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DEPARTMENT OF THE INTERIOR

Geological Survey

September 15, 1927.

Chalk Mountain, Quartz Mountain, Gold Basin, and King Mining Districts, Nevada.

The Chalk Mountain and Quartz Mountain mining districts are in southwestern Nevada southeast of Fallon, the nearest railroad station, to which the ore is hauled by autotrucks over the Lincoln Highway and thence shipped to Salt Lake City, Utah. The districts have recently been brought into prominence by the discovery of valuable ore bodies. This general region was examined by the Geological Survey several years ago, but in view of the recent discoveries and considerable production another visit was made in October, 1926. The work was done by F. C. Schrader, geologist, who received valuable aid and information from the local mining companies. The deposits occur mostly in Triassic (?) limestone and are associated with porphyritic intrusive rocks, like the ores of Tintic, Utah, and Leadville, Colo.

(3)

Chalk Mountain District

The Chalk Mountain district is about 40 miles east-southeast of Fallon, in Churchill County, midway between the famous old Fairview and Wonder districts. (See fig. 2.) Chalk Mountain, in which nearly all the ore occurs, is a conspicuous whitish hill in Fairview Valley. It is about 3 miles long, in a north-northeast direction, and 2 miles wide, and it rises to an altitude of 5,440 feet, or about 1,000 feet above the surrounding surface. (See fig. 3.) It is separated from the west front of the Westgate Range, which contains the eastern part of the district, by a valley about a mile wide.

Geology

Chalk Mountain consists mainly of whitish dolomitic limestone which has been arched into an anticlinal fault block along its longitudinal axis and intruded by granodiorite porphyry. The limestone contains the ore deposits. It is medium to thick bedded and is more or less marmarized. It has been faulted, sheeted, and locally intensely folded. Pronounced faults occur along the east front of the mountains, and with them is associated the principal zone of mineralization. Faulting and mineralization have occurred also on the west slope, in a cross zone, or "iron belt," nearly a mile south of the north end, and across the south end. Along the contact the granodiorite porphyry has changed the limestone into dolomitic marble and produced a contact-metamorphic zone, in places several hundred feet wide, containing a score or more of the usual metamorphic minerals and also bodies of ferruginous magnetic greenstone or low-grade iron ore, with which copper minerals are associated. Epidote, a green calcium-aluminum silicate, occurs in large bodies on the west slope of the mountain, and large masses of phlogopite, a light-gray, pearly-lustered magnesium mica, are found at the southeast base. No fossils indicative of its age have yet been found in the limestone of Chalk Mountain, but because of Jurassic fossils found in limestone in the foothills to the south and in the adjacent part of the Westgate Range, and because of the more highly metamorphosed character and dynamically shattered condition of the limestone in Chalk Mountain, it is thought to be probably of Triassic age and to belong to the formation that occurs 12 miles to the north, in the Stillwater Range, and was described by the Fortieth Parallel Survey as the Koipato series.

The granodiorite porphyry, with which the ore deposits are genetically connected, is a medium-grained gray porphyritic rock composed chiefly of soda-lime and alkali feldspars, quartz, biotite, and hornblende.

The limestone and granodiorite porphyry are intruded by dikes of a greenish iron-gray diorite and a whitish aplite, which are presumably complementary to each other and have been differentiated from the granodiorite porphyry magma. In places ore deposits are associated with these dikes.

At the north end of the mountain the limestone and the granodiorite porphyry are mostly covered by rhyolite, a light-colored siliceous volcanic rock. On the northeast slope occur two small areas of a dark-greenish iron-gray andesite, and a small belt of the andesite crosses the south base.

Covering the consolidated rocks on the lower slopes of the mountain is a thin mantle of alluvium or wash, which increases in thickness to at least 150 feet in the surrounding valley.

