LICENCE:	**Water Licence 2AM-MEL1631**
DATE:	**April 2, 2020**
SUBJECT:	**Review of Agnico Eagle's Application to Authorize the Release of Water from Containment Pond 1 (CP1) to Meliadine Lake**

INTRODUCTION

Agnico Eagle Mines Ltd. (Agnico Eagle) submitted a request to the Nunavut Water Board (NWB) on March 25, 2020 requesting an amendment of the Meliadine Water Licence 2AM-MEL1631 to permit the release of waters from Control Pond 1 (CP1) in excess of the 1,400 mg/L discharge criterion set out in Part F, Item 3 of the existing licence. Specifically, Agnico Eagle has requested approval *"or before May 1, 2020 for the following:*

- *A time-limited amendment of the total dissolved solid (TDS) discharge criteria set out at Part F, Item 3 of Water Licence 2AM-MEL1631 (the Water Licence) to permit discharge at levels of an average of 3,500 mg/L, only to be in effect for 2020 CP1 discharge season; and,*
- *Approval of the attached Water Quality Management Optimization Plan (WQMOP)."*

The NWB invited *"interested parties to review the information provided by the Applicant and provide their comments to the Board on the following:*

1. *whether they are in agreement that emergency circumstances exist and the Board should process the Amendment Application on that basis;*
2. *identifying any questions or technical review comments in respect of the Amendment Application that should be considered by the Board; and*
3. *indicating whether they are interested and available to participate in a Board-hosted teleconference to give parties an opportunity to discuss technical and procedural issues associated with the Amendment Application (tentatively April 8 or 9, 2020)."*

The Kivalliq Inuit Association Lands Department (KivIA) provide answers to the three areas as requested by the NWB in the following sections. We note that this memorandum was prepared with the support of our technical consultants from Hutchinson Environmental Sciences Ltd.

EMERGENCY CIRCUMSTANCES

Is the KivIA in agreement that emergency circumstances exist and should the Board process the Amendment Application on that basis?

The following comments reflect concerns with Agnico Eagle's application, and are also intended to address whether emergency circumstances exist.

Agnico Eagle has not provided sufficient rationale or technical information in its application to justify that an emergency circumstance exists and that the board should process the amendment application without a public hearing.

Article 13 of the Nunavut Act and sections 52 and 53 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* require the NWB to hold public hearings in an affected community before making decisions regarding certain types of applications, including Agnico Eagle's application. The right to be heard is a principle of natural justice which requires that an interested party or member of the public have sufficient notice of any process being carried out that may affect their interests. Agnico Eagle's application is likely to cause significant public concern regarding the proposed discharges into Meliadine Lake, even if on a temporary basis, and requires a public hearing. Rankinmuit rely on Meliadine Lake as one of many high-quality fishing locations around the community. Increasing permitted concentrations in the project's effluent is likely to degrade the community's perception of the water and fish in the lake, potentially diverting fishing behavior to other waterbodies.

The *NWNSRTA* allows the NWB to act on an application for an amendment of a license without notice and without a public hearing where the Board, with the consent of the Minister, declares the amendment to be required on an "emergency basis". NWB guidance documents clarify that:

(1) it is the responsibility of the applicant to undertake proper planning and submit applications with sufficient time for the NWB process – delayed filing is not an emergency situation; and
(2) for an application to be deemed urgent, the applicant must demonstrate that, unless the application is expedited, there will be an adverse environmental consequence.[1]

Processing of applications on an emergency basis should be reserved for serious circumstances of sudden and urgent public concern that outweigh the public's right to notice and a hearing, such as the emergency water takings by the City of Iqaluit in 2018 and 2019. The data in the Water Quality Management and Optimization Plan and publicly available information from Agnico Eagle[2] indicate that Agnico Eagle was aware as early as October 2019 that the TDS in CP1 was higher than predicted and the volume of water that could be discharged within the prescribed TDS limit was reduced. Agnico Eagle has not provided information to explain why it did not either implement management and mitigation measures or submit its application in sufficient time for the NWB process.

As noted in the two technical comments below, Agnico Eagle has also failed to demonstrate that there will be adverse environmental consequences if the application is not expedited.

