Baffinland

October 30, 2014

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
PO Box 219
Box 100
Iqaluit, NU X0A 0H0
Robert.Savard aandc-aancd.cg.ca

Re: Surface Water Drainage to Camp Lake Near Freshwater Intake – Sedimentation Control Plan
Mary River Project – Water License No. 2AM-MRY1325

Background

During the compliance inspection which was conducted on June 17-19, 2014 by Aboriginal Affairs and Northern Development Canada (AANDC) Water Resource officers, some concerns were identified pertaining to the sediment loading of surface drainage into Camp Lake near MS-MRY-1a. Flows through the drainage originate from, and flow through, the Weatherhaven Camp and surrounding area. The following outlines Baffinland's plan for the implimentation of sediment controls measures for the aforementioned drainage and surface runoff.

Local Environment and Design Considerations

The drainage area in question has an approximate size of roughly 8 hectares and is comprised mainly of hard packed and often frozen sand and gravels with scant vegetation. The area is relatively flat, with an approximate gradient differential of only 1.5 m over the majority of the area. Flows draining from this area occur via a single channel at the north end of the camp. The channel is roughly 200 meters long with an approximate 13 grade. The ground adjacent to the drainage channel has been determined to be ice rich, with visible ice wedge features throughout. In consideration of the sensitivity of the ice rich soils, it was determined that the construction activities would avoid these areas. Therefore, sediment control structures were located at the toe of the embankment, adjacent to Camp Lake, where the ground conditions are stable and where there would be minimal disturbance of the channel itself (Figure 1). The main design consideration for sediment control structures was to minimize the discharge of sediments in general to Camp Lake. It is acknowledged that the sediment control structures as designed will reduce but not eliminate the discharge of sediments to Camp Lake, especially during extremely high flow events.

Methodologies

The design basis for the drainage discharge modeling was undertaken using both the Rational Equation Method (REM) as well as the Technical Realease 55 (TR-55) model. The REM is the simplest method to determine peak discharge for drainage basin runoff. It is not as sophisticated as the TR-55 method and the REM runoff coefficient is a function of soil type and gradiant. The TR-55 model is more complex and presents a methodical and reliable approach to predicting peak discharge due to a 24-hr storm event. Peak flow rates and the associated resulting residency times (based on planned pond sizes) from a range of precipitation intensities are presented below in Table 1. The combined pond volumes for the purpose of this desgn is 30 m^3.

Baffinland

Table 1 – Flow Rates and Residency Times

Model	Assumed 24 Hour Rainfall Events (mm/day)	Peak Flow Rate (L/sec)	Residency Time (minutes)
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Construction of Settling Ponds

Sediment control of the surface water drainage to Camp Lake will be controlled by means of the of two successive settiling ponds at the base of the drainage that will be constructed by means of a mechanical excavator. The ponds will decrease the flow velocity and in turn provide additional time to allow for the settling out of suspended sedimients prior to the runoff entering Camp Lake (refer to Figure 2). The upstream and downstream settling ponds will have an approximate capacity of 18 cubic metres and 12 cubic metres, respectively. The pond banks and the spillway which connects the two ponds, as well as the outflow location of the ponds will be constructed using course rock material and will be lined with geotextile to reduce the posibility of erosion during high intensity flows. The ponds will be periodically monitored and deposited sediment excavated as required to maintain pond capacity and run-off retention times.

Constuction of the settling ponds is scheduled to be completed prior to freshet 2015 or when subsurface conditions allow. A silt curtain will be installed at the outlet to the new drainage discharge and will be maintained during the 2015 open water season to control any residual sediments from construction or from very high flow rainfall/snowmelt events.

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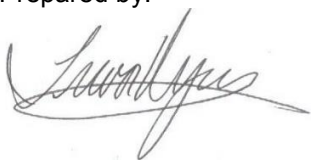
Upstream Drainage Diversion

The increased sediment loading of the runoff is in part a result of the high volume of vehicle traffic passing through the yard area of the Weatherhaven Camp. Various options for moving the location of the swale were examined to reduce vehicle interaction with the swale water and impacting its quality. At this time, no fesible solution was identified. It was determined that the main source of the increased traffic flows was a result of the maintenance and site services faciliies being located in area. Prior to the 2015 Freshet, the Maintenance and Site Services facilities are scheduled to be transitioned to the new camp area at the MSC. Once this transition has occurred, it will greatly reduce the amount of vehicle traffic through the yard at the Weatherhaven Camp and hence, through the the swale. This in turn will reduce the sediment loading for future runoff events.

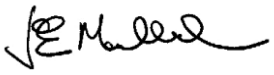
Should you require further information on the above, please feel free to contact the undersigned at (647) 253-0596 Ext. 6010 or Jim Millard at (902) 403-1337.

Prepared by:



Trevor Myers, B.A.(Hon.), M.Sc.
Environmental Superintendent

Reviewed by:



James Millard, M.Sc, P.Geol.
Environmental Manager

cc. Jim Millard, Allan Knight, Oliver Curran, Erik Madsen, Baffinland.
Justin Hack, AANDC

Figure 1 – Location of Settiling Ponds

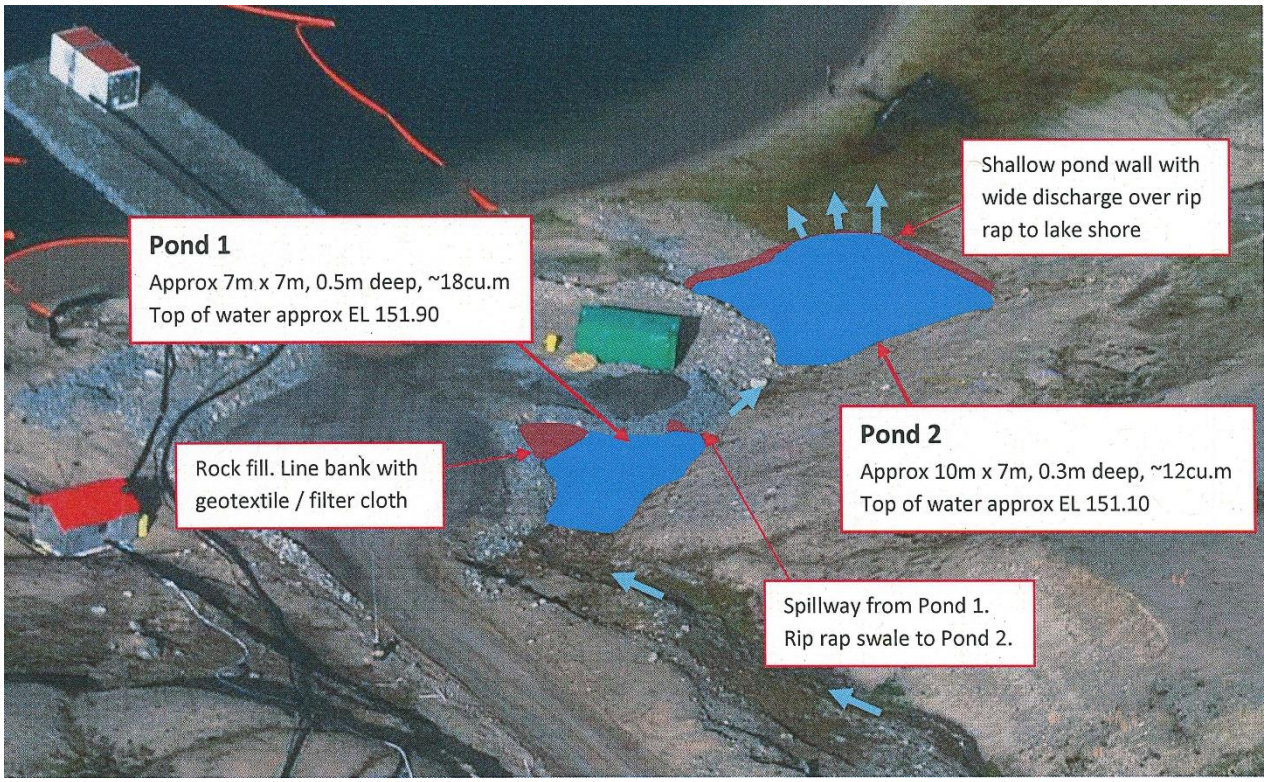


Figure 2 –Settiling Pond Design

Aboriginal Affairs and Northern Development Canada | Affaires autochtones et Développement du Nord Canada

November 3, 2014

Baffinland Iron Mines Corporation
2275 Upper Middle Road East
Oakville, ON
Canada L6H 0C3

Re: Open Burn Sites –Milne Port and Mary River
Mary River Project – Water Licence No. 2AM-MRY1325

Dear Mr Millard:

This letter is to address Baffinland Iron Mines Corporation's (BIMC) *Proposed Action Plan*, submitted September 12, 2014, regarding the open burn sites at Milne Port and Mary River. This plan was developed due to concerns on-site which were documented in the Aboriginal Affairs and Northern Development Canada's (AANDC) Water Licence Inspection Report (August 29, 2014).

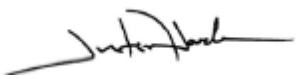
AANDC recognizes that BIMC has provided the required plan and photographic evidence, as re uired in their *Proposed Action Plan,* to show its committments have been met.

This is to ensure that future operation of the open burn facilities remain compliant, including increased site security, an education and adaptive management strategy, compliance monitoring, and improved waste segregation procedures. Documentation of the plan is attached.

On-site verification of the measures implemented will be conducted by a Water Resource Officer during the next water licence inspection.

Sincerely,

Justin Hack



Justin Hack
Water Resource Officer
Aboriginal Affairs and Northern Development Canada

cc. Erik Allain, Manager, Field Operations, AANDC Iqaluit
Robert Savard, Water Resource Officer, AANDC Iqaluit
Phyllis Beaulieu, NWB
Jim Millard, BIMC

APPENDIX A

- Baffinland's Proposed Action Plan
- Images
  - Image 1: Installation of new locking gates
  - Image 2: Signage posted at the open burn areas
  - Image 3: New burn bin at Mine Site
  - Image 4: New burn bin at Milne Port
  - Image 5: Education regarding open burn

Image 1: Installation of new locking gates

Image 2: Signage posted at the open burn areas

Image 3: New burn bin at Mine Site

Image 4: New burn bin at Milne Port

Baffinland
Iron Mines Corporation

ENVIRONMENTAL BULLETIN NO. 6

Open Burn Guidelines

Please review the following points with crews and post these guidelines at strategic locations at or near your work area, as they pertain to waste segregation and the use of open burn facilities. If anyone has any questions, please do not hesitate to contact the Environment Department for clarification. It is important that we do our part when it comes to waste management to safe guard the environment where we work.

ACCEPTABLE OPEN BURN WASTE

Acceptable clean wood waste **permitted** for open burning includes the following products that are not suitable for re-use or recycling:

- Lumber
- Timber
- Pallets
- Paper products & paperboard packaging

Open Burning Allowed

NON-ACCEPTABLE OPEN BURN WASTE

Non-clean wastes **not permitted** for open burning includes the following products:

- Treated or painted wood
- Plywood
- Petroleum-based materials
- Materials contaminated with petroleum or petroleum derivatives
- Petroleum products used as accelerants
- Plastics, electrical wire, Styrofoam or asbestos

NO Open Burning

GENERAL OPEN BURN PROCEDURE

- All acceptable open burn waste should be stockpiled and kept as dry as possible. Site Services should be contacted for material transport to open burn facilities.
- All identified open burn materials should be sorted to prevent deposition of unacceptable material prior to contacting Site Services for material transport.
- The main access gate for the open burn area will always be closed and locked when not in use by authorised Site Services personnel.
- Absolutely no unauthorised deposition of open burn material should occur

Image 5: Education regarding open burn

Aboriginal Affairs and Northern Development Canada | Affaires autochtones et Développement du Nord Canada

November 4, 2014

Baffinland Iron Mines Corporation
2275 Upper Middle Road East
Oakville, ON
Canada L6H 0C3

Re: Surface Water Drainage to Camp Lake
Mary River Project – Water Licence No. 2AM-MRY1325

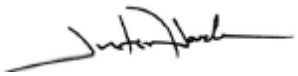
Dear Mr Millard:

This letter is to address Baffinland Iron Mines Corporation's (BIMC) *Preliminary Plan*, submitted September 8, 2014, regarding the sediment loading of surface drainage into Camp Lake near MS-MRY-1a. This plan was developed due to concerns on-site which were documented in the Aboriginal Affairs and Northern Development Canada's (AANDC) Water Licence Inspection June 17-19, 2014. The *Preliminary Plan* outlined that a final design plan would be submitted to the Water Resources Inspector on or before October 31st 2014 to provide further details related to drainage diversions, the use of flocculants, and the construction of settling ponds.

AANDC recognizes that BIMC has submitted the required plan entitled, *Surface Water Drainage to Camp Lake Near Freshwater Intake – Sedimentation Control Plan* (see Appendix A) on October 30, 2014. Implementation of the new plan will be monitored by AANDC Water Resource Officers.

Sincerely,

Justin Hack



Justin Hack
Water Resource Officer
Aboriginal Affairs and Northern Development Canada

cc. Erik Allain, Manager, Field Operations, AANDC Iqaluit
Robert Savard, Water Resource Officer, AANDC Iqaluit
James Neary, Environmental Assessment, AANDC Iqaluit
Phyllis Beaulieu, NWB
Stephen Bathory, QIA

APPENDIX A

- Preliminary Plan - September 8, 2014
- Final Design Plan, *Surface Water Drainage to Camp Lake Near Freshwater Intake – Sedimentation Control Plan* - October 30, 2014

Baffinland

September 8, 2014

Resource Management Officer
Nunavut Field Operations
Aboriginal Affairs and Northern Development Canada
PO Box 219
Box 100
Iqaluit, NU X0A 0H0
Robert.Savard aandc-aancd.cg.ca

Re: Surface Water Drainage to Camp Lake – Prelimanary Plan
Mary River Project – Water License No. 2AM-MRY1325

During the compliance inspection which was conducted on June 17-19, 2014 by Aboriginal Affairs and Northern Development Canada (AANDC) Water Resource officers, some concerns were identified pertaining to the sediment loading of surface drainage into Camp Lake near MS-MRY-1a. In the response letter from Baffinland dated July 4th, 2014, Baffinland commited to providing a technical memo to the inspector which outlined conceptual options for improvements to the drainage by September 1st, 2014. This date was subsequently extended to September 8, 2014 by the inspector on August 29th, 2014 as certain details of the of the conceptual plan were still not availible due to present conditions on site. The following outlines the the progess made thus far pertaining to options being examined as well as the proposed milestones moving forward.

