Contains Royal Regent or West Zone + Placer Mines (206)

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Unpublished Report 1947 - Field work 1911 - 1920 Carson Sink Area, Nevada U.S.G.S.

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Royal Regent or West zone

The Royal Regent or West zone lies about 2 miles west of the town of Rawhide mostly in hilly or mountainous country of the Cone Mountains, figure 54 (photos 27 and 28). It has a length of about 2 miles and is nearly a mile wide. It extends from the Rawhide Regent mine and camp on the north south-southwestward to the Ruby Queen group. Prominent hills or land marks situated in or near the zone beginning on the north are Crescent Peak, Black Eagle Hill, Bullskin Mountain, Chicago Mountain, and Pilot Cone, figure 54 (photos 27 and 28). The country rock in the eastern part of the zone is chiefly Cone Mountains rhyolite, while in the western part it is andesite as described under geology.

Deposits

The deposits are nearly all Tertiary and occur chiefly in the volcanic rocks which have been described mainly in the Cone Mountains rhyolite and in the andesite. Their precious metal is chiefly gold in which some of them are very rich due to process of secondary enrichment. The mines and prospects beginning on the north include the Regent, the Black Eagle, Gray Eagle, Bullskin Mountain, Penglaze, Indiana, Royal Tiger, Royal Mines Company, Wonder King, McMann, and Steinheimer groups.

Regent mine

Location--The Regent mine, owned by the Virginia Hills Mining Company of Reno, is located at Regent 2 miles northwest of Rawhide, in what was formerly known as the Regent district. It is at the edge of the wash at an elevation of about 6,000 feet in low foot hills a couple hundred feet high at the outer edge of the Rawhide Mountains that overlook a broad expanse of detritus-filled Terrell Valley, figure 52, (geologic map), and figure 79, (photo 20).

History and production--The production of the property by 1922 was said to be $150,000. Mineral ground was first located here by J. M. Schadler and the Regent property, now consisting of about 20 claims, figure 80, (claim map), was first located in December 1905. In February 1906, with only location work done on it, it was sold to a syndicate in Goldfield for $55,000 which put down a 100-foot shaft on Czar Hill, but did very little else.

Later the property was subdivided into lease blocks, but owing to the financing stringency of 1907 the lessees were unable to do much development work. Some high-grade silver ore was taken out on Czar Hill near the apex, and some from the McKinley vein and shaft.

The property as a whole was located by later owners in June, 1911, but no material work was done until the fall of 1912 from which time till the close of 1913 the Proskey-Regent Gold Mining Company of Rawhide mined, shipped, and milled ore, and there was also three sets of lessees working on the property taking out both shipping and milling ore.

The total production at that time was $35,000 of which about $12,000 came from the Czar lease; $12,000 from McKinley shaft; $2,000 from the Johnson vein in Silver Spring Hill, and $3,000 from other leases. The ore was said to run about $29 to the ton and that which was then being shipped to the Nevada New Mines Company mill $40. In value, it averaged about 90% in silver and 10% in gold.

The total amount of development at that time was 2,400 feet of work extending to the maximum depth of 160 feet, with a good 2- to 3-foot vein of $7 ore in the bottom of the workings.

With the facilities then afforded by the operation of the Nevada New Mines Company's mill, the Regent mines could handle $15 ore, but not ore of much lower grade. The ore haul was about 7½ miles gently down grade from Regent to the Nevada New Mines Company mill. On completion of the New National or Black Eagle mill then building, the haul was later reduced to about 3 miles, which enabled a lower grade than $15 ore to be worked.

In 1917 the property was acquired by the Mogul Mining Company, representing eastern capital.10/

10/ Mining and Scientific Press, April 28, 1917, p. 596.

In February 1919 it was incorporated as the Seminole-Regent Mining Company with a capitalization of $1,000,000 and headquarters at Reno. It was soon thereafter equipped with a 15-horse power gasoline hoist, compressor drills and the 125-ton Black Eagle mill. The mine was reopened in 1919 and was operating in 1920, at which time development work had been extended by a shaft to the 400-foot level and a crosscut driven there to cut the vein.

In 1923 the Seminole Regent Mining Company retired and by 1930 the property had been acquired by the Virginia Hills Mining Company of Reno, who, at that date, reported that for some time only assessment and a little lessee work had been done.

Geology--The geology at Regent is similar to that at Rawhide. The country rock is rhyolite which, in general, is light-brownish gray, fine grained, lithoidal or nearly dense. It is in part silicified, especially along the veins in Czar Hill and Silver Spring Hill, particularly along the hanging-wall side of the Czar vein, and shows other alterations and mineralization characteristic of the Rawhide rocks. The rhyolite is sheeted in an east-westerly direction and also variously crushed and subordinately sheeted in other directions. The flow sturcture and quartz banding in the rocks strike N. 25° E. and stand about vertical.

At about 1/3 mile west of Czar Hill the rhyolite and wash give way to light-colored rhyolitic tuff, which is very calcareous and is possibly to be correlated with the tuff found at Pilot Cone and at the mill and flats to the south of Rawhide.

In places the rhyolite is cut by dikes of reddish gray Pilot Cone ? andesite, as just below the Regent-Schurz road forks where occurs a dike of this rock (spec. 272) 30 feet wide which is said to extend southerly to the Penglaze and Flynn mines. The rock is strongly porphyritic with large roundish tabular feldspar phenocrysts 3/10 of an inch in average diameter which seem to have been replaced by calcite and other minerals. (Note. Have slide made of 272 a.)

Basalt caps a small north-south hill of the rhyolite at about 1/3 mile S. 30° E. from Czar Hill and Regent. It is sheeted north northeasterly-south southwesterly about the same as in the rhyolite.

Deposits--The deposits of the camp are gold and silver. They are contained in 5 or 6 fairly strong veins ranging from 1 foot to 40 feet in width in the rhyolite including adjacent ore bodies replacing the rhyolite wall rock. They are about parallel, in general have a northsoutherly strike (N. 15° E.) and steep westerly dip, figure 80 (claim map). They lie chiefly in Czar Hill and Silver Spring Hill. Those of Czar Hill are chiefly gold bearing, and those of Silver Spring Hill are chiefly siver bearing. Named in order from east to west the more important are the Czarina, Proskey, McKinley, and Czar Hill veins, to the west of which latter on the north is the Alexander, Maul, and Nye, and on the south in Silver Spring Hill, the Johnson and Josephine veins. The Annie Jane, a cross or east-west vein apparently about 1,000 feet in length, lies in low ground to the west of the middle part of the group.

The veins are in part fissure veins. They occupy fissures, fractures and fault zones. The gangue or filling (as shown in ore specimen 273), is chiefly quartz and altered silicified and replaced rhyolite, much of the rhyolite being flow-banded and the quartz comby and glassy.

Barite as a gangue mineral is associated with some of the veins and deposits and is well and plentifully developed along some of the fissure wall faces, as seen in the Proskey vein and down the McKinley shaft (spec. 277 a). Here areas of the rhyolite wall rock 5 or 6 inches in diameter are overgrown with tabular sheets 3/10 of an inch in thickness of barite in maximum dimension.

Banding is common and well developed, as shown in specimen 274 from the Proskey vein, where it is about 4 feet wide in the upper south slope of Silver Springs Hill, and in the rich ore (spec. 275) from the Johnson vein.