The KivIA Lands Department reserves the right to reconsider its position regarding the existence of an emergency circumstance based on our review of the requested information outlined in the following three technical comments.

[1] NWB Guide 5 – Processing Water Applications License Applications, p. 19.
[2] https://www.theglobeandmail.com/investing/markets/stocks/AEM-N/pressreleases/4388603/

Review Comment Number	KivIA-TC#1.
Subject/Topic	Justification of Risk to CP1 Dike
References	Agnico Eagle Mines Ltd. March 24, 2020. Request for Expedited Amendment to Permit Ministerial Approval of Amendment to 2AM-MEL1631 on or before May 1, 2020. Submitted to the Nunavut Water Board; All application documents submitted in support of Agnico Eagle's Application to Authorize the Release of Water from Containment Pond 1 (CP1) to Meliadine Lake
Detailed Review Comment	Agnico Eagle requests that their amendment application be processed as an emergency as CP1 must be completely dewatered starting in May 2020 to prevent *"significant risk"* to the integrity of the CP1 Dike (DCP1). We note that while we agree that that *"CP1 is to be drawn down every year prior to freeze-up* [to ensure] *the site has capacity for the following freshet"* as outlined in their application, complete dewatering does not appear necessary to maintain freshet capacity each year nor to avert the potential for *significant risk* to the integrity of the CP1 Dike. Further, Agnico Eagle has not provided information in their amendment application to support their concern for the integrity of CP1 Dike (the source and nature of the significant risk) should they not be permitted to commence complete dewatering of CP1 starting in May 2020.
Recommendation	For Agnico Eagle's amendment application be processed based on the *"significant risk"* to the CP1 Dike, the following information should be provided: Structural concerns with the CP1 Dike must be outlined and validated by a geotechnical engineer. A tentative timeline for when a *"significant risk"* to the CP1 dike would occur in 2020 and what the implications of those risks may be must also be provided. Agnico Eagle must further justify why complete dewatering is required as opposed to discharging water to Meliadine Lake with TDS in excess of the 1,400 mg/L effluent quality criterion at a rate sufficient to maintain the operational capacity for freshet. We understand that Agnico Eagle would prefer not to impact mining operations at Meliadine. However, Agnico Eagle must justify why a change in operations is either not feasible or would not result in a decrease in contact water reporting to CP1. Without this information, we do not see sufficient rationale to process the application as an emergency.

Review Comment Number	KivIA-TC#2.
Subject/Topic	Source of High TDS water in CP1
References	Request for Expedited Amendment to Permit Ministerial Approval of Amendment to 2AM-MEL1631 on or before May 1, 2020; Water Quality Management and Optimization Plan. Implementation Plan for Total Dissolved Solids, Appendix A Table A-4 All application documents submitted in support of Agnico Eagle's Application to Authorize the Release of Water from Containment Pond 1 (CP1) to Meliadine Lake
Detailed Review Comment	Agnico Eagle is seeking *"A time-limited amendment of the total dissolved solid (TDS) discharge criteria set out at Part F, Item 3 of Water Licence 2AM-MEL1631 (the Water Licence)"* to address *"The accumulation of the contact water in CP1… primarily related to the high volume of precipitation during the 2019 season and the stringent Water Licence TDS discharge criteria"*. We are concerned that Agnico Eagle has not provided an acceptable rationale as to why TDS has become elevated in CP1. High precipitation and associated contact water alone do not explain why the average TDS concentration measured within CP1 in 2017 and 2018 increased from 1,642 mg/L TDS to 3,902 mg/L TDS in 2019 and 2020. Agnico Eagle does note that *"The Mine has run into operational challenges with both the efficiency of the salt maker and securing large storage volumes for the brine produced by the reverse osmosis."*, but this still does not explain the increase in TDS within CP1.
Recommendation	Agnico Eagle must provide an explanation as to why TDS has increased within CP1 to the point at which discharges at the existing effluent quality criterion of 1,400 mg/L are no longer feasible. Additional mitigation measures (reduction at source) must also be investigated to ensure contact water with elevated TDS does not continue to pose a management problem on site and to reduce or eliminate the need for high salinity discharges to Meliadine Lake.

