

September 30, 2009

Via Email

Amy Liu/Dave Balint Habitat Management Biologist Department of Fisheries and Oceans Canada Central & Arctic Region, Eastern Arctic Area 304-3027 Harvester Road Burlington, ON

Dear Amy Liu/Dave Balint

## Re: Meadowbank Gold Project – Application for Water Intake Pipe Authorization for the Emulsion Plant

Agnico Eagle Mines Limited (AEM) is hereby requesting a freshwater intake pipe authorization for the emulsion plant of the Meadowbank Gold Project. This mining activity and water use is currently authorized under the Nunavut Water Board Type A Water License # 2AM-MEA0815.

Details of the freshwater intake for the emulsion plant are as follows.

## General and Site Information

- Common Name of the Watercourse: Un-named Lake
- Location of Watercourse: approximately 70 km north of Baker Lake, Nunavut
- Type of Watercourse: Lake
- Type of Water Intake: Pump
- Other Activities Associated with the Development of the Intake Structure: None

## **Biophysical Information**

• Fish Presence, Species and Habitat Conditions at the Project Site
This information has been previously submitted to DFO, as part of the 2008 annual report
(Appendix C5, Appendix E). The memo, entitled "Meadowbank AEMP Targeted Study:
Explosives Lake fish Status Assessment Results", is attached to this application letter for ease of
reference. Lake trout are present in the lake with sufficient overwintering habitat to support the
population year round. Lake trout are classified as subcarangiforms.

Tel: 819-759-3700 Fax: 819-759-3663



## Physical Description of Watercourse

This information has been previously submitted to DFO, as part of the 2008 annual report (Appendix C5, Appendix E). The lake receives water from a small headwater lake to the northwest, and drains via a boulder field and saturated grassy area at the northeast end into a small lake, which drains into Turn Lake. Connectivity between the lakes appears low (possibly during freshet) to nil (most likely).

Lake surface area and volume are estimated at approximately 25 ha and 0.6 Mm<sup>3</sup>. Mean depth, therefore, is about 2.4 m. Discharge is estimated at 15-20 L/s, or approximately 39,000 to 53,000 m<sup>3</sup>/month.

## Location and Position of Intake

The freshwater intake pipe for the Meadowbank Gold Project emulsion plant is located to the northwest of the plant in the unnamed lake; the intake pipe location is indicated on Figure 1. The intake pipe is located approximately 73 meters from the shoreline. The depth of the watercourse at the location of the water intake is 4 meters; the intake pump is suspended in the water column at a depth of 3 meters.

## Description of Site Features and Characteristics

The location of the emulsion plant was revised in November 2007. A clarification on the location and volume of freshwater source for the explosives mixing facility was provided in a letter to the Nunavut Water Board (as part of the Type A water license application) on March 6, 2008. This letter is attached for ease of reference. The explosives storage and mixing facilities are located on a spur road off the all weather private access road at Km 103.

The explosives to be used at the Meadowbank Gold Project will primarily be ANFO (Ammonium Nitrate Fuel Oil), with smaller amounts of other water resistant emulsions. The ANFO will be mixed on-site just prior to its delivery by emulsion truck to the open pit mine. The mixing facility will be maintained and operated by the explosives supplier selected by Agnico-Eagle Mines Ltd. the on-site storage facilities will be designed to house approximately 14 months supply of ammonium nitrate which will be shipped to site on the summer sealift in 1 ton capacity tote bags.

The storage area and emulsion plant is approximately 183 m from the nearest shoreline (unnamed lake).

## **Approval Period**

The water intake system for the Meadowbank Gold Project emulsion plant, as described in this application, is a permanent water intake system for the life of the mine.



#### **Water Use Information**

Purpose of Water Withdrawal

This freshwater intake system services the emulsion plant; the water is used for mixing ANFO and cleaning purposes.

Average Rate of Withdrawal

The maximum pump rate is 119.2 litres per minute (2 L/s). The pump will run intermittently, as required. The estimated volume of water to be used at the plant is estimated to be 200 m<sup>3</sup> per month (an average use of 6.5 m<sup>3</sup> per day).

