2019 Winter Site Visit Report

for the NIRB's Monitoring of
Baffinland Iron Mines Corp.'s Mary River Project




Nunavut Impact Review Board (August 2019)

Report title:	2019 Winter Site Visit Report for the Nunavut Impact Review Board's Monitoring of Baffinland Iron Mines Corp.'s Mary River Project (NIRB File No. 08MN053)
Project:	Mary River Project
Project Location:	Qikiqtani (North Baffin) Region, Nunavut
Land Tenure:	Inuit Owned and Crown Land
Project Owner:	Baffinland Iron Mines Corporation 2275 Upper Middle Road East, Suite 300 Oakville, ON L6H 0C3
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Site visit dates:	March 26-28, 2019
Last Site Visit:	August 14-16, 2018
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Cover picture:	View of Deposit No.1 at Mary River Mine Site

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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* and s. 135(4) of the *Nunavut Planning and Project Assessment Act*, S.C. 2013, c. 14 (*NuPPAA*). This report provides observations and findings that resulted from the NIRB's site visit to the Mary River Project site on March 26 to 28, 2019 as part of the Board's ongoing monitoring for the approved project in accordance with the requirement of the amended Project Certificate No. 005.

1.1 Objectives & Purpose of Site Visit

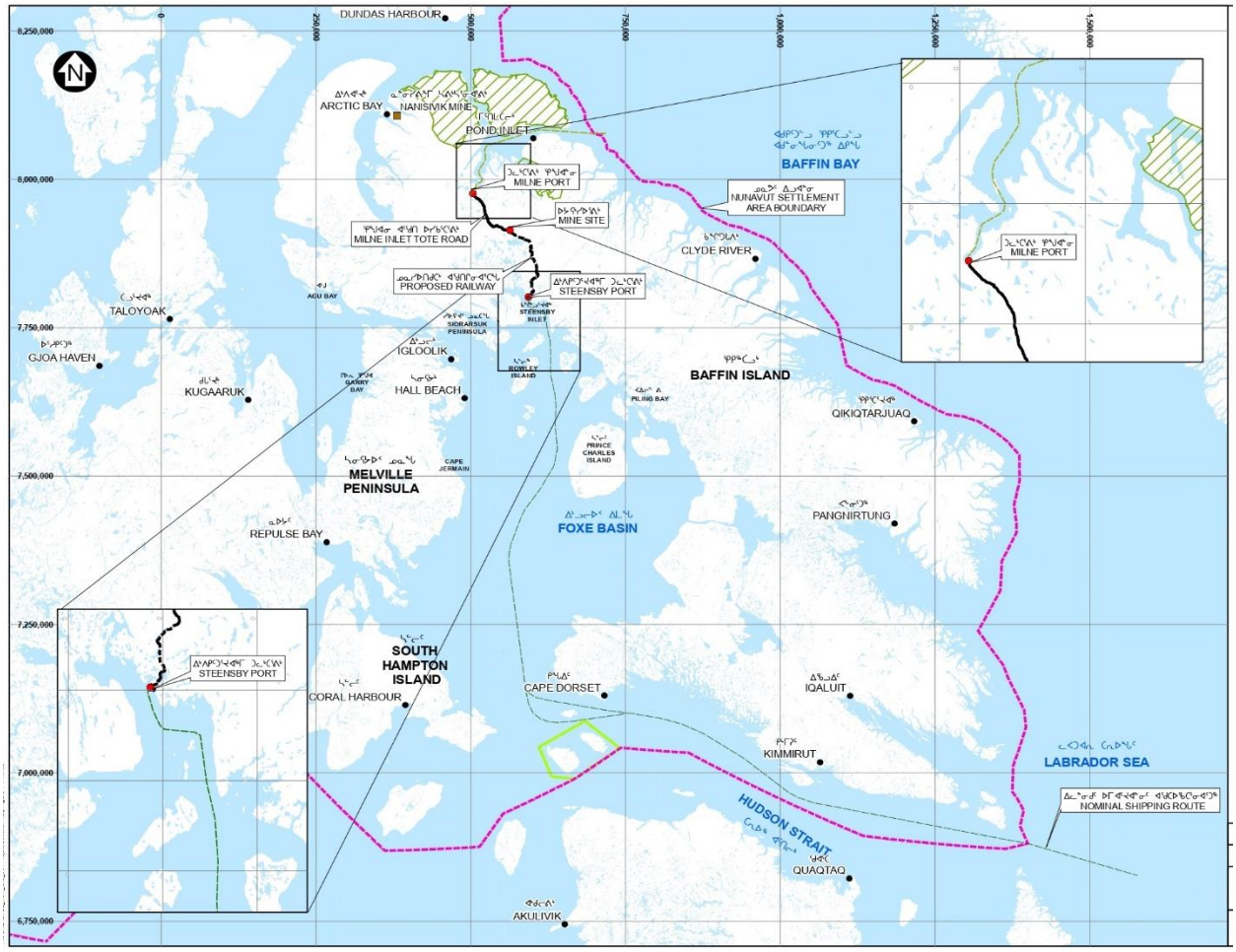
The objective of the NIRB's site visit was to determine whether, and to what extent the land or resource use in question, is being carried out within the predetermined Terms and Conditions as set out in the amended Project Certificate as issued for the Mary River Project, in accordance with Section 12.7.2(b) 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 Background of the Mary River Project and Amendments

