Indigenous and Northern Affairs Canada
Affaires autochtones et du Nord Canada

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

your file
2AM-MRY1325/PART G

April 11, 2018

Our file
CIDM #1216162

Assol Kubeisinova
Technical Advisor
Nunavut Water Board
P.O. Box 119
GJOA HAVEN, NU X0A 1J0

Re: Mary River Project: Modification Request No. 7 under Part G of the Type 'A' Water Licence 2AM-MRY1325

Dear Ms. Kubeisinova,

On March 8th, 2018, Baffinland Iron Mines Corporation (Baffinland) submitted an application for modifications under the above-mentioned Water Licence No. 2AM-MRY1325.

Indigenous and Northern Affairs Canada (INAC) reviewed the supporting documents of Baffinland's modification request. Please find attached here INAC's comments for the Nunavut Water Board's (NWB) consideration. Comments have been provided pursuant to INAC's mandated responsibilities under the Nunavut Waters and Nunavut Surface Rights Tribunal Act and the Department of Indian Affairs and Northern Development Act.

Should you need any clarifications, please do not hesitate to contact me at (867) 975-4657 or by e-mail at wajid.daouda@canada.ca

Regards,

Wajid (Ranti) Daouda, P. Eng.
Senior Engineer – Major Projects
Resource Management Directorate
Nunavut Regional Office

Cc. Ida Porter, Licensing Administrator, NWB
Spencer Dewar, Director of Resource Management, INAC
Ian Parsons, A/Manager Water Resources, INAC
Jonathan Mesher, Water Resource Officer, INAC
David Zhong, Senior Environmental Assessment Specialist, INAC

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INAC's Review Comments

April 11, 2018

To: Assol Kubeisinova – Technical Advisor, Nunavut Water Board

From: Wajid Daouda, P. Eng. Senior Engineer – Major Projects, Resource Management Directorate INAC

Re: Mary River Project: Modification Request No. 7 under Part G of the Type 'A' Water Licence 2AM-MRY1325

Submissions
The following documents were reviewed:

- **Design Basis Memorandum Waste Rock Pile Water Treatment Facility [Baffinland-Attachment 5]**
- **Milne Port Truck Shop and Portable Water Treatment System [Baffinland-Attachment 6b]**
- **Milne Port Water Management Drawing [Baffinland- Attachment 4]**
- **Mine Haul Road Construction Memorandum [Baffinland-Attachment 7]**
- **Mary River Project – Modification Request No.7 [Christopher Murray's letter to NWB, dated March 8th, 2018]**
- **Hatch Design Criteria [Civil Design Philosophy, dated December, 2017]**

Scope of Review
Conduct a technical review of the above-mentioned documents. No site visits were completed as part of this review to validate information provided by the BIMC

Review Comments

Mine Haul Road Construction Memorandum

1. We read in Appendix B that "the indicated erosion protection rock size is smaller than the required size". BIMC is to confirm the rock size required for the ditch erosion protection to meet the indicated 1:10 year design flow. It is not clear to us how the anticipated erosion protection rock size is smaller than what is required.

   INAC Recommendation: We would like BIMC to clarify the indicated specification (Note 7 - Appendix B)

2. For drainage and erosion control, "***where large diameter culverts cannot be avoided in permafrost regions, it is recommended to use riveted or bolted culverts and consider installation of polystyrene insulation beneath the culvert bedding material on the bottom and sloped sides of the excavation***" [Transportation Association of Canada (TAC) – Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions]. The proposed culvert (1200 mm

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Dia. – Appendix A) should be considered as a large diameter culvert. We notice that there is no insulation beneath the proposed culvert bedding material. Also, we would like to draw attention on the fact that the distance of culvert extension beyond the toe of road fill material is missing. "*Culverts should extend a short distance beyond the toe of road fill material to prevent blockage at the end of the culvert by eroded soil*" (INAC's Northern Land Use Guidelines – Access: Roads and Trails)

INAC Recommendation: We would request BIMC to clarify or take into consideration the above-highlighted TAC's recommendation for the proposed culvert installation in the submitted Mine Haul Road construction Memorandum. Also, BIMC is to provide distance of culvert extension on the submitted drawings.

3. We find seven (7) culverts listed on the submitted culvert schedule (Appendix A) and indicated on the Mine Haul Road - Figure 3. This number is different from the one (six culvert in total) indicated on the culvert inlet basin details. Moreover, Table 1 displays two (2) culverts installation and Table 2 indicates twelve (12) culverts extension. These numbers do not appear to us consistent with the ones shown on the provided figures.

   INAC Recommendation: BIMC is to confirm number and location of all the twinned culverts planned as part of this modification request for extension on the proposed Mine Haul Road. In the event that two (2) new culverts are anticipated for the proposed pit access road, we would suggest indicating these culverts as well on the submitted figures for clarification purpose.

4. Drawings and specifications pertaining to this modification request and issued for construction are to be stamped and signed by a qualified Professional Engineer in good standing with NAPEG (Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists).

Design Basis Memorandum Waste Rock Pile Water Treatment Facility

1. Section 1.6: National Building Code of Canada (NBCC) 2015 is to be included in the list of provided applicable standards and guidelines (year of edition is missing).