Duration and Time of Withdrawal

The water intake pump is controlled by a float switch to maintain the water level in the storage tanks. Consequently, the water is withdrawn intermittently, as required.

- Flow Rate in Watercourse at Times of Withdrawal Not applicable lake environment.
  - Expected Effects of Withdrawal on Existing Watercourse

As presented in the AEMP Targeted Study technical memo regarding the unnamed lake near the emulsion plant (attached at the end of this letter), the discharge estimate is 15 to 20 L/s. With an estimated water use of 200 m<sup>3</sup> per month, this represents 0.51% of the estimated monthly discharge volume and 0.03% of the total lake volume. Consequently, the planned water use will have a negligible impact on the lake hydrology.

• Description of Structures or Activities Associated with the Intake

The freshwater intake system consists of a 3Hp stainless steel Grundfos submersible well pump. Grundfos submersible pumps feature rugged and durable stainless-steel construction for all vital pump components. The pump itself is connected by a 2-inch diameter insulated HDPE pipeline to the emulsion plant. Storage is available for a total of 12,000 litres of water in the plant facility.

During ice up (fall, winter and spring), the pump is suspended in the water column from the surface of the ice. During the open summer months, the pump is suspended in the water column using a floatation device.

• Application for a New Intake, Re-development, or Upgrade
This is the first application for a freshwater intake authorization at the Meadowbank gold project emulsion plant.

#### Other Information

Site Plans
 See Figure 1.

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### **Fish Screen Information**

• Screen Open and Effective Areas; Physical Screen Parameters & Method of Installation The fish screen is cylindrical and specifically manufactured for the Grundfos well pump; it is made of stainless steel alloy mesh and attaches directly to the pump. The slot openings are 2.0 mm by 16 mm in size. The screen area is 40 mm in diameter by 292 mm in length, corresponding to a screen area of 0.037 m<sup>2</sup>.

The open screen area requirement is determined from Table 2 of the DFO "Freshwater Intake End-of-Pipe Fish Screen Guideline". For the maximum intake pump rate of 2 L/s, for subcarangiform fish, the open screen area can be extrapolated from the table to be 0.02 m<sup>2</sup>. For the 24-hour average flow rate of 0.075 L/s (based on a daily flow average of 6.5 m<sup>3</sup> per day), the open screen area falls well below the lowest reported value in the table; an estimate of 0.00075 m<sup>2</sup> can be used based on the linear statistical relationship of flow to open area, but the biological relevance of this value is questionable. The statistical relationship may not be accurate as the value approaches 0.

The effective screen area is calculated based on the material and size of the screening; from Table 3, the % open area for a stainless steel alloy mesh is 60%. For the maximum pump rate of 2 L/s, the effective screen area is  $(0.02 \text{ m}^2) / 60/100) = 0.03 \text{ m}^2$ . For the 24- hour average flow rate of 0.075 L/s, the effective screen area is 0.001 m<sup>2</sup>.

Based on the numbers presented above, AEM believes that the fish screening for the intake pump meets the intention of the DFO guidelines.

- 1. The actual screen area on the pump (0.037 m²) exceeds the requirements for the maximum intake pump rate (0.03 m²) and the maximum 24-hour average flow rate (0.001 m²).
- 2. The actual slot opening meets the 2.54 mm requirement on one side; it would be difficult for a fish to orient its body in such a way as to become entrained or impinged on the screen.
- 3. The screen area requirements have been based on extrapolations from the lowest values of the linear statistical relationship between flow and open area. Consequently, the biological relevance and statistical accuracy of these extrapolated screen area requirements is questionable.
- 4. Lastly, in the 10 + years of professional experience of our water treatment plant consultant/expert, he has never seen a fish impinged or entrained on a pump of this small size.

## Screen Maintenance

Biannually, when the pump is being changed to/from an ice-up to open water installation, the fish screen and intake pump will be cleaned and any maintenance/repairs performed. Should the pump suction pressure change at any time, indicating an issue with the fish screen, the intake pump will be removed from the water and the fish screen cleaned at that time.

