APPENDIX A

WATER AND SEDIMENT QUALITY SAMPLING PROTOCOL

(Pages A-1 to A-24)

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BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

WATER AND SEDIMENT QUALITY SAMPLING PROTOCOL
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ABBREVIATIONS

AEMP	Aquatic Environment Monitoring Program
BIM	Baffinland Iron Mines Corporation
DO	dissolved oxygen
EC	Environment Canada
FEIS	Final Environmental Impact Statement
KP	Knight Piésold Ltd
Mary River Project	the project
NSC	North South Consultants
UTM	universal transverse mercator

1 – INTRODUCTION

Baseline surface water and sediment quality sampling was conducted for the Mary River Project (the Project) in support of the Final Environmental Impact Statement (FEIS) completed by Baffinland Iron Mines Corporation (BIM) in 2012. An Aquatic Environment Monitoring Program (AEMP) Framework has been developed following submission of the FEIS. This field water and sediment sampling protocol supports the AEMP.

This document is intended to provide a detailed description of the baseline surface water and sediment quality field sampling methodologies that have been applied to date and that will be applied to the Project in the future.

The baseline sampling programs are conducted during the open-water season for streams and lakes in the Project area. Stream water quality is monitored during the spring, summer and fall, whereas, lake sampling takes places only during the summer and fall. Sediment sampling is done concurrently with the surface water sampling program during the fall campaign. The sampling methodologies within this protocol include details regarding:

- Equipment and sampling
- Field measurements and observations
- Quality assurance/quality control (QA/QC)
- Sample tracking (Chain of Custody) and shipping

2 – WATER QUALITY

2.1 GENERAL

Stream and lake water quality data were collected for the Mary River Project (the Project) by Knight Piésold Ltd. (KP) every year since 2005, with the exception of 2009 and 2010. Additional sampling was conducted by North/South Consultants Inc. (NSC) in 2007. The analytical suite of parameters included nutrients, total and dissolved metals, and major ions. A detailed list of water quality parameters is provided in Appendix A.

2.2 STREAM SAMPLING METHODOLOGY

2.2.1 Sampling Strategy

Consistent sampling methods have been applied throughout the stream water sampling programs. Stream samples are collected from flowing sections of the streams (unless otherwise noted) and are obtained by either wading into the stream or by collecting the sample from the bank. Samples are collected in an upstream direction, with bottles being placed beneath the surface (when possible) to reduce the amount of surface residue collected. Bottles with no acid preservative are rinsed three times before filling. For bottles where an acid preservative is required, the samples are transferred from a clean bottle into the bottle containing preservative.

2.2.2 Equipment and Sampling

The width of the stream at the sampling location is measured using range finders. If the stream is less than 5 metres (minimum distance for range finders), the width is estimated. Photos are taken upstream, downstream and across the sampling site.

The baseline water quality monitoring program includes as suite of analytical parameters (Appendix A). The laboratory typically provides nine sample bottles for these analyses (Table 2.1).

Table 2.1 Sample Bottle Summary

Sample Bottle Volume/Description	Analytical Parameter
1 L Amber glass	Chlorophyll *a*/Pheophytin
125 mL Plastic X 2	Total and Dissolved Metals
125 mL Plastic X 2 (pre-charged)	Nutrients
1 L Plastic	General/Routine
125 mL Amber glass X 2 (one pre-charged)	TOC, phenols, COD, etc.
250 mL Plastic	Chromium

The metals bottles require nitric acid preservative (blue label) that is provided in single dose vials by the laboratory (one vial per bottle). On occasion, the chromium sample bottle will not be provided pre-charged with preservative. In this case, a chromium preservative (green label) will be provided as required.

Prior to the addition of preservative, samples for dissolved metals and the other required parameters listed on the labels (e.g., dissolved organic carbon) are field filtered using Acrodisc® 32 mm Syringe Filters with 0.45 µm Supor® membrane filter. The syringes and filters are sealed in sterile packaging and should not be rinsed prior to use. The following steps outline the basic filtration technique that will be utilized:

- Attach the filter to the syringe prior to pulling the plunger out of the syringe (Note: pulling the plunger activates the filter media).
- Pull the plunger from the syringe, fill the syringe with sample water and then replace the plunger. Dispense the first 10 mL of water to the ground (not as sample).
- Filter the remaining sample directly into the appropriate container. Repeat the process until the sample bottle is full.
- Repeat the initial two steps if the water is particularly turbid and another filter is necessary prior to the sample bottle being full

