Indigenous and Northern Affairs Canada
Affaires autochtones et du Nord Canada

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

Your file - Votre référence
2AM-MRY1325

January 4, 2016

Our file - Notre référence
CIDM#1011769

Licensing Department
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0A 1J0

Re: 2AM-MRY1325 – Mary River Project – Baffinland Iron Mines Corporation – Interim Closure and Reclamation Plan

Thank you for Ms. Beaulieu's November 15, 2015 invitation for written representations on the above referenced Interim Closure and Reclamation Plan.

Indigenous and Northern Affairs Canada (INAC) has conducted a technical review of the Plan 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 AANDC'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, Manager, Mary River Project Team, AANDC
Erik Allain, Manager of Field Operations, AANDC

Canada

Technical Review Memorandum

To: Licensing Department, Nunavut Water Board

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

Date: January 4, 2016

Re: Review of Baffinland Iron Mines Corporation's Interim Closure and Reclamation Plan for Type A Water Licence #2AM-MRY1325

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

A. BACKGROUND

On November 15, 2015, the Nunavut Water Board (NWB or Board) provided notification of Baffinland Iron Mines Corporation's (the "Licensee" or Baffinland) submission of an updated Interim Closure and Reclamation Plan (ICRP) (BAF-PH1-830-P16-0012 Rev 4).

The ICRP outlines the closure goal, principles, objectives, criteria and activities associated with the final closure and reclamation of the Mary River Project. The NWB requested interested parties to review and make representations by January 4, 2016.

B. RESULTS OF REVIEW

Indigenous and Northern Affairs Canada (INAC) notes that none of the seven comments it made on the previous version of this plan (Rev 3) in its June 26, 2015 Technical Review Memorandum have been addressed. This is particularly disappointing because one of the comments (2.2.7) was from an earlier Memorandum, submitted September 15, 2014. We are attaching the June 26, 2015 submission as annex A. Comments 2.2.1 to 2.2.7 of the document form the first seven comments for Rev 4 of the ICRP as they remain relevant.

1. 2.2.1 of annex A - Long-term mine closure activity timeline
2. 2.2.2 of annex A - Accelerated open pit filling
3. 2.2.3 of annex A - Mary River option for accelerated pit filling
4. 2.2.4 of annex A - Aesthetic closure objective
5. 2.2.5 of annex A - Waste rock stockpile cover thickness
6. 2.2.6 of annex A - Timing of post-closure Surveillance Network Program (SNP) Monitoring

7. 2.2.7 of annex A - Ultimate Project closure and reclamation cost

8. Railway construction

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 4), October 30, 2015, Section 2

Comment:

In the projected Project lifecycle, the railway construction phase is "*up to five years beginning in 2015"*.

This is inconsistent with the submitted work plans which do not include railway construction and should be updated.

9. Closure activities planned for landfarm

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 4), October 30, 2015, Table 6-1 and Sections 9.10 and 10.2

Comment:

The final closure activities for permanent closure of the landfarm in Table 6-1 are as follows:

Year 0:	*Site audit*
Years 1 & 2:	*Routine inspection of facilities*
Year 3:	*Application of cover material (if required) and rehabilitation (re-grading and scarification) of all surfaces*

This is inconsistent the text description in Section 9.10 which states hydrocarbon impacted soil will be remediated on site in the landfarms or removed offsite. The schedule in Section 10.2 also lists treatment of contaminated soil in landfarms rather than routine inspections.

Recommendation:

INAC recommends that the Table 6-1 be modified to reflect activities planned at the landfarms.

10. Closure activities planned for site wide railway

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 4), October 30, 2015, Table 6-1 and Sections 9 and 10.1

Comment:

The final closure activities in Table 6-1 for permanent closure of the site wide railway include activities for year 0, year TBD, year TBD +1, year TBD +2, year TBD +3. If year 0 is not counted, this comprises four years of activities. In the executive summary, as

well as in Sections 9 and 10.1 of the document, closure activities are described as achievable and scheduled over three years.

Recommendation:
INAC recommends that the licensee clarify if railway reclamation activities will extend a year beyond all the other reclamation activities.

Annex A

Aboriginal Affairs and Northern Development Canada's June 2015 Technical Memorandum regarding the Aquatic Effects Monitoring Plan and Interim Closure and Reclamation Plan

Technical Review Memorandum

Date: June 26, 2015

To: Robin Ikkutisluk – Licence Administrator Assistant, Nunavut Water Board

From: Sarah Forté – Water Management Coordinator, AANDC

Subject: Review of Baffinland Iron Mine Corporation's Aquatic Effects Monitoring Plan and Interim Closure and Reclamation Plan for the Type A Water Licence 2AM-MRY1325

1.0 Background

Baffinland Iron Mines Corporation (Baffinland) submitted to the Nunavut Water Board (the Board or NWB) an Annual Report in March 2015. As required under Part B, Item 18 of the Type A water licence 2AM-MRY1325 (the licence), revisions to the Plans referred to in the licence as required by changes in operation and /or technology were included in the form of an Addendum to the Annual Report.

