

REPORT XVII OF THE STATE MINERALOGIST, MINING IN CALIFORNIA DURING 1920

PLACER COUNTY.

Clay of various grades, chromite, coal, copper, gold, granite, limestone, marble, quartz, and iron have been produced here in commercial quantities. A little asbestos has been produced and magnesite and ocher have been prospected. Silver occurred with the gold in the veins in the Ophir district and on Duncan Hill but has never been mined separately. Molybdenite has been noted in different granodiorite areas, usually remote from the railroad.

CHROMITE.

Dan Sullivan of Alta has shipped several carloads of high grade chromite from Alta during the past summer. The chromite was mined about ten miles from Alta and had to be packed part of the way. There is considerable good quality chromite still available in this county but market conditions have not encouraged mining it.

CLAY.

The clay resources of the county have been discussed in this Bureau's Preliminary Report No. 7 "The Clay Industry of California," published in January, 1920, which may be had free from the main and branch offices. Placer's clay resources are only partially developed and railroad facilities offered by the two lines of the Southern Pacific Railway are favorable for the expansion of the industry.

COAL.

Lignite was mined at and near Lincoln thirty to forty years ago and was shipped to Sacramento where it was retorted for the gas it contains. These lignite beds are rather wet and required considerable timbering. Lincoln Clay Products Company owns land 1 mile from Lincoln which is partly underlain by lignite. Drilling has revealed two bodies of the lignite, lying at depths of from 48 ft. to 70 ft. below the surface. The lignite beds are from 7 ft. to 15 ft. thick with a pink clay roof and blue clay floor. The beds are nearly flat and the lignite is similar in origin and character to that in Amador County. Old shafts and caved ground on this property indicate that an area of perhaps 6 to 8 acres has been mined. The competition of other fuels and the increasing cost of labor and timber are said to have caused suspension of operations. There were other old workings directly under the town of Lincoln.

COPPER.

The foothill copper belt traverses the western half of the county. There has been no copper mining here during the past year, although there were formerly producers at several localities, particularly in the foothills east of Sheridan and Lincoln, near Ophir and a few miles northwest of Clipper Gap.

GOLD.

This county's drift and hydraulic mines particularly have been heavy producers of gold. The recorded production of about \$32,500,000 in the past 40 years, together with an equal or greater amount produced in the 30 years preceding 1880, came chiefly from surface placers, drift and hydraulic mines. It was stated in 1868 that the mines within rifle shot of the express office at Forest Hill had produced at least \$10,000,000.

In spite of such a splendid past history, there has been comparatively little gold produced in Placer County for several years, and most of that produced has come from one dredger on American River and one quartz mine in the Ophir district. Conditions prevailing in recent years have been unfavorable for all forms of gold mining, and particularly for the investment of considerable sums of money in mining. Placer County has many drift, hydraulic and quartz properties which offer fair promise

to anyone equipped with sufficient money and experience to carry development to a conclusive point. Few of the quartz mines have been opened to depths greater than 600 feet.

QUARTZ MINES.

The history of the county's quartz mines has never been adequately covered; but the aim of the State Mining Bureau is to keep in touch with current mining development as well as to record past operations. As little quartz mining has been done in the county in 1920, only a few properties are mentioned. Some notes on mines not previously covered in detail are included because they have been the subject of inquiry during the past year.

