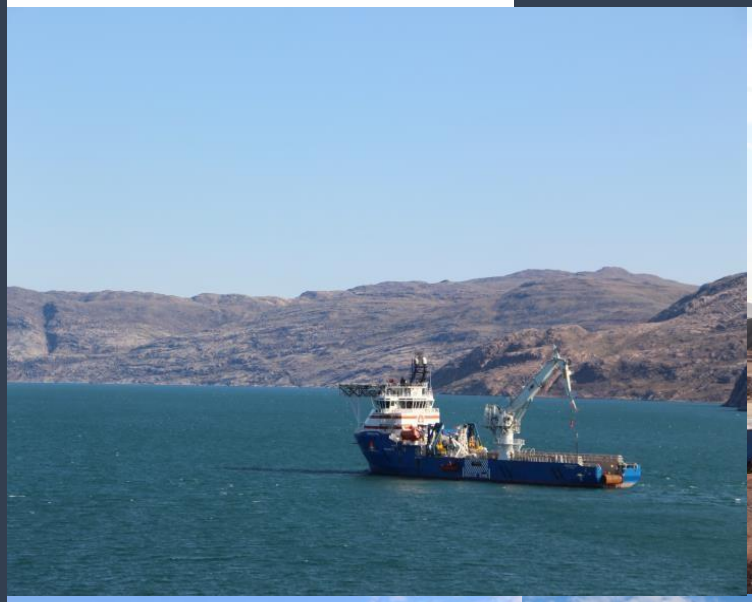
Nunavut Impact Review Board

August 2019 Site Visit Report

The Mary River project

Baffinland Iron Mines Corporation

NIRB File No. 08MN053



October

2019

Report title:	2019 Site Visit Report for the Nunavut Impact Review Board's Monitoring of Baffinland Iron Mines Corporation's *Mary River Project* (NIRB File No. 08MN057)
Project:	Mary River Project
Project Location:	Qikiqtani (North Baffin) Region, Nunavut
Project Owner:	Baffinland Iron Mines Corporation 2275 Upper Middle Road East, Suite 300 Oakville, ON L6H 0C3
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Site visit dates:	August 6-9, 2019
Last Site Visit:	March 26-28, 2019
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Photos by:	Cory Barker and Solomon Amuno; All photos shown were taken during the NIRB site visit on August 6-9, 2019.

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1 INTRODUCTION

The Nunavut Impact Review Board (NIRB or Board) was established through Articles 10 and 12 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada* (*Nunavut Agreement*) and is responsible for post environmental assessment monitoring of a Project in accordance with Part 7 of Article 12 of the *Nunavut Agreement*.

This report provides the findings that resulted from the NIRB's summer site visit to the Mary River Project site on August 6-9, 2019 and the public information session in Igloolik on August 9, 2019 as part of the NIRB's ongoing monitoring program.

1.1 Objectives & Purpose of Site Visit

The objective of the NIRB's site visit was to determine whether, and to what extent, the land or resource use in question is being carried out within the predetermined Terms and Conditions of amended NIRB Project Certificate No. 005 issued for the Mary River Project, in accordance with Section 12.7.2(b) of the *Nunavut Agreement*.

The observations resulting from this site visit shall, wherever possible, be incorporated into the measurement of the relevant effects of the Project, provide the information necessary for agencies to enforce terms and conditions of land or resource use approvals, and will be further used to assess the accuracy of the predictions contained in the project impact statements in accordance with Section 12.7.2 of the *Nunavut Agreement,* and s. 135 (3) of the NuPPAA.

1.2 Objective & Purpose of a Public Information Session

Pursuant to the *Nunavut Agreement* and the Mary River Project Certificate 005, the NIRB monitoring responsibilities include providing periodic updates regarding its Monitoring Program for the communities most affected by Baffinland Iron Mine Corporation's (Baffinland) Mary River Project. This meeting is also to further ensure ongoing awareness of Project-specific terms and conditions, and encourage effective participation throughout the Board's monitoring process.

2 BACKGROUND OF THE MARY RIVER PROJECT AND AMENDMENTS

The Mary River Project

The original Mary River Project was approved by the NIRB in December 2012 and involved the development of an open pit iron ore mine on northern Baffin Island. It included the use of an existing Tote Road between Milne Inlet and the Mine Site at Mary River and Steensby Inlet, as well as railway connecting the Mine Site to the Steensby Port (Figure 1). As originally proposed, iron ore would have been transported from the Mine Site via a railway south to the port at Steensby Inlet. Year-round shipping of the iron ore would be through Foxe Basin and Hudson Strait to markets in Europe, using custom designed ice-breaking ore carriers. Since the issuance of the Mary River Project Certificate No. 005 on December 28, 2012, several elements of the original Mary River Project have not been constructed, although these remain authorized under Project Certificate No. 005, including: the port at Steensby Inlet, the railway from the Mine Site to Steensby Inlet and the fleet of purpose-built ice-breaking ore carriers.

