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MEMORANDUM

Memo To: Mr. Jordan DeGroot **Date:** December 15, 2001

From: Bruce Donald, Reclamation Manager

Re: **Recommended Procedures for the Recovery and Disposal
of Waste Antifreeze from the Dock Facilities**

This memorandum is in response to the request for additional information on the nature, quantity and method of handling refrigerant from the freezing pipes installed in the dock.

Background Information

According to the original construction records and engineering drawings prepared by Bechtel Canada, the dock was to be constructed by freezing the imported fill materials to form the permanent working platform. Freezing of the fill materials during the construction period was to be accomplished by a heat removal and exchange system. The initial system consisted of a 55 kw refrigeration plant and 250 – 150 mm diameter carbon steel coolant injection (freeze) pipes. Because of the natural freezing condition at the site, not all of the components in the original design were required during the construction of the dock facility and the number of freeze pipes actually used was significantly reduced. Anecdotal evidence indicates that actual number of freeze pipes used may have been in the order of 145.

Antifreeze with a design operating temperature of -20° C was used as the heat transfer medium for the freezing of the construction area. However, there is no available record of the type of glycol used for the application. Ethylene glycol was used throughout the balance of the process area and, as a conservative approach, it has been assumed that ethylene glycol was used for dock freezing as well. This will be confirmed prior to removal.

If all of the freeze pipes were used as designed, the estimated volume of glycol would be approximately 70,300 liters (18,600 US gallons). As indicated above, the actual volumes could be significantly less, if only a portion of the freeze pipes were installed and found to contain glycol. For planning purposes, a conservative approach has been taken and, until field investigation during reclamation indicates otherwise, it has been assumed that all initial freeze pipes were installed and filled with glycol. The following procedures will be followed to ensure the glycol is removed and disposed of in an environmentally acceptable manner:

- ◆ Through the use of a metal detector, original drawings, and hand excavation, confirm the locations and number of all freeze pipes that were installed during the construction phase of the dock facility. According to the original design, the freeze pipe was blind-flanged approximately 150 mm (6 inches) below the top of the rockfill.
- ◆ Each freeze pipe will be examined to identify and record which are “dry” pipes and which contain glycol. Identifying and recording the conditions as “dry” or “filled” for each freeze pipe will be adequate.
- ◆ Sample the waste antifreeze in several pipes and determine the chemical characteristics of it by a certified laboratory. Every pipe does not require sampling, as the same type of glycol will be in all of the freeze pipes.
- ◆ Obtain submersible pumps, discharge hoses and shut-off valves that are suitable for pumping ethylene glycol. Transport to site sufficient containers approved for shipment of ethylene glycol.
- ◆ Remove the blind flange carefully to minimize the loose overburden materials from falling into the injection pipe.
- ◆ Lower the submersible pump into the injection pipe and place the pump discharge hose into one of the drums before starting the pump. Drums will be located in a portable watertight containment pan during filling.
- ◆ Operate pumps in a manner to minimize surges. When the first drum is nearly filled, close the shut-off valve and transfer the pump discharge hose to the empty container, avoiding splashing and spillage.
- ◆ Pump, hoses and fittings must be stored on the containment pan after each recovery operation. Containment pan contents must be drained and transferred into an empty drum.
- ◆ Label all filled drums and relocate to a temporary storage area to hold for disposal by one of the following methods:
 - a) Transport from site in approved shipping containers for recycling. The handling of the drums for shipping will be done by trained personnel, the drums will be labeled as required by regulations, shipments will be properly manifested and the drums will be shipped to a company approved to recycle or dispose of glycol.
 - b) Incinerate on-site in an approved two stage incinerator. While this is a less likely option, it is still an acceptable approach under current regulations.

The NWB will be notified of which disposal method is selected in advance.

- ◆ Arrange a portable steam generator or a closed-loop hot water supply/recirculation system for the injection pipe thawing operation.
- ◆ Remove the blind flange and lower the steam injector slowly into the freeze pipe to thaw the soil materials immediately next to the freeze pipe. Start the thawing operation from the bottom of the injection pipe. Once thawed, freeze pipes will be extracted by crane, jacking, vibratory means or by cutting off the pipe after being exposed.
- ◆ The residual glycol and the liquid from the closed-loop system will be recovered and drummed and in a similar manner as described above.