai conformément à cet article.

(6) Si l'emplacement d'un point de rejet final est déplacé, le propriétaire ou l'exploitant d'une mine porte la fréquence de tous les essais de détermination de la létalité aiguë à ce point de rejet final à celle prévue au

subsection 14(1) and conduct those tests in accordance with that subsection.

SOR/2012-22, s. 4; SOR/2018-99, s. 14.

paragraphe 14(1) et effectue ces essais conformément à ce paragraphe.

DORS/2012-22, art. 4; DORS/2018-99, art. 14.

Daphnia magna Monitoring Tests

17 (1) Unless the salinity value of the effluent is equal to or greater than four parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall conduct *Daphnia magna* monitoring tests in accordance with the procedure set out in section 5 or 6 of Reference Method EPS 1/RM/14 at the same time that the acute lethality tests are conducted under section 14, 15 or 16 of these Regulations.

(2) The owner or operator shall conduct *Daphnia magna* monitoring tests on the aliquots of each effluent sample collected for the acute lethality tests.

SOR/2018-99, s. 15.

Essai de suivi avec bioessais sur la *Daphnia magna*

17 (1) Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à quatre parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine qui fait des essais de détermination de la létalité aiguë en application des articles 14, 15 ou 16 effectue au même moment des essais de suivi avec bioessais sur la *Daphnia magna* selon les modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14.

(2) Il effectue chaque essai de suivi sur des portions aliquotes de chaque échantillon d'effluent prélevé pour les essais de détermination de la létalité aiguë.

DORS/2018-99, art. 15.

Obligation to Record All Test Results

18 The owner or operator of a mine shall record without delay the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 for all acute lethality tests and *Daphnia magna* monitoring tests that are conducted to monitor deposits from final discharge points.

SOR/2018-99, s. 16.

Enregistrement des renseignements

18 Le propriétaire ou l'exploitant d'une mine enregistre sans délai les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14 pour tous les essais de détermination de la létalité aiguë et tous les essais de suivi avec bioessais sur la *Daphnia magna* effectués dans le cadre du suivi des rejets provenant de points de rejet final.

DORS/2018-99, art. 16.

Volume of Effluent

19 (1) The owner or operator of a mine shall record, in cubic metres, the total monthly volume of effluent deposited from each final discharge point for each month during which there was a deposit.

(2) The total monthly volume of effluent deposited shall be either

(a) determined on the basis of the average of the flow rates, expressed in cubic metres per day, measured and calculated as follows:

(i) by measuring the flow rate at the same time as samples are collected under section 12,

(ii) by calculating the average monthly flow rate by adding the flow rate measurements taken during

Volume d'effluent

19 (1) Le propriétaire ou l'exploitant d'une mine enregistre, en mètres cubes, le volume mensuel total d'effluent rejeté à partir de chaque point de rejet final, pour chaque mois au cours duquel un effluent a été rejeté.

(2) Le volume mensuel total d'effluent rejeté est :

a) soit fondé sur la moyenne des débits, exprimée en mètres cubes par jour, auquel cas il est déterminé de la façon suivante :

(i) le débit est mesuré au moment où les échantillons sont prélevés en application de l'article 12,

the month and dividing the total by the number of times the flow rate was measured, and

(iii) by multiplying the average monthly flow rate by the number of days during the month that effluent was deposited; or

(b) determined by using a monitoring system that provides a continuous measure of the volume of effluent deposited.

(3) The owner or operator shall

(a) measure the flow rate or volume of effluent deposited by using a monitoring system that is accurate to within 15% of measured flow rate or volume; and

(b) maintain and calibrate the monitoring system at least once in each year and record the results, as well as the date on which and the manner in which the requirement to maintain and calibrate has been met.

SOR/2006-239, s. 9; SOR/2012-22, s. 5; SOR/2018-99, s. 17.

Calculation of Monthly Mean Concentration and Loading

19.1 (1) With respect to the deleterious substances that are contained in the effluent deposited from each final discharge point, the owner or operator of a mine shall, for each month during which there is a deposit and during which samples are collected, record the monthly mean concentration

(a) in mg/L for deleterious substances referred to in paragraphs 3(a) to (g); and

(b) in Bq/L for a deleterious substance referred to in paragraph 3(h).

(2) If the analytical result from any test conducted under section 12 or 13 is less than the method detection limit used for that test, the test result shall be considered to be equal to one half of the detection limit used for the purpose of calculating the monthly mean concentration.

SOR/2006-239, s. 9; SOR/2018-99, s. 18.

20 (1) With respect to the deleterious substances that are contained in the effluent deposited from each final discharge point, the owner or operator of a mine shall, for each month and for each calendar quarter during which there was a deposit and during which a sample is collected, record the loading

(ii) la moyenne mensuelle des débits est calculée par la division du total des mesures de débit enregistrées au cours du mois par le nombre de mesures prises,

(iii) la moyenne mensuelle des débits est multipliée par le nombre de jours où l'effluent a été rejeté;

b) soit déterminé à l'aide d'un système de surveillance à mesure continue.

(3) Le propriétaire ou l'exploitant mesure le volume ou le débit d'effluent rejeté en tenant compte des exigences suivantes :

a) il utilise à cette fin un système de surveillance donnant des mesures exactes à 15 % près;

b) il entretient et étalonne le système de surveillance au moins une fois par année et enregistre les résultats, la date à laquelle il s'est conformé à cette exigence ainsi que la manière dont il s'y est pris.

DORS/2006-239, art. 9; DORS/2012-22, art. 5; DORS/2018-99, art. 17.

Calcul de la concentration moyenne mensuelle et de la charge

19.1 (1) À l'égard des substances nocives désignées à l'article 3 se trouvant dans l'effluent rejeté à partir de chaque point de rejet final, le propriétaire ou l'exploitant d'une mine enregistre, pour chaque mois au cours duquel un effluent est rejeté et des prélèvements sont effectués :

a) la concentration moyenne mensuelle en mg/L des substances nocives énumérées aux alinéas 3a) à g);

b) la concentration moyenne mensuelle en Bq/L de la substance nocive figurant à l'alinéa 3h).

(2) Si le résultat analytique de tout essai effectué en application des articles 12 ou 13 est inférieur à la limite de détection de la méthode utilisée pour l'essai, il est considéré comme égal à la moitié de la limite de détection de la méthode utilisée pour le calcul de la concentration moyenne mensuelle.

DORS/2006-239, art. 9; DORS/2018-99, art. 18.

20 (1) À l'égard des substances nocives désignées à l'article 3 se trouvant dans l'effluent rejeté à partir de chaque point de rejet final, le propriétaire ou l'exploitant d'une mine enregistre, pour chaque mois et pour chaque trimestre civil au cours duquel un effluent a été rejeté et des prélèvements ont été effectués :

(a) in kg for deleterious substances referred to in paragraphs 3(a) to (g); and

(b) in MBq for a deleterious substance referred to in paragraph 3(h).

(2) The owner or operator shall determine the loading for each month using the following formula:

ML = C × V / 1,000

where

ML is the loading for a month;

C is the monthly mean concentration of the deleterious substance, recorded under section 19.1; and

V is the total monthly volume of effluent deposited from each final discharge point, recorded under section 19.

(3) The owner or operator shall determine the loading for each calendar quarter using the following formula:

QL = C × V / 1,000

where

QL is the loading for a calendar quarter;

C is the mean of the monthly mean concentrations of the deleterious substance for that calendar quarter, recorded under section 19.1; and

V is the total volume of effluent deposited from each final discharge point during that calendar quarter, based on the sum of the total monthly volumes of effluent deposited from each final discharge point, recorded under section 19.

SOR/2006-239, s. 9; SOR/2018-99, s. 19.

Reporting Monitoring Results

21 (1) The owner or operator of a mine shall submit to the Minister of the Environment an effluent monitoring report for all tests and monitoring conducted during each calendar quarter not later than 45 days after the end of the quarter.

(2) Subject to subsection (3), the effluent monitoring report shall include

(a) the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 as required by section 18;

(b) the concentration and monthly mean concentration of each deleterious substance prescribed in section 3 that is contained in the effluent samples

a) la charge en kg des substances nocives énumérées aux alinéas 3a) à g);

b) la charge en MBq de la substance nocive figurant l'alinéa 3h).

(2) Il détermine la charge pour chaque mois civil selon la formule suivante :

CM = C × V / 1 000

où :

CM représente la charge pour un mois;

C la concentration moyenne mensuelle de la substance nocive enregistrée en application de l'article 19.1;

V le volume total d'effluent rejeté à partir de chaque point de rejet final au cours du mois et enregistré en application de l'article 19.

(3) Il détermine la charge pour le trimestre civil selon la formule suivante :

CT = C × V / 1 000

où :

CT représente la charge pour un trimestre;

C la moyenne des concentrations moyennes mensuelles de la substance nocive enregistrées au cours du trimestre en application de l'article 19.1;

V le volume total d'effluent rejeté à partir de chaque point de rejet final au cours du trimestre, fondé sur la somme des volumes mensuels d'effluent rejeté à partir de chaque point de rejet final et enregistrés en application de l'article 19.

DORS/2006-239, art. 9; DORS/2018-99, art. 19.

Rapports sur les résultats de suivi

21 (1) Le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement un rapport sur le suivi de l'effluent pour tout essai ou mesure de suivi effectué au cours de chaque trimestre civil, dans les quarante-cinq jours suivant la fin du trimestre.

(2) Sous réserve du paragraphe (3), le rapport comporte ce qui suit :

a) les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14, qu'exige l'article 18;

b) la concentration et la concentration moyenne mensuelle des substances nocives désignées à l'article 3 se trouvant dans les échantillons d'effluent prélevés en

collected under subsection 12(1) and the concentrations of such deleterious substances contained in the effluent samples collected under subsection 13(1) or (2);

(c) the pH of the effluent samples as required by subsection 12(1);

(d) whether a composite or grab sample collection method was used for each effluent sample as required by subsection 12(1);

(d.1) for each month of the calendar quarter, the number of days that effluent was deposited;

(e) the total volume of effluent deposited during each month of the reporting quarter as recorded under section 19;

(f) the mass loading of the deleterious substances prescribed in section 3 as recorded under section 20; and

(g) the results of the effluent characterization conducted under paragraph 15(1)(a).

(3) If no effluent is deposited in a calendar quarter, the report shall only include a statement to that effect.

SOR/2006-239, s. 10; SOR/2018-99, ss. 20, 36.

22 The owner or operator of a mine shall submit to the Minister of the Environment, not later than March 31 in each year, a report in the form set out in Schedule 6, that shall include the following:

(a) the identifying information set out in Part 1 of that Schedule;

(b) the effluent monitoring results for the previous calendar year, including

(i) test results respecting each final discharge point, and

(ii) the results of acute lethality tests; and

(c) the following information regarding non-compliance:

(i) if the results of any effluent monitoring tests indicate that the maximum authorized concentrations set out in Schedule 4 were exceeded or that the pH of the effluent is less than 6.0 or greater than 9.5, the causes of that non-compliance and the remedial measures that are planned or that have been implemented, and

application du paragraphe 12(1) de même que la concentration de ces substances nocives dans les échantillons d'effluent prélevés au titre des paragraphes 13(1) ou (2);

c) le pH des échantillons, exigé par le paragraphe 12(1);

d) pour chaque échantillon d'effluent prélevé en application du paragraphe 12(1), s'il s'agit d'un échantillon composite ou instantané;

d.1) pour chaque mois du trimestre civil, le nombre de jours où il y a eu rejet d'effluent;

e) le volume total d'effluent rejeté pour chaque mois du trimestre, enregistré en application de l'article 19;

f) la charge des substances nocives désignées à l'article 3 enregistrée en application de l'article 20;

g) les résultats des essais de caractérisation de l'effluent effectués conformément à l'alinéa 15(1)a).

(3) Si au cours d'un trimestre civil aucun effluent n'a été rejeté, le rapport ne comporte qu'une mention à cet effet.

DORS/2006-239, art. 10; DORS/2018-99, art. 20 et 36.

22 Le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement, au plus tard le 31 mars de chaque année, un rapport en la forme prévue à l'annexe 6 et comportant les renseignements suivants :

a) les renseignements identificatoires prévus à la partie 1 de cette annexe;

b) les résultats du suivi de l'effluent pour l'année civile précédente dont :

(i) les résultats des essais à chacun des points de rejet final,

(ii) les résultats des essais de détermination de la létalité aiguë;

c) les renseignements suivants sur la non-conformité :

(i) si les résultats des essais de suivi de l'effluent montrent que les concentrations maximales permises prévues à l'annexe 4 ont été dépassées ou que le pH de l'effluent est inférieur à 6,0 ou supérieur à 9,5, les causes ainsi que les mesures correctives projetées ou mises en œuvre,

(ii) if the results of any acute lethality tests indicate that an effluent sample was determined to be acutely lethal, the remedial measures that are planned or that have been implemented.

SOR/2006-239, s. 11; SOR/2018-99, s. 21.

23 Any report or information referred to in sections 7, 21 and 22 shall be submitted electronically in the format provided by the Department of the Environment, but the report or information shall be submitted in writing if

(a) no such format has been provided; or

(b) it is, owing to circumstances beyond the control of either the owner or the operator, impracticable to submit the report or information electronically in the format provided.

SOR/2006-239, s. 11; SOR/2018-99, s. 22.

24 (1) The owner or operator of a mine shall notify an inspector without delay if the results of the effluent monitoring tests conducted under section 12 or 13, subsection 14(1) or section 15 or 16 indicate that

(a) the limits set out in Schedule 4 are being or have been exceeded;

(b) the pH of the effluent is less than 6.0 or greater than 9.5; or

(c) an effluent is acutely lethal.

(2) The owner or operator shall provide a written report of the test results to the inspector within 30 days after the tests have been completed.

(3) [Repealed, SOR/2018-99, s. 23]

SOR/2006-239, s. 12; SOR/2018-99, s. 23.

Relief

25 (1) Any time period specified for collecting samples of effluent referred to in this Division may be extended if

(a) unforeseen circumstances cause safety concerns or access problems and render the collection of samples of effluent impracticable; and

(b) the owner or operator of a mine notifies an inspector, without delay, of the circumstances and indicates when they expect to be able to collect the samples.

(ii) si les résultats des essais de détermination de la létalité aiguë démontrent qu'un échantillon d'effluent présente une létalité aiguë, les mesures correctives projetées ou mises en œuvre.

DORS/2006-239, art. 11; DORS/2018-99, art. 21.

23 Les rapports et renseignements visés aux articles 7, 21 et 22 sont présentés sous forme électronique selon le modèle fourni par le ministère de l'Environnement. Ils sont toutefois présentés par écrit dans l'un ou l'autre des cas suivants :

a) aucun modèle n'est fourni;

b) il est pratiquement impossible, pour des raisons indépendantes de la volonté du propriétaire ou de l'exploitant, selon le cas, de les présenter sous forme électronique selon le modèle fourni.

DORS/2006-239, art. 11; DORS/2018-99, art. 22.

24 (1) Le propriétaire ou l'exploitant d'une mine avise sans délai l'inspecteur si les résultats des essais de suivi de l'effluent effectués au titre des articles 12 ou 13, du paragraphe 14(1) ou des articles 15 ou 16 montrent que :

a) les limites prévues à l'annexe 4 sont ou ont été dépassées;

b) le pH de l'effluent est inférieur à 6,0 ou supérieur à 9,5;

c) l'effluent est un effluent à létalité aiguë.

(2) Il présente à l'inspecteur un rapport écrit des résultats des essais dans les trente jours suivant la fin de ceux-ci.

(3) [Abrogé, DORS/2018-99, art. 23]

DORS/2006-239, art. 12; DORS/2018-99, art. 23.

Dispense

25 (1) Les délais prévus dans la présente section à l'égard du prélèvement des échantillons d'effluent peuvent être prorogés si les conditions suivantes sont réunies :

a) des circonstances imprévues provoquent des problèmes de sécurité ou d'accessibilité et rendent le prélèvement d'échantillons d'effluent pratiquement impossible;

b) le propriétaire ou l'exploitant d'une mine a avisé l'inspecteur sans délai des circonstances et lui a indiqué le moment où il croit pouvoir procéder au prélèvement des échantillons.

(2) The owner or operator shall collect the samples of effluent without delay when the circumstances permit.

SOR/2006-239, s. 13.

(2) Le propriétaire ou l'exploitant prélève les échantillons d'effluent sans délai dès que les circonstances le permettent.

DORS/2006-239, art. 13.

DIVISION 3

Notice, Records and Other Documents

End of Commercial Operation Notice

26 (1) The owner or operator of a mine shall notify the Minister of the Environment in writing of the day on which the mine has stopped commercial operation not later than 90 days after the end of commercial operation.

(2) The owner or operator shall notify the Minister of the Environment in writing without delay if the mine returns to commercial operation.

SOR/2018-99, s. 36.

Records, Books of Account or Other Documents

27 The owner or operator of a mine shall keep all records, books of account or other documents required by these Regulations at the mine for a period of not less than five years, beginning on the day on which they are made, including

(a) records relating to all final discharge points, including any changes to those records;

(b) records relating to effluent monitoring equipment, including the calibration of that equipment;

(c) records relating to the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14;

(d) compensation plans;

(e) emergency response plans, including each update to the plan;

(f) reports on any unauthorized deposits;

(g) reports or other documents prepared and data collected for the purposes of environmental effects monitoring studies; and

SECTION 3

Avis, registres et autres documents

Avis de la fin de l'exploitation commerciale

26 (1) Le propriétaire ou l'exploitant d'une mine avise le ministre de l'Environnement par écrit de la date où l'exploitation commerciale de la mine a cessé, dans les quatre-vingt-dix jours suivant la cessation.

(2) Il avise le ministre de l'Environnement, par écrit et sans délai, de la reprise de l'exploitation commerciale.

DORS/2018-99, art. 36.

Registres, livres comptables ou autres documents

27 Le propriétaire ou l'exploitant d'une mine conserve à la mine, pendant au moins cinq ans à compter de leur établissement, tous les registres, livres comptables ou autres documents exigés par le présent règlement, soit, notamment :

a) les registres concernant les points de rejet final et tout changement à ces registres;

b) les registres concernant les équipements de surveillance des effluents, y compris les registres de calibration de ces équipements;

c) les registres concernant les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14;

d) les plans compensatoires;

e) les plans d'intervention d'urgence et chacune de leurs mises à jour;

f) tout rapport sur le rejet non autorisé;

(h) records and reports of measurements with respect to the pH, temperature and concentration of any deleterious substance prescribed in section 3.

SOR/2018-99, s. 24.

g) tous les rapports ou autres documents préparés et toutes les données recueillies pour une étude de suivi des effets sur l'environnement;

h) registres et rapports concernant toutes les mesures de pH, de la température et des concentrations des substances nocives énumérées à l'article 3.

DORS/2018-99, art. 24.

DIVISION 4

Tailings Impoundment Areas

Compensation Plan

27.1 (1) The owner or operator of a mine shall, before depositing a deleterious substance into a tailings impoundment area that is set out in Schedule 2, submit to the Minister of the Environment a compensation plan that includes the information described in subsection (2) and obtain that Minister's approval of the plan.

(2) The purpose of the compensation plan is to offset the loss of fish habitat resulting from the deposit of any deleterious substance into the tailings impoundment area. It shall contain the following information:

(a) a description of the location of the tailings impoundment area and of fish habitat that will be affected by the deposit;

(b) a quantitative impact assessment of the deposit on fish habitat;

(c) a description of the measures to be taken to offset the loss of fish habitat;

(d) a description of the measures to be taken during the planning and implementation of the compensation plan to mitigate any potential adverse effects on fish habitat that could result from the plan's implementation;

(e) a description of the measures to be taken to monitor the plan's implementation;

(f) a description of the measures to be taken to verify the extent to which the plan's purpose has been achieved;

(g) the time required to implement the plan that allows for the achievement of the plan's purpose within a reasonable time; and

(h) an estimate of the cost of implementing each element of the plan.

SECTION 4

Dépôts de résidus miniers

Plan compensatoire

27.1 (1) Avant de rejeter des substances nocives dans tout dépôt de résidus miniers qui figure à l'annexe 2, le propriétaire ou l'exploitant d'une mine présente au ministre de l'Environnement un plan compensatoire qui comporte les renseignements énumérés au paragraphe (2) et obtient son approbation.

(2) Le plan compensatoire a pour objectif de contrebalancer la perte d'habitat du poisson consécutive au rejet de substances nocives dans le dépôt de résidus miniers. Il comporte les renseignements suivants :

a) une description de l'emplacement du dépôt de résidus miniers et de l'habitat du poisson qui sera affecté par le rejet;

b) l'analyse quantitative de l'incidence du rejet sur l'habitat du poisson;

c) une description des mesures visant à contrebalancer la perte d'habitat du poisson;

d) une description des mesures envisagées durant la planification et la mise en œuvre du plan pour atténuer les effets défavorables sur l'habitat du poisson qui pourraient résulter de cette mise en œuvre;

e) une description des mesures de surveillance de la mise en œuvre du plan;

f) une description des mécanismes permettant de mesurer l'atteinte de l'objectif du plan;

g) le délai de la mise en œuvre du plan qui permet l'atteinte de son objectif dans un délai raisonnable;

h) l'estimation du coût de mise en œuvre de chacun des éléments du plan.

(3) The owner or operator of a mine shall submit with the compensation plan an irrevocable letter of credit to cover the plan's implementation costs, which letter of credit shall be payable upon demand on the declining balance of the implementation costs.

(4) The Minister of the Environment shall approve the compensation plan if it meets the requirements of subsection (2) and the owner or operator of a mine has complied with subsection (3).

(5) The owner or operator of a mine shall ensure that the compensation plan approved by the Minister of the Environment is implemented and, if the compensation plan's purpose is not being achieved, the owner or operator shall inform the Minister of the Environment.

(6) If the compensation plan's purpose is not being achieved, the owner or operator of a mine shall, as soon as practicable in the circumstances, identify and implement all necessary remedial measures to ensure that the purpose is achieved.

SOR/2006-239, s. 14; SOR/2018-99, s. 24.

(3) Le propriétaire ou l'exploitant d'une mine présente, avec le plan compensatoire, une lettre de crédit irrévocable couvrant les coûts de mise en œuvre du plan et payable sur demande à l'égard du coût des éléments du plan qui n'ont pas été mis en œuvre.

(4) Le ministre de l'Environnement approuve le plan compensatoire si celui-ci satisfait aux exigences visées au paragraphe (2) et si le propriétaire ou l'exploitant de la mine s'est conformé au paragraphe (3).

(5) Le propriétaire ou l'exploitant d'une mine veille à ce que le plan compensatoire qui a été approuvé par le ministre de l'Environnement soit mis en œuvre et informe ce dernier si l'objectif du plan n'a pas été atteint.

(6) Si l'objectif du plan compensatoire n'est pas atteint, le propriétaire ou l'exploitant d'une mine prend les mesures correctives nécessaires le plus tôt possible, eu égard aux circonstances.

DORS/2006-239, art. 14; DORS/2018-99, art. 24.

Deposits from Tailings Impoundment Areas

28 (1) The owner or operator of a mine shall deposit effluent from a tailings impoundment area only through a final discharge point that is monitored and reported on in accordance with the requirements of these Regulations.

(2) The owner or operator of a mine shall comply with section 6 and the conditions prescribed in paragraphs 4(1)(a) to (c) for all effluent that exits a tailing impoundment area.

Rejets à partir de dépôts de résidus miniers

28 (1) Le propriétaire ou l'exploitant d'une mine ne rejette l'effluent provenant d'un dépôt de résidus miniers qu'à un point de rejet final faisant l'objet d'un suivi et de rapports conformément aux exigences du présent règlement.

(2) Il remplit les conditions prévues aux alinéas 4(1)a) à c) et se conforme à l'article 6 lorsqu'il rejette un tel effluent.

PART 3

Unauthorized Deposits

29 [Repealed, SOR/2018-99, s. 25]

Emergency Response Plan

30 (1) The owner or operator of a mine shall prepare an emergency response plan that describes the measures to be taken in respect of a deleterious substance within the meaning of subsection 34(1) of the Act to prevent any unauthorized deposit of such a substance or to mitigate the effects of such a deposit.

PARTIE 3

Rejets non autorisés

29 [Abrogé, DORS/2018-99, art. 25]

Plan d'intervention d'urgence

30 (1) Le propriétaire ou l'exploitant d'une mine dresse un plan d'intervention d'urgence qui énonce, à l'égard d'une substance nocive au sens du paragraphe 34(1) de la Loi, les mesures à prendre pour prévenir tout rejet non autorisé d'une telle substance ou pour en atténuer les effets.

(2) The emergency response plan shall include the following elements:

(a) the identification of any unauthorized deposit that can reasonably be expected to occur at the mine and that can reasonably be expected to result in damage or danger to fish habitat or fish or the use by man of fish, and the identification of the damage or danger;

(b) a description of the measures to be used to prevent, prepare for, respond to and recover from a deposit identified under paragraph (a);

(c) a list of the individuals who are to implement the plan in the event of an unauthorized deposit, and a description of their roles and responsibilities;

(d) the identification of the emergency response training required for each of the individuals listed under paragraph (c);

(e) a list of the emergency response equipment included as part of the plan, and the equipment's location; and

(f) alerting and notification procedures including the measures to be taken to notify members of the public who may be adversely affected by a deposit identified under paragraph (a).

(3) The owner or operator shall complete the emergency response plan and have it available for inspection no later than 60 days after the mine becomes subject to this section.

(4) The owner or operator shall update and test the emergency response plan at least once each year to ensure that the plan continues to meet the requirements of subsection (2).

(4.1) The owner or operator of a mine shall, each time the emergency response plan is tested, record the following information and keep the record for at least five years:

(a) a summary of the test;

(b) the test results; and

(c) any modifications that are made to the plan as a consequence of the test.

(4.2) The owner or operator of a mine shall ensure that a copy of the most recent version of the emergency response plan is kept at the mine in a location that is readily available to the individuals who are responsible for implementing the plan.

(2) Le plan d'intervention d'urgence comporte en outre les éléments suivants :

a) la mention de tout rejet non autorisé qui pourrait se produire à la mine et entraîner des dommages ou des risques réels de dommages pour le poisson ou son habitat ou pour l'utilisation par l'homme du poisson, ainsi que l'identification de ces risques ou dommages;

b) le détail des mesures de prévention, de préparation, d'intervention et de réparation applicable à l'égard du rejet non autorisé mentionné au titre de l'alinéa a);

c) la liste des personnes chargées de mettre à exécution le plan en cas de rejet non autorisé ainsi qu'une description de leurs rôles et responsabilités;

d) la mention de la formation en intervention d'urgence exigée des personnes visées à l'alinéa c);

e) la liste de l'équipement d'intervention d'urgence prévu dans le plan et l'emplacement de cet équipement;

f) les procédures d'alerte et de notification, notamment les mesures prévues pour avertir les membres du public auxquels le rejet irrégulier mentionné au titre de l'alinéa a) pourrait causer un préjudice.

(3) Le propriétaire ou l'exploitant termine le plan d'intervention d'urgence, lequel doit être disponible pour inspection, dans les soixante jours suivant la date à laquelle la mine devient assujettie au présent article.

(4) Il tient à jour et met à l'essai le plan d'intervention d'urgence au moins une fois par année afin de veiller à ce que celui-ci satisfasse aux exigences du paragraphe (2).

(4.1) Chaque fois que le plan d'intervention est mis à l'essai, le propriétaire ou l'exploitant d'une mine consigne dans un registre les renseignements ci-après qu'il conserve pendant au moins cinq ans :

a) un résumé de l'essai;

b) les résultats de cet essai;

c) les modifications apportées au plan à la suite de cet essai.

(4.2) Il veille à ce qu'une copie du plan d'intervention d'urgence à jour soit conservée à la mine, à un endroit facilement accessible aux personnes chargées de mettre à exécution le plan.

(5) If a mine has not been subject to the requirements of this section for more than one year, a new emergency response plan shall be prepared and completed no later than 60 days after the day on which the mine again becomes subject to this section.

SOR/2006-239, s. 16; SOR/2012-22, s. 6(F); SOR/2018-99, s. 26.

Reporting

31 A report required by subsection 38(7) of the Act in respect of the unauthorized deposit of a deleterious substance shall contain the following information:

(a) the name, description and concentration of the deleterious substance deposited;

(b) the estimated quantity of the deposit and how the estimate was achieved;

(c) the day on which, and hour at which, the deposit occurred;

(d) the quantity of the deleterious substance that was deposited at a place other than through a final discharge point and the identification of that place, including the location by latitude and longitude and, if applicable, the civic address;

(e) the quantity of the deleterious substance that was deposited through a final discharge point and the identification of that discharge point;

(f) the name of the receiving body of water, if there is a name, and the location by latitude and longitude where the deleterious substance entered the receiving body of water;

(g) the results of the acute lethality tests conducted under subsection 31.1(1) or a statement indicating that acute lethality tests were not conducted but that notification was given under subsection 31.1(2);

(h) the circumstances of the deposit, the measures that were taken to mitigate the effects of the deposit and, if the emergency response plan was implemented, details concerning its implementation; and

(i) the measures that were taken, or that are intended to be taken, to prevent any similar occurrence of an unauthorized deposit.

SOR/2006-239, s. 17; SOR/2011-92, s. 6; SOR/2018-99, s. 27.

(5) Si la mine n'a pas été assujettie au présent article pendant plus d'un an, un nouveau plan d'intervention d'urgence est dressé — et doit être terminé — dans les soixante jours suivant la date à laquelle elle le redevient.

DORS/2006-239, art. 16; DORS/2012-22, art. 6(F); DORS/2018-99, art. 26.

Rapport

31 Le rapport exigé au paragraphe 38(7) de la Loi, à l'égard du rejet non autorisé d'une substance nocive, comporte les renseignements suivants :

a) le nom, la description et la concentration de la substance nocive rejetée;

b) la quantité estimative du rejet ainsi que la méthode d'estimation utilisée;

c) la date et l'heure du rejet;

d) la quantité de la substance nocive qui a été rejetée à partir d'un lieu autre qu'un point de rejet final et la mention de ce lieu ainsi que sa latitude et sa longitude et, le cas échéant, l'adresse municipale;

e) la quantité de la substance nocive qui a été rejetée à partir d'un point de rejet final, et la mention de celui-ci;

f) le nom du milieu aquatique récepteur, si ce nom existe, et la latitude et la longitude du point de pénétration de la substance nocive dans le milieu aquatique;

g) les résultats des essais de détermination de la létalité aiguë effectués en application du paragraphe 31.1(1) ou une attestation indiquant qu'aucun essai de détermination de la létalité aiguë n'a été effectué mais que l'avis visé au paragraphe 31.1(2) a été donné;

h) les circonstances du rejet, les mesures d'atténuation prises et, le cas échéant, le détail de l'exécution du plan d'intervention d'urgence;

i) les mesures prises ou planifiées afin d'éviter d'autres rejets semblables à l'avenir.

DORS/2006-239, art. 17; DORS/2011-92, art. 6; DORS/2018-99, art. 27.

Acute Lethality Testing

31.1 (1) If an unauthorized deposit of a deleterious substance occurs, the owner or operator of a mine shall, without delay, collect a grab sample of effluent at the place where the deposit occurred and determine whether the effluent is acutely lethal by conducting tests on aliquots of each effluent sample in accordance with sections 14.1 and 14.2.

(2) Despite subsection (1), the owner or operator of a mine is not required to conduct those tests if they notify an inspector, without delay, that the deposit is an acutely lethal effluent.

