Josephine General

of the country. The veins and veinlets carrying the gold have been undergoing erosion for many thousands of years, and during this time the gold has been carried by water and by gravity into the stream beds, from which it has been and is being mined.

PLACER MINES.

GENERAL OUTLINE.

The placer mines of Jackson and Josephine counties produced in 1907 gold to the value of $229,575, of which $107,722 came from Jackson County and $121,853 from Josephine County. More than 75 per cent of the production of Jackson County and more than 30 per cent of that of Josephine County came from the area described in this report. The chief districts contributing to this production are the Gold Hill, the Foots Creek, the Applegate, and the Jacksonville districts, in Jackson County; and the Althouse and Sucker Creek, the Williams Creek, the Waldo, and the Kerby districts, in Josephine County.

The gravel deposits that are being mined in these districts vary in thickness from a few feet to more than 50 feet. The average thickness of the gravels of all the important mines is more than 20 feet. The material of the deposits ranges from fine clay with but few bowlders to gravels that contain bowlders weighing several tons. The bowlders are, as a rule, fairly well rounded where the gradients of the streams are steep, but where the gradients are flatter, they are subangular and even angular. The predominating bowlders in the gravels are greenstone, but the kinds of bowlders vary in the different stream beds in accordance with the various kinds of rock in which the valleys have been cut. In many of the deposits the coarsest material is at or near the bed rock, but in some the bowlders are somewhat uniformly distributed throughout the section of the gravels.

With but one exception the placers are in gravels closely associated with the present streams, the deposits being either in the present stream beds or on terraces not many feet above them. The exception is at the High Gravel or Allen Gulch mine, near Waldo. Here the gravels are of Cretaceous age and lie on the divide between the east and west forks of Illinois River.

The gold content of the gravels varies greatly. In some of the best mines the average value is from 20 to 40 cents a cubic yard. The best values have usually been found at or near the base of the deposit. Much of the gold is fine, but nuggets are frequently found.

Many of the placer deposits have a bed rock of greenstone, which is in places considerably decomposed, fractured, and fissured, many of the fissures being filled with veinlets of quartz. But the gravels containing the gold are by no means confined to areas of greenstone.

From: Contributions to Economic Geology - Mineral Resources of the Grants Pass Quadrangle and bordering districts, Oregon J.S. Diller & G.F. Kay, 1908 USGS Bull. 380

Some of the placers have a bed rock of granodiorite, some of serpentine, and some of slate. In the Waldo district gravels are being mined which lie on Cretaceous conglomerates and sandstones. Much of the material of the deposits has been transported for considerable distances, and hence its origin bears no immediate relation to the rock on which it now lies. As the greenstones are the most widespread rocks of the region and as from them much of the gold of the quartz mines has come, it is reasonable to conclude that much of the placer gold has come from the veins and veinlets of the greenstone areas. But inasmuch as gold-bearing quartz is found also in other kinds of rock in this region, these have, no doubt, contributed gold to the placers. The usual slope of the bed rock is about 150 feet to the mile.

Placer mining is carried on chiefly during the first half of the year, when the supply of water is most abundant. A few mines are so equipped that there is sufficient water to operate them for a greater part of the year. Only one mine, the Champlin, on Foots Creek, is equipped for dredging; the other important mines are equipped for hydraulicking. The ground-sluicing method is used only in the small mines.

In many of the mines from three to five men are employed, but as many as fifteen are employed in some of the larger mines during the mining season.

GOLD HILL DISTRICT.

In the Gold Hill district there are no large placer mines. The most important is the Blockert mine, on Galls Creek. On the same stream work is being done on a few other properties. The gravels worked are in the present stream bed. The hydraulic method is used. On Sardine Creek also some mining is being done.

It is of interest to note that during the summer of 1908 preparations were being made to mine, by electric dredge, deposits to the south of Kane Creek, in the SW. ¼ sec. 36, T. 36 S., R. 3 W. The Electric Gold Dredging Company, of which H. A. Mansfield, of Indianapolis, is manager, had already begun work. The electric power shovel to be used is equipped with three motors, one for hoisting the dipper, one for swinging the crane or boom, and one on the crane or boom for crowding the dipper into the bank. The capacity of the shovel is about 500 cubic yards in ten hours. The electric power is brought from the Ray dam on Rogue River, 2 miles away. The water to be used in washing the gravels is obtained from reservoirs on the small stream which flows through the property. The material of the deposit is fine-grained clay and gravel having an average thickness of about 18 feet; very few bowlders are present. The bed rock is slate with a strike of N. 55° E. and a dip of about 70° SE. The slates have been considerably altered.

ALSEN GULCH PLACER Waldo area

see Johnson Placer

ALTA MINE (placer and lode) Waldo area

"The Alta Mine on Josephine Creek, 4 miles west of Kerby, consists of 3 claims. For some years the mine was worked only as a placer, but recently a lode mine was opened in the bluffs bordering the placer and a mill erected to crush the ore. The country rock is serpentine derived from peridotite and cut by a large dike composed of a rock related to dacite porphyry. The dike ranges from 25 to 40 feet in width between serpentine walls and is practically vertical. It strikes N. 40° E. and has been traced by Mr. Wilson about a mile and a half. Many smaller parallel dikes of the same material cut the serpentine of that region, so that the relation of the ore-bearing rock to the serpentine is evident.

"The ore is chiefly pyrite, occurring in scattered grains through the rock and more abundantly in small quartz veins, apparently with some chalcopyrite and possibly pyrrhotite. In some places when the rock is pulverized and panned it is found to contain not only pyrite but apparently considerable free gold. As the mine is in the early stage of its development, little is known of the distribution and extent of the disseminated ore. A good sample of the fresh rock with conspicuous blotches and scattered grains of pyritic ore in joints and veinlets of quartz was assayed by E. E. Burlingame and Company of Denver, for the Geological Survey, and it yielded 0.02 ounces in gold per ton. About a dozen sectional samples assayed by local assayers were reported to me by Mr. Wilson and they averaged about $5. in gold per ton.

"A 'Lane slow-speed Chilean mill' has been erected to crush the ore. The rock is first run through a breaker, and after it issues from the mill is run over plates to Johnson concentrators. The mill is run by a 25-horsepower steam engine and has a capacity of 40 tons in 24 hours. Mr. Wilson reports a satisfactory test run of about 500 tons, made in the fall of 1911, at a cost of 80 cents a ton by water power and $1 a ton by steam. After amalgamation and concentration the tailings are reported to show no trace of gold. The overburden of the mine is gravel, and during the winter the water is used for hydraulicking."

Reference: Diller, 14:70 (quoted)
Parks & Swartley, 16:14

ALTHOUSE MINE (placer) Waldo area

Owner: J. J. Skinner, Grants Pass, Oregon. Leased in 1939-1940 by C. O. Taylor and Andy Wilson.

Location: Secs. 7, 11, 12, T. 41 S., R. 6 W.

Informant: G. W. Thrasher, January, 1940.

Report by: Ray C. Treasher, January, 1940

ALTHOUSE - RUN GULCH PLACER Waldo area

Owner: A. N. Steele, Holland, Oregon.

Location: Sec. 26, T. 40 S., R. 7 W., on Run Gulch. Reached via Holland to "Old Tiger Town", thence 2 miles up No. 8 trail.

From: Oregon Metals Handbook. Oregon Dept of Geol. and Mineral Industries Bull 14-C Vol II Part 1

Area: Eight claims.

History: Original location goes back to 1875. Some time later the claims were acquired by Mr. Sheaffer, who called the placer the Sheaffer Placer. Steele acquired the claims by purchase from Mr. Sheaffer.

Development: One No. 1 giant is being operated.

Equipment: One No. 1 giant; two No. 3 giants; 2200 ft. of 7 - 18 inch pipe.

Water: Water is taken from Run Gulch through three miles of ditch and 2200 ft. of pipe, giving a 120 foot head. Gravel can be mined throughout the year except during July-August-September; it is then necessary to wait 2 hours for the reservoir to fill which allows piping for two hours.

Geology: At present, the operators are working an old channel 300 ft. wide. Bedrock is soft serpentine. There are quantities of boulders some of which are small-room-size. These are blasted and removed with a hand derrick. The ground is reported to average 40¢ per cubic yard.

Informant: A. N. Steele, 4/10/41

Report by: Ray C. Treasher, 4/10/41

ARNOLD MINE (gold) Waldo area

Owners: H. J., & M. L. Arnold, Jacksonville, Oregon.

Location: Center sec. 16, T. 41 S., R. 5 W., elevation 5500 feet; southwest of Whiskey Pk., and southeast of Lake Peak.

Area: Five claims, staked in 1914-1915 by E. Arnold.

Development: There are at least two tunnels. Lower tunnel was driven since 1934. About 500 tons removed before 1934; 100 tons since then. There is a small mill having two stamps and amalgamation plates.

Geology: The mine is located in metasediment near a serpentine contact. Ore is quartz with gold and a small amount of sulphides. Average tenor of ore is $20. Ratio of gold to silver is 6-8 oz. gold to 1 oz. silver.

General: The property is operated in a small way by Arnold Brothers.

Informant: Francis G. Wells, 41

Report by: Ray C. Treasher, 41

ATLAS GOLD DREDGING CORPORATION (placer) Waldo area

Owners: Property leased from R. S. Leonard by Atlas Gold Dredging Corporation of Los Angeles, California; Frank E. Ford, Pres; W. E. Moffett, Sec.-Treas; Edison Building, Los Angeles, California; H. J. Ackley, General Manager; W. Youmans, Dredgemaster.

Location: Secs. 4, 7, 8, 18, T. 40 S., R. 7 W., on Althouse Creek.

Area: 3,000,000 cubic yards sampled out with about 4,000,000 cubic yards yet to sample. Property extends along Althouse Creek for about 2½ miles.

History: Property includes the old Leonard Placer with extensions.

Development: Plant construction began Jan. 20, 1940. Operation started about Feb. 7, 1940, and was discontinued in March, 1941.

Equipment: Bodinson washing plant: Hull consists of four 10' x 36' x 3½' wooden pontoons and two 8' x 36' x 4' steel pontoons; hopper is 12' x 10'; trommel is 5' x 38', 26' of which is drilled section with 3/8 inch to 1/2 inch holes having 2 inch bridge at upper end to ½ inch bridge at lower end; three banks of Hungarian riffles; expanded metal cloth and cocoa matting. Power plant; main pump is a 60 h.p. ten-inch Byron-Jackson, capacity 5000 gallons per minute; fire pump, 5 h.p. three-inch high pressure; stacker motor is 10 h.p.; trommel motor is 30 h.p.; the stacker has a 36 inch belt and is 70 feet long.

A K-55 Link-Belt dragline having a 3-yard bucket with a 2½-yard extra heavy mining bucket; a 70 foot boom; powered by a 250 h.p. G. E. motor. (This was changed in May, 1940, to a diesel-electric Marion-Walker-type dragline with 5-yard Esco bucket.) Other equipment includes an R. D. 7 Diesel caterpillar tractor with bulldozer, two pick-up trucks, two large G.M.Trucks, (one a four ton and the other fourteen ton capacity). There is a well-equipped welding and blacksmith shop to take care of all work, and a neatly arranged tool house or storage.

Geology: The mineable channel has a width of about 500 feet over a distance of 2½ miles along Althouse Creek. Bedrock is predominately soft, decomposed granite, with a few serpentine "reefs". The granite is normally decomposed so that the dragline can dig it to a depth of 18 inches. The surface is uneven or rolling. Normally the serpentine can be dug to a depth of 12 inches, except in a few places such as the nose of a hill where the serpentine is quite hard. Practically barren overburden, mostly soil, will average about six feet. There is an increase in gold content to a point about six feet above bedrock. This last six-foot zone contains most of the gold. There is practically no clay; the top soil is silty enough so that it does not clog the washing plant. "Large" boulders are 18 inches in diameter.

Informant: H. J. Ackley, general manager, 3/26/40

Report by: Ray C. Treasher

BAILEY GROUP PLACERS — Waldo area

Owner: A. L. Bailey, 122 East 14th, Medford, Oregon.

Location: Secs. 20, 33, T. 40 S., R. 8 W.

Development: Idle in 1939-1940. Worked by Fred Galeno in 1938.

Informant: Harry Messenger, January, 1940.

Report by: Ray C. Treasher, January, 1940

BEAR PLACERS, INC. — Waldo area and Illinois River area

See Illinois River area, Bear Placers, Inc.

BLANKET LEDGE MINE (gold) — Waldo area

see Happy Day Group

BOLAN LAKE PLACER — Waldo area

Owners: W. H. Miller, Grants Pass, Oregon; R. L. Miller, Gold Hill, Oregon; W. D. Meissner, Glendale, Oregon.

JOHNSON PLACER — Waldo area
(also known as Alsen Gulch Placer)

Owner: Joe E. Johnson, Takilma, Oregon.

Location: 8 miles south of Holland on West Fork of Althouse Creek in sec. 9, T. 41 S., R. 7 W. The easiest way to reach the property is by way of Takilma and the Happy Camp road for a distance of about 7 miles to a sign pointing to Johnson Placer; thence 1¼ miles by trail.

History: Althouse Creek was first worked in the fifties. There is no record of the earliest locations, but the claim was located and relocated for years until the present owner took possession in 1914. Except for two years he has operated it every year since 1914.

Area: Four claims--75 acres--held by location.

Elevation 3500 feet; steep mountainous topography; gulch operation; 5 ft. of snow maximum; 5 acres mined; no exploration work; plenty of grade and dump room; September to August mining season.

There is a first priority water right of 1500 miner's inches out of West Fork of Althouse. A ditch 1500 ft. long with capacity of 10 c.f.s. gives a 150 ft. head. A new ditch is needed; one a mile long would give about 500 ft. head.

Equipment: 3 No. 2 Giants, and 1000 ft. of 8 in. to 16 inch pipe.

Geology: Greenstone and slate bedrock; little clay; many large boulders; 10 ft. maximum thickness of gravel.

Informant: J. E. Morrison, 38.

JOSEPHINE MINING COMPANY — Waldo area
see Plataurica Placer

KERBY QUEEN (SOWELL) MINE (copper) — Waldo area

History: "This property is now (1916) under option to John Hampshire, of Grants Pass, and Twohy Brothers, of Portland, who are doing some development work with a view to opening up other bodies of copper ores. It is located in the SE¼ of Sec. 17, T. 40 S., R. 7 W. The workings consist of 2 adits; the upper is about 240 feet in length and is mostly in weathered rock. The ore is a mixture of the sulphide and oxide minerals. Ore on the dump shows pyrite and a small amount of marcasite, associated with the chalcopyrite, and pyrrhotite. The ore is said to run $6 in gold in carload lots.

"The lower adit is about 700 feet long (August, 1913) and in serpentine all the way. Ore is expected when the limit of the serpentine is reached, estimated to be 60 or 70 feet further.

"Twelve or thirteen years ago a 10-ton smelter was installed in connection with this property and operated for 26 days, producing 32 tons of matte carrying copper and gold, to the value of $2,000.

"On the west end of this property an important deposit of chrome iron ore has been developed by D. W. Collard and son. (see Collard Mine) More than a thousand tons of chrome were mined and shipped during the summer of 1916. For more details, see description of the Golconda mine."

Reference: Parks & Swartley, 16:136 (quoted)

Development: An inclined shaft 80 feet deep started at a point about 200 feet from Sucker Creek and 60 feet east of Bolan Creek; a 250-foot tunnel driven generally south and above the inclined shaft.

General: Mountainous topography; vein was formed along contact of greenstone (hanging wall) and porphyry, and contains free gold together with some pyrite. Maximum snowfall is 4 ft.; ample timber and water; water power development possible.

Informant: J. E. Morrison, 38 (not visited)

SURPRISE MINING COMPANY (placer) Waldo area

Location: In Sec. 3 (?), T. 41 S., R. 6 W., above Johnson Point and Althouse Groups. Options turned over to Skinner or to Allison & Moulton (W. R. Burner 2/28/40).

History: "Office: 619 Henry Building, Portland, Oregon. H. Taylor Hill, Pres.; T. I. Loughlin, Sec.; M. E. Freeman, Treas., all of Portland. Capital stock, $10,000; par value $ 1.00; all subscribed and issued and paid up. (1916 report)

"This company owns 7 placer claims or approximately 140 acres on the east fork of Althouse creek, 5 miles east of Takilma In the fall of 1916 operations were in progress putting the mine in shape for winter operations. It is understood that some concentrating machinery for saving the fine gold is being installed."

Reference: Parks & Swartley, 16:210 (quoted)

SWAN MOUNTAIN GROUP Waldo area

see Lost Prospect; Inspiration.

TAKILMA SMELTING COMPANY Waldo area

see Queen of Bronze

TANNEN PLACER MINE Waldo area

The following information was obtained from a report by Mr. G. A. Bigelow made in 1934:

The Tannen Placer Mine is located on the head water of Sucker Creek in Josephine County, Oregon, a few miles north of the California-Oregon boundary in T. 41 S., R. 6 W., N.M.

Travel to the property is eastward on the Oregon Caves Highway from the Junction to a point well within the valley of Sucker Creek and about ten miles from the property. From this point a Forest Reserve road runs two miles up the creek, and thence by pack trail eight miles to the property.

There are eleven placer locations included in the property, eight of which are arranged two abreast for four claims lengthwise along Sucker Creek. One claim lies across the valley at the mouth of Grizzley Creek, the lower, or north end of the property, and the balance of the claims are up Tannen Gulch, to the south about midway of the property.

The elevation along the lower end of the property is about 3,000 feet; in two miles up the creek it is 3,500 feet, and in three and one-half miles it is 4,000, which indicate the available grade lines for hydraulic work.

Benches on Sucker Creek are very pronounced throughout its length. At the property, the lowest bench is less than 20 feet above the bedrock of the present stream; the second bench seems to occur from sixty to eighty feet above the Creek level; and a third, less well preserved, lies at about 100 to 120 feet.

a depth of more than 10 feet. An area of more than 10 acres has been mined. The property is equipped for hydraulicking. The water is brought from Munger Creek, the ditch being 8 miles long.

MILLER & SAVAGE MINE.

The Miller & Savage mine is on Miller Creek in sec. 25, T. 37 S., R. 5 W. The gravels range in thickness from 6 to 30 feet, the average being about 18 feet. Many bowlders exceeding 1 foot in diameter are present, the largest being at the bottom of the deposit. The gold is mostly fine, but nuggets of large size have been found. The largest nugget, which was found several years ago, is said to have weighed more than 13 ounces. The mine is equipped for hydraulicking. The present owners have mined each year since 1904, and considerable good ground remains to be washed.

OSCAR CREEK MINE.

The Oscar Creek mine, comprising more than 300 acres, is on Oscar Creek, a small stream which flows into Applegate River. The gravels have an average thickness of about 12 feet and contain many rounded bowlders of medium size. The materials are not strongly cemented. The gold is found in flakes and in nuggets. The equipment consists of two giants, 1,100 feet of pipe, 300 feet of flume, and 3 miles of ditches. The supply of water is sufficient to carry on operations for about four months of the year. It is said that the property has produced more than $35,000.

ALTHOUSE AND SUCKER CREEKS DISTRICT.

From the gravels of Althouse and Sucker creeks a large amount of gold was washed in the early days of placer mining in Oregon, but for several years the production has not been great, as the best ground was worked many years ago. During 1907 the production of the streams of this district probably did not exceed $6,000. There are no large mines, but numerous small ones, among which are the Jumbo, the Mountain Slide, the Slide, and the Yeager, on Sucker Creek and its branches. On Althouse Creek some work is being done on the Layman property, and recently the Klamath Development Co. acquired eight claims near Grass Flat. Some new ground was also being opened in 1911 at the mouth of Portuguese Gulch, a small branch of Althouse Creek near its head.

WALDO DISTRICT.

DEVELOPMENT.

In the Waldo district there are three important placer mines, the High Gravel or Allen Gulch mine, the Deep Gravel mine, and the Logan, Simmons & Cameron mine. Of these the Logan mine has been, at least in recent years, the most important producer.

From Diller, J.S., 1914, Mineral Resources of southwestern Oregon U.S.G.S. Bull. 546.

After prospecting portions of the extensive gravel placers north of Waldo the three mines mentioned were purchased several years ago by the Waldo Consolidated Gold Mining Co. of Oregon. The property controlled is said to embrace 4,000 acres of hydraulicking ground, and the Logan mine for some time was operated by this company.

The High Gravel mine is in gravel of Cretaceous age and is described on pages 94–95. The Deep Gravel and Logan mines, although partly on gravel of Cretaceous age, are mainly in gravel of the third cycle of erosion and will be described here.

DEEP GRAVEL MINE.

The Deep Gravel mine is about 1 mile northwest of Waldo. The property comprises about 560 acres in secs. 20, 21, and 28, T. 40 S., R. 8 W., and was until recently owned by the Deep Gravel Mining Co. The main workings are in Butcher Gulch and its tributary gulches. The gravels of these gulches are included in a bench which extends from the head of Butcher Gulch to the west fork of Illinois River. The upper limit of the bench is about 1½ miles from the west fork and about 125 feet higher than the bed of this stream. The most recent workings are in Joe Smith Gulch, an eastern tributary of Butcher Gulch, where an area of more than 10 acres has been mined. At the upper end of these workings the gravels are about 12 feet in thickness. At the lower end they are more than 60 feet thick, and the bank consists of gravel and sand containing practically no bowlders, except in the lowest 10 feet. Even there few bowlders exceed 1 foot in diameter. Stratification is well shown. The bedrocks in Joe Smith Gulch consist of purplish conglomerates of Cretaceous age, similar to the conglomerates that are being mined at the High Gravel mine. As these conglomerates of the Deep Gravel mine have not yet been well prospected, their gold content is not known.

The mine pit of Joe Smith Gulch is 1,500 feet from the west fork of Illinois River. The elevation of the bedrock in the mine pit is more than 30 feet below the stream bed of the west fork, a fact that has greatly increased the difficulties of mining, necessitating the use of a hydraulic elevator, which is situated at the lower end of a sluice with riffles. The pay gravel from the bank is first washed through the sluice, the coarse gold being caught on the riffles. Then the material, including the fine gold, is carried up 46 feet by the elevator, the water pressure used being about 200 feet. At the head of the elevator is a 4-foot flume, 400 feet in length, in which are wooden riffles placed about 1½ inches apart, and parallel to the length of the flume. A beveled steel strip is attached to the upper surface of each riffle. These steel strips are slightly wider than the riffles, and when they are set in place, are about three-fourths of an inch apart.

A clean-up is made about once a month. The gold is saved by amalgamation, and is very fine. The concentrates are sold for their value in platinum, osmium, and iridium.

The water used in the pit and in the elevator is brought by two ditches from the east fork of Illinois River. The longer ditch is about 4 miles in length. A race about 7,000 feet long was used for many years when the gravels being mined were at an elevation greater than that of the outlet of the race. At present only the lower end is used.

The history of the Deep Gravel mine dates back for more than 30 years. The first owners were George and Walter Simmons. In 1878 Wimer & Sons bought a half interest, and in 1888 they secured all rights to the property. In 1900 the Deep Gravel Mining Co. became the owner, and sold it to the Waldo Consolidated Gold Mining Co. of Oregon.

LOGAN, SIMMONS & CAMERON MINE.

The Logan, Simmons & Cameron mine, one of the largest placers in the State, is northeast of Waldo, the present workings being in sec. 22, T. 40 S., R. 8 W. The recent workings are on French Flat, where about 3 acres have been mined. Here the bank consists of gravel, sand, and clay, the thickness ranging from a few feet to 15 feet. Much of the material is fine; only a few bowlders are present, nearly all of which are less than 6 inches in diameter. The bedrock is purplish Cretaceous conglomerate, which has been fractured, fissured, and to some extent veined. The slope of the bedrock is very gentle.

An elevator raises the material 38 feet. The water from one of the three ditches has a pressure of 325 feet and is used in the elevator; that from another is used in two giants in the pit; and that from the third is used in forcing the tailings from the end of the sluice at the head of the elevator. Mining is carried on for about eight months of the year.

The old workings on this property are in Carroll Slough, more than a mile north of the present pit on French Flat. The gravels have been mined in a north-south direction for more than a mile. The average width of the cut is about one-eighth mile, the average depth about 18 feet. The bedrock is made up in some places of serpentine and in others of Cretaceous conglomerates and sandstones.

This mine has been operated for about 25 years, but not until a few years ago was work begun on French Flat, where there is a considerable area of auriferous gravels.

JOSEPHINE CREEK DISTRICT.

Josephine Creek drains an area of contacts between greenstone cut by serpentine and serpentine penetrated by many small dikes, chiefly

main ditch is about 1½ miles in length. The mine is equipped with giants, and a derrick is used for handling the bowlders. About 1 acre a year is mined. From 8 to 12 men are employed. The property contains about 900 acres, a large part of which is placer ground. For many years the mine was owned by the Vance Mining Company.

PEARCE MINE.

The Pearce mine is on the east fork of Forest Creek in sec. 11, T. 38 S., R. 3 W. The gravels have an average thickness of about 12 feet, but in places they have been 45 feet thick. Where recent work has been done the bank is about 25 feet thick. In the lowest 6 feet of the deposit there are many large undecomposed bowlders, but above this zone the material is gravel and sand not very strongly cemented. The best values are at and near the bottom. In general the gold is rather fine. Some of the ground has run as high as $7,000 to the acre. The bed rock is greenstone, the slope of which is not more than 2 feet in 100 feet. The mine is equipped for hydraulicking, three giants being used. The pressure of the water is only about 85 feet. The water is brought 1½ miles from the upper part of the stream on which the mine is located. A derrick is used for handling the bowlders. The property consists of 240 acres, a large part of which remains to be worked.

In addition to the mines on Forest Creek already described, there are some other small producers. In the early days of placer mining in Oregon, Forest Creek was among the most productive streams.

ALTHOUSE AND SUCKER CREEKS DISTRICT.

From the gravels of Althouse and Sucker creeks a large amount of gold was washed in the early days of placer mining in Oregon, but for several years the production has not been great, as the best ground was worked many years ago. During 1907 the production of the streams of this district probably did not exceed $6,000. There are no large mines, but numerous small ones. Among these are the Jumbo, the Mountain Slide, the Slide, and the Yeager, on Sucker Creek and its branches. On Althouse Creek some work is being done on the Layman property, and recently the Klamath Development Company acquired eight claims near Grass Flat, on which considerable work is to be done. Some new ground was also being opened at the mouth of Portuguese Gulch, a small branch of Althouse Creek near its head.

