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CALIFORNIA STATE MINING BUREAU
FERRY BUILDING, SAN FRANCISCO
FLETCHER HAMILTON State Mineralogist

Mines and Mineral Resources

Of the Counties of

Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus

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Field Assistants

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INTRODUCTION.

The group of counties presented in the chapters herewith covers the great San Joaquin Valley section of California, from its junction with the Sacramento River to its extreme southern limits (except Tulare County, for which the field work is not yet completed). It extends into the Coast Range Mountains on the west, to the summit of the Sierra Nevada Mountains on the east, and into the desert region for a short distance south and southeast of the Tehachapi where those two mountain systems come together. In this district are found such natural wonders as the Yosemite Valley, the Mariposa and General Grant Park Big Tree Groves, the Kings River Canyon and the Devil's Post Pile. Of mineral and geologic interest, we find the southern end of the great Mother Lode Gold Belt; also the Kern and Fresno County oil fields, the two largest petroleum producing districts in California. This branch has already been covered in a special report. In the valley sections, of course, agriculture is the dominant industry; dairying also is prominent. Both in the valley and in the mountainous sections stock raising is an important industry.

The valley is traversed north and south by two transcontinental railroad systems, and tapped at its northern end by a third. Several oil pipe lines carry the product of the wells to refineries and distributing points at tidewater.

This report represents the results of about three months' field work by the several authors, more or less simultaneously in their various areas, during the late summer of 1914. We have here endeavored to record all of the mineral resources and properties which have been the subject of commercial exploitation, as well as to mention some additional occurrences, as yet undeveloped.

Acknowledgment is here made of assistance rendered by the various owners and operatives of properties, both during the field work and in the subsequent preparation of this report.

FRESNO COUNTY.

By WALTER W. BRADLEY, FIELD ASSISTANT.

Field Work in August and September, 1914.

Fresno County was created April 19, 1856, and up to 1893 included the territory now in Madera County. In the early days, Millerton, now abandoned, near Friant, was the county seat. It is still among the larger counties of the State, having an area of 5977 square miles, or nearly three times that of the State of Delaware. Madera and Merced

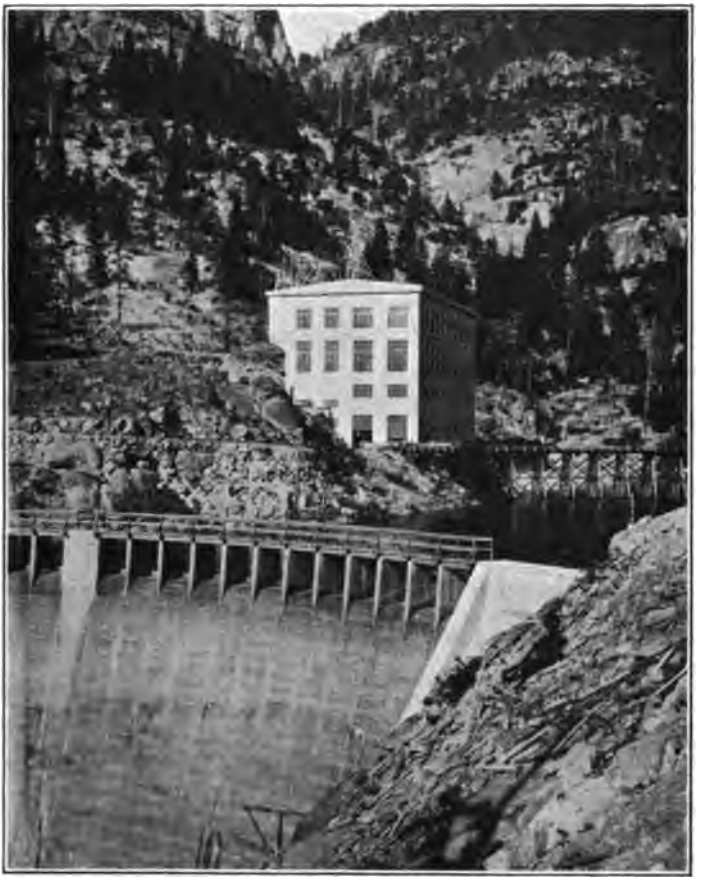


Photo No. 68. No. 1 power plant of Pacific Light and Power Company, at Cascada (Big Creek Post Office), Fresno County. Dam retains water for No. 2 plant, five miles below.

counties are on its north, Mono and Inyo on the east, Tulare and Kings on the south, with San Benito, Monterey, and San Luis Obispo adjoining it on the west. The San Joaquin River separates Fresno from the first named county, and the eastern boundary runs along the summit of the Sierra Nevada Mountains. Along this line are numerous peaks

exceeding 13,000 feet in elevation above sea-level, among which may be mentioned Mt. Abbott, 13,736 feet; Bear Creek Spine, 13,705 feet; Mt. Humphreys, 13,972 feet; Mt. Darwin, 13,841 feet; Mt. Powell, 13,361 feet; Agassiz Needle, 13,882 feet; Mt. Winchell, 13,749 feet; North Palisade, 14,254 feet; Middle Palisade, 14,049 feet; Mt. Pinchot, 13,471 feet, and University Peak, 13,588 feet. At the Kearsarge Pass the trail to Independence in Inyo County crosses the divide at an elevation of 11,823 feet. The western boundary of the county follows along inside of the first line of ridges of the Diablo Range, just back from the edge of the San Joaquin Valley.

Photo No. 69. Generators and water wheels, No. 1 power plant, Pacific Light and Power Company, Cascada, Fresno County.

The main drainage systems of Fresno County are those of the San Joaquin and Kings rivers and their branches. Much has been written and much more could be written of the wonder and rugged grandeur of the Sierran streams, canyons, cliffs, peaks and snowfields, delightful camping spots and unexcelled trout fishing—but they are here merely mentioned in passing. The streams of the western side of the county are only seasonal creeks, being dry in summer and lost sight of in the valley flats, except in times of exceptional winter rains.

In the valley proper, with water drawn from the San Joaquin and Kings River systems (principally the latter), over 400,000 acres of land are under irrigation. The various systems serving the county comprise some 450 miles of main ditches, with capacity exceeding 6000 cubic feet per second; also about 5000 miles of distributing canals. Water is sold

at the rate of 62½ and 75 cents an acre yearly. The census of 1910 showed 888 pumping plants in the county, with a capacity of 515,380 gallons per minute, and the cost varies from $1.50 to $4 per acre. The number of pumping plants has increased rapidly since 1910. The Hume-Bennett Lumber Company, with a 75-mile flume, utilizing water from the Kings River, transports lumber from its mill at Hume to the railroads at Sanger. Its production is approximately 35,000,000 feet per year. The Fresno Flume and Lumber Company, with mills of an equal capacity at Shaver, ship via a 45-mile flume to Clovis. The

Photo No. 73. Transmission tower, 150,000 volts. Pacific Light and Power Company, near Cascada, Fresno County.

water discharged from these flumes at their terminals is used for irrigation in the valley.

As to power for mining, industrial and agricultural purposes, this territory is well provided. Besides the electric power lines, many pumps for irrigating are driven by distillate engines and some by crude oil, the proximity of the oil fields at Coalinga being an advantage. The San Joaquin Light and Power Corporation distributes 40,000 horsepower in Fresno County, provided by two hydroelectric plants in Madera County and a steam plant in Fresno. Its main transmission is at 60,000 volts to its substations. In addition this company has power plants in Kern County. The Pacific Light and Power Company, though it does not distribute any power in Fresno County, has two

hydroelectric plants on Big Creek, a branch of the San Joaquin River. These two plants are each ultimately to have 60,000-kilowatts capacity, one half of which being at present installed and in operation. No. 1 plant (see photos Nos. 68 and 69) at Cascada (Big Creek post office), operates with a static head of 2104 feet (950 pounds per square inch, gauge pressure at the water wheels); while No. 2 plant, 5 miles below, has a 1900-foot head. The power is taken through to Los Angeles by a 150,000-volt transmission with aluminum cables on steel towers (see photo No. 73).

The county is traversed by two transcontinental railroad systems—the Southern Pacific and the Santa Fe. There are six oil pipe lines transporting crude oil from and through Fresno County. The Associated Oil Company has two 8-inch lines to Port Costa and a 6-inch line to Monterey. The Standard Oil Company has two 8-inch lines to Point Richmond, and the Producers Transportation Company has an 8-inch line to Port Harford. The Shell Oil Company is building an 8-inch line to Martinez.

The farm, fruit and lumber products of Fresno County at the present time total about $30,000,000 in value annually. Its total mineral product for 1913 was valued at $8,438,810. The total recorded mineral output of the county to the end of 1913 (see table opposite) is $67,669,637, from which we have deducted $1,375,000 gold and silver yielded from 1880–1892 by the territory then in Fresno, but now a part of Madera County. This leaves a net value of $66,294,637. The products in the order of their value to date are: petroleum, stone industry, copper, brick, gold, magnesite, mineral water and silver, with asphaltum, chrome, clay, coal, gypsum, gems, natural gas, and quicksilver, making up the list, combined under "miscellaneous and unapportioned." In addition, occurrences are known of asbestos, marble, pumice, limestone and tungsten, but they are as yet undeveloped.

ABRASIVES (see Volcanic Ash).

ASBESTOS.

J. E. Ellwood of Sanger, reports that he has a deposit of amphibole asbestos 30 miles east of Sanger. It is undeveloped.

Hogue and Phillips Claim. R. L. Hogue, Fresno, and Mr. Phillips, Letcher, owners. Some small bunches of asbestos have been taken out from this prospect in T. 13 S., R. 23 E., 12 miles north of Sanger.

Bibl.: Bull. No. 38, p. 262.

ASPHALT.

There is no natural asphalt occurring in Fresno County, but the manufactured article is obtained from the residue in the refining of crude petroleum. In the earlier statistical reports its value was given,

ut as it is included in the value of the crude oil from which it is erived, refined asphalt is not now entered independently; to do so ould result in a duplication. The California Fresno Oil Company, . Buttner, Fresno, manager, is the only refinery producing asphalt in his county. Its output is small.

BRICK AND CLAY.

Boger Gravel Pit (see under Stone Industry).

Craycroft-Herrold Brick Company. C. J. Craycroft, president; F. J. Craycroft, secretary; office, 407 Griffiths-McKenzie Building, Fresno.

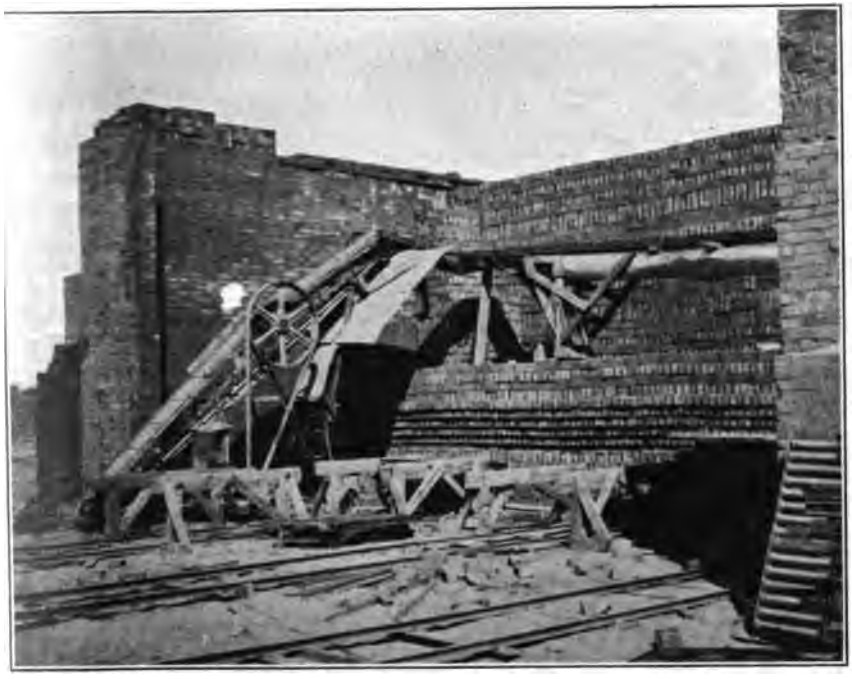


Photo No. 27. Brick elevator and conveyor, (electric driven), for charging kiln. Craycroft-Herrold Brick Company, Fresno County.

The plant of the company is at Crayold siding on the Kerman branch of the Southern Pacific Railroad, 3 miles west of Fresno. Under the name of C. J. Craycroft & Son Brick Company, a plant was formerly operated about 1 mile south of town. The present plant, which started in 1911, has a daily capacity of 50,000, and electric power is used. The clay is obtained from a superficial, flat valley deposit about 5 feet thick. It is loosened by pick and shovel and trammed to the mill where it is ground and passed through a stiff-mud machine.

The rectangular stream of stiff mud is cut up by a wire cutting brick machine (see photo No. 25), from which it passes onto a belt conveyer.

As the conveyer moves slightly faster than the mud stream, the bricks are separated so that they can be easily taken up by hand and transferred to cars and then run to the drying sheds. They are burned in field kilne having permanent side walls, and oil-fired (see photo No. 28). An electric driven elevator and conveyor is used in charging the kilns (see photo No. 27). There are 7 field kilns with a capacity of

Photo No. 28. Crude oil burners for brick kiln, Craycroft-Herrold Brick Company, Fresno County.

700,000 each, and one circular kiln for re-pressed brick. From seven to ten days are required to burn a kiln. During seven months twenty-five to forty men are employed, according to the market demands, and five to ten men the balance of the year. The present outlook of the business is quiet.

Bibl.: Bull. No. 38, p. 242.

Fresno Brick and Tile Company. F. Dean Prescott, president; E. M. Prescott, vice president and manager; James A. Douglas, superintendent. Office, H and Mono streets, Fresno. The plant is at Mars siding on the Southern Pacific, about 1 mile southeast of the city limits. This company formerly operated north of town. The clay is loaded by hand to side-tipping cars and drawn by horses to the storage bin. After coming from the brick machine (see photo No. 25), most of the product is sun-dried, but some by steam. There are six field kilns, three of which have permanent side walls, and are oil-fired (see photo No. 28). Their

Photo No. 25. Wire brick cutting machine, Fresno Brick and Tile Company, Fresno.

capacity is 600,000 per kiln and seven days are required for burning. An average of thirty-five men are employed.

Bibl.: Bull. No. 38, p. 243.

CHROMITE.

Chromite occurs in a serpentine belt near Sentinel in T. 11 S., R. 23 E., and running southeasterly into T. 12 S., R. 24 E. The Copper King Mines Company, when operating its smelter, used chromite from this vicinity.

Frank Alexander, of San Francisco, has some claims in the northwestern part of Watt Valley, from which chromite has been shipped, but none recently.

Victor Roberts, of Coalinga, has a deposit of chromite in Sec. 9, T. 22 S., R. 14 E., southwest of Coalinga. There is said to be a large deposit of good quality near the center of T. 18 S., R. 13 E., northwest of Coalinga.

Bibl.: R. X, p. 189; XIII, p. 49; Bull. No. 38, p. 268; MIN. RES. WEST OF ROCKY MOUNTAINS, 1868, p. 224.

COAL.

In the southwest corner of Fresno County are two localities where coal occurs, and which were producing in the early nineties. In the Coalinga field, the San Joaquin Valley Company, west of Coalinga, was the principal producer, and in 1894 was shipping at the rate of 300 tons of coal per month, principally to Fresno. The other locality, known as the Priest Valley field, is near the junction of Fresno with San Benito and Monterey counties, and includes the Stone Canyon mine in the last named. This coal is semi-bituminous, while that of the Coalinga field is a lignite, as is most of the California coal.

With the rise of the petroleum industry our coal, because of its poor quality and its cost of mining, has been relegated to the background; in fact, its production has practically ceased entirely. No work has been done on the coal beds of Fresno County since 1896.

Bibl.: R. VII, pp. 148, 172; IX, p. 323; X, p. 186; XI, p. 217; XII, pp. 50–54; XIII, p. 53; Bull. 67, pp. 194, 196; U. S. G. S., Bull. 398, p. 49.

COPPER.

The principal copper district of Fresno County is in the southern extension of the "Foothill Copper Belt," of the western edge of the Sierra Nevada Mountains. The only property here which has made any noteworthy yield of copper so far is the Copper King mine, described below. Because of the success of this one, a number of claims and prospects have been located in its neighborhood, but none of them have amounted to anything as yet, and they are all now idle. This district in 1865 made shipments amounting to 1440 tons of copper ore.

Farther back and near the summit of the main range of the Sierras the mineralized belt, which is more prominently known at The Minarets in Madera County, passes through Fresno County. In this belt copper ore has been found on Mt. Godard at an elevation of 12,000 feet above sea level; but owing to its inaccessibility it is undeveloped. Other occurrences are noted below.

Bibl.: R. VIII, p. 209; X, p. 194; XI, p. 217; XII, p. 66; XIII, pp. 58, 59; Bull. 50, pp. 277–289; Bull. pp. 17, 40; MIN. RES. WEST OF ROCKY MTS., 1868, p. 174.

Ackers Claim (see Expositor).

Black Jack Claim. V. F. Moore, Kingriver, R. F. D., owner. It is in Sec. 14, T. 12 S., R. 24 E., west of Trimmer, and located in 1910. It is stated that the ore zone is 150 feet wide, carrying 2½ per cent copper, with occasional high grade bunches. There is a small tonnage of high grade ore on the dump. Assessments only are maintained. There are two shafts, 125 and 20 feet, respectively, the former having two crosscuts and an 18-foot drift. The vein strikes northwest and dips 75° NE. The hanging-wall is schist and the footwall granite.

Copper King Mine (see Hart Copper Company).

Expositor and Summit Claims. Henry Ackers, Sanger, owner. About Sec. 10, T. 12 S., R. 24 E., 10 miles south of east from Letcher. There are two adits on the Expositor, 100 feet each, and a 60-foot shaft, the latter being filled with water when visited. On the Summit there is an adit of 140 feet. Both oxidized and sulphide ores occur. Assessments only.

Bibl.: R. XII, p. 66; XIII, p. 58.

Fresno Copper Mines (one time called Heiskell). Fresno Copper Company, Ltd., owner; C. C. Leavitt, manager, 585 Jean street, Oakland. This group of five claims is in Sec. 10, T. 12 S., R. 21 E., 4 miles east of El Prado on the Southern Pacific Railroad. There is an extensive surface equipment, including a smelter with two furnaces of 200 tons capacity each. The smelter has never been operated, as it is stated that about the time it was completed the ore was found to fall far short of its expected value. Steam furnished the power for the hoist and air compressor, while the pump, lighting plant, sawmill and shops were operated by electricity from the San Joaquin Light and Power Company. A more detailed description of the property is given in Bulletin No. 50. Idle since 1908.

Bibl.: Bull. No. 50, pp. 279–281.

Hart Copper Company (formerly Copper King, Ltd.). Truman Hart, president; A. W. Anderson, secretary; office, 716 Griffiths-McKenzie Building, Fresno. The mine, which is patented, is in Sec. 3, T. 12 S., R. 23 E., east of Letcher, and the smelter is at Seal Bluff Landing on Suisun Bay, Contra Costa County. Under the Copper King Company, operation of both the mine and smelter was a failure, but the present owners, who bought the property at a court sale, have shipped ore to a custom smelter and made a profit above the purchase price. No output has been made since early in 1908, but the roads and equipment are kept in repair and a watchman is employed. They report a fair tonnage of ore blocked out and that it is intended to resume shipments when the market and transportation facilities

improve. At present it is a 17-mile haul to the railroad. See Bulletin No. 50 for a more detailed description.

Bibl.: R. X, p. 194; XII, p. 66; XIII, p. 59; Bull. 50, pp. 282–286.

Kenawyer Group. Mrs. V. Kenawyer, owner, Kenawyer via Hume. This group of eight claims is in Sec. 11, T. 13 S., R. 31 E., near the junction of Copper Creek with the South Fork of Kings River; elevation 6000 feet. Assessment work is maintained.

Bibl.: R. XI, p. 217; XII, p. 66; Bull. No. 50, p. 289.

Painter Mine. Imperial Copper Mining Company, owner. In Sec. 33, T. 11 S., R. 21 E., southeast of Friant. Patented. Several hundred tons of copper ore have been shipped. Idle for years.

Bibl.: Bull. No. 50, p. 278.

Pleasant View (see Apache under Gold).

Uncle Sam Group. W. C. Luce et al., Trimmer, owners. This group of eight unpatented claims, located in 1906, is in Secs. 2 and 3, T. 12 S., R. 29 E., on Crown Creek, opposite Tehipite Dome, and 59 miles east of Piedra on the Santa Fe Railroad. It is in an almost inaccessible position above Tehipite Valley on the Middle Fork of Kings River. Elevation 5500 feet (U. S. G. S.). Development consists of a 30-foot shaft with 8 feet of drift, an adit of 50 feet, and some small surface cuts. The vein is from a few inches to two feet in width and carries azurite, malachite, bornite and magnetite. A large proportion of the mineral claimed by the owner to be bornite proved on examination to be magnetite. The country rock is schist and slate, but near the contact with the granite composing Tehipite Dome. Three men were at work this summer (August, 1914). Abundant hydroelectric power could be developed.*

No doubt this high Sierran mineral belt will be developed some day, but in its present state of lacking transportation, the writer can not see how anything but a high grade free gold proposition could be made to pay, much less a copper mine.

DIATOMACEOUS EARTH (see Infusorial Earth).

FELDSPAR.

J. K. Apperson and C. C. Overstreet, of Trimmer, have three claims located on a deposit of feldspar in Sec. 34, T. 11 S., R. 25 E., 5 miles northeast of Trimmer and 2 miles southwest of the Contact mine. Beryl and topaz are stated to be associated with the feldspar.

*September, 1915.—Luce reports opening up in the shaft, this summer, a body of high grade ore, and that it is the intention to ship two or three carloads to the smelter before snow closes the trail for the winter. It will be packed, via Dinkey Creek, 35 miles to a spur of the San Joaquin and Eastern Railroad near Shaver. Specimens of this ore shown us, carry mainly bornite and magnetite with some visible free gold.

FULLER'S EARTH.

A number of claims have been located in the Kettleman Hills section, southeast of Coalinga, on deposits reported to be fuller's earth. As far as we could learn, no practical tests of its value as a filtering and decolorizing medium have been made.

The *Walker-Mundy* claims, located by I. H. Patterson, A. D. Ewing et al., of Fresno, are in Sec. 32, T. 21 S., R. 17 E. Material from these claims, on examination in the laboratory of the State Mining Bureau, proved to be a volcanic ash, not particularly fine grained.

At Wahtoke siding on the Piedra branch of the Santa Fe, 5 miles north of Reedley, there is a stratum of white material 5 to 10 feet thick, said to be fuller's earth. It is exposed in a cut, where earth for railroad fills is being taken out with a steam shovel.

GEM MATERIALS.

Beryl and Topaz (see note under Feldspar).

Californite. "Jade mine." Nat Parker and Prothero Bros., Visalia, owners. On the south side of Watt Valley, in Sec. 5, T. 12 S., R. 24 E., located in 1909. The product has been marketed through the Southwest Turquoise Company, 318 West Fourth street, Los Angeles. There is a series of small adjacent veins totaling about 3 feet wide, in serpentine, exposed in several surface cuts and a shallow shaft. So far as developed the material is more or less fractured. The vein strikes southeast and dips northeast, nearly vertical. At present only assessment work is done. There is a white garnet associated with this californite. Because of occasional bright green spots in the mineral, it was thought by some locators to carry nickel, but an analysis made in the laboratory of the State Mining Bureau shows no nickel present.

Bibl.: Bull. 37, p. 94; Bull. 67, p. 125; U. S. G. S., Bull. 262, pp. 72–74; Min. Res. 1902, p. 747; 1911, Pt. 11, p. 1044.

Hyalite has been found at one or two points in the Sierras in Fresno but not exploited.

Tourmaline. Red and green tourmalines are found in quartz on the White Divide, south of Mt. Godard, at an elevation of about 12,000 feet. A few stones from here have been cut for gems. On Spanish Peak, in Sec. 1, T. 12 S., R. 28 E., at an elevation of 9700 feet there is a ledge of white quartz in schist, carrying brown garnets and green tourmaline. The material on account of being somewhat shattered and translucent, is not suitable for gems except occasional small crystals of the tourmaline. A mining location had been at one time filed on this ledge and a small hole blasted out.

Vesuvianite (see Californite).

GOLD.

In the early days and up to as late as 1903 more or less placer mining as well as quartz, was carried on in many of the gulches and canyons in the foothill region of the Sierras in Fresno County. Among these may be mentioned particularly Temperance Flat, Sampson's Flat, Big Dry Creek district, and along the San Joaquin River around old Fort Miller above Friant (formerly Pollasky). Most of the placers, being only superficial, have been worked out. Some of the quartz properties have been abandoned, and others consolidated, so that many of the names listed in the older reports do not now appear.

Photo No. 34. Two-stamp mill at Apache Mine, Trimmer, Fresno County.

Alice, Babby and Cloud Claims. William Terrill, Trimmer, owner. On Eagle Peak north of Trimmer. Assessments only.

Apache (formerly Pleasant View). Wm. Terrill, Trimmer, Dr. Powers et al., of Sanger, owners. There are two unpatented claims, on the north bank of the Kings River, in Sec. 20, T. 12 S., R. 24 E., 1 mile south of Trimmer Springs. The ore occurs as an impregnation in mica schist at a contact with serpentine. Granite is near-by on the west of the schist. The ore is principally base (pyrrhotite, chalcopyrite and pyrite), carrying some values in copper besides a little free gold. A working test at the Selby smelter is stated to have yielded

$22.50 per ton, concentrates 10 per cent, assaying $115 per ton. A 700-foot adit had crosscut the ore zone (August 1, 1914) showing a width of 10 feet at a depth of 440 feet. Other developments consist of shallow surface workings. Equipment includes a 2-stamp triple-discharge mill with a 2½-foot by 10-foot plate, and a 6-foot Frue vanner, driven by a 9 horsepower gasoline engine (see photo No. 34). Water is pumped from the Kings River to tanks above the mill. Concentrates will be shipped. Four men at work.

Arkansas, Black Bull and Arrastra Claims. Wm. Terrill et al., Trimmer, owners. On Sycamore Creek, in Sec. 5, T. 12 S., R. 25 E. There are two tunnels aggregating 500 feet. Assessments only.

Bantam Prospect. J. R. Fike, Trimmer, owner. On agricultural patented land, in Sec. 24, T. 12 S., R. 24 E. There is an incline shaft down 65 feet and a drift south 40 feet with a winze 50 feet. The quartz vein between granite walls is from a few inches to 2 feet wide, carrying pyrite, chalcopyrite and marcasite. Values are bunchy, said to average $4 to $5.

Benson (see Little May).

Big Sampson (see Delilah Mining Company).

Black Jack (see Delilah Mining Company).

Boger Gravel (see under Stone Industry).

Brushy Ridge Mining Company. M. Finnegan et al., Dunlap, owners. This group of eight claims is between the M. and M. and the Dixie Queen, about a mile from Dunlap. Elevation 1800 feet (bar.). The present company has had the property since January, 1907. The old shaft, down 30 feet, is said to have yielded a pocket of free gold ore which was treated in an arrastra. There are two short adits. The new incline shaft is down 206 feet, with a crosscut of 50 feet at the 200-foot level, showing the vein 12 feet wide, assaying $1 per ton. Drifting has not yet reached the ore shoot. Country rock is schist. Equipment includes a geared hoist with a 9 horsepower gasoline engine, 6-inch blower and a "bulldozer" pump.

Richard Burton and Joe Kesterman are working a placer claim on Laurel Creek in the NW. ¼, Sec. 11, T. 10 S., R. 26 E., 4 miles northeast of the Dinkey Creek Ranger Station.

Cloudburst Mining Co. (quartz), on Home Camp Creek near Cascada (Big Creek P. O.), is maintaining assessments only. J. St. Claire, Preston, Idaho, P. Donovan et al., owners.

Contact Mining and Milling Company (one time known as McDuff and McMurty, also Ira Hawk). J. K. Apperson, president; C. C.

Overstreet, secretary. Post office, Trimmer. There are three unpatented claims on unsurveyed land, about Sec. 23, T. 11 S., R. 25 E., 9 miles by trail from Trimmer, and 22 miles northeast of Piedra. Elevation 2750 feet (bar.) at the mill. The mine was first opened up in 1890 and worked with an arrastra. The present owners have worked it since 1894, incorporating in 1914. The ore occurs in a flat-lying vein

Photo No. 36. Straub patent mill (ten 175-pound stamps) at Contact Mine, Fresno County.

in granite (somewhat decomposed) and carries free gold, also galena and pyrite; average value stated to be $21.25 per ton, including a little silver. The sulphide ore occurs principally on the west and south, the oxidized ore being to the north and east and carrying the gold mostly in the ochre along the footwall. The pay shoot varies from 4 inches to 2 feet in width. Being a flat deposit all underground work is on the vein, including a 110-foot adit and two 60-foot drifts. The ground

between the latter two will be stoped out, allowing it to cave behind the work. A depth of 50 feet below the surface is reached. The ore is sledded to the mill about ½ mile.

A Straub patent stamp mill is used (see photo No. 36). This has ten 175-pound stamps, operating in a circular mortar, at 115 drops per minute, 5½-inch drop, with a 40-mesh, diagonal slot screen, and amalgamated plates. It is driven by a 6 h.p. distillate engine. The capacity is given at four tons per twenty-four hours. Five men were employed (July, 1914). There is another vein ¼ mile to the south, 3 feet wide, strike east, dip 45° S., said to assay $11.60 gold and 10 cents silver per ton. There is a tunnel in 90 feet. A cross vein carrying no values runs north and south between the two.

Davis Flat Mine (one time called Little Monitor). Davis Flat Mining Company, owner. T. Elliott, president. Office, Selma. It is in Sec. 1, T. 13 S., R. 26 E., on Sampson Creek about 10 miles northeast of Dunlap. The ore is free milling quartz from a series of gash veins. Development work consists of a 75-foot adit, with 60-foot winze, open cuts and some small stopes and short drifts. Between 400 and 500 tons of ore have been milled, mostly from the open cuts, said to have yielded $12 per ton. There is a 5-stamp mill with 1250-pound stamps, but the earlier milling was done with an arrastra. Worked intermittently; idle since 1912 except for assessments.

Bibl.: R. XII, p. 129; XIII, p. 168.

Delilah Mining Company (includes the Big Sampson, Black Jack, Gilkie, and Hercules). W. J. Kyle, president; Earl Covel, secretary. Home office, Coalinga. This group of eight claims is in the NE. ¼, Sec. 14, T. 13 S., R. 26 E., 8 miles north of Dunlap, elevation 4700 feet (bar.). There is a good road from Dunlap to within 1½ miles. It is within the boundaries of the Sequoia National Forest. The timber consists of oak, yellow and sugar pine, and water is obtained from springs. The principal vein as seen on the surface appears to be on the contact between an altered pyroxenite and a schist. Under the microscope the pyroxenite shows considerable secondary pyrite impregnating the phenocrysts as an alteration product. There are several shallow surface cuts, a tunnel in 700 feet and two shafts, 90 and 50 feet, the latter with a 30-foot drift. Some years ago the former owners had a cannon ball mill, also a Huntington. There is a 9″ x 10″ x 12″ Sullivan compressor, steam driven; and a Leyner-Ingersoll water drill is being used. Wood costs $2 per cord, and one cord per day (one shift) is consumed. Five men were at work (August, 1914). The tunnel is being driven to crosscut the vein.

Bibl.: R. VIII, p. 207; XII, pp. 127, 128; XIII, pp. 165, 166, 167, 171.

Dixie Queen Mining Company. John Whitt et al., Visalia, owners. This ground is northwest of the Brushy Ridge group, in Sec. 4, T. 14 S., R. 26 E., near Dunlap. There is no vein but the "ore" is an impregnated schist. Reduction equipment consists of a Dodge crusher, and a California roller mill (Chilian), driven by a 25 h.p. Fairbanks-Morse crude oil engine. There is also a 10″ x 12″ air compressor. Only a limited amount of development work has been done. Idle since May, 1914.

Dodge Placer. John Dodge, owner. This placer mine at Kaiser Creek Diggings, in Sec. 4, T. 7 S., R. 25 E., 12 miles due north of Cascada (Big Creek post office), has been worked in a small way by the owner for several years past. Elevation 5500 feet. (U. S. G. S.)

Eastwood Prospect, on the J. S. Eastwood ranch, in Sec. 30, T. 12 S., R. 25 E., south of Trimmer. J. S. and J. C. Riffe, of Kingriver, own an undivided half interest in the mineral ground. There are three shafts, 93, 45, and 37 feet, respectively. The first one shows the vein 5 feet wide, strike northwest, dip 30° NE. and steeper with depth. The footwall is granite and the hanging-wall schist. The 37-foot shaft shows a 33-inch vein of quartz. No ore has been milled as yet. Assays are stated to show $31.40 gold with a little silver and an occasional trace of copper.

Eliza Jane Mine. Owners, Clark-McClurge Company, 716 Griffith-McKenzie Building, Fresno; A. W. Anderson, secretary. R. W. Watson et al., Fresno, care of San Joaquin Light and Power Company, have a bond on the property. It is in the Hughes Creek District in Sec. 29, T. 12 S., R. 24 E., 4 miles north of Piedra, elevation 1150 feet (bar.) at tunnel. It was first worked about 1889 by V. Moore. The present owners have had it since 1904, having produced about $100,000, working at intervals. The ore body is a fissure vein in a hard schist, the value being mostly in free gold with some galena and pyrite. The vein varies from 16 inches to 3 feet in width, strike about N. 50° W., and dip E. nearly vertical. Adjacent to the vein the wall rock is schistose, but it grades through fine-grained to a coarse-grained gabbro.

There is a total of over 4000 feet of workings and a depth of 280 feet below the outcrop is reached in the winze from the main adit which is in 500 feet on the vein. The winze is down 145 feet and has drifts of 200 feet south at 90 feet; 60 feet south at 130 feet; 30 feet south and 20 feet north at bottom. In the last named the vein is 3 feet wide, said to mill $30. Both overhand and underhand stoping has been done. A width of 5 feet was stoped, averaging $12 per ton milled, the schist assayed $6 per ton. Though idle when visited (July, 1914) the mine was being kept unwatered by the watchman, pumps being driven by

compressed air. There is a 50 h.p. motor for the compressor, a 10 h.p. motor for the hoist at the winze, and a 15 h.p. motor for the Huntington mill. There are three 23-ton cyanide leaching tanks for tailings treatment. Power is obtained from the San Joaquin Light and Power Company.

Gilkie (see Delilah Mining Company).

Gilroy Claim. Henry Sullivan, Grabner, owner. This claim is in Sec. 17, T. 10 S., R. 22 E., on Temperance Flat, 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern Railroad, elevation 1000 feet (U. S. G. S.). It was located in 1896 and only assessment work done until 1913 when a new ore shoot was struck. The country rock is a decomposed granite and the quartz vein carries free gold, galena and pyrite, stated to mill $27 per ton in free gold. The vein averages 10 inches wide and strikes northeast, dipping 48° NW. The adit showing the new shoot is in 92 feet on the vein with a winze down 45 feet from which ore has been stoped for 30 feet along the vein. There is a 70-foot winze in the older workings. The ore was milled at the John L. mine adjoining, which arrangement will continue when work is resumed this fall.

Graveyard and Vulture. Ira F. Hawk, owner. Near Pine Ridge. Assessment only.

Hercules (see Delilah Mining Company).

Independence Group (Collins). Bert Sides and Bert Ashbrook, Kingriver, R. F. D., owners. This group of three parallel claims adjoins the Eliza Jane mine on the southeast, in Sec. 29, T. 12 S., R. 24 E., 4 miles north of Piedra; elevation 1000 feet (bar.). There are three veins, the middle one of which is the extension of the Eliza Jane, and like it, carries free gold, galena and pyrite in quartz. The wall rock is the same hard schist, and the vein is from a few inches to 2 feet in width. There are three adits, 100, 60 and 40 feet, and three shafts, 65, 50 and 45 feet. No stoping has been done as yet, but drifting has yielded a small tonnage of ore of which twelve tons treated in the Eliza Jane mill in February last, gave $25 per ton on the plates. Two men at work.

Robt. Ingelhardt is working a placer claim on Kaiser Creek north of Cascada.

Inyo (see John L.).

Iowa, a placer property on the San Joaquin River about 6 miles above Friant. Idle past eight years. It was worked by ground sluicing, using a turbine wheel and six 6-inch centrifugal pumps.

Jenny Claim, Olof V. Blom et al., Fresno, owners, P. O. Box 1006. It is in NW. ¼, Sec. 16, T. 13 S., R. 27 E., 5 miles northwest of Millwood. The quartz vein carries principally arsenopyrite, with some pyrite and chalcopyrite, said to assay $15 per ton in gold and silver with a little lead and copper. There is one adit of 115 feet; another 206 feet with 45 feet of crosscut at the end, and a shaft of 50 feet. It is proposed to put in a "Blom Patent Roaster and Fume Condenser" (U. S. Pat. No. 1098611) this fall to treat the ore, of which there is a small tonnage on the dump from development work.

John L. Mine (one time called Inyo, also Martin; known locally as the Sullivan). John Sullivan and Mrs. Henry Sullivan, Grabner, owners. This mine, on Temperance Flat, is in the SE. ¼, Sec. 17, T. 10 S., R. 22 E., 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern, by a fair road. It was located in 1853 and has been worked more or less regularly ever since—particularly the past thirty years, by Henry Sullivan. It is credited with a total output to date of over $75,000.

The vein, which is a fractured quartz, is between a talcose schist footwall and granite hanging and strikes northeast with dip 41° NW. It is proven for a length of 1500 feet on the surface by cuts and shallow shafts. The pay shoot is 12 to 41 inches wide and stated to be 1000 feet long. The old tunnel was in 1000 feet on the vein but is now caved and the new one 105 feet lower is in 600 feet with 200 feet of it on the vein. A raise is being driven to connect with the upper level. Originally an arrastra was used, and more recently a 1-stamp Kendall mill, steam driven. A 2-stamp Hendy mill, 1000-pound stamps, and a Frue vanner are to be installed this fall. Two men were at work (August, 1914).

Bibl.: R. VIII, p. 214; X p. 204; XII, p. 129; XIII, pp. 167, 171.

Kaiser Creek Diggings (see Dodge, also Ingelhardt).

Keeno and Joseph G. W. D. Coats, Fresno, owner. These are two patented claims at Temperance Flat. Idle.

Bibl.: R. XII, p. 129; XIII, pp. 167, 171.

Laurel Creek Mines (see Burton, Richter and Wakefield).

Little May Claim. Lawrence Benson et al., Burrough, owners. It is on Sycamore Creek, near Trimmer. The quartz vein carrying crystallized gold is in schist. There is a shaft down 40 feet and a tunnel in 60 feet.

Little Monitor (see Davis Flat Mining Company).

Low Pocket Mine. Owned by a Mr. Pearson, of Portland, Ore. It is in Sec. 28, T. 12 S., R. 25 E., southeast of Trimmer. It was so

named because of a pocket of several thousand dollars having been taken out at the surface a few years ago. Two men were at work on development this summer.

M. and M. Mining Company (formerly White Cross). W. A. Macdonald, president; G. A. Parker, secretary. Office, Dunlap. This company has a bond on the White Cross owned by Reed Bros., Reedley, and has in addition located several other claims on adjoining ground. The group is in Secs. 3 and 10, T. 14 S., R. 26 E., 1 mile southwest of Dunlap. There are two principal veins, the "White Cross" and the "Cross" which intersect. The former, which carries most of the values, is in schist near a granite contact, the granite being on the footwall side. The gold is mostly free, with some pyrite. On the 300-foot level this vein is stated to show average assays of $26.85 per ton for a length of 100 feet, the ore being 6 to 42 inches wide. On the same level the Cross vein is 4½ to 5½ feet wide and assays about $3 per ton. They have drifted 130 feet on the shoot and 125 feet on the Cross vein. The main adit (upper) is in 600 feet with a 150-foot vertical winze and a 90-foot crosscut at bottom. A new adit has been started to cut the vein 150 below the bottom of the winze. Idle, August, 1914, but work is to be resumed this fall. The former operators packed ore down by burros and sleds to the creek below (one summer about 1894), and put it through a 1-stamp mill, recovering $15,000.

Bibl.: R. VIII, p. 208; XII, p. 131; XIII, p. 170.

Martin (see John L.).

McDuff & McMurty (see Contact M. and M. Company).

Midas Claim. John Anderson, Grabner, and Mrs. E. A. Bonnell, Auberry, owners. This claim is at Temperance Flat, adjoining the Providence on the southwest. Anderson is working alone, drifting. There are two tunnels, 156 and 200 feet. Ten tons of ore recently treated by arrastra at the Providence is stated to have yielded $40 per ton. The pay streak is 8 inches wide in a 6-foot vein in granite.

Oro Fino No. 1 and No. 2. Adjoin Delilah at Sampson Flat. Abandoned.

Bibl.: R. VIII, p. 207; XII, p. 130; XIII, p. 168.

T. G. Price has been working a placer claim for several seasons on Dinkey Creek, 7 miles below Forest Ranger Station, about Sec. 3, T. 11 S., R. 26 E.

Providence Mine. Logan, Beard & Nelson, of Pine Ridge, owners. It is in Sec. 13, T. 10 S., R. 25 E., 2 miles north of west from the Dinkey Creek Station of the U. S. Forest Rangers. There is a 10-stamp mill on the property. Idle several years, except for assessment work.

Bibl.: R. XII, p. 130; XIII, pp. 169, 171.

Providence Claim (formerly Wide Awake). O. F. Sloan and Perry Tyre, Grabner, owners. It is on Temperance Flat, in SE. ¼, Sec. 17, T. 10 S., R. 22 E., 3½ miles northwest of Wellbarn Station on the San Joaquin and Eastern. Elevation 850 feet (U. S. G. S.). It was located in 1908. The vein is an ochreous quartz in decomposed granite. There is a vertical shaft of 50-foot depth, with a 38-foot drift. At 24 feet below the collar of the shaft is an adit in 200 feet. Wire gold shows in the ochre and quartz, the vein being about 8 inches wide. Three men were at work and an arrastra in operation (see photo No. 80). A 12 h.p. distillate engine furnishes power for the arrastra, pump and hoisting.

Photo No. 80. Arrastra and plant at Providence Mine, Temperance Flat, Fresno County.

H. Richter is working a placer claim at Cabin Meadow, in Sec. 14, T. 10 S., R. 26 E., on Laurel Creek, northeast of the Dinkey Creek Forest Ranger Station.

Rico Claim. John Bittern, Trimmer, owner. It is 3 miles north of Eagle Peak, north of Trimmer. The vein is reported to be 80 feet wide, with 20 feet of free milling ore assaying $10.50. There are three adits, 20, 40 and 60 feet. The footwall is stated to be serpentine and the hanging, slate.

Rosa Claim. T. S. and H. Schell and E. Bailey, owners, Hughes Creek via Sanger. It is in Sec. 18, T. 12 S., R. 24 E., 6 miles north of Piedra. The claim has been located and relocated several times in the past thirty years, and by the present owners in 1912. It is stated there are two veins at a contact between granite and schist. There are two adits, each in about 100 feet, one being a drift. The crosscut has not yet cut the vein. Assessment work only.

San Joaquin Claim. W. G. Walker, J. B. Baker and Dr. C. H. Power, owners; home office, Friant. It is located at Temperance Flat, in Sec. 17, T. 10 S., R. 22 E., 4 miles northwest of Wellbarn Station on the San Joaquin and Eastern railroad. Elevation 1350 feet (U. S. G. S.). This claim has been worked at intervals for some years, and by the present owners since April, 1914. The quartz vein is in decomposed granite, carrying free gold with some sulphides; strike northeast and dip 20° to 30° NW. The gold is stated to assay $14 per ounce. There is an incline down 100 feet on the vein and an adit below in 40 feet. A raise is being driven to connect the two. A 6 h.p. distillate engine runs the arrastra, which treats 2 tons of ore per twenty-four hours. Distillate costs approximately 14 cents per gallon at the mine, 4 cents of which represents the freight from Wellbarn Station to the mine. Two men were at work.

