BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

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

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BAFFINLAND IRON MINES CORPORATION

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

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. High-grade 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^3 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^3 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):

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^3 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.

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 SUMMARY OF DELETERIOUS SUBSTANCES MONITORING

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

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 Detectable Limit**										

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

Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)	Date	Volume Discharged (m^3)
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

Date	Volume Discharged (m^3)
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

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)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (µmhos/cm)
MDL	10	10	0.0030	0.000010	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)	Iron (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Electrical Conductivity (µmhos/cm)
MDL	10	10	0.0030	0.000010	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

Effluent Characterization MS-08 Effluent-Exposure Area (MS-08-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
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	-

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

Effluent Characterization MS-06 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
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	-

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

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.

MS-08 Sublethal Toxicity Test EC_{25} Or IC_{25}

Date	Species Tested	Sublethal Test Type	Sample Method	Lab	EC_{25} or IC_{25}	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.

Table 9.1- Results from Sub-Lethal Toxicity Testing EC_{25} or IC_{25} MS-08

MS-08 Sublethal Toxicity Test LC_{50}

Date	Species Tested	Sublethal Test Type	Sample Method	Lab	LC_{50}
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

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.

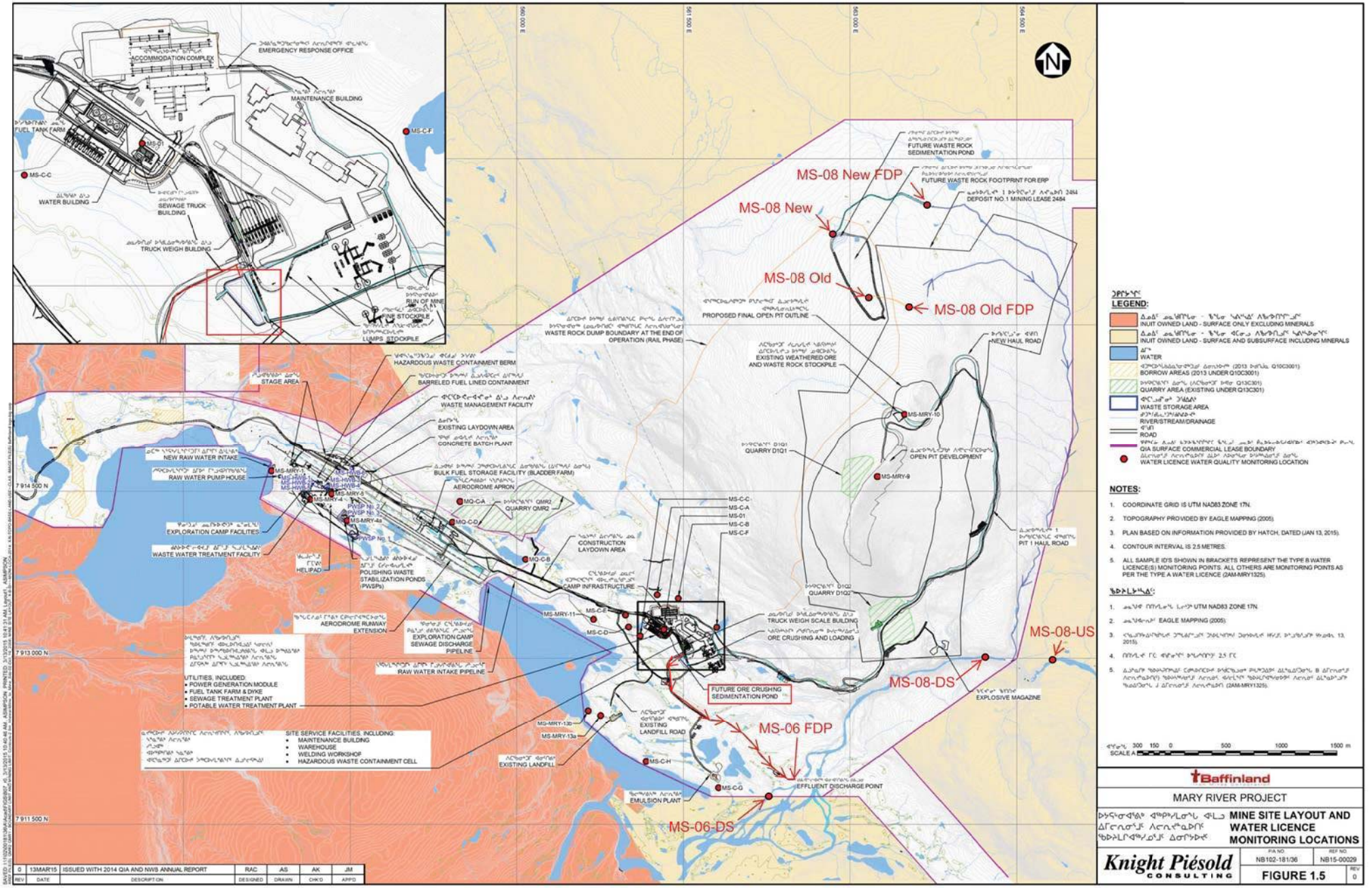
The QA/QC objectives of this Plan are designed to provide guidance to field staff and analytical laboratories in order to maintain a high level of confidence in the water quality data generated from the Mary River Project.

APPENDIX A

MONITORING LOCATION MAP

&

LETTERS OF NOTIFICATION


MS-08 New FDP
MS-08 New
MS-08 Old
MS-08 Old FDP
MS-08-US
MS-08-DS
MS-06 FDP
MS-06-DS
FUTURE WASTE ROCK SEDIMENTATION POND
FUTURE WASTE ROCK FOOTPRINT FOR ERP
DEPOSIT NO.1 MINING LEASE 2484
PROPOSED FINAL OPEN PIT OUTLINE
WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION (RAIL PHASE)
EXISTING WEATHERED ORE AND WASTE ROCK STOCKPILE
NEW HAUL ROAD
QUARRY D1Q1
OPEN PIT DEVELOPMENT
QUARRY D1Q2
PIT 1 HAUL ROAD
TRUCK WEIGH SCALE BUILDING
ORE CRUSHING AND LOADING
EXPLOSIVE MAGAZINE
FUTURE ORE CRUSHING SEDIMENTATION POND
EXISTING LANDFILL ROAD
EXISTING LANDFILL
EMULSION PLANT
EFFLUENT DISCHARGE POINT
HAZARDOUS WASTE CONTAINMENT BERM
BARRELED FUEL LINED CONTAINMENT
WASTE MANAGEMENT FACILITY
EXISTING LAYDOWN AREA
CONCRETE BATCH PLANT
STAGE AREA
NEW RAW WATER INTAKE
RAW WATER PUMP HOUSE
BULK FUEL STORAGE FACILITY (BLADDER FARM)
AERODROME APRON
QUARRY QMR2
EXPLORATION CAMP FACILITIES
WASTE WATER TREATMENT FACILITY
HELIPAD
POLISHING WASTE STABILIZATION PONDS (PWSPs)
CONSTRUCTION LAYDOWN AREA
CAMP INFRASTRUCTURE
AERODROME RUNWAY EXTENSION
EXPLORATION CAMP SEWAGE DISCHARGE PIPELINE
RAW WATER INTAKE PIPELINE
UTILITIES, INCLUDED:
• POWER GENERATION MODULE
• FUEL TANK FARM & DYKE
• SEWAGE TREATMENT PLANT
• POTABLE WATER TREATMENT PLANT
SITE SERVICE FACILITIES, INCLUDING:
• MAINTENANCE BUILDING
• WAREHOUSE
• WELDING WORKSHOP
• HAZARDOUS WASTE CONTAINMENT CELL
ACCOMMODATION COMPLEX
EMERGENCY RESPONSE OFFICE
MAINTENANCE BUILDING
FUEL TANK FARM
WATER BUILDING
SEWAGE TRUCK BUILDING
TRUCK WEIGH BUILDING
RUN OF MINE STOCKPILE
LUMPS STOCKPILE
560 000 E
561 500 E
563 000 E
564 500 E
7 914 500 N
7 913 000 N
7 911 500 N
LEGEND:
INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
WATER
BORROW AREAS (2013 UNDER Q10C3001)
QUARRY AREA (EXISTING UNDER Q13C301)
WASTE STORAGE AREA
RIVER/STREAM/DRAINAGE
ROAD
QIA SURFACE COMMERCIAL LEASE BOUNDARY
WATER LICENCE WATER QUALITY MONITORING LOCATION
NOTES:
1. COORDINATE GRID IS UTM NAD83 ZONE 17N.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PLAN BASED ON INFORMATION PROVIDED BY HATCH, DATED (JAN 13, 2015).
4. CONTOUR INTERVAL IS 2.5 METRES.
5. ALL SAMPLE ID'S SHOWN IN BRACKETS REPRESENT THE TYPE B WATER LICENCE(S) MONITORING POINTS. ALL OTHERS ARE MONITORING POINTS AS PER THE TYPE A WATER LICENCE (2AM-MRY1325).
SCALE A 300 150 0 500 1000 1500 m
Baffinland
MARY RIVER PROJECT
MINE SITE LAYOUT AND WATER LICENCE MONITORING LOCATIONS
Knight Piésold CONSULTING
PIA NO. NB102-181/36
REF NO. NB15-00029
FIGURE 1.5
REV 0
0 13MAR15 ISSUED WITH 2014 QIA AND NWB ANNUAL REPORT RAC AS AK JM
REV DATE DESCRIPTION DESIGNED DRAWN CHK'D APP'D

June 18, 2016

Ms. Susanne Forbrich, Regional Director
Environmental Protection Operations Directorate
Prairie and Northern Region
Eastgate Offices
9250 – 49th 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^3 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.

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

Baffinland

June 29, 2016

Ms. Susanne Forbrich, Regional Director
Environmental Protection Operations Directorate
Prairie and Northern Region
Eastgate Offices
9250 – 49th 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^3 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^3 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.

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.

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1801067-1 MS-08 Sampled By: CD/BB on 19-JUL-16 @ 11:55 Matrix: WATER							
Physical Tests							
Conductivity	63.3		3.0	umhos/cm		22-JUL-16	R3510049
Hardness (as CaCO3)	25		10	mg/L		26-JUL-16	
pH	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							
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							
Dissolved Organic Carbon	<1.0		1.0	mg/L		25-JUL-16	R3511655
Total Organic Carbon	<1.0		1.0	mg/L		24-JUL-16	R3511654
Total Metals							
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 (Tl)-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							
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) and Methodology.

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 (Tl)-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) 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
Matrix Spike	Chloride (Cl)	MS-B	L1801067-1
Matrix Spike	Nitrate (as N)	MS-B	L1801067-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1801067-1
Matrix 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

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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.

EC-WT	Water	Conductivity	APHA 2510 B

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

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-T-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

Reference Information

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

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

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

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 180 +/- 2C for 1hr.

SOLIDS-TSS-BF Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104 +/- 1C for a minimum of four hours or until a constant weight is achieved.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

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
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: L1801067 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R3510246								
WG2353594-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			108.2		%		80-120	23-JUL-16
WG2353594-4 DUP		**L1800901-1**						
Alkalinity, Total (as CaCO3)		182	184		mg/L	0.7	20	23-JUL-16
WG2353594-2 LCS								
Alkalinity, Total (as CaCO3)			109.2		%		85-115	23-JUL-16
WG2353594-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	23-JUL-16
C-DIS-ORG-WT	**Water**							
Batch R3511655								
WG2353843-3 DUP		**L1801117-5**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-JUL-16
WG2353843-2 LCS								
Dissolved Organic Carbon			91.6		%		80-120	25-JUL-16
WG2353843-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-JUL-16
WG2353843-4 MS		**L1801117-5**						
Dissolved Organic Carbon			97.8		%		70-130	25-JUL-16
CL-IC-N-WT	**Water**							
Batch R3510558								
WG2352992-10 DUP		**WG2352992-8**						
Chloride (Cl)		198	198		mg/L	0.2	20	22-JUL-16
WG2352992-7 LCS								
Chloride (Cl)			101.3		%		90-110	22-JUL-16
WG2352992-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUL-16
WG2352992-9 MS		**WG2352992-8**						
Chloride (Cl)			N/A	MS-B	%		-	22-JUL-16
EC-WT	**Water**							
Batch R3510049								
WG2352613-16 DUP		**WG2352613-15**						
Conductivity		886	886		umhos/cm	0.0	10	22-JUL-16
WG2352613-14 LCS								
Conductivity			100.6		%		90-110	22-JUL-16
WG2352613-13 MB								
Conductivity			<3.0		umhos/cm		3	22-JUL-16
F-IC-N-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R3510558								
WG2352992-10 DUP		**WG2352992-8**						
Fluoride (F)		0.115	0.119		mg/L	3.3	20	22-JUL-16
WG2352992-7 LCS								
Fluoride (F)			100.9		%		90-110	22-JUL-16
WG2352992-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUL-16
WG2352992-9 MS		**WG2352992-8**						
Fluoride (F)			100.4		%		75-125	22-JUL-16
HG-D-CVAA-WT	**Water**							
Batch R3509698								
WG2352735-3 DUP		**L1800873-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUL-16
WG2352735-2 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	22-JUL-16
WG2352735-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-16
WG2352735-4 MS		**L1800873-2**						
Mercury (Hg)-Dissolved			93.1		%		70-130	22-JUL-16
HG-T-CVAA-WT	**Water**							
Batch R3509643								
WG2352727-3 DUP		**L1800873-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-JUL-16
WG2352727-2 LCS								
Mercury (Hg)-Total			91.1		%		80-120	22-JUL-16
WG2352727-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	22-JUL-16
WG2352727-4 MS		**L1800873-2**						
Mercury (Hg)-Total			92.0		%		70-130	22-JUL-16
MET-D-CCMS-WT	**Water**							
Batch R3509130								
WG2352059-4 DUP		**WG2352059-3**						
Aluminum (Al)-Dissolved		0.0136	0.0130		mg/L	4.6	20	21-JUL-16
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	21-JUL-16
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	21-JUL-16
Calcium (Ca)-Dissolved		3.01	2.85		mg/L	5.6	20	21-JUL-16
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	21-JUL-16
Iron (Fe)-Dissolved		0.012	0.012		mg/L	0.5	20	21-JUL-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3509130								
WG2352059-4 DUP		**WG2352059-3**						
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	21-JUL-16
Magnesium (Mg)-Dissolved		4.27	4.35		mg/L	1.9	20	21-JUL-16
Manganese (Mn)-Dissolved		0.0826	0.0835		mg/L	1.1	20	21-JUL-16
Molybdenum (Mo)-Dissolved		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)-Dissolved		0.514	0.523		mg/L	1.8	20	21-JUL-16
Selenium (Se)-Dissolved		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 (Tl)-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)-Dissolved			95.0		%		80-120	21-JUL-16
Arsenic (As)-Dissolved			97.6		%		80-120	21-JUL-16
Cadmium (Cd)-Dissolved			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)-Dissolved			93.2		%		80-120	21-JUL-16
Manganese (Mn)-Dissolved			97.0		%		80-120	21-JUL-16
Molybdenum (Mo)-Dissolved			99.6		%		80-120	21-JUL-16
Nickel (Ni)-Dissolved			97.1		%		80-120	21-JUL-16
Potassium (K)-Dissolved			93.8		%		80-120	21-JUL-16
Selenium (Se)-Dissolved			101.0		%		80-120	21-JUL-16
Sodium (Na)-Dissolved			98.0		%		80-120	21-JUL-16
Thallium (Tl)-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			<0.0050		mg/L		0.005	21-JUL-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3509130								
WG2352059-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	21-JUL-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	21-JUL-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-16
Magnesium (Mg)-Dissolved			<0.050		mg/L		0.05	21-JUL-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	21-JUL-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-16
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	21-JUL-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-16
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	21-JUL-16
WG2352059-5 MS		**WG2352059-3**						
Aluminum (Al)-Dissolved			90.5		%		70-130	21-JUL-16
Arsenic (As)-Dissolved			98.8		%		70-130	21-JUL-16
Cadmium (Cd)-Dissolved			102.1		%		70-130	21-JUL-16
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	21-JUL-16
Copper (Cu)-Dissolved			96.8		%		70-130	21-JUL-16
Iron (Fe)-Dissolved			92.3		%		70-130	21-JUL-16
Lead (Pb)-Dissolved			98.6		%		70-130	21-JUL-16
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	21-JUL-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	21-JUL-16
Molybdenum (Mo)-Dissolved			98.7		%		70-130	21-JUL-16
Nickel (Ni)-Dissolved			95.2		%		70-130	21-JUL-16
Potassium (K)-Dissolved			97.2		%		70-130	21-JUL-16
Selenium (Se)-Dissolved			106.7		%		70-130	21-JUL-16
Sodium (Na)-Dissolved			111.8		%		70-130	21-JUL-16
Thallium (Tl)-Dissolved			98.1		%		70-130	21-JUL-16
Uranium (U)-Dissolved			99.0		%		70-130	21-JUL-16
Zinc (Zn)-Dissolved			92.3		%		70-130	21-JUL-16
MET-T-MS-WT	**Water**							

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3509713								
WG2352546-4 DUP		**WG2352546-3**						
Aluminum (Al)-Total		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	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 (Tl)-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		%		80-120	22-JUL-16
Arsenic (As)-Total			98.3		%		80-120	22-JUL-16
Cadmium (Cd)-Total			97.8		%		80-120	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 (Tl)-Total			98.8		%		80-120	22-JUL-16

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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 (Tl)-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

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3509713								
WG2352546-5 MS		**WG2352546-3**						
Sodium (Na)-Total			N/A	MS-B	%		-	22-JUL-16
Thallium (Tl)-Total			93.1		%		70-130	22-JUL-16
Uranium (U)-Total			N/A	MS-B	%		-	22-JUL-16
Zinc (Zn)-Total			97.6		%		70-130	22-JUL-16
NH3-WT	**Water**							
Batch R3511327								
WG2352634-11 DUP		**L1801903-1**						
Ammonia, Total (as N)		0.063	0.054		mg/L	15	20	22-JUL-16
WG2352634-10 LCS								
Ammonia, Total (as N)			100.2		%		85-115	22-JUL-16
WG2352634-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	22-JUL-16
WG2352634-12 MS		**L1801903-1**						
Ammonia, Total (as N)			98.6		%		75-125	22-JUL-16
NO3-IC-WT	**Water**							
Batch R3510558								
WG2352992-10 DUP		**WG2352992-8**						
Nitrate (as N)		16.5	16.5		mg/L	0.2	25	22-JUL-16
WG2352992-7 LCS								
Nitrate (as N)			100.7		%		70-130	22-JUL-16
WG2352992-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-JUL-16
WG2352992-9 MS		**WG2352992-8**						
Nitrate (as N)			N/A	MS-B	%		-	22-JUL-16
P-T-COL-WT	**Water**							
Batch R3509179								
WG2352557-3 DUP		**L1800881-1**						
Phosphorus, Total		0.0104	0.0130	J	mg/L	0.0026	0.006	22-JUL-16
WG2352557-2 LCS								
Phosphorus, Total			99.9		%		80-120	22-JUL-16
WG2352557-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	22-JUL-16
WG2352557-4 MS		**L1800881-1**						
Phosphorus, Total			94.9		%		70-130	22-JUL-16
PH-BF	**Water**							

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R3507976								
WG2351338-2 DUP		**L1800881-2**						
pH		8.11	8.07	J	pH units	0.04	0.2	20-JUL-16
WG2351338-1 LCS								
pH			7.02		pH units		6.9-7.1	20-JUL-16
SO4-IC-N-WT	**Water**							
Batch R3510558								
WG2352992-10 DUP		**WG2352992-8**						
Sulfate (SO4)		47.3	47.5		mg/L	0.3	20	22-JUL-16
WG2352992-7 LCS								
Sulfate (SO4)			101.2		%		90-110	22-JUL-16
WG2352992-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUL-16
WG2352992-9 MS		**WG2352992-8**						
Sulfate (SO4)			91.8		%		75-125	22-JUL-16
SOLIDS-TDS-BF	**Water**							
Batch R3508429								
WG2351499-3 DUP		**L1799920-7**						
Total Dissolved Solids		120	130		mg/L	8.0	25	21-JUL-16
WG2351499-2 LCS								
Total Dissolved Solids			102.9		%		70-130	21-JUL-16
WG2351499-1 MB								
Total Dissolved Solids			<20		mg/L		20	21-JUL-16
SOLIDS-TSS-BF	**Water**							
Batch R3508440								
WG2351497-3 DUP		**L1799920-8**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	21-JUL-16
WG2351497-2 LCS								
Total Suspended Solids			100.0		%		85-115	21-JUL-16
WG2351497-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-JUL-16
TKN-WT	**Water**							
Batch R3509989								
WG2352585-3 DUP		**L1800424-1**						
Total Kjeldahl Nitrogen		155	161		mg/L	3.6	20	22-JUL-16
WG2352585-2 LCS								
Total Kjeldahl Nitrogen			103.6		%		75-125	22-JUL-16
WG2352585-1 MB								

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R3509989								
WG2352585-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	22-JUL-16
WG2352585-4 MS		**L1800424-1**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	22-JUL-16
TOC-WT	**Water**							
Batch R3511654								
WG2353834-3 DUP		**L1800901-1**						
Total Organic Carbon		4.0	4.3		mg/L	7.0	20	24-JUL-16
WG2353834-2 LCS								
Total Organic Carbon			91.6		%		80-120	24-JUL-16
WG2353834-1 MB								
Total Organic Carbon			<1.0		mg/L		1	24-JUL-16
WG2353834-4 MS		**L1800901-1**						
Total Organic Carbon			94.3		%		70-130	24-JUL-16
TURBIDITY-BF	**Water**							
Batch R3507971								
WG2351495-3 DUP		**L1799920-1**						
Turbidity		4.33	4.32		NTU	0.2	25	19-JUL-16
WG2351495-1 MB								
Turbidity			<0.10		NTU		0.1	19-JUL-16

Quality Control Report

Workorder: L1801067 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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

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TOXICITY TEST REPORT

Work Order : 231524
Sample Number : 48375

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 Minnows. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/22 , 2nd ed. (February 2011).		

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth from Biomass)	>100%	-	-
LC50	>100%	-	-

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT 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)[a]	Statistical Method :	Spearman-Kärber (CETIS)[a]
Historical Mean IC25 :	1.02 g/L	Historical Mean LC50 :	1.21 g/L
Warning Limits (± 2SD) :	0.90 - 1.16 g/L	Warning Limits (± 2SD) :	1.09 - 1.34 g/L

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

TEST CONDITIONS

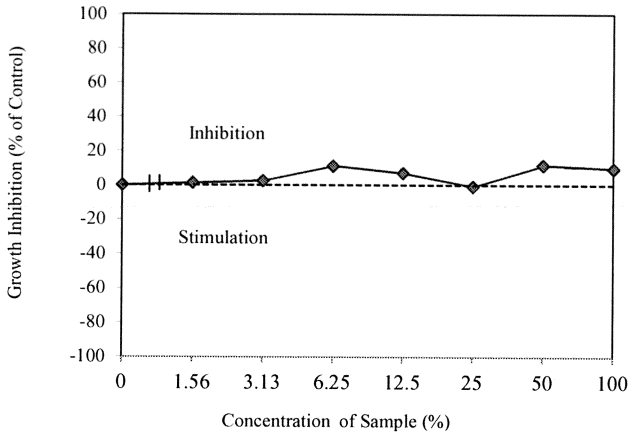
Test Organism :	*Pimephales promelas*	Test Type :	Static Renewal
Organism Batch :	Fm16-07	Control/Dilution Water :	Well water (no chemicals added)
Organism Age :	~07:00 - 22:25 h at start of test	Test Volume / Replicate :	300 mL
Source :	In-house culture	Test Vessel :	420 mL polystyrene beaker
Culture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

Work Order : 231524
Sample Number : 48375

Fathead Minnow Growth Inhibition (based on Biomass)



REFERENCES

[a] 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].

[b]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.

Date : 2016-08-24
yyyy-mm-dd

Approved By : M. Reed
Project Manager

Work Order : 231524
Sample Number : 48375

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% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)

FATHEAD MINNOW CUMULATIVE DAILY MORTALITY

Initiation Time : 14:55
Initiation Date : 2016-07-21
Completion Date : 2016-07-28

		Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Treatment
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		Mean Mortality (± SD)
Analyst(s):		MC		SS		MA		SV		SV		SV		MA		CZN		
Concentration		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	%
(%)	Replicate	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	Dead	
Control	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1.56	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3.13	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.33 (±5.77)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6.25	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	6.67 (±5.77)
	C	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	
12.5	A	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	
	B	0	0	0	0	0	0	1	10	1	10	2	20	4	40	4	40	16.67 (±20.82)
	C	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	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
50	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	3.33 (±5.77)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Aberrant behaviour or swimming impairment : None

Data Reviewed By: KEH

Date : 20160807

Work Order : 231524
Sample Number : 48375

FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

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

NOTES :
- No outlying data points were detected according to Grubbs Test[b].
- Control average dry weight per surviving organism = 0.872 mg

Data Reviewed By: KEH

Date : 20160827

Work Order : 231524
Sample Number: 48375

Fathead Minnow Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	9.6	7.8	74	30

		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	Day 6 - 7 2016-07-27
Sub-sample Used		1	1	1	2	2	3	3
Temperature (°C)		25.0	26.0	25.0	25.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)		9.6	9.3	9.8	9.8	9.6	9.5	9.6
Dissolved Oxygen % Sat.[1]		119	114	119	119	118	116	118
pH		7.8	7.7	7.8	7.8	7.6	8.0	7.6
Pre-aeration Time (min)[2]		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%)								
Temp.(°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
DO % Sat.	Initial	99	100	99	99	97	99	101
DO (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
pH	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
1.56 %								
Temp.(°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
DO (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
pH	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
25 %								
Temp.(°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
DO (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
pH	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
Cond. (µmhos)	Initial	472	474	513	516	516	515	516
100 %								
Temp.(°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
DO (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
pH	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
Cond. (µmhos)	Initial	69	67	73	83	73	71	73

"–" = not measured

[1] % saturation (adjusted for actual temperature and barometric pressure)

[2] ≤100 bubbles/minute

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TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

Work Order : 231524
Sample Number : 48375

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 Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/21, 2nd ed. (February 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
LC50	>100%	-	-
IC25 (Reproduction)	91.2%	59.5-97.2	Linear Interpolation (TOXSTAT) d

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2016-07-12	Analyst(s) :	SEC, SS
Organism Batch :	Cd16-07	Test Duration :	6 days
IC25 Reproduction :	1.22 g/L	LC50 :	1.89 g/L*
95% Confidence Limits :	1.06 - 1.33 g/L	95% Confidence Limits :	1.62 - 2.22 g/L
Statistical Method :	Linear Interpolation (CETIS)[a]	Statistical Method :	Spearman-Kärber (CETIS)[a]
Historical Mean IC25 :	1.36 g/L	Historical Mean LC50 :	2.24 g/L
Warning Limits (± 2SD) :	1.05 - 1.78 g/L	Warning Limits (± 2SD) :	1.95 - 2.56 g/L

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

TEST CONDITIONS

Sample Filtration :	None	Test Volume per Replicate :	15 mL
Test Aeration :	None	Test Vessel :	19 mL polystyrene vial
pH Adjustment :	None	Depth of Test Solution :	4.8 cm
Hardness Adjustment :	None	Organisms per Replicate :	1
Daily Renewal Method :	Transferred to fresh solutions	Number of Replicates :	10
Control/Dilution Water :	Well water (no chemicals added)	Test Method Deviation(s) :	None

COMMENTS

*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].

Work Order : 231524
Sample Number : 48375

TEST ORGANISMS

Test Organism :	*Ceriodaphnia dubia*	Range of Age (at start of test) :	10:40 h - 21:50 h
Organism Batch :	Cd 16-07	Mean Brood Organism Mortality :	0%
Organism Origin :	Single in-house mass culture	Ephippia in Culture :	No
Test Organism Origin :	Individual in-house cultures		

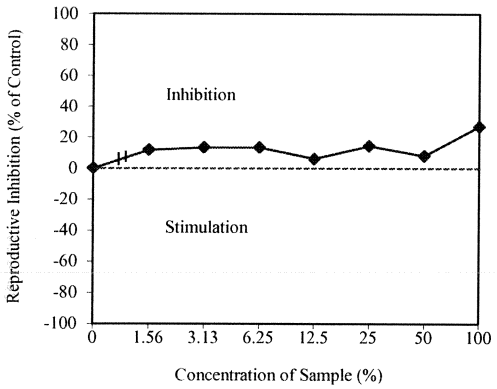
Brood Organism Neonate Production

Replicate :	1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subsequent brood):	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**



Cumulative Daily Test Organism Mortality (%)

		Concentration of Sample (%)							
Date	**Test Day**	Control	1.56	3.13	6.25	12.5	25	50	100
2016-07-22	1	0	0	0	0	0	0	0	0
2016-07-23	2	0	0	0	0	0	0	0	0
2016-07-24	3	0	0	0	0	0	0	0	0
2016-07-25	4	0	0	0	0	0	0	0	0
2016-07-26	5	0	0	0	0	0	0	0	0
2016-07-27	6	0	0	0	0	0	0	10	0
Total Mortality (%)		0	0	0	0	0	0	10	0

REFERENCES

[a] 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].

[d] West, Inc. and D. Gulley. 1996. Toxstat Release 3.5. Western Ecosystems Technology. Cheyenne, WY, U.S.A.

Date : 2016-08-24
yyyy-mm-dd

Approved By : M. Rudas
Project Manager

AQUATOX

TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

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 (%) Control	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)	Analyst(s)
2016-07-22	1	0	0	0	0	0	0	0	0	0	0	0	SS
2016-07-23	2	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	MA
2016-07-25	4	4	5	5	3	4	5	5	4	5	6	4.6	XD
2016-07-26	5	10	11	10	8	8	7	10	9	7	9	8.9	CZN
2016-07-27	6	14	15	12	15	10	8	15	13	12	13	12.7	RD
Total		**28**	**31**	**27**	**26**	**22**	**20**	**30**	**26**	**24**	**28**	**26.2 (±3.4)**	

Concentration (%) 12.5	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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	5	6	3	5	4	6	6	5	3	5	4.8
2016-07-26	5	10	10	8	8	9	10	9	7	7	9	8.7
2016-07-27	6	12	14	12	12	0	11	13	14	10	13	11.1
Total		**27**	**30**	**23**	**25**	**13**	**27**	**28**	**26**	**20**	**27**	**24.6 (±4.9)**

Concentration (%) 1.56	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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
Total		**29**	**26**	**25**	**25**	**14**	**9**	**27**	**26**	**22**	**28**	**23.1 (±6.5)**

Concentration (%) 25	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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
Total		**24**	**25**	**23**	**22**	**13**	**23**	**24**	**18**	**24**	**28**	**22.4 (±4.1)**

Concentration (%) 3.13	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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 (±4.2)**

Concentration (%) 50	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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	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 (±3.6)**

Concentration (%) 6.25	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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	5	6	3	5	6	4	4	5	2	3	4.3
2016-07-26	5	9	7	7	9	8	9	12	10	4	3	7.8
2016-07-27	6	11	10	9	13	12	13	10	12	7	9	10.6
Total		**25**	**23**	**19**	**27**	**26**	**26**	**26**	**27**	**13**	**15**	**22.7 (±5.2)**

Concentration (%) 100	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean 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	5	6	4	3	4	0	4	3	2	4	3.5
2016-07-26	5	0	8	10	7	10	7	8	7	8	10	7.5
2016-07-27	6	6	9	11	8	9	8	11	0	8	11	8.1
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)[a].

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

Data Reviewed By : KEH
Date : 2016 08 07

Work Order : 231524
Sample Number: 48375

Ceriodaphnia dubia Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	9.6	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 Used		1	1	1	2	2	3
Temperature (°C)		25.0	26.0	25.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)		9.6	9.3	9.8	9.8	9.6	9.5
Dissolved Oxygen % Sat.[3]		119	114	119	119	118	116
pH		7.8	7.7	7.8	7.8	7.6	8.0
Pre-aeration Time (min)[4]		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
	Final	26.0	24.0	24.0	24.0	24.0	24.0
DO % Sat.[3]	Initial	99	100	99	99	97	99
DO (mg/L)	Initial	8.1	8.0	8.0	8.0	7.9	8.0
	Final	7.3	7.7	7.5	7.7	7.6	7.6
pH	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
pH	Initial	8.3	8.3	8.4	8.5	8.4	8.4
	Final	8.0	8.1	8.2	8.2	8.1	8.0
Cond. (µmhos)	Initial	591	568	636	644	657	644
25 %							
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	8.0	8.3	8.4	8.3	8.2	8.2
	Final	7.4	7.8	7.6	7.6	7.6	7.6
pH	Initial	8.3	8.4	8.4	8.5	8.4	8.4
	Final	8.0	8.1	8.2	8.1	8.1	8.1
Cond. (µmhos)	Initial	472	474	513	516	516	515
100 %							
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	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
pH	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] ≤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

Lemna minor
EPS 1/RM/37

Work Order : 231524
Sample Number : 48375

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 for Measuring the Inhibition of Growth using the Freshwater Macrophyte, *Lemna minor*. Method Development and Application Section, Environmental Technology Centre, Environment Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January 2007) with deviation(s) as noted below.		

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Weight)	>97.0%	-	-
IC25 (Frond Production)	>97.0%	-	-

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2016-08-03	Statistical Method :	Non-Linear Regression* (CETIS)[a]
Organism Batch :	Lm16-07	Historical Geometric Mean IC25 :	2.20 g/L
Test Duration :	7 days	Warning Limits (± 2SD) :	1.57 - 3.08 g/L
IC25 (Frond Production) :	1.72 g/L	Growth Medium :	Modified APHA
95% Confidence Limits :	1.50 - 1.94 g/L	Analyst(s) :	CG, MA

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

TEST CONDITIONS

Test Organism :	*Lemna minor* L., Strain 7730	Test Type :	Static (no sub-samples required)
Organism Batch :	Lm16-07	Control/Dilution Medium :	Modified APHA
Culture Origin :	UTCC 492	Medium Preparation Water :	Distilled Water
Test Organism Source :	Axenic in-house culture	Source of Water :	Morning Mist
Culture Medium :	Modified Hoaglands E+	Medium Preparation Chemicals :	Modified APHA stocks A, B, C (10 mL/L)
Age (on Test Day 0) :	9 days	Nutrient Spiking of Sample :	Modified APHA stocks A, B, C (10 mL/L)
Health Criteria (in APHA) :	13.2-fold frond increase in 7 days	Replicates per Concentration :	4
Organism Acclimation :	24:50 h in APHA medium	Test Volume per Replicate :	100 mL
Inoculum (Test Day 0) :	2 plants (3 fronds per plant)	Test Vessel :	250 mL glass Erlenmeyer flask
Sample Filtration :	1 µm (Whatman GF/C)	Depth of Test Solution :	4.0 cm
Sample Pre-aeration :	20 min. at ≤100 bubbles/min.	Photoperiod/Light Intensity :	Continuous, 4520 - 5280 lux
pH Adjustment :	None	Test Method Deviation(s) :	See 'Comments'
Hardness Adjustment :	None		

COMMENTS

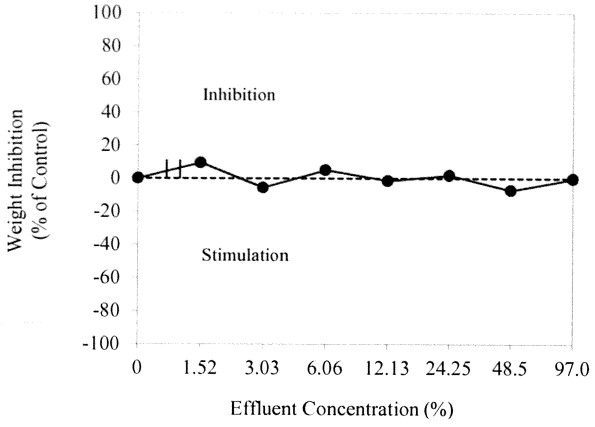
Noted Deviation(s): Due to technical error, the test plants were acclimated in APHA media for 24 hours and 50 minutes, instead of the 18-24 hours required by the test method. This deviation is not considered to have had a significant impact on the outcome of the test. There were no other unusual conditions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

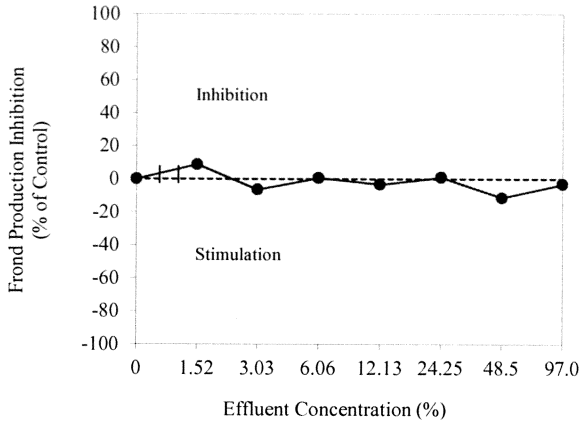
•All test validity criteria as specified in the test method cited above were satisfied.

