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UNITED STATES
DEPARTMENT OF THE INTERIOR

HAROLD L. ICKES Secretary
GEOLOGICAL SURVEY
W. C. MENDENHALL, Director

CIRCULAR 10

THE McCOY MINING DISTRICT
AND
GOLD VEINS IN HORSE CANYON
LANDER COUNTY, NEVADA

Papers by

F. C. SCHRADER 1860-
Schrader

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Figure 1. View of McCoy District, showing mines, Fish Creek
Mountains, and topography, from Limestone Ridge
Looking N. 30° W.

2. Sketch map of the Gold Reef group in Horse Canyon

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The McCoy mining district, Lander County, Nevada

By F. C. Schrader

Introduction

The following geologic sketch is based on a two-day visit made to the McCoy district in September, 1930. For valuable information and aid generously extended, the writer would express his thanks to the miners and prospectors of the district and especially to Mr. Joseph H. McCoy, a well-known mining man of Nevada and discoverer and founder of the district.

Location and topography

The McCoy district is in Lander County, 30 miles S. 35° W. of Battle Mountain, on the west side of the Reese River Valley, and is easy of access by automobile either from Battle Mountain or from the Nevada Central Railroad, about 8 miles to the west. It is approximately in latitude 40°15' N. and longitude 117°15' W., on the east flank of the northern part of the Fish Creek Mountains. At McCoy the range is about 5 miles wide, and the district lies between altitudes of about 5,200 and 5,600 feet, or only a few hundred feet above the Reese River Valley. The topography is mostly rolling, with rounded hills and gentle slopes (fig. 1).

The mines and prospects, about 20 in number, nearly all lie within a north-south belt about 1-1/2 miles long by a mile wide, mostly in the western part of sec. 2, T. 28 N., R. 42 E. Mount Diablo meridian. The relative position of the principal properties is indicated in figure 1.

At the time of the writer's visit (September 1930) there was considerable activity which had started in 1928, and there were said to be 70 people in the camp. The Gold Dome property was being worked by lessees who had pay ore, and several discoveries had just been made.

The district is supplied with water piped by gravity from McCoy Springs, about 2 miles south of McCoy up Gilman Canyon.

Geology

Sedimentary rocks (Triassic?)

Much of the rock in the vicinity of the mines is limestone, with locally some quartzite and a little shale. The sedimentary rocks are intricately intruded by diorite. Both sedimentary and igneous rocks have been so intensely altered and replaced by lime silicates that it is difficult to distinguish one from the other, a fact which has led to the local misconception that the district is underlain by diorite with only a little limestone here and there.

