AGNICO EAGLE

MELIADINE GOLD PROJECT

AMMONIA MANAGEMENT PLAN

VERSION: 1

MARCH 2017

EXECUTIVE SUMMARY

Agnico Eagle is committed to continue the sample monitoring program, which includes monitoring for Ammonia in all surface sumps, seeps, etc., in accordance with the site Water License, to implement a comprehensive and routine inspection program related to explosives management within the mine. This includes regular inspections at the explosives manufacturing facility (Dyno Nobel) to ensure all explosive products are stored in locked, sealed containers prior to use and to perform continuous review of analytical results such that mitigation measures can be implemented when increasing trends of ammonia are determined.

This technical note provides guidance for monitoring ammonia levels at the mine site, as part of the conditions applying to waste disposal and management listed in the water license (NWB 2016) for this water quality parameter.

DOCUMENT CONTROL

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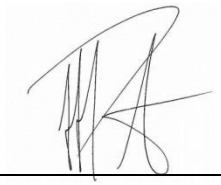
Prepared By: 

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1 INTRODUCTION

Agnico Eagle Mines Ltd (Agnico or the company) is committed to continuing a sample monitoring program, which includes monitoring for Ammonia in all mine pit sumps, seeps, etc., in accordance with the site Water License, implement a comprehensive and routine inspection program related to explosives management within the mine. This includes regular inspections at the explosives manufacturing facility (Dyno Nobel) to ensure all explosive products are stored in locked, sealed containers prior to use and to perform continuous review of analytical results such that mitigation measures can be implemented when increasing trends of ammonia are determined. It is important to note that Agnico has not exceeded any ammonia discharge criteria (Water License A, 2AM-MEL1631). The Ammonia Management Plan (AMP) provides guidance for monitoring ammonia levels at the mine site, as part of the conditions applying to waste disposal and management listed in the water license for this water quality parameter.

1.1 AMMONIA

Blasting of ammonium-nitrate (AN) explosives is typically the primary source of ammonia in areas of mining operations. It is used in the blasting agent ANFO (ammonium nitrate, fuel oil). AN readily absorbs water and dissolves easily, thereby mobilizing ammonia in either groundwater or surface runoff.

Ammonia dissolved in water exists in equilibrium by interchanging un-ionized (NH_3) and ionized (NH_4^+) forms. The equilibrium is influenced by pH, temperature, and ionic strength (salinity) where the amount of un-ionized ammonia is favoured as the pH becomes more basic or as the water temperature or salinity increases. Un-ionized ammonia can readily pass across the gill surface and enter into the bloodstream of fish, while ionized ammonia passes with greater difficulty. Once inside the fish, both forms of ammonia can cause toxic effects (CCME, 2010). Furthermore, it should be noted that ammonia oxidizes to nitrite (NO_2) and nitrate (NO_3), the former being particularly toxic to fish and humans. Both nitrite and nitrate are regulated by the CCME for the Protection of Aquatic Life.

This Ammonia Management Plan (AMP) proposes the monitoring of blasting practices for the assessment of explosive quantity used and blast performance, and monitoring of water quality to determine ammonia levels in waters within the mine site. The monitoring results can be used to review and adjust blasting practices or water management if ammonia levels need to be reduced.

In addition to ammonia, monitoring of nitrate and nitrite is also considered in the AMP, as both water quality parameters are signature compounds of AN explosives. NO_3 is listed with a discharge level threshold in the conditions applying to waste disposal and management in the water license (NWB 2016).

2 EXPLOSIVE MANAGEMENT AND BLASTING PRACTICES

2.1 SITE DESCRIPTION

2.1.1 Explosive Storage

Storage of explosive products will be located on the mine site Cap and Powder Mag area as presented on the Figure 1. The explosive products arrive by barge at the Rankin Inlet Itivia port. They are then transported by ground to the ANFO Pad located at the Tiriganiaq esker west of the exploration portal location.

The ANFO Pad area is located approximately 1 kilometer west of the Portal #1 and is accessible via service roads. This area consists of an ANFO Plant for the preparation of explosives, and two buildings for equipment storage. Seacan storage of Ammonium Nitrate is only allowed on the ANFO Pad. The service road running NW of the ANFO Plant is the only access to the Cap and Powder Mags.

Explosive products at the storage facilities are packed in sea containers, which limits the possibility of spillage. The products are only removed from these containers prior to use at the ANFO site.

2.1.2 Roads

The AWAR is a restricted access road constructed and operated by Agnico for ground transportation between the Meliadine mine site and Rankin Inlet. This road is used to transport explosive products from the Rankin Inlet Itivia facilities to the ANFO plant area at the mine site. In preparation for blasting operations, explosive products are transported from the ANFO plant area to the appropriate blasting locations via local site roads.