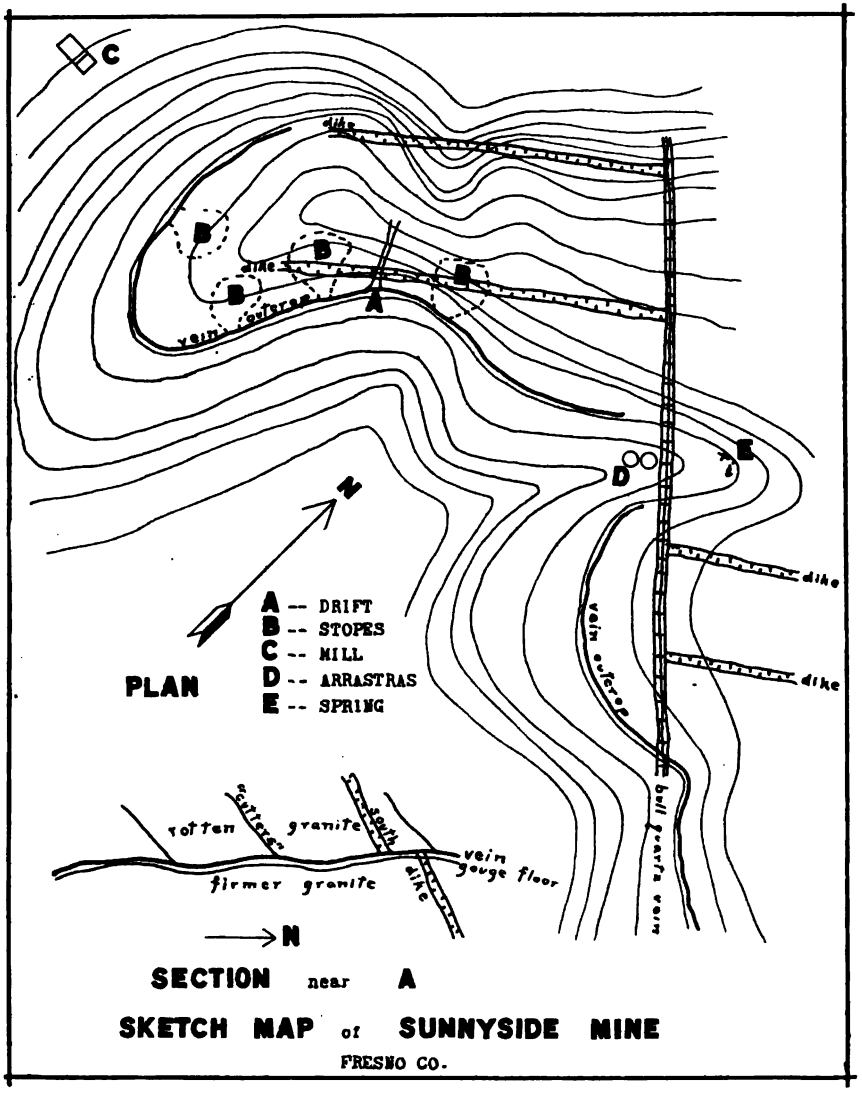
San Joaquin Rock and Gravel Co. (See under Stone Industry.)

John Ship and *Mr. Ward* have a quartz claim at Sample Meadow, about Sec. 18, T. 7 S., R. 26 E., north of Cascada (Big Creek post office). Assessments only.

Sullivan (see John L.).

Sunnyside Group. Sunnyside Gold Mining Company, owner; Edgar Van Meter, president; G. G. Parsons, secretary; L. B. Chenoweth, superintendent; office, Land Company Building, Fresno. This group is in the old "Sycamore District," now locally called Hughes Creek. It is located in Sec. 21, T. 12 S., R. 24 E., 18 miles northeast of Sanger and 5 miles north from Piedra Station of the Santa Fe Railroad. Elevation 1250 feet (bar.) at the mill, the mine workings being 250 feet higher. There are ten unpatented claims, first located over thirty years ago, but not much work done until 1903. All the gulches below have been placered.

The vein is flat, with occasional rolls and troughs and a slight dip to the south (see sketch map). The country rock is granite, the hanging-wall being softer and more decomposed than the footwall. There is an impervious clay gouge on the floor, which apparently prevented the waters, circulating along the fissure, from going into the granite below. The vein is from a few inches to 2 feet in width, and the gold is principally free, with some pyrite. High values are occasionally found in ochreous bunches. In the northern part of the area shown in the sketch map, outside of the vein as indicated, no gouge or mineralization has been found. The vein does not come to the surface on the north side of the hill. The dikes are aplite, and dip steeply to the north, the south one being displaced by the vein. Both



SECTION near A

SKETCH MAP of SUNNYSIDE MINE

FRESNO CO.

dikes are faulted by a heavy vein of bull quartz, which strikes northwesterly. The drift at "A" is being driven to crosscut the north dike and ascertain if the flat vein stops altogether or dips to the northwest and goes down steeper.

In the decomposed granite, which is partly granular in places, they use a 1¼-inch auger with ratchet and pressure drill. From 35 to 50 feet of holes per man per shift are drilled, and a special low Hercules 15 per cent powder is employed. In stoping, the ground is allowed to cave behind the work. The milling equipment includes a 2-stamp Krogh mill, with amalgamated plate 4 feet by 10 feet. Power is furnished by a gasoline engine. Six men were at work in July. The mine is credited with a total production to date of approximately $40,000, of which $17,000 was taken out from a single pocket and reduced in the arrastras.

Temperance Claim. Mrs. W. A. Field, Oakland, owner. This is a patented claim at Temperance Flat, northwest of Wellbarn. Idle.

Bibl.: R. XII, p. 131; XIII, p. 170.

Vulture (see Graveyard).

William Wakefield is working a small placer property in Sec. 13, T. 10 S., R. 26 E., on a branch of Laurel Creek, 4 miles due east from the Dinkey Creek Forest Ranger Station. Elevation 7000 feet (U. S. G. S.).

White Cross (see M. and M. Mining Company).

Wide Awake (see Providence, Temperance Flat).

GRAPHITE.

On the *E. D. Kean* ranch, in Sec. 12, T. 14 S., R. 24 E., 4 miles east of Squaw Valley post office, there is a deposit of graphitic schist. It has more or less quartz with it and is too impure to be of commercial value. There is also a similar occurrence on the Ruth ranch farther east.

A 15-inch vein of graphite is reported on Sycamore Creek near Trimmer, but we have not seen any samples of the material.

Bibl.: R. XIII, p. 642; Bull. 38, p. 280.

GYPSUM.

Gypsum is a hydrous calcium sulphate. Its color ranges through white, gray, yellow and red to darker shades, according to purity; and it is found massive, granular, fibrous and crystalline. Calcium sulphate occurring without water of crystallization is the mineral anhydrite. The uses of gypsum are many and varied. Calcined, it

is used as plaster of paris, and replaces lime for hardwall plasters. It is used as a retarder in the manufacture of Portland cement and in the preparation of fertilizers. It is also utilized in the paper, glass, dyeing and other industries. As a fertilizer, it is stated to be valuable in reclaiming "black alkali" land.

Coalinga Deposits. There are two deposits near Coalinga, one about 9 miles to the north and the other at the old San Joaquin Valley coal mine in Sec. 26, T. 20 S., R. 14 E. At one time a considerable tonnage of gypsum was shipped from both these properties, but they have now been idle several years.

Bibl.: R. XII, p. 323; XIII, p. 503; Bull. 3, p. 63; Bull. 38, p. 283.

Paoli Mine. A. P. Sheppard, C. S. Pierce et al., Fresno, owners. This deposit is on patented ground in Sec. 13, T. 15 S., R. 12 E., about 18 miles southwest of Mendota on the Southern Pacific. It was worked for a number of years and a considerable tonnage of gypsum shipped ground, for fertilizer purposes. On account of the expensive haul to the railroad the property has been idle the past four years.

Bibl.: R. XII, p. 323; XIII, p. 503; Bull. 3, p. 63; Bull. 38, p. 283.

Paul Schuck, of Fresno, has a deposit of gypsum on the west edge of T. 14 S., R. 12 E., from which shipments were being made via Firebaugh on the Southern Pacific, up to the end of 1913. Idle in 1914.

INFUSORIAL EARTH.

A. P. Sheppard, of Fresno, has a deposit of infusorial earth of good quality in T. 15 S., R. 12 E., southwest of Mendota.

LIME AND LIMESTONE.

Limestone occurs in T. 12 S., R. 26, 27 and 29 E., east of Trimmer, on the north side of the Kings River, also at Sampson's Flat, south of the river and north of Dunlap. Owing to their distance from a railroad these deposits are undeveloped.

Lime was at one time burned in a shaft kiln about ½ of a mile south of Dunlap and near the White Cross mine, but none has been produced for several years past.

Bibl.: R. VIII, p. 208; X, p. 185; XIII, p. 628; Bull. 38, p. 328.

MAGNESITE.

Magnesite is magnesium carbonate, $MgCO_3$, color snow-white to brown, hardness 3.5 to 4.5, sp. gr. 3.0 to 3.12. It is of frequent occurrence in the serpentine areas of California, particularly in the Coast Range, but also in the Sierran section, where the deposits in Fresno and Tulare counties are found.

The industrial uses for magnesite are many and varied, and the demand will no doubt increase materially in the next few years, particularly now that the Panama Canal gives the California product a cheaper entry into the eastern markets. For most purposes magnesite is calcined before using. The largest tonnage at the present time is used in the manufacture of bricks for the lining of basic Bessemer converters, both in steel and copper smelters. It is also employed in copper reverberatories, and other special metallurgical furnaces, such as for handling bullion, silver slimes, electric smelting, heating, welding and melting furnaces, calcium carbide kilns, and in the burning zone of rotary kilns in Portland cement plants.

Not as high a purity of material is necessary in furnace liners, particularly for steel, as in some other uses, for in the case of basic open hearth steel furnaces, while the magnesite must be free (or at least very low) from silica, it can carry a noticeable percentage of iron oxide or serpentine without impairing its efficiency. In fact, by some it is considered an advantage, as such impurities permit the sintering of brick at a lower temperature than is possible with pure magnesite. "Dead-burned" magnesite—that from which all the CO_2 has been expelled—is hard to handle, having little or no plasticity. Its plasticity is said to be improved by adding partly calcined or caustic magnesite.

Another extensive and expanding field for the employment of magnesite is in the manufacture of artificial stone, flooring, tiles, wainscoting, etc. These products are put on the market under various trade names, among which may be mentioned: idealite, marbeloid, monolith, karbolith, chemolith, etc. The magnesite floors being put in Pullman and other steel railroad coaches are of such products. The reaction made use of is that a moistened mixture of MgO and $MgCl_2$ will form a strong cement (known as oxychloride or Sorel cement). There should be an absence of lime, as calcium chloride is hygroscopic and on hydrating swells, destroying the usefulness of the material. Soluble silicates of the nature of "water glass" are also used with the magnesia. A similar magnesia cement is used as a paint, but of course applied thin with a brush. "Porcelith" and "Liquid Stone" are two brands prepared by San Francisco firms from California magnesite. For use on wood, where it acts as a fire retardant, it may be mixed still thinner and sprayed on.

In the "sulphite" process of paper manufacture, calcined magnesite is used as a carrier of SO_2 gas in the digester. The uses of the carbonic acid gas derived from calcining magnesite are well known, carbonating beverages, refrigeration, etc. For these purposes it is liquefied by compression, to facilitate its transportation. At the present time, however, as lime rock is obtained more cheaply and the calcined residue

is more readily marketed, no magnesite is being used on the Pacific Coast for the manufacture of CO_2. There are many other uses which will not be detailed here.

Production of magnesite in Fresno County began in 1904, with 38 tons reported, and the total recorded yield of the county to the end of 1913 has been 5643 tons, valued at $62,295 for the crude material at the mines.

Bibl.: Bull. 38, p. 327; Bull. 67, pp. 92, 93; U. S. G. S., Bull. 355 and 540, "CEMENTS, LIMES AND PLASTERS," E. C. Eckel, 1905, pp. 149–167.

Photo No. 33. Plant of Fresno Magnesite Company, Piedra, Fresno County.

Fresno Magnesite Company (one time locally called Bachler). M. F. Tarpey, president; A. B. Tarpey, secretary; office, Tarpey post office. This group of forty unpatented claims is principally in Sec. 5, T. 13 S., R. 24 E., ½ mile north of Piedra and on the opposite side of the river. Piedra is the terminus of the Santa Fe's Reedley-Piedra branch line. It was first worked in 1905, and most of the output to date from Fresno County has come from this property. The shipping point was formerly Sanger, a 15-mile haul, but since Hess' report* the Santa Fe branch above mentioned has been built and also an excellent steel bridge crossing the Kings River below the mine. The entire product has been shipped to the Hawley Pulp and Paper Company at Oregon City, Oregon. The haul from mine to rail costs 60¢ per ton, and a car per day can be loaded with one 4-horse team.

*U. S. G. S., Bull. 355, p. 51.

The magnesite occurs in a series of fissure veins in serpentine and metamorphic ferro-magnesian rocks. The main vein, which is 8 to 10 feet wide, strike W. of N., dip E. 50°, is developed by adits and has been worked by stoping. On the footwall it is more or less mixed with waste. The equipment includes a shaft furnace (see photo No. 33), fired by crude oil, with a capacity of approximately 25 tons per day. When operated, twenty men are employed. There was only a watchman on the property when visited (July, 1914).

Bibl.: Reports X, p. 185; XIII, p. 505; Bull. 38, p. 328; Bull. 67, p. 93; U. S. G. S., Bull. 355, pp. 50, 51.

Magnesite boulders have been noted in the "Big Blue" beds in the eastern foothills of the Diablo Range, between Cantua and Salt creeks, about 18 miles west of north from Coalinga. "They are not believed to represent an accumulation in any commercial quantity, but are mentioned only because they point to the presence of magnesite in the serpentine area on the west and prove that at least some of the magnesite veins originated in or prior to the early Miocene."*

L. F. Ward of Hopkins and Fourteenth avenue, Oakland, has a group of claims on a magnesite vein south of Kings River at Piedra, opposite to the mine of the Fresno Magnesite Company, and about ¾ of a mile distant south. The vein, about 8 feet wide, has an east-west strike and is developed principally by a series of shallow surface cuts, also a short tunnel. It is favorably situated for building a gravity tramway to land its product at the tracks of the Santa Fe a short distance below it. The magnesite appears to be of good quality.

Bibl.: U. S. G. S., Bull. 355, pp. 50, 51.

MARBLE

Ellison Bros., of Fresno, have claims located on a marble deposit on Big Creek, near that of the San Joaquin Marble Company, described below.

San Joaquin Marble Company, Emery Wishon et al., Fresno, owners. These claims, covering 125 acres, are in Sec. 36, T. 8 S., R. 24 E., on the south side of Big Creek, 5 miles below Cascada, the terminus of the San Joaquin and Eastern Railroad. Elevation 4000 feet (U. S. G. S.) The marble is only 2000 to 3000 feet from the railroad track, and 500 feet lower in elevation. There is ample electric power at hand, as the deposit is between the two power plants of the Pacific Light and Power Company, whose main transmission line passes near-by. Only minor development work has been done as yet, but marble of good

*U. S. G. S., Bull. 540, p. 509.

quality and the following colors is disclosed: white, blue, variegated and black. It occurs as a lens in a granite country and runs northwesterly, crossing Big Creek. Its limits were not fully determined, but it appears to be at least 200 feet wide by ½ mile long.

MINERAL WATER.

While not generally known as a mineral springs county, Fresno has several groups of springs, both hot and cold. They are found both in the Coast Range at the western end, and in the Sierra Nevada Mountains as well.

Balsam Grove Springs. This group in Sec. 32, T. 8 S., R. 25 E., is in the Sierra National Forest, and the operators, W. H. Thrower and Louis S. Budo, have a 10-year lease from the Forest Service for resort privileges. The post office is Big Creek. The hotel is ¼ of a mile from Carlson Station on the San Joaquin and Eastern, at an elevation of 4500 feet (U. S. G. S.). It is in a picturesque and well timbered country, there being an abundance of pine, fir, cedar and oak. There are three "iron" and one "white sulphur" springs, all cold. No water is bottled. The hotel and housekeeping tents will accommodate 120 people. This season, 1914, which was their first, having been a successful one, the lessees propose to enlarge their facilities for 1915.

Blaney Meadows Hot Springs are at the upper end of Blaney Meadows on the South Fork of the San Joaquin River, in Sec. 14, T. 8 S., R. 28 E., elevation 7600 feet (U. S. G. S.). There are four small springs with a maximum temperature of 110° F. and a total flow of about 40 gallons per minute. Analysis by the United States Geological Survey shows the total solids to be 780 parts per million, principally sodium chloride. The springs are not utilized except by occasional camping parties.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 54.

There is a carbonated spring at the eastern end of Fish Valley, 11 miles by trail southward from Soda Spring Flat. It is at the corner of the four townships, 4 and 5 S., Rs. 26 and 27 E.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 239.

Collins Spring (see Millerton).

Fresno Hot Springs. Kreyenhagen Estate, Coalinga, owner. Emil and Chas. Kreyenhagen, executors. These, the oldest commercially utilized mineral springs in Fresno County, are in Sec. 34, T. 20 S., R. 13 E., 12 miles due west from Coalinga and 18 miles by road. They are on a hillside about 100 feet above the creek in Hot Springs Canyon. There are five springs, sulphuretted, with temperatures from 88° to

97° F. A bathhouse and hotel were built some years ago at a cost of $11,000, and the property was leased as a resort up to 1914. It has been idle this year, owing to the heavy rains of last winter having washed out a considerable portion of the road up the canyon.

Bibl.: R. X, p. 189; XII, p. 333; XIII, p. 510; U. S. G. S., Bull. 32, p. 204; Water Sup. Pap. 338, p. 78; "MINERAL SPRINGS AND HEALTH RESORTS OF CAL.," WINSLOW ANDERSON, 1890, p. 135.

Lower Mineral Hot Springs. James E. Hughes, 630 Mandana boulevard, Oakland, has a lease from the U. S. Forest Service on the meadow containing this group of springs. They are on the South Fork of San Joaquin River, in Sec. 15, T. 7 S., R. 27 E., about 10 miles below the Blaney Meadow hot springs. They are reached by trail from Cascada and from Shaver, and are used privately and also by occasional camping parties. There are six springs, the hottest showing a temperature of 112° F.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 55.

Mercey Hot Springs. Mercey Mineral Springs Company, owner. F. J. Bourn, president; M. Nuckolls, secretary. Office, Humboldt Bank Building, San Francisco. W. Y. Bourn, manager at the springs. These springs are on Little Panoche Creek, in Sec. 15, T. 14 S., R. 10 E., 25 miles southwest of South Dos Palos, and 30 miles from Los Baños, which is their post office. Elevation 1200 feet (U. S. G. S.). They are located among the barren hills bordering the western edge of the San Joaquin Valley, and for many years were used to supply sheep watering troughs. There has been a resort there for about fifteen years, and the present company has had it since March, 1913. It is equipped with a small hotel and a number of tents, accommodating in all about sixty people. It is intended to improve the facilities in the near future. The main spring has been excavated, forming a reservoir about 15 feet square, which is lined with concrete. In the pool the water has a temperature of 111° F., while at the bathhouse some 250 feet distant the temperature is 108°. The principal constituent is sodium chloride, the water being slightly sulphuretted and there is a little excess gas at the spring. The water was at one time bottled for sale but not at present. The resort is open throughout the year and an automobile carries guests between Los Baños and the springs.

Bibl.: R. XIII, p. 510; U. S. G. S., Water Sup. Pap. 338, p. 78.

Millerton Spring (locally known as Collins). J. D., A. S. and W. G. Collins and J. Musick, owners. It is in Sec. 4, T. 11 S., R. 21 E.,

on the San Joaquin River, 2 miles northeast of Friant. Elevation 350 feet. (U. S. G. S.) There is one sulphur water spring issuing from a crevice in the granite bedrock near the river's edge. It has been known since the placer mining days of 1856, old Fort Miller and Millerton having been less than a mile east of here, but the spring has been used for resort purposes only since 1907. The temperature is 71° F.; the flow 17,000 gallons per twenty-four hours; and there is a little excess sulphuretted hydrogen gas. The spring is walled in by a cement curb and the water pumped to a cement tank, then heated for bathhouse use. Analysis shows 682 parts per million total solids, principally sodium and calcium chlorides, with 5.2 cc. H_2S per liter. Accommodations include eighteen tent cottages and a twenty-room hotel.

"Sulphur Baths." Santa Rosa Oil and Development Company, owner. Charles L. Smith, president; R. Whitehead, managing director. Office, 205 First National Bank, Oakland. This well, which is in Sec. 12, T. 21 S., R. 14 E., 3 miles southwest of Coalinga, was drilled in 1906 for oil but obtained an artesian flow of sulphur water. The following figures are from the log of the well:

1352 to 1360 feet, dark running sand;
1409 to 1421 feet, sand and shale (good oil);
1435 to 1439 feet, sand showing oil;
1440 to 1445 feet, sand and shale carrying oil;
1570 to 1585 feet, good oil sand;
1600 to 1630 feet, oil sand;
2057 to 2077 feet, white shell;
At 2077 feet, flowing sulphur water.

The flow was originally 6000 barrels per day, but at present it is only 1800 barrels per day.

The temperature of the water is 118° F. as it issues from the well, and it is accompanied by an inflammable gas which is utilized for illuminating purposes about the grounds. The water discharges into a cement-lined tank 75 feet long by 59 feet wide by 10 feet deep, which serves both as a reservoir head for the service pipes and as a swimming pool. There are twenty dressing rooms ranged around three sides of the pool, part of which is roofed over. The water is piped to Coalinga and parts of the oil fields for boiler purposes. It does not scale in the boilers as does most of the other waters obtainable in this region. The cost of operating is only nominal and the company has been paying dividends regularly, being in this respect more fortunate than many of the "oil" companies.

The following is an analysis of the water from this well, made by Smith, Emery & Company, San Francisco, for the Producers' Transportation Company:

Feed Water Analysis.

Analysis of solids	Grains per U. S. gallon	Incrusting solids	Grains per U. S. gallon
Suspended matter } Silica (SiO_2) }	.76	Suspended matter } Silica }	.76
Iron oxide and alumina (R_2O_3)	Nil	Iron oxide and alumina	Nil
Lime (CaO)	2.61	Calcium carbonate	4.49
Magnesia (MgO)	1.47	Calcium sulphate	.23
Soda (Na_2O)	29.55	Calcium chloride (corrosive)	Nil
Sulphuric anhydride (SO_3)	.81	Magnesium carbonate	2.75
Chlorine (Cl)	2.33	Magnesium chloride (corrosive)	Nil
Carbon dioxide (combined CO_2)	22.72		
Volatile and organic matter	9.35	Total	8.23
Total solids	69.60	Non-incrusting solids:	
Alkaline	Yes	Sodium carbonate	46.52
Acid		Magnesium sulphate*	.45
Hydrogen sulphide (H_2S)		Sodium sulphate	.68
		Sodium chloride	3.85
		Volatile and organic matter	9.35
		Total	60.85

*NOTE.—Magnesium sulphate forms some scale in presence of calcium carbonate and sodium carbonate.

There is a *sulphur spring* in Sulphur Meadows, ½ mile south of the Shaver lumber mills, in Sec. 19, T. 9 S., R. 25 E. It is utilized only locally.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 286.

Three Springs, while not "mineral," are yet worthy of mention. They are in Sec. 20, T. 11 S., R. 28 E., on a ridge between the north and main forks of Rancheria Creek, and beside the trail from the Dinkey Creek Ranger Station to Tehipite at the point where the Statum Meadow trail branches off. As the name indicates, there are three, large perennial springs within a short distance of each other, having a fine flow of clear cold water. They are used as a wayside camping spot by parties traveling through that part of the Sierras.

Bibl.: U. S. G. S., Water Sup. Pap. 338, p. 338.

Trimmer Springs. Trimmer Estate, owner; Morris Trimmer, Kingsburg, president; Wm. Terrill, renter. This group is in Sec. 18, T. 12 S., R. 25 E., on the Kings River, 14 miles northeast of Piedra, and ¾ of a mile south of Trimmer post office. It was formerly operated as a resort, but not since 1911. There are four springs yielding iron, magnesia, and sulphur water. All are cold. They are in a picturesque region.

Photo No. 113. Coalinga Oil Field, Fresno County, California, looking north from Associated Oil Company on Section 36.

Photo No. 114. Oil loading rack, Crump Siding near Coalinga, Fresno County.

NATURAL GAS.

There is more or less natural gas in nearly all of the oil wells of the Coalinga field. At some it is not utilized at all, while at others it is collected in gasometers and used for lighting, for fuel under boilers and in operating gas engines. The Turner Oil Company manufactures gasoline by compression from the gas of its wells at Coalinga. An inflammable gas has also been obtained in drilling for water northeast of Mendota.

Bibl.: R. VII, p. 65; X, p. 189; XI, p. 210; XII, p. 348; XIII, p. 567; Bull. 3, p. 20; Bull. 19, p. 183; Bull. 69; U. S. BUREAU OF MINES, Bull. No. 19.

NICKEL.

Nickel has been reported from Fresno County, but an analysis made in the laboratory of the State Mining Bureau on a sample of the supposed ore showed it to be californite, a green variety of vesuvianite.

PETROLEUM.

The Coalinga field is the only producing oil district in Fresno County. Of the total recorded mineral product of $66,294,637 for the county to the end of 1913, the sum of $62,130,959, or 94 per cent, represents the value of petroleum yielded. Oil production began in 1890 but was of small amount until 1896. For a time Fresno was the premier county of the State in petroleum output, and it now takes second place only to Kern, both in point of annual yield and of total amount to date.

The Coalinga district is approximately 50 miles long (north and south) by 15 miles wide, covering some 700 square miles on the western edge of the San Joaquin Valley and the eastern foothills of the Diablo Range. A detailed description of the district will not be entered into here as it has recently been covered very thoroughly by R. P. McLaughlin and C. A. Waring of the State Mining Bureau in Bulletin No. 69, "Petroleum Industry of California" (*q. v.*).

During 1913 there were 147 operating companies in the Coalinga field, with 1136 completed wells, of which 915 were producing, in an area of 22 square miles of proved oil land. The yield for 1913 was 18,956,965 barrels, valued at $7,927,736 at the wells.

Bibl.: R. VII, p. 65; X, p. 189; XII, p. 352; XIII, p. 571; Bull. No. 3, 15, 19, 31, 32, 69; U. S. G. S., Bull. 398. A more extended bibliography on petroleum in Fresno County is given in Bull. No. 69 of the State Mining Bureau.

PUMICE (see under Volcanic Ash).

QUICKSILVER.

Arambide and Aurecoechea Claims (see Pacific Quicksilver Company).

Archer Mine. Joe Byles, Coalinga, owner. This claim, located in 1904, is in Secs. 2 and 3, T. 18 S., R. 13 E., 24 miles northwest of Coalinga, and near the Mexican mine. A small amount of quicksilver has been produced, using a retort consisting of six 9-inch pipes. It is stated that the ore retorted yielded 10 to 20 per cent metal, but that

Photo No. 105. Furnace at Pacific Quicksilver Mine, Fresno County.

there is considerable low grade material in sight. The ore carries cinnabar and pyrite. The country rocks are serpentine and slate. There are five tunnels ranging from 20 to 150 feet in length, and several open cuts. But little more than assessment work is maintained.

Mercy Group. Mercy Bros., Llanada post office, owners. This group of three claims adjoins those of the Pacific Quicksilver Company on the northwest. Located about 1904. Development consists of several short adits. Assessment only.

Mexican Mine. Antonio Urrutia et al., Panoche, owners. This group of three claims in Sec. 22, T. 18 S., R. 13 E., northwest of Coalinga, was originally located in the sixties. Development work consists of several adits and some surface cuts. The vein is in sandstone and

Photo No. 106. Condensers at Pacific Quicksilver Mine, Fresno County.

Photo No. 107. Drawing off burned ore, Pacific Quicksilver Mine, Fresno County.

carries cinnabar associated with silica and oxides of iron, the oxidation product of iron sulphides. Only assessment work has been done of recent years.

Bibl.: Bull. 27, pp. 119, 120.

Pacific Quicksilver Company (includes properties formerly known under names of Providential, Arambide and Aurecoechea, Mercy, Croxon.) E. Augustus Waldron, president; Alfred C. Eaton, secretary. Office, Elks' Building, San Jose. This group includes eighteen claims and five mill sites on a branch of Little Panoche Creek, in Secs. 32 and 33, T. 13 S., R. 10 E., and Sec. 5, T. 14 S., R. 10 E., 25 miles southwest of South Dos Palos on the Southern Pacific Railroad. Elevation 1600 to 2000 feet (U. S. G. S.). The present company has had the property since 1911. The country rock is principally a metamorphic sandstone, and the ore occurs in a series of leached zones with quartz and ochre. Relatively little cinnabar can be seen except on panning, when the ochreous material is observed to yield a good percentage of concentrate. There is a little pyrite with the cinnabar.

Formerly the principal work was done on the Providential and Gabilan claims, but when visited (September, 1914), the ore supply was being drawn from the Arambide from a new shoot uncovered last spring. Here the values occur in a series of small veins and stringers over a width of 24 feet, striking east of south and dipping about 60° E. On this claim there is a 100-foot shaft and 400 feet of adits; and on the Aurecoechea 3000 feet of work, including a 150-foot shaft.

The reduction equipment includes a 24-ton Scott fine ore furnace (see photo No. 105), and two "D" retorts with a capacity of 300 pounds each. They are oil fired. Crude oil costs 88 cents to $1.10 per barrel delivered at South Dos Palos, plus $1.17 per barrel freight to the mine. The furnace is 4 tiles long, 50 tiles high, with a 4-inch spacing. The condensers consist of 14 brick chambers and 6 Knox-Osborne cast-iron chambers, the latter being connected in between No. 2 and No. 3 of the brick series (see photo No. 106). From the mine the ore is hauled about ¼ mile in a bottom dump wagon onto an ore bin, from which it is trammed to the jaw crusher (run by a small steam engine), then trammed to the furnace. The burned ore is drawn off into a side-tipping steel car (see photo No. 107) and trammed to the dump. There were seventeen men employed.

Bibl.: Bull. No. 27, pp. 119, 121; U. S. G. S., Mon. XIII, p. 380; Min. Res., 1912, Pt. I, p. 939; 1913, Pt. I, p. 204.

Providential (see Pacific Quicksilver Company).

STONE INDUSTRY.

Under this heading for the purpose of simplifying the statistical reports, the State Mining Bureau now classifies the following closely allied branches of the mineral industry: granite, paving blocks, macadam, concrete, rubble and crushed rock of all kinds, sand and gravel. In the earlier reports these materials were handled separately, but from the standpoint of the producer there is so much overlapping that it has been found more satisfactory to group them.

Academy Granite Company. J. S. Williams, San Jose, president; F. M. Blanchard, Fresno, manager. Office, 215 Griffith-McKenzie Building, Fresno. Quarry address, Academy post office. This quarry is in Sec. 13, T. 12 S., R. 22 E., 11 miles northeast of Clovis, on the Southern Pacific Railroad, and was opened up in 1903. The stone, as determined by a microscopic examination of a thin section, is a dark, hornblende diorite, but locally called "black granite." The color permits of a fine contrast of polished and unpolished surfaces, which makes it excellent for monumental and decorative purposes. It is medium grained, and is harder than the lighter granites such as the Raymond granite in Madera County. This makes it more expensive to cut.

So far as uncovered, the stone occurs in large, rounded boulders of disintegration, the quarry cut being as yet shallow (see photo No. 82). The stone at the eastern edge of the property is darker than that on the west. Pneumatic tools are used, power being furnished by distillate engines. The dressing and polishing is done in the sheds at the quarry, except for stone sold in the rough to other dealers. The product is hauled by wagon to Clovis (see photo No. 84). The largest block shipped weighed 16,800 pounds. Ten men were employed. Stone cutters receive $5 per day and quarrymen $3. The year 1913 was not a particularly active one, but improvement is reported for 1914.

Bibl.: Bull. 38, p. 26.

Boger Gravel Pit. D. and J. R. Boger, Friant, owners. This pit is in the SE. ¼ of SE. ¼, Sec. 7, T. 11 S., R. 21 E., at Friant, with a side track from the Southern Pacific Railroad. Work began here in 1900 and was for several years under lease to the Worswick Street Paving Company. The deposit is an old river bench above the present San Joaquin River bottoms. There are 7 to 15 feet of gravel, underlaid by 3 to 6 feet of clay (said to be suitable for pottery) below which are 36 feet of gravel reported to be gold bearing. Boger is considering putting in steam shovels after the clay is removed, to work the lower gravel for gold. The upper gravel, which is fine to medium, is moved by Fresno scrapers to a loading

Photo No. 82. In the quarry of Academy Granite Company, near Academy, Fresno County.

Photo No. 84. Block of stone (13,280 pounds) from Academy Granite Company, Fresno County.

pocket and then trammed to the railroad cars. It is not screened at present. Only one man was at work in August, though earlier in the year a larger force was employed.

California Road and Street Improvement Company (formerly Worswick Street Paving Company). R. D. Chittenden, president; P. E. Ludvigsen, secretary. Office, 218 Holland Building, Fresno. This pit is in Sec. 25, T. 11 S., R. 20 E., at Gravel Station on the Southern Pacific, 3 miles west of south from Friant. It has been worked by the present company since early in 1913. The gravel bed is on a bench above the present level of the San Joaquin River, but lower than the Boger gravel above described. The overburden varies from nothing to 6 feet in depth, and the gravel is about 15 feet deep. Five two-horse Fresno scrapers move the material to a pocket, from which it is elevated by a belt conveyer to the screening plant driven by a 100 h.p. electric motor. Two sizes only are made—sand, and up to 2½-inch ring, the oversize being crushed. Some is shipped without screening. There is considerable coarse material, consisting of diorite, basalt and various porphyritic rocks and some flinty material. The selling price is 40 cents, 45 cents and 50 cents per ton, f. o. b. Gravel Station. The capacity of the plant is 15 carloads (550 tons) per day, with average shipments of about ten cars daily. There were eighteen men and a foreman employed.

Doyle, Gill, Doyle & Company. Joseph Gill, manager. This company at Clovis operates a small "granite" quarry near the Academy quarry, 11 miles northeast of Clovis, under lease from N. Musick. The stone is the same, black, hornblende diorite occurring as large rounded boulders of disintegration at the surface, but more massive below. At the quarry a hand-operated derrick is used, while at the cutting sheds at Clovis, pneumatic tools are employed, electricity furnishing the power. Four men were at work in the sheds, the quarry being temporarily idle when visited in August.

Kings River Quarry. Atchison, Topeka and Santa Fe Railway, owner, leased to the Sharp & Fellows Contracting Company, 533 Central Building, Los Angeles; John Steigh, superintendent at the quarry. The quarry is in Sec. 8, T. 13 S., R. 24 E., on the Kings River at Piedra, the terminus of the Santa Fe's branch line from Reedley. Elevation 600 feet (bar.). It was opened up in the latter part of 1910, and there is now a quarry face over 100 feet high and 1000 feet wide. The rock is a fine-grained, blue-black basalt, partly in process of serpentinization. It is broken down by bank blasting, using both the "coyote hole" method and a drilling rig (air operated) on top of the bank. Firing is done by electricity.

A steam shovel loads the rock onto dump cars, which are drawn by a "dinkey" locomotive and discharged directly onto a No. 10 gyratory crusher. This crusher is driven by a 175 h.p. motor. The oversize is recrushed by smaller gyratories. The product is screened to four sizes, from $\frac{3}{8}$ to $2\frac{1}{4}$ inches. Equipment includes besides the crushers, belt and bucket elevators, two steam shovels and two dinkey

Photo No. 32. Loading railroad cars at Kings River Quarry, Piedra, Fresno County.

locomotives. The shovels and locomotives burn oil, while electric power for the other parts of the plant is obtained from the San Joaquin Light and Power Company. The capacity is 1500 tons per day and an average of forty men are employed. The product is sold for road metal and concrete work and is loaded directly from the bins to the railroad cars (see photo No. 32).

San Joaquin Rock and Gravel Company. E. A. Forthcamp, president; C. Murray, secretary and manager. Office, 224 Edgerly Build-

ing, Fresno. The property is owned by A. G. Wishon and W. E. Durfy of Fresno, the company operating under a lease. It is in Sec. 18, T. 11 S., R. 21 E., 1 mile southwest of Friant, with a spur track from the Southern Pacific Railroad. This bed of gravel, about 30 feet thick, forms a bench above the present level of the San Joaquin River, being on the same bench as the California Road and Street Improvement Company farther south. Elevation about 345 feet (S. P.). The overburden averages 2½ feet. The plant has been enlarged and improved this summer (see photo No. 67). Electric

Photo No. 67. Gravel pit and plant of San Joaquin Rock and Gravel Company, near Friant, Fresno County.

power is obtained from the San Joaquin Light and Power Company. Fresno scrapers move the material to the belt elevator. It is then screened and washed to four sizes, 2-inch to 1-inch; 1-inch to ⅝-inch; ⅝-inch to ¼-inch; sand. The oversize is crushed by a 24″ x 13″ jaw crusher. The motors installed vary from 5 h.p. to 35 h.p. The capacity of the plant is 500 cubic yards per day, and fifteen to twenty men are employed, according to demand for the product.*

*Since the above was written, the property has been sold to the Grant Rock and Gravel Company of San Francisco, with offices in Fresno. The washing section of the plant has been enlarged and fully equipped to a capacity of 20 cars (of 40 tons each) per day of 10 hours. Hungarian riffles have been placed in the discharge boxes from the screens to the sand bunkers. Sufficient gold is being recovered in the riffles to pay the operating expenses of this section of the plant.

Sharp & Fellows (see Kings River quarry).

Worswick Street Paving Company (see California Road and Street Improvement Company).

TIN.

Tin ore, occurring with wolframite, is reported by Fred Nobs of Redwood City, in the high Sierran section in eastern Fresno County. The exact locality is not stated.

TUNGSTEN.

L. H. Rhodes and G. E. Brown, of Coalinga, report having made locations on a deposit of tungsten ore in Secs. 29 or 33, T. 18 S., R. 13 E., about 30 miles northwest from Coalinga, near the San Benito County line.

Wm. Terrill of Trimmer has a claim near Trimmer, on a vein carrying scheelite with some gold values. The vein is stated to be 5 feet wide, strike east and west, dip south, with limestone footwall and granite hanging. The scheelite makes in bunches on the hanging-wall side of the vein. It probably would require concentration.

VOLCANIC ASH

Fort Miller Ranch Deposit. McKenzie Estate, owner, Griffith-McKenzie Building, Fresno. On this ranch, 3 miles northeast of Friant, there is a deposit of very fine-grained volcanic ash, 40 to 50 feet thick, over an area of several acres. It occurs in a number of small hills in a basin with a granite rim. Occasional pieces of vesicular pumice are found, but not in sufficient quantity to be of commercial value.

KERN COUNTY.

By G. CHESTER BROWN, FIELD ASSISTANT.

Field Work in September, 1914.

Introduction.

Kern, the leading mineral producing county of California, consisting of 8100 square miles, was organized in April, 1866. It is the third largest county in the State, and is bounded on the north by Tulare, Kings, and Inyo, on the south by Los Angeles and Ventura, on the east by San Bernardino, and on the west by San Luis Obispo. It is characterized by greater variety and contrasts of topography, geology, climate, and resources than any other California county.

This territory embraces the southern end of the San Joaquin Valley, thus affording a large area of land for agricultural purposes.

The wonderful development of the petroleum industry since 1900 has given Kern County first place as a mineral producer.

Topography.

Kern County takes in the southern portion of the Sierra Nevada Range, includes a portion of the Coast Range in its western end, and to the south and east of the Sierras it encloses a large section of the Mojave Desert. The lowest depressions are in its lagoons, where its rivers sink in the plains, some 300 feet above the sea level. It rises from that to 10,000 feet in the high peaks of the Sierra Nevada, its desert region east of the mountains having an elevation of 2751 feet at Mojave, and the mountains to the southwest over 6000 feet. The Sierra Nevada crosses the county from the north; Tehachapi Pass, 3964 feet in height, leading southeasterly; Tejon Pass, 5285 feet, and Cañada de las Uvas, about the same, leading southerly.

Along the northwestern border is the Diablo Range rising to a height of from 2000 to 3000 feet. From the junction of the Sierra Nevada and the Coast ranges, the San Emigdio mountains project 20 miles northward into the valley.

In the central portion of the southern end of the valley are Kern and Buena Vista lakes, the first covering an area of 13 square miles, and the other 25 square miles, receiving the water of the Kern River through a large number of sloughs, creating an extensive delta of marsh lands. This section has a drainage by Buena Vista Slough to Tulare Lake, 35 miles northwest. By the diversion of the water of Kern River and drainage of the basins, the lakes have become practically dry and much of their former beds are under cultivation.

There are in the county numerous mountain valleys of considerable extent. Poso Flat, Little Poso, and Linn Valley are beautiful parks on Poso Creek, in Greenhorn Mountains, a spur of the Sierra Nevada, west of Kern River. Havilah, once the county seat, and a famous

mining town, is in a deep valley of Clear Creek, a branch of Kern, 35 miles northeast of Bakersfield. Tehachapi Valley extends from the summit of the Sierra Nevada at Tehachapi Pass southeast along the valley of Cameron Creek, into the Mojave Desert, having a length of some 8 miles, and from ¼ to 1 mile in width, containing the town of the same name and numerous thrifty farms. Southwest of these are the similar valleys of the Tejon, Las Uvas, San Emigdio, Zapatero, Palita, Castera, and La Siebra.

Streams.

Kern River and Poso Creek are the principal streams of the county, Kern being the third in magnitude of the rivers flowing from the Sierra Nevada south of the Sacramento (see photo No. 1). This river, with a catchment area of 2383 square miles, rises among the highest peaks of the Sierra Nevada, in the northeastern part of Tulare County, having two large forks flowing southwesterly 125 miles. The stream carries an average flow of 805 cubic feet per second, with a flood flow averaging 2000 second feet. This water flows down a granite channel, dropping 8000 feet before entering the valley, and is one of the important streams of the State for the generating of hydroelectric power. It enters the valley near Bakersfield, then flowing westward divides into many channels, forming an extensive delta known as Kern Island.

Thirty large irrigating canals, comprising a total length of over 300 miles, divert water from this river, and serve some 270,000 acres of fertile and productive land.

Poso Creek has its source in many branches high up in the Greenhorn Mountains, the lofty spurs of the Sierra, rising in T. 25 S., R. 30 and 31 E., flowing southerly some 25 miles, then westerly and northwesterly until it sinks in the great valley in T. 25 S., R. 23 E., after a winding course of 75 miles. It has a watershed of 468 square miles.

South of Tulare Lake is a region called the "artesian belt," which is 35 miles long and from 8 to 12 miles wide, running east and west, for the most part in the heart of the plains. About 150 wells supply water for domestic, stock and irrigation purposes. In the Mountain View Colony there is an artesian well which has thrown 450 gallons a minute for twenty years.

Climatic conditions.

Mining operations can be pursued throughout the entire year, as the snowfall, even in the mountainous regions, is not heavy enough to interfere with the work. On the plains the rainfall amounts to about 8 inches per year; the temperature in July or August may reach 110° F., but the absence of humidity makes work not disagreeable.

Photo No. 1. Kern River, above Kernville, during flood period.

Photo No. 2. Borel generating plant, Pacific Light and Power Company.

Transportation facilities.

Two great transcontinental railroads, the Southern Pacific and the Santa Fe, pass through the center of the county, in a northerly and southerly direction. From Mojave the Southern Pacific owns and operates the Nevada and California Railroad, reaching Owens River Valley and passing through Nevada to connect with the Southern Pacific, Ogden Route. In the main valley a line of the Southern Pacific runs from Famosa to the east side. The oil fields are reached by branch lines from Bakersfield. Good wagon roads connect the mining districts with the railroads.

Photo No. 3. Canal, Pacific Light and Power Company.

Hydroelectric plants.

Pacific Light and Power Corporation maintains a power station at Borel, on the Kern River, which generates 18,000 horsepower, part of which is distributed for mining purposes in the vicinity of Hot Springs Valley, and the balance transmitted to Los Angeles (see photo No. 2). The company also operates a transmission line at 150,000 volts (the highest in the world) through Kern County, from two plants in Fresno, and maintains a substation at Magunden, 4 miles east of Bakersfield.

The intake for the Borel power plant is at Kernville, below the mill and powerhouse of the Kern Development Company. The canals and tunnels are lined with concrete and have a capacity of 30,000 miner's inches of water (see photo No. 3).

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San Joaquin Light and Power Corporation maintains a generating plant at the mouth of the canyon of the Kern River (1350 kilowatts capacity), and a steam plant in Bakersfield (13,500 kilowatts capacity). This corporation distributes power in the Kern River, Midway, McKittrick, and Sunset oil fields for the purpose of pumping oil.

The Bakersfield electric street car system is operated by the San Joaquin Light and Power Corporation.

Southern California Edison Company maintains a generating plant on the Kern River of 30,000 horsepower capacity, and from this plant current is delivered to Los Angeles, 116 miles distant. In the construction of this plant, the canal, which is 8⅔ miles long, consists almost entirely of tunnel, with inside measurements of 8 by 9 feet cut through solid rock to a point above where the powerhouse is located. Another plant on the Kern River, now under construction, will exceed 30,000 horsepower capacity. A railroad survey has been completed to connect with the Southern Pacific Railroad in order that the power equipment may be delivered at this powerhouse by rail. Two additional power stations are to be constructed at points selected on the Kern River, above Kernville.

Mineral resources.

Kern County's mineral resources consist of antimony, asphalt, barite, borax, brick, cement, clay, copper, fuller's earth, gems, gold, gypsum, iron, lead, lime, limestone, magnesite, marble, mineral paint, natural gas, petroleum, potash, salt, soapstone, soda, silver, stone industry, sulphur, tungsten and molybdenum.

ANTIMONY.

Antimony is found on a spur of the mountain bordering San Emigdio Canyon, in Secs. 10 and 15, T. 9 N., R. 21 W., S. B. M., also on Erskine Creek, 4 miles south of Hot Springs, in Sec. 23, T. 27 S., R. 33 E., M. D. M., and 10 miles west of Koehn in Secs. 5 and 6, T. 30 S., R. 36 E., M. D. M.

The San Emigdio and Tom Moore are the only properties that have been worked to any extent. The high cost of transportation and low market value of the product made it impossible to work the ore at a profit.

Antimony Consolidated Mines, formerly known as Mojave Antimony Company, consisting of 80 acres of patented ground, is located in Secs. 5 and 6, T. 30 S., R. 36 E., M. D. M., about 10 miles west of Koehn, and 12 miles northeast from Mojave. Owned by Arthur Asher, 225 S. Los Angeles street, Los Angeles. Ledge is 5 feet wide. Developed by means of shallow shafts and open cuts. Idle for several years.

