Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6100 000 011/010
NWB File: 2AM-MRY2540

January 30, 2026

via email at: licensing@nwb-oen.ca

Robert Hunter
Licensing Administrator
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Robert Hunter:

RE: 2AM-MRY2540 – Baffinland Iron Mines – Mary River Project – Baffinland's Submission of Commitment 30 and 31

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned submission.

ECCC provides expert information and knowledge to project assessments on subjects within the department's mandate and within federal jurisdiction, including greenhouse gas emissions and climate change, air quality, water quality and quantity, migratory birds, species at risk, environmental emergencies preparedness and response, and climate and meteorology. This work includes reviewing proponent's characterization of environmental effects and proposed mitigation measures, and providing information and knowledge to decision-makers on activities needed to mitigate these environmental effects within federal jurisdiction. Any comments received from ECCC in this context does not relieve the proponent of its obligations to respect all applicable federal legislation.

The following comments are provided:

1. **Topic: Pit Outflow**

   References

   1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
      - Section 2: Water Balance Model
      - Figure 1.1: Mary River Project – Deposit No. 1 Open Pit Area
   2. Interim Closure and Reclamation Plan BAF-PH1-830-P16-0012 Revised Draft - Rev 5 (Baffinland Iron Mines Corporation; October 30, 2018)

- Section 5.2.1.5: Engineering Work Associated with Closure Activity

Comment

For the early closure scenario: "*Inflow to the Pit is expected to be discharged through natural, gravity-driven drainage pathways rather than accumulate as a lake within the Pit. Therefore, the WBM* [water balance model] *was developed for a single representative point within the Pit.*" The location of the pit drainage pathway is relevant because it will determine the aquatic receiving environment and therefore have an influence on what appropriate water quality criteria might be.

The normal closure scenario involves a pit lake where: "*pit drainage will enter the natural environment through the spillway and natural drainage from the southeast corner of the open pit (KP 2008), eventually reaching the receiving waters of Mary River.*" The Mary River has a much higher discharge and assimilative capacity than the two streams to the west of the pit (Sheardown Lake Tributary 1 and Camp Lake Tributary 1) which seem likely to receive pit runoff in an early closure scenario.

ECCC Recommendations

ECCC recommends the Proponent specify:

a. the location in the aquatic receiving environment for pit runoff in an early closure scenario; and
b. the relative contribution of pit drainage to the total discharge in those receiving watercourses or waterbodies.

2. Topic: Water quality objectives

References

1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
    - Section 4: Model Uncertainties
2. Interim Closure and Reclamation Plan BAF-PH1-830-P16-0012 Revised Draft - Rev 5 (Baffinland Iron Mines Corporation; October 30, 2018)
    - Table 5.1: Closure Objectives, Criteria and Actions by Major Project Components

Comment

Water quality model [WQM] results are compared with water licence effluent quality criteria final environmental impact statement (FEIS) model predictions. All modeled parameter concentrations respect current water licence effluent quality criteria, however the report acknowledges in Section 4 "*effluent must pass acute toxicity testing prior to discharge and, upon entering the receiving environment, not exceed relevant AEMP benchmarks (Baffinland 2015)*". For the model run using average historical climate and median measured concentrations for source terms, predicted median total aluminum and cobalt concentrations

are above AEMP benchmarks, 3.8 and 2.75 times respectively. There are AEMP benchmark exceedances of additional parameters for 95th percentile concentrations in the same model run, including phosphorous and total chromium, lead and vanadium. As presented, drainage from the pit at early closure would not directly enter the aquatic environment so AEMP benchmarks would not apply at the discharge point. However, the predicted exceedances highlight the need to understand drainage pathways and the contribution of pit drainage to the receiving aquatic environment, to help determine appropriate effluent quality criteria.

In the Interim Closure and Reclamation Plan, closure objectives include open pit lake water, runoff and seepage water quality that is safe for humans and the receiving environment, and one of the closure criteria for surface runoff and seepage water quality is "*Effluent discharge quality is consistent or improved from the initial FEIS predictions.*" Several modeled parameter concentrations are higher than FEIS predictions for pit lake water quality. For the model run using average historical climate and median measured concentrations for source terms, predicted median total iron and manganese concentrations are above the upper range of FEIS model median concentration predictions (Year 21 open pit water quality). For the most conservative model run, which uses dry years in the climate input and 95th percentile parameter concentrations for source terms, predicted median concentrations of sulphate and total aluminum, barium, iron, lead, magnesium, manganese, sodium and vanadium are above the upper range of FEIS model median concentration predictions. The report presents five factors which contribute to some of the higher predicted concentrations in the early closure pit WQM than in the FEIS pit WQM, however there is no discussion of potential mitigation actions that would help meet stated closure criteria.

ECCC Recommendations

ECCC recommends the Proponent:

a. discuss what effluent quality would be necessary to meet AEMP benchmarks in the receiving aquatic environment, building on information provided in the response to ECCC Comment 1 (Pit Outflow); and

b. discuss mitigation measures which might be applied in an early closure scenario to reduce parameter concentrations in pit discharge sufficiently to meet closure criteria.

