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ECCC File: 6100 000 008/002 / 6100 000 008/014
NIRB File: 03MN107 / 16MN056
NWB File: 2AM-MEA1526 / 2AM-WTP1826

June 25, 2021

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

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Dear Karen Costello and Richard Dwyer,

RE: 03MN107 - 16MN056 / 2AM-MEA1526 - 2AM-WTP1826 – Agnico Eagle Mines Ltd. – Meadowbank Gold Mine and Whale Tail Pit Projects – 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.*

ECCC provides the following comments:

1. **Waste Management Activities**

   Reference(s)

   - 6.2.1.1 Stack Testing

   Comment

   Stack testing at the Meadowbank site was not completed in 2020; the Proponent indicated this was due to not receiving guidance from NIRB regarding testing frequency until December 3rd, 2020. The Proponent had requested to reduce the stack testing frequency to biennial following 5 years of compliance.

   ECCC Recommendation(s)

   ECCC recommends that the Proponent ensure stack testing is completed in 2021 to confirm continued compliance.

2. Spill Management

Reference(s)

- 7.1 Spill Summary
- 7.1.1 Meadowbank Site

Comment

An environmental incident occurred whereby tailings dust became airborne at the tailings storage facility, and spread outside the property. Short-term dust suppression was implemented.

ECCC Recommendation(s)

ECCC recommends that the Proponent ensure a dust management plan is developed and implemented to reduce the risk of similar incidents occurring.

3. Seabird Monitoring

Reference(s)

- Appendix 57 – Meadowbank and Whale Tail Marine Mammal and Seabird 2020 Annual 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, recording data and identifying species.

4. Breeding Bird Monitoring

Reference(s)

- Appendix 47 – Meadowbank and Whale Tail 2020 Wildlife Monitoring Summary Report
- Agnico Eagle. 2020c. Bird Survey Data Analyses – 2003 to 2015. November 2020. 164p.

Comment

ECCC reviewed the comprehensive 2003-2015 analyses of bird data (Agnico Eagle 2020c) and provided comments to the Proponent directly between December 2020 and April 2021. ECCC acknowledges the considerable amount of effort and detail that went into the analyses of the 2003-2015 bird monitoring data.

Although ECCC did not recommend further analysis of the data, ECCC noted that some concerns remain with the report (e.g. statistical approach not validating impact predictions, not accounting for the potential that effects were already present from advanced exploration, unclear statistical power to detect effect size of interest, and interpretation of results). ECCC maintains that several of the results in the report are suggestive of an effect of distance to infrastructure on bird abundance and that the interpretation of results should be more nuanced.

Given the location of the project and low detection of species at risk to date, ECCC accepts that an adequate amount of project-related effects monitoring for upland breeding birds has taken place. ECCC supports the Proponent's proposal to change the monitoring objective for the upland breeding bird VEC.

ECCC sees value in continuing bird monitoring on site to assess the effectiveness of mitigation measures and surveying for the presence of species at risk on site by qualified observers. The presence of species at risk could be monitored by contributing to regional and national bird monitoring programs following standardized protocols.

ECCC Recommendation(s)

N/A – For NIRB's information

5. Seepage Volumes

Reference(s)

- Appendix 11 – Meadowbank 2020 Water Management Plan, Section 3.1.11 – Seepage Management

Comment

The Water Management Plan provides brief summaries of the volumes of seepage that reported to each location in the year. At sampling location ST-16 115, 868 m^3 was pumped back to the North Cell TSF in 2020. However, no information is provided on how this compares to expected volumes, previous monitoring data, or average seepage volumes. In comparison to the 2019 Water Management Plan, in 2020 this location had 46,975 m^3 more seepage than 2019. While some monitoring stations (for example, central dike seepage) provide information on how the 2020 monitoring data compares to previous years, for other stations it is unclear whether the 2020 seepage volumes are within previously observed values or are increased compared to previous years. Comparisons to historical and expected volumes should be presented for all locations. If increased volumes are observed, potential causes of increased seepage (for example, increased precipitation) should be discussed.

ECCC Recommendation(s)

ECCC recommends that seepage volumes for all stations be compared to previous years and expected averages to aid in interpretation of data. In addition, for any locations with increased seepage as compared to previous years or expected averages, a preliminary discussion of potential sources/causes should be provided.

