TECHNICAL REVIEW

OF

WHALE TAIL EXPANSION PROJECT
WATER LICENCE AMENDMENT APPLICATION

NWB Water Licence 2AM-WTP1826

Prepared By:

NUNAVUT TUNNGAVIK INC.

And

KIVALLIQ INUIT ASSOCIATION

September 16, 2019

WITH SUPPORT FROM

Hutchinson Environmental Sciences Ltd. **And** **GeoVector Management Inc.**

Prepared For:

Nunavut Water Board

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Executive Summary

Nunavut Tunngavik Inc. (NTI) and the Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) Whale Tail Pit – Expansion Project Water Licence Amendment Application. This application is associated to NWB Licence Number 2AM-WTP1826 and is located on Inuit Owned Land (IOL) approximately 150 kilometers north of the hamlet of Baker Lake. The IOL parcel involved is BL 43. The review has outlined the following areas where additional information is required to complete a full technical review of the application.

In general, AEM's water licence application reflects the experience gained at earlier stages of the Meadowbank Mine and both the Whale Tail and Meliadine projects. Our technical review highlighted 21 concerns. These issues predominantly follow from our information requests building on the additional information provided by AEM.

We raised several concerns with respect to understanding potential impacts to water quality and quantity from the expansion project. These issues differed from the harmonized environmental impact assessment review and are summarized as follows:

- AEM provided an assessment of potential concentrations of mercury in aquatic life based on literature for permanent reservoirs. AEM updated those predictions for mercury concentrations in fish in the project area following a commitment made during the Nunavut Impact Review Board (NIRB) technical hearings. However, the model did not provide details on how the peak-increase-factor used to predict increased mercury concentrations in lake trout in the project area was calculated or provide definitive management actions in the event that predicted mercury concentrations in lake trout were exceeded.
- Several concerns were raised with respect to the water quality model. Specifically, interactions with pit walls were removed from the water quality model in the latest model update and cryo-concentration has yet to be incorporated. These concerns must be addressed to reduce the likelihood the water quality model has underpredicted concentrations of key parameters of concern in the receiving environment.
- It is unclear how excess water associated with a greater than 1:100-year flood event will be effectively dealt with using existing water management infrastructure.
- AEM has not factored climate change into the project design. In particular, it should incorporate a wet year scenario into the water balance analysis to demonstrate that extreme annual flows can be handled by the water management plan. In addition, it is not clear how increased temperature will affect estimates of permafrost dynamics beneath waterbodies and in the WRSF, both during operations and after mine closure.
- AEM has committed to water quality in the open pits being non-toxic to fish post-closure, but it is not clear what water quality objectives are proposed for the pits prior to breaching the dikes.
- AEM has not presented a quantitative assessment of the feasibility of the two alternative discharge locations (Lakes D1 and D5).
- Updated information on water quality predictions for Lake A53 (a fish-bearing lake slated to be used for the IVR Attenuation Pond) has not been presented.
- 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 has asserted that the IVR exposed walls above the final water level will be mined at

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a flatter angle so that they can be covered with overburden after closure. The feasibility of this mitigation needs to be demonstrated.

We also raised several concerns pertaining to water management and mitigation. Those issues are summarized as follows:

- Trigger and threshold values have not yet been developed and applied, raising uncertainty as to whether AEM will be able to follow the procedures and protocols laid out in their core receiving environment monitoring program (CREMP) that are dependent on them.
- The current interim closure plan assumes that mining equipment without salvage value will be decommissioned, cleaned, and disposed in the underground workings. We are concerned with the feasibility of this closure plan should AEM default and the use of security be required to close the site.
- The short term (24 hour) maximum allowable limit for total suspended solids (TSS) during dike construction does not comply with federal guidelines for this parameter.
- Most of the overburden (rock and soil covering the mineral deposit) excavated for the Project will be disposed of because AEM states it is not adequate for revegetation purposes. AEM needs to justify why lakebed sediments (which make up most of the overburden) are not suitable for revegetation efforts.
- It is not clear what the monitoring schedule is for testing that used oil/waste fuel meets standards for incineration on site.
- The Fish Habitat Offsetting Plan is missing details on approach, timeline, monitoring, contingency options and complementary measures.
- The thermal modelling report authored by O'Kane Consultants was provided by AEM and reviewed by the KivIA. The thermal modelling that recommends the use of a thermal cap of 4.7 metres appears to be reasonable. However, the KivIA requests that AEM establish a sufficient number of thermistor strings in the Whale Tail WRSF and the bedrock beneath and in close proximity to the WRSF in order to ensure that the modelling is updated with local project data instead of thermistor readings from the Portage WRSF at the Meadowbank Gold Mine. This local data will best determine how effective the ARD/ML material has been isolated within the WRSF. In addition, it will allow for a better understanding of the depth and distribution of the active layer as it is related to permafrost distribution should be determined with the additional thermistor strings that will be established in the Whale Tail WRSF. This will also better determine the effectiveness of the freeze back in the WRSF, the water retention ability and capacity of WRSF dike, and the impact of water flow from the WRSF on the water quality in Mammoth Lake.

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1. Introduction

Nunavut Tunngavik Inc. (NTI) and the Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) Whale Tail Pit – Expansion Project Water Licence Amendment Application. This application was submitted to the Nunavut Water Board (NWB) in May 2019 and is associated to NWB Licence Number 2AM-WTP1826. The project is located on Inuit Owned Land (IOL) approximately 150 kilometers north of the hamlet of Baker Lake. The IOL parcel involved is BL 43.

The KivIA and NTI represent Inuit beneficiaries of the Nunavut Land Claim Agreement at the regional and territorial levels, respectively. In particular, both organizations manage Inuit Owned Lands (IOL) with the main aim of promoting self-reliance and social well-being of Inuit now and in the future. Both organizations manage IOL in order to support sustainable economic development opportunities for Inuit as long as it is completed in an environmentally and socially responsible manner.

The technical review was completed with support from Hutchinson Environmental Sciences Ltd. and GeoVector Management Inc. to ensure that the potential impacts and benefits were comprehensively assessed through scientific and socio-economic best practices, and to ensure Inuit Qaujimajatuqangit (IQ) values continue to be incorporated into impact determination, mitigation, project design and monitoring.

