



NATURAL RESOURCES CANADA - INVENTIVE BY NATURE

Natural Resources Canada's Technical Meeting Presentation: Agnico Eagles Mines (AEM) Whale Tail Pit Project

Prepared for the Nunavut Impact Review Board

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Outline

1. Mandate and Role
2. Technical Review
 - Permafrost and Terrain Stability
 - Hydrogeology
3. Questions



NRCan's Mandate

- Enhance the responsible development, use and competitiveness of Canada's natural resources and products.
- Established leader in science and technology in the fields of earth sciences, energy, forests, and minerals and metals.



NRCan's Role in this Project

- *Explosives Act* and regulations
- Provision of scientific expertise:
 - Permafrost and terrain stability
 - Hydrogeology



Regulatory Review – Explosives

NRCan regulates the storage and manufacture of explosives through the *federal Explosives Act*. We do not regulate the use of explosives.

The Proponent requires a licence for the storage of explosives at the Whale Tail Pit site in the form of explosives magazines.

During the life of the project, NRCan will ensure that the Proponent complies with licence conditions.



Technical Review: Permafrost and Terrain Stability

Overview

- Baseline Permafrost and Terrain Conditions in the Project Area
- Design Cover Thickness for the Waste Rock Storage Facility (WRSF)
- Permafrost and Talik Distribution in the Project Area



Baseline Permafrost and Terrain Conditions in the Project Area

Permafrost provides a foundation for project infrastructure.

The proponent has conducted terrain mapping for the project, but at a scale too small to assess permafrost conditions.

NRCan recommends that further site investigations be carried out to better characterize the ground ice conditions and sensitive terrain.



Design Cover Thickness for the Waste Rock Storage Facility

The Proponent has proposed a cap of non-potentially acid generating (nPAG) rock of 2 to 4 meters for the cover thickness.

NRCAN concludes that a cover thickness of 2 to 4 meters may not be sufficient to host the active layer in perpetuity given warmer temperatures as a result of climate change.

NRCAN recommends that thermal modelling incorporate climate change to support the final design of the WRSF and the cover thickness at closure.



Permafrost and Talik Distribution in the Project Area

The Whale Tail Pit will be excavated in the footprint of Whale Tail Lake where there is a potential for an open talik.

NRCan has reviewed the techniques used by the Proponent to identify the distribution and depth of open taliks and agrees with the Proponent's approach to identify lakes likely to have open taliks. The Proponent has not modelled deeper areas under Whale Tail Lake for talik configuration.

NRCan recommends the Proponent consider thermal modelling of the deeper portions of Whale Tail Lake for a better characterization of talik configuration.



Technical Review: Hydrogeology

Overview

- Long-term Water Quality in the Flooded Pit
- Groundwater Sampling and Quality
- Groundwater Modelling



Long-term Water Quality in Flooded Pit

- The proponent predicts that water in the Whale Tail pit will develop layers of water which will not mix completely. Groundwater inflow from the surrounding area will enter from the bottom and should not mix with the upper layers.
- The Proponent has identified a plan to monitor the mine site contact water flow volume and quality for the post-closure phase.
- NRCan is in agreement with the Proponent's monitoring plan from a hydrogeological perspective and recommends that they continue to verify that the pit acts as a recharge area using continuous monitoring throughout the mine's life.



Groundwater Quality and Sampling

Groundwater quality:

- The proponent's groundwater samples were contaminated during the sampling process.
- NRCan recommends assessing site specific samples prior to mine development.

Sampling:

- The Proponent is developing a sampling plan for the life of the mine and through post-closure.
- NRCan is satisfied with the recommended sampling strategy



Groundwater Modelling

- The proponent has developed a groundwater model.
- NRCan considers that the current groundwater model can appropriately assess various scenarios.
- NRCan recommends that the model be validated and adjusted on the basis of knowledge and additional data acquired during mining operations.



Agnico Eagle's Response to NRCan Recommendations

Permafrost and Terrain Stability

NRCan is satisfied that the Proponent has addressed NRCan's concerns.

- Additional recommendations related to permafrost and talik distribution:
 - The Proponent may consider, for final design to refine groundwater modelling, conduct a sensitivity analysis to deal with uncertainties in thermal model parameters such as ground thermal regime, thermal properties and thermal gradient.

Hydrogeology

- NRCan is satisfied with the response provided by the Proponent



Questions?

