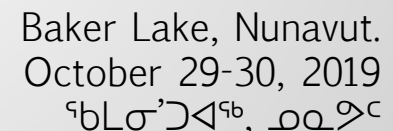


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- KivlA represents Inuit, administers and monitors certain provisions of the Nunavut Final Agreement in the Kivalliq Region.
- KivlA's mission is to represent Inuit in a fair and democratic manner in the development, protection, administration and advancement of their rights and benefits; and to promote economic, social, political and cultural well-being.
- The aim of Inuit Owned Land management is to administer IOL's so as to promote self-reliance and the cultural and social well-being of Inuit now and in the future.
- Inuit Owned Lands must be managed in such a way as to sustain and enhance the value of the lands.


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- The purpose of our technical review was to ensure the project can operate in line with the potential impacts and benefits described through the concurrent impact assessment; and
- To ensure Inuit Qaujimajatuqangit (IQ) values and Traditional Knowledge (TK) were incorporated into impact determination, mitigation, project design and monitoring.



Submission to Nunavut Water Board
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- A Technical Review of the water licence amendment application was submitted to NWB on September 16th, 2019.
- Our review highlighted 21 technical concerns, the majority of which followed directly from our completeness review submitted in July 2019.
- We raised several concerns with respect to understanding potential impacts to water quality and quantity from the expansion project
- We also raised several concerns pertaining to water management and mitigation

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- AEM has removed interactions with pit walls from the water quality model thereby excluding a potentially significant source of arsenic and phosphorus. Insufficient rationale was provided to justify the removal of pit walls from the water quality model.
- AEM clarified during a meeting with the KivIA that the model outlined in the EIS can be considered an upper bound of potential concentrations while the revised water licence model can be considered a lower bound for expected concentrations.
- AEM asserted that concentrations can be managed throughout the range of concentrations. We are still concerned whether this is feasible.
- This issue would be resolved if AEM provided a water management decision tree as per KIA-WL-TC#6 for review prior to receipt of the water license.
- This information is required to determine whether enriched effluent streams can be segregated to ensure treatment is feasible during the mine life.



- AEM committed to update the water quality model to include cryo-concentration during the NIRB technical hearings in June 2019. The model accompanying the water licence submission had not been updated. This update was required to increase confidence in arsenic and phosphorus concentrations within the receiving environment.
- AEM has now provided an updated model including cryo-concentration.
- We consider our concern with respect to arsenic modelling resolved in light of the modeled concentrations and the potential for adaptive management. However, we refer to KivIA-WL-TC#6 which must be addressed to provide confidence that treatment is a viable option if arsenic concentrations are elevated.
- We also request additional detail as to how the upper and lower bounds of the phosphorus uptake ratios were derived in the new model. AEM made reference to literature values. More detail is required on how those formulae were derived and the associated literature references.



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- AEM's water balance was based on monthly mean values. Given the uncertainties associated with the modelling exercise and use of an average climate year, the predicted concentrations are considered to be order-of-magnitude estimates.
- We therefore asked for a water management decision tree to provide confidence that water volumes exceeding average conditions could be adequately managed. The decision tree was also required to provide confidence arsenic rich water sources could be segregated for treatment.
- AEM committed to providing this quantitative decision tree during the EIS hearings in June 2019. The delivery date committed to was during the Water Licence technical review period.
- This decision tree has not yet been provided.
- AEM has indicated they will update the Water Management Plan with the requested decision tree and action items for water quantity 60 days following the reception of the amended water licence.
- This is not acceptable nor in keeping with their EIS commitment. We remain unsure whether key contact water streams can be effectively segregated for treatment.
- We recommend AEM provide a Quantitative Water Management Decision Tree to show how water volumes exceeding average conditions would be managed for review and approval at least 30 days prior to the final hearings.

