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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

File
Oceola / Hogum
Nevada

BULLETIN 340

CONTRIBUTIONS
TO
ECONOMIC GEOLOGY
1907

Part I.—METALS AND NONMETALS, EXCEPT FUELS

C. W. HAYES AND WALDEMAR LINDGREN
GEOLOGISTS IN CHARGE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

. CLAIM.

between the Goldbug and August
e in porphyry which strikes N. 35°
eet wide, is composed of fragments
and limonite, and is said to carry

. CLAIM.

rt distance southeast of the August
and Peter Sieh. The lode strikes
several shallow pits. It is a brec-
that has been recemented by iron
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ikes N. 43° to 67° E. and dips about
ode is from 6 inches to 3 feet wide
the ton.

GEOLOGY AND MINERAL RESOURCES OF THE OSCEOLA MINING DISTRICT, WHITE PINE COUNTY, NEV.

By F. B. Weeks.

INTRODUCTION.

As a part of the general reconnaissance of the Great Basin region the geology of the region was studied by J. E. Spurr [a] in the summer of 1899 and by the writer in 1900. The geologists of the Wheeler Survey [b] also published some general observations on the region. A portion of October, 1907, was spent by the writer in making a more detailed study of the geology and mineral resources of the Osceola mining district.

GENERAL DESCRIPTION OF THE SNAKE RANGE.

The Snake Range, in which is located the Osceola mining district, is one of the most prominent and extensive mountain ranges between the Wasatch and the Sierra Nevada. It extends between latitude 38° 30′ and 40° 30′, a distance of 135 miles parallel to and a little west of the Utah-Nevada boundary. (See fig. 5.) As an orographic feature it comprises the Deep Creek or Ibanpah Range and the connecting hills designated as Kern Mountains on the map of the Wheeler Survey. The Snake Range is about 10 miles in width. The interior portion has been eroded into sharp ridges trending in general with the range, and the east and west flanks descend in steep slopes or bold escarpments to the valleys below. Snake Valley occupies a broad depression on the east and opens into the southwest end of Great Salt Lake desert. Spring Valley, west of the Snake Range, extends from the Cedar Range on the south to the so-called Kern Mountains on the north. The difference in elevation between the valleys and the highest part of the range is about 6,000 feet. The rugged character of the range makes it a formidable barrier to east and west travel. There are only four natural passes which afford a

[a] Bull. U. S. Geol. Survey No 208, 1903, pp. 25–36.
[b] Rept. U. S. Geog. Surv. W. 100th Mer., vol. 3, 1875, pp. 240–242.

practicable route for wagon roads. The highest summit of the range is Wheeler Peak (locally known as Jeff Davis Peak), which has an elevation of 12,000 feet. In the region of the Osceola mining district the range presents an abrupt face to the west and a long, gentle slope to the east.

Upon a basement complex of granite and schist, only a small area of which is exposed, there has been deposited a series of Paleozoic

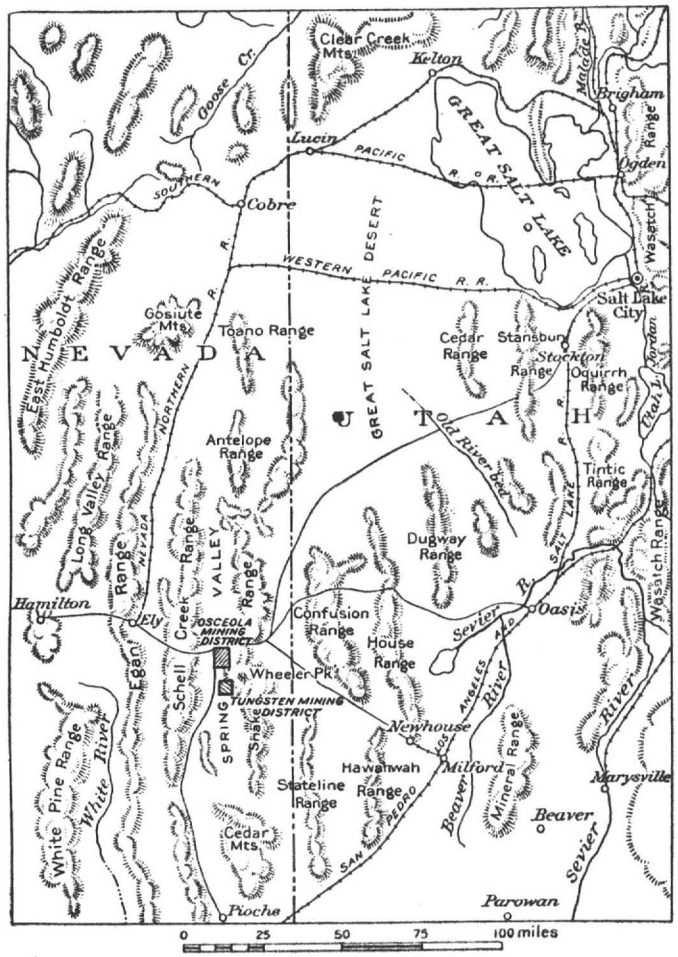

FIG. 5.—Map showing location of Osceola and Tungsten mining districts, White Pine County, Nev.

sediments from 8,000 to 10,000 feet in thickness. As shown by their fossils the strata were laid down in Cambrian, Ordovician, and Carboniferous time, a long interval of nondeposition occurring throughout the Silurian and Devonian periods. Some beds of unknown age may represent the Mesozoic era, but the evidence is inconclusive.

On the lower slope of the range in certain areas there are sands and gravels which lie above the Lake Bonneville beds and which were probably laid down in late Tertiary time. At the north end of the range terraces of the Pleistocene Lake Bonneville have been noted. It seems probable that from Carboniferous time to the present the greater part of this area has been subject to erosion.

Considerable bodies of igneous materials are exposed in the northern and central portions of the range. These igneous masses intruded Carboniferous strata and so, in part, at least, are Mesozoic or younger.

The prominent structural feature of the range is a dome in the region of Wheeler Peak, which both to the north and to the south passes into anticlinal folds whose axes in general trend with that of the range. This structure has been subsequently modified by compression and faulting and by the intrusion of igneous masses, so that the sedimentary beds generally have steep dips and are in many localities separated by considerable displacements. This is especially true in the region of the Osceola mining district.

OSCEOLA MINING DISTRICT.

SITUATION AND PHYSICAL FEATURES.

This mining district is about 35 miles east of Ely, Nev., the southern terminus of the Nevada Northern Railroad. It includes the crest and western slope of the Snake Range in the vicinity of Osceola. The east-west wagon road through the district is the principal route of travel between Utah and central Nevada. Near the summit on the eastern side the road forks, a branch leading over the Sacramento Pass and descending to Spring Valley on the west.

The principal drainage lines in the mining district are Dry Gulch and Mary Ann Canyon and along them and in their alluvial fans occur the most important placer deposits. The stream beds are dry during most of the year. About one-fourth mile above Osceola, near the wagon road, are several small springs and a small stream flows from the mouth of the New Moon mine. The elevation of the district ranges from 6,000 to 9,600 feet above sea level. The region is arid, the principal precipitation being in the form of snow.

GENERAL GEOLOGY.

The distribution of the rocks in this district is shown in the sketch map forming fig. 6, and a general section is given in the following table.

General geologic section of the Osceola mining district.

No. in fig. 7.	Age.	Character.	Thickness.
			Feet.
1	Recent	Gravel, coarse to fine, gold bearing	Up to 80
2	Upper and middle Cambrian	Gray to white, rather pure limestones and dark-blue crystalline limestones.	1,000
3	Lower Cambrian	Green sandy shales, *Olenellus* zone	150
4	do	White, blue, and purple quartzites, gold bearing	2,000
5	do	Purple argillite	750
6	do	Conglomerate	100 to 150
7	Archean (?)	Granites and schists, with intruded granite porphyry.	

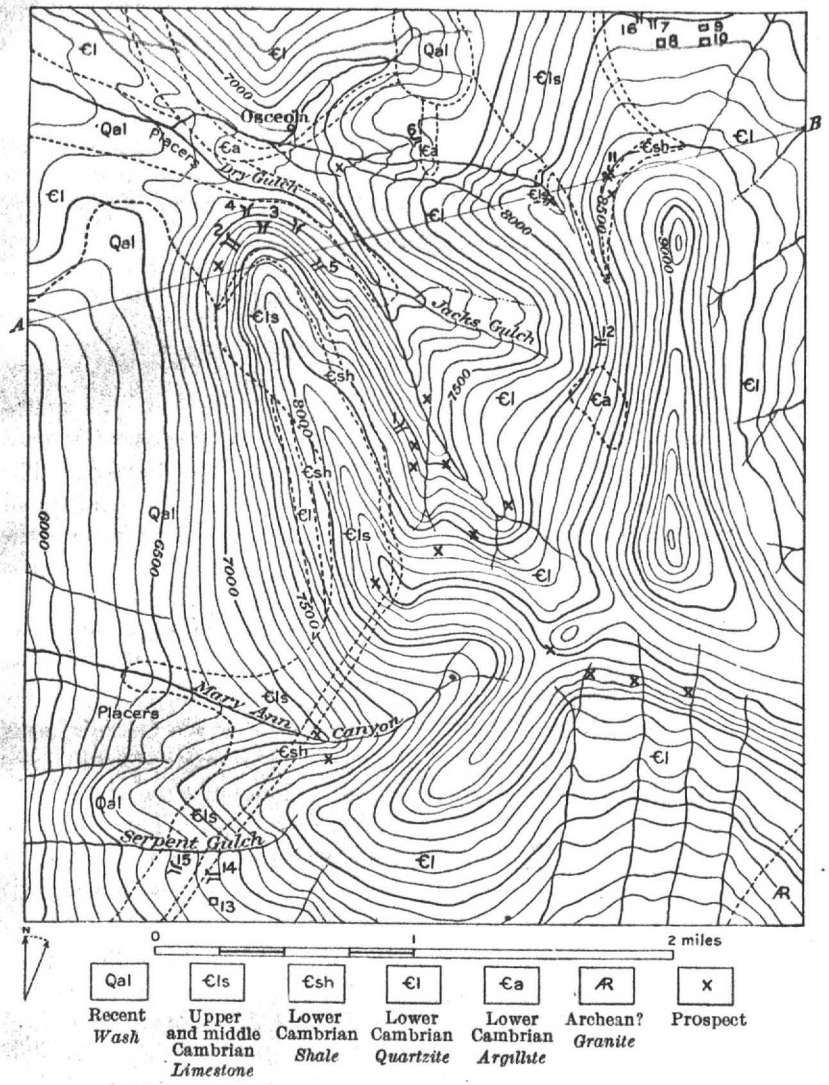

FIG. 6.—Sketch topographic and geologic map of the Osceola mining district. Contour interval 100 feet. Mines: 1, Cumberland; 2, Golden Eagle; 3, Crescent; 4, Time Check; 5, Exchange; 6, New Moon; 7, Gold Hill; 8, Gold Crown; 9, Queen; 10, King; 11, Whitney group; 12, Mulligan group; 13, Drummer shaft; 14, Mayday; 15, Serpent; 16, June. Dotted lines are boundaries of rock areas.

Fig. 7 is a cross section showing the structural relations along a line crossing Dry Gulch.

A short distance south of the mining district and near the crest of the range is an area of granite and schist overlain by a coarse conglomerate which grades into a compact argillaceous rock resembling argillite. The argillite is succeeded by a series of quartzites which pass into shales containing an *Olenellus* fauna. It appears from these observations that there is exposed here a small area of the basement complex rocks. Their structure has, however, been broken by an intrusive mass composed largely of gray and red granite porphyry which, north of the road crossing the range to Osceola, has penetrated through strata of possible Carboniferous age.[a] On the divide north of Wheeler Peak certain observations made in an area of poor rock exposures indicate that the granite porphyry cuts through the granites and schists of supposed Archean age.[b] These Archean rocks are much finer in grain and generally more basic than the intrusive rocks. By the presence of sheared zones and general

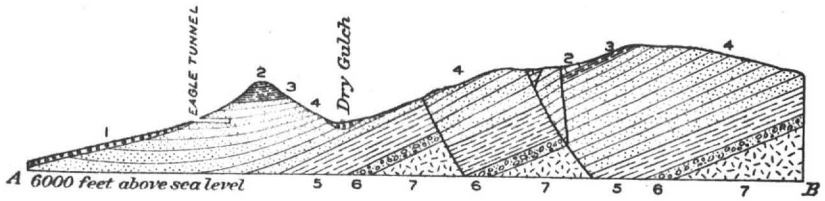

FIG. 7.—Structure section along line *A–B*, fig. 6. 1, Recent; 2, upper and middle Cambrian; 3 to 6, lower Cambrian; 7, Archean (?).

schistose structure they bear evidence of stresses and strains which were not observed in the intrusive granite porphyry.

The conglomerate which overlies the basement complex is about 100 feet thick and is formed of large subangular pebbles and bowlders derived from the older rocks. The conglomerate pebbles gradually become more rounded and smaller in size, argillaceous material forming a considerable portion of the rock, which passes into a massive bedded argillite. The argillaceous series is about 700 to 800 feet thick and is well exposed on the eastern slope of the high ridge that forms the crest of the range east of Osceola.

In this region the dip ranges from 25° to 40° NW.[c] and where the strata are cut by the intrusive porphyry they have been altered for the most part into a bluish-gray, generally schistose rock that has been called "silvery slate." This series is overlain by gray and white fine-grained quartzites. The beds have been thoroughly silicified and contain many veinlets of probably secondary quartz. They have

[a] Spurr, J. E., Bull. U. S. Geol. Survey No. 208, 1903, p. 32.
[b] Idem, pp. 26–27.
[c] Directions given in this paper are magnetic.

also been subjected to compression and numerous extensive belts of cross fracturing have been developed in which the quartzite has been broken into small angular fragments. The quartzite series has been estimated to be 2,500 feet in thickness. In the upper part of these beds occur the gold deposits and from the erosion of their outcropping edges the placer deposits in and along the sides of the gulches and in the alluvial fans have been formed.

The quartzite is succeeded by about 150 feet of green sandy and argillaceous shales. Where the outcrop of these beds crosses the south end of the ridge facing Spring Valley fossils of *Olenellus* type were found. These are the lowest beds in which fossils are known to occur, though careful search was made for them in the argillite.

Above the shale series occur dark-blue and gray limestones about 1,000 feet thick. The individual beds range from 1 to 3 feet in thickness, but in the crest of the ridge facing Spring Valley there are about 100 feet of thin-bedded and shaly blue limestones. The dark-blue limestones immediately overlie the shales and for the most part are crystalline or semicrystalline and contain numerous calcite veins. The gray limestone is comparatively pure and ranges from dark gray to white in color. Fossils have been collected at several horizons in the limestone series on the east and north slopes of the ridge facing Spring Valley and these have been determined as forms characteristic of the middle and upper Cambrian.[a]

Within the area of this mining district there are no other sedimentary rocks except the recent deposits in which occur the placers. These deposits are from a few inches to 80 feet thick. The gravel ranges from fine to coarse and contains few large bowlders.

HISTORY OF MINING DEVELOPMENT.

In 1877 work was begun on the placer deposits of Dry Gulch. A few quartz locations were made prior to that time. It is reported that 300 to 400 miners were working on the placers during 1877 to 1880 and during the latter year 400 placer and lode locations were on record. The important placer properties in Dry Gulch became the property of the Osceola Gravel Mining Company, subsequently known as the Osceola Placer Mining Company, in the early eighties. Prior to 1890 this company had constructed two ditches approximating 34 miles in length, at a cost of about $200,000. The operations of this company and of individuals continued until about 1900, when on account of light snowfall and the loss in efficiency of the ditch from leaky flumes and other causes work was discontinued.

The alluvial fan which spreads out from the mouth of Mary Ann Canyon, in the southern part of the district, is locally known as

[a] Fossils mentioned in this report have been determined by Mr. Charles D. Walcott.

Hogum. Here pay gravel was found several years after the discoveries in Dry Gulch and the deposits have been worked intermittently since that time.

Several attempts have been made to work the gold-quartz properties on a small scale. Three mills of 5, 10, and 20 stamps have been erected and operated, but none of them has been commercially successful. It is admitted that more than 50 per cent of the values went down the gulch with the tailings. Since field work was completed the 20-stamp mill has been partly repaired and a run of several hundred tons of ore from the Cumberland mine has been made. The results are not known.

From all accounts that have been obtained, it seems safe to estimate that the production of gold from this district approximates $2,000,000, of which about one-tenth was probably derived from the quartz mines.

MINING.

The slopes being steep, underground development is through tunnels, there being not more than half a dozen shafts in the district. In one or two mines an upper and lower tunnel have been connected by winzes. The quartzite is exceedingly hard and no timbering is required in the tunnels. In winzes and stopes a few stulls are all that is needed.

Some ore has been sacked and shipped to the smelters, but the greater part has been locally milled. Stamping and amalgamation constitute the principal method of treating the gold quartz. A small cyanide plant was constructed several years ago but was abandoned, apparently before receiving a satisfactory trial.

