



Environment and  
Climate Change Canada

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# **Agnico Eagle Mines Ltd. Meliadine Extension Water Licence Amendment Technical Hearing Presentation by Environment and Climate Change Canada**

October 12-13, 2023

Rankin Inlet, NU



Canada 

# Overview

- Mandate
- Relevant acts and regulations
- Technical Comments and Recommendations



# Environment and Climate Change Canada's Mandate

- Preservation and enhancement of the quality of the natural environment, including water, air and soil quality;
- Coordination of the relevant policies and programs of the Government of Canada;
- Renewable resources, including migratory birds and other non-domestic flora and fauna;
- Meteorology; and
- Enforcement of regulations



# Relevant acts and regulations

- *Department of the Environment Act*
- *Canadian Environmental Protection Act*
- *Fisheries Act – Pollution Prevention Provisions*
- *Migratory Birds Convention Act*
- *Species at Risk Act*



# ECCC-TRC-01: Meliadine Lake water balance

- Meliadine Lake water levels and water volume could be impacted by mine water withdrawals and discharges. This could have an impact on the lake's water quality and assimilation capacity.
- ECCC recommends that the Proponent confirm if Meliadine Lake levels are modelled in the Water Balance and Water Quality Model.
  - if so, explain how lake levels were modelled without incorporating the effects of water withdrawals by the mine.
  - if not, clarify where mine impacts on the lake levels have been considered.



# ECCC-TRC-02: Water Balance and Water Quality Model calibration

ECCC's recommendations to the Proponent regarding the Water Balance and Water Quality Model:

- provide a rationale as to what might cause natural catchment runoff volume to be halved for CP3, and clarify if/how this rationale was applied to other catchments; and
- provide a statistical measure of fit between modelled and measured pond volumes, and discuss how the variance could impact mine water management.



# ECCC-TRC-03: Water Balance and Water Quality Model results

- The Water Balance and Water Quality Model indicates that that certain water quality parameters will exceed water quality guidelines for certain pits and lakes during post-closure. The proposed timeline for model updates would not allow for management actions to be implemented to avoid exceedances.
- ECCC recommends that the Proponent:
  - discuss management actions for the parameters of potential concern; and
  - propose timelines and updates to the Water Balance and Water Quality Model to allow sufficient time for management actions to be put in place.



# ECCC-TRC-04: Water Balance and Water Quality Model uncertainty

- The accuracy of the Water Balance and Water Quality Model can be evaluated using validation or sensitivity analysis. Neither methods is present in the model, nor is there a discussion of uncertainty within the model.
- ECCC recommends that the Proponent evaluate the uncertainty of the model to provide an understanding of the range of possible results, and how this may impact the planned mine water management.





# ECCC-TRC-05: In-pit deposition modelling

- ECCC has three recommendations for the proponent regarding in-pit depositions modelling:
  - clarify additional water quantities required to create slurry tailings as opposed to filter tailings, specify from where this water would be sourced and confirm whether greater water withdrawals from Meliadine Lake would be required;
  - explain when tailings consolidation is expected to be complete, estimate the size and extent of diffusive fluxes from in-pit tailings, and describe the contribution of consolidated tailings to the Water Balance and Water Quality Model source terms of groundwater discharge through in-pit tailings or waste rock into pit lakes; and
  - describe a proposal for monitoring water quality at the interface between water and tailings or bedrock, including a proposed schedule. The monitoring plan should also discuss how the results will be used to verify model predictions and/or trigger further updates to the model.



# ECCC-TRC-06: Integration of Meliadine Extension project in Aquatic Effects Monitoring Program Design Plan

- The Aquatic Effects Monitoring Program Design has been updated for the Meliadine Extension project, but the extension project has not been integrated into the Design Plan.
- ECCC recommends that the Proponent integrate the Meliadine Extension project into the Aquatic Effects Monitoring Program, including referencing the Federal Environmental Impact Statement addendum, its findings and results.



# ECCC-TRC-07: Changes to analysis methods and descriptions in Aquatic Effects Monitoring Program Design Plan

- ECCC notes that certain modifications between versions 1 and 2 of the Aquatic Effects Monitoring Program Design Plan seem to reduce clarity or provide less analysis of the data.
- ECCC recommends that the Proponent justify the simplification of analyses and text between versions 1 and 2 of the Aquatic Effects Monitoring Program Design Plan or re-integrate what was included in the previous version of the Aquatic Effects Monitoring Program Design Plan.