- Arsenic release from exposed Whale Tail and IVR Pit walls is a source of uncertainty in the prediction of the long-term water quality of the flooded pit lake and Whale Tail Lake (North Basin). The source of the uncertainty lies in the occurrence of arsenic in the wall rock and in waste rock and its leachability, particularly with respect to the IVR Pit, which has shown through geochemical testing to leach higher amounts of arsenic than similar lithologies in Whale Tail Pit
- We requested AEM to provide documentation supporting their assertion that water treatment can effectively reduce arsenic concentrations to safe levels.
- We further request AEM provide documentation to support an increased fill rate, and what the greatest potential rate may be, for the pits intended to prevent ongoing oxidation of the pit walls.

- AEM has indicated that an increased fill rate would require water to be pumped from another large lake; Nemo, Lake D1 and Lake D5 are provided as potential sources. AEM has further indicated that these alternatives will be assessed as an adaptive management option as part of the final closure plan.
- We are concerned that a quantitative evaluation has not been conducted to provide confidence that this adaptive management option is viable should water exceed the predicted concentrations.
- We therefore recommend AEM commit to providing a quantitative analysis from at least one potential source of water to demonstrate the feasibility of an increased pit flood rate at least 30 days prior to the final hearing.
- We also reference KivIA-WL-TC#6. The water quantity management decision tree is required to demonstrate whether arsenic rich water can be effectively isolated for treatment.



- AEM states that it would consider using the O-WTP as a primary contingency option to treat water during the flooding sequence. However, this contingency would require treatment of large water volumes of low concentration water and may not achieve CWQG water quality guidelines for pit water. Isolation of high arsenic loadings from pit walls would allow efficient treatment of the source term and increase the feasibility of mitigation.
- We are concerned whether water quality that does not meet appropriate concentrations can be treated to meet a concentration that is protective of aquatic life
- We therefore reiterate KivIA-WL-TC#6 and #9. We recommend that AEM demonstrate the feasibility of segregating arsenic from pit walls or of the water mass in the pit itself to show the feasibility of the proposed water treatment option. This information should be provided at least 30 days prior to the final hearings.



- The proponent will be using a 4.7 metre thick NPAG / NML cap to host the thawed layer and prevent liquids from contacting the centre of the waste rock pile. The rationale for this is based on results to date on thermal modelling that considers thermistor readings at the Portage waste rock facility.
- The KivIA agree with AEM's response on the outcomes that will result from thermistor strings in the expanded WRST.
- However, the KivIA requests that AEM provide an accurate plan map that shows the planned locations of the drill holes that will contain the thermistor strings. This plan map needs to be provided prior to the 60-day construction notice for the WRSF.



Summary of Requests and Recommendations

- We request that AEM commit to provide a Quantitative Water Management Decision Tree to show how water volumes exceeding average conditions would be effectively managed at least 30 days prior to the final hearings
 - This must include evidence that effluent streams, particularly those rich in arsenic, can be effectively segregated for water treatment to safe concentrations.
- AEM should provide additional detail as to how the upper and lower bounds of the phosphorus uptake ratios were derived in the new water quality model, and associated literature references. This should be provided at least 30 days prior to the final hearings.



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- We requested additional detail to address:
 - the methodology used to determine the peak-increase-factor (PIF) for lake trout in the project area, specifically, why the value of 2.67 was used in contradiction of the stated methods which gave a range of 3.6-4.4 for PIFs, and
 - how any impacts from greater than anticipated mercury concentrations resulting from the project can be adequately mitigated.
- AEM has now clarified how the PIF was calculated.
- AEM has also clarified the communication based strategy that will be used to ensure residents of Baker Lake are not exposed to elevated mercury risks associated with the project.