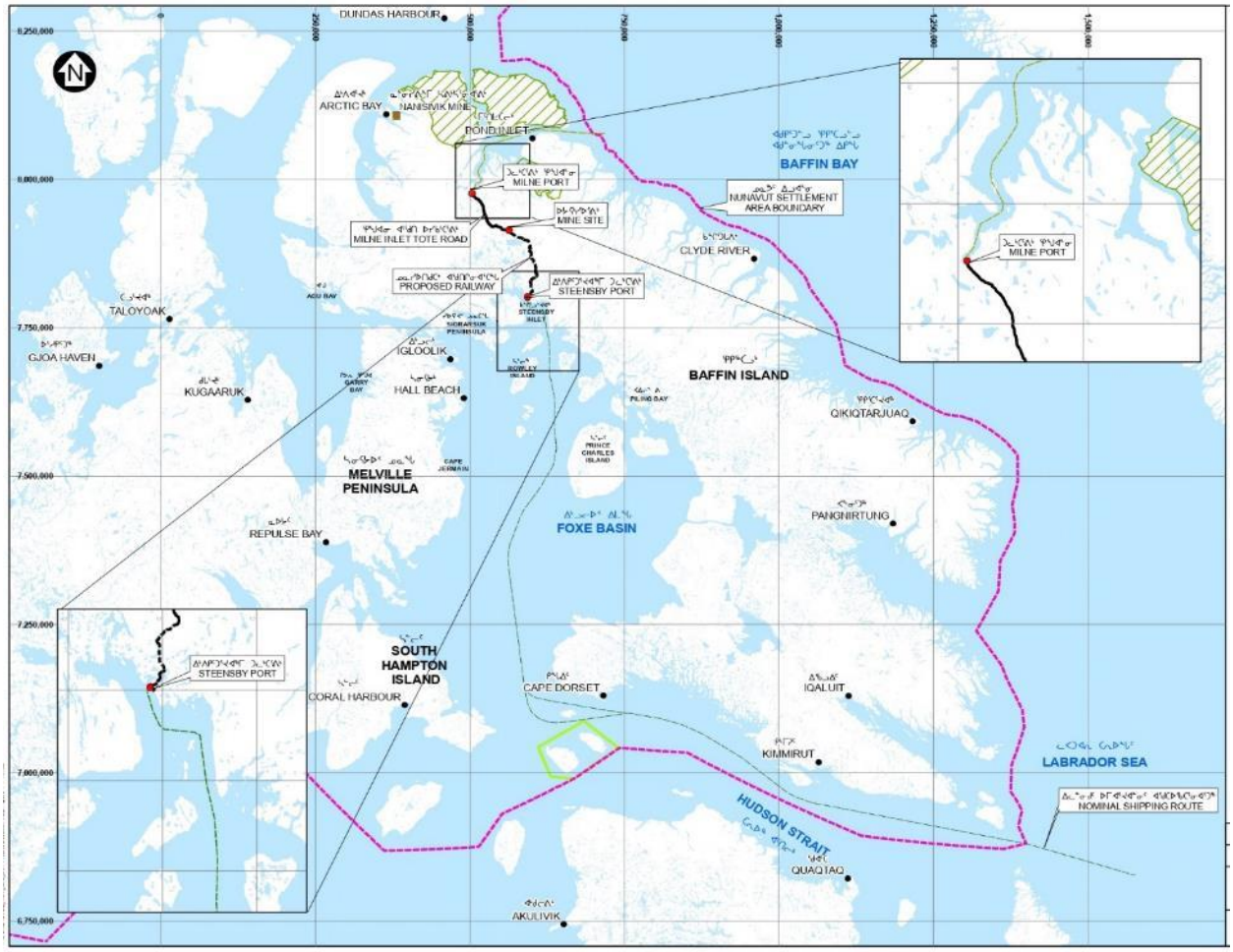

Figure 1: Project Location Map

The Early Revenue Phase Proposal

In January 2013, Baffinland applied for an amendment to the original Mary River Project, seeking to amend specific project components and activities to support limited mining activity to commence prior to the construction of the railway and full facilities at the Steensby Port (Figure 2). Specifically, Baffinland proposed to use the Milne Inlet Tote Road to transport a smaller volume of ore to Milne Port for shipment during the open water season only, with development of the railway, Steensby Port and the purpose-built ore carriers to be delayed until shipments through Milne Inlet had generated sufficient revenue to support subsequent development. Consequently, the Early Revenue Phase Proposal changed the shipping route from the southern route through Foxe Basin to a northern route through Eclipse Sound. Following the NIRB's assessment of the Early Revenue Phase Proposal, the project as modified was approved to proceed and Mary River Project Certificate No. 005 was subsequently amended and re-issued on May 28, 2014.

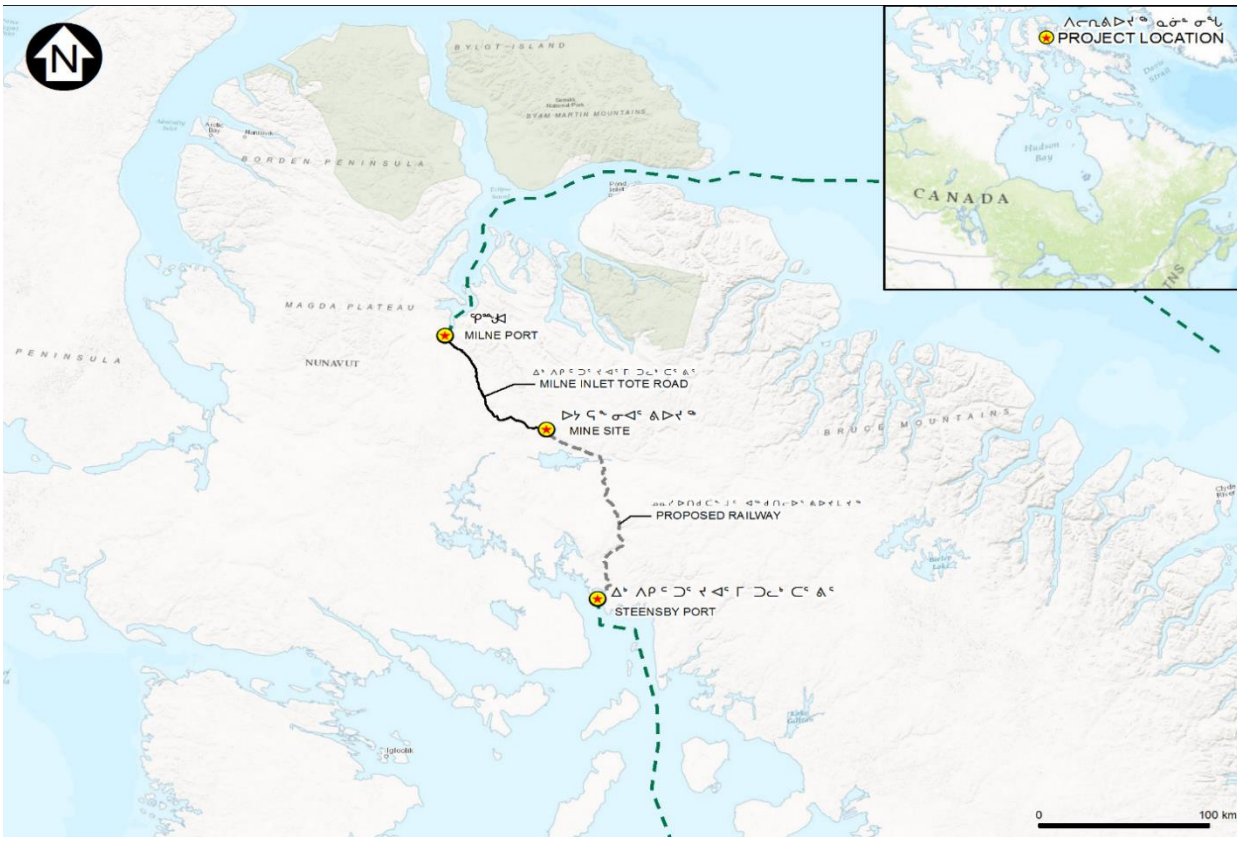

Figure 2: Early Revenue Phase of the Mary River Project

Production Increase Proposal

In December 2017, Baffinland provided the NIRB with notification that anticipated its 2017 road haulage operations would meet and potentially exceed (by 5-7%) the 4.2 million tons per year (Mt/a) limit established by Term and Condition 179(b) of the Mary River Project Certificate No. 005. The NIRB acknowledged receipt of the update and noted additional reporting would be required from Baffinland once final haulage numbers for 2017 were confirmed, including an analysis of potential ecosystemic and socio-economic effects related to any exceedance of road haulage activities from those predicted or permitted. The NIRB encouraged Baffinland to submit an application to amend Term and Condition 179(b) of the Mary River Project Certificate should it identify any challenges with complying in future. Baffinland later confirmed the actual tonnage of ore hauled in 2017 was 4.54 Mt, representing an approximately 7.5% exceedance of the limit specified in the Project Certificate.

In April 2018, Baffinland submitted the "Production Increase, Fuel Storage and Milne Port Accommodations Modification Proposal" (Production Increase Proposal), to the NIRB which proposed an increase in the maximum volume of ore that would be permitted to be trucked from the Mary River site to the Milne Port via the Tote Road from 4.2 Mt/a to 6 Mt/a (requiring up to 83 round trips by ore carriers to market in the open water season), as well as the addition of a 15 million-litre (ML) diesel fuel tank within the existing Fuel Storage Facility at Milne Port, and installation of a new 380-person accommodation at Milne Port. To accommodate these changes,

Baffinland requested that the NIRB amend Conditions 179(a)[1] and 179(b)[2] of the Mary River Project Certificate No. 005.

On September 30, 2018 the Ministers of Intergovernmental Affairs, Northern Affairs and Internal Trade and Crown-Indigenous Relations, on behalf of the Responsible Ministers (the Ministers), accepted the Board's recommendation to allow the fuel increase and installation of new accommodation at Milne Port without amendment to the Project Certificate. The Ministers also approved the Production Increase Proposal allowing Baffinland to increase shipping from Milne Inlet from 4.2 Mt/a to 6 Mt/a iron ore per year until the end of 2019. As a result of this approval, existing term and condition #10 (air emissions) was revised and additional new terms and conditions #179(c), #183 and #184 was added to the Project Certificate No.005 and re-issued on October 30, 2018 (Amendment No. 2) to reflect the activities associated with production increase activities. The revisions in Amendment No. 2 also established mechanisms to audit Baffinland's delivery of benefits in the Qikiqtani Region and compliance with environmental management commitments in relation to the Tote Road and marine shipping, and also support verification of monitoring and mitigation efforts related to the potential for effects on marine mammals due to project shipping.