SOR/2018-99, s. 27.

Essai de détermination de la létalité aiguë

31.1 (1) En cas de rejet non autorisé d'une substance nocive, le propriétaire ou l'exploitant d'une mine prélève sans délai un échantillon instantané d'effluent sur les lieux du rejet non autorisé et détermine si cet effluent présente une létalité aiguë en effectuant des essais conformément aux articles 14.1 et 14.2 sur des portions aliquotes de chaque échantillon d'effluent prélevé.

(2) Malgré le paragraphe (1), le propriétaire ou l'exploitant d'une mine n'est pas tenu d'effectuer les essais s'il avise sans délai l'inspecteur que le rejet est un effluent à létalité aiguë.

DORS/2018-99, art. 27.

PART 4

Recognized Closed Mines

Requirements

32 (1) An owner or operator who intends to close a mine shall

(a) provide written notice of that intention to the Minister of the Environment;

(b) maintain the mine's rate of production at less than 10% of its design-rated capacity for a continuous period of three years starting on the day on which the written notice is received by the Minister of the Environment; and

(c) conduct a biological monitoring study during the three-year period referred to in paragraph (b) in accordance with Division 3 of Part 2 of Schedule 5.

(2) If the owner or operator has complied with all of the requirements set out in paragraphs (1)(a) to (c), the mine becomes a recognized closed mine after the expiry of the three-year period referred to in subsection (1).

(3) The owner or operator shall notify the Minister of the Environment in writing at least 60 days before reopening the recognized closed mine.

(4) The owner or operator referred to in this section shall keep at any place in Canada all records, books of account or other documents required by these Regulations for a period of not less than five years beginning on the day

PARTIE 4

Mines fermées reconnues

Exigences

32 (1) Le propriétaire ou l'exploitant qui souhaite fermer sa mine :

a) en avise le ministre de l'Environnement par écrit;

b) maintient le taux de production de la mine à moins de 10 % de sa capacité nominale durant une période continue de trois ans commençant à la date à laquelle le ministre de l'Environnement reçoit l'avis;

c) effectue, durant la période prévue à l'alinéa b), une étude de suivi biologique conformément à la section 3 de la partie 2 de l'annexe 5.

(2) La mine devient une mine fermée reconnue à l'expiration de la période de trois ans prévue au paragraphe (1) si le propriétaire ou l'exploitant s'est conformé aux exigences visées aux alinéas (1)a) à c).

(3) Le propriétaire ou l'exploitant avise par écrit le ministre de l'Environnement de la réouverture de la mine fermée reconnue au moins soixante jours avant la réouverture.

(4) Le propriétaire ou l'exploitant visé par le présent article conserve n'importe où au Canada tous les registres, livres comptables ou autres documents exigés par le présent règlement pendant au moins cinq ans à compter de

they are made, and shall notify the Minister of the Environment in writing of their location.

SOR/2006-239, s. 18; SOR/2018-99, ss. 28, 36.

leur établissement et avise le ministre de l'Environnement par écrit du lieu où ils se trouvent.

DORS/2006-239, art. 18; DORS/2018-99, art. 28 et 36.

Identifying Information

33 (1) The owner or operator of a recognized closed mine shall submit in writing to the Minister of the Environment the information referred to in subsection (2) not later than 60 days after the day on which

(a) the recognized closed mine becomes subject to these Regulations; or

(b) ownership of the recognized closed mine is transferred.

(2) The information that shall be submitted is the name and address of

(a) both the owner and the operator of the recognized closed mine; and

(b) any parent company of the owner or the operator.

(3) The owner or operator shall notify the Minister of the Environment of any change in the information not later than 60 days after the change occurs.

SOR/2018-99, s. 36.

Renseignements d'identification

33 (1) Le propriétaire ou l'exploitant d'une mine fermée reconnue présente par écrit au ministre de l'Environnement les renseignements mentionnés au paragraphe (2) :

a) dans les soixante jours suivant la date à laquelle la mine fermée reconnue devient assujettie au présent règlement;

b) dans les soixante jours suivant le transfert de propriété de la mine fermée reconnue.

(2) Les renseignements à présenter sont :

a) les nom et adresse du propriétaire et de l'exploitant;

b) les nom et adresse de toute société mère du propriétaire ou de l'exploitant.

(3) Le propriétaire ou l'exploitant avise le ministre de l'Environnement de tout changement des renseignements dans les soixante jours suivant le changement.

DORS/2018-99, art. 36.

34 [Repealed, SOR/2018-99, s. 29]

35 [Repealed, SOR/2018-99, s. 29]

36 [Repealed, SOR/2018-99, s. 29]

37 [Repealed, SOR/2018-99, s. 29]

38 [Repealed, SOR/2018-99, s. 29]

39 [Repealed, SOR/2018-99, s. 29]

40 [Repealed, SOR/2018-99, s. 29]

41 [Repealed, SOR/2018-99, s. 29]

42 [Repealed, SOR/2018-99, s. 29]

34 [Abrogé, DORS/2018-99, art. 29]

35 [Abrogé, DORS/2018-99, art. 29]

36 [Abrogé, DORS/2018-99, art. 29]

37 [Abrogé, DORS/2018-99, art. 29]

38 [Abrogé, DORS/2018-99, art. 29]

39 [Abrogé, DORS/2018-99, art. 29]

40 [Abrogé, DORS/2018-99, art. 29]

41 [Abrogé, DORS/2018-99, art. 29]

42 [Abrogé, DORS/2018-99, art. 29]

SCHEDULE 1

[Repealed, SOR/2018-99, s. 30]

ANNEXE 1

[Abrogée, DORS/2018-99, art. 30]

SCHEDULE 2

(Subsections 5(1) and 27.1(1))

Tailings Impoundment Areas

Item	Column 1 Water or Place	Column 2 Description
1	Anderson Lake, Manitoba	Anderson Lake located at 54°51′ north latitude and 100°0′ west longitude near the town of Snow Lake, Manitoba. More precisely, the area bounded by **(a)** the contour of elevation around Anderson Lake at the 285-m level, and **(b)** the control dam built at the east end of Anderson Lake.
2	Garrow Lake, Nunavut	Garrow Lake located at 75°23′ north latitude and 97°48′ west longitude near the south end of Little Cornwallis Island, Nunavut.
3	South Kemess Creek, British Columbia	That part of South Kemess Creek being within the watershed of that tributary of South Kemess Creek **(a)** extending eastwards and upstream from the centre of a tailings dam constructed at 57°1′ north latitude and 126°41′ west longitude, and **(b)** below the crest of the dam at an elevation of 1515 m.
4	Albino Lake, British Columbia	Albino Lake located at 56°39.4′ north latitude and 130°29.4′ west longitude near the Eskay Creek Mine in British Columbia. More precisely, the area bounded by **(a)** the contour of elevation around Albino Lake at the 1040-m level, and **(b)** the outlet of Albino Lake.
5	Tom MacKay Lake, British Columbia	Tom MacKay Lake located at 56°39′ north latitude and 130°34′ west longitude near the Eskay Creek Mine in British Columbia. More precisely, the area bounded by **(a)** the contour of elevation around Tom MacKay Lake at the 1078-m level, and **(b)** the outlet of Tom MacKay Lake.
6	Trout Pond, Newfoundland and Labrador	Trout Pond located at 48°39′0.81882″ north latitude and 56°29′19.704984″ west longitude in west-central Newfoundland. More precisely, the area bounded by **(a)** the contour of elevation around Trout Pond at the 270 m level, and **(b)** the outlet of Trout Pond.
7	The headwater pond of a tributary to Gill's Pond Brook, Newfoundland and Labrador	The headwater pond of a tributary to Gill's Pond Brook, located at 48°38′29.599584″ north latitude and 56°30′15.560676″ west longitude in west-central Newfoundland. More precisely, the area bounded by **(a)** the contour of elevation around the pond at the 260 m level, and **(b)** the outlet of the pond.

ANNEXE 2

(paragraphes 5(1) et 27.1(1))

Dépôts de résidus miniers

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
1	Lac Anderson, Manitoba	Le lac Anderson, situé par 54°51′ de latitude N. et 100°0′ de longitude O., près de la ville de Snow Lake, au Manitoba. Plus précisément, le lieu délimité par : **a)** la courbe de niveau à 285 m autour du lac Anderson; **b)** le barrage de régulation à l'extrémité est du lac Anderson.
2	Lac Garrow, Nunavut	Le lac Garrow, situé par 75°23′ de latitude N. et 97°48′ de longitude O., près de l'extrémité sud de la petite île Cornwallis, au Nunavut.
3	Ruisseau South Kemess, Colombie-Britannique	La partie du ruisseau South Kemess située dans le bassin hydrographique du tributaire du ruisseau South Kemess : **a)** qui s'étend vers l'est et en amont du centre d'un barrage de retenue des stériles situé par 57°1′ de latitude N. et 126°41′ de longitude O.; **b)** qui se trouve en dessous de la crête du barrage, à une altitude de 1515 m.
4	Lac Albino, Colombie-Britannique	Le lac Albino, situé par 56°39,4′ de latitude N. et 130°29,4′ de longitude O., près de la mine Eskay Creek, en Colombie-Britannique. Plus précisément, la région délimitée par : **a)** la courbe de niveau à 1040 m autour du lac Albino; **b)** la décharge du lac Albino.
5	Lac Tom MacKay, Colombie-Britannique	Le lac Tom MacKay, situé par 56°39′ de latitude N. et 130°34′ de longitude O., près de la mine Eskay Creek, en Colombie-Britannique. Plus précisément, la région délimitée par : **a)** la courbe de niveau à 1078 m autour du lac Tom MacKay; **b)** la décharge du lac Tom Mackay.
6	Trout Pond, Terre-Neuve-et-Labrador	L'étang Trout Pond, situé par 48°39′0,818 82″ de latitude N. et 56°29′19,704 984″ de longitude O., dans la partie centrale ouest de Terre-Neuve et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 270 m autour de l'étang Trout Pond; **b)** la décharge de l'étang Trout Pond.

Item	Column 1 Water or Place	Column 2 Description
8	The northwest arm of Second Portage Lake, Nunavut	That portion of the northwest arm of Second Portage Lake, located at 65°1′39.29″ north latitude and 96°3′43″ west longitude, approximately 80 km north of the town of Baker Lake, Nunavut. More precisely, the area bounded by **(a)** the contour of elevation around the arm at the 146 m level, and **(b)** the dam built at the southeast end of the arm.
9	Tail Lake, Nunavut	Tail Lake, located at 68°7′25.8″ north latitude and 106°33′31.2″ west longitude, approximately 125 km southwest of the town of Cambridge Bay, Nunavut. More precisely, the area bounded by **(a)** the contour of elevation around Tail Lake at the 33.5 m level, and **(b)** the dams built at the south and north ends of the lake.
10	A portion of Wabush Lake, Newfoundland and Labrador	That portion of Wabush Lake near the towns of Labrador City and Wabush in western Labrador. More precisely, the area bounded by **(a)** the southern limit, extending from 53° north latitude, 66°50′24″ west longitude to 53° north latitude, 66°52′57″ west longitude, and **(b)** the outlet of Wabush Lake, extending from 53°09′4.7″ north latitude, 66°47′3.5″ west longitude to 53°08′57.5″ north latitude, 66°47′2.9″ west longitude.
11	Flora Lake, Newfoundland and Labrador	Flora Lake located at 52°55′ north latitude, 66°49′ west longitude, near the towns of Labrador City and Wabush in western Labrador.
12	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52′9.94″ north latitude, 66°47′14.26″ west longitude) for a distance of 75 m upstream from Flora Lake.
13	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52′10.70″ north latitude, 66°47′6.49″ west longitude) for a distance of 580 m upstream from Flora Lake.
14	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador	A portion of an unnamed tributary stream to Flora Lake, Newfoundland and Labrador. More precisely, an area extending from the mouth of the stream (52°52′57.45″ north latitude, 66°47′25.23″ west longitude) for a distance of 256 m upstream from Flora Lake.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
7	L'étang d'amont d'un tributaire du ruisseau Gill, Terre-Neuve-et-Labrador	L'étang d'amont d'un tributaire du ruisseau Gill, situé par 48°38′29,599 584″ de latitude N. et 56°30′15,560 676″ de longitude O., dans la partie centrale ouest de Terre-Neuve et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 260 m autour de l'étang; **b)** la décharge de l'étang.
8	Le nord-ouest du bras du lac Second Portage, Nunavut	La partie du nord-ouest du bras du lac Second Portage, située par 65°1′39,29″ de latitude N. et 96°3′43″ de longitude O., à environ 80 km au nord de la ville de Baker Lake, au Nunavut et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 146 m autour du bras; **b)** la digue construite à l'extrémité sud-est du bras.
9	Lac Tail, Nunavut	Le lac Tail, situé par 68°7′25,8″ de latitude N. et 106°33′31,2″ de longitude O., à environ 125 km au sud-ouest de la ville de Cambridge Bay, au Nunavut et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 33,5 m autour du lac; **b)** les digues construites aux extrémités sud et nord du lac.
10	Une partie du lac Wabush, Terre-Neuve-et-Labrador	La partie du lac Wabush, située près des villes de Labrador City et de Wabush dans la partie ouest du Labrador, et, plus précisément, la région délimitée par : **a)** la limite sud s'étendant de 53° de latitude N. et 66°50′24″ de longitude O., à 53° de latitude N. et 66°52′57″ de longitude O.; **b)** la décharge du lac Wabush, s'étendant de 53°09′4,7″ de latitude N. et 66°47′3,5″ de longitude O., à 53°08′57,5″ de latitude N. et 66°47′2,9″ de longitude O.
11	Lac Flora, Terre-Neuve-et-Labrador	Le lac Flora, situé par 52°55′ de latitude N. et 66°49′ de longitude O., près des villes de Labrador City et de Wabush dans la partie ouest du Labrador.
12	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52′9,94″ de latitude N., 66°47′14,26″ de longitude O.) sur une distance de 75 m en amont du lac Flora.
13	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52′10,70″ de latitude N., 66°47′6,49″ de longitude O.) sur une distance de 580 m en amont du lac Flora.

Item	Column 1 Water or Place	Column 2 Description
15	Sandy Pond, Newfoundland and Labrador	Sandy Pond, located at 47°25′33″ north latitude and 53°46′52″ west longitude, on the Avalon Peninsula, approximately 3 km east southeast of the town of Long Harbour-Mount Arlington Heights, Newfoundland and Labrador. More precisely, the area bounded by **(a)** the contour of elevation around Sandy Pond at the 137 m level, and **(b)** the dams built at the north end of Sandy Pond.
16	A portion of King Richard Creek, British Columbia	A portion of King Richard Creek, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 3.3 km portion of the creek extending northwards and upstream from the centre of a dam constructed at 55°06′42″ north latitude and 123°59′29″ west longitude, to the centre of a dam constructed at 55°07′52″ north latitude and 124°00′50″ west longitude.
17	A portion of an unnamed tributary to Alpine Lake, British Columbia	A portion of an unnamed tributary to Alpine Lake, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 900 m portion of the tributary extending southwards and upstream from the centre of a dam constructed at 55°08′19″ north latitude and 124°00′27″ west longitude, to the centre of a dam constructed at 55°07′59″ north latitude and 124°01′00″ west longitude.
18	A portion of an unnamed tributary to Alpine Lake, British Columbia	A portion of an unnamed tributary to Alpine Lake, located approximately 60 km southwest of the town of Mackenzie, British Columbia. More precisely, a 590 m portion of the tributary extending southwards and upstream from the centre of a dam constructed at 55°08′18″ north latitude and 124°00′41″ west longitude, to the centre of a dam constructed at 55°08′09″ north latitude and 124°01′08″ west longitude.
19	Mallard Lake, Saskatchewan	Mallard Lake, located at 56°00′32″ north latitude and 104°16′38″ west longitude, approximately 120 km northeast of the town of La Ronge, Saskatchewan. More precisely, the area bounded by **(a)** the contour of elevation around Mallard Lake at the 490 m level, and **(b)** the dam built at the south end of Mallard Lake.
20	The unnamed headwater pond of an unnamed tributary of East Creek, Ontario	An unnamed headwater pond of an unnamed tributary of East Creek, located at 50°02′17″ north latitude and 79°40′57″ west longitude, approximately 145 km northeast of the town of Cochrane, Ontario.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
14	Une partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador	La partie d'un ruisseau sans nom tributaire du lac Flora, Terre-Neuve-et-Labrador, et, plus précisément, la région s'étendant de l'embouchure du ruisseau (52°52′57,45″ de latitude N., 66°47′25,23″ de longitude O.) sur une distance de 256 m en amont du lac Flora.
15	Sandy Pond, Terre-Neuve-et-Labrador	L'étang Sandy Pond, situé par 47°25′33″ de latitude N. et 53°46′52″ de longitude O., dans la péninsule Avalon, à environ 3 km est-sud-est de la ville de Long Harbour-Mount Arlington Heights, Terre-Neuve-et-Labrador, et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 137 m autour de l'étang Sandy Pond; **b)** les digues construites à l'extrémité nord de l'étang Sandy Pond.
16	Une partie du ruisseau King Richard, Colombie-Britannique	La partie du ruisseau King Richard située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 3,3 km vers le nord et en amont du centre du barrage situé par 55°06′42″ de latitude N. et 123°59′29″ de longitude O. jusqu'au centre du barrage situé par 55°07′52″ de latitude N. et 124°00′50″ de longitude O.
17	Une partie d'un affluent sans nom tributaire du lac Alpine, Colombie-Britannique	La partie d'un affluent sans nom tributaire du lac Alpine située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie de l'affluent qui s'étend sur 900 m vers le sud et en amont du centre du barrage situé par 55°08′19″ de latitude N. et 124°00′27″ de longitude O. jusqu'au centre du barrage situé par 55°07′59″ de latitude N. et 124°01′00″ de longitude O.
18	Une partie d'un affluent sans nom tributaire du lac Alpine, Colombie-Britannique	La partie d'un affluent sans nom tributaire du lac Alpine située à environ 60 km au sud-ouest de la ville de Mackenzie en Colombie-Britannique, et, plus précisément, la partie de l'affluent qui s'étend sur 590 m vers le sud et en amont du centre du barrage situé par 55°08′18″ de latitude N. et 124°00′41″ de longitude O. jusqu'au centre du barrage situé par 55°08′09″ de latitude N. et 124°01′08″ de longitude O.
19	Lac Mallard, Saskatchewan	Le lac Mallard, situé par 56°00′32″ de latitude N. et 104°16′38″ de longitude O., à environ 120 km au nord-est de la ville de La Ronge en Saskatchewan et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 490 m autour du lac Mallard; **b)** le barrage construit à l'extrémité sud du lac Mallard.
20	L'étang d'amont sans nom d'un tributaire sans nom du ruisseau East, Ontario	L'étang d'amont sans nom d'un tributaire sans nom du ruisseau East situé par 50°02′17″ de latitude N. et 79°40′57″ de longitude O., à environ 145 km au nord-est de la ville de Cochrane, en Ontario.

Item	Column 1 Water or Place	Column 2 Description
21	A portion of an unnamed tributary to East Creek, Ontario	A portion of an unnamed tributary to East Creek, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 2.3-km portion of the tributary extending northwards and downstream from the outlet of the unnamed headwater pond referred to in item 20, to the centre of a dam constructed at 50°02′43″ north latitude and 79°40′20″ west longitude.
22	A portion of an unnamed tributary to Linden Creek, Ontario	A portion of an unnamed tributary to Linden Creek, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 1.8-km portion of the tributary extending southwards and downstream from the northern perimeter of a waste rock disposal area at 50°00′17″ north latitude and 79°43′37″ west longitude to the southern perimeter of the waste rock disposal area at 49°59′30″ north latitude and 79°43′07″ west longitude.
23	A portion of an unnamed tributary to an unnamed lake in the Linden Creek watershed, Ontario	A portion of an unnamed tributary to an unnamed lake in the Linden Creek watershed, Ontario, located approximately 145 km northeast of the town of Cochrane, Ontario. More precisely, a 1.4-km portion of the tributary extending southwards and downstream from the headwaters of the tributary at 50°00′17″ north latitude and 79°42′39″ west longitude to the southern perimeter of a waste rock disposal area at 49°59′25″ north latitude and 79°42′27″ west longitude.
24	A portion of Trail Creek, British Columbia	A portion of Trail Creek, located approximately 20 km southeast of the community of Iskut, British Columbia. More precisely, a 0.6 km portion of the creek extending southwards and downstream from a natural barrier located at 57°42′59″ north latitude and 129°44′10″ west longitude, to the centre of a dam constructed at 57°42′43″ north latitude and 129°44′20″ west longitude.
25	Lake Hesse, Quebec	Lake Hesse, located at 52°46′21″ north latitude and 67°20′58″ west longitude, approximately 15 km west of the town of Fermont, Quebec. More precisely, the area bounded by **(a)** the contour of elevation around Lake Hesse at the 620 m level, **(b)** the dam built at the north end of Lake Hesse, and **(c)** the control dam built at the south end of Lake Hesse.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
21	Une partie d'un tributaire sans nom du ruisseau East, Ontario	La partie d'un tributaire sans nom du ruisseau East située à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 2,3 km vers le nord et en aval de la décharge de l'étang d'amont sans nom visé à l'article 20 de la présente annexe, jusqu'au centre du barrage situé par 50°02′43″ de latitude N. et 79°40′20″ de longitude O.
22	Une partie d'un tributaire sans nom du ruisseau Linden, Ontario	La partie d'un tributaire sans nom du ruisseau Linden situé à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 1,8 km vers le sud et en aval du périmètre nord d'une aire de décharge de stériles située par 50°00′17″ de latitude N. et 79°43′37″ de longitude O., jusqu'au périmètre sud de l'aire de décharge de stériles située par 49°59′30″ de latitude N. et 79°43′07″ de longitude O.
23	Une partie d'un tributaire sans nom d'un lac sans nom du bassin hydrographique du ruisseau Linden, Ontario	La partie d'un tributaire sans nom d'un lac sans nom du bassin hydrographique du ruisseau Linden située à environ 145 km au nord-est de la ville de Cochrane, en Ontario et, plus précisément, la partie du tributaire qui s'étend sur 1,4 km vers le sud et en aval des eaux d'amont du tributaire située par 50°00′17″ de latitude N. et 79°42′39″ de longitude O., jusqu'au périmètre sud d'une aire de décharge de stériles située par 49°59′25″ de latitude N. et 79°42′27″ de longitude O.
24	Une partie du ruisseau Trail, Colombie-Britannique	Une partie du ruisseau Trail situé en Colombie-Britannique à environ 20 km au sud-est de la communauté d'Iskut et, plus précisément, la partie du ruisseau qui s'étend sur 0,6 km vers le sud et en aval de la barrière naturelle située par 57°42′59″ de latitude N. et 129°44′10″ de longitude O. jusqu'au centre du barrage situé par 57°42′43″ de latitude N. et 129°44′20″ de longitude O.
25	Le lac Hesse, Québec	Le lac Hesse, situé par 52°46′21″ de latitude N. et 67°20′58″ de longitude O., à environ 15 km à l'ouest de la ville de Fermont, au Québec, et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 620 m autour du lac Hesse; **b)** le barrage construit à l'extrémité nord du lac Hesse; **c)** le barrage de régulation construit à l'extrémité sud du lac Hesse.

Item	Column 1 Water or Place	Column 2 Description
26	An unnamed lake approximately 20 km west of Fermont, Quebec and a portion of its outlet	An unnamed lake, located at 52°49′43″ north latitude and 67°22′23″ west longitude, approximately 20 km west of the town of Fermont, Quebec, and a portion of its outlet. More precisely, the area bounded by **(a)** the contour of elevation around the lake at the 660 m level, and **(b)** the outlet of the lake extending from the mouth of an outlet stream at 52°49′33″ north latitude and 67°22′18″ west longitude for a distance of 30 m downstream from that mouth.
27	A portion of an unnamed stream discharging waters from an unnamed lake, other than the one referred to in item 26, approximately 20 km west of Fermont, Quebec	A portion of an unnamed stream discharging waters from an unnamed lake, other than the one referred to in item 26, approximately 20 km west of the town of Fermont, Quebec. More precisely, the 1815 m portion of the stream that extends southwards and downstream from the point located at 52°50′02″ north latitude and 67°21′29″ west longitude to the point located at 52°49′20″ north latitude and 67°21′39″ west longitude.
28	A portion of South Teigen Creek, British Columbia	A portion of South Teigen Creek, located approximately 65 km northwest of Stewart, British Columbia. More precisely, an 8.1-km portion of the creek extending northwestwards and downstream from the point located at 56°37′53″ north latitude and 129°54′44″ west longitude to the centre of a dam located at 56°40′11.57″ north latitude and 129°58′20.92″ west longitude.
29	A portion of North Treaty Creek, British Columbia	A portion of North Treaty Creek, located approximately 65 km northwest of Stewart, British Columbia. More precisely, a 3.3-km portion of the creek extending southwards and downstream from the headwaters of the creek located at 56°37′34″ north latitude and 129°54′50″ west longitude to the centre of a dam located at 56°35′54.24″ north latitude and 129°51′25.31″ west longitude.
30	An unnamed watercourse that is a tributary to Lake Jean, located approximately 25 km southeast of Chibougamau, Quebec	The unnamed watercourse that is a tributary to Lake Jean, located approximately 25 km southeast of the town of Chibougamau, Quebec, beginning at the unnamed pond located at 49°47′58″ north latitude and 74°01′38″ west longitude and extending northwards and downstream for a distance of 6.4 km to the centre of the dam constructed at 49°49′29″ north latitude and 74°03′07″ west longitude.
31	A portion of an unnamed watercourse that is a tributary to the watercourse referred to in item 30	A portion of an unnamed watercourse beginning at that watercourse's point of confluence with the watercourse referred to in item 30, which confluence is located at 49°47′57″ north latitude and 74°03′25″ west longitude, and extending for a distance of 1 km northwards and upstream from that point.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
26	Un lac sans nom situé à environ 20 km à l'ouest de Fermont, Québec et une partie de sa décharge	Un lac sans nom, situé par 52°49′43″ de latitude N. et 67°22′23″ de longitude O., à environ 20 km à l'ouest de la ville de Fermont, au Québec, et une partie de sa décharge, et, plus précisément, la région délimitée par : **a)** la courbe de niveau à 660 m autour du lac; **b)** la décharge du lac s'étendant de l'embouchure de l'émissaire situé par 52°49′33″ de latitude N. et 67°22′18″ de longitude O., sur une distance de 30 m en aval de son embouchure.
27	Une partie d'un ruisseau sans nom évacuant les eaux d'un lac sans nom, autre que celui mentionné à l'article 26, situé à environ 20 km à l'ouest de Fermont, Québec	Une partie d'un ruisseau sans nom évacuant les eaux d'un lac sans nom, autre que celui mentionné à l'article 26, situé à environ 20 km à l'ouest de la ville de Fermont, au Québec, et, plus précisément, la partie du ruisseau s'étendant sur une distance de 1815 m, au sud et en aval à partir du point situé par 52°50′02″ de latitude N. et 67°21′29″ de longitude O. jusqu'au point situé par 52°49′20″ de latitude N. et 67°21′39″ de longitude O.
28	Une partie du ruisseau South Teigen, Colombie-Britannique	La partie du ruisseau South Teigen située à environ 65 km au nord-ouest de Stewart, en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 8,1 km vers le nord-ouest et en aval d'un point situé par 56°37′53″ de latitude N. et 129°54′44″ de longitude O. jusqu'au centre d'un barrage situé par 56°40′11,57″ de latitude N. et 129°58′20,92″ de longitude O.
29	Une partie du ruisseau North Treaty, Colombie-Britannique	La partie du ruisseau North Treaty située à environ 65 km au nord-ouest de Stewart, en Colombie-Britannique, et, plus précisément, la partie du ruisseau qui s'étend sur 3,3 km vers le sud et en aval des eaux d'amont du ruisseau situé par 56°37′34″ de latitude N. et 129°54′50″ de longitude O. jusqu'au centre d'un barrage situé par 56°35′54,24″ de latitude N. et 129°51′25,31″ de longitude O.
30	Un cours d'eau sans nom tributaire du lac Jean, situé à environ 25 km au sud-est de Chibougamau, Québec	Le cours d'eau sans nom tributaire du lac Jean, situé à environ 25 km au sud-est de la ville de Chibougamau, au Québec, débutant à l'étang sans nom situé par 49°47′58″ de latitude N. et 74°01′38″ de longitude O. et s'étendant vers le nord et en aval sur une distance de 6,4 km jusqu'au centre du barrage situé par 49°49′29″ de latitude N. et 74°03′07″ de longitude O.
31	Une partie d'un cours d'eau sans nom tributaire du cours d'eau visé à l'article 30	La partie d'un cours d'eau sans nom débutant au point de confluence de celui-ci avec le cours d'eau visé à l'article 30 situé par 49°47′57″ de latitude N. et 74°03′25″ de longitude O. et s'étendant vers le nord et en amont de ce point sur une distance de 1 km.
32	Une partie d'un cours d'eau sans nom tributaire du cours d'eau visé à l'article 30	La partie du cours d'eau sans nom débutant au point situé par 49°48′06″ de latitude N. et 74°03′41″ de longitude O. et s'étendant vers le nord et en aval de ce point sur une distance de 740 m jusqu'au point de confluence avec le cours d'eau visé à l'article 30 situé par 49°48′25″ de latitude N. et 74°03′25″ de longitude O.