Croppings-- The croppings of the veins and the adjoining silicified wall rock are in places prominent, standing 10 or more feet above the surface, as shown in Czar Hill, figure 79, and they are stained reddish brown and blackish with iron and manganese. In general the veins and ore are oxidized as deep as the workings extend, which is 400 feet, though there is commonly associated with the ore a little pyrite and in a few instances a little chalcopyrite, and in the Czar Hill deposits, as in the Czar vein, some antimony (spec. 276) is also present. It is regarded by the operators as indicating a decrease in gold values.

Strewn over the surface of the wash on the Sminole group and adjoining ground on the west occurs considerable good looking quartz float (spec. 277), mostly in scattered boulders, some of which range up to 4 or 5 feet in diameter, the source of which has not yet been determined, and seems to be puzzling, since on nearing the base of the mountains and hills on the southeast it ceases.

Some of the float resembles Czar Hill vein croppings and ore, but the most of it seems to be different. Nothing like it has been found in the mountains on the south beyond Czar and Spring Hills, which caused it to appear as if the float may have been derived from some vein or ledge on the Seminole group, all traces of which in place have apparently now disappeared by weathering and erosion,

The float in general carries high values in gold, which fact has aroused considerable interest in its source. Some of it is slightly greenish quartz and is pseudomorphic after spar, etc., and resembles the type of quartz, which for instance in the Oatman and other districts in Mohave County, Arizona, carries good values. The float has led to prospecting by shafts on the David claim and adjoining ground of the Seminole group, but the results have not been encouraging.

McKinley or Big vein

The McKinley or "Big" vein lies about 200 feet west of the Proskey vein in rhyolite. It is about 1,000 feet in length and varies from 3 to 40 feet and is opened to the depth of 400 feet. Its course is curved with the concavity facing westward in which direction the vein also dips at angles of about 60°. It is thought that it may join the Czar Hill vein or be continuous with the Proskey vein on the southwest.

At about 200 feet south of the shaft the Big vein and also the neighboring hanging-wall vein are faulted 100 feet or more to the east on the north side of the fault, from which point, however, the Big vein gradually curves back on its course and passing through the lower northeast slope of Czar Hill extends beneath the wash on the northeast.

The vein is composed of quartz and replaced rock including some coarse boulders from 1 to 2 feet in diameter. Some of the quartz is of the glassy barren-looking type. The vein is said to have produced about $25,000 worth of silver-gold ore, most of which ran $30 to the ton and some $200 to the ton, but the run-of-mine ore is only about $12, the lowest grade that the company attempted to mine. One ore body about 7 feet wide is said to have run $58 to the ton. The value ratio of the precious metal content of the ore is said to be about 90% silver and 10% gold.

The ore varies from very hard firm quartz and cemented rhyolite breccia to relatively soft phases of altered and in part silicified rhyolite.

In 1913 the vein had been opened mainly by the McKinley shaft 60 feet deep, started in the wash.

The shaft contained, on the 60-foot level, two 40-foot drifts, one each to the north and to the south and two stopes 20 feet in diameter in the hanging wall, showing the vein to contain the same characteristics, coarse bouldery faulted rhyolite and quartz lenses.

In 1920 the vein was being worked on the 200-, 300-, and 400-foot levels.

On the 200-foot level it was 30 feet wide and dipped with variations about 47° NW., and the ore in places was in part sulphide. South of the shaft the vein narrows and joins the hanging-wall vein.

On the 300-foot level, which contained 200 feet of work, the vein is 35 feet wide and has about 3 feet of gouge on the hanging wall. It had been opened mainly by a drift extending 150 feet north of the shaft. A general specimen of the ore (spec. 677) is siliceous and vuggy and is largely composed of silicified and in part brecciated and replaced rhyolite, with dark or blackish bodies containing argentite, and gold.

On the 400-foot level the vein lies 175 feet west of the shaft, where short drifts had been run both north and south showing banded quartz ore. It is about 12 feet wide, strikes N. 40° E., and dips with variations 47° NW., but much of the hanging wall stands nearly vertical. Some of the ore consisting of crushed and silicified rhyolite cemented with a network of secondary quartz-adularia veinlets is pyritic with finely disseminated pyrite and blackish grains and small bodies of argentite (spec. 678). At 200 feet from the shaft or 50 feet beyond the vein the working crosscut ended in rhyolite tuff.

Alexander or $5 vein--The Alexander or $5 vein lies in the northwest slope of Czar Hill. It strikes N. 10° W. and stands about vertical. Shallow shafts at several points show it to be 8 feet wide and well banded with gangue on the west wall.

Proskey vein--Starting in the wash and road near the east base of Czar Hill, the Proskey vein extends southerly through Silver Spring Hill with a length of nearly 2,000 feet. Portions of it have been worked by lease.

In the upper south slope of the hill the vein is about 3 to 4 feet wide and is well banded with quartz and iron-stained mineralized rhyolite (spec. 274). In the north base of the hill it is opened by the Sailor Boy shaft, 160 feet deep, which in 1913 was the deepest opening in the camp, and ended in an incline winze. In the bottom of the shaft, the vein is reported to have narrowed to 2½ feet in width but carried $40 to $50 ore.

The vein in general was disappointing to the Company in not carrying the values expected of it in Silver Hill. In this connection it may be noted that from the bottom of the 100-foot Czar Hill shaft sunk in the southeast base of Czar Hill in early days, a crosscut extended to a point beneath the top of the hill. The vein for which this crosscut was driven

was not found but at 150 feet from the shaft the crosscut cuts a 6 to 8-foot blind vein, which is composed largely of low-grade, $8 to $10 ore, and was too low grade to work.

Czar Hill vein--The Czar Hill vein has a length of 1,500 feet or more and is about 5 feet wide. It extends from the south slope of Czar Hill through the hill, thence nearly 1/4 mile northerly into the flats or wash. In 1913 it was opened chiefly in the upper northeast slope of the hill on the Golden Spring claim to the depth of 40 or 50 feet, and by stope at a point where it is faulted. To the south of the fault the dip is 70° to the southeast. To the north it is about vertical. The vein has good looking quartz-rhyolite gangue, but the values, which range from $10 to $50, and are almost entirely in gold, are spotted.

The croppings to the north of the shaft are strong as shown in figure 79 (photo 20) and consist of quartz and silicified rhyolite stained with oxides of manganese and iron. Both croppings and the ore near the surface contain considerable "antimony" (?) (spec. 276), which is said to be not beneficial to the gold values.

Isabel or Maul-Nye vein

The Isabel or Maul-Nye vein situated to the northwest of Czar Hill on the Bourbon-Prince claim, trends north-northwesterly and dips 25° E. in rhyolite and outcrops at several points. It is opened by a crosscut tunnel and an upraise to the surface. It consists mainly of crushed and partly silicified rhyolite, contains but little quartz, and is said to carry about $15 ore whose values is chiefly in gold. The dump is said to average about $8 to the ton, the values having been derived mostly from a small quartz seam.

The Johnson and Josephine veins--The Johnson and Josephine veins which lie in the westerly slope of Silver Spring Hill, converge northerly and seem to unite in its mid-north slope at an elevation of about 5,460 feet. In 1913 both veins were being worked by lease. The Josephine vein carries considerable of its values in gold. It dips steeply to the west or northwest, and has gouge casing due to post-mineral movement.

Some of the best looking quartz on the property occurs in the Elma crosscut tunnel on what is thought to be the Johnson vein. It is a mixture of whitish and gray quartz, is some sugary and drusy, and a little brownish iron stained, with traces of replaced rhyolite through residuary quartz phenocrysts ?.

Profit Mine

The Profit (also called Matthews) mine, owned and operated in 1916 by J. F. Matthews and Bros., is 1½ miles northwest of Rawhide and 1/3 of a mile southeast or Regent in the foothills.

