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SOME QUICKSILVER PROSPECTS IN ADJACENT PARTS OF NEVADA, CALIFORNIA, AND OREGON

BY

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SOME QUICKSILVER PROSPECTS IN ADJACENT PARTS OF NEVADA, CALIFORNIA, AND OREGON

By Clyde P. Ross

ABSTRACT

This report summarizes the results of reconnaissance study of quicksilver deposits in the northwestern corner of Nevada, the northeastern corner of California, and Lake County, Oreg. made in August 1940. The Lene Pine district, Nevada, the Silvertown and Red Hawk properties in California, and the Currier and Glass Butte properties in Oregon were included. The first two of these require further development before a definite opinion as to their value can be formed. The Red Hawk mine has yielded high-grade ore, but the ore bodies so far worked are very small and scattered. The small amount of development at the recently opened Currier mine has yielded encouraging results. The deposits in the Glass Buttes are large but of such low grade that thorough sampling would be needed to determine their value. In general the region appears to warrant more attention from quicksilver prospectors than it has yet received.

INTRODUCTION

A region, recently reconnoitered, that includes the general vicinity of the point at which Oregon, California, and Nevada join (pl. 6), contains many quicksilver prospects and a few mines. Little ore has been produced in this region, but the possibilities of developing a profitable mine or mines there are sufficient to justify more attention than the region appears to have received. To the north is the Ochoco region with its numerous quicksilver mines that include the Horse Heaven mine, one of the country's leading producers. To the east are the Steens and Pueblo Mountains, with many undeveloped quicksilver deposits, in some of which small amounts of exceptionally rich ore have been found. Near McDermitt, Oreg., only a short distance

farther east, are the productive Opalite and Bretz mines. Among the nearest productive districts in northern Nevada are the Bottle Creek and National districts. The National contains the Buckskin Peak quicksilver mine (pl. 6).

Late in August 1940 the writer, ably assisted by Herman Zwang, made a trip from Denio, Oreg., through the northwest corner of Nevada to Cedarville, Calif., and thence north and east through Lakeview, Paisley, Bend, and Burns, Oreg., with the object of visiting some of the principal quicksilver properties in that region. (See pl. 6.) The properties visited were those in the Lone Pine district, Nevada, the Silvertown group near Cedarville and the Red Hawk mine near Willow Ranch, Calif., and the Currier property near Paisley and prospects in the Glass Buttes between Bend and Burns, Oreg. Several other prospects said to exist in this region were not visited. These include prospects east of Fairport, Calif, one near Adel, Oreg., and rumored occurrences of quicksilver near Hart Mountain and elsewhere. Although the deposits described are all in Tertiary volcanic rocks, they differ in structure and mineral content.

All the samples collected during this investigation were taken by chipping narrow grooves across the mineralized bodies. It was impracticable to take samples weighing more than a few pounds each, although, as cinnabar is very irregularly distributed in most of the deposits, much larger samples would have been desirable. The tenor of some of the samples, therefore, may be far from representing accurately the grade of the deposits.

All the samples were assayed by J. J. Fahey, of the U. S. Geological Survey.

LONE PINE DISTRICT, WASHOE COUNTY, NEV.

The Lone Pine district is in northwestern Washoe County, Nevada, just south of the Sheldon National Game Refuge (pl. 6).

There are some prospect holes within the refuge also, but that area is now closed to prospectors. The early prospecting for gold disclosed very little of that metal. The more recent discovery of cinnabar led to the locating of a block of 18 claims by Curtis Mathews and W. S. Miller in December 1929.

The claims whose boundaries could be identified are plotted on the map (pl. 7). Antelope No. 1 and No. 2 claims are reported to lie north of No. 5 and No. 6, but no boundary posts for these claims were found by the writer. Antelope No. 12 to No. 18 claims extend eastward from the side line of No. 11 to the streamway beyond the silicified rib near the east border of the area shown on plate 7. Shallow trenches and shafts have been dug at several places on the Antelope group, particularly in the northern part of Antelope No. 10 claim. In the winter of 1939-40 the Colton Log & Lumber Co., of Portland, Oreg., took a bond on the property and made several bulldozer cuts. These are all shallow, most of them being barely deep enough to remove the surface soil.

Some claims that lie just west of the Antelope group and include part of the ground originally explored for gold have recently been staked by Harry Woods, but as yet he has put down only a few small pits. The approximate positions of two of his claims--the Mary Lee and Margaret Dee--are shown on plate 7. Scattered holes and unmarked claim stakes indicate that the ground immediately to the north has been prospected to some extent.

