

March 31, 2017

#### **BAFFINLAND IRON MINES CORPORATION**

#### MARY RIVER PROJECT

#### 2016 ENVIRONMENT AND CLIMATE CHANGE CANADA METAL MINING EFFLUENT REGULATIONS ANNUAL REPORT

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#### **SECTION 1.0 - INTRODUCTION**

In accordance with the MMER, the purpose of this report is to summarize the monitoring that took place during the 2016 open water season at Baffinland Iron Mines Corporation's (Baffinland) Mary River Project.

Mining at the Mary River Project is currently conducted as a surface (contour strip) mining operation. Highgrade iron ore processing at the Mary River Project consists of crushing and screening, with no further milling or processing required.

On July 10, 2015, Baffinland Mary River Project became subject to the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act* as a result of the discharge of effluent in excess of 50 m<sup>3</sup> from a temporary mine waste rock settling pond. Environment and Climate Change Canada was notified on June 29, 2016 of a change in location of the Station MS-08 Final Discharge Point (FDP) commensurate with the commissioning of the permanent waste rock sedimentation pond. Information pertaining to the change in FDP location, including a general description, specifications, geographic coordinates, and receiving waterbody for the new discharge was included in the notification.

On June 18, 2016, Environment and Climate Change Canada was provided with notification and pertinent information regarding the addition of a new final discharge point (FDP). The new effluent FDP, which is referred to as Station MS-06, represents the Mary River Project's second federal compliance monitoring station, adding to the existing Station MS-08 FDP from the mine's waste rock sedimentation pond.

Letters of notification sent by Baffinland to Environment and Climate Change Canada in 2016 are provided in Appendix A.

#### MS-08

A waste rock pad and disposal area has been constructed east of the current mining operations. Seepage and storm water runoff originating from the waste rock pile is intercepted by perimeter collection ditches and directed to the permanent sedimentation pond. The permanent waste rock sedimentation pond is constructed as a lined earthen walled basin with an approximate capacity of 9,200 m<sup>3</sup> and a surface area of 11,000 sq. m. Waste rock runoff (i.e., effluent) accumulated in the settling pond is treated for solids removal via pond-based settling. Upon reaching 80% (or 0.5 m freeboard) capacity, effluent from the sedimentation pond is pumped overland using a Gorman or Wajax 6" or 4" trash pump. The current FDP discharges effluent to the tundra at the end of a 700 m layflat line at the following geographic coordinates (1983 North American Datum):



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#### Final Discharge Point MS-08 Latitude: 71° 20' 41.6" Longitude: 79° 13' 00.9"

Effluent discharge flow is monitored during periods of discharge through the use of a Badger M5000 3" or 6" magmeter. The frequency of effluent discharge is dictated by the level and capacity of the settling pond and as such, effluent is discharged intermittently, on an as-needed basis, from approximately late June to early/mid-September during the open water season. Consequently, implementation of MMER effluent and water quality monitoring is restricted to periods of effluent discharge rather than throughout the year (details provided in Appendix D). Since the mine became subject to MMER, effluent quality monitoring at the MS-08 final discharge point has been initiated and is conducted during periods of discharge (deleterious substances, acute toxicity, effluent characterization, effluent sub-lethal toxicity sampling and volume monitoring).

The current (new) MS-08 FDP lies within the same watershed, but upstream of the old MS-08 FDP. Briefly, treated effluent from the new FDP is discharged overland (no defined channel) and flows east north-east over boulder-cobble till material approximately 600 metres before entering a headwater depression that contains natural flow only intermittently. The gradient of the depression continues eastward, eventually forming a clearly defined channel approximately 1170 metres down gradient of the MS-08 final discharge point. This channel drains southeast approximately 740 metres before discharging into an unnamed tributary. From this confluence, the unnamed tributary flows south approximately 3.3 km before discharging into the Mary River. The unnamed tributary is believed to be non-fish bearing, due to the combination of complete freeze up during winter and steep gradient, as well as lack of suitable fish habitat. Thus, the Mary River represents the initial fish bearing waters reached by mine effluent, and is proposed as the Mary River Project's receiving body for EEM reporting.

Two water monitoring stations were established on the Mary River for the purpose of MMER water quality monitoring, including a reference station (MS-08-US) and an effluent-exposed station (MS-08-DS) located upstream and downstream, respectively. Geographic coordinates for the Mary River water monitoring stations are shown 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

A sedimentation pond has been constructed to treat seepage and stormwater runoff originating from the mine's ore crusher and stockpile pad. Briefly, seepage and storm water runoff originating from the ore stockpile that has been intercepted by perimeter collection ditches, swales, and sumps is directed to the ore stockpile sedimentation pond during the open-water season. The ore stockpile sedimentation pond has been constructed as a lined earthen walled basin with an approximate capacity of 4500 m<sup>3</sup> and approximate dimensions measuring 62m x 60m x 1.2m (length x width x depth). Runoff (i.e., effluent) collected in the sedimentation pond is treated for solids removal via pond-based settling. Upon reaching approximately 80% (or 0.3m freeboard) capacity, effluent from the settling pond is pumped using a gas-powered Honda centrifugal



3" trash pump (Model #WT40X - 433 gal/min) to the existing treated sewage effluent pipeline and subsequently to the Mary River outfall located approximately 1.3 km southeast of the sedimentation pond.

The geographic coordinates (1983 North American Datum) for the final discharge point (outfall location) and compliance location (for the pond itself) are as follows:

Final Discharge Point MS-06	Latitude: 71° 18' 06.2"	Longitude: 79° 15' 28.9"
Compliance Location for the Pond	Latitude: 71° 18' 41.0"	Longitude: 79° 16' 51.1"

Effluent discharge flow is monitored continuously during periods of discharge through the use of a Badger M5000 3" magmeter. Because the frequency of effluent discharge from the crusher pad and ore stockpile sedimentation pond will be dictated by precipitation levels and climatic conditions, it is anticipated that effluent will be discharged intermittently, on an as-needed basis, from approximately mid-July to mid-September during the open water season. As a result, implementation of MMER effluent and water quality monitoring will be restricted to periods when the pond effluent is not frozen and/or periods where there is effluent discharge.

At Station MS-06, effluent is pumped and transferred via the treated sewage effluent pipe to the outfall location near Mary River. Mary River is a fish bearing waterbody at the location that receives the Station MS-06 effluent discharge, and is the proposed receiving waterbody for monitoring of potential effects from the existing Station MS-08 discharge. Two stations have been established previously on Mary River for the purpose of MMER water quality monitoring, including a reference station (MS-08-US) and an effluent-exposed station (MS-08-DS), for the existing Station MS-08 effluent discharge. An additional receiving environment water quality monitoring station has been established on Mary River to monitor influences from Station MS-06 discharge. Geographic coordinates for the Mary River water quality monitoring stations are as follows:

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 site map showing location of sampling points is included in Appendix A.



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#### SECTION 2.0 - EFFLUENT AND WATER QUALITY MONITORING

The following section discusses the effluent and water quality monitoring for discharges from MS-08 and MS-06 during 2016. Due to weather related logistical constraints and holding time requirements, water samples were collected on August 30 for the mine waste rock sedimentation pond (MS-08) effluent discharge on September 1 and 2.

#### 2.1 <u>SUMMARY OF DELETERIOUS SUBSTANCES MONITORING</u>

Deleterious Substance monitoring was performed on eight (8) dates at times of discharge, seven dates for MS-08 and one date for MS-06. Frequency of sampling was dictated by dates when discharge was performed. The detections limits, mean monthly averages and mean monthly limits are displayed below in Table 1 and 2 along with the results for sample analysis performed. All Certificates of Analysis are provided in Appendix B. The daily and monthly cumulative volumes of effluent discharged from MS-08 and MS-06 for 2016 are displayed in Table 3 and 4. The last date of discharge in 2016 was September 12 from Station 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 (m3)
Detection Limits	0.00010	0.0010	0.00010	0.00050	0.0030	2.0	0.0045*	0.10	0.10	-
19-Jul-16	0.00011.	0.0053	0.00061	0.0024	0.005	10.4	0.01	7.31		
26-Jul-16	0.0001	0.0036	0.0003	0.0212	0.0157	4.2	0.01	7.45		
July	0.0001	0.0045	0.0005	0.0118	0.010	7.3	0.01	7.31	7.45	517.0
08-Aug-16	0.00013	0.0018	0.00044	0.034	0.0052	18.0	0.01	7.19		
09-Aug-16	0.0001	0.0047	0.0001	0.0711	0.0079	2.0	0.028	6.92		
16-Aug-16	0.0001	0.0022	0.0001	0.0743	0.0078	2.0	0.014	7.03		
22-Aug-16	0.0001	0.0016	0.0001	0.0727	0.0069	2.0	0.01	6.89		
30-Aug-16	0.0001	0.001	0.0001	0.0671	0.007	2.9	0.011	7.21		
August	0.0001	0.002	0.0002	0.064	0.007	5.4	0.015	6.89	7.21	3717.0
Mean Monthly Limit	0.50	0.30	0.20	0.50	0.50	15.0	0.37	-	-	-
*Minimum Detectable Limit										

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

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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 (m3)
Detection Limits	0.00010	0.0010	0.00010	0.00050	0.0030	2.0	0.0045*	0.10	0.10	-
12-Sep-16	0.00014	0.001	0.00013	0.0005	0.003	4.4	0.015	7.98		85.5
September	0.00014	0.001	0.00013	0.0005	0.003	4.4	0.015	7.98	7.98	85.5
Mean Monthly Limit	0.50	0.30	0.20	0.50	0.50	15.0	0.37	-	-	-
*Minimum Detectab	le Limit	•								

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

Date	Volume Discharged (m <sup>3</sup> )	Date	Volume Discharged (m <sup>3</sup> )	Date	Volume Discharged (m <sup>3</sup> )
20-Jul-16	135.0	06-Aug-16	308.7	01-Sep-16	584.6
21-Jul-16	252.8	07-Aug-16	656.4	02-Sep-16	687.0
22-Jul-16	129.0	08-Aug-16	302.5		
		17-Aug-16	83.8		
		18-Aug-16	567.2		
		19-Aug-16	767.0		
		29-Aug-16	566.8		
		30-Aug-16	232.3		
		31-Aug-16	286.3		
July	516.8	August	3771.0	September	1271.6

Table 3 - Volumes Effluent Discharged MS-08

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Date	Volume Discharged (m³)					
12-Sep-16	85.5					
September	85.5					

Table 4 - Volumes Effluent Discharged MS-06

#### 2.2 ACUTE TOXICITY

The Acute Toxicity Testing was performed at MS-08 on July 19, August 16, and August 30, 2016 as discharge quantities allowed. All samples were confirmed non-toxic (refer to Appendix B for Certificates of Analysis). Due to logistical and holding time requirements the monthly acute lethality sample collected at MS-06 on September 12, 2016 could not be analysed upon receipt at the laboratory.

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)
48375	MS-08	2015-07-19	0	0
48686	MS-08	2015-08-16	10	0
48803	MS-08	2015-08-30	0	0

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

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#### 2.3 EFFLUENT CHARACTERIZATION

Effluent characterization was conducted at each of the final discharge locations and water quality monitoring included two effluent-exposed stations (MS-08-DS and MS-06-DS) located downstream of the effluent discharges from the respective final discharge locations and a reference station (MS-08-US) situated upstream of any mine effluent-related influences. The required variables are shown in Tables 6.1 to Table 8.2 below, more details of these results and the optional site-specific parameters measured can be found in the Certificates of Analysis; Appendix B of this report. CCME - Water Quality Guidelines for the Protection of Aquatic Life for long term exposure (CCME LT WQG) are included as supplementary information in Tables 6.1 to Table 8.2.

#### Effluent Characterization MS-08

Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	lron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (μmhos/cm)
MDL	10	10	0.0030	0.000010	0.030	0.000010	0.000050	0.050	0.020	3.0
19-Jul-16	25	11	0.660	0.00001	0.774	0.00001	0.0005	0.02	0.221	63.3
16-Aug-16	683	21	0.020	0.00019	0.333	0.00001	0.000052	0.694	4.95	1240.0
30-Aug-16	718	16	0.057	0.000174	0.268	0.00001	0.00005	0.719	5.23	1300.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

Table 6.1 - Results from Effluent Characterization MS-08

#### **Effluent Characterization MS-06**

Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	lron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (μmhos/cm)
MDL	10	10	0.0030	0.000010	0.030	0.000010	0.000050	0.050	0.020	3.0
12-Sep-16	133	57	0.078	0.00001	0.110	0.00001	0.00385	0.02	0.744	318.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

Table 6.2 - Results from Effluent Characterization MS-06

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Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (μmhos/cm)
MDL	10	10	0.0030	0.00001	0.030	0.00001	0.000050	0.050	0.020	3.0
20-Jul-16	32	37	0.308	0.00001	0.251	0.00001	0.000174	0.02	0.02	73.5
29-Aug-16	82	75	0.572	0.00001	0.484	0.00001	0.000465	0.02	0.022	193.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

#### Effluent Characterization MS-08 Effluent-Exposure Area (MS-08-DS)

Table 7.1 - Results from Effluent Characterization MS-08 Effluent-Exposure Area

#### Effluent Characterization MS-06 Effluent-Exposure Area (MS-06-DS)

Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (µmhos/cm)
MDL	10	10	0.0030	0.00001	0.030	0.00001	0.000050	0.050	0.020	3.0
12-Sep-16	115	102	0.000012	0.000012	0.150	0.00001	0.00101	0.02	0.569	248.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

Table 7.2 - Results from Effluent Characterization MS-06 Effluent-Exposure Area

#### Effluent Characterization MS-08 Effluent-Reference Area Upstream (MS-08-US)

Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (μmhos/cm)
MDL	10	10	0.0030	0.00001	0.030	0.00001	0.000050	0.050	0.020	3.0
20-Jul-16	32	33	0.211	0.00001	0.170	0.00001	0.000172	0.02	0.02	70.5
29-Aug-16	80	72	0.475	0.00001	0.372	0.00001	0.000471	0.02	0.02	189.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

Table 8.1 - Results from Effluent Characterization MS-08 Effluent-Reference Area



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Date	Hardness (mg/L)	Alkalinity (mg/L)	Aluminum (mg/L)	Cadmium (mg/L)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (µmhos/cm)
MDL	10	10	0.0030	0.00001	0.030	0.00001	0.000050	0.050	0.020	3.0
12-Sep-16	108	106	0.055	0.00001	0.050	0.00001	0.000405	0.02	0.088	225.0
CCME LT WQG (mg/L)	-	-	0.1	0.00009	0.3	0.000026	0.073	-	13	-

Effluent Characterization MS-06 Effluent-Reference Area Upstream (MS-08-US)

Table 8.2 - Results from Effluent Characterization MS-06 Effluent-Reference Area



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#### 2.4 SUB-LETHAL TOXICITY TESTING

Sub-Lethal Toxicity Testing at MS-08 was performed on July 19, 2016 and August 30, 2016. The complete results can be found in Appendix B.

The testing for Sub-Lethal Toxicity was performed twice in 2016, as effluent was only discharged for short periods – July 20, 2016 to September 2, 2016, prior to freeze up.

Date	Species Tested	Sublethal Test Type	Sample Method	Lab	EC25 or IC25	Lower 95% C.L	Upper 95% C.L	Notes
19-Jul-16	Pimephales promelas	Growth	Grab	Aquatox	>100.00%			
19-Jul-16	Ceriodaphnia dubia	Reproduction	Grab	Aquatox	91.2%	59.5%	97.2%	
19-Jul-16	Lemna minor	Growth (fond weight)	Grab	Aquatox	>97.0%			
19-Jul-16	Lemna minor	Growth (fond number)	Grab	Aquatox	>97.0%			
19-Jul-16	Pseudokirchneriella subcapitata	Cell yield	Grab	Aquatox	>90.9%			Significant stimulation compared to control, according to ANOVA - Dunnett's Test (CETIS)a, a=0.05.
30-Aug-16	Pimephales promelas	Growth	Grab	Aquatox	>100.00%			
30-Aug-16	Ceriodaphnia dubia	Reproduction	Grab	Aquatox	>100.00%			
30-Aug-16	Lemna minor	Growth (fond weight)	Grab	Aquatox	21.5%	6.85%	75.2%	
30-Aug-16	Lemna minor	Growth (fond number)	Grab	Aquatox	7.9%	5.49%	9.74%	
30-Aug-16	Pseudokirchneriella subcapitata	Cell yield	Grab	Aquatox	>90.9%			Significant stimulation compared to control, according to ANOVA - Dunnett's Test (CETIS)a, a=0.05.

#### MS-08 Sublethal Toxicity Test EC<sub>25</sub> Or IC<sub>25</sub>

Table 9.1- Results from Sub-Lethal Toxicity Testing EC<sub>25</sub> or IC<sub>25</sub> MS-08

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#### MS-08 Sublethal Toxicity Test LC50

Date	Species Tested	Sublethal Test Type	Sample Method	Lab	LC <sub>50</sub>
19-Jul-16	Pimephales promelas	Growth	Grab	Aquatox	>100.00%
19-Jul-16	Ceriodaphnia dubia	Reproduction	Grab	Aquatox	>100.00%
30-Aug-16	Pimephales promelas	Growth	Grab	Aquatox	>100.00%
30-Aug-16	Ceriodaphnia dubia	Reproduction	Grab	Aquatox	>100.00%

Table 9.2 - Results from Sub-Lethal Toxicity Testing  $LC_{50}\ MS-08$ 



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#### **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" Licencees in Meeting SNP Requirements and for Submission of a QA/QC Plan (INAC, 1996).* This Plan is included in Appendix C.

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 from the Mary River Project.

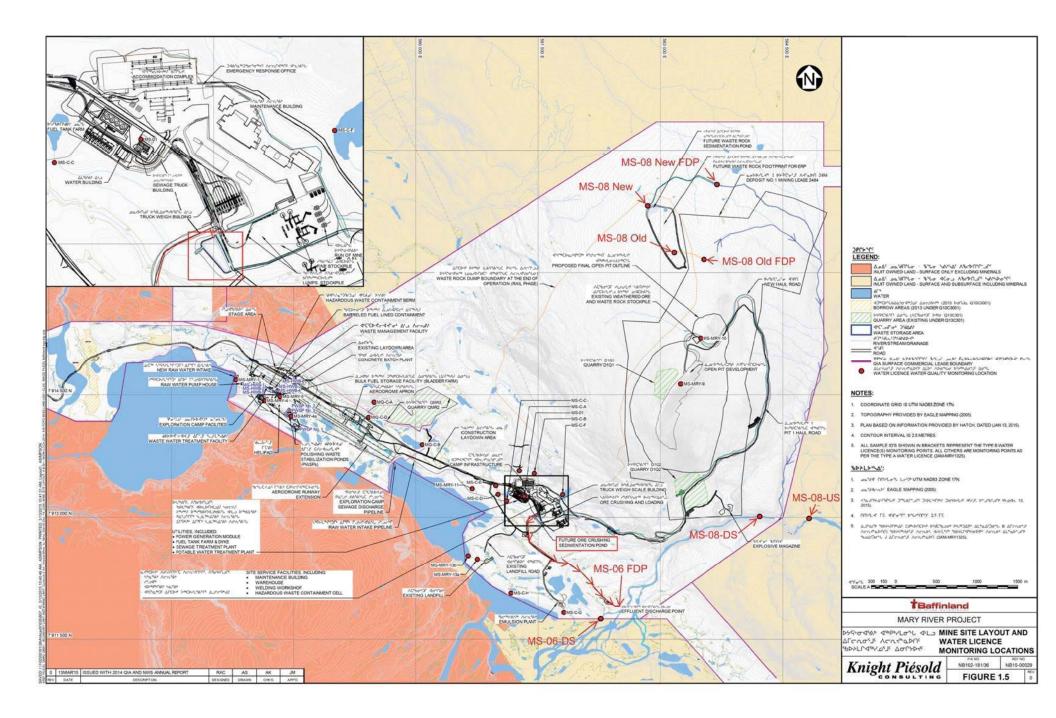


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# APPENDIX A MONITORING LOCATION MAP

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### LETTERS OF NOTIFICATION





June 18, 2016

Ms. Susanne Forbrich, Regional Director Environmental Protection Operations Directorate Prairie and Northern Region Eastgate Offices 9250 – 49<sup>th</sup> Street Edmonton, AB T6B 1K5

Dear Ms. Forbrich,

#### RE: Notification of Additional Final Discharge Point at the Mary River Project

In accordance with Metal Mining Effluent Regulations (MMER) Section 10(1b), the purpose of this letter is to provide Environment Canada with notification and pertinent information regarding the planned addition of a new final discharge point (FDP) at Baffinland Iron Mines Corporation's (BIM) Mary River Project. The new effluent FDP, which will be referred to as Monitoring Station-06 (MS-06), will represent the Mary River Project's second federal compliance monitoring station, adding to the existing Station MS-08 FDP from the mine's waste rock sedimentation pond. It is anticipated that the new MS-06 FDP will potentially begin discharge in during the summer of 2016. Information pertaining to the new FDP, including a general description, geographic coordinates and receiving waterbody for the new discharge, are provided herein.

A sedimentation pond has been constructed to treat seepage and storm water runoff originating from the mine's ore crusher and stockpile pad (refer to the attached drawing). Briefly, seepage and storm water runoff originating from the ore stockpile has been intercepted by perimeter collection ditches, swales, and sumps is directed to the ore stockpile sedimentation pond during the open-water season. The ore stockpile sedimentation pond has been constructed as a lined earthen walled basin with an approximate capacity of 4500 m<sup>3</sup> and surface area measuring 62m x 60m x 1.2 m (input length, width, depth). Wastewater (i.e., effluent) collected in the sedimentation pond will be treated for solids removal via pond-based settling. Upon reaching approximately 80% (or 0.3 m freeboard) capacity, effluent from the settling pond will be pumped using a gas-powered Honda Centrifugal 3" Trash Pump (Model # WT40X (433 gal/min) to the existing treated sewage effluent pipeline to the outfall located approximately 1.3 km southeast of the sedimentation pond.

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The geographic coordinates (1983 North American Datum) for the final discharge point (outfall location) and compliance location (for the pond itself) are as follows:

Final Discharge Point MS-06	Latitude degrees:	71° 18' 06.2"
	Longitude degrees:	79° 15' 28.9"
Compliance Location for the Pond	Latitude degrees	71° 18' 41.0"
	Longitude degrees:	79° 16' 51.1"

Effluent discharge flow will be monitored continuously during periods of discharge through the use of a GPI TM Series 3" Flowmeter (TM300-N). Because the frequency of effluent discharge from the ore stockpile sedimentation pond will be dictated by precipitation levels and climatic conditions, it is anticipated that effluent will be discharged intermittently, on an as-needed basis, from approximately mid-July to mid-September during the open water season. For the remainder of the year, low temperatures below freezing are expected to limit any substantial seepage or surface runoff from the ore stockpile, in turn resulting in the absence of any effluent discharge. As a result, implementation of MMER effluent and water quality monitoring will be restricted to periods when the pond effluent is not frozen and/or periods where there is effluent discharge.

At Station MS-06, effluent will be piped and transferred via the treated sewage effluent pipe to the outfall location 1 near Mary River. Mary River is a fish bearing water at the location that will receive the Station MS-06 effluent discharge, and is the receiving waterbody for monitoring of potential effects from the existing Station MS-08 discharge. Two stations have been established previously on Mary River for the purpose of MMER water quality monitoring, including a reference station (MS-08-US) and an effluent-exposed station (MS-08-DS), for the existing Station MS-08 effluent discharge. Therefore, it is proposed that an additional receiving environment water quality monitoring station be established on Mary River to monitor influences from the new Station MS-06 discharge. Geographic coordinates for the existing Mary River water quality monitoring stations, and the newly proposed water quality monitoring station, are as follows:

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



The attached map shows the above locations, as well as MS-06 compliance point (the pond), and effluent discharge location where effluent is discharged overland along an ephemeral drainage to Mary River.

I trust that the information and details regarding the addition of Mary River Project Station MS-06 FDP that are provided herein meet the requirements of notification indicated under the MMER. Should you have any questions, or require further information concerning the material provided herein, please do not hesitate to contact me at your convenience.

Sincerely, Baffinland Iron Mines Corporation

Jim Millard Environmental Manager

Cc: Curtis Didham, Reg Ejeckam, Craig Broom, Shelly Boss, Anne Wilson, (Environment Canada); Allan Knight, Todd Burlingame, Wayne McPhee (Baffinland)

Attach: Mine Site Crusher Pad Sedimentation Pond Earthworks and Drainage Plan. Mine Site Layout showing additional FDP



June 29, 2016

Ms. Susanne Forbrich, Regional Director Environmental Protection Operations Directorate Prairie and Northern Region Eastgate Offices 9250 – 49<sup>th</sup> Street Edmonton, AB T6B 1K5

Dear Ms. Forbrich,

#### RE: Notification of Change in Final Discharge Point (Station MS-08) at the Mary River Project

On July 10, 2015, Baffinland Iron Mines Corporation's (BIM) Mary River Project became subject to the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act* as a result of the discharge of effluent in excess of 50 m<sup>3</sup> from a temporary mine waste rock settling pond. During 2015, seepage and storm water runoff originating from the temporary mine waste rock pile and vicinity was intercepted by perimeter collection ditches and directed to this temporary pond during the open-water season. Wastewater (i.e., effluent) accumulated in the settling pond was treated for solids removal via pond-based settling. Upon reaching 80% (or 0.5 m freeboard) capacity, effluent from the settling pond was pumped overland using a 4" trash pump to a Final Discharge Point (FDP) located approximately 600 m east of the temporary settling pond, referred to as Station MS-08. At Station MS-08, mine effluent was discharged overland (i.e., no defined channel) and flows east north-east over boulder-cobble till material approximately 1.7 km before meeting an unnamed tributary to the Mary River (referred to herein as Unnamed Tributary). From this confluence, the Unnamed Tributary flows south approximately 3.3 km before discharging into the Mary River.

The mine waste rock settling pond indicated above was intended only for temporary use pending the construction of a permanent waste rock sedimentation pond approximately 450 m northwest of the existing temporary settling pond. In accordance with MMER Section 10(2), the purpose of this letter is to provide Environment Canada with notification of a change in the location of the Station MS-08 FDP commensurate with the commissioning of the permanent waste rock sedimentation pond, with is scheduled for July 2016 pending approval. Information pertaining to the new FDP, including a general description, specifications, geographic coordinates and receiving waterbody for the new discharge, are provided herein.

#### Final Discharge Points and Receiving Water Identification

Mining at the BIM Mary River Project is currently conducted as a surface (contour strip) mining operation. High-grade iron ore processing at the Mary River Project undergoes crushing and screening, with no further milling or processing required. A waste rock pad and disposal area has



been constructed east of the current mining operations. Seepage and storm water runoff originating from the waste rock pile is intercepted by perimeter collection ditches and directed to the permanent waste rock sedimentation pond. The permanent waste rock sedimentation pond is constructed as a lined earthen walled basin with an approximate capacity of 9,200 m<sup>3</sup> and surface area of 11,000 sq. m. Waste rock runoff (i.e., effluent) accumulated in the settling pond will be treated for solids removal via pond-based settling. Upon reaching 80% (or 0.5 m freeboard) capacity, effluent from the sedimentation pond will be pumped overland using a Gorman or Wajax 6" or 4" trash pump. The new FDP will discharge to the head of a constructed ditch system at the following geographic coordinates (1983 North American Datum):

Final Discharge Point MS-08	Latitude degrees:	71° 20' 41.6"
	Longitude degrees:	79° 13' 00.9"

The constructed ditch system will be fully operational by the end of August; there are few sections that require some excavation and riprapping. Until the ditch is fully operational, discharge from the pond will be via 4" discharge hose to a location near the constructed ditch outlet.

Effluent discharge flow will be monitored continuously during periods of discharge through the use of a Badger M5000 4" or 6" magmeter. Because the frequency of effluent discharge from the waste rock sedimentation pond will be dictated by precipitation levels and climatic conditions, it is anticipated that effluent will be discharged intermittently, on an as-needed basis during the open water season (typically from early July to early September). For the remainder of the year, low temperatures below freezing limit any substantial seepage or surface runoff from the waste rock pile, in turn resulting in the absence of any effluent discharge. As a result, implementation of MMER effluent and water quality monitoring will be restricted to periods of effluent discharge rather than throughout the year.

The new Station MS-08 FDP lies within the same watershed but upstream of the old (approved) Station MS-08 FDP discharge. Briefly, treated effluent from the new FDP will be discharged overland (i.e., no defined channel) and flows east north-east over boulder-cobble till material for a distance of approximately 600 m before meeting a shallow depression that contains flow only on an intermittent basis (e.g., freshet period and/or following periods of precipitation). The gradient of this shallow depression continues eastward, eventually forming a clearly defined channel approximately 1,170 m down gradient of the proposed Station MS-08 FDP. From this point, the channel drains southeast approximately 740 m before discharging into an unnamed tributary to the Mary River (referred to herein as Unnamed Tributary). From this confluence, Unnamed Tributary flows south approximately 3.3 km before discharging into the Mary River. Unnamed Tributary is non-fish bearing, which is believed to result from the combination of complete freeze-up during winter (i.e., lack of any overwintering habitat) and high gradient limiting fish colonization during the ice-free period. Thus, Mary River represents the initial fish bearing waters reached by mine effluent, and is proposed as the Mary River Project's receiving water body for MMER monitoring. Two stations were established on Mary River for the purpose of MMER water quality monitoring in 2015, including a reference station (MS-08-US) and an effluent-exposed station (MS-08-DS) located upstream and downstream,



respectively, of the Unnamed Tributary confluence. Geographic coordinates for the Mary River water monitoring stations are as follows:

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

I trust that the information and details regarding changes to the Mary River Project's FDP that are provided herein meet the requirements of notification indicated under the MMER. Should you have any questions, or require further information concerning the material provided herein, please do not hesitate to contact me at your convenience.

Sincerely, Baffinland Iron Mines Corporation

Jim Millard Environmental Manager

Cc: Curtis Didham, Reg Ejeckam, Craig Broom, Shelly Boss, Anne Wilson, (Environment Canada); Allan Knight, Todd Burlingame, Wayne McPhee (Baffinland)

Attach: Photos

IFC drawings of permanent sedimentation pond and discharge ditch Map showing FDP, upstream and downstream monitoring locations.



Photo 1: View of area just downstream of the approximate overland flow path from the New MS-08 Final Discharge Point.



Photo 2: Upstream view of effluent discharge stream at initial area of defined channel.



# Baffinland

Photo 3: Upstream view of the Unnamed Tributary approximately 2.8 km from the mine FDP.



Photo 4: Upstream view of the Mary River, downstream of the Unnamed Tributary confluence.



2016 MMER Annual Report

March 31, 2017

# APPENDIX B CERTIFICATES OF ANALYSIS



Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 19-JUL-16 Report Date: 29-AUG-16 10:44 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1801067 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1801067-1 MS-08 Sampled By: CD/BB on 19-JUL-16 @ 11:55							
Matrix: WATER							
Physical Tests	22.2						D0540040
Conductivity	63.3		3.0	umhos/cm		22-JUL-16	R3510049
Hardness (as CaCO3)	25		10	mg/L		26-JUL-16	00507070
pH Tarial Occurrent de la Calitat	7.31		0.10	pH units		20-JUL-16	R3507976
Total Suspended Solids	10.4		2.0	mg/L		21-JUL-16	R3508440
Total Dissolved Solids	41		20	mg/L		21-JUL-16	R3508429
Turbidity	20.8		0.10	NTU		19-JUL-16	R3507971
Anions and Nutrients			10			00 11 40	D0540040
Alkalinity, Total (as CaCO3)	11		10	mg/L		23-JUL-16	R3510246
Ammonia, Total (as N)	<0.020		0.020	mg/L		22-JUL-16	R3511327
Chloride (Cl)	0.64		0.50	mg/L		22-JUL-16	R3510558
Fluoride (F)	<0.020		0.020	mg/L		22-JUL-16	R3510558
Nitrate (as N)	0.221		0.020	mg/L		22-JUL-16	R3510558
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	22-JUL-16	22-JUL-16	R3509989
Phosphorus, Total	0.0155		0.0030	mg/L	22-JUL-16	22-JUL-16	R3509179
Sulfate (SO4)	16.9		0.30	mg/L		22-JUL-16	R3510558
Organic / Inorganic Carbon	10		4.0				DOCIAOSE
Dissolved Organic Carbon	<1.0		1.0	mg/L		25-JUL-16	R3511655
Total Organic Carbon Total Metals	<1.0		1.0	mg/L		24-JUL-16	R3511654
Aluminum (Al)-Total	0.660		0.010	mg/L	21-JUL-16	22-JUL-16	R3509713
Arsenic (As)-Total	0.00011		0.00010	mg/L	21-JUL-16	22-JUL-16	R3509713
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	21-JUL-16	22-JUL-16	R3509713
Calcium (Ca)-Total	2.98		0.50	mg/L	21-JUL-16	22-JUL-16	R3509713
Copper (Cu)-Total	0.0053		0.0010	mg/L	21-JUL-16	22-JUL-16	R3509713
Iron (Fe)-Total	0.774		0.050	mg/L	21-JUL-16	22-JUL-16	R3509713
Lead (Pb)-Total	0.00061		0.00010	mg/L	21-JUL-16	22-JUL-16	R3509713
Magnesium (Mg)-Total	4.62		0.050	mg/L	21-JUL-16	22-JUL-16	R3509713
Manganese (Mn)-Total	0.0972		0.00050	mg/L	21-JUL-16	22-JUL-16	R3509713
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		22-JUL-16	R3509643
Molybdenum (Mo)-Total	<0.00050		0.00050	mg/L	21-JUL-16	22-JUL-16	R3509713
Nickel (Ni)-Total	0.0024		0.0010	mg/L	21-JUL-16	22-JUL-16	R3509713
Potassium (K)-Total	0.776		0.050	mg/L	21-JUL-16	22-JUL-16	R3509713
Selenium (Se)-Total	0.000080		0.000050	mg/L	21-JUL-16	22-JUL-16	R3509713
Sodium (Na)-Total	<0.50		0.50	mg/L	21-JUL-16	22-JUL-16	R3509713
Thallium (TI)-Total	0.000017		0.000010	mg/L	21-JUL-16	22-JUL-16	R3509713
Uranium (U)-Total	0.000192		0.000010	mg/L	21-JUL-16	22-JUL-16	R3509713
Zinc (Zn)-Total	0.0050		0.0030	mg/L	21-JUL-16	22-JUL-16	R3509713
Dissolved Metals			0.0000	<del>9</del> / <b>–</b>			
Dissolved Mercury Filtration Location	FIELD					22-JUL-16	R3509352
Dissolved Metals Filtration Location	FIELD					21-JUL-16	R3508541
Aluminum (Al)-Dissolved	0.0136		0.0050	mg/L	21-JUL-16	21-JUL-16	R3509130
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	21-JUL-16	21-JUL-16	R3509130
* Refer to Referenced Information for Qualifiers (if any) a			0.00010				

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1801067-1 MS-08 Sampled By: CD/BB on 19-JUL-16 @ 11:55 Matrix: WATER							
Dissolved Metals							
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	21-JUL-16	21-JUL-16	R3509130
Calcium (Ca)-Dissolved	3.01		0.050	mg/L	21-JUL-16	21-JUL-16	R3509130
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	21-JUL-16	21-JUL-16	R3509130
Iron (Fe)-Dissolved	0.012		0.010	mg/L	21-JUL-16	21-JUL-16	R3509130
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	21-JUL-16	21-JUL-16	R3509130
Magnesium (Mg)-Dissolved	4.27		0.050	mg/L	21-JUL-16	21-JUL-16	R3509130
Manganese (Mn)-Dissolved	0.0826		0.00050	mg/L	21-JUL-16	21-JUL-16	R3509130
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	22-JUL-16	22-JUL-16	R3509698
Molybdenum (Mo)-Dissolved	0.000133		0.000050	mg/L	21-JUL-16	21-JUL-16	R3509130
Nickel (Ni)-Dissolved	0.00109		0.00050	mg/L	21-JUL-16	21-JUL-16	R3509130
Potassium (K)-Dissolved	0.514		0.050	mg/L	21-JUL-16	21-JUL-16	R3509130
Selenium (Se)-Dissolved	0.000096		0.000050	mg/L	21-JUL-16	21-JUL-16	R3509130
Sodium (Na)-Dissolved	<0.50		0.50	mg/L	21-JUL-16	21-JUL-16	R3509130
Thallium (TI)-Dissolved	<0.000010		0.000010	mg/L	21-JUL-16	21-JUL-16	R3509130
Uranium (U)-Dissolved	0.000033		0.000010	mg/L	21-JUL-16	21-JUL-16	R3509130
Zinc (Zn)-Dissolved	0.0034		0.0010	mg/L	21-JUL-16	21-JUL-16	R3509130
Radiological Parameters							
Ra-226	<0.0100		0.010	Bq/L	16-AUG-16	26-AUG-16	R3516820
Refer to Referenced Information for Qualifiers (if any) ar	d Mathadalagy						

 $^{\ast}$  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	L1801067-1
Matrix Spike		Magnesium (Mg)-Dissolved	MS-B	L1801067-1
Matrix Spike		Manganese (Mn)-Dissolved	MS-B	L1801067-1
Matrix Spike		Total Kjeldahl Nitrogen	MS-B	L1801067-1
Matrix Spike		Sulfate (SO4)	MS-B	L1801067-1
Vatrix Spike		Chloride (Cl)	MS-B	L1801067-1
Vatrix Spike		Nitrate (as N)	MS-B	L1801067-1
Matrix Spike		Ammonia, Total (as N)	MS-B	L1801067-1
Vatrix Spike		Calcium (Ca)-Total	MS-B	L1801067-1
Matrix Spike		Iron (Fe)-Total	MS-B	L1801067-1
Matrix Spike		Magnesium (Mg)-Total	MS-B	L1801067-1
Matrix Spike		Manganese (Mn)-Total	MS-B	L1801067-1
Matrix Spike		Sodium (Na)-Total	MS-B	L1801067-1
Matrix Spike		Uranium (U)-Total	MS-B	L1801067-1
ample Parameter Q	ualifier kev	listed:		
	ription			
	•			
MS-B Matrix	c Spike recove	ry could not be accurately calculated d	ue to high analyte	background in sample.
est Method Referen	ices:			
ALS Test Code	Matrix	Test Description	Method Reference	ence**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2	
Sample is filtered thro	Water ugh a 0.45um	Dissolved Organic Carbon filter, sample is then injected into a hea	ated reaction cham	INSTRUMENTAL ber which is packed with an oxidative catalyst. The wat
is vaporized and the o infrared detector.	ugh a 0.45um rganic cabon i	filter, sample is then injected into a hea s oxidized to carbon dioxide. The carbo	ated reaction cham on dioxide is transp	ber which is packed with an oxidative catalyst. The wat orted in a carrier gas and is measured by a non-dispers
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT	ugh a 0.45um rganic cabon i Water	filter, sample is then injected into a heat	ated reaction cham on dioxide is transp EPA 300.1 (m	ber which is packed with an oxidative catalyst. The wat orted in a carrier gas and is measured by a non-dispers
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a	ugh a 0.45um rganic cabon i Water inalyzed by lor Water	filter, sample is then injected into a hea s oxidized to carbon dioxide. The carbo Chloride by IC	eted reaction cham on dioxide is transp EPA 300.1 (m d/or UV detection. APHA 2510 B	ber which is packed with an oxidative catalyst. The wat orted in a carrier gas and is measured by a non-disper-
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT	ugh a 0.45um rganic cabon i Water unalyzed by lor Water e measured dir Water	filter, sample is then injected into a hea s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC	EPA 300.1 (m C/Or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m	ber which is packed with an oxidative catalyst. The wat orted in a carrier gas and is measured by a non-dispers od)
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known	ugh a 0.45um rganic cabon i Water analyzed by lor Water water unalyzed by lor Water Water a as Total Hard	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B ilcium and Magnes	ber which is packed with an oxidative catalyst. The war orted in a carrier gas and is measured by a non-disper od) od)
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known	ugh a 0.45um rganic cabon i Water analyzed by lor Water water unalyzed by lor Water Water a as Total Hard	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B ilcium and Magnes	ber which is packed with an oxidative catalyst. The way orted in a carrier gas and is measured by a non-disper od) od) sium concentrations, expressed in CaCO3 equivalents. sloulation.
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Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride	ugh a 0.45um rganic cabon i Water malyzed by lor Water water malyzed by lor Water water as Total Hard d Magnesium Water ered (0.45 um a, and analyzed	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cell Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, ther d by CVAAS.	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B Icium and Magness or the hardness ca EPA 1631E (m n undergo a cold-or	aber which is packed with an oxidative catalyst. The was ported in a carrier gas and is measured by a non-disper od) od) sium concentrations, expressed in CaCO3 equivalents. alculation. nod) exidation using bromine monochloride prior to reduction
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride Analysis conducted in Protection Act (July 1,	ugh a 0.45um rganic cabon i Water malyzed by lor Water water malyzed by lor Water water as Total Hard d Magnesium Water ered (0.45 um a, and analyzed	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cell Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, ther d by CVAAS.	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B Icium and Magness or the hardness ca EPA 1631E (m n undergo a cold-or	ber which is packed with an oxidative catalyst. The was norted in a carrier gas and is measured by a non-disper od) od) ium concentrations, expressed in CaCO3 equivalents. Iculation. hod) exidation using bromine monochloride prior to reduction sment of Properties under Part XV.1 of the Environment
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride Analysis conducted in Protection Act (July 1, HG-T-CVAA-WT	ugh a 0.45um rganic cabon i Water unalyzed by lor Water e measured dir Water analyzed by lor Water as Total Hard d Magnesium o Water ered (0.45 um a, and analyzed accordance w 2011). Water	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC In Chromatography with conductivity and Conductivity rectly by immersing the conductivity cell Fluoride in Water by IC In Chromatography with conductivity and Hardness Intersol is calculated from the sum of Cal concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, the d by CVAAS.	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B ilcium and Magness or the hardness ca EPA 1631E (n n undergo a cold-co Used in the Asses EPA 1631E (n	ber which is packed with an oxidative catalyst. The was norted in a carrier gas and is measured by a non-disper od) od) ium concentrations, expressed in CaCO3 equivalents. Iculation. hod) exidation using bromine monochloride prior to reduction sment of Properties under Part XV.1 of the Environment
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride Analysis conducted in Protection Act (July 1, HG-T-CVAA-WT Water samples underg	ugh a 0.45um rganic cabon i Water unalyzed by lor Water e measured dir Water analyzed by lor Water as Total Hard d Magnesium o Water ered (0.45 um a, and analyzed accordance w 2011). Water	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC n Chromatography with conductivity and Hardness thess) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, the d by CVAAS. with the Protocol for Analytical Methods Total Mercury in Water by CVAAS ation using bromine monochloride prior Dissolved Metals in Water by CRC	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B ilcium and Magness or the hardness ca EPA 1631E (n n undergo a cold-co Used in the Asses EPA 1631E (n	ber which is packed with an oxidative catalyst. The was borted in a carrier gas and is measured by a non-disper od) od) ium concentrations, expressed in CaCO3 equivalents. alculation. nod) ixidation using bromine monochloride prior to reduction sment of Properties under Part XV.1 of the Environment nod) itannous chloride, and analyzed by CVAAS.
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride Analysis conducted in Protection Act (July 1, HG-T-CVAA-WT Water samples undergo	ugh a 0.45um rganic cabon i Water water e measured dir Water analyzed by lor Water as Total Hard d Magnesium o Water ered (0.45 um e, and analyzed accordance w 2011). Water go a cold-oxida Water	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, the d by CVAAS. with the Protocol for Analytical Methods Total Mercury in Water by CVAAS	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B Icium and Magness or the hardness ca EPA 1631E (m n undergo a cold-or Used in the Asses EPA 1631E (m to reduction with s APHA 3030B/	aber which is packed with an oxidative catalyst. The was borted in a carrier gas and is measured by a non-disper od) od) ium concentrations, expressed in CaCO3 equivalents. alculation. hod) exidation using bromine monochloride prior to reduction sment of Properties under Part XV.1 of the Environment hod) trannous chloride, and analyzed by CVAAS. 6020A (mod)
Sample is filtered thro is vaporized and the o infrared detector. CL-IC-N-WT Inorganic anions are a EC-WT Water samples can be F-IC-N-WT Inorganic anions are a HARDNESS-CALC-WT Hardness (also known Dissolved Calcium and HG-D-CVAA-WT Water samples are filt with stannous chloride Analysis conducted in Protection Act (July 1, HG-T-CVAA-WT Water samples underg MET-D-CCMS-WT Water samples are filt	ugh a 0.45um rganic cabon i Water water e measured dir Water analyzed by lor Water as Total Hard d Magnesium o Water ered (0.45 um accordance w 2011). Water go a cold-oxida Water ered (0.45 um	filter, sample is then injected into a hear s oxidized to carbon dioxide. The carbo Chloride by IC n Chromatography with conductivity and Conductivity rectly by immersing the conductivity cel Fluoride in Water by IC n Chromatography with conductivity and Hardness dness) is calculated from the sum of Ca concentrations are preferentially used f Dissolved Mercury in Water by CVAAS ), preserved with hydrochloric acid, the d by CVAAS. with the Protocol for Analytical Methods Total Mercury in Water by CVAAS ation using bromine monochloride prior Dissolved Metals in Water by CRC ICPMS	EPA 300.1 (m EPA 300.1 (m d/or UV detection. APHA 2510 B I into the sample. EPA 300.1 (m d/or UV detection. APHA 2340 B I into the sample. EPA 1631E (m n undergo a cold-co Used in the Asses EPA 1631E (m to reduction with s APHA 3030B/m red by CRC ICPMS	ber which is packed with an oxidative catalyst. The was borted in a carrier gas and is measured by a non-disper od) od) ium concentrations, expressed in CaCO3 equivalents. Iculation. hod) exidation using bromine monochloride prior to reduction sment of Properties under Part XV.1 of the Environment hod) itannous chloride, and analyzed by CVAAS. 6020A (mod) S.

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).

EPA 350.1

NH3-WT	Water	Ammonia, Total as N	
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## **Reference Information**

Sample is measured col- colorimetrically.	orimetrically.	When sample is turbid a distillation step	is required, sample is distilled into a solution of boric acid and measured
NO3-IC-WT Inorganic anions are ana	Water alyzed by Ion	Nitrate in Water by IC Chromatography with conductivity and/o	EPA 300.1 (mod) r UV detection.
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried c after persulphate digestion			00-P "Phosphorus". Total Phosphorus is deteremined colourimetrically
PH-BF Water samples are analy	Water yzed directly b	pH by a calibrated pH meter.	APHA 4500 H-Electrode
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT Inorganic anions are ana	Water alyzed by Ion	Sulfate in Water by IC Chromatography with conductivity and/o	EPA 300.1 (mod) r UV detection.
SOLIDS-TDS-BF A well-mixed sample is f	Water iltered though	Total Dissolved Solids glass fibres filter. A known volume of t	APHA 2540C he filtrate is evaporated and dried at 180 +/- 2C for 1hr.
SOLIDS-TSS-BF A well-mixed sample is f four hours or until a cons			APHA 2540 D-Gravimetric ad the residue retained is dried in an oven at 104 +/- 1C for a minimum of
		Total Kjeldahl Nitrogen N to ammonium sulphate. The ammonia e concentration of ammonium sulphate i	APHA 4500-N ions are heated to produce a colour complex. The absorbance measured n the sample and is reported as TKN.
			APHA 5310B idative catalyst. The water is vaporized and the organic cabon is oxidized assured by a non-dispersive infrared detector.
		Turbidity on of the intensity of the light scattered nder the same conditions. Sample readi	APHA 2130 B by the sample under defined conditions with the intensity of light scattered ngs are obtained from a Nephelometer.
** ALS test methods may in	ncorporate mo	difications from specified reference met	hods to improve performance.
	•	·	
The last two letters of the	above test co	de(s) indicate the laboratory that perform	med analytical analysis for that test. Refer to the list below:

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:	L180106	57 R	eport Date: 29-	AUG-16		Page 1 of 10
Client:	Baffinland Iron Mine's Cor 2275 Upper Middle Rd. E. Oakville ON L6H 0C3							
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
	R3510246							
WG2353594-3 Alkalinity, Tot	<b>3 CRM</b> al (as CaCO3)	WT-ALK-CRM	108.2		%		80-120	23-JUL-16
WG2353594-4 Alkalinity Tot	<b>4 DUP</b> tal (as CaCO3)	<b>L1800901-1</b> 182	184		mg/L	0.7	20	
WG2353594-2		102	104		ilig/L	0.7	20	23-JUL-16
	al (as CaCO3)		109.2		%		85-115	23-JUL-16
WG2353594-1 Alkalinity, Tot	<b>I MB</b> tal (as CaCO3)		<10		mg/L		10	23-JUL-16
C-DIS-ORG-WT	Water							
Batch	R3511655							
WG2353843-3 Dissolved Or		<b>L1801117-5</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUL-16
WG2353843-2 Dissolved Or			91.6		%		80-120	25-JUL-16
WG2353843-1 Dissolved Or			<1.0		mg/L		1	25-JUL-16
WG2353843-4 Dissolved Or	-	L1801117-5	97.8		%		70-130	25-JUL-16
CL-IC-N-WT	Water							
Batch	R3510558							
WG2352992-1 Chloride (Cl)	IO DUP	<b>WG2352992-8</b> 198	198		mg/L	0.2	20	22-JUL-16
WG2352992-7 Chloride (Cl)	7 LCS		101.3		%		90-110	22-JUL-16
WG2352992-6 Chloride (Cl)	6 MB		<0.50		mg/L		0.5	22-JUL-16
WG2352992-9 Chloride (Cl)	9 MS	WG2352992-8	N/A	MS-B	%		_	22-JUL-16
EC-WT	Water							
Batch	R3510049							
WG2352613-1 Conductivity	16 DUP	<b>WG2352613-1</b> 886	<b>5</b> 886		umhos/cm	0.0	10	22-JUL-16
WG2352613-1 Conductivity	14 LCS		100.6		%		90-110	22-JUL-16
WG2352613-1 Conductivity	13 MB		<3.0		umhos/cm		3	22-JUL-16
F-IC-N-WT	Water							



## **Quality Control Report**

				Quanty		orneport			
			Workorder:	L1801067		Report Date: 29-Al	JG-16		Page 2 of 10
•	2275 Uppe	Iron Mine's Corp er Middle Rd. E. S DN L6H 0C3							
Contact:	Jim Millard	Ł							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT		Water							
Batch R	3510558								
WG2352992-10 Fluoride (F)	) DUP		<b>WG2352992-8</b> 0.115	0.119		mg/L	3.3	20	22-JUL-16
WG2352992-7 Fluoride (F)	LCS			100.9		%		90-110	22-JUL-16
WG2352992-6 Fluoride (F)	MB			<0.020		mg/L		0.02	22-JUL-16
WG2352992-9	MS		WG2352992-8			-			
Fluoride (F)		Water		100.4		%		75-125	22-JUL-16
HG-D-CVAA-WT	2500000	water							
Batch R WG2352735-3	3509698 DUP		L1800873-1						
Mercury (Hg)-I			<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUL-16
WG2352735-2 Mercury (Hg)-I				101.0		%		80-120	22-JUL-16
WG2352735-1 Mercury (Hg)-I	<b>MB</b> Dissolved			<0.000010		mg/L		0.00001	22-JUL-16
WG2352735-4 Mercury (Hg)-I			L1800873-2	93.1		%		70-130	22-JUL-16
HG-T-CVAA-WT		Water							
Batch R	3509643								
WG2352727-3 Mercury (Hg)-			<b>L1800873-1</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUL-16
WG2352727-2 Mercury (Hg)-				91.1		%		80-120	22-JUL-16
WG2352727-1 Mercury (Hg)-	<b>MB</b> Гotal			<0.000010		mg/L		0.00001	22-JUL-16
WG2352727-4 Mercury (Hg)- <sup>-</sup>			L1800873-2	92.0		%		70-130	22-JUL-16
MET-D-CCMS-WT		Water							
Batch R	3509130								
WG2352059-4 Aluminum (Al)	<b>DUP</b> Dissolved		<b>WG2352059-3</b> 0.0136	0.0130		mg/L	4.6	20	21-JUL-16
Arsenic (As)-D	issolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-JUL-16
Cadmium (Cd)	-Dissolved	t	<0.000010	<0.000010		mg/L	N/A	20	21-JUL-16
Calcium (Ca)-l	Dissolved		3.01	2.85		mg/L	5.6	20	21-JUL-16
Copper (Cu)-D	issolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-JUL-16
Iron (Fe)-Disso	olved		0.012	0.012		mg/L	0.5	20	21-JUL-16



Client:

Contact:

Test

## **Quality Control Report**

 Workorder:
 L1801067
 Report Date:
 29-AUG-16
 Page
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 of
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 Baffinland Iron Mine's Corporation (Oakville)
 2275 Upper Middle Rd. E. Suite #300
 Oakville ON L6H 0C3
 Jim Millard
 Voltage
 Voltage

MET-D-CCMS-WT	Water						
Batch R3509130							
WG2352059-4 DUP Lead (Pb)-Dissolved	<b>WG2352059-</b> <0.000050	• <b>3</b> <0.000050	RPD-NA	mg/L	N/A	20	21-JUL-16
Magnesium (Mg)-Dissol	ved 4.27	4.35		mg/L	1.9	20	21-JUL-16
Manganese (Mn)-Dissol	ved 0.0826	0.0835		mg/L	1.1	20	21-JUL-16
Molybdenum (Mo)-Disso	olved 0.000133	0.000141		mg/L	5.9	20	21-JUL-16
Nickel (Ni)-Dissolved	0.00109	0.00098		mg/L	10	20	21-JUL-16
Potassium (K)-Dissolve	d 0.514	0.523		mg/L	1.8	20	21-JUL-16
Selenium (Se)-Dissolve	d 0.000096	0.000070	J	mg/L	0.000025	0.0001	21-JUL-16
Sodium (Na)-Dissolved	<0.50	<0.50	RPD-NA	mg/L	N/A	20	21-JUL-16
Thallium (TI)-Dissolved	<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	21-JUL-16
Uranium (U)-Dissolved	0.000033	0.000031		mg/L	4.1	20	21-JUL-16
Zinc (Zn)-Dissolved	0.0034	0.0032		mg/L	5.9	20	21-JUL-16
WG2352059-2 LCS							
Aluminum (Al)-Dissolve	d	95.0		%		80-120	21-JUL-16
Arsenic (As)-Dissolved		97.6		%		80-120	21-JUL-16
Cadmium (Cd)-Dissolve	ed	94.8		%		80-120	21-JUL-16
Calcium (Ca)-Dissolved		95.5		%		80-120	21-JUL-16
Copper (Cu)-Dissolved		94.2		%		80-120	21-JUL-16
Iron (Fe)-Dissolved		97.3		%		80-120	21-JUL-16
Lead (Pb)-Dissolved		99.8		%		80-120	21-JUL-16
Magnesium (Mg)-Dissol	ved	93.2		%		80-120	21-JUL-16
Manganese (Mn)-Dissol	ved	97.0		%		80-120	21-JUL-16
Molybdenum (Mo)-Disso	blved	99.6		%		80-120	21-JUL-16
Nickel (Ni)-Dissolved		97.1		%		80-120	21-JUL-16
Potassium (K)-Dissolve	d	93.8		%		80-120	21-JUL-16
Selenium (Se)-Dissolve	d	101.0		%		80-120	21-JUL-16
Sodium (Na)-Dissolved		98.0		%		80-120	21-JUL-16
Thallium (TI)-Dissolved		99.6		%		80-120	21-JUL-16
Uranium (U)-Dissolved		98.2		%		80-120	21-JUL-16
Zinc (Zn)-Dissolved		91.9		%		80-120	21-JUL-16
WG2352059-1 MB Aluminum (Al)-Dissolved	d	<0.0050		mg/L		0.005	21-JUL-16
Arsenic (As)-Dissolved		<0.00010		mg/L		0.0001	21-JUL-16
Cadmium (Cd)-Dissolve	d	<0.00010		mg/L		0.00001	21-JUL-16
Calcium (Ca)-Dissolved		<0.050		mg/L		0.05	2100210
(,)				<u>.</u>			



## **Quality Control Report**

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		Workorder:	L180106	7	Report Date: 2	9-AUG-16		Page 4 of <sup>2</sup>
Client: Contact:	Baffinland Iron Mine's C 2275 Upper Middle Rd. Oakville ON L6H 0C3 Jim Millard	E. Suite #300						
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS	-WT Water							
Batch	R3509130							
WG235205			-0.050		~~~/l		0.05	
	Ca)-Dissolved u)-Dissolved		<0.050 <0.00020		mg/L mg/L		0.0002	21-JUL-16
Iron (Fe)-E			<0.00020				0.0002	21-JUL-16
Lead (Pb)-			<0.000050	0	mg/L mg/L		0.00005	21-JUL-16 21-JUL-16
. ,	m (Mg)-Dissolved		<0.050	0	mg/L		0.00003	
Ũ	e (Mn)-Dissolved		<0.00050		mg/L		0.0005	21-JUL-16
ů.	um (Mo)-Dissolved		< 0.000050		mg/L		0.00005	21-JUL-16 21-JUL-16
	-Dissolved		<0.00050		mg/L		0.0005	21-JUL-16
. ,	(K)-Dissolved		<0.050		mg/L		0.05	21-JUL-16
	(Se)-Dissolved		< 0.000050	0	mg/L		0.00005	21-JUL-16
	la)-Dissolved		<0.50		mg/L		0.5	21-JUL-16
Thallium (	TI)-Dissolved		<0.00001	0	mg/L		0.00001	21-JUL-16
Uranium (I	U)-Dissolved		<0.00001	0	mg/L		0.00001	21-JUL-16
Zinc (Zn)-I	Dissolved		<0.0010		mg/L		0.001	21-JUL-16
WG235205	9-5 MS	WG2352059-3						
Aluminum	(AI)-Dissolved		90.5		%		70-130	21-JUL-16
Arsenic (A	s)-Dissolved		98.8		%		70-130	21-JUL-16
Cadmium	(Cd)-Dissolved		102.1		%		70-130	21-JUL-16
Calcium (C	Ca)-Dissolved		N/A	MS-B	%		-	21-JUL-16
Copper (C	u)-Dissolved		96.8		%		70-130	21-JUL-16
Iron (Fe)-D			92.3		%		70-130	21-JUL-16
Lead (Pb)-	Dissolved		98.6		%		70-130	21-JUL-16
Magnesiur	m (Mg)-Dissolved		N/A	MS-B	%		-	21-JUL-16
Manganes	e (Mn)-Dissolved		N/A	MS-B	%		-	21-JUL-16
Molybdenu	um (Mo)-Dissolved		98.7		%		70-130	21-JUL-16
	-Dissolved		95.2		%		70-130	21-JUL-16
Potassium	(K)-Dissolved		97.2		%		70-130	21-JUL-16
	(Se)-Dissolved		106.7		%		70-130	21-JUL-16
· ·	la)-Dissolved		111.8		%		70-130	21-JUL-16
Thallium (	TI)-Dissolved		98.1		%		70-130	21-JUL-16

99.0

92.3

%

%

70-130

70-130

21-JUL-16

21-JUL-16

MET-T-MS-WT

Uranium (U)-Dissolved

Zinc (Zn)-Dissolved



## **Quality Control Report**

Workorder: L1801067

Report Date: 29-AUG-16

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Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3509713 WG2352546-4 DUP Aluminum (Al)-Total		<b>WG2352546-3</b> 0.018	0.017		mg/L	1.8	20	22-JUL-16
Arsenic (As)-Total		0.00043	0.00042		mg/L	2.0	20	22-JUL-16
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	2.0 N/A	20	22-JUL-16
Calcium (Ca)-Total		37.2	38.2		mg/L	2.6	20	22-JUL-16
Copper (Cu)-Total		0.0023	0.0021		mg/L	8.7	20	22-JUL-16
Iron (Fe)-Total		0.060	0.059		mg/L	1.7	20	22-JUL-16
Lead (Pb)-Total		0.00013	0.00024	J	mg/L	0.00011	0.0002	22-JUL-16
Magnesium (Mg)-Total		4.69	4.69		mg/L	0.1	20	22-JUL-16
Manganese (Mn)-Total		0.0352	0.0354		mg/L	0.5	20	22-JUL-16
Molybdenum (Mo)-Total		0.000243	0.000262		mg/L	7.6	20	22-JUL-16
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-JUL-16
Potassium (K)-Total		0.866	0.853		mg/L	1.5	20	22-JUL-16
Selenium (Se)-Total		0.000084	0.000087		mg/L	3.5	20	22-JUL-16
Sodium (Na)-Total		13.9	13.8		mg/L	0.5	20	22-JUL-16
Thallium (TI)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUL-16
Uranium (U)-Total		0.000254	0.000258		mg/L	1.6	20	22-JUL-16
Zinc (Zn)-Total		<0.0030	0.0041	RPD-NA	mg/L	N/A	20	22-JUL-16
WG2352546-2 LCS Aluminum (Al)-Total			96.0		%		00.400	
Arsenic (As)-Total			98.3		%		80-120	22-JUL-16
Cadmium (Cd)-Total			90.3 97.8		%		80-120 80-120	22-JUL-16 22-JUL-16
Calcium (Ca)-Total			98.4		%		80-120	22-JUL-16
Copper (Cu)-Total			99.1		%		80-120	22-JUL-16
Iron (Fe)-Total			100.4		%		80-120	22-JUL-16
Lead (Pb)-Total			100.0		%		80-120	22-JUL-16
Magnesium (Mg)-Total			97.9		%		80-120	22-JUL-16
Manganese (Mn)-Total			98.6		%		80-120	22-JUL-16
Molybdenum (Mo)-Total			99.8		%		80-120	22-JUL-16
Nickel (Ni)-Total			98.3		%		80-120	22-JUL-16
Potassium (K)-Total			99.97		%		80-120	22-JUL-16
Selenium (Se)-Total			98.7		%		80-120	22-JUL-16
Sodium (Na)-Total			99.0		%		80-120	22-JUL-16
Thallium (TI)-Total			98.8		%		80-120	22-JUL-16



## **Quality Control Report**

 Workorder:
 L1801067
 Report Date:
 29-AUG-16
 Page
 6
 of
 10

 Baffinland Iron Mine's Corporation (Oakville)
 2275 Upper Middle Rd. E. Suite #300
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Contact: Jim Millard

Client:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3509713								
WG2352546-2 LCS								
Uranium (U)-Total			102.8		%		80-120	22-JUL-16
Zinc (Zn)-Total			93.7		%		80-120	22-JUL-16
WG2352546-1 MB Aluminum (Al)-Total			<0.010		mg/L		0.01	22-JUL-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-JUL-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	22-JUL-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	22-JUL-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	22-JUL-16
Iron (Fe)-Total			<0.050		mg/L		0.05	22-JUL-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	22-JUL-16
Magnesium (Mg)-Total			<0.050		mg/L		0.05	22-JUL-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	22-JUL-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-JUL-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-JUL-16
Potassium (K)-Total			<0.050		mg/L		0.05	22-JUL-16
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-JUL-16
Sodium (Na)-Total			<0.50		mg/L		0.5	22-JUL-16
Thallium (TI)-Total			<0.000010		mg/L		0.00001	22-JUL-16
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-JUL-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-JUL-16
WG2352546-5 MS		WG2352546-3						
Aluminum (Al)-Total			93.3		%		70-130	22-JUL-16
Arsenic (As)-Total			92.4		%		70-130	22-JUL-16
Cadmium (Cd)-Total			92.9		%		70-130	22-JUL-16
Calcium (Ca)-Total			N/A	MS-B	%		-	22-JUL-16
Copper (Cu)-Total			92.3		%		70-130	22-JUL-16
Iron (Fe)-Total			N/A	MS-B	%		-	22-JUL-16
Lead (Pb)-Total			94.2		%		70-130	22-JUL-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-JUL-16
Manganese (Mn)-Total			N/A	MS-B	%		-	22-JUL-16
Molybdenum (Mo)-Total			98.8		%		70-130	22-JUL-16
Nickel (Ni)-Total			93.9		%		70-130	22-JUL-16
Potassium (K)-Total			92.0		%		70-130	22-JUL-16
Selenium (Se)-Total			93.3		%		70-130	22-JUL-16



## **Quality Control Report**

				Quant		or Keport			
			Workorder:	L1801067	,	Report Date:	29-AUG-16		Page 7 of 10
2	2275 Uppe	Iron Mine's Corp er Middle Rd. E. S DN L6H 0C3	oration (Oakville) Suite #300	)					
	Jim Millaro								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT		Water							
Batch R3	3509713								
<b>WG2352546-5</b> Sodium (Na)-Te	MS otal		WG2352546-3	N/A	MS-B	%		-	22-JUL-16
Thallium (TI)-To	otal			93.1		%		70-130	22-JUL-16
Uranium (U)-To	otal			N/A	MS-B	%		-	22-JUL-16
Zinc (Zn)-Total				97.6	_	%		70-130	22-JUL-16
NH3-WT		Water							
Batch R3	3511327								
WG2352634-11 Ammonia, Tota			<b>L1801903-1</b> 0.063	0.054		mg/L	15	20	22-JUL-16
<b>WG2352634-10</b> Ammonia, Tota				100.2		%		85-115	22-JUL-16
WG2352634-9 Ammonia, Tota	MB			<0.020		mg/L		0.02	22-JUL-16
WG2352634-12	MS		L1801903-1	98.6		%			
Ammonia, Tota NO3-IC-WT	(as N)	Water		90.0		70		75-125	22-JUL-16
	3510558	water							
WG2352992-10			WG2352992-8						
Nitrate (as N)	1.00		16.5	16.5		mg/L	0.2	25	22-JUL-16
WG2352992-7 Nitrate (as N)	LCS			100.7		%		70-130	22-JUL-16
WG2352992-6 Nitrate (as N)	MB			<0.020		mg/L		0.02	22-JUL-16
WG2352992-9 Nitrate (as N)	MS		WG2352992-8	N/A	MS-B	%		-	22-JUL-16
P-T-COL-WT		Water							
Batch R3	3509179								
WG2352557-3 Phosphorus, To	<b>DUP</b> otal		<b>L1800881-1</b> 0.0104	0.0130	J	mg/L	0.0026	0.006	22-JUL-16
WG2352557-2 Phosphorus, To	LCS otal			99.9		%		80-120	22-JUL-16
WG2352557-1 Phosphorus, To	<b>MB</b> otal			<0.0030		mg/L		0.003	22-JUL-16
WG2352557-4 Phosphorus, To	MS		L1800881-1	94.9		%		70-130	22-JUL-16
PH-BF		Water							



## **Quality Control Report**

			Workorder:	L1801067	7 Re	port Date: 29-Al	JG-16		Page 8 of 10
Client:	2275 Upp	Iron Mine's Corp er Middle Rd. E. 3 DN L6H 0C3	ooration (Oakville) Suite #300						
Contact:	Jim Millaro	b							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF		Water							
	R3507976								
<b>WG2351338-</b> рН	2 DUP		<b>L1800881-2</b> 8.11	8.07	J	pH units	0.04	0.2	20-JUL-16
WG2351338-	1 LCS				Ū	·	0.01	0.2	
рН				7.02		pH units		6.9-7.1	20-JUL-16
SO4-IC-N-WT		Water							
Batch	R3510558								
WG2352992-			<b>WG2352992-8</b> 47.3	17 5		~~~/l	0.0	20	00 11 11 40
Sulfate (SO4 WG2352992-			47.3	47.5		mg/L	0.3	20	22-JUL-16
Sulfate (SO4				101.2		%		90-110	22-JUL-16
WG2352992-0	6 MB								
Sulfate (SO4	)			<0.30		mg/L		0.3	22-JUL-16
WG2352992-9 Sulfate (SO4			WG2352992-8	91.8		%		75-125	22-JUL-16
SOLIDS-TDS-BF	-	Water							
	R3508429								
WG2351499-3 Total Dissolv			<b>L1799920-7</b> 120	130		mg/L	8.0	25	21-JUL-16
WG2351499-2 Total Dissolv				102.9		%		70-130	21-JUL-16
WG2351499- Total Dissolv				<20		mg/L		20	21-JUL-16
SOLIDS-TSS-BF		Water							
Batch	R3508440								
WG2351497-3 Total Suspen			<b>L1799920-8</b> <2.0	<2.0	RPD-NA	mg/L	N/A	25	21-JUL-16
WG2351497-2 Total Suspen				100.0		%		85-115	21-JUL-16
WG2351497- <sup>,</sup> Total Suspen				<2.0		mg/L		2	21-JUL-16
TKN-WT		Water							
	R3509989								
WG2352585-3 Total Kjeldah			<b>L1800424-1</b> 155	161		mg/L	3.6	20	22-JUL-16
WG2352585-2 Total Kjeldah				103.6		%		75-125	22-JUL-16
WG2352585-7	1 MB								



## **Quality Control Report**

				Quanty	Contr	ornepon			
			Workorder:	L1801067		Report Date: 29-	AUG-16		Page 9 of 10
Client:	2275 Upp	l Iron Mine's Cor <sub>l</sub> er Middle Rd. E. ON L6H 0C3	poration (Oakville Suite #300	))					
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT		Water							
Batch F WG2352585-1 Total Kjeldahl				<0.15		mg/L		0.15	22-JUL-16
WG2352585-4 Total Kjeldahl	MS		L1800424-1	N/A	MS-B	%		-	22-JUL-16
тос-wт		Water							
Batch F	R3511654								
WG2353834-3 Total Organic	-		<b>L1800901-1</b> 4.0	4.3		mg/L	7.0	20	24-JUL-16
WG2353834-2 Total Organic				91.6		%		80-120	24-JUL-16
WG2353834-1 Total Organic				<1.0		mg/L		1	24-JUL-16
WG2353834-4 Total Organic	-		L1800901-1	94.3		%		70-130	24-JUL-16
TURBIDITY-BF		Water							
WG2351495-3	R3507971 DUP		L1799920-1	4.00					
Turbidity <b>WG2351495-1</b> Turbidity	MB		4.33	4.32 <0.10		NTU	0.2	25 0.1	19-JUL-16 19-JUL-16

Workorder: L1801067

Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd, F. Suite #300

2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Contact: Jim Millard

#### Legend:

Client:

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 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.



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Fathead minnow EPS 1/RM/22 1 of 5

Work Order :	231524
Sample Number :	48375

Warning Limits  $(\pm 2SD)$ :

### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo		
Location :	Waterloo ON	Date Collected :	2016-07-19
Substance :	L1801067 MS-08	Time Collected :	11:55
Sampling Method :	Grab	Date Received :	2016-07-21
Sampled By :	C.D./B.B.	Time Received :	13:00
Temp. on arrival :	24.0°C	Date Tested :	2016-07-21
Sample Description :	Cloudy, light brown, odourless		
Test Method :	Test of Larval Growth and Survival Using Fathead Minn	ows. Environment Ca	nada, Conservation
	and Protection. Ottawa, Ontario. Report EPS 1/RM/22	2nd ed. (February 201	1).

		TEST RESULTS	
Effect	Value 95%	Confidence Limits	Statistical Method
IC25 (Growth from Biomass)	>100%	-	-
LC50	>100%	-	-
	The results reporte	d relate only to the sample tested.	
	POTASSIUM CHLOR	RIDE REFERENCE TOXICA	ANT DATA
Date Tested :	2016-07-20	Analyst(s) :	SDC, XD, MA, AW, NL
Organism Batch :	Fm16-07	Test Duration :	7 days
IC25 Growth (from Biomass) :	0.96 g/L	LC50 :	1.15 g/L
95% Confidence Limits :	0.89 - 1.01 g/L	95% Confidence	Limits : 1.09 - 1.21 g/L
Statistical Method :	Non-Linear Regression	(CETIS) <sup>a</sup> Statistical Metho	d : Spearman-Kärber (CETIS) <sup>a</sup>
Historical Mean IC25 :	1.02 g/L	Historical Mean	LC50 : 1.21 g/L

The reference toxicity test was performed under the same experimental conditions as those used with the test sample.

#### **TEST CONDITIONS**

Warning Limits (± 2SD) : 1.09 - 1.34 g/L

Test Organism :	Pimephales promelas	Test Type :	Static Renewal
Organism Batch :	Fm16-07	Control/Dilution Water :	Well water (no chemicals added)
Organism Age :	~07:00 - 22:25 h at start of test	Test Volume / Replicate :	300 mL
Source :	In-house culture	Test Vessel :	420 mL polystyrene beaker
Culture Mortality/Diseased :	0.2 % (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.

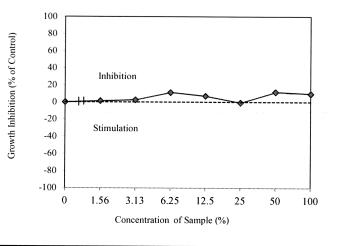
•No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.

•Inflated swim bladders were confirmed in all test organisms used in this test.

0.90 - 1.16 g/L

#### AQUATOX

Work Order :231524Sample Number :48375



### Fathead Minnow Growth Inhibition (based on Biomass)

#### REFERENCES

<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

<sup>b</sup>Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics, 11*:1-21.

Environment Canada, 2005. Guidance Document on Statistical Methods for Environmental Toxicity Tests. Environmental Protection Series, Ottawa, Ont., Rept. EPS 1/RM/46.