Booth Mine. Slosson and Spinney Estates. Address E. P. Slosson, Auburn, California. Located on Duncan Hill in sections 8, 9, and 16, T. 12 N., R. 8 E., about 2 miles by road from Auburn. Comprises 10 acres, patented, covering 338 ft. in width and 1600 ft. on strike of vein. The vein strikes a few degrees north of west and dips 62° S. It has an average width of 40 inches and is a solid quartz vein, filling a fissure in amphibolite and diabase near the surface but probably passing into diorite or granodiorite in depth. The Booth vein appears to be the east extension of the Bullion vein. This mine was located about 1871. There is a shaft 180 ft. deep on dip of vein and 4 levels were opened at 40, 70, 90 and 150 ft. deep. The vein was drifted 240 ft. west and 150 ft. east on 40 ft. level, 92 ft. east and 26 ft. west on 70 ft. level, 25 ft. east on 90 ft. level and 25 ft. east and 98 ft. west on 150 ft. level. The past production reported as amounting to over \$60,000, came from the shaft, from the surface, and from about 50 tons stoped near the shaft to a depth of 90 feet. Slosson reports numerous high assays from the vein in place, notably \$39 a ton from the 70 ft. east drift and an average of \$12 a ton for 46 assays, included in which were 12 assays from the 150 level. These included the vein as it came; some spots are rich in galena and pyrite. An average not including any specimens is thought to be \$4 gold, \$1.50 silver and \$4 lead and copper (at pre-war prices). No zinc or antimony was reported. There are said to be 4200 tons ready to stope between 150 level and surface, as soon as the water is pumped. Property is equipped with a small engine and pump and dwelling. A water ditch and electric power line cross one end of the property.

Centennial Mine. Wm. Walsh, Auburn, owner. Contains 10 acres, covering 1600 ft. of vein, in section 17, T. 12 N., R. 8 E., on Duncan Hill, 2 miles southwest of Auburn. The vein is about 30 inches wide but pinches down at intervals and fills a fissure between a hard footwall and a heavy hanging wall, both of amphibolite schist. It strikes N. 80° W. and dips 70° S. and has been proven over the length of the claim by 11 or 12 shafts. After these shafts were sunk, a tunnel was started and was driven the whole length of the claim, evidently with the idea of milling the whole vein. This tunnel was in two sections, 900 ft. and 700 ft. long, connecting a few feet apart vertically, with one of the old shafts. A heavy gouge, said to be 10 ft. wide was encountered on the hanging wall about 300 ft. inside tunnel, as a result of which the tunnel is now badly caved.

The production at this property was from the shafts, which were sunk to about the tunnel level (180 ft. below outcrop). The ore occurs in small rich shoots, 2 ft. to 50 ft. long, and the formation of these rich bunches appears to be influenced by "iron crossings," the miner's term for zones rich in pyrite and chalcopyrite in the amphibolite. These zones dip east, and the rich shoots, lying in the intersections of the iron crossings with the vein, pitch east and are said to cross the vein diagonally from hanging wall to footwall in their downward course.

A winze put down 80 ft. from the portal below the tunnel level is said to have yielded several hundred dollars, tending to indicate that the pay continues.

The quartz near the rich bunches is a greyish, dead looking rock carrying only a little pyrite. The estimated average value of the ore in the rich shoots was \$8 to \$12 a ton, but the vein as a whole is low

grade, considering present costs of operation. The Centennial is credited variously with a production of from \$150,000 to \$400,000.

Conrad Mine. Wm. Walsh, Auburn, California. The mine is in section 17, T. 12 N., R 8 E., 2 miles from Auburn, a few hundred feet south of Centennial Mine on Duncan Hill.

The claim covers about 1200 feet along the vein, and like the Centennial was worked at times from 1868 to 1890. The vein dips 40° to 50° south and is parallel to the Centennial. It averages about 2 ft. wide but pinches down at places. It lies between amphibolite walls.

The mine has been worked through a tunnel 784 ft. long (180 ft. below outcrop) which is open all the way, and shafts have been sunk from the surface and raises put up from tunnel level wherever pay was found. There is a winze about 60 feet below tunnel level, but it is said to be off the pay shoot. The largest pay chimney was found 30 ft. above the tunnel and yielded \$15,000. The property is credited with about \$50,000 production.

The ore resembles that in the Booth more than the Centennial, and is said to run from \$4 to \$8 a ton away from the rich chimneys.

