December 6, 2017

David Hohnstein
Director Technical Services
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Baffinland Response to INAC Review of the 2016 QIA & NWB Annual Report for Operations; Type A Water Licence (2AM-MRY1325); Commercial Lease Q13C301

Baffinland Iron Mines Corporation (Baffinland) has reviewed the comments and recommendations included in Indigenous and Northern Affairs Canada's (INAC) review[1] of Baffinland's 2016 QIA and NWB Annual Report for Operations (Annual Report)[2]. Baffinland wishes to thank INAC for their review.

Baffinland's responses to INAC's comments and recommendations are provided as Attachment 1 of this letter. A copy of INAC's review of the Annual Report is provided as Attachment 2.

We trust that this provides an adequate response to INAC's review of the Annual Report. Should you have any concerns or questions regarding this, please do not hesitate to contact the undersigned or Andrew Vermeer.

Regards,

Christopher Murray,
Environmental & Regulatory Compliance Manager

Attachments:

Attachment 1: Baffinland Response to INAC Review of Baffinland's 2016 QIA & NWB Annual Report for Operations
Attachment 2: INAC Review of Baffinland's 2016 QIA & NWB Annual Report for Operations (dated July 4, 2017)

Cc:
Sean Joseph (NWB)
Sarah Forté (INAC)
Stephen Williamson Bathory (QIA)
Tim Sewell, William Bowden, Connor Devereaux, Andrew Vermeer (Baffinland)

[1] INAC, 2017. 2AM-MRY1325 – Mary River Project – Baffinland Iron Mines Corporation – 2016 Annual Report. Issued July 4, 2017.
[2] BIMC, 2017. 2016 QIA & NWB Annual Report for Operations. Issued March 31, 2017.

Attachment 1

Baffinland Response to INAC Review of Baffinland's 2016 QIA & NWB Annual Report for Operations

Table 1 - Baffinland Response to INAC Review

Comment ID and Topic	INAC Comment	INAC Recommendation	Baffinland Response
2016 QIA & NWB Annual Report for Operations (Type A Water Licence 2AM-MRY1325)			
1. Surface runoff and seepage monitoring program stations	Several surface runoff and seepage sampling stations for the monitoring program are described as inactive because of evolving project infrastructure. Specifically: Station MS-MRY-9 "*Station MS-MRY-9 represents water flow/seepage from the 2008 Bulk Sample pit. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. This area has been repurposed into a laydown and the monitoring station has become inactive.*" The licence states this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it is no longer necessary because there is no pit or only because there was no flow. Station MS-MRY-10 "*Station MS-MRY-10 represents the samples collected from the 2008 Bulk Sample weathered ore stockpile located adjacent to the bulk sample pit. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. This area has been repurposed into the growing Deposit No. 1 Pit, and the monitoring station has become inactive*." The licence states this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it the Bulk Sample weathered ore stockpile is no longer there or only because there was no flow. Station MS-MRY-11 "*Station MS-MRY-11 represents surface runoff from the 2008 Bulk Sample coarse and fine ore stockpiles at the Mary River Mine Site. The majority of these stockpiles have been removed or capped due to construction and development of the area. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. Hence, this monitoring station has become inactive.*" The licence does not state this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it the majority of the stockpiles have been removed and capped or only because there was no flow. Station MP-MRY-12 "*Station MP-MRY-12 represents runoff/seepage originating from the Milne Bulk Sample Stockpile. Construction of the Milne Port Ore Stockpile Pad and Ore Dock has impacted this area and this monitoring location is now within the footprint of these new facilities. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. Hence, this monitoring station has become inactive*." The licence does not include this station as that is to become inactive in the future. From the explanation provided, it is not clear how runoff or seepage could be expected if the monitoring location is within the footprint of the Ore Stockpile Pad and Ore Dock.	We recommend that the licensee clarify: If stations MS-MRY-9 and MS-MRY-10 will remain inactive because they are no longer needed, and if so provide justifications of why they are no longer needed. If stations MS-MRY-11 and MP-MRY-12 will remain inactive because they can no longer be sampled. If so it may be necessary to suggest alternative sampling locations since the licence doesn't state they will be discontinued.	Monitoring stations MS-MRY-9 and MS-MRY-10 were established to monitor surface water runoff downstream of the Deposit 1 pit development associated with the 2008 Bulk Sample Program. Baffinland is currently reviewing water quality monitoring of surface water runoff from Deposit 1 to determine if stations should be relocated or classified as permanently inactive, and will provide an update to the NWB in the 2017 annual report required under the Type A Water Licence. Monitoring stations MS-MRY-11 and MP-MRY-12 were established to monitor surface water runoff and seepage from historical ore stockpiles at the Mine Site and Milne Port associated with the 2008 Bulk Sample Program. The historical stockpile area at the Mine Site was removed and regraded and is now a laydown area for freight and equipment. The historical stockpile area at Milne Port was regraded and incorporated into the current Milne Port Ore Stockpile Pad and shiploader operational areas. As a result MS-MRY-11 and MP-MRY-12 have become inactive and have been discontinued. Surface water runoff from current stockpile areas is captured in the sedimentation ponds associated with the Mine Site Crusher Pad and the Milne Port Ore Stockpile Pad. Water quality of runoff captured in the sedimentation ponds (MS-06, MP-05, MP-06) is monitored and confirmed to be in compliance with water licence criteria prior to discharge. Baffinland will consider submitting a request to the NWB to remove MS-MRY-11 and MP-MRY-12 from Schedule I of the Type A Water Licence.

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2. Acid drainage from waste rock	Monitoring station MS-08 is described in the licence as Waste Rock Stockpile West Pond, and the annual report describes testing done on seepage from the west side of the waste rock stockpile. In several locations the seeping water had pH values less than 6.5. It is not clear if this seepage was being captured and directed to the Waste Rock Stockpile West Pond. The results for pH presented in the August 2016 Monthly SNP report are acidic, but none are below 6.5.	We recommend that the licensee confirm if seepage from the west side of the waste rock pile is being captured in the Pond.	Seepage referenced in INAC's comment is directed to Waste Rock Stockpile Facility's sedimentation pond by the Facility's perimeter ditches. Surface water management infrastructure for the Waste Rock Stockpile Facility at the Mine Site is currently being reviewed by Baffinland.
3. Sampling protocol	Following rigorous sampling protocols are essential to collecting accurate data. Baffinland has a Sampling Program – Quality Assurance and Quality Control Plan in place and it would appear it is not being adhered to with enough care. Below are two examples "*Elevated TSS levels seen in a sample collected from the pond at 11:00 AM were caused by snow and ice that had fallen into the pond at the sampling location which may have disturbed bottom sediments*." The general sampling procedures described in the Sampling Program speak to this issue specifically in point 7: *Care will be taken to avoid disturbance of sediments and inclusion of disturbed suspended solids in the sample*. "*Of the 358 discrete sets of Water Licence regulatory samples collected in 2016, field QA/QC samples (20 duplicates, 4 field blanks and 5 travel blanks) comprised 8.1% of the total samples collected. This did not satisfy the minimum ten percent QA/QC sample requirement as stipulated in the QA/QC Plan.*" We note this year's revision of the Sampling Program includes more explicit instructions for the QA/QC samples and hope the new plan's implementation will improve this deficiency.	We recommend that the licensee follow their Sampling Program. It forms part of the water licence and must be complied with.	Noted. Baffinland will be vigilant in ensuring the Project's QA/QC Plan is fully adhered to in future years for freshwater monitoring programs. Baffinland agrees that the adherence to rigorous sampling protocols are essential to collecting accurate data.