3 PREPARATIONS FOR THE SITE VISIT

In preparation for the site visit, the Monitoring Officers reviewed the following items: Mary River Project Certificate No. 005 (Amendments No. 1 and 2); previous NIRB winter/summer site visit reports, the NIRB's 2018 Recommendations to Baffinland, and additional follow-up correspondence relevant to the monitoring of the approved Mary River Project.

4 PUBLIC INFORMATION MEETING - IGLOOLIK

The NIRB hosted the information session which consisted of an afternoon open house at 2:00 pm and an evening session at 7:00 pm located at the Igloolik Community Hall with sequential translation into Inuktitut.

Advertisements
The NIRB advertised the meeting through radio, poster, and online through Facebook in Igloolik both in English and Inuktitut in the month prior to the meeting.

Meeting Materials
At the public meeting, the following materials were provided by the NIRB in English and Inuktitut:

- The NIRB's Public Guide Series: Introduction, Screenings, Review and Monitoring
- The NIRB's PowerPoint presentation (in English and Inuktitut)
- Comment Forms

Copies of the above listed consultation materials can be obtained from the NIRB's online public registry at www.nirb.ca.

[1] In any given calendar year, the total volume of ore shipped via Milne Inlet shall not exceed 4.2 million tonnes.
[2] In any given calendar year, the total volume of ore transported by truck on the Milne Inlet Tote Road shall not exceed 4.2 million tonnes.

Meeting Summary
The NIRB's information session was open to all members of the public with refreshments and snacks provided. All in attendance, including government, industry representatives and media, were asked to sign in and identify the community or organization they represented. The meeting had a recorded attendance of 22 people with representatives from the following agencies at the meeting:

- Baffinland Iron Mines Corporation: Andrew Moore, Manager, Inuit, Government and Stakeholder Relations
- Baffinland Iron Mines Corporation: Joe Tigullaraq, Community Engagement Officer
- Isuma TV: Lloyd Lipsett

The NIRB began the evening meeting with a PowerPoint presentation that included a discussion of the NIRB's Monitoring Process, an update on the Mary River Project including an overview of project activities and issues identified through the project specific monitoring program. The presentation concluded with a discussion as to how interested parties and community members could participate in the NIRB's processes.

Both written and verbal comments were accepted at the meeting as the public was encouraged to ask questions, and verbal comments were recorded by the NIRB staff. These comments were then categorized by NIRB staff into the following areas: additional comments, concerns, and traditional and local knowledge related to the ongoing development of the Mary River Project.

A summary of the comments and concerns related to the Project received from community members can be found in Section 6.

5 SITE VISIT

The site visit was conducted on August 6-9, 2019 by the NIRB's Monitoring Officers: Solomon Amuno and Cory Barker (NIRB staff) flew from Iqaluit to the Mary River Mine site via Baffinland's regularly scheduled chartered flight, accompanied by Mr. Lou Kamermans, Baffinland's Director, Sustainable Development. While at site, NIRB staff were guided by Baffinland's Environmental Superintendent, Connor Devereaux.

On the morning of August 7, 2019, NIRB staff travelled throughout the Mary River Mine site area (Photo 1) observing: the following: crusher plant, Deposit No. 1, the waste rock storage area, the waste rock water treatment plant and ponds, the incinerator, the new accommodations complex and the waste management facility. On the afternoon of August 7, 2019, NIRB staff traveled south via helicopter to Steensby Inlet and subsequently returned to the Mary River landfill and the sewage outfall area.

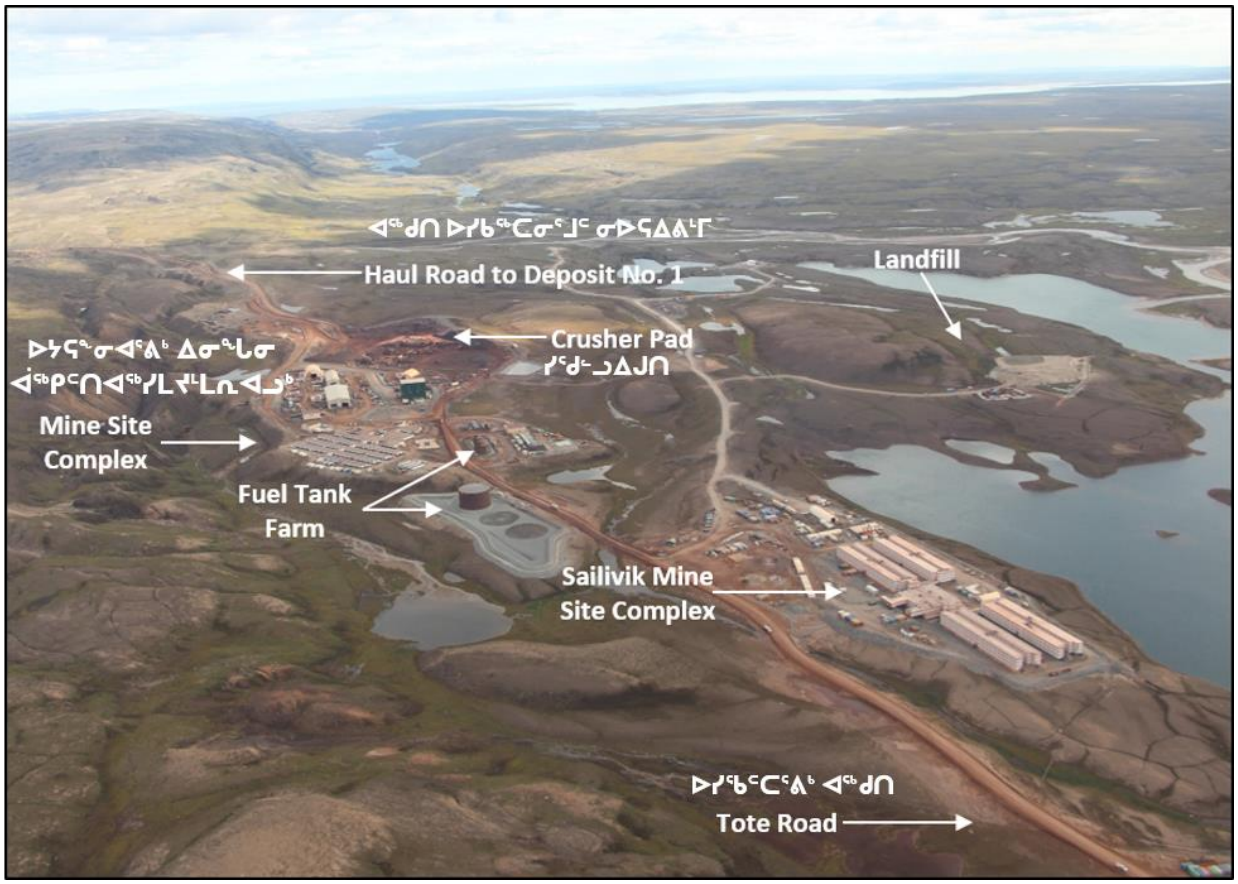

Photo 1: Aerial View of Mary River Mine Site

On August 8, 2019, NIRB staff travelled by truck from the Mine Site Complex to Milne port (Photo 2) via the Tote Road. Along this drive, stops were made to observe the dust suppression management area, road graders, dust fall monitoring stations, erosion along the Tote Road embankment, freshwater culverts (non-fish bearing), and the mock railway embankment for the Phase 2 proposal. While at Milne Port, observations were made of the Milne Port accommodations complex, the ore dock and ship loader facility, sedimentation ponds, pad drainage ditches, ore stockpile area, the landfarm, laydown areas, temporary floating dock and the wastewater treatment plant. On the afternoon of August 8, 2019, NIRB staff traveled via helicopter form Milne Port to the Bruce Head to observe Baffinland's narwhal monitoring program from the observation platform.

