The country rock is mostly rhyolite (spec. 338), and is dimly bedded or flow banded. It is intruded by a couple north-southerly 40-foot dikes of the greenstone andesite. Hooligan Hill dacite is also present, as shown by shaft dumps and croppings at the northeast base of the hill. Other openings in the Hill and vicinity are ..... ?

Burns Hill and Silver King Hill

Burns Hill and Silver King Hill are respectively the southern and the northern slightly enlarged and higher ends of a partly mineralized low ridge situated a short distance north of Hooligan Hill at the northwest edge of the town, figure 54. (pan. photo 27-28). Though the hills contain several openings 60 feet deep they are not known to have made any appreciable production. In the low saddle between the two hills a shallow shaft shows a banded rhyolite-dacite mineralized contact which strikes N. 25° E., dips 70° W. and probably represents the vein that appeared in a deeper shaft to the north.

Silver King Hill

In Silver King Hill, the country rock which is rhyolite, especially in the east slope of the Hill, weathers porous or honeycombed as if it had been very pyritic. Jointing as shown in shafts dips steeply westerly.

A 60-foot shaft in the southwest slope of the hill in light partly iron-stained light-colored rhyolite has a little rusty brown material on the dump but not much showing for ore. Just below this shaft in the south slope of the hill a 50-foot incline shaft shows a 6-foot wide sheared and seamed mineralized zone in brownish rhyolite, which strikes N. 70° W., and dips 65° N. into hill. A few tons of silicified rock and quartz, which seem to be low-grade ore, are piled on the dump.

Burns Hill

Dacite occurs in the northeast slope of Burns Hill and also in the southeast slope, whence it extends northward in the east face. It probably connects with the larger body of dacite on the east extending from Last Chance Hill southward to Hooligan Hill.

The Charter Oak prospect in the southwest slope of Burns Hill is opened by a 100-foot shaft in rhyolite and has apparently produced some ore. It is on the mineral lode or zone described last under Silver King Hill. In places the rhyolite in small seams has weathered to soft mud-like gouge.

A distinctive feature of Burns Hill is the occurrence, especially in its upper northerly slope, of bodies of platy pseudomorphic quartz 10 to 12 or more feet in diameter and several feet in thickness, figure 59 (spec. 247). Some of the plates are about 3 inches in diameter, and some slabs several feet in diameter are frozen to what seem to be walls of fissures. This and the New York mine are reported to be the only localities in the district that contain this pseudomorphic phenomena on so large a scale.

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 62, 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.

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

New York mine

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 5,050 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 perc[illegible]n 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. G. 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 total of about $50,000,000 worth of gold.

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

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, 1,600 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/,

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

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" Lorden 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 todiffer 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, sugering, 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 insteadof 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.

EAGLEVILLE (HOT SPRINGS) DISTRICT

Location and topography

The Eagleville district, also known as the Hot Springs district, centers at a point about 6 miles east of Rawhide. It is 30 miles northeast of Nolan, the nearest railroad station, 36 miles north of Luning, and 40 miles southeast of Fallon to which 25 miles of the route is over the Lincoln Highway.

The deposits are mostly contained in an east-west area about 8 miles long by 3 miles wide, figure 88, (topo. and geologic map).

The topography is mountainous. The district lies in a cross belt of low mountains that loosely connects the south end of the Sand Springs Range on the west with that of the Fairview Mountains on the east and separates Gabbs Valley on the south from Fairview Valley on the north. Most of the district is drained southward into Alkali Flat.

The two main settlements or camps, which are small, are Eagleville toward the northeastern part of the district and Sunnyside toward the southwestern part. The former electric power line to Fairview and Wonder extended northward through Sunnyside.

History and production

Mineral in the district was discovered in the early seventies or before at the site of the Harry Mann mine 3 miles northwest of Eagleville, for the treatment of whose ore the old Monte Cristo mill, then known as the Whiting mill, was built at the edge of Alkali Flat 5 miles southeast of Eagleville. The mill was operated in 1874 but with poor success, owing to the Mann mine ore being too basic. In these early days ore of less than $90 grade could not be shipped. At about this time mineral was also discovered at Sunnyside by Richard "Dick" Flynn who named his first discovery the Sunnyside and the next one the Great Eastern.