The Boston and Nevada Mining and Milling Company employs half a dozen men and about the same number are engaged from time to time in doing assessment work for nonresidents. The average wage for miners is $3.50 per day of eight hours.

All the mines and placers have been located by prospectors and working miners. No extensive consolidations have been made and the camp remains an aggregate of small mines and prospects on which, with the possible exception of the Osceola placers, but little outside money has been expended. The ores so far discovered have not been of high enough grade to attract lessees.

EXTENT OF PRODUCTIVE TERRITORY.

There seems to be no ground for assuming that the productive territory extends beyond the limits of the area shown on the map (fig. 6). So far developments indicate that the deposits are confined to fairly well defined zones in the quartzite. It has been thought by some that the same mineral belt extends northeastward to the recently opened

Black Horse district. It may be that the effects of the same dynamic forces which developed the lode systems in this district extended to the Black Horse district, but a slight examination of that region indicates that although the lithologic characters of the strata are in general similar, the beds at Black Horse were deposited during a later period and the ores are very different in character.

The fissures appear to be confined to the quartzite. They were not observed in the overlying shales and limestones and the underlying argillite has not been exposed in the underground workings. To the east and south of the area mapped the argillite series is well exposed and shearing with more or less movement along the bedding planes is a prominent feature, the beds being locally altered to a silvery slate.

DISTRIBUTION OF MINES.

The areas of greatest mineralization are (1) the ridge on the west and south sides of Dry Gulch, (2) the slopes of Mary Ann Canyon, and (3) the north end of the main mountain ridge. (See fig. 6.) In the Dry Gulch area are situated what is locally known as the Gold Exchange group, including the Woodman, Golden Eagle, Star, Time Check, Crescent, Exchange, and January. There also are the Butterfield and the Cumberland mines. In the region of Mary Ann Canyon are the Serpent, Mayday, Drummer, and other prospects. On the north end of the main ridge at an elevation of about 8,000 feet are the King, Queen, Gold Hill, June, and Gold Crown claims, locally known as the Summit group, and a little to the west are the Whitney and Mulligan groups.

UNDERGROUND DEVELOPMENT.

The most extensive underground workings are in the Gold Exchange group. The tunnels in these mines have a total length of about 1,000 feet, and connect with one or two shafts and several stopes and winzes. In Mary Ann Canyon several prospects have tunnels from 50 to 125 feet long. In the Summit group the tunnels range from 50 to 350 feet in length. The Whitney and Mulligan groups have about the same amount of development. The three tunnels in the Cumberland mine have a total length of approximately 1,700 feet.

STRUCTURE OF THE GOLD DEPOSITS.

There appear to be only two types of auriferous deposits in the district—(1) regular zones of fracturing or sheeting and (2) irregularly shattered masses of quartzite adjacent to these zones of fracture. In most places there is no distinct line of demarcation between the two types. There are no massive veins solidly filled with quartz such as are characteristic of many other regions.

The most characteristic structure is the sheeted zone. In this district these zones consist of narrow, nearly parallel fissures forming lodes ranging from several inches to 15 feet in width. In the wide belts, which may be considered as compound sheeted zones, there are generally one or more zones of closely spaced fissures. The sheeted zones contain some fracture planes which show slickensiding, but the displacement appears to be slight. This may be due to the brittle character of the fine-grained quartzite that forms the country rock. Beds which are broken into fine brecciated masses lie between massive beds of quartzite which apparently were not affected by the compressive stress.

Circulating waters carrying silica in solution have filled the fissures of the sheeted rock. The original openings were small, and they are as a rule completely filled. The most important exception is the Cumberland lode, in which the vein material contains many vugs lined with gold, fluorite, and other minerals.

The lodes are in places conspicuously exposed, forming bold outcrops of quartz. They are somewhat more resistant to erosion than the country rocks, but can not be followed on the surface for a very great distance. There are also lodes in the mines which do not appear at the surface. It is therefore impossible to describe in detail the lode systems, as there is a relatively small amount of underground work and the limits of the fracture zones have not been reached.

The Osceola lodes form two intersecting groups of approximately parallel fissures. In the northeastern part of the district the strike is northeast. In other parts of the area the strike varies but little from east and west, except that in the southwestern part there appears to be a northeast-southwest system of fracture zones which cut the east-west lodes. In general the lodes do not converge but maintain their direction until they can no longer be distinguished from the irregular jointing which occurs in all the rocks. The two systems seem to have formed simultaneously and they do not appear to fault each other. In Mary Ann Canyon the fissures intersect without noticeable displacement. The intersection is usually marked by an irregular broken zone, as may be seen on the outcrop and in the upper and lower tunnels of the Mayday mine.

The lodes are steeply inclined, nearly all being above 70° and many vertical. So far as the underground workings show they are fairly regular in dip. Adjacent fissures in general dip in the same direction. This is well shown in the Gold Exchange group. In many places the lodes for considerable distances are so ill defined that the dip can not be determined. It may be said in general that the east-west lodes are vertical and that the northeast-southwest lodes dip at high angles.

No systematic relation between dips, distribution of fissures, and general structure of the district has been found.

PERSISTENCE.

Very little can be said definitely regarding the persistence of the lodes in depth. The deepest underground workings are not more than 300 feet below the surface and the fissures extend to this depth. The ore shoots and sheeted zones are not necessarily coextensive, for the highly productive areas have generally proved to be moderate in extent. Detailed information concerning the length of the lodes is wanting. In the Gold Exchange group the principal lode has been fairly well traced for a distance of half a mile, the west end being cut off by erosion and the east end passing into undeveloped ground. In the Summit group not one but several fissures which appear to replace each other have been traced at irregular intervals for more than half a mile.

ORIGIN OF THE FISSURES.

The character of the stresses that fissured the strata is not easily determined. It is clear, however, that they were such as could be relieved by fracturing with only slight displacement. The hypothesis which seems to accord best with field observations is that in the readjustments, which followed the intrusion of the magma, stresses were set up that resulted in the shearing of the argillite and the fracturing of the fine-grained, brittle quartzites along vertical or highly inclined zones. Fissuring and the intrusion of the igneous magma appear to be genetically connected and were followed by ore deposition from circulating waters.

CHARACTER OF THE ORE.

The lodes of the Osceola district contain a relatively small amount of metallic or gangue minerals. Inasmuch as these minerals occur as the filling of narrow fissures or cracks in the fractured zone which usually constitutes a lode, or as the incomplete replacement of the country rock, the gangue of the ores is similar in character and composition to the rocks adjoining the fissures. Pyrite is very sparingly disseminated in grains so minute as scarcely to be distinguishable by the unaided eye. Ferruginous clays are common in the fissures. In certain lodes, particularly that in the Cumberland mine, the quartz is here and there honeycombed and contains many vugs lined with fluorite and other minerals as well as free gold. More commonly the gold occurs in flakes and also finely disseminated in quartz seams and veinlets.

So far as known gold is the only metal of commercial value in the Osceola ores. From the information available it is impracticable

to estimate definitely the average gold content. Commercial assay returns show a wide range in value. Three samples taken by the writer gave assay values of $5, $32, and $77 per ton, the last representing the face of a tunnel about 4 by 6 feet. Other samples taken by the writer ranged in value from 80 cents to $4.50 per ton and represented portions of lodes not less than 3 feet in width. The return from a shipment of several tons of selected ore from the fractured country rock adjoining a fissure zone gave a value of $28 per ton. It is evident that the gold content of the lodes varies greatly, as in other known gold-bearing veins. It is not unlikely that careful prospecting will develop ore bodies of sufficient size and value to render their exploitation profitable.

OXIDATION.

The greatest depth of underground workings does not exceed 300 feet, and the sulphide zone has not been reached, so far as known. No water is found in any of the mines except in the New Moon tunnel, which crosses a fault in the argillite series. Under present climatic conditions there is very little precipitation, so that the mines are practically never wet. The district stands high above the adjacent valleys, and other conditions suggest unusual depth of ground water.

The greater number of lodes contain a considerable amount of material oxidized to a yellow or brown clay, that does not appear to be easily carried away. Oxidation, however, does not seem to have changed the composition or obliterated the structure of the lode materials to any marked degree. No evidence was obtained that there had been a secondary enrichment of the lodes from the surface downward by leaching of the ore. Such action, however, may have taken place under more humid climatic conditions, such as are believed to have existed in this region in recent geologic time.

ORIGIN OF THE ORES.

No extended discussion of the origin of the gold-bearing ores of the Osceola district can be presented here, as the examination of the mines was not made in sufficient detail to determine many questions that have an important bearing on their genesis, and it has not been possible to study the field collections prior to the preparation of this paper. From general analogy with other deposits it is considered that the ores were deposited from circulating waters within fissure zones formed by compressive stresses. If, as seems likely, the greater part of the mineralization occurred by deposition from ascending waters the silica and the fluorine in the fluor spar locally developed were derived from the originally molten magma that probably underlies the region at no great depth, in geologic terms. In an adjoining area

tungsten-bearing veins in granite porphyry contain a considerable amount of fluorite. Evidence bearing on the source of the gold is inconclusive. That it was leached from the quartzite strata is not improbable, for there is some evidence that they are gold bearing. It may, on the other hand, have been separated from the intrusive magma and brought up through the fissures by magmatic waters.

DETAILED DESCRIPTION OF MINES.

GOLD EXCHANGE GROUP.

The Gold Exchange group comprises eleven lode claims, of which three are fractional. They extend from the west face of Pilot Knob Ridge around the north end, following the south and west slope of Dry Gulch. The slope is steep, but good mountain roads have been constructed to the several tunnel openings. A 20-stamp mill has been erected on the Star ground, which adjoins the Golden Eagle (No. 2 on map, fig. 6) on the west. Water from the west-side ditch has been used in operating this mill. The Star, Golden Eagle, Crescent (No. 3 on map), and Exchange (No. 5) are patented ground; the other claims are held by annual assessment work.

The underground workings on this group, except a portion of the lower tunnel on the Star ground, are in the upper part of the quartzite series. The average dip is 40° NW. and the strike is N. 10° E., but both dip and strike vary within short distances. There are many vertical or highly inclined fault planes, but the displacements observed do not exceed a few feet. The shale series overlies the quartzite and above the shales are the limestones capping the ridge. Near the mill a fault has thrown down the limestones and below these outcrops the slope is covered with débris.

The quartzite strata have been subjected to stresses resulting in two fracture zones, one having an east-west direction, the other northeast and southwest. The east-west zone is the principal one and within it occur many small displacements, the rocks showing well-marked slickensides. This zone can be traced on the surface as a succession of "blowouts." In some of the beds the fracturing extends beyond the usual limits of the lodes, but the other strata retain their massive character. The shattered beds were broken into small angular fragments.

There are two lode systems within this group, one within the Time Check and Crescent (Nos. 4 and 3 on map) and the other within the Golden Eagle (No. 2), Exchange (No. 5), and January ground. They are approximately parallel and are several hundred feet apart. The latter is apparently the more extensive and has produced the larger amount of ore.

The gold is concentrated within fissure zones of varying width and is also disseminated to a greater or less extent in the beds of finely shattered quartzite. It is not known to what extent these beds have been mineralized, as no drifts have been made in them. They evidently contain some pay ore, for in places chambers several feet in extent have been stoped. The gold is rarely visible, being very finely disseminated.

In accordance with the locally held idea that these ores are free-milling they have been treated in the ordinary stamp mill with amalgamation tables. These properties have not been worked since 1899 and at this time it is impossible to obtain definite information as to the average value of the material milled or the percentage saved. It is generally conceded, however, that there was considerable loss—possibly as much as 50 per cent of the assay values. On account of the high degree of fineness of the gold and the fact that it is not all in the free state it is believed by many that a much greater percentage of saving would result from cyanide treatment.

SUMMIT GROUP.

The Summit group of claims is situated on the crest of the range about 1 mile south of the wagon road which crosses the mountains from Osceola. Some underground work has been done on each of the claims which comprise this group.

The Gold Hill tunnel (No. 7 on map) is 309 feet in length and its direction is south. It is entirely in the quartzite strata, which strike N. 10° E. and dip 45° NW. They are generally massive bedded and contain several clay seams and fractured zones about 6 inches in width. On the eastern side of this claim there is another tunnel about 100 feet in length, having a direction S. 60° W., with a drift to the south from the face of the tunnel about 100 feet long. In these workings is exposed a broad zone of fractured and brecciated rock whose limits are not known. Considerable ore from this tunnel is said to have been milled, but no satisfactory estimate of value could be obtained.

The June tunnel (No. 16 on map) varies in direction and has a total length of 240 feet. The tunnel cuts a fault trending N. 26° E. East of the fault, in the direction of the face of the tunnel, the beds show little disturbance but contain many soft seams from which gold can be obtained by panning. To the northwest, or toward the mouth of the tunnel, the quartzite is very finely brecciated. In this fracture zone assays ranging from $8 to $15 are said to have been obtained, but no definite statement as to the width of the zone furnishing such assay values could be given. This fracture zone appears to have a general direction of N. 30° E.

The Gold Crown, Queen, and King (Nos. 8, 9, and 10 on map) are developed to a small extent. Average assays of $14 are said to have been obtained from these claims.

Within the Summit group there appear to be at least three fracture zones separated by intervals in which the quartzites are relatively undisturbed. The amount of mineralization varies greatly within these zones and extensive prospecting will be necessary to determine the distribution of the values.

WHITNEY GROUP.

The Whitney group (No. 11 on map) has been prospected by several tunnels cutting the shale and quartzite nearly at right angles to the strike. The strata are in places much broken and shattered and in others are undisturbed. Certain fault planes, indicated by slickensided surfaces, have been followed as walls in the tunnels. These fault planes dip 60° S. Considerable ore has been mined and milled from these workings, but no satisfactory statement of its value could be obtained.

MULLIGAN GROUP.

At the north end of the Mulligan group (No. 12 on map) there is an incline following what appeared to be a fault fissure nearly filled with vein quartz. The fault strikes N. 80° E. and dips 65° S. About 600 feet south of this incline is a tunnel which at the time of visit was closed, but the material on the dump showed that there must be considerable underground work in a formation of very finely crushed white quartzite. At the south end of this group is a 200-foot tunnel entirely in a crushed white quartzite.

CUMBERLAND MINE.

The Cumberland mine (No. 1 on map) has three tunnels having a common direction of S. 80° W., at vertical intervals of 100 to 200 feet. The lower tunnel is 500 feet in length and follows a fault zone in which are many small fissures showing slickensided surfaces and dipping both to the north and south at high angles. In some places a fault plane dipping steeply to the south has been followed until it became nearly horizontal in the roof and then another steeply inclined fault plane farther on in the tunnel has been used as a wall. In some places, for distances of 10 to 20 feet, the quartzite strata are unbroken and have the normal strike and dip. Many beds not showing distinct fault planes have been crushed into confused masses of small fragments. Clay seams are abundant, and some of them follow bedding planes.

The second tunnel was not examined. The third and upper tunnel is 650 feet in length. At 450 feet from the entrance is a winze 50 feet in depth and an upraise to the surface. In this upraise there is an ore shoot 3 to 4 feet in width which pitches 75° S. The greater part of this ore shoot has been worked out. Its hanging wall is a well-defined fault plane. The lower edge of the shoot is cut in the back of the third tunnel, but its pitch carries it to the south of the first and second tunnels, and no prospecting has been done to determine its extension in this direction. It is reported that most of the ore mined and milled from the Cumberland came from this upraise, but no definite information as to its average value could be obtained. The ore contains much free gold, partly in vugs with fluorite. Many beautiful specimens have been found in these ores.

OTHER PROSPECTS.

In the southwestern part of the Osceola district, in the region about Mary Ann Canyon, there has been considerable prospecting since 1900. This area is locally known as Hogum. The granite porphyry is exposed on the western edge of this area and small veins, generally of quartz, extend from it into the adjoining sedimentary strata. The derivation of the vein filling from the intrusive mass is more clearly shown here than in the other parts of the district. Although the structural features of this area have been affected by the intrusion of the igneous magma, they nevertheless are closely connected with those of other parts of the district previously described.

The Mayday claim (No. 14 on map) is developed by a tunnel 130 feet in length following the strike of the vein, which is S. 70° E. The gangue material is nearly all quartz and it pitches to the southwest, or in the direction of the granite porphyry, which is exposed about one-eighth of a mile farther south. The vein contains many gouge seams and small displacements. In the area between this vein and the granite porphyry the quartzite is fractured and broken into small angular fragments.

The Drummer claim (No. 13 on map) is developed by a shaft 18 feet in depth following an offshoot from the granite porphyry. This vein is about 4 feet wide and is formed of fine-grained granite porphyry and quartz. Its general direction is N. 30° E.

The Serpent claim (No. 15 on map) has two tunnels 50 and 80 feet in length. The entrance to the upper tunnel is in the limestone, which dips 45° NW. and strikes N. 30° E. The vein strikes N. 50° E. and dips 45° SW. The ore-bearing portion ranges in width from a 10-inch vein to a thin parting. The best ore, said to have been found where the pay streak averaged 4 inches wide, assayed $400. Coarse gold was observed on exposed faces of the vein.

The lower tunnel is 25 feet below the upper tunnel and has a direction S. 80° E. The vein is from 6 to 8 inches in width and dips 25° SW. The returns from the milling of this ore were reported as $17 to $20 per ton. Considerable lead ore is found in a parallel vein.

