

TECHNICAL MEMORANDUM

DATE: April 18 2002

TO: Bob Kirkpatrick – Region One
Mary Beth Marks – Gallatin Forest

FROM: Bill Bucher

RE: Como Basin Erosional Evaluation – New World Mining District Response and Restoration Project

On September 12 and 13, 2002, I visited the New World Mine site to conduct an engineering evaluation of erosional problems associated with the Como Basin. The purpose of the site visit was to determine in the field the erosional problems that need to be addressed during the design of the Como Basin Removal Action. The Removal Action is intended to mitigate water quality problems associated with the Como Basin and is scheduled to begin in 2003. Erosion issues were identified with the diversion channel on Fischer Mountain, the two natural channels that originate in the basin and descend the steep, east-facing slope below the basin, and the Lulu Pass road. Locations of these features are shown on the accompanying map.

The Como Basin is located in the upper Fisher Creek drainage just east of Lulu Pass. The area of investigation includes the basin itself situated north of Fisher Mountain and the east-facing slope which connects the basin to the Fisher Creek valley. The basin was subject to exploration activities for mining in the past and then recontoured and partially reclaimed. It is still largely devoid of plant cover. The east-facing slope below the basin has been subject to erosion due to down-cutting of the drainages leading out of the basin and vehicle traffic in the vicinity of the Lulu Pass road. The Lulu Pass road is a county road that will be maintained for public use after the Removal Action is complete. Closure of the Glengarry Mine, which is located at the foot of the east-facing slope, will be undertaken in conjunction with the Como Basin Removal Action.

Diversions Channel

A diversion ditch was constructed by Crown Butte Mining Company on the south side of the Como Basin. The purpose of the diversion is to prevent runoff from the north slope of Fisher Mountain from directly impacting the Como Basin. Instead, the runoff is diverted to the eastern border of the basin and then discharged into the most easterly channel that drains the Como Basin. The eastern half of the diversion channel appears to have been overloaded during runoff events as indicated by erosion of the down-slope bank. The channel capacity should be expanded on the eastern half of this diversion ditch. The other design issue with the channel is that the riprap ends on a relatively steep slope, and the existing channel that it discharges to is being downcut by the increased flow.

Channel Erosion

Channel erosion is occurring in the two main channels that originate in the Como Basin as well as the continuation of these channels down the east-facing slope that ends at the Glengarry Mine adit. The channel that originates with the diversion ditch turns to the east at the east edge of the basin and is the more southerly of the two main channels as it descends the east-facing slope. This channel is heavily eroded for its entire upper portion (about 300 meters) but is in relatively stable condition for the remainder of its descent (about 330 meters). In the Como Basin, the channel has incised as much as 1.3 meters and, after it starts to descend the east-facing slope with grades up to 50 percent, the incision is as great as two meters. Often ferrocete deposits are exposed by the erosion indicating they are acting as grade controls and limiting further vertical erosion. After the steepest grades on the headwall are passed and the grade begins to

moderate, the stream braids into two or three channels for about 100 meters. In this reach the channels are not incised but still subject to erosion. Near the end of the braided reach, the grade moderates again and there is an area of sediment deposition. Below the depositional area the channels rejoin and the channel bed appears to be relatively stable to the base of the slope. As shown on the accompanying map, the entire upper portion of the channel should be rebuilt. At the braided section, the most southerly channel should be rebuilt and the other channels abandoned and reclaimed. The more northerly of the two channels leading from the Como raises to this channel should also be reconstructed.

The more northerly channel originates in the western portion of Como Basin where the upper portion of the channel has been adequately rebuilt by Crown Butte. From this point to the base of the slope, much of the channel has been impacted by erosion. The initial 150 meters of channel on a moderate eight percent slope is only lightly eroded, and channel reconstruction is not necessary in this reach. At the point where the channel is joined by the channel originating near the Small Como dump, there is a sediment deposit that is estimated to contain up to 200 cubic meters of material. Starting at the sediment deposit and continuing downstream, the channel is eroded sufficiently that it requires reconstruction. The heaviest erosion is on the steep (50 percent) slope of the headwall of the east facing slope. After about 180 meters, the slope moderates and the flow separates into two channels for about 60 meters until it reaches a breached dike where the channels are forced together. This braided reach and the 35 meters of channel below the dike are in relatively good shape and do not need rebuilding although the breached dike should be reclaimed to minimize sediment contribution to the channel. The remaining 300 meters of channel has experienced some erosion and erosion protection measures should be considered. These could include addition rock or erosion mats in critical areas. A limiting factor for construction in this lower reach is the five meter high, steep slopes on either side of the channel.

There is a small channel that originates near the headwall of the east-facing slope on the south side of the Lulu pass road. This channel has been subject to heavy erosion for about 60 meters before it enters the north channel and should be rebuilt.

Lulu Pass Road Erosion

The Lulu Pass Road is a county road that will remain open to the public after reclamation of the Como Basin. It is located just north of the north channel, ascends the steep, east-facing slope below Como Basin, and then traverses the north side of the basin to Lulu Pass. The main track of the road has about seven switch-backs on the steep, east-facing slope. On this slope there are numerous side tracks that we would propose to reclaim. Closure could be accomplished through the placement of large boulders at the junctions and appropriate signing. In addition, there are three points at which a small channel enters the roadway and runs along the road. This water should be diverted off the road at these points through the use of water bars or culverts.

Surface Reclamation

The Como Basin was highly disturbed during exploration activities and was then regarded by Crown Butte. Revegetation on the regraded area has been sparse although there are areas, presumably unimpacted by mining activities, where vegetation is adequate. It is anticipated at this time that a large portion of the Como Basin will be capped to lessen generation of acid rock drainage. If this is the case, most of the surface of Como Basin will be reclaimed in the future, and no attempt to outline the area of reclamation will be made until the cap design is complete.

There are limited areas on the east-facing slope, in addition to the roads, that could benefit from surface reclamation. Because these areas are not likely to be toxic, reclamation will probably consist of limited regrading, adding compost, revegetation with Ray Brown's species selection, and protection with erosion mats. The areas of the east slope that are recommended for this treatment are outlined on the accompanying map.