2.2.3 Field Measurements and Observations

In-situ water quality measurements will be taken during the sample collection process, provided the multi-parameter probe (e.g., Quanta Hydrolab or YSI 600Q sonde) can be positioned downstream of the sample collection area. The following in-situ parameters are recorded (when available from the multi-parameter sonde):

- Water temperature (°C)
- Dissolved oxygen (mg/L and %)
- pH (pH units)
- Conductivity (µS/cm) and/or specific conductance (µS/cm^n) (both when possible)

Field observations around the sample area include:

- Description of the landscape (e.g., hilly, mountains, marsh, etc.)
- Vegetation
- Stream substrate (e.g., sand, cobble, boulder, bedrock)
- Stream flow description (e.g., strong-turbulent, slow-calm)
- Weather conditions
- Air temperature

All measurements and observations are recorded on the field record sheets included within Appendix B.

2.2.4 QA/QC

The QA/QC protocol aims to ensure the collection of reliable and accurate data. Using standard methods as outlined in this document provides control of sample collection, handling and shipping. While collection of duplicate samples ensures the laboratory results meet defined standards of quality, in addition to the internal laboratory QA/QC protocols required for analytical accreditation. Duplicate samples will be taken for 10 percent of the total number of samples. When possible, one field blank should be taken per sampling event.

2.2.5 Chain of Custody and Sample Shipment

An essential part of the QA/QC protocol is maintaining a record of the collected samples and the corresponding list of analytical parameters reported for those samples. A chain of custody (CoC) form will be completed digitally on the BIM environmental office laptop. An example of a completed CoC form is included as Appendix C. In order to start a new entry, the previous CoC should be opened and saved as a new file name beginning with the current sample date, followed by sample type (e.g., 13_07_24_COC_BWQ.pdf). The CoC is an editable pdf document that can be found using the following folder structure:

Mary River Project (\\10.20.1.253)(M:)
 Environment
  FINAL File System
   14.0 LABORATORY ANALYTICAL RESULTS
    2014 - Open last CoC and save as "YY_MM_DD_COC_BWQ.pdf"

The waybills for shipping coolers are provided by BIM in the environment office. One of the seasonal environmental staff or environmental coordinators will provide assistance in completing the required paperwork.

All coolers must have "this side up" arrows attached to either end of the cooler. These stickers are found on a roll in the BIM environment office. The laboratory shipping labels are also in the BIM environment office. Each cooler requires one laboratory shipping label affixed to the lid.

2.3 LAKE SAMPLING METHODOLOGY

2.3.1 Sampling Strategy

Consistent sampling methods have been applied throughout the lake water sampling programs. Wherever possible, water quality samples are collected from two isolated depths (approximately 1 m below surface and approximately 1 m above the bottom) at each of the lake water quality sites. Inflatable zodiac boats are used to access the lake sample locations and are anchored at the stations for the duration of the sampling and in-situ data collection. Some boat drift is inevitable due to wind and wave influence. The general procedures to be undertaken at each lake sampling station are detailed below.

2.3.2 Equipment and Sampling

The total depth of the water at each lake station is determined either using a portable fish finder, a weighted meter tape or the pressure sensor on the multi-parameter probe. The depth is recorded on the field record sheets. Windy conditions during sampling may result in variable depth measurements. The depth range, the estimated wind speed, and the estimated wind direction are always recorded.

The baseline water quality monitoring program includes a suite of analytes (Appendix A). As above (i.e., Table 2.1), the analytical laboratory typically provides nine sample bottles for these analyses.

A 2.2 L acrylic Kemmerer bottle with a graduated line is utilized to obtain water samples at the target depths. The Kemmerer bottle is set in the open position for sampling with the bottom sample valve in the closed position. The sampler is lowered to the desired depth and the messenger weight is released down the line to trigger the closing spring of the sampler. The Kemmerer bottle is retrieved and the retained water is discarded over the side of the boat.

Following this initial rinse, the Kemmerer bottle is deployed to the sample depth to obtain the analytical sample. Upon retrieval of the Kemmerer bottle, a small amount of water is purged out of the bottom sample valve. The remaining sample is discharged into the pre-labelled, laboratory sample containers (or into a field filter) via the sample valve. The remaining water is discarded over the side of the boat. This sampling process is then repeated for the next sample depth.