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4. Exceedances of total suspended solids in water downstream of project area	Six instances when total suspended solids (TSS) exceeded discharge criteria were noted for the year, four during freshet and two following rain events. The annual report refers the reader to Baffinland's Surface Water and Aquatic Ecosystems Management Plan for best management practises to mitigate impacts of sedimentation. It appears as if the current management plan is not adequate and we note that it has not been updated. A Fisheries Act Direction and Letter of Non-compliance were issued as a result of these exceedances and the response was reported in bi-weekly reports with a final completion report on September 30, 2016. The Sedimentation Mitigation Action Plan includes the recommendation to revise and update snow management plans for the Tote Road, the Mine Haul Road, the Crusher Pad, the Milne Port Ore Stockpile and the Mine and Milne Port sites, with completion dates ranging from September 30 to October 31, 2016. The Environmental Protection Plan references a Site Snow Management Procedure and a Tote Road Freshet Management Procedure. It is not clear how these relate to the snow management plans recommended by the consultant. For the last two years they have not been effective in preventing high sediment loads downstream of project areas. A Site Snow Management Standard Operating Procedure was provided to the INAC Water Resources Inspector in the fall of 2015 and pages of a Snow Management Plan were provided to Inspectors during a site visit in late May 2017. It is not clear if the snow management plans have been revised as recommended by the consultant. The current practises are inadequate as several concerns were flagged by the Inspectors during their late May 2017 visit.	We recommend that the licensee provide the updated snow management plans, as recommended by their consultant, to the NWB. The snow management plans should be reviewed by the Board, as they deal with water management. It may be appropriate to integrate them in the Surface Water and Aquatic Ecosystems Management Plan.	Noted. The Project's Snow Management Plan (BAF-PH1-300-P16-0002) is currently being reviewed and revised by Baffinland. A copy of the Snow Management Plan will be provided to the Nunavut Water Board for review and approval following additional consultation with the QIA.
5. Progressive reclamation of km 97 borrow area	A Borrow Source Reclamation Plan was created for borrow areas near Km 97 where there is localized permafrost degradation. Work described in the plan was initiated but not completed due to lack of resources. The annual report does not describe if the work completed has halted the progression of permafrost degradation or if the area impacted continues to increase.	We recommend that, at a minimum, the licensee do the work necessary to halt the progression of permafrost degradation.	Noted. Baffinland plans to continue implementing the remediation plan for the historical km 97 borrow sources in 2018.
6. Landfarm capacity	Approximately 9 900 m^3 of hydrocarbon impacted soil was stored at the landfarm as of February 1, 2017. This is more than the landfarm's capacity according to the geotechnical inspection report that states: "*landfarm was constructed to accommodate approximately 9000 m^3 of oil contaminated soil and seasonal water accumulations.*" The landfarm is therefore over capacity, which will make it very difficult to treat the contaminated soil and move it out.	We recommend that the licensee specify where they intend to store any new contaminated soil and how they propose to treat or discard the soil presently at the landfarm.	Baffinland is currently reviewing the current volumes of contaminated soil stored at the Milne Port Landfarm Facility. Options to address the situation are being assessed and may include shipping some material offsite to a licenced facility for proper treatment and/or disposal.

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7. Environmental Protection Plan update	Updating management plans is a critical part of keeping the water licence well adapted to site conditions and current best practises. Training personnel on the plans and their updates, as was done for the Environmental Protection Plan (EPP) is a good idea for helping ensure proper plan implementation. The new versions of management plans do not form part of the licence until they have been approved by the NWB. To our knowledge, the updated EPP wasn't submitted to the Board until March 2017, and we do not know if it has been approved yet. It would be important to let employees know that the updates in the plan are not effective until the plan has been approved.		Noted.
8. Sources of sludge	The monthly quantities of sludge removed are listed in Table 2.5 and it includes sludge taken from wastewater treatment plants at Mine Site and Milne Port as well as sludge from other sources. Sewage sludge is the only source of sludge discussed in the Waste Management Plan. What other sources of sludge are there? At Mine Site "other" sludge is only generated in the winter months, and at Milne Port it is generated throughout the year.	We recommend that the licensee specify where they are generating sludge outside the wastewater treatment plants.	Sewage sludge also accumulates in the bottom of the lift stations that service the accommodations camps at Project sites. Regular maintenance of the lift stations includes the periodic removal of the accumulated sewage sludge. Baffinland will update its Fresh Water Supply Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) to reflect this activity.
9. Water quality results table	Water quality results for water licence monitoring locations are presented in Table 5.2. The table is very difficult to navigate as results do not seem to be consistently organized by date, sampling station or site. This makes it extremely challenging to critically review the data.	We recommend that the licensee follow the table format used for Table 3.2 of Appendix C.4 to facilitate comparison of parameters at a same site over different dates.	Noted. Baffinland will organize water licence monitoring results chronologically by monitoring location in future annual reports.
10. Water quality monitoring station MP-06	Water quality results for water licence monitoring locations are presented in Table 5.2 and include stations MP-06-TEMP and MP-06-TEMP1, sampled in May 2016. Though presumably they are adjacent to MP-06, Milne Port Ore Stockpile Settling Pond (West), there is no explanation of their location or why they were sampled. MP-06-TEMP was sampled at the same date as MP-06 and though the TSS results are similar (8.40 and 9.2 mg/L respectively), the pH values are different (8.05 and 7.70 respectively).	We recommend that the licensee explain where these sample locations are and provide some context as to why they were sampled.	MP-06-TEMP and MP-06-TEMP1 were established in 2014 to temporarily monitor water quality of drainage routes near the Milne Port Ore Stockpile Pad prior to the completion of the pad's perimeter ditching and associated sedimentation ponds (MP-05 and MP-06). Surface water drainage infrastructure for the pad was completed in June 2016. As such, these monitoring stations are no longer required and have been discontinued.
11. Post-construction issues with waste rock sedimentation pond	Two issues were noted after construction of the waste rock sedimentation pond. "*The perimeter key that is designed to retain the pond liner on the upstream side of the pond collapsed due to poor ground conditions. As a result of this collapse, the liner lifted and allowed water under the liner. To remediate this issue, the liner was cut back and re-buried.*" When the liner was cut back before being re-buried, did it reduce the capacity of the pond since the liner is now smaller? "*There is a concern that water may be migrating underneath the liner in one location. Baffinland's Environmental Department is investigating this issue.*" When are the results of this investigation expected? It is important that the waste rock sedimentation pond adequately collect and hold drainage from the waste rock pile, particularly since some measurements indicate seepage of pH lower than 6.5 coming from the pile.	We recommend that the licensee provide explanations for questions raised by post-construction Issues with the waste rock sedimentation pond and describe actions taken to address the issues.	In regards to the first question, the cutting back of the liner occurred on the outer side of the liner key-in and did not alter the pond's capacity. As stated by the Construction Summary Report, the as-built capacity of the pond is 9,200 cubic metres (m^3). In regards to the second question, the performance of the liner and liner key-in was reassessed visually early in the 2017 field season and was inferred to be functioning as designed. Subsequently, seepage was observed in August 2017 originating from the toe of the Waste Rock Sedimentation Pond. Baffinland continues to investigate the source of seepage and assess the appropriate corrective actions.

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12. Consultant recommendations following mine haul road construction	The consultant's report contains six recommendations on the next steps in section 8.0 and Baffinland doesn't discuss how these will be handled. One recommendation in particular, "*a post-freshet 2016 inspection of the Phase 1 construction, prior to the onset of snowfall*", has not been reported on so we cannot know if it occurred.	We recommend that the licensee include in the report whether they will implement the consultant's recommendations. If they plan to, timelines envisaged should be provided. If they do not plan to, motivations for not executing the recommendations should be included.	Baffinland continues to assess the performance of the Mine Haul Road drainage improvements and Golder's recommendations for additional construction. To date, a post-construction inspection has not been conducted by Golder. Timelines for implementation of Golder's recommendations have not been determined at this time.
13. Consultant recommendations following geotechnical inspections	Bi-annual geotechnical inspections of earthworks and water management structures are required to monitor their state. When submitting the inspection reports to the Board, the licensee is required to include an implementation plan to address the recommendations of the geotechnical engineer. The first geotechnical inspection occurred in July and the report included seven recommendations. In the report for the second geotechnical inspection, no recommendations were made on structures that had not been flagged in the July report. Of the seven structures for which work was recommended in the July report, two had had the recommendations implemented, for one the issue was no longer mentioned and presumably no longer a problem, and for the remaining four, the initial recommendations were repeated. The structures which need further attention according to the October 2016 geotechnical inspection report are: Mine Site Enviro Tank Storage, Milne Port Landfarm Containment, Milne Port Sedimentation Pond East and Milne Port Sedimentation Pond West. We are aware an un-authorized discharge from a Milne Port Sedimentation Pond was necessary this spring because of high water volumes. The geotechnical engineer's concerns with pond liner stability raises further questions about how these structures performed in over capacity situations.	We recommend that the licensee provide a plan and schedule for implementation of the geotechnical engineer's recommendations or justify why they will not follow them.	Table 2 outlines the recommendations and items of concern identified during the 2016 geotechnical inspections and their current status. Plans to address any outstanding recommendations and/or items of concern are included in Table 2.