Item	Column 1 Water or Place	Column 2 Description
32	A portion of an unnamed watercourse that is a tributary to the watercourse referred to in item 30	A portion of an unnamed watercourse beginning at a point located at 49°48′06″ north latitude and 74°03′41″ west longitude and extending for a distance of 740 m northwards and downstream from that point to the point of confluence with the watercourse referred to in item 30, which confluence is located at 49°48′25″ north latitude and 74°03′25″ west longitude.
33	An unnamed pond east of Lake Bernadette, Quebec, and a portion of its outlet	An unnamed pond located at 49°48′43″ north latitude and 74°04′01″ west longitude and a portion of its outlet extending from the mouth of the outlet located at 49°48′47″ north latitude and 74°03′59″ west longitude for a distance of 190 m northwards and downstream from that mouth.
34	A portion of an unnamed creek (locally known as Loslo Creek), and of its unnamed tributaries, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Loslo Creek), and of its unnamed tributaries, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the northernmost point of the creek at 48°53′6″ north latitude and 94°2′43″ west longitude to the point located at 48°50′24″ north latitude and 94°3′36″ west longitude.
35	A portion of an unnamed creek (locally known as Marr Creek), and of its unnamed tributaries, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Marr Creek), and of its unnamed tributaries, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the northernmost point of the creek at 48°52′12″ north latitude and 94°1′49″ west longitude to the point located at 48°51′18″ north latitude and 94°2′25″ west longitude.
36	A portion of an unnamed creek (locally known as Marr Creek), other than the portion referred to in item 35, that is tributary to Pinewood River, Ontario	A portion of an unnamed creek (locally known as Marr Creek), other than the portion referred to in item 35, that is tributary to Pinewood River, located approximately 65 km northwest of the town of Fort Frances, Ontario. More precisely, the portion extending southwards and downstream from the point located at 48°50′52″ north latitude and 94°2′11″ west longitude, for a distance of 1.85 km, to the point located at 48°49′53″ north latitude and 94°2′24″ west longitude.
37	A portion of an unnamed stream and its unnamed tributaries located approximately 25 km northwest of the town of Amos, Quebec	A portion of an unnamed stream and its unnamed tributaries located approximately 25 km northwest of the town of Amos, Quebec. More precisely, the 4.6 km portion of the stream extending from the point located at 48°40′44.00″ north latitude and 78°29′12.68″ west longitude to the point located at 48°40′7.19″north latitude and 78°28′1.52″ west longitude and covering an area of 3.4 ha.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
33	Un étang sans nom à l'est du lac Bernadette, Québec, et une partie de sa décharge	Un étang sans nom situé par 49°48′43″ de latitude N. et 74°04′01″ de longitude O. et une partie de sa décharge s'étendant de l'embouchure de celle-ci située par 49°48′47″ de latitude N. et 74°03′59″ de longitude O. sur une distance de 190 m vers le nord en aval de son embouchure.
34	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Loslo) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Loslo) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point le plus au nord du ruisseau situé par 48°53′6″ de latitude N. et 94°2′43″ de longitude O., jusqu'au point situé par 48°50′24″ de latitude N. et 94°3′36″ de longitude O.
35	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr) et de ses tributaires sans nom, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point le plus au nord du ruisseau situé par 48°52′12″ de latitude N. et 94°1′49″ de longitude O., jusqu'au point situé par 48°51′18″ de latitude N. et 94°2′25″ de longitude O.
36	Une partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr), autre que la partie mentionnée à l'article 35, qui est tributaire de la rivière Pinewood, Ontario	La partie d'un ruisseau sans nom (connu localement sous le nom de ruisseau Marr), autre que la partie mentionnée à l'article 35, qui est tributaire de la rivière Pinewood, située à environ 65 km au nord-ouest de la ville de Fort Frances, en Ontario, et, plus précisément, la partie qui s'étend vers le sud et en aval du point situé par 48°50′52″ de latitude N. et 94°2′11″ de longitude O., sur une distance de 1,85 km, jusqu'au point situé par 48°49′53″ de latitude N. et 94°2′24″ de longitude O.
37	Une partie d'un ruisseau sans nom, et ses tributaires sans nom, située à environ 25 km au nord-ouest de la ville d'Amos, Québec	La partie d'un ruisseau sans nom, et ses tributaires sans nom, située à environ 25 km au nord-ouest de la ville d'Amos, au Québec, et, plus précisément, la partie du ruisseau qui s'étend sur 4,6 km à partir du point situé par 48°40′44,00″ de latitude N. et 78°29′12,68″ de longitude O. jusqu'au point situé par 48°40′7,19″ de latitude N. et 78°28′1,52″ de longitude O. et qui couvre une superficie de 3,4 ha.
38	Une partie d'un tributaire sans nom du Petit lac du Portage, Québec	La partie d'un tributaire sans nom du Petit lac du Portage située à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec. Plus précisément, la partie qui s'étend sur 465 m vers le sud-ouest et en amont du point situé par 50°16′00,90″ de latitude N. et 66°33′42,71″ de longitude O. jusqu'au point situé par 50°16′06,00″ de latitude N. et 66°33′31,55″ de longitude O. et qui couvre une superficie de 0,233 ha.

Item	Column 1 Water or Place	Column 2 Description
38	A portion of an unnamed tributary to Petit lac du Portage, Quebec	A portion of an unnamed tributary to Petit lac du Portage located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 465 m portion of the tributary to Petit lac du Portage extending southwest and upstream from the point located at 50°16′00.90″ north latitude and 66°33′42.71″ west longitude to the point located at 50°16′06.00″ north latitude and 66°33′31.55″ west longitude and covering an area of 0.233 ha.
39	An unnamed headwater pond of ruisseau Clet and its unnamed tributaries, Quebec	An unnamed headwater pond of ruisseau Clet located at 50°15′15.82″ north latitude and 66°33′13.6″ west longitude and covering an area of 2.486 ha, approximately 15 km northwest of the town of Sept-Îles, Quebec, and **(a)** a 471 m portion of its unnamed tributary extending upstream from the point located at 50°15′18.37″ north latitude and 66°33′24.01″ west longitude to the point located at 50°15′20.27″ north latitude and 66°33′13.51″ west longitude and covering an area of 0.117 ha; and **(b)** a 76 m portion of its unnamed tributary extending upstream from the point located at 50°15′11.97″ north latitude and 66°33′22.57″ west longitude to the point located at 50°15′12.82″ north latitude and 66°33′20.66″ west longitude and covering an area of 0.033 ha.
40	A portion of ruisseau Clet and its unnamed tributaries, Quebec	A portion of ruisseau Clet, and its unnamed tributaries, located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 1897 m portion of ruisseau Clet extending southeast and downstream from the outlet of the unnamed headwater pond referred to in item 39 to the point on ruisseau Clet located at 50°15′11.26″ north latitude and 66°32′15.99″ west longitude and covering an area of 0.850 ha.
41	An unnamed watercourse that is a tributary to Rivière Hall, Quebec	An unnamed watercourse that is composed of interconnected streams and ponds and is a tributary to Rivière Hall and located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, the 910 m portion of the unnamed watercourse extending downstream from the point located at 50°14′52.33″ north latitude and 66°33′27.75″ west longitude to the point located at 50°14′39.67″ north latitude and 66°32′45.74″ west longitude and covering an area of 3.619 ha.

Article	Colonne 1 Eaux ou lieux	Colonne 2 Description
39	Un étang d'amont sans nom du ruisseau Clet et ses tributaires sans nom, Québec	L'étang d'amont sans nom du ruisseau Clet qui est situé par 50°15′15,82″ de latitude N. et 66°33′13,6″ de longitude O. et qui couvre une superficie de 2,486 ha, à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et : **a)** la partie de son tributaire sans nom qui s'étend sur 471 m en amont du point situé par 50°15′18,37″ de latitude N. et 66°33′24,01″ de longitude O. jusqu'au point situé par 50°15′20,27″ de latitude N. et 66°33′13,51″ de longitude O. et qui couvre une superficie de 0,117 ha; **b)** la partie de son tributaire sans nom qui s'étend sur 76 m en amont du point situé par 50°15′11,97″ de latitude N. et 66°33′22,57″ de longitude O. jusqu'au point situé par 50°15′12,82″ de latitude N. et 66°33′20,66″ de longitude O. et qui couvre une superficie de 0,033 ha.
40	Une partie du ruisseau Clet et ses tributaires sans nom, Québec	La partie du ruisseau Clet, et ses tributaires sans nom, située à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et, plus précisément, la partie du ruisseau qui s'étend sur 1 897 m vers le sud-est et en aval de la décharge de l'étang d'amont sans nom visé à l'article 39 jusqu'au point du ruisseau situé par 50°15′11,26″ de latitude N. et 66°32′15,99″ de longitude O. et qui couvre une superficie de 0,850 ha.
41	Un cours d'eau sans nom tributaire de la rivière Hall, Québec	Le cours d'eau sans nom qui est composé de ruisseaux et d'étangs interconnectés, qui est tributaire de la rivière Hall et qui est situé à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec. Plus précisément, la partie du cours d'eau sans nom qui s'étend sur 910 m en amont du point situé par 50°14′52,33″ de latitude N. et 66°33′27,75″ de longitude O. jusqu'au point situé par 50°14′39,67″ de latitude N. et 66°32′45,74″ de longitude O. et qui couvre une superficie de 3,619 ha.
42	Des parties d'un ruisseau sans nom, Québec	Les deux parties d'un ruisseau sans nom situées à environ 15 km au nord-ouest de la ville de Sept-Îles, au Québec, et, plus précisément : **a)** la partie ouest du ruisseau qui s'étend sur 253 m du point situé par 50°15′18,78″ de latitude N. et 66°29′52,43″ de longitude O. jusqu'au point situé par 50°15′13,76″ de latitude N. et 66°29′46,60″ de longitude O. et qui couvre une superficie de 0,0585 ha; **b)** la partie est du ruisseau qui s'étend sur 267 m du point situé par 50°15′19,58″ de latitude N. et 66°29′45,99″ de longitude O. jusqu'au point situé par 50°15′14,18″ de latitude N. et 66°29′45,19″ de longitude O. et qui couvre une superficie de 0,0555 ha.

Item	Column 1 Water or Place	Column 2 Description
42	Portions of an unnamed creek, Quebec	Two portions of an unnamed creek located approximately 15 km northwest of the town of Sept-Îles, Quebec. More precisely, **(a)** the west portion of the creek extending for a distance of 253 m from the point located at 50°15′18.78″ north latitude and 66°29′52.43″ west longitude to the point located at 50°15′13.76″ north latitude and 66°29′46.60″ west longitude and covering 0.0585 ha; and **(b)** the east portion of the creek extending for a distance of 267 m from the point located at 50°15′19.58″ north latitude and 66°29′45.99″ west longitude to the point located at 50°15′14.18″ north latitude and 66°29′45.19″ west longitude and covering 0.0555 ha.

SOR/2006-239, ss. 21 to 23; SOR/2008-216, s. 1; SOR/2009-27, s. 1; SOR/2009-156, s. 2; SOR/2010-250, s. 1; SOR/2011-202, s. 1; SOR/2015-45, s. 1; SOR/2016-87, s. 1; SOR/2016-196, s. 1; SOR/2017-128, s. 1; SOR/2017-129, s. 1; SOR/2017-197, s. 1; SOR/2017-272, s. 1; SOR/2018-100, s. 1.

DORS/2006-239, art. 21 à 23; DORS/2008-216, art. 1; DORS/2009-27, art. 1; DORS/2009-156, art. 2; DORS/2010-250, art. 1; DORS/2011-202, art. 1; DORS/2015-45, art. 1; DORS/2016-87, art. 1; DORS/2016-196, art. 1; DORS/2017-128, art. 1; DORS/2017-129, art. 1; DORS/2017-197, art. 1; DORS/2017-272, art. 1; DORS/2018-100, art. 1.

SCHEDULE 3

(Subsections 1(1) and 12(2) and subsection 4(2) of Schedule 5)

Analytical Requirements for Metal or Diamond Mining Effluent

TABLE 1

Item	Column 1 Deleterious Substance/pH/ temperature	Column 2 Precision[1]	Column 3 Accuracy[2]	Column 4 Method Detection Limit (MDL)
1	Arsenic	10%	100 ± 10%	0.0025 mg/L
2	Copper	10%	100 ± 10%	0.001 mg/L
3	Cyanide	10%	100 ± 10%	0.005 mg/L
4	Lead	10%	100 ± 10%	0.0005 mg/L
5	Nickel	10%	100 ± 10%	0.0125 mg/L
6	Zinc	10%	100 ± 10%	0.010 mg/L
7	Suspended Solids	15%	100 ± 15%	2.000 mg/L
8	Radium 226	10%	100 ± 10%	0.01 Bq/L
9	Total ammonia	10%	100 ± 10%	0.05 mg/L expressed as nitrogen (N)
10	pH	0.1 pH unit	0.1 pH unit	Not Applicable
11	Temperature	10%	± 0.5 °C	Not Applicable

[1] Relative standard deviation at concentrations 10 times above the MDL.

[2] Analyte recovery at concentrations above 10 times the MDL.

TABLE 2

Item	Column 1 Substances/ hardness/ alkalinity/ electrical conductivity	Column 2 Precision[1]	Column 3 Accuracy[2]	Column 4 Method Detection Limit (MDL)
1	Aluminum	10%	100 ± 10%	0.005 mg/L
2	Cadmium	10%	100 ± 10%	0.000045 mg/L
3	Chloride	10%	100 ± 10%	60 mg/L

ANNEXE 3

(paragraphes 1(1) et 12(2) et paragraphe 4(2) de l'annexe 5)

Exigences analytiques pour les effluents des mines de métaux et des mines de diamants

TABLEAU 1

Article	Colonne 1 Substance nocive/pH/ température	Colonne 2 Précision[1]	Colonne 3 Exactitude[2]	Colonne 4 Limite de détection de la méthode (LDM)
1	Arsenic	10 %	100 ± 10 %	0,0025 mg/L
2	Cuivre	10 %	100 ± 10 %	0,001 mg/L
3	Cyanure	10 %	100 ± 10 %	0,005 mg/L
4	Plomb	10 %	100 ± 10 %	0,0005 mg/L
5	Nickel	10 %	100 ± 10 %	0,0125 mg/L
6	Zinc	10 %	100 ± 10 %	0,010 mg/L
7	Matières en suspension	15 %	100 ± 15 %	2,000 mg/L
8	Radium 226	10 %	100 ± 10 %	0,01 Bq/L
9	Ammoniac total	10 %	100 ± 10 %	0,05 mg/L sous forme d'azote (N)
10	pH	0,1 unité pH	0,1 unité pH	Sans objet
11	Température	10 %	± 0,5 °C	Sans objet

[1] Écart-type relatif à des concentrations dix fois supérieures à la LDM.

[2] Récupération de l'analyte à des concentrations de plus de dix fois la LDM.

TABLEAU 2

Article	Colonne 1 Substance/ dureté/ alcalinité/ conductivité électrique	Colonne 2 Précision[1]	Colonne 3 Exactitude[2]	Colonne 4 Limite de détection de la méthode (LDM)
1	Aluminium	10 %	100 ± 10 %	0,005 mg/L
2	Cadmium	10 %	100 ± 10 %	0,000045 mg/L
3	Chlorure	10 %	100 ± 10 %	60 mg/L

Item	Column 1 Substances/ hardness/ alkalinity/ electrical conductivity	Column 2 Precision[1]	Column 3 Accuracy[2]	Column 4 Method Detection Limit (MDL)
4	Chromium	10%	100 ± 10%	0.00445 mg/L
5	Cobalt	10%	100 ± 10%	0.00125 mg/L
6	Iron	10%	100 ± 10%	0.15 mg/L
7	Manganese	10%	100 ± 10%	0.005 mg/L
8	Mercury	10%	100 ± 10%	0.00001 mg/L
9	Molybdenum	10%	100 ± 10%	0.0365 mg/L
10	Nitrate	10%	100 ± 10%	1.46835 mg/L, expressed as nitrogen (N)
11	Phosphorus	10%	100 ± 10%	0.05 mg/L
12	Selenium	10%	100 ± 10%	0.0005 mg/L
13	Sulphate	10%	100 ± 10%	0.6 mg/L
14	Thallium	10%	100 ± 10%	0.0004 mg/L
15	Uranium	10%	100 ± 10%	0.0075 mg/L
16	Total ammonia	10%	100 ± 10%	0.05 mg/L expressed as nitrogen (N)
17	Hardness	10%	100 ± 10%	1 mg/L
18	Alkalinity	10%	100 ± 10%	2 mg/L
19	Electrical Conductivity	10%	100 ± 10%	1 µS/cm

[1] Relative standard deviation at concentrations 10 times above the MDL.

[2] Analyte recovery at concentrations above 10 times the MDL.

SOR/2006-239, s. 24; SOR/2018-99, s. 31.

Article	Colonne 1 Substance/ dureté/ alcalinité/ conductivité électrique	Colonne 2 Précision[1]	Colonne 3 Exactitude[2]	Colonne 4 Limite de détection de la méthode (LDM)
4	Chrome	10 %	100 ± 10 %	0,00445 mg/L
5	Cobalt	10 %	100 ± 10 %	0,00125 mg/L
6	Fer	10 %	100 ± 10 %	0,15 mg/L
7	Manganèse	10 %	100 ± 10 %	0,005 mg/L
8	Mercure	10 %	100 ± 10 %	0,00001 mg/L
9	Molybdène	10 %	100 ± 10 %	0,0365 mg/L
10	Nitrate	10 %	100 ± 10 %	1,46835 mg/L sous forme d'azote (N)
11	Phosphore	10 %	100 ± 10 %	0,05 mg/L
12	Sélénium	10 %	100 ± 10 %	0,0005 mg/L
13	Sulfate	10 %	100 ± 10 %	0,6 mg/L
14	Thallium	10 %	100 ± 10 %	0,0004 mg/L
15	Uranium	10 %	100 ± 10 %	0,0075 mg/L
16	Ammoniac total	10 %	100 ± 10 %	0,05 mg/L sous forme d'azote (N)
17	Dureté	10 %	100 ± 10 %	1 mg/L
18	Alcalinité	10 %	100 ± 10 %	2 mg/L
19	Conductivité électrique	10 %	100 ± 10 %	1 µS/cm

[1] Écart-type relatif à des concentrations dix fois supérieures à la LDM.

[2] Récupération de l'analyte à des concentrations de plus de dix fois la LDM.

DORS/2006-239, art. 24; DORS/2018-99, art. 31.

SCHEDULE 4

(Paragraph 4(1)(a), subsection 13(1), paragraph 13(3)(a), subparagraph 22(c)(i) and paragraph 24(1)(a))

Authorized Limits of Deleterious Substances

Item	Column 1 Deleterious Substance	Column 2 Maximum Authorized Monthly Mean Concentration	Column 3 Maximum Authorized Concentration in a Composite Sample	Column 4 Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.50 mg/L	0.75 mg/L	1.00 mg/L
2	Copper	0.30 mg/L	0.45 mg/L	0.60 mg/L
3	Cyanide	1.00 mg/L	1.50 mg/L	2.00 mg/L
4	Lead	0.20 mg/L	0.30 mg/L	0.40 mg/L
5	Nickel	0.50 mg/L	0.75 mg/L	1.00 mg/L
6	Zinc	0.50 mg/L	0.75 mg/L	1.00 mg/L
7	Total Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L

NOTE: All concentrations are total values.

SOR/2006-239, s. 25; SOR/2018-99, s. 32.

ANNEXE 4

(alinéa 4(1)a), paragraphe 13(1), alinéa 13(3)a), sous-alinéa 22c)(i) et alinéa 24(1)a))

Limites permises pour certaines substances nocives

Article	Colonne 1 Substance nocive	Colonne 2 Concentration moyenne mensuelle maximale permise	Colonne 3 Concentration maximale permise dans un échantillon composite	Colonne 4 Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,50 mg/L	0,75 mg/L	1,00 mg/L
2	Cuivre	0,30 mg/L	0,45 mg/L	0,60 mg/L
3	Cyanure	1,00 mg/L	1,50 mg/L	2,00 mg/L
4	Plomb	0,20 mg/L	0,30 mg/L	0,40 mg/L
5	Nickel	0,50 mg/L	0,75 mg/L	1,00 mg/L
6	Zinc	0,50 mg/L	0,75 mg/L	1,00 mg/L
7	Total des solides en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L

NOTE : Toutes les concentrations sont des valeurs totales.

DORS/2006-239, art. 25; DORS/2018-99, art. 32.

SCHEDULE 5

(Subsections 7(1) and (3) and paragraphs 15(1)(a) and (b) and 32(1)(c))

Environmental Effects Monitoring Studies

Interpretation

1 (1) The following definitions apply in this Schedule.

biological monitoring study means a study referred to in section 9. (*étude de suivi biologique*)

effect on fish tissue from mercury means a concentration of total mercury that exceeds 0.5 µg/g wet weight in fish tissue that is taken in an exposure area and that is statistically different from and higher than the concentration of total mercury in fish tissue that is taken in a reference area. (*effet du mercure sur les tissus de poissons*)

effect on the benthic invertebrate community means a statistical difference between data referred to in subparagraph 12(1)(e)(ii) and paragraph 12(1)(f) from a study respecting the benthic invertebrate community conducted in

(a) an exposure area and a reference area; or

(b) sampling areas within an exposure area where there are gradually decreasing effluent concentrations. (*effet sur la communauté d'invertébrés benthiques*)

effect on the fish population means a statistical difference between data relating to the indicators referred to in subparagraph 12(1)(e)(i) from a study respecting fish population conducted in

(a) an exposure area and a reference area; or

(b) sampling areas within an exposure area where there are gradually decreasing effluent concentrations. (*effet sur la population de poissons*)

exposure area means all fish habitat and waters frequented by fish that are exposed to effluent. (*zone exposée*)

fish has the same meaning as in section 2 of the Act but does not include parts of fish, parts of shellfish, parts of crustaceans or parts of marine animals. (*poisson*)

reference area means water frequented by fish that is not exposed to effluent and that has fish habitat that, as far as practicable, is most similar to that of the exposure area. (*zone de référence*)

sampling area means the area within an exposure or reference area where representative samples are collected. (*zone d'échantillonnage*)

ANNEXE 5

(paragraphes 7(1) et (3), alinéas 15(1)a) et b) et 32(1)c))

Études de suivi des effets sur l'environnement

Définitions et interprétation

1 (1) Les définitions qui suivent s'appliquent à la présente annexe.

effet du mercure sur les tissus de poissons Concentration du mercure total dans les tissus de poissons pris dans la zone exposée, supérieure à 0,5 µg/g (poids humide), présentant une différence statistique et ayant une concentration plus élevée par rapport à la concentration du mercure total dans les tissus de poissons pris dans la zone de référence. (*effect on fish tissue from mercury*)

effet sur la communauté d'invertébrés benthiques Différence statistique entre les données visées au sous-alinéa 12(1)e)(ii) et à l'alinéa 12(1)f) d'une étude sur la communauté d'invertébrés benthiques effectuée :

a) soit dans la zone exposée et dans la zone de référence;

b) soit dans les zones d'échantillonnage de la zone exposée qui présentent un gradient décroissant de concentration d'effluent. (*effect on the benthic invertebrate community*)

effet sur la population de poissons Différence statistique entre les données portant sur les indicateurs visés au sous-alinéa 12(1)e)(i) d'une étude sur la population de poissons effectuée :

a) soit dans la zone exposée et dans la zone de référence;

b) soit dans les zones d'échantillonnage de la zone exposée qui présentent un gradient décroissant de concentration d'effluent. (*effect on the fish population*)

étude de suivi biologique Étude visée à l'article 9. (*biological monitoring study*)

poisson S'entend au sens de l'article 2 de la Loi, à l'exclusion des parties de poissons, de mollusques, de crustacés et d'animaux marins. (*fish*)

zone d'échantillonnage Partie de la zone exposée ou de la zone de référence où les échantillons représentatifs sont prélevés. (*sampling area*)

zone de référence Les eaux où vivent des poissons et où se trouve un habitat du poisson, qui ne sont pas exposées à un effluent et qui présentent, dans la mesure du possible, les caractéristiques les plus semblables à celles de la zone exposée. (*reference area*)

(2) For the purpose of this schedule, ***critical effect size***, in relation to an effect indicator set out in column 1 of the following table, means the critical effect size set out in column 2:

Item	Column 1 Effect Indicator	Column 2 Critical Effect Size
	For Fish Population	(% of reference mean)
1	Total body weight at age	± 25%
2	Gonad weight at total body weight	± 25%
3	Liver weight at total body weight	± 25%
4	Total body weight at length (condition)	± 10%
5	Age	± 25%
	For Benthic Invertebrate Community	(Standard Deviation Units)
6	Density	± 2 SD
7	Simpson's Evenness Index	± 2 SD
8	Taxa Richness	± 2 SD

2 Environmental effects monitoring studies consist of the effluent and water quality monitoring studies set out in Part 1 and the biological monitoring studies set out in Part 2.

PART 1

Effluent and Water Quality Monitoring Studies

Required Studies

3 Effluent and water quality monitoring studies consist of effluent characterization, sublethal toxicity testing and water quality monitoring.

zone exposée Les eaux où vivent des poissons et l'habitat du poisson qui sont exposés à un effluent. (*exposure area*)

(2) Pour l'application de la présente annexe, ***seuil critique d'effet*** s'entend, à l'égard d'un indicateur d'effet qui figure dans la colonne 1 du tableau ci-après, du seuil critique d'effet correspondant de la colonne 2 :

Article	Colonne 1 Indicateur d'effet	Colonne 2 Seuil critique d'effet
	Pour la population de poissons	(% par rapport à la moyenne de référence)
1	Poids corporel total selon l'âge	± 25 %
2	Poids des gonades par rapport au poids corporel total	± 25 %
3	Poids du foie par rapport au poids corporel total	± 25 %
4	Poids corporel total par rapport à la longueur (condition)	± 10 %
5	Âge	± 25 %
	Pour la communauté d'invertébrés benthiques	(multiple d'écart type)
6	Densité	± 2 ET
7	Indice de régularité de Simpson	± 2 ET
8	Richesse des taxons	± 2 ET

2 Les études de suivi des effets sur l'environnement se composent des études de suivi de l'effluent et de la qualité de l'eau prévues à la partie 1 et des études de suivi biologique prévues à la partie 2.

PARTIE 1

Études de suivi de l'effluent et de la qualité de l'eau

Composition des études

3 Les études de suivi de l'effluent et de la qualité de l'eau se composent de la caractérisation de l'effluent, des essais de toxicité sublétale et du suivi de la qualité de l'eau.

Effluent Characterization

4 (1) Effluent characterization is conducted by analyzing a sample of effluent and recording the hardness, alkalinity, electrical conductivity and temperature of the sample and the concentrations, in total values, of the following substances:

(a) aluminum;

(b) cadmium;

(c) iron;

(d) subject to subsection (4), mercury;

(e) molybdenum;

(f) selenium;

(g) nitrate (concentration in units of nitrogen);

(h) chloride;

(i) chromium;

(j) cobalt;

(k) sulphate;

(l) thallium;

(m) uranium;

(n) phosphorus (concentration in units of phosphorus);

(o) manganese; and

(p) ammonia (concentration in units of nitrogen).

(2) The analysis shall comply with the analytical requirements set out in Table 2 of Schedule 3.

(3) The effluent characterization shall be conducted once per calendar quarter on an aliquot of effluent sample collected under sections 12 and 13 of these Regulations from each final discharge point at least one month after the sample on which the previous characterization was conducted.

(4) The recording of the concentration of mercury in effluent referred to in paragraph (1)(d) may be discontinued if that concentration is less than 0.10 µg/L in 12 consecutive samples collected under subsection (3).

(5) Quality assurance and quality control measures shall be implemented that will ensure the accuracy of the effluent characterization data.

Caractérisation de l'effluent

4 (1) La caractérisation de l'effluent est effectuée par l'analyse d'un échantillon d'effluent et par l'enregistrement de sa dureté, de son alcalinité, de sa conductivité électrique, de sa température et des concentrations, exprimées en valeurs totales, des substances suivantes :

a) l'aluminium;

b) le cadmium;

c) le fer;

d) sous réserve du paragraphe (4), le mercure;

e) le molybdène;

f) le sélénium;

g) le nitrate (la concentration en unités d'azote);

h) le chlorure;

i) le chrome;

j) le cobalt;

k) le sulfate;

l) le thallium;

m) l'uranium;

n) le phosphore (la concentration en unités de phosphore);

o) le manganèse;

p) l'ammoniac (la concentration en unités d'azote).

(2) Les analyses doivent satisfaire aux exigences analytiques prévues au tableau 2 de l'annexe 3.

(3) La caractérisation de l'effluent est effectuée, une fois par trimestre civil, sur une portion aliquote de l'échantillon d'effluent prélevé à chaque point de rejet final en application des articles 12 et 13 du présent règlement au moins un mois après la caractérisation précédente.

(4) La concentration en mercure n'a plus à être enregistrée aux termes de l'alinéa (1)d) si la concentration de mercure de douze échantillons consécutifs prélevés selon le paragraphe (3) est inférieure à 0,10 µg/L.

(5) Des mesures d'assurance de la qualité et de contrôle de la qualité sont prises pour garantir l'exactitude des données visant la caractérisation de l'effluent.

Sublethal Toxicity Testing

5 (1) Sublethal toxicity testing shall, in the case of effluent deposited into fresh waters, be conducted using the following test methodologies, as amended from time to time:

(a) in the case of a fish species,

(i) *Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows* (Report EPS 1/RM/22), published by the Department of the Environment, or

(ii) *Biological Test Method: Toxicity Tests Using Early Life Stages of Salmonid Fish (Rainbow Trout)* (Reference Method EPS 1/RM/28), published by the Department of the Environment;

(b) in the case of an invertebrate species, *Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia* (Report EPS 1/RM/21), published by the Department of the Environment;

(c) in the case of a plant species, *Biological Test Method: Test for Measuring the Inhibition of Growth Using the Freshwater Macrophyte, Lemna minor* (Reference Method EPS 1/RM/37), published by the Department of the Environment, as it applies to the biological endpoint based on the number of fronds; and

(d) in the case of an algal species,

(i) *Biological Test Method: Growth Inhibition Test Using a Freshwater Alga* (Report EPS 1/RM/25), published by the Department of the Environment, or

(ii) *Détermination de la toxicité : inhibition de la croissance chez l'algue Pseudokirchneriella subcapitata*, (Méthode de référence MA 500 – P. sub. 1.0, rév. 3), published by the Centre d'expertise en analyse environnementale du Québec du ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques du Québec.

(2) Sublethal toxicity testing shall, in the case of effluent deposited into marine or estuarine waters, be conducted for fish species, invertebrate species and algal species using the following test methodologies, as amended from time to time, as applicable to each species:

(a) *Biological Test Method: Fertilization Assay Using Echinoids (Sea Urchins and Sand Dollars)* (Report EPS 1/RM/27), published by the Department of the Environment;

(b) *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (Reference Method EPA/821/R-02/014), published by the U.S. Environmental Protection Agency; and

Essais de toxicité sublétale

5 (1) Dans le cas d'effluent rejeté dans l'eau douce, les essais de toxicité sublétale sont effectués en conformité avec les méthodes ci-après, avec leurs modifications successives :

a) dans le cas d'une espèce de poissons :

(i) soit la *Méthode d'essai biologique : essai de croissance et de survie sur des larves de tête-de-boule* (Rapport SPE 1/RM/22), publiée par le ministère de l'Environnement,

(ii) soit la *Méthode d'essai biologique : essais toxicologiques sur des salmonidés (truite arc-en-ciel) aux premiers stades de leur cycle biologique* (Méthode de référence SPE 1/RM/28), publiée par le ministère de l'Environnement;

b) dans le cas d'une espèce d'invertébré, la *Méthode d'essai biologique : essai de reproduction et de survie du cladocère Ceriodaphnia dubia* (Rapport SPE 1/RM/21), publiée par le ministère de l'Environnement;

c) dans le cas d'une espèce de plante, la *Méthode d'essai biologique : essai de mesure de l'inhibition de la croissance de la plante macroscopique dulcicole Lemna minor* (Méthode de référence SPE 1/RM/37), publiée par le ministère de l'Environnement et appliquée au paramètre biologique en fonction du nombre de thalles;

d) dans le cas d'une espèce d'algue :

(i) soit la *Méthode d'essai biologique : essai d'inhibition de la croissance d'une algue d'eau douce* (Rapport SPE 1/RM/25), publiée par le ministère de l'Environnement,

(ii) soit la méthode intitulée *Détermination de la toxicité : inhibition de la croissance chez l'algue Pseudokirchneriella subcapitata,* (Méthode de référence MA 500 – P. sub. 1.0, rév. 3), publiée par le Centre d'expertise en analyse environnementale du Québec du ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques du Québec.

(2) Dans le cas d'effluent rejeté dans l'eau de mer ou d'estuaire, les essais de toxicité sublétale sont effectués conformément aux méthodes ci-après, avec leurs modifications successives, à l'égard d'une espèce, selon le cas, de poisson, d'invertébré et d'algue :

a) la *Méthode d'essai biologique : essai sur la fécondation chez les échinides (oursins globuleux et oursins plats)* (Rapport SPE/1/RM/27), publiée par le ministère de l'Environnement;

b) les méthodes intitulées *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (Méthode de référence EPA/821/R-02/014), publiées par l'Environmental Protection Agency des États-Unis;

(c) *Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms* (Reference Method EPA/600/R-95-136), published by the U.S. Environmental Protection Agency.