Upon completion of the site visit, NIRB staff met with Baffinland staff from various on-site departments to discuss the observations noted during the site visit. This allowed NIRB staff to discuss specific areas of the operation needing improvement or changes with regards to environmental impacts and mitigation measures.

Photo 2: Aerial view of Milne Port

5.1 General Observations for Mary River Mine Site

The following are general observations made during the site visit and do not pertain specifically to any particular terms or conditions of the Meadowbank Project Certificate:

5.1.1 Mary River Mine Site

5.1.1.1 Waste Rock Storage Facility, Settling Pond and Wastewater Treatment Facility

The waste rock storage facility (WRF) is an open area where potentially acid generating rocks are stored (Photo 3). At the time of the site visit, no apparent environmental issues or concerns were noted at the waste rock stockpiles. No signs of runoff or uncontrolled seepage of potentially contaminated water was observed in the area. NIRB staff were able to see visible improvements in the depth of the settling pond since the overflow in 2017, specifically, new synthetic liners had been laid at the base of the pond to reduce the risk of a leak (Photo 4). While on site, NIRB staff were also able to observe loaders and equipment actively working on improvements of the pond.

Photo 3: Waste Rock Storage Pile

Photo 4: Settling Pond

NIRB staff visited the wastewater treatment facility adjacent to the waste rock settling pond (Photo 5) where waste water was collected prior to treatment and discharge as this facility was in full operation. Baffinland staff indicated that the facility was actively treating waste rock effluent through both chemical treatment (Photo 6) and physical treatment using a bladder system (Photo 7), before it is released to the tundra. In general, NIRB staff observed that progress was made to address most environmental concerns associated with the waste rock area and the adjacent sedimentation pond.

Photo 5: Waste Rock Water Treatment Facility

Photo 6: Chemical Treatment of Wastewater from the Waste Rock Settling Pond

Photo 7: Geotube Bladders used for Particle Separation of Waste Rock Effluent

5.1.1.2 Deposit No. 1

NIRB staff visited the Deposit No.1 pit (Photo 8) and noted that ore extraction and mining activities were underway (Photo 9). Heavy trucks, loaders, and drill equipment were observed within the mine pit area as consistent with other site visits. NIRB staff noted that water was pooling within the mine pit (Photo 8 see arrow); Baffinland staff indicated that the water present within the mine pit was acidic and that it was being pumped to the storage pond at the treatment facility. It was observed that while haul trucks were travelling to and from the pit area towards the crusher facility, a large amount of dust was produced by the trucks causing low visibility along the Haul road (Photo 10).

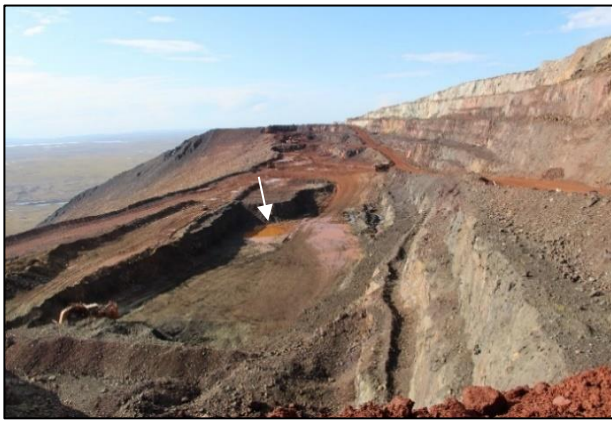

Photo 8: Mary River Mine Pit

Photo 9: Aerial view of Pit Benches

Photo 10: Dust Plume from Haul Truck along the Haul Road.

5.1.1.3 Crusher Plant and Sedimentation Pond

NIRB staff were also toured around the crusher facility (Photo 11) to follow-up on the Board's 2018 recommendation #21 pertaining to the implementation of proper engineering designs and controls to address the increased dust emissions from the crusher plant. The following were observed during the tours of the crusher facility:

- Additional hoods/shrouds as well as rubber bellows were installed on the crusher equipment (Photo 11 and Photo 12), which resulted in a significant decrease of dust emission from the facility compared to previous years. Baffinland has been slowly adding more hoods, shrouds and bellows to its crusher equipment annually, Photo 11 and Photo 13 represent the most recent additions. The use of dust control technology especially near the transfer point and the belts appeared to have been effective in reducing and controlling dust emission from the crusher. Bellows were mainly installed in crusher equipment used for crushing ores into fines in order to help control the dispersion of ore dust during the crushing process. However, in some areas of the crusher facility, dust clouds continue to be an ongoing issue (Photo 14).
- NIRB staff noticed significant buildup of both lump and fine ore underneath the crusher equipment and discussed with Baffinland the operation of those sites. Baffinland stated that it had a crew responsible to do daily cleanup of ore build up. (Photo 15).
- NIRB staff also noted water pooling issues in various parts of the crusher pad and underneath some equipment (Photo 16). Baffinland staff noted that the water build-up was due to a recent rainfall and that they would monitor any water pooling on the crusher pad, correcting any grade issues should it become necessary.

Photo 11: Aerial View of the Crusher Facility at the Mine Site

Photo 12: Shrouds and Bellows on the Shoot

Photo 13: Belt on the Crusher Equipment

Photo 14: Dust Emissions from the Crusher Facility at the Mine Site

Photo 15: Fine Ore Build-Up Beneath the Crusher Conveyor Belts

Photo 16: Water Collection throughout the Crusher Pad

5.1.1.4 Landfill Area

NIRB staff visited the landfill site in order to follow-up on the Board's 2018 recommendation #20 pertaining to the need for Baffinland to address the recurring fencing issue around the landfill footprint and to follow up on observations made during the last site visit in March 2019. NIRB staff had observed scrap vehicles at the landfill.

At the time of this site visit, NIRB staff noted that the landfill was still not fully enclosed with proper fencing (Photo 17) thereby increasing the risk for waste to be dispersed across the tundra. There was only a 300-meter segment of fence installed at the landfill along the Western edge. NIRB staff also observed that the scrap vehicles which had been noted at the landfill in March had

since been removed; however, there was now some scrap metal buried into the landfill and not segregated by material type as detailed in Baffinland's 2018 Waste Management Plan (Photo 18). During the NIRB's site visit, there were foxes digging through the landfill (Photo 19), increasing the need for a complete fence around the landfill. NIRB staff was unsatisfied with the level of progress made by Baffinland since 2014 to address the fencing issue at the landfill site and made this known at the close-out meeting. Baffinland committed to fully addressing the landfill issues in a document by August 23, 2019 with their plans.

Photo 17: Partial Landfill Fence

Photo 18: Scrap Metal Disposed in the Landfill

Photo 19: Fox Digging through the Landfill

5.1.1.5 Incinerator Facility

The incinerator facility at the Mary River mine site remains well maintained and most waste materials were observed to be segregated into labelled bins (Photo 20) for incineration (e.g., food and paper waste) or disposal off site (e.g., batteries, paint, oily rags, kitchen grease). However, the larger waste bins inside the incinerator facility were found to be overflowing (Photo 21) as the

capacity of bin has been exceeded with no space to accommodate additional waste materials. NIRB staff discussed that Baffinland could correct this issue by adding extra storage bins.

