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
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Your file - Votre référence
(2AM-MRY1325)
Our file - Notre référence
GCDocs#104376954

July 18, 2022

Sylvia Ekelik
Licensing Administrator Assistant
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 Review of Baffinland Iron Mine Corporation 2021 annual report for Type A Water Licence 2AM-MRY1325 for the Mary River Project

Dear Ms. Ekelik,

Thank you for the April 4, 2022 invitation to review the above referenced annual report. Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the report pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. Please find CIRNAC comments and recommendations in the attached technical memorandum.

If there are any questions or concerns, please contact Lauren Perrin at lauren.perrin@rcaanc-cirnac.gc.ca or Andrew Keim, Manager of Waters at andrew.keim@rcaanc-cirnac.gc.ca .

Sincerely,

Lauren Perrin
Water Management Specialist

Canada

Technical Review Memorandum

Date: July 18, 2022

To: Sylvia Ekelik, Licensing Administrator Assistant, Nunavut Water Board

From: Lauren Perrin, Water Management Specialist, CIRNAC

Subject: **Crown-Indigenous Relations and Northern Affairs Canada's review of Baffinland Iron Mine Corporation's 2020 annual report for Type A water licence 2AM-MRY1325 for the Mary River Project**

Region: ☐ Kitikmeot ☐ Kivalliq ☒ Qikiqtani

A. BACKGROUND

The Mary River Project is an operating high-grade iron mine located in the Qikiqtani Region of Nunavut, on northern Baffin Island. The mine is owned and operated by Baffinland Iron Mines Corporation (Baffinland) and includes the Mine Site, the Milne Port site, and a 100 km-long Tote Road connecting the two sites. The current approved project allows iron ore production through open pit mining. Part B Item 4 of water licence 2AMMRY1325 – Amendment No. 1 requires the proponent to submit an Annual Report for operations.

Baffinland has submitted plans for a "Phase 2 Proposal" that involves the construction of a new railway running adjacent to the existing Tote Road (called the North Railway) and an increase in total mine production. Phase 2 also involves development of additional infrastructure and upgrades at Milne Port and at the Mine Site. This licence amendment has been submitted to the Nunavut Water Board.

On April 4, 2022, the Nunavut Water Board provided notification of Baffinland's submission of the 2021 annual report for the Mary River Project and invited comments. A summary of the subjects of Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) comments and recommendations regarding the Annual Report are listed in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B. Detailed technical review comments are in Section C.

Table 1: Summary of Recommendations

Number	Subject
1	Sedimentation Management During Freshet
2	Sampling Errors and External Lab Errors
3	Deviation During Construction of KM106 Run of Mine Stockpile and Sedimentation Pond
4	Addition of Mine Haul Road and Tote Road to Bi-Annual Inspections including Assessment of Potential Permafrost Degradation Along These Roads
5	Omission of Thermal Monitoring Data in 2021 Annual Report
6	Assessment of Impact Predictions
7	Confirmation of Permafrost Degradation/Remedial/Maintenance Activities
8	Waste Rock Management
9	Tracking of Inspection Issues

B. DOCUMENTS REVIEWED AND REFERENCED

The following table (Table 2) provides a list of the documents reviewed under the submission and referenced during the review.

