

AMARUQ GOLD PROJECT

Quarrying Management Plan KVCA15Q01 Eskers 7 and 7B, Quarry 1

Prepared by:

**Agnico Eagle Mines Limited, Exploration Division** 

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## **Document Control**

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2	July 2017	МВС			Revised to add Quarry 1
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# Plan prepared by:

Exploration and Meadowbank Environment Department Agnico Eagle Mines Limited

# 1. Table of content

1.	Location	4
2.	Land Use Authorization	7
3.	Site description	7
4.	Overburden	8
5.	Mitigation Measure	8
6.	Quarry and Borrow Pit Extraction Methods (including blasting)	9
7.	Proximity of water bodies	10
8.	Access required	11
9.	Surface Water	11
10.	Acid Rock Drainage and Metal Leaching.	11
11.	Management of Archaeological Resources	11
12.	Ground Ice and Permafrost Protection	12
13.	Spills	12
14.	Wildlife Management in Borrow/Quarry Pits	12

### 1. Location

Agnico Eagle Mines Limited (Agnico Eagle) signed an exploration agreement with Nunavut Tunngavik Inc. in January 2013 for the Amaruq property. The Amaruq Project is a 408-square kilometre exploration property located on Inuit Owned Land approximately 150 kilometres north of Baker Lake and about 50 kilometres northwest of the Meadowbank mine. The Kivalliq Inuit Association issued Agnico Eagle a land use permit for exploration purposes and the Nunavut Water Board, a Type B water licence 2BE-MEA1318 (now 2BB-MEA1318). Agnico Eagle started the installation of an exploration camp during the summer 2014 and continued the construction and upgrade of the camp during the last years. A commercial lease with the Kivalliq Inuit Association has been obtained by Agnico Eagle and includes the camp area.

Since the signing of the exploration agreement in 2013, Agnico Eagle has been carrying out an active gold exploration program, including diamond drilling of the more promising prospects. The results of the drilling have shown encouraging gold mineralization at the north end of Whale Tail Lake. This inferred resource has the potential to be mined as a satellite open pit and would allow the Meadowbank mine to continue operating beyond 2018.

This management plan describes the use of the esker borrow pits #7 and 7B and quarry 1 that are exploited for gravel and bedrock requirements (See Figures 1a and 1b below). The gravel/bedrock material is used to construct gravel pads for the camp area, gravel roads between the camp and the eskers, small gravel exploration roads for the drilling and an airstrip, cover over the box cut, constructing a berm, and upgrading ancillary facilities around the site. All identified material comes from the borrow pits/quarry and not from existing watercourses; no rock and gravel will be gathered from below the high water mark of any watercourse, nor will any borrow pit operate within 31 metres of a water body. The Quarry permit was emitted by the Kivalliq Inuit Association. Fees are paid monthly to the Kivalliq Inuit Association for each cubic metre of material used, and an accurate record of the volume used is kept.

FORMAT ANSI A-8.5x11 STORM WATER STORAGE POND BULK SAMPLE STORAGE CONSTRUCTION MATERIAL STORAGE WASTE ROCK PAD QUARRY #1 AREA: 27 500m² VOL: 250 000m³ EXPLORATION RAMP PORTAL A53 EXPLORATION SERVICES PAD RAMP (UNDERGROUND CONFIGURATION) MAGAZINES EXPLORATION RAMP VENT RAISE ENVIROTANKS 0 AIRSTRIP ESKER BORROW PIT

WHALE LAKE

**AGNICO EAGLE** 

Figure 1a: Location of Esker 7 and Quarry 1

DESCRIPTION

REVISIONS

AGNICO EAGLE - MEADOWBANK DIVISION

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AMARUQ PROJECT PLAN VIEW

SITE ARRANGEMENT, RAMP & ROAD

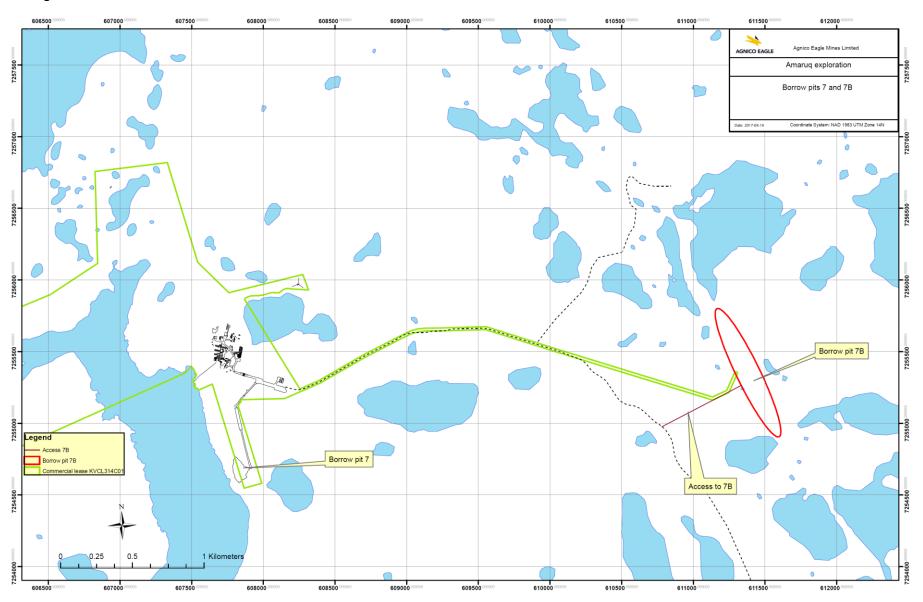
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FIG 2