Crandall Mine. Owner, T. F. Jull, Auburn, California. Lessee with option, Unitania Mining Company. Property comprises Cox and Denton patented claim 300 ft. x 1400 ft., Sacramento (agricultural patent) 230 ft. x 1320 ft., and North Star and Florence May locations. 2 full claims in section 8, T. 12 N., R 8 E., on Duncan Hill adjoining Booth mine on the west, and two miles from Auburn by road.

The Crandall tunnel has been driven 410 ft. on the Crandall (Cox and Denton) vein; a shaft has been sunk 90 ft. from the surface and a winze has been sunk 65 ft. from the tunnel, giving a depth of 245 ft. on this vein. The vein pinches and swells, but runs about two feet wide. It appears to be in line with the Booth vein, but there is a break at the end of the Booth; this may be only a surface slide. Other smaller veins called the Hunter and Sacramento average about one foot wide. Hunter vein has been opened by a shaft 85 ft. deep and a tunnel 200 ft. long. Sacramento vein has a tunnel 75 ft. long. Eleven of the small pay chimneys typical of the mines of Duncan Hill are said to have been found in a length of 400 ft. on the Cox and Denton vein. To a depth of 30 feet the ore milled gave \$16 a ton; below that depth it is said to have averaged \$6 a ton. Concentrate assays \$55 to \$100 a ton and makes up 2% to 4% of the ore. The same mistake has been made in the past at the Crandall as at other mines in the district, namely the attempt to mill the entire vein. In view of the fact that payable ore has been found at mines nearby at depths twice as great as those so far attained in the Crandall and other mines mentioned above, it appears entirely possible that such ore may be found in depth here. It has been claimed that the Booth and Crandall vein is the same as the Bullion vein worked in the Oro Fina Mine. This is quite probable but has not been proven, as the outcrop can not be traced continuously, and there are several parallel veins at both ends of the system.

There is a mill of five 1200-lb. stamps, a 10" x 14" Blake crusher, an old Deister concentrator and a 12-h.p. Bull Dog gas engine, on the property. There is an electric power line 800 feet distant and water for milling is available.

Canada Hill Mines, Henry Snyder, E. Armstrong, et al., Nevada City, owners. Metals Exploration Company, lessee, 120 Broadway, New York City. The claims are in Canada Hill district, in section 9, T. 15 N., R. 13 E., 24 miles by road from Forest Hill and 44 miles from Auburn. Elevation 6225 feet at Beauty shaft. There are two groups of claims, called Beauty Group, containing 10 claims and Nob Hill Group of seven claims, each covering 4500 feet on the strike of the veins.

A shaft was put down 30 feet on the vein on the northeast end of the Beauty claim, and an upper tunnel was run about 200 feet. These are said to have exposed a vein of quartz 1½ to 3 ft. wide, striking

northeast and giving a good prospect. During 1919 and 1920 the lessee drove a lower tunnel 800 feet westerly and northwesterly to strike the vein below the shaft. This is a crosscut for 600 feet. It struck heavy ground about 650 feet in and follows a crooked course thence to the face. The face in October, 1920, showed a few narrow quartz stringers and a gouge one foot thick. The property was idle at that time.

Several prospect tunnels have been driven on the Nob Hill claims. There are several outcroppings of quartz here, varying in strike from N. 10 W. to N. 20 W. These veins were of fair width and assayed well on the surface.

There is a good building near the Beauty claim and a 5-h.p. gas engine, blower, two ore cars and 800 feet of track at the lower tunnel.

Elizabeth Mine. John Watson, Penryn; lease and bond to E. C. Montgomery of Auburn, and others. This old mine is at Stewarts Flat about one mile east of Penryn by road, on Secret Ravine. It consists of one fractional claim.

The vein is quartz, 12 to 20 inches wide, strikes N. 7° E., and dips nearly vertical. It was opened in the early '60s to a depth of about 120 ft. and the vein is said to have been drifted 380 feet in good pay ore, which kept a 5-stamp mill in operation from 1862 to 1864. Both walls of vein are granodiorite. The quartz carries 1% to 2% pyrite and galena. A cyanide plant was put up on the property about 25 years ago and ran long enough to treat ore from the old dump, but this company is said to have broken up without having taken any ore from the mine.