1.) Construction of Settling Ponds

At present, one of the options being looked at is the creation of successive settiling ponds within the drainage in order to decrease the flow velocity and in turn allow for the suspended sedimients to settle out in the ponds. One of the constraints to this approach is that the gradiant of the drainage is quite steep and in turn create concerns pertaining to the staiblitly of the embankment. Also, at present we are not able to conduct any preliminary geotechnical ground testing due to flows in the channel and the risk of sedimentation into the lake as a result of the testing. A potential location for the ponds has been identified at the toe of the slope adjacent to the shore of the lake as the graident would likely be suitable to ensure pond and embankment stability (Figure 1). Once frozen conditions are present, preliminary ground testing will be conducted to acertain soil type as well as permafrost/ground ice conditions and a final design will be developed and submitted to the inspector on or before October 31st, 2014 with constuction being completed on or before May 15th, 2015 should this option prove viable.

2.) Use of Flocculants

Another option being examined is the use of flocculants to aid in increasing the rate of sediment precipitation from the water once it reaches the settiling ponds. This will likely be achevied through the placement of flocculant blocks into the channel upstream from the settling ponds, however the exact details are not currently availible as there is some investigation required into the sediment loading of the runoff in order to acertain an effective approach to this type of treatment. Further details on the use of flocculants will be provided in the final design plan to be submitted to the inspector on or before October 31st, 2014.

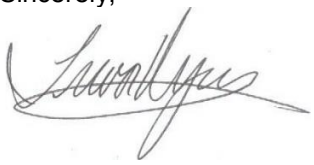
Baffinland

3.) Upstream Drainage Diversions

As was noted in the in the inspector's report from the June 17-19 inspection, the increased water drainage to the area was postulated to be caused from infrastructure work done adjacent to and on the runway. As a result of the runway upgrades, ponding of water has now been identified proximal to the toe of the runway alignment to support this theory. There is already a plan in place and a design produced to redirect the drainage southward and around the Weatherhaven camp to prevent the aforementioned ponding. This will in turn reduce the amount of melt runoff that will flow through the yard of the camp and down the drainage near Camp Lake. Furthermore, the increased silt load in the runoff is a result of the increased traffic passing through the yard and which must drive through the swale through which the runoff flows. Plans are in place to look at the various options for moving the location of the swale to an area that will not be driven through and to recontour the present location of the swale such that vehicle traffic is not required to drive through the runoff and in turn reduce the sediment loading of the runoff. Further details on the drainge diversions will be provided in the final design plan to be submitted to the inspector on or before October 31st, 2014.

Should you require further information on the above, please feel free to contact the undersigned at (647) 253-0596 Ext. 6010 or Jim Millard at (902) 403-1337.

Sincerely,



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Environmental Superintendent

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Figure 1 – Potential Loaction of Settiling Ponds

Baffinland

October 30, 2014

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Nunavut Field Operations
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Baffinland

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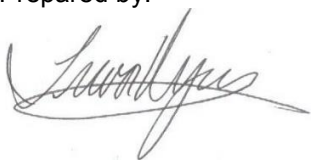

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Environmental Superintendent

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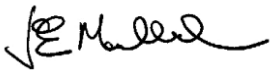

James Millard, M.Sc, P.Geol.
Environmental Manager

cc. Jim Millard, Allan Knight, Oliver Curran, Erik Madsen, Baffinland.
Justin Hack, AANDC

Figure 1 – Location of Settiling Ponds

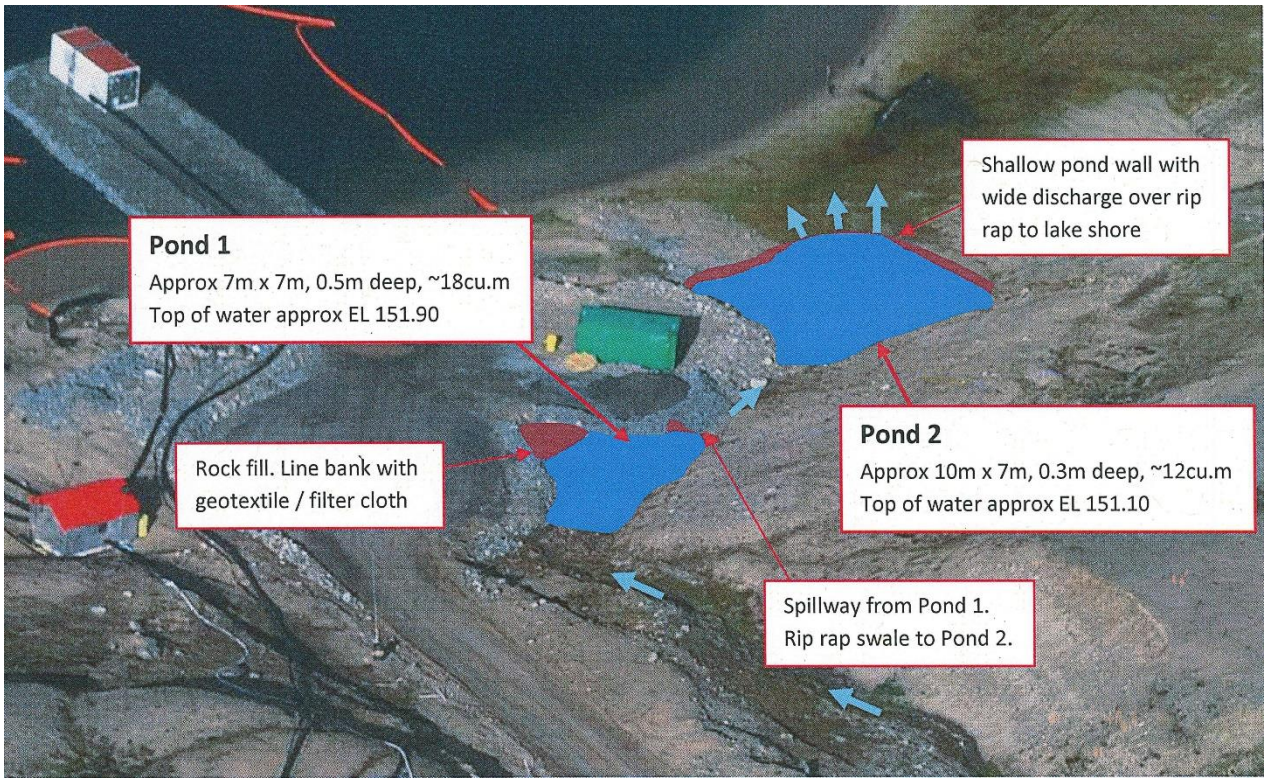

Figure 2 –Settiling Pond Design

APPENDIX E.7.2

QIA INSPECTION REPORTS AND BAFFINLAND RESPONSES

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Qikiqtani Inuit Association

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Serving the communities of

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Arctic Bay

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Cape Dorset

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Resolute Bay

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Sanikiluaq

June 24, 2014

Mr. Erik Madsen
Vice President
Sustainable Development, Health, Safety and Environment
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Madsen,

RE: MAY 2014 ENVIRONMENTAL INSPECTION

The Qikiqtani Inuit Association (QIA) submits this letter to Baffinland Iron Mines Corporation (BIMC) as response to a completed Environmental Inspection, as per Schedule "E" of the *Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation* (Commercial Lease No.: Q13C301[1]). This letter satisfies Schedule E, Item 12 with regards to reporting conclusions and recommendations to BIMC.

QIA notified BIMC in March 2014 of the intent to conduct an Environmental Inspection of the Mary River Project. Verbal confirmation of the acceptance of the proposed dates for the Environmental Inspection was received from BIMC. Flight arrangements for the Environmental Inspector, using BIMC's regular scheduled aircraft to/from Waterloo, was facilitated by BIMC. The Environmental Inspection was undertaken from the evening of May 6th to May 8th, 2014 on the portions of the Mary River Project that are part of the Commercial Lease. QIA contracted ARKTIS Solutions Inc. to act as the landlord's Environmental Inspector.

During the inspection, a small leak was observed at an inactive fuelling station at the Milne Inlet Bulk Fuel Facility. BIMC staff was informed of this issue as soon as the Inspector discovered it. QIA appreciates BIMC's immediate attention to commence corrective action for this leak while the Environmental Inspector was at site. QIA requests that follow up information regarding the remedial actions taken be provided to QIA when available.

Findings and environmental issues of concern were communicated to BIMC staff during a close-out meeting with BIMC representative Jim Millard (Environmental Manager) in the morning of May 8th, 2014. The following minor issues of environmental concern were

[1] Commercial Lease No.: Q13C301. Commercial Lease for Inuit Owned Lands Between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation.

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P.O. Box 1340, Iqaluit, Nunavut, X0A 0H0 • Phone: (867) 979-5391 • Toll Free 1 800-667-2742 • Fax: (867) 979-3238 • Website: qikiqtani.nu.ca

discussed during the meeting and QIA acknowledges that these items can be addressed by BIMC during routine site maintenance and operations:

- There were a significant number of small spills on site observed by the Environmental Inspector. Use of spill trays, and proactive reporting and corrective action by site staff is recommended.
- The fences at the landfill were overturned and should be repaired as soon as practical.
- Hazardous materials located at the Mary River burn pit shall be stored in secondary containment.
- The punctured tote on its side in hazardous laydown C at Mary River should have its contents moved to an intact container.
- The waste sorting area at Mary River could benefit from additional housekeeping and organization.

In addition to the Environmental Inspector observing site conditions, as noted above, during the site visit information was also sought with regards to quarry/borrow volume measurement methodology and quantity calculations. As previously communicated between QIA and BIMC during the approval process for the Quarry Management Plans[2][3][4][5][6], QIA is in the process of reviewing the information received and will provide further comments on this subject under a separate cover. Further, QIA notes that additional information on this topic will be sought out during the June, 2014 Environmental Inspection and potentially through additional follow up with BIMC.

[2] QIA December 23, 2013 letter to BIMC titled "Mary River Project Quarry Management Plan Submissions. Schedule "B"., Commercial Production Leae Q13C301 – Additional Clarification".

[3] QIA January 22, 2014 letter to BIMC titled "QIA Conditional Approval, Mary River Project Quarry Management Plan Submissions. Schedule "B", Commercial production Lease Q13C301".

[4] BIMC February 1, 2014 letter to QIA titled "Commercial Lease No. Q13C301 (the Lease), schedule "B", QIA conditional Approval of Mary River Project quarry Management Plan (QMP) Submissions".

[5] BIMC April 2, 2014 letter to QIA titled "KM104 Borrow Source Development".

[6] QIA April 4, 2014 letter to BIMC titled "QIA Conditional Approval, Mary River Project, KM104 Borrow Source Development, Schedule B, Commercial Production Lease Q13C301".

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QIA would like to thank BIMC for their efforts to facilitate this Environmental Inspection.

Sincerely,

Stephen Williamson Bathory
Director, Department of Major Project

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September 23rd, 2014

Mr. Erik Madsen
Vice President
Sustainable Development, Health, Safety and Environment
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Madsen,

Re: June 24th to June 26th 2014 Environmental Inspection

The Qikiqtani Inuit Association (QIA) submits this letter to Baffinland Iron Mines Corporation (BIMC) as response to a completed Environmental Inspection, as per Schedule "E" of the *Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation* (Commercial Lease No.: Q13C301[1]). This letter satisfies Schedule E, Item 12 with regards to reporting conclusions and recommendations to BIMC.

QIA notified BIMC in June 2014 of the intent to conduct an Environmental Inspection of the Mary River Project. Notification of an Environmental Inspection is a requirement of the Commercial Lease Q13C301. Verbal confirmation of the acceptance of the proposed dates for the Environmental Inspection was received from BIMC. Flight arrangements for the assessor, using BIMC's regular scheduled aircraft to/from Waterloo, was facilitated by BIMC.

The Environmental Inspection was undertaken from the evening of June 24th to June 26th, 2014 on the portions of the Mary River Project that are part of the Commercial Lease. QIA contracted ARKTIS Solutions Inc. to act as the landlord's Environmental Inspector. BIMC staff accompanied QIA's designated Environmental Inspector, and provided site access, accommodations and transportation for the duration of the inspection.

An environmental issue that required immediate attention was the presence of spilled hydrocarbons (and potentially other materials) and the associated free-product floating on meltwater within three hazardous material laydowns at the Milne Inlet camp. While QIA acknowledges these spills were within lined areas, the volume of spilled material combined with the water within these areas is an environmental concern for QIA. These laydowns were identified to BIMC staff by the Inspector during the inspection. QIA

[1] Commercial Lease No.: Q13C301. Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation.

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requests that follow up information regarding the causes of this spill, and the remedial actions taken be provided to QIA when available.

There were several smaller issues that had been identified to BIMC staff during previous Environmental Inspections that typically could be dealt with during routine maintenance and operations, however it was noted that these issues had not been dealt with at the time of the inspection. As such, QIA requests that follow up information be provided by BIMC identifying the current status of each of the following issues, and if the issue has not been addressed, provide a schedule for addressing the issue:

- Fences at the landfill should be repaired as soon as possible.
- The punctured tote on its side in hazardous laydown C at Mary River Mary Exploration Camp should have its contents moved to an intact container, and the punctured tote should be disposed of.

It was noted during the Environmental Inspection that BIMC was using new materials extracted along the Tote to assist with Tote Road realignment construction operations. These materials were not being measured or tracked in any way by BIMC.

