Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Information Requests

Whale Tail Pit Expansion Project Proposal

February 21, 2019

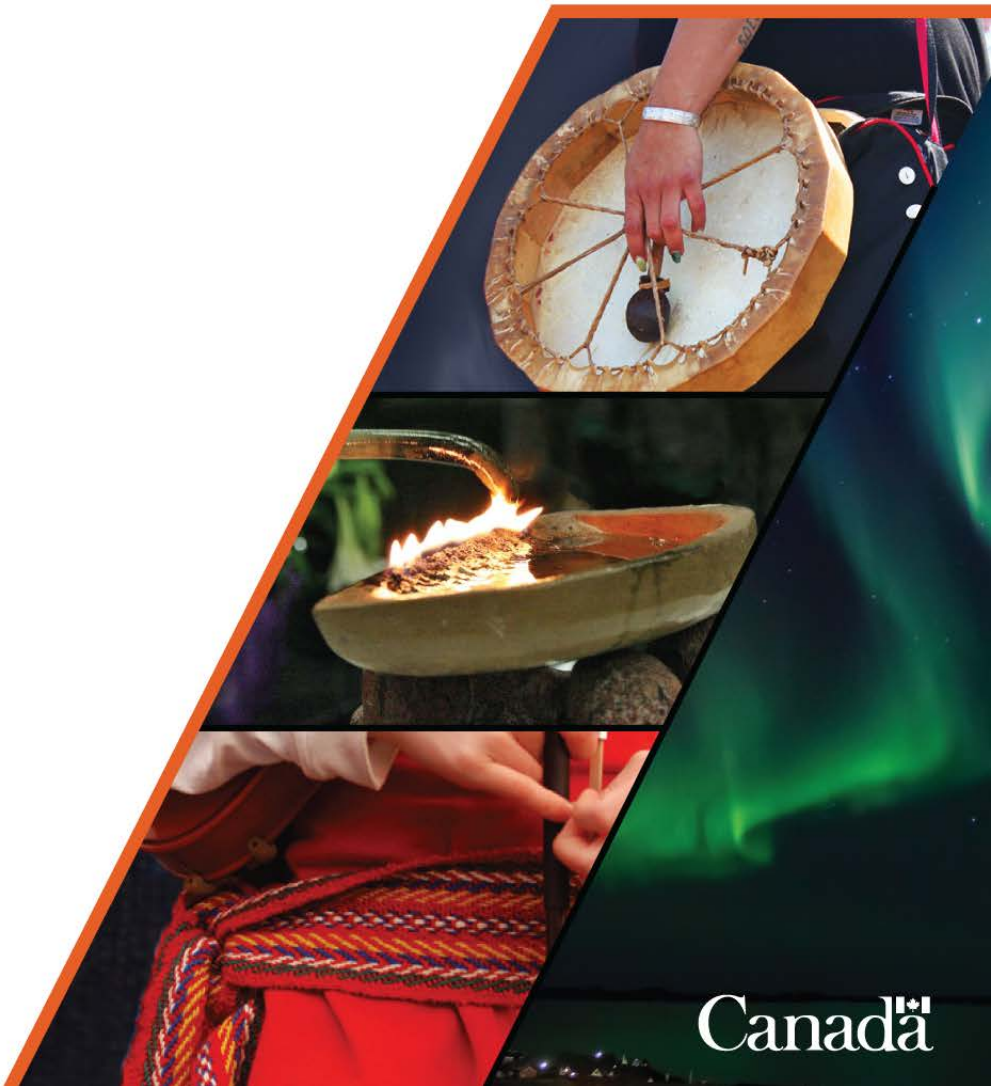


Table of Contents

Acronyms and Abbreviations

AEM	Agnico Eagle Mines Ltd.
ARD	Acid Rock Drainage
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
EPZ	Enhanced Permeability Zone
EQC	Environmental Quality Criteria
FEIS	Final Environmental Impact Statement
IR	Information Request
ML	Metal Leaching
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
SSWQO	Site-specific Water Quality Objectives
WRSF	Waste Rock Storage Facility

Information Request Number	**CIRNAC IR#: 1**
To	Proponent – Agnico Eagle
Subject	Comparative Analysis of Environmental Modelling Results for the Approved and Expansion Projects
Reference(s)	FEIS and supporting documentation
Issue/Concern	The FEIS and supporting documentation presents descriptions of the scope of the Expansion Project relative to the scope of the Approved Project. This includes new infrastructure and operational requirements associated with the expansion of the mining operation. Chapters 4 to 7 of the FEIS also contrast and compare the predicted environmental impacts associated with the Approved Project and proposed expansion. However, the FEIS does not provide a comparative analysis of the environmental modelling results generated in support of the two projects. To illustrate, on July 26th, 2018 AEM provided CIRNAC with a figure summarizing predicted arsenic concentrations in Mammoth Lake from the Approved Project. That figure (reproduced below) indicates that post-closure arsenic concentrations in Mammoth Lake are predicted to be approximately 0.007 mg/L (i.e., roughly 25% of the Site-Specific Water Quality Objective (SSWQO)). In contrast, Figure 11 from Appendix 6-H of the FEIS for the Expansion Project (also reproduced below) indicates that arsenic concentrations in Mammoth Lake during the closure phase will be roughly equivalent to 100 % of the SSWQO. Despite the significant increase in predicted arsenic concentrations between the Approved Project and the Expansion Project (i.e., an increase from 25% to 100% of the SSWQO), AEM has not presented: a) a comparison of the results; or b) an explanation for the substantive differences between the water quality predictions for the two projects. As a result, CIRNAC is unable to determine the significance of the incremental impacts associated with the new undertaking. While the example provided above focuses on the Freshwater Environment, the FEIS for the Expansion Project also lacks comparisons for Atmospheric and Terrestrial environmental components.
Information Request	CIRNAC recommends that the FEIS be revised to include comparative analyses of environmental modelling and predictions conducted on the Approved Project and the Expansion Project. The analyses should be quantitative and, where substantive changes in the environmental modelling results have occurred between the two projects, the rationale for the changes should be provided. The additional information is necessary to evaluate the incremental environmental impacts associated with the Expansion Project.

Note: The following two figures are provided to support the discussion presented in CIRNAC Information Request #1.

Figure provided by AEM to CIRNAC on July 26th, 2018 illustrating predicted arsenic concentrations in Mammoth Lake from the Approved Project

