AGNICO EAGLE

Meadowbank Division

Pore Water Quality Monitoring Program

JULY 2019
VERSION 1

DOCUMENT CONTROL

Version	Date	Section	Page	Revision	Author
1	July 2019			The Pore Water Quality Monitoring Program to support Type A Water Licence Amendment Application, submitted to Nunavut Water Board for review and approval	SNC Lavalin / Agnico Eagle Mines Ltd. / Golder Associates Ltd.

TABLE OF CONTENT

ACRONYMS

Agnico Eagle	Agnico Eagle Mines Limited – Meadowbank Division
ARD	Acid Rock Drainage
Board	Nunavut Water Board
DO	Dissolved Oxygen
LOM	Life of Mine
MDL	Method Detection Limit
MEND	Mine Environment Neutral Drainage
ML	Metal (and arsenic) Leaching
No	Number
NWB	Nunavut Water Board
ORP	Oxydo-Reduction Potential
RPD	Relative Percent Difference
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency

UNITS

%	percent
km	kilometer(s)
km^2	square kilometer(s)

SECTION 1 • INTRODUCTION

Agnico Eagle Mines Limited, Meadowbank Division ("Agnico Eagle") is developing the Whale Tail Pit, a satellite deposit on the Amaruq property, as a continuation of current mine operations and milling at the Meadowbank Mine. The Amaruq property is a 408 km² site located on Inuit Owned Land, approximately 150 km north of the Hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut. Ore will be transported from Whale Tail site to the Meadowbank Mine where it will be processed. Tailings generated from this operation will be deposited in the mined-out Goose and Portage pits.

The Meadowbank Mine is an approved mining operating in accordance with the Type "A" Water License No. 2AM-MEA1526. Agnico submitted an application to the Nunavut Water Board for an Amendment to the Type "A" Water Licence No. 2AM-MEA1526 to authorize water uses and tailings deposition in the pits. The Nunavut Water Board issued their decision on March 18, 2019.

As part of their decisions, Agnico is required to submit a Tailings Pore Water Quality Monitoring Program for the Board review and approve (Section IV, Part B: General Conditions).

The following sections presents the proposed Pore Water Quality Monitoring Program that will be implemented at Meadowbank Mine to comply with the amendments to the Type "A" Water Licence No. 2AM-MEA1526.

SECTION 2 • TAILINGS MANAGEMENT SUMMARY

For the Meadowbank In-Pit Tailings Disposal, slurry tailings will be deposited sub-aqueously in the mined-out Goose and Portage pits. A three (3) m (minimum) of water cover on top of the tailings surface will be maintained at all times during the operation phase to inhibit tailings reactivity to ensure water quality is not impacted.

Tailings will be deposited in one pit at a time, starting with Goose Pit for about 1 year, at which point it is expected to reach its storage capacity based on the current Life of Mine (LOM). Active tailings deposition will then alternate between Portage Pit A and Pit E. Tailings are expected to be fully consolidated within one year after placement.

SECTION 3 • PROGRAM PURPOSE AND APPROACH

3.1 Purpose

The purpose of the tailings Pore Water Quality Monitoring Program is to characterize and monitor the chemical composition of the pore water that exists in the tailings during operation and confirm predictions for mine closure. The data collected (Section 4.0) will be used to monitor pore water quality over time and to update and calibrate the hydrogeological and contaminant transport models developed for the tailings in-pit deposition.

The chemical composition of the mill effluent process water will have significant influence on the quality of supernatant water above the tailings surface (i.e. reclaim water) as well as the exfiltration from the tailings. The chemical composition of the tailings pore water is expected to be controlled by the chemical composition of the mill effluent and the reclaim water, which is a mixture of mill effluent process water and any other direct inputs to the pit (i.e. precipitation, runoff, etc.). Geochemical reactions within the tailings solids themselves are not expected to influence pore water chemistry.

3.2 Approach

The characterization of the movement and chemical composition of tailings pore water normally involves the installation of piezometers or monitoring wells. The piezometers allow the measurement of hydraulic head and consequently porewater flow directions, the measurement of hydraulic conductivity and the collection of porewater samples for chemical analysis.

However, it is unlikely that the piezometers/monitoring wells can remain operational for the entire monitoring duration due to the specific harsh arctic climate conditions at site including lateral pressure, damage caused by the ice sheet floating on the tailings pond in spring, etc. Observations from daily operation at Meadowbank site have shown that any instruments that were installed in the submerged tailings were damaged after first spring. Furthermore, it is also extremely challenging to install and maintain a monitoring well in the pit while in-pit deposition is occurring, especially as there will be no exposed subaerial tailings beach at any time during Operations.