Also in the early seventies the Murphy copper-lead deposits were discovered by John Murphy, pioneer resident at Alkali Flat, along the granite-limestone contact in the western part of the district from which occasional small shipments of ore were made.

In 1882 the Great Eastern group of four claims was bonded for $16,000 of which $1,000 was paid and the bond later relinquished. Since then the camp has shipped $5,000 worth of mostly gold ore running about $156 to the ton besides which moderate shipments have been made from time to time by Tom Kenyon and other parties. Some were being made from the Kenyon property by lessees in 1934[1].

1/ Mining Review, August 22, 1934.

The most of the early-day ore averaged about $55 to the ton. The camp can now handle $30 ore at a fair profit. The Sunnyside ore of today is gold-silver, lead and copper ore and averages about $20 to the ton of which $12 is in gold and $8 in silver. Two thousand tons of $20 ore is said to be now in sight in the Great Eastern mine, some of which runs more than $40. The ore, it is said, can be readily cyanided to a high degree of extraction. In recent years the camp has been making a moderate production of barite and is reported to have discovered promising deposits of tungsten.

In 1882 mineral was discovered at what is now the site of the Eagleville mine at Eagle by Albert A. Woodruff who soon thereafter formed the Eagleville Mining Company which began development work in 1884, took out $6,000 from the Eagle No. 2 vein on the upper or tunnel level, and in 1887 $2,000 each from the Golden Gate and Summit veins. About 10 tons of the ore averaging $100 to the ton was shipped and the rest, about 260 tons, running $35, was milled in the old Monte Cristo mill than known as the Whiting mill.

In the period, 1891-1895, the Company shipped to Selby, Chamberlain and Salt Lake $10,000 worth of gold ore which averaged $130 in gold to the ton, the highest being $299. This was the last work done up to 1913 excepting assessment work.

In 1913 the leading owners in the Company were William "Bill" Woodruff, Thomas "Tom" Kenyon, and Mr. McCracken, and the mine was said to be for sale for $65,000. Under conditions then prevailing the Company could handle $30 ore. The haulage to the railroad at Nolan was $10 whence railroad freightage to Thompson near Wabuska was 70 cents a ton. The miner's wage was $4 a day. The Company then claimed to have in sight in the mine $200,000 worth of ore that would average $12 to the ton.

The mine is opened to the depth of 300 feet and is developed by 8,000 feet of work. It was worked mainly through the crosscut tunnel and two 230-foot deep shafts and raises.

In 1925 it was reported that the Company had purchased the Black Eagle mill at Rawhide which was being moved to the mine and would be in operation at an early date.

Geology

The salient formations and geologic features in the Eagle district beginning with the older rocks are the Triassic (?) limestone shale, sedimentary series, which is intruded and in part overlain by quartz diorite porphyry which, together with the sedimentaries, is intruded by granite, and all three of these rocks are marginally overlain and locally intruded by Tertiary volcanics, figure 88.

Of the older rocks the quartz diorite porphyry is predominant in the eastern part of the district and the sedimentaries in the western part.

The ore deposits are associated with the older or pre-Tertiary rocks and are genetically connected with the granite and quartz diorite porphyry. The sedimentary series occur mainly in the western part of the district where it occupies an area of several square miles whence it tends northward into the Big Kasock area. It includes considerable white crystalline and blue-gray dolomitic limestone in which many of the mineral deposits are formed, especially those which are copper-bearing.