6. Scaling of Graphs

Reference(s)

- Appendix 11 – Meadowbank 2020 Water Management Plan, Appendix C

Comment

Several figures provided in Appendix C depict concentrations at various monitoring locations compared to the previous year forecasted values. However, several of the figure's Y-axis are not scaled appropriately causing data to be located at the bottom of the graph, making it difficult to interpret when CCME guidelines or Water Licence limits are exceeded. The Y-axis in the figures of Appendix C should be scaled appropriately such that data is clearly presented and easily interpreted.

ECCC Recommendation(s)

ECCC recommends that figures use appropriate Y-axis to aid in interpretation of data.

7. Measured Values Compared to Forecasted Values

Reference(s)

- Appendix 11 – Meadowbank 2020 Water Management Plan, Appendix C Figure 2-6 and Table 2-7

Comment

Figure 2-6 and Table 2-7 provide a comparison of measured water quality values to forecasted values for Portage Pit and Goose Pit. However, there is very little analysis and interpretation of these results, specifically when measured concentrations exceeded forecasted values. ECCC acknowledges that these comparisons are intended to aid in the understanding and identification of potential contaminants of concern and the development of treatment measures. However, additional interpretation of the results will aid in understanding of what may be driving these conditions.

ECCC Recommendation(s)

ECCC recommends that the comparison of measured versus forecasted values also include some preliminary discussion on potential sources when measured results differ from the forecasted values, specifically if the measured values exceed forecasted.

8. Mine Effluent 2020 Average vs Mill Effluent Quality Used in Model

Reference(s)

- Appendix 11 – Meadowbank 2020 Water Management Plan, Table 3-3 – Mill Effluent Concentrations when Processing Whale Tail Pit Ore

Comment

Table 3-3 presents the mill effluent average concentration in 2020 to the mill effluent quality retained in the model. The Proponent states that "in order to obtain the forecasted concentrations that are in the same order of magnitude as the measured values found in the Goose Pit and Portage Pit in 2019 and 2020, an adjustment factor was applied to the average measurement taken of the mill effluent in 2020 when processing Whale Tail ore at the mill." In many cases the mill effluent quality retained in the model is the same, or higher than the measured average mill effluent concentration in 2020, which should result in a reasonable amount of conservatism within the model. However, for several parameters (cadmium, chromium, molybdenum, nickel, strontium, zinc, cyanide, ammonia, and TDS) the concentrations used in the model are lower than the averages measured in the mill effluent. It is not clear how these adjustment factors were applied and why the concentrations used in the model would be lower than observed values.

ECCC Recommendation(s)

ECCC recommends the Proponent provide additional supporting information as to why for some parameters the concentrations used in the model are lower than the observed average concentrations in mill effluent in 2020.

9. Phytoplankton Community

Reference(s)

- Appendix 33 – Meadowbank and Whale Tail 2020 CREMP, 5.4 Phytoplakton Community, 5.4.1 General Observations

Comment

Diatoms are referred as belonging to the phylum Cryptophyta, which is incorrect.

ECCC Recommendation(s)

ECCC recommend that the proponent update the text to refer to the correct diatom phylum Bacillariophyta.

10. Increased Arsenic and Chloride at Pit-E Seepage Monitoring

Reference(s)

- Appendix 42 – Meadowbank 2020 Groundwater Monitoring Report, Section 6: Conclusions

Comment

The 2020 Meadowbank Groundwater Monitoring Report states that “in general, water quality was similar to results previously obtained, with a few exceptions. Concentrations of arsenic and chloride were higher than historic values at the Pit-E seepage monitoring location.” The proponent states that there is uncertainty around what may be causing these increased concentrations at this location but hypothesizes that it may be due to deposition of reclaim water effluent at the top of the west wall of Pit-E. Based on the recommendations provided in Section 7 of the report, it is unclear what potential next steps the proponent may be implementing to reduce uncertainty associated with these increased concentrations.

ECCC Recommendation(s)

ECCC recommends that the Proponent provide information on any potential next steps in monitoring to reduce uncertainty associated with the source of the elevated arsenic and chloride concentrations at Pit-E Seepage location.

11. Third Portage Lake Studies

Reference(s)

- Appendix 50 – Meadowbank Closure Water Treatment Strategy, Section 4.0: Conclusion

Comment

The Closure Water Treatment Strategy refers to the need for environmental studies to assess the assimilative capacity of Third Portage Lake in order to help define the allowable discharge volume and treated effluent requirements. Although it is acknowledged that discharge is not intended to begin until 2027, no details are provided on the timeline for when this study may be completed.

ECCC Recommendation(s)

ECCC recommends that the Proponent provide a general timeline for when the assimilative capacity studies for Third Portage Lake may be completed.