-//UldZ Project Mahage 2016-08-24 Approved By: Date : yyyy-mm-da



Work Order : Sample Number : 

**TOXICITY TEST REPORT** Fathead minnow EPS 1/RM/22

3 of 5

#### CUMULATIVE DAILY CONTROL MORTALITY AND IMPAIRMENT (±SD)

· Date :

2016-07-21 2016-07-22 2016-07-23 2016-07-24 2016-07-25 2016-07-26 2016-07-27 2016-07-28  $0.00\% \ (\pm 0.0) \quad 0.00\% \ (\pm$ 

				FATH	EAD	MINN	OW (	CUMU	LATI	VE DA	AILY	MOR	<b>FALI</b>	ſΥ				*****
Initiation Tin	ne :	14:55																
Initiation Dat	te :	2016-07	7-21															
Completion I	Date :	2016-07	7-28															
-		Day		Da		Da	y 2	Da	y 3	Da	iy 4	Da	ny 5	Da	y 6	Da	у 7	Treatment
Date :		2016-0		2016-		2016-	07-23	2016-	07-24	2016-	-07-25	2016	-07-26	2016-	07-27	2016-	07-28	Mean Mortality
Analyst(s):		M	С	S	S	Μ	A	S	V	S	V	S	$\mathbf{v}$	Μ	A	CZ	ZN	(± SD)
Concentration	l i	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	
	А	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Control	В	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	С	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	А	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1.56	В	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	С	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	А	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	
3.13	В	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.33 (±5.77)
	С	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	А	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6.25	В	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	6.67 (±5.77)
	С	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	
	А	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	
12.5	В	0	0	0	0	0	0	1	10	1	10	2	20	4	40	4	40	16.67 (±20.82)
	С	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Aberrant behaviour or swimming impairment :

0.00 (±0.00)

3.33 (±5.77)

 $0.00 (\pm 0.00)$ 

A

В

С

A

В

С

Α

В

С

None

Data Reviewed By: 4/1/1 Date : 201608707

AQUATOX

Work Order : 231524 Sample Number : 48375

Concentration	Replicate	Number of Larvae Exposed	Replicate Mean Dry Weight (mg)	Treatment Mean Biomass (mg)	Standard Deviation
(%)		Bui vue Exposed	bry weight (mg)	Diomass (mg)	Deviation
	А	10	0.851		
Control	В	10	0.855	0.872	0.032
	С	10	0.909		
	А	10	0.836		
1.56	В	10	0.903	0.860	0.038
	С	10	0.840		
	А	10	0.763		
3.13	В	10	0.854	0.849	0.084
	С	10	0.930		
	А	10	0.832		
6.25	В	10	0.847	0.774	0.113
	C	10	0.644		
	А	10	0.709		
12.5	В	10	0.681	0.811	0.201
	С	10	1.042		
	Α	10	0.859		
25	В	10	0.809	0.878	0.080
	С	10	0.966		
	А	10	0.808		
50	В	10	0.729	0.771	0.040
	С	10	0.775		
	А	10	0.811		1
100	В	10	0.880	0.788	0.106
	С	10	0.672		

## FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

NOTES :

•No outlying data points were detected according to Grubbs Test<sup>b</sup>.

• Control average dry weight per surviving organism = 0.872 mg

Data Reviewed By: KEH Date : 2016-DSV7

AQUATOX

**TOXICITY TEST REPORT** 

Fathead minnow

EPS 1/RM/22

5 of 5

Work Order :231524Sample Number:48375

### Fathead Minnow Water Chemistry Data

		Initial Chemistry:	• • •		рН	Conductivity (µmhos/cm)	Hardness (mg/L as CaCO <sub>3</sub> )		
			25.0	9.6	7.8	74	3	0	
		Day 0 - 1	Day 1 - 2	Day 2 - 3	Day 3 - 4	Day 4 - 5	Day 5 - 6	Day 6 - 7	
		2016-07-21	2016-07-22	2016-07-23	2016-07-24	2016-07-25	2016-07-26	2016-07-27	
ub-sample Used		1	1	1	2	2	3	3	
emperature (°C)		25.0	26.0	25.0	25.0	25.0	25.0	25.0	
issolved Oxygen		9.6	9.3	9.8	9.8	9.6	9.5	9.6	
Dissolved Oxygen	% Sat. <sup>1</sup>	119	114	119	119	118	116	118	
H		7.8	7.7	7.8	7.8	7.6	8.0	7.6	
re-aeration Time	(min) <sup>2</sup>	20	20	20	20	20	20	20	
Analyst(s	): Initial	MC	MC	CG	CG	SDC	SDC	SDC	
	Final	MC	CG	CG	SV	SV	SDC	CZN	
Control (0%)									
ſemp.(°Ċ)	Initial	25.0	26.0	25.0	25.0	25.0	25.0	25.0	
*	Final	26.0	25.0	25.0	25.0	25.0	25.0	25.0	
OO % Sat.	Initial	99	100	99	99	97	99	101	
OO (mg/L)	Initial	8.1	8.0	8.0	8.0	7.9	8.0	8.2	
	Final	7.5	6.9	7.6	7.4	6.7	6.6	6.7	
Н	Initial	8.3	8.3	8.4	8.4	8.3	8.3	8.4	
	Final	8.2	8.0	8.2	8.2	7.9	8.0	8.0	
Cond. (µmhos)	Initial	600	596	645	652	667	650	656	
.56 %									
emp.(°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0	25.0	
-	Final	26.0	25.0	25.0	25.0	25.0	25.0	25.0	
O (mg/L)	Initial	7.9	8.2	8.4	8.2	8.1	8.0	8.1	
	Final	8.0	6.9	7.6	7.5	6.7	7.0	6.5	
Н	Initial	8.3	8.3	8.4	8.5	8.4	8.4	8.4	
	Final	8.3	8.0	8.2	8.2	7.9	8.0	7.9	
Cond. (µmhos)	Initial	591	568	636	644	657	644	645	
5 %									
emp.(°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0	25.0	
	Final	26.0	25.0	25.0	25.0	25.0	25.0	25.0	
O (mg/L)	Initial	8.0	8.3	8.4	8.3	8.2	8.2	8.2	
	Final	7.8	6.9	7.6	7.6	6.8	6.9	6.6	
Н	Initial	8.3	8.4	8.4	8.5	8.4	8.4	8.4	
	Final	8.2	7.9	8.1	8.1	7.8	7.9	7.9	
ond. (µmhos)	Initial	472	474	513	516	516	515	516	
00 %									
emp.(°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0	25.0	
	Final	26.0	25.0	25.0	25.0	25.0	25.0	25.0	
O (mg/L)	Initial	8.4	8.6	9.0	8.8	9.1	8.8	9.0	
	Final	7.5	6.9	7.5	7.6	6.8	7.0	6.7	
Н	Initial	8.0	8.1	8.1	8.3	8.0	7.9	8.3	
	Final	7.8	7.4	7.5	7.4	7.3	7.8	7.7	
ond. (µmhos)	Initial	69	67	73	83	73	71	73	

"-" = not measured

<sup>1</sup> % saturation (adjusted for actual temperature and barometric pressure)

 $^{2} \leq 100$  bubbles/minute



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Ceriodaphnia dubia EPS 1/RM/21 1 of 4

Work Order :	231524
Sample Number :	48375

	SAMPLE I	DENTIFICATION	
Company : Location : Substance : Sampling Method : Sampled By : Temp. on arrival : Sample Description :	ALS Laboratory Group, Waterloo Waterloo ON L1801067 MS-08 Grab C.D./B.B. 24.0°C Cloudy, light brown, odourless	Time Date Time	Collected :2016-07-19Collected :11:55Received :2016-07-21Received :13:00Tested :2016-07-21
Test Method :	Test of Reproduction and Survival Conservation and Protection. Ottav		<i>odaphnia dubia</i> . Environment Canada, I/RM/21, 2nd ed. (February 2007).
	TES	T RESULTS	
Effect	Value 95%	% Confidence Limits	Statistical Method
LC50	>100%	_	_
IC25 (Reproduction)	91.2%	59.5-97.2	Linear Interpolation (TOXSTAT) d
	The results reported re	elate only to the sample tested	1.
	SODIUM CHLORIDE R	EFERENCE TOXICAN	Г ДАТА
Date Tested : Organism Batch :	2016-07-12 Cd16-07	Analyst(s) : Test Duration :	SEC, SS 6 days
IC25 Reproduction : 95% Confidence Limits Statistical Method : Historical Mean IC25 : Warning Limits (± 2SD) The reference toxicity test wa	Linear Interpolation (CETIS 1.36 g/L	Historical Mean LC Warning Limits (± 2	Spearman-Kärber (CETIS) <sup>a</sup> 550 : 2.24 g/L 2SD) : 1.95 - 2.56 g/L
		CONDITIONS	1
Sample Filtration : Test Aeration : pH Adjustment : Hardness Adjustment : Daily Renewal Method :	None None None Transferred to fresh solutior	Test Volume per Re Test Vessel : Depth of Test Solut Organisms per Repl	19 mL polystyrene vial ion : 4.8 cm icate : 1
Control/Dilution Water :	Well water (no chemicals ac		

#### COMMENTS

\*Note: The reference toxicant LC50 test result exceeded the 95% warning limits for historical data. No other unusual circumstances were observed and therefore the test result is considered acceptable.

•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  $(Toxstat)^d$ .

AQUATOX
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Work Order :

Sample Number :

#### TOXICITY TEST REPORT

Ceriodaphnia dubia EPS 1/RM/21 2 of 4

				TEST	ORGANI	SMS						
Test Organism : Organism Batch : Organism Origin : Test Organism Origin :	<i>Ceriodaphni</i> Cd 16-07 Single in-hou Individual in	ise mass c			Range of Mean Br Ephippia	ood Orga	nism Mo	/	:		10:40 0% No	h - 21:50 h
				I	Brood Or	ganism N	Neonate	Produc	ction			
Replicate :		1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subseque	nt brood):	16	16	12	16	14	13	13	15	14	13	14.2
Total (first three broods)	):	24	25	19	25	22	24	24	20	25	22	23.0

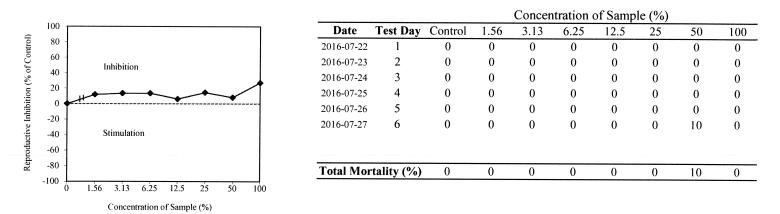
No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.

## **TEST DATA**

#### Ceriodaphnia dubia Reproductive Inhibition

231524

48375



#### REFERENCES

<sup>a</sup> CETIS™, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

<sup>d</sup> West, Inc. and D. Gulley. 1996. Toxstat Release 3.5. Western Ecosystems Technology. Cheyenne, WY, U.S.A.

Date :

Approved By :

Une Project Manage

Cumulative Daily Test Organism Mortality (%)

## AQUATOX

## **TOXICITY TEST REPORT**

Ceriodaphnia dubia EPS 1/RM/21 3 of 4

Work Order :	231524
Sample Number :	48375

#### Ceriodaphnia dubia Survival and Reproduction

Test Initiation Date :	2016-07-21
Initiation Time :	14:45
Test Completion Date :	2016-07-27

Concentration (	%)					Re	plicate	•				Mean Young	Analyst(	s) Concentration	n (%)					Rej	plicate	,				Mean
Control	Day	1	2	3	4	5	6	7	8	9	10	(±SD)		12.5	Day	1	2	3	4	5	6	7	8	9	10	Young (±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0	SS	2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0	MA	2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0	MA	2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	4	5	5	3	4	5	5	4	5	6	4.6	XD	2016-07-25	4	5	6	3	5	4	6	6	5	3	5	4.8
2016-07-26	5	10	11	10	8	8	7	10	9	7	9	8.9	CZN	2016-07-26	5	10	10	8	8	9	10	9	7	7	9	8.7
2016-07-27	6	14	15	12	15	10	8	15	13	12	13	12.7	RD	2016-07-27	6	12	14	12	12	0	11	13	14	10	13	11.1
Fotal		28	31	27	26	22	20	30	26	24	28	26.2 (±3.4	)	Total		27	30	23	25	13	27	28	26	20		

Concentration (	%)					Rep	olicate	9				Mean
1.56	Day	1	2	3	4	5	6	7	8	9	10	Young (±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	7	4	5	3	5	2	4	4	5	3	4.2
2016-07-26	5	8	7	7	10	9	0	10	9	5	11	7.6
2016-07-27	6	14	15	13	12	0	7	13	13	12	14	11.3
Fotal		29	26	25	25	14	9	27	26	22	28	23.1 (±6

Concentration (	%)					Rej	plicate					Mean
3.13	Day	1	2	3	4	5	6	7	8	9	10	Young (±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	4	5	3	3	3	5	4	2	6	4	3.9
2016-07-26	5	12	8	8	5	6	10	7	9	6	10	8.1
2016-07-27	6	14	10	8	11	7	11	12	10	11	13	10.7
Total		30	23	19	19	16	26	23	21	23	27	22.7 (±4.

Concentration	(%)					Rej	olicate					Mean
25	Day	1	2	3	4	5	6	7	8	9	10	Young (±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	6	5	4	5	4	4	4	3	4	5	4.4
2016-07-26	5	7	8	7	7	9	7	7	7	9	10	7.8
2016-07-27	6	11	12	12	10	0	12	13	8	11	13	10.2
Fotal		24	25	23	22	13	23	24	18	24	28	22.4 (±4.

Concentration	(%)					Rep	olicate					Mean Young
50	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	5	5	4	4	4	0	6	4	3	3	3.8
2016-07-26	5	8	7	8	8	8	7	13	9	9	7	8.4
2016-07-27	6	13 ;	x 12	10	14	12	12	13	12	11	10	11.9
Total		26	24	22	26	24	19	32	25	23	20	24.1 (±3.

Concentration (	%)					Re	plicate	2				Mean Young	Concentration	(%)					Re	olicate					Mean Young
6.25	Day	1	2	3	4	5	6	7	8	9	10	(±SD)	100	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0	2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0	2016-07-23	2	0	0	0	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0	2016-07-24	3	0	0	0	0	0	0	0	0	0	0	0
2016-07-25	4	5	6	3	5	6	4	4	5	2	3	4.3	2016-07-25	4	5	6	4	3	4	0	4	3	2	4	3.5
2016-07-26	5	9	7	7	9	8	9	12	10	4	3	7.8	2016-07-26	5	0	8	10	7	10	7	8	7	8	10	7.5
2016-07-27	6	11	10	9	13	12	13	10	12	7	9	10.6	2016-07-27	6	6	9	11	8	9	8	11	0	8	11	8.1
Total		25	23	19	27	26	26	26	27	13	15	22.7 (±5.2)	Total		11	23	25	18	23	15	23	10	18	25	19.1 (±5.6

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.
•No outlying data points were detected according to Grubbs Test (CETIS)<sup>a</sup>.

"x"= test organism mortality "\*"= accidental test organism mortality "-"=4th brood (see 'NOTES')

Data Reviewed By : Date : 2016 d

Work Order :

Sample Number: 48375

231524

#### TOXICITY TEST REPORT

*Ceriodaphnia dubia* EPS 1/RM/21 4 of 4

### Ceriodaphnia dubia Water Chemistry Data

		Initial Chemistry:	Temp. (°C)	DO (mg/L)	рН	Conductivity (µmhos/cm)	Hardness (mg/L as CaCO <sub>3</sub> )
			25.0	9.6	7.8	74	30
Date :		Day 0 - 1 2016-07-21	Day 1 - 2 2016-07-22	Day 2 - 3 2016-07-23	Day 3 - 4 2016-07-24	Day 4 - 5 2016-07-25	Day 5 - 6 2016-07-26
Sub-sample Use	•d	1	1	1	2010-07-24	2010-07-23	3
Temperature (°		25.0	26.0	25.0	25.0	25.0	25.0
Dissolved Oxyg	,	9.6	9.3	9.8	9.8	9.6	9.5
Dissolved Oxyg		119	114	119	119	118	
pH	en /o Sat.	7.8	7.7	7.8			116
Pre-aeration Ti					7.8	7.6	8.0
rre-aeration 11	me (min)	20	20	20	20	20	20
Analyst(s)	Initial	MC	MC	CG	CG	SDC	SDC
	Final	MC	CG	CG	SV	SV	AW
Control (0%)							
Temp. (°C)	, Initial	25.0	26.0	25.0	25.0	25.0	25.0
remp. ( C)	Final	26.0	24.0	23.0	23.0	23.0	23.0
DO % Sat. <sup>3</sup>	Initial	99	100	99	99	97	99
DO (mg/L)	Initial	8.1	8.0	8.0	8.0	7.9	8.0
(8)	Final	7.3	7.7	7.5	7.7	7.6	7.6
pН	Initial	8.3	8.3	8.4	8.4	8.3	8.3
	Final	8.0	8.1	8.2	8.2	8.2	7.9
Cond. (µmhos)	Initial	600	596	645	652	667	650
1.56 %							
Temp. (°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0
	Final	26.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	Initial	7.9	8.2	8.4	8.2	8.1	8.0
	Final	7.4	7.8	7.6	7.6	7.6	7.6
рН	Initial	8.3	8.3	8.4	8.5	8.4	8.4
Cond. (µmhos)	Final Initial	8.0 591	8.1 568	8.2	8.2	8.1	8.0
Cond. (µnnios)	muai	391	308	636	644	657	644
25 %							
Temp. (°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0
DO ( //)	Final	26.0	24.0	24.0	24.0	24.0	24.0
DO (mg/L)	Initial Einal	8.0	8.3	8.4	8.3	8.2	8.2
pН	Final Initial	7.4 8.3	7.8 8.4	7.6 8.4	7.6	7.6	7.6
pri	Final	8.0	8.1	8.4 8.2	8.5 8.1	8.4 8.1	8.4
Cond. (µmhos)	Initial	472	474	513	516	516	8.1 515
100 %							
Temp. (°C)	Initial	25.0	26.0	25.0	25.0	25.0	25.0
p. ( ©)	Final	25.0	20.0	23.0	23.0 24.0	23.0 24.0	23.0 24.0
DO (mg/L)	Initial	8.4	8.6	9.0	8.8	9.1	8.8
	Final	7.5	8.1	7.8	7.7	7.7	7.7
рН	Initial	8.0	8.1	8.1	8.3	8.0	7.9
	Final	8.0	7.9	7.9	7.8	7.5	7.6
Cond. (µmhos)	Initial	69	67	73	83	73	71

"\_" = not measured

 $^3$  % saturation (adjusted for actual temperature and barometric pressure)

 $^4 \leq 100$  bubbles/minute



 Work Order :
 231524

 Sample Number :
 48375

AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

TOXICITY TEST REPORT

Lemna minor EPS 1/RM/37 Page 1 of 4

SAMPI	LE IDENTIFICATION				
ALS Laboratory Group, Waterloo	)				
Waterloo ON		lected :	2016-07-19		
L1801067 MS-08	Time Col	lected :	11:55		
Grab	Date Rec	eived :	2016-07-21		
C.D./B.B.	Time Rec	ceived :	13:00		
24.0°C	Date Test	ted :	2016-07-21		
Cloudy, light brown, odourless					
Test for Measuring the Inhibition	of Growth using the Freshwater	Macrophyte	, Lemna minor.		
	t EPS 1/RM/37, 2nd ed. (January	2007) with	deviation(s) as noted		
below.					
Value 9.	5% Confidence Limits	Sta	tistical Method		
>97.0%	-		_		
a) >97.0%	-		-		
The results reported relate	e only to the sample tested.				
POTASSIUM CHLORI	DE REFERENCE TOXICAN	Г ДАТА			
2016-08-03	Statistical Method :	Non-Linear	Regression* (CETIS) <sup>a</sup>		
Lm16-07	Historical Geometric Mean IC25	: 2.20 g/L			
7 days		1.57 - 3.08 g/L			
1.72 g/L	Growth Medium :	Modified APHA			
	Analyst(s) :		J, MA		
			ample.		
TE	ST CONDITIONS				
Lemna minor L., Strain 7730	Test Type :	Static (no si	ub-samples required)		
Lm16-07	Control/Dilution Medium :	Modified APHA			
UTCC 492	Medium Preparation Water :	Distilled Water			
Axenic in-house culture	Source of Water :	Morning Mist			
Modified Hoaglands E+	Medium Preparation Chemicals :	-			
9 days	Nutrient Spiking of Sample :		PHA stocks A, B, C (10 mL/L		
		4			
: 13.2-fold frond increase in 7 days	Replicates per Concentration :	4			
: 13.2-fold frond increase in 7 days 24:50 h in APHA medium		•			
	Replicates per Concentration : Test Volume per Replicate : Test Vessel :	100 mL	ss Erlenmever flask		
24:50 h in APHA medium 2 plants (3 fronds per plant)	Test Volume per Replicate : Test Vessel :	100 mL	ss Erlenmeyer flask		
24:50 h in APHA medium	Test Volume per Replicate : Test Vessel : Depth of Test Solution :	100 mL 250 mL glas 4.0 cm			
24:50 h in APHA medium 2 plants (3 fronds per plant) 1 μm (Whatman GF/C)	Test Volume per Replicate : Test Vessel :	100 mL 250 mL glas 4.0 cm	, 4520 - 5280 lux		
	ALS Laboratory Group, Waterloo Waterloo ON L1801067 MS-08 Grab C.D./B.B. 24.0°C Cloudy, light brown, odourless Test for Measuring the Inhibition Method Development and Applic Canada. Ottawa, Ontario. Repor below. Value 9. >97.0% The results reported relate <b>POTASSIUM CHLORI</b> 2016-08-03 Lm16-07 7 days 1.72 g/L 1.50 - 1.94 g/L was performed under the same experience <b>TE</b> <i>Lemna minor</i> L., Strain 7730 Lm16-07 UTCC 492 Axenic in-house culture Modified Hoaglands E+	L1801067 MS-08 Time Col Grab Date Rec C.D./B.B. Time Rec 24.0°C Date Test Cloudy, light brown, odourless Test for Measuring the Inhibition of Growth using the Freshwater Method Development and Application Section, Environmental Tec Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January below. TEST RESULTS >97.0% - The results reported relate only to the sample tested. POTASSIUM CHLORIDE REFERENCE TOXICANT 2016-08-03 Statistical Method : Lm16-07 Historical Geometric Mean IC25 7 days Warning Limits ( $\pm$ 2SD) : 1.72 g/L Growth Medium : 1.50 - 1.94 g/L Analyst(s) : was performed under the same experimental conditions as those used we TEST CONDITIONS Lemna minor L., Strain 7730 Test Type : Lm16-07 Control/Dilution Medium : UTCC 492 Medium Preparation Water : Axenic in-house culture Source of Water : Modified Hoaglands E+ Medium Preparation Chemicals :	ALS Laboratory Group, Waterloo Waterloo ON Date Collected : L1801067 MS-08 Time Collected : Grab Date Received : C.D./B.B. Time Received : 24.0°C Date Tested : Cloudy, light brown, odourless Test for Measuring the Inhibition of Growth using the Freshwater Macrophyte Method Development and Application Section, Environmental Technology Ce Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January 2007) with below. TEST RESULTS Value 95% Confidence Limits Sta >97.0% - The results reported relate only to the sample tested. POTASSIUM CHLORIDE REFERENCE TOXICANT DATA 2016-08-03 Statistical Method : Non-Linear Lm16-07 Historical Geometric Mean IC25 : 2.20 g/L 7 days Warning Limits ( $\pm$ 2SD) : 1.57 - 3.08 1.72 g/L Growth Medium : Modified A 1.50 - 1.94 g/L Analyst(s) : CG, MA was performed under the same experimental conditions as those used with the test s Lemna minor L., Strain 7730 Test Type : Static (no ss Lm16-07 Control/Dilution Medium : Modified A UTCC 492 Medium Preparation Water : Distilled W Axenic in-house culture Source of Water : Morning M Modified Hoaglands E+ Medium Preparation Chemicals : Modified A		

#### COMMENTS

Noted Deviation(s): Due to technical error, the test plants were acclimated in APHA media for 24 hours and 50 minutes, instead of the 18-24 hours required by the test method. This deviation is not considered to have had a significant impact on the outcome of the test. There were no other unusual conditions or deviations from the test method and this test is considered to be valid.

•All test validity criteria as specified in the test method cited above were satisfied.

\*Poisson weighting (CETIS<sup>a</sup>) was applied.

Accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA)

## AQUATOX

## TOXICITY TEST REPORT

2016-07-28

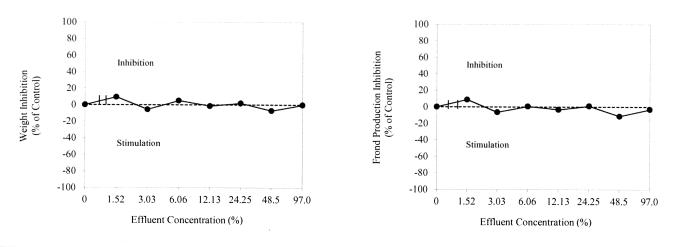
14:00

MA

*Lemna minor* EPS 1/RM/37 Page 2 of 4

Work Order :	231524
Sample Number :	48375

#### Lemna minor Growth Inhibition



### **TEST MONITORING**

Termination Date :

Termination Time :

Terminated By :

Initiation Date :2016-07-21Initiation Time :15:20Initiated By :SEC

Temperat	ture Monitori	ng	pH Monitoring					
Test Day	Date	Temperature	Concentration (%)	Day 0	Day 7			
		(°C)		-	·			
0 (unmodified sample)	2016-07-21	25.0	100 (unmodified sample)	6.9	<u> </u>			
0	2016-07-21	26.0	Control	8.4	8.3			
1	2016-07-22	26.0	1.52	8.3	8.4			
2	2016-07-23	25.0	3.03	-	-			
3	2016-07-24	25.0	6.06	-	-			
4	2016-07-25	26.0	12.13	8.3	8.4			
5	2016-07-26	26.0	24.25	-	-			
6	2016-07-27	26.0	48.5	-	-			
7	2016-07-28	25.0	97.0	8.3	8.4			
"-" = not required	2010/07-20	23.0	97.0	0.5	0.4			

## REFERENCES

<sup>a</sup> CETIS™, © 2000-2013. V.1.8.7.17. 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.

X0/6-Date : vvvv-mm-de

Approved By:

Project Manager

AQUATOX

Work Order : Sample Number : 231524 48375 Lemna minor EPS 1/RM/37 Page 3 of 4

#### Lemna minor Frond Increase

Concentration (%)	Replicate	Frond Count Day 0*	Frond Count Day 7	Frond Increase	Mean Frond Increase	Standard Deviation	CV (%)	Frond/Root Appearance (Day 7)
(70)	A	6	<u>94</u>	88	mercase	Deviation		
Control	В	6	81	75	81.75	6.24	7.6	Fronds healthy, appearance normal
	С	6	84	78			110	in all replicates.
	D	6	92	86				m un reprédices.
	А	6	79	73				
1.52	В	6	83	77	74.75	4.03	5.4	Fronds healthy, appearance normal
	С	6	76	70				in all replicates.
	D	6	85	79				
	A	6	107	101				
3.03	В	6	89	83	87.00	9.49	10.9	Fronds healthy, appearance normal
	С	6	86	80				in all replicates.
	D	6	90	84				
	А	6	80	74				
6.06	В	6	98	92	81.25	7.89	9.7	Fronds healthy, appearance normal
	С	6	88	82				in all replicates.
	D	6	83	77				·
	А	6	87	81				
12.13	В	6	68	62	84.50	17.48	20.7	Fronds healthy, appearance normal
	С	6	98	92				in all replicates.
	D	6	109	103				•
	А	6	90	84				· · · · · · · · · · · · · · · · · · ·
24.25	В	6	82	76	81.00	4.76	5.9	Fronds healthy, appearance normal
	С	6	92	86				in all replicates.
	D	6	84	78				
	А	6	92	86				
48.5	В	6	87	81	91.00	9.63	10.6	Fronds healthy, appearance normal
	С	6	100	94				in all replicates.
	D	6	109	103				-
	А	6	80	74				
97.0	В	6	106	100	84.25	14.01	16.6	Fronds healthy, appearance normal
	С	6	98	92				in all replicates.
	D	6	77	71				*

NOTES: \*No unusual appearance or treatment of culture prior to testing. Test inoculated with healthy plants.

•No significant stimulation ( $\alpha$ =0.05) of frond increase was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)<sup>a</sup> at any test level compared to the control.

•A 14.6-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)<sup>a</sup>.

"-" = not available/not required

Test Data	ı Rev	viewe	d By :	-	Æ
Date :	20	110-	CS-	Ì	9

AQUATOX

## TOXICITY TEST REPORT Lemna minor EPS 1/RM/37 Page 4 of 4

Work Order :	231524
Sample Number :	48375

## Lemna minor Frond Weight Data

Concentration (%)	Replicate	Dry Weight of Fronds (mg)	Treatment Mean Dry Weight (mg)	Standard Deviation
	A	9.36		
Control	В	8.01	8.87	0.93
	С	8.18		
	D	9.94		
	А	8.54		
1.52	В	7.92	8.04	0.74
	С	7.04		
	D	8.66		
	А	10.13		
3.03	В	8.62	9.37	0.67
	С	9.04		
	D	9.70		
	А	7.63		
6.06	В	10.06	8.43	1.13
	С	8.33		
	D	7.71		
	А	8.93		
12.13	В	6.81	8.99	1.56
	С	10.08		
	D	10.15		
	А	8.98		
24.25	В	8.58	8.70	0.50
	С	9.18		
	D	8.05		
	А	9.08		
48.5	В	8.86	9.50	0.62
	С	10.01		
	D	10.04		
	А	7.70		
97.0	В	10.63	8.88	1.40
	С	9.39		
	D	7.80		

NOTES :

•No significant stimulation ( $\alpha$ =0.05) of frond weight was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)<sup>a</sup> at any test level compared to the control.

•No outlying data points were detected according to Grubbs Test (CETIS)<sup>a</sup>.

"-" = not available/not required

Test Da	ta Reviewed By	' :	T.
Date :	2016-08-1	9	



231524

48375

Work Order :

Sample Number :

AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

### TOXICITY TEST REPORT

Pseudokirchneriella subcapitata EPS 1/RM/25 1 of 2

	SAMPLE	IDENTIFICATION			
Company :	ALS Laboratory Group, Waterloo				
Location :	Waterloo ON	Date	Collected :	2016-07-19	
Substance :	L1801067 MS-08		e Collected :	11:55	
Sampling Method :	Grab	Date	Received :	2016-07-21	
Sampled By :	C.D./B.B.	Time	e Received :	13:00	
Temp. on arrival :	24.0°C	Date	Tested :	2016-07-21	
Sample Description :	Cloudy, light brown, odourless				
Test Method :	Growth Inhibition Test Using a Free Protection. Ottawa, Ontario. Repo			servation and	
	TES	T RESULTS			
Effect	Value 95%	Confidence Limits	Statisti	cal Method	
IC25 (Growth)	>90.91%	-		_	
	The results reported	relate only to the sample tester	d.		
	ZINC (AS ZINC SULPHAT	E) REFERENCE TOXIC	ANT DATA		
Date Tested :	2016-08-02	Statistical Method :	Non-Line	ar Regression (CETIS) <sup>a</sup>	
Organism Batch :	Ps16-07	Historical Mean IC25 :	14.3 μg/L	,	
Test Duration :	72 hours	Warning Limits (± 2SD) :	7.8 - 26.5	μg/L	
IC25 Growth :	29.0 µg/L*	Analyst(s) :			
95% Confidence Limits	: 26.4 - 31.9 μg/L				
The reference toxicity test	was performed under the same experimental	conditions as those used with th	e test sample.		
	TEST	CONDITIONS			
Test Organism :	Pseudokirchneriella subcapitata	Control/Dilution Water :	Millipore	Milli-Q (no chemicals added	
Organism Batch :	Ps16-07	Test Vessel :	-	polystyrene microplate	
Strain Number :	CPCC 37	Volume per Replicate :	220 μL	1 5 5	
Source :	In-house culture	Enrichment Medium :	•	EDTA reduced to 25%	
Culture Origin :	University of Waterloo, Waterloo ON	Number of Control Replicat			
Age (at start of test) :	3 days (in exponential growth)	Number of Test Replicates :			
pH Adjustment :	None	Concentrations Tested :	10 + Cont	rol	
Hardness Adjustment :	None	Photoperiod / Light Intensity	y: Continuou	ıs light, 4000 - 4380 lux	
Sample Pre-aeration :	None	Mean Test Temperature (± S			
Sample Filtration :	0.45 µm preconditioned filter	Test Duration :	72 hours	,	
Volume Filtered:	≥10 mL	Test Method Deviation(s) :	None		
		OMMENTS			

#### COMMENTS

\*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.

•All test validity criteria as specified in the test method cited above were satisfied.

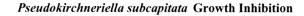
•No unusual appearance or treatment of culture prior to testing.

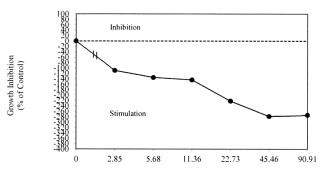
•Algal growth curve is determined at least twice per year as required by the test method cited above.

### AQUATOX

Work Order : 231524 Sample Number : 48375 **TOXICITY TEST REPORT** 

Pseudokirchneriella subcapitata EPS 1/RM/25 2 of 2





Concentration of Sample (%)

#### **CELL ENUMERATION AT 72-HOURS**

Initiation Date :	2016-07-21	Sample pH (at 0 hours):	6.9
Initiated By :	SEC	Control pH (at 0 hours) :	6.5
Completion/Enumeration Date	: 2016-07-24	Control pH (at 72 hours) :	7.0
Enumerated By :	AW	Initial Cell Density at 0-h :	10455 cells/mL per microplate well
Enumeration Technique :	Manual (haemocytometer)	Inoculum Prepared :	01:00 h prior to test initiation
Control Cell Increase Factor :	25.3 times growth		

Cell Concentration (x 10000 cells/mL)

#### Cell Yield (x 10000 cells/mL)

С	oncentratio	n			Replicate	2				Mean	Standard	CV (%)	Stimulation
	(%)	1	2	3	4	7	8	9	10		Deviation		(% of control)**
	Control	28.5	24.5	24.0	30.0	28.0	30.0	23.0	23.5	25.39	2.98	11.74	_
	0.18		·····	· · · · · · · · ·						· · · · · · · · · · · · · · · · · · ·	· · · · · <u> </u>	· · · · · · · · · · · · · · · · · · ·	
	0.35	_		_									
	0.71		_		_					_			
	1.42		_		-					_	_		
	2.85	50.5	52.0	60.0	_					53.12	5.11	9.6	109.2
	5.68	63.5	57.5	61.5						59.79	3.06	5.1	135.5
	11.36	69.0	59.5	60.5	-					61.95	5.22	8.4	144.0
	22.73	83.0	86.0	79.5						81.79	3.25	4.0	222.1
	45.46	106.0	90.0	96.0						96.29	8.08	8.4	279.2
	90.91	93.5	96.0	99.0	_					95.12	2.75	2.9	274.6

NOTES : \*\*Significant stimulation compared to control, according to ANOVA - Dunnett's Test (CETIS)a,  $\alpha$ =0.05. •Control replicates 5 and 6 used for pH measurement.

•The Mann-Kendall test shows that there is no inhibitory gradient ( $\alpha$ =0.05).

•No outlying data points were detected according to Grubbs Test (CETIS)<sup>a</sup>.

"-" = not enumerated/not required

Data Reviewed By Date : 51608

### REFERENCES

<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

Date : vvvv-mm-dd

Approved By :

1 <u>Melaz</u> Project Ma

Voice: (519) 763-4412	client: ALS Environmental Waterloo	Phone: (519) 886-6910	Contact: Wayne Smith / Danielle Walker	Analysis     Samba Markin       Analysis	Please list any special requests or instructions.
Fax: (519) 763-4419	Quote # - 162705399-15	Fax: (519) 886-9047	Analyses Requested		MMER Toxicity RISS Reporting required
CHAIN OF CUSTODY RECORD	LS - Ba (D,BB	signature ALS Environmental ALS Environmental	Custody Relinquished by: RH DaterTime Shipped: 21-JUL-16	Sample Identification       Date Collected (vyvy-immedit)     Sample Identification       Date Collected (vyvy-immedit)     Sample Name       2016-07-19     11:55	For Lab Use Only Au Received by: 2006 07-21 Date: 2006 07-21

<b>L1801067</b> WATERLOO	<b>B</b>			DATE SAMPLED DUE DATE Flag	7/ 19/ 2016 8/9/2016	Email: Wayne.Smith@alsglobal.com <b>sglobal.com</b>		
Have And Jose And And And And And And And And And And	Aqualta - Edmonton, Alberta, Canada	Please reference on final report and invoice: PO# <u>L1801067</u> ALS requires QC data to be provided with your final results.		ANALYTICAL REQUIRED	Rick Hawthorne (SPECIAL REQUEST-AQ 14) Rick Hawthorne (519) 886-6910 Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1 WATERLOD ON 2000, UNIT 1	nith@als	Date Shipped:	
	Aqualta - Edmon	NOTES: Please reduced and the second	SAMPLE NUMBER	L1801067-1 MS-08	Subcontract Info Contact: Analysis and reporting info contact:	<b>Please email conf</b> Shipped By:	Received By: Verified By:	Sample Integrity Issues:

# **ALS -- Fort Collins**

## Sample Number(s) Cross-Reference Table

Please contact your project manager with any questions you may have about this report.

OrderNum: 1607459 Client Name: ALS Environmental Client Project Name: Client Project Number: L1801067 Client PO Number: L1801067 Report Due Date: 8/11/2016

## **Project Manager**

Amy R. Wolf email: amy.wolf@alsglobal.com Phone: 970-490-1511

Client Sample Number	Lab Sample Number	Test Group	COC Number	Matrix	Date Collected	Time Collected
L1801067-1	1607459-1	1		WATER	19-Jul-16	

\*\*Designated QC

Analytical Methods by Test Group

Test Group: 1 Ra226\_RnE

Page 1 of 1



1607459

Subcontract Request Form

## Subcontract To:

### ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE FORT COLLINS,CO 80524

1	l report and invoice: PO# <u>L18</u> be provided with your final resul	8 <u>01067</u> ts.	
Please see enclosed <u>1</u> san	nple(s) in <u>û</u> Container(s	)	a 1979
SAMPLE NUMBER ANALYTI	ICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1801067-1 MS-08		7/ 19/ 2016	
Kd220 Dy	Alpha Scint, MDC=0.01 Bq/L (RA226	-MMER-FC 1) 8/11/2016	
Subcontract Info Contact:	Rick Hawthorne (519) 886-691	.0	
Analysis and reporting info contact:	Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1		
	WATERLOO, ON N2V 2B8		
	Phone: (519) 886-6910	Email: Wayne.Smith@alsgl	obal.com
Please email confirmation of rece	ipt to: Wayne.Smith@	alsglobal.com	
Shipped By:	Date Shipped:		
Received By: C. Mumble	Date Received:	7-22-14 101	5
Verified By:	Date Verified:		
	Temperature:		
Sample Integrity Issues:			

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ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM			
Client: ALS - WATENTOD Workorder No: 160	74	59	
Project Manager: AW Initials: Ch	Date:	1-2	2-16
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
<ol> <li>Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)</li> </ol>		VES	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?		ES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
<ul> <li><sup>14.</sup> Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: &lt; green pea&gt; green pea</li> </ul>	N/A	YES	NO
15. Do any water samples contain sediment?       Amount         Amount of sediment:	N/A	YES	NO
16. Were the samples shipped on ice?		YES	(NO)
<sup>17.</sup> Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	RAD	YES	(NO)
Cooler #:			
If applicable, was the client contacted? YES / NO /NA contact:         Project Manager Signature / Date:	_ Date/Ti	me: Page 1	of /

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AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419 TOXICITY TEST REPORT Daphnia magna Page 1 of 2

Work Order :	231524
Sample Number :	48375

## SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	C.D./B.B.
Location :	Waterloo ON	Time Collected :	11:55
Job Number :	L1801067	Date Collected :	2016-07-19
Substance :	L1801067 MS-08	Date Received :	2016-07-21
Sampling Method :	Grab	Date Tested :	2016-07-22
Sample Description :	Cloudy, light brown, odourless	Temp. on arrival :	24.0° C
Test Method :	Reference Method for Determining Acute Lethality	of Effluents to Daphni	a magna. Environment

Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

	48-h TEST	RESULTS	
Substance	Et	ffect	Value
Control	Mean Imn		0.0 %
	Mean Mon		0.0 %
100%	Mean Imn	•	0.0 %
	Mean Mor	rtality	0.0 %
	The results reported relate on	ly to the sample tested.	
SC	DDIUM CHLORIDE REFE	ERENCE TOXICANT DATA	
Organism Batch :	Dm16-14		
Date Tested (yyyy/mm/dd) :	2016-07-19	Historical Mean LC50 :	6.0 g/L
LC50 (95% Confidence Limits) :	6.3 g/L (5.9 - 6.7)	Warning Limits (± 2SD) :	5.5 - 6.6 g/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	SEC, MC, SV
	Daphnia magna CULT	URE HEALTH DATA	
Fime to First Brood : Culture Mortality :	11.2 days 0% (previous 7 days)	Mean Young Per Brood :	29.3
	TEST CON	NDITIONS	
Sample Treatment :	None	Number of Replicates :	3
oH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm16-14	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None
2016-08-02		JANN A	NWX



## TOXICITY TEST REPORT

Daphnia magna

Page 2 of 2

## Work Order:231524Sample Number:48375

	Hardness (mg/L as CaCO <sub>3</sub> )	Hardness Adjustment	рН	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O <sub>2</sub> Sat. (%) <sup>*</sup>	Total Pre-Aeration Time (h) @ 30 mL/m
Initial Water Chemistry:	40	None	8.0	9.4	67	21.0	109	0:30
			0 hours					
Date & Time	2016-07-22	9:25						
Fechnician:	SV	x 1.00.		<b>D</b> 0	<b>a</b> .		*	
Fest Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O <sub>2</sub> Sat. (%) <sup>*</sup>	Hardness
00A	0	0	8.0	9.0	66	21.0	105	40
00B	0	0	8.0	9.0	66	21.0	105	40
00C	0	0	8.0	9.0	66	21.0	105	40
Control A	0	0	8.5	8.5	471	21.0	100	200
Control B	0	0	8.5	8.5	471	21.0	100	200
Control C	0	0	8.5	8.5	471	21.0	100	200
Notes:								
			24 hours				-	. · ·
Date & Time Fechnician:	2016-07-23 SV	9:25						
ſest Conc. (%)	Mortality	Immobility	pН	D.O.	Cond.	Temp.		
00A	<b>—</b> 1. 1	0		—		21.0		
00B	· _	0	· _	-		21.0		
00C		0	_	_	_	21.0		
Control A	· · · · ·	0	_	-	-	21.0		
Control B	-	0	-	_		21.0		
Control C	-	0	-		-	21.0		
Notes:								
			48 hours					
Date & Time Technician:	2016-07-24 SV	9:25						
fest Conc. (%)	Mortality	Immobility	pН	<b>D.O.</b>	Cond.	Temp.		
00A	0	0	7.8	8.1	80	21.0		
00B	0	0	7.8	8.3	75	21.0		
00 <b>C</b>	0	0	7.7	8.4	75	21.0		
Control A	0	0	8.4	8.3	480	21.0		
Control B	0	0	8.4	8.1	477	21.0		
Control C	0	0	8.4	8.1	477	21.0		
lotes:								

# of control organisms showing stress: 0 Daphnia Batch #: Dm16-14

Number immobile does not include number of mortalities.

- = not measured

\* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: <u>DK</u> Date: <u>2016 - 07 - 26</u>



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

Work Order : 231524 Sample Number : 48375

### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	C.D./B.B.
Location :	Waterloo ON	Time Collected :	11:55
Job Number :	L1801067	Date Collected :	2016-07-19
Substance :	L1801067 MS-08	Date Received :	2016-07-21
Sampling Method :	Grab	Date Tested :	2016-07-22
Sample Description :	Cloudy, light brown, odourless	Temp. on arrival :	24.0°C
Test Method :	Reference Method for Determining Acute Lethality of Lic	uid Effluents to Ra	inhow Trout

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).

Substance	96-h TEST RESULTS Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

## POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Organism Batch :	T16-12		
Date Tested (yyyy-mm-dd) :	2016-07-14	Historical Mean LC50 :	3703 mg/L
LC50 (95% Confidence Limits) :	3464 mg/L (3000 - 4000)	Warning Limits $(\pm 2SD)$ :	3000 - 4571 mg/L
Statistical Method :	Binomial	Analyst(s) :	FS, DK, NL
Control Fish Sample Size :	10 TEST FISH	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	$0.46 \pm 0.24$ g	Mean Fish Fork Length $(\pm 2 \text{ SD})$ :	
Range of Weights :	0.31 - 0.63 g	Range of Fork Lengths (mm) :	32 - 41 mm

### **TEST CONDITIONS**

TIO	<u> </u>
Test Organism :	Oncorhynchu
Sample Treatment :	None
pH Adjustment :	None
Test Aeration :	Yes
Pre-aeration/Aeration Rate :	$6.5 \pm 1 \text{ mL/m}$

us mykiss  $6.5 \pm 1 \text{ mL/min/L}$ 

Volume Tested (L) : 20 Number of Replicates : 1 Organisms Per Replicate : 10 Total Organisms Per Test Level : 10 Test Method Deviation(s) : None

Date:

Approved by: Project Manage

Accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA)

Work Order:	231524						<b>Rainbov</b> Pa
Sample Number:	48375						
Total Pre-Aeration			рН	<b>D.O.</b> (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O <sub>2</sub> Sat. (%
<b>Time (h)</b> 0:30		Vater Chemistry: ry after 30min air:	7.2 7.4	8.9 8.9	60 59	15.0 15.0	- 99
		0 hou	irs				
Date & Time Technician:	2016-07-22 AW	10:15					
<b>Test Conc. (%)</b> 100	<b>Mortality</b> 0	Immobility 0	<b>рН</b> 7.4	<b>D.O.</b> 8.9	Cond. 59	<b>Temp.</b> 15.0	<b>O</b> <sub>2</sub> Sat. (% 99
Control	0	0	8.0	9.3	835	15.0	100
Notes:		24 ho					1.00000007777777777777777777777
Date & Time Technician:	2016-07-23 NL	10:15	u1 5				
<b>Test Conc. (%)</b> 100	<b>Mortality</b> 0	<b>Immobility</b> 0	pH _	<b>D.O.</b> –	Cond. –	<b>Temp.</b> 14.0	
Control Notes:	0	0	_		_	14.0	
				****			
Date & Time Technician:	2016-07-24 NL	<b>48 ho</b> 10:15	urs				
<b>Test Conc. (%)</b> 100	<b>Mortality</b> 0	<b>Immobility</b> 0	рН _	D.O. _	Cond.	<b>Temp.</b> 15.0	
Control	0	0	-	-	_	15.0	
Notes:							
		72 ho	urs				
Date & Time Technician:	2016-07-25 FS	10:15			,		
<b>Test Conc. (%)</b> 100	<b>Mortality</b> 0	<b>Immobility</b> 0	рН _	<b>D.O.</b> –	Cond. –	<b>Temp.</b> 15.0	
Control	0	0	<u> </u>	_	<del></del>	15.0	
Notes:							
Date & Time	2016 07 26	<b>96 ho</b>	urs				
Technician:	2016-07-26 FS	10:15					
<b>Test Conc. (%)</b> 100	<b>Mortality</b> 0	<b>Immobility</b> 0	<b>рН</b> 8.1	<b>D.O.</b> 9.3	Cond. 64	<b>Temp.</b> 15.0	
Control	0	0	8.3	9.3	935	15.0	

"-" = not measured

Number immobile does not include number of mortalities. \* adjusted for actual temp. & barometric pressure

	AIN OF		Shipping Address:	Address		AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Road, RR #3	Testi Iolas E	ng & C 3eaver	onsult Road,	ng Inc RR#	4 <b>M</b>		
AQUATOX	Aquator Work Order No. 231524		Voice: (519) 763-4412	519) 763	-	Guelph, Ontario Canada N1H 6H9 Fax: (519) 763-4419	Ontari Fax:	o Cana (519)	Canada N1H (519) 763-4419	1H 6H	თ		
P.O. Number:	ALS - Baffinland Toxicity	8	Client:	ALS	ALS Environmental Waterloo	nment	al Wa	aterloo					
Field Sampler Name (print): Simmature	CD,BB			Quo	Quote # - 162705399-15	162705	399-1	15					
Affiliation:	ALS Environmental			,									
Sample Storage (prior to shipping):	ing):		Phone:	(519	(519) 886-6910	6910							
Custody Relinquished by:	RH		Fax:	(519	(519) 886-9047	9047							
Date/Time Shipped:	21-JUL-16		Contact:		Wayne Smith / Danielle Walker	nith / D	anielle	e Walk	ker				
	Sample Identification				Analys	Analyses Requested	ested				Samp	Sample Method and Volume	
Time Collected Date Collected (e.g. 14:30, (yyy-mm-dct) 24 hr clock)	Sample Name	AquaTox Sample Number	Rainbow Trout Single Concentration Rainbow Trout LC50	Daphnia magna Single Concentration	Daphnia magna LC50	Fathead Minnow Survival & Growth Ceriodaphnia dubia	Seproduction Lemna minor Growth	Pseudokinchnendella Pseudokinchnendella Subcapitata Growth	RISS Data Entry	Dther (please specify	Grab Composite	# cf Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)	
-	MS-08	0,42 27.5 34.0	>	>		>	> >	>			5		
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For Lab Use Only A		Please list any special requests or instructions:	nstructions:										
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Shipping J	Client: ALS Environmental Wortertoo Q#162705399-15 Phone: 519-886-6910 Fax: 519-886-9047 contact Wayne Smith / Austin Parlerson		Daphnia magna LCS0 Daphnia magna LCS0 Fathaad Minnow Canodaphnia dubia Canodaphnia dubia Danna dubia Canna minor Growth		ts or instructions. R155 Reporting Deguined W Dlage 7111 in Sample Date & Sample Nome Det paperwork to Agurtox. Semant coc ex 2009 07 0910
REUULAD Toxicity Tests			AquaTox Tem Sample Number arr		Please list any special requests or instructions PLS LOG-i- Dlogue
AIN OF CUSTODY RECORD	ALSEN ALSEN ALS-IN-16 AI-JU-16	Sample Identification	(1801067-1 sample Name MS-08		Lease III
JATO 45C			Time Collected (e.g. 14:30, 24 ftr clock)	ō	1 1 1 1
A QU	Field Sampler Name (prin Signature: Affiliation: Sample Storage (prior to Custody Relinquished by: Date/Time Shipped:		Date Collected (yyyy-mm-dd) Doi (b 07 - M	For Lab Use	r Ag pava



## Subcontract Request Form

## Subcontract To:

,

## Aqualta - Edmonton, Alberta, Canada

<b>NOTES:</b> Please reference on final ALS requires QC data to	report and invoice: PO# <u>L18010</u> be provided with your final results.	<u>107</u>	
Please see enclosed <u>1</u> sam	nple <u>(</u> s) in <u>0</u> Container(s)		
SAMPLE NUMBER ANALYTI	CAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1801067-1 MS-08 Special Re	equest Aqualta (SPECIAL REQUEST-AQ 1	7/ 19/ 2016 (4) 8/9/2016	
Subcontract Info Contact: Analysis and reporting info contact:	Rick Hawthorne (519) 886-6910 Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1 WATERLOO,ON N2V 2B8 Phone: (519) 886-6910	Email: Wayne.Smith@alsgl	lobal.com
Please email confirmation of rece	ipt to: Wayne.Smith@al	sglobal.com	
Shipped By:	Date Shipped:		
Received By:	Date Received:		
Verified By:	Date Verified:		
	Temperature:		
Sample Integrity Issues:			



Chain of Custody (COC) / Analytical Request Form



📑 COC Number: 14 -

Page <u>1</u> of <u>1</u>

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Report To	www.alsglobal.com		Report Forma			1		· Select S	Service Level	Below (	Rush Tur	naround	Time (TAT	r) is not	ovailable	for all ic	:5(5)
Company:	Baffinland Iron Mines Corp ALS ENV Account 23642	Select Report F			DD (DIGITAL)	R			ndard TAT if r								
Contact:	Jim Millard, Allan Knight		(QC) Report with R		•	0	∏⊉ricr	ity (2-4	bus, days if re	weived b	у Эрт) S	0% surch	arge - co	ntact AL	.S to confit	m TAT	
Address:	2275 Upper Middle Rd. E., Suite #300	-	rt - provide details bekov		-	E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT									TAT		
	Oakville, ON, L6H 0C3	Select Distribut			⊡FAX	E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge											
Phone:	647-253-0596 EXT 6016	Email 1 or Fax	bimcore@alsgloba	ai.com		Spec	ify Dat	le Req	uired for E2	E or P	l <u>:</u>						
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·····	Copy of Invoice with Report	Select Invoice [	Distribution: DEM	MAIL DMAIL	DFAX	1	ſ			1							
Company:		Email 1 or Fax	ap@batfinland.coi	m		1	1	<u> </u>								1	
Contact:		Email 2				]			uiell	· ·							<u>ور</u>
	Project Information	- 01	l and Gas Require	d Fields (client	use)	]			wor								aine
ALS Quote #:	Q42455	Approver ID:		Cost Center:		1	1		Minnow otárchne								out
Job #:	MS-08	GL Account:		Routing Code:					athead Minnow, Pseudokirchneriella minor)								d C
PO/AFE:	4500007003	Activity Code:				]		1	(Fathead Ia, Pseud na minor)	8							per
LSD:		Location:		·		]		1	oxcity (Fa a dubla, Lemna	ctan							Vumber of Containers
•	ork Order # (lab use only) C1801067	ALS Contact:	Wayne Smith	Sampler:	CD, BB		226	6	al Toxcity phnía dub liata, Lemi	Specific Conductance							
ALS Sample # (lab use only)	Sample Identification and/or Coordinates		Date (dd-mmm-yy)	Time (hh:៣៣)	Sample Type	Group	Radium 226	Group :	Sublethal Tox Certodriphnía subcapitata, t	Specific				ŀ			
IV	MS-08		19-Jul-16	11:55	Water	R	R	R	R	R						T	14
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	g Water (DW) Samples <sup>1</sup> (client use) Field filtering performe	lab. Sample fro	om actual waste roo	ck pond.	or Radidite doile in	Froz		·····				SIF Obs	ervation	1S	Yes	N	
Are samples tai	ken from a Regulated DW System? Sile Specific Criteria - A /es F7 No	Account Manager	to update as requil	eo.		Cool	ing Ini					JUSIOOY			Yes [		
Are samples fo	r human drinking water use? 'es マNo						INITIAL Z-	T	CR TEMPER	ATURES	<u>°C</u>	T-		COOLE	RTEMPE		<b>S °C</b>
	SHIPMENT RELEASE (client use)	INITIAL'S	SHIPMENT RECEP	TION (lab use o	nly)			<u> </u>	FINA	L SHIF	PMENT	RECEP	TION (I	ab use	only)		
Released by: /	Andrew Vermeer Date:2016-07-19 Time: 13:00 Receiv	Khahhi		Date:		1	eived	-		þ	1	0	<u>*</u> e:/~	Y	fime://	20	1100
REFER TO BAC	K PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION		WI-	ITE - LABORATO	RY COPY YE	LLOW	- CLIE	NT CO	PY				hA-74-01	Jie vie Fro	rilQil Januay 201	4	

Failure to complete all portions of this form may delay analysis, Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 16-SEP-16 Report Date: 17-OCT-16 14:15 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1828891 Project P.O. #: 4500017476 Job Reference: MS-06 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1828891-1 MS-06							
Sampled By: AW/AV on 12-SEP-16 @ 13:00 Matrix: WATER							
Matrix: WATER Physical Tests							
Conductivity	240		2.0	umbaa/am		20 850 46	Darranco
	318		3.0	umhos/cm		20-SEP-16 22-SEP-16	R3553059
Hardness (as CaCO3)	133	PEHT	10	mg/L		22-SEP-16 20-SEP-16	R3553058
pH Tatal Suggestided Solida	7.98		0.10	pH units	00.055.40		
Total Suspended Solids	4.4	PEHT	2.0	mg/L	20-SEP-16	21-SEP-16	R3553370
Total Dissolved Solids	183	DLDS	20	mg/L		20-SEP-16	R3553363
Turbidity Anions and Nutrients	7.50		0.10	NTU		21-SEP-16	R3553398
Alkalinity, Total (as CaCO3)	57		10	ma/l		20-SEP-16	R3553579
	-			mg/L			
Ammonia, Total (as N)	<0.020		0.020	mg/L		21-SEP-16	R3553513
Chloride (Cl)	9.89		0.50	mg/L		20-SEP-16	R3552810
Fluoride (F)	0.088		0.020	mg/L		20-SEP-16	R3552810
Nitrate (as N)	0.744		0.020	mg/L		20-SEP-16	R3552810
Total Kjeldahl Nitrogen	0.41		0.15	mg/L	20-SEP-16	21-SEP-16	R3553949
Phosphorus, Total	0.0099		0.0030	mg/L	21-SEP-16	21-SEP-16	R3554021
Sulfate (SO4) Organic / Inorganic Carbon	78.4		0.30	mg/L		20-SEP-16	R3552810
Dissolved Organic Carbon	47		10			20-SEP-16	Darran
•	4.7		1.0	mg/L			R3553959
Total Organic Carbon Total Metals	4.5		1.0	mg/L		20-SEP-16	R3553961
Aluminum (Al)-Total	0.078		0.010	mg/L	21-SEP-16	22-SEP-16	R3554104
Arsenic (As)-Total	0.00014		0.00010	mg/L	21-SEP-16	22-SEP-16	R3554104
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Calcium (Ca)-Total	25.4		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Copper (Cu)-Total	<0.0010		0.0010	mg/L	21-SEP-16	22-SEP-16	R3554104
Iron (Fe)-Total	0.110		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Lead (Pb)-Total	0.00013		0.00010	mg/L	21-SEP-16	22-SEP-16	R3554104
Magnesium (Mg)-Total	16.9		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Manganese (Mn)-Total	0.00658		0.00050	mg/L	21-SEP-16	22-SEP-16	R3554104
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		20-SEP-16	R3552577
Molybdenum (Mo)-Total	0.00385		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	21-SEP-16	22-SEP-16	R3554104
Potassium (K)-Total	9.44		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Selenium (Se)-Total	0.000121		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Sodium (Na)-Total	4.01		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Thallium (TI)-Total	0.000017		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Uranium (U)-Total	0.00017		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Zinc (Zn)-Total	<0.00372		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Dissolved Metals	<0.0030		0.0030	ing/L	21-061-10	22-02-10	110004104
Dissolved Mercury Filtration Location	FIELD					20-SEP-16	R3552450
Dissolved Metals Filtration Location	FIELD					20-SEP-16	R3552511
Aluminum (Al)-Dissolved	0.0162		0.0050	mg/L	20-SEP-16	20-SEP-16	R3552957
Arsenic (As)-Dissolved	0.00012		0.00010	mg/L	20-SEP-16	20-SEP-16	R3552957
Refer to Referenced Information for Qualifiers (if any) ar			0.00010		20 021 -10	20 021 -10	10002001

\* 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
L1828891-1 MS-06 Sampled By: AW/AV on 12-SEP-16 @ 13:00 Matrix: WATER							
Dissolved Metals							
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	20-SEP-16	20-SEP-16	R3552957
Calcium (Ca)-Dissolved	26.0		0.050	mg/L	20-SEP-16	20-SEP-16	R3552957
Copper (Cu)-Dissolved	0.00057		0.00020	mg/L	20-SEP-16	20-SEP-16	R3552957
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	20-SEP-16	20-SEP-16	R3552957
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	20-SEP-16	20-SEP-16	R3552957
Magnesium (Mg)-Dissolved	16.6		0.050	mg/L	20-SEP-16	20-SEP-16	R3552957
Manganese (Mn)-Dissolved	0.00337		0.00050	mg/L	20-SEP-16	20-SEP-16	R3552957
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	20-SEP-16	20-SEP-16	R3552579
Molybdenum (Mo)-Dissolved	0.00370		0.000050	mg/L	20-SEP-16	20-SEP-16	R3552957
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	20-SEP-16	20-SEP-16	R3552957
Potassium (K)-Dissolved	9.82		0.050	mg/L	20-SEP-16	20-SEP-16	R3552957
Selenium (Se)-Dissolved	0.000097		0.000050	mg/L	20-SEP-16	20-SEP-16	R3552957
Sodium (Na)-Dissolved	4.08		0.50	mg/L	20-SEP-16	20-SEP-16	R3552957
Thallium (TI)-Dissolved	0.000019		0.000010	mg/L	20-SEP-16	20-SEP-16	R3552957
Uranium (U)-Dissolved	0.00353		0.000010	mg/L	20-SEP-16	20-SEP-16	R3552957
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	20-SEP-16	20-SEP-16	R3552957
Radiological Parameters				Ū			
Ra-226	0.015		0.0032	Bq/L	01-OCT-16	13-OCT-16	R3562833
L1828891-2 MS-08-US Sampled By: AW/AV on 12-SEP-16 @ 14:42 Matrix: WATER							
Physical Tests							
Conductivity	225		3.0	umhos/cm		20-SEP-16	R3553059
Hardness (as CaCO3)	108	нтс	10	mg/L		23-SEP-16	
pH	8.19	PEHT	0.10	pH units		20-SEP-16	R3553058
Total Suspended Solids	<2.0	PEHT	2.0	mg/L	20-SEP-16	21-SEP-16	R3553370
Total Dissolved Solids	112	DLDS	20	mg/L		20-SEP-16	R3553363
Turbidity	1.16		0.10	NTU		21-SEP-16	R3553398
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	106		10	mg/L		20-SEP-16	R3553579
Ammonia, Total (as N)	<0.020		0.020	mg/L		23-SEP-16	R3557039
Chloride (Cl)	7.86		0.50	mg/L		20-SEP-16	R3552810
Fluoride (F)	<0.020		0.020	mg/L		20-SEP-16	R3552810
Nitrate (as N)	0.088		0.020	mg/L		20-SEP-16	R3552810
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	05-OCT-16	05-OCT-16	R3564780
Phosphorus, Total	<0.0030		0.0030	mg/L	28-SEP-16	28-SEP-16	R3559429
Sulfate (SO4)	5.04		0.30	mg/L		20-SEP-16	R3552810
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.3		1.0	mg/L		03-OCT-16	R3562904
Total Organic Carbon Total Metals	1.5		1.0	mg/L		03-OCT-16	R3562903
Aluminum (Al)-Total	0.055		0.010	mg/L	21-SEP-16	22-SEP-16	R3554104

\* 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
L1828891-2 MS-08-US Sampled By: AW/AV on 12-SEP-16 @ 14:42 Matrix: WATER							
Total Metals							
Arsenic (As)-Total	<0.00010		0.00010	mg/L	21-SEP-16	22-SEP-16	R3554104
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Calcium (Ca)-Total	22.6		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Copper (Cu)-Total	0.0011		0.0010	mg/L	21-SEP-16	23-SEP-16	R3554104
Iron (Fe)-Total	<0.050		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Lead (Pb)-Total	<0.00010		0.00010	mg/L	21-SEP-16	22-SEP-16	R3554104
Magnesium (Mg)-Total	12.6		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Manganese (Mn)-Total	0.00087		0.00050	mg/L	21-SEP-16	22-SEP-16	R3554104
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		20-SEP-16	R355257
Molybdenum (Mo)-Total	0.000405		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Nickel (Ni)-Total	0.00066		0.00050	mg/L	21-SEP-16	23-SEP-16	R3554104
Potassium (K)-Total	1.20		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Selenium (Se)-Total	<0.000050		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Sodium (Na)-Total	3.57		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Thallium (TI)-Total	<0.000010		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Uranium (U)-Total	0.00558		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	21-SEP-16	22-SEP-16	R3554104
Radiological Parameters							
Ra-226	0.012		0.0032	Bq/L	01-OCT-16	13-OCT-16	R3562833
L1828891-3 MS-06-DS Sampled By: AW/AV on 12-SEP-16 @ 14:20 Matrix: WATER							
Physical Tests							
Conductivity	248		3.0	umhos/cm		20-SEP-16	R355305
Hardness (as CaCO3)	115	нтс	10	mg/L		23-SEP-16	
рН	8.21	PEHT	0.10	pH units		20-SEP-16	R355305
Total Suspended Solids	2.9	PEHT	2.0	mg/L	20-SEP-16	21-SEP-16	R355337
Total Dissolved Solids	124	DLDS	20	mg/L		20-SEP-16	R355336
Turbidity	1.83		0.10	NTU		21-SEP-16	R355339
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	102		10	mg/L		20-SEP-16	R355357
Ammonia, Total (as N)	<0.020		0.020	mg/L		23-SEP-16	R355703
Chloride (CI)	10.9		0.50	mg/L		20-SEP-16	R355281
Fluoride (F)	0.025		0.020	mg/L		20-SEP-16	R355281
Nitrate (as N)	0.569		0.020	mg/L		20-SEP-16	R355281
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	05-OCT-16	05-OCT-16	R356478
Phosphorus, Total	0.0046		0.0030	mg/L	28-SEP-16	28-SEP-16	R355942
Sulfate (SO4)	9.03		0.30	mg/L		20-SEP-16	R355281
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.3		1.0	mg/L		03-OCT-16	
Total Organic Carbon	1.6		1.0	mg/L		03-OCT-16	R3562903
Total Metals							

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1828891-3 MS-06-DS Sampled By: AW/AV on 12-SEP-16 @ 14:20 Matrix: WATER							
Total Metals							
Aluminum (Al)-Total	0.127		0.010	mg/L	21-SEP-16	22-SEP-16	R3554104
Arsenic (As)-Total	<0.00010		0.00010	mg/L	21-SEP-16	22-SEP-16	R3554104
Cadmium (Cd)-Total	0.000012		0.00010	mg/L	21-SEP-16	22-SEP-16	
Calcium (Ca)-Total	23.6		0.00010	mg/L	21-SEP-16		R3554104
Copper (Cu)-Total	0.0017		0.0010	mg/L	21-SEP-16	22-SEI -10 23-SEP-16	R3554104
Iron (Fe)-Total	0.150		0.050	mg/L	21-SEP-16	23-SEP-16	R3554104
Lead (Pb)-Total	0.00013		0.00010	mg/L	21-SEP-16		R3554104
Magnesium (Mg)-Total	13.6		0.050	mg/L	21-SEP-16		R3554104
Magnesium (Mg) Total Manganese (Mn)-Total	0.00291		0.00050	mg/L	21-SEP-16	22-SEP-16	
Mercury (Hg)-Total	<0.00291		0.000010	mg/L	21-021-10	22-SEF-16	
Molybdenum (Mo)-Total	0.00101		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Nickel (Ni)-Total	0.00128		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Potassium (K)-Total	1.46		0.00030	mg/L	21-SEP-16	23-SEP-16	R3554104
Selenium (Se)-Total	<0.000050		0.000050	mg/L	21-SEP-16		R3554104
Sodium (Na)-Total	5.20		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Thallium (TI)-Total	<0.000010		0.000010	mg/L	21-SEP-16		R3554104
Uranium (U)-Total	0.00528		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Zinc (Zn)-Total	<0.00320		0.0030	mg/L	21-SEP-16	22-SEP-16	R3554104
Radiological Parameters	<0.0030		0.0030	ing/∟	21-021-10	22-521-10	104
Ra-226	<0.0100		0.0034	Bq/L	01-OCT-16	13-OCT-16	R3562833

 $^{\ast}$  Refer to Referenced Information for Qualifiers (if any) and Methodology.

#### **QC Samples with Qualifiers & Comments:**

QC Type Descri	ption	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Aluminum (Al)-Dissolved	MS-B	L1828891-1
Matrix Spike		Calcium (Ca)-Dissolved	MS-B	L1828891-1
Matrix Spike		Iron (Fe)-Dissolved	MS-B	L1828891-1
Matrix Spike		Magnesium (Mg)-Dissolved	MS-B	L1828891-1
Matrix Spike		Manganese (Mn)-Dissolved	MS-B	L1828891-1
Vatrix Spike		Potassium (K)-Dissolved	MS-B	L1828891-1
Matrix Spike		Sodium (Na)-Dissolved	MS-B	L1828891-1
Vatrix Spike		Calcium (Ca)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike		Iron (Fe)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike		Magnesium (Mg)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike		Potassium (K)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike		Sodium (Na)-Total	MS-B	L1828891-1, -2, -3
Vatrix Spike		Uranium (U)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike		Total Kjeldahl Nitrogen	MS-B	L1828891-1
Sample Param	eter Qualifier key	listed:		
Qualifier	Description			
OLDS	Detection Limit Rais	ed: Dilution required due to high Disso	lved Solids / Elect	rical Conductivity.
HTC	Hardness was calcu	Ilated from Total Ca and/or Mg concent	trations and may b	e biased high (dissolved Ca/Mg results unavailable).
ИS-B	Matrix Spike recove	ry could not be accurately calculated d	ue to high analyte	background in sample.
PEHT	Parameter Exceede	d Recommended Holding Time Prior to	o Analysis	
est Method R	eferences:			
ALS Test Code	Matrix	Test Description	Method Refer	ence**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2	
	d the organic cabon i		ated reaction charr	-INSTRUMENTAL hber which is packed with an oxidative catalyst. The wate ported in a carrier gas and is measured by a non-dispersi

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.