Review Comment Number	KivIA-TC#3.
Subject/Topic	Alternative Management Strategies for Excess CP1 Water
References	Request for Expedited Amendment to Permit Ministerial Approval of Amendment to 2AM-MEL1631 on or before May 1, 2020; All application documents submitted in support of Agnico Eagle's Application to Authorize the Release of Water from Containment Pond 1 (CP1) to Meliadine Lake
Detailed Review Comment	Agnico Eagle proposes to discharge water with high salinity to Meliadine Lake but have not considered alternatives, most notably, trucking of the water to the marine outfall location, thereby avoiding any impact to Meliadine Lake.
Recommendation	Please provide a discussion and analysis of potential alternatives to the Meliadine Lake discharge.

TECHNICAL REVIEW COMMENTS

KivIA's overarching concerns pertaining to Agnico Eagle's application are twofold: a) risks to the aquatic environment and Inuit use associated with discharge of high TDS water to Meliadine Lake and b) the potential for failure of the dike wall and the need for appropriate mitigation. As noted in KivIA-TC-1, Agnico Eagle has not provided sufficient information to assess the potential failure of the CP1 dike; additional information is required to evaluate that risk.

KivIA's technical review of Agnico Eagle's application is informed by our initial high-level assessment of the draft amendment application provided to the KivIA in early March, 2020 and associated discussions with the proponent. In that assessment, we determined that Agnico Eagle would need to provide, at minimum, the following information to support their proposal and allow the KIA and other Parties to confirm their conclusions and to ensure that any adverse environmental effects will be detected in a timely manner and responded to appropriately:

1. Full chemical analysis of water quality in CP1. Characterization of the components (e.g. major ions, trace metals) comprising the total dissolved solids are needed to understand the potential environmental concerns associated with the CP1 discharges and should be used in addition to the Maximum Acceptable Concentration (MAC) for Total Dissolved Solids (TDS) to determine the potential environmental risk. Evidence should include a physicochemical water column profile of CP1 to determine whether the pond is fully mixed. A discrete sample should be collected from the depth at which the maximum electrical conductivity was measured if the water column profile suggests that CP1 is not fully mixed; a grab or depth composite sample is otherwise sufficient. Results from that sample should be applied as the worst-case scenario concentrations to determine potential environmental effects associated with the proposed discharges from CP1.
2. Acute and chronic toxicity test results using water collected from CP1 at the depth with the highest electrical conductivity to address concerns of environmental toxicity associated with the noncompliant discharges.
3. The number of days and average and maximum discharge rates proposed for the emergency discharge.
4. Modelling of the mixing zone and whole lake response to the proposed discharge using the maximum concentrations measured from CP1 and the total discharge volume proposed to predict water quality at the edge of the mixing zone, and in the near and far field areas during the discharge and comparison with predictions made in the Final Environmental Impact Statement. The KIA are particularly concerned with the integrity of the far field reference sites to maintain the ability to compare future changes with baseline conditions.
5. Details of a robust environmental monitoring program to be applied during periods when noncompliant water will be discharged to CP1 to validate toxicological and environmental predictions and a discussion of adaptive management measures that can be undertaken should measurements not conform to predictions.

Agnico Eagle has provided some information in their application pertaining to each of the four categories; that information does not alleviate all of our concerns with the amendment application. We provide the following four technical comments on Agnico Eagle's application.