12. Road and Construction Materials

Reference(s)

- Appendix 4 – Whale Tail Haul Road 2021 Work Plan
- Appendix 5 – Whale Tail KVCA15Q01 2021 Work Plan
- Appendix 6 – Whale Tail KVCA15Q02 2021 Work Plan
- Appendix 7 – Whale Tail KVCA18Q01 2021 Work Plan

Comment

The 2021 esker work plans (i.e., Appendices 5, 6 and 7) state that, in order to minimize the disturbance of eskers, priority will be given to using non-potential acid generating waste material from the Whale Tail pit instead of esker materials. Similarly, the *Whale Tail Haul*

Road 2021 Work Plan (Appendix 4) states that priority will be given for the use of non-potentially acid generating waste material from the Whale Tail Pit for the operation activities and maintenance of the Whale Tail Haul Road.

ECCC notes that road and construction materials should be non-metal leaching, as well as non-potentially acid generating. However, the work plans do not indicate whether the prioritized waste material will be non-metal leaching.

ECCC Recommendation(s)

ECCC recommends that road and construction materials be non-metal leaching and non-potentially acid generating, including for road operation and maintenance, and that applicable documents (including the *Whale Tail Haul Road 2021 Work Plan* and the 2021 esker/quarry work plans) be updated to reflect this guidance.

13. Receiving Environment Predictions for Nitrate and Phosphorous

Reference(s)

- Appendix 12 – Whale Tail 2020 Water Management Report, ver 6; Appendix D (Whale Tail Water Quality Forecast Update)

Comment

Updated water quality modeling results predict increased productivity in the receiving environment until approximately eight years after closure is initiated. Monitoring will be continued through life of mine and model predictions will be updated annually. ECCC notes that management response(s) would be needed if modeling indicates effects associated with the nutrient loading (e.g. productivity increases lead to dissolved oxygen depletion under-ice) or if modeling has under-predicted concentrations of phosphorus and nitrogen. Management options should be identified in advance.

ECCC Recommendation(s)

With respect to increased nutrients/productivity in the receiving environment, ECCC recommends that the Proponent proactively identify management response options to address potential effects, including under-predicted parameter concentrations.

14. Model Inputs and Assumptions – Changes Regarding STP Effluent Concentrations

Reference(s)

- Appendix 12 – Whale Tail 2020 Water Management Report, ver 6; Appendix D (Whale Tail Water Quality Forecast Update)
- Sewage Treatment Plant O&M Manual (May 2019)

Comment

Section 2.1.1 of the Whale Tail Water Quality Forecast Update states that water quality inputs for the sewage treatment plant (STP) effluent were updated to reflect 2020 monitoring results from STP effluent at Station ST-WT-11. Table 1 of this section indicates that nitrate

and phosphorus concentrations in STP effluent are not meeting the operational effluent targets identified in Table 6 of the Sewage Treatment Plant O&M Manual.

The 2020 annual report does not discuss potential causes of the elevated STP effluent parameters and does not indicate any response actions. It is unclear whether measures will be taken to improve STP effluent quality and meet operational/design targets in future.

Treated STP effluent is discharged to the attenuation ponds. As such, targets are not a regulatory concern but the STP does represent a source of nitrate and phosphorus loadings which should be minimized to the extent practicable.

ECCC Recommendation(s)

ECCC recommends that the Proponent:

- Clarify whether any actions are planned to improve sewage treatment plant (STP) effluent quality and meet the operational/design targets for nitrate and phosphorus, as set out in Table 6 of the Sewage Treatment Plant O&M Manual; and
- Clarify whether STP effluent exceeded operational/design targets for any other Table 6 parameters.

15. TSS-Turbidity Monitoring During Dike Construction

Reference(s)

- Appendix 59 – Water Quality Monitoring and Management Plan for Dike Construction and Dewatering, Version 3 (May 2020)

Comment

Section 4.3.2, which describes the Standard Operating Procedure for open water dike construction, does not indicate whether Total Suspended solids (TSS) samples will be collected for laboratory analyses.

ECCC Recommendation(s)

ECCC recommends that the Proponent clarify the frequency of TSS sample collection for laboratory analyses during open water dike construction, and updates relevant management plans as appropriate.

