Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6100 000 012/015
NWB File: 2AM-MEL1631

January 29, 2021

via email at: licensing@nwb-oen.ca

Richard Dwyer
Manager Licencing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Richard Dwyer,

RE: 2AM-MEL1631 Agnico Eagle Mines Ltd. - Meliadine Water Licence Amendment Application

Environment and Climate Change Canada (ECCC) attended the Technical Meeting for the above-noted project on November 30, 2020, after which a *List of Commitments* by the Project Proponents and Interveners was shared. ECCC is providing the following information to the Nunavut Water Board in response to Commitment #16, which requested ECCC to:

> *"Provide clarification of their position [with appropriate supporting rationales and evidence] on Agnico Eagle's proposed Maximum Grab sample limits of 5,000 mg/L for TDS, taking into consideration commitment 15."*

ECCC's specialist advice is based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act.*

1. Proposed Maximum Grab Concentration Limit of 5000 mg/L

References:

- List of Commitments Resulting from the Technical Meeting held on November 30, 2020 for Amendment Application to the Water Licence No: 2AM-MEL1631
- Technical Memorandum dated Dec. 8, 2020. Meliadine Lake Effluent – Summary of Rationale for Effluent Quality Criterion – Maximum Grab Concentration
- Water Quality Management and Optimization Plan Progress Update Rev4. Phase 3: Meliadine Mine Effluent Discharge Benchmarks for Total Dissolved Solids. Nov. 13, 2020
- Water Quality Management and Optimization Plan Progress Update Rev3 Section 4.0 Phase 3: Finalize Meliadine Mine Benchmarks. Aug. 24, 2020
- Water Management Working Group Tabulated Data – Excel file dated Nov. 4, 2020

Background:

Agnico Eagle has applied for Total Dissolved Solids (TDS) effluent quality criteria (EQC) of 3500 mg/L (calculated) Maximum Average Concentration (MAC) and 5000 mg/L (calculated) Maximum Grab Concentration (MGC). Monitoring and assessment of discharges under the 2020 permitted emergency discharge was done to evaluate the effects of releasing effluent with up to 3500 mg/L MAC TDS (measured). Over the course of the discharge season, effluent TDS concentrations ranged from 1340 to 3100 mg/L (measured), with a median TDS concentration of 1815 mg/L (measured) or 1400 mg/L (calculated) as calculated from the spreadsheet data provided to the Water Quality Working Group. The MAC did not exceed 2150 (calculated) or 2973 mg/L TDS (measured). It is not clear that a MGC of 5000 mg/L is needed, and that concentration has not been evaluated for the receiving environment.

Discharge TDS June 5 – Oct. 2, 2020	Average	Median	Min	Max	Range of MAC[(a)]
Calculated TDS (mg/L)	1676.5	1400	1000	2600	1150-2150 (median 1750)
Measured TDS (mg/L)	2039.6	1815	1340	3100	1460-2973 (median 1805)

[(a)]Calculated as the running average of any 4 consecutive concentrations

Evaluation of proposed Effluent Quality Criterion (EQC):

Monitoring of plume behaviour, measurement of effluent and receiving environment TDS concentrations, and toxicity testing were done to characterise the behaviour and effects of the effluent discharged under the Water Licence Emergency Amendment. The effluent TDS limit of 3500 mg/L MAC (measured) was not reached in any of the individual samples collected and analysed during the monitoring program.

The Water Quality Monitoring and Optimization Plan (WQMOP) early iterations, up to and including Rev. 3 dated Aug. 24, 2020 did not assess discharge at 5000 mg/L; measured TDS concentrations of up to 3500 mg/L were discussed and evaluated for fate and effects. The WQMOP Rev3 did include 5000 mg/L TDS as a 'Red Level 3' Adaptive Management Level, where 2 consecutive TDS concentrations above 5000 mg/L would result in ceasing pumping, and noted that the MAC would need to be finalized in validation studies. In support of this, Agnico Eagle

completed a supplemental investigation of toxicity using water from Containment Pond 1. The purpose of this study was stated as: "*Specifically, the work provides a partial validation of both the interim effluent quality criterion (EQC) for total dissolved solids (TDS) of 3500 mg/L and the interim site-specific water quality objective for TDS of 1000 mg/L*." TDS concentrations of 1080 to 4970 mg/L (calculated) were tested using *Ceriodaphnia dubia*. Chloride concentrations in the test solutions ranged from 535-2510 mg/L. Findings were reported in WQMOP Rev 4, which summarized the results of the monitoring and toxicity testing, and concluded that "*Based on these observations, and the testing completed on site in 2018 and 2019, the MAC (3,500 mg/L) and a MGC of TDS of 5,000 mg/L can be adopted as firm benchmarks (i.e., as EQCs) for managing the discharge*."

