Environment and Climate Change Canada | Environnement et Changement climatique Canada

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ECCC File: 6100 000 008/019
NWB File: 2AM-MEA1526

January 17, 2019

Via email at: licensing@nwb-oen.ca

Stephanie Autut
Executive Director
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Stephanie Autut:

RE: 2AM-MEA – Agnico Eagle Mines LImited – Meadowbank Gold Mine – Type A Water Licence Amendment

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned Type A Water Licence Amendment and is submitting the attached Technical Review Submission via email. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act*, and the pollution prevention provisions of the *Fisheries Act*.

Should you require further information, please do not hesitate to contact Emily Nichol (Environmental Assessment Coordinator) at (867) 669-4732 or Emily.Nichol@canada.ca.

Sincerely,

Margaret Fairbairn
A/Regional Director

cc: Bradley Summerfield, A/Head, Environmental Assessment North (NT and NU)
Ryan Vanengan, Agnico Eagle Mines Limited – Meadowbank Division

Environment and Climate Change Canada
Environnement et Changement climatique Canada

ENVIRONMENT AND CLIMATE CHANGE CANADA'S TECHNICAL REVIEW SUBMISSION TO THE NUNAVUT WATER BOARD

RESPECTING THE TYPE A WATER LICENCE AMENDMENT FOR MEADOWBANK GOLD MINE PROPOSED BY AGNICO EAGLE MINES LIMITED

JANUARY 17, 2019

Canada

Executive Summary

Agnico Eagle Mines Limited (the Proponent) is proposing a modification to their original Meadowbank Gold Mine Project (the Project) in order to deposit tailings from the Whale Tail Project into the Goose and Portage Pits at the Meadowbank mine site. The proposed modification requires an amendment to the Type A Water Licence in order to deposit the tailings slurry subaqueously within the pits. At closure, the Proponent will cover the deposited tailings with at least eight metres of water prior to breaching the dikes and connecting the pit waters to Third Portage Lake.

ECCC provides specialist expert information or knowledge to the Nunavut Water Board (NWB) as required under Article 13 of the *Nunavut Agreement*. ECCC has participated in all phases of the Water Licence process for the Project thus far and is continuing its participation through this Technical Review Submission, which ECCC is providing to the NWB for consideration.

ECCC's submission contains our expert advice on the Proponent's proposed Amendment to their Type A Water Licence including outstanding concerns and associated recommendations for consideration by the NWB. The comments and recommendations provided are based on ECCC's mandate in the context of the *Canadian Environmental Protection Act* (CEPA) and the pollution prevention provisions of the *Fisheries Act.* This Technical Review Submission also summarizes previously identified technical issues that the Proponent has committed to resolving.

ECCC's outstanding comments and recommendations are with respect to the hydrogeological and contaminant transport modeling for the pit lake and Second Portage and Third Portage lakes, and updating the Interim Closure and Reclamation Plan to include commitments made by the Proponent throughout the Nunavut Impact Review Board's (NIRB) and NWB's concurrent review of the Project.

List of Acronyms

CEPA	*Canadian Environmental Protection Act*
ECCC	Environment and Climate Change Canada
MBCA	*Migratory Birds Convention Act*
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
SARA	*Species at Risk Act*

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1.0 Introduction

Agnico Eagle Mines Limited (the Proponent) is proposing a modification to their original Meadowbank Gold Mine Project (the Project) in order to deposit tailings from the Whale Tail Project into the Goose and Portage Pits at the Meadowbank mine site. The proposed modification requires an amendment to the Proponent's Type A Water Licence in order to deposit the tailings slurry subaqueously within the pits. At closure, the Proponent will cover the deposited tailings with at least eight metres of water prior to breaching the dikes and connecting the pit waters to Third Portage Lake.

The Proponent submitted a proposal for an amendment to their Type A Water Licence to the Nunavut Water Board (NWB) for the Meadowbank Mine Project on February 26, 2018. The start of the amendment review process by the NWB was contingent on the consideration of the Nunavut Planning Commission's land use planning and Nunavut Impact Review Board's (NIRB) impact assessment processes.

ECCC provides specialist expert information or knowledge to the NWB as required under Article 13 of the *Nunavut Agreement*. ECCC has participated in all phases of the Water Licence process for the Project thus far and is continuing its participation through this Technical Review Submission, which ECCC is providing to the NWB for consideration.

The comments and recommendations provided are based on ECCC's mandate in the context of the *Canadian Environmental Protection Act* (CEPA), the pollution prevention provisions of the *Fisheries Act*.

A summary of ECCC's mandate and legislation is provided in Section 2.0. ECCC's technical review comments and recommendations for the outstanding issues are provided in Section 3.0. Technical issues that have been previously identified by ECCC and which the Proponent has committed to resolving are summarized in Section 4.0.

ECCC's comments and recommendations are provided with respect to hydrogeological and contaminant transport modeling for the pit lake and Second Portage and Third Portage lakes and updating the Interim Closure and Reclamation Plan to include commitments made by the Proponent throughout NIRB's and NWB's concurrent review of the project.