(3) The sublethal toxicity tests shall be conducted on aliquots of the same effluent sample collected for effluent characterization collected from the mine's final discharge point that has potentially the most adverse environmental impact on the environment, taking into account

(a) the loading of the deleterious substances contained in the effluent as determined under subsection 20(2) of these Regulations; and

(b) the manner in which the effluent mixes within the exposure area.

6 (1) The sublethal toxicity tests shall be conducted on the species referred to in subsections 5(1) and (2) two times each calendar year for three years and each test shall be conducted on an aliquot of effluent sample collected at least one month after the collection of the sample used in the previous tests.

(2) However, if effluent is discharged for 31 consecutive days or less in a calendar year, the tests may be conducted only once in that year.

(3) After three years, the tests shall be conducted once per calendar quarter on the species referred to in subsection 5(1) or (2), as the case may be, whose results for all the tests conducted in accordance with subsections (1) and (2) — including such tests conducted in addition to the number required by those subsections — produce the lowest geometric mean, taking into account the inhibition concentration that produces a 25% effect or an effective concentration of 25%.

Water Quality Monitoring

7 (1) Water quality monitoring is conducted by

(a) collecting samples of water from

(i) the exposure area surrounding the point of entry of effluent into water from each final discharge point and from the related reference areas, and

(ii) the sampling areas that are selected under clauses 10(b)(i)(B) and 10(c)(i)(A);

(b) recording the temperature of the water and the dissolved oxygen concentration in the water in the exposure and reference areas where the samples are collected;

(c) recording the concentration of the substances set out in paragraphs 4(1)(a) to (p) and,

(i) in the case of effluent that is deposited into fresh water, recording the pH, hardness, alkalinity and electrical conductivity of the water samples,

c) les méthodes intitulées *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (Méthode de référence EPA/600/R-95-136), publiées par l'Environmental Protection Agency des États-Unis.

(3) Les essais de toxicité sublétale sont effectués sur des portions aliquotes d'un même échantillon d'effluent prélevé pour la caractérisation de l'effluent au point de rejet final de la mine qui représente le plus grand risque de répercussions néfastes sur l'environnement, compte tenu :

a) de la charge des substances nocives se trouvant dans l'effluent, déterminée conformément au paragraphe 20(2) du présent règlement;

b) de la façon dont l'effluent se mélange dans la zone exposée.

6 (1) Les essais de toxicité sublétale sont effectués, à l'égard de chaque espèce visée aux paragraphes 5(1) et (2), à raison de deux fois par année civile pendant trois ans et chaque essai est effectué sur une portion aliquote de l'échantillon d'effluent prélevé au moins un mois après le prélèvement de l'échantillon utilisé pour les essais précédents.

(2) Toutefois, dans le cas de l'effluent rejeté pendant trente et un jours consécutifs ou moins dans une année civile, ces essais peuvent être effectués une fois pour cette année.

(3) Après trois ans, les essais sont effectués une fois par trimestre civil pour l'espèce visée au paragraphe 5(1) ou (2), selon le cas, à l'égard de laquelle les résultats de tous les essais effectués conformément aux paragraphes (1) ou (2) — y compris ceux excédant le nombre d'essais exigés par ces paragraphes — révèlent la moyenne géométrique la plus faible, compte tenu d'une concentration inhibitrice qui produit un effet de 25 % ou d'une concentration effective de 25 %.

Suivi de la qualité de l'eau

7 (1) Le suivi de la qualité de l'eau s'effectue :

a) par prélèvement d'échantillons d'eau :

(i) dans la zone exposée entourant l'endroit où l'effluent rejeté par chaque point de rejet final se mélange à l'eau, et dans les zones de référence connexes,

(ii) dans les zones d'échantillonnage choisies aux termes des divisions 10b)(i)(B) et 10c)(i)(A);

b) par enregistrement de la température de l'eau et de la concentration d'oxygène dissous dans l'eau des zones exposées et des zones de référence où les échantillons sont prélevés;

c) par enregistrement de la concentration des substances énumérées aux alinéas 4(1)a) à p) et :

(i) dans le cas où l'effluent est rejeté dans l'eau douce, par enregistrement du pH, de la dureté, de l'alcalinité et de la conductivité électrique des échantillons d'eau,

(ii) in the case of effluent that is deposited into estuarine waters, recording the pH, hardness, alkalinity, electrical conductivity and salinity of the water samples, and

(iii) in the case of effluent that is deposited into marine waters, recording the salinity of the water samples;

(d) recording the concentration of the deleterious substances prescribed in section 3 of these Regulations, but

(i) not recording the concentrations of cyanide if that substance is not used as a process reagent within the operations area, and

(ii) not recording the concentrations of radium 226 if the conditions of subsection 13(2) of these Regulations are met; and

(e) implementing quality assurance and quality control measures that will ensure the accuracy of water quality monitoring data.

(2) The water quality monitoring shall be conducted

(a) four times per calendar year and at least one month apart on the samples of water collected, while the mine is depositing effluent, from the areas referred to in subparagraph (1)(a)(i); and

(b) at the same time that the biological monitoring studies are conducted on samples of water collected in the areas referred to in subparagraph (1)(a)(ii).

Information Related to Effluent and Water Quality Monitoring Studies

8 The following information in relation to the effluent and water quality monitoring studies conducted during a calendar year under sections 4 to 7 shall be submitted to the Minister of the Environment not later than March 31 of the following year:

(a) the dates on which samples were collected for effluent characterization, sublethal toxicity testing and water quality monitoring;

(b) for each sample collected for effluent characterization, the location of the final discharge point from which samples were collected for effluent characterization;

(c) the location of the final discharge point from which samples were collected for sublethal toxicity testing and the data used in selecting the final discharge point in accordance with subsection 5(3);

(d) the latitude and longitude of sampling areas for water quality monitoring and a description that is sufficient to identify the location of the sampling areas;

(ii) dans le cas où il est rejeté dans l'eau d'estuaire, par enregistrement du pH, de la dureté, de l'alcalinité, de la conductivité électrique et de la salinité des échantillons d'eau,

(iii) dans le cas où il est rejeté dans l'eau de mer, par enregistrement de la salinité des échantillons d'eau;

d) par enregistrement de la concentration des substances nocives désignées à l'article 3 du présent règlement, sous réserve de ce qui suit :

(i) la concentration de cyanure n'est enregistrée que si cette substance est utilisée comme réactif de procédé sur le chantier,

(ii) la concentration de radium 226 n'est pas enregistrée si les conditions mentionnées au paragraphe 13(2) du présent règlement sont remplies;

e) par la prise des mesures d'assurance de la qualité et de contrôle de la qualité pour garantir l'exactitude des données visant le suivi de la qualité de l'eau.

(2) Le suivi de la qualité de l'eau est effectué :

a) quatre fois par année civile et à au moins un mois d'intervalle sur les échantillons d'eau prélevés, lorsque la mine rejette de l'effluent, dans les zones visées au sous-alinéa (1)a)(i);

b) en même temps que les études de suivi biologique, sur les échantillons d'eau prélevés dans les zones visées au sous-alinéa (1)a)(ii).

Renseignements relatifs aux études de suivi de l'effluent et de la qualité de l'eau

8 Les renseignements ci-après, relatifs aux études de suivi de l'effluent et de la qualité de l'eau effectuées au cours d'une année civile en application des articles 4 à 7, sont présentés au ministre de l'Environnement au plus tard le 31 mars de l'année suivante :

a) les dates de prélèvement des échantillons pour la caractérisation de l'effluent, les essais de toxicité sublétale et le suivi de la qualité de l'eau;

b) l'emplacement des points de rejet final où les échantillons sont prélevés pour la caractérisation de l'effluent;

c) l'emplacement du point de rejet final où les échantillons ont été prélevés pour les essais de toxicité sublétale et les données qui ont servi à le sélectionner conformément au paragraphe 5(3);

d) la latitude et la longitude des zones d'échantillonnage utilisées pour le suivi de la qualité de l'eau et une description qui permet de reconnaître l'emplacement de ces zones;

(e) the results of effluent characterization, sublethal toxicity testing and water quality monitoring;

(f) the methodologies used to conduct effluent characterization and water quality monitoring, and the related method detection limits;

(g) a description of the quality assurance and quality control measures that were implemented and the data related to the implementation of those measures; and

(h) with respect to every effluent sample collected at each final discharge point, the annual mean concentration of mercury and selenium.

e) les résultats de la caractérisation de l'effluent, des essais de toxicité sublétale et du suivi de la qualité de l'eau;

f) les méthodes utilisées pour la caractérisation de l'effluent et le suivi de la qualité de l'eau, ainsi que les limites de détection de celles-ci;

g) la description des mesures d'assurance de la qualité et de contrôle de la qualité qui ont été prises ainsi que les données associées à leur mise en œuvre;

h) à l'égard de chaque échantillon d'effluent prélevé à tout point final de rejet, les concentrations moyennes annuelles de mercure et de sélénium.

PART 2

Biological Monitoring Studies

Required Studies

9 (1) Biological monitoring studies shall include

(a) a study respecting fish population, if the highest concentration of effluent in the exposure area, during a period in which there are deposits, is greater than 1% at any location that is 250 m from a point at which the effluent enters the area from a final discharge point, unless the results of the previous two biological monitoring studies indicate

(i) for all effect indicators with no assigned critical effect size, no effect on the fish population, and

(ii) for all effect indicators with an assigned critical effect size, no effect on the fish population or an effect on the fish population the absolute value of the magnitude of which is less than the absolute value of its assigned critical effect size;

(b) a study respecting the benthic invertebrate community, if the highest concentration of effluent in the exposure area, during a period in which there are deposits, is greater than 1% at any location that is 100 m from a point at which the effluent enters the area from a final discharge point, unless the results of the previous two biological monitoring studies indicate

(i) for all effect indicators with no assigned critical effect size, no effect on the benthic invertebrate community, and

(ii) for all effect indicators with an assigned critical effect size, no effect on the benthic invertebrate community or an effect on the benthic invertebrate community the absolute value of the magnitude of which is less than the absolute value of its assigned critical effect size;

(c) a study respecting fish tissue mercury, if

PARTIE 2

Études de suivi biologique

Composition des études

9 (1) Les études de suivi biologique comportent :

a) une étude sur la population de poissons, si la concentration de l'effluent la plus élevée dans une zone exposée, lors d'une période pendant laquelle il y a des rejets, est supérieure à 1 % à tout endroit situé à 250 m du point où l'effluent entre dans la zone depuis un point de rejet final, à moins que les résultats des deux études de suivi biologique précédentes révèlent, à la fois :

(i) à l'égard des indicateurs d'effet pour lesquels il n'y a pas de seuil critique d'effet, qu'il n'y a aucun effet sur la population de poissons,

(ii) à l'égard des indicateurs d'effet pour lesquels il y a un seuil critique d'effet, qu'il n'y a aucun effet sur la population de poissons ou qu'il y a un effet sur la population de poissons, dont la valeur absolue de l'ampleur est inférieure à la valeur absolue du seuil critique d'effet;

b) une étude sur la communauté d'invertébrés benthiques, si la concentration de l'effluent la plus élevée dans une zone exposée, lors d'une période pendant laquelle il y a des rejets, est supérieure à 1 % à tout endroit situé à 100 m d'un point où l'effluent entre dans la zone depuis un point de rejet final, sauf si les résultats des deux études de suivi biologique précédentes révèlent à la fois :

(i) à l'égard des indicateurs d'effet pour lesquels il n'y a pas de seuil critique d'effet, qu'il n'y a aucun effet sur la communauté d'invertébrés benthiques,

(ii) à l'égard des indicateurs pour lesquels il y a un seuil critique d'effet, qu'il n'y a aucun effet sur la communauté d'invertébrés benthiques ou il y a un effet sur la communauté d'invertébrés benthiques, dont la valeur absolue de l'ampleur est inférieure à la valeur absolue du seuil critique d'effet;

(i) effluent characterization reveals an annual mean concentration of total mercury in the effluent that is equal to or greater than 0.10 µg/L, based on a calendar year, unless the results of the previous two biological monitoring studies indicate no effect on fish tissue from mercury, or

(ii) the method detection limit used in respect of mercury for the analysis of at least two of four effluent samples in a calendar year is equal to or greater than 0.10 µg/L;

(d) a study respecting fish tissue selenium, if

(i) effluent characterization reveals a concentration of total selenium in the effluent that is equal to or greater than 10 µg/L,

(ii) effluent characterization reveals an annual mean concentration of total selenium in the effluent that is equal to or greater than 5 µg/L, based on a calendar year, or

(iii) the method detection limit used in respect of selenium for the analysis of any effluent sample is equal to or greater than 10 µg/L, or the method detection limit used in respect of selenium for the analysis of at least two of four effluent samples in a calendar year is equal to or greater than 5 µg/L; and

(e) if the cause of any effect on the fish population, on fish tissue from mercury or on the benthic invertebrate community is not known, a study that will be used to determine the cause of the effect if

(i) the results of the previous two biological monitoring studies indicate a similar type of effect, and

(ii) for an effect indicator with an assigned critical effect size, the absolute value of the magnitude of the effect is equal to or greater than the absolute value of its critical effect size in either of those studies.

(2) If the results of the previous two biological monitoring studies are used to lift the requirement to conduct a study under any of paragraphs (1)(a), (b), (c) or (e), the earlier of those two studies shall not be used to lift a requirement to conduct a subsequent study.

(3) For the purposes of subsection (1), the concentration of effluent shall be determined or the effluent characterization shall be carried out, as the case may be,

(a) in the case of the first biological monitoring studies, beginning on the day on which the mine becomes subject

c) une étude sur le mercure dans les tissus de poissons, si :

(i) soit la caractérisation de l'effluent révèle une concentration annuelle moyenne de mercure total égale ou supérieure à 0,10 µg/L pour une année civile donnée, sauf si les résultats des deux études de suivi biologique précédentes révèlent qu'il n'y a aucun effet du mercure sur les tissus de poissons,

(ii) soit la limite de détection de la méthode utilisée, à l'égard du mercure, pour l'analyse d'au moins deux échantillons d'effluent sur quatre pour une année civile donnée est égale ou supérieure à 0,10 µg/L;

d) une étude sur le sélénium dans les tissus de poissons, si :

(i) soit la caractérisation de l'effluent révèle une concentration de sélénium total égale ou supérieure à 10 µg/L,

(ii) soit la caractérisation de l'effluent révèle une concentration annuelle moyenne de sélénium total égale ou supérieure à 5 µg/L pour une année civile donnée,

(iii) soit la limite de détection de la méthode utilisée, à l'égard du sélénium, pour l'analyse de tout échantillon d'effluent est égale ou supérieure à 10 µg/L ou la limite de détection de la méthode utilisée, à l'égard du sélénium, pour l'analyse d'au moins deux échantillons d'effluent sur quatre pour une année civile donnée est égale ou supérieure à 5 µg/L;

e) si la cause d'un effet sur la population de poissons, d'un effet du mercure sur les tissus de poissons ou d'un effet sur la communauté d'invertébrés benthiques n'est pas connue, une étude qui sera utilisée pour établir la cause de l'effet si, à la fois :

(i) les résultats des deux études de suivi biologique précédentes indiquent un type d'effet semblable,

(ii) à l'égard de tout indicateur d'effet pour lequel un seuil critique d'effet est prévu, la valeur absolue de l'ampleur de l'effet est égale ou supérieure à la valeur absolue du seuil critique d'effet, dans l'une ou l'autre de ces deux études précédentes.

(2) Si les résultats des deux études de suivi biologique précédentes sont utilisés pour lever l'obligation de présenter une étude en application des alinéas (1)a), b), c) ou e), celle qui est antérieure à l'autre ne peut être utilisée pour lever l'obligation de présenter une étude subséquente.

(3) Pour l'application du paragraphe (1), la concentration de l'effluent est déterminée — et la caractérisation de l'effluent est effectuée — selon les périodes suivantes :

a) dans le cas des premières études de suivi biologique, à partir de la date à laquelle la mine est assujettie à l'article 7 du présent règlement et jusqu'au jour qui précède la date à laquelle le premier plan d'étude doit être présenté;

to section 7 of these Regulations and ending on the day before the day on which the first study design is required to be submitted; and

(b) for any subsequent biological monitoring studies, beginning on the day on which the previous study design was required to be submitted and ending on the day before the day on which the subsequent study design is required to be submitted.

b) pour les études de suivi biologique subséquentes, à partir de la date à laquelle le plan d'étude précédent devait être présenté et jusqu'au jour qui précède la date à laquelle le plan d'étude subséquent doit être présenté.

DIVISION 1

First Biological Monitoring Studies

First Study Design

10 A first study design shall be submitted to the Minister of the Environment not later than 12 months after the day on which a mine becomes subject to section 7 of these Regulations. It shall contain

(a) a site characterization that includes

(i) a description of the manner in which the effluent mixes within each exposure area, during a period in which there are deposits, including an estimate of the concentration of effluent in the exposure area at 100 m and 250 m from every point at which the effluent enters the area from a final discharge point and — in respect of each calendar year — any supporting data, including raw data, for the estimate,

(ii) a description of the exposure and reference areas where the biological monitoring studies would be conducted — whether or not they are required — that includes information on the geological, hydrological, oceanographical, limnological, chemical and biological features of those areas,

(iii) the type of production process used by the mine and the environmental protection practices in place at the mine,

(iv) a description of any anthropogenic, natural or other factors that are not related to the effluent but that may reasonably be expected to affect the results of any biological monitoring study, whether or not it is required, and

(v) any additional information that would enable a determination as to whether studies would be conducted in accordance with generally accepted standards of good scientific practice;

(b) a description of how any required study respecting fish population, fish tissue mercury and fish tissue selenium will be conducted that includes

(i) a description of and the scientific rationale for

SECTION 1

Premières études de suivi biologique

Premier plan d'étude

10 Un premier plan d'étude est présenté au ministre de l'Environnement au plus tard douze mois après la date à laquelle la mine devient assujettie à l'article 7 du présent règlement et comporte :

a) la caractérisation du site comportant :

(i) une description de la façon dont l'effluent se mélange dans chaque zone exposée, lors d'une période pendant laquelle il y a des rejets, notamment une estimation de la concentration de l'effluent à 100 m et à 250 m de chaque point où l'effluent entre dans la zone depuis un point de rejet final ainsi que, à l'égard de toute année civile, toute donnée justificative à l'appui de l'estimation, y compris les données brutes,

(ii) une description des zones exposées et des zones de référence, si une étude de suivi biologique serait menée, qu'elle soit exigée ou non, y compris les renseignements sur les caractéristiques géologiques, hydrologiques, océanographiques, limnologiques, chimiques et biologiques de ces zones,

(iii) le type de procédé de production utilisé par la mine et les pratiques de protection de l'environnement appliquées à la mine,

(iv) les facteurs anthropiques, naturels ou autres non liés à l'effluent, mais dont on peut raisonnablement s'attendre à ce qu'ils affectent les résultats de toute étude de suivi biologique, qu'elle soit exigée ou non,

(v) tout renseignement supplémentaire qui permet de déterminer si des études seraient effectuées conformément aux normes généralement reconnues régissant les bonnes pratiques scientifiques;

b) la description du déroulement de l'étude portant sur la population de poissons, sur le mercure dans les tissus de poissons ou sur le sélénium dans les tissus de poissons, si une telle étude est exigée :

(i) les éléments ci-après, y compris les motifs scientifiques à l'appui :

(A) the fish species selected, taking into account the abundance of the species most exposed to effluent,

(B) the sampling areas selected within the exposure area and the reference area,

(C) the sampling period selected,

(D) the sample size selected, and

(E) the field and laboratory methodologies selected, and

(ii) an explanation as to how, in the case of the study respecting fish population or fish tissue mercury, the study will provide the information necessary to determine if the effluent has an effect on fish population or on fish tissue from mercury;

(c) a description of how any required study respecting the benthic invertebrate community will be conducted that includes

(i) a description of and the scientific rationale for

(A) the sampling areas selected, taking into account the benthic invertebrate diversity and the area most exposed to effluent,

(B) the sampling period selected,

(C) the sample size selected, and

(D) the field and laboratory methodologies selected, and

(ii) an explanation as to how the study will provide the information necessary to determine if the effluent has an effect on the benthic invertebrate community;

(d) the month in which the samples will be collected for each required biological monitoring study;

(e) a description of the quality assurance and quality control measures that will be implemented for each required biological monitoring study to ensure the validity of the data that is collected; and

(f) a summary of the results of any studies to determine whether the effluent was causing an effect on the fish population, fish tissue from mercury or the benthic invertebrate community and of any studies in the exposure and reference areas respecting fish tissue selenium completed before the mine becomes subject to section 7 of these Regulations and any scientific data to support the results.

(A) les espèces de poissons choisies, compte tenu de l'abondance des espèces les plus exposées à l'effluent,

(B) les zones d'échantillonnage choisies de la zone exposée et de la zone de référence,

(C) la période d'échantillonnage choisie,

(D) la taille des échantillons choisie,

(E) les méthodes choisies sur le terrain et en laboratoire,

(ii) dans le cas de l'étude sur la population de poissons ou de l'étude sur le mercure dans les tissus de poissons, la façon dont l'étude fournira les renseignements permettant de déterminer si l'effluent a un effet sur la population de poissons ou un effet du mercure sur les tissus de poissons;

c) la description du déroulement de toute étude sur la communauté d'invertébrés benthiques exigée, notamment :

(i) une description des éléments ci-après, y compris les motifs scientifiques à l'appui :

(A) les zones d'échantillonnage choisies, compte tenu de la diversité des invertébrés benthiques et de la zone la plus exposée à l'effluent,

(B) la période d'échantillonnage choisie,

(C) la taille des échantillons choisie,

(D) les méthodes choisies sur le terrain et en laboratoire,

(ii) la façon dont l'étude fournira les renseignements permettant de déterminer si l'effluent a un effet sur la communauté d'invertébrés benthiques;

d) le mois pendant lequel les échantillons seront prélevés pour toute étude de suivi biologique exigée;

e) la description des mesures d'assurance de la qualité et de contrôle de la qualité pour toute étude de suivi biologique exigée qui seront prises pour garantir la validité des données recueillies;

f) un résumé des résultats de toute étude qui indique si l'effluent produit un effet sur les populations de poissons, un effet du mercure sur les tissus de poissons ou un effet sur la communauté d'invertébrés benthiques et de toute étude sur le sélénium dans les tissus de poissons dans la zone exposée et de référence, effectuées avant la date à laquelle la mine devient assujettie à l'article 7 du présent règlement, ainsi que toutes données scientifiques justificatives.

First Biological Monitoring Studies

11 (1) Subject to subsection (2), the first biological monitoring studies shall start not earlier than six months after the day on which the first study design is submitted under section 10, and shall be conducted in accordance with that study design.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or operator shall inform the Minister of the Environment without delay of those circumstances and of the changes that are made to the study.

First Interpretative Report

12 (1) A first interpretative report shall be submitted to the Minister of the Environment not later than 36 months after the day on which the mine becomes subject to section 7 of these Regulations. It shall contain

(a) a description of any deviation from the study design that occurred while the biological monitoring studies were being conducted and any impact that the deviation had on the studies;

(b) the latitude and longitude of sampling areas and a description of the sampling areas sufficient to identify the location of the sampling areas;

(c) the dates and times when samples were collected;

(d) the sample sizes;

(e) the mean, median, standard deviation, standard error and minimum and maximum values in the sampling areas for

(i) in the case of the study respecting fish population, effect indicators of growth, reproduction, condition and survival that include, if practicable, the length, total body weight and age of the fish, the weight of its liver or hepatopancreas and, if the fish are sexually mature, the egg weight, fecundity and gonad weight of the fish,

(ii) in the case of the study respecting the benthic invertebrate community, effect indicators of the total benthic invertebrate density, evenness index, taxa richness and, if the study is conducted in an area where it is possible to sample sediment, total organic carbon content of sediment and particle size distribution of sediment,

(iii) in the case of the study respecting fish tissue mercury, the effect indicator of the concentration of total mercury (wet weight) in the fish tissue, and

(iv) in the case of the study respecting fish tissue selenium, the concentration — in the muscle or whole body and, if practicable, in the ovaries or eggs — of total selenium (dry weight) reported in μg/g and the percentage of the moisture content of the sample;

Premières études de suivi biologique

11 (1) Les premières études de suivi biologique débutent au plus tôt six mois après la date à laquelle le premier plan d'étude a été présenté en application de l'article 10 et sont effectuées conformément à ce plan.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Premier rapport d'interprétation

12 (1) Un premier rapport d'interprétation est présenté au ministre de l'Environnement au plus tard trente-six mois après la date à laquelle la mine devient assujettie à l'article 7 du présent règlement et comporte :

a) la description de tout écart par rapport au plan d'étude qui s'est produit durant les études de suivi biologique et l'incidence de ces écarts sur les études;

b) la latitude et la longitude des zones d'échantillonnage et une description qui permet de reconnaître l'emplacement de ces zones;

c) les dates et heures de prélèvement des échantillons;

d) la taille des échantillons;

e) la moyenne, la médiane, l'écart-type, l'erreur-type ainsi que les valeurs minimales et maximales dans les zones d'échantillonnage quant aux éléments suivants :

(i) dans le cas de l'étude sur la population de poissons, les indicateurs d'effet qui portent sur la croissance des poissons, leur reproduction, leur condition et leur survie qui comprennent, dans la mesure du possible, la longueur, le poids corporel total, l'âge, le poids du foie ou de l'hépatopancréas et, si les poissons ont atteint la maturité sexuelle, le poids des œufs, le taux de fécondité et le poids des gonades,

(ii) dans le cas de l'étude sur la communauté d'invertébrés benthiques, les indicateurs d'effet qui portent sur la densité totale des invertébrés benthiques, l'indice de régularité, la richesse des taxons et, si des sédiments peuvent être prélevés à l'endroit où s'effectue l'étude, la teneur en carbone organique total des sédiments et la distribution granulométrique de ceux-ci,

(iii) dans le cas de l'étude sur le mercure dans les tissus de poissons, l'indicateur d'effet portant sur la concentration de mercure total (poids humide) dans les tissus,

(iv) dans le cas de l'étude sur le sélénium dans les tissus de poissons, la concentration — dans les muscles ou le corps et, dans la mesure du possible, les ovaires ou

(f) in the case of the study respecting the benthic invertebrate community, a calculation of the similarity index effect indicator;

(g) an identification of the sex of the fish sampled and of the presence of any lesions, tumours, parasites or other abnormalities and, in the case of the study respecting fish tissue selenium, the type of fish tissue studied and the scientific rationale for the selection of that tissue;

(h) a determination as to whether there is a statistically significant difference between the sampling areas for the calculations under subparagraphs (e)(i) to (iii) and paragraph (f) taking into consideration the information identified under paragraph (g), with the statistical comparison made separately and independently for each effect indicator;

(i) a statistical analysis of the results of the calculations under subparagraphs (e)(i) to (iii) and paragraph (g) that indicates the probability of correctly detecting an effect of a pre-defined size and the degree of confidence that can be placed in the calculations;

(j) for an effect indicator referred to in paragraph (e) with an assigned critical effect size, a comparison of the magnitude of the effect — calculated in accordance with subsection (2) or (3), as the case may be — to its critical effect size;

(k) any supporting data, including raw data, for the information provided under paragraphs (e) to (j);

(l) a description of any quality assurance or quality control measures that were implemented and the data related to the implementation of those measures;

(m) based on the information referred to in paragraphs (e) to (k), the identification of

(i) any effect on the fish population,

(ii) any effect on the benthic invertebrate community, and

(iii) any effect on fish tissue from mercury;

(n) for an effect indicator with an assigned critical effect size, a statement as to whether the absolute value of the magnitude of the effect is equal to or greater than the absolute value of its critical effect size;

(o) a summary of the results of effluent characterization, sublethal toxicity testing and water quality monitoring reported under paragraph 8(e) beginning on the day on which the mine becomes subject to section 7 of these Regulations;

(p) the conclusions of the biological monitoring studies, and a description of how those conclusions will impact the study design for subsequent biological monitoring studies, taking into account

les œufs — de sélénium total (poids sec), rapportée en µg/g, et le pourcentage d'humidité de l'échantillon;

f) dans le cas de l'étude sur la communauté d'invertébrés benthiques, le calcul de l'indicateur d'effet portant sur l'indice de similitude;

g) l'identification du sexe des poissons pris et la présence de lésions, de tumeurs, de parasites et d'autres anomalies et, dans le cas de l'étude sur le sélénium dans les tissus de poissons, le type de tissu étudié ainsi que les motifs scientifiques à l'appui du choix de tissu;

h) l'établissement à savoir s'il existe une différence statistique significative entre les zones d'échantillonnage pour les calculs effectués en application des sous-alinéas e)(i) à (iii) et de l'alinéa f) et eu égard aux renseignements visés à l'alinéa g), selon une comparaison statistique séparée et indépendante pour chaque indicateur d'effet;

i) une analyse statistique des résultats des calculs effectués en application des sous-alinéas e)(i) à (iii) et de l'alinéa g) qui indique la probabilité de détection correcte d'un effet d'une ampleur prédéterminée ainsi que le degré de confiance pouvant être accordé aux calculs;

j) une comparaison de l'ampleur de l'effet — calculée conformément aux paragraphes (2) ou (3) — par rapport au seuil critique d'effet d'un indicateur d'effet visé par l'alinéa e) et pour lequel il y a un seuil critique d'effet;

k) toute donnée justificative à l'appui, y compris les données brutes, relatives aux renseignements visés aux alinéas e) à j);

l) la description des mesures d'assurance de la qualité et de contrôle de la qualité qui ont été prises ainsi que les données associées à leur mise en œuvre;

m) selon les renseignements visés aux alinéas e) à k), l'indication de tout :

(i) effet sur la population de poissons,

(ii) effet sur la communauté d'invertébrés benthiques,

(iii) effet du mercure sur les tissus de poissons;

n) à l'égard de tout indicateur d'effet, un énoncé à savoir si la valeur absolue de l'ampleur de l'effet est égale ou supérieure à la valeur absolue du seuil critique d'effet prévu pour cet indicateur d'effet;

o) un résumé des résultats de la caractérisation de l'effluent, des essais de toxicité sublétale et du suivi de la qualité de l'eau visés à l'alinéa 8e) à partir de la date où la mine devient assujettie à l'article 7 du présent règlement;

p) les conclusions des études de suivi biologique et l'incidence de ces conclusions sur le plan d'étude pour les études de suivi biologique subséquentes, compte tenu des éléments suivants :

(i) les résultats de toute étude visée à l'alinéa 10f),

(i) the results of any studies referred to in paragraph 10(f),

(ii) the presence of anthropogenic, natural or other factors that are not related to the effluent under study and that may reasonably be expected to contribute to any observed effect,

(iii) the results of the statistical analysis conducted under paragraphs (h) and (i), and

(iv) the data referred to in paragraph (l);

(q) the month in which the next biological monitoring studies will start, if any biological monitoring studies are required; and

(r) the date when the next interpretative report is required to be submitted or would be required to be submitted but for the application of subsection 16(3).

(2) For the purpose of the study respecting fish population, the magnitude of the effect for an effect indicator is to be calculated using the following formula:

(A – B)/B × 100

where

A is

(a) for the purpose of the age indicator, the mean value for the indicator in the exposure area, and

(b) for the purpose of the indicators other than age, the adjusted mean value — obtained using the analysis of covariance (ANCOVA) statistical test method — for the indicator in the exposure area; and

B is

(a) for the purpose of the age indicator, the mean value for the indicator in the reference area, and

(b) for the purpose of the indicators other than age, the adjusted mean value — obtained using the analysis of covariance (ANCOVA) statistical test method — for the indicator in the reference area.