16. TSS Turbidity Relationship

Reference(s)

- Appendix 59 – Water Quality Monitoring and Management Plan for Dike Construction and Dewatering, Version 3 (May 2020)

Comment

Section 4.4 (QA/QC for Turbidity Measurements) indicates that the TSS-turbidity relationship developed for Meadowbank in 2010 has been incorporated into the Whale Tail Pit and Haul

Road Project monitoring program. The plan does not discuss whether or how the Meadowbank TSS-turbidity relationship has been validated for the Whale Tail site.

ECCC Recommendation(s)

ECCC recommends that the Proponent clarify whether and how the Meadowbank TSS-turbidity relationship has been/will be validated for the Whale Tail site, and whether paired TSS-turbidity samples will be collected during construction at applicable locations in the Whale Tail site to validate or update the site-specific TSS-turbidity relationship.

17. QA/QC Plan

Reference(s)

- Appendix 54 – Meadowbank and Whale Tail Quality Assurance/Quality Control (QA/QC) Plan, Version 6 (July 2020)

Comment

Section 2.2.5 (Field Duplicates, Field Blanks and Trip Blanks) states that one field duplicate, one filter blank, and one field blank are collected for a) every 10 samples, b) each sampling event or c) once per year. The QA/QC Plan does not provide a rationale for the difference in QA/QC sampling frequencies among the various monitoring programs, nor justify collecting control samples only once per year for some programs.

Table 2.2 indicates a very low QA/QC sampling frequency (i.e., 2-3 samples per year) for the compliance monitoring programs regarding Groundwater Chemistry and Mine Facilities. QA/QC samples should comprise 10-15% of the samples analysed overall. It is also noted that most of the compliance monitoring programs listed in Table 2.2 include field duplicate and field blank samples, but no trip blanks.

ECCC Recommendation(s)

ECCC recommends that the Proponent update the QA/QC Plan as follows:

- Provide a discussion/rationale for the QA/QC sampling frequencies presented in Table 2-2 (Quality Control Sample Frequency);
- QA/QC sampling frequency of the compliance monitoring programs for Groundwater Chemistry and for Mine Facilities should be in line with best practices for each monitoring program; and
- Include trips blanks in all monitoring programs listed in Table 2-2.

18. Thermal Monitoring Report

Reference(s)

- Appendix 25 – Whale Tail 2020 Thermal Monitoring Report

Comment

As described in Section 3.2.1 (Expected Thermal Effects on Permafrost), the Proponent expected minimal effects to permafrost at the Whale Tail Dike abutment areas. Contrary to the expected minimal effects, thermal monitoring results indicate that the trend of permafrost degradation at the Whale Tail Dike abutment continued in 2020. In addition, a rapid warmup in the wall and foundation was also noted. The 2020 Thermal Monitoring Report states that this permafrost degradation at the abutment has not resulted in a seepage increase *for the moment,* but does not discuss the likelihood or potential effects of increased seepage. Nor does the report identify options to mitigate or manage a potential seepage increase.

ECCC Recommendation(s)

With respect to the continued trend of permafrost degradation at the Whale Tail Dike abutment and the rapid warmup in the wall and foundation, ECCC recommends that the Proponent describe:

- The likelihood that these changes would result in a seepage increase, and the potential timing and extent of increased seepage;
- Potential effects of such a seepage increase;
- Options to mitigate and manage a potential seepage increase; and
- Any other changes/impacts that may result from the continuing permafrost degradation at the abutment and the rapid warmup in the wall and foundation, and options to mitigate and manage such changes/impacts.

19. Whale Tail Interim Closure and Reclamation Plan

Reference(s)

- Appendix 51 – Whale Tail Interim Closure and Reclamation Plan, ver 4 (July 2020)

Comment

Per Table 5.2-2 (Closure Objectives and Criteria – Open Pits Workings) of the Whale Tail Interim Closure and Reclamation Plan (ICRP), routine pit lake water quality monitoring will be undertaken during closure and for three years into post closure.

Post-closure water quality monitoring should be of a sufficient duration to demonstrate stability of water quality onsite and in the receiving environment. As it is currently unknown how long it will take to achieve acceptable and stable water quality, the proposed 3-year post-monitoring period should be a minimum monitoring duration, with monitoring to continue as needed until conditions are stable.

ECCC Recommendation(s)

ECCC recommends that prior to decommissioning the contact water management system or reconnecting the pit lake to surface waters, monitoring results and water quality predictions demonstrate that runoff, seepage, and pit lake water quality has stabilized and will be consistently acceptable for release over the short-, medium- and long-term, taking into account seasonal and inter-annual variability and climate change considerations.