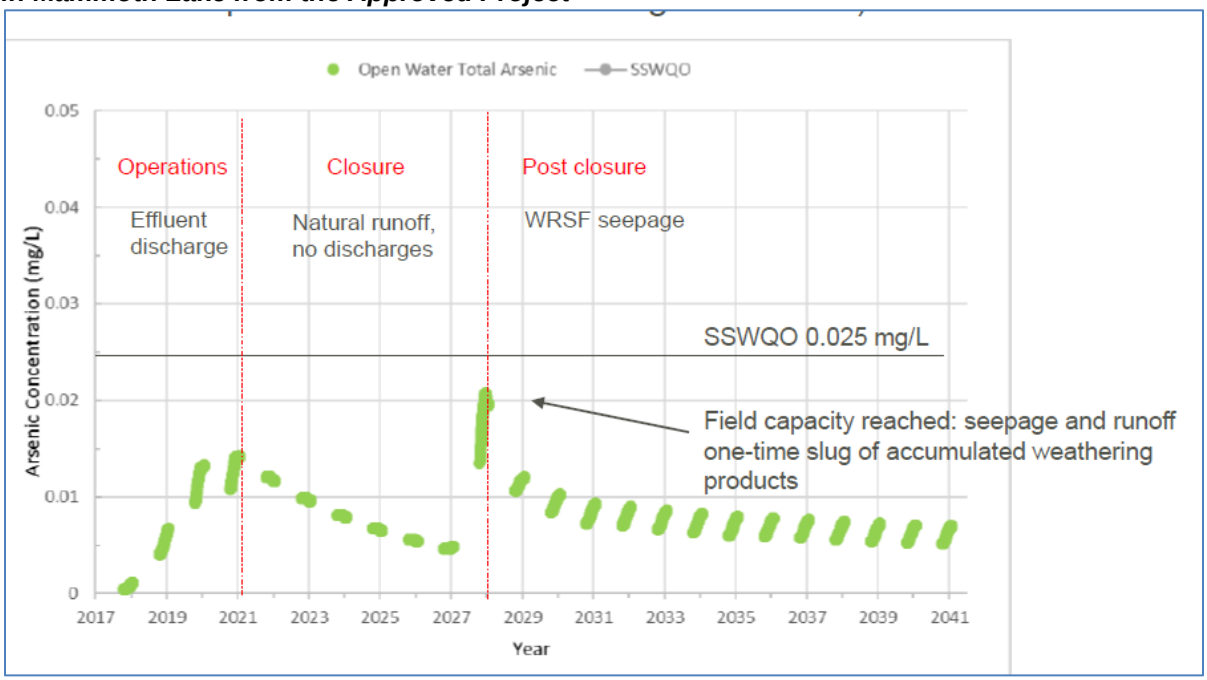
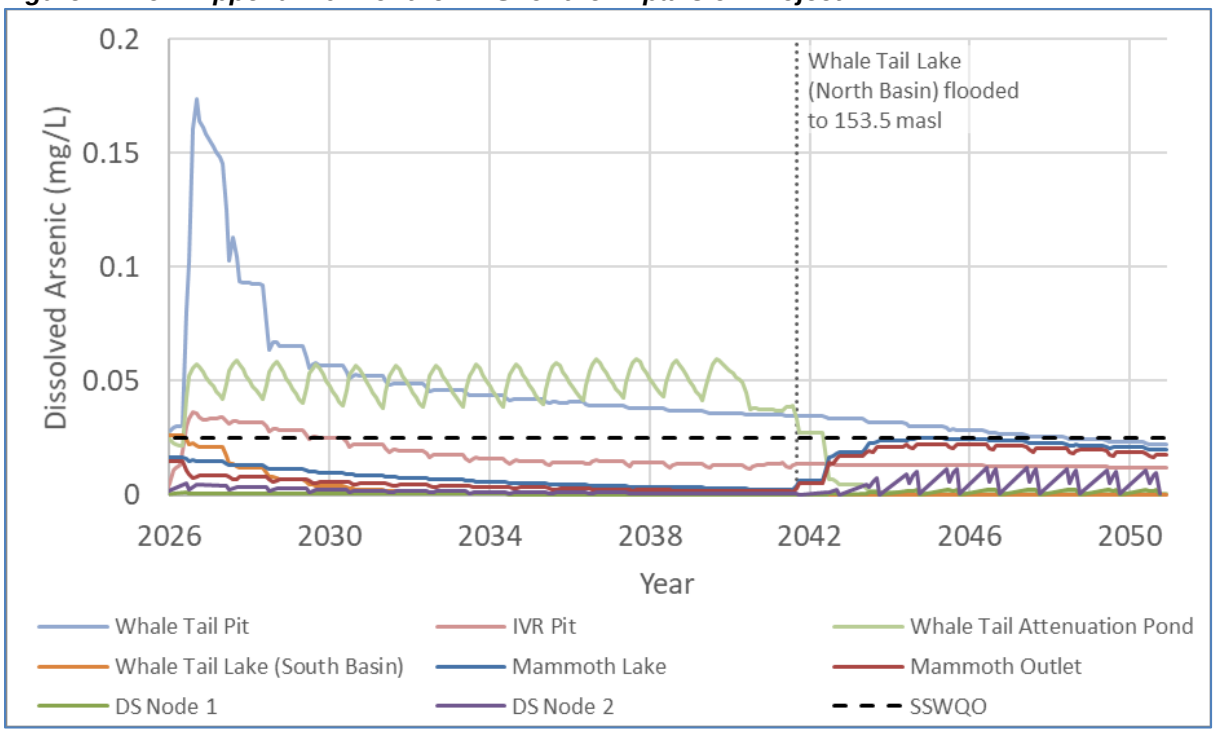