*Poisson weighting (CETIS[a]) was applied.

Work Order : 231524
Sample Number : 48375

Lemna minor Growth Inhibition





TEST MONITORING

Initiation Date :	2016-07-21	Termination Date :	2016-07-28
Intitiation Time :	15:20	Termination Time :	14:00
Initiated By :	SEC	Terminated By :	MA

Temperature Monitoring

Test Day	Date	Temperature (°C)
0 (unmodified sample)	2016-07-21	25.0
0	2016-07-21	26.0
1	2016-07-22	26.0
2	2016-07-23	25.0
3	2016-07-24	25.0
4	2016-07-25	26.0
5	2016-07-26	26.0
6	2016-07-27	26.0
7	2016-07-28	25.0

pH Monitoring

Concentration (%)	Day 0	Day 7
100 (unmodified sample)	6.9	–
Control	8.4	8.3
1.52	8.3	8.4
3.03	-	-
6.06	-	-
12.13	8.3	8.4
24.25	-	-
48.5	-	-
97.0	8.3	8.4

"–" = not required

REFERENCES

[a] 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.

Date : 2016-08-24
yyyy-mm-dd

Approved By: M. Medas
Project Manager

Work Order : 231524
Sample Number : 48375

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)
Control	A	6	94	88	81.75	6.24	7.6	Fronds healthy, appearance normal in all replicates.
	B	6	81	75				
	C	6	84	78				
	D	6	92	86				
1.52	A	6	79	73	74.75	4.03	5.4	Fronds healthy, appearance normal in all replicates.
	B	6	83	77				
	C	6	76	70				
	D	6	85	79				
3.03	A	6	107	101	87.00	9.49	10.9	Fronds healthy, appearance normal in all replicates.
	B	6	89	83				
	C	6	86	80				
	D	6	90	84				
6.06	A	6	80	74	81.25	7.89	9.7	Fronds healthy, appearance normal in all replicates.
	B	6	98	92				
	C	6	88	82				
	D	6	83	77				
12.13	A	6	87	81	84.50	17.48	20.7	Fronds healthy, appearance normal in all replicates.
	B	6	68	62				
	C	6	98	92				
	D	6	109	103				
24.25	A	6	90	84	81.00	4.76	5.9	Fronds healthy, appearance normal in all replicates.
	B	6	82	76				
	C	6	92	86				
	D	6	84	78				
48.5	A	6	92	86	91.00	9.63	10.6	Fronds healthy, appearance normal in all replicates.
	B	6	87	81				
	C	6	100	94				
	D	6	109	103				
97.0	A	6	80	74	84.25	14.01	16.6	Fronds healthy, appearance normal in all replicates.
	B	6	106	100				
	C	6	98	92				
	D	6	77	71				

NOTES: *No unusual appearance or treatment of culture prior to testing. Test inoculated with healthy plants.
•No significant stimulation (α=0.05) of frond increase was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.
•A 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)[a].

"–" = not available/not required

Test Data Reviewed By : JL
Date : 2016-05-19

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
Control	A	9.36	8.87	0.93
	B	8.01		
	C	8.18		
	D	9.94		
1.52	A	8.54	8.04	0.74
	B	7.92		
	C	7.04		
	D	8.66		
3.03	A	10.13	9.37	0.67
	B	8.62		
	C	9.04		
	D	9.70		
6.06	A	7.63	8.43	1.13
	B	10.06		
	C	8.33		
	D	7.71		
12.13	A	8.93	8.99	1.56
	B	6.81		
	C	10.08		
	D	10.15		
24.25	A	8.98	8.70	0.50
	B	8.58		
	C	9.18		
	D	8.05		
48.5	A	9.08	9.50	0.62
	B	8.86		
	C	10.01		
	D	10.04		
97.0	A	7.70	8.88	1.40
	B	10.63		
	C	9.39		
	D	7.80		

NOTES :

•No significant stimulation (α=0.05) of frond weight was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.

•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not available/not required

Test Data Reviewed By : _____
Date : 2016-08-19

AQUATOX
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

Work Order : 231524
Sample Number : 48375

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 : Growth Inhibition Test Using a Freshwater Alga. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/25, 2nd ed. (March 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	>90.91%	-	-

The results reported relate only to the sample tested.

ZINC (AS ZINC SULPHATE) REFERENCE TOXICANT DATA

Date Tested :	2016-08-02	Statistical Method :	Non-Linear Regression (CETIS)[a]
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) :	CG, RD
95% Confidence Limits :	26.4 - 31.9 µg/L		

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

TEST CONDITIONS

Test Organism :	*Pseudokirchneriella subcapitata*	Control/Dilution Water :	Millipore Milli-Q (no chemicals added)
Organism Batch :	Ps16-07	Test Vessel :	U-shaped 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 ON	Number of Control Replicates:	10
Age (at start of test) :	3 days (in exponential growth)	Number of Test Replicates :	4
pH Adjustment :	None	Concentrations Tested :	10 + Control
Hardness Adjustment :	None	Photoperiod / Light Intensity :	Continuous light, 4000 - 4380 lux
Sample Pre-aeration :	None	Mean Test Temperature (± SD):	23.3°C (± 0.5)
Sample Filtration :	0.45 µm preconditioned filter	Test Duration :	72 hours
Volume Filtered:	≥10 mL	Test Method Deviation(s) :	None

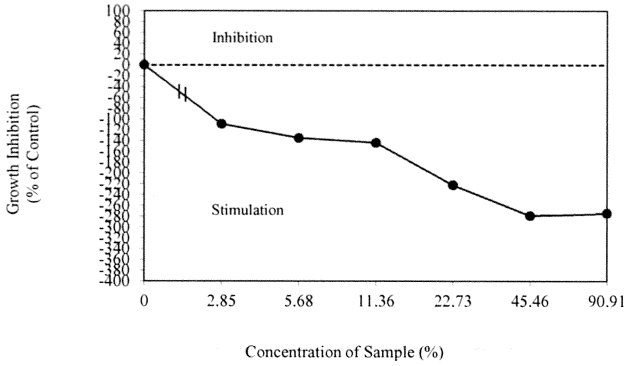
COMMENTS

*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.

Work Order : 231524
Sample Number : 48375

***Pseudokirchneriella subcapitata* Growth Inhibition**



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)**

Concentration (%)	Replicate 1	2	3	4	7	8	9	10	Mean	Standard Deviation	CV (%)	Stimulation (% 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	–	–	–	–					–	–	–	–
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, α=0.05.
•Control replicates 5 and 6 used for pH measurement.
•The Mann-Kendall test shows that there is no inhibitory gradient (α=0.05).
•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not enumerated/not required

Data Reviewed By : KH
Date : 20160807

REFERENCES

[a] 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].

Date : 2016-08-24
yyyy-mm-dd

Approved By : M. Nelson
Project Manager

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 231524

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

P.O. Number:	ALS - Baffinland Toxicity
Field Sampler Name (print):	CD,BB
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	21-JUL-16

Client:	ALS Environmental Waterloo Quote # - 162705399-15
Phone:	(519) 886-6910
Fax:	(519) 886-9047
Contact:	Wayne Smith / Danielle Walker

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	Daphnia magna Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
															✓		
2016-07-19	11:55	MS-08	48375	3.2C	✓		✓		✓	✓	✓	✓			as Pre-label 2016-07-21		

For Lab Use Only
Received By: AW
Date: 2016-07-21 13:00
[illegible]cation:
[illegible]C):

Please list any special requests or instructions:
MMER Toxicity RISS Reporting required

ALS Environmental

L1801067

WATERLOO

Subcontract Request Form

Subcontract To:

Aqualta - Edmonton, Alberta, Canada

NOTES: Please reference on final report and invoice: PO# L1801067
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED	DUE DATE	Priority Flag
L1801067-1 MS-08	Special Request Aqualta (SPECIAL REQUEST-AQ 14)	7/19/2016	8/9/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910

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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Sample Integrity Issues: _____ Temperature: _____

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

ALS Environmental

1607459

L1801067

WATERLOO

Subcontract Request Form

Subcontract To:

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

NOTES: Please reference on final report and invoice: PO# *L1801067*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1801067-1 MS-08		7/ 19/ 2016	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/11/2016	

(1)

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumbla Date Received: 7-22-16 1015

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Waterloo Workorder No: 1607459

Project Manager: AW Initials: CDS Date: 7-22-16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	Amb							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	11							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 7/24/16

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

1607459

ORIGIN ID:YKFA (519) 886-6910
ALEX GREEN
ALS LABS WATERLOO
60 NORTHLAND RD

WATERLOO, ON N2V2B8
CANADA CA

SHIP DATE: 21JUL16
ACTWGT: 5.00 LB
CAD: 9611609/INCA3790
DIMS: 16x11x14 IN

BILL SENDER

TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR

FORT COLLINS CO 80524
(800) 443-1511
INV:
PO:
REF:
DEPT:

10
-0

(US)

FedEx
Express

TRK# 0488 7768 1106 7713

10:30A
INTL PRIORITY
ETD
80524
CO-US DEN

NA FTCA

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

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

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE 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 CULTURE HEALTH DATA

Time to First Brood :	11.2 days	Mean Young Per Brood :	29.3
Culture Mortality :	0% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm16-14	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2016-08-02
yyyy-mm-dd

Approved by: _____
Project Manager

Work Order: 231524
Sample Number: 48375

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	40	None	8.0	9.4	67	21.0	109	0:30

0 hours

Date & Time 2016-07-22 9:25
Technician: SV

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	8.0	9.0	66	21.0	105	40
100B	0	0	8.0	9.0	66	21.0	105	40
100C	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 2016-07-23 9:25
Technician: SV

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2016-07-24 9:25
Technician: SV

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	0	0	7.8	8.1	80	21.0
100B	0	0	7.8	8.3	75	21.0
100C	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

Notes:

# 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: DK
Date: 2016-07-26

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

TOXICITY TEST REPORT
Rainbow Trout

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 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 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 (± 2SD) :	3000 - 4571 mg/L
Statistical Method :	Binomial	Analyst(s) :	FS, DK, NL

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.46 ± 0.24 g	Mean Fish Fork Length (± 2 SD) :	37.2 ± 6.2 mm
Range of Weights :	0.31 - 0.63 g	Range of Fork Lengths (mm) :	32 - 41 mm
Fish Loading Rate :	0.2 g/L		

TEST CONDITIONS

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 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2016-08-02
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 231524
Sample Number: 48375

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	7.2	8.9	60	15.0	–
	Chemistry after 30min air:	7.4	8.9	59	15.0	99

0 hours

Date & Time 2016-07-22 10:15
Technician: AW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.4	8.9	59	15.0	99
Control	0	0	8.0	9.3	835	15.0	100

Notes:

24 hours

Date & Time 2016-07-23 10:15
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	14.0
Control	0	0	–	–	–	14.0

Notes:

48 hours

Date & Time 2016-07-24 10:15
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2016-07-25 10:15
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2016-07-26 10:15
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	8.1	9.3	64	15.0
Control	0	0	8.3	9.3	935	15.0

Notes:

# of control organisms showing stress 0
Trout Batch #: T16-12

"–" = not measured
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: DK
Date: 2016-07-28

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 231524

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

P.O. Number:	ALS - Baffinland Toxicity
Field Sampler Name (print):	CD,BB
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	21-JUL-16

Client:	ALS Environmental Waterloo Quote # - 162705399-15
Phone:	(519) 886-6910
Fax:	(519) 886-9047
Contact:	Wayne Smith / Danielle Walker

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2016-07-19	11:55	MS-08	48375	24.0	✓		✓		✓	✓	✓	✓			✓		9 Pe-Inte 1
																	2016-07-21

For Lab Use Only

Received By: AW
Date: 2016-07-21
Time: 13:00
Location:
Temp.(°C)

Please list any special requests or instructions:
MMER Toxicity RISS Reporting required

REGULAR BAFFINLAND TOXICITY TESTS

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No:

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

P.O. Number:	4500017476
Field Sampler Name (print):	CD, BB
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	21-Jul-16

Client:	ALS Environmental Waterloo Q# 162705399-15
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Austin Paterson

Sample Identification					Analyses Requested									Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
2016-07-19	1155	L1801067-1 MS-08			XX		XX		X	X	X	X				1 Pail

For Lab Use Only

Received By:

Please list any special requests or instructions:

~~RTSS Reporting Required~~ WS

ALS Log-in, please fill in sample Date & Sample Name & Include sublet paperwork to Aquatox.

L1801067

WATERLOO

ALS Environmental

Subcontract Request Form

Subcontract To:

Aqualta - Edmonton, Alberta, Canada

NOTES: Please reference on final report and invoice: PO# *L1801067*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1801067-1 MS-08	Special Request Aqualta (SPECIAL REQUEST-AQ 14)	7/19/2016 8/9/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1801067-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑PDF ☑EXCEL ☑EDD (DIGITAL)	R ☑Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐Criteria on Report - provide details below if box checked Select Distribution: ☐EMAIL ☐MAIL ☐FAX	E ☐Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2	

Invoice To		Invoice Distribution	Analysis Request
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution: ☑EMAIL ☐MAIL ☐FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax ap@baffinland.com	
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08	GL Account:	Routing Code:
PO / AFE:	4500007003	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1801067 R1

ALS Contact: Wayne Smith | Sampler: CD, BB

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7	Radium 226	Group 3	Sublethal Toxicity (Fathead Minnow, Ceriodaphnia dubia, Pseudokirchneriella subcapitata, Lemna minor)	Specific Conductance	Number of Containers
1 ✓	MS-08	19-Jul-16	11:55	Water	R	R	R	R	R	14

assign PF TSS TDS turbidity -> BF

add other to WT

GH

Drinking Water (DW) Samples[1] (client use)	Field filtering performed on disolved metals/mercury bottles. Preservatives for Radium done in lab. Sample from actual waste rock pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No	☑
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☑
Cooling Initiated	☑				

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
12	9	17.7	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-07-19	Time: 13:00	Received by: F. Khahlu	Date: 19/07/16	Time: 14:00	Received by:	Date: 21-Jul-16	Time: 11:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

ES

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1828891-1 MS-06 Sampled By: AW/AV on 12-SEP-16 @ 13:00 Matrix: WATER							
Physical Tests							
Conductivity	318		3.0	umhos/cm		20-SEP-16	R3553059
Hardness (as CaCO3)	133		10	mg/L		22-SEP-16	
pH	7.98	PEHT	0.10	pH units		20-SEP-16	R3553058
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	7.50		0.10	NTU		21-SEP-16	R3553398
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	57		10	mg/L		20-SEP-16	R3553579
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)	78.4		0.30	mg/L		20-SEP-16	R3552810
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.7		1.0	mg/L		20-SEP-16	R3553959
Total Organic Carbon	4.5		1.0	mg/L		20-SEP-16	R3553961
Total Metals							
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 (Tl)-Total	0.000017		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Uranium (U)-Total	0.00372		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
Dissolved Metals							
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) 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 (Tl)-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							
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	HTC	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	1.5		1.0	mg/L		03-OCT-16	R3562903
Total Metals							
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	R3552577
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 (Tl)-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	R3553059
Hardness (as CaCO3)	115	HTC	10	mg/L		23-SEP-16	
pH	8.21	PEHT	0.10	pH units		20-SEP-16	R3553058
Total Suspended Solids	2.9	PEHT	2.0	mg/L	20-SEP-16	21-SEP-16	R3553370
Total Dissolved Solids	124	DLDS	20	mg/L		20-SEP-16	R3553363
Turbidity	1.83		0.10	NTU		21-SEP-16	R3553398
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	102		10	mg/L		20-SEP-16	R3553579
Ammonia, Total (as N)	<0.020		0.020	mg/L		23-SEP-16	R3557039
Chloride (Cl)	10.9		0.50	mg/L		20-SEP-16	R3552810
Fluoride (F)	0.025		0.020	mg/L		20-SEP-16	R3552810
Nitrate (as N)	0.569		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	0.0046		0.0030	mg/L	28-SEP-16	28-SEP-16	R3559429
Sulfate (SO4)	9.03		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	1.6		1.0	mg/L		03-OCT-16	R3562903
Total Metals							

* 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
L1828891-3 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		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Calcium (Ca)-Total	23.6		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Copper (Cu)-Total	0.0017		0.0010	mg/L	21-SEP-16	23-SEP-16	R3554104
Iron (Fe)-Total	0.150		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	13.6		0.050	mg/L	21-SEP-16	22-SEP-16	R3554104
Manganese (Mn)-Total	0.00291		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	0.00101		0.000050	mg/L	21-SEP-16	22-SEP-16	R3554104
Nickel (Ni)-Total	0.00128		0.00050	mg/L	21-SEP-16	23-SEP-16	R3554104
Potassium (K)-Total	1.46		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	5.20		0.50	mg/L	21-SEP-16	22-SEP-16	R3554104
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	21-SEP-16	22-SEP-16	R3554104
Uranium (U)-Total	0.00528		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	<0.0100		0.0034	Bq/L	01-OCT-16	13-OCT-16	R3562833

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Aluminum (Al)-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
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1828891-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1828891-1
Matrix 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
Matrix Spike	Uranium (U)-Total	MS-B	L1828891-1, -2, -3
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1828891-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

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.

EC-WT	Water	Conductivity	APHA 2510 B

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

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Reference Information

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

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

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Water	pH	MOEE E3137A-R511

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 Bq/L	EPA 903.1

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5°C overnight and then 180–10°C for 1hr.

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

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

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

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

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

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

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

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R3553579								
WG2393012-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			106.5		%		80-120	20-SEP-16
WG2393012-4 DUP		**L1828891-1**						
Alkalinity, Total (as CaCO3)		57	56		mg/L	0.4	20	20-SEP-16
WG2393012-2 LCS								
Alkalinity, Total (as CaCO3)			96.0		%		85-115	20-SEP-16
WG2393012-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	20-SEP-16
C-DIS-ORG-WT	**Water**							
Batch R3553959								
WG2393022-3 DUP		**L1830982-2**						
Dissolved Organic Carbon		2.1	1.7	J	mg/L	0.4	2	20-SEP-16
WG2393022-2 LCS								
Dissolved Organic Carbon			101.1		%		80-120	20-SEP-16
WG2393022-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	20-SEP-16
WG2393022-4 MS		**L1830982-2**						
Dissolved Organic Carbon			95.8		%		70-130	20-SEP-16
Batch R3562904								
WG2402020-3 DUP		**L1835648-25**						
Dissolved Organic Carbon		3.3	2.8		mg/L	19	20	03-OCT-16
WG2402020-2 LCS								
Dissolved Organic Carbon			97.2		%		80-120	03-OCT-16
WG2402020-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	03-OCT-16
WG2402020-4 MS		**L1835648-25**						
Dissolved Organic Carbon			92.1		%		70-130	03-OCT-16
CL-IC-N-WT	**Water**							
Batch R3552810								
WG2392297-3 DUP		**L1828891-3**						
Chloride (Cl)		10.9	11.0		mg/L	0.2	20	20-SEP-16
WG2392297-2 LCS								
Chloride (Cl)			102.1		%		90-110	20-SEP-16
WG2392297-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-SEP-16
WG2392297-4 MS		**L1828891-3**						
Chloride (Cl)			98.9		%		75-125	20-SEP-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	**Water**							
Batch R3553059								
WG2392146-8 DUP		**WG2392146-7**						
Conductivity		78.5	79.1		umhos/cm	0.8	10	20-SEP-16
WG2392146-6 LCS								
Conductivity			101.1		%		90-110	20-SEP-16
WG2392146-5 MB								
Conductivity			<3.0		umhos/cm		3	20-SEP-16
F-IC-N-WT	**Water**							
Batch R3552810								
WG2392297-3 DUP		**L1828891-3**						
Fluoride (F)		0.025	0.026		mg/L	3.6	20	20-SEP-16
WG2392297-2 LCS								
Fluoride (F)			99.5		%		90-110	20-SEP-16
WG2392297-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-SEP-16
WG2392297-4 MS		**L1828891-3**						
Fluoride (F)			101.3		%		75-125	20-SEP-16
HG-D-CVAA-WT	**Water**							
Batch R3552579								
WG2392460-5 DUP		**L1828891-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-16
WG2392460-2 LCS								
Mercury (Hg)-Dissolved			102.0		%		80-120	20-SEP-16
WG2392460-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-SEP-16
WG2392460-6 MS		**L1828891-1**						
Mercury (Hg)-Dissolved			94.2		%		70-130	20-SEP-16
HG-T-CVAA-WT	**Water**							
Batch R3552577								
WG2392454-7 DUP		**L1828891-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-16
WG2392454-2 LCS								
Mercury (Hg)-Total			102.0		%		80-120	20-SEP-16
WG2392454-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	20-SEP-16
WG2392454-8 MS		**L1828891-2**						
Mercury (Hg)-Total			95.3		%		70-130	20-SEP-16
MET-D-CCMS-WT	**Water**							

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3552957								
WG2392528-4 DUP		**WG2392528-3**						
Aluminum (Al)-Dissolved		0.537	0.551		mg/L	2.5	20	20-SEP-16
Arsenic (As)-Dissolved		0.0095	0.0096		mg/L	1.5	20	20-SEP-16
Cadmium (Cd)-Dissolved		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	20-SEP-16
Calcium (Ca)-Dissolved		594	569		mg/L	4.3	20	20-SEP-16
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	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	N/A	20	20-SEP-16
Magnesium (Mg)-Dissolved		114	109		mg/L	4.7	20	20-SEP-16
Manganese (Mn)-Dissolved		0.512	0.501		mg/L	2.1	20	20-SEP-16
Molybdenum (Mo)-Dissolved		<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)-Dissolved		28.8	28.6		mg/L	0.9	20	20-SEP-16
Selenium (Se)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-SEP-16
Sodium (Na)-Dissolved		93.8	90.1		mg/L	4.0	20	20-SEP-16
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-16
Uranium (U)-Dissolved		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 LCS								
Aluminum (Al)-Dissolved			100.3		%		80-120	20-SEP-16
Arsenic (As)-Dissolved			96.6		%		80-120	20-SEP-16
Cadmium (Cd)-Dissolved			95.5		%		80-120	20-SEP-16
Calcium (Ca)-Dissolved			102.3		%		80-120	20-SEP-16
Copper (Cu)-Dissolved			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)-Dissolved			98.9		%		80-120	20-SEP-16
Manganese (Mn)-Dissolved			98.9		%		80-120	20-SEP-16
Molybdenum (Mo)-Dissolved			98.7		%		80-120	20-SEP-16
Nickel (Ni)-Dissolved			96.4		%		80-120	20-SEP-16
Potassium (K)-Dissolved			98.1		%		80-120	20-SEP-16
Selenium (Se)-Dissolved			94.7		%		80-120	20-SEP-16
Sodium (Na)-Dissolved			98.5		%		80-120	20-SEP-16
Thallium (Tl)-Dissolved			95.6		%		80-120	20-SEP-16

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3552957								
WG2392528-2 LCS								
Uranium (U)-Dissolved			101.2		%		80-120	20-SEP-16
Zinc (Zn)-Dissolved			93.4		%		80-120	20-SEP-16
WG2392528-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	20-SEP-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	20-SEP-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	20-SEP-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	20-SEP-16
Copper (Cu)-Dissolved			<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)-Dissolved			<0.050		mg/L		0.05	20-SEP-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	20-SEP-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	20-SEP-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	20-SEP-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	20-SEP-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	20-SEP-16
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	20-SEP-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	20-SEP-16
Uranium (U)-Dissolved			<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)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Arsenic (As)-Dissolved			77.3		%		70-130	20-SEP-16
Cadmium (Cd)-Dissolved			92.8		%		70-130	20-SEP-16
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Copper (Cu)-Dissolved			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)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Molybdenum (Mo)-Dissolved			96.5		%		70-130	20-SEP-16
Potassium (K)-Dissolved			N/A	MS-B	%		-	20-SEP-16
Selenium (Se)-Dissolved			95.1		%		70-130	20-SEP-16
Sodium (Na)-Dissolved			N/A	MS-B	%		-	20-SEP-16

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3552957								
WG2392528-5 MS		**WG2392528-3**						
Thallium (Tl)-Dissolved			93.0		%		70-130	20-SEP-16
MET-T-CCMS-WT	**Water**							
Batch R3554104								
WG2393067-4 DUP		**WG2393067-3**						
Aluminum (Al)-Total		0.078	0.075		mg/L	3.6	20	22-SEP-16
Arsenic (As)-Total		0.00014	0.00013		mg/L	5.2	20	22-SEP-16
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-SEP-16
Calcium (Ca)-Total		25.4	23.8		mg/L	6.7	20	22-SEP-16
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-SEP-16
Iron (Fe)-Total		0.110	0.087	J	mg/L	0.024	0.1	22-SEP-16
Lead (Pb)-Total		0.00013	0.00011		mg/L	14	20	22-SEP-16
Magnesium (Mg)-Total		16.9	16.2		mg/L	3.7	20	22-SEP-16
Manganese (Mn)-Total		0.00658	0.00678		mg/L	3.0	20	22-SEP-16
Molybdenum (Mo)-Total		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 (Tl)-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 LCS								
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)-Total			99.1		%		80-120	22-SEP-16
Manganese (Mn)-Total			99.1		%		80-120	22-SEP-16
Molybdenum (Mo)-Total			99.2		%		80-120	22-SEP-16
Nickel (Ni)-Total			99.1		%		80-120	22-SEP-16

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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 (Tl)-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								
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		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		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		mg/L		0.00005	22-SEP-16
Sodium (Na)-Total			<0.50		mg/L		0.5	22-SEP-16
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-SEP-16
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-SEP-16
WG2393067-5 MS		**WG2393067-3**						
Aluminum (Al)-Total			98.2		%		70-130	22-SEP-16
Arsenic (As)-Total			97.1		%		70-130	22-SEP-16
Cadmium (Cd)-Total			97.5		%		70-130	22-SEP-16
Calcium (Ca)-Total			N/A	MS-B	%		-	22-SEP-16
Copper (Cu)-Total			104.4		%		70-130	22-SEP-16
Iron (Fe)-Total			N/A	MS-B	%		-	22-SEP-16
Lead (Pb)-Total			96.4		%		70-130	22-SEP-16
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-SEP-16
Manganese (Mn)-Total			101.1		%		70-130	22-SEP-16

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3554104								
WG2393067-5 MS		**WG2393067-3**						
Molybdenum (Mo)-Total			96.2		%		70-130	22-SEP-16
Nickel (Ni)-Total			96.8		%		70-130	22-SEP-16
Potassium (K)-Total			N/A	MS-B	%		-	22-SEP-16
Selenium (Se)-Total			96.3		%		70-130	22-SEP-16
Sodium (Na)-Total			N/A	MS-B	%		-	22-SEP-16
Thallium (Tl)-Total			90.9		%		70-130	22-SEP-16
Uranium (U)-Total			N/A	MS-B	%		-	22-SEP-16
Zinc (Zn)-Total			97.5		%		70-130	22-SEP-16
NH3-WT	**Water**							
Batch R3553513								
WG2393498-3 DUP		**L1830990-1**						
Ammonia, Total (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	21-SEP-16
WG2393498-2 LCS								
Ammonia, Total (as N)			98.4		%		85-115	21-SEP-16
WG2393498-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	21-SEP-16
WG2393498-4 MS		**L1830990-1**						
Ammonia, Total (as N)			98.7		%		75-125	21-SEP-16
Batch R3557039								
WG2395147-11 DUP		**L1831117-1**						
Ammonia, Total (as N)		0.095	0.076	J	mg/L	0.020	0.04	23-SEP-16
WG2395147-10 LCS								
Ammonia, Total (as N)			97.8		%		85-115	23-SEP-16
WG2395147-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	23-SEP-16
WG2395147-12 MS		**L1831117-1**						
Ammonia, Total (as N)			89.0		%		75-125	23-SEP-16
NO3-IC-WT	**Water**							
Batch R3552810								
WG2392297-3 DUP		**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**						

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	**Water**							
Batch R3552810								
WG2392297-4 MS		**L1828891-3**						
Nitrate (as N)			98.6		%		70-130	20-SEP-16
P-T-COL-WT	**Water**							
Batch R3554021								
WG2393113-3 DUP		**L1831025-2**						
Phosphorus, Total		0.0208	0.0201		mg/L	3.0	20	21-SEP-16
WG2393113-2 LCS								
Phosphorus, Total			101.1		%		80-120	21-SEP-16
WG2393113-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	21-SEP-16
WG2393113-4 MS		**L1831025-2**						
Phosphorus, Total			92.5		%		70-130	21-SEP-16
Batch R3559429								
WG2398465-3 DUP		**L1828891-3**						
Phosphorus, Total		0.0046	0.0040		mg/L	15	20	28-SEP-16
WG2398465-2 LCS								
Phosphorus, Total			97.0		%		80-120	29-SEP-16
WG2398465-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	29-SEP-16
WG2398465-4 MS		**L1828891-3**						
Phosphorus, Total			96.3		%		70-130	28-SEP-16
PH-WT	**Water**							
Batch R3553058								
WG2392144-6 DUP		**WG2392144-5**						
pH		7.13	7.26	J	pH units	0.12	0.2	20-SEP-16
WG2392144-4 LCS								
pH			7.01		pH units		6.9-7.1	20-SEP-16
SO4-IC-N-WT	**Water**							
Batch R3552810								
WG2392297-3 DUP		**L1828891-3**						
Sulfate (SO4)		9.03	9.06		mg/L	0.3	20	20-SEP-16
WG2392297-2 LCS								
Sulfate (SO4)			101.9		%		90-110	20-SEP-16
WG2392297-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-SEP-16
WG2392297-4 MS		**L1828891-3**						

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	**Water**							
Batch R3552810								
WG2392297-4 MS		**L1828891-3**						
Sulfate (SO4)			97.1		%		75-125	20-SEP-16
SOLIDS-TDS-WT	**Water**							
Batch R3553363								
WG2392665-3 DUP		**L1829595-11**						
Total Dissolved Solids		500	484		mg/L	3.3	20	20-SEP-16
WG2392665-2 LCS								
Total Dissolved Solids			100.7		%		85-115	20-SEP-16
WG2392665-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-SEP-16
SOLIDS-TSS-WT	**Water**							
Batch R3553370								
WG2392355-3 DUP		**L1828905-1**						
Total Suspended Solids		340	330		mg/L	3.0	20	21-SEP-16
WG2392355-2 LCS								
Total Suspended Solids			99.6		%		85-115	21-SEP-16
WG2392355-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-SEP-16
TKN-WT	**Water**							
Batch R3553949								
WG2392477-3 DUP		**L1830466-1**						
Total Kjeldahl Nitrogen		94.5	82.7		mg/L	13	20	21-SEP-16
WG2392477-2 LCS								
Total Kjeldahl Nitrogen			94.4		%		75-125	21-SEP-16
WG2392477-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	21-SEP-16
WG2392477-4 MS		**L1830466-1**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	21-SEP-16
Batch R3564780								
WG2403815-3 DUP		**L1837865-1**						
Total Kjeldahl Nitrogen		5.8	5.3		mg/L	9.4	20	05-OCT-16
WG2403815-2 LCS								
Total Kjeldahl Nitrogen			93.4		%		75-125	05-OCT-16
WG2403815-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	05-OCT-16
WG2403815-4 MS		**L1837865-1**						

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R3564780								
WG2403815-4 MS		**L1837865-1**						
Total Kjeldahl Nitrogen			92.1		%		70-130	05-OCT-16
TOC-WT	**Water**							
Batch R3553961								
WG2393023-3 DUP		**L1828891-1**						
Total Organic Carbon		4.5	4.7		mg/L	5.5	20	20-SEP-16
WG2393023-2 LCS								
Total Organic Carbon			103.8		%		80-120	20-SEP-16
WG2393023-1 MB								
Total Organic Carbon			<1.0		mg/L		1	20-SEP-16
WG2393023-4 MS		**L1828891-1**						
Total Organic Carbon			97.0		%		70-130	20-SEP-16
Batch R3562903								
WG2402021-3 DUP		**L1837263-1**						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	03-OCT-16
WG2402021-2 LCS								
Total Organic Carbon			99.5		%		80-120	03-OCT-16
WG2402021-1 MB								
Total Organic Carbon			<1.0		mg/L		1	03-OCT-16
WG2402021-4 MS		**L1837263-1**						
Total Organic Carbon			95.5		%		70-130	03-OCT-16
TURBIDITY-WT	**Water**							
Batch R3553398								
WG2392590-3 DUP		**L1828891-3**						
Turbidity		1.83	1.92		NTU	4.8	15	21-SEP-16
WG2392590-2 LCS								
Turbidity			102.0		%		85-115	21-SEP-16
WG2392590-1 MB								
Turbidity			<0.10		NTU		0.1	21-SEP-16

Quality Control Report

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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: 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

Hold Time Exceedances:

ALS Product Description	Sample 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
pH							
	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							
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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Thursday, 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

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

1609402

Radium-226:

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

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 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	

ALS Environmental

1609402

L1828891

WATERLOO

Subcontract Request Form

Subcontract To:

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

NOTES: Please reference on final report and invoice: PO# *L1828891*
ALS requires QC data to be provided with your final results.

Please see enclosed 3 **sample(s) in** 3 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1828891-1 MS-06		9/12/2016	
1	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	10/11/2016	
L1828891-2 MS-08-US		9/12/2016	
2	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	10/11/2016	
L1828891-3 MS-08-DS		9/12/2016	
3	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	10/11/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 9/25/16 9/22/16 09:0

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1609402

Project Manager: ARW Initials: RLR Date: 9/23/16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	1.6°C							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	13							
Background µR/hr reading:	10							

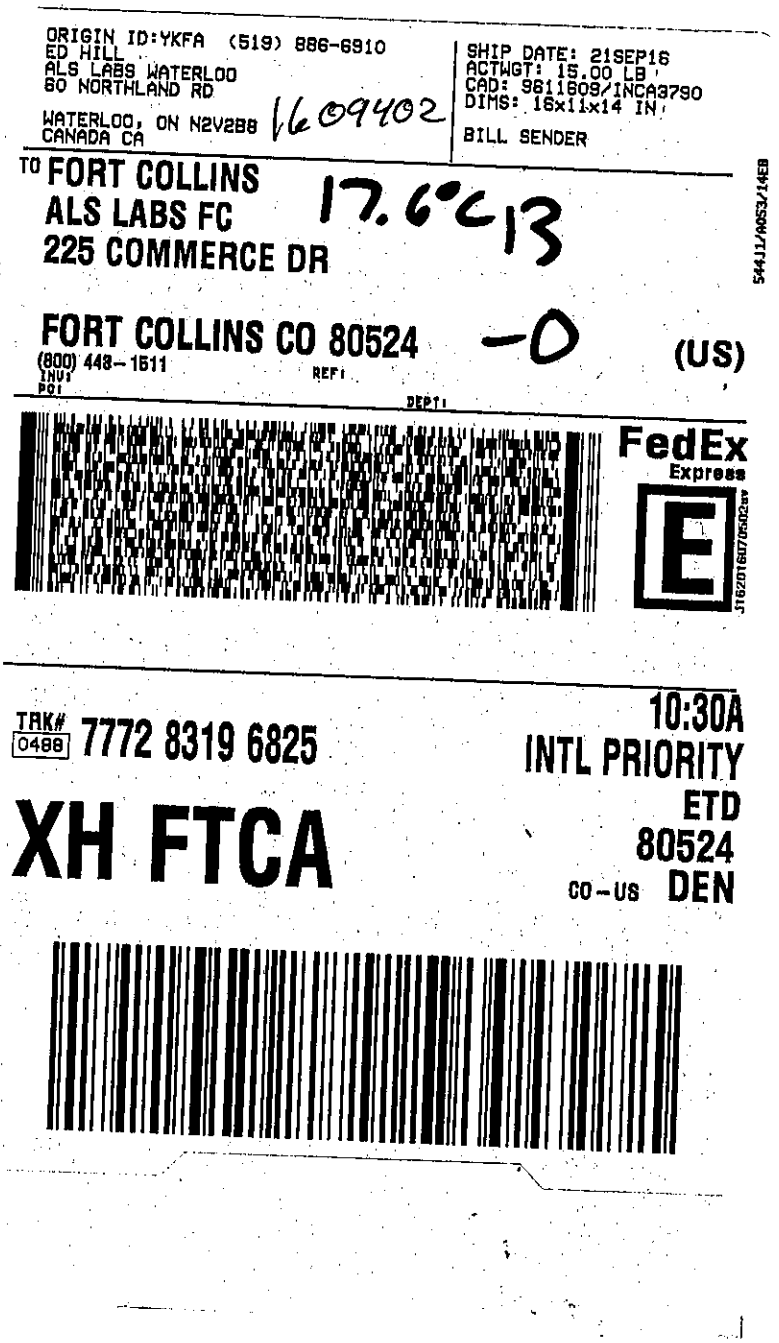
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? (YES) / NO / NA (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 9/23/16

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


ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
80 NORTHLAND RD
WATERLOO, ON N2V2B8
CANADA CA

16 09402

SHIP DATE: 21SEP16
ACTWGT: 15.00 LB
CAD: 9611809/INCA3790
DIMS: 16x11x14 IN
BILL SENDER

TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR

17.6°C 13

FORT COLLINS CO 80524

-0

(US)

(800) 448-1511
INV:
PO:
REF:
DEPT:

FedEx
Express

J16201607050202

TRK# 0488 7772 8319 6825

10:30A
INTL PRIORITY
ETD
80524
CO-US DEN

XH FTCA

Client:	ALS Environmental	**Date:**	*13-Oct-16*
Project:	L1828891	**Work Order:**	1609402
Sample ID:	L1828891-1	**Lab ID:**	1609402-1
Legal Location:		**Matrix:**	WATER
Collection Date:	9/12/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**			Prep Date: **10/1/2016**	PrepBy: **CDJ**
Ra-226	**0.015 (+/- 0.0064)**		**0.0032**	**BQ/l**	NA	10/13/2016 12:09
Carr: BARIUM	*95.7*		*40-110*	*%REC*	DL = NA	10/13/2016 12:09

Client:	ALS Environmental	**Date:**	*13-Oct-16*
Project:	L1828891	**Work Order:**	1609402
Sample ID:	L1828891-2	**Lab ID:**	1609402-2
Legal Location:		**Matrix:**	WATER
Collection Date:	9/12/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**			Prep Date: **10/1/2016**	PrepBy: **CDJ**
Ra-226	**0.012 (+/- 0.0057)**	Y1	**0.0032**	**BQ/l**	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
Collection Date:	9/12/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**			Prep Date: **10/1/2016**	PrepBy: **CDJ**
Ra-226	0.0065 (+/- 0.0040)	Y1,LT	0.0034	BQ/l	NA	10/13/2016 12:09
Carr: BARIUM	*102*	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
Collection Date:	9/12/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE161001-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE161001-2** Units: **BQ/l** Analysis Date: **10/13/2016 13:14**

Client ID: Run ID: **RE161001-2A** 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					P
Carr: BARIUM	16100		16270		99.1	40-110					

LCSD Sample ID: **RE161001-2** Units: **BQ/l** Analysis Date: **10/13/2016 13:14**

Client ID: Run ID: **RE161001-2A** 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	0.05	2.1	P
Carr: BARIUM	15700		16270		96.7	40-110		16100			

MB Sample ID: **RE161001-2** Units: **BQ/l** Analysis Date: **10/13/2016 13:14**

Client ID: Run ID: **RE161001-2A** 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: BARIUM	15100		16270		93	40-110					

The following samples were analyzed in this batch: 1609402-1 1609402-2 1609402-3

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1828891-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax bimcore@alsglobal.com	Specify Date Required for E2, E or P:
		Email 2	

Invoice To		Invoice Distribution
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	
Company:		Email 1 or Fax ap@baffinland.com
Contact:		Email 2

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-06	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1828891 RH

ALS Contact: Wayne Smith **Sampler:** AW/AV

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7	Group 7 (no dissolved metals or dissolved mercury)	Specific Conductance	Radium 226	48h Single Conc. - Daphnia - AQUATOX	96h Single Conc - Rainbow Trout - AQUATOX	Number of Containers
1	MS-06	12-Sep-16	13:00	Water	R		R	R	R	R	9
2	MS-08-US	12-Sep-16	14:42	Water		R	R	R			6
3	MS-06-DS	12-Sep-16	14:20	Water		R	R	R			6

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Site Specific Criteria - Account Manager to update as required.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12.5		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-09-13	Time: 13:00	Received by:	Date:	Time:	Received by: RH	Date: 20 Sept 16	Time: @ 900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

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

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

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 - SUBLETHAL TOXICITY
Job Reference: MS-08
C of C Numbers:
Legal Site Desc:

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.]