Ore Deposits

Chalk Mountain

Since the early Comstock days it has been known that ore occurs in Chalk Mountain, but until 1921 there was only sporadic production, occasionally in carload lots, running about 60 per cent of lead and 60 ounces in silver to the ton. Until about 1920 the operators believed that the mountain contained considerable ore but that it was of too low grade to be shipped and that the veins were not persistent. Beginning with the operations of the Chalk Mountain Silver-Lead Mines Co., about 1921, more extensive deposits were found, which stimulated activity and increased production. The property of the company lies about the middle of the lower east slope of the mountain and extends nearly 1½ miles on the zone of mineralization, in which the vein along the main fault fissure dips steeply to the east. The mine is situated toward the south end of the property. (See fig. 2.) By May, 1923, the company had shipped, mostly from development work, 120 tons of $80 ore, comprising about 80 per cent of the ore mined. By 1925 a 5-foot ore body had been developed for 375 feet on the 110-foot level and a new shaft, 600 feet south of the old shaft, showed the ore body to be about 10 feet wide on the 160-foot level, from which the company was shipping daily 12 tons of $100 ore. In July, 1926, a large, rich ore body was opened on the 335-foot level. It alone produced $175,000 worth of ore, some of which ran 70 per cent in lead. In places it was 12 feet wide. The ore was found to continue down to the 500-foot level, where the main vein contained 6 feet of rich ore. By February 1927, the company had shipped 51 cars of ore, which returned $127,400, or an average net value of $60.94 to the ton. About $500,000 worth of $25 mill ore had been blocked out in the mine and about 3,000 tons of $20 ore accumulated on the dump. The ore shipped runs about $90 in gross value to the ton, of which $60 is in lead and $30 in silver. The company can profitably mine and ship ore of $30 grade.

Other operators at Chalk Mountain, mostly on the west side, are the Nevada Chalk Mining Co., the Chalk Mountain West Side Mines Co., the Quartz-Chalk Mountain Mining Co., and the Chalk Mountain Extension Mining Co., each with a group of four to eight claims. The Nevada Chalk Mining Co. has for some time been producing on a small scale.

The deposits are mostly oxidized, and the ore bodies, though a few are tabular, are mostly irregular masses of porous iron-stained material. They occur as veins and replacement deposits along fractures or bedding planes in the limestone. The ore minerals are cerusite, wulfenite, anglesite, argentiferous galena, cerargyrite, plumbojarosite, copper carbonates, and vanadinite. The gangue consists of altered limestone, quartz, calcite, dolomite, chalcedony, jarosite, garnet, epidote, jasperoid, iron oxide, and brown ferruginous material. Iron is present in sufficient quantity to make the ore desirable for smelting.

The ores were deposited as sulphides, principally argentiferous galena, pyrite, molybdenite, and chalcopyrite, by hot solutions that ascended from the granodiorite porphyry magma and circulated through the openings in the limestone. They were deposited soon after consolidation of the granodiorite, probably at depths of about 1,000 feet below the surface, largely in the places they now occupy. Since their deposition they have been partly enriched through the processes of leaching and concentration by descending surface waters.

Additional commercial deposits probably occur in and near Chalk Mountain, associated with the zones of mineralization in the limestone. Most of the veins, especially those of steep dip, probably continue in depth to or below water level, and enrichment probably extends to that depth, which is from 300 to 500 feet in the mines. Below water level, however, the deposits are probably leaner than above, having received less, if any, enrichment from descending surface waters. Owing to irregularity in the occurrence of the deposits, the best guide in prospecting and mining is to follow the signs of mineralization in the limestone, which may range from a broad iron-stained zone to an almost invisible seam. Owing to the prevailing easterly dip of the limestone and of the eastern zone of mineralization, the east side of the mountain seems to be the more promising, as it is more favorably situated for enrichment by concentration, along the bedding planes and fractures, of minerals leached from higher levels.