The vein, which is 3/4 of a foot to 2-feet wide, strikes north-northeast, dips 70° E., and was opened by an incline shaft to the depth of 110 feet. It consists of brecciated, somewhat pebbly, silicified quartz and rhyolite, and barite ?, more or less banded, streaked, iron stained and oxidized. (Spec. 550). Much of it is said to run $35 to the ton in silver and gold and some is very high-grade ore. Some 1/4- to 1-inch wide soft talcose or alunitic streaks are said to carry good values.

Hauley Tungsten Prospect

In 1930 there was reported to have been discovered at Regent a deposit containing tungsten as well as silver and gold. It belongs to Dan Hauley and was being developed by a Tonopah party. 11/

11/ Salt Lake Mining Review, vol. 32, November 30, 1930.

Black Eagle Mine

Location

The Black Eagle mine is located in the Cone Mountains 2 miles west of Rawhide at an elevation of about 5,950 feet, fig. 52 (Geologic map of Rawhide) and fig. 81 (Photo 22). It is near the head of Black Eagle gulch or so-called canyon which drains northward into Terrell Valley, fig. 81 and fig. 52. (Topographic map). The topography, which is typical of that of deeply eroded volcanic rocks, is hilly to mountainous and rough but not difficult to access.

History and Production

The Black Eagle mine was discovered in 1907, a year before Rawhide was discovered by (Billy) W. W. Stockton who soon did considerable development work, before the mine, a little later, was aqquired by the present owner, the Black Eagle Gold Mining Company of Berkeley, California. In 1909 the Company was reported to be working the mine and hauling several hundred tons of ore to the Victor mill. In 1911 it was said to have sufficient ore blocked out to serve the mill for 3 years, and about

this time it was found that cyanidation was the process best suited for treating the ore. Then followed panicky times, the Rawhide fire and the burning of the Company's National Mill, all of which retarded development until 1913.

By 1913 the mine had been opened to the depth of 300 feet by the old shaft and was working 2 shifts of men. Later the new shaft located 500 feet north of the old shaft and with its collar 60 feet lower than that of the old shaft, was sunk to the depth of 300 feet. Both shafts are regarded as having reached the sulphide zone and ground water level. Sulphide ore and ground water are said to occur in the bottom of both shafts.

As the shafts are each 300 feet deep, and the collar of the new or north shaft stands 60 feet lower than that of the old or south shaft the bottom of the new shaft is 60 feet lower than that of the old shaft.

The production by 1913 was 3,500 tons of ore having a value of $471,500, of which 1,700 tons of $25 ore came from the Wiley lease stope; 1,000 tons of $18 ore from the manganese stopes, figure 82, and 800 tons of $20 ore from the development work lay on the dumps and more than 4,000 tons of $10 ore were said to be blocked out in the mine.

By 1916 the Nevada News Mines Company had taken out considerable additional ore, especially from the Blacksmith Shop Tunnel workings, where the vein from 15 to 20 feet wide yielded a large amount of $55 grade ore.

The property comprises a group of about 12 claims, the Black Eagle group, which in triple file extends north-northwesterly, figure 63, (Arnold claim map), with the mine or most of the development being on the Black Eagle claim in the south-central part of the group.

Geology

The mine lies in the Cone Mountains rhyolite which for a half mile or more north of the mine is intruded and overlain by dikes and patches of dark fresh looking basaltic hypersthene andesite (spec. 311) and at about 400 feet north-northwest of the mine and camp by altered andesite ? (spec. 312).

In Squaw Peak, Arnold Mountain No. 2 ?, which stands at an elevation of 6,400 feet, figure 81, the rhyolite is capped by a reddish brown quartz-bearing andesite porphyry (spec. 325) 50 feet or more in thickness which seems to be related to that occurring at and a half mile below the Royal mine, figure 52 and figure 59-a. Sheeting or jointing in both the andesite and the rhyolite dip westerly. A N. 30° W. sheeting dips steeply NE. and a N. 40° E. sheeting dips steeply NW.

In Vein Peak, which is 3/8 of a mile southeast of Squaw Peak, the footwall of the Black Eagle vein seems to be a dike intruded into the lighter country rock rhyolite and may be genetically connected with the ore deposits.

The country rock rhyolite probably is not more than a few hundred feet in thickness since the lower workings of the Black Eagle mine 300 feet deep seem to penetrate underlying limestone on which the rhyolite appears to rest. Study of a specimen (No. 322) of this rock shows it to be a fine-grained lead-gray dolomitic brecciated limestone in part silicified. It is locally traversed by calcite quartz veinlets and contains alunite and a little pyrite.

Though the country rock on the hanging-wall side of the vein quite generally is rhyolite some of the rock in places on the foot wall corresponds to quartz latite or latite; e.g., in the face of the 30-foot crosscut to east on the 150-foot level the rock is dull reddish gray, highly altered and seems to be a tuffaceous quartz latite (spec. 316). The feldspar is altered to a mat of sericite.

Associated with the vein in places, chiefly on the footwall side, are also tabular bodies ranging up to 2½ feet wide of blackish rhyolitic obsidian which seems to represent post vein dikes or intrusions not genetically connected with the ore, of which an example occurs in shaft No. 1 near the top of the ridge.

Ore deposits

The ore deposits occur in the Black Eagle vein which strikes about N. 25° W. and dips with variations about 80° W. in the country rock rhyolite. It apparently extends throughout the length of the claim group and seems to be the same vein which continues southward on the Rawhide Nevada King and McMann groups with the same manganese-quartz characteristics, and to have an extent of more than a mile. On the McMann ground especially, it contains pockets and benches of sooty manganese ore said to be very rich. It varies from 2 to 20 feet or more in width and is composed of chiefly quartz and brecciated or crushed and altered mineralized rhyolite and other rock. The composition, however, varies from place to place. It contains also considerable kaolin, alunite, and manganese oxide, and in part is well banded, denoting deposition in open fissure space.

On the Black Eagle property the vein has been opened or prospected for a length of 2,000 feet and to the depth of 300 feet, mainly by two shafts and several crosscut tunnels, figure 81, (photo 22), and figure 82, (stope map). The footwall in general is well defined, and from it in places where the hanging wall is not well defined the ore deposits in some instances continue as replacements for the distance of 25 or 30 feet into the hanging wall.

At 400 feet north-northwest of the mine and camp the vein is 8 feet wide, dips 80° W. and consists chiefly of crushed and altered mineralized rhyolite. In the cellar tunnel it is 6 to 8 feet wide, carries considerable quartz and manganese and is all ore with the values as good in the rhyolite as in the quartz, and well disseminated in both quartz and rock. The rock in both walls is crushed for a considerable distance back from the vein.

In the Old tunnel the vein is 12 feet wide and dips 50° to the west. It is about all ore, and contains much alunite (spec. 317).

In the large Howard or manganese stope, which extends from a point near the 150-foot level to the surface, the vein is 12 feet wide, and strong with a good well-defined hanging wall and a fair foot wall, and values are said to favor the footwall side. It is all ore, much of which is of the black "manganese type", some of which is sooty, with pyrolusite and contains also quartz and kaolin, but the quartz portions do not carry any better values than the rest of the vein,

The croppings of the vein which approximately parallel the canyon at about 50 feet above the tunnels are in part prominent, figure 81, and consist of a 12 to 20-foot wide reef of black manganese and iron-stained quartz and silicified rhyolite (spec. 318), and show some crude banding denoting open fissure deposition.