PLACERS.

The placer deposits of Dry Gulch range from a thin covering of the edges of the quartzite strata in the upper part of the gulch to deposits 25 to 30 feet in depth in the lower part, below which the débris spreads out into an alluvial fan. Hydraulicking and ground-sluicing methods were employed to recover the gold. The values were more or less disseminated through the gravel, the principal pay deposits being as usual near bed rock. Large nuggets were rarely found, the gold being in general very fine. There still remains a considerable area of ground to be worked, but lack of water has thus far rendered further operations impracticable.

In the southwestern part of the district, in the area locally known as Hogum, the placer deposits occur in channels buried under the material of the alluvial fan below the mouth of Mary Ann Canyon. They usually occur in a stratum overlying a so-called cement or false bed rock, of which there appear to be several at different levels. The channels are worked by sinking and drifting. The material is raised by a whim, shoveled into sluice boxes, and washed with a small quantity of water from the ditch. Here, as in every other part of the district, the gold is fine and nuggets of much size are seldom found. Frequently small potholes are encountered in the false bed rock. These have the gold concentrated around their edges, but not within them. During the summer of 1907 the Gold Bar Placer Company employed from two to four men and the operations are said to have given a satisfactory return on the investment. The pay stratum was reported to have yielded from $6 to $8 per cubic yard.

Placer mining has also been carried on east of the divide, above the town of Osceola, in Mill and Weaver creeks. This area lies to the northeast of that shown on the map and was not studied in detail. The gold is derived from the erosion of the quartzite strata, as in all other parts of the district.

GENERAL SUMMARY.

The lode systems of the Osceola district are known to be extensive. All of them carry gold, but the values are irregularly distributed along the fissure zones. Systematic and extensive prospecting must be done to determine the average value of these lodes. It seems certain that the average product of the lodes will be a low-grade ore

which must be worked at a small cost and in large quantity to be profitable.

Water for milling purposes and placer mining can be obtained from the several creeks heading around Wheeler Peak, which are also available for the generation of electricity. As it will require the waters of all these creeks to fully develop the resources of the district there should be such a combination of interests as would permit the development of the water and power for the use of the various mining companies. Future development and prosperity depend on a concentration of local interests on a basis that will attract capital.

d San Miguel county localities,[a]
analogous to the vanadium mica
was found to present a chloritic
green, very similar to the green
aps a very slightly deeper tinge

e rock is stained with the more
hydrates), which color it rusty

in general character the previ-
mineral, both the Coal Creek de-
n Colorado and Utah. The asso-
the Coal Creek locality has not
g rather of an accidental nature
the deposition of the minerals.[b]
lently mere crusts or coatings, or
brecciated, and jointed zones in
cciation evidently mark the path
which the deposits have been

f the Blue Mountain deposits is
ance. Nowhere had development
15 feet in from the surface. At
appear to be any great quantity
t developments. The occurrence
sting feature, and there is a possi-

On carnotite and associated vanadiferous
4th ser., vol. 10, 1900, p. 134.

TUNGSTEN DEPOSITS IN THE SNAKE RANGE, WHITE PINE COUNTY, EASTERN NEVADA.

By F. B. Weeks.

INTRODUCTION.

A brief description of the tungsten deposits in the Snake Range, eastern Nevada, was published by the writer (2)[a] in 1901, and in 1902 F. D. Smith (6) published an account of the occurrence and development of the prospects. In October, 1907, the writer made a more detailed study of the development at this locality and the character and occurrence of the ore deposition.

SITUATION.

In 1900 a mining district was formed under the name Tungsten mining district, embracing several square miles along the western slope of the Snake Range south of Wheeler Peak (locally known as Jeff Davis Peak). This range as an orographic feature begins about 25 miles south of this locality and extends northward from its southern limit about 135 miles between latitude 38° and 40°. It includes the Deep Creek or Ibanpah Range and the group of connecting hills known as "Kern Mountains." This is one of the most extensive and prominent ranges between the Wasatch and the Sierra Nevada. Its highest point, Wheeler Peak, reaches an elevation of 12,000 feet. (See fig. 5, p. 118.) In the area of the tungsten prospects the surface of the mountain slope is dissected by several wide, shallow gulches which are dry except when occupied by melting snow or storm waters. There are several small springs, but at present the water sinks in the gulch gravels.

The region is about 45 miles southeast of the nearest railroad at Ely, Nev. This road—the Nevada Northern—is 140 miles long and connects with the Southern Pacific Railroad at Cobre, Nev. The wagon road to Ely is an excellent mountain road which crosses the

[a] Numbers in parenthesis refer to corresponding numbers in "List of recent publications" at end of this paper.

Schell Creek Range (see map, fig. 5) over a comparatively low pass with no very steep grades. Prior to September, 1906, the outlet to the railroad was via Osceola over the Snake Range to Newhouse, Utah, a distance of 100 miles.

GEOLOGY.

The rocks of the region are granites, which may be in part the oldest rocks; Cambrian argillites, quartzites, shales, and limestones, and an intrusive granite porphyry which is younger than any of the sedimentaries. Within the Tungsten mining district the only rocks exposed are the granite porphyry and the quartzites and argillites.

The granite porphyry ranges from fine to coarse in texture and from light to dark gray and red in color. It occupies the lower part of the mountain slope and forms a portion of a considerable mass which extends to the northeast for several miles and is exposed on the eastern side of the range. There seem to be slight indications of deformation within the eruptive mass, and contact metamorphism is developed only to a limited extent. Apparently the intrusion took place since the formation of the mountain range. In general character and mode of occurrence this intrusion of granite porphyry resembles many intrusive masses in other parts of Utah and Nevada. Some of these are known to be post-Carboniferous and they may be of much more recent occurrence.

The base of the sedimentary rocks is not exposed in the Tungsten mining district. Only a small area of purplish argillite is exposed in the northwest corner of the district, overlain by 100 to 200 feet of quartzite. The quartzites are gray, blue, and purple, the gray quartzite forming the larger part of the series. The strata are cut by many quartz veinlets which are probably of secondary origin, formed during the silicification of the original sandstone. The rocks are fine grained and the alteration by silicification is very complete. In thickness the beds range from a few inches to 2 feet. The argillite is a compact purple rock in rather thick layers. In this area it is little altered, but in other parts of this region the process of metamorphism has progressed much farther and the rock has been called "silvery slate."

GEOLOGIC STRUCTURE.

The Snake Range in this region is a quaquaversal dome, having its center near Wheeler Peak. Subsequent to the uplift there was an intrusion of a considerable mass of igneous rocks that tilted the beds to a high angle in some parts of the region and displaced them in others. The steep southerly dips in Wheeler Peak and the high ridges to the south flatten to 25° in the Tungsten district. North of Wheeler Peak the fold has been broken by several northeast-southwest faults of considerable displacement, the beds having a northeast-southwest strike and dipping 45° NW.

In the area shown on the map the metamorphism and deformation which accompanied the intrusion are not so extensive as in other parts of the region.

VEINS.

GENERAL DESCRIPTION.

The veins carrying the tungsten ore are not vertical, but pitch to the northwest or southeast at varying angles, ranging from 55° to 75°, the general direction being northeast and southwest. The actual outcrop is usually limited to a few feet. From the close proximity of some of the veins it might be considered that they are branches from a main vein, but neither outcrops nor underground workings have shown this to be the case. In some places the vein splits into several narrow veins separated by the country rock. Their occurrence is irregular and from the débris it appears probable that there are veins now covered by "slide rock." In width they range from a few inches to 3 feet. The composition of the vein material is essentially quartz and hübnerite, with here and there a little fluorite, pyrite, and scheelite. The quartz is compact and contains no pores, vugs, or honeycombed areas. A few assays have been made which show the presence of gold and silver, but the amount is small and no attempt has been made to recover it. Well-defined walls are of common occurrence, but they are not persistent.

OCCURRENCE OF THE TUNGSTEN ORES.

The hübnerite occurs irregularly through the vein material. In some places there has been a concentration of the ore near the walls. Hübnerite crystals, varying in size and completely surrounding the quartz crystals, and also quartz crystals inclosing the hübnerite, are abundant. The greater part of the ore is disseminated in fine grains through the quartz or in irregular massive bodies. Where the veins pinch to a few inches in width the hübnerite occurs in thin stringers or is interlaminated with the quartz. No wolframite has yet been determined from this region. In 1901 Dr. W. F. Hillebrand made a qualitative test of two or three specimens from the principal vein which showed the ore to be hübnerite. Scheelite has been found very sparsely disseminated in zones which appear to indicate shearing. It occurs in small flakes instead of the usual granular or massive forms.

EXTENT OF MINERALIZATION.

There appears to be a general consensus of opinion among prospectors and others interested in tungsten deposits that these ore-bearing veins do not extend in depth. No workings have thus far been put down which determine this point. It may be true that some, possibly most, of the individual veins do not extend to great depths. In considering the question of depth, however, it should be remembered that in this region the intrusive mass is a part of a magma of unknown depth, which has been forced through a considerable thickness of sedimentary strata. In the area under discussion erosion has removed at least 300 feet from the upper part of the principal vein. In the light of present knowledge of veins of this kind it seems probable that there may be ore-bearing veins within the igneous mass which have not yet been exposed by erosion.

ORIGIN OF THE VEINS.

The magma which intruded the sedimentary strata probably cooled entirely beneath the surface and is now exposed by erosion as a body of granite porphyry. Before complete consolidation the magma was subjected to strains which produced cracks and fissures. These fissures, varying in width and vertical extent, were distributed irregularly through a portion of the rock, but in the main strike in a nearly uniform direction. The latest phase of consolidation consisted in the deposition of the fissure filling by magmatic waters carrying in solution silica and a small amount of certain rare metals.

MINING DEVELOPMENTS.

About 30 claims have been located within the Tungsten mining district, and at present all of them are controlled by the Tungsten Mining and Milling Company.

The principal underground workings are on the Hub claim (No. 1 on map, fig. 13). Tunnel No. 1 (fig. 13) is 225 feet in length, and the face is 125 feet below the surface, which forms the deepest working on any of the veins. At 150 feet from the mouth of the tunnel an upraise has been made to join an incline from the surface. In this tunnel nearly all the various features described under the headings "Veins" and "Occurrence of the tungsten ore" are exhibited. The vein ranges from a few inches to 3 feet in width, strikes N. 68° E., and dips 65° NW. Present developments show that this is the largest and most prominently mineralized vein in the region. Tunnel No. 2 is about 125 feet vertically above No. 1 and is 59 feet in length. This portion of the vein is split into four parts, separated by the granite porphyry. There is about 18 inches of streaky ore in the face of this tunnel. Shaft No. 1 is 37 feet in depth. Near

the surface the vein is pinched, but about midway of the shaft it is about 3 feet wide. Shaft No. 2 shows the vein about 30 inches in width, with a small amount of ore. In the face of the tunnel near shaft No. 2 the vein is 24 inches wide, with ore in streaks.

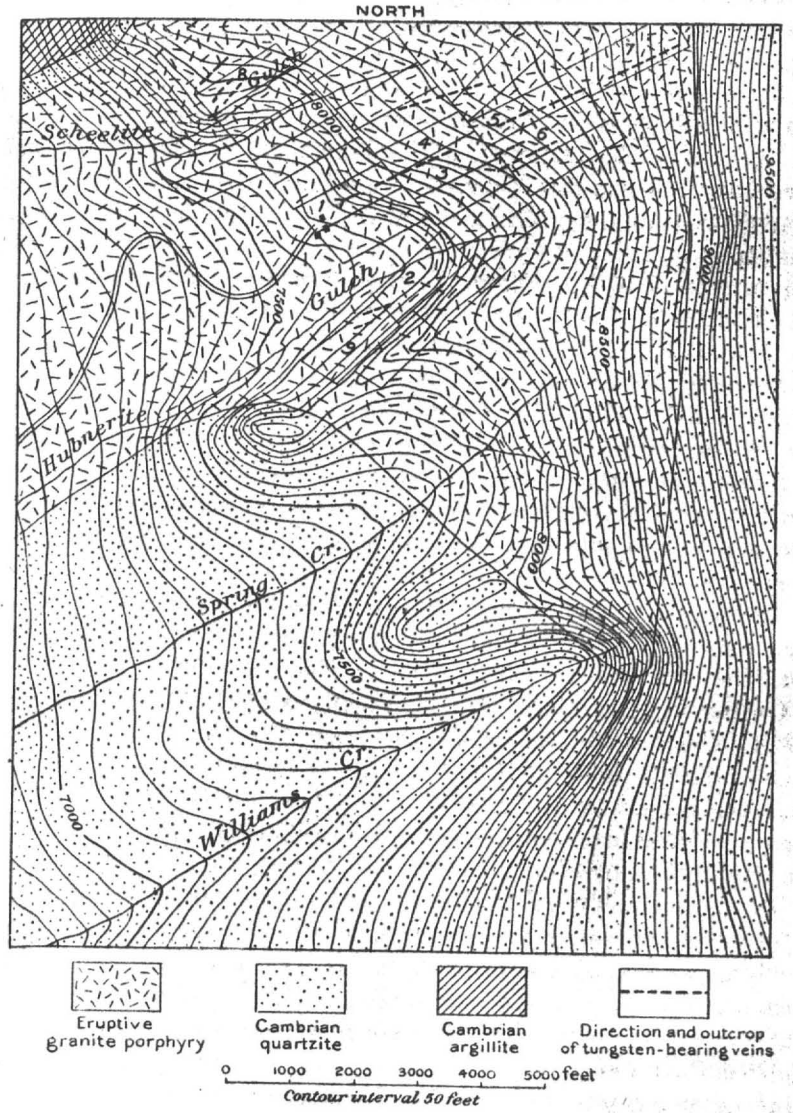

FIG. 13.—Geologic and topographic sketch map of Tungsten mining district, White Pine County, Nev.

On the slope below the outcrop of this vein several tons of ore, which was reported to average about 68 per cent of tungstic acid, were picked up among the "slide rock" and shipped before underground work was begun. Grains of hübnerite are disseminated

through the finer material of the slope and the bottoms of the gulches. Considerable ore has also been gathered from time to time and added to the dumps.

The development work on the Tungsten claim (No. 3 on map) consists of two tunnels and a shaft. On the Wolframite and Great Eastern claims (Nos. 4 and 5 on map) are several small trenches exposing narrow veins with ore. On the Eagle claim (No. 7 on map), just below the contact of the granite porphyry and quartzite, the vein is exposed in a trench, standing nearly vertical and striking N. 40° E. Hübnerite with a small amount of scheelite is found here. In the quartzite débris it was found that small veinlets of quartz penetrate the quartzite, a few of them carrying a little hübnerite. It is probable that this ore occurs near the contact zone. The region is said to have been thoroughly prospected and very little material of this kind has been found in the quartzite, which therefore seems unlikely to yield a deposit of commercial importance.

In the Side Issue claim (No. 2 on map), on the south side of Hübnerite Gulch, a mineralized vein is exposed in a 10-foot cut pitching 80° S. and striking N. 45° E. On the lower side of the cut the vein is 2 feet wide and it is said that from this place a piece of solid hübnerite was taken weighing 114 pounds. On the upper side of the cut the vein is split into two 6-inch veins separated by 4 feet of granite porphyry. In the bottom of the gulch these veins have pinched to a thickness of 3 inches each. The country rock is a coarse-grained, light-colored porphyry which, it is said, can be worked more easily than the rock in other parts of the district.

On the Tungstic claim (No. 9 on map) is a 4-foot vein striking N. 65° E. which shows very little ore. About 50 feet above is a 3-foot quartz vein in which no ore was seen.

In the ridge west and a little north of the Hub claim a hübnerite-bearing vein is exposed in several places. Several small veins appear to extend in a direction about N. 60° E.

The Star claim (No. 8 on map) is developed by a tunnel 32 feet long in which the vein ranges from 6 inches to 2 feet in thickness, pitching 55° SE. and striking N. 30° E. In this tunnel scheelite associated with hübnerite occurs in larger quantity than in any other known locality in the district. About 55 feet and 70 feet south of this vein are two hübnerite-bearing veins striking N. 42° E. The country rock is granite porphyry of a more pronounced reddish color than in other parts of the area. A short distance north of the tunnel a 1-foot vein striking N. 42° E. and showing considerable hübnerite is exposed in a shallow trench.

METHODS OF MINING.

The vein material is exceedingly hard and difficult to mine. Drills quickly become dulled and the rock does not shoot well. The work is all done by hand labor and tunneling is said to cost nearly $30 per running foot. At present it would appear advisable to develop the vein by open cuts at different levels with a steel-lined shoot on the surface on each side—one to care for the waste and the other for the ore. A much larger amount of material would be dislodged by each shot than when confined in a tunnel or shaft. There would be no expense for hoisting and there would always be good light for sorting. In handling the material care should be taken to save the fines, as a considerable part of the hübnerite occurs in grains disseminated through the quartz. The scheelite also is likely to be thrown away in the waste on account of its general resemblance to quartz.