- KivIA were concerned that the thermal modelling did not consider the effects of climate change on permafrost degradation
- We were concerned permafrost degradation will affect groundwater dynamics and ground stability in the vicinity of the pits. Climate change will exacerbate thawing of the permafrost caused by flooding the pits after the mine is closed.
- AEM had not incorporated climate change into the post closure thermal analysis.
- AEM has clarified how estimates of permafrost degradation are conservative (i.e., fast rate of degradation), which reflect expected climate change patterns.
- We accept AEM's response with respect to near surface groundwater reporting to the pits.
- Thermal characterization of the ground in proximity to the WRSF is outstanding and addressed separately as part of KivIA-WL-TC#21



- We requested AEM demonstrate the long-term feasibility of the current closure plan under climate change (i.e., beyond 2085), especially with respect to permafrost dynamics beneath water bodies and in the WRSF
- AEM presented thermal assessment modelling under two climate change scenarios: representative concentration pathway (RCP) 6 and RCP 8.5 for the WRSF.
- Results suggest that the depth of the active layer will increase. Net infiltration, however, will decrease, resulting in a low probability of mobilization of ML/ARD products from waste rock.
- The rate of permafrost degradation below pits will be influenced mainly by the pit lake water temperature.
- However, we request CIRNAC clarify whether their concerns regarding interflow through the WRSF have been adequately addressed: CIRNAC-TRC#1.



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- We were concerned that mine operations began this year (2019) but triggers and thresholds for implementing adaptive management had yet to be developed.
- These are required to provide confidence AEM will follow procedures and protocols laid out in the CREMP that depend on them.
- AEM has stated that the new area-specific trigger and threshold values for Whale Tail will be incorporated into the formal statistical analysis conducted as part of the 2019 CREMP report.
 - KivlA will review that submission as part of our Annual Report review



- The water quality modelling has determined that, due to arsenic leaching from the lithologies in the IVR Pit high walls, rehabilitation of the exposed walls is needed to meet the water quality criteria. AEM indicated that the IVR exposed walls above the final water level will be mined at a flatter angle so that they can be covered with overburden after closure. Erosion protection will be placed over the cover. However, the feasibility of this mitigation needed to be demonstrated.
- AEM has clarified that the overburden will be covered / armoured with a stable thermal cap. Details were also provided on the cap thickness as well as the constructed setback from the sloping and potentially less stable weathered pit walls.

- [illegible]



- While AEM committed to water quality in the open pits being “non-toxic to fish” it was not clear what water quality objectives were proposed for the pits prior to breaching the dikes post-closure
- AEM confirmed that water quality in the pits will meet CCME criteria for the Protection of Aquatic Life or site-specific water quality objectives prior to dike breaching in the expansion project as per the existing Water Licence for the approved project.



- AEM stated that most of the overburden arising from the project will be disposed of in the WRSF instead of being used for revegetation of mine and road footprint areas, because it will come from bed lake sediments which are not considered “adequate for revegetation” purposes.
- It was not clear why lake bed sediments are not adequate for revegetation
- AEM has now clarified that the lake sediments lack appropriate geotechnical properties for revegetation during closure. They consist of water saturated soft soils which could cause instability and erosion into surface waters.



- AEM indicated that samples of used oil/waste fuel will be tested to ensure they meet standards for disposal through incineration. Any batches not meeting standards will be shipped offsite.
- It was not clear what the monitoring schedule for feedstock samples will be.
- AEM clarified that it will use oil/waste fuel guidelines identified by the Nunavut Government. AEM tests one sample per year and burns used oil/waste fuel as it becomes available.


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- KivIA requested details on the Fish Habitat Offsetting Plan, including overall approach, timeline, monitoring, complementary measures and contingency options.
- We note that this information can be provided during the regulatory phase of the project; we recommend the NWB include this requirement as a condition of the water licence and include appropriate time for review by the KivIA and other intervenors as appropriate.
- Updates on several proposed components of the offsetting plan (i.e., offsetting measures, monitoring plans, contingency options) were provided during the teleconference between KivIA, AEM and DFO on September 30, 2019. We look forward to further involvement as the plan develops.