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	R3542731
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		01-SEP-16	R3541334
Total Organic Carbon	<1.0		1.0	mg/L		01-SEP-16	R3541335
Total Metals							
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	R3538784
Copper (Cu)-Total	0.0010		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Iron (Fe)-Total	0.268		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Lead (Pb)-Total	<0.00010		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Magnesium (Mg)-Total	136	DLHC	0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Manganese (Mn)-Total	6.11	DLHC	0.0050	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	<0.000050		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Nickel (Ni)-Total	0.0671		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Potassium (K)-Total	1.96		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Selenium (Se)-Total	0.00200		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Sodium (Na)-Total	2.62		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Thallium (Tl)-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 (Tl)-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							
Ra-226	0.011		0.0070	Bq/L	22-SEP-16	30-SEP-16	R3562833

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Chloride (Cl)	MS-B	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

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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.			
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
EC-WT	Water	Conductivity	APHA 2510 B
Water samples can be measured directly by immersing the conductivity cell into the sample.			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Reference Information

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-T-CCMS-WT Water Total Metals by CRC ICPMS EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT Water pH MOEE E3137A-R511

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 Bq/L EPA 903.1

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5°C overnight and then 180–10°C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

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

Reference Information

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: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R3539116								
WG2380731-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			100.0		%		80-120	01-SEP-16
WG2380731-4 DUP		**L1822688-1**						
Alkalinity, Total (as CaCO3)		823	834		mg/L	1.4	20	01-SEP-16
WG2380731-2 LCS								
Alkalinity, Total (as CaCO3)			96.2		%		85-115	01-SEP-16
WG2380731-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	01-SEP-16
C-DIS-ORG-WT	**Water**							
Batch R3541334								
WG2380765-3 DUP		**L1818933-1**						
Dissolved Organic Carbon		5.0	5.2		mg/L	3.8	20	01-SEP-16
WG2380765-2 LCS								
Dissolved Organic Carbon			99.0		%		80-120	01-SEP-16
WG2380765-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	01-SEP-16
WG2380765-4 MS		**L1818933-1**						
Dissolved Organic Carbon			99.4		%		70-130	01-SEP-16
CL-IC-N-WT	**Water**							
Batch R3542048								
WG2381106-15 DUP		**WG2381106-13**						
Chloride (Cl)		135	134		mg/L	0.3	20	02-SEP-16
WG2381106-12 LCS								
Chloride (Cl)			101.2		%		90-110	02-SEP-16
WG2381106-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-SEP-16
WG2381106-14 MS		**WG2381106-13**						
Chloride (Cl)			N/A	MS-B	%		-	02-SEP-16
CN-TOT-WT	**Water**							
Batch R3542731								
WG2383066-23 DUP		**L1821779-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-22 LCS								
Cyanide, Total			94.4		%		80-120	07-SEP-16
WG2383066-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	07-SEP-16
WG2383066-24 MS		**L1821779-1**						

Quality Control Report

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Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R3542731								
WG2383066-24 MS		**L1821779-1**						
Cyanide, Total			91.6		%		70-130	07-SEP-16
EC-WT	**Water**							
Batch R3539238								
WG2379938-4 DUP		**WG2379938-3**						
Conductivity		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								
WG2381106-15 DUP		**WG2381106-13**						
Fluoride (F)		0.046	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		**WG2381106-13**						
Fluoride (F)			95.8		%		75-125	02-SEP-16
HG-D-CVAA-WT	**Water**							
Batch R3539747								
WG2380897-4 DUP		**WG2380897-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380897-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	02-SEP-16
WG2380897-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	02-SEP-16
WG2380897-6 MS		**WG2380897-5**						
Mercury (Hg)-Dissolved			88.7		%		70-130	02-SEP-16
HG-T-CVAA-WT	**Water**							
Batch R3539762								
WG2380992-4 DUP		**WG2380992-3**						
Mercury (Hg)-Total		<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

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R3539762								
WG2380992-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	02-SEP-16
WG2380992-8 MS		**WG2380992-7**						
Mercury (Hg)-Total			90.5		%		70-130	02-SEP-16
MET-D-CCMS-WT	**Water**							
Batch R3539746								
WG2380829-4 DUP		**WG2380829-3**						
Aluminum (Al)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-SEP-16
Arsenic (As)-Dissolved		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)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	02-SEP-16
Iron (Fe)-Dissolved		5.76	5.69		mg/L	1.3	20	02-SEP-16
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-SEP-16
Magnesium (Mg)-Dissolved		152	149		mg/L	1.8	20	02-SEP-16
Manganese (Mn)-Dissolved		0.213	0.210		mg/L	1.4	20	02-SEP-16
Molybdenum (Mo)-Dissolved		0.00095	0.00089		mg/L	6.7	20	02-SEP-16
Nickel (Ni)-Dissolved		<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)-Dissolved		677	664		mg/L	1.9	20	02-SEP-16
Thallium (Tl)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-SEP-16
Uranium (U)-Dissolved		0.00011	0.00011		mg/L	0.6	20	02-SEP-16
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380829-2 LCS								
Aluminum (Al)-Dissolved			97.1		%		80-120	02-SEP-16
Arsenic (As)-Dissolved			98.3		%		80-120	02-SEP-16
Cadmium (Cd)-Dissolved			97.8		%		80-120	02-SEP-16
Calcium (Ca)-Dissolved			96.6		%		80-120	02-SEP-16
Copper (Cu)-Dissolved			94.9		%		80-120	02-SEP-16
Iron (Fe)-Dissolved			94.7		%		80-120	02-SEP-16
Lead (Pb)-Dissolved			96.0		%		80-120	02-SEP-16
Magnesium (Mg)-Dissolved			98.2		%		80-120	02-SEP-16
Manganese (Mn)-Dissolved			95.6		%		80-120	02-SEP-16
Molybdenum (Mo)-Dissolved			99.5		%		80-120	

Quality Control Report

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Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3539746								
WG2380829-2 LCS								
Molybdenum (Mo)-Dissolved			99.5		%		80-120	02-SEP-16
Nickel (Ni)-Dissolved			95.5		%		80-120	02-SEP-16
Potassium (K)-Dissolved			95.0		%		80-120	02-SEP-16
Selenium (Se)-Dissolved			98.7		%		80-120	02-SEP-16
Sodium (Na)-Dissolved			96.3		%		80-120	02-SEP-16
Thallium (Tl)-Dissolved			95.9		%		80-120	02-SEP-16
Uranium (U)-Dissolved			95.0		%		80-120	02-SEP-16
Zinc (Zn)-Dissolved			89.2		%		80-120	02-SEP-16
WG2380829-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	02-SEP-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	02-SEP-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	02-SEP-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	02-SEP-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	02-SEP-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	02-SEP-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	02-SEP-16
Magnesium (Mg)-Dissolved			<0.050		mg/L		0.05	02-SEP-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	02-SEP-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	02-SEP-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	02-SEP-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	02-SEP-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	02-SEP-16
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	02-SEP-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	02-SEP-16
Uranium (U)-Dissolved			<0.000010		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)-Dissolved			93.9		%		70-130	02-SEP-16
Arsenic (As)-Dissolved			93.3		%		70-130	02-SEP-16
Cadmium (Cd)-Dissolved			93.3		%		70-130	02-SEP-16
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Copper (Cu)-Dissolved			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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3539746								
WG2380829-5 MS		**WG2380829-3**						
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Molybdenum (Mo)-Dissolved			90.5		%		70-130	02-SEP-16
Nickel (Ni)-Dissolved			88.5		%		70-130	02-SEP-16
Potassium (K)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Selenium (Se)-Dissolved			97.0		%		70-130	02-SEP-16
Sodium (Na)-Dissolved			N/A	MS-B	%		-	02-SEP-16
Thallium (Tl)-Dissolved			88.2		%		70-130	02-SEP-16
Zinc (Zn)-Dissolved			87.8		%		70-130	02-SEP-16
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-4 DUP		**WG2380132-3**						
Aluminum (Al)-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
Cadmium (Cd)-Total		<0.000010	<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	2.5	20	01-SEP-16
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
Selenium (Se)-Total		0.000073	0.000076		mg/L	4.0	20	01-SEP-16
Sodium (Na)-Total		26.6	25.8		mg/L	3.1	20	01-SEP-16
Thallium (Tl)-Total		<0.000010	<0.000010	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
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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-2 LCS								
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)-Total			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 (Tl)-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			<0.000010		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)-Total			<0.000050		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			<0.000050		mg/L		0.00005	01-SEP-16
Sodium (Na)-Total			<0.50		mg/L		0.5	01-SEP-16
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-SEP-16
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-SEP-16
WG2380132-5 MS		**WG2380132-3**						
Aluminum (Al)-Total			94.2		%		70-130	02-SEP-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-5 MS		**WG2380132-3**						
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 (Tl)-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		**L1821470-1**						
Ammonia, Total (as N)		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		**WG2381106-13**						
Nitrate (as N)		4.94	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		**WG2381106-13**						

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	**Water**							
Batch R3542048								
WG2381106-14 MS		**WG2381106-13**						
Nitrate (as N)			N/A	MS-B	%		-	02-SEP-16
P-T-COL-WT	**Water**							
Batch R3539203								
WG2380808-3 DUP		**L1822930-6**						
Phosphorus, Total		0.0647	0.0638		mg/L	1.5	20	02-SEP-16
WG2380808-2 LCS								
Phosphorus, Total			105.5		%		80-120	02-SEP-16
WG2380808-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	02-SEP-16
WG2380808-4 MS		**L1822930-6**						
Phosphorus, Total			86.4		%		70-130	02-SEP-16
PH-WT	**Water**							
Batch R3539237								
WG2379935-6 DUP		**WG2379935-5**						
pH		6.83	6.83	J	pH units	0.00	0.2	01-SEP-16
WG2379935-4 LCS								
pH			7.00		pH units		6.9-7.1	01-SEP-16
SO4-IC-N-WT	**Water**							
Batch R3542048								
WG2381106-15 DUP		**WG2381106-13**						
Sulfate (SO4)		28.4	28.2		mg/L	0.7	20	02-SEP-16
WG2381106-12 LCS								
Sulfate (SO4)			100.8		%		90-110	02-SEP-16
WG2381106-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-SEP-16
WG2381106-14 MS		**WG2381106-13**						
Sulfate (SO4)			100.7		%		75-125	02-SEP-16
SOLIDS-TDS-WT	**Water**							
Batch R3541963								
WG2382254-3 DUP		**L1820555-1**						
Total Dissolved Solids		267	259		mg/L	3.2	20	06-SEP-16
WG2382254-2 LCS								
Total Dissolved Solids			97.4		%		85-115	06-SEP-16
WG2382254-1 MB								
Total Dissolved Solids			<10		mg/L		10	06-SEP-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R3541613								
WG2381067-3 DUP		**WG2381067-4**						
Total Suspended Solids		18400	18100		mg/L	1.6	20	06-SEP-16
WG2381067-2 LCS								
Total Suspended Solids			99.2		%		85-115	06-SEP-16
WG2381067-1 MB								
Total Suspended Solids			<2.0		mg/L		2	06-SEP-16
TKN-WT	**Water**							
Batch R3539956								
WG2380278-3 DUP		**L1819966-1**						
Total Kjeldahl Nitrogen		0.35	0.38		mg/L	5.9	20	02-SEP-16
WG2380278-2 LCS								
Total Kjeldahl Nitrogen			88.2		%		75-125	02-SEP-16
WG2380278-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-SEP-16
WG2380278-4 MS		**L1819966-1**						
Total Kjeldahl Nitrogen			110.9		%		70-130	02-SEP-16
TOC-WT	**Water**							
Batch R3541335								
WG2380766-3 DUP		**L1822039-2**						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	01-SEP-16
WG2380766-2 LCS								
Total Organic Carbon			99.4		%		80-120	01-SEP-16
WG2380766-1 MB								
Total Organic Carbon			<1.0		mg/L		1	01-SEP-16
WG2380766-4 MS		**L1822039-2**						
Total Organic Carbon			92.6		%		70-130	01-SEP-16
TURBIDITY-BF	**Water**							
Batch R3538456								
WG2379069-3 DUP		**L1821468-6**						
Turbidity		63.5	65.0		NTU	2.3	15	31-AUG-16
WG2379069-1 MB								
Turbidity			<0.10		NTU		0.1	31-AUG-16

Quality Control Report

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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Friday, 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

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.

ALS -- Fort Collins

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	

ALS Environmental

1609039

L1821470

WATERLOO

Subcontract Request Form

Subcontract To:

ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA

225 COMMERCE DRIVE
FORT COLLINS,CO 80524

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

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1821470-1 MS-08		8/30/2016	
(1)	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/23/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910

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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumbl Date Received: 9-2-16 1000

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS- Waterloo Workorder No: 1609039

Project Manager: AW Initials: ODT Date: 9-2-16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY	(YES)	NO

Cooler #:	1							
Temperature (°C):	5.4							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	11							
Background µR/hr reading:	12							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 9/6/16

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

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


ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
60 NORTHLAND RD
WATERLOO, ON N2V2B8
CANADA CA
SHIP DATE: 01SEP16
ACTWGT: 10.00 LB
CAD: 9611609/INCA3790
DIMS: 16x11x1
BILL SENDER
TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR
FORT COLLINS CO 80524
(800) 443-1611
INV:
PO:
REF:
DEPT:
3.4°C
FedEx
Express
TRK#
0488 7771 3644 2045
XH FTCA
10:30A
INTL PRIORITY
ETD
80524
CO-US DEN
RT 616
ST 10
10:30
A
2045
09:02

Client:	ALS Environmental	**Date:**	*30-Sep-16*
Project:	L1821470	**Work Order:**	1609039
Sample ID:	L1821470-1	**Lab ID:**	1609039-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/30/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**			Prep Date: **9/22/2016**	PrepBy: **CDJ**
Ra-226	**0.011 (+/- 0.0065)**		**0.007**	**BQ/l**	NA	9/30/2016 12:15
Carr: BARIUM	*92.9*		*40-110*	*%REC*	DL = NA	9/30/2016 12:15

Client:	ALS Environmental	**Date:**	*30-Sep-16*
Project:	L1821470	**Work Order:**	1609039
Sample ID:	L1821470-1	**Lab ID:**	1609039-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/30/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160922-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**
Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.62 (+/- 0.400)	0.00521	1.673		96.6	67-120					P
Carr: BARIUM	16400		16610		98.5	40-110					

LCSD Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**
Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.70 (+/- 0.422)	0.00604	1.673		102	67-120		1.62	0.1	2.1	P
Carr: BARIUM	12900		16610		77.5	40-110		16400			

MB Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**
Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.0068									U
Carr: BARIUM	14700		16610		88.3	40-110					

The following samples were analyzed in this batch: 1609039-1

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

TOXICITY TEST REPORT

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).		

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth from Biomass)	>100%	-	-
LC50	>100%	-	-

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

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 Regression (CETIS)[a]	Statistical Method :	Spearman-Kärber (CETIS)[a]
Historical Mean IC25 :	1.01 g/L	Historical Mean LC50 :	1.21 g/L
Warning Limits (± 2SD) :	0.87 - 1.17 g/L	Warning Limits (± 2SD) :	1.09 - 1.34 g/L

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

TEST CONDITIONS

Test Organism :	*Pimephales promelas*	Test Type :	Static Renewal
Organism Batch :	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

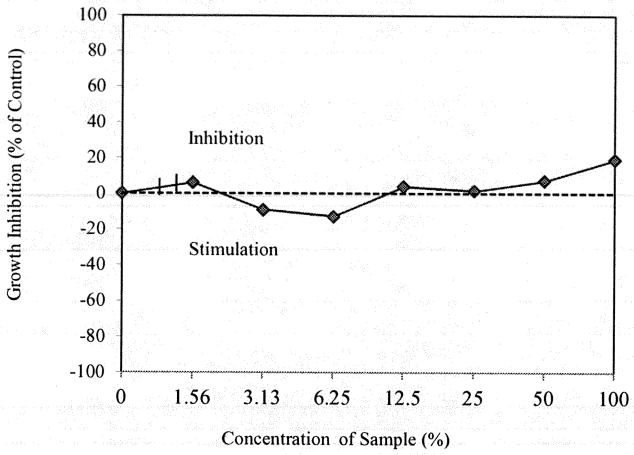
COMMENTS

*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.

Work Order : 231846
Sample Number : 48803

Fathead Minnow Growth Inhibition (based on Biomass)



REFERENCES

[a] 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].

[b]Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics, 11* :1-21.

Date : 2016-09-30
yyyy-mm-dd

Approved By : _____
Project Manager

AQUATOX

TOXICITY TEST REPORT

Fathead minnow
EPS 1/RM/22

Work Order : 231846
Sample Number : 48803

CUMULATIVE DAILY CONTROL MORTALITY AND IMPAIRMENT (±SD)

Date :	2016-09-02	2016-09-03	2016-09-04	2016-09-05	2016-09-06	2016-09-07	2016-09-08	2016-09-09
	0.00% (±0.0)	0.00% (±0.0)	0.00% (±0.0)	3.33% (±5.8)	3.33% (±5.8)	3.33% (±5.8)	3.33% (±5.8)	3.33% (±5.8)

FATHEAD MINNOW CUMULATIVE DAILY MORTALITY

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

		Day 0		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Treatment Mean Mortality (± SD)
Date :		2016-09-02		2016-09-03		2016-09-04		2016-09-05		2016-09-06		2016-09-07		2016-09-08		2016-09-09		
Analyst(s):		XD		SS		RD		SS		SDC		SDC		SDC		SDC		
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	%
Control	A	0	0	0	0	0	0	1	10	1	10	1	10	1	10	1	10	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.33 (±5.77)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1.56	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3.13	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	1	10	2	20	2	20	6.67 (±11.55)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6.25	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12.5	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 (±0.00)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
50	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	B	0	0	0	0	0	0	0	0	0	0	0	0	1	10	1	10	6.67 (±5.77)
	C	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	
	B	0	0	0	0	0	0	0	0	0	0	0	0	1	10	2	20	13.33 (±11.55)
	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Aberrant behaviour or swimming impairment : None

Data Reviewed By: DK

Date : 2016-09-28

Work Order : 231846
Sample Number : 48803

FATHEAD MINNOW DRY WEIGHT AND BIOMASS DATA

Concentration (%)	Replicate	Number of Larvae Exposed	Replicate Mean Dry Weight (mg)	Treatment Mean Biomass (mg)	Standard Deviation
Control	A	10	1.124	1.047	0.109
	B	10	0.923		
	C	10	1.095		
1.56	A	10	0.989	0.983	0.011
	B	10	0.971[1]		
	C	10	0.990		
3.13	A	10	1.158	1.143	0.037
	B	10	1.101		
	C	10	1.171		
6.25	A	10	1.278	1.183	0.088
	B	10	1.165		
	C	10	1.105		
12.5	A	10	1.112	1.007	0.091
	B	10	0.967		
	C	10	0.943		
25	A	10	1.094	1.032	0.116
	B	10	0.899[1]		
	C	10	1.104		
50	A	10	1.083	0.972	0.108
	B	10	0.868		
	C	10	0.966		
100	A	10	0.824	0.847	0.031
	B	10	0.883		
	C	10	0.835		

NOTES :

- [1]Outlier according to Grubbs Test[b]. Outlying data points were not excluded from statistical analysis, since they could not be attributed to error.
- Control average dry weight per surviving organism = 1.089 mg

Data Reviewed By: DK

Date : 2016-09-28

Work Order : 231846
Sample Number: 48803

Fathead Minnow Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	9.2	7.2	1282	740

		Day 0 - 1 2016-09-02	Day 1 - 2 2016-09-03	Day 2 - 3 2016-09-04	Day 3 - 4 2016-09-05	Day 4 - 5 2016-09-06	Day 5 - 6 2016-09-07	Day 6 - 7 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.[2]		112	118	117	121	119	121	119
pH		7.2	7.6	7.5	7.5	7.4	7.2	7.2
Pre-aeration Time (min)[3]		20	20	20	20	20	20	20
Analyst(s) :	Initial	SV	SEC	JL	JL	SDC	SDC	SV
	Final	SEC	JL	JL	SDC	SDC	SV	CG
Control (0%)								
Temp.(°C)	Initial	26.0	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 % Sat.	Initial	98	98	98	100	99	98	98
DO (mg/L)	Initial	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	Initial	8.4	8.5	8.5	8.5	8.4	8.3	8.3
	Final	8.3	8.3	8.1	8.0	8.2	8.0	7.9
Cond. (µmhos)	Initial	642	672	664	722	708	701	696
1.56 %								
Temp.(°C)	Initial	26.0	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)	Initial	8.0	8.5	8.2	8.3	8.1	8.0	8.5
	Final	7.9	7.8	7.3	6.8	6.5	7.6	7.0
pH	Initial	8.4	8.4	8.5	8.4	8.4	8.3	8.3
	Final	8.3	8.3	8.2	8.0	7.9	8.0	7.8
Cond. (µmhos)	Initial	655	697	683	744	720	718	730
25 %								
Temp.(°C)	Initial	26.0	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)	Initial	8.3	8.5	8.3	8.4	8.1	8.1	8.5
	Final	8.0	7.2	7.4	6.8	6.7	7.7	7.0
pH	Initial	8.4	8.4	8.4	8.4	8.3	8.2	8.2
	Final	8.2	8.1	8.2	7.9	7.8	7.9	7.7
Cond. (µmhos)	Initial	822	859	850	896	872	874	888
100 %								
Temp.(°C)	Initial	26.0	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)	Initial	9.1	9.0	8.6	8.5	9.3	8.8	8.6
	Final	8.0	7.8	7.5	6.9	6.1	7.8	6.6
pH	Initial	7.3	7.7	7.5	7.4	7.6	7.4	7.2
	Final	7.6	7.3	7.3	7.1	7.1	7.1	6.9
Cond. (µmhos)	Initial	1286	1303	1301	1308	1286	1289	1324

"–" = not measured

[2] % saturation (adjusted for actual temperature and barometric pressure)

[3] ≤100 bubbles/minute

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

TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

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 Reproduction and Survival using the Cladoceran *Ceriodaphnia dubia*. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/21, 2nd ed. (February 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
LC50	>100%	-	-
IC25 (Reproduction)	>100%	-	-

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2016-09-06	Analyst(s) :	MA, MC, XD, RD
Organism Batch :	Cd16-09	Test Duration :	6 days
IC25 Reproduction :	1.30 g/L	LC50 :	1.87 g/L*
95% Confidence Limits :	1.01 - 1.38 g/L	95% Confidence Limits :	1.50 - 2.33 g/L
Statistical Method :	Linear Interpolation (CETIS)[a]	Statistical Method :	Linear Regression (MLE) (CETIS)[a]
Historical Mean IC25 :	1.36 g/L	Historical Mean LC50 :	2.22 g/L
Warning Limits (± 2SD) :	1.04 - 1.78 g/L	Warning Limits (± 2SD) :	1.91 - 2.59 g/L

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

TEST CONDITIONS

Sample Filtration :	None	Test Volume per Replicate :	15 mL
Test Aeration :	None	Test Vessel :	19 mL polystyrene vial
pH Adjustment :	None	Depth of Test Solution :	4.8 cm
Hardness Adjustment :	None	Organisms per Replicate :	1
Daily Renewal Method :	Transferred to fresh solutions	Number of Replicates :	10
Control/Dilution Water :	Well water (no chemicals added)	Test Method Deviation(s) :	None

COMMENTS

*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.

Work Order : 231846
Sample Number : 48803

TEST ORGANISMS

Test Organism :	*Ceriodaphnia dubia*	Range of Age (at start of test) :	11:05 h - 22:25 h
Organism Batch :	Cd16-09	Mean Brood Organism Mortality :	0%
Organism Origin :	Single in-house mass culture	Ephippia in Culture :	No
Test Organism Origin :	Individual in-house cultures		

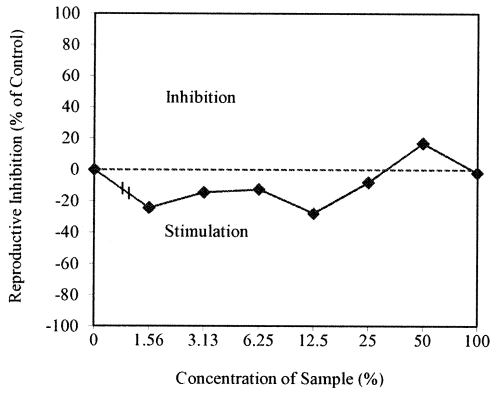
Brood Organism Neonate Production

Replicate :	1	2	3	4	5	6	7	8	9	10	Mean
Total (third or subsequent brood):	16	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**



Cumulative Daily Test Organism Mortality (%)

		Concentration of Sample (%)							
Date	**Test Day**	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 Mortality (%)		0	0	0	0	0	10	0	0

REFERENCES

[a] 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].

[b] Grubbs, F.E., 1969. Procedures for detecting outlying observations in samples. *Technometrics, 11* :1-21.

Date : 2016-09-30
yyyy-mm-dd

Approved By : [signature]
Project Manager

AQUATOX

TOXICITY TEST REPORT

Ceriodaphnia dubia
EPS 1/RM/21

Work Order : 231846
Sample Number : 48803

Ceriodaphnia dubia Survival and Reproduction

Test Initiation Date : 2016-09-02
Initiation Time : 15:20
Test Completion Date : 2016-09-08

Concentration (%) Control	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±SD)	Analyst(s)
2016-09-03	1	0	0	0	0	0	0	0	0	0	0	0	RD
2016-09-04	2	0	0	0	0	0	0	0	0	0	0	0	SS
2016-09-05	3	0	0	0	0	0	0	0	0	0	0	0	JL
2016-09-06	4	3	3	5	4	5	5	3	4	3	4	3.9	MC
2016-09-07	5	8	6	8	10	12	9	9	8	10	8	8.8	MC
2016-09-08	6	5	8	7	7	6	9	7	8	7	10	7.4	MC
Total		**16**	**17**	**20**	**21**	**23**	**23**	**19**	**20**	**20**	**22**	**20.1 (±2.3)**	

Concentration (%) 12.5	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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	5	6	4	4	4	4	4	4	4	4.3
2016-09-07	5	12	11	11	10	10	8	7	12	11	13	10.5
2016-09-08	6	8	14	14	13	1	13	10	12	13	11	10.9
Total		**24**	**30**	**31**	**27**	**15[1]**	**25**	**21**	**28**	**28**	**28**	**25.7 (±4.8)**

Concentration (%) 1.56	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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	4	4	4	3	4	4	3	6	4.2
2016-09-07	5	8	12	11	9	10	8	12	13	9	12	10.4
2016-09-08	6	13	12	9	9	9	8	8	11	13	12	10.4
Total		**25**	**30**	**24**	**22**	**23**	**19**	**24**	**28**	**25**	**30**	**25.0 (±3.5)**

Concentration (%) 25	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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	3	6	6	3	5	0 x	5	1	5	3	3.7
2016-09-07	5	8	12	12	9	7	0	10	0	8	9	7.5
2016-09-08	6	13	13	12	11	12	0	11	8	13	12	10.5
Total		**24**	**31**	**30**	**23**	**24**	**0[1]**	**26**	**9**	**26**	**24**	**21.7 (±9.7)**

Concentration (%) 3.13	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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
Total		**18**	**21**	**28**	**26**	**14**	**20**	**28**	**16**	**26**	**33**	**23.0 (±6.1)**

Concentration (%) 50	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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 (±7.2)**

Concentration (%) 6.25	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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	3	3	4	5	5	2	4	4	3	4	3.7
2016-09-07	5	8	11	10	10	10	11	9	9	7	12	9.7
2016-09-08	6	7	6	7	11	10	10	8	9	11	13	9.2
Total		**18**	**20**	**21**	**26**	**25**	**23**	**21**	**22**	**21**	**29**	**22.6 (±3.2)**

Concentration (%) 100	Day	Replicate 1	2	3	4	5	6	7	8	9	10	Mean Young (±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	4	5	7	3	5	4	4	5	4	4.5
2016-09-07	5	10	5	4	11	7	9	8	0	10	8	7.2
2016-09-08	6	12	9	3	12	0	8	11	8	10	15	8.8
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[b]. 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 : DK
Date : 2016-09-28

Work Order : 231846
Sample Number: 48803

Ceriodaphnia dubia Water Chemistry Data

Initial Chemistry:	Temp. (°C)	DO (mg/L)	pH	Conductivity (µmhos/cm)	Hardness (mg/L as $CaCO_3$)
	25.0	9.2	7.2	1282	740

Date :		Day 0 - 1 2016-09-02	Day 1 - 2 2016-09-03	Day 2 - 3 2016-09-04	Day 3 - 4 2016-09-05	Day 4 - 5 2016-09-06	Day 5 - 6 2016-09-07
Sub-sample Used		1	1	1	2	2	3
Temperature (°C)		25.0	25.0	24.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)		9.2	9.8	9.7	10.1	9.8	9.9
Dissolved Oxygen % Sat.[3]		112	118	117	121	119	121
pH		7.2	7.6	7.5	7.5	7.4	7.2
Pre-aeration Time (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.[3]	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
pH	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	8.0	8.5	8.2	8.3	8.1	8.0
	Final	7.5	7.3	7.1	7.1	7.4	7.0
pH	Initial	8.4	8.4	8.5	8.4	8.4	8.3
	Final	8.1	8.2	8.1	8.1	8.0	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
	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	9.1	9.0	8.6	8.5	9.3	8.8
	Final	7.4	7.3	7.1	7.2	7.4	7.1
pH	Initial	7.3	7.7	7.5	7.4	7.6	7.4
	Final	8.5	7.2	7.2	7.6	7.1	7.0
Cond. (µmhos)	Initial	1286	1303	1301	1308	1286	1289

"–" = not measured

[3] % saturation (adjusted for actual temperature and barometric pressure)

[4] ≤100 bubbles/minute

AQUATOX
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TOXICITY TEST REPORT

Pseudokirchneriella subcapitata
EPS 1/RM/25

Work Order : 231846
Sample Number : 48803

SAMPLE IDENTIFICATION

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

Test Method : Growth Inhibition Test Using a Freshwater Alga. Environment Canada, Conservation and Protection. Ottawa, Ontario. Report EPS 1/RM/25, 2nd ed. (March 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Growth)	>90.91%	-	-

The results reported relate only to the sample tested.

ZINC (AS ZINC SULPHATE) REFERENCE TOXICANT DATA

Date Tested :	2016-08-30	Statistical Method :	Linear Interpolation (CETIS)[a]
Organism Batch :	Ps16-08	Historical Mean IC25 :	15.7 µg/L
Test Duration :	72 hours	Warning Limits (± 2SD) :	7.3 - 33.7 µg/L
IC25 Growth :	18.3 µg/L	Analyst(s) :	SEC
95% Confidence Limits :	16.6 - 20.1 µg/L		

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

TEST CONDITIONS

Test Organism :	*Pseudokirchneriella subcapitata*	Control/Dilution Water :	Millipore Milli-Q (no chemicals added)
Organism Batch :	Ps16-08	Test Vessel :	U-shaped 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 ON	Number of Control Replicates:	10
Age (at start of test) :	4 days (in exponential growth)	Number of Test Replicates :	4
pH Adjustment :	None	Concentrations Tested :	10 + Control
Hardness Adjustment :	None	Photoperiod / Light Intensity :	Continuous light, 4240 - 4400 lux
Sample Pre-aeration :	None	Mean Test Temperature (± SD):	23.4°C (± 0.3)
Sample Filtration :	0.45 µm 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.

AQUATOX

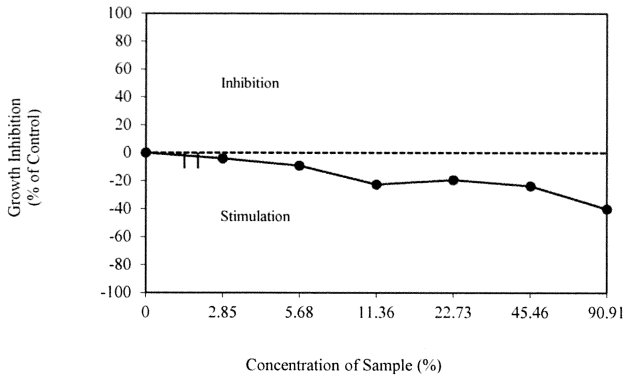
TOXICITY TEST REPORT

Pseudokirchneriella subcapitata

EPS 1/RM/25

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)**

Concentration (%)	Replicate 1	2	3	4	7	8	9	10	Mean	Standard Deviation	CV (%)	Stimulation (% 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, α=0.05.
•Control replicates 5 and 6 used for pH measurement.
•The Mann-Kendall test shows that there is no inhibitory gradient (α=0.05).
•No outlying data points were detected according to Grubbs Test (CETIS)[a].

"–" = not enumerated/not required

Data Reviewed By : [signature]
Date : 2016-09-28

REFERENCES

[a] 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].

Date : 2016-09-29
yyyy-mm-dd

Approved By : [signature]
Project Manager

AquaTox Testing & Consulting Inc.
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Puslinch ON N0B 2J0
Tel: (519) 763-4412 Fax: (519) 763-4419

Work Order : 231846
Sample Number : 48803

SAMPLE IDENTIFICATION

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

Test Method : Test for Measuring the Inhibition of Growth using the Freshwater Macrophyte, *Lemna minor*. Method Development and Application Section, Environmental Technology Centre, Environment Canada. Ottawa, Ontario. Report EPS 1/RM/37, 2nd ed. (January 2007).

