CARSON SINK AREA, NEVADA

By

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Holy Cross (Terrell) District (7)

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The present report is based mainly on a 1½ day examination of the district made by the writer in August 1913, in which, for aid generously extended, thanks are due members of the several mining companies especially Geo. Pollinger.

Location and topography

The Holy Cross district, perhaps better known as the Terrell district, is 28 miles south of Fallon and 14 miles northeast of Shurz, the nearest railroad station on the Hazen-Goldfield Branch of the S. P. Railway, from both of which it is reached by a good road. It is in the southwestern part of Churchill County and the adjacent border of Lyon and Mineral counties and is on the Carson Sink topographic sheet of the U.S.G.S., Fig. 3. It is mainly in the northeast slope of the southern part of the Dessert Mountains with Terrell the camp located on the gently sloping wash or valley fill at the foot at an elevation of about 4,200 feet, above which the mountains have a ~~maximum~~ maximum relief of about 2,400 feet, Fig. 3 (Topo map), and Fig. 100 (Photo). Though the topography is semi-rugged as is characteristic of eroded Tertiary volcanic rocks, the deposits are not ~~difficult~~ difficult of access.

The deposits are nearly all contained in an east-west rectangular area 2 miles long by one mile wide with Terrell located in the northeast part. The area is drained northeastward into Terrell valley which has no outlet. The climate is very dry, the annual rainfall being only about 5 inches, but good water occurs at depths of about 90 feet in several mines in the front part of the range.

History and production

Mineral in the district was first discovered in 1910 by J. V. (Judd) Terrell and George Pollinger on the Silver Star claim. They were soon joined and financially aided by Craig Catterson of Oregon and the trio sunk a shaft 107 feet deep and crosscut

the vein with encouraging results. They finally acquired a group of 24 claims which they bonded, in July 1911, to George Wingfield. This group contains most of the mines and prospects described in the present report and they nearly all had been discovered by 1913.

In 1912 the district was quite active, the Loma Mining Co. in driving a 160-foot tunnel had struck a 1-foot wide vein of mostly galena, and when visited by the writer in August 1913, the camp had 30 cabins and tents and the July shipment was said to have been 10 tons of ore averaging $68 to the ton. The cost of ore haulage to Shurz was $4 per ton. In 1914 the Minerva Mining Co. of Minneapolis, Minn., working a small force on its group of 3 claims, exposed a small vein of rich copper-silver-lead-gold ore, and considerable nickel was reported to have been found in some of the ore by Francis McDonough and associates who were working an 8-foot vein. In 1915 the Scotia mine was reported to be active. In 1918 several tons of manganese ore were mined and shipped by the Bullion Company.[1] In 1919 there was moderate

1/ Pardee, J. T., U.S.G.S. Bull. 710, pt. I, p. 233.

activity. In 1920 the Minerva Company, with a shaft 95 feet deep, mined and made a shipment of copper ore containing silver,[2] and in 1921 a small shipment of

2/ U.S.M. Res. 1920, Pt. I, p. 328.

siliceous gold-silver ore was made from the Last Hope mine[3].

3/ U.S.M. Res. 1921, Pt. I, p. 379.

The total production of the district seems to have been about 150 tons of mostly high-grade ore having a value of $9,000. Complete records, however, are not available. The principal ore shipments to 1913, as given by the several mining companies appears in the following table.

Mine	Tons	Value
Silver Star	11.0	$ 920.00
Last Hope	5.5	1,124.00
Last Hope No. 1	6.2	543.00
Last Hope No. 3	00.5	78.00
Black Butte	1.5	150.00
Poorman	2.8	172.00
Jump	11.0	1,958.00

Statements on the production from 1913-1927 appear in the U. S. M. Res. reports for instance in 1916, "The Silver Star, Pyramid, Fraction, and four other properties produced an output valued at $1,522 in gold, silver, copper, and lead, but in most cases the quantity or value of the ore is not given. The Silver Star mine and the Last Hope mine seem to have been the most steady producers.

Development and equipment

Several of the mines or properties are equipped with gasoline hoists or air compressor drills and engines and most of them are opened to depths of 80 to 100 feet. The occurrence of water at depths of 90-100 feet in the front part of the mountains seems to explain why more of the workings have not been sunk much below the 100-foot level. In 1915 there was talk of putting in a mill to treat ore that is too low grade to be profitably shipped.