WILLIAMS CREEK DISTRICT.

The chief placer mines in the Williams Creek district are the Horsehead mine, on a branch of Williams Creek, the Miller & Savage mine, on Miller Creek, and the Oscar placer, on Oscar Creek.

the river into northern California. Carberry Creek, Squaw Creek, and especially Palmer Creek were all worked extensively.

On the lower river other creeks with significant placer-mining activity were Keeler, Williams, Powell, Slagle, Carris, Miners, Rocky, and Miller in the Missouri Flat area, Oscar, Board Shanty, Grays, and Murphy Creeks. The history and production records of these areas is scanty, but one can still see evidence of the early-day mining and a few small, seasonal operations continue in the area. A one-yard diesel shovel was operated on Oscar Creek in 1933 and gravel was transported about 1 mile from the shovel to a sluice by five-ton trucks.

Waldo area

In the southern part of the Gold Hill-Applegate-Waldo area the bulk of placer production has been along Sucker and Althouse Creeks and in the vicinity of Takilma and Waldo.

Diller (1914, p. 118) states:

> "From the gravels of Althouse and Sucker Creeks a large amount of gold was washed in the early days of placer mining in Oregon, but for several years the production has not been great, as the best ground was worked many years ago. During 1907 the production of the streams of this district probably did not exceed $6,000. There are no large mines, but numerous small ones..."

Placers in the Waldo area were along a number of small gulches which cut across old cemented bench gravels that are partly decomposed. These gravels, mapped by Shenon (1933c) as coarse "Tertiary conglomerate" and by Wells (1949) as early Pleistocene "auriferous gravels of the second cycle of erosion" are apparently the intermediate host rock for much of the placer gold in the area. Some of the more important early-day placers that were worked by a large number of individuals on closely spaced claims were on Scotch, Allen, Sailor, Waldo, and Fry Gulches, all within a two-mile radius of the town of Takilma.

Hydraulic mining: Large operations in the Waldo area that were mined by hydraulic methods after the ditch system was developed during the 1870's include the High Gravel mine, the Llano de Oro (Esterly) mine, and the Deep Gravel mine.

The High Gravel mine at the head of Allen Gulch in secs. 33 and 34, T. 40 S., R. 8 W. includes several pits covering an area of approximately 150,000 square yards. The mine, which operated to 1917, is estimated to have produced about $90,000, not including production from the old workings along the bottoms of Allen and Scotch Gulches. The gold is found in the old cemented and partly decomposed gravel deposit. The average value was estimated at about 3 cents per cubic yard, at $20 per ounce.

The largest mine in the Waldo area was the Llano de Oro or Esterly mine situated in secs. 8, 9, 10, 15, 16, 21, 22, and 27, T. 40 S., R. 8 W., which included more than 3000 acres of land. Mining was done on Carroll Slough at the head of Logan Cut in secs. 10, 15, and 16, and on French Flat in secs. 22 and 27. Hydraulic elevators were used to mine from pits below the water table on French Flat (Figure 36). These pits, which cover an area of more than 30 acres, are now called Esterly Lakes. The mine was operated by various groups up to 1945. Value of the gravels worked ranged from $12\frac{1}{2}$ cents to $33\frac{1}{2}$ cents per yard, at $20 per ounce. Total production to 1933 was estimated at about $500,000. Production since that time may have been as much as $100,000. The U.S. Bureau of Mines Minerals Yearbook review of 1939 (1940, p. 431) reports that during the year (operating season was generally from 4 to 9 months) 75,000 cubic yards of gravel were hydraulicked at the Esterly mine and 421 ounces of gold and 25 ounces of silver recovered. Some platinum-group metals are also recovered from the mine concentrates in this area. The ratio of platinum to gold in the Llano de Oro mine is estimated at about 1 to 50 (Shenon, 1933c, p. 187).

The Deep Gravel mine was on Butcher Gulch in secs. 16, 17, 20, and 21, T. 40 S., R. 8 W., just over the low ridge west of the Llano de Oro mine. In 1933 four deep pits and an aggregate of shallow pits covered an area of about 65 acres. The mine was operated from year of discovery in 1874 to 1933; the estimated total production was about $276,000. Recorded production between 1907 and 1933 was $26,316 (Shenon, 1933c, p. 188). Kay (1909, p. 74) reports that the average value of pay gravel over

From Oregon Dept. of Geol. and Mineral Industries Bull. 61, 1968.

a period of five years was about 25 cents per yard, at $20 per ounce.

Dredging: Dredging in the Waldo area has been limited to a few short-lived operations on lower Althouse Creek, Sucker Creek, and along the East Fork of the Illinois near Takilma. A shovel and washing plant owned by Von der Hellen Brothers worked the Leonard placer in sec. 4, T. 40 S., R. 7W. on lower Althouse Creek from 1936 to 1938. This area and down stream a short distance was also dredged by the Atlas Gold Dredging Corp. during 1940 and early 1941, using a 5-yard dragline that could handle 6000 yards daily and was the largest dragline washing plant in southwestern Oregon. Their work disclosed that much of the area had been drift-mined in the early days by Chinese (W. J. Cannon, oral communication, 1968).

In 1945 and 1946 B. H. Oregon, Ltd., ran a 3-yard dragline and washing plant on Sucker Creek a short distance above Grayback Creek.

A dragline and washing plant was operated intermittently by the Takilma Mining Co. along East Fork Illinois River just north of Takilma during the period of 1947 to 1950. Another dragline and washing plant was active at the Bailey mine on Fry Gulch west of Waldo during the same period. Production of these properties is not reported.

Principal Lode Mines

Sylvanite mine: The main workings of the Sylvanite mine (map no. 10) are on 80 acres of patented land about 3 miles northeast of Gold Hill. The property is under sales contract (1966) to Daniel Jones from the owner, George Tulare of Gold Hill. Libbey (1963) describes the mine as follows:

> "The discovery and early history of the mine are not of public record. Various published reports show that, beginning in 1916, owners and operators were, successively, E. T. Simons, with Stone and Avena, Denver, Colorado, lessees who found scheelite (tungsten ore) associated with the gold ore; Oregon-Pittsburg Co. in 1928; Discon Mining Co., A. D. Coulter, Manager, discoverer of the high-grade ore shoot along the Cox Lyman vein in 1930; Western United Gold Properties; Sylvanite Mining Co.; and finally Imperial Gold Mines, Inc., in 1939. This last company built a concentrating mill of 140 tons daily capacity and cleaned out underground workings to expose the openings where the rich ore shoot had been found.
>
> "The Sylvanite vein or shear zone occurs between metaigneous and metasedimentary (largely argillite) rocks. It shows intense shearing and alteration and is intruded in places by basic igneous dikes. It trends just east of north and dips southeasterly at about 45°. The Cox-Lyman shear zone strikes at right angles to the Sylvanite vein and stands nearly vertical. No certain sequence of faulting in the two shear zones has been established. Ore shoots are said to be from 5 to 12 feet thick and have averaged from $5 to $15 a ton. They have a gangue of quartz and calcite and carry galena, chalcopyrite, and pyrite. A fracture zone roughly parallel to the Sylvanite vein cuts the Cox-Lyman vein and at the intersection a rich ore shoot was found on the hanging wall, producing $1,000 per lineal foot of winze in sinking 600 feet. Discontinuous pockets of ore were found in the hanging wall of the shoot for 200 additional feet of depth. The winze reached 900 feet below the surface. This ore shoot was reported to have yielded about $700,000.
>
> "A total of more than 2,560 lineal feet of underground development work has been done. In addition, numerous surface pits and cuts, now caved, have been dug by pocket hunters.
>
> "Seemingly little effort has been made to explore the scheelite possibilities, although it is known that the Imperial Gold Mines Co. had such plans. They ran into difficulties underground because of caving ground, and presumably war-time conditions finally forced them to close down."

Lucky Bart mine: Lucky Bart Group (map no. 6) is about 6 miles northwest of Gold Hill, west of the left fork of Sardine Creek. Workings are between 2080 and 2900 feet elevation. There were 11 claims, and at least one in NE¼ sec. 29 is patented. The mine was worked intermittently by various operators

production of chromite in the Takilma-Waldo district is estimated at about 1,000 tons, which has come almost entirely from the Esterly mine.

ESTERLY MINE

The Esterly mine is about 2 miles northwest of Takilma, in the NW. ¼ sec. 22, T. 40 S., R. 8 W. The ore has been mined from a trench about 50 feet long and from several open pits. The larger openings are now inaccessible because of water. The mine was worked in 1918 by George Barton and is said to have produced about 1,000 tons of ore.[46]

The ore occurs as irregular bodies in serpentine and, as indicated by the trend of the openings, has a strike of about N. 20° E. The ore is typically mottled green and black and is composed principally of chromite and serpentine. Because of the inaccessibility of the mine openings, very little field evidence is available regarding the origin of the chromite. Thin sections show veinlets of fibrous antigorite cutting the chromite, but this evidence in itself is not sufficient, especially in view of the more recent studies,[47] to conclude that all or most of the chromite at the Esterly mine is of early magmatic origin.

OWENS MINE

The Owens chromite mine is in the NW. ¼ sec. 11, T. 41 S., R. 8. W. It is reached by a trail connecting with the East Fork road at the Owens farm. The deposit is opened by a tunnel about 40 feet long. Only a few tons of ore have been mined. A small body of serpentine crops out at the mine and is surrounded on all sides by fine-grained greenstone. The chromite occurs as two small lens-shaped bodies, one near the face of the drift and one about 15 feet from the portal.

PLACER DEPOSITS — Takilma-Waldo District

HISTORY AND PRODUCTION

Placer mining began in the region of Takilma in the spring of 1853, with the discovery of gold on Althouse Creek. At about the same time sailors are said to have abandoned a ship on the coast and traveled overland to the "Sailor Diggings," near Takilma.[48] Raymond[49] quotes Doctor Watkins, a physician of long residence in the community, as follows:

> A ditch was dug some 15 miles long at a cost of some $75,000 or $80,000 to bring water to the rich placers of this vicinity and when fairly well under

[46] Esterly, G. M., personal communication.

[47] Sampson, Edward, May chromite crystallize late?: Econ. Geology, vol. 24, No. 6, pp. 632–641, 1929. Ross, C. S., Is chromite always a magmatic segregation product?: Idem, pp. 641–645. Fisher, L. W., Origin of chromite deposits: Idem, pp. 691–721.

[48] Winchell, A. N., op. cit., p. 241.

[49] Raymond, R. W., Mines and mining in the States and Territories west of the Rocky Mountains for 1869, p. 213, 1870.

From - Shennon, P. J., 1933, Geology and Ore Deposits of the Takilma-Waldo District, Oregon: U.S. G.S. Bull. 846-B

way paid for itself the first year. It paid heavy dividends to its stockholders for 10 or 12 years, and many parties who live sumptuously every day owe their fortune to their connection with the Sailor Diggings Ditch Co.

An early-day mining town, Allentown, located near the mouth of Allen Gulch, flourished for several years. Names of some of its early inhabitants are still legible on tombstones in an old graveyard a few hundred feet southeast of the Platerica mine pit. With the exhaustion of the more readily mined and richer gravel, mining activity declined until 1878, when work was started on the Deep Gravel mine. After a short time production again gradually declined until 1901, when the introduction of hydraulic elevators made possible the profitable working of the gravel of French Flat by hydraulic methods. In recent years the placer production of the Takilma-Waldo district has come chiefly from the Llano de Oro mine. Considerable unworked areas have been prospected on Llano de Oro ground, and these are reported to carry gold and platinum in sufficient amounts to yield a profit for several years.

No figures are available on the production of the placers of the Takilma-Waldo district before 1878, although undoubtedly the richest ground was worked prior to that time. The known placer production since 1878 is, in round figures, about $1,000,000. In the absence of authentic records of the early-day production, a rough estimate of the minimum production may be based on the extent of the ground that was worked and the costs of operation at the time. In addition to stream alluvium at Waldo and in Allen, Sailor, and other gulches, the early miners worked the surface material on the adjacent slopes, particularly the areas on or adjoining the patches of Tertiary conglomerate. Second-growth timber including trees 50 to 60 years old covers most of this mined ground and fixes rather definitely the time elapsed since that mining period. All accounts agree that the gulch placers were rich, which in those days meant that with primitive methods such as rocking and ground sluicing each miner could produce at least $4 to $10 a day by uncovering 1 or 2 square yards of bedrock. On this basis $2 a square yard is assumed as a safe estimate of the minimum yield. The areas observed to have been worked over during the early period aggregate at least 300 acres, or 1,500,000 square yards, from which the gold produced is estimated to be at least $3,000,000. The total minimum production up to the present time is therefore estimated at $4,000,000.

MINING METHODS

The shovel and rocker of the early days, with a capacity of 3 to 5 cubic yards of gravel a day, have been supplanted in the Takilma-Waldo district by large-scale methods whereby hundreds of cubic yards of gravel is washed daily. Hydraulic giants are used entirely

for mining. Water for their operation is brought in ditches for long distances, from the East Fork of the Illinois River. From one ditch a nozzle pressure of over 300 feet is obtained. Sufficient water is available for only about 7 months of each year, however, and hence the mines are worked continuously day and night during the mining season. The broken material loosened from the gravel banks by the giants is washed through sluice boxes and undercurrents (pl. 21, *C*), where the gold is collected with quicksilver or in a concentrate. In the more favorably situated mines the discarded gravel (tailings) is carried away by the natural run-off of the water, but in mines where there is but little grade it is lifted by hydraulic elevators (pl. 21, *B*) and distributed over the ground selected for tailings dumps.

CLASSIFICATION OF PLACERS

The placers are classified as Tertiary and Quaternary deposits. The Tertiary deposits are composed principally of cemented boulders and sandy material derived from the erosion of older rocks. In places the unweathered Tertiary formation contains sufficient gold to be minable, but in general the gold content is small. Weathering and leaching have, however, enriched the conglomerate near the surface and produced a mantle containing a relatively high gold content. This material, before it was mined out, covered a considerable area. Most of this ground was mined 50 or 60 years ago and is said to have been very productive. The most valuable placer deposits remaining in the region are the Quaternary deposits, which have been derived in part through the reworking of the Tertiary conglomerate by erosional processes that have caused a reconcentration of the gold. Almost if not quite all the richest of the reworked placers are located on or below areas of Tertiary conglomerate where streams or rain wash have transported and re-sorted the material. (See pl. 11.) Valuable Quaternary deposits have thus been formed at the Llano de Oro and Deep Gravel mines and in several small gulches traversing or receiving wash from the Tertiary conglomerate—for example, in Sailor, Allen, Fry, and Scotch Gulches. The small gulches were worked out by the early-day miners, but considerable areas of the transported deposits remain unworked at the Llano de Oro and Deep Gravel mines, and with the mining methods now in use, a steady production may be expected to continue from them for a number of years.

TERTIARY PLACERS

GENERAL FEATURES

The Tertiary placer mines of the Takilma-Waldo district are all in the Tertiary conglomerate. This formation is found in the north-

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western part of the district, but, owing to faulting and erosion, only remnants of it are now present. The remnants have a linear distribution over a distance of 4 miles. Although the origin of practically all the placer gold in the district can be traced to this formation, only a small portion of it has been mined in place. The early-day miners must have produced considerable gold by mining the residual surface mantle over the conglomerate, but no reliable estimates of this production are available. Exclusive of the mantle material and the re-sorted gravel, the Tertiary conglomerate has probably produced gold worth $100,000.

The Tertiary conglomerate is composed for the most part of large, highly altered boulders in a sandy matrix. Sandstone beds occur in the lower part of the formation but are scarce in the upper part. The formation is cut by many joints and some faults, and veinlets filled with quartz and calcite are fairly numerous. Several different types of bedrock underlie the conglomerate. The most southerly outcrops are underlain by greenstones; those in the northern part of the district are underlain principally by serpentine and Horsetown(?) sandstone. In general, the bedrock is regular in contour and very well suited for placer mining. The greenstone bedrock is colored purple and is greatly decomposed for several inches below the contact with the Tertiary conglomerate. A short distance beyond the limits of the overlying formation, however, the greenstones appear to be free from alteration. The intense alteration of the bedrock directly beneath the conglomerate formation is apparently connected with the intense alteration of the boulders within the formation. At some time past the rocks near the surface were apparently subjected to deep secular decay. The weathering agencies probably penetrated the porous Tertiary formation with relative ease, and in most places the underlying bedrock was attacked. A thick mantle of soil was thus formed on the bedrock beneath the conglomerate as well as beyond its limits, but, where this soft, altered material was not protected by the overlying beds, it was removed by erosion. Some of the overlying boulders may also have contained sufficient sulphide minerals to liberate considerable sulphuric acid when attacked by oxygenated surface waters. If so, this sulphuric acid could have attacked other boulders as well as the underlying bedrock.

Gold and platinum are distributed throughout the Tertiary conglomerate but probably are slightly more abundant near bedrock. Those more familiar with the mining conditions estimate that the gold content of the formation averages from 2½ to 3 cents a cubic yard. The gold is angular and flaky, and much of it is coated with a black film, apparently silica and iron oxide. Chromite, magnetite, limonite, hematite, ilmenite, epidote, zircon, and other heavy miner-

als occur in the concentrates with the gold and platinum. According to J. T. Logan, the ratio of platinum to gold is 1 to 75.[50]

Several ideas have been expressed regarding the origin of the gold and platinum, but, because it is difficult to prove them definitely, owing to the very small amount of these metals in a large volume of conglomerate, it is quite probable that differences of opinion will continue. Some operators believe that the gold has been derived from the quartz stringers which cut the Tertiary formation (pl. 22, *B*). If enough of the gold and platinum were derived from the stringers to make this source worthy of mention, the distribution should be related to the stringers. In other words, the highest gold and platinum content would be expected in or near the stringers, and a less amount away from them. This question was discussed with several of the operators familiar with the occurrence of the gold and platinum, and most of them stated that they had noticed no particular concentration of gold near the stringers. Furthermore, assays of the stringers did not show even a trace of gold or platinum. An acceptable explanation for the origin of the gold must take several conditions into account. (1) The gold and platinum are distributed throughout the formation; (2) there is apparently but little concentration along the bedrock; (3) most of the gold and platinum is flaky and angular in outline; (4) the boulders are softened by decay, and most of them are broken up during mining operations; (5) the gold appears to be more abundant where the boulders are most completely softened.

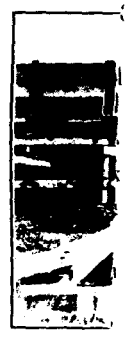
Under normal conditions, gold and platinum gravitate toward the bottom of the gravel as it moves downstream with the current, and as a result the richest ground in placer deposits is generally found at or near bedrock. As this is not true, or true only to a minor extent, of the Tertiary conglomerate, the gold and platinum must have remained suspended in the gravel as it moved downstream, or they must have been introduced after the gravel came into place, or they must have been enclosed in the boulders when the boulders were deposited, to be later liberated when the boulders disintegrated. Because the gold and platinum in the Tertiary conglomerate are not abnormally fine, it seems reasonable to assume that they should have gravitated downward during transportation, but this has happened only to a very slight extent, if at all. The objections to the hypothesis that the gold and platinum have been introduced after the deposition of the gravel have already been stated. The explanation that most of the gold and platinum were liberated by the disintegration of the boulders is best supported by the

[50] Hornor, R. R., Notes on the black-sand deposits of southern Oregon and northern California: U. S. Bur. Mines Tech. Paper 196, p. 31, 1918.

U.S. GEO

A. CHROMITE

B. HYDRAULI



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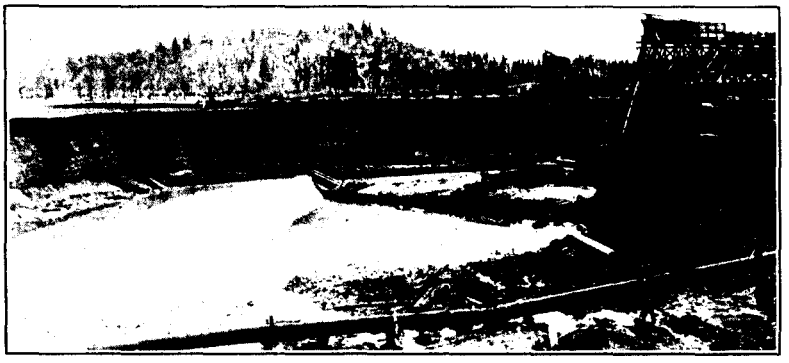
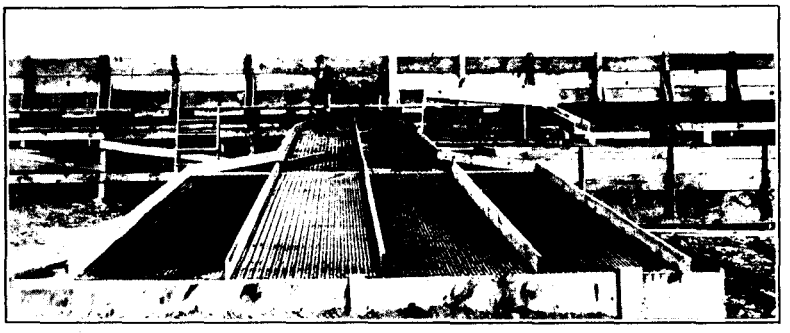
A. CHROMITE DEPOSIT (DARK) IN SERPENTINE IN NO. 2 PIT, LLANO DE ORO MINE.



B. HYDRAULIC ELEVATORS USED TO LIFT WATER AND TAILINGS FROM PLACER PITS, LLANO DE ORO MINE.



C. UNDERCURRENTS FOR SAVING FINE GOLD AND PLATINUM, LLANO DE ORO MINE.

All photographs by G. M. Esterly.

A. LEACHED OUTCROP AT TURNER MINE.

B. QUARTZ-ZEOLITE VEINLETS IN TERTIARY CONGLOMERATE, PLATERICA MINE.

Photograph by J. T. Pardee.

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[51] Cameron, C. D., personal co

(See pl. 13, *A*.) In the most westerly cut the contact strikes about N. 10° E. and dips about 20° E. At the High Gravel mine, as elsewhere, the conglomerate is composed of highly altered yet firmly cemented boulders of various types. Because of the induration attempts have been made to loosen the banks with explosives before hydraulicking, but according to reports this proved too costly for economical mining. The bedrock has a purplish tint and is highly decomposed wherever it is exposed beneath the conglomerate. It is cut by numerous fractures and small veins.

According to Mr. Cameron, the gold is distributed throughout the Tertiary conglomerate but is more abundant near the surface, where the formation is exposed to weathering. Much of it is coated with black material which makes amalgamation difficult. Mr. Cameron estimates the average gold content in the Osgood pits at about 3 cents a cubic yard.

CAMERON MINE

The pit here called the Cameron mine is near the head of Scotch Gulch, in the SW. ¼ sec. 34, T. 40 S., R. 8 W. It is owned by F. H. Osgood, of Seattle, Wash., but has been worked principally by lessees, chiefly J. T. Logan, C. D. Cameron, C. H. White, E. N. Bayse, and C. P. Johnson. A pit roughly 400 by 500 feet has been excavated by hydraulic giants. Water for the operation of the giants is supplied by the Osgood ditch, which takes water from the East Fork of the Illinois River south of the Oregon-California boundary. The tailings are removed by natural run-off. Most of the mining was done during the period 1924–27 although some gold was produced prior to 1909. The total production is estimated at about $9,000—$1,500 before 1909 and $7,500 during the period 1924–1927.[52]

The gold occurs in Tertiary conglomerate. As elsewhere, the lower beds are sandy and dark purple, and the upper exposed beds are light tan and consist principally of large, well-indurated boulders. Bedrock is not exposed beneath the conglomerate at the Cameron mine, but at the south side of the pit greenstones of the bedrock series are in fault contact with it. The fault that has dropped the conglomerate into contact with the greenstone strikes east and dips about 65° N., whereas the bedding in the conglomerate strikes N. 10° E. and dips 14° W. Boulders of greenstone, argillite, a talcky-appearing rock that is probably decomposed serpentine, and granitic rocks are most abundant in the conglomerate. The boulders are all well rounded and, for the most part, are highly decomposed. Even the granitic rocks readily fall to pieces when broken from their

[52] Cameron, C. D., and White, C. H., personal communication.

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matrix. The matrix is principally sandstone, but the deposit is sufficiently indurated to make hydraulic mining difficult.

The gold is flat and flaky, and because much of it is covered with a black coating, amalgamation is difficult. According to C. H. White, the gold is distributed throughout the Tertiary beds but appears to be more abundant in areas of intense alteration. Mr. White estimates that the Tertiary formation in the Cameron mine contains on an average from 2½ to 3 cents in gold to the cubic yard.

PLATERICA MINE

During the winter and spring of 1929–30 a small cut was excavated by the Platerica Mining Co. in the NW. ¼ sec. 34 and the SW. ¼ sec. 27, T. 40 S., R. 8 W., near the head of Allen Gulch, about a mile west of Takilma. The gravel is mined by hydraulic giants, and the tailings are disposed of by natural run-off. Shallow workings southeast of the Platerica pit were excavated by early-day miners.

The Platerica Mining Co. has worked the lower beds of the Tertiary conglomerate, which where exposed in the pits is composed largely of greatly altered, rounded boulders in a sandy matrix. Numerous joints and some faults cut the conglomerate. Near the center of the cut an east-west normal fault, dipping about 45° N., has dropped the conglomerate into contact with the greenstone bedrock. The bedrock has a purplish tint, is greatly decomposed, and is traversed by numerous veins filled with quartz, epistilbite, and calcite. An assay of the material from the veins showed they contained no gold. According to J. L. Eggers, superintendent of operations, the gold occurs throughout the Tertiary conglomerate but is more abundant near bedrock. Here, as elsewhere, a large percentage of the gold is coated with black material. Much of it is collected in a black-sand concentrate along with chromite, magnetite, hematite, platinum, and other heavy minerals. It is reported that the hematite contains gold, although none was seen in polished sections of it. Mr. Eggers states that the conglomerate above bedrock averages about 2½ cents in metallic content to the cubic yard.