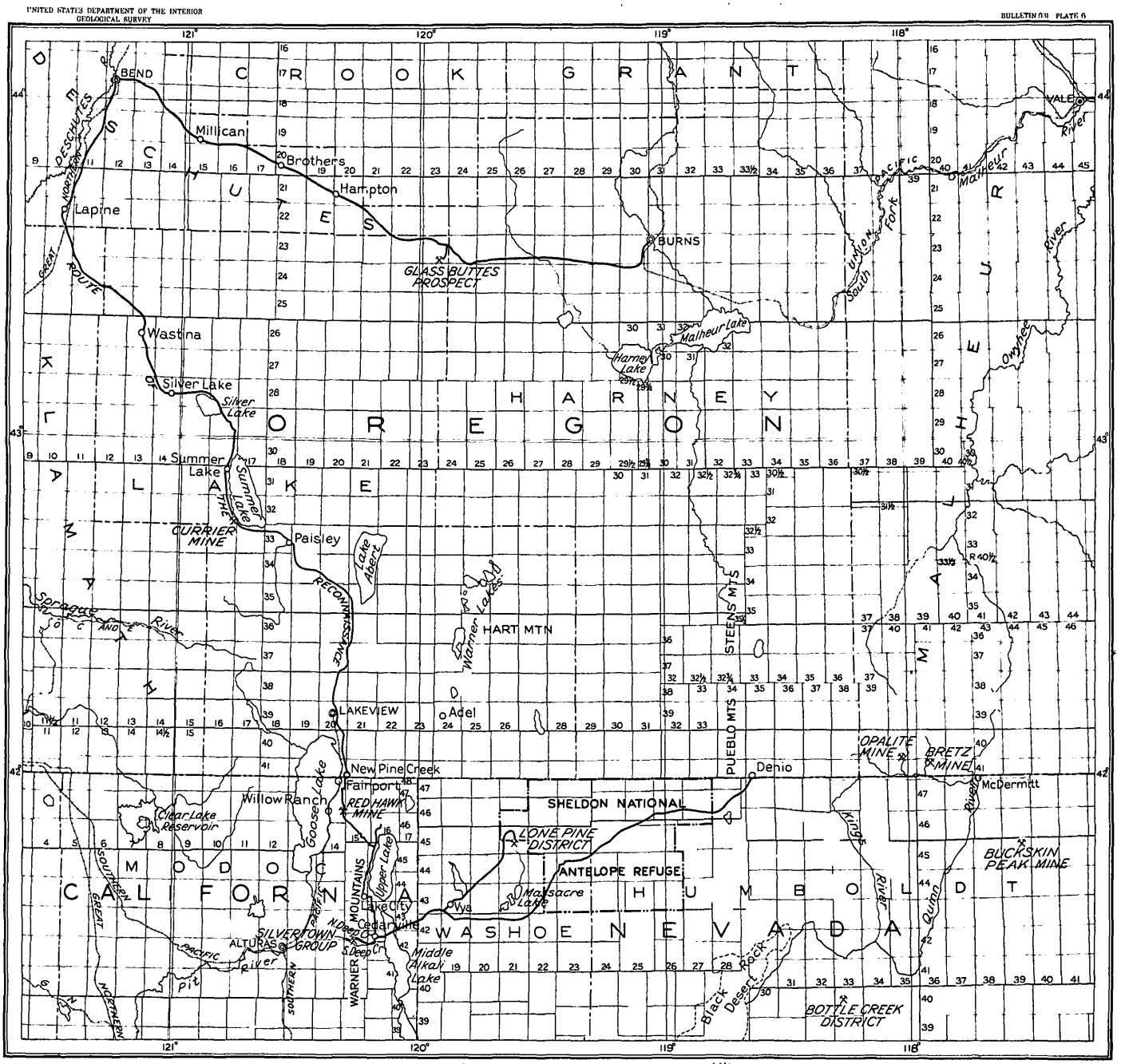
Ralph Roberts and Arthur Granger, of the Geological Survey, paid a brief visit to the district in the fall of 1939 and the writer and Herman Zwang spent 3 days in August 1940 in mapping and studying the area shown on plate 7.

General geology.--The district is underlain by lava flows and associated tuffs that appear to belong to two units, both presumably of Tertiary age. (See pl. 7.) The lower unit

consists of red to nearly black fine-grained andesite lava interbedded with and underlain by light-colored tuff with a few bands of conglomerate. These rocks in general dip gently east, but locally the lava has a platy structure that simulates bedding, and these partings dip northeastward at angles of 45° and more. Along the southern border of the area mapped, the andesitic rocks are overlain unconformably by a basalt flow, 20 to 50 feet thick, which dips gently south. The basalt contains numerous vesicles, in part filled with quartz. Near the middle of the eastern edge of the area mapped there are exposures of a dark-colored rock that is somewhat similar to the basalt, though more pumiceous; this rock is mapped with the basalt, but it may perhaps belong stratigraphically with the andesite.

