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NWB File: 2AM-MEL1631



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

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Nunavut Water Board
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Dear Karen Costello and Richard Dwyer,

RE: 11MN034 / 2AM-MEL1631 – Agnico Eagle Mines Ltd. – Meliadine Gold Project 2020 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 Eagles Mines Ltd. (the Proponent) regarding the above-mentioned Annual Report.

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

The following comments are provided:

1. Monitored vs. Predicted Concentrations at CP1

Reference(s)

- Meliadine Gold Project 2020 Annual Report
 - Section 3.2.2. Surface Contact Water Quality Model Results

Comment

Figures 3, 4, and 5 of the 2020 Annual Report depict the forecasted upper and lower modeled concentrations for a select group of parameters (total dissolved solids (TDS), total aluminum, and total ammonia) for life of mine and closure, as well as how monitoring data from 2019 and 2020 has aligned with these predictions. While the 2019 and 2020 values (predictions and monitoring) are within the y-axis of the figure, upper bound predictions beyond 2020 increase sharply each year and peak concentrations exceed the values presented on the graph. In addition, the report states that "concentrations of total aluminum and total ammonia are not expected to exceed monthly average or sample grab limits during the annual discharge



season.” However, measured concentrations of total ammonia in CP1 exceeded the maximum grab sample in 2020 (Figure 5) and the figures suggest that exceedances may be expected going forward. It is unclear whether these off the chart peak concentrations are in error and it is unclear what the predicted upper bound maximum concentrations may be going forward.

ECCC Recommendation(s)

ECCC recommends that:

- The Proponent clarify the predicted concentrations for TDS, total ammonia, and total aluminum presented in Figures 3, 4, and 5; and,
- All graphs are displayed on appropriate axis such that data is easily interpreted.

2. Exceedances of Guidelines

Reference(s)

- Meliadine Gold Project 2020 Annual Report
 - Section 7.1.2. Water Quality in Meliadine Lake
- Appendix 17 – 2020 Aquatic Ecosystem Monitoring Program (AEMP) Report
 - Section 5.3.3. Current Water Quality Compared to Guidelines

Comment

In discussing water quality in Meliadine Lake, the Proponent states that “if, as was observed in 2020, concentrations are well below aquatic life guidelines, there is a high degree of confidence that water in Meliadine Lake is safe for fish and other aquatic organisms living in the lake.” However, the AEMP report indicates that there was one water quality guideline exceedance recorded at the near-field area for total copper in March.

ECCC Recommendation(s)

ECCC recommends that all action level exceedances and exceedances of guidelines are clearly described in the annual report with supporting rationale for potential causes of exceedances and whether additional actions are required.

3. Low Action Level for Water Quality

Reference(s)

- Appendix 17 – 2020 Aquatic Ecosystem Monitoring Program (AEMP) Report
 - Section 5.4.2. Water Quality for the Protection of Aquatic Life and Human Health
 - Figure 5-21 – Water Quality in Meliadine Lake in 2020 Relative to Normal Ranges, AEMP Action Levels and AEMP Benchmarks
 - Appendix C2 – Meliadine Lake Water Chemistry - Scatterplots

Comment

The AEMP Report provides an analysis on whether the low action level for water quality has been achieved, and includes analysis of the following criteria:

- Has water quality in the near-field are changed relative to baseline/reference conditions;

- Is the concentration for a given parameters at near-field area MEL-01 greater than 75% of the AEMP benchmark; and,
- Is there evidence of a divergent trend over time in concentrations of a given parameters at the near-field compared to the reference area?

This analysis indicates that several parameters have changed relative to the normal range, and that several parameters have increased in the near-field area relative to baseline and reference conditions, but that no parameters exceeded the AEMP action level in 2020. However, as depicted in Appendix C2, several parameters did exceed the water quality action level (75% of the AEMP benchmark) in the 2020 monitoring period, including:

- Total phosphorus (Figure C2-23);
- Total copper (Figure C2-36); and,
- Dissolved Zinc (Figure C2-54).

Although the overall median concentration for these parameters did not exceed the AEMP Action levels in order to trigger a full action level exceedance, several of these exceedances have occurred in multiple monitoring years and additional discussion and interpretation of data may be warranted.