The documents reviewed consisted of the following:

- Water Licence Amendment Application for 2AM-WTP1826;
- Water Licence Amendment Application for 2AM-MEA1526;
- Water Licence Amendment Application for 2BB-MEA1828;
- Main Application Document;
- Executive summary in English and Inuktitut;
- Letter to NWB;
- Filled out Supplemental Information Guide table;
- NPC conformity determination;
- Compliance assessment;
- Certificate of Incorporation;
- List of Permits and Licenses for the Project;
- Record of consultations;
- Whale Tail Pit Waste Rock Management Plan dated May 2019;
- Thermal Monitoring Plan dated May 2019;
- Water Quality Monitoring and Management Plan for Dike Construction and Dewatering dated May 2019;
- Whale Tail Pit Expansion Project Landfill Design and Waste Management Plan dated April 2019;
- Whale Tail Pit Water Management Plan dated May 2019;
- Whale Tail Pit Water Quality and Flow Monitoring Plan dated May 2019;
- Whale Tail Pit – Expansion Project Landfarm Design and Management Plan dated April 2019;
- Whale Tail Pit – Incinerator and Composter Waste Management Plan dated April 2019;
- Whale Tail Pit - Expansion Project Haul Road Management Plan dated April 2019;

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- Ammonia Management Plan Whale Tail Pit Expansion Project dated April 2019;
- Meadowbank and Whale Tail Bulk Fuel Storage Facility: Environmental Performance Monitoring Plan dated April 2019;
- Whale Tail Pit – Emergency Response Plan dated May 2019;
- Hazardous Materials: Meadowbank Mine Site, Whale Tail Pit Site, Baker Lake Facilities Management Plan dated May 2019;
- Spill Contingency Plan dated April 2019;
- Groundwater Monitoring Plan dated May 2019;
- Conceptual Fish Habitat Offsetting Plan dated April 2019;
- Operational ARD-ML Sampling and Testing Plan – Whale Tail Pit Expansion Project dated April 2019;
- Core Receiving Environment Monitoring Plan: 2015 Plan Update – Whale Tail Pit Expansion Addendum_NWB dated April 2019;
- Interim Closure and Reclamation Plan dated May 2019;
- Quality Assurance / Quality Control (QA/QC) Plan dated May 2019;
- Operation & Maintenance Manual Sewage Treatment Plant (STP) dated May 2019;
- Updated Hydrogeological Assessment, Whale Tail Pit, Expansion Project dated May 6, 2019;
- 2019 Mean Annual Water Balance Update, dated May 2019;
- Mine Site and Downstream Receiving Water Quality Predictions dated May 2019;
- Whale Tail Lake Thermal Assessment dated April 2019;
- Site layout;
- Pre-development layout;
- Planned site layouts for 2019 through 2025 and 2042 post-closure;
- Operation IVR Attenuation Pond Dikes Longitudinal Profiles and Sections;
- IVR WRSF cross-section drawing;
- Typical section and road widening;
- Appendix K – Project Design Considerations.

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2. Summary of Technical Comments

Our technical review follows directly from our completeness review submitted to the NWB in July 2019. The completeness review highlighted 51 areas in which additional information was required to complete our full technical review. AEM responded to those issues in August 2019, completely resolving 20 issues. AEM provided sufficient information on an additional 26 issues such that a full technical review of those concerns could be conducted. Only five issues were not sufficiently resolved during the completeness review.

Our full technical review of the water licence amendment has highlighted 21 technical concerns. These issues predominantly follow from our information requests building on the additional information provided by AEM. These issues are summarized below; full technical comments are provided in Section 3 of this report.

In general, AEM's water licence application reflects the experience gained at earlier stages of the Meadowbank Mine and both the Whale Tail and Meliadine projects. We raised several concerns with respect to understanding potential impacts to water quality and quantity from the expansion project. These issues predominantly differed from the concurrent environmental impact assessment review and are summarized as follows:

- AEM provided an assessment of potential concentrations of mercury in aquatic life based on literature for permanent reservoirs. AEM updated those predictions for mercury concentrations in fish in the project area following a commitment made during the Nunavut Impact Review Board (NIRB) technical hearings. However, the model did not provide details on how the peak-increase-factor used to predict increased mercury concentrations in lake trout in the project area was calculated or provide definitive management actions in the event that predicted mercury concentrations in lake trout were exceeded.
- Several concerns were raised with respect to the water quality model. Specifically, interactions with pit walls were removed from the water quality model in the latest model update and cryo-concentration has yet to be incorporated. These concerns must be addressed to reduce the likelihood the water quality model has underpredicted concentrations of key parameters of concern in the receiving environment.
- It is unclear how excess water associated with a greater than 1:100-year flood event will be effectively dealt with using existing water management infrastructure.
- AEM has not factored climate change into the project design. In particular, it should incorporate a wet year scenario into the water balance analysis to demonstrate that extreme annual flows can be handled by the water management plan. In addition, it is not clear how increased temperature will affect estimates of permafrost dynamics beneath waterbodies and in the WRSF, both during operations and after mine closure.
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- 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 has asserted 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. The feasibility of this mitigation needs to be demonstrated.

We also raised several concerns pertaining to water management and mitigation. Those issues are summarized as follows:

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- The current interim closure plan assumes that mining equipment without salvage value will be decommissioned, cleaned, and disposed in the underground workings. We are concerned with the feasibility of this closure plan should AEM default and the use of security be required to close the site.
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- It is not clear what the monitoring schedule is for testing that used oil/waste fuel meets standards for incineration on site.
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- The thermal modelling report authored by O'Kane Consultants was provided by AEM and reviewed by the KivIA. The thermal modelling that recommends the use of a thermal cap of 4.7 metres appears to be reasonable. However, the KivIA requests that AEM establish a sufficient number of thermistor strings in the Whale Tail WRSF and the bedrock beneath and in close proximity to the WRSF in order to ensure that the modelling is updated with local project data instead of thermistor readings from the Portage WRSF at the Meadowbank Gold Mine. This local data will best determine how effective the ARD/ML material has been isolated within the WRSF. In addition, it will allow for a better understanding of the depth and distribution of the active layer as it is related to permafrost distribution should be determined with the additional thermistor strings that will be established in the Whale Tail WRSF. This will also better determine the effectiveness of the freeze back in the WRSF, the water retention ability and capacity of WRSF dike, and the impact of water flow from the WRSF on the water quality in Mammoth Lake.