ECCC noted in the November 30, 2020, Technical Meeting that there are concerns with the toxicity to *C. dubia* at 5000 mg/L as well as the lack of discussion and receiving environment evaluation of discharging at 5000 mg/L TDS. Additionally, Agnico Eagle proposes to use calculated TDS rather than measured TDS[1]. As observed for previous sample results, this difference could mean measured TDS in effluent of approximately 20-25% higher concentrations.

In response to concerns raised, Agnico Eagle provided a technical memo dated Dec. 8, 2020 providing their rationale for the Maximum Grab Concentration of 5000 mg/L TDS. Under *Section 1.0 Background for Maximum Grab Concentration* the statement is made that following discussions of the adaptive management triggers with the Kivalliq Inuit Association, interim targets were agreed to for the discharge of 3500 mg/L MAC and 5000 mg/L MGC TDS on a calculated sum basis (bottom of page 2). This does not reflect ECCC's understanding and position; we note that the last Water Quality Working Group Meeting #5 was November 6, 2020, in advance of the submission of WQMOP Rev 4 which proposed the 5000 mg/L as a firm MGC limit, and no subsequent Working Group or ECCC discussions were held on this specifically.

As noted in the Dec. 8 memo, the Meliadine Gold Mine operates under the Metal and Diamond Mining Effluent Regulations (MDMER). These regulations evaluate acute toxicity based on rainbow trout and *Daphnia magna* bioassay tests, and include an Environmental Effects Monitoring component, which requires sub lethal toxicity testing (including *Ceriodaphnia dubia*) of effluent. ECCC does not disagree with the conclusion of the Technical Memo that *"…5000 mg/L TDS (approximately 2500 mg/L chloride) is protective against acute toxicity as defined under MDMER…"* however, there was demonstrated mortality at that concentration to a sensitive zooplankton species, and the additional loadings associated with higher-than-evaluated discharge concentrations have not been reviewed. While ECCC has reservations about the protectiveness of the 5000 mg/L MGC limit on the receiving environment given the demonstrated impacts to sensitive species and the unknown impacts of additional loadings, ongoing monitoring

[1] Measured vs. calculated TDS:

Measured TDS provides the most accurate representation for TDS as it includes all possible sources of ions. While calculated TDS includes the largest chemical contributors, it is not exhaustive and may become unreliable if the chemistry of the sample changes. All analytical methods are subject to interferences; however, the measured TDS method is designed to mitigate sources of error. Measured TDS methods include requirements to store samples in desiccators and decrease sample volume if there is a potential for the sample to form a water trapping crust (caused by high TDS values).

of the effluent quality and toxicity test data can provide evidence of any potential need to revisit the proposed EQC.

ECCC notes that protection of the receiving environment is addressed in large measure by the Adaptive Management Strategy (Table 3, page 9, WQMOP Rev. 4) which includes thresholds that trigger action should the 3500 mg/L limit be exceeded two or more times, or if the proposed MGC is reached. The next update of the Adaptive Management Plan, due January 29, 2021, will include identifying conditions under which a site-specific water quality objective for chloride would be developed. Chloride is a main parameter of concern with respect to toxicity in the effluent, and is approximately 50% of the calculated TDS concentration. If the ionic composition of the effluent changes and the proportion of chloride increases, it would be appropriate to identify an EQC for chloride as well as receiving environment benchmarks.

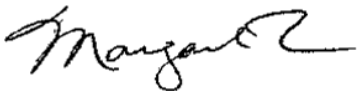
Recommendations:

ECCC recommends that:

- Use of a lower TDS Maximum Grab Concentration limit would be more conservative and in line with observed and evaluated concentrations;
- If the proposed TDS EQC of 5000 mg/L (calculated) Maximum Grab Concentration is granted, that ongoing review of sublethal toxicity testing conducted under the Environmental Effects Program or other monitoring be done, along with monitoring of receiving environment conditions;
- Changes (increases) in the chloride proportion in effluent be monitored, and benchmarks for effluent and receiving environment chloride concentrations be identified.

If you need more information, please contact Victoria Shore at Victoria.Shore@canada.ca.

Sincerely,



Margaret Fairbairn, Acting Regional Director
Environmental Protection Operations Directorate, Prairie Northern Region

cc: Brian Asher, Acting Head, Environmental Assessment North (NT and NU)