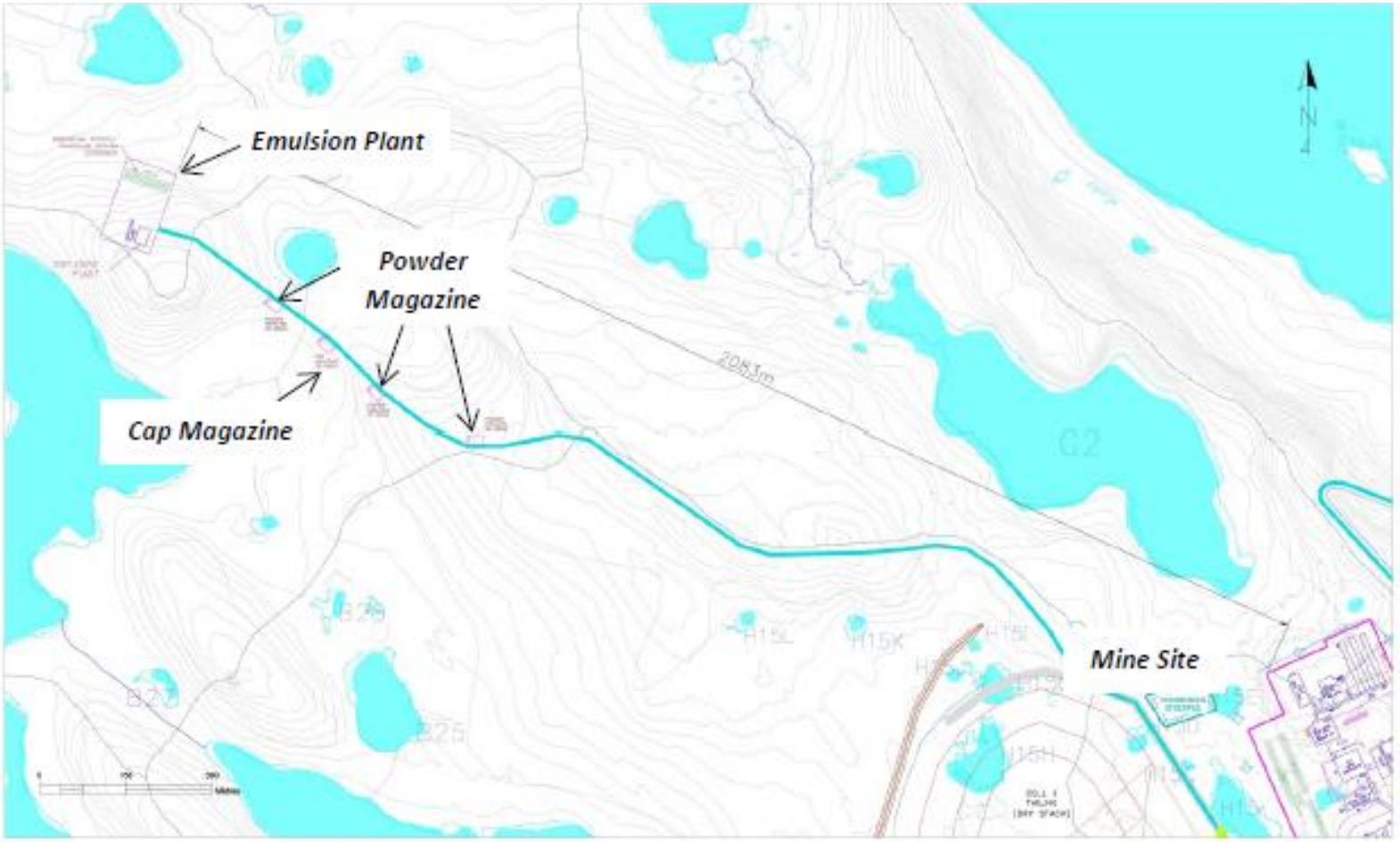
2.1.3 Mine

The development sequence of the mine site is provided in Table 1.1 of the 2017 Mine Waste Management Plan. Explosives are used for the mining of waste rock and ore in the underground operations at the Tiriganiaq deposit.

2.2 AMMONIA PATHWAYS

Ammonia not fully detonated within the blasting operations mobilizes through several pathways on the mine site. Water from drainage runoff is the primary mechanism of mobilization for ammonia residuals remaining within the underground. This water is collected at underground sumps. Blasting residuals are also expected to be attached to waste rock and ore materials, which are transported from the underground to their respective storage and processing facilities. Residuals from waste rock may be washed off by precipitation and be ultimately conveyed to any of the collection ponds CP1-5. All of these pathways are monitored in accordance with the Water License requirement. No contact water from the waste rock will be drained towards watercourses.

