Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Nunavut Regional Office
Iqaluit, NU X0A 0H0

Your file - Votre référence
2AM-WTP1826

October 22, 2018

Our file - Notre référence
CIDM# 1230042

Richard Dwyer
Manager of Licensing
Nunavut Water Board
Gjoa Haven, NU X0B 1J0

Sent via email:licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) review of the Operational ARD-ML Sampling and Testing Plan – Whale Tail Pit Project under Agnico Eagle Mines Limited's Type "A" Water Licence No. 2AM-WTP1826.

Dear Mr. Dwyer,

Thank you for the email notice, received on September 21, 2018, regarding the 2AM-WTP1826 Operational ARD-ML Sampling and Testing Plan.

CIRNAC reviewed the plan and comments are provided pursuant to its mandated responsibilities from the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

If you have any questions or require further information with respect to this matter, please contact me at (867) 975-4555 or email david.zhong@canada.ca, or Ian Parsons at (867) 222-9278 or email ian.parsons@canada.ca.

Regards,

David Zhong
Regulatory & Science Advisor, Water Resource Division

Cc. Spencer Dewar, Director, Resource Management Directorate – CIRNAC, NRO
Justin Hack, Manager of Field Operations – CIRNAC, NRO

Canada

Memorandum

To: Richard Dwyer, Manager of Licensing, NWB

From: David Zhong, Regulatory & Science Advisor, Water Resource Division – CIRNAC, NRO

Date: October 22, 2018

Re: **Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) review of the Operational ARD-ML Sampling and Testing Plan – Whale Tail Pit Project under Agnico Eagle Mines Limited's Type "A" Water Licence No. 2AM-WTP1826.**

Applicant:	Agnico Eagle Mines Limited (AEM)
Representatives:	Jamie Quesnel and Ryan Vanengen
Project:	Whale Tail Pit Project
Region:	Kivalliq

A. BACKGROUND

On July 11, 2018, the Minister of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) approved Agnico Eagle Mines Limited's (AEM) Whale Tail Pit Project Type 'A' Water Licence No. 2AM-WTP1826 application.

The ARD and Metal Leaching Plan is one of three management plans to be updated prior to operation of the Starter Pit (i.e. Quarry 2) within the Whale Tail Pit area, and construction of the Waste Rock Storage Facility (WRSF) Berm. This is stated in Part B Item 15 of the Whale Tail Pit Water Licence which states "that commitments made with respect to submissions received during the technical review of the Application, as well as final submissions and issues raised during the 2017-2018 Public Hearing process are to be taken into account." Table 1 is in CIRNAC's March 19, 2018 final submission. AEM subsequent March 26, 2018 submission agreed to Table 1. In accordance with Table 1, the ARD and Metal Leaching Management Plan was reviewed with particular attention paid to laboratory leach testing and triggers for adaptive management related to leach testing.

B. SUMMARY OF REVIEW

CIRNAC notes, as stated by AEM, that "*The Operational ARD-ML Sampling and Testing Plan is the primary tool to ensure that all overburden and waste rock generated during the Project is appropriately characterized and managed to prevent the future release of contaminants from the Whale Tail WRSF into the receiving environment.*"

CIRNAC would like to emphasize that based on its model results and waste rock management plan, AEM will need to construct a WRSF (waste rock storage facility) cover that will be at least 4.7-meter thick and free of potentially acid generating (PAG) or metal leaching (ML) waste rocks. This Operational ARD/ML Sampling and Testing Plan, therefore, has to be revised to include AEM's methodology and process for identifying any PAG or ML waste rock.

CIRNAC has identified a number of issues in the "Review Findings and Recommendations" that should be implemented to ensure the plan is sufficient.