Review Comment Number	KivIA-TC#4.
Subject/Topic	Insufficient Characterization of High TDS Water in CP1
References	Water Quality Management and Optimization Plan. Implementation Plan for Total Dissolved Solids; Appendix A Supporting Information for the Interim TDS Targets
Detailed Review Comment	Agnico Eagle has summarized water chemistry measured at MEL-14 between September 2017 and October 2019 providing summary statistics for all major constituents in the Meliadine Mine Effluent. This information is used as supporting evidence that chloride comprises up to approximately 50% of effluent discharged to Meliadine Lake. Based on the composition of TDS in the Meliadine Effluent, chloride is expected to be the primary driver of toxicity. Additional support for the composition of the Meliadine effluent is also provided in Table A-3 and Table A-4 which outline the relative contribution of chloride to TDS in water collected from CP1 as well as at the pre and post treatment sampling station (MEL-12 and MEL-14) for chronic and acute toxicity testing respectively. Agnico Eagle does not however, provide a fulsome characterization of water chemistry from CP1. We are concerned with Agnico Eagle's application of these results to characterize the high TDS water that may be discharged to Meliadine Lake. Water chemistry reported for CP1 appears to have been collected from a discrete location and may not accurately reflect the water chemistry in CP1 as high TDS water may resist mixing with lower TDS water. It is therefore unclear whether samples reported from CP1 and MEL-12 adequately reflect the potential influent the treatment system will need to treat in order to meet the proposed 3,500 mg/L TDS discharge criterion.
Recommendation	A full chemical analysis of water quality in CP1 is still required. Characterization of the components (e.g. major ions, trace metals) comprising the total dissolved solids throughout CP1 are needed to understand the potential environmental risk associated with the CP1 discharges. Specifically, we request Agnico Eagle collect physicochemical water column profiles from multiple locations within CP1 to determine whether the pond is fully mixed. A discrete sample should be collected from the depth at which the maximum conductivity was measured if the water column profile suggests that CP1 is not fully mixed; a depth composite sample is otherwise sufficient. Results from that sample should be applied as the worst-case scenario concentrations to determine potential environmental effects associated with the proposed discharges from CP1. This full characterization is particularly important as Agnico

	Eagle is proposing a 3,500 mg/L TDS discharge criterion as a maximum average concentration rather than a fixed value. The samples used to provide this characterization of water within CP1 must have been collected no earlier than December 2019 as results from CP1 presented in Table A-4 indicate measured TDS concentrations in December 2019 and after increased significantly as compared to earlier water quality measurements. If this information has already been collected, we request Agnico Eagle provide it to all intervenors for review.

Review Comment Number	KivIA-TC#5.
Subject/Topic	Dilution Factor to Meet Interim TDS Target at Edge of Mixing Zone
References	Water Quality Management and Optimization Plan. Implementation Plan for Total Dissolved Solids; Section 2.2 Interim TDS Target at the Edge of the Mixing Zone; Appendix A Supporting Information for the Interim TDS Targets Table A-4
Detailed Review Comment	Agnico Eagle has conducted a plume delineation study under operating conditions *"based on specific conductivity results in 2018 in the near-field region of Meliadine Lake as part of the Environmental Effects Monitoring (EEM)/Aquatic Effects Monitoring Program (AEMP). The EEM plume delineation study used field surveys of specific conductivity to evaluate effluent dispersion with distance from the diffuser" The study evaluated dilution factors at a series of monitoring stations up to, and extending beyond, 250 m from the diffuser, based on the specific conductivity of the effluent and the measured field values through the water column at each the stations*." The results of this study as presented in *"Table 1: Dilution Factors in the Near-field Exposure Area at Meliadine Lake"* indicate that the effluent mixed well with water in the receiving environment, achieving dilution factors of at least 71x by 100 m from the diffuser. This dilution factor is used to provide confidence that discharges of TDS concentrations up to an average maximum concentration (MAC) of 3,500 mg/L will be fully assimilated by the receiving environment. We note however that TDS in 2018 at MEL-14, presented in Table A-4, was measured at a maximum concentration of 1,360 mg/L, significantly lower than the proposed discharge concentrations of a 3,500 mg/L MAC. Effluent at the higher TDS concentration will not mix with the low TDS receiving water as easily as the 2018 effluent used in the plume delineation study. High TDS effluent is more likely to travel from the diffuser as a consolidated plume rather than achieving the mixing ratios presented in the Assimilative Capacity Evaluation. We therefore lack confidence that sufficient dilution will occur within the mixing zone allowing Agnico Eagle to achieve the proposed *"interim target of 1,000 mg/L (as calculated TDS) to apply in the receiving environment at the edge of the*