Findings and environmental issues were communicated to BIMC staff during a close-out meeting with BIMC representative Jim Millard (Environmental Manager) in the morning of May 8th, 2014. The following issues were discussed during the meeting and shall be addressed during routine site maintenance and operations:

- Hazardous materials should be in containment at the Mary River burn pit.
- The burn pit area at Mary River should have all loose ash removed from the area and contained within drums, and waste should only be burned as specified in the BIMC Solid Waste Management Plan.
- The lined laydowns need to have meltwater removed from them.
- BIMC spill contingency plans need to be known by all staff, particularly staff that will be required to clean up spills.
- Waste bags containing food should not be left outside, and should be managed as per BIMC's Waste Management Plan.
- The materials stored at Quarry 104 need to be stored correctly, with all hydrocarbon burning equipment stored within containment. The multiple small spills in this area should be addressed.

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QIA would like to thank BIMC for their efforts to facilitate this Environmental Inspection.

Should you have any questions or comments please do not hesitate to contact our office.

Sincerely,

Stephen Williamson Bathory
Director, Department of Major Projects

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October 15, 2014

Manager, Major Projects
□ikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0
swbathory□ qia.ca

Re: QIA Concerns from June 24th to June 26th 2014 Environmental Inspection Report

In the □IA Environmental Inspection Report dated September 23, 2014 for the inspection which took place on June 24th to June 26th, 2014, □IA noted two concerns and requested that follow up information be provided. The follow outlines the concerns noted as well as Baffinland□s response and follow up information.

Concern Identified by QIA:

Fences at the landfill should be repaired as soon as possible.

Baffinland's Response:

During the winter months, the temporary fencing at the landfill become damaged as a result of the extreme cold temperatures and high wind conditions. Every summer, Baffinland undertakes work during the summer to repair the sections of the fencing that has been damaged during the previous winter. As of August, the fences were fully repaired.

Concern Identified by QIA:

The punctured tote on its side in hazardous laydown C at Mary River Mary Exploration Camp should have its contents moved to an intact container, and the punctured tote should be disposed of.

Baffinland's Response:

Baffinland can confirm the punctured tote referred to in the aforementioned inspection report had its contents transferred to undamaged containers which were then placed in lined secondary containment. The empty, damaged tote was placed into a secondary containment berm to await proper disposal.

Should you require further information on the above, please feel free to contact the undersigned or Allan Knight at (647) 253-0596 Ext. 6010 or Jim Millard at (902) 403-1337.

Sincerely,

Trevor Myers, B.A.(Hon.), M.Sc.
Environmental Superintendent

cc. Jim Millard, Allan Knight, Oliver Curran, Erik Madsen, Baffinland.

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October 17th, 2014

Erik Madsen
VP, Sustainable Development, HS&E
Baffinland Iron Mines Corporation (BIMC)
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

RE: Preliminary Findings, Environmental Audit

Mr. Madsen,

The Qikiqtani Inuit Association (QIA) submits this letter to Baffinland Iron Mines Corporation (BIMC) as a preliminary response to a completed Environmental Audit, as per Schedule E, Item 1 of the *Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation* (Commercial Lease No.: Q13C301[1], hereafter referred to as the "CPL"). This letter is being sent to discuss one issue in particular and further correspondence that will satisfy Schedule E, Item 12 will be sent at a later date.

During the recent QIA Environmental Audit, it has become clear to QIA that one issue is a root cause for the majority of BIMC's non-compliances: a lack of formality and understanding of the CPL. In QIA's preliminary analysis, BIMC's lack of understanding and formal procedures has led to the following:

1. Non-compliance with Section 5.2 a)(i) of the CPL – issuance of studies.
2. Non-compliance with Section 5.2 i) of the CPL – notice of non-compliance with other regulatory agencies.
3. Non-compliance with Section 5.2 j) of the CPL – changes and amendments to permits, licenses and approvals.

QIA believes it could assist and work with BIMC to rectify this issue. First and foremost however, BIMC must recognize QIA's authority established as the owner of Inuit Lands and the CPL. If BIMC wishes to proceed with a responsive and cordial relationship with QIA a greater effort will need to be made. This should start with BIMC informing QIA of any and all planned or considered changes to the Mary River Project (Section 5.2 j) or amendments to approvals prior to or in concert with these discussions being had with any other regulatory agency, such as the Nunavut Impact Review Board or Nunavut Water Board. At a minimum, QIA expects that such notifications would be provided at least 30-days prior to formal submissions related to changes and amendments to permits, licenses and approvals.

[1] Commercial Lease No.: Q13C301. Commercial Lease for Inuit Owned Lands Between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation. Sept. 2013.

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QIA intends to file a more comprehensive Environmental Audit report with BIMC consistent with Schedule “E” subsection 12 of Q13C301.

Sincerely,

{Original Signed By}

Stephen Williamson Bathory
Director, Department of Major Projects

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Qikiqtani Inuit Association

August 21, 2014

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Mr. Erik Madsen
Vice President
Sustainable Development, Health, Safety and Environment
Baffinland Iron Mines Corporation (BIMC)
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Madsen,

RE: 2014 ENVIRONMENTAL AUDIT

The Qikiqtani Inuit Association (QIA) thanks the Baffinland Iron Mines Corporation (BIMC) for their hospitality and assistance provided to the QIA Environmental Audit team. As BIMC is aware, a portion of the Environmental Audit involved interviewing staff regarding BIMC's compliance with the terms, conditions and obligations pursuant to the Commercial Production Lease – Q13C301.

QIA hereby informs BIMC that the Environmental Audit team was not able to have all questions answered by staff available at the Mary River site during their August 7 to 12, 2014 site visit. This was a result of either unavailability of staff qualified to answer questions and/or deferral of questions to BIMC Corporate in Oakville, ON. Thus, the Environmental Audit is not yet complete.

The QIA provides this notification to BIMC that members of the Environmental Audit team will connect with Mr. Erik Madsen, within one week of issuance of this letter, to address the outstanding information. It is assumed that Mr. Madsen will be the conduit to obtain responses from the most appropriate BIMC staff. Where appropriate, a teleconference between the Environmental Audit team and BIMC staff may be required to either address the initial questions or as a follow up to a response.

Attached to this letter, as Annex A, is a list of outstanding information required for QIA to complete the Environmental Audit. The Environmental Audit will be completed when the Environmental Audit team obtains satisfactory responses to the outstanding information.

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Please do not hesitate to contact the undersigned should you require any further information.

Sincerely,

Stephen Williamson Bathory
Director, Department of Major Projects

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ANNEX A – 2014 ENVIRONMENTAL AUDIT OUTSTANDING INFORMATION

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Applicable Commercial Production Lease (CPL)[1] Section	Audit Inquiry
2.4, 3.8, 5.2 (f)	Accurate survey data is key to understanding environmental conditions at any project site. QIA understands from the Environmental Audit that BIMC intends to submit the survey information required on September 6th, 2014. There are specific requirements outlined within the CPL regarding the survey information required. Site staff were not able to comment upon what this survey package will contain. QIA requests that BIMC provides a list of the specific information that will be contained within the September 6th, 2014 submission.
3.1, 3.2, 3.3, 3.4 (a-j), 2.4, 3.8, 3.9	Land classification is an important way QIA tracks the potential environmental liability of operations on Inuit Owned Land and is a requirement of the CPL. As such, how land use is managed on site and tracked is an important part of managing environmental liability. As such, QIA has the following questions: • How does BIMC track land use during operations? • What is the current procedure to track how on-site activities are verified to be taking place within the proper Land Use Areas? • How does BIMC delineate Land Use Areas at the field and operations level? • Are these Land Use Areas marked on maps used for site planning? • If so, can BIMC provide maps showing Land Use Areas in relation to planned and current project activities? • Are there any planned Land Classification Amendments anticipated by BIMC?
2.7 (c), 4.4, 6.4	The CPL requires quarterly reporting of waste deposited in specified Waste Storage Areas. Understanding the quantity of waste deposited on Inuit Owned Land is a key component of understanding environmental liabilities and conditions at site. QIA requests that BIMC submit the Quarter 1 and Quarter 2 quantities of waste deposited on Inuit Owned Land.
5.2 (a)(i-iv)	The CPL requires BIMC to provide to QIA, without QIA requesting, reports and studies that contain information regarding the Mary River Project site and environment. To date, no direct formal submissions have been received by QIA. During the Environmental Audit, QIA was pointed to submissions to NIRB for this information, an external government agency. QIA requests that BIMC describe the procedure by which the relevant reports and studies are tracked and reported to QIA.
5.2 (j)	The CPL requires BIMC to provide advance notice to QIA of any anticipated amendment, renewal or annulment of any and all permits, licenses or approvals associated with the Mary River Project. To date, QIA has not received formal notice regarding any anticipated amendments, renewals, or annulments. QIA requests that BIMC provides a description of their procedure for providing this notice to QIA as well as a listing of any anticipated amendments, renewals or

[1] Commercial Lease No.: Q13C301. Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation. Sept 6, 2014.

Applicable Commercial Production Lease (CPL)[1] Section	Audit Inquiry
	annulments for any permits, licenses or approvals currently held by BIMC for the Mary River Project.
5.2 (h)	BIMC is required to provide notice to QIA regarding the discovery of carving stone and/or any archeological site on Inuit Owned Land, as these are important cultural and environmental resources. QIA has not received formal notice in 2013 or 2014 regarding any found archeological or carving stone sites as required by the CPL. QIA requests that BIMC describe the procedures currently in place for providing notice to QIA upon discovery of an archeological or carving stone site. If omitted to date, QIA requests BIMC provide notice for any carving stone or archeological sites discovered during 2013 or 2014.
6.4 (f)(g)	BIMC is required to annually provide QIA with the type and quantity of materials that were both shipped off of, and shipped to and stored on Inuit Owned Land. During the Environmental Audit information regarding the procedures for tracking inventory were investigated. QIA auditors were informed about an SAP database that contains this information that could be made available to QIA. QIA requests that BIMC provide the aforementioned SAP database that details the inventory of materials currently stored on leased lands.

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Qikiqtani Inuit Association

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November 13th, 2014

Mr. Erik Madsen
Vice President
Sustainable Development, Health, Safety and Environment
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Mr. Madsen,

Re: 2014 ENVIRONMENTAL AUDIT

The Qikiqtani Inuit Association (QIA) submits this letter to Baffinland Iron Mines Corporation (BIMC) as the response to a completed Environmental Audit, as per Schedule E, Item 1 of the *Commercial Lease for Inuit Owned Lands between Qikiqtani Inuit Association and Baffinland Iron Mines Corporation* (Commercial Lease No.: Q13C301[1], hereafter referred to as the "CPL"). This letter satisfies Schedule E, Item 12 with regards to reporting conclusions and recommendations to BIMC.

QIA notified BIMC in July, 2014 of the intent to conduct an Environmental Audit of the Mary River Project. Notification of an Environmental Audit is a requirement of the CPL. Verbal confirmation of the acceptance of the proposed dates for the environmental audit was received from BIMC. Flight arrangements for the Environmental Auditors, using BIMC's regular scheduled aircraft to/from Waterloo Airport, was facilitated by BIMC.

The Environmental Audit was undertaken from the evening of August 13 to August 18, 2014 on the portions of the Mary River Project accessed through the CPL. QIA contracted ARKTIS Solutions Inc. to act as their Environmental Auditor. BIMC staff and consultants (Hatch) accompanied QIA's designated Environmental Auditor during the site visit. BIMC also provided site access, accommodations and transportation for the duration of the Environmental Audit.

The Environmental Audit findings are listed below, and are classified in two categories, non-compliance and opportunity for improvement. When a non-compliance was found, QIA will require corrective action(s) to be completed to meet compliance. For opportunities for improvement, QIA presents recommendations to work with QIA in order to move forward with the implementation of the CPL. The contents of this document have been developed consistent with *Schedule "E", Role, Responsibility and Authority of the Environmental Inspector and Environmental Monitor*, of the CPL.

[1] Commercial Lease No.: □13C301. Commercial Lease for Inuit Owned Lands Between □ikiqtani Inuit Association and Baffinland Iron Mines Corporation. Sept 4, 2013

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P.O. Box 1340, Iqaluit, Nunavut, X0A 0H0 • Phone: (867) 979-5391 • Toll Free 1 800-667-2742 • Fax: (867) 979-3238 • Website: qikiqtani.nu.ca

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Qikiqtani Inuit Association

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1. NON COMPLIANCE: ***Section 2.4***

"The Tenant shall cause the boundaries of each Land Use Area set forth in Schedule "A2", Schedule "A3" and Schedule "A4" to be certified by a Canada Land Surveyor by not later than one (1) Year following the date of this Lease at the Tenant's sole cost and expense."

As indicated by BIMC during the Environmental Audit, these documents would be sent to QIA consistent with the requirements of Q13C301. QIA did not receive these document on/before September 6th, 2014.

Further BIMC indicated during the Environmental Audit there was some uncertainty related to the types of documents that should be filed with QIA. QIA reminds BIMC that *Section 2.4* includes a requirement that *"The Tenant shall provide the Landlord with copies of all survey data, digital files and surveyors' notes.*"

CORRECTIVE ACTION

QIA understands that developing survey material takes time and is willing to work with BIMC on this topic, however QIA requires that BIMC be more forthright in communicating delays to CPL requirements such that QIA is able to consider the circumstance and respond appropriately.

QIA directs that survey materials be submitted to QIA immediately, and, that materials submitted are consistent with CPL requirements.

2. NON COMPLIANCE: ***Section 5.2(a)(i)***

Submission to QIA of any report or study regarding the nature of the Inuit Lands, and their fauna and flora, or any biological or environmental studies.

As indicated by BIMC during the Environmental Audit, these reports are sent to other regulators, and QIA is copied. Additionally, the reports are contained within the annual report submitted to the Nunavut Impact Review Board (NIRB). These reports are at times not submitted to QIA directly and/or written to demonstrate compliance with the CPL.