Bottles with no acid preservative are rinsed three times before filling. For bottles where acid preservative is required, samples are transferred from the Kemmerer bottle into the sample bottle containing preservative. Some samples will also require field filtration before adding preservatives. The filtration process is discussed in Section 2.2.2.

2.3.3 Field Measurements and Observations

Upon collection of the shallow and deep samples, in-situ lake profiling and secchi depths are completed at each sample station.

The profiling is undertaken using a measuring tape that is secured to a multi-parameter probe (e.g., Quanta Hydrolab or YSI 600Q sonde). The probe is lowered in 1 m increments and given time to stabilize prior to recording the in-situ parameters listed in Section 2.2.2.

Secchi depths are determined by attaching the measuring tape to the secchi disk and lowering the disk over the shaded side of the boat. Two depths are recorded: the depth at which the disk disappears while lowering the disk and the depth at which it reappears while raising the disk. The secchi depth is calculated from the average of these two depths and recorded on the field record sheets.

2.3.4 QA/QC

As with the stream samples, duplicate samples are to be taken for 10 percent of the total number of samples. When possible, one field blank per sampling event will be taken.

2.3.5 Chain of Custody and Sample Shipment

Information regarding the COC’s and sample shipping methods are discussed in Section 2.2.5.

2.4 METHODOLOGY ADJUSTMENTS OVER TIME

There have not been any changes to the sampling methods for streams and lakes between 2005 and 2013, unless specific circumstances required alternative methods. These exceptions would be very rare, and any changes to methodology would be recorded on field record sheets. Field record sheets used by KP were updated in 2013 and are included in Appendix B. NSC used their own field sheets.

Equipment used for field measurements and lake sample collection have varied over time, based on the equipment available at the time. For lake sampling, the following samplers have been used:

- Beta bottle
- Van Dorn sampler
- Kemmerer bottle

It was decided in 2012 that the Kemmerer bottle would be the only sampler used for future sampling events in order to maintain consistency.

3 – SEDIMENT QUALITY

3.1 GENERAL

Stream sediment quality data were collected for the Project by KP every year since 2005, with the exception of 2009 and 2010. Lake sediment quality data were collected for the Project every year since 2006, with the exception of 2009 and 2010. Parameters analysed included nutrients, metals, major ions and particle size. A detailed list of parameters is provided in Appendix A.

Sediment quality monitoring is typically conducted as part of the benthic invertebrate community surveys for mining projects. These sampling programs typically focus on total organic carbon content, metals and particle size distribution (EC, 2012). The purpose of sediment monitoring at these sites is to identify any habitat differences that may contribute to changes in the invertebrate community. As such, sediment samples will be collected concurrently with benthic invertebrate samples.

3.2 STREAM SEDIMENT SAMPLING METHODOLOGY

3.2.1 Sampling Strategy

Consistent sampling methods have been applied throughout the stream sediment sampling programs. Stream samples are collected from flowing sections of the streams (unless otherwise noted) and are obtained by wading into the stream. The sampling equipment and collection protocol is discussed in the following section.

3.2.2 Equipment and Sampling

Equipment used for stream sediment sampling includes the following:

- Stainless steel bowl
- Stainless steel spatula
- Stainless steel spoon
- 500 mL Polyethylene (PET) bottle with open ends
- Four 250 mL amber glass sample jars
- Zip-top or Whirl-pak sample bag for archived sample

Stream sediment samples are collected as near as possible to the water sample location. Wherever possible, sediment samples are collected from the wetted area of the stream at water depths between 10 cm and 40 cm. Prior to collecting the sediment samples, all of the sampling equipment is rinsed in the stream water to ensure that trace sediments do not transfer between sample stations. Samples are collected by wading downstream to upstream. Where possible, sediment is collected from the surface of the stream bed. Up to 10 sub-samples can be taken where sufficient fine sediments (particles < 2 mm diameter) are present.

The following procedure for sampling stream sediments is followed at each sub-sample location:

- Insert the open-ended PET bottle 5 cm to 10 cm into the bottom substrate
- Slide the stainless steel spatula under the bottom of the PET bottle to trap the sediments inside
- Slowly raise the spatula and PET bottle out of the stream
- Place the contents of the PET bottle into a stainless steel bowl for compositing

The stainless steel bowl and sample is allowed to settle once sufficient sample has been obtained to fill the sample containers. Any excess water that forms on the surface of the sample is either poured-off or siphoned-off using a sterile syringe. Care must be taken during this process not to lose any fines. The sample is homogenized using a stainless steel spoon. The composite sample is then created by removing any large inorganic material (e.g., cobble). The sample is transferred to laboratory provided sample jars. This transfer is completed by adding a spoonful of sample to each of the jars and repeating until all the jars they are all full. This approach provides more consistent results than what would be obtained if each jar was filled in turn. Surplus sample will be put into a labeled Zip-top or Whirl-pak bag. Samples should be kept cool and in the dark until they can be shipped to the laboratory.

