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January 31, 2019
NWB File #: 2AM-MEA1526
NRCan File #: NT-010

Richard Dwyer
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P.O. Box 119
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Sent via email: richard.dwyer@nwb-oen.ca

Mr. Dwyer,

Re: 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 – Nunavut Water Board request to parties regarding concerns being addressed.

This letter is in response to the Nunavut Water Board's (NWB) request of January 25, 2019, inquiring of parties if their concerns have been addressed and whether they have an opinion as to the need for a Public Hearing. As mentioned in previous correspondence, Natural Resources Canada (NRCan) normally does not participate in the NWB process based on NRCan not having a regulatory role. However, as discussions with Agnico Eagle Mines (AEM) regarding the thermal and hydrogeological modelling associated with the In-Pit Tailings Disposal Modification Proposal were not completed during the shortened Nunavut Impact Review Board (NIRB) process, NRCan submitted comments on the technical memorandum summarizing the results from the fourth version of the modelling to the NWB, including some suggested activities to improve future monitoring. NRCan defers to regulators as to whether these activities are undertaken during operations or are deferred to the Interim and Final Closure and Reclamation Plans.

In summary, NRCan considers its comments on the modelling complete and does not require further input from AEM. As NRCan does not have a regulatory role, we do not have a position regarding the requirement for a Public Hearing. NRCan defers to regulatory bodies to determine whether or not the requirement for a Public Hearing can be waived. However, NRCan does not require a Public Hearing to address any issues within NRCan's mandate.

Please find NRCan's detailed comments addressing AEM's most recent submission below. Should you have any questions related to NRCan's review, please do not hesitate to contact me at peter.unger@canada.ca.

Sincerely,

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NRCan's Final Comments on the In-Pit Tailings Disposal Modification Proposal at the Meadowbank Gold Mine (2AM-MEA1526)

Background

Agnico-Eagle Mines Limited (AEM, the proponent) operates the Meadowbank Mine, Nunavut, and has proposed to modify the storage of mine tailings at the site by disposing them in the Goose and Portage A and E pits. Natural Resources Canada (NRCan) submitted Information Requests (IRs) to the Nunavut Impact Review Board (NIRB) on 9 July 2018 (NRCan, 2018a). The proponent provided responses to these IRs on 16 July 2018 (AEM, 2018a). NRCan submitted its Final Written Submission on 3 August 2018 (NRCan, 2018b). The proponent provided its response to the NIRB on 17 August 2018 (AEM, 2018b). NIRB closed the registry and later released its reconsideration report and recommendations on 31 August 2018 indicating that the proposed amendment may proceed to the licensing and permitting regulatory phase (NIRB, 2018). On 21 September 2018, NRCan submitted comments (NRCan, 2018c) outlining remaining concerns to the Nunavut Water Board (NWB). The proponent, their consultant (SNC-Lavalin), NRCan and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC, by phone) met on 25 September 2018 to discuss version 3 of their hydrogeological model and NRCan concerns. SNC-Lavalin updated the thermal and hydrogeological modelling on 14 December 2019 (SNC-Lavalin, 2018). NRCan commented on the updated thermal and hydrogeological modelling on 18 January 2019 (NRCan, 2019). AEM provided a response to these comments on 23 January 2019 (AEM, 2019). The NWB has requested that NRCan comment on the AEM (2019) response, which is the content of this report.

NRCan Comments:

NRCan #1:
AEM's (2019) reply has indicated the specific objectives of their groundwater monitoring. NRCan recommended that explicit goals for the groundwater monitoring program be established "within the context of the overall monitoring expectations of the regulators." NRCan also recommended that it "would be helpful if the groundwater monitoring program could specifically indicate what parameters or variables are to be measured or validated (e.g., contaminant fluxes to lakes, contaminant concentrations in lakes or contaminant concentrations in groundwater discharge)." NRCan defers to the regulators to define expectations as to what parameters or variables need to be met and where.

For example, NRCan does not know to what extent the possible discharge of contaminated groundwater into the Third Portage Lake (Pit Lake) beginning in approximately 600 years is an issue of concern to the regulators. If so, where will water quality guidelines need to be met (in the groundwater discharge/benthic zone, in the bottom of the lake or in the lake as a whole)? These questions have important consequences for the locations, methods and duration of monitoring. The proponent has indicated that the groundwater discharge will be diluted in the lake such that the whole lake concentrations are predicted to be below guidelines.

NRCan also recommended that "The proponent, in consultation with appropriate regulators, should also indicate the anticipated duration of the monitoring." The proponent's response does not address the anticipated duration of monitoring. A monitoring program designed to monitor for years to decades could be very different than a program designed to monitor for centuries or millennia. The positioning of monitoring wells should take into consideration the anticipated duration of monitoring. As discussed with respect to the proponent's breakthrough curves (NRCan, 2019), most existing monitoring wells are not expected to respond noticeably to contaminants for millennia. Furthermore, groundwater flow

through tailings deposited into Pit A (i.e. displacing tailings pore waters) may only begin to discharge significantly to Third Portage Lake in several hundred years. NRCan recommends that the regulators establish the approximate expected duration of the monitoring program, and that the duration be consistent with the goals and expectations of the monitoring program(s) and the parameters to be monitored.