The Aquatic Effects Monitoring Plan (AEMP) and the Interim Closure and Reclamation Plan (ICRP) were submitted by Baffinland as addenda to the Annual Report. The NWB requested interested parties to review and make representations by June 26, 2014.

The AEMP is a monitoring program 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 ICRP outlines the closure goal, principles, objectives, criteria and activities associated with the final closure and reclamation of the Project.

2.0 Results of Review

2.1 Aquatic Effects Monitoring Plan

The Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 0) submitted by Baffinland is the same as was submitted in June 2014. In October 2014, the Board requested comments from interested parties and in November 2014 both Aboriginal Affairs and Northern Development Canada (AANDC) and Environment Canada

submitted comments. These comments have not been addressed as the Plan has not been modified.

In a letter to the Water Board dated February 6, 2015, Baffinland committed to update and revise several plans including the AEMP within 60 days of issuance of an amended Type A licence.

AANDC believes that the comments submitted in November 2014 are still relevant and our previous technical review memorandum is included as Appendix A. Since this AEMP was submitted before commencing operations of the Early Revenue Phase following the issuance of Water Licence 8BC-MRY1416, it is independent of the Type A licence amendment process.

AANDC therefore recommends the Board withhold its approval of the plan until the comments submitted have been addressed. It is understood that further modifications to the plan would be necessary following an amendment of the Type A licence and AANDC requests an opportunity to review the modified plan when submitted.

Some additional comments are presented below.

2.1.1 Data evaluation methods for biota populations

Reference:

- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 0), June 27, 2014, Section 5.4
- Appendix A – Draft Environmental Effects Monitoring Program (EEM) Cycle One Study Design, June 2014, Sections 3.4.3, 3.5.2

Comment:

In Table 5.5 the statistical tests proposed for comparing effect indicators are ANOVA and ANCOVA. These tests assume a normally distributed sample population. In the arctic char measured during the baseline study, fork length and round weight were not normally distributed as illustrated in Figure E.1 and described in Table E.2 of the Draft EEM. The inappropriateness of this test is mentioned in Section 3.5.2 of the Draft EEM: "*An ANOVA model will be used ….. provided the populations are normally distributed, of equal variance and independent of one another.*"

No alternate models are proposed for use when the populations are not normally distributed and the ANOVA model has already been applied in such cases, for example in table E.2.

Recommendation:

AANDC recommends that: a) the AEMP and EEM only use ANOVA tests to compare fish or biota populations when they are normally distributed and b) the documents propose alternate tests for non-normal distributions.

2.1.2 Fish usability

Reference:

Appendix A – Draft Environmental Effects Monitoring Program (EEM) Cycle One Study Design, June 2014, Section 3.4.5

Comment:

A concentration is referred to in order to justify not proposing a fish usability study. The parameter with a concentration below 0.01 µg/L is not specified.

Recommendation:

AANDC requests that the AEMP specify the parameter used to justify not proposing a fish usability study.

2.2 Interim Closure and Reclamation Plan

The Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3) was reviewed but the plans and documents it refers to were not. Comments are presented below and AANDC expects to have further comments during the Annual Security Review process.

Three referencing errors were noticed in the document, on pages 68, 96 and 125.

2.2.1 Long-term mine closure activity timeline

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Section 8

Comment:

Baffinland details activities associated with long-term temporary mine closure, such as the removal from site of hazardous waste and explosives. These activities would take place if the Project ceases operation for a period greater than a year, but no timeline has been proposed. This contrasts with the final mine closure and reclamation activities for which a three year schedule is proposed in table 6-1.

Recommendation:

AANDC recommends that the ICRP set timelines for long-term mine closure activities.

2.2.2 Accelerated open pit filling

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Sections 9.2 and 11.3

Comment:

Baffinland states they anticipate the open pit will take an estimated 85 to 150 years to passively fill with water from natural sources. They also state they expect closure to take three years with post-closure monitoring to be required over a five year period.

One of the pit closure objectives is that "*Surface runoff and seepage water quality is safe for humans and wildlife*." It will not be possible to determine the pit lake water quality and its influence on surface runoff and seepage water until the pit has filled and equilibrated. Without accelerated pit filling, closure for the pit would take much longer than the three years planned.

Recommendation:
AANDC recommends that the ICRP include either or both:

- accelerated open pit filling as a planned activity rather than a potential one;
- a modified mine closure and post-closure monitoring timeline to reflect the lengthy period before pit closure.

2.2.3 Mary River option for accelerated pit filling

Reference:

- Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Section 9.2.1
- Drawing H337697-4210-07-012-0001 Preliminary Mine Closure and Reclamation Plan – Mine Site Construction Phase
- Drawing H337697-4210-07-012-0002 Preliminary Mine Closure and Reclamation Plan – Mine Site Final Closure Phase
- Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039 Rev 0), June 27, 2014, Figure 3.2
- Final Environmental Impact Statement - Appendix 7A - Hydrology Baseline Report, January 4, 2012, Table 6.1

Comment:
The preferred option pit filling alternative is the Mary River, at MR-12, the east pond discharge location. This location is not identified on either Mine Site drawing and though it is understood that the discharge location is not yet precisely determined since neither the waste rock stockpile nor its east pond have yet been built. Figure 3.2 from the Aquatic Effects Monitoring Plan has a SNP seasonal discharge station labelled MS-09 described as "waste rock stockpile east pond stormwater".

