

Figure 2, Debris avalanches from side drainages contribute much debris that cannot be moved far by Mill Creek except during flooding periods. The result is a channel change during and after large floods.

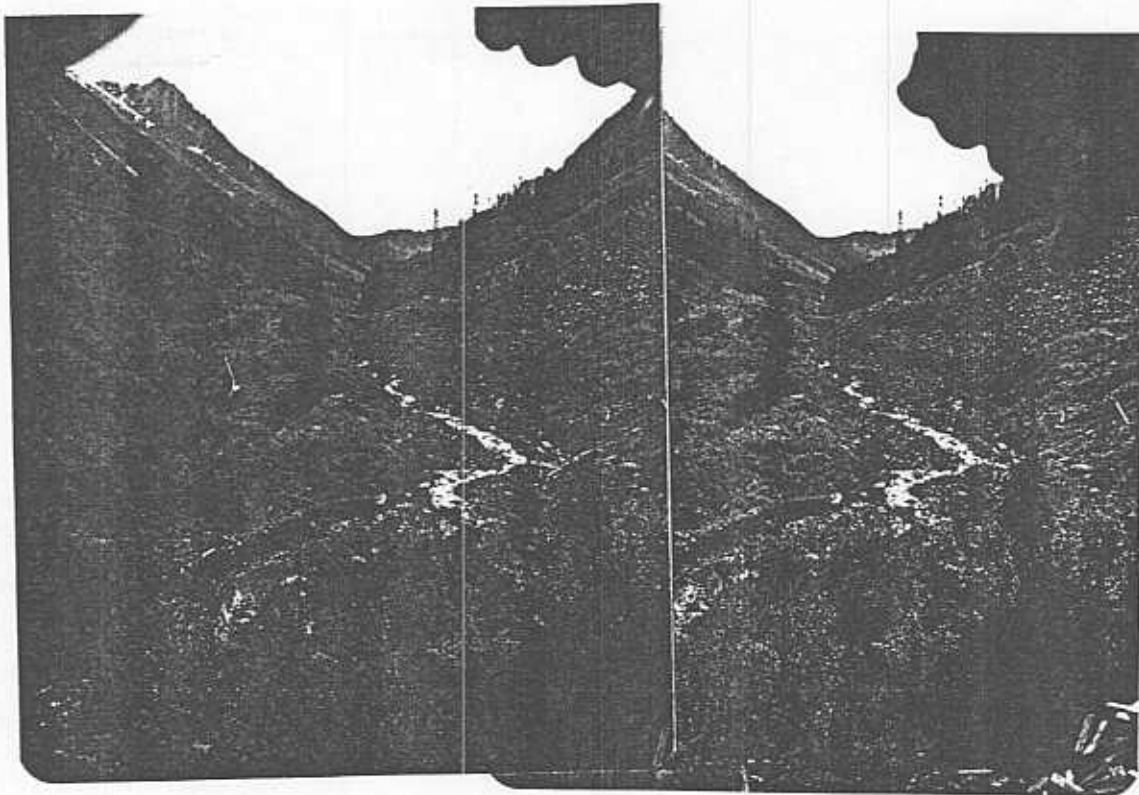
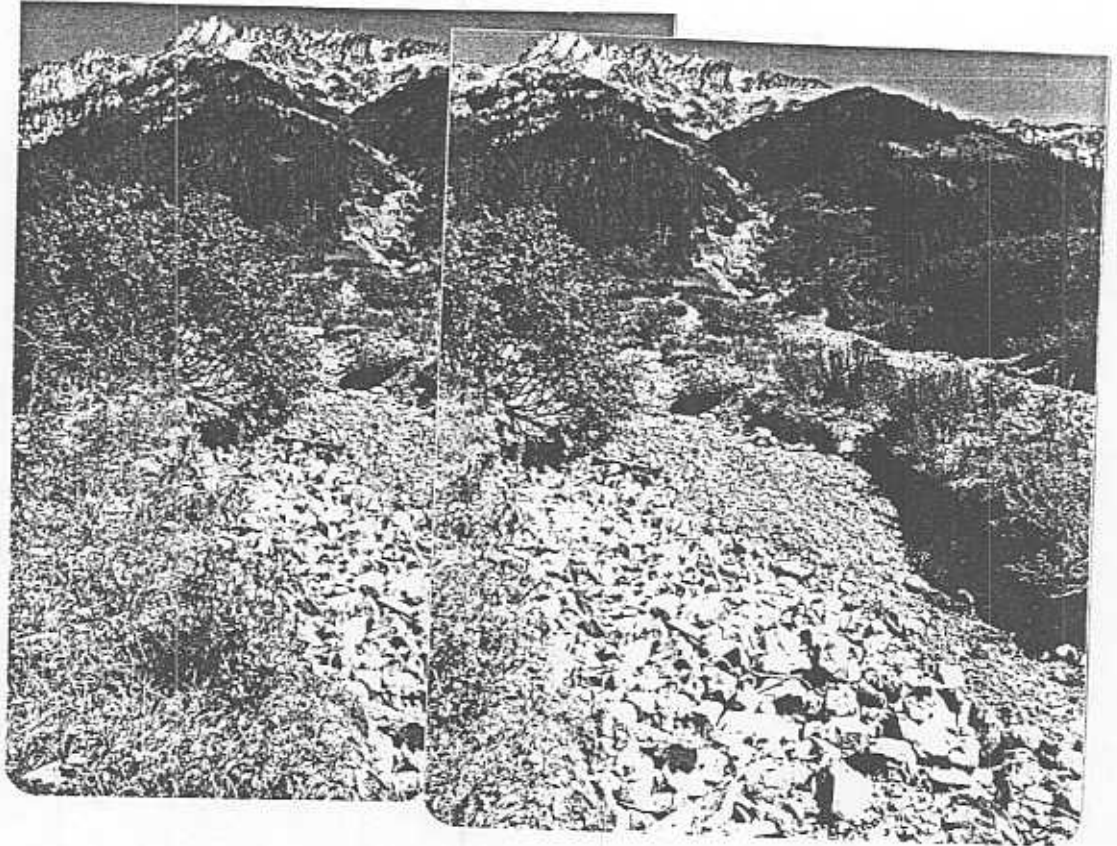