The quartz diorite porphyry occupies a belt nearly a mile wide extending from near Sunnyside 4 miles eastward to a mile from Eagleville. It, as seen at Eagleville, Sunnyside, and elsewhere, is an iron gray, fine-grained, nearly dense porphyritic rock, sparingly speckled with small dull feldspar and blackish hornblende and augite phenocrysts. It shows faint parallelism of structure due to pressure. Though the rock is typically iron gray, it presents from place to place phases ranging from blackish or dark as in basalt to comparatively light gray as in monzonite. Where weathered, as seen in the Eagleville mine, it has a dull greenish tinge due to the alteration products, chlorite and epidote, and in general is slightly calcareous. The microscope shows it to be monzonitic, containing considerable orthoclase as well as plagioclase feldspar, which latter mineral, however, is dominant. It also shows it to be highly altered to kaolin, sericite, chlorite, and epidote to a degree that the feldspars and other minerals are difficult to determine. Bent forms of biotite and other minerals show it to have suffered dynamic disturbance. It shows also small areas of intergrown secondary quartz and feldspar forming in places a sort of graphic structure.

Granite

The granite occupies an irregular area of about a mile square with Sunnyside camp near its center. Here on the northwest it forms a prominent roundish hill about 400 feet high called Granite Mountain and abundantly intrudes the limestone-shale series while on the east it similarly intrudes the diorite. It also occupies a smaller outlying area about three-fourths mile in diameter at about 1½ miles northwest of Sunnyside on the south ridge of Big Kasock Mountain. With its contact with both host rocks, mineral deposits and contact metamorphic phenomena are associated.

It is medium-grained gray or speckled with greasy luster quartz feldspar and abundant black shiny biotite resembling very perfectly a coarse-grained salt-pepper mixture. It weathers reddish brown. The microscope shows it to be a lime-soda biotite granite or "granitite" and to be composed of acidic oligoclase quartz, orthoclase, microcline, and brown biotite with accessory apatite, titanite, and magnetite. There is twice as much oligoclase as orthoclase feldspar present. The oligoclase is mostly in stout prisms and cuboidal forms with much zonal structure. Some of the biotite is altered to chlorite. In the Big Kasock area the rock is slightly coarser grained and tends to be porphyritic with crystals of feldspar and biotite ranging up to .15 of an inch in diameter.

Volcanic rocks

The volcanic rocks are chiefly light-colored rhyolite besides which however some andesite, trachyte and basalt are also present. As noted later

on, much of the rhyolite in the northeastern part of the district is the young purple finely flow-banded variety. Proceeding from Granite Mountain north northwestward for about a mile the country rock, which is mainly white crystalline and bluish limestone, is locally overlain and freely intruded by a dull lead gray fine-grained augite andesite.

Deposits

The valuable metals contained in the deposits are chiefly gold and silver, but some of the deposits contain copper and lead. The deposits are nearly all genetically connected with the intrusive granite. Those in the eastern part of the district occur in or are associated with the diorite porphyry and those in the western part with the limestone sedimentary series.

At Eagleville

In the Eagleville camp the deposits are chiefly gold or gold and silver. They occur in a dozen or more small mines and prospects. They occur in quartz veins or lodes, mostly in the quartz diorite with their openings mostly confined to the oxidized zone. Besides quartz, their veins contain grayish altered brecciated rock and barite which in places are important constituents of the gangue and some of the barite is secondary. They include the Eagle mine, Jo Dandy, Olive, Monitor vein, Snowflake, Prince Albert, North and South American vein, Buckskin, and Troy. Though the veins nearly all carry fair values, some of them are obviously too narrow to be profitably mined at great depth. Notes on a few of them are as follows:

Eagle mine

The Eagle mine is at Eagleville, mostly in a local land mark, Eagle Hill, with the main crosscut tunnel at an elevation of about 5,600 feet below which level the workings extend to a depth of 250 feet where, however, only traces of sulphides occur. The hill is composed mainly of the quartz diorite porphyry, but granite and dark volcanic tuff outcrop in its northeast base and rhyolite and fresh basalt occur farther east toward the Jo Dandy prospect.