2.0 ECCC's Mandate, Roles, and Responsibilities

The mandate of ECCC is determined by the statutes and regulations under the responsibility of the Minister of Environment and Climate Change. ECCC's specialist advice is provided in the context of CEPA, the pollution prevention provisions of the *Fisheries Act*, the *Species at Risk Act* (SARA), and the *Migratory Birds Convention Act* (MBCA).

ECCC administers the pollution prevention provisions of the *Fisheries Act*, which prohibits the deposit of a deleterious substance into fish-bearing waters. ECCC also participates in the regulation of toxic chemicals and the development and implementation of environmental quality guidelines pursuant to CEPA.

Additional information on ECCC's mandate can be found at: https://www.canada.ca/en/environment-climate-change/corporate/acts-regulations/acts-administered.html.

3.0 ECCC's Technical Review Comments

These technical review comments summarize the results of ECCC's review of the outstanding issues and the additional information provided by the Proponent in the Water Licence Amendment Application.

3.1 ECCC# 1 – Updated Hydrogeological Modelling: Climate Change

References

- SNC Lavalin Technical Memorandum dated December 14, 2018. Meadowbank In-Pit Tailings Disposal - Thermal and Hydrogeological Modeling Update to Address Natural Resources Canada's Comments.

Proponent Conclusion

The SNC Lavalin Technical Memorandum states that, "climate warming was projected for 100 years after pit closure and it is assumed will remain constant beyond 100 years" (Page 3, Section 2.2 – Methodology). The Memorandum also states that, "a projected climate warming with 4°C increase within 100 years after closure was assumed based on IPCC (IPCC, 2014), but no warming trend was projected further beyond" (Page 4, Section 2.3 – Assumptions and Boundary Conditions).

ECCC Conclusion

Use of a 100 year time frame for climate warming is a reasonable practice, but may understate the timing and extent of talik development and potential groundwater movement in the period beyond 100 years should warming trajectories continue. Following the completion of tailings deposition (2029), the predictions provided in the report should be reviewed and the thermal and hydrogeological modeling updated. This would inform the need for mitigation measures to be developed in the event of potential groundwater quality/transport issues.

ECCC Recommendation

ECCC recommends that the Proponent conduct updated thermal and hydrogeological modeling following the completion of tailings deposition (2029) and identify the potential requirement for mitigation measures to be developed.

3.2 ECCC# 2 – Updated Hydrogeological Modelling: Duration of Tailings Deposition

References

- SNC Lavalin Technical Memorandum dated December 14, 2018. Meadowbank In-Pit Tailings Disposal - Thermal and Hydrogeological Modeling Update to Address Natural Resources Canada's Comments.
- In-Pit Tailings Deposition Water Balance and Water Quality Forecast. SNC Lavalin. September 12, 2017.

Proponent Conclusion

The December 2018 The SNC Lavalin Technical Memorandum report and attached presentation state that tailings inputs will go into the pits from April 2018 to June 2029. The September 2017 In-Pit Tailings Deposition Water Balance and Water Quality Forecast report, which much of the updated modeling is based on, uses January 2018 to September 2028 as the period of tailings deposition.

ECCC Conclusion

It is unclear if the additional six months of deposition affects the water quality conclusions. It is also unclear whether or not tailings volumes were different for the two model runs; the 2017 report specifies tonnage of 4,003,786 for Portage/Vault, 11,497,499 for Whale Tail, and 18,882,000 for Future Ore Bodies, the 2018 report does not include tailings tonnage.

ECCC Recommendation

ECCC recommends that the Proponent clarify the currently anticipated timing for tailings deposition and identify any differences between the 2017 and 2019 modeling associated with timing/volumes of tailings deposited.

3.3 ECCC# 3 – Updated Hydrogeological Modelling: Arsenic and Chloride Transport

References

- SNC Lavalin Technical Memorandum dated December 14, 2018. Meadowbank In-Pit Tailings Disposal - Thermal and Hydrogeological Modeling Update to Address Natural Resources Canada's Comments.
- C.F. Andrade, C.F, H.E. Jamieson, T.K. Kyser, T. Praharaj and D. Fortin. 2009. Biogeochemical redox cycling of arsenic in mine-impacted lake sediments and co-existing pore waters near Giant Mine, Yellowknife Bay, Canada. Applied Geochemistry 25:199-211.

Proponent Conclusion

The SNC Lavalin Technical Memorandum states that, “higher hydraulic heads at the northern limit of the model along with the open talik below Pit A lead to an upward vertical gradient in the northern part of Pit A. If the maximum chloride upward flux at the northern part of Pit A is applied to Pit A lake area, Chloride and Arsenic mass fluxes into the overlying Pit A lake (and Third Portage Lake) will be 14 and 0.11 g/day, respectively” (Page 9, Section 3.4 – Hydrogeological and Contaminant Modeling Update).

