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PRELIMINARY REPORT ON THE SUTHERLAND ANTIMONY MINE, PERSHING COUNTY, NEVADA

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INTRODUCTION

Location and accessibility

The Sutherland Antimony mine is in Section ~~11~~ 15, T. 27 N., R. 35 E., Mt. Diablo Base and Meridian, in the Black Knob mining district, northern Pershing County, Nevada (see index map). The mine is 16 miles by paved highway and good desert road from Lovelock, the nearest town.

The property is in the Humboldt Lake range, on the north side of Coal Canyon, a main canyon which cuts diagonally across the range. It is in smoothly rounded, deeply dissected hills, at an altitude of approximately 5200 feet.

Climate and vegetation

The annual precipitation, both as winter snow and summer thunder storms, averages about 6 inches, and will support only desert brush and small sage. A few scattered juniper trees are found at the higher altitudes. The nearest sources of water are from wells drilled in Antelope valley, to the south, and from Black Knob spring, 4 miles east of the mine.

Summer temperatures reach a maximum of about 100° F., and, although freezing temperatures prevail in winter, snowfall is light, so that year-round operations are possible.

History and production

St. Louis Smelting & Refining Co.
National Lead Co.

The three unpatented mining claims, the Kermesite, Kermesite No. 1, and Kermesite No. 2, which comprise the Sutherland Antimony mine, are owned by the St. Louis ~~Mining and Smelting Company~~. The property was under lease to John M. Heizer and associates, of Lovelock, Nevada, at the time of the examination.

The mine has produced during both world wars, but during the period between the wars and for much of the time following World War II it has been idle. It is credited with a total production of 4500 tons during World War ~~II~~ I/, but this figure appears to be too high. The property was operated again during World War II, but production figures are not available. Development and rehabilitation work was undertaken in 1949 by Heizer and associates, but falling antimony prices caused a suspension of activity. Some 300 tons of ore, containing approximately 100 tons of metallic antimony, were shipped as a result of that work2/.

1/ Vanderburg, W. O., Reconnaissance of Mining Districts in Pershing County, Nev., U. S. Bureau of Mines Infl. Circ. 6902, p. 13, 1936

2/ Heizer, John M., personal communication

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Field work and investigations

The mine was visited by the author in April 1951, accompanied by D. E. White and H. R. Craig. Two weeks were spent on surface and underground mapping, geochemical sampling, and geophysical surveys in May 1951, during which time the author was ably assisted by Mr. Craig. The mine was inactive at the times of both visits.

Previous work includes examinations by White in 1939 and again in 1942; as a result of the second examination, a report was prepared as a part of the strategic minerals investigations of antimony3/.

Development

The mine is developed by means of a vertical shaft; 3 adits, 2 of which are connected to the shaft; and a winze. The shaft is reported to be 245 feet deep, but recent rehabilitation work has been carried out only to the third level, 127 feet below the collar of the shaft. The shaft is inaccessible below that point. A winze, 140 feet deep, has been sunk from a point on the third level approximately 100 feet north of the shaft. Three sublevels have been driven from the winze, each a drift on ore. Extensive stoping has been carried out from the upper levels, but many of the stopes were inaccessible at the time of the visits. Adits, crosscuts, and drifts total approximately 1800 feet. All were accessible at the time of the examination.

GEOLOGY AND ORE DEPOSITS

General geology

The Humboldt Lake range is composed of Mesozoic sediments overlain and intruded by Tertiary volcanics. The range owes its present relief largely to block faulting; erosion has modified and decreased the relief.

The Mesozoic sedimentary rocks, of Triassic (?) age, consist primarily of shale, sandy shale with interbedded sandstone, and argillaceous limestone. The shale is buff to gray in color, fine grained and with very thin bedding. It is incompetent, and often tightly folded against the more competent interbedded sandstone and limestone. It is easily eroded, and forms relatively gentle slopes.