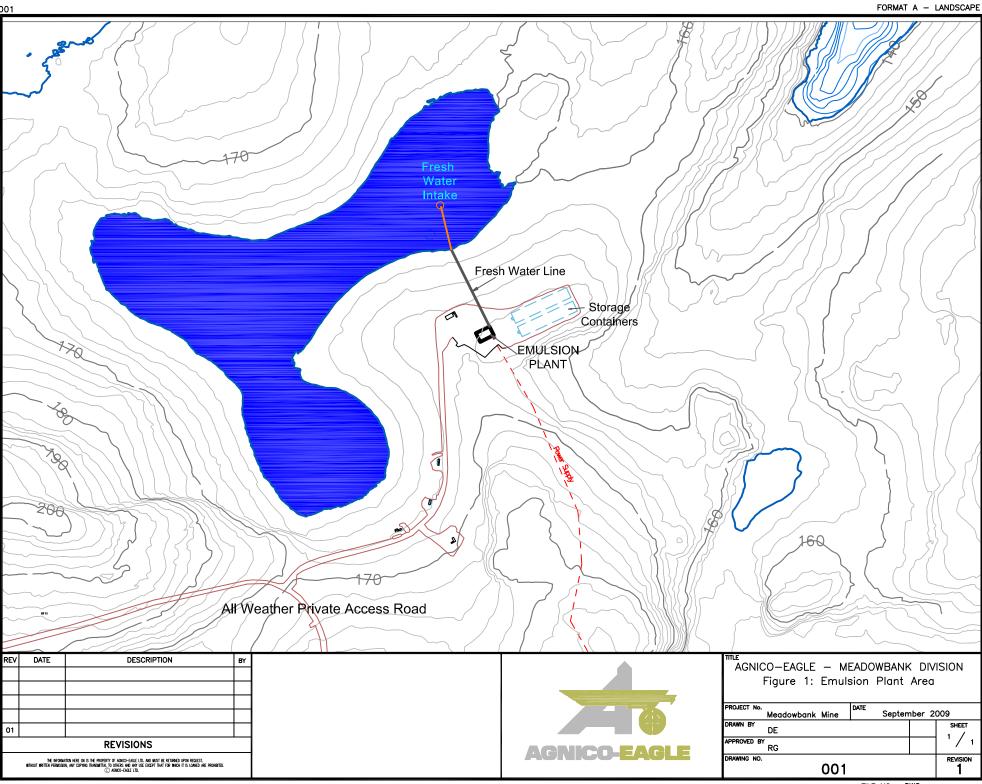


Should you have any questions regarding the information provided, please contact me at via email at rgould@agnico-eagle.com.

Regards,

Agnico-Eagle Mines Limited – Meadowbank Division

Rachel Lee Gould, M.Sc. Environmental Coordinator





## **Technical Memorandum**

**Date:** 10 October 2008

To: Meadowbank AEMP Monitoring Report 2008

Cc:

From: Gary Mann

**RE:** Meadowbank AEMP Targeted Study: "Explosives Lake" Fish Status

**Assessment Results** 

## **Background and Summary**

The location of the explosives plant for Agnico Eagle Mines Ltd's (AEM) Meadowbank Gold Project was moved northwest of the mine site in early 2008 (**Figure 1**; **Photo 1**). The new location is adjacent to a small, unnamed lake (herein referred to as "Explosives Lake") from which water will be sourced for operation of the explosives plant. This targeted study, implemented on 22 July 2008, was developed to address key information gaps regarding the lake and will be included as an appendix of the 2008 Aquatic Effects Monitoring Program (AEMP). The lake was found to contain lake trout and sufficient overwintering habitat to support the population year round. Planned water use was shown to have a negligible impact to lake hydrology.

## **Objectives**

The main objectives of this targeted AEMP study were to:

- Describe local hydrology Provide a general understanding of water flow paths in this part of the site.
- Characterize bathymetry/hydrology No information on depth features or bathymetry (max depth, mean depth) of Explosives Lake exists and whether it is deep enough to provide sufficient overwintering habitat to sustain a fish population. AEM plans to withdraw up to 200 m³ of water per month. Outlet discharge rates were estimated to determine the approximate influence of this withdrawal on water volume and on daily discharge.
- Fish presence/connectivity Adequate bathymetry and presence of fish will confirm overwintering
  potential and verify the issue of fish habitat from DFO's perspective. The presence/absence of fish was
  determined by setting gill nets in the lake. Connectivity with the much larger Turn Lake was evaluated by
  assessing the streams to the lake.