Rayo, consisting of 40 acres, is located in Sec. 36, T. 26 S., R. 33 E., M. D. M., about 6 miles southeast of Isabella and 37 miles north of Caliente, the nearest railroad station. Ledge from 3 to 10 feet wide; developed slightly by shallow shafts and open cuts. Idle for several years.

San Emigdio, one of the oldest mineral locations in Kern County, is owned by the Kern County Land Company, of Bakersfield. The holdings consist of 80 acres, patented, in Secs. 9 and 10, T. 9 N., R. 21 W., S. B. M., about 12 miles southwest of Sunset. The ledge is 11 feet wide, strike north and south, dip 68° W., porphyry walls. Workings consist of several tunnels from 20 to 600 feet long (caved in a number of places). The ore was roasted in an old furnace (dismantled). Some of the ore gave returns of 45 per cent antimony and from $4 to $16 per ton in silver. Property said to have been worked by the padres during missionary period; reopened in 1876 by S. Bouchier. Idle for a number of years.

Bibl.: Reports VIII, p. 680; X, p. 225.

Tom Moore, also known as Erskine Creek, consisting of 10 acres, patented in 1882, is located in Sec. 24, T. 27 S., R. 33 E., M. D. M., about 36 miles north of Caliente in the Valley View mining district. Owned by Orejana Mining Company, of Hayward; C. S. Long, president. Ledge is 3 feet wide, strike north and south, dip 50° E., granite-porphyry walls. Workings consist of a number of shafts from 40 to 65 feet deep, and open cuts. Some of the ore carried 65 per cent antimony and was reduced years ago in an old furnace, now dismantled. Property idle for several years.

Bibl.: Report X, p. 237.

ASBESTOS.

A serpentine belt cutting Jawbone Canyon carries asbestos in the form of chrysotile, being especially noticeable in Sec. 7, T. 30 S., R. 36 E., M. D. M.

Sunshine, consisting of three claims located in 1912 by J. H. Durnal, of Tehachapi, is situated in Sec. 7, T. 30 S., R. 36 E., M. D. M., about 23 miles north of Mojave by wagon road. Ledge is 10 feet wide, strike northeast and southwest, dip 40° S., serpentine walls, and can be traced on the surface for a distance of 150 feet. Prospect, undeveloped.

ASPHALT.

Deposits of natural asphalt are found in the Buena Vista and the Sunset oil districts. In recent years refined asphalt only has been used commercially because a better grade can be produced for less money than the deposits of natural asphalt afford.

Bibl.: Report XII, pp. 26–28; Bull. 3, pp. 41–53.

BORAX AND POTASH.

The Mojave Desert contains a host of dry lakes and sinks which are the source of many salines, especially borax and potash.

Buckhorn Springs, about 20 miles east of Mojave, in T. 9 N., R. 9 W., S. B. M., occupy the south end of a large dry lake, and here are found considerable deposits of borates mixed with salt and other salines.

Indian Springs are situated in T. 26 S., R. 38 E., M. D. M., in the west side of the Salt Wells Valley. Borax is present, mixed with salt, soda and other salines. Beds have not been exploited.

Kane Springs, also known as Mesquite, Cane, and Desert Springs, are located in T. 30 S., R. 38 E., M. D. M. Deposit discovered in 1873 by H. J. Lent, who produced some borax of excellent quality here years ago, but beds have been idle for some time. The rich borate spots cover 3 acres.

Teagle-Churchill Potash Company owns 5792 acres in T. 25 S., R. 40 and 41 E., known as China Borax Lake and Salt Wells Lake, which were located in 1911. This company consists of E. E. Teagle, C. H. Churchill, and associates. It is proposed to drill and pump the deposit for treatment to produce borax and potash. Searles Lake is 2 miles east.

Bibl.: Bull. 24, p. 50. The Saline Deposits of California, issued by State Mining Bureau.

BRICK AND CLAY.

The clay deposits in the vicinity of Bakersfield, the county seat of Kern County, furnish excellent material for the manufacture of brick.

An unusually good grade of pottery clay is obtained from a large deposit in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond Station, which has been worked by the Los Angeles Pottery Company.

Bakersfield Sandstone Brick Company own a clay deposit consisting of 10 acres (patented) in Sec. 28, T. 29 S., R. 23 E., M. D. M., in East Bakersfield. Home office is Bakersfield. W. S. Tevis, president; Jas. Curran, manager. The plant consists of Kommick-Elbring grinder, kilns of a daily capacity of 40,000 brick, cars for holding brick when drying, buildings, etc. Two classes of brick are manufactured: sandstone selling for $15 per 1000 for red, $13 for select and $9 for second grade; clay brick sells for $9 per 1000. Twenty-five men are employed. Some clay is purchased from the East Side Canal Company. Oil is used for fuel.

Kern County Brick Company's holdings consist of 12 acres, patented, in Sec. 21, T. 29 S., R. 28 E., M. D. M., in East Bakersfield. O. V. Paye, of Bakersfield, controls this corporation. The deposit is 25 feet thick and has been worked for twenty years. The plant consists of Potts disintegrator, kilns, buildings, etc. Capacity of plant is 37,000 brick per day, which sell for $8 per 1000 at the yard; cost of manufacturing about $4 per 1000. Ten men employed. Oil used for fuel, costing 40 cents per barrel.

Los Angeles Pottery Company, also known as the Hamilton deposit, owns 40 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., some 5 miles northwest of Rosamond Station. The deposit covers about 5 acres, the clay being plastic, has a smooth, even texture, shows no evidence of stratification, and is about 25 feet thick. It varies in color from greenish to light gray, and has been used for the manufacture of pottery and firebrick. Material has been shipped to the company's plant at Los Angeles. Workings consist of a tunnel 200 feet long, and a pit about 45 feet deep. Idle for several years.

Bibl.: State Mining Bureau Bull. No. 38, p. 212.

Photo No. 4. Cement plant at Monolith, erected by City of Los Angeles.

CEMENT.

Los Angeles Aqueduct Plant was constructed by the city of Los Angeles to manufacture cement for use in constructing the Owens River water supply system. The holdings, consisting of 120 acres, are located in Sec. 14, T. 32 S., R. 33 E., M. D. M., at Monolith Station, 3 miles east of the town of Tehachapi (see photo No. 4).

Limestone was obtained near the plant, and also from the Summit quarry. An ample supply of clay was extracted from a pit near the works. The plant has a daily capacity of 1250 tons, operated by electricity from Pacific Light and Power Corporation.

COAL.

Small seams of coal 18 inches wide, in the vicinity of Garlock, T. 28 S., R. 38 E., M. D. M., were worked some years ago by the Randsburg Coal Company. Three shafts, 80, 145 and 150 feet in depth, were sunk on the vein.

COPPER.

The copper occurrences are so few and widely separated, as far as discovered, that they can not be identified with any particular belt. Copper deposits exist in three localities: Near Woody, north of Randsburg; on the northern edge of the Mojave Desert; and on the southeastern slope of the Sierras, in Secs. 7, 18, 19 and 30, T. 28 S., R. 40 E., M. D. M., and in Secs. 12, 13 and 24, T. 28 S., R. 39 E.

The road from Randsburg to the south fork of the Kern River, through Walker's Pass, diagonally crosses copper croppings in T. 27 S., R. 38 and 39 E., M. D. M.

The country rock in the Keyes mining district in Secs. 29 and 31, T. 26 and 27 S., R. 33 E., M. D. M., is impregnated with copper carbonates, and a small amount of development work has been done in this territory in prospecting for gold. Greenback is the only producing copper mine in the county.

Copper King, consisting of 40 acres, is located in Sec. 3, T. 27 S., R. 33 E., M. D. M., in the Keyes mining district, about 6 miles southwest of Isabella, in the Sequoia National Forest Reserve. Owner, G. C. Hooper. Elevation 5500 feet; vein matter, consisting of country rock with copper carbonates, about 10 feet wide, strike northwest and southeast, dip 30° N.; slate footwall and granite hanging. Slightly developed with a tunnel 230 feet in length. A little high grade ore found, carrying gold values. Prospect.

Greenback Group, the largest copper mine in Kern County, is located in Secs. 1, 2, 3, 4, and 10, T. 26 S., R. 29 E., in the town of Woody and 32 miles northeast of Bakersfield. The holdings, consisting of 2300 acres (600 patented), are owned by I. Weringer, of Woody. Elevation 1800 feet; discovered in the early fifties, and surface worked for gold values. Located in 1890 by present owner. Six parallel veins about 600 feet apart; average width 30 feet; strike northeast and southwest, dip 60° N.; granite walls. On the Iron Mountain Chief the croppings are pronounced. Workings consist of a single-compartment shaft 200

feet deep, sunk at 45° angle, three levels at 100′, 140′ and 200′; 360 feet of drifts; 100 feet raise. The equipment consists of horse whim, ore bin, cars, tools and assay office. Two men employed. Ore recently shipped to smelter was hauled in motor trucks to MacFarland, a distance of 25 miles, at a cost of $5 per ton. Property produced to date $40,000; about 4000 tons of ore on dump and considerable in sight in mine. Sulphide at 60-foot depth, runs from 5% to 30% copper and $2 per ton in gold. Iron Mountain Wonder adjoins Greenback on the south.

Bibl.: Bull. 50, p. 297, issued by State Mining Bureau.

Iron Mountain Wonder consists of 20 acres in Sec. 10, T. 26 S., R. 29 E., about ¼ mile east of Woody. Owners, Hancock and Sorenson, of Woody. Two parallel veins about 20 feet wide, strike northeast and southwest; dip 60° N.; granite walls. Slightly developed with 60-foot shaft and 80-foot tunnel; continuation of Greenback lode. Prospect. Idle.

Silverado Mountains, consisting of 40 acres, is located in Sec. 29, T. 26 S., R. 33 E., in the Keyes mining district, 1 mile south of Isabella, in Sequoia Forest Reserve. Owner, C. L. Warfield. Elevation 3500 feet. Fissure vein, 3 feet wide, consisting of greenish colored quartz, carrying copper carbonates and gold; strike northwest and southeast, dip 60° SW. Developed with two tunnels on vein, 210 and 620 feet in length. Worked for a time by lessees, who took out some rich ore from pockets. Prospect. Idle.

FULLER'S EARTH.

Fuller's earth is a soft, friable clay, that is used in fulling wool, in deodorizing and clarifying oils, fats, greases, and in the production of clay pigments as a basis for color printing on wall papers. It falls to powder readily in water, and removes with avidity grease from cloth. The shades of color of fuller's earth are fully as great as those of other kinds of clay. Most of the earths on the market are light brown, gray, buff, or cream color, and a few are almost white. All which have been found valuable for bleaching purposes show a distinct acid reaction. Fuller's earth, as a rule, is lighter and more porous than other clays. The market value ranges from $10 to $15 per ton.

California Fuller's Earth Company. Packard Estate, Bakersfield, owners, control 140 acres (patented) in Sec. 14, T. 27 S., R. 28 E., M. D. M., about 18 miles north of Bakersfield. This deposit covers many acres and varies in thickness from 15 to 50 feet. A thin layer of soil covers this earth, which is first removed and then the material is taken out in open pits. Deposit was first worked in 1898 by

H. L. Packard, and the material hauled to Bakersfield, ground, and shipped to Kansas City, Mo., for refining animal and vegetable oils. Property has not been worked for several years.

The analysis of the earth shows:

Silica (SiO_2)	54.32%
Alumina (Al_2O_3)	18.88%
Iron oxide (Fe_2O_3)	6.50%
Lime (CaO)	1.00%
Magnesia (MgO	3.22%
Loss on ignition	11.86%
Alkalies (by difference)	4.21%

Bibl.: Bull. 38, p. 275, issued by California State Mining Bureau.

The Eight Oil Company, with a small grinding plant at Bakersfield, has reported production of fuller's earth from Kern County.

GOLD.

The first discovery of gold in Kern County was made by a member of Fremont's party in 1851, at Greenhorn Gulch, near the Kern River. Here a camp soon sprang up, and it is claimed that some of the placer ground yielded $50 to the pan. This territory was known in the early days as Whiskey Flat.

Jonathan and Keyes, shortly after the Whiskey Flat excitement, made the first quartz discovery in Rich Gulch, near the site of the old town of Keyesville. The first mine was named the Brother Jonathan, an arrastra was built, and as the ore ran over $100 per ton they made money. The Mammoth mine near by, was located after the Brother Jonathan discovery, and Captain Maltby, the owner, erected a costly water power mill, which was a failure, as the mortars leaked out the quicksilver that was recklessly thrown in. Colonel Keyes erected the first practical wooden stem, hog trough, iron mortar mill, consisting of four stamps. The cost of mining and milling was $15 per ton and, as the ore ran over $100 per ton, a handsome profit was made.

In 1861 Rogers and Olds discovered the mines of the Cove district, near Kernville, which have produced several millions, and which were extensively worked for over twenty-five years.

The discovery and working of the mines of the Cove district were a great incentive to prospecting, and resulted in the finding of the Clear Creek quartz mines by Ben Mitchell. The town of Havilah was built, and at one time was the county seat of Kern County.

The discovery of placer gold at Goler, in 1893, led to the development of quartz mines in this section, as the Yellow Aster find soon followed, which caused the Rand to be the largest producing district in the county.

Mining districts.

Amalie, also known as the Agua Caliente mining district, is the name used to designate the territory between the most southerly summits of Pah Ute range and Caliente Creek.

The characteristic geological features of the district consist of syenite and slate formations traversed by numerous trachytic dikes. The altitude ranges from 2500 feet on Caliente Creek to 7000 feet in the Pah Ute range.

A good wagon road connects this district with Caliente, a town on the Tehachapi branch of the Southern Pacific Railroad. Amalie, a small settlement in the center of the district, is 15 miles east of Caliente.

Clear Creek, 25 miles north of Caliente, by wagon road, includes the territory in T. 28 S., R. 32 E., M. D. M. The formations consist of syenite and slates, cut by numerous diorite dikes. The altitude ranges from 3000 to 5500 feet. Havilah, a small settlement on Clear Creek, is the post office.

Cove, one of the famous mining districts in the county, is 42 miles north of Caliente, by wagon road (see photo No. 5). The natural amphitheater occupied by this territory is the characteristic which gives it its name. The formations consist of granite and slate, the former predominating. Nine lodes can be traced on the surface for a considerable distance, as the croppings are very bold. The value of the main lode (Sumner) lies in its great size and the vast amount of good milling rock which it can furnish; it is over 150 feet wide in places. The Nellie Dent and Commonwealth lodes are also of unusual width, carrying low grade gold values. The installation of large reduction plants will make this district one of the best producers in Kern County, as an abundance of water from the Kern River for power purposes, topography suitable for open-cut mining, and ideal climatic conditions afford very cheap mining and milling costs. The altitude ranges from 2600 to 5000 feet.

Green Horn Mountain District includes the territory adjacent to the Green Horn Mountains, about 48 miles north of Caliente, by wagon road, in T. 26 and 27 S., R. 31 and 32 E. This region adjoins the Keyes mining district on the west. The formations consist of granite and slate. A limited amount of placer mining is pursued in this section. The altitude ranges from 3000 to 6500 feet.

Green Mountain District includes the territory from Piute post office to Kelsey Valley on the east dip of Piute Mountain, T. 28 and 29 S., R. 34 E. Piute post office is 30 miles northeast of Caliente by wagon road. The formations consist of slate and schists, cut by diorite dikes. The veins, as a rule, are small but rich; the ore shoots are short. Pocket mining is pursued mainly in this district. The altitude ranges from 3500 to 8000 feet.

Keyes, the oldest mining district in Kern County, includes the territory north and west of the old site of Keyesville for a distance of about 5 miles, in T. 26 S., R. 32 and 33 E. Isabella, the post office, is 37 miles north of Caliente, by wagon road. Granite is the predominating formation. The veins are narrow, but carry good values in gold. The Keyes quartz mine has been worked intermittently for sixty-two years. Placer mining was extensively pursued here during the fifties.

Long Tom District, 20 miles northeast of Bakersfield, in T. 27 S., R. 29 E., M. D. M., is known chiefly on account of the Long Tom mine, which was a famous producer several years ago. The formations consist of diabase and granite. A good wagon road affords an easy means of transportation between this district and Bakersfield, the county seat. The altitude ranges from 1500 to 2500 feet.

Mojave District includes the territory in T. 10 and 11 N., R. 11, 12, and 13 W., S. B. M. The principal mines are only 3 miles south of Mojave, a town on the junction of the Santa Fe and Southern Pacific railroads. The formations consist of quartz-porphyry, phonolite and granite. The veins are large, with lenses of high grade, so that practically all of the ore can be profitably worked with adequate reduction plants. The lack of timber is no handicap as the ground stands well. The climatic conditions are good, being similar to other sections of the Mojave Desert.

The Pioneer District includes the territory in an easterly and westerly direction between Greenhorn Mountains and the Green Mountain mining district, and in a northerly and southerly direction from Clear Creek to Erskine Creek, in T. 27 and 28 S., R. 32 and 33 E., M. D. M. The formations consist of granite, porphyry, slate, and syenite. Bodfish, the post office, is 32 miles north of Caliente by wagon road. Mining operations can be pursued throughout the year. Wood and water are abundant. The altitude ranges from 3000 to 8000 feet.

Rand Mining District comprises the territory in T. 29 and 30 S., R. 40 E., M. D. M., Kern County, and T. 29 and 30 S., R. 41 E., M. D. M., San Bernardino County. The formations consist of granite, andesites, basalt, schists, sandstone, limestone and quartzite. The rocks of Rand Mountain are schists, with quartzite and altered limestones. The fragmental deposits, such as sand and gravel, cover considerable areas, but only a small portion are of economic importance.

Gold was first discovered in the Goler Wash, 9 miles northwest of Randsburg in 1893, and dry washing camps soon sprang up in Last Chance and Red Rock canyons, and at Summit Diggings. In 1895 the Yellow Aster mine was discovered by Singleton, Burcham & Mooers, and other quartz discoveries quickly followed. A railroad was

Photo No. 5. Cove Mining District, looking north.

Photo No. 6. Amalie mine, mill and hoist.

soon constructed from Kramer, on the Atchison, Topeka and Santa Fe Railroad, to Johannesburg. A number of mines, after taking out fair ores near the surface, were unable to follow them downward owing to faulting, pinching of the vein, or impoverishment of the ores and have been abandoned. Mines, including placers, have produced $10,000,000, of which the Yellow Aster has taken out $6,000,000.

In the old Stringer District, so named on account of narrowness of the veins, some rich ore has been worked. This section is located along the southeast side of Rand Mountains, from 1½ to 4 miles southwest of Randsburg. The Napoleon is said to have yielded $1,000 per foot from a shaft 100 feet deep. The veins in this district are all more or less disturbed by faults, having a maximum width of 2 feet (U. S. Geol. Surv., Bull. No. 430). The altitude ranges from 3500 to 5000 feet.

The Red Dog custom mill, about ¼ mile southwest of Johannesburg, handles ores from the Rand district. This plant is owned by Stanford Mining and Reduction Company, of Los Angeles, and consists of ten stamps, cyanide plant, and one Standard concentrator, operated by steam and electricity.

Tehachapi District includes the territory in T. 32 S., R. 33 and 34 E., M. D. M., and T. 11 N., R. 14 and 15 W., S. B. M. The formations consist of granite, quartz-porphyry, limestone and basalt. The Pine Tree is the only gold mine with any production record. The mining industry at the present time is confined to the extraction of limestone. The altitude ranges from 3900 to 6000 feet.

Woody, formerly White River mining district, includes the territory in T. 25 and 26 S., R. 29 and 30 E., M. D. M. Woody, the post office, is 31 miles northeast of Bakersfield, by wagon road. The formations consist of granite, quartz-porphyry and slate. The veins, as a rule, are narrow and have been disturbed by faults. Mining has been confined to shallow workings. Rich ore has been found on the surface, and as a result this district was very active some eighteen years ago. Placer mining was extensively pursued near Woody during the '50s. The altitude ranges from 1800 to 3000 feet.

Valley View District includes a portion of the territory in T. 27 and 28 S., R. 33 and 34 E., M. D. M., along Clear and Erskine creeks, about 35 miles north of Caliente. The formations consist of granite, syenite and slate, cut by numerous diorite dikes. The veins are from 2 to 8 feet in width, carrying good milling values. An ample supply of wood and water is at hand. The mineral resources of this district are still undeveloped. The altitude ranges from 3500 to 7500 feet.

Mines and prospects.

Accident, consisting of 40 acres, is located in Sec. 32, T. 11 N., R. 12 W., S. B. M., about 3 miles south of Mojave, in the Mojave mining district. It is a prospect slightly developed by short tunnels on the vein. Owner, G. E. Ashler.

Amalie, one of the famous old producers of this county, is located in Sec. 22, T. 30 S., R. 33 E., M. D. M., about 18 miles northeast of Caliente, in the Amalie mining district (see photo No. 6). The holdings consist of 180 acres in the Sequoia National Forest Reserve, owned by the Provident Mining Company; T. Bowden, president; B. W. Marks, secretary; home office, Union Trust building, Los Angeles. The vein is narrow, averaging about 10 inches in width, but rich; strike NW. and SE., dip 40° E., quartz-porphyry walls. Pay shoot is about 180 feet long and 10 inches wide, free milling. Ore carries considerable silver below the surface oxides, rich on the surface in free gold. Workings consist of a vertical shaft 560 feet deep, five levels, raises, stopes and drifts, comprising over 5000 feet of work. Mine equipment consists of cars, 60 h.p. boiler, steam hoist, five dwellings and assay office. Reduction equipment consists of 5-foot Huntington mill, driven by both gasoline and steam, three concentrators and 50-ton cyanide plant, leased to Barbarossa Mining Company. Property said to have produced $600,000. Idle since 1912. Barbarossa mine adjoins the Amalie on the north.

Bibl.: Reports XII, p. 141; XIII, p. 605.

American Golden Eagle, owned by Homer Bros., of Havilah, consists of 100 acres, in Secs. 2 and 10, T. 28 S., R. 32 E., M. D. M., in the Clear Creek mining district, 2 miles south of Havilah, in the Sequoia Forest Reserve. Claims formerly owned by American Golden Eagle Mining and Milling Company, of Los Angeles, who worked property for several years, then abandoned it. Relocated by Homer Brothers. Ore free on surface, but base with depth, carrying gold, silver and copper. Vein 8 feet wide with quartz-porphyry walls, strike northeast and southwest, dip 85° E. Workings consist of 100-foot shaft, 200-foot tunnel, drifts and stopes. Small producer. Ore shipped to smelter. Claims worked by owners. Adjoins McKidney prospect on the west.

Anatrosa is a prospect located in Sec. 13, T. 30 S., R. 32 E., M. D. M., 8 miles east of Caliente, in Amalie mining district, and in the Sequoia National Forest. Owned by Blodget et al., of Bakersfield. Leased to H. Williams. Vein is 30 feet wide, low grade. Small vein of high grade ore recently found in granite. Slightly developed with 200-foot tunnel and open cuts.

Arizona Group, consisting of 80 acres, is a small producer in the Rand mining district, 5 miles south of Randsburg, owned by Henry Bopp. Located in January, 1913. Small vein in schist. Sinking a shaft, at present 60 feet deep; gasoline hoist (8 h.p.) is used. Ore hauled to Red Dog custom mill. Twenty tons gave returns of $1520. Two men employed.

Baltic, a producer, in the Rand district, is located in Sec. 1, T. 20 S., R. 40 E., M. D. M., 1½ miles southeast of Johannesburg. Holdings consist of 40 acres (patented), owned by the Baltic Mining Company, of Randsburg; C. H. Wynn, president; H. R. Wynn, secretary and manager. Deposit consists of many small veins in a sheer zone of schistose quartz from 100 to 300 feet wide. Country rock is rhyolite and porphyry. Ore is free milling. Workings consist of two incline shafts, each 250 feet deep, levels, stopes, and 150 feet crosscut. Steam hoist is 20 h.p. Owners claim an ore reserve of 200,000 tons, assaying $2.50 per ton. Reduction equipment consists of 10-stamp Llewellyn mill, Blaker crusher (8″ x 10″), and 50-ton cyanide plant. Electric power used. Twenty men are employed. Adjoining mines are: G. B. on north, Gold Coin on south, Placer Gold Company on east and Bismarck on west.

Barbarossa Group, the largest producer in the Amalie mining district, is located in Sec. 29, T. 30 S., R. 33 E., M. D. M., about 15 miles northeast of Caliente, in the Sequoia Forest Reserve. This group, consisting of 140 acres, is owned by B. G. Parlow, of Loraine. Elevation at lower tunnel is 3600 feet. There are seven veins on the claim; only one however, the Barbarossa, has been worked. Strike of this vein is northwest and southeast, dip 40° E., average width 4 feet; granite footwall and quartz-porphyry hanging. Pay shoot is 200 feet long and 4 feet wide, free milling. Workings consist of several tunnels on the vein, drifts and stopes. Ore is hauled in wagons to Amalie mill, a distance of 1½ miles. Five men are employed. Property produced $4000 in June, 1914; total production, $60,000. Croppings on Gasonia claim are 1000 feet long and 40 feet wide, and carry some gold values. Pacific Light and Power Company's line runs through these claims.

Beauregard, one of the famous mines of the Cove district, is located in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Sequoia Forest Reserve, and ¾ of a mile north of Kernville. Elevation 3000 feet. This property consists of one claim (1200 feet long and 200 feet wide), making a total area of 6 acres, patented in 1882, and is owned by the Kern Development Company. C. S. Long, president; C. C. Hamilton, secretary; home office, Portland, Me.; local office, Kernville. Located in 1861, and acquired by present owners in 1907. There are two parallel veins on the claim, averaging 3 feet in width, strike S.

75° W., dip vertical; granite walls. Pay shoot is 1200 feet long and 3 feet wide, and has been worked for this distance. Workings consist of seven shafts from 100 to 300 feet deep, three levels, 2300 feet of drifts, and six stopes. Ore treated in 10-stamp mill, operated by water power from Kern River. Ditch is 2¼ miles long. Production to date, $600,000. Worked at one time by leasers. Ore is very free and plates $35 per ton. Some high grade found at times. Adjoining mines: Minnie E. on north and west, Urbana on south and North Extension Sumner on east.

Bella Rufin, formerly known as the Berry, is located in Sec. 25, T. 29 S. R. 33 E., M. D. M., in the Green Mountain district, about 23 miles northwest of Caliente. Elevation 3000 feet. Holdings consist of 40 acres, in Sequoia Forest Reserve, at an elevation of 3000 feet. Owned by J. E. Miller; leased to E. Peterson, Piute post office. Vein is 4 feet wide, strike southeast and northwest, dip vertical; granite walls. Pay ore occurs in pockets. Workings consist of shaft 120 feet deep, short drifts and one stope. Old 12-foot steam arrastra, horse-whim and cabin on property. Small producer. Total production about $15,000. Prospect. Mentioned in Report XII, p. 142.

Photo No. 7. Flashlight photo, showing ore in Big Blue Mine, 240-foot level.

Big Blue, owned by the Kern Development Company. C. S. Long, president and manager. Was one of California's famous gold producers in the '70s (see photo No. 7). The holdings, consisting of 12 acres patented in 1872, are located in Sec. 28, T. 25 S., R. 33 E.,

M. D. M., in the Cove mining district, about ½ mile north of Kernville, in the Sequoia Forest Reserve. Elevation 2900 feet. Three parallel veins known as East, West and Middle, which have an average width of 44 feet, strike N. 20° W., and dip 70° W. West vein pay shoot is 1500 feet long and 44 feet wide. Workings consist of four shafts, designated as Pierson, Engine, Donkey and Adit, maximum depth being 400 feet, five levels, over a mile of drifts, several stopes, three tunnels, the adit having a length of 2100 feet, and drains the Big Blue at a depth of 270 feet, another the Blue Gouge is 1057 feet long. Mine equipment consists of hoist, shops and office. Ore is reduced in 10-stamp mill on Kern River. Two men working at present. Property has produced $2,000,000. Some of the ore runs over $300 per ton in free gold. Adjoining mines: Sumner on north, Oriana and Blue Gouge No. 2 on west, Content on south, Juniper on east.

Bibl.: Reports VIII, p. 315; XIII, p. 191.; U. S. Comm. of Mineral Statistics, Raymond, 1875.

Black Hawk Group, consists of 130 acres, in the Rand district, 2½ miles southwest of Johannesburg. Owner, D. A. Blue, of Randsburg. Three veins, designated as South, North and Gray Eagle. Workings consist of four shafts, from 70 to 130 feet deep, and 4000 feet of drifts. Country rock is schist. Mine equipment consists of two horse-whims, blacksmith shop and cabins. A 5-stamp mill on Black Hawk claim constitutes the reduction equipment. Water obtained from Randsburg Water Company, through 3 miles of 1-inch pipe. Three men employed. Placer deposits on Gray Eagle, One and Two Track claims, which owner states runs $6 per ton in free gold and $2.50 in tungsten. Small producer.

Blue Gouge Group, consisting of 350 acres, is located in Secs. 28 and 33, T. 25 S., R. 33 E., M. D. M., in the Cove mining district, 2 miles north of Kernville in the Sequoia Forest Reserve. Elevation 3600 feet. Owners, Orejana Mining Company; C. S. Long, president and manager; C. C. Hamilton, secretary; home office, Hayward. Eight parallel veins on the claims, average width 5 feet (small veins), strike northwest and southeast, dip 68° N.; granite walls. The large lode (east vein) is from 100 to 500 feet wide, low grade. Workings consist of crosscut tunnel 1057 feet long, shaft 200 feet deep, one stope, and several open cuts. High grade ore on the S. F. Belle, from which $75,000 in gold has been extracted. The Red Top, Blue Gouge, and Lynx claims contact with the Content and Nellie Dent ore bodies, forming a width of 500 feet of low-grade ore that can be worked as an open cut. This, owing to its abrupt elevation and being only 2000 feet from the Kern River, could be handled by gravity to a mill conveniently located so as to take advantage of the cheap power which is abundant.

Bright Star, a noted mine of the Green Mountain district, located in Sec. 10, T. 28 S., R. 34 E., M. D. M., 34 miles northeast of Caliente, in Sequoia Forest Reserve, is owned by Mrs. Tracy et al., of San Francisco. Elevation at shaft 8400 feet. Holdings consist of 60 acres, patented, located some forty-five years ago. The vein has an average width of 20 inches, strike northeast and southwest, dip 60° N., slate walls. Pay shoot about 120 feet long and 20 inches wide, high grade ore. Workings consist of a shaft 540 feet deep, three levels, several thousand feet of drifts and stopes. The ore was treated in a 5-foot Huntington and 3-stamp mills, now removed from property. The Denver Gold and Silver Extraction Company worked the tailings with a 50-ton cyanide plant with good results. Production record said to be $600,000. Idle for several years. Collar Button, a prospect, adjoins property on west.

Bright Star, a prospect in the Woody mining district, was a small producer a few years ago. It is in Sec. 12, T. 25 S, R. 29 E., M. D. M., about 41 miles northeast of Bakersfield. Owner, E. A. James. Two parallel veins, having a width of 2 feet, strike E. and W., dip 30° S.; short pay shoot. Workings consist of tunnel on vein 600 feet long, and 800 feet of drifts. Idle.

Bull Run, another famous producer of the Cove mining district, consisting of 5.67 acres, patented in 1884, is located in Sec. 28, T. 25 S., R. 33 E., M. D. M., about ½ mile north of Kernville in the Sequoia Forest Reserve. Elevation 2980 feet. Owners, Lady Belle Company; Dr. R. P. Schupphaus, president; C. C. Hamilton, secretary; home office, Portland, Maine; local office, Kernville. Vein is 2 feet wide, strike northeast and southwest, dip 70° N. Pay shoot is 900 feet long and 2 feet wide, free milling, rich sulphurets. Workings consist of main shaft 360 feet deep, seven levels, several thousand feet of drifts and crosscuts, and one stope 900 feet long. Mine equipment consists of hoisting plant, shop and office. Production to date $450,000. In 1893 J. B. Medina, a former lessee, mined from the north end of this property (at a depth of 80 feet), 100 tons of ore that gave returns of $150 per ton on the plates and $400 per ton from the concentrates.

Bibl.: Report VIII, p. 321.

Caldwell, a prospect, is located in Sec. 18, T. 26 S., R. 33 E., M. D. M., in the Keyes district, about 1½ miles northeast of Isabella, in the Sequoia Forest Reserve, comprising 20 acres, owned by A. R. Kiester. Vein is 6 inches wide, high grade ore. Workings consist of tunnel on vein 620 feet long, and short drifts. Formation is granite and slate.

Chief, prospect, in the Long Tom district, in Sec. 22, T. 27 S., R. 29 E., M. D. M., about 21 miles northeast of Bakersfield, owned by D. M. Tressel. Consists of 60 acres, elevation 2100 feet. Small vein in

granite. Workings consist of two tunnels on vein, being 120 and 380 feet in length, and short drifts. A little high grade ore extracted by leasers.

Collar Button, prospect, is located in Sec. 10, T. 28 S., R. 34 E., M. D. M., in the Green Mountain district, about 34 miles northeast of Caliente, in the Sequoia Forest Reserve. Elevation 8100 feet. Owner, W. B. Grant, of Piute post office. Holdings consist of 14 acres. Vein is 2 feet wide, in slate. Extent of pay shoot not determined. Shaft 60 feet deep, shows 2 feet of ore that runs $40 per ton. Bright Star adjoins claim on east.

Commonwealth, owned by the Kern Development Company. C. S. Long, president and manager. Consists of 32.4 acres, patented, in Sec. 15, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ½ mile north of Kernville in the Sequoia Forest Reserve; elevation 3000 feet. Four parallel veins in slate and granite, average width 4 feet. Only slightly developed with shallow shaft and open cuts. Surface ore mills $15 per ton.

Crystal, formerly known as the Bonanza, is a prospect in the Clear Creek district, in Sec. 2, T. 29 S., R. 31 E., M. D. M., about 22 miles north of Caliente in the Sequoia Forest Reserve. Holdings consist of 60 acres, owned by A. R. Cox. Elevation 2500 feet. Vein is 10 inches wide, in granite. Slightly developed with 120-foot shaft. Small pocket taken out in May, 1914.

Dead River Channel (placer), consists of 40 acres of placer ground in Sec. 17, T. 26 S., R. 33 E., M. D. M., in the Keyes mining district, about 1½ miles north of Isabella, at an elevation of 2500 feet. Owner, C. E. Barton. Course of channel is north and south, depth of gravel 10 feet. Granite bedrock. Water obtained from Kern River. Small producer.

Deer Hunter, is a prospect in the Amalie district, Sec. 20, T. 30 S., R. 34 E., M. D. M., about 18 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 4100 feet. Owner, M. D. Elliott. Holdings consist of 60 acres. Small vein, in granite and schist. Slightly developed with short tunnel and drifts. Little high grade extracted.

Double Standard, owned by the Mojave Mining and Milling Company, of Los Angeles; G. E. Benton, president; B. Wagemann, watchman. Consists of 40 acres in Sec. 5, T. 10 N., R. 12 W., S. B. M., in the Mojave district, 3 miles south of Mojave. Elevation 2700 feet. Vein is 5 feet wide, strike northeast and southwest, dip 40° W. Quartz-porphyry walls, ore free milling. Workings consist of shaft

200 feet deep, two levels, and 2000 feet of drifts and stopes. Mine equipment consists of steam hoist, cars, tools, assay office, dwellings. Reduction equipment consists of 5-stamp mill (1100-pound stamps), operated by steam power. Idle. Two men employed. Property has been a producer.

Dreadnot, formerly known as Hardtack, consists of 80 acres in Secs. 11, 12 and 14, T. 25 S., R. 29 E., M. D. M., about 40 miles northeast of Bakersfield in the Woody mining district. Owners, Blue Mountain Mining Company, of San Jose; E. Wolf, president. Two parallel veins known as Dreadnot and Grizzly, strike east and west, dip 45° N., width 2 feet, free milling. Workings consist of a shaft 220 feet deep, three levels, 400 feet of drifts and one stope. Mine equipment consists of steam hoist, cars, tools and dwellings. Reduction equipment consists of 5-stamp mill and two Frue concentrators. Property is idle.

Bibl.: Report XII, p. 143.

Early Sunrise, a prospect, owned by the Early Sunrise Mining and Milling Company, of Santa Ana; W. W. Holesworth, president; W. A. Penrol, secretary. Consists of 60 acres, in Sec. 26, T. 26 S., R. 32 E., M. D. M., in the Keyes district, about 3 miles south of Isabella, in Sequoia Forest Reserve. Elevation 3600 feet. Small vein, in granite. Slightly developed with short tunnel, 430 feet long, and a few hundred feet of drifts. A little high grade found. Idle.

Eclipse No. 1, a prospect in the Woody mining district. Owned by D. Engle et al., is located in Sec. 34, T. 25 S., R. 29 E., M. D. M., ½ mile north of Woody. Elevation 2000 feet. Holdings consist of 20 acres. Vein is 1 foot wide, granite walls, ore free milling on the surface, but base with depth. Slightly developed with shaft 70 feet deep and a tunnel 80 feet long, and short drifts. Ore was worked in a Huntington mill (now removed), and gave returns of $40 per ton on plates. Said to have produced $20,000. Idle.

Elephant Group, consists of 100 acres, in the Mojave mining district, in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 5 miles south of Mojave, at an elevation of 3900 feet. Owner, D. E. Baker, of Nordhoff; B. Fisher, superintendent. The vein is 7 feet wide, 3 feet in bottom of shaft, said to run $200 per ton in gold, strike northwest and southeast, dip 60° N., granite-porphyry walls. Workings consist of a shaft 100 feet deep, short drifts, and one stope 120 feet long. Mine equipment consists of windlass, cars, tools, shop and cabin. Three men employed. Ore shipped to Selby's smelter, total cost (smelter charges, freight, mining, etc.) is $10 per ton for ore assaying $50 per ton. Small producer.

Ella Group, a prospect located in May, 1914, in the Amalie mining district, in Sec. 29, T. 30 S., R. 33 E., M. D. M., 15 miles northeast of Caliente, is owned by Rainey Brothers of Loraine. Group consists of 40 acres. Elevation 4000 feet. Vein 2 feet wide, runs $40 per ton in free gold, granite footwall and rhyolite hanging. Slightly developed with shaft 55 feet deep and a short drift. Three owners working. Forty tons of ore on dump.

Ellston, formerly known as Producer, is a prospect, in the Clear Creek mining district, in Sec. 8, T. 29 S., R. 31 E., M. D. M., 20 miles north of Caliente, in the Sequoia Forest Reserve. Owner, R. E. Ellston. Holdings consist of 55 acres, at an elevation of 3200 feet. Pay ore occurs in pockets in granite. Slightly developed with shaft 80 feet deep and short drifts. Ore worked in 12-foot arrastra, power obtained from Clear Creek. Two men employed. Some rich ore extracted.

Excelsior, prospect, in Mojave mining district, in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 3½ miles south of Mojave. Owned by Hunter, Clark and Ischinger of Mojave. Holdings consist of 20 acres, at an elevation of 2800 feet. Vein 2 feet wide, quartz-porphyry walls. Workings consist of three shafts on vein, from 60 to 150 feet deep. Idle.

Exposed Treasure (see *Mojave Consolidated*).

Fair View, consists of 80 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 4 miles northwest of Rosamond Station. Owners, Pierce & Company, of Los Angeles. Elevation 2650 feet. Vein 2 feet wide, granite-porphyry walls. Workings consist of shaft 400 feet deep, four levels, 1500 feet of drifts and a stope 130 feet long. There is a gasoline hoist, and dwellings on the property. Reduction equipment consists of 10-stamp mill and 50-ton cyanide plant, operated by steam power. Idle since 1911.

Garnishee, prospect, consists of 40 acres in Sec. 35, T. 26 S., R. 32 E., M. D. M., in the Keyes mining district, about 3 miles south of Isabella, at an elevation of 3200 feet. Owner, H. Stavert. Vein is small, the pay ore occurring in bunches in granite. Workings consist of tunnel 460 feet long and 2000 feet of drifts. Some rich ore extracted a few years ago. Idle.

G. B., consisting of 22.5 acres, is located in Sec. 1, T. 30 S., R. 41 E., M. D. M., 1¼ miles southwest of Johannesburg, at an elevation of 3600 feet. Owners, G. B. Mining and Reduction Company of Randsburg. C. G. Illingworth, president; G. L. Caulfield, manager; J. MacFarlane, superintendent. The holdings consist of 22.5 acres. The deposit consists of a shear zone from 100 to 300 feet wide, containing numerous parallel ledges, in rhyolite. Ledges have a width of from

10 to 18 feet, strike N. 10° E., dip 30° to 50° E. Ore is free milling. Workings consist of four shafts from 150 to 260 feet deep, two levels, 1000 feet of drifts, crosscuts, raises, winzes, and a stope 700 feet long. Ore reserve 10,000 tons, of a value of $5 per ton. Caving system of mining used. Mine equipment consists of 10 h.p gasoline hoist, cars, tools, electric motor for blower, buildings, and electric lights in mine. Reduction plant consists of dry crushing mill equipped with two crushers, rolls and screens, run by 50 h.p. motor. Capacity of mill 60 tons in twenty-four hours; also cyanide plant consisting of ten tanks of 8 tons capacity each (experimental plant). Electric power costs 12 cents per ton. Total operating cost $3 per ton. Six men employed. Worked until 1910 by leasers, who extracted some good milling ore. Some of the sulphides run $3000 per ton in gold. Adjoining mines, Baltic on south and Yellow Astor on west.

Glen Olive, the largest producer in the Pioneer mining district, consists of 120 acres in Sec. 33, T. 27 S., R. 33 E., M. D. M., 42 miles north of Caliente, in the Sequoia Forest Reserve. Elevation at tunnel, 7500 feet. Owners, A. W. Stetson et al., San Francisco; F. A. Braden, superintendent. Two parallel veins, about 200 feet apart, known as Bulgarian Troubles and Russian Bear; average width 3 feet; strike northwest and southeast, dip N. 15° W. Ore free milling, giving returns of $25 per ton on the plates. Pay shoot about 200 feet long. Workings consist of two tunnels on vein 200 feet apart and each 700 feet long, several hundred feet of drifts, crosscut 320 feet long, raises, three winzes 100 feet deep. all stoped between tunnels. Mine is equipped with cars, 800 feet automatic tramway (use two cars), shops, assay office, and dwellings. Reduction equipment consists of 10-stamp Hendy mill (1000-pound stamps) driven by gasoline, which costs 12 cents per gallon. Water obtained from springs. Tailings impounded in gulch. Production to date, $500,000. Mine closed down in May, 1914, on account of general financial conditions, as the crosscut tunnel must be extended to cut the vein so as to block out ore.

Gold Crown Consolidated, formerly known as Gold King Group, consisting of 46 acres, patented, is located in Secs. 11 and 12, T. 30 S., R. 40 E., M. D. M., 2½ miles south of Johannesburg in the Stringer mining district, at an elevation of 4000 feet. Owner, H. W. Mauby, of Randsburg. Several veins from 5 to 20 feet wide in schist. Worked by means of shallow shafts and open cuts. Ore treated at Red Dog custom mill. Cost of hauling and milling is $5.50 per ton. Net profit per ton $20. Two men employed. Small producer.

Golden Group, formerly known as Jack Rabbit, consisting of 100 acres, is located in Sec. 34, T. 30 S., R. 32 E., M. D. M., in the Amalie district, 8 miles east of Caliente, in the Sequoia Forest Reserve. Elevation 2000 feet. Owner, J. B. Ferris, of Caliente. The deposit is massive, the average width of pay ore being 20 feet, low grade, strike northwest and southeast, dip 45° N., granite walls. Workings consist of shaft 200 feet deep, three levels, 300 feet of drifts and stopes. Reduction equipment consists of Marathon tube mill (6 feet long and 3 feet

Photo No. 8. Water wheel operating "Marathon" tube mill, Golden Group.

diameter), operated by 24-foot overshot water wheel (see photo No. 8). Water from Caliente Creek through 10-inch pipe, 1000 feet long. Total production to date $5,000. Four men employed. Owner claims large ore reserve.

Gold Peak, formerly known as the Zada, one of the producers of the Amalie mining district, is located in Sec. 28, T. 30 S., R. 33 E., M. D. M., 14 miles northeast of Caliente, in the Sequoia Forest Reserve. Holdings consist of 340 acres, patented. Owned by Gold Peak Mining Company, of San Francisco; H. H. Blood, president; F. Kramer, secretary. Bonded to Coulson Bros., of Los Angeles. Six veins; only one,

the Zada, has been worked. Average width 10 feet, strike northwest and southeast, dip 40° E., quartz-porphyry walls. Pay shoot 300 feet long and 10 feet wide. Ore as a rule is free milling, but one vein carries base metals, being rich in sulphides of copper and silver. Workings consist of tunnel 450 feet long and several thousand feet of drifts and stopes. Mine equipment consists of machine drills, compressor plant, cars, ore bins, dwellings and assay office. Reduction plant consists of 20-stamp Hendy mill and four Frue concentrators, operated with gasoline engine. Idle. Tailings are impounded. Over $100,000 worth of ore shipped to smelter before mill was erected. Three men employed.