Figure 1b: Location of Esker 7 and 7B



### 2. Land Use Authorization

This quarry management plan describes the proposed activities for the Amaruq Gold Project under the quarrying permit KVCA15Q01 (eskers 7 and 7B) and the ongoing permitting process for Quarry 1. The activities described in this management plan are authorized by various authorizing agencies. The Nunavut Impact Review Board in the decision 11EN010 and the Nunavut Water Board in the water licence 2BB-MEA1318 Amendment `4 (previously 2BE-MEA1318) have authorized the exploitation of the borrow pits and quarry with some conditions. These borrow pits/quarry are located on Inuit Owned Land and administered by the Kivalliq Inuit Association. They are both located on the KIA Commercial Lease.

### 3. Site description

Figure 1a and Figure 1b show the gravel deposits located in the eskers 7 and 7B that are located in the area of the Amaruq exploration project. The area used for the borrow pits will be around 1 hectare for the esker 7 and up to 13 hectares for the 7B. A maximum of 260,000m³ is planned to be used from these borrow pits. When the exploitation is completed, the reclaimed borrow pits will have gently sloping walls and positive drainage wherever possible. With prudent initial design, the borrow pits should require little reclamation.

Quarry 1 is illustrated on Figure 1a. This quarry is also located in the area of the Amaruq exploration project. Quarry 1, at its full extent, will have a surface area of 2.75 hectare. It is expected that the quantity of rock excavated from the quarry will be around 250,000 m<sup>3</sup> over the five years of underground development and quarry operations

The crusher is to be located on the operations waste rock pad and will make aggregate using acceptable rock from the quarry and the underground. All crushed material will be stockpiled on the operations pad and be available for use on site when and where required. Planned uses of aggregate includes, constructing berms as needed, upgrading site roads, making camp improvements, and eventually, backfilling around the portal

cover. If aggregate remains at the end of the underground program, it will used on future roads and development. If it is not needed in future development, the aggregate will be spread over the waste rock pad and left in place.

#### 4. Overburden

There is almost no overburden present in the eskers 7 and 7B gravel deposits. At many locations, the gravel is exposed without any overburden. The estimated thickness of the overburden varies between 0 and 2 cm depending on the area. The volume of overburden that will be stockpiled during the exploitation will be very low to absent, since it is very difficult to remove only the overburden without mixing it with the gravel due to its small layer.

To reach the bedrock, Agnico Eagle will have to remove over the Quarry 1 footprint a volume equivalent to 122,000m<sup>3</sup> of overburden. This material is planned to be disposed of on the Waste Rock Pad but if the material is to be sustainable for some construction, Agnico Eagle may use it to build some pads. Overburden will not be saved for future reclamation.

Please refer to the Conceptual Closure and Reclamation Plan Version 6 for more details regarding the reclamation plan for these borrow pits and quarry.

# 5. Mitigation Measure

Best management practices will employ the following general mitigation measures for the borrow pits/quarry:

- Minimize the surface area of borrow pits/quarry;
- · Locate pits in well drained areas;
- Where possible, maintain the floor of the pits slightly above the elevation of the surrounding area to promote natural drainage patterns, to avoid creating ponds, and to prevent permafrost degradation in pits;
- Prevent erosion and sedimentation through appropriate control measures such as silt fences;

- Carry out ARD/ML testing and water quality monitoring in support of mitigation measures;
- Protect archeological resources and mitigate as deemed appropriate by GN cultural and heritage department;
- If deemed necessary, maintain air quality through dust control/suppression;
- Use progressive reclamation in closing pits that are no longer needed.

Where mitigation measures are not proving effective, adaptive management will be employed to address shortcomings.

## 6. Quarry and Borrow Pit Extraction Methods (including blasting)

Quarries consist of rock material that is typically extracted by digging, cutting, or blasting and yields large stones that may then need to be crushed (INAC 2009). Borrow pits consist of fine grained fill materials, such as sand or clay that are normally used at a nearby site (INAC 2009).

Quarry operations will use explosives. The design, size, and shape of the blasts are planned with safety being the foremost consideration. A predetermined pattern of drill holes are drilled to a depth not exceeding the overall depth of the quarry and filled with explosives. Prior to a blast, a notice is sent to all employees to inform of the blast location and time. All personnel and equipment are moved to a safe distance from the blast area. The blast fragments (i.e., the blasted rock) is then loaded into haul or dump trucks using either a loader or a hydraulic shovel. The truck drives to the end of the road (or other construction area) where the rock is dumped. The rock is then pushed into place using a dozer. This sequence is called a "drill, blast, load, haul, dump" sequence. Some rock can be moved to a crusher to produce aggregate of various sizes. The crusher is located as far from water as possible and where it is best shielded from the prevailing wind, preferably behind a high wall in a quarry so as to reduce the quantity of wind-blown dust and to have as much dust as possible fall within the boundaries of the quarry.