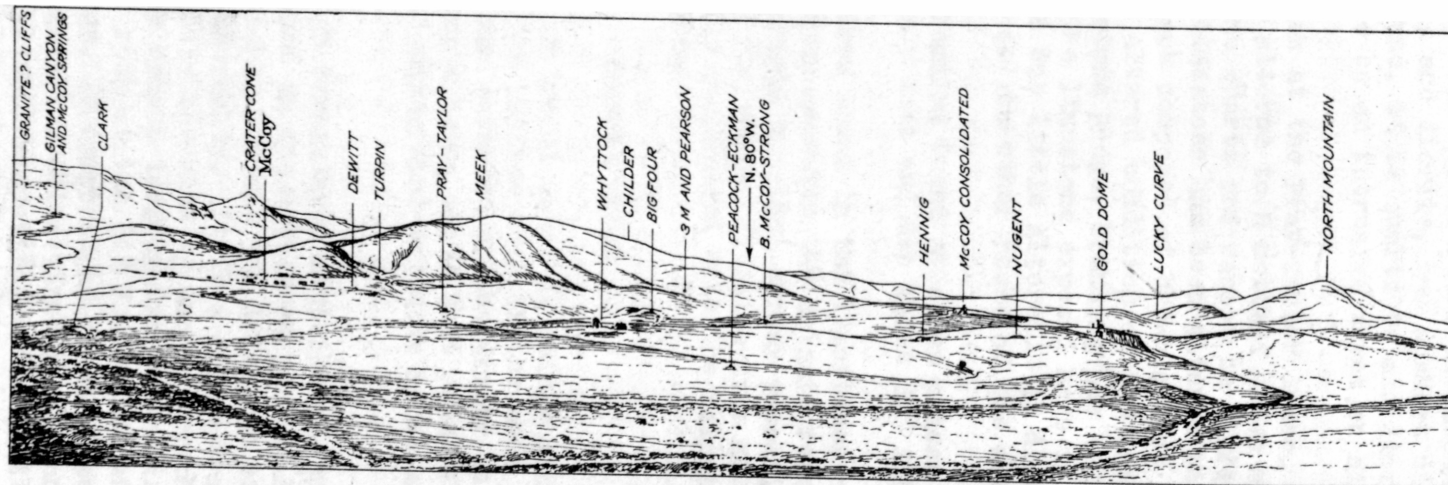


Figure 1.— View of McCoy district, showing mines, Fish Creek Mountains, and topography, from Limestone Ridge, looking N. 80° W.

In the ridge on the Pay Day claim group, in the southwestern part of the district, the succession of rocks in descending order seems to be quartzite, limestone, and diorite, but a short distance to the southeast, on the Meek ground, it is quartzite and diorite. The diorite on the Meek ground seems to be an intrusive sheet or sill.

In some places, as at the Pray-Taylor lease, the limestone and diorite have both been altered to a mottled green massive rock composed chiefly of epidote and quartz and cannot be differentiated macroscopically; elsewhere the limestone has been altered to a banded brownish and pale yellowish-green rock composed of brown garnet and nontronite. An exception to the highly altered condition of the limestone occurs in the southward-sloping Limestone Ridge, bounding the southern part of the mining area on the east. The limestone exposed here is bluish gray, medium to thick bedded, and but little altered. It dips about 30° S., at about the same attitude as the other rocks of the area.

From indistinct bedding found at a few places the rocks in general seem to strike nearly east and dip about 30° SSE.

No fossils have been found in the limestones of the McCoy district. Lithologically they resemble the Koipato formation, of Triassic age, which the Fortieth Parallel Survey recognized at Storm Canyon, on the west base of the range, 12 miles from McCoy. For this reason they are provisionally correlated with the Koipato and hence regarded as probably Triassic.

Igneous rocks

The igneous rock of the district is mainly diorite. Although rhyolite is represented as the surface rock of the area on the Fortieth Parallel Surveys map, none was observed by the writer in or near the district. However, microscopic study shows that some of the altered rock is a latitic tuff, indicating that effusive rocks are locally present.

The diorite, though irregularly distributed, probably underlies about half of the surface in the developed part of the district, where it has intruded and highly altered the limestone and in turn is itself highly altered hydrothermally. It is a greenish-gray medium-grained granitoid rock slightly speckled by darker ferromagnesian minerals. It weathers rusty brown, largely from disseminated pyrite. A specimen from the country rock at the Big Four mine, which is a little less altered than the average, is composed of about 75 percent oligoclase-andesine, 15 percent greenish chloritized hornblende, and 10 percent quartz with accessory titanite, apatite, and magnetite. The plagioclase tends to form stout prisms about 0.5 millimeter in average length. The hornblende is much broken up and altered. The quartz is interstitial.

Ore deposits

General character

Most of the deposits of the McCoy district are gold lodes containing insufficient silver to be of economic consequence. In the southwestern part of the district the Iron Ore or Pay Day lode also contains bodies of iron ore in the form of magnetite with some copper.

Most of the lodes have a northerly strike, about parallel with the axis of the range and nearly at right angles to the prevailing strike of the country rocks. As a rule they dip steeply.

The deposits are of two types -- replacement deposits and contact-metamorphic deposits -- but the latter form only a subordinate part of the whole.

The workings in the district are still in the oxidized zone, even on the 250-foot level, the bottom of the Gold Dome mine, which was the deepest opening in the district at the time of visit.

Replacement deposits

In nearly all the deposits in the district the ores have been formed chiefly by replacement along faults or fracture and shear zones in the diorite and limestone. In places they are irregular lodes ranging from 1 foot to 50 feet in width, in which the ore, especially the rich ore, is sporadically distributed. There are no veins or fissures except in the narrow fractures that served as feeders for the replacement process.

The deposits contain mostly ore of mill grade, running from \$10 to \$25 to the ton in gold, which is relatively free and is easily cyanided.

The metallic minerals include native gold and silver, cerargyrite, malachite, azurite, cerusite, pyrite, chalcopyrite, and possibly some galena. Pyrite is only sparingly disseminated, an exception being in the Gold Dome mine, where, close to the lode just below the 100-foot level, a residual lump of pyrite weighing about 100 pounds was found. This is said to have averaged 130 ounces of silver and \$12 in gold to the ton.