QUATERNARY PLACERS

Quaternary deposits have produced most of the gold and platinum in the Takilma district. Nearly all the valuable deposits have formed just below outcrops of Tertiary conglomerate, and the highest gold and platinum contents have been found closest to or on the conglomerate. These relationships are so consistent that there is little doubt as to the principal source of these metals in the Quaternary deposits. In general, there are three different types of Quaternary placers—(1) those formed on slopes below outcrops of Tertiary conglomerate where the gold is associated with very little gravel,

(2) deposits in narrow gulches traversing Tertiary conglomerate, and (3) transported deposits to which the Tertiary and other formations have contributed material. Deposits of the first group were largely worked out during the early days, so that little is known regarding their productivity. Good examples occur in the SE. ¼ sec. 21 and the SW. ¼ sec. 10, T. 40 S., R. 8 W., where the gold collected on serpentine bedrock. Deposits of the second type are well illustrated by the placers of Sailor and Allen Gulches. They were richly productive but, like the deposits of the first group, were worked by the early-day miners, and hence little is known of the amount of gold they produced. Most of the gold and platinum in recent years has come from the deposits of the third group, illustrated by the Llano de Oro and Deep Gravel mines and portions of Fry Gulch.

LLANO DE ORO MINE

The Llano de Oro mine, formerly the Logan, Simmons & Cameron mine, has for many years been the most productive gold-platinum placer in Oregon. The property includes over 3,000 acres of land in secs. 8, 9, 10, 15, 16, 21, 22, and 27, T. 40 S., R. 8 W., although practically all of the mining has been confined to the S. ½ sec. 15, the S. ½ sec. 22, and the N. ½ sec. 27. The property is operated by George M. Esterly, of Waldo.

The first important work on the Llano de Oro property was done south of the highway near the center of sec. 27 by early-day miners. C. H. White, who was acquainted with one of the miners, states that they mined gold worth $80,000 from this place. Later George Simmons, Frank Ennis, and Theodric Cameron took $110,000 out of Carroll Slough.[53] J. T. Logan mined the gravel on French Flat from 1907 to 1917, when the property was sold to G. M. Esterly. Mr. Esterly has worked the property almost continuously, during the mining seasons, up to the present time. He estimates the production in gold and platinum since 1917 at about $225,000 and the total production of the entire property at about $500,000.

Since 1907 most of the work at the Llano de Oro mine has been confined to the vicinity of French Flat. Four pits have been excavated, covering in all an area of over 30 acres. The depths of the pits vary considerably from place to place. For example, the depth to bedrock in pit 3 is about 8 feet on the west side and about 18 feet on the east side, whereas the average depth of the Logan or no. 1 pit is more than 30 feet, and at one place in it the tailings were elevated 50 feet. The company owns three ditches known as the upper, middle, and lower, together with three water rights to 500, 518, and 1,100

[53] Historical data furnished by C. D. Cameron and G. M. Esterly.

miner's inches from the East Fork of the Illinois River.[54] The total length of the ditches is over 15 miles. During the mining season, which averages about 7 months yearly, sufficient water is available to operate 2 giants in the pits, 2 hydraulic elevators, and 1 giant for stacking tailings. When the plant is operating steadily from 15,000 to 30,000 cubic yards of gravel, depending largely upon the seasonal water supply, is washed each month.

Both the Tertiary conglomerate and the Quaternary Llano de Oro formation have been worked at the Llano de Oro mine, but the latter has been by far the most productive. In only one place on Llano de Oro ground, in the SW. ¼ sec. 15, has the Tertiary formation been washed for its gold content. At this place the formation is well exposed in several cuts, where it can be seen resting upon serpentine in fault contact. The fault, which in part defines the eastern boundary of the Tertiary formation, strikes north and dips 65° W., whereas the normal contact dips 20° W.

The Llano de Oro formation consists of gravel, sand, and clay, is in general poorly sorted, and ranges in thickness from less than 1 foot near the edges to nearly 50 feet, but within the prospected areas on French Flat averages about 18 feet. Few boulders with diameters exceeding 6 inches are present. The bedrock varies at different localities. At several places it is Tertiary conglomerate; at other places serpentine or Horsetown (?) sandstone. The gold and platinum are concentrated near bedrock, although prospect holes show that some gold is distributed throughout most of the formation.

Most of the gold is angular and is associated with platinum chromite, magnetite, ilmenite, hematite, limonite, epidote, zircon, and other heavy minerals. Chromite was abundant enough in some of the areas of serpentine bedrock to be troublesome in the sluice boxes. The platinum occurs as flattened scales with rounded corners, which range in size from tiny grains to pieces over 2 millimeters in cross-section. Picked grains of platinum from the concentrate were analyzed by E. T. Erickson of the chemical laboratory of the United States Geological Survey, who reports that "the sample consists largely of platinum and ruthenium with smaller proportions of iridium and osmium. A small quantity of gold and slight quantities of palladium and rhodium were also detected." According to Mr. Esterly, platinum accounted for one tenth of the value of the clean-ups when it was worth $110 an ounce. In other words, the ratio of platinum to gold in the mined areas on French Flat is about 1 to 50.

In 1921 L. A. Levensaler, mining engineer in charge of prospecting for Mr. Esterly, estimated that the unmined gravel on French Flat

[54] Hornor, R. R., op. cit., p. 29.

within the prospected areas would average about 18 cents to the cubic yard. According to Mr. Levensaler, the value of the ground worked by J. T. Logan in the upper (No. 1) pit averaged 22½ cents a cubic yard, and that worked by Mr. Esterly at the other places in the same pit averaged 33½ cents a cubic yard. Kay [55] states that the gold content of the gravel mined in Carroll Slough was about 12½ cents a cubic yard.

DEEP GRAVEL MINE

The Deep Gravel mine is in Butcher Gulch, in secs. 16, 17, 20, and 21, T. 40 S., R. 8 W. Four deep pits covering a total area of approximately 50 acres and shallow pits covering well over 15 acres constitute the principal workings. The deep pits are designated, from north to south, Joe Smith Gulch, Wadleigh No. 2, Weimer, Wadleigh No. 1, and Johnson pits. The mine was first worked about 1874 by George and Walter Simmons. W. J. Weimer and sons purchased the property in 1878. In 1900 the ownership passed to the Deep Gravel Mining Co., in which Mr. Weimer retained an interest. In 1911 the Waldo Consolidated Mining Co. obtained an option on the property, but when the payments were not completed the ownership reverted to the Deep Gravel Mining Co. A. E. Reams, of Medford, Oreg., at present owns two thirds of the stock and acts as the representative of the company. Mr. Weimer stated that until 1908 about $130,000 had been expended on the property and it had produced $250,000.[56] Since 1907 the mine has produced about $26,316 in gold.[57] The Deep Gravel Mining Co. owns 350 acres of patented placer land, 410 acres of land held by mineral location, and a water right to take 2,800 inches of water from the East Fork of the Illinois River at a point a short distance west of Takilma.[58]

Most of the production of the Deep Gravel mine has come from the Llano de Oro formation, but recently Charles Johnson, of Takilma, excavated a small cut in Tertiary conglomerate in the S½ sec. 21. The Tertiary formation is here almost identical in appearance with the exposures at the Cameron mine, in Scotch Gulch. The lower beds are purplish conglomerate and sandstone; the upper beds are tan conglomerate composed of poorly sorted, coarse boulders which are fairly well indurated with sandy material. Like those at the Cameron mine, the boulders of the Tertiary conglomerate in the Johnson cut are for the most part highly decomposed. On the west they are in fault contact with Cretaceous sandstone.

[55] Diller, J. S., and Kay, G. F., Mineral resources of the Grants Pass quadrangle and bordering districts, Oreg.: U. S. Geol. Survey Bull. 380, p. 74, 1909.

[56] Kay, G. F., op. cit., p. 74.

[57] Data supplied by Victor C. Heikes, of the United States Bureau of Mines, and published with permission of owner.

[58] Hornor, R. R., op. cit., p. 32.

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At the Deep Gravel mine, as elsewhere, the Llano de Oro formation is composed of gravel, sand, and clay and except in the lower 10 feet contains but few boulders over 6 inches in diameter. Stratification is well shown in some places. The thickness of the formation ranges from less than 1 foot near the edges to over 80 feet. Joe Johnson, of Takilma, assisted in the sinking of two prospect pits south of Mr. Potter's house. According to Mr. Johnson, the shafts passed through sand and clay containing lenses of fine gravel and at about 70 feet entered sandstone bedrock. A 2-foot layer of gravel on bedrock prospected very well, but above this layer the gold was sparsely distributed. So far as known, the bedrock in the various pits is either Cretaceous sandstone or Tertiary conglomerate. According to Kay[59] the bedrock in Joe Smith Gulch was 30 feet below the stream bed of the West Fork of the Illinois River, and hence hydraulic elevators were necessary to lift the gravel after the coarse gold had been removed on the riffles of a short sluice. After being elevated, the gravel was washed through another sluice 400 feet long in which the finer gold was collected. According to Kay[60] the average value of the pay gravel over a period of five years was about 25 cents to the cubic yard.

FRY GULCH

Fry Gulch is in secs. 28 and 33, T. 40 S., R. 8 W. Much of the gravel in it was worked in the early days, but some unworked ground remains. Two northward-trending branches of Fry Gulch join near the quarter corner between secs. 28 and 33. Both branches, as well as the main gulch for about 1,500 feet below the junction, have been mined. The east branch heads at the High Gravel mine, and the gold in it was clearly derived from the Tertiary conglomerate. The west branch heads near a flat summit close to the quarter corner of secs. 32 and 33. The boulders in it are similar to those in the east branch, but the source of the gold is not known, although it probably came from a patch of the Tertiary conglomerate, now completely eroded. Like Sailor Gulch and other small gulches receiving the wash from the Tertiary conglomerate, Fry Gulch was undoubtedly a rich placer, but, because much of the mining was done in the early days, no records of production are available.

In 1930 A. L. Bailey was working in a small cut near the mouth of the west branch. The gravel in the cut is composed of dark-red sand with pebbles of greenstone, serpentine, granitic rocks, sandstone, hematite, and chromite. The material is principally sand, and only a few of the boulders exceed 6 inches in diameter. Patches of unworked material of this sort extend up the west branch for about

[59] Kay, G. F., op. cit., p. 73. [60] Idem, p. 74.

2,500 feet. The bedrock in Bailey's cut is Cretaceous sandstone, but in the east branch and farther up the west branch the gravel rests upon serpentine. According to J. L. Eggers, the production from about 1,650 cubic yards of gravel in Bailey's upper cut was $1,000, or about 60 cents a cubic yard.

RESERVES OF PLACER GRAVEL

Under present conditions it is doubtful whether the Tertiary conglomerate should be classified as among the reserve placer deposits. If, however, at some time exceptionally low costs should prevail, much of the formation might prove to be workable. Existing remnants within the area mapped aggregate a square mile or more and evidently contain many million cubic yards of material. The Llano de Oro gravel is to be regarded as the chief source of future placer production. Information given by the reports of trustworthy engineers and from other reliable sources indicates that areas of this formation aggregating several hundred acres contain enough gold to be profitably mined. In addition there is much ground that is probably gold-bearing, and the areas of known and probable value together aggregate at least 1,000 acres. The deposit ranges from less than a foot to 80 feet or more in depth, and its volume probably equals or exceeds that of the Tertiary. The largest remaining body adjoins the Llano de Oro and Logan (Carroll Slough) mines. Smaller areas remain in Butcher Gulch and in Fry Gulch below Waldo. In the prospected areas, the available information indicates that the gold content ranges generally from 10 to 60 cents a cubic yard, with streaks that are much richer.

BLUE CREEK DISTRICT

GEOLOGY

The geologic map of the Blue Creek district (fig. 25) includes about 4 square miles situated approximately 5 miles southwest of Takilma. Although most of the mining in this district has been done at the Turner (Albright) mine, the mapped area includes several other prospects.

The rocks of the area have been grouped into four units—the Galice formation, of Jurassic age; greenstones of Paleozoic or Mesozoic age; serpentine of Cretaceous age; and recent alluvium. The Galice formation, of sedimentary origin, occupies about one-third of the area mapped; greenstones and serpentine, of igneous origin, occupy most of the remainder. Small areas of recent alluvium occur along the larger streams.

The Galice formation near the Turner mine consists principally of sandstones (partly arkosic), slates and argillites, fine-grained con-

Placer Deposits

At present the chief placer deposits of the Waldo district are in the Takilma area; formerly there were important placer mines on Althouse and Sucker creeks, although the latter were always small mines. The production from both these gulches has varied from $1000 to $10,000 annually during the past six years, the largest yield being in 1911. The small mines include the Jumbo, Mountain Slide, Yeager, and Layman. In 1913 a placer mine said to be owned by Dr. Pickrel of Spokane, was in operation near the mouth of Grizzly gulch. It is equipped with a ditch, pipe line, saw mill, derrick and giant. A miner named Arndt is taking out a little gold and platinum from gravel at the mouth of Limestone creek. Placer miners were also at work at two points on Cave creek, one being about 3 miles below the caves at a small waterfall. Tests were also in progress in 1913 on ground near Holland to determine whether it was rich enough to warrant the installation of a dredge.

Near Waldo there are three important placer mines, namely: Logan, Simmons and Cameron mine, the Deep Gravel or Wimer mine, and the High Gravel or Osgood mine. These three properties are now controlled by the Waldo Consolidated Gold Mining Company of Oregon and operated under the management of Mr. J. M. Logan, who states that the company owns sufficient placer ground to maintain operations for an indefinite period in the future.

Several long ditches carry water from the higher portions of the east and west forks of the Illinois river to the placer ground. The water supply permits mining for about eight months of the year. The placer gold here, which is generally very fine, is accompanied by some platinum as well as a little osmium and iridium.

The Logan, Simmons and Cameron mine is one of the largest placer mines in the state. The oldest workings on this property are in Carroll slough, extending for more than a mile north from near the southwest corner of section 5, T. 40 S., R. 8 W. The area mined varies greatly in width, averaging nearly an eighth of a mile. The pit is from 10 to 25 feet in depth and the bedrock is conglomerate and sandstone with some serpentine. Beginning over 25 years ago, mining in this vicinity was carried on for more than 15 years. More recently several acres have been mined on French Flat, where the workings are in the southern part of section 22, T. 40 S., R. 8 W. The material here mined includes a good deal of clay as well as gravel and sand. A hydraulic elevator was used to remove material from

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Petrology and Mineral Resources of Jackson and Josephine Counties, Oregon
Oregon Bureau of Mines ~~Bot~~ and Geology
Vol. 1 No 5. 1914

the pit, which had a maximum depth of about 15 feet, now largely filled with water. There are only a few bowlders visible in the material removed, and most of them are less than 6 inches in diameter. According to Kay,[1] the gravel in Carroll slough averaged about 12½ cents a cubic yard, and the bed rock sediments belong to the Cretaceous period. The bedrock in French flat is a purplish conglomerate, also Cretaceous, which has been fractured, fissured, and even somewhat veined. There are three ditches, the water from one being used in the elevator under a head of 325 feet, that from another being employed in two giants, and that from the third being used to clear away the tailings from the end of the sluice at the head of the elevator.

The Deep Gravel mine was first opened by George and Walter Simmons, passing to Wimer and Sons in 1888, then to the Deep Gravel Mining Company, and finally to the Waldo Consolidated Company. According to Mr. Wimer about $130,000 had been expended on the property and about $250,000 taken out of it before 1908. It embraced about 560 acres in sections 20, 22, and 28 of T. 40 S., R. 8 W., the chief workings being in Butcher gulch and its tributaries about a mile northwest of Waldo. According to Kay,[2] "the gravels of these gulches are included in a bench which extends from the head of the Butcher gulch to the west fork of the Illinois river. The upper limit of the bench is about 1½ miles from the west fork and about 125 feet higher than the bed of this stream. The most recent workings are in Joe Smith gulch, where an area of more than 10 acres has been mined. At the upper end of these workings the gravels are about 12 feet in thickness; at the lower end they are more than 60 feet, and the bank consists of gravel and sand containing practically no bowlders except small ones in the lowest 10 feet. Stratification is well shown. The bed rocks in Joe Smith gulch consist of purplish conglomerates of Cretaceous age, similar to the conglomerates that are being mined in the High Gravel mine." The pay gravel is washed through a sluice, elevated by hydraulic pressure, and carried through another long sluice with steel lined riffles. "A clean-up is made about once a month. The gold is saved by amalgamation and is very fine. The concentrates are sold for their values in platinum, osmium, and iridium. Mr. Wimer stated that the average value of the pay gravels during the years 1903–1907 was about 25 cents to the cubic yard. The water used in the pit and in the elevator is brought by two ditches from the east fork of Illinois river. The longer of the two ditches is about 4 miles in length."

[1] U. S. Geol. Survey Bull. 380, p. 74, 1909.
[2] Loc. cit., p. 73.

The High Gravel mine is in sections 33 and 34, T. 40 S., R. 8 W., a little less than a mile south of Waldo. The principal workings are at the head of Allen gulch on both sides of the divide between the east and west forks of Illinois river. Most of the material mined is the conglomerate, determined to be of Cretaceous age by Diller,[1] which forms the bedrock of the other placer mines in the region; it occurs here as a small remnant of a formation once much more widespread. On the west slope the deposits mined extend for about an eighth of a mile along the ridge with an average width of about 100 feet. A strip less than 100 feet wide separates the cuts on the two sides of the hill. In the cut on the east side of the ridge a maximum thickness of about 60 feet is exposed. Mining has been discontinued here. There has been some mining of the recent gravels all along Allen gulch. According to Kay,[2] the conglomerates "are not strongly cemented and the bowlders are rather uniformly distributed throughout the section. Distinct joints are present in the conglomerates and a few small veinlets occur. The bed rock is a fractured, fissured, decomposed, and veined greenstone, which, owing to the presence of iron oxides, has a decidedly purplish tint. These Cretaceous conglomerates are shore deposits, derived from older rocks, similar to those on which they now lie. As stringers carrying values are fairly widespread in these old rocks, some gold is probably present in much of the conglomerate which has been derived from them. But whether or not these values are sufficiently concentrated, as at the High Gravel mine, to be profitably mined can be determined only by prospecting."

Gold-bearing Quartz Veins

The January First mine is owned by Harry Siskron who has operated it successfully on a small scale for several years. It is on the southwest side of Sucker creek at an elevation of about 2400 feet, a little more than a mile from the "mountain ranch," and about the same distance from California bar. The mine is opened by a crosscut adit extending N. 75° W. about 110 feet to a quartz vein about 18 inches thick which strikes north and dips 45° W. A drift runs north 30 feet and south 100 feet; at the south breast a 3-inch vein of quartz strikes east and dips 60° N.; here the main vein is nearly pinched out and contains no ore of value. From the drift stoping has been carried up to the surface. The ore is packed on burros to an arrastre on Sucker creek; the tailings are saved and concentrated on a canvas table.

[1] U. S. Geol. Survey Bull. 380, p. 72, 1909. Bull. 546, p. 94, 1914.
[2] Loc. cit., p. 72.

The Grayback pluton of dioritic rocks covers much of the southeast part of the County. There are only occasional occurrences in the area south of the pluton, even though the Applegate Group rocks there are of favorable composition. The Mountain View, No. 437, in greenstone, and the Arnold Mine, No. 466, in metasedimentary rock, are isolated, small, high-grade vein-type deposits that have produced a few hundred ounces each. Southwest of the Grayback pluton and the Oregon Caves to the California state line, and mainly in the drainages of Sucker and Althouse Creeks, there are many small prospects and mines. Among those that had high-grade ore shoots and some production are the Rainbow, No. 405; Frog Pond, No. 452; and the Pony Shoe Group, No. 453.

In 1904, the most famous pocket, the Briggs, No. 462, produced over 2,000 oz from a small surface pit (Figure 13). During the early 1900's, the Boswell, No. 383, had a total reported production of up to 15,000 oz from shallow workings in oxidized surface materials. The Boswell Mine is still being explored, and the area as a whole probably contains other, small, high-grade vein-gold deposits.

The Waldo-Takilma district, known mainly for its copper mines and gold placer deposits, has a complex geologic setting like that of the Greenback area. The Triassic rocks include narrow belts of greenstone, serpentinite, gabbro, and metasedimentary rocks in a zone of thrust faulting near the contact of the younger Jurassic Galice Formation to the west. The only significant lode gold production from the Waldo-Takilma area has been from the massive sulfide copper ores of the Queen of Bronze and other nearby copper mines. At the Albright, No. 444, a massive sulfide deposit in Jurassic metavolcanic rocks, surface gossan deposits were worked for their gold content in the early 1900's.

In the far southwest corner of the County, the large area underlain by peridotite and serpentinite of the Josephine peridotite sheet contains no gold lode deposits. To the north, however, a mineralized greenstone belt occurring at the head of Canyon Creek, Fiddler, Days, and Mikes Gulches, and extending northward to Hoover Gulch and the Illinois River contains the surface deposits and narrow gold-quartz veins of Pocket Knoll. The Eureka Mine, No. 244a, is reported to have had considerable output from gold-bearing ribboned veins and quartz lenses at the contact of greenstone and serpentinite (Figure 14).

The northwestern part of the County from Galice Creek to Mount Reuben contains as many as 60 gold and silver mines or prospects that have produced at least a few hundred ounces of gold. The most important mines and prospects and their approximate productions are the Benton, No. 11 (18,500 oz); Gold Bug, No. 12 (37,500 oz); J.C.L., No. 23 (5,000 oz); Bunker Hill, No. 135 (7,000 oz). The Almeda, No. 78, produced at least 1,000 oz of byproduct gold from copper ores. The mines and prospects occur in a variety of geologic environments but are mainly in a 5-mi wide, 20-mi long, northeast-trending belt composed primarily of metavolcanic rocks of the Rogue Formation but also containing a fault-bounded block of highly metamorphosed Briggs Creek amphibolite. The western part of the belt adjacent to a major thrust fault has been complexly intruded by bodies of diorite, gabbro, and serpentinite.

The mines of the Mount Reuben area, with the exception of the Benton, are in small, rich ore shoots in narrow, discontinuous quartz veins and shear zones in greenstone. The Benton, however, has more extensive and persistent ore shoots occurring in a small body of quartz diorite which intrudes greenstone and gabbro. Free gold and pyrite are the ore minerals in quartz veins and sheared altered diorite. Molybdenite and chalcopyrite are also reported. Several thousand tons of ore were blocked out before the mine and mill were closed by government order in 1942.

The mines and prospects in the Briggs Creek amphibolite are generally small, with narrow, discontinuous quartz veins along fractures. Some free gold, pyrite, and chalcopyrite are the main sulfides in the ore. The Bunker Hill, No. 135, near the west edge of the belt, is somewhat isolated and occurs near the major thrust-fault contact with the Dothan Formation. There are several, narrow, quartz-filled veins in a narrow zone of Rogue Formation greenstone surrounded by quartz diorite. Free gold and petzite, a gold-silver telluride, were recovered in enriched zones of the narrow veins. About 7,000 oz of gold have been recovered.

Two other prospects along Howard Creek, the Red Elephant, No. 85, and Blue Bell, No. 86, are near the same thrust-fault contact and contain broad zones of altered greenstone with some gold and molybdenite. This zone adjacent to the fault zone has probably not been well prospected and may likely contain mineral deposits. The high concentrations of lode mines and prospects in the Galice-Mount Reuben area and the favorable geology for both quartz-vein deposits and massive sulfides (volcanogenic deposits) give it a high potential for future discoveries and additional production from reserves such as those at the Benton Mine.

Placer deposits

Two properties of gold, its high specific gravity and its ability to resist chemical decomposition, cause it to be concentrated along with other heavy minerals in placer deposits. The principal concentrations occur

From Dept of ~~Min~~ Geol. and Mineral Industries Bull 100 Geology and Mineral Resources of Josephine Co., 1979, Len Ramp.

in the beds of streams and gulches downstream from lode deposits. Bed rock containing gold sometimes disintegrates more or less in place, forming residual placers on flat areas or gentle slopes. More often, however, running water carries the loosened material and much of the gold away from its place of origin. The heavier, coarser gold works its way to the bottom of the moving debris and eventually reaches bed rock. Coarser gold tends to work its way to bed rock more rapidly than the finer gold and is often found mixed with sand and gravel in crevices of the bed rock.

Paystreaks, concentrations of gold in auriferous gravel deposits, are seldom uniform or regular, so usually only part of a deposit is rich enough to work profitably. Gold may be transported long distances. As a rule, however, the greater the distance from the source, the finer, more scattered, more rounded, and more flattened the particles become. The size of the gold particles varies greatly from dust, several thousand particles of which are worth one cent, to nuggets of relatively large size. The largest nugget reported from Josephine County came from Althouse Creek and weighed 17 lb. Most nuggets, however, range from the size of a mustard seed to that of a wheat grain (Brooks and Ramp, 1968).

Placer deposits accumulated at many places in Josephine County. It is estimated that at least 75 percent of the total gold production of the County was recovered from a variety of placer deposits. Shovel, pan, and sluice box were used in early hand mining. Later, most placers were worked hydraulically by bringing large volumes of water for long distances via ditch and flume. Bucket-line dredges, draglines, and a variety of mechanical washing plants have also been used at times in the County's placer mines.

In the topography of southwestern Oregon, Diller (1914) recognized evidence of three cycles of erosion that left ancient stream channel deposits at different elevations. The oldest (first cycle) and least extensive stream gravel deposits occur at an elevation of 4,000 ft and are believed to be of late Tertiary age. The only deposit of this cycle in Josephine County is near York Butte. The gold content of this deposit is not known, but the coarse gold found on upper Red Dog Creek may have come from weathering and erosion of these first cycle gravels.

The deposits of the second cycle of erosion (of Pleistocene age) are more abundant and appear to have been left by an ancestral Illinois River that flowed northeastward from the vicinity of Sixmile Creek through Briggs Valley and joined the Rogue River near Galice. These stream-deposited gravels occur at a general elevation of 2,700 ft. Remnants of the gravels of this old channel occur on the ridges between the drainages of Briggs, Taylor, and Galice Creeks and are as much as 150 ft thick; they were the sources for major quantities of gold for the rich placers of Galice Creek; Rocky and Rich Gulches; and Swede, Onion, and Briggs Creeks. Old channel gravels also occupy high terraces along lower Grave Creek and the Rogue River. Wells and Walker (1953) divided the deposits into the old channel, about 500 ft above streams; high bench gravels, 100 to 400 ft above streams; and bench gravels, as much as 40 ft above streams. Diller's (1914) auriferous gravels of the third and continuing cycle of erosion included all of the bench, bar, and channel gravel deposits related to the present streams.

Because of the large number of individual mines and the lack of historical information about them, only a general review of the important placer deposits can be included in this report. Diller and Kay (1909), Diller (1914), Winchell (1914), Parks and Swartley (1916), Shenon (1933a), Oregon Department of Geology and Mineral Industries (1952), and Brooks and Ramp (1968) review and describe the placer mines of Josephine County in some detail.