EC-WTWaterConductivityAPHA 2510 BWater 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-WTWaterHardnessAPHA 2340 BHardness (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 EPA 1631E (mod) CVAAS

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 APHA 3030B/6020A (mod) ICPMS

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 samples are dig	Water ested with nitri	Total Metals by CRC ICPMS ic and hydrochloric acids, and analyzed	EPA 200.2/6020A (mod) by CRC ICPMS.
Method Limitation (re:	Sulfur): Sulfide	and volatile sulfur species may not be	recovered by this method.
Analysis conducted in Protection Act (July 1,		th the Protocol for Analytical Methods I	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
NH3-WT Sample is measured co colorimetrically.	Water olorimetrically.	Ammonia, Total as N When sample is turbid a distillation ste	EPA 350.1 pp is required, sample is distilled into a solution of boric acid and measured
NO3-IC-WT Inorganic anions are a	Water nalyzed by Ion	Nitrate in Water by IC Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried after persulphate diges	out using proo tion of the san	cedures adapted from APHA Method 4	500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically
PH-WT Water samples are and	Water alyzed directly	pH by a calibrated pH meter.	APHA 4500 H-Electrode
Analysis conducted in Protection Act (July 1,		th the Protocol for Analytical Methods I	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
PH-WT Water samples are and	Water alyzed directly	pH by a calibrated pH meter.	MOEE E3137A-R511
Analysis conducted in Protection Act (July 1,		th the Protocol for Analytical Methods I	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT Inorganic anions are a	Water nalyzed by Ion	Sulfate in Water by IC Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
SOLIDS-TDS-WT A well-mixed sample is 180–10°C for 1hr.	Water filtered thoug	Total Dissolved Solids h glass fibres filter. A known volume of	APHA 2540C f the filtrate is evaporated and dried at 105–5°C overnight and then
SOLIDS-TSS-WT A well-mixed sample is four hours or until a co			APHA 2540 D-Gravimetric and the residue retained is dried in an oven at 104–1°C for a minimum of
			APHA 4500-N ia ions are heated to produce a colour complex. The absorbance measured a in the sample and is reported as TKN.
			APHA 5310B oxidative catalyst. The water is vaporized and the organic cabon is oxidized neasured by a non-dispersive infrared detector.
			APHA 2130 B d by the sample under defined conditions with the intensity of light scattered dings are obtained from a Nephelometer.
** ALS test methods may	incorporate m	odifications from specified reference m	ethods to improve performance.
The last two letters of th	e above test c	ode(s) indicate the laboratory that perfo	ormed analytical analysis for that test. Refer to the list below:
Laboratory Definition (	Code Labo	pratory Location	
\ <b>\</b> /T	AL 6		

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.



			quain		ontopon			
		Workorder:	L182889	)1	Report Date: 1	7-OCT-16		Page 1 of 12
Client:	Baffinland Iron Mine's Co 2275 Upper Middle Rd. E Oakville ON L6H 0C3		)					
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch	R3553579							
WG2393012 Alkalinity, To	-3 CRM otal (as CaCO3)	WT-ALK-CRM	106.5		%		80-120	20-SEP-16
WG2393012	-4 DUP	L1828891-1						
	otal (as CaCO3)	57	56		mg/L	0.4	20	20-SEP-16
WG2393012 Alkalinity, T	-2 LCS otal (as CaCO3)		96.0		%		85-115	20-SEP-16
WG2393012 Alkalinity, Te	-1 MB otal (as CaCO3)		<10		mg/L		10	20-SEP-16
C-DIS-ORG-WT	Water							
Batch	R3553959							
WG2393022 Dissolved C	- <b>3 DUP</b> Organic Carbon	<b>L1830982-2</b> 2.1	1.7	J	mg/L	0.4	2	20-SEP-16
WG2393022 Dissolved C	-2 LCS Organic Carbon		101.1		%		80-120	20-SEP-16
WG2393022 Dissolved C	-1 MB Organic Carbon		<1.0		mg/L		1	20-SEP-16
WG2393022 Dissolved C	-4 MS Organic Carbon	L1830982-2	95.8		%		70-130	20-SEP-16
Batch	R3562904							
WG2402020 Dissolved C	-3 DUP Organic Carbon	<b>L1835648-25</b> 3.3	2.8		mg/L	19	20	03-OCT-16
WG2402020	-2 LCS							
	Organic Carbon		97.2		%		80-120	03-OCT-16
WG2402020 Dissolved C	-1 MB Organic Carbon		<1.0		mg/L		1	03-OCT-16
WG2402020 Dissolved C	<b>-4 MS</b> Organic Carbon	L1835648-25	92.1		%		70-130	03-OCT-16
CL-IC-N-WT	Water							
Batch	R3552810							
WG2392297 Chloride (Cl		<b>L1828891-3</b> 10.9	11.0		mg/L	0.2	20	20-SEP-16
WG2392297 Chloride (Cl			102.1		%		90-110	20-SEP-16
WG2392297 Chloride (Cl			<0.50		mg/L		0.5	20-SEP-16
WG2392297 Chloride (Cl	-4 MS	L1828891-3	98.9		%		75-125	20-SEP-16



			Workorder:	L1828891	Re	eport Date: 17-	OCT-16		Page 2 of 12
Client:	2275 Upp	l Iron Mine's Corr er Middle Rd. E. ON L6H 0C3	poration (Oakville) Suite #300	)					
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT		Water							
Batch	R3553059								
WG2392146-8 Conductivity	8 DUP		<b>WG2392146-7</b> 78.5	79.1		umhos/cm	0.8	10	20-SEP-16
WG2392146-6 Conductivity	6 LCS			101.1		%		90-110	20-SEP-16
WG2392146-9 Conductivity	5 MB			<3.0		umhos/cm		3	20-SEP-16
F-IC-N-WT		Water							
Batch	R3552810								
WG2392297-3	3 DUP		L1828891-3	0.026		~~~~/l	0.0	00	
Fluoride (F) WG2392297-2	2 LCS		0.025	0.026		mg/L	3.6	20	20-SEP-16
Fluoride (F)				99.5		%		90-110	20-SEP-16
WG2392297-7 Fluoride (F)				<0.020		mg/L		0.02	20-SEP-16
WG2392297-4 Fluoride (F)	4 MS		L1828891-3	101.3		%		75-125	20-SEP-16
HG-D-CVAA-WT		Water							
	R3552579								
WG2392460-9 Mercury (Hg)			L1828891-1 <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-16
WG2392460-2 Mercury (Hg)				102.0		%		80-120	20-SEP-16
WG2392460-7 Mercury (Hg)				<0.000010		mg/L		0.00001	20-SEP-16
WG2392460-6 Mercury (Hg)	6 MS		L1828891-1	94.2		%		70-130	20-SEP-16
HG-T-CVAA-WT		Water		0				10 100	20 021 10
	R3552577								
WG2392454-7 Mercury (Hg)			<b>L1828891-1</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-16
WG2392454-2 Mercury (Hg)				102.0		%		80-120	20-SEP-16
WG2392454- Mercury (Hg)	1 MB			<0.000010		mg/L		0.00001	20-SEP-16
WG2392454-8 Mercury (Hg)	B MS		L1828891-2	95.3		%		70-130	20-SEP-16
MET-D-CCMS-W		Water							



Workorder: L1828891

Report Date: 17-OCT-16

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R35529	57							
WG2392528-4 DU Aluminum (Al)-Disso		WG2392528-3 0.537	0.551		mg/L	2.5	20	
Arsenic (As)-Dissolve		0.0095	0.0096		mg/L	2.5 1.5	20 20	20-SEP-16
Cadmium (Cd)-Disso		<0.0000	0.000011	RPD-NA	mg/L	1.5 N/A	20 20	20-SEP-16 20-SEP-16
Calcium (Ca)-Dissol		594	569	RFD-NA	mg/L	4.3	20	20-SEP-16
Copper (Cu)-Dissolv		<0.0020	<0.0020	RPD-NA	mg/L	4.3 N/A	20	20-SEP-16
Iron (Fe)-Dissolved		0.38	0.35		mg/L	6.5	20	20-SEP-16
Lead (Pb)-Dissolved		<0.00050	< 0.00050	RPD-NA	mg/L	0.0 N/A	20	20-SEP-16
Magnesium (Mg)-Dis	solved	114	109		mg/L	4.7	20	20-SEP-16
Manganese (Mn)-Dis		0.512	0.501		mg/L	2.1	20	20-SEP-16
Molybdenum (Mo)-D		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-SEP-16
Nickel (Ni)-Dissolved		0.0116	0.0119		mg/L	2.3	20	20-SEP-16
Potassium (K)-Disso	lved	28.8	28.6		mg/L	0.9	20	20-SEP-16
Selenium (Se)-Disso	lved	<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-SEP-16
Sodium (Na)-Dissolv	ed	93.8	90.1		mg/L	4.0	20	20-SEP-16
Thallium (TI)-Dissolv	ed	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-16
Uranium (U)-Dissolve	ed	0.00023	0.00023		mg/L	1.6	20	20-SEP-16
Zinc (Zn)-Dissolved		0.014	0.014		mg/L	1.4	20	20-SEP-16
WG2392528-2 LC	S							
Aluminum (Al)-Disso	lved		100.3		%		80-120	20-SEP-16
Arsenic (As)-Dissolve	ed		96.6		%		80-120	20-SEP-16
Cadmium (Cd)-Disso	blved		95.5		%		80-120	20-SEP-16
Calcium (Ca)-Dissolv			102.3		%		80-120	20-SEP-16
Copper (Cu)-Dissolv	ed		96.8		%		80-120	20-SEP-16
Iron (Fe)-Dissolved			93.4		%		80-120	20-SEP-16
Lead (Pb)-Dissolved			99.6		%		80-120	20-SEP-16
Magnesium (Mg)-Dis			98.9		%		80-120	20-SEP-16
Manganese (Mn)-Dis			98.9		%		80-120	20-SEP-16
Molybdenum (Mo)-Di			98.7		%		80-120	20-SEP-16
Nickel (Ni)-Dissolved			96.4		%		80-120	20-SEP-16
Potassium (K)-Disso Selenium (Se)-Disso			98.1 94.7		%		80-120	20-SEP-16
Sodium (Na)-Dissolv			94.7 98.5		%		80-120 80-120	20-SEP-16 20-SEP-16
Thallium (TI)-Dissolv			96.5 95.6		%		80-120 80-120	20-SEP-16 20-SEP-16
	cu .		55.0		70		80-120	20-327-10



 Workorder:
 L1828891
 Report Date:
 17-OCT-16
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 Baffinland Iron Mine's Corporation (Oakville)
 2275 Upper Middle Rd. E. Suite #300
 2275 Upper Middle Rd. E. Suite #300

 Oakville ON L6H 0C3
 Jim Millard
 2275 Upper Middle Rd. E. Suite #300
 2275 Upper Middle Rd. E. Suite #300

Contact:

Client:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R355295	7							
WG2392528-2 LCS								
Uranium (U)-Dissolve			101.2		%		80-120	20-SEP-16
Zinc (Zn)-Dissolved			93.4		%		80-120	20-SEP-16
WG2392528-1 MB Aluminum (Al)-Dissolv	red		<0.0050		mg/L		0.005	20-SEP-16
Arsenic (As)-Dissolve	b		<0.00010		mg/L		0.0001	20-SEP-16
Cadmium (Cd)-Dissol	ved		<0.000010		mg/L		0.00001	20-SEP-16
Calcium (Ca)-Dissolve	ed		<0.050		mg/L		0.05	20-SEP-16
Copper (Cu)-Dissolve	d		<0.00020		mg/L		0.0002	20-SEP-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	20-SEP-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	20-SEP-16
Magnesium (Mg)-Diss	olved		<0.050		mg/L		0.05	20-SEP-16
Manganese (Mn)-Diss	olved		<0.00050		mg/L		0.0005	20-SEP-16
Molybdenum (Mo)-Dis	solved		<0.000050		mg/L		0.00005	20-SEP-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-SEP-16
Potassium (K)-Dissolv	red		<0.050		mg/L		0.05	20-SEP-16
Selenium (Se)-Dissolv	red		<0.000050		mg/L		0.00005	20-SEP-16
Sodium (Na)-Dissolve	d		<0.50		mg/L		0.5	20-SEP-16
Thallium (TI)-Dissolve	d		<0.000010		mg/L		0.00001	20-SEP-16
Uranium (U)-Dissolve	d		<0.000010		mg/L		0.00001	20-SEP-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	20-SEP-16
WG2392528-5 MS		WG2392528-3						
Aluminum (Al)-Dissolv			N/A	MS-B	%		-	20-SEP-16
Arsenic (As)-Dissolve			77.3		%		70-130	20-SEP-16
Cadmium (Cd)-Dissol			92.8		%		70-130	20-SEP-16
Calcium (Ca)-Dissolve			N/A	MS-B	%		-	20-SEP-16
Copper (Cu)-Dissolve	d		74.3		%		70-130	20-SEP-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Lead (Pb)-Dissolved			95.0		%		70-130	20-SEP-16
Magnesium (Mg)-Diss	olved		N/A	MS-B	%		-	20-SEP-16
Manganese (Mn)-Diss	olved		N/A	MS-B	%		-	20-SEP-16
Molybdenum (Mo)-Dis	solved		96.5		%		70-130	20-SEP-16
Potassium (K)-Dissolv	red		N/A	MS-B	%		-	20-SEP-16
Selenium (Se)-Dissolv	red		95.1		%		70-130	20-SEP-16
Sodium (Na)-Dissolve	d		N/A	MS-B	%		-	20-SEP-16



Quality Control Report								
		Workorder:	L1828891		Report Date:	17-OCT-16		Page 5 of 12
2275 L	and Iron Mine's ( Jpper Middle Rd. le ON L6H 0C3		e)					
Contact: Jim M	illard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R35529	57							
WG2392528-5 MS Thallium (TI)-Dissolv		WG2392528-3	<b>3</b> 93.0		%		70-130	20-SEP-16
MET-T-CCMS-WT	Water							
Batch R35541	04							
WG2393067-4 DU	Р	WG2393067-3						
Aluminum (Al)-Total Arsenic (As)-Total		0.078 0.00014	0.075 0.00013		mg/L mg/L	3.6	20	22-SEP-16
Cadmium (Cd)-Total		<0.00014	<0.00013	RPD-NA	mg/L	5.2 N/A	20 20	22-SEP-16 22-SEP-16
Calcium (Ca)-Total		25.4	23.8	RFD-NA	mg/L	6.7	20	22-SEP-16
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	0.7 N/A	20	22-SEP-16
Iron (Fe)-Total		0.110	0.087	J	mg/L	0.024	20 0.1	22-SEP-16
Lead (Pb)-Total		0.00013	0.00011	5	mg/L	14	20	22-SEP-16
Magnesium (Mg)-Tot	al	16.9	16.2		mg/L	3.7	20	22-SEP-16
Manganese (Mn)-To		0.00658	0.00678		mg/L	3.0	20	22-SEP-16
Molybdenum (Mo)-To		0.00385	0.00370		mg/L	4.1	20	22-SEP-16
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-SEP-16
Potassium (K)-Total		9.44	9.79		mg/L	3.6	20	22-SEP-16
Selenium (Se)-Total		0.000121	0.000122		mg/L	1.0	20	22-SEP-16
Sodium (Na)-Total		4.01	4.10		mg/L	2.2	20	22-SEP-16
Thallium (TI)-Total		0.000017	0.000013	J	mg/L	0.000004	0.00002	22-SEP-16
Uranium (U)-Total		0.00372	0.00339		mg/L	9.1	20	22-SEP-16
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-SEP-16
WG2393067-2 LC	S							
Aluminum (Al)-Total			97.3		%		80-120	22-SEP-16
Arsenic (As)-Total			98.7		%		80-120	22-SEP-16
Cadmium (Cd)-Total			99.9		%		80-120	22-SEP-16
Calcium (Ca)-Total			100.6		%		80-120	22-SEP-16
Copper (Cu)-Total			98.9		%		80-120	22-SEP-16
Iron (Fe)-Total			94.8		%		80-120	22-SEP-16
Lead (Pb)-Total			100.4		%		80-120	22-SEP-16
Magnesium (Mg)-Tot			99.1		%		80-120	22-SEP-16
Manganese (Mn)-To			99.1		%		80-120	22-SEP-16
Molybdenum (Mo)-To	otal		99.2		%		80-120	22-SEP-16
Nickel (Ni)-Total			99.1		%		80-120	22-SEP-16



Workorder: L1828891

Report Date: 17-OCT-16

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

Contact: Jim Millard

Teet	Motrier	Defenses	Deguilt	Qualifier	l Inite	000	1 100 14	Analyzad
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3554104								
WG2393067-2 LCS Potassium (K)-Total			100.8		%		80-120	22-SEP-16
Selenium (Se)-Total			97.4		%		80-120	22-SEP-16
Sodium (Na)-Total			100.3		%		80-120	22-SEP-16
Thallium (TI)-Total			98.1		%		80-120	22-SEP-16
Uranium (U)-Total			103.8		%		80-120	22-SEP-16
Zinc (Zn)-Total			95.4		%		80-120	22-SEP-16
WG2393067-1 MB							00 120	
Aluminum (Al)-Total			<0.010		mg/L		0.01	22-SEP-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-SEP-16
Cadmium (Cd)-Total			<0.000010	0	mg/L		0.00001	22-SEP-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	22-SEP-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	23-SEP-16
Iron (Fe)-Total			<0.050		mg/L		0.05	22-SEP-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	22-SEP-16
Magnesium (Mg)-Total			<0.050		mg/L		0.05	22-SEP-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	22-SEP-16
Molybdenum (Mo)-Total			<0.000050	0	mg/L		0.00005	22-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-SEP-16
Potassium (K)-Total			<0.050		mg/L		0.05	22-SEP-16
Selenium (Se)-Total			<0.000050	0	mg/L		0.00005	22-SEP-16
Sodium (Na)-Total			<0.50		mg/L		0.5	22-SEP-16
Thallium (TI)-Total			<0.000010	0	mg/L		0.00001	22-SEP-16
Uranium (U)-Total			<0.000010	0	mg/L		0.00001	22-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-SEP-16
WG2393067-5 MS		WG2393067-3	00.0		0/		70.400	
Aluminum (Al)-Total			98.2		% %		70-130	22-SEP-16
Arsenic (As)-Total Cadmium (Cd)-Total			97.1 07.5		%		70-130	22-SEP-16
Calcium (Ca)-Total			97.5 N/A	MCD	%		70-130	22-SEP-16
Copper (Cu)-Total			N/A 104.4	MS-B	%		-	22-SEP-16
Iron (Fe)-Total			N/A	MS-B	%		70-130	22-SEP-16
Lead (Pb)-Total			96.4	IVIS-D	%		-	22-SEP-16
Magnesium (Mg)-Total			90.4 N/A	MS-B	%		70-130	22-SEP-16
Manganese (Mn)-Total			101.1	IVIO-D	%		-	22-SEP-16
manganese (min)- i ola			101.1		70		70-130	22-SEP-16



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			Workorder:	L182889	)1 F	Report Date:	17-OCT-16		Page 7 of 12
Client:	2275 Upp	l Iron Mine's Cor <sub>l</sub> er Middle Rd. E. ON L6H 0C3	poration (Oakville Suite #300	)					
Contact:	Jim Millar								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-W	т	Water							
Batch F	R3554104								
WG2393067-5 Molybdenum			WG2393067-3	96.2		%		70-130	22-SEP-16
Nickel (Ni)-To				96.8		%		70-130	22-SEP-16
Potassium (K				N/A	MS-B	%		-	22-SEP-16
Selenium (Se				96.3	NO D	%		70-130	22-SEP-16
Sodium (Na)-				N/A	MS-B	%		-	22-SEP-16
Thallium (TI)-				90.9	NIO-D	%		- 70-130	22-SEP-16
Uranium (U)-				N/A	MS-B	%		70-130	22-SEP-16
Zinc (Zn)-Tota				97.5	MG-D	%		-	
	ai			97.5		70		70-130	22-SEP-16
NH3-WT		Water							
	R3553513								
WG2393498-3 Ammonia, To			L1830990-1 <0.020	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-16
WG2393498-2			<0.020	<0.020		111g/ E	N/A	20	21-327-10
Ammonia, To				98.4		%		85-115	21-SEP-16
WG2393498-1									
Ammonia, To				<0.020		mg/L		0.02	21-SEP-16
WG2393498-4	MS		L1830990-1						
Ammonia, To	tal (as N)			98.7		%		75-125	21-SEP-16
Batch F	R3557039								
WG2395147-1	-		L1831117-1						
Ammonia, To	tal (as N)		0.095	0.076	J	mg/L	0.020	0.04	23-SEP-16
WG2395147-1				07.0		0/			
Ammonia, To				97.8		%		85-115	23-SEP-16
WG2395147-9 Ammonia, To				<0.020		mg/L		0.02	23-SEP-16
WG2395147-1	. ,		L1831117-1	<b>10.020</b>				0.01	23-321-10
Ammonia, To			L1031117-1	89.0		%		75-125	23-SEP-16
NO3-IC-WT		Water							
	R3552810	Water							
WG2392297-3			L1828891-3						
Nitrate (as N)			0.569	0.572		mg/L	0.5	25	20-SEP-16
WG2392297-2	LCS								
Nitrate (as N)				101.7		%		70-130	20-SEP-16
WG2392297-1	MB								
Nitrate (as N)				<0.020		mg/L		0.02	20-SEP-16
WG2392297-4	MS		L1828891-3						



			Qualit	y Conti	for Report			
		Workorder:	L182889 <sup>,</sup>	1	Report Date: 17-	-OCT-16		Page 8 of 12
22		e's Corporation (Oakville) Rd. E. Suite #300 0C3	)					
Contact: Ji	m Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R3: WG2392297-4 Nitrate (as N)	552810 MS	L1828891-3	98.6		%		70-130	20-SEP-16
P-T-COL-WT	Water							
Batch R35 WG2393113-3 Phosphorus, Tot	<b>554021</b> <b>DUP</b> cal	<b>L1831025-2</b> 0.0208	0.0201		mg/L	3.0	20	21-SEP-16
WG2393113-2 Phosphorus, Tot			101.1		%		80-120	21-SEP-16
WG2393113-1 Phosphorus, Tot	<b>MB</b> al		<0.0030		mg/L		0.003	21-SEP-16
WG2393113-4 Phosphorus, Tot	<b>MS</b> al	L1831025-2	92.5		%		70-130	21-SEP-16
Batch R35 WG2398465-3 Phosphorus, Tot	<b>559429</b> DUP cal	<b>L1828891-3</b> 0.0046	0.0040		mg/L	15	20	28-SEP-16
<b>WG2398465-2</b> Phosphorus, Tot	LCS al		97.0		%		80-120	29-SEP-16
WG2398465-1 Phosphorus, Tot	<b>MB</b> al		<0.0030		mg/L		0.003	29-SEP-16
WG2398465-4 Phosphorus, Tot	<b>MS</b> al	L1828891-3	96.3		%		70-130	28-SEP-16
PH-WT	Water							
Batch R35 WG2392144-6 рН	553058 DUP	<b>WG2392144-5</b> 7.13	7.26	J	pH units	0.12	0.2	20-SEP-16
<b>WG2392144-4</b> рН	LCS		7.01		pH units		6.9-7.1	20-SEP-16
SO4-IC-N-WT	Water							
Batch R35 WG2392297-3 Sulfate (SO4)	552810 DUP	<b>L1828891-3</b> 9.03	9.06		mg/L	0.3	20	20-SEP-16
WG2392297-2 Sulfate (SO4)	LCS		101.9		%		90-110	20-SEP-16
WG2392297-1 Sulfate (SO4)	МВ		<0.30		mg/L		0.3	20-SEP-16
WG2392297-4	MS	L1828891-3						



			Quan		orneport			
		Workorder:	L182889	1	Report Date: 17	'-OCT-16		Page 9 of 12
2275 U	and Iron Mine's Col Ipper Middle Rd. E e ON L6H 0C3		)					
Contact: Jim Mi	llard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R35528	10							
<b>WG2392297-4 MS</b> Sulfate (SO4)		L1828891-3	97.1		%		75-125	20-SEP-16
SOLIDS-TDS-WT	Water							
Batch R35533	63							
WG2392665-3 DUI Total Dissolved Solid		<b>L1829595-11</b> 500	484		mg/L	3.3	20	20-SEP-16
WG2392665-2 LCS Total Dissolved Solid			100.7		%		85-115	20-SEP-16
WG2392665-1 MB Total Dissolved Solid	S		<10		mg/L		10	20-SEP-16
SOLIDS-TSS-WT	Water							
Batch R35533	70							
WG2392355-3 DUI Total Suspended Soli		<b>L1828905-1</b> 340	330		mg/L	3.0	20	21-SEP-16
WG2392355-2 LCS Total Suspended Soli			99.6		%		85-115	21-SEP-16
WG2392355-1 MB Total Suspended Soli	ds		<2.0		mg/L		2	21-SEP-16
TKN-WT	Water							
Batch R355394	49							
WG2392477-3 DUI Total Kjeldahl Nitroge		<b>L1830466-1</b> 94.5	82.7		mg/L	13	20	21-SEP-16
WG2392477-2 LCS Total Kjeldahl Nitroge			94.4		%		75-125	21-SEP-16
WG2392477-1 MB Total Kjeldahl Nitroge	n		<0.15		mg/L		0.15	21-SEP-16
WG2392477-4 MS Total Kjeldahl Nitroge		L1830466-1	N/A	MS-B	%		-	21-SEP-16
Batch R35647	80							
WG2403815-3 DUI Total Kjeldahl Nitroge	5	<b>L1837865-1</b> 5.8	5.3		mg/L	9.4	20	05-OCT-16
WG2403815-2 LCS Total Kjeldahl Nitroge			93.4		%		75-125	05-OCT-16
WG2403815-1 MB Total Kjeldahl Nitroge	en		<0.15		mg/L		0.15	05-OCT-16
WG2403815-4 MS		L1837865-1						



				Quanty		or report			
			Workorder:	L1828891		Report Date:	17-OCT-16		Page 10 of 12
Client:	2275 Upp Oakville(	Iron Mine's Corp er Middle Rd. E. S DN L6H 0C3		)					
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT		Water							
Batch WG240381 Total Kjeld	R3564780 5-4 MS ahl Nitrogen		L1837865-1	92.1		%		70-130	05-OCT-16
TOC-WT		Water							
Batch WG239302 Total Orga			<b>L1828891-1</b> 4.5	4.7		mg/L	5.5	20	20-SEP-16
WG239302 Total Orga	3-2 LCS			103.8		%		80-120	20-SEP-16
WG239302 Total Orga	nic Carbon			<1.0		mg/L		1	20-SEP-16
WG239302 Total Orga	nic Carbon		L1828891-1	97.0		%		70-130	20-SEP-16
Batch WG240202 Total Orga			<b>L1837263-1</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	03-OCT-16
WG240202 Total Orga				99.5		%		80-120	03-OCT-16
WG240202 Total Orga	nic Carbon			<1.0		mg/L		1	03-OCT-16
WG240202 Total Orga			L1837263-1	95.5		%		70-130	03-OCT-16
TURBIDITY-W		Water							
Batch WG239259 Turbidity	R3553398 0-3 DUP		<b>L1828891-3</b> 1.83	1.92		NTU	4.8	15	21-SEP-16
WG239259 Turbidity	0-2 LCS			102.0		%		85-115	21-SEP-16
WG239259 Turbidity	0-1 MB			<0.10		NTU		0.1	21-SEP-16

Workorder: L1828891

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

### Contact:

### 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.

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Workorder: L1828891

Report Date: 17-OCT-16

Client: Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Contact: Jim Millard

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#### Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Suspended solids							
	1	12-SEP-16 13:00	21-SEP-16 00:00	7	8	days	EHT
	2	12-SEP-16 14:42	21-SEP-16 00:00	7	8	days	EHT
	3	12-SEP-16 14:20	21-SEP-16 00:00	7	8	days	EHT
Turbidity							
	1	12-SEP-16 13:00	21-SEP-16 08:00	48	211	hours	EHTR
	2	12-SEP-16 14:42	21-SEP-16 08:00	48	209	hours	EHTR
	3	12-SEP-16 14:20	21-SEP-16 08:00	48	210	hours	EHTR
рН							
	1	12-SEP-16 13:00	20-SEP-16 20:00	4	8	days	EHTL
	2	12-SEP-16 14:42	20-SEP-16 20:00	4	8	days	EHTL
	3	12-SEP-16 14:20	20-SEP-16 20:00	4	8	days	EHTL
Leachable Anions & Nutrients	5						
Nitrate in Water by IC							
	1	12-SEP-16 13:00	20-SEP-16 17:20	7	8	days	EHT
	2	12-SEP-16 14:42	20-SEP-16 17:20	7	8	days	EHT
	3	12-SEP-16 14:20	20-SEP-16 17:20	7	8	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 L1828891 were received on 16-SEP-16 10:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against 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.



### Ft. Collins, Colorado

LIMS Version: 6.829

Thursday, October 13, 2016

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

Re: ALS Workorder: 1609402 Project Name: Project Number: L1828891

Dear Mr. Smith:

Three water samples were received from ALS Environmental, on 9/22/2016. 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 Shiloh J. Summy Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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 Environme	ntal – Fort Collins
Accreditation Body	License or Certification Number
AIHA	214884
Alaska (AK)	UST-086
Alaska (AK)	CO01099
Arizona (AZ)	AZ0742
California (CA)	06251CA
Colorado (CO)	CO01099
Connecticut (CT)	PH-0232
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
L-A-B (DoD ELAP/ISO 170250)	L2257
Louisiana (LA)	05057
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



# 1609402

### Radium-226:

The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

## Sample Number(s) Cross-Reference Table

OrderNum: 1609402 Client Name: ALS Environmental Client Project Name: Client Project Number: L1828891 Client PO Number: L1828891

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1828891-1	1609402-1		WATER	12-Sep-16	
L1828891-2	1609402-2		WATER	12-Sep-16	
L1828891-3	1609402-3		WATER	12-Sep-16	



1609402

L1828891

### 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# <u>L1828891</u> ALS requires QC data to be provided with your final results.

Please see enclosed <u>3</u> sample(s) in <u>3</u> Container(s)

SAMPLE NUMBER					DATE SA	MPLE	D	Priority		
· .	ANALYTI	CAL REQU	IRED			DUE	DATE	Fla		
L1828891-1 MS-06					9/ 12/ 20	)16				
	Ra226 by	Alpha Scint	t, MDC=0	.01 Bq/L (RA226-N	MMER-FC 1)	10/11	1/2016			
L1828891-2 MS-08-US					9/ 12/ 20	)16				
2	Ra226 by	Alpha Scint	t, MDC=0	.01 Bq/L (RA226-N	MMER-FC 1)	10/11	1/2016			
L1828891-3 MS-08-DS					9/ 12/ 20	016				
3	Ra226 by	Alpha Scint	t, MDC=0	.01 Bq/L (RA226-N	MMER-FC 1)	10/11	1/2016			
Subcontract Info Contact:		Rick Hav	wthorne	(519) 886-6910						
Analysis and reporting info	contact:	-	•	.Chem., C.E.T.						
	·			ROAD, UNIT 1						
			•	N2V 2B8	EmpileMay		itheologia		~	
				886-6910	Email: Way		ntn@alsgld	ibal.cor	11	
Please email confirmation	n of recei	pt to:	v	Vayne.Smith@a	isglobal.co	m				
Shipped By:	11			Date Shipped:		_				
Received By:	M		i	Date Received:	9/251	He	91221	16	<u>091</u> C	
Verified By:				Date Verified:	_ <u> </u>					
			•	Temperature:			<del></del>			
Sample Integrity Issues:	<u> </u>						<u> </u>	<u>~</u>		

	h		
A	l L	5	>

### ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

(ALS)			
Client: <u>ALS Waterlos</u> Workorder No: <u>1609</u> Project Manager: <u>ARW</u> Initials: <u>RUK</u>		aloz 1	
Project Manager: NICO Initials:	Date:	9/23/	/6
1. Does this project require any special handling in addition to standard ALS procedures?		YES	<u>k</u> O'
2. Are custody seals on shipping containers intact?	NONE	YES	NÖ
3. Are Custody seals on sample containers intact?	NONE	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		(ES)	NÖ
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.)		(TES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	<b>KES</b>	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	ES	NO
9. Are all aqueous non-preserved samples pH 4-9?	KA I	YES	NO
10. Is there sufficient sample for the requested analyses?		Æ	NO
11. Were all samples placed in the proper containers for the requested analyses?		Ē	NO
12. Are all samples within holding times for the requested analyses?		(ÈS	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		Ē	NO
<ul> <li><sup>14.</sup> Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: &lt; green pea &gt; green pea</li> </ul>	N/Å	YES	NO
15. Do any water samples contain sediment? Amount		N.T.O.	
Amount of sediment: 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*: #2 (#4)	RAD	YES	NO
Cooler #:			
Temperature (°C): 17.6°C			
No. of custody seals on cooler:			
DOT Survey/ Acceptance External uR/hr reading: 13			
Information Background $\mu$ R/hr reading: $\int O$			······
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria? WES NO / NA (If no, see	Form 008.)		
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EX		ND #16.	
· · · · · · · · · · · · · · · · · · ·			

If applicable, was the client contacted? YES / NO (NA) Contact:	Date/Time:
Project Manager Signature / Date: 4 DPU 9/23/16	
*IR Gun #2: Oakton, SN 29922500201-0066	

Form 201r24.xls (06/04/2012)

\*IR Gun #4: Oakton, SN 2372220101-0002



Client:	ALS Environmental					Date:	13-Oct-16
Project:	L1828891				7	Work Order:	1609402
Sample ID:	L1828891-1					Lab ID:	1609402-1
Legal Location	:					Matrix: \	WATER
<b>Collection Date</b>	e: 9/12/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by	y Radon Emanation - M	ethod 903.1	PAI	783	Prep	Date: 10/1/201	6 PrepBy: CDJ
Ra-226		0.015 (+/- 0.0064)		0.0032	BQ/I	NA	10/13/2016 12:09

Client:	ALS Environmental					Date: 1	13-Oct-16
Project:	L1828891				۲.	Work Order:	1609402
Sample ID:	L1828891-2					Lab ID:	1609402-2
Legal Location:						Matrix: V	WATER
<b>Collection Date:</b>	9/12/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by	Radon Emanation - M	lethod 903.1	PAI	783	Prep	Date: 10/1/201	6 PrepBy: CDJ
Ra-226		0.012 (+/- 0.0057)	Y1	0.0032	BQ/I	NA	10/13/2016 12:09
Carr: BARIUM		101	Y1	40-110	%REC	DL = NA	10/13/2016 12:09

Client:	ALS Environmental					Date:	13-Oct-16
Project:	L1828891				,	Work Order:	1609402
Sample ID:	L1828891-3					Lab ID:	1609402-3
Legal Location	:					Matrix:	WATER
<b>Collection Date</b>	: 9/12/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by	Radon Emanation - M	lethod 903.1	PAI	783	Prep	Date: 10/1/201	6 PrepBy: CDJ
Radium-226 by Ra-226	Radon Emanation - N	<b>Nethod 903.1</b> 0.0065 (+/- 0.0040)	<b>PAI</b> Y1,LT	<b>783</b> 0.0034		Date: <b>10/1/201</b> NA	6 PrepBy: CDJ 10/13/2016 12:09

Client:	ALS Environmental					Date	e: 13-Oct-1	6
Project:	L1828891					Work Order	: 1609402	
Sample ID:	L1828891-3						: 1609402-	-3
-							WATER	5
Legal Location:								
Collection Date	: 9/12/2016				Perc	ent Moisture	2:	
Analyses		Result		eport	Units	Dilution		Date Analyz
		11050110	Quai 1	Jiiiit	Omts	Factor		2 400 1 1141 9 2
Explanation of (	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ess than the sample specific M	DC.				not met, but the re	eported	
	is in control at 100-110%. Qua	antitative yield is assumed.			eater than the below lower	e reported MDC.		
	outside default limits.			-		r control limit.		
-	han Warning Limit of 1.42	logic is Dr. Maist				y within control lim	nits.	
	As Received' while the Report B Dry Weight' while the Report Ba	, .			-	side control limits		
G - Sample density of	differs by more than 15% of LC		NC - Not	Calcula	ed for duplica	ate results less that	an 5 times MDC	
D - DER is greater th			B - Analy	te conce	ntration great	ter than MDC.		
M - Requested MDC			B3 - Ana MDC.	lyte conc	entration grea	ater than MDC but	less than Requ	lested
LT - Result is less th	nan requested MDC but greater	than achieved MDC.	WDC.					
B - Result is less that U or ND - Indicates t	an the requested reporting limit that the compound was analyze	d for but not detected.						
<ul> <li>B - Result is less that</li> <li>U or ND - Indicates t</li> <li>E - The reported value</li> <li>M - Duplicate inject</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery retained</li> <li>* - Duplicate analysis</li> </ul>		d for but not detected. presence of interference. A . A post spike is analyzed f s less than four times the sp lanatory note may be includ ot within control limits.	n explanatory note or all ICP analyses ike added concen ed in the narrative.	e may be when th tration.	included in th	e and or spike		
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Client:	ALS Environmental
Work Order:	1609402
Project:	L1828891

## **QC BATCH REPORT**

Batch ID: R	E161001-2-1 In	strument ID Alp	oha Scin		Method: R	adium-226	by Rado	on Emanation				
LCS	Sample ID: RE161001-2				U	nits: <b>BQ/I</b>		Analys	s Date:	10/13/20	16 13:14	
Client ID:		Run II	D: RE161001-	2A			F	Prep Date: 10/1	/2016	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 (+/- 0.425)	0.00331	1.673		103	67-120					Р
Carr: BARIL	UM	16100		16270		99.1	40-110					
LCSD	Sample ID: RE161001-2				U	nits: <b>BQ/I</b>		Analys	s Date:	10/13/20	16 13:14	l.
Client ID:		Run II	D: RE161001-	2A			F	Prep Date: 10/1	/2016	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 (+/- 0.418)	0.00571	1.673		101	67-120		1.72	2 0.05	2.1	Р
Carr: BARIL	UM	15700		16270		96.7	40-110		16100	)		
МВ	Sample ID: RE161001-2				U	nits: <b>BQ/I</b>		Analys	s Date:	10/13/20	16 13:14	ļ
Client ID:		Run II	D: RE161001-	2A			F	Prep Date: 10/1	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		ND	0.0066									U
Carr: BARIL	UM	15100		16270		93	40-110					
The follow	ving samples were analyzed	I in this batch:	16094	402-1	160940	02-2	1609	9402-3				



Chain of Custody (COC) / Analytical Request Form



COC Number: 14 -

Page <u>1</u> of <u>1</u>

(ALS)	Environmenta	Canada To	II Free: 1 800 66	68 9878							;									
	www.alsglobal.com																			
Report To				Report Format	/ Distribution			Sele	ect Serv	ice Lev	el Belov	w (Rush	Tumar	round 1	fime (TA	AT) is i	not ava	iilable fo	or all tes	ts)
Company:	Baffinland Iron Mines Corp ALS ENV	Account 23642	Select Report Fo	ormat: IPDF	⊡excel 🖸	EDD (DIGITAL)	R	⊡Regu	ılar (Sta	ndard T	AT if rec	ceived b	y 3 pm	- busin	ess day:	s)				
Contact:	Jim Millard, Atlan Knight		Quality Control (	QC) Report with R	eport 🛛 🔽 Ye	s ⊏"No	Р				ys if reo									
Address:	2275 Upper Middle Rd. E., Suite #300		Criteria on Repor	t - provide details below	v if box checked		E	[]Eme	rgency (	1-2 bus	i. days if	receive	d by 3p	m) 100	)% surci	harge	- conta	act ALS 1	to confir	TAT m
	Oakville, ON, L6H 0C3		Select Distribution	on: 🗌 EMA		FAX	E2	Sam	e day or	weeke	nd emer	gency -	contact	t ALS to	confirm	n TAT	and su	rcharge		
Phone:	647-253-0596 EXT 6016		Email 1 or Fax	bimcore@alsgloba	l.com		Spec	ify Date	e Requ	uired fo	or E2,E	E or P:								
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Company:			Email 1 or Fax	ap@baffinland.con	n							٩TC								
Contact:			Email 2								Daphnia - AQUATOX	Trout - AQUATC								دو
	Project Information		Oil	and Gas Require	d Fields (client i	use)					-Yn	t - A								aine
ALS Quote #:	Q42455		Approver ID:		Cost Center:			s			A0	Irou		[						onta
Job #:	MS-06		GL Account:		Routing Code:			metals			nia	MO								č č
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LSD:			Location:				1	Cur)	tanc											Number of Containers
	rk Order # (lab use only)	8891 RH	ALS Contact:	Wayne Smith	Sampler:	AW/AV		Group 7 (no dissolved or dissolved mercury)	Specific Conductance	Radium 226	48h Single Conc.	gle Conc								z
ALS Sample #		tion and/or Coordinates		Date	Time		i è	lp 7 Isso	cific	Ë	Sing	Single		1				Î		
(lab use only)		will appear on the report)		(dd-mmm-yy)	(hh:mm)	Sample Type	Group	0 Jo D Jo	Spe	Rad	48h	96h			1					
3	MS-06	·· · · · ·		12-Sep-16	13:00	Water	R		R	R	R	R						$\neg$		9
2	MS-08-US			12-Sep-16	14:42	Water		R	R	R					-					6
				12-Sep-16	14:20	Water	+	R	R	R				_						
	MS-06-DS			12-366-10	14.20	vvale)	+	<u> </u>	<u> </u>							-		$\rightarrow$		6
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Drinking	g Water (DW) Samples <sup>1</sup> (client use)						Froz	en					SIF C	Obser	vations	5	Yes		No	
Are samples tal	ten from a Regulated DW System?	Site Specific Criteria -	Account Manager	to update as requir	red.			acks	Yes		No		Custo	ody se	eal inta	ict	Yes		No	
רח	res 🔽 No	1						ling Init												
Are samples for	r human drinking water use?						IN	ITTAL CO	DOLER	TEMPE	RATUR	ES℃			<b>7</b>	OOLE	RTEN	MPERAT	URES	с <sub>.</sub>
ГΥ	es 🔽 No													<u>کر ا</u>						
	SHIPMENT RELEASE (client use)		INITIAL S	HIPMENT RECEP	TION (lab use o					FI	AL SH	IPME	NT RE			(lab ι	ise or	ıly)		
Released by: A	ndrew Vermeer Date:2016-09	-13 Time: 13:00 Rece	ived by:		Date:	Time:	Red	eived l	by:			N	1	Date	ĴÕ <	5	Tin/i∉ Ŋ{Ū	0	9	100
REFER TO BAC	K PAGE FOR ALS LOCATIONS AND SAM	PLING INFORMATION		WH	L IITE - LABORATO	RY COPY YE	LLOW	- CLIEP	NT COF	γ			<del></del>		NA FM 0321	5e v09 Fro	ors/04 Janu	ary 2014		

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the while - report copy.
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.





Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 30-AUG-16 Report Date: 04-OCT-16 12:21 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1821470 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

4500017476 - SUBLETHAL TOXICITY MS-08

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

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www.alsglobal.com

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1821470-1 MS-08 Sampled By: BB/KM/BDB on 30-AUG-16 @ 11:20 Matrix: WATER							
Physical Tests							
Conductivity	1300		3.0	umhos/cm		01-SEP-16	R3539238
Hardness (as CaCO3)	718		10	mg/L		02-SEP-16	
pH	7.21		0.10	pH units		01-SEP-16	R3539237
Total Suspended Solids	2.9		2.0	mg/L	02-SEP-16	06-SEP-16	R3541613
Total Dissolved Solids	1060	DLDS	20	mg/L		06-SEP-16	R3541963
Turbidity	1.48		0.10	NTU		31-AUG-16	R3538456
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	16		10	mg/L		01-SEP-16	R3539116
Ammonia, Total (as N)	0.719		0.020	mg/L		02-SEP-16	R3539884
Chloride (Cl)	7.91		0.50	mg/L		02-SEP-16	R3542048
Fluoride (F)	0.112		0.020	mg/L		02-SEP-16	R3542048
Nitrate (as N)	5.23		0.020	mg/L		02-SEP-16	R3542048
Total Kjeldahl Nitrogen	1.13		0.15	mg/L	01-SEP-16	02-SEP-16	R3539956
Phosphorus, Total	<0.030	DLM	0.030	mg/L	02-SEP-16	02-SEP-16	R3539203
Sulfate (SO4)	668		0.30	mg/L		02-SEP-16	R3542048
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		07-SEP-16	R354273
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		01-SEP-16	R3541334
Total Organic Carbon Total Metals	<1.0		1.0	mg/L		01-SEP-16	R3541338
Aluminum (Al)-Total	0.057		0.010	mg/L	01-SEP-16	01-SEP-16	R3538784
Arsenic (As)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Cadmium (Cd)-Total	0.000174		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Calcium (Ca)-Total	54.7		0.50	mg/L	01-SEP-16	01-SEP-16	R353878
Copper (Cu)-Total	0.0010		0.0010	mg/L	01-SEP-16	01-SEP-16	R353878
Iron (Fe)-Total	0.268		0.050	mg/L	01-SEP-16	01-SEP-16	R353878
Lead (Pb)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R353878
Magnesium (Mg)-Total	136	DLHC	0.50	mg/L	01-SEP-16	01-SEP-16	R353878
Manganese (Mn)-Total	6.11	DLHC	0.0050	mg/L	01-SEP-16	01-SEP-16	R353878
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		02-SEP-16	R353976
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R353878
Nickel (Ni)-Total	0.0671		0.00050	mg/L	01-SEP-16	01-SEP-16	R353878
Potassium (K)-Total	1.96		0.050	mg/L	01-SEP-16	01-SEP-16	R353878
Selenium (Se)-Total	0.00200		0.000050	mg/L	01-SEP-16	01-SEP-16	R353878
Sodium (Na)-Total	2.62		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Thallium (TI)-Total	0.000034		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Uranium (U)-Total	0.000044		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Zinc (Zn)-Total	0.0070		0.0030	mg/L	01-SEP-16	01-SEP-16	R3538784
Dissolved Metals				-			
Dissolved Mercury Filtration Location	FIELD					02-SEP-16	R3539299
Dissolved Metals Filtration Location	FIELD					02-SEP-16	R3539177

\* 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
L1821470-1 MS-08 Sampled By: BB/KM/BDB on 30-AUG-16 @ 11:20 Matrix: WATER							
Dissolved Metals							
Aluminum (Al)-Dissolved	0.0057		0.0050	mg/L	02-SEP-16	02-SEP-16	R3539746
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	02-SEP-16	02-SEP-16	R3539746
Cadmium (Cd)-Dissolved	0.000184		0.000010	mg/L	02-SEP-16	02-SEP-16	R3539746
Calcium (Ca)-Dissolved	56.3		0.050	mg/L	02-SEP-16	02-SEP-16	R3539746
Copper (Cu)-Dissolved	0.00076		0.00020	mg/L	02-SEP-16	02-SEP-16	R3539746
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	02-SEP-16	02-SEP-16	R3539746
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	02-SEP-16	02-SEP-16	R3539746
Magnesium (Mg)-Dissolved	140	DLHC	0.50	mg/L	02-SEP-16	02-SEP-16	R3539746
Manganese (Mn)-Dissolved	6.45	DLHC	0.0050	mg/L	02-SEP-16	02-SEP-16	R3539746
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	02-SEP-16	02-SEP-16	R3539747
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	02-SEP-16	02-SEP-16	R3539746
Nickel (Ni)-Dissolved	0.0674		0.00050	mg/L	02-SEP-16	02-SEP-16	R3539746
Potassium (K)-Dissolved	1.87		0.050	mg/L	02-SEP-16	02-SEP-16	R3539746
Selenium (Se)-Dissolved	0.00214		0.000050	mg/L	02-SEP-16	02-SEP-16	R3539746
Sodium (Na)-Dissolved	2.70		0.50	mg/L	02-SEP-16	02-SEP-16	R3539746
Thallium (TI)-Dissolved	0.000031		0.000010	mg/L	02-SEP-16	02-SEP-16	R3539746
Uranium (U)-Dissolved	0.000027		0.000010	mg/L	02-SEP-16	02-SEP-16	R3539746
Zinc (Zn)-Dissolved	0.0086		0.0010	mg/L	02-SEP-16	02-SEP-16	R3539746
Radiological Parameters				5 //			
Ra-226	0.011		0.0070	Bq/L	22-SEP-16	30-SEP-16	R3562833

 $^{\ast}$  Refer to Referenced Information for Qualifiers (if any) and Methodology.

### **QC Samples with Qualifiers & Comments:**

QC Type Desc	cription	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Chloride (Cl)	MS-B	L1821470-1
Matrix Spike		Calcium (Ca)-Dissolved	MS-B	L1821470-1
Matrix Spike		Iron (Fe)-Dissolved	MS-B	L1821470-1
Matrix Spike		Magnesium (Mg)-Dissolved	MS-B	L1821470-1
Matrix Spike		Manganese (Mn)-Dissolved	MS-B	L1821470-1
Matrix Spike		Potassium (K)-Dissolved	MS-B	L1821470-1
Matrix Spike		Sodium (Na)-Dissolved	MS-B	L1821470-1
Matrix Spike		Calcium (Ca)-Total	MS-B	L1821470-1
Matrix Spike		Iron (Fe)-Total	MS-B	L1821470-1
Matrix Spike		Magnesium (Mg)-Total	MS-B	L1821470-1
Matrix Spike		Manganese (Mn)-Total	MS-B	L1821470-1
Matrix Spike		Sodium (Na)-Total	MS-B	L1821470-1
Matrix Spike		Ammonia, Total (as N)	MS-B	L1821470-1
Matrix Spike		Nitrate (as N)	MS-B	L1821470-1
	motor Qualifier key l	· · · ·		
Qualifier	meter Qualifier key I Description	Isted:		
	••••			
DLDS		ed: Dilution required due to high Dissol		,
DLHC		ed: Dilution required due to high conce		
DLM	Detection Limit Adjus	sted due to sample matrix effects (e.g.	chemical interfere	ence, colour, turbidity).
MS-B	Matrix Spike recover	y could not be accurately calculated du	ue to high analyte	background in sample.
est Method	References:			
ALS Test Cod	e Matrix	Test Description	Method Refer	ence**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2	
	ered through a 0.45um f and the organic cabon is		ted reaction charr	-INSTRUMENTAL ber which is packed with an oxidative catalyst. The wate ported in a carrier gas and is measured by a non-dispersi
CL-IC-N-WT Inorganic anio	Water ons are analyzed by Ion	Chloride by IC Chromatography with conductivity and	EPA 300.1 (m I/or UV detection.	od)
		Cyanide, Total ombination of UV digestion and distillat with a combination of barbituric acid a	ion. Cyanide is co	N C E-STRONG ACID DIST COLORIM nverted to cyanogen chloride by reacting with chloramine d to form a highly colored complex.
		of thiocyanate in samples can cause fan nethod, ALS recommends analysis for		1-2% of the thiocyanate concentration. For samples with eck for this potential interference
EC-WT Water sample	Water es can be measured dire	Conductivity ectly by immersing the conductivity cel	APHA 2510 B I into the sample.	
F-IC-N-WT Inorganic anic	Water ons are analyzed by Ion	Fluoride in Water by IC Chromatography with conductivity and	EPA 300.1 (m l/or UV detection.	od)
	so known as Total Hardr	Hardness ness) is calculated from the sum of Ca oncentrations are preferentially used for		sium concentrations, expressed in CaCO3 equivalents.
HG-D-CVAA-W	VT Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (n	nod)
	es are filtered (0.45 um) s chloride, and analyzed		n undergo a cold-c	oxidation using bromine monochloride prior to reduction
	ducted in accordance wi st (July 1, 2011).	th the Protocol for Analytical Methods	Used in the Asses	sment of Properties under Part XV.1 of the Environment
I TOLCCLION AC				

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

CRC APHA 3030B/6020A (mod)

### MS-08

### **Reference Information**

Method Limitation (re	Sulfur): Sulfid	e and volatile sulfur species may not be	recovered by this method.
Analysis conducted ir Protection Act (July 1		vith the Protocol for Analytical Methods U	Jsed in the Assessment of Properties under Part XV.1 of the Environmenta
MET-T-CCMS-WT Water samples are di	Water gested with nit	Total Metals by CRC ICPMS ric and hydrochloric acids, and analyzed	EPA 200.2/6020A (mod) l by CRC ICPMS.
Method Limitation (re	Sulfur): Sulfid	e and volatile sulfur species may not be	recovered by this method.
Analysis conducted ir Protection Act (July 1		vith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmenta
NH3-WT Sample is measured colorimetrically.	Water colorimetrically	Ammonia, Total as N v. When sample is turbid a distillation ste	EPA 350.1 pp is required, sample is distilled into a solution of boric acid and measured
NO3-IC-WT Inorganic anions are a	Water analyzed by lor	Nitrate in Water by IC n Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carrie after persulphate dige			500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically
PH-WT	Water	рН	APHA 4500 H-Electrode
Water samples are an	nalyzed directly	v by a calibrated pH meter.	
Analysis conducted ir Protection Act (July 1		vith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmenta
PH-WT	Water	рН	MOEE E3137A-R511
Water samples are ar	alyzed directly	v by a calibrated pH meter.	
Analysis conducted ir Protection Act (July 1		vith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmenta
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT Inorganic anions are a	Water analyzed by lor	Sulfate in Water by IC n Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
SOLIDS-TDS-WT A well-mixed sample 180–10°C for 1hr.	Water is filtered thoug	Total Dissolved Solids gh glass fibres filter. A known volume of	APHA 2540C the filtrate is evaporated and dried at 105–5°C overnight and then
SOLIDS-TSS-WT A well-mixed sample four hours or until a c			APHA 2540 D-Gravimetric and the residue retained is dried in an oven at 104–1°C for a minimum of
		Total Kjeldahl Nitrogen KN to ammonium sulphate. The ammoni he concentration of ammonium sulphate	APHA 4500-N ia ions are heated to produce a colour complex. The absorbance measured in the sample and is reported as TKN.
			APHA 5310B oxidative catalyst. The water is vaporized and the organic cabon is oxidized neasured by a non-dispersive infrared detector.
TURBIDITY-BF	Water	Turbidity	APHA 2130 B d by the sample under defined conditions with the intensity of light scattere

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**

#### ΒF

#### 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 wet - 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.



		Workorder:	L182147	D	Report Date:	04-OCT-16		Page 1 of 10
Client:	Baffinland Iron Mine's Cor 2275 Upper Middle Rd. E. Oakville ON L6H 0C3							
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
WG2380731-3	R3539116 3 CRM al (as CaCO3)	WT-ALK-CRM	100.0		%		80-120	01-SEP-16
WG2380731-4 Alkalinity, Tot	<b>4 DUP</b> tal (as CaCO3)	<b>L1822688-1</b> 823	834		mg/L	1.4	20	01-SEP-16
WG2380731-2 Alkalinity, Tot	2 LCS tal (as CaCO3)		96.2		%		85-115	01-SEP-16
WG2380731-1 Alkalinity, Tot	<b>I MB</b> al (as CaCO3)		<10		mg/L		10	01-SEP-16
C-DIS-ORG-WT	Water							
	R3541334							
WG2380765-3 Dissolved Org		<b>L1818933-1</b> 5.0	5.2		mg/L	3.8	20	01-SEP-16
WG2380765-2 Dissolved Org			99.0		%		80-120	01-SEP-16
WG2380765-1 Dissolved Org			<1.0		mg/L		1	01-SEP-16
WG2380765-4 Dissolved Org	-	L1818933-1	99.4		%		70-130	01-SEP-16
CL-IC-N-WT	Water							
	R3542048							
WG2381106-1 Chloride (Cl)		<b>WG2381106-1</b> : 135	<b>3</b> 134		mg/L	0.3	20	02-SEP-16
WG2381106-1 Chloride (Cl)			101.2		%		90-110	02-SEP-16
WG2381106-1 Chloride (Cl)	11 MB		<0.50		mg/L		0.5	02-SEP-16
WG2381106-1 Chloride (Cl)	14 MS	WG2381106-13	<b>3</b> N/A	MS-B	%		-	02-SEP-16
CN-TOT-WT	Water							
	R3542731							
WG2383066-2 Cyanide, Tota		<b>L1821779-1</b> <0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-2 Cyanide, Tota			94.4		%		80-120	07-SEP-16
WG2383066-2 Cyanide, Tota			<0.0020		mg/L		0.002	07-SEP-16
WG2383066-2	24 MS	L1821779-1						



			Quanty		Report			
		Workorder:	L1821470	R	eport Date: 04-	OCT-16		Page 2 of 10
2275 Up	nd Iron Mine's Corp per Middle Rd. E. \$ ON L6H 0C3							
Contact: Jim Milla	ard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	Water							
Batch R3542731	l							
WG2383066-24 MS Cyanide, Total		L1821779-1	91.6		%		70-130	07-SEP-16
EC-WT	Water							
Batch R3539238	3							
WG2379938-4 DUP Conductivity		<b>WG2379938-3</b> 11400	11400		umhos/cm	0.1	10	01-SEP-16
WG2379938-2 LCS Conductivity			99.5		%		90-110	01-SEP-16
WG2379938-1 MB Conductivity			<3.0		umhos/cm		3	01-SEP-16
F-IC-N-WT	Water							
Batch R3542048	3							
WG2381106-15 DUP Fluoride (F)		<b>WG2381106-13</b> 0.046	<b>3</b> 0.046		mg/L	0.7	20	02-SEP-16
WG2381106-12 LCS Fluoride (F)			98.5		%		90-110	02-SEP-16
WG2381106-11 MB Fluoride (F)			<0.020		mg/L		0.02	02-SEP-16
WG2381106-14 MS Fluoride (F)		WG2381106-13	<b>3</b> 95.8		%		75-125	02-SEP-16
HG-D-CVAA-WT	Water							
Batch R3539747	,							
WG2380897-4 DUP Mercury (Hg)-Dissolved	d	<b>WG2380897-3</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380897-2 LCS Mercury (Hg)-Dissolved	d		103.0		%		80-120	02-SEP-16
WG2380897-1 MB Mercury (Hg)-Dissolved	d		<0.000010		mg/L		0.00001	02-SEP-16
WG2380897-6 MS Mercury (Hg)-Dissolved	d	WG2380897-5	88.7		%		70-130	02-SEP-16
HG-T-CVAA-WT	Water							
Batch R3539762	2							
WG2380992-4 DUP Mercury (Hg)-Total		<b>WG2380992-3</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380992-2 LCS Mercury (Hg)-Total			101.0		%		80-120	02-SEP-16



			Quant	y contro	rivebou			
		Workorder:	L1821470	) R	Report Date: (	04-OCT-16		Page 3 of 10
2	Baffinland Iron Mine's C 2275 Upper Middle Rd. Oakville ON L6H 0C3		)					
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	Water							
Batch R: WG2380992-1 Mercury (Hg)-7	<b>3539762</b> <b>MB</b> Fotal		<0.000010	)	mg/L		0.00001	02-SEP-16
WG2380992-8 Mercury (Hg)-7	MS	WG2380992-7			%		70-130	02-SEP-16
MET-D-CCMS-WT								
	3539746							
WG2380829-4	DUP	WG2380829-3						
Aluminum (Al)-	Dissolved	<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-16
Arsenic (As)-D	issolved	0.0013	0.0013		mg/L	4.5	20	02-SEP-16
Cadmium (Cd)	-Dissolved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-16
Calcium (Ca)-	Dissolved	557	569		mg/L	2.1	20	02-SEP-16
Copper (Cu)-D	issolved	<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	02-SEP-16
Iron (Fe)-Disso	blved	5.76	5.69		mg/L	1.3	20	02-SEP-16
Lead (Pb)-Diss	solved	<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-SEP-16
Magnesium (M	lg)-Dissolved	152	149		mg/L	1.8	20	02-SEP-16
Manganese (M	In)-Dissolved	0.213	0.210		mg/L	1.4	20	02-SEP-16
Molybdenum (I	Mo)-Dissolved	0.00095	0.00089		mg/L	6.7	20	02-SEP-16
Nickel (Ni)-Dis	solved	<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-SEP-16
Potassium (K)-	Dissolved	62.4	63.4		mg/L	1.5	20	02-SEP-16
Selenium (Se)-	-Dissolved	<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-SEP-16
Sodium (Na)-D	Dissolved	677	664		mg/L	1.9	20	02-SEP-16
Thallium (TI)-D	Dissolved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-16
Uranium (U)-D	issolved	0.00011	0.00011		mg/L	0.6	20	02-SEP-16
Zinc (Zn)-Disso	olved	<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380829-2								
Aluminum (Al)-			97.1		%		80-120	02-SEP-16
Arsenic (As)-D			98.3		%		80-120	02-SEP-16
Cadmium (Cd)			97.8		%		80-120	02-SEP-16
Calcium (Ca)-E			96.6		%		80-120	02-SEP-16
Copper (Cu)-D			94.9		%		80-120	02-SEP-16
Iron (Fe)-Disso			94.7		%		80-120	02-SEP-16
Lead (Pb)-Diss			96.0		%		80-120	02-SEP-16
Magnesium (M			98.2		%		80-120	02-SEP-16
Manganese (M			95.6		%		80-120	02-SEP-16
Molybdenum (I	No)-Dissolved		99.5		%		80-120	



Jim Millard

## **Quality Control Report**

Workorder: L1821470

Report Date: 04-OCT-16

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

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							-
Batch R35397								
WG2380829-2 LCS	-							
Molybdenum (Mo)-Di	ssolved		99.5		%		80-120	02-SEP-16
Nickel (Ni)-Dissolved			95.5		%		80-120	02-SEP-16
Potassium (K)-Dissol	ved		95.0		%		80-120	02-SEP-16
Selenium (Se)-Dissol	ved		98.7		%		80-120	02-SEP-16
Sodium (Na)-Dissolve	ed		96.3		%		80-120	02-SEP-16
Thallium (TI)-Dissolve	ed		95.9		%		80-120	02-SEP-16
Uranium (U)-Dissolve	ed		95.0		%		80-120	02-SEP-16
Zinc (Zn)-Dissolved			89.2		%		80-120	02-SEP-16
WG2380829-1 MB								
Aluminum (Al)-Dissol	ved		<0.0050		mg/L		0.005	02-SEP-16
Arsenic (As)-Dissolve	ed		<0.00010		mg/L		0.0001	02-SEP-16
Cadmium (Cd)-Disso			<0.00001	0	mg/L		0.00001	02-SEP-16
Calcium (Ca)-Dissolv	ed		<0.050		mg/L		0.05	02-SEP-16
Copper (Cu)-Dissolve	ed		<0.00020		mg/L		0.0002	02-SEP-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	02-SEP-16
Lead (Pb)-Dissolved			<0.00005	0	mg/L		0.00005	02-SEP-16
Magnesium (Mg)-Dis	solved		<0.050		mg/L		0.05	02-SEP-16
Manganese (Mn)-Dis	solved		<0.00050		mg/L		0.0005	02-SEP-16
Molybdenum (Mo)-Di	ssolved		<0.00005	0	mg/L		0.00005	02-SEP-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	02-SEP-16
Potassium (K)-Dissol	ved		<0.050		mg/L		0.05	02-SEP-16
Selenium (Se)-Dissol	ved		<0.00005	0	mg/L		0.00005	02-SEP-16
Sodium (Na)-Dissolve	ed		<0.50		mg/L		0.5	02-SEP-16
Thallium (TI)-Dissolve	ed		<0.00001	0	mg/L		0.00001	02-SEP-16
Uranium (U)-Dissolve	ed		<0.00001	0	mg/L		0.00001	02-SEP-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	02-SEP-16
WG2380829-5 MS		WG2380829-3						
Aluminum (Al)-Dissol			93.9		%		70-130	02-SEP-16
Arsenic (As)-Dissolve			93.3		%		70-130	02-SEP-16
Cadmium (Cd)-Disso	lved		93.3		%		70-130	02-SEP-16
Calcium (Ca)-Dissolv	ed		N/A	MS-B	%		-	02-SEP-16
Copper (Cu)-Dissolve	ed		87.2		%		70-130	02-SEP-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Lead (Pb)-Dissolved			92.1		%		70-130	02-SEP-16



Test

### **Quality Control Report**

Workorder: L1821470 Report Date: 04-OCT-16 Page 5 of 10 Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Contact: Jim Millard Matrix Reference Result Qualifier Units RPD Limit Analyzed MET-D-CCMS-WT Water R3539746 Batch WG2380829-5 MS WG2380829-3 N/A % Magnesium (Mg)-Dissolved MS-B -02-SEP-16 Manganese (Mn)-Dissolved N/A MS-B % 02-SEP-16 90.5 Molybdenum (Mo)-Dissolved % 70-130 02-SEP-16 Nickel (Ni)-Dissolved 88.5 % 70-130 02-SEP-16 Potassium (K)-Dissolved MS-B % N/A 02-SEP-16 Selenium (Se)-Dissolved 97.0 % 70-130 02-SEP-16 Sodium (Na)-Dissolved N/A MS-B % 02-SEP-16 Thallium (TI)-Dissolved 88.2 % 70-130 02-SEP-16 Zinc (Zn)-Dissolved 87.8 % 70-130 02-SEP-16 MET-T-CCMS-WT Water R3538784 Batch WG2380132-4 WG2380132-3 DUP Aluminum (AI)-Total 0.018 0.017 mg/L 9.2 20 01-SEP-16 Arsenic (As)-Total 0.00045 0.00045 mg/L 1.4 20 01-SEP-16 < 0.000010 Cadmium (Cd)-Total < 0.000010 **RPD-NA** mg/L N/A 20 01-SEP-16 Calcium (Ca)-Total 37.3 36.3 mg/L 2.8 20 01-SEP-16 Copper (Cu)-Total 0.0043 0.0042 mg/L 1.8 20 01-SEP-16 Iron (Fe)-Total 0.052 0.053 mg/L 1.7 20 01-SEP-16 Lead (Pb)-Total 0.00018 0.00018 mg/L 2.5 20 01-SEP-16 Magnesium (Mg)-Total 5.14 5.01 mg/L 01-SEP-16 2.5 20 Manganese (Mn)-Total 0.0425 0.0409 mg/L 3.7 20 01-SEP-16 Molybdenum (Mo)-Total 0.000280 0.000279 mg/L 0.3 20 01-SEP-16 Nickel (Ni)-Total < 0.00050 < 0.00050 **RPD-NA** mg/L N/A 20 01-SEP-16 Potassium (K)-Total 0.897 0.865 mg/L 3.7 20 01-SEP-16 0.000073 0.000076 Selenium (Se)-Total mg/L 4.0 20 01-SEP-16 26.6 Sodium (Na)-Total 25.8 mg/L 3.1 20 01-SEP-16 Thallium (TI)-Total < 0.000010 < 0.000010 mg/L **RPD-NA** N/A 20 01-SEP-16 Uranium (U)-Total 0.000244 0.000238 mg/L 2.7 20 01-SEP-16 Zinc (Zn)-Total 0.0031 < 0.0030 **RPD-NA** mg/L N/A 20 01-SEP-16 WG2380132-2 LCS Aluminum (Al)-Total 98.3 % 80-120 01-SEP-16 Arsenic (As)-Total 96.2 % 80-120 01-SEP-16 Cadmium (Cd)-Total 95.1 % 80-120 01-SEP-16



Workorder: L1821470

Report Date: 04-OCT-16

Page 6 of 10

Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300

Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3538784								
WG2380132-2 LCS					24			
Calcium (Ca)-Total			97.9		%		80-120	01-SEP-16
Copper (Cu)-Total			93.4		%		80-120	01-SEP-16
Iron (Fe)-Total			96.3		%		80-120	01-SEP-16
Lead (Pb)-Total			96.5		%		80-120	01-SEP-16
Magnesium (Mg)-Total			94.5		%		80-120	01-SEP-16
Manganese (Mn)-Total			98.2		%		80-120	01-SEP-16
Molybdenum (Mo)-Tota			101.6		%		80-120	01-SEP-16
Nickel (Ni)-Total			93.6		%		80-120	01-SEP-16
Potassium (K)-Total			97.3		%		80-120	01-SEP-16
Selenium (Se)-Total			91.4		%		80-120	01-SEP-16
Sodium (Na)-Total			95.6		%		80-120	01-SEP-16
Thallium (TI)-Total			96.6		%		80-120	01-SEP-16
Uranium (U)-Total			100.1		%		80-120	01-SEP-16
Zinc (Zn)-Total			89.7		%		80-120	01-SEP-16
WG2380132-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	01-SEP-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-16
Cadmium (Cd)-Total			<0.00001	0	mg/L		0.00001	01-SEP-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	01-SEP-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	01-SEP-16
Iron (Fe)-Total			<0.050		mg/L		0.05	01-SEP-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	01-SEP-16
Magnesium (Mg)-Total			<0.050		mg/L		0.05	01-SEP-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	01-SEP-16
Molybdenum (Mo)-Tota			<0.00005	0	mg/L		0.00005	01-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-SEP-16
Potassium (K)-Total			<0.050		mg/L		0.05	01-SEP-16
Selenium (Se)-Total			<0.00005	0	mg/L		0.00005	01-SEP-16
Sodium (Na)-Total			<0.50		mg/L		0.5	01-SEP-16
Thallium (TI)-Total			<0.00001	0	mg/L		0.00001	01-SEP-16
Uranium (U)-Total			<0.00001	0	mg/L		0.00001	01-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-16
WG2380132-5 MS Aluminum (Al)-Total		WG2380132-3	94.2		%		70-130	02-SEP-16



Workorder: L1821470

Report Date: 04-OCT-16

Page 7 of 10

Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3538784								
WG2380132-5 MS		WG2380132-3			0/			
Arsenic (As)-Total			96.4		%		70-130	02-SEP-16
Cadmium (Cd)-Total			95.6		%		70-130	02-SEP-16
Calcium (Ca)-Total			N/A	MS-B	%		-	01-SEP-16
Copper (Cu)-Total			91.7		%		70-130	02-SEP-16
Iron (Fe)-Total			N/A	MS-B	%		-	01-SEP-16
Lead (Pb)-Total			93.1		%		70-130	02-SEP-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	01-SEP-16
Manganese (Mn)-Total			N/A	MS-B	%		-	01-SEP-16
Molybdenum (Mo)-Total			99.1		%		70-130	02-SEP-16
Nickel (Ni)-Total			94.8		%		70-130	02-SEP-16
Potassium (K)-Total			94.6		%		70-130	02-SEP-16
Selenium (Se)-Total			96.1		%		70-130	02-SEP-16
Sodium (Na)-Total			N/A	MS-B	%		-	01-SEP-16
Thallium (TI)-Total			94.0		%		70-130	02-SEP-16
Uranium (U)-Total			90.8		%		70-130	02-SEP-16
Zinc (Zn)-Total			98.4		%		70-130	02-SEP-16
NH3-WT	Water							
Batch R3539884								
WG2380997-3 DUP Ammonia, Total (as N)		<b>L1821470-1</b> 0.719	0.718		mg/L	0.1	20	02-SEP-16
WG2380997-2 LCS Ammonia, Total (as N)			101.6		%		85-115	02-SEP-16
WG2380997-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	02-SEP-16
WG2380997-4 MS		L1821470-1						
Ammonia, Total (as N)			N/A	MS-B	%		-	02-SEP-16
NO3-IC-WT	Water							
Batch R3542048								
WG2381106-15 DUP Nitrate (as N)		<b>WG2381106-1</b> 4.94	<b>3</b> 4.91		mg/L	0.4	25	02-SEP-16
WG2381106-12 LCS Nitrate (as N)			99.8		%		70-130	02-SEP-16
WG2381106-11 MB Nitrate (as N)			<0.020		mg/L		0.02	02-SEP-16
WG2381106-14 MS		WG2381106-1	3					



				Qualit	y Contr	or Report			
			Workorder:	L1821470	)	Report Date: 04-0	DCT-16		Page 8 of 10
•	2275 Uppe	Iron Mine's Corpo er Middle Rd. E. S DN L6H 0C3							
Contact:	Jim Millaro	b							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT		Water							
Batch F	3542048								
WG2381106-1 Nitrate (as N)	4 MS		WG2381106-13	<b>3</b> N/A	MS-B	%		-	02-SEP-16
P-T-COL-WT		Water							
Batch F	3539203								
<b>WG2380808-3</b> Phosphorus, <sup>-</sup>			<b>L1822930-6</b> 0.0647	0.0638		mg/L	1.5	20	02-SEP-16
WG2380808-2 Phosphorus,				105.5		%		80-120	02-SEP-16
WG2380808-1 Phosphorus,				<0.0030		mg/L		0.003	02-SEP-16
WG2380808-4 Phosphorus,			L1822930-6	86.4		%		70-130	02-SEP-16
PH-WT		Water							
Batch F	3539237								
<b>WG2379935-6</b> рН	DUP		<b>WG2379935-5</b> 6.83	6.83	J	pH units	0.00	0.2	01-SEP-16
<b>WG2379935-4</b> рН	LCS			7.00		pH units		6.9-7.1	01-SEP-16
SO4-IC-N-WT		Water							
Batch F	3542048								
WG2381106-1 Sulfate (SO4)			<b>WG2381106-1</b> 3 28.4	<b>3</b> 28.2		mg/L	0.7	20	02-SEP-16
WG2381106-1 Sulfate (SO4)				100.8		%		90-110	02-SEP-16
WG2381106-1 Sulfate (SO4)				<0.30		mg/L		0.3	02-SEP-16
WG2381106-1 Sulfate (SO4)			WG2381106-13	<b>3</b> 100.7		%		75-125	02-SEP-16
SOLIDS-TDS-WT		Water							
	83541963								
WG2382254-3 Total Dissolve			<b>L1820555-1</b> 267	259		mg/L	3.2	20	06-SEP-16
WG2382254-2 Total Dissolve				97.4		%		85-115	06-SEP-16
WG2382254-1 Total Dissolve				<10		mg/L		10	06-SEP-16



	Quality Control Report								
			Workorder:	L1821470	)	Report Date:	04-OCT-16		Page 9 of 10
Client: Contact:	2275 Uppe	er Middle Rd. E. S DN L6H 0C3	oration (Oakville) Suite #300						
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	-	Water							
Batch I WG2381067-3 Total Suspen			<b>WG2381067-4</b> 18400	18100		mg/L	1.6	20	06-SEP-16
WG2381067-2 Total Suspen				99.2		%		85-115	06-SEP-16
WG2381067-1 Total Suspen				<2.0		mg/L		2	06-SEP-16
TKN-WT		Water							
Batch I WG2380278-3 Total Kjeldah	-		<b>L1819966-1</b> 0.35	0.38		mg/L	5.9	20	02-SEP-16
WG2380278-2 Total Kjeldah				88.2		%		75-125	02-SEP-16
WG2380278-1 Total Kjeldah				<0.15		mg/L		0.15	02-SEP-16
WG2380278-4 Total Kjeldah	-		L1819966-1	110.9		%		70-130	02-SEP-16
тос-wт		Water							
	R3541335		1 4000000 0						
WG2380766-3 Total Organic	: Carbon		<b>L1822039-2</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	01-SEP-16
WG2380766-2 Total Organic	Carbon			99.4		%		80-120	01-SEP-16
WG2380766-1 Total Organic	Carbon			<1.0		mg/L		1	01-SEP-16
WG2380766-4 Total Organic			L1822039-2	92.6		%		70-130	01-SEP-16
TURBIDITY-BF		Water							
Batch I WG2379069-3 Turbidity	R3538456 B DUP		<b>L1821468-6</b> 63.5	65.0		NTU	2.3	15	31-AUG-16
<b>WG2379069-</b> 1 Turbidity	MB			<0.10		NTU		0.1	31-AUG-16

Workorder: L1821470

Report Date: 04-OCT-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

#### Contact:

#### 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 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.



#### Ft. Collins, Colorado

LIMS Version: 6.829

Friday, September 30, 2016

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

Re: ALS Workorder: 1609039 Project Name: Project Number: L1821470

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 9/2/2016. 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 Shiloh J. Summy Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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						
Alaska (AK)	CO01099						
Arizona (AZ)	AZ0742						
California (CA)	06251CA						
Colorado (CO)	CO01099						
Connecticut (CT)	PH-0232						
Florida (FL)	E87914						
Idaho (ID)	CO01099						
Kansas (KS)	E-10381						
Kentucky (KY)	90137						
L-A-B (DoD ELAP/ISO 170250)	L2257						
Louisiana (LA)	05057						
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						



# 1609039

#### Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

### Sample Number(s) Cross-Reference Table

OrderNum: 1609039 Client Name: ALS Environmental Client Project Name: Client Project Number: L1821470 Client PO Number: L1821470

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1821470-1	1609039-1		WATER	30-Aug-16	

5) Environmental

#### Subcontract Request Form

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. . . . . .

#### **Subcontract To:**

#### ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE FORT COLLINS, CO 80524

NOTES: Please reference on final report and invoice: PO# <u>L1821470</u> ALS requires QC data to be provided with your final results.

Please see enclosed sample(s) in 1 Container(s) 1

SAMPLE NUMBER ANA	LYTICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1821470-1 MS-08		8/30/2016	
Ra2	6 by Alpha Scint, MDC=0.01 Bq/L (RA22	6-MMER-FC 1) 9/23/2016	
Subcontract Info Contact:	Rick Hawthorne (519) 886-69	10	
Analysis and reporting info conta			
	60 NORTHLAND ROAD, UNIT	1	
	WATERLOO, ON N2V 2B8		
	Phone: (519) 886-6910	Email:Wayne.Smith@alsg	lobal.com
Please email confirmation of	eceipt to: Wayne.Smith	@alsglobal.com	
Shipped By:	Date Shipped:		
Received By: C Sumb	Date Received	1: 9-2-14 [000	
/erified By:	Date Verified:		
	Temperature:		
Sample Integrity Issues:			

1609039 L1821470

1

		-		
	Client: MS-WATEr 100 Workorder No: 160°	<u>70</u> _	39	
	Project Manager: Initials:	Date:	9-2-	Ξlļ
1.	Does this project require any special handling in addition to standard ALS procedures?		YES	(N
2.	Are custody seals on shipping containers intact?	NONE	YES	N
3.	Are Custody seals on sample containers intact?	NONE	YES	N
4	Is there a COC (Chain-of-Custody) present or other representative documents?		YES	N
5.	Are the COC and bottle labels complete and legible?		(YES)	N
6.	Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		YES	N
7.	Were airbills / shipping documents present and/or removable?	DROP OFF	YES	٢
8.	Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	١
9.	Are all aqueous non-preserved samples pH 4-9?	N/A	YES	1
10	D. Is there sufficient sample for the requested analyses?		YES	1
1	. Were all samples placed in the proper containers for the requested analyses?		YES	1
Ľ	2. Are all samples within holding times for the requested analyses?			]
1	3. Were all sample containers received intact? (not broken or leaking, etc.)		<u>(YES)</u>	]
1	4. 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	נ
1	5. Do any water samples contain sediment? Amount Amount of sediment: dusting moderate heavy	N/A	YES	á
1	6. Were the samples shipped on ice?	./	(YES)	
1	7. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	RAD ONLY	(ES)	]
	Cooler #:	····		_
	No. of custody seals on cooler: 0			_
	DOT Survey/         External μR/hr reading:			_
1	Background μR/hr reading:			
L	Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria? (YES) NO / NA (If no, see	e Form 008.	)	

Form 201r24.xls (06/04/2012)

\*IR Gun #4: Oakton, SN 2372220101-0002

.



### SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	30-Sep-16	
Project:	L1821470					Work Order:	1609039	
Sample ID:	L1821470-1		Lab ID: 1609039-1					
Legal Location:						Matrix:	WATER	
<b>Collection Date</b>	: 8/30/2016				Perc	ent Moisture:		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed	
Radium-226 by	Radon Emanation - M	ethod 903.1	PAI	783	Pre	p Date: <b>9/22/20</b>	16 PrepBy: CDJ	
Ra-226		0.011 (+/- 0.0065)		0.007	BQ/I	NA	9/30/2016 12:15	

### SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	30-Sep-16	
Project:	L1821470				۲	Work Order:	1609039	
Sample ID:	L1821470-1					Lab ID:	1609039-1	
Legal Location:						Matrix:	WATER	
Collection Date:					Porce	ent Moisture:	WITT DIV	
Jonection Dates	0/30/2010				1 61 0	ent wioistui e.		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor		Date Analyze
Explanation of (	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ess than the sample specific I	MDC.	Ma			ot met, but the rep	orted	
Y1 - Chemical Yield	is in control at 100-110%. Qu	uantitative yield is assumed.	ı		reater than the			
	outside default limits.			-	y below lower o y above upper (			
-	han Warning Limit of 1.42					within control limits	i.	
	s Received' while the Report Dry Weight' while the Report E					de control limits		
	liffers by more than 15% of L0			-	-	e results less than	5 times MDC	
D - DER is greater th	-				entration greate			
M - Requested MDC					centration great	er than MDC but le	ss than Reque	sted
LT - Result is less th	an requested MDC but greate	er than achieved MDC.	M	DC.				
Inorganics:								
B - Result is less tha	n the requested reporting limi	it but greater than the instrum	nent method	detection limit	(MDL).			
U or ND - Indicates the	hat the compound was analyz	zed for but not detected.						
-	ue is estimated because of the	e presence of interference. A	n explanato	ry note may be	included in the	e narrative.		
	ion precision was not met.							
	ecovery not within control limit native sample concentration				ne matrix spike	and or spike		
-	not within control limits. An ex	-						
* - Duplicate analysis	s (relative percent difference)	not within control limits.						
S - SAR value is estin	mated as one or more analyte	es used in the calculation we	re not detect	ted above the o	detection limit.			
Organics:								
U or ND - Indicates tl	hat the compound was analyz	zed for but not detected.						
B - Analyte is detecte	ed in the associated method b	blank as well as in the sample	e. It indicate	s probable bla	nk contaminatio	on and warns the d	ata user.	
-	ation exceeds the upper level	-						
	The result is less than the re			ent method det	ection limit (ME	DL).		
-	tified compound is a suspecte		τ.					
-	diluted below an accurate qua y is equal to or outside the co							
-	ent difference (RPD) equals o							
	bling gasoline was detected in							
	ling diesel was detected in th	is sample.						
D - A pattern resemb	oling motor oil was detected ir							
M - A pattern resemb	-	n this sample.						
M - A pattern resemb C - A pattern resemb	ling crude oil was detected in							
M - A pattern resemb C - A pattern resemb 4 - A pattern resemb	ling crude oil was detected in ling JP-4 was detected in this							
M - A pattern resemb C - A pattern resemb 4 - A pattern resemb 5 - A pattern resemb	ling JP-4 was detected in this ling JP-5 was detected in this ling JP-5 was detected in this	sample.	indow for th	e analute of int	erest			
<ul> <li>M - A pattern resemb</li> <li>C - A pattern resemb</li> <li>4 - A pattern resemb</li> <li>5 - A pattern resemb</li> <li>H - Indicates that the</li> </ul>	bling crude oil was detected in ling JP-4 was detected in this ling JP-5 was detected in this fuel pattern was in the heaving	s sample. er end of the retention time w						
<ul> <li>M - A pattern resemb</li> <li>C - A pattern resemb</li> <li>4 - A pattern resemb</li> <li>5 - A pattern resemb</li> <li>H - Indicates that the</li> <li>L - Indicates that the</li> </ul>	ling JP-4 was detected in this ling JP-5 was detected in this ling JP-5 was detected in this	s sample. er end of the retention time w end of the retention time wir	dow for the	analyte of inte	rest.	g petroleum hydroc	arbon products	c
<ul> <li>M - A pattern resemb</li> <li>C - A pattern resemb</li> <li>4 - A pattern resemb</li> <li>5 - A pattern resemb</li> <li>H - Indicates that the</li> <li>L - Indicates that the</li> <li>Z - This flag indicate</li> <li>- gasoline</li> </ul>	bling crude oil was detected in ling JP-4 was detected in this ling JP-5 was detected in this fuel pattern was in the heaving fuel pattern was in the lighter	s sample. er end of the retention time w end of the retention time wir	dow for the	analyte of inte	rest.	g petroleum hydroc	arbon products	c
<ul> <li>M - A pattern resemb</li> <li>C - A pattern resemb</li> <li>4 - A pattern resemb</li> <li>5 - A pattern resemb</li> <li>H - Indicates that the</li> <li>L - Indicates that the</li> <li>Z - This flag indicate</li> </ul>	bling crude oil was detected in ling JP-4 was detected in this ling JP-5 was detected in this fuel pattern was in the heaving fuel pattern was in the lighter	s sample. er end of the retention time w end of the retention time wir	dow for the	analyte of inte	rest.	g petroleum hydroc	arbon products	:
<ul> <li>M - A pattern resemb</li> <li>C - A pattern resemb</li> <li>4 - A pattern resemb</li> <li>5 - A pattern resemb</li> <li>H - Indicates that the</li> <li>L - Indicates that the</li> <li>Z - This flag indicate</li> <li>- gasoline</li> <li>JP-8</li> <li>- diesel</li> <li>- mineral spirits</li> </ul>	bling crude oil was detected in ling JP-4 was detected in this ling JP-5 was detected in this fuel pattern was in the heaving fuel pattern was in the lighter	s sample. er end of the retention time w end of the retention time wir	dow for the	analyte of inte	rest.	g petroleum hydroc	arbon products	:
M - A pattern resemb C - A pattern resemb 4 - A pattern resemb 5 - A pattern resemb H - Indicates that the L - Indicates that the Z - This flag indicate - gasoline - JP-8 - diesel	bling crude oil was detected in ling JP-4 was detected in this ling JP-5 was detected in this fuel pattern was in the heaving fuel pattern was in the lighter	s sample. er end of the retention time w end of the retention time wir	dow for the	analyte of inte	rest.	g petroleum hydroc	arbon products	:

Client:	ALS Environmental
Work Order:	1609039
Project:	L1821470

### **QC BATCH REPORT**

Batch ID: R	RE160922-2-1 In	strument ID Alp	ona Scin		Method: Ra	aalum-226	b by Rador	n Emanation				
LCS	Sample ID: RE160922-2				Ur	nits: <b>BQ/I</b>		Analysi	s Date: 9	/30/201	6 13:01	
Client ID:		Run II	D: RE160922-	2A			P	rep Date: <b>9/22</b>	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qua
Ra-226		1.62 (+/- 0.400)	0.00521	1.673		96.6	67-120					Р
Carr: BARI	UM	16400		16610		98.5	40-110					
LCSD	Sample ID: RE160922-2				Uı	nits: <b>BQ/I</b>		Analysi	s Date: 9	/30/201	6 13:01	
Client ID:		Run II	D: RE160922-	2A			P	rep Date: <b>9/22</b>	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qua
Ra-226		1.70 (+/- 0.422)	0.00604	1.673		102	67-120		1.62	0.1	2.1	Р
Carr: BARI	UM	12900		16610		77.5	40-110		16400			
МВ	Sample ID: RE160922-2				Uı	nits: <b>BQ/I</b>		Analysi	s Date: 9	/30/201	6 13:01	
Client ID:		Run II	D: RE160922-	2A			P	rep Date: <b>9/22</b>	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qua
Ra-226		ND	0.0068									U
Carr: BARI	UM	14700		16610		88.3	40-110					



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 1 of 5

Work Order :	231846
Sample Number :	48803

#### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo					
Location :	Waterloo ON	Sampled By :	B.B./ K.M./ B.D.B			
Job Number :	L1821470	Date Collected :	2016-08-30			
Substance :	MS-08	Time Collected :	11:20			
Sampling Method :	Not provided	Date Received :	2016-09-01			
Temp. on arrival :	20.0°C	Time Received :	12:20			
Sample Description :	Clear, pale yellow, mild odour.	Date Tested :	2016-09-02			
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).					

Effect	Value	TEST RE 95% Confidenc		Statistical Method
IC25 (Growth from Biomass)	>100%		energen er en	-
LC50	>100%	-		-
	The results r	eported relate only	to the sample tested.	
	POTASSIUM CI	HLORIDE REF	ERENCE TOXICANT DA	АТА
Date Tested :	2016-09-13		Analyst(s) :	SV, MC
Organism Batch :	Fm16-09		Test Duration :	7 days
IC25 Growth (from Biomass) :	0.83 g/L*		LC50 :	1.22 g/L
95% Confidence Limits :	0.73 - 0.91 g/L		95% Confidence Limits	: 1.15 - 1.29 g/L
Statistical Method :	Non-Linear Regre	ssion (CETIS) <sup>a</sup>	Statistical Method :	Spearman-Kärber (CETIS) <sup>a</sup>
Historical Mean IC25 :	1.01 g/L		Historical Mean LC50 :	1.21 g/L
Warning Limits $(\pm 2SD)$ :	0.87 - 1.17 g/L		Warning Limits (± 2SD)	: 1.09 - 1.34 g/L
The reference toxicity test was per	rformed under the sam	ne experimental co	onditions as those used with th	e test sample.

#### **TEST CONDITIONS**

Test Organism :	Pimephales promelas	Test Type :	Static Renewal
Organism Batch :	Fm16-09	Control/Dilution Water :	Well water (no chemicals added)
Organism Age :	~07:00 - 21:00 h at start of test	Test Volume / Replicate :	300 mL
Source :	In-house culture	Test Vessel :	420 mL polystyrene beaker
Culture Mortality/Diseased :	% (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

\*Note: The reference toxicant IC25 (Growth from Biomass) data point exceeded the 95% warning limits for historical data. No other unusual circumstances were observed and therefore the test result is considered acceptable.

- •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.

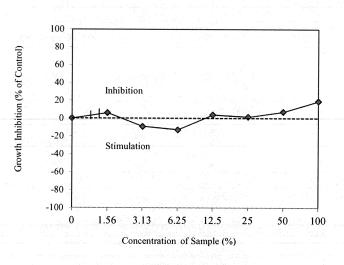


**TOXICITY TEST REPORT** Fathead minnow EPS 1/RM/22 2 of 5

Work Order : Sample Number : 231846

48803

Fathead Minnow Growth Inhibition (based on Biomass)



#### REFERENCES

<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

<sup>b</sup>Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics*, 11:1-21.

Date :

Xo16

yyyy-mm-dd

Approved By: Project Manage

AQUATOX

Work Order : 231846 Sample Number : 48803

**TOXICITY TEST REPORT** Fathead minnow

EPS 1/RM/22 3 of 5

#### CUMULATIVE DAILY CONTROL MORTALITY AND IMPAIRMENT (±SD)

FATHEAD MINNOW CUMULATIVE DAILY MORTALITY

Date :

2016-09-02 2016-09-07 2016-09-03 2016-09-04 2016-09-05 2016-09-06 2016-09-08 2016-09-09  $0.00\% \ (\pm 0.0) \quad 0.00\% \ (\pm 0.0) \quad 0.00\% \ (\pm 0.0) \quad 3.33\% \ (\pm 5.8) \$ 

Initiation Time :	13:30
Initiation Date :	2016-09-02
Completion Date :	2016-09-09

Date : Analyst(s):		Day 2016-0 XI	9-02	Da 2016- S	09-03		y 2 09-04 D	Da 2016- S		Dag 2016-0 SE	09-06	Da 2016- SE	09-07	Da 2016- SE	09-08		y 7 09-09 DC	Treatment Mean Mortality (± SD)
Concentration	Replicate	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	Number Dead	% Dead	%
(70)	A	0	0	0	0	0	0	1	10	1	10	1	10	1	10		10	
Control	B	0	0	0	0	0	0	0	0	0	0	0	10 0	0	10 0	1	10	2 22 (15 55)
	C	0	0	0	0	0	0	0	0	0						0	0	3.33 (±5.77)
	 A	0	0	0	0	0	0	0	0	0	<u>0</u> 0	0	0	0	0	0	0	
1.56	В	0	0	0	0	0	0	0	0			0	0	0	0	0	0	
1.50	C	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0.00 (±0.00)
	 	0	0	0	0	0	0	0	<u>0</u> 0	00	00	00	0 0	0	0	0	0	
3.13	B	0	0	0	0	0	0	0	0					0		0	0	< < <b>-</b> ( ) 11
5.15	C B	0	0	0	0	0	0	0	0	0	0	1	10	2	20	2	20	6.67 (±11.55
	 A	0	0	0	0	0	0	0	0	00	<u>0</u> 0	0	0	0	0	0	0	
6.25	B	0	0	0	0	0	0	0			-	0	0	0	0	0	0	
0.25	C B	0	0	0	0	-		-	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	 A	0	0			0	0	0	0	0	0	0	0	0	0	0	0	
12.5		-		0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12.5	B C	0 0	0	0 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	A		0		0	0	0	0	0	0	0	0	0	0	0	0	0	
25	B C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	 	00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1979 - Sall Inner an Anna an an an ann an ann an ann an ann an a
50			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
50	B	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	6.67 (±5.77)
	<u> </u>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	
100	A	0	0	0	0	0	0	0	0	1	10	1	10	2	20	2	20	
100	B	0	0	0	0	0	0	0	0	0	0	0	0	1	10	2	20	13.33 (±11.55
	С	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: DK Date : 2016-09-28

AQUATOX

Work Order : 231846 Sample Number : 48803

Concentration	Replicate	Number of Larvae Exposed	Replicate Mean Dry Weight (mg)	Treatment Mean Biomass (mg)	Standard Deviation
(%)					
	А	10	1.124		
Control	В	10	0.923	1.047	0.109
	С	10	1.095	and the second second	
	А	10	0.989		
1.56	В	10	0.971 <sup>1</sup>	0.983	0.011
	С	10	0.990		
	А	10	1.158		
3.13	В	10	1.101	1.143	0.037
	C	10	1.171		
	А	10	1.278		
6.25	В	10	1.165	1.183	0.088
	С	10	1.105		
	А	10	1.112		
12.5	В	10	0.967	1.007	0.091
	С	10	0.943		
	А	10	1.094		
25	В	10	$0.899^{1}$	1.032	0.116
	С	10	1.104		
	А	10	1.083		
50	В	10	0.868	0.972	0.108
	С	10	0.966		-
	А	10	0.824		
100	В	10	0.883	0.847	0.031
	С	10	0.835		

### FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

NOTES :

• <sup>1</sup>Outlier according to Grubbs Test<sup>b</sup>. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.

• Control average dry weight per surviving organism = 1.089 mg

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Data Reviewed By: DK Date :\_ 2016 - 09 - 28

AQUATOX

Work Order :231846Sample Number:48803

### TOXICITY TEST REPORT

Fathead minnow EPS 1/RM/22 5 of 5

#### Fathead Minnow Water Chemistry Data

	Initial Chemistry:	Temp. (°C)	DO (mg/L)	pН	Conductivity (µmhos/cm)		iness 5 CaCO3)
		25.0	9.2	7.2	1282	74	40
	Day 0 - 1	Day 1 - 2	Day 2 - 3	Day 3 - 4	Day 4 - 5	Day 5 - 6	Day 6 - 7
	2016-09-02	2016-09-03	2016-09-04	2016-09-05	2016-09-06	2016-09-07	2016-09-08
Sub-sample Used	1	1	1	2	2	3	3
Temperature (°C)	25.0	25.0	24.0	25.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)	9.2	9.8	9.7	10.1	9.8	9.9	9.5
Dissolved Oxygen % Sat. <sup>2</sup>	112	118	117	121	119	121	119
рН	7.2	7.6	7.5	7.5	7.4	7.2	7.2
Pre-aeration Time (min) <sup>3</sup>	20	20	20	20	20	20	20
Analyst(s) : Initia	l SV	SEC	JL	JL	SDC	SDC	SV
Final	SEC	JL	JL	SDC	SDC	SV	CG
Control (0%)							
Temp.(°C) Initia	1 26.0	25.0	24.0	25.0	25.0	25.0	26.0
Final		24.0	24.0	25.0	25.0	25.0	25.0
DO % Sat. Initia	1 98	98	98	100	99	98	98
DO (mg/L) Initia	1 8.0	7.9	8.0	8.2	8.1	7.9	7.8
Final	7.9	7.0	7.2	6.9	7.8	7.8	7.0
pH Initia		8.5	8.5	8.5	8.4	8.3	8.3
Final		8.3	8.1	8.0	8.2	8.0	7.9
Cond. (µmhos) Initia	1 642	672	664	722	708	701	696
1.56 %							
Temp.(°C) Initia		25.0	24.0	25.0	25.0	25.0	26.0
Final		24.0	24.0	25.0	25.0	25.0	25.0
DO (mg/L) Initia		8.5	8.2	8.3	8.1	8.0	8.5
Final		7.8	7.3	6.8	6.5	7.6	7.0
pH Initia		8.4	8.5	8.4	8.4	8.3	8.3
Final		8.3	8.2	8.0	7.9	8.0	7.8
Cond. (µmhos) Initia	655	697	683	744	720	718	730
25 %							
Temp.(°C) Initia		25.0	24.0	25.0	25.0	25.0	26.0
Final	25.0	24.0	24.0	25.0	25.0	25.0	25.0
DO (mg/L) Initia		8.5	8.3	8.4	8.1	8.1	8.5
Final Initia	8.0 I 8.4	7.2	7.4	6.8 8 4	6.7	7.7	7.0
pH Initia Final	8.2	8.4 8.1	8.4 8.2	8.4 7.9	8.3	8.2 7.9	8.2 7.7
Cond. (µmhos) Initia		859	8.2 850	7.9 896	7.8 872	874	888
100.0/							
<b>100 %</b> Temp.(°C) Initia	24.0	25.0	24.0	25.0	25.0	25.0	26.0
Temp.(°C) Initia Final	26.0 25.0	25.0 24.0	24.0 24.0	25.0 25.0	25.0 25.0	25.0 25.0	26.0 25.0
DO (mg/L) Initia		24.0 9.0	24.0 8.6	25.0 8.5	25.0 9.3		25.0 8.6
Final	8.0	9.0 7.8	8.0 7.5	8.3 6.9	9.3 6.1	8.8 7.8	8.6 6.6
pH Initia		7.8	7.5	7.4	7.6	7.8	7.2
Final	7.6	7.3	7.3	7.4	7.0	7.4	6.9
Cond. (µmhos) Initia		1303	1301	1308	1286	1289	1324

"\_" = not measured

 $^2$  % saturation (adjusted for actual temperature and barometric pressure)

 $^3 \leq 100$  bubbles/minute



AquaTox Testing & Consulting Inc. B-11 Nicholas Beaver Rd. Puslinch ON N0B 2J0 Tel: (519) 763-4412 Fax: (519) 763-4419 TOXICITY TEST REPORT

Ceriodaphnia dubia EPS 1/RM/21 1 of 4

 Work Order :
 231846

 Sample Number :
 48803

Sample Number :	48803			
	SAMPLE	DENTIFICATION		
Company : Location : Job Number : Substance : Sampling Method : Temp. on arrival : Sample Description : Test Method :	ALS Laboratory Group, Waterloo Waterloo ON L1821470 MS-08 Not provided 20.0°C Clear, pale yellow, mild odour. Test of Reproduction and Surviv Conservation and Protection. Ot	Sam Date Tim Date Tim Date al using the Cladoceran <i>Cer</i>		
	TE	CST RESULTS		
Effect	Value 9	5% Confidence Limits	St	atistical Method
LC50	>100%	-		_
IC25 (Reproduction)	>100%	-		-
	The results reported	d relate only to the sample teste	ed.	
	SODIUM CHLORIDE	<b>REFERENCE TOXICAN</b>	T DATA	
Date Tested : Organism Batch :	2016-09-06 Cd16-09	Analyst(s) : Test Duration :	MA, MC, 1 6 days	XD, RD
IC25 Reproduction : 95% Confidence Limits :	1.30 g/L 1.01 - 1.38 g/L	LC50 : 95% Confidence Limits	1.87 g/L* : 1.50 - 2.33	g/L
Statistical Method : Historical Mean IC25 : Warning Limits (± 2SD) The reference toxicity test was	Linear Interpolation (CETIS 1.36 g/L : 1.04 - 1.78 g/L s performed under the same experimental con-	Historical Mean LC50 : Warning Limits (± 2SD)	2.22 g/L : 1.91 - 2.59	gression (MLE) (CETIS) <sup>a</sup> g/L
		CONDITIONS		

#### **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

\*Note: The reference toxicant LC50 test result exceeded the 95% warning limits for historical data. No other unusual circumstances were observed and therefore the test result is considered acceptable.

•All test validity criteria as specified in the test method cited above were satisfied.

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Work Order :

Sample Number :

#### TOXICITY TEST REPORT

Ceriodaphnia dubia EPS 1/RM/21 2 of 4

			TEST (	ORGANI	SMS						
Organism Batch : Cd16-09	h <i>nia dubia</i> house mass o in-house cu			Range of Mean Br Ephippia	:		h - 22:25				
			I	Brood Or	ganism N	Neonate	Produc	ction			
Replicate :	1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subsequent brood):	13	12	18	15	11	13	15	11	17	14.1	
Total (first three broods):	17	16	17	16	16	21	19	19	19	18	17.8

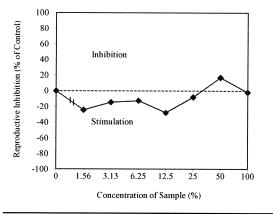
No organisms exhibiting unusual appearance, behaviour, or undergoing unusual treatment were used in the test.

#### TEST DATA

#### Ceriodaphnia dubia Reproductive Inhibition

231846

48803



				Concen	tration	of Samp	le (%)		
Date	<b>Test Day</b>	Control	1.56	3.13	6.25	12.5	25	50	100
2016-09-03	1	0	0	0	0	0	0	0	0
2016-09-04	2	0	0	0	0	0	0	0	0
2016-09-05	3	0	0	0	0	0	0	0	0
2016-09-06	4	0	0	0	0	0	10	0	0
2016-09-07	5	0	0	0	0	0	10	0	0
2016-09-08	6	0	0	0	0	0	10	0	0
Total Mo	rtality (%)	0	0	0	0	0	10	0	0

Cumulative Daily Test Organism Mortality (%)

#### REFERENCES

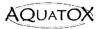
<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

<sup>b</sup>Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics*, 11:1-21.

Date :

Approved By : lanager

yyyy-mm-dd



#### **TOXICITY TEST REPORT**

Ceriodaphnia dubia EPS 1/RM/21 3 of 4

 Work Order :
 231846

 Sample Number :
 48803

Test Completion Date :

Test Initiation Date :2016-09-02Initiation Time :15:20

2016-09-08

#### Ceriodaphnia dubia Survival and Reproduction

Concentration (	oncentration (%)				Re	plicate					Mean Young	s) Concentratio	oncentration (%) Replicate										Mean Young			
Control	Day	1	2	3	4	5	6	7	8	9	10	(±SD)		12.5	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0	RD	2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0	SS	2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0	JL	2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0
2016-09-06	4	3	3	5	4	5	5	3	4	3	4	3.9	MC	2016-09-06	4	4	5	6	4	4	4	4	4	4	4	4.3
2016-09-07	5	8	6	8	10	12	9	9	8	10	8	8.8	MC	2016-09-07	5	12	11	11	10	10	8	7	12	11	13	10.5
2016-09-08 Total	6	5 16	8 17	7 20	7 21	6 23	9 23	7 19	8 20	7 20	10 22	7.4 <b>20.1 (±2.3</b> )	MC	2016-09-08 Total	6	8 24	14 <b>30</b>	14 <b>31</b>	13 <b>27</b>	1 15 <sup>1</sup>	13 25	10 21	12 28	13 28	11 28	10.9 <b>25.7 (±4.8</b>

Concentration (	%)					Rep	olicate		You			Mean Concentration (%) Young				Replicate									Mean Young
1.56	Day	1	2	3	4	5	6	7	8	9	10	(±SD)	25	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0	2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0	2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0	2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0
2016-09-06	4	4	6	4	4	4	3	4	4	3	6	4.2	2016-09-06	4	3	6	6	3	5	0 ;	x 5	1	5	3	3.7
2016-09-07	5	8	12	11	9	10	8	12	13	9	12	10.4	2016-09-07	5	8	12	12	9	7	0	10	0	8	9	7.5
2016-09-08 Total	6	13 25	12 <b>30</b>	9 24	9 22	9 23	8 19	8 24	11 28	13 <b>25</b>	12 <b>30</b>	10.4 <b>25.0 (±3.5)</b>	2016-09-08 Total	6	13 <b>24</b>	13 <b>31</b>	12 <b>30</b>	11 23	12 <b>24</b>	0 01	11 26	8 9	13 <b>26</b>	12 <b>24</b>	10.5 <b>21.7 (±9.7)</b>

Concentration (	%)				Rep	plicate					Mean Young	
3.13	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0
2016-09-06	4	4	3	6	5	5	3	6	4	6	6	4.8
2016-09-07	5	9	9	10	11	9	10	11	12	9	12	10.2
2016-09-08	6	5	9	12	10	0	7	11	0	11	15	8
fotal		18	21	28	26	14	20	28	16	26	33	23.0 (±6.1)

Concentration	n (%)					Rej	plicate					Mean Young		
50	Day	1	2	3	4	5	6	7	8	9	10	(±SD)		
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0		
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0		
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0		
2016-09-06	4	4	6	6	2	3	5	6	2	2	2	3.8		
2016-09-07	5	7	7	7	9	6	9	2	2	0	3	5.2		
2016-09-08	6	9	12	12	10	1	9	8	9	2	5	7.7		
Total		20	25	25	21	10	23	16	13	4	10	16.7 (±7.		

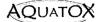
Concentration (	oncentration (%)			Replicate					Mean Young Concentration (%)			Replicate					Mean Young								
6.25	Day	1	2	3	4	5	6	7	8	9	10	(±SD)	100	Day	1	2	3	4	5	6	7	8	9	10	(±SD)
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0	2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0	2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0	2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0
2016-09-06	4	3	3	4	5	5	2	4	4	3	4	3.7	2016-09-06	4	4	4	5	7	3	5	4	4	5	4	4.5
2016-09-07	5	8	11	10	10	10	11	9	9	7	12	9.7	2016-09-07	5	10	5	4	11	7	9	8	0	10	8	7.2
2016-09-08	6	7	6	7	11	10	10	8	9	11	13	9.2	2016-09-08	6	12	9	3	12	0	8	11	8	10	15	8.8
Total		18	20	21	26	25	23	21	22	21	29	22.6 (±3.2)	Total		26	18	12	30	10	22	23	12	25	27	20.5 (±7.1)

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<sup>b</sup>. 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 : <u>DK</u> Date : <u>2016 - 09 - 28</u>



#### TOXICITY TEST REPORT

Ceriodaphnia dubia EPS 1/RM/21 4 of 4

Work Order : 231846 Sample Number: 48803

#### Ceriodaphnia dubia Water Chemistry Data

		Initial Chemistry:	<b>Temp. (°C)</b> 25.0	<b>DO (mg/L)</b> 9.2	<b>рН</b> 7.2	Conductivity (µmhos/cm) 1282	Hardness (mg/L as CaCO <sub>3</sub> ) 740
		Day 0 - 1	Day 1 - 2	Day 2 - 3	Day 3 - 4	Day 4 - 5	Day 5 - 6
Date :		2016-09-02	2016-09-03	2016-09-04	2016-09-05	2016-09-06	2016-09-07
Sub-sample Use		1	1	1	2	2	3
Temperature (°C	,	25.0	25.0	24.0	25.0	25.0	25.0
Dissolved Oxyge	· · · /	9.2	9.8	9.7	10.1	9.8	9.9
Dissolved Oxyge	en % Sat."	112	118	117	121	119	121
pН		7.2	7.6	7.5	7.5	7.4	7.2
Pre-aeration Tir	ne (min)⁴	20	20	20	20	20	20
Analyst(s)	Initial	SV	SEC	JL	JL	SDC	SDC
	Final	SS	JL	JL	SDC	CG	SDC
Control (0%)							
Temp. (°C)	Initial	26.0	25.0	24.0	25.0	25.0	25.0
	Final	25.0	24.0	24.0	24.0	24.0	25.0
DO % Sat. <sup>3</sup>	Initial	98	98	98	100	99	98
DO (mg/L)	Initial	8.0	7.9	8.0	8.2	8.1	7.9
	Final	7.6	7.2	7.1	7.3	7.4	7.2
pН	Initial	8.4	8.5	8.5	8.5	8.4	8.3
	Final	8.2	8.2	8.1	8.1	8.0	8.0
Cond. (µmhos)	Initial	642	672	664	722	708	701
1.56 %							
Temp. (°C)	Initial	26.0	25.0	24.0	25.0	25.0	25.0
	Final	25.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	Initial Einel	8.0	8.5	8.2	8.3	8.1	8.0
pН	Final Initial	7.5 8.4	7.3 8.4	7.1 8.5	7.1 8.4	7.4 8.4	7.0 8.3
рп	Final	8.1	8.2	8.3	8.1	8.4 8.0	8.3 7.9
Cond. (µmhos)	Initial	655	697	683	744	720	718
25 %							
Temp. (°C)	Initial	26.0	25.0	24.0	25.0	25.0	25.0
F·()	Final	25.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	Initial	8.3	8.5	8.3	8.4	8.1	8.1
	Final	7.3	6.9	7.1	7.1	7.4	7.0
pH	Initial	8.4	8.4	8.4	8.4	8.3	8.2
	Final	8.0	8.0	8.0	8.0	7.9	7.8
Cond. (µmhos)	Initial	822	859	850	896	872	874
100 %							
Temp. (°C)	Initial	26.0	25.0	24.0	25.0	25.0	25.0
	Final	25.0	24.0	24.0	24.0	24.0	25.0
DO (mg/L)	Initial Final	9.1	9.0 7.2	8.6	8.5	9.3	8.8
pH	Final Initial	7.4 7.3	7.3 7.7	7.1 7.5	7.2 7.4	7.4 7.6	7.1 7.4
Pri	Final	8.5	7.2	7.2	7.6	7.0	7.0
Cond. (µmhos)	Initial	1286	1303	1301	1308	1286	1289

"-" = not measured

 $^3$  % saturation (adjusted for actual temperature and barometric pressure)

 $^4 \leq 100$  bubbles/minute



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 1 of 2

Work Order :	231846
Sample Number :	48803

	SAMPLE	DENTIFICATION				
Company : Location : Job Number : Substance : Sampling Method : Sampled By : Sample Description :	ALS Laboratory Group, Waterloo Waterloo ON L1821470 MS-08 Not provided B.B./ K.M./ B.D.B Clear, pale yellow, mild odour.	Tir Da Tir Ter	te Collected : ne Collected : te Received : ne Received : mp. on arrival : te Tested :	2016-08-30 11:20 2016-09-01 12:20 20.0°C 2016-09-02		
Test Method :	Growth Inhibition Test Using a F Protection. Ottawa, Ontario. Re			nservation and		
77.00		ST RESULTS				
Effect	Value 95	% Confidence Limits	Statist	ical Method		
IC25 (Growth)	>90.91%	-		-		
	The results reported	d relate only to the sample tes	ted.			
	ZINC (AS ZINC SULPHA	<b>TE) REFERENCE TOXI</b>	ICANT DATA			
Date Tested :	2016-08-30	Statistical Method :	Linear In	terpolation (CETIS) <sup>a</sup>		
Organism Batch :	Ps16-08	Historical Mean IC25 :	15.7 μg/I	_		
Test Duration :	72 hours	Warning Limits (± 2SD)	: 7.3 - 33.7	7 μg/L		
IC25 Growth :	18.3 μg/L	Analyst(s) :	SEC	SEC		
95% Confidence Limits	,					
The reference toxicity test	was performed under the same experime	ntal conditions as those used with	ith the test sample.			
	TES	<b>F</b> CONDITIONS				
Test Organism :	Pseudokirchneriella subcapitata	Control/Dilution Water :	Millipore	e Milli-Q (no chemicals added)		
Organism Batch :	Ps16-08	Test Vessel :	U-shaped	l polystyrene microplate		
Strain Number :	CPCC 37	Volume per Replicate :	220 μL			
Source :	In-house culture	Enrichment Medium :	Stock 2B	: EDTA reduced to 25%		
Culture Origin :	University of Waterloo, Waterloo O	ON Number of Control Repli	cates: 10			
Age (at start of test) :	4 days (in exponential growth)	Number of Test Replicate	es: 4			
pH Adjustment :	None	Concentrations Tested :	10 + Con	itrol		
Hardness Adjustment :	None	Photoperiod / Light Inten	sity : Continuo	ous light, 4240 - 4400 lux		
Sample Pre-aeration :	None	Mean Test Temperature (	(± SD): 23.4°C (=	± 0.3)		
Sample Filtration :	0.45 $\mu$ m preconditioned filter	Test Duration :	72 hours			
Volume Filtered:	≥10 mL	Test Method Deviation(s)	): None			

#### COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.

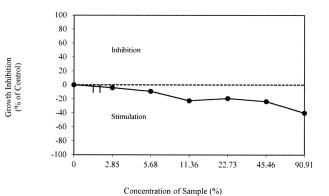
•No unusual appearance or treatment of culture prior to testing.

•Algal growth curve is determined at least twice per year as required by the test method cited above.



#### Work Order : 231846 Sample Number : 48803

#### Pseudokirchneriella subcapitata Growth Inhibition



#### **CELL ENUMERATION AT 72-HOURS**

Initiation Date :	2016-09-02	Sample pH (at 0 hours) :	7.2
Initiated By :	AS	Control pH (at 0 hours) :	6.5
Completion/Enumeration Date	: 2016-09-05	Control pH (at 72 hours) :	7.0
Enumerated By :	RD	Initial Cell Density at 0-h :	10318 cells/mL per microplate well
Enumeration Technique :	Manual (haemocytometer)	Inoculum Prepared :	00:40 h prior to test initiation
Control Cell Increase Factor :	50.0 times growth		

#### Cell Concentration (x 10000 cells/mL)

#### Cell Yield (x 10000 cells/mL)

Concentratio	n			Replicate					Mean	Standard	CV (%)	Stimulation
(%)	1	2	3	4	7	8	9	10		Deviation		(% of control)**
Control	48.0	52.5	53.0	48.5	53.0	52.0	58.5	47.0	50.53	3.71	7.34	· _
0.18			-	-								_
0.35			-								_	
0.71	-	—							-		-	
1.42		-							_		-	-
2.85	59.5	47.0	54.5	-					52.63	6.29	12.0	
5.68	54.0	57.5	57.0						55.13	1.89	3.4	
11.36	64.5	59.5	65.0	-					61.97	3.04	4.9	22.6
22.73	63.5	60.0	60.5	_					60.30	1.89	3.1	19.3
45.46	65.0	62.0	63.5						62.47	1.50	2.4	23.6
90.91	68.5	74.0	73.0	-					70.80	2.93	4.1	40.1

NOTES : \*\*Significant stimulation compared to control, according to ANOVA - Dunnett's Test (CETIS)a,  $\alpha$ =0.05. •Control replicates 5 and 6 used for pH measurement.

•The Mann-Kendall test shows that there is no inhibitory gradient ( $\alpha$ =0.05).

•No outlying data points were detected according to Grubbs Test (CETIS)<sup>a</sup>.

"\_" = not enumerated/not required

Data Reviewed By : Date: 2016-09

#### REFERENCES

<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. Comprehensive Environmental Toxicity Information System. Tidepool Scientific Software, LLC, McKinleyville, CA 95519 [Program on disk and printed User's Guide].

160 Date : vvvv-mm-dd

Approved By :

Project Manager

TOXICITY TEST REPORT

Pseudokirchneriella subcapitata EPS 1/RM/25 2 of 2

#### **TOXICITY TEST REPORT**



AquaTox Testing & Consulting Inc. B-11 Nicholas Beaver Rd. Puslinch ON N0B 2J0 Tel: (519) 763-4412 Fax: (519) 763-4419 *Lemna minor* EPS 1/RM/37 Page 1 of 4

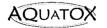
Work Order :	231846
Sample Number :	48803

	SAMPI	LE IDENTIFICATION			
Location : Substance : Job Number : Sampling Method : Sampled By :	ALS Laboratory Group, Waterloo Waterloo ON MS-08 L1821470 Not provided B.B./ K.M./ B.D.B Clear, pale yellow, mild odour.	Time Co Date Rec Time Re	llected : ceived : ceived : n arrival :	2016-08-30 11:20 2016-09-01 12:20 20.0°C 2016-09-02	
	Test for Measuring the Inhibition Method Development and Applic Canada. Ottawa, Ontario. Repor	ation Section, Environmental Te	chnology Cer		
	]	TEST RESULTS			
Effect	Value 9	5% Confidence Limits	Stat	tistical Method	
IC25 (Weight)	21.5%	6.85-75.2	Linear Int	erpolation (CETIS) a	
IC25 (Frond Production	a) 7.90%	5.49-9.74	Linear Int	erpolation (CETIS) a	
	The results reported relate	e only to the sample tested.			
	POTASSIUM CHLORI	DE REFERENCE TOXICAN	T DATA		
Date Tested : Organism Batch : Test Duration : IC25 (Frond Production) :	-	Statistical Method : Historical Geometric Mean IC25 Warning Limits (± 2SD) : Growth Medium :	1.52 - 3.09 g/L Modified APHA		
95% Confidence Limits : The reference toxicant tes	1.37 - 2.14 g/L t was performed under the same exp	Analyst(s) : perimental conditions as those used	SEC, MA I with the test	sample.	
	TE	<b>ST CONDITIONS</b>			
Test Organism : Organism Batch : Culture Origin : Test Organism Source : Culture Medium : Age (on Test Day 0) : Health Criteria (in APHA Organism Acclimation : Inoculum (Test Day 0) : Sample Filtration : Sample Pre-aeration : pH Adjustment : Hardness Adjustment :	Lemna minor L., Strain 7730 Lm16-08 UTCC 492 Axenic in-house culture Modified Hoaglands E+ 10 days ): 15-fold frond increase in 7 days 21:20 h in APHA medium 2 plants (3 fronds per plant) 1 $\mu$ m (Whatman GF/C) 20 min. at $\leq$ 100 bubbles/min. None None	Test Type : Control/Dilution Medium : Medium Preparation Water : Source of Water : Medium Preparation Chemicals Nutrient Spiking of Sample : Replicates per Concentration : Test Volume per Replicate : Test Vessel : Depth of Test Solution : Photoperiod/Light Intensity : Test Method Deviation(s) :	Modified A Distilled Wa Morning Mi Modified A Modified A 4 100 mL 250 mL glas 4.0 cm	ater	

#### **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 suitable models could not be found. Therefore, test results were calculated using Linear Interpolation (CETIS)<sup>a</sup>. In test concentrations where frond production/weights were stimulated (greater than the control), data were replaced with control values for the purposes of statistical analysis, as recommended by Environment Canada (2005).



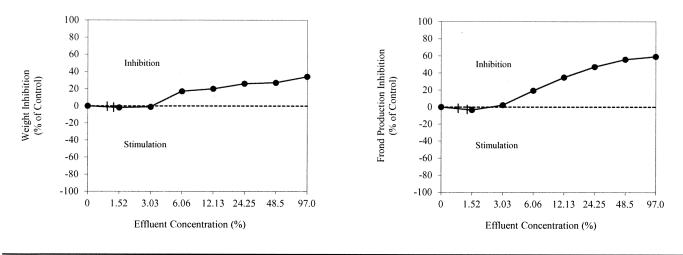
#### TOXICITY TEST REPORT

*Lemna minor* EPS 1/RM/37 Page 2 of 4

 Work Order :
 231846

 Sample Number :
 48803

Lemna minor Growth Inhibition



**TEST MONITORING** 

Termination Date :

Termination Time :

Terminated By :

Initiation Date :2016-09-02Initiation Time :14:00Initiated By :AW/NK

Temperat	ture Monitori	ng	pH Monitoring						
Test Day	Date	Temperature (°C)	Concentration (%)	Day 0	Day 7				
0 (unmodified sample)	2016-09-02	25.0	100 (unmodified sample)	7.2	-				
0	2016-09-02	25.5	Control	8.3	8.5				
1	2016-09-03	25.0	1.52	8.3	8.4				
2	2016-09-04	25.0	3.03	_	_				
3	2016-09-05	25.0	6.06	_	_				
4	2016-09-06	25.0	12.13	8.1	8.4				
5	2016-09-07	25.0	24.25	_	×				
6	2016-09-08	25.0	48.5	_	_				
7	2016-09-09	25.0	97.0	7.9	8.3				
"_" = not required									

#### REFERENCES

<sup>a</sup> CETIS<sup>™</sup>, © 2000-2013. V.1.8.7.17. 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.

6-09-30

Date :

yyyy-mm-dd

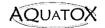
Approved By:

Project Manager

2016-09-09

14:30

AW



Work Order : Sample Number : 231846 48803 Lemna minor EPS 1/RM/37 Page 3 of 4

#### Lemna minor Frond Increase

Concentration	Replicate	Frond Count	Frond Count	Frond	Mean Frond	Standard	CV (%)	Frond/Root Appearance (Day 7)
(%)		Day 0*	Day 7	Increase	Increase	Deviation		
	А	6	80	74				
Control	В	6	87	81	75.50	3.87	5.1	Fronds healthy, appearance normal in
	С	6	78	72				all replicates.
	D	6	81	75				·
	А	6	71	65			****	
1.52	В	6	92	86	78.00	12.46	16.0	Fronds healthy, appearance normal in
	С	6	76	70				all replicates.
	D	6	97	91				1
	A	6	85	79				
3.03	В	6	80	74	73.75	3.86	5.2	Fronds healthy, appearance normal in
	С	6	78	72				all replicates.
	D	6	76	70				1
	A	6	65	59				
6.06	В	6	68	62	61.00	3.16	5.2	Fronds healthy, appearance normal in
	С	6	71	65				all replicates.
	D	6	64	58				
	A	6	57	51				
12.13	В	6	54	48	49.25	2.75	5.6	Fronds healthy, appearance normal in
	С	6	52	46				all replicates.
	D	6	58	52				
	Α	6	50	44				
24.25	В	6	41	35	40.00	4.24	10.6	In all replicates, fronds are yellow in
	С	6	44	38				appearance.
	D	6	49	43				
	Α	6	41	35				
48.5	В	6	39	33	33.50	3.42	10.2	In all replicates, fronds are yellow in
	С	6	43	37				appearance.
	D	6	35	29				
	A	6	43	37				
97.0	В	6	35	29	31.00	4.32	13.9	In all replicates, fronds are yellow in
	C	6	37	31			,	appearance.
	D	6	33	27				appearance.

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)<sup>a</sup> at any test level compared to the control.

•A 13.6-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)<sup>a</sup>.

"-" = not available/not required



#### TOXICITY TEST REPORT Lemna minor EPS 1/RM/37

Page 4 of 4

 Work Order :
 231846

 Sample Number :
 48803

#### Lemna minor Frond Weight Data

Concentration (%)	Replicate	Dry Weight of Fronds (mg)	Treatment Mean Dry Weight (mg)	Standard Deviation
	Α	7.03		
Control	В	8.31	7.74	0.54
	С	7.95		
	D	7.66		
	А	6.26 <sup>2</sup>		
1.52	В	8.79	7.88	1.27
	С	7.50		
	D	8.98		
	А	7.94		
3.03	В	7.82	7.82	0.31
	С	7.40		
	D	8.12		
	А	6.34		
6.06	В	6.39	6.41	0.06
	С	6.44		
	D	6.47		
	А	5.92		
12.13	В	6.12	6.19	0.21
	С	6.38		
	D	6.32		
	A	6.27		
24.25	В	5.16	5.72	0.70
	С	5.07		
	D	6.38		
	А	5.34		
48.5	В	5.38	5.63	0.53
	С	6.42		
	D	5.39		
	Α	4.98		
97.0	В	5.17	5.10	0.13
	C	5.24		
	D	4.99		

NOTES :

•No significant stimulation ( $\alpha$ =0.05) of frond weight was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)<sup>a</sup> at any test level compared to the control.

•No outlying data points were detected according to Grubbs Test (CETIS)<sup>a</sup>.

• <sup>2</sup>Outlier according to Grubbs Test (CETIS)<sup>a</sup>. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.

"-" = not available/not required

Test Data Reviewed By :\_\_\_\_\_ Date : 2016-09-28

Shipping Address:AquaTox Testing & Consulting Inc.11B Nicholas Beaver Road, RR #3 Guelph, Ontario CanadaN1H 6H9Voice:(519) 763-4412Fax:Voice:(519) 763-4412Fax:	client: ALS Environmental Waterloo Quote # - 162705399-15	Phone: (519) 886-6910 Fax: (519) 886-9047 Contact: Wayne Smith / Danielle Walker		Alanbow Trout Single Concentration Rainbow Trout Single Concentration Rainbow Trout LC50 Rainbow Trout LC50 Rainbow Trout LC50 Rainbow Trout LC50 Reader Concentration Concentration Concentration Rainbow Centration Rainbow Centration Rainbow Concentration Rainbow Centration Rainbow Concentration Rainbow Concentration Rainbow Centration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Rainbow Concentration Concentration Concentration Rainbow Concentration Concentrati	7 > 7 > 7 > 7 > 7 > 7 > 7 > 7 > 7 > 7 >		Instructions: Reporting required
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JATO	LS I	Sample Storage (prior to shipping): Custody Relinquished by: Date/Time Shipped:		Time Collected Collected (yyyy-mm-dd) 24 hr clock)	BORIGILO NAO		For Lab Use Only Received by: Received by: Date: Date: Styrage Location: Styrage Location: Styrage Location:

Rottle.

ALS Environmental

L1821470

WATERLOO

#### Subcontract Request Form

#### Subcontract To:

## AQUATOX TESTING AND CONSULTING

11B NICHOLAS BEAVER ROAD RR3 GUELPH,ON N1H 6H9

	on final report and invoice: PO# data to be provided with your final re	L1821470 esults.	
	3 blac 1 Plast	ider bass 1 Paril	
Please see enclosed 1	sample(s) in <u>0</u> Containe	r(s)	
SAMPLE NUMBER	NALYTICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1821470-1 MS-08 S	pecial Request Aquatox (SPECIAL REQUES	8/ 30/ 2016 GT2-AQT 14) 9/20/2016	
Subcontract Info Contact: Analysis and reporting info cor	Rick Hawthorne (519) 886-6 ntact: Wayne Smith, C.Chem., C.E 60 NORTHLAND ROAD, UNIT WATERLOO,ON N2V 2B8 Phone: (519) 886-6910	and the second sec	hal com
Please email confirmation of Shipped By:	of receipt to: Wayne.Smit	h@alsglobal.com	
/erified By:	Date Receive Date Verified Temperature	:	
Sample Integrity Issues:			1999 



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419 TOXICITY TEST REPORT Daphnia magna Page 1 of 2

 Work Order :
 231846

 Sample Number :
 48803

	SAMPLE IDENTIFICATION
0005	

Company :	ALS Laboratory Group, Waterloo	Sampled By :	B.B./ K.M./ B.D.B
Location :	Waterloo ON	Time Collected :	11:20
Job Number :	L1821470	Date Collected :	2016-08-30
Substance :	MS-08	Date Received :	2016-09-01
Sampling Method :	Not provided	Date Tested :	2016-09-01
Sample Description :	Clear, pale yellow, mild odour.	Temp. on arrival :	20.0° C
Test Method :	Reference Method for Determining Acute Lethality o	f Effluents to <i>Daphni</i>	a magna. Environment

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	Et	ifect	Value
Control	Mean Imn	nobility	0.0 %
	Mean Mor		0.0 %
100%	Mean Imn	•	0.0 %
	Mean Mor	tality	0.0 %
	The results reported relate on	ly to the sample tested.	
SC	DIUM CHLORIDE REFE	RENCE TOXICANT DATA	
Organism Batch :	Dm16-18B		
Date Tested (yyyy/mm/dd) :	2016-08-31	Historical Mean LC50 :	6.0 g/L
LC50 (95% Confidence Limits) :	5.6 g/L (5.3 - 5.9)	Warning Limits (± 2SD) :	5.4 - 6.7 g/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	CZN, AW
	Daphnia magna CULT	URE HEALTH DATA	
Time to First Brood : Culture Mortality :	8.4 days 1.7% (previous 7 days)	Mean Young Per Brood :	29.6
	TEST CON	DITIONS	
Sample Treatment :	None	Number of Replicates :	3
oH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Drganism Batch :	Dm16-18B	Organism Loading Rate :	15.0 mL/organism
-		Test Method Deviation(s) :	None

12 Date: vvvv-mm-dd

Accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA)

Approved by

Project Manage



## TOXICITY TEST REPORT

Daphnia magna

Page 2 of 2

## Work Order:231846Sample Number:48803

	Hardness (mg/L as CaCO <sub>3</sub> )	Hardness Adjustment	рН	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O <sub>2</sub> Sat. (%) <sup>*</sup>	Total Pre-Aeration Time (h) @ 30 mL/min
Initial Water Chemistry:	740	None	7.6	9.2	1279	20.0	106	0:30
			0 hours			an a		
Date & Time Technician:	2016-09-01 CZN	14:50						
Test Conc. (%)	Mortality	Immobility	pН	D.O.	Cond.	Temp.	$O_2$ Sat. (%)*	Hardness
100A	0	0	7.8	8.9	1288	20.0	102	740
100A	0	0	7.8	8.9	1288	20.0	102	740
100 <b>D</b>	0	0	7.8	8.9	1288	20.0	102	740
Control A	0	0	7.8 8.4	8.5	723	20.0	98	220
Control B	0	0	8.4 8.4	8.5 8.5	723	20.0	98 98	220
Control B Control C	0	0	8.4 8.4	8.5 8.5	723	20.0	98 98	220
	0	0	0.4	8.5	123	20.0	98	220
Notes:								
Data & Time	2016 00 02	14.50	24 hours					
Date & Time Technician:	2016-09-02 CZN	14:50						
Test Conc. (%)	Mortality	Immobility	pН	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 Technician:	2016-09-03 SEC	14:50						
Test Conc. (%)	Mortality	Immobility	рН	<b>D.O.</b>	Cond.	Temp.		
100A	0	0	8.2	8.3	1294	21.0		
100B	0	0	8.0	8.3	1289	21.0		
100C	0	0	8.1	8.4	1290	21.0		
Control A	0	0	8.7	8.1	736	21.0		
Control B	0	0	8.7	8.4	730	21.0		
Control C	0	0	8.7	8.3	729	21.0		
Notes:								

# of control organisms showing stress: 0 Daphnia Batch #: Dm16-18B

Number immobile does not include number of mortalities.

– = not measured

\* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: <u>))K</u> Date: <u>2016-09 - 09</u>



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

 Work Order :
 231846

 Sample Number :
 48803

#### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	B.B./ K.M./ B.D.B
Location :	Waterloo ON	Time Collected :	11:20
Job Number :	L1821470	Date Collected :	2016-08-30
Substance :	MS-08	Date Received :	2016-09-01
Sampling Method :	Not provided	Date Tested :	2016-09-01
Sample Description :	Clear, pale yellow, mild odour.	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.

# POTASSIUM CHLORIDE REFERENCE TOXICANT DATAOrganism Batch :T16-14Date Tested (yyyy-mm-dd) :2016-09-02LC50 (95% Confidence Limits) :3464 mg/L (3000 - 4000)Warning Limits (± 2SD) :3064 - 4483 mg/LStatistical Method :BinomialAnalyst(s) :NL, TL, SS

Control Fish Sample Size :10TEST FISH<br/>Cumulative stock tank mortality:0.2% (prev. 7 days)Mean Fish Weight ( $\pm 2$  SD) : $0.45 \pm 0.29$  gMean Fish Fork Length ( $\pm 2$  SD) : $36.3 \pm 7.5$  mmRange of Weights :0.28 - 0.74 gRange of Fork Lengths (mm) :32 - 44 mmFish Loading Rate :0.2 g/L0.2 g/L0.2 g/L

#### **TEST CONDITIONS**

Test Organism : Sample Treatment : pH Adjustment : Test Aeration : Pre-aeration/Aeration Rate : Oncorhynchus mykiss None Yes  $6.5 \pm 1 \text{ mL/min/L}$ 

Volume Tested (L) :20Number of Replicates :1Organisms Per Replicate :10Total Organisms Per Test Level :10Test Method Deviation(s) :None

Date: vvvv-mm-da

Annroved by oiect Manage

Accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA)

Work Order:	231846						<b>Rainbo</b> Pa
Sample Number:	48803						
			pН	D.O.	Cond.	Temp.	O2 Sat. (%
Total Pre-Aeration				(mg/L)	(µmhos/cm)	(°C)	
<b>Time (h)</b> 0:30	Initial W	ater Chemistry:	6.7	9.3	1302	15.0	_
		ry after 30min air:	6.9	9.3	1307	14.5	99
		0 hou	irs				****
Date & Time Technician:	2016-09-01 NL	14:05					
Test Conc. (%)	Mortality	Immobility	pН	<b>D.O.</b>	Cond.	Temp.	O2 Sat. (%
100	0	0	6.9	9.3	1307	14.5	99
Control	0	0	8.0	9.5	863	14.5	100
Notes:							
Date & Time	2016-09-02	<b>24 ho</b> 14:05	urs				
Technician:	2010-07-02 NL	14.05					
Test Conc. (%)	Mortality	Immobility	pН	<b>D.O.</b>	Cond.	Temp.	
100 Control	0 0	0 0	_	_	_	15.0 15.0	
	Ū	0	_	_	_	15.0	
Notes:							
	2014 00 02	48 ho	urs				
Date & Time Technician:	2016-09-03 TL	14:05					
Test Conc. (%)	Mortality	Immobility	рН	D.O.	Cond.	Temp.	
100	0	0	-	_	-	15.0	
Control	0	0	-	—	_	15.0	
Notes:							
		72 ho	urs				
Date & Time Technician:	2016-09-04 TL	14:05					
Test Conc. (%)	Mortality	Immobility	pН	<b>D.O</b> .	Cond.	Temp.	
100	0	0		-	_	15.0	
Control	0	0			_	15.0	
Notes:							
Date & Time	2016-09-05	<b>96 ho</b> 14:05	urs				
Technician:	TL						
Test Conc. (%)	Mortality	Immobility	pН	<b>D.O.</b>	Cond.	Temp.	
100 Control	0 0	0 0	7.0 8.0	9.1 9.2	1311 778	15.0 15.0	
Control	U	U	0.0	1.2	110	15.0	

"\_" = not measured

Number immobile does not include number of mortalities.

\* adjusted for actual temp. & barometric pressure

CHAIN OF CUSTODY RECORD

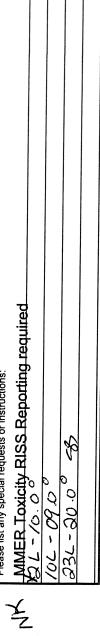


Aquator Work Order No: 23 1846

P.O. Number:	ALS - Baffinland Toxicity
Field Sampler Name (print):	BB. KM BDB
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	:(buid
Custody Relinquished by:	<u>\</u> 2+
Date/Time Shipped:	

AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Road, RR #3 Guelph, Ontario Canada N1H 6H9	<b>Fax:</b> (519) 763-4419	ental Waterloo	05399-15	0	2	Contact: Wavne Smith / Danielle Walker
	9) 763-4412	ALS Environmental Waterloo	Quote # - 162705399-15	(519) 886-6910	(519) 886-9047	Wayne Smith /
Shipping Address:	Voice: (519) 763-4412	Client:		Phone:	Fax:	Contact:

		Sample Identification						Analys	Analyses Requested	uested				Sa	nple Metho	Sample Method and Volume	
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	ししる子での - 1 Sample Name	Aquators Sample Number	Temp. on antval	Rainbow Trout Single Concentration	Rainbow Trout LC50	Daphnia magna Single Concentration	020J engem einhqeD	Virvival & Growth Survival & Growth	Ceriodaphnia dubia Survival & Reproduction	Lemna minor Growth Pseudokirchneriella	RISS Data Entry	Other (please specify	Grab Grab	Composite . # عَدَّ 2 ع	# of Containers and 2 Containers and 2 V1 3 V101 ev V	
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#### Subcontract Request Form

#### Subcontract To:

#### AQUATOX TESTING AND CONSULTING

11B NICHOLAS BEAVER ROAD RR3 GUELPH,ON N1H 6H9

	be provided with your final res	1821470 ults. (er bass plail c Bottle	
Please see enclosed <u>1</u> sa	mple(s) in <u>0</u> Container(	(s)	
SAMPLE NUMBER ANALYT	ICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1821470-1 MS-08 Special R	equest Aquatox (SPECIAL REQUEST	8/30/2016 F2-AQT14) 9/20/2016	
Subcontract Info Contact: Analysis and reporting info contact:	Rick Hawthorne (519) 886-69 Wayne Smith, C.Chem., C.E.1 60 NORTHLAND ROAD, UNIT WATERLOO,ON N2V 2B8	Г. 1	
Please email confirmation of rece	Phone: (519) 886-6910	Email: Wayne.Smith@als <u>c</u> @alsglobal.com	lobal.com
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Received By:	Date Received	<b>:</b>	
Verified By:	Date Verified:		
	Temperature:		

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Chain of Custody (COC) / Analytical Request Form



COC Number: 14 -

-| Page 1 of

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www.aisgioual.com					8	Select Service Level Betow (Rush Turnaround Time (TAT) is not available for all tasts)	H Betow (Ru	In Tumaround	Time (TAT) is	not avaitable fo	r ell tosts)	
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Contact Jim Mällard, Allan Knight	Quality Control	Quality Control (QC) Report with Report	port V Yes	2 Z		Emergency (1-2 bus. days if received by 3pm) 100% surchange - contact ALS to confirm TAT	ys if received	by 3pm) 100%	o - aduzupus o	ontact ALS to o	onfirm TAT	
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Drinking Water (DW) Samples <sup>1</sup> (cilent use)	Field fittering performed on disolved ( including Radium, S)	J metals/mercury bottles. Preservatives addeed an itelo, Sample from actual waste rock pond.	is. Preservatives a ste rock pond.	DOBCI IN LIGIO	Frozen			SIFO	SIF Observations	, Yes		30
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION Z	NG INFORMATION	UHMA			VELLOW - CLIENT COPY							

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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 29-AUG-16 Report Date: 06-OCT-16 07:13 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1821469 Project P.O. #: 4500017476 Job Reference: MS-08 RECE C of C Numbers: Legal Site Desc:

4500017476 MS-08 RECEIVING ENVIRONMENT

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

www.alsglobal.com

**RIGHT SOLUTIONS RIGHT PARTNER** 

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1821469-1 MS-08-DS							
Sampled By: NF/KM on 29-AUG-16 @ 15:35 Matrix: WATER							
Matrix: WATER Physical Tests							
Conductivity	193		3.0	umhos/cm		01-SEP-16	R3539238
Hardness (as CaCO3)	82	нтс	3.0 10	mg/L		01-SEP-16 02-SEP-16	K3539236
pH	8.16	mo	0.10	pH units		02-SEP-16	D2520227
Total Suspended Solids	6.8		2.0	·	02-SEP-16	07-SEP-16	R3542648
Anions and Nutrients	0.0		2.0	mg/L	02-327-10	07-327-10	K3042040
Acidity (as CaCO3)	<2.0		2.0	mg/L		03-SEP-16	R3541821
Alkalinity, Total (as CaCO3)	75		10	mg/L		01-SEP-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		02-SEP-16	R3539884
Chloride (Cl)	8.76		0.50	mg/L		02-SEP-16	R3542048
Fluoride (F)	0.028		0.020	mg/L		02-SEP-16	
Nitrate (as N)	0.022		0.020	mg/L		02-SEP-16	R3542048
Phosphorus, Total	0.0104		0.0030	mg/L	02-SEP-16	02-SEP-16	R3541913
Sulfate (SO4)	5.02		0.30	mg/L		02-SEP-16	R3542048
Cyanides	0.02		0.00				
Cyanide, Total	<0.0020		0.0020	mg/L		07-SEP-16	R3542731
Organic / Inorganic Carbon				-			
Dissolved Organic Carbon	1.5		1.0	mg/L		01-SEP-16	R3541336
Total Organic Carbon	1.4		1.0	mg/L		01-SEP-16	R3541337
Total Metals							
Aluminum (Al)-Total	0.572		0.010	mg/L	01-SEP-16	01-SEP-16	R3538784
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Arsenic (As)-Total	0.00013		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Barium (Ba)-Total	0.0142		0.00020	mg/L	01-SEP-16	01-SEP-16	R3538784
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Boron (B)-Total	<0.010		0.010	mg/L	01-SEP-16	01-SEP-16	R3538784
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Calcium (Ca)-Total	17.0		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Cesium (Cs)-Total	0.000069		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Chromium (Cr)-Total	0.00116		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Cobalt (Co)-Total	0.00023		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Copper (Cu)-Total	0.0015		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Iron (Fe)-Total	0.484		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Lead (Pb)-Total	0.00040		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Lithium (Li)-Total	0.0017		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Magnesium (Mg)-Total	9.59		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Manganese (Mn)-Total	0.00598		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		02-SEP-16	R3539762
Molybdenum (Mo)-Total	0.000465		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Nickel (Ni)-Total	0.00104		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Phosphorus (P)-Total	<0.050		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
	1.48			mg/L	01-SEP-16	01-SEP-16	R3538784

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1821469-1 MS-08-DS Sampled By: NF/KM on 29-AUG-16 @ 15:35 Matrix: WATER							
Total Metals							
Rubidium (Rb)-Total	0.00344		0.00020	mg/L	01-SEP-16	01-SEP-16	R3538784
Selenium (Se)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Silicon (Si)-Total	2.05		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Sodium (Na)-Total	3.92		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Strontium (Sr)-Total	0.0188		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Sulfur (S)-Total	1.85		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-SEP-16	01-SEP-16	R3538784
Thallium (TI)-Total	0.000015		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Thorium (Th)-Total	0.00057		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Titanium (Ti)-Total	0.0282		0.00030	mg/L	01-SEP-16	01-SEP-16	R3538784
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Uranium (U)-Total	0.00471		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Vanadium (V)-Total	0.00112		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-16	01-SEP-16	R3538784
Zirconium (Zr)-Total	0.00102		0.00030	mg/L	01-SEP-16	01-SEP-16	R3538784
Radiological Parameters				_			
Ra-226	<0.0100		0.010	Bq/L	23-SEP-16	04-OCT-16	R3562833
L1821469-2 MS-08-US Sampled By: NF/KM on 29-AUG-16 @ 15:47 Matrix: WATER							
Physical Tests							
Conductivity	189		3.0	umhos/cm		01-SEP-16	R3539238
Hardness (as CaCO3)	80	нтс	10	mg/L		02-SEP-16	
рН	8.19		0.10	pH units		01-SEP-16	R3539237
Total Suspended Solids	3.8		2.0	mg/L	02-SEP-16	07-SEP-16	R3542648
Anions and Nutrients				_			
Acidity (as CaCO3)	<2.0		2.0	mg/L		03-SEP-16	R3541821
Alkalinity, Total (as CaCO3)	72		10	mg/L		01-SEP-16	R3539116
Ammonia, Total (as N)	<0.020		0.020	mg/L		02-SEP-16	R3539884
Chloride (Cl)	8.90		0.50	mg/L		02-SEP-16	R3542048
Fluoride (F)	0.025		0.020	mg/L		02-SEP-16	R3542048
Nitrate (as N)	<0.020		0.020	mg/L		02-SEP-16	R3542048
Phosphorus, Total	0.0086		0.0030	mg/L	02-SEP-16	02-SEP-16	R3541913
Sulfate (SO4)	4.90		0.30	mg/L		02-SEP-16	R3542048
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		07-SEP-16	R3542731
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.4		1.0	mg/L		01-SEP-16	
Total Organic Carbon Total Metals	1.4		1.0	mg/L		01-SEP-16	R3541337

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batcl
1821469-2 MS-08-US ampled By: NF/KM on 29-AUG-16 @ 15:47 /latrix: WATER							
Total Metals							
Aluminum (AI)-Total	0.475		0.010	mg/L	01-SEP-16	01-SEP-16	R353878
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Arsenic (As)-Total	0.00012		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Barium (Ba)-Total	0.0138		0.00020	mg/L	01-SEP-16	01-SEP-16	R35387
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R35387
Boron (B)-Total	<0.010		0.010	mg/L	01-SEP-16	01-SEP-16	R35387
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	01-SEP-16	01-SEP-16	R35387
Calcium (Ca)-Total	16.5		0.50	mg/L	01-SEP-16	01-SEP-16	R35387
Cesium (Cs)-Total	0.000054		0.000010	mg/L	01-SEP-16	01-SEP-16	R35387
Chromium (Cr)-Total	0.00098		0.00050	mg/L	01-SEP-16	01-SEP-16	R35387
Cobalt (Co)-Total	0.00017		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Copper (Cu)-Total	0.0015		0.0010	mg/L	01-SEP-16	01-SEP-16	R35387
Iron (Fe)-Total	0.372		0.050	mg/L	01-SEP-16	01-SEP-16	R35387
Lead (Pb)-Total	0.00032		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Lithium (Li)-Total	0.0015		0.0010	mg/L	01-SEP-16	01-SEP-16	R35387
Magnesium (Mg)-Total	9.42		0.050	mg/L	01-SEP-16	01-SEP-16	R35387
Manganese (Mn)-Total	0.00432		0.00050	mg/L	01-SEP-16	01-SEP-16	R35387
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		02-SEP-16	R35397
Molybdenum (Mo)-Total	0.000471		0.000050	mg/L	01-SEP-16	01-SEP-16	R35387
Nickel (Ni)-Total	0.00076		0.00050	mg/L	01-SEP-16	01-SEP-16	R35387
Phosphorus (P)-Total	<0.050		0.050	mg/L	01-SEP-16	01-SEP-16	R35387
Potassium (K)-Total	1.46		0.050	mg/L	01-SEP-16	01-SEP-16	R35387
Rubidium (Rb)-Total	0.00318		0.00020	mg/L	01-SEP-16	01-SEP-16	R35387
Selenium (Se)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R35387
Silicon (Si)-Total	1.73		0.050	mg/L	01-SEP-16	01-SEP-16	R35387
Silver (Ag)-Total	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R35387
Sodium (Na)-Total	4.15		0.50	mg/L	01-SEP-16	01-SEP-16	R35387
Strontium (Sr)-Total	0.0187		0.0010	mg/L	01-SEP-16	01-SEP-16	R35387
Sulfur (S)-Total	1.64		0.50	mg/L	01-SEP-16	01-SEP-16	R35387
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	01-SEP-16	01-SEP-16	R35387
Thallium (TI)-Total	0.000011		0.000010	mg/L	01-SEP-16	01-SEP-16	R35387
Thorium (Th)-Total	0.00048		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Tin (Sn)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Titanium (Ti)-Total	0.0219		0.00030	mg/L	01-SEP-16	01-SEP-16	R35387
Tungsten (W)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R35387
Uranium (U)-Total	0.00486		0.000010	mg/L	01-SEP-16	01-SEP-16	R35387
Vanadium (V)-Total	0.00094		0.00050	mg/L	01-SEP-16	01-SEP-16	R35387
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	01-SEP-16	01-SEP-16	R35387
Zirconium (Zr)-Total	0.00086		0.00030	mg/L	01-SEP-16	01-SEP-16	R35387
Radiological Parameters							

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
-1821469-2 MS-08-US Sampled By: NF/KM on 29-AUG-16 @ 15:47 Matrix: WATER Radiological Parameters							
Ra-226	<0.0100		0.010	Bq/L	23-SEP-16	04-OCT-16	R356283
<u>κα-220</u>	<0.0100		0.010	Bq/L	23-SEP-16	U4-OC1-16	K356283

## **Reference Information**

#### **QC Samples with Qualifiers & Comments:**

QC Type Descript	ion	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Barium (Ba)-Total	MS-B	L1821469-1, -2
Matrix Spike		Calcium (Ca)-Total	MS-B	L1821469-1, -2
Matrix Spike		Iron (Fe)-Total	MS-B	L1821469-1, -2
Vatrix Spike		Magnesium (Mg)-Total	MS-B	L1821469-1, -2
Vatrix Spike		Manganese (Mn)-Total	MS-B	L1821469-1, -2
Matrix Spike		Silicon (Si)-Total	MS-B	L1821469-1, -2
Vatrix Spike		Sodium (Na)-Total	MS-B	L1821469-1, -2
Vatrix Spike		Strontium (Sr)-Total	MS-B	L1821469-1, -2
Matrix Spike		Sulfur (S)-Total	MS-B	L1821469-1, -2
	er Qualifier key l	isted:		
	Description			
		Ŭ		e biased high (dissolved Ca/Mg results unavailable).
MS-B M	Aatrix Spike recover	y could not be accurately calculated	due to high analyte	background in sample.
est Method Ref				
ALS Test Code	Matrix	Test Description	Method Refere	ence**
ACY-TITR-TB This analysis is c endpoint.	Water arried out using pro	Acidity cedures adapted from APHA Method	APHA 2310 B 2310 "Acidity". Acid	modified dity is determined by potentiometric titration to a specifie
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2	
infrared detector. CL-IC-N-WT	Water	Chloride by IC Chromatography with conductivity a	EPA 300.1 (m	oorted in a carrier gas and is measured by a non-dispers
		Cyanide, Total ombination of UV digestion and distil with a combination of barbituric acid	lation. Cyanide is co	N C E-STRONG ACID DIST COLORIM nverted to cyanogen chloride by reacting with chloramir d to form a highly colored complex.
		of thiocyanate in samples can cause nethod, ALS recommends analysis t		1-2% of the thiocyanate concentration. For samples wit eck for this potential interference
EC-WT Water samples c	Water an be measured dire	Conductivity ectly by immersing the conductivity c	APHA 2510 B cell into the sample.	
F-IC-N-WT Inorganic anions	Water are analyzed by Ion	Fluoride in Water by IC Chromatography with conductivity a	EPA 300.1 (m and/or UV detection.	od)
	nown as Total Hard	Hardness ness) is calculated from the sum of ( concentrations are preferentially used		sium concentrations, expressed in CaCO3 equivalents.
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAA	S EPA 1631E (n	nod)
Water samples u	ndergo a cold-oxida	tion using bromine monochloride pri	or to reduction with s	stannous chloride, and analyzed by CVAAS.
MET-T-CCMS-WT Water samples a		Total Metals by CRC ICPMS ic and hydrochloric acids, and analyz	EPA 200.2/60 zed by CRC ICPMS.	
Method Limitation	n (re: Sulfur): Sulfide	e and volatile sulfur species may not	be recovered by this	s method.
Analysis conduct Protection Act (Ju		th the Protocol for Analytical Method	ls Used in the Asses	ssment of Properties under Part XV.1 of the Environmen
NH3-WT Sample is measu colorimetrically.	Water red colorimetrically.	Ammonia, Total as N When sample is turbid a distillation	EPA 350.1 step is required, san	nple is distilled into a solution of boric acid and measure
NO3-IC-WT Inorganic anions	Water are analyzed by Ion	Nitrate in Water by IC Chromatography with conductivity a	EPA 300.1 (m and/or UV detection.	od)

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

#### **Reference Information**

** ALS test methods ma	y incorporate m	nodifications from specified reference m	ethods to improve performance.
to carbon dioxide. The	e carbon dioxid	e is transported in a carrier gas and is n	oxidative catalyst. The water is vaporized and the organic cabon is oxidized neasured by a non-dispersive infrared detector.
TOC-WT	Water	Total Organic Carbon	APHA 5310B
	is filtered throu	gh a weighed standard glass fibre filter a	and the residue retained is dried in an oven at 104–1°C for a minimum of
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
SO4-IC-N-WT Inorganic anions are	Water analyzed by lor	Sulfate in Water by IC Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
Analysis conducted ir Protection Act (July 1		ith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
Water samples are a	nalyzed directly	by a calibrated pH meter.	
PH-WT	Water	рН	MOEE E3137A-R511
Analysis conducted ir Protection Act (July 1		ith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
PH-WT Water samples are a	Water nalyzed directly	pH by a calibrated pH meter.	APHA 4500 H-Electrode
after persulphate dige		•	
This analysis is carrie	ed out using pro	ocedures adapted from APHA Method 4	500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically

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
ТВ	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA

#### Chain of Custody Numbers:

#### **GLOSSARY OF REPORT TERMS**

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



				-	-			
		Workorder:	L182146	9 R	eport Date:	06-OCT-16		Page 1 of 10
Client:	Baffinland Iron Mine's Cor 2275 Upper Middle Rd. E. Oakville ON L6H 0C3							
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	Water							
Batch WG2381787 Acidity (as C		<b>L1823237-1</b> 20.4	20.0		mg/L	2.0	20	03-SEP-16
WG2381787 Acidity (as C			101.8		%		85-115	03-SEP-16
WG2381787 Acidity (as C			<2.0		mg/L		2	03-SEP-16
ALK-WT	Water							
Batch	R3539116							
-	otal (as CaCO3)	WT-ALK-CRM	100.0		%		80-120	01-SEP-16
WG2380731 Alkalinity, To	-4 DUP otal (as CaCO3)	<b>L1822688-1</b> 823	834		mg/L	1.4	20	01-SEP-16
WG2380731 Alkalinity, To	-2 LCS otal (as CaCO3)		96.2		%		85-115	01-SEP-16
WG2380731 Alkalinity, To	<b>-1 MB</b> otal (as CaCO3)		<10		mg/L		10	01-SEP-16
C-DIS-ORG-WT	Water							
Batch	R3541336							
WG2380793 Dissolved O	-3 DUP Organic Carbon	<b>L1822233-1</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	01-SEP-16
WG2380793 Dissolved O	-2 LCS Organic Carbon		98.2		%		80-120	01-SEP-16
WG2380793 Dissolved O	-1 MB Organic Carbon		<1.0		mg/L		1	01-SEP-16
WG2380793 Dissolved O	-4 MS Organic Carbon	L1822233-1	98.8		%		70-130	01-SEP-16
CL-IC-N-WT	Water							
Batch	R3542048							
WG2381106 Chloride (Cl		<b>WG2381106-3</b> 8.90	8.89		mg/L	0.1	20	02-SEP-16
WG2381106 Chloride (Cl			101.8		%		90-110	02-SEP-16
WG2381106 Chloride (Cl			<0.50		mg/L		0.5	02-SEP-16
WG2381106 Chloride (Cl		WG2381106-3	103.5		%		75-125	02-SEP-16
CN-TOT-WT	Water							