Figure 11 from Appendix 6-H of the FEIS for the Expansion Project

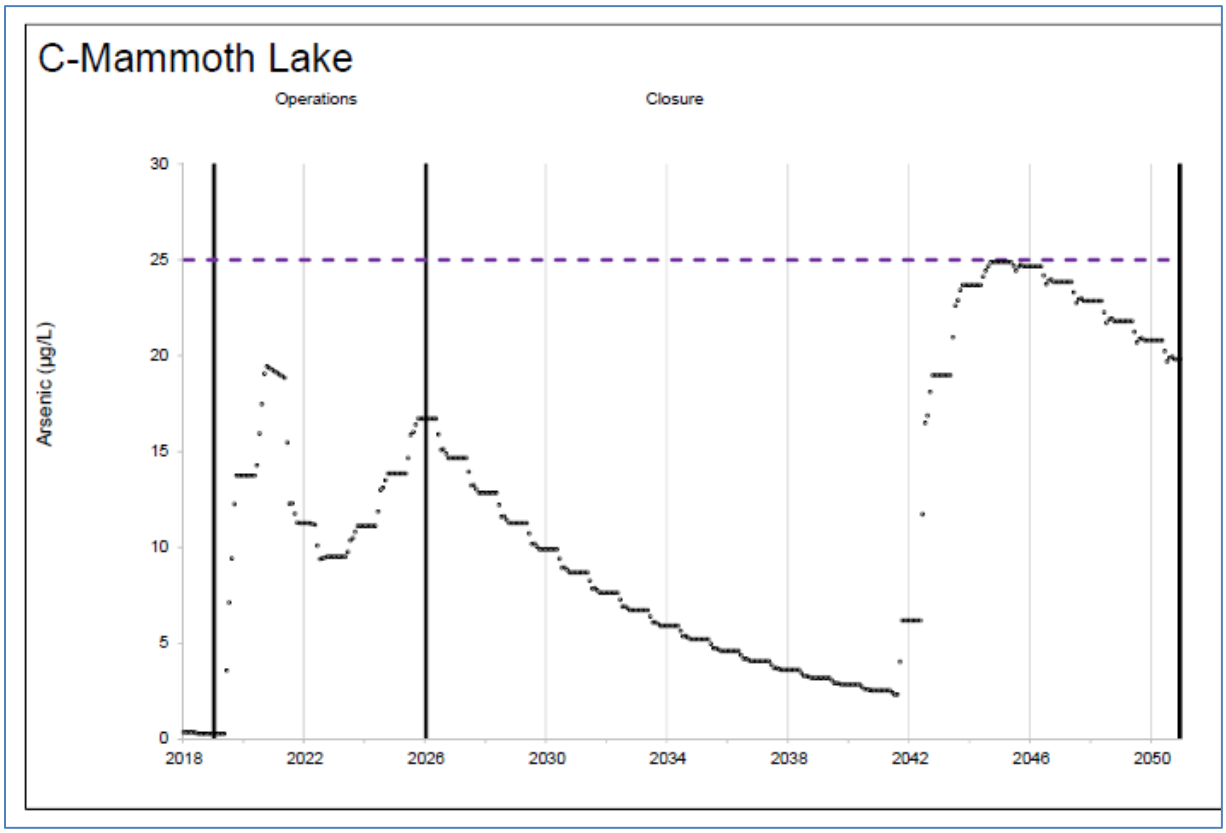


Information Request Number	**CIRNAC IR#: 2**
To	Proponent – Agnico Eagle
Subject	Effluent Mixing Zone Delineation and Impact Characterization
Reference(s)	FEIS Vol. 6, Freshwater Environment APPENDIX 6-H Addendum Mine Site and Downstream Receiving Water Quality Predictions APPENDIX 6-I Addendum Water Quality Prediction Summary
Issue/Concern	The water quality predictions presented by AEM indicate that some parameters will approach their respective environmental quality criteria (EQC) in the receiving environment. For example, Figure 6-I-2 from Appendix 6-I (reproduced below) indicates that arsenic concentrations in Mammoth Lake will be roughly equivalent to the Site-Specific Water Quality Objective (SSWQO) during the closure phase. The following statement from Appendix 6-H is relevant when interpreting the results presented in the figure (emphasis added): *Results presented for the receiving environment and downstream lakes assume fully mixed conditions where the effluent and downstream lake overflows are conservatively assumed to be mixed instantaneously. In reality, constituent transport and mixing will occur spatially and over time.* We do not agree with AEM's statement that this is a conservative approach. To the contrary, the assumption that discharges to surface water receivers will be instantaneously and fully mixed will result in an under-prediction of potential adverse environmental consequences. While the modelled results predict the average contaminant concentrations within the surface water receivers, they fail to account for the spatial variability that will inevitably occur under field conditions. Based on the average water quality predictions noted above, we would expect that arsenic concentrations at some locations in Mammoth Lake will be elevated above the SSWQO (e.g., in the vicinity of the discharge point from Whale Tail Lake). AEM's submission does not provide clarity on the spatial extent of these elevated arsenic concentrations. Specifically, the FEIS for the Expansion Project does not include any mixing studies to demonstrate that discharges to surface water receivers will remain below applicable EQC at all locations. Furthermore, an assessment of potential ecological impacts associated with the exceedances has not been provided. While AEM has indicated that the water quality criteria for the Approved Project would also be applied to the Expansion Project, there is a lack of clarity regarding where those criteria would be applied. For example, it is not clear whether SSWQO would be achieved at all locations within receivers or only on average. Ambiguity regarding the size of the post-closure mixing zone contributes to this uncertainty. The deficiencies noted above make it difficult to assess the physical extent, nature and significance of potential adverse impacts in areas that have water quality concentrations above the proposed criteria.

Information Request	CIRNAC recommends that AEM clearly indicate the spatial extent within all surface water receivers in which concentrations of potential contaminants may exceed the SSWQO or other applicable criteria. The evaluation should identify and characterize potential ecological impacts in areas where the proposed water quality criteria may be exceeded. Using the findings of the assessment noted above, CIRNAC recommends that AEM clearly indicate the monitoring and compliance points that will be used to assess performance against the SSWQO.

Note: The following figure is provided to support the discussion presented in CIRNAC Information Request #2.

Figure 6-I-2 from Appendix 6-I of the FEIS for the Expansion Project



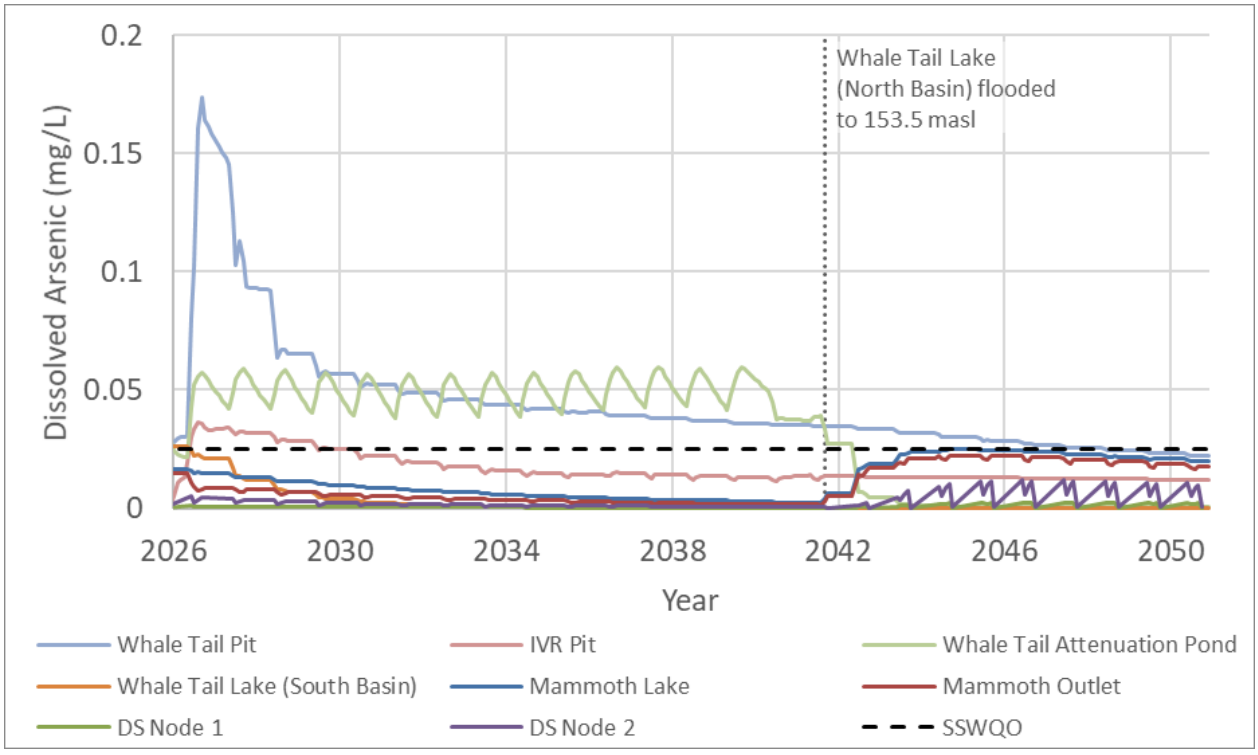
Information Request Number	**CIRNAC IR#: 3**
To	Proponent – Agnico Eagle
Subject	Water Quality Prediction Margin of Error Relative to Environmental Quality Criteria
Reference(s)	FEIS Vol. 6, Freshwater Environment APPENDIX 6-H Addendum Mine Site and Downstream Receiving Water Quality Predictions APPENDIX 6-I Addendum Water Quality Prediction Summary
Issue/Concern	Figure 11 from Appendix 6-H (reproduced below) summarizes the predicted dissolved arsenic concentrations in surface water receivers. Based on the results presented in the figure, we note the following: 1. Arsenic concentrations in Whale Tail Lake south are predicted to exceed the SSWQO during the operational phase, despite the fact that the water body will continue to serve as fish habitat. AEM has not provided a description of anticipated ecological impacts associated with the exceedance. 2. Arsenic concentrations in the Whale Tail Pit are predicted to remain above the SSWQO until 2051. Based on the slow rate at which arsenic concentrations decline prior to that date, we assume that there is a high degree of uncertainty regarding when compliance will be achieved. For example, higher than anticipated arsenic loadings could delay the compliance date by multiple years. 3. Average arsenic concentrations in Mammoth Lake are predicted to remain slightly below the SSWQO for an extended period.[1] Each of these points demonstrates there is limited "margin of error" between the modelled arsenic concentrations and levels at which impacts may occur (i.e., the SSWQO). To address the elevated results, AEM has indicated that a number of conservative assumptions were incorporated into the modelling. For example, AEM states that the modelling conservatively included seepage from the Whale Tail and IVR Waste Rock Storage Facilities (WRSF), despite the fact that similar seepage has not been observed at Meadowbank. As described further in IR #4, the Meadowbank WRSF may produce seepage in the future when field capacity is reached and, as such, CIRNAC does not consider the potential for seepage from the Whale Tail Project to be a conservative assumption. Further, there are instances where AEM's modelling has excluded potentially significant source terms. Most notably, the modelling is based on the optimistic assumption that WRSF covers will be constructed exclusively of "clean" material. This results in a reduction of the modelling conservatism. When evaluating the limited margin of error in the water quality modelling results noted above, it should be emphasized that actual results can vary significantly from predictions. The following statement in Appendix 6-H indicates AEM is fully aware of