Original Mary River Project

The original Mary River Project as approved by the NIRB in December 2012, and operated by Baffinland, involved the development of an open pit iron ore mine on northern Baffin Island, and associated infrastructure that includes the use of an existing Tote Road between Milne Inlet and a mine site at Mary River, ports at Milne Inlet and Steensby Inlet, and a railway connecting the mine site to the Steensby Port (Map 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, significant 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.



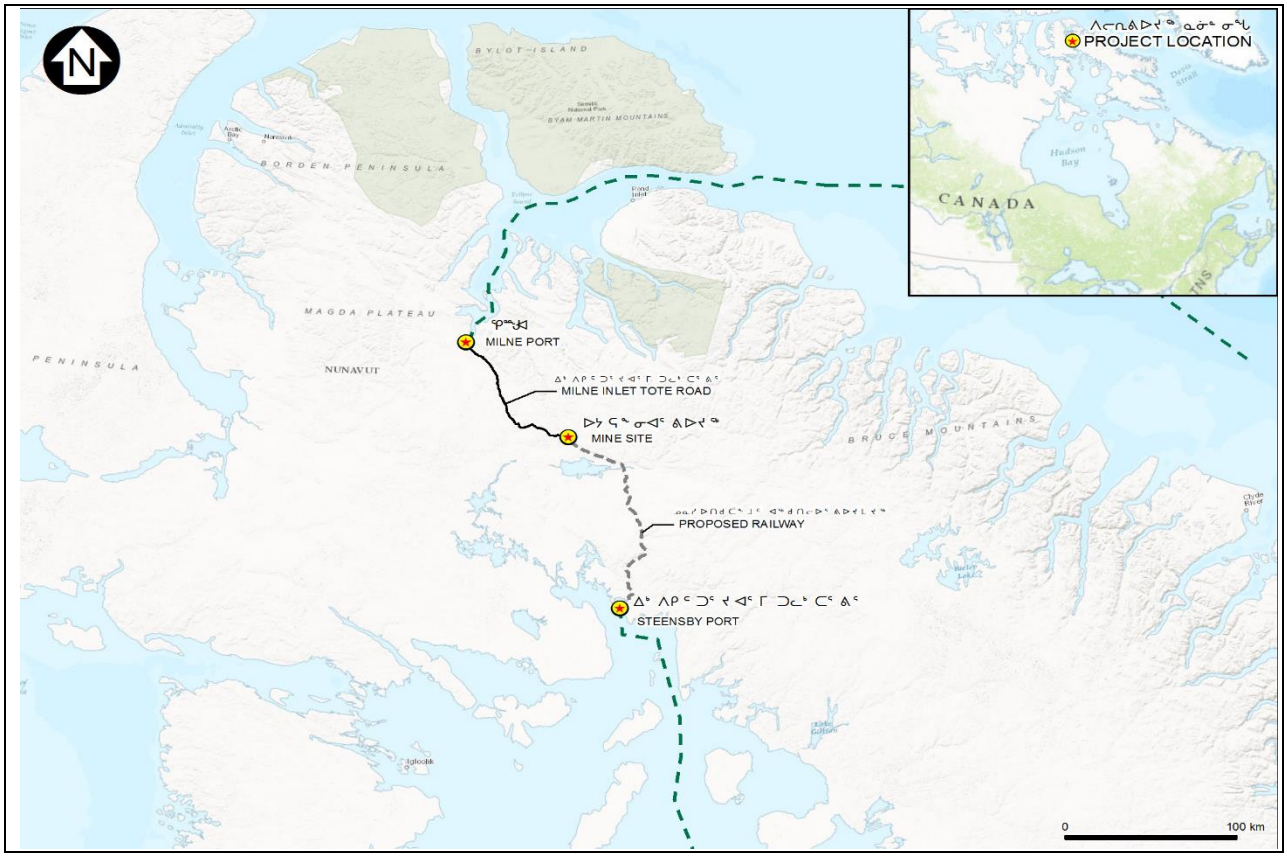
Map 1: Project Location Map

Modification of the Original Project Under the Early Revenue Phase Proposal

In January 2013, Baffinland applied for a modification to the original Mary River Project, as approved, 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 (Map 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 fleet of purpose-built ore carriers to be delayed until shipments through Milne Inlet had generated sufficient revenue to support subsequent development (the Early Revenue Phase Proposal). 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.

While the consideration of the Phase 2 Development Proposal remained ongoing, on November 8, 2017 Baffinland submitted a "Tote Road, Camp, and Fuel Upgrade" proposal to the NIRB for consideration. The scope of this proposal included proposed upgrades to the existing Tote Road to address road safety and operational issues, addition of a 15 ML fuel tank to the existing Fuel