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3. Detailed Technical Comments

3.1 Mercury concentrations in fish

Review Comment Number	KivIA-WL-TC#1. KivIA-WL-IR#30
Subject/Topic	Mercury concentrations in fish
References	Final Environmental Impact Statement Addendum, Whale Tail Pit – Expansion Project, Section 6.2.3.2 Azimuth 2017.Whale Tail Pit Project: Predicted Changes in Fish Mercury Concentrations in the Flooded Area of Whale Tail Lake (South Basin) Azimuth 2019. Technical Memorandum: Whale Tail Permitting Support – Revised Predictions of Fish Mercury Concentrations in Whale Tail Lake (South Basin) FINAL
Summary	AEM provided an assessment of the potential for increasing concentrations of mercury in aquatic life based on literature for permanent reservoirs. Further information was required to provide confidence for reviewers that impacts to aquatic life stemming from mercury are adequately characterized and reversible and an outline of management options was requested. AEM updated predictions for mercury concentrations in fish in the project area by not including a modifying factor for the shortened life span of the flooded area. AEM committed to long-term monitoring of fish mercury concentrations and further risk-based analyses if measured fish tissue concentrations exceeded model predictions. The technical memorandum did not discuss how the peak-increase-factor for standardized lake trout was calculated, provide adequate details on what AEM would define as an exceedance of predicted concentrations or discuss potential mitigation.
Importance of issue	Could negatively impact aquatic biota, human health and Inuit use of affected areas if changes in mercury concentrations are not fully understood and managed.
Detailed Review Comment	In Section 3.1 of the memo AEM states, "*As none of the models directly predicts changes in mercury concentrations for lake trout, the peak-increase-factor (PIF) empirical models for both northern pike and walleye were used to estimate post-impoundment concentrations in lake trout. Post-impoundment lake trout mercury concentrations were estimated by multiplying the PIF results by the baseline mercury concentrations for lake trout*." Azimuth 2017, (Figure 3-5) however, shows that the Mean PIFs for northern pike were 3.6 and 4.4 and for walleye 3.9 and 4.2. In Azimuth 2017 the baseline fish mercury concentration for a -standard lake trout size of 550 mm lake trout was 0.58 mg/kg wet muscle and the predicted mean methylmercury concentration in a standard-size lake trout was 1.55 mg/kg wt. Therefore, the PIF used was 2.67, which is lower than those noted in Azimuth 2019. Details pertaining to how the 2.67 PIF was calculated

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	were not provided in either Azimuth 2017 or Azimuth 2019. Greater detail describing the calculation of the PIF for lake trout is required to give the reviewer confidence in the predicted mercury concentrations in fish. AEM, "*commits to further risk-based analyses if measured fish tissue concentrations exceed model predictions (i.e., approximately three times baseline fish mercury concentrations for a 550 mm lake trout*)." However, details discussing how AEM defines an exceedance are not provided and no management actions are proposed to mitigate any exceedances.
Recommendation/Request	AEM has not provided details on how the peak-increase-factor used to predict increased mercury concentrations in lake trout in the project area were calculated or definitive management and mitigative actions in the instance that predicted mercury concentrations in lake trout were exceeded. We request additional detail to address: 1. the methodology used to determine the peak-increase-factor 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 2. how any impacts from greater than anticipated mercury concentrations resulting from the project can be adequately mitigated.

3.2 Removal of pit walls from water quality model predictions

Review Comment Number	KivIA-WL-TC#2. KivIA-WL-IR#32
Subject/Topic	Removal of pit walls from water quality model predictions
References	Mine site and downstream receiving water quality predictions Whale Tail Pit – Expansion Project Section 3.2.2.1 Surface facilities Table 4: Changes in surface facility inputs Page 24
Summary	AEM has removed interactions with pit walls from the water quality model thereby excluding a significant source of arsenic and phosphorus. Insufficient rationale has been provided to justify the removal of pit walls from the water quality model.
Importance of issue	Removal of interactions with pit walls from the water quality model may underpredict concentrations of key parameters of concern in the receiving environment.
Detailed Review Comment	AEM provides the following justification for removal of pit wall from the water quality model: • *"1 m interaction depth on pit benches and floors; no interaction with the pit walls"* • *"It is unlikely that surface runoff over the pit walls will significantly acquire a mass load; rather, the majority of the load will be sourced from pit benches and floors."*

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	• *"At the Whale Tail pit sump, the largest source of arsenic is from runoff over pit benches and floors…. The largest source of phosphorus is the shallow groundwater seepage at the south wall*." AEM's response to our information request provides further logic for the removal of pit walls from the model, stating that *"The main sources of leaching in an open pit are the benches due to the rubble zone that includes fine grained material that develops on account of over drilling and blasting."* While we agree that the most significant source will be the benches and pit floor, we disagree with the removal of pit walls all together from the model. The pit walls will be weathered over the course of mine life both during operation and throughout closure. We assert that removal of the pit walls as source terms for the water quality model removes a potentially significant source of arsenic and phosphorus and increases the likelihood that concentrations in the receiving environment are being underpredicted.
Recommendation/Request	Please reintroduce the pit walls as source terms to the water quality model to more conservatively predict water quality concentrations in the receiving environment. Management and mitigation measures should be proposed along with a discussion of their effectiveness should concentrations of parameters of potential concern, including both phosphorus and arsenic, approach their respective discharge criteria and low action level thresholds. Also see "KivIA-WL-TC#12 Early warning trigger development".

3.3 Cryo-concentration in water quality model assumptions

Review Comment Number	KivIA-WL-TC#3. KivIA-WL-IR#31
Subject/Topic	Cryo-concentration in water quality model assumptions
References	Mine site and downstream receiving water quality predictions Whale Tail Pit – Expansion Project Section 2.1.1 Changes to FEIS Addendum Table 1: General water balance assumptions pertinent to the water quality model Page 11
Summary	AEM committed to update the water quality model to include cryo-concentration during the NIRB technical hearings in June 2019. The water quality model accompanying the water licence submission does not include cryo-concentration and must be updated.
Importance of issue	The current water quality model predictions do not reflect changes committed to during the NIRB technical hearings.
Detailed Review Comment	The reviewer is aware that the information provided in the water license submission pertaining to cryo-concentrating inclusion in the water quality model is currently out of date and will be updated by the proponent as committed to during the EIS technical hearings in June 2019. Review of that documentation will be used to confirm whether water balance assumptions are appropriate.

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	We note that the updated model has not been provided during the technical review period.
Recommendation/Request	Please update the water quality model to include cryo-concentration. This update should be provided as soon as possible but no later than 30 days prior to the public hearings to provide sufficient time for technical review.