Mineralized bodies.--The mineralized bodies in this area consist of lava and tuff that are fractured, kaolinized, locally silicified, and somewhat iron-stained. They contain some cinnabar and a little pyrite that is largely oxidized. The deposits have not been sufficiently explored to determine their size and shape. In most places the fractures are discontinuous and strike in various directions; but the more prominent fracture zones found so far, including the prominent silicified rib that crosses the northeast corner of Antelope No. 18 claim, the minor seam in a shallow shaft on Antelope No. 16, and the more conspicuous of the fracture zones revealed by the workings on Antelope No. 10, all trend northwestward. The first two are nearly vertical and the last dips 55° NE.

The silicified rib is 2 to 5 feet wide and is easily traceable for more than 800 feet. The intensely silicified fault breccia of which it is composed is reliably reported to contain a little cinnabar, but a sample chipped from it at one spot yielded no quicksilver on assay. The seam on Antelope No. 16 is said to contain a little gold. The workings on Antelope No. 10 claim show considerable cinnabar along some fractures, much of



INDEX MAP OF ADJACENT PARTS OF NEVADA, CALIFORNIA, AND OREGON SHOWING THE LOCATION OF THE PROPERTIES DESCRIBED

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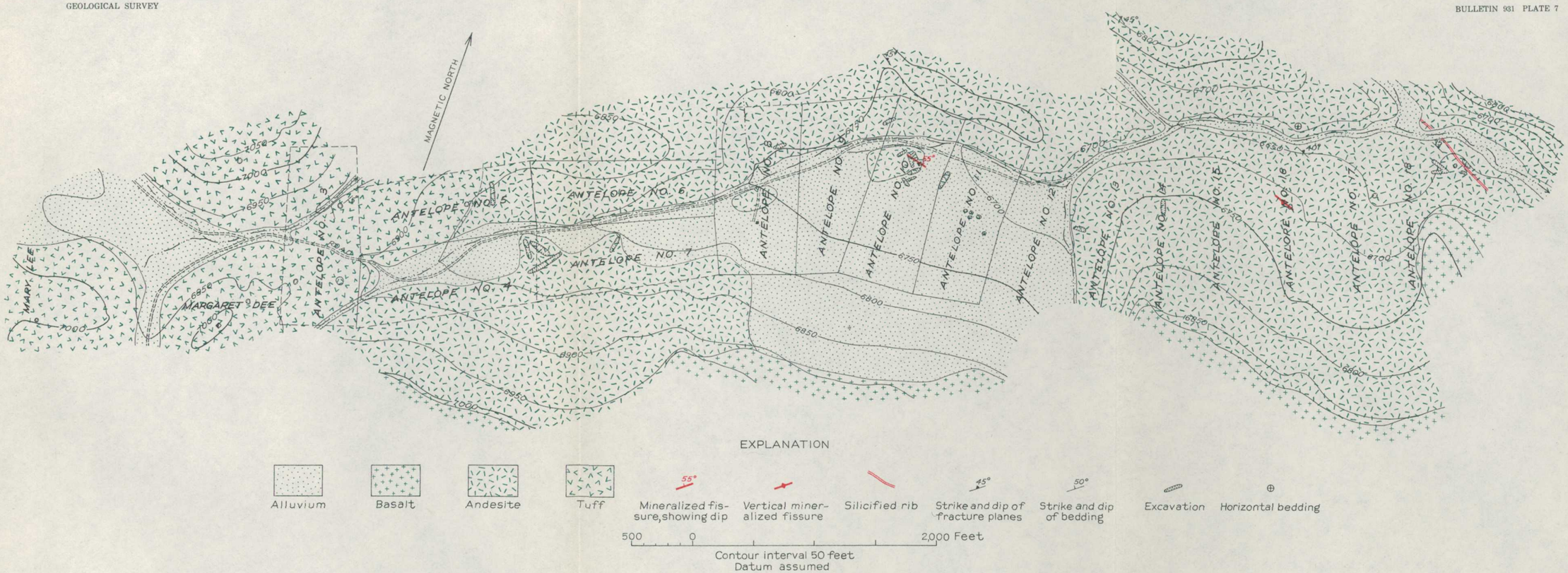