Geology

The geology at Terrell and vicinity consists mostly of Tertiary volcanic rocks, rhyolites, and andesites, and related types and phases disposed in flows that are more or less heavy.

Proceeding from the foot of the range southerly and ascending in the geologic column the succession of the principal rock formations, broadly speaking, is as follows:

(1) gray andesite (spec. 446)

(2) white rhyolite (spec. 439)

(3) lavender rhyolite (spec. 440)

These formations each occupy a northwest-southeast belt of variable width trending almost parallel with the front of the range and are each at least several hundred feet and probably much more in thickness. The most abundant is the white rhyolite and the next abundant the lavender rhyolite. The andesite is equally important, however, from standpoint of deposits that occur in it. From its frontal position and to differentiate it from other andesite rocks it is here ~~indx~~ referred to as the front andesite. It is also locally known as the water-shaft rock or andesite from the fact that the so-called water shaft or mine is sunk in it. It is a darkish gray submedium hornblende biotite andesite porphyry speckled with lighter dull feldspar phenocrysts and abundant smaller forms including those of hornblende and biotite. About 70 percent of it is composed of microcrystalline nearly felsitic base with flow structure in which rest the larger forms which are mostly prismatic. The feldspar is mostly olig-andesine but ranges to and-lab. The green hornblende occurs in long prismatic forms the brown biotite in short broad foils. Some of it is altered to greenish chlorite; augite and magnetite are also present.

On the northeast the andesite passes beneath the wash or valley fill while on the southwest it is unconformably overlain by the white rhyolite next described as exposed at a point a few hundred feet southerly from the Water Shaft mine. In the deeply eroded main or camp gulch it is exposed extending up the gulch for a mile or more from camp and the mouth of the gulch. At about a third of a mile up from the mouth (of the gulch) it exhibits a fairly well developed vertical columnar structure, several of the columns having castle-like and some pinnacle-like terminations.

White rhyolite

Next above and back of the front andesite the white rhyolite occupies about 1/3 of the width of the northeast slope of the range extending from a point 1 mile or more southeast of Terrell to an equal distance to the northwest of it.

It is a whitish or light-gray rock with a pale greenish tinge. It has a lithoidal texture and is a tuffaceous rhyolite standing near trachyte (spec, 439 and 444). About 80 percent of the rock consists of a crypto-crystalline to glassy base. In places where the rock has been hydrothermally altered it is profusely speckled with small rust brown cavities from which disseminated fine-grained pyrite has been dissolved out. Besides orthoclase and quartz some oligoclase and a little biotite and hornblende are present.

Lavender rhyolite

The next abundant rock is a lavender or reddish fine-grained rhyolite (spec. 440), which forms the upper one-third of the northeast slope of the range and is co-extensive with the light rhyolite which, in places at least, it unconformably overlies. It is a lavender-colored sub-medium grained massive tuffaceous rhyolitic rock containing stout prismatic feldspars ranging up to about 2/10 of an inch maximum dimension and numerous small microscopic forms of quartz and biotite.

Besides the three formations afore-described, there is also present occurring as flow bands or sills well up in the range and locally as the cap rock, a dark, medium-grained rhyolite (spec. 441) that weathers with a greenish tinge.

Deposits

The deposits are mostly silver and gold-bearing small veins that occur in the Tertiary volcanic rocks mainly in the front andesite near its contact with the white rhyolite. Some of the veins, however, carry also lead, copper and zinc, and a few are reported to contain also nickel. Some of the veins, as at the Nova Scotia mine, are decidely manganiferous.

The veins are composed mainly of faulted and crushed mineralized andesite containing or heavily stained dark brown or blackish with iron and manganese oxides. They are generally calcareous and with little or no quartz. In places associated with the veins are mineral-bearing stringers. Both veins and stringers carry the best values and ore more extensive where they lie out in the andesite a short distance from the rhyolite contact and parallel with it. Here they generally extend for long distances.

The veins do not prominently outcrop. The larger veins occur in the andesite and lie about parallel with the andesite-rhyolite contact, but they are not so rich as the stringers in the rhyolite which are obliquely, at angles 20° to 30° to the contact. Some stringer zones are as much as 200 feet wide and 1,000 feet long.

Mineralogy

The ore minerals are mainly cerargyrite, gold, argeritite, galena, chalcopyrite, and pyrite, malachite, gran. and manganese oxides. The galena seems to be argentiferous.

