

Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6100 000 008/019
NWB File: 2AM-MEA1526



September 30, 2019

via email at: licensing@nwb-oen.ca

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Richard Dwyer:

RE: 2AM-MEA1526 – Agnico Eagle Mines Limited – Meadowbank Gold Mine – Responses to Ground Water Monitoring Plan, Meadowbank Interim Closure and Reclamation Plan, Pore Water Quality Monitoring Program and Waste Rock-Tailings Management Plan Comments

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned plans. This letter provides ECCC's responses and specialist advice based on our mandate, in the context of the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

The following response is provided:

1. Re: Control Strategies for Acid Rock Drainage

ECCC's Original Comment and Recommendation on the Meadowbank Gold Mine: Updated Mine Waste Rock and Tailings Management Plan (Submitted to the NIRB August 26, 2019)

Comment:

The Proponent has set out some design criteria specific to the cover system design that includes:

- In areas where the active layer extends into the tailings material, the thawed layer should be limited to the upper 30 cm of the tailings mass and saturation of the tailings should remain above 85% to limit oxidation of the tailings.
- As an additional method to reduce tailings reactivity, the degree of saturation within the tailings mass should remain above 85%. This will reduce the tailings reactivity should part of the upper region of the tailings mass thaw during a warm year event.



Thermal modelling shows that the tailings material, beneath the minimum 2.0 m thick cover will remain frozen for all year (excluding the warmest years) from the 100-year database, accounting for climate change. The unfrozen tailings are segregated in the upper 0.5 m of the tailings storage facility (TSF) and remain above 85% saturation, thus reducing the risk of oxidation until the material freezes back into the permafrost over time.

ECCC notes that the Proponent indicated that the cover depth in some areas of the TSF would be less than the active layer and that the top 0.5 m of the tailings even when thawed during the warm months, will remain saturated up to 85%. It is understandable that when a tailings zone or layer is saturated, the acid rock drainage (ARD) activity would be reduced or slowed if the saturation remains (i.e., soaked with abundance of water). It is also reasonable to expect that some rock materials may be able to retain moisture or water longer than others may. However, if the warm period continues, it is unclear to ECCC how the Proponent would be able to retain the 85% saturation in the tailings such that ARD/metal leaching (ML) reactivity of the tailings will not occur or will be reduced. Tailings are finely ground rock particles ranging from sand-sized to silt-sized and are not specifically designed or engineered to retain water.

Recommendation(s):

ECCC recommends that the Proponent clarify plans to ensure that the top 0.5 m of the tailings within the active layer under cover will remain saturated.

Proponent's Response (Submitted to the NIRB September 20, 2019)

The 0.5 m of thawed material referenced above is not expected to occur every year but only in the warmest year. For most year, all tailings are expected to remain entirely frozen. The thawed zone of 0.5 m would be valid for a 2 m cover, however most of the landform is planned to be significantly thicker than 2 m.

Additional monitoring and analysis are required to verify the performance of the cover against the design intent and inform on the final cover design. The final cover design will be subject to modification depending on the results obtained from the site trials as well as from data from the Thermal Monitoring Program. Results of the modelling and the final cover design will be provided in the Final Closure and Reclamation plan for Meadowbank site.

ECCC's Response to Proponent's Response

Reference(s):

- Agnico Eagle Mines Limited. 2019. Meadowbank Gold Mine: Updated Mine Waste Rock and Tailings Management Plan - 2019, Section 7: Control Strategies for Acid Rock Drainage – Cover Design and Section 7.1: TSF Cover Design
- Okane. 2019. Whale Tail Project – Thermal Modelling of Whale Tail WRSF under RCP8.5. Memorandum prepared for Agnico Eagle Mines Limited June 20, 2019.

Comment:

ECCC notes that Figures 8-10 in the e Memorandum show the thermal modelling of the Whale Tail Project Waste Rock Storage Facility (WRSF) under RCP8.5. These figures indicate that the thaw goes deeper than the cover thickness. Yet, it concluded that thaw due

to “annual climate cycling” remained constrained to the cover system. In all figures provided in the Memorandum, the temperature close to the proposed cover system interface, shown in a black dashed line, is around 0°C, which may indicate that it is not frozen. Given the thermal modelling results provided in the Okane Memorandum, it is unclear to ECCC whether the Proponent has considered using cover greater than 2 m. A cover thicker than the active layer would constrict or restrict the active layer within the cover material and would not rely on the saturation of the top 0.5 m of tailings.

In the Updated Mine Waste Rock and Tailings Management Plan, the Proponent acknowledged that the active layer extends into the tailings material. If this is the case, it is not clear to ECCC why a cover that is thicker than the active layer is not being considered for the entire landform rather than in limited areas (especially given the thermal modelling results for the Whale Tail Project under RCP8.5).

ECCC Recommendation(s):

ECCC recommends that the Proponent:

- Clarify the statement that thaw due to “annual climate cycling” remained constrained to the cover system, in the *Thermal Modelling of Whale Tail WRSF Under RCP8.5*, when Figures 8-10 show otherwise.
- Consider using a cover thickness greater than 2 m for the entire landform.

Please contact Emily Nichol at (867) 669-4732 or Emily.Nichol@Canada.ca should you require more information.

Sincerely,

[original signed by]

Emily Nichol
Environmental Assessment Coordinator

cc: Georgina Williston, Head, EA North (NT and NU), EPOD, ECCC