On the 150-foot level in the new (incline) shaft the vein with depth has straightened up to a dip of 70° and the dip continues to steepen on down to the bottom of the mine and 300-foot level. Here the south drift, 430 feet long, contains 15 well-distributed raises or chutes and most of the way some prospect stoping extending to the height of 30 to 50 feet. This work was done mostly in 1911 when it was learned that a cyanide plant was needed to treat the ore.

Six to 18 inches of drab argillaceous gouge occurs on the footwall only. The hanging wall is hard, smooth polished rock. At some points the vein or ore-bearing part of the ledge is 20 feet wide and in the face of a crosscut extending 28 feet into the hanging wall the rock averages about $4 to the ton.

At about 400 feet south of the shaft the ore for a considerable distance along the drift runs about $60 to the ton and carries considerable bluish crushed quartz stained yellowish with limonite (spec. 320).

On the 180-foot level, horizontal slips or faulting are present and have disturbed the regularity of the ore and in places its values, and have mixed the vein with the crushed wall rock, especially the footwall rock and at 120 feet farther down, on the 300-foot level, a 130-foot prospect crosscut to the west is apparently all in wall rock. It follows a horizontal slip or fault whose upper surface or plane is highly polished by frictional movement.

Ore--The general average of the ore in the mine is about $10 a ton. But the range in value is from $2 up to several thousand dollars. In the old shaft the vein and values are good and regular from the surface all the way down to the bottom of the mine or 300-foot level. A microscopic section of the ore shows it to consist chiefly of shattered vein quartz and adularia with a small amount of dark silver sulphide, all of which after having been faulted and fractured was recemented by a network of secondary veinlets of mostly isotropic minerals composed of chalcedonic silica, kaolin, opal and alunite, resembling fine-grained volcanic tuff.

An economic feature of the mine is the softness of the vein and great ease with which it can be mined. In general, a round of shots at the base of an ore face results in bringing down a large overburden of ore broken in condition to be carted away. On the middle and lower levels augurs instead of drills are used in blasting with the result that a man puts in 15 rounds per shift or a three-foot hole per half hour.

From the stopes known as the Wiley lease in the old shaft, figure 82, 1,700 tons of ore averaged $25 to the ton. Here the vein consists of the talcy ground-up substance with quartz (spec. 321).

On the 200-foot level of the new shaft the vein is vertical or has a steep reverse dip. The rock is tuffaceous. (spec. 324). The ore is sulphide and runs about $5 to the ton. In general, however, the sulphide ore in the bottom of the mine runs only $3 and the values are mainly in the quartz, which is chiefly darkish gray and has been more or less crushed or brecciated and recemented and is crudely banded, and not calcareous (spec. 323). As each shaft is 300 feet deep, and the collar of the new shaft is 60 feet lower than that of the old shaft the bottom of the new shaft is accordingly 60 feet lower than that of the old. The supposed ground-water table and upper limit of the sulphide zone stand at the depth of about 300 feet.

Though panning is employed in making preliminary ground tests in mining the deposits, because the manganese coating obscures the particles of gold and ore in the pan, the values are determined by assay where accurate results are required.

Profound hydrothermal alteration has taken place in both the wall rock and the vein, with the result that large quantities of the vein are alunite as described on page 57, and shown in figure 60, or kaolin and sericite and large masses of the rhyolite wall rock have been altered to and replaced by chalcedony and opal, which minerals occur also in the vein and ore. In the hill to the north of the Blacksmith Shop and road the chalcedony-opal rock forms a bed or mass 50 feet or more in width. It is whitish with a vitreous luster and hackly fracture (spec. 549).

North of the Black Eagle claim group near the end line of the Eagle fraction claim, there occurs, according to Mr. E. Nichols, a 6-inch wide vein of barite cutting the country rock rhyolite.

Gray Eagle mine[12/]

12/ In preparing this statement the field notes of F. C. Templeton have been helpful.

The Gray Eagle mine, owned by the Nevada-Buckeye Mining Company, of Youngstown, Ohio, is 2½ miles west of Rawhide and about a half mile west of the Black Eagle mine. The property comprises a group of 18 claims which joins the Black Eagle group on the west and flanks Squaw Peak on the same side, figure 52 (special map).

The mine is among the early day (1908) workings, and from its stopes through the tunnel it soon produced some good ore in which, according to E. W. King, the values were nearly all gold. At time of visit in 1913 some ore was sacked at the shaft on the southern part of the property.

The mine is developed mainly by a 100-foot shaft and 440-foot tunnel with crosscuts, drifts, and stopes, the work being mainly on the tunnel, figure 83 (tunnel map).

Geology

The country rock is mainly the white rhyolite and the underlying mud rock formation. Dacite tuff is also present north-northwest of the tunnel. As shown in the workings, mineralization occurs chiefly in the white rhyolite. The rocks have suffered considerable disturbance and are cut by several small north-south faults and are locally brecciated. Dim flow ? structure or sheeting? seen at a few places in the workings dips steeply southeast or easterly.

In the east fork of the tunnel the hard rhyolite ? appears to be imperfectly bedded with the bedding structure dipping 60° NE.-SE, and in the north branch of the main stope the bedding planes dip 64° SE.

In the north stope of the tunnel at point of forking the contact of the Balloon rhyolite on the underlying dacite tuff dips 85° E. and in the face of the south fork of the stope the contact here pretty well defined between the rhyolite and the mud formation dips 70° S.

In places the dacite contains considerable fibrous gypsum in layers up to an inch in thickness, and the mud rock, e.g., at 30 feet in from the portal of the tunnel contains a 10-inch lens of so-called talc which, however, microscopic examination shows to be alunite.

Deposits

The deposits occur in several veins which strike a little east of north. They are mostly silver-bearing veins but in the Gray Eagle vein, which lies toward the western border of the property, the useful metal is chiefly gold. Also in the face of the main workings or stope the vein or ore bed carries a 3-inch to 12-inch band of dark-greenish brown gold ore and the raise in the stope contained on either side a 3-inch breccia vein.

The alunite which is massive, brittle, and nearly white with a slightly reddish tinge occurs in tabular sheets or lenses ranging up to a foot or more in thickness, parallel with the vein (spec. 317). It is characteristically present on slip planes or slickensides.

In general, the wall rock is considerably shattered for 40 or 50 feet back laterally from the vein, and in places it contains recementing veinlets of quartz and adularia, the two minerals in places being alternately banded (spec. 315). In Vein Peak and south of there the footwall seems to be a large dike, a section of which extending from a point in the south slope of the peak for 1/10 of a mile southward is faulted several hundred yards to the east.

McMann group

The McMann, Royal and Royal Tiger groups here described were mostly located by McMann and associates but later acquired by Otto Steinheimer and associates through whom they came to be known as the Steinheimer group or mine. The Steinheimers were among the first to do important mining development in the Reward camp, and by opening up the new Reward-Schurz road greatly shortened the haulage distance to the railroad.

The McMann group or so-called mine joins the Black Eagle mine on the southwest and contains about 4,000 feet of what is regarded as the continuation of the Black Eagle vein which extends longitudinally through the Partnership and McMann claims and across the intervening Partnership No. 2 and Reward claims. Throughout this extent the vein has been prospected at about 40 points by crosscut tunnels, pits and shafts aggregating probably more than 2,000 feet of work, with several of the tunnels exceeding 200 feet long, but so far as learned without production or encouragement. Some of the ground seems to have been worked by the lease block system similar to that in Rawhide.