Table 2: Documents Reviewed and Referenced

Document Title	Author, File No., Rev., Date
Mary River Project, 2021 QIA and NWB Annual Report for Operations	Baffinland Iron Mine Corporation, 31 March 2022
Appendix A – Concordance Table Type "A" Water Licence 2AM-MRY1325 – Amendment No.1	Baffinland Iron Mine Corporation, March 2022
Appendix C.1 – Construction Summary Report (CSR) Mine Site Waste Rock Facility Expansion and Drainage System, Construction of West Ditch and East Ditch Phase 2021 (Parts 1-3)	Baffinland Iron Mine Corporation, 27 December 2021
Appendix C.2 – Geotechnical Inspection Report, Annual Geotechnical Inspections – 2021 Report 1 and Report 2 (Parts 1-5)	Wood, 23 August 2021 & 16 November 2021
Appendix C.3 – DFO Tote Road Fish Habitat Monitoring (Parts 1-2)	Baffinland Iron Mine Corporation, 31 December 2021, Rev0
Appendix C.4 - Tote Road Priority Action Schedule	Baffinland Iron Mine Corporation, March 2022
Appendix D.1 – Mine Site Photo Sheet	Baffinland Iron Mine Corporation, March 2022
Appendix D.2 – Tote Road Photo Sheet	Baffinland Iron Mine Corporation, March 2022
Appendix D.3 – Milne Port Photo Sheet	Baffinland Iron Mine Corporation, March 2022
Appendix D.4 – Steensby Port, Mid-rail Camp and Bruce Head Camps Photo Sheet	Baffinland Iron Mine Corporation, March 2022
Appendix D.5 – Socio-economic Benefits and Community Engagement Photo Sheet	Baffinland Iron Mine Corporation, March 2022
Appendix E.1 – Waste Backhaul Report	Qikiqtaaluk Environmental, 21 February 2022
Appendix E.2 – Incinerator Ash Testing Results	Baffinland Iron Mine Corporation, March 2022

Document Title	Author, File No., Rev., Date
Appendix E.3 - 2021 Surveillance Network Program (SNP) Hydrometric Monitoring Program (Memorandum)	North Water Environmental, 18 March 2022
Appendix E.4 – Shipping Manifest (Inbound and Outbound)	Baffinland Iron Mine Corporation, March 2022
Appendix E.5.1 – Snow Management Plan	Baffinland Iron Mine Corporation, 31 March 2022, Rev5
Appendix E.5.2 – Sampling Program – Quality Assurance and Quality Control Plan	Baffinland Iron Mine Corporation, 31 March 2022, Rev5
Appendix E.5.3 – Aquatic Effects Monitoring Plan	Baffinland Iron Mine Corporation, 31 March 2022, Rev2
Appendix E.5.4 – Hazardous Materials and Hazardous Waste Management Plan	Baffinland Iron Mine Corporation, 31 March 2022, Rev6
Appendix E.5.5 – Fresh Water Supply, Sewage, and Wastewater Management Plan (FWSSWMP) (Parts 1-5)	Baffinland Iron Mine Corporation, 31 March 2022, Rev9
Appendix E.5.6 – QMR2 Quarry Management Plan	Baffinland Iron Mine Corporation, 30 July 2021, Rev3
Appendix E.6 – Waste Rock Geochemistry Analytical Sampling Results	Baffinland Iron Mine Corporation, 2022
Appendix E.7 – Quarry Geochemistry Analytical Sampling Results	Baffinland Iron Mine Corporation, 2022
Appendix E.8.1 – CIRNAC Inspection Reports and Baffinland Response	Baffinland Iron Mine Corporation, 25 November 2021
Appendix E.8.2 – QIA Inspection Reports and Baffinland Response	QIA, July 2021
Appendix E.8.3 - Initial and Follow-up Spill Reports	Baffinland Iron Mine Corporation, 2022
Appendix E.9.1 - 2021 Core Receiving Environmental Monitoring Program (CREMP) Report (Parts 1-2)	Minnow, March 2022
Appendix E.9.2 - 2021 Lake Sedimentation Monitoring Report	Minnow, March 2022
Appendix E.9.3 - 2021 Aquatic Effects Monitoring Plan (AEMP) Hydrometric Monitoring Report	North Water Environmental, 18 March 2022
Appendix E.10 – Reclamation Research Studies, Revegetation Survey & Preliminary Reclamation Trial 2021 Project Update (Parts 1-2)	EDI, March 2022, Rev.1.0
Appendix E.11 - 2021 Freshet Monitoring Report	Baffinland Iron Mine Corporation, 31 March 2022, Rev0
Appendix E.12 - 2021 Groundwater Monitoring Program	Tetra Tech, 24 March 2022, Rev0
Appendix E.13 – Surveillance Network Program (SNP) Modification Application	Baffinland Iron Mine Corporation, 31 March 2022
Appendix E.14 – Response to 2020 Annual Report Comments	Baffinland Iron Mine Corporation, 31 March 2022
Appendix E.15 – Metal and Diamond Mining Effluent Regulations (MDMER) Annual Report	Government of Canada, 2021
NWB Licence No. 2AM-MRY1325 – Amendment No.1	NWB, 31 July 2015
CIRNAC Review of BAFFINLAND's 2020 Annual Report for Type A Water Licence 2AM-MRY1325 for the Mary River Project	CIRNAC, 10 August 2021
Baffinland's Responses to Comments 2020 QIA & NWB Annual Report for Operations Mary River Project, Type 'A' Water Licence – 2AM-MRY1325 – Amendment No. 1	Baffinland Iron Mine Corporation, 13 December 2021