## **Local Hydrology**

As seen in **Figure 1**, Explosives Lake receives water from a small headwater lake to the northwest. Explosives Lake drains via a stream at the northeast end into a small lake (see **Photos 2 - 4**), which drains into Turn Lake (i.e., part of the Second Portage Lake drainage system via Drilltrail Lake).

## **Bathymetry/Hydrology Results**

The bathymetric survey was conducted using a Garmin GPSMAP 76 GPS and a Hawkeye Digital Sonar. Survey locations are shown in **Figure 2**. Surfer was used to create a 3-D grid of the lake (based on kriging), bathymetric contours, and surface/volume estimates. The results for bathymetry are shown in **Figure 3**. Lake surface area and volume were estimated at approximately 25 ha and 0.6 Mm<sup>3</sup>, respectively. Mean depth, therefore, would be about 2.4m.

Discharge estimates were obtained by combining the rough cross-sectional area of the four small (20 to 25-cm wide) channels and approximated velocities. The resulting estimate was 15 to 20 L/s, or approximately 39,000 to 53,000 m³/month. It is important to note that this estimate was made well past freshet.

## Planned Water Use by AEM

AEM's planned monthly water use for the explosive plant is 200 m<sup>3</sup>. Removing this small amount of water would lower the lake by less than 0.1 cm; it represents 0.51% of estimated monthly discharge volume and 0.03% of the total lake volume. Consequently, the planned water use would have a negligible impact on lake hydrology.

## Fish Presence/Absence and Habitat Suitability

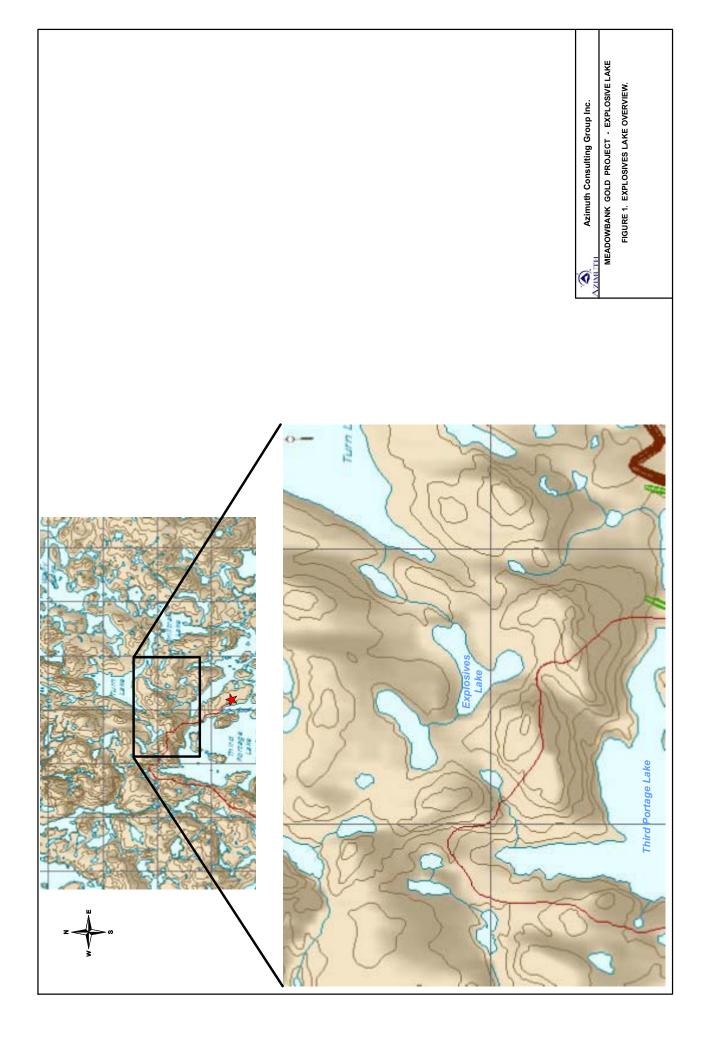
The presence/absence of fish was evaluated by setting two 50-m long gill nets in the lake (**Figure 4**). Both small mesh (38 mm [1.5"]) and short set duration were employed to minimize harm to fish. Four lake trout were caught (**Table 1**; **Photo 5**). Based on the bathymetry, there is clearly suitable habitat for overwintering in Explosives Lake.