Much of the deposit is regarded as a replacement quartz vein in a porphyry dike, and capable of producing a good grade mill ore. To the southwest of this property and its mineralization are veins and mineralized dikes of low grade mill ore running about $4 to the ton and accordingly not now workable.

Royal mine

The Royal mine owned by the Rawhide Royal Mines Company joins the McMann group on the east. The property consists of a group of 4 claims known as the Wonder King group, with the United States location mineral monument No. 217 located on its southern border. It is said to have produced considerable good ore in the early days of the camp. Three feet of the lode is said to have assayed nearly $1,400 to the ton, chiefly in gold.13/

13/ Root, W. A., The development of the Rawhide district: The Mining World, April 1908, vol. 28, p. 671.

The vein strikes N. 15° E. and dips 60° W. in shattered mineralized rhyolite. It is about 7 feet wide and seems to consist chiefly of iron and manganese stained mineralized crushed rock and quartz in joints, seams and fractures of the rhyolite much as in the Hooligan Hill ore zone, figure 61 (photo 23). There is in general but little quartz present. A specimen of the ore examined contains disseminated pyrite. The vein is opened by shaft and tunnel to the depth of 400 feet and a trench several hundred yards in extent on the croppings.

Royal Tiger mine

The Royal Tiger mine, located nearly 2 miles west of Rawhide, joins

the Royal mine on the northeast, figure 63 (Arnold claim map). The property consists of 2 claims, the Royal and the Tiger. It was discovered by Carl Bray and later in 1908 purchased by the present company, the Royal Tiger Mining Company for $30,000, who later sold the Royal lease, 200 feet by 600 feet in area for $25,000, and which yielded much rich shipping ore running $800 to the ton. A car load of ore shipped from the Stinson lease is said to have averaged $150 to the ton.14/

14/ Amer. Mining Review, vol. 23, No. 22, May 30, 1908, p. 17.

Also the showings on the Upton lease on the Tiger claim were very exceptional.

The country rock is rhyolite which is much broken, and is locally intruded by rhyolitic obsidian as at the Black Eagle mine and by purplish gray speckled porphyritic Pilot Cone ? andesite (spec. 328), as shown by croppings in the gulch 50 feet southwest of the tunnel to the hanging wall side of the vein and in the tunnel, at 150 feet in from the portal.

There are 3 veins or lodes contained in the shattered rhyolite, of which the main vein strikes N. 23° E. and dips about 60° to the west. The ore occurs chiefly in a belt of blocky or shattered rhyolite forming the hanging wall rather than in the vein itself or what is worked as the vein, the structure in the rhyolite being peculiarly favorable for the accumulation of the ore, and it extends in depth to the 3rd or 200-foot level.

The mine is opened to the depth of 550 feet, including a 100-foot winze at the bottom, mainly by a shaft and tunnel with levels turned at the depths of 25, 110, 200, 450, and 550 feet respectively, and with drifts and crosscuts on each level adequate for testing the ground. Good grade ore containing free gold is said to occur in the bottom of the mine.

The shaft stands at an elevation of about 6,050 feet and the tunnel, which is known as the Tiger tunnel, is about 100 feet lower down the slope, and runs N. 40° W. At the portal of the tunnel just above a pink rhyolite dike (?) occurs a reddish iron and manganese-stained rhyolitic obsidian dike 8 feet or more wide (spec. 322) dipping 65° to the west, above which is a 4-foot vein of crushed, altered and brecciated rhyolite in part altered to a "mud vein" and containing mostly hard brecciated quartz boulder-like bodies and lenses 10 feet long and said to run 26 ounces in silver to the ton, above which comes the hanging wall of mineralized and in general crushed light rhyolite. At only 40 feet in depth the vein already contains much pyrite and other ore mineral.

The production is said to be about $8,000 of which about $6,000 was high grade shipping ore running several hundred dollars or more to the ton. Later considerable lower-grade ore was hauled to the Nevada New Mines Company mill, and still later some ore was shipped by H. S. Guinan.

The ore nearly all came from near the surface, mostly from the 1st or 25-foot level, and seems to represent chiefly secondary enrichment. So far as learned the operators found but little encouragement for deep mining.

To the northeast of the Royal Tiger and neighboring mines in the southwest side of the pass which stands at an elevation of about 6,150 feet and separates the Reward drainage on the southwest from that of Rawhide Gulch on the northeast, occur two or more good-looking veins which dip 20° to 60° westerly in the rhyolite and are said to carry fair values. They are more or less faulted and shattered. The croppings and ore are pink and brownish iron and manganese stained rhyolite and quartz, in part streaked with dark silver sulphides (spec. 330). To the southwest of the pass the ore deposits occur in or below a reddish glassy rhyolite dike or bed which is from 50 to 300 feet in thickness (spec. 331), whereas to the northeast they occur above, or at a higher horizon than this rock.

Bullskin Mountain mine

The Bullskin Mountain (or Penglaze) mine is 1¼ miles west-southwest of Rawhide in the hills forming the lower southeast slope of Bullskin Mountain at an elevation of about 5,850 feet, figure 54. It is owned by the Nevada Silver Company. The property consists of a group of 6 or more claims known as the Bullskin Mountain group, figure 84, (vein map). It joins the Rawhide Metals property on the southwest and that of the New York mine on the east. It began to be worked prior to 1913, but the production by 1920 so far as learned had not much exceeded $30,000. Much of the ore was milled at Rawhide, including 500 tons it is said which ran 25 ounces in silver and $4 in gold to the ton. The value ratio of the precious metals contained of the ore as a whole is about 90% silver and 10% gold, assuming silver to be worth $1 an ounce.

The country rock is the Cone Mountains rhyolite, and it is intruded by a belt about 500 feet wide of greenstone or altered andesite ? extending in a north-northeasterly direction across the property. The deposits occur in both these rocks, figure 84. (vein map). The east contact between the two rocks dip west-northwest. The andesite, which is dull apple-green in color and seems to contain much epidote, has been highly altered, crushed and recemented with a network of minute veinlets composed of quartz, lime and iron carbonate, including probably ankerite, and ferruginous dust-like material.(spec. 263). The rock weathers dark or blackish somewhat similar to the Black Buttes andesite, and the manganese and iron material leached from it readily darkens the surrounding rhyolite.

Deposits

The deposits occur in a half dozen or more steeply dipping veins in the rhyolite and andesite. The veins in general are small and not extensive. They are composed chiefly of crushed, altered and mineralized rock and contain relatively only a moderate amount of quartz. The valuable metals are silver and gold and the principal ore minerals

are cerargyrite, iodyrite ? and argentite. The veins consist of two sets or groups, an east-west or lower set and a north-south set locally referred to as the upper or cross veins. Those of the former are the more numerous and important and seem to be the older, as shown in figure 85, (sketch), showing an east-west vein cut by a north-south vein. The prevailing dip of the east-west veins is steeply north and that of the north-south veins steeply west. At the time of visit in 1913 the deposits had been opened to the depth of 200 feet on the shaft vein on the Bullskin Mountain claim No. 1, on the rhyolite-andesite contact. The vein is 3 feet wide and dips 70° N. about parallel with the structure in the wall rock rhyolite. At and near its point of intersection by the west vein, as shown on the 45-foot level, it carries a 6-inch wide shoot of rich silver ore. Elsewhere in the vein and to some extent in the wall rock the ore occurs largely in fractures and as replacements. The ore minerals are mainly cerargyrite and iodyrite. The ore as mined is mostly fine or of small size, must of it resembling screenings. It is said to average about 7 ounces silver and $9 in gold to the ton. Panning is employed as a preliminary test in guidance of the operators.

