



CUTOFF WALL

Abandoned Mine Tailings Pond

Carcross, Yukon Territory

Case 7

Date: September, 1995

Problem

The Venus Mine is located approximately 10 km south of Carcross on Highway #2 running between Whitehorse, Yukon Territory and Skagway, Alaska. Mining for both Gold and Zinc took place, until the mid 1950's, with the processing of the ore taking place on the banks of Bennett Lake. Processing methods resulted in the creation of a large mine tailings pond that had high concentrations of iron, arsenic, zinc and lead. Spring runoff and summer rainfall then infiltrated through the pond, resulting in contamination of Bennett Lake with heavy metals. The lake is a primary source of drinking water and the prevention of further contamination of this water supply was required as part of an aboriginal land settlement claim.

Solution

The site remediation plan was based on the installation of a vertical Waterloo Barrier® cutoff wall along the down gradient side of the former tailings pond to act as a barrier to prevent contaminated ground water from entering Bennett Lake. This barrier was to be placed as close as possible to the lake shore. Once the barrier was in place, a clay cap would be installed to prevent surface water from entering the pond and thus prevent further migration of contaminants into Bennett Lake. As shown in Figure 1, the tailings pond was bounded by the Highway on the up gradient side.



Figure 1, Site Overview

The Waterloo Barrier® system was selected as the cutoff wall because of the difficult soil conditions, the low conductivity of the system, and the need to seal the system to a bedrock surface. Because of the remote location and high transportation costs, extensive preparatory geotechnical work was done to define the bottom profile of the barrier. This allowed for the sheet piling to be precut to design lengths at the mill prior to shipping to reduce waste.

Approximately 12,000 square feet of Waterloo Barrier® WZ75 sheet piling was installed, in varying depths (from 25 to 15 feet), following the bedrock profile along the down gradient side of the former tailings pond. As can be seen in Figure 2, the preparatory geotechnical work was very beneficial as only one unexpected rock outcropping was encountered. The sheet pile driving was completed using a 2,500 lb impact hammer and a mobile crane.



Figure 2, Rock Outcropping

The specifications called for driving the pile into the fractured bedrock until refusal to aid in ensuring a seal at the bottom of the barrier. During operations a drainage culvert from the Highway was discovered. This unexpected obstacle required a penetration in the barrier. This was accomplished by excavating the barrier at the location of the culvert and torch cutting a hole in the barrier. The culvert was installed through the hole and a concrete bulkhead cast to seal the penetration. The completed bulkhead is shown in Figure 3.



Figure 3, Culvert Penetration

The joint sealing operation was completed in two phases. During the first phase, a mechanical packer was inserted to the base of the sheet pile joint and once inflated, the sheet pile/bedrock interface was pressure grouted. During the second phase, standard joint grouting operations were completed using a silica fume modified cementitious grout (WBS 301) to seal the joint on the sheet piling.

SITE SUMMARY

Barrier: 12,000 sf of Waterloo Barrier® Sheet Piling WZ75

Sealant: WBS 301, cementitious grout

Start: September, 1995

Finish: October, 1995

Consultant: PWGS, Canada

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