CORRECTIVE ACTION

If BIMC wishes to continue this practice, than upon delivery of a document to another regulator that is intended to also satisfy the CPL, BIMC must provide to QIA's registry a separate memorandum that demonstrates how the submitted document satisfies the CPL.

QIA directs that this corrective action be implemented immediately. QIA requires BIMC to confirm its understanding and commitment to this corrective action.

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3. NON COMPLIANCE: *Section 2.5(e)*

The definition of a Waste Storage Area is provided in the CPL as follows (Section 2.5, Item E):

> *"being Lands identified by the Tenant in an Impact Area approved by the Landlord for either: i) the permanent storage of Solid Waste or permanent storage of disturbed natural materials resulting from Project activities, not including waste rock, or ii) the semi-permanent (Le. greater than 90 days) storage of greater than 50 litres or 50 kilograms of any hazardous material waste including purpose-built structures, liners, bladders, containment vessels, materials storage facilities, landfills and landfarms. No semi-permanent (Le. greater than 90 days) explosives storage shall be permitted within one hundred (100) meters of a Waste Storage Area or greater distance prescribed by Applicable Laws. Waste Storage Areas shall not be located within one hundred (100) meters of the ordinary high water mark of any bed or body of water, or on Lands that are within ten (10) meters of the surveyed boundary of the Land Use Area, and all structures shall be not less than ten (10) meters away from of any other structure."*

The Environmental Audit determined that materials are being stored in BIMC hazardous waste laydowns for greater than 90 days, therefore, these areas fall under the definition of a Waste Storage Area as defined in the CPL.

CORRECTIVE ACTION

BIMC is required to complete the following:

a. Reclassify all hazardous waste laydowns where materials are stored for more than 90 days as "Waste Storage Areas".
b. Survey the extents of these areas as required by the CPL.
c. Provide the quantities and type of material deposited in each hazardous material laydown each calendar quarter.

QIA directs that this corrective action be implemented within 90 days of the date of this letter. QIA requires BIMC to confirm its understanding and commitment to this corrective action.

4. NON COMPLIANCE: *Section 6.4(c)*

The Tenant shall provide the Landlord All "As Built" reports available, signed and stamped by an Engineer, for all works completed as per 6.4 b).

BIMC incorrectly stated during the Environmental Audit that As-Builts are driven by the Type 'A' water licence requirements; and availability of existing drawings / reports is based on Type 'A' water licence reports. QIA does not agree with BIMC's interpretation of the CPL and this is considered a non-compliance to this CPL

condition. BIMC did indicate that it was unclear what constitutes an "As-Built" report and the requirements the report, and QIA expectations need to be clarified.

CORRECTIVE ACTION

QIA defines an "As Built" that details the changes made in the field that differ from the "Issued for Construction". BIMC is required to adhere to a professional engineering definition of "As-built" (NAPEG).

All "As-Built" reports for buildings constructed since signing of the lease, should be delivered to QIA by January 1, 2015 and annually thereafter within the appropriate Annual Plan. All "As-built" reports for infrastructure associated with the Water Licence, including but not limited to waste containment facilities, water diversion or storage structures/facilities, borrows and quarries shall also be submitted to QIA.

5. NON COMPLIANCE*: Section 2.7 and 2.8*

"QIA is of the position that materials sourced from within the Milne Inlet Tote Road Areas, as described under section 2.5 c), shall require the payment of fees to QIA (as per section 2.7 a)), except where such are "granular materials" sourced from the surface of the "current" tote road (as per 2.7 b)). Additionally, the use of such materials shall also require the existence of an approved Quarry Management Plan (as per section 2.7 a) and Section 1 of Schedule B - the Quarry Concession Agreement) except a Quarry Management Plan is not required for activities contained within the surface of the "current" tote road (as per 2.7 b)"[2] [3]

Section 2.7 and 2.8 of the CPL outlines the requirements of BIMC with regards to the use of material along the Tote Road, BIMC staff were not willing to discuss this during the Environmental Audit.

CORRECTIVE ACTION

QIA and BIMC continue to discuss this matter separately from the other Environmental Audit findings included herein.

[2] Stephen Williamson Bathory, Director, Department of Major Projects □IA to Erik Madsen, Vice President, Sustainable Development, Health Safety and the Environment. Re: Tote Road Upgrades, Commercial Production Lease (□13□301). August 18, 2014.

[3] Stephen Williamson Bathory, Director, Department of Major Projects □IA to Erik Madsen, Vice President, Sustainable Development, Health Safety and the Environment. Re: Tote Road Upgrades, Commercial Production Lease (□13C301). November 13, 2014.

6. OPPORTUNITY FOR IMPROVEMENT

BIMC is obligated to provide immediate Notice to QIA when any archaeological sites or carving stones are found, whether requested by QIA or not.

As per Section 6.4 l) of the CPL, QIA further requests that BIMC submit a summary of found archeological and/or carving stone areas within the CPL Annual Report. If no areas are found within a calendar year, this should be reported as well.

Please note as per section 5.2 h), BIMC shall also provide immediate Notice to QIA when an archeological and/or carving stone area is found.

QIA requires BIMC to confirm its understanding and commitment to this corrective action.

7. OPPORTUNITY FOR IMPROVEMENT

Section 5.2 i) BIMC is obligated to provide immediate verbal Notice of a non-compliance to QIA and follow up thereafter.

Aboriginal Affairs and Northern Development Canada Inspections[4] and NIRB's 2013 Site Visit Report[5] indicates items that required action or instances where the Project Certificate terms and conditions did not meet NIRB expectations. Notification of non-compliance was not submitted to QIA. During the Environmental Audit, BIMC staff did not consider these occurrences to be examples of non-compliance as per the CPL.

It is requested that BIMC work with QIA to define the term "non-compliance" as used within Section 5.2 i) of the CPL. QIA requires BIMC to confirm its understanding and commitment to this corrective action.

8. OPPORTUNITY FOR IMPROVEMENT

Section 5.2 j), requires BIMC to provide QIA with <u>advance</u> notice of any anticipated amendment, renewal or annulment of any and all permits, licensed or approvals associated with a Work Plan or Work on the Property.

As stated in QIA's letter to BIMC dated October 17, 2014,[6] QIA defined ***<u>advanced</u>*** as a minimum of 30 days prior to any amendments or changes are submitted to any regulatory or government agency. QIA is open to continue this discussion with BIMC at their convenience.

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[4] Aboriginal Affairs and Northern Development Canada. 140625 2AM-MRY1325 June 2014 AANDC Inspection Report and 140829 2AM-MRY1325 AANDC Inspection rpt Aug 21-24 14.

[5] Nunavut Impact Review Board. ftp://ftp.nirb.ca/. 131028-08MN053-2013 Site Visit Report-OT8E. May 23, 2014.

[6] Stephen Williamson Bathory, Director, Department of Major Projects □IA to Erik Madsen, Vice President, Sustainable Development, Health Safety and the Environment. Re: Preliminary Finding, Environmental Audit, Commercial Production Lease (□13□301). October 17, 2014.

The Environmental Audit also completed an evaluation of BIMC's activities on IOL during the site visit to facilitate development of a reclamation liability estimate for the Mary River Project. Details of the site activities and associated reclamation liability have been provided to BIMC under separate cover.[7]

QIA would like to thank BIMC for their efforts to facilitate the 2014 Environmental Audit, and would be pleased to discuss the requests contained within this Memorandum with BIMC at their earliest convenience

Should you have any questions or comments please do not hesitate to contact our office.

Sincerely,

Stephen Williamson Bathory
Director, Department of Major Project

[7] Stephen Williamson Bathory, Director, Department of Major Projects □IA to Erik Madsen, Vice President, Sustainable Development, Health Safety and the Environment. Re: □IA Revised 2014 Financial Security Estimate. October 31, 2014.

Baffinland

December 17, 2014

Stephen Williamson Bathory
□ikiqtani Inuit Association
Igluvut Building, 2nd floor
P.O. Box 1340
Iqaluit, NU
X0A 0H0

Re: Response to QIA's 2014 Environmental Audit Findings, Commercial Lease Q13C301

To Stephen,

Baffinland Iron Mines Corporation (Baffinland) presents its responses, herein, to the □ikiqtani Inuit Association (□IA) 2014 audit findings/concerns as presented in their October 17th and November 13th, 2014, letters to Baffinland. Baffinland makes the assumption that the preliminary findings noted in the October 17th letter were reiterated and superceded by their November 13th letter. On this basis, Baffinland directs its responses to the Audit findings provided in □IA□s November 13th letter. As presented in their November 13th letter, □IA□s environmental findings are presented in two categories, non-compliance and opportunity for improvement.

1. ***QIA Non-Compliance: Section 2.4*** *"The Tenant shall cause the boundaries of each Land Use Area set forth in Schedule "A2", Schedule "A3" and Schedule "A4" to be certified by a Canada Land Surveyor by not later than one (1) Year following the date of this Lease at the Tenant's sole cost and expense." As indicated by BIMC during the Environmental Audit, these documents would be sent to QIA consistent with the requirements of Q13C301. QIA did not receive these document on/before September 6th, 2014. Further BIMC indicated during the Environmental Audit there was some uncertainty related to the types of documents that should be filed with QIA. QIA reminds BIMC that Section 2.4 includes a requirement that "The Tenant shall provide the Landlord with copies of all survey data, digital files and surveyors' notes."*

QIA Proposed Corrective Action: QIA understands that developing survey material takes time and is willing to work with BIMC on this topic, however QIA requires that BIMC be more forthright in communicating delays to CPL requirements such that QIA is able to consider the circumstance and respond appropriately. QIA directs that survey materials be submitted to QIA immediately, and, that materials submitted are consistent with CPL requirements.

Baffinland Response: Baffinland acknowledges that there were delays in providing this information to □IA this year due to the magnitude of the effort that was involved in completing the field work and office drafting/reporting. □IA and Baffinland agreed on a

methodology for surveying in late June, 2014, based on correspondence and proposed methodology provided to □IA in a letter, dated April 30th. Digital copies of plans were provided to □IA in late October with follow-up hard copy and digital raw files provided on November 27. □IA is now in receipt of all survey data and files associated with this project. We note that after contacting the CLS for the Project, we were told that the field surveying project was straightforward, and as such, there were no corresponding survey notes available for this Project.

2. ***QIA Non-Compliance: Section 5.2 (a) (i)*** *"Submission to QIA of any report or study regarding the nature of the Inuit Lands, and their fauna and flora, or any biological or environmental studies." As indicated by BIMC during the Environmental Audit, these reports are sent to other regulators, and QIA is copied. Additionally, the reports are contained within the annual report submitted to the Nunavut Impact Review Board (NIRB). These reports are at times not submitted to QIA directly and/or written to demonstrate compliance with the CPL.*

   QIA Proposed Corrective Action: If BIMC wishes to continue this practice, than upon delivery of a document to another regulator that is intended to also satisfy the CPL, BIMC must provide to QIA's registry a separate memorandum that demonstrates how the submitted document satisfies the CPL QIA directs that this corrective action be implemented immediately. QIA requires BIMC to confirm its understanding and commitment to this corrective action.

   Baffinland's Response: In Baffinland's opinion, we have been diligent in providing □IA with copies of relevant studies by means of a combination of direct upload to □IA's ftp site, direct submissions to □IA, and copying of □IA in its submission to other regulators and government agencies. Baffinland notes that there are opportunities for joint improvements between Baffinland and □IA in regard to the administrative aspects of study issuance. In particular we suggest that we work jointly to improving the current information transfer protocol so that it is more effective. This could also include improvements to □IA's ftp site including its file structure and download/upload methodology to make this aspect efficient and workable utilizing readily available technology.

3. ***QIA Non-Compliance: Section 2.5(e)*** *"The definition of a Waste Storage Area is provided in the CPL …(Section 2.5, Item E)". The Environmental Audit determined that materials are being stored in BIMC hazardous waste laydowns for greater than 90 days, therefore, these areas fall under the definition of a Waste Storage Area as defined in the CPL*.

   □IA Proposed Corrective Action: BIMC is required to complete the following:

   a. Reclassify all hazardous waste laydowns where materials are stored for more than 90 days as □Waste Storage Areas□.

b. Survey the extents of these areas as required by the CPL.
c. Provide the quantities and type of material deposited in each hazardous material laydown each calendar quarter.

IA directs that this corrective action be implemented within 90 days of the date of this letter. IA requires BIMC to confirm its understanding and commitment to this corrective action.

Baffinland s Response: The Mary River Project is in the transitional stage between construction and operation. As-built reports for the permanent waste disposal areas are in preparation and will be submitted by the end of January 2015. These as-built reports will include survey plans, which will allow the areas of the waste facilities to be accurately calculated. The other existing berms across the site referred to by IA are to be strictly temporary (<90 days) in nature with all wastes being processed, packaged, labelled, and inventoried through the Waste Management Building. Once the waste has been processed, it will be sent to Milne Inlet for storage in seacans within the permanent waste storage facility. Therefore, it is envisioned that during normal operations, wastes will not be stored in the Waste Management Building or adjacent berms for more than 90 days. In the meantime, Baffinland acknowledges that wastes have been stored in some of the temporary berms and transfer stations for periods greater than 90 days, however, as mentioned above, this is due to the startup and is not the long term plan. Baffinland is agreeable to providing IA with a short report detailing the status, survey extents, and areas of all hazardous material storage areas by February 13, 2015. Baffinland will assess the practicality of conducting quarterly inventories of the waste storage berms and will update IA on its plans in this respect within the February 13 report.

4. ***QIA Non-Compliance: Section 6.4(c).*** *The Tenant shall provide the Landlord All "As Built" reports available, signed and stamped by an Engineer, for all works completed as per 6.4 b). BIMC incorrectly stated during the Environmental Audit that As-Builts are driven by the Type 'A' water licence requirements; and availability of existing drawings / reports is based on Type 'A' water licence reports. QIA does not agree with BIMC's interpretation of the CPL and this is considered a non-compliance to this CPL condition. BIMC did indicate that it was unclear what constitutes an "As-Built" report and the requirements the report, and QIA expectations need to be clarified.*

IA s Proposed Corrective Action: IA defines an As Built that details the changes made in the field that differ from the Issued for Construction. BIMC is required to adhere to a professional engineering definition of As-built (NAPEG). All As-Built reports for buildings constructed since signing of the lease, should be delivered to IA by January 1, 2015 and annually thereafter within the appropriate Annual Plan. All As-built reports for infrastructure associated with the Water Licence, including but not limited to waste containment facilities, water diversion or storage structures/facilities, borrows and quarries shall also be submitted to IA.