On account of the large percentage of waste a considerable amount of hand sorting is necessary. After crushing, the hübnerite is easily separated from the quartz. A hand-made jig, operated by horsepower, was used and afterwards replaced by a 5-horsepower gasoline engine.

SUMMARY.

The occurrence and character of the vein material vary so much within a few feet that the depth and width of the veins and the amount of hübnerite can not be estimated. Nature has, however, done much to assist in determining the other factors which affect the commercial value of these deposits. Several springs of small flow occur at a considerable elevation above the natural location for a concentrating plant and their combined flow would be sufficient for milling purposes. Williams Creek has an estimated flow of 700 cubic feet per minute and would furnish power to generate electricity for a mill and drilling purposes. There is still sufficient timber on the higher mountain slopes to furnish mine timbers. The lower slopes are covered in spots with mountain mahogany, which makes a good domestic fuel. There are ranches in the valley which could furnish general supplies. Railroad facilities are now at a considerable distance, but surveys have been made for a railroad to connect Ely with southwestern Nevada and Salt Lake to the northeast. One of these surveyed lines crosses the Schell Creek Range into Spring Valley opposite Osceola, about 20 miles north of the Tungsten mining district.

Possible Properties 1/3/84

Midas Dist (Gold Circle Dist)

70 - 80 claim Some pat.

13 to 1 Silver to Gold

near Carlin

K. W. Foote

Est. $100,000-200,000

one buy out party

others work committment, taxes & assessment.

3 reports on dist. U.S.G.S. & Nevada Bureau of Mines

Osceola

(Hogum

Ark - Nev

former Placer

U.S.G.S. Report on Placer

Decollment

Low entry but work committment

2000 acres.

Ex
MINERALS ASSOCIATES INC.
7781 N Avde Carlotta
Tucson AZ 85704
Grandpa
K. W. FOOTE
VICE PRESIDENT
602/297 4057
~~100 W. GROVE STREET, SUITE 115~~
~~RENO, NEVADA 89509~~
~~(702) 827-2600~~

Bill - this is all
I have on Osceola.
Spencer has the maps,
aerial photos, etc.

Thanks

Spode

assays - spectrographic rock samples assayed on lode samples

Harold T. Allen
342 East 2nd North Phone: 801-753-1594
Logan, Utah 84321

NO OPINION SUBSTITUTES
FOR SCIENTIFIC FACT

November 28, 1980

September Mining Co., Inc.
Diamond Block Bldg.
P.O. Box 1721
Helena, Montana 59601

Gentlemen:

On the 18th day of November, 1980, I accompanied J. Lyn Larson and Merrill Nelson to the Osceola Mining District, White Pine County, Nevada, to obtain samples of materials from your property to have assayed. I witnessed the sampling of 7 different locations on sections of your property situated in Township 14 North, Range 67 East. I also certify that the 7 samples taken to Rogers Research for assaying were the same samples that I witnessed taken from the above referred to areas.

These samples came from the following sections and referred to as follows:

#1 From the Northeast Quarter of Section 22 at a depth of 18 inches.

#2 From the center of Section 23. This sample was taken in an assessment cut that was approximately 20 feet deep.

#3 From the section line dividing sections 27 and 28. This sample was taken from the cuttings from a 16" well drilled to a depth of 225' some 10 years ago.

#4 From the Northeast Quarter of Section 27. This sample was taken from a pile pushed up during assessment work, from the top of the pile, so, theoretically, a depth of 18" to 24" would be assumed.

#5 From the Southeast Quarter of Section 27 from a depth of 18 inches.

#6 From the Southwest Quarter of Section 26. Taken from an assessment cut at an estimated depth of 6 feet.

#7 From the Northeast Quarter of Section 28. This sample was taken to get an idea of what the lower end of the fan would carry in values. This was lower on the fan than the well sample so the gravels could be 250-plus deep. This sample was taken from an assessment cut and would again be 18 inches.

MINING ENGINEERING — GEOLOGY —MINERAL RESEARCH — FLOW CHARTS — CONSULTING —PROCESS PROCEDURES
PRECIOUS METALS — RARE EARTHS

Harold T. Allen
342 East 2nd North
Phone: 801-753-1594
Logan, Utah 84321

NO OPINION SUBSTITUTES
FOR SCIENTIFIC FACT

I feel that these samples are very representative of the area on which the WEBE, SQUEEGEE and DUKE Claims are located. It is my opinion that the values will enrich with depth of material, especially just above the "false" bedrock formations that are in evidence in the deeper areas of the fan.

The former owner of the well that was drilled 10 years ago reports that the driller went through seven of the false bedrocks drilling to the 225 foot depth. Unfortunately, the cuttings were not sampled as the well was drilled. He assumed 225 feet was bedrock.

A conservative estimation of gold bearing gravels on the 1700 acres would be 342,832,200 yards. This is based on an average depth of 125 feet. On the lower end of the alluvial fan the depths would exceed well over 225 feet; on the upper end, approximately 100 feet.

I certify that the above described sampling was from the areas reported and that I personally accompanied Mr. Larson when he delivered the samples to Rogers Research for assaying.

Respectfully,

Harold T. Allen

Harold T. Allen
Geologist & Mining Engineer

ROGERS RESEARCH & ANALYSIS INC.

HOME OFFICE
551 NORTH 1100 EAST
BOUNTIFUL, UTAH 84010
PHONE (801) 295 4402

2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc. November 27, 1980

Sample Identification: # 1

Antimony	Trace	Platinum	Trace
Arsenic	.1 %	Rhodium	
Barium	1.0 %	Rubidium	.2 %
Bismuth	Trace	Ruthenium	
Chromium	.3 %	Silver	3.9 oz/ton
Cobalt	Trace	Strontium	.6 %
Copper	Trace	Thorium	Trace
Gold	.1 oz/ton	Tin	Trace
Iron	6.5 %	Titanium	1.7 %
Lead	.4 %	Tungsten	.3 %
Manganese	.3 %	Uranium	
Molybdenum	Trace	Vanadium	Trace
Mercury		Yttrium	
Osmium	Trace	Zinc	.3 %
Palladium		Zirconium	.4 %
Nickel	Trace		

Clair W. Rogers M.S.

ROGERS RESEARCH & ANALYSIS INC.

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BOUNTIFUL UTAH 84010
PHONE (801) 295 4402

2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc. November 27, 1980

Sample Identification: #2

Antimony	Trace	Platinum	Trace
Arsenic	.2 %	Rhodium	
Barium	1.0 %	Rubidium	.3 %
Bismuth	Trace	Ruthenium	
Chromium	.2 %	Silver	3.6 oz/ton
Cobalt	Trace	Strontium	.6 %
Copper	.1 %	Thorium	
Gold	.1 oz/ton	Tin	.1 %
Iron	6.7 %	Titanium	1.6 %
Lead	.3 %	Tungsten	.2 %
Manganese	.4 %	Uranium	
Molybdenum	Trace	Vanadium	Trace
Mercury		Yttrium	
Osmium	Trace	Zinc	.3 %
Palladium		Zirconium	.5 %
Nickel	.1 %		

Clair W. Rogers M.S.

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2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc.

November 27, 1980

Sample Identification: #3

Antimony		Platinum	Trace
Arsenic	.1 %	Rhodium	Trace
Barium	1.2 %	Rubidium	.2 %
Bismuth	Trace	Ruthenium	
Chromium	.3 %	Silver	4.5 oz/ton
Cobalt	Trace	Strontium	.5 %
Copper	Trace	Thorium	Trace
Gold	.1 oz/ton	Tin	Trace
Iron	3.3 %	Titanium	1.4 %
Lead	.3 %	Tungsten	.2 %
Manganese	.3 %	Uranium	
Molybdenum	.1 %	Vanadium	Trace
Mercury		Yttrium	
Osmium		Zinc	.2 %
Palladium		Zirconium	.6 %
Nickel	Trace		

Clair W. Rogers M.S.

ROGERS RESEARCH & ANALYSIS INC.

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BOUNTIFUL UTAH 84010
PHONE (801) 295 4407

2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc.

November 27, 1980

Sample Identification: #4

Antimony		Platinum	Trace
Arsenic	Trace	Rhodium	
Barium	.8 %	Rubidium	.2 %
Bismuth	Trace	Ruthenium	
Chromium	.3 %	Silver	3.3 oz/ton
Cobalt	Trace	Strontium	.6 %
Copper	Trace	Thorium	Trace
Gold	.1 oz/ton	Tin	Trace
Iron	5.8 %	Titanium	1.6 %
Lead	.5 %	Tungsten	.4 %
Manganese	.3 %	Uranium	
Molybdenum	.1 %	Vanadium	Trace
Mercury		Yttrium	
Osmium		Zinc	.3 %
Palladium		Zirconium	.5 %
Nickel	Trace		

Clair W. Rogers M.S.

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PHONE (801) 295 4402

2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc. November 27, 1980

Sample Identification: #5

Antimony	Trace	Platinum	Trace
Arsenic	Trace	Rhodium	Trace
Barium	1.0 %	Rubidium	.1 %
Bismuth		Ruthenium	
Chromium	.2 %	Silver	3.1 oz/ton
Cobalt	Trace	Strontium	.6 %
Copper	.1 %	Thorium	
Gold	.2 oz/ton	Tin	Trace
Iron	5.4 %	Titanium	1.5 %
Lead	.3 %	Tungsten	.3 %
Manganese	.2 %	Uranium	
Molybdenum	.1 %	Vanadium	Trace
Mercury		Yttrium	
Osmium		Zinc	.4 %
Palladium		Zirconium	.4 %
Nickel	Trace		

Clair W. Rogers M.S.

ROGERS RESEARCH & ANALYSIS INC.

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PHONE (801) 295 4402

2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc. November 27, 19[illegible]

Sample Identification: #6

Antimony		Platinum	Trace
Arsenic	.1 %	Rhodium	
Barium	1.1 %	Rubidium	.2 %
Bismuth	Trace	Ruthenium	
Chromium	.3 %	Silver	3.3 oz/ton
Cobalt	Trace	Strontium	.6 %
Copper	Trace	Thorium	Trace
Gold	.1 oz/ton	Tin	Trace
Iron	3.9 %	Titanium	1.6 %
Lead	.4 %	Tungsten	.1 %
Manganese	.5 %	Uranium	
Molybdenum	.1 %	Vanadium	Trace
Mercury		Yttrium	
Osmium	Trace	Zinc	.3 %
Palladium		Zirconium	.4 %
Nickel	Trace		

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2340 South Redwood Road (1700 W.) Salt Lake City, Utah 84119 Phone 801-973-4637
CLAIR W. ROGERS, President

September Mines Inc. November 27, 1976

Sample Identification: #7

Antimony	Trace	Platinum	Trace
Arsenic	.1 %	Rhodium	
Barium	.4 %	Rubidium	.3 %
Bismuth		Ruthenium	
Chromium	.4 %	Silver	3.9 oz/ton
Cobalt	Trace	Strontium	.7 %
Copper	Trace	Thorium	
Gold	.1 oz/ton	Tin	Trace
Iron	4.7 %	Titanium	1.3 %
Lead	.5 %	Tungsten	.1 %
Manganese	.4 %	Uranium	
Molybdenum	.1 %	Vanadium	Trace
Mercury		Yttrium	
Osmium	Trace	Zinc	.4 %
Palladium		Zirconium	.3 %
Nickel	Trace		

Clair W. Rogers M.S.

Osceola Placer District

White Pine County, Nevada

The Osceola Placer District was visited on 23 June 82. This is an old placer district. It is well known and many reports have been written about it. One from Nevada Bureau of Mines and Geology is attached.

The claims in Dry Gulch below the old Oceola townsite seem to be held in small groups. Some groups are held by estates with several heirs. It did not seem possible to assemble quickly a group here that would permit large scale operation.

I was offered blocks of claims totaling 2200 Acres of the mouth of Mary Ann Canyon (Hogum). This was a productive part of the district. The spokesman for the claim owners is:

Merill A. Nelson
4501 W. 5415 S
Salt Lake City, UT
(801) 968-4167

He has reports with sampling results that he will make available.

Also, I was offered a block of 3000 acres in what is described as the "Summit Diggings". Here, the gold is reported very fine. Conventional placer operations based on Gravity Seperation - panning - jigs - sulices, etc. have not been able to recover this gold consistantly and have failed. There are some newer methods and machines which might succeed. Any agreement for lease or purchase should allow for sampling and testing the samples to ensure that the gold can profitably be recovered. The owners are:

Linda and Lester Huckaley
Spring Valley - Baker Stage Route
Ely, Nevada 89301

Below the Huckaley claims on the East slope is another block

owned by: Milt Andres
Box 87
Baker, NV 89311
(702) 234-7242

The appearance of the gravel is similar to the ground above. Milt Andres stated that he had blocked out a considerable yardage of gravel with a value of 0.12 oz. Au/cu. yd. Huckaley claimed similar values for his ground.

K.W. Foote

Mining Geologist

No copy necessary

NEVADA BUREAU OF MINES AND GEOLOGY

BULLETIN 85

GEOLOGY AND MINERAL RESOURCES OF WHITE PINE COUNTY, NEVADA

(Prepared cooperatively by the United States Geological Survey)

PART I
GEOLOGY

RICHARD K. HOSE AND M. C. BLAKE, JR.

PART II
MINERAL RESOURCES

ROSCOE M. SMITH

MACKAY SCHOOL OF MINES
UNIVERSITY OF NEVADA • RENO

1976

TABLE 12. Newark mining district, summary of recorded production through 1968.

[0, none; blank, figures not available]

Productive years	Ore, old tailings sold or treated[1] (short tons)	Total value when sold[1] $	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Tungsten (short ton units)
1867–1877	3,146	231,514	0		0	0	0	0
1883–1891	4,335	150,448	0		0	0	0	0
1902–1908	1,566	66,131	17	93,718	32,574	70,909	0	0
1913	7	913	0	1,188	489	2,712	0	0
1922	11	1,863	0	1,760	490	667	0	0
1935–1950	5,249	65,745	0	34,022	565	25,371	16,757	3,126
1952–1957	>56	>1,187	0	>945	0	>1,700	>2,192	>2,826
Totals	14,370	517,801	17	131,633	34,118	101,359	18,949	5,952

[1] Excluding tungsten.

Canyon) north of Newark Mountain (pl. 2). The mines and prospects are in the northwest part of T. 19 N., R. 55 E.

History

The earliest discoveries, in 1866, were the lead-silver-bearing quartz veins, the Chihuahua and several lesser veins, of the Bay State mine. Although a large mill equipped with 20 stamps and eight reverberatory roasting furnaces was constructed in 1867, no proportionately large amount of ore was produced. The mill operated chiefly on ores from the White Pine and Pinto districts in 1869 and 1870 and was idle 1875–1878. There has been intermittent small production of silver in every decade except the 1960's since its discovery. Lead and copper were recovered from the ores beginning in 1903, zinc from 1944. Scheelite was discovered in the dump and workings of the Bay State mine in 1942; during the years 1942 through 1944, tungsten ore valued at about $73,000 was shipped. In 1952, 1955, and 1956, production from the Bay State totaled about 3,000 short ton units of WO_3 and a little silver, lead, and zinc. Fifteen tons of silver ore produced in 1956 were valued partly for silica content as fluxing ore at the McGill smelter. No production was reported from the district for 1958–1963. No production has been reported from the Meister mine (pl. 2) under that name.

Production records for this district are fairly complete. They are summarized in table 12 by years of nearly continuous production. The largest dollar value was for 1868, when 770 tons valued at $75,847 were produced.

Geologic Setting and Ore Deposits

In the mine area, limestones of the Nevada Formation are tilted about 20° N. and cut by fractures that strike northwest or northeast and dip steeply. The fractures terminate upward in breccia zones, all at about the same stratigraphic horizon (M. R. Klepper, written communication, 1943). In the Bay State mine the ore bodies are veins of quartz with a little calcite along the northwest-striking fractures and discontinuous stockworks of quartz in the breccia zones that cap the veins. Near the veins and stockworks, the limestone is highly silicified. The largest vein, the Chihuahua, was mined above and below adits on the north and south sides of Mining Canyon. It is as much as 15 feet wide and has been mined for more than 1,000 feet along the strike (North adit is 875 feet long) and about 500 feet along the dip (shaft on south side is 400 feet deep). The largest stockwork mined, that in the upper Chihuahua workings, was about 150 feet long, 50 feet wide, and 50 feet high.

The ore minerals are silver-bearing galena, tetrahedrite, sphalerite, small amounts of their oxidation products, and scheelite. Both the sulfide minerals and the scheelite occur in the quartz and in the silicified limestone as veins or small irregular replacement bodies, but scheelite ore is restricted almost entirely to the stockworks, where it is commonly adjacent to, but not mixed with, the lead-silver ore.

Much of the lead-silver ore mined averaged about 20 percent lead, 10 percent copper, and 50 ounces silver per ton. Scheelite ore averaged about 2.5 percent WO_3.

