

Date 1931

3800 0026

Retyped by

From: Ken Smith
Quintana Minerals to
Ken McGoffey
Julie Polasky

(1913)

NEVADA RAND MINE

Location and Topography

ITEM 26

The Nevada Rand, more commonly known as the Rand Mine, is in the northeastern part of Mineral County, 15 miles direct (17 by road) east of Nolan, the nearest railroad station on the Hazen-Goldfield branch of the Southern Pacific Railway. It is in the western slope of Gabbs Valley Range toward the north end of the range at an elevation of about 5,650 feet, and is 2 miles north of the Gold Pen Mine. It is easily reached by a good road that finally ascends a short wash, Lone Star wash, that joins Nugent Wash about a mile northwest of the mine, figure 3 (topo-map). The mountain range in this latitude, though more or less deeply dissected, consists mainly of a single ridge about 2 miles wide, standing at an elevation of about 6,000 feet with a relief of 1,000 feet. The topography is of the milder type usually produced by longitudinal erosion and weathering of Tertiary volcanic rocks in the desert regions of the Southwest. Its general character is indicated in figure 3, map, and figure 94 (photo of mine). Nearly all parts of the range are easy of access.

History and Production

In preparing the present report the writer, who visited the mine in 1916 and in 1920, has been generously given access by the company to brief progress reports and notes of several mining engineers and geologists who examined the mine or some of its rocks and ores for the company.

The mineral deposit of what is now the Rand Mine was discovered in June 1908, by Frank Thomas and Lou Rose, who named the property the Last Hope Mine, which name it bore until 1916 and the claims still retain. They soon sunk a 50-foot shaft and in 1909 mined and shipped from between the 50-foot level and the surface $7\frac{1}{2}$ tons of \$118.00 ore, whose value was mostly in gold. In 1911 the shaft was extended to the 150-foot level; whence, at Raise No. 58 West, considerable additional ore was mined and thenceforth the mine continued to be a nearly steady producer until 1916.

In 1913 the mine was owned by Charles Hubert, Charles Pike, and Charles Koegel, and the ore produced was mostly hauled to Kings Rawhide mill, 12 miles north, at Alkali Flat.

In 1914 the shaft was extended to the 250-foot level and by June the mine had shipped 600 tons of ore running about \$110.00 to the ton.

In July 1916 the property was reorganized and incorporated into a stock company, the Nevada Rand Mines Company, and the stock listed on the San Francisco Stock Exchange and on the New York Curb. At this time the mine contained more than 3,000 feet of work and had produced about \$31,000 worth of high-grade ore as follows:

- (a) High-grade ore from shipments being nearly \$1,600 to the ton.
- (b) Smelter ore running \$90.00 to the ton.
- (c) Mill ore running \$40.00 to the ton.

Besides this production, 1,200 tons of \$17.00 ore lay on the dump and much second-grade ore remained as fill in the mine.

The metal ratio in the ore at this time was said to be 40 ounces in silver to 1 ounce gold or half and half in money values with silver rated at 50¢ per ounce. Ore as low as \$20.00 grade could be profitably shipped. The wagon haul to Nolan was \$10.00 per ton, miner's wage was \$4.50 per day. Beginning about 1916 much of the ore was shipped to the Western Ore Purchasing Company at Hazen.

In 1917 the mine was reported by the examining engineer to have in sight about 35,000 tons of ore averaging \$15.00 to the ton and in 1921 it was credited with a shipping record of \$50,000 in mostly high-grade ore. The shaft had been deepened to the 450-foot level and several newly opened workings showed good grade milling ore. A 75-foot shoot of primary ore was found on the 200-foot level, of which 3 feet ran \$54.00 to the ton.

By 1923-24 the production was said to total \$60,000 and the mine continued to ship considerable high-grade ore, mostly from the 250-foot level east and just below it where two ore shoots produced about \$26,000.

In 1925 the production is said to have totaled \$100,000 in high-grade ore, of which the former owners had shipped \$40,000 worth that ran \$31.00 to the ton and the Rand Company had shipped 812 tons that netted nearly \$65.00 to the ton. The potential ore in the mine was estimated to be 30,000 tons of \$15.00 ore besides which about 2,000 tons of \$20.00 ore lay on the dump.