C. RESULTS OF REVIEW

1. Sedimentation Management During Freshet

Comment:

In 2021, Baffinland continued to assess and implement the appropriate mitigation measures and corrective actions to address ongoing sedimentation concerns at the Project site. The prompt implementation of sedimentation mitigation measures generally proved effective in controlling the mobilization of sediments and returning total suspended solids (TSS) levels to below applicable TSS discharge criteria stipulated in the Type 'A' Water Licence. Despite these efforts however, in 2021 three spills of sediment laden water to streams were reported to the Northwest Territories-Nunavut (NT-NU) Spill Report Line (21-146, 21-164 and 21-257) during freshet, as noted in Section 7 of the Annual Report and Appendix E.11 – 2021 Freshet Monitoring Report.

Discharges of sediment laden water to streams at the Project site are expected to decrease as additional measures (e.g., KM105 sedimentation pond and related facilities, etc.) included in the long-term water management plan are implemented on site but in the meantime the sediment spills remain an issue.

Recommendation:

(R-01) CIRNAC recommends that Baffinland implement the approved Mine Site Water Management Plan to limit future sediment laden water discharges to the project area streams with the approval of the Mine Site Water Management Plan.

2. Sampling Errors and External Lab Errors

Comment:

As with the 2020 Annual Report, CIRNAC notes several instances in the 2021 Annual Report where exceedances of water quality criteria are attributed to 'sampling error' or 'external laboratory error'. For example, this is noted in Section 7.2 for the measurement of elevated total lead concentrations in stormwater from the Milne Port Bulk Fuel Storage Facility (MP-03) and elevated total suspended solids (TSS) and total lead concentrations in stormwater from the Milne Port Contaminated Snow Containment Area.

CIRNAC is of the opinion that determining the root cause of these exceedances will help determine if these exceedances are real. As well ensure that proper sampling methods in

the field and analytical procedures in the laboratory are followed might help reduce the number of observed exceedances resulting from error.

The true cause of these exceedances should be investigated to confirm whether the exceedances of water quality criteria are due to laboratory errors or other factors**.**

Recommendation:
(R-02) CIRNAC recommends that:

a) Baffinland investigate the root cause of water quality exceedances for TSS and total lead.

b) Ensure that proper sampling procedures in the field and analytical procedures in the laboratory are being followed to help reduce the number of observed exceedances resulting from error.

3. Deviation During Construction of KM106 Run of Mine Stockpile and Sedimentation Pond

Comment:
During construction of the KM106 Run of Mine Stockpile and Sedimentation Pond, a swale was excavated to address a low-lying area identified in the northeast corner of the pond. Subsequent settlement monitoring of the area and inspections of the swale would help address any potential water ponding concerns in the future.

While Baffinland's approach to the geotechnical inspection requirements identified in the water licence are understood, with respect to settlement monitoring and swales, inspections rely solely on visual observations. There is limited discussion provided in the Annual Report regarding monitoring and inspections of the swale.

In addition, it is noted that no mine infrastructure is being inspected, i.e., Mine Haul Road swales as part of the geotechnical inspections.

Recommendation:
(R-03) CIRNAC recommends that results of settlement monitoring of the swale at the KM106 Run of Mine Stockpile and Sedimentation Pond be provided for review.