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Review Findings and Recommendations

#	Reference	Finding / Recommendation
1	General	**Finding:** The Plan indicates that the ARD/ML sampling and testing approach is based on practices at the Meadowbank Mine (e.g., S.3.1). However, it should be clarified that the risks associated with the Whale Tail Project are unique for a variety of reasons (increased ARD/ML potential, short operational life limiting adaptive management, etc.). As a consequence, all aspects of the approach used at Meadowbank are not necessarily appropriate for the Whale Tail Pit Project. Modifications of the Plan are therefore necessary to address the site-specific risks, as described in the following findings/recommendations.
2	Executive Summary	**Finding:** The text indicates that the current Plan relates to the proposed amendment of Water Licence No. 2AM-MEA1525. **Recommendation:** The statement should be updated to clarify that the Plan is now linked to a new licence (as opposed to an amendment).
3	S.2.1	**Finding:** The Plan indicates that the ARD/ML potential of each waste rock lithology was evaluated through a static and kinetic testing programs that are on-going. **Recommendation:** CIRNAC recommends that the updated results of the ongoing testing program be reported on an annual basis. The report should explicitly assess whether the updated results would affect prior conclusions regarding the environmental performance of the waste rock.
4	Table 2.1	**Finding:** Table 2.1 presented a summary of the anticipated ARD and ML potentials of the six major bedrock waste types as well as overburden and lake sediment. However, no estimate is given on the volume or mass of each waste type. **Recommendation:** As it is critical that sufficient quantity of not-PAG (NPAG) and low-ML waste rocks be available for the construction of the WRSF cover, CIRNAC recommends that the volumes of each waste rock types be provided along with their ARD and ML potentials.
5	Table 2.1 Table A.1	**Finding:** Both Table 2.1 and Table A.1 are summaries of the same set of static and kinetic test data (i.e., Golder 2016). In Table 2.1, the different waste rock types are classified as having (1) “ARD potential” or (2) “no ARD potential” or (3) “variable ARD potential”. This classification can be misleading as Table A.1 shows that for many of the waste rock types classified as having “no ARD potential” (e.g., Komatiite South, Diorite), up to 29% of the samples tested are in fact having “ARD potential”. **Recommendation:** CIRNAC recommends that quantitative data be

#	Reference	Finding / Recommendation
		presented quantitatively whenever possible.
6	Table 2.1 Table A.1 S.2.2	**Comment:** Overburden is classified as having "no ARD potential" and "low ML potential" in Table 2.1. However, Table A.1 of Appendix A shows that aluminum, copper and iron in test leachate of overburden samples exceeded their respective effluent quality criterion. Therefore, overburden should not be classified as having "low ML potential" and used for construction or as material for waste rock facility cover. In fact, in Section 2.2, it is stated that "*Overburden generated from the Whale Tail Pit will be placed in the Whale Tail Waste Rock Storage Facility (WRSF)*." **Recommendation:** CIRNAC recommends that AEM clarify overburden's ML potential and how it will be disposed of.
7	Table 2.1	**Finding:** Sediment characterization is based on Shake Flask Extraction tests instead of more reliable large column kinetic tests. **Recommendation:** Based on the elevated ARD/ML potential of sediments indicated by those tests, CIRNAC recommends that they be subjected to kinetic testing if the sediments are placed in any location other than the frozen core of the WRSF.
8	S.2.2	**Finding:** This section discusses waste rock segregation and disposal. However, it is not clear how lake sediment will be disposed of. **Recommendation:** CIRNAC recommends that AEM clarify how lake sediment will be disposed of.
9	S.2.2.1	**Finding:** It is stated that "*The Whale Tail WRSF will be constructed to encapsulate potentially acid generating (PAG) and ML waste rock inside a layer of NPAG material as a control measure for ARD and ML. The NPAG rock that is placed on the top and sides of the storage pile is needed in the long term to host the thawed layer and prevent liquids from contacting the centre of the pile that contains PAG and ML waste rock. Presently it is anticipated that the cover design will be similar to the Meadowbank Portage WRSF. The cover will consist of a 4.0 m thick NPAG/NML waste rock layer on the top and edges of the facility. The cover is expected to maintain freezing conditions in the pile in the long-term. This rationale is based on results to date on thermal modelling that considers thermistor readings at the Portage waste rock pile (Golder 2018, in preparation). Rock oxidation can still occur in frozen material but will proceed at a slower rate than predicted by laboratory testing because of the cold temperature prevalent for much of the year. Permafrost will retain water as ice, so it was predicted that contaminants will not be transported away from the core of the WRSF in the long-term."* We note the following errors in the above statement:

