



Water Resources
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

May 25, 2016

Ida Porter
Licence Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0A 1J0

Your file - Votre référence
2AM-MRY1325

Our file - Notre référence
CIDM#1068332

**Re: 2AM-MRY1325 – Mary River Project – Baffinland Iron Mines Corporation –
Aquatic Effects Monitoring Plan**

Dear Ms. Porter,

Thank you for your April 25, 2016 invitation for written submissions on the above referenced Aquatic Effects Monitoring Plan (AEMP).

Indigenous and Northern Affairs Canada (INAC) has conducted a technical review of the AEMP submitted by Baffinland Iron Mines Corporation and the results of our review are presented in the attached memorandum for the Nunavut Water Board's consideration.

Comments have been provided pursuant to INAC's mandated responsibilities for the enforcement of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

INAC appreciates the opportunity to participate in this review. If there are any questions or concerns, please contact me at (867) 975-3876 or by e-mail at sarah.forte@aandc-aadnc.gc.ca.

Sincerely,

Sarah Forté
Water Management Coordinator

cc. Scott Burgess, David Abernethy, Erik Allain, INAC

Technical Review Memorandum

To: Ida Porter, Licence Administrator, Nunavut Water Board

From: Sarah Forté, Water Management Coordinator, Water Resources Division, INAC

Date: May 25, 2016

Re: Review of Baffinland Iron Mines Corporation's Aquatic Effects Monitoring Plan for Type A Water Licence #2AM-MRY1325

Applicant: Baffinland Iron Mines Corporation
Project: Mary River Project
Region: Qikiqtani

A. BACKGROUND

On April 25, 2016, the Nunavut Water Board (NWB or Board) provided notification of Baffinland Iron Mines Corporation's (the licensee or Baffinland) submission of an updated Aquatic Effects Monitoring Plan (AEMP) (BAF-PH1-830-P16-0039 Rev 2), dated April 2016.

The AEMP is a monitoring plan for the Mary River Project designed to:

- Detect short-term and long-term effects of the Project's activities on the aquatic environment resulting from the Project.
- Evaluate the accuracy of impact predictions.
- Assess the effectiveness of planned mitigation measures.
- Identify additional mitigation measures to avert or reduce environmental effects.

The NWB requested interested parties review the plan and make representations by May 25, 2016.

B. RESULTS OF REVIEW

Indigenous and Northern Affairs Canada (INAC) has reviewed version 2 of the AEMP and is encouraged to see the integration of newly collected water and sediment quality data into the document. The Department has some concerns with a few of the proposed changes to the Core Receiving Environment Monitoring Plan (CREMP), which is a component of the AEMP, as well as for the AEMP sediment quality benchmarks and the sampling protocol for dissolved metal water samples.

1. Reducing number of CREMP lake water quality monitoring stations

Reference:

- Baffinland cover letter Re: Revised Aquatic Effects Monitoring Plan - Mary River Project Type A Water Licence 2AM-MRY1325 (Amendment No. 1), , April 11, 2016, Attachment A: Mary River Project CREMP Recommendations for Future Monitoring, produced by Minnow Environmental Inc.
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 2), April 8, 2016, Section 4.2.2

Comment:

The revised AEMP, following recommendation #7 from Minnow Environmental, proposes to reduce the number of water quality monitoring stations on the mine area lakes according to the following table:

Lake	Number of stations	
	AEMP R1	AEMP R2
Camp	5	3
Sheardown NW	6	3
Sheardown SE	5	3
Mary	11	4

Two reasons are given as justification:

- 1) *No consistent spatial differences in water chemistry were evident in any of the mine-exposed or reference lakes in 2015, nor during any of the baseline studies; and*
- 2) *In-situ water quality profile data collected in 2015 indicates that all lakes are generally well mixed both laterally and vertically.*

The Department is of the opinion that reducing the number of sampling stations at this stage may be premature. INAC notes that though the mine was in operation in 2015, it was not at the fully planned Early Revenue Phase operating capacity. The third crusher was not operating until the end of 2015 so its impact would not have been measurable in the 2015 data.

Additionally, though the data indicate the lakes are well mixed, to our knowledge, the lake replenishment rates have not been discussed and therefore the impacts of a future point source are uncertain. It would be relevant to keep the initially determined number of water quality monitoring stations to help detect possible future point sources.

Recommendation:

INAC recommends that the number of water quality monitoring stations for Camp, Sheardown NW, Sheardown SE and Mary lakes be maintained.