3.4 Uncertainty in Waste Rock Seepage Estimates

Review Comment Number	KivIA-WL-TC#4. KivIA-WL-IR#4
Subject/Topic	Uncertainty in Waste Rock Seepage Estimates
References	Water Management Plan, Section 3.1.4.5, pp. 31-33, Tables 3.7, 3.8
Summary	*As shown in tables 3.5 and 3.6, the update water balance shows an overall reduction in the inflow volume to the ponds. The reduction in water inflow to the ponds is due to the estimated reduction of seepage outflow from the WRSFs.*
Importance of issue	Moderate
Detailed Review Comment	As indicated in AEM's response to KivIA-WL-IR#4, *"the change to the contact water volume reporting to the attenuation pond is not related to 2019 Weather data but due to a refinement of the Landform Water Balance for the WRSFs".* These updates show reduced volumes of seepage reporting to the IVR and Whale Tail attenuation ponds. AEM has indicated that they have *"conducted flood routing analyses for the attenuation ponds based on the mine plan and construction sequence of the ponds considering 1:100 and 1:1000-year flood events. Pumping rates were also analyzed and adjusted when required in order to maintain a water level below or equal to the Maximum Water Level (MWL) in the ponds during the passage of the 1:100-Yr Flood. All flood routing charts indicate that extreme events can be managed within the infrastructures with adequate freeboards."* We are concerned with how excess water associated with a greater than 1:100-year flood event will be dealt with.
Recommendation/Request	Please provide results from the flood routing analysis and the range of seepage and runoff that can be accommodated by the attenuation ponds and comment on their ability to handle increased variance in runoff or climatic extremes. Please compare these inflows to the 1:1000-year flood event analysis to provide confidence that relatively extreme events can be adequately managed through current water management infrastructure and the attenuation ponds.

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3.5 Thermal Modelling of Permafrost

Review Comment Number	KivIA-WL-TC#5. Re: KivIA-WL-IR45 and IR46
Subject/Topic	Thermal Modelling of Permafrost
References	FEIS Addendum, Appendix 6-B: Addendum Hydrogeological Assessment and Modelling, Interim Closure and Reclamation Plan Section 3.1.2 Climate Change p. 19, and AEM Responses to KivIA-WL-IR7 p. 52-54, IR45 p. 98 and IR46 p. 99-101
Summary	Thermal modelling was completed 10,000 years into the future to predict the extent and nature of permafrost thawing under the Whale Tail and IVR pits during closure and post-closure. The modelling did not consider the effects of climate change on permafrost degradation because of a lack of reliable long-term climate change projections. Thus, modelling assumes that climate conditions in 10,000 years will be similar to current conditions. Although robust century-scale climate change models may not be available, temperature projections do exist to the end of the 21st century for the Canadian Arctic and these show substantial warming[1]. These data should be incorporated into pit thermal modelling to provide a more realistic estimate of the timing and extent of permafrost thawing due to formation of the pit lakes.
Importance of issue	High 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.
Detailed Review Comment	Thermal modelling was completed 10,000 years into the future to predict the extent and nature of permafrost thawing under the Whale Tail and IVR pits during closure and post-closure, based on Baker Lake climate normal air temperatures from 1981 to 2010. The modelling did not consider the effects of climate change on permafrost degradation because long-term climate change projections (i.e., 300 – 10,000 years into the future) were deemed to have *"a minimal degree of certainty"* (p. 11) and *"would not bring any benefit to the model quality"* (p. 11). The model thus assumes that climate conditions in 10,000 years are similar to current conditions, which the report acknowledges *"to be unrealistic"* (p. 12). The report states that *"climate change impacts are typically considered for a post-closure period of up to 100 years as the current standard practice"* (p. 11). While robust climate change projections may not be available beyond the next 100 years, temperature projections do exist to the end of the 21st century for the Canadian Arctic. These data should be incorporated into pit thermal modelling to provide a more realistic estimate of the timing and extent of permafrost thawing due to

[1] *https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/Climate-change/pdf/CCCR-Chapter4-TemperatureAndPrecipitationAcrossCanada.pdf*

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	formation of the pit lakes. (In fact, AEM presents data for mean annual temperature predicted from ~2030-2050 in AEM Response to KivIA-WL-IR7, p. 54 and the ICRP discusses projected climate change to 2085 in Section 3.1.2).
Recommendation/Request	Please incorporate existing climate change projections for the next 50-80 years (e.g., the Overland *et al.* 2013 data cited in the Water Management Plan) into thermal modelling to provide a more accurate estimate of the fate of permafrost in the vicinity of the pits during closure and post-closure. Please demonstrate the stability of the pits and the robustness of the hydrogeological predictions regarding groundwater dynamics given the increased rate of permafrost thawing that is expected (due to the combined effects of climate change and pit flooding).

3.6 Climatic inputs for water quality model

Review Comment Number	KivIA-WL-TC#6. KivIA-WL-IR#34
Subject/Topic	Climatic inputs for water quality model
References	Mine site and downstream receiving water quality predictions Whale Tail Pit – Expansion Project Section 4.0 Water quality predictions, Page 47 Water Management Plan
Summary	AEM states, "*Predicted concentrations are monthly mean values during operations and closure. Given the uncertainties associated with the modeling exercise and use of an average climate year, the predicted concentrations are considered to be order-of-magnitude estimates*."
Importance of issue	Medium
Detailed Review Comment	AEM has only conducted water balance modelling under mean annual precipitation conditions. This does not provide sufficient confidence that AEM will be able to mitigate impacts from increased or decreased site water should conditions diverge from the historical mean during construction, operations and closure. This issue was raised during the EIS review, and in response AEM committed to providing an adaptive management decision tree in the updated water management plan to provide confidence that greater than anticipated water quantity could be adequately managed. As of the technical review period, this decision tree has not been provided despite AEM's response to our information request that *"the water management decision tree available for the technical comment review period."*.
Recommendation/Request	Please update the water management plan with the decision tree for water quantity management as committed to in the EIS technical hearings in June 2019 and within the response to KivIA-WL-IR#34.

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3.7 Climate Change and Project Timeline

Review Comment Number	KivIA-WL-TC#7. Re: KivIA-WL-IR3
Subject/Topic	Climate Change and Project Timeline
References	Water Management Plan, Section 2.1.5 p. 12, Section 2.1.1 Table 2.1, Section 3.4 p. 34 and AEM Response to Information Request KivIA-WL-IR3 p. 46-47
Summary	Climate change was not factored into the water management plan due to the short duration of the project. AEM considers that water management is *"sufficiently conservative"* however because of undercatch correction factors applied to the water balance and design features in the water management facilities which account for extreme weather events (in addition to average conditions). AEM states that it may also run a wet year scenario for the water balance to make sure it can handle extreme annual flows. The water balance results for the wet weather scenario should be presented for technical review.
Importance of issue	High The wet weather scenario should be incorporated into the water balance to ensure that extreme annual flows are adequately considered in the water management plan.
Detailed Review Comment	The absence of climate change consideration over the project operations and closure period, coupled with projected changes in climate over the same period, reduces the certainty in the water budget and predictions. While AEM states that the water management plan is *"sufficiently conservative" (AEM Response p. 46)* because (i) the water balance corrects for under-recording at stations and (ii) water management facilities are designed to account for extreme events, AEM acknowledges that *"for further conservatism in the design…[it] is considering running a wet year scenario for the water balance to ensure the water management can handle extreme annual flows" (AEM Response p. 46).* The wet weather scenario should be run to improve confidence in the water budget and predictions.
Recommendation/Request	Please provide water balance results for the wet weather scenario as described.