Westgate Range

About 2 miles east of Chalk Mountain, in the west slope of the Westgate Range, which here is composed chiefly of Jurassic limestone, is a north-south series of active prospects or claim groups, including the Mogul, Huber-Morrell, Watkins, Sawyer, Twin Metals, and Wolff. These prospects extend through a distance of several miles and are mostly at altitudes between 5,000 and 5,500 feet. Some of them have made a small production. The deposits, like those at Chalk Mountain, carry lead and silver and occur in veins and replacement bodies in the limestone, but they are closely associated with intrusive andesite and rhyolite and therefore may belong to the Tertiary period of ore deposition.

Quartz Mountain District (245)

The Quartz Mountain district is in Nye County, 60 miles east-southeast of Fallon, 25 miles south-southeast of Chalk Mountain, and just northwest of Marble and the old Illinois mine. (See fig. 2.) It is about 8 miles long east and west by 5 miles wide. Quartz Mountain and the town and post office of Quartz Mountain are near its center. (See fig. 1.) The population is about 200. A daily auto mail stage is in operation from Fallon.

The district lies in open rolling country. It is drained southward into Gabbs Valley. The dominant topographic and structural features and the ore deposits trend northwestward. The southeastern part of the district is occupied by the western half of the Lodi Hills, which have the form of an isosceles triangle with its apex on the northwest in Quartz Mountain. (See fig. 1.) The groundwater table probably stands at a depth of about 800 feet.

The district is named from Quartz Mountain, a low elliptical hill about half a mile long and 100 feet high, much of whose northern half is strewn with quartz and whitish silicified rock. Ore deposits similar to those it contains were discovered in 1858 at the neighboring Illinois mine, which produced more than $100,000 in lead-silver-gold ore, and in 1905 ore was discovered in the western part of the district, 2 miles west of Quartz Mountain, where the Broken Hills mine has produced more than $210,000 in similar ore.

Ore was discovered at Quartz Mountain in 1920, and by the end of 1925, under the Annette-Walker lease, the discovery property had produced $90,000 worth of ore. Then the property, henceforth known as the San Rafael mine, and many surrounding claims were taken over by several mining companies, including the San Rafael Co., which has since produced and shipped from the mine about $250,000 worth of silver-lead ore running about $40 to the ton and has opened up sufficient ore to continue its present rate of output for a year.

Mining or deep prospecting is also being done on several other properties, including the Quartz Mountain Metals, Hasbrouck, Calico, San Felipe, Exchequer, Standard, Argentum, West Divide, Tripod, Desert, and Iron Mountain. Some of them are opened to depths of 400 feet, and some have made a small production.