TEST RESULTS

Effect	Value	95% Confidence Limits	Statistical Method
IC25 (Weight)	21.5%	6.85-75.2	Linear Interpolation (CETIS) a
IC25 (Frond Production)	7.90%	5.49-9.74	Linear Interpolation (CETIS) a

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE TOXICANT DATA

Date Tested :	2016-08-31	Statistical Method :	Non-Linear Regression (CETIS)[a]
Organism Batch :	Lm16-08	Historical Geometric Mean IC25 :	2.17 g/L
Test Duration :	7 days	Warning Limits (± 2SD) :	1.52 - 3.09 g/L
IC25 (Frond Production) :	1.75 g/L	Growth Medium :	Modified APHA
95% Confidence Limits :	1.37 - 2.14 g/L	Analyst(s) :	SEC, MA

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

TEST CONDITIONS

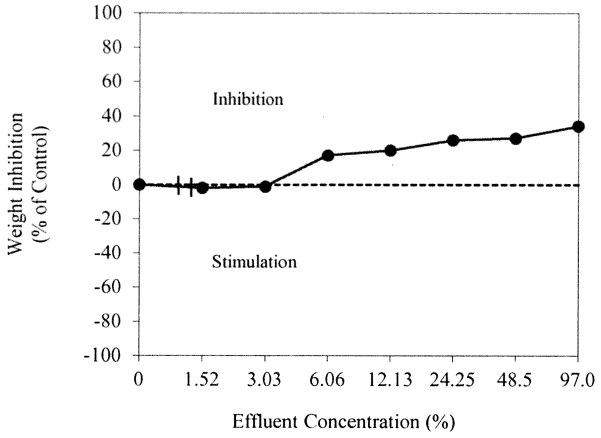
Test Organism :	*Lemna minor* L., Strain 7730	Test Type :	Static (no sub-samples required)
Organism Batch :	Lm16-08	Control/Dilution Medium :	Modified APHA
Culture Origin :	UTCC 492	Medium Preparation Water :	Distilled Water
Test Organism Source :	Axenic in-house culture	Source of Water :	Morning Mist
Culture Medium :	Modified Hoaglands E+	Medium Preparation Chemicals :	Modified APHA stocks A, B, C (10 mL/L)
Age (on Test Day 0) :	10 days	Nutrient Spiking of Sample :	Modified APHA stocks A, B, C (10 mL/L)
Health Criteria (in APHA) :	15-fold frond increase in 7 days	Replicates per Concentration :	4
Organism Acclimation :	21:20 h in APHA medium	Test Volume per Replicate :	100 mL
Inoculum (Test Day 0) :	2 plants (3 fronds per plant)	Test Vessel :	250 mL glass Erlenmeyer flask
Sample Filtration :	1 µm (Whatman GF/C)	Depth of Test Solution :	4.0 cm
Sample Pre-aeration :	20 min. at ≤100 bubbles/min.	Photoperiod/Light Intensity :	Continuous, 4640 - 5200 lux
pH Adjustment :	None	Test Method Deviation(s) :	None
Hardness Adjustment :	None		

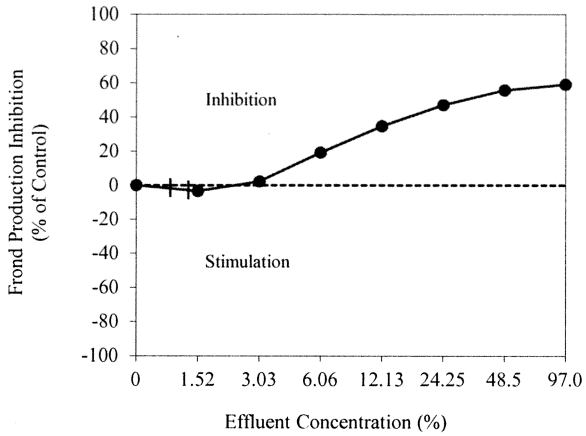
COMMENTS

•All test validity criteria as specified in the test method cited above were satisfied.
•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)[a]. 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).

Work Order : 231846
Sample Number : 48803

Lemna minor Growth Inhibition





TEST MONITORING

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

Termination Date : 2016-09-09
Termination Time : 14:30
Terminated By : AW

Temperature Monitoring

Test Day	Date	Temperature (°C)
0 (unmodified sample)	2016-09-02	25.0
0	2016-09-02	25.5
1	2016-09-03	25.0
2	2016-09-04	25.0
3	2016-09-05	25.0
4	2016-09-06	25.0
5	2016-09-07	25.0
6	2016-09-08	25.0
7	2016-09-09	25.0

pH Monitoring

Concentration (%)	Day 0	Day 7
100 (unmodified sample)	7.2	–
Control	8.3	8.5
1.52	8.3	8.4
3.03	–	–
6.06	–	–
12.13	8.1	8.4
24.25	–	–
48.5	–	–
97.0	7.9	8.3

"–" = not required

REFERENCES

[a] 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.

Date : 2016-09-30
yyyy-mm-dd

Approved By: G. Medas
Project Manager

Work Order : 231846
Sample Number : 48803

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)
Control	A	6	80	74	75.50	3.87	5.1	Fronds healthy, appearance normal in all replicates.
	B	6	87	81				
	C	6	78	72				
	D	6	81	75				
1.52	A	6	71	65	78.00	12.46	16.0	Fronds healthy, appearance normal in all replicates.
	B	6	92	86				
	C	6	76	70				
	D	6	97	91				
3.03	A	6	85	79	73.75	3.86	5.2	Fronds healthy, appearance normal in all replicates.
	B	6	80	74				
	C	6	78	72				
	D	6	76	70				
6.06	A	6	65	59	61.00	3.16	5.2	Fronds healthy, appearance normal in all replicates.
	B	6	68	62				
	C	6	71	65				
	D	6	64	58				
12.13	A	6	57	51	49.25	2.75	5.6	Fronds healthy, appearance normal in all replicates.
	B	6	54	48				
	C	6	52	46				
	D	6	58	52				
24.25	A	6	50	44	40.00	4.24	10.6	In all replicates, fronds are yellow in appearance.
	B	6	41	35				
	C	6	44	38				
	D	6	49	43				
48.5	A	6	41	35	33.50	3.42	10.2	In all replicates, fronds are yellow in appearance.
	B	6	39	33				
	C	6	43	37				
	D	6	35	29				
97.0	A	6	43	37	31.00	4.32	13.9	In all replicates, fronds are yellow in appearance.
	B	6	35	29				
	C	6	37	31				
	D	6	33	27				

NOTES: *No unusual appearance or treatment of culture prior to testing. Test inoculated with healthy plants.
•No significant stimulation (α=0.05) of frond increase was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.
•A 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)[a].

"–" = not available/not required

Test Data Reviewed By : I
Date : 2016-09-28

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
Control	A	7.03	7.74	0.54
	B	8.31		
	C	7.95		
	D	7.66		
1.52	A	6.26[2]	7.88	1.27
	B	8.79		
	C	7.50		
	D	8.98		
3.03	A	7.94	7.82	0.31
	B	7.82		
	C	7.40		
	D	8.12		
6.06	A	6.34	6.41	0.06
	B	6.39		
	C	6.44		
	D	6.47		
12.13	A	5.92	6.19	0.21
	B	6.12		
	C	6.38		
	D	6.32		
24.25	A	6.27	5.72	0.70
	B	5.16		
	C	5.07		
	D	6.38		
48.5	A	5.34	5.63	0.53
	B	5.38		
	C	6.42		
	D	5.39		
97.0	A	4.98	5.10	0.13
	B	5.17		
	C	5.24		
	D	4.99		

NOTES :

- No significant stimulation (α=0.05) of frond weight was detected by ANOVA-Dunnett Multiple Comparison Test (CETIS)[a] at any test level compared to the control.
- No outlying data points were detected according to Grubbs Test (CETIS)[a].
- [2]Outlier according to Grubbs Test (CETIS)[a]. 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

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 231846

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

P.O. Number:	ALS - Baffinland Toxicity
Field Sampler Name (print):	BB, KM, BDB
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	

Client:	ALS Environmental Waterloo Quote # - 162705399-15
Phone:	(519) 886-6910
Fax:	(519) 886-9047
Contact:	Wayne Smith / Danielle Walker

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name: L1821470-1	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
30 Aug 16	1120	MS-08	48803	*	✓		✓		✓	✓	✓	✓					Pail, Bladder, Bottle.

For Lab Use Only	
Received By:	SB
Date:	2016-09-01
Time:	12:20
Storage Location:	
Storage Temp.(°C)	

Please list any special requests or instructions:

MMER Toxicity RISS Reporting required

2L - 10.0°

10L - 09.0°

23L - 20.0° SB

ALS Environmental

L1821470

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L1821470*
ALS requires QC data to be provided with your final results.
3 bladder bags 1 Pail
1 Plastic Bottle

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1821470-1 MS-08		8/ 30/ 2016	
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	9/20/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

AQUATOX
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

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 Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE 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 CULTURE HEALTH DATA

Time to First Brood :	8.4 days	Mean Young Per Brood :	29.6
Culture Mortality :	1.7% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm16-18B	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2016-09-12
yyyy-mm-dd

Approved by: *Project Manager*

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 231846
Sample Number: 48803

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	740	None	7.6	9.2	1279	20.0	106	0:30

0 hours

Date & Time 2016-09-01 14:50
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	Hardness
100A	0	0	7.8	8.9	1288	20.0	102	740
100B	0	0	7.8	8.9	1288	20.0	102	740
100C	0	0	7.8	8.9	1288	20.0	102	740
Control A	0	0	8.4	8.5	723	20.0	98	220
Control B	0	0	8.4	8.5	723	20.0	98	220
Control C	0	0	8.4	8.5	723	20.0	98	220

Notes:

24 hours

Date & Time 2016-09-02 14:50
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2016-09-03 14:50
Technician: SEC

Test Conc. (%)	Mortality	Immobility	pH	D.O.	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: DK
Date: 2016-09-09

AQUATOX

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

TOXICITY TEST REPORT
Rainbow Trout

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 DATA

Organism Batch :	T16-14		
Date Tested (yyyy-mm-dd) :	2016-09-02	Historical Mean LC50 :	3706 mg/L
LC50 (95% Confidence Limits) :	3464 mg/L (3000 - 4000)	Warning Limits (± 2SD) :	3064 - 4483 mg/L
Statistical Method :	Binomial	Analyst(s) :	NL, TL, SS

TEST FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0.2 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.45 ± 0.29 g	Mean Fish Fork Length (± 2 SD) :	36.3 ± 7.5 mm
Range of Weights :	0.28 - 0.74 g	Range of Fork Lengths (mm) :	32 - 44 mm
Fish Loading Rate :	0.2 g/L		

TEST CONDITIONS

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 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2016-09-12
yyyy-mm-dd

Approved by: *Project Manager*

Work Order: 231846
Sample Number: 48803

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	6.7	9.3	1302	15.0	–
	Chemistry after 30min air:	6.9	9.3	1307	14.5	99

0 hours

Date & Time 2016-09-01 14:05
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	6.9	9.3	1307	14.5	99
Control	0	0	8.0	9.5	863	14.5	100

Notes:

24 hours

Date & Time 2016-09-02 14:05
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

48 hours

Date & Time 2016-09-03 14:05
Technician: TL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

72 hours

Date & Time 2016-09-04 14:05
Technician: TL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2016-09-05 14:05
Technician: TL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	7.0	9.1	1311	15.0
Control	0	0	8.0	9.2	778	15.0

Notes:

# of control organisms showing stress 0
Trout Batch #: T16-14

"–" = not measured
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: DK
Date: 2016-09-09

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 23/846

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

P.O. Number:	ALS - Baffinland Toxicity
Field Sampler Name (print):	BB, KM, BDB
Signature:	
Affiliation:	ALS Environmental
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	

Client:	ALS Environmental Waterloo Quote # - 162705399-15
Phone:	(519) 886-6910
Fax:	(519) 886-9047
Contact:	Wayne Smith / Danielle Walker

Sample Identification					Analyses Requested										Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	RISS Data Entry	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
30Aug 16	1120	L1821470-1 MS-08	48803	*	✓		✓		✓	✓	✓	✓					Pail, Bladder, Bottl

For Lab Use Only

Received By:	SB
Date:	2016-09-01
Time:	12:20
Storage Location:	
Storage Temp.(°C)	

NK

Please list any special requests or instructions:

MMER Toxicity RISS Reporting required

2L - 10.0°

10L - 09.0°

23L - 20.0° SB

ALS Environmental

L1821470

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L1821470*
ALS requires QC data to be provided with your final results.
3 bladder bags 1 Pail
1 Plastic Bottle

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1821470-1 MS-08		8/ 30/ 2016	
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	9/20/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1821470-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
Phone:	647-253-0596 EXT 6016	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2, E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:	RH	Location:	

ALS Lab Work Order # (lab use only): L1821470

ALS Contact: Wayne Smith | Sampler: BB, KM, BDB

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7	Radium 226	Group 3	Sublethal Toxicity (Fathead Minnow, Ceriodaphnia dubia, Pseudokirchneriella subcapitata, Lemna minor)	Specific Conductance	Cyanide	Number of Containers
1	MS-08	30-Aug-16	11:20	Water	R	R	R	R	R	R	14

* only Turb to BF *

Drinking Water (DW) Samples[1] (client use)	Field filtering performed on dissolved metals/mercury bottles. Preservatives added in field, including Radium. Sample from actual waste rock pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
11.2			13.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Brett Bennett	Date: 2016-08-30	Time: 15:20	Received by:	Date: 8/30/16	Time: 3:54 pm	Received by:	Date: 15/09/16	Time: 0930

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SW

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 RECEIVING ENVIRONMENT
C of C Numbers:
Legal Site Desc:

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.]

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							
Physical Tests							
Conductivity	193		3.0	umhos/cm		01-SEP-16	R3539238
Hardness (as CaCO3)	82	HTC	10	mg/L		02-SEP-16	
pH	8.16		0.10	pH units		01-SEP-16	R3539237
Total Suspended Solids	6.8		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)	75		10	mg/L		01-SEP-16	R3539116
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	R3542048
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							
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
Potassium (K)-Total	1.48		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784

* 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
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 (Tl)-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	HTC	10	mg/L		02-SEP-16	
pH	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	R3541336
Total Organic Carbon	1.4		1.0	mg/L		01-SEP-16	R3541337
Total Metals							

* 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
L1821469-2 MS-08-US Sampled By: NF/KM on 29-AUG-16 @ 15:47 Matrix: WATER							
Total Metals							
Aluminum (Al)-Total	0.475		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	0.00012		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Barium (Ba)-Total	0.0138		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	16.5		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Cesium (Cs)-Total	0.000054		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Chromium (Cr)-Total	0.00098		0.00050	mg/L	01-SEP-16	01-SEP-16	R3538784
Cobalt (Co)-Total	0.00017		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	0.372		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Lead (Pb)-Total	0.00032		0.00010	mg/L	01-SEP-16	01-SEP-16	R3538784
Lithium (Li)-Total	0.0015		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Magnesium (Mg)-Total	9.42		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Manganese (Mn)-Total	0.00432		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	0.000471		0.000050	mg/L	01-SEP-16	01-SEP-16	R3538784
Nickel (Ni)-Total	0.00076		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
Potassium (K)-Total	1.46		0.050	mg/L	01-SEP-16	01-SEP-16	R3538784
Rubidium (Rb)-Total	0.00318		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	1.73		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	4.15		0.50	mg/L	01-SEP-16	01-SEP-16	R3538784
Strontium (Sr)-Total	0.0187		0.0010	mg/L	01-SEP-16	01-SEP-16	R3538784
Sulfur (S)-Total	1.64		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 (Tl)-Total	0.000011		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Thorium (Th)-Total	0.00048		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	0.0219		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	0.00486		0.000010	mg/L	01-SEP-16	01-SEP-16	R3538784
Vanadium (V)-Total	0.00094		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	0.00086		0.00030	mg/L	01-SEP-16	01-SEP-16	R3538784
Radiological Parameters							

* 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
L1821469-2 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	R3562833

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Total	MS-B	L1821469-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L1821469-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L1821469-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1821469-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L1821469-1, -2
Matrix Spike	Silicon (Si)-Total	MS-B	L1821469-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L1821469-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L1821469-1, -2
Matrix Spike	Sulfur (S)-Total	MS-B	L1821469-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-TITR-TB	Water	Acidity	APHA 2310 B modified

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
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.

CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

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	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Water	pH	MOEE E3137A-R511

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 Bq/L	EPA 903.1
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-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.

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

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

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

Chain of Custody Numbers:

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: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R3541821								
WG2381787-3 DUP		**L1823237-1**						
Acidity (as CaCO3)		20.4	20.0		mg/L	2.0	20	03-SEP-16
WG2381787-2 LCS								
Acidity (as CaCO3)			101.8		%		85-115	03-SEP-16
WG2381787-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	03-SEP-16
ALK-WT	**Water**							
Batch R3539116								
WG2380731-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			100.0		%		80-120	01-SEP-16
WG2380731-4 DUP		**L1822688-1**						
Alkalinity, Total (as CaCO3)		823	834		mg/L	1.4	20	01-SEP-16
WG2380731-2 LCS								
Alkalinity, Total (as CaCO3)			96.2		%		85-115	01-SEP-16
WG2380731-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	01-SEP-16
C-DIS-ORG-WT	**Water**							
Batch R3541336								
WG2380793-3 DUP		**L1822233-1**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	01-SEP-16
WG2380793-2 LCS								
Dissolved Organic Carbon			98.2		%		80-120	01-SEP-16
WG2380793-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	01-SEP-16
WG2380793-4 MS		**L1822233-1**						
Dissolved Organic Carbon			98.8		%		70-130	01-SEP-16
CL-IC-N-WT	**Water**							
Batch R3542048								
WG2381106-4 DUP		**WG2381106-3**						
Chloride (Cl)		8.90	8.89		mg/L	0.1	20	02-SEP-16
WG2381106-2 LCS								
Chloride (Cl)			101.8		%		90-110	02-SEP-16
WG2381106-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-SEP-16
WG2381106-5 MS		**WG2381106-3**						
Chloride (Cl)			103.5		%		75-125	02-SEP-16
CN-TOT-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R3542731								
WG2383066-19 DUP		**L1820776-11**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-23 DUP		**L1821779-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383066-18 LCS								
Cyanide, Total			94.6		%		80-120	07-SEP-16
WG2383066-22 LCS								
Cyanide, Total			94.4		%		80-120	07-SEP-16
WG2383066-17 MB								
Cyanide, Total			<0.0020		mg/L		0.002	07-SEP-16
WG2383066-21 MB								
Cyanide, Total			<0.0020		mg/L		0.002	07-SEP-16
WG2383066-20 MS		**L1820776-11**						
Cyanide, Total			102.2		%		70-130	07-SEP-16
WG2383066-24 MS		**L1821779-1**						
Cyanide, Total			91.6		%		70-130	07-SEP-16
EC-WT	**Water**							
Batch R3539238								
WG2379938-4 DUP		**WG2379938-3**						
Conductivity		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								
WG2381106-4 DUP		**WG2381106-3**						
Fluoride (F)		0.025	0.026		mg/L	5.1	20	02-SEP-16
WG2381106-2 LCS								
Fluoride (F)			99.3		%		90-110	02-SEP-16
WG2381106-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-SEP-16
WG2381106-5 MS		**WG2381106-3**						
Fluoride (F)			103.6		%		75-125	02-SEP-16
HG-T-CVAA-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R3539762								
WG2380992-4 DUP		**WG2380992-3**						
Mercury (Hg)-Total		<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
WG2380992-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	02-SEP-16
WG2380992-8 MS		**WG2380992-7**						
Mercury (Hg)-Total			90.5		%		70-130	02-SEP-16
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-4 DUP		**WG2380132-3**						
Aluminum (Al)-Total		0.018	0.017		mg/L	9.2	20	01-SEP-16
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-SEP-16
Arsenic (As)-Total		0.00045	0.00045		mg/L	1.4	20	01-SEP-16
Barium (Ba)-Total		0.0421	0.0410		mg/L	2.5	20	01-SEP-16
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	01-SEP-16
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-SEP-16
Boron (B)-Total		0.018	0.018		mg/L	0.6	20	01-SEP-16
Cadmium (Cd)-Total		<0.000010	<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
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-SEP-16
Cesium (Cs)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	01-SEP-16
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	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
Lithium (Li)-Total		0.0012	0.0012		mg/L	3.1	20	01-SEP-16
Magnesium (Mg)-Total		5.14	5.01		mg/L	2.5	20	01-SEP-16
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
Phosphorus (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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-4 DUP		**WG2380132-3**						
Silicon (Si)-Total		3.00	3.01		mg/L	0.6	20	01-SEP-16
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	01-SEP-16
Sodium (Na)-Total		26.6	25.8		mg/L	3.1	20	01-SEP-16
Strontium (Sr)-Total		0.141	0.140		mg/L	0.9	20	01-SEP-16
Sulfur (S)-Total		3.48	3.58		mg/L	3.1	25	01-SEP-16
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-2 LCS								
Manganese (Mn)-Total			98.2		%		80-120	01-SEP-16
Molybdenum (Mo)-Total			101.6		%		80-120	01-SEP-16
Nickel (Ni)-Total			93.6		%		80-120	01-SEP-16
Phosphorus (P)-Total			100.9		%		80-120	01-SEP-16
Potassium (K)-Total			97.3		%		80-120	01-SEP-16
Rubidium (Rb)-Total			95.5		%		80-120	01-SEP-16
Selenium (Se)-Total			91.4		%		80-120	01-SEP-16
Silicon (Si)-Total			111.1		%		80-120	01-SEP-16
Silver (Ag)-Total			96.8		%		80-120	01-SEP-16
Sodium (Na)-Total			95.6		%		80-120	01-SEP-16
Strontium (Sr)-Total			97.9		%		80-120	01-SEP-16
Sulfur (S)-Total			97.8		%		70-130	01-SEP-16
Thallium (Tl)-Total			96.6		%		80-120	01-SEP-16
Tellurium (Te)-Total			92.0		%		80-120	01-SEP-16
Thorium (Th)-Total			93.8		%		70-130	01-SEP-16
Tin (Sn)-Total			97.8		%		80-120	01-SEP-16
Titanium (Ti)-Total			91.8		%		80-120	01-SEP-16
Tungsten (W)-Total			98.9		%		80-120	01-SEP-16
Uranium (U)-Total			100.1		%		80-120	01-SEP-16
Vanadium (V)-Total			98.0		%		80-120	01-SEP-16
Zinc (Zn)-Total			89.7		%		80-120	01-SEP-16
Zirconium (Zr)-Total			96.0		%		80-120	01-SEP-16
WG2380132-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	01-SEP-16
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-SEP-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-SEP-16
Barium (Ba)-Total			<0.00020		mg/L		0.0002	01-SEP-16
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-SEP-16
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-SEP-16
Boron (B)-Total			<0.010		mg/L		0.01	01-SEP-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	01-SEP-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	01-SEP-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	01-SEP-16
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	01-SEP-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-1 MB								
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	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
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 (Tl)-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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-5 MS		**WG2380132-3**						
Bismuth (Bi)-Total			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 (Tl)-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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3538784								
WG2380132-5 MS		**WG2380132-3**						
Zirconium (Zr)-Total			98.5		%		70-130	02-SEP-16
NH3-WT	**Water**							
Batch R3539884								
WG2380997-11 DUP		**L1821469-1**						
Ammonia, Total (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	02-SEP-16
WG2380997-10 LCS								
Ammonia, Total (as N)			101.3		%		85-115	02-SEP-16
WG2380997-9 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	02-SEP-16
WG2380997-12 MS		**L1821469-1**						
Ammonia, Total (as N)			90.4		%		75-125	02-SEP-16
NO3-IC-WT	**Water**							
Batch R3542048								
WG2381106-4 DUP		**WG2381106-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	02-SEP-16
WG2381106-2 LCS								
Nitrate (as N)			100.1		%		70-130	02-SEP-16
WG2381106-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-SEP-16
WG2381106-5 MS		**WG2381106-3**						
Nitrate (as N)			103.6		%		70-130	02-SEP-16
P-T-COL-WT	**Water**							
Batch R3541913								
WG2380851-3 DUP		**L1821835-1**						
Phosphorus, Total		0.0114	0.0117		mg/L	1.9	20	02-SEP-16
WG2380851-2 LCS								
Phosphorus, Total			107.0		%		80-120	02-SEP-16
WG2380851-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	02-SEP-16
WG2380851-4 MS		**L1821835-1**						
Phosphorus, Total			86.7		%		70-130	02-SEP-16
PH-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R3539237								
WG2379935-6 DUP		**WG2379935-5**						
pH		6.83	6.83	J	pH units	0.00	0.2	01-SEP-16
WG2379935-4 LCS								
pH			7.00		pH units		6.9-7.1	01-SEP-16
SO4-IC-N-WT	**Water**							
Batch R3542048								
WG2381106-4 DUP		**WG2381106-3**						
Sulfate (SO4)		4.91	4.71		mg/L	4.2	20	02-SEP-16
WG2381106-2 LCS								
Sulfate (SO4)			101.2		%		90-110	02-SEP-16
WG2381106-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-SEP-16
WG2381106-5 MS		**WG2381106-3**						
Sulfate (SO4)			101.6		%		75-125	02-SEP-16
SOLIDS-TSS-WT	**Water**							
Batch R3542648								
WG2381066-3 DUP		**L1821547-1**						
Total Suspended Solids		160	185		mg/L	14	20	07-SEP-16
WG2381066-2 LCS								
Total Suspended Solids			101.4		%		85-115	07-SEP-16
WG2381066-1 MB								
Total Suspended Solids			<2.0		mg/L		2	07-SEP-16
TOC-WT	**Water**							
Batch R3541337								
WG2380794-3 DUP		**L1821469-1**						
Total Organic Carbon		1.4	1.5		mg/L	6.7	20	01-SEP-16
WG2380794-2 LCS								
Total Organic Carbon			96.5		%		80-120	01-SEP-16
WG2380794-1 MB								
Total Organic Carbon			<1.0		mg/L		1	01-SEP-16
WG2380794-4 MS		**L1821469-1**						
Total Organic Carbon			100.4		%		70-130	01-SEP-16

Quality Control Report

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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

ALS Environmental

Chain of Custody (COC) Request Form

L1821469-COFC

...bel here

COC Number: 14 -

Page 1 of 1

Canada Toll Free: 1 800 (

www.alsglobal.com

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0598 EXT 6018	Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2, E or P:
		Email 2		

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Analysis Request
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax	ap@baffinland.com	
Contact:		Email 2		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08 Receiving Environment	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)	L1821469 AH	ALS Contact: Wayne Smith	Sampler:	NF/KM

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-MMER-WT	Number of Containers
1	MS-08-DS	29-Aug-16	15:35	Water	R	7
2	MS-08-US	29-Aug-16	15:47	Water	R	7
	* ALL TEST to WT *					

Drinking Water (DW) Samples[1] (client use)	
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☑				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
8.6			13.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Karen Martens	Date: 2016-08-29	Time: 17:20	Received by:	Date: 8/29/16	Time: 9:00pm	Received by:	Date: 1 Sep 16	Time: 0930

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

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

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

SH

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
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	R3532722
Total Suspended Solids	<2.0		2.0	mg/L		23-AUG-16	R3534466
Turbidity	3.03		0.10	NTU		23-AUG-16	R3532704
Total Metals							
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	R3536295
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

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

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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).			
PH-BF	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.			
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SOLIDS-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.

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3536295								
WG2377253-4 DUP		**WG2377253-3**						
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	29-AUG-16
Copper (Cu)-Total		0.0011	0.0010		mg/L	2.9	20	29-AUG-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	29-AUG-16
Nickel (Ni)-Total		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)-Total			95.7		%		80-120	29-AUG-16
Copper (Cu)-Total			94.5		%		80-120	29-AUG-16
Lead (Pb)-Total			95.9		%		80-120	29-AUG-16
Nickel (Ni)-Total			96.0		%		80-120	29-AUG-16
Zinc (Zn)-Total			87.7		%		80-120	29-AUG-16
WG2377253-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	29-AUG-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	29-AUG-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-AUG-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-AUG-16
WG2377253-5 MS		**WG2377253-3**						
Arsenic (As)-Total			95.3		%		70-130	29-AUG-16
Copper (Cu)-Total			93.7		%		70-130	29-AUG-16
Lead (Pb)-Total			93.7		%		70-130	29-AUG-16
Nickel (Ni)-Total			93.6		%		70-130	29-AUG-16
Zinc (Zn)-Total			98.9		%		70-130	29-AUG-16
PH-BF	**Water**							
Batch R3532722								
WG2374594-2 DUP		**L1818073-9**						
pH		8.16	8.19	J	pH units	0.03	0.2	23-AUG-16
WG2374594-1 LCS								
pH			7.00		pH units		6.9-7.1	23-AUG-16
SOLIDS-TSS-BF	**Water**							
Batch R3534466								
WG2376199-3 DUP		**L1818090-1**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	23-AUG-16
WG2376199-2 LCS								
Total Suspended Solids			100.4		%		85-115	23-AUG-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-BF	**Water**							
Batch R3534466								
WG2376199-1 MB								
Total Suspended Solids			<2.0		mg/L		2	23-AUG-16
TURBIDITY-BF	**Water**							
Batch R3532704								
WG2374582-3 DUP		**L1818073-8**						
Turbidity		2.32	2.31		NTU	0.4	15	23-AUG-16
WG2374582-1 MB								
Turbidity			<0.10		NTU		0.1	23-AUG-16

Quality Control Report

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

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.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Friday, 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

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.

ALS -- Fort Collins

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	

ALS Environmental

160858

L1818090

WATERLOO

Subcontract Request Form

Subcontract To:

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

NOTES: Please reference on final report and invoice: PO# *L1818090*
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L1818090-1 MS-08**		8/ 22/ 2016	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	9/15/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Dumbell Date Received: 8-30-16 0930

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Waterloo Workorder No: 1608588

Project Manager: AW Initials: CDT 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?		(YES)	NO
5.	Are the COC and bottle labels complete and legible?		(YES)	NO
6.	Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7.	Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8.	Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9.	Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10.	Is there sufficient sample for the requested analyses?		(YES)	NO
11.	Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12.	Are all samples within holding times for the requested analyses?		(YES)	NO
13.	Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14.	Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15.	Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY	(YES)	NO

Cooler #:	1								
Temperature (°C):	5.8								
No. of custody seals on cooler:	0								
DOT Survey/ Acceptance Information — External µR/hr reading:	10								
Background µR/hr reading:									

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 9/1/16

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

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

ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
60 NORTHLAND RD

WATERLOO, ON N2V2B8
CANADA CA

SHIP DATE:
ACTWGT: 5.0
CAD: 9611605
DIMS: 11x8x

BILL SENDER

FedEx TRK# 0488 7771

XH

658651 MI

1608588

TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR

10 - 0

FORT COLLINS CO 80524
(800) 443-1511
INV:
PO:
REF:
DEPT:

(US)

FedEx Express

J18201607050

TRK# 7771 0268 7195

0488

10:30A
INTL PRIORITY
ETD
80524
CO-US DEN

XH FTCA

TRK# 7771 0268 7195

Form 0488

INTL PRIORITY

REF:
DESC1:water sample
DESC2:
DESC3:
DESC4:

COUNTRY MFG: CA
CARRIAGE VALUE: 0.00 CAD
CUSTOMS VALUE: 1.00 CAD

D/1

These commodities, technology, or software were exported from Canada in accordance with the export administration regulations. Diversion contrary to Canadian law prohibited. The Warsaw Convention may apply and will govern and in most cases limit the liability of Federal Express for loss or delay of or damage to your shipment. Subject to the conditions of the contract.

FEDEX AWB COPY — PLEASE PLACE IN POUCH

B-6910

Ship Date: 29AUG16
ActWgt: 5.00 LB
CAD: 9611609/INCA3790

Dims: 11x8x11 IN

EIN/VAT:

ALS Labs Waterloo
60 Northland Rd

Waterloo, ON N2V2B8
CANADA, CA

TO Fort Collins
ALS Labs FC
225 Commerce Dr

Fort Collins, CO 80524

(800) 443-1511

FedEx Express

(US)

AWB

J18201607050

XH FTCA
ETD
PKG TYPE: CUSTOMER

TRK# 7771 0268 7195

Form 0488

616 RT 5 10:30 A 7195 08.30 ST 8

Client:	ALS Environmental	**Date:**	*30-Sep-16*
Project:	L1818090	**Work Order:**	1608588
Sample ID:	L1818090-1	**Lab ID:**	1608588-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/22/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **9/22/2016**	PrepBy: **CDJ**	
Ra-226	0.0081 (+/- 0.0055)	LT	0.0067	BQ/l	NA	9/30/2016 12:15
Carr: BARIUM	*95.4*		*40-110*	*%REC*	DL = NA	9/30/2016 12:15

Client:	ALS Environmental	**Date:**	*30-Sep-16*
Project:	L1818090	**Work Order:**	1608588
Sample ID:	L1818090-1	**Lab ID:**	1608588-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/22/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160922-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**

Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.62 (+/- 0.400)	0.00521	1.673		96.6	67-120					P
Carr: BARIUM	16400		16610		98.5	40-110					

LCSD Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**

Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	1.70 (+/- 0.422)	0.00604	1.673		102	67-120		1.62	0.1	2.1	P
Carr: BARIUM	12900		16610		77.5	40-110		16400			

MB Sample ID: **RE160922-2** Units: **BQ/l** Analysis Date: **9/30/2016 13:01**

Client ID: Run ID: **RE160922-2A** Prep Date: **9/22/2016** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref	DER	DER Limit	Qual
Ra-226	ND	0.0068									U
Carr: BARIUM	14700		16610		88.3	40-110					

The following samples were analyzed in this batch: 1608588-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1818090-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑PDF ☑EXCEL ☑EDD (DIGITAL)	R ☑Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☑Criteria on Report - provide details below if box checked Select Distribution: ☐EMAIL ☐MAIL ☐FAX	E ☐Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6010	Email 1 or Fax bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2 bimww@alsglobal.com	Analysis Request
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution: ☑EMAIL ☐MAIL ☐FAX	
Company:		Email 1 or Fax ap@baffinland.com	
Contact:		Email 2	
Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID: / Cost Center:	
Job #:	MS-08	GL Account: / Routing Code:	
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1818090 NH | ALS Contact: Wayne Smith | Sampler: | BDB/CR

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7A	Turbidity	Number of Containers
1	MS-08 ✓	22-Aug-16	16:20	Water	R	R	3
	Assign pH, TSS, Turb						
	to BF						

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice packs Yes ☑ No ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
4	19.2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Brett Bennett	23-Aug-16	Time: 13:20	Received by: F. Khalil	Date: 23 Aug	Time: 14:00	Received by:	Date: 26 Aug	Time: 0900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

GD

SN

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
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		18-AUG-16	R3528335
Total Suspended Solids	<2.0		2.0	mg/L		18-AUG-16	R3528342
Total Dissolved Solids	1030		20	mg/L		18-AUG-16	R3528114
Turbidity	3.09		0.10	NTU		18-AUG-16	R3528332
Anions and Nutrients							
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 (Cl)	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							
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	R3530151
Sodium (Na)-Total	2.73		0.50	mg/L	20-AUG-16	20-AUG-16	R3530151
Thallium (Tl)-Total	0.000032		0.000010	mg/L	20-AUG-16	20-AUG-16	R3530151
Uranium (U)-Total	0.000030		0.000010	mg/L	20-AUG-16	20-AUG-16	R3530151
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	R3530236
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	21-AUG-16	22-AUG-16	R3530822
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	21-AUG-16	22-AUG-16	R3530822

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

* 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

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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.