A small headframe has recently been erected and a pump and gasoline engine have been installed. The shaft has been cleaned out and unwatered to a depth of about 90 ft., after considerable difficulty, as it is in a good sized drainage basin. It is hoped the old workings will soon be cleared and the vein prospected. The surface of this district was rich placer ground and the adjoining Chicago Quartz Mine was worked to a depth of about 600 feet.

Oro Fina Mine. Oro Fina Mining Company. Haines Gridley, secretary and treasurer, Auburn, California, is in charge of the mine, which is in Ophir Mining District, in sections 7 and 8, T. 12 N., R. 8 E., about four miles by road west of Auburn. The property contains 96 acres, patented, covering about 4500 feet along the strike of vein. The vein pinches down in places, but runs as a rule about 2 ft. wide, having a width of 16 inches where it enters the granodiorite on the 700 level. It strikes a little north of west and dips 65° S. Both walls are amphibolite in the upper levels. The mine is near the granodiorite contact, but work on the 700 level has not gone far enough to show whether the granodiorite is the main dome lying to the south, or is a dike branching from it. The vein appears to continue into the granite without lateral displacement or loss in value.

The new shaft on Bullion No. 1 claim is 730 feet deep on an angle of 72° in the hanging wall. Six levels are open, called 200, 300, 400, 500, 600, and 700 levels. This company began work in 1913 and sank all this shaft but 50 feet. It connects on 300 level with the old Bellevue shaft, 312 ft. deep. No. 2 level is open 1080 ft. east and 130 ft. west; No. 3, 1400 ft. east and 800 ft. west; No. 4, 1250 ft. east and 200 ft. west; No. 5, 300 ft. east and 500 ft. west; No. 6, 900 ft. east and No. 7, 100 ft. east.

Ore shoots have been worked on both sides of shaft, for lengths of 150 to 250 ft. The vein just west of shaft was of low grade, but apparently not cut off, in the contact zone between 600 and 700 level, at the granodiorite contact. It is said to be of good grade in the bottom, where it passes into the hard granodiorite. East of shaft, No. 7 level must be driven several hundred feet to strike the large ore shoot worked above the 600 level. This region is still well above the contact zone. The vein carries a small amount of sulphides, averaging 1% pyrite, worth \$60 a ton.

The mine is equipped with an Ingersoll Rand Imperial air compressor, capacity 600 cu. ft. of free air a minute, operated by 100-h.p. motor, hoist with depth capacity of 1200 ft.; operated by 50-h.p. motor, drill sharpener and oil fired forge. There is a pump with capacity of 200 gal. a minute on 500 level, one of 150 gallons capacity on 300 level and a sinker pump on 700 level.

The mill was built in 1915 and contains rockbreaker, ten 1000-lb. stamps dropping 6½ to 7 inches 100 times a minute, and one each Deister sand and slime concentrators. The capacity of mill is 35 to 40 tons in 24 hours.

A comparison of costs of operation (not including any charges for depreciation of plant and depletion of ore), for the years 1916 to 1919, inclusive, shows the constantly increasing weight of those conditions that have forced or hurried the closing of nearly every mine with low or medium grade ores in California.

Operating Costs at Oro Fina Mine, 1916-1919.
(Courtesy of Haines Gridley.)

Costs per ton mined	1916	1917	1918	1919
Milling	2.92	3.37	4.44	4.52
Milling	.79	.95	1.04	.99
Concentrating	.12	.10	.11	.13
Other costs (pumps, insurance, etc.)	.85	1.25	1.25	1.57
Total, exclusive of development	4.68	5.67	6.84	7.21
Development	.87	2.18	.58*	None done
Total operating cost	5.55	7.85	7.42	

*Very little development done in 1918; no development done in 1919.

Timber which cost \$14 a thousand feet in 1916 now costs \$43. The price of electric power has been raised repeatedly. First there was the 20% surcharge. This was followed by a raise of ½ c per k.w.h. On top of this, another 15% increase was levied. It is said to cost \$68 a month now to run the pumps, hoist the skip occasionally, and satisfy the "stand by" charges.