ECCC Recommendation(s)

ECCC recommends that the Proponent provide acknowledgement and preliminary discussion for all exceedances of AEMP action levels for water quality

4. Identification of Guideline and Action Level Exceedances

Reference(s)

- Appendix 17 – 2020 Aquatic Ecosystem Monitoring Program (AEMP) Report
 - Tables 5-5 through 5-11
 - Tables 7-4 through 7-6
 - Appendix C3 – Meliadine Lake Water Chemistry Results, 2020
 - Appendix D – Peninsula Lake – Supporting Tables

Comment

Tables 5-5 through 5-11 and 7-4 through 7-6 provide summary statistics for 2020 sampling and Appendix C3 provides the tabulated monitoring data from sampling conducted in in 2020. ECCC notes that comparison of results to action levels or guidelines is not clearly provided in all these tables.

ECCC Recommendation(s)

ECCC recommends that all future water quality data tables provide clear comparison to action levels and AEMP guidelines to increase clarity and aid in analysis of data.

5. Non-PAG Classification Criteria

Reference(s)

- Appendix 11 – 2020 Annual Geochemical Report
 - Section 4.3. SP4 Containment Pond

Comment

In section 4.3, the Proponent states that “The potential for SP4 to produce [Acid Rock Drainage (ARD)] was based on NPR ratios, but also a sulphur limit of 0.1%, meaning that any samples with 0.1% or less, sulphur would be non-[potentially acid generating (PAG)] regardless of the NPR ratio. Based on the two criteria, there was no samples collected that were classified as PAG. However, there was one sample that would be classified as uncertain, which had an elevated sulphur content of 1.34%. This one samples does not appear to be consistent with all other samples collected to data and is not a material risk for water quality given the excess of carbonate in all other rocks tested in 2020.”

ECCC is of the view that Neutralization Potential Ratio (NPR) indicates the relative magnitude of the neutralization potential (NP) and acid potential (AP) expressed by the ratio of NP/AP (or NPR). The values of NP and AP are based on the acid base accounting (ABA) process, therefore, the rock unit that contains 0.1 wt. % of sulphur but not enough neutralization potential such that its NPR is equal to or less than 2, that unit or rock type should be classified as PAG. With this in mind, the statement by the proponent “*that any samples with 0.1% or less, sulphur would be non-PAG regardless of the NPR ratio*” does not appear to align with that classification principle.

ECCC Recommendation(s)

ECCC recommends that the proponent reconsider its non-PAG classification criteria for samples with $NPR < 2$ as expressed above.

6. Acid Rock Drainage

Reference(s)

- Appendix 11 – 2020 Annual Geochemical Report
 - Section 5. Filtered Tailings

Comment

The proponent states that “Despite the uncertain classification of the majority of the tailings samples, Agnico Eagle does not consider the tailings to pose an ARD risk for the site for a number of reasons.” One of the reasons stated is “*if ARD could develop, permafrost will develop 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*”.

ECCC understands that Acid Base Accounting (ABA) was conducted on the tailings samples, and was classified as uncertain due to its NPR. ECCC agrees that the arctic climate will slow down the sulphide oxidation reaction rate; however, it is not clear which tailings that the proponent referred to as containing the amount of carbonates will buffer the reactions for at least 100 years when that same tailings were determined to be uncertain due to lack of buffering material.

ECCC Recommendation(s)

ECCC recommends that the proponent explain its rationale for the following statement when the majority of the tailings have been classified as uncertain in the PAG and non-PAG classification scheme: “*if ARD could develop, permafrost will develop 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”.

7. Arsenic Leaching

Reference(s)

- Appendix 11 – 2020 Annual Geochemical Report
 - Section 5.2. Metal Leaching

Comment

The Proponent states that “Arsenic concentrations ranged from a minimum of 5700 mg/kg to a maximum of 15,000 mg/kg, with a median of 9900 mg/kg in 2020. These values are higher when compared to waste rock and SP4 containment pond and this is not unexpected as the ore is associated with sulphides, including arsenopyrite.”

ECCC notes that given the high concentration of arsenic in the filtered tailing, it is not clear how much of the arsenic is predicted to leach out from the filtered tailings facility.

ECCC Recommendation(s)

ECC recommends that the Proponent:

- Indicate how much arsenic is likely to leach out of the filtered tailings facility given the high values of arsenic content in the tailings; and,
- Demonstrate that the amount of arsenic that leaches out will not cause adverse effect on the environment

8. Shoreline Surveys

Reference(s)

- Appendix 26 – 2020 Terrestrial Environment Management and Monitoring Plan (TEMMP) Report
 - Section 8.1. Shoreline Surveys

Comment

ECCC notes inconsistent survey timing across years. In 2018 and 2019, surveys were conducted in early to mid-June but in 2020 they were conducted late June to late July. It is unclear how much of the survey effort took place late July in 2020. ECCC notes that the survey period is not only longer but also shifted in 2020 compared to previous years.