[1] For reference, Appendix 6-H states: "*Mammoth Lake and downstream water qualities are fully recovered by post-closure, with no long-term effects to water quality*." As indicated in Figure 11 above, this is not accurate; Mammoth Lake does not return to baseline and therefore will not be "fully recovered".

	this limitation (emphasis added): *Given the uncertainties associated with the modelling and an average climate year in the water balance, the predicted concentrations are considered to be order-of-magnitude estimates.* In summary, based on the information presented to date and the inherent uncertainty associated with environmental modelling, there is insufficient margin of error between the water quality predictions and relevant impact thresholds (e.g., SSWQO). While AEM has stressed that this is attributable to the conservatism of their analyses, CIRNAC is of the opinion that further evidence is required to justify this conclusion.
Information Request	CIRNAC recommends that AEM perform quantitative sensitivity analyses of their water quality modelling. The analyses should systematically quantify potential variability in all major source terms and associated pathways (e.g., elevated arsenic seepage from pit walls, WRSF and mine areas). CIRNAC acknowledges that some sensitivity analyses have already been performed (e.g., variable hydraulic conductivities) but a more comprehensive analysis of all variables is justified. The additional information is necessary to verify the proponent's conclusion that their modelling results are highly conservative and that they likely over-predict any potential impacts.

Note: The following figure is provided to support the discussion presented in CIRNAC Information Request #3.

Figure 11 from Appendix 6-H of the FEIS for the Expansion Project



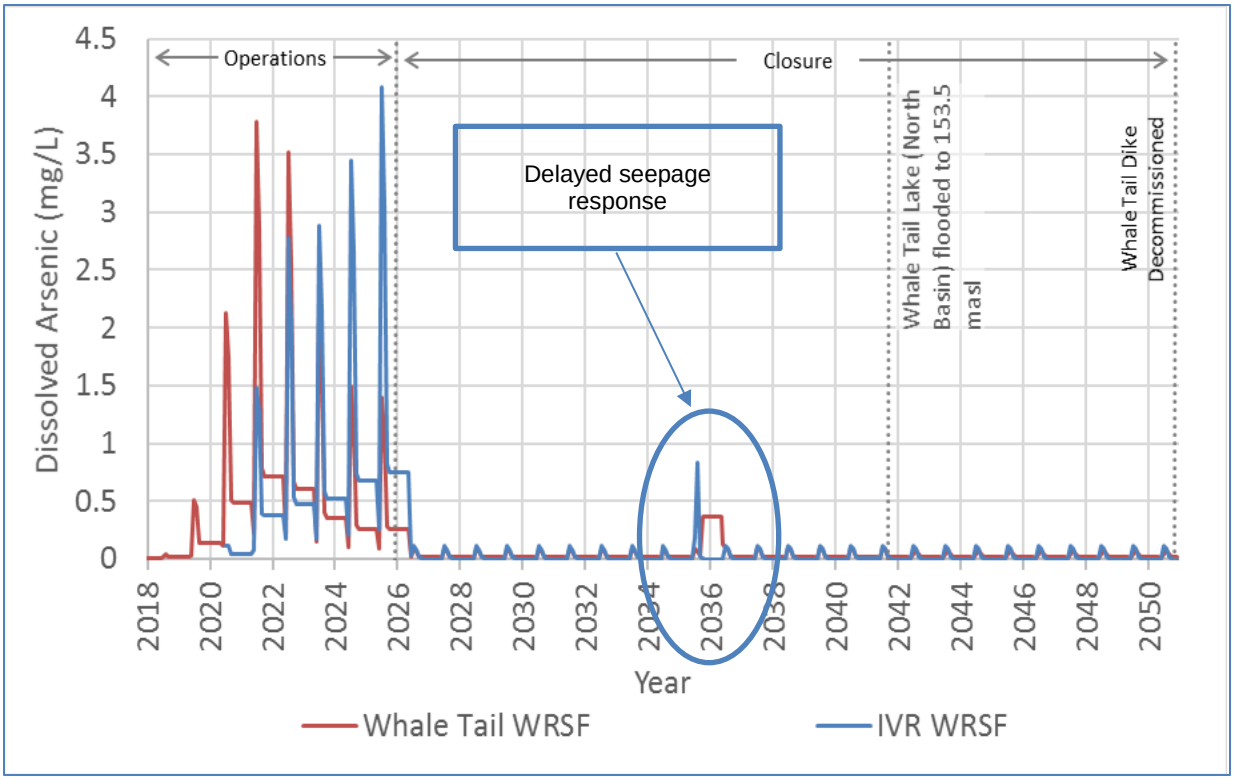
Information Request Number	**CIRNAC IR#: 4**
To	Proponent – Agnico Eagle
Subject	Contamination of Waste Rock Covers and Other Mine Infrastructure by Waste Rock with Elevated ARD/ML Potential
Reference(s)	APPENDIX 8-A.1: Whale Tail Pit –Waste Rock Management Plan APPENDIX 6-H Addendum Mine Site and Downstream Receiving Water Quality Predictions
Issue/Concern	Similar to the Approved Project, the majority of waste rock associated with the Expansion Project will be deposited in Waste Rock Storage Facilities (WRSFs) that are predicted to remain frozen year-round. As a result, the permanently frozen rock is anticipated to be a negligible source of arsenic seepage during the post-closure phase. However, the active zone of the WRSFs will be an ongoing source of arsenic seepage and loadings to the downstream receiving environment. The extent to which this occurs will depend on the geochemical properties of the material used to construct the WRSF covers. AEM states that the WRSF covers will be constructed exclusively of "clean" waste rock (i.e., rock with low ARD/ML potential). They note that this position is supported by: a) the company's rigorous waste rock management practices; and b) observations from the Meadowbank Mine. The following summaries present an overview of CIRNAC's position and concern on these topics. <u>Waste Rock Management Practices</u> While CIRNAC agrees that AEM's waste rock management approaches are generally consistent with standard industry practices and that they should be effective in <u>reducing</u> the extent and probability of cover contamination, the department does not support the conclusion that such contamination can be fully eliminated. Within the context of an operating mine, many factors are likely to result in some degree of cover contamination, including but not limited to: ineffective geochemical characterization; physical mixing of waste types during extraction, transport, storage and cover construction; and human error (e.g., placing waste rock in the wrong dump). All of these factors are known to have occurred at other mines, some of which possessed robust waste rock management practices. Within this context, it is overly-optimistic to assume that the WRSF covers will be constructed exclusively of clean waste rock. CIRNAC identified similar concerns during the environment assessment and regulatory processes for the Approved Project. In response to those concerns, AEM conducted additional modelling of WRSF seepage with varying levels of cover contamination. The additional modelling clearly demonstrated that low levels of cover contamination are likely to result in WRSF seepage that has highly elevated arsenic concentrations. CIRNAC considers this to be an important finding that warrants serious consideration. However, AEM has not incorporated the potential impacts of cover contamination into their modelling of the Expansion Project. Further, based on the documentation reviewed to date, it appears AEM has not evaluated the potential impacts associated with similar contamination of construction materials for mine infrastructure such as roads and lay down areas. When considering the implications of such contamination, CIRNAC draws attention to the fact that the Expansion Project has limited "margin of error" before arsenic concentrations will exceed applicable criteria (as described in IR #3). As a