The gangue is principally a mixture of two or more of the minerals or silicates quartz, hematite, limonite, nontronite, epidote, garnet, jasper, opal, calcite, pyrite, kaolin, talc(?), and magnetite(?).

The so-called "jasperoid ore," noted chiefly in the Big Four mine, consists mainly of a gangue of brown jasperoid containing more or less dark hematite and a lesser amount of yellowish-greenish nontronite, all replacing altered diorite. The hematite and nontronite tend to occur in irregular alternating streaks as much as half an inch in width. The gold, which in some specimens is present to the value of \$40 a ton, probably came in with the quartz and pyrite and now is about all associated with the hematite.

In other deposits much of the so-called "quartz" is hydrous silica which has given rise to several peculiar kinds of ore or gangue. Among these is the "opalite" ore composed largely of yellowish, greenish, and reddish compact opal of vitreous luster, with which is associated more or less light-colored kaolin. Examples of this opalite ore on the Peacock-Eckman lease are said to be gold-silver ore of good grade.

Another variety of the gangue consists of light-gray to nearly white, very finely porous, honeycombed opal very similar in appearance to siliceous sinter. The mass has a specific gravity but little greater than that of water. A considerable quantity of ore of this class on the 100-foot level of the Gold Dome mine is said to run about \$100 in gold to the ton. The walls of druses in this sintery ore are studded with a little quartz, in part in the form of small columnar crystals with pyramidal terminations.

Elsewhere, as in the Gold Dome and other mines, the gangue is merely a siliceous soft mass of partly altered and replaced diorite. On the M and M lease the deposit consists of whitish crushed and altered limestone and diorite and is said to carry only a little gold.

Contact-metamorphic deposits

The only contact-metamorphic deposits observed in the district are the Iron Ore lode and its associated showings, in the southwestern part. The lode strikes about northwest, in general on the contact of the intrusive diorite on the east and limestone on the west, and dips steeply southwest into the hill. It has a reported length of about 2,500 feet, in places is 150 feet wide, and has been opened at several points by the Meek, Turpin, and other leases to depths of about 70 feet. Its principal metal is iron in the form of magnetite, accompanied by a lesser amount of hematite and showings of copper. It is said to have also a fair tenor in gold and silver.

The magnetite seems to have replaced limestone and diorite. It mostly contains more than 70 percent of iron, but it is not known to occur in commercial quantity. In polished section it is shown to be dotted with numerous minute platy inclusions thought to be hematite.

The typical limestone silicate rock produced in this metamorphic or garnet zone, as seen in the 75-foot Turpin shaft, is a brown rock composed of garnet and nontronite and containing also a few veinlets of quartz. The garnet and nontronite are present in the ratio of about 2 to 1. They are more or less interbanded, and veinlets of nontronite traversing considerable bodies of the garnet seem to indicate that the garnet is the earlier of the two. The garnet is the calcium-iron variety andradite.

In the Iron Ore lode and associated deposits the gold-ore gangue -- as shown, for instance, in the shaft on the limestone-diorite contact on the Meek lease -- consists of dark bluish-gray quartz, much magnetite, garnet, a little hematite, malachite, and a little chalcopyrite.

In the Exploration shaft, 400 feet north of the Meek shaft, the deposit consists chiefly of compact magnetite and a subordinate amount of specular hematite and shows incipient alteration of the magnetite to hematite. Much copper carbonate is also present, and the magnetite is stained greenish with malachite along seams and fractures.

The contact-metamorphic deposits here described are believed to be of the same origin and age as the replacement deposits, except that they were formed more immediately along the contact of the diorite intrusive into the limestone.

Outlook

Most of the deposits now being mined, especially those which are porous and contain free gold, seem to be enriched by gold from portions of the lodes that formerly stood at higher levels than the present surface. This fold, as the croppings and rock were broken down and removed by erosion, became concentrated by meteoric waters in the deposits as we now find them. Therefore the deposits as they descend into the sulphide zone, where they have not been thus enriched, will be found to be leaner.

Although most of the principal lodes doubtless contain workable ore bodies in places, it does not seem likely that workable deposits on many of the individual leases extend to any considerable depth below the oxidized zone.