ECCC also recommends that relevant sections of the Whale Tail ICRP, including Table 5.2-2 (Closure Objectives and Criteria – Open Pits Workings), be revised to:

- Acknowledge that a post-closure water quality monitoring period of 3 years is aspirational and that 3 years would be a minimum duration; and
- Provide post-closure water quality monitoring until it is demonstrated that pit lake water quality is stable and will consistently meet water quality objective values over the short-, medium- and long-term.

20. Classification of ARD Potential

Reference(s)

- Appendix 21 – Whale Tail Operational ARD-ML Sampling and Testing Plan. Ver 6, Section 3.2.1

Comment

Proponent states that:

> *The [Acid Rock Drainage (ARD)] potential of waste materials will be classified first based on total sulphur content and then using the NPR-based guidelines published by MEND (2009). Total sulphur will be used as an initial screening criteria to identify NPAG material, whereby a sample will be considered NPAG when it contains less than 0.1 wt% sulphur, regardless of the CaNPR (Golder 2018). Where total sulphur is above 0.1%, the calculated carbonate CaNPR value will be used for sample classification, as summarized in Table 3.1."*

ECCC is of the view that Neutralization Potential Ratio (NPR) or CaNPR 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 2 or less, that unit or rock type should be classified as Potentially Acid Generating (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 CaNPR ratio" does not appear to align with that classification principle.

ECCC Recommendation(s)

ECCC recommends that the Proponent reconsider its non-PAG classification criterion as expressed above.

21. ARD/ML Plan Adaptive Management Actions

Reference(s)

- Appendix 21 – Whale Tail Operational ARD-ML Sampling and Testing Plan. Ver 6, Section 5.1

Comment

ECCC notes that in the Potential Issues column of Table 5-1, one item is that “Thermal monitoring confirms that the waste rock cover freeze back is not occurring as anticipated”. The steps to be taken did not include investigation of the presence of “hot spots” within the Waste Rock Storage Facility (WRSF), which could potentially cause some spots or layer in the waste rock facility not to freeze back.

ECCC Recommendation(s)

ECCC recommends that the actions include the investigation of the possible presence of hot spots in the WRSF.

22. TSF Cover Design

Reference(s)

- Appendix 22 – Meadowbank Mine Waste Rock and Tailings Management Plan Ver 11, Section 7.1

Comment

The Proponent indicates that the Design criteria specific to the cover system design include:

- In areas where the active layer extends into the tailings material, the thawed layer should be limited to the upper 30 cm of the tailings mass and saturation of the tailings should remain above 85% to limit oxidation of the tailings.
- As an additional method to reduce tailings reactivity, the degree of saturation within the tailings mass should remain above 85%. This will reduce the tailings reactivity should part of the upper region of the tailings mass thaw during a warm year event.

The Proponent indicates that the objectives of the cover system are to maintain the tailings material below 0°C under most conditions and to maintain saturation above 85%. In addition, the unfrozen tailings are segregated in the upper 0.5 m of the Tailings Storage Facility (TSF) and remain above 85% saturation, thus reducing the risk of oxidation until the material freezes back into the permafrost over time. However, the Proponent did not explain how it plans to maintain the 85% saturation in the 0.5m section of the TSF that will be penetrated during the warm months, and how this will be maintained given the ongoing impact of climate change in the region.

ECCC Recommendation(s)

ECCC recommends that the Proponent explain how they plan to maintain the 85% saturation in the 0.5m section of the TSF that will be penetrated by thaw during the warm months, and how this will be maintained given the ongoing impact of climate change in the region.

23. WRSF Monitoring and Closure

Reference(s)

- Appendix 23 – Whale Tail Waste Rock Management Plan Ver 7, Section 9.1.1

Comment

The Proponent states, “Once water quality meets the discharge criteria established through the water licensing process, the contact water management system will be decommissioned to allow the surface runoff and seepage water from the Whale Tail WRSF and IVR WRSF to naturally flow to the outside environment”.

Given the above statement, ECCC would like to remind the Proponent that as long as the Whale Tail mine is regulated under the *Metal and Diamond Effluent Regulations* (MDMER), all effluent discharge from the mine site would need to be monitored and discharged through a final discharge point until the mine acquires the recognized closed mine status (RCM). After which time the mine is no longer subject to MDMER but captured under the general prohibition against the deposit of deleterious substances into waters frequented by fish, described in ss. 36(3) of the *Fisheries Act.*

ECCC Recommendation(s)

Recommends that the proponent be aware of the requirements of the MDMER.

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

Sincerely,

[original signed by]

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

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