Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

Information Requests for the Technical Review of Agnico Eagle Mines Ltd.'s Whale Tail Pit Project

Indigenous and Northern Affairs Canada

Submission to the Nunavut Impact Review Board

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Canada

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1.0 Water Quality

Information Request Number	**INAC-IR#: 1**
To	Proponent – Agnico Eagle
Subject	**Seepage Quality**
Reference(s)	APPENDIX 5-E Geochemical Baseline
Issue/Concern	The report suggests that if the levels of arsenic in the humidity cells or shake flask tests are below the discharge criteria then they are not of concern. However, the lab tests indicate that arsenic levels in waste pile runoff may be a material issue in both the short and long-term. For example, in the shake flask extractions, a large proportion of total arsenic was leached in the 24-hour tests (0.9% in the ultramafic rock and 1.9 % in the iron formation). Furthermore, based on page 45 of Appendix 5-E, it is clear that metal concentrations increased at higher solid:liquid ratios. This correlation demonstrates that the observed concentrations are not solubility controlled. It also raises the potential that the Waste Rock Storage Facility (WRSF), which has a high solid:liquid ratio, will result in elevated seepage concentrations and rates. The documentation accurately concludes that the exceedances noted in static and kinetic leaching tests do not necessarily suggest that drainage from the waste rock will be similar. This is primarily due to the fact that actual leaching conditions will be less aggressive than experienced in laboratory tests. Regardless, INAC agrees with the proponent that arsenic is likely to be released from waste rock upon contact with water and that this drainage should be captured and monitored before discharge to the receiving environment. In summary, lab testing suggests that the arsenic concentration in runoff could be much higher than the discharge criteria. In contrast, actual field conditions could result in arsenic concentrations being lower than those predicted by the lab tests. However, leach testing does not seem to be representative of conditions in the WRSF. It is unclear how the proponent has accounted for the correlation between solid:liquid ratio and metal concentrations. Additional information is therefore required to ascertain potential effluent concentrations from the WRSF. In particular, further details are required regarding leaching rates and the influence of solid:liquid ratios.
Information Request	INAC requests that the Proponent provide the following additional information to assist in determining future effluent quality from the WRSF: a. The percent of the total arsenic in the samples that were leached from the humidity cells and column leach tests. b. Provide data on the arsenic leaching rate (e.g., mg/kg/week). c. A description of the impact of solid:liquid ratios on leaching rates, with an emphasis on ratios that are representative of future conditions in the WRSF.

	d. In Appendix 5-E, Table 9, is the NP total NP of CaNP? e. In Appendix 5-E, Figure 2, the grain sizes of several rock pieces appear to be greater than 9.5 mm. What is meant by <9.5 mm? f. Some of the high sulphur greywacke (chert) has minimal NP and may acidify rapidly even in the Arctic environment. Other than placement below the proposed rock cover, are there any additional plans for the selective placement or management of this PAG waste rock material?

Information Request Number	**INAC-IR#: 2**
To	Proponent – Agnico Eagle
Subject	**Long-Term Water Quality in the Flooded Pit**
Reference(s)	EIS Vol. 6, Freshwater Environment APPENDIX 6-H Mine Site and Receiving Environment Water Quality Predictions
Issue/Concern	Following closure, there are no predicted exceedances of the Canadian Environmental Quality Guidelines for Aquatic Life (CEQG-AL) criteria or the Site-specific Water Quality Objective (SSWQO) for arsenic in the fully flooded pit lake or the overlying waters within Whale Tail Lake (North Basin). By extension, water within Whale Tail Lake is predicted to be of sufficient quality for overflow to Mammoth Lake. The modelling that was used to reach the conclusions noted above was based on two critical assumptions: 1) there will be no diffusion from the pit wall rock; and 2) that no exchanges will occur between water in the Whale Tail Pit and the overlying water within the North Basin of Whale Tail Lake. With regard to the first assumption, modelling conducted by the Proponent has determined that seepage of leachable arsenic from the pit walls could, under some scenarios, result in arsenic concentrations within the flooded pit and Whale Tail Lake that are above the applicable criterion (see S.5.3.2 of Appendix 6-H). This is identified as a conservative scenario and there is an acknowledgement that further work will be necessary to validate the appropriateness of the original modelling assumption (i.e., no diffusion). Regarding the second assumption, there is a potential that waters within the pit will become meromictic (i.e., chemically stratified), with layers that are mildly anoxic and with elevated levels of arsenic. As a result, future destratification and mixing could result in poor surface water quality. The proponent has not presented a detailed analysis to support the assumption that stable meromixis will be established. Further, the factors that could result in the destratification of the flooded pit have not been assessed in detail. While the current submission includes a variety of important commitments to collect additional information (e.g., seepage monitoring within the pit), a comprehensive and integrated research program to further refine the future water quality predictions within the pit lake has not been presented. Collectively, this information would help to validate the appropriateness of post-closure water quality predictions for Whale Tail Lake and is therefore required for review.
Information Request	INAC requests that the Proponent provide a technical analysis that addresses the following questions:

	a. Is meromixis expected in the pit lake? b. If yes, will the meromixis be stable? What factors could result in future turnover and mixing (high winds, pit wall failure)? c. What additional work will be completed to validate assumptions regarding pit diffusion and meromixis? When will a detailed plan describing this work become available?

Information Request Number	**INAC-IR#: 3**
To	Proponent – Agnico Eagle
Subject	**Mixing Zones and Compliance Points**
Reference(s)	EIS Vol. 6, Freshwater Environment APPENDIX 6-H Mine Site and Receiving Environment Water Quality Predictions
Issue/Concern	Following closure, water from the WRSF pond will drain directly to Mammoth Lake. Table 11 of Appendix 6-H indicates that the average and maximum post-closure concentrations of arsenic in the WRSF pond are predicted to be 0.12 and 0.38 mg/L, respectively (i.e., 4 and 14 times above the SSWQO). As a consequence, it is assumed that arsenic concentrations within Mammoth Lake in the vicinity of the WRSF pond drainage point will be above the SSWQO. The current submission does not identify the spatial extent in which arsenic concentrations within Mammoth Lake will exceed the SSWQO. Furthermore, an assessment of potential ecological impacts associated with the exceedances has not been provided. While the proponent has proposed operational and post-closure water quality criteria that would be applied to the undertaking, in some instances there is a lack of clarity regarding where those criteria would be applied. For example, it isn't clear whether the post closure SSWQO would be achieved at all locations within a receiver or only on average. 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	INAC requests that the Proponent provide: a. An assessment of the spatial extent of areas within Mammoth Lake and other receivers that are predicted to have average or maximum concentrations above the proposed water quality objectives for arsenic and any other contaminants of potential concern. To ensure the full range of potential loading scenarios are considered, the assessment should evaluate a variety of seepage loading rates from the WRSF (e.g., with and without effective seepage mitigation). b. A description of anticipated ecological impacts associated with any areas within Mammoth Lake or other receivers that are predicted to have localized concentrations above the applicable water quality criteria. c. A consolidated list of proposed water quality criteria, associated compliance points (end of pipe, edge of defined mixing zone, etc.) and frequency considerations (mean, max, etc.).

Information Request Number	**INAC-IR#: 4**
To	Proponent – Agnico Eagle
Subject	**Ammonia and Nitrate Discharges**
Reference(s)	EIS Vol. 6, Freshwater Environment APPENDIX 6-H Mine Site and Receiving Environment Water Quality Predictions
Issue/Concern	Elevated levels of ammonia and nitrate are recognized as a common issue at many mines, particularly in northern oligotrophic lakes. Specific data on explosives use was not provided but during the 3 main mining years approximately 17 Mt of rock will be blasted. This is likely to require on the order of 8 to 9 million kg of explosive (@.5 kg/t). Given the annual discharge from the site is low, levels of ammonia and nitrate could be elevated, both during operations and in the flooded pit. It is understood emulsions explosives are proposed and this should minimize losses. The current modelling assumes that the average concentrations of ammonia and nitrate observed in the operating open pits at the Meadowbank site will also occur within the Whale Tail Pit and WRSF. However, as noted by the Proponent, the predicted concentrations of these parameters could differ if the explosives management practices implemented at the Project differ from those at Meadowbank Mine. There is, therefore, value in developing site-specific estimates of ammonia and nitrate concentrations using predicted explosives management practices for the Project. This would serve as a site-specific baseline to assess future changes in explosives management and any associated changes to environmental performance.
Information Request	INAC requests that the Proponent provide the following additional information: a. Estimates of explosive use, projected losses and estimated discharge concentrations for ammonia and nitrate.

