Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6100 000 008/021
NWB File: 2AM-MEA1530

March 28, 2025

via email at: licensing@nwb-oen.ca

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

Dear Richard Dwyer:

RE: 2AM-MEA1530 – Agnico Eagle Mines – Meadowbank Mine – Site Specific Water Quality Objectives – Round #3 comments

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned site-specific water quality objectives.

ECCC provides expert information and knowledge to project assessments on subjects within the department's mandate, including climate change, air quality, water quality, biodiversity, environmental preparedness and emergencies. This work includes reviewing proponent characterization of environmental effects and proposed mitigation measures. We provide advice to decision-makers regarding a proponent's characterization of environmental effects, the efficacy of their proposed mitigation activities, and may suggest additional mitigation measures. Any comments received from ECCC in this context does not relieve the proponent of its obligations to respect all applicable federal legislation.

The following comments are provided:

1. **Site-Specific Water Quality Objective**

Reference(s)

- Appendix B: Revised TDS SSWQO Report
- Canadian Council of Ministers of the Environment (CCME). 2007. A protocol for the derivation of water quality guidelines for the protection of aquatic life 2007. In: Canadian environmental quality guidelines

Comment

The approaches used by proponent for development of a species sensitivity distribution (SSD) to support the Total Dissolved Solids (TDS) Site Specific Water Quality Objectives (SSWQO) are not consistent with Canadian Council of Ministers of the Environment (CCME) (2007). Namely, in compiling the dataset used for the SSD (Table 1-5) many unacceptable geomeans were taken among disparate endpoints which either measured different effects (e.g. growth, mortality, length), different endpoints (EC25, IC20, NOEC (no observable effect concentration)) or represented different exposure durations (e.g. 28 d and 35 d). As such, the endpoint selection should be revisited and geomeans recalculated for the following species: rainbow trout, fathead minnow, *H. azteca*, *C. triangulifer*, and *C. dilutus*. The geomeans should only be taken for endpoints that represent the same effect measurement, equal exposure duration, same life stage and conducted under similar water quality conditions.

The endpoint used to represent fathead minnow is problematic as it combined an unbounded NOEC (>2211 mg/L) for various measures (i.e., length, survival, post-hatch survival, proportion normal, hatch rate) with a bounded NOEC for dry weight (487 mg/L) which is unacceptable. As per CCME (2007), the recommendation would be to calculate a maximum acceptable toxicant concentration (MATC) for this study using the lowest observable effect concentration (LOEC) (600 mg/L) and NOEC (487 mg/L) for dry weight to yield an MATC of 541 mg/L. The NOEC and LOEC determined by Nautilus Environmental Ltd. for fathead minnow was subsequently rendered by WSP Canada Inc. of questionable reliability given the low effect sizes seen in dry weight for the treatment groups and the inability to fit the data to a concentration-response curve. To be conservative, it is recommended the MATC from this study be retained in the dataset or the 34-d IC10 of 500 mg/L (Wang et al. 2016) be used, since this value aligns well with the MATC and suggests fathead minnow are one of the more sensitive species among those included in the dataset.

Another omission from the SSD is the absence of 28-d LC10 of 502 mg/L for *Villosa iris* (Wang et al. 2016). This endpoint should also be retained in the SSD as there was no reason provided for its exclusion.

Including the above-mentioned endpoints will have the effect of lowering the SSWQO which will be consistent with the protection goals for Canadian water quality guidelines (CCME 2007). ECCC acknowledges that the Board may choose to set different SSWQO based on site-specific protection goals.

ECCC Recommendation(s)

To increase consistency with CCME (2007) ECCC provides the following recommendations:

- Endpoint selection should be revisited and geomeans recalculated for rainbow trout, fathead minnow, *H. azteca*, *C. triangulifer*, and *C. dilutus*
- For fathead minnow, the MATC (541 mg/L) be retained in the dataset or the 34-d IC10 of 500 mg/L (Wang et al. 2016) be used
- include the 28-d LC10 of 502 mg/L for *Villosa iris* (Wang et al. 2016) in the SSD.

2. Changes to Ionic Composition

Reference:

- ECCC-R-6

Comment

The response to ECCC-R-6 states that, *"if future effluent quality with respect to TDS constituents is markedly different, then re-evaluation of the dataset underlying the proposed TDS benchmark would be considered."* ECCC agrees with this approach, but notes that a specific trigger should be provided for what would be considered "markedly different" to increase clarity for all parties when a re-evaluation of the TDS dataset would be required such that the changes in TDS composition do not result in unanticipated effects to aquatic life.

ECCC Recommendation

ECCC recommends that, if the SSWQO is approved, the Proponent provide wording on the specific conditions (i.e. degree of change/divergence in ionic composition) that would trigger re-evaluation of the TDS dataset.

3. Extent of Mixing Zone

Reference

- Appendix C: Assimilative Capacity Assessment of Wally Lake Meadowbank Mine
  - Section 2.3 – Model Assumptions and Limitations

Comment

The assimilative capacity assessment states that, *"the edge of the mixing zone was set where a minimum dilution factor of 2:1 was achieved. As the model does not predict spatial variations for concentrations within the mixing zone or the lake itself, the size or extent of the mixing zone was not needed."* Due to the process of assimilation, a mixing zone results in the potential to exceed water quality objectives within a defined area, prior to achieving guidelines at an established location (edge of mixing zone). Mixing zone dimensions should be as small as practicable and not impair the use of the water body as a whole. The dimensions of the mixing zone (i.e. distance from discharge) and the defined point at which site-specific water quality guidelines are expected to be met is an important consideration in understanding potential effects to aquatic life both within the mixing zone and in the overall water body.

Recommendation

ECCC recommends the Proponent quantify the dimensions of the mixing zone in Wally Lake and the distance from the discharge point where the SSWQO would be expected to be achieved based on the 2:1 dilution factor used in the Assimilative Capacity Assessment.

If you need more information, please contact Russell Wykes at (867) 445-1263 or Russell.Wykes@ec.gc.ca.

Sincerely,

Wykes, Russell

Digitally signed by Wykes, Russell
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Russell Wykes
Senior Environmental Assessment Officer

cc: Eva Walker, Head, Environmental Assessment North (NT and NU)