Gold State Group, a prospect, is located in Sec. 9, T. 29 S., R. 34 E., M. D. M., in the Green Mountain district, about 31 miles east of Caliente, at an elevation of 7300 feet. Owners, M. J. Errecart et al., of Loraine post office. Holdings consist of 100 acres, reached by a 7-mile trail from Piute post office. Vein is 10 inches wide, granite footwall and slate hanging. Slightly developed with shaft 80 feet deep, 200 feet of drifts, and one stope 80 feet long. Reduction plant consists of an old 12-foot arrastra, operated by steam power, wood being used as fuel. One man employed. Some high grade ore extracted. Total production $20,000.

Good Hope, formerly known as Good Hope and Kenyon, owned by Consolidated Mines Company, of Los Angeles; W. H. Herren, president; S. H. Ellis, secretary; Robert Lanka, superintendent. Consists of 156 acres (patented) in Sec. 35, T. 29 S., R. 40 E., M. D. M., 1 mile west of Johannesburg in the Rand mining district. Elevation 3550 feet. Two veins, Good Hope and Butte, strike east and west, dip 56° S., diorite walls, average width 20 inches. Pay shoot 300 feet long and 20 inches wide. Ore free milling. Workings consist of shaft 300 feet deep, five levels, and several thousand feet of drifts, raises, winzes and stopes. Mine equipment consists of 15 h.p. gasoline hoist, shop, ore bins, and dwellings. Reduction equipment consists of 5-stamp Union Iron Works mill, Blake rock crusher, settling tanks, and 30 h.p. motor, all operated with gasoline costing 25¢ per gallon. Water obtained from wells at Johannesburg. Tailings impounded to be cyanided at some future time. Eleven men employed. Cost (per ton): development $2, mining $2, treatment $1, general 50¢, making a total of $5.50. Adjoining mines: Yellow Astor, Big Butte, Little Butte and King Solomon.

Good Luck, a prospect, consists of 40 acres in Sec. 16, T. 27 S., R. 29 E., M. D. M., in the Long Tom mining district, about 21 miles northeast of Bakersfield, owned by A. P. Tucker, of Tulare. Elevation 1750 feet. Vein is small in granite, but rich. Pay shoot short. Slightly developed with tunnel 420 feet long, 200 feet of drifts, and a

stope 40 feet long. Ore worked in 12-foot arrastra, driven by water power from Long Tom Creek. One man working.

Bibl.: Report XII, p. 191.

Grace Group, a prospect in the Mojave mining district, consists of 120 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4½ miles south of Mojave, at an elevation of 3400 feet. Vein is 20 inches wide, strike northwest and southeast, dip 60° N., granite-porphyry walls. Slightly developed with tunnel 450 feet long. Originally part of Karma group. Little high grade ore found. Adjoining mine: Queen Esther on the west.

Grey Eagle, formerly known as Echo, consists of 100 acres, patented, in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4 miles south of Mojave, in the Mojave district, at an elevation of 3500 feet. Owner, A. Asher, of Mojave. Vein is 15′ wide, strike northwest and southeast, dip 50° W., granite-porphyry walls. Pay shoot is 240 feet long and 15 feet wide, low grade, with rich ore on footwall side; free milling. Workings consist of shaft 350 feet deep, three levels, 3000 feet of drifts and one stope 240 feet long. Old steam hoist, assay office and dwellings on the property. The former owners, Echo Mining Company, worked the ore in a 10-stamp mill which was removed in 1906. Owner claims a production record of $200,000. Idle since 1905.

Iconoclast, prospect, in the Valley View mining district, in Sec. 25, T. 27 S., R. 33 E., M. D. M., about 36 miles north of Caliente, consists of 60 acres, in the Sequoia Forest Reserve, owned by R. E. Porter. Elevation 8000 feet. Vein is 2 feet wide, free milling, granite footwall and slate hanging. Slightly developed with tunnel on vein 360 feet long. A little high grade ore extracted. Ore on dump said to run $30 per ton. One man employed.

Bibl.: Report XIII, p. 186.

Illinois and Golden Bell, prospect, in Pioneer mining district in Sec. 16, T. 27 S., R. 33 E., M. D. M., about 40 miles north of Caliente in Sequoia Forest Reserve, owned by J. Peep, of Bodfish P. O. Elevation 7800 feet. Holdings consist of 60 acres. Vein is 12 inches wide, slate footwall and granite hanging, free milling. Slightly developed with tunnel 310 feet long on vein. Worked as a pocket mine and $12,000 in gold said to have been extracted.

Indian Queen, a prospect, consisting of 40 acres, is located in Sec. 15, T. 27 S., R. 29 E., M. D. M., 22 miles northeast of Bakersfield, in the Long Tom mining district. Owner, R. E. Dosworth, of Tulare. Small vein, granite footwall, and diabase hanging. Workings consist of tunnel 80 feet long and short drifts. A little rich ore found.

Jeff Davis, one of the early producers of the Cove mining district, consists of 5 acres (patented in 1884) in Sec. 28, T. 25 S., R. 33 E., M. D. M., about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 2900 feet. Owners, Lady Belle Company, of Portland, Maine; president, Dr. R. C. Schupphaus; secretary, C. C. Hamilton; manager, C. S. Long, Kernville. Vein is 12 inches wide, granite walls, strike east and west, dip 70° N. Pay shoot is 350 feet long, and 12 inches wide, free milling ore, high grade. Workings consist of shaft 200 feet deep, one level, several hundred feet of drifts and a stope (350′ by 3′ by 150′). Ore stoped out from the level (150 feet), to the surface by leasers during the sixties. Production to date, $150,000. Adjoining mines: Orejana on south, Lady Belle on west, Bull Run on north, Summer on east.

Jennette, the largest producer in the Green Mountain mining district, consists of 40 acres in Sec. 22, T. 29 S., R. 34 E., M. D. M., about 25 miles northeast of Caliente, in the Sequoia Forest Reserve. Elevation 8000 feet. Owner, J. Lombard, of Piute post office. The vein has an average width of 6 inches, free milling, high grade ore, strike northeast and southwest, dip 40° S., granite walls. Workings consist of several tunnels on the vein, from 50 to 400 feet long, 2500 feet of drifts and stopes. Reduction equipment consists of 4-stamp mill, operated with steam power, wood being used for fuel. Seven men employed. Yearly production from $15,000 to $20,000. Ore runs $40 per ton. Adjoining mine: Gwinn to west.

Josephine Group, a consolidation of several old properties in the Woody mining district, consists of 150 acres, patented, and 150 acres held by location, in Secs. 2, 3, 4, 5 and 8, T. 25 S., R. 29 E., M. D. M., about 5 miles southeast of White River post office. Owner, W. Adams, of Corinth, Miss. Elevation 4000 feet. The claims included in this group are Josephine, Ballard, Last Chance, Mountain View, Banner, Alta, Queen, Vulture (patented), and Missouri, Yankee and Perseverance groups. Six parallel veins, average width 2 feet, strike east and west, dip 45° E., quartz-porphyry footwall and slate hanging, free milling ore. Main workings are on the Josephine and consist of a tunnel 300 feet long, 120-foot crosscut, 1000 feet of drifts and a stope 80′ by 3′ by 70′. Several open cuts on other claims. Reduction equipment consists of a 5-foot Huntington mill run by steam power, wood being used for fuel. One man employed. Josephine was a good producer some years ago.

Bibl.: Reports XII, p. 145; and XIII, p. 191.

Josephine T. G. Group, consists of 70 acres in the Rand district, 2 miles southwest of Randsburg, and adjoining the Yellow Aster mine

on the southwest. Owner, J. P. Howe, of Randsburg. Elevation 4000 feet. Deposit consists of quartz fissures in schist. Workings consist of several shafts from 20 to 150 feet deep, 400-foot crosscut, and a number of open cuts. Ore is free milling and shipped to Red Dog custom mill. Total operating cost, including milling, about $20 per ton. Equipment consists of 8 h.p. gasoline hoist, skids, buckets, cars and tools. Three men employed. Production to date $11,500.

Karma, owned by the Karma Mining Company, of San Francisco, R. Trost, president, E. L. Wigman, superintendent. Consists of 30 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., about 4 miles south of Mojave, in the Mojave district, at an elevation of 3200 feet. Two parallel veins, average width 15 feet, strike north and south, dip 60° E., granite-porphyry walls. Pay shoot 240 feet long and 15 inches wide. Ore free milling, needs fine grinding. Workings consist of a tunnel 1800 feet long on vein, shaft 160 feet deep, drifts and stope 240 feet long. Mine equipment consists of cars, steam hoist, assay office, shops, ore bins and dwellings. Ore reduced in a 20-stamp mill, steam driven. Idle. Water obtained from Soledad Pipe Line Company. Three men employed. Property only worked to a limited extent since 1904. Said to have produced $300,000. Adjoins Double Standard mine on the west.

Kern County Consolidated Gold Mines, formerly known as Gwynne, a small producer in the Green Mountain district, is located in Sec. 22, T. 29 S., R. 34 E., M. D. M., about 25 miles northeast of Caliente, in the Sequoia Forest Reserve. Owners, Kern County Consolidated Gold Mines Company. F. W. Gwynne, president, J. Ross, superintendent, Piute post office. Holdings consist of 40 acres, patented, at an elevation of 7500 feet. Vein has an average width of 14 inches, strike northeast and southwest, dip 40° S. Short pay shoot, free milling. Workings consist of a shaft 300 feet deep, three levels, several hundred feet of drifts, stopes and a tunnel on the vein 1500 feet long. Mine equipment consists of 30 h.p. steam hoist, cars, skip, shop and dwellings. The ore is reduced in a 3-stamp Hendy mill (850-pound stamps), operated with steam power, wood being used for fuel. Some rich ore mined. Five men employed. It adjoins the Jennette mine on the east.

Keyes, formerly known as the Old Keyes, located in 1852 by Colonel Keyes, is one of the famous mines of Kern County. The holdings consist of 100 acres in Sec. 26, T. 26 S., R. 32 E., M. D. M., in Keyes district, about 3 miles southeast of Isabella, in the Sequoia Forest Reserve, at an elevation of 3600 feet. Owners, Keyes Mining Company, of San Diego. J. L. Hooper, president, Geo. Stavent, superintendent. The vein (Keyes) is 2 feet wide, strike northeast and southwest, dip 70° E., granite walls, free milling, high grade. Workings consist of

several thousand feet of tunnels, drifts and stopes. Maximum depth about 450 feet. Mine equipment consists of cars, shops, assay office and dwellings. Ore is reduced in a new 5-stamp mill (1100-pound stamps), operated by distillate, costing about 8¢ per gallon. Nine men employed. Producer.

Bibl.: Reports XII, p. 145; and XIII, p. 191. U. S. G. S., Mineral Resources of U. S.

Keysville Placer, consists of 40 acres in Sec. 36, T. 26 S., R. 32 E., M. D. M., about 3 miles southeast of Isabella, in the Sequoia Forest Reserve, owned by G. Henschkel. Elevation 3400 feet. Old river deposit, worked in winter by ground sluicing. Course of channel northwest and southeast, granite bedrock, pay gravel 5 to 10 feet deep, easily worked, small producer.

King Solomon Consolidated Mines Company, consists of 90 acres, in Sec. 35, T. 29 S., R. 40 E., M. D. M., ¾ of a mile west of Johannesburg in the Rand district. Owners, King Solomon Consolidated Mines Company, of Los Angeles. E. Shipsey, president; J. Shipsey, superintendent. Elevation 3900 feet. Vein is 3 feet wide, granite footwall and porphyry hanging. Pay shoot said to be 1400 feet long, free milling. Workings consist of a shaft 520 feet deep, levels every 50 feet, 1400-foot drift and stopes. Mine equipment consists of a 20 h.p. West Coast hoist, cars and ore bin. Ore is reduced at Red Dog custom mill. Ten men employed. Adjoining mines, Butte and Gold Consolidated.

King Solomon Gold Mining Company, formerly known as the Pleasant View, the largest producer in the Clear Creek district, is owned by the King Solomon Gold Mining Company, of Los Angeles. B. Hohn, president; Mrs. J. Hayes, secretary. Leased to C. E. Benton. The holdings consist of 100 acres, in Secs. 9 and 10, T. 28 S., R. 33 E., M. D. M., about 4 miles east of Havilah, in the Sequoia Forest Reserve, at an elevation of 6500 feet. The vein is 3 feet wide, strike northeast and southwest, dip 60° S., granite walls. Pay shoot 300 feet long, free milling. Workings consist of a shaft 300 feet deep, three levels, short drifts, and one stope. Mine equipment consists of a steam hoist, two 30 h.p. boilers, cars, assay office, shop and dwellings. Ore is reduced in a 5-stamp Hendy mill (1000-pound stamps), operated with steam power, wood being used for fuel. Six men employed. Said to have produced $40,000 since 1912.

La Cross, a prospect, consists of 20 acres in the Stringer mining district in Sec. 2, T. 30 S., R. 40 E., about 1½ miles south of Randsburg, at an elevation of 4000 feet. Owner, H. Putnam, of Los Angeles. Vein is small, averaging 6 inches, high grade; albite schist forms the walls. Idle on account of litigation.

Lady Belle, one of the famous producers of the Cove district, consists of two full claims (the Lady Belle and Boston Belle, the former claim patented in 1884), located in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Sequoia Forest Reserve, and about ½ mile north of Kernville. Owners, Lady Belle Company, of Portland, Maine. Dr. R. C. Schupphaus, president; C. S. Long, manager, Kernville. Elevation 3100 feet. Lady Belle vein has a width of 3 feet, strike east and west, dip 65° N., granite walls. Pay shoot is 250 feet long and 3 feet wide, free milling. Property has been worked since 1861, and at one time supported a number of lessees as the ore is high grade and easily mined. The workings consist of a shaft 372 feet deep, four levels, several thousand feet of drifts and three stopes each 200 feet long. Ore reserves 4000 tons, value $35 per ton. The mine equipment consists of steam hoist, two Cameron pumps, assay office, ore bins and cars. Ore reduced at the 10-stamp mill on Kern River. Total cost of mining and milling at present is about $5 per ton. Three men employed. One run of 1500 tons of ore gave $40 on the plates. Production to date about $500,000. Adjoining mines: Big Hill, Pinnacle, and Penn cut on south, Jeff Davis and Bull Run on east, S. F. Belle and Frank on north.

Lida, also known as the Hamilton, consists of 180 acres in Sec. 11, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond, at an elevation of 2800 feet. Owners, Milwaukee Mining Company, of Milwaukee, Wis.; C. H. Watkins, president and manager; Geo. Bert, superintendent. The vein is 2 feet wide, granite footwall and slate hanging, strike northeast and southwest, dip 25° S., free milling. Workings consist of a shaft 320 feet deep, three levels, 2000 feet of drifts, and a stope 200 feet long. Mine equipment consists of steam hoist, cars, assay office, ore bin, shops and dwellings. Oil is used for fuel. A 10-stamp mill (1000-pound stamps), and a 25-ton cyanide plant comprise the reduction equipment. Water obtained from springs. Six men employed. Property said to have a production record of $200,000. Small producer at present.

Little Angel, formerly known as Warrington, consists of 40 acres, in Clear Creek district in Sec. 2, T. 28 S., R. 32 E., M. D. M., in Sequoia Forest Reserve, about 30 miles north of Caliente. Owner, S. C. Smith, of Havilah post office. Vein is small, but high grade. Short ore shoot in granite. Slightly developed with a tunnel 320 feet long on the vein, a 60-foot raise and one stope 80 feet long. Small producer some years ago.

Bibl.: Report XIII, p. 192.

Little Bonanza, a prospect in the Green Mountain mining district, in Sec. 35, T. 26 S., R. 32 E., M. D. M., about 5 miles south of Isabella,

in the Sequoia Forest Reserve, consists of 20 acres. Elevation 4100 feet. Owner, A. R. Lucy, of Isabella. Small vein in slate and granite. A tunnel 140 feet long on vein and short drifts comprise the development work. Worked as a pocket mine. Adjoins the Mammoth mine on the west.

Bibl.: Report XII, p. 191.

Little Butte, consists of 60 acres in the Rand district in Sec. 35, T. 29 S., R. 40 E., M. D. M., about 1 mile west of Johannesburg, at an elevation of 3600 feet. Owners, Little Butte Mining and Milling Company, of Los Angeles; C. W. Clark, president; Dr. J. W. Oakley, secretary; R. F. Dickinson, superintendent. Vein 4 feet wide, free milling, diorite footwall and porphyry hanging. Workings consist of a shaft 610 feet deep and 3500 feet of drifts. Equipment consists of 25 h.p. gasoline hoist, skip, cars and 2-stamp mill. Distillate, costing 20¢ per gallon, used for fuel. Ore shipped to Red Dog custom mill. Worked since 1907 by lessees. A production record of $150,000 is claimed.

Long Tom, consisting of 120 acres, patented, was the first discovery in the Long Tom mining district, and the largest producer. This group is located in Sec. 21, T. 27 S., R. 29 E., about 20 miles northeast of Bakersfield, at an elevation of 1600 feet. Owner, H. Herschfeld, of Bakersfield. The vein has a width of 16 inches, strike northwest and southeast, dip 45° N., diabase footwall and granite hanging, free milling. Workings consist of a shaft 380 feet deep (sunk at an angle of 45°), several thousand feet of drifts, and stopes 150 feet long. All ore has been stoped from the 300-foot level to the surface. Equipment consists of dwellings and 20-stamp mill (850-pound stamps). Idle. Property was a noted producer some years ago but is now only worked to a limited extent. Some of the old workings are caved. Two men employed.

Bibl.: Report XI, p. 238.

Mammoth, also known as the Harrison, is the largest mine in the Keyes district, and has been in operation over sixty years. This group, consisting of 100 acres, is located in Sec. 35, T. 26 S., R. 32 E., M. D. M., about 5 miles south of Isabella, in the Sequoia Forest Reserve, at an elevation of 3900 feet. Owners, Mammoth Mountain Mining Company, of Los Angeles; H. M. Russell, president; A. G. Keating, manager. The Mammoth vein is 2 feet wide, strike northeast and southwest, dip 70° E., slate footwall and granite hanging, free milling ore. Workings consist of a tunnel on the vein 700 feet long, and several thousand feet of drifts, stopes, and raises. Mine equipment consists of cars, shops, assay office and dwellings. The ore is reduced

in a 10-stamp mill (1100-pound stamps), driven by electric power from the Pacific Light and Power Company. Nine men employed. Producer.

Bibl.: Reports VIII, p. 314; and XIII, p. 193.

Mascot Group, 5 miles southwest of Randsburg, in the Rand mining district, consists of 60 acres. Owned by G. M. Humphrey, of Randsburg. Elevation, 3000 feet. Small vein of high grade ore in schist, free milling. Extent of ore body not determined. A shaft 50 feet deep and a short drift constitute the workings. Ore is reduced in Red Dog custom mill. Three men employed. Cost of mining and milling, about $20 per ton. Ore plates from $50 to $75 per ton.

McKidney, consisting of 60 acres, in Sec. 9, T. 28 S., R. 32 E., M. D. M., about 28 miles north of Caliente, in the Sequoia Forest Reserve, is a small producer in the Clear Creek district. Elevation, 4300 feet. Owner, D. Fergusin, of Havilah post office. Three parallel veins, but only one, the McKidney, has been worked. Average width, 2 feet, strike northeast and southwest, dip 78° S., syenite footwall and granite hanging. Ore free milling and runs from $20 to $100 per ton in free gold. Workings consist of a shaft on vein 230 feet deep, two levels and 1000 feet of drifts and stopes. Mine equipment consists of a gasoline hoist, two engines (10 and 20 h.p.) one Burleigh drill, compressor plant, tools and dwelling. Three men employed. Adjoining mine: American Golden Eagle on the west.

Bibl.: Report XIII, p. 193.

Minnehaha, a small producer of the Rand district, consists of 80 acres in Sec. 2, T. 29 S., R. 40 E., M. D. M., about 3 miles west of Johannesburg, at an elevation of 3800 feet. Owners, E. B. Maginnis et al., of Randsburg. Small vein, high grade ore, milling, $100 per ton. Workings consist of four tunnels, each 400 feet long, and four shafts each 100 feet deep. Ore reduced in Red Dog custom mill. Three men employed. Production to date, $35,000.

Minnie E. Group, consists of 40 acres, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about 1 mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 2950 feet. Owners, Lady Belle Company, of Portland, Me.; Dr. A. C. Schupphaus, president; C. S. Long, manager, Kernville. Prospect. Undeveloped.

Minnesota Group, formerly known as King George. A small producer of the Rand mining district, in Sec. 35, T. 29 S., R. 40 E., M. D. M., about 3 miles south of Randsburg, at an elevation of 4000 feet. Owner, D. Gunderson. Holdings consist of 50 acres located in 1896. Small vein in schist. Ore runs $68 per ton in free gold. Workings

consist of three shafts, each 100 feet deep and short drifts. Mine equipment consists of horse-whim, car and dwelling. Ore reduced at Red Dog custom mill. Three men employed. Produced $10,000 to date. Adjoins Josephine group on the east.

Mojave Consolidated Gold Mines, formerly known as Exposed Treasure, the largest producer in the Mojave mining district, is located in Sec. 32, T. 11 N., R. 12 W., S. B. M., about 3½ miles south of Mojave, on south side of Soledad Butte. The holdings, consisting of 280 acres. patented, and 60 acres held by location, are owned by the Mojave Consolidated Gold Mines, of Los Angeles; C. B. Campbell, president; W. H. Taylor, secretary; C. F. Nourse, superintendent. Property acquired

Photo No. 9. Mill at Mojave Consolidated Mine.

by present owners in 1912. There are six parallel veins on claims known as Mill, Assay Office, Golden Carrier, Yellow Rover, Boston and Exposed Treasure. These veins vary in width from 100 to 1000 feet, strike northwest and southeast, dip 30° E., granite footwall and quartz-porphyry hanging. Pay shoots 1500 feet long and 100 feet wide, free milling. Workings consist of several shafts on the vein, the deepest 900 feet, nine levels, over 2 miles of drift, crosscuts and stopes. One stope is 900 feet long on Exposed Treasure claim. Several hundred thousand tons of ore in sight. Ore showing free gold in bottom of 900-foot shaft on Exposed Treasure. Shrinkage stope method of mining used. Mine equipment consists of cars, compressor plant, machine drills, shops, assay office, ore bins, dwellings, 3½ miles of telephone line to Mojave, three steam hoists, several mine pumps and two Moreland

auto trucks. Reduction equipment consists of 20-stamp mill (1100-pound stamps) and a 60-ton cyanide plant (nine sand vats and three slime agitators) (see photo No. 9). Crude oil used as fuel. Water obtained from Soledad Pipe Line Company. Fifty men employed. Daily production, 60 tons. Production record to date about $2,000,000.

Bibl.: Transactions Am. Inst. Min. Engineers, Vol. XXXVII, pp. 168–176; XXXVIII, pp. 310–319.

Monarch Tungsten Gold Mining Company, a prospect in the Rand mining district, in Sec. 1, T. 30 S., R. 40 E., M. D. M., about 1½ miles south of Johannesburg, at an elevation of 3800 feet, consists of 50 acres, owned by W. A. Wise et al., of Los Angeles. Slightly developed with shallow shafts. Ore has not been found in place (gold and tungsten float). Joins Baltic on east. Idle.

Nellie Dent and Content, consists of 54.3 acres, patented in 1874, in Secs. 28 and 33, T. 25 S., R. 33 E., in Cove mining district, about ½ mile of Kernville, in the Sequoia Forest Reserve, at an elevation of 3100 feet. Owners, Kern Development Company of Portland, Maine. C. S. Long, president and manager, Kernville. Vein has an average width of 130 feet (low grade), between granite walls, strike S. 27° W., dip 68° W. Pay shoot on surface can be traced for 4200 feet by the croppings, free milling. Workings on Nellie Dent claim consist of a shaft 150 feet deep, a drift 450 feet long and one stope 450 feet in length, from which $100,000 was extracted. Report by C. W. Kempton states 1,000,000 tons of ore in sight on Content claim; also that 50 feet of ledge gave returns of $5 per ton in gold, and that deposit can be worked by open cut method of mining. Raymond, U. S. Commissioner of Mineral Statistics, in 1875, stated that "the vein on the Nellie Dent mine is 200 feet wide between walls, and carries ore yielding up to $10 or $12 per ton." Adjoining mines: Big Blue to north, Arroyo to northwest, Lyna and Blue Gouge No. 3 to northeast, and Maverick to southwest.

Old Cowboy, consists of 80 acres in Sec. 28, T. 30 S., R. 33 E., M. D. M., in Amalie District about 14 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 2800 feet. Owner, A. E. Bryson, of Los Angeles. The vein has an average width of 12 feet, quartz-porphyry walls, strike northeast and southwest, dip S. 40° E. Pay shoot 230 feet long and 12 feet wide (3 feet paid to ship), free milling. Workings consist of tunnel on vein 520 feet long, and several hundred feet of drift and stopes. Worked at times by lessees who extracted about $60,000 worth of shipping ore. Idle at present. Adjoins Gold Peak mine on west.

Ophir, consists of 40 acres, patented, in Sec. 11, T. 28 S., R. 32 E., M. D. M., in the Clear Creek district, about 29 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4200 feet. Owner, J. E. Waters, of Havilah post office. Vein is 4 feet wide, slate walls. Development work consists of a tunnel on the vein 420 feet long, several shallow shafts, 600 feet of drifts and one stope 130 feet long. Ore worked years ago in 5-stamp mill, which has been removed to the King Solomon mine. Owner claims that property produced $90,000. Idle.

Bibl.: Report XIII, p. 194.

Oro Fino, one of the early producers of the Clear Creek mining district, consisting of 60 acres, patented, in Sec. 3, T. 28 S., R. 32 E., M. D. M., about 30 miles north of Caliente, in the Sequoia Forest Reserve, is owned by J. A. Bouquet, of San Francisco. The vein is 4 feet wide, granite walls, strike northeast and southwest, dip 72° E. Workings consist of a tunnel on the vein 230 feet long and several hundred feet of drifts and stopes. Ore was milled in the custom mill at Havilah, now removed. Property said to have produced $100,000. Ore was rich in free gold.

Bibl.: Report XIII, p. 194.

Pickwick, a prospect, in Sec. 3, T. 27 S., R. 33 E., M. D. M., in the Pioneer district, about 35 miles north of Caliente, in the Sequoia Forest Reserve, consists of 80 acres, owned by John Ross of Bodfish. Small vein in granite, pay ore found in pockets. Slightly developed with a crosscut tunnel 180 feet long, which cuts the vein at a distance of 155 feet from the portal. Small producer. Worked by owner.

Pine Tree, also known as American, the only gold mine in the Tehachapi district, consists of 190 acres (170 patented and 20 held by location), in Secs. 3 and 4, T. 11 N., R. 15 W., S. B. M., about 6 miles south of Tehachapi, owned by Geo. Gordon. Elevation 5000 feet. Two parallel veins but only one, the Pine Tree, has been worked, 4 feet wide, strike northeast and southwest, dip 45° E., granite walls. Pay shoot 250 feet long and 4 feet wide, free milling. Workings consist of several tunnels on vein (longest 800 feet), and several thousand feet of drifts and stopes. Mine equipment consists of cars, shops and dwellings. Ore was reduced in a 4-foot Huntington mill, wood being used for fuel. Produced $250,000 from 1876 to 1907. Idle at present.

Bibl.: Report XIII, p. 194.

Piute Consolidated, a prospect, consists of 100 acres, in Valley View district, in Sec. 13, T. 28 S., R. 34 E., M. D. M., about 42 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 7500

feet. Owner, R. L. Wilson, of Havilah. Vein is 2 feet wide, strike northeast and southwest, dip 45° S., granite footwall and quartz-porphyry hanging. Pay shoot 150 feet long, free milling. Workings consist of a crosscut tunnel 300 feet long, cutting the ore at a distance of 150 feet from the portal, short drifts and open cuts. Ore reduced in a 4-stamp mill on Clear Creek. Leased by Wilson. Owner in 1913 saved $2,500 on the plates from 80 tons of ore.

Phoenix Development Company, formerly known as Valverde, a prospect in Sec. 35, T. 29 S., R. 40 E., M. D. M., about ½ mile north of Johannesburg in Rand district, owned by Mrs. C. A. Burcham, of Randsburg. Elevation 3800 feet. Vein is large, but pay ore found in small lenses, schist formation. Equipment consists of 5-stamp mill and one stamp battery, operated by 15 h.p. gasoline engine, and a small friction hoist. Development work consists of shallow shafts and short drifts. Property produced $30,000. Idle.

Pinmore, prospect, formerly known as Cræsus, consists of 40 acres, in Sec. 26, T. 29 S., R. 40 E., M. D. M., in Rand district, about 1 mile north of Johannesburg. Owned by Los Angeles Company. Small veins in schist. Equipment consists of 15 h.p West Coast gas engine, skip and cars. The 10-stamp mill destroyed by fire. Company paid $5,000 in dividends in two years. Idle.

Placer Gold Company (placer), consists of 60 acres in Sec. 1, T. 30 S., R. 40 E., M. D. M., about ½ mile south of Johannesburg, in the Rand district, at an elevation of 3500 feet. Owners, Placer Gold Company, of Los Angeles; E. Dunham, president; H. R. Wynn, superintendent. Deposit consists of igneous materials from the surrounding hills. Worked by sluicing and concentrating on cocoa matting, then the coarse is crushed through a Bronze reduction mill and then over Cummings concentrating tables, the gold being extracted in amalgam barrel and the tungsten shipped to smelter. Water obtained from Randsburg Water Company and Santa Fe Railroad. Gasoline used for power, costing about 7¢ per cubic yard for gravel handled. Net profit per cubic yard $1.30. Plant handles 100 cubic yards daily. Six men employed. Ground worked from 1898 to 1913 by "dry wash" method.

Polar Bear, a prospect, consists of 80 acres, in Sec. 29, T. 27 S., R. 33 E., in the Pioneer mining district, about 34 miles north of Caliente, in the Sequoia Forest Reserve. Elevation 3200 feet. Small veins in granite. Worked for "pockets" by G. F. Haskins, the owner. One tunnel on vein 210 feet long. Produced $8,000 to date.

President, a prospect, consists of 20 acres in Sec. 4, T. 27 S., R. 32 E., M. D. M., in the Keyes district, about 5 miles south of

Isabella, in the Sequoia Forest Reserve, at an elevation of 3200 feet. Owner, U. T. Smith. Short pay shoot, granite footwall and granodiorite hanging. Tunnel on vein 465 feet long and 150 feet of drifts. Idle.

Pyramid, a prospect, in the Stringer mining district, about 5 miles northeast of Johannesburg, consists of 40 acres at an elevation of 4000 feet, owned by B. Ostick, of Randsburg. Small vein in schist. Workings consist of shaft 200 feet deep and 200 feet of drifts. Hoisting done with horse-whim. Property idle. Ostick also owns the Tip Top custom mill (5 stamps), near Atolia.

Queen Esther, one of the famous mines of the Mojave district, consists of 160 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., 4 miles south of Mojave, at an elevation of 3200 feet. Owners, Queen Esther Mining and Milling Company, Central Building, Los Angeles; S. W. Mudd, president; A. A. Burnard, manager; Gus Colberg, watchman. The vein has an average width of 8 feet, strike northwest and southeast, dip 40° E., granite-porphyry footwall and quartzite hanging. Pay shoot 500 feet long and 8 feet wide, free milling. Underground workings consist of several tunnels on the vein, drifts and stopes, making in all over 3500 feet of development. Equipment consists of cars, steam hoist, shops, office and dwellings. The reduction equipment consists of a 100-ton Cornish roll mill, and cyanide plant. Water obtained from Soledad pipe line. Property discovered in 1894 and worked until August, 1910, during which time several hundred thousand dollars in gold was extracted. Rich ore was shipped from the surface.

Rainbow, a prospect, 5 miles southwest of Johannesburg, in the Stringer district, consists of 30 acres, owned by B. Ostick, of Randsburg. Small vein in schist. Workings consist of a tunnel on vein 100 feet long and shallow shafts. A little ore shipped to his custom mill at Atolia. Owner doing assessment work.

Rand, a prospect in the Clear Creek mining district, consists of 20 acres in Sec. 3, T. 28 S., R. 32 E., M. D. M., about 25 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4500 feet. Owner, G. E. Bennett, of Caliente. The vein is 1 foot wide in granite, free milling. Workings consist of a tunnel on the vein 500 feet long and 400 feet of drifts. Two men driving a crosscut tunnel (contract work).

Rawhide, a prospect, consists of 40 acres in Sec. 28, T. 29 S., R. 34 E., M. D. M., in the Green Mountain district, about 23 miles northeast of Caliente, in Sequoia Forest Reserve, at an elevation of 7000 feet. Owner, A. R. Bulong, of Piute post office. Vein is 18 inches wide.

strike north and south, dip 30° E., granite walls, free milling ore, high grade. Workings consist of a tunnel on the vein 380 feet long and 250 feet of drifts. Two men employed. Small producer.

Red Hill, owned by Orejana Mining Company, of Hayward, Cal.; C. S. Long, president and manager; consists of 24 acres (4 acres patented), in Sec. 21, T. 25 S., R. 33 E., M. D. M., in the Cove mining district, about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3500 feet. Three parallel and three cross veins, slate footwall and granite hanging. Croppings on surface are 125 feet wide and carry some values in gold. A short tunnel and several open cuts constitute the development work. Adjoining mines: Zadel, Stirrup and Queirolo on west, Mystic on north, and northeast extension Sumner on south.

Red Hill Group, consists of 220 acres in Secs. 16 and 21, T. 25 S., R. 33 E., M. D. M., in the Cove district, about 1 mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3600 feet. Owner, Orejana Mining Company, of Hayward; C. S. Long, president and manager. Three parallel veins having an average width of 10 feet. Lode outcrops for a distance of 8500 feet. Prospect.

Rose, a prospect, consists of 20 acres, patented, in Sec. 31, T. 26 S., R. 32 E., M. D. M., in the Greenhorn Mountain district, about 8 miles southeast of Isabella, in Sequoia Forest Reserve, at an elevation of 6000 feet. Owner, George King, of Isabella. Vein is 3 feet wide, strike northeast and southwest, dip 60° E., slate footwall and granite hanging. Workings consist of shaft 140 feet deep, 700 feet of drifts, and a crosscut tunnel 230 feet long. A little high-grade ore found. Idle.

Royal Bohn, a prospect in the Rand district, consists of 140 acres about 5 miles southwest of Randsburg, owned by A. M. Powell. Small vein in schist. Ore shipped to Red Dog custom mill. Small producer. Some tungsten mined. Three men employed.

Rustler and San Diego, a prospect adjoining the Yellow Astor mine on the west, consists of 40 acres in Sec. 2, T. 29 S., R. 40 E., M. D. M., about 1 mile west of Randsburg, in the Rand district. Owners, E. B. Maginnis and J. T. O'Leary, of Randsburg. Large body of low grade ore in schist and rhyolite, but only the high-grade streaks are worked. Three short tunnels and shallow shafts constitute the workings. Ore shipped to Red Dog custom mill. Two men employed. Small producer.

Santa Ana Gold Mines, formerly known as Napoleon Consolidated, a producer, consists of 40 acres in Sec. 11, T. 30 S., R. 40 E., M. D. M., about 2½ miles southwest of Randsburg, in the Stringer district, at an elevation of 4000 feet. Owner, Santa Ana Gold Mines Company, of

Los Angeles; F. Layton, president; J. Montgomery, secretary. Small vein in schist, high-grade ore, free milling. Workings consist of several shafts from 40 to 300 feet deep. Equipment consists of 15 h.p. Fairbanks-Morse gas engine, cars and shop. Distillate used as fuel, costing 20¢ per gallon. Ore is shipped to Red Dog custom mill. Property worked from 1896 to 1903 by the company, but since that time by lessees. A production record of $400,000 is claimed.

Shoestring, a prospect, consists of 20 acres in Sec. 12, T. 27 S., R. 32 E., M. D. M., in the Keyes district, about 4 miles south of Isabella, in the Sequoia Forest Reserve, at an elevation of 2800 feet. Owner, Geo. King, of Isabella. Small vein in granite, high-grade ore, free milling. Workings consist of a tunnel on vein 430 feet long and 600 feet of drifts. Idle.

Sidney Group, a small producer in the Rand mining district, consists of 260 acres in T. 30 S., R. 40 E., M. D. M., at an elevation of 4300 feet. Owner, A. C. White, of Randsburg. Several parallel veins in schist. Ore is free milling and runs from $10 to $200 per ton in gold. Shipped to Red Dog custom mill. Average profit per ton, $35. Workings consist of several shafts from 50 to 325 feet deep, 2000 feet of drifts and a number of stopes. Equipment consists of two gasoline hoists (18 h.p. and 50 h.p.), compressor plant, capacity three Ingersoll drills, shop and dwellings. Owner employs from three to ten men. Total production, $200,000.

Silver Boy, a prospect adjoining the Queen Esther mine on the east, consists of 80 acres in Sec. 6, T. 10 N., R. 12 W., S. B. M., in the Mojave district, about 3½ miles south of Mojave, at an elevation of 3000 feet. Owner, Gus. Colberg, of Mojave. Vein is 4 feet wide, quartzite footwall and granite-porphyry hanging. Slightly developed with shaft 100 feet deep and 200-foot drift. A shipment of 200 tons of ore to Selby smelter gave returns of $20 per ton in gold and $10 in silver.

Southern Cross Group, consists of 240 acres in Secs. 3 and 10, T. 28 S., R. 32 E., M. D. M., in the Clear Creek district, about 29 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4200 feet. Owner, A. Nielson, of Havilah post office. Vein is 20 feet wide, granite footwall and syenite hanging, strike northeast and southwest, dip 50° S. Ore free milling, low grade. Workings confined to the Mountain King claim and consist of a tunnel on the vein 360 feet long, 500 feet of drifts, and several open cuts. Two men employed.

Stanford, a prospect adjoining the Sunshine on the southwest, consists of 75 acres in Sec. 11, T. 30 S., R. 40 E., in Rand district, about 4 miles west of Johannesburg, at an elevation of 3800 feet. Owner, Sam Montgomery. Small vein in schist. Free milling ore, high

grade. Workings consist of a shaft 425 feet deep and several thousand feet of drifts and stopes. Equipment consists of a 12 h.p. gasoline hoist, a horse-whim, cars, shop and dwellings. Worked to a limited extent by lessees. Small producer.

Summit Group, adjoining the Bright Star mine on the east, consists of 120 acres in Sec. 11, T. 28 S., R. 34 E., M. D. M., in the Green Mountain district, about 35 miles northeast of Caliente, in the Sequoia Forest Reserve. Owner, E. Roble, of Los Angeles. The vein is 2 feet wide, slate walls, and is an extension of the Bright Star lead. Workings consist of a shaft 100 feet deep and 1000 feet of drifts. Ore is free milling and runs $50 per ton. Two men employed. Prospect.

Sumner and North Extension, a famous producer in the pioneer mining days of Kern County, consists of 18 acres, patented in 1874, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ½ mile north of Kernville, in the Sequoia Forest Reserve, at an elevation of 3000 feet. Owners, Kern Development Company of Portland, Maine, C. S. Long, president and manager; C. C. Hamilton, secretary. Local office, Kernville. Six veins; three parallel veins have an average width of 80 feet, slate footwall and granite hanging, strike N. 20° W., dip 70° W. (on Sumner claim). The three cross veins are smaller, having a width of 2 feet and are on the North Extension claim. The main workings are on the Sumner claim and consist of four shafts from 40 to 240 feet deep, three levels at 80′, 160′ and 240′; 2500 of drifts and two stopes, one 700 and the other 300 feet long. Ore is free milling. Equipment consists of a steam hoist, compressor plant, cars and shop. Ore reduced in 10-stamp mill on Kern River. Sumner claim has produced $600,000. Adjoining mines: Jeff Davis, Bull Run, Frank, and Orejana on the west, Big Blue on the south, North Extension Sumner on the north. Raymond in Seventh Annual Report of U. S. Commissioner of Mining Statistics, states: "That the Sumner produced, in 1874, 5000 tons of ore with an average yield per ton of $40, total bullion product $200,000, number of stamps 16, cost of mining per ton $2.50, cost of milling per ton $2, kind of power and amount, water, no limit."

Bibl.: Report VIII, p. 315. U. S. Commissioner of Mining Statistics, Seventh Report.

Sunset, a prospect, consists of 40 acres in Sec. 10, T. 27 S., R. 32 E., M. D. M., in the Pioneer district, about 33 miles north of Caliente in the Sequoia Forest Reserve. Owner, C. E. Pierrel, of Bodfish post office Small vein of high grade ore in granite, free milling. Slightly developed with tunnel on vein 230 feet long. Worked by owner.

Sunshine, a prospect, consists of 18 acres, patented, in Sec. 11, T. 30 S., R. 40 E., M. D. M., in the Stringer district, about 2½ miles southwest of Johannesburg. Owner, T. W. Atkinson, of Randsburg. Small vein in schist. A shaft 500 feet deep and numerous drifts and stopes comprise the workings. Mine equipment consists of 25 h.p. gasoline hoist, air compressor, four machine drills and pumping plant to bring water from Johannesburg to the claim. Reduction equipment consists of a 3-stamp mill and cyanide plant, operated by gasoline. Idle.

Sunrise, a prospect, consists of 20 acres, in Sec. 10, T. 26 S., R. 29 E., M. D. M., in the Woody mining district, about 25 miles east of MacFarland. Owner, A. W. McRae, of Bakersfield. Vein is 2 feet wide, schist footwall and granite hanging. Ore is base, carrying gold and copper. Some rich ore found on the surface showing free gold. Slightly developed with a shallow shaft and a short tunnel on the vein. Idle.

Tip Top, a prospect, consists of 60 acres, in Sec. 14, T. 27 S., R. 33 E., M. D. M., in the Pioneer district, about 36 miles north of Caliente in the Sequoia Forest Reserve. Owner, C. E. Hayes, of Bakersfield. Small vein in granite. Workings consist of a tunnel on the vein 360 feet long and 200 feet of drifts. Idle.

Trestle, a prospect, owned by J. Trestle, and leased to the Practical Investment Company, of Los Angeles, W. R. Letton, president, is a small producer, in the Green Mountain district, in Sec. 18, T. 29 S., R. 34 E., M. D. M., about 26 miles northeast of Caliente, in the Sequoia Forest Reserve. Holdings consist of 60 acres, at an elevation of 7400 feet. Vein is small but high grade, granite walls. Ore is free milling. A tunnel on the vein 600 feet long and 200 feet of drifts comprise the workings. The ore is reduced in a 16-foot arrastra driven by steam power, wood being used for fuel. Four men employed.

Tropico, formerly known as Big Tree, is owned by the Tropico Mining and Milling Company, of Rosamond; V. V. Cochran, president; B. Gross, secretary. The holdings consist of 80 acres in Secs. 10, 11, 14 and 15, T. 9 N., R. 13 W., S. B. M., about 5 miles northwest of Rosamond, at an elevation of 2500 feet. The vein is 2 feet wide, strike northeast and southwest, dip 45° S., quartz-porphyry walls. Workings consist of a shaft 300 feet deep, 2000 feet of drifts and a stope 160 feet long. Mine equipment consists of a gasoline hoist, cars, shop, ore bins and dwellings. Reduction equipment consists of a 10-stamp mill, Blake crusher and cyanide plant. Gasoline used for power. Idle.

Urbana and Frank, consist of 24 acres, patented in 1882, in Sec. 28, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ¾ of a mile north of Kernville in the Sequoia Forest Reserve. Owners, Kern De-

velopment Company, of Portland, Maine. C. S. Long, president and manager, Kernville. The vein has an average width of 18 inches, granite walls, strike S. 75° W., dip 70° N. Pay shoot is 700 feet long and 18 inches wide, free milling and high grade. Workings consist of five shafts from 50 to 180 feet deep, drifts and stopes. Ore milled in 10-stamp mill on Kern River. Production to date $200,000. Adjoining mines: Sumner on northeast, Bull Run on southwest, Lady Belle on south, and Beauregard on northwest. Rich ore extracted by lessees years ago.

White Star, a prospect, consists of 20 acres in Sec. 11, T. 27 S., R. 32 E., M. D. M., in the Pioneer district, about 32 miles north of Caliente, in the Sequoia Forest Reserve, at an elevation of 4300 feet. Owner, F. A. Braden, of Bodfish post office. Small vein, granite footwall and syenite hanging. Pay shoot is 40 feet long and 10 inches wide, free milling. Slightly developed with a tunnel on the vein 320 feet long, 400 feet of drifts and a stope 40 feet long. Reduction equipment consists of a 2-stamp mill (1000-pound stamps), steam driven, wood being used for fuel. Some rich ore mined. Property said to have produced $30,000. Idle.

Willow (placer), consists of 40 acres, in Sec. 22, T. 25 S., R. 33 E., M. D. M., in the Cove district, about ¾ of a mile north of Kernville, at an elevation of 2700 feet. Owners, Orejana Mining Company, of Hayward. C. S. Long, president and manager. River deposit, slate and granite bedrock, soft. Pay gravel is about 6 feet deep. Extent of deposit not determined. Ditch has a capacity of 300 inches, the water being diverted from the Kern River. Worked several years ago by ground sluicing. Idle.

Windy Gold Mining Company, controlled by John Singleton, of Randsburg, owns 90 acres in Sec. 34, T. 29 S., R. 40 E., M. D. M., in the Rand district, about ¾ of a mile west of Johannesburg, at an elevation of 3800 feet. Property leased to Fahey Bros. Small vein in schist, high grade ore, free milling. Workings consist of a shaft 200′ deep, drifts and stopes. Equipment consists of a horse-whim, cars, shop and dwelling. Ore is shipped to the Red Dog custom mill. Ore runs from $40 to $300 per ton. Two men employed.