Section 4.10.2 of the TEMMP (Version 3) states the primary objective of the waterfowl and waterbird monitoring program is to determine the effects, if any, of sensory disturbance from mining activities, including access along the all-weather access road (AWAR) on breeding success or change in distribution of mated pairs. Considering this objective, surveys conducted in July would be too late to determine distribution of breeding pairs.

ECCC notes that not enough information is provided to determine the temporal distribution of the surveys (i.e. quantity in late June versus late July). Given the difference in survey methodology between 2020 and previous survey years, there is likely considerable added variation in the data from the methodology, which will impact the analysis.

ECCC Recommendation(s)

ECCC recommends the Proponent standardize survey timing and data collection across years. Surveys and data collection should be timed to optimize detectability, to align with monitoring objectives.

9. Breeding Bird Surveys

Reference(s)

- Appendix 26 – 2020 Terrestrial Environment Management and Monitoring Plan Report
 - Section 8.2. Point Counts

Comment

ECCC notes inconsistent survey timing across years. In 2018 and 2019, surveys were conducted in early to mid-June but in 2020 they were conducted late June to late July. It is unclear how much of the survey effort took place in 2020 took place in late July. ECCC notes that the survey period is not only longer but also shifted in 2020 compared to previous years.

Section 4.11.2 of the TEMMP (Version 3) states the objective of the upland bird monitoring program is to determine any-mine related changes in upland bird abundance, species richness, diversity, and distribution, in particular along the AWAR. Section 4.11.3 of the TEMMP (Version 3) specifies data are to be collected using point count surveys. Songbird detectability (i.e. through male song) declines as the breeding season progresses and July is generally considered too late for these types of surveys.

ECCC also notes that not enough information is provided to determine the temporal distribution of the surveys (i.e. quantity in late June versus late July). Given the difference in survey methodology between 2020 and previous survey years, there is likely considerable added variation in the data from the methodology, which will impact analysis.

Lastly, it is unclear from Table 8-3 why the number of samples (N) per habitat type is different across years, considering the point counts are repeated annually.

ECCC Recommendation(s)

ECCC recommends that the Proponent:

- Standardize survey timing and data collection across years. Surveys and data collection should be timed to optimize detectability, to align with monitoring objectives; and,
- Clarify the sample size discrepancy in Table 8.3.

10. Incidents and Mortalities

Reference(s)

- Appendix 26 – 2020 Terrestrial Environment Management and Monitoring Plan Report
- Appendix 30 – 2020 Wildlife Observations

Comment

ECCC notes inconsistencies in reported mortalities between Appendix 26 and 30.

ECCC notes a notable amount of bird mortalities in 2020, which has raised concerns about notification procedures.

Geese, ducks, and songbirds are migratory birds protected under the *Migratory Birds Convention Act*. Procedures outlined in section 4.12.3 of the TEMMP (Version 3) include contacting ECCC for migratory bird mortalities.

ECCC Recommendation(s)

ECCC recommends that migratory bird mortalities be reported to ECCC and the Proponent should package and preserve (i.e. freeze) the mortality until further instruction from ECCC.

Migratory bird mortalities should be reported to the Wildlife Enforcement Division at ec.dalfnordwednorth.ec@canada.ca and the Canadian Wildlife Service at ec.cwsnorth-scfnord.ec@canada.ca.

11. Seabird Monitoring

Reference(s)

- Appendix 31 – 2020 Marine Mammal and Seabird Report

Comment

ECCC supports the Proponent's approach to consolidating the Meadowbank and Meliadine marine mammal and seabird monitoring results into a single report given the amount of spatial overlap and the shared shipping vessels.

ECCC provided comments to the Proponent's consultants and had a follow-up discussion in March 2021 related to the seabird data collected in 2020. ECCC noted inconsistencies in how observers recorded the data during the surveys in relation to the standardized protocols and some issues with species identification.

ECCC Recommendation(s)

ECCC recommends the Proponent continue to provide and improve training for seabird observers to minimize errors implementing the protocols, data recording and misidentifications.

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

Sincerely,

[original signed by]

Victoria Shore
Senior Environmental Assessment Officer
Environmental Protection Operations Directorate, Prairie Northern Region

cc: Jody Small, Head, Environmental Assessment North (NT and NU)
Environmental Protection Operations Directorate, Prairie Northern Region