This mine has produced about \$430,000 in the past five years. The property was closed down on December 31, 1920, but underground work was resumed in February, 1921.

Rising Sun Mine. Rising Sun Consolidated Gold Mining Company has a lease and option to purchase; John Zeeman, president ; E. C. Klinker, manager. The mine lies in section 33, T. 15 N., R. 9 E., about a mile and a half west of Colfax, by road, at an elevation of 2300 feet. Property includes the Rising Sun patented claim 3000 feet long, and other patented land; total 440 acres.

The vein, which averaged 18 inches wide in the upper levels, but is wider in the bottom, strikes northeast and dips 85 degrees south to the 7th level, where it rolls over and reverses its dip in 20 feet. Below this roll, the vein increases in width and becomes softer. Above the 7th level, vein was said to have been extremely hard in the old workings.

It lies between hard diabase walls.

The mine was opened in 1866 and was operated until 1874 with a 5-stamp mill, and from then till 1880 with a 10-stamp mill which crushed 12 to 15 tons of ore a day, six days a week. The deepest shaft is 749 feet deep, and there are ten levels. There are two other shafts west of the above, one sunk to the fifth level, the other to the third. Levels are said to have been driven about 150 feet west and 400 feet east of main shaft. On west of shaft there was a pay chimney about 40 feet long which was so rich in free gold on the first four levels that the gold is said to have literally held the quartz together. A north and south

crossing apparently bounded the rich ore on this side and had probably influenced its deposition. East of shaft the pay was in stringers. The production under previous operators was over \$2,000,000. The mine has been idle since 1884 until 1919, when the present company began work.

The workings had been completely unwatered early in the summer of 1920. A new headframe, compressor, hoist, and electric motors have been put in, and a new ten-stamp mill has been installed. The company is capitalized for 250,000 shares of a par value of \$1 each.

Snowbird Mine. Nevada-Pacific Exploration Company, N. K. Cooper, president, 319 First National Bank Building, San Francisco. The property is near Sugar Pine Mill, on the Forest Hill Divide.

The serpentine and peridotite belt passing through this region in a northerly direction is characterized by the occurrence of free gold, sometimes in attractive quantities, but often in a talc or talcose schist gangue, from which its recovery is a problem requiring a plant beyond the means of the average owner.

The above company has put up a 50-ton plant the past summer and has opened the property to a depth of 175 feet. They are said to have made a small production from high grade ore and there is said to be a promising showing in the lower workings.

DRIFT MINES.

Big Dipper Mine. McGeachin Placer Gold Company; lease and bond to Stanislaus Development Company, 1321 Baker Detweiler Building, Los Angeles ; A. D. Hadsel, superintendent at mine. Contains 165 acres, 3½ miles by road from Iowa Hill and 12 miles from Colfax.

The property includes the Irish and Bryne claim, and Harmon claim, both patented. The old deep channel was supposed to have been worked out years ago. Mr. Hadsel believed there was a section of it left, where the channel turned and old works passed over it. He has done considerable work in the past 3 years including a long cut made with a drag-line scraper, and some prospect shafts. Several thousand cars of gravel from terraces off the old workings have been washed. Two to four men are employed part time.

The property is equipped with an old plant operated by water power. There are a rock breaker, grizzly, ten 950 lb. stamps, 24-inch, 36-inch, and 72-inch Pelton wheels, air compressor (capacity 2 drills) 700 ft. pipe line, drag line scraper and old buildings.

Blue Eyes Mine. S. S. Caples, and Mrs. Ella Caples, Sacramento, owners. Blue Eyes Syndicate, comprising F. A. Moss et al., have a 35 years lease with option to purchase. The property contains about 2800 acres and covers four miles along a ridge covered by andesite and glacial debris, lying northwest of Duncan Canyon, 20 miles by road and trail (2 miles trail) from Westville.