In the northeast part of the County, including the Greenback district, most of the streams including Grave Creek and its main tributaries, Wolf and Coyote Creeks, have had important production from stream channel, bar, and bench deposits. One of the largest placer mines in the State, the Columbia, No. 116, was located on Tom East Creek, where over 2 mi of the channel below the Greenback Mine produced at least 25,000 oz of gold from about 1900 to 1941. Lower Grave Creek has had many productive placers, mainly from bench gravel deposits. One of the largest dredging operations was located near Leland from 1935 to 1939. A large bucket-line dredge (Figure 9) was used by the Rogue River Gold Company, which regularly employed 40 men, to process gravels from 2 mi of an old Grave Creek channel, the County's largest producer during the late 1930's. Dredging ceased in 1939, when upstream gravels became so thick that the bed rock could not be cleaned. Hydraulic placer mining continued on a small scale as late as 1960 on Grave, Coyote, and Louse Creeks. The small communities of Golden on Coyote Creek and Placer on Grave Creek are present-day reminders of the mining camps that once served the old mines in the Greenback district.

Near Grants Pass, a minor gold placer was worked on Bloody Run Gulch, a small tributary of the Rogue River. Farther south, along the eastern border of the County from Murphy to Williams, many of the Applegate tributaries show evidence of early mining. Miller and Rocky Creeks, Whisky and Bamboo Gulches, and other tributaries of Williams Creek were worked extensively. The placer mines of Oscar Creek, Nos. 296, 297, and 298, were known for large nuggets.

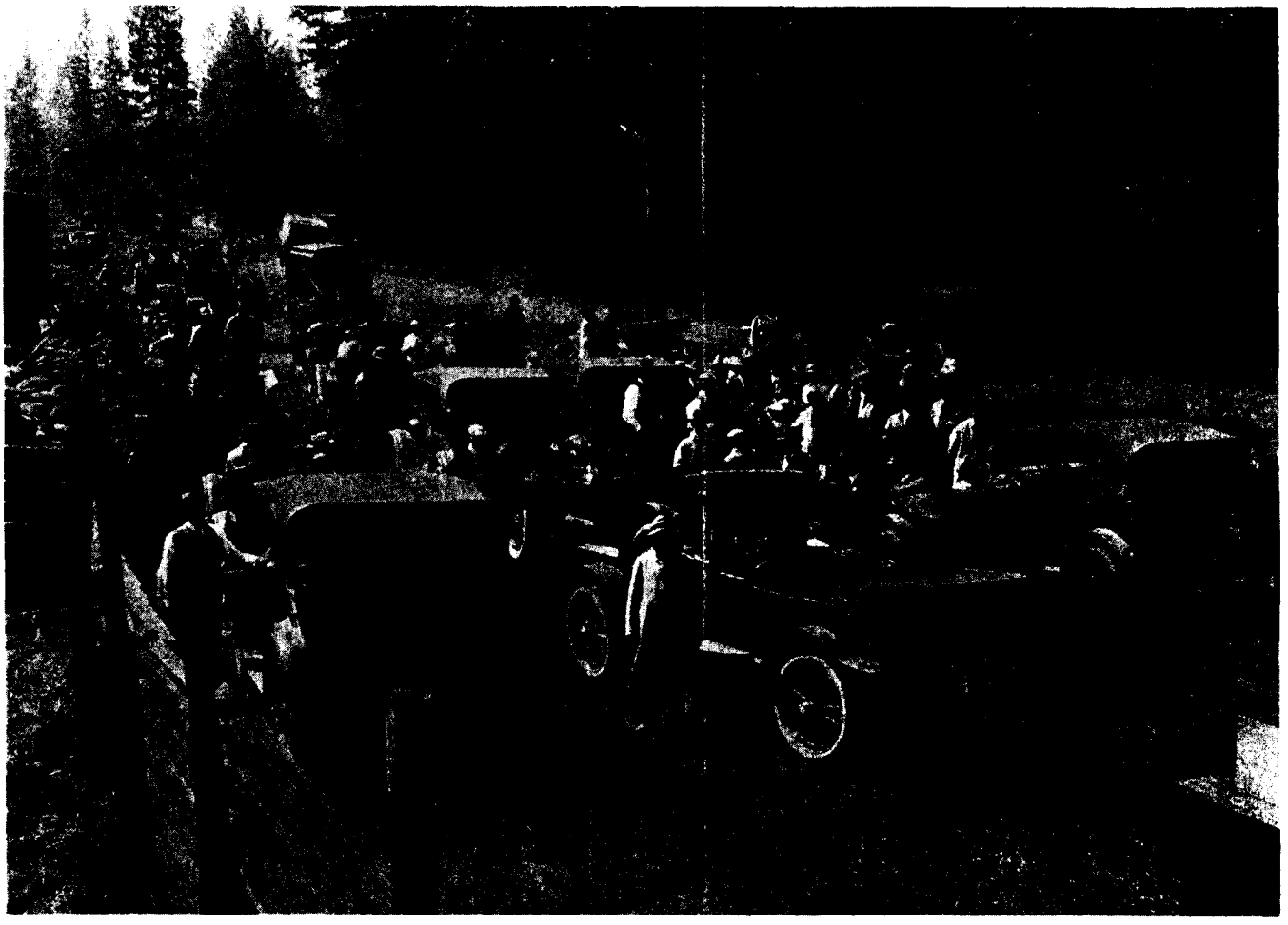


Figure 17. California and Oregon Coast Railroad terminus at Waters Creek 1916 Rally. Copper ore from Takilma is being loaded on freight cars. Chromite was shipped from here starting in 1917. (Photo courtesy Elizabeth Hiller)

is 150 ft above the present stream channel and is well cemented. Early miners did considerable drifting (tunneling) on the bed rock. The lower, less extensive terrace is about 30 ft above the stream and has been worked out (Diller, 1914, p. 12). Platinum and the rare nickel-iron mineral josephinite were also contained in the placer gravels of Josephine Creek. The Anderson Mine, No. 310, was operated by hydraulic methods during the late 1880's and early 1900's and had a considerable production of gold and platinum from a broad gravel bench on both sides of the Illinois River below the mouth of Josephine Creek and above the mouth of Deer Creek.

Diller (1914) considered the present-day course of upper Briggs Creek to mark the approximate course of an old stream channel that had flowed northeastward to the Galice area. A number of small placers with important production probably derived their placer gold from these old channel gravels. Placers near the mouth of Soldier, Red Dog, and Onion Creeks, and the Barr Mine, No. 182, on upper Briggs Creek, are reported to have produced over 5,000 oz in gold, mainly in the late 1800's.

In the Galice-Mount Reuben area, erosion that liberated the gold from many small lodes and thick old channel gravels produced deposits that resulted in many noteworthy placer mines. Placer mining began in 1854, mainly in the channels of the main streams including Galice, Taylor, and Reuben Creeks, as well as along the Rogue River in the vicinity of Galice. A 4-mi-long band of thick (up to 150 ft) old channel gravels, one-fourth to one-half of a mile wide, about 600 ft above and roughly paralleling Galice Creek and the Rogue River, has been mined extensively at several places and is reported to have yielded over 50,000 oz. The Old Channel Mine, No. 99, is reportedly the largest placer mine in southwest Oregon. The pit is about one-third of a mile in diameter and over 100 ft deep in places. Estimated production from the Old Channel Mine is about 50,000 oz.

Terrace and bench gravels at various elevations above the Rogue River channel occur at several places

along the river, mainly above Galice. The Flanagan, No. 200, near Robertson Bridge; the Big Four, No. 153; and Stratton Creek, No. 149, were all worked extensively and had moderate production. Along the Rogue River below Galice, the Rocky Gulch, No. 100a; Dean and Dean, No. 95; Rand, No. 84; Tyee Bar, No. 3; Norton, No. 2; and Horseshoe Bar, No. 1, all had early-day production but are now within the Rogue Wild and Scenic River Corridor.

With the recently increased price of gold, some areas with thick deposits of gravel and known gold values may become economic to mine. The large areas of gravel remaining at the High Gravel, Deep Gravel, and Esterly placer mines in the Waldo-Takilma area perhaps should be evaluated.

Another area of over 100 acres along Grave Creek below the mouth of Tom East Creek near Placer has been proposed for sampling and appears to have potential for a large-scale operation.

Patches of gravel along many of the streams were missed or bypassed by the early miners. Restrictions imposed by environmental concerns and rights to water make it extremely difficult to predict any large-scale placer operations, and any such proposed operation would necessarily involve thorough reclamation procedures.

COPPER

Copper has been the second most important metal in terms of production in the County. The bulk of it was produced before 1920 from the mines of the Waldo-Takilma area. Unlike gold, which has had a history of controlled prices, copper values have varied with the economy. Only when the price has been high has it been economically feasible to exploit copper ore from the Josephine County deposits.

All of the Josephine County copper deposits appear to be massive sulfide deposits in volcanic rocks. These deposits are generally lens shaped and concordant with the beds of the surrounding rocks. The ore is composed mainly of sulfide minerals with small proportions of silicate gangue. Pyrite and pyrrhotite are the main sulfides, with varying amounts of chalcopyrite, sphalerite, and galena. Small amounts of precious metals are also commonly present. New theories of the origin of massive sulfide deposits have been developed since the late 1960's and are continuously being refined. The source of metals for these deposits may be the same magma that gave rise to the surrounding volcanic rocks. Different sulfide minerals are associated with different lava types. The assemblage of pyrite, pyrrhotite, and chalcopyrite appears to be associated with basaltic volcanic rock; chalcopyrite, sphalerite, and galena deposits are found with more silicic volcanic rock.

Both types and some intermediate varieties are present in Josephine County. All of those in the Waldo-Takilma area, which includes the largest producing mines, occur in greenstones derived from basaltic volcanic rocks. At the Queen of Bronze Mine, No. 421, small to large pods and lenses of massive pyrite, pyrrhotite, and chalcopyrite produced over 20,000 tons of ore that averaged 8½ percent copper. Most of this ore was processed at the nearby smelter; but some was shipped via horse-drawn freight wagons to the California and Oregon Coast Railroad terminal at Waters Creek, about 15 mi southwest of Grants Pass (Figure 17).

The extremely contorted and sheared nature of the greenstone at or near the Queen of Bronze Mine has obscured rock relationships, but it appears that the greenstone was once pillow lava and that the sulfides were deposited between pillows or the pillowed lava flows. The other Waldo-Takilma area mines appear to have a similar origin except for the Cowboy, No. 446, where 5,000 tons of massive sulfide ore were produced from serpentinite near its contact with greenstone. Some cobaltite and sphalerite occur with the abundant pyrrhotite and chalcopyrite. The ore mined at the Cowboy occurred in a fault zone in slickensided lens-shaped masses that were apparently tectonically emplaced.

At the Almeda Mine, No. 78, massive sulfide deposits include some galena and sphalerite. Thick layers of barite are present in some parts of the orebody, and precious metals are associated with both siliceous ore and barite. The mineralization occurs at the contact between the Rogue and Galice Formations and now appears to be a stratiform deposit in layered pyroclastic rocks ranging from andesite to dacite in composition. The mineralized zone at the Almeda Mine is as much as several hundred feet wide and can be traced both south and north for a considerable distance. This zone has been called locally the Big Yank Lode. A segment of this zone north of Grave Creek is shown on the map of T. 33 S., R. 7 W. (Plate 3).

Smaller massive sulfide deposits discovered in the early days have had some production, mainly of precious metals, from their weathered surface outcrops. The Oak Mine, No. 162, contains massive chalcopyrite and sphalerite ore and continues to be an interesting deposit. The Copper Queen, No. 113, and the Fall Creek, No. 279, are other massive sulfide deposits that have had some production and may merit further exploration. At the Albright, No. 444, two or more thick lenses of massive sulfides overlain by thick gossan deposits have produced some gold and continue to be explored for their possible copper content.

SUBMITTAL -- BASIC DATA CHECKLIST

Property name(s): Althouse Placer

Represented by: Walt Farmer Position: Lessee

Address: Cave Junction, Ore Phone: (503) 592-2777

Location and access: Josephine County, Oregon

Ownership (Company?): Longview Fiber

Nature of holdings -- claims (patented?), other; acreage:
500 patented acres

Existing lease or option arrangements; obligations:
15% gross, start work on property this year 5 year lease

Land ownership; administrative agency:
Private

Elevation, topography:

Type of deposit; minerals (metals): Placer gold

Additional geology and mineralization data (area and property):

History and production:

Neighboring mines?; district production:

Development, workings; condition:

Highway, R.R., water, power:

Geophysics, geochemistry, detailed geologic mapping:

Physical exploration -- trenching, drilling, underground:

Map coverage -- topographic, geologic:

Published descriptions (literature):

Engineering studies; beneficiation studies:

Assay data:

Reserves (tonnage and grade); ore shoots: 25,000,000 yards

Buildings, equipment, plant:

Reports and maps available:

Proposed deal: Lessee will take part of the action

Additional data:

Evaluation/action:

Dogami Bull. 14

- "bed of stream was found to be uniformly rich"
- most accessible deposits largely exhausted.

USGS Bull. 546

- "the best ground was worked many years ago"

Dogami. – "Geol & Min Res. of Joseph. Co."

- lg. nuggets rptd from Althouse Cr.
- channel was "intensively mined" & lasted only a few years"
- "Althouse placers were reported to be exceptionally & uniformly rich & were famous for the large nuggets recovered"

Dogami – "Gold & Silver in Oregon"

- dredging "limited to a few short-lived operations on lower Althouse Creek, ..."
- "A shovel & washing plant ... worked the Leonard placer ... on lower Althouse Cr. from 1936 to 1938." "This area & down stream a short distance was also dredged by .... during 1940 & early 1941." "... could handle 600 yards daily..." "Their work disclosed that much of the area had been drift-mined in the early days by Chinese"

- "However, the small placer mines on Althouse & Sucker creeks are now largely exhausted ... "
- "Browntown, once the center of placer mining on Althouse Cr., is now deserted, & only a few placer miners still remain on Sucker Cr."
- "... formerly there were important placer mines on Althouse & Sucker creeks, although the latter were always small mines."

Prelim descr. of Geol of Kirby Quad

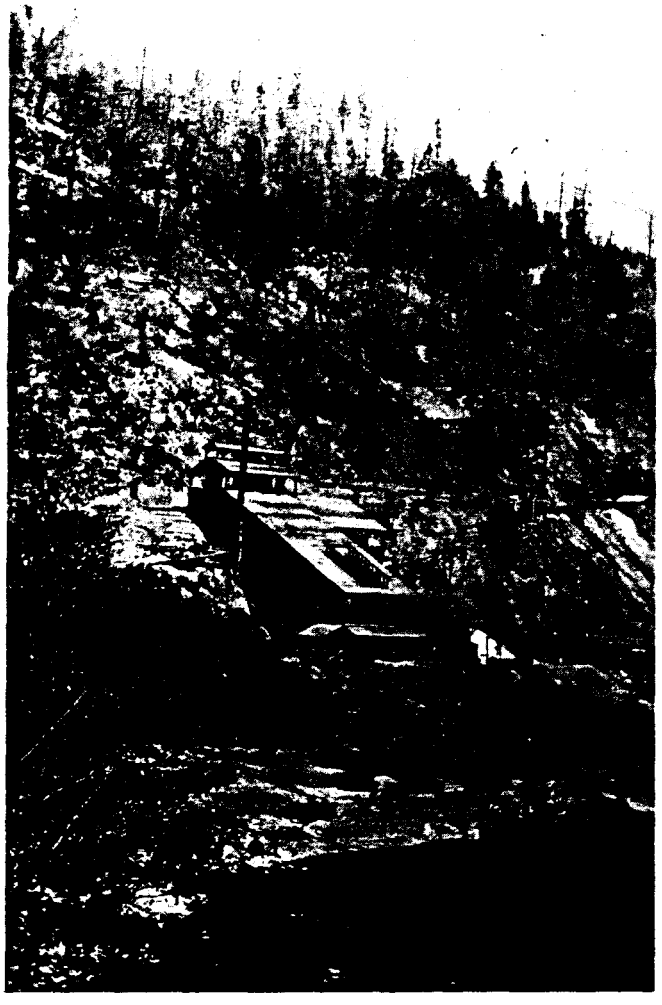


Figure 7. Almeda Mine, No. 78, and smelter, 1913.

plored and are continuing their exploration of the nickeliferous laterite deposits. In 1978, Ramp detailed nickel resources and their potential as part of an Oregon Department of Geology and Mineral Industries nickel study.

Most important of the nonmetallic mineral commodities is sand and gravel, but limestone (marble) has been mined in significant quantities from Marble Mountain near Wilderville. From the late 1920's until 1967, high-quality limestone has been produced for the paper industry and for the Ideal Cement Company plant. A small amount of marble has been quarried from the Jones Marble deposit near Williams, mainly for monuments.

Production statistics for gold, silver, copper, and chromite (Tables 2 and 3) show that the total production for Josephine County is at least $16 million, and it may be twice or even three times that amount. After the estimated $7½ million value for limestone is added, the *minimum* total is brought to about $25 million. Winchell (1914), Libbey (1963), and Brooks and Ramp (1968) all point out the lack of reliable reports for the early-day mining period from 1850 to about 1880. Shortly thereafter, the U.S. Geological Survey and the U.S. Bureau of Mines began their systematic annual surveys. Although the statistics are now more reliable, they are still believed to be incomplete and therefore contain serious understatements of the value of gold production. Even though the tabulations contain detailed statistics, many estimates are involved. The statistics do show interesting changing trends in mineral production due to economic or political developments of the time.

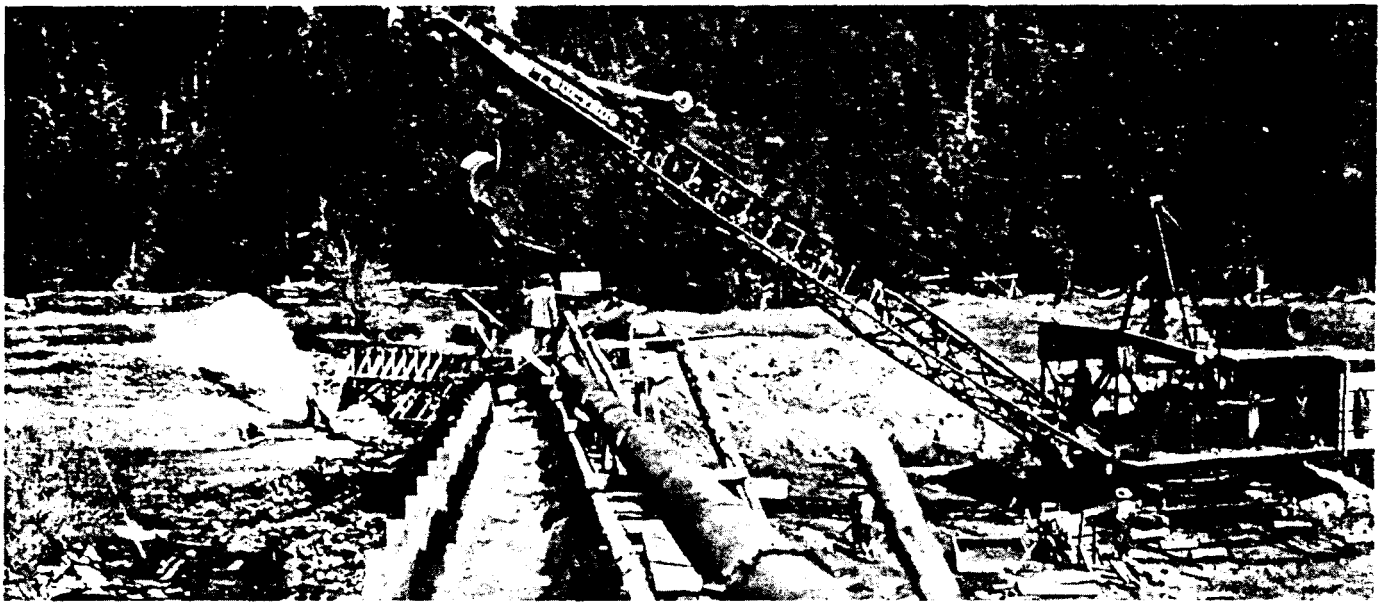


Figure 8. Sluicebox and wood-fired, steam-powered dragline at Leonard Placer Mine on lower Althouse Creek during the 1930's.

THE METALS

Western Oregon

The state of Oregon contains several metal-bearing areas, widely scattered in different regions. More than half of its coast is bordered by beaches and coastal plains which in places contain beds of auriferous sands. These may also contain concentrations of magnetite, chromite and ilmenite. A second mining field, - the chief producing one of western Oregon - is situated in the southwestern part of the state and includes Jackson, Josephine, Douglas, Coos and Curry counties. It may be considered as the northern extension of the gold-copper belt of California. A third region in western Oregon is that on the western slope of the great Cascade range including Bohemia, Blue River, Quartzville, North Santiam and Ogle creek districts, extending from the Klamath mountains on the south almost to the base of Mount Hood near the Columbia river on the north.

Although gold was reportedly found in Oregon (on the headwaters of the John Day river) as early as 1845, the earliest mining of gold in Oregon was in Jackson and Josephine counties, in 1851 and 1852. In 1852 Jacksonville district was organized, following the discovery of placer gold on a tributary of Jackson creek. In the fall of 1852 gold was found on Josephine creek and in the spring of 1853 a great rush followed to Althouse creek, where the bed of the stream was found to be uniformly rich. From Sailor Diggings, a famous placer region on the upper Illinois, a 15-mile ditch was paid for out of one year's production. In the two or three following years practically every part of southern Oregon was prospected for gold and many productive districts were organized. After the most accessible gravel deposits were taken up and largely exhausted, placer miners turned to benches wherever such deposits could be worked by water under considerable pressure. Hydraulic mining was done in southern Oregon as early as 1856 and has been carried on almost continuously ever since.

Soon after the discovery of gold-bearing gravels, quartz veins were located. In 1859 quartz was found at Gold Hill so rich that $400,000 is said to have been taken out the next year. A similar rich deposit at Steamboat, found at about the same date, yielded $350,000 in a short time. The quick exhaustion of the many rich strikes gave the region a reputation of being a "pocket" country, and this caused prospectors to search for near-surface pockets rather than to do underground development work. It is a region where many bonanzas have been found, but developments now indicate that it also contains bodies of lower grade ores of gold and copper.

Early in the '60's an 8-stamp mill was installed near Grants Pass, and many plants of similar nature have been erected since that date, the largest of which, the Greenback mill, had 40 stamps.

Eastern Oregon

The most important mining region in eastern Oregon, as well as the entire state, is that of the Blue Mountains, situated in the northeastern part of the state and extending westward for 130 miles from the Idaho line. This important region comprises many mining districts. Its total gold production to date is at least three-fourths of the entire state.

ATLAS GOLD DREDGING CORPORATION (placer) **Waldo area**

Owners: Property leased from R. S. Leonard by Atlas Gold Dredging Corporation of Los Angeles, California; Frank E. Ford, Pres; W. E. Moffett, Sec.-Treas; Edison Building, Los Angeles, California; H. J. Ackley, General Manager; W. Youmans, Dredgemaster.

Location: Secs. 4, 7, 8, 18, T. 40 S., R. 7 W., on Althouse Creek.

Area: 3,000,000 cubic yards sampled out with about 4,000,000 cubic yards yet to sample. Property extends along Althouse Creek for about 2½ miles.

History: Property includes the old Leonard Placer with extensions.

Development: Plant construction began Jan. 20, 1940. Operation started about Feb. 7, 1940, and was discontinued in March, 1941.

Equipment: Bodinson washing plant: Hull consists of four 10' x 36' x 3½' wooden pontoons and two 8' x 36' x 4' steel pontoons; hopper is 12' x 10'; trommel is 5' x 38', 26' of which is drilled section with 3/8 inch to 1/2 inch holes having 2 inch bridge at upper end to ½ inch bridge at lower end; three banks of Hungarian riffles; expanded metal cloth and cocoa matting. Power plant; main pump is a 60 h.p. ten-inch Byron-Jackson, capacity 5000 gallons per minute; fire pump, 5 h.p. three-inch high pressure; stacker motor is 10 h.p.; trommel motor is 30 h.p.; the stacker has a 36 inch belt and is 70 feet long.

A K-55 Link-Belt dragline having a 3-yard bucket with a 2½-yard extra heavy mining bucket; a 70 foot boom; powered by a 250 h.p. G. E. motor. (This was changed in May, 1940, to a diesel-electric Marion-Walker-type dragline with 5-yard Esco bucket.) Other equipment includes an R. D. 7 Diesel caterpillar tractor with bulldozer, two pick-up trucks, two large G.M.Trucks, (one a four ton and the other fourteen ton capacity). There is a well-equipped welding and blacksmith shop to take care of all work, and a neatly arranged tool house or storage.

Geology: The mineable channel has a width of about 500 feet over a distance of 2½ miles along Althouse Creek. Bedrock is predominately soft, decomposed granite, with a few serpentine "reefs". The granite is normally decomposed so that the dragline can dig it to a depth of 18 inches. The surface is uneven or rolling. Normally the serpentine can be dug to a depth of 12 inches, except in a few places such as the nose of a hill where the serpentine is quite hard. Practically barren overburden, mostly soil, will average about six feet. There is an increase in gold content to a point about six feet above bedrock. This last six-foot zone contains most of the gold. There is practically no clay; the top soil is silty enough so that it does not clog the washing plant. "Large" boulders are 18 inches in diameter.

Informant: H. J. Ackley, general manager, 3/26/40

Report by: Ray C. Treasher

Mining Journal
June 15, 1940

A new walker-type five-yard Marion dragline, Diesel-electrically operated, is being installed by the **Atlas Gold Dredging Company** on Althouse Creek near Holland, Oregon. The equipment already in use on the ground includes a 200-yard per hour Bodinson dragline dredge and Link-Belt dragline, each equipped with 2½-yard Esco buckets. This equipment was moved from the company's California operations last year. H. J. Ackley, 309 West A Street, Grants Pass, is superintendent. The property, formerly operated by the Von der Hellen interests, is known as the Leonard mine. Frank E. Ford, Edison Building, Los Angeles, is president and general manager.