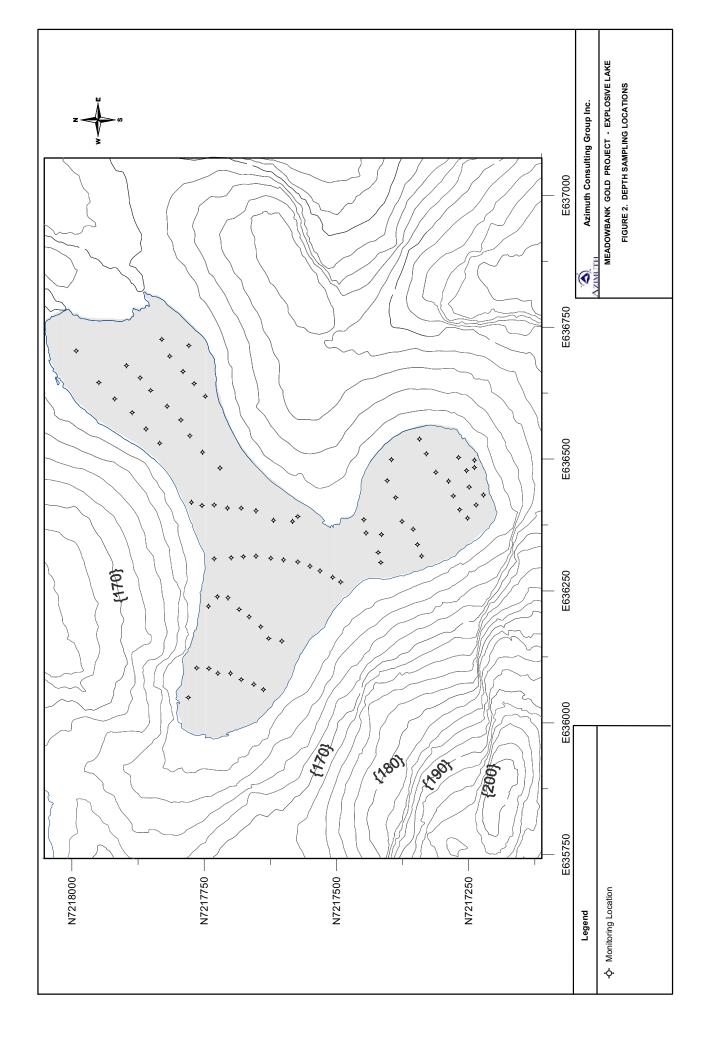
	Net ID	Species	Length
,	E001	LKTR	213
	E002	LKTR	263
	E002	LKTR	238
	E002	LKTR	255