In the Eagle mine the deposits occur in three parallel veins or lodes spaced about 100 feet apart, the Golden Gate, Eagle No. 2, and Summit veins, figure 89 (plan of veins). They strike northwesterly in the diorite across a 300-foot wide fracture zone in which they are richer. They are opened by about 8,000 feet of worked mostly by crosscut tunnels, drifts, shafts, and stopes. The valuable metal is gold, of which 10 percent is said to be free and nearly all of the balance to be readily extracted by cyanide treatment. In 1916 the ore was being screened and cobbed; the fines and that of intermediate grade netting about $150 to the ton, were sacked and shipped. One-third of the gross, about 600 tons, running $45 to the ton, lay on the dump to be later milled. The shipments in 1916 to October 1 were as follows:

Tons	Value per ton
16	$114
20	137
17	150

Freightage to Fallon was $12 per ton and working charges $17 per ton.

Golden Gate vein

The Golden Gate vein, the most southerly of the three veins, dips 70° south. It is opened to the length of several hundred feet and locally to the depth of 330 feet by workings, some of which are indicated in figure 89. It averages about a foot wide but, as seen in the face of the north drift at about 300 feet from the crosscut tunnel at 90 feet deep, it is about 3 feet wide and is composed mainly of hard oxidized iron-stained quartz more or less well banded and some associated heavy spar or barite. Some of the quartz is honeycombed by pyrite having been dissolved out. In its footwall side the vein carries a 1-foot wide pay shoot said to be mostly $40 ore while the remaining 2 feet of quartz forming the hanging-wall side is mostly good milling ore, the values all being in gold.

The new work in the mine is mostly toward the north end of the Golden Gate vein. Here for the distance of 100 feet on the tunnel level drift and for 75 feet above it and 60 feet below it the ore has been mostly stoped (fig. 89). The portion above the level is said to have yielded 1,000 tons of $45 ore, some of which ran $100 to the ton and that below the level an almost equal quantity of $30 ore. South of the stope the 90-foot winze and about 200 feet of drifts turned from it to the east are said to contain throughout a 2½-foot wide vein that is nearly all $30 ore.

Eagle No. 2 vein

The Eagle No. 2 vein, intersected by the crosscut tunnel at 750 feet in from the portal, dips to the northeast. It varies from a few feet to 30 feet in width. It has a sparry barite gangue and contains, besides quartz, much coarsely crystalline barite and country rock diorite breccia. It is mainly opened by drifts and winzes to the depth of 160 feet below the tunnel level, mostly east of the tunnel. The ore in general ran about $6 to the ton of which there is said to be a large quantity. Much of the ore, however, is of higher grade, example given in the Borden 40-foot winze east of the tunnel, the vein is 12 feet wide and the ore runs $30 to the ton and the nearby stopes rising above this level produced considerable high-grade ore.

In the bottom of the mine the gangue in this vein is mostly brownish and dark iron-stained crystalline barite and the wall rock, quartz, diorite, contains a little fine-grained pyrite.

Summit vein

The Summit vein, as seen toward the base of the crosscut tunnel figure 89, is only 8 to 10 inches wide, which is seemingly too narrow to be profitably mined at great depth. It extends to and outcrops at the surface where it is also opened by two shafts, one being several hundred feet deep. It consists mainly of shattered and sheared rock diorite, but is said to carry good values and in early days produced $7,000 in gold ore. By 1916, some new work had been done on its eastern part on the lower level at 350 feet below the surface where it is 5 feet or more wide and consists mainly of a barite-calcite oxidized rock gangue and carries a fair quantity of $12 to $15 ore.

Jo Dandy prospect

The Jo Dandy prospect, about three-fourths of a mile east of Eagleville, is in a quartz breccia vein which dips 80° south-southeasterly in the diorite porphyry which here resembles greenstone, and a tongue of the intrusive Sunnyside granite with which the deposits may be genetically connected extends up the gulch to within 200 feet of the prospect.

The croppings, some of which are manganese-iron stained, are 3 feet wide, stand 3 feet high, and are here traceable for 500 feet and by some are thought to be the extension of the Prince Albert vein. Where opened mainly by a 50-foot shaft and drifts, the vein is said to be 15 feet wide and to carry fair values in lead, silver and gold. A pit 100 feet northwest of the shaft shows a 2½-foot wide quartz-barite vein containing considerable galena which, however, is not known to be part of the Joe Dandy vein.