Figure 1. Location of Cap Magazine, Powder Magazine, and Emulsion Plant



2.3 EXPLOSIVES AND BLASTING

Based on experience at other open pit mines in the Canadian Arctic, the largest potential source of ammonia in mine water will be from explosive residue from blasting. Depending on the wetness of the site, water may leach explosives from blastholes prior to the blast. Other forms of ammonia release from AN are explosives flowing into cracks and fissures in the rock and not detonating, or from an incomplete detonation of the explosive column and misfired blastholes. An AN based explosive is used as a blasting agent at the Meliadine site. This material (ANFO) is designed to repel water thus minimizing the potential for ammonia to impact mine water.

Blasting operations on site include monitoring of explosive quantities and blast design, procedures and practices. Combined with water monitoring, the compilation of these data is used to assess blasting performance. The results of this assessment are used to adjust blasting practices as needed to:

a) Optimize the use of explosives; and

b) Increase the completion and efficiency of explosive detonations.

Any modifications to blast design are intended to decrease the amount of ammonia that may become available for mobilization in mine water.

This section summarizes the explosive products and blasting design parameters, procedures and practices employed at Meliadine. Associated monitoring is also discussed.

2.3.1 Explosive Products

Explosive products used at the mine site include ANFO, packaged explosives, cast boosters, detonating cords, non-electric delay detonators and non-electric lead lines. Of these products, the greatest potential for water contamination comes from the bulk explosives. Presently, Meliadine uses ANFO as the primary explosive for its blasting operations.

Although bulk ANFOs are water resistant, contaminants can be leached from the product if it is left in contact with standing or flowing water for extended periods of time. The performance of the explosive, and hence the potential for post-blast contaminations, deteriorates with the length of time that the ANFO remains loaded (i.e., sleep time). Blast procedures currently in use are designed to minimize sleep time so that standing or flowing water is not in contact with the bulk ANFO for extended periods of time.

2.3.2 Procedures and Practices

Quality control procedures are in place to verify AN content in bulk explosives. Quality control procedures for the ANFO occur at the plant.

The primary factors that may reduce the amount of ammonia available for mobilization in mine water are:

- Explosives handling
- Completeness of detonation

ANFO spillage during loading could (as ANFO is resistant to water) be a source of ammonia that could be carried by water collected in the sumps. Spillage control protocols, procedures and handling of spilled material, and explosive management for storage and transport, are in place at the Meliadine site.

Incomplete detonation results in higher ammonia residue on the blasted rock. Evidence of incomplete detonation is often observed as an orange fume after a blast and sometimes an orange pigment on the blasted rock. Explosives that have failed to detonate may be observed in the muckpile. Muckpiles are routinely inspected by Meliadine staff for signs of incomplete detonation.

2.4 MONITORING

Monitoring of explosive handling and blasting is as follows:

a) Explosive quantities: Records of explosive quantities used for blasting are kept for each blasting event and will be conserved throughout the mine life.
b) Design parameters: Blast design parameters are in place. Blast design at the face is determine by the jumbo operator as required.

Loading instruction standards are in place for the Meliadine Project. These standards are followed when loading explosives.

3 WATER MANAGEMENT

Water quantity and quality monitoring assist in the monitoring of ammonia loadings from explosive residuals,. The Meliadine water license (NWB 2016) includes monitoring stations that are used for the monitoring of ammonia loadings. The stations that specifically monitor for ammonia are listed in Table 1. Table 2 lists the monitoring parameters for each group.

Table 1 Water Monitoring Station Included under the Meliadine Water License A, 2AM-MEL1631

Station	Description	Phase	Monitoring Parameters	Frequency
MEL-SR-1-TBD	Surface Runoff – runoff downstream of Construction areas at Meliadine Site and Itivia Site, Seeps in contact with the roads, earthworks and any Runoff and/or discharge from borrow pits and quarries	Construction, and Operations	As defined in the Water Management Plan referred to in Part D, Item 18 and Part I, Item 11	Prior to Construction, Weekly during Construction
			Group 1	Monthly during open water or when water is present upon completion
MEL-11	Water intake from Meliadine Lake	Construction, Operation, and Closure	Full Suite	Monthly during periods of intake
MEL-12	Water treatment plant (pre-treatment) coming from CP1, off the pipe and not in the pond	Construction (prior to release), Operations, and Closure	Group 1	Monthly during periods of discharge
MEL-13 (and AEMP Stations)	Mixing zone in Meliadine Lake, Station 1; and MMER exposure stations for final discharge point within mixing zone	Construction (prior to release), Operations, and Closure	Full Suite, Group 3 (MMER)	Monthly during periods of discharge
MEL-14(a) (MEL-01 suggested by AEM in the Aplication)	Water treatment plant from CP-1 (post-treatment), end of pipe (before offsite release) in the plant before release.	Construction (upon effluent release), Operations, and Closure	Full Suite, Group 3	Prior to discharge and Weekly during discharge
MEL-15	Local Lake E-3	Operations, and Closure	Group 2	Bi-annually during open water