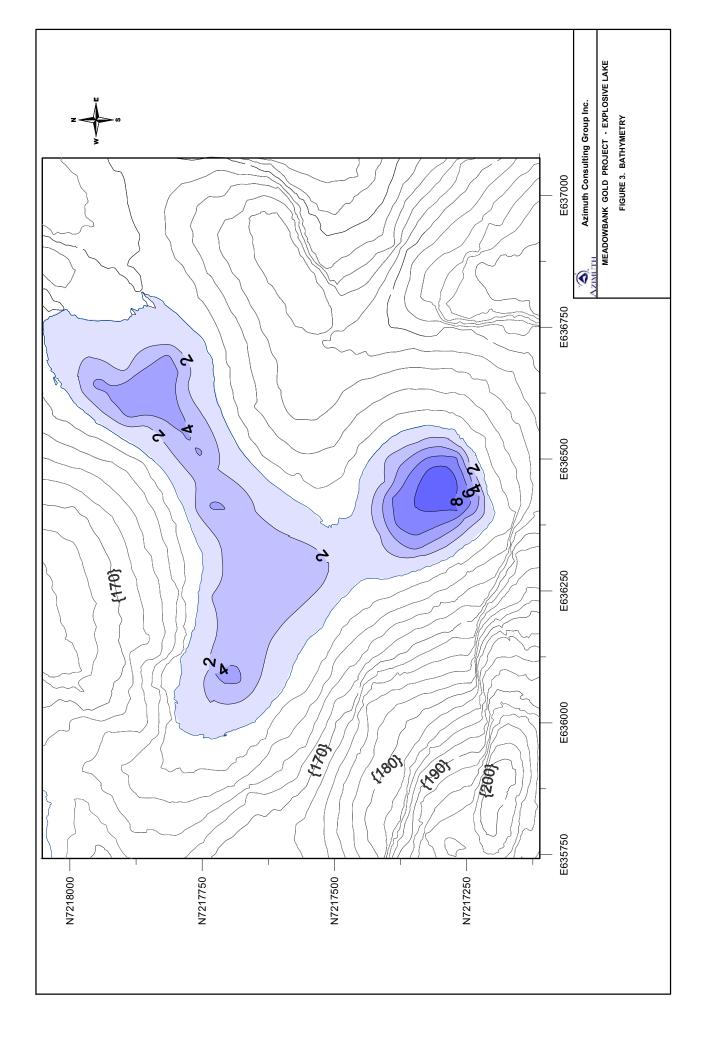
Table 1. Gill net catch results for Explosives Lake.

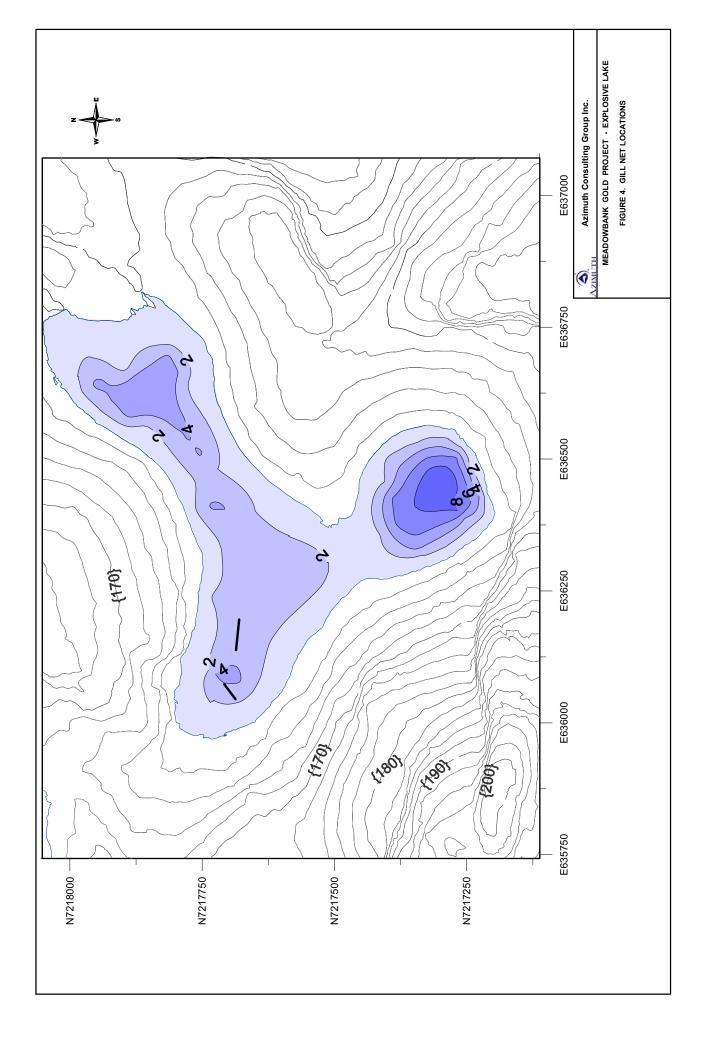
## **Lake Connectivity**

As discussed previously, Explosives Lake discharges to an unnamed lake to the NE that discharges to Turn Lake. There are two outlet paths from Explosives Lake: the N flow path is likely only active during freshet conditions and appears to be dominated by terrestrial vegetation; the S flow path is the primary discharge point. It starts with a boulder field (**Photo 2**) and a diffuse, saturated grassy area that are unlikely passable by fish. It then continues in four small channels (**Photos 3 and 4**) over a fairly steep gradient to the next small lake; no fish were observed in these channels during our survey. Overall, connectivity appears low (possibly during freshet) to nil (most likely).