In 1920 there was reported to have been stoped from the shaft mine east of the shaft between the surface and the 100-foot level 30 tons of ore that averaged $45 to the ton as indicated in figure 86.

Tunnel vein

The Tunnel vein lies about 150 feet south of the shaft vein and is opened by an adit driven westward at a point 300 feet southwest of the shaft and across the gulch. The vein dips 80° S. in chiefly andesite. It is only 3 inches wide but has an extent of 1,000 feet, of which 300 feet lies east of the portal and 700 feet to the west of it. The most of it is said torun about 500 ounces in silver and several ounces in gold to the ton. It contains but little quartz. The ore minerals, cerargyrite and iodyrite, are intimately associated with black manganese oxide.

In No. 2 tunnel, about 200 feet long, the vein in 8 inches wide and contains some sulphide quartz ore of which a considerable quantity runs several hundred dollars to the ton. Some of the later quartz is chalcedonic.

On the Bullskin Mountain No. 2 claim, at an elevation of 5,900 feet, on the Backlin-Flynn lease a fault vein in rhyolite was opened to the depth of 80 feet. The vein is 3 feet wide and consists largely of shattered rhyolite with the ore contained in the fractures similar as at Hooligan Hill, figure 61. The values occur mostly in the 18-inch hanging wall part of the vein which averages about $42 in silver and $8 in gold to the ton. Some of the ore shipped ran $600 to the ton. At the depth of 50 feet the vein is offset by a fault with low dip, and shows drag material, and here considerable ore was mined. Beyond the fault the vein resumes its normal course and values which it maintains to the bottom of the mine, and considerable ore had been stoped out especially to the east of the shaft. The vein is thought to extend south-easterly to the New York ground, and at an intervening point on this course a prospect opening shows a 3-foot wide "ledge" of compressed or laminated black ferruginous manganese oxide containing considerable crystalline manganite (spec. 266), but the

deposit is not regarded as of any commercial value for manganese at the present time.

New York mine

?Bucksk in?

The New York mine, owned by the New York Rawhide Mining Company, is southeast of the Bullskin Mountain mine in the northeast slope of Chicago Mountain on a fissure or fault seam which dips southwest in the rhyolite, figure 63, (Arnold map), and figure 54 (photos 27-28). It is opened by three adits of considerable length spaced about 80 feet apart vertically, the upper one being at an elevation of about 5,650 feet. On the strength of the ore showing in the portal of the upper tunnel much stock, it is said, was sold and considerable work done. But the ore, which looks well and contains much rusty brown iron-stained pale greenish quartz pseudomorphic after calcite or other spar, did not continue in extent but appears to have been only a local pocket or body similar to those described in Burns Hill near town.

The Rawhide Metals mine

The Rawhide Metals Mine, credited with having produced some good ore, is about one-third of a mile southeast of the Bullskin Mountain or Penglaze mine. It is in the southerly side of the ridge that extends southeasterly from Bullskin Mountain at about 100 feet below the crest and at an elevation of 5,750 feet, figure 52 (large scale map). The elevation of the Rawhide metals saddle is 5,650 feet.

The country rock is the light-colored rhyolite (specimen 262) which is fine grained and considerably kaolinized, much of it being no longer firm.

The shaft which is 150 feet deep and equipped with a hoist is sunk on the contact of the rhyolite with a dike of dacite which is medium grained, drab gray, porphyritic, and contains considerable hornblende and biotite. From here the contact between the light rhyolite on the northwest and the tuff and andesite on the southeast extends southwestward about direct for Pilot Cone. Also a long tunnel with its face beneath the ridge is driven to the northeast.

Outlying prospects in the west zone

Lappatt Lead mine

The Lappatt Lead mine is 2½ miles southwest of the Black Eagle mine and 3 miles southwest of Pilot Cone in the west base of the mountains near the eastern edge of Copper Mountain Basin. It is reached from the southwest by 4 miles of good road which connects it with the Schurz-Dead Horse Well road, figure 3, (topo, map). It has made a small production.

Geology--The geology in this area, so far as mineral deposits are concerned, consists mainly of the Jura-Triassic ? limestone-quartzite-shale-slate series of sedimentary rocks and granitic intrusive by which they are invaded. The mineral deposits or so-called veins, several of which are from 1 to 4 feet wide, occur along the contact of the granitics with the sedimentary rocks, mostly in the sedimentaries as contact metamorphic or replacement deposits. Besides lead, most of the deposits contain also a little copper and some of them iron, but the copper does not appear to be intimately associated with the galena.

The Lappatt Lead mine, according to the owner, Edward Lappatt, is on a granite-quartzite contact and is opened to a depth of 190 feet. The ore from the surface down is mostly lead carbonate and galena. It occurs seemingly as replacement mainly in the quartzite and in fault breccia and gouge forming a part of the lead along the contact, but as it decreases in value at shallow depths and showed no sign of improvement in the bottom of the mine, Lappatt temporarily suspended active operation but continued to do the required assessment work on the property in 1916.

Queen Regent Merger group

The Queen Regent Merger group, formerly the Queen Regent Copper and Gold group, comprising 17 claims owned by the Queen Regent Merger Mines Company of San Francisco, is about 6 miles southwest of Rawhide, figure 3 (topo. map) and figure 63 (Arnold claim map). It has also been called the Kerr mine. The discovery of mineral on the group is said to have been made by James "Jim" Murray in 1907.

The Company was operating with a small force of men in 1913, the manager being Mr. Tridell by whom, and W. E. Davis, who also worked there, much of the present information was kindly supplied.

Deposits--The deposits contain copper, iron, gold, and silver, especially in the gossan and croppings. They occur mainly on a quartzite-limestone-diorite contact with bluish gray Mesozoic limestone forming the hanging wall and into which the diorite (spec. 349) seems to be intrusive and probably is genetically connected with the deposits as the limestone is altered and silicated along its contact which in general dips steeply east. These rocks in turn are cut by lighter colored monzonite dikes. The diorite is a dark gray or black and gray speckled medium-grained granitoid rock and contains much hornblende. It is pressed or slightly schistose in texture and is probably of late Mesozoic age.

The deposits are opened mostly by several shafts, short tunnels, and drifts. The deepest shaft, which is about 400 feet deep, and is locally known as the iron mine was started on a quartz cropping for gold and copper. At the depth of 250-300 feet it passes through a 50-foot wide blackish iron dike, dipping about 40 degrees east, figure 87, and which, in general, seems to be a fine-grained greenish-blackish iron-bearing amphibole (spec. 351).

The lode is said to have a horizontal extent of a half mile. At the shaft from the surface to the depth of 300 feet, where it becomes brecciated or conglomeratic with considerable quartz on the footwall side and decreases in iron content, it is said to consist mainly of iron ore which averages 50 percent in iron. Study of a specimen (350) from this part of the lode

under the microscope and in polished section shows the material to be about 60 percent fine-grained magnetite containing a little greenish amphibole, calcite, quartz, and copper carbonates, all more or less uniformly disseminated. The calcite and quartz occur mostly in jagged interstitial bodies, and were formed later than the magnetite.

Also at about one-fourth mile southeast of the mine shallow workings in the limestone present encouraging showings in copper which are apparently associated with the diorite-limestone contact nearby. At about a third of a mile to the north of the iron mine openings 50 feet deep on quartz veins in Tertiary rhyolite present good showings in gold and silver which, however, do not seem to maintain their metal tenor in depth.