Unusually early snow and an impassable road prevented a trip to the property last October. A new section of road will be open next season which will greatly benefit the mines east of Canada Hill. The property has been worked in a small way as a hydraulic mine. Moss's efforts have been confined to the development of a drift mine. A prospect tunnel 5 ft. x 6 ft. had been driven 800 feet in October, 1920, on the Gold Dollar claim. Gravel was first encountered in the present works in August, 1920, and was found to prospect well in gold. A small crew of men was employed and supplies were taken in to permit working through the winter. Cost of tunneling is reported at \$3.50 to \$4 a foot in soft ground and \$8 to \$10 near the face, in lava. A winze put down 55 feet near face of tunnel is in lava ash the first 35 feet and in fine gravel for 20 feet, with considerable water coming in. The tunnel will be driven ahead, as it is thought they are now crossing a deep hole and will bottom the channel ahead.

The channel is supposed to course northwest. The bedrock is slate and hard quartzite and quartzitic sandstone. The pay gravel is believed to be 50 ft. to 60 ft. wide. The tunnel is at an elevation of

1650 ft. but the property extends along the ridge to an elevation of 5800 ft. Water has not been brought in yet, but can be obtained from Spruce Canon in sufficient quantity. By putting in a pipe line water could be taken from Spruce Canon to Duncan Canon giving a fall of 800 ft. for generating power. F. A. Moss, superintendent, Michigan Bluff.

Carmack Placer Mines (formerly called **Pacific Blue Lead Mine**). George W. Carmack, Seattle, Washington. The mine comprises 350 acres in sections 4 and 5, T. 15 N., R. 13 E., 24 miles by road from Forest Hill via Westville, or 44 miles from Auburn, at the head of Big Secret Canon at an elevation of 6200 feet.

The probable course of the channel is west, but work done to date has not been sufficient to give an adequate idea of the dimensions, direction, or character of the deep gravel channel believed to exist here. Leo Harris, a former operator, drove an adit 350 ft. east from near the buildings and this adit, which is caved most of the way now, is said to have crossed above a section of deep channel which has not been bottomed. Through this portal he worked a bench or remnant of free white quartz gravel, 20 ft. by 60 ft. in area and 2 ft. to 4 ft. deep and evidently from the rim. This is well above the deep gravel and is possibly part of an earlier channel that has been cut by the deep gravel. The willow-covered flat between the house and county road seems to be worth prospecting for more of this older gravel.

Beside the creek, in a place where the chert, slate and quartzite rims are only a few hundred feet apart, Carmack has sunk an incline 70 ft. deep at 45°. In the bottom of this shaft the volcanic overburden comes down directly upon water-worn chert, seeming to show that the shaft has struck the rim bedrock.

Work was suspended October, 1920, but will be resumed next spring. Property has 2 cabins, a blacksmith shop, one 6-h.p. gas engine, a Gould pump, cars, rails and tools. There is ample timber and water for mining.

Excelsior Mine. (See Mascot.)

Glenn Mine. Geo. McAulay, A. K. Robinson, Auburn, et al., owners. Leased to Frank Tillotson. It is six miles east of Last Chance on a lava-capped ridge northwest of Duncan Canon, in the south half of T. 15 N., R. 13 E. The lower workings are in the NW. ¼ of section 34. The road from Westville to Last Chance crosses the property. As originally located the property contained about 650 acres. It lies at about 5000 ft. elevation.

The channel courses southeast and south. The work has been done on the south end of property, on the NW. ¼ of section 34 and adjoining part of section 27, on Grey Eagle and Outlet claims. A total of nearly 8000 ft. of underground work has been done on the mine. The tunnels have encountered a steep channel, interrupted at frequent intervals by falls, where abrupt rises, devoid of gravel, are found. The bedrock is schist and quartzite with pot holes, and the pay gravel, ranging up to 100 ft. in width, is cemented in the bottom and carries some glacial wash. The pay taken out lately has been mined chiefly by two sublessees, who have a piece of ground estimated to be enough for a year's work, and said to carry \$5 a ton. Tillotson has had a small crew engaged on development work. The property is equipped with buildings, blacksmith shop, etc. Rich gravel was entered by Tillotson in March, 1921, in the lower adit, but the extent of the strike is not yet known.