# ECCC-TRC-08: Aquatic Effects Monitoring Program reference areas

- Reference areas monitored through the Aquatic Effects Monitoring Program help identify local changes to the aquatic environment due to weather and other factors that are not related to the mine. Typically, reference areas are located in different watersheds or upstream of the near field and mid field sites.
- ECCC notes that the three reference areas used are all in Meliadine Lake. Two are downstream, located at the lake outflows. The third is in a bay that is not likely in a flow path potentially affected by discharges to Meliadine Lake.
- ECCC recommends that the Proponent demonstrate how the selected references sites within Meliadine Lake will remain suitable reference areas over a prolonged period with the mine Extension. Consideration should be given to alternate reference areas and/or modifications to the study design.



# ECCC-TRC-09: Closure of saline pond SP6 (Lake B7)

- The Extension Project proposes to use Lake B7 as a saline water storage pond for approximately 18 years. The mine plan of the Main Application document includes obtaining *Metal and Diamond Mine Effluent Regulation* Schedule 2 listing for Lake B7, so it can be fished out and dewatered.
- ECCC notes that sediment at the bottom will become enriched in salts from the contact with saline water over a prolonged period. If they are left in place uncovered at closure, the sediments will then become a source of salts and metals for the overlying water via diffusion. This enrichment would eventually reach Meliadine Lake through the connections with filled pits, lakes and streams.
- ECCC recommends that:
  - the proponent clarify if the Water Balance and Water Quality Model incorporates diffusion fluxes of salts and metals from saline sediment at the bottom of SP6. If it does not, the magnitude of this source should be described in relation to other fluxes so its impact can be evaluated; and
  - guidelines for the protection of aquatic life are used for SP6 to assess post-closure water quality.



# ECCC-TRC-10: Saline water disposal during closure

- At closure, saline water stored on surface will have to be disposed of.
- Although it is indicated that there is sufficient underground void space for this saline water at closure, the Water Balance and Water Quality Model provides an alternative for saline water disposal.
- ECCC recommends that the Proponent confirm if they are still considering disposing saline water in pits.
  - if so, a description of what modelling would be done, data necessary for the modelling and proposed timelines should be provided.



# ECCC-TRC-11: Uncertainty in thermal modelling for Discovery WRSFs

- Most of the waste rock at the Meliadine mine is classified as non-potentially acid generating and non-metal leaching.
- Waste rock associated with the Discovery Pit is different in that the majority has been classified as potentially acid generating or metal leaching, or uncertain with respect to acid generation and metal leaching. Discovery Pit waste rock must therefore be stored in a manner to prevent development of acid drainage or metal leaching which would negatively impact water quality.
- A thermal cover made of non-potentially acid generating and non-metal leaching waste rock is proposed for the Discovery waste rock storage facilities. Uncertainty in the thermal model of the waste rock storage facilities is not discussed.
- ECCC recommends that the Proponent:
  - discuss uncertainty in the Thermal Modelling of Meliadine Discovery waste rock storage facilities through a sensitivity analysis or comparison to measured data at other waste rock storage facilities; and
  - consider including a safety factor in the design of the thermal cover thickness.





# Thank You



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# Annex I: Environment and Climate Change Canada's Technical Review Comments

ECCC-TRC-01	Meliadine Lake water balance
ECCC-TRC-02	Water Balance and Water Quality Model calibration
ECCC-TRC-03	Water Balance and Water Quality Model results
ECCC-TRC-04	Water Balance and Water Quality Model uncertainty
ECCC-TRC-05	In-pit deposition modelling
ECCC-TRC-06	Integration of Meliadine Extension project in Aquatic Effects Monitoring Program Design Plan
ECCC-TRC-07	Changes to analysis methods and descriptions in Aquatic Effects Monitoring Program Design Plan
ECCC-TRC-08	Aquatic Effects Monitoring Program reference areas
ECCC-TRC-09	Closure of saline pond SP6 (Lake B7)
ECCC-TRC-10	Saline water disposal during closure
ECCC-TRC-11	Uncertainty in thermal modelling for Discovery WRSFs

