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Report on Site Conditions in Vicinity of LeRoy No. 1 Mine, Ptarmigan Creek Watershed, Glacier Bay National Park

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BACKGROUND

The LeRoy mine is located at an elevation of 950-1000 ft. in Ptarmigan Creek basin, approximately two miles west of Reid Inlet. Gold was found in quartz veins and adjacent altered zones within metamorphic rocks in 1938. Active mining occurred during the early 1940's and then terminated. Recently, Mount Parker Mining Co. has expressed interest in reworking the old LeRoy No. 1 claim. The proposed mining would be in same general location as the old mine. A definite mill site has not yet been comfirmed, although the mining company desires to use a site consisting of several natural basins located south of the original claim.

The middle and upper portions of Ptarmigan valley were glaciated as late as mid to early 1800's. Presently, a remnant glacier occupies the upper portion of the basin below which lies a very recent glacial outwash plain (Figure 1). The lower portion of the valley bottom is covered by a rather thick glacial deposit of an earlier age. This report represents a summary of observations and measurements taken during a 2-day field trip to the Ptarmigan Creek area (September 22 - 23, 1981) at the request of the National Park Service to gather environmental data on the LeRoy No. 1 claim.

SLOPE STABILITY

The hillslope above the mine consists of a very steep granodiorite outcrop with an average gradient 48°. Frequent rock slides and falls are evidenced by a talus slope lying immediately below the rock face. The average gradient of the talus slope is approximately 37°. At the base of the talus slope is a rather broad bench which appears to have contained much of the eroded rock from above. The mine adits are located slightly downslope of this bench. The tailings disposal site proposed by the mining company is bounded on the west side by a talus slope (average gradient of 29°) derived from a steep bedrock outcrop at a higher elevation (Figure 2).

The potential for snow avalanching is high all along the steep northeast facing slope of Mt. Parker. Precise locations of past snow avalanches are difficult to determine because of the lack of mature vegetation over the entire slope. Apparently, the old mill site was destroyed by a snow avalanche a number of years ago. Site protection measures such as natural terrain features and the use of avalanche diversion or protection structures should be considered in selecting a new mill site.

SURFACE HYDROLOGY

Flow in Ptarmigan Creek is supplied by numerous perennial drainages along the steep northeast flank of Mt. Parker as well as melt water from the remnant glacier and subsurface seepage. Two small drainages flow on either side of the tailings disposal site and merge just before entering Ptarmigan Creek. These tributaries are fed by a portion of the water eminating from the main and secondary adits.

Flow measurements were taken on September 22, 1981 at each adit and in Ptarmigan Creek just upstream of the mine tailings drainage entry point. Discharge at the main and secondary adits were calculated to be 1.7 and 0.6 cubic feet per second (cfs), respectively. Since these flows represent ground water seepage intercepted by the adits, they should be fairly constant throughout the year. Discharge just above the tailings tributary in Ptarmigan Creek was 15.2 cfs. The combined discharge from the two adits was approximately 15% of the total base flow or non-storm discharge in Ptarmigan Creek. During storm flows the discharge from the adits would comprise a smaller proportion of the total flow in Ptarmigan Creek.

Stream velocities along the gaged cross-section of Ptarmigan Creek varied from 1.2 to 3.8 feet per second (fps). These relatively high velocities coupled with a steep channel gradient (averaged 7% at gaged cross-section) and excessive turbulence would present a difficult physical environment for fish migration (Figure 3). The mouth of Ptarmigan Creek may be better fish habitat.

WATER CHEMISTRY

The original assay data from the LeRoy mine indicated high levels of arsenic, cadmium, lead and zinc in certain mine lode samples. No core samples from the ore body in which future mining is propsed have been analyzed for heavy metals. The potential input sources of heavy metals into Ptarmigan Creek are: 1) water draining from new or existing adits (Figure 4); 2) surface water flowing through or adjacent to tailings disposal site; and 3) natural sources. No heavy metal analyses were performed on water quality samples. The pH of water draining from the two adits (6.2-6.5) was within the range of values found in Ptarmigan Creek (6.0-6.4). None of these pH levels are so low as to indicate a concern over metal solubility. However, without knowing the heavy metal levels and solubility (pH) conditions of the ore, tailings, and soil it is difficult to predict what the effect additional mining would have on water chemistry in Ptarmigan Creek. Further sampling and testing of ore, tailings, water and soil may be useful in final selection of a tailings disposal site.