(3) For the purposes of the study respecting the benthic invertebrate community, the magnitude of the effect for an effect indicator is to be calculated using the following formula:

(A – B)/C

where

A is the mean value for the indicator in the exposure area;

B is the mean value for the indicator in the reference area; and

C is the standard deviation for the indicator in the reference area.

(ii) la présence de facteurs anthropiques, naturels ou autres non liés à l'effluent à l'étude et dont on peut raisonnablement s'attendre à ce qu'ils contribuent à tout effet observé,

(iii) les résultats de l'analyse statistique effectuée en application des alinéas h) et i),

(iv) les données visées à l'alinéa l);

q) le mois pendant lequel les prochaines études de suivi biologique débuteront, si des études de suivi biologique sont exigées;

r) la date à laquelle le prochain rapport d'interprétation doit être présenté ou devrait être présenté si ce n'était l'application du paragraphe 16(3).

(2) Pour l'étude sur la population de poissons, l'ampleur de l'effet d'un indicateur d'effet se calcule selon la formule suivante :

(A – B)/B × 100

où :

A représente :

a) dans le cas de l'âge, la moyenne pour l'indicateur dans la zone exposée;

b) dans le cas des autres indicateurs d'effet, la moyenne ajustée — obtenue en application de la méthode statistique de l'analyse de covariance (ANCOVA) — pour l'indicateur dans la zone exposée;

B selon le cas :

a) dans le cas de l'âge, la moyenne pour l'indicateur dans la zone de référence;

b) dans le cas des autres indicateurs d'effet, la moyenne ajustée — obtenue en application de la méthode statistique de l'analyse de covariance (ANCOVA) — pour l'indicateur dans la zone de référence.

(3) Pour l'étude sur la communauté d'invertébrés benthiques, l'ampleur de l'effet d'un indicateur se calcule selon la formule suivante :

(A – B)/C

où :

A représente la moyenne pour l'indicateur dans la zone exposée;

B la moyenne pour l'indicateur dans la zone de référence;

C l'écart-type pour l'indicateur dans la zone de référence.

DIVISION 2

Subsequent Biological Monitoring Studies

Subsequent Study Designs

13 (1) Each subsequent study design shall be submitted to the Minister of the Environment

(a) at least six months before the start of the biological monitoring studies that are set out in that study design; or

(b) if no biological monitoring studies are required, not later than 12 months after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3).

(2) Each subsequent study design shall include

(a) a summary of the information referred to in paragraph 10(a) and a description of any changes to that information since the submission of the most recent study design, as well as — in respect of each calendar year — any supporting data, including raw data, for the estimate referred to in subparagraph 10(a)(i), whether or not the estimate has changed;

(b) the information referred to in paragraphs 10(b) to (e);

(c) a summary of the results of any biological monitoring studies conducted after June 6, 2002;

(d) if the study referred to in paragraph 9(1)(e) is required,

(i) the month in which the study will start, and

(ii) a description of how the study will be conducted that includes any field and laboratory methodologies that will be used to determine the cause of the effect; and

(e) if the cause of an effect on the fish population, on fish tissue from mercury or on the benthic invertebrate community is known, the cause of the effect and any supporting data, including raw data.

Conduct of Subsequent Biological Monitoring Studies

14 (1) Subject to subsection (2), the subsequent biological monitoring studies shall be conducted in accordance with the study design submitted under section 13.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or

SECTION 2

Études de suivi biologique subséquentes

Plans d'étude subséquents

13 (1) Tout plan d'étude de suivi biologique subséquent est présenté au ministre de l'Environnement :

a) au moins six mois avant le début des études de suivi biologique visées dans ce plan d'étude;

b) si aucune étude de suivi biologique n'est exigée, au plus douze mois après la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3).

(2) Tout plan d'étude de suivi biologique subséquent comporte :

a) un résumé des renseignements visés à l'alinéa 10a) et une description de toute modification à ces renseignements apportée depuis la présentation du dernier plan d'étude ainsi que, à l'égard de toute année civile, toute donnée justificative à l'appui de l'estimation visée au sous-alinéa 10a)(i), y compris les données brutes, que cette estimation ait changé ou non;

b) les renseignements visés aux alinéas 10b) à e);

c) un résumé des résultats de toute étude de suivi biologique effectuée depuis le 6 juin 2002;

d) si une étude visée à l'alinéa 9(1)e) est requise :

(i) le mois pendant lequel l'étude débutera,

(ii) une description de la façon dont l'étude sera effectuée, y compris toute méthode sur le terrain et en laboratoire, pour établir la cause de l'effet;

e) si la cause d'un effet sur la population de poissons, d'un effet du mercure sur les tissus de poissons ou d'un effet sur la communauté d'invertébrés benthiques est connue, la cause de l'effet ainsi que toute donnée justificative à l'appui, y compris les données brutes.

Déroulement des études de suivi biologique subséquentes

14 (1) Toute étude de suivi biologique subséquente est effectuée conformément au plan d'étude présenté en application de l'article 13.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de

operator shall inform the Minister of the Environment without delay of those circumstances and the changes that are made to the study.

Content of Subsequent Interpretative Reports

15 Subject to subsection 16(3), each subsequent study design shall be followed by a subsequent interpretative report that includes

(a) for a study referred to in paragraphs 9(1)(a) to (d), the information referred to in paragraphs 12(1)(a) to (n) and (p) to (r);

(b) a summary of the results of effluent characterization, sublethal toxicity testing and water quality monitoring reported under paragraph 8(e) after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3); and

(c) if the study design includes the description required under paragraph 13(2)(d),

(i) the cause of the effect, if determined, and any supporting data, including raw data, or

(ii) if the cause of the effect was not determined, an explanation of why and a description of any steps that need to be taken in the next study to determine that cause.

Submission of Subsequent Interpretative Reports

16 (1) Subject to subsection (2), each subsequent interpretative report shall be submitted to the Minister of the Environment not later than 36 months after the day on which the previous interpretative report was required to be submitted or would have been required to be submitted but for the application of subsection 16(3).

(2) The interpretative report following a resumption of effluent discharge referred to in subsection 17(2) shall be submitted not later than 36 months after the day on which effluent discharge resumes.

(3) An interpretative report is not required in respect of a 36-month period if no biological monitoring studies are required in respect of that period.

Cessation of Discharge

17 (1) The owner or operator of a mine that has ceased discharging effluent for a period of at least 36 months is not required to conduct environmental effects monitoring studies so long as the period of cessation continues.

sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Contenu des rapports d'interprétation subséquents

15 Sous réserve du paragraphe 16(3), tout plan d'étude subséquent est suivi d'un rapport d'interprétation subséquent qui comporte :

a) dans le cas des études visées aux alinéas 9(1)a) à d), les renseignements visés aux alinéas 12(1)a) à n) et p) à r);

b) un résumé des résultats de la caractérisation de l'effluent, des essais de toxicité sublétale et du suivi de la qualité de l'eau visés à l'alinéa 8e) à partir de la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3);

c) si le plan d'étude comprend une description exigée par l'alinéa 13(2)d) :

(i) la cause de l'effet, si elle a été déterminée, ainsi que toutes données justificatives à l'appui, y compris les données brutes,

(ii) si la cause n'a pas été déterminée, les raisons de l'échec ainsi que les mesures nécessaires pour déterminer cette cause lors de la prochaine étude.

Présentation des rapports d'interprétation subséquents

16 (1) Tout rapport d'interprétation subséquent est présenté au ministre de l'Environnement au plus tard trente-six mois après la date à laquelle le rapport d'interprétation précédent devait être présenté ou aurait dû être présenté si ce n'était l'application du paragraphe 16(3).

(2) Toutefois, le rapport d'interprétation suivant la reprise du rejet d'effluents visée au paragraphe 17(2) est présenté au plus tard trente-six mois après la date de cette reprise.

(3) Aucun rapport d'interprétation n'est exigé à l'égard d'une période de trente-six mois à l'égard de laquelle aucune étude de suivi biologique n'est exigée.

Cessation du rejet d'effluent

17 (1) Le propriétaire ou l'exploitant d'une mine dont les rejets d'effluent ont cessé pour une période d'au moins trente-six mois n'a pas l'obligation de mener des études de suivi des effets sur l'environnement tant que l'absence de rejets se poursuit.

(2) The requirement to conduct environmental effects monitoring studies shall resume, as the case may be, on

(a) the day on which effluent discharge resumes; or

(b) the day on which a notice referred to in paragraph 32(1)(a) of these Regulations is received by the Minister of the Environment.

(3) The owner or operator shall notify the Minister of the Environment in writing without delay

(a) when the period of cessation begins; and

(b) when the mine resumes effluent discharge.

(4) Any biological monitoring study that began before the end of the 36-month period shall be completed and followed by an interpretative report in accordance with section 15.

(2) L'obligation de mener des études de suivi des effets sur l'environnement reprend, selon le cas :

a) à la date de reprise du rejet d'effluents;

b) à la date à laquelle l'avis visé à l'alinéa 32(1)a) du présent règlement est reçu par le ministre de l'Environnement.

(3) Le propriétaire ou l'exploitant d'une mine avise le ministre de l'Environnement par écrit sans délai :

a) au début de la période d'absence de rejet d'effluents;

b) à la reprise du rejet d'effluents.

(4) Toute étude de suivi biologique débutée avant la fin de la période de trente-six mois est complétée et suivie d'un rapport d'interprétation conformément à l'article 15.

DIVISION 3

Final Studies

General

18 (1) If an owner or operator of a mine has provided a notice referred to in paragraph 32(1)(a) of these Regulations to the Minister of the Environment, the owner or operator shall

(a) if the notice is received before biological monitoring studies have started, conduct the biological monitoring studies and submit any interpretative report that is required in respect of those studies; and

(b) if the notice is received after biological monitoring studies have started, in addition to submitting any interpretative report that is required in respect of those studies, submit a final study design in accordance with subsection (2), conduct final biological monitoring studies in accordance with section 19 and submit a final interpretative report in accordance with section 20.

(2) The final study design shall be submitted to the Minister of the Environment not later than six months after the day on which the notice referred to in paragraph 32(1)(a) of these Regulations is received. It shall include the information required under subsection 13(2).

Conduct of Final Biological Monitoring Studies

19 (1) Subject to subsection (2), the final biological monitoring studies shall be conducted in accordance with the study design submitted under subsection 18(2) not earlier than six months after the day on which the final study design has been submitted.

SECTION 3

Études finales

Généralités

18 (1) S'il a présenté au ministre de l'Environnement un avis visé à l'alinéa 32(1)a) du présent règlement, le propriétaire ou l'exploitant d'une mine :

a) dans le cas où l'avis est reçu avant le début des études de suivi biologique, effectue les études de suivi biologique et présente tout rapport d'interprétation requis à l'égard de ces études;

b) dans le cas où l'avis est reçu après le début des études de suivi biologique, en plus d'effectuer les études de suivi biologique et de présenter tout rapport d'interprétation exigé à l'égard de ces études, présente un plan d'étude final conformément au paragraphe (2), effectue une étude de suivi biologique finale conformément à l'article 19 et présente un rapport d'interprétation final conformément à l'article 20.

(2) Le plan d'étude final est présenté au ministre de l'Environnement au plus tard six mois après la date de réception de l'avis visé à l'alinéa 32(1)a) du présent règlement et comporte les renseignements exigés par le paragraphe 13(2).

Déroulement des études de suivi biologique finales

19 (1) Les études de suivi biologique finales sont effectuées conformément au plan d'étude présenté en application du paragraphe 18(2), au plus tôt six mois après la date de présentation du plan d'étude final.

(2) If the owner or operator is unable to follow the study design due to circumstances beyond their control, the owner or operator shall inform the Minister of the Environment without delay of those circumstances and the changes that are made to the study.

Content of Final Interpretative Report

20 The final interpretative report shall be submitted to the Minister of the Environment not later than three years after the day on which the notice referred to in paragraph 32(1)(a) of these Regulations is received and shall include the information referred to in paragraphs 15(a) to (c).

SOR/2006-239, ss. 26 to 33, 34(F); SOR/2012-22, ss. 10 to 17; SOR/2018-99, s. 33.

(2) Toutefois, si le propriétaire ou l'exploitant est incapable de suivre le plan d'étude pour des raisons indépendantes de sa volonté, il en avise sans délai le ministre de l'Environnement et l'informe des modifications à apporter aux modalités du déroulement de l'étude.

Contenu du rapport d'interprétation final

20 Le rapport d'interprétation final est présenté au ministre de l'Environnement au plus tard trois ans après la date de réception de l'avis visé à l'alinéa 32(1)a) du présent règlement et comporte les renseignements visés aux alinéas 15a) à c).

DORS/2006-239, art. 26 à 33 et 34(F); DORS/2012-22, art. 10 à 17; DORS/2018-99, art. 33.

SCHEDULE 6

(Section 22)

Annual Report Summarizing Effluent Monitoring Results

PART 1

Identifying Information

1 Name of the mine

2 Address of the mine

3 Name of the operator of the mine

4 Operator's telephone number and e-mail address, if any

5 Reporting period

6 Date of report

PART 2

Test Results Respecting Each Final Discharge Point

1 Complete the following table with the monthly mean concentration for the deleterious substances set out in the table for each final discharge point and identify the location of the final discharge point.

2 Any measurement not taken because there was no deposit from the final discharge point shall be identified by the letters "NDEP" (No Deposit).

3 Any measurement not taken because no measurement was required in accordance with the conditions set out in section 12 or 13 of the *Metal Mining Effluent Regulations* shall be identified by the letters "NMR" (No Measurement Required).

ANNEXE 6

(article 22)

Rapport annuel résumant les résultats du suivi de l'effluent

PARTIE 1

Renseignements identificatoires

1 Nom de la mine

2 Adresse de la mine

3 Nom de l'exploitant de la mine

4 Numéro de téléphone de l'exploitant et adresse électronique, le cas échéant

5 Période visée

6 Date du rapport

PARTIE 2

Résultats des essais à chacun des points de rejet final

1 Remplir le tableau suivant pour chaque point de rejet final, identifier son emplacement et indiquer la moyenne mensuelle de la concentration des substances nocives.

2 S'il n'y a pas eu de résultats parce qu'il n'y avait pas de rejet à partir du point de rejet final, inscrire « A.R. » (aucun rejet).

3 S'il n'y a pas eu de mesure parce que l'article 12 ou 13 du *Règlement sur le effluents des mines de métaux* n'en exigeait aucune, inscrire « A.M.E. » (aucune mesure exigée).

Location of final discharge point:												
Month	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	Lowest pH	Highest pH	Effluent Volume (m^3)
Jan											
Feb											
Mar											
Apr											
May											
June											
July											
Aug											
Sept											
Oct											
Nov											
Dec											

Emplacement du point de rejet final :											
Mois	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	TSS (mg/L)	Ra 226 (Bq/L)	pH le plus bas	pH le plus haut	Volume d'effluent (m^3)
Janv											
Févr.											
Mars											
Avr											
Mai											
Juin											
Juill.											
Août											
Sept											
Oct											
Nov											
Déc											

PART 3

Results of Acute Lethality Tests and *Daphnia Magna* Monitoring Tests

Location of final discharge point:			
Date Sample Collected	Results for Rainbow Trout Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for *Daphnia magna* Monitoring Tests (mean percentage mortality in 100% effluent test concentration)	Results for Threespine Stickleback Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)

PARTIE 3

Résultats des essais de détermination de la létalité aiguë et des essais de suivi avec bioessais sur la *Daphnia magna*

Emplacement du point de rejet final :			
Date du prélèvement de l'échantillon	Résultats des essais de détermination de la létalité aiguë sur la truite arc-en-ciel (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de suivi avec bioessais sur la *Daphnia magna* (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de détermination de la létalité aiguë sur l'épinoche à trois épines (pourcentage moyen de mortalité dans l'effluent non dilué)

PART 4

[Repealed, SOR/2018-99, s. 34]

SOR/2006-239, s. 35; SOR/2018-99, s. 34.

PARTIE 4

[Abrogée, DORS/2018-99, art. 34]

DORS/2006-239, art. 35; DORS/2018-99, art. 34.

SCHEDULE 6.1
[Repealed, SOR/2018-99, s. 35]

ANNEXE 6.1
[Abrogée, DORS/2018-99, art. 35]

SCHEDULE 7
[Repealed, SOR/2018-99, s. 35]

ANNEXE 7
[Abrogée, DORS/2018-99, art. 35]

SCHEDULE 8

[Repealed, SOR/2018-99, s. 35]

ANNEXE 8

[Abrogée, DORS/2018-99, art. 35]

RELATED PROVISIONS

— SOR/2018-99, s. 37

37 (1) Despite subsection 8(1) of the *Metal and Diamond Mining Effluent Regulations*, the owner or operator of a mine that is subject to those Regulations on the day on which this section comes into force shall submit in writing to the Minister of the Environment the information referred to in paragraph 8(2)(c) of those Regulations not later than 60 days after the day on which this section comes into force.

(2) During the 12-month period beginning on the day on which this section comes into force, despite subsection 16(2) of the *Metal and Diamond Mining Effluent Regulations*, the owner or operator of a diamond mine may, for the purposes of determining whether effluent is acutely lethal for the 12-month period referred to in subsection 16(1) of those Regulations, use acute lethality data that was collected during any period of 12 consecutive months before the day on which this section comes into force, if the owner or operator submits a report to the Minister of the Environment that indicates that

(a) the tests to determine acute lethality have been conducted in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/10 or section 5 or 6 of Reference Method EPS 1/RM/13;

(b) the data relates to effluent generated after the start of commercial operation by the mine; and

(c) the data was collected not more than 36 months before the day on which this section comes into force.

(3) During the 12-month period beginning on the day on which section 14.3 of the *Metal and Diamond Mining Effluent Regulations* comes into force, despite subsection 16(2) of those Regulations, the owner or operator of a metal mine or diamond mine may, for the purposes of determining whether effluent is acutely lethal for the 12-month period referred to in subsection 16(1) of those Regulations, use acute lethality data that was collected during any period of 12 consecutive months before the day on which that section 14.3 comes into force, if the owner or operator submits a report to the Minister of the Environment that indicates that

(a) the tests to determine acute lethality have been conducted in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14;

(b) the data relates to effluent generated after the start of commercial operation by the mine; and

(c) the data was collected not more than 36 months before the day on which that section 14.3 comes into force.

DISPOSITIONS CONNEXES

— DORS/2018-99, art. 37

37 (1) Malgré le paragraphe 8(1) du *Règlement sur les effluents des mines de métaux et des mines de diamants*, le propriétaire ou l'exploitant d'une mine qui est assujettie à ce règlement, à la date d'entrée en vigueur du présent article, présente par écrit au ministre de l'Environnement les renseignements visés à l'alinéa 8(2)c) de ce règlement dans les soixante jours suivant la date d'entrée en vigueur du présent article.

(2) Pendant la période de douze mois commençant à la date d'entrée en vigueur du présent article, malgré le paragraphe 16(2) de ce règlement, le propriétaire ou l'exploitant d'une mine de diamants peut se fonder sur les données d'essai de détermination de la létalité aiguë recueillies pendant toute période de douze mois consécutifs précédant la date d'entrée en vigueur du présent article pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe 16(1) de ce règlement, s'il présente au ministre de l'Environnement un rapport indiquant que :

a) les essais de détermination de la létalité aiguë ont été effectués conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/10 ou aux sections 5 ou 6 de la méthode de référence SPE 1/RM/13;

b) les données se rapportent à l'effluent émanant de la mine depuis le début de son exploitation commerciale;

c) les données ont été recueillies au cours des trente-six mois précédant la date d'entrée en vigueur du présent article.

(3) Pendant la période de douze mois commençant à la date d'entrée en vigueur de l'article 14.3 de ce règlement, malgré le paragraphe 16(2) de ce règlement, le propriétaire ou l'exploitant d'une mine de métal ou d'une mine de diamants peut se fonder sur les données d'essai de détermination de la létalité aiguë recueillies pendant toute période de douze mois consécutifs précédant la date d'entrée en vigueur de l'article 14.3 de ce règlement pour établir si l'effluent présente une létalité aiguë pendant la période de douze mois visée au paragraphe 16(1) de ce règlement, s'il présente au ministre de l'Environnement un rapport indiquant que :

a) les essais de détermination de la létalité aiguë ont été effectués conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14;

b) les données se rapportent à l'effluent émanant de la mine depuis le début de son exploitation commerciale;

c) les données ont été recueillies au cours des trente-six mois précédant l'entrée en vigueur de l'article 14.3 de ce règlement.

— SOR/2018-99, s. 38

38 (1) Despite section 10 of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, the first study design of a diamond mine that is subject to those Regulations on June 1, 2018 may be submitted not later than the earlier of June 1, 2021 and the day on which a document that is equivalent to a study design is required to be submitted under provincial or territorial laws.

(2) In the case of a diamond mine in respect of which the first study design is submitted under subsection (1), the period referred to in subsection 11(1) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations* does not apply.

(3) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the results of any studies conducted before the day on which the first study design is submitted may be used for the purpose of determining which biological monitoring studies are required to be conducted under section 9 of Schedule 5 to those Regulations if those results can be used for the purpose of meeting the requirements of section 12 of that Schedule.

(4) However, only information gathered — for the purpose of meeting the requirements of provincial or territorial laws — during the three-year period before the day on which the first study design is submitted may be used to determine the concentration of effluent, mercury and selenium for the application of subsections 9(1) and (2) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*. If that information is used, paragraph 9(3)(a) of that Schedule does not apply.

(5) If the results of studies referred to in subsection (3) and the information referred to in subsection (4) are used in accordance with those subsections, the first study design shall include, in addition to the information referred to in section 10 of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, the information referred to in paragraph 13(2)(d) or (e), as the case may be, of that Schedule, copies of and a summary of the results of the studies and an explanation — that includes supporting information — as to how the results and information can be used for the purposes of meeting the requirements of sections 9 and 12 of that Schedule.

(6) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the effluent and water quality monitoring studies set out in Part 1 of Schedule 5 to those Regulations shall be started on the day on which the first study design is submitted.

(7) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the results of sublethal toxicity tests conducted — for the purpose of meeting the requirements of provincial or territorial laws — during the three-year period before the day on which the first study design is submitted may be used for the application of subsection 6(3) of Schedule 5 to those Regulations, as if three years had elapsed, if those tests meet the requirements of subsection 5(1) of that Schedule. If those results are used, subsections 6(1) and (2) of that Schedule do not apply.

— DORS/2018-99, art. 38

38 (1) Malgré l'article 10 de l'annexe 5 du *Règlement sur les effluents des mines de métaux et des mines de diamants*, le premier plan d'étude concernant une mine de diamants assujettie à ce règlement le 1er juin 2018 peut être présenté, au plus tard, le 1er juin 2021 ou, si elle est antérieure, à la date à laquelle un document équivalent à un plan d'étude doit être présenté aux termes de règles de droit provinciales ou territoriales.

(2) Dans le cas d'une mine de diamants à l'égard de laquelle le premier plan d'étude est présenté en application du paragraphe (1), la période visée au paragraphe 11(1) de cette annexe ne s'applique pas.

(3) Dans le cas d'une mine de diamants assujettie à ce règlement le 1er juin 2018, les résultats d'études effectuées avant la date à laquelle le premier plan d'étude est présenté peuvent être utilisés pour déterminer quelles études de suivi biologique doivent être effectuées en application de l'article 9 de cette annexe, à condition que ces résultats puissent être utilisés pour satisfaire aux exigences prévues à l'article 12 de cette annexe.

(4) Toutefois, seuls les renseignements recueillis — pour satisfaire aux règles de droit provinciales ou territoriales — dans les trois ans qui précèdent la date de présentation du premier plan d'étude peuvent être utilisés pour déterminer la concentration de l'effluent, de mercure et de sélénium pour l'application des paragraphes 9(1) et (2) de cette annexe. Si ces renseignements sont utilisés, l'alinéa 9(3)a) de cette annexe ne s'applique pas.

(5) Si les résultats d'études visés au paragraphe (3) et les renseignements visés au paragraphe (4) sont utilisés conformément à ces paragraphes, le premier plan d'étude comprend, en plus des renseignements visés à l'article 10 de cette annexe, les renseignements visés, selon le cas, à l'alinéa 13(2)d) ou e) de cette annexe, des copies et un résumé des résultats des études et une explication — y compris les renseignements à l'appui — quant à la manière dont les résultats et les renseignements peuvent être utilisées pour satisfaire aux exigences des articles 9 et 12 de cette annexe.

(6) Dans le cas d'une mine de diamants assujettie à ce règlement le 1er juin 2018, les études de suivi de l'effluent et de la qualité de l'eau prévues à la partie 1 de cette annexe débutent à la date de présentation du premier plan d'étude.

(7) Dans le cas d'une mine de diamants assujettie à ce règlement le 1er juin 2018, les résultats d'essais de toxicité sublétale effectués — pour satisfaire aux règles de droit provinciales ou territoriales — dans les trois ans qui précèdent la date de présentation du premier plan d'étude peuvent être utilisés pour l'application du paragraphe 6(3) de cette annexe, comme s'il s'était écoulé trois ans, si ces essais satisfont aux exigences du paragraphe 5(1) de cette annexe. Si ces résultats sont utilisés, les paragraphes 6(1) et (2) de cette annexe ne s'appliquent pas.

(8) If the results of sublethal toxicity tests are used in accordance with subsection (7), the information referred to in paragraphs 8(a), (c), (e) and (g) of Schedule 5 to the *Metal and Diamond Mining Effluent Regulations*, in relation to those tests, shall be submitted to the Minister of the Environment not later than the day on which the first study design is submitted and shall be accompanied by a summary of the results of the tests and an explanation — that includes supporting information — as to how the results can be used for the purposes of meeting the requirements of subsection 5(1) of that Schedule.

(9) In the case of a diamond mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018, the first interpretative report shall, despite subsection 12(1) of Schedule 5 to those Regulations, be submitted not later than 24 months after the day on which the first study design is submitted and shall contain, in addition to the information referred to in section 12 of that Schedule, the information referred to in paragraph 15(c) of that Schedule.

— SOR/2018-99, s. 39

39 In the case of a metal mine that is subject to the *Metal and Diamond Mining Effluent Regulations* on June 1, 2018,

(a) sections 4 to 8 of Schedule 5 to those Regulations apply beginning on January 1, 2019 and, until that day, the *Metal Mining Effluent Regulations*, as they read immediately before June 1, 2018, continue to apply to the matters referred to in those sections;

(b) subsections 6(1) and (2) of Schedule 5 to those Regulations do not apply and the results of sublethal toxicity tests conducted under the *Metal Mining Effluent Regulations* during the three-year period before January 1, 2019 shall be used for the application of subsection 6(3) of that Schedule, as if three years had elapsed; and

(c) biological monitoring studies started on or before June 1, 2018 shall be completed, and the corresponding interpretative report shall be submitted, in accordance with the *Metal Mining Effluent Regulations*, as they read immediately before June 1, 2018.

(8) Si les résultats d'essais de toxicité sublétale sont utilisés conformément au paragraphe (7), les renseignements relatifs à ces essais visés aux alinéas 8a), c), e) et g) de cette annexe sont présentés au ministre de l'Environnement au plus tard à la date de présentation du premier plan d'étude et ils sont accompagnés d'un résumé des résultats des essais ainsi qu'une explication — y compris les renseignements à l'appui — quant à la manière dont les résultats peuvent être utilisées pour satisfaire aux exigences du paragraphe 5(1) de cette annexe.

(9) Dans le cas d'une mine de diamants assujettie à ce règlement le 1er juin 2018, le premier rapport d'interprétation est présenté, malgré le paragraphe 12(1) de cette annexe, au plus tard vingt-quatre mois après la date de présentation du premier plan d'étude et il comprend, en plus des renseignements visés à l'article 12 de cette annexe, les renseignements visés à l'alinéa 15c) de l'annexe.

— DORS/2018-99, art. 39

39 Dans le cas d'une mine de métaux assujettie au *Règlement sur les effluents des mines de métaux et des mines de diamants* le 1er juin 2018 :

a) les articles 4 à 8 de l'annexe 5 de ce règlement s'appliquent à partir du 1er janvier 2019 et, jusqu'à cette date, les dispositions du *Règlement sur les effluents des mines de métaux*, dans leur version antérieure au 1er juin 2018, continuent de régir les matières visées par ces articles;

b) les paragraphes 6(1) et (2) de cette annexe ne s'appliquent pas et les résultats des essais de toxicité sublétale effectués au titre du *Règlement sur les effluents des mines de métaux* dans les trois années qui précèdent le 1er janvier 2019 sont utilisés pour l'application du paragraphe 6(3) de cette annexe, comme s'il s'était écoulé trois ans;

c) les études de suivi biologique débutées le 1er juin 2018 ou avant cette date sont menées à terme conformément aux dispositions du *Règlement sur les effluents des mines de métaux*, dans leur version antérieure au 1er juin 2018, et le rapport d'interprétation qui s'y rapporte est présenté selon les modalités prévues à cette version du même règlement.

AMENDMENTS NOT IN FORCE

— SOR/2018-99, s. 2(4)

2 (4) The definition *acutely lethal* in subsection 1(1) of the Regulations is amended by striking out "or" at the end of paragraph (a), by adding "or" at the end of paragraph (b) and by adding the following after paragraph (b):

(c) more than 50% of the *Daphnia magna* subjected to it for a period of 48 hours, when tested in accordance with the acute lethality test set out in section 14.3.

— SOR/2018-99, s. 2(6)

2 (6) Section 1 of the Regulations is amended by adding the following after subsection (1):

(2) Every reference in these Regulations to column 1, 2, 3 or 4 of Schedule 4 shall be read as

(a) a reference to column 1, 2, 3 or 4 of Table 1 of Schedule 4, in the case of a mine to which subparagraph 4(1)(a)(i) applies; or

(b) a reference to column 1, 2, 3 or 4 of Table 2 of Schedule 4, in the case of a mine to which subparagraph 4(1)(a)(ii) applies.

— SOR/2018-99, ss. 3(2), (3)

3 (2) Section 3 of the Regulations is amended by striking out "and" at the end of paragraph (g), by adding "and" at the end of paragraph (h) and by adding the following after paragraph (h):

(i) un-ionized ammonia.

(3) Paragraph 4(1)(a) of the Regulations is replaced by the following:

(a) the concentration of the deleterious substance in the effluent does not exceed the maximum authorized concentrations that are set out in columns 2, 3 and 4 of

(i) Table 1 of Schedule 4, in the case of a mine in respect of which these Regulations apply for the first time on or after June 1, 2021 or in the case of a recognized closed mine that returns to commercial operation on or after June 1, 2021, or

(ii) Table 2 of Schedule 4, in any other case;

— SOR/2018-99, s. 4

4 The Regulations are amended by adding the following after section 4:

MODIFICATIONS NON EN VIGUEUR

— DORS/2018-99, par. 2(4)

2 (4) La définition de *létalité aiguë*, au paragraphe 1(1) du même règlement, est modifiée par adjonction, après l'alinéa b), de ce qui suit :

c) plus de 50 % des *Daphnia magna* qui y sont exposées pendant une période de quarante-huit heures au cours de l'essai de détermination de la létalité aiguë visé à l'article 14.3.