Information Request Number	**INAC-IR#: 5**
To	Proponent – Agnico Eagle
Subject	**Post Closure Water Treatment Contingency**
Reference(s)	APPENDIX 8-F Addendum for Closure and Reclamation Plan
Issue/Concern	The need for post-closure water treatment will be determined based on water quality monitoring before the Whale Tail Dike and the Mammoth Dike are to be breached. Prior to back-flooding of the pit, the quality of surface water and any groundwater seepage reporting from the pit walls will be sampled to assess the potential for contamination of the pit water during filling. In addition, the surface water and profiles of the back-flooded area will be sampled. The Closure and Reclamation Plan states that if the results of water quality monitoring indicate that water in the back-flooded area is not suitable for direct discharge, the following alternatives will be considered as contingencies for the treatment of the back-flooded area water: • *in-situ* treatment; and • active treatment through the Water Treatment Plant (WTP) prior to discharge into the receiving environment. At various points throughout the documentation the Proponent identifies loading scenarios that may result in water quality that is not suitable for discharge after flooding (e.g., arsenic seepage from the pit walls). There is not, however, a consolidated review of these scenarios, their likelihood and the associated consequences to the receiving environment. This information would help to inform the likelihood that the contingencies noted above would need to be implemented. Furthermore, conceptual plans and cost estimates for each contingency would provide important insights into the technical viability and financial implications of actions that would need to be taken if site water quality is not amenable to direct discharge after closure.
Information Request	INAC requests that the Proponent provide: a. Descriptions of all loading scenarios that may result in exceedances of the CEQG-AL and/or SSWQO for relevant parameters. b. Descriptions of potential impacts to the downstream receivers and exposed species if contingencies are not implemented. c. Conceptual plans for the implementation of the two proposed water treatment contingencies. d. Indicative cost estimates for the implementation of the two proposed water treatment contingencies (single event and long-term).

2.0 Waste Rock Storage Facility Closure

Information Request Number	**INAC-IR#: 6**
To	Proponent – Agnico Eagle
Subject	**WRSF Permafrost Active Zone**
Reference(s)	EIS Vol. 1, Project Description APPENDIX 8-F Addendum for Closure and Reclamation Plan
Issue/Concern	The current plan is to provide 2-4 m of clean rock cover to assure contaminated rock remains frozen and is not a source of contaminated drainage. Recent work at the Diavik Diamond Mine has indicated that the permafrost active layer within waste rock deposits could be much deeper than originally anticipated. A zone of fine grained till has been proposed to promote the active layer being retained within the cover under current and future potential climate conditions. We appreciate the climate of the Whale Tail site is different from that of the Diavik Diamond Mine. Nonetheless, the experience at that site warrants consideration in the current case. Steady state permafrost and seepage from the WRSF will not be established until many years after the operation and closure of the facility. As a consequence, there will be limited opportunities to use field monitoring data to modify the WRSF designs prior to construction and closure. Within this context, detailed thermal modelling should serve as critical input to the design process to confirm that the cover will perform as intended. Based on the available documentation, it appears that such modelling has yet to be performed. As it stands, the information presented provides very little justification for the effectiveness of the current WRSF closure design in both the short and long term. This information is required for review.
Information Request	INAC requests that the Proponent provide: a. A detailed description of the basis of the WRSF closure design (i.e. basis for the 2-4 m NPAG cover) and justification of its effectiveness to meet objectives in both the short and long term (e.g. thermal modelling). Descriptions of thermal monitoring and updated modelling that will be conducted to assure the WRSF will remain frozen under current and future climate change scenarios should also be provided. b. Descriptions of design modifications capable of enhancing the establishment of permafrost or other adaptive measures that might be required should monitoring and/or modelling results show that objectives may not be met in either the short or long term. c. Empirical evidence that permafrost aggradation has been achieved in comparable waste rock deposits (i.e., at locations with similar climate and

	physical properties such as grain size).