Storage Facility at Milne Port and the installation of a new 280-person accommodations camp at the Milne Inlet Port. Following a cursory review of the associated documentation, the NIRB determined that Baffinland had not demonstrated that the proposed activities were separate and distinct from the Phase 2 Development Proposal. On November 17, 2017 the NIRB issued correspondence directing Baffinland to modify and resubmit its proposal once it was able to demonstrate that the proposed activities were independent of and not integrally linked to the Phase 2 Development Proposal, and further noted that sufficient supporting information would be required to assess those proposed works not previously considered by the NIRB.



Map 2: Early Revenue Phase of the Mary River Project

Production Increase Amendment

On December 8, 2017, the NIRB received correspondence from Baffinland providing notice that it anticipated that its 2017 road haulage operations would meet and potentially exceed (by 5-7%) the 4.2 Mt/a limit established by Term and Condition 179(b) of the Mary River Project Certificate No. 005. On December 12, 2017 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 early April 2018, Baffinland indicated informally to the NIRB that based on 2018 production rate predictions the current limit of 4.2 Mt/a would be reached by October because of increased efficiencies in operations at the mine. Baffinland also indicated that if production limits were reached prior to the end of the year and mining operations would therefore need to cease to comply with the limits in the Project Certificate, there would be adverse impacts to employees and contractors as well as interruption to other direct and indirect benefits of the Mary River Project. Baffinland also noted that an increase in ore production and shipment would allow Baffinland to better sustain relationships with existing markets, thus capitalizing on the demand for ore, which would contribute to the long-term viability of the Mary River project.