SEDIMENT TRANSPORT

Primary natural sources of sediment in Ptarmigan Creek include the following: 1) streambank erosion along main channel; 2) glacial outwash in upper portion of basin; 3) mass wasting from surrounding hillslopes; and 4) surface erosion the tributary (82 mg/l). Several measures could be taken to minimize the transport of sediment from future tailings sites. The tailings disposal site should not be located in the path of existing perennial drainages that do not have natural sediment depositional areas. Use of natural slope depressions would be encouraged provided their storage capacity is not exceeded, thus inducing large sediment releases during extreme precipitation events. A verbal estimate of milled material production for the proposed mining operation was 50-100 tons/day. Assuming a median production figure of 75 tons/day and a 100-day working year, approximately 75 million tons of tailings will be produced over a 5-year operation period. This represents the need for disposal of 30,000 cubic yards of tailings (assuming a tailings density of 1.5 g/cm^3).

The present streambank erosion occurring in lower Ptarmigan Creek would prohibit access over this portion of the drainage. Any roading through the area should be viewed with caution because of the highly erodible nature of the recently glaciated landscape. Access to the mine site in winter using tracked vehicles on sufficient snowpack may be feasible by traversing above the highly eroded portion of Ptarmigan Creek. Another option would be to transport equipment to the site by helicopter from the beach. In all cases, care should be take to limit excavation along temporary roadways or other areas at the mining site since this will create an erosion hazard.

Figure 1. Glacial outwash plain in Ptarmigan Creek basin. Remnant glacier in upper portion of basin.

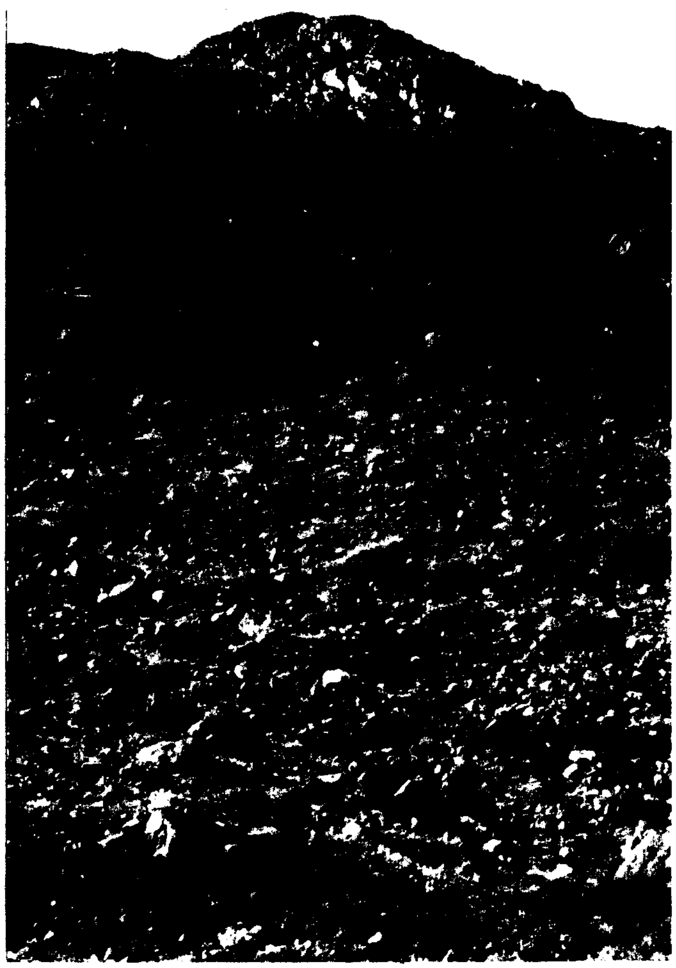

Figure 2. Talus slope behind proposed mine tailing site.

