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ECCC File: 6100 000 011/004  
NWB File: 2AM-MRY1325

September 14, 2018

Via email: [licencing@nwb-oen.ca](mailto:licencing@nwb-oen.ca)

Richard Dwyer  
Manager of Licensing  
Nunavut Water Board  
P.O. Box 119  
Gjoa Haven, NU X0B 1J0

Dear Mr. Dwyer:

**RE: 2AM-MRY1325 – Baffinland Iron Mines Corporation – Mary River Project –  
Type A Water Licence – 2017 Annual Report**

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned annual report and is submitting comments via email. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act*, and the pollution prevention provisions of the *Fisheries Act*.

The following comments are provided:

**1. Potential onset of Acid Rock Drainage (ARD)**

Reference:

- 2017 QIA NWB Annual Report for Operations Table 5.2.15 and 5.3

Issue:

As outlined in the report, in August of 2017 the pH of runoff collected in the Waste Rock Facility (WRF) pond dropped below the regulated pH discharge limits, with subsequent toxicity test failures. The decrease in pH may have been the result of acid rock drainage (ARD) occurring. Baffinland Iron Mines Corporation (Baffinland or the Proponent) has retained a consultant to investigate the potential for ARD and develop mitigation measures as required. A water treatment system will be commissioned in early 2018 to treat non-compliant waters in the WRF pond.

The drop in pH itself was probably not the cause of the observed toxicity; however, the lower pH changed the form and bioavailability of metals in the effluent, which affected the toxicity. Unfortunately, the chemical characterization of the effluent on the dates that toxicity was observed did not include all the parameters, nor the dissolved fraction for metals, which would help in the interpretation of test results.

Waste rock at the site was predicted to be non-acid generating, and thus it has been used as a construction material at the mine site, which warrants further investigation.

### Recommendation(s)

ECCC recommends that

- the Proponent ensure effluent is fully characterized with the full suite of total and dissolved metals analyzed, as well as sulphate, for samples used for bioassay tests. This full characterization should also be done periodically for routine sampling.
- the Proponent describe the proposed water treatment system, including the parameters and its target effluent quality.
- the Proponent develop appropriate mitigation measures to prevent ARD based on the results from the investigation of the cause of the drop in pH.
- The Proponent conduct inspections of any construction incorporating the waste rock to identify any detectable ARD onset.

## **2. Sheardown Lake Sedimentation**

### Reference:

- 2016-17 Lake Sedimentation Monitoring Report
- 2017 CREMP Report Section 4.2.3 and 4.3.3 Sediment Quality; Appendix D Sediment Quality Table D.26

### Issue:

As in 2016, the 2017 a significant input of sediments in Sheardown Lake when compared to baseline was observed, with increases from the 2014-2015 period as well as sustained inputs compared to the 2016-2017 period at the depositional stations. Sedimentation rates were highest during the open-water period compared to the ice-cover period, representing higher inputs during summer from dust and biological productivity. Total sediment deposited was highest during the ice-cover period, due to the extended duration of ice-cover compared to open water.

The deposition depth of sediments ranged from 1.39 to 2.30 mm/year (vs 1.26 mm/year to 2.02 mm/year in 2016-2017). This is within the range associated with adverse effects on fish egg survival. ECCC acknowledges that effects were not observed in the

monitoring of Arctic char; however, sediment deposition rates appear to be trending upwards (Figure 3.1 2017 Lake Sedimentation Monitoring Report) and continuing increases are of concern. The 2017 Core Receiving Environment Monitoring Program (CREMP) reports that: “[...] *sediment iron concentrations appeared to be highest at Sheardown Lake NW stations situated closest to the outlets of SDLT1 and SDLT12 [...] Iron concentrations in deposited sediment at SDLT1 and SDLT12 were considerably higher than sediment of Sheardown Lake NW (Appendix Table D.29), indicating that these tributaries were a source of iron loadings to the lake.*”

In the three Sheardown Lake sampling sites, sediment iron concentrations were above sediment quality guidelines (noting that the reference lake is also elevated) and above the AEMP benchmarks in many cases. Source contributions may be a combination of surface erosion, dustfall transport in freshet meltwaters or in surface runoff, or direct dust deposition on the lake surface.

#### Recommendations:

ECCC recommends that

- the Sheardown Lake sedimentation monitoring study continue on an ongoing basis.
- management and mitigation of dust at the mine site and Milne Inlet facility be an ongoing priority for Baffinland.

### **3. Nitrate Guideline**

#### Reference:

- Various tables and text throughout reports.

#### Issue:

The reports consistently refer to the Canadian Council of Ministers of the Environment (CCME) guideline for nitrate as 13 mg/L. This is correct, however the data reported in the appendices and used in the report graphs and tables is for nitrate as N. Accordingly, the guideline should be in the same units, and would be 2.93 mg N/L.

#### Recommendation:

ECCC recommends use of consistent units for nitrogen parameters.

#### **4. Management of quarry water**

##### Reference:

- QMR2 Quarry Management Plan, Section 4.6 – Monitoring
- Q1 Quarry Management Plan, Section 4.6 – Monitoring
- Appendix E.9.1 2017 Core Receiving Environment Program

##### Issue:

The quarry management plans indicate that, *“in the event that water quality at monitoring locations exceed the relevant discharge criteria, additional investigative water sampling will be conducted to identify the source of elevated water quality parameters.”*

However, the plans do not indicate how water that does not meet discharge criteria will be managed. For example, there is no indication on how it will be stored or treated in order to achieve acceptable quality for discharge.

Monitoring done under the 2017 CREMP has documented changes to the Camp Lake system, with elevated concentrations of copper, iron, nitrate, sulphate, chloride, manganese, molybdenum, sodium and uranium in water, plus elevated arsenic and manganese in sediments of Camp Lake. The source has been linked to active quarrying in the watershed.

##### Recommendation:

ECCC recommends that the Proponent identify how quarry water that is unsuitable for discharge will be managed. This should include potential storage locations and treatment options.

#### **5. Groundwater Monitoring**

##### Reference:

- Appendix E.11 Groundwater Monitoring Report 2017 Pilot Program

##### Issue:

Three shallow groundwater wells were established in 2017 to investigate the feasibility of using drive-point piezometers to monitor groundwater quality. The groundwater dataset is extremely limited, and monitoring of the active layer groundwater can be used to characterize sub-surface flows and to provide information about migration of any parameters in the shallow groundwater. Baffinland proposes to continue work on this in 2018. ECCC supports the development of a robust groundwater monitoring plan.

Recommendation:

ECCC recommends that the Proponent identify sites which will be monitored beyond the mine site landfill.

Should you require further information, please do not hesitate to contact Gabriel Bernard-Lacaille at (867) 669-4746 or [Gabriel.Bernard-Lacaille@Canada.ca](mailto:Gabriel.Bernard-Lacaille@Canada.ca)

Sincerely,

*[original signed by]*

Gabriel Bernard-Lacaille  
A/ Senior Environmental Assessment Coordinator

cc: ECCC Review Team