Consequently, the "Production Increase, Fuel Storage and Milne Port Accommodations Modification Proposal" (Production Increase Proposal), was submitted to the NIRB by Baffinland on April 30, 2018. The Production Increase Proposal involved 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 million tons per year (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 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 October 1, 2018, the Production Increase Proposal was approved by Responsible Ministers 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 production increase meant that up to 83 round trips by ore carriers could now be required each shipping season to transport the 6 Mt/a of ore to markets in Europe and Asia. 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.

1.3 Preparations for the Site Visit

In preparation for the site visit, the Monitoring Officer 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.

[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.

2 SITE VISIT

The site visit was conducted on March 26 to 28, 2019 by Solomon Amuno, Technical Advisor II and the NIRB's Monitoring Officer for the Mary River Project and Cory Barker, Technical Advisor I. On Tuesday, March 26, 2018, NIRB Staff flew from Iqaluit to the Mary River site via Baffinland's regularly scheduled aircraft charter, accompanied by Baffinland's Director, Corporate Sustainability Ms. Megan Lord-Hoyle. Once on site, Mr. Bill Bowden and other Environmental Staff provided tours of the mine site area and other project locations after a brief health and safety orientation.

On March 27, 2019, NIRB staff travelled by truck to Milne Port via the Tote Road and conducted its site visit at the following locations around Milne Inlet: the landfarm, incinerator, ore stockpile area, ore pad drainage ditches, sedimentation ponds, ore dock area, laydown areas, and Milne Inlet accommodations facility. Upon return to the Mary River camp, the landfill, sewage outfall area and the newly constructed accommodations facility were visited to observe improvements or changes based on previous site visits and the NIRB's 2018 recommendations to Baffinland.

On March 28, 2019 the site visit focused on: the crusher plant and associated sedimentation pond, Deposit No.1, the waste rock storage area, waste rock water treatment plant, the incinerator and the Membrane Biological Reactor Facility (MBR). There was no observational visit to the Steensby Inlet area during this current site visit as no project-related activities were taking place there.

Upon completion of the site visit, NIRB staff met with Baffinland staff to discuss all the observations noted during the site visit. This meeting allowed for NIRB staff to discuss specific areas of the Project site needing improvement or changes with regards to environmental impacts and mitigation measures. Photo 1 below is an observation image of the Deposit No. 1 Mine pit.

Photo 1: Deposit No.1 at Mary River

Photo 2: Milne Inlet ore stockpile and port site

2.1 General Observations based on Progress from Previous Site Visits

The following sections briefly describe the major facilities visited during the tour around the project development area (PDA), as well as observations of the overall progress of the site compared to the previous site visit(s). Where applicable, the Monitoring Officer noted compliance with specific terms and conditions of the Project Certificate and followed up on items where Baffinland made commitment to mitigate the potential ecosystemic impacts of the Mary River Project. Photo 2 is the observation image of the ore stock pile area and port site at Milne Inlet.

2.1.1 **Mary River Mine Site**

Waste Rock Dump, Waste Rock Settling Pond, and Wastewater Treatment Unit

The waste rock facility (WRF) is an open area where potentially acid generating (PAG) rocks are disposed and stored. At the time of the site visit, no apparent environmental issues or concerns were noted at the waste rock stockpiles area. No signs of runoff or uncontrolled seepage of potentially contaminated contact water was observed in the area. In addition, NIRB staff followed up with Baffinland staff on the repair status of the WRF sedimentation pond which overflowed during previous summers. Baffinland staff indicated that efforts have been made since the last overflow incident in 2017 to address the structural issues identified at the facility. NIRB staff was unable to fully assess the extent of the repairs or improvements made to the sedimentation pond because of snow accumulation within the facility.

NIRB staff also visited the wastewater treatment facility adjacent to the waste rock sedimentation pond, but the facility was not in operation as Baffinland was installing different equipment to support the operations of the facility in the future.