				Quant		orneport			
			Workorder:	L1821469	)	Report Date:	06-OCT-16		Page 2 of 10
Client:	2275 Upp	Iron Mine's Corp er Middle Rd. E. S DN L6H 0C3							
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT		Water							
Batch	R3542731								
WG2383066-1 Cyanide, Tota			<b>L1820776-11</b> <0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-2 Cyanide, Tota			<b>L1821779-1</b> <0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-1 Cyanide, Tota				94.6		%		80-120	07-SEP-16
WG2383066-2 Cyanide, Tota				94.4		%		80-120	07-SEP-16
WG2383066-1 Cyanide, Tota				<0.0020		mg/L		0.002	07-SEP-16
WG2383066-2 Cyanide, Tota				<0.0020		mg/L		0.002	07-SEP-16
WG2383066-2 Cyanide, Tota			L1820776-11	102.2		%		70-130	07-SEP-16
WG2383066-2 Cyanide, Tota			L1821779-1	91.6		%		70-130	07-SEP-16
EC-WT		Water							
Batch	R3539238								
WG2379938-4 Conductivity	DUP		<b>WG2379938-3</b> 11400	11400		umhos/cm	0.1	10	01-SEP-16
WG2379938-2 Conductivity	LCS			99.5		%		90-110	01-SEP-16
WG2379938-1 Conductivity	MB			<3.0		umhos/cm		3	01-SEP-16
F-IC-N-WT		Water							
Batch	R3542048								
WG2381106-4 Fluoride (F)			WG2381106-3 0.025	0.026		mg/L	5.1	20	02-SEP-16
WG2381106-2 Fluoride (F)	LCS			99.3		%		90-110	02-SEP-16
<b>WG2381106-</b> 1 Fluoride (F)	MB			<0.020		mg/L		0.02	02-SEP-16
<b>WG2381106-5</b> Fluoride (F)	6 MS		WG2381106-3	103.6		%		75-125	02-SEP-16
HG-T-CVAA-WT		Water							



				- adding					
			Workorder:	L1821469	F	Report Date: 0	6-OCT-16		Page 3 of 10
Chorn	2275 Upp Oakville	oer Middle Rd. E. ON L6H 0C3	ooration (Oakville) Suite #300						
Contact:	Jim Millar	ď							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT		Water							
	3539762								
WG2380992-4 Mercury (Hg)-			WG2380992-3 <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380992-2 Mercury (Hg)-				101.0		%		80-120	02-SEP-16
<b>WG2380992-1</b> Mercury (Hg)- <sup>-</sup>	<b>MB</b> Total			<0.000010		mg/L		0.00001	02-SEP-16
WG2380992-8	MS		WG2380992-7			<u>g</u> , <u>–</u>		0.00001	02 021 10
Mercury (Hg)-	-			90.5		%		70-130	02-SEP-16
MET-T-CCMS-WT		Water							
Batch R	3538784								
WG2380132-4 Aluminum (Al)			WG2380132-3 0.018	0.017		mg/L	9.2	20	
Antimony (Sb)			<0.00010	<0.0017	RPD-NA	mg/L	9.2 N/A	20 20	01-SEP-16 01-SEP-16
Arsenic (As)-T			0.00045	0.00045		mg/L	1.4	20	01-SEP-16
Barium (Ba)-T			0.0421	0.0410		mg/L	2.5	20	01-SEP-16
Beryllium (Be)			<0.00010	<0.00010	RPD-NA	mg/L	2.5 N/A	20	01-SEP-16
Bismuth (Bi)-T			<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-SEP-16
Boron (B)-Tota			0.018	0.018		mg/L	0.6	20	01-SEP-16
Cadmium (Cd)			<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-SEP-16
Calcium (Ca)-			37.3	36.3		mg/L	2.8	20	01-SEP-16
Chromium (Cr			<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-SEP-16
Cesium (Cs)-T	otal		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-SEP-16
Cobalt (Co)-To	otal		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-SEP-16
Copper (Cu)-T	otal		0.0043	0.0042		mg/L	1.8	20	01-SEP-16
Iron (Fe)-Total			0.052	0.053		mg/L	1.7	20	01-SEP-16
Lead (Pb)-Tota	al		0.00018	0.00018		mg/L	2.5	20	01-SEP-16
Lithium (Li)-To	otal		0.0012	0.0012		mg/L	3.1	20	01-SEP-16
Magnesium (M	lg)-Total		5.14	5.01		mg/L	2.5	20	01-SEP-16
Manganese (M	In)-Total		0.0425	0.0409		mg/L	3.7	20	01-SEP-16
Molybdenum (	Mo)-Total		0.000280	0.000279		mg/L	0.3	20	01-SEP-16
Nickel (Ni)-Tot	al		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-SEP-16
Phosphorus (F	P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-SEP-16
Potassium (K)	-Total		0.897	0.865		mg/L	3.7	20	01-SEP-16
Rubidium (Rb)	-Total		0.00159	0.00152		mg/L	4.4	20	01-SEP-16
Selenium (Se)	-Total		0.000073	0.000076		mg/L	4.0	20	01-SEP-16



Workorder: L1821469

Report Date: 06-OCT-16

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Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3538784								
WG2380132-4 DUP Silicon (Si)-Total		WG2380132-3 3.00			ma/l	0.0		
Silver (Ag)-Total		<0.00050	3.01 <0.000050		mg/L	0.6	20	01-SEP-16
Sodium (Na)-Total		<0.000050 26.6	<0.000030 25.8	RPD-NA	mg/L	N/A	20	01-SEP-16
		20.0 0.141	25.8 0.140		mg/L	3.1	20	01-SEP-16
Strontium (Sr)-Total					mg/L	0.9	20	01-SEP-16
Sulfur (S)-Total		3.48	3.58		mg/L	3.1	25	01-SEP-16
Thallium (TI)-Total		<0.000010	<0.000010		mg/L	N/A	20	01-SEP-16
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	01-SEP-16
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	01-SEP-16
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-SEP-16
Titanium (Ti)-Total		0.00054	0.00049		mg/L	9.3	20	01-SEP-16
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-SEP-16
Uranium (U)-Total		0.000244	0.000238		mg/L	2.7	20	01-SEP-16
Vanadium (V)-Total		0.00064	0.00065		mg/L	2.2	20	01-SEP-16
Zinc (Zn)-Total		0.0031	<0.0030	RPD-NA	mg/L	N/A	20	01-SEP-16
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	01-SEP-16
WG2380132-2 LCS								
Aluminum (Al)-Total			98.3		%		80-120	01-SEP-16
Antimony (Sb)-Total			98.7		%		80-120	01-SEP-16
Arsenic (As)-Total			96.2		%		80-120	01-SEP-16
Barium (Ba)-Total			98.7		%		80-120	01-SEP-16
Beryllium (Be)-Total			99.0		%		80-120	01-SEP-16
Bismuth (Bi)-Total			97.4		%		80-120	01-SEP-16
Boron (B)-Total			96.1		%		80-120	01-SEP-16
Cadmium (Cd)-Total			95.1		%		80-120	01-SEP-16
Calcium (Ca)-Total			97.9		%		80-120	01-SEP-16
Chromium (Cr)-Total			94.8		%		80-120	01-SEP-16
Cesium (Cs)-Total			96.4		%		80-120	01-SEP-16
Cobalt (Co)-Total			96.1		%		80-120	01-SEP-16
Copper (Cu)-Total			93.4		%		80-120	01-SEP-16
Iron (Fe)-Total			96.3		%		80-120	01-SEP-16
Lead (Pb)-Total			96.5		%		80-120	01-SEP-16
Lithium (Li)-Total			104.3		%		80-120	01-SEP-16
Magnesium (Mg)-Total			94.5		%		80-120	01-SEP-16



Workorder: L1821469

Report Date: 06-OCT-16

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

Contact: Jim Millard

-								
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
	538784							
WG2380132-2 Manganese (Mn	LCS		00.0		%		00.400	
-			98.2		%		80-120	01-SEP-16
Molybdenum (M			101.6				80-120	01-SEP-16
Nickel (Ni)-Total			93.6		%		80-120	01-SEP-16
Phosphorus (P)			100.9		%		80-120	01-SEP-16
Potassium (K)-T			97.3		%		80-120	01-SEP-16
Rubidium (Rb)-1			95.5		%		80-120	01-SEP-16
Selenium (Se)-T			91.4		%		80-120	01-SEP-16
Silicon (Si)-Tota			111.1		%		80-120	01-SEP-16
Silver (Ag)-Total			96.8		%		80-120	01-SEP-16
Sodium (Na)-To			95.6		%		80-120	01-SEP-16
Strontium (Sr)-T	otal		97.9		%		80-120	01-SEP-16
Sulfur (S)-Total			97.8		%		70-130	01-SEP-16
Thallium (TI)-To	tal		96.6		%		80-120	01-SEP-16
Tellurium (Te)-T	otal		92.0		%		80-120	01-SEP-16
Thorium (Th)-To	otal		93.8		%		70-130	01-SEP-16
Tin (Sn)-Total			97.8		%		80-120	01-SEP-16
Titanium (Ti)-To	tal		91.8		%		80-120	01-SEP-16
Tungsten (W)-T	otal		98.9		%		80-120	01-SEP-16
Uranium (U)-Tot	tal		100.1		%		80-120	01-SEP-16
Vanadium (V)-T	otal		98.0		%		80-120	01-SEP-16
Zinc (Zn)-Total			89.7		%		80-120	01-SEP-16
Zirconium (Zr)-T	otal		96.0		%		80-120	01-SEP-16
WG2380132-1	MB							
Aluminum (Al)-T			<0.010		mg/L		0.01	01-SEP-16
Antimony (Sb)-T	otal		<0.00010	)	mg/L		0.0001	01-SEP-16
Arsenic (As)-Tot	tal		<0.00010	0	mg/L		0.0001	01-SEP-16
Barium (Ba)-Tot	al		<0.00020	0	mg/L		0.0002	01-SEP-16
Beryllium (Be)-T	otal		<0.00010	)	mg/L		0.0001	01-SEP-16
Bismuth (Bi)-Tot	tal		<0.00005	50	mg/L		0.00005	01-SEP-16
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-16
Cadmium (Cd)-	Fotal		<0.00001	10	mg/L		0.00001	01-SEP-16
Calcium (Ca)-To	otal		<0.50		mg/L		0.5	01-SEP-16
Chromium (Cr)-	Total		<0.00050	)	mg/L		0.0005	01-SEP-16
Cesium (Cs)-To	tal		<0.00001	10	mg/L		0.00001	01-SEP-16



Client:

Contact:

Batch

Test

## **Quality Control Report**

Workorder: L1821469 Report Date: 06-OCT-16 Page 6 of 10 Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Qualifier Units RPD Limit Analyzed MET-T-CCMS-WT Water R3538784 WG2380132-1 MB Cobalt (Co)-Total < 0.00010 0.0001 mg/L 01-SEP-16 Copper (Cu)-Total <0.0010 mg/L 0.001 01-SEP-16

		<0.0010		iiig/L	0.001	01-SEP-16
Iron (Fe)-Total		<0.050		mg/L	0.05	01-SEP-16
Lead (Pb)-Total		<0.00010		mg/L	0.0001	01-SEP-16
Lithium (Li)-Total		<0.0010		mg/L	0.001	01-SEP-16
Magnesium (Mg)-Total		<0.050		mg/L	0.05	01-SEP-16
Manganese (Mn)-Total		<0.00050		mg/L	0.0005	01-SEP-16
Molybdenum (Mo)-Total		<0.000050		mg/L	0.00005	01-SEP-16
Nickel (Ni)-Total		<0.00050		mg/L	0.0005	01-SEP-16
Phosphorus (P)-Total		<0.050		mg/L	0.05	01-SEP-16
Potassium (K)-Total		<0.050		mg/L	0.05	01-SEP-16
Rubidium (Rb)-Total		<0.00020		mg/L	0.0002	01-SEP-16
Selenium (Se)-Total		<0.000050		mg/L	0.00005	01-SEP-16
Silicon (Si)-Total		<0.050		mg/L	0.05	01-SEP-16
Silver (Ag)-Total		<0.000050		mg/L	0.00005	01-SEP-16
Sodium (Na)-Total		<0.50		mg/L	0.5	01-SEP-16
Strontium (Sr)-Total		<0.0010		mg/L	0.001	01-SEP-16
Sulfur (S)-Total		<0.50		mg/L	0.5	01-SEP-16
Thallium (TI)-Total		<0.000010		mg/L	0.00001	01-SEP-16
Tellurium (Te)-Total		<0.00020		mg/L	0.0002	01-SEP-16
Thorium (Th)-Total		<0.00010		mg/L	0.0001	01-SEP-16
Tin (Sn)-Total		<0.00010		mg/L	0.0001	01-SEP-16
Titanium (Ti)-Total		<0.00030		mg/L	0.0003	01-SEP-16
Tungsten (W)-Total		<0.00010		mg/L	0.0001	01-SEP-16
Uranium (U)-Total		<0.000010		mg/L	0.00001	01-SEP-16
Vanadium (V)-Total		<0.00050		mg/L	0.0005	01-SEP-16
Zinc (Zn)-Total		<0.0030		mg/L	0.003	01-SEP-16
Zirconium (Zr)-Total		<0.00030		mg/L	0.0003	01-SEP-16
WG2380132-5 MS	WG2380132-3					
Aluminum (Al)-Total		94.2		%	70-130	02-SEP-16
Antimony (Sb)-Total		94.3		%	70-130	02-SEP-16
Arsenic (As)-Total		96.4		%	70-130	02-SEP-16
Barium (Ba)-Total		N/A	MS-B	%	-	01-SEP-16
Beryllium (Be)-Total		95.6		%	70-130	02-SEP-16



Workorder: L1821469

Report Date: 06-OCT-16

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Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3538784								
WG2380132-5 MS Bismuth (Bi)-Total		WG2380132-3	94.2		%		70-130	02-SEP-16
Boron (B)-Total			93.7		%		70-130	02-SEP-16
Cadmium (Cd)-Total			95.6		%		70-130	02-SEP-16
Calcium (Ca)-Total			N/A	MS-B	%		-	01-SEP-16
Chromium (Cr)-Total			94.7		%		70-130	02-SEP-16
Cesium (Cs)-Total			99.6		%		70-130	02-SEP-16
Cobalt (Co)-Total			94.6		%		70-130	02-SEP-16
Copper (Cu)-Total			91.7		%		70-130	02-SEP-16
Iron (Fe)-Total			N/A	MS-B	%		-	01-SEP-16
Lead (Pb)-Total			93.1		%		70-130	02-SEP-16
Lithium (Li)-Total			93.0		%		70-130	02-SEP-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	01-SEP-16
Manganese (Mn)-Total			N/A	MS-B	%		-	01-SEP-16
Molybdenum (Mo)-Total			99.1		%		70-130	02-SEP-16
Nickel (Ni)-Total			94.8		%		70-130	02-SEP-16
Phosphorus (P)-Total			116.6		%		70-130	02-SEP-16
Potassium (K)-Total			94.6		%		70-130	02-SEP-16
Rubidium (Rb)-Total			95.8		%		70-130	02-SEP-16
Selenium (Se)-Total			96.1		%		70-130	02-SEP-16
Silicon (Si)-Total			N/A	MS-B	%		-	01-SEP-16
Silver (Ag)-Total			97.4		%		70-130	02-SEP-16
Sodium (Na)-Total			N/A	MS-B	%		-	01-SEP-16
Strontium (Sr)-Total			N/A	MS-B	%		-	01-SEP-16
Sulfur (S)-Total			N/A	MS-B	%		-	01-SEP-16
Thallium (TI)-Total			94.0		%		70-130	02-SEP-16
Tellurium (Te)-Total			90.0		%		70-130	02-SEP-16
Thorium (Th)-Total			127.0		%		70-130	01-SEP-16
Tin (Sn)-Total			98.8		%		70-130	02-SEP-16
Titanium (Ti)-Total			95.8		%		70-130	02-SEP-16
Tungsten (W)-Total			99.7		%		70-130	02-SEP-16
Uranium (U)-Total			90.8		%		70-130	02-SEP-16
Vanadium (V)-Total			97.5		%		70-130	02-SEP-16
Zinc (Zn)-Total			98.4		%		70-130	02-SEP-16



				Quant	y oonard				
			Workorder:	L1821469	9	Report Date: 06	6-OCT-16		Page 8 of 10
Client:	2275 Uppe	Iron Mine's Corp er Middle Rd. E. 3 DN L6H 0C3	ooration (Oakville) Suite #300						
Contact:	Jim Millard	b							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-W	VT	Water							
Batch WG2380132- Zirconium (Z			WG2380132-3	98.5		%		70-130	02-SEP-16
NH3-WT		Water							
Batch	R3539884								
<b>WG2380997-</b> Ammonia, T	-		<b>L1821469-1</b> <0.020	<0.020	RPD-NA	mg/L	N/A	20	02-SEP-16
<b>WG2380997-</b> Ammonia, T				101.3		%		85-115	02-SEP-16
<b>WG2380997-</b> Ammonia, T	•=			<0.020		mg/L		0.02	02-SEP-16
<b>WG2380997-</b> Ammonia, T			L1821469-1	90.4		%		75-125	02-SEP-16
NO3-IC-WT		Water							
Batch WG2381106- Nitrate (as N			<b>WG2381106-3</b> <0.020	<0.020	RPD-NA	mg/L	N/A	25	02-SEP-16
WG2381106- Nitrate (as N	2 LCS		<b>10.020</b>	100.1	RF D-INA	%	N/A	70-130	02-SEP-16
WG2381106- Nitrate (as N				<0.020		mg/L		0.02	02-SEP-16
<b>WG2381106-</b> Nitrate (as N			WG2381106-3	103.6		%		70-130	02-SEP-16
P-T-COL-WT		Water							
Batch WG2380851- Phosphorus			<b>L1821835-1</b> 0.0114	0.0117		mg/L	1.9	20	02-SEP-16
WG2380851- Phosphorus				107.0		%		80-120	02-SEP-16
WG2380851- Phosphorus				<0.0030		mg/L		0.003	02-SEP-16
WG2380851- Phosphorus			L1821835-1	86.7		%		70-130	02-SEP-16
PH-WT		Water							



Quality Control Report									
			Workorder:	L1821469	9	Report Date:	06-OCT-16		Page 9 of 10
Client: Contact:	2275 Upp	er Middle Rd. E. DN L6H 0C3	poration (Oakville) Suite #300						
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT		Water							
Batch I WG2379935-6 pH	R3539237 5 DUP		<b>WG2379935-5</b> 6.83	6.83	J	pH units	0.00	0.2	01-SEP-16
<b>WG2379935-</b> 4 рН	LCS			7.00		pH units		6.9-7.1	01-SEP-16
SO4-IC-N-WT		Water							
Batch I WG2381106-4 Sulfate (SO4)	-		<b>WG2381106-3</b> 4.91	4.71		mg/L	4.2	20	02-SEP-16
WG2381106-2 Sulfate (SO4)				101.2		%		90-110	02-SEP-16
WG2381106-1 Sulfate (SO4)				<0.30		mg/L		0.3	02-SEP-16
WG2381106-5 Sulfate (SO4)			WG2381106-3	101.6		%		75-125	02-SEP-16
SOLIDS-TSS-WT		Water							
	R3542648								
WG2381066-3 Total Suspen	ded Solids		<b>L1821547-1</b> 160	185		mg/L	14	20	07-SEP-16
WG2381066-2 Total Suspen				101.4		%		85-115	07-SEP-16
WG2381066-1 Total Suspen				<2.0		mg/L		2	07-SEP-16
тос-wт		Water							
Batch I WG2380794-3 Total Organic			<b>L1821469-1</b> 1.4	1.5		mg/L	6.7	20	01-SEP-16
WG2380794-2 Total Organic	LCS			96.5		%		80-120	01-SEP-16
WG2380794-1 Total Organic				<1.0		mg/L		1	01-SEP-16
WG2380794-4 Total Organic			L1821469-1	100.4		%		70-130	01-SEP-16

Workorder: L1821469

Report Date: 06-OCT-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

#### Contact:

#### 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 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.

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Z9-Aug-16     15:35     Water     R     R       Z9-Aug-16     15:47     Reserved by     Reserved by     Reserved by	ALS Sample # Sample identification and/or Coordinates (tab use only) (This description will appear on the report)	Tune (httmm)		
29-Aug-16     15:47     Water     R     Image: Complex of the standard stand		15:35	х 	~
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Failure to complete all portions of this form may defay analysis. Please fits in this form the use of this form the tast accordinges and access with the Terms and Conditions as specified on the back page of the writes - report copy.

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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 23-AUG-16 Report Date: 04-OCT-16 12:04 (MT) Version: FINAL REV. 2

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1818090 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Comments: WS/WT Revised to include Copper, Nickel, Lead, and Zinc

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

www.alsglobal.com

**RIGHT SOLUTIONS RIGHT PARTNER** 

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1818090-1 MS-08							
Sampled By: BDB/CR on 22-AUG-16 @ 16:20							
Matrix: WATER Physical Tests							
pH	6.89		0.10	pH units		23-AUG-16	<b>D</b> 2522722
Total Suspended Solids	<2.0		2.0	mg/L		23-AUG-16	
Turbidity	3.03		0.10	NTU		23-AUG-16	
Total Metals	0.00		0.10			207/00 10	110002704
Arsenic (As)-Total	<0.00010		0.00010	mg/L	28-AUG-16	29-AUG-16	R3536295
Copper (Cu)-Total	0.0016		0.0010	mg/L	28-AUG-16	29-AUG-16	
Lead (Pb)-Total	<0.00010		0.00010	mg/L	28-AUG-16	29-AUG-16	R3536295
Nickel (Ni)-Total	0.0727		0.00050	mg/L	28-AUG-16	29-AUG-16	R3536295
Zinc (Zn)-Total	0.0069		0.0030	mg/L	28-AUG-16	29-AUG-16	R3536295
Radiological Parameters							
Ra-226	<0.0100		0.010	Bq/L	22-SEP-16	30-SEP-16	R3562833
	1	1		1	1	1	1

## **Reference Information**

#### **Test Method References:** ALS Test Code Matrix **Test Description** Method Reference\*\* MET-T-CCMS-WT Total Metals by CRC ICPMS Water 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 рΗ 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 EPA 903.1 Bq/L 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:

#### **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.



Workorder: L1818090

Report Date: 04-OCT-16

Page 1 of 3

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•			oration (Oakville)						
		er Middle Rd. E. S N L6H 0C3	Sulte #300						
	lim Millarc								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT		Water							
Batch R3	3536295								
WG2377253-4 Arsenic (As)-To	<b>DUP</b> otal		<b>WG2377253-3</b> <0.00010	<0.00010	RPD-NA	mg/L	N/A	20	29-AUG-16
Copper (Cu)-To	otal		0.0011	0.0010		mg/L	2.9	20	29-AUG-16
Lead (Pb)-Total	I		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	29-AUG-16
Nickel (Ni)-Tota	al		0.00052	0.00054		mg/L	4.4	20	29-AUG-16
Zinc (Zn)-Total			<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	29-AUG-16
WG2377253-2	LCS								
Arsenic (As)-To				95.7		%		80-120	29-AUG-16
Copper (Cu)-To	otal			94.5		%		80-120	29-AUG-16
Lead (Pb)-Total	I			95.9		%		80-120	29-AUG-16
Nickel (Ni)-Tota	al			96.0		%		80-120	29-AUG-16
Zinc (Zn)-Total				87.7		%		80-120	29-AUG-16
WG2377253-1 Arsenic (As)-To	<b>MB</b> otal			<0.00010		mg/L		0.0001	29-AUG-16
Copper (Cu)-To	otal			<0.0010		mg/L		0.001	29-AUG-16
Lead (Pb)-Total	I			<0.00010		mg/L		0.0001	29-AUG-16
Nickel (Ni)-Tota	al			<0.00050		mg/L		0.0005	29-AUG-16
Zinc (Zn)-Total				<0.0030		mg/L		0.003	29-AUG-16
<b>WG2377253-5</b> Arsenic (As)-To	MS otal		WG2377253-3	95.3		%		70-130	29-AUG-16
Copper (Cu)-To				93.7		%		70-130	29-AUG-16
Lead (Pb)-Total				93.7		%		70-130	29-AUG-16
Nickel (Ni)-Tota				93.6		%		70-130	29-AUG-16
Zinc (Zn)-Total				98.9		%		70-130	29-AUG-16
PH-BF		Water						10 100	20110010
	3532722								
WG2374594-2	DUP		L1818073-9						
рН			8.16	8.19	J	pH units	0.03	0.2	23-AUG-16
<b>WG2374594-1</b> рН	LCS			7.00		pH units		6.9-7.1	23-AUG-16
SOLIDS-TSS-BF		Water							
Batch R3	3534466								
WG2376199-3 Total Suspende	<b>DUP</b> ed Solids		<b>L1818090-1</b> <2.0	<2.0	RPD-NA	mg/L	N/A	25	23-AUG-16
WG2376199-2 Total Suspende				100.4		%		85-115	23-AUG-16



			Workorder:	L1818090	)	Report Date:	04-OCT-16		Page 2 of 3
Client:	2275 Upp	Iron Mine's Corp er Middle Rd. E. DN L6H 0C3	ooration (Oakville Suite #300	)					
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF Batch WG2376199-1 Total Suspen	R3534466 I MB	Water		<2.0		mg/L		2	23-AUG-16
TURBIDITY-BF		Water							
	R3532704								
WG2374582-3 Turbidity	B DUP		<b>L1818073-8</b> 2.32	2.31		NTU	0.4	15	23-AUG-16
WG2374582-1 Turbidity	I MB			<0.10		NTU		0.1	23-AUG-16

Workorder: L1818090

Report Date: 04-OCT-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

Contact:

#### 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.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

#### Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



#### Ft. Collins, Colorado

LIMS Version: 6.829

Friday, September 30, 2016

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

Re: ALS Workorder: 1608588 Project Name: Project Number: L1818090

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 8/30/2016. 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 Shiloh J. Summy Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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					
Alaska (AK)	CO01099					
Arizona (AZ)	AZ0742					
California (CA)	06251CA					
Colorado (CO)	CO01099					
Connecticut (CT)	PH-0232					
Florida (FL)	E87914					
Idaho (ID)	CO01099					
Kansas (KS)	E-10381					
Kentucky (KY)	90137					
L-A-B (DoD ELAP/ISO 170250)	L2257					
Louisiana (LA)	05057					
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					



## 1608588

#### Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1608588 Client Name: ALS Environmental Client Project Name: Client Project Number: L1818090 Client PO Number: L1818090

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1818090-1	1608588-1		WATER	22-Aug-16	



1608588

- -- --

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#L1818090ALS requires QC data to be provided with your final results.

Please see enclosed <u>1</u> sample(s) in <u>1</u> Container(s)

SAMPLE NUMBER	ANALYT	CAL REQU	IRED	DATE S	AMPLED DUE DATE	Priority Flag
L1818090-1 MS-08				8/22/2		
·	Ra226 by	Alpha Scin	t, MDC=0.01 Bq/L (RA22)	5-MMER-FC 1)	9/15/2016	
Subcontract Info Conta Analysis and reporting		Wayne 60 NOR	wthorne (519) 886-69 Smith, C.Chem., C.E.T THLAND ROAD, UNIT 1 LOO,ON N2V 2B8			
		Phone:	(519) 886-6910	Email: Wa	yne.Smith@alsgl	obal.com
Please email confirm	ation of rece	ipt to:	Wayne.Smith	@alsglobal.c	om	
Shipped By:		~	Date Shipped:			
Received By: 🔶 🖌	hinde	2	Date Received	: 8-30-	-16 09:	30
Verified By:			Date Verified:		,	
			Temperature:			
Sample Integrity Issue	5:					

ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM			
Client: AS-WATEN DD Workorder No: 1608	581	*	-
Project Manager: AU Initials: COT	Date:	8-30	-16
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?	$\leq$	YES	NO
5. Are the COC and bottle labels complete and legible?		YES	NO
<ol> <li>Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)</li> </ol>		YES	NO
7. Were airbills / shipping documents present and/or removable?	ROP 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?	Í	(ES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		YES	NO
<sup>14.</sup> 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:	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*: #2 (#4)	RAD ONLY	(YÉS)	NO
Cooler #:		ND #16.	
If applicable, was the client contacted? YES / NO / A Contact: Project Manager Signature / Date: Form 201r24.xls (06/04/2012) *IR Gun #2: Oakton, SN 29922500201-0066 *IR Gun #4: Oakton, SN 2372220101-0002	Date/Tin	ne: Page 1 c	



# SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date: 3	30-Sep-16	
Project:	L1818090				•	Work Order: 1	1608588	
Sample ID:	L1818090-1		Lab ID: 1608588-1					
Legal Location:	:					Matrix: \	WATER	
Collection Date: 8/22/2016					Perce	ent Moisture:		
Analyses		Result	Qual	Report Limit		Dilution Factor	Date Analyzed	
Radium-226 by	Radon Emanation - N	lethod 903.1	PAI	783	Prer	o Date: <b>9/22/201</b>	6 PrepBy: CDJ	
Ra-226		0.0081 (+/- 0.0055)	LT	0.0067	BQ/I	NA	9/30/2016 12:15	
Carr: BARIUM		95.4		40-110	%REC	DL = NA	9/30/2016 12:15	

## SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	30-Sep-16	
Project:	L1818090					Work Order:	1608588	
Sample ID:	L1818090-1					Lab ID:	1608588-1	
Legal Location:							WATER	
0	8/22/2016				Dono	ent Moisture:	WITLIN	
<b>Collection Date:</b>	8/22/2010				rerco	ent woisture:		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor		Date Analyzed
Explanation of Q	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ss than the sample specific MDC	<b>).</b>	M			not met, but the rep	orted	
Y1 - Chemical Yield is	s in control at 100-110%. Quanti	itative yield is assumed.		activity is gr LCS Recovery		reported MDC.		
Y2 - Chemical Yield o				- LCS Recovery				
•	an Warning Limit of 1.42			-		within control limits	S.	
	s Received' while the Report Bas ry Weight' while the Report Basis					de control limits		
G - Sample density di	ffers by more than 15% of LCS d					te results less than	5 times MDC	
D - DER is greater that			В	- Analyte conce	entration greate	er than MDC.		
M - Requested MDC					entration grea	ter than MDC but le	ess than Reque	sted
	an requested MDC but greater the	an achieved MDC.	IVII	DC.				
Inorganics:								
B - Result is less than	the requested reporting limit bu	-	nent method	l detection limit	(MDL).			
B - Result is less thar U or ND - Indicates th	at the compound was analyzed f	or but not detected.				e narrative		
B - Result is less thar U or ND - Indicates th E - The reported value	at the compound was analyzed f e is estimated because of the pre	or but not detected.				e narrative.		
B - Result is less thar U or ND - Indicates th E - The reported value M - Duplicate injection	at the compound was analyzed f	or but not detected. esence of interference. A	n explanato	ory note may be	included in the			
B - Result is less thar U or ND - Indicates th E - The reported value M - Duplicate injectio N - Spiked sample ree	at the compound was analyzed f e is estimated because of the pre- on precision was not met.	or but not detected. esence of interference. A A post spike is analyzed f	n explanato	ory note may be nalyses when th	included in the			
B - Result is less thar U or ND - Indicates th E - The reported valu M - Duplicate injectio N - Spiked sample re duplicate fail and the Z - Spiked recovery n	at the compound was analyzed f e is estimated because of the pre- on precision was not met. covery not within control limits. A native sample concentration is le ot within control limits. An explan	or but not detected. esence of interference. A A post spike is analyzed f ess than four times the sp natory note may be includ	on explanato or all ICP ar	ory note may be nalyses when th concentration.	included in the			
<ul> <li>B - Result is less than</li> <li>U or ND - Indicates the</li> <li>The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery meta</li> <li>* - Duplicate analysis</li> </ul>	at the compound was analyzed f e is estimated because of the pre- on precision was not met. covery not within control limits. A native sample concentration is le ot within control limits. An explan (relative percent difference) not	or but not detected. esence of interference. A A post spike is analyzed f ess than four times the sp hatory note may be includ within control limits.	on explanato or all ICP ar bike added o ed in the na	ory note may be nalyses when the concentration. rrative.	included in the			
<ul> <li>B - Result is less than</li> <li>U or ND - Indicates the</li> <li>E - The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample readuplicate fail and the</li> <li>Z - Spiked recovery not solve analysis</li> <li>S - SAR value is estimation</li> </ul>	at the compound was analyzed f e is estimated because of the pre- on precision was not met. covery not within control limits. A native sample concentration is le ot within control limits. An explan	or but not detected. esence of interference. A A post spike is analyzed f ess than four times the sp hatory note may be includ within control limits.	on explanato or all ICP ar bike added o ed in the na	ory note may be nalyses when the concentration. rrative.	included in the			
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<ul> <li>B - Result is less thar</li> <li>U or ND - Indicates the</li> <li>E - The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery network</li> <li>* - Duplicate analysis</li> <li>S - SAR value is estim</li> <li>Organics:</li> <li>U or ND - Indicates the</li> <li>B - Analyte is detected</li> <li>E - Analyte concentration</li> </ul>	at the compound was analyzed f e is estimated because of the pre- on precision was not met. covery not within control limits. A native sample concentration is le ot within control limits. An explan (relative percent difference) not nated as one or more analytes us	For but not detected. A post spike is analyzed f ess than four times the sp latory note may be includ within control limits. sed in the calculation we for but not detected. K as well as in the sample ne calibration range.	or all ICP ar or all ICP ar ike added c ed in the na re not detec e. It indicate	ory note may be halyses when the concentration. rrative. ted above the c	included in the ne matrix spike letection limit. nk contaminati	and or spike	lata user.	
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<ul> <li>B - Result is less than</li> <li>U or ND - Indicates the</li> <li>The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample readuplicate fail and the</li> <li>Z - Spiked recovery not a spiked recovery the spike recovery the spike</li></ul>	at the compound was analyzed f e is estimated because of the pre- on precision was not met. covery not within control limits. A native sample concentration is le ot within control limits. An explan (relative percent difference) not a nated as one or more analytes us at the compound was analyzed f d in the associated method blank- tion exceeds the upper level of th The result is less than the reporti- fied compound is a suspected al liluted below an accurate quantita- v is equal to or outside the control nt difference (RPD) equals or ex- ling gasoline was detected in this sing diesel was detected in this sing motor oil was detected in this ing crude oil was detected in this	Tor but not detected. assence of interference. A A post spike is analyzed f ass than four times the sp atory note may be includ within control limits. sed in the calculation were the calculation were the calculation range. Ing limit but greater than Idol-condensation product ation level. I criteria used. ceeds the control criteria is sample. is sample. is sample. is sample. is sample. is sample.	or all ICP ar bike added c ed in the na re not detec e. It indicate the instrume	ory note may be halyses when the concentration. rrative. ted above the c	included in the ne matrix spike letection limit. nk contaminati	and or spike	lata user.	
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Client:	ALS Environmental
Work Order:	1608588
Project:	L1818090

# **QC BATCH REPORT**

LCS	Sample ID: RE160922-2				Ur	nits: <b>BQ/I</b>		Analysi	s Date: 9/	30/201	6 13:01	
Client ID:		Run II	D: RE160922-3	2A			Pr	ep Date: 9/22	/2016	DF:	NA	
					SPK Ref		Control	Decision	DER		DER	
Analyte		Result	ReportLimit	SPK Val	Value	%REC	Limit	Level	Ref	DER	Limit	Qua
Ra-226		1.62 (+/- 0.400)	0.00521	1.673		96.6	67-120					Ρ
Carr: BARI	UM	16400		16610		98.5	40-110					
LCSD	Sample ID: RE160922-2				Ur	nits: <b>BQ/I</b>		Analysi	s Date: 9/	30/201	6 13:01	
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Ra-226		1.70 (+/- 0.422)	0.00604	1.673		102	67-120		1.62	0.1	2.1	Р
Carr: BARI	UM	12900		16610		77.5	40-110		16400			
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Client ID:		Run II	D: RE160922-3	2A			Pr	ep Date: 9/22	/2016	DF:	NA	
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Ra-226		ND	0.0068									U
	UM	14700		16610		88.3	40-110					



Chain of Custody (COC) / Analytical Request Form



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COC Number: 14 -

Page <u>1</u> of <u>1</u>

Canada Toli Free: 1 800 668 9878

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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 16-AUG-16 Report Date: 23-SEP-16 06:51 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1815159 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental

www.alsglobal.com

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815159-1 MS-08 Sampled By: AV on 16-AUG-16 @ 13:00 Matrix: WATER							
Physical Tests							
Conductivity	1240		3.0	umhos/cm		20-AUG-16	R3529840
Hardness (as CaCO3)	683		10	mg/L		22-AUG-16	
pH	7.03		0.10	pH units			R3528335
Total Suspended Solids	<2.0		2.0	mg/L			R3528342
Total Dissolved Solids	1030		20	mg/L		18-AUG-16	R3528114
Turbidity	3.09		0.10	NTU			R3528332
Anions and Nutrients	0.00		0.10				
Alkalinity, Total (as CaCO3)	21		10	mg/L		22-AUG-16	R3531794
Ammonia, Total (as N)	0.694		0.020	mg/L		22-AUG-16	R3530911
Chloride (CI)	7.9	DLDS	2.5	mg/L		22-AUG-16	R3531814
Fluoride (F)	<0.10	DLDS	0.10	mg/L		22-AUG-16	R3531814
Nitrate (as N)	4.95	DLDS	0.10	mg/L		22-AUG-16	R3531814
Total Kjeldahl Nitrogen	1.16		0.15	mg/L	22-AUG-16	22-AUG-16	R3531163
Phosphorus, Total	0.048	DLM	0.030	mg/L	22-AUG-16	23-AUG-16	R3531254
Sulfate (SO4)	688	DLDS	1.5	mg/L		22-AUG-16	R3531814
Organic / Inorganic Carbon				5			
Dissolved Organic Carbon	<1.0		1.0	mg/L		21-AUG-16	R3531213
Total Organic Carbon	<1.0		1.0	mg/L		21-AUG-16	R3531214
Total Metals							
Aluminum (Al)-Total	0.020		0.010	mg/L	20-AUG-16	20-AUG-16	R3530151
Arsenic (As)-Total	<0.00010		0.00010	mg/L	20-AUG-16	20-AUG-16	R3530151
Cadmium (Cd)-Total	0.000190		0.000010	mg/L	20-AUG-16	20-AUG-16	R3530151
Calcium (Ca)-Total	54.8		0.50	mg/L	20-AUG-16	20-AUG-16	R3530151
Copper (Cu)-Total	0.0022		0.0010	mg/L	20-AUG-16	20-AUG-16	R3530151
Iron (Fe)-Total	0.333		0.050	mg/L	20-AUG-16	20-AUG-16	R3530151
Lead (Pb)-Total	<0.00010		0.00010	mg/L	20-AUG-16	20-AUG-16	R3530151
Magnesium (Mg)-Total	136	DLHC	0.50	mg/L	20-AUG-16	20-AUG-16	R3530151
Manganese (Mn)-Total	6.19	DLHC	0.0050	mg/L	20-AUG-16	20-AUG-16	R3530151
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		22-AUG-16	R3530929
Molybdenum (Mo)-Total	0.000052		0.000050	mg/L	20-AUG-16	20-AUG-16	R3530151
Nickel (Ni)-Total	0.0743		0.00050	mg/L	20-AUG-16	20-AUG-16	R3530151
Potassium (K)-Total	1.91		0.050	mg/L	20-AUG-16	20-AUG-16	R3530151
Selenium (Se)-Total	0.00195		0.000050	mg/L	20-AUG-16	20-AUG-16	
Sodium (Na)-Total	2.73		0.50	mg/L	20-AUG-16	20-AUG-16	R3530151
Thallium (TI)-Total	0.000032		0.000010	mg/L	20-AUG-16	20-AUG-16	
Uranium (U)-Total	0.000030		0.000010	mg/L	20-AUG-16	20-AUG-16	
Zinc (Zn)-Total	0.0078		0.0030	mg/L	20-AUG-16	20-AUG-16	R3530151
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					22-AUG-16	R3530695
Dissolved Metals Filtration Location	FIELD					21-AUG-16	
Aluminum (AI)-Dissolved	<0.0050		0.0050	mg/L	21-AUG-16	22-AUG-16	
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	21-AUG-16	22-AUG-16	

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

L1815159-1 MS-08 Sampled By: AV on 16-AUG-16 @ 13:00 Matrix: WATER Dissolved Metals Cadmium (Cd)-Dissolved Calcium (Ca)-Dissolved Copper (Cu)-Dissolved Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters Ra-226	0.000192 52.3 0.00129 <0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726 1.84	DLHC DLHC	0.000010 0.050 0.00020 0.010 0.000050 0.50	mg/L mg/L mg/L mg/L mg/L	21-AUG-16 21-AUG-16 21-AUG-16 21-AUG-16 21-AUG-16	22-AUG-16 22-AUG-16 22-AUG-16 22-AUG-16	R3530822
Dissolved Metals Cadmium (Cd)-Dissolved Calcium (Ca)-Dissolved Copper (Cu)-Dissolved Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Selenium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters	52.3 0.00129 <0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.050 0.00020 0.010 0.000050 0.50	mg/L mg/L mg/L mg/L	21-AUG-16 21-AUG-16 21-AUG-16	22-AUG-16 22-AUG-16	R3530822
Cadmium (Cd)-Dissolved Calcium (Ca)-Dissolved Copper (Cu)-Dissolved Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	52.3 0.00129 <0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.050 0.00020 0.010 0.000050 0.50	mg/L mg/L mg/L mg/L	21-AUG-16 21-AUG-16 21-AUG-16	22-AUG-16 22-AUG-16	R3530822
Calcium (Ca)-Dissolved Copper (Cu)-Dissolved Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	52.3 0.00129 <0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.050 0.00020 0.010 0.000050 0.50	mg/L mg/L mg/L mg/L	21-AUG-16 21-AUG-16 21-AUG-16	22-AUG-16 22-AUG-16	R3530822
Copper (Cu)-Dissolved Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	0.00129 <0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.00020 0.010 0.000050 0.50	mg/L mg/L mg/L	21-AUG-16 21-AUG-16	22-AUG-16	
Iron (Fe)-Dissolved Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	<0.010 <0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.010 0.000050 0.50	mg/L mg/L	21-AUG-16		
Lead (Pb)-Dissolved Magnesium (Mg)-Dissolved Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Sodium (Na)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters	<0.000050 134 6.17 <0.000010 <0.000050 0.0726		0.000050 0.50	mg/L			R3530822
Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	6.17 <0.000010 <0.000050 0.0726						R3530822
Mercury (Hg)-Dissolved Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	<0.000010 <0.000050 0.0726	DLHC	0.0050	iiig/L	21-AUG-16	22-AUG-16	R3530822
Molybdenum (Mo)-Dissolved Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters	<0.000050 0.0726		0.0050	mg/L	21-AUG-16	22-AUG-16	R3530822
Nickel (Ni)-Dissolved Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters	0.0726		0.000010	mg/L	22-AUG-16	22-AUG-16	R3530930
Potassium (K)-Dissolved Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>		1	0.000050	mg/L	21-AUG-16	22-AUG-16	R3530822
Selenium (Se)-Dissolved Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	1.84		0.00050	mg/L	21-AUG-16	22-AUG-16	R3530822
Sodium (Na)-Dissolved Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>			0.050	mg/L	21-AUG-16	22-AUG-16	R3530822
Thallium (TI)-Dissolved Uranium (U)-Dissolved Zinc (Zn)-Dissolved <b>Radiological Parameters</b>	0.00210		0.000050	mg/L	21-AUG-16	22-AUG-16	R3530822
Uranium (U)-Dissolved Zinc (Zn)-Dissolved Radiological Parameters	2.62		0.50	mg/L	21-AUG-16	22-AUG-16	R3530822
Zinc (Zn)-Dissolved Radiological Parameters	0.000032		0.000010	mg/L	21-AUG-16	22-AUG-16	R3530822
Radiological Parameters	0.000014		0.000010	mg/L	21-AUG-16	22-AUG-16	R3530822
_	0.0062		0.0010	mg/L	21-AUG-16	22-AUG-16	R3530822
Ra-226							
	0.014		0.0060	Bq/L	06-SEP-16	20-SEP-16	R3543792
					1		

 $^{\ast}$  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	L1815159-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1815159-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1815159-1
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1815159-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1815159-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L1815159-1
Matrix Spike	Iron (Fe)-Total	MS-B	L1815159-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1815159-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L1815159-1
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L1815159-1
Matrix Spike	Potassium (K)-Total	MS-B	L1815159-1
Matrix Spike	Sodium (Na)-Total	MS-B	L1815159-1
Matrix Spike	Zinc (Zn)-Total	MS-B	L1815159-1

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**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
			APHA 5310 B-INSTRUMENTAL ted reaction chamber which is packed with an oxidative catalyst. The water n dioxide is transported in a carrier gas and is measured by a non-dispersiv
CL-IC-N-WT Inorganic anions are a	Water analyzed by Ior	Chloride by IC n Chromatography with conductivity and	EPA 300.1 (mod) //or UV detection.
EC-WT Water samples can be	Water e measured di	Conductivity rectly by immersing the conductivity cell	APHA 2510 B into the sample.
F-IC-N-WT Inorganic anions are a	Water analyzed by Ior	Fluoride in Water by IC n Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
	as Total Hard	Hardness Iness) is calculated from the sum of Cal concentrations are preferentially used fo	APHA 2340 B cium and Magnesium concentrations, expressed in CaCO3 equivalents. or the hardness calculation.
HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples are filt with stannous chloride		), preserved with hydrochloric acid, then	n undergo a cold-oxidation using bromine monochloride prior to reduction
Analysis conducted in Protection Act (July 1,		vith the Protocol for Analytical Methods I	Used in the Assessment of Properties under Part XV.1 of the Environmental
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples under	go a cold-oxida	ation using bromine monochloride prior t	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 filt	ered (0.45 um	), preserved with nitric acid, and analyze	ed by CRC ICPMS.
Method Limitation (re:	Sulfur): Sulfid	e and volatile sulfur species may not be	e recovered by this method.
Analysis conducted in Protection Act (July 1,		vith the Protocol for Analytical Methods I	Used in the Assessment of Properties under Part XV.1 of the Environmenta

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

### MS-08

# **Reference Information**

Method Limitation (re	: Sulfur): Sulfid	le and volatile sulfur species may not be	recovered by this method.
Analysis conducted in Protection Act (July 1		vith the Protocol for Analytical Methods L	Jsed in the Assessment of Properties under Part XV.1 of the Environmental
NH3-WT Sample is measured colorimetrically.	Water colorimetrically	Ammonia, Total as N v. When sample is turbid a distillation ste	EPA 350.1 p is required, sample is distilled into a solution of boric acid and measured
NO3-IC-WT Inorganic anions are a	Water analyzed by Io	Nitrate in Water by IC n Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carrie after persulphate dige			500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically
PH-BF Water samples are a	Water nalyzed directly	pH / by a calibrated pH meter.	APHA 4500 H-Electrode
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT Inorganic anions are a	Water analyzed by Io	Sulfate in Water by IC n Chromatography with conductivity and	EPA 300.1 (mod) /or UV detection.
SOLIDS-TDS-BF A well-mixed sample	Water is filtered thoug	Total Dissolved Solids gh glass fibres filter. A known volume of	APHA 2540C the filtrate is evaporated and dried at 180 +/- 2C for 1hr.
SOLIDS-TSS-BF A well-mixed sample four hours or until a c			APHA 2540 D-Gravimetric and the residue retained is dried in an oven at 104 +/- 1C for a minimum of
		Total Kjeldahl Nitrogen KN to ammonium sulphate. The ammoni he concentration of ammonium sulphate	APHA 4500-N ia ions are heated to produce a colour complex. The absorbance measured in the sample and is reported as TKN.
TOC-WT Sample is injected int to carbon dioxide. The	Water o a heated rea e carbon dioxic	Total Organic Carbon ction chamber which is packed with an c le is transported in a carrier gas and is n	APHA 5310B oxidative catalyst. The water is vaporized and the organic cabon is oxidized neasured by a non-dispersive infrared detector.
TURBIDITY-BF Sample result is base by a standard referen	Water d on a compar ce suspension	Turbidity ison of the intensity of the light scattered under the same conditions. Sample rea	APHA 2130 B d by the sample under defined conditions with the intensity of light scattered dings are obtained from a Nephelometer.
ALS test methods ma	y incorporate n	nodifications from specified reference me	ethods to improve performance.

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.



		Workorder:	L181515	9	Report Date: 2	3-SEP-16		Page 1 of 10
Client:	Baffinland Iron Mine's Co 2275 Upper Middle Rd. E Oakville ON L6H 0C3		)					
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
WG2373023-3	R3531794 B CRM al (as CaCO3)	WT-ALK-CRM	104.9		%		80-120	22-AUG-16
WG2373023-4 Alkalinity, Tot	<b>DUP</b> al (as CaCO3)	<b>L1815159-1</b> 21	22		mg/L	5.3	20	22-AUG-16
WG2373023-2 Alkalinity, Tot	2 LCS al (as CaCO3)		104.0		%		85-115	22-AUG-16
WG2373023-1 Alkalinity, Tot	l <b>MB</b> al (as CaCO3)		<10		mg/L		10	22-AUG-16
C-DIS-ORG-WT	Water							
Batch F WG2372396-3	R3531213 B DUP	L1816023-3						
Dissolved Org		6.5	6.7		mg/L	3.2	20	21-AUG-16
WG2372396-2 Dissolved Org	ganic Carbon		100.6		%		80-120	21-AUG-16
WG2372396-1 Dissolved Org	ganic Carbon		<1.0		mg/L		1	21-AUG-16
WG2372396-4 Dissolved Org		L1816023-3	95.9		%		70-130	21-AUG-16
CL-IC-N-WT	Water							
Batch F WG2372641-2 Chloride (Cl)	R3531814 2 LCS		101.7		%		90-110	
WG2372641-1 Chloride (Cl)	MB		<0.50		mg/L		0.5	22-AUG-16 22-AUG-16
EC-WT	Water				-			
	R3529840							
WG2372065-4 Conductivity	L DUP	<b>WG2372065-3</b> 1240	1250		umhos/cm	0.5	10	20-AUG-16
WG2372065-2 Conductivity			101.9		%		90-110	20-AUG-16
WG2372065-1 Conductivity	MB		<3.0		umhos/cm		3	20-AUG-16
F-IC-N-WT	Water							
Batch F WG2372641-4 Fluoride (F)	R3531814 I DUP	<b>L1815674-2</b> 0.043	0.044		mg/L	3.7	20	22-AUG-16
WG2372641-2	2 LCS							-



	Quality Control Report							
		Workorder:	L1815159		Report Date:	23-SEP-16		Page 2 of 10
2275 U	and Iron Mine's Co Ipper Middle Rd. E e ON L6H 0C3	rporation (Oakville) . Suite #300	1					
Contact: Jim Mi	llard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	Water							
Batch R35318 WG2372641-2 LCS Fluoride (F)			99.4		%		90-110	22-AUG-16
WG2372641-1 MB Fluoride (F)			<0.020		mg/L		0.02	22-AUG-16
WG2372641-5 MS Fluoride (F)		L1815674-2	97.3		%		75-125	22-AUG-16
HG-D-CVAA-WT	Water							
Batch R353093 WG2372649-3 DUF Mercury (Hg)-Dissolv	5	<b>L1816008-1</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372649-2 LCS Mercury (Hg)-Dissolv			101.0		%		80-120	22-AUG-16
WG2372649-1 MB Mercury (Hg)-Dissolv	ed		<0.000010		mg/L		0.00001	22-AUG-16
WG2372649-4 MS Mercury (Hg)-Dissolv	ed	L1816008-2	90.8		%		70-130	22-AUG-16
HG-T-CVAA-WT	Water							
Batch R353092 WG2372647-4 DUF Mercury (Hg)-Total	-	<b>WG2372647-3</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372647-2 LCS Mercury (Hg)-Total	3		102.0		%		80-120	22-AUG-16
WG2372647-1 MB Mercury (Hg)-Total			<0.000010		mg/L		0.00001	22-AUG-16
WG2372647-6 MS Mercury (Hg)-Total		WG2372647-5	94.4		%		70-130	22-AUG-16
MET-D-CCMS-WT	Water							
Batch R353082 WG2372405-4 DUF Aluminum (Al)-Dissol	5	<b>WG2372405-3</b> <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-AUG-16
Arsenic (As)-Dissolve	ed	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-16
Cadmium (Cd)-Disso	lved	0.000192	0.000194		mg/L	0.9	20	22-AUG-16
Calcium (Ca)-Dissolv	ed	52.3	51.0		mg/L	2.7	20	22-AUG-16
Copper (Cu)-Dissolve	ed	0.00129	0.00105	J	mg/L	0.00024	0.0004	22-AUG-16
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-AUG-16
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-AUG-16



Copper (Cu)-Dissolved

Client:

## **Quality Control Report**

Contact: Jim Millard Test Matrix Reference Result Qualifier Units RPD Limit Analyzed MET-D-CCMS-WT Water R3530822 Batch WG2372405-4 DUP WG2372405-3 Magnesium (Mg)-Dissolved 135 134 mg/L 0.6 20 22-AUG-16 Manganese (Mn)-Dissolved 6.17 6.05 mg/L 2.0 20 22-AUG-16 Molybdenum (Mo)-Dissolved < 0.000050 < 0.000050 RPD-NA mg/L N/A 20 22-AUG-16 Nickel (Ni)-Dissolved 0.0726 0.0732 mg/L 0.8 20 22-AUG-16 Potassium (K)-Dissolved 1.84 1.82 mg/L 1.6 20 22-AUG-16 Selenium (Se)-Dissolved 0.00210 0.00216 mg/L 3.2 20 22-AUG-16 Sodium (Na)-Dissolved 2.62 2.54 mg/L 3.1 20 22-AUG-16 Thallium (TI)-Dissolved 0.000032 0.000034 mg/L 6.4 20 22-AUG-16 Uranium (U)-Dissolved 0.000014 0.000015 mg/L 6.1 20 22-AUG-16 Zinc (Zn)-Dissolved 0.0062 0.0058 mg/L 5.9 20 22-AUG-16 WG2372405-2 LCS Aluminum (AI)-Dissolved 97.6 % 80-120 22-AUG-16 Arsenic (As)-Dissolved 100.4 % 80-120 22-AUG-16 Cadmium (Cd)-Dissolved 99.4 % 80-120 22-AUG-16 Calcium (Ca)-Dissolved 94.7 % 80-120 22-AUG-16 Copper (Cu)-Dissolved 98.3 % 80-120 22-AUG-16 Iron (Fe)-Dissolved 100.2 % 80-120 22-AUG-16 Lead (Pb)-Dissolved 97.9 % 80-120 22-AUG-16 Magnesium (Mg)-Dissolved 100.1 % 80-120 22-AUG-16 Manganese (Mn)-Dissolved 99.6 % 80-120 22-AUG-16 Molybdenum (Mo)-Dissolved 96.4 % 80-120 22-AUG-16 Nickel (Ni)-Dissolved 99.9 % 80-120 22-AUG-16 Potassium (K)-Dissolved 98.2 % 80-120 22-AUG-16 Selenium (Se)-Dissolved % 102.6 80-120 22-AUG-16 Sodium (Na)-Dissolved 97.1 % 80-120 22-AUG-16 Thallium (TI)-Dissolved 96.9 % 80-120 22-AUG-16 Uranium (U)-Dissolved 99.6 % 22-AUG-16 80-120 Zinc (Zn)-Dissolved 98.9 % 80-120 22-AUG-16 WG2372405-1 MB Aluminum (AI)-Dissolved < 0.0050 mg/L 0.005 22-AUG-16 Arsenic (As)-Dissolved < 0.00010 0.0001 mg/L 22-AUG-16 Cadmium (Cd)-Dissolved < 0.000010 mg/L 0.00001 22-AUG-16 Calcium (Ca)-Dissolved 0.05 < 0.050 mg/L 22-AUG-16

< 0.00020

mg/L

0.0002

22-AUG-16



# **Quality Control Report**

		Workorder:	L181515	9	Report Date: 23	-SEP-16		Page 4 of 10
Client: Contact:	Baffinland Iron Mine's C 2275 Upper Middle Rd. Oakville ON L6H 0C3 Jim Millard		)					
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-	-WT Water							
Batch	R3530822							
WG237240								
Iron (Fe)-D			<0.010	_	mg/L		0.01	22-AUG-16
Lead (Pb)-			<0.00005	0	mg/L		0.00005	22-AUG-16
-	n (Mg)-Dissolved		<0.050		mg/L		0.05	22-AUG-16
•	e (Mn)-Dissolved		<0.00050		mg/L		0.0005	22-AUG-16
	im (Mo)-Dissolved		<0.00005		mg/L		0.00005	22-AUG-16
Nickel (Ni)-			<0.00050		mg/L		0.0005	22-AUG-16
Potassium	(K)-Dissolved		<0.050		mg/L		0.05	22-AUG-16
Selenium (	Se)-Dissolved		<0.00005	0	mg/L		0.00005	22-AUG-16
Sodium (N	a)-Dissolved		<0.50		mg/L		0.5	22-AUG-16
Thallium (1	FI)-Dissolved		<0.00001	0	mg/L		0.00001	22-AUG-16
Uranium (L	J)-Dissolved		<0.000010		mg/L	mg/L		22-AUG-16
Zinc (Zn)-D	Dissolved		<0.0010		mg/L		0.001	22-AUG-16
WG237240		WG2372405-3						
	(AI)-Dissolved		93.7		%		70-130	22-AUG-16
Arsenic (As	s)-Dissolved		104.0		%		70-130	22-AUG-16
Cadmium (	(Cd)-Dissolved		98.6		%		70-130	22-AUG-16
Calcium (C	a)-Dissolved		N/A	MS-B	%		-	22-AUG-16
Copper (Cu	u)-Dissolved		96.3		%		70-130	22-AUG-16
Iron (Fe)-D	Dissolved		100.9		%		70-130	22-AUG-16
Lead (Pb)-	Dissolved		97.6		%		70-130	22-AUG-16
Magnesiun	n (Mg)-Dissolved		N/A	MS-B	%		-	22-AUG-16
Manganes	e (Mn)-Dissolved		N/A	MS-B	%		-	22-AUG-16
Molybdenu	m (Mo)-Dissolved		97.1		%		70-130	22-AUG-16
Nickel (Ni)	-Dissolved		N/A	MS-B	%		-	22-AUG-16
Potassium	(K)-Dissolved		103.4		%		70-130	22-AUG-16
Selenium (	Se)-Dissolved		115.4		%		70-130	22-AUG-16
Sodium (N	a)-Dissolved		N/A	MS-B	%		-	22-AUG-16
Thallium (T	FI)-Dissolved		97.5		%		70-130	22-AUG-16
Uranium (L	J)-Dissolved		102.7		%		70-130	22-AUG-16

96.1

%

70-130

22-AUG-16

MET-T-CCMS-WT

Zinc (Zn)-Dissolved

Water



Workorder: L1815159

Report Date: 23-SEP-16

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Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3530151 WG2372047-4 DUP		WG2372047-3	i					
Aluminum (Al)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-AUG-16
Arsenic (As)-Total		0.0017	0.0015		mg/L	7.6	20	20-AUG-16
Cadmium (Cd)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-AUG-16
Calcium (Ca)-Total		43.8	44.2		mg/L	1.0	20	20-AUG-16
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-AUG-16
Iron (Fe)-Total		1.09	1.10		mg/L	1.1	20	20-AUG-16
Lead (Pb)-Total		<0.0010	0.0010	RPD-NA	mg/L	N/A	20	20-AUG-16
Magnesium (Mg)-Total		31.7	32.1		mg/L	1.2	20	20-AUG-16
Manganese (Mn)-Total		1.02	1.02		mg/L	0.4	20	20-AUG-16
Molybdenum (Mo)-Tota	I	0.0903	0.0910		mg/L	0.7	20	20-AUG-16
Nickel (Ni)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-AUG-16
Potassium (K)-Total		31.6	31.2		mg/L	1.2	20	20-AUG-16
Selenium (Se)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-AUG-16
Sodium (Na)-Total		140	148		mg/L	5.4	20	20-AUG-16
Thallium (TI)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-AUG-16
Uranium (U)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-AUG-16
Zinc (Zn)-Total		0.097	0.097		mg/L	0.5	20	20-AUG-16
WG2372047-2 LCS Aluminum (Al)-Total			104.8		%		80,120	
Arsenic (As)-Total			104.8		%		80-120	20-AUG-16
			99.9		%		80-120	20-AUG-16
Cadmium (Cd)-Total Calcium (Ca)-Total			99.9 104.4		%		80-120	20-AUG-16
Copper (Cu)-Total			104.4		%		80-120	20-AUG-16
Iron (Fe)-Total			99.7		%		80-120 80-120	20-AUG-16
Lead (Pb)-Total			103.8		%			20-AUG-16 20-AUG-16
Magnesium (Mg)-Total			103.8		%		80-120 80-120	20-AUG-16 20-AUG-16
Manganese (Mn)-Total			103.0		%		80-120 80-120	20-AUG-16 20-AUG-16
Molybdenum (Mo)-Tota	I		102.4		%		80-120 80-120	20-AUG-16 20-AUG-16
Nickel (Ni)-Total			103.8		%		80-120	20-AUG-16
Potassium (K)-Total			105.0		%		80-120	20-AUG-16
Selenium (Se)-Total			101.8		%		80-120	20-AUG-16
Sodium (Na)-Total			105.1		%		80-120	20-AUG-16
Thallium (TI)-Total			103.8		%		80-120	20-AUG-16
							00-120	20-00-10



 Workorder:
 L1815159
 Report Date:
 23-SEP-16
 Page
 6
 of
 10

 Baffinland Iron Mine's Corporation (Oakville)

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
		IVEIEI EIICE	Nesult		Units	ΝΓυ	Liillit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3530151								
WG2372047-2 LCS Uranium (U)-Total			105.1		%		80-120	20-AUG-16
Zinc (Zn)-Total			98.8		%		80-120	20-AUG-16
WG2372047-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	20-AUG-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-AUG-16
Cadmium (Cd)-Total			<0.000010	)	mg/L		0.00001	20-AUG-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	20-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	20-AUG-16
Iron (Fe)-Total			<0.050		mg/L		0.05	20-AUG-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	20-AUG-16
Magnesium (Mg)-Total			<0.050		mg/L		0.05	20-AUG-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	20-AUG-16
Molybdenum (Mo)-Total	l		<0.000050	)	mg/L		0.00005	20-AUG-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-AUG-16
Potassium (K)-Total			<0.050		mg/L		0.05	20-AUG-16
Selenium (Se)-Total			<0.000050	)	mg/L		0.00005	20-AUG-16
Sodium (Na)-Total			<0.50		mg/L		0.5	20-AUG-16
Thallium (TI)-Total			<0.000010	)	mg/L		0.00001	20-AUG-16
Uranium (U)-Total			<0.000010	)	mg/L		0.00001	20-AUG-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-AUG-16
WG2372047-5 MS		WG2372047-3						
Aluminum (Al)-Total			87.2		%		70-130	20-AUG-16
Arsenic (As)-Total			83.5		%		70-130	20-AUG-16
Cadmium (Cd)-Total			86.0		%		70-130	20-AUG-16
Calcium (Ca)-Total			N/A	MS-B	%		-	20-AUG-16
Copper (Cu)-Total			87.7		%		70-130	20-AUG-16
Iron (Fe)-Total			N/A	MS-B	%		-	20-AUG-16
Lead (Pb)-Total			82.0		%		70-130	20-AUG-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	20-AUG-16
Manganese (Mn)-Total			N/A	MS-B	%		-	20-AUG-16
Molybdenum (Mo)-Total			N/A	MS-B	%		-	20-AUG-16
Nickel (Ni)-Total			84.5		%		70-130	20-AUG-16
Potassium (K)-Total			N/A	MS-B	%		-	20-AUG-16
Selenium (Se)-Total			85.5		%		70-130	20-AUG-16



				Qualit	y Contro	o Report			
			Workorder:	L181515	9	Report Date:	23-SEP-16		Page 7 of 10
Client:	2275 Upp	I Iron Mine's Corp er Middle Rd. E. DN L6H 0C3	ooration (Oakville) Suite #300	1					
Contact:	Jim Millar								
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-W	т	Water							
Batch WG2372047- Sodium (Na)·			WG2372047-3	N/A	MS-B	%		-	20-AUG-16
Thallium (TI)				81.8		%		70-130	20-AUG-16
Zinc (Zn)-Tot				N/A	MS-B	%		-	20-AUG-16
NH3-WT		Water							
Batch WG2372598-3 Ammonia, To			<b>L1815391-1</b> <0.20	<0.20	RPD-NA	mg/L	N/A	20	22-AUG-16
<b>WG2372598-</b> 2 Ammonia, To				100.2		%		85-115	22-AUG-16
<b>WG2372598</b> - Ammonia, To	otal (as N)			<0.020		mg/L		0.02	22-AUG-16
<b>WG2372598-</b> Ammonia, To	-		L1815391-1	92.9		%		75-125	22-AUG-16
NO3-IC-WT		Water							
Batch WG2372641-4 Nitrate (as N)			<b>L1815674-2</b> <0.020	<0.020	RPD-NA	mg/L	N/A	25	22-AUG-16
WG2372641-2 Nitrate (as N)				101.0		%		70-130	22-AUG-16
WG2372641- Nitrate (as N)	)			<0.020		mg/L		0.02	22-AUG-16
WG2372641- Nitrate (as N)			L1815674-2	95.0		%		70-130	22-AUG-16
P-T-COL-WT		Water							
Batch WG2373158-3 Phosphorus,			<b>L1815674-1</b> 0.0094	0.0087		mg/L	7.5	20	23-AUG-16
WG2373158-2 Phosphorus,				97.8		%		80-120	23-AUG-16
WG2373158- Phosphorus,				<0.0030		mg/L		0.003	23-AUG-16
WG2373158-4 Phosphorus,			L1815674-1	82.2		%		70-130	23-AUG-16
PH-BF		Water							



			Workorder:	L1815159	- 9 Re	eport Date: 23-S	EP-16		Page 8 of 10
Client:	2275 Upp	Iron Mine's Corp er Middle Rd. E. DN L6H 0C3	ooration (Oakville) Suite #300	)					-
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF		Water							
	3528335								
<b>WG2370448-2</b> рН	DUP		<b>L1815159-1</b> 7.03	7.04	J	pH units	0.01	0.2	18-AUG-16
WG2370448-1	LCS		1.00	1.04	5	priranite	0.01	0.2	18-409-10
pH	200			7.00		pH units		6.9-7.1	18-AUG-16
SO4-IC-N-WT		Water							
Batch R	3531814								
WG2372641-4			L1815674-2						
Sulfate (SO4)			<0.30	<0.30	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372641-2 Sulfate (SO4)				101.4		%		90-110	22-AUG-16
WG2372641-1								50 110	22 /100 10
Sulfate (SO4)				<0.30		mg/L		0.3	22-AUG-16
WG2372641-5 Sulfate (SO4)			L1815674-2	95.9		%		75-125	22-AUG-16
SOLIDS-TDS-BF		Water							
Batch R	3528114								
WG2370200-3			L1802455-1						
Total Dissolve			46	45		mg/L	1.8	25	18-AUG-16
WG2370200-2 Total Dissolve				101.2		%		70-130	18-AUG-16
WG2370200-1 Total Dissolve				<20		mg/L		20	18-AUG-16
SOLIDS-TSS-BF		Water							
Batch R	3528342								
WG2370458-3 Total Suspend			<b>L1815159-1</b> <2.0	<2.0	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370458-2 Total Suspend				99.4		%		85-115	18-AUG-16
WG2370458-1 Total Suspend	МВ			<2.0		mg/L		2	
TKN-WT		Water		<2.0		liig/∟		۷	18-AUG-16
	3531163	mater							
WG2372426-3 Total Kjeldahl	DUP		<b>L1814889-1</b> 0.59	0.55		mg/L	7.8	20	22-AUG-16
WG2372426-2	LCS		0.00				7.0		
Total Kjeldahl	-			96.2		%		75-125	22-AUG-16
WG2372426-1	MB								



				Quanty		JINEPOIL			
			Workorder:	L1815159	)	Report Date: 23-SI	EP-16		Page 9 of 10
onorm.	2275 Upp	l Iron Mine's Corj er Middle Rd. E. ON L6H 0C3	poration (Oakville Suite #300	)					
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT		Water							
Batch F WG2372426-1 Total Kjeldahl				<0.15		mg/L		0.15	22-AUG-16
WG2372426-4 Total Kjeldahl	-		L1814889-1	81.7		%		70-130	22-AUG-16
TOC-WT		Water							
Batch F	3531214								
WG2372398-3 Total Organic			<b>L1815353-1</b> 1.5	1.5		mg/L	1.2	20	21-AUG-16
WG2372398-2 Total Organic				102.9		%		80-120	21-AUG-16
WG2372398-1 Total Organic				<1.0		mg/L		1	21-AUG-16
WG2372398-4 Total Organic			L1815353-1	100.2		%		70-130	21-AUG-16
TURBIDITY-BF		Water							
WG2370460-3	3528332 DUP		L1815159-1						
Turbidity			3.09	3.04		NTU	1.6	25	18-AUG-16
<b>WG2370460-1</b> Turbidity	МВ			<0.10		NTU		0.1	18-AUG-16

Workorder: L1815159

Report Date: 23-SEP-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

### Contact:

#### Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

#### Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
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 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.



### Ft. Collins, Colorado

LIMS Version: 6.827

Tuesday, September 20, 2016

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

Re: ALS Workorder: 1608448 Project Name: Project Number: L1815159

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 8/24/2016. 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 Amy R. Wolf Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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				
Alaska (AK)	CO01099				
Arizona (AZ)	AZ0742				
California (CA)	06251CA				
Colorado (CO)	CO01099				
Connecticut (CT)	PH-0232				
Florida (FL)	E87914				
Idaho (ID)	CO01099				
Kansas (KS)	E-10381				
Kentucky (KY)	90137				
L-A-B (DoD ELAP/ISO 170250)	L2257				
Louisiana (LA)	05057				
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				



# 1608448

### Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1608448 Client Name: ALS Environmental Client Project Name: Client Project Number: L1815159 Client PO Number: L1815159

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1815159-1	1608448-1		WATER	16-Aug-16	



1608448

### Subcontract Request Form

### **Subcontract To:**

## ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE FORT COLLINS,CO 80524

	I report and invoice: PO# <u>L181</u> be provided with your final results		
Please see enclosed <u>1</u> san	nple(s) in <u>1</u> Container(s)		
SAMPLE NUMBER ANALYT	ICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1815159-1 MS-08 Ra226 by	Alpha Scint, MDC=0.01 Bq/L (RA226-N	8/ 16/ 2016 IMER-FC 1) 9/9/2016	
Subcontract Info Contact: Analysis and reporting info contact:	Rick Hawthorne (519) 886-6910 Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1 WATERLOO,ON N2V 2B8 Phone: (519) 886-6910	Email: Wayne.Smith@alsgl	obal com
Please email confirmation of rece			obalicolii
Shipped By: Received By: Verified By:	Date Shipped: Date Received: Date Verified:	8/23/16 09	35
Sample Integrity Issues:	Temperature:		



### **ALS Environmental - Fort Collins** CONDITION OF SAMPLE UPON RECEIPT FORM

3//G 5 NO 5 NO 5 NO 7 NO 7 NO 7 NO 7 NO 7 NO
S     NO       S     NO       V     NO       V     NO       V     NO       V     NO       NO     NO
s NO NO NO NO NO
<ul> <li>NO</li> <li>NO</li> <li>NO</li> <li>NO</li> <li>NO</li> <li>NO</li> </ul>
<ul> <li>NO</li> <li>NO</li> <li>NO</li> <li>NO</li> <li>NO</li> </ul>
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D NO
S NO
S NO
NO NO

> \*IR Gun #2: Oakton, SN 29922500201-0066 \*IR Gun #4: Oakton, SN 2372220101-0002

1608448

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# SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	20-Sep-16
Project:	L1815159					Work Order:	1608448
Sample ID:	L1815159-1					Lab ID:	1608448-1
Legal Location:	:					Matrix:	WATER
<b>Collection Date</b>	: 8/16/2016				Perc	ent Moisture:	
Analyses		Result	01	Report	<b>T</b> T •/	Dilution	
		Kesuit	Qual	Limit	Units	Factor	Date Analyzed
	Radon Emanation - N		Qual	-		Factor	•
	Radon Emanation - N		<b>C</b> • •	-	Prep		•

## SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	20-Sep-16	
Project:	L1815159				•	Work Order:	1608448	
Sample ID:	L1815159-1					Lab ID:	1608448-1	
Legal Location:							WATER	
0					<b>D</b>			
Collection Date:	8/16/2016				Perce	ent Moisture:		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor		Date Analyzed
Explanation of (	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ess than the sample specific MD	C.	M3 -			not met, but the rep	orted	
Y1 - Chemical Yield i	s in control at 100-110%. Quan	titative yield is assumed.				reported MDC.		
Y2 - Chemical Yield				-	below lower o above upper			
-	nan Warning Limit of 1.42					within control limit	S.	
	s Received' while the Report Ba Dry Weight' while the Report Bas					de control limits		
	iffers by more than 15% of LCS			-	-	te results less than	5 times MDC	
D - DER is greater th	-				entration greate			
M - Requested MDC					entration grea	ter than MDC but I	ess than Reques	sted
LT - Result is less the	an requested MDC but greater the	han achieved MDC.	MDO	0.				
Inorganics:								
B - Result is less tha	n the requested reporting limit b	ut greater than the instrum	nent method d	detection limit	(MDL).			
U or ND - Indicates th	nat the compound was analyzed	· · · · · · · · ·						
		for but not detected.						
E - The reported valu	e is estimated because of the pr		n explanatory	/ note may be	included in the	e narrative.		
E - The reported valu M - Duplicate injecti	e is estimated because of the pr on precision was not met.	resence of interference. A		-				
E - The reported valu M - Duplicate injecti N - Spiked sample re	e is estimated because of the pro- on precision was not met. covery not within control limits.	resence of interference. A A post spike is analyzed f	or all ICP ana	lyses when th				
E - The reported valu M - Duplicate injecti N - Spiked sample re duplicate fail and the	e is estimated because of the pr on precision was not met.	resence of interference. A A post spike is analyzed f less than four times the sp	or all ICP ana bike added co	lyses when the the second s				
E - The reported valu M - Duplicate injecti N - Spiked sample re duplicate fail and the Z - Spiked recovery n * - Duplicate analysis	e is estimated because of the pro- on precision was not met. covery not within control limits. native sample concentration is l ot within control limits. An expla (relative percent difference) not	A post spike is analyzed f less than four times the sp natory note may be includ within control limits.	or all ICP ana bike added co ed in the narr	llyses when the ncentration. ative.	e matrix spike			
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Client:	ALS Environmental
Work Order:	1608448
Project:	L1815159

# **QC BATCH REPORT**

Batch ID: R	E160906-2-1 li	nstrument ID Alp	oha Scin		Method: R	adium-226	by Radon	Emanation				
LCS	Sample ID: RE160906-2				U	nits: <b>BQ/I</b>		Analysi	s Date: 9	/20/201	6 12:57	
Client ID:		Run II	D: RE160906-	2A			Pr	ep Date: 9/6/2	2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.76 (+/- 0.437)	0.00737	1.673		105	67-120					Р
Carr: BARI	UM	13700		15980		85.6	40-110					
LCSD	Sample ID: RE160906-2				U	nits: <b>BQ/I</b>		Analysi	s Date: 9	/20/201	6 12:57	
Client ID:		Run II	D: RE160906-	2A			Pr	ep Date: 9/6/2	2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.55 (+/- 0.384)	0.0077	1.673		92.7	67-120		1.76	0.4	2.1	Р
Carr: BARI	UM	15400		15970		96.7	40-110		13700			
МВ	Sample ID: RE160906-2				U	nits: <b>BQ/I</b>		Analysi	s Date: 9	/20/201	6 12:57	
Client ID:		Run II	D: RE160906-	2A			Pr	ep Date: 9/6/2	2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		ND	0.0058									U
Carr: BARI	UM	15000		15970		94.2	40-110					



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419 TOXICITY TEST REPORT Daphnia magna Page 1 of 2

Work Order :231754Sample Number :48686

### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	A.V.
Location :	Waterloo ON	Time Collected :	13:00
Job Number :	L1815159	Date Collected :	2016-08-16
Substance :	L1815159-1 MS-08	Date Received :	2016-08-20
Sampling Method :	Not provided	Date Tested :	2016-08-21
Sample Description :	Clear, light green, odourless	Temp. on arrival :	24.0° C
Test Method :	Reference Method for Determining Acute Lethality of	f Effluents to Daphnia	<i>a magna</i> . Environment

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).