Additionally, there are various safety concerns associated with the installation of monitoring wells in winter during active tailings deposition, as the water column above the tailings is not anticipated to freeze completely. These include ice sheet thickness, access to the pit during the winter season, pit wall stability, undulating tailings surface, logistic issues and safety of the working crew.

For the reasons noted above, monitoring wells will not be installed as part of the Pore Water Quality Monitoring Program. Instead, the quality of the reclaim water and process water in the plant effluent slurry will be monitored. These two waters are expected to bracket the potential range of quality of the tailings pore water (Section 3.1). The solids component of the plant effluent slurry will also be analyzed to evaluate the potential impacts on mill water chemistry.

SECTION 4 • SAMPLE COLLECTION AND ANALYSIS

4.1 Sample Collection and Frequency

The following samples will be collected at Goose Pit on a quarterly basis for the first year of Operations:

- One sample of reclaim water from the Pit where tailings are actively being deposited, if possible to be done safely.
- One sample of plant effluent slurry representative of the end of pipe prior to tailings disposal in Goose pit (collected in the mill). Sufficient volume will be collected to analyze both the water and solid components.

Monitoring pore water quality from Goose Pit will provide insights on the behavior of the pore water quality over time as the tailings self-consolidate. The data collected from Goose Pit should be representative of the behavior within Portage Pit A and Pit E since similar tailings are deposited in these pits.

Depending on the results collected over the first year of Operations, the sampling frequency may be adjusted and/or the analytical parameters (Section 2.2) may be reduced for the remainder of Operations.

4.2 Physicochemical and Geochemical Parameters

To obtain a good characterization of the tailings process water and reclaim water, as well as data that can be compared against the groundwater quality sampled around the pit, the following parameters are proposed to be analyzed for each water sample:

- pH, turbidity, salinity, electrical conductivity, oxydo-reduction potential (ORP), and dissolved oxygen (DO);
- Total and Dissolved Metals: aluminum, antimony, arsenic, boron, barium, beryllium, cadmium, copper, chromium, iron, lithium, manganese, mercury, molybdenum, nickel, lead, selenium, tin, strontium, titanium, thallium, uranium, vanadium, and zinc;
- Nutrients: Ammonia-nitrogen, total kjeldahl nitrogen, nitrate nitrogen, nitrite-nitrogen, ortho-phosphate, total phosphorous, total organic carbon, total dissolved organic carbon, and reactive silica;
- Conventional Parameters: total alkalinity, bicarbonate alkalinity, carbonate alkalinity, hardness, calcium, potassium, magnesium, sodium, chloride, sulphate, fluorides, bromides, total dissolved solids (TDS) and total suspended solids (TSS), turbidity;
- Total cyanide, weak acid dissociable (WAD) cyanide, and Free cyanide.

The plant effluent slurry solids will be analyzed for the following:

- trace metal content
- total sulphur
- sulphate sulphur
- total inorganic carbon

4.3 Quality Control on Sampling and Analysis

4.3.1 Handling

The following procedures will be followed to provide data quality control:

- Minimization of the exposure of the sampled reclaim water and plant effluent slurry to the atmosphere;
- In-situ measurement of sensitive chemical parameters (pH, electrical conductivity, dissolved oxygen) for the reclaim water, where applicable;
- Abiding by sample preservation methods (refrigeration and use of preservatives where needed), and specified holding times; and
- The plant effluent slurry water and solid components will be separated at the laboratory.

4.3.2 Duplicates, Field and Trip Blank

A duplicate water sample will be collected twice a year and submitted to the analytical laboratory. When both results are higher than five times the method detection limit (MDL), the relative percent difference (RPD) will be calculated as:

- RPD = absolute difference in concentration/average concentration x 100

USEPA (1994) indicates that an RPD of 20% or less is acceptable. Where one or both results are less than five times the MDL, a margin of +/- MDL is acceptable.

One field and one trip blank will also be collected twice a year.

4.4 Data Analysis

Following laboratory analysis, Agnico Eagle will compare the tailings effluent pore water and reclaim water results to Portage Effluent Limits (per Water Licence). Parameter concentrations above the effluent limit after considering dilution potential of mill water will be flagged as a potential risk for closure and post-closure.

SECTION 5 • REFERENCES

Golder (Golder Associates Ltd.). 2018. Evaluation of the Geochemical Properties of Waste Rock, Ore, Tailing, Overburden and Sediment from the Whale Tail Pit, Agnico Eagle Mines, Meadowbank Division. Document No. 182. October 2018.

MEND. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. Report 1.20.1. Mining Environment Neutral Drainage (MEND) Program, Natural Resources Canada. December 2009.

U.S. Environmental Protection Agency (USEPA). 1994. USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review. EPA 9240.1-05-01.