In 1927 the mine under lease shipped to the Thompson Smelter some low-grade ore running about \$20.00 to the ton on which the charges were as follows:

	Per Ton
Truck haulage to Nolan	\$3.00
Railroad freight	.60
Smelter treatment	4.50
TOTAL	\$ 8.10

In metal content this ore averaged gold, .4 ounces and silver, 15.9 ounces to the ton. 10/

10/ W. V. Rudderrow, Manager, letter April 4, 1927.

In October 1927 the mine was sold at sheriff's sale for \$2,500 to R. J. Randall, former lessee, who in 1931 was still operating it. 11/

← Date

11/ Mines Handbook, Vol. 18, pt. 1, p. 1545, 1931.

Development and Equipment

The property of the Rand Mines comprises a group of seven claims, aggregating about 160 acres, figure 95 (claim map). It is opened mainly through the Rand shaft to the depth of 250-feet, by about 5,000 feet of workings distributed on six levels--mainly the 50, 150, 250, and 450-foot levels; the 180 and 200 levels being intermediate, figure 95-B and C (cross-section). The workings extend about 400 feet along the strike of the lode.

As the shaft is sunk in the hanging-wall side of the lode the main crosscuts are driven in the direction of the footwall and the drifts mostly parallel the lode in its footwall side. The mine is dry, only slight moisture occurs in its deep part. The ground is all easy to work and required almost no timber.

The surface equipment includes a 25 horsepower gasoline hoist, office, camp, and mine buildings for accommodating a small crew of men. As a mill to treat the medium to low grade ore at the mine was needed, the company in 1919 was reported to have purchased a 20-ton mill standing in good condition at Alkali Flat, 12 miles from the mine, with water at the depth of 160-feet, but the writer does not know whether the mill was later moved to the mine or any of the ore was treated in it. A water supply can probably be obtained at a reasonable depth in Nugent wash, a mile west of the mine.

Geology

The principal rock at the Nevada Rand mine and vicinity is a gray hornblende andesite standing close to trachy-andesite or latite. It is tuffaceous and is of acidic type. Concerning the fragmental character of the rock, there seems to be no doubt. Though the rock is considerably altered, it contains fragments of andesite and its minerals, and fragments of the underlying rhyolite and of dark shale or slate.

As the structure or bedding of the andesite is not known, no definite statement can be made to its thickness. At the mine it appears to have a thickness of about 500-feet but in the axis of the range, at about half a mile east of the mine, it probably has a thickness of nearly 1,000 feet. And in case the rock dips 30° NE., as has been suggested may be the case, the thickness would then be considerably greater as it would then be measured on the hypotenuse instead of the leg of the right angle triangle.

The andesite probably consists of more than one flow, which point is not yet determined. It extends from a point nearly a mile southeast of the mine, through a distance of 2 miles northeast of it, to beyond Nugent wash.

It occurs throughout the mine and apparently forms the main upper mass of the mountain range back of the mine on the northeast.

It is composed mainly of numerous small phenocrysts of feldspar in a greenish-gray microlitic groundmass, which latter constitutes 40 to 60 percent of the rock and generally shows flow structure. Hornblende and biotite also occur as small phenocrysts and are essential minerals. Augite is scarce. Accessory minerals are apatite, magnetite, quartz, and zircon. In places accessory magnetite is abundant. The feldspar consists mainly of oligoclase and andesine with oligoclase predominant and in some sections a little orthoclase is present. The feldspar is mostly altered to kaolin and sericite; the hornblende to green chlorite, epidote, hematite, actinolite, and carbonate; the biotite to green chlorite and iron ore.

To the abundance of chlorite the altered rock in most instances owes its green color. In places, as on the 250-foot level, the andesite is vuggy with small cavities lined with quartz crystals. The andesite seems to be sparingly cut by one or more small dikes of a fresher andesite porphyry which is probably related to the cap rock of the R.A.M. ridge south of the mine.

South of the andesite is a thin series of andesite breccia overlain by a thick pink rhyolite. These rocks are apparently in fault contact with the andesite. ^{12/} Also along the road and wash just south of

^{12/} Foshag, W. F., U. S. National Museum Mss., Notes on the Hawthorne district, 1925.

4

camp occurs a bed of volcanic agglomerate which Gianella 13/ thinks

13/ Gianella, V. P., Nevada State Bureau of Mines, Reno, Nevada, oral communication, May 30, 1928.