	<b>48-h</b> TEST	<b>FRESULTS</b>		
Substance	F	Effect		
Control	Mean Im	•	0.0 %	
	Mean Me	•	0.0 %	
100%	Mean Im	•	0.0 %	
	Mean Mo	ortality	0.0 %	
	The results reported relate o	nly to the sample tested.		
SC	DDIUM CHLORIDE REF	ERENCE TOXICANT DATA		
Organism Batch :	Dm16-17C			
Date Tested (yyyy/mm/dd) :	2016-08-17	Historical Mean LC50 :	6.0 g/L	
LC50 (95% Confidence Limits) :	6.2 g/L (6.0 - 6.4)	Warning Limits $(\pm 2SD)$ :	5.5 - 6.6 g/L	
Statistical Method :	Spearman-Kärber	Analyst(s) :	CZN, SEC	
	Daphnia magna CULT	TURE HEALTH DATA		
Time to First Brood : Culture Mortality :	9 days 0.7% (previous 7 days)	Mean Young Per Brood :	35.4	
	TEST CO	NDITIONS		
Sample Treatment :	None	Number of Replicates :	3	
pH Adjustment :	None	Test Organisms / Replicate :	10	
Test Aeration :	None	Total Organisms / Test Level :	30	
Organism Batch :	Dm16-17C	Organism Loading Rate :	15.0 mL/organism	
-		Test Method Deviation(s) :	None	

Date: 2016-08-31

Approved by: Manager The project Manager



# TOXICITY TEST REPORT

Daphnia magna

Page 2 of 2

Work Order:	231754
Sample Number:	48686

	Hardness (mg/L as CaCO <sub>3</sub> )	Hardness Adjustment	рН	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	$O_2$ Sat. (%) <sup>*</sup>	Total Pre-Aeration Time (h) @ 30 mL/mi
Initial Water Chemistry:	820	None	7.4	8.5	1246	21.0	100	0:00
			0 hours					
Date & Time Technician:	2016-08-21 CZN	10:00						
Test Conc. (%)	Mortality	Immobility	рН	<b>D.O</b> .	Cond.	Temp.	$O_2$ Sat. (%) <sup>*</sup>	Hardness
100A	0	0	7.4	8.5	1246	21.0	100	820
100B	0	0	7.4	8.5	1246	21.0	100	820
100C	0	0	7.4	8.5	1246	21.0	100	820
Control A	0	0	8.6	8.4	789	21.0	100	230
Control B	0	0	8.6	8.4	789	21.0	100	230
Control C	0	0	8.6	8.4	789	21.0	100	230
Notes:								
			24 hours					
Date & Time Technician:	2016-08-22 FS	10:00						
Test Conc. (%)	Mortality	Immobility	рН	<b>D.O</b> .	Cond.	Temp.		
100A	-	0	_	-	-	21.0		
100B	-	0	-			21.0		
100C	-	0		and the second sec		21.0		
Control A	-	0	-	-	-	21.0		
Control B	-	0	_			21.0		
Control C	-	0		-	-	21.0		
Notes:								
			48 hours					
Date & Time Technician:	2016-08-23 SEC	10:00						
Test Conc. (%)	Mortality	Immobility	рН	D.O.	Cond.	Temp.		
100A	0	0	7.6	8.6	1270	21.0		
100B	0	0	7.6	8.6	1273	21.0		
100C	0	0	7.6	8.6	1272	21.0		
Control A	0	0	8.6	8.3	804	21.0		
Control B	0	0	8.6	8.2	806	21.0		
Control C	0	0	8.6	8.2	806	21.0		
Notes:								

# of control organisms showing stress: 0 Daphnia Batch #: Dm16-17C

Number immobile does not include number of mortalities.

- = not measured

<sup>\*</sup> adjusted for actual temp. & barometric pressure



AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Rd. Guelph ON N1H 6H9 Tel: (519) 763-4412 Fax: (519) 763-4419

Work Order :231754Sample Number :48686

#### SAMPLE IDENTIFICATION

Company :	ALS Laboratory Group, Waterloo	Sampled By :	A.V.
Location :	Waterloo ON	Time Collected :	13:00
Job Number :	L1815159	Date Collected :	2016-08-16
Substance :	L1815159-1 MS-08	Date Received :	2016-08-20
Sampling Method :	Not provided	Date Tested :	2016-08-21
Sample Description :	Clear, light green, odourless	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 R	ESULTS	
Substance	Effect		Value
Control	Mean Immo	bility	0.0 %
	Mean Morta	lity	0.0 %
100%	Mean Immo	bility	0.0 %
	Mean Morta	lity	10.0 %
	The results reported relate o	nly to the sample tested.	
	TASSIUM CHLORIDE REFE	RENCE TOXICANT DATA	
Organism Batch :	T16-14		
Date Tested (yyyy-mm-dd) :	2016-08-17	Historical Mean LC50 :	3673 mg/L
LC50 (95% Confidence Limits) :	3566 mg/L (3192 - 3968)	Warning Limits (± 2SD) :	2965 - 4549 mg/L
Statistical Method :	Linear Regression (MLE)	Analyst(s) :	NL, AW
	TEST F	ISH	
Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	$0.34 \pm 0.08 \text{ g}$	Mean Fish Fork Length ( $\pm 2$ SD) :	
Range of Weights :	0.30 - 0.41 g	Range of Fork Lengths (mm) :	31 - 36 mm
Fish Loading Rate :	0.2 g/L		
	TEST COND	ITIONS	
Test Organism :	Oncorhynchus mykiss	Volume Tested (L) :	20
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 :	$6.5 \pm 1 \text{ mL/min/L}$	Test Method Deviation(s) :	None

Date: <u>2016-08-31</u> yyyy-mm-dd

Approved by: Manager

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### TOXICITY TEST REPORT

## **Rainbow Trout**

Work Order: Sample Number:	231754 48686						Page
Total Pre-Aeration			рН	<b>D.O.</b> (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	$O_2$ Sat. (%)*
Time (h)							
0:30		/ater Chemistry: ry after 30min air:	7.3 7.4	8.7 8.7	1274 1260	15.0 15.0	_ 95
		0 hou	irs				
Date & Time Technician:	2016-08-21 AW	10:30					
Test Conc. (%)	Mortality	Immobility	рН	D.O.	Cond.	Temp.	$O_2$ Sat. (%) <sup>*</sup>
100	0	0	<b>7</b> .4	8.7	1260	15.0	95
Control	0	0	8.2	9.5	883	15.0	100
Notes:							
		24 ho	urs				
Date & Time Technician:	2016-08-22 MA	10:30					
Test Conc. (%)	Mortality	Immobility	рН	D.O.	Cond.	Temp.	
100 Control	0 0	0 0		_		15.0 15.0	
Notes:							
		48 ho	urs				
Date & Time Technician:	2016-08-23 NL	10:30					
Test Conc. (%)	Mortality	Immobility	рН	D.O.	Cond.	Temp.	
100 Control	0 0	0 0				14.0 14.0	
	0	0	_		_	14.0	
Notes:							
Data & Tima	2016 09 24	72 ho	urs				
Date & Time Technician:	2016-08-24 NL	10:30					
Test Conc. (%)	Mortality	Immobility	pН	D.O.	Cond.	Temp.	
100	0	0		-	-	15.0	
Control	0	0	-	_	-	15.0	
Notes:							
Deta & Thur	2016 00 25	<b>96 ho</b>	urs				
Date & Time Technician:	2016-08-25 NL	10:30					
Test Conc. (%)	Mortality	Immobility	pН	<b>D.O</b> .	Cond.	Temp.	
100	1	0	7.1	9.3	1269	14.5	
Control	0	0	8.1	9.5	808	14.5	

Trout Batch #: T16-14

"\_" = not measured

Number immobile does not include number of mortalities.

\* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: <u>ET5</u> Date: <u>2016-08-30</u>

BAFFINLAND	Shipping Address: AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Road, RR #3 Guelph, Ontario Canada N1H 6H9	Voice: (519) 763-4412 Fax: (519) 763-4419	Client ALS ENVICONNENTAL	Waterloo Q#162765399-15	Phone: 510 - 201, 201, 0	210-	contact Wayne Smith / Austin Paterson	Analvese Portioned	omposite Concentration Concentration nbow Trout LC50 nobw Trout LC50 Concentration for a magna Single Concentration for a crowth for a	ечто ded ded Xinus ieo base ded Arrite base ded Xinus ieo base ded Xinus ieo base ded Xinus ieo base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Xinus ieo co base ded Co co co co co co co co co co co co co co			RISS Reporting Reported W) Deale Fill in Sample Date & Sample None	
REUULAD	TOXICITY									Value arrivation Sample Number arrivat VKBK6 24.0		Please list any special requests or instructions;	S Log-in ) De notude subles	
	AIN UP CUSIODY RECORD	ARI-CO.1 ALI	AV	ALS EN	-	12H 18 20-2 16		Sample Identification	L1815189-1	NS - OB			6-cg-20 16:00	
	AQUATOX		Name		Sample Storage (prior to shipping):	Custody Relinquished by: Date/Time Shipped:			Time Collected (e.g. 41:30,	++		Use Only AA		
	Y		Field S	Signature: Affiliation:	Sample	Custody Date/Tin			Date Collected	16 08		For Lab Use	neceived by Date Time Storage Location Storage Temp (C)	

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## **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#L1815159ALS requires QC data to be provided with your final results.

Please see enclosed 1 sample(s) in  $\Omega$  Container(s)

SAMPLE NUMBER AN	ALYTICAL REQU	JIRED	DATE	SAMPLED DUE DATE	Priority Flag
L1815159-1 MS-08			8/16/	2016	1 M. M. B. M. B.
Spo	ecial Request Aqu	atox (SPECIAL REQUES	ST2-AQT 14)	9/6/2016	
Subcontract Info Contact:	Rick Ha	wthorne (519) 886-6	910		
Analysis and reporting info cont	60 NOR	Smith, C.Chem., C.E. THLAND ROAD, UNIT _00,0N N2V 2B8			
	Phone:	(519) 886-6910	Email: Wa	yne.Smith@alsgl	obal.com
Please email confirmation of	receipt to:	Wayne.Smit	h@alsglobal.c	om	
Shipped By:		Date Shipped	l:		
Received By:		Date Receive	d:		
Verified By:		Date Verified	:		
		Temperature	:		
Sample Integrity Issues:					

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.



Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 09-AUG-16 Report Date: 07-SEP-16 06:44 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1810826 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
.1810826-1 MS-08 Sampled By: BG/BP on 09-AUG-16 @ 09:00 Matrix: WATER							
Physical Tests							
pH	6.92		0.10	pH units		12-AUG-16	R352423
Total Suspended Solids	<2.0		2.0	mg/L	13-AUG-16	14-AUG-16	R35254
Total Metals							
Aluminum (Al)-Total	0.035		0.010	mg/L	11-AUG-16	11-AUG-16	R352424
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Arsenic (As)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Barium (Ba)-Total	0.0218		0.00020	mg/L	11-AUG-16	11-AUG-16	R35242
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R35242
Boron (B)-Total	0.023		0.010	mg/L	11-AUG-16	11-AUG-16	R35242
Cadmium (Cd)-Total	0.000187		0.000010	mg/L	11-AUG-16	11-AUG-16	R35242
Calcium (Ca)-Total	49.6		0.50	mg/L	11-AUG-16	11-AUG-16	R35242
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	11-AUG-16	11-AUG-16	R35242
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	11-AUG-16	11-AUG-16	R35242
Cobalt (Co)-Total	0.0643		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Copper (Cu)-Total	0.0047		0.0010	mg/L	11-AUG-16	11-AUG-16	R35242
Iron (Fe)-Total	1.41		0.050	mg/L	11-AUG-16	11-AUG-16	R35242
Lead (Pb)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Lithium (Li)-Total	0.0071		0.0010	mg/L	11-AUG-16	11-AUG-16	R35242
Magnesium (Mg)-Total	130	DLHC	0.50	mg/L	11-AUG-16	12-AUG-16	R35242
Manganese (Mn)-Total	5.69	DLHC	0.0050	mg/L	11-AUG-16	12-AUG-16	R35242
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R35242
Nickel (Ni)-Total	0.0711		0.00050	mg/L	11-AUG-16	11-AUG-16	R35242
Phosphorus (P)-Total	<0.050		0.050	mg/L	11-AUG-16	11-AUG-16	R35242
Potassium (K)-Total	1.84		0.050	mg/L	11-AUG-16	11-AUG-16	R35242
Rubidium (Rb)-Total	0.00366		0.00020	mg/L	11-AUG-16	11-AUG-16	R35242
Selenium (Se)-Total	0.00199		0.000050	mg/L	11-AUG-16	11-AUG-16	R35242
Silicon (Si)-Total	0.779		0.050	mg/L	11-AUG-16	11-AUG-16	R35242
Silver (Ag)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R35242
Sodium (Na)-Total	2.41		0.50	mg/L	11-AUG-16	11-AUG-16	R35242
Strontium (Sr)-Total	0.0284		0.0010	mg/L	11-AUG-16	11-AUG-16	R35242
Sulfur (S)-Total	223		0.50	mg/L	11-AUG-16	11-AUG-16	R35242
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-AUG-16	11-AUG-16	R35242
Thallium (TI)-Total	0.000032		0.000010	mg/L	11-AUG-16	11-AUG-16	R35242
Thorium (Th)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Tin (Sn)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	11-AUG-16	11-AUG-16	R35242
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R35242
Uranium (U)-Total	0.000058		0.000010	mg/L	11-AUG-16	11-AUG-16	R35242
Vanadium (V)-Total	<0.00050		0.00050	mg/L	11-AUG-16	11-AUG-16	R35242
Zinc (Zn)-Total	0.0079		0.0030	mg/L	11-AUG-16	11-AUG-16	R35242

\* 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
L1810826-1 MS-08 Sampled By: BG/BP on 09-AUG-16 @ 09:00 Matrix: WATER							
Total Metals							
Zirconium (Zr)-Total	<0.00030		0.00030	mg/L	11-AUG-16	11-AUG-16	R352424
Radiological Parameters			0.00000				
Ra-226	0.028		0.0066	Bq/L	25-AUG-16	02-SEP-16	R354183

 $^{\ast}$  Refer to Referenced Information for Qualifiers (if any) and Methodology.

## **Reference Information**

### **QC Samples with Qualifiers & Comments:**

QC Type Descr	iption	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Barium (Ba)-Total	MS-B	L1810826-1
Matrix Spike		Calcium (Ca)-Total	MS-B	L1810826-1
Matrix Spike		Cobalt (Co)-Total	MS-B	L1810826-1
Matrix Spike		Iron (Fe)-Total	MS-B	L1810826-1
Matrix Spike		Magnesium (Mg)-Total	MS-B	L1810826-1
Matrix Spike		Manganese (Mn)-Total	MS-B	L1810826-1
Matrix Spike		Nickel (Ni)-Total	MS-B	L1810826-1
Matrix Spike		Silicon (Si)-Total	MS-B	L1810826-1
Matrix Spike		Strontium (Sr)-Total	MS-B	L1810826-1
Matrix Spike		Sulfur (S)-Total	MS-B	L1810826-1
Sample Param	neter Qualifier key li	isted:		
Qualifier	Description			
DLHC	Detection Limit Raise	ed: Dilution required due to high concent	tration of test and	alyte(s).
MS-B	Matrix Spike recover	y could not be accurately calculated due	e to high analyte	background in sample.
Test Method R	eferences:			
Test Method R ALS Test Code	Matrix	Test Description	Method Refere	
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu	Matrix VT Water s are digested with nitri tion (re: Sulfur): Sulfide ucted in accordance wit	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be	EPA 200.2/60 by CRC ICPMS. recovered by this	20A (mod) s method.
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu Protection Act	Matrix VT Water s are digested with nitri tion (re: Sulfur): Sulfide ucted in accordance wit (July 1, 2011).	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be th the Protocol for Analytical Methods U	EPA 200.2/60 by CRC ICPMS. recovered by this	20A (mod) s method. sment of Properties under Part XV.1 of the Environment.
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu Protection Act PH-WT	Matrix VT Water s are digested with nitri tion (re: Sulfur): Sulfide ucted in accordance wit (July 1, 2011). Water	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be th the Protocol for Analytical Methods U pH	EPA 200.2/60 by CRC ICPMS. recovered by this sed in the Asses	20A (mod) s method. sment of Properties under Part XV.1 of the Environment
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu Protection Act PH-WT Water samples	Matrix VT Water s are digested with nitri tion (re: Sulfur): Sulfide ucted in accordance wit (July 1, 2011). Water s are analyzed directly ucted in accordance wit	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be th the Protocol for Analytical Methods U pH by a calibrated pH meter.	EPA 200.2/60 by CRC ICPMS. recovered by this sed in the Asses APHA 4500 H	20A (mod) s method. sment of Properties under Part XV.1 of the Environment -Electrode
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu Protection Act PH-WT Water samples Analysis condu	Matrix VT Water s are digested with nitri tion (re: Sulfur): Sulfide ucted in accordance wit (July 1, 2011). Water s are analyzed directly ucted in accordance wit (July 1, 2011).	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be th the Protocol for Analytical Methods U pH by a calibrated pH meter.	EPA 200.2/60 by CRC ICPMS. recovered by this sed in the Asses APHA 4500 H	20A (mod) s method. sment of Properties under Part XV.1 of the Environment -Electrode
ALS Test Code MET-T-CCMS-V Water samples Method Limitat Analysis condu Protection Act PH-WT Water samples Analysis condu Protection Act RA226-MMER-F SOLIDS-TSS-W A well-mixed s	Matrix       VT     Water       s are digested with nitri       tion (re: Sulfur): Sulfide       ucted in accordance wit       (July 1, 2011).       Water       s are analyzed directly       ucted in accordance wit       (July 1, 2011).       E       Water       VIT	Total Metals by CRC ICPMS c and hydrochloric acids, and analyzed and volatile sulfur species may not be the the Protocol for Analytical Methods U pH by a calibrated pH meter. the Protocol for Analytical Methods U Ra226 by Alpha Scint, MDC=0.01 Bq/L Suspended solids h a weighed standard glass fibre filter a	EPA 200.2/60 by CRC ICPMS. recovered by this sed in the Asses APHA 4500 H sed in the Asses EPA 903.1 APHA 2540 D	20A (mod) s method. sment of Properties under Part XV.1 of the Environment -Electrode sment of Properties under Part XV.1 of the Environment

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

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.



Workorder: L1810826

Report Date: 07-SEP-16

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3524241 WG2366080-4 DUP		WG2366080-3	0.000					
Aluminum (Al)-Total		0.035	0.033		mg/L	5.8	20	11-AUG-16
Antimony (Sb)-Total Arsenic (As)-Total		<0.00010 <0.00010	<0.00010 <0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Barium (Ba)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Beryllium (Be)-Total					mg/L	1.5	20	11-AUG-16
		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-AUG-16
Boron (B)-Total		0.023	0.022		mg/L	2.8	20	11-AUG-16
Cadmium (Cd)-Total		0.000187	0.000195		mg/L	3.8	20	11-AUG-16
Calcium (Ca)-Total		49.6	51.1		mg/L	3.0	20	11-AUG-16
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-16
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-AUG-16
Cobalt (Co)-Total		0.0643	0.0656		mg/L	2.1	20	11-AUG-16
Copper (Cu)-Total		0.0047	0.0048		mg/L	2.7	20	11-AUG-16
Iron (Fe)-Total		1.41	1.44		mg/L	2.6	20	11-AUG-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Lithium (Li)-Total		0.0071	0.0068		mg/L	4.6	20	11-AUG-16
Magnesium (Mg)-Total		125	126		mg/L	1.4	20	11-AUG-16
Manganese (Mn)-Total		5.66	5.83		mg/L	2.9	20	11-AUG-16
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-AUG-16
Nickel (Ni)-Total		0.0711	0.0736		mg/L	3.4	20	11-AUG-16
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-AUG-16
Potassium (K)-Total		1.84	1.84		mg/L	0.3	20	11-AUG-16
Rubidium (Rb)-Total		0.00366	0.00361		mg/L	1.3	20	11-AUG-16
Selenium (Se)-Total		0.00199	0.00202		mg/L	1.2	20	11-AUG-16
Silicon (Si)-Total		0.779	0.791		mg/L	1.5	20	11-AUG-16
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-AUG-16
Sodium (Na)-Total		2.41	2.44		mg/L	1.1	20	11-AUG-16
Strontium (Sr)-Total		0.0284	0.0285		mg/L	0.4	20	11-AUG-16
Sulfur (S)-Total		223	228		mg/L	2.1	25	11-AUG-16
Thallium (TI)-Total		0.000032	0.000031		mg/L	2.2	20	11-AUG-16
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	11-AUG-16
Thorium (Th)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	25	11-AUG-16
Tin (Sn)-Total		<0.00010	<0.00010		mg/L			11-AUG-16



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 oration (Oakville)

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3524241								
WG2366080-4 DUP		WG2366080-3						
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Titanium (Ti)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	11-AUG-16
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Uranium (U)-Total		0.000058	0.000060		mg/L	2.0	20	11-AUG-16
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-AUG-16
Zinc (Zn)-Total		0.0079	0.0079		mg/L	0.7	20	11-AUG-16
Zirconium (Zr)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	11-AUG-16
WG2366080-2 LCS Aluminum (Al)-Total			105.0		%		00.400	
Antimony (Sb)-Total			103.0		%		80-120	12-AUG-16
• • •			103.2		%		80-120	12-AUG-16
Arsenic (As)-Total Barium (Ba)-Total			101.9		%		80-120	12-AUG-16
Beryllium (Be)-Total			107.9		%		80-120	12-AUG-16
Bismuth (Bi)-Total			97.5		%		80-120	12-AUG-16
Boron (B)-Total					%		80-120	12-AUG-16
( )			97.6				80-120	12-AUG-16
Cadmium (Cd)-Total			100.2 103.7		%		80-120	12-AUG-16
Calcium (Ca)-Total			103.7		%		80-120	12-AUG-16
Chromium (Cr)-Total					%		80-120	12-AUG-16
Cesium (Cs)-Total			104.5		%		80-120	12-AUG-16
Cobalt (Co)-Total			102.9		%		80-120	12-AUG-16
Copper (Cu)-Total			100.5		%		80-120	12-AUG-16
Iron (Fe)-Total			103.5		%		80-120	12-AUG-16
Lead (Pb)-Total			101.2		%		80-120	12-AUG-16
Lithium (Li)-Total			102.9		%		80-120	12-AUG-16
Magnesium (Mg)-Total			104.1		%		80-120	12-AUG-16
Manganese (Mn)-Total			105.1		%		80-120	12-AUG-16
Molybdenum (Mo)-Total			103.3		%		80-120	12-AUG-16
Nickel (Ni)-Total			100.5		%		80-120	12-AUG-16
Phosphorus (P)-Total			105.7		%		80-120	12-AUG-16
Potassium (K)-Total			105.1		%		80-120	12-AUG-16
Rubidium (Rb)-Total			102.5		%		80-120	12-AUG-16
Selenium (Se)-Total			99.2		%		80-120	12-AUG-16
Silicon (Si)-Total			115.8		%		80-120	12-AUG-16



Workorder: L1810826

Report Date: 07-SEP-16

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

Contact: Jim Millard

MET-T-CCMS-WT         Water           Batch         R3524241           WG2366080-2         LCS           Silver (Ag)-Total         106.6         %         80-120         12-AUG-16           Soldurn (Na)-Total         104.9         %         80-120         12-AUG-16           Strontium (Sr)-Total         102.8         %         80-120         12-AUG-16           Strontium (Sr)-Total         104.8         %         70-130         12-AUG-16           Tailuru (T)-Total         100.3         %         80-120         12-AUG-16           Trailuru (T)-Total         100.2         %         80-120         12-AUG-16           Thorium (T)-Total         102.4         %         80-120         12-AUG-16           Tin (Sr)-Total         102.4         %         80-120         12-AUG-16           Tungsten (W)-Total         102.6         %         80-120         12-AUG-16           Vanadium (V)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         94.7         %         80-120         12-AUG-16           Vanadium (V)-Total         94.7         %         80-120         12-AUG-16           Vanadium (C)-Total         90.000	Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
Batch         R3524241           WC2366080-2         LCS           Silver (A)-Total         106.6         %         80-120         12-AUG-16           Sodium (Na)-Total         102.8         %         80-120         12-AUG-16           Suronium (S)-Total         102.8         %         80-120         12-AUG-16           Surfur (S)-Total         102.8         %         80-120         12-AUG-16           Thailum (Th)-Total         00.3         %         80-120         12-AUG-16           Tonium (Th)-Total         00.3         %         80-120         12-AUG-16           Tins (S)-Total         102.2         %         80-120         12-AUG-16           Tins (S)-Total         102.4         %         80-120         12-AUG-16           Tins (S)-Total         100.1         %         80-120         12-AUG-16           Vanadium (V)-Total         100.4         %         80-120         12-AUG-16           Vanadium (V)-Total         100.4         %         80-120         12-AUG-16           Zinc (Z)-Total         94.7         %         80-120         12-AUG-16           Auminu (V)-Total         0.0010         mgL         0.0101         11-AUG-16 <tr< th=""><th>MET-T-CCMS-WT</th><th>Water</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr<>	MET-T-CCMS-WT	Water							
Silver (Ag)-Total         106.6         %         80-120         12-AUG-16           Sodium (Na)-Total         104.9         %         80-120         12-AUG-16           Strontium (S)-Total         102.8         %         80-120         12-AUG-16           Sufur (S)-Total         104.8         %         80-120         12-AUG-16           Thallium (T)-Total         100.3         %         80-120         12-AUG-16           Thotium (Te)-Total         102.2         %         80-120         12-AUG-16           Thorium (Te)-Total         102.4         %         80-120         12-AUG-16           Tins (S)-Total         102.4         %         80-120         12-AUG-16           Turagsten (W)-Total         102.4         %         80-120         12-AUG-16           Uranium (U)-Total         102.4         %         80-120         12-AUG-16           Uranium (U)-Total         105.4         %         80-120         12-AUG-16           Zhoro (Z)-Total         94.7         %         80-120         12-AUG-16           Anadium (V)-Total         0.010         mgL         0.011         11-AUG-16           Antonoru (S)-Total         -0.0010         mgL         0.001         11-AUG-	Batch R352424	1							
Sodium (Na)-Total         104.9         %         80-120         12.AUG-16           Strontium (Sr)-Total         102.8         %         80-120         12.AUG-16           Sudiur (Sr)-Total         102.8         %         80-120         12.AUG-16           Thallium (Ti)-Total         100.3         %         80-120         12.AUG-16           Thallur (Ti)-Total         102.2         %         80-120         12.AUG-16           Thorum (Th)-Total         102.2         %         80-120         12.AUG-16           Thorum (Th)-Total         102.4         %         80-120         12.AUG-16           Tin (Sn)-Total         102.4         %         80-120         12.AUG-16           Tin (Sn)-Total         102.6         %         80-120         12.AUG-16           Uranium (U)-Total         104.3         %         80-120         12.AUG-16           Vanadium (V)-Total         104.3         %         80-120         12.AUG-16           Zirconium (Z)-Total         94.7         %         80-120         12.AUG-16           Zirconium (X)-Total         -0.0010         mgL         0.01         11.AUG-16           Aluminum (M)-Total         -0.00010         mgL         0.001									
Strontium (St)-Total         102.8         %         80-120         12.AUG-16           Suffur (S)-Total         104.8         %         70-130         12.AUG-16           Thallium (T))-Total         100.3         %         80-120         12.AUG-16           Thallium (T))-Total         102.2         %         80-120         12.AUG-16           Thornium (T))-Total         102.4         %         80-120         12.AUG-16           Tin (Sn)-Total         102.4         %         80-120         12.AUG-16           Tin (Sn)-Total         102.4         %         80-120         12.AUG-16           Tin (Sn)-Total         102.4         %         80-120         12.AUG-16           Turagsten (W)-Total         106.4         %         80-120         12.AUG-16           Uranium (U)-Total         106.4         %         80-120         12.AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12.AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12.AUG-16           Autimum (V)-Total         -0.010         mg/L         0.01         11.AUG-16           Autimum (Q)-Total         -0.0010         mg/L         0.001         11.AUG-16<								80-120	
Sulfur (S)-Total         104.8         %         70-130         12-AUG-16           Thallium (T)-Total         100.3         %         80-120         12-AUG-16           Tellurium (Te)-Total         102.2         %         80-120         12-AUG-16           Thorium (Th)-Total         95.5         %         80-120         12-AUG-16           Tin (Sn)-Total         102.4         %         80-120         12-AUG-16           Tungsten (W)-Total         100.1         %         80-120         12-AUG-16           Uranium (U)-Total         102.6         %         80-120         12-AUG-16           Uranium (U)-Total         104.3         %         80-120         12-AUG-16           Zinc (Zn)-Total         95.1         %         80-120         12-AUG-16           Zinc (Zn)-Total         95.1         %         80-120         12-AUG-16           Zinc (Zn)-Total         90.010         mg/L         0.011         11-AUG-16           Artiminum (A)-Total         0.00010         mg/L         0.001         11-AUG-16           Artiminum (A)-Total         0.00001         mg/L         0.0001         11-AUG-16           Barium (Ba)-Total         0.00001         mg/L         0.0001         <								80-120	
Thallium (TI)-Total         100.3         %         80-120         12-AUG-16           Tellurium (Te)-Total         102.2         %         80-120         12-AUG-16           Thorium (Th)-Total         95.5         %         70-130         12-AUG-16           Tin (Sn)-Total         102.4         %         80-120         12-AUG-16           Tintanium (Ti)-Total         102.4         %         80-120         12-AUG-16           Tungsten (W)-Total         102.6         %         80-120         12-AUG-16           Vanadium (V)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zinc (Zn)-Total         0.010         mg/L         0.01         11-AUG-16           Antimony (Sb)-Total         <0.0010								80-120	
Teilurium (Te)-Total         102.2         %         80-120         12-AUG-16           Thorium (Th)-Total         95.5         %         70-130         12-AUG-16           Tin (Sh)-Total         102.4         %         80-120         12-AUG-16           Titanium (Th)-Total         100.1         %         80-120         12-AUG-16           Tungsten (W)-Total         102.6         %         80-120         12-AUG-16           Uranium (U)-Total         104.3         %         80-120         12-AUG-16           Zinc (Zn)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zinc (Zn)-Total         0.010         mg/L         0.01         11-AUG-16           Autimium (A)-Total         <0.0001								70-130	12-AUG-16
Thorium (Th)-Total         95.5         %         70.130         12.AUG-16           Tin (Sn)-Total         102.4         %         80.120         12.AUG-16           Titanium (Ti)-Total         100.1         %         80-120         12.AUG-16           Tungsten (W)-Total         102.6         %         80-120         12.AUG-16           Uranium (U)-Total         104.3         %         80-120         12.AUG-16           Uranium (U)-Total         105.4         %         80-120         12.AUG-16           Zinc (Zn)-Total         95.1         %         80-120         12.AUG-16           Zirc conium (Zr)-Total         95.1         %         80-120         12.AUG-16           Murinum (Al)-Total         0.010         mg/L         0.001         11.AUG-16           Antimony (Sb)-Total         <0.0010								80-120	12-AUG-16
Tin (Sn)-Total         102.4         %         80-120         12-AUG-16           Titanium (Ti)-Total         100.1         %         80-120         12-AUG-16           Tungsten (W)-Total         102.6         %         80-120         12-AUG-16           Uranium (U)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zinc (Zn)-Total         95.1         %         80-120         12-AUG-16           Zinconium (Zr)-Total         95.1         %         80-120         12-AUG-16           Zinconium (A)-Total         90.010         mg/L         0.01         11-AUG-16           Antimony (Sb)-Total         <0.0010	Tellurium (Te)-Total							80-120	12-AUG-16
Titanium (Ti)-Total         100.1         %         80.120         12-AUG-16           Tungsten (W)-Total         102.6         %         80.120         12-AUG-16           Uranium (U)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zirconium (Zr)-Total         94.7         %         80-120         12-AUG-16           Zirconium (Zr)-Total         95.1         %         80-120         12-AUG-16           WG236600-1         MB          0.010         mg/L         0.01         11-AUG-16           Antimony (Sb)-Total         <0.00010	Thorium (Th)-Total			95.5				70-130	12-AUG-16
Tungsten (W)-Total         102.6         %         80-120         12-AUG-16           Uranium (U)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zirconium (Zr)-Total         95.1         %         80-120         12-AUG-16           WG2366080-1         MB          0.01         11-AUG-16           Ahuminum (AI)-Total         <0.010	Tin (Sn)-Total			102.4		%		80-120	12-AUG-16
Uranum (U)-Total         104.3         %         80-120         12-AUG-16           Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zirconium (Zr)-Total         95.1         %         80-120         12-AUG-16           WG2366080-1         MB          0.01         11-AUG-16           Aluminum (Al)-Total         <0.0010	Titanium (Ti)-Total			100.1		%		80-120	12-AUG-16
Vanadium (V)-Total         105.4         %         80-120         12-AUG-16           Zinc (Zn)-Total         94.7         %         80-120         12-AUG-16           Zirconium (Zr)-Total         95.1         %         80-120         12-AUG-16           WG2366080-1         MB         80-120         12-AUG-16           Muminum (Al)-Total         <0.010	Tungsten (W)-Total			102.6		%		80-120	12-AUG-16
Zinc (Zn)-Total         94.7         %         80.120         12-AUG-16           Zirconium (Zr)-Total         95.1         %         80.120         12-AUG-16           WG2366080-1 <mb< th="">         MB        </mb<>	Uranium (U)-Total			104.3		%		80-120	12-AUG-16
Zirconium (Zf)-Total         95.1         %         80.120         12-AUG-16           WG2366080-1         MB	Vanadium (V)-Total			105.4		%		80-120	12-AUG-16
WG2266080-1         MB           Aluminum (Al)-Total         <0.010	Zinc (Zn)-Total			94.7		%		80-120	12-AUG-16
Aluminum (Al)-Total         <0.010         mg/L         0.01         11-AUG-16           Antimony (Sb)-Total         <0.00010	Zirconium (Zr)-Total			95.1		%		80-120	12-AUG-16
Antimony (Sb)-Total       <0.00010									
Arsenic (As)-Total       <0.00010				<0.010		mg/L		0.01	11-AUG-16
Barium (Ba)-Total         <0.00020         mg/L         0.0002         11-AUG-16           Beryllium (Be)-Total         <0.00010						mg/L			11-AUG-16
Beryllium (Be)-Total         <0.00010         mg/L         0.0001         11-AUG-16           Bismuth (Bi)-Total         <0.00050				<0.00010		mg/L		0.0001	11-AUG-16
Bismuth (Bi)-Total       <0.00050				<0.00020		mg/L		0.0002	11-AUG-16
Boron (B)-Total         <0.010         mg/L         0.01         11-AUG-16           Cadmium (Cd)-Total         <0.00010	Beryllium (Be)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Cadmium (Cd)-Total       <0.000010	Bismuth (Bi)-Total			< 0.00005	0	mg/L		0.00005	11-AUG-16
Calcium (Ca)-Total       <0.50	Boron (B)-Total			<0.010		mg/L		0.01	11-AUG-16
Chromium (Cr)-Total         <0.00050         mg/L         0.0005         11-AUG-16           Cesium (Cs)-Total         <0.00010	Cadmium (Cd)-Total			<0.00001	0	mg/L		0.00001	11-AUG-16
Cesium (Cs)-Total       <0.000010	Calcium (Ca)-Total			<0.50		mg/L		0.5	11-AUG-16
Cobalt (Co)-Total         <0.00010         mg/L         0.0001         11-AUG-16           Copper (Cu)-Total         <0.0010	Chromium (Cr)-Total			<0.00050		mg/L		0.0005	11-AUG-16
Copper (Cu)-Total         <0.0010         mg/L         0.001         11-AUG-16           Iron (Fe)-Total         <0.050	Cesium (Cs)-Total			<0.00001	0	mg/L		0.00001	11-AUG-16
Iron (Fe)-Total         <0.050         mg/L         0.05         11-AUG-16           Lead (Pb)-Total         <0.00010	Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Lead (Pb)-Total         <0.00010         mg/L         0.0001         11-AUG-16           Lithium (Li)-Total         <0.0010	Copper (Cu)-Total			<0.0010		mg/L		0.001	11-AUG-16
Lithium (Li)-Total         <0.0010         mg/L         0.001         11-AUG-16           Magnesium (Mg)-Total         <0.050	Iron (Fe)-Total			<0.050		mg/L		0.05	11-AUG-16
Magnesium (Mg)-Total <0.050 mg/L 0.05 11-AUG-16	Lead (Pb)-Total			<0.00010		mg/L		0.0001	11-AUG-16
	Lithium (Li)-Total			<0.0010		mg/L		0.001	11-AUG-16
Manganese (Mp)-Total <0.00050 mg/l 0.0005 11.0.1/6	Magnesium (Mg)-Tota	d		<0.050		mg/L		0.05	11-AUG-16
	Manganese (Mn)-Tota	al		<0.00050		mg/L		0.0005	11-AUG-16
Molybdenum (Mo)-Total <0.000050 mg/L 0.00005 11-AUG-16	Molybdenum (Mo)-Tot	tal		<0.00005	0	mg/L		0.00005	11-AUG-16



Client:

Contact:

Test

# **Quality Control Report**

Workorder: L1810826 Report Date: 07-SEP-16 Page 4 of 7 Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Qualifier Units RPD Limit Analyzed MET-T-CCMS-WT Water

MET-T-CCMS-WT	Water					
Batch R3524241						
WG2366080-1 MB Nickel (Ni)-Total		<0.00050		mg/L	0.0005	11-AUG-16
Phosphorus (P)-Total		<0.050		mg/L	0.05	11-AUG-16
Potassium (K)-Total		<0.050		mg/L	0.05	11-AUG-16
Rubidium (Rb)-Total		<0.00020		mg/L	0.0002	11-AUG-16
Selenium (Se)-Total		<0.000050		mg/L	0.00005	11-AUG-16
Silicon (Si)-Total		<0.050		mg/L	0.05	11-AUG-16
Silver (Ag)-Total		<0.000050		mg/L	0.00005	11-AUG-16
Sodium (Na)-Total		<0.50		mg/L	0.5	11-AUG-16
Strontium (Sr)-Total		<0.0010		mg/L	0.001	11-AUG-16
Sulfur (S)-Total		<0.50		mg/L	0.5	11-AUG-16
Thallium (TI)-Total		<0.000010		mg/L	0.00001	11-AUG-16
Tellurium (Te)-Total		<0.00020		mg/L	0.0002	11-AUG-16
Thorium (Th)-Total		<0.00010		mg/L	0.0001	11-AUG-16
Tin (Sn)-Total		<0.00010		mg/L	0.0001	11-AUG-16
Titanium (Ti)-Total		<0.00030		mg/L	0.0003	11-AUG-16
Tungsten (W)-Total		<0.00010		mg/L	0.0001	11-AUG-16
Uranium (U)-Total		<0.000010		mg/L	0.00001	11-AUG-16
Vanadium (V)-Total		<0.00050		mg/L	0.0005	11-AUG-16
Zinc (Zn)-Total		<0.0030		mg/L	0.003	11-AUG-16
Zirconium (Zr)-Total		<0.00030		mg/L	0.0003	11-AUG-16
WG2366080-5 MS Aluminum (Al)-Total	WG2366080-3	86.7		%	70-130	11-AUG-16
Antimony (Sb)-Total		93.1		%		
Arsenic (As)-Total		94.6		%	70-130	11-AUG-16
Barium (Ba)-Total		94.0 N/A	MS-B	%	70-130	11-AUG-16
Beryllium (Be)-Total		83.3	1010-0	%	-	11-AUG-16
Bismuth (Bi)-Total		93.8		%	70-130	11-AUG-16
Boron (B)-Total		93.8 80.5		%	70-130	11-AUG-16
. ,		93.0			70-130	11-AUG-16
Cadmium (Cd)-Total				%	70-130	11-AUG-16
Calcium (Ca)-Total Chromium (Cr)-Total		N/A	MS-B	%	-	11-AUG-16
Cesium (Cs)-Total		92.2		%	70-130	11-AUG-16
. ,		96.5 N/A			70-130	11-AUG-16
Cobalt (Co)-Total		N/A	MS-B	%	-	11-AUG-16
Copper (Cu)-Total		90.2		%	70-130	11-AUG-16



Workorder: L1810826

Report Date: 07-SEP-16

Page 5 of 7

Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3524241								
WG2366080-5 MS		WG2366080-3	<b>N</b> 1/A		0/			
Iron (Fe)-Total			N/A	MS-B	%		-	11-AUG-16
Lead (Pb)-Total			92.3		%		70-130	11-AUG-16
Lithium (Li)-Total			76.7		%		70-130	11-AUG-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	11-AUG-16
Manganese (Mn)-Total			N/A	MS-B	%		-	11-AUG-16
Molybdenum (Mo)-Total			98.8		%		70-130	11-AUG-16
Nickel (Ni)-Total			N/A	MS-B	%		-	11-AUG-16
Phosphorus (P)-Total			99.3		%		70-130	11-AUG-16
Potassium (K)-Total			90.0		%		70-130	11-AUG-16
Rubidium (Rb)-Total			90.1		%		70-130	11-AUG-16
Selenium (Se)-Total			101.4		%		70-130	11-AUG-16
Silicon (Si)-Total			N/A	MS-B	%		-	11-AUG-16
Silver (Ag)-Total			90.5		%		70-130	11-AUG-16
Sodium (Na)-Total			89.0		%		70-130	11-AUG-16
Strontium (Sr)-Total			N/A	MS-B	%		-	11-AUG-16
Sulfur (S)-Total			N/A	MS-B	%		-	11-AUG-16
Thallium (TI)-Total			92.4		%		70-130	11-AUG-16
Tellurium (Te)-Total			92.1		%		70-130	11-AUG-16
Thorium (Th)-Total			93.9		%		70-130	11-AUG-16
Tin (Sn)-Total			93.2		%		70-130	11-AUG-16
Titanium (Ti)-Total			95.0		%		70-130	11-AUG-16
Tungsten (W)-Total			94.4		%		70-130	11-AUG-16
Uranium (U)-Total			97.2		%		70-130	11-AUG-16
Vanadium (V)-Total			95.4		%		70-130	11-AUG-16
Zinc (Zn)-Total			86.9		%		70-130	11-AUG-16
Zirconium (Zr)-Total			94.4		%		70-130	11-AUG-16
PH-WT	Water							
Batch R3524237								
<b>WG2365816-3 DUP</b> рН		<b>WG2365816-2</b> 8.11	8.10	J	pH units	0.01	0.2	12-AUG-16
<b>WG2365816-1 LCS</b> рН			7.01		pH units		6.9-7.1	12-AUG-16

SOLIDS-TSS-WT

Water



			Workorder:	L1810826	6	Report Date:	07-SEP-16		Page 6 of 7
Client:		Iron Mine's Cor er Middle Rd. E.	poration (Oakville Suite #300	)					
	Oakville (	DN L6H 0C3							
Contact:	Jim Millaro	Ł							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	•	Water							
Batch F	R3525414								
WG2367091-3	DUP		L1812554-2						
Total Suspend	ded Solids		148	152		mg/L	2.7	20	14-AUG-16
WG2367091-2	LCS								
Total Suspend	ded Solids			98.6		%		85-115	14-AUG-16
WG2367091-1 Total Suspend				<2.0		mg/L		2	14-AUG-16

Workorder: L1810826

Report Date: 07-SEP-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

## Contact:

#### 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 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.



Ft. Collins, Colorado

LIMS Version: 6.826

Tuesday, September 06, 2016

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

Re: ALS Workorder: 1608251 Project Name: Project Number: L1810826

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 8/12/2016. 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 Amy R. Wolf Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company



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					
Alaska (AK)	CO01099					
Arizona (AZ)	AZ0742					
California (CA)	06251CA					
Colorado (CO)	CO01099					
Connecticut (CT)	PH-0232					
Florida (FL)	E87914					
Idaho (ID)	CO01099					
Kansas (KS)	E-10381					
Kentucky (KY)	90137					
L-A-B (DoD ELAP/ISO 170250)	L2257					
Louisiana (LA)	05057					
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					



# 1608251

## Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1608251 Client Name: ALS Environmental Client Project Name: Client Project Number: L1810826 Client PO Number: L1810826

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1810826-1	1608251-1		WATER	09-Aug-16	



L1810826 WATERLOO

1608251

## Subcontract Request Form

## **Subcontract To:**

## ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE FORT COLLINS, CO 80524

NOTES: Please reference on final	I report and invoice: PO# <u>L1</u>	810826	
ALS requires QC data to	be provided with your final resu	ults.	
	·		
		IXILGC	
Please see enclosed <u>1</u> san	nple(s) in <u>1</u> Container(	s)	
SAMPLE NUMBER		DATE SAMPLED	Priority
ANALYT	ICAL REQUIRED	DUE DATE	Flag
L1810826-1 MS-08		8/9/2016	
Ra226 by	Alpha Scint, MDC=0.01 Bq/L (RA22	26-MMER-FC 1) 9/1/2016	
Subcontract Info Contact:	Rick Hawthorne (519) 886-69	910	
Analysis and reporting info contact:	Wayne Smith, C.Chem., C.E.T		
	60 NORTHLAND ROAD, UNIT	1	
	WATERLOO,ON N2V 2B8 Phone: (519) 886-6910	Email: Wayne.Smith@alsgl	obal com
Please email confirmation of rece		@aisglobal.com	obalicom
Shipped By:	Date Shipped	·	
Received By: MM	Kebecer Manage Received	1: <u>8112/16</u> 10	00
Verified By:	Date Verified:		
	Temperature:		
Sample Integrity Issues:			



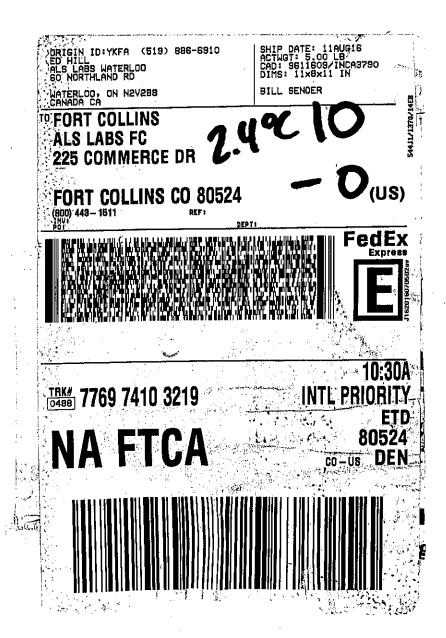
#### ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Water loo	Workorder No: 1608	:251		_
Project Manager: <b>ARW</b>	Initials:	Date:	8/12/	16
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?		NONÉ	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representa	tive documents?		(YES)	NO
5. Are the COC and bottle labels complete and legible?			<b>E</b> S	NO
6. Is the COC in agreement with samples received? (IDs, dates, tin containers, matrix, requested analyses, etc.)	mes, no. of samples, no. of		YES	NO
7. Were airbills / shipping documents present and/or removable?	*****************	DROP OFF	Œ	NO
8. Are all aqueous samples requiring preservation preserved correctly? (	(excluding volatiles)	N/A	ÝES	NO
9. Are all aqueous non-preserved samples pH 4-9?			YES	NO
10. Is there sufficient sample for the requested analyses?			ĒS	NO
11. Were all samples placed in the proper containers for the reques	sted analyses?		Ē	NO
12. Are all samples within holding times for the requested analyse	s?			NO
13. Were all sample containers received intact? (not broken or lea	king, etc.)		(YE)	NO
<sup>14.</sup> Are all samples requiring no headspace (VOC, GRO, RSK/ME headspace free? Size of bubble: < green pea	EE, Rx CN/S, radon) > green pea	N/A	YES	NO
15. Do any water samples contain sediment?	Amount		VEC	
Amount of sediment:dustingmoderate	heavy	IN/A	IES	NO
16. Were the samples shipped on ice?		Date:       8 (1)2/1/2         YES       YES         YONE       YES         YES       YES         N/A       YES         N/A       YES         N/A       YES         YES       YES         N/A       YES         YES       YES         N/A       YES         YES       YES         YES	NO	
<sup>17.</sup> Were cooler temperatures measured at 0.1-6.0°C?	gun used*: #2 🙀		<b>E</b>	NO
Cooler #: ,				
Temperature (°C): 2.4%			,	
No. of custody seals on cooler:				
DOT Survey/ Acceptance External μR/hr reading:				
			<u></u>	
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance cr	iteria? YES NO / NA (If no, see	e Form 008.)		
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONS			ND #16.	
	-			

\*IR Gun #2: Oakton, SN 29922500201-0066 \*IR Gun #4: Oakton, SN 2372220101-0002

1608251

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## SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	06-Sep-16	
Project:	L1810826					Work Order:	1608251	
Sample ID:	L1810826-1		Lab ID: 1608251-1					
Legal Location:						Matrix:	WATER	
<b>Collection Date:</b>	8/9/2016				Perce	ent Moisture:		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed	
	Radon Emanation - Me		Qual PAI	Limit			•	
	Radon Emanation - Me			Limit	Prep	Factor	•	

## SAMPLE SUMMARY REPORT

Client:	ALS Environmental				<b>Date:</b> 06-S	ep-16
Project:	L1810826				Work Order: 1608	251
Sample ID:	L1810826-1				Lab ID: 1608	
-	L1010020-1					
Legal Location:					Matrix: WAT	ΓER
<b>Collection Date:</b>	8/9/2016			Per	cent Moisture:	
			Rep	ort	Dilution	
Analyses		Result	Qual Lin	it Units	Factor	Date Analyzed
Explanation of (	Qualifiers					
Radiochemistry:						
U or ND - Result is le	ss than the sample specific MDC.		M3 - The rec	uested MDC was	not met, but the reported	
Y1 - Chemical Yield is	s in control at 100-110%. Quantitati	ve yield is assumed.	,	is greater than th	•	
Y2 - Chemical Yield o	utside default limits.			overy below lower		
W - DER is greater th	nan Warning Limit of 1.42			overy above uppe		
	s Received' while the Report Basis i			•	y within control limits.	
	ry Weight' while the Report Basis is		-	ike Recovery outs		
G - Sample density di D - DER is greater tha	iffers by more than 15% of LCS der an Control Limit	iony.		culated for duplica	ate results less than 5 times l ter than MDC	
M - Requested MDC			-	-	ater than MDC but less than	Requested
•	an requested MDC but greater than	achieved MDC.	MDC.			4
Inorganics:						
E - The reported value M - Duplicate injection N - Spiked sample read duplicate fail and the r	hat the compound was analyzed for e is estimated because of the prese on precision was not met. covery not within control limits. A p native sample concentration is less ot within control limits. An explanato	nce of interference. An ost spike is analyzed fo than four times the spik ory note may be include	r all ICP analyses when added concentration			
	(relative percent difference) not with nated as one or more analytes used		not detected above th	e detection limit.		
			not detected above th	e detection limit.		
S - SAR value is estin Organics:		l in the calculation were	not detected above th	detection limit.		
S - SAR value is estin <b>Organics:</b> U or ND - Indicates th B - Analyte is detected	nated as one or more analytes used nat the compound was analyzed for d in the associated method blank as	l in the calculation were but not detected. s well as in the sample.			n and warns the data user.	
S - SAR value is estin Organics: U or ND - Indicates th B - Analyte is detecter E - Analyte concentra	nated as one or more analytes used nat the compound was analyzed for d in the associated method blank as tion exceeds the upper level of the o	l in the calculation were but not detected. s well as in the sample. calibration range.	It indicates probable b	ank contaminatio		
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Client:	ALS Environmental
Work Order:	1608251
Project:	L1810826

# **QC BATCH REPORT**

Batch ID: R	RE160825-1-1 In	strument ID: Alp	oha Scin		Method: Ra	adium-226	by Rador	Emanation				
LCS	Sample ID: RE160825-1				U	nits: <b>BQ/I</b>		Analysi	s Date:	9/2/2016	6 14:17	
Client ID:		Run II	D: RE160825-	1 <b>A</b>			Pre	ep Date: 8/25	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.39 (+/- 0.346)	0.00362	1.673		83.3	67-120					Р
Carr: BARI	UM	15800		16790		93.9	40-110					
LCSD	Sample ID: RE160825-1				Ui	nits: <b>BQ/I</b>		Analysi	s Date:	9/2/2016	6 14:17	
Client ID:		Run II	D: RE160825-	1 <b>A</b>			Pre	ep Date: 8/25	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.34 (+/- 0.331)	0.00322	1.673		79.9	67-120		1.39	0.1	2.1	Р
Carr: BARI	UM	16300		16780		96.8	40-110		15800			
МВ	Sample ID: RE160825-1				U	nits: <b>BQ/I</b>		Analysi	s Date:	9/2/2016	6 14:17	
Client ID:		Run II	D: RE160825-	1A			Pre	ep Date: <b>8/25</b>	/2016	DF:	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		ND	0.0069									U
	UM	16400		16780		98	40-110					



Chain of Custody (COC) / Analytical Request Form



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COC Number: 14 -

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Page <u>1</u> of <u>1</u>

Canada Toll Free: 1 800 668 9878
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	www.alsglobal.com						*						-								
Report To						Report Format	t / Distribution		T	:	Select \$	Service Lev	el Below (	Rush T	umarou	nd Tim	e (TAT	) is not a	vailable	for all tests	)
Company:	Baffinland Iron Mines Co	p ALS ENV /	Account 23642		Select Report F	ormat: JPDF	exca. 🗹	EDD (DIGITAL)	R Regular (Standard TAT if received by 3 pm - business days)												
Contact:	Jim Millard, Allan Knight				Quality Control	(QC) Report with R	Report 🔽 Ye	s ĽNo	P Priority (2-4 bus. days if received by 3pm) 50% Surcharge - contact ALS to confirm TAT							<b>h</b>					
Address:	2275 Upper Middle Rd. E	., Suite #300		-	Criteria on Repo	nt - provide details belo	w if bax checked		E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT						ா						
	Oakville, ON, L6H 0C3				Select Distributi	ion: 🗋 Ema		<b>FAX</b>	E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge												
Phone:	647-253-0596 EXT 6016				Email 1 or Fax	bimcore@alsgloba	al.com					uired for E		-							
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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 02-AUG-16 Report Date: 07-SEP-16 07:30 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1807074 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1807074-1 MS-08							
Sampled By: BG/CR/JH on 01-AUG-16 @ 17:15							
Matrix: WATER							
Physical Tests							
рН	7.19	PEHT	0.10	pH units		12-AUG-16	
Total Suspended Solids	18.0		2.0	mg/L	11-AUG-16	12-AUG-16	
	14.5		0.10	NTU		03-AUG-16	R3517355
Total Metals							
Arsenic (As)-Total	0.00013		0.00010	mg/L	10-AUG-16	10-AUG-16	
Copper (Cu)-Total	0.0018		0.0010	mg/L	10-AUG-16	10-AUG-16	
Lead (Pb)-Total	0.00044		0.00010	mg/L	10-AUG-16	10-AUG-16	
Nickel (Ni)-Total	0.0340		0.00050	mg/L	10-AUG-16	10-AUG-16	
Zinc (Zn)-Total Radiological Parameters	0.0052		0.0030	mg/L	10-AUG-16	10-AUG-16	R3522755
_	-0.0100		0.040	Bc/	22 4110 10	02 SED 46	D2544024
Ra-226	<0.0100		0.010	Bq/L	23-AUG-16	02-SEP-16	R3541834
Refer to Referenced Information for Qualifiers (if any) ar							

 $^{\ast}$  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 Nickel (Ni)-Total MS-B L1807074-1 Sample Parameter Qualifier key listed: Qualifier Description MS-B Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. PEHT Parameter Exceeded Recommended Holding Time Prior to Analysis **Test Method References:** ALS Test Code Matrix **Test Description** Method Reference\*\* ACY-TITR-TB Water APHA 2310 B Acidity 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 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. CI -IC-N-WT Water Chloride by IC EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. APHA 4500CN C E-STRONG ACID DIST COLORIM CN-TOT-WT Cyanide, Total Water 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-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-T-CCMS-WT Water Total Metals 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 Ammonia, Total as N Water 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 Nitrate in Water by IC Water 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 pН 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

RA226-MMER-FC Water Ra226 by Alpha Scint, MDC=0.01 EPA 903.1

Protection Act (July 1, 2011).

## **Reference Information**

Bq/L 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. 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. \*\* 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
ТВ	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.



 Workorder:
 L1807074
 Report Date:
 07-SEP-16
 Page 1
 of 4

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3522755								
WG2364477-4 DUP		WG2364477-3						
Arsenic (As)-Total		0.00013	0.00013		mg/L	0.8	20	10-AUG-16
Copper (Cu)-Total		0.0018	0.0019		mg/L	4.0	20	10-AUG-16
Lead (Pb)-Total		0.00044	0.00044		mg/L	1.0	20	10-AUG-16
Nickel (Ni)-Total		0.0340	0.0338		mg/L	0.6	20	10-AUG-16
Zinc (Zn)-Total		0.0052	0.0053		mg/L	2.0	20	10-AUG-16
WG2364477-2 LCS Arsenic (As)-Total			97.3		%		80-120	10-AUG-16
Copper (Cu)-Total			91.7		%		80-120	10-AUG-16
Lead (Pb)-Total			99.3		%		80-120	10-AUG-16
Nickel (Ni)-Total			98.3		%		80-120	10-AUG-16
Zinc (Zn)-Total			89.0		%		80-120	10-AUG-16
WG2364477-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	10-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	10-AUG-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	10-AUG-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	10-AUG-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	10-AUG-16
WG2364477-5 MS Arsenic (As)-Total		WG2364477-3	93.5		%		70-130	10-AUG-16
Copper (Cu)-Total			86.6		%		70-130	10-AUG-16
Lead (Pb)-Total			93.2		%		70-130	10-AUG-16
Nickel (Ni)-Total			N/A	MS-B	%		-	10-AUG-16
Zinc (Zn)-Total			85.8		%		70-130	10-AUG-16
PH-WT	Water							
Batch R3524237								
WG2365816-3 DUP		WG2365816-2						
рН		8.11	8.10	J	pH units	0.01	0.2	12-AUG-16
<b>WG2365816-1 LCS</b> рН			7.01		pH units		6.9-7.1	12-AUG-16
SOLIDS-TSS-WT	Water							
Batch R3524510								
WG2366268-3 DUP		L1812140-1						
Total Suspended Solids		30.5	30.0		mg/L	1.7	20	12-AUG-16
WG2366268-2 LCS Total Suspended Solids			97.6		%		85-115	12-AUG-16



# **Quality Control Report**

		Workorder:	L1807074		Report Date:	07-SEP-16		Page 2 of 4
2275 Upp	er Middle Rd. E.		)					
Jim Millar	d							
	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
R <b>3524510</b> I MB ded Solids	Water		<2.0		mg/L		2	12-AUG-16
R3517355 3 DUP	Water	L1807025-4						
I MB		136	141 <0.10		NTU	3.6	25 0.1	03-AUG-16 03-AUG-16
	2275 Upp Oakville ( Jim Millar - R3524510 MB ded Solids R3517355 B DUP	2275 Upper Middle Rd. E. Oakville ON L6H 0C3 Jim Millard Matrix Water R3524510 MB ded Solids Water R3517355 B DUP	Baffinland Iron Mine's Corporation (Oakville 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Water R3524510 MB ded Solids Water R3517355 B DUP L1807025-4 136	Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Water R3524510 Water R3517355 B DUP L1807025-4 136 141	2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Qualifier Water R3524510 Water Water R3517355 DUP L1807025-4 136 141	Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard          Matrix       Reference       Result       Qualifier       Units         Water	Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Qualifier Units RPD Water R3524510 MB Water R3517355 8 DUP L1807025-4 136 141 NTU 3.6	Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Reference Result Qualifier Units RPD Limit Water R3524510 MB ded Solids <2.0 mg/L 2 Water R3517355 B DUP L1807025-4 136 141 NTU 3.6 25

Workorder: L1807074

Report Date: 07-SEP-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

## Contact:

## 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 Duplicate results and limits are expressed in terms of absolute difference. J MS-B Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Workorder: L1807074

Report Date: 07-SEP-16

Client: Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

#### Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Suspended solids							
	1	01-AUG-16 17:15	12-AUG-16 00:00	7	10	days	EHT
рН							
	1	01-AUG-16 17:15	12-AUG-16 01:00	4	10	days	EHT
Legend & Qualifier Definition	16.						

#### 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 L1807074 were received on 02-AUG-16 15:30.

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.



### Ft. Collins, Colorado

LIMS Version: 6.825

Tuesday, September 06, 2016

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

Re: ALS Workorder: 1608198 Project Name: Project Number: L1807074

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 8/11/2016. 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 Amy R. Wolf Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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 Environme	ntal – Fort Collins						
Accreditation Body	License or Certification Number						
AIHA	214884						
Alaska (AK)	UST-086						
Alaska (AK)	CO01099						
Arizona (AZ)	AZ0742						
California (CA)	06251CA						
Colorado (CO)	CO01099						
Connecticut (CT)	PH-0232						
Florida (FL)	E87914						
Idaho (ID)	CO01099						
Kansas (KS)	E-10381						
Kentucky (KY)	90137						
L-A-B (DoD ELAP/ISO 170250)	L2257						
Louisiana (LA)	05057						
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						



# 1608198

### Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1608198 Client Name: ALS Environmental Client Project Name: Client Project Number: L1807074 Client PO Number: L1807074

	Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1	807074-1	1608198-1		WATER	01-Aug-16	



1608198

### 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# ALS requires QC data to be provided with your final	<u>L1807074</u> I results.	
	······································		

Please see enclosed <u>1</u> sample(s) in <u>1</u> Container(s)

SAMPLE NUMBER ANAL	TICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1807074-1 MS-08		8/ 1/ 2016	
Ra226	by Alpha Scint, MDC=0.01 Bq/L (RA226	-MMER-FC 1) 8/26/2016	
Subcontract Info Contact:	Rick Hawthorne (519) 886-691	.0	
Analysis and reporting info contact	•		
	60 NORTHLAND ROAD, UNIT 1		
	WATERLOO, ON N2V 2B8		
	Phone: (519) 886-6910	Email: Wayne.Smith@alsglo	obal.com
Please email confirmation of re	ceipt to: Wayne.Smith@	alsglobal.com	
Shipped By:	Date Shipped:		
Received By: <u>C. M.M.S.</u>	Date Received:	8-11-16 093	0
Verified By:	Date Verified:		
	Temperature:		
Sample Integrity Issues:			

ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM				
Client: ALS - WHAEN 00 Workorder No: 161	5819	8		
Project Manager: AW Initials: COT	Date:	8-11-	-1 le	
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	
<sup>6.</sup> 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	
3. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO	
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?		(YE3)	NO	
<sup>12.</sup> Are all samples within holding times for the requested analyses?		(E)	NO	
13. Were all sample containers received intact? (not broken or leaking, etc.)		YES	NO	
<sup>14.</sup> 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:	N/A	YES	NO NO	
16. Were the samples shipped on ice?	RAD	(YES	- MAR	PIV-V
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 (#4)	ONLY	(YES)	Los	ſ
Cooler #: Temperature (°C): Arrow 1.08 No. of custody seals on cooler:			·	
DOT Survey/ Acceptance External μR/hr reading: 10		·	·	
Background µR/hr reading:				
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criterial YES/NO / NA (If no, see	Form 008.)			
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, E	(CEPT #1 A	ND #16.		
If applicable, was the client contacted? YES / NO / NA Contact: Project Manager Signature / Date:	Date/Ti 	me:		
Form 201r24.xls (06/04/2012) *IR Gun #4: Oakton, SN 2372220101-0002		Page 1	of	

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1608178



### SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date: 0	6-Sep-16
Project:	L1807074				,	Work Order: 1	608198
Sample ID:	L1807074-1					Lab ID: 1	608198-1
Legal Location:	:					Matrix: V	VATER
<b>Collection Date</b>	: 8/1/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
	Radon Emanation - M		Qual PAI	Limit			•
	Radon Emanation - M			Limit	Prep	Factor	•

### SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date:	06-Sep-16	
Project:	L1807074				۲	Work Order:	1608198	
Sample ID:	L1807074-1					Lab ID:	1608198-1	
Legal Location:						Matrix:	WATER	
Collection Date:					Porce	ent Moisture:	() III DIC	
Jonection Dates	. 8/1/2010				1000	ent Moisture.		
Analyses		Result	Qual	Report Limit	Units	Dilution Factor		Date Analyze
Explanation of (	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ess than the sample specific I	MDC.	M3			ot met, but the rep	orted	
Y1 - Chemical Yield	is in control at 100-110%. Qu	antitative yield is assumed.				reported MDC.		
	outside default limits.			-	y below lower o y above upper (			
-	han Warning Limit of 1.42					within control limits	5.	
	s Received' while the Report Dry Weight' while the Report E					de control limits		
	liffers by more than 15% of L0			-	-	te results less than	5 times MDC	
D - DER is greater th	-				entration greate			
M - Requested MDC					centration great	ter than MDC but le	ess than Reque	sted
LT - Result is less th	an requested MDC but greate	er than achieved MDC.	MD	ю.				
Inorganics:								
B - Result is less tha	n the requested reporting limi	t but greater than the instrun	nent method	detection limit	t (MDL).			
U or ND - Indicates t	hat the compound was analyz	ed for but not detected.						
	ie is estimated because of the	e presence of interference. A	An explanator	y note may be	e included in the	e narrative.		
	ion precision was not met.	a A post spike is applyzed f		alvaaa whaa t	a matrix anika	and or anika		
	covery not within control limit native sample concentration				le matrix spike	and of spike		
Z - Spiked recovery r	ot within control limits. An ex	planatory note may be includ	ed in the nar	rative.				
	(relative percent difference)							
S - SAR value is esti	mated as one or more analyte	es used in the calculation we	re not detecte	ed above the o	detection limit.			
Organics:								
U or ND - Indicates t	nat the compound was analyz	ed for but not detected.						
-	ed in the associated method b		e. It indicates	s probable bla	nk contaminati	on and warns the d	lata user.	
-	ation exceeds the upper level	=				~		
	The result is less than the re			nt method det	ection limit (IVIL	JL).		
-	ified compound is a suspecte diluted below an accurate qua	-	<i>.</i>					
-	y is equal to or outside the co							
-	ent difference (RPD) equals o							
G - A pattern resemb	ling gasoline was detected in	this sample.						
-	ling diesel was detected in th							
	ling motor oil was detected in							
-	ling crude oil was detected in this							
-	ling JP-4 was detected in this ling JP-5 was detected in this							
	fuel pattern was in the heavier		indow for the	analyte of int	erest.			
H - Indicates that the	fuel pattern was in the lighter							
	s that a significant fraction of	the reported result did not re	semble the p	atterns of any	of the following	g petroleum hydrod	arbon products	:
L - Indicates that the Z - This flag indicate								
L - Indicates that the Z - This flag indicate - gasoline								
L - Indicates that the Z - This flag indicate - gasoline - JP-8 - diesel								
L - Indicates that the Z - This flag indicate - gasoline - JP-8 - diesel - mineral spirits								
L - Indicates that the Z - This flag indicate - gasoline - JP-8 - diesel								

Client:	ALS Environmental
Work Order:	1608198
Project:	L1807074

# **QC BATCH REPORT**

Batch ID: R	RE160823-2-1 In:	strument ID Alp	oha Scin		Method: R	adium-226	by Rad	on Emanation					
LCS	Sample ID: RE160823-2				U	nits: <b>BQ/I</b>		Analys	is Date: 9	/2/2016	6 13:12		
Client ID:		Run II	D: RE160823-	2A				Prep Date: 8/23	/2016	DF	NA		
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual	
Ra-226		1.39 (+/- 0.345)	0.00478	1.673		83.1	67-120					Р	
Carr: BARI	UM	15400		16220		95	40-110						
LCSD	Sample ID: RE160823-2				U	nits: <b>BQ/I</b>		Analys					
Client ID:		Run II	D: RE160823-	2A	Prep Date: 8/2			Prep Date: 8/23	/2016	DT6 DF: NA			
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual	
Ra-226		1.32 (+/- 0.327)	0.00802	1.673		78.7	67-120		1.39	0.2	2.1	Р	
Carr: BARI	UM	15400		16220		94.9	40-110		15400				
МВ	Sample ID: RE160823-2				U	nits: <b>BQ/I</b>		Analys	is Date: 9	/2/2016	6 13:12		
Client ID:		Run II	D: RE160823-	2A	Prep Date: 8/23/2016		/2016	DF	NA				
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual	
Ra-226		ND	0.0073									U	
Carr: BARI	UM	15400		16220		94.8	40-110						

The following samples were analyzed in this batch:

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Chain of Custody (COC) / Analytical Request Form

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COC Number: 14 -

L1807074-COFC

Page <u>1</u> of <u>1</u>

Canada	Toll Fro	ю: 1 800	668 9878
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Contact:		Jim Millard, Allan Knight		Quality Control	(QC) Report with R	eport P7 Yes	a ⊑No	Р		rity (2-4	bus. days if i (1-2 bus. day	received i	ay 3pama) ∞athwi3	50% \$		ge - cona mbarra	200 AL	->000000 ->tAl\$to	m (Al confirm )	TAT
Address:		2275 Upper Middle Rd. E., Suite #300		Criteria on Repo	rt - provide details belor	_	_												-	
		Oakville, ON, L6H 0C3		Select Distributi						_	r weekend en			I ALS C		IN TAL	and su	ronarge		
Phone:		647-253-0598 EXT 6016		Email 1 or Fax	bimcore@aisgloba	al.com		Spec	ify Dat	e Req	uired for E2	2 E or P					_			
				Email 2				L	_					ysis F	_					
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Company	<i>r</i> .			Email 1 or Fax	ap@baffinland.cor	n														
Contact				Email 2				]											i i	2
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ALS Quo	ite #	Q42455		Approver ID:		Cost Center:		1			· .									Number of Containers
Job #:		MS-08	_	GL Account	GL Account: Routing Code: Activity Code: Location: ALS Contact: Wayne Smith Sampler: BG/CR/JH										1					5
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ALS San	npie #	Sample Identification	and/or Coordinates		Date	Time	Sample Type	Group	Turbidity											
(lab uso	only)	(This description will a	appear on the report)		(dd-mmm-yy)	(hh:mm)		Ū	<u> </u>											
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D a	rinking	) Water (OW) Samples <sup>1</sup> (client use)	Pres	served in field. Sa	mple from actual wa	aste rock pond.		Froz	en					SIF C	bser	vations	1	′es [	No	_
Are same	oles tak	en from a Regulated DW System?	Site Specific Criteria - /	Account Manager	to update as requir	red.		ke p	acks	Yes		No		Custe	ody se	eal inta	ct `	Yes [	] No	
14	ГΥ	-		2				Cool	ing Init			_								
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		SHIPMENT RELEASE (dlant use)	L	INITIAL S	SHIPMENT RECEP	TION (lab use or	iy)	+=-			FINA	L SHIP	MENT			ON (lat	o use	only)		
Release	d by: R	Shirmen Recever (diancuse)	Time: 13:00 Receiv	ved by:	/	Date:	Time:	Rec	eived I	by:		Λ	$\overline{\mathcal{M}}$		Date	AA	Ţ	Tinle:	$\overline{\rho}$	an
110/000	~~~			allet	2	08/02/16	3:39pm				<u> </u>		<u>///</u>			۲IJ۲	7	10	5	<u>90</u>
REFER T	O BAC	K PAGE FOR ALS LOCATIONS AND SAMPLI	NG INFORMATION	<del>7 × -</del>	WH	ITE - LABORATOR	RY COPY YE	LOW	- CLIEN	NT COF	PΥ					NA-PM-0326	CR P(	404 January 20		

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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 26-JUL-16 Report Date: 07-SEP-16 11:54 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1805159 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Comments: ADDITIONAL 07-SEP-16 10:37

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

www.alsglobal.com

**RIGHT SOLUTIONS RIGHT PARTNER** 

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1805159-1 MS-08							
Sampled By: JH/BP on 26-JUL-16 @ 14:58							
Matrix: WATER Physical Tests							
pH	7.45		0.10	pH units		29-JUL-16	R3515453
Total Suspended Solids	4.2		2.0	mg/L	29-JUL-16	30-JUL-16	R3515453
Turbidity	7.83		0.10	NTU	20 002 10	26-JUL-16	R3513972
Total Metals	1.00		0.10			20 002 10	10010072
Arsenic (As)-Total	<0.00010		0.00010	mg/L	28-JUL-16	29-JUL-16	R3514778
Copper (Cu)-Total	0.0036		0.0010	mg/L	28-JUL-16	29-JUL-16	R3514778
Lead (Pb)-Total	0.00030		0.00010	mg/L	28-JUL-16	29-JUL-16	R3514778
Nickel (Ni)-Total	0.0212		0.0010	mg/L	28-JUL-16	29-JUL-16	R3514778
Zinc (Zn)-Total	0.0157		0.0030	mg/L	28-JUL-16	29-JUL-16	R3514778
Radiological Parameters							
Ra-226	<0.0100		0.010	Bq/L	23-AUG-16	02-SEP-16	R3541834

**Test Method References:** 

### **Reference Information**

#### ALS Test Code Matrix **Test Description** Method Reference\*\* ALK-WT Water Alkalinity, Total (as CaCO3) EPA 310.2 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. 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. 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-D-CCMS-WT Water Dissolved Metals in Water by CRC APHA 3030B/6020A (mod) **ICPMS** 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). MFT-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). 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. APHA 4500-P PHOSPHORUS P-T-COL-WT Water Total P in Water by Colour 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 APHA 4500 H-Electrode рΗ 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). RA226-MMER-FC Water Ra226 by Alpha Scint, MDC=0.01 EPA 903.1 Bq/L 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 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. Water SOLIDS-TSS-WT 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 Total Kjeldahl Nitrogen APHA 4500-N Water 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. TOC-WT **Total Organic Carbon** Water 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

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

### **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**

Report Date: 07-SEP-16 Workorder: L1805159 Page 1 of 3 Baffinland Iron Mine's Corporation (Oakville)

Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3514778								
WG2357378-4 DUP Arsenic (As)-Total		<b>WG2357378-3</b> 0.00129	0.00126		mg/L	2.0	20	29-JUL-16
Copper (Cu)-Total		0.0024	0.0024		mg/L	1.9	20	29-JUL-16
Lead (Pb)-Total		0.00297	0.00292		mg/L	1.9	20	29-JUL-16
Nickel (Ni)-Total		0.00390	0.00380		mg/L	2.8	20	29-JUL-16
Zinc (Zn)-Total		0.0104	0.0099		mg/L	4.5	20	29-JUL-16
WG2357378-2 LCS Arsenic (As)-Total			99.8		%		80-120	29-JUL-16
Copper (Cu)-Total			99.5		%		80-120	29-JUL-16
Lead (Pb)-Total			102.0		%		80-120	29-JUL-16
Nickel (Ni)-Total			98.7		%		80-120	29-JUL-16
Zinc (Zn)-Total			94.0		%		80-120	29-JUL-16
WG2357378-1 MB Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-JUL-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	29-JUL-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	29-JUL-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-JUL-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-JUL-16
WG2357378-5 MS		WG2357378-3			-			
Arsenic (As)-Total			94.4		%		70-130	29-JUL-16
Copper (Cu)-Total			90.9		%		70-130	29-JUL-16
Lead (Pb)-Total			90.8		%		70-130	29-JUL-16
Nickel (Ni)-Total			90.1		%		70-130	29-JUL-16
Zinc (Zn)-Total			89.2		%		70-130	29-JUL-16
PH-WT	Water							
Batch R3515453 WG2357576-3 DUP		WG2357576-2	9.06			0.00		20 HH 40
		8.04	8.06	J	pH units	0.02	0.2	29-JUL-16
<b>WG2357576-1 LCS</b> рН			7.00		pH units		6.9-7.1	29-JUL-16
SOLIDS-TSS-WT	Water							
Batch R3515693 WG2357668-3 DUP Total Suspended Solids		<b>L1804352-3</b> 22.2	23.6		mg/L	6.1	20	30-JUL-16
WG2357668-2 LCS Total Suspended Solids			99.2		%		85-115	30-JUL-16



# **Quality Control Report**

			Workorder:	L180515	9	Report Date:	07-SEP-16		Page 2 of 3
Client:	2275 Uppe	Iron Mine's Co er Middle Rd. I DN L6H 0C3	orporation (Oakvill E. Suite #300	e)					
Contact:	Jim Millaro	b							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
Test SOLIDS-TSS-W	/т	Matrix Water	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed

Workorder: L1805159

Report Date: 07-SEP-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

Contact:

### 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.

#### 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 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.



### Ft. Collins, Colorado

LIMS Version: 6.825

Friday, September 02, 2016

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

Re: ALS Workorder: 1608051 Project Name: Project Number: L1805159

Dear Mr. Smith:

One water sample was received from ALS Environmental, on 8/3/2016. 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 Amy R. Wolf Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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				
Alaska (AK)	CO01099				
Arizona (AZ)	AZ0742				
California (CA)	06251CA				
Colorado (CO)	CO01099				
Connecticut (CT)	PH-0232				
Florida (FL)	E87914				
Idaho (ID)	CO01099				
Kansas (KS)	E-10381				
Kentucky (KY)	90137				
L-A-B (DoD ELAP/ISO 170250)	L2257				
Louisiana (LA)	05057				
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				



# 1608051

### Radium-226:

The sample was prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1608051 Client Name: ALS Environmental Client Project Name: Client Project Number: L1805159 Client PO Number: L1805159

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1805159-1	1608051-1		WATER	26-Jul-16	



1608051

### Subcontract Request Form

### Subcontract To:

### ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE FORT COLLINS,CO 80524

	al report and invoice: PO# <u>L18</u> o be provided with your final result	0 <u>5159</u> :s.		
Please see enclosed <u>1</u> sa	mple(s) in <u>1</u> Container(s)	)		
SAMPLE NUMBER ANALYI	ICAL REQUIRED	DATE SAMPLI DUI	ED E DATE	Priority Flag
L1805159-1 MS-08 Ra226 b	y Alpha Scint, MDC=0.01 Bq/L (RA226	7/ 26/ 2016 MMER-FC 1) 8/4/	2016	
Subcontract Info Contact: Analysis and reporting info contact:	Rick Hawthorne (519) 886-691 Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1 WATERLOO,ON N2V 2B8 Phone: (519) 886-6910	0 Email: Wayne.Sı	mith@alsqlobal	.com
Please email confirmation of rec	· · ·	alsglobal.com		
Shipped By: Received By: Maghe	Date Shipped: Date Received:	813116	0910	
Verified By: Sample Integrity Issues:	Date Verified: Temperature:			

WATERLOO

L1805159



### ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Vaterloo Workorder No: 1608	051		_
Project Manager: ARV Initials:	Date:	8/3/1	6
Does this project require any special handling in addition to standard ALS procedures?		YES	NO
Are custody seals on shipping containers intact?	NONE	YES	NO
Are Custody seals on sample containers intact?	NONE	YES	NO
Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
Are the COC and bottle labels complete and legible?		YES	NO
Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	NO
Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
Is there sufficient sample for the requested analyses?		TES	NO
Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
Are all samples within holding times for the requested analyses?		(YES	NO
Were all sample containers received intact? (not broken or leaking, etc.)		YES	NO
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
Do any water samples contain sediment?       Amount         Amount of sediment:	N/A	YES	NC
Were the samples shipped on ice?		YES	NO
Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 (#4)	RAD ONLY	YES	NO
Cooler #:	, 01121		
Temperature (°C): <b><u>7</u>,0%</b>	·······		
No. of custody seals on cooler:			
DOT Survey/ Acceptance External μR/hr reading: /2			
Information Background μR/hr reading: 12			
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria? <b>(VES)</b> NO / NA (If no, see	Eorm (108.)		
dditional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EX		ND #16.	
5) Sample pHed at 2.5 so HNO, was added		<del></del>	
			<u> </u>
applicable, was the client contacted? YES / NO (NA) contact:	_ Date/Tir	ne:	
roject Manager Signature / Date: UUU 3/4/14	_		
*IR Gun #2: Oakton, SN 29922500201-0066			м

\*IR Gun #4: Oakton, SN 2372220101-0002

-



**ALS Environmental - Fort Collins** CONDITION OF SAMPLE UPON RECEIPT FORM

Client:	ALS-Vaterlos	
Project Manager:	ARV	

Workorder No: 1608051 Initials: 100 Date: \$13/16

NOTE:

No pH adjustments shall be made without prior consent of Project Manager. After pH adjustments, hold metals and radchem samples  $\geq$  16 hrs. before analysis.

