



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

Your file - Votre référence  
2AM-MEA1526

September 5, 2019

Our file - Notre référence  
CIDM#1261355

Richard Dwyer  
Manager of Licensing  
Nunavut Water Board  
Gjoa Haven, NU X0E 1J0

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

**Re: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) review of Ground Water Monitoring Plan July 2019 Version 10 and Meadowbank Interim Closure and Reclamation Plan 2019 – Meadowbank Gold Mine Project, Type 'A' Water Licence No. 2AM-MEA1526, Agnico Eagle Mines Limited (AEM).**

Dear Mr. Dwyer,

Thank you for the email notice, received on July 31, 2019, regarding the above mentioned Type 'A' Water Licence Ground Water Monitoring Plan July 2019 Version 10 and Meadowbank Interim Closure and Reclamation Plan 2019 for the Meadowbank Gold Mine Project. The updated plans are a result of the Meadowbank In-Pit Tailings disposal water licence amendment. CIRNAC's technical comments on the Meadowbank In-Pit Tailings disposal are summarized in the January 31, 2019 submission to the Nunavut Water Board (NWB).

CIRNAC reviewed the plans and the results of our review are provided for the NWB's consideration. Comments have been provided pursuant to the mandated responsibilities of CIRNAC under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relation and Northern Affairs Act*.

If you have any questions or require further information with respect to this matter, contact me at (867) 975-3877 or [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,

Michelle Blade  
Regional Coordinator, Water Resource Division

## Technical Review Comments

### **Recommend 1: Depth of in-pit tailings water cover and details of aggregate cover required**

With respect to the Interim Closure Reclamation Plan (ICRP), CIRNAC's comment is unresolved. On January 31, 2019, CIRNAC requested the updated ICRP specify that an assessment of the material deposited to date and pore water monitoring be completed to inform mitigative measures, such as the depth of water cover and details of aggregate cover required, to comply with flooded pit water quality objectives - and that those mitigative measures are carried out in the event the ICRP is implemented. CIRNAC reviewed Sections 1.3.4, 5.2.4, and 6.2.4 on open pits in the Meadowbank ICRP update 2019 and did not locate the aforementioned commitment.

#### **Recommendation 1:**

CIRNAC requests the location of the aforementioned commitment within the ICRP is provided for CIRNAC to review. Alternatively, CIRNAC requests the ICRP specify that an assessment of the material deposited to date and pore water monitoring will be completed to inform mitigative measures, such as the depth of water cover and details of aggregate cover required, to comply with flooded pit water quality objectives. In the event the ICRP is implemented, CIRNAC requests the timeline by which the assessment would be completed, and the mitigative measures submitted to the NWB for review.

### **Comment 2:Groundwater monitoring well installations during operations**

On January 31, 2019, CIRNAC indicated:

The performance of the thermal and hydrogeological modelling has been satisfactorily improved. However, CIRNAC is in agreement with NRCAN on the ineffectiveness of the current and proposed groundwater monitoring network noting that the sparse monitoring network will be unable to provide information useful for model validation, particularly for the ICRP and prior to closure which informs the Final Closure and Reclamation Plan.

CIRNAC concurs the current groundwater monitoring plan is for the operation phase, and that the ICRP and Final Closure and Reclamation Plan will address groundwater monitoring commitments during closure and post-closure.

CIRNAC agrees with NRCAN that the monitoring well locations should not be selected solely on the basis of the simulated

groundwater plume and that they should include consideration of field data such as fracture observation, borehole logging, packer testing and thermal profiling. CIRNAC also agrees that breakthrough curves are a suitable approach to help plan and evaluate groundwater monitoring locations (from the simulation results) as they include the processes of advection, dispersion and diffusion. The current groundwater monitoring wells were located on the basis of groundwater flow paths during the mining of the pits. One should not expect these same wells to be suitably located for future monitoring following the flooding of the pits. CIRNAC therefore reiterates that the breakthrough curve analysis in conjunction with field data be used to select future monitoring well locations, and that the monitoring well locations are installed and monitored as a term and condition in the water licence of the ICRP and Final Closure and Reclamation Plan.

AEM reported installing four groundwater monitoring wells from May 29 to June 4, 2018.

Section 3 of Ground Water Monitoring Plan July 2019 Version 10 states:

In 2018, the latest version of the groundwater numerical model was used to forecast the post closure evolution of chloride concentrations at existing wells, including the four new wells installed in 2018. Breakthrough chloride concentration curves (predicted concentrations of chloride over time at a specific point of the 3D model) were extracted from the model at each monitoring well. Concentration increases over time showed that monitoring wells could intercept the contaminant plume from Pit A, Pit E and Goose Pit after closure over different period and at different concentrations.

It is unclear if the breakthrough curves informed choosing the location of the four groundwater monitoring wells installed from May 29 to June 4, 2018, or if a sufficient number of groundwater monitoring wells have been installed and will be monitored during operations to inform the ICRP and Final Closure and Reclamation Plan.

**Recommendation 2:**

CIRNAC requests clarification on where the 3D model breakthrough curves predicted the highest chloride concentrations, and if the existing monitoring wells network intersects each of these predicted highest chloride concentration areas.

**Comment 3: Groundwater monitoring well installations during ICRP**

Section 9.0 of the Interim Closure and Reclamation Plan 2019 states:

Regarding in-pit tailings deposition at Goose Pit and Portage Pit, groundwater monitoring network was implemented in 2018 with monitoring wells to assess groundwater quality of the in-pit tailings deposition both during the operation phase and after closure. Tailings pore water quality will be monitored in each pit to assess its chemical evolution. The thermal modelling, hydrogeological modelling and contaminant transport simulations will be updated after in-pit tailings deposition and will be used as a predictive tool, along with field observations, to adapt the post-closure groundwater monitoring program (well locations, frequency, parameters). In addition, additional monitoring wells will be installed to monitor the groundwater flow paths. Breakthrough curves to predict concentrations of contaminant over time will be produced with the hydrogeological model to support the selection of monitoring wells screen location and depth. As part of the final closure plan, Agnico Eagle will adapt well characteristics at closure to ensure plume interception and explore the potential of installing a groundwater monitoring station in the vicinity of Portage Pit area A, where an open talik is expected to develop over the years. Agnico Eagle will review, 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 inform the thermal and hydrogeological model.

The thresholds to determine if additional groundwater monitoring well installations will be required were not identified, along with how often field data will be collected, models will be updated, and the time until a new groundwater monitoring well is installed after a threshold is exceeded.

**Recommendation 3:**

CIRNAC requests the ICRP specify the thresholds for when additional groundwater monitoring well installations are required. The ICRP should also identify how often field data will be collected, models will be updated, and the time until a new groundwater monitoring well is installed after a threshold is exceeded