OSCEOLA (WEAVER CREEK, SUMMIT DIGGINGS, HOGUM, WILLARD CREEK) DISTRICT

Location

The Osceola district, possibly once called the Centennial district (U.S. Geol. Survey, 1905, p. 274) is the only predominantly placer gold district in the county; it includes the Hogum (Hawg-um), Weaver Creek, and Summit areas as well as the principal lode mines, which are in the Dry Gulch area. The district covers both sides of the crest and the western slope of the Snake Range from Osceola summit south to Willard Creek. Nearly all of the gold mines are in T. 14 N., Rs. 67–68 E. In addition to the gold mines, the Bat Cave guano mine in sec. 25, T. 15 N., R. 67 E., is included in the Osceola district.

History

Lode gold was discovered in 1872 and the Exchange claim located on the northeast slope of Pilot Knob Ridge above Dry Gulch. Other discoveries of gold-bearing quartz veins followed quickly in five principal groups: (1) Gold Exchange, (2) Mary Ann Canyon (Serpent), (3) Summit, (4) Whitney, and (5) Mulligan. The most extensive underground workings were in the Star, Crescent, Time Check, Cumberland, and Exchange mines of the Gold Exchange group on Pilot Knob. The first ores were milled in arrastras. By 1878 about 100 lode claims had been staked. A small cyanide plant was constructed in the early 1900's, but never received a satisfactory trial, presumably for lack of ore.

Placer gold was discovered in 1877 in Dry Gulch and in Grub (Wet) Gulch. The richest deposits were near their confluence north of Pilot Knob below the site of Osceola. By 1878 about 300 placer claims had been staked. The gold was washed in rockers. Several years after the discoveries in Dry Gulch, other placer deposits were discovered in the alluvial fan below Mary Ann Canyon in the Hogum area.

Placer mining was hampered from the start by lack of water. Small springs in Wet Canyon yielded about one miner's inch[1] of water, which supplied a few rockers. Consequently two ditches were constructed in 1885 at a cost of $200,000—one, 18 miles long, from Lehman Creek on the east side of the range to Osceola; the other, about 16 miles long, from Shingle Creek on the west side of the range to Hogum. The first ditch to be completed provided 356 inches of water 6 to 8 hours per day; 2,000 inches were finally available from both ditches. Hydraulic mining, ground-sluicing, and sluice box methods were employed until 1900, when a combination of light snowfall, leaky flumes, water theft from the ditches, and other factors caused placer mining to be discontinued. Since 1902 there has been a small production of both lode and placer gold nearly every year through 1959; during the years 1939–1941 it may have exceeded $200,000 annually. Some of the reported lode production was from the Gilded Age mine in the Sacramento district.

The placers were worked principally by small-scale hand methods using either wet or dry washers. A dragline and sluice were operated at Weaver Creek placers in 1932; during a few weeks in 1935, two dragline scrapers, a trommel, and a 2- x 50-foot sluice treated 3,000 cubic yards of gravel averaging 69½ cents per cubic yard at the Hampton placer in Dry Gulch.

A minor gold rush to placer ground in the Summit area was reported by Vanderburg (1936, p. 172):

> "The Summit Diggings are near the crest of the divide several miles above Osceola. In 1932 considerable excitement was aroused over the reported discovery of placer gold in the area. Many claims were staked out by miners from Ely, but, after a short period of prospecting, it was found that the ground did not come up to expectations, and the diggings were abandoned."

[1] In Nevada, 50 miner's inches equal 1 cubic foot per second.

Tungsten was discovered in 1916 and a 2-stamp mill was built at the Pea Ridge mine, from which both gold and tungsten concentrates were recovered. In 1942 tungsten ore was discovered and mined at the Black Mule and Dirty Shirt gold mines. Tungsten concentrate from the Three Sisters placer mine and tungsten ore from the Shipper underground mine were produced in 1954 and 1955. Most of the tungsten ores from the Osceola, Sacramento, and Black Horse districts were milled at Goody's mill on U.S. Highway 50 (pl. 2).

Phosphate rock discovered sometime prior to 1917 and reported by Lincoln (1923, p. 253) refers to bat guano at Rose Cave, also known as Bat Cave. About 1926 a tunnel 170 feet long was driven from the hillside below the natural opening into the lowest part of the cave to extract the guano.

The largest production recorded is for 1940, when the combined value of lode and placer gold and silver was $257,228. A total of 31 lode mines and 44 placers reported gold production from 1902 through 1959. Production is summarized in table 13. Production records from the Woodman (Eagle or Gold Eagle) and Gilded Age mines in the Sacramento district are included in the Osceola district in most official records and in table 13. These mines may have yielded about 37,000 tons of ore containing roughly 30,000 ounces gold and 15,000 ounces silver valued at about $1,050,000. Lead ore produced from the May mine and from the Hanna mine (Mount Moriah area) has been credited to the Osceola district in some reports.

Geologic Setting

The oldest rocks exposed in the district are quartzites, conglomeratic quartzite, and argillite of the McCoy Creek Group of Misch and Hazzard (1962) of Precambrian age. These rocks are overlain conformably by the Prospect Mountain Quartzite, Pioche Shale, and Pole Canyon Limestone of Cambrian age and are intruded by a granite porphyry stock and a granitic (metadolerite) dike of Mesozoic(?) age. The sedimentary strata are tilted westward, commonly about 35°, but locally as much as 85°, and in some localities—notably at the Osceola mine—they dip north.

The sedimentary rocks are cut by steep faults that trend north or northeast. Both the granite and the sedimentary rocks are cut by two sets of joints and sheeted zones of small displacement; one set strikes east and dips north or is vertical, the other, less prominent set strikes northeast and dips steeply.

Ore Deposits

Gold deposits, both lode and placer, are the principal ores, but tungsten deposits have been mined and bat guano was produced from Rose Cave.

Lode gold deposits are veins 1 to 3 feet wide or groups of veinlets and stringers along both sets of sheeted zones in quartzite. Most of the lodes are made up of discontinuous veinlets of quartz that have filled narrow parallel fissures in sheeted zones as much as 15 feet wide and half a mile long (Stephen Kosanke, oral communication, 1964). Iron-stained clay accompanies quartz that contains sparse, very fine-

TABLE 13. Osceola mining district, summary of recorded production through 1968.

[0, none; *, estimated, partly estimated, or computed; blank, figures not available]

Productive years	Ore, old tailings sold or treated[1] (short tons)	Total value when sold[1] $	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)	Tungsten (short ton units)	Guano
				LODE[2]					
1872–1901		197,177*	9,470*	1,000*	0	0	0	0	0
1902–1959	54,500*	1,221,634*	32,102	119,161	1,344	112,422	11,832	550	0
Totals		1,418,811*	41,572	120,161	1,344	112,422	11,832	550	0
				PLACER (Johnson, 1972)					
1877–1901		1,774,595*	85,500*	9,000*	0	0	0	0	0
1902–1933			3,253	290*	0	0	0	0	
1934–1942		149,204*	3,125	200*	0	0	0	0	
1943–1959			215		0	0	0	0	0
Totals		1,923,799*	92,093*	9,490*	0	0	0	Few	
Totals Lode and Placer[2]		3,342,610*	133,665*	129,651*	1,344	112,422	11,832	>550	

[1] Excluding tungsten, guano.

[2] Including Woodman (Eagle) and Gilded Age mines in the Sacramento district.

grained, disseminated pyrite and many fluorite-lined vugs. Gold occurs finely disseminated in the quartz and clay and as flakes in the quartz or lining the vugs (Weeks, 1908). Average grade of the ore was $10–$20 per ton, although some pay streaks assayed as high as $400 per ton across a few inches.

Placer gold deposits in Dry Gulch and Grub (Wet) Gulch near the townsite of Osceola, and in Mary Ann Canyon near Hogum, are localized in gravel above the quartzite or limestone bedrock in the canyons and above several layers of caliche-cemented alluvium called "false bedrock" in the alluvial fans. Deposits were mined as deep as 200 feet in the fans, but most of the production came from channels 20 to 30 feet deep, 2 to 8 feet thick, as much as 60 feet wide, and a mile or more long. The gold is generally very fine; nuggets are uncommon, but one weighing 24 pounds valued at $2,600 (at $20.67 per ounce) was perhaps the largest found in the State (Whitehill, 1879, p. 157). Average grade of the placers is not known; samples from Dry Gulch taken in 1934 ranged from 17 cents to $8.77 per cubic yard, averaging $1.32 (Vanderburg, 1936, p. 169).

Tungsten deposits are scheelite-bearing quartz veins an inch to 20 feet thick in granitic rocks and pipelike replacement deposits in limestone. The largest deposit was found near Mary Ann Canyon at the Dirty Shirt mine (pl. 2, Hogum group), where a quartz vein 3 to 20 feet thick is along or in a metadolerite dike about 10 feet thick that cuts the Prospect Mountain Quartzite. Scheelite in tiny grains and in crystals to more than an inch in diameter is disseminated erratically in the quartz. Richer pockets contain at least 5 percent WO_3, and about a hundred tons of ore mined may have averaged nearly 2 percent. The most productive tungsten mine was the Black Mule, which yielded several hundred units of WO_3 from a pipelike deposit in the Wheeler (Combined Metals) Limestone. The ore averaged about 1 percent WO_3 (D. M. Lemmon, written communication, 1970).

PANCAKE DISTRICT

Location

The Pancake district was organized ". . . on Pancake Mountain, fifteen miles southwest of Hamilton, and one and a half miles from the Elko road." (Raymond, 1870, p. 180.) The exact location of the original discoveries of silver chloride ores is not specified but may have been in the area of Pogues Station. Subsequent prospecting elsewhere in the Pancake Range makes it convenient to include in this district all of the Pancake Range north of Pogues Station. The Pancake coal mine is near the center of sec. 28, T. 18 N., R. 56 E. Four sandstone quarries in secs. 20 and 29 of the same township are visible from U.S. Highway 50, and a quarry in sec. 27, T. 17 N., R. 55 E., is shown on the topographic map of the Pinto Summit quadrangle (15-minute series). Perlite crops out along the south side of U.S. Highway 50 at Pancake Summit in sec. 21, T. 18 N., R. 56. E.

History

The Pancake district was organized in 1870, when silver chloride ore assaying $80 per ton was discovered. Although

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BULLETIN 27

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PLACER MINING IN NEVADA

By William O. Vanderburg

Prepared in cooperation with the U. S. Bureau of Mines

MACKAY SCHOOL OF MINES
UNIVERSITY OF NEVADA • RENO

RELATION OF PLACERS TO LODE DEPOSITS

Sometimes placer deposits have led to the discovery of important lode mines, but in many cases the lode sources of the placer

gold have never been found. The converse of this statement is also true to some extent, and, likewise, many important lode deposits, wherein gold is the principal metal have never produced any gold from associated placers. Considering the large number of gold camps within the State it is remarkable how few have had associated placers. Such well-known camps as Cherry Creek, Seven Troughs, Bullfrog, Pine Grove, Delamar, National, Ely (Lane City), Jarbidge, Goldfield, Divide, Silver Peak, and others of lesser importance have produced little or no placer gold. The production of precious metals in Nevada has been approximately one billion dollars, of which about 40 percent has been in gold and the balance in silver. In comparison with the gold production from lode mines the placer production of $30,000,000 appears very small, amounting to about 7 percent, particularly in comparison with the State of California, where placer production has accounted for a much larger proportion.

Due to the fact that outcrops are situated at the surface where changes are most rapid, they have had a more eventful geological history than other portions of deposits. As the outcrop is eroded away the component minerals are broken up and migrate either mechanically or in solution. If they are moved mechanically, the heavier portions may be concentrated as placers when conditions are favorable. If conditions are unfavorable, they may be distributed widely and lost, as far as their economic value is concerned. If the minerals migrate in solution, they may enrich the deposit lower down.

Many of the precious metal deposits in Nevada carry silver as the principal metal; such deposits seldom have associated placers as silver is chemically less stable than gold. Such important silver camps within the State as Tonopah, Fairview, Wonder, Yellow Pine, Cornucopia, Spruce Mountain, Cortez, Eureka, Mineral Hill, Reese River, Candelaria, Ward, Belmont, Hamilton, and a number of others, have never had any placer production. The Comstock and Rochester Districts are exceptions, however. Placer gold is nearly always alloyed with some silver. The insolubility of placer gold as compared with silver has been shown by McConnell[8] in nuggets from the Klondyke, which actually have a greater fineness on the outside than the inside. The loss of silver on the outer portions of nuggets was found to be from 5 to 7 percent as compared to the inner parts.

Emmons has determined the relation of manganese to the

[8]McConnell, R. G., Report on the Gold Values in the Klondyke High-Level Gravels: Geol. Survey of Canada, Ottawa, 1907, p. 979.

secondary enrichment of gold deposits. Finely divided gold and the presence of manganese oxide are unfavorable to the formation of placers and are favorable to leaching of the upper parts of the oxidized zone. According to Emmons:[9] "Inasmuch as enrichment is produced by the downward migration of gold instead of by its superficial removal and accumulation, it should follow that both gold placers and outcrops rich in gold would generally be found in connection with nonmanganiferous deposits; and this inference is confirmed by field observations. Placer deposits are in general associated with nonmanganiferous lodes, and such lodes are generally richer at the outcrops and in the oxidized zones than in depth, the enrichment being due, in the main, to the material associated with the gold."

In Nevada, with the exception of the Tertiary river channels, it may be stated as a general rule that placer gold originated from nearby lode deposits. The writer is of the opinion that the gold in the placer deposits in the State that are of economic importance has traveled, at the most, not more than 10 miles, this distance being about the maximum length of the canyons from their heads to the points where they debouch into the valleys. No doubt a large amount of fine gold has been transported long distances and is scattered in the sediments that fill the valleys, but, with the exception of the gold in alluvial fans at the mouths of some of the canyons, the gold in the valley sediments is too scattered to be of economic importance. In most of the placer deposits within the State the gold has traveled less than five miles.

Rounded or flattened particles of gold in well-washed and rounded gravels generally have traveled farther from their source than coarse rough gold with sharp edges and show more or less crystalline structure. It may be stated that the angularity of placer gold is roughly proportional to the distance it has traveled from its source.

PROSPECTING AND SAMPLING PLACERS

The greatest incentive the placer miner has in searching for gold is the possibility of discovering rich pockets in unsuspected places. In searching for placer deposits in new areas, it is important that the prospector bear in mind that the deposits may have little relation to the present topography, as the conditions under which some Nevada placers were formed were totally different

[9]Emmons, M. H., The Enrichment of Ore Deposits, U. S. Geol. Survey Bull. 625, 1917, p. 316.

at an elevation of 7,400 feet. The District was discovered in 1869, and placer gold was mined in the early days, principally by Chinese. The amount of gold recovered was small.

The placer deposits are found in Water Canyon and tributary ravines. The old workings in Water Canyon are outlined by pits and tailings extending up the canyon for about one mile west of the abandoned camp of Joy. The richest ground was near the lower end of Water Canyon, where the channel is narrow and the gravel is about 10 feet deep. At this point the pay streak on bedrock was 14 to 18 inches thick, overlain by 6 to 13 feet of overburden, which carried a little gold irregularly distributed. The gold found on the bedrock was fairly coarse. Nuggets ranging in value from $2.50 to $10 were found. Concentrate from the gravel contains scheelite.

The scarcity of water and the short mining season made placer mining difficult. Small-scale methods were used by the early miners. In recent years a number of attempts have been made to work placer ground in the District, but the results were not encouraging.

OSCEOLA DISTRICT

The Osceola District is on the west flank of the Snake Range in southwestern White Pine County, 40 miles southeast of Ely, Nevada. The first lode discovery in the District was made by James Matteson in 1872, and considerable quartz mining was done for several years. John Versan, an intelligent prospector, concluded that the gulches (one known as Grub and the other as Dry Gulch) would carry the gold that had been eroded from the quartz veins. He organized a prospecting party and began to sink shafts. His efforts were rewarded by finding very rich gravel at the junction of these two gulches, and in a few days following this discovery some 300 placer claims were located. The discovery of placer gold occurred in 1877 and marked the beginning of placer mining in the District, which has continued up to the present.

Prior to 1900 the output of placer gold is estimated to have been between $2,000,000 and $3,500,000, the first figure probably being more nearly correct. From 1903 to 1933 the placer output was $51,531, as shown by the annual volumes of Mineral Resources of the United States.

The placers are distributed over a wide area, which includes Dry Gulch and Grub Gulch (also known as Wet Gulch) in the immediate vicinity of the town of Osceola, Weaver Creek, Mary Ann Canyon (Hogum placers), and the Summit placer diggings.

The main placer diggings are in Dry and Grub Gulches, which are the drainage channels for the area surrounding Osceola. The gulches are dry the greater part of the year.

The placer deposits in Dry and Grub Gulches vary from a thin covering at the upper ends to as much as 200 feet deep at the lower ends. Usually the gold is disseminated more or less through the gravels, but the principal pay streak is near bedrock. The bedrock is shale, limestone, and quartzite. The gravels contain but few large boulders. The gold is both coarse and fine, having a fineness of about 850.

It is reported that from 300 to 400 placer miners worked in these two gulches for several years following their discovery. These placers were worked by ground sluicing, rockers, and sluice boxes when water was available. According to an item in the White Pine News, dated October 6, 1888, dry washers were introduced into the District that year. Small-scale placer-mining operations continued into the early eighties. In the year 1878, on one of Versan's claims, a miner found a nugget weighing 24 pounds and valued at $3,600. This nugget was stolen and carried to the nearby camp of Ward, where it was melted into bars. The thief eventually repented of his deed and returned the bullion to the rightful owner. This nugget is perhaps the largest found in the State.

