Environmental Protection Operations Directorate
Prairie & Northern Region
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

ECCC File: 6100 000 011/001
NWB File: 2AM-MRY1325

August 20, 2020

via email at: licensing@nwb-oen.ca

Karén Kharatyan
Director of Technical Services
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Karén Kharatyan:

RE: 2AM-MRY1325 – Baffinland Iron Mine Corporation – Mary River – 2019 Annual Report

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-noted Annual Report, as well as the Phase 1 Waste Rock Management Plan - Revision 3. We appreciate the opportunity to submit these comments to the registry, and regret that we did not submit our comments by the indicated date of July 24, 2020. You will find our comments below.

ECCC's specialist advice is based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act.*

ECCC provides the following comments:

1. Trigger Action Response Plan

Reference(s)

- NWB Appendix E.5.3 – Surface Water and Aquatic Ecosystems Management Plan
  - Table 9-2
  - Appendix G

Comment

The Surface Water and Aquatic Ecosystems Management Plan was updated in April 2020 and now includes a Trigger Action Response Plan (TARP) for erosion and sediment. Table 9-2 identifies four "triggers" related to erosion and sedimentation and subsequent response actions, including:

- Observations identifying potential causes of erosion and sedimentation.

- Severe weather periods in the forecast, per on-site weather stations and weather alerts
- Exceedance of Water Licence Criteria for Total Suspended Solids
- Regulatory Feedback

Upon reading these triggers, it is not immediately clear what event needs to occur to instigate implementation of the TARP. For example, the trigger of, “TSS exceedance of Water Licence Criteria” insinuates that a sample has already been taken and an exceedance identified, but the response action discusses suspected exceedances and that water samples should be taken for testing. The Triggers should be simply worded and extremely clear such that actions can be taken quickly when a trigger event occurs.

ECCC Recommendation(s)

ECCC recommends the Proponent review the TARP and ensure that “triggers” are clear, descriptive, and related directly to an observation or event that would trigger action.

2. Removal of SNP Station MP-C-G

Reference(s)

- NWB Appendix E-13 – SNP Modification Application

Comment

The application for modification of SNP stations proposes to remove monitoring of MP-C-G at Milne Port, which is intended to capture surface discharge downstream of the construction area at Milne Site. The rationale provided is that this station, “no longer captures surface discharge downstream of construction due to the expansion of the Ore Pad at Milne Port. Thus removal of the station is proposed.” The rationale provided does not acknowledge whether surface runoff is still an issue at this location (implying that monitoring is no longer required), or whether the station simply no longer captures runoff due to mine site changes.

ECCC Recommendation(s)

ECCC recommends the Proponent provide a discussion on whether monitoring in the vicinity of MP-C-G is still warranted, and whether the SNP Station should be relocated, rather than discontinued.

3. Groundwater Monitoring

Reference(s)

- NWB Appendix E-12; NIRB Appendix G5 – 2019 Groundwater Monitoring Report

Comment

The groundwater monitoring report found elevated concentrations in the down-gradient wells relative to the up-gradient wells, and noted that further years of monitoring data is required to evaluate potential trends. However, although concentrations have been provided, there are no figures displaying the data for 2019 or any potential temporal trends in groundwater quality. Given that, by 2021 there will be four years of groundwater monitoring data available, figures would aid in interpretation of the data.

Section 4 Conclusions and Recommendations states that: *"Consideration will be given to the development of site-specific groundwater quality screening criteria based on background (reference) conditions (if available) and potentially utilizing groundwater quality guidelines from other jurisdictions…"*

ECCC supports developing site-specific groundwater quality objectives for the purpose of screening groundwater quality.

ECCC Recommendation(s)

ECCC recommends that the Proponent present the groundwater data collected graphically in figures to depict differences in up-gradient and down-gradient concentrations in future reporting years, and to identify any temporal trends.

ECCC recommends that appropriate screening groundwater quality objectives be identified for use in comparisons of groundwater quality data from the monitoring program.