See
Mining World.
March, 1941, pp. 25-29

G.P. Courier Mar 22, 1941

Dredge Equipment Shipped South

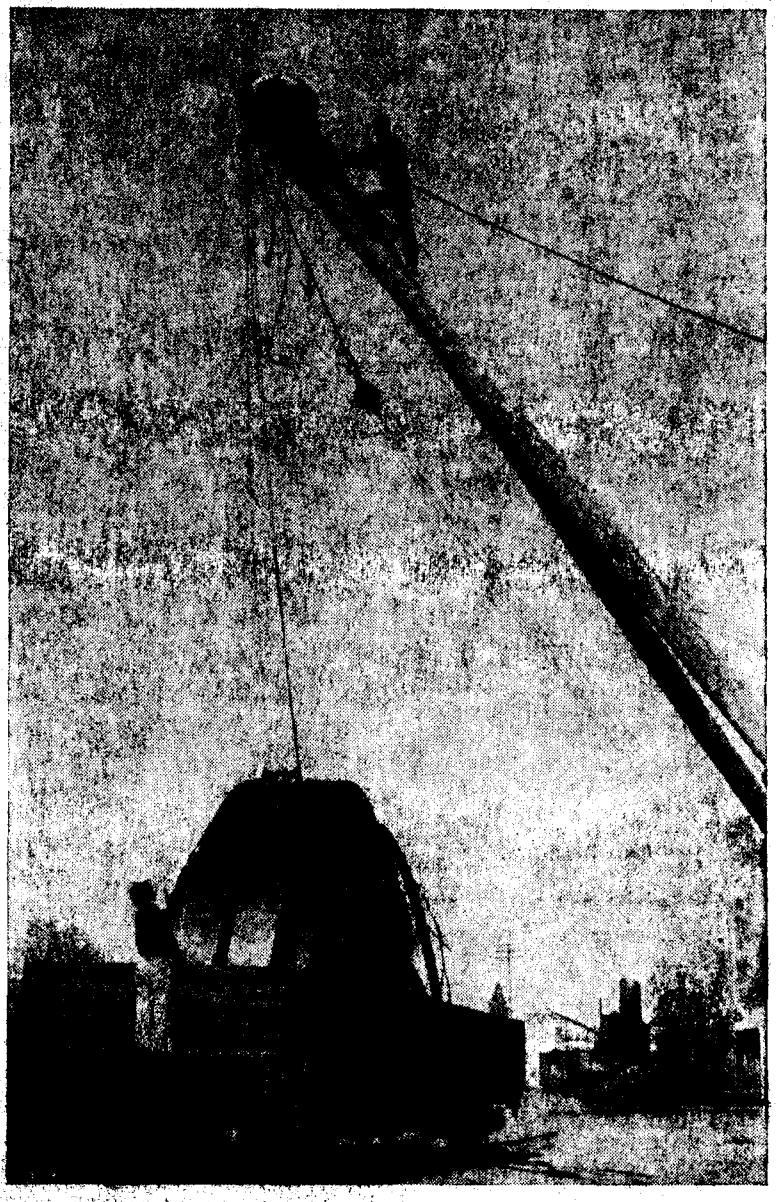
The equipment used by the Atlas Dredging corporations, [illegible] the past year near Holland, was being loaded this week on two flatcars for shipment to Sacramento, Calif. The Atlas corporation has been one of Josephine county's largest operators.

see also. G.P. Bulletin Mar. 28, 1941

George;
This is all I could find in our files on the old Leonard placer. It appears to be a lack of info on values. Sorry

Lee

Heavy Mining Proposed —



Dragline dredge equipment of such size that seven or eight freight cars are required to bring it here from the Merriam Manufacturing company in Ohio was being shifted to a truck at the local yards Friday morning to be taken to Althouse creek, near Holland, for operations by the Atlas gold dredgers. Pictured here are two pieces for the pontoon, together weighing 28 tons. Yet to arrive are the Diesel-electric engine, 100-foot boom, five-yard bucket, cab, and other equipment which will bring the total weight to about 170 tons. The new machinery will replace a link belt dragline that the company has used on Althouse creek since setting up operations there several months ago. (Courier Photo and Engraving.)

MINERAL RESOURCES

INTRODUCTION

The Mineral Locality Map (Plate 2) shows the location of 470 individual mines, prospects, and mineralized areas in the County as accurately as the map scale allows. The metallic mineral commodities of gold, silver, copper, chromium, and nickel have been and will continue to be the most important resources. Other metals that occur are lead, zinc, manganese, mercury, molybdenum, platinum, and tungsten. Nonmetallic minerals other than sand and gravel include asbestos, barite, limestone, semiprecious gem stones, and soapstone, with limestone the only nonmetallic commodity produced in any quantity.

Each of the 470 mines is listed in Table 1 (folded, in envelope), along with information from the listed references about its location, development, production, and mineralization. Production statistics attributed to individual mines are included in the table. Very few tunnels, shafts, or other underground workings listed in the table are still accessible; most adits are caved at the surface, and lower workings are full of water.

HISTORY

Mining began in southern Oregon in 1850 with the discovery of gold along the Illinois River near the mouth of Josephine Creek in what was later to become Josephine County. Since that time, gold, silver, copper, chromium, and limestone have been important commodities to the economy of the County. The following paragraphs provide a thumbnail sketch of some of the mining history of Josephine County. Figure 4 shows the locations and times of some of the important events.

Early-day Josephine County was almost exclusively involved with mining. Other discoveries quickly followed the finding of placer gold in 1850. Street and Street (1973) report the discovery of gold at Sailors' Diggings early in 1852. At that time, Althouse Creek was already being mined. Activity spread to Sucker and Galice Creeks in 1853 and on to many other tributaries of the Rogue, Illinois, and Applegate Rivers during the remainder of the 1850's.

The rich placer deposits within stream channels were the first to be mined and lasted only a few years; because ditches and flumes were built to bring water from miles away for hydraulic mining of the old channel, bench, and terrace gravels (Figure 3), the era of intensive placer mining was extended to the 1870's. Lodes that were the sources of gold in the placers were also sought, and as early as 1860, some surface concentrations and gold-bearing quartz veins had been found. In 1863, the Jewett Mine near Grants Pass had an 8-stamp mill.

Because underground mining was time consuming and required considerable exploration, it developed more slowly, during the 1870's and 1880's. The early 1890's saw the Mount Reuben and Galice districts become very active. Gold and silver production was coming from the Ajax, Copper Stain, J.C.L., Gold Bug, and Golden Wedge Mines. The Benton Mine had been discovered but was not to attain prominence until much later. In 1898, Greenback Mine ore was being treated in an arrastre, but soon its output increased to major production. By 1902, it was equipped with an electric-powered 40-stamp mill and a 100-ton capacity cyanide plant (Figure 5). In 1904, the Greenback produced more gold than any other mine in Oregon, except the North Pole Mine in Baker County.

About the same time, the Almeda Mine had 1,400 ft of underground workings; the Granite Hill Mine had a deep shaft and a 20-stamp mill (Figure 6); and the Daisy, discovered in 1890, was on the way to producing a quarter of a million dollars (14,000 oz) in gold and silver from rich, gold-bearing quartz veins.

Copper was discovered in the Waldo-Takilma area in 1860, but economics prevented large-scale production until 1904, when a small, matte smelter was built at Takilma. This smelter operated more or less continuously until 1910. It smelted over 20,000 tons of ore with an average copper content of 8½ percent. Of the estimated 7 million pounds of copper produced in the County, the Queen of Bronze and other mines near Takilma were responsible for nearly 6 million pounds. A small but interesting copper deposit on Fall Creek also had a small smelter as early as 1899, with some production then and some again in 1965. Considerable quantities of copper were also produced at the Almeda Mine, which as early as 1908 had a matte smelter that

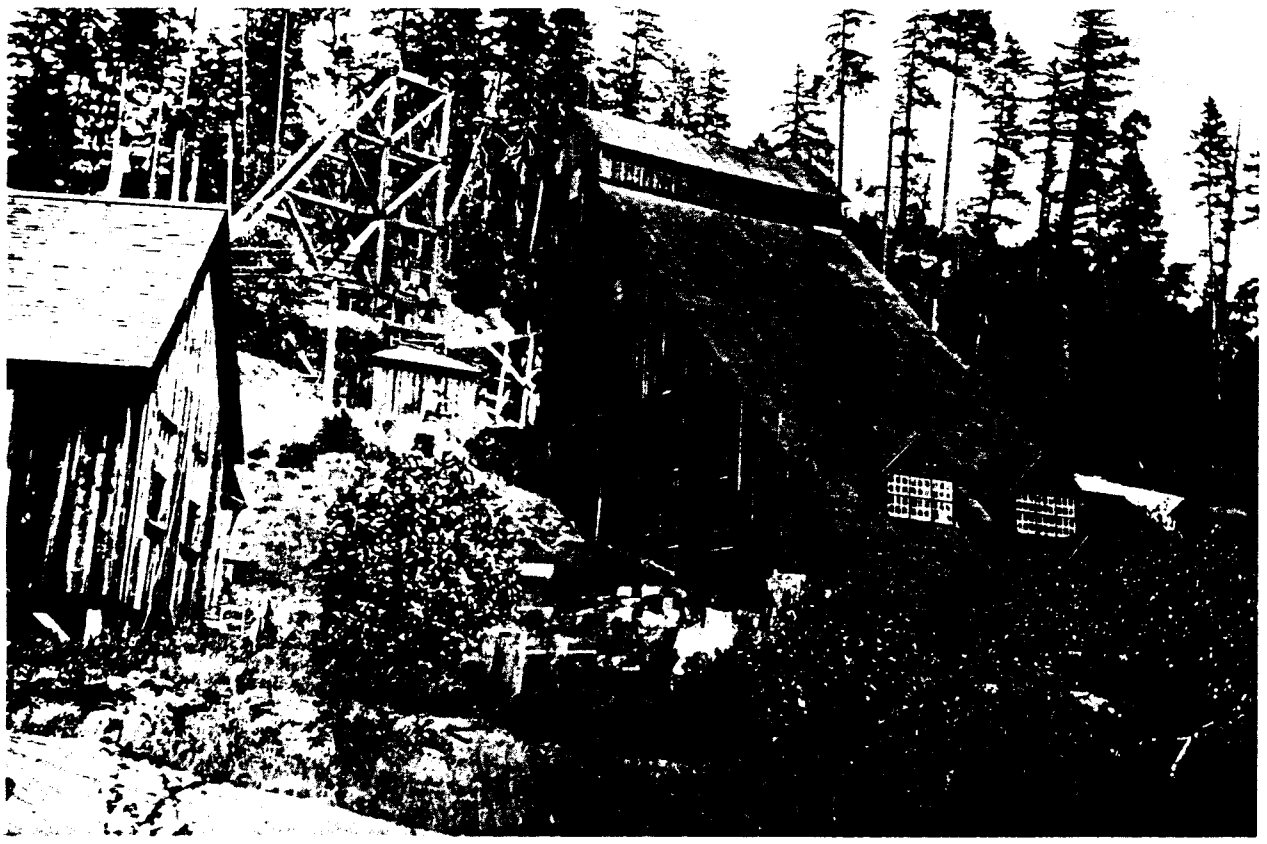
operated intermittently from 1911 to 1917 (Figure 7). The Almeda Mine ores also contained significant gold and silver values that were recovered and a gangue mineral barite that was never exploited.

Small- to moderate-size gold occurrences continued to be discovered and developed on a small scale from World War I until the early 1930's. Then the depression and its widespread unemployment, a substantial rise in the price of gold, and the development of the Benton Mine all combined to increase production to the highest levels since the early 1900's. A large dragline operation on Althouse Creek (Figure 8) and a still larger bucket-line dredge on Grave Creek (Figure 9) contributed to the increased production of gold. In 1938, about 13,000 oz were produced from a variety of placer operations and lode mines, of which the Benton Mine was the greatest. Gold and silver production remained strong until mid-1942, when World War II restrictions on labor and supplies closed down the gold mines. After World War II, the high cost of labor and mining supplies, along with a fixed price for gold, made mining uneconomic, and the important lode mines never reopened. Hydraulic placer mining provided insignificant production until about 1960. Between 1960 and 1979, the lack of incentive to explore for gold, environmental concerns and restrictions, plus the high financial risk and initial investment, discouraged any substantial gold and silver mining ventures, even though in 1969 the government began its deregulation policies for gold, and the price began to rise. From 1969 to 1979, only minor production (estimated at 100 oz per year) occurred, mainly from the operation of small portable dredges, individual sniping, and small-scale intermittently operated lode mines.

Chromium is another metal that has at times contributed significantly to Josephine County's economy. A total of 48,941 long tons of ore was sold between 1917 and 1958: first during World War I (1917-1918), during and following World War II (1941-1948), and finally between 1952 and 1958, when the U.S. Government was building a stockpile of strategic materials (Figure 10).

Nickel resources have been known to exist at Eight Dollar Mountain and other areas of the County since 1942, and several major mining companies have ex-

Figure 6. Granite Hill Mine headframe, No. 202, and 20-stamp mill.



in the beds of streams and gulches downstream from lode deposits. Bed rock containing gold sometimes disintegrates more or less in place, forming residual placers on flat areas or gentle slopes. More often, however, running water carries the loosened material and much of the gold away from its place of origin. The heavier, coarser gold works its way to the bottom of the moving debris and eventually reaches bed rock. Coarser gold tends to work its way to bed rock more rapidly than the finer gold and is often found mixed with sand and gravel in crevices of the bed rock.

Paystreaks, concentrations of gold in auriferous gravel deposits, are seldom uniform or regular, so usually only part of a deposit is rich enough to work profitably. Gold may be transported long distances. As a rule, however, the greater the distance from the source, the finer, more scattered, more rounded, and more flattened the particles become. The size of the gold particles varies greatly from dust, several thousand particles of which are worth one cent, to nuggets of relatively large size. The largest nugget reported from Josephine County came from Althouse Creek and weighed 17 lb. Most nuggets, however, range from the size of a mustard seed to that of a wheat grain (Brooks and Ramp, 1968).

Placer deposits accumulated at many places in Josephine County. It is estimated that at least 75 percent of the total gold production of the County was recovered from a variety of placer deposits. Shovel, pan, and sluice box were used in early hand mining. Later, most placers were worked hydraulically by bringing large volumes of water for long distances via ditch and flume. Bucket-line dredges, draglines, and a variety of mechanical washing plants have also been used at times in the County's placer mines.

In the topography of southwestern Oregon, Diller (1914) recognized evidence of three cycles of erosion that left ancient stream channel deposits at different elevations. The oldest (first cycle) and least extensive stream gravel deposits occur at an elevation of 4,000 ft and are believed to be of late Tertiary age. The only deposit of this cycle in Josephine County is near York Butte. The gold content of this deposit is not known, but the coarse gold found on upper Red Dog Creek may have come from weathering and erosion of these first cycle gravels.

The deposits of the second cycle of erosion (of Pleistocene age) are more abundant and appear to have been left by an ancestral Illinois River that flowed northeastward from the vicinity of Sixmile Creek through Briggs Valley and joined the Rogue River near Galice. These stream-deposited gravels occur at a general elevation of 2,700 ft. Remnants of the gravels of this old channel occur on the ridges between the drainages of Briggs, Taylor, and Galice Creeks and are as much as 150 ft thick; they were the sources for major quantities of gold for the rich placers of Galice Creek; Rocky and Rich Gulches; and Swede, Onion, and Briggs Creeks. Old channel gravels also occupy high terraces along lower Grave Creek and the Rogue River. Wells and Walker (1953) divided the deposits into the old channel, about 500 ft above streams; high bench gravels, 100 to 400 ft above streams; and bench gravels, as much as 40 ft above streams. Diller's (1914) auriferous gravels of the third and continuing cycle of erosion included all of the bench, bar, and channel gravel deposits related to the present streams.

Because of the large number of individual mines and the lack of historical information about them, only a general review of the important placer deposits can be included in this report. Diller and Kay (1909), Diller (1914), Winchell (1914), Parks and Swartley (1916), Shenon (1933a), Oregon Department of Geology and Mineral Industries (1952), and Brooks and Ramp (1968) review and describe the placer mines of Josephine County in some detail.

In the northeast part of the County, including the Greenback district, most of the streams including Grave Creek and its main tributaries, Wolf and Coyote Creeks, have had important production from stream channel, bar, and bench deposits. One of the largest placer mines in the State, the Columbia, No. 116, was located on Tom East Creek, where over 2 mi of the channel below the Greenback Mine produced at least 25,000 oz of gold from about 1900 to 1941. Lower Grave Creek has had many productive placers, mainly from bench gravel deposits. One of the largest dredging operations was located near Leland from 1935 to 1939. A large bucket-line dredge (Figure 9) was used by the Rogue River Gold Company, which regularly employed 40 men, to process gravels from 2 mi of an old Grave Creek channel, the County's largest producer during the late 1930's. Dredging ceased in 1939, when upstream gravels became so thick that the bed rock could not be cleaned. Hydraulic placer mining continued on a small scale as late as 1960 on Grave, Coyote, and Louse Creeks. The small communities of Golden on Coyote Creek and Placer on Grave Creek are present-day reminders of the mining camps that once served the old mines in the Greenback district.

Near Grants Pass, a minor gold placer was worked on Bloody Run Gulch, a small tributary of the Rogue River. Farther south, along the eastern border of the County from Murphy to Williams, many of the Applegate tributaries show evidence of early mining. Miller and Rocky Creeks, Whisky and Bamboo Gulches, and other tributaries of Williams Creek were worked extensively. The placer mines of Oscar Creek, Nos. 296, 297, and 298, were known for large nuggets.

Figure 15. Logan Placer Mine, No. 396, later called the Llano de Oro or Esterly Mine, near Waldo, in the late 1800's. (Photo courtesy Josephine County Historical Society)

The Watts, No. 352, operated for many years on thick hillside accumulations below the Humdinger, Rising Star, and other lode mines of the Williams area. The Watts placer had an estimated production of over 10,000 oz.

In the southern part of the County, the placers of the Waldo-Takilma area and Althouse and Sucker Creeks are the best known and most important in the County's early history. First discovered were the rich deposits of Sailor, Allen, Fry, and Scotch Gulches, as well as the channels of Althouse and Sucker Creeks. These were intensively mined and lasted only a few years. The Althouse placers were reported to be exceptionally and uniformly rich and were famous for the large nuggets recovered. The largest reported nugget, weighing 204 oz (17 lb) and valued at $3,500, was found on the East Fork of upper Althouse Creek by Mattie Collins. Spreen (1939) reports that a single piece from near Waldo weighed over 15 lb and was valued at $3,100. An $800 nugget came from near Browntown. At July 1979 gold prices, the gold value of these nuggets would be $58,000, $51,000, and $14,000, respectively, and they would probably be worth twice that much as museum specimens.

Development of a ditch system in about 1860 and consolidation of numerous closely-spaced claims led to the development of three large placer mines: the High Gravel, No. 416 (Figure 3); the Deep Gravel, No. 393; and the Esterly (Llano de Oro), No. 396 (Figures 15 and 16). These three properties contained several thousand acres underlain by gold- and platinum-bearing gravels. All were operated seasonally from 1870 to 1940 as hydraulic mines. Their combined estimated production was about 55,000 oz. Because the ratio of platinum to gold was 1:75, a small amount of platinum was also recovered. Shenon (1933a) believed it came from the complete disintegration of serpentinite and other ultramafic boulders of the thick gravel deposits. Bed rock at the Deep Gravel and Esterly Mines was well below the elevation of the Illinois River, so huge hydraulic elevators were used to hoist the gravel and water to the sluices (Figure 16).

Spreen (1939) reports that the earliest discovery of gold was made on the Illinois River near the mouth of Josephine Creek by a party of prospectors traveling to the California gold mines in 1850. The Illinois River received its name because five members of the party had originally come from that state. The area, including Josephine and Canyon Creeks and their tributaries, mainly Days and Fiddler Gulches, was intensively mined from 1852 through the early 1900's and had important production. There were numerous moderate-size hydraulic mines on Josephine Creek, where the bed rock is entirely serpentinite, and where two prominent benches or terraces of partially cemented gravels occur. The higher and more extensive terrace

talcose and pyrite-bearing gouge. Kays and Bruemmer (1964) determined from a gravity study that the major faults are deep seated and contain injections of serpentinized peridotite. They suggest that the amount of peridotite is directly related to the magnitude and extent of the faulting.

Some of the mapped faults may have very little structural importance, while others that are relatively important may have been overlooked. The thick vegetation and colluvium make detailed geologic mapping a frustrating endeavor. Filling in the gaps between good exposures of bed rock is largely a matter of geologic interpretation, and no two geologists are likely to develop identical pictures.

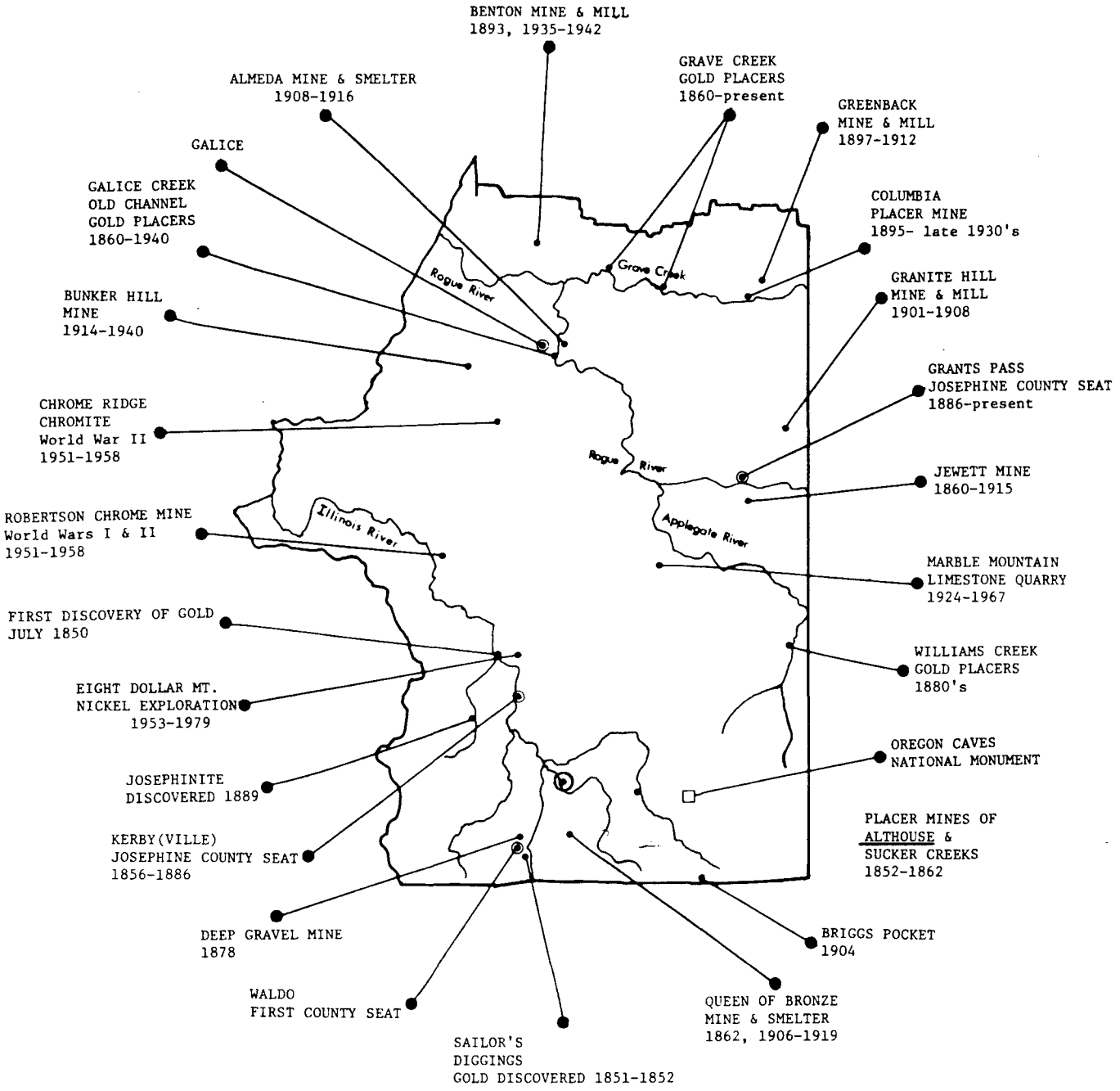


Figure 4. Some of the places and events important in Josephine County's mining history.

a period of five years was about 25 cents per yard, at $20 per ounce.

Dredging: Dredging in the Waldo area has been limited to a few short-lived operations on lower Althouse Creek, Sucker Creek, and along the East Fork of the Illinois near Takilma. A shovel and washing plant owned by Von der Hellen Brothers worked the Leonard placer in sec. 4, T. 40 S., R. 7 W. on lower Althouse Creek from 1936 to 1938. This area and down stream a short distance was also dredged by the Atlas Gold Dredging Corp. during 1940 and early 1941, using a 5-yard dragline that could handle 6000 yards daily and was the largest dragline washing plant in southwestern Oregon. Their work disclosed that much of the area had been drift-mined in the early days by Chinese (W. J. Cannon, oral communication, 1968).

In 1945 and 1946 B. H. Oregon, Ltd., ran a 3-yard dragline and washing plant on Sucker Creek a short distance above Grayback Creek.

A dragline and washing plant was operated intermittently by the Takilma Mining Co. along East Fork Illinois River just north of Takilma during the period of 1947 to 1950. Another dragline and washing plant was active at the Bailey mine on Fry Gulch west of Waldo during the same period. Production of these properties is not reported.

Principal Lode Mines

Sylvanite mine: The main workings of the Sylvanite mine (map no. 10) are on 80 acres of patented land about 3 miles northeast of Gold Hill. The property is under sales contract (1966) to Daniel Jones from the owner, George Tulare of Gold Hill. Libbey (1963) describes the mine as follows:

> "The discovery and early history of the mine are not of public record. Various published reports show that, beginning in 1916, owners and operators were, successively, E. T. Simons, with Stone and Avena, Denver, Colorado, lessees who found scheelite (tungsten ore) associated with the gold ore; Oregon-Pittsburg Co. in 1928; Discon Mining Co., A. D. Coulter, Manager, discoverer of the high-grade ore shoot along the Cox Lyman vein in 1930; Western United Gold Properties; Sylvanite Mining Co.; and finally Imperial Gold Mines, Inc., in 1939. This last company built a concentrating mill of 140 tons daily capacity and cleaned out underground workings to expose the openings where the rich ore shoot had been found.
>
> "The Sylvanite vein or shear zone occurs between metaigneous and metasedimentary (largely argillite) rocks. It shows intense shearing and alteration and is intruded in places by basic igneous dikes. It trends just east of north and dips southeasterly at about 45°. The Cox-Lyman shear zone strikes at right angles to the Sylvanite vein and stands nearly vertical. No certain sequence of faulting in the two shear zones has been established. Ore shoots are said to be from 5 to 12 feet thick and have averaged from $5 to $15 a ton. They have a gangue of quartz and calcite and carry galena, chalcopyrite, and pyrite. A fracture zone roughly parallel to the Sylvanite vein cuts the Cox-Lyman vein and at the intersection a rich ore shoot was found on the hanging wall, producing $1,000 per lineal foot of winze in sinking 600 feet. Discontinuous pockets of ore were found in the hanging wall of the shoot for 200 additional feet of depth. The winze reached 900 feet below the surface. This ore shoot was reported to have yielded about $700,000.
>
> "A total of more than 2,560 lineal feet of underground development work has been done. In addition, numerous surface pits and cuts, now caved, have been dug by pocket hunters.
>
> "Seemingly little effort has been made to explore the scheelite possibilities, although it is known that the Imperial Gold Mines Co. had such plans. They ran into difficulties underground because of caving ground, and presumably war-time conditions finally forced them to close down."