— DORS/2018-99, par. 2(6)

2 (6) L'article 1 du même règlement est modifié par adjonction, après le paragraphe (1), de ce qui suit :

(2) Tout renvoi à la colonne 1, 2, 3 ou 4 de l'annexe 4 dans le présent règlement constitue un renvoi :

a) dans le cas d'une mine à laquelle s'applique le sous-alinéa 4(1)a)(i), à la colonne 1, 2, 3 ou 4 du tableau 1 de l'annexe 4;

b) dans le cas d'une mine à laquelle s'applique le sous-alinéa 4(1)a)(ii), à la colonne 1, 2, 3 ou 4 du tableau 2 de l'annexe 4.

— DORS/2018-99, par. 3(2) et (3)

3 (2) L'article 3 du même règlement est modifié par adjonction, après l'alinéa h), de ce qui suit :

i) l'ammoniac non ionisé.

(3) L'alinéa 4(1)a) du même règlement est remplacé par ce qui suit :

a) la concentration de la substance nocive dans l'effluent ne dépasse pas les concentrations maximales permises qui sont établies aux colonnes 2, 3 et 4 :

(i) du tableau 1 de l'annexe 4, dans le cas d'une mine à l'égard de laquelle le présent règlement s'applique pour la première fois le 1er juin 2021 ou après cette date ou d'une une mine reconnue fermée dont l'exploitation commerciale a repris le 1er juin 2021 ou après cette date,

(ii) du tableau 2 de l'annexe 4, dans tous les autres cas;

— DORS/2018-99, art. 4

4 Le même règlement est modifié par adjonction, après l'article 4, de ce qui suit :

4.1 Paragraph 4(1)(c) does not apply in the case where the effluent is determined to be acutely lethal in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14 when the owner or operator of a mine is testing at the frequency prescribed in subsection 14(1), unless the effluent is determined to be acutely lethal in accordance with any other acute lethality test.

— SOR/2018-99, ss. 9(2) to (4)

9 (2) Subsection 12(1) of the Regulations is replaced by the following:

12 (1) The owner or operator of a mine shall, not less than once per week and at least 24 hours apart, collect from each final discharge point

(a) a grab sample or composite sample of effluent and record the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of the deleterious substances prescribed in section 3 except un-ionized ammonia; and

(b) a grab sample of effluent and record the temperature and the pH of the sample at the time of its collection and record, without delay after collecting the sample, the concentrations of total ammonia expressed as nitrogen (N).

(3) Section 12 of the Regulations is amended by adding the following after subsection (3):

(4) The owner or operator of a mine shall determine and record the concentration of un-ionized ammonia, using the temperature, pH and concentration of total ammonia recorded under paragraph (1)(b), in accordance with the following formula:

$$A\ (1/(1 + 10^{pKa-pH}))$$

where

A is the concentration of total ammonia — which is the sum of un-ionized ammonia (NH_3) and ionized ammonia (NH_4^+) — expressed in mg/L as nitrogen (N);

pH is the pH of the effluent sample; and

pKa is a dissociation constant calculated in accordance with the following formula:

$$0.09018 + 2729.92/T$$

where

T is the temperature of the effluent sample in kelvin.

(4) Subsection 13(1) of the Regulations is replaced by the following:

13 (1) The owner or operator of a mine may reduce the frequency of conducting tests relating to the concentrations of arsenic, copper, cyanide, lead, nickel, zinc or un-ionized ammonia at a final discharge point to not less than once in each calendar quarter, each test being conducted at least one

4.1 L'alinéa 4(1)c) ne s'applique pas s'il est déterminé que l'effluent présente une létalité aiguë conformément aux modes opératoires visés aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14, lorsque le propriétaire ou l'exploitant d'une mine effectue l'essai à la fréquence prévue au paragraphe 14(1) à moins qu'un autre essai de détermination de la létalité aiguë indique que l'effluent présente une létalité aiguë.

— DORS/2018-99, par. 9(2) à (4)

9 (2) Le paragraphe 12(1) du même règlement est remplacé par ce qui suit :

12 (1) Au moins une fois par semaine et à au moins vingt-quatre heures d'intervalle, le propriétaire ou l'exploitant d'une mine prélève, à partir de chaque point de rejet final :

a) un échantillon instantané ou un échantillon composite d'effluent dont il enregistre le pH au moment du prélèvement, ainsi que, sans délai après celui-ci, les concentrations des substances nocives désignées à l'article 3, à l'exception de l'ammoniac non ionisé;

b) un échantillon instantané d'effluent dont il enregistre la température et le pH au moment du prélèvement, ainsi que, sans délai après celui-ci, la concentration d'ammoniac total sous forme d'azote (N).

(3) L'article 12 du même règlement est modifié par adjonction, après le paragraphe (3), de ce qui suit :

(4) Le propriétaire ou l'exploitant d'une mine calcule et enregistre la concentration d'ammoniac non ionisé selon la formule ci-après, en utilisant la température, le pH et la concentration d'ammoniac total enregistré en application de l'alinéa (1)b) :

$$A\ (1/(1 + 10^{pKa-pH}))$$

où :

A représente la concentration d'ammoniac total — soit l'ammoniac non ionisé (NH_3) et l'ammoniac ionisé (NH_4^+) — exprimée en mg/L et sous forme d'azote (N);

pH le pH de l'échantillon d'effluent;

pKa la constante de dissociation calculée selon la formule suivante :

$$0,09018 + 2729,92/T$$

où :

T représente la température de l'échantillon d'effluent en kelvin.

(4) Le paragraphe 13(1) du même règlement est remplacé par ce qui suit :

13 (1) Le propriétaire ou l'exploitant d'une mine peut, à un point de rejet final, réduire la fréquence des essais concernant la concentration d'arsenic, de cuivre, de cyanure, de plomb, de nickel, de zinc ou d'ammoniac non ionisé à au moins une fois par trimestre civil, chaque essai étant effectué à au moins

month apart, if that substance's monthly mean concentration at that final discharge point is less than 10% of the value set out in column 2 of Schedule 4 for 12 consecutive months.

— SOR/2018-99, ss. 10(2), (3)

10 (2) Subsection 14(1) of the Regulations is replaced by the following:

14 (1) Subject to section 15, the owner or operator of a mine shall collect, once a month, a grab sample of effluent from each final discharge point and determine whether the effluent is acutely lethal by conducting acute lethality tests on aliquots of each effluent sample in accordance with sections 14.1 to 14.3.

(3) Subsection 14(3) of the Regulations is replaced by the following:

(3) When collecting a grab sample of effluent for the purposes of subsection (1), the owner or operator of a mine shall

(a) collect a sufficient volume of effluent to enable the owner or operator to comply with paragraph 15(1)(a); and

(b) record the temperature and the pH of each grab sample of effluent at the time of the sample's collection.

— SOR/2018-99, s. 11

11 The Regulations are amended by adding the following after section 14.2:

Acute Lethality Test — *Daphnia Magna*

14.3 Unless the salinity value of the effluent is equal to or greater than four parts per thousand and the effluent is deposited into marine waters, the owner or operator of a mine shall, in addition to conducting the acute lethality test set out in section 14.1, determine whether the effluent is acutely lethal by conducting an acute lethality test in accordance with the procedures set out in section 5 or 6 of Reference Method EPS 1/RM/14.

— SOR/2018-99, s. 12(2)

12 (2) Paragraphs 15(1)(a) and (b) of the Regulations are replaced by the following:

(a) without delay,

(i) conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample collected under subsection 14(1),

(ii) record the concentration of total ammonia and, using that concentration and using the temperature and pH recorded under paragraph 14(3)(b), determine the

un mois d'intervalle, si la concentration moyenne mensuelle de la substance à ce point de rejet final est inférieure à 10 % de la valeur établie à la colonne 2 de l'annexe 4 pendant douze mois consécutifs.

— DORS/2018-99, par. 10(2) et (3)

10 (2) Le paragraphe 14(1) du même règlement est remplacé par ce qui suit :

14 (1) Sous réserve de l'article 15, le propriétaire ou l'exploitant d'une mine prélève une fois par mois un échantillon instantané d'effluent à chaque point de rejet final et détermine si cet effluent présente une létalité aiguë en effectuant des essais de détermination de la létalité aiguë sur des portions aliquotes de chaque échantillon conformément aux articles 14.1 à 14.3.

(3) Le paragraphe 14(3) du même règlement est remplacé par ce qui suit :

(3) Lors du prélèvement des échantillons instantanés en application du paragraphe (1), le propriétaire ou l'exploitant d'une mine :

a) prélève un volume d'effluent suffisant pour lui permettre de se conformer à l'alinéa 15(1)a);

b) enregistre, au moment du prélèvement, la température et le pH de chaque échantillon.

— DORS/2018-99, art. 11

11 Le même règlement est modifié par adjonction, après l'article 14.2, de ce qui suit :

Essai de détermination de la létalité aiguë — *Daphnia magna*

14.3 Sauf dans le cas où la salinité de l'effluent est égale ou supérieure à quatre parties par millier et que l'effluent est rejeté dans l'eau de mer, le propriétaire ou l'exploitant d'une mine détermine si l'effluent présente une létalité aiguë en effectuant, en plus de l'essai de détermination de la létalité aiguë prévu à l'article 14.1, un essai de détermination de la létalité aiguë conformément aux modes opératoires prévus aux sections 5 ou 6 de la méthode de référence SPE 1/RM/14.

— DORS/2018-99, par. 12(2)

12 (2) Les alinéas 15(1)a) et b) du même règlement sont remplacés par ce qui suit :

a) sans délai :

(i) effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané prélevé en application du paragraphe 14(1),

(ii) enregistre la concentration d'ammoniac total et, au moyen de cette concentration et de la température et du

concentration of un-ionized ammonia in accordance with the formula set out in subsection 12(4), and

(iii) record the concentrations of the deleterious substances prescribed in section 3;

(b) collect a grab sample twice a month from the final discharge point from which the effluent sample determined to be acutely lethal was collected, record the temperature and the pH of each sample at the time of its collection and, without delay, conduct the acute lethality test that determined the effluent sample to be acutely lethal on each grab sample in accordance with the procedure set out in section 6 of the applicable reference method and, if the sample is determined to be acutely lethal, without delay,

(i) conduct the effluent characterization set out in subsection 4(1) of Schedule 5 on the aliquot of each grab sample,

(ii) record the concentration of total ammonia and, using that concentration and using the temperature and pH recorded under this paragraph, determine the concentration of un-ionized ammonia in accordance with the formula set out in subsection 12(4), and

(iii) record the concentrations of the deleterious substances prescribed in section 3; and

pH enregistrés en application de l'alinéa 14(3)b), calcule la concentration d'ammoniac non ionisé selon la formule prévue au paragraphe 12(4),

(iii) enregistre les concentrations des substances nocives désignées à l'article 3;

b) deux fois par mois, prélève un échantillon instantané à partir du point de rejet final d'où l'échantillon d'effluent qui présente une létalité aiguë a été prélevé, enregistre, au moment du prélèvement, la température et le pH de chaque échantillon, et effectue sans délai après le prélèvement, sur chacun de ces échantillons, selon le mode opératoire prévu à la section 6 de la méthode de référence, l'essai de détermination de la létalité aiguë à partir duquel la létalité aiguë de l'échantillon a été établie. S'il est ainsi établi que l'échantillon présente une létalité aiguë, le propriétaire ou l'exploitant d'une mine, sans délai :

(i) effectue la caractérisation de l'effluent conformément au paragraphe 4(1) de l'annexe 5 sur une portion aliquote de chaque échantillon instantané,

(ii) enregistre la concentration d'ammoniac total et, au moyen de cette concentration et de la température et du pH enregistrés en application du présent alinéa, calcule la concentration d'ammoniac non ionisé selon la formule prévue au paragraphe 12(4),

(iii) enregistre les concentrations des substances nocives désignées à l'article 3;

— SOR/2018-99, s. 13

13 The Regulations are amended by adding the following after section 15:

15.1 Despite paragraph 15(1)(c), if an effluent sample is determined to be acutely lethal when tested using the acute lethality test set out in section 14.3, the owner or operator of a mine shall, without delay, collect the first grab sample required by paragraph 15(1)(b) and comply with the requirements of that paragraph.

— DORS/2018-99, art. 13

13 Le même règlement est modifié par adjonction, après l'article 15, de ce qui suit :

15.1 Malgré l'alinéa 15(1)c), s'il est établi qu'un échantillon d'effluent présente une létalité aiguë après l'essai de détermination de la létalité aiguë prévu à l'article 14.3, le propriétaire ou l'exploitant d'une mine prélève sans délai le premier échantillon instantané exigé par l'alinéa 15(1)b) et se conforme aux exigences de cet alinéa.

— SOR/2018-99, s. 15(2)

15 (2) Section 17 of the Regulations and the heading before it are repealed.

— DORS/2018-99, par. 15(2)

15 (2) L'article 17 du même règlement et l'intertitre le précédant sont abrogés.

— SOR/2018-99, s. 16(2)

16 (2) Section 18 of the Regulations is replaced by the following:

18 The owner or operator of a mine shall record without delay the data referred to in section 9.1 of Reference Method EPS 1/RM/10, section 8.1 of Reference Method EPS 1/RM/13 and section 8.1 of Reference Method EPS 1/RM/14 for all acute lethality tests that are conducted to monitor deposits from final discharge points.

— DORS/2018-99, par. 16(2)

16 (2) L'article 18 du même règlement est remplacé par ce qui suit :

18 Le propriétaire ou l'exploitant d'une mine enregistre sans délai les données visées à la section 9.1 de la méthode de référence SPE 1/RM/10, à la section 8.1 de la méthode de référence SPE 1/RM/13 et à la section 8.1 de la méthode de référence SPE 1/RM/14 pour tous les essais de détermination de la létalité aiguë effectués dans le cadre du suivi des rejets provenant de points de rejet final.

— SOR/2018-99, s. 18(2)

18 (2) Paragraph 19.1(1)(a) of the Regulations is replaced by the following:

(a) in mg/L for deleterious substances referred to in paragraphs 3(a) to (g) and (i); and

— SOR/2018-99, s. 19(2)

19 (2) Paragraph 20(1)(a) of the Regulations is replaced by the following:

(a) in kg for deleterious substances referred to paragraphs 3(a) to (g) and (i); and

— SOR/2018-99, s. 27(2)

27 (2) Subsection 31.1(1) of the Regulations is replaced by the following:

31.1 (1) If an unauthorized deposit of a deleterious substance occurs, the owner or operator of a mine shall, without delay, collect a grab sample of effluent at the place where the deposit occurred and determine whether the effluent is acutely lethal by conducting tests on aliquots of each effluent sample in accordance with sections 14.1 to 14.3.

— SOR/2018-99, s. 32(2)

32 (2) Schedule 4 to the Regulations is replaced by the Schedule 4 set out in Schedule 2 to these Regulations.

SCHEDULE 4

(Subsection 1(2), subparagraphs 4(1)(a)(i) and (ii), subsection 13(1), paragraph 13(3)(a), subparagraph 22(c)(i) and paragraph 24(1)(a))

Maximum Authorized Concentrations of Prescribed Deleterious Substances

TABLE 1

Item	Column 1 Deleterious Substance	Column 2 Maximum Authorized Monthly Mean Concentration	Column 3 Maximum Authorized Concentration in a Composite Sample	Column 4 Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.10 mg/L	0.15 mg/L	0.20 mg/L
2	Copper	0.10 mg/L	0.15 mg/L	0.20 mg/L
3	Cyanide	0.50 mg/L	0.75 mg/L	1.00 mg/L

— DORS/2018-99, par. 18(2)

18 (2) L'alinéa 19.1(1)a) du même règlement est remplacé par ce qui suit :

a) la concentration moyenne mensuelle en mg/L des substances nocives énumérées aux alinéas 3a) à g) et i);

— DORS/2018-99, par. 19(2)

19 (2) L'alinéa 20(1)a) du même règlement est remplacé par ce qui suit :

a) la charge en kg des substances nocives énumérées aux alinéas 3a) à g) et i);

— DORS/2018-99, par. 27(2)

27 (2) Le paragraphe 31.1(1) du même règlement est remplacé par ce qui suit :

31.1 (1) En cas de rejet non autorisé d'une substance nocive, le propriétaire ou l'exploitant d'une mine prélève sans délai un échantillon instantané d'effluent sur les lieux du rejet non autorisé et détermine si cet effluent présente une létalité aiguë en effectuant des essais conformément aux articles 14.1 à 14.3, sur des portions aliquotes de chaque échantillon d'effluent prélevé.

— DORS/2018-99, par. 32(2)

32 (2) L'annexe 4 du même règlement est remplacée par l'annexe 4 figurant à l'annexe 2 du présent règlement.

ANNEXE 4

(paragraphe 1(2), sous-alinéas 4(1)a)(i) et (ii), paragraphe 13(1), alinéa 13(3)a), sous-alinéa 22c)(i) et alinéa 24(1)a))

Concentrations maximales permises des substances nocives désignées

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
4	Lead	0.08 mg/L	0.12 mg/L	0.16 mg/L
5	Nickel	0.25 mg/L	0.38 mg/L	0.50 mg/L
6	Zinc	0.40 mg/L	0.60 mg/L	0.80 mg/L
7	Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L
9	Un-ionized ammonia	0.50 mg/L expressed as nitrogen (N)	Not applicable	1.00 mg/L expressed as nitrogen (N)

TABLEAU 1

	Colonne 1	Colonne 2	Colonne 3	Colonne 4
Article	Substance nocive	Concentration moyenne mensuelle maximale permise	Concentration maximale permise dans un échantillon composite	Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,10 mg/L	0,15 mg/L	0,20 mg/L
2	Cuivre	0,10 mg/L	0,15 mg/L	0,20 mg/L
3	Cyanure	0,50 mg/L	0,75 mg/L	1,00 mg/L
4	Plomb	0,08 mg/L	0,12 mg/L	0,16 mg/L
5	Nickel	0,25 mg/L	0,38 mg/L	0,50 mg/L
6	Zinc	0,40 mg/L	0,60 mg/L	0,80 mg/L
7	Matières en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L
9	Ammoniac non ionisé	0,50 mg/L sous forme d'azote (N)	Sans objet	1,00 mg/L sous forme d'azote (N)

NOTE: The concentrations for items 1 to 8 are total values.

NOTE : Les concentrations pour les articles 1 à 8 sont des valeurs totales.

TABLE 2

	Column 1	Column 2	Column 3	Column 4
Item	Deleterious Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
1	Arsenic	0.30 mg/L	0.45 mg/L	0.60 mg/L
2	Copper	0.30 mg/L	0.45 mg/L	0.60 mg/L
3	Cyanide	0.50 mg/L	0.75 mg/L	1.00 mg/L
4	Lead	0.10 mg/L	0.15 mg/L	0.20 mg/L

Item	Column 1 Deleterious Substance	Column 2 Maximum Authorized Monthly Mean Concentration	Column 3 Maximum Authorized Concentration in a Composite Sample	Column 4 Maximum Authorized Concentration in a Grab Sample
5	Nickel	0.50 mg/L	0.75 mg/L	1.00 mg/L
6	Zinc	0.50 mg/L	0.75 mg/L	1.00 mg/L
7	Suspended Solids	15.00 mg/L	22.50 mg/L	30.00 mg/L
8	Radium 226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L
9	Un-ionized ammonia	0.50 mg/L expressed as nitrogen (N)	Not applicable	1.00 mg/L expressed as nitrogen (N)

TABLEAU 2

Article	Colonne 1 Substance nocive	Colonne 2 Concentration moyenne mensuelle maximale permise	Colonne 3 Concentration maximale permise dans un échantillon composite	Colonne 4 Concentration maximale permise dans un échantillon instantané
1	Arsenic	0,30 mg/L	0,45 mg/L	0,60 mg/L
2	Cuivre	0,30 mg/L	0,45 mg/L	0,60 mg/L
3	Cyanure	0,50 mg/L	0,75 mg/L	1,00 mg/L
4	Plomb	0,10 mg/L	0,15 mg/L	0,20 mg/L
5	Nickel	0,50 mg/L	0,75 mg/L	1,00 mg/L
6	Zinc	0,50 mg/L	0,75 mg/L	1,00 mg/L
7	Matières en suspension	15,00 mg/L	22,50 mg/L	30,00 mg/L
8	Radium 226	0,37 Bq/L	0,74 Bq/L	1,11 Bq/L
9	Ammoniac non ionisé	0,50 mg/L sous forme d'azote (N)	Sans objet	1,00 mg/L sous forme d'azote (N)

NOTE: The concentrations for items 1 to 8 are total values.

NOTE : Les concentrations pour les articles 1 à 8 sont des valeurs totales.

— SOR/2018-99, ss. 33(2), (3)

33 (2) Schedule 5 to the Regulations is amended by replacing the references after the heading "Schedule 5" with the following:

(Subsections 7(1) and (3), subparagraphs 15(1)(a)(i) and (b)(i) and paragraph 32(1)(c))

(3) Subsection 4(1) of Schedule 5 to the Regulations is amended by adding "and" at the end of paragraph (n), by striking out "and" at the end of paragraph (o) and by repealing paragraph (p).

— DORS/2018-99, par. 33(2) et(3)

33 (2) Les renvois qui suivent le titre « Annexe 5 », à l'annexe 5 du même règlement, sont remplacés par ce qui suit :

(paragraphes 7(1) et (3), sous-alinéas 15(1)a)(i) et b)(i) et alinéa 32(1)c))

(3) L'alinéa 4(1)p) de l'annexe 5 du même règlement est abrogé.

— SOR/2018-99, s. 34(1)

34 (1) Part 2 of Schedule 6 to the Regulations is replaced by the following:

PART 2

Test Results Respecting Each Final Discharge Point

1 Complete the following table with the monthly mean concentration for the deleterious substances set out in the table for each final discharge point and identify the location of the final discharge point.

2 Any measurement not taken because there was no deposit from the final discharge point shall be identified by the letters "NDEP" (No Deposit).

3 Any measurement not taken because no measurement was required in accordance with the conditions set out in section 12 or 13 of these Regulations shall be identified by the letters "NMR" (No Measurement Required).

— DORS/2018-99, par. 34(1)

34 (1) La partie 2 de l'annexe 6 du même règlement est remplacée par ce qui suit :

PARTIE 2

Résultats des essais à chacun des points de rejet final

1 Remplir le tableau suivant pour chaque point de rejet final, identifier son emplacement et indiquer la moyenne mensuelle de la concentration des substances nocives.

2 S'il n'y a pas eu de résultats parce qu'il n'y avait pas de rejet à partir du point de rejet final, inscrire « A.R. » (aucun rejet).

3 S'il n'y a pas eu de mesure parce que l'article 12 ou 13 du présent règlement n'en exigeait aucune, inscrire « A.M.E. » (aucune mesure exigée).

Location of final discharge point:												
Month	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	SS (mg/L)	Ra 226 (Bq/L)	Un-ionized ammonia (mg/L, expressed as Nitrogen (N))	Lowest pH	Highest pH	Effluent Volume (m^3)
Jan.												
Feb.												
Mar.												
Apr.												
May												
June												
July												
Aug.												
Sept.												
Oct.												
Nov.												
Dec.												

Emplacement du point de rejet final :												
Mois	As (mg/L)	Cu (mg/L)	CN (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)	SS (mg/L)	Ra 226 (Bq/L)	Ammoniac non ionisé (mg/L sous forme d'azote (N))	pH le plus bas	pH le plus haut	Volume d'effluent (m^3)
Janv.												
Févr.												
Mars												
Avr.												
Mai												
Juin												
Juil.												
Août												
Sept.												
Oct.												
Nov.												
Déc.												

— SOR/2018-99, s. 34(3)

34 (3) Part 3 of Schedule 6 to the Regulations is replaced by the following:

— DORS/2018-99, par. 34(3)

34 (3) La partie 3 de l'annexe 6 du même règlement est remplacée par ce qui suit :

PART 3

Results of Acute Lethality Tests

Location of final discharge point:			
Date Sample Collected	Results for Rainbow Trout Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for *Daphnia magna* Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)	Results for Threespine Stickleback Acute Lethality Tests (mean percentage mortality in 100% effluent test concentration)

PARTIE 3

Résultats des essais de détermination de la létalité aiguë

Emplacement du point de rejet final :			
Date du prélèvement de l'échantillon	Résultats des essais de détermination de la létalité aiguë sur la truite arc-en-ciel (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de détermination de la létalité aiguë sur la *Daphnia magna* (pourcentage moyen de mortalité dans l'effluent non dilué)	Résultats des essais de détermination de la létalité aiguë sur l'épinoche à trois épines (pourcentage moyen de mortalité dans l'effluent non dilué)

APPENDIX C
EMERGENCY RESPONSE TRUCK INVENTORY

Baffinland

Rescue EMG-005

Equipment checklist **Date:** **Time:** **Inspector:**

N/A - Not Applicable

Compartment	Items		Yes	Condition	Full	Empty	Tested	Comments
Cabin		**Sat Phone**						**Check Battery level**
	1	Safety Glasses clear box						
	1	Safety glasses Darks box						
	1	Binoculars						
	1	Rolls of duck tape						
	2	Care Flare						
	1	Emergency Road kit						
	1	First Aid kit						
	1	Thermal Imaging Camera						**Change with spare battery**
	4	Eyewash						
	1	10 pound fire extinguisher						
1 Left Compartment	**7**	5 Delta Air, 2 Scott 2.2						
	17	SCBA Cylinder						
	21	SCBA face Masks (straps extended)						
	1	Piercing Nozzle with Shut Off						
	1	Red Rope (coil)						
	1	Rit Pack						
	10	Banks Pelican flashlights						
2 Left Compartment	**1**	Step Ladder						
	1	Skill Saw, 1 blade						
	1	Cable Power Puller						
	1	Saws all (reciprocating saw)						
	1	Saws all Blades (kits)						
	3	Drill Bits set						
	1	Cordless drill						
	1	Tape measure						
	1	Socket Set						9mm socket missing
	1	Wrench Set (in tool box)						
	2	Boxes of 30' socks						
	1	roll mech wire						
	1	Tool Box with assorted tools						
	1	Large Bolt Cutters						
	3	Battery Charger						
	8	Batteries Dewalt						
	2	Battery Milwakee						
	1	Charger & battery TIC						
	1	Safety Glasses (box) Assorted						
	1	Small Axe						
	1	Small Bolt Cutters						
	1	Haligan Bar						
	2	Axe						
	2	Pick Head Axe						
	1	Fire Pole						
	1	Steel Jerry can (gas)						
	1	Plastic Jerry Can (gas)						
	1	portable Fan						**Start and run for 5 min**
	1	Yellow rope (spool)						
		Miscellaneous Oils						
	2	Chop Saw Blade						
	1	Power pack for Jaws of Life						**Start and run for 5 min**
	1	Chain Saw chain						
	1	Duck Tape						
	1	Red Cordless Drill/Charger/Batteries						
3 Left Compartment	**1**	Portable Fan (electric)						
	2	Tarps						
	3	Ratchet Straps						
	1	Air Hammer						
	1	20 ton bottle jack						
	3	Hurst Tool Hose						

	1	Spreader						
	1	Cutter						
	1	Combi Tool						
	1	Ram						
	1	Gloves						
	1	Regulator Assembly						
	2	Air Hoses						
	1	32" Air bag						
	1	13" Air Bag						
	1	1/2 air impact						
	1	80 ton Air bag						
	2	Grizzly Struts						
		Assorted Cribbing						
4 Left Compartment	2	1.5 inch hose (yellow)						
	4	1.5 inch hose (red)						
	3	2.5 inch hose (white)						
	4	2.5 inch hose (red)						
	6	Mustang suits						
	1	Spanners						
	4	1.5 inch nozzle						
	1	3 inch adapter 2.5"						
	1	1.5" plastic Nozzle						
	2	10 lbs. extinguisher						
	1	6" connector pipe for portatanks						
	1	Rolligliss 550						
		Wood (cribbing)						
	1	Chainsaw						**Start and run for 5 min**
	1	Rescue Saw						**Start and run for 5 min**
	2	20lbs fire extinguisher						
5 Left Compartment	6	Exo Fit harness						
	1	Rollglis R 550						
	6	Self Inflatable Life vests						
	4	Boots (pairs) (Hip waiters)						
	3	Rescue rope (200 foot bags)						
	1	Tripod straps and pullies (bag)Top of ARFF						
	4	Climbing harness						
	3	Petzl AVAO Harness						
	1	Edge covers (bag)						
	8	Rock climbing helmet						
	1	Rescue ring						
	1	Life jackets (bag) of 4						
	9	Air horn						
	1	Kovak Ice drillkit						
	1	Bag assorted webbing straps						
	2	Mini 4:1						
	3	Bags of Caribiner						
	1	Bag Prusick						
	1	Pelican case Assorted High angle rescue gear						
	2	Assender kits						
	4	Pylons						
	2	Beam Clamps						
	1	Rope Launcher						
	2	400' rope bags						
	2	Confined space SCBA (Black case						
	5	6' lanyard						
	2	Telescopic reach pole						
1 Right Compartment	16	Orange blankets						
	1	Kendrick Extrication Device (KED)						
	8	Folding stretchers						
	1	White plastic rigid Leg splint						
	8	Safety vests						
	4	Misc. rigid splints (sets) (orange bag)						
	1	6 Bank Radio Charger (5 batterys)						
	1	Ferno Stair chair						
	2	Spider Straps						
	1	Burn kit						
	2	Neck brace						
	5	Quick connect straps (back board)						
	3	Trauma bag (red)						**Check Expiry Data (Burn Kits, Sterile water)**
	4	CID blocks (orange)						
	2	Flashlights (Box) MAG lites						
	1	Incident Command Board						