6ct appears in the bottom of the mine, of which he has made a study for the Company. If this view is correct the agglomerate bed beginning in the wash, unless faulted must dip about 32° to the northeast which agrees in general with the dip of the rocks in the front of the Range at the Gold Pen mine and vicinity, and is of interest in possibility affording a clue to the structure of the rocks in detail at the mine.

— Rand Mines

As the rhyolite pitches to the northeast it passes beneath the andesite at a half mile or more southeast of the Rand mine and underlies the andesite at a depth of about 300-feet at the Lone Star mine situated 1,500 -feet southeast of the Rand mine with the contact between the two rocks dipping the Rand mine, it probably also underlies the andesite at the Rand Mine, though at a somewhat greater depth than has yet been reached by the deepest workings. It probably lies at a depth of less than 600-feet. At 1¼ miles northwest of the mine the rhyolite is said to form Beacon Hill and dip steeply northeast under the andesite of the range.

The Jura-Trias sedimentary limestone-shale series on whose eroded surface the volcanics of the region in general are supposed to rest, is not known to outcrop within several miles of the mine.

Associated with the lode in the mine ample slickensided surfaces indicate faulting and movement in several directions, among which the south or hanging wall seems to have moved upward as if the fault here were a reverse fault.

Just northeast of the mine where the surface rises steeply several hundred feet toward the top of the mountain, the andesite is not only sheeted but is cut by a cross cleavage that strikes N. 25° W. and dips 80° eastward into the range and by a coarse jointing system with its plane surfaces well slickensided dips 45° S. SW. toward the mine. Here the andesite, normally gray, weathers brown.

At the mine and vicinity, which is in a faulted, sheared, and crushed zone, the andesite has been hydrothermally altered or propylitized and mineralized by magmatic solutions that circulated through the faults and fractures in the andesite, following its eruption and consolidation and later it was leached and bleached by surface water so that now is stained by iron and manganese oxides and contains jarosite and alunite in fractures. The hot mineralizing solutions were the same that formed the deposits last described, and the greater amount of alteration occurs near the deposits.

The zone of the mineralization, whose extent was controlled besides the solutions by fissures, fractures, and weathering in the andesite, is irregular in width and intensity. It varies from 20 to 200 feet or more in width and has an extent of 3,000-feet or more. Beginning at the mine it covers the northeast part of the Last Hope claim, the adjacent part of the Thomas fraction, and of the L. H. extension. Where the zone passes into Nugent wash on the northwest it widens to nearly 1,000-feet. On the southeast it extends to beyond the Lone Star mine. On the southwest or Last Hope Extension No. 1 and on Hope extension No. 2, it is approximately paralleled by a couple of secondary or subzones, figure 95-A (claim map).

The principal changes produced by the hot solutions in the andesite in the mineralized zones were development of finely disseminated pyrite and chlorite and silification in the rock. The abundance of chlorite locally gives the rock a greenish color, which in places is increased by epidote.

In places the phenocrysts of feldspar in the andesite breccia were altered by sulphurous vapors to alunite. Cubical pits show where pyrite was removed and there is present a trace of kaolin.

In some instances of silification the andesite is largely replaced by quartz and calcite and in others it is changed to a semi-soft porous rock containing much sericite, chalcadony and carbonate. 71

In places in the mine as on the 450-foot level, considerable bodies of the andesite have been altered to a dark bluish-gray mud rock or simply mud, especially in the drift to the northwestward where it is cut by closely spaced nearly vertical sheeting parallel with the lode whose profusely slickensided planes indicate considerable movement. On the east level, however, the andesite, though highly altered is a consolidated fairly firm greenish-gray rock cut by sheeting that dips 80° NW. and under the microscope shows good flow structure.

The andesite in general is deeply oxidized, the oxidation being almost as great on the 450-foot level as on the 50-foot level.

The later bleaching of the andesite and the formation of jarosite was caused by oxidation of the pyrite contained in it. In general the pyrite oxidized to hematite but in places to limonite. On the west side of the shaft on the 250-foot level the rock is a mica andesite but contains labradorite and seems to be a different flow from that in the main 250-foot crosscut. *

Deposits

The deposits are gold and silver veins of the replacement type. They occur in the Nevada Rand lode or vein in the zone of bleached and crushed andesite. The lode is about 100-feet wide, it strikes about northwest, and dips 80° SW., or stands about vertical and seems to pitch to the southeast, figure 95 (map). It contains numerous small fissures and fractures, which, in general, parallel of the lode, but dip steeply northeast or southwest and have largely controlled the irregularity of the ore deposits which mostly occur in them.