The field record sheet will record the number of jars and/or sample bags obtained at each station. A note on the field record sheet should also indicate if insufficient sample is available at a station.

3.2.3 Field Measurements and Observations

Field observations made during sediment sampling include sample characteristics, such as:

- Substratum composition
- Colour
- Odour
- Vegetation presence

3.2.4 QA/QC

As with the water samples, duplicate sediment samples will be taken for 10 percent of the total number of samples.

3.2.5 Chain of Custody and Sample Shipment

The required COC's and sample shipping procedures are discussed in Section 2.2.5.

3.3 LAKE SEDIMENT SAMPLING METHODOLOGY

3.3.1 Sampling Strategy

Lake sediment samples have been collected using various methods as described in section 3.4. The methods defined below describe the collection of the lake sediment samples.

3.3.2 Equipment and Sampling

A sediment gravity core sampler (Figure 3.1) will be utilized to obtain lake sediment samples. The top two centimeters of sediment from the core samples will be retained for laboratory analysis.

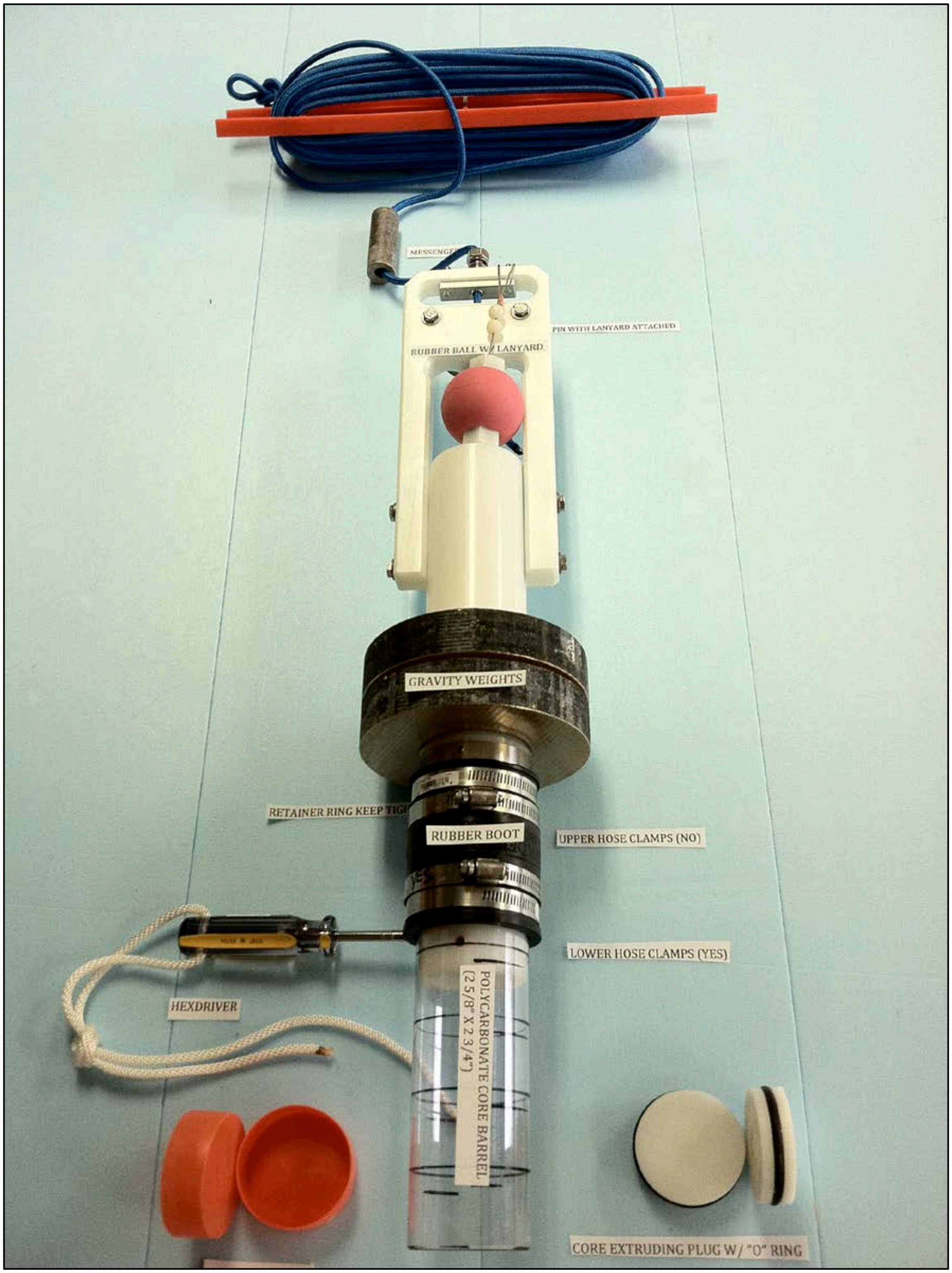

Figure 3.1 Sediment Gravity Core Sampler

3.3.3 Field Measurements and Observations

At each sampling site, the following information will be recorded during the collection of sediment samples.

- Site ID and UTM coordinates and location of any duplicate samples collected
- Sampling date and time
- Ambient weather conditions (e.g., wind speed, direction, wave action, current, air temperature)
- Sediment collection device
- General site description and observations (e.g., depth of water or ice)
- Sample properties (e.g., colour, texture, consistency, odour, presence of biota, estimate of quantity of recovered sediment)
- Deviations from standard operating procedures

Lake sediment samples will be collected using the sediment gravity corer and the following procedure.

- A clear polycarbonate core tube will be loaded into the corer and secured using a set of stainless steel hose clamps
- The corer (Figure 3.1) 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.
- 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.
- The corer will be retrieved vertically and at a constant speed to surface
- 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.
- Following placement of the core tube plugs, the hose clamps on the corer will be loosened to release the tube
- The visual characteristics of the core sample will be recorded on the field record sheets (e.g., colour, apparent horizons, aquatic vegetation, etc.)
- Overlying water within the tube will be described on field notes (e.g., clarity) prior to decanting. The decanting process should be undertaken carefully to ensure that no sediment sample is lost.