Greek Mine. Martin, Burner, et al., of Forest Hill, lessees. On Little Secret Canon, about a mile by trail from the old Secret House, in section 1, T. 15 N., R. 12 E., and 46 miles from Auburn by road. The Greek mine is supposed to be worked out up to the line of the Macedon property. The gravel channel passing through these two claims is thought to be the same as the one mined years ago in the Black Canon workings about 8000 feet west. The Greek tunnel was run downstream, and would be out of grade in a distance of about 500 feet farther if continued into the Macedon. The old Greek tunnel, about 600 feet

long, and the water right on Little Secret Canon which has been used at the Greek mine, would be of limited use, therefore, in working the Macedon property.

Macedon Mine. Dr. C. W. Richards, et al., Sacramento, owners. In the southwest quarter of section 1, T. 15 N., R. 12 E., adjoining the Greek mine on the west. This property contains the westward or downstream extension of the channel worked at the Greek mine. The channel here has been worked only where touched in the Greek tunnel. A tunnel started on the Macedon years ago would be too high if continued to the channel.

Mascot Mine (formerly **Excelsior Mining Company**). Haines Gridley, Auburn, is trustee for the owners. The mine is about ½ mile southeast of Forest Hill. This property is thought to still contain 1500 feet of channel on the Blue Lead, which was worked in the Mayflower and Paragon, to the northeast, in years past, at a good profit.

The present operators, for whom Gridley is superintendent, have driven about 800 feet of new drifts and have advanced about 400 feet upstream. They work through the old tunnel. The gravel they have opened has been mostly low grade, and is thought to be in a long hole in the channel.

The property is supplied with electric power from a plant at Horseshoe Bar. Machine drills are used. There is a small stamp mill on the property, but the present company has not crushed much gravel.

Ralston Divide Gravel Mine. California and Hawaiian Development Company, owner; J. S. McCandless, president; office 859 Mills Building, San Francisco. The property consists of about 15 sections, 9600 acres, in townships 13 and 14 N., R. 12 E., and townships 13 and 14 N., R. 13 E., on Ralston Divide, between Long Canon and Middle Fork of American River. The claims cover a length of about 14 miles. Of the total holdings, 1060 acres are patented and patents for more have been applied for. The mine is reached from Auburn via Michigan Bluff by 30 miles of road and 9 miles of trail; or via Georgetown to Barton's Cabin by 30 miles of road and 8 miles of trail. There is also an old road from Soda Springs station.

The present company has had the property since 1908, and has expended to date probably over \$150,000 for equipment and development work on the portion for which patent is being sought.

Geologists and engineers believe that the channel under this property is the extension of the channel mined in the Paragon at Bath. The series of interstratified layers of gravel and rhyolite tuff is 160 feet thick or more, and is much wider than at Bath.

The portal of tunnel No. 1 is in the northeast ¼ of section 5, T. 13 N., R. 12 E. This tunnel is 7 ft. by 8 ft. in cross section and about 4700 feet long. About 2500 ft. of drifts and 1000 ft. of raises were run from this tunnel, and 15 diamond drill holes were put up. This work cost nearly \$75,000.

Tunnel No. 2 is somewhat over a mile south, a little west of No. 1. It is 145 feet long, with an incline 153 feet long, and a crooked drift about 280 feet long from the foot of the incline.

Tunnel No. 3 begins near the center of the northwest ½ of section 8, T. 13 N., R. 12 E., and has probably reached a length of 1600 feet by this time. It runs nearly northeast; 775 feet from the portal, a raise of 14 feet connects with the drift from the bottom of the incline from No. 2 tunnel. A good deal of this later work is along the channel. No. 2 and No. 3 tunnels are 8 ft. by 8 ft. in cross section.