Information Request Number	**INAC-IR#: 7**
To	Proponent – Agnico Eagle
Subject	**Revegetation**
Reference(s)	APPENDIX 8-F Addendum for Closure and Reclamation Plan
Issue/Concern	The closure plan does not envisage active revegetation of disturbed areas. Instead, it is anticipated that the site will revegetate naturally. While the plan is clear that active revegetation is not planned, there are no descriptions of the natural revegetation process, in particular its duration. This information is required to assess the nature, magnitude and duration of post-closure impacts as well as to provide transparency to all parties with respect to the effectiveness of reclamation efforts.
Information Request	INAC requests that the Proponent indicate: a. The anticipated order of magnitude period (e.g., years, decades or centuries) that will be required for the natural re-establishment of vegetation on disturbed areas of the site (e.g., the WRSF and scarified roads).

Information Request Number	**INAC-IR#: 8**
To	Proponent – Agnico Eagle
Subject	**Terrain Features - Alternatives**
Reference(s)	EIS Vol. 1, Project Description
Issue/Concern	A key aspect of the closure is to assure safe access, travel through, and use of the site by wildlife or otherwise. The waste rock storage area is to be covered with run of mine waste rock. This waste contains sharp angular pieces of blasted rock with large open voids that creates the potential for injury or a potential impediment to access and/or travel. It is unclear if consideration has been given to alternative means to mitigate these potential effects. Further, the proposed WRSF has a design height of 80 m (relative to the local topography) and a diameter of approximately 800 m. The selection of the proposed location for the WRSF was based on a variety of factors, including: to reduce the risks to the downstream waterbodies; to reduce the direct impacts on waterbodies; and to reduce interaction of surface water with the Whale Tail WRSF. Although not stated in the Project Description, it is assumed that the proportions (i.e., diameter:height) of the WRSF were also influenced by the same factors. With a height equivalent to a 25 story building, the proposed WRSF will be the tallest and most visible terrain feature within the context of the local topography. If the WRSF achieves its current design objectives (e.g., physical and chemical stability) the dimensions and proportions of the facility are not necessarily a concern from a biophysical perspective. However, this permanent terrain feature, which will be devoid of vegetation, represents a potential aesthetic effect and access impediment that may be the subject of community concern. Based on the available documentation, it is unclear if alternate WRSF proportions were considered and, in particular, whether the current design concept was informed by community input.
Information Request	INAC requests that the Proponent provide: a. An indication as to whether consideration has been given to placement of fine grained material (e.g. crushed waste rock or overburden) on the WRSF ramps and selected surfaces to facilitate safe access to and across the waste rock pile by wildlife or land users. b. Descriptions of alternative waste rock facilities with different diameter:height proportions, identifying any associated advantages and disadvantages. c. Evidence that interested parties have been consulted on the conceptual design of the WRSF, including its height and accessibility.

3.0 Closure Planning

Information Request Number	**INAC-IR#: 9**
To	Proponent – Agnico Eagle
Subject	**Reclamation Research**
Reference(s)	APPENDIX 8-F Addendum for Closure and Reclamation Plan
Issue/Concern	Consistent with applicable guidance, the Interim Closure and Reclamation Plan (ICRP - Appendix 8-F) identifies uncertainties that are associated with each of the selected closure methods. In an effort to address these uncertainties, the proponent has committed to undertake a variety of research initiatives. To illustrate, monitoring of WRSF thermistors and sampling of seepage will occur throughout the operational phase of the project. The proponent indicates that information derived from these research initiatives will be used to modify the closure plan for the site, where appropriate. Given the short duration of the operational phase (3 years), it is unclear if the proposed reclamation research will provide useful information prior to the implementation of the closure plan. In the case of the WRSF, construction of the facility will be virtually complete at the end of the operational phase, thereby limiting opportunities to modify the closure plan. Furthermore, the time required to obtain useful information from the WRSF reclamation research will extend well beyond the operational phase. For example, it is unlikely that site-specific research into permafrost aggradation and the potential for acid rock drainage (ARD) and metal leaching (ML) will be available until well after closure has been initiated. These timing constraints may affect the ability of the proponent to verify and amend their planning assumptions prior to closing the site. Based on the information provided to date, it is unclear when information from reclamation research will become available. By extension, linkages between the reclamation research and critical design decisions have not been provided. It is therefore difficult to verify that important uncertainties can be effectively resolved at appropriate points prior to the construction and closure of the project.
Information Request	INAC requests that the Proponent provide: a. A consolidated summary of uncertainties associated with the closure design. b. A consolidated summary of research programs and anticipated outputs that will be used to address each uncertainty. c. A schedule indicating the timing of each research program, specifying when research findings will become available. Linkages to key decisions in the closure planning process should also be provided.