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14. Aluminum concentrations in water	The water quality results in the annual report to Department of Fisheries and Oceans (DFO) include five samples where total aluminum concentrations are above the Canadian Council of Ministers of the Environment (CCME) guideline for protection of aquatic life, as outlined in the table below. No discussion of these exceedances is found in the report. High concentrations of aluminum are also reported in the QIA/NWB annual report for monitoring stations MP-05, MP-06, and MS-08. The first two are the ore stockpile sedimentation ponds at Milne Port and the last is the Mine Site waste rock sedimentation pond. We noted a total of 13 samples between the three stations with aluminum concentrations above 0.1 mg/L. They ranged between 0.106 and 1.8 mg/L and averaged 0.76 mg/L, and were sampled between May 31 and October 4, 2016. While the discharge MP-05 and MP-06 is directed to the marine environment, that of MS-08 will find its way to the Mary River. There is no discharge criterion for aluminum in the licence, and CCME criteria apply to the receiving environment and not for discharge. The Core Receiving Environment Monitoring Program report also includes water quality results with aluminum concentrations. These samples were taken in the receiving environment and can therefore be directly compared to the CCME guideline which is 0.1 mg/L when the pH is above 6.5. The only freshwater system studied with aluminum concentrations above 0.1 mg/L was the Mary River. Concentrations are above this benchmark both upstream and downstream of the mine, but increase downstream. The last two downstream stations have concentrations above the Aquatic Effects Monitoring Program (AEMP) benchmark of 0.966 mg/L. It appears as though aluminum enrichment may become an issue.	We recommend that the licensee provide a discussion of possible causes of aluminum concentration exceedance reported to DFO, with suggested mitigation measures if appropriate.	Natural metals enrichment of water bodies in the Project area have been observed during several of Project's freshwater monitoring programs, during both the baseline studies and since ERP operations commenced. Example of this is the Mary River, as documented in the Project's Core Receiving Environment Monitoring Program (CREMP). Of the five (5) aluminum CCME exceedances documented in the 2016 DFO Tote Road Monitoring Report, four (4) exceedances occurred during late June 2016 while the remaining exceedance occurred during baseline studies in September 2006. Of the four exceedances that occurred during June 2016, two (2) exceedances were documented upstream and two (2) exceedances were documented downstream of Tote Road culverts. It should be noted that elevated aluminum levels documented at Tote Road culverts in 2016 were not persistent throughout the open water season and were only detected during the June 2016 sampling session. Due to aluminum CCME exceedances being present during baseline studies and upstream of Project infrastructure, the cause of aluminum exceedances is uncertain at this time. Baffinland will continue to monitor water crossings along the Tote Road to see if elevated aluminum levels persist. As discussed by Minnow in the 2015 and 2016 CREMP monitoring reports, metals such as aluminum and manganese levels may be correlated with turbidity in certain water bodies. Freshwater monitoring will continue to be conducted at the Project to confirm this relationship/correlation. A discussion of exceedances of the AEMP benchmarks will be included in the 2017 CREMP monitoring report.
15. Waste rock geochemistry	The consultant's report presenting the results of the humidity cell testing program monitoring leachate from rock samples over a long period of time does not contain any conclusions or recommendations. From the implementation Schedule Update, we can gather that this testing work is ongoing, but no information is available about the duration of work, possible next steps, or results that would allow conclusions to be made. The comparison of humidity test results with leaching predictions used for the Final Environmental Impact Statement will be necessary to evaluate if reclamation measures planned will be adequate. An interim comparison would be helpful to improve confidence in the interim closure and reclamation plan.	We recommend that the licensee provide more context for the humidity cell test results, including how the tests will be continued and interim conclusions.	Due to the events that occurred at the Waste Rock Stockpile Facility in 2017, Baffinland is currently reviewing the Project's waste rock stockpile monitoring programs and schedule. Once finalized, proposed changes to waste rock stockpile monitoring programs will be submitted to the NWB and other agencies for review and approval. A framework will be included in the submission that will discuss how monitoring results will inform reclamation measures and adaptive management practices.

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16. Exceptional weather in 2016	The Fisheries Act Direction and Letter of Non-compliance were a result of unauthorized releases of sediment in May and June 2016. The first of a series of bi-weekly response reports states: "*The major contributing factor to these unanticipated releases included the excessive snowfall, snow pack, and wind events that were observed during 2016. Based on visual observations and anecdotal evidence, the snow pack was much thicker and extensive in 2016 as compared to other years. In addition there were many major wind events during 2016, probably exceeding the number of events that have occurred in recent years' past.* *The available precipitation and wind data from weather stations will be reviewed for 2016 and compared to previous years to substantiate the visual and anecdotal evidence and included in the Completion Report due September 30, 2016.*" No review of weather data was found in the completion report. Further unauthorized sediment releases have occurred in May and June 2017 which weakens the argument that 2016 was an exceptional year and suggests that high flows are a yearly occurrence at freshet and plan to manage them needs to be in place. In principle, hydrometric data could also be used to provide evidence for a year with exceptional flows. In practise, because the stations must be re-installed every year and this can only be done when it is safe, the data available often does not include freshet flows. The multi-year data presented for station H05 indicates 2016 was not an exceptionally high flow year for the period with measurements.	We recommend that the licensee provide the review of 2016 weather data so that we can understand if it was exceptional and a valid explanation for the high sediment discharges.	The Project's weather stations are not equipped to monitor precipitation in the form of snow. As such, characterizing snow pack and snow accumulation for the purposes of quantifying flows during freshet is not feasible at this time using the data collected from the Project's weather stations. Given the sediment releases observed in May and June 2017, Baffinland acknowledges that high flows may be a yearly occurrence associated with freshet. Baffinland continues to upgrade and evaluate Project surface water management infrastructure to address sedimentation concerns during freshet.
17. Chemical dust suppressant use and testing	The Dust Mitigation Action Plan states that application of CaCl as a dust suppressant will be used to mitigate dust problems along the Tote Road. In the section on the Mine Haul Road, the use of chemical dust suppressants (either CaCl or EK-35) will be subject to the performance of a pilot program. For the airstrip, yet another approach is proposed; the use of CaCl and continued testing of EK-35. The use of CaCl as a dust suppressant can increase Cl^- concentrations in water. The freshwater environment in the project area has low Cl^- concentrations and could be sensitive to increases. Results from the CREMP report show increasing concentrations since initiation of project operations. The use of and testing of CaCl on roads in the project area should include measures to minimize its impact on water and measurements to confirm no negative impacts.	We recommend that the licensee provide information on the planned use and testing of CaCl with detail on water protection measures.	To minimize impacts to water bodies near Project roads, a buffer zone of 31 meters will be maintained between areas where the dust suppressant product is applied and the high water mark of nearby natural water bodies, including water crossings. The Project's Dust Suppressant Protocol will be updated to reflect these practices. Water quality monitoring for chloride (Cl^-) is included in several of the Project's freshwater monitoring programs, including the Core Receiving Environment Monitoring Program at the Mine Site. The Project's Surface Water and Aquatic Ecosystems Management Plan (BAF-PH1-830-P16-0026) is currently being revised and will provide additional clarity on the monitoring of water bodies for chloride (Cl^-) along the Tote Road.

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18. Response to high metal concentrations measured in receiving environment	The Core Receiving Environment Monitoring Program report presents water and sediment quality data from samples collected in 2016. In several instances increases in metal concentrations have been measured and are attributed to mine related influence. For certain sites, the concentrations are above the Aquatic Effects Monitoring Plan (AEMP) benchmarks, as listed in the table below. The AEMP includes a response framework outlining the management response if data evaluation finds mine related effects that are equal to or greater than AEMP benchmarks. The Moderate Action response includes: "*• Risk assessment / WOE evaluation* *• Evaluate need for & specifics of increased monitoring;* *• Consider potential mitigation plans and implementation if trend analysis suggests continued increase;* *• Develop High Action response threshold*" If these steps have been taken, they are not discussed in the CREMP report.	We recommend that the licensee provide the management response they have initiated as a result of the CREMP results including a timeline for different actions.	Baffinland has collected three (3) years of data for the Core Receiving Environment Monitoring Program (CREMP) since mining operations commenced in 2014. As such, Baffinland believes it now has sufficient data to conduct an assessment of benchmark exceedances for data collected under the CREMP. The assessment will include an evaluation of AEMP benchmark applicability and/or implementation of a moderate action response and will be included the 2017 annual report submitted to the Nunavut Water Board.
19. Sedimentation rate conversion factor	Sedimentation rates are measured in mass per area per time. This is converted to an accumulation thickness by dividing it by the sediment's dry bulk density. For this study, "*in lieu of sufficient sample volumes to determine bulk density of sedimentation material, bulk density information from similar sedimentation studies conducted by Minnow Environmental Inc. (Minnow; unpublished data) at Canadian Shield lakes in northern Ontario was used as a surrogate for the calculation of sediment accumulation.*" The calculated annual sedimentation accumulation thicknesses are greater than those for which adverse effects on fish egg survival have been documented. However, the consultant concludes the sediment accumulation was not problematic because "*the derived accumulation thicknesses for Sheardown Lake NW can be considered conservative (over) estimates of actual values*" and there was a relatively high abundance of healthy young-of-the-year arctic char. It is not productive to calculate an estimate and discard it when it doesn't fit with other data without taking steps to correct how that estimate is made. Given concerns with unauthorized sediment discharges, accurate sediment accumulation rates will be important for monitoring possible effects.	We recommend that the licensee explain how they will improve their sediment accumulation rate estimates.	Noted. Baffinland has already discussed this concern with its consultant, Minnow Environmental, and has developed a plan to better characterize the bulk density of the sediment collected in the Lake Sedimentation Monitoring Program. Baffinland plans to install large sediment traps during the 2018 open water season in Sheardown Lake NW that will capture enough sediment to permit bulk density analysis. Data collected from this initiative will better inform future sediment accumulation rate estimates.