3. Topic: Predicted water quality under climate change scenarios

References

1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
    - Section 3.3: Water Quality Model Scenarios
    - Section 3.5: Water Quality Model Results

Comment

Six water quality model scenarios were run but none used predicted climate change climate conditions, as was done for water balance model. Predicted water quality results that

consider climate change are not presented in the report, though they are discussed: "*Generally, long-term climate change is expected to increase water quality concentrations as increased temperature and precipitation will lead to increased mineral reaction rates, higher suspended sediment loads, and more water infiltrating Pit walls and rubble.*"

The climate is changing and incorporating how it will influence water quality is a critical element of a successful closure plan. Estimating the range of parameter concentrations in pit runoff that could occur in closure and post-closure with climate change will help identify which parameters might be of concern for the aquatic environment and allow development of mitigation plans if necessary.

ECCC Recommendations

ECCC recommends the Proponent provide tables of parameter concentration summary statistics for climate change model scenarios used in the water balance model. The tables should compare concentrations against water licence discharge criteria and FEIS model predictions, as was done for the average and dry climate model runs (Tables 3.9-3.11).

4. Topic: Total suspended solids

References

1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
    - Section 3.5: Water Quality Model Results

Comment

Total suspended solids (TSS) concentration predictions are not reported, and it is not clear how TSS were incorporated into the model. Management of high TSS loads in runoff around mine infrastructure is a persistent challenge at the Mary River mine, so it is relevant to consider how it will be addressed in closure and post closure.

Sediment control is mentioned in Section 3.5: "*higher predicted concentrations of some metals, particularly iron, which are expected to be elevated in suspended sediment following freshet and high-rainfall events. These concentrations would likely be reduced with sediment control.*" The sediment control measures used currently on site are constantly monitored and managed, especially during freshet and high rainfall events. It would be challenging to control erosion and sedimentation from the pit in its steep mountainside location in an early closure scenario without requiring on-site presence.

ECCC Recommendations

ECCC recommends the Proponent:

a. describe how TSS were incorporated into the model;

b. provide predicted TSS concentrations; and

c. discuss sediment and erosion control measures that do not require on-site presence and could be appropriate for pit drainage in an early closure scenario.

5. Total and dissolved metal concentrations

References

1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
    - Section 3.2.1.1: Concentration-Based Source Terms
    - Section 3.5: Water Quality Model Results
    - Table 3.7: Water Quality Model Scenarios
    - Section 4: Model Uncertainties
2. Mary River Project, 2020-2024 Qikiqtani Inuit Association and Nunavut Water Board Annual Report for Operations (Baffinland Iron Mines Corporation; March 2021-2025)

Comment

One of the uncertainties in the model source terms is "*Using total metals concentrations to represent dissolved metals concentrations in datasets containing only totals metals results and vice versa. This approach likely led to an overestimation of some concentration-based source terms and an underestimation of some leaching-rate based source terms, including iron and manganese.*"

Since the modelled pit outflow concentrations include both types of source terms, concentration based and leaching rate based, it is not clear if the result is likely an over- or underestimate. Since the relative contribution of both types of source terms varies with the different climate scenarios, the answer might be variable. The differences between total and dissolved concentrations are different for each metal in source terms where both are used (high grade iron formation-oxidized and overburden). The differences vary from none (ex. lithium or tin) to one or two orders of magnitude (ex. aluminum or copper).

Though a range of geochemical source terms were used to address model uncertainties, these were principally using the 50^{th} and 95^{th} percentile of measured concentrations. The uncertainty due to substituting different metal concentrations does not seem to have been addressed and doing so could help quantify uncertainty.

Using measured metal concentrations for source terms when they are available contributes to reducing uncertainty. It is not clear why a substitution was used for non-acid generating (non-AG) waste rock, as specified in section 3.5: "*In this model, total metals concentrations were used to represent dissolved metals concentrations in operational water quality datasets only containing total metals results, such as the WRF* [waste rock facility] *and 570 Sump water quality datasets used to develop the non-AG waste rock and soluble sulphate fraction source terms, respectively.*" The annual reports for the last five years (2020-2024) report both total and dissolved metal concentrations at the WRF surveillance network program (SNP) station MS-08.

ECCC Recommendations

ECCC recommends the Proponent:

a. characterize the magnitude of uncertainty introduced by substituting total metal for dissolved metal concentrations and vice versa;

b. quantify the relative contributions of concentration based and leaching rate-based source terms in the predicted pit outflow parameter concentrations;

c. discuss the uncertainty in pit outflow predicted concentrations due to substituting total metal for dissolved metal concentrations and vice versa; and

d. explain why sample results from SNP station MS-08 at the waste rock facility were not used to develop the non-AG waste rock source term

6. Report recommendations

Reference

1. Deposit No. 1 Open Pit Water Balance and Water Quality Model Report – Operations and Early Closure, Mary River Project (Nunami Stantec Limited; December 5, 2025)
    - Section 5.2: Recommendations

Comment

The report makes two recommendations, regarding additional kinetic testing and using a consistent analyte suite. The Proponent has not discussed if they intend to implement the recommendations and when they might do so if applicable.

ECCC Recommendations

ECCC recommends the Proponent clarify if they intend to implement either or both of the report's recommendations, and provide timelines if applicable.

If you need more information, please contact Jessica Kassar at (867) 222-2036 or Jessica.Kassar@ec.gc.ca.

Sincerely,

Kassar, Jessica

Digitally signed by Kassar, Jessica
Date: 2026.01.30 14:18:56 -05'00'

Jessica Kassar
Environmental Assessment Officer

Attachment(s):

cc: Eva Walker, Head, Environmental Assessment North (NT and NU)