Was the pH of any sample adjusted by the laboratory? (See Table below) / NO

### pH Excursion:

ALS Sample ID	Client Sample ID	Initial pH	Final pH	Reagent Used	Volume Added (mL)	Lot No. of Reagent	Requested Analysis	Initials / Date / Time	
1608051-1	L1805159-1	2.5	22.0	HNO3	O.S.L	131530	RAD	RN/8/3/16	62 SI
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L	L	1	L	<u> </u>	l		l	<u> </u>	

If applicable, was the client contacted? YES / NO(/NA) Contact:	Date/Time:
Project Manager Signature / Date:	/

Form 201r24.xls (06/04/2012)

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1608051



## SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date: 0	02-Sep-16
Project:	L1805159				,	Work Order: 1	608051
Sample ID:	L1805159-1					Lab ID: 1	608051-1
Legal Location	:					Matrix: V	WATER
<b>Collection Date</b>	e: 7/26/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1			PAI	783	Prep	Date: 8/23/201	6 PrepBy: CDJ
Ra-226		ND (+/- 0.0042)	U	0.0066	BQ/I	NA	9/2/2016 12:06

### SAMPLE SUMMARY REPORT

Client:	ALS Environmental							02-Sep-16		
Project:	L1805159					Work Or	der:	1608051		
ample ID:	L1805159-1					Lab	D:	1608051-1	l	
Legal Location:						Mat	trix:	WATER		
Collection Date:	: 7/26/2016				Perc	cent Moist	ure:			
	· ·· ·· · · ·		n							
Analyses		Result		eport Aimit	Units	Dilut Fac			Date Ana	alyzed
Explanation of (	Qualifiers									
Radiochemistry:										
U or ND - Result is le	ess than the sample specific MDC.					not met, but th		ted		
Y1 - Chemical Yield	is in control at 100-110%. Quantita	ative yield is assumed.				e reported MD control limit.	JC.			
	outside default limits.			-		er control limit.				
-	han Warning Limit of 1.42					ry within contro				
	s Received' while the Report Basis Dry Weight' while the Report Basis					side control lim				
	liffers by more than 15% of LCS de			-	-	ate results less		times MDC		
D - DER is greater th	-					ater than MDC.				
M - Requested MDC	not met.			/te conc	entration grea	eater than MDC	C but les	s than Reque	sted	
LT - Result is less th	an requested MDC but greater that	n achieved MDC.	MDC.							
Inorganics:										
-	n the requested reporting limit but	greater than the instrum	ent method detecti	on limit	(MDL).					
B - Result is less tha	n the requested reporting limit but hat the compound was analyzed fo	-	ent method detecti	on limit	(MDL).					
B - Result is less tha U or ND - Indicates the E - The reported value	hat the compound was analyzed fo ue is estimated because of the pres	r but not detected.				he narrative.				
B - Result is less tha U or ND - Indicates tl E - The reported valu M - Duplicate injecti	hat the compound was analyzed fo ue is estimated because of the pres- ion precision was not met.	r but not detected. sence of interference. A	n explanatory note	may be	included in th					
B - Result is less tha U or ND - Indicates tl E - The reported valu M - Duplicate injecti N - Spiked sample re	hat the compound was analyzed fo ue is estimated because of the pres- ion precision was not met. ecovery not within control limits. A	r but not detected. sence of interference. An post spike is analyzed fo	n explanatory note or all ICP analyses	may be when th	included in th		9			
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<ul> <li>B - Result is less that</li> <li>U or ND - Indicates the</li> <li>The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery restrict analysis</li> <li>S - SAR value is estimed to a strain the second strain the second</li></ul>	hat the compound was analyzed for use is estimated because of the pres- ion precision was not met. accovery not within control limits. A mative sample concentration is less not within control limits. An explana is (relative percent difference) not w mated as one or more analytes use that the compound was analyzed for ad in the associated method blank is ation exceeds the upper level of the The result is less than the reportin tified compound is a suspected and diluted below an accurate quantitat y is equal to or outside the control ent difference (RPD) equals or exce bling diesel was detected in this sam bling motor oil was detected in this sam bling JP-4 was detected in this sam if uel pattern was in the heavier end	r but not detected. sence of interference. An post spike is analyzed fo is than four times the spi itory note may be include ithin control limits. ed in the calculation were r but not detected. as well as in the sample. e calibration range. Ig limit but greater than t iol-condensation product tion level. criteria used. eeds the control criteria. sample. sample. sample. sample. ple. ple. d of the retention time wind	n explanatory note or all ICP analyses ke added concentr ed in the narrative. e not detected abo . It indicates proba he instrument meth	may be when the ration. ve the c able blan hod dete hod dete	included in the matrix spike letection limit. hk contaminat ection limit (M	ke and or spike t. ation and warns MDL).	– s the da		5:	
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<ul> <li>B - Result is less that</li> <li>U or ND - Indicates the</li> <li>The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery restrict analysis</li> <li>S - SAR value is estimed value is estimed to a second second</li></ul>	hat the compound was analyzed for use is estimated because of the pres- ion precision was not met. accovery not within control limits. An enative sample concentration is less not within control limits. An explana is (relative percent difference) not within mated as one or more analytes use that the compound was analyzed for add in the associated method blank is attion exceeds the upper level of the The result is less than the reportin tified compound is a suspected ald diluted below an accurate quantitat y is equal to or outside the control ent difference (RPD) equals or exceeds bling diesel was detected in this sam bling orude oil was detected in this sam bling JP-4 was detected in this sam i fuel pattern was in the heavier end fuel pattern was in the lighter end	r but not detected. sence of interference. An post spike is analyzed fo is than four times the spi itory note may be include ithin control limits. ed in the calculation were r but not detected. as well as in the sample. e calibration range. Ig limit but greater than t iol-condensation product tion level. criteria used. eeds the control criteria. sample. sample. sample. sample. ple. ple. d of the retention time wind	n explanatory note or all ICP analyses ke added concentr ed in the narrative. e not detected abo . It indicates proba he instrument meth	may be when the ration. ve the c able blan hod dete hod dete	included in the matrix spike letection limit. hk contaminat ection limit (M	ke and or spike t. ation and warns MDL).	– s the da		5:	
<ul> <li>B - Result is less that</li> <li>U or ND - Indicates the</li> <li>The reported value</li> <li>M - Duplicate injection</li> <li>N - Spiked sample reduplicate fail and the</li> <li>Z - Spiked recovery restrict analysis</li> <li>S - SAR value is estimed</li> <li>Organics:</li> <li>U or ND - Indicates the</li> <li>B - Analyte is detected</li> <li>C - Analyte concentration</li> <li>J - Estimated value.</li> <li>A - A tentatively idention</li> <li>X - The spike recover</li> <li>+ - The relative perced</li> <li>G - A pattern resemb</li> <li>M - A pattern resemb</li> <li>M - A pattern resemb</li> <li>M - A pattern resemb</li> <li>H - Indicates that the</li> <li>L - Indicates that the</li> <li>L - Indicates that the</li> <li>Z - This flag indicates</li> <li>- AP-8</li> <li>- diesel</li> </ul>	hat the compound was analyzed for use is estimated because of the pres- ion precision was not met. accovery not within control limits. An enative sample concentration is less not within control limits. An explana is (relative percent difference) not within mated as one or more analytes use that the compound was analyzed for add in the associated method blank is attion exceeds the upper level of the The result is less than the reportin tified compound is a suspected ald diluted below an accurate quantitat y is equal to or outside the control ent difference (RPD) equals or exceeds bling diesel was detected in this sam bling orude oil was detected in this sam bling JP-4 was detected in this sam i fuel pattern was in the heavier end fuel pattern was in the lighter end	r but not detected. sence of interference. An post spike is analyzed fo is than four times the spi itory note may be include ithin control limits. ed in the calculation were r but not detected. as well as in the sample. e calibration range. Ig limit but greater than t iol-condensation product tion level. criteria used. eeds the control criteria. sample. sample. sample. sample. ple. ple. d of the retention time wind	n explanatory note or all ICP analyses ke added concentr ed in the narrative. e not detected abo . It indicates proba he instrument meth	may be when the ration. ve the c able blan hod dete hod dete	included in the matrix spike letection limit. hk contaminat ection limit (M	ke and or spike t. ation and warns MDL).	– s the da		5:	

Client:	ALS Environmental
Work Order:	1608051
Project:	L1805159

# **QC BATCH REPORT**

Batch ID: R	RE160823-2-1 In	strument ID Alp	oha Scin		Method: F	Radium-226	by Rade	on Emanation				
LCS	Sample ID: RE160823-2				ι	Jnits: <b>BQ/I</b>		Analys	is Date: 9	9/2/2016	6 13:12	
Client ID:		Run II	D: RE160823-2	2A				Prep Date: 8/23	/2016	DF	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.39 (+/- 0.345)	0.00478	1.673		83.1	67-120					Р
Carr: BARI	UM	15400		16220		95	40-110					
LCSD	Sample ID: RE160823-2				ι	Jnits: <b>BQ/I</b>		Analys	is Date: 🤇	9/2/2016	6 13:12	
Client ID:		Run II	D: RE160823-2	2A				Prep Date: 8/23	/2016	DF	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.32 (+/- 0.327)	0.00802	1.673		78.7	67-120		1.39	0.2	2.1	Р
Carr: BARI	UM	15400		16220		94.9	40-110		15400			
МВ	Sample ID: RE160823-2				ι	Jnits: <b>BQ/I</b>		Analysis Date: 9/2/2016 13:12		6 13:12		
Client ID:		Run II	D: RE160823-2	2A				Prep Date: <b>8/23</b>	/2016	DF	NA	
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		ND	0.0073									U
Carr: BARI	UM	15400		16220		94.8	40-110					

The following samples were analyzed in this batch:



### Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



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COC Number: **14** -Page <u>1</u> of

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Report To			Report Format	t / Distribution			\$	Select S	iervice Level	Below (	Rush Ť	urnarcı	und Time	(TAT)	is not avail	able for a	ill tests
Company:	Baffinland Iron Mines Corp ALS ENV Account 23642	Select Report F	Format: ⊡PDF	⊡EXCEL ⊡	EDD (DIGITAL)	R	Regu	ular (Sta	andard TAT if	received	by 3 pr	n - busi	iness day	rs)			
Contact:	Jim Millard, Allan Knight	Quality Control	(QC) Report with R	leport 🛛 🕅 Ye	s 🖸 No	Р	Prior	ity (2-4	bus, days if r	received l	by 3pm)	) 50% s	surcharge	e - cont	act ALS to	confirm "	TAT
Address:	2275 Upper Middle Rd. E., Suite #300	Criteria on Repo	ht - provide details belo	w if box checked		E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to conf							firm TA				
	Oakville, ON, L6H 0C3	Select Distribut	ion: 💽 Ema	JL [MA]L	FAX	E2	<b>∐</b> 5am	e day o	r weekend en	tergency	- conța	ICT ALS	to confirr	n TAT a	and surcha	ge	
Phone:	647-253-0596 EXT 6016	Email 1 or Fax	bimcore@alsgloba	al.com		Specify Date Required for E2,E or P:											
		Email 2	Email 2			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 I	Select Invoice Distribution: DEMAIL TAX														
Company:		Email 1 or Fax	ap@baffinland.cor	n													
Contact:		Email 2															
	Project Information	OI STREET	I and Gas Require	d Fields (client	use) 🔨 👘 🐼							·					
ALS Quote #:	Q42455	Approver ID:		Cost Center:		1											
Job #:	MS-08	GL Account:	-	Routing Code:		1											
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LSD:		Location:															$\leq$
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ALS Sample #	Sample Identification and/or Coordinates		Date	Time		Pi ₽	Turbidity		Α.								2
(lab use only)	(This description will appear on the report)	XKS.	(dd-mmm-yy)	(hh:mm)	Sample Type	Group	1 II										$\leq$
レ	MS-08	<del>Curs</del>	26-Jul-16	14:58	Water	R	R										3
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Drinking	g Water (DW) Samples <sup>1</sup> (client use) Pr	eserved in field. Sa	mple from actual wa	aste rock pond.		Froze	en e				_	SIF	Observ	ations	Yes		No
Are samples tak	ten from a Regulated DW System? Site Specific Criteria	Account Manager	to update as requir	ed.		Ice p	acks	Yes	Ē	No		Cust	ody se	al inta	ct Yes		No
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Are samples for	r human drinking water use?						INITIAL	COOL	ER TEMPERA	TURES	°C	A	् FI	NAL CO	OOLER TE	MPERAT	URES
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Baffinland Iron Mine's Corporation (Oakville) ATTN: Jim Millard 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Date Received: 21-JUL-16 Report Date: 29-AUG-16 11:44 (MT) Version: FINAL

Client Phone: 416-364-8820

# Certificate of Analysis

Lab Work Order #: L1802450 Project P.O. #: 4500017476 Job Reference: MS-08 C of C Numbers: Legal Site Desc:

Wayne Smith

Wayne Smith, C.Chem., C.E.T. Client Services Manager

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ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

Environmental 💭

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L1802450 CONTD.... PAGE 2 of 7 Version: FINAL

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1802450-1 MS-08-DS							
Sampled By: BG/KB on 20-JUL-16 @ 15:20 Matrix: WATER							
Physical Tests	70.5		2.0	umbee/em		26 11 16	D0540500
Conductivity	73.5		3.0	umhos/cm		26-JUL-16	R3512583
Hardness (as CaCO3)	32		10	mg/L		28-JUL-16 21-JUL-16	D0500040
pH Tatal Quarter ded Quilde	7.83		0.10	pH units			R3509819
Total Suspended Solids Anions and Nutrients	<2.0		2.0	mg/L		22-JUL-16	R3510188
Acidity (as CaCO3)	<2.0		2.0	mg/L		29-JUL-16	R3515550
Alkalinity, Total (as CaCO3)	37		2.0 10	mg/L		29-JUL-16	R3512457
Ammonia, Total (as N)	<0.020		0.020	mg/L		28-JUL-16	R3513917
Chloride (Cl)	<0.020		0.020	mg/L		27-JUL-16	R3513917
Fluoride (F)	<0.020			-		27-JUL-16	R3513990
Nitrate (as N)			0.020	mg/L		27-JUL-16 27-JUL-16	
Nitrate (as N) Phosphorus, Total	<0.020		0.020	mg/L		27-JUL-16 09-AUG-16	R3513990
	0.0064		0.0030	mg/L	08-AUG-16		R3521679
Sulfate (SO4) Cyanides	1.17		0.30	mg/L		27-JUL-16	R3513990
Cyanide, Total	<0.0020		0.0020	mg/L		27-JUL-16	R3513818
Organic / Inorganic Carbon	<0.0020		0.0020	iiig/∟		27-301-10	K3513010
Dissolved Organic Carbon	<1.0		1.0	mg/L		27-JUL-16	R3514472
Total Organic Carbon	<1.0		1.0	mg/L		27-JUL-16	R3514473
Total Metals			1.0			27 002 10	110014470
Aluminum (Al)-Total	0.308		0.010	mg/L	27-JUL-16	28-JUL-16	R3512784
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Arsenic (As)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Barium (Ba)-Total	0.00616		0.00020	mg/L	27-JUL-16	28-JUL-16	R3512784
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	27-JUL-16	28-JUL-16	R3512784
Boron (B)-Total	<0.010		0.010	mg/L	27-JUL-16	28-JUL-16	R3512784
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Calcium (Ca)-Total	6.70		0.50	mg/L	27-JUL-16	28-JUL-16	R3512784
Cesium (Cs)-Total	0.000041		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Chromium (Cr)-Total	0.00066		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Cobalt (Co)-Total	0.00010		0.00030	mg/L	27-JUL-16	28-JUL-16	R3512784
Copper (Cu)-Total	<0.0010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Iron (Fe)-Total	0.251		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Lead (Pb)-Total	0.00019		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Lithium (Li)-Total				•	27-JUL-16	28-JUL-16	
	< 0.0010		0.0010	mg/L			R3512784
Magnesium (Mg)-Total	3.71		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Manganese (Mn)-Total	0.00276		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Mercury (Hg)-Total	<0.000010		0.000010	mg/L	07 11 10	26-JUL-16	R3511950
Molybdenum (Mo)-Total	0.000174		0.000050	mg/L	27-JUL-16	28-JUL-16	R3512784
Nickel (Ni)-Total	<0.00050		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Phosphorus (P)-Total	<0.050		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Potassium (K)-Total	0.694		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1802450-1 MS-08-DS Sampled By: BG/KB on 20-JUL-16 @ 15:20 Matrix: WATER							
Total Metals							
Rubidium (Rb)-Total	0.00181		0.00020	mg/L	27-JUL-16	28-JUL-16	R3512784
Selenium (Se)-Total	<0.000050		0.000050	mg/L	27-JUL-16	28-JUL-16	R3512784
Silicon (Si)-Total	1.20		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Silver (Ag)-Total	<0.000050		0.000050	mg/L	27-JUL-16	28-JUL-16	R3512784
Sodium (Na)-Total	0.97		0.50	mg/L	27-JUL-16	28-JUL-16	R3512784
Strontium (Sr)-Total	0.0072		0.0010	mg/L	27-JUL-16	28-JUL-16	R3512784
Sulfur (S)-Total	<0.50		0.50	mg/L	27-JUL-16	28-JUL-16	R3512784
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	27-JUL-16	28-JUL-16	R3512784
Thallium (TI)-Total	<0.000010		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Thorium (Th)-Total	0.00031		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Tin (Sn)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Titanium (Ti)-Total	0.0151		0.00030	mg/L	27-JUL-16	28-JUL-16	R3512784
Tungsten (W)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Uranium (U)-Total	0.000763		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Vanadium (V)-Total	0.00057		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Zinc (Zn)-Total	0.0034		0.0030	mg/L	27-JUL-16	28-JUL-16	R3512784
Zirconium (Zr)-Total	0.00055		0.00030	mg/L	27-JUL-16	28-JUL-16	R3512784
Radiological Parameters				5			
Ra-226	<0.0100		0.010	Bq/L	16-AUG-16	26-AUG-16	R3516820
L1802450-2         MS-08-US           Sampled By:         BG/KB on 20-JUL-16 @ 15:50           Matrix:         WATER							
Physical Tests							
Conductivity	70.5		3.0	umhos/cm		26-JUL-16	R3512583
Hardness (as CaCO3)	32		10	mg/L		28-JUL-16	
рН	7.81		0.10	pH units		21-JUL-16	R3509819
' Total Suspended Solids	<2.0		2.0	mg/L		22-JUL-16	R3510188
Anions and Nutrients			2.0				
Acidity (as CaCO3)	<2.0		2.0	mg/L		29-JUL-16	R3515550
Alkalinity, Total (as CaCO3)	33		10	mg/L		26-JUL-16	R3512457
Ammonia, Total (as N)	<0.020		0.020	mg/L		28-JUL-16	R3513917
Chloride (Cl)	1.33		0.50	mg/L		27-JUL-16	R3513990
Fluoride (F)	<0.020		0.020	mg/L		27-JUL-16	R3513990
Nitrate (as N)	<0.020		0.020	mg/L		27-JUL-16	R3513990
Phosphorus, Total	0.0039		0.0030	mg/L	09-AUG-16	09-AUG-16	
Sulfate (SO4)	1.15		0.30	mg/L		27-JUL-16	
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		27-JUL-16	R3513818
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		27-JUL-16	R3514472
Total Organic Carbon	<1.0		1.0	mg/L		27-JUL-16	R3514473
Total Metals							

mg/L mg/L mg/L mg/L mg/L mg/L mg/L	27-JUL-16 27-JUL-16 27-JUL-16 27-JUL-16 27-JUL-16	28-JUL-16 28-JUL-16 28-JUL-16 28-JUL-16	R3512784 R3512784 R3512784
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mg/L mg/L mg/L mg/L mg/L	27-JUL-16 27-JUL-16 27-JUL-16	28-JUL-16	
mg/L mg/L mg/L mg/L	27-JUL-16 27-JUL-16		R3512784
mg/L mg/L mg/L	27-JUL-16	28-JUI -16	
mg/L mg/L			R3512784
mg/L		28-JUL-16	R351278
-	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
~	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L		26-JUL-16	R351195
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
m a /l	27-JUL-16	28-JUL-16	R351278
mg/L	27-JUL-16	28-JUL-16	R351278
	mg/L mg/L mg/L mg/L mg/L	mg/L       27-JUL-16         mg/L       27-JUL-16	mg/L         27-JUL-16         28-JUL-16           mg/L         27-JUL-16         28-JUL-16

Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
<0.0100		0.010	Bq/L	16-AUG-16	26-AUG-16	R3516820
<0.0100		0.010	Bq/L	16-AUG-16	26-AUG-16	R3516820

## **Reference Information**

### **QC Samples with Qualifiers & Comments:**

QC Samples v	with Qualifiers & Co	omments:		
QC Type Desci	ription	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Cyanide, Total	MS-B	L1802450-1, -2
Matrix Spike		Cyanide, Total	MS-B	L1802450-1, -2
Matrix Spike		Aluminum (AI)-Total	MS-B	L1802450-1, -2
Matrix Spike		Calcium (Ca)-Total	MS-B	L1802450-1, -2
Matrix Spike		Iron (Fe)-Total	MS-B	L1802450-1, -2
Matrix Spike		Magnesium (Mg)-Total	MS-B	L1802450-1, -2
Matrix Spike		Silicon (Si)-Total	MS-B	L1802450-1, -2
Matrix Spike		Titanium (Ti)-Total	MS-B	L1802450-1, -2
Matrix Spike		Uranium (U)-Total	MS-B	L1802450-1, -2
-	neter Qualifier key	listed:		
Qualifier	Description			
MS-B	Matrix Spike recove	ry could not be accurately calculated	due to high analyte	background in sample.
Fest Method F				
ALS Test Code	e Matrix	Test Description	Method Refere	ence**
ACY-TITR-TB This analysis i endpoint.	Water is carried out using pro	Acidity ocedures adapted from APHA Methoo	APHA 2310 B 2310 "Acidity". Acio	lity is determined by potentiometric titration to a specified
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2	
	red through a 0.45um nd the organic cabon i		eated reaction cham	INSTRUMENTAL ber which is packed with an oxidative catalyst. The wate ported in a carrier gas and is measured by a non-dispersive
CL-IC-N-WT Inorganic anio	Water ns are analyzed by lor	Chloride by IC Chromatography with conductivity a	EPA 300.1 (monocological contents in the second sec	od)
		Cyanide, Total ombination of UV digestion and distill s with a combination of barbituric acid	lation. Cyanide is co	N C E-STRONG ACID DIST COLORIM nverted to cyanogen chloride by reacting with chloramine d to form a highly colored complex.
		of thiocyanate in samples can cause method, ALS recommends analysis f		1-2% of the thiocyanate concentration. For samples with eck for this potential interference
EC-WT Water sample	Water s can be measured dir	Conductivity rectly by immersing the conductivity c	APHA 2510 B cell into the sample.	
F-IC-N-WT Inorganic anio	Water Ins are analyzed by lor	Fluoride in Water by IC Chromatography with conductivity a	EPA 300.1 (m nd/or UV detection.	od)
HARDNESS-CA Hardness (als Dissolved Cal	o known as Total Hard	Hardness Iness) is calculated from the sum of C concentrations are preferentially used	APHA 2340 B Calcium and Magnes I for the hardness ca	ium concentrations, expressed in CaCO3 equivalents.
HG-T-CVAA-W	T Water	Total Mercury in Water by CVAAS	6 EPA 1631E (m	nod)
Water sample	s undergo a cold-oxida	ation using bromine monochloride pric	or to reduction with s	tannous chloride, and analyzed by CVAAS.
			EPA 200.8 estion (APHA 3030E)	). Instrumental analysis is by inductively coupled plasma
NH3-WT Sample is me colorimetricall	,	Ammonia, Total as N . When sample is turbid a distillation	EPA 350.1 step is required, san	nple is distilled into a solution of boric acid and measured
NO3-IC-WT Inorganic anio	Water Ins are analyzed by lor	Nitrate in Water by IC Chromatography with conductivity a	EPA 300.1 (m nd/or UV detection.	od)
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P	PHOSPHORUS
	is carried out using pro ate digestion of the sa		I 4500-P "Phosphoru	us". Total Phosphorus is deteremined colourimetrically

 PH-BF
 Water
 pH
 APHA 4500 H-Electrode

 Water samples are analyzed directly by a calibrated pH meter.
 APHA 4500 H-Electrode

### **Reference Information**

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT Inorganic anions are ana	Water alyzed by Ion	Sulfate in Water by IC Chromatography with conductivity and/	EPA 300.1 (mod) or UV detection.
SOLIDS-TSS-BF A well-mixed sample is f four hours or until a cons		, , ,	APHA 2540 D-Gravimetric and the residue retained is dried in an oven at 104 +/- 1C for a minimum of
			APHA 5310B xidative catalyst. The water is vaporized and the organic cabon is oxidized reasured 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
ТВ	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

rng/kg iwt - milligrams per kilogram based on lipid weight of sampl

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:	L1802450	) Re	port Date: 29-A	JG-16		Page 1 of 10
Client:	Baffinland Iron Mine's Corp 2275 Upper Middle Rd. E. Oakville ON L6H 0C3							
Contact:	Jim Millard							
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	Water							
Batch WG2357861-9 Acidity (as Ca		<b>L1805141-4</b> 9.8	7.5	J	mg/L	2.3	4	29-JUL-16
WG2357861-6 Acidity (as Ca			97.0		%		85-115	29-JUL-16
WG2357861- Acidity (as Ca			<2.0		mg/L		2	29-JUL-16
ALK-WT	Water							
	R3512457							
WG2355432-3 Alkalinity, Tot	<b>3                                    </b>	WT-ALK-CRM	100.6		%		80-120	26-JUL-16
WG2355432-4 Alkalinity, Tot	<b>4 DUP</b> tal (as CaCO3)	<b>L1802232-43</b> 325	326		mg/L	0.4	20	26-JUL-16
WG2355432-2 Alkalinity, Tot	2 LCS tal (as CaCO3)		98.2		%		85-115	26-JUL-16
WG2355432- Alkalinity, To	1 MB tal (as CaCO3)		<10		mg/L		10	26-JUL-16
C-DIS-ORG-WT	Water							
WG2356389-3	R3514472 3 DUP ganic Carbon	<b>L1802450-2</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2356389-2 Dissolved Or	2 LCS ganic Carbon		98.7		%		80-120	27-JUL-16
WG2356389- Dissolved Or	1 MB ganic Carbon		<1.0		mg/L		1	27-JUL-16
WG2356389-4 Dissolved Or	4 MS ganic Carbon	L1802450-2	94.4		%		70-130	27-JUL-16
CL-IC-N-WT	Water							
Batch WG2355810-4	R3513990	WCODEE040						
Chloride (Cl)		<b>WG2355810-3</b> 1.28	1.28		mg/L	0.1	20	27-JUL-16
WG2355810-2 Chloride (Cl)			102.1		%		90-110	27-JUL-16
WG2355810- Chloride (Cl)			<0.50		mg/L		0.5	27-JUL-16
WG2355810- Chloride (Cl)		WG2355810-3	97.1		%		75-125	27-JUL-16
CN-TOT-WT	Water							



				Quality		л кероп			
			Workorder:	L1802450		Report Date: 29-A	AUG-16		Page 2 of 10
Client:	2275 Upp	Iron Mine's Corp er Middle Rd. E. S DN L6H 0C3	ooration (Oakville) Suite #300						
Contact:	Jim Millar	d							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT		Water							
Batch WG2356644-3 Cyanide, Tota			<b>L1802303-1</b> 211	212		mg/L	0.5	20	27-JUL-16
WG2356644-2 Cyanide, Tota				96.6		%		80-120	27-JUL-16
WG2356644- Cyanide, Tota	al			<0.0020		mg/L		0.002	27-JUL-16
WG2356644-4 Cyanide, Tota			L1802303-1	N/A	MS-B	%		-	27-JUL-16
EC-WT		Water							
Batch WG2354869-4 Conductivity	R3512583 4 DUP		<b>WG2354869-3</b> 72.2	72.2		umhos/cm	0.0	10	26-JUL-16
WG2354869-2 Conductivity	2 LCS			99.6		%		90-110	26-JUL-16
WG2354869- Conductivity	1 MB			<3.0		umhos/cm		3	26-JUL-16
F-IC-N-WT		Water							
	R3513990		W00055040.0						
WG2355810-4 Fluoride (F)			<b>WG2355810-3</b> <0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2355810-2 Fluoride (F)				99.1		%		90-110	27-JUL-16
WG2355810- Fluoride (F)				<0.020		mg/L		0.02	27-JUL-16
WG2355810-5 Fluoride (F)	5 MS		WG2355810-3	99.9		%		75-125	27-JUL-16
HG-T-CVAA-WT		Water							
Batch WG2354782-3 Mercury (Hg)			<b>L1802460-1</b> <0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-JUL-16
WG2354782-2 Mercury (Hg)				102.0		%		80-120	26-JUL-16
<b>WG2354782-</b> Mercury (Hg)				<0.000010		mg/L		0.00001	26-JUL-16
WG2354782-4 Mercury (Hg)			L1802460-2	102.0		%		70-130	26-JUL-16
MET-T-MS-WT		Water							

MET-T-MS-WT

Water



Workorder: L1802450

Report Date: 29-AUG-16

Page 3 of 10

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

Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3512784								
WG2355510-4 DUP Aluminum (Al)-Total		WG2355510-3 0.308	0.305		mg/L	1.2	20	28-JUL-16
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Barium (Ba)-Total		0.00616	0.00624		mg/L	1.3	20	28-JUL-16
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Bismuth (Bi)-Total		<0.000050	<0.000050		mg/L	N/A	20	28-JUL-16
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-JUL-16
Cadmium (Cd)-Total		<0.000010	<0.000010		mg/L	N/A	20	28-JUL-16
Calcium (Ca)-Total		6.70	6.73		mg/L	0.5	20	28-JUL-16
Cesium (Cs)-Total		0.000041	0.000036		mg/L	15	20	28-JUL-16
Chromium (Cr)-Total		0.00066	0.00061		mg/L	7.8	20	28-JUL-16
Cobalt (Co)-Total		0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	28-JUL-16
Iron (Fe)-Total		0.251	0.244		mg/L	2.8	20	28-JUL-16
Lead (Pb)-Total		0.00019	0.00020		mg/L	5.9	20	28-JUL-16
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	28-JUL-16
Magnesium (Mg)-Total		3.71	3.80		mg/L	2.5	20	28-JUL-16
Manganese (Mn)-Total		0.00276	0.00268		mg/L	2.9	20	28-JUL-16
Molybdenum (Mo)-Total		0.000174	0.000174		mg/L	0.1	20	28-JUL-16
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-JUL-16
Phosphorus (P)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-JUL-16
Potassium (K)-Total		0.694	0.708		mg/L	2.0	20	28-JUL-16
Rubidium (Rb)-Total		0.00181	0.00176		mg/L	2.5	20	28-JUL-16
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUL-16
Silicon (Si)-Total		1.20	1.30		mg/L	7.8	20	28-JUL-16
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-JUL-16
Sodium (Na)-Total		0.97	1.00		mg/L	2.9	20	28-JUL-16
Strontium (Sr)-Total		0.0072	0.0076		mg/L	5.3	20	28-JUL-16
Sulfur (S)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	28-JUL-16
Tellurium (Te)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	28-JUL-16
Thallium (TI)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-JUL-16
Thorium (Th)-Total		0.00031	0.00029		mg/L	7.6	20	28-JUL-16
Tin (Sn)-Total		<0.00010	<0.00010		mg/L			28-JUL-16



Client:

Contact:

# **Quality Control Report**

Report Date: 29-AUG-16 Workorder: L1802450 Page 4 of 10 Baffinland Iron Mine's Corporation (Oakville) 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard Matrix Pofe Qualific Unite PPD Limit P ٨ alv ч

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3512784								
WG2355510-4 DUP		WG2355510-3						
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Titanium (Ti)-Total		0.0151	0.0145		mg/L	4.1	20	28-JUL-16
Tungsten (W)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-JUL-16
Uranium (U)-Total		0.000763	0.000768		mg/L	0.6	20	28-JUL-16
Vanadium (V)-Total		0.00057	0.00054		mg/L	4.9	20	28-JUL-16
Zinc (Zn)-Total		0.0034	0.0035		mg/L	2.8	20	28-JUL-16
Zirconium (Zr)-Total		0.00055	0.00050		mg/L	8.8	20	28-JUL-16
WG2355510-2 LCS					0/			
Aluminum (Al)-Total			93.9		%		80-120	28-JUL-16
Antimony (Sb)-Total			94.1		%		80-120	28-JUL-16
Arsenic (As)-Total			96.7		%		80-120	28-JUL-16
Barium (Ba)-Total			99.98		%		80-120	28-JUL-16
Beryllium (Be)-Total			87.9		%		80-120	28-JUL-16
Bismuth (Bi)-Total			100.1		%		80-120	28-JUL-16
Boron (B)-Total			89.3		%		80-120	28-JUL-16
Cadmium (Cd)-Total			97.0		%		80-120	28-JUL-16
Calcium (Ca)-Total			95.7		%		80-120	28-JUL-16
Cesium (Cs)-Total			95.7		%		80-120	28-JUL-16
Chromium (Cr)-Total			96.8		%		80-120	28-JUL-16
Cobalt (Co)-Total			97.0		%		80-120	28-JUL-16
Copper (Cu)-Total			95.6		%		80-120	28-JUL-16
Iron (Fe)-Total			98.8		%		80-120	28-JUL-16
Lead (Pb)-Total			98.9		%		80-120	28-JUL-16
Lithium (Li)-Total			85.9		%		80-120	28-JUL-16
Magnesium (Mg)-Total			92.0		%		80-120	28-JUL-16
Manganese (Mn)-Total			97.3		%		80-120	28-JUL-16
Molybdenum (Mo)-Total			99.4		%		80-120	28-JUL-16
Nickel (Ni)-Total			96.1		%		80-120	28-JUL-16
Phosphorus (P)-Total			90.8		%		80-120	28-JUL-16
Potassium (K)-Total			95.1		%		80-120	28-JUL-16
Rubidium (Rb)-Total			96.1		%		80-120	28-JUL-16
Selenium (Se)-Total			94.9		%		80-120	28-JUL-16
Silicon (Si)-Total			99.1		%		80-120	28-JUL-16



Jim Millard

# **Quality Control Report**

Workorder: L1802450

Report Date: 29-AUG-16

Page 5 of 10

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

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3512784 WG2355510-2 LCS								
Silver (Ag)-Total			96.0		%		80-120	28-JUL-16
Sodium (Na)-Total			95.5		%		80-120	28-JUL-16
Strontium (Sr)-Total			101.4		%		80-120	28-JUL-16
Sulfur (S)-Total			90.1		%		80-120	28-JUL-16
Tellurium (Te)-Total			89.2		%		80-120	28-JUL-16
Thallium (TI)-Total			95.7		%		80-120	28-JUL-16
Thorium (Th)-Total			96.1		%		80-120	28-JUL-16
Tin (Sn)-Total			96.8		%		80-120	28-JUL-16
Titanium (Ti)-Total			92.1		%		80-120	28-JUL-16
Tungsten (W)-Total			101.7		%		80-120	28-JUL-16
Uranium (U)-Total			96.6		%		80-120	28-JUL-16
Vanadium (V)-Total			97.7		%		80-120	28-JUL-16
Zinc (Zn)-Total			90.7		%		80-120	28-JUL-16
Zirconium (Zr)-Total			96.1		%		80-120	28-JUL-16
WG2355510-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	28-JUL-16
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-JUL-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-JUL-16
Barium (Ba)-Total			<0.00020	1	mg/L		0.0002	28-JUL-16
Beryllium (Be)-Total			<0.00010	1	mg/L		0.0001	28-JUL-16
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	28-JUL-16
Boron (B)-Total			<0.010		mg/L		0.01	28-JUL-16
Cadmium (Cd)-Total			<0.00001	0	mg/L		0.00001	28-JUL-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	28-JUL-16
Cesium (Cs)-Total			<0.00001	0	mg/L		0.00001	28-JUL-16
Chromium (Cr)-Total			<0.00050	1	mg/L		0.0005	28-JUL-16
Cobalt (Co)-Total			<0.00010	1	mg/L		0.0001	28-JUL-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	28-JUL-16
Iron (Fe)-Total			<0.050		mg/L		0.05	28-JUL-16
Lead (Pb)-Total			<0.00010	)	mg/L		0.0001	28-JUL-16
Lithium (Li)-Total			<0.0010		mg/L		0.001	28-JUL-16
Magnesium (Mg)-Total			<0.050		mg/L		0.05	28-JUL-16
Manganese (Mn)-Total			<0.00050	1	mg/L		0.0005	28-JUL-16
Molybdenum (Mo)-Total			<0.00005	0	mg/L		0.00005	28-JUL-16



Client:

Contact:

Test

# **Quality Control Report**

 Workorder:
 L1802450
 Report Date:
 29-AUG-16
 Page
 6
 of
 10

 Baffinland Iron Mine's Corporation (Oakville)
 2275 Upper Middle Rd. E. Suite #300
 Oakville ON L6H 0C3
 Jim Millard
 Vorkorder:
 Vorkorde

MET-T-MS-WT	Water					
Batch R3512784						
WG2355510-1 MB						
Nickel (Ni)-Total		<0.00050		mg/L	0.0005	28-JUL-16
Phosphorus (P)-Total		<0.050		mg/L	0.05	28-JUL-16
Potassium (K)-Total		<0.050		mg/L	0.05	28-JUL-16
Rubidium (Rb)-Total		<0.00020		mg/L	0.0002	28-JUL-16
Selenium (Se)-Total		<0.000050		mg/L	0.00005	28-JUL-16
Silicon (Si)-Total		<0.050		mg/L	0.05	28-JUL-16
Silver (Ag)-Total		<0.000050		mg/L	0.00005	28-JUL-16
Sodium (Na)-Total		<0.50		mg/L	0.5	28-JUL-16
Strontium (Sr)-Total		<0.0010		mg/L	0.001	28-JUL-16
Sulfur (S)-Total		<0.50		mg/L	0.5	28-JUL-16
Tellurium (Te)-Total		<0.00020		mg/L	0.0002	28-JUL-16
Thallium (TI)-Total		<0.000010		mg/L	0.00001	28-JUL-16
Thorium (Th)-Total		<0.00010		mg/L	0.0001	28-JUL-16
Tin (Sn)-Total		<0.00010		mg/L	0.0001	28-JUL-16
Titanium (Ti)-Total		<0.00030		mg/L	0.0003	28-JUL-16
Tungsten (W)-Total		<0.00010		mg/L	0.0001	28-JUL-16
Uranium (U)-Total		<0.000010		mg/L	0.00001	28-JUL-16
Vanadium (V)-Total		<0.00050		mg/L	0.0005	28-JUL-16
Zinc (Zn)-Total		<0.0030		mg/L	0.003	28-JUL-16
Zirconium (Zr)-Total		<0.00030		mg/L	0.0003	28-JUL-16
WG2355510-5 MS	WG2355510-3					
Aluminum (Al)-Total		N/A	MS-B	%	-	28-JUL-16
Antimony (Sb)-Total		110.6		%	70-130	28-JUL-16
Arsenic (As)-Total		113.2		%	70-130	28-JUL-16
Barium (Ba)-Total		113.2		%	70-130	28-JUL-16
Beryllium (Be)-Total		104.5		%	70-130	28-JUL-16
Bismuth (Bi)-Total		121.2		%	70-130	28-JUL-16
Boron (B)-Total		114.9		%	70-130	28-JUL-16
Cadmium (Cd)-Total		114.5		%	70-130	28-JUL-16
Calcium (Ca)-Total		N/A	MS-B	%	-	28-JUL-16
Cesium (Cs)-Total		112.1		%	70-130	28-JUL-16
Chromium (Cr)-Total		115.4		%	70-130	28-JUL-16
Cobalt (Co)-Total		116.5		%	70-130	28-JUL-16
Copper (Cu)-Total		119.5		%	70-130	28-JUL-16



Workorder: L1802450

Report Date: 29-AUG-16

Page 7 of 10

Baffinland Iron Mine's Corporation (Oakville) Client: 2275 Upper Middle Rd. E. Suite #300 Oakville ON L6H 0C3 Jim Millard

Contact:

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3512784								
WG2355510-5 MS		WG2355510-3						
Iron (Fe)-Total			N/A	MS-B	%		-	28-JUL-16
Lead (Pb)-Total			117.9		%		70-130	28-JUL-16
Lithium (Li)-Total			108.6		%		70-130	28-JUL-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	28-JUL-16
Manganese (Mn)-Total			115.9		%		70-130	28-JUL-16
Molybdenum (Mo)-Tota	l		122.2		%		70-130	28-JUL-16
Nickel (Ni)-Total			117.1		%		70-130	28-JUL-16
Phosphorus (P)-Total			115.3		%		70-130	28-JUL-16
Potassium (K)-Total			115.6		%		70-130	28-JUL-16
Rubidium (Rb)-Total			110.9		%		70-130	28-JUL-16
Selenium (Se)-Total			111.7		%		70-130	28-JUL-16
Silicon (Si)-Total			N/A	MS-B	%		-	28-JUL-16
Silver (Ag)-Total			111.8		%		70-130	28-JUL-16
Sodium (Na)-Total			115.8		%		70-130	28-JUL-16
Strontium (Sr)-Total			124.6		%		70-130	28-JUL-16
Tellurium (Te)-Total			97.2		%		70-130	28-JUL-16
Thallium (TI)-Total			117.4		%		70-130	28-JUL-16
Thorium (Th)-Total			119.8		%		70-130	28-JUL-16
Tin (Sn)-Total			116.1		%		70-130	28-JUL-16
Titanium (Ti)-Total			N/A	MS-B	%		-	28-JUL-16
Tungsten (W)-Total			121.4		%		70-130	28-JUL-16
Uranium (U)-Total			N/A	MS-B	%		-	28-JUL-16
Vanadium (V)-Total			117.8		%		70-130	28-JUL-16
Zinc (Zn)-Total			106.5		%		70-130	28-JUL-16
Zirconium (Zr)-Total			122.9		%		70-130	28-JUL-16
NH3-WT	Water							
Batch R3513917								
WG2356518-3 DUP Ammonia, Total (as N)		<b>L1804602-1</b> 0.027	0.027		mg/L	1.5	20	28-JUL-16
WG2356518-2 LCS Ammonia, Total (as N)			104.1		%		85-115	28-JUL-16
WG2356518-1 MB Ammonia, Total (as N)			<0.020		mg/L		0.02	28-JUL-16
WG2356518-4 MS		L1804602-1						



ron Mine's Corpor Middle Rd. E. Su N L6H 0C3		_1802450	Re	eport Date: 29-A	JG-16		Page 8 of 10
Middle Rd. E. Su N L6H 0C3							
Matrix F							
Matrix F							
	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
Water							
	L1804602-1	113.5		%		75-125	28-JUL-16
Water							
		<0.020	RPD-NA	mg/L	N/A	25	27-JUL-16
		101.4		%		70-130	27-JUL-16
		<0.020		mg/L		0.02	27-JUL-16
,	WG2355810-3	96.8		%		70-130	27-JUL-16
Water							
		0.0057		mg/L	12	20	09-AUG-16
		106.8		%		80-120	09-AUG-16
		<0.0030		mg/L		0.003	09-AUG-16
	L1802450-1	87.5		%		70-130	09-AUG-16
		0.0044		mg/L	9.1	20	09-AUG-16
		101.7		%		80-120	09-AUG-16
		<0.0030		mg/L		0.003	09-AUG-16
	L1806575-3	88.7		%		70-130	09-AUG-16
Water							
		7.82	J	pH units	0.01	0.2	21-JUL-16
	Water Water	L1804602-1 Water WG2355810-3 <0.020 WG2355810-3 Water L1802450-1 0.0064 L1802450-1 L1806575-3 0.0040 L1806575-3	Water       L1804602-1       113.5         Water       113.5         Water       101.4         20.020       101.4         101.4       20.020         101.4       20.020         101.4       20.020         101.4       20.020         101.4       20.020         101.4       20.020         101.4       20.020         101.7       106.8         10.0040       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030         101.7       20.0030 <t< td=""><td>Water L1804602-1 113.5 Water VG2355810-3 &lt;0.020 0.020 RPD-NA 101.4 101.4 101.4 101.4 10.020 6.8 10.020 10.8 10.0057 10.0054 10.0057 10.0030 10.1 10030 101.7 10.01 101.7 10.004 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 10.004 10.0 10.0 10.0 10.0 10.0 10.0 1</td><td>L1804602-1       113.5       %         Water       113.5       %         WG2355510-3       &lt;0.020</td>       RPD-NA       mg/L         &lt;0.020</t<>	Water L1804602-1 113.5 Water VG2355810-3 <0.020 0.020 RPD-NA 101.4 101.4 101.4 101.4 10.020 6.8 10.020 10.8 10.0057 10.0054 10.0057 10.0030 10.1 10030 101.7 10.01 101.7 10.004 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 101.7 10.0030 10.004 10.0 10.0 10.0 10.0 10.0 10.0 1	L1804602-1       113.5       %         Water       113.5       %         WG2355510-3       <0.020	Water       L1804602-1       113.5       %         water       113.5       %         V022355810-3       <0.020	Mater         L1804602-1         113.5         %         75-125           Water



				Quanty		Report			
			Workorder:	L1802450	R	eport Date: 29	-AUG-16		Page 9 of 10
22 0	275 Uppe	Iron Mine's Corpo er Middle Rd. E. S DN L6H 0C3							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF Batch R34 WG2353129-1 pH	509819 LCS	Water		7.00		pH units		6.9-7.1	24 111 40
pri				7.00		pri units		6.9-7.1	21-JUL-16
SO4-IC-N-WT		Water							
Batch R3 WG2355810-4 Sulfate (SO4)	513990 DUP		<b>WG2355810-3</b> 1.17	1.17		mg/L	0.2	20	27-JUL-16
WG2355810-2 Sulfate (SO4)	LCS			102.3		%		90-110	27-JUL-16
WG2355810-1 Sulfate (SO4)	MB			<0.30		mg/L		0.3	27-JUL-16
WG2355810-5 Sulfate (SO4)	MS		WG2355810-3	95.8		%		75-125	27-JUL-16
SOLIDS-TSS-BF		Water							
Batch R3 WG2353147-3 Total Suspender	510188 DUP d Solids		<b>L1802460-6</b> <2.0	<2.0	RPD-NA	mg/L	N/A	25	22-JUL-16
WG2353147-2 Total Suspende	LCS d Solids			98.8		%		85-115	22-JUL-16
WG2353147-1 Total Suspender	MB d Solids			<2.0		mg/L		2	22-JUL-16
тос-wт		Water							
Batch R3 WG2356390-3 Total Organic C	514473 DUP arbon		<b>L1804840-3</b> <1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2356390-2 Total Organic C	LCS arbon			97.6		%		80-120	27-JUL-16
WG2356390-1 Total Organic Ca	<b>MB</b> arbon			<1.0		mg/L		1	27-JUL-16
WG2356390-4 Total Organic C			L1804840-3	94.7		%		70-130	27-JUL-16

Workorder: L1802450

Report Date: 29-AUG-16

Client:	Baffinland Iron Mine's Corporation (Oakville)
	2275 Upper Middle Rd. E. Suite #300
	Oakville ON L6H 0C3
Contact:	Jim Millard

### Contact:

#### 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 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.



LIMS Version: 6.825

Friday, August 26, 2016

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

Re: ALS Workorder: 1607513 Project Name: Project Number: L1802450

Dear Mr. Smith:

Two water samples were received from ALS Environmental, on 7/27/2016. 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 Amy R. Wolf Project Manager

> ADDRESS 225 Commerce Drive, Fort Collins, Colorado, USA 80524 | PHONE +1 970 490 1511 | FAX +1 970 490 1522 ALS GROUP USA, CORP. Part of the ALS Laboratory Group An ALS Limited Company

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								
Alaska (AK)	CO01099								
Arizona (AZ)	AZ0742								
California (CA)	06251CA								
Colorado (CO)	CO01099								
Connecticut (CT)	PH-0232								
Florida (FL)	E87914								
Idaho (ID)	CO01099								
Kansas (KS)	E-10381								
Kentucky (KY)	90137								
L-A-B (DoD ELAP/ISO 170250)	L2257								
Louisiana (LA)	05057								
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								



# 1607513

### Radium-226:

The samples were prepared and analyzed according to the current revision of SOP 783.

All acceptance criteria were met.

# Sample Number(s) Cross-Reference Table

OrderNum: 1607513 Client Name: ALS Environmental Client Project Name: Client Project Number: L1802450 Client PO Number: L1802450

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L1802450-1	1607513-1		WATER	20-Jul-16	
L1802450-2	1607513-2		WATER	20-Jul-16	



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#### Subcontract Request Form

#### Subcontract To:

#### ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

.

225 COMMERCE DRIVE FORT COLLINS,CO 80524

NOTES:		l report and invoice: PO# <u>L18</u> be provided with your final resul	8 <u>02450</u> ts.	
Please see	enclosed <u>2</u> san	nple(s) in <u>2</u> Container(s	)	
SAMPLE NUMBER	ANALYT	ICAL REQUIRED	DATE SAMPLED DUE DATE	Priority Flag
L1802450-1			7/ 20/ 2016	
, 	Ra226 by	Alpha Scint, MDC=0.01 Bq/L (RA226	-MMER-FC 1) 8/15/2016	
) <sup>L1802450-2</sup>		Alpha Scint, MDC=0.01 Bq/L (RA226	7/ 20/ 2016 G-MMER-FC 1) 8/15/2016	
	Info Contact:   reporting info contact:	Rick Hawthorne (519) 886-691 Wayne Smith, C.Chem., C.E.T. 60 NORTHLAND ROAD, UNIT 1 WATERLOO,ON N2V 2B8		
		Phone: (519) 886-6910	Email: Wayne.Smith@als	global.com
Please ema	il confirmation of rece	ipt to: Wayne.Smith@	Dalsglobal.com	
Shipped By:		Date Shipped:		
Received By	: <u> </u>	Date Received:	7-27-10 10	D915
Verified By:		Date Verified:	<b></b>	
		Temperature:		
Sample Inte	grity Issues:	·		

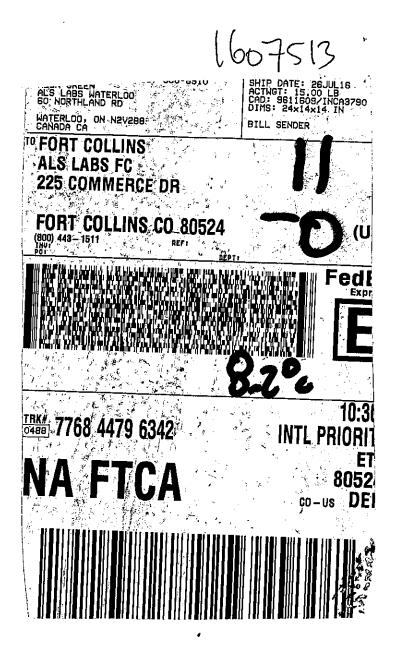


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#### ALS Environmental - Fort Collins CONDITION OF SAMPLE UPON RECEIPT FORM

(ALS)			
	7512	5	_
Project Manager: <u>AR</u> Initials: <u>SDM</u>	Date:	7-27	-16
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?		É	NO
<sup>6.</sup> Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(TE)	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	(YE)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YE)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YE)	NO
12. Are all samples within holding times for the requested analyses?		Ē	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(Es	NO
<ul> <li><sup>14.</sup> Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: &lt; green pea&gt; green pea</li> </ul>		YES	NO
15. Do any water samples contain sediment?       Amount         Amount of sediment:	N/A	YES	(N)
16. Were the samples shipped on ice?		YES	NÖ
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#2) #4	(RAD ONL)	YES	NO
Cooler #:			
Temperature (°C): $\Theta \cdot Z$			
No. of custody seals on cooler:		<u> </u>	
Acceptance External µR/hr reading: \\			
Information Background μR/hr reading: ΙΟ			
Were external $\mu$ R/hr readings $\leq$ two times background and within DOT acceptance criteria? (YES) NO / NA (If no, see	Earth (108.)		r
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EX			
	CEFT #TAI	10.	
			<u>.</u>
			<del></del>
			· · · · ·
		·	
	··-		
If applicable, was the client contacted? YES / NO /NA Gontact:	Date/Tin	ne:	<u></u>
Project Manager Signature / Date: (1)DU 7/28/16	_		
	-		
*IR Gun #2: Oakton, SN 29922500201-0066 Form 201r24.xls (06/04/2012) *IR Gun #4: Oakton, SN 2372220101-0002			
		Page 1	of



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# SAMPLE SUMMARY REPORT

Client:	ALS Environmental					<b>Date:</b> 2	6-Aug-16
Project:	L1802450				,	<b>Work Order:</b> 1	607513
Sample ID:	L1802450-1					Lab ID: 1	607513-1
Legal Location:						Matrix: V	VATER
<b>Collection Date</b>	: 7/20/2016				Perce	nt Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
	Radon Emanation - M		Qual PAI	Limit			
	Radon Emanation - M			Limit		Factor	

## SAMPLE SUMMARY REPORT

Client:	ALS Environmental					Date: 2	6-Aug-16
Project:	L1802450				,	<b>Work Order:</b> 1	607513
Sample ID:	L1802450-2					Lab ID: 1	607513-2
Legal Location:						Matrix: V	VATER
<b>Collection Date:</b>	: 7/20/2016				Perce	ent Moisture:	
Analyses		Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
	Radon Emanation - M		Qual PAI	Limit			
	Radon Emanation - M			Limit	Prep	Factor	

### SAMPLE SUMMARY REPORT

-								
Client:	ALS Environmental					Date:	26-Aug-16	6
Project:	L1802450				,	Work Order:	1607513	
Sample ID:	L1802450-2						1607513-2	,
-								<u>ت</u>
Legal Location:					_		WATER	
Collection Date:	: 7/20/2016				Perce	ent Moisture:		
				Report		Dilution		
Analyses		Result	Qual	Limit	Units	Factor		Date Analyzed
Explanation of (	Qualifiers							
Radiochemistry:								
U or ND - Result is le	ess than the sample specific MI	DC.	N			not met, but the rep	orted	
Y1 - Chemical Yield	is in control at 100-110%. Qua	ntitative yield is assumed.				reported MDC.		
	outside default limits.			LCS Recovery				
-	han Warning Limit of 1.42					within control limits	s.	
	s Received' while the Report Ba Dry Weight' while the Report Ba			V - Matrix Spike F	-		-	
	differs by more than 15% of LCS					te results less than	5 times MDC	
D - DER is greater th	nan Control Limit		E	3 - Analyte conce	ntration greate	er than MDC.		
M - Requested MDC					entration grea	ater than MDC but le	ess than Reque	sted
LT - Result is less th	an requested MDC but greater	than achieved MDC.	Ν	MDC.				
	in the requested reporting limit line the compound was analyzed	-	ent metho	d detection limit	(MDL).			
U or ND - Indicates the E - The reported value M - Duplicate injection N - Spiked sample reduplicate fail and the Z - Spiked recovery row * - Duplicate analysis	In the requested reporting limit I hat the compound was analyzed ue is estimated because of the p ion precision was not met. ecovery not within control limits. In ative sample concentration is not within control limits. An expl is (relative percent difference) not mated as one or more analytes	d for but not detected. oresence of interference. A A post spike is analyzed f less than four times the sp anatory note may be includ ot within control limits.	n explana or all ICP a vike added ed in the n	tory note may be analyses when th concentration. larrative.	included in the	e and or spike		
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Client:	ALS Environmental
Work Order:	1607513
Project:	L1802450

# **QC BATCH REPORT**

Batch ID: R	RE160816-2-1 Ir	nstrument ID Alp	oha Scin		Method: R	adium-226	by Rade	on Emanation				
LCS	Sample ID: RE160816-2		U	nits: <b>BQ/I</b>	Analys	Analysis Date: 8/26/2016 12:25						
Client ID:		Run II	D: RE160816-	2B			Prep Date: 8/16	/2016	DF:	NA		
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.48 (+/- 0.366)	0.00681	1.673		88.3	67-120					Р
Carr: BARI	UM	15300		17340		88.5	40-110					
LCSD	Sample ID: RE160816-2				U	nits: <b>BQ/I</b>		Analys	is Date:	8/26/201	6 12:25	
Client ID:		Run II	D: RE160816-	2B	F			Prep Date: 8/16	/2016	DF:		
Analyte		Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226		1.48 (+/- 0.366)	0.00508	1.673		88.2	67-120		1.48	3 0.004	2.1	Р
Carr: BARI	UM	14600		17330		84.1	40-110		15300	)		
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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



COC Number: 14 -

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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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#### MARY RIVER PROJECT

2016 MMER Annual Report March 31, 2017

# **APPENDIX C**

# SAMPLING PROGRAM - QUALITY ASSURANCE AND QUALITY CONTROL PLAN

# **Baffinland Iron Mines Corporation**

# Sampling Program – Quality Assurance and Quality Control Plan

### BAF-PH1-830-P16-0001

### Rev 1

Prepared By: William Bowden Department: Environment Title: Environmental Coordinator Date: March 14, 2016 Signature:

Approved By: Erik MadsenDepartment:Health, Safety and EnvironmentTitle:Vice President – SD, Environment, Health & SafetyDate:March 14, 2016Signature:

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# **DOCUMENT REVISION RECORD**

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
01/15/2014	0	ML	EM	Approved for Use
03/14/16	1	WB 35	EM	Approved for Use
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#### 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 January 15, 2014 version (BAF-PH1-830-P16-0001, Rev 0).

#### Index of Major Changes/Modifications in Revision 5

Item No.	Description of Change	Relevant Section
1	Major revision to whole document	
2		
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# 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 future work scope modifications, QA/QC procedures, and associated approvals. 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 Quality Assurance and Quality Control (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 31, 2014.

In accordance with the stipulations of the Type A Water Licence No. 2AM-MRY1325 Amendment No. 1, this Surface 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 sample 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.

### 1.1.1 2016 WORK PLAN UPDATE

To support the activities identified in the 2016 Work Plan, Baffinland is committed to following the QA/QC procedures documented within this management plan.

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### **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:

- Air Quality and Noise Abatement Management Plan (BAF-PH1-830-P16-0002)
- Aquatic Effects and Monitoring Plan (BAF-PH1-830-P16-0039)
- Environmental Protection Plan (BAF-PH1-830-P16-0008)
- Fresh Water, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010)
- Hazardous Materials and Hazardous Waste Management Plan (BHF-PH1-830-P16-0011)
- Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012)
- Surface Water, Aquatic Ecosystems, Fish and Fish Habitat Management Plan (BAF-PH1-830-P16-0026)
- Terrestrial Environmental Management and Monitoring Plan (BAF-PH1-830-P16-0027)
- Waste Management Plan (BAF-PH1-830-P16-0028)

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### 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:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- 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.

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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 2016

### 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.

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# 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, socioeconomic 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.

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### **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 2016

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### 3 ENVIRONMENTAL RESPONSIBILITIES

### 3.1 ROLES AND RESPONSIBILITIES

Baffinland's Environment Department is structured into two components; on - site personnel and off-site personnel. The Project's organisational structure is provided in Figure 1.

Baffinland's Corporate Environment Department provides coordination and oversight on environmental and community works for both on and off-site programs and activities

Baffinland's Project Environment Department provides direct coordination and oversight of Project environmental activities (refer to Table 1).

#### TABLE 1: BAFFINLAND IRON MINES CORPORATION ON-SITE ENVIRONMENTAL DEPARTMENT

Baff	Baffinland Iron Mines Corporation On-Site Environmental Team		
Position	Responsibilities and Accountabilities		
Environmental Manager	Reports directly to VP Sustainable Development, Health, Safety and Environm		
Environmental Superintendent	<ul> <li>Reports to Environmental Manager</li> <li>Specific accountabilities for environmental monitoring and reporting</li> <li>Leads investigations and reporting of environmental incidents onsite</li> <li>Serves as the liaison for regulators during onsite inspections and visits</li> <li>Provides ongoing environmental education and environmental a wareness training to all employees and contract workers</li> <li>Oversees environmental database management</li> <li>Prepares updates for management plans</li> </ul>		
Environmental Coordinator	<ul> <li>Reports to the Environmental Superintendent and Manager</li> <li>Specific accountabilities for environmental monitoring and reporting</li> <li>Provides day to day direction to Environmental staff onsite</li> <li>Serves as a liaison for regulators during onsite inspections and visits.</li> </ul>		

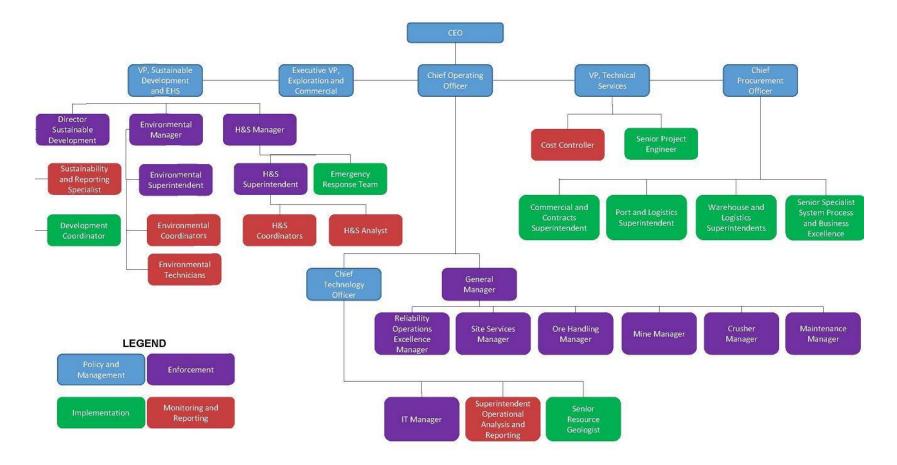
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Position	Responsibilities and Accountabilities		
	Provides ongoing environmental education and environmental awareness training to all employees and contract workers		
	Assists with environmental database management		
Environmental Monitor and Technician	<ul> <li>Reports to the Environmental Superintendent or designate</li> <li>Assists with environmental database management</li> <li>Assists with monitoring and sampling activities as per the Project's management plans</li> </ul>		
QIAMonitor	<ul> <li>Works alongside the Baffinland Environment Department to ensure the proper implementation of all environmental management and monitoring plans</li> <li>Acts as the QIA liaison for onsite environmental matters</li> </ul>		
Environmental Support Groups (Consultants, etc.)	<ul> <li>Assists with sampling, monitoring and reporting activities as required by permits, licenses and environmental management plans</li> <li>Provides technical expertise to various environmental studies</li> </ul>		

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#### Figure 1 - MARY RIVER PROJECT ORGANIZATION CHART



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### 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.

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### 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 3. 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 Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and the Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1.

### 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 are a 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 landfarm 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.).

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Exact locations and sampling frequency for designated monitoring stations are presented in Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and the Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1.

### 4.3 WATER SAMPLING METHODS AND EQUIPMENT

Water samples specified under Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1 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, fuel contaminated drainage and receiving waters). Sample jugs will be replaced on a regular basis.
- 4. Prior to collecting the sample, the sampling jug will be rinsed in the source water three times. Rinse water will be disposed of so that it does not contaminate the source water where the sample will be collected.
- 5. Do not rinse bottles that are supplied certified sterile by the laboratory For samples *not requiring preservatives*, sample bottles not certified sterile will be rinsed three times with source water before filling the bottle to the top.
- 6. For samples *requiring preservatives*, the sample bottle will be filled to the top (or to the indicator line marked on the bottle) and 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 indelible 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 filters must be used at each monitoring station. Alternatively, sample filtration can be carried out by the analytical laboratory.
- 10. All samples will be sealed by ensuring their lids are tightly secured before placing the bottles into the coolers.
- 11. All samples will be placed in an iced cooler as soon as possible after collection.

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#### 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:

- 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 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 multimeter (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.

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#### 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 up ward 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 SAMPLING FOR TOXICITY TESTING

Sampling for lethal toxicity testing is a condition of Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) 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)

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#### 4.3.5 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. For a complete list of required parameters please refer to the Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014). 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.

#### 4.3.5.1 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.

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### 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 No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and the Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1. 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 3. 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 No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1 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 indelible 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:

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- 1. Sampling station locations will be dependent upon the monitoring program objectives and the sample location.
- 2. A sterile spatula or spoon will be utilized to obtain a representative sample of the sediment for analyse.
- 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 5.2.1 and the following additional QA/QC considerations for a gravity percussion corer:

- 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 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.

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- 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 water quality.

## 6 BENTHIC INVERTEBRATES SAMPLE COLLECTION

For a complete list of required analyses at pre-established monitoring stations, see Baffinland's Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1. 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 area lakes, streams and rivers in remote reference areas
- Collection of benthic invertebrate samples from area lakes, streams and rivers in the Project Area to determine:
  - 1. Water quality changes related to discharge of ore or stockpile runoff to freshwater systems
  - 2. Water quality changes related to discharge of treated sewage effluent
  - 3. Water quality changes due to deposition of dust in lakes and streams.
  - 4. Changes in water levels and/or flows due to water withdrawals, diversions, and effluent discharges

### 6.2 BENTHIC INVERTEBRATE SAMPLING METHODS AND EQUIPMENT

Benthic Invertebrate samples follow the same general procedures outlined in 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 Management Plan BAF-PH1-830-P16-0039 r1. 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.

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## 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. Descriptions of the QA/QC samples that will be used (e.g. field blank, travel blank, equipment blank and field duplicate) are presented on Table 2. Except equipment blanks, ten percent of all samples will comprise QA/QC samples.

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 rectify the problem. Compliance monitoring and data management for water license sampling will be conducted by Baffinland, with the assistance of a designate as required.

