Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

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

Your file - Votre référence
2AM-MRY1325
Our file - Notre référence
CIDM#1223019

July 16, 2018

Licence Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's comments on Baffinland Iron Mines Corporation's Modification Request No. 8 Waste Rock Facility Pond, Water Licence 2AM-MRY1325 – Amendment No. 1

Dear Ms. Porter,

Thank you for your June 27, 2018 invitation for technical review comments on the above referenced application.

The Water Resources Division of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the application and the results of our review are provided in the enclosed memorandum for the Nunavut Water Board's consideration. Comments have been provided pursuant to CIRNAC's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

CIRNAC appreciates the opportunity to participate in this review. If there are any questions or concerns, please contact either me at david.zhong@canada.ca or (867) 975-4555 or Wajid Daouda at wajid.daouda@canada.ca or (867) 975-4657.

Sincerely,

David Zhong
Regulatory and Science Advisor

Technical Review Memorandum

To: Ms. Porter, Licence Administrator, Nunavut Water Board

From: David Zhong, Regulatory and Science Advisor, Water Resources Division, CIRNAC

Date: July 16, 2018

Re: Modification Request No. 8 – Waste Rock Facility Sedimentation Pond Mary River Project, Water Licence 2AM-MRY1325 – Amendment No.1

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

A. BACKGROUND

On June 26, 2018, Baffinland Iron Mines Corporation (Baffinland) submitted the above-noted modification request to the Nunavut Water Board (Board) on Water Licence 2AM-MRY1325 – Amendment No.1 for additional activities related to its 2018 Work Plan, which include raising of the berm and expansion of the footprint to increase the holding capacity of the waste rock facility (WRF) sedimentation pond and the construction of a new emergency spillway, two perimeter diversion ditches, and a culvert crossing for a road to access the water treatment system pad. Baffinland stated that these additional activities were the results of the need to expand the footprint of the WRF in 2018 to accommodate new waste rock management practices associated with the placement of potentially acid generating (PAG) waste rocks in the WRF.

Baffinland conducted a self-assessment of the proposed modification, in accordance with the *Process for Seeking Approval for Modifications to Previously-Approved Projects* (NIRB 2018), the significance criteria presented in *Section 90 of the Nunavut Project Planning and Assessment Act (NuPPAA), and Section 12.8.2 of the Nunavut Agreement and Section 112 of the NuPPAA*, and concluded that the proposed activities were assessed previously, that their effects were not significant, and that a reconsideration of the terms and conditions of the Project Certificate No. 005 was not required.

The detail of the proposed modification activities and engineering designs are presented in Attachment 2: Civil Design Report (by Golder) of Baffinland's modification request.

B. RESULTS OF REVIEW

The Water Resources Division of CIRNAC's (Crown-Indigenous Relations and Northern Affairs Canada) Nunavut Regional Office reviewed the documents associated with Baffinland's Modification Request No.8 and would like to provide the following comments and recommendations for the Board's consideration.

1. Identify Root Cause(s) of Seepage from WRF Sedimentation Pond

Reference:

- Modification Request No. 8 – Waste Rock Facility Sedimentation Pond, Mary River Project, Water Licence 2AM-MRY1325 – Amendment No.1. Baffinland Iron Mines Corporation, June 26, 2018
- Attachment 2: Civil Design Report. Golder, June 15, 2018

Comment:
Baffinland stated that seepage out of the existing WRF pond berm had been identified, but the source of the seepage had not been conclusively determined, as no damage to the existing WRF pond geomembrane was noted during an inspection carried out in September 2017 by Hatch (Hatch 2017). In the Civil Design Report, Golder stated that an attempt would be made to identify the source of the seepage and the existing geomembrane be repaired or replaced.

It is not clear if a damaged geomembrane is the root cause of the seepage and there is no information on how the root cause(s) or source(s) of the seepage will be identified other than draining the pond completely so that a more thorough inspection of the existing geomembrane could be conducted.

Recommendation:
Baffinland should include a detailed plan to identify the cause(s) of the observed seepage from the WRF sedimentation pond prior to any pond expansion activities so that appropriate mitigation measures can be implemented to prevent any seepage from entering the environment.