It was also noted by NIRB staff that the vehicle fluid storage needed to be improved and better organized to eliminate clutter around the filling station (Photo 22). Additionally, NIRB staff observed that these engine fluids were being stored immediately adjacent to a frost fighter heater (Photo 23), which could potentially pose a fire hazard.

Photo 20: Waste Sorting

Photo 21: Overflowed Waste Storage Bin

Photo 22: Engine Fluid Filling Station

Photo 23: Engine Fluid Storage adjacent to Heater

5.1.1.6 Effluent Discharge Area

During the site visit, NIRB staff noted that the terrain around one of the discharge pipes was rip-rapped and stable (Photo 24), while there remained some erosion issues around the second pipe; possibly caused by permafrost decay around the sewage discharge pipe (Photo 25).

During the site visit, Baffinland noted that Tetratech Engineering had been contracted to evaluate erosion issues across the entire project development area. It was noted by Baffinland that installation of rip-rap is an ongoing activity across the site based on the recommendations of the engineers. Tetratech has stated that the terrain stability issues near the sewage outfall area were

not of immediate concern and that that it was likely a natural occurrence; however, Baffinland committed to continued monitoring the location for future improvements if necessary.

Photo 24: Stable

Photo 25: Unstable Terrain around the Sewage Discharge Pipe

5.1.2 Steensby Inlet

While on site, NIRB staff visited Steensby Inlet Camp (Photo 26) to observe any changes that have occurred since the last visit there in 2016. The camp located at Steensby Inlet is largely decommissioned and is solely being used as a fuel cache for the current monitoring programs and Eqe Bay exploration activities by Baffinland (NIRB File No.18EN026). During the current site visit NIRB staff observed that several seacans had been removed since the last visit (Photo 27); however, the buildings on site were heavily deteriorating causing debris to be blown across the tundra (Photo 28 and Photo 29). There also appeared to be chemicals and garbage bags left in Weatherhavens and/or seacans which can pose a risk to wildlife.

Photo 26: Steensby Inlet Mine Camp, August 2019

Photo 27: Steensby Inlet Mine Camp, July 2016

Photo 28: Deteriorated Steensby Camp Buildings

Photo 29: Debris Blown onto the Tundra

5.1.3 Tote Road

During the drive along the Tote Road NIRB staff noticed dust plumes at certain points causing low visibility on the road (Photo 30). Further, NIRB staff observed some minor erosion concerns (Photo 31), it was recommended that the Proponent use rip-rap to improve terrain stability at those locations. The Proponent indicated that Tetra Tech Engineering (Tetra Tech) was contracted to monitor and/or assist with actions to reduce erosion along the Tote Road and that installation of rip-rap is a regularly performed maintenance activity. Baffinland also committed to continued monitoring along the road for future improvements if necessary.

Culverts along the Tote Road were also observed and noted to be in good condition (Photo 32). Along the drive of the Tote Road, NIRB staff also noted the presence of the emergency shelter. In general, the Tote Road is well maintained and there were no major environmental issues observed.

The NIRB staff also followed up on the condition of borrow pit #2 at KM 97 along the Tote Road and observed minor terrain stability issues around the loading area of the borrow source pit. Baffinland staff indicated that they are currently using that location to collect water to be used for dust management along the Tote Road. Baffinland also noted that this location was part of the terrain stability issues being investigated by Tetra Tech and that this site will be monitored and rip-rap would be applied should Tetra Tech deem it necessary.

Photo 30: Dust Plume along the Tote Road

Photo 31: Erosion along the Tote Road

Photo 32: Culvert Along the Tote Road

5.1.4 Milne Port

5.1.4.1 Landfarm Area

NIRB staff visited the landfarm facility in order to follow-up with progress made to the facility in accordance with best practices and past Board Recommendations. Baffinland has made significant improvements at the landfarm facility. Tilling has begun in the 2019 season and most synthetic liners have been removed (Photo 33); however, there is still progress to be made towards completing the cleanup of smaller pieces of entrenched liners (Photo 34).

NIRB staff also observed that the salt bags that were stored at the temporary laydown area near the landfarm in 2018 had since been removed. This represents good progress towards total organization and cleanup of the landfarm area.

Photo 33: Cleaned Landfarm at Milne Port

Photo 34: Few Remaining Synthetic Liners in the Landfarm

5.1.4.2 Ore Dock and Stockpile Area

NIRB staff also took a tour around the ore dock area, ship loader and the ore stockpile. Generally, the ore dock and ship loader were very clean and organized (Photo 35). There was very little noticeable dust being dispersed as the ships were being loaded due to the shoots extending directly into the ship's ore storage compartment (Photo 36). NIRB staff observed the ore stockpile being leveled, shaped and separated for ship loading (Photo 37). Further, NIRB staff noted that the ore stockpile seen in both the August (summer) and March (winter) 2019 site visits was noticeably larger than in the past, a result of the Production Increase Proposal approved in 2018. While NIRB staff were on site, there were several ore carriers, tug boats as well as the *MSV Botnika* located at various anchoring locations in Milne Inlet waiting to facilitate ship loading activities (Photo 38).

Photo 35: Ore Dock and Ship Loading Conveyor Belt

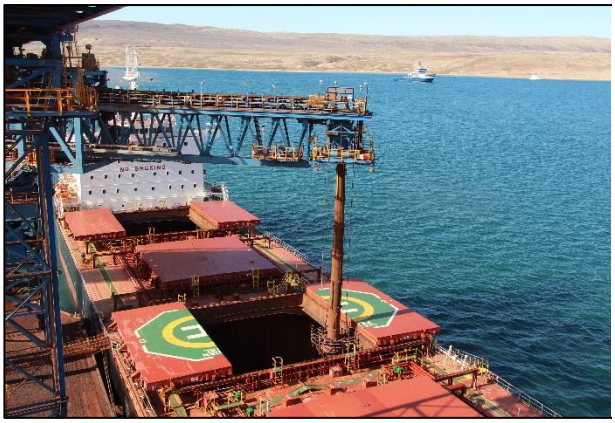

Photo 36: Pile Ore Carrier being Loaded

Photo 37: Fine Ore Stock

Photo 38: Ships Waiting for Instruction in Milne Inlet

5.1.4.3 Milne Port Settling Pond

NIRB staff visited both settling ponds at Milne Port and noted that the ponds and adjacent water treatment facility seem to be in working condition and well maintained. The scrap materials located within the vicinity of the settling pond during the 2019 winter (March) site visit had been removed and the area was clear of obstruction (Photo 39 and Photo 40).

Photo 39: East Settling Pond at Milne Port

Photo 40: West (Right) Settling Ponds at Milne Port

5.1.5 Bruce Head Observation Platform and Camp

NIRB staff travelled to the Bruce Head Camp via helicopter (Photo 41) to observe changes that had occurred since the last visit there in the summer of 2016. In 2018, Baffinland indicated that the previous observation platform was destroyed in a winter storm and Baffinland had replaced the original structure with a temporary viewing cabin in the same location as the original platform (Photo 42). As part of these changes, the camp at Bruce Head was relocated from the top of the cliff, to the lower section adjacent to the viewing platform. Baffinland staff noted that once the 2019 sealift is complete, this cabin would be replaced by a permanent viewing platform from recycled seacans. In general, the temporary platform and the newly constructed accommodations camp were in good condition. NIRB staff also observed team members performing narwhal observations (Photo 43) as part of the annual narwhal monitoring efforts by Baffinland.

Photo 41: Bruce Head Camp

Photo 42: Bruce Head Temporary Observation Platform

Photo 43: Observers performing Surveys

5.2 Observations Based on NIRB Project Certificate No. 005

Appendix A summarizes observations made during the site visit that pertain specifically to observable terms and conditions of Project Certificate No. 005 relevant to the pre-construction and construction phase of the Mary River Project.

