



Water Resources Division  
Nunavut Regional Office  
Iqaluit, NU X0A 0H0

Your file - Votre référence  
2AM-MEA1526

January 24, 2019

Our file - Notre référence  
CIDM# 1239544

Richard Dwyer  
Manager of Licensing  
Nunavut Water Board  
Gjoa Haven, NU X0B 1J0

Sent via email: [licensing@nwb-oen.ca](mailto:licensing@nwb-oen.ca)

**Re: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) reply to Nunavut Water Board's (NWB) notice of application and commencement of technical review of an amendment to Type "A" Water Licence No: 2AM-MEA1526 associated with the In-Pit Tailings Disposal Modification Proposal – Meadowbank Gold Mine Project. Thermal monitoring and hydrogeological connectivity comment.**

Dear Mr. Dwyer,

Thank you for the email notice, received on December 17, 2018, regarding notice of application and commencement of technical review of an amendment to Type "A" Water Licence No: 2AM-MEA1526 associated with the In-Pit Tailings Disposal Modification Proposal at the Meadowbank Gold Mine; Agnico Eagle Mines Limited.

CIRNAC reviewed the amendment to Type "A" Water Licence No: 2AM-MEA1526 associated with the In-Pit Tailings Disposal Modification Proposal at the Meadowbank Gold Mine pursuant to its mandated responsibilities from the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

As per the email notice, received on January 15, 2019 from the NWB, CIRNAC is providing comment on the **thermal monitoring and hydrogeological connectivity** concern by January 24, 2019. CIRNAC's issues raised regarding the thermal and hydrogeological modelling have been addressed as the performance of the models have been satisfactorily improved. However, CIRNAC is in agreement with NRCAN on the ineffectiveness of the current and proposed groundwater network noting that the sparse monitoring network will be unable to provide information useful for model validation, particularly prior to post-closure. Recommendations on improving the groundwater monitoring network are provided in the following section.



## **Thermal monitoring and hydrogeological connectivity.**

On August 3, 2018, CIRNAC recommended the hydrogeological flow models be updated to reflect the changing extent of permafrost, and to examine potential changes in groundwater contaminant transport from the Meadowbank Gold Mine Property – in particular out of the Goose and Portage pits.

Based on CIRNAC's review of the documents, CIRNAC's issues raised regarding the thermal and hydrogeological modelling have been addressed as the performance of the models have been satisfactorily improved. AEM has committed in their January 23, 2019 submission to "optimize and adapt the location of the monitoring wells as part of the final closure plan in collaboration with the regulators. In addition, available thermistors and piezometer across the site will continue to be monitored and used to update the hydrogeological model and update the groundwater monitoring plan." Therefore, CIRNAC requests this commitment be captured as a term and condition in the water licence.

CIRNAC is in agreement with NRCAN's January 18, 2019 submission on the ineffectiveness of the current and proposed groundwater network noting that the sparse monitoring network will be unable to provide information useful for model validation, particularly prior to post-closure. NRCAN noted that the small number of wells is not sufficient to monitor groundwater plumes from the three pits and that several of the monitoring wells are not located directly downflow of the tailings and are therefore poor sentinels of contaminant migration.

CIRNAC therefore agrees with NRCAN's recommendations of:

### *Groundwater Monitoring*

- 1) Clearly state the explicit goals of the groundwater monitoring program within the context of the overall monitoring expectations of the regulators; specifically indicate what parameters or variables are to be measured or validated based on the goals of the monitoring program and end use of the data; and, indicate the anticipated duration of the monitoring program as groundwater contaminant migration at this site is predicted to occur after several centuries.
- 2) Assess the 3-D groundwater flowpaths and travel times to each monitoring well screen using backwards pathlines in FEFLOW. Wells with backwards particle tracks crossing the tailings or not originating near the edge of the tailings are likely of limited value to the monitoring network.
- 3) Install monitoring wells that will intercept the main axis(es) of each groundwater plume during the monitoring period. The purpose, location and screen interval of each new monitoring well should be justified and initially guided by modelling results (including pathlines as in recommendation 2 above). NRCAN and CIRNAC are not convinced of the effectiveness of the proposed new wells and



recommend that the current model be used to assess pathlines, travel times and breakthrough curves for these wells. The proposed use of long well screens should be justified.

*Sub-permafrost Groundwater:*

- 4) The thawing of permafrost below Pit A will not only allow tailings pore water to discharge to Third Portage Lake but will also allow sub-permafrost groundwater to discharge. The potential effects of sub-permafrost groundwater discharge to Third Portage Lake have not been considered or discussed to date. NRCan and CIRNAC are not aware whether sub-permafrost groundwater chemistry have been measured at Meadowbank. If so, these values should be used to assess whether there is the potential for impacts to receptors in Third Portage Lake. If not, conservative estimates of sub-permafrost groundwater chemistry could be used to assess the potential for impacts.

If you have any questions or require further information with respect to this matter, contact me at (867) 975-3877 or email [michelle.blade@canada.ca](mailto:michelle.blade@canada.ca), or Ian Parsons at (867) 222-9278 or email [ian.parsons@canada.ca](mailto:ian.parsons@canada.ca).

Regards,

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