MAXIM TECHNOLOGIES INC®

851 Bridger Drive Ste F
Bozeman, MT 59715

406.582.8780
FAX 406.582.8790

TECHNICAL MEMORANDUM

To: Bob Kirkpatrick

From: Allan Kirk

Date: February 15, 2002

Re: Reopening of the Portals of the Lower Spaulding Adit and the McLaren Adit or Winter Tunnel

CC: F. Ehernberger
M. B. Marks
M. Cormier

Introduction

As part of the overall New World Response and Reclamation Plan, two caved adits were proposed for re-opening in order to conduct preliminary assessment of water in-flows prior to designing and constructing long-term adit closures. One of these is the Lower Spaulding Adit located on the southern flank of Scotch Bonnet Mountain, north of the Como Pit; and the other is the McLaren Adit, or Winter Tunnel, located at the northwest end of the McLaren Pit. It was proposed to reopen both adits to complete a visual assessment of the extent of mine workings, the presence of pooled water, and the amount and source of in-flowing water.

The portals of each of these adits were to be opened using a tracked excavator. If the workings were easily accessible, geologic mapping and water quality sampling would be conducted to determine if the geology, structure or water inflow might be significant with respect to an overall closure plan for either of these mines. No other activity was proposed to clear the adits. It was decided in advance that if the workings proved to be inaccessible, no further consideration of the underground conditions would be warranted.

The Lower Spaulding Adit

The Glengarry Mining Company initially had operations on the south-facing flank of Scotch Bonnet Mountain, immediately northeast of Lulu Pass (9700 ft in elevation). On old historic mine maps, these workings are called the Spaulding Tunnels. The Spaulding Tunnels consist of three short adits at different elevations, the lower two of which are connected by a winze. The upper and lower adit portals were closed with mine waste backfill material at some time in the past. The middle adit was accessible for a short distance of about 50 feet where a cave blocked further access to the workings. Detailed planimetric maps of the three levels of the Spaulding tunnels and a description of the mine workings can be found in another report on Underground Mine Workings in the New World District (Kirk, 2001 in preparation).

The Lower Spaulding Adit consistently weeps water (1-2 gpm) in the spring and early summer through a waste rock plug placed at some time in the past, at the portal presumably for safety reasons to prevent unauthorized entry. This waste rock plug did not go all the way to the back (roof) of the portal and water could be sampled with a bailer from a pool behind the waste rock dam. The collapsed adit or portal entry

had, however, produced a 40-foot long trough into the hillside, with a steep drop of more than 20 feet in height at the north end of the collapsed adit, as the adit was driven into the steep hillside. Thus, the collapsed portal or entryway was a relatively unstable topographic feature.

Waste rock at the Middle and Lower Spaulding adits was removed during August 2001 by IT (the US Forest Service contractor) for the Selective Source Response Action and hauled to the SB4 repository as part of reclamation activities. During the course of waste rock removal, the walls of the trough formed at the collapsed portal of the lower adit sloughed and the location of the lower portal was lost. Despite considerable effort using both a tracked excavator and a rubber-tired backhoe digging exploratory trenches on two occasions (August 23 and August 24, respectively) the portal could not be relocated, and the lower adit was not reopened.

Closure of the upper and lower waste rock dump-sites and their respective portal areas was accomplished by regrading of the slope once the waste rock was removed, a lime amendment of the remaining surficial materials, and topsoil cover placed over the lime-amended surface. Erosion blankets were placed on the steeper parts of the slope. A percolation basin consisting of a lens of gravel surrounded by filter fabric was constructed just below the seep location at the lower portal site and a lined and armored drainage channel was constructed from the percolation basin down into the Como topographic basin proper. The middle tunnel portal was backfilled with rock.

The McLaren Adit (or the Winter Tunnel)

In 1933, the McLaren gold-copper-silver mining operation was developed on the west side of Fisher Mountain. Initial mining and exploration was conducted from a series of six, east-northeast trending adits of varying lengths. Five of these adits are shown on McLaren Gold Mine maps of 1937 and 1947. The sixth adit, called the McLaren Adit or the Winter Tunnel, does not appear on maps until 1952 – one year prior to the cessation of open-pit mining. The geometry of ore exposed in the exploration adits indicated that the ore in the McLaren Mine was areally extensive, tabular, and dipped gently to the southwest. It was determined that the McLaren gold-copper-silver deposits could be most efficiently mined by open-pit methods. In subsequent open-pit mining operations, waste rock was stripped from the underlying mass of sulfide ore, and stockpiled to the north side of the pit. The mass of sulfide ore was stripped down to its lower contact with an interformational dacitic intrusive sill. Presumably, the first five adits were mined out during open-pit mining operations, although this cannot be confirmed with existing information. The sixth adit, the Winter Tunnel, is still present at the northwest end of the McLaren Pit. The pre-construction plan view of the adit extends about 400 feet to the northeast on historic maps.