Source of the deposits

The deposits seem to be of hypogene origin and to have been formed by magmatic hydrothermal solutions whose circulation through the issues and fractures followed eruptions of one or more of the Tertiary volcanic rocks especially the white rhyolite. They were originally deposited as sulphides, the primary ore minerals being mainly pyrite, argentite, galena, chalcopyrite, and rhodochrosite ?. The pyrite was auriferous and some of it cupriferous, the argentite auriferous, the galena argentiferous, the chalcopyrite auriferous, the rhodochrosite argentiferous. From most of these minerals as they through the agency of erosion were exposed to oxidation the present ore minerals—gold, cerargyrite, copper carbonates, oxides of iron and manganese were derived and through the processes of leaching, redeposition, and replacement and secondary enrichment were concentrated to the present ores.

Outlook

The outlook of the district depends on conditions that would favor the working of small shoots of good-grade silver-gold ore such as have been mined and of which there seems to be a considerable reserve. Below ground-water level in the sulphide zone the deposits will be found to be leaner and some of the veins too small to be profitably mined to any great depth.

Mines and prospects

The district contains about 20 small mines and prospects the most of which are named in the following list and a few of which are described.

Mines and prospects in the Holy Cross (Terrell) district:

Name of mine:

Water Shaft	Cripple Queen
Scotia	Black Butte
Milton	Anchor
Lost Hope	Pyramid
Lost Hope 1	Minerva
Lost Hope 3	Silver Star
Terrell	Poorman
Wingfield	Bullion
Darr	Loma
Jump	

Water Shaft mine

The Water Shaft mine is about 400 feet west-southwest of Terrell on the Silver Star claim at an elevation of about 4,400 feet. The vein strikes about N. 80° E. in the front andesite at about 200 feet northeast of its contact with the overlying white rhyolite, and stands about vertical, has a width of about 3 feet on the 100 level,

and a known extent of 700 feet at the shaft. It is composed mainly of oxidized materials, impure calcite, and other carbonates stained dark brown and blackish with iron and manganese. In places it has a crudely banded structure and resembles impure travertine.

The vein is opened to the depth of 107 feet by a vertical shaft and a 115 crosscut on the 100-foot level. Water was reached at the depth of 94 feet and it soon rose to the 80-foot level.

At the depth of 50 feet the vein is faulted 105 feet to the south and just west of the shaft a 10-foot lateral fault to the south shows on the surface. From just beyond this fault 10 tons of $68 ore was mined and shipped in 1913. The value of the ore is nearly all in silver, contained in cerargyrite, but the ore carries also about $2 in gold to the ton.

West of the shaft the vein has a known extent of 700 feet and is so offset by jog faults that the westerly part of its course is S. 65° W.

In the hydrothermally altered wallrock north of the vein there occur at intervals brown oxidized stringers 2-16 inches wide, said to carry good values in silver.

Scotia mine

The Scotia mine, owned by the S. Consolidated Co. of Boston, is 1/5 mile west of Terrell on the Silver Star No. 2 claim at an elevation of 4,390 feet or but 10 feet lower than the neighboring Water shaft mine. It was reported to be active in 1915.

The vein dips steeply to the south in the front andesite with a small body or dike ? of the white rhyolite exposed a few hundred feet down the slope to the northeast. It is opened mainly by a 150-foot deep shaft 300 feet of crosscuts and a drift extending 100 feet west of the shaft on the 100-foot level. Water was reached at a depth of 90 feet. The shaft is equipped with a 25-horsepower gasoline hoist,

On the 100-foot level the vein is said to be 2½ feet wide and to contain several stringers of high-grade ore.

In the workings east of the shaft the rock is altered, and the ground soft, and caving shows stringers or vein material to have been dragged by faulting. No definite vein is exposed but a couple stringers of blackish calcareous manganese oxide 2-10 inches wide dipping 60° E. are said to be mostly good-grade silver ore (Spec. 445). They and the ore are composed mainly of crudely banded calcareous rock material containing or stained dark brown and blackish with manganese oxide and iron and is similar to the ore in the Water Shaft mine. They contain parallel streaks and also small cross veinlets of impure calcite.

In the east crosscut jointing in the andesite dips 45° W., and is locally intersected by another joint system that dips steeply east.

Loma mine

The Loma mine owned by the Loma mining Company of San Diego is about ½ mile south of Terrell. It is on the Green claim at an elevation of about 4,750 feet.