2. WRF Sedimentation Pond Berm Stability

Reference:

- Attachment 2: Civil Design Report. Golder, June 15, 2018

Comment:
The WRF pond berm is designed to be stable under the expected loading conditions. However, the material strength parameters and foundation conditions for the stability

model were based on professional judgement only, without any laboratory testing to verify the strength parameters and borehole information on the foundation conditions. In fact, the Civil Design Report stated that "*The foundation conditions have been assumed based on the results of the two boreholes located approximately 2.0 km from the WRF Pond (KPC, 2006). No additional information is available on the foundation conditions at the WRF Pond Berm. It is recommended that test pitting be carried out along the WRF Pond Berm expanded foundation, prior to construction of the berm, if ground conditions permit. The foundation conditions should then be verified against the material strength parameters assumed in Table 4. The presence of weak foundation materials may require removal or result in the requirement to flatten or buttress the WRF Pond Berm downstream slope. The presence of continuous layers of ground ice within the foundation may also result in creep of the WRF Pond Berm slopes. If test pitting is not feasible due to frozen ground conditions, it is recommended that survey monitoring pins be installed along the WRF Pond Berm downstream slope.*" In addition, CIRNAC is aware that in the past, Baffinland had experienced difficulties in constructing the ditches due to unexpected foundation conditions. There is evidence to suggest that foundation conditions at the WRF pond berm site are different from that at the two borehole sites located 2 km away.

It is apparent that there is a high level of uncertainty in the stability estimate. Given that the causes of the seepage observed downstream of the WRF are still unknown, the permafrost condition under the WRF pond and the berm may have changed due to the presence of water body in the WRF pond and seepage passing through under the berm, and water stored in the WRF pond could be acidic and contain high level of metals, the level of uncertainty or risk in the stability of the WRF pond berm needs to be reduced.

Recommendation:
Baffinland should obtain the critical information on the WRF pond berm foundation conditions through boreholes and conduct laboratory testing to verify if the strength parameters used in the model are adequate. At the minimum, Baffinland should implement Golder's recommendations noted in the Civil Design Report.

3. Acid Rock Drainage and Diversion Ditch Design Criteria

Reference:
- Attachment 2: Civil Design Report. Golder, June 15, 2018

Comment:
Two perimeter ditches are proposed to collect contact water from the WRF to the WRF sedimentation pond. The ditches are designed for the 1:25 year 10-min with an intensity of 12.4 mm/hr rain event and the 1:100 year storm flood event.

ARD (acid rock drainage) has occurred in the WRF. The two perimeter ditches are constructed with porous earth materials that would not be able to prevent seepage of ARD from the ditches into the surrounding environment.

Recommendation:

Baffinland should design the diversion ditches by also taking into consideration that any potential seepage from the ditches needs to be prevented as contact water from the WRF could be acidic and contain high level of dissolved metals.

4. Disposal of Sediment in WRF Sedimentation Pond

Reference:

- Attachment 2: Civil Design Report. Golder, June 15, 2018

Comment:

Baffinland stated that *"the pond shall be completely drained and the condition of the existing geomembrane inspected prior to construction of the WRF Pond expansion*." The sedimentation pond has been in operation since 2014 and in-situ water treatment has been conducted in the sedimentation pond to raise pH and precipitate dissolved metals. Consequently, sediment in the sedimentation pond may contain high level of toxic metals. However, this issue is not discussed in the Civil Design Report and it is not clear how the sediment will be safely disposed of.

Recommendation:

Baffinland should have management or mitigation measures in place for the appropriate disposal of the sediment in the WRF sedimentation pond.

cc:

Brigdet Campbell, Regional Coordinator, Water Resources Division, Resource Management Directorate, Nunavut Region, CIRNAC
Spencer Dewar, Director, Resource Management Directorate, Nunavut Region, CIRNAC
Erik Allain, Director, Lands Directorate, Nunavut Region, CIRNAC
Sarah Forte, A/Manager, Water Resources Division, Resource Management Directorate, Nunavut Region, CIRNAC
Wajid Daouda, Senior Engineer, Resource Management Directorate, Nunavut Region, CIRNAC