The sample is extruded out of the core tube and processed as follows:

- A suitable extruding apparatus, such as a PVC tube cut longer than core tube and with a slightly smaller outside diameter, will be used to force the extruding plug through the core tube. This process moves the sediment sample to the end. Care will be taken not to extrude the sediment, since the first two centimetres are the sample.
- The top two centimeters of sediment will be scooped out using a clean stainless steel spoon and placed in a clean stainless steel bowl
- A minimum of three core samples will be required per station. Limiting the amount of sampled sediment per tube (i.e., the top two centimeters) typically requires more sampling effort to obtain the required sample size.

- Samples within a station will be close to one another, but far enough apart to ensure that sampling disturbance from one grab does not affect another. Sampling from both sides of the boat and around the bow typically provides suitable spatial distribution within the station.
- 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 sampling is complete at that particular station
- The core tube will be rinsed at surface and reloaded into the sampler in preparation for the next sample.

3.3.4 Sediment Sample Homogenization

Once sufficient sediments have been collected within the stainless steel bowl, the sample will be homogenized. Prior to homogenization, excess water will be decanted once the water has settled (to prevent loss of fines) and any large inorganic material (e.g., cobble) or debris will be removed. Once this step is complete, the sample will be thoroughly mixed using a newly gloved hand or stainless steel spoon until the sample has a homogeneous appearance. The sample containers will be filled by alternating aliquots between each of the containers. Once the containers are full, each sample will be transferred to an ice-packed cooler. Samples will be kept cool and in the dark until they can be shipped to the analytical laboratory.

3.3.5 QA/QC

All sampling equipment will be thoroughly cleaned between sampling stations and rinsed with ambient water prior to sampling. Duplicate samples will be taken for ten percent of the total number of samples.

3.3.6 Chain of Custody and Sample Shipment

The COC's and sample shipping methods are discussed in Section 2.2.5.

3.4 METHODOLOGY ADJUSTMENTS OVER TIME

Sediment sampling conducted prior to 2012 utilized a Petite Ponar grab sampler (231 cm^2) or an Ekman dredge sampler (523 cm^2). The sediment fraction collected for analysis was limited to the top 5 cm.