Mines and prospects

Gold Dome mine

Location and topography.-- The Gold Dome mine, owned by the Gold Dome Mining Co., of Los Angeles, is in the eastern part of the district, on the Mountain Chief claim, on a southwestward-sloping ridge at an altitude of about 5,450 feet, and is easy of access (fig. 1).

History and production.-- The first mineral location in the district was made in 1914 by Joseph H. McCoy, who discovered lode gold on the ground now known as the Iron King, from which and adjoining ground, including the Gold Dome mine, with only hand labor available, in 1915, a few cars of ore was mined and shipped. Placer mining on a small scale was also done.

In 1928 McCoy sold his group of 11 claims to H. W. Boyer, of Los Angeles, who with W. D. Brown organized the Nevada Gold Dome Mining Co. After Brown died the company leased the property to McCoy, who sub-leased portions of it in blocks, worked the Gold Dome mine up to October 1930, made several shipments of gold ore, and found an ore body on the 250-foot level. Including the work of lessees the camp had developed several hundred tons of high-grade \$20 mill ore besides considerable shipping ore that was sent to the smelters.

In the fall of 1929 the Gold Dome mine shipped to the American Smelting & Refining Co. at Garfield, Utah, 350 tons of \$40 ore. Most of the high-grade ore of the camp, however, was shipped to the Selby smelter at San Francisco. The total production by September 1930 was about 500 tons of ore that averaged more than \$40 in gold to the ton.

Development and equipment.— The mine is opened to the depth of 250 feet by a vertical shaft with levels spaced 50 feet apart and contains about 200 feet of drifts on each of the five levels. The levels trend northwest, and most of the development is on the northwest side of the shaft. The mine is dry.

The surface equipment comprises a gasoline hoist with a well-housed engine and a 25-ton custom cyanide mill run as an experimental plant to determine the process best suited for treating the ore. Grinding was done by a Huntington mill in which the gold is collected by amalgamation on plates. The experiments thus far made, together with the fact that much of the gold contained in the ore is free, indicated cyanidation as the process best adapted for treating the ore. In December 1930 it was reported that the McCoy Consolidated Mines Co. had taken over the mill and would continue to treat ore from the leases as well as from the mines.

Geology.— The country rock is chiefly soft altered diorite. The mine is probably on or near the contact of the diorite and limestone, but this point was not determined in the present work.

The deposits are chiefly replacement deposits in the diorite, and much of the gold is free. Most of the ore is of the finely porous or honeycombed opal sintery type.

The mine is on the junction or intersection of two ore zones -- the Clark lode, which strikes north-northeast, and another lode which strikes about northwest across the Mountain Chief No. 2 claim and which, because the deposits in the mine are a part of it, is here called the Gold Dome lode.

The large size and high tenor of the ore body is probably due to its situation at the junction of the two lodes, where the rocks were more extensively fractured than elsewhere and where consequently the circulation of the hypogene solutions that originally deposited the ore and the meteoric waters that later concentrated it was facilitated.

As seen in the mine the lode has a maximum width of 25 feet. Although here, as elsewhere in the district, the deposits crop out at the surface, the best showings were found between the 50-foot and 150-foot levels. On the 50-foot level the ore body for a width of 18 feet is said to have averaged \$19 in gold to the ton. At the time of visit it had just been opened on the 100-foot level and showed a width of more than 20 feet, of which a considerable portion is of the sintery opal type, and was said to run nearly \$100 in gold to the ton.

Below the 150-foot level the ore body became irregular and barren and was lost. It was recovered on the 200-foot level, however, and is continuous from there to the 250-foot level, the bottom of the mine. In September 1930 the mine was said to have developed about 300 tons of ore that would average about \$20 to the ton. In March 1931 it was reported that a new ore body 30 feet wide had been found on the 250-foot level and that it was believed to extend to the surface as well as to greater depth. 1/

Big Four mine

At the Big Four mine the "fissures" or "veins" are of moderate width and stand about vertical. They are in the diorite near the intrusive monzonite and are opened by shaft and tunnel or adit drift. They contain both jasper ore and "opalite" ore, of which some very rich specimens were found near the surface in a 5-inch streak. A shipment of about 60 tons of the ore is said to have averaged about \$61 to the ton or amounted to \$3,660, all of which, except 14 ounces in silver, was in gold. In September 1930, 300 sacks had been filled with \$40 ore from a 5-foot "vein."

