Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
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Your file - Votre référence
2AM-MEL1631

Our file - Notre référence
GCDocs#97850241

September 27, 2021

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
Sent via e-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) Review of the Meliadine Mine Water Quality Management Optimization Plan for Type "A" Water Licence No. 2AM-MEL1631

Dear Mr. Dwyer,

Thank you for the August 20, 2021 invitation to review the Meliadine Mine Water Quality Management Optimization Plan (WQ-MOP), submitted by Agnico Eagle Mines Limited, for Type "A" Water Licence No. 2AM-MEL1631.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the WQ-MOP pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. Please find CIRNAC comments and recommendations in the attached Technical Memorandum.

If there are any questions or concerns, please contact me at (867) 975-4689 or john.onita@canada.ca or Andrew Keim at (867) 975-4550 or andrew.keim@canada.ca

Sincerely,

John Onita,
Regional Water Coordinator

Canada

Technical Review Memorandum

Date: September 27, 2021

To: Richard Dwyer – Manager of Licensing, Nunavut Water Board

From: John Onita – Regional Water Coordinator, CIRNAC

Subject: **Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) Review of the Meliadine Mine Water Quality Management Optimization Plan for Type "A" Water Licence No. 2AM-MEL1631**

Region: ☐ Kitikmeot ☒ Kivalliq ☐ Qikiqtani

A. BACKGROUND

As documented in Appendix "A", Section 1.0, of the WQ-MOP, the Licensee states in Paragraph 3 that:

"On 24 March 2020, Agnico Eagle submitted an emergency request for an amendment to their Type "A" Water Licence (No. 2AM-MEL-1631), specifically seeking the following amendment:

- *Authorization to temporarily discharge water from Containment Pond 1 (CP1) to Meliadine Lake that contains a maximum average TDS concentration up to 3,500 mg/L, which exceeds the current limit described in Part F, Item 3 of the current Water Licence of 1,400 mg/L*

The emergency request issued by Agnico Eagle was based on the determination that the water storage capacity of CP1 would be exceeded if dewatering was not conducted prior to or in conjunction with the 2020 spring freshet. If the dewatering was not permitted, and the water storage capacity of CP1 was exceeded, this could represent a significant risk to site infrastructure, as well as human and environmental health.

On 29 April 2020, the Nunavut Water Board recommended approval of Licence Amendment 1 for Agnico Eagle's Type "A" Water Licence, which permits the following:

- *The time-limited discharge (May 2020 – October 2020) of effluent from the Containment Pond 1 (CP1) into Meliadine Lake through the Meliadine Lake Diffuser (Monitoring Program Station MEL-14) and the water discharge shall not exceed 3,500 mg/L for the Maximum Average Concentration (MAC) of the Total Dissolved Solids (TDS)"*

NWB's approval of the Emergency Amendment 1 was based on conditions specified by NWB's Reasons for Decision which required the Licensee in part, to conduct a Water Quality

Study. Responding to the NWB's directive, the Licensee adopted a "Phased Approach" for the WQ-MOP framework it developed which was described as:

- Phase 1: Develop Interim TDS Targets for effluent discharge into Meliadine Lake.
- Phase 2: Conduct Validation Study against the Interim TDS Targets and provide information on receiving environment assimilation capacities.
- Phase 3: Finalize Meliadine Mine Benchmarks by integrating the results of Phase 1 and Phase 2 and provide recommendation on acceptable TDS Targets for Meliadine Lake.

The Licensee implemented its WQ-MOP validation framework as itemized above and concluded as follows:

- *TDS concentrations measured in the discharge were consistently below the MAC of 3,500 mg/L in each of the weekly sampling events and ranged between 1,340 and 3,100 mg/L measured TDS [Appendix B, Section B5.0, Page 40].*

- *The discharge was not acutely toxic in 18 rounds of acute toxicity tests conducted on Daphnia magna and Rainbow Trout, as the LC_{50} values were >100% discharge in each of the tests. No survival data for either species indicate that full strength discharge is approaching concentrations causing mortality [Appendix B, Section B5.0, Page 40].*