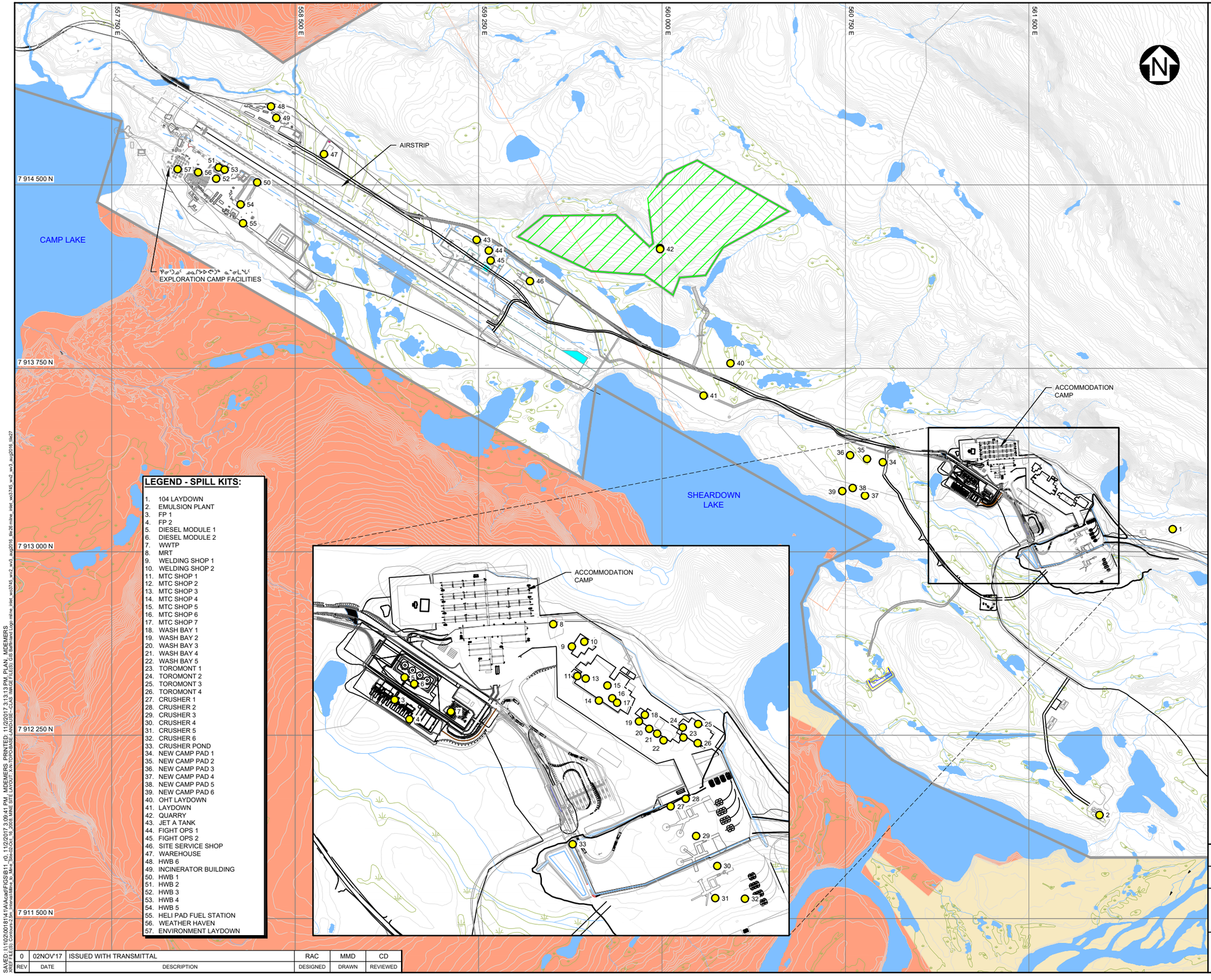
	3	Roll Caution tape						
	3	Roll Danger tape						
	1	SKED						
	1	SCBA Mask cleaning wipes						
	1	Bag stretcher cover						
	1	Nutragrain bars						
	2	Basket Stretcher kits (complete)						
2 Right Compartment	**1**	Empty Cube Totes						
	1	6" tube for portable tank						
		Diaphragm pump (Hoses)						
3 Right Compartment	**3**	Quatrex bags (white)						
	2	Lithium fire extinguisher						
	2	Magnesium fire extinguisher						
	4	Grey spill pads						
	4	12x 18 tarp						
	2	Boxes of 30' sock						
	2	Backboard						
	1	Water bottle/sleeve cups						
	9	coveralls						
	1	4 white spill pads						
4 Right Compartment	**1**	1000 VSG Bladder						
	1	5000 VSG Bladder						
	1	15000 VSG Bladder						
	5	Quatrex bags (black)						
	3	Bladder repair kits						
	1	4X4 duck pond						
	2	Box 30' spill boom						
	3	Bladder fitting kit						
5 Right Compartment	**1**	Spade						
	2	Mass Casualty Kits						**Check Expiry Data (Burn Kits, Sterile water)**
	2	Rake						
	1	Push broom						
	2	Shovel (square head)						
	2	Chicken wire (roll)						
	12	Long gloves (pair)						
	6	Extension cord						
	1	Honda GX 270 trash pump						**Start and run for 5 min**
	1	3 inch flat hose						
	3	Tyvek coveralls (box)						
	1	Funnel						
	1	Gap seal; 20 L bucket (plug agent)						
	1	Scoop						
	3	3 inch x 10 foot spill booms (box)						
	4	Cones						
	2	Dumpster liners						
	1	Box of Garbage bags						
	3	Spill pads white						
	1	Honda generator						**Start and run for 5 min**
	4	spill pads Grey						

MRT Emergency Response Truck

Right Side:

Left Side:

APPENDIX D
MINE SITE SPILL KIT INVENTORY AND LOCATIONS



LEGEND - SPILL KITS:

1. 104 LAYDOWN
2. EMULSION PLANT
3. FP 1
4. FP 2
5. DIESEL MODULE 1
6. DIESEL MODULE 2
7. WWTP
8. MRT
9. WELDING SHOP 1
10. WELDING SHOP 2
11. MTC SHOP 1
12. MTC SHOP 2
13. MTC SHOP 3
14. MTC SHOP 4
15. MTC SHOP 5
16. MTC SHOP 6
17. MTC SHOP 7
18. WASH BAY 1
19. WASH BAY 2
20. WASH BAY 3
21. WASH BAY 4
22. WASH BAY 5
23. TOROMONT 1
24. TOROMONT 2
25. TOROMONT 3
26. TOROMONT 4
27. CRUSHER 1
28. CRUSHER 2
29. CRUSHER 3
30. CRUSHER 4
31. CRUSHER 5
32. CRUSHER 6
33. CRUSHER POND
34. NEW CAMP PAD 1
35. NEW CAMP PAD 2
36. NEW CAMP PAD 3
37. NEW CAMP PAD 4
38. NEW CAMP PAD 5
39. NEW CAMP PAD 6
40. OHT LAYDOWN
41. LAYDOWN
42. QUARRY
43. JET A TANK
44. FIGHT OPS 1
45. FIGHT OPS 2
46. SITE SERVICE SHOP
47. WAREHOUSE
48. HWB 6
49. INCINERATOR BUILDING
50. HWB 1
51. HWB 2
52. HWB 3
53. HWB 4
54. HWB 5
55. HELI PAD FUEL STATION
56. WEATHER HAVEN
57. ENVIRONMENT LAYDOWN

LEGEND:

- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- WATER
- QUARRY AREA (EXISTING UNDER Q13C301)
- RIVER/STREAM/DRAINAGE
- ROAD
- QIA SURFACE COMMERCIAL LEASE BOUNDARY
- SPILL KIT LOCATION

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, AND 2017.
4. CONTOUR INTERVAL IS 2.5 METRES.

SCALE A 150 75 0 250 500 750 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	02NOV'17	ISSUED WITH TRANSMITTAL	RAC	MMD	CD

Baffinland

MARY RIVER PROJECT

MINE SITE SPILL KIT LOCATIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/41	NB17-00729

FIGURE 2 REV 0

Inventory of Typical Spill Kits	
Amount	**Description**
1	30 Gallon Drum with Lid
50	Sorbent Pads
4	Sorbent Socks
2	Sorbent Booms
1	Shaker of Safety Sorb
1	Neoprene Drain Cover
1	Disposable Bag
2 Pair	Safety Goggles
2 Pair	Nitrile Gloves

* Best efforts are made to ensure spill kits remain fully stocked at their designated locations.

APPENDIX E
NT-NU SPILL REPORT FORM

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 **06-20-2018**	REPORT TIME **19:00**	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **18 - 244**
B	OCCURRENCE DATE: MONTH – DAY – YEAR **06-19-2018**	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 **20** SECONDS **38**	LONGITUDE DEGREES **79** MINUTES **14** SECONDS **19**
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 **Surface Water**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantifiable**	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 **Waste Rock Stockpile**	SPILL CAUSE **High overland flow**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Drainage to tundra**	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

On June 19th, Environmental personnel monitoring the Waste Rock Stockpile Pond (MS-08), observed water seeping out of the west drainage ditch. The seepage was tested and determined to have pH levels below 6.0. The capacity of the drainage ditch was increased to eliminate pooling within ditch and seepage contained. The perimeter emergency ditch was also extended to contain seepage runoff. Preliminary testing indicates impacted water was in the immediate vicinity of the waste rock stockpile. Water quality monitoring results and corrective actions will be presented in the follow-up report. The seepage occurred on IOL located > 3 km from nearest fish bearing water. This spill is being reported as required by the conditions of water license no. 2AM-MRY1325, Part H , item 9(b); under the Fisheries Act as required by section 31 of the Metal Mining Effluent Regulations; and as required by the Government of Nunavut's, Environmental Protection Act paragraph 5.1(a).

L	REPORTED TO SPILL LINE BY **Connor Devereaux**	POSITION **Env. Superintendent**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **416-364-8820**	TELEPHONE **ext. 6016**
M	ANY ALTERNATE CONTACT **Tim Sewell**	POSITION **Head of Environment**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **416-364-8820**	ALTERNATE TELEPHONE **ext. 6054**

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 F
WASTE POND WATER TREATMENT PLANT OPERATIONS

Baffinland Iron Mines Corporation

Waste Pond Water Treatment Plant Operations

Rev 1.0

Prepared By: Chet Fong
Department: Mine Operations
Title: Senior Mining Engineer
Date: 17/08/2018
Signature:

Approved By: Simon Fleury
Department: Mine Operations
Title: Mine Manager
Date: 17/08/2018
Signature: Simon L. Fleury

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
08/17/18	V1.0	CF		Initial

TABLE OF CONTENTS

1 PURPOSE

This document outlines the basic procedure to safely operate the Water Treatment Plant

2 SCOPE

This document will cover the basic operations of the plant, including start up and shut down, monitoring, treatment, and emergency protocols and procedures for at risk activities at the Water Treatment Plant.

2.1 EXEMPTIONS

This document does not include instructions related to water treatment, which can be found in the plant Operations and Maintenance Manual.

3 RESPONSIBILITES

Any visitor shall request permission to the plant operator prior to entering the work area. In the absence of an operator, permission shall be requested to the mine supervisor.

The Plant operator shall ensure that everyone working in the plant wears the requisite PPE according to the activities being performed (e.g. chemical handling).

4 PROCEDURES

The information in this section is intended as a summary of plant operations. In the case of a discrepancy between this document and the Operations and Maintenance Manual, the latter will take precedence.

For full details on design and plant operation, refer to the operator's manual. In standard operations, the WTP is intended to draw water from the Waste Dump Pond and treat the intake water in 3 steps inside the WTP structure. The water is then discharged to a Geotube Settling Pond, where a fourth treatment step of settlement will occur, before water is either discharged into the environment or, if not compliant, recirculated back to the Waste Dump Pond.

The three steps of treatment involve the injection of chemical into temporary storage tanks.

- Step 1 – Iron Precipitation
- Step 2 – Hydroxide Precipitation and pH Adjustment

- Step 3 – Flocculation
- Step 4 - Filtration

Steps 1-3 occur inside the WTP structure, with the 4th step taking place in the Geotube Settling Pond.

4.1 PLANT OPERATIONS

Plant operations consists primarily of managing flow, dosage and water levels across the pond, sump, and tanks. Flow is managed with a combination of control panel adjustments and manual valve manipulations.

The plant consists of the following components:

1. Intake Pump – pulls water from the Waste Dump Pond into the WTP
2. Onion tanks – water is stored for treatment prior to discharge. There are two trains, which can be run independently or concurrently.
3. Control panel – use to remotely manage pumps – can be set for automatic and manual operations
4. Dosing pumps – use to inject chemical into onion tanks at a fixed rate
5. Dosing tanks – mixing tanks from which chemicals (Lime, Polymer) is depleted at a configurable rate
6. Transfer pumps – used to take treated water from the plant out to the Geotube Pond
7. Geotube Pond – discharge from the plant is deposited here for particulate settlement prior to final discharge.
8. Discharge pump – used to pull treated water from the Geotube Pond to either be discharged into the environment or recirculated back to the Waste Dump Pond.
9. Blower motors – used to agitate water in onion tanks during treatment to ensure more even dispersion of chemicals.

Once the Plant is operational, the operator will commence with monitoring the measured levels of pH and suspended solids with built in instrumentations and gauges. These readings may be corroborated with manual instrumentations such as a YSI meter.

When readings indicate pH readings at the desired values, the operator shall then initiate discharging of water into the Geotube Pond. This water is allowed to percolate through the Geotube, which catches particulates as a filter. Once in the Sump, where any remaining particulates are then captured and settle into the bottom of the pond.

Water is discharged from this Geotube Pond, either directly into the environment or back into the Waste Dump Pond. The maximum flow rate for these discharging is 1200 gal/min, this limit imposed by the flowmeter installed.

At design capacity, the intake pump(s) should be able to pull water into the WTP for treatment at an equal rate to the discharge pump. The plant effectively runs continuously with dosing in-stream.

4.2 Plant Start up

The following steps should be undertaken when starting up the WTP.

1. Ensure blower motors are activated.
2. Ensure all the Valves to the Geotube Sump are open.
3. Ensure the transfer pumps are switched to automatic
4. Check that all the intake valves are open
5. Keep valves open between tanks on each train
6. Start up intake pump and adjust pressure accordingly. To do this, adjust the following:
    a. Rpm of the pump
    b. Valve openings
7. Start Ferric Sulphate Dosing system. Ensure intake is in the Ferric Sulphate barrels, and there are no leaks present. Pumps should be activated.
8. Start Lime Dosing system. Dosing pumps should be activated.
9. Start up Polymer Dosing System. Dosing pumps should be activated

Plant operations can now commence.

4.3 Plant Shut Down

Plant shut down can be undertaken when it is to be unmanned for a longer period of time (eg. More than 2 shifts) within the same system (for winter decommissioning, procedure XXX). To run a plant shut down

1. Shut all intake valves
2. Shut all Ferric Sulphate dosing equipment
3. Shut all Lime dosing equipment
4. shut all Polymer dosing equipment
5. Rinse Lime lines (reference other procedure)

Plant can now be shut down. This procedure can be utilized with the onion tanks full. This should also be done before any interruptions in power due to generator maintenance or other causes.

4.4 Discharging

Discharging be undertaken whenever the plant is running. It is most efficient to run the discharge when there is moderate to high water levels in the Geotube Sump. The intake hose for the Geotube Sump should utilize the ring to ensure that drawn water is from the top of the water surface.

Discharging requires the manual operation of the valves to discharge the water either to the environment or back to the Waste Dump Pond. Readings should also be checked and logged on the flowmeter when discharge begins using the totalizer values.

NOTE: discharge flow rate should be kept below 1200 gal/min, as flow greater than this will not be measureable.

To discharge, the following steps should be undertaken:

1. Ensure enough water to discharge. Water levels should be at least 50 centimetres from the bottom of the sump prior to beginning discharge.
2. Ensure valve on re-circulation line is closed. This will enable the water to discharge into the environment. Where re-circulation is required, close the valve on the discharge line and open the valve on the re-circulation line.
3. If discharging to the environment, check the totalizer reading on the flowmeter prior to discharge. This is not required if re-circulating.
4. On the control panel, Set discharge to "on"
5. While discharging, check discharge pH and Turbidity with sampling tap periodically. Samples can be collected and tested using YSI instrument.
6. When discharging is complete or to be disabled, go to control panel and set discharge to "off"

4.5 CHEMICAL DOSING

Chemical dosing is performed as part of the treatment process. The primary drivers for chemical dosing is:

1. Reduce the pH
2. Reduce the suspended solids

Prior to discharging water back into the environment.

As dosing quantities will vary depending on flow rate and water qualities, refer to user manual for dosing quantities.

Dosing procedures will vary slightly between the stages of treatment. The three stages that require chemical intervention are Ferric Sulphate, Lime, and Polymer.

4.5.1 FERRIC SULPHATE – LIQUID

PPE Required: long chemical resistant gloves, apron, face shield, standard PPE

- Prepare a barrel for dosing by placing the barrel into the duck pond by the ferric sulphate dosing area and removing the top seal.
- Put 2 dosing pumps into 1 barrel (1 per train)
- Switch on dosing pump on the control panel
- On the pump, check frequency and stroke length to ensure dosage is as expected.
- To change barrels, switch off on the dosing pump and change barrel

4.5.2 LIME – BAGS

PPE Required: long chemical resistant gloves, respirator, face shield, respirator, standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add lime to water

4.5.3 POLYMER – BAGS

PPE Required: standard PPE

- Fill mixing tank with intake water.
- Check filter on accessory intake water line (dedicated line for filling lime and polymer mixing tanks)
- Open valve on AI water line (fill tank). Fill to required water levels
- Ensure mixer is operating
- Add polymer to water

4.6 SYSTEM AUTOMATION

For instruction on System Automation, please refer to the Operations and Maintenance Manual.

4.7 TROUBLE SHOOTING

For issue identification, please refer to the checklists in the Operations and Maintenance Manual.

4.8 ACCIDENT RESPONSE

As the WTP involves the handling of a number of chemicals that may be harmful, precautions must be taken to ensure all personnel who are in the work area are informed of the hazards and the preventative and treatment measures.

4.8.1 RESPONSE EQUIPMENT AVAILABLE

The WTP is equipped with a stationary emergency shower, 2 portable emergency shower stations and eyewash stations (dual purpose), 2 fire extinguishers, and 1 stationary eyewash station.

Additionally, the WTP is equipped with spare PPE, face shields, respirators, chemical resistant gloves, hearing protection, and spill kits.

There are also patch kits for the onion tanks, hose and fitting replacements, tools, and a base station radio available at the WTP.

In the event that an incident occurs that requires emergency response, same basic steps should be immediately undertaken. The following lists some of the possible situations and a brief of the response steps.

4.8.2 SPILLS ON THE GROUND

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.8.3 SPILLS ON PERSON

- Proceed to stationary emergency shower
- Notify secondary operator
- Secondary operator activates pump switch
- Pull handle and rinse for 10 mins
- If unable to proceed to stationary emergency shower, refer to “emergency response procedure”

4.8.4 LIME IN EYES

- If possible, proceed immediately to emergency eyewash station
- Activate emergency eyewash and rinse for 10 mins.
- Repeat if required
- Notify secondary operator
- If unable to proceed to emergency eyewash station, refer to “emergency response procedure”

4.8.5 LIME SPILL

- Retrieve spill pad kit
- use gloves to handle
- dispose in drum
- Label and dispose.

4.9 APPENDICIES

Appendix A – Operations and Maintenance Manual for Mary River Mine Waste Rock Pile Water Treatment Plant

APPENDIX A – OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE WASTE ROCK PILE WATER TREATMENT PLANT
20180817_v02

OPERATIONS & MAINTENANCE MANUAL FOR MARY RIVER MINE WASTE ROCK PILE WATER TREATMENT PLANT 20180817_v02

Baffinland Iron Mines Corporation

Prepared by:

McCue Engineering Contractors
203-8291 92 Street
Delta, BC
V4G 0A4

Project No. 137-0001

TABLE OF CONTENTS

Page

1.0 INTRODUCTION

This documents outlines the Operations Manual for Baffinland Iron Mine Corporation's (BIM) Mary River Mine Waste Rock Pile water treatment plant (WTP).

2.0 PLANT OVERVIEW

2.1 General Process Description

The WTP employs a process of coagulation, pH adjustment, flocculation, and filtration to treat acid rock surface runoff collected in the pond at the base of the waste rock pile. The objective of the system operation is to treat water to within the parameters outlined in the Metal Mining Effluent Regulations (MMER), as specified to McCue by BIM, and summarized in Table 1.

Table 1: MMER Effluent Limits

Parameter	Unit	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentrations in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Arsenic	mg/L	0.5	0.75	1.00
Copper	mg/L	0.3	0.45	0.60
Cyanide	NTU	1.00	1.50	2.00
Lead	mg/L	0.20	0.30	0.40
Nickel	mg/L	0.50	0.75	1.00
Zinc	mg/L	0.50	0.75	1.00
Total Suspended Solids	mg/L	15.00	22.50	30.00
Radium 226	Bq/L	0.37	0.74	1.11
pH	SU	6-9.5	6-9.5	6-9.5

The treatment steps are described in Section 2.2. Refer to drawings in Appendix A:

2.2 Brief Process Overview

2.2.1 *System Inlet*

Water is collected at an inlet storage pond (P-001) where it is held for treatment. Two diesel powered centrifugal trash pumps (PU-100A/B) are used to transfer water from the storage pond to an equipment enclosure where the WTP is housed.

At the WTP, the flow can be divided into two separate treatment trains (1 and 2), with each train having a flow meter on the inlet line to monitor flow.

Water is directed into two reactor tanks (TA-110 and TA-210) for processing.

2.2.2 *Step 1 – Iron Precipitation*

Ferric sulphate solution is injected into TA-110 and TA-210 to promote coagulation and precipitation of some heavy metals.

As of system commissioning in June 2018, ferric sulphate liquid solution (12% Fe) is used and injected directly into the process. Each process train utilizes an independent chemical pump to introduce chemical into the system.

The WTS also includes a ferric sulphate make down system, including a holding tank and mixer to allow for makeup of solution using dry ferric sulphate.

Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.3 *Step 2 – Hydroxide Precipitation and pH Adjustment*

Water flows by gravity from TA-110 and TA-210 to TA-120 and TA-220 respectively. Here, hydrated lime is injected into the process to increase pH and aid in further precipitation of some metals through hydroxide precipitation.

Hydrated lime solution is made manually by adding dry hydrated lime and raw influent water to a mixing tank (TA-020). A mixer is run continuously to ensure the hydrated lime slurry does not solidify.

One hydrated lime chemical pump is utilized to dose each reactor tank with chemical. Two motorized valves (MV-120 and MV-220) are used to control the flow of lime to each reactor tank. Each reactor tank includes a pH sensor to provide continuous monitoring of pH.

Each reactor tank is equipped with four air diffusers which supply air to the process and provide continuous mixing so that solids are kept suspended. Each train is supplied air by a dedicated blower.

2.2.4 *Step 3 – Flocculation*

Water flows by gravity from TA-120 and TA-220 to TA-130 and TA-230 respectively. Here, polymer is injected into the process to aid in flocculation of suspended solids prior to filtration.
Polymer solution is made manually by adding dry polymer and raw influent water to a mixing tank (TA-030). A mixer is run continuously to ensure uniformity of the polymer solution.

Two polymer chemical pumps are utilized to provide polymer dosing to each train. Polymer can be dosed directly into each reactor tank, or inline through a static mixer located directly downstream of the reactor tank.

2.2.5 *Step 4 – Filtration*

Water from TA-130 and TA-230 is pumped to a geotube pond via two diesel powered centrifugal trash pumps (PU-200A/B).

Water is directed to a manifold where it can be distributed to two geotube bags for solids filtration. Two additional geotube bags can be deployed in the pond once the currently operating geotube bags have reached capacity. These spare geotubes are currently stored in a warehouse for future use.

Filtered water leaves the geotube bags and is directed to a collection point at the North West corner of the pond. From here, water is pumped via one diesel trash pump (PU-300) to the Mary River discharge point, or recycled back to the inlet pond. A flow meter is installed on the discharge line to Mary River to allow for data logging of flow.

2.3 Major Equipment List

The WTP layout is provided in appendix A. A list of major equipment is provided in Table 2.

Table 2: Major WTP Equipment

Equipment	Description	Qty	Drawing Reference (If Available)
Pond Transfer Pump	Model: Prime Aire PA4A60-404ST Power: Diesel Driven Capacity: 140m3/hr	2	PU-100 A / PU-100 B
Inlet Flow Meter	Model: GF Signet 3-2551-P1-42	2	FT-100 / FT-200
Ferric Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-110 / TA-210
Lime Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-120 / TA-220
Polymer Reaction Tank	Material: Polyurethane Size: 5.9m W x 1.5 H Capacity: 24,820 Liters	2	TA-130 / TA-230
Aeration Blowers	Gast R7100A-3 Blower • 208 V / 3 HP / 60 Hz	2	BL-100A / BL-100B
pH Controller and Sensors	Model: Walchem W900 (Controller) Model: Walchem WEL-PHF-NN (Sensors)	1	pH-110/120/210/220
Motorized Ball Valve	Hayward 1” Ball Valve Model: HRSN2	2	MV-120 and MV-220
Level Transmitter	Model: Echosonic 11 LU27	2	LT-130 / LT-230
Bag Filter	Model: FTI830-2P-150-CS-BS-P13-DP Bag Size: 5 Micron	1	FIL-100
Ferric Chemical Pump	Model: Walchem EHE31E1-VC Power: 115 VAC/1hp/60Hz Capacity: 1 LPM @ 105m TDH	2	PU-010A / PU-010B
Lime Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 9.5 LPM @ 105 m TDH	1	PU-020
Polymer Chemical Pump	Model: Flowmotion FR25-HR30HR Power: 230V/3hp/60Hz Capacity: 16.5 LPM @ 105 m TDH	2	PU-030A / PU-030B
Ferric Mixing Tank	Material: Polyurethane Size: Ø 1.2m x 1.3m Height	1	TA-010
Lime Mixing Tank	Material: Polyurethane Size: Ø 1.8m x 1.7m Height	1	TA-020
Polymer Mixing Tank	Material: Polyurethane Size: Ø 1.6m x 1.6m Height	1	TA-030
Coarse Bubble Diffusers	Model: Maxair 24” SS	24	-

2.4 System Automation

The system is automated through a main control panel located in the system enclosure. The system P&ID is provided in Appendix A. Operation is outlined in Table 3.

Table 3: Control Panel Automation

Equipment ID	Equipment Description	Control Logic	PID Control Reference	Controls	Panel Indication
PU – 100 A/B	Inlet Pond Pump	Units can be controlled in Hand or in Auto. Pump will turn on in Hand in Auto or in Hand.	-	-	Pump icon will indicate run status
		Pump will turn off if high level is measured in TA-110 or TA-210	LSH-110 / LSH-210	Auto	High level alarm at panel
		Pump will turn off if high level measured in TA-130 or TA-230	LIT-130 / LIT-230	Auto - High level settable at panel	High level alarm at panel
BL-100 A/B	Blower	Units can be controlled in Hand or in Auto Blower will turn on in Auto or in Hand	-	-	Blower icon will indicate run status
		BL-100 A will turn off if low level is measured by LIT-130	LIT-130	Auto – Low level settable at panel	Low level alarm
		BL-100 B will turn off if low level is measured by LIT-230	LIT-230	Auto – Low level settable at panel	Low level alarm
pH-110	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC
pH-210	pH Sensor	Continuous monitoring of pH	-	-	Display pH on PLC

pH-210	pH Sensor	If pH>9.5, close MV-120 - Alarm	MV-120	Auto – pH set point settable at panel	Display pH on PLC
pH-220	pH Dosage	If pH>9, close MV-220 - Alarm	MV-220	Auto – pH set point settable at panel	Display pH on PLC
PU-010A	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-100 measures flow, PU-010A energizes.	FIT-100	Auto	Display run status on PLC
PU-010B	Ferric Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If FIT-200 measures flow, PU-010B energizes.	FIT-100	Auto	Display run status on PLC
PU-020	Lime Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Speed Control (1 train only) If pH-120> 8.5, PU-020 will reduce speed. If pH < 8, pump will increase pump speed. If pH is between 8 to 8.5, pump will maintain pump speed.	pH-110 / pH-120	Auto – pH set point adjustable at panel	Display run status on PLC
		Speed Control Disabled If flow is detected by both trains, speed control is disabled.	FIT-100 / FIT-200	Auto	Display run status on PLC
PU-030 A	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status

		Polymer pump energizes if PU-200 A is on	PU-200A	-	Display run status on PLC
PU-030 B	Polymer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Polymer pump energizes if PU-200 B is on	PU-200B	-	Display run status on PLC
PU-200 A	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-130 measures < 3', PU-200A off. If LT-130 measures >3', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-130 measures >4.5', PU-200A off. If LT-130<4.5', PU-200A on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-200 B	Transfer Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		If LT-230 measures < 3', PU-200B off. If LT-230 measures >3', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
		If LT-230 measures >4.5', PU-200B off. If LT-230<4.5', PU-200B on.	LT-130	Auto – Set points adjustable at panel	Pump icon will indicate run status
PU-300	Discharge Pump	Units can be controlled in Hand or in Auto	-	-	Pump icon will indicate run status
		Pump off at LSL-200	LSL-200	-	Level indicator on panel

		Pump on at LSH-200	LSH-200	-	Level indicator on panel
		High Level Alarm at LSHH-200	LSHH-200	-	High Level Alarm
MX-010 /020/030	Mixer	Units can be controlled on/off manually	-	-	-

3.0 GENERAL STARTUP PROCEDURE

3.1 After Dormancy Pre-start-up Procedures

The following steps shall be taken after extended periods of dormancy, prior to general startup of the WTP.

Task	Check
Perform a visual inspection of the system enclosure for signs of water/snow ingress.	☐
Inspect hose and pipe for signs of leaks, abrasion, or other physical damage.	☐
Inspect Reactor tanks as follows: • Signs of leaks, abrasion, or other physical damage. • Tank connections for signs of strain or stress. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Blowers as follows: • Signs of abrasion, or other physical damage on all external accessories such as relief valves, gauges and filters. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Diesel Pumps as follows: • Signs of leaks, abrasion, or other physical damage. • Check for and tighten loose attaching hardware. • Make sure that valves at the inlet and outlet are opened. • Check oil levels and lubricate as necessary.	☐
Inspect Ferric Sulphate pump as follows • Signs of leaks, abrasion, or other physical damage. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Hydrated Lime pumps as follows • Signs of leaks, abrasion, or other physical damage. • Inspect condition of internal pump hose. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Polymer pump as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect condition of internal pump hose. • Make sure that valves at the inlet and outlet are opened.	☐
Inspect Level Transmitter as follows: • Monitor debris and ensure the sensor is level and mounted perpendicular to water level. • Check and roughly compare measurement on the PLC with the real on the field.	☐
Inspect pH sensors as follows: • Monitor debris and deposition of scaling on the transmitter. Perform a cleaning of the sensors as necessary.	☐

-

Insect Bag Filter vessel as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect filter bag and replace as necessary	☐
Inspect Inlet Flow Meter as follows: • Signs of leaks, abrasion, or other physical damage. • Inspect flow sensor for scaling. Clean as necessary.	☐
Inspect Geotube Bag as follows: • Ensure inlet connection points are securely attached. • Ensure height of bag does not exceed recommended limits. If so, decommission geotube bag. • Clean geotube surface of sediment and scaling to prevent fouling using a push broom, or gentle pressure washing.	☐

3.2 Commissioning

After pre-start-up procedures are completed, the system can be energized. The following procedure reflects a high level overview of equipment checks to be performed. Detailed instructions can be found in the product specific manuals. Before any mechanical intervention, disconnect the electrical supply.

3.2.1 *Hydrated Lime Pump / Polymer Pump*

Task	Check
Ensure that all protections (cover, cover window, ventilator hood, coupling protection) are in place before operating the pump.	☐
Check the direction of rotation of the pump.	☐
Make sure that valves at the inlet and outlet are opened.	☐
Start the pump by checking its direction of rotation through the cover window.	☐
Check the flow and discharge pressure and adjust rollers if these figures don't match the pump specifications.	☐

IMPORTANT: Ensure lime pump valves remains open during operation. Should valves be left in the closed position, the process line can over pressurize, leading to a rupture of the chemical hose.