During review of the FEIS, BIM agreed to a recommendation from Environment Canada to carry out sediment sampling utilizing core in order to collect only the uppermost one to two centimetres. The rationale for this approach is that most infaunal organisms and the most recently introduced sediment (including contaminants of concern) are found in the upper two centimetres of the lake sediment. Arctic lakes experience low sedimentation rates and, therefore, collection of a thinner sample using a sediment coring instrument provides better resolution of changes in sediment quality.

Collection of thinner (1 cm to 2 cm) sediment samples was implemented by Baffinland starting in 2012. The top 2 cm of sediment from the core samples as described above will be retained for laboratory analysis.

4 – REFERENCES

Environment Canada (EC). 2012. *Environmental Effects Monitoring Technical Guidance Document*. National Environmental Effects Monitoring Office.

APPENDIX A

2014 SURFACE WATER AND SEDIMENT QUALITY PARAMETER LIST

(Pages A-1 to A-3)

Details of Quotation

Baseline - Cr III and VI

ANALYTE	METHOD REFERENCE	MDL	UNITS
Cr(VI)	Cr(VI) water M US EPA	0.05	mg/L
Cr(III)	Cr(VI) water M US EPA	0	mg/L

Baseline - Sediment

ANALYTE	METHOD REFERENCE	MDL	UNITS
Ca	Metals soil FAA - AMSFAAE2 M SM3111B-3050B	100	ug/g
Mg	Metals soil FAA - AMSFAAE2 M SM3111B-3050B	100	ug/g
Na	Metals soil FAA - AMSFAAE2 M SM3111B-3050B	100	ug/g
K	Metals soil FAA - AMSFAAE2 M SM3111B-3050B	100	ug/g
Al	ICP-MS SOIL PE6100 EPA 200.8	5	ug/g
Ba	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Be	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Cd	ICP-MS SOIL PE6100 EPA 200.8	0.5	ug/g
Cr	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Co	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Cu	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Fe	ICP-MS SOIL PE6100 EPA 200.8	5	ug/g
Pb	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Mn	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Mo	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Ni	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Ag	ICP-MS SOIL PE6100 EPA 200.8	0.2	ug/g
Sr	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Tl	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
V	ICP-MS SOIL PE6100 EPA 200.8	2	ug/g
Zn	ICP-MS SOIL PE6100 EPA 200.8	2	ug/g
As	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Sb	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Se	ICP-MS SOIL PE6100 EPA 200.8	1	ug/g
Hg	Hydride - Soil M SM3114C-3500C	0.1	ug/g
Sand (>0.050mm)	Particle Size C Ag Particle	1	%
Silt (>0.002-0.050mm)	Particle Size C Ag Particle	1	%
Clay (<=0.002mm)	Particle Size C Ag Particle	1	%
Moisture	MOISTURE C SM2540B	0.1	%
Total Kjeldahl Nitrogen	TKN soil/solids - AMTKNHX8 C SM4500-Norg-B	0.01	%
TOC	Organic matter Ag Soil	0.01	%
N-NO2	SOIL - Extractable N C 33-3 Methods of So	1	ppm
N-NO3	SOIL - Extractable N C 33-3 Methods of So	1	ppm
NO2 + NO3 as N	NO2/NO3 SKALAR - AMNOXSE1 C SM4500-NO3-F	0.1	mg/L
Boron (hot water extract)	Boron - hot water EXT Boron HWE	0.5	ug/g

Baseline - SW Chem

ANALYTE	METHOD REFERENCE	MDL	UNITS

pH	pH in water : Auto - AMAPCAE1 C SM4500-H+B	1	
Conductivity	Conductivity : Auto - AMAPCAE1 C SM2510B	5	uS/cm
Alkalinity as CaCO3	Alkalinity : Auto - AMAPCAE1 SM 2320B	5	mg/L
TDS (COND - CALC)	solids in water - AMSOLWE1 C SM2540	5	mg/L
Turbidity	Turbidity - AMTURBE1 C SM2130B	0.1	NTU
Phenols	Phenols 4-AAP - AMPHACE1 C SM5530D	0.001	mg/L
N-NH3	NH3 water low - AMNH3LE1 C SM4500-NH3D	0.02	mg/L
SO4	Anions by IC - DX-100 SM 4110C	3	mg/L
Cl	Anions by IC - DX-100 SM 4110C	1	mg/L
Br	Anions by IC - DX-100 SM 4110C	0.05	mg/L
N-NO2	Low NO2 - Technicon C SM4500-NO2-B	0.005	mg/L
N-NO3	NO2/NO3 SKALAR - AMNOXSE1 C SM4500-NO3-F	0.1	mg/L
NO2 + NO3 as N	NO2/NO3 SKALAR - AMNOXSE1 C SM4500-NO3-F	0.1	mg/L
TOC	TOC in water - AMDTOCE1 C SM5310C	0.5	mg/L
DOC	TOC in water - AMDTOCE1 C SM5310C	0.5	mg/L
Total Suspended Solids	solids in water - AMSOLWE1 C SM2540	2	mg/L
Total P	Low Total P C SM4500-PF	0.003	mg/L
Total Kjeldahl Nitrogen	TKN low water - AMTKNLE1 C SM4500-Norg-C	0.1	mg/L