Prince Albert prospect

The Prince Albert prospect on the Prince Albert vein about a half mile west of Eagleville, is opened by a 25-foot shaft, and the ore is said to average 30 percent lead and $8 in gold and $1.50 in silver to the ton. Where exposed in the northwestern slope of Eagle Hill this vein, 7 feet wide, dips 80° northwest in the diorite porphyry and carries considerable galena in a finely crystalline quartz-barite gangue. The vein is claimed to have been traced for several miles both to the east and to the west of Eagleville.

Good View prospect

The Good View prospect at about a half mile southwest of Eagleville has two veins of which the main one is about 14 inches wide, strikes northwest, and stands about vertical. It consists mainly of a quartz gangue which is in part copper stained, and the most of it is said to carry about $20 in gold and $1.50 in silver to the ton.

Olive prospect

The Olive prospect 1¼ miles south of Eagleville is on an east-west 12-foot wide vertical quartz vein opened by a 60-foot shaft and an 180-foot tunnel.

Monitor vein

The Monitor vein near the cabin on the Eagle group dips steeply west, has a known extent of 3,000 feet, is about 12 feet wide, and is said to carry about $9 ore nearly all the way across and to contain an 8-inch ore shoot running about $30 in gold to the ton. It is probably a fair low-grade deposit.

to 2 feet wide and averages about a foot in width and looks well. It is mostly gold-silver ore having a rusty dark brown or black iron or manganese-stained oxidized quartz gangue. It shows more or less depositional banding and later compression that caused it to become sheeted and cleaved parallel to its course, and later it was recemented with dark carbonate of lime and iron and manganese oxides. In places it contains also galena but this mineral is not known to be present in commercial quantities. It is locally drusy and honeycombed by casts of pyrite dissolved out. A polished section of a specimen of the banded ore shows it to contain a few small grains of hematite, which may be hypogene, as no pyrite was observed. The ores are said to run about $20 to the ton. In place a little ore occurs also as replacement deposits in the adjoining wall rock diorite which here is hydrothermally bleached to a lightish color but weathers dark and becomes coated greenish with epidote. On the Great Eastern ground where it is opened by several tunnels and a 30-foot winze it carried good ore continuously for the extent of 300 feet. Here at time of visit about 10 tons of ore lay on the dump and some sulphide ore was exposed in the vein in the bottom of the winze.

Similarly on the western extension ground, about 1,500 feet to the west, the vein is opened by a tunnel whose stope or ore shoot is said to be 200 feet long and to have made a considerable production. In the gulch on the opposite or southeast side of the ridge bouldery float quartz containing or being stained with much malachite seems to have come from this vein.

South Star No. 5 prospect

At about 800 feet south-southeast from the Great Eastern mine in the upper part of Kenyon Canyon at an elevation of about 5,330 feet the South Star No. 5 prospect was opened by a 50-foot shaft and drifts from which ore was being mined and 7 tons had recently been shipped at time of visit in 1913. The ore shipped averaged about $40 to the ton and contained $36.16 in gold and 14 ounces of silver to the ton. The ore contains also considerable copper in the form of chrysocolla. In the bottom of the shaft the ores seem to be low grade with a glassy quartz gangue.

A short distance upstream from the South Star No. 5 prospect in Kenyon Canyon a 3-inch wide granite dike cuts the diorite porphyry and, as associated with the contact, occur seams up to 2 inches wide of silicate rock composed mainly of garnet and epidote.

The Gold Reef mine

The Gold Reef or Borden mine is about one-half mile east of Sunnyside camp on the east side of Kenyon Canyon at an elevation of about 5,250 feet and 60 feet above the floor of the canyon or wash. It is on a 17-foot wide sill of the diorite porphyry enclosed in the granite and locally known as the "Gold Reef dike." The deposit was discovered in January 1913, after many trials by Jim Borden, the owner, who two years earlier had found very rich gold-quartz float in the wash some distance farther down stream. In 1913 the owner was reported to have given a $15,000 option on the property, and in 1920 it was reported that work had recently been done on the property by George Troast.