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3.8 Addressing a Changing Climate in Project Design

Review Comment Number	KivIA-WL-TC#8. Re: KivIA-WL-IR7
Subject/Topic	Addressing a Changing Climate in Project Design
References	Appendix K – Project Design Considerations p. 1, Section 2.1.1 Temperature and 2.1.3 Precipitation, Table 1and AEM Response to Information Request KivIA-WL-IR7 p. 52-54
Summary	AEM presents a figure showing predicted changes in mean annual temperature under climate change. It is not clear how this predicted increased temperature will affect estimates for the development and maintenance of permafrost beneath waterbodies and in the WRSF.
Importance of issue	High Project infrastructure that depends on thermal stability or which is designed to manage water flows may not operate as planned under increased temperatures predicted due to climate change.
Detailed Review Comment	AEM presents Figure KivIA-WL-IR7-6 in AEM Response KivIA-WL7 (p. 54) showing predicted changes in temperature under climate change. It is not clear how this increased predicted mean temperature will affect estimates of the development and maintenance of permafrost beneath waterbodies and in the WRSF. We are concerned with the long-term stability of the site under a warming climate.
Recommendation/Request	Please 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.

3.9 Arsenic and ARD mitigation on Whale Tail Pit Wall

Review Comment Number	KivIA-WL-TC#9. KivIA-WL-IR#14
Subject/Topic	Arsenic and ARD mitigation on Whale Tail Pit Wall
References	Interim Closure and Reclamation Plan Sect. 5.2.2.6 p. 67 See also 5.2.2.7 p.68 5.2.2.9 Table 8.0-1
Summary	The release of arsenic under submerged conditions from arsenic salts generated from exposure during mining is being evaluated as part of the water quality predictions (Golder 2019c). The north greywacke has a variable ARD potential and testing suggests that the delay to onset of ARD is likely to be much longer than the construction, operations and closure phases of the Project combined. However, if the north greywacke (or any other PAG/ML rock) were to be left exposed in the long-term on the highwall above the water level, a permanent control mechanism would be required. Arsenic release from exposed Whale Tail and IVR Pit walls is a source of uncertainty in the prediction of the long-term water quality

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	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 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 These results demonstrate a lack of certainty in predictions for water quality in the pits at closure and no response plan is specified.
Importance of issue	*High*
Detailed Review Comment	The release of arsenic from submerged pit walls is stated as an unknown and extended exposure of PAG rock will require a permanent control mechanism yet no mitigation is proposed. Section 5.2.2.8 and 5.2.2.8 speak to ongoing monitoring and in situ treatment but the feasibility of in-situ treatment is not addressed. AEM's response to the original IR indicated that in the *"event water quality is different than predicted, mitigation options range from using the water treatment plant that will be on-site during filling of the pit, to increasing the rate of filling (this will stop oxidation sooner), to delaying the time to reconnect the lakes. While treatment is not expected to be required during closure, if it was, it would likely only be short in duration as the source of arsenic will be stopped as the pit fills."* The proposal of *"…increasing the rate of filling (this will stop oxidation sooner)…"* contradicts the statement that *"However, if the north greywacke (or any other PAG/ML rock) were to be left exposed in the long-term on the highwall above the water level, a permanent control mechanism would be required."* We also refer the reader to KivIA-WL-TC#2 "Removal of pit walls from water quality model predictions".
Recommendation/Request	We therefore request AEM provide documentation to support the 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. Given the uncertainty in the occurrence of arsenic in the pit walls and their contribution to concentrations during closure, we request AEM ensure treatment of pit water quality is addressed under security. We request the NWB include a condition within the water licence requiring AEM to develop an adaptive management plan that identifies thresholds and timelines for treatment or other mitigation should water quality not be suitable for discharge during closure. This is intended to ensure water quality is suitable for discharge by the intended start of post closure in 2043.

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3.10 Implications of rock fracturing on groundwater volumes

Review Comment Number	KivIA-WL-TC#10. KivIA-WL-IR47
Subject/Topic	Implications of rock fracturing on groundwater volumes
References	Appendix G.15 – Whale Tail Project Groundwater Monitoring Plan, May 2019, Section 2.0 Agnico Eagle. 2AM-WTP1826, Information Request Reponses, Whale Tail Pit – Expansion Project, page 102. August 1, 2019.
Summary	The site and hydrogeological conditions are summarized in this section, including current, operational and post-closure conditions. Hydraulic conductivities and seepage are described for the development timeline in the different subsurface strata to provide context for the monitoring program.
Importance of issue	High: Spatial-temporal hydrogeological conditions and their potential effects on water management and post-closure must be understood so that monitoring programs can be implemented that accurately represent the conditions of concern.
Detailed Review Comment	The potential effects of groundwater migration/infiltration due to rock fracturing from the pit (and eventual shaft) construction were not discussed. Given the large size and surface area of the pit, the reviewer assumes that rock fracturing will only occur relatively near to the pit and would not appreciably increase groundwater migration to it, overall, especially if freeze back occurs as Agnico indicated could happen. However, rock fracturing in near-surface areas where there is more water available, especially in early development when groundwater storage has not been depleted, could affect the assumptions about early water intrusion to the pit. Previous hydrogeological investigations by Golder identified increased hydraulic conductivity related to jointing (fracturing) over 30 m from approximately 436 – 466 m deep (referenced in the Updated Hydrogeological Investigation, Whale Tail Pit, Expansion Project – Golder Associates, May 6, 2019). Agnico Eagle clarified that: “Mechanical fracturing of rock along the pit perimeter may locally increase the hydraulic conductivity near the pit walls; however, flow to the pit will be primarily controlled by the vertical gradient induced by mine dewatering (i.e., it will be controlled the relative depth of the unfrozen portion of the pit and the lake elevation in the South Basin of Whale Tail Lake) and the bedrock hydraulic conductivity. Some small temporary increases in flow from storage release may occur, but these flows will be minimized by the portions of the pit perimeter that is located in permafrost, and they would be small in comparison to the flow through the weathered bedrock, which is significant due to its high hydraulic conductivity (1×10^{-5} m/s).”

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	(Agnico Eagle. 2AM-WTP1826, Information Request Reponses, Whale Tail Pit – Expansion Project, page 102. August 1, 2019.) The Agnico Eagle response is reasonable, however a quantity estimate of relative groundwater contributions from rock fracturing should be provided to substantiate the assumed minimal contributions.
Recommendation/Request	Please provide a quantity estimate of relative groundwater contributions from rock fracturing.