	mixing zone… for the protection against chronic toxicity to representative aquatic species". This may result in deleterious effects on aquatic life outside the 100 m regulatory mixing zone.
Recommendation	We request Agnico Eagle provide hydrodynamic modelling results to demonstrate the behavior of the plume using 3,500 mg/L TDS as an input. We further request Agnico Eagle provide a second model run using 4,000 mg/L TDS as a model input given the discharge concentration will be regulated as a MAC. This modelling is intended to provide confidence that dilution of effluent discharged at MAC of 3,500 mg/L TDS will be achieved sufficient to meet the 1,000 mg/L TDS target at the edge of the mixing zone. We further request Agnico Eagle specify the intended effluent discharge rate and apply that to the hydrodynamic model.

Review Comment Number	KivIA-TC#6.
Subject/Topic	Chronic Toxicity Concerns
References	Water Quality Management and Optimization Plan. Implementation Plan for Total Dissolved Solids; Appendix A Supporting Information for the Interim TDS Targets, A1.1.3 Site-Specific Composition, Table A-2: Chronic toxicity testing dataset for Snap Lake TDS SSWQO as summarized by Chapman and McPherson (2015), A1.4 Site-Specific Chronic Toxicity Data CCME (Canadian Council of Ministers of the Environment). 2011. Canadian water quality guidelines for the protection of aquatic life: Chloride. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg**.**
Detailed Review Comment	Agnico Eagle outlines the results of chronic toxicity testing in Table A-3 using water both from the treatment system's influent (MEL-12) and effluent (MEL-14). A relatively limited dataset is provided for tests using concentrations reflective of the 1,000 mg/L interim TDS target intended for application at the edge of the mixing zone. Of the test on effluent collected at MEL-14, sublethal effects were observed on reproduction in 50% of tests on *Ceriodaphnia dubia* (1/2) and on 7 day biomass in 20% of tests on *Lemna minor* (1/5). Chronic effects observed at TDS concentrations ~1,000 mg/L indicates a potential for aquatic life to experience chronic toxicity outside the mixing zone at the higher discharge concentrations proposed.

	This concern is exacerbated by the potential for a plume migrating outside the 100 m mixing zone with concentrations in excess of 1,000 mg/L TDS as outlined in KivIA-TC#4: Dilution Factor to reach Interim TDS Target at Edge of Mixing Zone. We further note that unlike the comparative example of Snap Lake outlined in Table A-2, chronic toxicity tests were not conducted on *Daphnia magna* using effluent from Meliadine. *Daphnia magna* are sensitive to chloride exposure with chronic toxicity observed at 421 mg/L (CCME 2011). Chronic toxicity testing of *Daphnia magna* is therefore particularly important to assess the potential range in chronic toxicity associated with the 1,000 mg/L interim target TDS target for a range of species. Chloride comprises up to 50% of the TDS in Meliadine effluent and may therefore be a primary driver of toxicity in the receiving environment.
Recommendation	We request additional chronic toxicity testing to assess the potential for aquatic life exposed to effluent from the Meliadine site to experience deleterious effects should Agnico Eagle be permitted to discharge effluent from CP1 at a MAC of 3,500 mg/L TDS. Specifically, we request serial dilution chronic toxicity tests using water currently in CP1. Test water must be collected directly from CP1 at the depth where conductivity is measured at the highest concentration as determined by a conductivity profile collected from the deepest point of the pond. Serial dilution tests should be run on all species listed in Table A-3 as well as *Daphnia magna* at the following dilutions: 100%, 75%, 50% and 25%, 12.5%. Note that no tests need be run at TDS concentrations lower than 500 mg/L. We further request Agnico Eagle provide a discussion of the feasibility of either a) lowering the interim TDS target for the edge of the mixing zone and b) using a chloride based interim target for the edge of the mixing zone Finally, we request Agnico Eagle propose a maximum effluent concentration associated with the currently proposed 3,500 mg/L TDS MAC and clarify the time over which the average would be calculated.