Winnie, consists of 20 acres in Sec. 11, T. 30 S., R. 40 E., M. D. M., about 3 miles southwest of Johannesburg, in the Stringer district, at an elevation of 4000 feet. Owner, C. A. Koehn, of Randsburg. A number of small parallel veins in schist. Worked by means of shafts from 50 to 250 feet deep. Ore free milling, carrying a small percentage of tungsten. Horse-whim, shop and dwelling on the claim. Two men employed. Two lessees working a portion of the holdings. Ore shipped to Red Dog custom mill. Small producer.

Yellow Aster, the largest gold producer in southern California, and one of the noted mines of the State, is located in Sec. 2, T. 29 S., R. 40 E., M. D. M., in the Rand mining district, about 2 miles west of Johannesburg. The holdings, consisting of over 600 acres, are owned by the Yellow Aster Mining Company, of Los Angeles; John Singleton, president; Roselle Burcham, secretary. Elevation 5200 feet. The vein has an average width of 250 feet, schist hanging-wall, footwall not exposed as yet. The country rock consists of granite, porphyry and schist. The workings consist of a shaft 750 feet deep, 12 miles of tunnels, 15 miles of raises, winzes and stopes, and a number of open cuts Method of mining consists of open cut work, formerly by shaft and tunnels. Ore reserve about 5,000,000 tons of $3 rock. Mine equip-

Photo No. 10. New 100-stamp mill, Yellow Aster Mine.

ment consists of three 7-ton Porter locomotives, 15 h.p. gas motor, machine drills, compressor plant, shops, 130 h.p. gasoline hoist and three air hoists. Reduction equipment consists of 130 stamps and cyanide plant (see photo No. 10). Steam power costs $12.50 per h.p. Electric power system being installed to connect with line of Sierra Power Company. Tailings stacked on the dump at present. About 500 tons of ore are crushed daily, free milling. Extraction about 98%. Yearly production $480,000. Production to date (1895–1914) over $8,000,000. Total mining and milling costs $1.55 per ton. Water is obtained by pumping from two springs, one at Goler, 7 miles northwest of the mine, and another 4 miles northeast; cost about 40 cents per 1000 gallons. About 20,000 b. m. feet of timber per month is required. Number of men employed 175. Monthly dividends at present $5,000. Adjoining mines: Consolidated on the east and Maginnes on the west.

Zenda, a producer, consists of 180 acres in Sec. 30, T. 30 S., R. 33 E., M. D. M., in the Amalie district, about 12 miles northeast of Caliente, in the Sequoia Forest Reserve, at an elevation of 3500 feet. Owner, Zenda Mining and Milling Company, of Los Angeles; Dr. C. W. Bryson, president; T. Martin, secretary. Leased to J. Faucet. Vein has an average width of 30 feet, granite footwall and quartz-porphyry hanging, strike northeast and southwest, dip 40° N. Pay shoot over 300 feet long and 30 feet wide, free milling. Workings consist of a tunnel on the vein 230 feet long and several hundred feet of drifts and stopes. Some ore extracted from open cuts. Several hundred thousand tons of ore in sight. An automatic tramway (48 buckets holding 200 pounds each), ¾ of a mile long, conveys the ore from the mine to the mill. Equipment consists of 120 h.p. Fairbanks-Morse gas engine, 20 h.p. pump, assay office, small electric plant, and dwellings. Reduction equipment consists of 10 stamps, tube mill (4¼′ x 18′), Dorr classifier and thickener, and five cyanide tanks (daily capacity 10 tons each). New equipment cost the lessee $40,000. The pebbles for the tube mill come from San Diego and cost $25 per ton. Gasoline used for power. Four men employed.

GYPSUM.

Gypsum deposits of varying quality occur for many miles along the lower foothills of the Sierra Nevada, reaching from Caliente on the south nearly to Porterville on the north.

In the valley of Cottonwood Creek, 5 miles north of Pampa Station, on the Southern Pacific Railroad, the beds are rather extensive, and a number of mines have been opened. The gypsum here occurs both as a crust on the surface and as interstratified beds. The latter vary in thickness from 20 inches to 5 feet, and lie upon a bed of marl. The material is sacked and hauled 8 miles to Wade Station, and is used for fertilizing purposes.

U. S. G. S. Bull. 223, p. 121.

W. A. Fauntleroy mined gypsum several years ago from his property in Secs. 21, 27, 28 and 29, T. 29 S., R. 30 E., M. D. M., on both sides of Cottonwood Creek.

Near McKittrick, in Sec. 21, T. 30 S., R. 22 E., a deposit of gypsum has been worked by the *California Gypsum and Mineral Company.* This deposit is 2 feet deep, and overlain by 6 inches of soil.

Abbott and Hickox own a deposit in Sec. 30, T. 30 S., R. 22 E., about 2½ miles southwest of McKittrick. Deposit that has been worked is about 500 feet long, 200 feet wide, and 12 inches thick. About 5000 tons have been shipped. The analysis of this gypsite gives an equivalent of 92.5% of gypsum (hydrous calcium sulphate).

There are several small areas in the vicinity of Sunset that carry thin deposits of gypsite. Large quantities are also reported in the southeastern part of Kern County.

Bibl.: Reports X, p. 223; XI, p. 233; XII, p. 324; U. S. G. S. Bull. 223, p. 121; Bull. 413, pp. 16–20.

IRON.

Deposits of iron ore occur at Woody, in Secs. 10 and 15, T. 26 S., R. 29 E., M. D. M.; at foot of Mount Breckenridge in Sec. 4, T. 29 S., and near San Emidio in Sec. 17, T. 9 N., R. 21 W., S. B. M. None of these deposits have been worked, and their commercial value is doubtful on account of the cost of transportation.

Iron Mountain, consists of 80 acres in Secs. 10 and 15, T. 26 S., R. 29 E., M. D. M., about 1½ miles south of Woody. Owned by J. Werringer of Woody. Deposit is 300 feet wide, consisting of magnetite, mica schist walls. A few open cuts constitute the development work. Some of the ore contains 70% iron.

Iron Mountain Nos. 1 and 2, consist of 40 acres at the foot of Mount Breckenridge, in Sec. 4, T. 29 S., R. 31 E., M. D. M., about 20 miles north of Caliente. Formerly owned by D. Lutz, of Bakersfield. Deposit consists of hematite from 10 to 300 feet wide, mica walls, strike northeast and southwest, dip 45° W. A few open cuts constitute the development work.

Two to One, located in Sec. 17, T. 19 N., R. 21 W., S. B. M., owned by C. R. Merriam, of Bakersfield. Consists of a massive deposit of hematite from 50 to 400 feet in width. Slightly developed by means of open cuts and short tunnels.

LIME AND LIMESTONE.

The lime industry is a large and important one at Tehachapi, on the Southern Pacific and Santa Fe railroads. The industry began several years ago by burning lime for local use, and then for shipment to other points, until now the Tehachapi lime is known all over southern California.

Limestone outcrops at many points in this area, also at Keene, and along Erskine Creek, some 30 miles north of Caliente (see photo No. 11.)

Jameson Lime Company owns an extensive deposit of limestone in the west half of Sec. 14, T. 32 S., R. 33 E., M. D. M., about 2 miles east of Tehachapi. These holdings, consisting of 320 acres, are controlled by J. W. Jameson, of Taft, and an excellent grade of lime is produced. The limestone is in part coarsely crystallized, and blue to white in color. The belt is at least 2500 feet wide and several hundred feet

Photo No. 11. Limestone croppings along Erskine Creek.

thick, with practically no overburden. The deposit has been worked for twenty years. Limestone is burned in two modern kilns, having a daily capacity of 40 barrels each. Oil is used for fuel, costing 50¢ per barrel. Plant is operated about six months during the year, ten men being employed.

Bibl.: Bull. No. 38, p. 70. The Structural and Industrial Materials of California, issued by California State Mining Bureau.

Mountain Summit Lime Company, of Los Angeles, owns a large limestone quarry at Keene Station, 8 miles northwest of Tehachapi, and some years ago considerable lime was produced. Lime is similar to the Tehachapi product.

Summit Lime Company, formerly known as the Union Lime Company, owns 640 acres, patented in Sec. 35, T. 12 N., R. 15 W., S. B. M., about 3 miles south of Tehachapi. F. O. Wyman, president; W. O. North, secretary; C. W. Shoff, superintendent; Home office, 303 Heney Building, Los Angeles. Trade name, "Blue Summit Lime." The

Photo No. 12. Summit Lime Company's Plant at Tehachapi.

limestone occurs in heavy beds, with a strike of N. 75° W., and varies in color from white to light blue. It is all crystallized, in some places coarse grained, and elsewhere fine grained. The quarry is 300 feet long and 300 feet deep, the rock being conveyed to the kilns by an automatic tram. The company operates four kilns at the deposit, and four

near Tehachapi, in Sec. 21, T. 32 S., R. 33 E., M. D. M. (see photo No. 12). The limestone is hauled from the quarry to the Tehachapi plant, 3 miles, with eight-horse teams. Total capacity of the two plants is 560 barrels. Oil used for fuel. Output in 1912 was 120,000 barrels. Fifty men employed. Product sold in southern California and in Arizona.

Bibl.: Report XIII, p. 628; Bull. No. 38, p. 71.

MACADAM.

Kern County Rock Quarry, located in Sec. 21, T. 31 S., R. 32 E., M. D. M., at Keene Station, is owned by the county of Kern, and comprises an area of 100 acres, patented. The deposit is a rather coarse-grained, friable granite, which it is proposed to crush and use as macadam on the county roads. Such rock, however, is a poor road-making material. A large crushing plant, to be operated by electricity, is being installed. Twenty men employed.

MAGNESITE.

Bissell Deposit is unique in being the only occurrence of magnesite of evidently sedimentary origin that has been reported in the United States. These holdings, consisting of 40 acres, are located in Secs. 11 and 12, T. 10 N., R. 11 W., S. B. M., about ¾ of a mile north of Bissell Station, on the Atchison, Topeka and Santa Fe Railroad, 11 miles east of Mojave. Located in 1907 by B. M. Denison et al., of Tehachapi. The magnesite occurs in definitely bedded form, interstratified with clay and clay shales, the whole having a width of some 300 feet, and can be traced for a distance of 2500 feet. The workings consist of open cuts and shallow shafts from 10′ to 30′ deep.*

Section at prospect cut near Bissell Station shows:

	Feet	Inches
Magnesite		4
Clay, thin streak		
Magnesite		2
Clay, thin streak		
Magnesite		2
Clay (with thin streak of magnesite)		6
Magnesite		8
Clay, greenish	1	3
Magnesite		2
Clay, greenish	1	
Totals	4	3

(Bull. No. 540, p. 515, U. S. Geol. Surv.)

*Shipments are being made (May, 1915) to the calcining plant of the Rex Plaster Co., at Los Angeles.

Analyses of samples of magnesite from Bissell.

	1	2	3	4
SiO_2	9.64	8.51	6.08	4.75
$Al_2O_3+Fe_2O_3$	2.46	2.94	1.40	.76
CaO	4.25	3.88	1.56	Trace
MgO	37.19	38.82	42.78	44.20
CO_2	40.70	40.12	45.78	47.32
Undetermined	5.76	6.75	2.45	2.97
Totals	100.00	100.00	100.00	100.00

Theoretically pure magnesite is composed of 47.6% of magnesia plus 52.4% of carbon dioxide.

Bibl.: Bull. No. 540, pp. 512–516, U. S. Geol. Surv.

MARBLE.

Marble occurs near Neenach, on the south slope of the Tehachapi range, in Brights Valley, in San Emigdio Canyon, and along Erskine Creek. The Neenach deposit is the only one that has been worked.

Antelope Valley Marble Quarry, owned by the Southern California Marble Company, is located in Sec. 2, T. 9 N., R. 17 W., S. B. M., near Neenach, on the south slope of the Tehachapi range. The deposit consists of a large body of fine-grained marble, consisting of a number of beds of various colors, dipping at an angle of 35° into the mountain. In the quarry is found white marble with reddish-brown and heavy blue veins. This marble has been used in the Stimson Block, Los Angeles, in the Spreckels bandstand, Golden Gate Park, Goldberg & Bowen's store, Sutter street, San Francisco. Quarry has been idle since 1904.

Bibl.: Report VI, part 1, p. 23; XIII, p. 629; Bull. No. 38, p. 100.

MINERAL SPRINGS.

Kern County has a number of mineral springs, especially along the Kern River. No water on the market.

Bibl.: Water Sup. Pap. No. 338, U. S. Geol. Surv.

Air Compressor Springs, also known as Hobo, owned by U. S. Government, consist of three springs on the Kern River in Sec. 15, T. 27 S., R. 32 E., M. D. M., about 3 miles west of Bodfish post office. Waters contain sulphuretted hydrogen; temperature 140° F.; said to be good for rheumatism. A number of people visit the springs during the summer months. No accommodations.

Delonagha Hot Springs, owned by H. H. Fish, of Bakersfield, consist of three springs in Sec. 26, T. 27 S., R. 31 E., M. D. M., about 34 miles north of Caliente, at an elevation of 2500 feet. Water contains iron, sodium and other salts; temperature 116° F.; said to be good for rheumatism. Accommodations for a small number of people.

Democrat Springs, owned by D. D. Hill, of Bakersfield, consist of five springs in Sec. 5, T. 28 S., R. 31 E., M. D. M., about 35 miles north of Bakersfield, at an elevation of 2250 feet. Auto stage conveys guests from Bakersfield to the springs. Water contains iron, sodium and other salts; temperature 115° F. Several buildings afford accommodations for a number of people.

Kernville Hot Springs, owned by A. Brown Company, of Kernville, consist of two springs in Sec. 34, T. 25 S., R. 33 E., M. D. M., on the Kern River, 2 miles northeast of Kernville, at an elevation of 2700 feet. Water contains iron and salts that are a curative for blood diseases; temperature 100° F. No accommodations.

Koehn Springs consist of five springs in Sec. 8, T. 30 S., R. 38 E., M. D. M., about 15 miles west of Randsburg. Water contains borax and other salts. Temperature 80° F.

Neill's Hot Springs, owned by J. Neill, of Isabella, consist of three springs in Sec. 31, T. 26 S., R. 33 E., M. D. M., about 3 miles north of Isabella, at an elevation of 2500 feet. Water contains iron, sodium chloride, and other salts; temperature 130° F.; good for blood diseases. Accommodations for a few guests.

Werringer Sulphur Springs, owned by J. Werringer, of Woody, consist of six springs in Sec. 3, T. 26 S., R. 29 E., M. D. M., about ½ mile south of Woody, at an elevation of 1600 feet. Water contains sulphur and some iron. Accommodations for several people.

Willow Springs, owned by E. M. Hamilton Estate, consist of twenty-three springs in Sec. 13, T. 9 N., R. 13 W., S. B. M., about 3 miles west of Rosamond, at an elevation of 2600 feet. Water contains sodium chloride, borates, and other salts. Well known summer resort. Accommodations for a number of guests.

NATURAL GAS.

The production of natural gas in 1913 amounted to 7,111,237 M cubic feet, valued at $568,899. (For details see Bulletin No. 69, issued by California State Mining Bureau.)

ORNAMENTAL STONES.

Sapphirine chalcedony is found at Kane Springs, in masses of a deep sky-blue color, with the grape-cluster surface characteristic of this material. Undeveloped; extent not determined.

This stone was highly valued in ancient times and was a favorite material for the carved Babylonian seals, 3000 to 4000 B. C. That used for this purpose came from Persia.

Bibl.: Bull. 37, p. 73.

Rose quartz and opal reported in Kern County, north of Kernville, by J. W. Stockton, of Wasco.

PETROLEUM.

Kern produces more petroleum than any other county in California, and over 58% of the total yield of the state.

Production in 1913 amounted to 58,698,432 barrels, valued at $27,038,474. (For details see Bulletin No. 69, issued by California State Mining Bureau.)

SANDSTONE.

A large quantity of sandstone is found a few miles south of Tehachapi, and in San Emigdio Canyon, the former deposit being worked several years ago by the Kern Development Syndicate.

Kern Development Syndicate Quarry, owned by the Kern Development Syndicate, of Los Angeles, consists of 140 acres in Sec. 14, T. 32 S., R. 34 E., M. D. M., 6 miles south of Tehachapi, and 3 miles from Erie Station, on the Southern Pacific and Santa Fe railroads. The sandstone is of many colors—green, blue, red, tan and drab. The formation lies at an angle of 10°, and varies in thickness from 3 to 30 feet. The supply seems to be unlimited. The stone used in the construction of the Pasadena library building, and the Date and Fish blocks of Los Angeles. Quarry idle.

Bibl.: Bull. 38, pp. 128 and 370.

SULPHUR.

In the Sunset oil district, on the western side of Kern County, there are deposits of sulphur which altogether cover an area of several acres. Open cuts from 10 to 15 feet deep show that these deposits are made up of both high and low grade sulphur ore, the larger part, however, consists of drift cemented with sulphur or decomposed rock or earth permeated with sulphur.

Bibl.: Bull. 3, p. 33; Bull. 38, p. 372; Reports XI, p. 233, and XII, p. 410.

TUNGSTEN.

Scheelite ($CaWO_4$), the principal tungsten mineral of the State, is found in the Amalie, Rand and Stringer districts, where it is usually gold bearing.

Bibl.: Bull. 67, p. 176.

Black Hawk Group (listed under Gold).

Gold Crown Consolidated (listed under Gold).

J. Hodgson, Care American Hotel, Howard St., San Francisco, has a deposit of tungsten ore, in the form of hübnerite. It is ½ mile from the Granite King Mine, 28 miles west of Randsburg.

Monarch Tungsten Gold Mining Company (listed under Gold).

Placer Gold Company (listed under Gold).

Royal Bohn (listed under Gold).

Santa Ana Gold Mines (listed under Gold).

Sunshine (listed under Gold).

Winnie (listed under Gold).

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Bulletin No. 430, U. S. Geol. Surv. Gold mining in the Randsburg quadrangle.
Bulletin No. 471, U. S. Geol. Surv. San Joaquin Valley, south end.
Bulletin No. 540, U. S. Geol. Surv. Magnesite deposits in California, pp. 512–516.
Water Supply Paper No. 338, U. S. Geol. Survey.

KINGS COUNTY.

By WALTER W. BRADLEY, FIELD ASSISTANT.
Field Work in September, 1914.

Kings County was created March 22, 1893, from a part of Tulare, and in 1909 extended by annexing a portion of Fresno County, so that at the present time its area is 1257 square miles. Its outline approximates a right triangle with the vertical side on the east, bounded by Tulare County, and the hypothenuse on the northwest, bounded by Fresno. Kern County forms the base at the south, while Monterey adjoins on the southwest, cutting off the point of the angle. The most notable single geographical feature of Kings County is Tulare Lake, which has varied in the past from a condition of complete dryness to a water area of over 400 square miles. Its present area is between 30 and 40 square miles. Its water is derived from the Kings River in high flood periods, and the reason for such wide variation in superficial area is that it lies in a shallow basin with very flat-sloping sides.

With the exception of the Kettleman and Kreyenhagen Hills and the edge of the Diablo Range at its southwest corner, Kings County is almost entirely a valley county. For this reason its mineral resources are not as prominent as its agricultural interests. The value of the total recorded mineral production of the county to the end of 1913, is $219,830. To this sum, the following have contributed in the order named: Brick, quicksilver, fuller's earth, natural gas, gypsum and mineral paint. Occurrences of chromite are known but they are as yet undeveloped.

The southwestern two thirds of the county is lacking in transportation facilities, while the northeastern part has both the transcontinental line of the Santa Fe and two branch lines of the Southern Pacific Railroad.

The Associated Oil, Standard Oil and Independent Producers' Transportation companies have oil pipe lines passing through the county, but no oil has as yet been produced here in commercial quantities. The San Joaquin Light and Power Company supplies portions of the county with electricity.

KINGS COUNTY—Table of Mineral Production.

Year	Brick		Gypsum		Natural gas		Quicksilver		Miscellaneous and unapportioned	
	Thousands	Value	Tons	Value	Thousand cubic feet	Value	Flasks	Value	Kind	Value
1894										
1895										
1896										
1897										
1898	1,250	$8,450								
1899	1,650	11,550								
1900	750	5,000								
1901	1,000	5,000							Unapportioned, 1900-1909	$10,500
1902	3,500	19,000								
1903	3,400	24,200								
1904	3,100	23,300								
1905	3,400	24,000					*250	$9,000		
1906	2,800	20,000								
1907	1,000	8,000							100 tons Fuller's earth	1,000
1908	3,000	24,000	100	$400					50 tons Fuller's earth	1,000
1909	1,000	8,500	100	300	360	$360			100 tons Fuller's earth	2,000
									20 tons mineral paint	100
1910	400	3,200	100	490	1,200	600	100	4,525	100 tons Fuller's earth	1,000
									10 tons mineral paint	270
1911			20	100		300				
1912			50	200		1,650				
1913			100	300	1,916	575			20 tons mineral paint	60
									Other minerals	400
Totals	26,250	$184,200	470	$1,790		$3,985	350	$13,525	Miscellaneous	$16,330

*Flasks of 75 pounds.

Totals.

Brick	$184,200
Gypsum	1,790
Natural Gas	3,985
Quicksilver	13,525
Miscellaneous and Unapportioned	16,330
Total to end of 1913	$219,830

BRICK.

Clinker Brick Company, J. H. Burnett, Hanford, owner. This plant has been idle since 1911, and is now partly dismantled. It is at Clinker siding on the Santa Fe, 1½ miles south of Hanford. A stiff mud and wire-cutting brick machine and three field kilns were used. Power was furnished by an oil burning steam plant. All bricks for local operations are at present shipped in from points outside of the county.

Trewhitt Brickyard, Hanford, abandoned.

Bibl.: Bull. No. 38, p. 243.

CHROMITE.

Chromite float has been found in the serpentine area at the southwest corner of Kings County, near Parkfield, Monterey County, but the deposits are as yet undeveloped.

FULLER'S EARTH.

C. E. Boyd of Hanford reports a small production of both fuller's earth and gypsum from a group of claims in Sec. 13, T. 24 S., R. 17 E., in the edge of the Kreyenhagen Hills northwest of Dudley. Two men were at work a part of the year.

Tulare Lake View Group. Louis and Oscar Couch, R. E. Stevens et al., of Hanford, have located this group of five claims in Secs. 26, 35 and 36, T. 21 S., R. 17 E., in the Kettleman Hills, near the Fresno County line, southeast of Coalinga, for "gypsum, fuller's earth and phosphates." Only assessment work has been done so far.

GYPSUM.

C. E. Boyd of Hanford reports a small tonnage of gypsum produced in 1913, as well as fuller's earth, from his claims in Sec. 13, T. 24 S., R 17 E., northwest of Dudley. (See also under Fuller's Earth.)

Tulare Lake View Group (see under fuller's earth).

MINERAL PAINT.

C. E. Boyd of Hanford reports having produced a small tonnage of mineral paint in connection with fuller's earth and gypsum from claims near Dudley, in the southwestern corner of the county.

NATURAL GAS.

Natural gas is obtained from a number of artesian wells around the eastern side of Tulare Lake, in T. 21 and 22 S., R. 22 E., south of Corcoran and west of Angiola; also in T. 20 S., R. 20 E., near Stratton (Stratford post office), on the north side of the lake. The gas is found at varying depths down to between 1000 and 1100 feet. Some of the

wells yield sulphur water. The gas is utilized locally, on several of the ranches where found, for lighting and heating, and also for operating gas engines. Among those having gas wells may be mentioned the following:

Boot Bros. (see E. Workman).

L. Charles of Hanford, in Sec. 13, T. 22 S., R. 22 E., west of Angiola.

R. D. Hunter, near Corcoran, has two 2-inch bored wells, 300 to 500 feet deep, both flowing.

A. H. Johnson, in Sec. 26, T. 21 S., R. 22 E., 2 miles south of Corcoran.

O. P. Quimby, in Sec. 24, T. 22 S., R. 22 E., west of Angiola.

W. N. Stratton of Stratford, on his ranch near that place.

L. D. Tennant, P. O. box 86, Corcoran, in Sec. 14, T. 22 S., R. 22 E., west of Angiola.

Esau Workman (formerly Boot Bros.), in Sec. 25, T. 22 S., R. 22 E., west of Angiola.

Bibl.: R. XIII, p. 567; Bull. 3, pp. 20, 68; Bull. 19, p. 183.

PETROLEUM.

There are a couple of strips of possible oil-producing territory in the Kettleman and Kreyenhagen Hills, running through Kings County, between the Coalinga district of Fresno County on the northwest and the Lost Hills district of Kern County to the southeast. A number of companies are drilling in this section, but no production of oil in commercial quantities has as yet resulted. For a detailed description of the geology and possibilities of this district, see Bulletin No. 69 of the State Mining Bureau, "Petroleum Industry of California."

QUICKSILVER.

The quicksilver district of Kings County is at its extreme western end in the corner formed between Fresno and Monterey counties. It is on the eastern edge of Table Mountain which extends northwesterly through that part of Monterey and forms a portion of the boundary with Kings. Table Mountain is principally of serpentine. Parkfield, Monterey County, is the nearest town.

Dawson Pit. H. Dawson, Lemoore, owner. This is a quicksilver prospect on patented land in the NW. ¼, Sec. 28, T. 23 S., R. 16 E., near the Kings Company. Only a small amount of development work has been done.

Bibl.: Bull. No. 27, p. 122.

Fair View Group. G. H. French and J. A. Greenlaw, Parkfield, owners. In the SW. ¼, Sec. 28, T. 23 S., R. 16 E. Assessments only.

Bibl.: Bull. No. 27, p. 122.

Francis Claims (see Kings Quicksilver Mining Company).

Kings Quicksilver Mining Company, Ltd. Wm. Gray, president; W. P. Darsh, secretary; office, 520 King street, London, Ontario, Canada. A. A. Lewis, superintendent at the mine. This property includes the Segregation and Summit claims owned by C. F. Francis, under bond, besides a number of claims located by members of the company on adjoining ground. The group is principally in Sec. 20, T. 23 S., R. 16 E., 14 miles by road east of Parkfield and 40 miles north of east

Photo No. 116. Ten-ton Scott fine-ore furnace and condensers, Kings Quicksilver Mining Company, Ltd., Kings County, California.

from San Miguel on the Coast Division of the Southern Pacific Railroad. Elevation 3100 feet (bar.) at the lower tunnel. The country rocks are serpentine, shale and metamorphic sandstone. The ore values occur in a crushed zone, in part as stockworks, carrying cinnabar and native mercury with some calcite. In the upper level this zone shows about 35 feet wide, with strike southeast and dip 45° to 50° SW., and when visited had been drifted on for 70 feet. The upper adit was in 700 feet (part crosscut and part drift), with two raises to the surface and one winze of 85 feet to the lower adit. The latter has 850 feet of work and reaches a depth of 200 feet below the outcrop. Five men were at work. Hand drills and augers are used.

The mine was originally worked about 1902, and again in 1905 and 1910, during which operations it is credited with a total output valued at over $13,000. The reduction equipment consisted of a series of pipe retorts. The present company has this year completed a 10-ton Scott fine-ore furnace (see photo No. 116), with brick condensers. The bricks were burned in a field kiln at the mine. It is intended to install concentrators. These and the rock breaker will be driven by a 25 h.p. crude oil engine; and the furnace blower by a 4 h.p. distillate engine.

Bibl.: Bull. No. 27, p. 122; *U. S. G. S.*, Min. Res. 1902, p. 253; 1912, Pt. I, p. 939; 1913, Pt. I, p. 204.

Segregation and Summit (see Kings Quicksilver Mining Company).

MADERA COUNTY.

By R. P. McLAUGHLIN and WALTER W. BRADLEY, FIELD ASSISTANTS.

Field Work in July, 1913, and July, 1914.

Madera County, which was created March 11, 1893, has an area of 2112 square miles. It was formed from Fresno County which adjoins it on the south and west, the San Joaquin River being the boundary line between the two. On the north are Merced and Mariposa counties, with Mono on the east.

Madera County is longest—approximately 100 miles—in a northeast-southwesterly direction. The western half is in the San Joaquin Valley proper, while the eastern boundary line runs along the summit of the divide of the Sierra Nevada Mountains and possesses a number of peaks exceeding 12,000 feet in altitude. Among these may be mentioned: Mt. Lyell, 13,090 feet; Rodgers Peak, 13,056 feet; Ritter Mountain, 13,156 feet; McClure Mountain, 12,500 feet; Banner Peak, 12,957 feet; and the Minarets, 12,000 to 12,278 feet. The high Sierran section abounds in glacial lakes and meadows. The Devil's Post Pile, a knob of hexagonal, basaltic columns, which has been designated as a "National Monument" is in this part of Madera County near Mammoth Pass and the head of the Middle Fork of the San Joaquin River.

Geology.

A detailed geological survey was not made, but a general description can be given, as the relations of the formations are comparatively simple. There are several parallel belts running northwesterly across the county.

The western part of the county (the San Joaquin Valley) is nearly level and consists of sedimentary and alluvial beds lying nearly horizontal. These horizontal beds rest on steeply dipping schist which is exposed in the westerly foothills forming the eastern margin of the San Joaquin Valley.

The schist belt is 4 or 5 miles wide, its western boundary being the eastern edge of the flat floor of the San Joaquin Valley. The eastern boundary of the schist is a contact with granite or granodiorite which line runs as follows: From the western base of Green Mountain crossing the Southern Pacific Railroad about 1 mile east of Jesbel to a point near Sesame. This zone of schist contains the copper deposits of the county. It has been looked upon favorably by some people desirous of prospecting for oil, but of course no such occurrence is probable or even possible.

The granite occupies a zone from 5 to 10 miles wide, its eastern boundary being schist or slate. This line of contact runs southwest from Grub Gulch to Coarse Gold and the vicinity of Hildreth. The

granite or granodiorite is usually coarse-grained and decomposed for a depth of about 20 or 30 feet. Exceptional spots exist where the rock is fine-grained and not decomposed to great depth. It is these exceptional spots which furnish the valuable deposits of building stone. Dikes are in evidence in various parts of the area standing up as ridges 40 to 50 feet wide. The dikes observed were of finer texture than the surrounding rock and possibly composed of different minerals, as muscovite was noted in some of them.

Schist and slate exist as a belt from 3 to 5 miles wide along Potter Ridge. Its eastern boundary is a contact with a large body of granite. The contact runs immediately west of Wassamma ("Poison Switch") and near Lone Cedar Ranch. Granite dikes, from a few feet to ¼ mile wide, cut the slate and schist in many places. This is more fully illustrated with a drawing by W. H. Storms, Report of State Mineralogist, XII, 1894, p. 166. This belt of schist and slate carries most of the gold bearing veins of the county. Toward the east, into the high Sierras, most of the rock is granite, with some metamorphic areas near Mt. Raymond and around The Minarets. Within the larger granite area, occupying the eastern portion of the county, are found smaller areas of metamorphic rock, largely quartzite.

Mt. Raymond, White Chief Mountain and Iron Mountain, T. 5 S., R. 22 and 23 E., immediately east of the Mariposa Big Tree grove, are composed largely of metamorphic rocks. The most of it is quartzite which in some places shows the original bedding very much contorted. In most places, however, the rock is massive and cut by numerous fractures or cleavage planes. Granite and possibly other igneous rocks are observed occasionally as though intruded in large masses. South of the Big Trees, along the road from Summerdale ("Fish Camp") to Mt. Raymond, basic igneous rock occurs, probably as surface flows similar to those observed farther east.

Considerable prospecting was done in the region some twenty or thirty years ago, apparently without favorable results Recently considerable work has been done in prospecting for iron and copper. Specimens of the following minerals were collected in the district: sphalerite, pyrrhotite, magnetite, chalcopyrite, pyrite, bornite and siderite.

Geologic notes—Sierra Nevada Mountains, southwest of Mono Lake.

The following geologic observations were made during a hasty trip and are presented as of possible value to future work in the neighborhood:

At the head of Bloody Canyon midway between Sardine Lake and Walker Lake is a contact of granodiorite and metamorphic rock, the latter lying to the west. The red color of the canyon sides seems due to

iron oxide from the weathered metamorphic rocks. Dikes of considerable size cut the granodiorite.

The metamorphic rock from Mono Pass to Parker Peak are mostly of a slaty nature, almost black. They dip steeply and are probably a portion of a fold formed at the time of the granite intrusion. All of the dips observed by the writer were to the west, but, according to the old State Geological Survey, farther north and west the series dips toward the east, indicating a synclinal fold. Bedding is distinct and singularly regular in strike, especially near Parker Peak, where it is N. 25° W. About ½ mile east of Mono Pass schist and conglomerate accompany the slate. Very little quartz float is observed in the débris but at Mono Pass there are several old prospect holes all apparently idle for many years. Running N. 25° W. for about 2 miles from the summit of Parker Peak is a particularly noticeable light colored bed or dike following the bedding. About 1 mile west of Parker Lake, on the north side of the canyon, is a very prominent outcrop exposed for several thousand feet and suggesting by its appearance a quartz ledge. The western edge of this metamorphic mass is clearly exposed in contact with granitic rocks and runs along the following southerly line from a point ½ mile west of Tioga Pass to a point ¼ mile east of Mammoth Peak, thence along the eastern base of Kuna Crest near the west shore of Helen Lake and about ¼ mile west of Kuna Peak. The entire region is smoothed off by glaciation. Some prospecting work was done in past years at the foot of the permanent snow bank of the slope of Kiop and Parker peaks, evidently without success.

South of Parker Peak the metamorphic series continues its western margin, being near Kiop Crest and extending to the west shore of Gem Lake and its eastern margin being somewhere to the east of the ridge from Mt. Wood to Agnew Lake. At the south shore of Alger Lake the dip is about 45° to the southwest and about 80° to the southwest near Gem Lake. One fourth mile north of Alger Lake is an exposure of quartz, about 10 feet wide and 300 feet long, upon which some prospecting has been done, otherwise but little quartz was seen.

From Gem Lake to Agnew Meadows the metamorphic series continues clearly exposed with steep western dip and uniform northwestern strike. In this region there are numerous quartz veins conforming to the bedding. The North Fork Mining District was formed here in 1878, and some prospecting work was continued until 1892 when E. B. Preston described the district (Report State Mineralogist 1892, p. 218) as showing some ten veins on the east side of the Middle Fork of San Joaquin River, within a distance of about 3000 feet across the formation, having an average width of 45 feet each, the largest being 75 feet wide and the smallest 15 feet wide. "An average assay made in the State Mining Bureau from a sample of mixed ores from the different

veins gave a higher result (than $30) in—silver and (over 17 per cent) lead. Some samples from the west side veins showed a yield of 30 per cent copper and 27 ounces silver." The report also states that there are some nine veins on the west side of the river averaging 30 to 40 feet in width, carrying a large percentage of copper. The average sample above mentioned was not, it is learned, taken across the entire vein widths but only in its mineralized streaks. The district is now entirely idle.

The most easterly exposure of the metamorphic series in this neighborhood is at the edge of a more recent flow of basic lava which apparently forms the summit of the ridge bounding Mono and Madera counties. This line of contact runs from the south end of Gem Lake near the trail for a distance of about 3 miles; thence gradually toward the east and over the summit about 2 miles south of Deadman Pass. The western or metamorphic side of the valley is of the usual smooth glacial shape while the eastern or lava side is terraced, which brings up the question as to age of the lava as compared with the glacier.

The western margin of the metamorphic series crosses the river about ½ mile north of Soda Spring and courses about S. 25° E., thence the prevailing country rock in a southwesterly direction is granitic. Occasional patches of basaltic lava lying on the granite, are encountered on the trail to Little Jackass Meadow, as follows: One mile south of Soda Spring, at the Devil's Post Pile; on the summit between Snow Canyon and Stairway Creek; and an outcrop extends for several miles along the eastern bank of the North Fork of San Joaquin River near Sheep Crossing.

Between Devil's Post Pile and Stairway Creek there is a thin mantle (possibly 2 feet) of pumice on the granite. Fragments larger than ½ inch are seldom seen. East and south of Devil's Post Pile for a considerable distance granite appears to be the prevailing rock although Mammoth Mountain is probably metamorphic. About 2 miles southwest from Mammoth Pass are two small craters, readily distinguished in the distance by their shape and color.

The lava at Devil's Post Pile is described by Preston as being glaciated, but also showing pumice cones of very recent date. The lava near Sheep Crossing has some glacial drift resting upon it. It lies in almost horizontal terraces and the topography several miles southwest suggests an extensive flow since cut by canyons.

In the vicinity of Little Jackass Meadow there is an extensive covering of glacial drift containing mostly granitic, some metamorphic and very rarely basaltic boulders.

One mile west of Little Jackass Meadows is an exposure of metamorphic rock (fine quartzite with a little mica) striking N. 15° W. Surrounding granite is glaciated.

From Little Jackass Meadows to Yosemite Valley, by way of Fernandez and Merced passes, only granite is seen.

Resources.

As will be noted from the Table of Mineral Production (p. 111) the following have yielded commercial quantities to the end of 1913 in the order named: gold, granite, copper, silver, brick, stone industry (outside of granite for building stone) and lead. In addition to these, occurrences are known of asbestos, iron, mineral water, turquoise and zinc, though as yet no commercial production of them has been made. The iron deposits, which are among the most important in the State, will be described later.

As has already been mentioned, previous to 1893, Madera County was a part of Fresno. Of the $1,555,888 gold and the $25,657 silver credited to Fresno County in the United States Mint Reports for the years 1880 to 1892 inclusive, between 80 and 90 per cent came from that portion of its territory in the schist belt between Grub Gulch and Hildreth, for which reason, $1,350,000 and $25,000, respectively, have been added to the outputs of those two metals, bringing the total value of mineral production for Madera County properties to $5,500,677 to the end of 1913. At the present time, granite is the most important mineral product of the county in point of value, followed by copper and gold in second and third places, respectively.

A recent development, which will prove of importance to the mineral industry in the future in this section of the State, is the advent of hydroelectric power. The San Joaquin Light and Power Corporation of Fresno has a reservoir and a 25,000 horsepower plant at Crane Valley on the North Fork of the San Joaquin River. Its power lines are now serving not only a large part of Madera County, but also a considerable area in Fresno, Tulare and Kern counties to the south, and Merced, Mariposa, and Stanislaus to the north.

The canal systems of Madera County, while they serve mainly for irrigation purposes, are yet worthy of mention here. The Madera Canal and Irrigation Company has more than 100 miles of ditches, distributing water principally from the Fresno River, and also from the San Joaquin River. In addition to the canals, water for irrigation is also obtained from artesian wells and by pumping. The Madera Sugar Pine Company has a 65-mile "V" flume (see photos No. 24 and No. 22), by which the sawed lumber is transported from its mill at Sugar Pine to the finishing mill and storage yards at Madera. In a busy season 350,000 feet b. m. are thus brought down per day, from eleven to twelve hours being required for the lumber to travel the 65 miles. The cost is but a fraction of what it would be by teams, as there is no railroad into that section.

Photo No. 24. "V" Flume for transporting lumber, Madera Sugar Pine Company, Madera County, California.

Photo No. 22. Discharging lumber from "V" flume, Madera Sugar Pine Company, Madera County, California.

Table of Mineral Production.

Year	Gold	Silver	Copper		Brick		Stone Industry: Granite		Stone Industry: Rubble and crushed rock		Miscellaneous and unapportioned	
	Value	Value	Pounds	Value	M.	Value	Cubic feet	Value	Tons	Value	Kind	Value
1893	$150,696	$614										
1894	107,791	180					48,858	$31,494				
1895	162,323						39,590	49,662				
1896	104,339	1,240					48,628	73,525	15,600	$7,800		
1897	85,963						39,080	37,215	3,996	1,249		
1898	94,884	50			400	$2,800	23,108	49,673	2,940	500		
1899	73,758	292			439	3,070	47,433	36,000	5,000	2,500		
1900	104,184	3,883	500,000	$77,500	500	3,000	124,015	80,000			1900-1909, unapportioned	$35,000
1901	82,749	2,600	108,430	17,077	500	3,000	96,716	294,799	2,400	600		
1902	35,128	3	18,600	2,139	230	1,840	105,845	78,041	10,000	4,000		
1903	98,070	3	36,000	4,680	216	972	128,581	389,800	4,000	1,000		
1904	75,308	25	10,300	1,313	750	3,750	113,627	98,088	1,000	500		
1905	50,867	10,014					42,316	123,106				
1906	22,390	508					65,472	176,416				
1907	13,308	506	1,895	379	1,250	12,500	99,278	98,372				
1908	45,107	1,264	113,298	15,454	250	2,250	140,086	123,668	8,560	2,140	2,279 lbs. lead	84
1909	14,716	403	5,000	635			142,622	111,390	182,177	5,836		
1910	10,076	1,850	336,667	42,876	740	3,700	99,192	74,152	2,550	1,112		
1911	1,958	77	14,608	1,826	270	1,350	99,900	74,190	1,300	800		
1912	9,162	1,162	248,129	40,941	300	1,500	82,135	56,068	12,851	3,213	5,533 lbs. lead	249
1913	14,489	1,617	532,408	82,522	315	1,650	150,994	270,123	7,380	1,466		
	$1,352,206	$25,941	1,925,325	$297,342	6,160	$41,382	1,737,421	$2,320,757	259,754	$32,716		$65,333
	*1,350,000	*25,000										
	$2,702,206	$50,941										

*80 to 90 per cent of amounts credited to Fresno County, 1880 to 1892, inclusive.

Totals.

Gold	$2,702,206
Silver	50,941
Copper	297,341
Brick	41,382
Granite	2,320,757
Rubble and crushed rock	32,716
Miscellaneous	65,333
Total	$5,500,677

ASBESTOS.

Amphibole asbestos occurs at the Savannah mine, near Grub Gulch, stated to be 4 feet wide and traceable over a distance of about 3 miles in length. It is undeveloped. The amphibole variety is also found at the Baker mine near Coarse Gold.

BRICK.

Sunset Brick Company (also known as the Dyer Brickyard). J. A. Dyer, Madera, owner; bonded to W. J. Keys. This plant at the south edge of town (Madera) is operated only intermittently according to demands of the local market. The clay is hauled in dump carts to the grinders, and a soft mud brick machine is used. The bricks are dried in the sun and burned in field kilns, using oil for fuel. Electric power is used, and when operating, from eleven to fifteen men are employed.

Bibliography: Bull. 38, p. 249.

COBALT (see under Nickel).

COPPER.

The foothill copper belt of the eastern side of the San Joaquin Valley extends in a southeasterly direction through Madera County and on into Fresno. It passes to the west of Raymond a few miles, and maintains the same characteristics which it shows farther north in Mariposa County. During the copper excitement of the early sixties the Buchanan mine near the Mariposa line in Sec. 33, T. 8 S., R. 18 E., was operated with a small furnace and is credited with having shipped 150 tons of copper bars up to 1866. At various times since, work has been done on that and a number of other properties in this section, but at present only one is yielding any copper—the Daulton.

Copper ores are also found in the Minarets section of Madera County in the high Sierras, but on account of its inaccessibility from transportation lines no production has as yet been made.

Bibl.: R. XI, pp. 218–223, XIII, p. 59, Bull. 50, pp. 269–276; MINERAL RESOURCES WEST OF ROCKY MOUNTAINS, 1868, pp. 174–213; 1872, p. 47.

Daulton Mine (formerly the California Copper Company, also Ne Plus Ultra). Walter Smith and L. M. Bradford, Madera, owners. This property is in Secs. 25 and 35, T. 9 S., R. 18 E., about 1 mile from Daulton Station on the Raymond branch of the Southern Pacific Railroad. It was first worked in the sixties and the ore shipped to Swansea, Wales. There have been no changes in the equipment since that described in Bulletin 50. There are three shafts, equipped with

steam hoists. The present owners are working in a limited way, with four men, and shipping an occasional carload of ore to one or the other of the large smelters of the State.

Bibl.: Bull. 38, pp. 272–275.

Yosemite Copper Company (see under Iron).

GEMS.

Specimens of *turquoise* have been found at the Taylor ranch on the Chowchilla River, north of Madera; *garnets* at Grub Gulch and Fresno Flats; and *andalusite* on the Chowchilla River, north of Madera; but no commercial production has ever resulted.

Bibl.: Bull. 37, pp. 52, 107; Bull. 67, pp. 121, 128, 163; GEOLOGICAL RECONNAISSANCE IN CALIFORNIA, W. P. Blake, 1858, pp. 304–306.

GOLD.

Gold mining is at present not active in Madera County, although a great many prospects have been opened during the past thirty years. Only three mines (Enterprise, Gambetta, and Texas Flat) have been operated extensively of recent years, and are here described. Many mines or prospects mentioned in previous reports have lost their identity either by abandonment or consolidation. An effort has been made to here record all those which have received any appreciable attention or development.

Abby. Idle for many years; Sec. 30, T. 9 S., R. 22 E., patented; owner, James Ryan. It is reported to have produced considerable gold (see Bibliography). Vein strikes N. 10° E., dips 26° NW. Incline shaft 725 feet deep. Six levels ran north from 600 to 900 feet from the shaft and a short distance south. Stoping was carried on from all the levels, the vein being from 18 inches to 2 feet wide. Ten stamps and four Frue vanners constituted the milling equipment with a capacity of 42 to 48 tons per twenty-four hours. Reported value of ore is $20, with 2 per cent sulphurets, valued at $200 per ton. About 30,000 gallons of water were pumped in twenty-four hours.

Bibl.: R. VI, Pt. 2, p. 43; VIII, p. 202; X, p. 194; XII, p. 154; XIII, p. 205.