4. Addition of Mine Haul Road and Tote Road to Bi-Annual Inspections including Assessment of Potential Permafrost Degradation Along These Roads

Comment:

Under Part D, Item 18 of Baffinland Type "A" Water License 2AM-MRY1325 Amendment No. 1, Baffinland is required to conduct bi-annual geotechnical inspections of the of earthworks, geological and hydrological regimes of the Project. The Annual Report noted that water management and erosional issues along the Mine Haul Road continue to be a challenge. Baffinland noted that addressing these issues for the Mine Haul Road will be quite challenging given the location and setting of the road (steep slopes, etc.). As a result, Baffinland developed a two-pronged approach: first short-term mitigation plans for the 2020 freshet, and second the development of a long-term water management plan by Q3 of 2020. From CIRNAC's review of Baffinland's geotechnical reports, comments were limited to culvert conditions along the Mine Haul Road. The inspection reports should have included an inspection of the conditions of the Mine Haul Road between the open pit and the ore haul truck pad to address any potential impacts of surface water flow from culverts over areas of permafrost adjacent to the mine road.

In addition, the geotechnical inspections of the Tote Road were limited to a small subset of culverts along the road. Review of 2021 geotechnical reports found no discussion of potential permafrost degradation along the road as a follow up to the 2019 Tetra Tech Inspection of Milne Inlet Tote Road and Associated Borrow Sources report. Appendix C.4 provides Baffinland's Tote Road Priority Action Schedule detailing when the recommendations of the 2019 Tetra Tech report will be addressed. It is not clear why the status of these four items were not discussed as part of the bi-annual inspections. As these items remain outstanding and are scheduled to be addressed in 2022.

Recommendation:

(R-04) CIRNAC recommends that Baffinland include both the Tote Road to Milne Inlet and the Mine Haul Road from Mary River Mine to the pit in all future bi-annual inspections so as to address all potential erosion, permafrost degradation, slope and structural concerns along these routes.

5. Omission of Thermal Monitoring Data in 2021 Annual Report

Comment:

As per Part B Item 4 and Part K Schedule B of the Type 'A' Water Licence 2AM-MRY1325-Amendment 1 stipulating what is to be included in the Annual Report for Operations, Part e) Monitoring ii) outlines the following:

'Results of thermal monitoring and/or research carried out in conjunction with the Waste Rock Management Plan and disposal of potentially acid generating and metal leaching materials, permafrost integrity along the railway alignment and other project sites'

In Section 9.6.4 of the 2021 Annual Report Baffinland states that as part of the ongoing waste rock geochemical evaluation program, eight (8) thermistor series at varying depths and locations throughout the Waste Rock Facility (WRF) were installed from 2018 to 2019 to characterize the thermal conditions of the WRF. Real time thermal data continued to be acquired from these instruments in 2021. The thermal data were not included for review anywhere within the main report or supporting appendices. Also, the 2021 Annual Report did not discuss permafrost integrity along the railway alignment and other project related sites (e.g., Tote Road, Quarry Areas, Mine Site areas, etc.).

Recommendation:

(R-05) CIRNAC requests that Baffinland provide the report that summarizes and interprets the thermal data collected at the Project in 2021 for review.

6. Assessment of Impact Predictions

Comment:

The Aquatic Effects Monitoring Plan (AEMP) was identified as a follow-up monitoring program in BIMC's Final Environmental Impact Statement (FEIS) and is designed to (a) detect short-term and long-term effects of the Project's activities on the surrounding aquatic environment; (b) evaluate the accuracy of impact predictions; (c) assess the effectiveness of planned mitigation measures; and (d) identify additional mitigation measures to avert or reduce unforeseen environmental effects. It is structured as a framework which conceptually provides the opportunity to integrate the results of individually monitored but related aquatic monitoring programs (i.e., Core Receiving Environment Monitoring Program (CREMP); Lake Sedimentation Monitoring Program; Hydrometric Monitoring Program; Dustfall Monitoring Program; Stream Diversion Barrier Study (currently deferred); Environmental Effects Monitoring (EEM) Program).