GEOLOGIC AND TOPOGRAPHIC MAP OF THE PRINCIPAL PART OF THE LONE PINE DISTRICT, WASHOE COUNTY, NEVADA

AUGUST 1940

it in coatings of the pulverulent cinnabar commonly called "paint." Samples from the two shallow shafts or pits in the southeast part of the main group of workings, taken from channels cut across seams 48, 36, and 15 inches wide, yielded 0.29, 0.07, and 0.18 percent of quicksilver, respectively. A sample chipped across an especially promising 10-inch seam was found to contain 0.70 percent (14 pounds to the ton) of quicksilver. This sample contained 0.12 percent of mercuric chloride, which was not looked for in the other samples. The possibility that chloride may be present in the ore represented by other samples should be taken into account in treating material from this district. Four samples cut by Walter Bentley, of the Colton Log & Lumber Co., from a trench somewhat farther north contained 0.35, 0.33, 0.075, and 0.075 percent of quicksilver. The workings west of the Antelope group, particularly on the Margaret Dee claim, are in partly opalized tuff with a little pyrite and cinnabar. No samples were cut there, because the rock now exposed obviously contains very little quicksilver. It is reported, however, that better material was found in one of the pits now caved.

Outlook.--Even though the district has not been thoroughly explored, some altered rocks that occur in it have been shown to contain fair percentages of quicksilver. The deposits have been sampled by several people, and some of the samples have yielded higher percentages than any of the samples collected for the Geological Survey. But the chance of mining quicksilver profitably depends on finding larger bodies of ore than were visible in 1940. In order to learn whether such bodies exist at readily accessible depths, it would be necessary to sink shafts or to drill. The first exploration should be undertaken in Antelope No. 10 claim, where the best showings now are, and should be guided by the fact that the principal fractures trend northwest.

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The lava in this vicinity is underlain by tuff, and parts of the tuff may possibly have been replaced, like that exposed farther west, by opaline material containing cinnabar in minable quantities. None of this material is exposed here, and the search for it would necessarily be somewhat blind; but it seems most likely to be found in the vicinity of outcrops of fractured and mineralized lava. Such prospecting, however, would scarcely be justified unless prices became exceptionally high.

SILVERTOWN GROUP NEAR CEDARVILLE, CALIF.

The Silvertown group, in the north-central part of T. 42 N., R. 15 E., in the Warner Mountains, Modoc County, Calif. (pl. 6), consists of 5 claims held by Roy Stanley, of Cedarville, Calif. The claims extend across the mountains from a point near North Deep Creek to South Deep Creek, a distance of nearly a mile, and the lode is said to have been explored, in places, even farther south.

The country rock of the prospects is thick-bedded agglomerate, conglomerate, lava, and tuffaceous sandstone that belong to what has been called the Lower Cedarville formation, of Miocene age.[1/] This unit is reported to comprise "from 2,000 to 3,500 feet of andesitic agglomerates, tuffs, conglomerates, intercalated flows, and sediments." The great mass of Tertiary strata that make up the Warner Mountains is reported to have a maximum aggregate thickness of about 5,000 feet. In the vicinity of the Silvertown group the beds trend east of north and dip 10° W.

The lode is a silicified fracture zone that trends N. 20° W. and has a steep northeast dip. The rock is more or less silicified over a width of fully 100 feet, but the more intensely

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1/ Russell, R. J., Basin range structure and stratigraphy of the Warner Range, northeastern California: California Univ., Dept. Geol. Sci., Bull., vol. 17, No. 11, pp. 402-406, 1928. LaMotte, R. S., The Upper Cedarville flora of northwestern Nevada and adjacent California: Carnegie Inst. Washington Pub. 455, p. 61, 1936.

mineralized material appears to range in width from a few inches to 20 feet. The workings include shallow cuts and caved tunnels distributed along the length of a claim on the north side of the valley of South Deep Creek and scattered holes farther north.

The lode contains films and specks of cinnabar and disseminated grains of pyrite, malachite, and azurite, in altered rock that is in places almost completely replaced by jasper and sericite. As the mineralized fracture zone traverses the beds obliquely, its country rock is different in different places; much of the zone is in agglomerate, but some of it appears to be in lava. The more thoroughly mineralized portions are reported to contain 0.55 pound of quicksilver with local richer streaks. The two samples cut by the writer contain 0.04 and 0.01 percent of quicksilver, but these samples were too small to be representative; it seems entirely probable that selective mining would yield ore of higher tenor. The scanty workings accessible at the time of visit suffice only to show that there is a large amount of cinnabar-bearing material. Additional exploration is necessary in order to obtain a satisfactory idea of the commercial possibilities of the area.

RED HAWK MINE NEAR WILLOW RANCH, CALIF.

The Red Hawk quicksilver mine, formerly known as the Modoc,[2] is in T. 4 N., R. 14 E., about 3 miles from the post office of Willow Ranch, Calif. (pl. 6). It lies in the southern part of the High Grade district, where gold was formerly mined.[3] The property comprises three claims. Some work was done at the Red Hawk mine in 1917 or 1918 by A. H. Dixon and Charles Kirkpatrick, of Lakeview, Oreg. A ruined furnace is on the property but no record of the amount of quicksilver produced

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2/ Bradley, W. W., Quicksilver resources of California: California State Min. Bur. Bull. 78, p. 72, 1918.