Baffinland's Response: Available as-built reports will be provided to QIA within the QIA Annual Report due on March 31 each year, as stated under Section 6.4, Annual Reporting Requirements, rather than on January 1, as requested. It should be noted that many of structures on site are trailers, fold away buildings, and other temporary structures. As such, the intention is to provide, once construction of each major site component is completed, accurate footprints of these structures on site plans, signed by an engineer. These plans will also include critical exterior features such as fuel tanks and lines, major electrical service lines, domestic water pipes and sewage pipes located around the exterior of the structures. Baffinland has in the past and will continue in the future to copy/submit as-built reports sent to the Nunavut Water Board also to QIA.

5. ***QIA Non-Compliance: Section 2.7 and 2.8.*** *This relates to the standard practice of cut and fill along the Tote Road.*

QIA Proposed Corrective Action: QIA and BIMC continue to discuss this matter separately from the other Environmental Audit findings included herein.

Baffinland's Response: Baffinland is in agreement with this approach.

6. ***QIA Opportunity for Improvement****: BIMC is obligated to provide immediate Notice to QIA when any archaeological sites or carving stones are found, whether requested by QIA or not. As per Section 6.4 l) of the CPL, QIA further requests that BIMC submit a summary of found archeological and/or carving stone areas within the CPL Annual Report. If no areas are found within a calendar year, this should be reported as well. Please note as per section 5.2 h), BIMC shall also provide immediate Notice to QIA when an archeological and/or carving stone area is found. QIA requires BIMC to confirm its understanding and commitment to this corrective action.*

Baffinland's Response: Baffinland understands the importance of notifying QIA in the event there is a discovery of carving stone on the Project Site. There was no such discovery of carving stone during 2013. In future, if there are no discoveries of carving stone, we will explicitly state this in our reports. With regard to archaeological finds, as stated in Section 7.6.1.1 of the 2013 NIRB Annual Report, archaeological work was completed in 2013 to ensure the protection of archaeological sites that may be affected by Project activities. Archaeological work in 2013 included the mitigation of nine archaeological sites and the excavation of one archaeological site. A Permit Report and Status Report detailing the work completed in 2013 was submitted early in 2014 to the GN Archaeologist. Both of these reports are confidential as they contain sensitive information about archaeological sites within the study area. Baffinland is bound by Territorial Law to keep these sites confidential. Baffinland suggests that if QIA wishes to pursue this further, that they may wish to contact the GN Archaeologist directly regarding this matter.

7. ***Opportunity for Improvement: Section 5.2 i)*** *BIMC is obligated to provide immediate verbal Notice of a non-compliance to QIA and follow up thereafter. Aboriginal Affairs and Northern Development Canada Inspections and NIRB's 2013 Site Visit Report indicates items that required action or instances where the Project Certificate terms and conditions did not meet NIRB expectations. Notification of non-compliance was not submitted to QIA. During the Environmental Audit, BIMC staff did not consider these occurrences to be examples of non-compliance as per the CPL.*

   QIA's Proposed Corrective Action: It is requested that BIMC work with QIA to define the term "non-compliance" as used within Section 5.2 i) of the CPL. QIA requires BIMC to confirm its understanding and commitment to this corrective action.

   Baffinland's Response: Baffinland looks forward to discussing this item further with QIA in the near-future.

8. **Opportunity for Improvement: Section 5.2 j):** requires BIMC to provide QIA with advance notice of any anticipated amendment, renewal or annulment of any and all permits, licensed or approvals associated with a Work Plan or Work on the Property. As stated in QIA's letter to BIMC dated October 17, 2014, QIA defined advanced as a minimum of 30 days prior to any amendments or changes are submitted to any regulatory or government agency. QIA is open to continue this discussion with BIMC at their convenience.

   Baffinland's Response: Baffinland looks forward to discussing this item further with QIA in the near-future.

We trust that the above responses have helped to address and clarify your concerns. With regard to the future implementation of the Lease, Baffinland acknowledges that there have been some minor difficulties to date. To address this issue, and recognizing that it is in our mutual interest to iron out the problem areas in Lease implementation, Baffinland is willing to devote time and effort to work proactively with QIA in this regard.

To further and lead this initiative, we are suggesting that Jim Millard, Environmental Manager for the Site, is best positioned within Baffinland. Jim understands the Lease very well and is well positioned with the organization to initiate any day to day changes that are required. We suggest Jim could meet regularly with you and/or your representative over the next several months in Iqaluit for this purpose. If you are agreeable, we could commence this process by mutually developing a short list of items to be discussed and clarified over the coming weeks. This would not include the Tote Road cut and fill issue which would be handled separately. If this approach is acceptable to you, we could commence these discussions as soon as possible in the New Year.

Please let us know if you are in agreement with this approach. We look forward to your response in this regard.

Sincerely,

Erik Madsen, Vice President
Sustainable Development, Health, Safety and Environment

c.c. Michael Anderson
Oliver Curran
Jim Millard

APPENDIX E.7.3

WSCC INSPECTION REPORTS

20140120

email michael.anderson@baffinland.com

Michael Anderson
Vice President Operations
Baffinland Iron Mines Corporation
120 Adelaide Street West - Suite 1016
Toronto ON M5H 1T1

Dear Mr. Anderson:

Further to the **Mine Health and Safety Act article 26** attached is my 20140120 Mary River project inspection report.

As per **MHSA article**

28. please post a copy of this inspection report in a conspicuous location, and

29. advise the chief inspector within 30 days of the remedial measures taken and the remedial measures still to be taken in respect of the inspection report.

32.(1) A person who is adversely affected by a decision or order issued by an inspector may appeal the decision or order, in writing, to the chief inspector within 30 days after its issue.

The WSCC is committed to service excellence. If you have any questions or concerns about this inspection report, please feel free to contact my supervisor Peter Bengts or myself. His phone number is 867 669 4412 or email peter.bengts@wscc.nt.ca.

Sincerely
Workers' Safety and Compensation Commission of the NWT and NU Mine Safety

Martin van Rooy
Engineer/Mines Inspector

cc OHSC c/o glen.hein@ baffinland.com

WSCC Workers' Safety & Compensation Commission | ᐃᖃᓗᐃᔭᖏᑎᓂᑦ ᐊᑕᐊᖅᑐᑐᒃᓴᓂᖅ ᐊᒪᒪ ᓇᓕᐅᑦᓯᒪᓂᑦ ᖃᐅᔨᓴᖅᑎᑦ

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

Mine:	Mary River project	Location:	~950 km NW of Iqaluit
Operator:	Baffinland Iron Mines Corp.	Lat. 71-19'N	Long. 79-24'W
Manager:	Michael Anderson	Inspection Date:	2014015 and 16
Address:	120 Adelaide Street West - Suite 1016 - Toronto ON M5H 1T1		

A general site safety inspection was conducted by Martin van Rooy (engineer/mine inspector) on January 15 and 16, 2014 of Baffinland's Mary River site. The areas checked were the new ice landing strip, electrical houses 1 and 2, new accommodation complex, ERT building, Arctic Construction workshop, Hatch warehouse seacan storage area and the quarry.

Maurice Despres, Brian Larson, Troy Leclair, Harry Mack, Tony Noseworthy, Bikash Paul and Julie Wauchope accompanied Martin van Rooy for parts of this inspection.

Noticed Baffinland has constructed an airstrip on lake ice to service its Mary River operation while it up grades and lengthens the Mary River airstrip. There are a number of concerns with the operation of an ice strip such as apron location, apron loading and their duration, ambient air temperature changes, ice surface inspection and maintenance and training of the ground crew for working on the ice.

1 Please submit a copy of the ice strip's design including the operating instructions covering ice inspections, maintenance, loading, de-icing and field crew training for this work on the ice.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

Noticed there are about 400 people employed on Baffinland's Mary River project. The company has implemented a Jet charter service to shuttle the people from their two-week work rotation on site south. It is also building up its emergency response team(s) and the Mary River team was training during my inspection. However, there is only one medic at each site and this could be a problem with an incident involving multiple casualties such as a plane crash.

Date of Report 2014/01/20 **Inspector** _____

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

2 Please conduct an emergency response practice at the Mary River site and the Milne Inlet site using a loaded passenger plane crash or a loaded bus crash scenario, to determine the preparedness of each site in case of an incident involving multiple casualties.

MHSR sect 8.32.(1) *The manager shall prepare a procedure for dealing with any emergency that is likely to occur at the mine.*

(2) *The procedure shall specify the organization and procedures for handling sudden unexpected situations that require immediate attention.*

(3) *The manager shall involve the Committee in the preparation of the procedure.*

(4) *The manager shall send a copy of the procedure to the chief inspector.*

Noticed there is no CO monitor installed in the discharge line of the air compressor used to charge up the SCBA cylinders, in the emergency response building. A CO monitor is required in the discharge line, to safeguard from adding CO into the cylinder from a compressor malfunction or from combustion gases near the compressor inlet.

3 Please ensure a CO monitor is installed on the compressed air discharge line charging the cylinders to prevent CO contaminating the breathing air in the cylinder.

MHSR sect 10.99.(1) *The manager shall ensure that all compressed air supply systems that are used to supply underground workings with compressed air are continuously sampled by a carbon monoxide monitor installed in the discharge air stream of the compressor.*

(2) *The carbon monoxide monitoring system shall, when the carbon monoxide sampled reaches 25 ppm, sound an alarm and*
(a) cause the immediate shut down of all the compressors connected to the air supply that is being sampled; and
(b) shut off any supply of air into the air supply system.

Date of Report 2014 01 20 **Inspector**

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

(3) *The failure of any component of the carbon monoxide monitoring system or the control devices or an interruption of the power supply to the monitoring system or the control devices shall cause the monitoring system to*
(a) sound an alarm;
(b) immediately shutdown all the compressors connected to the air supply that is being sampled; and
(c) shut off the sampled compressed air supply.

(4) *The manager shall ensure that the carbon monoxide monitoring system is working by testing the system at least monthly and recording the results in the compressor's maintenance record.*

Noticed the exhaust fumes from a manlift, in use in the emergency response building, had contaminated the ambient air in the building. The fire truck is also parked in this building however; there is no exhaust system in place to remove the combustion gases from the engine when it is started to move the vehicle out of the building.

4 Please ensure combustion exhaust gases are vented to the outside of an enclosed building and prevented from entering or re-entering a building.

MHSR sect 10.59.(2) *The exhaust of an internal combustion engine that is temporarily or permanently operating within a building on the surface shall be conducted to a point outside the building and prevented from*
(a) re-entering the building;
(b) entering the intake of any compressor;
(c) contaminating the atmosphere of another building; or
(d) contaminating mine workings.

Noticed two men working from an elevated manlift basket however, they had no logbook or pre-operating inspection report in or at the equipment. The men explained they had completed their single sheet pre-operating inspection report at their previous work location and left it there.

5 Please ensure a logbook or pre-operating inspection report is present on the equipment at all times when the equipment is in use. Please submit a copy of the pre-operating inspection report for each model of manlift to confirm the items noted in inspection report 20130720 item 2, have been

Date of Report 2014 01 20 **Inspector** _____

REPORT OF AN INSPECTOR OF MINES

Issued pursuant to Section 26(2) of the *Mine Health and Safety Act*

addressed.

MHSR sect 10.133.(1) *The manager shall ensure that a procedure is established for the safe operation, maintenance, inspection and testing of all portable or mobile platforms, scaffolding, bosun's chairs and other types of temporary work or access platforms.*

Noticed further to inspection report 20130720 item 4, the electronic spreadsheet reconciling the weekly explosive inventory for each magazine versus the explosives used in the blasting process, was not available for review on site.

6 Please submit a copy of this electronic spreadsheet reconciling the weekly explosives inventory for each magazine versus the explosives used in the blasting process and ensure this weekly report is submitted to the mine manager and available for review.

MHSA art 10.(1) *The manager shall take every reasonable measure and precaution to protect the health and safety of employees and other persons at a mine.*

MHSR sect 14.15. *The manager shall authorize and require one or more qualified persons to make a thorough weekly inspection of all magazines, day benches, shift boxes or shift containers used for storing explosives or detonators and to report, in writing, to the manager stating that the required inspection has been made and indicating the conditions found.*

Noticed a sea-container used for sling storage, had a number of long grommet slings lying on the floor of the container. The slings lying on the floor are a trip hazard and can be easily damaged by an object falling on them.

7 Please remove the slings lying on the floor of the seacan and hang them up to minimize the risk of damage and ensure each sling is inspected and its condition recorded in a sling logbook before its use.

MHSR sect 10.126.(4) *A lifting device, pulling device, or utility hoist and its support or anchorage system shall be maintained by a qualified person so that it does not endanger the safety of workers.*

Date of Report 20140120 **Inspector**

Baffinland

February 19, 2014

Mr. Martin Van Rooy
Mine Inspector
Worker's Compensation Board
Nunavut
PO Box 669
Iqaluit, Nunavut
XOA 0H0

Dear Martin,

In follow-up to your January 20, 2014 inspection report, please find below responses to each of the inspection findings.

Noticed Baffinland has constructed an airstrip on lake ice to service its Mary River operation while it upgrades and lengthens the Mary River airstrip. There are a number of concerns with the operation of an ice strip such as apron location, apron loading and their duration, ambient air temperature changes, ice surface inspection and maintenance and training of the ground crew for working on ice.