Raines Iron prospect

The present note on the Raines Iron prospect, owned by W. M. "Billy" Raines, 7 miles northeast of Double Spring, 12 miles northeast of Schurz, and 10 miles west of Rawhide, is based on an examination made of specimens of the ore and rock and a letter received from Mr. Raines in August 1927. The rock specimen said to form at least one wall of the deposits is a fairly fresh reddish-gray fine-grained quartz monzonite porphyry sparingly speckled with small glassy feldspar and blackish augite and hornblende phenocrysts. It is cut by joint planes and marked by pressure lines and is similar to the intrusive and dike rocks in the neighboring Benway and Copper Mountain camps. The specimens of ore, of which there is said to be a large quantity in sight, are reddish brown massive botryoidal hematite and finely crystalline blackish hematite, which seems to have been derived from pyrite. The material is of high specific gravity and contains by estimate about 40 percent iron. With the crystalline hematite, especially on joint planes, is associated considerable greenish chloropal, a hydrous silicate of iron and aluminum, which is a secondary product of alteration resulting from the breaking down of pyritic ore and rock by weathering.

As the ore specimens appear to be from croppings or gossan, it is inferred that the deposit probably grades downward into siderite or magnetite and finally into pyrite.

Placer deposits

Location and topography

The Rawhide placers occur chiefly in Rawhide Wash (also erroneously called Rawhide Canyon) and a couple of its tributaries near Rawhide. They extend from the town and Hooligan Hill on the west about 6 miles southeastward to Alkali Flat, and are about all contained in a belt about a half mile wide.

The presence of gold throughout most of this distance was shown during the Rawhide boom days of 1907-1908 by pits and shafts sunk in a somewhat desultory manner by sundry miners and prospectors and later in the lower part of the course by wells sunk by mining companies in or near the edge of the Flat for water. In the lower 2 miles of the deposits, however, extending from the foothills to the Flat the gold is not yet known to be present in commercial quantities.

Rawhide Wash is about one-fourth mile wide and open, figure 54 (photo), and has a maximum depthto bed rock of about 90 feet. On the north, however, the deposits have a width of a half mile or more and as such they extend from Balloon Hill on the east and Hooligan Hill, Climax, and Holland-Ricard shafts on the west, about a mile southeastward to the National Mill Hill. As noted under topography, its surface, all parts of which are easy of access, has a fairly uniform gradient of 175 feet to the mile or 3.3 percent throughout the extent of its course and may be likened to the bed of an aggraded stream.

History and production

The deposits were discovered in the early boom days of Rawhide, 1907 and 1908, during which period and just after they were worked by about 500 men, mostly with dry washers, the ground being divided into claim blocks 50 feet square. Some operators sluiced the gravel with water hauled from Dead Horse well in Alkali Flat for which the price was $1 per barrel. Most of the gold was mined from rich streaks and bars of gravel on bed rock, but considerable was also rocked and panned from shallow deposits in the side gulches almost from the surface down, especially between Hooligan Hill and National Mill Hill.

During this period many pits and shafts were dug of which 25 to 30 shafts were sunk 40 to 90 feet deep to bedrock. Owing to scarcity of water many sorts of dry-process devices were employed to recover the gold, the most important of which were large dry washers driven by gasoline engines. Some of the washers had chain or belt cupped elevators and were quite well equipped. Since then the deposits have continued to be worked at intervals. Any broke prospector, it is said, readily takes out from $2 to $4 worth of gold a day to replenish his larder with flour and bacon.

In 1913 a couple dry washers were in operation at Roseberry Hill and vicinity and by August the merchandise store of J. C. Carter had taken in for that year $500 worth of the newly mined gold.

In 1915-1916 the placers were being worked with dry washers by a few parties mainly between Hooligan and National Mill Hills and at the Davis-Light mine in Rawhide Wash near the south end of Murray Hill.

In 1930-1931 the first 1½ miles of the deposit extending from the town to the National Mill Hill was said to be owned by the Crutt Brothers and the remaining 4½ miles by the Hart Syndicate composed of Frank Channing, B. G. Good, and R. G. Hart. The latter tract contains 1,200 acres and includes several old workings that yielded rich gravel on bed rock and is estimated by the owners to contain about 100,000,000 cubic yards of gravel that will average 50 cents to the cubic yard[15/], or a

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15/ Nevada Mining Press, April 10, 1931, p. 1.

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total of about $50,000,000 worth of gold.

During 1930 and 1931 the syndicate did some drift mining next to bed rock at the bottom of a 92-foot shaft on the Nuggett claim using dry washers on the surface to recover the gold. Here the 5 feet of gravel next to bed rock is said to average $2 in gold to the cubic yard, and some to contain as much as $5 to the cubic yard. The gravel is first screened to a grade in which the fines constitute about 40 percent. One washer was built to treat 100 tons of gravel a day. It employs an air current blown through a wide inclined travell canvas screen or belt studded with riffles to separate the gold from the gravel and a barrel amalgamator.

In November 1930, the Idaho Gold Dredging Company, of Boise, Idaho, took a bond and lease on about all of the deposits, 1,800 acres or more extending from Rawhide to the edge of the foothills, and made a preliminary examination with a view to dredging them if subsequent churn drill tests should indicate enough gold present to warrant consummation of the project16/,

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16/ Nevada Mining Press, December 12, 1930, p. 1.

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and later the deposits were being thoroughly sampled by the Hammon Engineering Company of San Francisco operating under the same bond and lease, which included payment of $75,000 within five years and certain royalities on the production. In May 1931, however, this company also discontinued sampling and the property reverted to the original owners. The reason for the Company's relinquishing the option seems to be the erratic distribution and low average values of the gold.

Production

The placer gold production of the district is variously estimated from $100,000 to $250,000. Probably $200,000 is a fair figure. J. C. Carter had by 1913 received and shipped out from the camp over $30,000 worth of the gold. Also during and just after the boom days five or six other firms bought the new gold, and a considerable quantity is known to have been carried out by prospectors individually among whom James "Jim" Borden took out $3,000 worth.

Deposits

The bed rock in which the channel of Rawhide Wash is carved and on which the placer deposit rests for at least the 4 miles of its course, extending from the town to the outer edge of the foothills, is composed of volcanic rocks, chiefly rhyolite, and in cross section the sides or rim rock seem about everywhere to be of fairly gently slope. The deposits fill the channel from the bottom to the present surface to maximum depth of 90 or more feet. They consist mainly of a heterogeneous mixture of coarse- to fine-angular wash material ranging from bits of silt, fine-grained sand and grit up to boulders nearly a foot in diameter. In general, they are crudely or discordantly stratified. They are composed mostly of light-colored volcanic rocks which are predominently rhyolite.

Of the gravel, especially in the upper part of Rawhide Wash, a considerable portion of the pebbles tend to be dominantly elongated or crudely finger-like in form with rounded terminations, which feature seems to be due to the structure of the slate and other parent rock from which they were derived.

In depth the deposits are not wet but usually just moist enough for the material to cohere or stick together when pressed in the hand.

In many places the 5 or 6 feet of gravel next to bed rock, though not lithified, are partially consolidated or cemented by a sort of manganese-iron oxide argillaceous mixture, which feature causes it to stand so firmly that blasting is employed to loosen it, and widely spaced pillars of the material left standing in mining readily support the 60 to 90 feet of overburden, an important feature in scarcity of timber. The clay in the matrix seems to be derived mostly from decomposition of feldspar in the rhyolite and other rocks.