EC-WT	Water	Conductivity	APHA 2510 B

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

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

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

Reference Information

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

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

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

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

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

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

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

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

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

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
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	**Water**							
Batch R3531794								
WG2373023-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			104.9		%		80-120	22-AUG-16
WG2373023-4 DUP		**L1815159-1**						
Alkalinity, Total (as CaCO3)		21	22		mg/L	5.3	20	22-AUG-16
WG2373023-2 LCS								
Alkalinity, Total (as CaCO3)			104.0		%		85-115	22-AUG-16
WG2373023-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	22-AUG-16
C-DIS-ORG-WT	**Water**							
Batch R3531213								
WG2372396-3 DUP		**L1816023-3**						
Dissolved Organic Carbon		6.5	6.7		mg/L	3.2	20	21-AUG-16
WG2372396-2 LCS								
Dissolved Organic Carbon			100.6		%		80-120	21-AUG-16
WG2372396-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	21-AUG-16
WG2372396-4 MS		**L1816023-3**						
Dissolved Organic Carbon			95.9		%		70-130	21-AUG-16
CL-IC-N-WT	**Water**							
Batch R3531814								
WG2372641-2 LCS								
Chloride (Cl)			101.7		%		90-110	22-AUG-16
WG2372641-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-AUG-16
EC-WT	**Water**							
Batch R3529840								
WG2372065-4 DUP		**WG2372065-3**						
Conductivity		1240	1250		umhos/cm	0.5	10	20-AUG-16
WG2372065-2 LCS								
Conductivity			101.9		%		90-110	20-AUG-16
WG2372065-1 MB								
Conductivity			<3.0		umhos/cm		3	20-AUG-16
F-IC-N-WT	**Water**							
Batch R3531814								
WG2372641-4 DUP		**L1815674-2**						
Fluoride (F)		0.043	0.044		mg/L	3.7	20	22-AUG-16
WG2372641-2 LCS								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R3531814								
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		**L1815674-2**						
Fluoride (F)			97.3		%		75-125	22-AUG-16
HG-D-CVAA-WT	**Water**							
Batch R3530930								
WG2372649-3 DUP		**L1816008-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372649-2 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	22-AUG-16
WG2372649-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-16
WG2372649-4 MS		**L1816008-2**						
Mercury (Hg)-Dissolved			90.8		%		70-130	22-AUG-16
HG-T-CVAA-WT	**Water**							
Batch R3530929								
WG2372647-4 DUP		**WG2372647-3**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372647-2 LCS								
Mercury (Hg)-Total			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		**WG2372647-5**						
Mercury (Hg)-Total			94.4		%		70-130	22-AUG-16
MET-D-CCMS-WT	**Water**							
Batch R3530822								
WG2372405-4 DUP		**WG2372405-3**						
Aluminum (Al)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-AUG-16
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-AUG-16
Cadmium (Cd)-Dissolved		0.000192	0.000194		mg/L	0.9	20	22-AUG-16
Calcium (Ca)-Dissolved		52.3	51.0		mg/L	2.7	20	22-AUG-16
Copper (Cu)-Dissolved		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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3530822								
WG2372405-4 DUP		**WG2372405-3**						
Magnesium (Mg)-Dissolved		134	135		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 (Tl)-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 (Al)-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 (Tl)-Dissolved			96.9		%		80-120	22-AUG-16
Uranium (U)-Dissolved			99.6		%		80-120	22-AUG-16
Zinc (Zn)-Dissolved			98.9		%		80-120	22-AUG-16
WG2372405-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	22-AUG-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-AUG-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-16
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-AUG-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-AUG-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	**Water**							
Batch R3530822								
WG2372405-1 MB								
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-AUG-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-16
Magnesium (Mg)-Dissolved			<0.050		mg/L		0.05	22-AUG-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-AUG-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-AUG-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-AUG-16
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	22-AUG-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-16
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-AUG-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-AUG-16
WG2372405-5 MS		**WG2372405-3**						
Aluminum (Al)-Dissolved			93.7		%		70-130	22-AUG-16
Arsenic (As)-Dissolved			104.0		%		70-130	22-AUG-16
Cadmium (Cd)-Dissolved			98.6		%		70-130	22-AUG-16
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	22-AUG-16
Copper (Cu)-Dissolved			96.3		%		70-130	22-AUG-16
Iron (Fe)-Dissolved			100.9		%		70-130	22-AUG-16
Lead (Pb)-Dissolved			97.6		%		70-130	22-AUG-16
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	22-AUG-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	22-AUG-16
Molybdenum (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 (Na)-Dissolved			N/A	MS-B	%		-	22-AUG-16
Thallium (Tl)-Dissolved			97.5		%		70-130	22-AUG-16
Uranium (U)-Dissolved			102.7		%		70-130	22-AUG-16
Zinc (Zn)-Dissolved			96.1		%		70-130	22-AUG-16
MET-T-CCMS-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3530151								
WG2372047-4 DUP		**WG2372047-3**						
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)-Total		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 (Tl)-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	20-AUG-16
Arsenic (As)-Total			103.5		%		80-120	20-AUG-16
Cadmium (Cd)-Total			99.9		%		80-120	20-AUG-16
Calcium (Ca)-Total			104.4		%		80-120	20-AUG-16
Copper (Cu)-Total			102.1		%		80-120	20-AUG-16
Iron (Fe)-Total			99.7		%		80-120	20-AUG-16
Lead (Pb)-Total			103.8		%		80-120	20-AUG-16
Magnesium (Mg)-Total			108.9		%		80-120	20-AUG-16
Manganese (Mn)-Total			103.0		%		80-120	20-AUG-16
Molybdenum (Mo)-Total			102.4		%		80-120	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 (Tl)-Total			103.8		%		80-120	20-AUG-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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			<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 (Tl)-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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3530151								
WG2372047-5 MS		**WG2372047-3**						
Sodium (Na)-Total			N/A	MS-B	%		-	20-AUG-16
Thallium (Tl)-Total			81.8		%		70-130	20-AUG-16
Zinc (Zn)-Total			N/A	MS-B	%		-	20-AUG-16
NH3-WT	**Water**							
Batch R3530911								
WG2372598-3 DUP		**L1815391-1**						
Ammonia, Total (as N)		<0.20	<0.20	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372598-2 LCS								
Ammonia, Total (as N)			100.2		%		85-115	22-AUG-16
WG2372598-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	22-AUG-16
WG2372598-4 MS		**L1815391-1**						
Ammonia, Total (as N)			92.9		%		75-125	22-AUG-16
NO3-IC-WT	**Water**							
Batch R3531814								
WG2372641-4 DUP		**L1815674-2**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	22-AUG-16
WG2372641-2 LCS								
Nitrate (as N)			101.0		%		70-130	22-AUG-16
WG2372641-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-AUG-16
WG2372641-5 MS		**L1815674-2**						
Nitrate (as N)			95.0		%		70-130	22-AUG-16
P-T-COL-WT	**Water**							
Batch R3531254								
WG2373158-3 DUP		**L1815674-1**						
Phosphorus, Total		0.0094	0.0087		mg/L	7.5	20	23-AUG-16
WG2373158-2 LCS								
Phosphorus, Total			97.8		%		80-120	23-AUG-16
WG2373158-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	23-AUG-16
WG2373158-4 MS		**L1815674-1**						
Phosphorus, Total			82.2		%		70-130	23-AUG-16
PH-BF	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R3528335								
WG2370448-2 DUP		**L1815159-1**						
pH		7.03	7.04	J	pH units	0.01	0.2	18-AUG-16
WG2370448-1 LCS								
pH			7.00		pH units		6.9-7.1	18-AUG-16
SO4-IC-N-WT	**Water**							
Batch R3531814								
WG2372641-4 DUP		**L1815674-2**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	22-AUG-16
WG2372641-2 LCS								
Sulfate (SO4)			101.4		%		90-110	22-AUG-16
WG2372641-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-AUG-16
WG2372641-5 MS		**L1815674-2**						
Sulfate (SO4)			95.9		%		75-125	22-AUG-16
SOLIDS-TDS-BF	**Water**							
Batch R3528114								
WG2370200-3 DUP		**L1802455-1**						
Total Dissolved Solids		46	45		mg/L	1.8	25	18-AUG-16
WG2370200-2 LCS								
Total Dissolved Solids			101.2		%		70-130	18-AUG-16
WG2370200-1 MB								
Total Dissolved Solids			<20		mg/L		20	18-AUG-16
SOLIDS-TSS-BF	**Water**							
Batch R3528342								
WG2370458-3 DUP		**L1815159-1**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370458-2 LCS								
Total Suspended Solids			99.4		%		85-115	18-AUG-16
WG2370458-1 MB								
Total Suspended Solids			<2.0		mg/L		2	18-AUG-16
TKN-WT	**Water**							
Batch R3531163								
WG2372426-3 DUP		**L1814889-1**						
Total Kjeldahl Nitrogen		0.59	0.55		mg/L	7.8	20	22-AUG-16
WG2372426-2 LCS								
Total Kjeldahl Nitrogen			96.2		%		75-125	22-AUG-16
WG2372426-1 MB								

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	**Water**							
Batch R3531163								
WG2372426-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	22-AUG-16
WG2372426-4 MS		**L1814889-1**						
Total Kjeldahl Nitrogen			81.7		%		70-130	22-AUG-16
TOC-WT	**Water**							
Batch R3531214								
WG2372398-3 DUP		**L1815353-1**						
Total Organic Carbon		1.5	1.5		mg/L	1.2	20	21-AUG-16
WG2372398-2 LCS								
Total Organic Carbon			102.9		%		80-120	21-AUG-16
WG2372398-1 MB								
Total Organic Carbon			<1.0		mg/L		1	21-AUG-16
WG2372398-4 MS		**L1815353-1**						
Total Organic Carbon			100.2		%		70-130	21-AUG-16
TURBIDITY-BF	**Water**							
Batch R3528332								
WG2370460-3 DUP		**L1815159-1**						
Turbidity		3.09	3.04		NTU	1.6	25	18-AUG-16
WG2370460-1 MB								
Turbidity			<0.10		NTU		0.1	18-AUG-16

Quality Control Report

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

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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Tuesday, September 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

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.

ALS -- Fort Collins

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	

ALS Environmental

1608448

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# *L1815159*
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1815159-1 MS-08	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/16/2016 9/9/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____
Received By: _____ Date Received: 8/23/16 0935
Verified By: _____ Date Verified: _____
Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1608448

Project Manager: ARV Initials: RR Date: 8/23/16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY	(YES)	NO

Cooler #:	1							
Temperature (°C):	3.8°C							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	10							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

* Not relinquished

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

Project Manager Signature / Date: 8/25/16

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

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

1608448


ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
60 NORTHLAND RD
WATERLOO, ON N2V2B8
CANADA CA
SHIP DATE: 22AUG16
ACTWGT: 5.00 LB
CAD: 9611609/INCA3790
DIMS: 16x11x14 IN
BILL SENDER
TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR
FORT COLLINS CO 80524
(800) 443-1511
REF:
DEPT:
INV:
PO:
10 - 0
3.8°C
(US)
FedEx
Express
TRK# 0488 7770 4878 6709
NA FTCA
10:30A
INTL PRIORITY
ETD
80524
CO-US DEN

Client:	ALS Environmental	**Date:**	*20-Sep-16*
Project:	L1815159	**Work Order:**	1608448
Sample ID:	L1815159-1	**Lab ID:**	1608448-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/16/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**			Prep Date: **9/6/2016**	PrepBy: **CDJ**
Ra-226	**0.014 (+/- 0.0070)**		**0.006**	**BQ/l**	NA	9/20/2016 12:24
Carr: BARIUM	*97.7*		*40-110*	*%REC*	DL = NA	9/20/2016 12:24

Client:	ALS Environmental	**Date:**	*20-Sep-16*
Project:	L1815159	**Work Order:**	1608448
Sample ID:	L1815159-1	**Lab ID:**	1608448-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/16/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160906-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160906-2** Units: **BQ/l** Analysis Date: **9/20/2016 12:57**

Client ID: Run ID: **RE160906-2A** Prep Date: **9/6/2016** 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					P
Carr: BARIUM	13700		15980		85.6	40-110					

LCSD Sample ID: **RE160906-2** Units: **BQ/l** Analysis Date: **9/20/2016 12:57**

Client ID: Run ID: **RE160906-2A** Prep Date: **9/6/2016** 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	P
Carr: BARIUM	15400		15970		96.7	40-110		13700			

MB Sample ID: **RE160906-2** Units: **BQ/l** Analysis Date: **9/20/2016 12:57**

Client ID: Run ID: **RE160906-2A** Prep Date: **9/6/2016** 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: BARIUM	15000		15970		94.2	40-110					

The following samples were analyzed in this batch: 1608448-1

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

Work Order : 231754
Sample 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 Effluents to *Daphnia magna.* Environment Canada EPS 1/RM/14 (Second Edition, December 2000, with February 2016 amendments).

48-h TEST RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	0.0 %

The results reported relate only to the sample tested.

SODIUM CHLORIDE REFERENCE 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 (± 2SD) :	5.5 - 6.6 g/L
Statistical Method :	Spearman-Kärber	Analyst(s) :	CZN, SEC

Daphnia magna CULTURE HEALTH DATA

Time to First Brood :	9 days	Mean Young Per Brood :	35.4
Culture Mortality :	0.7% (previous 7 days)		

TEST CONDITIONS

Sample Treatment :	None	Number of Replicates :	3
pH Adjustment :	None	Test Organisms / Replicate :	10
Test Aeration :	None	Total Organisms / Test Level :	30
Organism Batch :	Dm16-17C	Organism Loading Rate :	15.0 mL/organism
		Test Method Deviation(s) :	None

Date: 2016-08-31
yyyy-mm-dd

Approved by: Nancy Hedges
Project Manager

AQUATOX

TOXICITY TEST REPORT

Daphnia magna

Work Order: 231754
Sample Number: 48686

	Hardness (mg/L as $CaCO_3$)	Hardness Adjustment	pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*	Total Pre-Aeration Time (h) @ 30 mL/min/L
Initial Water Chemistry:	820	None	7.4	8.5	1246	21.0	100	0:00

0 hours

Date & Time 2016-08-21 10:00
Technician: CZN

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*	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 2016-08-22 10:00
Technician: FS

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100A	–	0	–	–	–	21.0
100B	–	0	–	–	–	21.0
100C	–	0	–	–	–	21.0
Control A	–	0	–	–	–	21.0
Control B	–	0	–	–	–	21.0
Control C	–	0	–	–	–	21.0

Notes:

48 hours

Date & Time 2016-08-23 10:00
Technician: SEC

Test Conc. (%)	Mortality	Immobility	pH	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
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: [illegible]
Date: 2016-08-23

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

TOXICITY TEST REPORT
Rainbow Trout

Work Order : 231754
Sample 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 RESULTS

Substance	Effect	Value
Control	Mean Immobility	0.0 %
	Mean Mortality	0.0 %
100%	Mean Immobility	0.0 %
	Mean Mortality	10.0 %

The results reported relate only to the sample tested.

POTASSIUM CHLORIDE REFERENCE 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 FISH

Control Fish Sample Size :	10	Cumulative stock tank mortality:	0 % (prev. 7 days)
Mean Fish Weight (± 2 SD) :	0.34 ± 0.08 g	Mean Fish Fork Length (± 2 SD) :	33.5 ± 3.4 mm
Range of Weights :	0.30 - 0.41 g	Range of Fork Lengths (mm) :	31 - 36 mm
Fish Loading Rate :	0.2 g/L		

TEST CONDITIONS

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 ± 1 mL/min/L	Test Method Deviation(s) :	None

Date: 2016-08-31
yyyy-mm-dd

Approved by: Nancy Kreger
Project Manager

Work Order: 231754
Sample Number: 48686

Total Pre-Aeration Time (h)		pH	D.O. (mg/L)	Cond. (µmhos/cm)	Temp. (°C)	O_2 Sat. (%)*
0:30	**Initial Water Chemistry:**	7.3	8.7	1274	15.0	–
	Chemistry after 30min air:	7.4	8.7	1260	15.0	95

0 hours

Date & Time 2016-08-21 10:30
Technician: AW

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.	O_2 Sat. (%)*
100	0	0	7.4	8.7	1260	15.0	95
Control	0	0	8.2	9.5	883	15.0	100

Notes:

24 hours

Date & Time 2016-08-22 10:30
Technician: MA

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

48 hours

Date & Time 2016-08-23 10:30
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	14.0
Control	0	0	–	–	–	14.0

Notes:

72 hours

Date & Time 2016-08-24 10:30
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	0	0	–	–	–	15.0
Control	0	0	–	–	–	15.0

Notes:

96 hours

Date & Time 2016-08-25 10:30
Technician: NL

Test Conc. (%)	Mortality	Immobility	pH	D.O.	Cond.	Temp.
100	1	0	7.1	9.3	1269	14.5
Control	0	0	8.1	9.5	808	14.5

Notes:

# of control organisms showing stress 0
Trout Batch #: T16-14

"–" = not measured
Number immobile does not include number of mortalities.
* adjusted for actual temp. & barometric pressure

Test Data Reviewed By: EJS
Date: 2016-08-30

REGULAR BAFFINLAND TOXICITY TESTS

CHAIN OF CUSTODY RECORD

AQUATOX

AquaTox Work Order No: 231754

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

P.O. Number:	4500017476
Field Sampler Name (print):	AV
Signature:	
Affiliation:	ALS Env
Sample Storage (prior to shipping):	
Custody Relinquished by:	RH
Date/Time Shipped:	18 Aug 16

Client:	ALS Environmental Waterloo Q# 162705399-15
Phone:	519-886-6910
Fax:	519-886-9047
Contact:	Wayne Smith / Austin Paterson

Sample Identification					Analyses Requested									Sample Method and Volume		
Date Collected (yyyy-mm-dd)	Time Collected (e.g. 14:30, 24 hr clock)	Sample Name: L1815159-1	AquaTox Sample Number	Temp. on arrival	Rainbow Trout Single Concentration	Rainbow Trout LC50	*Daphnia magna* Single Concentration	*Daphnia magna* LC50	Fathead Minnow Survival & Growth	*Ceriodaphnia dubia* Survival & Reproduction	*Lemna minor* Growth	*Pseudokirchneriella subcapitata* Growth	Other (please specify below)	Grab	Composite	# of Containers and Volume (eg. 2 x 1L, 3 x 10L, etc.)
16 08 16	1300	MS-08	48686	24.0	X		X									1 Pail

For Lab Use Only	
Received By	AW
Date	2016-08-20
Time	16:00
Storage Location	
Storage Temp (°C)	

Please list any special requests or instructions:
~~RISS Reporting Required~~ LWS
ALS Log-in, please fill in Sample Date & Sample Name & Include sublet paperwork to Aquatox.

L1815159

WATERLOO

Subcontract Request Form

Subcontract To:

AQUATOX TESTING AND CONSULTING
11B NICHOLAS BEAVER ROAD
RR3
GUELPH,ON N1H 6H9

NOTES: Please reference on final report and invoice: PO# *L1815159*
ALS requires QC data to be provided with your final results.

Please see enclosed 1 **sample(s) in** 0 **Container(s)**

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1815159-1 MS-08		8/ 16/ 2016	
	Special Request Aquatox (SPECIAL REQUEST2-AQT 14)	9/6/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910

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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: _____

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1815159-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Turnaround Time (TAT) (Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report ☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
Phone:	647-253-0596 EXT 6016	Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2	

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax ap@baffinland.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)	L1815159	ALS Contact:	Wayne Smith	Sampler:	AV

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7	Specific Conductivity	Radium-226	Group 3								Number of Containers
	MS-08	16-Aug-16	13:00	Water	R	R	R	R								9

Drinking Water (DW) Samples[1] (client use)	Sample from Actual Waste Rock Pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)					
Frozen	☐		SIF Observations	Yes ☐	No ☐
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
					20.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-08-16	Time: 16:00	Received by:	Date:	Time:	Received by: KSm	Date: AUG 20 16	Time: 1505

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

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

Date Received: 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, C.Chem., C.E.T.
Client Services Manager

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1810826-1 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	R3524237
Total Suspended Solids	<2.0		2.0	mg/L	13-AUG-16	14-AUG-16	R3525414
Total Metals							
Aluminum (Al)-Total	0.035		0.010	mg/L	11-AUG-16	11-AUG-16	R3524241
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Arsenic (As)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Barium (Ba)-Total	0.0218		0.00020	mg/L	11-AUG-16	11-AUG-16	R3524241
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R3524241
Boron (B)-Total	0.023		0.010	mg/L	11-AUG-16	11-AUG-16	R3524241
Cadmium (Cd)-Total	0.000187		0.000010	mg/L	11-AUG-16	11-AUG-16	R3524241
Calcium (Ca)-Total	49.6		0.50	mg/L	11-AUG-16	11-AUG-16	R3524241
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	11-AUG-16	11-AUG-16	R3524241
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	11-AUG-16	11-AUG-16	R3524241
Cobalt (Co)-Total	0.0643		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Copper (Cu)-Total	0.0047		0.0010	mg/L	11-AUG-16	11-AUG-16	R3524241
Iron (Fe)-Total	1.41		0.050	mg/L	11-AUG-16	11-AUG-16	R3524241
Lead (Pb)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Lithium (Li)-Total	0.0071		0.0010	mg/L	11-AUG-16	11-AUG-16	R3524241
Magnesium (Mg)-Total	130	DLHC	0.50	mg/L	11-AUG-16	12-AUG-16	R3524241
Manganese (Mn)-Total	5.69	DLHC	0.0050	mg/L	11-AUG-16	12-AUG-16	R3524241
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R3524241
Nickel (Ni)-Total	0.0711		0.00050	mg/L	11-AUG-16	11-AUG-16	R3524241
Phosphorus (P)-Total	<0.050		0.050	mg/L	11-AUG-16	11-AUG-16	R3524241
Potassium (K)-Total	1.84		0.050	mg/L	11-AUG-16	11-AUG-16	R3524241
Rubidium (Rb)-Total	0.00366		0.00020	mg/L	11-AUG-16	11-AUG-16	R3524241
Selenium (Se)-Total	0.00199		0.000050	mg/L	11-AUG-16	11-AUG-16	R3524241
Silicon (Si)-Total	0.779		0.050	mg/L	11-AUG-16	11-AUG-16	R3524241
Silver (Ag)-Total	<0.000050		0.000050	mg/L	11-AUG-16	11-AUG-16	R3524241
Sodium (Na)-Total	2.41		0.50	mg/L	11-AUG-16	11-AUG-16	R3524241
Strontium (Sr)-Total	0.0284		0.0010	mg/L	11-AUG-16	11-AUG-16	R3524241
Sulfur (S)-Total	223		0.50	mg/L	11-AUG-16	11-AUG-16	R3524241
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	11-AUG-16	11-AUG-16	R3524241
Thallium (Tl)-Total	0.000032		0.000010	mg/L	11-AUG-16	11-AUG-16	R3524241
Thorium (Th)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Tin (Sn)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	11-AUG-16	11-AUG-16	R3524241
Tungsten (W)-Total	<0.00010		0.00010	mg/L	11-AUG-16	11-AUG-16	R3524241
Uranium (U)-Total	0.000058		0.000010	mg/L	11-AUG-16	11-AUG-16	R3524241
Vanadium (V)-Total	<0.00050		0.00050	mg/L	11-AUG-16	11-AUG-16	R3524241
Zinc (Zn)-Total	0.0079		0.0030	mg/L	11-AUG-16	11-AUG-16	R3524241

* 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	R3524241
Radiological Parameters							
Ra-226	0.028		0.0066	Bq/L	25-AUG-16	02-SEP-16	R3541834

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Total	MS-B	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 Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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).

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
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.

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

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

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

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3524241								
WG2366080-4 DUP		**WG2366080-3**						
Aluminum (Al)-Total		0.035	0.033		mg/L	5.8	20	11-AUG-16
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-AUG-16
Barium (Ba)-Total		0.0218	0.0221		mg/L	1.5	20	11-AUG-16
Beryllium (Be)-Total		<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 (Tl)-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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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		%		80-120	12-AUG-16
Antimony (Sb)-Total			103.2		%		80-120	12-AUG-16
Arsenic (As)-Total			101.9		%		80-120	12-AUG-16
Barium (Ba)-Total			107.9		%		80-120	12-AUG-16
Beryllium (Be)-Total			100.6		%		80-120	12-AUG-16
Bismuth (Bi)-Total			97.5		%		80-120	12-AUG-16
Boron (B)-Total			97.6		%		80-120	12-AUG-16
Cadmium (Cd)-Total			100.2		%		80-120	12-AUG-16
Calcium (Ca)-Total			103.7		%		80-120	12-AUG-16
Chromium (Cr)-Total			104.3		%		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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3524241								
WG2366080-2 LCS								
Silver (Ag)-Total			106.6		%		80-120	12-AUG-16
Sodium (Na)-Total			104.9		%		80-120	12-AUG-16
Strontium (Sr)-Total			102.8		%		80-120	12-AUG-16
Sulfur (S)-Total			104.8		%		70-130	12-AUG-16
Thallium (Tl)-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
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			95.1		%		80-120	12-AUG-16
WG2366080-1 MB								
Aluminum (Al)-Total			<0.010		mg/L		0.01	11-AUG-16
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Barium (Ba)-Total			<0.00020		mg/L		0.0002	11-AUG-16
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	11-AUG-16
Boron (B)-Total			<0.010		mg/L		0.01	11-AUG-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	11-AUG-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	11-AUG-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	11-AUG-16
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	11-AUG-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	11-AUG-16
Iron (Fe)-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
Magnesium (Mg)-Total			<0.050		mg/L		0.05	11-AUG-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	11-AUG-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	11-AUG-16

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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 (Tl)-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		**WG2366080-3**						
Aluminum (Al)-Total			86.7		%		70-130	11-AUG-16
Antimony (Sb)-Total			93.1		%		70-130	11-AUG-16
Arsenic (As)-Total			94.6		%		70-130	11-AUG-16
Barium (Ba)-Total			N/A	MS-B	%		-	11-AUG-16
Beryllium (Be)-Total			83.3		%		70-130	11-AUG-16
Bismuth (Bi)-Total			93.8		%		70-130	11-AUG-16
Boron (B)-Total			80.5		%		70-130	11-AUG-16
Cadmium (Cd)-Total			93.0		%		70-130	11-AUG-16
Calcium (Ca)-Total			N/A	MS-B	%		-	11-AUG-16
Chromium (Cr)-Total			92.2		%		70-130	11-AUG-16
Cesium (Cs)-Total			96.5		%		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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R3524241								
WG2366080-5 MS		**WG2366080-3**						
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 (Tl)-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								
WG2365816-3 DUP		**WG2365816-2**						
pH		8.11	8.10	J	pH units	0.01	0.2	12-AUG-16
WG2365816-1 LCS								
pH			7.01		pH units		6.9-7.1	12-AUG-16
SOLIDS-TSS-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R3525414								
WG2367091-3 DUP		**L1812554-2**						
Total Suspended Solids		148	152		mg/L	2.7	20	14-AUG-16
WG2367091-2 LCS								
Total Suspended Solids			98.6		%		85-115	14-AUG-16
WG2367091-1 MB								
Total Suspended Solids			<2.0		mg/L		2	14-AUG-16

Quality Control Report

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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Tuesday, September 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

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.

ALS -- Fort Collins

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	

ALS Environmental 1608257

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# *L1810826*
ALS requires QC data to be provided with your final results.

1 x 1 LGC

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1810826-1 MS-08	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/9/2016 9/1/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____
Received By: Rebecca Mo Date Received: 8/12/16 1000
Verified By: _____ Date Verified: _____
Temperature: _____
Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Waterloo Workorder No: 1608251

Project Manager: ARW Initials: RCR 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?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
5. Are the COC and bottle labels complete and legible?		(YES)	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY)	(YES)	NO

Cooler #:	1							
Temperature (°C):	2.9°C							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	10							
Background µR/hr reading:	11							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 8/15/16

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

1608251

ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
60 NORTHLAND RD

WATERLOO, ON N2V2B8
CANADA CA

SHIP DATE: 11AUG16
ACTWGT: 5.00 LB
CAD: 9611609/INCA3790
DIMS: 11x8x11 IN

BILL SENDER

TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR

FORT COLLINS CO 80524

(800) 443-1511 REF:

INV:
PO: DEPT:

2.4 x 10 - 0 (US)

5441J/1370/14E8

FedEx Express

J16201807052uv

TRK# 0488 7769 7410 3219

10:30A
INTL PRIORITY
ETD
80524
DEN

NA FTCA

CO-US

Client:	ALS Environmental	**Date:**	*06-Sep-16*
Project:	L1810826	**Work Order:**	1608251
Sample ID:	L1810826-1	**Lab ID:**	1608251-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/9/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **8/25/2016**		PrepBy: **CDJ**
Ra-226	**0.028 (+/- 0.011)**		**0.0066**	**BQ/l**	NA	9/2/2016 13:44
Carr: BARIUM	*92.7*		*40-110*	*%REC*	DL = NA	9/2/2016 13:44

Client:	ALS Environmental	**Date:**	*06-Sep-16*
Project:	L1810826	**Work Order:**	1608251
Sample ID:	L1810826-1	**Lab ID:**	1608251-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/9/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160825-1-1** Instrument ID: **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160825-1** Units: **BQ/l** Analysis Date: **9/2/2016 14:17**

Client ID: Run ID: **RE160825-1A** Prep 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					P
Carr: BARIUM	15800		16790		93.9	40-110					

LCSD Sample ID: **RE160825-1** Units: **BQ/l** Analysis Date: **9/2/2016 14:17**

Client ID: Run ID: **RE160825-1A** Prep 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	P
Carr: BARIUM	16300		16780		96.8	40-110		15800			

MB Sample ID: **RE160825-1** Units: **BQ/l** Analysis Date: **9/2/2016 14:17**

Client ID: Run ID: **RE160825-1A** Prep 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	ND	0.0069									U
Carr: BARIUM	16400		16780		98	40-110					

The following samples were analyzed in this batch: 1608251-1

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1810826-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax	bimcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax	ap@baffinland.com
Company:		Email 2	
Contact:			

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08	GL Account:	Routing Code:
PO / AFE:	4500017476	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1810826 RH

ALS Contact: Wayne Smith **Sampler:** BG/BP

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Metals - Full List	TSS, pH	Radium-226	Number of Containers
1	MS-08	9-Aug-16	9:00	Water	R	R	R	3

Drinking Water (DW) Samples[1] (client use)	Sample from actual waste rock pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
	6°	9-8	1

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Andrew Vermeer	Date: 2016-08-09	Time: 15:00	Received by:	Date:	Time:	Received by: RH	Date: 10 Aug 16	Time: 0900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1807074-1 MS-08 Sampled By: BG/CR/JH on 01-AUG-16 @ 17:15 Matrix: WATER							
Physical Tests							
pH	7.19	PEHT	0.10	pH units		12-AUG-16	R3524237
Total Suspended Solids	18.0		2.0	mg/L	11-AUG-16	12-AUG-16	R3524510
Turbidity	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	R3522755
Copper (Cu)-Total	0.0018		0.0010	mg/L	10-AUG-16	10-AUG-16	R3522755
Lead (Pb)-Total	0.00044		0.00010	mg/L	10-AUG-16	10-AUG-16	R3522755
Nickel (Ni)-Total	0.0340		0.00050	mg/L	10-AUG-16	10-AUG-16	R3522755
Zinc (Zn)-Total	0.0052		0.0030	mg/L	10-AUG-16	10-AUG-16	R3522755
Radiological Parameters							
Ra-226	<0.0100		0.010	Bq/L	23-AUG-16	02-SEP-16	R3541834

* 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	Acidity	APHA 2310 B

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.

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.

CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

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	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

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

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
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

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		**WG2364477-3**						
Arsenic (As)-Total			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**						
pH		8.11	8.10	J	pH units	0.01	0.2	12-AUG-16
WG2365816-1 LCS								
pH			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

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
SOLIDS-TSS-WT	**Water**							
Batch R3524510								
WG2366268-1 MB								
Total Suspended Solids			<2.0		mg/L		2	12-AUG-16
TURBIDITY-BF	**Water**							
Batch R3517355								
WG2359450-3 DUP		**L1807025-4**						
Turbidity		136	141		NTU	3.6	25	03-AUG-16
WG2359450-1 MB								
Turbidity			<0.10		NTU		0.1	03-AUG-16

Quality Control Report

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

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.

Quality Control Report

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

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
pH							
	1	01-AUG-16 17:15	12-AUG-16 01:00	4	10	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 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Tuesday, September 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

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

1608198

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

All acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 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
L1807074-1	1608198-1		WATER	01-Aug-16	

ALS Environmental

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# *L1807074*
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1807074-1 MS-08		8/ 1/ 2016	
	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/26/2016	

(1)

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____

Received By: C Trumbla Date Received: 8-11-16 0930

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Water100 Workorder No: 1608198

Project Manager: AW Initials: CDT Date: 8-11-16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		YES	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	N/A	YES	NO
10. Is there sufficient sample for the requested analyses?		YES	NO
11. Were all samples placed in the proper containers for the requested analyses?		YES	NO
12. Are all samples within holding times for the requested analyses?		YES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		YES	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	N/A	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY	YES	NO

Cooler #:	1							
Temperature (°C):	1.8							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information: External µR/hr reading:	10							
Background µR/hr reading:								

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 8/12/16

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

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

1608178


rKFA (519) 886-6910
LABS WATERLOO
60 NORTHLAND RD
WATERLOO, ON N2V2B8
CANADA CA
SHIP DATE: 10AUG16
ACTWGT: 5.00 LB
CAD: 9811609/INCA3790
DIMS: 16x11x14 IN
BILL SENDER
TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR
FORT COLLINS CO 80524
(800) 443-1511
INV:
PO:
REF:
DEPT:
10
-0
(US)
FedEx
Express
E
1.80
TRK# 0488 7769 6326 6870
10:30A
INTL PRIORITY
NA FTCA
ETD
80524
CO-US DEN

Client:	ALS Environmental	**Date:**	*06-Sep-16*
Project:	L1807074	**Work Order:**	1608198
Sample ID:	L1807074-1	**Lab ID:**	1608198-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **8/23/2016**		PrepBy: **CDJ**
Ra-226	ND (+/- 0.0043)	U	0.0082	BQ/l	NA	9/2/2016 12:38
Carr: BARIUM	*94.6*		*40-110*	*%REC*	DL = NA	9/2/2016 12:38

Client:	ALS Environmental	**Date:**	*06-Sep-16*
Project:	L1807074	**Work Order:**	1608198
Sample ID:	L1807074-1	**Lab ID:**	1608198-1
Legal Location:		**Matrix:**	WATER
Collection Date:	8/1/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160823-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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					P
Carr: BARIUM	15400		16220		95	40-110					

LCSD Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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	1.32 (+/- 0.327)	0.00802	1.673		78.7	67-120		1.39	0.2	2.1	P
Carr: BARIUM	15400		16220		94.9	40-110		15400			

MB Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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	ND	0.0073									U
Carr: BARIUM	15400		16220		94.8	40-110					

The following samples were analyzed in this batch:

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com
Canada Toll Free: 1 800 668 9878

L1807074-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report	☑ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
Phone:	647-253-0598 EXT 6016	Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax	blmcore@alsglobal.com	Specify Date Required for E2,E or P:
		Email 2		
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Analysis Request
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax	ap@baffinland.com	
Contact:		Email 2		
Project Information		Oil and Gas Required Fields (client use)		
ALS Quote #:	Q42455	Approver ID:	Cost Center:	
Job #:	MS-08	GL Account:	Routing Code:	
PO / AFE:	4500017476	Activity Code:		
LSD:		Location:		
ALS Lab Work Order # (lab use only)	L1807074 JH	ALS Contact: Wayne Smith	Sampler: BG/CR/JH	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 1a	Turbidity	Number of Containers
	MS-08	1-Aug-16	17:15	Water	R	R	3
	* Only Assign TURB to BF *						
	* All other tests for WT *						

Drinking Water (DW) Samples[1] (client use)	Preserved in field. Sample from actual waste rock pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
5.2			20.2		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Bill Bowden	Date: 2016-08-02	Time: 13:00	Received by:	Date: 08/02/16	Time: 3:39pm	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SN

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
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	R3515693
Turbidity	7.83		0.10	NTU		26-JUL-16	R3513972
Total Metals							
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

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

Reference Information

Test Method References:

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 ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
MET-T-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.			
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.			
PH-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5°C overnight and then 180–10°C for 1hr.			
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.			
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.			
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.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

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

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3514778								
WG2357378-4 DUP		**WG2357378-3**						
Arsenic (As)-Total		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**						
pH		8.04	8.06	J	pH units	0.02	0.2	29-JUL-16
WG2357576-1 LCS								
pH			7.00		pH units		6.9-7.1	29-JUL-16
SOLIDS-TSS-WT	**Water**							
Batch R3515693								
WG2357668-3 DUP		**L1804352-3**						
Total Suspended Solids		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

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
SOLIDS-TSS-WT	**Water**							
Batch R3515693								
WG2357668-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-JUL-16

Quality Control Report

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

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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Friday, 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

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.