Wherever possible, borrow pit material will be ripped using a dozer. This loosens the material and allows it to be picked up using a loader or a hydraulic shovel. Standard drill and blast procedures may be used in instances where ripping is not possible. The sequence of steps under this circumstance follows that for rock quarries.

Approved ammonia management procedures will be adopted to ensure blasting practices monitor explosive quantities and blast performance to optimize the blasting practices while reducing impacts to nearby water quality from blast residue.

## 7. Proximity of water bodies

The lakes located near the proposed borrow areas must be protected against any possible sedimentation coming from the borrow pits/quarry. The buffers requested by the Nunavut Impact Review Board and by the Nunavut Water Board are the following:

# Water Licence No. 2BB-MEA1318 Amendment 4 (previously 2BE-MEA1318) Part E, Item 9:

The Licensee shall maintain a minimum of thirty-one (31) metres large undisturbed buffer zone between the periphery of quarry sites and the high water mark of any water body. The Licensee shall not excavate and/or remove material from the quarry beyond a depth of one (1) meter above the high water mark or above the groundwater table, to prevent the contamination of groundwater. The quarrying shall be in accordance with all applicable legislation and industry standards including the Northern Land Use Guidelines, Pits and Quarries (INAC, 2010).

## Nunavut Impact review Board, new conditions 11EN010

69. The Proponent shall maintain an undisturbed buffer zone between the periphery of quarry sites and the high water mark of any water body that is of an adequate distance to ensure erosion control.

## 8. Access required

The road needed to access the borrow pits/quarry from the Amaruq camp is mostly located within the perimeter of the commercial lease entitled by the Kivalliq Inuit Association KVCL314C01.

### 9. Surface Water

All contact water in the quarry, if any, will be collected in a sump and pumped to A-P5 when it is constructed. Wherever possible, contact water is to be used as makeup water in developing the ramp, for dust control at the crusher when it is operating and/or on site roads.

## 10. Acid Rock Drainage and Metal Leaching

Geochemical testing was carried out to assess the chemical composition of the potential building material, its potential to generate acid rock drainage (ARD), and its potential to leach metals into the receiving environment upon exposure to ambient conditions. Sampling and testing prior to use of any rock significantly reduces the risk of ARD/ML. Avoiding the use of undesirable or questionable materials ranks this mitigation measure as highly desirable.

Initial testing of borrow pits/quarry materials was completed and found that the samples show no potential to generate acid drainage. If generating material is found, they will be stockpiled in the Waste Rock Pad. Additional tests will be carry out during the development of the Quarry 1 and eskers 7 and 7B to confirm the no ARD-ML status of the material to be taken.

# 11. Management of Archaeological Resources

Agnico Eagle has carried out an archaeological assessment of the area around Amaruq camp and no concerns were raised following the assessment on the Commercial lease area, including Q1, and the esker 7. One archeological site was found on the esker 7B, and protection measures will be applied to protect this site. It is Agnico Eagle's intent to

avoid archaeological resources in constructing the infrastructures wherever possible; this is the preferred mitigation measure. The goal is to protect archaeological sites identified at any borrow pit or on the access road. However, if any identified site cannot realistically be avoided, Agnico Eagle will apply for a Culture and Heritage permit to mitigate the site(s). If any potential archaeological site is identified during the operation of any borrow pit, work will stop, a professional archaeologist will be consulted, and Culture and Heritage will be informed of the discovery.

### 12. Ground Ice and Permafrost Protection

Should permafrost degradation become evident, the area will be monitored and, if necessary, stabilized by covering the affected land with 1.0 to 1.5 m of granular material. This reclamation effort would allow the permafrost to move up into the material covering the area and stop any further permafrost degradation or prevent further melting of any ground ice. Inspections of borrow pits will continue after their closure at the end of construction.

Any significant seeps originating from the borrow pits/quarry as a result of ground ice, permafrost melting, or from precipitation events will be monitored if the water is likely to reach receiving waters.

## 13. Spills

Spill management will be in accordance with the Spill Contingency Plan – Version 10.

# 14. Wildlife Management in Borrow/Quarry Pits

The Nunavut Wildlife Act and Regulations will apply as raptors nesting close or in the quarry may be disturbed, or raptors may nest in the quarries upon the completion of their use. Environmental Department will complete inspections in quarry pits on a weekly basis to make sure there is no raptor nest during operations and before any work is conducted. If a nest is discovered, all work will be suspended.

Land animals may also be disturbed by the quarrying activities. Blasting will require the use of explosive. The activities will have to comply with the Explosive Use Act and Regulations, and the Mine Health and Safety Act and Regulations. No blast will be held if there is any wildlife near the area to be blasted.