The important placers in Dry Gulch were consolidated in the early eighties and the Osceola Placer Mining Company was organized to work the deposits on a large scale by hydraulicking and sluicing. At a cost of $200,000 this company constructed a ditch and flume line having a total length of about 30 miles. One branch of the ditch ran on the east side of the range and brought in water from Baker and Lehman Creeks; the other branch was built on the west slope and brought water to the placer diggings from Williams, Pine, Shingle, Ridge, and Willard Creeks. The ditches were dug with scrapers and teams, and several small sections had to be blasted in rock. A White Pine News item states that up to August 31, 1886, 125,892 cubic yards of gravel had been hydraulicked with an average of 356 miner's inches of water available from six to eight hours per day. The yield from this amount of gravel was $29,715.23. The ditch line was begun in 1885, and the foregoing amount of water was obtained from only one branch. Later the other branch was completed, and it is reported that as much as 2,000 miner's inches of water was available from the two ditches. A view of a placer bank on the Hampton placer ground in Dry Gulch, which was hydraulicked in the early days, is shown in figure 63.

This bank is 46 feet high, and a 5-cubic-yard channel sample taken by E. R. Wagner of Las Vegas, Nevada, from surface to the bottom of the bank is reported to have averaged $1.31 per cubic yard.

The Osceola Placer Mining Company continued hydraulicking until about 1900, when, on account of the loss in efficiency of the ditch from leaky flumes, light snowfall, stealing of the water from the ditch line, and other causes, work was discontinued.

In 1934 the Hampton placer, covering 417.74 acres of patented ground in Dry Gulch owned by W. N. Bowen, was bonded to the Wagner Gold Placer Company, Inc. Edgar R. Wagner,

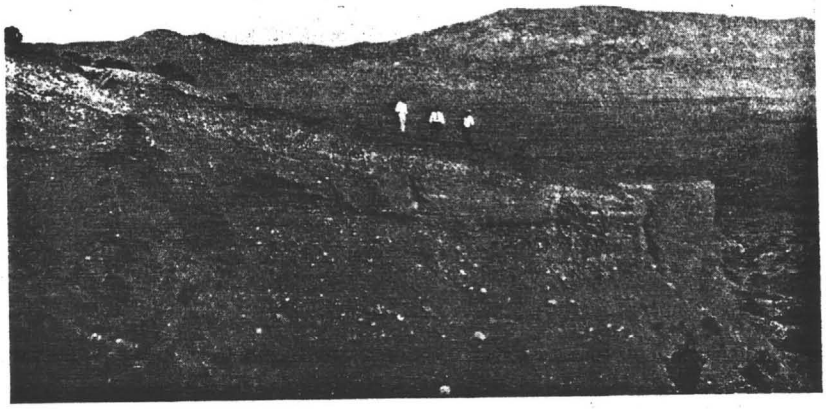


Figure 63. Placer bank hydraulicked in the early days, Osceola District.

of Las Vegas, Nevada, is the principal stockholder. The treatment plant is shown in figure 64. Cost of the equipment was about $11,000.

The old workings in the upper portion of Dry Gulch was sampled by taking 174 cubic yards of gravel in 1-cubic-foot lots from several of the old shafts on the property. These samples ranged from 17 cents to $8.77 per cubic yard from surface to bedrock and averaged $1.32 per cubic yard. The shafts sampled ranged from 7 to 54 feet deep. The average depth of 124 holes was 26½ feet to bedrock. Sampling by drilling at Osceola is impracticable, as the quartzite boulders in the alluvium carry values in free gold up to $1.20 per ton and this gold would vitiate drill samples.

The gravel plant consists of two dragline scrapers, each driven by a 75-hp. Waukesha gasoline engine, and a washing plant made

by the Pioneer Gravel Equipment Manufacturing Company of Milwaukee, Wis.

The gravel is hauled to the washing plant by one of the dragline outfits and is discharged into a hopper below the surface of the ground. Above the hopper is a grizzly made of ⅝ x 3-inch strap iron with 3-inch openings. From the hopper, the gravel is fed to an inclined conveyer belt 24 inches wide and 70 feet long, which discharges into the trommel. The trommel is 42 inches in diameter, 16 feet long, and is equipped with a punched-plate screen having ⅝- and 1-inch holes. Oversize from the trommel is discharged into a 21-cubic-yard steel bin below, and from the bin it is discharged over a slide to the side of the machine. From the side of the machine the oversize is

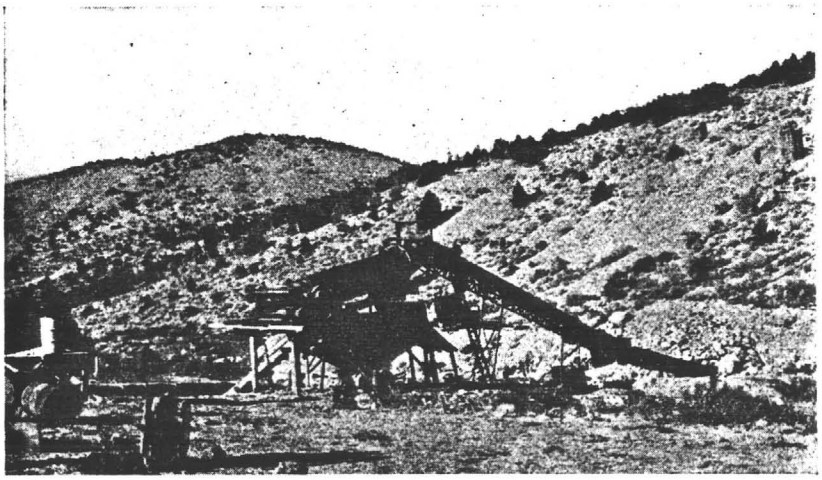


Figure 64. Placer plant of the Wagner Gold Placer Company, Dry Gulch, Osceola District.

transported by the other dragline scraper to the waste dump on the side of the hill.

The trommel undersize, constituting about 50 percent of the material mined, is discharged by gravity to a sluice box 50 feet long, 2 feet wide, 10 inches deep and sloping 1½ inches per foot. Riffles in the sluice are made of 1 x 3-inch boards spaced 3 inches apart and built in 5-foot sections.

The management states that the plant operated a few weeks in 1935 and during this period treated some 3,000 cubic yards of gravel averaging 69½ cents per cubic yard. The gravel treated consisted mainly of tailings from former operations. The plant closed in October for the winter because of water shortage.

During 1934 and 1935 about 25 men were working placer

deposits in the District by small-scale hand methods. Most of these were working in the Hogum area on ground owned by T. B. Tilford. Royalty payments on Tilford ground vary from 25 to 35 percent of the gross returns.

The Hogum placers are three miles southwest of Osceola, on an alluvial fan that spreads out from Mary Ann Canyon. Pay gravel was found here in 1879, and the deposits have been worked intermittently since that time.

The placer deposits occur in channels buried under the detrital material of the alluvial fan. Usually they occur in a stratum overlying a false bedrock of cemented material. Frequently small potholes that carry high values are found in the false bedrock. It is believed that the gold was derived from the

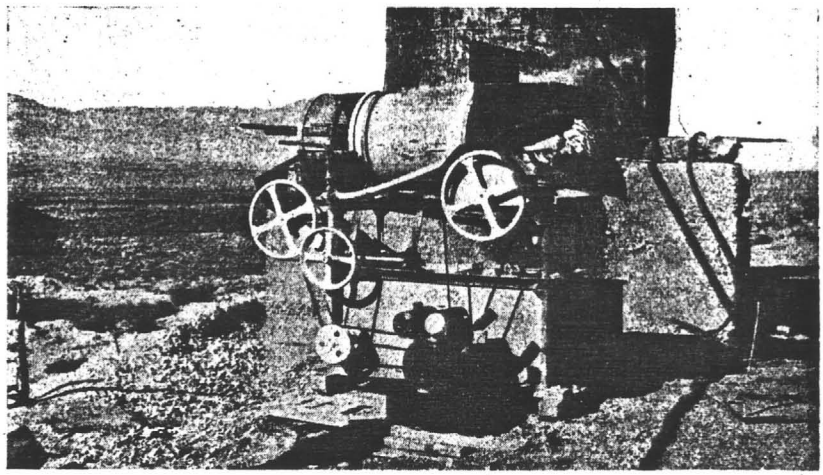


Figure 65. Patented portable placer machine used in Hogum placer area, Osceola District.

quartzite strata exposed on the ridge above the canyon. The gold is generally fine.

The pay gravel is removed by drift mining and hoisted either by hand windlasses or small power hoists. In the spring of the year when water is available the gravel is sluiced. During the summer months hand-powered dry washers generally are used to recover the gold. In working with dry washers, sometimes the gravel has to be dried before it can be treated. Stoves made of sheet iron placed on rocks are employed for this purpose. Sagebrush is used for fuel.

During 1933 and 1934 William Trent worked in the Hogum area and recovered $7,500 in gold with a G. B. portable placer machine, shown in figure 65. This machine handled about two

cubic yards per hour with a water consumption of 70 gallons per cubic yard. Water for placering was pumped to the ground through two miles of 2-inch pipeline with a Gould triplex pump, size 4 by 6 inches, belt driven by a 12 - hp. Fairbanks - Morse gasoline engine.

The Weaver Creek placer diggings are east of the divide, above the camp of Osceola. In the early days a considerable area at the upper end of the creek was worked by Chinese. In 1932 an attempt was made to work the gravels adjacent the creek by sluicing. The gravel was excavated and transported to the sluice by a small dragline scraper. Operations were hampered by large boulders and water on the bedrock. In addition, the placer operators became involved with ranchers below the placer workings over water rights. In 1935 there was very little placer activity in the vicinity of Weaver Creek.

The Summit Diggings are near the crest of the divide several miles above Osceola. In 1932 considerable excitement was aroused over the reported discovery of placer gold in the area. Many claims were staked out by miners from Ely, but, after a short period of prospecting, it was found that the ground did not come up to expectations, and the diggings were abandoned.

In 1935 some 4,000 acres of ground on the west slope of the Snake Range north of the Hogum placers were under option to the Osceola Gold Mining Corporation, Norman C. Stines, consulting engineer and director. The ground represents a consolidation of 19 separate placer holdings. During 1935 about 15 men were employed by the company in sampling. Prospecting shafts 4 x 5 feet in section were sunk on contract. The contract price for sinking shafts varied from $3 to $4 per linear foot, depending on character of material and the depth.

The pay gravel occurs in a series of channels on a false bedrock of caliche. The shallowest depth to the caliche is 30 feet. According to William Trent, who was instrumental in consolidating the various placer holdings, seven channels have been found, averaging about two miles in length and about 60 feet in width. Gold is found from the surface to the false bedrock, but the best values are in the five to six feet of gravel directly above the false bedrock. Most of the alluvium is wash gravel with a few boulders up to one foot in diameter. Some of the gravel is cemented, and blasting is necessary. The false bedrock varies in thickness from six inches to three feet. True

bedrock on the alluvial fans has not been determined, but judging from the exposures at the east boundary of the placer ground it is probably quartzite to the north and limestone to the south. The gold is fairly coarse and it has a fineness of 844 to 857.

In Spring Valley, to the west of the placer ground, a large flow of subsurface water is available. A sump 15 by 15 feet in area and 20 feet deep was dug in the valley, and the water level in the sump is about 12 feet from the surface. A 250-gallon-per-minute pump was installed to test the amount of water available. Several weeks of steady pumping did not lower the water level. Near this sump is a drilled well, 750 feet deep, which has a flow of at least 400 gallons per minute by actual test. The water in this well rises to within about 12 feet from the surface.

In 1935 some preliminary sampling was done on placer ground on the east slope of the Snake Range about three and one-half miles west of Osceola. The Black Horse Gold Mining Company, financed by a group of business men from Houston, Tex., is planning to work the property.

The placer ground consists of the T. S. Mathis ranch of 160 acres, which is held under option, and 320 acres of located ground. This ground has never been worked. Three shafts, averaging 54 feet deep, were sunk on the property in 1935. Bedrock is said to be quartzite. The best values occur in the two feet of material above bedrock.

A flow of 65 miner's inches of water is available from seven springs on the property.

MINING ON RAILROAD GRANT LANDS

The Southern Pacific Railroad Company owns, or has legal rights in, many thousands of acres of desert land in Nevada. The question is often asked: "What right have I to a mineral discovery I have made upon railroad grant land?"

When railroad grant lands have been patented by the railroad company, no one may obtain title to any mineral thereon, or mine the same, without first purchasing or leasing the land from Southern Pacific Company, Land Department, San Francisco, Calif.

Therefore, the discoverer should first write to the Register and Receiver, United States Land Office, Carson City, Nevada, to ask if the land has or has not been patented. If the railroad grant land has not been patented, a discovery of valuable mineral

① Oscala

i The Jacks Gulch, Dry Gulch, Grub Gulch properties said to contain 28 M yd^3 at 0.02 oz au or \$8/yd^3 124 holes averaged 26.5 ft to bedrock Good placer potential

② Hogum area
Not much data - bedrock deep - 200 ft.
production from false bedrock or caliche layers

③ Weaver Creek 3.5 miles east of Oscala
\$6.90/yd at present price of gold

④ Midas Area - fright as underground mining on 2-3 ft veins - although placers at Tuscora

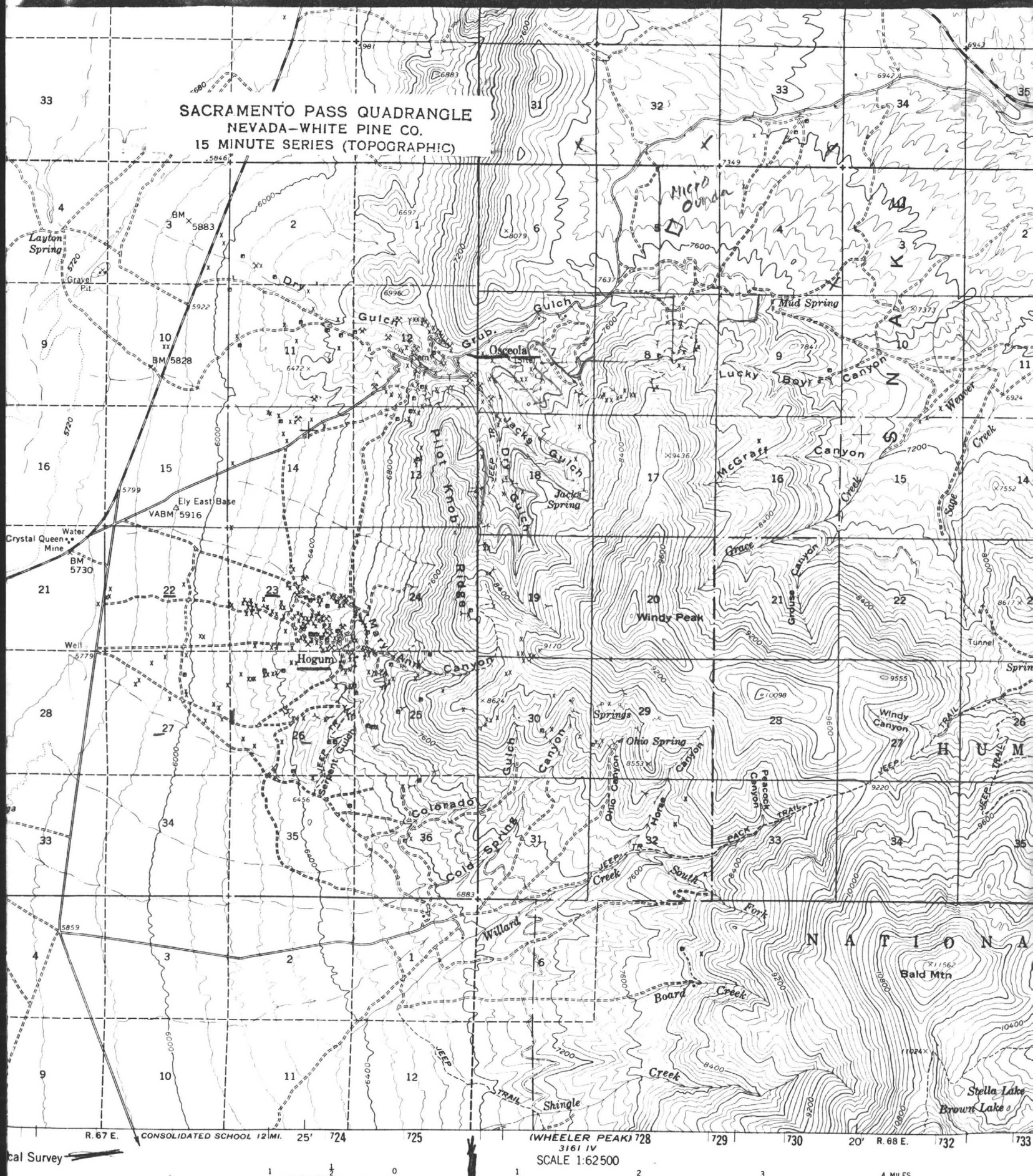
Potential of placer \$1-\$2-\$3
0.1 oz au . \$40
3.5 oz ag . \$35
0.3% W
\$75/ton = \$35/yd recovery 50% - \$17/yd
To good to be true what's the hitch