5.2.1 Air Quality –Dust Management and Monitoring Plan

Dust management and monitoring plans were followed up on during the site visit pursuant to Terms and Conditions 10 and 58 pursuant to the NIRB's Project Certificate No. 005. During the drive along the Tote Road, NIRB staff observed several dust-fall stations (Photo 44). NIRB staff also noted that traffic (both haul and pick-up trucks) caused significant dust generation both along the Tote Road and the Haul road towards Deposit No.1. At the time of visit, and throughout the Baffinland road network, NIRB staff did not observe the application of dust suppressants on the roads.

Dust emissions have been an ongoing issue at the Mary River site since 2014 and efforts have been made to lower the amount of dust being generated (e.g., shrouds at the crusher) but success has been limited, especially with regards to the Tote Road and Haul road towards deposit No. 1 and the ore stock pile area at Milne Inlet (Photo 45). The NIRB staff recognizes the efforts made by Baffinland to improve the concerns regarding dust on site; however, there is still improvements to be made regarding dust management.

Photo 44: Dust Fall Stations at various distances leading away from the Tote Road

Photo 45: Dust Generated along the Tote Road from Vehicle Traffic

5.2.2 Terrestrial Wildlife and Habitat

Terrestrial Wildlife and Habitat management and monitoring plans were followed up on during the site visit pursuant to Terms and Conditions 53, 61, and 64 pursuant to the NIRB's Project Certificate No. 005. During the site visit, NIRB staff did not observe any caribou around the Project area; however, foxes were observed at the Mine Site Landfill (Photo 19). In addition, NIRB staff noted that wildlife logs were posted at the main camp buildings for staff to report on wildlife encounters or observations around Mary River Site, Milne Port, and along the Tote Road.

6 MEETING NOTES FROM THE NIRB'S PUBLIC INFORMATION MEETING

The following section summarizes the comments and concerns that were raised both verbally and in writing at the community information sessions with respect to the monitoring of the Mary River project. These comments helped the Board identify items that need to be addressed or considered throughout the NIRB's monitoring program for the Mary River Project.

Issues regarding Shipping

- Question regarding how many ships are being used per year by Baffinland.
- Concern over potential contamination of marine wildlife from sewage and waste on board Baffinland ships.
- Questions regarding the number of Inuit working aboard the ore and supply ships used by Baffinland.

Issues regarding Dust

- Concerns regarding dust control and that dust may be causing harm to the flora and fauna surrounding the mine site.
- Questions regarding Baffinland's current dust monitoring and whether it includes monitoring dust in lakes and streams.

Socioeconomic/Cultural Issues

- Community members would like to see a training program available to Inuit to help them learn how to manage the money they make from the mine. Otherwise, the money earned at the mine doesn't go back into the communities.

Issues regarding employment

- Community members would like to see more Inuit working in different areas of the mine, not just as cooks and cleaners.

Other Issues

- Question asking if royalties will increase if the mine expands as planned.
- Community members would like to see larger scale monitoring instead of only monitoring areas immediately adjacent to the mine.

7 RECOMMENDATIONS AND DIRECTION

Based on the observations made during this current site visit, the Mary River Project facilities in operation the NIRB Monitoring Officers note that the site appeared to be well managed, and generally are maintained with adequate environmental protection measures and procedures in place. Several improvements were observed across the Project area in relation to:

- The Waste Rock Storage Facility by addition of the water treatment plant;
- Dust levels at the crusher due to mechanical improvements (e.g., additional hoods, shrouds, and bellows continue to be added as required);
- The landfarm area with the removal of most synthetic liners and the removal of salt bags from adjacent temporary laydown area;
- Storage of waste tires as no waste tires were observed to around site.

In order to fully meet the requirements of the Project Certificate terms and conditions; Community Member's concerns related to terrestrial, marine and socio-economic environments; and to ensure that potential adverse impacts to the environment are adequately mitigated, the NIRB Monitoring Officers have identified several issues of concern in during the August site visit.

- The build-up of iron ore around the crusher and under the conveyor belt;
- The water pooling on the crusher pad; and
- Dust organization of the Incinerator building at the mine site.

7.1 Terrain Stability Issues

While on site, the Monitoring Officers noted several instances where terrain appeared visibly unstable and was eroding potentially due to permafrost degradation was occurring. The first instance was along the Tote Road where the road embankment near kilometers 29-32, were observed to be very eroded. The second location with erosion concerns is the sewage outfall area. The hill where the outfall pipes are located has also begun to degrade and will require corrective action. The third instance of noticeable erosion is at the borrow source #2 at KM 97. While on site, Monitoring Officers recommended that rip-rap be installed at the sewage discharge in order to minimize safety risk and prevent further degradation of the land.

7.1 Steensby Camp

During the 2016 summer NIRB site visit, the NIRB viewed the Steensby camp which been placed into temporary closure. The NIRB returned to the Steensby site in 2018 and noted that and several seacans had been removed since the NIRB's last visit. However, it was observed that several of the accommodation buildings were torn and the insulation was being blown onto the tundra. Further, Monitoring Officers noted that site Weatherhavens and seacans were left open and appeared to contain chemicals and garbage bags which can be an animal attractant. Baffinland noted that this site is now largely used as a fuel cache for Eqe Bay exploration activities (NIRB File No. 18EN026).

7.2 Dust Emissions

During the NIRB's August 2019 site visit, staff noticed an improvement in the amount of dust produced from the crusher area as well as the ship loader. Based on previous NIRB recommendations, Baffinland has installed a series of shrouds along the crusher belts and bellows at the mouth of crusher and has extended the ship loader shoot further into the hull of the ships. Together, this has greatly reduced the amount of dust emissions generated from the vicinity of the crusher area. However, while on site the Monitoring Officers observed consistent large dust plumes on both the Haul and the Tote Roads and did not observe any application of dust suppression.

7.3 Waste Management

During the NIRB's August 2019 site visit, it was again noted that solid waste materials were generally properly contained within the landfill, although the incomplete fencing of the landfill continues to be a recurring issue and this lack of fencing does not meet the requirements of Term and Condition 64 of the amended Project Certificate.

Baffinland staff stated that additional chain-link fencing was being shipped and would arrive during the 2019 sealift; however, fencing would only be used on the north and west sides of the landfill given the prevailing wind conditions. The fence has been partially installed in a 300 metre segment only along the west side of the landfill.

On August 8, 2019 during the site close out meeting, the Monitoring Officers recommended that Baffinland provide updated information on how to address the recurring fencing issues. The Monitoring Officers discussed that the information should include details on Baffinland's progress made to date on the fence, along with a plan outlining dates for when the landfill will be permanently enclosed. Baffinland committed to supplying this information by August 23, 2019. The NIRB received Baffinland's response on August 26, 2019 (Appendix B) along with information related to other topics discussed during the site visit including dust suppression, Steensby Camp update, Incinerator Building status, Tote Road and effluent line stability, and landfarm update.

8 CONCLUSION

Throughout the August 2019 site visit, NIRB and Baffinland staff discussed how the Mary River project is being operated through the amended Project Certificate and Baffinland appeared to have a well managed site maintained with adequate environmental protection measures and procedures in place. However, there were some issues identified for improvement and the increased activity at site due to the Production Increase, Monitoring Officers have also highlighted areas of concern that Baffinland should be prepared to address moving forward in the monitoring program and in consideration with the NIRB's current assessment of the Phase 2 project proposal.