1. ***Please submit a copy of the ice strip's design including the operating instructions covering ice inspections, maintenance, de-icing and field crew training for this work on the ice.***

Response:

The requested information was submitted in the emails (Glen Hein to Martin Van Rooy) dated February 6, 7, and 11, 2014. Baffinland is confident the noted concerns have been addressed through the ice strip planning, design, and construction phases of the project. Based on the successful test of the ice strip on February 6, 2014 the ice strip began operation on February 11, 2014.

Noticed there are about 400 people employed on Baffinland's Mary River project. The company has implemented a Jet charter service to shuttle the people from their two-week work rotation on site south. It is also building up its emergency response team(s) and the Mary River team was training during my inspection. However, there is only one medic at each site and this could be a problem with an incident involving multiple casualties such as a plane crash.

2. ***Please conduct an emergency response practice at the Mary River site and the Milne Inlet site using a loaded passenger plane crash or a loaded bus crash scenario, to determine the preparedness of each site in case of an incident involving multiple casualties.***

Response:

Baffinland agrees that a mass causality exercise would provide value in assessing our emergency response capabilities. We are proposing a loaded bus crash scenario be conducted in July 2014 during which weather conditions will be more suitable for adequate assessment of the ERT response. This scenario will involve both Mary River and Milne Inlet teams in the response.

Noticed there is no CO monitor installed in the discharge line of the air compressor used to charge up the SCBA cylinders, in the emergency response building. A CO monitor is required in the discharge line, to safeguard from adding CO into the cylinder from a compressor malfunction or from combustion gases near the compressor inlet.

3. ***Please ensure a CO monitor is installed on the compressor air discharge line charging the cylinders to prevent CO contaminating the breathing air in the cylinder.***

Response:

Baffinland has ordered two (2) JORDAIR J-E-COM-4021-CL panel mount CO monitors to be installed at Mary River and Milne Port. This panel mounted CO monitor has a CO alarm and compressor shut down at 5 ppm. Baffinland expects to take delivery of these monitors during the week of February 17, 2014 with installation by the end of February.

Noticed the exhaust fumes from a manlift, in use in the emergency response building, had contaminated the ambient air in the building. The fire truck is also parked in this building however; there is no exhaust system in place to remove the combustion gases from the engine when it is started to move the vehicle out of the building.

4. ***Please ensure combustion exhaust gases are vented to the outside of an enclosed building and prevented from entering or re-entering a building.***

Response:

Baffinland has utilized a combination of engineering and administrative controls to reduce the risk of combustion gases being present in the ERT building. With regards to the active construction and use of manlift in buildings, a hard piped ducts are now used to direct gases from the exhaust to the outside of the building. Additional measures to source exhaust venting systems for the building is underway by the Maintenance Department and scrubbers ordered for

installation on this type of mobile equipment. With regards to the long-term use of the ERT building, the ERT members have been instructed to ensure the overhead door is activated prior to starting the fire truck and to close after the building has been sufficiently vented. Baffinland will utilize hand held gas detectors to monitor the effectiveness of these activities.

Noticed two men working from an elevated manlift basket however, they had no logbook or pre-operating inspection report in or at the equipment. The men explained they had completed their single sheet pre-operating inspection report at their previous work location and left it there.

5. ***Please ensure a logbook or pre-operating inspection report is present on the equipment at all times when the equipment is in use. Please submit a copy of the pre-operating inspection report for each model of manlift to confirm the items noted in inspection report 20130720, have been addressed.***

Response:
Baffinland has created and ordered pre-operating inspection books for all aerial lift platforms. We believe this inspection checklist (attached) is sufficient to capture the models available on site.

Noticed further to inspection report 20130720 item 4, the electronic spreadsheet reconciling the weekly explosive inventory for each magazine versus the explosives used in the blasting process, was not available for review on site.

6. ***Please submit a copy of this electronic spreadsheet reconciling the weekly explosives inventory for each magazine versus the explosives used in the blasting process and ensure this weekly report is submitted to the mine manager and available for review.***

Response:

The electronic spreadsheet of explosives reconciling will be submitted by email to your attention. This report is being submitted to the mine manager on a weekly basis.

Noticed a sea container used for sling storage, had a number of long grommet slings lying on the floor of the container. The slings lying on the floor are a trip hazard and can be easily damaged by an object falling on them.

7. ***Please remove the slings lying on the floor of the seacan and hang them up to minimize the risk of damage and ensure each sling is inspected and its condition recorded in a sling logbook before its use.***

Response:

Hatch has instructed ADCO, Arctic Construction, and other contractors on the project to ensure a sling logbook is maintained and that the condition of the sling is recorded prior to use. The slings lying on the floor of the seacan has subsequently been hung up (photo attached) as per the finding. With respect to Baffinland slings, the Maintenance Department has been assigned the role of managing these devices. When a department requires a sling they will sign it out via a logbook and return it for inspection and inventorying and proper storage by the maintenance department.

Should you have any questions regarding this submission please contact Michael Anderson by phone at 416.814.3163 or email at Michael.Anderson@Baffinland.com.

Best Regards,

Érik Madsen
Vice President
Sustainable Development, Health, Safety and Environment

cc. Michael Anderson
Glen Hein

Attachments:
Aerial Lift Platform Pre-Use
Arctic Construction – Sling storage

Aerial Work Platform Checklist

Date:_____

Shift:___ Unit #_____ Hour Reading_____ Operator:_____

Pre-Operational Checklist

Walk Around (Ground Level)

Check box if OK

Labels/Literature	Fluid Level Checks
❑ Labels/Decals/Signs/ are all Legible	❑ Fuel Level
❑ Operators Manual Available	❑ Engine Oil Level
❑ Bucket capacity: Lbs / KG	❑ Hydraulic Oil Level
	❑ Coolant level
Visual Checks	**Lift Pre-Use Checklist (Prior to use)**
	❑ Check Tilt Sensor
❑ Check tires for Wear, Cracks, Missing Rubber	❑ Check Lift Assembly
❑ Check for fluid leaks	❑ Check Bumpers on Assembly
❑ Check railings, Access Ladders, and Access Gates	❑ Check extension Platform
❑ Check All Anchor Points	❑ Check Ground Controls

Functional Tests

Check box if OK

❑ Test Emergency Stop Button
❑ Test Enable Switch
❑ Test Start Up
❑ Check All Gauges And Displays
❑ Test Emergency Lowering
❑ Test Outriggers/ Extending Axles
❑ Test Platform Raise/Lower

Platform Controls

Check box if OK

❑ Test Emergency Stop Button	❑ Test Platform Raising/Lower
❑ Test Horn/Lights	❑ Test Tilt Sensor
❑ Test Enable Switch	❑ Test Drive Speed Limits
❑ Test Steering/Driving	❑
❑ Test Brakes	❑
❑ Total weight of Personnel, Tools, Equipment, and Parts	❑

Comments:

_____

_____

_____

_____

_____

_____

_____


GREENLEE
WEBBING

Glen Hein

From: Glen Hein
Sent: Thursday, February 6, 2014 10:26 PM
To: Martin van Rooy
Cc: Michael Anderson; Erik Madsen; Bikash Paul
Subject: January 20 Inspection - followup to item 1
Attachments: 009 - BIM - Mary River - David Lake Airstrip Profile Report.xlsx; Letter Mary River Ice Airstrip Bearing Capacity Feb 3_14.pdf; Nolinor Ice Aerodrome Manual.pdf

Good day Martin,

In regards to your January 20, 2014 inspection, Item 1, Baffinland hired Nolinor Aviation to develop an ice strip that meets aviation standards and the Nolinor Ice Aerodrome Manual. Nolinor hired two companies to ensure the work proceeded in a safe and acceptable manner. NUNA, with a history of building ice strips and ice roads, was responsible for building the ice strip and performing the necessary ice profiling. NOR-EX was hired to develop the safe work documents, quality assurance, and site observation services for the ice strip (runway and apron). Attached to this reply are the following documents to support the design, construction, and operation of the ice strip:

- Nolinor Ice Aerodrome Manual which sets the standards for the ice runway.
- Recent ice profile results showing a minimum ice thickness of 63.5”
- NOR-EX ice bearing analysis report recommending an ice thickness of 47” (120 cm) for the runway and 59” (150 cm) for the apron. Additional recommendations regarding taxing speed, monitoring plans, and plans for thawing temperatures will be implemented.

Baffinland also conducted a risk assessment on October 28, 2013 regarding the building, operation, and use of the ice strip. Many of the same comments you had were identified in this assessment and recommendations implemented. The decision to utilize Nolinor, NUNA, and NOR-EX – all with experience in ice strip design, construction and use provided diligence that the air strip would meet safety requirements. We will continue to utilize the expertise of NUNA during operation to ensure the strip is maintained to meet Nolinor requirements. During its operation, Baffinland Site Services personnel will perform their activities in a similar manner as at the gravel airstrip. However, additional precautions with respect to fueling, fuel storage, and de-icing, including scraping up any de-icing fluid that maybe used that falls on the ice will be implemented.

Please let me know should you have any further questions regarding the use of the ice strip. We will submit the ice strip QA/QC documentation to you shortly. We plan to have our first test landing on the ice strip on Friday February 6, 2014.

Best Regards,

Glen

Baffinland
2275 Upper Middle Road East, Suite 300
Oakville, ON, Canada L6H 0C3

Main: 416.364.8820 x5020
Fax: 416.364.0193
www.baffinland.com

Glen Hein
Health & Safety Manager

Cell: 416.571.3934
glen.hein@baffinland.com

1308 Copperhead Dr.
Kamloops, BC V2E 2T4
5308 Dalhurst Cr NW
Calgary, AB, T3A 1P7

February 3, 2014

NOR-EX File: 2013-1810

Nolinor Aviation

Attention: Dave Morgan

Re: Ice Bearing Capacity Recommendations
Mary River Ice Airstrip
Mary River Project Site

Nolinor Aviation retained NOR-EX Ice Engineering Inc. to provide safe work documents, quality assurance, and site observations services for the ice airstrip (runway and apron) at the Mary River Project, Baffin Island, Nunavut. Nolinor authorized this in an agreement dated November 25, 2013.

Subsequent to this agreement, NOR-EX was requested to provide ice bearing capacity analyses for the ice airstrip and unloading operations on the ice apron. Dave Morgan of Nolinor approved this additional set of services in an e-mail dated January 27, 2014.

This document summarizes the engineering analyses undertaken by NOR-EX and provides ice bearing capacity recommendations for Nolinor's 2014 operations at the Mary River ice airstrip and apron.

NOR-EX submitted a Quality Assurance Plan for the Mary River Ice Airstrip to Nolinor on January 14, 2014.

NOR-EX's scope of services does not include the aviation aspects of the airstrip design, construction and operations, such as runway orientation, and runway surface preparation.

1 Background

Baffinland Iron Ore company is currently operating an airstrip at the Mary River Project site. However, they plan to suspend operations to repair and lengthen the runway. During these repair operations, the air traffic will be diverted to an ice airstrip under construction on a lake about 12 km northwest of the Mary River camp. The ice airstrip will be operated from early February to the end of April 2014.

Nolinor retained Nuna Logistics to provide construction supervision and GPR ice profiling of the ice airstrip from late November to late December 2013. An as-built drawing of the airstrip from December 28, 2013 is provided in Figure 1.

2 Ice Bearing Capacity Analyses

2.1 Data Inputs

According to Nolinor the aircraft operations will be confined to one air movement per day and the heaviest aircraft will be a Nolinor 737-200 with a maximum taxiing weight of 58,300 kg. The

Table 1 Summary of 737-200 Aircraft Loads Used for Take-off and Landing Ice Bearing Capacity

Item	Load Unit	Load (kg)
1a	737-200 front landing gear	11660
1b	737-200 port landing gear	23320
1c	737-200 starboard landing gear	23320
	Total	53800

We understand that Baffinland Site Services will unload the aircraft (cargo and passengers), re-fuel the 737, and board passengers in a 1 to 2 hour time frame on the ice apron adjacent to the runway. The stationary loads on the ice apron during this 1 to 2 hour time frame are summarized in Table 2.

Table 2 Summary of Loads Stationary on the Ice Apron During Unloading and Boarding

Item	Load Unit	Load (kg)
1a	737-200 front landing gear	11660
1b	737-200 port landing gear	23320
1c	737-200 starboard landing gear	23320
2	Cat950H loader	20000
3	Cube Van	4000
4	Fuel truck	24000
	Total	106300

The lake ice is natural blue ice and we have estimated the freshwater engineering properties in the analyses from the appropriate sources ((Frederking & Gold, 1976) (Masterson, 2009) (Civil Aviation, 2011):

- Elastic modulus (Young's modulus): 7000 GPa
- Poisson's ratio=0.3
- Maximum allowable ice flexural strength for aircraft landing and takeoff: 800 kPa

- Maximum allowable ice flexural strength for stationary loads on ice apron for 2 h: 730 kPa
- Maximum allowable ice flexural strength for stationary loads on ice apron for 24 h: 570 kPa

2.2 Ice Bearing Capacity Methods

Transport Canada's Advisory Circular 301-001 on ice aerodromes (Civil Aviation, 2011) is the primary reference document for the design and operations of ice aerodromes (airstrips) in Canada. Figure 2 reproduces the Appendix A – Minimum ice thickness for limited aircraft movements from this documents. We used this Figure to estimate the ice thickness for the flexural strength noted in Section 2.1

As a check on this method, we also modeled the ice cover as an thick elastic plate floating on water and estimated the ice stresses from loads modeled as circular areas in accordance with methods described in the literature (Masterson, 2009), (Hayley & Proskin, 2008) and (U.S. Army Corps of Engineers, 2002).

For the stationary load analysis we adopted the time dependent allowable stress method developed by (Frederking & Gold, 1976) to account for the creep deflection of ice under load. According to Nolinor and Baffinland site services, the turn-around time for the 737-200 on the ice apron is less than 2 hours. We also considered the situation of a mechanical malfunction that confined the 737-200 to the apron for up to 24 hours to allow time for aircraft repairs.

2.3 Results

2.3.1 Ice Runway

Based on the Transport Canada method for an allowable ice flexural stress of 800 kPa, the recommended thickness of good quality ice is 120 cm for a maximum aircraft weight of 58,300 kg.