Section 7.6 of the 2021 Annual Report for Operations discusses the AEMP while reports of AEMP programs that were completed in 2021 are included in Appendix E.9. However, the discussion in Section 7.6 is limited to outlining the scope of the AEMP and does not provide an integrated interpretation of the data collected under the various AEMP programs. Furthermore, all of the program reports (i.e., CREMP, Lake Sedimentation Monitoring Report and Hydrometric Monitoring Program) generally lacked comparisons to FEIS predictions needed to assess ongoing environmental conditions and trends at the Project to inform monitoring and mitigation programs and to confirm the accuracy of the impact predictions.

Recommendation:

(R-06) CIRNAC recommends Baffinland:

a) Integrate the results of individually monitored but related aquatic monitoring programs under the AEMP.

b) Include comparisons to impact predictions made in the FEIS within the AEMP and other monitoring documents in order to confirm their accuracy, and to aid with the ongoing assessment of environmental conditions and trends at the Project.

7. Confirmation of Permafrost Degradation/Remedial/Maintenance Activities

Comment:

The 2019 Annual Report provided summary information on construction activities carried out during the year in the main body of the report (Section 2) and more detailed information in the 2019 Construction Summary Reports in Appendix C.1. Many of the construction activities included excavations in existing permafrost soils. Challenges associated with permafrost degradation, erosion and sediment release are acknowledged.

The 2019 Tote Road and Associated Borrow Areas inspection report by Tetra Tech identified numerous areas requiring actions that needed to be undertaken to mitigate permafrost degradation. Table 1 of the document provides a summary of 2019 Inspection along with an action priority rating. This table also contains summaries of the earlier 2009 and 2014 Inspections. The report noted the presence of potential very high-risk areas (designated as A+++ including Site 14-km 89.8, Site 22-km 72.4, Site 29-km 63.7, Site 32/33-km 56.9R/56.7L) that may be susceptible to sudden catastrophic failure due to permafrost degradation and require priority action and immediate attention. In addition, there were 8 sites with high-risk A+ priority, and 22 sites with a B priority rating. Of the 87 sites assessed, only 5 sites had lower risk ratings in 2019 compared to earlier years.

Baffinland in Section 8.1 of the 2019 Annual Report state that “Evaluation of the condition of the Tote Road by Tetra Tech led to the implementation of an action plan to address the historic borrow sources on the Tote Road, to be executed in 2019 and 2020. Works were initiated at the KM7.2 borrow with the placement of material to restore the grade of the borrow pit. Further work is required to restore the overburden material, as well as other infilling and stabilization activities at the remaining priority historic roadside borrow source locations”.

In addition to the Tote Road, the Tetra Tech report also commented on slope instability and erosion along the Haul Road from the Open Pit where several large erosion channels

have formed downslope of the road (Photos 49, 50, and 51). This erosion has been the source of considerable amounts of sediment into the creek below the road which flows directly into Mary River. The flowing water and erosion have caused permafrost thaw, which reduces the soil strength making it considerably more prone to erosion. Concentrated flow from the culverts now channelizes the flow causing both thermal and mechanical erosion. Tetra Tech stated that to be able to develop appropriate remediation methods, it will be necessary to carefully investigate permafrost conditions on the slope and along the haul road and to have an accurate topographic survey carried out for the slope.

In its 16 December 2019 letter response to CIRNAC Inspections, Baffinland commented on the complexity of water management and erosion control in general and specifically as related to the Open Pit mine haul road. Baffinland committed to carrying out short term actions to mitigate the potential impacts of the 2020 freshet and for the development of a long-term freshet and mine haul road water management plan in 2020.