	consequence, there is a potential that very low levels of contamination would result in unacceptable impacts. In addition, the Expansion Project involves waste rock lithologies that have elevated ARD/ML potential relative to the Approved Project.[2] Therefore any cover contamination that does occur, may have a greater negative impact on water quality than for the Approved Project. Collectively, these considerations heighten the need to assess the potential impacts of contamination of covers and other mine infrastructure by waste rock with elevated ARD/ML potential. <u>WRSF Seepage from the Meadowbank Mine</u> In their evaluation of potential risks associated with the Whale Tail WRSFs, AEM stated that the modelling likely over-predicts the impact of WRSF seepage on surface water quality. A key line of evidence in this conclusion is that the Meadowbank WRSF is not generating seepage. For example, Appendix 6-H states: "*Site data from Meadowbank shows that there is very little to no runoff or seepage from the waste rock piles, and it is likely to be the case at the Extension Project as well*." CIRNAC does not support AEM's conclusion because it fails to consider the delayed seepage response attributable to the field capacity of the WRSFs. To illustrate, Figure 5 from Appendix 6-H (reproduced below) indicates that the Whale Tail and IVR WRSFs only generate a spike of arsenic concentrations when the field capacity of the piles is reached approximately 10 years after closure (i.e., in 2036). Prior to that date, the piles will continue to absorb moisture and are expected to generate negligible seepage. CIRNAC expects that the Meadowbank WRSF is experiencing a similar delay and, as such, there is a potential that seepage rates and loadings will increase significantly once the field capacity has been reached. The department therefore cautions against using the current performance of the Meadowbank WRSF as an indication of long-term seepage from the Whale Tail waste rock deposits.
Information Request	CIRNAC recommends that the following additional information be provided prior to the Technical Review phase. The information is necessary to determine potential long-term environmental impacts associated with the proposed project. 4a) AEM should conduct a sensitivity analysis to assess the water quality impacts associated with 1% contamination of WRSF covers with ARD/ML material (e.g., komatiite and iron formations). The sensitivity analysis should also evaluate the impacts associated with similar contamination of other mine infrastructure such as mine roads, lay down areas, etc. 4b) If AEM uses the Meadowbank WRSF seepage results as evidence for the current application, AEM should specify the date at which the facility is predicted to reach its field capacity.

Note: The following figure is provided to support the discussion presented in CIRNAC Information Request #4.

[2] The Komatiite (0b) unit in the IVR Pit is approximately 1.75 times more leachable than that in the Whale Tail Pit

Figure 5 from Appendix 6-H of the FEIS for the Expansion Project



Information Request Number	**CIRNAC IR#: 5**
To	Proponent – Agnico Eagle
Subject	Confirmation of Requirements and Impacts for New Water Discharge and Intake Points
Reference(s)	FEIS FEIS Vol. 6, Freshwater Environment APPENDIX 6-H Addendum Mine Site and Downstream Receiving Water Quality Predictions APPENDIX 6-I Addendum Water Quality Prediction Summary
Issue/Concern	<u>New Discharge Point to the South Basin of Whale Tail Lake</u> The FEIS states that AEM will require an additional discharge point into the South Basin of Whale Tail Lake. As shown in the following figure (Fig. 6-I-2 from Appendix 6-I, reproduced below), arsenic concentrations are predicted to rapidly increase until they exceed the SSWQO by the end of the brief operations phase. Based on this trend, it appears there is no "margin of error" for discharges to the basin. Specifically, higher than anticipated loading rates and/or a longer operations phase could result in arsenic concentrations that are well above the SSWQO. The FEIS does not present the rationale for discharging to this fish-bearing lake and alternative discharge scenarios are not evaluated. For example, the document does not describe why the approved discharge location in Mammoth Lake is insufficient to meet the needs of the Expansion Project. Similarly, the FEIS does not identify alternative approaches to ensure arsenic concentrations in Whale Tail Lake are kept as low as reasonably achievable (e.g., through improved effluent quality). <u>Modified Mammoth Lake Discharges</u> Throughout the environmental assessment and regulatory processes for the Approved Project there was an evolution in the proposed location and configuration of effluent discharges to Mammoth Lake. During a presentation to CIRNAC on July 26th, 2018 to discuss the (now) Approved Project, AEM indicated two diffusers would be required to meet the applicable water quality criteria. The locations of the two diffusers were identified in a figure which is reproduced below. With regard to the Expansion Project, the FEIS now indicates that only one diffuser is required in Mammoth Lake and that it will be in a different location than noted above. The location of the revised discharge location for Mammoth Lake is shown in Figure 1.2-1 of the Expansion Project FEIS (reproduced below). No information is provided to explain the revised diffuser requirements for Mammoth Lake. <u>Alternative Discharges</u> The FEIS states: "*Any water requiring treatment will be pumped to the water treatment plant(s) prior to discharge through the diffuser in Mammoth Lake or through a diffuser in Whale Tail Lake (South Basin) <u>or other alternatives</u>*.". It also indicates: "*Agnico Eagle may require an additional discharge point(s)*.". However, the FEIS provides no information on alternative discharge locations. On this basis, CIRNAC assumes AEM is not proposing any other discharge locations with the current application.

	<u>Waste Stream Mixing</u> Appendix 6-H for the Expansion Project indicates that effluent from the water treatment plant will be mixed with effluent from the sewage treatment plant to lower the concentration of most constituents. Based on CIRNAC's understanding, this is not within the scope of the Approved Project. The FEIS package does not describe why the change is required, nor does it explain the environmental implications of the change. <u>Mammoth Lake Emulsion Plant Intake</u> The FEIS indicates the Expansion Project will require a new water intake from Mammoth Lake to supply an Emulsion Plant. While the volumetric requirements of this intake are minor, no information is presented to justify why the new facility is required (i.e., as opposed to using water from the Nemo Lake intake).
Information Request	CIRNAC recommends that the following additional information be provided prior to the Technical Review phase. The information is necessary to understand the scope of the proposed project, why any changes are justified and to assess any incremental environmental impacts. 5a) AEM should justify all proposed changes to water intake/discharge infrastructure and operational practices (e.g., effluent mixing), emphasizing why the requirements have changed since the Approved Project. 5b) AEM should explicitly identify and describe the environmental impacts associated with any incremental chemical loadings caused by the Expansion Project. In addition, AEM should specify the water quality implications to surface water receivers if arsenic loading rates are higher than currently predicted and/or the duration of discharge is longer than planned. In situations where there are potential exceedances of applicable water quality criteria, potential mitigation measures should be evaluated (e.g., more stringent effluent criteria to reduce the probability and severity of impacts to surface water receivers). 5c) AEM should confirm it is not proposing alternate water intake or discharges, other than those described in detail and explicitly assessed in the FEIS.

Note: The following three figures are provided to support the discussion presented in CIRNAC Information Request #5.