McCoy Consolidated mine

The McCoy Consolidated mine, owned by the McCoy Consolidated Mines Co., is about 600 feet northwest of the Gold Dome mine, on the Mountain Chief No. 2 claim (fig. 1). The company was organized in 1929 by Mr. Caldwell, Capt. Charles Krengle, and others. The shaft is said to have a depth of 150 feet and was sunk by the company in 1929 and 1930. It is on a lode which strikes about N. 20° W. and is probably a south branch of the Gold Dome lode. It is said to contain good jasperoid and opalite ore.

McCoy-Strong lease

In the Bart McCoy-Strong lease, southwest of the Gold Dome mine, which contains very rich stringers in a wide mineralized zone, the lode strikes N. 30° E. and dips 80° W. in altered diorite. The ore extends from the surface to the bottom of the 40-foot shaft. In September 1930 the lessees had sacked 6 tons of ore assaying \$395, or about \$66 to the ton.

1/ Nevada Min. Press, Mar. 20, 1931.

Dewitt lease

On the Ben Dewitt lease, which is opened by a 50-foot inclined shaft just southeast of McCoy, the deposit carries gold in lead carbonate (?). It also contains pyrite stained with iron and manganese and seamed with gypsum, but the pyrite seems to be barren. The lode dips about 60° NW. and strikes northeast, continuing in that direction through the Pray-Taylor lease.

Three M lease

On the Three M lease the deposits are opened by a 70-foot shaft having 100 feet of lateral work. This work was done to prospect beneath a gossan outcrop in the edge of the wash, in dense quartzite or silicified limestone dipping south-southeast. The dump at the time of visit contained an 8-inch lump of iron pyrite, some copper carbonate stain, and a little chalcopyrite, but the workings showed no ore nor lead.

Childer prospect

Up in the hills west of the iron-ore lode Childer Bros. are said to have an encouraging lead-silver prospect in limestone opened by a 50-foot shaft. The silver is said to occur in lead carbonate.

Other prospects

The Peacock-Eckman lease, south-southeast of the Gold Dome mine, in sinking 30 feet on an ore body 8 feet wide had sorted out 25 tons of ore that assayed \$61 to the ton and had stored a greater tonnage running about \$20 to the ton.

On the Caldwell-Brown lease, 300 feet west of the Gold Dome mine, prospecting along an east-west fracture had opened up a leached zone 30 feet wide containing stringers and bunches of high-grade ore and at the depth of 35 feet seemed to be entering an ore body.

Gold veins in Horse Canyon, Lander County, Nevada

By F. C. Schrader

Introduction

Horse Canyon, formerly called Mill Creek,^{1/} is on the west slope of the Shoshone or Lewis Range, in north-central Nevada. It is reached from the Southern Pacific Railroad at Battle Mountain by a road 20 miles long and is a few miles east of Baileys, in Reese River Valley, on the Nevada Central Railroad. Horse Canyon trends nearly west, and the prospects are about 2 miles above its mouth, near the center of T. 29 N., R. 45 E., Mount Diablo base and meridian. Here the canyon is about 1,000 feet deep and is steepest on its south side. It is traversed by a small perennial stream of good water.

The Gold Reef prospects, in Horse Canyon, were inspected during a 3-hour visit September 24, 1930, made because of the reported discovery of rich gold ore. Thanks are due to Messrs. Joe Adler and George Feldman, operators, for aid and information.

General geology

The principal rocks composing this part of the Shoshone Range are quartzite and other sedimentary rocks which on lithologic grounds are thought to be mainly Carboniferous.^{2/} In Horse Canyon near the Gold Reef mine the sedimentary rock is medium to thick bedded bluish-gray quartzite (Weber?). The beds dip 30° SE. and are cut by irregular masses of andesite and a later porphyry dike.

Two of the andesitic dikes are shown in figure 2. Similar rock is exposed in the tunnel near the center of Gold Reef claim 4. The dikes on the surface trend northeast, but that in the tunnel appears to occupy the same fissure as the monzonite porphyry dike described below, which trends somewhat west of north. All the dikes appear to be steeply inclined.

Figure 2. A sketch map of the Gold Reef group in Horse Canyon.

^{1/} U. S. Geol. Expl. 40th Par. map 5, east half.

^{2/} Emmons, W. H., A reconnaissance of some mining camps in Elko, Lander, and Eureka Counties, Nevada: U. S. Geol. Survey Bull. 408, p. 114, 1910.