NOR-EX analysis using the thick elastic plate theory indicates that the maximum flexural stress in 120 cm of good quality ice is 620 kPa—this is well below the allowable ice flexural stress of 800 kPa.

2.3.2 Ice Apron

There are two situations that were examined:

- 2 hour (max) unloading/boarding operation on the apron for the 737-200 aircraft, 950H loader, F550 cube van and 20000 litre fuel truck.
- 24 hour (max) 737-200 parked on the ice apron

Using the stationary load analysis method ((Frederking & Gold, 1976), NOR-EX found that 1.5 m of good quality ice to was required to keep the elastic ice stress below the estimated allowable creep stresses; results are summarized in Table 3.

Note that the Transport Canada guide recommends the maximum deflection of the ice sheet under the parked aircraft should not exceed 8% of the ice thickness. In other words, the ice deflection should not permit the water level in an observation hole in the ice to reach the top of the ice.

For this ice thickness the allowable deflection is 12 cm (or 8% of the ice thickness of 1.5 m).

Table 3 Summary of Ice Apron Analyses

Aircraft Weight (kg)	Duration (h)	Ice Thickness (cm)	Elastic Ice Stress (kPa)	Estimated allowable creep stress (kPa)
106300	2	150	550	730
58300	24	150	420	570

3 Recommendations

Considering the loads and operations noted in section 2.1 and results reported herein, NOR-EX makes the following recommendations for the ice runway and apron:

1. Ice runway ice thickness should be 120 cm of good quality ice.
2. Ice apron ice thickness should be 150 cm of good quality ice.
3. Max aircraft taxiing speed should be 40 km/h (Transport Canada--Appendix D Critical taxiing speeds)
4. 737-200 aircraft should have no other loads within 100 m (Transport Canada--Appendix C Load influence radius) if it is to be parked for more than 2 h (and no more than 24 h).
5. Ice deflection under stationary or parked loads should not exceed the ice freeboard (8% of the ice thickness for unloaded ice)
6. Ice airstrip monitoring and maintenance should be undertaken in accordance with NOR-EX's Quality Assurance Plan
7. Nolinor should develop a plan for operations for thawing temperatures if the ice runway operations extend beyond April 15, 2014.

4 Limitations

This report and the recommendations contained in it are intended for the sole use of the client. NOR-EX does not accept any responsibility for the accuracy of any of the data, the

analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than NOR-EX's client unless authorized in writing by NOR-EX. Any unauthorized use of the report is at the sole risk of the user. This report and the recommendations contained in it are intended for the referenced project site.

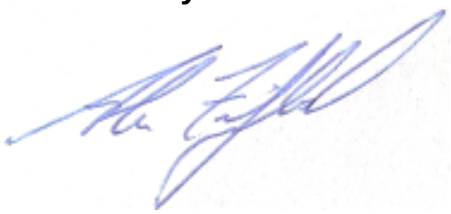
5 Closure

We trust that this letter provides you with the recommendations you need to commence the operations of the Mary River Project ice airstrip. Please contact the undersigned should you have any questions.

Respectfully submitted,

Per: NOR-EX ICE ENGINEERING INC.

Reviewed by



Samuel A. Proskin, Ph.D., P.Eng.
VP Engineering

Al Fitzgerald, P.Eng.
President

6 Bibliography

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Frederking, R. M., & Gold, L. W. (1976). The bearing capacity of ice covers under static loads. *Canadian Journal of Civil Engineering , 3*, 288-293.

Hayley, D., & Proskin, S. (2008). Managing the safety of ice covers used for transportation in an environment of climate warming. *4th Canadian Conference on Geohazards.* Quebec City: Canadian Geotechnical Society.

Masterson, D. (2009). State of the art of ice bearing capacity and ice construction. *Cold Regions Science and Technology , 58*, 99-112.

U.S. Army Corps of Engineers. (2002). Chapter 8 Bearing Capacity of Floating Ice Sheets. In Engineers Manual, *Engineering and Design: Ice Engineering* (Change 2 ed., pp. 8-1 to 8-11). Washington, DC, USA: Department of the Army.

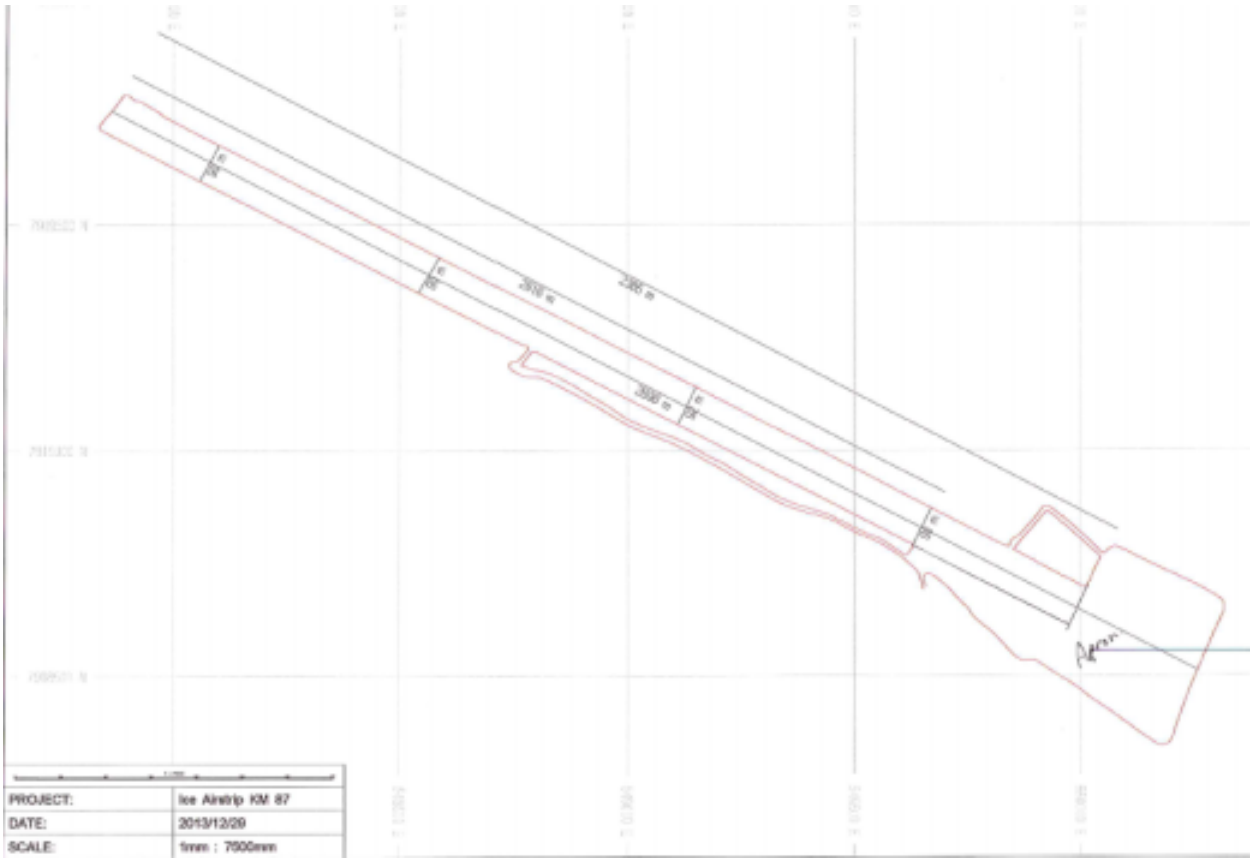

Figure 1 Mary River Ice Airstrip As-Built December 28, 2013

APPENDIX A— MINIMUM ICE THICKNESS FOR LIMITED AIRCRAFT MOVEMENTS

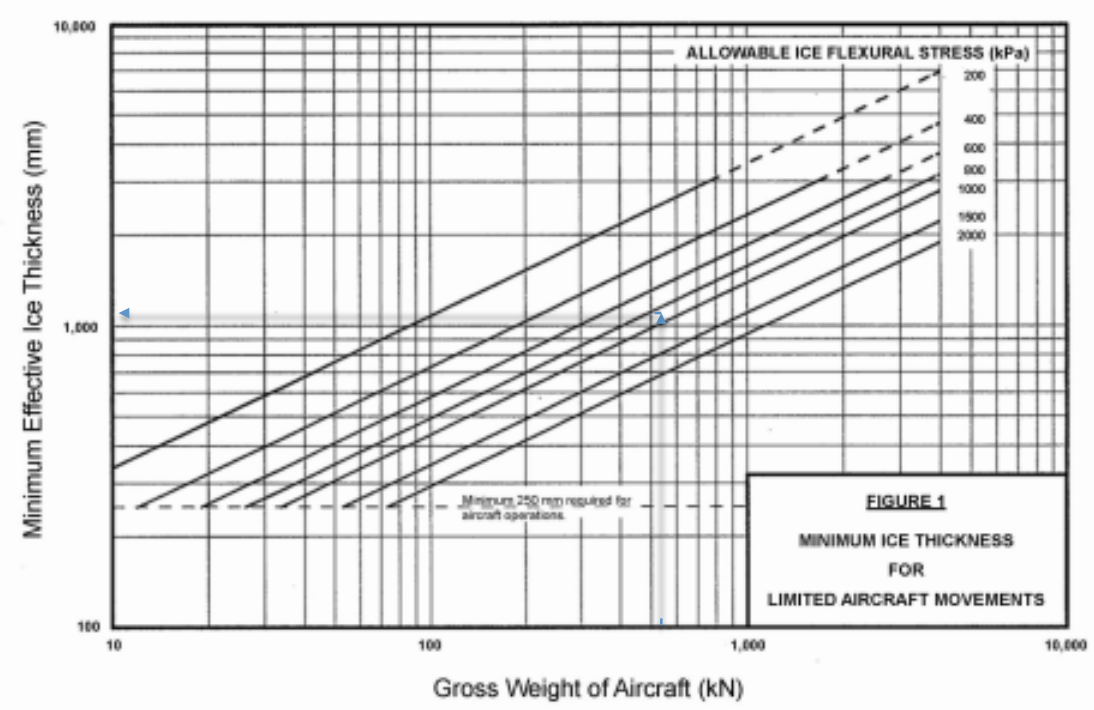

Figure 2 Ice Thickness Chart from Transport Canada Guide

NOLINOR Aviation

Ice Aerodrome Manual

Procedures & Standards Guide

February 2013

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1.0 Introduction

The Nolinor Ice Aerodrome Manual - Standards and Procedures Guide provides information to Nolinor Sales & Marketing and Flight Operations to support Nolinor's customers in the development, operations and maintenance of Ice Aerodromes. The content this manual is intended for Nolinor aircraft operations only. Where the content of this manual is in conflict with: Nolinor Flight Operations Manual (FOM), aircraft SOPS or the AFM those manual(s) will take precedence.

1.0.1 Purpose

The purpose of this document is to provide a set of standards to the customer that will meet the expectation of Nolinor Flight Operations Department in the safe and reliable dispatch of company aircraft to ice runways (Ice Aerodromes). The procedures provided will facilitate communications between the Nolinor and the customer in planning and during aircraft operations.

1.0.2 Policy

Nolinor has established ice aerodrome standards and procedures for use by Nolinor personnel and it's customer.

All ice aerodromes shall be inspected by; Nolinor – Flight Operations personnel prior to commencement of aircraft operations. An alternate method of inspection may be documented and approved by the Director of Flight Operations where it is not practical or possible to utilize company flight operations personnel. The aerodrome operator is responsible for the coordination and scheduling of the ice aerodrome inspection. Ice runways that have closed during the season or runways that have undergone significant changes or repair may require inspection prior to re-start of aircraft operations.

The aerodrome operator will maintain an aerodrome log throughout the construction and seasonal operation of the ice runway. The aerodrome operator will maintain a weather watch and maintain a weather log during aircraft operations. The customer will report runway surface conditions and weather information to Nolinor prior to dispatch of an aircraft. Nolinor flight crew will submit an aerodrome report to dispatch on each day of flight operations to an ice aerodrome. Ice aerodrome operator will provide direct communication with operating aircraft.

Nolinor personnel (commercial and flight) involved in ice aerodrome operations will receive annual pre-season training on the procedures and guidelines set out in this Ice Aerodrome Manual – Procedures and Standards Guide.

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2.0 Definitions and Abbreviations

The following abbreviations are used in this document:

a) **ICAO:** International Civil Aviation Organization

b) **IP**: Instrument Procedure;

c) **IMC**: Instrument Meteorological Conditions;

d) **kN**: kilo-newton;

e) **NOTAM**: *Notice to Airmen*;

f) **SI**: The international system of units of measurement;

g) **VMC**: Visual Meteorological Conditions; and

h) **RIP**: Restricted Instrument Procedure.

The following **definitions** are used in this document:

a) **Frazil:** an accumulation of ice crystals in water that is too turbulent to freeze solid *(Oxford Dictionary, 10th edition)*;

b) **Kilo-newton (kN):** is the SI derived unit of force;

c) **Qualified Ice Specialist**: a person who has successfully completed training in the study of load bearing characteristics of snow and ice covers;

d) **Qualified Instrument Procedure Designer:** as defined in Subsection 803.02(b) of the CARs —a person who has successfully completed training in the interpretation and application of the standards and criteria specified in the manual entitled *Criteria for the Development of Instrument Procedures*, which training has been accepted by the Minister‖; and

e) **Sponsor:** an individual or organization that has agreed to assume the regulatory and fiscal responsibility for an instrument procedure at an aerodrome, heliport or operational location. Sponsors may be air, private or aerodrome operators, or other organizations.

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3.0 SITE CONSIDERATIONS

3.0.1 Initial Planning

a) All aerodromes in Canada, including those that are not listed in the *Canada Flight Supplement* (CFS) or the *Water Aerodrome Supplement* (WAS), are subject to marking, lighting, equipping and operating in accordance with the Part III of the CARs – *Aerodromes, Airports, and Heliports*. (Applicable sections of Part III of the CARs are in Appendix "E" of this Manual).

b) Ice aerodrome operators should become informed about any local building codes and regulations respecting environmental issues, construction, occupancy, fire orders, and Workers ' Compensation, along with the provision of applicable marine regulations that may apply.

c) Awareness of the day-to-day problems associated with sudden climatic changes and dynamic forces should be taken into account when considering the suitability of an ice aerodrome. Ice surfaces, unlike a land runway, are constantly changing.

