Water Resources Division
Resource Management Directorate
Nunavut Regional Office
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Your file - Votre référence
2AM-MEL1631
Our file - Notre référence
CIDM#1292165

January 8, 2021

Mr. Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada Confirmation on Agnico Eagle Mines Response to Comments on 2AM-MEL1631 2019 Annual Report.

Dear Mr. Dwyer,

Thank you for your December 16, 2020 email invitation to confirm if the additional response from Agnico Eagle Mines (AEM) addresses Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) comments on the above-noted annual report.

CIRNAC reviewed the additional response from AEM and provides the following additional comments to the Nunavut Water Board (NWB) for consideration.

AEM did not provide any further response on CIRNAC comments #1 (High Water Levels in CP1, CP3 and CP4 and Potential Risk to Stability of D-CP1) and #2 (Higher-Than-Expected TDS in CP1). CIRNAC has therefore no further comments to offer to the NWB on these two issues. CIRNAC is still of the opinion that summaries of the measures taken in 2019 should be provided and incorporated into the annual monitoring report.

On CIRNAC comment #4 (Higher-Than-Predicted ARD Potential of Filtered Tailings), AEM provided the following response:

> "*A classification change on the ARD potential of the tailings will have no impact on the site water quality model during the life of mine. In the very unlikely scenario that these tailings ever produce ARD, it would not occur for several decades or more based on median neutralization potential of the tailings (85 kg CaCO3/t), owing to carbonate content of the ore and lime addition during ore processing. Updated water quality predictions for the site are being developed as part of the next phase of mining at Meliadine, including continued characterization of the tailings and how they will impact water quality. Findings to date suggest there is*

more carbonate available than has been reported, further lowering the risk of these tailings ever producing ARD.

INAC (1992) recommends an NPR criterion of 1.2 for tailings. While this has not been used at Meliadine, the criterion is lower for tailings because of the far greater mineral contact and homogenization in the material as compared to waste rock. The majority of tailings would be considered non-PAG using a criterion of 1.2.

ARD potential needs to be considered in context of the storage facility. Even if some of the tailings have ARD potential, the physical storage of these tailings is significant and should not be overlooked. The compaction of the tailings in thin (30cm) lifts and grading of the facility to shed water effectively inhibits oxygen diffusion into the pile and severely limits infiltration. Effectively there are two mechanisms inhibiting ARD, which are in addition to the climate at site that serves to arrest oxidation for at least 8 months of the year."

CIRNAC would like to point out that:

1. CIRNAC would like to emphasize that a change in the overall NPR from 2.7 to 1.4, a corresponding ARD potential classification from "*non-PAG*" to "*uncertain*", for tailings could probably be significant. A classification change on the ARD potential of the tailings will potentially have significant impact on the site water quality during the life of mine and beyond if the management and mitigation strategies are not updated to take into consideration of such a significant change.
2. While mineralogy, grain size, temperature, hydrology, degree of homogeneity or heterogeneity, and microbial activity would all influence the onset time or the absence of ARD in the tailings, NPR remains to be the key criterion. This has been summarized in the MEND Report 1-20 (i.e., *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, 2009*) as (on page 14-1):
   "*For cases where AP and NP are equally exposed and AP generates acid identical to pyrite and NP neutralizes acid like calcite, samples with an NPR less than 1.0 are PAG and samples with an NPR grater than 2.0 are non-PAG. A sample with an NPR between 1.0 and 2.0 is capable of generating ARD*" (emphasise added).
3. While ARD has not occurred *"…owing to carbonate content of the ore and lime addition during ore processing…*", it has the potential to occur in the future, given the uncertain classification based on the NPR (i.e., 1.4) and the relative reactivity of carbonate minerals over sulfide minerals in the tailings. CIRNAC would like to emphasize that should the rate of carbonate dissolution be faster than that of sulfide oxidation in the tailings, the quantity of carbonate minerals would decrease faster than that of sulfide minerals. ARD would occur as soon as carbonate is depleted.
4. CIRNAC recognizes that the mitigation strategy already implemented in the tailings storage facility would help in delaying the onset or reducing the intensity of ARD. However, given that such mitigation strategy was based on the assumption of

tailings with an NPR of 2.7, instead of 1.4, it may not be sufficient or the most appropriate.

5. As has been recommended by CIRNAC, AEM should re-evaluate and update the Water Quality Model and the Management Plans associated with the monitoring and management of the filtered tailings.

CIRNAC appreciates the opportunity to participate in this review. If there is any question, please contact me at (867) 975-4555 or david.zhong@canada.ca or Bridget Campbell at (867) 975-4282 or bridget.campbell@canada.ca.

Sincerely,

David Zhong
Regulatory and Science Advisor