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20. Hydrometric monitoring	There are restrictions on authorized water use for dust suppression from certain sources (CV099, CV087, CV078, BG32, David Lake and BG17) after July during low flow years. Hydrographic monitoring is required to assess the flow relative to mean flow in order to determine if it is a low flow year and restrictions are to be implemented. The Hydrometric Monitoring Program report indicates 2016 was a low flow year. From the QIA/NWB annual report, it is possible to confirm that the only water sources used that have restrictions were CV099 and BG32, and at these sources, water extraction occurred only in June and July. The report compiling hydrometric data was only produced in February 2017 and could not have served to determine if restrictions for certain water sources were applicable in August and September 2016. The dust mitigation plan call for use of water on the Tote Road as a dust suppressant and we have been informed there will be a dedicated team for watering the road. It therefore seems likely that water use for dust suppression purposes will increase in 2017.	We recommend that the licensee explain the system used to ensure hydrometric data will be monitored to provide timely information on possible restrictions for certain authorized water sources along the Tote Road in August and September.	Baffinland does not agree with INAC's interpretation that 2016 was a low flow year for water sources along the Tote Road. The 2016 Hydrometric Monitoring Program Report states "The total annual runoff in 2016 at the H05 station was greater than in 2015 but the third lowest recorded from 2006 to 2016." H05 station monitors flow at a Camp Lake tributary at the Mine Site and is not necessarily representative of flows at Tote Road water sources. Baffinland does agree that more clarity needs to be provided by Baffinland on how low flow years will be determined in the future and the systems in place to monitor flows at Tote Road water take locations with restrictions. The Project's Fresh Water Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) will be updated to provide more clarity on the subject. The revised Plan will be included in the 2017 annual report submission to the Nunavut Water Board.
21. Incomplete rating curves in hydrometric network	At hydrometric stations, stage (instream water height) measurements are converted to flow measurements using rating curves. These curves are created for each station by manually measuring the flow at different stages. They can then be used to convert continuous automated stage measurements into flow and are most accurate if they are created with calibration measurements from a broad range of stages. Extrapolating rating curves above the calibration points introduces error because as the stream water height increases, its width will increase non-linearly so it is not possible to estimate flow. The consultant's report repeated recommendations made in their 2015 report for more calibration measurements for the rating curves of stations H02, H04 and H11. At these stations, the rating curves are used far outside the measurement ranges with which they were created. The worst case is H04 where the calibration point with highest flow is ~0.6 m^3/s and it is being used to estimate flows almost four times greater, at ~2.2 m^3/s.	We recommend that the licensee describe how they will implement their consultant's recommendation to make additional rating curve calibration measurements for the high flows at stations H02, H04 and H11.	Noted. Safety concerns associated with conducting instream stage flow measurements during high flows has prevented Baffinland from obtaining high flow measurements in the past. Given the safety concerns, Baffinland is currently assessing alternative flow measurement methodologies to improve data collection during high flow periods at hydrology monitoring stations.

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Management Plans			
25. Waste Management Plan (BAF-PH1-830-P16-0028, Rev. 5)	INAC notes that our comments on Rev 4 of the Plan have been addressed. One of these was regarding the handling of concrete wastes. A section titled "Unset Concrete and Concrete Wash Water from Mixing and Transportation of Concrete" present in Rev 3, had been removed from Rev 4, and is now re-integrated in Section 3.4.3 of Rev 5. The re-integrated section includes the statement: "*A purpose built pond shall be used to receive all of the waste concrete and concrete contaminated wash water*."	We recommend the licensee provide information on if and where the concrete waste pond has been built, if an already existing pond has been used, or when and where a pond might be built.	A temporary concrete waste pond was used in 2014/2015 at the Mine Site to support Early Revenue Phase construction however the pond was subsequently decommissioned. The approximate coordinates for the temporary pond at the Mine Site is as follows: N71° 19' 34.3" W79° 21' 27.3"
26. Spill Contingency Plan (BAF-PH1-830-P16-0036, Rev 3)	We appreciate that Baffinland addressed our comment from a review of the previous version of this plan. We are aware that a camp located at Steensby Port has been moved to Milne Port, but are do not know what has been done with the 1 952 drums of fuel reported at Steensby in last year's Spill Contingency Plan.	If the fuel drums that were at Steensby last year are still on site, we recommend that they be included in the Spill Contingency Plan.	Drums of fuel stored at the Steensby site have not be relocated and continue to be used to support exploration activities on as needed basis during the summer months. The storage of fuel at the Steensby site is captured under the Exploration Spill Contingency Plan (BAF-PH1-830-P16-0036, Rev. 0) which will be revised and submitted along with the 2017 annual report. As of October 5, 2017 there are a total of 624 diesel fuel drums and approximately 780 Jet-A fuel drums stored at Steensby. Baffinland will continue to provide inventories of fuel stored at Project sites in future annual reports required by Baffinland's water licences.

Table 2 - Summary of Recommendations - 2016 Biannual Geotechnical Inspection Reports

Geotechnical Inspection	Project Site	Structure	Recommendation/Observation	Status
July 2016 (Report No. 1)	Mine Site	Waste Storage Containment (MS-HWB-1)	We recommend the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell or that this cell be permantently decommissioned.	Recommendation completed. Waste storage containment cell not being used.
	Mine Site	Waste Storage Containment (MS-HWB-6)	The liner at the back of the cell on the dyke was observed to be torn, likely caused by placing a pallet of barreled waste into the cell. The torn liner should be repaired.	Not completed. Baffinland will repair the torn liner by the end June 2018. In the meantime, stormwater and snowmelt in the berm will not be allowed to reach the height of the tear.
	Mine Site	Solid Waste Disposal Site (Landfill)	At the time of the inspection, the debris blow fence had not yet been extended to provide control of debris that might originate from the recently expanded area of the facility.	Recommendation completed in 2016. Installation of a permanent solution is being assessed by Baffinland.
	Mine Site	Steel Fuel Tank Farm Containment	It was recommended that at least one sump be installed as per the drawings prepared for this facility.	Recommendation completed in 2016.
	Mine Site	QMR2 Quarry	It was observed that there was some instability in areas of the pit where there were fractured zones and subsidence observed.	As documented during the July 2017 Geotechnical Inspection Report, concerns identified in 2016 have been addressed.
	Milne Port	Steel Fuel Tank Farm Containment	It was recommended that at least one additional sump be installed as per the drawings prepared for this facility.	Recommendation completed in 2016.
	Milne Port	Ore Stockpile Sedimentation Pond East (MP-05)	Some tears were observed at the inlet to the containment facility. A review of the use of ballast over the exposed liner should be undertaken in consideration that there appears to be some liner damage due to uplift from wind.	Recommendation completed in 2017.
	Milne Port	Ore Stockpile Sedimentation Pond East (MP-06)	The west end of the south side of the liner needs to be better keyed in. The inlet to the pond is allowing water to potentially be conducted under the liner and should be repaired. Additional tire ballast should be placed on exposed areas of the liner.	Recommendation completed in 2017.
October 2016 (Report No. 2)	Mine Site	Waste Storage Containment (MS-HWB-1)	We recommend the geotextile over the liner be checked and the granular cover be made good prior to continuing use of this cell.	Recommendation completed. Waste storage containment cell not being used.
	Milne Port	Landfarm Facility	We recommend that the remaining dyke structure without protective cover over it, be covered as per the design drawings. This, however, is not a absolute requirement.	Not completed. Not required.
	Milne Port	Ore Stockpile Sedimentation Pond East (MP-05)	We recommend review of the use of a ballast (possibly tires) on the exposed liner at the dyke to prevent wind uplift. We further recommend the re-installation of the liner at the westerly inlet such that the liner is shaped to the profile of the inlet ditch.	Recommendation completed in 2017.
	Milne Port	Ore Stockpile Sedimentation Pond East (MP-06)	Complete construction at the inlet structures to ensure contaminated water flows into the containment and not under it. With snow conditions it was diffcult to confirm the construction.	Recommendation completed in 2017.

