Environmental Protection Operations Directorate
Prairie & Northern Region
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

ECCC File: 6100 000 012/012 / 6100 000 012/015
NIRB File: 11MN034
NWB File: 2AM-MEL1631

June 20, 2022

via email at: info@nirb.ca and licensing@nwb-oen.ca

Karen Costello
Executive Director
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, NU X0B 0C0

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

Dear Karen Costello and Richard Dwyer,

RE: 11MN034 / 2AM-MEL1631 – Agnico Eagle Mines Ltd. – Meliadine Gold Project 2021 Annual Report

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Impact Review Board (NIRB) and the Nunavut Water Board (NWB) by Agnico Eagle Mines Ltd. (the Proponent) regarding the above-mentioned Annual Report.

ECCC is providing technical, science-based information and knowledge based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*. These comments are intended to inform the assessment of this project's potential effects in the receiving environment and on valued ecosystem components. 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. Radium-226 Units

Reference(s)

- Annual Report Section 3.2 – Figure 17. Forecasted versus observed radium concentrations in TIRI02
- Appendix 5 – Table 4

Comment

Units shown for Radium-226 are mg/L rather than the standard Bq/L.

ECCC Recommendation(s)

Confirm the units for Radium-226 as Bequerels/liter (Bq/L) or provide the conversion done.

2. Ammonia and Total Phosphorus in CP1

Reference(s)

- Annual Report Section 3.2.2 Surface Contact Water Quality Model Results
- Appendix 5 – Figure 11

Comment

The updated model results indicate that ammonia (NH_3) and total phosphorus (TP) were over-predicted in comparison to observed levels in CP1. The annual report noted that further investigation was required to identify whether nutrient attenuation is occurring due to algal growth in CP1. The 2021 AEMP documented higher chlorophyll-*a* in near-field and mid-field exposure areas, which may be consistent with nutrient export from CP1, but would not be consistent with lower levels in CP1. Further review to identify the reasons for the differences between modeled and observed concentrations is warranted.

Figure 11 in Appendix 5 shows comparisons of observed vs forecasted phosphorus concentrations. There are no under-ice sample data points which would validate the predicted spikes in TP concentrations due to cryoconcentration and/or internal recycling of phosphorus. Consideration could be given to conducting limited winter sampling to identify TP levels under ice to validate the range of predictions.

ECCC Recommendation(s)

ECCC recommends review of the modeling for ammonia and total phosphorus in CP1 to identify the source of the discrepancy in observed vs predicted concentrations, and that consideration be given to validating under-ice predictions.

3. Definitions for IC25 and QA/QC Blanks

Reference(s)

- Appendix 32-1 AEMP Design Plan
    - List of Abbreviations
    - Section 5.1.5 Quality Assurance/Quality Control

Comment

IC25

The ICp is the inhibiting concentration for a specified percent effect, such as a 25% reduction in growth. The definition for IC25 provided should be corrected from “inhibition concentration affecting 25% of tested organisms” to “effluent concentration that causes a 25% inhibitory

effect in the sublethal endpoint being measured". The definition provided is for EC25 rather than IC25.

QA/QC

Errata note: The descriptions of travel and field blanks in the AEMP Design QA/QC section on page 44 have been transposed and should be corrected.

ECCC Recommendation(s)

ECCC recommends revising the definitions as noted, for clarity.

4. QA/QC Blanks

Reference(s)

- Appendix 18 AEMP Report – Section 4.4.5 Quality Assurance and Quality Control

Comment

Water chemistry QA/QC included "Six deionized water blanks (DI) and three equipment blanks…"

It is not clear whether the blanks included travel blanks or were all field blanks, which would make a difference for the samples showing the presence of analytes and the subsequent conclusions to be drawn.

ECCC Recommendation(s)

ECCC recommends that the Proponent clarify the use of QA/QC blanks, noting the different purposes between field and travel blanks.

5. Low Action Levels – Phytoplankton Assessment Criteria

Reference(s)

- Appendix 32-1 AEMP Design – Table 8-2 Proposed Low Action Levels for Toxicological Impairment for Meliadine Lake

Comment

The first part of the Phytoplankton Assessment Criteria is "Phytoplankton community metrics at the Near-field area beyond the range of baseline/reference conditions"

For toxicological impairment, most of the metrics would demonstrate a lower value (e.g. density and biomass), but using the descriptive term "beyond" implies higher. This should be clarified by describing the trigger as "below" or "outside" the range of baseline/reference conditions.

Footnote (c) is missing for this table.

ECCC Recommendation(s)

ECCC recommends revision of the assessment criteria statement to specify “below” or “outside” rather than “beyond” the range of baseline/reference conditions and that footnote (c) be completed.