3.11 Alternative Effluent Discharge Locations

Review Comment Number	KivIA-WL-TC#11.
Subject/Topic	Alternative Effluent Discharge Locations
References	Main Application Document NWB Water Licence 2AM-WTP 1826 Amendment Section 1.2.5.2 Effluent Treatment and Water Management Plan Appendix G.5
Summary	The report states that two alternative discharge locations were considered for the Expansion Project (D1 and D5 lakes). Preliminary baseline data was collected for these alternatives in 2018 and each has been assessed qualitatively. It is not clear whether these alternative locations have been assessed quantitatively, nor under what circumstances they would be considered as alternative discharge locations.
Importance of issue	High It is not possible to fully assess the feasibility of the two alternative discharge locations without the missing information.
Detailed Review Comment	Section 1.2.5.2 states that *"conceptual design and modelling results for the Expansion Project for alternative discharge locations are included in the Water Management Plan (Appendix G.5)"* (p. 33) and that "preliminary baseline data collection was completed in 2018 on two alternative locations for effluent discharge…both lakes have been assessed qualitatively" (p. 33). It is not clear whether the D1 and D5 lakes have been assessed quantitatively as alternative discharge locations, since the conceptual design and modelling results mentioned in the Main Application Document could not be found in the Water Management Plan. Furthermore, it is not clear under what circumstances they would be considered as alternative discharge locations.
Recommendation/Request	Please provide results of the quantitative assessment of D1 and D5 lakes as alternative discharge locations. Please explain under what circumstances these lakes would be considered as alternative discharge locations.

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3.12 Early warning trigger development

Review Comment Number	KivIA-WL-TC#12. KivIA-WL-IR#29
Subject/Topic	Early warning trigger development
References	Core Receiving Environment Monitoring Program (CREMP): 2015 Plan Update – Whale Tail Pit Expansion Addendum_NWB Section 2.2.1 Approach, Page 3
Summary	Mine operations are to commence this year (2019). The NWB should ensure that the Water Licence includes a schedule for trigger/threshold development by AEM and review by the KIA to ensure adaptative management is in place prior to the open water season of 2020.
Importance of issue	It is unclear when early warning triggers will be developed for the CREMP. This reduces certainty that appropriate adaptive management will be implemented in a timely fashion.
Detailed Review Comment	AEM states, "*Thus, comparison of the data to the early warning trigger values is the initial analytical focus; only if trigger values are exceeded are data then compared to the applicable thresholds (if available). Similar to what was done for the Meadowbank CREMP (Azimuth, 2012), area-specific trigger/threshold (as appropriate) values will be developed to support management of the Whale Tail Pit Study Area*." The CREMP details the management plan that AEM proposes to abide by for the Whale Tail expansion project. As part of that plan, annual average data is to be compared to early warning triggers. Mine operations is anticipated to begin in 2019, however no triggers have been developed. This reduces certainty that appropriate adaptive management will be implemented in a timely fashion. AEM's response to our information request indicated *"Water quality trigger and threshold values screening values will be developed for the Whale Tail Expansion Project. These will be derived from the recently completed 2018 Core Receiving Environment Monitoring Program (CREMP) – Meadowbank Mine and Whale Tail Project (Azimuth 2019), so that all relevant baseline data can be included in the derivation."* While we appreciate that water quality trigger and threshold values will be developed, we reiterate our concern that they have not been developed at this time and have not been reviewed by the KIA.
Recommendation/Request	Please provide a schedule as to when trigger and threshold values will be developed and applied, providing confidence AEM will follow the procedures and protocols laid out in their CREMP that are dependent on them. This schedule should include at least 30 days for KivIA technical review of the triggers and thresholds. We further recommend that the NWB incorporate a feasible schedule for the development and implementation of the triggers and threshold values into the project terms and conditions.

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3.13 IVR High Pit Walls as Mitigation

Review Comment Number	KivIA-WL-TC#13. KivIA-WL-IR#13
Subject/Topic	IVR High Pit Walls As Mitigation
References	Interim Closure and Reclamation Plan Section 5.2.2.5 p. 66
Summary	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. 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 The feasibility of this mitigation needs to be demonstrated.
Importance of issue	High
Detailed Review Comment	Overburden is easily eroded from all but the flattest slopes by wind, rain and runoff and will be subject to water turbulence and loss of permafrost after the pit is flooded. How can AEM maintain the cover at a depth sufficient to eliminate as leaching from the pit walls. At present, the feasibility of this mitigation needs to be demonstrated. We also refer the reader to KivIA-WL-IR#32 “Removal of pit walls from water quality model predictions”. As indicated in AEM’s response to this IR, AEM *“is currently working on a conceptual design of this mitigation measure for the IVR pit high walls and would like to defer the discussion of the outcome of this design to the technical phase of the project.”*
Recommendation/Request	The KIA submits that the feasibility of proposed mitigation should be demonstrated prior to approval. Please provide the conceptual design of the overburden capped pit wall for technical review. The design should indicate the slope at which the IVR Pit high walls will be mined, the depth to which overburden will be added, the type of erosion protection that will be used and how the integrity of the overburden coverage and erosion protection will be assured.

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3.14 Fate of Equipment

Review Comment Number	KivIA-WL-TC#14. KivIA-WL-IR#12
Subject/Topic	Fate of Equipment
References	Interim Closure and Reclamation Plan Section 5.2.1.5 p. 60 Table 5.2.4, p.73
Summary	The salvage value of equipment and machinery is expected to be limited due to the site location and high transport costs. Therefore, it has been assumed that all machinery and equipment have no salvage value and they will be left in the underground workings Machinery, materials and equipment will be removed off-site for salvage where economic to do so Metals will be separated and shipped off-site as scrap if economical to do so or disposed on-site in designated areas for non-hazardous materials While this may make economic sense to AEM, the KivIA should be provided with the opportunity to revisit this decision through contingency security values.
Importance of issue	Moderate
Detailed Review Comment	Inuit groups in the past have objected to equipment being left in pits and underground facilities at closure. AEM has indicated in their response to the IR that *"The RECLAIM cost estimate currently assumes that mining equipment will be decommissioned, cleaned, and disposed in the underground workings…and Planned disposal of cleaned mining equipment in underground workings has been approved by the NWB for other mining projects in Nunavut, such as Ulu Mine and Lupin Mine".* While we accept this approach at end of life, we caution that this approach assumes the mining has been completed at the time of closure. We are concerned that the KivIA, as landowner, should be afforded the option to revisit underground storage of equipment and heavy machinery at closure should security be tapped prior to the completion of planned mining activities.
Recommendation/Request	Please include removal of equipment and machinery from the underground and transport to secure disposal off site in the RECLAIM cost estimate.