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.	Field Staff
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
Equipment blank	Assesses cross contamination from field water sampling apparatus (e.g Kemmerer). Rinse deionized water through water sampling apparatus and transfer to sample bottles.	Bottle contains dionized water that has been rinsed through the sampling apparatus.	Collected prior and after completion of sampling program (if required).	Field Staff
Field duplicate	Assesses sample variability and precision of laboratory analytical methods. Collected from a randomly selected location, split from a homogenized	Duplicate sample selected at random. A large sterile bottle is used to collect the	Ten percent of all samples collected will be QA/QC.	Field Staff

#### TABLE 2: PURPOSE, DESCRIPTION AND FREQUENCY OF QA/QC SAMPLES

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	sample and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory.	water. Water is the poured equally interview of pre- labelled bottles.		

### 8 SAMPLE MANAGEMENT

### 8.1 SAMPLE LABELING

Accurate sample labelling is essential for later interpretation of field data. Ensure that labels are legible and written with an indelible marker. For a complete list of the predetermined sample labels at monitoring station, please refer to Baffinland's Type A Water Licence No. 2AM-MRY1325 Amendment No. 1 (Nunavut Water Board, July 31 2014) and the Aquatic Effects Management Plan BAF-PH1-830-P16-0039 r1.

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. Preferably, leak-proof ice packs will be used for cooling the samples. If loose ice is used then this should be securely sealed in plastic bags to prevent leakage of melt water.

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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.

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### 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 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.

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### 9.5 SUMMARY OF ANALYTICAL PROCEDURES

TABLE 3: SUMMARY OF ANALYTES, WATER AND SOIL SAMPLE VOLUMES, PRESERVATIVES AND SAMPLE STORAGE TIME FOR ALS ENVIRONMENTAL

Inorganics	Analysis <sup>1</sup>	Water Container	Water Preserv ation	Additional Notes	Soil Container	Water / Soil Hold Time
-	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 <sup>19</sup> , 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 <sup>8</sup> / NA
	COD and Phenols (4AAP)	125-250 mL Glass	1:1 Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )		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
ROUT INE	Dissolved Oxygen	300 mL BOD bottle	1 each; MnSO₄ & alkaline io	dide azide pillows	NA	8 Hours <sup>20</sup> / NA
AND PHYSICALS	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 <sub>2</sub> SO <sub>4</sub> )	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
	рН	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
	Ammonia Nitrogen	250 mL Glass or Plastic	1:1 Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )		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 <sub>2</sub> SO <sub>4</sub> )	Field Filter for Dissolved	NA	28 Days / NA
NUTRIENTS	Nutrients, Available (N.P.K.S)	NA			125-250 mL Jar or Bag	NA / 3 Days <sup>11</sup>
	Phosphorus, Reactive (orthophosphate)	0.5-1 L Plastic			NA	2-7 Days <sup>12</sup> / NA
	Phosphorus, Total Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	Field Filter for Dissolved	NA	28 Days / NA
	Phosphorus, Total	250 mL Glass or Plastic	1:1 Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	Dissolved	NA	28 Days / NA
	·	125 mL Plastic	50 % NaOH (BC MoE) or 6N NaC	0H + Ammonium Buffer	125-250 mL Jar or Bag	28 Days / 30 Days
	Chromium VI (Hexavalent)		(OMoE) 1:1 Hydrochloric Acid (HCl) <sup>21</sup>	Field Filter for	125-250 mL Jar or Bag	
METALS	Mercury, Methyl	250 mL FLPE		Dissolved Field Filter for	-	6 Months / 28 Days
	Mercury, Total or Dissolved	40 mL Glass Vial	1:1 Hydrochloric Acid (HCI)	Dissolved Field Filter for	125-250 mL Jar or Bag	28 Days / 28 Days
	Metals, Total or Dissolved	125-250 mL Plastic	1:3 Nitric Acid (HNO <sub>3</sub> ) to pH<2	Dissolved	125-250 mL Jar or Bag	6 Months / 6 Months
Organics						40
	F1, Volatile Organic Compounts (VOCs), THMs, 1,4-Dioxane, Volatile Petroleum Hydrocarbons	2 or 3 x 40 mL Glass Vials <sup>2</sup>	Sodium Bisulfate 4	Zero Headspace	Field Methanol Kit <sup>6</sup>	14 Days / 40 Days 13
	(VPH)	2 or 3 x 40 mL Glass Vials <sup>2</sup>	Sodium Bisulfate <sup>4</sup>	Zero Headspace	Hermetic Sampler kit <sup>6</sup>	14 Days / 48 Hours
	CCME CWS F1, BTEX	2 or 3 x 40 mL Glass Vials <sup>2</sup>	Sodium Bisulfate 4	Zero Headspace	125 - 500 mL Jar	14 Days / 7 Days
HYDRO- CARBONS	CCME CWS F2-F4	2 x 60 mL Amber Glass Vials <sup>3</sup>	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 <sup>5</sup>	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 <sub>2</sub> SO <sub>4</sub>		125 - 500 mL Jar	28 Days / 28 Days
	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 <sub>3</sub> ) to pH<2		125 - 500 mL Jar	6 months <sup>15</sup> / 28 Days
	C1 - C5 Gases	3 x 40 mL Blue Septa Vials	Sodium Bisulfate <sup>4</sup>	Zero Headspace	NA	14 Days / NA
	Dioxins and Furans, PBDE and PBB	2 x 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited
TRACE ORGANICS	Formaldehyde/Aldehydes	2 x 40 mL Amber Glass Vials $^{\rm 2}$	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

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	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 <sup>4</sup>	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 <sup>4</sup>	125 mL Jar	14 Days / 14 Days
	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
PESTICIDE RESIDUES	Herbicides, Acidic	2 x 1 L Amber Glass	Sodium Bisulfate <sup>4</sup>	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-	Coliforms-Fecal, Total, E-coli & HPC	100 - 300 mL Sterilized Plastic	Sodium Thiosulfate	500 mL Sterilized Jar	24-48 Hours <sup>18</sup> (24 - HPC / NA
BIOLOGICAL	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 OMbE. 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 formoisture. Hermetic samplers kit consists of a T-handle, two 5g hermetic samplers and a125mL soil jar for moisture. One additional parameter, such as metals or hydrocarbons can also be obtained from the 125mL soil ar is or hydrocarbons can also be obtained from the 125mL soil jar

7. 4 Days hold time for Electrical Conductivity only as per Ontario MISA.

 3 Days hold time for British Columbia as per BC Ministry of Environment (BC MoE), 4 Days hold time as per OMoE.

 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 OMbE. 30 Days hold time as received for pH in soil as per OMbE. 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 Gass + 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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### $10\,\,\mathrm{data}\,\,\mathrm{management}\,\,\mathrm{and}\,\,\mathrm{reporting}$

### 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 Water Quality Database Manager (WQDM).
- 2. Upon receipt, laboratory analytical data will be reviewed by the WQDM 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 WQDM 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 WQDM 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.

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### **11 REFERENCES**

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- 2. Environment Canada (EC). 2012. <u>Metal mining technical guidance for Environmental Effects</u> <u>Monitoring</u>. ISBN 978-1-100-20496-3.
- 3. Environment Canada, 2002. <u>Metal Mining Guidance Document for Aquatic Environmental Effects</u> <u>Monitoring. http://www.ec.gc.ca/eem/English/MetalMining/Guidance/default.cfm.</u>
- INAC, 1996. <u>Quality Assurance (QA) and Quality Control (QC) Guidelines for Use by Class "A" Licenses</u> 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.
- 5. Nunavut Water Board, 2013. <u>Baffinland Iron Mines Corp. Class A Water License No: 2AM-MRY1325</u>. Issued by the Nunavut Water Board, 2013.
- 6. USEPA, 2002. <u>Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to</u> <u>Freshwater and Marine Organisms</u>; 5<sup>th</sup> Ed., USEPA, ref. No. EPA-821-R-02-012.

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## **Appendix A-**

Quality Assurance 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

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## **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<sub>3</sub> 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 <sub>3</sub> to lower pH<2 OR (*) unpreserved	6 months
Metals, General	Polyethylene	250	For dissolved metals filter immediately, add Conc. $HNO_3$ to $pH<2$	6 months
Mercury	Glass (rinsed with 1 + 1 HNO <sub>3</sub> )	500	Add Conc. HNO <sub>3</sub> 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 $H_2SO_4$ 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 <sub>2</sub> S0 <sub>4</sub> to pH<2, refrigerate	28 days
рН	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.

	Sampling Program – Quality Assurance and Quality	Issue Date: March 14, 2016				
Baffinland	Control Plan	Rev.: 0				
	Environment	Document #: BAF-PHI-830-P16-0001				

## Appendix- B

## **Example Forms**



#### Chain of Custody (COC) / Analytical **Request Form**

Canada Toll Free: 1 800 668 9878

COC Number: 15 -

## Affix ALS barcode label here

(lab use only)

Page of

	www.alsglobal.com																					
Report To	Contact and company na	me below will app							Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply													
Company:			Select Report Format: DPDF EXCEL DDD (DIGITAL)						Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply													
Contact:				Quality Control (QC) Report with Report VES NO							day [F	-			исү	1	Busi	ness o	lay [E	E1]		
Phone:			Compare Results to Criteria on Report - provide details below if box checked						PRIORITY (Business Days	3	day [F	P3]			EMERGENCY	s	ame	Day, V	Neek	end o	r	
	Company address below will a	ppear on the final	l report	Select Distribution:   EMAIL MAIL FAX					sng) Id	2	day [F	P2]			EMI		Statu	tory h	olida	iy [E0]		
Street:					Email 1 or Fax					Date an	nd Time	e Require	ed for a	II E&P	TATs:				dd-m	mm-y	y hh:n	nm
City/Province:					Email 2	For tests that can not be performed according to the service level selected, you will be contacted.																
Postal Code:					Email 3						ŀ	Analy	sis Re	eques	st							
Invoice To	Same as Report To	YES [	NO			Invoice Dis	stribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
	Copy of Invoice with Repor	t 🗌 YES [	NO		Select Invoice D	vistribution: 🗌 EMA	IL 🗌 MAIL 🗌	FAX														
Company:					Email 1 or Fax																	
Contact:					Email 2				1													Ś
	Project Info	rmation			Oil	and Gas Required	l Fields (client u	ıse)														iner
ALS Account #	/ Quote #:				AFE/Cost Center:		PO#															onta
Job #:					Major/Minor Code:		Routing Code:		1													ŭ
PO / AFE:					Requisitioner:		•		1													ero
LSD:					Location:				1													Number of Containers
							- ·															ž
ALS Lab Wor	k Order # (lab use only)				ALS Contact:		Sampler:															
ALS Sample #	Sample	Identification	n and/or Coordinate	es		Date	Time															
(lab use only)	(This d	escription will	appear on the report	)		(dd-mmm-yy)	(hh:mm)	Sample Type														
									-													
									-													
																		T	T		T	
Special Instructions /					pecify Criteria to add on report by clicking on the drop-down list below							SAMP	LE CO	DNDIT	ION /	AS RE	ECEI	/ED (I	ab us	se onl	y)	
Drinking Water (DW) Samples' (client use)				(electronic COC only)					en					SIF	Obser	vatior	าร `	Yes		No		
Are samples taken from a Regulated DW System?									acks		Ice C	ubes		Cust	ody se	eal in	tact	Yes		No		
YES NO										iated												
Are samples for human drinking water use?									INIIT	IAL CO	OLER TE	MPER/	ATURE	S⁰C		FINAL COOLER TEMPER				MPERA	TURES °C	
YES NO																						
	SHIPMENT RELEA		,		INITIAL SHIPMENT RECEPTION (lab use only)									VAL S	HIPM	ENT I		PTIO	N (lab	use o		
Released by:	Da	te:	Tin	ne:	Received by: Date:					:	Rece	eived by	y:				Date	e:			·	Time:
	A PAGE FOR ALS LOCATIONS					\A(I)	TE - LABORATOR				Т СОР											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.

	Sampling Program – Quality Assurance and Quality	Issue Date: March 14, 2016	
<b>B</b> affinland	Control Plan	Rev.: 0	
	Environment	Document #: BAF-PHI-830-P16-0001	

# Appendix- C

# **Analytical Laboratory Accreditation and Licencing**

The information contained herein is proprietary Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

# for Laboratory Accreditation Inc. Canadian Association CALA

Certificate of Accreditation

Waterloo, Ontario ALS Environmental (Waterloo) ALS Canada Ltd. 60 Northland Rd. Unit 1

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 Communique dated 8 January 2009).



Accreditation Date: January 3, 2005 Expiry Date: January 21, 2017



This certificate is the property of the Canadian Association for Laboratory Accreditation Inc. and must be returned on request; reproduction must follow policy in place at date of issue. For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at www.cala ca

Ministry of the Environment and Ministère de l'Environnement et de Climate Change

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

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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 Téléc: (416) 235 - 6519



## **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 22, 2015

Licensee: ALS Canada Ltd.

60 Northland Rd. Unit #1 Located at: 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 Lab Method Code:	WT-TM-1027	Colourimetry Appendix #: C009
Alkalinity Lab Method Code:	WT-TM-1032	Colourimetry Appendix #: C094
Alkalinity Lab Method Code:	WT-TM-1012	Titrimetry-Manual Appendix #: C070
Aluminum Lab Method Code:	NA-TM-1002	ICP-MS(Total-digested) Appendix #: C032
Aluminum Lab Method Code:	NA-TM-1002	ICP-MS (Total-non-digested) Appendix #: C005
Ammonia Lab Method Code:	WT-TM-1013	Colourimetry Appendix #: C095
Antimony Lab Method Code:	NA-TM-1002	ICP-MS (Total-non-digested) Appendix #: C005
Antimony Lab Method Code:	NA-TM-1002	ICP-MS(Total-digested) Appendix #: C032
Arsenic Lab Method Code:	NA-TM-1002	ICP-MS (Total-non-digested) Appendix #: C005

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Sec. 1

l'Action en matière de changement climatique Direction du contrôle de la qualité de l'equi

Direction du contrôle de la qualité de l'eau potable Programme de délivrance des permis et de conformité des laboratoires



Cass: Inorganic			Technique - Sob-Technique:		
Calcium			ICP-MS (Total-non-digested)		an mark
Lab Method Code:	NA-TM-1002		Appendix #:	C005	_
Carbon; dissolved or	ganic		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		M	Colourimetry		
Lab Method Code:	WT-TM-1021		Appendix #:	C074	
Chlorine; total			Colourimetry		
Lab Method Code:	WT-TM-1021		Appendix #:	C074	1.1
Chromium	0.23		ICP-MS(Total-digested)	-	12%
Lab Method Code:	NA-TM-1002		Appendix #:	C032	1.0
Chromium			ICP-MS (Total-non-digested)		
Lab Method Code:	NA-TM-1002		Appendix #:	C005	
Chromium VI			IC-UV/VIS		-
Lab Method Code:	WT-TM-1035	9	Appendix #:	C157	
Cobalt			ICP-MS (Total-non-digested)		
Lab Method Code:	NA-TM-1002		Appendix #:	C005	
Cobait			ICP-MS(Total-digested)		
Lab Method Code:	NA-TM-1002		Appendix #:	C032	
Copper			ICP-MS(Total-digested)		
Lab Method Code:	NA-TM-1002		Appendix #:	C032	-
Copper		17	ICP-MS (Total-non-digested)		
Lab Method Code:	NA-TM-1002	_	Appendix #:	C005	Mar. 21
Cyanate			ISE		2047
Lab Method Code:	WT-TM-1036		Appendix #:	C161	

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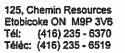
Gass: Inorganic	Technique - Sub-Technique:
Molybdenum	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	Appendix #: C032
Molybdenum	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	Appendix #: C005
Nickel	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	Appendix #: C032
Nickel	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	Appendix #: C005
Nitrate (as nitrogen)	
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-1023	Appendix #: C099
o-Phosphate	Colourimetry
Lab Method Code: WT-TM-1025	Appendix #: C098
Organic nitrogen	Calculation-Colourimetry-Digestion-Aquakem
Lab Method Code: WT-TM-1023	Appendix #: N/A
Perchiorate	LC-MS-MS
Lab Method Code: WT-TM-1505	Appendix #: C168
Phosphorus	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	Appendix #: C005

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Direction du contrôle de la qualité de l'eau potable Programme de délivrance des permis et de conformité des laboratoires





Class Inorganic	Children and procession and california	Techniqua - Sub-Techniqua:	
Strontium		ICP-MS (Total-non-digested)	1.1
Lab Method Code:	NA-TM-1002	Appendix #	C005
Sulphate		C	
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-digested)	
Lab Method Code:	NA-TM-1002	Appendix #:	C032
Thallium		ICP-MS (Total-non-digested)	
Lab Method Code:	NA-TM-1002	Appendix #	C005
Tîn		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 -
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
Uranium		ICP-MS (Total-non-digested)	
Lab Method Code:	NA-TM-1002	Appendix #	: C005

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Elast: Microbiologie	al	Technique - Sub-Te	churique.
Total coliform		MF-mEndo	and the second
Lab Method Code:	WT-TM-1200		Appendix #: C002
Total coliform backgr	round	MF-mEndo	
Lab Method Code:	WT-TM-1200	2211	Appendix #: C002
Gass: Organic		Technique - Sub-Te	
1,1,1,2-tetrachloroeth	ane	GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,1,1-trichloroethane		GC-MS/FID	the state of the state
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,1,2,2-tetrachioroeth	ane	GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,1,2-trichloroethane	Concercion - Concercional - Concerci	GC-MS/FID	a the tagent seeds to
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,1-dichloroethane		GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,1-dichloroethene		GC-MS/FID	III ISMIEL A LUIS
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,2,4-trichlorobenzen	e	GC-MS	
Lab Method Code:	WT-TM-1101/WT-TM-1300		Appendix #: C015
1,2-dibromoethane		GC-MS/FID	e in the second in
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,2-dichlorobenzene	-	GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,2-dichloroethane		GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,2-dichloropropane		GC-MS/FID	
Lab Method Code:	NA-TM-1102		Appendix #: C113
1,2-propanediol		GC-FID	
Lab Method Code:	WT-TM-1601		Appendix #: C090

Licence #: 2290 (Feb 03, 2016)

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THE OTHER DESIGNATION.

Direction du contrôle de la qualité de l'eau potable Programme de délivrance des permis et de conformité des laboratoires



Class Organic	LE LE LE	Sec. Sec.	Technique - Sul	b-Technique:		
2,4,6-trichlorophenol			GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	
2,4-D			GC-MS	22	R. N. 11	
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			185
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		1.1	GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	P 1
2,6-dinitrotoluene		E .	GC-MS			w daare
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	
2-chloronaphthalene		0.0	GC-MS			-
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	
2-chlorophenol			GC-MS			Ē
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	-
2-hexanone			GC-MS/FID			100.0
Lab Method Code:	NA-TM-1102			Appendix #:	C113	
2-methyl-4,6-dinitroph	ienol		GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	100
2-methylnaphthalene			GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	-
2-nitrophenol			GC-MS			11
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	

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Organic	in last the second	and the state	Technique - Sub-Tech	mlyne:	il salati t	1411 1 11
Aldrin+Dieldrin			Calculation-GC-N	/IS		
Lab Method Code:	WT-TM-1102/WT-TM-1302			Appendix #:	N/A	
Anthracene		1112	GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	- 1-
Aroclor 1242			GC-MS			georgi - a
Lab Method Code:	WT-TM-1105/WT-TM-1301			Appendix #:	C017	
Aroclor 1248			GC-MS			i da stati
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		la - i	GC-MS		0001	111 C
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	C023	
Atrazine + N-dealkylat	ted metabolites	3	Calculation-GC-N	IS	244	
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	N/A	
Azinphos-methyl			GC-MS			2.2
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	C023	-
b-BHC			GC-MS			1.4(m) ==
Lab Method Code:	WT-TM-1102/WT-TM-1302			Appendix #;	C019	20 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
Bendiocarb	- 1 K.		GC-MS		-	
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	C023	
Велzепе			GC-MS/FID			
Lab Method Code:	NA-TM-1102			Appendix #:	C113	
Benzo(a)anthracene			GC-MS			Es un
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	

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Pass Organic		Technique - Sub-Tech	oldoð:		
Bromomethane		 GC-MS/FID			
Lab Method Code:	NA-TM-1102	 3	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:	NA-TM-1102		Appendix #:	C113	1.0
Carbon tetrachloride		GC-MS/FID			
Lab Method Code:	NA-TM-1102		Appendix #:	C113	100
Chlordane; total		Calculation-GC-M	S		
Lab Method Code:	WT-TM-1102/WT-TM-1302		Appendix #:	N/A	· · · · ·
Chlorodibromoacetic	acid	GC-Derivitatizatio	n/ECD		
Lab Method Code:	WT-TM-1604	-	Appendix #:	C163	
Chloroethane	2	GC-MS/FID	-		
Lab Method Code:	NA-TM-1102		Appendix #:	C113	
Chloroform		GC-MS/FID			
Lab Method Code:	NA-TM-1102		Appendix #:	C113	
Chloromethane		GC-MS/FID			
Lab Method Code:	NA-TM-1102		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	

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

125 Resources Rd. Etobicoke ON M9P 3V6 Tel: (416) 235 - 6370 Fax: (416) 235 - 6519

Ministry of the Environment and 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



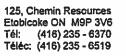
Class: Organic		Technique - Sub-Te	chalique;		Constant States
Dichloromethane		GC-MS/FID			
Lab Method Code:	NA-TM-1102		Appendix #:	C113	-
Diclofop-methyl		GC-MS			and a second sec
Lab Method Code:	WT-TM-1107/WT-TM-1302		Appendix #:	C023	
Dieldrin		GC-MS			
Lab Method Code:	WT-TM-1102/WT-TM-1302		Appendix #:	C019	
Diethyl phthalate		GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300		Appendix #:	C015	< 121
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	11
Dinoseb		GC-MS			
Lab Method Code:	WT-TM-1107/WT-TM-1302		Appendix #:	C023	
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	

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

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Ministry of the Environment and 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





Gass Organic	Technique - Sub-Technique:
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
Hexachioroethane	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	Appendix #: C015
Hexane	GC-MS/FID
Lab Method Code: NA-TM-1102	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

Ministry of the Environment and Ministère de l'Environnement et de Climate Change l'Action en matière de changement

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

125 Resources Rd. Etobicoke ON M9P 3V6 Tel: (416) 235 - 6370 Fax: (416) 235 - 6519 l'Action en matière de changement climatique Direction du contrôle de la qualité de l'eau

Direction du contrôle de la qualité de l'eau potable Programme de délivrance des permis et de conformité des laboratoires



Class: Organic	Technique - Sub-Technique:
Monochloroacetic acid	GC-Derivitatization/ECD
Lab Method Code: WT-TM-1604	Appendix #: C163
Monochiorobenzene	GC-MS/FID
Lab Method Code: NA-TM-1102	Appendix #: C113
MTBE	GC-MS/FID
Lab Method Code: NA-TM-1102	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
Nonyiphenol	LC-MS-MS
Lab Method Code: WT-TM-1521	Appendix #: C116
Nonylphenol Diethoxylate	LC-MS
Lab Method Code: WT-TM-1521	Appendix #: C116
Nonyiphenol 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
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 Mothod Code: WT-TM-1101/WT-TM-1300	Appendix #: C015
Octylphenoi	LC-MS
Lab Method Code: WT-TM-1521	Appendix #: C116

Ministry of the Environment and Ministère de l'Environnement et de Climate Change

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

125 Resources Rd. Etobicoke ON M9P 3V6 Tel: (416) 235 - 6370 Fax: (416) 235 - 6519 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



Class: Organic			Techn'que - Sub-Te	etnique;		
Phenoi	1 I C III		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	<u> </u>		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 biphe	enyls —		GC-MS			
Lab Method Code:	WT-TM-1105/WT-TM-1301		- <u></u>	Appendix #:	C017	
Prometryn			GC-MS			
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	C023	- 111
Pyrene			GC-MS			
Lab Method Code:	WT-TM-1101/WT-TM-1300			Appendix #:	C015	
Simazine	201		GC-MS			
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #:	C023	
Styrene			GC-MS/FID			
Lab Method Code:	NA-TM-1102			Appendix #:	C113	
Temephos			GC-MS			
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #	C023	1-10
Terbufos			GC-MS			
Lab Method Code:	WT-TM-1107/WT-TM-1302			Appendix #	C023	
Tetrachloroethylene	0		GC-MS/FID			
Lab Method Code:	NA-TM-1102			Appendix #	: C113	= 211
Tetraethyl Lead			GC-MS			
Lab Method Code:	WT-TM-1308			Appendix #	: C159	
Toluene	1.115-12		GC-MS/FID			
Lab Method Code:	NA-TM-1102			Appendix #	: C113	
				r		

Safe Drinking Water Branch Laboratory Licensing and Compliance Program

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### Ministry of the Environment and 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



Dass Physical/Others	Technique - <u>Sub-Technique:</u>
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-1010	Appendix #: C048
Conductivity	Potentiometry
Lab Method Code: WT-TM-1028	Appendix #: C108
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-1028	Appendix #: C106
рН <sup>©</sup>	Potentiometry
Lab Method Code: WT-TM-1001	Appendix #: C026
Solids; total	Gravimetry
Lab Method Code: WT-TM-1011	Appendix #: C056
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
Tannins and Lignins	Colourimetry-Spectrophotometry
Lab Method Code: WT-TM-1015	Appendix #: C124

 $H_{\rm eff} = 1$   $H_{\rm eff} = 3$   $H_{\rm eff} = 3$ 

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Y.

- 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.

- (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.

\* 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

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**CALA Directory of Laboratories** 

Laboratory Accreditation Inc.

Standards	Conforme with requirements of ISO/IEC 17025
Email:	ALSWT.Quality@alsglobal.com; linda.neimor@ALSGlobal.com
	(519) 886-9047
	(519) 886-6910
Contact:	Mr. Jonathan Fisher
Address:	60 Northland Rd. Unit 1 Waterloo ON N2V 2B8
Parent Institution:	ALS Canada Ltd.
Laboratory Name:	ALS Environmental (Waterloo)
Membership Number:	3149

Standard: Conforms with requirements of ISO/IEC 17025 Clients Served: All Interested Parties Revised On: August 7, 2015 Valid To: January 21, 2017

### Scope of Accreditation

### Air (Inorganic)

Fixed Gases - Air (180) WT-TM-1703; modified from EPA 3C and ASTM D1946-90 GC/FID & TCD **Carbon Dioxide** Carbon Monoxide Methane Nitrogen Oxygen

### **Biosolids (Microbiology)**

Escherichia coli (E. coli) - Biosolids (087) WT-TM-1200; modified from MOE/LSB-E3433 MEMBRANE FILTRATION (mFC-BCIG) Escherichia coli (E. coli)

### **Biosolids (Organic)**

Nonylphenol and Nonylphenol Ethoxylates - Biosolids (165) WT-TM-1554; modified from JOURNAL OF CHROMATOGRAPHY A.849 (1999) 467-482 LC/MS - EXTRACTION **Bisphenol A** Nonylphenol Diethoxylate Nonylphenol Monoethoxylates Nonylphenols Nonylphenols Ethoxylates Octviphenol **Octylphenol Diethoxylate Octylphenol Monoethoxylate** 

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

C1-Dibenzothiopenes C1-Fluoranthenes/Pyrenes C1-Fluorenes C1-Naphthalenes C1-Phenanthrenes/Anthracene C2-Benzofluoroanthenes/Benzo(a)pyrenes C2-Biphenvl **C2-Chrysenes C2-Dibenzothiopenes** C2-Fluoranthenes/Pyrenes **C2-Fluorenes** C2-Naphthalenes C2-Phenanthrenes/Anthracene C3-Chrysenes C3-Dibenzothiopenes C3-Fluoranthenes/Pyrenes **C3-Fluorenes** C3-Naphthalenes C3-Phenanthrenes/Anthracene C4-Dibenzothiopenes C4-Fluoranthenes/Pyrenes C4-Naphthalenes C4-Phenanthrenes/Anthracene Chrysene Dibenzo (a,h) anthracene Dibenzothiopene Fluoranthene Fluorene Indeno (1,2,3 - cd) pyrene Naphthalene Pervlene Phenanthrene Pvrene Quinoline Retene Solids (Inorganic) Ammonia - Soil (096) WT-TM-1013; modified from EPA 350.1 COLORIMETRIC Ammonia Solids (Inorganic) Anions - Soil, Sludge (041) NA-TM-1001, WT-TP-2013; modified from EPA 300 ION CHROMATOGRAPHY Bromide Chloride Fluoride Nitrate Nitrite

Sulphate

+ "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

Nickel Phosphorus Potassium Selenium Silver Sodium Strontium Sulphur Thallium	
Tin Titanium Uranium Vanadium Zinc	
Solids (Inorganic) Metals - Solid Waste (138) NA-TM-1700, NA-TM-1002; EPA 1311 (LEACH) and modified from EPA ICP/MS - TCLP	A 6020A (ANALYSIS)
Antimony Arsenic Barium Beryllium Bismuth Boron Cadmium	
Calcium Chromium Iron Lead Lithium	
Magnesium Manganese Potassium Selenium Silver Sodium	
Sodium Strontium Sulphur Thallium Tin Uranium	
Zinc Zirconium	
Solids (Inorganic) Oil and Grease - Soil, Sludge (031) WT-TM-1100; modified from SM 5520 B, D, E, F and EPA 8015 GRAVIMETRIC - EXTRACTION	
Mineral Oil and Grease Total Oil and Grease (Solvent Extractables)	

2-Nitrophenol 2.3.4-Trichlorophenol 2.3.4.5-Tetrachlorophenol 2.3.4.6-Tetrachlorophenol 2,3,5-Trichlorophenol 2,3,5,6-Tetrachlorophenol 2.4-Dichlorophenol 2,4-Dimethylphenol 2,4-Dinitrophenol 2,4-Dinitrotoluene 2.4.5-Trichlorophenol 2,4,6-Trichlorophenol 2,6-Dichlorophenol 2.6-Dinitrotoluene 3,3'-Dichlorobenzidene 4-Bromophenyl Phenyl Ether 4-Chloro-3-Methylphenol 4-chloroaniline 4-Chlorophenyl Phenyl Ether 4-Nitrophenol 4.6-Dinitro-o-Cresol 5-Nitroacenaphthylene Acenaphthene Acenaphthylene Acridine Anthracene Benzo (a) anthracene Benzo (a) pyrene Benzo (b) fluoranthene Benzo (g,h,i) perylene Benzo (k) fluoranthene Benzyl Butyl Phthalate Biphenyl Bis (2-Chlorethoxy) Methane Bis (2-Chloroethyl) Ether Bis (2-Chloroisopropyl) Ether Bis (2-ethylhexyl) Phthalate Camphene Chrvsene Di-n-Butylphthalate Di-n-Octylphthalate Dibenzo (a,h) anthracene **Diethyl Phthalate Dimethyl Phthalate** Diphenyl Ether Fluoranthene Fluorene Hexachlorobenzene Hexachlorobutadiene Hexachlorocyclopentadiene Hexachloroethane Indeno (1,2,3 - cd) pyrene Indole

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

beta-BHC Chlordane delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan Sulfate Endrin Endrin Aldehyde gamma-Chlordane Heptachlor Heptachlor Epoxide Lindane Mirex o,p'-DDD o,p'-DDE o,p'-DDT Oxychlordane p,p'-DDD p,p'-DDE p,p'-DDT p,p'-Methoxychlor Solids (Organic) Pesticides - Soil (150) WT-TM-1107, WT-TM-1302; modified from EPA SW-846 8270 and SW-846 3500 C **GC/MS - EXTRACTION** 2.4-D 2.4.5-T 2.4.5-TP Alachlor Ametryn Atrazine Atrazine Desethyl Azinphos-methyl Bendiocarb Bromoxynil Carbaryl Carbofuran Chlorpyrifos Cyanazine Diazinon Dicamba Diclofop-methyl Dimethoate Dinoseb Malathion **MCPA** Mecoprop Metolachlor Metribuzin Parathion Phorate Picloram

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

1.1.2.2-Tetrachloroethane 1.1.2.2-Tetrachloroethane 1.2-Dibromomethane 1.2-Dichlorobenzene 1,2-Dichloroethane 1,2-Dichloropropane 1.3-Dichlorobenzene 1.4-Dichlorobenzene 2-Hexanone Acetone (2-Propanone) Benzene Bromodichloromethane Bromoform **Bromomethane** Carbon Disulfide **Carbon Tetrachloride** Chlorobenzene Chlorodibromomethane Chloroethane Chloroform Chloromethane cis-1.2-Dichloroethylene cis-1,3-Dichloropropene Dibromochloromethane Dibromomethane Dichlorodifluoromethane Dichloromethane Ethylbenzene Ethylene Dibromide Hexane m/p-xylene Methyl ethyl ketone Methyl isobutyl ketone Methyl t-butyl ether **Methylene Chloride** o-xylene Styrene Tetrachloroethane Tetrachioroethylene Toluene trans-1.2-Dichloroethylene trans-1,3-Dichloropropene Trichloroethylene Trichlorofluoromethane Vinyl chloride

Solids (Organic) Volatile Organic Compounds (VOC) - Solid Waste (182) WT-TM-1017, NA-TM-1002; EPA 1311 (LEACH) and modified from EPA SW-846 8260 (ANALYSIS) GC/MS - HEADSPACE - TCLP 1,2-Dichlorobenzene 1,4-Dichlorobenzene Benzene Carbon tetrachloride

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<b>Water (Inorganic)</b> Alkalinity - Water (070)	OSDWA †
WT-TM-1012; modified from SM 2320 B MANUAL TITRATION Alkalinity (pH 4.5)	
Water (inorganic) Alkalinity - Water (094)	OSDWA †
WT-TM-1032; modified from EPA 310.2 COLORIMETRIC	
Alkalinity (pH 4.5) Water (Inorganic)	OSDWA †
Ammonia - Water (095) WT-TM-1013; modified from EPA 350.1 COLORIMETRIC	
Ammonia Ammonia + ammonium	
Water (Inorganic) Anions - Water, Wastewater (003) NA-TM-1001; modified from EPA 300.0	OSDWA †
ION CHROMATOGRAPHY Bromide	
Chloride Fluoride Nitrate	
Nitrite Sulfate	
Water (Inorganic) Biochemical Oxygen Demand (BOD) - Water (001) WT-TM-1002; modified from SM 5210B D.O. METER	OSDWA †
BOD (5 day) CBOD (5 day)	
Water (Inorganic) Bromate - Water (114) WT-TM-1503, WT-TM-1505; modified from EPA 6850 LC-MS/MS - EXTRACTION Bromate	OSDWA †
Water (Inorganic) Carbon - Water (047) WT-TM-1024; modified from SM 5310 B IR - COMBUSTION Organic Carbon	OSDWA †
Water (Inorganic) Chemical Oxygen Demand (COD) - Water (035) WT-TM-1006; modified from SM 5220 D REFLUX - COLORIMETRIC COD	OSDWA †
Water (Inorganic) Chlorine - Water (074) WT-TM-1021; modified from SM 4500-CL G and EPA 330.5 COLORIMETRIC Free Chlorine	OSDWA †

Phosphorus	
Potassium	
Selenium	
Silicon	
Silver	
Sodium	
Strontium	
Sulphur	
Thallium	
Tin	
Titanium	
Tungsten	
Uranium Vanadium	
Zinc	
Zirconium	
Water (Inorganic)	OSDWA †
Hexavalent Chromium - Water (157)	
WT-TM-1035; modified from EPA 1636 and EPA 7199 ION CHROMATOGRAPHY	
Chromium (Hexavalent)	
Water (Inorganic)	OSDWA †
Hydrogen Sulphide - Water (012)	
WT-TM-1003; modified from SM 4500-S2, D, E, F COLORIMETRIC	
Hydrogen Sulfide	
Water (Inorganic)	OSDWA †
Mercury - Water, Wastewater (049)	
WT-TM-1018; modified from EPA 7470A and EPA 245.2 COLD VAPOUR AA - SPECTROMETRIC	
Mercury	
Water (Inorganic)	OSDWA †
Oil and Grease - Water (033)	
WT-TM-1100; modified from SM 5520 B, D, E, F and EPA 1664 GRAVIMETRIC - EXTRACTION	
Mineral Oil and Grease	
Total Oil and Grease	
	10.0
Water (Inorganic)	OSDWA †
Perchlorate - Water (168)	
WT-TM-1505; modified from EPA 6850 LC-MS/MS - EXTRACTION	
Perchlorate	
Water (Inorganic)	OSDWA †
pH - Water (026)	
WT-TM-1001; modified from SM 4500-H B pH - METER	
pH	
-	
Water (Inorganic)	OSDWA †
pH - Water (106)	
WT-TM-1028; modified from SM 4500-H B PC TITRATE	
pH	
hi i	

Cobalt Copper Iron Lead Lithium		
Magnesium Manganese Molybdenum Nickel Phosphorus Potassium		
Selenium Silicon Silver Sodium Strontium		
Sulphur Thallium Tin Titanium Tungsten		
Uranium Vanadium Zinc Zirconium Water (Inorganic)	OSDWA †	
Total Phosphorus - Water (011) WT-TM-1020; modified from SM 4500-P E, F AUTO COLOR - DIGESTION Total Phosphorus		
WT-TM-1020; modified from SM 4500-P E, F AUTO COLOR - DIGESTION	OSDWA †	
WT-TM-1020; modified from SM 4500-P E, F AUTO COLOR - DIGESTION Total Phosphorus Water (Inorganic) Turbidity - Water (024) WT-TM-1004; modified from SM 2130 B TURBIDIMETRIC	OSDWA † OSDWA †	
<ul> <li>WT-TM-1020; modified from SM 4500-P E, F AUTO COLOR - DIGESTION Total Phosphorus</li> <li>Water (Inorganic)</li> <li>Turbidity - Water (024)</li> <li>WT-TM-1004; modified from SM 2130 B TURBIDIMETRIC Turbidity</li> <li>Water (Microbiology)</li> <li>Coliforms - Water (155)</li> <li>WT-TM-1200; modified from MOE/LSB MICROMFDC-E3407 MEMBRANE FILTRATION (DC) Escherichia coli (E. coli) Total Coliforms</li> <li>Water (Microbiology)</li> <li>Escherichia coli (E. coli) Total Coliforms</li> <li>Water (Microbiology)</li> <li>Escherichia coli (E. coli) - Water (052)</li> <li>WT-TM-1200; modified from ONTARIO MOE COMPARISON EV MEMBRANE FILTRATION (mFC-BCIG)</li> </ul>	OSDWA † OSDWA †	
<ul> <li>WT-TM-1020; modified from SM 4500-P E, F AUTO COLOR - DIGESTION Total Phosphorus</li> <li>Water (Inorganic)</li> <li>Turbidity - Water (024)</li> <li>WT-TM-1004; modified from SM 2130 B TURBIDIMETRIC Turbidity</li> <li>Water (Microbiology)</li> <li>Coliforms - Water (155)</li> <li>WT-TM-1200; modified from MOE/LSB MICROMFDC-E3407 MEMBRANE FILTRATION (DC) Escherichia coli (E. coli) Total Coliforms</li> <li>Water (Microbiology)</li> <li>Escherichia coli (E. coli) Total Coliforms</li> <li>Water (Microbiology)</li> <li>Escherichia coli (E. coli) - Water (052)</li> <li>WT-TM-1200; modified from ONTARIO MOE COMPARISON EX</li> </ul>	OSDWA † OSDWA †	

C1-Chrysenes **C1-Dibenzothiopenes** C1-Fluoranthenes/Pyrenes C1-Fluorenes C1-Naphthalenes C1-Phenanthrenes/Anthracene C2-Benzofluoroanthenes/Benzo(a)pyrenes C2-Biphenvl C2-Chrysenes C2-Dibenzothiopenes C2-Fluoranthenes/Pyrenes C2-Fluorenes C2-Naphthalenes C2-Phenanthrenes/Anthracene C3-Chrysenes C3-Dibenzothiopenes C3-Fluoranthenes/Pyrenes C3-Fluorenes C3-Naphthalenes C3-Phenanthrenes/Anthracene C4-Dibenzothiopenes C4-Fluoranthenes/Pyrenes C4-Naphthalenes C4-Phenanthrenes/Anthracene Chrvsene Dibenzo (a,h) anthracene Dibenzothiopene Fluoranthene Fluorene Indeno (1,2,3 - cd) pyrene Naphthalene Pervlene Phenanthrene Phenanthrene Pyrene Quinoline Retene Water (Organic) Base Neutral Acid Extractables (BNA) - Water, Wastewater (015) WT-TM-1101/WT-TM-1300; modified from EPA SW-846-8270 and EPA SW-846 3500C GC/MS - EXTRACTION 1-Chloronaphthalene 1-Methylnaphthalene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1.3-Dichlorobenzene 2-Chloronaphthalene 2-Chlorophenol 2-Methvinaphthalene 2-Nitrophenol 2,3,4-Trichlorophenol

2,3,4,5-Tetrachlorophenol 2,3,4,6-tetrachlorophenol OSDWA †

† "OSDWA" indicates the appendix is used for the analysis of Ontario drinking water samples, which is subject to the rules and related regulations under the Ontario "Safe Drinking Water Act" (2002).

Nitrobenzene o-Cresol p-chloroaniline Pentachlorophenol Pervlene Phenanthrene Phenol **Pvrene** Quinoline **Total Diphenylamine** Water (Organic) OSDWA † Diquat and Paraquat - Water (134) WT-TM-1506: modified from MDS SCIEX APPLICATION NOTE DIQUAT and PARAQUAT LC-MS/MS - EXTRACTION Diquat Paraguat Water (Organic) OSDWA † Formaldehyde - Water (162) WT-TM-1603; modified from EPA 556.1 GC/ECD Formaldehyde OSDWA † Water (Organic) Glycols - Water (090) WT-TM-1601; modified from EPA 8015B - MODIFIED GC/FID 1,2 - Propylene Glycol 1,3 - Propylene Glycol **Diethylene Glycol** Ethylene Glycol **Triethylene Glycol** Water (Organic) OSDWA † Glyphosate - Water (133) WT-TM-1504; modified from MOE-GLYMS-E3500 LC-MS/MS - EXTRACTION Glyphosate Water (Organic) OSDWA + Haloacetic Acids - Water (163) WT-TM-1604: modified from EPA 552.3 GC/ECD Bromoacetic Acid (BAA) **Bromochloroacetic Acid Bromodichloroacetic Acid** Chloroacetic Acid (CAA) Chlorodibromoacetic Acid Dalapon (2,2-Dichloropropionic Acid) Dibromoacetic Acid (DBAA) Dichloroacetic Acid (DCAA) Tribromoacetic acid (TBAA) Trichloroacetic Acid (TCAA)

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Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) - Water (17 WT-TM-1557; modified from JOURNAL OF CHROMATOGRAPHY A.1093 (2005), LC-MS/MS	
Perfluorooctane Sulfonate (PFOS) Perfluorooctanoic Acid (PFOA)	
Water (Organic) Pesticides - Water (023)	OSDWA †
WT-TM-1107/WT-TM-1109-/WT-TM-1302; modified from EPA SW-846 8270 and E GC/MS - EXTRACTION	PA SW-846 3500C
2,4-dichlorophenoxyacetic acid	
2,4,5-trichlorophenoxyacetic acid	
Alachior	
Atrazine	
Azinphos-methyl Bendiocarb	
Bromoxynil	
Carbaryl	
Carbofuran	
Chlorpyrifos (ethyl)	
Cyanazine	
De-ethylated atrazine	
Diazinon	
Dicamba	
Diclofop-methyl (as free acid)	
Dimethoate Dinoseb	
Malathion	
Metolachlor	
Metribuzin	
Parathion (ethyl)	
Phorate	
Picloram	
Prometryne	
Simazine	
Temephos	
Terbufos	
Triallate	
Trifluralin	
Water (Organic)	OSDWA †
Petroleum Hydrocarbons (PHC) - Water (068)	
WT-TM-1307/WT-TM-1112; modified from MOE:DECPH E3421 GC/FID - EXTRACTION	
F2 (C10-C16)	
F3 (C16-C34)	
F4 (C34-C50)	
Water (Organic)	OSDWA †
	CODANY I
Petroleum Hydrocarbons (PHC) - Water (069)	
Petroleum Hydrocarbons (PHC) - Water (069) WT-TM-1307/WT-TM-1112; modified from MOE:DECPH E3421	
Petroleum Hydrocarbons (PHC) - Water (069)	

Water (Organic) Volatile Organic Compounds - Water (113) NA-TM-1102; modified from EPA 8260C and EPA 5021A GC/MS - HEADSPACE 1,1-Dichloroethane 1,1-Dichloroethylene 1.1-Dichloropropene 1.1.1-Trichloroethane 1.1.1.2- Tetrachloroethane 1.1.2-Trichloroethane 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-Chloropropane 1.2-Dichlorobenzene 1.2-Dichloroethane 1,2-Dichloropropane 1,2,3-Trichlorobenzene 1,2,3-Trichloropropane 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1.3-Dichlorobenzene 1,3-Dichloropropane 1,3,5-TrimethylBenzene 1,4-Dichlorobenzene 2-Chlorotoluene 2-Hexanone 2.2-Dichloropropane 4-Chlorotoluene Acetone (2-Propanone) Benzene Bromobenzene Bromochloromethane Bromodichloromethane Bromoform Bromomethane Carbon disulfide Carbon Tetrachloride Chlorobenzene Chlorodibromomethane Chloroethane Chloroform Chloromethane cis-1,2-Dichloroethylene cis-1,3-Dichloropropene Dichlorodifluoromethane Dichloromethane Ethylbenzene Ethylene Dibromide Hexachlorobutadiene Hexane Isopropylbenzene Isopropyltoluene Isopropyltoluene m/p-xylene

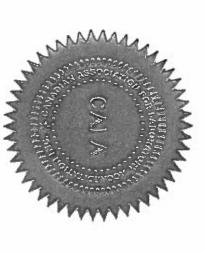
OSDWA †

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# for Laboratory Accreditation Inc. CALA

AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Road Guelph, Ontario

management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009). This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005



Accreditation No.: A2803 Issued On: November 10, 2014 Accreditation Date: January 3, 2005 Expiry Date: May 10, 2017

A CALA

President & CEO

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**CALA Directory of Laboratories** 

Laboratory Accreditation Inc.

Parent Institution: Address: Contact: Phone: Fax:	2803 AquaTox Testing & Consulting Inc. 11B Nicholas Beaver Road Guelph ON N1H 6 Ms. Stephanie Folz (519) 763-4412 (519) 763-4419 sfolz@aquatox.ca	3H9	
Clients Served: Revised On:	Conforms with requirements of ISO/IEC 17025 November 10, 2014 May 10, 2017	;	
	Scope of Accreditation		
Solids (Toxicology) Chironomids - Sediment SOP 391, 271; EPS 1/RM SURVIVAL AND 0 Chironomus dilutu Chironomus ripari	/32 GROWTH is (formerly Chironomus tentans)		
Solids (Toxicology) Hyalella azteca - Sedimen SOP 390, 270; EPS 1/RM SURVIVAL AND ( Hyalella azteca	/33		
Solids (Toxicology) Marine Amphipods - Sedir SOP 387; EPS 1/RM/26, E ACUTE LETHALI Amphipods	EPS 1/RM/35		
Solids (Toxicology) Microtox - Solid Phase - S SOP 375; EPS 1/RM/42 BIOLUMINESCEM Microtox Solid Pha	NCE		
Solids (Toxicology) Polydora cornuta - Sedime SOP 361; EPS 1/RM/41 SURVIVAL AND ( Polydora cornuta			

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### Water (Toxicology) Rainbow Trout - Water (001) SOP 330, 308, 240; EPS 1/RM/9, EPS 1/RM/13 ACUTE LETHALITY (SURVIVAL) Trout LC50 (96 h) Trout Single Concentration (96h)

### Water (Toxicology)

Silverside - Water (009) SOP 371; modified from EPA - 821-R-02-014, METHOD 1006.0 GROWTH AND SURVIVAL Silverside

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Baffinland	Sampling Program – Quality Assurance and Quality	Issue Date: March 14, 2016
	Control Plan	Rev.: 0
	Environment	Document #: BAF-PHI-830-P16-0001

# Appendix- D

# Laboratory Analytical Methods

The information contained herein is proprietary Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.



GIENE METHOD A 1311 A 1311 HA 2120 HA 2510 B HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0 0.10 0.10 1.0 3.0 10 0.10 20 2.0 0.10 0.10 0.10 0.10	C.U. C.U. umhos/ cm mg/L
A 1311 A 1311 HA 2120 HA 2510 B HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 0.10 1.0 3.0 10 0.10 20 2.0 0.10 0.10 0.10	umhos/ cm mg/L pH units mg/L mg/L NTU
A 1311 HA 2120 HA 2510 B HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 1.0 3.0 10 0.10 20 2.0 0.10 0.10 0.10	pH units C.U. umhos/ cm mg/L pH units mg/L mg/L NTU
A 1311 HA 2120 HA 2510 B HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 1.0 3.0 10 0.10 20 2.0 0.10 0.10 0.10	pH units C.U. umhos/ cm mg/L pH units mg/L mg/L NTU
HA 2120 HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	1.0 3.0 10 0.10 20 2.0 0.10 0.10	pH units C.U. umhos/ cm mg/L pH units mg/L mg/L NTU
HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	3.0 10 0.10 20 2.0 0.10 0.10	umhos/ cm mg/L pH units mg/L mg/L NTU
HA 2510 B HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	3.0 10 0.10 20 2.0 0.10 0.10	umhos/ cm mg/L pH units mg/L mg/L NTU
HA 2340 B HA 4500 H-Electrode HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	10 0.10 20 2.0 0.10 0.10	umhos/ cm mg/L pH units mg/L mg/L NTU
A 4500 H-Electrode A 2540C A 2540 D-Gravimetric A 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 20 2.0 0.10 0.10	mg/L pH units mg/L mg/L NTU
A 4500 H-Electrode A 2540C A 2540 D-Gravimetric A 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 20 2.0 0.10 0.10	pH units mg/L mg/L NTU
HA 2540C HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	20 2.0 0.10 0.10 0.10	mg/L mg/L NTU
HA 2540 D-Gravimetric HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	2.0 0.10 0.10 0.10	mg/L NTU %
HA 2130 B vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10 0.10 0.10	NTU
vimetric: Oven Dried estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10	%
estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10	
estry Canada (1991) p. 46-53 estry Canada (1991) p. 46-53	0.10	
estry Canada (1991) p. 46-53		%
estry Canada (1991) p. 46-53		%
	0.10	
	0.10	%
estry Canada (1991) p. 46-53	0.10	%
estry Canada (1991) p. 46-53		
SUBLET LAB'S REPORT		· · · ·
AOE DUSTFALLS	0.10	mg/
		dm2.day
NOE DUSTFALLS	0.10	mg/ dm2.day
IOE DUSTFALLS	0.10	mg/
		dm2.day
SH 7500		
3		
300.0	1.0	ug/g
300.0	1.0	ug/g
IA 4500-N	200	mg/kg
		mg/L
	MOE DUSTFALLS MOE DUSTFALLS S SSH 7500 S A 300.0 A 300.0 HA 4500-N	MOE DUSTFALLS       0.10         MOE DUSTFALLS       0.10         S       0.10



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
Fotal Kjeldahl Nitrogen	APHA 4500-N	0.15	mg/L
Total Phosphorus	APHA 4500-P B E	0.0030	mg/L
Soil-Anions and Nutrien	ts		
Nitrate and Nitrite as N	APHA 4110 B	1.0	ug/g
Water-Cyanides			
Cyanide, Free	ASTM 7237	0.0050	mg/L
Water-Organic / Inorgan	ic 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
otal Organic Carbon	CARTER 21.2	0.10	%
Water-Bacteriological To	ests		
E. Coli	SM 9222D	0	CFU/100
ecal Coliforms	SM 9222D	0	mL CFU/100
otal Coliforms	SM 9222B	0	mL CFU/100
Soil-Metals			mL
luminum (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
	· · · · · · · · · · · · · · · · · · ·	*	~ <del>~</del> ~9
	EPA 200.2/6020A	1	ua/a
Barium (Ba) Cadmium (Cd)	EPA 200.2/6020A EPA 200.2/6020A	1 0.5	ug/g ug/g



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/
Antimony (Sb)-Total	EPA 6020A	0.00010	dm2.day mg/
Arsenic (As)-Total	EPA 6020A	0.00010	dm2.day mg/
Barium (Ba)-Total	EPA 6020A	0.000050	dm2.day 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



Parameter	Method Reference	Report D.L.	Units
Molybdenum (Mo)-Total	EPA 6020A	0.000050	mg/
Nickel (Ni)-Total	EPA 6020A	0.00050	dm2.day mg/
			dm2.day
Potassium (K)-Total	EPA 6020A	0.050	mg/
Selenium (Se)-Total	EPA 6020A	0.0010	dm2.day mg/
Silver (Ag)-Total		0.000045	dm2.day
	EPA 6020A	0.000010	mg/ dm2.day
Sodium (Na)-Total	EPA 6020A	0.050	mg/
Strontium (Sr)-Total	EPA 6020A	0.00010	dm2.day
		0.00010	mg/ dm2.day
Thallium (TI)-Total	EPA 6020A	0.00010	mg/
Tin (Sn)-Total	EPA 6020A	0.00010	dm2.day mg/
Lizenium (L) Tetel			dm2.day
Uranium (U)-Total	EPA 6020A	0.000010	mg/ dm2.day
Vanadium (V)-Total	EPA 6020A	0.0010	mg/
Zinc (Zn)-Total	EPA 6020A	0.0000	dm2.day
		0.0030	mg/ dm2.day
Water-Total Metals			
Aluminum (A!)-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 (AI)-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 Chromium (Cr)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Cobalt (Co)-Total		0.0005	mg/L
Copper (Cu)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Copper (Cu)-Total	APHA 3030 B&E / EPA SW-846 6020A EPA 200.8	0.0005	mg/L
	EFA 200.0	0.001	mg/L



Parameter	Method Reference	Report D.L.	Units
Iron (Fe)-Total	APHA 3030 B&E / EPA SW-846 6020A		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 (TI)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
in (Sn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Fitanium (Ti)-Total	EPA SW-846 3005A/6010B	0.01	mg/L
Jranium (U)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Jranium (U)-Total	EPA 200.8	0.001	mg/L
/anadium (V)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
(inc (Zn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.003	mg/L
Linc (Zn)-Total	EPA 200.8	0.003	mg/L
Water-Dissolved Metals			
luminum (Al)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
ntimony (Sb)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
rsenic (As)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
arium (Ba)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
eryllium (Be)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	-
ismuth (Bi)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
oron (B)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.000	mg/L
admium (Cd)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
alcium (Ca)-Dissolved	EPA 200.8	0.5	mg/L
hromium (Cr)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
		0.0001	mg/L



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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 (TI)-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
₋ead (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
Dil 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			
Dil and Grease, Total	APHA 5520 B	500	mg/kg
Water-Volatile Organic Con	-		
,4-Difluorobenzene	SW846 8260 (HEADSPACE)	1	



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
MiscMiscellaneous			
Special Request	SEE SUBLET LAB RESULTS		



Product	Matrix	Product Description	Analytical Method Reference
AIR VOLUME-ED	Misc.	Air volume (L)	HYGIENE METHOD
NOTE: When air concers sampling flow rate) supp	ntrations of and lied by the clie	alytes are reported, they are based on a ent.	r sampling information (air volume, sampling time,
ALK-SPEC-WT	Water	Speciated Alkalinity	EPA 310.2
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS3-WT	Water	CI, F, SO4	EPA 300.0 (IC)
BOD-WT	Water	BOD	APHA 5210 B
Diluted and seeded sam	ples are filled i	in an airtight bottle and incubated at a sp	ecified 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 ex	tracting a soil (		thanol, then analyzing by headspace-GC/MS.
3TX-HS-WT	Water	BTEX by Headspace	SW846 8260 (HEADSPACE)
catalyst. The water is va	porized and the	e organic cabon is oxidized to carbon die	APHA 5310 B-INSTRUMENTAL reaction chamber which is packed with an oxidative oxide. The carbon dioxide is transported in a carrier
gas and is measured by	a non-dispersi	ve infrared detector.	
CHL/A-ACET-FLUORO-WP		Chlorophyll a by fluorometry	EPA 445.0 ACET
This analysis is done usi followed with analysis by chlorophyll b.	ng procedures fluorometry us	modified from EPA method 445.0. Chloring the non-acidification procedure. This	rophyll a is determined by a 90 % acetone extraction s method is not subject to interferences from
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 o Utilizing Gas Diffusion Se final determination by col	eparation and <i>i</i>	Amperometric Detection". Free cyanide	"Free Cyanide with Flow Injection Analysis (FIA) is determined by in-line gas diffusion at pH 6 with
OD-BF	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidian spectrophotometer.	zes COD mate	erial when the sample is digested and aft	er digestion the sample is then analyzed on a
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidi	zes COD mate		er digestion the sample is then analyzed on a

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 determ	nined by analysis	s of the decanted sample using the platinu	m-cobalt colourimetric method.	
DUSTFALLS-INS.DM2-VA	Dustfall	Dustfalls Insoluble (mg/dm2.day)	BCMOE DUSTFALLS	
Dustfall analysis is carrie	d out in accorda	nce with procedures published by the B.C.	Ministry of Environment Laboratory.	
EC-BF	Water	Conductivity	APHA 2510 B	
Water samples can be me	easured 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 me	easured 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.



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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.

F1 (O.Reg.153/04)

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)

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 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

E3398/CCME TIER 1-HS

E3421/CCME (HS)

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.



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 hydrocarb to remove polar contamin detection (FID) and a 100	ants. The final of	concentrated extract is analyzed by gas ch	t partition. The extracts are treated with silica gel romatography (GC) using flame ionization
using external calibration nC16 to the apex nC34 a	using a standar nd the F4 fractio	d mix containing nC10, nC16 and nC34, S	apex of nC10 to the apex nC16 and quantitating imilarly, the F3 fraction extends from the apex of ne apex nC50. If the chromatogram does not 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
published by the America SW-846 published by the	n Public Health / United States E	Association, and with procedures adapted	ne Examination of Water and Wastewater" from "Test Methods for Evaluating Solid Waste" instrumental analysis is by cold vapour atomic nod 245.7).
HG-R511-WT	Soil	Mercury-O.Reg 153/04 (July 2011)	SW846 3050B/7471
Solid sample is digested we mercury is then reduced to	with a heated, str o elemental mer	rong, mixed acid solution to convert all for cury, sparged from solution and analyzed	ms of mercury to divalent mercury. The divalent by CVAAS.
Analysis conducted in acc the Environmental Protect	cordance with the tion Act (July 1, 2	e Protocol for Analytical Methods Used in a 2011).	the Assessment of Properties under Part XV.1 of
HG-T-L-CVAA-WT	Water	Total Mercury in Water by CVAAS (Low)	EPA SW846 7470A
Liquid sample is digested mercury is then reduced to	with a heated, s o elemental mer	trong, mixed acid solution to convert all for cury, sparged from solution and analyzed	rms of mercury to divalent mercury. The divalent 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	APHA 3030 B&E / EPA SW-846 6020A
published by the Americar SW-846 published by the treatment by acid digestion	n Public Health A United States Ei n, using hotbloc	nvironmental Protection Agency (EPA), T	te Examination of Water and Wastewater" from "Test Methods for Evaluating Solid Waste" he procedures may involve preliminary sample ntal analysis is by collision cell inductively
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).



Product	Matrix	Product Description	Analytical Method Reference
MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A
published by the Americ	an Public Healt e United States	h Association, and with procedures adapte Environmental Protection Agency (EPA).	" the Examination of Water and Wastewater" ad from "Test Methods for Evaluating Solid Waste Instrumental analysis is by inductively coupled
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A
published by the America SW-846 published by the treatment by acid digesti	an Public Healt e United States on, using hotbl	h Association, and with procedures adapte Environmental Protection Agency (EPA).	the Examination of Water and Wastewater" of from "Test Methods for Evaluating Solid Waste" The procedures may involve preliminary sample nental analysis is by collision cell inductively
MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8
This analysis involves pr inductively coupled plasm	eliminary samp na - mass spec	le treatment by hotblock acid digestion (AF trometry (EPA Method 6020A).	PHA 3030E). Instrumental analysis is by
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
published by the America SW-846 published by the treatment by acid digesti	an Public Healt United States on, using either	h Association, and with procedures adapte Environmental Protection Agency (EPA).	the Examination of Water and Wastewater" d from "Test Methods for Evaluating Solid Waste" The procedures may involve preliminary sample d 3005A). Instrumental analysis is by inductively
MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A
Sample is vigorously dige	ested with nitric	and hydrochloric acid. Analysis is conduct	ted by ICP/MS.
Analysis conducted in ac the Environmental Protect Protocol states that all ar	ction Act (July 1	1, 2011), unless a subset of the Analytical 1	n the Assessment of Properties under Part XV.1 o Fest Group (ATG) has been requested (the
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
NH3-WT	Water	Ammonia, Total as N	EPA 350.1
Sample is measured color acid and measured color	primetrically. Wi		equired, sample is distilled into a solution of boric
NO2-L-IC-WP	Water	Nitrite as N by Ion Chromatography	EPA 300.1 (Modified)
Anions in aqueous matric	xes are analyze	d using ion chromatography with conductiv	
NO2-WT	Soil		EPA 300.0
NO3-WT	Soil	Nitrate in Soil	EPA 300.0
NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)



Product	Matrix	Product Description	Analytical Method Reference
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calculation	CALCULATION
Sample is extracted with and is then determined (	n hexane, samp gravimetrically.	le speciation into mineral and animal/vegeta	ble fractions is achieved via silica gel separation
OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B
Sample is extracted with and is then determined g	hexane, samp gravimetrically.	le speciation into mineral and animal/vegeta	ble fractions is achieved via silica gel separation
OGG-TOT-WT	Soil	Oil and Grease, Total	APHA 5520 B
Sample is extracted with oil and grease.	an acetone:he	xane mixture followed, extract is then evapo	rated and residue is weighed to determine total
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B
Sample is extracted with	hexane, extrac	t is then evaporated and the residue is weig	
P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E
This analysis is carried t "Phosphorus".	y out an discre	te colorimetric auto-analyzer using procedur	
PARTICULATE-0.10-SLT	Filter	Respirable Dust N0600	SEE SUBLET LAB'S REPORT
PH-BF	Water	pH	APHA 4500 H-Electrode
Water samples are analy	zed directly by	a calibrated pH meter.	
Analysis conducted in ac the Environmental Prote	cordance with t ction Act (July 1	the Protocol for Analytical Methods Used in t	the Assessment of Properties under Part XV.1 of
PH-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analy	zed directly by	a calibrated pH meter.	
Analysis conducted in ac the Environmental Protect	cordance with f ction Act (July 1	the Protocol for Analytical Methods Used in to , 2011).	the Assessment of Properties under Part XV.1 of
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is ferricyanide to form a red	used to distill th complex which	ne sample. The distillate is then buffered to p n is measured colorimetrically.	oH 9.4 which reacts with 4AAP and potassium
HEOA-ACET-FLUORO-WI	> Water	Pheophytin a by fluorometry	EPA 445.0 ACET
This analysis is done usi collectively as Pheophyti procedure.	ng procedures i n a by a 90% (v	modified from EPA method 445.0. Pheopigrr /v) acetone extraction followed with analysis	nents present in the sample are determined
REP-DUSTFALL-VA	Dustfall	Dustfall Sample Preparation	

PREP-DUSTFALL-VA Dustfall Dustfall Sample Preparation



Product	Matrix	Product Description	Analytical Method Reference
PSA-3-SK	Soil	Particle size - Pipette removal OM & C	CO3Forestry Canada (1991) p. 46-53
remaining soil is treated suspension is allowed to clay fraction, an aliquot	with sodium he settle in accor of the clay susp on, then drying	dance with Stoke's Law so that only clay pa pension is removed, then dried and weigher	en peroxide to remove organic matter. The persion of primary soil particles. The homogenized articles remain in suspension. To determine the d. The sand fraction is determined by wet sieving re. The silt fraction is determined by calculation
Reference: Burt, R. (2009). Soil Sur United States Departme	vey Field and L ant of Agricultur	aboratory Methods Manual. Soil Survey Inve e Natural Resources Conservation Service.	vestigations Report No. 5. Method 3.2.1.2.2.
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 f overnight and then 180±	iltered though of 10°C for 1hr.	plass fibres filter. A known volume of the fil	trate is evaporated and dried at $105\pm5^{\circ}C$
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C
A well-mixed sample is f overnight and then 180±	iltered though g 10°C for 1hr.	lass fibres filter. A known volume of the fil	trate is evaporated and dried at 105±5°C
SOLIDS-TSS-BF	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is f for a minimum of four ho	iltered through urs or until a co	a weighed standard glass fibre filter and the onstant weight is achieved.	e residue retained is dried in an oven at $105\pm5^{\circ}C$
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is f for a minimum of four ho	iltered through urs or until a co	a weighed standard glass fibre filter and the onstant weight is achieved.	e residue retained is dried in an oven at 105±5°C
SPECIAL REQUEST-SLT	Misc.	Special Request Datachem Salt Lake	SEE SUBLET LAB RESULTS
rc-mf-wt	Water	Total Coliforms	SM 9222B
A 100mL volume of sam 35±0.5°C for 24±2h. Met	ple is filtered th hod ID: WT-TN	rough a membrane, the membrane is place I-1200	ed on mENDO LES agar and incubated at
ſĸŊ-ŴŢ	Soil	Total Kjeldahl Nitrogen	APHA 4500-N
A homogenized soil sam colour complex. The abs sample and is reported a	orbance measu	to convert the TKN to ammonium sulphate. Ired by the instrument is proportional to the	. The ammonia ions are heated to produce a concentration of ammonium sulphate in the
KN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N
Sample is digested to co absorbance measured by TKN.	nvert the TKN t y the instrumen	o ammonium sulphate. The ammonia ions	are heated to produce a colour complex. The monium sulphate in the sample and is reported as



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 organic cabon is oxidized infrared detector.	heated reactio	n chamber which is packed with an oxidativ xide. The carbon dioxide is transported in a	ve catalyst. The water is vaporized and the carrier gas and is measured by a non-dispersive
TURBIDITY-BF	Water	Turbidity	APHA 2130 B
Sample result is based o intensity of light scattered Nephelometer.	n a comparison d by a standard	n of the intensity of the light scattered by the I reference suspension under the same con	e sample under defined conditions with the ditions. Sample readings are obtained from a
TURBIDITY-WT	Water	Turbidity	APHA 2130 B
Sample result is based o intensity of light scattered Nephelometer.	n a comparisor d by a standard	n of the intensity of the light scattered by the I reference suspension under the same con	e sample under defined conditions with the ditions. Sample readings are obtained from a
XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION
Total xylenes represents	the sum of o-x	ylene and m&p-xylene.	
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION
Total vulance represente	the even of a se	dama and as 0 a set as a	

Total xylenes represents the sum of o-xylene and m&p-xylene.

∎Baffinland	Sampling Program – Quality Assurance and Quality	Issue Date: March 14, 2016	
	Control Plan	Rev.: 0	
	Environment	Document #: BAF-PHI-830-P16-0001	

# Appendix- E

# Analytical Laboratory QA/QC Procedures

The information contained herein is proprietary Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.



## 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.

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## 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  $\pm 2$  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.

$$MDL = (s_x t_y) + |MBIk|$$

Where:

-  $s_0$  = the standard deviation derived from the analysis of blank or low level samples, whichever gives a higher standard deviation,

- t\_ = the Student's t-distribution with n-1 degrees of freedom for the one-sided 99% confidence interval.

 $-|\dot{M}Blk|$  = 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<sub>5</sub>. 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<sub>5</sub>, test results are considered to be quantitatively accurate. A reported parameter at the LOQ<sub>5</sub> is considered to be within 40% of the true value 95% of the time.

 $LOQ_{s} = 5s_{0} + |MB|k|$ 

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

 $U(c) = 2 * [\sqrt{\{s_0^2 + (\Theta c)^2\}}] + |MBIk_{II}|$ 

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.

-  $\Theta$  = Combined relative standard uncertainty, excluding MDL and Method Blank contributions. Theta has no units.

-  $|MBIk_{LT}|$  = Absolute value of the mean long-term Method Blank value, where significant (i.e. if > 1/5 s<sub>0</sub>). [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

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.
- 2<sup>nd</sup> 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:

- o 1 Method Blank.
- 1 Sample Duplicate. \*
- o 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  $\pm 2 \times \text{the LOR}$  (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.<sup>1</sup>

**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  $\pm 1 \times$  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

 $<sup>^{1}</sup>$  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.
- 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:

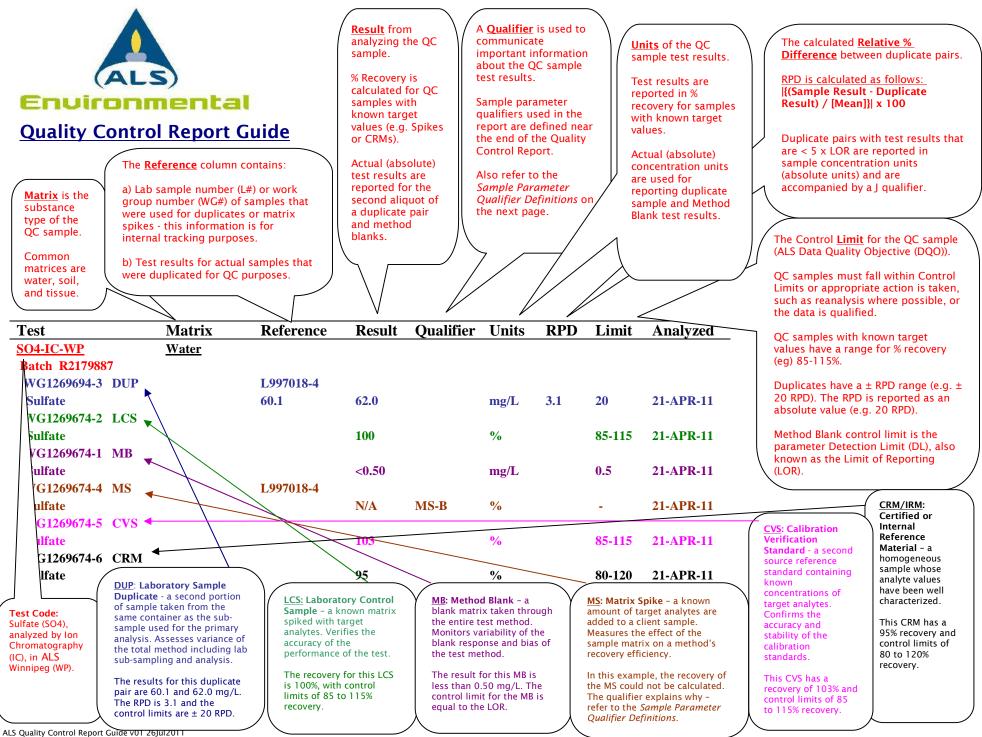
DTC: Dissolved concentration exceeds total. Results were confirmed by re-analysis.



## 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



Page 1 of 3

# **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

<u>Legend</u>: explains acronyms that may be used in the QC Report.

## Sample Parameter Qualifier Definitions:

#### Qualifier Description

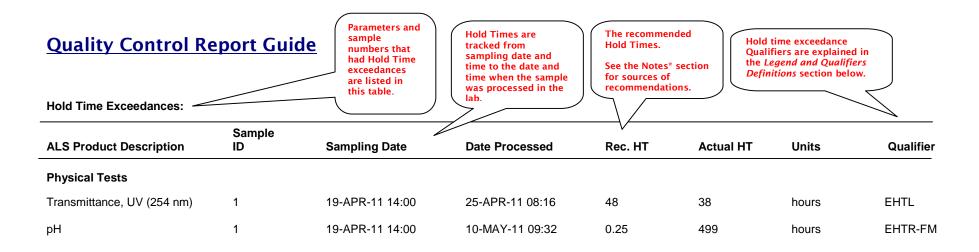
J	Duplicate results and limits are expressed in terms of absolute difference.

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.

<u>Qualifiers:</u> 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.



#### 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. Sample was received less than 24 hours prior to expiry. 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 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.



## MARY RIVER PROJECT

2016 MMER Annual Report March 31, 2017

# APPENDIX D

# MMER SAMPLING AND REPORTING REQUIREMENTS MEMO



## Memorandum

Date:	May 20,	2015
Duio.		2010

- 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<sup>3</sup>) 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<sup>3</sup>/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 – 49<sup>th</sup> Street Edmonton, AB T6B 1K5 <u>Susanne.forbrich@ec.gc.ca</u> (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<br/>deleterious substances, acute toxicity and characterization<br/>monitoring components under the MMER.

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

<sup>a</sup> 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)

<sup>b</sup> 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.,  $\geq$ 50% mortality), sampling frequency must be increased.

*Effluent volume* must be monitored in cubic meters (m<sup>3</sup>), and reported in m<sup>3</sup>/day, m<sup>3</sup>/month and m<sup>3</sup>/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 31<sup>st</sup> 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				Year 1 Reporting Period				
		Sampling Initiation Free	Sampling Frequency (when discharging)	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
	Deleterious Substances and pH	July 1 <sup>st</sup> - 8 <sup>th</sup> , 2015	every week <sup>a</sup>	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 1 <sup>st</sup> - 8 <sup>th</sup> , 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	Effluent Volume (datalogger?)	July 1 <sup>st</sup> - 8 <sup>th</sup> , 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 <sup>b</sup>	3 sampling events <sup>b</sup>	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events <sup>b</sup>
	Sub-lethal toxicity	July 2015	twice annually <sup>b</sup>	2 sampling events	none required	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	2 sampling events
	Downstream (effluent- exposed) Station	July 2015	four times annually <sup>b</sup>	3 sampling events <sup>b</sup>	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events <sup>b</sup>
	Upstream (reference) Station	July 2015	four times annually <sup>b</sup>	3 sampling events <sup>b</sup>	1 sampling event (assume Nov, Dec freeze up)	no effluent discharge likely (freeze-up)	no effluent discharge likely (freeze-up)	4 sampling events <sup>b</sup>
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

<sup>a</sup> Weekly monitoring samples must be collected a minimum of 24 hours apart <sup>b</sup> 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 <u>http://dsp-psd.pwgsc.gc.ca/Collection/En49-24-1-39E.pdf</u>.

- 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.

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