Baseline Chlorophyll-Pheo

ANALYTE	METHOD REFERENCE	MDL	UNITS
Chlorophyll-a	Chlorophyll C SM10200H	0.2	mg/m3
Pheophytin-a	Chlorophyll C SM10200H	0.2	mg/m3

Baseline Dissolved Metals

ANALYTE	METHOD REFERENCE	MDL	UNITS
Ca	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Mg	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	100	ug/L
Na	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
K	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Al	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	3	ug/L
Sb	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
As	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Ba	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Be	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Bi	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
B	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	10	ug/L
Cd	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
Cr	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Co	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Cu	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Fe	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	30	ug/L
Pb	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Li	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	5	ug/L
Mn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Mo	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Ni	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Se	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	1	ug/L

Si	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Ag	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
Sr	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Tl	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Sn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Ti	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	10	ug/L
U	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
V	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	1	ug/L
Zn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	3	ug/L
Hardness as CaCO3	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	500	ug/L
Hg	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L

Baseline Total Metals

ANALYTE	METHOD REFERENCE	MDL	UNITS
Ca	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Mg	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	100	ug/L
Na	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
K	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Al	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	3	ug/L
Sb	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
As	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Ba	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Be	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Bi	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
B	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	10	ug/L
Cd	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
Cr	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Co	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Cu	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Fe	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	30	ug/L
Pb	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Li	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	5	ug/L
Mn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Mo	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.05	ug/L
Ni	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.5	ug/L
Se	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	1	ug/L
Si	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	50	ug/L
Ag	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
Sr	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Tl	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Sn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.1	ug/L
Ti	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	10	ug/L
U	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L
V	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	1	ug/L
Zn	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	3	ug/L
Hardness as CaCO3	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	500	ug/L
Hg	ALS Low Level ICP-MS TOTAL Met ALS-OUTSIDE	0.01	ug/L

APPENDIX B

FIELD RECORD SHEET

(Page B-1)

SURFACE WATER QUALITY SAMPLING FIELD FORM

Knight Piésold
CONSULTING

PROJECT NO.: ______________________ *(i.e. NB102-102/10)*

SITE: ______________________ *(i.e. BISSETT CREEK)* **DATE:** ______________________ *(i.e.12MAR2013)*

STATION ID: ______________________ *(i.e. SW12-01)* **STAFF:** ______________________ *(i.e. SMR / DKK)*

SITE CONDITIONS

Air Temperature ____________ ºC **Wind** ____________ *(direction, speed)* **Weather** ____________ *(clear, o'cast, rain, etc.)*

SAMPLE DESCRIPTION/OBSERVATIONS

Sample ID: ______________________ *(i.e. SW12-01)* **UTM mE** ______________________ *(i.e. 558407)*

Sample Date / Time: ______________________ *(i.e.12MAR2013/14:35)* **UTM mN** ______________________ *(i.e. 7914885)*

No. of bottles ______________________ **Zone / Datum** ______________________ *(i.e. 17T / NAD83)*

Quote No. ______________________ **Accuracy** ______________________ *(± m)*

WATER BODY TYPE: ☐ Lake ☐ Pond ☐ Wetland ☐ Stream

FLOW: ☐ Stagnant ☐ Low ☐ Moderate ☐ High

ODOUR: ☐ None ☐ Describe: ______________________ *(i.e. mineral, organic)*

COLOUR: ☐ None ☐ Describe: ______________________ *(i.e. light tea, brown, black)*

TRANSPARENCY: ☐ Clear ☐ Translucent ☐ Opaque

SAMPLES FILTERED: ☐ None ☐ Yes, analytes incl.: ______________________

IN-SITU WQ DATA

Water Temperature: ____________ ºC **pH:** ____________ pH **WQ INSTRUMENT:** *(i.e. Hanna/HI 98129, YSI 600QS)*