3/ Hill, J. M., Some mining districts in northeastern California and northwestern Nevada: U. S. Geol. Survey Bull. 594, pp. 38-48, 1915.

in it has been found, and it probably was operated only a short time. In August 1940, when the mine was visited, the property was held by E. D. McGilroy and R. S. Hall, who had done some development work and planned to do more. No work was then in progress. Several short tunnels, irregular cuts, and a shallow shaft, scattered over the hillside, explore several separate steep mineralized fractures that trend about N. 20° W. The country rock of tuff, interbedded with some rhyolite, strikes north and dips 30° E. The ore, which is erratically distributed along the fractures, consists of silicified tuff with cinnabar, hematite, and nontronite (hydrous silicate of iron). Locally mosslike radiating groups of cinnabar and hematite grains lie in a groundmass of fine-grained quartz. Beryllium is reported to be present in the nontronite-bearing rock, but it was not detected in specimens tested at the Geological Survey. Pockets of high-grade cinnabar ore have been found in the past, but apparently all were small. As cinnabar is visible at several places in the shallow workings, further exploration seems justified; but the mineralized zones appear to be so discontinuous that it would be unwise to spend much money until larger and more persistent ore bodies are found.

CURRIER MINE NEAR PAISLEY, OREG.

The Currier mine is in sec. 36, T. 32 S., R. 16 E., about 12 miles northwest of Paisley, Lake County, Oreg., near the Fremont Highway (pl. 6). It lies close to the base of Winter Ridge and just above the flats that border Summer Lake. Cinnabar, it is said, has long been known to occur here, but the present activity dates from May 1940, when A. M. Seits and Dr. E. W. Howard took a bond on the property. In August, development in the shallow open cuts shown in figure 3 was being pushed. No work was being done in the old tunnel, though it had been extended earlier in the year to the point shown on the map. A Lacey