ALS -- Fort Collins

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	

ALS Environmental 1608051

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# *L1805159*
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
L1805159-1 MS-08		7/26/2016	
(1)	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	8/4/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: **Wayne.Smith@alsglobal.com**

Shipped By: _____ Date Shipped: _____
Received By: _____ Date Received: 8/3/16 0910
Verified By: _____ Date Verified: _____
Temperature: _____
Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1608051

Project Manager: ARV Initials: RR Date: 8/3/16

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
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	YES	(NO)
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY	(YES)	NO

Cooler #:	1							
Temperature (°C):	3.0°C							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information: External µR/hr reading:	12							
Background µR/hr reading:	12							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

8) Sample pHed at 2.5 so HNO_3 was added

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

Project Manager Signature / Date: [signature] 8/4/16

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

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

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS - Waterloo Workorder No: 1608051

Project Manager: ARV Initials: RM Date: 8/3/16

NOTE:

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

Was the pH of any sample adjusted by the laboratory? (YES) (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	HNO_3	0.5mL	131530	RAD	RM/8/3/16/1230

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

Project Manager Signature / Date: 8/4/16

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

1608051

ORIGIN ID:YKFA (519) 886-6910
ED HILL
ALS LABS WATERLOO
80 NORTHLAND RD

WATERLOO, ON N2V2B8
CANADA CA

SHIP DATE: 02AUG16
ACTWGT: 5.00 LB
CAD: 9611609/INCA3790
DIMS: 16x11x14 IN

BILL SENDER

TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR

FORT COLLINS CO 80524 (US)
(800) 443-1511
INV:
PO:
REF:
DEPT:

12 3.0 kg
0-

FedEx Express

TRK# 0488 7768 9988 6270

10:30A
INTL PRIORITY
ETD

NA FTCA

80524
CO-US DEN

Client:	ALS Environmental	**Date:**	*02-Sep-16*
Project:	L1805159	**Work Order:**	1608051
Sample ID:	L1805159-1	**Lab ID:**	1608051-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **8/23/2016**		PrepBy: **CDJ**
Ra-226	ND (+/- 0.0042)	U	0.0066	BQ/l	NA	9/2/2016 12:06
Carr: BARIUM	*98.8*		*40-110*	*%REC*	DL = NA	9/2/2016 12:06

Client:	ALS Environmental	**Date:**	*02-Sep-16*
Project:	L1805159	**Work Order:**	1608051
Sample ID:	L1805159-1	**Lab ID:**	1608051-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/26/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160823-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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					P
Carr: BARIUM	15400		16220		95	40-110					

LCSD Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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	1.32 (+/- 0.327)	0.00802	1.673		78.7	67-120		1.39	0.2	2.1	P
Carr: BARIUM	15400		16220		94.9	40-110		15400			

MB Sample ID: **RE160823-2** Units: **BQ/l** Analysis Date: **9/2/2016 13:12**

Client ID: Run ID: **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	ND	0.0073									U
Carr: BARIUM	15400		16220		94.8	40-110					

The following samples were analyzed in this batch:

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1805159-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)		R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report ☑ Yes ☐ No		P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TA
Phone:	647-253-0596 EXT 6016	Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX		E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
		Email 1 or Fax bimcore@alsglobal.com		Specify Date Required for E2,E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
	Copy of Invoice with Report ☐ Yes ☑ No		
Company:		Email 1 or Fax ap@baffinland.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q42455	Approver ID:	Cost Center:
Job #:	MS-08	GL Account:	Routing Code:
PO / AFE:	4500007003	Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)	L1805159	ALS Contact: Wayne Smith	Sampler: JH/BP

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Group 7a	Turbidity										Number
L	MS-08	26-Jul-16	14:58	Water	R	R										3
	ASSIGN turb to BP															
	All other to WI															

Drinking Water (DW) Samples[1] (client use)	Preserved in field. Sample from actual waste rock pond.
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☑ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
				13.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katherine Babin	Date: 2016-07-26	Time: 17:00	Received by: F. Khalil	Date: 26 JUL 16	Time: 17:00	Received by:	Date: 28/16	Time: 900

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1802450-1 MS-08-DS Sampled By: BG/KB on 20-JUL-16 @ 15:20 Matrix: WATER							
Physical Tests							
Conductivity	73.5		3.0	umhos/cm		26-JUL-16	R3512583
Hardness (as CaCO3)	32		10	mg/L		28-JUL-16	
pH	7.83		0.10	pH units		21-JUL-16	R3509819
Total Suspended Solids	<2.0		2.0	mg/L		22-JUL-16	R3510188
Anions and Nutrients							
Acidity (as CaCO3)	<2.0		2.0	mg/L		29-JUL-16	R3515550
Alkalinity, Total (as CaCO3)	37		10	mg/L		26-JUL-16	R3512457
Ammonia, Total (as N)	<0.020		0.020	mg/L		28-JUL-16	R3513917
Chloride (Cl)	1.28		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	0.0064		0.0030	mg/L	08-AUG-16	09-AUG-16	R3521679
Sulfate (SO4)	1.17		0.30	mg/L		27-JUL-16	R3513990
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							
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		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Copper (Cu)-Total	<0.0010		0.0010	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	<0.0010		0.0010	mg/L	27-JUL-16	28-JUL-16	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		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

* 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
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 (Tl)-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							
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	
pH	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							
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	R3521680
Sulfate (SO4)	1.15		0.30	mg/L		27-JUL-16	R3513990
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							

* 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
L1802450-2 MS-08-US Sampled By: BG/KB on 20-JUL-16 @ 15:50 Matrix: WATER							
Total Metals							
Aluminum (Al)-Total	0.211		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	0.00613		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	6.80		0.50	mg/L	27-JUL-16	28-JUL-16	R3512784
Cesium (Cs)-Total	0.000026		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Copper (Cu)-Total	<0.0010		0.0010	mg/L	27-JUL-16	28-JUL-16	R3512784
Iron (Fe)-Total	0.170		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Lead (Pb)-Total	0.00016		0.00010	mg/L	27-JUL-16	28-JUL-16	R3512784
Lithium (Li)-Total	<0.0010		0.0010	mg/L	27-JUL-16	28-JUL-16	R3512784
Magnesium (Mg)-Total	3.76		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Manganese (Mn)-Total	0.00190		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		26-JUL-16	R3511950
Molybdenum (Mo)-Total	0.000172		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	0.676		0.050	mg/L	27-JUL-16	28-JUL-16	R3512784
Rubidium (Rb)-Total	0.00149		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	1.01		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	1.01		0.50	mg/L	27-JUL-16	28-JUL-16	R3512784
Strontium (Sr)-Total	0.0073		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 (Tl)-Total	<0.000010		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Thorium (Th)-Total	0.00023		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	0.00955		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	0.000796		0.000010	mg/L	27-JUL-16	28-JUL-16	R3512784
Vanadium (V)-Total	<0.00050		0.00050	mg/L	27-JUL-16	28-JUL-16	R3512784
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	27-JUL-16	28-JUL-16	R3512784
Zirconium (Zr)-Total	0.00036		0.00030	mg/L	27-JUL-16	28-JUL-16	R3512784
Radiological Parameters							

* 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
L1802450-2 MS-08-US Sampled By: BG/KB on 20-JUL-16 @ 15:50 Matrix: WATER							
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) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Cyanide, Total	MS-B	L1802450-1, -2
Matrix Spike	Cyanide, Total	MS-B	L1802450-1, -2
Matrix Spike	Aluminum (Al)-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

Sample Parameter Qualifier key listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-TITR-TB	Water	Acidity	APHA 2310 B

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.

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.

CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM

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-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.

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Reference Information

RA226-MMER-FC	Water	Ra226 by Alpha Scint, MDC=0.01 Bq/L	EPA 903.1
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-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.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

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

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
FC	ALS ENVIRONMENTAL - FORT COLLINS, COLORADO, USA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
BF	ALS ENVIRONMENTAL - BAFFIN ISLAND, NUNAVUT, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

Quality Control Report

Workorder: 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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACY-TITR-TB	**Water**							
Batch R3515550								
WG2357861-9 DUP		**L1805141-4**						
Acidity (as CaCO3)		9.8	7.5	J	mg/L	2.3	4	29-JUL-16
WG2357861-8 LCS								
Acidity (as CaCO3)			97.0		%		85-115	29-JUL-16
WG2357861-7 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	29-JUL-16
ALK-WT	**Water**							
Batch R3512457								
WG2355432-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			100.6		%		80-120	26-JUL-16
WG2355432-4 DUP		**L1802232-43**						
Alkalinity, Total (as CaCO3)		325	326		mg/L	0.4	20	26-JUL-16
WG2355432-2 LCS								
Alkalinity, Total (as CaCO3)			98.2		%		85-115	26-JUL-16
WG2355432-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	26-JUL-16
C-DIS-ORG-WT	**Water**							
Batch R3514472								
WG2356389-3 DUP		**L1802450-2**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2356389-2 LCS								
Dissolved Organic Carbon			98.7		%		80-120	27-JUL-16
WG2356389-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	27-JUL-16
WG2356389-4 MS		**L1802450-2**						
Dissolved Organic Carbon			94.4		%		70-130	27-JUL-16
CL-IC-N-WT	**Water**							
Batch R3513990								
WG2355810-4 DUP		**WG2355810-3**						
Chloride (Cl)		1.28	1.28		mg/L	0.1	20	27-JUL-16
WG2355810-2 LCS								
Chloride (Cl)			102.1		%		90-110	27-JUL-16
WG2355810-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	27-JUL-16
WG2355810-5 MS		**WG2355810-3**						
Chloride (Cl)			97.1		%		75-125	27-JUL-16
CN-TOT-WT	**Water**							

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-TOT-WT	**Water**							
Batch R3513818								
WG2356644-3 DUP		**L1802303-1**						
Cyanide, Total		211	212		mg/L	0.5	20	27-JUL-16
WG2356644-2 LCS								
Cyanide, Total			96.6		%		80-120	27-JUL-16
WG2356644-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	27-JUL-16
WG2356644-4 MS		**L1802303-1**						
Cyanide, Total			N/A	MS-B	%		-	27-JUL-16
EC-WT	**Water**							
Batch R3512583								
WG2354869-4 DUP		**WG2354869-3**						
Conductivity		72.2	72.2		umhos/cm	0.0	10	26-JUL-16
WG2354869-2 LCS								
Conductivity			99.6		%		90-110	26-JUL-16
WG2354869-1 MB								
Conductivity			<3.0		umhos/cm		3	26-JUL-16
F-IC-N-WT	**Water**							
Batch R3513990								
WG2355810-4 DUP		**WG2355810-3**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2355810-2 LCS								
Fluoride (F)			99.1		%		90-110	27-JUL-16
WG2355810-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	27-JUL-16
WG2355810-5 MS		**WG2355810-3**						
Fluoride (F)			99.9		%		75-125	27-JUL-16
HG-T-CVAA-WT	**Water**							
Batch R3511950								
WG2354782-3 DUP		**L1802460-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-JUL-16
WG2354782-2 LCS								
Mercury (Hg)-Total			102.0		%		80-120	26-JUL-16
WG2354782-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	26-JUL-16
WG2354782-4 MS		**L1802460-2**						
Mercury (Hg)-Total			102.0		%		70-130	26-JUL-16
MET-T-MS-WT	**Water**							

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	**Water**							
Batch R3512784								
WG2355510-4 DUP		**WG2355510-3**						
Aluminum (Al)-Total		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	RPD-NA	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	RPD-NA	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 (Tl)-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

Quality Control Report

Client: Baffinland Iron Mine's Corporation (Oakville)
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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		**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								
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

Quality Control Report

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

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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 (Tl)-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		mg/L		0.0002	28-JUL-16
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	28-JUL-16
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-JUL-16
Boron (B)-Total			<0.010		mg/L		0.01	28-JUL-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	28-JUL-16
Calcium (Ca)-Total			<0.50		mg/L		0.5	28-JUL-16
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	28-JUL-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	28-JUL-16
Cobalt (Co)-Total			<0.00010		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		mg/L		0.0005	28-JUL-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-JUL-16

Quality Control Report

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Oakville ON L6H 0C3
Contact: Jim Millard

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
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 (Tl)-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

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-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)-Total			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 (Tl)-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		**L1804602-1**						
Ammonia, Total (as N)		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**						

Quality Control Report

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Oakville ON L6H 0C3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	**Water**							
Batch R3513917								
WG2356518-4 MS		**L1804602-1**						
Ammonia, Total (as N)			113.5		%		75-125	28-JUL-16
NO3-IC-WT	**Water**							
Batch R3513990								
WG2355810-4 DUP		**WG2355810-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	27-JUL-16
WG2355810-2 LCS								
Nitrate (as N)			101.4		%		70-130	27-JUL-16
WG2355810-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	27-JUL-16
WG2355810-5 MS		**WG2355810-3**						
Nitrate (as N)			96.8		%		70-130	27-JUL-16
P-T-COL-WT	**Water**							
Batch R3521679								
WG2362879-3 DUP		**L1802450-1**						
Phosphorus, Total		0.0064	0.0057		mg/L	12	20	09-AUG-16
WG2362879-2 LCS								
Phosphorus, Total			106.8		%		80-120	09-AUG-16
WG2362879-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	09-AUG-16
WG2362879-4 MS		**L1802450-1**						
Phosphorus, Total			87.5		%		70-130	09-AUG-16
Batch R3521680								
WG2363580-3 DUP		**L1806575-3**						
Phosphorus, Total		0.0040	0.0044		mg/L	9.1	20	09-AUG-16
WG2363580-2 LCS								
Phosphorus, Total			101.7		%		80-120	09-AUG-16
WG2363580-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	09-AUG-16
WG2363580-4 MS		**L1806575-3**						
Phosphorus, Total			88.7		%		70-130	09-AUG-16
PH-BF	**Water**							
Batch R3509819								
WG2353129-2 DUP		**L1802450-2**						
pH		7.81	7.82	J	pH units	0.01	0.2	21-JUL-16
WG2353129-1 LCS								

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-BF	**Water**							
Batch R3509819								
WG2353129-1 LCS								
pH			7.00		pH units		6.9-7.1	21-JUL-16
SO4-IC-N-WT	**Water**							
Batch R3513990								
WG2355810-4 DUP		**WG2355810-3**						
Sulfate (SO4)		1.17	1.17		mg/L	0.2	20	27-JUL-16
WG2355810-2 LCS								
Sulfate (SO4)			102.3		%		90-110	27-JUL-16
WG2355810-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	27-JUL-16
WG2355810-5 MS		**WG2355810-3**						
Sulfate (SO4)			95.8		%		75-125	27-JUL-16
SOLIDS-TSS-BF	**Water**							
Batch R3510188								
WG2353147-3 DUP		**L1802460-6**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	25	22-JUL-16
WG2353147-2 LCS								
Total Suspended Solids			98.8		%		85-115	22-JUL-16
WG2353147-1 MB								
Total Suspended Solids			<2.0		mg/L		2	22-JUL-16
TOC-WT	**Water**							
Batch R3514473								
WG2356390-3 DUP		**L1804840-3**						
Total Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	27-JUL-16
WG2356390-2 LCS								
Total Organic Carbon			97.6		%		80-120	27-JUL-16
WG2356390-1 MB								
Total Organic Carbon			<1.0		mg/L		1	27-JUL-16
WG2356390-4 MS		**L1804840-3**						
Total Organic Carbon			94.7		%		70-130	27-JUL-16

Quality Control Report

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

Legend:

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

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

Friday, 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

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.

ALS -- Fort Collins

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	

ALS Environmental

160753

L1802450

WATERLOO

Subcontract Request Form

Subcontract To:

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

NOTES: Please reference on final report and invoice: PO# *L1802450*
ALS requires QC data to be provided with your final results.

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

SAMPLE NUMBER	ANALYTICAL REQUIRED	DATE SAMPLED / DUE DATE	Priority Flag
(1) **L1802450-1 MS-08-DS**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/20/2016 8/15/2016	
(2) **L1802450-2 MS-08-US**	Ra226 by Alpha Scint, MDC=0.01 Bq/L (RA226-MMER-FC 1)	7/20/2016 8/15/2016	

Subcontract Info Contact: Rick Hawthorne (519) 886-6910
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@alsglobal.com

Please email confirmation of receipt to: Wayne.Smith@alsglobal.com

Shipped By: _____ Date Shipped: _____

Received By: _____ Date Received: 7-27-16 0915

Verified By: _____ Date Verified: _____

Temperature: _____

Sample Integrity Issues: _____

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: ALS Waterloo Workorder No: 1607513

Project Manager: ARW Initials: SDM 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?		(YES)	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ 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 ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	8.7							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	11							
Background µR/hr reading:	10							

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

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

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

Project Manager Signature / Date: 7/28/16

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

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

1607513


ALS LABS WATERLOO
60 NORTHLAND RD
WATERLOO, ON N2V2B8
CANADA CA
SHIP DATE: 26JUL16
ACTWGT: 15.00 LB
CAD: 9611609/INCA3790
DIMS: 24x14x14 IN
BILL SENDER
TO FORT COLLINS
ALS LABS FC
225 COMMERCE DR
FORT COLLINS CO 80524
(800) 443-1511
INV:
PO:
REF:
DEPT:
11
-0
(U
8.20
TRK#
0488
7768 4479 6342
NA FTCA
INTL PRIORIT
ET
8052
CO-US
DE

Client:	ALS Environmental	**Date:**	*26-Aug-16*
Project:	L1802450	**Work Order:**	1607513
Sample ID:	L1802450-1	**Lab ID:**	1607513-1
Legal Location:		**Matrix:**	WATER
Collection Date:	7/20/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **8/16/2016**		PrepBy: **CDJ**
Ra-226	ND (+/- 0.0040)	U	0.0067	BQ/l	NA	8/26/2016 11:52
Carr: BARIUM	*90.5*		*40-110*	*%REC*	DL = NA	8/26/2016 11:52

Client:	ALS Environmental	**Date:**	*26-Aug-16*
Project:	L1802450	**Work Order:**	1607513
Sample ID:	L1802450-2	**Lab ID:**	1607513-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/20/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**PAI 783**		Prep Date: **8/16/2016**		PrepBy: **CDJ**
Ra-226	ND (+/- 0.0035)	U	0.0054	BQ/l	NA	8/26/2016 11:52
Carr: BARIUM	*91.9*		*40-110*	*%REC*	DL = NA	8/26/2016 11:52

Client:	ALS Environmental	**Date:**	*26-Aug-16*
Project:	L1802450	**Work Order:**	1607513
Sample ID:	L1802450-2	**Lab ID:**	1607513-2
Legal Location:		**Matrix:**	WATER
Collection Date:	7/20/2016	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

LT - Result is less than requested MDC but greater than achieved MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE160816-2-1** Instrument ID **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE160816-2** Units: **BQ/l** Analysis Date: **8/26/2016 12:25**

Client ID: Run ID: **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					P
Carr: BARIUM	15300		17340		88.5	40-110					

LCSD Sample ID: **RE160816-2** Units: **BQ/l** Analysis Date: **8/26/2016 12:25**

Client ID: Run ID: **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)	0.00508	1.673		88.2	67-120		1.48	0.004	2.1	P
Carr: BARIUM	14600		17330		84.1	40-110		15300			

MB Sample ID: **RE160816-2** Units: **BQ/l** Analysis Date: **8/26/2016 12:25**

Client ID: Run ID: **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	ND	0.0077									U
Carr: BARIUM	15100		17340		87	40-110					

The following samples were analyzed in this batch:

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1802450-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Turnaround Time (TAT) (Rush Turnaround Time (TAT) is not available for all tests)
Company:	Baffinland Iron Mines Corp. - ALS ENV Account 23642	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)		R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Millard, Allan Knight	Quality Control (QC) Report with Report ☑ Yes ☐ No		P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	2275 Upper Middle Rd. E., Suite #300 Oakville, ON, L6H 0C3	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution: ☐ EMAIL ☐ MAIL ☐ FAX		E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	647-253-0596 EXT 6016	Email 1 or Fax bimcore@alsglobal.com		Specify Date Required for E2, E or P:
		Email 2		Analysis Request
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ Yes ☑ No	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX		
Company:		Email 1 or Fax ap@baffinland.com		
Contact:		Email 2		
Project Information		Oil and Gas Required Fields (client use)		
ALS Quote #:	Q42455	Approver ID:	Cost Center:	
Job #:	MS-08	GL Account:	Routing Code:	
PO / AFE:	4500007003	Activity Code:		
LSD:		Location:		
ALS Lab Work Order # (lab use only)	L1802450	ALS Contact: Wayne Smith	Sampler: BG/KB	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BIM-MMER-WT	Number of Containers
1	MS-08-DS	20-Jul-16	15:20	Water	R	7
2	MS-08-US	20-Jul-16	15:50	Water	R	7
	TSS					
	Assign pH and ~~Filtering~~ to BF					
	All other tests to WT					
	F.K.					

Drinking Water (DW) Samples[1] (client use)	Preservatives for Radium and Cyanide done in lab, Others Preserved in field
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Site Specific Criteria - Account Manager to update as required.
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☑

Ice packs Yes ☑ No ☐ Custody seal intact Yes ☐ No ☑

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
3			15.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katie Babin	Date: 2016-07-20	Time: 19:00	Received by: F. Khalik	Date: 21 Jul 16	Time: 11:00	Received by:	Date: 26-Jul-16	Time: @ 900

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

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

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 Madsen
Department: Health, Safety and Environment
Title: Vice President – SD, Environment, Health & Safety
Date: March 14, 2016
Signature:

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DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
01/15/2014	0	JM	EM	Approved for Use
03/14/16	1	WB	EM	Approved for Use

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		
3		
4		
5		
6		
7		
8		
9		
10		

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List of Appendix

List of Table

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List of Figure

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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.

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.

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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, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

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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

Baffinland Iron Mines Corporation On-Site Environmental Team	
Position	**Responsibilities and Accountabilities**
Environmental Manager	• Reports directly to VP Sustainable Development, Health, Safety and Environment and Indirect reporting and coordination with Operations VP and Director Environment • Overall accountability for environmental staff and performance at site • Coordinates implementation and monitors the performance of the Environmental Management System at site • Liaises with the senior management, regulators and stakeholders • Ensures effective monitoring and auditing of environmental performance of departments and contractors on site and identifies opportunities for improvement • Monitors compliance with permits, licenses and authorizations • Ensures all regulatory environmental monitoring and reporting requirements (monthly, annual) are met • Leads and coordinates site permitting requirements. • Initiates and oversees environmental studies • Oversees investigations and reporting of environmental incidents to regulatory bodies, stakeholders and senior management • Reviews and updates environmental management plans
Environmental Superintendent	• Reports to Environmental Manager • Specific accountabilities for environmental monitoring and reporting • Leads investigations and reporting of environmental incidents onsite • Serves as the liaison for regulators during onsite inspections and visits • Provides ongoing environmental education and environmental awareness training to all employees and contract workers • Oversees environmental database management • Prepares updates for management plans
Environmental Coordinator	• Reports to the Environmental Superintendent and Manager • Specific accountabilities for environmental monitoring and reporting • Provides day to day direction to Environmental staff onsite • Serves as a liaison for regulators during onsite inspections and visits.

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Baffinland Iron Mines Corporation On-Site Environmental Team	
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	• Reports to the Environmental Superintendent or designate • Assists with environmental database management • Assists with monitoring and sampling activities as per the Project's management plans
QIA Monitor	• Works alongside the Baffinland Environment Department to ensure the proper implementation of all environmental management and monitoring plans • Acts as the QIA liaison for onsite environmental matters
Environmental Support Groups (Consultants, etc.)	• Assists with sampling, monitoring and reporting activities as required by permits, licenses and environmental management plans • Provides technical expertise to various environmental studies

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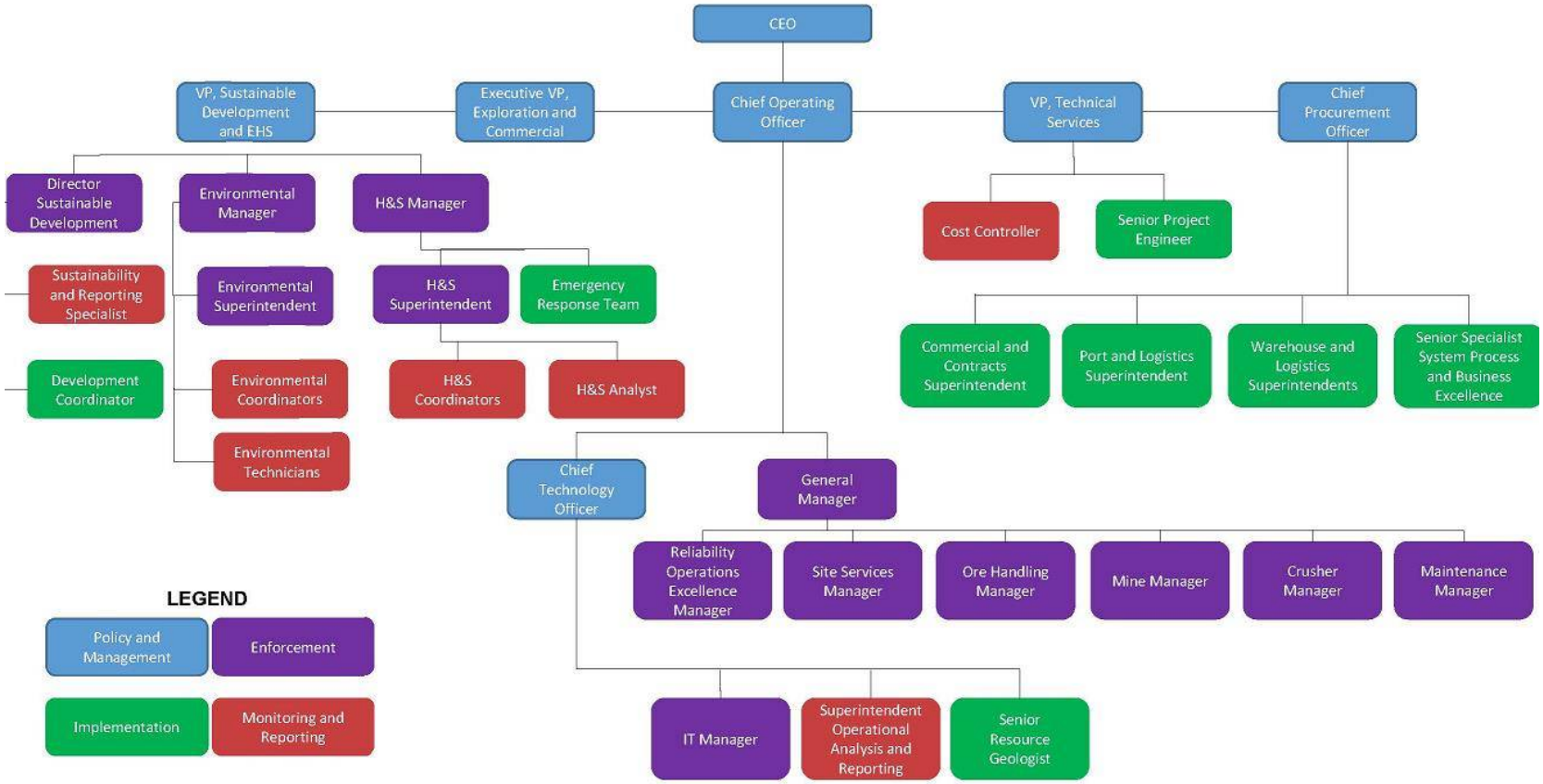
Figure 1 - **MARY RIVER PROJECT ORGANIZATION CHART**



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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 area lakes, streams and rivers.
2. Collection of effluent samples from the current and future wastewater treatment facilities located at the Mine Site, Milne Port and Steensby Port.
3. Collection of drinking water samples from camp potable water sources.
4. Collection of surface water discharges from ore stockpiles and waste rock dumps.
5. Collection of surface water discharges from future bulk sample open pits.
6. Collection of water samples from fuel berms and dispensing facilities.
7. Collection of water samples from 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:

1. Sampling station locations will be dependent upon the monitoring program objectives and the lake dimensions. When sampling from a watercraft all efforts will be made to anchor the boat stationary. Map coordinates for all lake sampling station locations will be recorded using a 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 upward into the current to fill.
3. Once the bottle is full, remove the bottle from the water in one motion by forcing the opening upward and into the current and seal the bottle securely.

When selecting water quality monitoring station locations on rivers, care will be taken where a tributary joins a river, since complete mixing of the two waters may not be achieved within several hundred metres downstream of the confluence (or further). When in doubt, vertical profile monitoring across the river's width using a field parameter such as pH, temperature or conductivity will be used to assess if complete mixing has occurred.

4.3.4 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:

1. Sampling station locations will be dependent upon the monitoring program objectives and the lake dimensions. When sampling from a watercraft all efforts will be made to anchor the boat stationary. Map coordinates for all lake sampling station locations will be recorded using a 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.

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

QA/QC Plan	Purpose	Description	Frequency	Prepared By
Field blank	Identification of potential contaminants arising from sample collection. The field blank bottle is prefilled with laboratory deionized water and is handled in the same way as regular sample bottles (i.e., opened and closed during the sample collection). The bottle is submitted as a routine sample.	Bottle contains prefilled deionized water. Bottle is handled the same as one would handle the samples.	Ten percent of all samples collected will be QA/QC.	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

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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 then poured equally into two sets 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 [1]	Water Container	Water Preservation	Additional Notes	Soil Container	Water / Soil Hold Time
ROUTINE INORGANICS AND PHYSICALS	Acidity and Alkalinity	0.5-1 L Plastic			125-250 mL Jar or Bag	14 Days / NA
	Anions (Br, Cl, SO4, F) and Electrical Conductivity	0.5-1 L Plastic			125-250 mL Jar or Bag	28 Days [7] / Unlimited
	Bromate[19], Chlorate and Chlorite	125 mL Plastic	EDA (Ethylenediamine)		NA	28 Days (Chlorite 14 Days) / NA
	BOD, Colour and Turbidity	0.5-1 L Plastic			NA	2-4 Days [8] / NA
	COD and Phenols (4AAP)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
	Cyanide, Total ,Weak Acid Dissociable,Free	145 mL Plastic	6N NaOH		125-250 mL Jar or Bag	14 Days / 14 Days
	Dissolved Oxygen	300 mL BOD bottle	1 each; $MnSO_4$ & alkaline iodide azide pillows		NA	8 Hours[20] / NA
	Dissolved or Total Inorganic Carbon (DIC or TIC)	125-250 mL Glass	.	Field Filter for Dissolved	125-250 mL Jar or Bag	14 Days / 28 Days
	Dissolved or Total Organic Carbon (DOC or TOC)	125-250 mL Glass	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Flashpoint	2 x 100-250 mL Amber Glass		Zero Headspace	125-250 mL Jar	7 Days / 7 Days
	pH	0.5-1 L Plastic			125-250 mL Jar or Bag	0.25 Hours / 30 Days [9]
	Solids (TS, TSS, TDS)	0.5-1 L Plastic			NA	7 Days / NA
	Sulfide	125 - 150 mL Plastic	Zinc Acetate & 6N NaOH		125-250 mL Jar or Bag	7 Days / 7 Days
	Sulfite	125 mL Plastic			NA	0.25 Hours / NA
NUTRIENTS	Ammonia Nitrogen	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		125-250 mL Jar or Bag	28 Days / 72 Hours
	Nitrate or Nitrite Nitrogen (and Ammonia unpreserved)	0.5-1 L Plastic			NA	2-7 Days [10] / 72 Hours
	Nitrogen, Kjeldahl, Organic, Total or Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Nutrients, Available (N,P,K,S)	NA			125-250 mL Jar or Bag	NA / 3 Days [11]
	Phosphorus, Reactive (orthophosphate)	0.5-1 L Plastic			NA	2-7 Days [12] / NA
	Phosphorus, Total Dissolved	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)	Field Filter for Dissolved	NA	28 Days / NA
	Phosphorus, Total	250 mL Glass or Plastic	1:1 Sulfuric Acid (H_2SO_4)		NA	28 Days / NA
METALS	Chromium VI (Hexavalent)	125 mL Plastic	50 % NaOH (BC MoE) or 6N NaOH + Ammonium Buffer (OMoE)		125-250 mL Jar or Bag	28 Days / 30 Days
	Mercury, Methyl	250 mL FLPE	1:1 Hydrochloric Acid (HCl)[21]	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 28 Days
	Mercury, Total or Dissolved	40 mL Glass Vial	1:1 Hydrochloric Acid (HCl)	Field Filter for Dissolved	125-250 mL Jar or Bag	28 Days / 28 Days
	Metals, Total or Dissolved	125-250 mL Plastic	1:3 Nitric Acid (HNO_3) to pH<2	Field Filter for Dissolved	125-250 mL Jar or Bag	6 Months / 6 Months
Organics						
HYDRO-CARBONS	F1, Volatile Organic Compounds (VOCs), THMs, 1,4-Dioxane, Volatile Petroleum Hydrocarbons (VPH)	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Field Methanol Kit [6]	14 Days / 40 Days [13]
		2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	Hermetic Sampler kit [6]	14 Days / 48 Hours
	CCME CWS F1, BTEX	2 or 3 x 40 mL Glass Vials [2]	Sodium Bisulfate [4]	Zero Headspace	125 - 500 mL Jar	14 Days / 7 Days
	CCME CWS F2-F4	2 x 60 mL Amber Glass Vials [3]	Sodium Bisulfate		125 - 500 mL Jar	14 Days [14] / 14 Days
	EPH or LEPH/HEPH	2 x 250 mL Amber Glass with Septa Cap	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Polycyclic Aromatic Hydrocarbons (PAHs)	2 x 0.25 - 1 L Amber Glass [5]	Sodium Bisulfate		125 - 500 mL Jar	14 Days / 14 Days
	Oil & Grease or Mineral Oil & Grease	2 x 0.25 - 1 L Glass	1:1 HCl or H_2SO_4		125 - 500 mL Jar	28 Days / 28 Days
TRACE ORGANICS	Alcohols	2 x 40 mL Glass Vials		Zero Headspace	125 - 500 mL Jar	7 Days / 7 Days
	Alkanolamines (MEA, DEA, DIPA)	250 mL Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	AOX	40 - 250 mL Amber Glass	1:3 Nitric Acid (HNO_3) to pH<2		125 - 500 mL Jar	6 months [15] / 28 Days
	C1 - C5 Gases	3 x 40 mL Blue Septa Vials	Sodium Bisulfate [4]	Zero Headspace	NA	14 Days / NA
	Dioxins and Furans, PBDE and PBB	2 x 1 L Amber Glass			125 - 500 mL Jar	Unlimited / Unlimited
	Formaldehyde/Aldehydes	2 x 40 mL Amber Glass Vials [2]	Ammonium Chloride+Copper Sulfate	Zero Headspace	125 - 500 mL Jar	7 Days / 5 Days
	Glycols	2 x 40 mL Amber Glass Vials			125 - 500 mL Jar	7 Days / 14 Days
	Hormones and Steroids	1 L Plastic			NA	28 Days / NA
	Naphthenic Acids	2 x 250 mL Amber Glass			125 - 500 mL Jar	14 Days / 14 Days
	Nitroaromatics and Nitrosamines (Explosives)	1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Nonylphenol & Ethoxylates, Bisphenol A (BPA)	1 L Amber Glass			125 - 500 mL Jar	28 Days / 14 Days

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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 [4]		125 - 500 mL Jar	14 Days / 14 Days
	Priority Pollutants (EPA 625 list) or SVOCs	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days [17]
	Resin Acids & Fatty Acids	2 x 0.5 - 1 L Amber Glass	Ascorbic Acid & NaOH		125 mL Jar	14 Days / 14 Days
	Sulfolane	2 x 0.5 - 1 L Amber Glass	Sodium Bisulfate [4]		125 mL Jar	14 Days / 14 Days
PESTICIDE RESIDUES	Carbamate Pesticides	1 L Amber Glass	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	7 Days / 14 Days
	Glyphosate / AMPA	1 L Plastic	Use Sodium Thiosulfate if chlorinated		125 - 500 mL Jar	14 Days / 14 Days
	Herbicides, Acidic	2 x 1 L Amber Glass	Sodium Bisulfate [4]		125 - 500 mL Jar	14 Days / 14 Days
	Organochlorine or Organophosphate Pesticides	2 x 1 L Amber Glass			125 - 500 mL Jar	7 Days / 14 Days
	Soil Sterilant Scan	1 L Amber Glass			250 g Poly Bag	7 Days / 14 Days
Micro						
MICRO-BIOLOGICAL	Coliforms-Fecal, Total, E-coli & HPC	100 - 300 mL Sterilized Plastic	Sodium Thiosulfate		500 mL Sterilized Jar	24-48 Hours [18] (24 - HPC) / NA
	Microtox	1 L Amber Glass			125-250 mL Jar or Bag	3 Days / 3 Days

1. Additional analyses with the same container type and preservation may be possible - consult the lab for details.

2. The number of 40 mL glass vials required (2 or 3) for BTEX & VOC varies by lab based on instrumentation. Consult the lab for details.

3. Please fill to the top of the marked line on the 60 mL Amber Glass Vials.

4. Use Sodium Thiosulfate instead of Sodium Bisulfate if sample is chlorinated.

5. OMoE has no preservation requirement for PAHs. 2 X 250 mL Amber Glass required for BC MoE and OMoE. For AB and SK and for Alkylated PAHs, ALS requires 2 x 1 L Amber Glass.

6. Soil sampling options depend on soil location and condition of soil. Field Methanol Kit consists of one 5g TerraCore® sampler or similar sampling device, two pre-weighed 40 mL glass vials with methanol preservative and a 125 mL soil jar for moisture. Hermetic sampler kit consists of a T-handle, two 5g hermetic samplers and a 125mL soil jar for moisture. One additional parameter, such as metals or hydrocarbons can also be obtained from the 125 mL soil jar.

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

8. 3 Days hold time for British Columbia as per BC Ministry of Environment (BC MoE), 4 Days hold time as per OMoE.

9. pH in water should be taken in the field as per BC MoE, 4 Days hold time for Ontario MISA and 28 Days hold time for OMoE. 30 Days hold time as received for pH in soil as per OMoE. One year hold time once soil is dried.

10. 3 Days hold time as per BC MoE, 5 Days hold time as per Ontario MISA and 7 Days hold time as per OMoE.

11. 3 Days hold time until received. Unlimited hold time once soil is dried.