#	Reference	Finding / Recommendation
		(1) The WRSF needs to be encapsulated by materials that are both NPAG and NML, not just NPAG; (2) Based on AEM's latest thermal modeling results, a minimum of 4.7 meter thick WRSF cover will be required, not 4.0 meter; and (3) "Long-term" in the last sentence needs to be defined for the statement to be correct. Given enough time, contaminants will be transported away from the core of the WRSF. **Recommendation:** CIRNAC recommends that the above-quoted statement be revised and clarified.
10	S.2.2.1	**Finding:** The Plan states that the WRSF cover will consist of a 4.0 m thick NPAG/NML waste rock layer on the top and edges of the facility. In contrast, the Waste Rock Management Plan indicates the thickness will be 4.7 m (based on additional modelling requested by CIRNAC during the EIS/licencing process). **Recommendation:** The discrepancies should be reconciled. In addition, statements regarding the thickness of the cover should be expanded to clarify that the currently assumed thickness may be modified during the detailed design process.
11	S.3.1	**Finding:** The document indicates that the Geology Superintendent will have the discretion to vary aspects of the Sampling and Testing Plan (e.g., reduced sampling rate) without approval from applicable authorities. **Recommendation:** CIRNAC recommends that the rationale for any such changes be clearly documented and implemented only with the prior approval of the NWB. Depending on the available evidence, additional sampling and testing may be required. This recommendation should be applied to the entire Plan (i.e., not just S.3.1).
12	S.3.1	**Finding:** The Plan indicates that field sampling will be based on the collection of drill hole cuttings. We assume that some drill holes will intersect more than one lithology and, as a result, will contain cuttings that exhibit a range of ARD/ML potential. Those cuttings may not be fully mixed when sampled and, by extension may not be representative of the ARD/ML potential throughout the drill/blast depth. **Recommendation:** CIRNAC recommends that the Plan describe the approach that will be used to ensure the cuttings are representative (e.g., mixing the cuttings prior to sampling and/or sub-sampling).
13	S3.2.1 Appendix A	**Finding:** Appendix A states that "*ARD potential was evaluated by comparing ABA results to the Canadian guidelines presented in MEND (2009)*." In Section 3.2.1, it is stated that "*The ARD potential of*

#	Reference	Finding / Recommendation
		waste materials from Whale Tail Pit 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 NP (Golder 2016)." We note that on page 14-13, MEND (2009) states "*It is important to note that a % S cut-off should NOT be used as the only means of assessing ARD potential unless the minimum NP value is known. Even low levels of sulphide can lead to ARD if the NP is insufficient to neutralize the resulting acid.*" We also note that results from the Diavik Waste Rock Project show that effluent from low S content (<0.1 wt%S) waste rock had low pH (pH<4.5) and high concentrations of sulfate and dissolved metals (Bailey et al., 2016). **Recommendation:** CIRNAC recommends that the MEND (2009) guidelines be strictly applied unless it can be proven otherwise with site-specific data and analysis.
14	S.3.2.2	**Finding:** The Plan states that it is not feasible to segregate waste materials based on measured ML potentials derived from leaching tests due to the time required to complete the tests. AEM therefore assessed alternative methods that could be used to rapidly screen wastes for segregation. It was concluded that the amount of arsenic released by leaching is proportional to the total arsenic content of the sample. Specifically, the Plan indicates that samples with total arsenic content below 75 ppm indicates a low potential to leach arsenic. On this basis, the Plan proposes to segregate wastes using the 75 ppm criterion. No analysis justifying the selection of the criterion is presented in the Plan. **Recommendation:** CIRNAC recommends that AEM present a detailed assessment demonstrating that the 75 ppm threshold is appropriate.
15	S.3.2.3	**Finding:** The Plan indicates that separate "duplicate" analyses will occur at a testing frequency of 75 samples per quarter. **Recommendation:** Instead of analysing a fixed number of samples per time period, CIRNAC recommends that the frequency of duplicate analyses be based as a percentage of the number of samples collected (e.g., one in five samples). Further CIRNAC recommends that the duplicate analysis rate be doubled for lithologies known to have elevated ARD/ML potential (i.e., Komatiite and Iron Formation).
16	S.3.2.3	**Finding:** The Plan indicates that the results of the duplicate analyses will be evaluated against the proposed Effluent Quality Criteria (EQC)