Geology

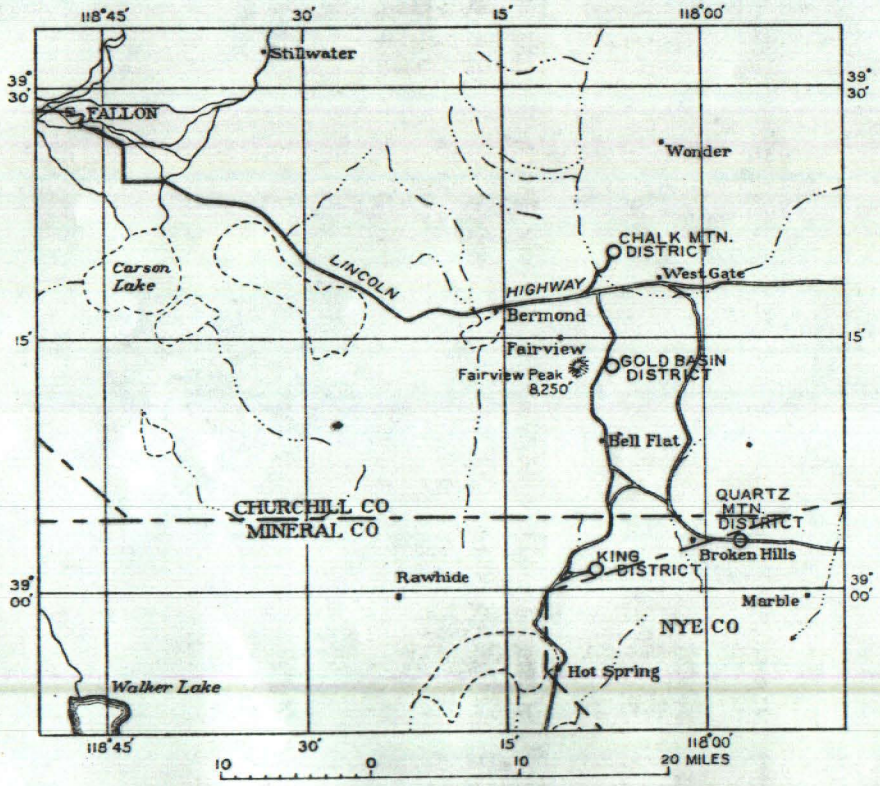
Most of the surface is covered by a mantle of alluvium or wash, 150 feet in maximum thickness, beneath which the consolidated rocks are mostly Tertiary volcanic flows, but the Lodi Hills, in which are nearly all the recently discovered ore deposits, is chiefly Cretaceous or Jurassic granodiorite porphyry or allied intrusive rocks, together with areas and masses of Triassic (?) limestone and greenstone. (See fig. 1.) The assignments to the Mesozoic are based on age determinations of similar rocks in the adjoining Paradise Range, on the southeast, made by H. G. Ferguson and S. H. Cathcart, of the Geological Survey. In the Lodi Hills the limestone is locally underlain by an older series of volcanic greenstones and tuffs of Triassic (?) age.

The most abundant of the granitic rocks is the granodiorite porphyry, which has intruded and metamorphosed the limestone and together with its complementary dikes of diorite, quartz monzonite, and aplite represents the magma from which the ores were derived. It is a dull greenish-gray medium-grained rock and is locally compressed, with most of its minerals considerably altered.

The oldest sedimentary rock is the limestone exposed in the Lodi Hills. These hills consist mainly of a batholith of granodiorite porphyry containing remnants of a huge limestone roof, most of which has been removed by erosion. The limestone is the principal ore repository. It is a medium to thick bedded

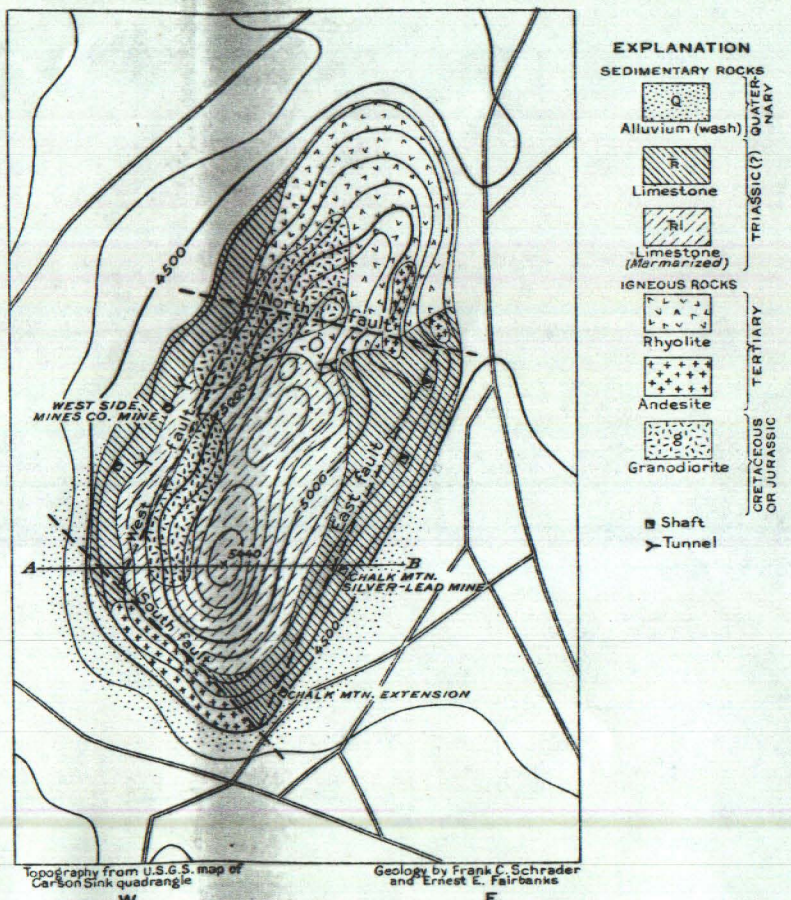
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FIGURE 2