12. 3 Days hold time as per BC MoE and 7 Days hold time as per OMoE.

13. 40 Days hold time as per BC MoE and 14 Days hold time as per OMoE. Recovered methanol extract from laboratory has a 40 Days hold time as per OMoE.

14. 40 Days hold time as per OMoE.

15 14 Days hold time as per Ontario MISA.

16. 14 Days hold time as per OMoE. Consult lab for container size if limited sample volume is available.

17. 14 Days hold time for water and 60 Days hold time for soil as per OMoE. Ontario labs require 2 x 250 mL Amber Glass + 500 mL Amber Glass.

18. 30 Hours hold time as per BC Drinking Water Regulation and 48 Hours as per OMoE.

19. Bromate alone does not require preservative.

20. 15 Minutes hold time as per OMoE - Field measurement by meter is recommended.

21. Use 1:1 Sulfuric Acid (H_2SO_4) for preservation of marine or brackish samples.

SEPTEMBER 2015 BACK

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10 DATA MANAGEMENT AND REPORTING

10.1 DATA MANAGEMENT

All sample data collected by Baffinland or designate consultants from the various environmental programs required on Project sites will be stored electronically in a spreadsheet database (Microsoft Excel) or using alternative software designed specifically for environmental data management.

QA/QC measures relating to data validation will include the following:

1. Designation of a suitable person to act as 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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1. APHA *et al*, 1989. Standard Methods for the Examination of Water and Wastewater; AHPA, AWWA and WPCF, 17th ed.

2. Environment Canada (EC). 2012. Metal mining technical guidance for Environmental Effects Monitoring. ISBN 978-1-100-20496-3.

3. Environment Canada, 2002. Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring. http://www.ec.gc.ca/eem/English/MetalMining/Guidance/default.cfm.

4. INAC, 1996. Quality Assurance (QA) and Quality Control (QC) Guidelines for Use by Class "A" Licenses in Meeting SNP Requirements and for Submission of a QA/QC Plan. Prepared by Department of Indian and Northern Affairs Canada Water Resources Division and the Northwest Territories Water Board, July 1996.

5. Nunavut Water Board, 2013. Baffinland Iron Mines Corp. – Class A Water License No: 2AM-MRY1325. Issued by the Nunavut Water Board, 2013.

6. USEPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms; 5th Ed., USEPA, ref. No. EPA-821-R-02-012.

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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).

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QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC)

GUIDELINES

FOR USE BY CLASS "A" LICENSEES IN MEETING SNP REQUIREMENTS

AND FOR SUBMISSION OF A QA/QC PLAN

JULY 1996

DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS CANADA
WATER RESOURCES DIVISION
AND THE
NORTHWEST TERRITORIES WATER BOARD

Table of Contents

1.0 Introduction and Definitions

In order to assist Licensees in completing their Quality Assurance and Quality Control (QA/QC) Plan, the following guidelines are provided, which indicates the minimum information that should be included.

These Guidelines are divided into three sections:

1) Field Sampling
2) Lab Analysis
3) Reporting Requirements

It is recognized that there may be different interpretations as to what is covered by "Quality Assurance/Control" due to the fact that certain Licensees have their own laboratories, while others only use commercial laboratories. For licence purposes, "Quality Assurance" and "Quality Control" refer to the following:

Quality Assurance: is the system of activities designed to better ensure that quality control is done effectively; while

Quality Control: is the use of established procedures to achieve standards of measurement for the three principal components of quality: precision, accuracy and reliability.

2.0 Field Sampling

2.1 Sample Collection

2.1.1 Location

A QA/QC plan must identify the locations of all sampling stations and the markers used to identify the stations. If the Surveillance Network Program (SNP) of the Water Licence does not specify sampling locations, locations should be chosen with help from an Inspector.

Buoys and landmarks identify sampling stations in tailings ponds and lakes, while sign post positioning usually marks stream sample stations. Stations should be used repeatedly, with the same personnel and techniques to reduce operational error. The use of Global Positioning System (GPS) to identify Latitude and Longitude for sampling stations is recommended.

2.1.2 Sampling Equipment

The Plan must include a detailed section on the equipment used for sampling, the rationale behind the choices of equipment, and descriptions of how the equipment is maintained and calibrated. Equipment and bottles should be selected so that they do not contaminate or otherwise alter the concentrations of parameters of interest.

Sampling devices, sample bottles and filtration devices should be constructed of non-metallic material. Most samples are now collected in containers constructed of high density polyethylene plastic. However, there are some exceptions, when testing for oil and grease or phenols glass containers are to be used. When conducting a fish bioassay, plastic drums are used while hydrocarbon based containers are not to be used for the collection of organic samples.

This section should also identify whether new or used bottles are used for each sample analysis. New bottles are preferred,

but sample containers may be used repeatedly with proper handling measures.

If old bottles are used, a detailed description should be included, noting how they are maintained, stored and cleaned. Usually, this will closely resemble the product manufacturer's instructions. An example of how bottles should be cleaned is outlined below:

- Rinse well with hot tap water for one minute or more.
- Empty bottle and add 30% HNO_3 to approximately 1/3 container capacity. Shake well for three to four minutes.
- Rinse vigorously with hot tap water for two minutes.
- Rinse thoroughly three times with tap water and three times with distilled water.
- Store with 0.2% HNO_3 for a minimum of one week.
- Rinse again with distilled water at least three times.

Bottles that are to be used for bacteria testing should be acid washed or autoclaved if possible.

Note: Additional information on bottle washing is also available from Water Resources Division.

2.1.3 Sampling Methods

This Section will include details on methods for sample collection and the equipment that is to be used for each station.

In lakes and ponds, regular sample bottles are used the majority of the time, but Van Dorn samples are often utilized. The sample or the sample bottle is usually lowered to mid

depth and washed three times before collecting the sample on the fourth submersion. Approximately 2% of the sample container capacity should remain to provide for mixing, preservative addition and thermal expansion.

Stream water sampling is usually done by plunging a sample bottle toward the current and allowing it to fill. Once again, the bottle should be rinsed three times before filling and room should be left for preservative addition and mixing.

A glass bottle should be used when sampling for oil and grease with the sample being collected during the first submersion and not rinsed three times first.

This section should also describe how often field blanks and replicate samples will be collected. Field blanks are samples of distilled/deionized water that are to be treated in exactly the same manner as the other samples. Blanks should therefore be taken to the field and handled and preserved as part of the sample program. They indicate when a sample may be contaminated and are indicative of general sample integrity. Replicate samples (duplicates and triplicates) are two or three samples collected from the same station at the same time. They help to ensure sample precision at the laboratory.

2.2 Sample Handling

2.2.1 Preservation

After collection, most samples must be preserved in order to prevent chemical or biochemical changes to the sample. The QA/QC plan must describe how samples from each station are to be preserved.

Preservation is generally done by the addition of certain chemicals into the bottle immediately after the sample is collected. **Table 1** is a general guide to preservatives and their appropriate concentrations. The QA/QC plan should contain more detailed information on the concentrations and amount of preservatives that will be used.

2.2.2 Sample Identification

The plan should include a description of the system used to identify samples. The system must provide positive sample identification and ensure that the identification is maintained. It is advisable to keep a logbook of samples that have already been delivered.

The identification can be maintained by marking the bottle itself or a label, with a water resistant, non-smear felt pen. The information should be clear to persons uninvolved in the sampling and may include such details as company name, sample area, SNP number, time and date.

2.2.3 Transportation

The section on transportation will describe how sample integrity will be ensured from the time of collection to completion of delivery. Delivery to the lab should be done as soon as possible after the samples have been collected.

Usually, samples are sealed and stored upright in a box with other samples to provide a snug, immobile storage space during transfer. Any samples that require refrigeration for preservation should be kept cool during transport.

3.0 Lab Analysis

Because certain Class "A" Licensees have their own analytical laboratory and others rely on commercial laboratories, this section of the Guidelines is divided accordingly.

3.1 Outside Laboratories

3.1.1 Lab Accreditation

The Licensee will identify in the plan the name of the commercial laboratory that will be conducting the analyses. A letter must be provided from the commercial lab indicating that they are accredited to conduct analyses on each of the required sampling parameters. Ideally, the lab should be accredited by the Canadian Associated for Environmental Analytical Laboratories (C.A.E.A.L.) and should provide a certificate stating parameters for which they are accredited.

3.1.2 Detection Limits

Detection limits for the commercial lab should be identified for all parameters and should be reported when any SNP data is submitted.

3.1.3 Methodology

Descriptions should be included for any methods of analysis used that are not outlined in "Standard Methods for the Examination of Water and Wastewater".

3.2 In House Laboratories

3.2.1 Identification of Analytical Laboratory/Detection Limits

Licensees using in-house labs shall identify their detection limits for all parameters and report them when any SNP data is submitted. The Licensee shall also identify the commercial lab they use to check for quality control.

3.2.2 For Overall Analytical Methods, Precision and Accuracy

The plan must describe how the Licensee will ensure precision and accuracy in their analytical methods. This includes what action will be taken if any sample results are found to be outside the appropriate ranges.

All analyses should be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater" or by other approved methods. In addition, the lab should analyze standard reference material for each parameter measured. For each parameter (group) to be measured, a complete description of the sampling procedure must be documented and adhered to.

If any sample results are outside the appropriate QA/QC ranges, attempts should be made to correct the problem and the sample shall be immediately re-analyzed. If any analysis indicates a violation of a licence condition, an Inspector shall be notified of the violation, any corrective action taken, and the results of retests.

3.2.3 Accuracy Requirements

The plan should document how the Licensee will go about

ensuring accuracy in the laboratory. Accuracy is the measurement of how closely a value approximates a standard, or true value. The Licensee should identify the frequency at which certified or reference standards will be analyzed during each sampling period.

3.2.4 Precision Requirements

Precision is a measure of the closeness or repeatability of a set of values. This section will describe how and when replicate samples are taken to ensure lab precision. It is recommended that the Licensee take triplicates at one SNP station during each sampling period. If daily sampling is required at only one station, a duplicate sample should be taken each time, with a triplicate sample taken one a week.

3.2.5 Methodology

Descriptions should be included of any methods of analysis that are not taken from "Standard Methods for the Examination of Waste and Wastewater." Standard methods should be referenced.

4.0 Reporting Requirements

4.1 General Submission

The QA/QC plan will contain a section outlining what information will be reported in the monthly SNP reports. Any control charts or graphs which display the precision and accuracy of the methods used to analyze the samples should be submitted with the report. This includes warning and control limits used to determine acceptability of the data.

4.2 Outside Laboratories

The Licensee shall outline the number of replicate samples that will be collected and submitted with each SNP report. It is recommended that one set of duplicates or triplicates from an assigned SNP site, as well as the results from field blanks, be submitted with each required SNP report. This would serve as an internal/external check for the Licensee and the commercial lab.

4.3 In-House Laboratories

The Licensee shall outline the number of results from replicate samples that will be included with each required SNP report. It is recommended that two duplicate sets be collected per month at an assigned SNP site, with one set being sent to a commercial lab while the other is to be analyzed by the Licensee's lab. Analytical results from both labs should be submitted with each required SNP report. This would serve as an external check for the lab. Any results from a commercial lab should be presented on the lab's letterhead.

FOR FURTHER INFORMATION, CONTACT THE WATER RESOURCES DIVISION AT:

Box 1500
Yellowknife, NWT
X1A 2R3
(867) 669-2654 Phone
(867) 669-2716 Fax

Appendix 1
Table 1: General Summary of Special Sampling or Handling Techniques

Determination	Container	Minimum Sample Size (ml)	Preservation	Maximum Storage Recommended
BOD	Sterile polyethylene	1000	Refrigerate 4°C	24 hours
Conductivity	Polyethylene	500	Refrigerate 4°C	28 days
Total Cyanide	Polyethylene	500	Add NaOH to raise pH>12 refrigerate in dark	24 hours
Hardness	Polyethylene	100	Add Conc. HNO_3 to lower pH<2 OR (*) unpreserved	6 months
Metals, General	Polyethylene	250	For dissolved metals filter immediately, add Conc. $HN0_3$ to pH<2	6 months
Mercury	Glass (rinsed with 1 + 1 HNO_3)	500	Add Conc. HNO_3 or pH<2 or H_2SO_4 + 1 ml of 5% $K_2Cr_2O_7$, refrigerate 4°C	28 days
Nitrogen:				
Ammonia	Polyethylene	500	Analyze as soon as possible or add H_2S0_4 to pH<2, refrigerate OR (*) unpreserved	7 days
Nitrate	Polyethylene	100	Analyze as soon as possible or refrigerate	48 hours
Oil and Grease	Glass or wide-mouth calibrated	1000	Add H_2S0_4 to pH<2, refrigerate	28 days
pH	Polyethylene	--	Analyze immediately	2 hours
Suspended Solids	Polyethylene	--	Refrigerate	7 days
Temperature	Polyethylene	--	Analyze immediately	0
Turbidity	Polyethylene	--	Analyze same day; store in dark up to 24 hours, refrigerate	24 hours
Bacteria	Polyethylene (sterilized)	--	None: Keep cool	6 - 48 hours

(*) Unpreserved = check with lab that will be analyzing the samples

Appendix 2

References:

Gilbert, Andrew (1993). "Echo Bay Mines Ltd. Environmental Laboratory Quality Assurance Plan".

Soniassy, R. (1980). "A Guide for the Collection of Water and Effluent Samples"; pp 1-16; INAC

"Standard Methods for the Examination of Water and Wastewater" (1989); AHPA, AWWA and WPCF, 17th edition.

Water Resources Division, Indian and Northern Affairs Canada (1990). "Generic Quality Assurance (QA) Plan Guidelines for Use by the Licensees in Meeting SNP Requirements for Submission of a QA Plan"; INAC.

Appendix- B

Example Forms

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.

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	
Contact:	
Phone:	
	Company address below will appear on the final report
Street:	
City/Province:	
Postal Code:	

Report Format / Distribution	
Select Report Format:	☐ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☐ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	
Email 3	

Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Project Information	
ALS Account # / Quote #:	
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)		**ALS Contact:**	**Sampler:**

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☐ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		**1 Business day [E1]** ☐
	3 day [P3] ☐		**Same Day, Weekend or Statutory holiday [E0]** ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	**Sample Identification and/or Coordinates** (This description will appear on the report)	**Date** (dd-mmm-yy)	**Time** (hh:mm)	**Sample Type**	Number of Containers

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human drinking water use?
☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INIITIAL COOLER TEMPERATURES ºC			FINAL COOLER TEMPERATURES ºC		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY OCTOBER 2015 FRONT

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

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

Appendix- C

Analytical Laboratory Accreditation and Licencing

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Canadian Association for Laboratory Accreditation Inc.

CALA

Certificate of Accreditation

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

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

Accreditation No.: A3149
Issued On: July 24, 2014
Accreditation Date: January 3, 2005
Expiry Date: January 21, 2017

President & CEO

CALA

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 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

Ministère de l'Environnement et de l'Action en matière de changement climatique
Direction du contrôle de la qualité de l'eau potable
Programme de délivrance des permis et de conformité des laboratoires
125, Chemin Resources
Etobicoke ON M9P 3V6
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Téléc: (416) 235 - 6519

Ontario

Drinking-Water Testing Licence

Under the Drinking-Water Testing Services Regulation, O. Reg. 248/03 and the Safe Drinking Water Act, 2002

Licence #: 2290
This supercedes licence issued: Sep 22, 2015
Licensee: ALS Canada Ltd.

Located at: 60 Northland Rd. Unit #1
Waterloo ON N2V 2B8
Canada

The licensee is authorized to conduct the following drinking-water tests at the laboratory:

Class: Inorganic	Technique - Sub-Technique:
4AAP-phenolics	Colourimetry
Lab Method Code: WT-TM-1027	**Appendix #:** C009
Alkalinity	Colourimetry
Lab Method Code: WT-TM-1032	**Appendix #:** C094
Alkalinity	Titrimetry-Manual
Lab Method Code: WT-TM-1012	**Appendix #:** C070
Aluminum	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Aluminum	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Ammonia	Colourimetry
Lab Method Code: WT-TM-1013	**Appendix #:** C095
Antimony	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Antimony	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Arsenic	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005

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Class: Inorganic	Technique - Sub-Technique:
Calcium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Carbon; dissolved organic	Combustion
Lab Method Code: WT-TM-1024	**Appendix #:** C047
Carbon; total organic	Combustion
Lab Method Code: WT-TM-1024	**Appendix #:** C047
Chloride	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Chlorine; residual	Colourimetry
Lab Method Code: WT-TM-1021	**Appendix #:** C074
Chlorine; total	Colourimetry
Lab Method Code: WT-TM-1021	**Appendix #:** C074
Chromium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
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	**Appendix #:** C157
Cobalt	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Cobalt	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	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Cyanate	ISE
Lab Method Code: WT-TM-1036	**Appendix #:** C161

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Class: Inorganic	Technique - Sub-Technique
Molybdenum **Lab Method Code:** NA-TM-1002	ICP-MS(Total-digested) **Appendix #:** C032
Molybdenum **Lab Method Code:** NA-TM-1002	ICP-MS (Total-non-digested) **Appendix #:** C005
Nickel **Lab Method Code:** NA-TM-1002	ICP-MS(Total-digested) **Appendix #:** C032
Nickel **Lab Method Code:** NA-TM-1002	ICP-MS (Total-non-digested) **Appendix #:** C005
Nitrate (as nitrogen) **Lab Method Code:** NA-TM-1001	IC **Appendix #:** C003
Nitrilotriacetic acid **Lab Method Code:** WT-TM-1007	Colourimetry **Appendix #:** C036
Nitrite (as nitrogen) **Lab Method Code:** NA-TM-1001	IC **Appendix #:** C003
Nitrogen; ammonia+ammonium **Lab Method Code:** WT-TM-1013	Colourimetry **Appendix #:** C095
Nitrogen; nitrate+nitrite **Lab Method Code:** NA-TM-1001	Calculation-IC **Appendix #:** N/A
Nitrogen; total Kjeldahl **Lab Method Code:** WT-TM-1023	Colourimetry-Digestion-Aquakem **Appendix #:** C099
o-Phosphate **Lab Method Code:** WT-TM-1025	Colourimetry **Appendix #:** C098
Organic nitrogen **Lab Method Code:** WT-TM-1023	Calculation-Colourimetry-Digestion-Aquakem **Appendix #:** N/A
Perchlorate **Lab Method Code:** WT-TM-1505	LC-MS-MS **Appendix #:** C168
Phosphorus **Lab Method Code:** NA-TM-1002	ICP-MS (Total-non-digested) **Appendix #:** C005

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Class: Inorganic	Technique - Sub-Technique:
Strontium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Sulphate	IC
Lab Method Code: NA-TM-1001	**Appendix #:** C003
Sulphide	Colourimetry
Lab Method Code: WT-TM-1003	**Appendix #:** C012
Sulphur	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Sulphur	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Thallium	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
Thallium	ICP-MS (Total-non-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C005
Tin	ICP-MS(Total-digested)
Lab Method Code: NA-TM-1002	**Appendix #:** C032
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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Class: Microbiological	Technique - Sub-Technique:
Total coliform	MF-mEndo
Lab Method Code: WT-TM-1200	**Appendix #:** C002
Total coliform background	MF-mEndo
Lab Method Code: WT-TM-1200	**Appendix #:** C002

Class: Organic	Technique - Sub-Technique:
1,1,1,2-tetrachloroethane	GC-MS/FID
Lab Method Code: NA-TM-1102	**Appendix #:** C113
1,1,1-trichloroethane	GC-MS/FID
Lab Method Code: NA-TM-1102	**Appendix #:** C113
1,1,2,2-tetrachloroethane	GC-MS/FID
Lab Method Code: NA-TM-1102	**Appendix #:** C113
1,1,2-trichloroethane	GC-MS/FID
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
Lab Method Code: NA-TM-1102	**Appendix #:** C113
1,2,4-trichlorobenzene	GC-MS
Lab Method Code: WT-TM-1101/WT-TM-1300	**Appendix #:** C015
1,2-dibromoethane	GC-MS/FID
Lab Method Code: 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

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Ontario

Class: Organic	Technique - Sub-Technique	
2,4,6-trichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,4-D	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		Appendix #: C023
2,4-dichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,4-dimethylphenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,4-dinitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,4-dinitrotoluene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,6-dichlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2,6-dinitrotoluene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2-chloronaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2-chlorophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2-hexanone	GC-MS/FID	
Lab Method Code: NA-TM-1102		Appendix #: C113
2-methyl-4,6-dinitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2-methylnaphthalene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015
2-nitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		Appendix #: C015

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Ontario

Class: Organic	Technique - Sub-Technique:	
Aldrin+Dieldrin	Calculation-GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** N/A
Anthracene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Aroclor 1242	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1248	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1254	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Aroclor 1260	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Atrazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Atrazine + N-dealkylated metabolites	Calculation-GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** N/A
Azinphos-methyl	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
b-BHC	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Bendiocarb	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Benzene	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113
Benzo(a)anthracene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Benzo(a)pyrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015

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Ontario

Class: Organic	Technique - Sub-Technique:	
Bromomethane	GC-MS/FID	
Lab Method Code: NA-TM-1102		**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
Carbon tetrachloride	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113
Chlordane; total	Calculation-GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** N/A
Chlorodibromoacetic acid	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163
Chloroethane	GC-MS/FID	
Lab Method Code: 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

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Ontario

Class: Organic	Technique - Sub-Technique:	
Dichloromethane	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113
Diclofop-methyl	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Dieldrin	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
Diethyl phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Diethylene glycol	GC-FID	
Lab Method Code: WT-TM-1601		**Appendix #:** C090
Dimethoate	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Dimethyl phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
di-n-butyl phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
di-n-octyl phthalate	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Dinoseb	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
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

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Ontario

Class: 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
Hexachloroethane	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

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Ontario

Class: Organic	Technique - Sub-Technique:	
Monochloroacetic acid	GC-Derivitatization/ECD	
Lab Method Code: WT-TM-1604		**Appendix #:** C163
Monochlorobenzene	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
Nonylphenol	LC-MS-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Nonylphenol Diethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
Nonylphenol Monoethoxylate	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116
o,p'-DDD	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o,p'-DDE	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o,p'-DDT	GC-MS	
Lab Method Code: WT-TM-1102/WT-TM-1302		**Appendix #:** C019
o-Cresol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Octylphenol	LC-MS	
Lab Method Code: WT-TM-1521		**Appendix #:** C116

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Ontario

Class: Organic	Technique - Sub-Technique:	
Phenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Phorate	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Picloram	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
p-nitrophenol	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Polychlorinated biphenyls	GC-MS	
Lab Method Code: WT-TM-1105/WT-TM-1301		**Appendix #:** C017
Prometryn	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Pyrene	GC-MS	
Lab Method Code: WT-TM-1101/WT-TM-1300		**Appendix #:** C015
Simazine	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Styrene	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113
Temephos	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Terbufos	GC-MS	
Lab Method Code: WT-TM-1107/WT-TM-1302		**Appendix #:** C023
Tetrachloroethylene	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113
Tetraethyl Lead	GC-MS	
Lab Method Code: WT-TM-1308		**Appendix #:** C159
Toluene	GC-MS/FID	
Lab Method Code: NA-TM-1102		**Appendix #:** C113

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Ontario

Class: Physical/Others	Technique - Sub-Technique:	
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
pH	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

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**

CALA
Canadian Association for Laboratory Accreditation Inc.

CALA Directory of Laboratories

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

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
Octylphenol
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).

The list of tests and measurement capabilities for which a laboratory is accredited can change at any time due to circumstances such as scope extensions, voluntary withdrawal of tests by the laboratory and suspension. Scopes are published by the CALA via the Internet at http://www.cala.ca/cala_directories.html

C1-Dibenzothiopenes
C1-Fluoranthenes/Pyrenes
C1-Fluorenes
C1-Naphthalenes
C1-Phenanthrenes/Anthracene
C2-Benzofluoroanthenes/Benzo(a)pyrenes
C2-Biphenyl
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
Perylene
Phenanthrene
Pyrene
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

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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 6020A (ANALYSIS)
ICP/MS - TCLP
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Iron
Lead
Lithium
Magnesium
Manganese
Potassium
Selenium
Silver
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)

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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
Chrysene
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

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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

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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
Tetrachloroethylene
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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Water (Inorganic) OSDWA †
Alkalinity - Water (070)
WT-TM-1012; modified from SM 2320 B
MANUAL TITRATION
Alkalinity (pH 4.5)

Water (Inorganic) OSDWA †
Alkalinity - Water (094)
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) OSDWA †
Anions - Water, Wastewater (003)
NA-TM-1001; modified from EPA 300.0
ION CHROMATOGRAPHY
Bromide
Chloride
Fluoride
Nitrate
Nitrite
Sulfate

Water (Inorganic) OSDWA †
Biochemical Oxygen Demand (BOD) - Water (001)
WT-TM-1002; modified from SM 5210B
D.O. METER
BOD (5 day)
CBOD (5 day)

Water (Inorganic) OSDWA †
Bromate - Water (114)
WT-TM-1503, WT-TM-1505; modified from EPA 6850
LC-MS/MS - EXTRACTION
Bromate

Water (Inorganic) OSDWA †
Carbon - Water (047)
WT-TM-1024; modified from SM 5310 B
IR - COMBUSTION
Organic Carbon

Water (Inorganic) OSDWA †
Chemical Oxygen Demand (COD) - Water (035)
WT-TM-1006; modified from SM 5220 D
REFLUX - COLORIMETRIC
COD

Water (Inorganic) OSDWA †
Chlorine - Water (074)
WT-TM-1021; modified from SM 4500-CL G and EPA 330.5
COLORIMETRIC
Free Chlorine

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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

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

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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

Water (Inorganic) OSDWA †
Turbidity - Water (024)
WT-TM-1004; modified from SM 2130 B
TURBIDIMETRIC
Turbidity

Water (Microbiology) OSDWA †
Coliforms - Water (155)
WT-TM-1200; modified from MOE/LSB MICROMFDC-E3407
MEMBRANE FILTRATION (DC)
Escherichia coli (E. coli)
Total Coliforms

Water (Microbiology) OSDWA †
Escherichia coli (E. coli) - Water (052)
WT-TM-1200; modified from ONTARIO MOE COMPARISON EVALUATION and SM 9222D
MEMBRANE FILTRATION (mFC-BCIG)
Escherichia coli (E. coli)

Water (Microbiology) OSDWA †
Fecal (Thermotolerant) Coliforms - Water (051)
WT-TM-1200; modified from SM 9222 D
MEMBRANE FILTRATION (m FC)
Fecal (Thermotolerant) Coliforms

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C1-Chrysenes
C1-Dibenzothiopenes
C1-Fluoranthenes/Pyrenes
C1-Fluorenes
C1-Naphthalenes
C1-Phenanthrenes/Anthracene
C2-Benzofluoroanthenes/Benzo(a)pyrenes
C2-Biphenyl
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
Perylene
Phenanthrene
Phenanthrene
Pyrene
Quinoline
Retene

Water (Organic) OSDWA †

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-Methylnaphthalene
2-Nitrophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6-tetrachlorophenol

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Nitrobenzene
o-Cresol
p-chloroaniline
Pentachlorophenol
Perylene
Phenanthrene
Phenol
Pyrene
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
Paraquat

Water (Organic) OSDWA †
Formaldehyde - Water (162)
WT-TM-1603; modified from EPA 556.1
GC/ECD
Formaldehyde

Water (Organic) OSDWA †
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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Water (Organic)
Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) - Water (174)
WT-TM-1557; modified from JOURNAL OF CHROMATOGRAPHY A.1093 (2005), 89-97
LC-MS/MS
Perfluorooctane Sulfonate (PFOS)
Perfluorooctanoic Acid (PFOA)

Water (Organic) OSDWA †
Pesticides - Water (023)
WT-TM-1107/WT-TM-1109-/WT-TM-1302; modified from EPA SW-846 8270 and EPA SW-846 3500C
GC/MS - EXTRACTION
2,4-dichlorophenoxyacetic acid
2,4,5-trichlorophenoxyacetic acid
Alachlor
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 †
Petroleum Hydrocarbons (PHC) - Water (069)
WT-TM-1307/WT-TM-1112; modified from MOE:DECPH E3421
GRAVIMETRIC
F4G (C34-C50)

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Water (Organic) OSDWA †

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

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Canadian Association for Laboratory Accreditation Inc.

CALA

Certificate of Accreditation

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

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

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

President & CEO

ilac-MRA CALA

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.

CALA
Canadian Association for Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 2803
Laboratory Name: AquaTox Testing & Consulting Inc.
Parent Institution:
Address: 11B Nicholas Beaver Road Guelph ON N1H 6H9
Contact: Ms. Stephanie Folz
Phone: (519) 763-4412
Fax: (519) 763-4419
Email: sfolz@aquatox.ca

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served:
Revised On: November 10, 2014
Valid To: May 10, 2017

Scope of Accreditation

Solids (Toxicology)
Chironomids - Sediment (011)
SOP 391, 271; EPS 1/RM/32
SURVIVAL AND GROWTH
Chironomus dilutus (formerly Chironomus tentans)
Chironomus riparius

Solids (Toxicology)
Hyalella azteca - Sediment (010)
SOP 390, 270; EPS 1/RM/33
SURVIVAL AND GROWTH
Hyalella azteca

Solids (Toxicology)
Marine Amphipods - Sediment (015)
SOP 387; EPS 1/RM/26, EPS 1/RM/35
ACUTE LETHALITY (SURVIVAL)
Amphipods

Solids (Toxicology)
Microtox - Solid Phase - Sediment (021)
SOP 375; EPS 1/RM/42
BIOLUMINESCENCE
Microtox Solid Phase IC-50

Solids (Toxicology)
Polydora cornuta - Sediment (030)
SOP 361; EPS 1/RM/41
SURVIVAL AND GROWTH
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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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.

Note: This is an UNCONTROLLED COPY printed for reference purposes and valid only on 3/16/2016

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Misc.-Field Tests			
Air volume	HYGIENE METHOD	0	
Waste-Sample Preparation			
Final pH	EPA 1311	0.10	pH units
Initial pH	EPA 1311	0.10	pH units
Water-Physical Tests			
Color, Apparent	APHA 2120	1.0	C.U.
Conductivity	APHA 2510 B	3.0	umhos/cm
Hardness (as CaCO3)	APHA 2340 B	10	mg/L
pH	APHA 4500 H-Electrode	0.10	pH units
Total Dissolved Solids	APHA 2540C	20	mg/L
Total Suspended Solids	APHA 2540 D-Gravimetric	2.0	mg/L
Turbidity	APHA 2130 B	0.10	NTU
Soil-Physical Tests			
% Moisture	Gravimetric: Oven Dried	0.10	%
Soil-Particle Size			
% Clay (<2um)	Forestry Canada (1991) p. 46-53	0.10	%
% Sand (2.0mm - 0.05mm)	Forestry Canada (1991) p. 46-53	0.10	%
% Silt (0.05mm - 2um)	Forestry Canada (1991) p. 46-53	0.10	%
Texture	Forestry Canada (1991) p. 46-53		
Filter-Particulates			
Particulates Analysis	SEE SUBLET LAB'S REPORT		
Dustfall-Particulates			
Fixed Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Total Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Volatile Insoluble Dustfall	BCMOE DUSTFALLS	0.10	mg/dm2.day
Air-Asbestos/Quartz/Other Fibres			
Cristobalite	NIOSH 7500		
Soil-Leachable Anions & Nutrients			
Nitrate-N	EPA 300.0	1.0	ug/g
Nitrite-N	EPA 300.0	1.0	ug/g
Total Kjeldahl Nitrogen	APHA 4500-N	200	mg/kg
Water-Anions and Nutrients			
Alkalinity, Bicarbonate (as CaCO3)	EPA 310.2	10	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Alkalinity, Carbonate (as CaCO3)	EPA 310.2	10	mg/L
Alkalinity, Hydroxide (as CaCO3)	EPA 310.2	10	mg/L
Alkalinity, Total (as CaCO3)	EPA 310.2	10	mg/L
Ammonia, Total (as N)	EPA 350.1	0.050	mg/L
Bromide (Br)	EPA 300.0 (IC)	0.10	mg/L
Chloride	EPA 300.0 (IC)	2.0	mg/L
Chloride (Cl)	EPA 300.0 (IC)	2.0	mg/L
Fluoride	EPA 300.0 (IC)	0.10	mg/L
Nitrate and Nitrite as N	APHA 4110 B	0.10	mg/L
Nitrate-N (NO3-N)	EPA 300.0 (IC)	0.10	mg/L
Nitrite-N	EPA 300.1 (Modified)	0.0010	mg/L
Sulphate	EPA 300.0 (IC)	2.0	mg/L
Sulphate (SO4)	EPA 300.0 (IC)	2.0	mg/L
Total Kjeldahl Nitrogen	APHA 4500-N	0.15	mg/L
Total Phosphorus	APHA 4500-P B E	0.0030	mg/L
Soil-Anions and Nutrients			
Nitrate and Nitrite as N	APHA 4110 B	1.0	ug/g
Water-Cyanides			
Cyanide, Free	ASTM 7237	0.0050	mg/L
Water-Organic / Inorganic Carbon			
Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL	1.0	mg/L
Total Organic Carbon	APHA 5310B	1.0	mg/L
Soil-Organic / Inorganic Carbon			
Fraction Organic Carbon	CARTER 21.2	0.0010	g/g
Total Organic Carbon	CARTER 21.2	0.10	%
Water-Bacteriological Tests			
E. Coli	SM 9222D	0	CFU/100 mL
Fecal Coliforms	SM 9222D	0	CFU/100 mL
Total Coliforms	SM 9222B	0	CFU/100 mL
Soil-Metals			
Aluminum (Al)	EPA 200.2/6020A	50	ug/g
Arsenic (As)	EPA 200.2/6020A	0.2	ug/g
Arsenic (As)	EPA 200.2/6020A	1	ug/g
Barium (Ba)	EPA 200.2/6020A	1	ug/g
Cadmium (Cd)	EPA 200.2/6020A	0.5	ug/g
Calcium (Ca)	EPA 200.2/6020A	100	ug/g

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Chromium (Cr)	EPA 200.2/6020A	1	ug/g
Copper (Cu)	EPA 200.2/6020A	1	ug/g
Iron (Fe)	EPA 200.2/6020A	50	ug/g
Lead (Pb)	EPA 200.2/6020A	1	ug/g
Magnesium (Mg)	EPA 200.2/6020A	20	ug/g
Manganese (Mn)	EPA 200.2/6020A	1	ug/g
Mercury (Hg)	SW846 3050B/7471	0.010	ug/g
Sodium (Na)	EPA 200.2/6020A	100	ug/g
Uranium (U)	EPA 200.2/6020A	1	ug/g
Zinc (Zn)	EPA 200.2/6020A	5	ug/g
Dustfall-Metals			
Aluminum (Al)-Total	EPA 6020A	0.0030	mg/dm2.day
Antimony (Sb)-Total	EPA 6020A	0.00010	mg/dm2.day
Arsenic (As)-Total	EPA 6020A	0.00010	mg/dm2.day
Barium (Ba)-Total	EPA 6020A	0.000050	mg/dm2.day
Beryllium (Be)-Total	EPA 6020A	0.00050	mg/dm2.day
Bismuth (Bi)-Total	EPA 6020A	0.00050	mg/dm2.day
Boron (B)-Total	EPA 6020A	0.010	mg/dm2.day
Cadmium (Cd)-Total	EPA 6020A	0.000050	mg/dm2.day
Calcium (Ca)-Total	EPA 6020A	0.020	mg/dm2.day
Chromium (Cr)-Total	EPA 6020A	0.00050	mg/dm2.day
Cobalt (Co)-Total	EPA 6020A	0.00010	mg/dm2.day
Copper (Cu)-Total	EPA 6020A	0.00050	mg/dm2.day
Interval	EPA 245.7	1	days
Interval	EPA 6020A	1	days
Lead (Pb)-Total	EPA 6020A	0.000050	mg/dm2.day
Lithium (Li)-Total	EPA 6020A	0.0050	mg/dm2.day
Magnesium (Mg)-Total	EPA 6020A	0.0050	mg/dm2.day
Manganese (Mn)-Total	EPA 6020A	0.000050	mg/dm2.day
Mercury (Hg)-Total	EPA 245.7	0.000050	mg/dm2.day