3.2.2 *Blowers*

Task	Check
Ensure impeller rotation is correct.	☐
Check filters and inspect for signs of fouling. Replace if necessary.	☐

-

Ambient temperature – Check room and discharge air temperatures. Exhaust air should not exceed 135ºC.	☐
Working pressure and vacuum values – Adjust relief valve pressure or vacuum setting, if needed.	☐
Motor current – Check that the supply current matches recommended current rating on product nameplate.	☐
Electrical overload cutout – Check that the current matches the rating on product nameplate.	☐

3.2.3 *Ferric Pump*

Task	Check
Ensure pump is energized.	☐
Make sure that valves at the inlet and outlet are opened.	☐
Start the pump manually, in order to prime and adjust dosing rates.	☐
Prime the pump. See manual for details.	☐
Adjust dosing according to inlet water flow rate. See below.	☐
Check dosing rate with calibration cylinder.	☐

3.2.4 *Motorized Valve*

Task	Check
Ensure valve is energized.	☐
Ensure valve opens/closes reliably in manual mode:	☐

3.2.5 *Diesel Pumps*

Task	Check
Check fuel level and oil levels in the engine, air compressor, pump bearings and seal housing.	☐
Consult engine operations manual before attempting to start the unit.	☐
Allow pump to prime.	☐
Adjust engine speed to desired output.	☐

3.2.6 *pH Sensors*

Task	Check
Ensure sensor is calibrated.	☐
Ensure the pH reading displayed locally at the Walchem panel is transmitted correctly to PLC.	☐

3.2.7 *Geotube*

Task	Check
Ensure surface is clean of sediment and debris.	☐
Ensure all inlet valve are open.	☐
Ensure height of geotube does not exceed manufacturer recommended limit.	☐

4.0 OPERATION

4.1 General Operating Instructions

Operation of the WTP will consist of ensuring major equipment (blowers, dosing pumps, motorized valves, level transmitters) is running correctly, and ensuring influent/effluent monitoring and sampling are conducted on schedule.

The drivers for pH adjustment and TSS treatment are operation of the Ferric Sulfate, Hydrated Lime and Polymer Pump, along with the proper performance of the aeration blowers and diffusers equipment.

The unit will run manually. During short term dormancy, the unit can be operated in a “Sleep Mode” where the system is run in a re-cycle status using two submersible pumps inside TA-130 and TA-230 to recirculate water from the end of each train to the beginning of each train. Chemical injection is disabled during dormancy, however, the lime mixer should remain on to maintain suspension of the hydrated lime slurry. Blowers will also remain on to ensure suspension of solids within the reactor tanks.

Parameters to be measured and recorded daily include temperature, pH (typical values are between 6.5 and 9), and TSS. The system must be monitored regularly to ensure pH does not drop below the low level set point or raise above the level set point.

The pH reading should be recorded daily. The pH should be cross referenced regularly with a hand held device. Should the pH differ from the hand held reading, the operator should clean the pH electrodes using a 2-5% solution of hydrochloric acid.

System data can be recorded in the spreadsheet provided in Appendix B. Regular daily monitoring of parameters such as pH, temperature, TSS, and Geotube height must be recorded to ensure proper operation.

4.2 Operating Procedure

The following section will outline the step-by-step procedures for operating the treatment system.

4.2.1 *Standard Operation*

Inlet

The inlet pond level should be checked and recorded prior to start up. Two pond pumps can be utilized to transfer raw water to the treatment system. Usage will depend on the volume of treatment required. At low pond levels, one pond pump and one process train can be utilized. At high levels, both pumps can be utilized to increase the treatment volume.

All pump discharge valves must be opened. The pumps (PU-100 A/B) shall be placed in “Hand” at the PLC. This will energize the pumps and begin transfer of water to the treatment system. The pumps will only turn on if a high level is measured by LSH-110/210 or LT-130/230.

Operators must ensure the inlet pond level is monitored, as the pumps do not include a low level shut off.

Ferric Pumps (PU-010 A/B)

Water is transferred from the inlet pond to two reactor tanks (TA-110 and TA-210) where ferric sulphate is injected. The dosage rate of the ferric pumps is determined by the inlet quality of the raw water and can range from 0 to 20 mg/l. The dosage rate is to be determined by the operator.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The ferric pumps, PU-010 A and PU-010 B, will energize when flow is detected by FIT-100 and FIT-200 respectively.

Before starting the pumps, all discharge valves must be opened.

Lime Pump (PU-020)

After coagulant addition, water flows by gravity to TA-120 and TA-220 where hydrated lime is injected into the process. The dosage rate of the Lime pump is determined by the inlet quality of raw water and the pH required, and can range from 0 to 300 mg/l. The dosage rate is to be determined by the operator.

In manual mode, the speed of the pump can be set at the pump VFD, located on the lime pump stand.

Pump speed will be dependent on the pH measured by pH-120, and the pH set point entered into the panel (adjustable by an operator). At a setpoint of 8.5, the pump will increase speed if pH-120 measures a pH below 8. If pH-120 measures a pH above 9, pump speed will decrease. If pH is measured between 8 to 8.5, the dosage rate will remain the same.

-

At a pH above 9.5, MV-120 and MV-220 will close.

The lime pump will operate continuously, with chemical consistently recirculated to the lime mixing tank (TA-020). This is done to ensure the lime slurry does not settle and solidify in the piping system. At the end of every shift, clean water must be flushed through the piping in order to prevent fouling. Flushing may be required more frequently depending on operational conditions.

Due to the possibility of fouling, the lime pump system must be monitored for pressure consistently.

Lime Solution Make Up

Hydrated lime solution is made manually, with the solution concentration ranging from 5-10% depending on volume of raw water to be treated. A concentration of 5% is recommended to minimize line fouling caused by the lime slurry. Higher concentrations can be made, but more frequent line flushing will be required.

The lime tank mixer is operated from the panel, and should be operated continuously to prevent the slurry from solidifying.

Polymer Pumps (PU-030 A/B)

The dosage rate of the ferric pumps is determined by the inlet quality and can range from 0 to 3 mg/l.

The dosage rate must be set manually at the pump. Once set, the pump can be set to “Auto” at the control panel. The polymer pumps, PU-020 A and PU-020 B, will energize when the transfer pumps, PU-200 A and PU-200 B are energized.

Before starting the pumps, all discharge valves must be opened.

Polymer Solution Make Up

Polymer solution is made manually, with concentration ranging from 0.1 to 0.25% depending on volume to be treated.

The polymer tank mixer is operated from the panel, and should be kept on at all times to maintain uniformity of the solution.

Blowers

The blowers are operated from the panel, and should be energized at all times when raw water is being processed in the reactor tanks.

Both blowers (BL-100A and BL-100B) can be set in “Auto” at the panel, at which point they will run continuously until the water level in TA-130 and TA-230 is measured to be less than 6”. This level is settable at the panel.

Raw Water Bag Filter

The bag filter provides filtration of water required for chemical makeup. The filter bags should be replaced periodically when differential pressure across the filter exceeds approximately 20 psi.

Geotube Bags

Water is transferred from the final reactor tanks (TA-130 and TA-230) by diesel generated trash pumps (PU-200 A and PU-200 B) to the geotube pond. The transfer pumps, PU-200A and PU-200B are operated based on the level measured by the reactor tank level transmitters, LT-130 and LT-230 respectively. These set points are adjustable at the panel.

The height of the geotube bags must be monitored regularly.

4.3 Daily Operator Checklist

The following steps outline day-to-day operational procedures for the WTS.

Standard Operation

Task	Check
Check inlet pond and record water level	☐
Check lime and polymer solutions, make up additional solution as required.	☐
Place PU-100 A (and PU-100 B if necessary) in Hand mode at the control panel.	☐
Set Ferric Sulphate pump (PU-010 A / B) dose rate and place pump in Auto at control panel. Ensure pump energizes when flow is detected by FIT-100 or FIT-200.	☐
Turn on hydrated lime pump (PU-020 A) manually. Adjust dose rate based on flow measured by inlet flow meters.	☐
Monitor hydrated lime pump pressure gauge. If pressure gauge is showing a pressure greater than 15 psi, flush line with water.	☐
Set polymer pump dose rate at panel. Set in “remote” mode. Set pump to auto at panel. Pump will turn on when PU-200A/B energize.	☐
Set Blowers (BL-100 A / BL-100B) to Hand.	☐
Once onion tanks are full, set PU-200A/B to Auto (if using both trains). Ensure downstream valves to geotube bags are open.	☐

Observe reactor tank water levels to ensure inlet and outlet flows are balanced.	☐
Observe and record height of geotube bags. Height must not exceed 6 feet.	☐
Set PU-300 to auto in the panel. Once the water in the pond reaches the operating float switch, the pump will be energized.	☐
Discharge vales must be set manually to allow for discharge to the creek, or recycle back to the inlet pond. Set valves in correct position.	☐

Daily Shutdown

Task	**Check**
Set inlet pump to Off position	
Allow reactor tanks to be pumped down to ¼ volume.	☐
Turn off chemical pumps.	☐
Flush lime line with water	☐
Keep lime mixer (Mix-020) on to ensure hydrated lime slurry remains in liquid form.	☐
If tanks are lowered, blowers can be turned off. If tanks are kept full, energize recirculation pumps.	☐
Check lime and polymer solutions, make up additional solution if required.	☐
Turn transfer pumps (PU-200 A/B) and discharge diesel pump (PU-300) off.	☐

APPENDIX A –DRAWINGS

NOTES:

PU-200A/B- Transfer Pump
PU-300- Discharge Pump
FT-300- Flow Meter
LS- Level Switch
-LSHH 200
-LSH 200
-LSL 200

Process lines
Instrumentation lines

Process based on conceptual desgin by Golder Associates

REVISION TABLE

No.	DESCRIPTION	DATE
0	Original Issue	2018/04/30
1	Record Drawing	2018/07/31

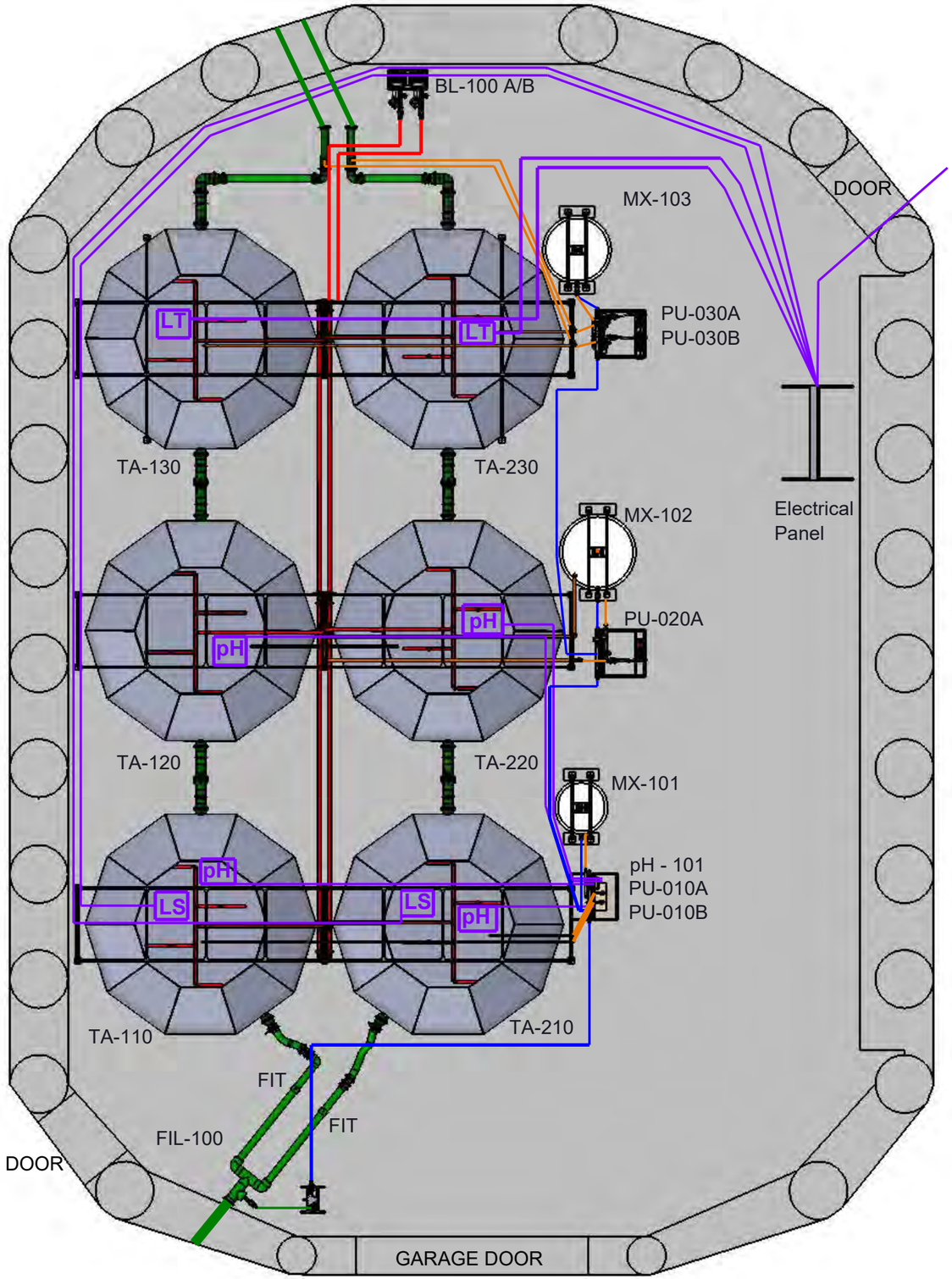
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

FULL SITE LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-001



LEGEND

BL-100 A/B - Blower
FIL-100 - Bag Filter
MX-101 - Ferric Mixing Station
MX-102 - Lime Mixing Station
MX-103 - Polymer Mixing Station
PU-010 A/B - Ferric Pump
PU-020 - Lime Pump
PU-030 A/B - Polymer Pump
TA-110 - Ferric Process Tank (Train 1)
TA-210 - Ferric Process Tank (Train 2)
TA-120 - Lime Process Tank (Train 1)
TA-220 - Lime Process Tank (Train 2)
TA-130 - Polymer Process Tank (Train 1)
TA-230 - Polymer Process Tank (Train 2)
pH-101 - pH Controller
FIT - Flow Meter
pH - pH Sensor
LS - Level Switch
LT - Level Transmiter

Notes:

- Process Lines
- Water Make-up Lines
- Chemical Lines
- Air Lines
- Instrumentation Line

Process based on conceptual design by Golder Associates

REVISION TABLE		
No.	DESCRIPTION	DATE
0	Original Issue	2018/05/01
1	Record Drawing	2018/08/17

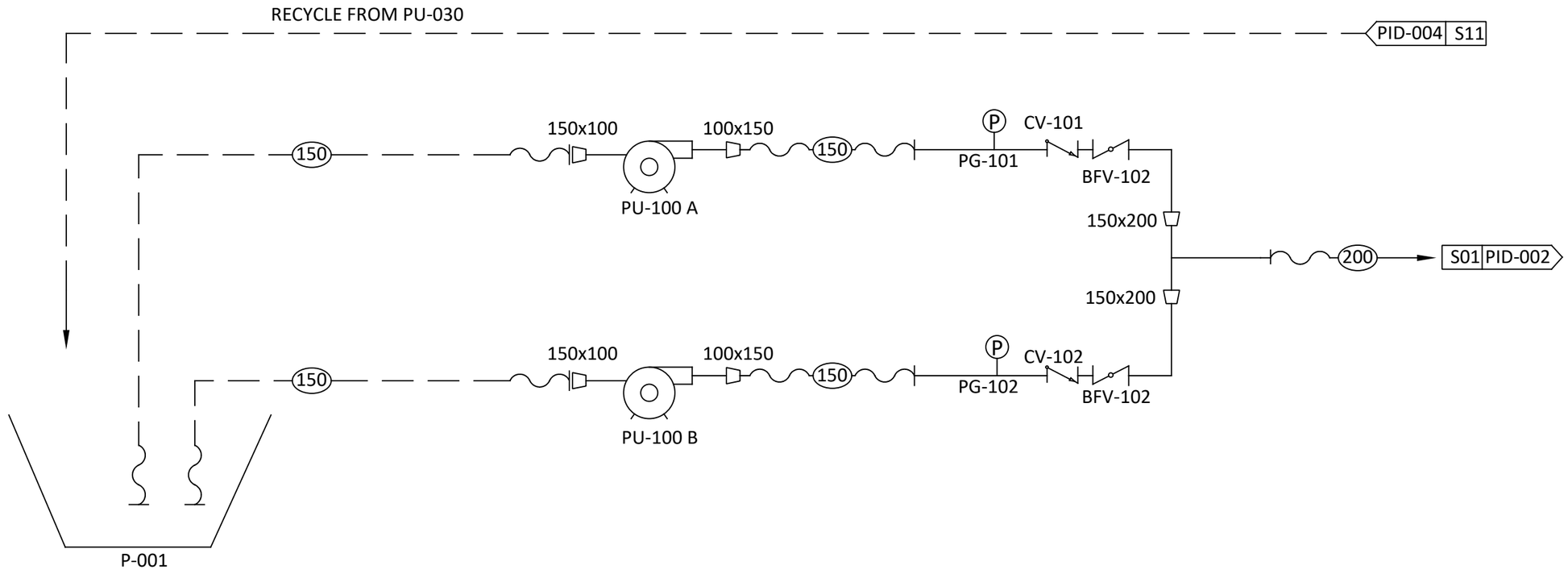
McCUE ENGINEERING CONTRATORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

BUILDING LAYOUT
GENERAL ARRANGEMENT DRAWING
Waste Rock Pile Water Treatment Plant

DATE: August 17, 2018	SCALE: AS SHOWN
DATA BY: R.B	JOB NO: 137-0001
DRAWN BY: L.S	FIG: GA-002



P-001
Inlet Storage Pond

PU-100 A/B
Pond Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

LEGEND :

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

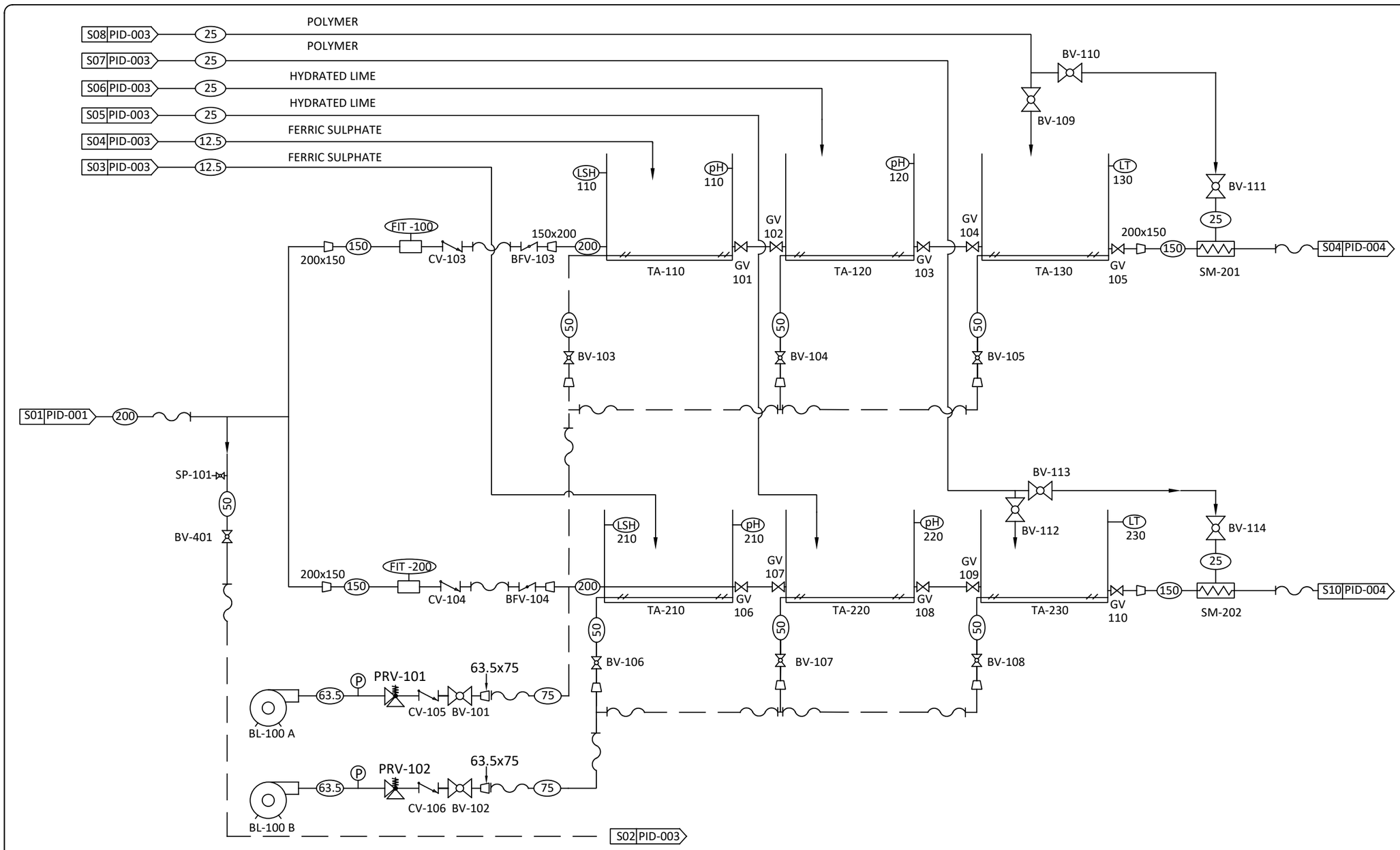
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

Waste Rock Water Storage Pond
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0001



BL-100 A/B
Blower
Model: Gast R7100A-3
Power: 208V/3hp/60Hz
Capacity: 500m³/hr @ 1.9m TDH

TA-110/210
Ferric Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-120/220
Lime Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

TA-130/230
Polymer Reaction Tank
Material: Polyurethane
Size: 5.9m W x 1.5 H
Capacity: 24,820 Liters

FT-100/200
Influent Flow Meter
Model: GF Signet 3-2551-P1-41

LT-130/230
Level Transmitter
Model: Echosonic 11 LU27

pH-110/120/210/220
pH Meter
Model: Walchem WEL-PHF-NN

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- Pressure Gauge
- Static Mixer
- Gate Valve
- Pressure Relief Valve
- Ball Valve
- Sample Port
- Flow Meter
- Level Switch
- pH Sensor
- Level Transmitter

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

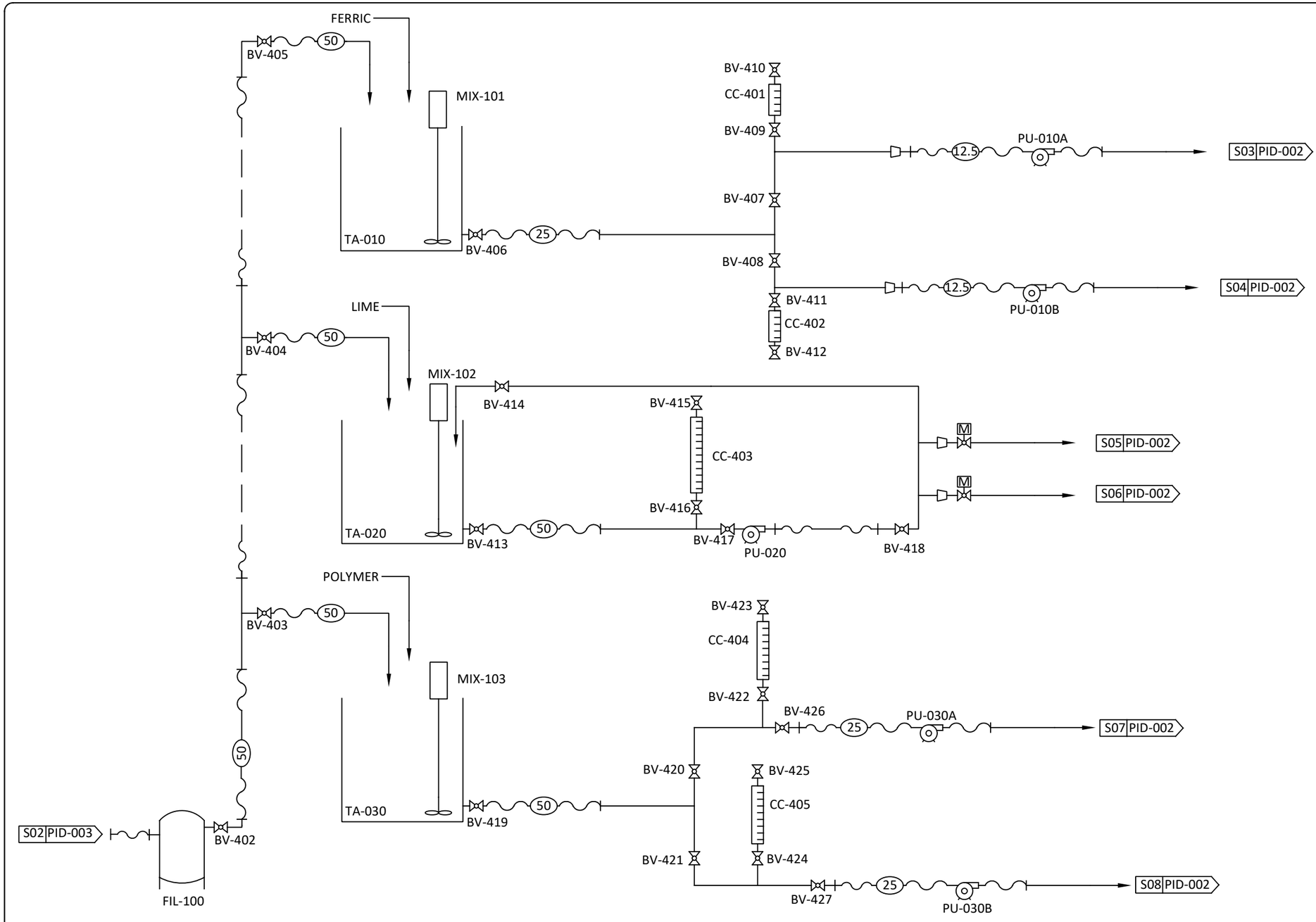
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

REACTION TANKS
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-0002



FIL-100
Bag Filter
Model: FTI 830-2P-150-CS-BS-P13-DP
Bag Size: 5 Micron

PU-010A/B
Ferric Chemical Pump
Model: Welchmen EHE31E1-VC
Power: 115 VAC/1hp/60Hz
Capacity: 21 LPM @ 106m TDH

PU-020
Lime Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 570 LPM @ 42m TDH

PU-030
Polymer Chemical Pump
Model: Flowmotion FR25-HR30HR
Power: 230V/3hp/60Hz
Capacity: 990 LPM @ 42m TDH

MIX-101
Ferric Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 41" Long

MIX-102
Lime Mixer
Model: Dynamix DMX-5505K-2
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 52" Long

MIX-103
Polymer Mixer
Model: Dynamix DMX-5505K-1
Power: 0.5 HP, 230V/1Ph/60Hz
Shaft: 1" Diameter x 49" Long

TA-010
Ferric Mixing Tank
Material: Polyurethane
Size: Ø 1.2m x 1.3m Height

TA-020
Lime Mixing Tank
Material: Polyurethane
Size: Ø 1.8m x 1.7m Height

TA-030
Polymer Mixing Tank
Material: Polyurethane
Size: Ø 1.6m x 1.6m Height

CC-401/402/403/404/405
Calibration Column

LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Ball Valve
- Reducer
- Motorized Ball Valve

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

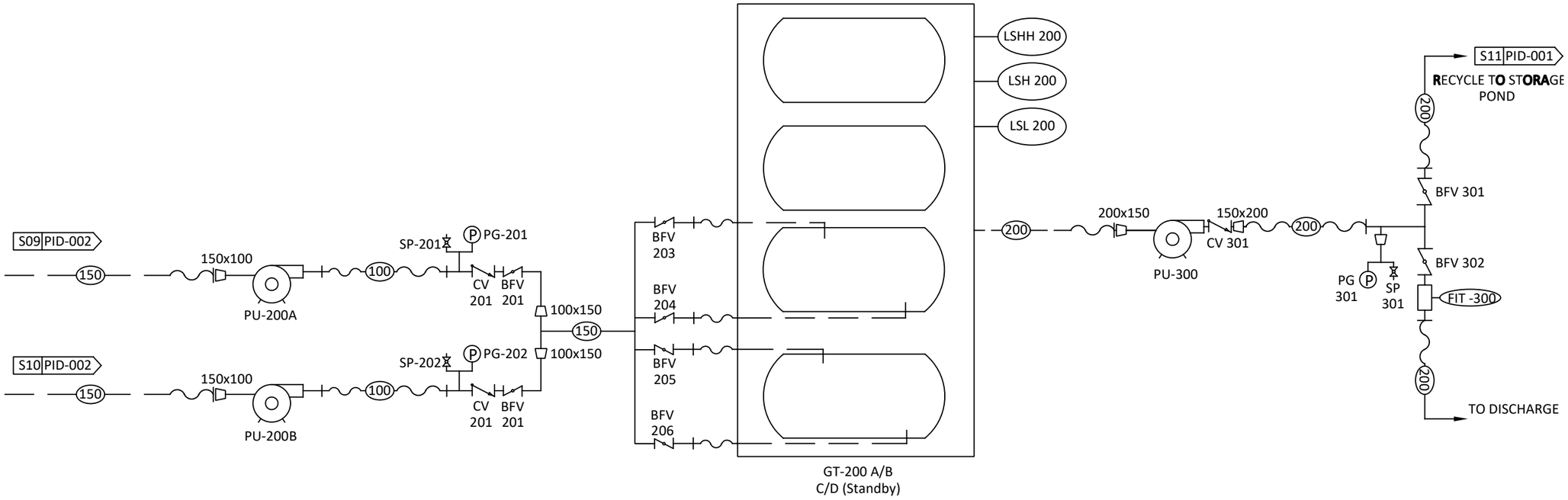
McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

CHEMICAL MAKEUP
PROCESS & INSTRUMENTATION DIAGRAM
Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-003



LEGEND:

- Hose
- Sch. 80 PVC Pipe
- Butterfly Valve
- Check Valve
- Reducer
- (P) Pressure Gauge
- SP Sample Port
- (LS) Level Switch

Process based on conceptual design by Golder Associates

NO.	REVISION TABLE	DATE
0	Original Issue	April 30, 2018
1	Record Drawing	July 31, 2018

McCUE ENGINEERING CONTRACTORS

CLIENT:

BAFFINLAND IRON MINES CORPORATION

GEOTUBE FIELD PROCESS & INSTRUMENTATION DIAGRAM

Waste Rock Pile Water Treatment Plant

DATE: July 31, 2018	SCALE: NTS
DATA BY: R.B.	MCCUE JOB NO: 137-0001
DRAWN BY: M.T.	FIG: PID-004

PU-200A/B
Transfer Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 140m³/hr

GT-200 A/B/C/D
Geotube
Model: Tencare GT500
Dimensions: 60' Circumference x 100' Long

PU-300
Discharge Pump
Model: Prime Aire PA4A60-404ST
Power: Diesel Driven
Capacity: 280m³/hr

FT-300
Flow Meter
Model: Toshiba GFG32

APPENDIX B - MONITORING

BROWNFIELDS TO GOLD MINES

Monitoring Spreadsheet

Project Name: BaffinLand Iron Mine
Waste Pile Water Treatment

Date	Time	OP	Inlet Quality			Train 1						Train 2						Discharge							
			Temp	Inlet pH	Inlet TSS	FIT-100	pH-110	pH-120	Ferric Dosage	Lime Dosage	Polymer Dosage	FIT-200	pH-210	pH-220	Ferric Dosage	Lime Dosage	Polymer Dosage	FIT-300	FIT-300 Totalizer	Geotube Pond pH	Geobag 1 Height	Geobag 2 Height	Discharge pH	Discharge Turbidity	Discharge TSS
			ºC		mg/L	(L/s)			Stroke/Speed	Hz	Hz	(L/s)			Stroke/Speed	Hz	Hz	(gpm)	(gpm)		(m)	(m)		NTU	(mg/L)

Observations

Chemical Availability	Week #1 Date:	Week #2 Date:	Week #3 Date:	Week #4 Date:
Ferric Sulphate				
Hydrated Lime				
Polymer				