2. Reference: *Page 3, Table 1 Item No. 5*

   "The proposed waste rock sedimentation pond improvements involve the installation of a water treatment plant to manage acid-rock drainage/metal (ARD/ML) runoff from the waste rock stockpile. In the FEIS, Baffinland committed to install a water treatment plant should ARD/ML conditions develop despite the application of best practices, to ensure compliance with the discharge limits of the Type "A" Water Licence."

   Reference: *Page 68 of Volume 3, Section 3.4.5 of FEIS - 3.4.5 Waste Rock Stockpile*

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"Baffinland's approach to management of potential ARD/ML from the waste rock pile is four fold:

On-going gap-filling program for geological and geochemical characterization of waste rock that will assist in confirming water quality model assumptions and predictions, and will inform and improve waste rock management and design practices in an ongoing fashion:

Optimization of waste rock pile design that will prevent the development of ARD/ML by effectively managing rock material groups based on projected lithology, mineralogy, chemical reactivity, and physical properties.;

Runoff and seepage water from the waste rock pile will be captured, diverted, and contained in storm water / sedimentation ponds where the water quality can be monitored prior to discharge to the receiving environment; and,

Should, despite the application of best practices, ARD/ML develop, and the waste rock stockpile runoff water collected does not meet discharge criteria established by the MMER regulation, the water will be treated to acceptable effluent limits, prior to discharge to the environment."

INAC Recommendation: It is not clear if best practices have been applied, particularly practices related to waste rock geochemical characterization, water quality model assumptions and predictions, and ARD/ML prevention (e.g., waste rock segregation and waste rock pile design). Water treatment should be considered as the last option. INAC recommends that in addition to implementing water treatment, BIMC also re-evaluate and update its waste rock management plan so that best practices are applied and implemented and ARD/ML is prevented or managed effectively.

3. Reference: *Page 10 - 3.2.3 Identification of any Potential Impacts to the Receiving Environment*

"Operation of the water treatment plant will provide a net benefit in improving the quality of the effluent being discharged from the waste rock sedimentation pond at monitoring station MS-08, and will ensure compliance with the Type A Water Licence. Sludge will be disposed of in the landfill in accordance with the Waste Management Plan (Baffinland, 2017a)."

INAC Recommendation: It is not clear which landfill and how the sludge will be disposed of. More importantly, the environmental impacts of disposing water treatment sludge have not been fully assessed in the FEIS and FEIS Addendum.

4. Reference: *Page 11 - 3.2.5 Schedule for Construction*

"Construction is expected to begin 60 days following submission of this modification request in accordance with Part G Item 1 of the Type "A" Water Licence, or upon written

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approval from the Board in accordance with Part G Item 2. The work is expected to be completed before the onset of freshet in June 2018."

INAC Recommendation: This modification request was submitted on March 8th, 2018 and construction can start on May 6th, 2018 at the earliest. It is not clear if there is sufficient time for BIMC to have the treatment system in place (i.e., construction, testing, and personal training, etc.) and ready before the onset of freshet in June 2018. INAC recommends that BIMC have a contingency plan in place to handle freshet as soon as possible.

5. Reference: *Page 11 - 3.2.6 Drawings of Engineered Structures 3.2.5 Schedule for Construction*

   The following engineering document provides details on the WTS:

   Attachment 5 – Mine Site Waste Rock Stockpile Design Basis Memorandum (Golder, 2018)."

   INAC Recommendation: Attachment 5 is not an engineering document. It does not provide sufficient engineering details on the WTS (water treatment system).

6. Reference: *Page1 - 1.1 Purpose*

   "The purpose of this Design Basis Memorandum (DBM) is to summarize conditions, assumptions, input data and treatment targets, to support procurement of a water treatment system (WTS) for Baffinland Iron Mines (BIM)'s Mary River Project waste rock pile facility. Additional work is required, to specify detailed engineering, procurement construction, commissioning and operations. This document is not intended for construction and the assumptions will be revised upon detailed engineering."

   INAC Recommendation: This statement contradicts BIMC's characterization of this document (see Comment #5 above)

7. Reference: *Page 6 - 3.0 TREATMENT PLANT DETAILS - 3.1 Process*

   "The design consists of physical-chemical treatment for converting dissolved metals into precipitates and removing the solids by physical barrier. The water treatment processes include coagulation, pH adjustment and precipitation, flocculation and filtration.
   The treatment plant process, flow rate, and equipment are analogous to facilities successfully installed and operated at other mines in Canada."

   INAC Recommendation: It is not clear which dissolved metals will be precipitated and removed by the treatment process and if the proposed treatment plant has ever been tested or operated successfully at mine sites in a similar climate and drainage conditions as the Mary River Iron mine.

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8. This document does not address an important question: how water treatment sludge materials will be managed or disposed of to avoid or limit any potentially significant environmental impacts.

9. In order to ensure that the recently constructed containment ditch, below the waste rock stock pile sedimentation pond is capturing all leachate as intended. INAC's Resource Management Officer is requesting that the Licensee install monitoring wells downstream of the facility and sample them bi-weekly during periods of flowing water, or develop a monitoring plan. This will help to ensure that the facility is operating as intended and the licensee is conforming with the direction written by Water Resource Officer, Justin Hack, on September 5, 2017 to Baffinland Iron Mines Corporation.

End of comments