Gold

The gold occurs irregularly distributed throughout the deposits from the surface down to bed rock, but generally in commercial quantities in the lower part of the section only, mostly on or near bed rock. Here the commercial gold occurs at various horizons in so-called pay streaks, a few of which are as much as 10 or 12 feet above bed rock. As seen in the Lease shaft below Murray Hill, the pay streaks are from 5 to 12 feet wide and from 3 inches to 14 inches in thickness. They represent former water channels and these the miner tries to follow.

In some instances, as shown in the Davis-Light mine, a pay streak may gradually leave the bed rock and in a comparatively short distance become separated from it by several feet of gravel.

In the pay streak the gold is irregularly distributed or bunchy and varies from a few cents to several dollars to the pan. Usually the dark brown ferruginous oxidized appearing layers of the gravel contain the best values and in most cases are a good guide to follow in search of pay dirt.

On bed rock the richer pay occurs where the floor is sufficiently rough to form natural riffles or where it is benchy with the benches being from 1 to 2 feet above one another.

The erratic distribution of the gold seems to be due mainly to the precipitous manner in which it was deposited, namely by torrential floods or violent rushes of water and debris due to cloudbursts that were of startling short duration and occurrred at comparatively wide intervals.

The gold is mostly coarse and rough and has yielded nuggets up to $50 in value, one of which on exhibit at J. C. Merz' "Dads" restaurant was seen by the writer. It was said to be from bed rock 90 feet deep in the Golden Wonder mine about a half mile below the National Mill.

A small handful of other gold said to be from the Grutt Consolidated placer mine west of Murray Hill contained several pieces worth 75 cents to $1 each.

The gold varies in grade of fineness from $16 to $11 and averages about $14 to the ounce. That in the upper part of Rawhide Wash derived from the Balloon and Murray Hill area is said to be more persistently yellow and of better grade than that in the Hooligan Hill region. The lighter-colored or lowest-grade gold is found in the gulches west of Hooligan Hill and is electrum. It seems to have been derived from silver deposits in the Cone Range.

Mines

Grutt placer mine

The Grutt placer mine is in Rawhide Wash about a half mile below Rawhide and opposite the south end of Murray Hill. It is opened by a 65-foot deep shaft to bed rock which is rhyolite. It was active when examined by the writer in 1913. The gold was being won by dry washing. Two pay streaks were being worked, one on bed rock and the other at about 3 feet above it. They were each about 8 feet wide and lay nearly horizontal but converged slightly to the north or upstreamward in which direction at no great distance the upper streak was supposed to join the lower. They were separated by about 2 feet of gravel locally called false bed rock but which did not seem to differ from the ordinary run of gravel found elsewhere. The pay streak on bed rock was about a foot in thickness and carried its coarsest gold conspicuously in or near the bottom mostly in the rougher part of the bed rock floor.

The upper pay streak was 14 inches in thickness and consisted mostly of coarse sand or finer material than the average gravel and was slightly argillaceous and consequently less pervious at the base.

The gold in the pay streak is irregularly distributed, bunchy or pockety and varies from a few cents to $2 to the pan of gravel. It is mostly coarse, rough, and wiry or porous. Some of the largest pieces found on bed rock were worth 75 cents to $1. Parts of some wiry specimens are interlinked and apparently hold the same relations they had in the Mother Lode quartz matrix similar to lode specimens found in the Kearns No. 2 shaft. Though it has a fairly good yellow color, it is said to average only about $14 fine to the ounce. A tablespoonful of the dry washer concentrates from this mine (spec. 434) examined microscopically by the writer was found to consist of about 90 percent black sand and to contain 16 or more small particles of gold. Eighty percent of the sand was fine-grained magnetite. Other minerals in the sand mostly subangular and but few of them well rounded are mostly quartz and chalcedony with a scattering of garnet, hematite, plagioclase, hornblende, augite, chlorite, olivine, zircon, and muscovite. The gold particles are all of good yellow color except at points where they have been mechanically shattered or bruised by erosion. There the color is lighter and approaches that of electrum. The largest piece is slightly more than two-tenths of an inch long and five-one-hundredths of an inch in width

and thickness and is slightly curved. Excepting one side, which is slightly porous or perforated, its surface is mostly nodular, botryoidal, or beady, having the appearance of being composed of numerous minute nuggets or beads. One side near its middle part contains a small elongated piece of quartz, part of which is stained reddish by hematite.

Golden Wonder mine

The Golden Wonder mine is about 2½ miles below Rawhide and 1½ miles below the National Mill on the opposite side or east rim rock of Rawhide Wash, here called the bench. When visited in 1913 it was opened mainly by a shaft 90 feet deep to bed rock and was being worked by several prospectors jointly. The gold was being extracted by a dry washer driven by gasoline engine which readily handled a ton of gravel per hour. Although the shaft was five years old, it having been sunk and considerable drifting and mining done in it in 1908, the gravel was so firmly cemented that the ground still stood well, a few remaining pillars without timber supported the 80 odd feet of overburden, and drilling, augering, and blasting were employed to loosen the gravel being mined.

Here the lower 8 feet of the gravel were said to be commercially valuable and to run several dollars to the cubic yard, but operations were then being confined to the lower 6 feet, which were said to run about $5 to the cubic yard. The richer pay occurred in the 8 inches next to bed rock, a considerable portion of which had been mined by the previous owner and is the source of the Merz $50 nugget. Above the 8 inches resting on bed rock the next 5½ feet of the gravel was said to run about $3 to the cubic yard, to have yielded several pieces of gold worth $7.50 each. Twenty cubic yards of gravel just mined out averaged $3.50 to the yard.

Further down the wash is another 90-foot shaft in which the deposits are said to be promising.

Source of the gold--The roughness and coarseness of the gold and the gravel containing it indicate it to be wholly of local origin and not far traveled. It was derived by erosion and transportation from various Tertiary volcanic veins and lodes within the district, some of which are now being mined as shown by placer pay streaks on bed rock in the Davis-Light, Crawford, and other placer shafts below Rawhide leading up to the Morning Star, Trost, and other lode mines in Murray and Balloon Hills and vicinity.

In some areas, as a couple miles east of Rawhide, the contributing veins and lodes, together with their containing volcanic rocks, have been completely eroded from off the sediments that now underlie the surface as described under the Titanic prospect, page 185.

Outlook--The 5 miles of the deposits extending from Rawhide and Hooligan Hill to the edge of the foothills seem to contain a considerable quantity of gold, but because of the erratic distribution of the gold vertically and the heavy overburden covering most of it, they probably cannot be profitably exploited on a large scale as by dredging, although ample water for this purpose could be pumped from Alkali Flat. Perhaps some gain could be

made by working the ground in large tracts through a few long tunnels or gently inclined shafts through which the pay dirt could be brought to the surface by tram and treated in a centrally located plant on a large scale instead of hoisting it through numerous vertical shafts as at present.

The lower 2 miles of the deposits extending from the edge of the foothills to about the middle of Alkali Flat have not been prospected. All of several wells sunk in them near the edge of the flats to depths of about 100 feet report them to contain gold, and some engineers suggest that the deeper "lake" beds in this section, supposedly composed mainly of material discharged from Rawhide Wash, probably contain much gold. Even so, unless pay dirt begins at moderate depths, there would be a very heavy overburden to remove, and underground mining would probably not be feasible in depth on account of water. The gold in this area is probably finely divided and doubtless more evenly distributed than in Rawhide Wash. The depth to which the deposits extend is not known. One well is reported to have attained a depth of 150 feet without reaching bed rock, but whether the deposits are gold-bearing to this depth is not known. As this part of the deposit is composed of fine material, its prospecting with churn drill or otherwise is an easy matter. The lower lying part of the area, however, should be undertaken in dry season only.