Maxim Technologies reopened the Winter Tunnel in September of 2001 using a track-mounted excavator. A portion of each of four days was spent to open the mine. Figure 1 shows the collapsed portal of the Winter Tunnel prior to reopening. The portal timber set remained in place, however the lagging in the back had collapsed to form a ramp that dipped back into the mine upon which material had caved. Degraded water typically flows all year around at a rate of about 8-10 gallons per minute. The portal was blocked and dammed essentially all the way to the back, such that, under spring run-off conditions, dammed up water in the adit jetted out between the lagging boards above the top beam at the portal under a pressure estimated to be about 15 lbs. Ferricrete deposits lying immediately to the east of the portal and overlying the collapsed portion of the adit showed evidence of collapse to surface (Figure 1). This area of collapse was excavated first and water drained (Figure 1) from behind the adit portal so as not to risk a complete breaching of the portal dam.

Two settling ponds or basins were constructed down gradient of the portal prior to beginning to drain the workings. The down gradient pond lies immediately adjacent and to the north of the waste rock dump (Figure 3). This pond was constructed with a rock core and uphill face of coarse talus material and was

lined with a filter fabric. The outlet to this pond was a 6-inch HDPE pipe that discharged into the tributary that previously drained the mine workings.

The up-hill drainage basin or settling pond (Figure 4) was constructed immediately outside of the mine portal, uphill of the main access road and the culvert that drains the working under the road. This pond was dug about 15 feet deep and was excavated into bedrock to allow for maximum settling of sediments discharged from the mine. This basin was not lined.

Once the sediment ponds were constructed, the collapsed portal was opened from above, and water pumped into the drainage channel. Once the water level dropped a few feet, the collapsed portal was breached with excavator, and the cave-in slowly lowered in elevation to drain the remainder of water from the mine. Figure 2, shows the breached portal dam draining the adit, and the condition of the portal area during the draining process. Figure 5 shows the lower drainage pond and discharge pipe during active dewatering.

Historic maps showing the proposed location of the Winter Tunnel (McLaren Gold Mines, 1953), project the underground workings about 400 feet east-northeast of the portal. Track, ties and timber at the portal and on the waste rock dump indicate that waste material was removed from the mine by rail, and therefore, the probable slope of the workings should be about 1-2%. Assuming a 5-foot by 7-foot cross-section and a 400-foot length, there could have been as much as 100,000 gallons of water stored in the mine. The volume of material in the waste rock dump is estimated at about 3,000 cubic yards, which suggest that the total amount of workings may actually be in excess of 1,200 lineal feet. Twelve hundred lineal feet of workings, along the same heading, would take the tunnel well past the main Fisher Mountain intrusive contact (and out of the ore) and it is therefore presumed that there must be cross-cuts and drifts and/or stopes developed in the mine to account for additional waste material.

Kirk and Bogert entered the Winter Tunnel on September 18 to explore the workings and look for sources of the water inflow. The tunnel has continuous timber sets for a distance of about 100 feet with lagging in the back and sidewalls. The mine is open from this point for a distance of about 300 feet, where there is a cave about 3.5 feet high that dams water. An oxygen meter indicated that oxygen levels were depleted to 19.5%, a level that the Mine Safety and Health Administration (MSHA) deems unsafe for workers without supplied air. From the cave at 400 feet, the next approximately 100 feet of workings were visible, at which point there was another small cave. Both of these caves could be crossed allowing access to the remaining workings if safe oxygen levels were present.

Altered and mineralized sedimentary rocks of the Meagher Limestone (pyrite, chalcopyrite and abundant iron oxides) are complexly intruded by the Fisher Mountain porphyry (dikes, sills and stocks?) over the accessible and visible portions of the mine (100-300 feet). No water sources (other than an occasional drip) were observed in the first 400 feet of working, and water was flowing over the dam at 400 feet. Based on the fact that the mine flowed year around it is assumed that a significant inflow must occur at some point further into the mine.

The area around the portal was cleaned up, and regraded once the mine was reopened and drained (Figure 6). A construction safety fence and a plywood portal closure were constructed for the winter.

Water quality was monitored at the mine's drainage channel confluence with Daisy Creek (Surface Water Sampling Site DC-2). There was only one short period that exceeded the turbidity standards in Daisy Creek during the dewatering event.

It is likely that the air will improve by natural convection over the winter, and access to the deeper portions of the mine could be attempted in early summer of 2002.