2. Collecting CREMP lake water samples from mid-water column**Reference:**

- Baffinland cover letter Re: Revised Aquatic Effects Monitoring Plan - Mary River Project Type A Water Licence 2AM-MRY1325 (Amendment No. 1), , April 11, 2016, Attachment A: Mary River Project CREMP Recommendations for Future Monitoring, produced by Minnow Environmental Inc.
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 2), April 8, 2016, Section 4.2.2 & Appendix B (Water and Sediment Quality review and CREMP Study Design NB102-181/33-1 r3)
- Baffinland Final Environmental Impact Statement, Appendix 7B, Surface Water and Sediment Quality Baseline report (NB102-181/30-5), December 22, 2011, Section 3.2

Comment:

The revised plan proposes to *“Collect a single water quality sample at mid-depth instead of collecting two samples, surface and bottom, at each lake water quality monitoring station”* (Minnow Environmental recommendation #9). The justification given is that *“Water chemistry data collected during the 2015 CREMP, as well as during baseline studies, has generally shown only minor (i.e., <2-fold higher) differences in water chemistry and chlorophyll a concentrations between the surface and bottom at each station.”* A note in the Minnow Environmental recommendation is made that if the lakes are determined to be stratified based on *in-situ* water quality profile data, two samples (top & bottom) would be taken. This does not appear in the main text of the AEMP R2 but is found in Appendix A of Appendix B.

The Final Environmental Impact Statement discussion states that *in-situ* water quality depth profiles indicated the lakes were thermally stratified in summer 2011 and not in fall 2011. Therefore, though not permanent, lake stratification does occur and the Department is of the opinion that it would be prudent to continue sampling with the top-bottom approach rather than using an average mid-water column sample.

Recommendation:

INAC recommends that continuing lake water quality sampling at two depths (1 m below surface and 1 m above bottom) rather than at a single depth (mid-water column).

3. Discontinuation of CREMP stream sediment quality monitoring

Reference:

- Baffinland cover letter Re: Revised Aquatic Effects Monitoring Plan - Mary River Project Type A Water Licence 2AM-MRY1325 (Amendment No. 1), , April 11, 2016, Attachment A: Mary River Project CREMP Recommendations for Future Monitoring, produced by Minnow Environmental Inc.
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 2), April 8, 2016, Section 4.2.3

Comment:

The revised plan proposes to discontinue stream sediment quality monitoring (Minnow Environmental recommendation #10) because the streams and rivers in the study area “*contain very limited depositional habitat suitable for the collection of fine sediments.*” Two streams in the area are expected to experience flow reductions; Camp Lake Tributary 2 (CLT-2), during the full scale project, and Sheardown Lake Tributary 1 (SDLT-1), due to diversions associated with West Pond and the open pit. It is not clear if these flow reductions would be such that suitable depositional habitat may be created.

Recommendation:

INAC recommends that Baffinland discuss whether depositional habitats may be created by flow reductions on streams CLT-2 and SDLT-1, and if so, confirm these would be sampled.

4. AEMP sediment quality benchmarks

Reference:

- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 2), April 8, 2016, Section 5.3.3.3
- 2015 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report, March 2016, appendix E.10.1 2015 Core Receiving Environment Monitoring Plan
- Baffinland cover letter Re: Revised Aquatic Effects Monitoring Plan - Mary River Project Type A Water Licence 2AM-MRY1325 (Amendment No. 1), , April 11, 2016, Attachment A: Mary River Project CREMP Recommendations for Future Monitoring, produced by Minnow Environmental Inc.

Comment:

The sediment quality benchmarks developed for Sheardown Lake NW are interim due to confounding factors in the collected data. Further study was recommended for 2015. It is not clear whether the data presented in the 2015 annual report meets this recommendation and the information has not yet been integrated, or if there is still work to do.

Recommendation #14 by Minnow Environmental is to consider updating the AEMP sediment quality benchmarks because “*On average, arsenic, copper and iron concentrations were elevated above respective AEMP sediment quality benchmarks within Reference Lake 3 littoral and/or profundal station sediment during the 2015*

CREMP.” Given that to date, sediment quality benchmarks have been developed on a lake by lake basis, using data from Reference Lake 3 to modify existing benchmarks in mine site lakes appears as a change in methodology. The Department notes that it did not find reference to this recommendation in the AEMP document.

Recommendation:

INAC recommends that Baffinland:

- 1) Provide an update on work done to remove the interim status of the Sheardown NW quality benchmarks; and
- 2) Clarify if and how they would modify previously developed sediment quality benchmarks for mine site lakes.

5. Water sample filtration for metal analyses

Reference:

- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 2), April 8, 2016, Appendix B (Water and Sediment Quality review and CREMP Study Design NB102-181/33-1 r3)

Comment:

Field sampling protocols for water sampling are presented in Appendix B which includes several appendices itself. The protocol for filtering water samples for dissolved metal analyses does not appear consistent between the appendices.

Section 2.2.2 of Appendix A (Water and Sediment Quality Sampling Protocol R1) states: *“Prior to the addition of preservative, samples for dissolved metals are field filtered using Acrodisc® 32 mm Syringe Filters with 0.45 µm Supor® membrane filter.”*

Section 4.3.1 of Appendix B (Sampling Program – Quality Assurance and Quality Control Plan BAF-PH16-001 R1) states: *“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.”*

Recommendation:

INAC recommends that the water sample filtration protocol for dissolved metal analyses be consistent, and that if samples are filtered at the laboratory instead of in the field, it be clearly indicated in the notes. Ideally, filtration should always occur in the same place to ensure results are as comparable as possible.