3.0.2 Runway Characteristics and Considerations

a) When deciding on the operational length of the ice runway, the operating characteristics of the most demanding aircraft type or types proposing to use the facility should be taken into consideration. Customers should consult with Nolinor to obtain the latest operational information and requirements for the aircraft to be utilized.

b) It is recommended that the minimum width of the runway is:

1. 125 ft (38 m) for ice runways up to 2650 ft (800 m) in length;
2. 150 ft (46 m) for ice runways greater than 2650 ft (800 m) up to 4000 ft (1200 m) in length;
3. 200 ft (61 m) for ice runways greater than 4000 ft (1200 m) in length.

c) Minimum recommended runway width and length specific to Nolinor aircraft:

1. Convair operations: 150 ft (46 m) and 4000 ft (1200 m) in length*****;
2. Boeing operations: 200 ft (61 m) wide and 5000 ft (1500 m) in length*;

Note *: Subject to takeoff and landing performance analysis by Nolinor Aviation Flight Operations Department.

3.0.3 Runway Location and Orientation

When deciding on the location and orientation of the ice runway(s), consideration should be given to the following factors:

a) surface characteristics;

b) prevalence and nature of gusts and turbulence;

c) location and runway orientation cross-wind situations;

d) high terrain or other obstacles in the vicinity of the aerodrome site;

e) volume of air traffic and aircraft type(s);

f) confliction with other aerodromes and controlled airspace; and

g) other surface traffic.

Note: High terrain or other obstacles in the vicinity of an aerodrome may be assessed as hazardous to the navigable airspace. Such obstacles may affect the usability of the aerodrome. Nolinor Flight Operations Department will assist in determination of operational impact due to many of the factors in deciding on location and orientation of the ice runway(s).

3.0.4 Visual Aids

a) In addition to visual aid regulatory requirements for aerodrome markers, markings, signage, wind direction indicators and runway lighting addressed by Subpart 301 of the CARs, the following guidance is provided: (Applicable section of Part III of the CARS is located in Appendix “E” of this Manual)

1. Markers should be used and installed to delineate the usable limits of ploughed or levelled ice runway surfaces. Surface markings could also be used to supplement the markers. Surface markings

2. Mark taxiways, when provided, where it is considered necessary to confine the taxiing of aircraft to safe movement areas.

3. Confirm that all markers used to outline the runway and taxiways dimensions are:

    a. lightweight;

    b. frangible;

    c. of a contrasting colour;

    d. clearly recognizable on the surface and from the air at a height of 1000 feet above ground level and at distance of one mile; and

    e. uniformly spaced at longitudinal intervals not exceeding 300 feet

with one or more markers at each corner of an ice runway, at 90 degrees to the centreline.

b) Due to the nature of an ice aerodrome, closed markings and unserviceable areas are difficult to properly identify to air operators. Transport Canada and Nolinor acknowledges the challenges that face ice aerodrome operators and that different methods may be needed to properly identify any closed or unserviceable areas of the aerodrome movement surfaces around which aircraft are permitted to operate. Subsection 301.04(8) of the CARs states:

—Where the surface of a manoeuvring area or part thereof is snow-covered or otherwise unsuitable for painting or where the closure is not permanent, ***closed markings may be applied by means of a conspicuously coloured dye or may be constructed from a suitable coloured material or product.***

Additionally, ice aerodrome operator published notices of surface closures to Nolinor for the purpose of distribution to flight crew will enhance awareness and safety.

3.0.5 Recommendations

a) If an IP (Instrument Procedure) is planned, consultation with a qualified IP designer is recommended. Further guidance related to IPs to a registered aerodrome can be found in AC 803-004 – *Restricted Instrument Procedures* (RIPs).

c) When an IP is established, if geographic features or ice conditions impose operational limitations on the area declared for the runway, the site Airport Operations Manual (AOM), and/or the required aerodrome attestation (AC 301-001) should be annotated. Consideration and subsequent amendment should be made to any relevant AIS publications (i.e. CFS, WAS, Canada Air Pilot (CAP) etc,) that describe the operational area and any such limitations, otherwise the aerodrome location need only be generally specified.

d) Aerodrome operators should consider the provision of certain on-shore items that would be needed to support both personnel and passenger safety needs when operating in cold winter weather environments, such as:

1. personnel and passenger shelters;
2. communications facilities;
3. methods of passenger transport to and from shore facilities.

e) Operators considering aerodrome registration, have the responsibility to assure TCCA that no discernable hazards exist within either the runway approach or departure areas that would adversely impact air operator flight safety. This assurance should be provided to TCCA through either a written attestation or physically verified during any site safety inspection conducted

as part of the aerodrome registration process and at the discretion of the applicable TCCA Regional Office. Further guidance is provided by TCCA AC 301-002- *Aerodrome Registration*.

f) Operators intending to accommodate scheduled service for the transport of passengers are encouraged to contact the appropriate TCCA Regional Office for the area where the aerodrome is to be situated. Guidance can be provided on the aerodrome needs or possible certification requirements identified in Subpart 302 of the CARs – *Airports*.

3.0.6 SEASONAL RECONSTRUCTION

After every summer thaw and subsequent winter re-construction of the runway and facilities, it is the aerodrome operator‘s responsibility to ensure that the re-constructed runway has the same location, with the same characteristics (i.e. threshold co-ordinates, alignment, length, elevation etc) as had originally existed when first constructed. Consultation with Nolinor operations department is recommended prior to initiation of changes. In the case of different location or characteristics Nolinor must be notified prior to the ice aerodrome inspection.

Where the ice aerodrome is registered or certified and a variation from that been originally documented, an aeronautical information amendment in accordance with AC 300-001 —*Processing of Aerodrome Aeronautical Information* must be initiated. If an IP exists, it is the IP Sponsor‘s responsibility to ensure that all reconstructed aerodrome reference points that were critical to the original IP, are maintained within IP design and publication/charting limits (see TP308/GPH209 & ICAO Annex 15 Appendix 7)

4.0 RESPONSIBILITIES

4.0.1 Facility Unserviceability

a) It is the responsibility of the aerodrome operator to advise users whenever a public facility is not serviceable. In the case of both registered and certified ice aerodromes, the operator is responsible for the issuance of a NOTAM in accordance with the *Canadian NOTAM Procedures Manual*.

b) At remote sites it is not required to report every minor interruption to aerodrome availability however, at registered and certified ice aerodromes both a NOTAM and *Aircraft Movement Surface Condition Report* (AMSCR) reporting will be required pending completion of any snow clearing and removal activities associated with any of the aircraft movement areas.

4.0.2 Runway Incursions

a) Where there is potential conflict between aircraft and vehicles, for example snowmobiles and site support vehicles, the degree of confliction should be examined and addressed.

b) Where there is a possibility of persons near an ice runway, conspicuous warning signs and markings should be installed.

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5.0 FLOATING ICE THICKNESS FOR AIRCRAFT OPERATIONS

The minimum ice thickness data in Appendix A provides guidelines for the safe operation of aircraft under limited operating conditions. This data is recommended for use at ice aerodromes (both freshwater and sea ice) and relate primarily to determining the safe load bearing capacity for runways by taking into account such factors as:

a) ice thickness;

b) ice condition;

c) ice types; and

d) air temperatures.

5.0.1 Limited Movements

a) Subject to the restrictions and adjustments outlined in the next sections, the minimum effective thickness of ice recommended for limited aircraft movements is given in Appendix A. The use of Appendix A requires a value for ice flexural stress and that appropriate value may be selected from Appendix B. Allowable flexural stress values selected from Appendix B are generally conservative and actual measurements of ice strength conducted by an ice specialist may permit operations on thinner ice covers, or by heavier aircraft.

b) Limited aircraft movements may involve up to three landings per day. Landing on the recommended minimum ice thickness involves the risk of breakthrough if a detailed ice survey has not been carried out. It is recommended that the following precautions to minimize this risk are conducted as follows:

1. where practical, the aircraft is to be removed from the ice as soon as possible;

2. if ice conditions are uncertain, moving the aircraft to another position if possible, on short notice; and

3. the ice should be inspected at least once a day and any deflection or cracking of the ice watched closely; if cracking continues, reduce loads or cease the use of the runway if deemed necessary.

5.0.2 Unlimited Movements

a) An engineering analysis, including a detailed survey and investigation of the ice cover, should be made by a qualified ice specialist to approve a runway for an unlimited number of landings per day.

b) The bearing capacity of an ice sheet can be affected more by ice quality than by ice thickness. Safe estimates of strength values can be made by experienced

ice specialists through observations of the type and quality of the ice, which may be supplemented by measurements of ice strength. These estimates can provide the basis for a decision to allow unlimited aircraft movements, or to allow loads in excess of the maximum recommended for limited use.

Alternatively, unlimited number of landings per day maybe conducted provided that 1.5 times the minimum ice thickness is applied to all operations for the entire day of aircraft operations.

5.0.3 Parking

a) Aircraft may normally be parked on the minimum ice thickness given in Appendix A provided that the maximum deflection of the ice sheet under the parked aircraft does not exceed 8% of the effective ice thickness.

b) When parking on ice of minimum thickness, an aircraft should be separated by a distance of at least one load influence radius from other loads, open cracks or free ice edges. The load influence radius of an ice cover is a function of ice thickness, as given in Appendix C. The recommended minimum ice thickness should be increased by one-third for the parking of two aircraft with a separation of less than one load influence radius.

c) Parking is **not recommended** under the following conditions:

1. if radial or circular cracks form around the loaded area, or if continuous cracking is heard;
2. if deflection continues at an increasing rate;
3. if deflection exceeds 8% of the effective ice thickness; or
4. if water appears on the surface of the ice cover.

5.0.4 Operations at Thawing Temperatures

Recommended minimum ice thickness for limited aircraft operations must be adjusted if operations are to proceed with a daily average temperature higher than –1 °C for fresh water ice, or higher than –2 °C for sea ice. Minimum required ice thickness should be increased by 5% or aircraft weight should be decreased by 10% for each consecutive day of elevated temperature. Operations should be suspended after four days of elevated temperatures, or if the maximum air temperature exceeds 4 °C. Operations may have to be suspended before the fourth day if the condition of the ice surface deteriorates. Puddles of water should be filled with snow.

5.0.5 Cracks

a) Ice covers usually have many cracks caused by thermal contractions, or by movements of the ice cover. Various types of cracks affect the bearing capacity of ice covers to varying degrees. Hair line cracks are lines in the ice not more than 2 mm in width. Wider cracks are classified as —wet or —dry depending on whether water can be observed. Wet cracks may re-freeze to strengths equal to the original ice sheet, but the depth of healing should be verified.

b) The following adjustments should be made to allowable aircraft weight, or to minimum ice thickness, if cracks are present.

ADJUSTMENTS FOR CRACKED ICE

Type of Crack	Adjustment to Either	
	Aircraft Weight	Ice Thickness
Hairline Cracks	None	None
Re-frozen Cracks	None	None
Dry Cracks (≤ 2cm wide) Non-intersecting Intersecting	Use 2/3 weight Use 1/3 weight	Increase by 20% Increase by 70%
Wet Cracks Non-intersecting Intersecting	Use 1/2 weight Use 1/4 weight	Increase by 40% Increase by 100%

c) Aircraft should cross single cracks at right angles and should not traverse areas where several active cracks intersect. Operations should be separated from an open or active lead by a least one load radius.

5.0.6 Effective Ice Thickness

a) Effective ice thickness is the thickness of good quality dense ice. Dense freshwater ice may be taken as ice having a specific gravity of at least 0.90. If the ice is layered and if one of the layers is of poor quality (e.g. light, drained snow ice, drained frazil ice, snow or frazil slush), only the thicker section of continuous dense ice should be counted as effective ice thickness.

b) If a water layer is present within the ice cover, effective thickness corresponds to the thickness of the upper layer of ice. An exception may occur if the water layer is thin and not continuous, or if the lower layer has sufficient thickness and strength to fully support the load at the temperature of –1 °C for fresh water ice, or –2 °C for sea ice.

c) The effective thickness of an ice cover can vary within wide limits. Dangerously thin areas can occur in the covers of rivers, estuaries and on lakes near the inlet or outlet of rivers. Thickness should be determined by holes spaced at not more than 15 m for a river, 30 m for a lake, and 90 m for smooth sea ice. Ice thickness should be checked once a week for average daily air temperatures between –12 °C and –5 °C. Checks can be less frequent if effective ice thickness exceeds minimum requirements.

d) When a build-up of ice thickness is necessary, care must be taken to ensure that the built-up ice is of good quality. Snow cover should be removed prior to flooding. Alternately, if the snow cover is uniform, good quality ice can be constructed by slow, careful flooding of the snow cover from the bottom upward. Flooding should occur outward from runway centreline and should be limited to a depth that will freeze within 12 hours. A water depth of 50 mm will freeze overnight with an average air temperature of –18 °C, and a depth of 90 mm will freeze overnight at –30 °C. Complete freezing should be ensured before adding subsequent lifts.

5.0.7 Resonance

Under certain conditions, a taxiing aircraft will induce resonance waves under an ice cover which can place considerable stress on the ice. When operating on ice which is at or close to recommended minimum thickness, safety can be increased and resonance avoided, by observing the following precautions:

a) avoid taxiing at the speeds indicated in Appendix D;

b) avoid taxiing parallel to a shoreline at a distance of one load influence radius or less;

c) cross the shoreline at an angle of about 45 degrees when taxiing between an ice runway and land; and

d) locate manoeuvring surfaces on an ice runway more than 2 influence radii, or less than one-half an influence radius from the shore. If this positioning is not practical, then the runway should be oriented at an angle of approximately 45 degrees to the shore.