Lucky Bart mine: Lucky Bart Group (map no. 6) is about 6 miles northwest of Gold Hill, west of the left fork of Sardine Creek. Workings are between 2080 and 2900 feet elevation. There were 11 claims, and at least one in NE¼ sec. 29 is patented. The mine was worked intermittently by various operators

HISTORY

Mining began in the Waldo district in the spring of 1853 when a placer miners' "stampede" to Althouse creek occurred. At about the same time sailors are said to have abandoned a ship on the coast and travelled overland to the "Sailor Diggings" near Waldo where a ditch costing $75,000 is reported to have paid for itself in one year. The gravels on Sucker creek were extensively mined from 1854 to 1860, though the results were not very satisfactory. In the latter year the Waldo copper mine was discovered by Mr. Hawes, and quartz veins on Althouse creek were opened soon afterward. The early work at the Waldo mine gave poor returns on account of the extrmeely high cost of transportation and materials. Work in the gravel of Scott's gulch near Waldo began in 1861 and continued for about 35 years. The Waldo Hydraulic Mining Company began work in 1877, and the ground is not yet exhausted. Simmons Brothers opened the Deep Gravel mine more than 40 years ago; in 1878 Wimer and Sons bought a half interest, and in 1888 they secured the remaining half of the property. The Deep Gravel Mining Company became the owner in 1900, and later sold to the Waldo Consolidated Gold Mining Company. The chief mining activity in the district has been in the placers ever since mining began, and unlike other districts in southern Oregon these gravel deposits are still productive and give promise of continuing to yield for many years. However, the small placer mines on Althouse and Sucker creeks are now largely exhausted and most of the placer gold at present comes from the extensive and deep deposits in the Illinois river valley near Waldo. Browntown, once the center of placer mining on Althouse creek, is now deserted, and only a few placer miners still remain on Sucker creek.

Of recent years the development of lode mining has progressed more or less steadily. Harry Siskron has met with success in operating the January First mine near Holland. The copper mines near Takilma have been opened and a smelter erected, and other mines have been more or less prospected.

GEOLOGY

The Waldo district is occupied chiefly by old sedimentary rocks including argillites, quartzites, and limestones, and by dark colored subsiliceous igneous rocks, including andesite, serpentine, auganite,

Placer Deposits

At present the chief placer deposits of the Waldo district are in the Takilma area; formerly there were important placer mines on Althouse and Sucker creeks, although the latter were always small mines. The production from both these gulches has varied from $1000 to $10,000 annually during the past six years, the largest yield being in 1911. The small mines include the Jumbo, Mountain Slide, Yeager, and Layman. In 1913 a placer mine said to be owned by Dr. Pickrel of Spokane, was in operation near the mouth of Grizzly gulch. It is equipped with a ditch, pipe line, saw mill, derrick and giant. A miner named Arndt is taking out a little gold and platinum from gravel at the mouth of Limestone creek. Placer miners were also at work at two points on Cave creek, one being about 3 miles below the caves at a small waterfall. Tests were also in progress in 1913 on ground near Holland to determine whether it was rich enough to warrant the installation of a dredge.

Near Waldo there are three important placer mines, namely: Logan, Simmons and Cameron mine, the Deep Gravel or Wimer mine, and the High Gravel or Osgood mine. These three properties are now controlled by the Waldo Consolidated Gold Mining Company of Oregon and operated under the management of Mr. J. M. Logan, who states that the company owns sufficient placer ground to maintain operations for an indefinite period in the future.

Several long ditches carry water from the higher portions of the east and west forks of the Illinois river to the placer ground. The water supply permits mining for about eight months of the year. The placer gold here, which is generally very fine, is accompanied by some platinum as well as a little osmium and iridium.

The Logan, Simmons and Cameron mine is one of the largest placer mines in the state. The oldest workings on this property are in Carroll slough, extending for more than a mile north from near the southwest corner of section 5, T. 40 S., R. 8 W. The area mined varies greatly in width, averaging nearly an eighth of a mile. The pit is from 10 to 25 feet in depth and the bedrock is conglomerate and sandstone with some serpentine. Beginning over 25 years ago, mining in this vicinity was carried on for more than 15 years. More recently several acres have been mined on French Flat, where the workings are in the southern part of section 22, T. 40 S., R. 8 W. The material here mined includes a good deal of clay as well as gravel and sand. A hydraulic elevator was used to remove material from

others will be found.

Cobalt

The ore from the Cowboy mine is a copper ore, but contains appreciable quantities of cobalt. The geology of this deposit has been described in detail by Shenon (14).

Copper

About 6,000,000 pounds of copper as well as some zinc, cobalt and gold have been produced from mines in the Kerby quadrangle, and under favorable price conditions more of these metals will be produced from the area. Three different but related types of deposits have been found. The most productive type is found close to the contacts of metavolcanic rocks and peridotite, and most of them are in those metavolcanic rocks commonly called greenstones. These deposits occur as irregular bodies and lenses of massive sulfides that have been deposited in and along fractures of the enclosing rocks. The primary (hypogene) sulfides include chalcopyrite (copper-iron sulfide), sphalerite (zinc-iron sulfide), pyrite, pyrrhotite, and at the Cowboy mine cobaltite (cobalt-arsenic sulfide). A small amount of gold is also present. They are everywhere associated with altered wall rocks and small amounts of quartz and calcite as gangue minerals. The percentages of the different sulfides present vary widely within a given deposit. Only limited parts of the massive sulfide bodies have a high enough content of the sulfides of metals other than iron to be classed as ore, and several of the massive sulfide deposits contain only a few hundredths of one percent of such minerals. Oxidation and sulfide enrichment have been important processes only close to the surface. The largest and most productive deposits of the massive sulfide type are in the Takilma-Waldo district, and have been described by Shenon (14).

Where sulfide deposits of this type are exposed for long periods of time to the action of downward percolating surface waters containing dissolved air, they are oxidized. All of the zinc and much of the iron are carried away in solution. Most of the copper is carried down to the water table, where it is deposited as new sulfide compounds with a higher copper content, and if the process is continued long enough under favorable conditions even native copper is formed. Gold, being insoluble, is left behind, and is increased in relative amount by the removal of the other constituents. Very low grade sulfide deposits on or just below the old upland surface have been enriched to ore by this process. The Cleopatra mine (secs. 3 and 4, T. 18 N., R. 2 E., H. M.) just south of the quadrangle yielded large lumps of native copper. This is the second type of copper deposit. The Turner mine (183) has been enriched in gold.

Vein deposits of pyrite, chalcopyrite, and some sphalerite associated with a great deal of quartz and some calcite are found in shear zones of the dioritic rocks of the quadrangle. They constitute the the third type. Those that have been explored contain enough gold to interest the prospectors. Those that have been examined are composite veins. The Old Glory mine (27) is a good example of this type. Prospectors report deposits in which pyrite and chalcopyrite in small amounts are scattered widely through the diorite, but no such occurrence has been seen by the writers.

Gold

Gold was the most important mineral resource of the Kerby quadrangle. Since the discovery of placer gold on the Illinois River in 1851, placer and lode mining have continued with some interruptions to the present day. In the early days they played an important part in the development of the region. The early mining camps Waldo and Allentown nearby, Sevastopol and Pondtown on Canyon Creek at and above its confluence with Josephine Creek, were settlements of several hundred persons. Now it is difficult to find traces of them. The gold output from this area can never be known, for records of the most productive period of placer mining are very incomplete. Shenon estimates gold production from the Takilma-Waldo area at $4,000,000, and any reasonable estimate of production from Josephine Creek and Althouse Creek would raise this figure to over $5,000,000.

Placer

Placer deposits are found on most of the streams. East of the Kerby fault zone these deposits fill the valley bottoms and make the beds of the present streams; west of this zone the streams flow on bedrock except near their sources, and the placers are found on the terraces along them. In the eastern area the gravel deposits that have been mined range in thickness from a few feet to more than 60 feet; the average thickness of gravel in the larger stream is more than 20 feet. In the deeper deposits there are layers of clay, and the gravel consists largely of fairly well-rounded cobbles and pebbles. Some of the deeper placer gravel on the larger streams is still unworked, and may justify drag-line or dredge operations. Shenon (14) has described the placers of this type in the Takilma-Waldo area. The shallow deposits are a jumble of subangular to angular rock fragments.

Most of the shallow placers on the small streams were worked out in the early days. The early miners worked the beds of these streams assuming that the gold would be mainly concentrated in the channels. It now appears that they erred in so assuming, and that the small streams effected little concentration of the gold from the side-hill wash. Paying quantities of gold are recovered in small scale "sniping" operations which are still carried on from the poorly assorted material on the banks of the streams.

In the western area two terrace levels are developed along the larger streams. The rock platform of the lower one is from 10 to 30 feet and the higher one from 80 to 150 feet above the streams. The gravel deposits are from 4 to 30 feet thick. In general they are quite coarse, and boulders up to several feet in diameter are present. On Josephine Creek these deposits are firmly cemented, and only the upper weathered part can be mined by placer methods. The higher terrace gravels probably are the equivalent of the Llano de Oro gravel in the Illinois Valley. The gravel of the Second Cycle of Erosion (Tertiary gravel) has been mined, and in the Takilma-Waldo district has yielded considerable gold and platinum. According to the old miners, the gold recovered from streams that cut gravels of the Second Cycle of Erosion ("Tertiary gravels", called the "Old Channel"

by them) has a higher fineness. The old Channel gold runs 967 fine and other placer gold runs 800 to 900 fine.

Lode

Though the larger part of the gold produced in the Kerby quadrangle has been recovered from placer mines, there has been a large production from pockets and lodes.

Very little pocket hunting has been carried on during the past few years, and the writers have had very few opportunities to examine newly opened pockets. The term "pocket" is used in this region to describe any occurrence of free gold in a restricted space. Some of these pockets have no visible roots, but others are obviously associated with veins or veinlets. It follows from the manner of searching for pockets that all those found lie close to the surface. Both Hershey and Ferguson have mentioned that the pockets in the Klamath Mountains in California are formed by supergene processes and therefore must be near the surface. These writers believe that most, if not all, of the gold was brought to the pocket by downward moving groundwater and that the pockets are all on contacts of black carbonaceous slate with more competent rocks. Owing to the nature of pockets and pockethunters, record of all but the largest pockets does not exist, traces of the holes are soon obliterated, and memory of them is gone with the passage of the pockethunter. Hence the following generalizations about pockets are based on fragmentary information. The most productive areas have been the upper part of the basin of Althouse Creek, the basin of Canyon Creek, the west slope of County Line Ridge from Babyfoot Lake to Golden Dream mine, and the ridge between the Illinois River and Josephine Creek, northeast of Fiddler Mountain. These areas are underlain by pre-Dothan rocks, carbonaceous Galice slates are absent, thinly layered tuffaceous and cherty sediments and thin platy siliceous flows are commonly present, and large masses of diorite or more siliceous intrusives are not present. It follows that in the Kerby quadrangle localization of pockets is not effected by carbonaceous slate or by major igneous contacts. Probably contacts between small masses of more competent and less competent rocks are a factor, and the number of pockets that have been found on the ridge tops or high up the slopes indicates that supergene processes have played a part. In conclusion, it may be said that pockets are irregular and discontinuous rich pods of quartz which may have been somewhat enriched by supergene processes. They are similar to the small bodies of rich gold ore, called "hot spots" by the miners, that are found in some of the more continuous quartz veins.

No well defined gold quartz veins such as those developed at the Ashland or Benton mines have been opened up in the Kerby quadrangle. The smaller rudely tabular deposits are of two types: those composed of quartz, free gold and a few percent of sulfide minerals, and those in which the sulfides constitute a large part of the deposit, and contain gold and silver values in the sulfide minerals. The Robert E. mine, described by Shenon (13), is an example of the first; and the Old Glory mine of the second.

Another type of gold deposit is the gossan of large low-grade sulfide deposits from which the sulfide minerals have been removed by prolonged oxidation and leaching. The Turner mine, which has been described briefly by Shenon (14), is an example.

Manganese

The only manganese ore that has been mined in the Kerby quadrangle came from a lens of manganiferous chert in the Dothan formation (Black Beauty prospect, no. 186). The chert lenses in both the Applegate group and the Galice formation are also manganiferous in places. The manganese may be present in the chert as manganese carbonate, rhodochrosite, or as the manganese silicates. The rhodochrosite deposits, where sufficiently rich, form ore, but at present manganese cannot be won economically from manganese silicates. Where the silica has been leached out by downward percolating surface water leaving concentrations of manganese oxide, the residual material may be ore. Therefore chert layers near the ridge tops are more likely to contain exploitable deposits.

Nickel

Nickel in small amounts is present in many peridotite bodies. It occurs in the olivine, the nickel content of which may be as much as one-third of a percent, but is usually much less. Under proper conditions of weathering, the magnesium, most of the silica, and much of the iron is removed from olivine, but the nickel may be fixed by the iron hydroxide that precipitates out of the solution in the groundwater; or it may be fixed as a nickel silicate, garnierite, which is characteristically green. In this way an ore deposit may be formed on and below an erosion surface. A good example described by Pecora and Hobbs (12) is found at Riddle, Oregon. Garnierite has been found in the peridotite along the edge of the Illinois Valley, but no noteworthy deposits of nickel have been found.

Platinum and allied metals

Although the presence of platinum in the placers of Kerby quadrangle was known in the early days of mining, its value was not appreciated and so it was not recovered. Since the turn of the century its value has been generally known, and it is sought with care by placer miners. The platinum of the miner is an alloy of two or more of the six metals--platinum, iridium, osmium, ruthenium, rhodium and palladium. The value of these metals varies: for the last several years palladium has had the least value--about half that of platinum; ruthenium and platinum have had about the same value; and iridium, osmium and rhodium each have had about twice the value of platinum. Precise analytical data for these metals in the "platinum" from southwestern Oregon are scanty, but apparently it runs about 30 percent platinum, 32 percent iridium, 25 percent osmium, 13 percent ruthenium, and little or no rhodium or palladium. The placer deposits near Waldo, along Josephine Creek, and on the Illinois River just below the mouth of Dear Creek, are reported to carry platinum. Little information on the ratio of gold to platinum metals recovered from these placers is available. According to J. T. Logan the ratio of "platinum" to gold in mines near Waldo is 1 to 75.

~~Dee Hanson~~ :) Walt Farmer

500 ft channel

5'± overburden

bottom 6' of gravel is pay

~~tested~~ 3,000,000 yds had 400,000 to go

worked one year Feb 1940 to March 1941

removed pays 500,000 yds w/ 2½ yd ~~4.5~~ yd dragline

190 C 04705 8

7/20/82 - Call from Walt

Mike Wells is available

40 acres apart when they working and when W.F. gravels

gold is larger in size than expected

boulders are larger up to four ft.

EDWARD MINING COMPANY

see Ida Consolidated

EMERSON PLACER

see Flanagan Mine

EMPIRE MINE (quicksilver) GRANTS PASS DISTRICT

Owner: Lester R., Lela, Uleda, and Loris Briggs, Route 2, Box 520, Grants Pass, Oregon.

Location: center sec. 3, T. 36 S., R. 7 W., elev. 1500 feet.

Area: Four claims, 80 acres, held by location.

Development: One adit of 65 feet; one of 45 feet; one shaft of 35 feet; all caved at present. Three men are working, reopening the lower adit. Some of the ore is stock-piled at the portal.

Equipment: Two ore bins, one 8 by 10 feet; the other 12 by 16 feet. Four hundred feet of 20 and 40 pound rail. One-half ton ore car. Small tools.

Geology: Country is "porphyry schist", the vein is "porphyry". The cinnabar is disseminated through the rock. Width of the ore body is eight feet, and has been traced on the surface for 1500 feet, and in underground workings for 400 feet. The ore is classed as 1 percent cinnabar ore.

Informant: Lester Briggs, 4/16/40

Report by: RCT.

FLANAGAN & EMERSON MINE (placer)

see Flanagan Mine

EMPIRE MINE (quicksilver)

CONFIDENTIAL

Briggs states that the ore has been traced underground for 400 feet, yet it will be noted that his underground workings of 65' + ~~54~~ 45' + 35' total 145'. So I would be inclined to question his opinion of the size of the ore body.

The tunnels were caved at time of visit, but are being reopened. Could not get underground. I stated that we would be glad to come out and look over the property when it was opened and Briggs indicated that he was not interested; in fact, he would prefer if we did not; that everytime anyone looked at anything of his, his taxes went up. Besides, he was developing the mine for his own use and did not care for the information to be broadcast. He will not lease, but will sell "if I can get my price". Bob Betts looked at it and stated that if he would drive an adit about 150 feet lower in elevation that Blackbutte would give him $30,000 for the property. Just like that!!! Some of the "ore" was seen; small specks of cinnabar could be detected, but I could form no opinion as to the quality of the ore, and certainly none as to quantity.

Briggs has quite a local reputation. He is in the business of jumping claims and what not, according to local residents, and seems to be in considerable disrepute. I'm not vouching for these stories, - ~~XXXX~~ they are given as "straws in the wind".

I got stuck leaving the property, - had to back down a road that rises some 1000 feet in half a mile, and I got off to one side. At one time, I thot I might spend the rest of my life on the mountainside, and a short life at that, as the car began creeping over the edge of the road in slippery mud and there seemed to be little I could do about it.

Ray C. Treasher.
4/16/40

The early history of Southern Oregon is very closely associated with mining; gold was the beacon that signaled to the first settlers of Josephine and Jackson Counties. In 1851 or 52 the miners first came to Jackson County in the vicinity of what is now known as Jacksonville. In 1852 gold was discovered on Josephine creek in Josephine County and in 1853 there was a great rush to Althouse creek. The latter was made famous by sailors who deserted their wrecked schooner at ~~Crescent City~~ to seek their fortunes in the placers of this area. Within a very few years prospectors had scattered all over Southern Oregon and new mines were opening up in many localities. The influx of men who believed in mining must have been ~~terrific~~ great for we find the Gold Hill district, the Upper and Lower Applegate and Galice Districts producing in 1853 and 1854. The Grants Pass district did not become important until the placers were largely exhausted and an 8-stamp mill was built at the Hewett Mine in 1863. The Ashland district was organized in 1858 and placer operations had started on Grave and Wolf Creek by 1860.

By 1870 placer mining had become unprofitable for the small miner using hand methods. Chinamen and organizations that were able to expend considerable money on ditches and flumes then carried on the work. From 1870 until 1890 new placers in outlying districts and the "old" placers which had passed to the "big" operators were the principal producers. By 1890 quartz or lode mines had become more successful and the area settled down to a more or less steady production. The records that exist show that Josephine County had its peak production in the first part of this century, the greatest year being 1905 when $400,000 was reported. From then on there was a steady decline until after the First World War. The advent of better quartz mining methods and the mechanization of placer mining by the continous bucket dredge revived mining and we find

another peak year in 1940 when this countys metal production was valued at $391, 378. The mines suffered another setback, however, with the coming of World War II. At first this was due to priorities and higher production costs and then in October 1942 WPB order L-208 stopped all non-essential mining of any size. This order was not revoked until July 1, 1945. As a result of this order Josephine County's gold production was probably lower than at any time sice it was discovered in 1852. In 1944 production was given as $7,000. The figures for 1943 and 1945 are not available as yet but it is believed that they are about the same as for 1844's. The outlook for 1946 and the years to come, however, are much brighter as interest is again running high and materials are becoming more available. So far this year there are two fairly large mechanized placer operations being readied and at least two moderately sized hydraulic operations. Lode or quartz mining is very slow to respond, however, mainly due to higher production costs and lack of equipment.

The progress of this community is somewhat reflected in the improvement in mining methods. The first placer miners recovered the gold by hand methods, that is by pan and "rocker". By panning it is estimated that approximately 2 cu. yds. of gravel can be moved a day. By "rocker" and "long Tom" a maximum of 10 yards can be moved. As early as 1856 hydraulic methods were employed. This entails the building of ditches and flumes to obtain sufficient water which when applied under great pressure thru nozzles, called giants , banks and benches can be washed down. This type of mining, with improvements, exists today. 1898 is the first record of dredging. This was near Tolo and the operation was not a success. In 1903 and 1905 dredges were installed on Foots Creek and near Kane Creek in Jackson county but they, too, met with indifferent success. Since 1929 dredges and mechanized washing plants fed by power shovels have been the

most important contributors to our gold production. These are equipped to handle up to 4,000 cubic yards of gravel a day--quite a contrast to the 2 to 10 yards formerly moved.

Quartz mining is also a far cry from the single-jack--arrastre methods. Its first improvement is recorded in the 8-stamp mill that was erected on the Jewett mine on Baldy Mountain /in/ in 1863. In 1902 the most modern mine was the Greenback which had a 40 stamp mill and a cyanide plant equipped to handle 100 tons a day. One of the recent mines, the Benton, had in 1940 mechanical muckers, compressed air drills and a ball mill.

Other metallic minerals besides gold and silver have been important in Josephine County but to a much lesser extent--gold and silver usually accounting for 98% of the metal values. Copper and copper ores have been produced in varying quantities between 1904 and 1930 and chromite (the main ore of chromium) was shipped during both World Wars.

Copper was first discovered in the Takilma area in 1860. Not much work was done on the properties, however, until 1903. In 1904 a smelter was erected and operated until 1910, processing ores from the Queen of Bronze. After that ore was shipped until May 1930. Total value of the copper ores smelted and shipped from this area amounts to approximately $1,700,000. An additional $108,000 of copper ore came from the Almeda mine in the Galice district in the five year period from 1911 to 1916. Both these figures include the gold values contained in the ores.

Chromite is found in many places throughout Josephine County but the bulk of it has come from the Illinois Valley area. From 1918 to 1925 12,000 long tons were shipped and in the period 1942-1947 approximately 38,000

long tons were shipped from the government stockpile at Grants Pass. The value of ~~all~~ this ore was around $2,000,000. Not all of the 1942-1947 ore came from Josephine County; some was brought in from the area just across the California line.

The total production of gold from Oregon in the years from 1852-1944 has amounted to approximately $126½ million. This places Oregon as the 9th greatest producer of this metal in the U. S. and Alaska. California is the greatest producer with a total production 19 times that of Oregons. Washington ranks 10th with a production about ½ that of Oregons. Of this states production Josephine County has probably produced between $15-$20 million with an additiona $1 million in silver and, as already mentioned, $2 millionmin copper and around 1 million in Chromite.

But this is not all the mining that has been done in Josephine county. We have many nonmetallic or industrial mineral that have added considerable to the wealth of ~~this~~ the area. The differences between a metal and a nonmetal are: a metal is usually malleable, ductile, has a metallic lustre, and good conductivity to heat and electricity; a nonmetal, if a solid, is usually brittle, and is not malleable or ductile, and has a poor conductivity to heat and electricity. Among the metals are gold, silver, copper, lead, zinc, quicksilver, platinum, etc.--the nonmetals are limestone, clay, silica, sulphur, asbestos, etc. Usually included among the nonmetals are materials such as sand and gravel, granite, and road aggregates.

The value of the nonmetallic production inJosephine County in 1940 was estimated as $84,143. In 1946 it was estimated as $165,000, or almost twice the 1940 figure. The bulk of this has come from the production of

Limestone, mainly at Pacific Portland Cement Co's. quarry at Marble Mt. From this quarry each year come severals tens of thousands of tons, and its payroll is one of the most consistant throughout the years. Other non-metallic producers in the county last year includes six aggregate companies and one brick plant.

This gives us a pretty good picture of the past and present mineral wealth of Josephine County. It has shown that the county has always been a leading one in the mineral production of the State and that the county owes it foundation and early development directly to mining. Since 1912 mining has played a much less prominent part but never-the-less it has always been a vital factor in the economy of the area.

And now the question comes up: What is the future of mining and how large a role will it play in the further development of Josephine County.

Turning first to the metal mines we find that the placers first showed signs of being unprofitable as early as 1870. It was unprofitable to the hand operator but the building of large and long ditches to bring water in made hydraulic mining practical. In later years ground that had been previously "worked out" was re-run by dredges and at a profit. In other words, ground that was considered submarginal in the early days became profitable, as time passed, with the advent of improved mining methods and the increase in the price of gold. There is still some dredging and hydraulicking ground left and placer mining will still continue to contribute its share of gold to the county's wealth in the immediate future. The ground that is suitable for dredging operations is limited, however, and it is my opinion that the bulk of it will be "worked out" again within the next 20 to 30 years, but how new improvements in mining will change that picture is hard to predict.

There is probably still a ~~good~~ fair future in quartz, or underground mining. The immediate future doesn't look good because of the present high cost of labor and materials and the difficulty of obtaining equipment, but when these factors become stablized interest will be revived. It is not likely that new mines will be found but that some of the old mines will be investigated for values at depth. Low grade bodies with considerable tonnage will probably ~~form the bulk of~~ be the future gold mines of southwestern Oregon. An indication of this trend before the war was the Benton Mine. It was first located in 1893 but the bulk of the work was done in the years preceeding its closure in 1942 by W.P.B. order L-208. It might be of interest to you to know that the Benton furnished Josephine County's largest payroll for many years. It is not at all unlikely to believe there are several other old mines in the community that could be profitably worked if investigated thoroughly. But the day of the rich bonanza's like the Gold Hill pocket which produced $400,000 in one year, and the Steamboat, Revenue and Town pockets each credited with $100,000 to $350,000 and at least a half dozen others with $50-100,000 is probably past. It is quite possible that one or two small pockets will be discovered but they probably won't be of the size the old pockets were.