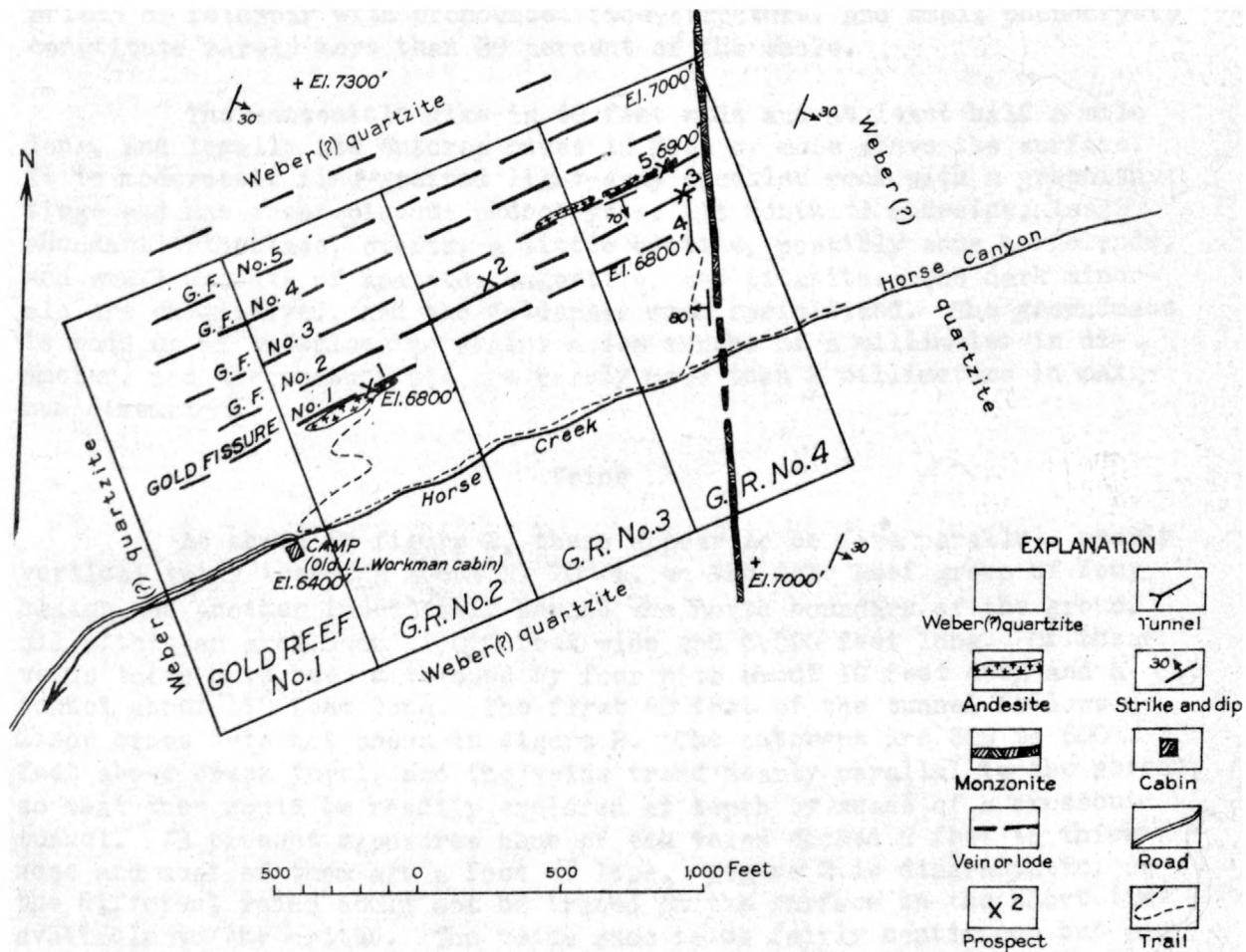


Figure 2.—Sketch map of the Gold Reef group in Horse Canyon, Lander County, Nevada.

The andesite is a dense greenish-gray rock composed of andesine, green hornblende, subordinate biotite, and possibly some potash feldspar. The ferromagnesian minerals are much chloritized and are locally so greatly altered that their original character is indeterminate. The feldspar is somewhat sericitized. There is considerable disseminated magnetite and locally pyrite. The groundmass is made up mainly of small laths and prisms of feldspar with pronounced flow structure, and small phenocrysts constitute rarely more than 20 percent of the whole.