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Molybdenum (Mo)-Total	EPA 6020A	0.000050	mg/dm2.day
Nickel (Ni)-Total	EPA 6020A	0.00050	mg/dm2.day
Potassium (K)-Total	EPA 6020A	0.050	mg/dm2.day
Selenium (Se)-Total	EPA 6020A	0.0010	mg/dm2.day
Silver (Ag)-Total	EPA 6020A	0.000010	mg/dm2.day
Sodium (Na)-Total	EPA 6020A	0.050	mg/dm2.day
Strontium (Sr)-Total	EPA 6020A	0.00010	mg/dm2.day
Thallium (Tl)-Total	EPA 6020A	0.00010	mg/dm2.day
Tin (Sn)-Total	EPA 6020A	0.00010	mg/dm2.day
Uranium (U)-Total	EPA 6020A	0.000010	mg/dm2.day
Vanadium (V)-Total	EPA 6020A	0.0010	mg/dm2.day
Zinc (Zn)-Total	EPA 6020A	0.0030	mg/dm2.day
Water-Total Metals			
Aluminum (Al)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.003	mg/L
Aluminum (Al)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Aluminum (Al)-Total	EPA 200.8	0.01	mg/L
Antimony (Sb)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Total	EPA 200.8	0.001	mg/L
Barium (Ba)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Barium (Ba)-Total	EPA 200.8	0.002	mg/L
Beryllium (Be)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Bismuth (Bi)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Boron (B)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Cadmium (Cd)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Cadmium (Cd)-Total	EPA 200.8	0.00009	mg/L
Calcium (Ca)-Total	EPA 200.8	0.5	mg/L
Calcium (Ca)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Chromium (Cr)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Chromium (Cr)-Total	EPA 200.8	0.0005	mg/L
Cobalt (Co)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Copper (Cu)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Copper (Cu)-Total	EPA 200.8	0.001	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Iron (Fe)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Iron (Fe)-Total	EPA 200.8	0.05	mg/L
Lead (Pb)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Lead (Pb)-Total	EPA 200.8	0.0005	mg/L
Lithium (Li)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Magnesium (Mg)-Total	EPA 200.8	0.5	mg/L
Magnesium (Mg)-Total	EPA SW-846 3005A/6010B	0.1	mg/L
Manganese (Mn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Manganese (Mn)-Total	EPA 200.8	0.001	mg/L
Mercury (Hg)-Total	EPA SW846 7470A	0.000010	mg/L
Molybdenum (Mo)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Nickel (Ni)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Phosphorus (P)-Total	EPA SW-846 3005A/6010B	0.3	mg/L
Potassium (K)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Selenium (Se)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Silicon (Si)-Total	EPA SW-846 3005A/6010B	0.05	mg/L
Silver (Ag)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Sodium (Na)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Sodium (Na)-Total	EPA 200.8	0.5	mg/L
Strontium (Sr)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Thallium (Tl)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Tin (Sn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Titanium (Ti)-Total	EPA SW-846 3005A/6010B	0.01	mg/L
Uranium (U)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Uranium (U)-Total	EPA 200.8	0.001	mg/L
Vanadium (V)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Zinc (Zn)-Total	APHA 3030 B&E / EPA SW-846 6020A	0.003	mg/L
Zinc (Zn)-Total	EPA 200.8	0.003	mg/L
Water-Dissolved Metals			
Aluminum (Al)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Antimony (Sb)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Arsenic (As)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Barium (Ba)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Beryllium (Be)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Bismuth (Bi)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Boron (B)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Cadmium (Cd)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Calcium (Ca)-Dissolved	EPA 200.8	0.5	mg/L
Chromium (Cr)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
Cobalt (Co)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Copper (Cu)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Dissolved Metals Filtration Location	EPA 200.8		
Iron (Fe)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Lead (Pb)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Lithium (Li)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Magnesium (Mg)-Dissolved	EPA 200.8	0.5	mg/L
Manganese (Mn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Molybdenum (Mo)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00005	mg/L
Nickel (Ni)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0005	mg/L
Potassium (K)-Dissolved	EPA SW-846 3005A/6020A	0.05	mg/L
Selenium (Se)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Silver (Ag)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Sodium (Na)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.05	mg/L
Strontium (Sr)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0002	mg/L
Thallium (Tl)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Tin (Sn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.0001	mg/L
Titanium (Ti)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.01	mg/L
Uranium (U)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.00001	mg/L
Vanadium (V)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Zinc (Zn)-Dissolved	APHA 3030 B&E / EPA SW-846 6020A	0.001	mg/L
Waste-TCLP Metals			
Arsenic (As)	EPA 200.8	0.001	mg/L
Barium (Ba)	EPA 200.8	0.01	mg/L
Cadmium (Cd)	EPA 200.8	0.0001	mg/L
Chromium (Cr)	EPA 200.8	0.001	mg/L
Lead (Pb)	EPA 200.8	0.001	mg/L
Mercury (Hg)	SW846 7470A	0.00010	mg/L
Water-Aggregate Organics			
BOD	APHA 5210 B	2.0	mg/L
COD	APHA 5220 D	10	mg/L
Oil and Grease, Total	APHA 5520 B	2.0	mg/L
Mineral Oil and Grease	APHA 5520 B	1.0	mg/L
Phenols (4AAP)	EPA 9066	0.0010	mg/L
Soil-Aggregate Organics			
Oil and Grease, Total	APHA 5520 B	500	mg/kg
Water-Volatile Organic Compounds			
1,4-Difluorobenzene	SW846 8260 (HEADSPACE)	1	

Quoted Parameters with Detection Limits

Parameter	Method Reference	Report D.L.	Units
4-Bromofluorobenzene	SW846 8260 (HEADSPACE)	1	
Benzene	SW846 8260 (HEADSPACE)	0.5	ug/L
Ethyl Benzene	SW846 8260 (HEADSPACE)	0.5	ug/L
Toluene	SW846 8260 (HEADSPACE)	0.5	ug/L
Water-Hydrocarbons			
2-Bromobenzotrifluoride	MOE DECPH-E3421/CCME TIER 1	1	
3,4-Dichlorotoluene	E3421/CCME (HS)	1	
Chrom. to baseline at nC50	MOE DECPH-E3421/CCME TIER 1		
F2-Naphth	CCME CWS-PHC DEC-2000 - PUB# 1310-L	100	ug/L
F3-PAH	CCME CWS-PHC DEC-2000 - PUB# 1310-L	250	ug/L
F2 (C10-C16)	MOE DECPH-E3421/CCME TIER 1	100	ug/L
F3 (C16-C34)	MOE DECPH-E3421/CCME TIER 1	250	ug/L
F4 (C34-C50)	MOE DECPH-E3421/CCME TIER 1	250	ug/L
Total Hydrocarbons (C6-C50)	CCME CWS-PHC DEC-2000 - PUB# 1310-L	250	ug/L
F1 (C6-C10)	E3421/CCME (HS)	100	ug/L
F1-BTEX	CCME CWS-PHC DEC-2000 - PUB# 1310-L	100	ug/L
Soil-Hydrocarbons			
2-Bromobenzotrifluoride	MOE DECPH-E3398/CCME TIER 1	1	
3,4-Dichlorotoluene	E3398/CCME TIER 1-HS	1	
Chrom. to baseline at nC50	MOE DECPH-E3398/CCME TIER 1		
F2-Naphth	CCME CWS-PHC DEC-2000 - PUB# 1310-S	10	ug/g
F3-PAH	CCME CWS-PHC DEC-2000 - PUB# 1310-S	50	ug/g
F2 (C10-C16)	MOE DECPH-E3398/CCME TIER 1	10	ug/g
F3 (C16-C34)	MOE DECPH-E3398/CCME TIER 1	50	ug/g
F4 (C34-C50)	MOE DECPH-E3398/CCME TIER 1	50	ug/g
Total Hydrocarbons (C6-C50)	CCME CWS-PHC DEC-2000 - PUB# 1310-S	50	ug/g
F1 (C6-C10)	E3398/CCME TIER 1-HS	5.0	ug/g
F1-BTEX	CCME CWS-PHC DEC-2000 - PUB# 1310-S	10	ug/g
Water-Organic Parameters			
Chlorophyll a	EPA 445.0 ACET	0.10	ug/L
Phaeophytin a	EPA 445.0 ACET	0.10	ug/L
Misc.-Miscellaneous			
Special Request	SEE SUBLET LAB RESULTS		

Methodology

Product	Matrix	Product Description	Analytical Method Reference
AIR VOLUME-ED	Misc.	Air volume (L)	HYGIENE METHOD

NOTE: When air concentrations of analytes are reported, they are based on air sampling information (air volume, sampling time, sampling flow rate) supplied by the client.

ALK-SPEC-WT	Water	Speciated Alkalinity	EPA 310.2
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS3-WT	Water	Cl, F, SO4	EPA 300.0 (IC)
BOD-WT	Water	BOD	APHA 5210 B

Diluted and seeded samples are filled in an airtight bottle and incubated at a specified temperature for 5 days.

BR-WT	Water	Bromide	EPA 300.0 (IC)
BTX-HS-WT	Soil	BTEX by Headspace	SW846 8260 (HEADSPACE)

BTX is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/MS.

BTX-HS-WT	Water	BTEX by Headspace	SW846 8260 (HEADSPACE)

BTX is determined by analyzing by headspace-GC/MS.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CHL/A-ACET-FLUORO-WP	Water	Chlorophyll a by fluorometry	EPA 445.0 ACET

This analysis is done using procedures modified from EPA method 445.0. Chlorophyll a is determined by a 90 % acetone extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

CL-WT	Water	Chloride	EPA 300.0 (IC)
CN-FREE-CFA-WT	Water	Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

COD-BF	Water	Chemical Oxygen Demand	APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
COLOUR-WT	Water	Colour	APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

DUSTFALLS-INS.DM2-VA	Dustfall	Dustfalls Insoluble (mg/dm2.day)	BCMOE DUSTFALLS

Dustfall analysis is carried out in accordance with procedures published by the B.C. Ministry of Environment Laboratory.

EC-BF	Water	Conductivity	APHA 2510 B

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

EC-MF-WT	Water	E. coli	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5±0.2°C for 24±2h. Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

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

ETL-HARDNESS-CALC-WT	Water	Hardness (as CaCO3)	APHA 2340 B
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
F-WT	Water	Fluoride	EPA 300.0 (IC)
F1-F4-CALC-WT	Soil	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-S

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k) fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k) fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT	Soil	F1 (O.Reg.153/04)	E3398/CCME TIER 1-HS

Fraction F1 is determined by extracting a soil or sediment sample as received with methanol, then analyzing by headspace-GC/FID.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT	Soil	F2-F4 (O.Reg.153/04)	MOE DECPH-E3398/CCME TIER 1

A sub-sample of the solid sample is extracted with a solvent mixture. Following extraction, the sample extract is treated in situ with Silica Gel analyzed by GC/FID.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FILTER-NC-WT	Water	Lab Filtered and Preserved (as required)	
HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-R511-WT	Soil	Mercury-O.Reg 153/04 (July 2011)	SW846 3050B/7471

Solid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

HG-T-L-CVAA-WT	Water	Total Mercury in Water by CVAAS (Low)	EPA SW846 7470A

Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	SW846 7470A
LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-D-MS-WT	Water	Dissolved Metals in Water by ICPMS	EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-DIS-MS-VA	Water	Dissolved Metals by ICPMS	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Methodology

Product	Matrix	Product Description	Analytical Method Reference
MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 200.8

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A

Sample is vigorously digested with nitric and hydrochloric acid. Analysis is conducted by ICP/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-L-IC-WP	Water	Nitrite as N by Ion Chromatography	EPA 300.1 (Modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO2-WT	Soil		EPA 300.0

NO3-WT	Soil	Nitrate in Soil	EPA 300.0

NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calculation	CALCULATION

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-TOT-WT	Soil	Oil and Grease, Total	APHA 5520 B

Sample is extracted with an acetone:hexane mixture followed, extract is then evaporated and residue is weighed to determine total oil and grease.

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

Sample is extracted with hexane, extract is then evaporated and the residue is weighed to determine total oil and grease.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E

This analysis is carried by out an discrete colorimetric auto-analyzer using procedures adapted from APHA Method 4500-P "Phosphorus".

PARTICULATE-0.10-SLT	Filter	Respirable Dust N0600	SEE SUBLET LAB'S REPORT

PH-BF	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

PHEOA-ACET-FLUORO-WP	Water	Pheophytin a by fluorometry	EPA 445.0 ACET

This analysis is done using procedures modified from EPA method 445.0. Pheopigments present in the sample are determined collectively as Pheophytin a by a 90% (v/v) acetone extraction followed with analysis by fluorometry using the acidification procedure.

PREP-DUSTFALL-VA	Dustfall	Dustfall Sample Preparation	

Methodology

Product	Matrix	Product Description	Analytical Method Reference
PSA-3-SK	Soil	Particle size - Pipette removal OM & CO3	Forestry Canada (1991) p. 46-53

Dry, < 2 mm soil is treated hydrochloric acid top remove carbonates, then hydrogen peroxide to remove organic matter. The remaining soil is treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. The homogenized suspension is allowed to settle in accordance with Stoke's Law so that only clay particles remain in suspension.To determine the clay fraction, an aliquot of the clay suspension is removed, then dried and weighed. The sand fraction is determined by wet sieving the remaining suspension, then drying and weighing the sand retained on the sieve. The silt fraction is determined by calculation where % Silt = 100 - (%Sand+%Clay)

Reference:
Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

SAMPLE-DISPOSAL-WT	Misc.	Sample Handling and Disposal Fee	
SHIPPING-WT	Misc.	Shipping Charge	
SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-BF	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105±5°C overnight and then 180±10°C for 1hr.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105±5°C overnight and then 180±10°C for 1hr.

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

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105±5°C for a minimum of four hours or until a constant weight is achieved.

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

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105±5°C for a minimum of four hours or until a constant weight is achieved.

SPECIAL REQUEST-SLT	Misc.	Special Request Datachem Salt Lake	SEE SUBLET LAB RESULTS
TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35±0.5°C for 24±2h. Method ID: WT-TM-1200

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

Methodology

Product	Matrix	Product Description	Analytical Method Reference
TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2
TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

TURBIDITY-BF	Water	Turbidity	APHA 2130 B

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

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

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

XYLENES-SUM-CALC-WT	Soil	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

Appendix- E

Analytical Laboratory QA/QC Procedures

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.

Note: This is an UNCONTROLLED COPY printed for reference purposes and valid only on 3/16/2016

ALS Quality Management System Summary

ALS is a global diversified testing services organization with a presence on every continent, offering a broad range of services to leading global companies.

The following report summarizes standard practices routinely employed by the ALS Environmental Division in Canada. Our practices exceed accreditation requirements and have been built to meet the needs of our customers and to give them confidence in the reliability of our test data.

Additional information is available on request from the Quality Department. Customers are invited to audit or tour ALS facilities at their convenience.

Services to Customers

ALS cooperates closely with its customers to ensure their testing needs are understood, and allows them reasonable access to relevant work areas of the laboratories to audit the management system or to witness test work undertaken on their behalf.

All client issues are logged into our tracking system to ensure each issue is addressed completely and appropriately. Local and national oversight and initiatives ensure that identified improvements are incorporated in the Canadian laboratories so that customers receive the same level of service regardless of which location performs the testing.

Documentation and Document Control

Test methods and support procedures are documented in detail to ensure consistency of application, repeatability of test results and traceability of analyses.

Test method requirements include but are not limited to sample handling, sample storage, minimizing interference, sample preparation, reagent and standard specifications, equipment, supplies, calibration requirements, instrumental measurement procedures, quality control requirements, data quality objectives and corrective actions, calculations, reporting requirements, reference information, hazards and their preventive measures.

Administrative support procedures are also documented where needed to ensure quality system procedures and customer services are provided in a controlled, approved manner consistent with ALS policies and client needs.

All procedures are authorized prior to use by the signing authority, ensuring adequate technical and quality oversight.

Distribution of documents is controlled to ensure only the most recent version is available for use. Authorized documents are reviewed periodically by the signing authority to ensure they continue to meet ALS requirements and customer needs.

Test methods and support procedures are available for client viewing on-site.

Internal Audits

Internal audits are scheduled and performed by qualified Quality and Technical staff for all routine analytical procedures and Quality System elements. Such audits ensure that procedures are implemented as intended, that test methods are scientifically defensible and technically sound, and that policies, procedures and records continue to meet the Quality System objectives.

Quality staff may periodically initiate unscheduled audits in response to proficiency testing program results, client feedback, requests from managers or any other circumstance that warrants investigation.

Quality Control (QC)

ALS has established QC procedures for monitoring the validity of tests performed by its laboratories. Individual test methods specify quality control requirements, frequency of use, and Data Quality Objectives (DQOs).

The type of quality control elements used for process monitoring is dependent on the test performed, but typically includes (as appropriate): Calibration Verification Standards, Continuing Calibration Verifications, Instrument Blanks, Method Blanks, Laboratory Control Samples, Reference Materials, Matrix Spikes, Surrogate Spikes, and Internal Standards.

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs.

Test results for selected QC samples are available on test reports. Please contact your Account Manager for more information.

Control Charts

Control charts are used to provide a graphical representation of QC results and test method performance over time. Control charts graphically display DQOs as well as the statistically derived mean and ± 2 and 3 standard deviations ("sigma") around the mean, calculated from recent historical QC results. ALS applies advanced trend monitoring algorithms to identify outliers and non-random data distributions (trends) that may indicate undesirable changes in test method performance. The trend monitoring process has been automated within our LIMS. Upon data entry, each QC result is checked against programmed limits and trends. If a trend is identified, a notification is e-mailed to the analyst and their supervisor, so that it can be investigated and corrected.

Continuous Improvement

ALS is committed to continuously improving its processes and services. The Quality System feeds into a continuous cycle of review, implementation, and monitoring so that improvements are actively sought and adopted where needed.

Data Validation

ALS analytical data proceeds through several reviews prior to the release of final reports. The ALS data validation process includes test result validation, inter-parameter validation and report validation. Test result validation involves an independent peer review of raw and calculated test results. Inter-parameter validation occurs when all department specific parameters for a sample are completed, and involves an overall review of test results within each sample for consistency among any related test parameters. Report validation occurs when all the requested test results for a work order are completed, and involves a review of the final report before it is sent to the customer.

ALS maintains laboratory records in a traceable manner for five years.

Method Validation

Customers rely on ALS to select test methods that are appropriate to meet their needs. Wherever possible, ALS references the latest versions of published standard methods developed by organizations such as American Public Health Association, United States Environmental Protection Agency, NIOSH, Environment Canada, and other international, regional or regulatory organizations, or equipment manufacturers.

Method validations are conducted to confirm that our test methods are fit for their intended use. The validations are as extensive as necessary to meet the needs of the given application. The extent depends on the source of the method. Test methods are revalidated periodically to ensure continued suitability and fitness for purpose.

Method Detection Limits and Limits of Reporting

ALS Limits of Reporting (LORs) are established using rigorous experimental and statistical procedures that begin with the determination of the Method Detection Limit (MDL) at 99% confidence. The MDL takes into account several factors, like long term Method Blanks, low level Sample Duplicates, and low level Spiked Samples. When detected at or above the MDL, ALS test results are considered to be qualitatively accurate, and a parameter can be reported with 99% confidence as being present in the sample.

$$MDL = (s_0 \times t_{n-1}) + |MBlk|$$

Where:
- s_0 = the standard deviation derived from the analysis of blank or low level samples, whichever gives a higher standard deviation,
- t_{n-1} = the Student's t-distribution with n-1 degrees of freedom for the one-sided 99% confidence interval.
- |MBlk|= the absolute value of the mean method blank.

ALS takes a conservative approach to detection limits. Our goal is to minimize false positives, because we recognize that any false positive results can be damaging for our clients. Where possible, we establish LORs at levels well-above the statistical MDL, and ideally at the LOQ_5. This improves the accuracy and precision of results near the detection limit, and reduces the chance of false positives due to sample-specific issues. At or above the LOQ_5, test results are considered to be quantitatively accurate. A reported parameter at the LOQ_5 is considered to be within 40% of the true value 95% of the time.

$$LOQ_5 = 5s_0 + |MBlk|$$

Where:
- s_0 = the standard deviation used in the MDL calculation,
- |MBlk| = the absolute value of the mean method blank.

The D. L. column on ALS analytical reports contains the LOR. The LOR may be the MDL as calculated above, or a higher value. ALS does not report LORs that are less than the calculated MDL.

Measurement Uncertainty (MU)

ALS procedures for calculating measurement uncertainty are based on accepted practices of identifying components contributing to uncertainty, compiling data that represents or includes these components, evaluating the data using appropriate statistical calculations, and reporting in a manner that prevents misunderstanding of the result. The Type A method of calculating measurement uncertainty is followed, however additional factors are considered to ensure the best and most complete information is derived from our evaluation of test method performance.

The ALS model describes the dependency of uncertainty on three factors. The first is a constant contribution to uncertainty attributable to s_0, the standard deviation of the method for concentrations that approach zero. The second is a constant relative uncertainty associated with higher parameter concentrations. The third is a constant contribution to uncertainty attributable to the mean long-term method blank value where it is significant. The following is the ALS equation for measurement uncertainty, using an expansion factor of k=2:

Expanded 95% Uncertainty as a Function of Concentration

$$U(c) = 2 * [\sqrt{ \{ s_0^2 + (\Theta c)^2 \} }] + |MBlk_{LT}|$$

Where:
- **U(c)** = The expanded uncertainty at concentration c. The range c ± U(c) represents approximately the 95% confidence interval (two standard deviations).
- **c** = Measured concentration of parameter in the sample.
- s_0 = A constant contribution to standard uncertainty represented by the standard deviation at zero concentration, which is related to the method detection limit.
- **Θ** = Combined relative standard uncertainty, excluding MDL and Method Blank contributions. Theta has no units.
- $|MBlk_{LT}|$ = Absolute value of the mean long-term Method Blank value, where significant (i.e. if > 1/5 s_0). [Note that the Method Blank term is not expanded because it represents a constant bias, not a variance.]

Uncertainty values obtained from this procedure must be regarded as estimates. Primarily, this is because all environmental samples are different, especially with regard to matrix effects and heterogeneity. It is our intent with this procedure to arrive at an estimate of a 95% confidence level uncertainty value that can be assumed to apply to 95% (or more) of the samples that a laboratory receives for a given test. It follows that for samples where undetected matrix effects or interferences occur, or for samples that are atypically heterogeneous, uncertainty estimates may be low.

Another aspect of reporting MU is the reporting of test method bias. Bias occurs in a small number of test methods that cannot recover 100% of a parameter from a sample. In these cases ALS reports bias along with the MU to aid with the interpretation of the test result.

Participation in Interlaboratory Proficiency Testing (PT) Programs

ALS locations participate in an extensive variety of proficiency testing programs. Where available, formal programs operated by outside agencies are used. When not available, ALS utilizes less formal proficiency testing studies. Root cause analysis is initiated and corrective action plans are developed when PT program results indicate a decline in test method performance.

Staff Training

Formal training procedures are in place to ensure all staff are trained in ALS polices and analytical procedures prior to performing analyses. A staff orientation program communicates ALS polices to newly hired staff. Task specific training is performed, and analyst proficiency is demonstrated and documented before staff are authorized to work independently. On-going analyst proficiency is monitored using proficiency testing programs. Records are maintained in training logs issued to staff upon hiring.

As well, ALS Canada promotes continuing education and learning by offering advanced courses covering technical and quality functions.

Employee Agreements

ALS protects its customers' confidential information and proprietary rights. We require all employees to review and sign a Code of Conduct policy that communicates the ALS confidentiality policy. It is ALS practice to never disclose information about a client's analysis to a third party without prior consent of the client, or unless compelled to by law. If we are obligated by law to disclose such information, we will inform the client prior to doing so.

Our employees avoid involvement in activities that would diminish confidence in their competence, impartiality, judgment, or integrity by complying with the ALS Code of Conduct and Data Integrity Policy.

Sample Tracking

Procedures are in place to track samples from receipt at the lab through to final reporting. A data management system (LIMS – Laboratory Information Management System) is used to generate a work order number for each sample submission, and a unique identification number is generated for each sample within the work order. The system is then used to assign specific analyses for the samples, to identify methods to be used, and to assign due dates for the results. The system is used to manage analytical workloads and track the status of all samples in-house. LIMS is a secure system that can only be accessed using login passwords. Controlling the level of access according to staff needs provides additional security.

When requested by the client, legal sample protocols are implemented to ensure chain of custody defensibility in a court of law. Contact the lab for legal sampling and transportation instructions if this service is needed.

Equipment Calibration

Measuring and testing equipment used by ALS laboratories that can have a significant effect on the accuracy or validity of test results is calibrated using established procedures. The procedures ensure traceability through an unbroken chain of calibrations or comparisons to national measurement standards. Where traceability of measurements to SI units is not possible and/or not relevant, traceability is provided by the use of certified reference materials and/or consensus standards.

Management Reviews (MR)

Management conducts a review at least annually to ensure the management system is effective, and continues to be suitable for its operations, and to identify necessary changes or improvements. Senior management is included in the review process for all locations.

ALS Quality Control Protocols

08 May, 2012

Quality control samples are introduced into batches of samples at critical points of sample handling, preparation and analysis to demonstrate the processes are performing as expected. In general, quality control samples are considered either Instrument QC or Method QC.

Instrument QC:

Instrument QC samples demonstrate control for the instrumental portion of a method. Instrument QC requirements must be successfully met before the analysis of Method QC or samples may proceed.

- Verification of initial calibration - criteria varies with each test.
- 2nd source Calibration Verification Standard (CVS) – at minimum, with each initial calibration.
- Continuing Calibration Verification (CCV) – frequency varies by test.
- Instrument Blanks – usage and frequency varies by test.

Method QC:

Method QC samples encompass the entire method and are initiated at the earliest point of the method where appropriate. Refer to the QC Definitions below. One set of Method QC is included for each batch of up to 20 client samples. Each set includes:

- 1 Method Blank.
- 1 Sample Duplicate. *
- 1 Lab Control Sample.
- 1 Reference Material or Matrix Spike. **
- Surrogate Compounds.

* Duplicate analyses are not performed where sub-sampling is not possible – e.g. most tests for organics in water.
** Spikes and Reference Materials are unavailable for Microbiology tests.

Method QC must be successfully analyzed before sample results are approved. Method QC results are normally reported to ALS clients with data reports.

Data Quality Objectives (DQOs):

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs. Current DQOs are available upon request.

Detailed descriptions of how DQOs are evaluated for different types of Quality Control samples are described on the following pages.

Types of Quality Control – Definitions and Evaluation Protocols

Method Blank (MB) - A blank sample prepared to represent the sample matrix as closely as possible and analyzed exactly like the calibration standards, samples, and quality control (QC) samples. Results of Method Blanks provide an estimate of the within batch variability of the blank response and an indication of bias introduced by the analytical procedure.

Except in special cases (as outlined in ALS DQO summary documents) the ALS DQO for Method Blanks is for all results to lie below the Limit of Reporting (LOR).

Laboratory Sample Duplicate (DUP) - A second portion of sample taken from the same container as the sub-sample used for the primary analysis, that is analyzed independently through all steps of the laboratory's sampling and analytical procedures. Duplicate samples are used to assess variance of the total method including sampling and analysis.

Duplicate precision is normally measured as Relative Percent Difference (RPD), where RPD = |(Result2 - Result1) / Mean| * 100. Duplicate samples should normally agree to within the ALS Precision DQO for the test and parameter (expressed as RPD), or within ± 2 x the LOR (for low level results). Refer to the ALS DQOs for Precision for specific limits for any given test.

ALS does not establish DQOs for Field Sample Duplicates. However, it is generally understood and accepted that the variability of Field Sample Duplicates is significantly more than what is observed with Laboratory Sample Duplicates.[1]

Laboratory Control Sample (LCS) - A known matrix spiked with compound(s) representative of the target analytes. An LCS is used to verify the accuracy of the laboratory's performance of the test.

LCS accuracy is calculated as the measured amount divided by the target concentration, and is normally expressed as percent recovery. LCS recoveries should normally lie within the ALS Accuracy DQOs for the test and parameter. For a low level LCS, the result should lie within ± 1 x the LOR of the target concentration. Refer to the ALS Accuracy DQOs for specific limits for any given test.

Reference Material (RM) – A material or substance, one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. An RM is similar to an LCS, but encompasses a representative sample matrix. Similar to an LCS, an RM is used to verify the accuracy of the laboratory's performance of the test, but including the challenges of a complex sample matrix.

RM accuracy is calculated, expressed, and evaluated similarly to LCS accuracy. Refer to ALS Accuracy DQOs for specific limits for any given test.

Matrix Spike (MS) - A sample prepared by adding a known amount of a target analyte to a specified amount of a sample for which an independent estimate of the target analyte concentration is available. Spiked samples are used, for example, to determine the effect of the sample matrix on a method's recovery efficiency.

Matrix Spike results are calculated and expressed as percent recovery, by dividing the measured result (minus any analyte contribution from the unspiked sample) by the target analyte concentration. Matrix Spike results should normally lie within the ALS Accuracy DQOs for Matrix

[1] Depending on the type of Field Sample Duplicates being evaluated (e.g. Co-located versus Split Sample Duplicates), ALS recommends DQOs for Field Sample Duplicates that are between 1.5 – 2.0 times higher than our Laboratory Sample Duplicate DQOs. Co-located Sample Duplicates generally require higher DQOs than Split Sample Duplicates.

Spikes. Matrix Spike results cannot be calculated or reported in cases where the background concentration of the test parameter in the sample is too high relative to the spike level.

Surrogate Compounds (SURR) – Surrogate Compounds are added to every sample where applicable (organics tests only). They are substances with properties that mimic the analyte of interest, and which are unlikely to be found in environmental samples. They are added at known concentration to samples to establish that the analytical method has been properly performed.

Surrogate results are calculated and expressed as percent recovery, by dividing the measured result against the expected target concentration. Refer to ALS Accuracy DQOs for specific limits for any given test.

Automated Relational Checks

In addition to all our standard Quality Control checks, ALS also employs dozens of "Relational Checks", which are programmed into our Laboratory Information Systems (LIMS) to automatically highlight any situations where the expected relationships between different test parameters are violated, which can often point to errors. Such errors may originate with field sampling, or from laboratory processes, but should always be identified and pro-actively investigated.

Total versus Dissolved Metals ("D > T" Check) – One of the most important and common relational checks we do is a check for situations where Dissolved Metal concentrations significantly exceed Total Metal concentrations. By definition, this situation should not occur. However, there are a few reasons why this can occur:

i) Circumstances where Dissolved Metals slightly exceed Total Metals are expected in a small percentage of samples, simply due to normal random variability. In fact, when all metals in a test sample exist in the dissolved form, we expect that Dissolved Metals measurements will numerically exceed Total Metals measurements exactly half the time (by a small margin), simply due to random chance.

ii) Samples to be analyzed for Dissolved Metals must be filtered, which is normally done in the field. Filtration processes are a common source of low level metals contaminants. Contamination of a sample during filtration is the most common source of significant D > T issues.

iii) Field samples for Dissolved and Total Metals are normally collected independently, so variability of the sampling process is another common cause of D > T issues.

If none of the above causes can explain a situation where Dissolved Metals exceed Total Metals, then another type of error may be indicated, either with the collection of the sample in the field, or with sample containers or preservatives, or with the laboratory testing process.

ALS automatically highlights and investigates all circumstances where a Dissolved Metal result exceeds the Total Metal result by 20% RPD or more, but only if the absolute difference between the two results is greater than the sum of the Limits of Reporting (Detection Limits) of the two results.

The mechanism of this relational check is derived from the ALS Duplicate DQOs for Metals in Water.

All D > T relational checks that violate the rule above are flagged internally, and are investigated by ALS before sample results will be released to our clients. In most cases, results will be re-analyzed to confirm or correct the anomalous relationship. If results are confirmed by re-analysis, the following data qualifier is applied:

DTC: Dissolved concentration exceeds total. Results were confirmed by re-analysis.

Other Important Relational Checks Conducted by ALS

ALS employs dozens of other relational checks to highlight anomalous relationships between test parameters. Some of more common checks include the following:

- *Total Ammonia should not exceed Total Kjeldahl Nitrogen*
- *Weak Acid Dissociable Cyanide should not exceed Total Cyanide*
- *E. coli should not exceed Fecal Coliforms*
- *Nitrate + Nitrite should not exceed Total Nitrogen*
- *Hexavalent Chromium should not exceed Total Chromium*
- *True Colour should not exceed Apparent Colour*
- *Mineral Oil and Grease should not exceed Total Oil and Grease*
- *Reactive Phosphorus should not exceed Total Phosphorus*

Quality Control Report Guide

Matrix is the substance type of the QC sample.

Common matrices are water, soil, and tissue.

The **Reference** column contains:

a) Lab sample number (L#) or work group number (WG#) of samples that were used for duplicates or matrix spikes - this information is for internal tracking purposes.

b) Test results for actual samples that were duplicated for QC purposes.

Result from analyzing the QC sample.

% Recovery is calculated for QC samples with known target values (e.g. Spikes or CRMs).

Actual (absolute) test results are reported for the second aliquot of a duplicate pair and method blanks.

A **Qualifier** is used to communicate important information about the QC sample test results.

Sample parameter qualifiers used in the report are defined near the end of the Quality Control Report.

Also refer to the *Sample Parameter Qualifier Definitions* on the next page.

Units of the QC sample test results.

Test results are reported in % recovery for samples with known target values.

Actual (absolute) concentration units are used for reporting duplicate sample and Method Blank test results.

The calculated **Relative % Difference** between duplicate pairs.

RPD is calculated as follows:
|{(Sample Result - Duplicate Result) / [Mean]}| x 100

Duplicate pairs with test results that are < 5 x LOR are reported in sample concentration units (absolute units) and are accompanied by a J qualifier.

The Control **Limit** for the QC sample (ALS Data Quality Objective (DQO)).

QC samples must fall within Control Limits or appropriate action is taken, such as reanalysis where possible, or the data is qualified.

QC samples with known target values have a range for % recovery (eg) 85-115%.

Duplicates have a ± RPD range (e.g. ± 20 RPD). The RPD is reported as an absolute value (e.g. 20 RPD).

Method Blank control limit is the parameter Detection Limit (DL), also known as the Limit of Reporting (LOR).

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-WP	**Water**							
Batch R2179887								
WG1269694-3 DUP		L997018-4						
Sulfate		60.1	62.0		mg/L	3.1	20	21-APR-11
WG1269674-2 LCS								
Sulfate			100		%		85-115	21-APR-11
WG1269674-1 MB								
Sulfate			<0.50		mg/L		0.5	21-APR-11
WG1269674-4 MS		L997018-4						
Sulfate			N/A	MS-B	%		-	21-APR-11
WG1269674-5 CVS								
Sulfate			103		%		85-115	21-APR-11
WG1269674-6 CRM								
Sulfate			95		%		80-120	21-APR-11

Test Code: Sulfate (SO4), analyzed by Ion Chromatography (IC), in ALS Winnipeg (WP).

DUP: Laboratory Sample Duplicate - a second portion of sample taken from the same container as the sub-sample used for the primary analysis. Assesses variance of the total method including lab sub-sampling and analysis.

The results for this duplicate pair are 60.1 and 62.0 mg/L. The RPD is 3.1 and the control limits are ± 20 RPD.

LCS: Laboratory Control Sample – a known matrix spiked with target analytes. Verifies the accuracy of the performance of the test.

The recovery for this LCS is 100%, with control limits of 85 to 115% recovery.

MB: Method Blank – a blank matrix taken through the entire test method. Monitors variability of the blank response and bias of the test method.

The result for this MB is less than 0.50 mg/L. The control limit for the MB is equal to the LOR.

MS: Matrix Spike – a known amount of target analytes are added to a client sample. Measures the effect of the sample matrix on a method's recovery efficiency.

In this example, the recovery of the MS could not be calculated. The qualifier explains why – refer to the *Sample Parameter Qualifier Definitions*.

CVS: Calibration Verification Standard - a second source reference standard containing known concentrations of target analytes. Confirms the accuracy and stability of the calibration standards.

This CVS has a recovery of 103% and control limits of 85 to 115% recovery.

CRM/IRM: Certified or Internal Reference Material – a homogeneous sample whose analyte values have been well characterized.

This CRM has a 95% recovery and control limits of 80 to 120% recovery.

Quality Control Report Guide

Legend:

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

Legend: explains acronyms that may be used in the QC Report.

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Qualifiers: QC sample qualifiers are listed and explained here.

The three examples are common qualifiers. They explain unusual or special circumstances that pertain to the QC sample results.

Quality Control Report Guide

Parameters and sample numbers that had Hold Time exceedances are listed in this table.

Hold Times are tracked from sampling date and time to the date and time when the sample was processed in the lab.

The recommended Hold Times.

See the Notes* section for sources of recommendations.

Hold time exceedance Qualifiers are explained in the *Legend and Qualifiers Definitions* section below.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Transmittance, UV (254 nm)	1	19-APR-11 14:00	25-APR-11 08:16	48	38	hours	EHTL
pH	1	19-APR-11 14:00	10-MAY-11 09:32	0.25	499	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Explanations for the Qualifiers listed above.

See also the additional Notes below.

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L997206 were received on 21-APR-11 07:30.

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

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

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

APPENDIX D

MMER SAMPLING AND REPORTING REQUIREMENTS MEMO

Memorandum

Date: May 20, 2015

To: Jim Millard (Baffinland Iron Mines Corp.)

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

From: Paul LePage (Minnow Environmental Inc.)

RE: Overview of MMER Sampling and Reporting

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

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

Information Required Within 60 Days of Initiation of Effluent Discharge

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

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

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

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

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

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

Sampling Required Following Initiation of Effluent Discharge

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Reporting Schedule and Content

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Conclusions

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

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