Conductivity: ____________ µS/cm **Secchi:** ____________ m ______________________

Dissolved Oxygen: ____________ % ______ **:** ____________ Calibrated (Date / Time):

Dissolved Oxygen: ____________ mg/L ______ **:** ____________ ______________________

Calibration Check (Date / Time):

PHOTOS: ☐ Upstream/Downstream ☐ None taken ______________________

QA/QC INFORMATION

Duplicate Collected: ☐ No ☐ Yes, ID: ______________________ *(i.e. SW12-01-DUP)*

Field Blank Collected: ☐ No ☐ Yes, ID: ______________________ *(i.e. SW12-01-FB)*

SITE SKETCH: *(i.e. stream, flow direction, road, culvert, north arrow, beaver dams, sample location, etc.)*

NOTES: *(i.e. additional WQ instrument calibration notes, water body name, photo notes, changes in site since last visit)*

APPENDIX C

EXAMPLE CHAIN OF CUSTODY

(Page C-1)

CHAIN OF CUSTODY RECORD

ACCUTEST LABORATORIES LTD.

☑ 146 Colonnade Rd., Unit 8
Ottawa, ON K2E 7Y1
Ph: (613) 727-5692 Fax: (613) 727-5222

☐ 608 Norris Court
Kingston, ON K7P 2R9
Ph: (613) 634-9307 Fax: (613) 634-9308

LABORATORY USE ONLY
Report #: ________________

Company Name: Baffinland Iron Mines Corporation
Address: Mary River
Report Attention: Mr. Jim Millard/Allan Knight/Trevor Myers
City/Prov: via Iqaluit, NU
Postal Code:
Phone: 647-693-9447
Ext
Project #
* Quotation # Baseline Water Quality
* Waterworks Name:
* Waterworks Number:

☐ Fax Results to: ________________
☑ E-mail Results to: Millard/Myers/Knight/mrsite.sd
☑ Copy of Results to: salldred@knightpiesold.com

Note that for drinking water samples, all exceedances will be reported where applicable legislation requires.

Invoice to:
(if different from above)
____
____

SAMPLE ANALYSIS REQUIRED

⇦ Indicate: F=Filtered or P=Preserved

Sample ID	*** Date/Time Collected**	**Sample Matrix** i.e. Water, Soil, Paint	*** Sample Type** (see "Codes" below)	*** MOE Reportable?** Y = Yes N = No	**# of Containers**	**** Service Required** R=Rush S=Standard	Baseline Water Quality - Dissolved Metals Field Filtered								**Criteria Required** (i.e. Reg.170, Reg.153, CCME, PWQO etc.)	**Laboratory Identification**
BL0-05-B4	July 24, 2013, 14:35	Water	-	N	9	S	✔									
C0-01	July 24, 2013, 15:20	Water	-	N	9	S	✔									
C0-01-DUP	July 24, 2013, 15:25	Water	-	N	9	S	✔									
C0-10	July 24, 2013, 16:20	Water	-	N	9	S	✔									
C0-10-FB	July 24, 2013, 16:25	Water	-	N	9	S	✔									
E0-20	July 24, 2013, 17:10	Water	-	N	9	S	✔									
E0-21	July 24, 2013, 17:50	Water	-	N	9	S	✔									

Sample Type Codes for Drinking Water Systems: **RW** = Raw Water, **RWFC** = Raw Water For Consumption, **TW** = Treated Water at point of entry to distribution, **DW** = Distribution/Plumbing Water
"MOE Reportable" refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer.

Sampled By: Shannon Alldred
Date/Time: July 24, 2013 19:00
Relinquished By: Allan Knight
Date/Time: July 25, 2013 08:00
Work Authorized By (signature):
Date/Time:
Received By Lab:
Date/Time:

Comments
CN AWB
518-64071313

Cooler Temp (°C) on Receipt

*** Indicates a required field.** If not complete, analysis will proceed only on verification of missing information. A quotation number is required, if one was provided.
**** There may surcharges applied to "Rush" service.** Please check with lab prior to submission of samples for rush analysis to confirm availability and pricing.

Page _____ of ______

AFCOCR.1

Copies: White – Sampler, Yellow – Laboratory, Pink – With Report
Please print and submit, to the laboratory, 2 copies of this form with your samples.