OUTLINE MAP SHOWING LOCATION OF CHALK MOUNTAIN AND QUARTZ MOUNTAIN MINING DISTRICTS, NEVADA

FIGURE 3



EXPLANATION

SEDIMENTARY ROCKS

- Q — Alluvium (wash) — QUATERNARY
- R — Limestone — TRIASSIC(?)
- Ti — Limestone (Marmarized) — TRIASSIC(?)

IGNEOUS ROCKS

- Rhyolite — TERTIARY
- Andesite — TERTIARY
- G — Granodiorite — CRETACEOUS OR JURASSIC

Shaft
Tunnel

GEOLOGIC SKETCH MAP AND SECTION OF CHALK MOUNTAIN, CHURCHILL COUNTY, NEVADA

0 1/2 Mile
Contour interval 100 feet

FIGURE 4

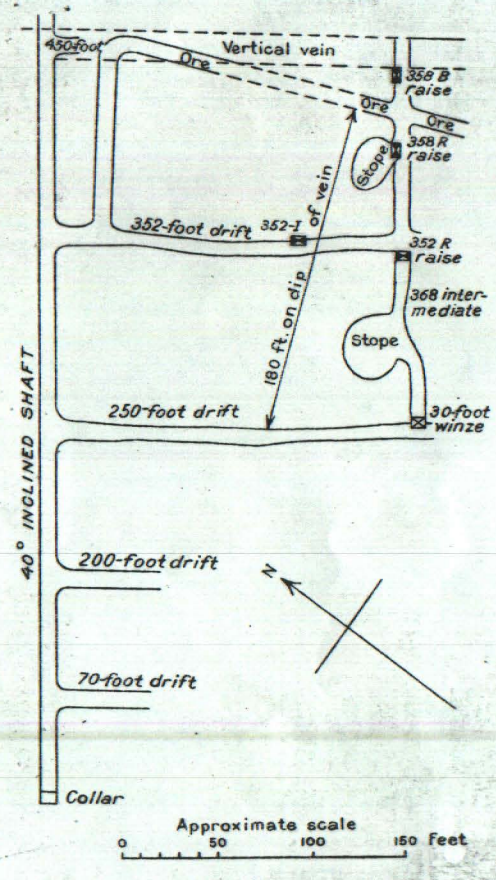


DIAGRAM OF THE PRINCIPAL WORKINGS ON THE LEASE VEIN IN THE SAN RAFAEL MINE, QUARTZ MOUNTAIN, NEVADA


ALKALI FLAT
STILLWATER
NATIONAL
WILDLIFE REFUGE
Cattle camp
Corral
NW-28
NW-33-5
JOB PEAK
TABLE MOUNTAIN
MT LINCOLN
DIXIE VALLEY
Ranch
Ranch (ruins)
NW-33-1
NW-28-4
PIROUETTE MTN
ROUND MTN
Wonder (ruins)
TWIN PEAKS
U S NAVAL
ELECTRONIC WARFARE
TRAINING AREA
NW-33-4
CHALK MOUNTAIN
NW-33-7
NW-33-3
FOURMILE FLAT
Frenchman
Alkali flat
Targets
U S NAVAL
TARGET AREA
BAKER 17
TARGET
AREA
FAIRVIEW PEAK
NW-33-6
Hunter sheep camp
FAIRVIEW VALLEY