The walls of the lode are irregular, as are also those of the individual veins and ore shoots. In places deposits are separated from the country rock by a sheet of yellowish clay gouge or "talc" ranging up to a foot or more in thickness. The gouge seems to be very similar to that which carried fair values in the Nevada Wonder mine; but here it is mostly barren--example given on the 250-foot level, the south or hanging wall has a well defined sheet of gouge which, however, is very low-grade or barren while the adjacent crushed andesite carries good values in both gold and silver.

The deposits occurs in irregular fissures and fractures at flattish lens-like bodies, ranging up to 10-feet in width and 100-feet in extent.

On the 150-foot level in the main east wing and vicinity is an 8-foot shoot of \$20.00 ore, of which 10 inches runs about \$500.00 to the ton. On this level the main vein strikes N. 70° W., and carries 5-feet of \$10.00 ore, while to the northeast of it a secondary shoot strikes N. 20° W., with dip 75° W., and 120-feet out from the shaft carries several feet of \$8.00 mill grade-ore. This shoot, further north, finally feathers out in oxidized vertically banded barren andesite.

On the 180-foot level a 13-foot wide ore shoot, consisting mainly of quartz vertically streaked and banded with manganese, averaged \$15.40 to the ton, of which \$7.00 was in gold and the rest silver. All the ore contains silver.

On the 200-foot level occurred an ore shoot 60-feet long.

On the 250-foot level occurred a 12-foot shoot of \$3.00 quartz ore and farther northwest a 7-foot shoot of \$6.00 "sand" or loose quartz ore. On the footwall side of the lode in the raise, winze, and drift, in an ore body 7½-feet wide by 30-feet long, there remained 3½-feet of \$82.00 ore after more than 4-feet of high-grade ore had been mined out.

A polished section of rich ore (\$2,650 to the ton mostly gold) from the east drift of this level showed the gangue to be mainly hematite containing the precious metals mainly in the form of electrum and free gold. The hematite seems to be secondary after pyrite but the electrum according to M. W. Short is undoubtedly primary as a super gene process would separate the gold and silver. This ore contained also a little selenium, argentite, tetrahedrite, calaverite, wulfenite, manganese oxide, pyrite, and copper minerals especially malachite and tenorite. The wulfenite occurred in yellowish disseminated platy, crystals, and is probably an important source of the high lead content of the ore. Several of these minerals may be derived from tetrahedrite. ← *

On the 450-foot level the vein or ore shoot seems to be disturbed by a slip, or fault, but some good manganese-stained high-grade ore was found in and near the floor of the drift.

In 1925 it was reported that six shipments of high-grade ore averaged about 5.6 ounces gold and 190 ounces silver to the ton; a metal ratio of about 34 ounces of silver to one ounce of gold, and contained additionally per chemical analysis, silica 82 percent; iron 3 percent; lime 2 percent; alumina 6.3 percent.

The deposits are composed mainly of brecciated, silicified andesite and quartz that has been crushed by renewed movement along the fault. The ore bodies strike about northwest, parallel with the trend of the zone. They stand about vertically or dip steeply to the northeast or southwest, the attitude of any particular ore body being dependant on that of the fracture in which it happened to be deposited. The country rock and lode are so crushed and mineralized that the ground is easy to work.

Oxidation

Oxidation is almost complete down to the bottom of the mine or 450-foot level, and it probably extends considerably deeper. On the 300-foot level the vein is faulted and oxidation pronounced.

Croppings

The general croppings consist of mainly an inconspicuous streak or band of iron or manganese-stained quartz and silicified rock that usually pans well in free gold. The surface ores, however, to the depth of 50-feet, though good looking and seemingly rich manganese ore as seen in openings northwest of the mine, are mostly leached to low-grade.

The production of the mine has mostly come from between the 90-foot and the 270-foot levels.