4. Updates to Water Quality Guidelines

Reference(s)

- NWB Appendix E.9.1; NIRB Appendix G1 – 2019 CREMP Monitoring Report
    - Table 2.2

Comment

Table 2.2 lists the water quality guidelines used for the Mary River project, the majority of which are based on the CCME Water Quality Guidelines for the Protection of Aquatic Life. Where no CCME guidelines exist for certain parameters, the Proponent has implemented the lowest of either the Ontario or BC Provincial Water Quality Guidelines. ECCC notes that neither the dissolved zinc nor manganese guidelines have been updated by the Proponent in accordance with the revised CCME criteria (released in 2018 and 2019, respectively). The equation for guideline derivation released by CCME is based on hardness and pH, and appears to result in a potentially lower water quality guideline than the 0.935 mg/L BC Water Quality Guideline and may be a more appropriate metric for use at Mary River.

ECCC Recommendation(s)

ECCC recommends the Proponent:

- Use the updated zinc CCME Water Quality Guideline for analysis in future monitoring years.

- Discuss whether the newly released CCME Manganese Water Quality Guideline is more appropriate for use at the mine site than the BC Water Quality Guideline.

5. Nitrate Guidance and the AEMP Benchmark

Reference(s)

- NWB Appendix E.9.1; NIRB Appendix G1 – 2019 CREMP Monitoring Report

Comment

The nitrate guideline listed in Table 2.2 is 3 mg/L and stated to be reflective of the CCME Water Quality Guideline for Nitrate. Table 3.1 also identified the guideline as 3 mg/L as well as the AEMP Benchmark as 3 mg/L and identifies an exceedance at sampling station L2-3. However, in figure 3.2 the nitrate WQG depicted on the figure is 13 mg/L and therefore does not acknowledge the exceedance. ECCC notes that the Proponent appears to be using the nitrate guideline and nitrate-N guideline interchangeably, and that the appropriate comparison is to the 3 mg-N/L nitrate.

ECCC Recommendation(s)

ECCC recommends that the Proponent consistently applies the 3 mg-N/L nitrate guidelines.

6. Water Quality near QMR2 Quarry

Reference(s)

- NWB Appendix E.9.1; NIRB Appendix G1 – 2019 CREMP Monitoring Report
    - Section 3.1.1 – Camp Lake System – CLT1 – Water Quality

Comment

Water quality guidelines for nitrate have been exceeded for the last two years at station L2-03 (CLT1 upper main stem) and concentrations of several metals have increased over time. This sampling location is in close proximity to QMR2 quarry and the proponent acknowledges that these increases are consistent with the deposition of explosive residues from the quarry. However, they go on to state that despite the elevated parameters at the upper CLT1 main stem, none were elevated above WQG or AEMP benchmarks at the lower stem prior to discharge into Camp Lake. This rationale minimizes the potential localized effects that could be occurring in the vicinity of station L2-03 and the QMR2 quarry, and no potential mitigations have been presented to minimize impacts from nitrogen compound use and dust creation from the quarry.

ECCC Recommendation(s)

ECCC recommends the Proponent provide potential mitigation measures to reduce impacts from dust and nitrogen deposits into CLT1 from the QMR2 quarry.

7. Sulfate and Nitrate – Mary River System

Reference(s)

- NWB Appendix E.9.1; NIRB Appendix G1 – 2019 CREMP Monitoring Report
    - Section 5.1.1 – Mary River System – Water Quality

Comment

Water chemistry within the Mary River showed no distinct and/or consistent spatial gradients with progression downstream, with the exception of sulfate and nitrate, which were elevated at Mary River Tributary F. Based on the temporal analysis provided in Figure 5.2, elevated levels of nitrate and sulfate have not been observed in previous years and represent a large increase compared to previous sampling data. Although the concentrations presented do not exceed water quality guidelines, the sudden jump in concentration may be due to mine influences. The report does not provide any discussion or analysis of the sudden increases in nitrate and sulfate or examine any potential causes.

ECCC Recommendation(s)

ECCC recommends the proponent provide a discussion of potential causes of the sudden increases in nitrate and sulfate at the confluence of Mary River Tributary F.

8. Lake Sedimentation

Reference(s)

- NWB Appendix E.9.2; NIRB Appendix G2 – Lake Sedimentation Monitoring Report
    - Section 2.2 – Station Locations
    - Section 3.1 – Sedimentation Rates

Comment

Section 2.2 describes the station SHAL1 as a silt-loam substrate, and notes that it is the closest of the stations to Sheardown Lake Tributary inflow. Section 3.1.1 describes the sedimentation rates and refers to SHAL1 as being the hard-bottomed substrate near the tributary, and SHAL2 as being the silt substrate.