Attachment 2

INAC Review of Baffinland's 2016 QIA & NWB Annual Report for Operations

(dated July 4, 2017)

Indigenous and Northern Affairs Canada
Affaires autochtones et du Nord Canada

Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
2AM-MRY1325

July 4, 2017

Our file - Notre référence
CIDM#1156833

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

Re: 2AM-MRY1325 – Mary River Project – Baffinland Iron Mines Corporation – 2016 Annual Report

Dear Ms. Porter,

On May 3, 2017, you sent out the 2016 Annual Report for the above referenced licence, indicating that interested parties should provide comments.

Indigenous and Northern Affairs Canada (INAC) has conducted a technical review of the 2016 Annual Report and the results of our review are presented in the attached memorandum for the Nunavut Water Board's consideration. Comments have been provided pursuant to INAC's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

INAC appreciates the opportunity to participate in this review. If there are any questions or concerns, please contact me at (867) 975-3876 or by e-mail at sarah.forte@aandc-aadnc.gc.ca.

Sincerely,

Sarah Forté
Water Management Coordinator

Canada

Technical Review Memorandum

To: Ida Porter, Licensing Administrator, Nunavut Water Board

CC: Andrew Vermeer, Regulatory Reporting Specialist, Baffinland Iron Mines Corporation

From: Sarah Forté, Water Management Coordinator, Water Resources Division, INAC

Date: July 4, 2017

Re: Review of Baffinland Iron Mines Corporation's 2016 Annual Report for Type A Water Licence #2AM-MRY1325

Applicant: Baffinland Iron Mines Corporation
Project: Mary River Project
Region: Qikiqtani

A. BACKGROUND

On May 3, 2017, the Nunavut Water Board (Board) distributed Baffinland Iron Mines Corporation's (Baffinland) 2016 Annual Report for their type A water licence 2AM-MRY1325. It is entitled 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, and is dated March 31, 2017.

The Mary River Project is an iron mine with activities covered under water licences 2AM-MRY1325 and 2BE-MRY1421. The type A licence is for mine operations and the type B is an exploration licence. The report covers the activities under the type A licence and includes updates to six management plans:

1. Sampling Program – Quality Assurance and Quality Control Plan;
2. Environment Protection Plan;
3. Hazardous Materials and Hazardous Waste Management Plan;
4. Waste Management Plan;
5. Spill Contingency Plan; and
6. Emergency Response Plan.

Both the annual report and the modified management plans have been reviewed, and the results are presented in two separate sections.

B. RESULTS OF ANNUAL REPORT REVIEW

INAC appreciates the work Baffinland put in to the 2016 Annual Report and our general comment is that the reporting requirements are covered, though sometimes the information provided is unclear or insufficient. One part which is missing is how consultant recommendations will be addressed. A comment we had in previous years, about the report containing too much information and detail on items not directly related to the water licence, has been heeded to and this facilitates our review of the document.

The following comments and recommendations on the 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations are provided for the Board's consideration.

1. Surface runoff and seepage monitoring program stations

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 5.3.1
- Water Licence No.2AM-MRY1325 – Amendment no.1, Nunavut Water Board, July 21, 2015, Schedule I, Table 13

Comment:

Several surface runoff and seepage sampling stations for the monitoring program are described as inactive because of evolving project infrastructure. Specifically:

Station MS-MRY-9

> "*Station MS-MRY-9 represents water flow/seepage from the 2008 Bulk Sample pit. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. This area has been repurposed into a laydown and the monitoring station has become inactive.*"

The licence states this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it is no longer necessary because there is no pit or only because there was no flow.

Station MS-MRY-10

> "*Station MS-MRY-10 represents the samples collected from the 2008 Bulk Sample weathered ore stockpile located adjacent to the bulk sample pit. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. This area has been repurposed into the growing Deposit No. 1 Pit, and the monitoring station has become inactive*."

The licence states this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it the Bulk Sample weathered ore stockpile is no longer there or only because there was no flow.

Station MS-MRY-11

> "*Station MS-MRY-11 represents surface runoff from the 2008 Bulk Sample coarse and fine ore stockpiles at the Mary River Mine Site. The majority of these stockpiles have been removed or capped due to construction and development of the area. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. Hence, this monitoring station has become inactive.*"

The licence does not state this station is to become inactive in the future. From the explanation provided, it is not clear if this station is inactive because it the majority of the stockpiles have been removed and capped or only because there was no flow.

Station MP-MRY-12

> "*Station MP-MRY-12 represents runoff/seepage originating from the Milne Bulk Sample Stockpile. Construction of the Milne Port Ore Stockpile Pad and Ore Dock has impacted this area and this monitoring location is now within the footprint of these new facilities. During 2016, no flows were observed from this monitoring station and subsequently samples were not taken. Hence, this monitoring station has become inactive*."

The licence does not include this station as that is to become inactive in the future. From the explanation provided, it is not clear how runoff or seepage could be expected if the monitoring location is within the footprint of the Ore Stockpile Pad and Ore Dock.

Recommendation:
We recommend that the licensee clarify:

If stations MS-MRY-9 and MS-MRY-10 will remain inactive because they are no longer needed, and if so provide justifications of why they are no longer needed.

If stations MS-MRY-11 and MP-MRY-12 will remain inactive because they can no longer be sampled. If so it may be necessary to suggest alternative sampling locations since the licence doesn't state they will be discontinued.

2. Acid drainage from waste rock

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 5.3.2

- Water Licence No.2AM-MRY1325 – Amendment no.1, Nunavut Water Board, July 21, 2015, Schedule I, Table 13
- Water Licence 2AM-MRY1325 Monthly SNP Report – August 2016, Baffinland Iron Mines Corporation, September 30, 2016

Comment:
Monitoring station MS-08 is described in the licence as Waste Rock Stockpile West Pond, and the annual report describes testing done on seepage from the west side of the waste rock stockpile. In several locations the seeping water had pH values less than 6.5. It is not clear if this seepage was being captured and directed to the Waste Rock Stockpile West Pond. The results for pH presented in the August 2016 Monthly SNP report are acidic, but none are below 6.5.

Recommendation:
We recommend that the licensee confirm if seepage from the west side of the waste rock pile is being captured in the Pond.

3. Sampling protocol

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Sections 5.3.2 & 5.5
- Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001 Rev 1), Baffinland Iron Mines Corporation, March 14, 2016, Sections 4.3.1 & 7
- Surface Water Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001 Rev 2), Baffinland Iron Mines Corporation, March 29, 2017, Sections 4.3.1 & 7

Comment:
Following rigorous sampling protocols are essential to collecting accurate data. Baffinland has a Sampling Program – Quality Assurance and Quality Control Plan in place and it would appear it is not being adhered to with enough care. Below are two examples

> "*Elevated TSS levels seen in a sample collected from the pond at 11:00 AM were caused by snow and ice that had fallen into the pond at the sampling location which may have disturbed bottom sediments*."

The general sampling procedures described in the Sampling Program speak to this issue specifically in point 7: *Care will be taken to avoid disturbance of sediments and inclusion of disturbed suspended solids in the sample*.

"*Of the 358 discrete sets of Water Licence regulatory samples collected in 2016, field QA/QC samples (20 duplicates, 4 field blanks and 5 travel blanks) comprised 8.1% of the total samples collected. This did not satisfy the minimum ten percent QA/QC sample requirement as stipulated in the QA/QC Plan.*"

We note this year's revision of the Sampling Program includes more explicit instructions for the QA/QC samples and hope the new plan's implementation will improve this deficiency.

Recommendation:
We recommend that the licensee follow their Sampling Program. It forms part of the water licence and must be complied with.

4. Exceedances of total suspended solids in water downstream of project area

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 5.4
- Appendix D.7.3 (5 of 5) Mary River Project, Sedimentation Mitigation Action Plan, Rev 1, 16611774 (5000), Golder Associates Inc., September 29, 2016, Sections 2.3., 3.3, 4.3, 5.3, 6.3
- Environmental Protection Plan (BAF-PH1-830-P16-0008 Rev 1), Baffinland Iron Mines Corporation, August 30, 2016, Sections 2.19.2 & 2.31.2

Comment:
Six instances when total suspended solids (TSS) exceeded discharge criteria were noted for the year, four during freshet and two following rain events. The annual report refers the reader to Baffinland's Surface Water and Aquatic Ecosystems Management Plan for best management practises to mitigate impacts of sedimentation. It appears as if the current management plan is not adequate and we note that it has not been updated.