NRCan #2:
NRCan agrees with the proponent that the monitoring well locations should not be selected solely on 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. NRCan 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. However, NRCan notes that the location of monitoring wells cannot be made on the basis of field observations alone and must also take into consideration the predictions of groundwater flow and plume migration.

As noted in the proponent response to NRCan comment #1, the current groundwater monitoring wells were located on 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. NRCan's analysis of the proponent's simulated breakthrough curves and plume patterns (NRCan, 2019) concluded that the monitoring wells were not located in the main path of the predicted contamination plumes and therefore did not make effective monitoring wells for post-closure. Specifically, NRCan observed that 6 of the 8 monitoring wells are predicted to remain below 1 mg/L chloride (from the tailings) for more than 6000 years. The proponent did not respond to this statement.

NRCan is still of the opinion that the current monitoring network will not be effective for post-closure because it appears that most monitoring wells are not located along the direct flowpaths of the groundwater plumes and their locations are predicted to require millennia before increases in contaminant concentrations would be observable. NRCan had recommended that backwards particle tracking be used as a further test of the monitoring well locations with respect to the contaminant plumes. However, in NRCan's opinion, the breakthrough curves are sufficient to demonstrate the predicted ineffectiveness of the monitoring network without the backward particle tracking.

NRCan #3:
NRCan is satisfied that the proponent has stated that they will consider NRCan's recommendation with respect to the installation of new monitoring wells as part of the final closure plan and that their locations, depths and screen lengths will consider monitoring results and model updates to ensure they intercept the plume. NRCan was not aware that five piezometers were installed as part of each groundwater monitoring location. Such data should be incorporated into model calibration, verification and update.

NRCan #4:
The low concentration samples described by the proponent in response to this comment appears to be collected from the open talik rather than sub-permafrost groundwater. The description of borehole BH10-1 in the seepage zone of the former Second Portage Lake implies that this site would have sampled discharging sub-permafrost groundwater. NRCan cannot assess if this is the case. The response does seem to acknowledge the possible presence of sub-permafrost groundwater of sufficient salinity to result in density dependent flow. NRCan has raised the issue of sub-permafrost water quality to ensure

that it be considered; however, NRCan deems the issue of discharging pore water tailings to Third Portage Lake (from tailings in Pit A) to warrant more attention than the discharge of saline sub-permafrost groundwater.

NRCan #5:
NRCan made the suggestion of installing a monitoring well into the sub-permafrost groundwater at the north end of Pit A. The proponent believes that the model (V.4) is sufficiently conservative to assess potential upward groundwater flow into Third Portage Lake (Pit Lake). Both NRCan and the proponent acknowledge the difficulty of installing such a well. The proponent will explore the potential of installing a groundwater monitoring station near Pit A as part of the final closure plan. NRCan has no more comments concerning this suggestion.

References

AEM, 2019. Agnico Eagle Mines Limited – Meadowbank Division, 2AM-MEA1526 Notice of Application, & Commencement of Technical Review, Responses to Natural Resources Canada Technical Review Comments, 23 January 2019.
AEM, 2018a. In-Pit Disposition. NR-CAN information request responses. 16 July 2018.
AEM, 2018b. Agnico Eagle Mines Limited – Meadowbank Division, 2AM-MEA1526, Proposed Modification, NWB In-Pit Tailings Disposal, Comment Responses, August 17, 2018.
NIRB, 2018. Nunavut Impact Review Board, Reconsideration Report and Recommendations, In-Pit Tailings Disposal Modification, Agnico Eagle Mines Ltd., NIRB File No.: 03MN107. 31 August 2018
NRCan, 2019. Re: 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 – Natural Resources Canada comments on results of Version 4 hydrogeological modelling. Letter from NRCan to the Nunavut Water Board. 18 January 2019.
NRCan, 2018a. Information Requests for Agnico Eagle Mine’s In-Pit Tailings Disposal Modification (NIRB File No. 03MN107), Natural Resources Canada, Submission to the Nunavut Impact Review Board, 9 July 2018.
NRCan, 2018b. Final Written Submission, Agnico Eagle Mine’s In-Pit Tailings Disposal Modification (NIRB File No. 03MN107), Natural Resources Canada, Submission to the Nunavut Impact Review Board, 3 August 2018.
NRCan, 2018c. NRCan’s Final Comments on the Proposal for In-Pit Tailings Disposal at the Meadowbank Mine. Natural Resources Canada, Submission to the Nunavut Water Board, 21 September 2018.
SNC-Lavalin, 2018. Meadowbank In-Pit Tailings Disposal - Thermal and Hydrogeological Modeling Update to Address NRCan's Comments. Memorandum to AEM. 655183-000-4GCA-0001 Rev 01, 14 December 2018.