Standard Operating Procedure: Cementing of Completed Drill Holes

1. PURPOSE

This document outlines procedures for minimizing risks associated with cementing of abandoned diamond drill holes, completed from ice and land site on the Hope Bay Belt.

2. SCOPE

This document outlines procedures covering mechanical equipment and the use and preparation of cement to be followed to minimize the risk of injury and to maximize the effectiveness of the cementing.

3. DEFINITIONS

Portland Cement	Portland cement is the binding ingredient used in concrete mixes with or without other binders. Concrete is widely used as a building material for structure and pavements.

4. RESPONSIBILITY

Title or Position	Key Responsibilities
Supervisors Drill Foremen	Ensure that the drill crews are given a review of the procedures given below: 1. Work Activity 2. Risk Levels 3. Control Measures 4. PPE (Hearing protection, Safety goggles, Dust masks, Elbow-length rubber gloves, Water proof apron, Rubber Steel-toed boots) 5. MSDS
Drill Foremen	Ensure that all drill crews have been orientated on the procedures for cementing.
Drillers/Helpers	Follow procedures as outline below.

5. PROCEDURE

5a. Protective clothing and equipment:

Portland cement is a light grey powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet Portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry Portland cement.

-Hearing protection
-Safety goggles
-Cartridge Respirator
-Elbow-length rubber gloves
-Full slicker suit (pants /coat). Taped at sleeves and top of boots.
-Rubber and steel-toed boots

5b Inspection of Equipment:

Prior to starting the mixing or pumping, the operator must perform the following checks of the equipment:

- Water pump
- Water tub
- Water swivel
- Check the mud mixer and hydraulic connections

5c OPERATING PROCEDURES:

All bags of cement stored at or near the drill site must be in mega bags as secondary containment.

Cementing complete hole

- Pull all the rods and take out outer tube
- Mix the cement in the water tub or in a second tub follow the recipe, do not exceed the amount of cement, calculate the meter you want to cover, ex;40m, wear the appropriate PPE
- Pull back down drill rod and stop at about 1 inch from the bottom
- Put a plug (rubber, venturi plug) in drill rods and then pump the cement, unscrew the rods and then put another plug inside drill rods
- Pump the cement in hole with fresh water until the pressure increase, then pull back drill rods for the cement calculation depth ex;40m
- Prepare another batch of cement and repeat the procedure until completing the hole
- Clean the water tub, pump, water swivel and mud mixer after completing the cementing with fresh water.
- Need section on site clean-up around the drill hole
    - Upon completion of cementing all drill hole areas must be completely cleaned of residual material

Cementing a portion of hole

- A plug is required to cap the hole at the designated depth (Van Ruth)
- Prepare the cement quantity as per your needs, put the plus in drill rods and then pump the cement slowly, when water pressure increase stop pumping and pull the rods.
- Follow the same procedure to clean the rods
- Clean the water tub, pump, water swivel and mud mixer after completing the cementing

All spills of used or unused cement must be cleaned up immediately.

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NEVER USE DEFECTIVE EQUIPMENT, AND LOCKOUT WHEN REQUIRED.

5d. Mixing Procedure:

Added To Make-Up Water for Cement (Preferred Method)

- Based on water: cement ratio of 5.2 gal water to one 94 lb. sack cement the volume yield will be 1 cubic foot (7.48 gallons). The following table will give you an idea of the approximate volume filled by one sack of cement. This has all of the usual caveats such as having gauge hole, etc.

	Bit (hole) size, in.	Volume, gal / ft	height filled by 1 sx cement feet	meters
HQ	3.761	0.573	13.1	3.99
HQ Oversize	3.775	0.577	13.0	3.96
	3.800	0.585	12.8	3.90
	3.900	0.616	12.1	3.68
NQ	2.960	0.355	21.1	6.43
NQ Oversize	2.970	0.357	20.9	6.37
	3.038	0.374	20.0	6.10
	3.100	0.389	19.2	5.85

- The actual equation used to determine hole volume is: hole diameter squared divided by 24.7 is equal to the hole capacity in gallons per foot.

5e First Aid

Portland Cement

Eyes:
Immediately flush eyes thoroughly with water. Continue flushing for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin:
Wash skin with cool water and pH-neutral soap or a mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

Inhalation Of Airborne Dust:
Remove to fresh air. Seek medical help if coughing and other symptoms do not subside. (“Inhalation” of gross amounts of portland cement requires immediate medical attention.)

Ingestion:
Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

5f Disposal

Portland Cement

- Dispose of waste material according to local, Territorial, and federal regulations. (Since portland cement is stable, uncontaminated material may be saved for future use.)
- Dispose of used bags in an approved incinerator or package for shipment off the Hope Bay Belt.
- All spilt unused and used cement must be cleaned up and placed with the drill cuttings to be disposed of in an approved storage site.

6 Appendix: Material Safety Data Sheets (M.S.D.S.)

See Attachments

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REVIEW AND ACKNOWLEDGEMENT

By signing off on this form, you acknowledge that you have reviewed, understand and accept the terms of this Standard.

First Name (Print)	Last Name (Print)	Company	Position	Date	Signature	HBML Representative