A Fisheries Act Direction and Letter of Non-compliance were issued as a result of these exceedances and the response was reported in bi-weekly reports with a final completion report on September 30, 2016. The Sedimentation Mitigation Action Plan includes the recommendation to revise and update snow management plans for the Tote Road, the Mine Haul Road, the Crusher Pad, the Milne Port Ore Stockpile and the Mine and Milne Port sites, with completion dates ranging from September 30 to October 31, 2016.

The Environmental Protection Plan references a Site Snow Management Procedure and a Tote Road Freshet Management Procedure. It is not clear how these relate to the

snow management plans recommended by the consultant. For the last two years they have not been effective in preventing high sediment loads downstream of project areas.

A Site Snow Management Standard Operating Procedure was provided to the INAC Water Resources Inspector in the fall of 2015 and pages of a Snow Management Plan were provided to Inspectors during a site visit in late May 2017. It is not clear if the snow management plans have been revised as recommended by the consultant. The current practises are inadequate as several concerns were flagged by the Inspectors during their late May 2017 visit.

Recommendation:
We recommend that the licensee provide the updated snow management plans, as recommended by their consultant, to the NWB. The snow management plans should be reviewed by the Board, as they deal with water management. It may be appropriate to integrate them in the Surface Water and Aquatic Ecosystems Management Plan.

5. Progressive reclamation of km 97 borrow area

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 6.1

Comment:
A Borrow Source Reclamation Plan was created for borrow areas near Km 97 where there is localized permafrost degradation. Work described in the plan was initiated but not completed due to lack of resources.

The annual report does not describe if the work completed has halted the progression of permafrost degradation or if the area impacted continues to increase.

Recommendation:
We recommend that, at a minimum, the licensee do the work necessary to halt the progression of permafrost degradation.

6. Landfarm capacity

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 6.1

- Appendix C.2 (1 of 2) Baffinland Iron Mines Corporation, Annual Geotechnical Inspections, Mary River Project, Initial Inspection of Two, July 2016, Barry H. Martin, July 31, 2016, Section 4.05

Comment:
Approximately 9 900 m^3 of hydrocarbon impacted soil was stored at the landfarm as of February 1, 2017. This is more than the landfarm's capacity according to the geotechnical inspection report that states: "*landfarm was constructed to accommodate approximately 9000 m^3 of oil contaminated soil and seasonal water accumulations.*"

The landfarm is therefore over capacity, which will make it very difficult to treat the contaminated soil and move it out.

Recommendation:
We recommend that the licensee specify where they intend to store any new contaminated soil and how they propose to treat or discard the soil presently at the landfarm.

7. Environmental Protection Plan update

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Section 7.2

Comment:
Updating management plans is a critical part of keeping the water licence well adapted to site conditions and current best practises. Training personnel on the plans and their updates, as was done for the Environmental Protection Plan (EPP) is a good idea for helping ensure proper plan implementation.

The new versions of management plans do not form part of the licence until they have been approved by the NWB. To our knowledge, the updated EPP wasn't submitted to the Board until March 2017, and we do not know if it has been approved yet. It would be important to let employees know that the updates in the plan are not effective until the plan has been approved.

8. Sources of sludge

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Table 2.5

- Waste Management Plan (BAF-PH1-830-P16-0028 Rev 5), Baffinland Iron Mines Corporation, March 29, 2017

Comment:
The monthly quantities of sludge removed are listed in table 2.5 and it includes sludge taken from wastewater treatment plants at Mine Site and Milne Port as well as sludge from other sources. Sewage sludge is the only source of sludge discussed in the Waste Management Plan.

What other sources of sludge are there? At Mine Site “other” sludge is only generated in the winter months, and at Milne Port it is generated throughout the year.

Recommendation:
We recommend that the licensee specify where they are generating sludge outside the wastewater treatment plants.

9. Water quality results table

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Table 5.2
- Appendix C.4 Baffinland Iron Mines Corporation, Mary River Project, Early Revenue Phase – Tote Road Upgrades Fish Habitat Monitoring, 2016 Annual Report to Department of Fisheries and Oceans, Baffinland Iron Mines Corporation, December 31, 2016, Table 3.2

Comment:
Water quality results for water licence monitoring locations are presented in Table 5.2. The table is very difficult to navigate as results do not seem to be consistently organized by date, sampling station or site. This makes it extremely challenging to critically review the data.

Recommendation:
We recommend that the licensee follow the table format used for Table 3.2 of Appendix C.4 to facilitate comparison of parameters at a same site over different dates.

10. Water quality monitoring station MP-06

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Table 5.2

Comment:
Water quality results for water licence monitoring locations are presented in Table 5.2 and include stations MP-06-TEMP and MP-06-TEMP1, sampled in May 2016. Though presumably they are adjacent to MP-06, Milne Port Ore Stockpile Settling Pond (West), there is no explanation of their location or why they were sampled.

MP-06-TEMP was sampled at the same date as MP-06 and though the TSS results are similar (8.40 and 9.2 mg/L respectively), the pH values are different (8.05 and 7.70 respectively).

Recommendation:
We recommend that the licensee explain where these sample locations are and provide some context as to why they were sampled.

11. Post-construction issues with waste rock sedimentation pond

Reference:

- Appendix C.1 (1 of 3) Baffinland Iron Mines Corporation, Mary River Project, Construction Summary Report: Mine Site Waste Rock Sedimentation Pond and Drainage Ditch, H349002-0000-07-236-0002, Rev. 0, Hatch, January 24, 2017, Section 6

Comment:
Two issues were noted after construction of the waste rock sedimentation pond.

> "*The perimeter key that is designed to retain the pond liner on the upstream side of the pond collapsed due to poor ground conditions. As a result of this collapse, the liner lifted and allowed water under the liner. To remediate this issue, the liner was cut back and re-buried.*"

When the liner was cut back before being re-buried, did it reduce the capacity of the pond since the liner is now smaller?

> "*There is a concern that water may be migrating underneath the liner in one location. Baffinland's Environmental Department is investigating this issue.*"

When are the results of this investigation expected? It is important that the waste rock sedimentation pond adequately collect and hold drainage from the waste rock pile, particularly since some measurements indicate seepage of pH lower than 6.5 coming from the pile.

Recommendation:
We recommend that the licensee provide explanations for questions raised by post-construction issues with the waste rock sedimentation pond and describe actions taken to address the issues.

12. Consultant recommendations following mine haul road construction

Reference:

- Appendix C.1 (2 of 3) Baffinland Iron Mines Corporation, Mary River Project, Mine Haul Road Drainage Improvement Project, Phase 1 Construction As-Built Report, 1649295 (DOC008), Golder Associates Ltd., August 29, 2016, Sections 2.0 & 8.0

Comment:

The consultant's report contains six recommendations on the next steps in section 8.0 and Baffinland doesn't discuss how these will be handled.

One recommendation in particular, "*a post-freshet 2016 inspection of the Phase 1 construction, prior to the onset of snowfall*", has not been reported on so we cannot know if it occurred.

Recommendation:

We recommend that the licensee include in the report whether they will implement the consultant's recommendations. If they plan to, timelines envisaged should be provided. If they do not plan to, motivations for not executing the recommendations should be included.

13. Consultant recommendations following geotechnical inspections

Reference:

- Appendix C.2 (1 of 2) Baffinland Iron Mines Corporation, Annual Geotechnical Inspections, Mary River Project, Initial Inspection of Two, July 2016, Barry H. Martin, July 31, 2016
- Appendix C.2 (2 of 2) Baffinland Iron Mines Corporation, Annual Geotechnical Inspections, Mary River Project, Second Inspection of Two, October 2016, Barry H. Martin, November 15, 2016
- Water Licence No.2AM-MRY1325 – Amendment no.1, Nunavut Water Board, July 21, 2015, Part D, Item 18 & Part I, Items 12 & 13

Comment:

Bi-annual geotechnical inspections of earthworks and water management structures are required to monitor their state. When submitting the inspection reports to the Board, the licensee is required to include an implementation plan to address the recommendations of the geotechnical engineer.

The first geotechnical inspection occurred in July and the report included seven recommendations. In the report for the second geotechnical inspection, no recommendations were made on structures that had not been flagged in the July report. Of the seven structures for which work was recommended in the July report, two had had the recommendations implemented, for one the issue was no longer mentioned and

presumably no longer a problem, and for the remaining four, the initial recommendations were repeated.

The structures which need further attention according to the October 2016 geotechnical inspection report are: Mine Site Enviro Tank Storage, Milne Port Landfarm Containment, Milne Port Sedimentation Pond East and Milne Port Sedimentation Pond West.

We are aware an un-authorized discharge from a Milne Port Sedimentation Pond was necessary this spring because of high water volumes. The geotechnical engineer's concerns with pond liner stability raises further questions about how these structures performed in over capacity situations.