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3.15 Inuit Input into Closure Objectives

Review Comment Number	KivIA-WL-TC#15. Re: KivIA-WL-IR10
Subject/Topic	Inuit Input into Closure Objectives
References	Interim Closure and Reclamation Plan, Sections 5.2.2.3, Table 5.2.2 p. 64, 5.2.2.6, p. 67 and AEM Response to KivIA-WL-IR10 p. 59
Summary	The ICRP states that water quality parameters in Mammoth Dike and Whale Tail Dike, and downstream environments, will meet aquatic life guidelines post-closure. AEM commits to water quality in the open pits being *"non-toxic to fish"* in its Response to KivIA-WL-IR10. However, it is not clear what water quality objectives are proposed for the pits prior to breaching the dikes post-closure.
Importance of issue	High Water quality within and downstream of the pits post-closure is important for protecting aquatic life, including fish, in the area of the mine.
Detailed Review Comment	Table 5.2.2. in the ICRP states *"prior to breaching the Mammoth Dike and the Whale Tail Dike, the water quality will be profiled to confirm it is suitable for release. Treatment options will be investigated, if necessary (e.g., in-situ treatment or through the O-WTP)" (p. 64).* The ICRP also states *"...*predicted concentrations of major ions, nutrients (except phosphorus), and metals in Mammoth Lake, and downstream environments, for post-closure are predicted to be lower than aquatic life guideline" (p. 67). The Response to KivIA-WL-IR10 states a commitment that water will be *"non-toxic to fish"* (p. 59". There is uncertainty in what water quality objectives are proposed for the pits prior to breaching the dikes post closure.
Recommendation/Request	Please confirm that water quality in the pits will meet CCME criteria for Protection of Aquatic Life or site-specific water quality objectives as applicable prior to breaching dikes.

3.16 High TSS Concentrations during Construction

Review Comment Number	KivIA-WL-TC#16. Re: KivIA-WL-IR25 and IR26
Subject/Topic	High TSS Concentrations during Construction
References	Water Quality Monitoring and Management Plan for Dike Construction and Dewatering Section 3 Standards for the Protection of Fish and Fish Habitat, Tables 2.1 p. 3 and 3.1 p. 5 and AEM Response to KivIA-WL-IR25 (p. 76-77) and KivIA-WL-IR26 p. 78
Summary	Table 3.1 indicates that AEM has proposed a short term (i.e., 24 hour) maximum allowable TSS concentration during dike construction for impounded areas at all times in all areas, and all other areas and at times when eggs/larvae are not present, at 50 mg/L. In the Response to KivIA-WL-IR25, AEM states that this limit is protective of the environment because this concentration and exposure time would

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	cause *"minor measurable sub-lethal effects"* that would tend to be localized and of short duration. As shown in Table 2.1, the CCME short term exposure guideline for TSS is no more than 25 mg/L over background levels for a period of 24h, while the MDMER short term guideline is 22.5 mg/L in a composite effluent sample and 30 mg/L in a grab effluent sample. AEM should set a short term maximum limit that meets either CCME or MMER/MDMER guidelines.
Importance of issue	High Fish and other aquatic life may be exposed to deleterious TSS concentrations over the short-term, causing sub-lethal (e.g., physiological stress) or lethal effects.
Detailed Review Comment	Table 3.1 indicates that the short term (i.e., 24 hour) maximum allowable TSS concentration during dike construction for impounded areas at all times in all areas, and all other areas and at times when eggs/larvae are not present, is 50 mg/L. As shown in Table 2.1, the CCME short term exposure guideline for TSS is no more than 25 mg/L over background levels, while the MMER short term guideline is 22.5 mg/L in a composite effluent sample and 30 mg/L in a grab effluent sample. AEM suggests that the CCME guideline may not be applicable to Whale Tail because it is based on stream rather than lake environments. AEM suggests that the MDMER guideline is not applicable to dike construction because it is based on *"continuous/long-term discharge of effluent from a mine site"* (Response to KivIA-WL-IR26, p. 78). In its Response to KivIA-WL-IR25, AEM states that it based its short-term trigger concentration on the findings of Newcombe and Jensen (1996), which established a Severity of Effects Value (SEV) based on TSS concentration and duration of exposure. AEM states that *"at this concentration and exposure time, the SEV would be below a value of 6, indicating that some minor measurable sub-lethal effects…may be identified (e.g., physiological stress)"* (p. 77) for fish, plankton and benthic invertebrates. However, according to Newcombe and Jensen (1996) it appears that SEVs are in the lethal range for stickleback species at the 55 mg/L short term maximum (Figure 5), and this may also be the case for less mobile invertebrate species that would be found in the vicinity of the construction area or dewatering discharge locations. We are concerned that the 50 mg/L short term maximum for TSS is not sufficiently protective of aquatic life. AEM should set a short term maximum limit that meets either CCME or MMER guidelines.
Recommendation/Request	Please apply a short term maximum TSS limit for dike construction that meets either CCME or MDMER guidelines.

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3.17 Overburden for Closure

Review Comment Number	KivIA-WL-TC#17. Re: KivIA-WL-IR11
Subject/Topic	Overburden for Closure
References	Interim Closure and Reclamation Plan, Section 4.5.3, p. 42, and AEM Response to KivIA-WL-IR11 p. 60
Summary	AEM states 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 is not clear why lake bed sediments are not adequate for revegetation.
Importance of issue	Moderate Overburden of tills and organic matter is a valuable resource for facilitation of revegetation of scarified areas during closure and contributes to the closure goal of "self sustaining ecosystems".
Detailed Review Comment	In Response to KivIA-WL-IR11, AEM states that *"most of the overburden generated by the project (5.5 Mt) will be composed of bed lake sediments, which is currently not considered as adequate for revegetation or for use in road foot print areas"* (p. 60) and that *"approximately 0.1 Mt of overburden other than bed lake sediments would be available flor revegetation and road footprint areas"* (p. 60). Overburden of tills and organic matter is a valuable resource for revegetation of scarified areas (e.g., roads, camp site etc.) during closure and its use contributes to the closure goal of *"self sustaining ecosystems".* It is not clear why lake bed sediments are not adequate for this purpose.
Recommendation/Request	Please explain why lake bed sediments are not considered adequate for use in the revegetation of mine and road footprint areas during closure.

3.18 Water Quality Contingencies

Review Comment Number	KivIA-WL-TC#18. Re: KivIA-WL-IR18
Subject/Topic	Water Quality Contingencies
References	Interim Closure and Reclamation Plan, Section 5.2.9.9 and AEM Response to KivIA-WL-IR18 p. 67
Summary	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 treatment cannot achieve CWQG water quality guidelines for pit water unless high arsenic loadings from pit walls can be isolated and treated separately. The response does not indicate that pit water can be treated to levels protective of aquatic life.