The monzonitic dike is 40 feet wide and at least half a mile long, and locally its outcrop rises 10 feet or more above the surface. It is moderately fine-grained light-gray speckled rock with a greenish tinge and has inconspicuous phenocrysts. It contains andesine, less abundant orthoclase, quartz, a little biotite, possibly some hornblende, and small amounts of apatite, magnetite, and titanite. The dark minerals are chloritized, and the feldspars much sericitized. The groundmass is made up of interlocking grains a few tenths of a millimeter in diameter, and the phenocrysts are rarely more than 2 millimeters in maximum dimension.

Veins

As shown in figure 2, there appear to be five parallel, nearly vertical veins trending about N. 70° E. on the Gold Reef group of four claims and another immediately beyond the north boundary of the group, all within an area about 1,000 feet wide and 3,000 feet long. Of these veins three have been developed by four pits about 10 feet deep and a tunnel about 120 feet long. The first 60 feet of the tunnel follows a minor cross vein not shown in figure 2. The outcrops are 300 to 600 feet above creek level, and the veins trend nearly parallel to the stream, so that they could be readily explored at depth by means of a crosscut tunnel. In present exposures none of the veins exceed 2 feet in thickness and most of them are a foot or less. Figure 2 is diagrammatic, as the different veins could not be traced on the surface in the short time available to the writer. The veins seem to be fairly continuous but are narrow and tight and in places contract to mere seams. Most of the sulphide ore so far found is close to the west side of the monzonitic dike.

The lode matter is rudely and indistinctly banded, somewhat drusy quartz with some ankerite or similar carbonate and in most places sparsely disseminated sulphides. Pyrite, pyrrhotite, and chalcopyrite are the principal sulphides, and a little argentite and galena appear to be present locally. Hematite, limonite, and malachite are present in the oxidized ore, which extends only 10 to 20 feet below the surface. In places panning of the oxidized ore yields considerable amounts of deep-yellow gold in fine particles, and it is thought that some of that in the sulphide ore is also in the native state. The reported value of the ore in different exposures ranges from \$40 to \$77 a ton in gold (reckoned at \$20.67 an ounce). Some of the ore is reported to contain as much as 22 ounces of silver to the ton. The content of other metals is negligible.

Locally there has been some replacement of quartzite and andesite by vein quartz and dissemination of pyrite in the wall rocks, but most of the quartz fills fissures. The chlorite in the andesite and especially the abundant sericite in the monzonite probably resulted from hydrothermal alteration related to the ore deposition.

About 60 feet from the portal the tunnel on Gold Reef claim 4 intersects a vein 6 inches to 1-1/2 feet thick which, as shown in figure 2, corresponds in position to Gold Fissure vein 1. The ore here differs from that in all other exposures seen except that in the more northerly of the two pits on shafts on the same claim. In this part of the tunnel the ore consists largely of sulphide with some carbonate resembling ankerite, shot through with irregular parallel stringers of quartz 8 millimeters in maximum thickness. This ore, thought to be a result of the replacement of quartzite and andesite, is reported to average \$77 a ton in gold, the richest so far exposed.

M. N. Short, of the United States Geological Survey, who examined specimens from the tunnel in polished section, reports that pyrrhotite is the most abundant mineral and is intergrown with chalcopyrite in smooth boundaries which give no evidence of replacement of either mineral by the other. In the pyrrhotite masses there are small rounded masses of pyrite, each of which shows concentric banding. The gangue minerals are quartz and carbonate. The carbonate does not effervesce in cold dilute hydrochloric acid and is probably ankerite or dolomite. The quartz is earlier than the sulphides. The carbonate is later than the quartz, but its relation to the sulphides is obscure.

Conclusions

Although the area containing the deposits is fairly large, the veins are narrow and so widely spaced that each would have to be stoped separately. Both the character of the hypogene mineralization and the fact that each of the veins appears to be continuous for a considerable distance on the surface suggest that they are persistent in depth. The ore exposed up to the time of visit had all been affected by oxidation to a greater or less extent and may well have had some enrichment, both by removal of soluble components and by redistribution of gold by supergene solutions. The fact that the deepest and least oxidized ore found is also reported to be the richest is a favorable indication. Future development depends on whether or not the sulphide ore below the influence of oxidation is of sufficiently high average tenor to be profitably extracted from veins less than 2 feet thick.