- *Adverse toxicological effects were not identified during the chronic toxicity testing at MEL-14 from July to September. The additional round of chronic toxicity testing of MEL14 in October at a measured TDS concentration of 2,740 mg/L (2,500 mg/L calculated TDS) did not indicate impairment on fathead minnow, Hyalella Azteca, or Daphnia magna. However, chronic effects to Lemna minor frond count were noted in full strength effluent as well as the 48.5% and 24.2% concentrations when compared to the laboratory controls. The October Lemna minor frond count results does not align with the previous rounds of testing with IC_{50} greater than 97% at TDS concentrations ranging between 1,700 and 1,850 mg/L measured TDS (1,200 and 1,400 mg/L calculated TDS). Although this test result was anomalous, it remains protective of a TDS concentration of 1,000 gm/L [Appendix B, Section B5.0, Page 40].*

- *Consistent with the low TDS concentration results reported in the receiving environment, adverse toxicological effects were not identified during the monthly chronic toxicity testing programs of the receiving environment, In the few cases where statistically significant differences were identified, they were found not to be linked to degree of discharge influence, but rather to other sources of variance [Appendix B, Section B5.0, Page 40].*

Based on these conclusions, the Licensee is recommending to the NWB as per Phase 3 of the WQ-MOP that:

"The interim TDS targets for the discharge and receiving environment developed under Phase 1 be ratified as regulatory targets for TDS as Effluent Quality Criterion (EQC) for discharge and Site-Specific Water Quality Objective (SSWQO) for the receiving environment that will be applicable to future operating conditions at the Meliadine Mine. Specifically:

- *The MAC of TDS of 3,500 mg/L and the maximum grab concentration (MGC) of TDS of 4,500 mg/L for discharge from CP1 to Meliadine Lake (i.e., EQC); and*

- *The benchmark concentration of TDS of 1,000 mg/L to be achieved at the edge of the mixing zone in Meliadine Lake, which would also be consistent with the SSWQO for longer-term management of the receiving environment of Meliadine Lake". [Appendix B, Section B5.0, Page 41].*

Based on this, the amended Water Licence was approved on June 23, 2021 which approved the Licensee's request to ratify a TDS discharge target of 3,500 mg/L into Meliadine Lake.

On August 20, 2021 CIRNAC received an invitation from the NWB to review the Meliadine Mine WQ-MOP, submitted by the Licensee which provides results of the Toxicity tests conducted from July through October 2020, to show effects of the approved TDS discharge target of 3,500 mg/L on *Daphnia magna, Lemna minor* and other pollution indicator species in Meliadine Lake, as directed by the NWB.

CIRNAC provides the following comments and recommendations pertaining to the Meliadine Mine WQ-MOP review. A summary of the subjects of recommendations can be found in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B.

Table 1: Summary of Recommendations

Recommendation Number	Subject
R-01	Licensee to monitor Water Quality

B. DOCUMENTS REVIEWED AND REFERENCED

The following table (Table 2) provides a list of the documents reviewed under the submission and reference during the review.

Table 2: Documents Reviewed and Referenced

Document Title	Author, File No., Rev., Date
210820 2AM-MEL1631 Water Quality MGMT Optimization Plan-IMLE_Rev4b-IMLE; Pahse 3: Meliadine Mine Effluent Discharge Benchmarks for Total Dissolved Solids	Golder Associates Ltd; August 10, 2021
160415 2AM-MEL1631 Water Licence OVCE	Nunavut Water Board; April 1, 2016

C. Recommendation:

(R-01) CIRNAC recommends that the Licensee continues water quality monitoring at Meliadine Lake and report on exceedances above permitted limits for parameters as stated in the Water Licence.

D. REFERENCES

Department of Crown-Indigenous Relations and Northern Affairs Act (2019)

Nunavut Water Board Type “A” Water Licence 2AM-MEL1631; NWB, April 1, 2016

Nunavut Waters and Nunavut Surface Rights Tribunal Acts (2016); *Nunavut Water Board*

Water Quality MGMT Optimization Plan-IMLE_Rev4b-IMLE; Pahse 3: Meliadine Mine Effluent Discharge Benchmarks for Total Dissolved Solids; *Golder Associates Ltd*; August 10, 2021