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Importance of issue	High Water quality within and downstream of the pits post-closure is important for protecting aquatic life, including fish, in the area of the mine.
Detailed Review Comment	In Response to KivIA-WL-IR18, AEM states that it *"would consider using the Operation Water Treatment Plant (O-WTP)"* (p. 67,) which could treat arsenic to 0.1 mg/L at a maximum flow of 1600 m^3/hr. This means that pit water could not be treated to CWQG levels unless the source terms (pit walls) could be isolated, and thus pit water would not have water quality levels protective of aquatic life.
Recommendation/Request	Please describe how any high arsenic loadings from pit walls could be isolated and treated in order to maintain pit water quality within CWQG levels and provide evidence of the feasibility of the proposed management option.

3.19 Testing of Used Oil/Waste Fuel

Review Comment Number	KivIA-WL-TC#19.
Subject/Topic	Testing of Used Oil/Waste Fuel
References	Incinerator and Composter Waste Management Plan Section 7.4 Used oil/Waste fuel testing
Summary	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 is not clear what the monitoring schedule for feedstock samples will be.
Importance of issue	Moderate Additional information is required to assess the effectiveness of monitoring of incinerator activity.
Detailed Review Comment	Section 7.4 states that *"a sample of feedstock of used oil/waste fuel will be collected each month with one of the monthly samples being tested each year. Used oil/waste fuel not meeting impurity limits or having a flash point less than 37.7ºC will be drummed and shipped to a certified management facility for re-refining, treatment, recycling, and/or disposal"* (p. 21). If only one monthly sample is tested annually does this mean that all used oil/waste fuel generated each year is stored until the single sample for the year is tested? Where is the used oil/waste fuel stored in the interim? What is the rationale for only testing once per year?
Recommendation/Request	Please describe the monitoring schedule for testing the quality of used oil/waste fuel to ensure it meets standards for incineration. Please include details on how many samples are tested annually, where the used oil/waste fuel is stored while awaiting test results, and the rationale for the frequency of testing.

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3.20 Conceptual Fish Habitat Offsetting Plan

Review Comment Number	KivIA-WL-TC#20.
Subject/Topic	Conceptual Fish Habitat Offsetting Plan
References	Conceptual Fish Habitat Offsetting Plan, Section 1 Introduction, 8 Habitat Gains through Offsetting, 9 Contingency Options and Appendix C Complementary Measures
Summary	The purpose of the Conceptual Fish Habitat Offsetting Plan is to present feasible offsetting options to address loss of fish habitat due to the Expansion Project. Throughout the Plan, AEM indicates that more detail will be provided during the regulatory phase of the Project regarding the Plan's approach, timeline, monitoring, contingency options, and complementary measures. This additional information is required during the technical review to enable a proper assessment of the feasibility and adequacy of the fish habitat offsetting plan.
Importance of issue	High Additional information is required to assess the effectiveness of proposed fish habitat offsetting measures, to ensure any loss of fish habitat is balanced by appropriate habitat compensation.
Detailed Review Comment	AEM states *that "the objective of this conceptual plan is to demonstrate that feasible offsetting options exists to counterbalance fish habitat loss from the Whale Tail Pit Expansion Project"* (p. 1) and that it "will be updated with further detail during the regulatory phase of the Project, including with additional community and regulatory engagement that may inform the final offsetting measures" (p. 1). As the Plan is still under development, information on the approach, timeline, monitoring, contingency options and complementary measures is incomplete. For example, • Section 1.2 states that *"during the regulatory phase of the Project, two separate offsetting/compensation plans will be developed to clearly distinguish and support the final applications"* (p. 3) under the Fisheries Act and MDMER; • Section 8.1.1 states that *"the timeline for the offsetting measures will be determined during the regulatory phase"* (p. 30; • Section 8.1.2 states that *"any changes that may be required to the monitoring plan due to the Project expansion will be addressed during the regulatory phase"* (p. 30); • Section 9 states that "during the review of the FEIS and the regulatory phase, AEM will consult with stakeholders including the KIA…to address contingency options" (p. 37); and • Appendix C states that "if there is agreement that the proposed projects are suitable, more detailed study designs will be developed during the regulatory phase" (p. 1 of 11). The missing information should be provided to the KivIA to enable a proper assessment of the proposed offsetting plan, including its

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	feasibility and adequacy in compensating for fish habitat loss anticipated due to the Expansion Project.
Recommendation/Request	Please provide more details on the Fish Habitat Offsetting Plan, including overall approach, timeline, monitoring, complementary measures and contingency options. 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.

3.21 Waste Rock Storage Facility Design

Review Comment Number	KivIA-WL-TC#21. KivIA-WL-IR50
Subject/Topic	Waste Rock Storage Facility Design
References	Appendix G.17, Whale Tail Pit ARD-ML Sampling Plan v.5; Section 2.2.1, page 4.
Summary	The proponent will be a using a 4.7 metre thick NPAG / NML to host the thawed layer and prevent liquids from contacting the centre of the waste rock pile. The rational for this is based on results to date on thermal modeling that considers thermistor readings at the Portage waste rock facility.
Importance of issue	The proponent is basing the effectiveness of the 4.7 metre thick NPAG/NML on a Golders report that is “in preparation”. Until this final report is available there is no way to determine if the 4.7 metres will be effective in isolating the ARD/ML material.
Detailed Review Comment	Until this final report is available there is no way to determine if the 4.7 metres will be effective in isolating the ARD/ML material.
Information Request	Provide the Golders report on thermal modeling that considers thermistor readings at the Portage waste rock facility as soon as is reasonable possible.
Proponent Response to the Information Request	The thermal modeling report authored by O’Kane Consultants was provided by AEM and reviewed by the KivIA
KivIA Response	The thermal modeling that recommends the use of a thermal cap of 4.7 metres appears to be reasonable. However, the KivIA requests that AEM establish a sufficient number of thermistor strings in the Whale Tail WRSF and the bedrock beneath and in close proximity to the WRSF in order to ensure that the modeling is updated with local project data instead of thermistor readings from the Portage WRSF at the Meadowbank Gold Mine. This local data will best determine how effective the ARD/ML material has been isolated within the WRSF. In addition, it will allow for a better

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	understanding of the depth and distribution of the active layer as it is related to permafrost distribution should be determined with the additional thermistor strings that will be established in the Whale Tail WRSF. This will also better determine the effectiveness of the 1) freeze back in the WRSF, 2) the water retention ability and capacity of WRSF dike, and 3) the impact of water flow from the WRSF on the water quality in Mammoth Lake.

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