6. Proposed Action Levels for Nutrient Enrichment Hypothesis

Reference(s)

- Appendix 32-1 AEMP Design – Table 8-3 Proposed Action Low Action Levels for Nutrient Enrichment for Meliadine Lake

Comment

In order to meet the Low Action Level for Water Quality, the following three conditions are proposed to have to exist:

- Concentrations of TP in the Near-field area above the normal range, supported by temporal trends AND
- A statistically significant relative difference between the Near-field area and Reference for TP AND
- Lake-wide average phosphorus concentration exceeds 75% of AEMP Benchmark

Considering the extent and volume of Meliadine Lake, the third condition would almost certainly never be measured, and to be met would entail an increase of significant magnitude in TP loadings and ensuing concentrations. The AEMP Benchmark has been set at 0.010 mg/L TP to reflect the upper bound of the oligotrophic status, and the Action level trigger would be 0.0075 mg/L TP. A more timely and realistic trigger condition would be on the basis of near-field rather than lake-wide change.

ECCC Recommendation(s)

ECCC recommends amending the third condition by replacing “lake-wide” with “near-field”.

7. Tissue Chemistry – Threespine Stickleback

Reference(s)

- Appendix 18 AEMP Report

Comment

Fish tissue results from MEL-01 in 2021 documented higher concentrations of calcium, arsenic, manganese, strontium, and uranium in Threespine Stickleback compared to the reference areas and compared to baseline tissue chemistry results from 2015. Arsenic, manganese and strontium were also higher in sediments in 2021 than in 2018, and arsenic, strontium and uranium concentrations have increased in water in the east basin of Meliadine Lake since baseline. While none of theses parameters triggered action levels, the potential

increasing trend in water, sediments, and fish tissue should be tracked in future monitoring and a weight-of-evidence approach used to assess cause and overall effects.

ECCC Recommendation(s)

ECCC recommends continued monitoring and evaluation of parameters that are showing consistent increases in biotic and abiotic components of the Meliadine Lake ecosystem.

8. Acid Rock Drainage

Reference(s)

- Annual Report Section 4.2.4 Filtered Tailings ARD Potential

Comment

Proponent states, despite the uncertain classification of the majority of the tailings samples over the 2019-2021 period, Agnico Eagle does not consider the tailings to pose an ARD risk for the site, for the following reasons:

- the tailings are being stored in a facility that will freeze back (i.e. re-develop permafrost) and inhibit water movement within a few years post-operations;
- placement of the tailings includes compacting by a vibrator packer and sloping to shed water off the facility, which will lower oxygen diffusion into the tailings and limit water contact, both established mechanisms to reduce ARD;
- there is enough carbonate in the tailings that ARD may never occur as the actual ratio that ARD onset is expected is much closer to 1.0;
- if ARD could develop, permafrost freeze back will occur before (at least one hundred years before) the onset of ARD due to the amount of carbonate in the tailings and arctic climate slowing reaction rates. The late potential onset of acidic conditions is based on the slow oxidation rate of sulphides, and therefore slow rate of neutralization consumption of carbonates and if slow enough, silicate neutralization. While tailings may be classified as uncertain, they still contain enough carbonate to neutralize the acidity produced until many decades after operations have ended. Furthermore, it is also worth noting that the analytical laboratory completed an investigation showing that past carbonate analyses were biased low (section 3), meaning that there is more carbonate than previously shown, which would only extend the delay to consumption of carbonate; and
- progressive reclamation is a part of the facility management for closure, meaning a cover will be placed over most of the tailings before the mine ceases operations.

As was noted in ECCC's 2020 annual report comments, ECCC continues to express its concerns regarding the proponent's conclusion that "*Despite the uncertain classification of the majority of the tailings samples over the 2019-2021 period, Agnico Eagle does not consider the tailings to pose an ARD risk for the site* ". Samples classified as uncertain, reflects lack of enough neutralization potential.

ECCC Recommendation(s)

Recommends that the proponent implement a monitoring plan to verify its conclusion on filtered tailing classified as uncertain.

9. Dustfall

Reference(s)

- Annual Report Section 7.7.1 Air Quality monitoring

Comment

The second paragraph of page 99 begins with the statement: "For AWAR and By-Pass Road transects (DF-1, DF-2, DF-3, and DF-WT, summer-only sampling), overall rates of dustfall were lower than ever observed previously, despite similar or increased traffic in 2021." The Proponent acknowledges that sampling later in the season than previously (into October) may have reduced average rates due to effects of snow cover. However, there is no acknowledgement that the heavier precipitation for the 2021 summer season (JJA total of 147.7 mm at Rankin Inlet Airport) vs. the 2020 summer season (JJA total of 44.9 mm) may have also been a factor in the reduced rate of dustfall.

ECCC Recommendation(s)

ECCC requests that the Proponent assess the impact of the heavier 2021 summer precipitation on the reduced rate of dustfall.

10. Relative Humidity

Reference(s)

- Appendix 24: 2021 Air Quality Monitoring Report, APPENDIX B: DAILY AVERAGE WEATHER DATA

Comment

Relative humidities appear to be biased on the high side at the Meliadine meteorological station. For example, on July 19, 2021, the average relative humidity is calculated at 87%. In comparison, the relative humidity at the Rankin Inlet Airport weather station averages 60% on this day despite its closer proximity to Hudson Bay, and both stations reporting moderate northwesterly winds.

ECCC Recommendation(s)

ECCC recommends that the Proponent perform a quality assurance of the relative humidity data.

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

Sincerely,

[original signed by]

Victoria Shore
Senior Environmental Assessment Officer

cc: Jody Small, Acting Head, Environmental Assessment North (NT and NU)