Ackers. One mile southwest of the Waterloo mine. Owner, Otto Ackers. Two-stamp mill run occasionally.

Baker Gold Mining Company (formerly Babby). T. S. Spaulding, Woodland, president; S. H. Baker, 1616 Eleventh street, Sacramento, manager. This group of two claims is in Secs. 24 and 30, T. 7 S.,

R. 20 and 21 E., 3 miles northwest from Coarse Gold; elevation 2300 feet (U. S. G. S.), on a branch of Cabin Creek. The claims were worked by Babby for about twenty years, during the course of which he sank several small shafts, one of which is down 70 feet. The gold, which is said to assay $19 per ounce, occurs crystallized, in quartz seams in the schist. The present company took over the claims in January, 1914, and is driving a crosscut tunnel to cut the ledge at 75 feet below the outcrop. In July it was in 250 feet.

Balfron (formerly Grand Central, Sunshine and Standard No. 2). One mile northeast of Coarse Gold, in Greaser Gulch, SE¼, Sec. 32, T. 7 S., R. 21 E.; owner, C. Melvin; unpatented; only assessment work done. Located seven years ago, but known and located for many years before. Present work on 6 to 12-inch vein opened by about 200 feet of cuts and shallow adits, with ore bearing considerable free gold. Alongside is a 3-foot vein of white quartz striking N. 70° W., dipping 70° NE.; country rock, schist.

Bibl.: R. XII, p. 164; XIII, p. 213.

Bazinet Group (formerly Morrow; includes Eliza Jane, Lawsuit, and Delia). Jas. Ryan and Pete Bazinet, owners. Near the Abbey mine at Hildreth, Sec. 30, T. 9 S., R. 22 E. The property has not been worked recently and the 5-stamp mill was removed. Vein width from 12 to 20 feet, and is said to have milled less than $10. A shaft about 270 feet in depth was sunk and several adits run.

Bibl.: R. X, p. 195; XII, pp. 154, 156, 159; XIII, pp. 206, 207, 210, 211.

Belle. Southern extension of Lucky Bill claim, Sec. 12 or 13, T. 7 S., R. 20 E., unpatented, prospect with shallow surface workings; ledge not developed. Owners, O. Bentley et al., Grub Gulch.

Big Stick. Unpatented claim on Quartz Mountain, near O'Neals; no equipment; 30-foot shaft on 2-foot vein; owner, W. H. Larew, Madera.

Boomer. Prospect, unpatented, near Grub Gulch; two shafts 60 and 80 feet deep; owner, Nels Anderson.

Butterfly. Near Grub Gulch, Sec. 23, T. 7 S., R. 20 E. Three unpatented claims (Butterfly, Bumble Bee, and Sunset). Owned by Mark Sullivan of Grub Gulch. Discovered in 1883; country rock, granite and schist; vein 18 inches to 4 feet wide; coarse N. 50° W., dip 50° NE. Recently several men have been employed on development work which is as follows: On the Butterfly claim four adits on vein. No. 1, 150 feet long with 200 feet of drifting and a 98-foot winze; No. 2, 500 feet long, 100 feet of drifts and 40-foot winze; No. 3, 160 feet

long; No. 4, 200 feet long. On the Bumble Bee surface cuts. On the Contact, adit 300 feet long and 160 feet of drifting.

Bibl.: R. XII, p. 155; XIII, p. 206.

Caledonia. Situated 5 miles east of Grub Gulch. Recently relocated by O. B. Allen et al. Discovered 1895. Vein 12 inches wide in schist. Adit 350 feet, shaft 30 feet, drifts 40 feet.

Bibl.: R. XIII, p. 206.

Canary (Rex). Near Grub Gulch, on Bullion and Rex veins, patented. Owner, John Day, Grub Gulch. Bullion vein 3 to 18 inches wide, course N. 60° W., in schist; 1400-foot adit on ledge (into Jeff Davis claim). About 750 feet from the entrance, crosscut runs north 200 feet to the Rex vein upon which there are: 400-foot drift west and 100 feet east, besides a 100-foot winze and raise to the surface. A 2-stamp, triple discharge mill without concentrators and operated by a gasoline engine comprises the equipment. The reason stated for inactivity is lack of water.

Bibl.: R. XIII, p. 206.

Colorado. Two miles east of Coarse Gold, prospect only slightly developed. Owner, J. P. Lang.

Bibl.: R. XII, p. 155; XIII, p. 207.

Consolidated Four (see Waterloo).

Contention (see Bazinet).

Crystal Spring. About 2½ miles northeast of Grub Gulch. Five patented claims idle for many years. Owner, Wales L. Palmer, Golden State and Miners' Iron Works, San Francisco. Vein 2 feet wide in schist. Several old shafts 50 to 175 feet deep.

Bibl.: R. XII, p. 155, XIII, p. 207.

Daisy (formerly Handy Andy). Near Grub Gulch, on same vein as Canary, between Rex and Woodland, unpatented. Owner, John Day, Grub Gulch. There is a 500-foot crosscut adit and a 30-foot drift. Assessment work only.

Daisy Bell (formerly Greaser Gulch). Near Coarse Gold. Adjoins Hawkeye on the northwest. Owner, Tom Jones, Jr. Discovered about twenty-five years ago. A shaft has been sunk 100 feet and at one time rich rock was worked in an arrastra.

Bibl.: R. XIII, p. 208.

Diana. Four miles south of Hildreth; Sec. 18, T. 10 S., R. 22 E., No work besides assessment. Several adits from 200 to 400 feet long. Owner, John McDonald, Friant.

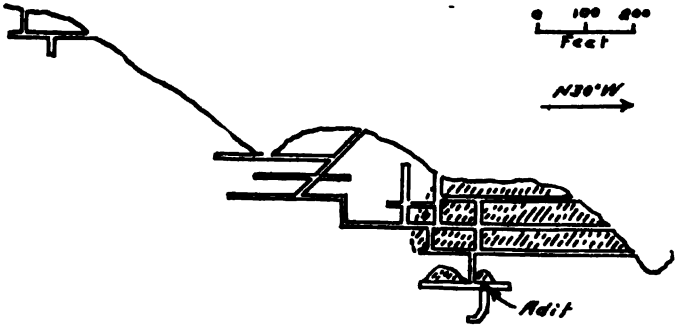
Bibl.: R. XII, p. 156; XIII, p. 207.

Eliza Jane. Prospect, included in Bazinet Group, possibly on extension of Bazinet vein. Sec. 25, T. 9 S., R. 21 E. Only work for many years is assessment.

Empire. Three miles southwest of Grub Gulch, patented. Owners, Lovely Bros. Narrow vein in granite. Worked part of time by arrastra.

Bibl.: R. XIII, p. 207.

Enterprise (one time called Fresno Enterprise). Situated in Sec. 12, T. 7 S., R. 20 E., about 3 miles northeast of Grub Gulch. Comprises 550 acres of patented land, including John W. Cates mine. Owner, Madera Enterprise Mines and Land Company, Lou R. Johnston, manager. The vein is in the bedding of schist or slate striking N. 35° W., dipping 80° NE. It is cut but not displaced by several granitic sills 2 to 3 feet thick, lying nearly horizontal. These are said to cause a slight enrichment on each side. The vein was discovered in 1881; development work, as shown on the accompanying sketch, was done within a short time after discovery and the property was idle until April, 1913.



ENTERPRISE MINE.
(From old drawing)

A 10-stamp mill, which once stood on the property, crushed, from June 1, 1881, to June 1, 1882, 8,257 tons, yielding $108,420 of bullion, assaying $19.05 per ounce, or an average value for the ore of $13.13 per ton. The present operators have erected a new 10-stamp mill, with 4-foot plates and no concentrators. A recent run of 1200 tons is stated to have recovered $13.65 per ton. Ten men were at work in July. Water from the Fresno River furnishes power except in the dry season when a gasoline engine is used. A turbine water wheel is used, operating under a 34-foot head with 650 cubic feet per minute. The stamps operate on a 6-inch drop with 7½-inch discharge and 96 drops per minute. Screens of 60-mesh are used. Capacity 18 to 24 tons per twenty-four hours. High water in January, 1914, took out the dam and

flume on the river, causing considerable delay before they could be restored. There are 1½ miles of ditch and flume. A compressor running three drills is the mine equipment. All work is carried on through an adit.

Bibl.: R. XII, p. 156; XIII, p. 208.

Europa. Near Raymond. H. G. Kohlo and E. J. Harrah, Raymond, owners. Assessment work only maintained.

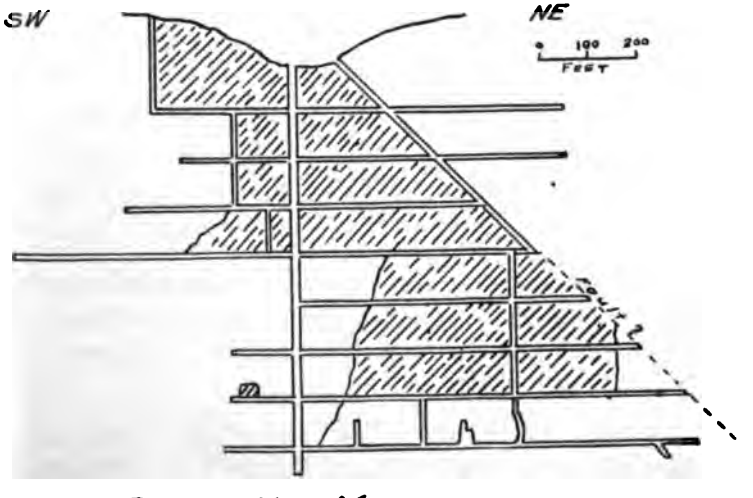
Bibl.: R. XIII, p. 207.

Five Oaks (includes Alpha). Situated 1 mile south of Coarse Gold, Sec. 9, T. 8 S., R. 21 E., on what is said to be an extension of the Waterloo vein, 3' feet wide, dipping 35° NE. Unpatented. Owner, John Quadt, San Francisco, and J. P. McFarland, Coarse Gold. Only assessment work has been done for some five years. An adit was run about 1000 feet and stoping carried up to the surface, about 200 feet. Equipment is a steam hoist and a 25-ton Huntington mill.

Bibl.: R. XII, p. 156; XIII, p. 208.

Flying Dutchman (see Hoboken).

Freda. Near Grub Gulch, adjoins the Gambetta. Unpatented. Owner, D. Ramsden, Grub Gulch. An adit 40 feet long and two shafts 20 and 25 feet constitute the development. Small production has been made from panning rich ore.



Gambetta Mine
(From Descriptions)

Gambetta (one time known as Arkansas Traveler). Situated ¼ mile west of Grub Gulch, in Sec. 15, T. 7 S., R. 20 E. Owned by the Madera Consolidated Mining Company, J. H. Lester, manager. The vein cuts

across the bedding of slate or schist and into the adjoining granite coursing about N. 45° E., and dipping 78° SE. The accompanying sketch shows approximately the extent of old workings, as determined by descriptions. Enclosing schist strikes N. 50° W. and dips 40° NE. parallel to the contact with granite which lies to the southwest. Extension of the course of this vein and that of the Josephine, which strikes due east and west and dipping south, would intersect in the granite some 400 feet southwest of the new shaft. Croppings of both veins are traceable by holes sunk in the granite. The Flying Dutchman vein is still farther southwest.

The Gambetta was discontinuously operated from 1880 until 1904. Ore was crushed in a Huntington mill of 12 tons capacity per twenty-four hours. The total production is said to have been $490,000; ore averaging $33 per ton, and in 1903 a test run of 400 tons of old stope filling recovered $3.98 per ton, and 1700 tons of dump $2.38. Average width of vein is 2½ feet.

In 1910 the present operators sunk a 170-foot incline on the vein about 1000 feet southwest of the old shaft, drifted 250 feet southeast, partly between granite walls, and 160 feet northwest, and a shoot of high grade ore is reported. During the past year they cemented the shaft from 100 feet up, and on the 400-foot level have drifted 700 feet to get under the newer workings. They have also raised to the levels above from No. 2 shaft (the incline). No stoping has as yet been done in the new ground on the 400-foot. Except for three leasers driving an adit in the upper part of the mine, it has been idle since June 1, 1914. It is expected to resume on company account as soon as electric power is obtained.

The mill has at present two 5-foot Huntingtons and two Deister concentrators, giving an hourly capacity of 2½ tons. Water supply from the shaft (15,000 gallons per twenty-four hours) is said to be sufficient to mill only about 11 tons per day. Two boilers (50 h.p. and 80 h.p.) furnish power, oil fuel being used at a cost of $1.80 to $2.15 per barrel at the mine, depending upon the condition of the road from Raymond. It is expected that the San Joaquin Light and Power Company will enter the district with a line this year. A Norwalk compressor runs five 2¼-inch drills.

Bibl.: R. X. pp. 197–198; XIII, p. 208.

Golden Road (formerly Providence and County View). Possibly the north extension of Texas Flat vein. Four unpatented claims owned by C. Melvin, Coarse Gold. Adit 1300 feet long and three shafts 100, 200 and 300 feet deep. Average width of vein 5 feet.

Bibl.: R. VIII, p. 213.

Gold Metal and Gold Metal No. 1. Near O'Neal's. Mrs. Mary Arciniaga, Gilroy, owner. Assessment work only is done.

Hanmore (Lignus Asbestos). At Grub Gulch, unpatented, prospect. John Day, Grub Gulch, owner.

Hanover. Near O'Neal's, unpatented. Owner, George Williams, O'Neals. The vein is 20 inches wide and recently has been successfully worked in a small way for pockets. There is a 300-foot shaft and numerous short adits. A 5-stamp mill once stood on the property but was recently removed to a nearby claim.

Bibl.: R. VIII, pp. 204, 205; XII, p. 157; XIII, p. 208.

Hawkeye. Two miles northeast of Coarse Gold. Owner, J. P. Lang. Little work has been done recently. Two adits were run 250 and 350 feet long. A 5-stamp mill was at one time on the property, which is said to have produced about $25,000 from ore averaging $13 per ton.

Bibl.: R. XII, p. 157; XIII, p. 208.

Hazel. It is on the Fresno River near Raymond, and owned by A. C. Shaw of Raymond. Assessments only.

High Grade (formerly Washington). Two miles northeast of Coarse Gold in Deadwood Gulch, owner, Dan Long. Prospect on 2-foot quartz vein; shaft 26 feet deep. Small amount (20 tons) of ore recently milled at Texas Flat mill.

Hoboken (includes the Flying Dutchman). Situated 2 miles south of Grub Gulch (about Sec. 26, T. 7 S., R. 20 E.). Consists of ten unpatented claims, including the Flying Dutchman. Owners, Rice and Whittlesey, of San Francisco. A shaft and adit develop the ledge which is from 4 to 6 feet wide. About thirteen years ago some 400 tons of ore are said to have been put through a Bryan mill, at that time located on the property, and yielded $12 per ton. Assessment work has been done for a considerable time.

Bibl.: R. VIII, p. 213; XII, p. 158; XIII, pp. 208, 209.

J. M. Near Grub Gulch, unpatented claim, between Jeff Davis and Mammoth claims. Only workings are surface cuts. Owner, John Day. Abandoned.

Johnny. Near O'Neals, on Quartz Mountain, Sec. 4, T. 9 S., R. 21 E., portion patented. Owners, J. C. Albee and Geo. Lawrenson, who began their work about seven years ago. Adit on vein 140 feet, shaft 90 feet, vein 18 inches to 11 feet wide. An arrastra is on the ground and recently a small tonnage of ore was crushed.

Johnny Bull. Situated 2 miles northeast of Grub Gulch, between the Enterprise and Lucky Bill mines. Unpatented claim; owner,

J. D. Westfall; discovered 1895. Work consists of a 40-foot shaft and adit cutting vein at a depth of 40 feet. At one time a 5-stamp mill stood on the ground. It is said that some good ore has been produced, particularly a 9-foot incline which gave a total of $600.

John W. Cates. Portion of Enterprise property. A 60-foot shaft was once sunk and ore milled at the Enterprise.

Josephine. At Grub Gulch, Sec. 15, T. 7 S., R. 20 E., opposite the Gambetta mine, three patented claims. Owner, Risdon Iron Works, San Francisco. The mine has been idle and dismantled for many years. A 20-stamp mill was once operated. Vein 2½ feet wide, dip 55° to the south, strike nearly east and west. An incline shaft was sunk 555 feet and eight levels were run. A drawing and description are in State Mineralogist's Report X (1890), p. 203. It shows two shoots pitching east, from which it would appear that above the 325-foot level some 36,000 tons of ore were stoped. It is stated that the ore averaged about $10 per ton. There was a flow of 72,000 gallons of water per twenty-four hours.

Bibl.: R. VIII, pp. 213, 214; X, pp. 202, 203; XIII, p. 209.

Lady Ellen. Adjoins the Hoboken on the east. Four claims, agricultural patent. The vein is said to be an extension of the Hoboken. Years ago considerable surface work was done, the deepest being 60 feet. Ore was packed to arrastras. It is reported that ore left on the dumps assays $12 per ton. The property is under bond to McMicken and Rowe, who expect to begin operations.

Lawsuit (see Bazinet).

Lingo. Two miles northeast of Coarse Gold, in Swede Gulch; Scott Bufford, owner. Over 500 feet of adits have been run. It is reported that about ten years ago 200 tons of ore yielded about $12 per ton.

Bibl.: R. XII, p. 159; XIII, p. 210.

Little Bullion. Adjoins the Daisy Bell on the northwest; owner, David R. Jones. Discovered about twenty-five years ago. A 40-foot shaft and surface cuts have been opened. About a year ago 70 tons of ore were milled and reported to have yielded $22 per ton. It is near Coarse Gold.

Lucky Bill. Two miles northeast of Grub Gulch, SE. ¼, Sec. 12, T. 7 S., R. 20 E. Two unpatented claims (Syndicate and Safe deposit); owners, John Morrison et al., Grub Gulch. Discovered in 1880, but for the past three years only assessment work has been done. Workings consist of a 200-foot shaft and about 200 feet of drifting. The ore is in the form of a chimney or kidney, and is said

to be 20 feet wide in the lowest workings. Ore was at one time worked in a 2-stamp mill and arrastra near the Enterprise. One run of 1000 tons is reported to have averaged $16 per ton. There is no machinery on the property and workings are full of water.

Bibl.: R. XIII, p. 210.

Magnet. Three miles northeast of O'Neals; Sec. 11, T. 9 S., R. 21 E.; unpatented claim. Owned for past ten years by R. W. Walker, who works it himself a part of each year. There are two adits 300 and 150 feet long and a shaft 100 feet deep. At one time there was a 2-stamp mill on the property. The vein is 2 feet wide and is reported to be rich in spots.

Mammoth (see Woodland).

Melvin, Mountain Lily, Mary. Near Coarse Gold, lying along the west side of and parallel to the Texas Flat property. Unpatented, discovered about 1899. Owner, C. Melvin. Vein material or stringers 60 feet wide, striking north and south, spots of good ore. There are six shafts from 60 to 240 feet deep and about 300 feet of drifting.

Bibl.: R. XII, p. 161; XIII, p. 211.

McKenzie-Minturn Mine. This is a drift mine on the north bank of the San Joaquin River, in Sec. 34, T. 10 S., R. 21 E., 3 miles northeast of Friant. Owners, A. H. McKenzie and W. Minturn, 806 Griffiths-McKenzie Building, Fresno. Both above and below this point on the south side of the river and above it on the north side, these placer gravels were worked between 1850 and 1860, the camp being known as Millerton, the county seat of Fresno County. The present workings were commenced in 1904. The ground is patented. The gravel is in an ancient river channel with a decomposed granite bedrock. The gravel, which is firm but not cemented, is 3 to 6 feet thick, and the bedrock runs about 28 feet below the surface of the ground. The channel is 5 to 6 feet higher than high-water mark of the present river, and has a different character of gravel, being coarser and made up of different rocks.

The main adit was driven in 700 feet and stoping began at the back end, the ground being allowed to cave behind the work. The bedrock shows three channels, the one farthest back from the present river channel carrying the best values. The gold is coarse, but without nuggets, the largest single piece found weighing only $3.20, and is stated to assay better than $19 per ounce. About 200 feet square of the 160 acres have been worked. The gravel is stated to average around $2 per cubic yard. The method of working is to stope out the gravel, fill behind with the coarse material and tram out the sand and small stuff

to the sluices. Sixteen-foot sluices with Hungarian riffles are used. A 6-inch centrifugal pump driven by a 40 h.p. distillate engine furnishes water from the river. Two men are employed (August, 1914).

McLaughlin and Pearl. Situated between Johnny Bull and Enterprise mines. Two unpatented claims owned by Mrs. G. Wilson, Grub Gulch. Discovered about thirty-five years ago. There are several adits about 25 feet long, and a shaft 50 feet deep. Two years ago a little ore was hauled to Grub Gulch and milled, reported value about $20 per ton.

Millenium. Two miles west of Coarse Gold, about Sec. 1, T. 8 S., R. 20 E., unpatented. Owner, S. H. Baker. Discovery was made eight years ago and only work is a 40-foot shaft. The vein is reported 6 feet wide in granite. Work is to commence shortly.

Moonlight and Starlight. Three miles north of Enterprise mine near Crooks ranch. The starlight adjoins the Mammoth on the east, unpatented. Owner, Nels Anderson, Grub Gulch. Vein 20 inches wide in granite. Shaft 20 feet deep and 75 feet of drifting. A Huntington mill once on the property was removed two years ago.

Morning Star. Near Coarse Gold, in Deadwood Gulch. The land is now held under an agricultural patent by a Mr. Lea of Los Angeles. No work has been done for many years when several shafts 30 to 60 feet deep exposed a narrow vein.

Bibl.: R. XII, p. 161; XIII, p. 211.

Mountain View. Six miles northeast of O'Neals, Sec. 6, T. 9 S., R 22 E. Five unpatented claims. Owner, John Davis. Only assessment work has been done for the past ten years. A number of shafts have been sunk from 50 to 100 feet in depth, and some drifts run. Arrastras and a nearby mill once treated ore reported to have yielded $23 per ton.

Bibl.: R. X, p. 198; XII, p. 161; XIII, p. 211.

Mud Springs (formerly known as Berry, also Wilson). Near O'Neals, about Sec. 26, T. 9 S., R. 21 E. Five unpatented claims. Owners, W. McKenzie Estate, and Jas. Mussel; office, Griffiths-McKenzie Building, Fresno. Average width of vein less than 2 feet. For the past two years the property has been idle, except for assessment work. It has been partly developed for more than 300 feet in depth. A Huntington mill of 20 tons capacity per day is on the property. It was formerly worked by T. Hart and J. Hoxie of Fresno, who took out $250,000. Mussel has recently found a new shoot of ore and will reopen the mine soon.

Bibl.: R. XII, p. 161; XIII, p. 211.

New Citizen (and Pure Gold). Near Coarse Gold, in Deadwood Gulch, unpatented. Owners, Marrone and MacLain of Fresno. On a vein supposed to be the same as the Balfron. Workings are 220-foot shaft, 279 feet of drifts and 39-foot crosscut. About ten years ago 200 tons were sorted and milled, reported yield being $36 per ton. Across 5 feet of formation it is said the ore will assay $4 per ton. Assessments.

Bibl.: R. XII, p. 161; XIII, p. 211.

Old Blue (or Gladiator). Six miles east of Raymond, about Sec. 33, T. 8 S., R. 20 E. Two unpatented claims. Owner, S. H. Baker, 1616 Eleventh street, Sacramento. Two veins in the granite, dip S. 35°. Reported amount of sulphurets 7 per cent. Three shafts 120, 275 and 150 feet deep and about 175 feet of drifts. Equipment consists of a 4 h.p. gasoline hoist. Until very recently from three to eight men have been employed in development work.

Paradise. About 1 mile west of Enterprise mine. Unpatented claim. Owner, Wm. Mose. Prospect only, from which owner is reported to occasionally obtain a little gold.

Patton. Two miles east of O'Neals; Sec. 22, T. 9 S., R. 21 E., unpatented. Owner, H. G. Patton of O'Neals. Some shallow workings have been opened during the past twenty years on an 18-inch vein. At one time a small amount of the ore was worked in the Standard mill.

Paymaster (see Waterloo).

Pure Gold Mining Company (Florence M). Dr. Topp of Raymond, owner. It is in Sec. 20, T 7 S., R. 21 E., about 3 miles north of Coarse Gold. Idle.

Quartz Mountain. Five miles south of Coarse Gold; Sec. 33, T. 8 S., R. 21 E. Several claims, some of which are patented. Owners, McN. Fenn, Nels & P. Anderson et al., Madera. Idle for many years. Formerly owned by a French company which vacated about 1906. The vein is up to 10 feet wide and has yielded some rich pockets. An incline was sunk for 250 feet, and a 60-stamp mill erected.

Bibl.: R. VIII, p. 210; XII, p. 162; XIII, p. 212.

Ragesdale. Seven miles southeast of Hildreth on the San Joaquin River, two unpatented claims. Until recently owned by J. W. Ragesdale of Taft; present owners, W. G. Walker, Friant, and Dr. Powers, Sanger. Several short adits were run and at one time a small mill was on the property. The present owners propose to clean out the lower adit and drive it ahead, then raise to the upper levels and stope, there being 300 feet of backs.

Savannah. One and a half miles southeast of Grub Gulch, Secs. 14, 23 and 24, T. 7 S., R. 20 E. Four unpatented claims, owned by Maxfield & Lizby, with Mark Sullivan of Grub Gulch, superintendent. There are three veins, but most of the work has been done on one which is 4 feet wide. On the Savannah No. 1 there is a 260-foot shaft and 300 feet of drifts. On the Savannah No. 2 there is a 160-foot shaft with 100 feet of drifts. On the Wide Awake is 120-foot adit and surface cuts. On the Joe claim is a 260-foot shaft with 300 feet of drifts, all of which are caved, and a new adit 200 feet long with 200 feet of drifts has been run below the old works. There is an old 10-stamp mill on the property in very poor condition from disuse. Several men have recently been employed in development work.

Bibl.: R. XII, pp. 158, 163; XIII, pp. 212, 213.

Standard. Two miles northeast of O'Neals, Sec. 14, T. 9 S., R. 21 E. Three unpatented claims. Assessment work done for owners by H. G. Patton of O'Neals. Operations ceased about eight or ten years ago. A 5-stamp mill is located about 2 miles distant on Fine Gold Creek. Workings consist of a 300-foot shaft and some drifting and stoping. The mill was operated for about six months. Width of vein 4 inches to 4 feet.

Bibl.: R. XII, p. 163; XIII, p. 213.

Starbuck (or Fine Gold). Three and one half miles northeast of O'Neals. Unpatented. Owner, F. F. Baker. Vein 6 inches wide. Shallow surface workings by the owner have furnished ore for occasional runs by arrastra.

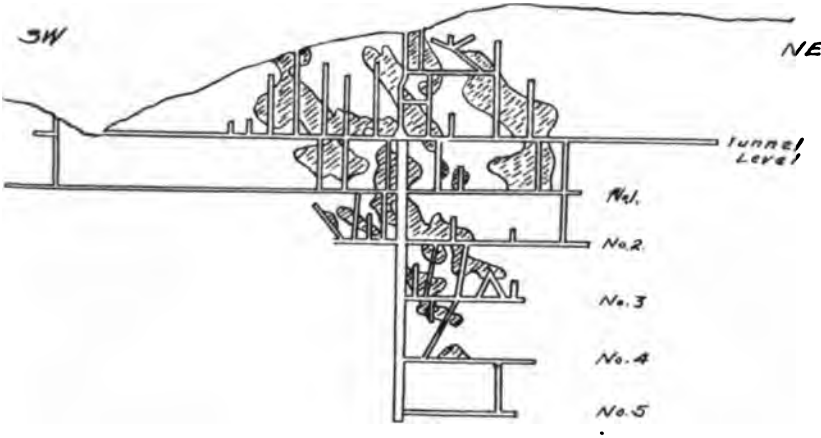
Bibl.: R. XII, p. 164; XIII, p. 213.

Starlight Group (one time called Mammoth). At Grub Gulch. Three unpatented claims owned by John Anderson. Recent work has been simply assessment. There is an old shaft; at the 50-foot level is a crosscut 150 feet north with drifts 150 feet west and 25 feet east; at the 200-foot level is a 50-foot drift west, and at the 340-foot level drifts 50 feet east and 50 feet west with a crosscut 15 feet north towards the hanging-wall. The vein outcrops for 15,000 feet or more, striking N. 70° W., dipping 45° NE. The width is 20 to 25 feet. About 1896 a 10-stamp mill was erected by an English company, the mine having been developed as above described. Operations continued only a short time.

Bibl.: R. XII, pp. 160, 162; XIII, pp. 210, 212.

Sunshine (see Balfron).

Texas Flat. Situated in Sec. 6, T. 8 S., R. 21 E., 1 mile northwest of Coarse Gold. Consists of four patented claims, discovered in 1853. Owner, Ed. Dickinson, of Kansas City. Under option to Phillip Rowe, of Seattle, who has been operating since 1912. Wm. Krohn is superintendent. The vein varies in width from 3½ to 4 feet, strikes with the bedding of enclosing slate, N. 40° E., and dips 30° SE. An adit 1400 feet along the vein meets the 920-foot incline shaft at a point 260 feet below the collar. The workings are shown by the accompanying sketch copied from the mine map. The mine has been thoroughly equipped for about ten years. An electric power plant stands on the Fresno River about 3 miles distant. Water has 110 feet fall and generates 110 horsepower. An electric hoist is stationed at the tunnel level of the shaft. The mine is practically dry and water is



TEXAS FLAT MINE
ON PLANE OF VEIN, DIP 30°
0 100 200
Feet

ordinarily handled with skips. There is a compressor capable of running four drills. The mill has 20 stamps (1500 pounds) and 4 Wilfley tables. Capacity 120 tons per day. Since 1904 the mill operated four or five seasons from November until July when waterpower fails. In January of this year (1914) high water in the Fresno River took out their flume and damaged the power house, for which reason the mine is at present idle. Operations will be resumed, however, as soon as the San Joaquin Light and Power Company gets a line into the district.

The total production since 1903 is said to be $185,000, the ore averaging $4 per ton. Amount of concentrates ½ per cent, value $98 per ton, bullion fineness .555. It is said that ore has been stoped and milled for $1.40 per ton. Recent work has been on a footwall ledge at No. 3 level, where some ore of $20 to $50 in value is said to have been encountered.

Bibl.: R. VIII, p. 212; XII, p. 164; XIII, p. 213.

Thrower. Near O'Neal's, Sec. 9, T. 9 S., R. 21 E. Owner, Hayden Payne, of O'Neals. The vein is 2 feet wide between granite walls, and is said to average $8 per ton with rich spots. A 90-foot shaft has been sunk but only assessment work has been done recently. A small tonnage of ore is occasionally treated in an arrastra.

Ten Strike (formerly McLellan). Adjoins Hawkeye on the southeast; owner, J. P. Lang. Discovery made about twenty years ago. Vein 1 to 5 feet wide. A shaft 60 feet deep and some surface cuts have been opened. No ore has been milled. Assessments.

Topps (see Pure Gold Mining Company).

Volcano No. 1 (also called Hildreth). At Hildreth, Secs. 25 and 26, T. 9 S., R. 21 E.; patented. Owner, Wm. Dumphrey Estate. The vein is about 12 inches wide, and the last work, some twenty years ago, opened it to a depth of about 400 feet. This is the only property which has been extensively operated in the vicinity. At one time it had a steam hoist and Huntington mill and is reported to have produced about $100,000 from pockets.

Bibl.: R. XII, p. 158; XIII, p. 209.

Washington. Two miles south of Grub Gulch. Two unpatented claims; owners, John Anderson et al. The vein is 2 inches to 2 feet wide in granite. There are four shafts, 60 to 140 feet deep, and 100 feet of drifting. Assessments only at present.

Bibl.: XII, p. 164; XIII, p, 214.

Waterloo (Paymaster) *and Consolidated Four.* Four miles southeast of Coarse Gold, Sec. 15, T. 8 S., R. 21 E.; owners, H. A. Krohn et al., Coarse Gold. The Waterloo group consists of two patented claims, the Paymaster and Alpha No. 2. The Consolidated Four group is composed of four unpatented claims which adjoin the others on the northwest, all being in the same line. They are on the north fork of Fine Gold Creek, at an elevation of 2300 feet (U. S. G. S.). On the Waterloo group two parallel veins 40 feet apart strike northwest and southeast and dip 30° NE. Each vein is about 3½ feet wide and they are reported to average $10 per ton.

In 1901 an incline shaft was sunk 300 feet; an adit 400 feet long runs to the 75-foot level on the southeast side; 45 feet below the adit level a drift runs northwest 250 feet; at 90 feet below the adit drifts run southeast 150 feet and northwest 200 feet; 200 feet below the adit drifts extend each way for 200 feet. A little stoping was done and during six months' milling it is reported that $30,000 was produced. Values are principally in free gold, with some galena and pyrite. A 10-stamp steam-driven mill is on the property, unused for nine years.

The electric power line of the San Joaquin Light and Power Company now (July, 1914) crosses the property near the mill. On the lowest level a run of 300 tons is said to have averaged $8.60 per ton. Last winter high water exposed a new vein in the creek bank on the Alpha No. 2, which has been traced through the full length of both claims. It is stated that a Canadian company is now considering a bond on the property. The four unpatented claims have been opened by several shafts from 10 to 50 feet deep.

Bibl.: R. XI, p. 216; XII, p. 161; XIII, p. 211.

Willow Creek. It is 2½ miles south of O'Neals; unpatented. Owner, Chas. O'Neals. Discovered thirty years ago but only assessment work done for the past ten years. The vein is 6 inches to 5 feet wide, said to average $13 per ton by arrastra. A shaft was sunk 60 feet (now full of water) and 50 feet of drift run, besides a 90-foot adit.

Bibl.: R. XIII, p. 214.

Woodland (also known as Mammoth). Near Grub Gulch, unpatented. Owner, John Day. Adjoins the Handy Andy, on the same vein as the Daisy, known as the Bullion vein, which is 3 to 4 feet wide. An adit 140 feet long and 90 feet of crosscut. Ore said to average $5 per ton. Last winter (January, 1914) a new shoot was found, but work was stopped by heavy rains causing the ground to cave. It is intended to reopen this fall.

Bibl.: R. XII, p. 160; XIII, p. 210.

Zebra (U. B. Dam No. 1). Near O'Neals, unpatented. Owner, Wm. Rucker, San Jose. Only assessment work has been done for many years. The vein is about 18 inches wide, striking northeast and southwest and dipping 40° SE. State Mineralogist's Report, 1890, page 199, gives the following information: Four adits on the vein at vertical intervals of about 50 feet, their lengths being 640, 460, 510, and 583 feet, and a 100-foot shaft near the lowest adit. Considerable stoping was done, one shoot being developed for a length of 120 feet, and two other shoots partly determined. A Bryant roller mill of 18 tons capacity was operated for a time, but removed about fifteen years ago. Mining and milling is said to have cost $2.10 per ton; and the ore to have averaged $15 to $20 per ton.

Bibl.: R. VIII, p. 210; X, p. 199; XI, p. 216; XIII, p. 214.

Zulu. Near Coarse Gold. A prospect formerly owned by David R. Jones, now abandoned. Work consists of a 30-foot shaft and 60-foot drift, besides surface cuts. About 5 years ago 100 tons of ore were milled.

IRON.

On the western slope of Mt. Raymond, Sec. 9, T. 5 S., R. 22 E., there has been considerable prospecting in recent years for iron. Near the summit of the mountain is an adit about 50 feet long, showing irregular spots and seams of magnetite and pyrite 2 feet to 3 feet wide. The country rock is a siliceous metamorphic showing considerable red iron stain and some smaller spots of leached iron ore. Three unpatented claims (Bathse, Summit, and Blue Bell) located about twenty years ago comprise the property owned by *Thomas Biledo,* of Fresno Flat.

In the same locality, but farther south near the base of Mt. Raymond, a number of shallow shafts have been sunk by *H. A. Krohn* of Coarse Gold. Geologic conditions are similar to those on the Biledo property, except that soil covers a great deal of this land. Some bodies of magnetite and other iron ores are exposed, possibly being in the form of lenses as much as 4 or 5 feet thick and 50 to 100 feet long.

Farther east, about Secs. 14, 15, 22 and 23, T. 5 S., R. 22 E., similar geologic conditions prevail and many shallow pits and shafts have been sunk by *T. G. Hart* of Fresno.

Yosemite Copper Mines Company. George J. Main, superintendent, Hayward. This company has done considerable work at Hogum in the vicinity of Iron Creek, Sec. 14, T. 5 S., R. 22 E., and Sec. 7, T. 5 S., R. 23 E. The property consists of nine claims and a mill site which have been surveyed for patent. Five adits from 40 to 100 feet in length have been run, besides numerous smaller surface workings. On the claims in Sec. 14 six core-drill holes have been sunk from 30 to 225 feet. Geologic conditions as described nearer Mt. Raymond prevail here except that on this property there is more granite or granodiorite. The drill cores are said to show a thickness of from 50 to 100 feet of ore, which seems to be principally magnetite, white iron sulphide, and pyrite. But little copper stain from sulphide or carbonate is seen. It is stated that assays of the entire cores were not made. The cores have been preserved. Outcrops near the drill holes do not indicate a continuous ore body and lack of evidence as to dip prevents definite statements as to extent.

Some idea of hardness of the rocks may be conveyed by the rates of drilling with a Davis Calyx 3⅛-inch machine using chilled steel shot. They are said to have averaged as follows: Granite, 6 to 10 feet per day; ore, 4 to 6 feet; quartzite, 2 to 3 feet.

Transportation facilities to the district are poor, the nearest railroad point being Raymond, about 30 miles distant. Heavy snowfall prevents work for from four to six months a year. There is a fair water supply, and excellent timber covers most of the territory.

Bibl.: R. X, pp. 191-193; XI, p. 214; Bull. 38, p. 298.

THE MINARET IRON DEPOSIT.

By F. B. WEEKS.

A reconnaissance examination, by the writer, of all reported iron deposits in California showed the largest to be in Madera County. This iron deposit occurs at the south end of the Minaret range which constitutes one of the prominent ridges of the Sierra Nevada in the north-

Fig. A. Southern end of The Minarets, looking from the west. Peak at left of center is Iron Mountain. Photo by F. B. Weeks.

east corner of Madera County. The region is characterized by Alpine ruggedness and contains many glacial amphitheaters and lakelets. It is drained by the North and Middle Forks of the San Joaquin River which have cut canyons 3,000 to 4,000 feet below the general level of the Minaret ridge, which separates these streams. Figure A shows the topographic features of the country. This photograph was taken from

the ridge on the west side of the North Fork looking east to the southern end of the Minaret range. The peak at the left of the center of the picture is Iron Mountain.

A mountain wagon road has been constructed from Fresno Flats to Jackass Creek and from this point there is a trail used by cattle men which crosses the North Fork on a bridge known as Sheep Crossing and thence to "77" Corral. From "77" Corral there is a trail leading north to Iron Mountain. From the east the deposit may be reached by wagon road from the town of Bishop in Owens River Valley to Mammoth, and thence by trail over Mammoth Pass and crossing the Middle Fork near the Devil's Post Pile and to "77" Corral. These roads, trails and localities are shown on the topographic maps of the U. S. Geological Survey of this region and these maps should be in the hands of every person going into this country. The only persons in the region are a few prospectors and cattle men in July, August and September. The remainder of the year the country is uninhabited. The winters are long and severe and the snowfall heavy.

There is considerable timber in the region but the iron deposit is 1500 feet or more in elevation above timber line. The North Fork would afford water power for any mining or milling operation in this region.

A preliminary railroad survey was once run through this country by way of Mammoth Pass. A railroad from the west would traverse a rolling country rising gradually to the east as far as the ridge on the west side of North Fork. From this point construction and operation of a railroad would meet with the usual difficulties encountered in the high Sierras.

This iron deposit has been known for many years. It has been briefly described, usually in exaggerated terms, in various mining papers and is mentioned in some of the reports of the California State Mining Bureau. It should be remembered that it has only been within a few years that the nature and origin of iron deposits of this character have been sufficiently understood to expect a reasonable description from persons who have personally examined this deposit.

From "77" Corral up the trail to the foot of Iron Mountain the country rock is the grano-diorite characteristic of the high Sierra. Upon the southern slope of Iron Mountain, there is a variety of igneous rocks, from very acid to basic types, the different types occurring in belts having a general N. 30° E. strike. The contact between the iron deposit and country rock is usually covered but where observed the line of demarkation between them is sharp and distinct.

However, some large pieces of slide rock show banding of iron with both acid and intermediate rocks indicating a probable intermingling of materials about the edge of the iron mass. On the northwest side of the deposit the contact rock is of light gray color of an acid type

while rocks of an intermediate character are in contact with the iron at other points.

There are no indications of movement at any of the observed contacts. Fracturing in a northeasterly direction, parallel to the strike of the deposit, is strongly developed through the iron mass. Figure B shows the portal of a tunnel that is entirely within the iron mass

Fig. B. Portal of tunnel in massive iron ore on Iron Mountain.
Photo by F. B. Weeks.

and the fracturing characteristic of the deposit is here strongly developed. The fracturing is subsequent to the formation of the ore and may be wholly due to shrinkage of the mass prior to its complete consolidation. In certain narrow belts of the associated igneous rocks schistose structures are developed. No flow structures were observed. The slopes of Iron Mountain are covered with slide material composed of the igneous rocks and iron from the deposit.

The deposit is a mass of iron composed of magnetite in which no other material was observed. Its strike is NE.–SW., and its elevation about 11,000 feet above sea level. On account of the slide rock no accurate determination of the surface extent of the deposit could be made. It was estimated to be 2000 feet or more in length, 400 feet in average width, and by erosion on the northeast end it was shown to be 250 feet in depth. On the basis of these estimates there should be thirty million tons of iron ore available. Development may show a greater amount.

The general aspect of the iron mass and the enclosing rocks point to its origin in the differentiation and segregation of materials within the original igneous magma and their consolidation in the form now exposed by erosion. An analysis of a sample taken from the face of a tunnel gave: Fe, 64.14%; Al_2O_3, 1.52%; CaO MgO, 0.53%; SiO_2, 8.60%; P, 0.72% Cu, none; S, 0.60%.

The deposit is within the Sierra National Forest Reserve. It was reported that the deposit is claimed by parties who have made mineral locations. There being no persons in the region at time of examination the names of the present locators could not be ascertained. Approximately 100 feet of underground development work was found within or in close proximity to the iron deposit.

LEAD AND SILVER.

Star Mine. Situated near the summit of Mt. Raymond, NE. ¼, Sec. 10, T. 5 S., R. 22 E., at an elevation of 9000 feet. About 1888 this property was slightly developed, and a concentration plant was erected about 1½ miles distant, near the center of Sec. 16, T. 5 S., R. 22 E. An aerial tramway connected the mine and mill. The intention was to work the ore for its silver and lead content, but the project was a failure after about one year of operation. Very little information is to be had. The plant is at present in a very bad state of repair. About seven years ago an attempt was made to again work the property. It is stated that such ore as was milled contained about 10 per cent of concentrates, valued at $40 per ton and occasionally as high as $100. H. A. Krohn, of Coarse Gold, is the present owner.

Bibl.: R. VIII, pp. 215, 216.

Silver-Lead ores are found in the North Fork Mining district in T. 3 and 4 S., R. 25 and 26 E., but little work has been done of recent years.

Bibl.: R. XI, pp. 218-223.

MINERAL WATER.

There are several soda and sulphur water springs, both cold and hot, near Isberg Pass and the Devil's Post Pile in the extreme eastern end of the county. They are not utilized, however, except by occasional camping parties. Of the hot springs, the most important are the "Red Meadows Hot Sulphur Springs" at the Devil's Post Pile; temperatures 90° to 120° F.

Bibl.: U. S. G. S. Water Supply Paper No. 338, pp. 55, 238, 239, 240, 241, 381.

MOLYBDENITE.

A small deposit of molybdenite was found near the sawmill of the Madera Sugar Pine Company, at Sugar Pine, and some development work done. The deposit proved to be too small. It was said to carry small values in gold.

NICKEL AND COBALT.

H. A. Krohn of Coarse Gold has 80 acres under an agricultural patent in Secs. 23 and 26, T. 10 S., R. 19 E., 12 miles northeast of Madera. While developing for supposed copper values, a body of pyrrhotite ore was opened up, said to assay 7 per cent nickel and 14 per cent cobalt. Development consists of a 100-foot shaft and a short crosscut. No commercial production has as yet been made.

SILVER (see Lead and Silver).

SOAPSTONE.

Brown Deposit. On the north side of the San Joaquin River, a short distance above Friant. Owner, George Brown, Friant. D. Evanger and G. D. Hutchinson, lessees, 3480 Tulare avenue, Fresno. This deposit of talcose schist has been known for twenty-five years, but not utilized except locally. There is a belt of the material about 400 feet wide, striking northwest. Only a small quarry face has been opened up. It is not high grade, but can be sawed into blocks several feet across.

STONE INDUSTRY.

The well known "Raymond" granite quarries near Raymond, in Madera County, not only are and have been for a number of years the most important mineral industry of the county, but they are also an important factor in the state's production. As has already been noted (see Introduction), these deposits of workable building stone are located in the western edge of the Sierra foothills. There are two quarries about 1 mile apart, on the east side of a small valley, about 2 miles east of Raymond, which is the terminus of the Berenda-Raymond branch of the Southern Pacific Railroad. Both quarries are served by spur tracks

Photo No. 123. Hearst Memorial Mining Building, University of California, Berkeley. Raymond granite (1903).

