Environmental Protection Operations Directorate
Prairie & Northern Region
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Yellowknife, NT X1A 2P7

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

September 28, 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 Gold Project 2020 Annual Report

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) by Agnico Eagles Mines Ltd. (AEM; the Proponent) responding to ECCC's comments on the above-mentioned Annual Report.

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.*

The following comments are provided:

ECCC-1, ECCC-2, ECCC-3, ECCC-4, and ECCC-7 have been adequately addressed by AEM's responses.

ECCC-5: Non-PAG Classification Criteria

ECCC recommended that AEM provide a discussion about reconsidering the non-PAG classification criteria reconsideration for samples with NPR<2, as expressed in the ECCC's comment:

> *"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."

In their response, AEM indicated that,

> *"As per 2020 Annual Report Answers provided to the NIRB on July 28th, 2021 (ECCC-5), Agnico Eagle thanks ECCC for the above comment and recommendation. Agnico Eagle wishes to clarify that the 0.1% sulphur value is used at Meliadine as one approach to assess mine waste reactivity. The value is used at many other mine sites and project development studies as well because it has been shown to be a conservative sulphur value below which other mineral components in the rock (i.e. silicates) can consume the minor amounts of acidity that would get produced. Globally this is a commonly used approach and has been demonstrated at other sites and in other guidance documents:*
>
> *• Price W.A. (1997); MDNR (2004); Smith et al (2013).*
>
> *Agnico Eagle believes acid-base accounting and relatively low sulphur are both useful ways to characterize mine waste on site. It should also be noted that these tests are only for comparison with project development studies and are not being used to drive management decisions.*
>
> *Agnico Eagle remains available to further discuss issues related to mine waste characterization with ECCC at ECCC's convenience."*

ECCC agrees that weight percentage of sulfide content in a waste rock is used as one of the tools to determine whether waste rock is PAG or non-PAG; however, the percentage adopted as a cut off criteria also depends on the amount of neutralization potential available in the rock unit, or where there has been a static test conducted to determine a threshold that is an appropriate cut off point.

ECCC acknowledges that use of the sulphur content is a recognised method of screening samples, but does not agree with the statement by the proponent that "any samples with 0.1%, or less, sulphur would be non-PAG regardless of the NPR ratio". Therefore, ECCC reiterates that any sample with NPR less than 2 should be treated as PAG or uncertain based on the generally accepted classification scheme.

AEM also cited three publications but did not provide any references for the published articles.

ECCC-6: Acid Rock Drainage

In its comments, ECCC recommended that AEM explain the 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*".

In response, AEM indicated that,

> *"As per 2020 Annual Report Answers provided to the NIRB on July 28th, 2021 (ECCC-6), the statement relating to the 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. Therefore the statement refers to all tailings as while they may be classified as uncertain, they still contain enough carbonate to neutralize the acidity produced until many decades after operations have ended. It is also worth noting that the analytical laboratory recently completed an investigation showing that past carbonate analyses were biased low, meaning that there is more carbonate than previously shown, which would only extend the delay to consumption of carbonate. The report from the analytical laboratory to this effect is available in appendix."*

ECCC acknowledges the SGS letter indicating that the Pyrolysis method to determine the carbonate content is biased low, however, no results were provided after the re-analysis of the samples.

Samples are classified as uncertain because there is not enough neutralization potential in the rock to make them non-PAG. Therefore, unless the classification is revised, the Proponent's statement that "refers to all tailings as while they may be classified as uncertain, they still contain enough carbonate to neutralize the acidity produced until many decades after operations have ended" contradicts the generally accepted classification criteria, which is based on neutralization potential.

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