In the 2021 Annual Report Appendix C.4 Baffinland provided a Tote Road Priority Action Schedule in which they have identified seventeen priority items of varying risk profiles. Of the seventeen items Baffinland has stated thirteen have been addressed, one is ongoing and three remain to be started with the scheduled completion date for the four remaining items to be addressed in 2022. Neither the Annual Report nor the Geotechnical Inspection reports, as prepared in 2021, comment on or provide independent confirmation on how the initial list from the 2019 rehabilitation priorities (i.e., Table 1 of the Tetra Tech Report) have been addressed. It is unclear if the information provided in Appendix C.4 of the 2021 Annual Report is current and reflective of all recommended work outlined by Tetra Tech in their 2019 Inspection Report.

Recommendation:

(R-07) CIRNAC requests that Baffinland:

a) Provide a copy of the Action Plan that was implemented to address historic borrow sources along the Tote Road (i.e., not just a list of priorities as provided in Appendix C.4 but a more comprehensive list referencing back to the original Table 1 of the 2019 Tetra Tech report)

b) Provide an update of the actions, including the items completed and dates for when this work was completed with references provided to how the rehabilitation work was inspected to confirm completeness.

c) Provide an overall action plan for all disturbed areas (including any new areas identified as part of Baffinland inspections of the respective roadways since the time of the 2019

Tetra Tech inspection) identified at the existing and historic borrow areas along Tote Road and for the Mine Haul Road

8. Waste Rock Management

Comment:

Section 5.3.1 of the 2021 Annual Report notes that 6.03 Mt of waste rock were generated and classified as Potentially Acid Generating (PAG) or Non-Acid Generating (Non-AG) based on operational testing procedures outlined in the Phase 1 – Waste Rock Management Plan. These materials were reportedly deposited in PAG and Non-AG areas of the waste rock storage facility (WRF) as per the quantities shown in Table 5.8. Section 9.6 refers to the WRF Quality Assurance/Quality Control and geochemistry monitoring programs for PAG/Non-AG classification and WRF water quality and thermal monitoring programs with analytical results presented in Appendix E.6 (with the exception of thermal monitoring results, which were not included with the 2021 annual report submission).

In reviewing the 2021 Annual Report for Operations CIRNAC notes that the information provided on operations related to waste rock management and storage is limited, making it difficult to assess whether waste rock is being placed and managed as per the Waste Rock Management Plan. Furthermore, as noted in Section 9.6.3 Water Quality Monitoring Program, 12 drainage/seepage samples collected from seven locations along the toe of the WRF (i.e., 17% of a total of 69 samples) were acidic with pH values < 6, ranging from 4.57 to 5.92 (Table E.6.6, Appendix E.6). While this drainage/seepage appears to be localized and appropriately managed during operations by redirecting to the WRF pond, the observed acidic seepage raises concerns regarding the placement of materials within the WRF and the long-term performance of the WRF during closure.

Recommendation:

(R-08) CIRNAC recommends that Baffinland take the following measures to address the concerns above:

a) Provide operational details and figures on waste rock placement (e.g. how and where, etc.) to allow for comparison of actual activities verses requirements of the Waste Rock Management Plan.

b) Provide cumulative information on waste rock stored to date.

c) Provide additional supporting information for Baffinland’s conclusion that 17% of seepage samples from the WRF being acidic is not an issue for concern.

9. Tracking of Inspection Issues

Comment:

A variety of informal and formal inspections are carried out on project construction and operational activities, facilities, and of the immediate and local environment. Formal inspections include those carried out by Baffinland and its consultants as required under the licence, as well as inspections carried out by CIRNAC, QIA, ECCC and WSCC.

The issues raised as a result of an inspection are recorded and provided to Baffinland for actions where needed. Baffinland in turn responds to the inspection items within a timeframe as required.

While this process is appropriate and in keeping with licence requirements, it does not provide an overall perspective on site-wide issues (e.g. permafrost degradation, ongoing non-compliant TSS releases, etc.) or perspective with respect to ongoing challenges associated with a specific site feature, operation, or system. The annual report should contain a cross reference of findings and recommendations from various inspections reports including the generation of a cumulative tracking list of findings and recommendations.

Recommendation:

(R-09) CIRNAC recommends that Baffinland develop a register for tracking inspection findings, recommendations and final disposition / actions on a category and site feature basis to allow for easier tracking of issues, concerns and resolution actions.