Review Comment Number	KivIA-TC#7.
Subject/Topic	Robust Effluent Monitoring for 2020
References	Water Quality Management and Optimization Plan. Implementation Plan for Total Dissolved Solids; Section 3.0 Phase 2: Conduct Validation Study
Detailed Review Comment	Agnico Eagle has provided details on a Plume Delineation Study, Water Quality Monitoring and Toxicity Testing for 2020 intended to validate that effluent discharged at a concentration above the current 1,400 mg/L TDS effluent quality criterion behaves as predicted in the WQMOP. Specifically: • That the whole effluent is not acutely lethal, • The effluent is diluted to at least 1,000 mg/L TDS at the edge of the mixing zone, • Chronic exposure to TDS concentrations up to 1,000 mg/L will not results in deleterious effects on aquatic life, and • Effluent is fully assimilated within the receiving environment such that no changes are observed at the mid field or far field monitoring locations. Details of the plume delineation study, water quality monitoring program and toxicity testing are outlined in Table 3. We provide several recommendations to refine the proposed validation studies.
Recommendation	We provide the following recommendations to refine Agnico Eagle's proposed validation studies if the amendment is granted: **Plume Delineation Study** Water quality samples collected as part of the plume delineation study within the receiving environment should include samples collected both at surface (grab) as well as at the point of highest conductivity in the water column as determined by a physico-chemical water column profile. This is intended to ensure the plume is appropriately characterized at depth within the mixing zone. **Water Quality Monitoring** We request a more robust sampling regime as part of validation sampling for discharges of Meliadine effluent with a MAC of 3,500 mg/L TDS. Specifically, we request weekly sampling at both MEL-12 and MEL 14 for the test parameter categories outlined in Table 3. We request weekly triangulated water quality samples be collected from the edge of the mixing zone for at least the first four weeks of discharges at the new TDS effluent quality criterion. Four weekly samples should also be collected at the midfield monitoring areas. Monthly water quality samples should be collected from the far field and reference areas. Physico-chemical profiles should be added to the list of test parameters as part of water quality monitoring in the receiving environment. Water quality samples should be collected from the surface (grab) as well as from the depth with the highest measured conductivity at each station at the edge of the mixing zone.

	A working group hosted by the NWB consisting of the KivIA and other key parties (e.g. ECCC, CIRNAC, DFO) should be established to review and evaluate the effluent and environmental monitoring data with the first meeting scheduled two weeks following the commencement of discharges from CP1. Adaptive management and mitigation options should be provided by the proponent for each meeting if a) there has been any instances of noncompliance with the effluent quality criterion of 3,500 mg/L MAC TDS as measured at MEL-14, and b) if there have been any instances of noncompliance with the interim TDS threshold applied to the edge of the mixing zone. **Toxicity Testing** *Daphnia magna* should be added as a test species for chronic toxicity testing performed on the effluent and samples collected at the edge of the mixing zone. Toxicity test samples at the edge of the mixing zone should be collected from the depth in the water column at which the highest conductivity was measured through a water column profile conducted concurrent with the collection of water for those tests.

TELECONFERENCE PARTICIPATION

The KivIA and their representatives are both willing and available to participate in a Board-hosted teleconference on both April 8 and 9, 2020 intended to give parties an opportunity to discuss technical and procedural issues associated with the Amendment Application.

We further request that the board make every effort to host a community consultation teleconference to provide the Nunavummiut of Rankin Inlet an opportunity learn the details of Agnico Eagle's application, ask any questions they may have and voice their thoughts. We specifically request this consultation be hosted via teleconference in light of current guidance from the Federal and Territorial governments pertaining to physical distancing and COVID-19. The KivIA understand that the standard notice prior to a community meeting may not be possible, but nevertheless highlight the importance of providing the community an opportunity to discuss Agnico Eagle's application.

CLOSING

We thank the NWB for this opportunity to provide feedback on Agnico Eagle's amendment application and look forward to further discussions to ensure the environmental and economic interests of both the proponent and beneficiaries are protected.

If you have any questions regarding this memorandum, please contact Luis Manzo of the KivIA (lmanzo@kivalliqinuit.ca) or Richard Nesbitt of Hutchinson Environmental Sciences Ltd. (Richard.Nesbitt@environmentalsciences.ca).