Figure 3, Mill Creek shows abundance of debris and how it influences channel location

Erosion of the tailings pile is also occurring (Figure 4). Some of the eroded material is making it to Mill Creek, but most of the eroded material is deposited on the hillside before it reaches Mill Creek. The concentration of water on the tailings has lead to some off-site damage directly below the tailings (Figure 5).

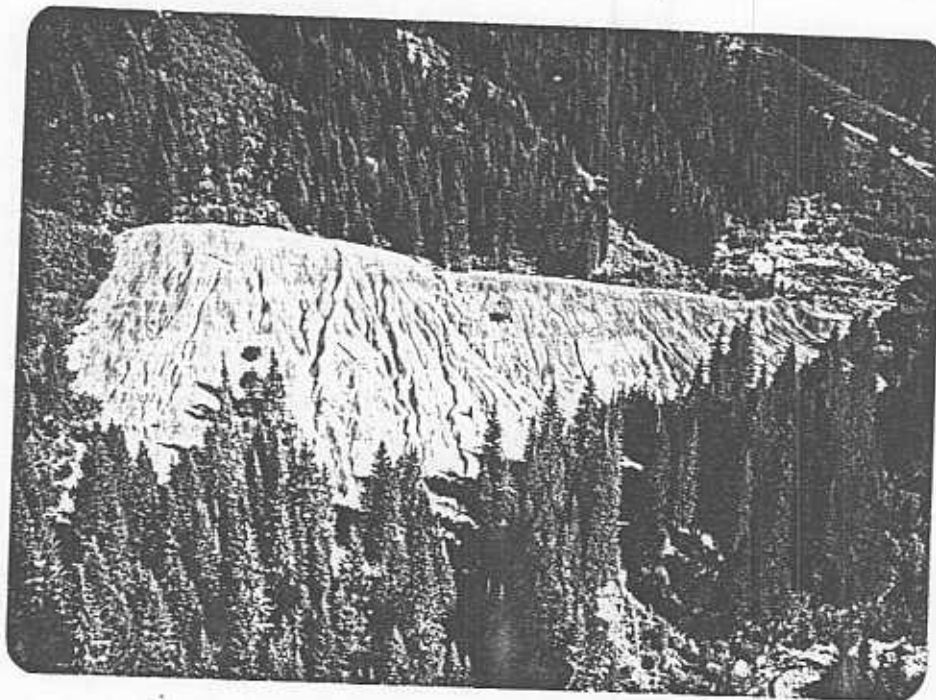


Figure 4, Water concentrates in rills. Sediment is carried off site (Figure 5)