Copper and chrome ores have to be shipped to smelters, the closest ones being at Tacoma, Washington and Selby, California. Because of the high freight rates and transportation costs the mining of these ores depend on an artificial market, such as one caused by war or by government subsidy. Consequently the future of these metals is not very bright and this is in view of the fact that some of the chromite from this area is as high grade as is found at any place in the world.

The real mining future of Josephine County probably lies in the nonmetallic minerals. They are the ones which are truly undeveloped. Limestone, which is used in the manufacture of cement and paper and in agriculture, is quite plentyful both in Josephine and Jackson Counties, although there is but one quarry in operation. A few years ago the Washington Brick and Lime Co. operated a kiln out by Williams. It is closed now but in the near future it will probably reppen. A new firm, The Grants Pass Lime Products Co., is opening a quarry behind Marble Mt. The limestone of this quarry is suitable for furnishing one of the raw materials for the carbide plant in Portland. If ever a steel mill is erected in the northwest it is quite possible that limestone from this area will be used for a flux.

Other nonmetallic minerals that will probably be important are clay, talc, and granite. This area can very well support a brick plant and a pottery industry. It is very possible that there are clays in this area suitable for the manufacture of these products, and I believe we ought to do all we can to encourage their coming. Talc, a mineral used in paints, paper, fire bricks, etc., is known to be quite plentyful but to date it has not been developed. Attempts at utilizing granite for building stone have been made several times but due to distance from market they have never been too successful. Someday it should achieve its rightful prominence.

The discovery and utilization of other minerals from this area is not very promising. But it is towards this end as well as the developing of the resources that are already known that the State Dept. of Geology and Minerals Industries and the U. S. Geological Survey are working. To say that a new mineral industry will not be created would be extremely

pessimistic for witness the development being done by Alcoa in the ferruginous bauxites of northwestern Oregon. This project was pioneered and outlined by your State Dept. of Geology and probably will ultimately result in the greatest contribution to Oregon's mineral wealth to date, besides adding a new large payroll and creation of a new industry. Investigations such as these are being carried on throughout the State and Josephine County will certainly come in for thorough investigation.

A recapitulation of the future of mining in Josephine County then, is this:

Placer mining will be an important contributor to gold production for many years. The ~~immediate~~ future looks bright.

Quartz-gold mining will undoubtedly be carried on with one to three operating mines, for some time. The immediate future does not look bright due to high operating costs. The day of the rich bonanzas is probably past and future mining will dpend on the exploitation of low grade deposits and reopening of old mines, ore being developed at depth.

Gold mining in general depends on lowering of operating costs and development. If at any time there is an increase in the price of gold some submarginal properties of today will be able to operate. Gold mining itself will never again be the vital factor it has been in the past.

Copper mines and especially chrome mines depend on artifical

markets. Although good grades of both these metals occur they are not yet found in large bodies. The distance from smelters which are necessary to treat these ores is a major factor in their development.

Nonmetallics will be the main contributor to mining in Josephine County in the future. Limestone production will probably be the first to increase. A brick and tile plant is feasible as well as a plant for making pottery; the latter mainly for tourist trade. Clays suitable for these products are undoubtedly within the county. Other nonmetallics expected to swell the mineral wealth are talc, building stone, silica, and asbestos.

Investigations of the present mineral resources and of potential mineral resources of Josephine County are not only warranted but necessary if the county is to progress and maintain a place in the inudstrialization of the West.

GEOLOGY

General Features

Igneous rocks predominate in the area mapped in the Mt. Reuben district. They are chiefly serpentine, hornblende gabbro, diorite, quartz diorite and related rocks, together with metavolcanic rocks which include meta-andesites, altered porphyritic amygdaloidal basic lava and andesitic tuff. Some schists were found associated with metavolcanic rocks which may have been derived in part from sedimentary rocks in the vicinity of China Gulch. Sedimentary rocks of the Dothan formation are found in the western portion of the area mapped. This formation consists of massive and thin-bedded sandstones and shales. The Galice formation, a sedimentary series believed to be of approximately the same age as the Dothan, lies a short distance to the east of the area mapped.

The attitude of the igneous rocks usually could not be determined; however, exposures along the Rogue River indicate that andesitie flows and tuff beds are nearly vertical. The formations in general have a northeasterly strike. Strikes in the Dothan formation range from north to N.30° E.; dips are steep to the east.

Sedimentary Rocks

Dothan Formation

The Dothan formation occurs in the western portion of the area in contact with a body of igneous rocks haveing a northeasterly trend. The gray to dark gray sandstone and argillite are changed to a hard dense black rock or hornfels. A bluff of bluish-white to gray, banded chert is exposed on the north side of the Eden Valley road in sec. 2, T.33S., R.8W. The conglomerate is composed of cemented small pebbles of chert.

Igneous Rocks

Greenstone

The term greenstone is here applied to a series of metavolcanic rock consisting of meta-andesite and associated schistose tuffs. These rocks have been called greenstone owing to the development of chlorite, actinolite, and fine-grained green hornblende.

These rocks occupy an area bounded generally on the east by Reuben Creek and on the west by a line extending from China Gulch on the Rogue River to the summit of Mt. Reuben. They are exposed in sections along the bluffs on the north side of Rogue River from the mouth of Grave Creek to China Gulch. Some true schists are present in the area and may possibly be older than the greenstone.

Serpentine

A body of serpentine is exposed on the slope extending from the Reno mine to the Rogue River between Whisky Creek and the Reno mine gulch. Other bodies of serpentine were noted along major shear zones where these zones crossed more basic intrusive rock but were not large enough to be mapped. Some amphibole asbestos was observed in several of these serpentinized areas.

Gabbro Complex

The area mapped as gabbro occupies an area from several hundred to several thousand feet in width extending from the mouth of Whisky Creek north to the west slope of Mt. Reuben. This belt is composed of a mass of partially altered gabbro and related rocks. These rocks are partially recrystallized hornblende gabbro. At the junction of California Gulch and Wisky Creek these rocks have a distinct banding, varying from a fine-grained, gray-green rock to a crystalline rock in which hornblende crystals are well developed. The banding has a northeasterly strike parallel to the predominant shearing in

area. Several small areas of hornblendite were observed in the upper Drain Creek basin.

Petrographic examination of the gabbro shows that most specimens are made up largely of roughly equal amounts of hornblende and labradorite feldspar with a composition ranging from Ab_4An_6 to Ab_3An_7. In some the hornblende is much more abundant than the plagioclase and in one spedimen magnetite constitutes more than 5 percent of the rock. Either chlorite or epidote is present in the specimens of gabbro collected. One specimen of altered pyroxenite showed the augite partially converted to uralite, a variety of hornblende. However, uralitization does not appear to have effected most of the alteration shown by the gabbro; recrystallization is largely responsible.

The original texture of the gabbro was hyidiomorphic granular but recrystallization has preceeded far enough so that the term granoblastic may be better applied.

Quartz Diorite and Related Rocks

Quartz diorite occupies only a relatively small portion of the area mapped. This rock occurs as small stocks elongated along their northeasterly trending axes close to the contact between the Dothan formation and the greenstone or gabbro complex. The Benton stock which is 2500 feet wide and 1 ¾ miles long is the largest exposed in the area. A smaller body crosses the Eden Valley road just west of the Windy Gap mine and extends about 2000 feet to the south.

Petrographic examination of thin sections of the diorite shows that andesine feldspar, ranging in composition from Ab_7An_3 to Ab_6An_4 or even slightly more basic, makes up about 50 percent or more of the rocks. Quartz is present in most specimens in amounts from 5 to 35 percent, Either green hornblende or pyroxene is present and in several specimens may constitute as much as 35 percent. Magnetite may be

present as an accessory mineral. The characteristic texture of the diorite is hypidiomorphic granular. Most thin sections show at least slight alteration, probably largely hydrothermal. Sericitization, chloritization, and/or epidotization effects/ were noted. Chlorite has been formed from the pyriboles, and epidote were associated chlorite has resulted from alteration of plagioclase.

Age Relationships

The age and relationships of any of the rocks in the Mt. Reuben district are not entirely clear. Diller, in his regional studies of southwestern Oregon, determined from fossils in the Galice formation, and from similar, though not as distinctive, fossils in the Dothan formation, that both belong to the Jurassic system. Diller also believed that the greenstone rock lying between these two formations are of the same age. A body of schist in China Gulch which was mapped as greenstone may possibly be older than the meta-andesites and schistose andesitic tuffs and may have been derived from sediments. Petrographic studies of three specimens of schists showed them to be quartz-actinolite schist, andesine-hornblende schist and oligoclase-andesine quartz biotite schist.

Contact relationships indicate that the greenstone and Dothan formations were intruded first by serpentine, then by gabbro and related rocks, and finally by quartz diorite. As the dioritic intrusives of southwestern Oregon are generally considered to be largely of late Jurassic or early Cretaceous age, all the intrusive rocks of the Mt. Reuben district are assigned to late Jurassic or early Cretaceous. Petrographic examinations of the gabbro and quartz diorite show that the gabbro is more deformed than the quartz diorite. Besides recrystallization of part of the horn-blende, there is straining and even slight displacement of some plagioclase grains as well as

partial recrystallization. This criterion suggests that the gabbro is older and has been subjected to more stress than the quartz diorite.

The quartz diorite intrusives in the Mt. Reuben area, which probably are genetically related to the region's ore deposits, are believed to be related to other intrusive diorite masses in southwestern Oregon. These masses vary somewhat in composition and have been variously termed diorite, tonalite, quartz diorite, and commonly, by prospectors, granite.

In the Mt. Reuben district the most important ore deposit lies within the quartz diorite stock at the Benton mine. Numerous gold- and copper-bearing veins also exist in the adjacent gabbros and greenstones.

Mineralogy

Hypogene Minerals

The minerals in the veins of the district are similar, varying only in quantity. Those seen were pyrite, chalcopyrite, pyrrhotite, galena, free gold, molybdenite, quartz, barite, chlorite, sericite and calcite. The principal minerals are quartz and pyrite with gold associated with the pyrite. Veins in the quartz diorite contain very small amounts of chalcopyrite and pyrrhotite. Minor amounts of molybdenite were noted in several veins. Chlorite, sericite, calcite and minor amounts of barite are the common gangue minerals. Chalcopyrite is much more common in the veins in gabbro and greenstone, and pyrrhotite also occurs in larger amounts. Gold is almost completely absent in veins occuring in gabbro, and where it does occur it is found as small high-grade pockets. In greenstones gold is found associated with pyrite and chalcopyrite, and as free gold in quartz. Galena was seen only in one specimen which was taken from the Whiteneck prospect on lower Whisky Creek.

Spectrographic analyses were made on ores from 31 of the prospects examined. Results are given in the table below. The samples are listed in descending order of gold values contained in each sample. It was thought that gold values might have some relationship to one or several other metals occurring in the ore, but no such arrangement could be found in this group of samples. Several relationships to host rocks were noted. Lead was absent in all samples from ore occurring in quartz in greenstones and gabbro. Copper was present in only three samples in quartz diorites which came from veins near the contacts with greenstones, but in samples from veins in gabbro and greenstones, copper was more common. Nickel was found distributed

through all the samples with a definite tendency to be of higher content in the gabbros. Molybdenum, tin, and cobalt occurred in several samples but had no particular relation to host rocks or other base metals.

The more common metals are to be found in most of the veins but the quantities differ somewhat, apparently owing to the effect of the host rock on the mineralizing solutions. In addition, temperature and pressure relationships were probably a factor in the distribution of the metallic minerals. The distribution of gold appears to be largely controlled by the host rock and to a lesser degree by temperature pressure relationships and the mineralizing solutions are therefore thought to have had a common source.

Supergene Minerals

Oxidation in most veins has reached a relatively shallow depth, usually from 10 feet to 75 feet. Pyrite has been oxidized to malachite staining the ore green. At the Mt. Reuben mine the outcrop is a brilliant red iron gossan. A shaft sunk on the vein exposed some bornite and chalcocite. This was the only occurrence of secondary copper sulphide minerals noted.

Paragenesis of the Ore Minerals

The sequence of mineralization in the veins of the area follows the same general pattern. Quartz mineralization was followed by brecciation which in turn was followed by a second period of quartz mineralization with pyrite, sericite, chlorite, and gold, probably introduced simultaneously. Calcite was introduced later, forming veinlets which cut all other minerals.

Structures

At the close of the Jurassic period, Jurassic greenstones and sediments in the Mt. Reuben district were uplifted and tightly folded. The Dothan formation dips generally steeply to the east and the greenstone appears to have a similar attitude. During uplift, major regional faults were developed, and into these were injected serpentine, gabbro, quartz diorite and related rocks. These zones of weakness appear to be at or near the northeasterly trending contact between the greenstone and the Dothan formation. Major regional northeasterly trending thrust faults were developed, marked by major shear zones in the greenstone. These shear zones and accompanying faults formed zones of weakness and openings along which ore-bearing solutions migrated and in places formed ore bodies.

During the cooling stages of the intruded magmas of quartz diorite and related rocks, shrinkage and slumping in these masses and the release of regional stresses caused tension faults along which, in the later stages of cooling, ore-bearing solutions ascended and deposited commercial ore bodies in favorable zones, such as were well developed in the Benton quartz diorite stock.

Economic Considerations and Guides to Prospecting

Sampling and studies of individual prospects indicate that the area should be divided into four parts according to the gold values and types of vein structures found. These four parts coincide with the areas occupied by the principal rock formations - namely, the Dothan sediments the greenstones, gabbro complex, and the quartz diorite intrusives.

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Preliminary Geological Feasibility Study of Josephine County Reservoirs.

Explanation: Five sites for possible fish propogation reservoirs were visited briefly on July 18, with Cole Rivers. The following geologic information was obtained.

Dutcher Creek Site

Location: Sec. 11, T. 36 S., R. 6 W.

Geology: The surface of the bedrock is decomposed "granite" (quartz diorite). It is capped by alluvium consisting largely of stream deposited decomposed granite sand and silt with occasional layers of well rounded pebbles.

The alluvium has apparently been deposited by the meandering Rogue River and Dutcher Creek.

At no place in the proposed area of the reservoir or dam site was the bedrock seen. It is difficult to distinguish between the decomposed granite (in place) and the transported granite sand in the alluvium. The alluvium is distinguishable only by the presence of a clayey silt and the rounded pebbles. Bedding is poorly defined.

The depth to undecomposed granite could easily be determined by power auger or churn drill.

Vannoy Creek Site

Location: Sec. 9, T. 36 S., R. 6 W.

Geology: Description of the Dutcher Creek site applies with no

(Vannoy Creek Site concluded)

exceptions to this site. They are about 2 miles apart.

Choice between the two sites will depend on factors other than those presented here.

Madams Creek Site

Location: Sec. 23, T. 36 S., R. 7 W.

Geology: The entire area of the reservoir site is overlain by alluvium consisting of red clay and gravel with less abundant sand. Pebbles are mostly about one inch in diameter, but range from pea size to 8 inches in diameter. Valley fill near the stream appears to have a greater portion of reddish-brown clay material.

The round knoll on the west edge of the dam site is also made up of gravel and clay.

No exposures of bedrock were seen in the area of the reservoir. The underlying rock formation is known as the Galice formation. It is composed largely of slate and sandstone. The predominant structures trend north to northeast with a steep dip east or southeast.

The clay mixture in the gravel may make it sufficiently impermeable to be used in an earth filled dam, if properly protected from erosion.

Reeves Creek Site

Location: Sec. 34, T. 38 S., R. 8 W.

Geology: The Reeves Creek site is underlain by rocks of the Galice formation. Thin-bedded sandstone and slaty shale strike from N. 20° E. to N. 43° E. and dip 75° SE. There is little or no overburden at the

(Reeves Creek Site concluded)

dam site. The strike and dip of the formation is favorably oriented for placement of a dam providing no large fracture zones are found cutting across the structure.

A small amount of alluvium is found up the valley from the dam site which may possibly be used for fill material. Although none was seen at this time thin deposits of residual clay are known in the area.

Leuizenger Creek Site

Location: Sec. 31, T. 40 S., R. 8 W.

Geology: The broad valley appears to be filled to a considerable depth with poorly sorted clay and sand with mixed small angular rock fragments and lenses of gravel. The valley fill material appears to be sufficiently impervious for use as foundation and fill, but should, of course, be tested. The hillsides are underlain by fractured, quartz-veined, medium to fine-grained sandstone and shale of the Galice formation with a thin cover of rock fragments and brown clayey soil.

Report by: Len Ramp - 9/5/58.

References: Geology of Kerby quadrangle by F. G. Wells, and others 1949, Oregon Dept. Geol. & Min. Ind. Bull. #40; Geology of Grants Pass quadrangle, by F. G. Wells, and others, 1940.

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Josephine County

Galice Dist.

P = Pyrite
Pr = Pyrrhotite
Cu = $CuFeS_2$
Ca = Calcite
S = sphalerite
ch = chalcocite
M = magnetite

Number	Name & Location	Field Relations	Mineralization: Ore	Mineralization: gangue	Strike & Dip of vein	Strike & Dip of wall rock
1 ✓	Almeda ☆ SE¼, sec 13, T34S R8W	Contact between Galice seds. & Galice volcanics.	Au, Ag, Cu	Qtz, Ba, P, G, S ch	N30E	N 30E
2. ✓	Alta Vista NE¼, sec13, T 35S, R9W	Qtz veins in metagabbro (meta volcanics?)	Au	qtz	N28W, ⊥90	
3. ✓	Argo ☆ sec14, T34S, R8W	schistose tuffaceous (meta vols). No distinct vein.	Au	qtz	N 35 E, 90 ⊥-76NW	
4. ✓	Benton ☆ sec 22-23-27, T33S, R8W	Gabbro & diorite. (contact (?), considerable faulting.	Au	qtz, P, ch, S, M	Main adit N70W, 85S	
5. ✓	Black Bear ☆ sec 26, T34S, R8W	Fault zone in meta vols. Dunite to SW.	Au	qtz, P	N15E, 80E N45W, 70SW	N12E
6. ✓	Bradbury sec 12, T34S, R8W	Qtz veining in schistose volcanics	Au	qtz, P	N17E	
7 ✓	Buffalo sec 28, T34S, R8W	300' wide qtzite (??) with serp to W & vols. to E	Au, Cu.	qtz, P	N23E, 68NW	
8. ✓	California Mine ☆ secs 25-26, T33S, R8W sec. 30, T33S, R7W	Shear zones in volcanics	Au	qtz	N10E	
9. ✓	Gold Bug ☆ sec 26, T33S, R8W	Qtz vein in metaandesite	Au	qtz, P, Cu	N-S, 45°E, N35W, 70SW	
10. ✓	Golden Wedge ☆ Secs 14&23, T34S, R8W	① Qtz veins in metavolcanics. Dacite intrusives ② Fault zone in serp	Au	qtz, P.	N20E, 50°E N10W, 88E	
11. ✓	Lucky Shot sec 12, T34S, R8W.	Porphyritic dacite intrusive into vols.	Au	qtz.	N15W, 75E N35W, 35N	
12. ✓	Molly Hill sec. 26, T33S, R8W	Diorite country rock	Au	qtz	N-S, 80W	
13. ✓	Oriole ☆ sec. 26, T34S, R8W	"Fault on contact between greenstone & rhyodacite porphyry."	Au	qtz, P, Cu.	N5°E, 75E	

Galice Dist.

#	Name & Location	Field Relations	Mineralization: Ore	Mineralization: Gangue	Strike & Dip of vein	Strike & Dip of wall rock
14 ✓	Pyx sec 26, T33S, R8W	Contact between "greenstone & porphyry"	Au	Qtz, P, Cu	N30W, 30SW	
15 ✓	Reno sec 27, 28, 33, 34, T33S, R8W.	Qtz veining in volcanics cut by qtz. monzonite aplite.	Au		E-W, 40N N20E, 70NW	
16 ✓	Robertson or Bunker Hill ★ sec. 2, T35S, R9W	Qtz veins in fractures in volcanics near qtz. diorite intrusive.	Au, petzite	P, qtz	N W, SW N-S, E hi	
17 ✓	Silver Ck. Mines sec 29, T35S, R9W	Fault zone in metagabbro	Au, Cu	qtz, P	N55E, 60N N25E, S 70	
18 ✓	Tibbets Springs sec1, T33S, R8W	Qtz. vein in a shear zone in porphyry.	Au	P, qtz, cu	N25W, 70E	
19.		**Grants Pass Dist.**				
19. ✓	Buckeye sec 25, T36S, R8W	In metavolcanics near contact with serp & diorite	Cu.	P, Pr, Cu oxides		N10E, 45SE
20. ✓	Granite Hill ★ sec. 26, T35S, R5W & 27	Qtz vein in granodiorite bordered by volcanics on west & serp on East.	Au	Qtz, Cu, G, P	E-W, 70S	
21. ✓	Lambtongue (Baby) ★ SE¼SE¼, sec 8, T35S, R5W	Qtz filling in fault in metagabbro. Complicated by cross faulting	Au	Qtz.	N40W, 80NE	
22 ✓	Lucky Queen w½, SE¼, sec. 31, T34S, R5W	Qtz veins in argillaceous quartzite	Au	Qtz	N40E, 50SE	N40E, 50SE
23 ✓	Oak ★ SW¼, sec 4, T35S, R5W	Silicified shear zones in metaandesite	Au, Cu, Zn	P, pr, S, gg	N25E to N30W, 70W	

Greenback Dist.

#	Name & Location	Field Relations	Mineralization: Ore	Mineralization: Gangue	Strike & Dip of vein	Strike & Dip of wall rock
24 ✓	Cougar NE¼, sec. 22, T33S, R5W	Fracture in volcanics, serp contact to east	Au	Qtz	IX 35E, 70 N	
25 ✓	Dorthea ☆ NW¼, sec. 22, T33S, R5W	Qtz. vein along contact between diorite & serpentine	Au.	Qtz	E-W, N	
26. ✓	Greenback ☆ Secs. 32 & 33, T33S, R5W sec 4, T34S, R5W	Qtz veins in volcanics near contacts with serp. & argillite	Au	Qtz, Ca, P	E-W, 45°N	
27 ✓	Horseshoe Lode NW¼, sec. 28, T33S, R5W	Fissure vein in volcanics near contact with serp.	Au.	P, Cu, qtz, rhodochrosite	E-W, N NW-SE, W	
28 ✓	Livingston Sec. 22, T33S, R5W	Qtz vein along contact between serp. & volcanics	Au	Qtz, Ca, P, Cu	IX10 E, 50E	
29 ✓	Macabee SE¼, sec 20, T33S, R5W	In a faultzone on a contact between slate (seds) & volcanics	Au	Qtz, P, Cu.	IX25E, 15SE	
30 ✓	Martha SW¼, sec 28, T33S, R5W	Qtz veins in a shear zone in volcanics	Au	Qtz	N70 W, 60°?	
31 ✓	Shot NW¼, sec. 33, T33S, R5W	Qtz veins in greenstone & qtz. diorite	Au	qtz, G, P	E-W, 70°N N-S, 40°W	
32 ✓	Silent Friend ☆ sec 15, T33S, R5W	stringers in greenstone. Some gossan	Au	qtz, Ca, P, A, Cu	NE to E, —	

Illinois River Dist.

33 ✓	Alta Sec 2, T34S, R9W	Qtz veins in Dacite porphyry dike in serpentine.	Au	qtz, P, Cu Pr	IX 40E, 90°	
34 ✓	Becca & Morning Group sec 7, T38S, R9W	Along a serpentine greenstone contact. Gosson	Au	P, Cu	IX 50E	
35 ✓	Calument Secs 5 & 8, T38S, R9W	Qtz veins along a serp. tuffaceous gs contact	Au	P, Pr, Cu, G	N 40W to IX 70E	

#	Name & Location	Field Relations	Mineralization: Ore	Mineralization: Gangue	Strike & Dip of vein	Strike & Dip of wall rock
36 ✓	Eureka ☆ Sec 22, T37S, R9W	Veins of quartz along greenstone-serpentine contact	Au	Qtz	N50W, 75NE	
37 ✓	Gold Ridge Sec 12, T38S, R9W	Qtz veins along contact between serp, volcanics, & chert	Au	qtz, P	N20E, 50SE	

Curry County

Agness Dist

38. ✓	Pine Flat 1X1/2, sec26, T35S, R12W	shear zone in serp. near contact with dacite-porphyry.	Cu	Cu	N80E, 32SE	

Chetco Dist

39 ✓	Peck ☆ Sec23, T38S, R10W	Qtz veins along a serp., greenstone, diorite contact	Au	Qtz, Cu, Py	N60E, SE	

Mule Creek Dist

40 ✓	Mammoth Group Secs 3&4, T33S, R10W	Vein in fractured greenstone	Au	Qtz, P, Cu	1X20E, 85W	

Riddle District

#	Name & Location	Field Relations	Mineralization Ore	Gangue	Strike & Dip of vein	Strike & Dip of wall rock
41	Golden Gate Mine ?	In chlorite schist	Au, Cu	P		N30-60E, 50-70 SE
42	Silver Peak ★ Secs 23, 26, T31S, R6W	Massive tabular bodies in schist	Au, Cu, Zn G	P, Q, Ba	NE-SW	

Tiller - Drew

43	Chieftan ★ sec. 20, T29S, R3W	Quartz vein in metagabbro. Dacite intrusives near.	Au, Cu, Zn	P, Q,	S 80°W, 70°N	
44	Continental ★ NW¼, Sec 29, T29S, R3W	same	Au	P, Q	E-W, 70N	
45	Rowley Group Sec 4, T32S, R2W	sulphide lens in schist	Cu	P	?	?
46	South Umpqua Mining Co. Sec 34, T31S, R2W ★	Sulphides disseminated in greenstone which is intruded by porphyry.	Cu, tr	P, Mag, Q	same	N-S, E

Umpqua

None

Jackson County

Gold Hill District

47	Gold Note Sec 30, T33S, R3W 25, T33S, R4W	Contact between Galice, metavolcanics, diorite, & chico. In shear zones in slate	Au, Cu	P, Pr, Q	E-W, 35°S	N60E, 40°S
48	Mammoth Lode/	Qtz veins & disseminated	Cu	sulphides		N30E, 50 SE

JOSEPHINE COUNTY

Galice District

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
1	Almeda*, SE¼ sec. 13, T. 34 S., R. 8 W.	Contact between Galice sediments and Galice volcanics.	Au,Ag,Cu	Qtz.,Ba,FeS_2, PbS,ZnS, $CuFeS_2$	N 30 E	N 30 E
2	Alta Vista NE¼ sec. 13, T. 35 S., R. 9 W.	Quartz veins in metagabbro (metavolcanics?)	Au	Qtz.	N 28 W, ⊥(90°)	
3	Argo* Sec. 14, T. 34 S., R. 8 W.	Schistose tuffaceous (metavolcanics). No distinct vein.	Au	Qtz.	N 35 E, ⊥(90°), 76NW	
4	Benton* Sec. 22-23-27, T. 33 S., R. 8 W.	Gabbro and diorite. Contact(?), considerable faulting.	Au	Qtz.,FeS,ZnS, $CuFeS_2$,Fe_3O_4	Main adit N 7 W, 85 S	
5	Black Bear* Sec. 26, T. 34 S., R. 8 W.	Fault zone in metavolcanics. Dunite to SW.	Au	Qtz.,FeS_2	N 15 E, 80 E N 45 W, 70 SW	N 12 E
6	Bradbury Sec. 12, T. 34 S., R. 8 W.	Quartz vein in schistose volcanics.	Au	Qtz.,FeS_2	N 17 E	
7	Buffalo Sec. 28, T. 34 S., R. 8 W.	300' wide quartzite(??) with serpentine to W and volcanics to E.	Au,Cu	Qtz.,FeS_2	N 23 E, 68 NW	
8	California Mine* Secs. 25-26, T. 33 S., R. 8 W.	Shear zones in volcanics.	Au	Qtz.	N 10 E	
9	Gold Bug* Sec. 26, T. 33 S., R. 8 W.	Quartz vein in meta-andesite	Au	Qtz.,$CuFeS_2$, FeS_2	N-S, 45 E, N 35 W, 70 SW	

Galice District (cont.)