## **Explosives Lake Photos**



Photo 1. Explosives Lake overview showing drainage to Turn Lake (looking from south) .



**Photo 2.** South outlet path looking upstream to boulder field; unlikely passable by fish.



**Photo 3.** South flow path, looking downstream to channel starting after grassy area.



 $\mbox{\bf Photo 4.}\ \mbox{One of the south flow path channels looking upstream to grassy.}$ 



Photo 5. Lake trout caught in Explosives Lake



# AGNICO-EAGLE MINES LTD. Meadowbank Division

March 6, 2008

Mr. Richard Dyer, Licensing Administrator, Nunavut Water Board PO Box 119, Gjoa Haven, NU, X0B 1J0 Canada

REFERENCE: CLARIFICATION – LOCATION AND VOLUME OF

FRESHWATER SOURCE FOR THE EXPLOSIVES MIXING

**FACILITY** 

During the Pre-hearing conference of the Nunavut Water Board (Water Board) that took place February 26 and 27, 2008, the Water Board requested that Agnico-Eagle Mines Inc. (AEM) provide additional information on the proposed source and volume of freshwater to be used at the proposed explosives emulsion mixing plant at the Meadowbank Project.

The explosives to be used at the Meadowbank Project will primarily be ANFO (Ammonium Nitrate Fuel Oil) with smaller amounts of other water resistant emulsions. The ANFO will be mixed on-site just prior to its delivery by emulsion truck to the open pit mine. The ANFO will be produced by mixing ammonium nitrate prills with diesel fuel to form ANFO. The mixing facility will be maintained and operated by the explosives supplier selected by Agnico-Eagle Mines Ltd. The on site storage facilities will be designed to house approximately 14 months supply of ammonium nitrate prills which will be shipped to site on the summer sealift in water proof plastic lined 1 tonne capacity tote bags.

The general arrangement and location of the explosives storage facilities and emulsion (ANFO) mixing plant at the Meadowbank Project site are shown in the general arrangement drawing attached to this letter as Figure 1 entitled "Plantsite Infrastructure Emulsion Plant Location and Finish Grading – Plan".

The facility is to be located to the north of the main Meadowbank site to the southeast of Turn Lake. The facilities will be accessed via a spur road off of the AWPAR (all-weather private access road) and will be set back approximately 500 m from the AWPAR. The location in relation to the Meadowbank site is presented in Figure 2 attached to this letter entitled "Plantsite Infrastructure Overall Site Plan".

**Baker Lake Office:** 

Tel: 867-793-4610 Fax: 867-793-4611

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Baker Lake, Nunavut

The emulsion mixing plant will be housed in a 64' x 92' building to be set on concrete pad. Water for use in the emulsion plant (for mixing and cleaning) will be obtained as and when needed by submersible pump from the small unnamed lake located 250 m to the east and held in a small head tank inside the plant. There will be no waste water from this facility as all wash water will be recycled and used in the production of ANFO. The intake pump will be a small electric submersible pump set on the lake bottom with a hose connection feeding into rigid a pipeline that will run from the shoreline to the emulsion plant. The pipeline will be heat traced and insulated. The installation will be similar to that used at the current Meadowbank Exploration camp. The maximum volume of water to be used is estimated to be 200 m<sup>3</sup>/month (average use of 6.5 m<sup>3</sup>/day).

We trust that the above information is sufficient for your needs at this time. Should you require further information, please do not hesitate to contact the undersigned

Regards, Agnico-Eagle Mines Ltd.

Larry Connell, P. Eng.

Regional Manager of Environment, Social & Government Affairs

cc: Kivalliq Inuit Association

Environment Canada

INAC Water Resources Division Fisheries and Oceans Canada GN Department of Environment