It is not clear where MR-12 is located. If it is located near MS-09 or next to the east pond, it is on a tributary to the Mary River rather than on the main branch. The hydrology monitoring station H7 was on this tributary and the four years of recorded data have much smaller flows than the 78 million cubic meters annual total flow volume for MR-12.

The annual total flow volume measured at nearby hydrology monitoring station H6, which is on the Mary River more closely resembles the flow presented in the ICRP. Yet the predicted 10-year dry flow at this station is much lower than for MR-12.

The Department of Fisheries and Oceans' (DFO) "Framework for Assessing the Ecological Flow Requirements to Support Fisheries" states that:

Cumulative flow alterations <10% in amplitude of the actual (instantaneous) flow in the river relative to a "natural flow regime" have a low probability of detectable impacts to ecosystems that support commercial, recreational or Aboriginal fisheries. Such projects can be assessed with "desktop" methodologies.

Periodic pumping from the Mary River at a rate of 8700 m^3 of water per hour over 4 months is proposed, which is approximately to the total yearly volume withdrawal proposed (25 000 000 m^3) divided by the number of hours in 4 months. It does not seem to take into account the variability of flows between months and the need for instantaneous flow alterations in the river to be less than 10% in amplitude.

Recommendation:
AANDC recommends that: a) the position of potential water withdrawal location MR-12 be located on a map or figure and b) the hydrological data used to determine permissible annual water take be identified and presented.

AANDC recommends that Baffinland begin collecting data at the location where they plan to withdraw water since the Framework for Assessing the Ecological Flow Requirements recommends a minimum of 20 years of river flow data to establish the "natural flow regime". This data will be critical in accurately evaluating the 10-year dry flow.

AANDC also recommends that the ICRP incorporate a pit filling scenario that is respectful of DFO guidelines.

2.2.4 Aesthetic closure objective

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Table 6-1 and section 9

Comment:
In Table 6-1 a closure objective included for site wide for Milne Port, Tote Road, Mine Site, Railway, and Steensby Port is the following:

Landscape features (shape and vegetation) match aesthetics of the surrounding natural area.

All other closure objectives in Table 6-1 are echoed in section 9 in the appropriate sub-sections, however the aesthetic objective is not referred to.

Recommendation:
AANDC recommends that the ICRP clarify which of the final mine closure and reclamation measures the aesthetic objective will be applied to.

2.2.5 Waste rock stockpile cover thickness

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Section 9.11

Comment:

The minimum thickness of the cover for the waste rock stockpile is not defined. The first paragraph of section 9.1 specifies the maximum thickness, stating:

> *Mine planning will ensure that at closure the exterior of the dump consists of a layer of non-PAG (potential acid generating) material up to 50 m thick.*

The following paragraph states that the "*surficial "active" zone, … , will not reach the 50 m thickness of non-PAG material in the long-term …*" as if the cover thickness is determined at 50 m.

Recommendation:

AANDC recommends that the ICRP define the minimum waste rock stockpile cover thickness.

2.2.6 Timing of post-closure Surveillance Network Program (SNP) Monitoring

Reference:

Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Section 11.3.1.1

Comment:

Baffinland expects sampling of revised and approved SNP locations to occur once a year, during a low flow period at the end of summer and to focus on surface water quality monitoring.

Sampling during low flow is a good time for recording high concentrations for certain criteria. However other criteria, such as total suspended solids, would be higher during the high flow conditions of freshet.

Appropriate sampling periods could be discussed when revising the Surveillance Network Program.

2.2.7 Ultimate Project closure and reclamation cost

Reference:

- Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 3), March 19, 2015, Sections 13.1.1 and 13.1.2.1
- Preliminary Mine Closure and Reclamation Plan (H33769-0000-07-126-0014 Rev D), February 2012, Table 12-1
- Interim Abandonment and Reclamation Plan (H349000-1000-07-126-0012 Rev 0), June 7, 2013, Table 12-1

- Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012 Rev 2), June 27, 2014, Table 12-1
- Final Environmental Impact Statement (FEIS) Closure and Reclamation – Financial Security Estimate Addendum (H349001-0000-07-220-0001 Rev 0), March 25, 2015, Table 4-1

Comment:
This comment is the same as was made in AANDC's Technical Review Memorandum submitted September 15, 2014.

The financial cost of final closure and reclamation is identical to that provided in the Preliminary Mine Closure and Reclamation Plan (February 2012), Interim Abandonment and Reclamation Plan (June 2013) and Interim Mine Closure and Reclamation Plan (June 2014). This means that the estimate provided for final closure cost ($518 711 208) does not include changes related to the Early Revenue Phase.

Baffinland has developed a financial security estimate addendum to incorporate the changes but have not modified the ICRP to present the amended final closure cost of $526 526 287.

Recommendation:
AANDC recommends that the ICRP present a final closure cost which includes all components of the Mary River Project including the additional infrastructure necessary for the Early Revenue Phase.