Figure 6-I-2 from Appendix 6-I of the FEIS for the Expansion Project

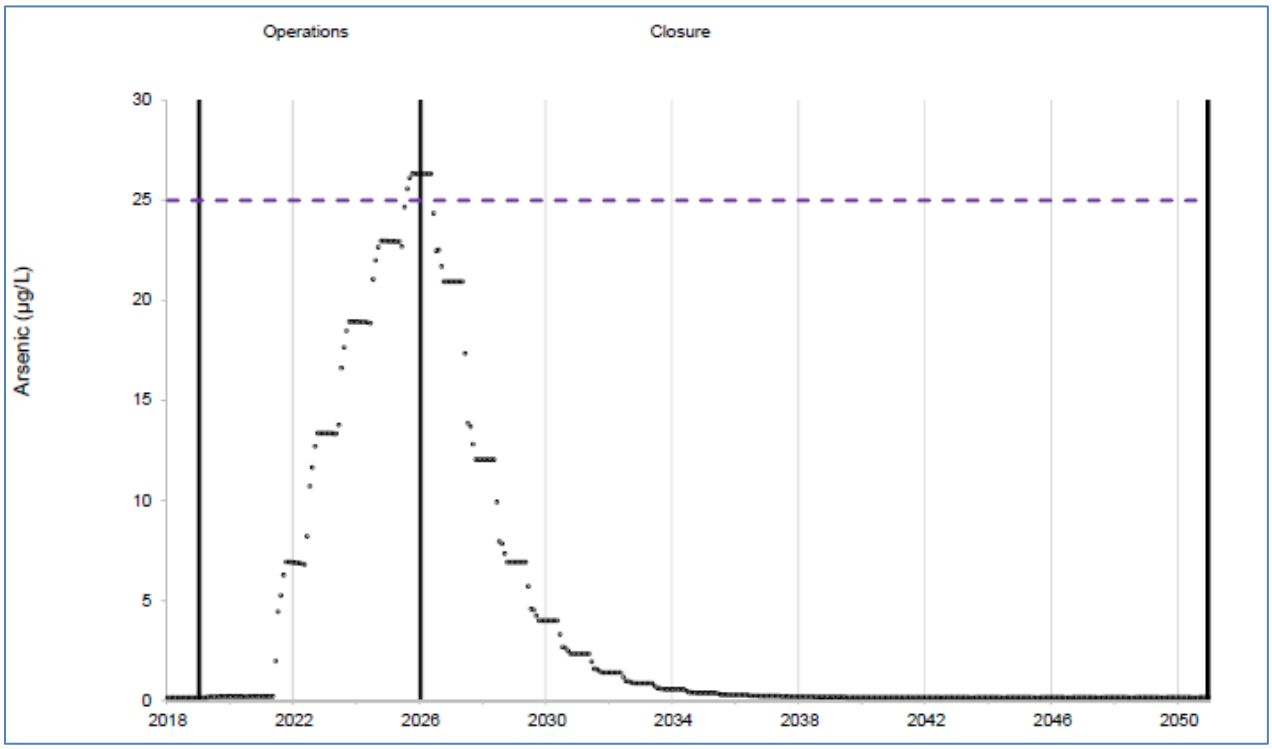


Figure provided by AEM to CIRNAC on July 26th, 2018 identifying two effluent diffusers in Mammoth Lake required by the Approved Project

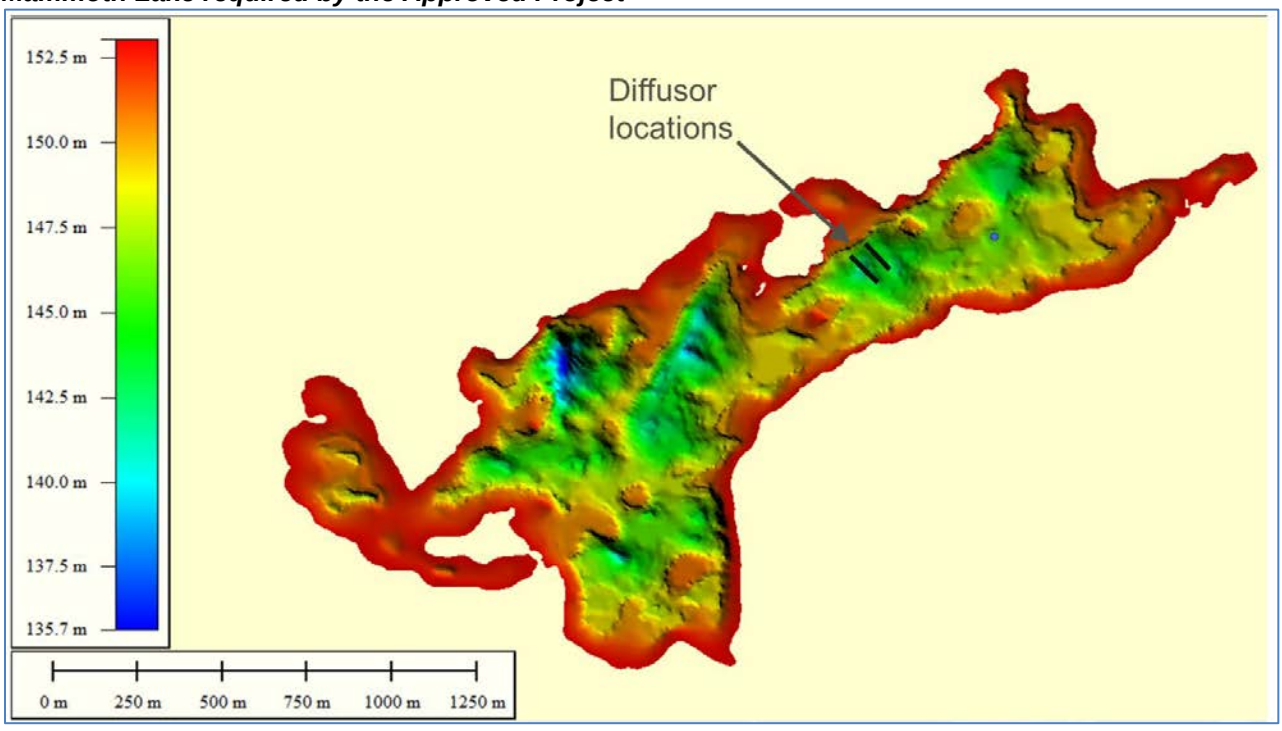
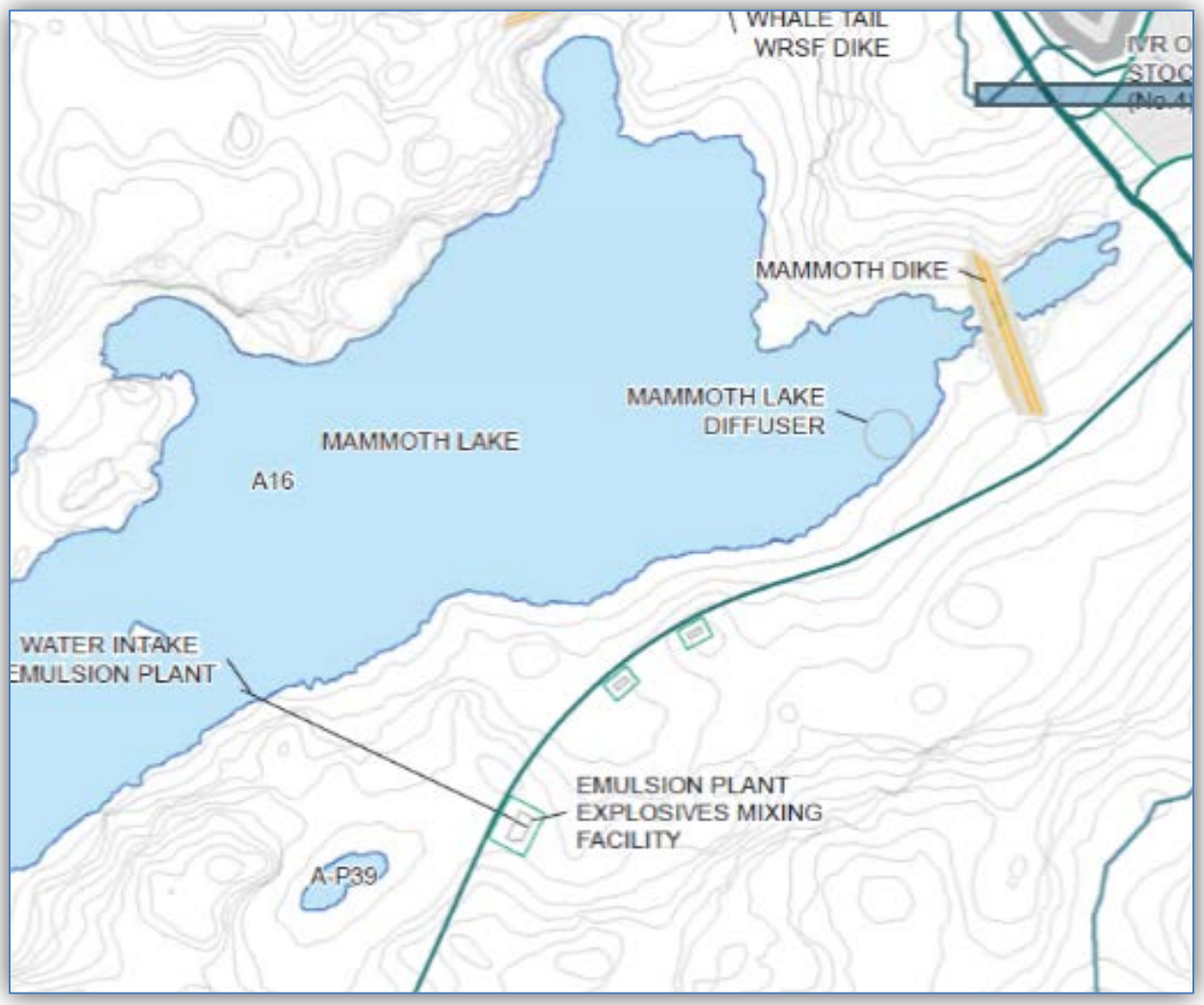