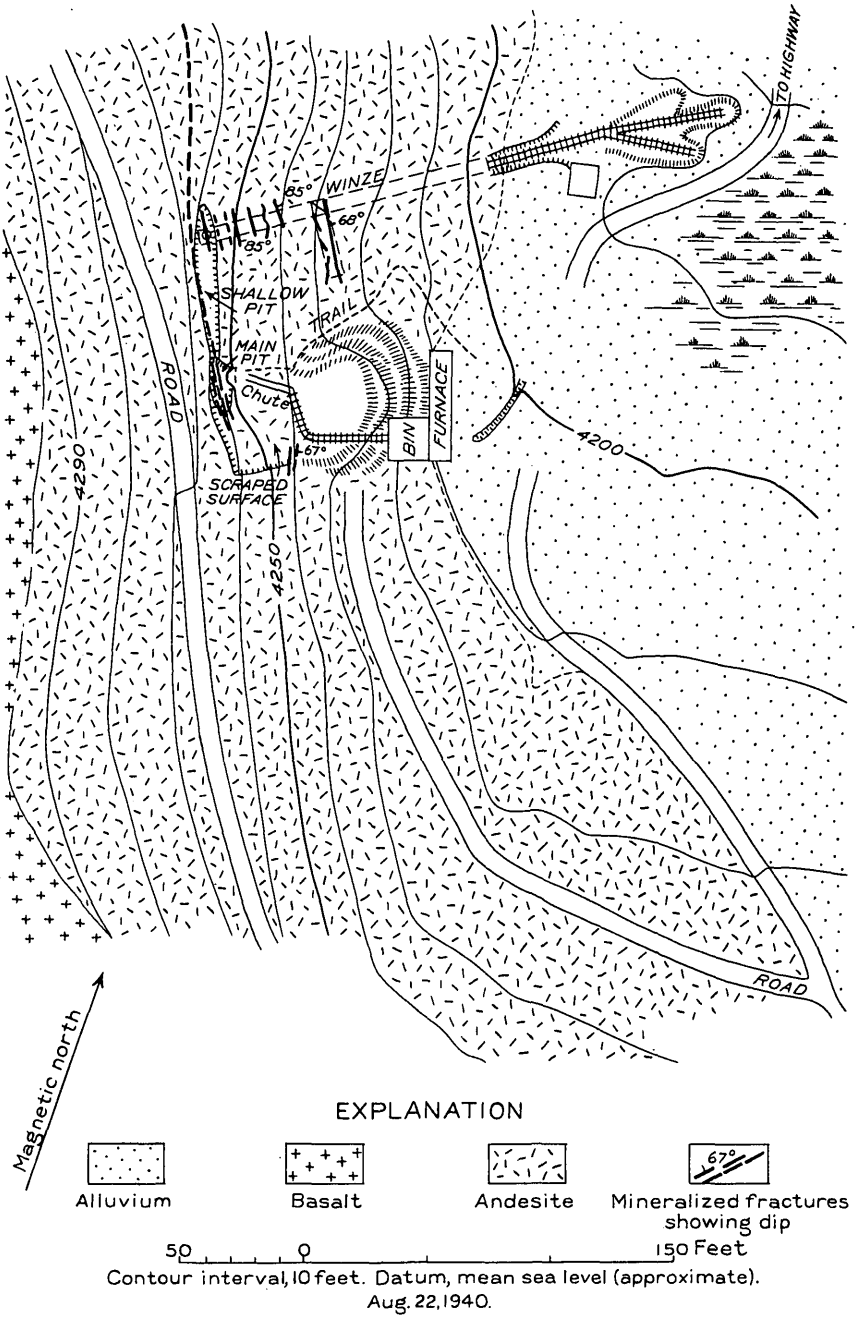

Figure 3.--Geologic and topographic map of the Currier mine, near Paisley, Lake County, Oreg.

furnace of some 35 to 40 tons rated capacity, equipped with a special condensing system designed by Mr. Seits, was on the property and had been in operation, but it was shut down and under repair.

The workings are in a flow of andesite that is nearly black where fresh and is overlain by a basaltic flow; both are essentially horizontal. These lavas are stratigraphically low in the Tertiary volcanic series from which Winter Ridge has been carved. The andesite is irregularly bleached and altered and is cut by several shear and breccia zones, which trend nearly north and stand vertical or dip east at moderate to high angles. These minor fractures are presumably related to the fault that was believed by Russell [4/] to border this part of Winter Ridge.

The recognizable fracture zones in and close to the present workings are shown in figure 3. Scattered exposures are said to indicate that the persistent fracture zone which passes through the main pit extends for considerable distances both north and south of the area mapped. The rock in these zones is brecciated, silicified, and replaced by the clay mineral dickite. It is lighter-colored than the unaltered andesite and has in most places a distinctly purple cast, presumably due to finely divided hematite. The breccia fragments are cemented by quartz, and some of them are coated with cinnabar, which also lines the walls of fissures in the altered rock. A little calcite is associated with the cinnabar, and barite and a little native quicksilver are locally present. There is some pyrite, notably in the shallow winze in the tunnel.

Samples cut in the short crosscut extending southward from the tunnel contain only 0.02 and 0.03 percent of quicksilver, but high-grade material is reliably reported to have been found in the tunnel workings, particularly in the winze. A sample

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4/ Russell, I. C., A geological reconnaissance in southern Oregon: U. S. Geol. Survey 4th Ann. Rept., pp. 445-449, pl. 84, 1884.

from the shear zone at the southeast edge of the scraped surface above the furnace yielded 0.09 percent of quicksilver, and one from the shear zone at the north end of the main pit contained 0.08 percent. Two from the south end of that pit, the first from a cut across a highly silicified seam a foot wide and the second from a cut 5½ feet long across the entire lode, contained 0.65 and 0.69 percent respectively. A pocket of high-grade cinnabar ore had been removed from this part of the pit the day before the samples were taken. If any material from this pocket had been included in the samples, the tenor would have been much higher.

The work done thus far, though not a sufficient basis for estimating reserves, has had some distinctly encouraging results. The andesite is cut by discontinuous mineralized fractures distributed over a width of roughly 50 feet. The length of the mapped area is only about 200 feet, but further exploration is expected to show that the mineralized zone extends much farther than this. The vertical range thus far explored is about 65 feet, and in order to exceed this range materially, it would be necessary to sink. Sinking would necessitate pumping, for the ground at the east edge of the area shown in figure 3 was marshy as late as August, after the weather had long been dry.

Further development and sampling will be required in order to reveal the grade of ore to be expected. It seems probable, however, that ore shoots 5 feet or more in width and containing fully 10 pounds of quicksilver to the ton will be found and that there will be pockets containing more than 20 pounds to the ton. Mr. Seits thinks that a large part of the mineralized ground averages 5 pounds to the ton.

GLASS BUTTES PROSPECT, NORTHEASTERN LAKE COUNTY, OREG.