ECCC Conclusion

Stated in mg/L, there will be 14,000 mg/day of chloride, and 110 mg/day of arsenic welling up through the pore water of the tailings in Pit A. Acknowledging that this will be occurring over a fairly large tailings surface with a large overlying volume of water, there is none-the-less concern with the behaviour of arsenic in the tailings. Cycling of arsenic in surficial sediments and pore waters, with remobilized arsenic, has been shown to produce a secondary enriched zone at the sediment water interface (Andrade et al. 2009). While Andrade et al. (2009) had different conditions from the Project conditions (e.g., arsenic source, organic matter, arsenic-reducing bacteria) arsenic accumulation in the pit lake tailings-water interface may still develop over time.

ECCC Recommendation

ECCC recommends that the Proponent identify the potential for accumulation of arsenic at the sediment-water interface of the pit lake.

3.4 ECCC# 4 – Closure Planning

References

- Agnico Eagle Mines Limited. August 17, 2018 03MN107 - In-Pit Tailings Disposal Final Written Submission Response
- Nunavut Water Board. Water Licence No: 2AM-MEA1525. Agnico-Eagle Mines Limited. Type A Water Licence Meadowbank Gold Mine. July 23, 2015.
- Golder Associates Ltd. for Agnico Eagle Mines Limited. Interim Closure and Reclamation Plan for the Meadowbank Gold Project, Version 2. January 2014.

Proponent Conclusion

The Proponent has made a number of commitments throughout the technical review process and in the Final Written Submission Response regarding:

- treatment of reclaim water,
- monitoring of the surface water quality at site,
- completing updates on an annual basis of the water management plan (which includes an update of the water balance, the water quality forecast and the water treatment requirements at closure),
- developing the Final Closure Plan which will include details on the final design of the water treatment plant and the detailed management strategy for pit lake treatment and brine and/or residual waste management of the treatment plant; and
- evaluating the feasibility for capping the tailings.

ECCC Conclusion

The current water licence for the Project expires in July of 2025, thus the Final Closure Plan would be submitted and much of the water treatment done under this existing licence, as per Part J. Item 2 (Page 21, Part J: Conditions Applying to Abandonment, Reclamation and Closure). This licence condition is not explicit with respect to water quality at closure as it references the 2014 Interim Closure and Reclamation Plan and does not cover the amended Project activities.

ECCC Recommendation

ECCC recommends that the commitments made by the Proponent throughout the technical review process regarding closure planning be incorporated into the next version of the Interim Closure and Reclamation Plan.

4.0 Previously Identified and Resolved Issues

The following issues have been previously identified throughout the review process: pit water treatment, management and treatment of wastewater, and feasibility of capping tailings. ECCC understands that these issues will be addressed in the Nunavut Water Board's review of the Type A Water Licence Amendment Application. The commitments made by the Proponent to resolve these issues have been summarized below.

4.1 Pit Water Treatment – ECCC# 1a

Reference

- Agnico Eagle Mines Limited. August 17, 2018 03MN107 - In-Pit Tailings Disposal Final Written Submission Response.

The Proponent has agreed to ECCC's recommendation regarding the stable disposal of treatment residuals outside of the pit (to be encapsulated in the waste rock disposal facility). Treatment would be introduced at the end of tailings deposition, and the Proponent states that the treatment plant details will be included in the Final Closure Plan (due 12 months prior to end of operation), noting that at that time, there will be additional data to inform planning.

4.2 Management and Treatment of Wastewater – ECCC# 2

Reference

- Agnico Eagle Mines Limited. August 17, 2018 03MN107 - In-Pit Tailings Disposal Final Written Submission Response.

ECCC has identified concerns with management and treatment of high-sulphate and total dissolved solids (TDS) wastewater, and recommended further work be done by the Proponent well in advance of closure planning and prior to re-flooding. The Proponent has agreed to this, and ECCC is satisfied this can be addressed during the regulatory process prior to the submission of the Final Closure Plan.

4.3 Feasibility of Capping Tailings – ECCC# 1b and 3

Reference

- Agnico Eagle Mines Limited. August 17, 2018 03MN107 - In-Pit Tailings Disposal Final Written Submission Response.

The Proponent has agreed to ECCC's recommendation to evaluate the feasibility of capping the tailings, and identify conditions where this may be warranted. In addition, the Proponent has agreed to monitor pore water quality and identify potential mitigation strategies if needed. This is satisfactory, and ECCC anticipates this would be done in the period leading up to development of the Final Closure Plan. However, timing should be identified, and predicted behaviour of the arsenic with respect to potential for cycling in the surficial tailings and pore water should be considered (as noted in Section 3.0 of this Technical Review Submission).

5.0 Acknowledgements

ECCC acknowledges and appreciates the effort that the Proponent has taken to address concerns brought forward by parties throughout the NIRB and NWB process. ECCC would like to thank the Board for this opportunity to provide input to the Type A Water Licence Amendment application review and looks forward to continuing its participation.

ECCC's technical review comments and recommendations are not to be interpreted as any type of acknowledgement, compliance, permission, approval, authorization, or release of liability related to any requirements to comply with federal or territorial statutes and regulations.