Figure 1.2-1 of the Expansion Project FEIS identifying only one diffuser in Mammoth Lake at a different location



Information Request Number	**CIRNAC IR#: 6**
To	Proponent – Agnico Eagle
Subject	Pre-Development Groundwater Characterization
Reference(s)	FEIS FEIS Vol. 6, Freshwater Environment APPENDIX 6-B Addendum Hydrogeological Assessment and Modelling APPENDIX 6-H Addendum Mine Site and Downstream Receiving Water Quality Predictions
Issue/Concern	During the environmental assessment and regulatory processes for the Approved Project CIRNAC expressed concerns that insufficient information was available regarding the groundwater regime of the Amaruq site. The lack of information created uncertainty when evaluating the potential impacts of the project. While some new information has been collected in the intervening period, there continue to be gaps in the knowledge base for both the Approved and Expansion Projects. In broad terms, the information required to make fully informed decisions regarding groundwater interactions can be grouped into the following categories which are described below: groundwater quality, hydraulic conductivity and hydraulic gradients. <u>Groundwater Quality</u> FEIS Appendix 6-B indicates that efforts to collect samples for the characterization of groundwater quality at the Amaruq property have been unsuccessful. In lieu of site-specific information, AEM has inferred that the groundwater quality is similar to that of the Meadowbank Mine which is more than 60 km away. While there are similarities between the geology of the two sites, there are clear differences between the geochemical properties of some rock lithologies (e.g., several Amaruq rock types tend to leach arsenic at significantly elevated rates when compared to Meadowbank). CIRNAC is of the view that these differences could affect groundwater quality and, by extension, that water quality predictions for the Approved and Expansion Projects may lack an appropriate level of conservatism. <u>Hydraulic Conductivity</u> In the Approved Project, limited hydraulic conductivity test results (6 in unfrozen rock) were available, and therefore, the presence of a zone of enhanced permeability (EPZ) was assumed in the predictive analyses to be conservative. For the Expansion Project analysis, an additional 49 test results were available. The larger dataset indicates that the near surface bedrock is significantly more permeable than previously identified, indicating that shallow groundwater flows are likely to be greater than previously assumed. This significant difference emphasizes the need to incorporate a high degree of conservatism when assumptions are used to address information gaps. Based on the additional tests noted above, AEM concluded that the hydraulic conductivity measurements do not indicate that the permeability of the structures intersected to date are higher than the surrounding competent bedrock. On that basis, AEM did not include an EPZ in its assessment of the Expansion Project. However, we note that AEM has identified a 30 metre interval in deeper bedrock with hydraulic conductivity that is significantly elevated relative to the surrounding

	rock mass. AEM speculates that the higher hydraulic conductivity is likely attributed to an interval with localized multiple joint sets with carbonate infilling. The presence of this interval demonstrates that other high permeability zones may exist in areas that have yet to be characterized. While CIRNAC acknowledges that the new hydraulic conductivity dataset provides useful information, there continues to be insufficient information to conclude there are no enhanced permeability zones in the vicinity of the mine. On this basis, the elimination of an EPZ from the assessment of the Expansion Project lacks the conservatism that is typically incorporated into Environmental Assessment Processes. Further, in reviewing modelling for the Expansion Project (e.g., Appendix 6-B), CIRNAC notes that AEM developed an "EA Scenario" based on hydraulic conductivities that are more conservative than the geometric mean. However, AEM does not present the rationale for selection of the hydraulic conductivity values that were incorporated into the EA Scenario (e.g., 95th percentile conductivity). As a result, CIRNAC is unable to confirm whether AEM's modelling is appropriately conservative. <u>Hydraulic Gradients</u> AEM has installed multiple groundwater wells to characterize the hydrogeological regime of the Amaruq site. Unfortunately, a variety of factors have prevented AEM from collecting hydrostatic data from most of the wells to determine the hydraulic gradients of the area. In the absence of well data, AEM has developed a conceptual groundwater flow model that assumes hydraulic gradients can be inferred from local lake levels. Within Whale Tail Lake, AEM predicts that gradients will range from slightly downward in the north basin (i.e., recharge) to upward in the south basin (i.e., discharge). The overall regional trend in groundwater flow is inferred to be towards the northwest. While CIRNAC concurs with the general logic of AEM's conceptual model at a regional level, there is insufficient information to confirm the model also applies at the local level. To illustrate, Nemo Lake is elevated relative to Whale Tail Lake, suggesting that groundwater flow between the two lakes would tend to move from north to south (i.e., contrary to the northwesterly direction predicted by AEM). In the absence of groundwater monitoring data to confirm hydraulic gradients, CIRNAC insists that modelling be based on appropriately conservative assumptions. In the case of the Approved and Expansion Projects, this would require sensitivity analyses to evaluate the implications of hydraulic gradients with different magnitudes and directions.

Information Request	CIRNAC recommends that AEM provide a consolidated summary indicating the information gaps and uncertainties associated with the hydrogeological regime.[3] At minimum, the summary should identify gaps and uncertainties related to the following three variables: groundwater quality, hydraulic conductivity and hydraulic gradients. Using sensitivity analyses, the summary should quantitatively demonstrate that an appropriate level of conservatism has been used in the FEIS.[4]

Information Request Number	**CIRNAC IR#: 7**
To	Proponent – Agnico Eagle
Subject	Justification of Transportation Requirements and Consideration of Alternatives
Reference(s)	FEIS APPENDIX 8-C.1 Whale Tail Pit Haul Road Management Plan
Issue/Concern	Road Widening Under the Expansion Project, AEM proposes to increase the width of the haul road between the Meadowbank Mine and the Whale Tail Project site from 9.5 metres to 15 (i.e., > 50% increase). The company reports that the increased width was deemed necessary following field trials conducted in 2018 to evaluate optimum safety, efficiency and production of hauling along the corridor (with safety being the primary motivation). Based on those trials, AEM concluded the additional width is needed to allow long haul trucks to pass each other safely. In evaluating this proposed change, CIRNAC notes the following: a. FEIS Appendix 8-C.1 of the Approved Project states that AEM "….*plans to expand the road to be 9.5 m in width, with a bypass bay every 400 m*." The bypasses were reportedly sufficient to allow for effective and safe transportation along the corridor for the Approved Project; b. The FEIS for the Expansion Project indicates there will be no increases of traffic volume on the road. Based on the above, it is unclear why there is now a requirement to widen the road to ensure safety. Further widening of the road has the potential to result in incremental environmental effects (increased borrow requirements, construction impacts, etc.). Ore Processing at Meadowbank

[3] CIRNAC is aware that some (but not all) of the requested information is presented in different supporting documents to the FEIS. However, for the public record, clarity and completeness, we recommend that the information be consolidated into a single technical summary.
[4] Potential examples of such analyses include modelling the effects of: a) groundwater quality with arsenic concentrations that are at least double those currently assumed; b) hydraulic conductivities that are at least one order of magnitude greater than assumed; c) switching the direction and doubling the magnitude of the assumed hydraulic gradient.