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		for arsenic which is stated to be the MDMER criterion of 0.1 mg/L. We note, however, that the MDMER will not apply to the post-closure discharges of WRSF seepage to Mammoth Lake. **Recommendation:** For post-closure discharges of WRSF seepage to Mammoth Lake, CIRNAC recommends that the results of the analyses be compared to the Site-Specific Water Quality Objective (SSWQO) for arsenic.
17	S.3.2.3	**Finding:** Some of the critical tests (i.e., total sulfur, total inorganic carbon, and total arsenic) will be carried out in the on-site laboratory for waste rock characterization, classification and disposal. However, no QA/QC procedure is described in the plan for the on-site laboratory tests. **Recommendation:** Given that waste rock classification and disposal will rely on on-site laboratory test results and that there is little room for error, CIRNAC recommends that AEM develop a QA/AC procedure for its on-site laboratory tests (i.e., total sulfur, total inorganic carbon, and total arsenic).
17	S.3.3	**Finding:** The text indicates that the ARD/ML classification of all samples will be logged in a database for the Project, and will be available as required for annual reports or upon request. **Recommendation:** Based on the risks associated with waste segregation (e.g., impacts of cover contamination) and the short operational life of the mine, CIRNAC recommends that comparative reporting be provided to the NWB on a quarterly basis (as opposed to annual reports).
18	Table 5.1	**Finding:** The table indicates that AEM Management will be notified if there are any deviations from the proposed plan (e.g., higher proportion of waste rock is PAG/ML than anticipated). **Recommendation:** CIRNAC recommends that the NWB also be informed of all such circumstances.
19	General	**Finding:** During the EIS and Water Licensing processes, CIRNAC emphasized there was uncertainty regarding AEM's assumption there would be zero cover "contamination" (i.e., inadvertent inclusion of waste rock with elevated ARD/ML potential into the cover). The environmental risks of low levels of contamination (e.g., 2%) have been demonstrated to be significant. The current Plan does not include any sampling/testing to determine whether such contamination has occurred. Based on the significant, long-term and difficult to mitigate impacts associated with cover contamination CIRNAC requires additional monitoring evidence to verify that rock with elevated ARD/ML potential will not been incorporated into the cover. **Recommendation:** CIRNAC recommends that a sampling/testing program be conducted of the cover materials both before placement

#	Reference	Finding / Recommendation
		(i.e., from the NPAG/NML stockpile) and after placement (i.e., from the cover itself). This program should be designed to include the collection of representative cover material samples and long-term kinetic testing. The analysis program should be initiated no later than one year prior to closure and the results of the ongoing study should be reported annually. Information from the kinetic testing would help to inform the final design of the cover and any long-term management decisions for the site (e.g., the duration of post-closure monitoring).
20	General	**Recommendation:** Related to the previous point, CIRNAC recommends that the post-closure performance of the WRSF facility be re-modelled annually with actual measured data regarding the ARD/ML properties of the cover one year prior to site closure. The objective of the additional model run is to confirm that revised long-term seepage predictions are consistent with the original assessment.