Baffinland indicated that it anticipates that the full operation of the new waste water treatment plant would help properly manage all the effluent discharges originating from the waste rock facility (Photo 3 and Photo 4). In general, NIRB staff observed that progress has been made to address most of the environmental concerns associated with the waste rock area and the adjacent sedimentation pond.

Photo 3: Waste Rock Storage Area Pond

Photo 4: Wastewater Treatment Plant

Deposit No. 1 Reserve

After leaving the waste rock facility, NIRB staff visited Deposit No.1 mine pit and noted that ore extraction and mining activities were taking place there. Heavy trucks, loaders, and drill equipment were also observed within the mine pit area as consistent with other site visit observations (Photo 5 and Photo 6). A few haul trucks were observed travelling to and from the pit area towards the crusher facility. No blasting activities occurred at the time of the site visit.

Photo 5: Deposit No.1 Pit Benches

Photo 6: Haul truck going to Deposit No.1 Pit

Crusher Plant and Sedimentation Pond

NIRB staff also took a tour around the crusher facility (Photo 7 and Photo 8) 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:

- Hoods/shrouds were still in place on the crusher equipment similar to the observations in 2017 and 2018, which resulted in decreased emission of dust from the facility compared to previous years. Further, the use of dust control technology especially near the transfer point and the belts appear to have been effective to a certain degree in reducing and controlling dust emission from the crusher; however, in certain areas of crusher facility visible dust plumes continue to be observed. NIRB staff noted that in general dust emissions from the crusher plant appear to have improved.
- During the last winter site visit, NIRB staff noted that the trenches/ditches around the crusher pad were filled with ore lumps, and the Monitoring Officer recommended that Baffinland address this issue immediately. During the current site visit, NIRB staff followed up with this observation and noted that the trenches/ditches around the crusher pad showed no signs of blocked drainage/channel.
- NIRB staff also noted progress around the crusher facility in relation to the clean-up of the piles of waste materials that had accumulated in the area for many years.

Photo 7: Crushed Iron being piled for transport

Photo 8: Shroud installation at crusher facility

Landfill Area

NIRB staff also visited the landfill site 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. At the time of the site visit, NIRB staff noted that the landfill was still not fully enclosed with proper fencing thereby increasing the risk for offsite waste dispersion (Photo 9). NIRB staff also observed that one of the temporary laydown areas adjacent to landfill area continued to accumulate increased amount of unused materials and there are concerns that this laydown area may eventually become a permanent laydown area if these items are not properly cleaned out or relocated to an appropriate location for disposal. NIRB staff also observed a scrap vehicle (Photo 10) in the landfill site and this was brought to the attention of Baffinland site staff for immediate action. In addition, a bulldozer was also observed clearing wastes within the facility (Photo 11). The Monitoring Officer remains unsatisfied with the level of progress made by Baffinland since 2014 to address the fencing issue at the landfill site.

Photo 9: Partial fencing around the landfill

Photo 10: Scrap truck (black arrow) in the landfill

Photo 11: Ongoing activities at the landfill

Incinerator Area

The incinerator at the Mary River mine site remain well maintained (Photo 12) and waste materials were observed to segregated into labelled bins for incineration (i.e., food and paper waste) or disposal off site (i.e., batteries, paint, oily rags, kitchen grease etc.) (Photo 13). Waste sorting has improved as we didn't observe any recyclable waste materials such as cans for incineration unlike in 2018. During the current site visit, NIRB staff noted that the huge piles of tires and unused materials stored outside and in the vicinity of the incinerator facility have been removed.

Photo 12: Inside of the Incinerator Building

Photo 13: Waste segregation in the facility

Effluent Discharge Area

The sewage discharge area is an area where treated effluent from the waste treatment plant is discharged into the receiving environment (Photo 14). During the site visit, NIRB staff noted some terrain stability issues caused by erosion of the land where the discharge pipe was laid (Photo 15).