	The Approved and Expansion Projects both involve transporting ore 72 km to the Meadowbank Mine for processing and tailings disposal. At the same time, AEM has repeatedly stated that the Amaruq deposit will be the centre piece of its long-term operations in Nunavut. This implies the company intends to continue developing ore bodies in the vicinity of the Whale Tail site. If this were to occur, construction and operation of processing facilities at the Amaruq property would eliminate the need for ongoing ore transportation. CIRNAC assumes this would help to significantly reduce environmental impacts that are caused by AEM's operations (e.g., reduced disturbance of caribou habitat and much lower greenhouse gas emissions). It is unclear whether AEM considered this alternative when developing its plans for the Expansion Project.
Information Request	CIRNAC recommends that the following additional information be provided prior to the Technical Review phase. The information is necessary to understand the scope of the proposed project, why any changes are justified and to determine the extent to which alternative project means were considered. 7a) CIRNAC recommends that AEM provide further justification for the proposed widening of the haul road. The justification should clarify why the approved 9.5 m road with bypasses every 400 m would not be safe. 7b) CIRNAC requests that AEM indicate whether it has considered the merits of relocating ore processing operations from Meadowbank to the Amaruq site. If this alternative has been considered, CIRNAC recommends that AEM provide a synopsis of the assessment, with a particular emphasis on any environmental impacts/benefits that would be associated with the move (e.g., reduced caribou disturbance and greenhouse gas emissions).

Information Request Number	**CIRNAC IR#: 8**
To	Proponent – Agnico Eagle
Subject	Approaches Used to Assess and Communicate Human Health and Ecological Risks Associated with the Proposed Project
Reference(s)	FEIS APPENDIX 8-B Addendum Human Health and Ecological Risk Assessment Summary
Issue/Concern	AEM conducted a Human Health and Ecological Risk Assessment (HHERA), a summary of which is presented in Appendix 8-B. Following is a synopsis of AEM's findings from the HHERA and CIRNAC's observations of those findings. <u>Risks to People – Water Use Pathway:</u> With respect to the Approved Project, the HHERA calculations determined that changes to water quality will not result in elevated risks for people (due to dermal contact and consumption). However, for the Expansion Project, the HHERA predicts that arsenic concentrations in local lakes will reach levels that could cause carcinogenic risks for people, particularly during the post-closure phase. <u>Risks to People – Fish Consumption Pathway:</u> Similar to the water pathway above, risks to human health were not predicted due to fish ingestion for the Approved Project. In the case of the Expansion Project, the HHERA predicts that consumption of fish caught from local lakes could result in carcinogenic risks for people, particularly during the post-closure phase. <u>Risks to Aquatic Life</u> For the Expansion Project, potential risks to aquatic life were identified in Whale Tail Pit due to arsenic released early during the post-closure phase. <u>AEM's Overall Interpretation of the HHERA Findings</u> As noted above, the HHERA calculations predicted that the Expansion Project will result in carcinogenic risks to people (from water and fish consumption) and risks for aquatic life in the flooded Whale Tail Pit. Notwithstanding the elevated risks that were calculated by the HHERA, AEM also concluded: *The significance of the Expansion Project's residual effects is expected to be consistent with those predicted for the Approved Project (i.e., not significant). The assessment of the Expansion Project found that overall risks to human health, wildlife, and aquatic life due to predicted changes to air quality and water quality were negligible. No additional mitigation or monitoring commitments are required based upon the effects assessment carried out for the HHERA.* In summary, AEM concluded that the elevated risks predicted by the HHERA were negligible and not significant due to the overly-conservative assumptions used in the assessment. Specifically, AEM stated that the conservative nature of the water quality model, the toxicity information used in the assessment, and the conservative

	exposure scenario which assumed people would use the site for two weeks each year resulted in an over-prediction of site risks. <u>CIRNAC Preliminary Interpretation</u> CIRNAC has not yet reviewed the full HHERA upon which Appendix 8-B is based. However, we offer the following preliminary observations regarding the assumptions that AEM indicates skewed the findings of the HHERA: a. Water Quality Modelling – As indicated in other CIRNAC IRs, there is currently insufficient information to determine whether water quality modelling conducted in support of the Expansion Project is overly-conservative. b. Toxicity Information – CIRNAC has not reviewed the toxicity information used by AEM in the HHERA but we assume it is consistent with industry best practice (i.e., it is appropriately conservative to address uncertainty). c. Exposure Scenario – The HHERA assumed people would use the site for two weeks per year. This assumption is generally consistent with risk assessments conducted for mines and contaminated sites in northern/remote locations. The duration of the exposure scenarios is typically determined through consultation with individuals that commonly use the land. Based on the above, CIRNAC does not support AEM's conclusion that the findings of the HHERA are over-conservative. Further, CIRNAC is of the view that there is currently insufficient information to conclude that no additional mitigation or monitoring commitments are required to address the risks to people and aquatic life, as predicted by the HHERA. Such risks warrant further consideration before concluding they are "negligible and not significant".
Information Request	CIRNAC recommends that the following additional information be provided prior to the Technical Review phase. The information is necessary to understand the predicted incremental risks to humans and the environment that could be caused by the proposed project. We also want to verify that potentially impacted parties have been fully informed of those incremental risks. 8a) CIRNAC recommends that the full HHERA be provided for review prior to the Technical Review Period. 8b) CIRNAC recommends that AEM specify which project changes are primarily attributable for the incremental risks calculated for the Expansion Project (i.e., as compared to the Approved Project). 8c) CIRNAC recommends that AEM confirm whether local residents were consulted when determining which land use scenarios should be used in the HHERA. 8d) CIRNAC recommends that AEM confirm whether community consultation regarding the Expansion Project has included summaries of the HHERA findings. Specifically, please confirm that land users were informed the HHERA predicts the Expansion Project will result in elevated risks to people and aquatic life.

Information Request Number	**CIRNAC IR#: 9**
To	Proponent – Agnico Eagle
Subject	Revised Management Plans
Reference(s)	FEIS and all associated Management Plans
Issue/Concern	During the water licensing phase for the Approved Project, CIRNAC conducted detailed reviews of selected Management Plans and submitted detailed review comments and recommendations to the Nunavut Water Board. Those plans included: 1. CREMP Addendum Mercury Monitoring Plan; 2. Haul Road Management Plan; 3. Water Quality and Flow Monitoring Plan; 4. Water Management Plan; 5. Waste Rock Management Plan; 6. Operation ARD-ML Sampling and Testing Plan; and 7. Groundwater Monitoring Plan With regard to the Expansion Project, AEM submitted a revised set of Management Plans to NIRB in support of the current environmental assessment process. In addition to modifications required to address the Expansion Project, AEM indicated that CIRNAC's prior input was also incorporated into the revised plans. However, AEM has not clarified specifically how CIRNAC's comments and recommendations were addressed. As a result, CIRNAC has not been able to verify whether its prior concerns have been addressed. This information is necessary to confirm the adequacy of the revised Management Plans to mitigate potential environmental impacts associated with the Expansion Project.
Information Request	CIRNAC recommends that AEM provide a clear summary of if and how CIRNAC's input on prior versions of the Management Plans for the Approved Project have been incorporated into the revised submissions. A separate response should be provided for each of CIRNAC's comments and recommendations.