D G

Hogum - 2200 acres in one group

Foote believes a large portion of all values are in rock as analysis was fire assay

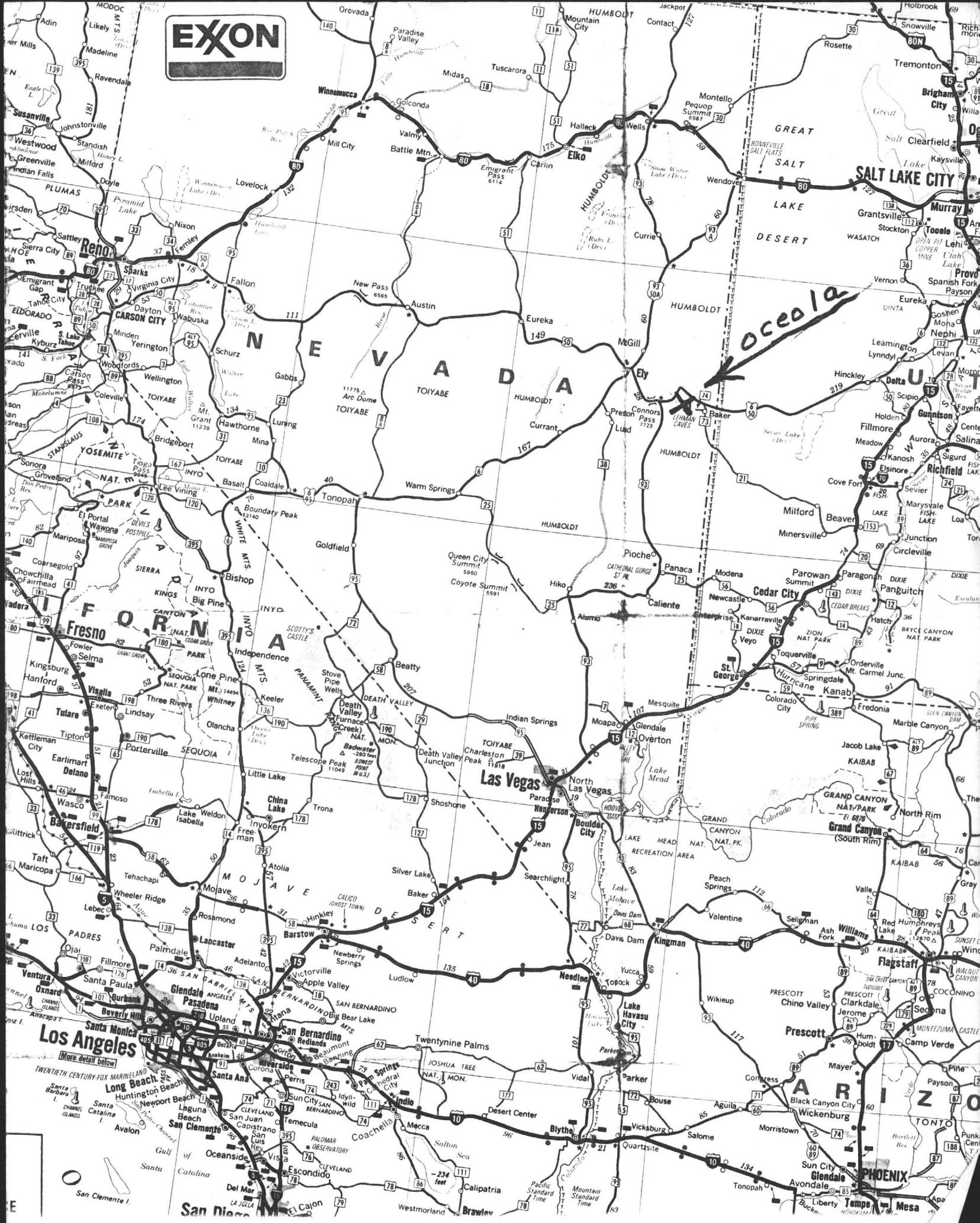
How much free gold - in past considerable placer operations



cal Survey

etric methods
s taken 1956

n, east zone


EXXON
Ocala
NEVADA
CALIFORNIA
ARIZONA
SALT LAKE CITY
Reno
Sparks
CARSON CITY
Winnemucca
Elko
Ely
Las Vegas
Fresno
Bakersfield
Los Angeles
San Diego
Flagstaff
PHOENIX
Kingman
Needles
Barstow
Lancaster
Palmdale
Victorville
San Bernardino
Riverside
Indio
Blythe
Yuma
Tucson
Prescott
Cedar City
St. George
Richfield
Gunnison
Delta
Provo
Murray
Tooele
Brigham City
Tremonton
Grand Canyon (South Rim)
Williams
Lake Havasu City
Boulder City
Henderson
North Las Vegas
Overton
Moapa
Caliente
Pioche
Tonopah
Goldfield
Beatty
Death Valley Junction
Shoshone
Baker
Barstow
Mojave
Tehachapi
Bishop
Mammoth Lakes
Lone Pine
Independence
Bridgeport
Yosemite
Sonora
Mariposa
Coarsegold
Visalia
Tulare
Porterville
Delano
Taft
Maricopa
Ventura
Oxnard
Santa Barbara
Santa Monica
Beverly Hills
Pasadena
Glendale
Burbank
Long Beach
Huntington Beach
Newport Beach
Laguna Beach
San Clemente
Oceanside
Escondido
Del Mar
La Jolla
El Cajon
Calexico
Mexicali
Yuma
Parker
Bouse
Quartzsite
Salome
Wickenburg
Black Canyon City
Prescott
Jerome
Sedona
Camp Verde
Mesa
Tempe
Glendale
Avondale
Tonopah
Gulf of Santa Catalina
San Clemente I.
Salton Sea
Mojave Desert
Death Valley
Lake Mead
Lake Mohave
Grand Canyon National Park
Zion National Park
Bryce Canyon National Park
Yosemite National Park
Joshua Tree National Park
Pacific Standard Time
Mountain Standard Time

OSCEOLA PLACER PROJECT

A. Introduction:

1. History

2. Physical Description

3. Geology

4. Evaluation and Economics

5. Exploitation procedure

B. Conclusions:

Estimated Cash Flow before start-up)

Operating Cost Analysis)

Estimated Cash Flow after start-up.)

Map C-1)

Map: U.S.GS. Topographic 15 minute series.)
Sacramento Pass Quadrangle
Nevada, White Pine County)
N3900 - W11415/15)

ENCLOSURES

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1. HISTORY

The first lode discovery in the Osceola District was made in 1872 -- and considerable quartz vein mining was done for five years. In 1877 placer deposits were discovered and over 300 placer claims were located. The Osceola gravels have been worked intermittently since that time.

Estimated placer gold production prior to 1900 is between 2 and 3.5 million dollars.

The main deposits are in Dry Gulch, Grub Gulch, and Jacks Gulch. These gulches are dry for most of the year. The placers were worked by hand methods until the early eighties (1885) when the important claims were consolidated and the Osceola Placer Mining Company was organized to work the ground by hydraulicking and sluicing. This company invested $200,000. in a ditch and flumes to bring water from the headwaters of Baker and Lehman Creeks on the east slope of Bald Mountain and another branch on the west slope to drain Willard, Pine, Shingle, and Williams Creeks. About 2,000 miners inches of water (3,000 Cu. Ft./min) was made available by these ditches and flume lines. Hydraulicking was carried out in Dry Gulch until about 1900, when water theft, leaky flumes, and legal battles over water rights, forced work to stop. A record grade of 23.7¢ per cubic yard was reported in a White Pine News item in 1886. At the present price of gold (1975) $170/oz. this amounts to $2.01/cu. yd.

In 1935 the Hampton placer, 417 acres in Dry Gulch was sampled and worked by the Wagner Gold Placer Company using two dragline scrapers and a washing plant. This operation lasted only a short time and was shut down because of water shortage. About 3,000 cubic yards was treated with a recovery of 69.5¢ per yd. (Present value, $3.37 @ $170/oz.) This treated gravel was mainly tailings from older operations.

"In the year 1878, on one of John Versan's claims in Dry Gulch, a miner found a nugget weighing 24 pounds and valued at $3,600. This nugget

INTRODUCTION

The purpose of this report is to provide a background for, and to outline an exploitation program for the Osceola Placer gravels in the Snake Range, White Pine County, Nevada.

The report is not intended as a formal scientific treatment of the subject matter, therefore theoretical and controversial items have been avoided wherever possible.

was stolen and carried to the nearby camp of Ward, where it was melted into bars. The thief eventually repented of his deed and returned the bullion to its rightful owner. This nugget is perhaps the largest found in the State."

* "Placer Mining in Nevada"
William O. Vanderburg.

2. PHYSICAL DESCRIPTION

The Osceola Placer Deposits are located in a dendritic series of Westerly and Northwesterly trending V shaped gulches on the north flank of Bald Mountain, and 5 miles Southwest from Sacramento Pass, along the east side of Spring Valley, White Pine County, Nevada. The gulches have a common entry onto the alluvial plain which forms the east flank of Spring Valley. It is at this convergence of the gulches where most of the placer mining was done in the 1870's.

The ridges dividing the gulches are steep sided with very little soil cover and a moderate amount of vegetation which is mostly jack pine.

Small springs exist in two of the gulches, but they produce less than ten gallons per minute each in the late summer.

The placer gravels are primarily the result of rapid, periodic erosion produced by the heavy rains of short duration which are typical of mountain-desert areas of the Southwest. The V-shaped gulches were formed during a period of heavier precipitation and at a later period filled with gravel when precipitation became more periodic.

The average elevation of the major portion of the gravels in 7,600 ft. above sea level.

3. GEOLOGY

The geology of the Osceola District has been described in semi-detail in various studies and reports. The earliest complete report was published by Mr. F.B. Weeks in 1907. The most valuable source of information on Osceola is from the University of Nevada Bulletin Vol. XXX No. 4, May 15, 1936 by William O. Vanderburg, Mining Engineer, U.S. Bureau of Mines.

The Osceola gravels are derived from the Cambrian limestones, shales and quartzites which are host rocks in varying degree to the gold mineralization which occurs in the form of fracture filling by mineralized quartz.

Quartz vein mineralization is predominant with secondary fracture filling as a further source. Lode mining of the quartz veins surrounding and transversing the Osceola gravels has produced a significant but unknown quantity of gold.

A detailed geological mapping and prospecting program is planned for 1976 by Osceola Exploration Co. Inc. This program will thoroughly explore lode mining possibilities in the Osceola District, and will include detailed surface mapping and sampling, detailed color photo-geology, fracture pattern analysis, exploration and mapping of old undergound workings, and research of old records of lode mining.

It is anticipated that this program will result in discovery of worthwhile lode mining targets.

4. EVALUATION AND ECONOMICS

The Osceola Gravels have been worked in various ways, for many years. The last serious work was done in the 1930's and very little has been done since that time because of the low fixed price of gold in relation to the constantly rising costs of mining and taxation. Now that the price of gold has been freed from control, placer deposits of this type and extent are again attractive investments.

SAMPLING

A sampling program for the upper Dry Gulch old workings was performed in 1934 by Wagner Gold Placer Co. Inc. Results were not completely satisfactory because of the non-homogenous nature of the gravels, but a fairly even horizontal distribution of the gold values was established.

"The old workings in the upper portion of Dry Gulch was sampled by taking 174 cubic yards of gravel in 1 cubic foot lots from several of the old shafts on the property. These samples ranged from 17 cents to $8.77 per cubic yard from surface to bedrock and averaged $1.32 per cubic yard. The shafts sampled ranged from 7 to 54 feet deep. The average depth of 124 holes was 26½ ft. to bedrock. Sampling by drilling at Osceola is impracticable, as the quartzite boulders in the alluviun carry values in free gold up to $1.20 per ton and this gold would vitiate drill samples." *

* Page 169, "Placer Mining in Nevada"
by William O. Vanderburg.
Mining Engineer, U.S. Bureau of Mines
University of Nevada Bulletin
Vol. XXX No. 4 May 15, 1936.

It is assumed that the above quotation refers to a sampling program by Wagner Gold Placer Company Inc. as conducted in 1934 when the price of gold was $35.00 per oz. At the present price of Gold, $170.00 per ounce, the average value of the above samples becomes $6.40 per cubic yard.

Drilling for samples is not a practical method because the cobbles and boulders are themselves gold bearing and would contaminate the drill holes when encountered. The only realistic method for sampling these gravels is by cross trenching the gulches to bedrock, sorting boulders and cobbles, screening and washing through sluices and in effect placer mining the gravels. It is therefore obvious that a sampling program as described above, could be scaled up with very little additional investment in equipment, to a point where the operation becomes profitable.

GOLD CONTENT

Accurate production figures are seldom if ever available for small placer gold deposits, for a multitude of reasons. Chief among the reasons being the desire of the operator to either keep secret the extent of a profitable operation or to inflate the apparent value of an unprofitable working for possible sale.

Available production figures for the Osceola Placers have been studied, and as far as possible given weighted values as to reliability. This study indicates that an average grade per cubic yard will be about .02 Troy ounces of gold. At a gold price of $170. per ounce this gives a gross value of $3.40 per cubic yard.

Old production figures state that the Osceola placer gold averages 850 fine.

RESERVES

Calculations of reserves were done in the following way:

1. The shaded area enclosed by dotted lines on the enclosed map C-1 shows the limits of the placer gravels. This shaded area was measured by scale and found to be 2.8 million sq. yds. This area was multiplied by 10 yds. as a conservative average depth of gravel in the gulches, to arrive at a reserve figure of 28 million cubic yards.

2. Reserve value @ $170. per oz. Gold.

(28,000,000 yd^3) (.02 oz.) = 560,000 ounces

(560,000) (.70 recovery) = 392,000 ounces

(392,000) ($170. gold price) = $66,640,000. - gross

ECONOMICS.

Gross Gold Value	$66,640,000.	
Mining and Washing Cost	30,408,000.	@ $1.086/yd^3
Net Gold Value	$36,232,000.	

Exploitation plans involve the building of a 1000 cubic yard per day pilot washing plant and the required digging and transportation equipment to handle this volume.

Estimated investment over a six month period to startup is:

Capital expense	$156,000
Expendibles	60,000
Labor & Supervision	80,000
	$296,000

Total write-off = 60.9% = $180,264.00

After startup costs and income will be:

	Monthly	Yearly
Operating income	$102,000.	$1,224,000.
Operating costs	31,950.	383,400.
	$ 70,050	$ 840,600.

Payout time = 4.2 months.

Attached to this report are:
1. Estimated Monthly Cash Flow before startup.
2. Operating Analysis.
3. Estimated Cash Flow after startup.

EXPANSION

When the Pilot Plant has been operating for a period of time sufficient to determine an accurate grade for the gravels, and to overcome any minor operating problems, expansion plans will be formulated. These plans will be based upon the economic limits of the property.

5. EXPLOITATION PROCEDURE

The Osceola Placer gold deposits offer some operational problems; the first, of course being water requirements, and the second is the choice of the most efficient method of digging and sorting the gravels before washing.

Water

Water will be obtained by developing the existing year round springs and by drilling one or two water wells in the middle portion of Jacks Gulch where an impervious igneous dike may effectively dam the gravels in the gulch and may have produced an aquifer. If, for some unforseen reason, the Jack's Gulch water wells are unproductive, another location will be chosen and drilled in Spring Valley where sufficient water is certain to be obtained. If this Spring Valley well is necessary, haulage costs will be increased slightly because the washing plant will be erected on a location in proximity to the water well. In other words, the location of the water supply determines the site of the washing plant.

Digging and Sorting

The Osceola Gravels are fine to coarse, poorly sorted, with numerous cobbles and boulders. The medium to small size particles are sharp and only slightly water worn. The larger cobbles and boulders are fairly well rounded. Clay content is slight in the gravels. Partial cementation of the gravels has occurred in layers of Caliche with a thickness of up to 3 feet, however these Caliche beds are not extensive.

Digging of these gravels may be best accomplished by use of a power shovel with 3 yd^3 bucket. The shovel will be advanced into a face with the bench surface on bedrock wherever possible. As the shovel digs, large boulders will be sorted to one side and the remainder of the material stacked for loading by a 3 to 4 yd^3 front end loader. As bedrock areas of sufficient size are opened, periodic high pressure water washing of

the bedrock surface will be done in order to obtain the higher value sand and gravel which is expected at the bedrock surface. Boulders and loading stacks will then be placed on the washed bedrock. If in certain portions of the gravel, digging becomes too difficult for the shovel, lines of vertical blast holes will be drilled behind the face and the gravel loosened by explosives.

When a high percentage of cobbles and boulders is encountered, it may be necessary to sort with a long tooth rake pulled by tracked vehicle. However, this type of sorting is not anticipated.