Recommendation:
We recommend that the licensee provide a plan and schedule for implementation of the geotechnical engineer's recommendations or justify why they will not follow them.

14. Aluminum concentrations in water

Reference:

- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, March 31, 2017, Table 5.2
- Appendix C.4 Baffinland Iron Mines Corporation, Mary River Project, Early Revenue Phase – Tote Road Upgrades Fish Habitat Monitoring, 2016 Annual Report to Department of Fisheries and Oceans, Baffinland Iron Mines Corporation, December 31, 2016, Table 3.2
- Appendix D.9.1 (1 of 2) Mary River Project 2016 Core Receiving Environment Monitoring Program Report, Minnow Environmental Inc., March 2017, Tables 3.1, 3.4, 4.1, 4.2, 4.8, 5.1 & 5.2
- Canadian Environmental Quality Guidelines, Water Quality for the Protection of Aquatic Life, Aluminum, Canadian Council of Ministers of the Environment, 1999

Comment:
The water quality results in the annual report to Department of Fisheries and Oceans (DFO) include five samples where total aluminum concentrations are above the Canadian Council of Ministers of the Environment (CCME) guideline for protection of aquatic life, as outlined in the table below. No discussion of these exceedances is found in the report.

Location	Date	Total Al (mg/L)	Dissolved Al (mg/L)	Total suspended sediment (mg/L)	pH	CCME total Al guideline (mg/L)
CV217-DS	29-06-2017	0.150	N.M.[1]	<2.0	7.41	0.1
CV128-US	30-06-2017	0.83	N.M.	54.8	8.11	0.1
CV128-DS	30-06-2017	0.76	N.M.	44.4	8.15	0.1
CV093-US	30-06-2017	0.139	N.M.	4.4	7.99	0.1
BG24	10-09-2017	0.163	<0.005	N.M.	6.95	0.1

[1]N.M. - not measured

High concentrations of aluminum are also reported in the QIA/NWB annual report for monitoring stations MP-05, MP-06, and MS-08. The first two are the ore stockpile sedimentation ponds at Milne Port and the last is the Mine Site waste rock sedimentation pond. We noted a total of 13 samples between the three stations with aluminum concentrations above 0.1 mg/L. They ranged between 0.106 and 1.8 mg/L and averaged 0.76 mg/L, and were sampled between May 31 and October 4, 2016. While the discharge MP-05 and MP-06 is directed to the marine environment, that of MS-08 will find its way to the Mary River. There is no discharge criterion for aluminum in the licence, and CCME criteria apply to the receiving environment and not for discharge.

The Core Receiving Environment Monitoring Program report also includes water quality results with aluminum concentrations. These samples were taken in the receiving environment and can therefore be directly compared to the CCME guideline which is 0.1 mg/L when the pH is above 6.5. The only freshwater system studied with aluminum concentrations above 0.1 mg/L was the Mary River. Concentrations are above this benchmark both upstream and downstream of the mine, but increase downstream. The last two downstream stations have concentrations above the Aquatic Effects Monitoring Program (AEMP) benchmark of 0.966 mg/L.

It appears as though aluminum enrichment may become an issue.

Recommendation:
We recommend that the licensee provide a discussion of possible causes of aluminum concentration exceedance reported to DFO, with suggested mitigation measures if appropriate.

15. Waste rock geochemistry

Reference:

- Appendix D.5 (1 of 2) Geochemical Characterization Program – Implementation Schedule Update, Baffinland Iron Mines Corporation, March 2017

- Appendix D.5 (1 of 2) Mary River Project, 2017 Review of Mine Rock Humidity Cell Program, TC170202, Amec Foster Wheeler, March 15, 2017

Comment:
The consultant's report presenting the results of the humidity cell testing program monitoring leachate from rock samples over a long period of time does not contain any conclusions or recommendations. From the Implementation Schedule Update, we can gather that this testing work is ongoing, but no information is available about the duration of work, possible next steps, or results that would allow conclusions to be made.

The comparison of humidity test results with leaching predictions used for the Final Environmental Impact Statement will be necessary to evaluate if reclamation measures planned will be adequate. An interim comparison would be helpful to improve confidence in the interim closure and reclamation plan.

Recommendation:
We recommend that the licensee provide more context for the humidity cell test results, including how the tests will be continued and interim conclusions.

16. Exceptional weather in 2016

Reference:

- Appendix D.7.3 (1 of 5) Report on Actions Taken: June 7th 2016, Fisheries Act Direction (File number: 4408-2016-05-10-001) and Response to June 16th 2016, INAC Letter of Non-Compliance, Report No. 1, Baffinland Iron Mines Corporation, June 24, 2016, Section 2
- Appendix D.7.3 (5 of 5) Completion Report: Environment and Climate Change Canada Fisheries Act Direction (File number: 4408-2016-05-10-001) and INAC Letter of Non-Compliance (NWB Licence 2AM-MRY1325), Baffinland Iron Mines Corporation, September 29, 2016
- Appendix D.9.3 2016 Hydrometric Monitoring Program, 199-03-09, Story Environmental Inc., February 28, 2017

Comment:
The Fisheries Act Direction and Letter of Non-compliance were a result of unauthorized releases of sediment in May and June 2016. The first of a series of bi-weekly response reports states:

> "*The major contributing factor to these unanticipated releases included the excessive snowfall, snow pack, and wind events that were observed during 2016. Based on visual observations and anecdotal evidence, the snow pack was much thicker and extensive in 2016 as compared to other years. In addition there were many major wind events during 2016, probably exceeding the number of events that have occurred in recent years' past.*

The available precipitation and wind data from weather stations will be reviewed for 2016 and compared to previous years to substantiate the visual and anecdotal evidence and included in the Completion Report due September 30, 2016."

No review of weather data was found in the completion report. Further unauthorized sediment releases have occurred in May and June 2017 which weakens the argument that 2016 was an exceptional year and suggests that high flows are a yearly occurrence at freshet and plan to manage them needs to be in place.

In principle, hydrometric data could also be used to provide evidence for a year with exceptional flows. In practise, because the stations must be re-installed every year and this can only be done when it is safe, the data available often does not include freshet flows. The multi-year data presented for station H05 indicates 2016 was not an exceptionally high flow year for the period with measurements.

Recommendation:
We recommend that the licensee provide the review of 2016 weather data so that we can understand if it was exceptional and a valid explanation for the high sediment discharges.

17. Chemical dust suppressant use and testing

Reference:

- Appendix D.7.3 (5 of 5) Mary River Project, Dust Mitigation Action Plan, Rev 1, 16611774 (5000), Golder Associates Inc., September 29, 2016, Sections 2.3.3, 5.3.1& 6.3.2

Comment:
The Dust Mitigation Action Plan states that application of CaCl as a dust suppressant will be used to mitigate dust problems along the Tote Road. In the section on the Mine Haul Road, the use of chemical dust suppressants (either CaCl or EK-35) will be subject to the performance of a pilot program. For the airstrip, yet another approach is proposed; the use of CaCl and continued testing of EK-35.

The use of CaCl as a dust suppressant can increase Cl^- concentrations in water. The freshwater environment in the project area has low Cl^- concentrations and could be sensitive to increases. Results from the CREMP report show increasing concentrations since initiation of project operations.

The use of and testing of CaCl on roads in the project area should include measures to minimize its impact on water and measurements to confirm no negative impacts.

Recommendation:
We recommend that the licensee provide information on the planned use and testing of CaCl with detail on water protection measures.

18. Response to high metal concentrations measured in receiving environment

Reference:

- Appendix D.9.1 (1 of 2) Mary River Project 2016 Core Receiving Environment Monitoring Program Report, Minnow Environmental Inc., March 2017, Tables 3.1, 3.5, 4.1, 4.3 & 5.3
- Aquatic Effects Monitoring Plan, BAF-PH1-830-P16-0039, Rev 2, Baffinland Iron Mines Corporation, April 8, 2016, Figure 5-1

Comment:
The Core Receiving Environment Monitoring Program report presents water and sediment quality data from samples collected in 2016. In several instances increases in metal concentrations have been measured and are attributed to mine related influence. For certain sites, the concentrations are above the Aquatic Effects Monitoring Plan (AEMP) benchmarks, as listed in the table below.