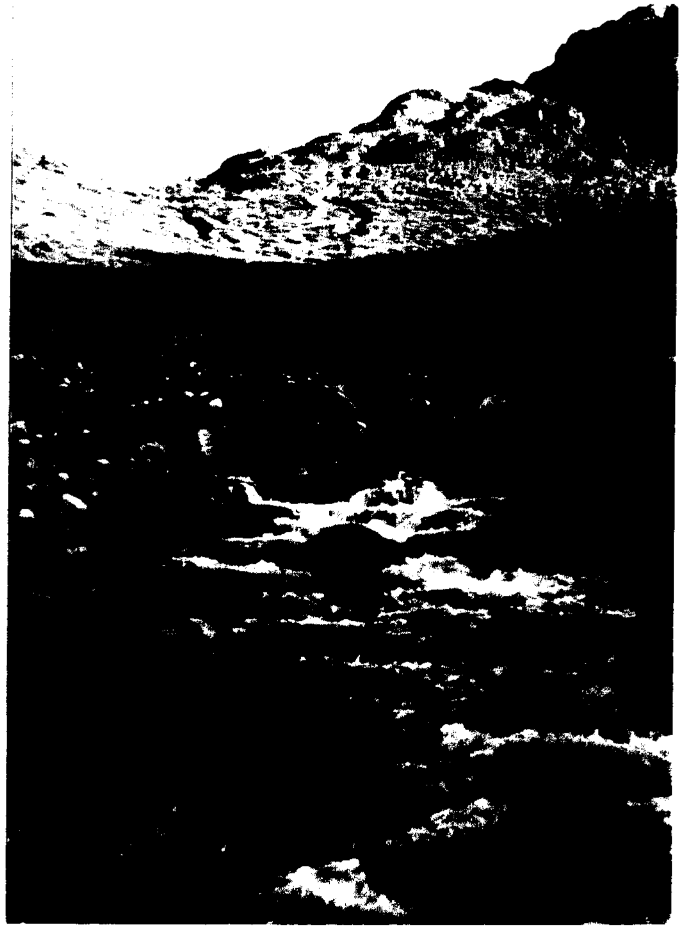

Figure 3. Ptarmigan Creek near tailings tributary.

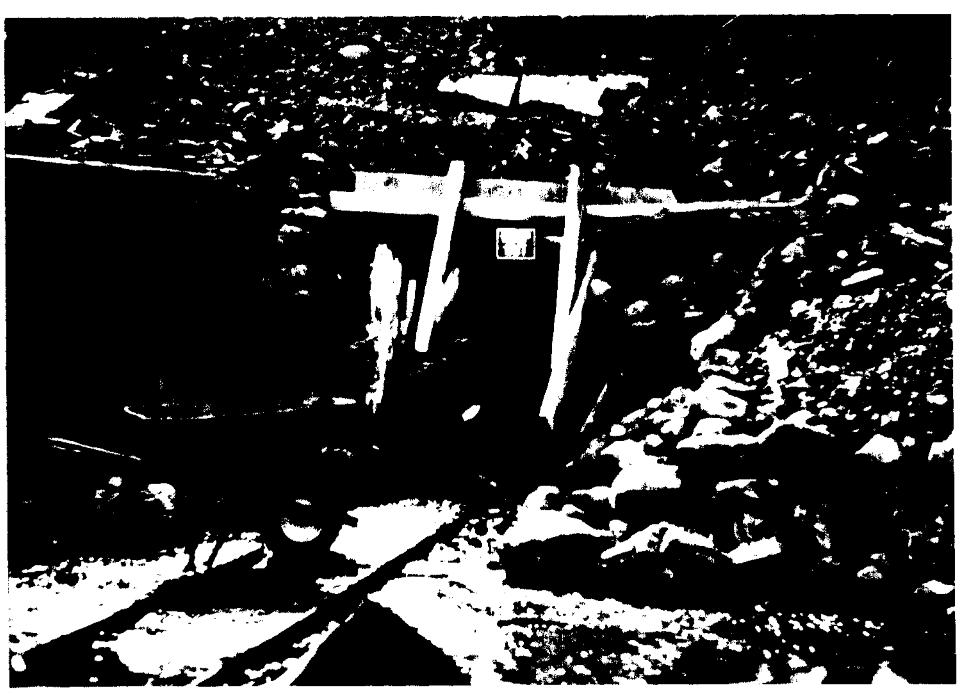

Figure 4. Subsurface water draining from main adit.

Figure 5. Extensive streambank erosion along lower portion of Ptarmigan Creek.

Figure 6. Former road into old mill site has been abruptly truncated by active streambank erosion.