Prepared by:	Cory Barker	Reviewed by:	Kelli Gillard
Title:	Technical Advisor I	Title:	Manager, Project Monitoring
Date:	October 3, 2019	Date:	September 3, 2019
Signature:		Signature:	

Appendix A: 2019 NIRB Site Visit Observations for Select Terms and Conditions for the Mary River Project

T&C No.	Topic	Site Observation
Meteorology and Climate (Climate Change)		
1	Installation of tidal gauges at Steensby Port and Milne Port	Related to T&C 83 Weather station observed at Milne Port and the Mine site; however, due to time restrictions, tidal gauges were not observed. No tidal gauges are installed at Steensby Inlet as there is currently no activity at this site.
Air Quality		
10	Monitoring for dust fall	Dust fall monitoring stations were observed at the Mine site, the Tote Road, and Milne Port.
Hydrology and Hydrogeology		
17	Prevent impacts to water bodies from effluent	Related to T&C 24 and 46 Effluent testing was observed at both the MBR Facility and the Wastewater Treatment Plant.
19	Maintenance of natural water flow	NIRB staff observed various culverts along the Tote Road and they were in good condition.
Groundwater/Surface Water		
21	Monitor dust/deposition rates in water bodies along the Tote Road	Related to T&C 10, 26, and 43 Dust fall monitoring stations were observed throughout the site.
24	Monitoring Effluent	Related to T&C 17 and 46 Observed at the Membrane Reactor Facility and Wastewater Treatment Plant.
Landforms, Geology and Geomorphology, Soils and Permafrost		
26	Erosion Management	Related to T&C 43 NIRB staff noted concerns at various points on site.
30	Quarry or borrow site management	NIRB staff did not visit the quarry but did visit the borrow source site at KM 97 and noted some terrain stability concerns.

Freshwater Aquatic Environment including Biota and Habitat		
41	Maintenance of 100 m vegetation buffer for quarry or borrow sites	NIRB staff did not visit the quarry.
46	Effluent and discharge requirements	Related to T&C 17 and 24 Effluent testing was observed at both the MBR Facility and the Waste Water Treatment Plant.
51	Coordination of monitoring effort	Related to T&C 35 Monitoring programs were ongoing.
59	Aircraft disturbances	Related to T&C 71 and 72 Helicopters and fixed-wing aircraft were observed operating on site. Baffinland has indicated that flight restrictions regarding altitude and animal disturbances are written into their aviation contracts.
Terrestrial Wildlife Habitat and Waste Management		
64	Waste management – carnivore deterrents	Observed well maintained skirting placed all camp buildings including the new Sailivik Mine Site Complex. However, the fence around the landfill at the Mine site remains incomplete.
Birds and Flight Altitude Restrictions		
72	Aircraft Logs	Related to T&C 59 & 71 Baffinland has indicated that pilot logs are required by contract on all helicopter flights.
Marine Environment, Marine Water/Ice and Sediment Quality		
83	Tidal Gauges	Related to T&C 1 not observed on site due to time restrictions.
92	Spill response equipment on site	Equipment was observed at Milne Port but due to time restrictions, NIRB staff were unable to visit the tank farms.
Marine Wildlife and Marine Habitat		
101	Shore-based narwhal behavior monitoring in Milne Inlet	NIRB staff visited Bruce Head during the site visit and observed narwhal observations.
Socio-Economic Terms and Conditions		
142	Promotion of family and languages on-site	Baffinland has Inuktitut translations posted on most signs around site as well as signage about respecting individuals and diversity.
143	Use of technology to maintain contact with family and/or home	Landline telephone are installed in all private rooms free of charge to Baffinland staff and visitors.

Culture, Resources and Land Use		
165	Emergency shelters	Observed along the Tote Road and appeared well maintained.
Accidents and Malfunctions		
174	Spill response equipment and training	Related to T&C 92 Equipment was located on the shore at Milne Inlet.
Verification of Project Monitoring and Mitigation for Potential Effects on Marine Mammals		
183	Marine Monitoring	NIRB staff observed the Bruce Head monitoring programs and discussed the ship-based monitoring program onboard of the *MSV Botnika* with Baffinland staff.

NOTES: ***PC** = NIRB Project Certificate No. 006 (October 2018)

Appendix B: Follow up to NIRB August 2019 Site Visit, Findings and Recommendations

August 26, 2019

Solomon Amuno
Technical Advisor II
Nunavut Impact Review Board

RE: Follow up to NIRB August 2019 Site Visit, Findings and Recommendations

Baffinland Iron Mines Corporation (Baffinland) is pleased to provide the Nunavut Impact Review Board with a description of follow-up actions undertaken by Baffinland following recommendations made by the NIRB during the Site Visit on August 7-8, 2019.

The attached Table 1 provides Baffinland's responses to the findings and recommendations of the NIRB Site Visit including details, where applicable, on progress made to date.

Should you have any additional concerns or questions regarding the attached responses, the 2018 Annual Report to the NIRB submitted by Baffinland March 31 2019 and subsequent reviewer comments, or Baffinland's environmental monitoring and operational management implemented throughout 2019 to ensure adherence to the terms and conditions of Project Certificate No. 005 for the Mary River Project, please do not hesitate to contact the undersigned at your convenience.

Regards,

Lou Kamermans
Director, Sustainable Development
Baffinland Iron Mines

Cc: Megan Lord-Hoyle, Shawn Stevens, William Bowden, Connor Devereaux, Emma Malcolm (Baffinland)

Attachments:
Attachment 1 – Baffinland Responses to NIRB Findings and Recommendations
Attachment 2 – Baffinland Follow-Up Photos
Attachment 3 – Figure 1 – Interim Landfill Enclosure Plan

Baffinland

Attachment 1

Baffinland Responses to NIRB Findings and Recommendations

Baffinland

Table 1 – Baffinland Responses to NIRB Finding and Recommendations - August 2019 Site Visit

#	Project Location	Description of Concern or Finding	Recommended Action	Response
2	Mine Site / Milne Port / Tote Road / Mine Haul Road	Dust deposition on Project Roads and dust generation at site.	Update on mitigations implemented to minimize dust deposition. Provide update on dust stop trial. Continued application of dust suppressant.	Baffinland is committed to controlling dust sources at the Project. This has included continual development of new dust suppression alternatives at Milne Port, including ore pad redesign to position fines in the centre and lump ore around the margins, installation of downwind fencing and proper positioning of the conveyors to minimize distances when stock piling. Additional shrouds were also installed at the Mine Site crusher in 2019 and Baffinland is actively considering and/or implementing new methods through reengineering of equipment designs to minimize dust generation. Calcium chloride and water has also been applied on road surfaces throughout operations to mitigate dust emissions. Based on feedback received from communities, the QIA and other regulators, Baffinland actioned an implementation plan for testing new dust suppression products with increased durability and longevity for site infrastructure. Dust Stop, produced by Cypher Environmental is an approved product for dust suppression under Nunavut's Environmental Guideline for Dust Suppression on unpaved Roads. Dust Stop is environmentally friendly, and is expected to have a longer lasting durability for both traffic and rainfall impact, as it promotes a hard, competent water repellant surface when properly applied. Dust Stop product was shipped on the 2019 sealift and a full application along the Tote Road is expected to commence in September 2019. A micro trial of Dust Stop was performed in August 2019 from km 103.5 - km 97 on the Mine Site and Tote Road to determine efficacy of the product on site. Improved dust suppression was observed throughout the application zones and the product also showed signs of water shedding during rain events supporting improved road sealant and application lifespan. (Refer to photos provided in Attachment 2). Following arrival of the sealift, Baffinland will implement an expanded trial and use the results to determine the efficacy and feasibility of this alternative. If it is determined that Dust Stop is both economically feasible and a more effective alternative, Baffinland will procure a larger volume to be delivered on summer 2020 sealift for ongoing application.