It is on a 3-5 foot wide vein that strikes northeast-southwest and lies mainly in the front andesite but extends southwestward into the white rhyolite. It dips 70° northwest. It is opened mainly by a 600-foot adit tunnel drift that extends southwestward and is equipped with a 15-horsepower Morse-Banks compressor. The course of the vein and drift is not entirely straight, At about 100 feet in from the portal of the tunnel a 40-foot section of the vein is cross-faulted about 20 feet to the northwest or hanging-wall wise and at about the 250-foot point in from the portal the vein ? and drift fork, the so-called right drift continues its southwest course on the main vein to the 300 ft. point while the left drift following a branch or stringer extends southward to the 600-foot point, with the last 50 feet or more in the rhyolite.

The vein is composed mainly of faulted crushed and mineralized andesite containing or being heavily stained with iron and manganese oxides and with but little quartz.

In the rhyolite the vein is composed of crushed and recemented rhyolite stained with iron and manganese oxide and both vein and rhyolite wall rock are pressed and laminated or made schistose with the structure dipping 60° to the west-northwest.

Considerable portions of the vein are said to carry ore the most of which run s about $10 to the ton in silver. This is essentially true for the 2-foot wide faulted section extending from the 100 to the 150-foot points in from the tunnel portal. Just beyond the faulted section 6 inches of the vein is said to average $40 to the ton and at the 200-foot point where the vein is 5 feet wide and has a good hard hanging wall it carries a fair body of $10.75 ore and in the right drift beyond this place is a fair body of $15 ore. At about 550 feet in from the portal a ½ inch wide stringer in the rhyolite was said to be very rich in both gold and silver.

Last Hope mine

The Last Hope mine is nearly a mile south-southwest of Terrell, at an elevation of 5,050 feet. It is on an east-westerly vein that dips southerly in a narrow belt of front andesite near its contact with the overlying white rhyolite and is opened to the depth of 130 feet by a 50° southerly incline shaft known as the Green shaft with drifts and laterals on the 50 and 100-foot levels. At the time of visit in 1913, the company was doing development work, from which it had shipped 7 tons of good-grade ore, and several tons of low-grade ore lay on the dump. Some of the ore is said to be very rich and to run several hundred ounces in silver and $90 in gold to the ton.

Also, a small lot of siliceous gold-silver ore was shipped from the mine in 1921.[1]

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[1] U. S. Min. Res. 1921, Pt. I, p. 379.

The vein is from ½ ft. to 4 ft. wide, but in its wider portions the ore values occur mainly in a series of parallel stringers. At the surface the vein follows a joint plane and has a dip of 50° but the dip flattens with descent to the extent that in the bottom of the mine it is only about 25°. On the 100-foot level the mine for some distance follows the andesite-rhyolite contact, but the ore is best developed in the andesite. It was later reported that at greater depths the vein pinches out on the contact. The ore is silver-gold ore, but it contains also considerable lead and a little zinc, especially on and below the 100-foot level. The ore minerals are cerargyrite, galena, which is probably argentiferous, pyrite, and hematite, and specularite. Gypsum in the form of bands and stringers forms a considerable part of the gangue and in the more oxidized ore at shallow depths the ore is stained reddish and blackish with hematite and manganese and besides calcite and quarts contains also a considerable quantity of other carbonates, judging from its calcareous nature. In the deeper part of the mine the ore is mostly sulphide. A stringer found in the eastern part of the mine is thought by the company to probably represent the vein of the Milton mine on the north, said to have a known extent of 3,000 feet.

Terrell mine

The Terrell mine is on the westward continuation of the same vein or fissure as the Last Hope mine which here has a width of 2 feet, and is geologically and mineralogically similar to what it is in the Last Hope mine except that it is better banded and contains more gypsum and galena and higher silver values. It has shipped several tons of mostly high-grade ore. On the ridge westward from the mine the vein seems to be composed mainly of quarts breccia and contains much greenish horn stone.

Jump mine

The Jump mine is about 1-3/4 miles west of Terrell at an elevation of 5,100 feet. It is owned by Harry Davis of Los Angeles. It is on a 3-foot wide vein or lode composed of many mineral-bearing quartz stringers. The lode dips steeply east in altered and crushed andesite near its contact with rhyolite. It has a known extent of 700 feet. Several shallow openings made in the lode are said to have produced 11 tons of silver-gold ore valued at $1958.