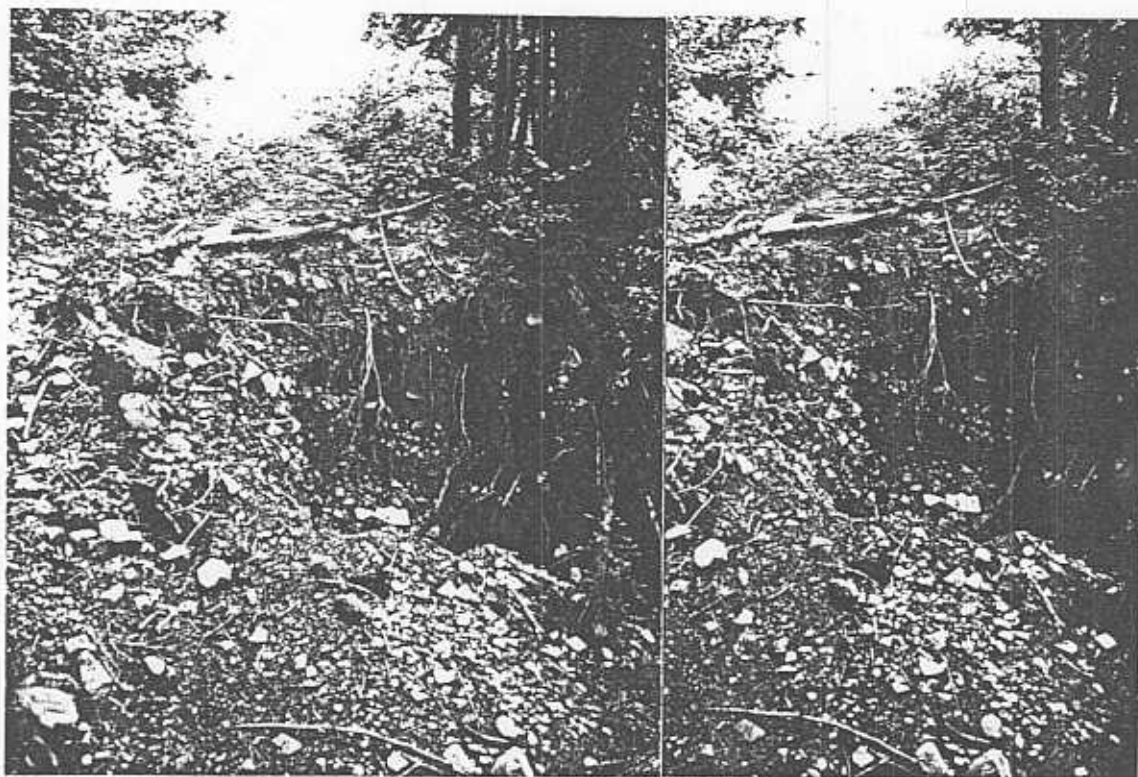


Figure 5, Sediment and water from tailings pile concentrate on the old wagon road, causing some mass erosion above Mill Creek.

Extent of Problem

The tailings are about 6 feet thick. The waste rock, being undercut by Mill Creek, is about 30 feet thick. The ph of the waste rock and tailings is about 3. At this low ph value, vegetation is not likely to grow, and in fact has not been growing (Figure 4).

The waste rock pile is likely to be further undercut until it reaches an angle of repose (70-80%). Mill Creek is subject to flash floods and debris avalanche from side drainages. The heavy load of debris increases the stream's tendency to meander and eventually cause more undercutting of the waste rock pile.

The fines from the waste rock pile and tailings pile are carried into Mill Creek. Because of the periodic summer floods and spring snowmelt floods, the sediments will eventually move into Slate Creek. The heaviest concentrations of tailings are within 200-300 yards of the Azurite Mine site. Continued erosion will maintain the deposits of tailings in Mill Creek and may influence water ph.

Possible Solutions

The undercutting of the waste rock can be reduced by: 1) diverting Mill Creek away from the waste rock; or 2) installing bulkheads or riprapping the base of the waste rock pile. The erosion of the tailings into Mill Creek can be reduced by: 1) terracing the tailings and route surface flow to the side; 2) construct a setting basin below the tailings to intercept the runoff; 3) repair the old wagon road breach (Figure 5) to allow the runoff to continue running down the wagon road to eventually enter Mill Creek at a lower location.

Diverting Mill Creek is likely to require heavy equipment; D-4 or D-6 tractors, for example. Diversion should be effective for a short time, but because of the tendency for Mill Creek to meander, the stream will eventually undercut the waste rock pile without continued channel maintenance. Installing a bulkhead or riprap is the most effective of the two methods. It will also require heavy equipment. Fairly large material to withstand floods will be required, and equipment to handle that material will also be required. This method would be the most long lasting of the 2 approaches.

Terracing of the tailings pile will require heavy equipment about size of a D-4 cat. This would be fairly effective, but because the tailings have such a low ph, its not likely vegetation would ever be established. Constructing a catch basin below the tailings is not really feasible because of the steep terrain. Repairing or rebuilding the old wagon road is the best alternative. The work could be done by hand or heavy equipment. It would also improve the wagon road to make it more usable as a trail.



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