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Item 18

HALL PROPERTY

Location and Access. The Hall property is in the San Antone (Liberty) mining district on the west flank of the San Antonio Mountains in Sec. 5, T. 5 N., R. 42 E., one mile north of the Liberty mine (see Army Map Service, Tonopah topographic quadrangle map), in Nye County, 22 road-miles north of Tonopah.

History and Production. The deposits of the district reportedly were discovered in 1863. Small amounts of silver, gold, manganese, lead, and copper have been produced sporatically.

The Hall property was first prospected for silver; an inclined shaft was sunk and the first (110-foot) level driven. From 1935 to 1938, the U. S. Vanadium Corp. did some 3,500 feet of exploratory work deepening the shaft to 310 feet, and drove a 1,250-foot drift with crosscuts on the 280-foot level. In 1940, the Freeport Sulphur Co. sampled the workings.

The U. S. Bureau of Mines did additional sampling in 1942 and 1943. Later in 1943, the Metals Reserve Co. sank two shafts, drove short crosscuts from the shafts, and drilled two diamond-drill holes. Anderson (1945) stated that the U. S. Bureau of Mines estimated reserves at 1,300,00 tons of ore containing 0.3 to 0.37 percent MoS_2.

In 1956, the Anaconda Co. leased and optioned the property from Clarence H. Hall, W. C. Rigg, and Lee Hand; since then the company has under taken an extensive exploratory drilling program.

The workings now total over 4,400 feet, all the work since 1935 being done while exploring for molybdenum (see Anderson, 1945 for plans of the workings).

Previous Work. Anderson (1945) described the geology of the deposit. Michell (1945) discusses the oxidation of the deposit. War Minerals Report 196 gives the results of the U. S. Bureau of Mines sampling, as well as other sampling.

The Rocks. A roughly circular stock of massive alaskite, about 2,500 feet in diameter, has intruded Ordovician (?) mica schist, sericitic quartzite, and limestone. Andesite dikes cut the schist.

The limestone lies unconformably on the schist and quartzite. At the mine, the schist is well foliated with muscovite the dominent mica, and biotite in lesser amounts; the foliation generally strikes northwest and dips steeply northeast and southwest. Elsewhere the schist includes fine-grained calcareous rock, hard slate, and quartzitic schist. The limestone is dark gray, massive, and locally highly silicified.

The alaskite is variable in texture, ranging from aplitic to porphyritic. The porphyritic variety consists of orthoclase and/or quartz phenocrysts in a medium-grained groundmass of orthoclase and quartz, some plagioclase, and rare muscovite; rare biotite is present locally. At the mine, the alaskite-schist contact is irregular both in plan and section, but has a general dip of 80° NE (toward, instead of away from the stock).

Andesite dikes, ranging from a foot up to 70 feet wide, occur in the schist at the mine cutting the molybdenite mineralisation. The andesite is blue-gray, dense, blocky, and even-textured.

Structures. Numerous faults and fractures occur in the margins of the alaskite stock and in the rocks along the contact, forming a "halo" around the center of the stock. Quartz veins and masses fill many of the faults and fractures. Other faults displace the veins, alaskite contact, and andesite dikes short distances. These faults have both flat and steep dips. Anderson (1945) states that: "there is no evidence contrary to the supposition that all of the faults are somewhat contemporaneous . . ."; and that the "faults have no bearing on the localization of the molybdenite mineralization."

The Quartz Halo. Extensive silicification, numerous quartz veins and masses, and fault gouge occur around the margins of the alaskite stock both in

the alaskite and intruded rocks, forming a "hood". Most of the veins are 1 to 4 inches wide. The "contacts" of the quartz halo are gradational, quartz veins being scattered sporadically outside the halo. (The areas mapped as part of the halo, in general, approached at least 30 percent quartz.)

Locally the alaskite contains over 50 percent of the veins. The orientation of the veins varies greatly; in some areas the orientation is completely random, in other areas the majority of the veins have one persistent attitude with the remainder having random strikes and dips. Persistent attitudes are more common in the eastern part of the stock. Numerous small masses of quartz accompany the veins, and are particularly abundant in the northern part of the stock. In the same zone the feldspar is largely altered to kaolin and sericite and replaced by quartz.

The quartz veins in the schist most commonly parallel foliation. The veins in the limestone are randomly oriented and distributed more erratically, some limestone along the alaskite stock being essentially free of veins.

There are several large masses of quartz in the alaskite and schist. These masses contain only minor reminents of the country rock, have gradational boundaries, and apparently have been formed by replacement.

Primary Mineralization. The Hall orebody is in the schist, and more rarely in the alaskite, along the southern contact of the alaskite stock. The body is essentially tabular, 50 to 75 feet wide, 1,500 feet long (northwest-southeast), and roughly parallels the contact and schistocity. Below the zone of oxidation, molybdenite, pyrite, and a little chalcopyrite occur in quartz veins and pods, both in the orebody and more sporatically in the surrounding rocks. The molybdenite-bearing veins in the schist commonly parallel the foliation, which strikes parallel to the alaskite contact, but dips somewhat less steeply (70° NE). In the alaskite, the richer veins are randomly oriented, the veins that parallel the contact having generally a much lower molybdenite content. The andesite

dikes in the orebody are completely barren of molybdenite. There are no sharp boundries to the mineralized area.

Molybdenite also occurs elsewhere in the quartz veins making up the quartz halo are as abundant as in the Hall orebody, but apparently is spotty and in general low grade, the majority of the veins being barren of molybdenum. Anaconda Company's exploration program is testing the potential of this mineralization. Anderson (1945) mentions that molybdenite was found in two prospect cuts in the limestone east of the alaskite stock as a few scattered crystals in widely spaced quartz veins.

Oxidation. The Hall orebody has been oxidized to a depth of 95 to 150 feet, oxidation having locally extended below this level along cracks. The bottom of the oxidation zone is sharp and, in general, parallels the surface drainage gradient of the "wash" above the deposit. Abundant yellowish-brown "limonite" fills cracks and stains surfaces in both the schist and alaskite of the mineralized area at the orebody. Malachite and azurite are present but rare. Some ferrimolybdite is intimately mixed with the limonite. The abundant "limonite" has obscured the color and other characteristics usually found in molybdenitic gossans. Powellite is erratically distributed in the area of the orebody, but its distribution shows no relation with the orebody.

In the oxidized zone 30 to 40 percent of the molybdenum is in the form of sulfide, in contrast to the over 85 percent sulfide content of the sulfide zone. The percentage of molybdenum shows no significant change from one zone to the other, indicating that the metal did not migrate readily. Some residual pyrite also remains in the oxidized zone.

Molybdenum Mineralogy. The molybdenite occurs most commonly as small flakes and bunches in the quartz veins, less commonly as thin coatings on fracture and fault surfaces, and more rarely along the margins of gouge-filled faults. In the quartz veins, the molybdenite is largely along the margins, in contrast to the pyrite which is distributed throughout the veins. Subsequent

Jim Wilson (Anaconda)
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Hell property

"limestones" are volcanics
mainly tuffs

"slate" is quartz monzonite
(this may be only a
difference in terminology)

intrusive varies texturally
and compositionally especially
with depth

will take me down in
month or so