The ore is mostly oxidized manganese-iron stained silicified hard rock and coarse quartz containing chiefly free gold and electrum, cerargyrite, argentite, and other oxidized minerals. The richest of the ore contains much unctuous greenish cerargyrite, stain of chrysocolla and malachite, and white or yellowish wulfenite. In some of the ore a little argentiferous cerussite has been reported; also tetrahedrite and calaverite and selenium were found in the present work. *

The argentite occurs mainly in the quartz and is thought by some to be about all primary, whereas cerargyrite, however, fills cracks and cavities, and was not formed directly from some original mineral.

Some ore contains much vein pyrite now oxidized.

Two types of gold occur, a light-colored gold in fair-sized particle (prob. electrum) and a dark-colored gold in very small flakes. Some gold is contained within quartz crystals and must be regarded as primary.

A little secondary pyrargyrite has been found attached to other minerals. Tenorite rims argentite and polytastite.

White quartz ore, formed on the south side of the Mud Gorge that cuts the vein on the 250-foot level east, assayed 5.44 ounces gold and 34.4 ounces silver to the ton. The wall rock adjacent to the vein is much altered and shows a little actinolite, calcite, replacement quartz and aggregates of pyrite oxidized to limonite. There is also a little primary argentite in the quartz.

Some of the ore is streaked or banded, indicating that it was deposited on fissure walls. Hard manganese, as psilomelane, is indicative of good values, but the sooty manganese on pyrolusite is not. Also copper minerals are indications of rich ore. The ore stopped averaged about 5-feet in width and is said to have run about \$125.00 to the ton. Some of the ore, however, runs as high as several thousand dollars to the ton. On the 180-foot level and the 200-foot level a few lenses ran \$8,000.00 to the ton. Good grade ores extend from the 90-foot level to below the 250-foot level.

Micro-ore

A specimen of the vein from 300-foot level was found by Ross to be mostly a mixture of vein(?) quartz and carbonate which latter is abundant, and seems to be mostly siderite, but the relative age of the carbonate and quartz is not determinable.

Some ore on the 200-foot level contains considerable adularia in the gangue.

Calaverite is reported by Tomlinson in ore from the 250-foot level and that there is considerable tetrahedrite in the black phase of the ore.

Ore Treatment

The ores are said to be easily crushed and treated. They are best treated by simple cyanidization, which process yields an extraction of 96 percent of the values.

The values in the ore are largely due to concentration of silver and gold in the oxidized zone. This is especially evident in the case of the silver where all the values lie largely if not entirely in the chloride-cerargyrite. The primary ore minerals were deposited chiefly as sulphides--namely, auriferous pyrite and argentite--by the hydrothermal solutions and subsequently through the breaking down of the sulphides during a long period of oxidation, erosion, and percolation of surface water the isolated metals were concentrated mainly as free gold and cerargyrite. During oxidation the manganese carbonate in the rocks was changed to the manganese oxides now present in the rocks and ores.

As gold and silver seem to be associated or carried to greater depth with manganese oxide, the presence of a considerable quantity of this mineral in the mine is thought to favor extension of the deposits in depth. There is more manganese on the 50-foot level than on the 150-foot level.

Excepting remnants of the primary ore type found on the "new" 200-foot level, little is known of the primary or unaltered mineralization.

Here, at a depth of 175 to 225-feet, was found a 75-foot shoot of primary ore dipping steeply southwest, of which a width of 3-feet was said to have run \$54.00 to the ton. Bodies of auriferous argentite and chalcopyrite, both minerals believed to be primary though the argentite is partly altered to cerargyrite, were contained in hard manganese-stained quartz boulders and the ore contained higher proportions of silver to gold than is usual. The microscope shows the sulphide to be replacement of the andesite and patches of adularia and quartz containing primary (?) bouldery ore occurring in the Lone Star mine, next described, but the two ore bodies are not yet known to be connected.

Outlook

The mine still contains a considerable tonnage of medium-grade to low-grade ore. It seems advisable, however, that exploration work be extended to greater depth for two reasons: (a) to learn whether secondary enrichment of economic import may have taken place at the top of the sulphide zone, and (b) the character of the deposits in the underlying rhyolite, supposed to be present at a depth of about 550-feet, or less than 100-feet below the present bottom of the mine.

Jones suggests that "as the type of the ore deposit is similar to that found in Tonopah, there is an excellent chance that with depth the primary ore will be found to be of commercial grade".