ECCC Recommendation(s)

ECCC requests clarification on the stations' substrates.

9. Waste Rock Management Plan - Thermal Assessment

Reference(s)

- Phase 1 Waste Rock Management Plan - Revision 3 – Section 7

Comment

The Proponent stated that, “One of the conclusions from the thermal assessment review is that if no internal heat source is present, the models indicate that the entire waste rock layer deposited in summer would freeze within a year, with or without additional deposition of waste rock in winter, and the extent of the thawed zone in the interior of the pile would be very limited.” In section 8: WRF DEVELOPMENT STRATEGY, the Proponent further states, “Further expansion of the WRF is in the planning stages in order to accommodate future waste rock quantities and ensure compliance to the above guidelines.” Section 5.2 Thermal Model Calibration of the Waste Rock Management Plan, for 2020 through 2021 by Golder, states, “*Calibration models were run for the period between March 15, 2019 and September 11, 2019, with temperature profiles predicted along boreholes BH1, BH2 and BH3 and horizontal thermistor T3. The purpose of the calibration models was to validate the model input parameters until the predicted temperature profiles generally agreed with the temperature profiles provided by the thermistors.*

To improve model calibration at BH2 and BH3, internal heat generation was included by adding a heat flux boundary (30 kJ/day) to waste rock parcels adjacent to the BH2 and BH3 thermistor strings at depths where the existence of PAG waste rock was identified (Golder, 2019b). Inclusion of the 30 kJ/day heat flux boundary improved model calibration to the measured temperatures at BH2 and BH3.”

ECCC Recommendation(s)

Given the above statements, it is not clear how the calibration of the model with the addition of heat flux (30 KJ/day) will impact the placement of successive waste rock lifts and deposition strategy guidelines (section 8.2). The need to include the heat flux implies that there is an internal heat source that could potentially create or cause a thawed zone. ECCC requests clarification as to whether further expansion of the WRF will assume or manage an internal heat source and potential thawed zone.

10. Waste Rock Management Plan – Adaptive Management

Reference(s)

- Phase 1 Waste Rock Management Plan - Revision 3 – Section 12

Comment

In comment ECCC-2, ECCC recommended that the Proponent provide adaptive management measures and evaluate potential effects of hot spots within the waste rock pile.

In response, the Proponent indicated that adaptive management has been included in an updated revision to the 2019 WRMP (Section 12).

Item 1b in the list of general steps that will be taken to assess the potential for the thawed material to impact the WRF long-term performance, proposes to “*Identify if thawing was the result of construction practices or exothermic reaction and (b). If the thawed zone developed from an exothermic reaction or the reason cannot be determined, then additional*

investigation may be required. The extent of the investigation (desktop study vs. field investigation) will be assessed on a case-by-case basis."

ECCC Recommendation(s)

ECCC is of the view that the adaptive management actions described propose further studies or investigation without having identified potential mitigation options to eliminate or manage the hot spots within the waste rock pile. Therefore, it is not clear whether adaptive management options would include avoidance or elimination of segregation practices that may have caused the misclassification of PAG and non-PAG rock that would have created the hot spots in the first place. ECCC requests clarification.

11. Waste Rock Management Plan – WRF Closure

Reference(s)

- Waste Rock Management Plan, *For 2020 through 2021* by Golder, Section: 10.3 WRF Closure

Comment

The Proponent states, "*When monitoring shows that runoff meets water quality objectives for closure the runoff management, ponds will be decommissioned and runoff will be discharged directly to the environment."*

ECCC Recommendation(s)

ECCC would like to re-emphasize that as long as the Mary River Iron Ore mine is subject to the *Metal and Diamond Mining Effluent Regulations*, all discharges from the mine would have to go through a final discharge point (FDP), and effluent sampling and reporting through MERS will continue until the mine achieves recognized closed mine (RCM) status.

If you need more information, please contact Anna Graham at Anna.Graham2@Canada.ca.

Sincerely,

[original signed by]

Anna Graham
Environmental Assessment Coordinator

cc: John Olyslager, Acting Head, Environmental Assessment North (NT and NU)
Anne Wilson, Team Lead, Expert Support – Water Quality
Lou Kamermans, Senior Director - Sustainable Development, Baffinland Iron Mines Corporation