There is a power house generating 100 h.p. on the lower part of Brushy Creek, from which a power line runs south nearly two miles to supply power for the compressor at No. 3 tunnel and for other needs. There are also blacksmith shops at No. 2 and No. 3 tunnels, sluices and camp buildings. All the above workings and plant are at Ralston's on the western end of the divide.

Besides the above, considerable has been done at the Goggins hydraulic pit, in the southeast ¼ of section 22, T. 14 N., R. 13 E. The hydraulic pit here is 500 feet long, 90 feet wide and 60 feet in average

depth. A tunnel driven from this pit is 755 feet long in the direction of the channel (NW. and SE.) with about 750 feet of branch drifts. There is also a compressor house and compressor, blacksmith shop sluice boxes, camp and hydraulic equipment. The Lambert ditch, 22 miles long from French Meadows on the Middle Fork of American River, can deliver an ample supply of water for hydraulicking. There is an abundance of good timber on the property.

HYDRAULIC MINES.

There was no activity in hydraulic mining in the county during 1920. A little preliminary work was done at the mine named below early last year. This property has never been adequately covered heretofore in the Bureau's reports, and as it appears to be well worthy of attention, some data are given here about it.

Lost Camp Hydraulic Mine. Located in sections 22 and 23, T. 16 N., R. 11 E., 2 miles by road from Blue Canon at an elevation of 4300 feet. There are 440 acres of patented land in the property, of which about 140 acres is mining ground. Under lease and option in 1920 to J. S. Day et al., trust deed held by E. T. Robie, Auburn.

The deposit contains interbedded layers of rhyolite tuff and auriferous quartz gravel lying on slaty bedrock. The best pay is said to be well above the bedrock. The direction of the old stream was westward. The gravel is free wash, carries no overburden, and the boulders are mostly of quartz and medium sized. A good amount of water is desirable in piping on account of the quantity of tuff in the bank. The ground lies on a bench between Texas Gulch and a branch of Blue Canon Creek, and there are steep canons on both sides.

The Slums Cut on Texas Gulch was on the rim on the northeast. It is said to have paid well for ground sluicing. The Miller Cut is on the rim on the southeast and is about two acres in area. It is said to have paid \$80,000 for hydraulicking. The Boston Cut on the Blue Canon side, is estimated to be about 600 feet long, 300 feet wide and 100 feet deep, covering about four acres in area. The total yield of the property is locally reputed at "several hundred thousand dollars," but it has been worked over such a long period by so many different small operators that a definite figure is hard to arrive at. Day made a short test run in the Miller Cut early last year and claims the result was very satisfactory. There is about one-third of a mile of channel remaining unworked between the east and west pits.

The property is equipped with 1500 feet of old pipe from 14 inches diameter down, one giant and a few hundred feet of sluices. A water right on Blue Canon is owned but the two miles of ditches are in bad shape. Water can be bought during six months in winter and spring from Pacific Gas and Electric Company. The present pipe line gives 100 feet fall, but needs to be replaced. There is ample room for building a series of dams in Blue Canon Creek for storing tailings. The bedrock cut in Boston Pit should be deepened to give grade for more piping on that side.

GOLD DREDGERS.

There is only one dredger in operation in the county at present. The dredger formerly operated by the El Dorado and Placer Counties Gold Mining and Power Company on the Middle Fork of American River, and the one operated by Lawrence Gardella at the old placer mining camp of Virginia, between Newcastle and Lincoln, have both been out of commission several years.

Pacific Gold Dredging Company, 582 Market street, San Francisco, California. The dredger formerly operated by this company near Mammoth Bar on the Middle Fork of American River, finished

work there about three years ago and has been moved to the North Fork of the river below Applegate. This dredger is now the principal gold producer of the county.

Seventeenth Annual Report of the State Mineralogist, 1920, Pages 441 to 453

Note: This file does not include Granite quarries, Iron, Limestone and Marble; Pp. 453 to 454