Photo No. 126. University Library, University of California, Berkeley. Raymond granite (1912).

Photo No. 6. Dressing a platform stone (size 21 feet by 6 feet by 2 feet) for the San Francisco City Hall. McGilvray Raymond Granite Company, Madera County, Cal.

Photo No. 8. Sculptural Carving (plaster model at right), for San Francisco City Hall. McGilvray Raymond Granite Company, Madera County, Cal.

from this branch line. It is now recognized that this stone is not excelled by any other building granite found either in this state or elsewhere. It is noted for its beautiful white color, the fineness and uniformity of its texture, its weathering qualities, and its freeness in working. As to this last named feature, it lends itself readily to all classes of fine structural carving.

Madera County Rock Crusher. The county has a rock crushing plant at the McGilvray quarry to utilize waste rock and spalls for road material. It is under the supervision of H. L. Craw, supervisor. Idle in 1914.

Photo No. 129. Sculptural detail on City Hall, San Francisco. Stone from McGilvray Raymond Granite Company, Madera County, California.

McGilvray Raymond Granite Company (formerly McClellan Quarry). John D. McGilvray, president; office, 634 Townsend street, San Francisco; Alexander McGilvray, superintendent at the quarry. Situated in Sec. 27, T. 8 S., R. 19 E. The rock is similar to that described in the Knowles quarry, except in the manner of natural fracturing. Here, no large exfoliation planes have as yet been exposed; but cross fractures some 20 to 30 feet apart occur, besides occasional small dikes. The quarry is a side hill cut worked on about the same scale as the other, but covering a smaller area and deeper. Equipment includes 6 derricks with oil-burning steam hoists, 2 saw sets, 4 over-

head traveling cranes on two runways, and a locomotive track crane. The two compressors are driven by 150 h.p. and 250 h.p. motors, electric power being obtained from the line of the San Joaquin Light and Power Company, installed this year (February, 1914). Most of the work is done with pneumatic tools.

This summer the quarry has been employing from 250 to 300 men, the largest force in its history. This is mainly due to their furnishing the stone for the new San Francisco City Hall, the granite contract alone for which represents a value of $991,313. The architectural plans call for a large amount of fine sculptural detail, and this work is practically all done at the quarry sheds. In this department there were seventeen carvers working under a special foreman. The majority of these artists (for "artists" they must be to do such work) are Italians and Scotchmen. Among the larger blocks finished are several platform pieces for the City Hall, 21′ x 6′ x 2′. (See photo No. 6.)

The product has an extensive market, another example being the United States Custom House in San Francisco. The four monolithic Doric columns at the First National Bank are also from this quarry. The largest single piece shipped from this quarry was 14′ x 13′ 10″ x 2′ for the top of a mausoleum in Cypress Lawn Cemetery, San Mateo County.

Bibl.: R. XII, p. 384; XIII, p. 620; Bull. 38, p. 32.

Raymond Granite Company (also known as the Knowles Quarry). F. E. Knowles, president; office, Division street and Potrero avenue, San Francisco; F. J. Krebs, superintendent at the quarry. Situated in Sec. 22, T. 8 S., R. 19 E. Operations have continued since 1888 with varying activity, there being at present (July, 1914) 175 men employed about the entire plant. The company owns some 1700 acres. About 5 or 10 acres are free of weathered overburden on a low rounded hill (see panoramic photo No. 4A). The rock breaks to extensive fractures lying nearly parallel to the ground surface and from a few inches to 15 or 20 feet apart. Cutting of these immense slabs is done principally by wedges with a little powder used occasionally. A channeling machine is also employed. (See photos Nos. 1, 2 and "M".)

The largest single piece reported was 4′ x 4′ x 40′, but much larger blocks could doubtless be obtained. The stone is completely dressed or carved at the sheds adjoining the quarry, where air-driven machines are used. The equipment includes 6 derricks with oil-burning steam hoists, 2 sets of saws, and overhead traveling electric cranes (3 large and 2 small). Until February of this year oil has been used to generate power, since which time the San Joaquin Light and Power Company has been furnishing electricity. The steam plant is still maintained as an auxiliary. The stonecutters receive $5 per day for eight hours.

Photo No. 4A. Raymond Granite Company's quarry near Raymond , Madera County, California. Panoramic view of quarry from below.

Photo No. 1. Raymond Granite Company, Madera County, Cal. Upper part of quarry.

Photo No. 2. Wedging out a large block of granite (about 10 feet by 20 feet by 5 feet). Raymond Granite Company, Madera County, California.

Monumental and building stone has been furnished to many large structures, among which may be mentioned the San Francisco post office, Municipal Auditorium, the U. S. Sub-Treasury Building and the Fairmont Hotel; also for buildings at the University of California in Berkeley. Of the latter, the most striking example is the Campanile, or bell tower, a shaft of 34 feet square base and 305 feet in height to the top of the surmounting bronze lantern. On the front of the new U. S. Sub-Treasury Building in San Francisco are ten Doric columns about 4½ feet in diameter and 27 feet long, each in three sections. As originally drawn, the specifications called for these columns to be monolithic. The change was made because of the greater cost of handling. As has already been pointed out even larger monolithic pieces than that can be obtained here. We were informed that the cost of cutting would be practically the same, but that the necessity of providing heavier equipment to handle them would have increased the cost $2000 for the ten columns in question, or $200 per column. It seems to the writer that it would have been money well spent, for the beauty of the building would have been enhanced many times.

Photo "M". Raymond Granite Company's quarry, Raymond, Madera County, California.

Bibl.: R. X, p. 189; XII, p. 384; XIII, p. 620; Bull 38, pp. 30–32.

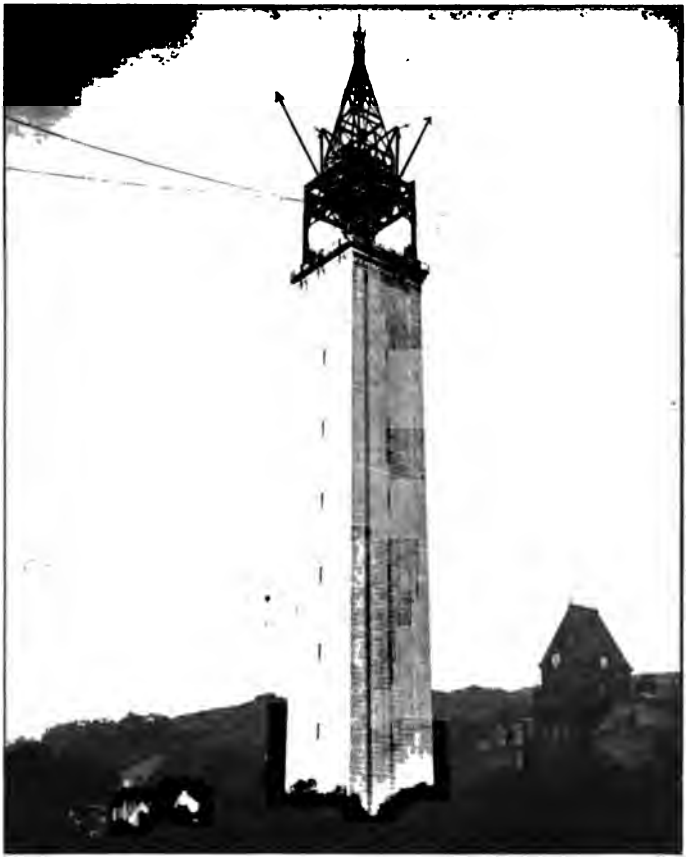


Photo No. 125. Sather Campanile, University of California, Berkeley. Stone from Raymond Granite Company, Madera County, California.

Sand and Gravel.

Primmer Artificial Stone Plant. B. J. Primmer of Madera has a plant which is producing concrete pipe and culverts. California cement is used with sand and gravel obtained from the Fresno River north of Madera.

Santa Fe Gravel Company (formerly San Joaquin River Rock and Gravel Company). F. Knobloch and Louis Manuel, owners, 1929 Fresno street, Fresno. This gravel pit on the San Joaquin River, in Sec. 32, T. 12 S., R. 19 E., is 1 mile north of Herndon station on the Southern Pacific railroad, but ships via Knobloch spur on the Santa Fe. It was opened up about 1904. The material is moved by Fresno scrapers to a trap over dump cars; then hauled ¾ mile by mules on a light track to the railroad spur. Formerly a dinky locomotive was used. The plant has a capacity of 100 tons per day, with six men employed. The product is not screened at the pit.

TALC (see Soapstone).

TUNGSTEN.

Wolframite occurs in the form of masses and large crystals in a quartz vein in andalusite schist, 12 miles north of Raymond. The deposit is undeveloped.

Bibl.: Bull. 67, p. 176.

VOLCANIC ASH.

Mineralite Manufacturing Company. G. D. Hutchinson, president, M. H. Heitzig, secretary; office and factory, 3480 Tulare avenue, Fresno. This material is an extremely fine, powdery, though somewhat compacted volcanic ash, the deposit being on the ranch of C. D. Armstrong, in Sec. 1, T. 11 S., R. 20 E., 2 miles northwest of Friant. It was first worked about 15 years ago in a small way and used for a polish. The present lessees incorporated in March, 1914, and have developed the deposit to a depth of 20 feet to 30 feet by open cut. They ship the material to their plant in Fresno where it is crushed, and bolted through a 125-mesh screen. The product is marketed in the form of a polishing powder, and as scouring and polishing soaps. At the pit two men are employed intermittently.

ZINC.

It is stated that zinc is found in some of the ores of the Minarets district. It is also found in the North Fork Mining District.

Bibl.: R. XI, p. 222.

MARIPOSA COUNTY.

By F. L. LOWELL, Field Assistant.
Field Work in July, 1914.

Mariposa County might be said to possess more distinctions than any other county in California from the fact that not only does the southern extremity of the famous "Mother Lode" of the State end in this county but also that the famous Yosemite Valley and Mariposa Grove of Big Trees are included in it.

The county is bounded on the north by Tuolumne County, on the southeast by Madera County, and on the west and southwest by Merced County. The greater portion of the county is drained by the Merced River and its branches with the exception of that portion extending from the Mariposa Grant to the south end of the county. While the county receives a fair amount of rainfall, yet water is not very abundant during the summer and the power used in the prosperous days of mining in the county was derived from the then abundant wood fuel. Wood as a fuel at the present time is too expensive for working the grade of ores that now prevail.

POWER.

Some mines along the Merced River develop hydroelectric power from the river for their own use and the Mariposa Grant also supplies a limited amount of power for lighting purposes and mill power from its plant on the Merced River at Bagby. Their lines run from the Merced River through the grant to the towns of Mt. Bullion and the county seat, Mariposa. The plant consists of a flume 400 feet long by 16 feet wide and 6 feet deep which carries water under a 34-foot head to three Pelton wheels which are 27, 30 and 40 inches in diameter, respectively. The plant is capable of developing 600 horsepower and the power is generated by two Westinghouse dynamos.

The Pacific Gas and Electric power line comes from Tuolumne County to the Peñon Blanco mine and thence through the town of Coulterville to the Potosi gold mine owned by the Merced Gold Mining Company.

A company formerly had a power plant at Exchequer on the Merced River, but their plant was washed out during the heavy freshet of the winter of 1913. The San Joaquin Power and Light Company, which generates power from Merced Falls in Merced County, owns a power line which extends as far as the Mt. Gaines mine in the Hornitos mining district. This company also uses the Exchequer line for transmitting power.

Mariposa Commercial and Mining Company's dam and hydroelectric plant on the Merced River at Bagby, Mariposa County, California.

GEOLOGY.

Mariposa County is about 65 miles long and 35 miles wide. The serpentine, amphibolite schists and metamorphic slate belt comes as far south as the Mariposa Grant and south of this estate the granites of the eastern portion of the county crowd over toward the west, thus ending the so-called "Mother Lode." The "Grant" boundaries appear to be well chosen so far as including most of the Mother Lode vein south of the Merced River is concerned, for, outside of these boundaries, the veins are smaller.

In the southeastern section of the county there is a limestone belt with a northeast and southwest direction which extends for some distance through the county. This limestone belt carries copper in considerable quantities. The formation in the eastern part of the county which is taken up by the Yosemite National Park, is mostly of granite and heavily timbered. No mineral is reported and no prospecting is being done within the boundaries of the National Park.

Mariposa County had many producing mines at one time but many of the larger ones reached a zone of decreased values and ceased operations at this point. On the Mother Lode in other counties, this same lean zone has been encountered and, in some cases, it has been pierced and better values found below. This advanced prospecting has not been done to

any extent in this county, and it remains to be proven whether the shoots go down. Some of the mines have very enviable reputations as producers from the surface down to the point of abandonment. The fuel question has been a drawback to the county of late years. There are ores that could be worked at a profit if cheap power could be had. Wood costs $2.50 to $4 per cord delivered.

ASBESTOS.

Some asbestos of the amphibole variety has been found east of the Mariposa Grant, the exact locality not being known. It is impure and not being worked.

BARYTES.

El Portal Mining Company, whose office is at 354 Pine street, San Francisco, owns considerable barytes (heavy spar) on the north bank of the Merced River, about one mile down river from El Portal. The plant consists of a bin at the railroad tracks, also a bin at the quarry, a surface tram down the hill and two ore cars. No one was working in the quarry at the time the plant was visited. A very good quality of barium sulphate is produced.*

El Portal Mining Company's barytes quarry on the Merced River one mile below El Portal, Mariposa County, California.

*The property is under lease to the Barber Chemical Company, which has a plant at Melrose, Alameda County, Cal., manufacturing barium compounds.

COPPER.

Copper mining in the county has not reached large proportions and the southern end of the county is the only place where any work is being done and not much even there. Leasers are taking out most of the copper that is being shipped. This ore is freighted by wagon to the railroad at Raymond in Madera County and shipped to the smelters. This county is said to have had the first smelter in the State, the ruins of which are still standing not far from Green Mountain. The copper belt in this county extends for forty miles and considerable copper ore was mined in the early days, but the industry has dwindled to very insignificant proportions. Those properties that are operating at present will be described and a few of the new groups mentioned, but for the older and idle properties reference can be found in Bulletin No. 50, "Copper Resources of California," issued by this Bureau in 1908.

Remains of what is said to have been the first smelter in California, near Green Mountain in southern Mariposa County, California.

Green Mountain Copper Group. This group, which consists of eight mineral claims and 26 acres of patented agricultural land, is situated in Sec. 3, T. 8 S., R. 18 E., M. D. M., about 8 miles by wagon road northwest of the railroad at Raymond in Madera County and owned by the Legioneer Gold Mining Company and J. B. Pearce. Two of the eight claims are patented, namely, the Copper Queen and Buena Vista. The Copper Chief, Buster Brown, Cuban Nigger, Flotsom, Jetsam, and Amador claims are not patented. The first claims were located in 1861

and have been worked and shut down at various times. The ores consist of copper oxides and carbonates. There are about 4,000 feet of underground works. A gossan capping covers the schist which carries the copper ores in the form of replacements. The mine is worked through tunnels. At present there is very little equipment on the ground with the exception of a horse whim, three ore cars and drill steel, also a dwelling house. Three leasers are working at present. Fifty-two cars shipped averaged $1,000 per car, but did not carry gold values. Assays showed 2 ounces in silver.

Pocahontas Copper Mine. This property, which consists of 320 acres of patented land, is situated in Sec. 14, T. 7 S., R. 17 E., M. D. M., about 16 miles northeast by wagon road from Le Grande in Merced County, which is on the Atchison, Topeka and Santa Fe Railroad. The property is owned by a stock company called the Pocahontas Mining Company, with their home office in San Francisco. The exact date of location is not known, but supposed to have been located in the early sixties. The mineral bearing formation is gossan, several seams of which run through the county, and the ores are principally sulphides and carbonates, the carbonates predominating down to about 100 feet when the sulphides take principal place. The greatest depth attained is by shaft, which is down 300 feet; 900 feet of drifting has been done, and a 200-foot tunnel has been driven on the vein. The mine equipment consists of a donkey engine, skip, tools, blacksmith shop, assay office, timber shed, and dwelling house. All the ore was shipped to the Selby Smelting and Lead Company by way of Le Grande. Two men are leasing the property now.

San José Copper Group. This group of copper claims, which was formerly known as the Cavan Copper Mine, consists of nine claims and one mill site all unpatented, and is situated in Secs. 5 and 8, T. 8 S., R. 18 E., M. D. M., about 10 miles northwest by wagon road from Raymond in Madera County. The property is owned by S. L. Pearce. These claims were located about fifty years ago and they consist of 170 acres. The lode is schist carrying replacement copper. The mine is worked by a 150-foot shaft. There are sixty-five feet of drifts, also a few prospect shafts and a crosscut tunnel. The only equipment consists of a horse whim, mine bucket and drill steel. The mine is being worked by Mr. Pearce, who has shipped seven carloads of ore to the Selby Smelting Works. They are said to have averaged $1000 per car. The ore carries $2.50 per ton in gold. The costs are $3.50 per ton for hauling to the town of Raymond and $2.25 per ton railway charges to the smelter. Total costs per ton are $12. A patent has been applied for, but not granted on account of litigation with homesteaders.

A group of 26 copper claims located in Sec. 30, T. 5 S., R. 19 E., just east of the Mariposa Grant near Mormon Bar in March, 1913, has been prospected in some places and bonds have been taken out on them, but so far no one has developed them. The ore carrying formation is quartz porphyry.

Another group of copper claims is located in Secs. 19 and 20, T. 6 S., R. 20 E., M. D. M., and is called the *Indian Peak Group.* There are fifteen claims in the group and most of the development work has been done on the Indian Peak claim. The copper ores which are in

Copper dump on the property of the Indian Peak copper claims, Mariposa County, California.

limestone with granite walls are mostly carbonates and sulphides. This limestone belt has a northeast and southwest direction and can be traced for some distance through the county. There are two incline shafts, each 35 feet deep and both are in ore. There are four tunnels, one 120 feet long, two 20 feet each, and another 50 feet long. The claims have a cabin and blacksmith shop on them. No work is being done at present. The Indian Peak claim was located twenty years ago and the other claims were located in 1913.

Another group of copper claims in the Indian Peak district comprises seven claims and are owned by *Mrs. Emma Chard* of Red Bluff. These claims are not developed.

A second group of five claims in the same district is owned by J. L. Divens, Mrs. E. McKeith, Lee La Valley, and Matt Logan. There is a 20-foot tunnel on one of the claims and a shaft on another, but very little work has been done.

There is also a *copper vein* on the Mariposa Grant, in Sec. 18, T. 5 S., R. 18 E. The strike is northeast. The vein is in slate walls and has not been developed. It is about seven feet in width on the surface.

GOLD (LODE).

Gold mining in the county has suffered a relapse since the boom days notwithstanding the large production of some of the mines. The shutting down of the larger mines on the Mariposa estate and also those of the Merced Gold Mining Company in the Coulterville district, has, in a large measure, put a damper on mining, and the fact that cheaper power is not always available for working the lower grade ores also hampers the industry. While many of the older mines have reached a zone of unpayable values, yet there are numerous new properties that show promise of developing into mines if the necessary capital and energy are forthcoming. Many of these properties will be mentioned in the following list:

Adelaide Quartz Mine. Owned by the estate of Mary P. MacCrellish, W. P. Edwards of Alameda, manager. The claim is patented and located in Secs. 22 and 23, T. 3 S., R. 16 E., M. D. M., 1½ miles by wagon road from Kittridge. The vein, which has a northwest strike, is between serpentine footwall and slate hanging-wall, and ranges from 6 to 10 feet in width. About 2500 feet of development work, one tunnel and an old incline shaft 150 feet deep. The equipment consists of a 4-drill Sullivan air compressor, blacksmith shop, and boarding house. The mine was bonded, but the bond lapsed July 1, 1914, and is now idle.

Aden Quartz Mine. Owned by the Aden Mining Company, box 242, Vallejo. Very little information could be obtained on this property. There is a crosscut tunnel 300 feet long, 180 feet of drifts, and two shafts, one 105 feet and the other 40 feet in depth. Now idle.

Alice Quartz Mine. Owned by the Mariposa Commercial and Mining Company, Alaska Commercial Building, San Francisco. The property consists of two claims located in Sec. 16, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road to Merced Falls in a westerly direction. The vein of quartz lies between slate walls and averages 3 feet in thickness. The development consists of a 200-foot shaft, three levels with 360 feet of drifts, a winze 27 feet deep and a raise 38 feet long. There is no mine equipment on the property and it has not been worked since 1902.

Anderson Quartz Mine. Owned by the estate of Mary P. MacCrellish, W. P. Edwards of Alameda, manager. The property consists of

one patented claim located in Sec. 23, T. 3 S., R. 16 E., M. D. M., about 1½ miles by trail north from Kittridge and 5 miles by wagon road to Coulterville. The quartz ledge has serpentine footwall and slate hanging-wall and measures from 4 to 12 feet in width. The development consists of a 30-foot incline shaft, 3 levels and a tunnel 120 feet on the vein. The equipment consists of shaft with rails, one skip, 25 h.p. motor hoist, one bailing skip and pump. There is also a blacksmith shop, engine house, bunkhouse, and boarding house. The mine has been under bond, but it expired July 1, 1914, and is now idle.

Artru Mine (pocket). Owned by H. Artru and consists of a fraction of a claim 450 feet in length and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 3½ miles by trail from Saxon Creek station on the Yosemite Valley Railroad and 20 miles by wagon road to Bagby. The ore body is a porphyry dike said to average 20 feet in width and having slate hanging-wall and footwall. The development consists of a 75-foot shaft, 450 feet of drifts, 4 crosscut tunnels each about 140 feet long and several small raises. There is a cabin on the claim and a wheelbarrow and drill steel. The gold obtained is of the crystallized variety. The mine has been shut down for two years.

Austin Quartz Mine. Owned by the Austin Group Mining and Milling Company, 244 Kearny street, San Francisco. Consists of four unpatented claims, located in Secs. 29 and 32, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road to Bagby on the Yosemite Valley Railroad. The quartz vein is from 6 inches to 4 feet in width and lies between porphyry walls. The development consists of two incline shafts each 120 feet deep, one crosscut 700 feet long and a drift 150 feet long, also one stope 60 feet long by 120 feet high. The equipment consists of a hoist, blacksmith shop, 10-stamp mill, compressor, one Pindar concentrator, and Challenge feeders. The mine has not been working for the past one and one half years.

Bank of California Quartz Claim. Owned by G. E. Dunbar of 515 Southwest street, Kalamazoo, Mich. There are two unpatented claims, located in Sec. 27, T. 4 S., R. 18 E., M. D. M. The vein of quartz averaged 2½ feet in width and has porphyry and slate walls. The development consists of a 50-foot shaft, also a 75-foot shaft, which is now filled up. Is idle at present.

Black Log Quartz Claim. Owned by F. N. Clark and Wm. Bush of Mariposa. This is a prospect located in Sec. 13, T. 4 S., R. 18 E., M. D. M., and the only development work done consists of an incline shaft 70 feet deep. The vein is 8 inches to one foot in width. Only assessment work is done.

Blue Bell Quartz Mine. Owned by Hiram W. Branson and located in Sec. 9, T. 4 S., R. 20 E., M. D. M., 10 miles by trail from El Portal, near Jerseydale. The property consists of two unpatented claims and the vein of quartz lies between porphyry footwall and slate hanging-wall and has an average width of 5 feet. The development consists of a 145-foot crosscut tunnel and 80 feet of drifts. No equipment outside of an iron ore car, drill steel, and blacksmith shop. Mine not working.

Bogan & Baitaille Quartz Mine. Owned by Fred Mebold and consists of one patented claim located in Sec. 26, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. The quartz vein which averages about 2½ feet wide has a prophyry footwall and a slate hanging-wall. The development consists of four adit levels being 60, 100, 250, and 300 feet long, respectively, and several raises. The equipment consists of one ore car, mortar and spring pole, and a blacksmith shop. The mine is not working at present.

Bondurant Quartz Mine. Owned by A. L. Adams of 307 Center street, Bridgeport, Conn., and consists of 100 acres of patented claims, also 700 acres of patented timber land located in Secs. 25 and 36 in T. 2 S., R. 16 E., M. D. M., 13 miles north of Bagby by wagon road. The ledges are quartz and there are eight of them. They have slate walls and the Bondurant vein is 7 feet wide, the Reynolds 4 to 10 feet, and the Louisiana 4 to 15 feet. The development consists of a 412-foot incline shaft, 975 feet of drifts, 945-foot crosscut on river level, and 225-foot crosscut on adit level; also 150-foot air raise and 20-foot winze. The Reynolds shaft is down 125 feet. There are 5 stopes. The equipment includes a hoist, one Ingersoll-Sargent compressor, 40 h.p. boiler, 2 machine drills, skip, 2 blacksmith shops, drill steel, compressed air pipe, and one Worthington pump. The reduction equipment includes a 10-stamp mill (1000-pound stamps), rock crusher, Challenge feeders, two 4′ x 16′ plates, two Union tables, one Dean pump, mill engine, two small pumps and one 60 h.p. boiler. Five men were working doing development work. G. H. Gerkin, superintendent.

Booth Quartz Claim. One claim patented, owned by C. L. Booth of Mariposa, and located in Sec. 5, T. 5 S., R. 20 E., M. D. M. The strike is northwest and southeast and dips northeast about 45°. There are two shafts, 28 and 95 feet deep, and one tunnel 120 feet long. The vein varies from a few inches to 18 inches in width. No work is being done.

Bowman Quartz Claim. A pocket claim owned by F. N. Clark of Mariposa, located in Sec. 26, T. 4 S., R. 18 E., M. D. M. There are several prospect holes and shafts. Nothing being done at present.

Bull Dog Quartz Claim. Consists of one claim owned by Theodore Kokel of Lyons Gulch and situated in Sec. 31, T. 4 S., R. 18 E., M. D. M., 25 miles from Bagby on Yosemite Valley Railroad. The vein of quartz varies from 2 to 4 feet in width and lies between porphyry walls. Only assessment work is done each year and there is only a windlass on the property.

Bull Pup Quartz Claim. Consists of one claim owned by Jack Zerney of Merced, located in Sec. 31, T. 4 S., R. 18 E., M. D. M., 25 miles from Bagby by wagon road. The vein is 2 to 4 feet wide in porphyry walls and the development consists of an incline shaft 165 feet deep and 100 feet of drifts. There is practically no equipment with the exception of a windlass and a wooden skip. The claim has been relocated from year to year.

Bunker Hill Quartz Claim. Owned by Charlie Lewis of Hites Cove. The claim is located near Hites Cove and is said to have had the first quartz mill in the State in 1851. The claim is still unpatented and has had considerable development work done on it. The mine was discovered from quartz brought to the surface in a squirrel hole and was formerly called the Squirrel Mine. Still held by possessory rights.

Busch Quartz Mine. Three unpatented claims owned by L. F. W. Busch of Mariposa, located in Sec. 21, T. 4 S., R. 18 E., M. D. M., 4½ miles south of Briceburg and 22 miles from Bagby by wagon road. The vein is 16 feet wide at the surface and 9 feet wide in the bottom of the shaft, and the walls are slate. The development consists of a 180-foot shaft, 140 feet of drifting, one winze, length unknown, and one crosscut 67 feet long. There is a blacksmith shop and hoisting shed, also windlass, in the way of equipment. Only assessment work is being done.

Busch Quartz Claim. One unpatented claim owned by L. F. W. Busch, situated in Sec. 28, T. 4 S., R. 18 E., M. D. M., east of the Diltz mine. The vein which is in porphyry walls is 2 feet wide and has a strike of northwest and southeast and dips northeast. Only assessment work is being done.

Champion Quartz Mine. Consists of one unpatented claim owned by G. E. Dunbar of Mariposa, and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 22½ miles by wagon road from Bagby. The quartz vein averages 4 feet wide and has porphyry footwall and slate hanging-wall. Development consists of a shaft 9 feet deep, 188 feet of drifts, 3 levels and an air shaft 60 feet to surface. No equipment remains on the property. Only assessment work is done.

Cohen Quartz Mine. Consists of one patented claim owned by a man by the name of Cohen and is situated in Sec. 33, T. 4 S., R. 18 E. The claim was patented in 1912, but has not been worked for some time. Very little information could be obtained about the mine.

Colorado Quartz Mine. Consists of three claims, one of which is patented, owned by P. W. Judkins, C. H. Weston and I. L. Dearborn of Mariposa and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 22 miles by wagon road from Bagby. The vein is a true fissure vein with

Colorado Gold Quartz Mine on Long Gulch Creek, Whitlock mining district, Mariposa County, California.

slate walls and averages 2 feet in width. The development consists of an adit level 500 feet long, an air raise 119 feet long and a second raise 75 feet long, also a winze 14 feet deep. There is one stope 120 feet long and 35 feet high. The equipment consists of a gasoline hoisting engine, 4 ore cars, drill steel, 10-stamp mill, rock crusher, Challenge feeders, two 5′ x 10′ amalgamating plates, 2 tables, 2 vanners, and a blacksmith shop. There is also an assay office, change house, bunkhouse, office, storeroom, and dwelling house. There is a surface tramway from the mill to the wagon road above. This mine was being developed at the time it was visited.

Colorado Quartz Claim. Consists of two claims, one of which is patented, owned by P. W. Judkins, C. H. Weston and I. L. Dearborn of Mariposa and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 30 miles by wagon road from Bagby. Fissure vein in slate is 2 to 6 feet wide. The development consists of a 500-foot adit level, 140-foot raise to surface, another 65-foot raise and 13-foot winze. One stope 300 feet long. Equipment consists of 3 ore cars, tools and blacksmith shop. There are also a Gates rock crusher, 2 Gates tables, 2 vanners, assay office, bunkhouse, and superintendent's house. There are 5 gas engines all told for the plant. The mine is working most of the time.

Comet Gold Mine. Consists of three unpatented claims owned by the Comet Mining and Milling Company of Kansas City, Mo., and located in Sec. 22, T. 4 S., R. 19 E., M. D. M., 15 miles by wagon road from the town of Mariposa. The quartz vein averages 2½ feet wide and has a granite footwall and slate hanging-wall. The development consists of two adit levels in which 785 feet of drifts have been run, also 100 feet of crosscut, two raises, one 40 feet and one 168 feet and one winze 45 feet deep. The equipment consists of 3 iron ore cars, drill steel, ventilating pipe, 10-stamp mill, Blake rock crusher, Challenge feeders, 2 amalgamating plates, 4′ x 12′ Deister tables and clean-up frame. There is also a sawmill and 45 h.p. boiler for the same, and overshot water wheel for the ventilating fan. The steam is piped 300 feet in naked pipe to the stamp mill. The buildings include bunkhouse, office, residence, storehouse, assay office and cookhouse. The mine was not working at the time it was visited, but was being examined.

Compromise and Eubank Quartz Mine. Consists of 40 acres owned by J. A. Flink and R. C. Haywood and located in Secs. 30 and 31, T. 2 S., R. 18 E., M. D. M., 30 miles from the railway. The vein averages 2 feet in width between hard slate walls. The development consists of a shaft 350 feet deep, 100-foot winze, and three levels each 100 to 700 feet long. The property has been idle for thirty years and has recently been bought by the present owners from P. J. and W. W. Hilliard.

Cranberry Quartz Mine. Consists of one patented claim and a mill site owned by A. H. Ward of 53 Stevenson street, San Francisco, located in Sec. 15, T. 3 S., R. 19 E., M. D. M., on the Yosemite Valley Railroad. The vein is 3 to 6 feet wide, and is a fissure vein in slate walls. The development consists of 410 feet of shaft and winze, 1240 feet of drifts, winze 300 feet deep and a raise 460 feet long. There is no equipment on the property at present. It has not been worked for twenty years.

Crown Lead Gold Mine. Consists of one patented claim owned by the estate of Mary P. MacCrellish; W. P. Edwards, manager, of Alameda, and located in Secs. 26 and 36, T. 3 S., R. 16 E., M. D. M., on the Yosemite Valley Railroad. The vein is 10 feet and has a serpentine footwall and slate hanging-wall. The development consists of a 50-foot incline shaft and a 25-foot tunnel. There is no equipment on the property and the underground works have caved. The property was under bond, but it expired July 1, 1914.

Crown Peak Quartz Mine. Consists of one patented claim owned by the estate of Mary P. MacCrellish and located in Sec. 36, T. 3 S., R. 16 E., M. D. M., at Kittridge on the Yosemite Valley Railroad. There are two veins averaging 7 feet in width and having serpentine footwall and slate hanging-wall. The development consists of a 45-foot incline shaft and a 50-foot open cut. There is no equipment on the property. It was under bond but it expired July 1, 1914. The mine has not been worked for many years.

Diltz Quartz Mine. Consists of two claims, one of which is patented, owned by S. J. Harris and wife of Jerseydale, and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., 3 miles by road and 5 miles by trail to Briceburg. The vein is 20 inches wide and has diorite footwall and slate hanging-wall. The development consists of a 30-foot drift and one adit level, also a 60-foot crosscut and winze 22 feet deep. The equipment consists of one small skip, one hand pump, 22 feet of 1½-inch water pipe, and a blacksmith shop. Some work has been done the past summer by the Mariposa Mines Development Company.

Early Quartz Mine. Consists of one unpatented claim owned by the August Revel estate and Eli Revel, and located in Sec. 27, T. 4 S., R. 19 E., M. D. M., 6 miles south of North Fork on the Yosemite Valley Railroad. The vein is from 3 to 6 feet wide in granite walls. The development consists of one adit level 800 feet long, one 40-foot crosscut tunnel and one stope 800 feet in length by 150 feet high. Equipment consists of a 10-stamp mill run by a 25 h.p. steam engine, one boiler, one amalgamating plate, 4 feet by 8 feet. The workings have caved and the mine is not working.

Elizabeth Quartz Mine. Consists of patented claims owned by the Mariposa Commercial and Mining Company, Alaska Commercial Building, San Francisco, and located in Sec. 5, T. 5 S., R. 17 E., M. D. M., on the Mariposa Grant, 16 miles by wagon road from Merced Falls. The vein averages 6 feet in width and has a slate footwall and diabase hanging-wall. The development consists of a 100-foot incline shaft and 100 feet of drifts, also one stope. The equipment consists of hoisting engine, one 40 h.p. boiler, ore car and blacksmith shop. This property has been worked by leasers only but has been closed since 1911.

Emma Quartz Mine. Consists of one unpatented claim owned by Marcus Shinskie, and located in Sec. 36, T. 3 S., R. 19 E., M. D. M., about five miles from the wagon road to Hites Cove. The vein swells and pinches and has a diorite footwall and slate hanging-wall. The development consists of a 90-foot tunnel and two other tunnels that have caved, also two 50-foot raises and a winze 4 feet deep. There are three stopes. There is practically no equipment on the property and it is now idle.

Farmers' Hope Quartz Mine. Consists of seven quartz claims (one patented), two placer claims, and a mill site owned by G. L. Kennedy of Mariposa, and situated in Sec. 29, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. There are three veins, one contact with mariposite footwall and porphyry hanging-wall. The development consists of two shafts and 1125 feet of drifting, one crosscut 385 feet long, 440 feet of raises and a 35-foot winze. The equipment consists of a gasoline hoist, one skip, 5-stamp mill, rock crusher, mill feed, one Frue vanner, one amalgamating plate 4′ x 10′, one 10 h.p. engine and one 12 h.p. boiler. The mine is not working at present and is for sale.

Feliciana Quartz Mine. Consists of one patented claim owned by J. B. Campbell of Mariposa and located in Secs. 12 and 13, T. 4 S., R. 18 E., M. D. M., 5 miles southeast of Briceburg by trail. The vein is from 2 feet to 6 feet in width and has slate walls. The development consists of a 700-foot tunnel, 600 feet of drifts, 400-foot crosscut, two winzes—one 40 feet and the other 55 feet deep. There is also a stope 700 feet long and 650 feet to the surface. The equipment is about all gone, only some grinding pans being left. The mine has not been worked for thirty years.

Geary Quartz mine. Consists of one claim, unpatented, owned by Mrs. Potter and located in Sec. 30, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road from Bagby. The vein averages 3 feet wide and has a slate footwall and porphyry hanging-wall. The development consists of an incline shaft 100 feet deep and 325 feet of drifting. There is no equipment on the property and the mine is idle.

Gray Eagle Quartz Mine. Consists of two unpatented claims owned by B. C. Gruby of Coulterville and located in Sec. 30, T. 3 S., R. 17 E., M. D. M., 3 miles from Bagby by wagon road. The dike of porphyry consists of a 133-foot shaft, 355 feet of drifts, 300-foot crosscut tunnel and two stopes—one 60 feet by 40 feet and the other 60 feet by 35 feet high. The shaft has a double compartment and there is only one ore car and windlass on the ground. Mine is under bond and work is supposed to begin on August 1, 1914.

Golden Gate Group. Consists of three unpatented claims and a five-acre mill site owned by Chas. A. Schlaguerty of Mariposa and located in Secs. 18 and 19, T. 4 S., R. 17 E., M. D. M., 7 miles by wagon road from Bagby. The vein is from 3 to 6 feet in width and has a mariposite footwall and a slate hanging-wall. The development consists of a 210-foot shaft, an adit level 250 feet long, 250-foot crosscut and a 20-foot raise. There is only some drill steel and a small skip together with a blacksmith shop and a shed over the collar of the shaft. The mine is not working at present.

Greens Gulch Quartz Mine. Consists of one patented claim, owned by the Mariposa Commercial and Mining Company and located in Secs. 12 and 13, T. 5 S., R. 17 E., M. D. M., on the Mariposa Grant, 12 miles by wagon road from Bagby. The vein averages 3 feet in width and has slate walls. The development consists of a 300-foot shaft, 550-foot adit level, 870 feet of drifting, crosscut 200 feet long and about 250 feet of raises. There is one stope 200 feet long and 200 feet high. The equipment consists of a hoist, bucket, water skip, 2 machine drills, compressor, 2 pumps and an air receiver. The mine is under lease at present and power is supplied from the Princeton mine.

Guadaloupe Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 32, T. 5 S., R. 18 E., M. D. M., 17 miles by wagon road from Bagby. The average width of the vein is 18 inches and the walls are granite. The development consists of a 250-foot tunnel, but could not find out what had been done in the way of drifting. The mine has no equipment and has not been worked by the company for years. Two leasers are now working the property.

Guest Quartz Mine. Consists of one claim on unpatented farm land and is owned by J. W. Guest, located in Sec. 35, T. 4 S., R. 16 E., M. D. M. The vein is 2 to 8 inches wide in slate walls. There is a shaft 50 feet deep and the equipment consists of a gas engine hoist, one ore car, skip and a pump. Only assessment work is done.

Herman Quartz Mine. Consists of two unpatented claims owned by George Herman of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M. The vein is said to average 10 feet in width and to have porphyry walls. The development consists of a tunnel, 210 feet of drifts, one shaft 30 feet deep and an air shaft 150 feet deep. Only a windlass and bucket comprise the equipment. Only assessment work is being done.

Hite Mine. Consists of one placer and 15 quartz claims owned at present by J. S. Spellman of 244 Kearny street, San Francisco, and located in Sec. 27, T. 3 S., R. 19 E., M. D. M. The veins average 4

feet in width and are in diorite hanging-walls and footwalls. The development consists of a shaft 330 feet deep and there are three levels and nine adit levels. The total drifting could not be obtained. There are some winzes and raises and a stope 800 feet long by 100 feet high. Most of the $2,000,000 taken from this mine has been extracted from near the surface. The equipment consists of an air hoist, several machine drills, air compressor, drill steel, skip, station pump, 10-stamp

Hite Gold Mine on the south fork of the Merced River, Mariposa County, California.

mill, 3 tables, Challenge feeders, 2 amalgamating plates and a cyanide plant. The mine has been closed down since 1882. There are several buildings; in fact, the mine is thoroughly equipped and also has a flume 500 feet long and takes water from the south fork of the Merced River. Idle at present and a caretaker on the property.

Josephine Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 16, T. 4 S., R. 17 E., M. D. M., 3 miles by wagon road to Bagby. The vein averages 6 feet in width and has slate walls. The development consists of a shaft 500 feet deep, 2518 feet of

drifts, 710 feet of crosscuts, 400 feet of raises and a stope 500 feet long and 200 feet high.

The equipment consists of three mine cars, compressor, drills, drill steel, blacksmith shop, 30 h.p. motor; in fact, a complete mine equipment with buildings and hydroelectric power from their plant on the Merced River. Leasers are now working the mine. This mine is one of the largest belonging to this company.

Kane Quartz Claim. Consists of one unpatented claim, formerly called the Mayflower, owned by C. N. Kane of Mariposa and located in Sec. 2, T. 5 S., R. 19 E., M. D. M., between the Mt. Buckingham and the Golden Eagle. There are two tunnels, 60 and 140 feet long, respectively, and a 30-foot winze. There is no equipment. Only assessment work is being done.

Kennedy-Milburn-Allerd Quartz Claims. Consists of three unpatented claims owned by C. L. Kennedy, W. H. Milburn and Lawrence Allerd of Mariposa and located on the south fork of Chowchilla River, 2 miles east of Indian Peak, one half mile south of Nelson's Cove and 12 miles from Raymond in Madera County. The vein has a northeast and southwest strike and is about 9 feet wide. There is no wagon road to the claims and the development consists of a 40-foot adit level. Only assessment work is being done. Located in May, 1914.

Landrum Quartz Mine. Consists of two unpatented claims owned by Simeon Landrum and located in Secs. 34 and 35, T. 4 S., R. 18 E., M. D. M., 6 miles by trail from Briceburg. The vein averages 2 feet in width and has a limestone and talc footwall and a porphyry hanging-wall. The development work consists of a shaft 90 feet deep and 825 feet of drifts. The equipment consists of a gas engine, bucket and windlass. There are two cabins and a blacksmith shop. Only assessment work is being done.

Little Bear Quartz Mine. Consists of one unpatented claim owned by Pete Gordan of Mariposa and located in Sec. 19, T. 4 S., R. 19 E., M. D. M., 26 miles by wagon road from Bagby. The vein averages 2 feet wide and has a slate footwall and granite hanging-wall. The development consists of a 12-foot shaft. There is a cabin on the property, but nothing else. Only assessment work is being done.

Live Oak Quartz Mine. Consists of three unpatented claims owned by George Trede of Briceburg and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., one half mile by trail from Saxon Creek station on the Yosemite Valley Railroad. The vein is about 20 inches wide and has a greenstone footwall and a slate hanging-wall. The development consists of 4 shafts, 20, 30, 40, and 80 feet deep, respectively, and a crosscut tunnel 200 feet long. The equipment consists of one half mile of ditch,

16-foot arrastra, 2-stamp mill, Pelton wheel, blacksmith shop, tools, boarding house, bunk house and gravity tramway. The mine is not working at present.

London Quartz Mine. Consists of one claim, unpatented, owned by Albert Austin and L. E. Austin of Whitlock and located in Sec. 30, T. 4 S., R. 18 E., M. D. M., 25½ miles by wagon road from Bagby. The vein has an average width of 22 inches and the walls are porphyry. The ore is base, carrying copper with the gold values. The development work consists of a 30-foot incline shaft and a 16-foot drift. Only a windlass and wheelbarrow comprise the equipment. The owners are working at present.

Long Mary Quartz Mine. Consists of patented land on the Mariposa Grant owned by the Mariposa Commercial and Mining Company and located in Sec. 17, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road from Merced Falls. The vein is 2 feet wide with slate walls. The development consists of a 413-foot shaft, 1480 feet of drifts, drain tunnel 263 feet long, and 905 feet of raises. There is one stope 350 feet long by 400 feet high. The equipment consists of a hoist, 50 h.p. boiler, headgear, blacksmith shop, 5-stamp mill, rock crusher, Challenge feeder, two Union tables and an amalgamating plate. Not working at present.

Louis Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located in Sec. 11, T. 5 S., R. 17 E., M. D. M., 12 miles by wagon road from Bagby. The vein averages 4 feet in width and has slate walls. The development consists of a 400-foot shaft, 924 feet of drifts, adit level 350 feet long, 115-foot crosscut, 150 feet of raises and a 30-foot winze; also a stope 80 feet long. There is no equipment on the property at the present and the property is idle.

Louisa Quartz Mine. Consists of one unpatented claim owned by August Revel and Eli Revel of Sweetwater and located in Sec. 27, T. 4 S., R. 19 E., M. D. M., 6 miles by trail from South Fork station on the Yosemite Valley Railroad. The vein is 4 feet wide between granite walls. The development consists of a 16-foot shaft and some trenches on the surface. There are also two adit levels 50 and 60 feet long, respectively. There is no equipment and only assessment work is being done.

Louise Quartz Mine. Consists of claims owned by the Merced Mining Company of Boston, Mass., and located in Sec. 4, T. 3 S., R. 16 E., M. D. M., in the Coulterville mining district. There are three levels and a vertical shaft 375 feet deep, 850 feet of drifts, 775 feet of crosscuts, 150-foot air shaft, 600 feet of winze. This mine has been idle for a number of years and not much information could be found about it.

Lovely Rogers Quartz Mine. Consists of one patented claim and one unpatented claim owned by Shimer Brothers of Coulterville and located in Sec. 11, T. 3 S., R. 17 E., M. D. M., 16 miles by road from Bagby. The vein is 2 feet wide in slate walls. The development consists of a 100-foot shaft and 3 adit levels, 400, 300, and 250 feet long, respectively; also a 70-foot crosscut and a winze 80 feet deep. There is one stope 200 feet long and 80 feet high. There is no equipment. Only development work is being done.