Aquatic system	**Metals with concentrations above AEMP benchmark**
WATER	
Camp Lake Tributary	Cu, Fe
Sheardown Lake Tributary	Cu
Mary River	Al, Cu, Fe, Pb
SEDIMENT	
Camp Lake	litoral: As; profundal: As, Fe, P
Sheardown Lake NW	litoral: Fe
Sheardown Lake SE	litoral: Fe, Mn

The AEMP includes a response framework outlining the management response if data evaluation finds mine related effects that are equal to or greater than AEMP benchmarks. The Moderate Action response includes:

"• *Risk assessment / WOE evaluation*
• *Evaluate need for & specifics of increased monitoring;*
• *Consider potential mitigation plans and implementation if trend analysis suggests continued increase;*
• *Develop High Action response threshold*"

If these steps have been taken, they are not discussed in the CREMP report.

Recommendation:
We recommend that the licensee provide the management response they have initiated as a result of the CREMP results including a timeline for different actions.

19. Sedimentation rate conversion factor

Reference:

- Appendix D.9.2 Mary River Project 2015-2016 Lake Sedimentation Monitoring Report, Minnow Environmental Inc., March 2017, Sections 2.3 & 3.2

Comment:
Sedimentation rates are measured in mass per area per time. This is converted to an accumulation thickness by dividing it by the sediment's dry bulk density. For this study, "*in lieu of sufficient sample volumes to determine bulk density of sedimentation material, bulk density information from similar sedimentation studies conducted by Minnow Environmental Inc. (Minnow; unpublished data) at Canadian Shield lakes in northern Ontario was used as a surrogate for the calculation of sediment accumulation."*

The calculated annual sedimentation accumulation thicknesses are greater than those for which adverse effects on fish egg survival have been documented. However, the consultant concludes the sediment accumulation was not problematic because "*the derived accumulation thicknesses for Sheardown Lake NW can be considered conservative (over)estimates of actual values*" and there was a relatively high abundance of healthy young-of-the-year arctic char.

It is not productive to calculate an estimate and discard it when it doesn't fit with other data without taking steps to correct how that estimate is made. Given concerns with unauthorized sediment discharges, accurate sediment accumulation rates will be important for monitoring possible effects.

Recommendation:
We recommend that the licensee explain how they will improve their sediment accumulation rate estimates.

20. Hydrometric monitoring

Reference:

- Appendix D.9.3 2016 Hydrometric Monitoring Program, 199-03-09, Story Environmental Inc., February 28, 2017, Section 3
- Water Licence No.2AM-MRY1325 – Amendment no.1, Nunavut Water Board, July 21, 2015, Part E Item 25
- 2016 Qikiqtani Inuit Association (QIA) and Nunavut Water Board (NWB) Annual Report for Operations, Water Licence 2AM-MRY1325 and Commercial Lease Q13C301, Baffinland Iron Mines Corporation, Table 2.2

Comment:
There are restrictions on authorized water use for dust suppression from certain sources (CV099, CV087, CV078, BG32, David Lake and BG17) after July during low flow years. Hydrographic monitoring is required to assess the flow relative to mean flow in order to determine if it is a low flow year and restrictions are to be implemented.

The Hydrometric Monitoring Program report indicates 2016 was a low flow year. From the QIA/NWB annual report, it is possible to confirm that the only water sources used that have restrictions were CV099 and BG32, and at these sources, water extraction occurred only in June and July.

The report compiling hydrometric data was only produced in February 2017 and could not have served to determine if restrictions for certain water sources were applicable in August and September 2016. The dust mitigation plan call for use of water on the Tote Road as a dust suppressant and we have been informed there will be a dedicated team for watering the road. It therefore seems likely that water use for dust suppression purposes will increase in 2017.

Recommendation:
We recommend that the licensee explain the system used to ensure hydrometric data will be monitored to provide timely information on possible restrictions for certain authorized water sources along the Tote Road in August and September.

21. Incomplete rating curves in hydrometric network

Reference:

- Appendix D.9.3 2016 Hydrometric Monitoring Program, 199-03-09, Story Environmental Inc., February 28, 2017, Sections 2 & 4

Comment:
At hydrometric stations, stage (instream water height) measurements are converted to flow measurements using rating curves. These curves are created for each station by manually measuring the flow at different stages. They can then be used to convert continuous automated stage measurements into flow and are most accurate if they are created with calibration measurements from a broad range of stages. Extrapolating rating curves above the calibration points introduces error because as the stream water height increases, its width will increase non-linearly so it is not possible to estimate flow.

The consultant's report repeated recommendations made in their 2015 report for more calibration measurements for the rating curves of stations H02, H04 and H11. At these stations, the rating curves are used far outside the measurement ranges with which they were created. The worst case is H04 where the calibration point with highest flow is ~0.6 m^3/s and it is being used to estimate flows almost four times greater, at ~2.2 m^3/s.

Recommendation:
We recommend that the licensee describe how they will implement their consultant's recommendation to make additional rating curve calibration measurements for the high flows at stations H02, H04 and H11.

C. RESULTS OF MANAGEMENT PLANS REVIEW

The following comments and recommendations on six modified management plans are provided for the Board's consideration.

22. Sampling Program – Quality Assurance and Quality Control Plan

The modifications of the Sampling Program – Quality Assurance and Quality Control Plan are principally the addition of senior management under the roles and responsibilities section, inclusion of details and reference to the Guidance Document for the Sampling and Analysis of Metal Mining Effluents, and more detailed explanation of samples necessary for quality control.

Reference:

- Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001 Rev 1), Baffinland Iron Mines Corporation, March 14, 2016
- Surface Water Sampling Program – Quality Assurance and Quality Control Plan (BAF-PH1-830-P16-0001 Rev 2), Baffinland Iron Mines Corporation, March 29, 2017

Comment:

INAC finds the most recent version an improvement and encourages Baffinland to follow their protocols diligently to produce high quality environmental data. We appreciate that Baffinland addressed our comment from a review of the previous version of this plan regarding quality assurance/quality control samples.

23. Environmental Protection Plan

Only those sections of the Environmental Protection Plan pertaining to water were reviewed. The changes to the Plan are principally identifying management plans more explicitly, and removing references to Steensby Port Camp and Mid-Rail Camp.

INAC has no comments on the updates to this version of the Plan.

24. Hazardous Materials and Hazardous Waste Management Plan

The modifications of the Hazardous Materials and Hazardous Waste Management Plan are principally the addition of senior management under the roles and responsibilities section, and the removal of the Table for projected hazardous waste quantities for the year.

INAC has no comments on the updates to this version of the Plan. We note that the few missing references flagged in the previous version of the Plan have been corrected.

25. Waste Management Plan

The modifications of the Waste Management Plan are principally the addition of senior management under the roles and responsibilities section, reference to a new plan and procedure, the removal of the Table for projected tonnage of waste generated, and the addition of a section on unset concrete and concrete waste water.

Reference:

- Waste Management Plan (BAF-PH1-830-P16-0028 Rev 3), Baffinland Iron Mines Corporation, March 20, 2015
- Waste Management Plan (BAF-PH1-830-P16-0028 Rev 4), Baffinland Iron Mines Corporation, March 7, 2016
- Waste Management Plan (BAF-PH1-830-P16-0028 Rev 5), Baffinland Iron Mines Corporation, March 29, 2017

Comment:

INAC notes that our comments on Rev 4 of the Plan have been addressed. One of these was regarding the handling of concrete wastes. A section titled “Unset Concrete and Concrete Wash Water from Mixing and Transportation of Concrete” present in Rev 3, had been removed from Rev 4, and is now re-integrated in Section 3.4.3 of Rev 5.

The re-integrated section includes the statement: “*A purpose built pond shall be used to receive all of the waste concrete and concrete contaminated wash water*.”

Recommendation:

We recommend the licensee provide information on if and where the concrete waste pond has been built, if an already existing pond has been used, or when and where a pond might be built.

26. Spill Contingency Plan

The modifications of the Spill Contingency Plan are principally the addition of emergency response truck inventory lists, and the removal of fuel barrel inventory at Steensby in section 7.1.

Reference:

- Spill Contingency Plan (BAF-PH1-830-P16-0036 Rev 2), Baffinland Iron Mines Corporation, March 7, 2016
- Spill Contingency Plan (BAF-PH1-830-P16-0036 Rev 3), Baffinland Iron Mines Corporation, March 30, 2017

Comment:

We appreciate that Baffinland addressed our comment from a review of the previous version of this plan. We are aware that a camp located at Steensby Port has been moved to Milne Port, but are do not know what has been done with the 1 952 drums of fuel reported at Steensby in last year's Spill Contingency Plan.

Recommendation:

If the fuel drums that were at Steensby last year are still on site, we recommend that they be included in the Spill Contingency Plan.

27. Emergency Response Plan

The modifications of the Emergency Response Plan are principally simplifications, where a sentence or a few points are removed.

INAC has no comments on the updates to this version of the Plan. We note that the INAC contact information flagged in the previous version of the Plan have been corrected.