Photo 14: Sewage Outfall area

Photo 15: Erosion of terrain near outfall area

Tote Road

During the drive along the Tote Road, NIRB staff did not observe any major environmental issues along the Tote Road as the road was well maintained. However, at some locations, dust plumes were observed during the drive to Milne Inlet. In addition, snowmobile signages and bridge crossings were also observed along the Tote road (Photo 16 and Photo 17).

Photo 16: New road signage along the Tote Road

Photo 17: Bridge crossing along the Tote Road

2.1.2 **Milne Inlet**

Landfarm Area

NIRB staff visited the landfarm facility in order to follow-up with progress made to the facility in accordance with best practices. While some improvements have been made to the general operations of the facility, the entrenchment of synthetic liner materials within the facility continues to be an issue at the facility (Photo 18 and Photo 19). NIRB staff also observed that salt bags had continued to be stored in a temporary laydown area near the landfarm and the Proponent was unable to outline what long-term storage options are being considered to ensure that salt bags in the area are not permanently stored in that location or damaged.

Photo 18: Landfarm area

Photo 19: Plastic materials in the landfarm facility

Membrane Biological Reactor Facility (MBR)

The MBR is a waste treatment facility that removes the liquid component of sewage leaving dry, burnable waste. NIRB staff took a tour of the MBR at the Milne Port site and noted that the facility was functional, clean, and generally well maintained like previous site visits.

Ore Dock and Stockpile Area

NIRB staff also took a tour around the ore dock area and observed that ore stockpiling activities were taking place (Photo 20). It was observed that during ore stockpiling activities dust was being blown from the stockpile area towards Milne Inlet resulting in widespread deposition of dust particles into the snow and ice surface around Milne Inlet (Photo 21). NIRB staff also observed that one of the dustfall monitoring station near Milne Inlet was located too close to a laydown pad area and the Proponent indicated that various actions were being considered at that point to try to relocate the dustfall station to a farther location so as not to compromise the accuracy of dustfall monitoring at Milne Port (Photo 22).

Photo 20: Conveyor system at Milne Inlet

Photo 21: Ore dust on snow around Milne Inlet

Photo 22: Dust fall station near laydown area at Milne Inlet

Hazardous waste

The hazardous waste storage area was observed to be located adjacent to Milne Inlet and the pad that was used as the base for the facility was low and near the marine area. NIRB staff asked some questions regarding the operations and maintenance of the facility including what measures are in place to prevent berm failures and runoff of hazardous waste into the marine area (Photo 23).

Photo 23: Hazardous waste storage area

Visual Environment and Aesthetic Quality of Milne Port

NIRB staff noted that some historical laydown areas around Milne port, which were known to have accumulated tires piles and scrap materials, were fully cleaned out thereby improving the aesthetics of the area. However, specific areas near the shiploader were observed to still accumulate scrap metal materials (Photo 24). Baffinland staff indicated that a site wide clean-up is being planned during and after freshet to address waste management issues onsite.

Photo 24: Piles of metal scrap around shiploader in Milne Port

2.2 Observations Based on NIRB Project Certificate No. 005

The following are the observations made during the site visit that pertain specifically to terms and conditions of the amended Project Certificate No. 005:

2.2.1 Air Quality –Dust Management and Monitoring Plan

The Proponent is required pursuant to Condition 10 and 58 of the Project Certificate to monitor the status of dust deposition on site. During the drive along the Tote Road, NIRB staff observed several dust fall stations along the Tote Road, which is noted as being in compliance to part c of Condition 10 (Photo 25). NIRB staff also noted that vehicular traffic also resulted in the generation of dust plumes and widespread discolouration of the snowbanks along the road.

Photo 25: Dustfall Monitoring Station

At the time of the site visit, there was evidence of dust deposition and accumulation on sea ice around Milne Inlet and this was likely influenced by blowing ore dust during ore stockpiling.