#	Project Location	Description of Concern or Finding	Recommended Action	Response
3	Mine Site / Landfill	Landfill fence does not completely surround active landfill areas. More cover material required on top of current layer and west side.	Develop detailed action plan for landfill fence construction that surrounds entire action landfill area.	Baffinland is committed to managing the Mine Site Landfill as per the approved Waste Management Plan. After discussions with NIRB, a fence was installed on the west side of Cell 1 to address concerns of potential wind-blown debris sourcing from the landfill to the Tundra. Baffinland erected a fence in the fall of 2018. This included approximately 275 metres of fence on the downwind side of the landfill. The fence also repurposed over 800 used tires as part of Baffinland's used tire disposal and recycling initiative. The fence currently captures windblown debris from the landfill effectively. (Refer to photos in Attachment 2). An additional 405 metres of Landfill fence was ordered by Baffinland for delivery on the 2019 sealift (mid to late September arrival). The fence will be erected to further mitigate the potential for wind-blown debris impacting the tundra that the prevailing wind fence was not already capturing. Figure 1 (Attachment 3) outlines the plan to enclose the current working space of the landfill by the end of Q4 2019.
4	Steensby	General maintenance and clean-up of site.	General site clean-up required.	In 2016, Baffinland performed a major sealift operation at Steensby that removed hazardous substances, heavy equipment and camp modules. Following NIRB's site visit in August, Baffinland performed a general cleanup of windblown debris, assessed potential hazards to the Tundra and completed critical repairs to weatherhaven tents to minimize future dispersion of materials in the general area. (Refer to photos in Attachment 2). Baffinland will continue to run its annual end of year clean-up of the Site and may consider backhauling the weatherhaven tents, if feasible, in 2020.
5	Mine Site / Waste Management Building	Waste Management building. Excess garbage present, fluids on the ground and oil dispensing system needs shelving or frame.	Overall clean up and organization of waste management building	As part of Baffinland's approved Waste Management Plan, waste management buildings are used to store, segregate and sort all kinds of waste on the Project Site. The structures are concrete floor secondary containment buildings with built in sump systems which water is processed from. When waste is actively processed and sorted in these buildings it can appear visually unappealing however this is the intent and function of the buildings and is consistent with Baffinland's Waste Management Plan. Weekly waste retention structure inspections are performed to consistently identify improper waste sorting practices and resultant corrective actions. It was noted during the NIRB visit in August 2019 that fluids were present on the concrete floor sourcing from the lube and oil station. All fluids impacting the floor have been cleaned up and tertiary containment has been installed under all totes and sources of leaks. (Refer to photos in Attachment 2).

#	Project Location	Description of Concern or Finding	Recommended Action	Response
6	Tote Road – KM 29-32	Tote Road km 29-32 - noticed some issues with slope stability issues	Remediate area and add erosion protection measures.	Baffinland has developed several protocols to address concerns regarding erosion, permafrost degradation and sedimentation at the Project. Regular inspections of the Tote Road are conducted by the Road Maintenance and Environment Department to ensure areas of potential concern are identified, and corrective actions initiated. Visual monitoring is conducted, and if any concerns are identified in an area this will trigger additional monitoring and installation of erosion and sediment control measures. In general, the following measures are implemented to address reoccurring water ponding on site: • Baffinland will work to remove ponding water from beside the Tote Road in noted areas, by regrading or contouring the road banks. • Regular inspections of borrow locations will be completed during this work through the Tote Road Monitoring Program. • Any additional unstable slopes identified will be re-graded to eliminate depressions and re-establish natural drainage patterns. • Cut and fill areas will be stabilized by constructing gentle slopes less prone to erosion. • Areas of unexpected settlement will be filled to re-establish the natural contours and eliminate ponding of water. • Borrow activities will occur only at approved locations and will be concentrated to limit the area of disturbance. Areas of concern will be further inspected by the Road Maintenance and Environment Department, and ranked based on risk/likelihood of adverse environmental impacts. Re-contouring/grading of areas will be prioritized in 2019 based on the highest to lowest risk areas of potential concern.
7	Mine Site	Effluent line erosion present.	Need to add armour/rip rap to slope that has stability issues	It was noted during the 2018 NIRB visits that erosion of a tundra bank nearby to the Mine Site Waste Water Treatment Plant effluent outfall location was occurring. Since that time, this erosion has been evaluated by geotechnical inspectors on a bi-annual basis since its identification. Results of these inspections have determined that the erosion is not a concern for stability of the outfall laydown pad. It is also noted that this erosion is naturally occurring and has not been impacted or influenced by effluent as it segregated from the outfalls. Baffinland has committed to remediating the natural erosion identified by further armoring the slope with additional rip rap. Baffinland commits to completing this by the end of September.

#	Project Location	Description of Concern or Finding	Recommended Action	Response
8	Milne Port / Landfarm	Remaining buried plastic in Landfarm.	Need to remove plastics in landfarm as more is tilled to surface.	NIRB has noted that light plastics continue to present in the Milne Port Landfarm. The Landfarm is a lined engineered containment facility. The plastics in the Landfarm are actively cleaned up and removed on an annual ongoing basis. (Refer to photo in Attachment 2). Active tilling to remediate contaminated soils in the Landfarm regularly unearths plastic to the surface, which are then subsequently cleaned up and removed. Remediated soil from the containment facility will not be removed with any liner. Baffinland will continue to remove plastics from the Landfarm on an annual basis and maintains that the plastics do not impact functional efficacy of the containment facility.

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Attachment 2

Baffinland Follow-Up Photos

PHOTO 1 – Dust Suppression Application along Project Roads

PHOTO 2 – Dust Suppression Application along Project Roads

Baffinland

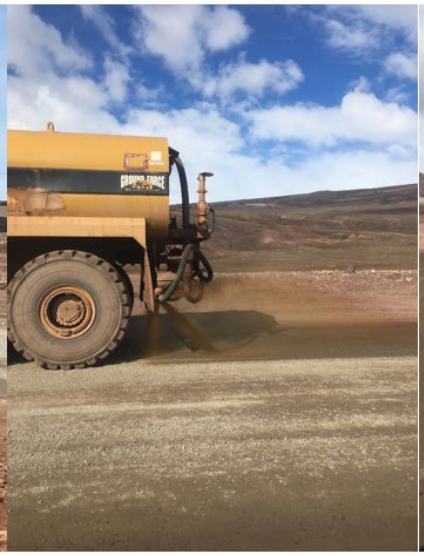
Long range visual-TREATED- Minimal dust off OHT (24 hours after treatment)

Long range Visual- UNTREATED- Visual dust off OHT at KM100 dip northbound

PHOTO 3 and 4 – Long Range Visual of Treatment Area Post-Trial

Fresh gravel laid out

Pressurized application of DSMB



Product applied – full coverage

PHOTO 5, 6 and 7 – Photos Taken During August 2019 Dust Stop Trial

PHOTO 8 – Dust Stop Tote

PHOTO 9 – Existing Fencing at Landfill

PHOTO 10 – Steensby Camp Post- August Site Clean Up

PHOTO 11 – Waste Management Building Post-August Clean Up and Installation of Tertiary Containment Under Totes

PHOTO 12 – Ongoing Clean-Up of Plastics at Milne Port Land Farm

Baffinland

Attachment 3

Figure 1 – Interim Landfill Enclosure Plan

LEGEND

- Existing Fence
- Planned Permanent Fence
- Semi-Permanent Fence
- 2012 FEIS/ Type A Water License Landfill and Landform Limit
- Current Limit of Landfill

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Interim Landfill Enclosure Plan

Projection: NAD 1983 UTM ZONE 17N.
Source: © Her Majesty the Queen in rights of Canada Department of Natural Resources (2009).

0 10 20 40 60 80 Meters

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FIGURE 1