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
10	Golden Wedge* Secs. 14 & 23, T. 34 S., R. 8 W.	1. Qtz veins in metavolcanics. Dacite intrusives. 2. Fault zone in serpentine.	Au	Qtz., FeS_2	N 20 E, 50 E N 10 W, 88 E	
11	Lucky Shot Sec. 12, T. 34 S., R. 8 W.	Porphyritic dacite intrusive into volcanics.	Au	Qtz.	N 15 W, 75 E N 35 W, 35 N	
12	Molly Hill Sec. 26, T. 33 S., R. 8 W.	Diorite country rock.	Au	Qtz.	N-S, 80 W	
13	Oriole Sec. 26, T. 34 S., R. 8 W.	Fault on contact between "greenstone and rhyodacite porphyry."	Au	Qtz., $CuFeS_2$, FeS_2	N 5 E, 75 E	
14	Pyx Sec. 26, T. 33 S., R. 8 W.	Contact between "greenstone and porphyry."	Au	Qtz., $CuFeS_2$, FeS_2	N 30 W, 30 SW	
15	Reno Sec. 27, 28, 33, 34, T. 33 S., R. 8 W.	Quartz vein in volcanics cut by quartz. Monzonite aplite.	Au		E-W, 60 N N 20 E, 70 NW	
16	Robertson or Bunker Hill* Sec. 2, T. 35 S., R.9 W.	Quartz veins in fractures in volcanics near quartz diorite intrusive.	Au, petzite	Qtz., FeS_2	NW, SW N-S, E h:	
17	Silver Creek Mines Sec.24, T.35S., R.9W.	Fault zone in metagabbro	Au,Cu	Qtz., FeS_2	N 55 E, 60 N N 25 E, S 70	
18	Tibbets Springs Sec. 1, T. 33 S., R. 8 W.	Quartz vein in a shear zone in porphyry.	Au	Qtz., $CuFeS_2$, FeS_2	N 25 W, 70 E	

Grants Pass District

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
19	Buckeye Sec. 25, T. 36 S., R. 8 W.	In metavolcanics near contact with serpentine and diorite.	Cu	FeS_2, FeS, $CuFeS_2$ oxides		N 10 E, 45 SE
20	Granite Hill* Sec. 26, T. 35 S., R. 5 W.	Quartz vein in granodiorite bordered by volcanics on west and serpentine on east.	Au	Qtz., $CuFeS_2$, PbS, FeS_2	E-W, 70 S	
21	Lambtongue* $SE\frac{1}{4}$ $SE\frac{1}{4}$ sec. 8, T. 35 S., R. 5 W.	Quartz filling in fault in metagabbro. Complicated by cross faulting.	Au	Qtz.	N 40 W, 80 NE	
22	Lucky Queen $W\frac{1}{2}$ $SE\frac{1}{4}$ sec. 31, T. 34 S., R. 5 W.	Quartz veins in argillaceous quartzite.	Au	Qtz.	N 40 E, 50 SE	N 40 E, 50 SE
23	Oak* $SW\frac{1}{4}$ sec. 4, T. 35 S., R. 5 W.	Silicified shear zones in metaandesite.	Au, Cu, Zn	FeS_2, FeS, ZnS, PbS	N 25 E to N 30 W, 70 W	
		Greenback District				
24	Cougar $NE\frac{1}{4}$ sec. 22, T. 33 S., R. 5 W.	Fracture in volcanics. Serpentine contact to east.	Au	Qtz.	N 35 E, 70 N	
25	Dorthea* $NW\frac{1}{4}$ sec. 22, T. 33 S., R. 5 W.	Quartz vein along contact between diorite and serpentine.	Au	Qtz.	E-W, N	
26	Greenback* Secs. 32 & 33, T. 33 S., R. 5 W. Sec. 4, T. 34 S., R. 5 W.	Quartz veins in volcanics near contacts with serpentine and argillite.	Au	Qtz., $CaCO_3$, FeS_2	E-W, 45 N	

Greenback District (cont.)

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
27	Horseshoe Lode NW¼ sec. 28, T. 33 S., R. 5 W.	Fissure vein in volcanics near contact with serpentine.	Au	Qtz., $CuFeS_2$, FeS_2, rhodochrosite.	E-W, N NW-SE, W	
28	Livingston Sec. 22, T. 33 S., R. 5 W.	Quartz vein along contact between serpentine and volcanics.	Au	Qtz., $CuFeS_2$, $CaCO_3$, FeS_2	N 10 E, 50 E	
29	Macabee SE¼ sec. 20, T. 33 S., R. 5 W.	In a fault zone on a contact between slate (sediments) and volcanics.	Au	Qtz., $CuFeS_2$, FeS	N 25 E, 15 SE	
30	Martha SW¼ sec. 28, T. 33 S., R. 5 W.	Quartz veins in a shear zone in volcanics.	Au	Qtz.	N 70 W, 60 ?	
31	Shot NW¼ sec. 33, T. 33 S., R. 5 W.	Quartz veins in greenstone and quartz diorite.	Au	Qtz., FeS_2, PbS	E-W, 70 N N-S, 40 W	
32	Silent Friend* Sec. 15, T. 33 S., R 5 W.	Stringers in greenstone. Some gossan.	Au	Qtz., $CuFeS_2$, $CaCO_3$, FeS_2, FeASS	NE to E, -	
		Illinois River District				
33	Alta Sec. 2, T. 39 S., R. 9 W.	Quartz veins in dacite porphyry dike in serpentine.	Au	Qtz., $CuFeS_2$, FeS_2, FeS	N 40 E, 90	
34	Becca and Morning Group Sec. 7, T. 38 S., R. 9 W.	Along a serpentine greenstone contact. Gossan.	Au	FeS_2, $CuFeS_2$	N 50 E	

Illinois River District (cont.)

No.	Name and location	Field relations	Mineralization Ore	Mineralization Gangue	Strike and dip of vein	Strike and dip of wall rock
35	Calument Secs. 5 & 8, T. 38 S., R. 9 W.	Quartz veins along a serpentine tuffaceous greenstone contact.	Au	FeS_2, $CuFeS_2$, FeS, PbS	N 40 W to N 70 E	
36	Eureka* Sec. 22, T. 37 S., R. 9 W.	Veins of quartz along greenstone - serpentine contact.	Au	Qtz.	N 50 W, 75 NE	
37	Gold Ridge Sec. 12, T. 38 S., R. 9 W.	Quartz veins along contact between serpentine, volcanics, and chert.	Au	Qtz., FeS_2	N 20 E, 50 SE	
		CURRY COUNTY				
		Agness District				
38.	Pine Flat N½, Sec. 26, T. 35 S., R. 12 W.	Shear zone in serpentine near contact with dacite porphyry.	Cu	$CuFeS_2$	N 80 E, 32 SE	
		Chetco District				
39	Peck* Sec. 23, T. 38 S., R. 10 W.	Quartz veins along a serpentine, greenstone, diorite contact	Au	Qtz., $CuFeS_2$ FeS_2	N 60 E, SE	
		Mule Creek District				
40	Mammoth Group Secs. 3 and 4, T. 33 S., R. 10 W.	Vein in fractured greenstone.	Au	Qtz., $CuFeS_2$, FeS_2	N 20 E, 85 W	

DOUGLAS COUNTY

Riddle District

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
41	Golden Gate Mine ?	In chlorite schist	Au, Cu	FeS_2		N 30-60E, 50-70 SE
42	Silver Peak* Secs. 23, 26, T. 31 S., R. 6 W.	Massive tabular bodies in schist.	Au, Cu, Zn, G	Qtz., FeS_2, Ba	NE-SW	

Tiller - Drew District

No.	Name and location	Field relations	Mineralization: Ore	Mineralization: Gangue	Strike and dip of vein	Strike and dip of wall rock
43	Chieftan* Sec. 20, T. 29 S., R. 3 W.	Quartz vein in metagabbro. Dacite intrusives near.	Au, Cu, Zn	Qtz., FeS_2	S 80 W, 70 N	
44	Continental* $NW\frac{1}{4}$ sec. 20, T. 29 S., R. 3 W.	Same	Au	Qtz., FeS_2	E-W, 70 N	
45	Rowley Group Sec. 4, T. 32 S., R. 2 W.	Sulphide lens in schist.	Cu	FeS_2	?	?
46	South Umpqua*	Sulphides disseminated in greenstone which is intruded by porphyry.	Cu, Hg	Qtz., Fe_3O_4, FeS_2	Same	N-S, E

Umpqua District

None

JACKSON COUNTY

Gold Hill District

47	Gold Note Sec. 30, T. 33 S., R. 4 W.	Contact between Galice, meta-volcanics, diorite, and chico. in shear zones in slate.	Au, Cu	Qtz., FeS_2, FeS	E-W, 35 S	N 60 E, 40 S
48	Mammoth Lode $NW\frac{1}{4}$ sec. 28, $NE\frac{1}{4}$ sec. 29, T. 32 S., R. 2 W.	Quartz veins and disseminated Cu sulphides in schist.	Cu	Sulphides		N 30 E, 50 SE

* Deposits with known production

Ba - Barite
P - Pyrite
Pr - Pyrrhotite
Cu - $CuFeS_2$
Ca - Calcite
G - Galena
S - Sphalerite
Ch - Chalcocite
M - Magnetite

February 7, 1974

INVESTIGATION OF SITES FOR CAVE JUNCTION WATER INFILTRATION GALLERY

Location: Sites visited are on the East Fork Illinois River, just south of Cave Junction in the SE¼ sec. 21 and NE¼ sec. 28, T. 39 S., R. 8 W.

Bedrock geology: The area examined is underlain by sandstones and siltstones with minor conglomerate or pebbly sandstones belonging to the Upper Jurassic Galice Formation. Where best exposed in the river immediately upstream from State Hwy 199 bridge. The rock layers strike about N. 20° E. and dip 55° E. Variations in dip to vertical are apparent within a short distance of this measurement. Multiple shears and fractures are present in the rocks and the shearing appears to be more intense progressing upstream closer to the contact with the older Applegate group rocks. This contact is mapped near the east edge of sec. 28. There are only spotty exposures of bedrock progressing upstream into sec. 28.

The area for about 200 feet above the bridge on the south side of the river has continuous bedrock exposure on a flat erosion plane with very little gravel cover at the present time. The deepest portion of the channel at the bridge appears to lie closer to the north side of the river and the bed of the stream probably has continuous bedrock exposure. Progressing upstream a short distance from the bridge bedrock exposure becomes intermittent and gravel bars more abundant.

Character of the stream channel: The channel of the East Fork of the Illinois River upstream from the State Highway 199 bridge is of a transitory nature. The river meanders across a broad flood plain with low relief. The stream channel has abundant sand and gravel bars along it which tend to migrate during flood stage with accompanying significant channel changes.

Requirements of infiltration gallery: Consulting engineers have recommended that in order to remain functional over an extended period of time, the infiltration gallery must be dug in solid bedrock to a minimum depth of about 5 feet. Perforated pipes are laid in the gallery and covered with gravel and a heavy rock capping. The perforated pipes slope gently toward a reinforced concrete vertical pump-housing and sump imbedded in the bank of the stream. This pump-housing and sump should be properly protected from lateral erosion of the stream.

It appears that the most desirable location for the proposed infiltration gallery is just upstream from the highway bridge on the north side of the river where bedrock is exposed and the stream channel is fairly well restricted and stable.

Area visited: February 6, 1974 with Per Zimmerlund and Torleiv Flatebo

Report by: Len Ramp, Resident Geologist, February 7, 1974.

PROJECT NAME: MCNEIL

OWNER(S): ALHAMBRA MINES INC (OPTIONEE, OPERATOR)
AMERICAN PYRAMID RESOURCES INC (OPTIONOR)

METAL(S): GOLD

EXPL. STATUS: EXPLORATION
ACTIVITY STATUS: INACTIVE

OPERATION-TYPE: PLACER

MINESEARCH #: 100379

MOST RECENT SOURCE: NOVEMBER 1985

LOCATION

STATE: OREGON
COUNTY: JOSEPHINE

THIS PROSPECT IS LOCATED IN SOUTHERN OREGON. ?

GENERAL COMMENTS

ALHAMBRA SIGNED AN AGREEMENT WITH AMERICAN PYRAMID IN 4/85 THAT WILL ENABLE IT TO EARN A 50% NPI FROM PRODUCTION AT THE MCNEIL. NO SIGNIFICANT WORK HAS TAKEN PLACE ON THE PROPERTY SINCE 1981. ALHAMBRA HAS NO PLANS SCHEDULED FOR THE 1986 SEASON. (PC 11/85)

WORK HISTORY

1930'S: 16 KEYSTONE HOLES WERE DRILLED.
1981: TEN PLACER HOLES WERE DRILLED IN THE SUMMER AND FALL. (AMERICAN PYRAMID AR 1981)
1982: THE PROJECT WAS PUT ON HOLD. (PC 1/83)
1985: ALHAMBRA OPTIONED THE PROPERTY, BUT DID NO EXPLORATORY WORK. (PC 11/85)

GEOLOGY REPORT

ZONE NAME: N/A
GENESIS 1: RESIDUAL CONCENTRATION
OREBODY TYPE 1: PLACER
ORE 1: GOLD
CLASS 1: NATIVE
HOST-ROCK: GRAVEL

TRANSACTION REPORT 1

TRANSACTION DATE:1985
TRANSACTION TYPE:OPTION

PARTY#1: AMERICAN PYRAMID RESOURCES INC
DESIGNATION 1: OPTIONOR
ORIGINAL INT 1: 100

PARTY#2: ALHAMBRA MINES INC
DESIGNATION 2: OPTIONEE
ORIGINAL INT 2: 0
POTENTIAL INT 2: 50NPI

ALHAMBRA MUST SPEND $300,000 FOR EXPLORATION AND DEVELOPMENT TO EARN A 50% INTEREST IN NET PROFITS AFTER PRODUCTION BEGINS. (PC 11/85)

TRANSACTION COMMENTS

THE AGREEMENT WAS SIGNED IN 4/85. (PC 11/85)

COMPANY INFORMATION

AMERICAN PYRAMID RESOURCES INC
907-865 HORNBY ST
VANCOUVER, BC V6Z 2G3
(604) 682-4641

ALHAMBRA MINES INC
1325 AIRMOTIVE WAY #200
RENO, NV 89502
(702) 323-6200

BIBLIOGRAPHY

AMERICAN PYRAMID RESOURCES INC ANNUAL REPORT 1981
GREENSHIELDS RESEARCH REPORT 7/13/81
PERSONAL CONVERSATION 1/83
PERSONAL CONVERSATION 2/83
PERSONAL CONVERSATION 8/83
PERSONAL CONVERSATION 4/84

I. TITLE Proposed Aeromagnetic and Geochemical Survey of Josephine County.

II. APPLICANT:

(a) Proposal by the Josephine County Area Development Committee:

Chairman - Glen Kennedy
Vice Chairman - Jack McMahan
Secretary - Virgil R. Adams

(See approved copy O.E.D.P.)

(b) Prepared by: Minerals Committee
Wesley Pieren, Chairman
Len Ramp, Technical Advisor
Jack Brownell, Com. Member
George Reynolds, Com. Membe

(c) General background:

It is generally accepted by the mineral industries that systematic prospecting by geophysical and geochemical methods are the best means available to them. Airborne magnetometer surveys and geochemical sampling are considered among the most direct and rapid methods available in the search for mineral deposits. (See attached list of World Geophysical Discoveries from June "Engineering and Mining Journal".)

Pertinant projects:

The State of Oregon Dept. of Geology & Mineral Industries has started a long-range geochemical sampling program in Oregon. The program involves taking samples of stream sediment and analysing the samples for copper, zinc, and molybdenum. To date the Department has taken and analysed about 450 samples in Josephine County. It is estimated that another 400 samples would give a fairly good reconnaissance coverage of the county.

In 1960 the U.S. Geological Survey published an aeromagnetic map of the Kerby 30 minute quadrangle. (Geophysical Investigations Map GP-197)

In brief, it is the committee's proposal to complete both the aeromagnetic and geochemical coverage of Josephine County, and to publish this data in a form that will create a favorable incentive to exploration and development of the county's mineral resources.

III. DESCRIPTION OF PROJECT:

(a) Area:

The area of Josephine County is 1625 square miles. Our population is about 35,000. The principal industries are logging, lumber, tourism, and recreation with agriculture, mining and other diversified industries playing a relatively small part at present.

Labor force in the county is summarized on the attached table.

Major market areas for wood products originating in the

county are in the western U. S. midwest and southern California.

Transportation facilities are via Southern Pacific railroad and all major truck lines. The nearest seaport is 80 miles. A good system of highways serves the area.

The area is blessed by a moderate climate. (See attached summary of climate.)

Our resources include timber, minerals, soil, and people. The following minerals are known to occur in the county: Limestone, chromite, gold, silver, copper, barite, lead, zinc, molybdenum, mercury, iron, nickel, clay, soapstone, stone, etc. At present only gold and limestone are being mined.

Employment in the county shows a strong seasonal effect due to the nature of our major industry - woodworking (logging and lumber).

(b) Problem:

The one basic problem we would like to solve is a lack of adequate diversification in industry.

(c) Objectives:

The proposed project is intended to accomplish a greater diversification of industry by bringing about developments in mining. When completed, the project is expected to stimulate interest and activity in prospecting for and development of mineral deposits in Josephine County.

In the short run it is possible that the proposed aeromagnetic and geochemical survey of Josephine County can be completed in one year.

Information published showing the results of these surveys will create interest in our area on the part of individuals and companies in the business of minerals exploration and mining. The completed survey will facilitate the search for minerals by pinpointing more favorable areas for exploration, thus greatly cutting down the time and cost. In the long run the information obtained in these surveys will never lose its value. As new minerals and techniques are developed and new geological information is made available, the aeromagnetic and geochemical data can always be referred to for assistance in geological interpretation and in the never-ending search for mineral materials used by man.

(d) Procedures:

The aeromagnetic survey should be conducted by standard geophysical methods described in the State of Washington Division of Mines and Geology Report of Investigations No. 20, prepared by Hunting Geophysical Services, Inc. 1960. (A scintillometer survey, which accompanied the airborne work in the Wash. project, is not intended in the present proposal.)

The survey should be done in all areas of the county except the Kerby 30 minute quadrangle that has already been flown and published. (U.S.G.S. Map GP-197)

The following 15 minute quadrangles should be covered: Oregon Caves, Grants Pass, Glendale, Galice, and that south eastern portion (about 60 sq. miles) of the Marial quadrangle included in Josephine County. The total area is nearly 1000 sq. miles (see attached map of county showing quadrangles). This area is essentially the same size as that surveyed in northeastern Washington in 1960 (see attached sheet showing their time schedule and cost analysis). Total cost of the present proposed aeromagnetic survey including printing of 4500 copies of a report and accompanying maps should not exceed $45,000. The survey should be on a bid basis by qualified technicians in the field of geophysical surveying.

GEOCHEMICAL SURVEY

The State of Oregon Department of Geology & Mineral Industries has agreed to complete and publish the results of their geochemical survey in Josephine County as a supplement to an aeromagnetic survey - if one is made available.

About 450 stream sediment samples have already been taken and analysed for Josephine County by the State Geology Dept. as part of a state geochemical sampling program. The cost per sample, including analysis, using student help in sampling the more easily accessable areas, has been about $4 per sample. Sampling the remaining more inaccessable areas in the county would increase the cost to about $7.50 per sample. Another 400 samples would give fair reconnaissance coverage of the county.

* Cost of geochemical sampling project to date in southwestern Oregon.

700 samples collected by student help	$900.00
Analysis @ $2.50 per sample	1750.00
Reducing and plotting data	100.00
	$2750.00

Remaining cost to complete Josephine County.

400 samples @ $5.00, collecting	$2000.00
Analysis @ $2.50	1000.00
Publication cost	5000.00
Total additional cost to complete Josephine County	$8000.00

IV. RELATIONSHIP TO OVERALL ECONOMIC DEVELOPMENT PROGRAM

The OEDP report points out that mineral deposits are known in the area of Josephine County and that further exploration and study is desirable to encourage development of a mining industry.

V. DEVELOPMENT IMPACT

At present, with the improving metal markets, most mining companies are becoming involved in various exploration projects. The availability of a completed aeromagnetic and geochemical survey for Josephine County will act as a timely incentive resulting in greatly increased exploration. The exploration parties normally hire a few local people for guides and field assistants. The period of their exploration

* Cost analysis figures furnished by St. of Ore. Dept. of Geology & Mineral Ind.

activities depends on their available funds and nature of any finds, but would normally last at least two field seasons in order to cover the area. The number of resulting exploration parties cannot be predicted.

These are the only jobs that can be guaranteed as a direct result of the proposed survey. However, just one significant discovery would result in a great many jobs over a long period of time. This would give the economic stability needed in the county. It should be noted that one significant discovery would result in further excelerated exploration - thus more new jobs.

VI. DURATION

The proposed project can be completed in one year as shown on the attached schedule of the similar project done in Washington.

VII. FOLLOW-UP

The State of Oregon Dept. of Geology & Mineral Industries will check out all significant geochemical anomalies and publish appropriate supplemental reports on them. The committee suggests that either the U.S. Bureau of Mines or the State of Oregon Dept. of Geology & Mineral Industries would be suited to monitor the proposed aeromagnetic survey. Director, Hollis M. Dole of the above named State Dept. has expressed their willingness to act as monitor for the overall project in conjunction with their cooperative part in the proposed project.

VIII. NEED FOR A.R.A. FUNDS

It is generally believed that funds for this type of an overall study are not available from private or local government sources. We quote from a letter to Mr. Len Ramp from Mr. Hollis M. Dole, dated June 11, 1964, and relating to this proposal:

"My thinking on this was that if this type of survey is so expensive, it is not within the possibilities of the individuals in the county to pay for it nor would it be warranted for the county to pay for it, and I am certain that this Department could never get the funds through the State Legislature. That being the case, then here would be a good example of where it couldn't be paid for on the local level, and it would be appropriate for the Federal Government to step in."

IX. PROPOSED METHODS OF FINANCING (See breakdown III (c))

(a) Total cost.....$53,000.00
(b) A.R.A. funds requested..... 45,000.00
(c) State contribution..... 8,000.00
(d) Other participation - none
(e) Basis of cost estimates - State of Washington Dept. of Conservation Division of Mines and Geology Report of Investigations No. 20, and summary of cost submitted by Marshall T. Huntting, Supervisor. Figures showing cost of State of Oregon Dept. of Geology & Mineral Industries geochemical sampling program submitted by R.G. Bowen, geologist in charge of project.

X. PROJECT PERFORMANCE

(a) The Aero Service Corporation, 210 East Courtland St., Philadelphia 20, Penn. has expressed an interest in the aeromagnetic survey. The committee has a letter and brochure from them. minerals

(b) The Hunting Geophysical Services Inc. of New York did the similar survey in Washington and if still in business would be a likely bidder.

The committee is certain that other qualified bidders could be obtained if ~~this~~ this proposal is approved.

XI. COORDINATION

The committee recommends that the project be coordinated by the State of Oregon Dept. of Geology & Mineral Industries. They have been advised of the proposal and have agreed to cooperate in the project.

XII. SUMMARY OF ATTACHMENTS

1. Labor force Josephine County summary for April, 1964.
~~2.~~ 3 Map of Josephine County showing quadrangles.
Insert ~~3.~~ 4 Huntting's letter of submittal and greakdown of Washington aeromagnetic survey cost.
~~4.~~ 5 Partial list of world geophysical discoveries E.& M. J. June, 1964
* ~~5.~~ 6 Aeromagnetic map of Kerby and part of the Grants Pass Quadrangles, Josephine and Curry Counties, Oregon, U.S. Geological Survey Geophysical Investigations Map GP-197.
* ~~6.~~ 7 State of Washington Dept. of Conservation, Div. of Mines & Geology Report of Investigations No. 20 Geological Interpretation of Airborn Magnetometer and Scintillometer Survey (4 15 minute quadrangles) Okanogan and Ferry Counties Washington, 1960 (and accompanying maps and transparent overlays).

#2. Climate Chart

* Please refer to library copies.

Galice Area

1. Almeda (?) Cu, Au, Ag, Pb, Ba.
   Prod — 108,000 (1911-1916)
   Approx. 4,000' of underground workings.
   Extens 450' below the Rogue River &
   350' above the river.

Benton (1893) Au
   Prod — ?
   Develop = 10,000'

Robertson (1914) Au
   Prod — 175,000
   Develop — 5,000'

G.P. Area

Granite Hill Au
   Prod — 100,000
   Devel — 12,000

Greenback

Daisy (1890) Au
   Prod — 200,000 +

Greenback (1897) Au.
   Prod — 3½ million.
   Devel — 7000'

Galice Area

Benson Placer
1,000,000 yds^3 moved 2,000,000 yds^3 remain.
Prod. = #250,000

Rocky Gulch (1856)
Prod - #150,000 +

#

~~G.P. Area~~

Deep Gravel - 500,000
Esterly (Llan de Oro) - 500,000