The Glass Buttes prospect is on the isolated hills of that name in the northeast part of Lake County, Oreg. It is about

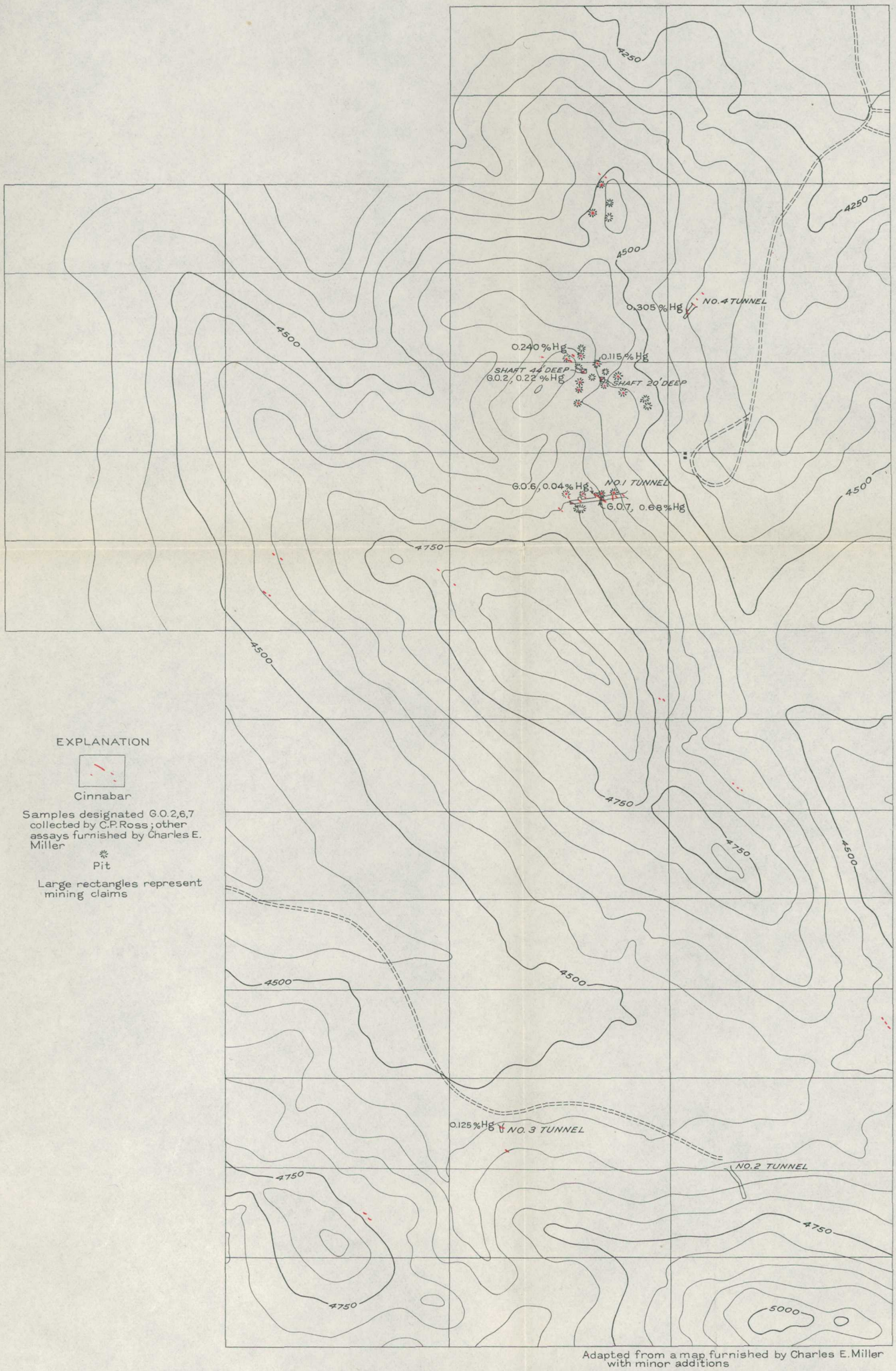
3.5 miles by road south of the highway between Bend and Burns, in Tps. 23 and 24 S., R. 23 E. (pl. 6). The property is owned by Charles E. Miller, of Bend, Oreg., and comprises 48 claims, as shown on plate 8. Quicksilver has been known for several years to occur here.[5] Test pits and short tunnels are scattered over the property, but so far there has been no production. The part of the Miller property from No. 1 tunnel to about 2,000 feet to the north was visited by the writer August 23, 1940.

According to Waters,[6] the buttes are composed of three groups of lava flows. The highest and lowest of these groups are basaltic. The intermediate group, which is more than 400 feet thick and forms the greater part of the Glass Buttes, includes dacite and several other kinds of andesite, as well as perlite, obsidian, and vitrophyre. Only these glassy lavas are exposed at the quicksilver prospects. According to Waters, the volcanic rocks of the Glass Buttes form a broad anticline broken by many normal faults of diverse trends and magnitudes.

