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ECCC File: 6100 000 011 /001
NIRB File: 08MN053

May 14, 2018

Via email: info@nirb.ca

Solomon Amuno
Technical Advisor II
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU X0B 0C0

Dear Mr. Amuno

RE: 08MN053 – Baffinland Iron Mines Corporation – Mary River Project – 2017 Annual Monitoring Report

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Impact Review Board regarding the above-mentioned annual report. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act* (CEPA), the pollution prevention provisions and the Metal Mining Effluent Regulations of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act* (SARA). Note that ECCC continues to participate in the Marine Environment Working Group and is generally satisfied with the marine monitoring program.

The following comments are provided:

Effects Monitoring

Air Quality

1. ECCC has reviewed the air quality Term and Conditions #7 to #12 and summary conclusions. However, without access to supporting documentation, such as an air data report, we are unable to confirm Baffinland Iron Mines Corporation's (the Proponent's) conclusions presented in the annual monitoring report. In future iterations of the annual report, ECCC recommends that the Proponent provide this information.

2. ECCC would also like to note that on October 28, 2016 and December 9, 2017 the Federal Government formally established Canadian Ambient Air Quality

Standards (CAAQS) for SO_2 and NO_2 through their publication on the Canada Gazette on under the authority of the *Canadian Environmental Protection Act, 1999* http://gazette.gc.ca/rp-pr/p1/2017/2017-12-09/html/notice-avis-eng.html

The CAAQS were developed for the purpose of protecting human health and the environment. They are supported by air quality management levels, which call for progressively more rigorous actions by jurisdictions as air quality approaches or exceeds the CAAQS, thereby ensuring that the CAAQS are not treated as "pollute-up-to" levels.

3. The Proponent has responded to the concern with stack testing frequency raised last year and proposes a five (5) year basis of conducting the testing. ECCC is reviewing this and may provide further comments during the Nunavut Water Board review of the 2017 annual report.

Water Quality - Acid Rock Drainage

4. 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. 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 in and of 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. Investigation of the cause of the drop in pH will be the key to developing appropriate mitigation and prevention of ARD.

   ECCC recommends that the Proponent ensure effluent is consistently fully characterized, with the full suite of total and dissolved metals analyzed, as well as sulphate, for samples used for bioassay tests as well as periodically for routine sampling.

   ECCC requests that the Proponent describe the proposed water treatment system, including the parameters and target effluent quality it is expected to treat to.

   Waste rock at the site was predicted to be non-acid generating, and it has been used as a construction material at the mine site. ECCC recommends that an

inspection of any construction incorporating the waste rock should be done to identify any detectable ARD onset.

Water Quality - Sheardown Lake Sediment

5. As in the previous year, the 2017 results identified significantly increased inputs of sediments into Sheardown Lake when compared to baseline, with increases from the 2014-2015 period and 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, as well as 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), 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 Aquatic Effects Monitoring Program 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.

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

Water Quality - Nitrate Guideline

6. The reports consistently refer to the Canadian Council of Ministers of the Environment 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 mgN/L.

Compliance Monitoring

No authorizations from ECCC have been issued. One (1) site visit, three (3) on-site inspections and five (5) off-site report verifications were completed by ECCC Environmental Enforcement in 2017:

1. ECCC Environmental Enforcement participated in a site visit and Pre-Freshet meeting which took place on March 22, 2017 to discuss the Proponent's readiness and action plan to deal with upcoming spring freshet.

2. An onsite inspection of the Mary River Project was completed by ECCC Environmental Enforcement on May 30-June 1st, 2017 to verify compliance under the *Canadian Environmental Protection Act* (CEPA) and the *Fisheries Act*. There were no compliance issues identified under CEPA during the course of the on-site inspection. The following contains highlights from the inspection:

    - East and West Stockpile Sedimentation pond is at holding capacity at Milne Inlet. East Stockpile Sedimentation pond (MP-05) overtopped and discharged into Milne Inlet, Arctic Ocean resulting in spill 2017-178.
    - Sediment was found on Ice under 4 bridge crossings. The Proponent will clean ice before freshet and is currently working on a permanent solution.
    - Some Culvert drainage issues were identified along the Tote Road but this was greatly improved from the previous year.
    - Crusher Pad Iron Ore dust embedded in snow melting into Camp Lake and Sheardown Lake.
    - Waste Rock Sedimentation Pond (MS-08) at holding capacity.
    - The Mary River Project would benefit from a Water Management Containment Facility. This facility would allow a backup place to divert water from Sedimentation Ponds when they are at risk of overflowing. This facility would also allow a place to store snow that has Iron Ore dust embedded in it.
    - There was no sampling conducted during the inspection as there was no ongoing discharge from the two final discharge points (MS-08 or MS-06) at the time of the inspection.
    - Spill reporting good at site.

3. An onsite inspection of the Mary River Project was completed by ECCC Environmental Enforcement on July 18-19, 2017 to verify compliance under CEPA and the *Fisheries Act*. There were no compliance issues identified under CEPA

during the course of the on-site inspection. The following contains highlights from the inspection:

- Waste Rock Sedimentation Pond (MS-08) at holding capacity.
- Camp Lake and Sheardown Lake flowing clean with no sedimentation.
- Signs of erosion along Mine Haul Road adjacent to Mary River Tributary.
- There was no sampling conducted during the inspection as there was no ongoing discharge from the two final discharge points (MS-08 or MS-06) at the time of the inspection.

4. An onsite inspection of the Mary River project was completed by ECCC Environmental Enforcement on August 23-24, 2017 to verify compliance under the *Fisheries Act*. The following contains highlights from the inspection:

    - Waste Rock Sedimentation Pond (MS-08) discharge (pH & Total Suspended Solids [TSS]) from final discharge point not in compliance with the *Metal Mining Effluent Regulations* (MMER) and possible Waste Rock Sedimentation Pond (MS-08) leaking. Investigation opened on the Proponent under subsection 36(3) of the *Fisheries Act* and under MMER.
    - There was no sampling conducted from final discharge point MS-08 during the inspection as there was no ongoing discharge as it had been stopped.
    - Sampling was conducted at locations around the Waste Rock Sedimentation Pond (MS-08) where it was believed to be leaking.

5. Five (5) MMER off-site report verifications were conducted by ECCC Environmental Enforcement. ECCC reviewed the 2017 1st, 2nd, 3rd, 4thquarterly reports and one (1) annual report submitted on the Regulatory Information Submission System (RISS) for the final discharge. The following contains highlights from the report reviews:

    - The 3rd quarter report review determined that sampling required under MMER by the Proponent identified that discharge from the Waste Rock Sedimentation Pond (MS-08) final discharge point had a Bioassay failure, TSS limit exceedance, and pH level outside the acceptable pH range (6.0-9.5). This is also part of the ongoing open investigation.

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

Sincerely,

[original signed by]

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cc: ECCC Review Team
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