2.2.2 Terrestrial Wildlife and Habitat

Pursuant to condition 53 and 61 of the Project Certificate Baffinland is required to demonstrate steps taken to prevent caribou mortality and wildlife safety measures on site. During the site visit, NIRB staff did not observe caribou around the Project area; however, many foxes were witnessed around the project site (Photo 26). Metallic skirtings were observed around the base of all accommodations buildings to deter foxes and other carnivores from entry into the buildings pursuant to the requirement of term and condition 64 of the Project Certificate. 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, Milne Port, and along the Tote Road.

Photo 26: Fox Tracks

3 FINDINGS AND SUMMARY

Due to the winter condition, several biophysical components of the Project site could not be fully observed due to ice conditions and extensive snow cover across the site. In addition, some terms and conditions of the amended Project Certificate could not be fully assessed during the winter and many items have been deferred to the summer site visit where observations are likely to be better. Based on the observations made during this winter site visit, all Mary River Project facilities in operation appear to be generally well maintained with adequate environmental protection measures and procedures in place. Several improvements were also observed across the project area in relation to:

- the management of tires,
- maintenance of the Tote Road,
- signages for snowmobile travellers, and
- dust emission from the crusher facility.

In order to fully meet the requirements of the amended Project Certificate terms and conditions, and to ensure that potential adverse impacts to the environment are adequately mitigated, the NIRB Monitoring Officer has identified some issues that require follow-up and corrective action:

3.1 Dust emission from the ore stockpiling

Condition 10 requires the implementation of a dust management and monitoring plan at site to prevent impacts to air quality from dust dispersion. At the time of the current site visit, the Monitoring Officer noted that dust emissions from the orestock pile area posed an environmental risk to marine area around Milne Inlet. Specifically, during orestockpiling activities it was observed that ore dust was blown across the Milne Inlet surrounding causing widespread dust deposition on sea ice. While the issue of dust deposition on sea ice has been consistently raised by the community members of Pond Inlet and NIRB staff over the last 2 years, the NIRB notes that Baffinland has not taken any specific-site actions to reduce or prevent blowing ore dust from the ore stockpile area into the Milne Inlet environment.

The Monitoring Officer observed a general improvement d in relation to dust emission from the crusher facility, Baffinland is still required to adopt for technologically sound measures and engineering designs to reduce or prevent dust dispersion from the crusher facility. Therefore, the Monitoring Officer will be looking to discuss what adaptive management measures Baffinland will be using to reduce dust dispersion from ore stockpiles in Milne Inlet during the summer site visit and if these measures will need to be incorporated into its Dust Management and Monitoring Plan.

3.2 Waste management

NIRB staff noted during the site visit that several locations around the project site, particularly around the shiploaders, landfarm and landfill area require improved waste management actions as many waste materials was found to have accumulated there.

For example, at the landfill site, the fencing issue continue to remain an outstanding issue as no action has been taken by the Proponent since 2014 to fully enclose the facility to prevent off-site

dispersion of waste materials into the adjacent tundra. Partial enclosure of the landfill facility should not be considered a long-term strategy for the site and best practices should be adopted. There is also need for the Proponent to remove the scrap vehicle disposed of at landfill facility.

The Monitoring Officer is therefore requesting Baffinland to develop an action-plan for addressing the recurring fencing issue at the landfill and present a timeline for the full enclosure of the landfill prior to the NIRB's next site visit. The NIRB will be inspecting the site for progress on this topic during the summer site visit report.

The Monitoring Officer notes that the landfarm will be inspected again in the summer site visit to observe the progress made in conducting landfarming and reduction of pieces of synthetic liner in the materials.

3.3 Sewage Outfall Area

Due to the extent of terrain deterioration, there is need for Baffinland to implement appropriate erosion control measures and implement rip-rapping measures in the affected areas at the sewage outfall area to prevent terrain deterioration of the land associated with the effluent discharge area.

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