The property, which has an area of about 1.5 square miles, is underlain by lava that originally consisted almost exclusively of flow-banded glass. This lava has been extensively opalized along broad zones of northwesterly trend that extend beyond the limits of the area shown on plate 8. Halloysite, a clay mineral, is mixed with the opal, locally in some abundance. Cracks and holes in the opaline material are lined with fine-grained quartz. Other and presumably later cracks are lined with cinnabar grains. The opaline material locally has horizontal bands that may represent the flow bands of the lava which it has replaced. Most of the pits and other excavations seen by the writer show cinnabar but generally in very small amounts. The cinnabar darkens on exposure, and it can therefore be detected only by chipping the surface of the opaline material.

5/ Schuette, C. N., Quicksilver in Oregon: Bull. 4, State of Oregon, Dept. Geology and Min. Industries, p. 168, 1938.

6/ Waters, Aaron, A structural and petrographic study of the Glass Buttes, Lake County, Oreg.: Jour. Geology, vol. 35, No. 5, pp. 441-452, 1927.



EXPLANATION

Cinnabar

Samples designated G.0.2,6,7 collected by C.P. Ross; other assays furnished by Charles E. Miller

Pit

Large rectangles represent mining claims

Adapted from a map furnished by Charles E. Miller with minor additions

TOPOGRAPHIC SKETCH MAP OF GLASS BUTTES PROSPECT, LAKE COUNTY, OREGON

1,000 0 2,000 Feet

Contour interval 50 feet, datum mean sea level (approximate)

AUGUST 1940

In several places the opaline material is broken by fractures and breccia zones that are comparatively rich in cinnabar. These trend N. 55°-65° W. and most of them dip rather steeply northeastward, though a few dip toward the southwest. The largest ones thus far exposed--in No. 1 tunnel and in the bottom of a 43-foot shaft 850 feet northeast of the portal of that tunnel--are 2 to 5 feet wide and have been followed only short distances along the strike.

The quicksilver content of a few representative samples is shown on plate 8. The samples designated by G. O. and a number were taken by the writer; the others were furnished by Mr. Miller, who also reports two samples not recorded on plate 8. One of these, from a "broken zone" 1 foot wide, contained 0.675 percent of quicksilver; the other, from a "brecciated seam," contained 0.550 percent of quicksilver. Sample G.O.2, from the bottom of the 44-foot shaft, contained 0.10 percent of mercuric chloride. As the total amount of quicksilver in this sample was only 0.22 percent, a large proportion of the metal was present as chloride, and this may be true of other parts of the deposit. This possibility should be taken into account in planning the reduction plant, and other samples should be tested for chloride. On the other hand, sample G.O.7, which is from a comparatively rich band 2 feet wide in No. 1 tunnel, yielded only 0.05 percent of mercuric chloride. This sample contained 0.68 percent of quicksilver.

The assays, together with observations on the ground, indicate that the quicksilver content of the opalized material ranges from a trace to about 15 pounds to the ton. Most of the samples recorded on plate 8 are from the richer parts of the deposit, so that the assays probably do not fairly represent the average tenor. It seems improbable that more than a small part of the deposit could be mined profitably at the prices that prevail under normal circumstances, but as the deposit is very

large and certainly contains some fairly rich ore, further work may show that it could serve as a source of quicksilver under emergency conditions.

CONCLUSION

The deposits described in this paper include only the principal ones revealed by prospects along the route of the reconnaissance (pl. 6), but they probably are representative of others scattered over this region. Other deposits are known to occur in the region, and it is probable that still others would be revealed by careful prospecting. The region has, in the past, contributed little to quicksilver production, partly because many of the deposits are not rich enough to be profitable when quicksilver prices are normal and partly because many prospectors are unfamiliar with quicksilver lodes; but the recent abnormally high prices have aroused interest in quicksilver deposits of all kinds and have induced many prospectors to learn how to look for them. The scanty available information is inadequate but suggests that, on the whole, the deposits within the limits of the present reconnaissance will be mainly of low grade and profitable only during periods when the price of quicksilver is high.

Each of the deposits described above differs from the others, and it is to be expected that distinctly different types will be found in other parts of the region. As cinnabar deposits rarely contain abundant sulphides of other metals, their outcrops are less deeply colored, in general, than those of other metalliferous deposits; they tend, rather, to be paler than the surrounding rocks. This is not an invariable rule, but it applies to many of the deposits in and near the region here considered. Any area of conspicuously light-colored rocks should therefore be examined, especially if opal and other fine-grained forms of silica are abundant in them; and it should be remembered that

cinnabar darkens so readily as rarely to be recognizable on the surface of an outcrop. Rock that seems likely to contain cinnabar should therefore be examined on freshly chipped surfaces.

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