Wingfield mine

The Wingfield mine opened by a 100-foot southerly inclined shaft on the same vein as the Last Hope and Terrell mines was said to have shipped $600 worth of high-grade ore, some running 600 ounces silver and $20 in gold to the ton. The vein is 4 feet wide. It is in andesite and the ore is mostly sulphide in the deeper part of the mine.

Darr mine

The Darr mine 1½ miles southwest of Terrell is in a 2½-foot vein that dips 85° east in rhyolite. It is opened mainly by a 40-foot shaft and is said to have shipped a little ore that ran $12 to the ton. The footwall rock contains many stringers parallel with vein.

Cripple Queen (Martini) mine

The Cripple Queen or Martini mine, owned by F. J. Martini is about 2/3 of a mile southeasterly from Terrell and 1,400 feet higher, being at an elevation of 5,600 feet. It is easterly from the Lena mine. The property comprises an east-west group of 7 claims. It is on a wide mineralized zone dipping 60° northeasterly in the front andesite and other volcanic rocks that seem to form the northeast side of a domal uplift. The zone, however, contains a 2½-foot wide vein that carries considerable $22 ore. It is opened mainly by a 185-foot adit tunnel driven northwesterly of which the latter half crosscuts the zone diagonally.

Black Butte mine

The Black Butte vein dips west in the front andesite near the andesite-rhyolite porphyry contact. It is 30 inches wide and contains 1½ feet of sulphide ore that runs $6.50 to the ton. Some of the concentrates assayed $150 in gold to the ton.

At 40 feet east of the vein the foot-wall rhyolite porphyry contains a 100-foot wide zone of stringers some of which are rich. Thirteen hundred pounds of the ore shipped to the Western Ore Purchasing Co. in 1911 ran $17 in gold and 92 ounces silver to the ton and 12 percent lead, 4 percent iron and 3 percent zinc. A latter shipment of 1,740 lbs. from one of the stringers ran $11.80 in gold and 190 ounces in silver to the ton.

Bellevue prospect

The Bellevue prospect is 1-3/4 miles southwest of Terrell at an elevation of 5,420 feet. It is said to have made a small shipment of ore. The vein dips steeply north in andesite.

Bullion prospect

The Bullion prospect, a manganese property comprising a group of 3 claims owned by R. Z. Hodges, is about a mile southwest of Terrell in Comet Gulch, the first Gulch west of Terrell, at an elevation of about 5,050 feet. A few tons of manganese ore was shipped from it in 1918. The deposit consists of manganese oxides in a shear zone in rhyolite and rhyolite tuff which rocks seem to overlie the white rhyolite and a short distance south of the deposit the rocks are cut by a 200-foot wide northwest-southeast dike of dark hornblende biotite andesite porphyry.

The zone is 50 feet wide and extends east-westerly in which direction stringers and small masses of manganese oxide crop out more or less abundantly for the distance of about 3/4 of a mile. The structure dips gently northerly downstream.

The ore minerals are mainly psilomelane and pyrolusite that have replaced the sheared rhyolite. The associated or gangue minerals are fine-grained silica and iron oxides. Some of the deposit which is mostly of the pyrolusite phase though fairly firm is very fine-grained arenaceous and contains uniformly disseminated minute particles of specularite. The better grades of the deposit contain tabular bodies of fairly pure hard psilomelane an inch and a half or more in thickness.

According to a later examination and report [5] "the greatest depth attained

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5/ Pardee, J. T., U.S.G.S. Bull. 710, pt. I, p. 234.

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in the workings is 6 feet. The oxides probably extend to a depth of 25 feet. The largest workable ore body which is 300 feet long and from 5 to 8 feet wide was estimated to contain 10% of manganese and more than 20% of silica and the zone as a whole was estimated to contain 50,000 to 100,000 tons of material that will run from 5 percent to 15 percent of manganese. The material can be concentrated to a high-grade product." "The deposits are in or associated with manganiferous silver veins but the parent mineral from which the manganese oxides were derived is not known."

Lake View mine

The Lake View mine, owned by the Lake View Mining Company 3 (?) miles south of Terrell, is on a 2½-foot vein in andesite, of which 1 foot averages about $50 to the ton, the values being nearly all in silver with small values in gold and copper. This is thought to be on the same vein as the Loma and Scotia mines. [6]

6/ Churchill Co. Eagle, Mar. 28, 1914.

Anchor prospect

The Anchor prospect was being worked in 1913 by Darr & Timson, lessees, who had made two small shipments of $60 ore.