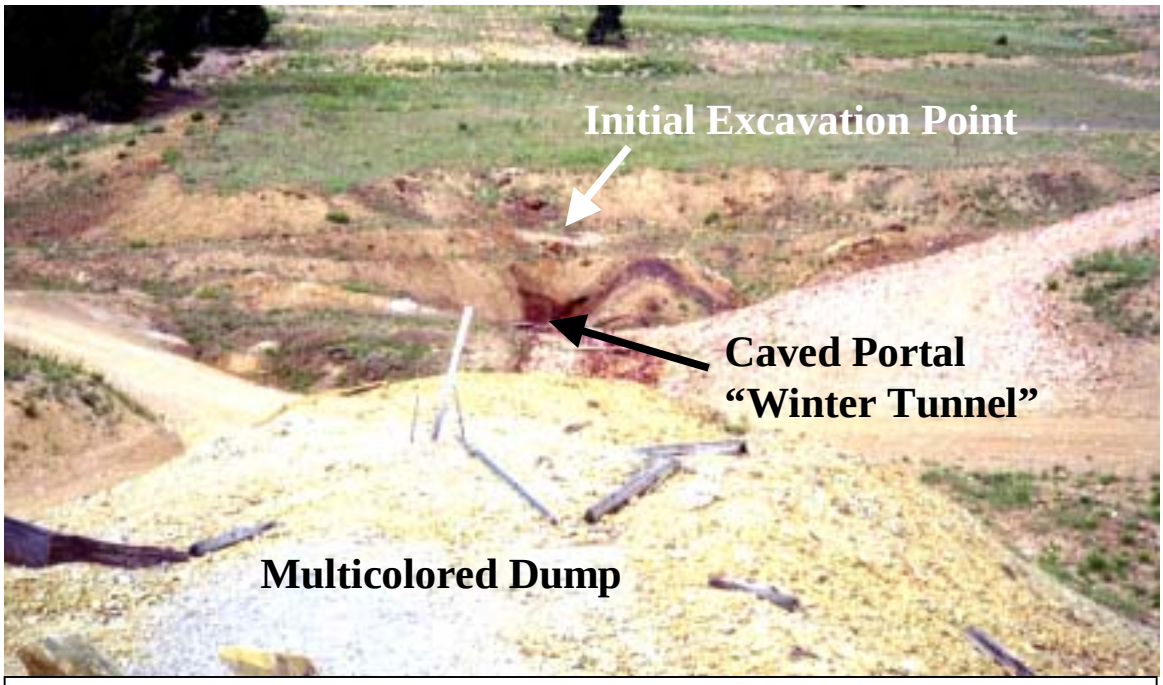

Figure 1. McLaren Adit or Winter tunnel prior to opening, showing collapsed portion of the portal and where excavation was begun.

Figure 2. Draining of the Winter Tunnel once the portal dam had been breeched.

Figure 6. Clean-up and regraded portal site of Winter Tunnel after draining.

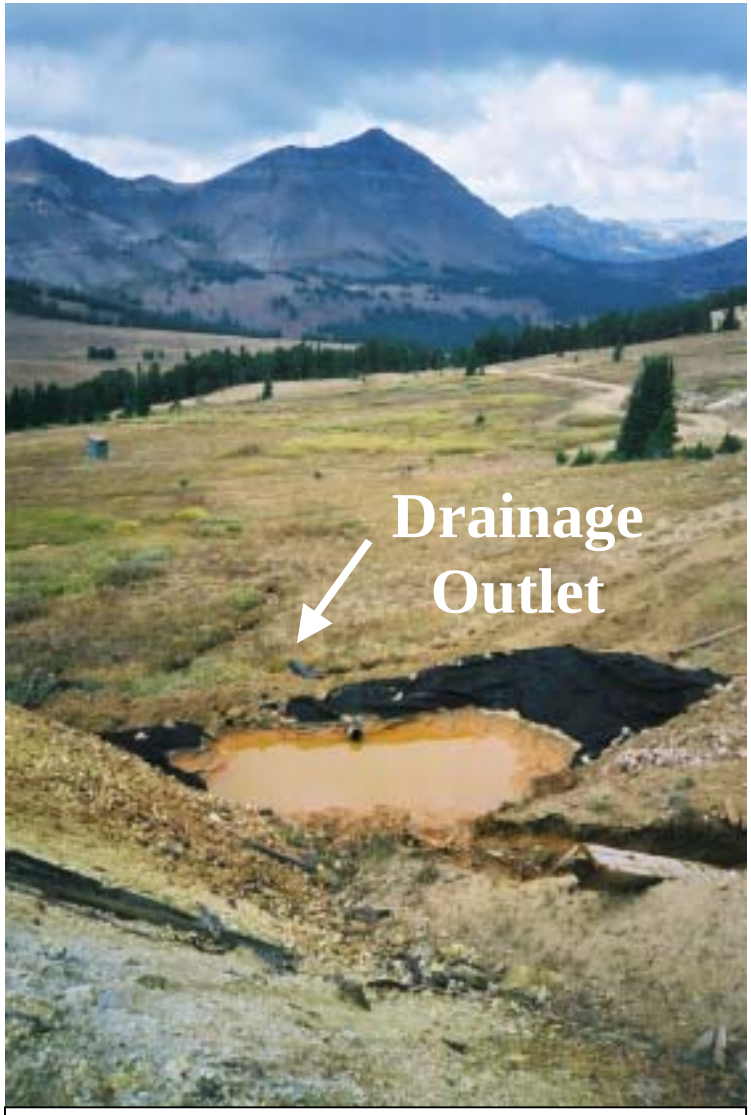

Figure 3. Lower settling pond showing outlet adjacent to waste rock dump of the Winter Tunnel.

Figure 4. Upper settling pond at the Winter tunnel showing culvert under the road and upper portion of the waste rock dump.

Figure 5. Lower settling pond and discharge pipe during active draining at the Winter Tunnel.