Washing Plant

The basic design of the washing plant is as follows:

1. Conveyor in tunnel beneath ground level grizzley. Gravel is dumped along grizzly and fed by loader thru grizzly to conveyor.
2. Gravel is sized in traumel - oversize to tails.
3. Undersize from traumel to jig - washover to sluice concentrate to sizer & table.
4. Sluice - concentrate to amalgam
   - tails to stack
5. Table - concentrate to amalgam plates
   - tails to stack
6. Amalgam - to retort
7. Retort + 357° C — Hg + Au — TO FURNACE
   TO SALE

B. CONCLUSIONS

1. The Osceola gravels may be worked profitably in approximate accordance with Section 5 (Exploitation Procedure) of this report.

2. Water supply is the important limiting factor of the project, and must be developed before proceeding with further investment. A year round minimum of 250 gallons per minute must be made available or the project is not viable. Such a water development is possible at approximate cost as outlined in Section 5.

3. The Pilot Plant operation as planned at 1000 cu. yds. per day is proper procedure for the following reasons.

a) Gold values may be concentrated in smaller areas so that expansion is not economically justified.

b) Upper gulch water may be reasonably expected in sufficient quantity for a plant of this size.

c) Maximum recovery methods may be worked out and standardized before larger plant design is begun. The gold in the upper portions of the gulches may be of such coarse size that large plant design will be drastically altered.

d) Digging operations will be made more efficient by experience gained during the smaller scale Pilot Project.

Robert W. Copeland
P. Geological Engineer,
Alberta Reg. No. 26920.

OSCEOLA EXPLORATION CO. Feb. 11, 1975.

ESTIMATED MONTHLY CASH FLOW. (STARTUP)

WASHER PLANT & LOADING OPERATION

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Water Well	3,000.					
Pump	4,000.					
Pipe		5,000.	5,000.			
Power Inst.			5,000.	5,000.	5,000.	5,000.
Shovel 3 yd.	5,000.	5,000.	5,000.	5,000.	2,000.	
Cat D9			5,000.	10,000.	15,000.	
Loader 3 yd.		5,000.	5,000.	5,000.	5,000.	
Trucks				5,000.	10,000.	
Traumel		3,000.	2,000.	4,000.	1,000.	
Jig		2,000.	2,000.	1,000.		
Table			1,000.	1,000.		
Sluice		1,000.	1,000.			
Pumps		1,000.	2,000.	2,000.		
Conveyors		2,000.		5,000.	5,000.	8,000.
Misc. & Contingency	8,333.	8,333.	8,333.	8,333.	8,333.	8,333.
Labor & Supervision	10,000.	10,000.	10,000.	15,000.	15,000.	18,000.
	30,333.	42,333.	51,333.	66,333.	66,333.	39,333.
Cum. Totals	(30,333)	(72,666)	(123,999)	(190,332)	(256,665)	(295,998)
Interest 25%	631.95	1,513.87	2,583.31	3,965.25	5,347.18	6,166.63

OSCEOLA PLACER
OPERATING COST ANALYSIS @ 1000 yd^3/DAY
Two 12 hr. Shift Basis.

LABOR	DAILY	MONTHLY	PER YD^3
Shovel Op. (2)	120.	3,600.	
Cat. Op. (2)	110.	3,300.	
Truck Dr. (2)	100.	3,000.	
Truck Dr. (2)	100.	3,000.	
Plant Op. (2)	90.	2,700.	
Super. (2)	133.	4,000.	
	653.	19,600.	.653.
Compensation	65.	1,950.	.065.
Other Expense	12.	360.	.012
El. Power	40.	1,200.	.040
Fuel .30¢ gal. 20 hr. day 3 yd.			
Shovel (1) 11 gal./hr.	70.	2,100.	.070
Cat (1) D.8 9 gal./hr.	56.	1,680.	.056
Trucks (2) 15 gal./hr (2)	90.	2,700.	.090
Repairs	88.	2,640.	.088
Insurance	15.	450.	.015
	$ 1,089.	$32,680.	$1.086/$yd.^3$

OSCEOLA PLACER
ESTIMATED CASH FLOW AFTER STARTUP

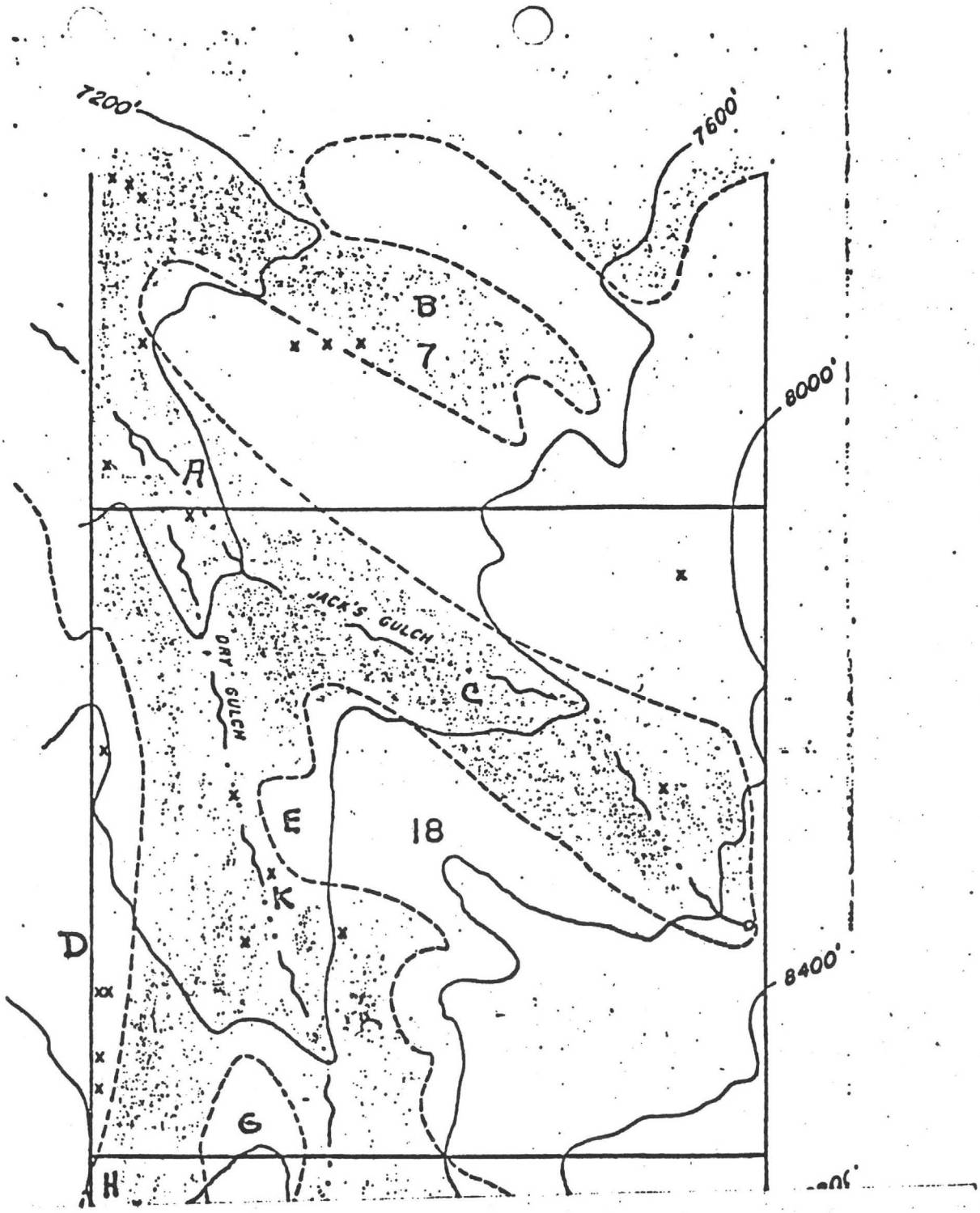
STARTUP PLUS	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6
FUNDS SOURCE						
Income @ .02 oz. @ $170./oz.	102,000.	102,000.	102,000.	102,000.	102,000.	102,000.
FUNDS DISPOSITION						
Operating Costs @ 1000 yds^3/Day	31,950.	31,950.	31,950.	31.950.	31.950.	31,950.
Accumulated Interest					30,282.	
Capital Repayment	70,050.	70,050.	70,050.	70,050.	15,798.	
For Distrib. Or Expansion					23,970.	70,050

AFTER STARTUP

	MONTH 7	MONTH 8	MONTH 9	MONTH 10	MONTH 11	MONTH 12
Op. Costs See Page 2.	31,950.	31,950.	31,950.	31,950.	31,950.	31,950.
Income @ .02 oz. yd^3 $170. per oz.	102,000.	102,000.	102,000.	102,000.	102,000.	102,000.
Op. Profit	70,050.	70,050.	70,050.	70,050.	70,050.	70,050.
Interest 25%	4,707.25	3,247.87	1,789.54	329.13	Int. pay off 30,281.96	
Cash Position	225,948.	155,898.	85,898.	15,798.	23,970.04	124,302

Investment Interest Payoff	MONTH 11
	30,281.96

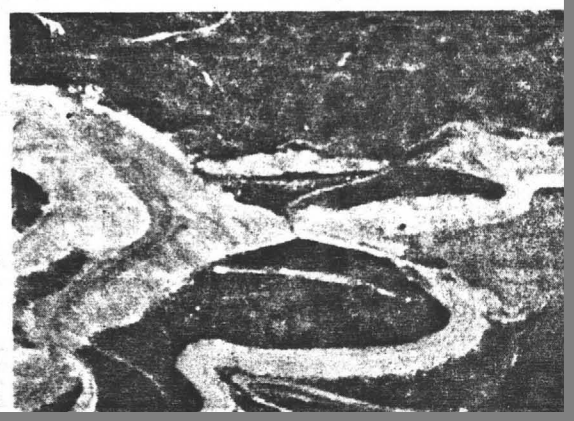
	MONTH 11	MONTH 12	MONTH 13	MONTH 14	MONTH 15	MONTH 16
Available For Distribution Or Expansion	23,970.04	70,050.	70,050.	70,050.	70,050.	70,050.
Taiga 25%	5,992.51	17,512.50	17,512.50	17,512.50	17,512.50	17,512.50
Osceola 75%	17,977.53	52,537.50	52,537.50	52,537.50	52,537.50	52,537.50


7200'
7600'
8000'
8400'
B
7
A
JACK'S GULCH
DRY GULCH
C
E
18
K
D
G
H

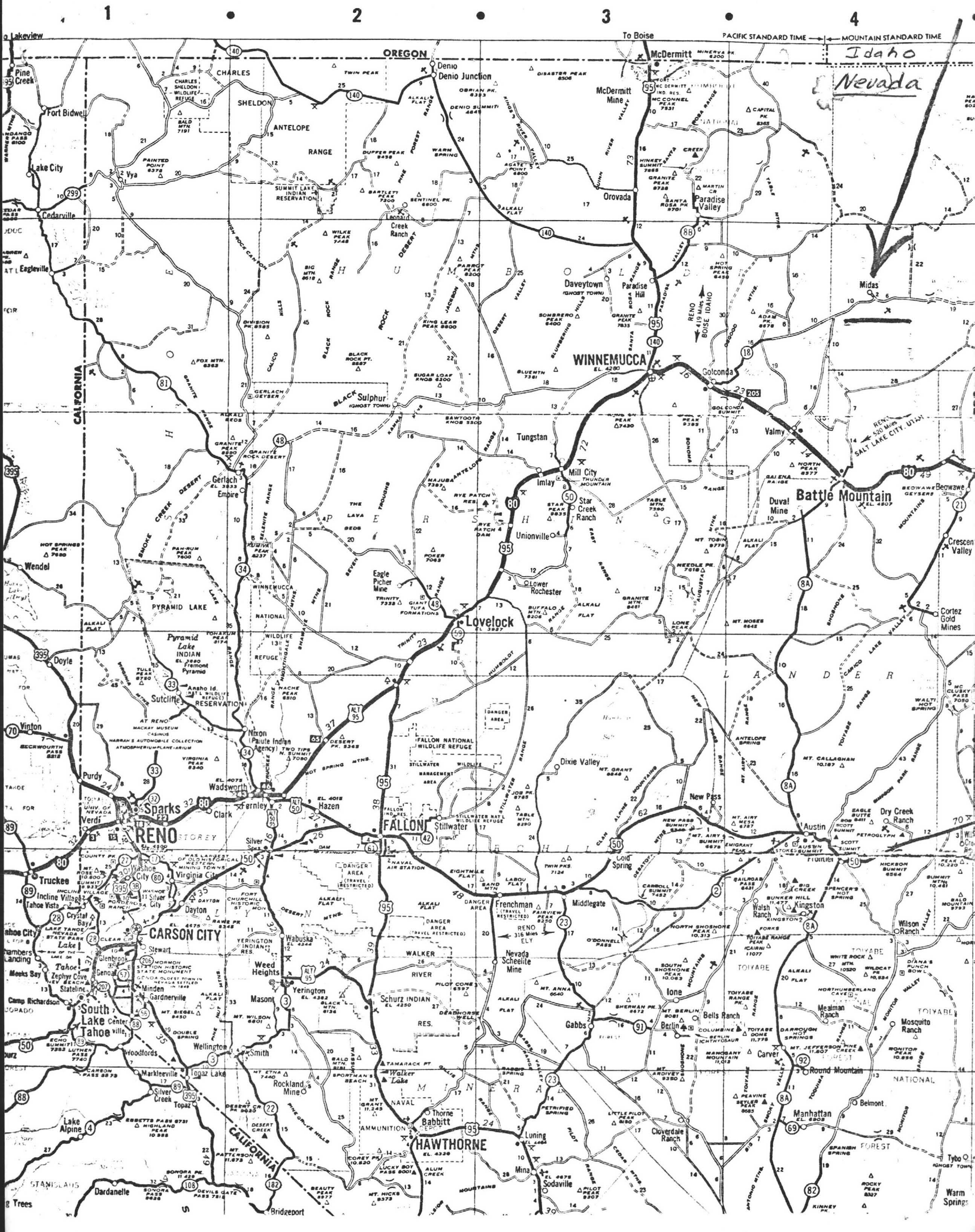
Midas File

CARLIN GOLD

A NEWMONT MONEY GENERATOR KEEPS ON RENEWING ITSELF AFTER SPARKING THE REBIRTH OF GOLD MINING IN NEVADA



Dan Jackson, western editor, COAL AGE



1
2
3
4
Lakeview
To Boise
PACIFIC STANDARD TIME
MOUNTAIN STANDARD TIME
Idaho
Nevada
OREGON
CALIFORNIA
Denio
Denio Junction
McDermitt
McDermitt Mine
Pine Creek
Fort Bidwell
Lake City
Cedarville
Eagleville
Vya
CHARLES SHELDON WILDLIFE REFUGE
SHELDON
ANTELOPE
RANGE
SUMMIT LAKE INDIAN RESERVATION
Leonard Creek Ranch
Orovada
Paradise Valley
Midas
Daveytown (GHOST TOWN)
Paradise Hill
WINNEMUCCA
Golconda
Valmy
Battle Mountain
Beowawe
Crescent Valley
Cortez Gold Mines
Sulphur (GHOST TOWN)
Gerlach
Empire
Tungstan
Mill City
Imlay
Star Creek Ranch
Unionville
Lower Rochester
Duval Mine
Eagle Picher Mine
Lovelock
Wendel
PYRAMID LAKE
Pyramid Lake INDIAN RESERVATION
Sutcliffe
Doyle
Vinton
Nixon (Paiute Indian Agency)
Purdy
Wadsworth
Sparks
Clark
Fernley
Hazen
Verdi
RENO
Truckee
Incline Village
Tahoe Vista
Crystal Bay
Washoe City
Virginia City
Silver Springs
Dayton
CARSON CITY
Stewart
Glenbrook
Genoa
Zephyr Cove
Stateline
Camp Richardson
South Lake Tahoe
Minden
Gardnerville
Woodfords
Markleeville
Topaz Lake
Topaz
Silver Creek
Lake Alpine
Dardanelle
Bridgeport
FALLON
Stillwater
FALLON NATIONAL WILDLIFE REFUGE
Dixie Valley
New Pass
Austin
Dry Creek Ranch
Cold Spring
Frenchman
Middlegate
Nevada Scheelite Mine
Wabuska
Weed Heights
Yerington
Mason
Wellington
Smith
Schurz INDIAN RES.
WALKER RIVER
Walker Lake
Rockland Mine
Thorne
Babbitt
HAWTHORNE
Luning
Mina
Sodaville
Gabbs
Ione
Berlin
Bells Ranch
Walsh Ranch
Kingston
Wilson Ranch
Mealman Ranch
Mosquito Ranch
Carver
Round Mountain
Belmont
Manhattan
Cloverdale Ranch
Tybo
Warm Springs
LANDER
TOIYABE NATIONAL FOREST
RENO 419 Miles BOISE IDAHO
RENO 520 Miles SALT LAKE CITY, UTAH
RENO 316 Miles ELY

CGMI JUN 1983

THE MIDAS MINING AND DEVELOPMENT CORPORATION MINING PROPERTIES

Report Prepared

by

Sherman B. Jensen
Geologist

Salt Lake City, Utah
June 28, 1971

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