The sandstone commonly occurs as thin beds within the shale. The beds range in thickness from less than an inch to almost 2 feet. Where tightly folded, the thinner sandstone members tend to shatter. The sandstone forms ridges; the thicker (1-to 2-foot) beds often stand several feet above the surrounding shale.

Generally underlying, but sometimes interbedded with, the sandstone-shale member is a blue-gray argillaceous limestone. In places the limestone is massive, but in the vicinity of the Sutherland Antimony mine, thin beds of limestone are intercalated with the shale and sandstone.

3/ White, D. E., Sutherland Antimony mine, Black Knob district, Pershing County, Nevada, U. S. Geological Survey unpublished manuscript, 1942

The limestone beds range from a few inches to several feet in thickness.

The beds range from flat-lying to vertical. They are often tightly folded into close, isoclinal folds. The structure in the mine area is a doubly plunging anticline whose axis trends a little west of north.

Ore deposits

Antimony minerals occur as fissure filling along with quartz and some pyrite. The principal primary antimony mineral is stibnite (Sb_2S_3), which has been altered in the upper zones to brown, red, and white earthy oxides. These are difficult to identify positively in hand specimens but are believed to be valentinite, senarmontite, and kermesite. Fine-grained pyrite is associated with the stibnite, apparently becoming increasingly common with depth. Quartz is the dominant gangue mineral, although some clay minerals, siderite, and calcite are present.

The vein fills a north-trending, steeply dipping fault. In the upper part of the deposit the vein dips 80° to the east. The dip is reversed in the lower workings to about 80° to the west. Predominent movement along the fault has been vertical, the western side having been dropped with respect to the eastern. Several periods of movement are indicated by drag along the fault, however, movement in the reverse direction is indicated during one period. Brecciation of the stibnite and quartz indicates probable post-mineral movement.

Throughout much of its length, the vein is quite regular, with a uniform strike and dip; however, in the southern part, the vein rolls and splits into several branches. Most cross faults and slips do not offset the vein, but die out in it. An important cross fault cuts off the ore in the southern end of the workings in a sublevel below the third level, about 50 feet south of the shaft.

The wall rock consists of interbedded sandstone and shale. At no place was the vein found to be in limestone. Wall rock alteration is in the form of kaolinization and pyritization, and is limited to within a foot of the walls. In many places fault gouge is 2 feet thick. In the lower levels the vein lies near the footwall of the fault zone.

Control of ore deposition appears to be more stratigraphic than structural. Where the fault has cut beds which are predominately sandstone or sandy shale, brecciation has been more extensive, and conditions are more favorable for ore deposition. Where the fault has cross-cut strata whichare for the most part fine grained shale, less brecciation has taken place, and the vein narrows to but a few inches in width.

Geophysical and geochemical studies

Both geophysical and geochemical work was undertaken. The geophysical survey consisted of 2 natural potential traverses at right angles to the structure, with one across known ore (traverse no. 2), and the other north of any known ore occurrence. Geochemical samples were taken along the two natural potential traverses, at 50 foot intervals, except near the intersection with the structure, where 25 foot spacing was used. Samples of the shale, limestone, basalt, and rhyolite near the deposit, and samples of basalt from 1 to 4 miles away, were taken for geochemical anal

analysis. Geophysical results and geochemical analyses are summarized in graphical and tabular form at the end of this report.

CONCLUSIONS

Further detailed mapping of both surface and underground, which time did not permit, will be needed before the structural picture is complete. The natural potential survey indicates that this method of geophysical prospecting may be successfully applied to this type ore-deposit, but again, further work will bennecessary before definate conclusions can be reached.

In order to further develop the property, attempts should be made to find the northern extension of the vein. Some exploratory bulldozer cuts across the northward projection of the vein have been made, but probably did not go deep enough to intersect thevvein. Diamond drilling, or geophysical and geochemical exploration followed by diamond drilling, is indicated.

The structure in the southern part of the ore body, particularily south of the shaft, is complicated anf further study will be necessary. Here again,geophysical and geochemical prospecting followed by diamond drilling might disclose new ore bodies, but the chances for success in this direction would seem to be less favorable than to the north.