

Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6100 000 010/042
NWB File: 2AM-DOH-1335



September 11, 2019

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-DOH 1335 – TMAC Resources INC – Naartok East Crown Pillar Recovery at Madrid North, Proposed Site-Specific Geochemical Criteria for use of Non-Mineralized Waste Rock for Construction

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned site specific criteria. This letter and comments provides ECCC's specialist advice based on our mandate, in the context of the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

The following comment is provided:

1. Metal Leaching and Potentially Acid Generating Rock

Reference(s)

- Classification of Waste Rock in Support of Segregating Construction Rock from Naartok East Crown Pillar Recovery, Madrid North, Hope Bay Project
 - Sections: 4.2 ARD Potential & 5.3 Field Classification Method

Comment

Figure 4-9 indicates that Acid Rock Drainage (ARD) classifications are sensitive to sulphur content, with all samples with sulphur less than (<) 1% classified as non-potentially acid generating (non-PAG). Conversely, all uncertain or PAG samples contained sulphur greater than (>) 1%. Figure 4-10 indicates that samples classified non-PAG have arsenic content less than 80 ppm. However, when the accounting for rock types other than sedimentary units (5), all samples were classified as non-PAG with arsenic as high as 800 ppm.



In section 5.3 Field Classification Method, TMAC Resources (the Proponent) stated that “All samples of sedimentary units (5) contained arsenic content above the criterion of 70 ppm and selected samples were classified as uncertain or PAG. All samples of rock type 5 classified as non-PAG contained <1% total Sulphur”. Rock type 5 was the only rock type to be classified as uncertain or PAG, therefore, it is anticipated that all other waste rock types, including 1aj, will have a low risk for ARD. Nevertheless, a 1% sulphur criterion will be applied as a geochemical criterion to segregate waste rock. Rock type 5 will not be used for construction.”

ECCC notes that the Proponent has used arsenic content as one of the criteria to indicate non-metal leaching rock. Although the Proponent has indicated that any rock containing less than 70 ppm is considered low potential to leach arsenic (metal leaching, Figure 5.1). However, no information has been provided on how much arsenic would be expected to leach out of the rock with a concentration of less than 70 ppm i.e. what proportion of the arsenic content of the rock is expected to leach out.

In addition, the proponent stated that a 1% sulphur criterion would be applied as a geochemical criterion to segregate waste rock”. In general, as stated by the Prediction Manual for Drainage Chemistry for Sulphidic Geologic Materials - MEND Report 1.20.1 Dec. 2009, “the % sulphur capable of causing ARD should not be a generic number but depends on the magnitude of effective neutralization potential (NP).” In places, this number has been about 0.2-0.3 wt. percentage. Therefore, using as much as 1%, total sulphur without the corresponding neutralization potential for that unit seem insufficient as a tool to predict ARD or to segregate the rock that has potential for ARD.

ECCC notes the following:

- Not all rocks that contain sulphide minerals will become acid generating. It depends on the amount of neutralizing minerals and materials (such as limestone) that are present in the rocks. If there is balance, or if there is an excess of neutralizing minerals, the rocks may not generate metal leaching (ML) and ARD. If there is excess sulphide minerals, then ML/ARD will typically develop after all of the neutralizing minerals have dissolved. This can result in a significant time delay to the development of ML/ARD in rocks.
- The rocks at most metal and some coal mines contain high amounts of sulphide minerals. The excavating and crushing of ores during mining greatly increases the amount of rock surfaces that can be exposed to oxygen and water. Therefore, mining activities can have a high potential for ML/ARD.
- ML/ARD can occur from sulphide bearing mining wastes or from open pit or underground mine surfaces. Mining wastes often include mineralized rock that is not of ore grade (called waste rock) and tailings which are sand sized material left over from processing ore.
- Most mining operations leach metals to some degree. The potential for environmental impacts depends on many factors including the amount of metals in the mine drainage, the amount of acid-neutralizing ability in nearby rocks and water, the amount of dilution available in streams and how sensitive the receiving environment is.

ECCC Recommendation(s)

ECCC recommends that the proponent indicate the quantity or proportion of the arsenic content of the rock that is expected to leach out if the 70 ppm is used as threshold for low risk to leach arsenic. ECCC recommends that the Proponent demonstrate that rocks that has 1 % total sulphur also has enough carbonates or other neutralizing materials to neutralize the potential for acid generation.

Please contact Eva Walker at (867) 669-4744 or eva.walker@Canada.ca should you require more information.

Sincerely,

[original signed by]

Eva Walker
Environmental Assessment Coordinator

Attachment(s):

cc: Georgina Williston, Head, Environmental Assessment North (NT and NU)