MEL-16	Local Lake G2	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-17	Local Pond H1	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-18	Local Lake B5	Construction, Operations, and Closure	Group 2	Bi-annually during open water
MEL-19	CP-2 Collection of natural catchment drainage from the outer berm slopes of the Landfarm and industrial pad	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-20	CP-3 Collection of drainage from dry stacked tailings	Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-21	CP-4 Collection of drainage from WRSF1	Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-22	CP-5 Collection of drainage from WRSF1 and WRSF2	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-23	CP-6 Collection of drainage from WRSF3	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present
MEL-24	Seepage from the Landfill between the landfill and Pond H3	Construction, Operations, and Closure	Group 1	Monthly during open water or when Water is present

In addition to the monitoring listed in Table 1 any surface runoff locations identified as potention receptors for increased ammonia will be sampled as well.

Table 2 - Monitoring Group (Meliadine Water License A, 2AM-MEL1631)

Group	Parameters
1	pH, turbidity, hardness, alkalinity, chloride, fluoride, sulphate, total dissolved solids (TDS), total suspended solids (TSS), total cyanide, ammonia nitrogen, nitrate, nitrite, phosphorus, orthophosphate, Total Metals (aluminum, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, and zinc).
2	**Total and Dissolved Metals**: aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc. **Nutrients**: ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen, nitrite-nitrogen, orthophosphate, total phosphorus, total organic carbon, dissolved organic carbon, and reactive silica. **Conventional Parameters**: bicarbonate alkalinity, chloride, carbonate alkalinity, turbidity, conductivity, hardness, calcium, potassium, magnesium, sodium, sulphate, pH, total alkalinity, TDS, TSS, total cyanide, free cyanide, and weak acid dissociable (WAD) cyanide.
3	**MMER parameters**: total cyanide, arsenic, copper, lead, nickel, zinc, radium-226, TSS, pH, sulphate, turbidity, and aluminum. **MMER additional requirements**: Effluent volumes and flow rate of discharge, Acutely Lethality tests (Rainbow Trout and Daphnia magna) and environmental effects monitoring (EEM).
4	Total arsenic, total copper, total lead, total nickel, TSS, ammonia, benzene, toluene, ethylbenzene, xylene, total petroleum hydrocarbons (TPH), and pH.
Full Suite	Group 2, TPH, and turbidity.
Flow	Flow data-logger.
Field measurements	Field pH, specific conductivity, dissolved oxygen, and temperature.

MMER - Metal Mining Effluent Regulations (SOR/2002-222).

4 REPORTING

Reporting of ammonia concentrations at the sampling stations listed in Table 1 is included as part of the requirement of the water license (NWB 2016). The reporting frequency is required by the water license (NWB 2016), and includes:

- Brief monthly reports of the compiled water quality monitoring results, sent to the Nunavut Water Board (NWB), the Indigenouss and Northern Affairs Canada (INAC) Water License Inspector and to the Kivalliq Inuit Association (KIA); and

- An annual report submitted to the NWB, KIA, INAC, Nunavut Impact Review Board (NIRB), Government of Nunavut, and other interested parties. This report summarizes monitoring results for each sampling station, annual seep water chemistry results, receiving water monitoring results, spills and any accidental releases, measured flow volumes, effluent volumes and loadings, and results of QA/QC analytical data.

Mine operation and environment personnel reviews on a monthly basis the data gathered from the sampling stations in Table 1 and from the monitoring action proposed under the AMP. If the data indicates that further studies and/or significant changes to the water management infrastructure are required to assess or control ammonia concentrations, Agnico will notify the Nunavut Water Board as early as practical. Results of these further studies and/or changes to the AMP monitoring actions will be transmitted to the Nunavut Water Board for review.

5 INSPECTION

On a weekly basis, the engineering department will conduct inspections in the blasting area to ensure that the loading procedures are being implemented (this will minimize blasting residues). In addition, environmental inspections will be undertaken at explosive product storage facilities (Dyno Nobel) to ensure that explosives products are stored in sealed containers and there is no spillage. If any non-conformities are observed follow up actions will be undertaken and corrective measures will be put in place.

6 REVIEW OF AMMONIA MANAGEMENT PLAN

Review of the results of the site water quality and AMP monitoring during the year may provide new information, and/or indications that changes to the AMP are necessary. When revisions are warranted, an updated AMP will be submitted to the Nunavut Water Board for review.

7 REFERENCES

CCME (2010), Canadian Water Quality Guidelines for the Protection of Aquatic Life, Ammonia.

NWB (Nunavut Water Board License) (2016). Water License No: 2AM-MEL1631. Agnico- Eagle Mines Ltd. April 2016.