Malivina Quartz Mine. Consists of one claim belonging to the Merced Gold Mining Company of Boston, Mass. The development consists of a vertical shaft 1000 feet deep, one incline shaft on the vein 875 feet deep, 2287 feet of drifts and 1225 feet of crosscuts. The milling is done on the adjoining Potosi mine owned by the same company. The equipment consists of a hoisting engine and building and head frame. The ore was trammed by mule team to the Potosi mill. Idle at present.

Malone Quartz Mine. Consists of five unpatented claims owned by the Golden Wreath Mining Company of San Francisco and located in Sec. 5, T. 5 S., R. 19 E., M. D. M., 28 miles by wagon road from Bagby. The vein ranges in width from 3 inches to 1 foot, between granite walls. The development consists of a 150-foot shaft, 600 feet of drifts, one adit level and a 600-foot crosscut tunnel. There is a stope 300 feet long, and 90 feet high. The equipment consists of a skip, 20 h.p. engine, 25 h.p. hoist engine, 80 h.p. boiler, 10-stamp mill, Golden State rock crusher, 2 Challenge feeders and 2 amalgamating plates. There is a dwelling house, blacksmith shop, boarding house, and bunkhouse. The mine had just started its plant at the time it was visited.

Mariposa Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company of San Francisco and located in Sec. 23, T. 5 S., R. 18 E., M. D. M., 16 miles from Bagby by wagon road. The vein averages 5 feet in width and is in diabase walls. The development consists of a 1550-foot shaft, 5757 feet of drifts on the 8 levels, 800 feet of crosscuts, 1000 feet of raises and about 100 feet of winzes. All the ground is stoped from the eighth level to the surface with a width of 500 feet. The equipment consists of a reduction plant, namely, 5-stamp mill, Challenge feeder, 4′ x 12′ plate, compressor, hoist, one 75 h.p. and one 10 h.p. motor, blacksmith shop, machine shop, tools and machine drills. All underground equipment has been removed to the surface as the mine is caving. When the mine was visited a roasting furnace and cyanide plant was being completed to treat some concentrates lying on the mine. This plant is to be operated by leasers. The mine is idle and formerly used to be one of the large producers of the county.

Mary Harrison Quartz Mine. Consists of one claim owned by the Merced Gold Mining Company of Boston, Mass., and located in Secs. 10 and 11, T. 3 S., R. 16 E., M. D. M., 9 miles from Pleasant Valley by wagon road. The vein averages 2 feet in width and lies between slate walls. The development consists of a 1200-foot shaft; on the 12 levels there are 4800 feet of drifts, 700 feet of crosscuts, an incline shaft 600 feet deep, 540 feet of winzes and some raises that have been stoped out. There are many stopes of various dimensions. The equipment consists of a fine boiler house with boilers, engine house and hoisting engine, stone office building, storehouse and all kinds of machinery parts and hardware, also rock crusher and bins. The ore was crushed and hauled by tram over a narrow gauge track to the Potosi mill which is owned by the same company. This property, which was formerly one of the large producers of the county, has not been worked for some years. A caretaker remains on the property.

Mebold Quartz Mine. Consists of one unpatented claim owned by Fred Mebold of Jerseydale and located on Sweetwater Creek, northwest of the Sweetwater mine. It has a 50-foot crosscut tunnel and a few feet of drifts. The vein is 2 feet wide and in granite walls. Not working at present.

Merced River Quartz Mines. Consists of 13 unpatented claims owned by R. A. Keller and the James Burns Company and located in Secs. 15, 16 and 22, T. 3 S., R. 16 E., M. D. M., one half mile from the Yosemite Valley Railroad. The vein is from 1 to 4 feet in width. The development consists of a 100-foot shaft with two levels and 210 feet of drifts. Another shaft is 90 feet deep. There is one crosscut 230 feet long. The equipment consists of a 10-stamp mill which is not erected, 2 rock crushers, 25 h.p. gas engine, boarding house, bunk house, and dwelling house. Not working at present.

Mocking Bird Quartz Mine. Consists of one patented claim owned by J. A. Schroeder and C. J. Schroeder of Mariposa and located in Sec. 27, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. The vein averages 3 feet in width, with porphyry footwall and slate hanging-wall. The development consists of a 100-foot shaft and 100 feet of drifts. Blacksmith shop, drill steel, bucket, windlass and cabin complete the equipment. Only in a prospect condition and a little work is done each year.

Monte Cristo Group. Consists of four unpatented claims owned by F. M. Skilton and L. C. Worthington of Jerseydale and located in Sec. 20, T. 4 S., R. 20 E., M. D. M., 13 miles by wagon road and trail from the forks of Merced River and 3 miles by trail from the Comet mine. The quartz vein averages 6 feet wide, as far as opened up, and

carries some arsenic and antimony with the values. There are: 65-foot incline shaft and several open cuts in the way of development, but there is no equipment outside of a cabin, blacksmith forge, windlass and bucket. This property was idle at the time it was visited but an examination had been made and the engineer took his report to New York to try to sell the property.

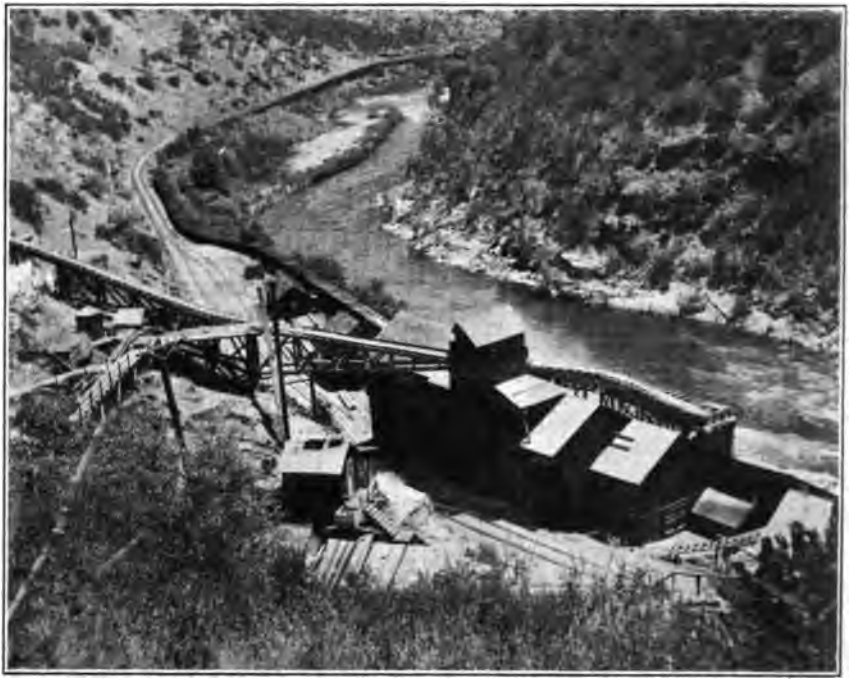
Mountain Belle Quartz Mine. Consists of one patented claim owned by J. P. Crichton of San Francisco and located in Sec. 25, T. 5 S., R. 17 E., M. D. M., 14 miles by wagon road from Bagby. The vein averages 3 feet wide in quartz porphyry walls. The development includes a 174-foot incline shaft and 100 feet of drifting on the two levels. The equipment consists of a 10 h.p. gasoline engine, an amalgamating plate 4′ x 10′, one Union concentrator, 15 h.p. gasoline engine for the mill drive and a Blake rock crusher. The buildings include a boarding house. Nothing has been done on the claim since 1908.

Mt. Buckingham Group. Consists of eight quartz claims, 2 mill sites and 169 acres of timber land. Twenty acres of the quartz claims are patented and the 169 acres of timber are also patented. These claims are owned by the Mt. Buckingham Gold Mining Company of Mariposa and are located in Secs. 1, 2, 11 and 12, T. 5 S., R. 19 E., M. D. M., 13 miles from Briceburg by wagon road. There are five contact veins with granite footwall and slate hanging-wall and the widths range from 2 feet to 10 feet. The development consists of a 500-foot crosscut tunnel, 250-foot raise and 30-foot winze. There are two stopes—one 40 feet long by 200 feet high and the other 60 feet long and 200 feet high. The equipment consists of three mine cars and hand drill steel. Not working but expect to begin soon. J. L. Diven in charge.

Mt. Gaines Quartz Mine. Consists of 14 claims owned by A. R. Maines, 439 Kingsley drive, Los Angeles, and located in Sec. 35, T. 4 S., R. 16 E., M. D. M., 14 miles by wagon road from Merced Falls. The vein pinches and swells into various widths and lies between diorite walls.

The development consists of an incline shaft 1350 feet long with 11 levels and 7840 feet of drifts and 250 feet of raises. There are two large stopes—one 340 feet long by 550 feet high and several smaller ones of irregular shapes. The equipment consists of a power line from the San Joaquin Power and Light Company's line to the property, hoisting equipment by air or steam, 2 boilers, one 10-machine compressor, 9 machine drills, pipe, skip, 5 pumps, including sinking pump, 20-stamp mill, rock crusher, Challenge feeders, 4 amalgamating plates and 8 concentrators. There are also blacksmith shop, store room, office, cook house, 2 bunk houses, assay office, 4 cabins, transformer house, sulphuret house, boiler house, compressor building, 4 cottages and superintendent's house. The mine closed down in 1910 and has not worked since.

Mountain King Quartz Mine. Consists of 12 claims owned by the Mountain King Mining and Milling Company of 244 Kearny street, San Francisco, and located on the north bank of the Merced River on the Yosemite Valley Railroad in Sec. 31, T. 3 S., R. 18 E., M. D. M. The veins of quartz and slate average 5 feet in width and lie between slate walls. The development consists of 5 levels with 5200 feet of drifts, 1550 feet of crosscuts, 70 feet of winzes and 700 feet of raises. There is also a stope 200 feet long by 600 feet high.



Mountain King Mine, mill and ditch line on the Merced River, Mariposa County, California.

The equipment consists of 10 ore cars, 4 machine drills, drill steel, blacksmith shop, timber shed, 34-stamp mill, Blake crusher, 2 amalgamating plates, 2 Challenge feeders, 6 Standard tables, flume 1000 feet long, 2 Victor turbines, Rix compressor, Gould triplex pump, office, bunk house, cook house, change house, assay office, foreman's office, superintendent's office and residence, and surface tramway. Ten stamps were working and 26 men were employed and 75 horsepower was being developed on the river in their power plant.

Mt. Ophir Quartz Mine. Consists of one patented claim located on the Mariposa Grant in Sec. 12, T. 5 S., R. 18 E., M. D. M., and owned by the Mariposa Commercial and Mining Company. It is 10 miles by wagon road from Bagby. The vein averages 5 feet in width and lies

between a serpentine footwall and a slate hanging-wall. The development consists of three adit levels with 1500 feet of drifts, 360 feet of raises, 80 feet of crosscuts and 20 feet of winze. There is a stope 200 feet long and 300 feet high. There is not very much equipment on the

Ruins of what is said to have been the first mint in California, at Mount Ophir, on the Mariposa Estate. Fifty-dollar slugs were minted here.

property other than the track and ore car. The high voltage power line from Bagby passes over the property. It was closed down in 1910 and some leasing has been done but is idle now.

Mt. Queen Quartz Claims. Consists of two unpatented claims owned by Daniel E. Johnson of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., in the Whitlock mining district. The vein averages 2 feet in width. There are five shafts, three of them being 85 feet, 60 feet, and 45 feet in depth. There is a cabin and a windlass on the claims. The claims are under bond to the Mariposa Mines and Development Company.

Mountain View Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located on the Mariposa Grant in Sec. 11, T. 5 S., R. 17 E., M. D. M., 10 miles by wagon road from Bagby. The vein averages 2½ feet in width and lies between slate walls. The development consists of two adit levels with 500 feet of drifting, 400 feet of crosscuts, 160 feet of raises and one stope, 50 feet long and 100 feet high. No equipment except the track. The ore was hauled to the Princeton mill by wagon. The mine has been closed for about a year. Was worked by leasers.

Number One Quartz Mine. Consists of one full claim owned by the Treasure Gold Mining Company of Hornitos and located in Secs. 34

and 35, T. 4 S., R. 16 E., M. D. M., 15 miles by wagon road from Merced Falls. The vein averages 3 feet in width with a slate footwall and diabase and porphyry hanging-wall. The development consists of a 360-foot shaft, three levels with 1150 feet of drifts, 130-foot crosscut and three stopes. The equipment consists of an electric hoist, 20-h.p. motor, skip, 2000 feet of rails, blacksmith shop, 10-stamp mill, 2 compressors, 2 motors, Challenge feeders, 2 amalgamating plates, 3 concentrators and a Johnson rock crusher. The buildings include a hoist building, assay office, store house, office and several small buildings. Power from the San Joaquin Power and Light Company. The mine has just been reopened.

Number Five Quartz Mine. Consists of two full claims and a half, unpatented, and owned by the Nevada Mineral Extraction Company of Berkeley, Cal., and located in Sec. 10, T. 5 S., R. 16 E., M. D. M., 13 miles by wagon road from Merced Falls. The vein of quartz varies from 17 to 30 feet in width and has a diorite footwall and a slate schist hanging-wall. The development consists of a 260-foot shaft, 110 feet of drifts, and a 427-foot crosscut. The equipment consists of an electric

Ore bins, crushing plant and amalgamating plant of the Number 5 Gold Mine, Hornitos mining district, Mariposa County, California.

hoist, Gardner compressor, 35 h.p. motor for compressor, 40 h.p. motor for hoist, 2 machine drills, 100 feet of mine rails, bucket, blacksmith shop, Cameron sinking pump, duplex Fairbanks pump, Parker Linn ball crusher and Parker Linn ball pulverizer, Parker amalgamating machine and 3 motors for crushers and grinders. The amalgamating plates are treated by chemicals before mercury is used on them. Mine was being equipped at time it was visited. The buildings include assay office, transformer house, and small buildings.

Old Wilcox Quartz Claim. Consists of one unpatented claim owned by A. H. Ward of San Francisco and located in Sec. 18, T. 3 S., R. 19 E., M. D. M., on the north bank of the Merced River. The vein lies between a granite footwall and slate hanging-wall. The development consists of a shaft that is supposed to be 110 feet deep and a tunnel 75 to 80 feet long. The claim has not been worked since 1862 and has no equipment.

Original Quartz Mine. Consists of four unpatented claims owned by the Original Mining and Milling Company of Merced, Merced County, and located in Sec. 21, T. 3 S., R. 19 E., M. D. M. The vein averages 2 feet in width between slate walls. The development consists of a 640-foot shaft, 4 levels with 2053 feet of drifts, 185-foot crosscut, 485 feet of raises, a winze 462 feet deep and three stopes. The equipment consists of a hydroelectric plant on the Merced River which has a Westinghouse 133 k.w. generator, 100 h.p. Ingersoll Rand air compressor, one 30-inch and one 20-inch Pelton wheel, undershot and low pressure. The ditch and flume are 3400 feet long and carry 6000 inches of water at 34-foot head. An electric hoist (30 h.p.), one skip, 3000 feet of 12-pound mine rails, 1500 feet of 8-inch ventilating pipe, 2-inch compressed air pipe, 10 machine drills, drill steel, etc., are also included in the plant.

The reduction equipment includes a 10-stamp mill, Blake rock crusher, 2 Challenge feeders, two 4′ x 6′ plates and three Gates vanners. The buildings include an office, 2 bunk houses, dining room, change room, assay office, blacksmith shop, concentrate house, 8 small residences, and 7 small tent houses. The mine and mill are lighted by electricity. About 40 men are employed at present.

Orra Rica Quartz Mine. Formerly called the Peñon Blanco, consisting of five patented claims owned by J. C. Wilson and associates of San Francisco and located in Sec. 20, T. 2 S., R. 16 E., M. D. M., about 7 miles by wagon road from the town of Coulterville. The vein is from 3 to 6 feet in width and has a slate footwall and diorite hanging-wall. The development consists of a tunnel 2050 feet long and some drifts. Very little information was to be had as the mine is in litigation and all information was withheld.

Pine Tree Quartz Mine. Consists of one patented claim located on the Mariposa Grant in Sec. 9, T. 4 S., R. 17 E., M. D. M., 3 miles by wagon road from Bagby and owned by the Mariposa Commercial and Mining Company. The vein averages 10 feet in width and has a slate footwall and serpentine hanging-wall. The development consists of a 380-foot shaft with 4 levels and 400 feet of drifts, 133 feet of crosscuts, 700 feet of raises; the pay shoot is stoped for a length of 500 feet and

to a height of 500 feet. The equipment consists of a 5-stamp mill called the Benton mill located on the Merced River at Bagby, 2 Union tables and two 20 h.p. motors. The ore is mined and hauled by wagon to Bagby. The mill has a Dodge crusher, Challenge feeder, amalgamating plate 5′ x 20′. The mine is now being worked by leasers.

Potosi Quartz Mine. Consists of one patented claim owned by the Merced Gold Mining Company of Boston, Mass., and located in Sec. 4, T. 3 S., R. 16 E., M. D. M., 9 miles by wagon road from Pleasant Valley on the Yosemite Valley Railroad. The vein is from 3 to 20 feet wide and has slate walls. The development consists of a shaft and 9 levels, 2500 feet of drifts, 2 air shafts, 50 feet of crosscut, 25-foot raise and a stope 100 feet long. The equipment is quite extensive and includes a power line of the Pacific Gas and Electric Company from the Orra Rica quartz mine, 11,433 feet long and a large motor not set up. There are also 3000 feet of track, shaft pump, ore cars and 2 rock crushers, 40-stamp mill, 16 Union Iron Works vanners, eight 4′ x 16′ amalgamating plates, Challenge feeders, blacksmith and machine shop with complete set of lathes and tools, boiler house and 4 boilers, compressors, hoisting engine, mill engine and engine for rock crusher. There are about 4 miles of narrow gauge track from the Mary Harrison mine to the Potosi mill, one 8-ton locomotive, twelve 3-ton ore cars, transformer house, change house, cook house, office, assay office, and several small buildings. The shaft was unwatered as far as the ninth level in 1912, when work ceased and the mine has been idle since.

Princeton Quartz Mine plant, belonging to the Mariposa Commercial and Mining Company of Mariposa County, California.

Princeton Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company of San Francisco, and located on the Mariposa Grant in Sec. 18, T. 5 S., R. 18 E., M. D. M., 12 miles by wagon road from Bagby. The vein averages 8 feet wide and has slate walls. The development consists of an incline shaft 1660 feet long with 8 levels, 11,418 feet of drifts, 1827 feet of raises and 1300 feet of crosscuts. The shoot is stoped from the 1200-foot level to the surface. All underground equipment has been removed from below. There is a 40-stamp mill, Challenge feeders, amalgamating plates, Union tables, machine shop, blacksmith shop, carpenter shop, assay office, store, saw mill, change house, five 50 h.p. boilers, machine drills and tools, powder magazine and transformer house, two 150 h.p. and one 100 h.p. compressors, three motors, Snow duplex pump, and a Cameron sinking pump. The mine is fully equipped but idle at present.

Quail Quartz Claims. Consist of four unpatented claims located in Sec. 16, T. 3 S., R. 17 E., M. D. M., in the California mining district, 9 miles by wagon road from Bagby. The vein averages 4 feet wide and has slate walls. The development consists of a shaft, one adit level, 600 feet of drifts, 3 raises and a stope 200 feet long by 70 feet high. The equipment consists of 900 feet of rails, 3 ore cars, Park and Lacey duplex compressor, hoist and blacksmith shop. There are also 10-stamp mill, 2 rock crushers, 40 h.p. engine and 50 h.p. Nagle boiler. Not working at present.

Recorder Quartz Mine. Consists of one unpatented quartz claim owned by Frank Armstrong and Isaac Miller of Briceburg and located in Sec. 28, T. 4 S., R. 18 E., M. D. M., 22 miles by wagon road from Bagby. The vein averages one foot in width and lies between porphyry walls. The development consists of one adit level with 200 feet of drifting. There is a cabin on the mine. Only assessment work is done.

Reed Quartz Claim. Consists of a quartz ledge located on 154 acres of patented farm land in Secs. 28 and 33, T. 2 S., R. 16 E., M. D. M., and owned by Mrs. J. W. Reed. Only small prospect holes have been sunk.

Revel Quartz Mine. Consists of one unpatented claim owned by August Revel and Eli Revel of Sweetwater and located in Sec. 28, T. 4 S., R. 19 E., M. D. M., 6 miles by trail from North Fork station on the Yosemite Valley Railroad.

The vein averages 2 feet in width and lies between granite walls. The development consists of a 150-foot shaft, one level with 700 feet of drifts, 30-foot crosscut and a stope 800 feet long and 150 feet high. There is one ore car and some track on the property. The property is not working at present. The drifts have caved.

Roma Quartz Mine. Owned by the Harris Estate and situated in Sec. 14, T. 4 S., R. 18 E., M. D. M. The vein is 2 feet wide and there is a 1000-foot tunnel. It closed down 25 years ago and very little information could be found about it.

Royal Group. Consists of six unpatented claims and a fraction owned by Tresidder, Bains and Tresidder of Mariposa and located in Sec. 29, T. 4 S., R. 18 E., M. D. M. There are a shaft 75 feet deep, 200 feet of drifts and a 30-foot winze. The vein ranges from an inch to 18 inches in width and lies in porphyrite formation. Only assessment work is done.

Rutherford Quartz Mine. Consists of one patented claim owned by A. H. Ward of San Francisco and located in Sec. 22, T. 3 S., R. 19 E., M. D. M. The vein is 4 feet wide and the development consists of a 460-foot adit level and an 80-foot raise, also a stope 60 feet long by 80 feet high. There is no equipment on the property and no work has been done for 20 years.

Ruth Pierce Quartz Mine. Consists of two claims on patented agricultural land owned by the Hornitos Gold Mining Company of 127 Montgomery street, San Francisco, and situated in Sec. 13, T. 5 S., R. 16 E., M. D. M., 4 miles by wagon road from Hornitos. The vein averages about 3 feet in width and the development consists of a 550-foot shaft, part vertical and part incline, with 6 levels and 2272 feet of drifts. There is one stope 330 feet long by 375 feet high. The equipment consists of a 15 h.p. gasoline hoist, skip, mine track, boiler, 4-machine compressor, 4 machine drills, blacksmith shop, 10-stamp mill, Challenge feeders, two amalgamating plates 5 feet wide by 16 feet long, and two Frue vanners. The mine was taken over by the present company in May, 1913, and is now being put in shape to develop.

San Domingo Quartz Mine. Consists of one unpatented claim owned by Wm. Zeller of Escalon, near Stockton, and located in Sec. 13, T. 4 S., R. 18 E., M. D. M., 29 miles by wagon road from Bagby. The vein is 2 feet wide and has a slate footwall and a granite hanging-wall. The equipment consists of a 400-foot tunnel, 180-foot air shaft, several winzes and some raises. There are 180 feet of mine rails, one ore car, drill steel and a blacksmith shop. Only assessment work is being done.

Schroeder Group. Consists of 4 quartz claims and one placer claim owned by J. A. Schroeder, P. W. Judkins and C. H. Weston and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., 2 miles by trail from Saxon Creek station on the Yosemite Valley Railroad. The vein varies from a few inches to 3 feet in width, and has porphyry footwall and slate hanging-wall. The development consists of an open cut 200 feet long and 30 feet deep and 375 feet of drifts. The equipment consists of

300 feet of track, 4 ore cars, blacksmith shop, and derrick. This is only a prospect and some work is now being done.

Sierra Rica Quartz Mine. Consists of two claims, one of which is patented, owned by M. A. Wilson and J. M. Graham of San Jose, located in Sec. 14, T. 4 S., R. 18 E., M. D. M,, 24 miles by road from Bagby. The vein averages 1½ feet in width and has porphyry footwall and slate hanging-wall. The development consists of a 300-foot tunnel on one claim and a 100-foot tunnel on the other, one 125-foot raise and one 60-foot raise. The equipment consists of 2 mine cars, tools, drill steel and a blacksmith shop. There are 4-stamp mill, Challenge feeders, rock crusher and one amalgamating plate 4 feet by 8 feet. There are two miles of ditch, one boiler and engine, a boarding house and two dwellings. Not worked at present.

Silver Lead Quartz Mine. Consists of three patented claims owned by the Mariposa Mining and Milling Company of Carson, City, Nev., and located in Sec. 34, T. 4 S., R. 16 E., M. D. M., 12 miles by wagon road from Merced Falls. The development consists of a 240-foot shaft and 422 feet of drifts. The equipment consists of an air hoist, compressor, 75 h.p. motor, sinking pump, gas engine, 5-stamp mill, rock crusher, Challenge feeder, one 4′ x 16′ amalgamating plate, 2 concentrators and two small motors—one 10 h.p. and the other 20 h.p. There is a boarding house, blacksmith shop, and a barn on the mine. Twelve men were being employed at the time the mine was visited.

Spencer Quartz Mine. Consists of a patented fraction of a claim owned by Ada Harris and located in Sec. 29, T. 4 S., R. 18 E., M. D. M., 23 miles by wagon road from Bagby. The vein averages 5 feet in width and has a diorite footwall and slate hanging-wall. The development consists of a 150-foot shaft, air shaft 150 feet long, 500 feet of drifts, 220 feet of crosscut, 50-foot winze, and a stope 350 feet long and 150 feet high. The equipment consists of one ore car, hand pump, drill steel and blacksmith shop. The mine is under bond to the Mariposa Mining and Development Company for six months.

Spread Eagle Quartz Mine. Consists of two unpatented claims owned by Nick Mullins of Whitlock and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 19 miles by wagon road from Bagby. The vein averages 2 feet in width and has porphyry walls. The development consists of a 210-foot shaft with 2 levels and 1800 feet of drifts. Adit level is 1000 feet long. There are one 200-foot crosscut, some winzes and raises, also some old stopes. The equipment consists of 2000 feet of mine rails, 2 ore cars, hand drills and 2 blacksmith shops. The mine is being leased.

Squirrel Mine (see *Bunker Hill*).

Stockton Creek Quartz Mine. Consists of one patented claim owned by the Mariposa Commercial and Mining Company and located in Sec. 24, T. 5 S., R. 18 E., M. D. M. The vein is about 2½ feet wide with diabase walls. The development consists of a 135-foot incline shaft with 2 levels and 550 feet of drifts and a stope 100 feet long by 70 feet high. The equipment includes a hoist, 5 h.p. dynamo, 200 feet of mine rails and a blacksmith shop. Not working at present.

Stud Horse Flat Group. Consists of three unpatented claims and a millsite owned by John P. Carroll of Bagby and located in Sec. 35, T. 3 S., R. 16 E., M. D. M., 3 miles from Bagby by trail. The vein is from 3 to 6 feet wide and has a slate footwall and porphyry and diorite hanging-wall. The development consists of a 150-foot shaft with 2 levels and 300 feet of drifts, 70 feet of old shafts and 80 feet of tunnels and a stope 250 feet long and 60 feet high. The equipment consists of a 5-stamp mill which has not yet been set up. Three men are employed sinking.

Sunshine Group. Consists of five quartz claims and one placer claim owned by Mrs. J. L. Divens, 147 Kempton avenue, Oakland, and located in Secs. 19 and 20, T. 4 S., R. 18 E., M. D. M. The veins vary from 1 foot to 3 feet in width and have poryhyry footwall and slate hanging-wall. The development consists of a 100-foot incline shaft, 280 feet of drifts, a 100-foot raise and a stope 140 feet long which is stoped to the surface. The equipment consists of 380 feet of mine rails, two skips, one mine car, drill steel and tools, gasoline hoist, 200-ton ore bin, and one Chilian mill. The power is from steam supplied from an adjoining mine. The mine is under bond to the Mariposa Mines and Development Company and not working at present.

Sweetwater Quartz Mine. Consists of seven quartz claims owned by the Midway Mining and Milling Company and located in Secs. 17 and 20, T. 4 S., R. 19 E., M. D. M., 38 miles by wagon road to Bagby. The vein averages 2½ feet wide and has granite walls. The development consists of a 100-foot shaft, 1500 feet of drifts, 240 feet of raises, one 6-foot winze, 600-foot crosscut tunnel and four stopes of various sizes. The equipment consists of 2300 feet of mine track, 2 iron skips, Cameron pump, 1 Blake rock crusher, Cornish rolls, 10-stamp mill, 2 amalgamating plates 4′ x 16′, two Johnson vanners, 1 Standard table, 1 Pindar table, 1 compressor, 2 boilers, 4 machine drills, boarding house, blacksmith shop, concentrate house and bunkhouse. The mine is bonded to J. L. McAllister and Mrs. E. McKeith and no work is being done at present.

Tyro Quartz Mine. Consists of one patented claim, the owner of which is unknown, and located in Secs. 9 and 10, T. 3 S., R. 16 E.,

M. D. M. The vein is 2 feet wide and has slate walls. The development consists of a 700-foot shaft, with 6 levels and 1370 feet of drifts, a 60-foot raise and a stope 80 feet long by 700 feet high. The equipment includes 1 skip, Cornish pump, Cameron steam pump, 10-stamp mill, rock crusher, 2 Challenge feeders, 2 amalgamating plates, 4′ x 12′, 3 Frue vanners, 2 boilers, 8 h.p. each, steam hoisting engine for mill, blacksmith shop, caretaker's house and a large oil tank and water tank. The mine is idle at present.

Virginia Quartz Mine. Consists of four claims, one of which is patented, owned by the White Gulch Mining Company of 263 Twelfth street, Oakland, and located in Secs. 13 and 18, T. 3 S., R. 16 E., M. D. M., 8 miles by wagon road from Bagby. The vein varies from a seam to many feet and has a serpentine footwall and diabase hanging-wall. The development consists of a 650-foot shaft with four levels and 250 feet of drifts, several crosscuts, about 350 feet of raises and 250 feet of winzes. There are two stopes—one 100 feet long by 150 feet high, and the other 100 feet long and 60 feet high. The equipment includes about 2000 feet of mine track, 2 ore cars, 700 feet of 3-inch compressed air pipe, 300 feet of 2-inch compressed air pipe, a Fairbanks-Morse hoist and 35 h.p. motor, 20 cubic foot skip, 200 feet of 2-inch pump column, 10-stamp mill, 2 Challenge feeders, Blake rock crusher, 2 amalgamating plates and a 50 h.p. gas engine. There are also 50 h.p. Ingersoll-Rand compressor, 3 miles of power line, blacksmith shop, bunkhouse, timber shed, cookhouse, office, transformer house, and superintendent's house. The mine has been operated by this company since 1912 and employs 15 men. C. C. Powning, superintendent.

White Oak Quartz Claim. Consists of one unpatented claim owned by A. H. Ward of San Francisco, and located in Sec. 18, T. 3 S., R. 19 E., M. D. M. The vein is 2 feet wide and has a granite footwall and slate hanging-wall. The development consists of a shallow prospect shaft, one tunnel 450 feet long in granite. Has not been worked for twenty years.

Whitlock Group. Consists of three patented claims owned by Dr. Gallison and Lizzie Sain and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 18 miles by wagon road from Bagby. The vein is 4 feet wide between greenstone walls. The development consists of a shaft and four levels and 2115 feet of drifts, winze 140 feet deep and 400 feet of crosscuts. The Alabama claim has a shaft 300 feet deep. There are two stopes—one 150 feet long by 150 feet high, and the other 240 feet long and 300 feet high. The equipment includes 2000 feet of mine rails, 6 ore cars, 3 trucks, 3 air machines and steel, 20-stamp mill,

rock crusher, Challenge feeders, air compressor, 50 h.p. hoist engine, 3 boilers, 4 amalgamating plates, 4 vanners, assay office, blacksmith shop, boarding house and superintendent's house. The mine was shut down in 1899 and leasers worked it for a time, but it is idle now.

GOLD (PLACER).

Placer mining in the county has dwindled to almost nothing and what little work is being done is very irregular and depends very extensively on the rainfall. One does not see the long ditch lines in this county such as are to be found in other counties, bringing water to the placer mines.

Ah Wai Drift Mine. Consists of one unpatented claim (placer) owned by John Hand and W. D. Weston of Mariposa and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. The gravel is bench gravel with a rough slate bedrock with free wash and large boulders.

The development consists of 2000 feet of bedrock tunnel. The equipment consists of 2 miles of ditch, a reservoir 30 feet by 10 feet by 4 feet deep, sluice boxes, and pole and Hungarian riffles. There are cabin, blacksmith shop, drills and tools and one ore car. Works six months during the winter season.

Schroeder Placer Mine. Consists of one patented claim owned by J. A. Schroeder, C. J. Schroeder, P. W. Judkins and C. H. Weston and located in Sec. 16, T. 4 S., R. 18 E., M. D. M., 20 miles by wagon road from Bagby. These are bench diggings and the gravel is medium wash with some clay and boulders on a porphyry bedrock. The development consists of about 5 acres that have been washed off by ground sluicing with a canvas hose. A tunnel 50 feet long is being extended. The equipment consists of 3 ditch lines, having a total length of 5½ miles, 1500 feet of 8-inch pipe, sluice boxes and riffles. It is being worked each winter.

The Garden Placer Claim. Consists of one patented claim owned by W. D. Weston and located in Sec. 32, T. 4 S., R. 18 E., M. D. M., 25 miles by wagon road from Bagby. There are 20 acres of bench gravel which is small wash and is worked by ground sluicing during three months in the winter. The bedrock is slate. Pole and Hungarian riffles are used and the gold is fairly coarse.

GRANITE.

Granite abounds in large quantities in Mariposa County of the same variety as the famous granite at Raymond in Madera County, but it is so far from transportation that it is not able to compete at present

with that more favorably situated. A granite property consisting of 50 acres of patented land located in Sec. 20, T. 6 S., R. 19 E., M. D. M., was located in 1906 by Guido Vignalo but was deeded to the State for taxes.

It is 15 miles by wagon road from Raymond and the granite is the same as that of the Raymond granite but is not being worked.

MARBLE.

There is a very fine marble located in Sec. 2, T. 4 S., R. 19 E., M. D. M., 6 miles southwest of El Portal on the road to Hites Cove and on the south fork of the Merced River. It is owned by F. A. Bondshu,

Croppings of white marble on the south fork of the Merced River near Hites Cove, Mariposa County, California.

J. F. Harris, C. P. Pratt and J. W. Pratt of Mariposa. The limestone is about 3000 feet wide and stands 600 feet from the river. The marble is white with dark streaks through it and takes a fine polish.

MEERSCHAUM.

Meerschaum has been found on a copper claim just east of the town of Mariposa located in Sec. 30, T. 5 S., R. 19 E., M. D. M., and located by Thomas A. Schlagerty of Mariposa. The quantity is not very large but the quality is excellent.

PHOSPHORETIC ZINCBLENDE.

The Aposozein Manufacturing Company of 512 Mission street, San Francisco, owns 80 acres of grazing land in Secs. 9 and 10, T. 4 S., R. 15 E., M. D. M., upon which there is a ledge of schist containing phosphoretic zincblende which is being ground by the Natura Company of San Francisco and sold under the name of "Akoz" as a curative for various ailments. The rock has the peculiar property of imparting a glow when scratched with a knife or piece of steel.

QUICKSILVER.

There is a quartz ledge on the Merced River at Horseshoe Bar that has a north and south strike and carries crystallized cinnabar on the footwall side. It is not in sufficient quantity to be of commercial value but merely as a note of interest. See Geological Survey of California (Vol. 1) by Whitney for mention of it.

ROCK QUARRIES.

Yosemite Rock Quarry. This quarry consists of 80 acres owned by the Merced Stone Company and leased by the E. B. & A. L. Stone Company, Rialto Building, San Francisco. The quarry and plant are

Merced Stone Company's rock quarry at Jasper Point on the Merced River and the Yosemite Valley Railroad, Mariposa County, California.

located on the Merced River at Jasper Point in Sec. 19, T. 3 S., R. 16 E., M. D. M. The rock is an altered quartzite, very hard and of a jaspery nature. The equipment consists of a steam shovel, compressor and air drills, three gyratory crushers, screens, bucket conveyors, bins, electric motors, power line and transformer house. Power is obtained from the San Joaquin Light and Power Company. The capacity of the plant is 750 tons per ten hours and the rock is sold at from 20 to 30 cents per ton on the cars of the Yosemite Valley Railroad. Only a few men were at work when the property was visited.

Yosemite Stone Quarry. This property consists of 40 acres of patented land owned by the Ransome-Crummey Company of Oakland and located on the Merced River at Exchequer on the Yosemite Valley

Ransome-Crummey rock crusher at Exchequer, on the Merced River and Yosemite Valley railroad, Mariposa County, California.

Railroad. The rock is a fine grained diorite and the dike is about 500 feet wide between the walls of slate. The equipment consists of an air compressor and 5 machine drills, a blacksmith shop, gravity tram, two 5-ton cars, 5 Gates gyratory crushers, elevating buckets, 10 motors, one 100-ton ore bin, a large crane, office, and superintendent's house. Power is supplied by the San Joaquin Light and Power Company and 20 men are employed at the present time.

SLATE.

Cunningham Slate Quarry. Consists of slate land located in Secs. 6, 7, 8, and 17, T. 7 S., R. 17 E., M. D. M., and owned by the Cunningham Corporation of Planada, Merced County. The quarry was leased from Cunningham by D. J. Gonyer for fifteen years. The quarry is developed and a good quality of roofing slate produced. It is not working at present.

Pacific Slate Quarry. Consists of 50 acres of land located in Sec. 6, T. 6 S., R. 16 E., M. D. M., 4 miles from Merced Falls and

Roofing slate from quarry of Pacific Slate Company in Sec. 6, T. 6 S., R. 16 E.,

owned by the Pacific Slate Company of Merced, Merced County. The slate is quarried and cut into slabs for roofing purposes mostly. None is being shipped at present, as there is very little demand.

Slate Quarry of Pacific Slate Company of Merced, in Sec. 6, T. 6 S., R. 16 E., M. D. M.

MERCED COUNTY.

By F. L. LOWELL, FIELD ASSISTANT.
Field work in September, 1914.

Merced is, strictly speaking, an agricultural county. Most of its 1,276,800 acres of land is under cultivation and the question of water has long been settled by the introduction of a system of irrigating ditches which is augmented by numerous flowing wells.

There is very little mineral in the county and only one gold mining company is operating. The mineral indications are found in the Coast Range mountains in the southwestern part of the county adjoining Santa Clara County and in the northeastern part adjoining Mariposa County.

ASBESTOS.

Asbestos is said to occur near the Mariposa County line in T. 7 and 8 S., R. 16 E., M. D. M. No work has been done on it and no information could be obtained about it.

CLAY.

A white clay said to be suitable for the manufacture of pottery when mixed with other clay that gives it the required fatty consistency is found in the region of Merced Falls, on the land owned by M. Goldman, of Merced. It is not being worked although many experiments have been made with it to test the quality. Clay also is said to be found in T. 5 S., R. 14 E.

COPPER.

Copper has been found in the south end of the county but not in sufficient quantities to pay commercially.

Jose Copper Claim. This claim is located in Sec. 4, T. 13 S., R. 9 E., M. D. M., about 35 miles from Hollister, San Benito County. The ledge proper has not been discovered, but what appears to have been a slide from the ore body has been developed by a 500-foot tunnel. A small quantity of chalcopyrite running high in gold and silver values was found. The claim has been idle for a number of years.

Victor Bonanza Group. This group of copper claims is located in Secs. 14, 15, 16, 23, 24 and 25, T. 13 S., R. 9 E., and Secs. 30 and 31, T. 13 S., R. 10 E., M. D. M., 16 miles from Dos Palos. Native copper and chalcopyrite have been found in the croppings. The formation is sandstone and porphyry. Practically no development has been done. (See "Copper Resources of California," Bulletin No. 50.)

Yosemite Gold Dredging and Mining Company's dredge at Snelling, Merced County, California.

GOLD.

The only gold mining that is being done at present is that at Snelling on the Merced River where the Yosemite Gold Dredging and Mining Company operates a dredge on their 400 acres along the river. The gravel is a clean wash and quite free from clay or large boulders. The gravel averages 20 feet to bedrock and a total of 24,200 cubic yards averaged 16½ cents per yard, and working costs 6½ cents per yard. The gold is coarse, clean and easy to save. The electric power is supplied from their own plant on the Merced River which is about 1½ miles from the dredge and costs not over 1¾ cents per kilowatt hour. (See "Gold Dredging in California," Bulletin No. 57.)

MANGANESE.

Briggs Mine. This mine is owned by N. C. Briggs, of Hollister, San Benito County, and is located in Sec. 16, T. 13 S., R. 9 E., M. D. M. The manganese deposit is claimed to show on the surface over a width of 100 to 200 feet. Very little development work has been done. (See "Structural and Industrial Materials of California," Bulletin No. 38, for Manganese, also U. S. G. S. Bulletin No. 427.)

WATER.

As said before, this county is well supplied with water, both from wells which reach water at a comparatively short distance from the surface, and also from the four irrigating systems whose canals traverse the county. Among these four systems is the Crocker and Huffman Land and Water Company, which also supplies the city of Merced with municipal water.

SAN JOAQUIN COUNTY.

By F. L. LOWELL, FIELD ASSISTANT.
Field work in August, 1914.

San Joaquin County, of which Stockton is the county seat, has an area of 1370 square miles or approximately 926,720 acres. Of this acreage 763,048 acres are in farm lands. The population of the county was 50,731 in 1910. The county may be classed as agricultural and very little mineral is found in commercial quantities to pay for working.

The principal output under a mineral head is natural gas. There is also some manganese, clay and indications of coal in the Corral Hollow district in the southern end of the county. Water is abundant and is obtained from wells and irrigation ditches. The county is bounded on the north by Sacramento County, on the northeast by Amador and Calaveras counties, on the east and southeast by Stanislaus County, on the southwest by Alameda County and on the west by Contra Costa County.

BUILDING MATERIALS.

Brick and pottery.

Carnegie Brick and Pottery Company. This company, which owns the E. ½ of Sec. 33, and the W. ½ of Sec. 34, T. 3 S., R. 4 E., M. D. M., has a very extensive plant for the manufacture of brick and terra

Carnegie Brick and Pottery Company's Plant at Carnegie, San Joaquin County, California. Photo by Walter W. Bradley.

cotta on the Tesla line of the Western Pacific Railroad at Carnegie. The clay came from the Tesla coal mine in Alameda County and was hoisted from the underground workings and conveyed by railroad to the brick plant. The plant includes forty-five brick kilns

Floor construction of a brick kiln at the Carnegie Brick and Pottery Plant, San Joaquin County, California. Photo by Walter W. Bradley.

and the equipment cost in the neighborhood of half a million dollars. It has not been in operation since 1912. The brick and terra cotta plant is in San Joaquin County and the mine and pottery plant are in Alameda County.

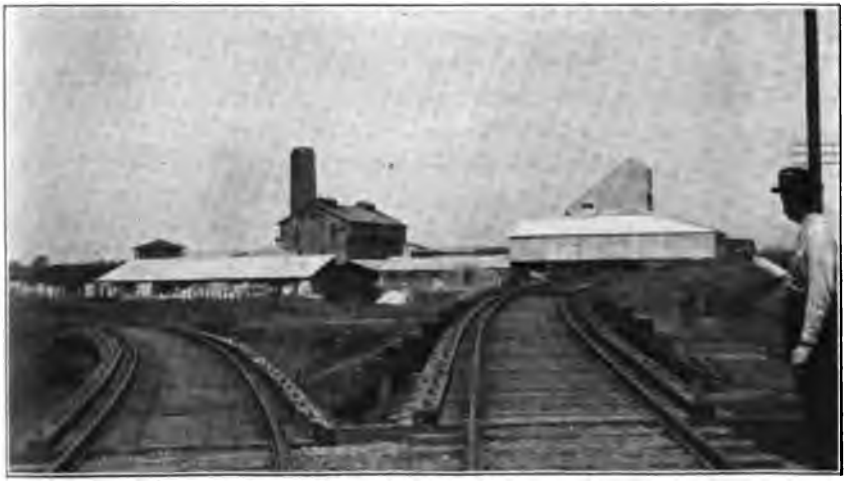
San Joaquin Brick Company Plant (red brick). This property consists of sixty acres of clay land on Roberts Island, outside of Stockton, and is a consolidation of the San Joaquin Brick Company plant and the Roberts Island Brick Company plant, with offices at 33 South El Dorado street, Stockton. The clay is dredged from the slough by a Marion steam dredger and allowed to weather in the air before it is used for making the common red brick.

The plant consists of 2 kilns, 2 brick machines, 2 brick cutters, one 40 h.p. motor, one steam shovel on a barge, dry sheds and other buildings. Forty men are employed and the plant has a capacity of 40,000 brick per day with one unit and could produce 80,000 with another unit operating.

Stockton Fire and Enamel Brick Company Plant. The plant is located on the outskirts of the city of Stockton near the glass works and Jackson baths, and consists of 5 brick kilns, 2 brick pressing machines,

Roberts Island Brick Plant, owned by the San Joaquin Brick Company of Stockton, San Joaquin County, California.

2 cutting machines, pugmill, dry pan, oil tanks, 2 boilers and a steam engine. The brick machinery is run by four motors, the power being supplied by the Western States Gas and Electric Company. Twenty-five men are employed. This company manufactures fire-brick, face brick, hand moulded material, and linings. The clay comes from Carnegie, Ione, Valley Springs and Lincoln. The capacity of the plant



Stockton Fire and Enamel Brick Company's plant at Stockton, San Joaquin County, California.

is 50,000 brick per day, besides hand moulded material. Red brick is not manufactured. The plant has been working two years and is on a spur track of the Southern Pacific Railroad.

NATURAL GAS.

Natural gas has been a very important factor in the fuel question of the manufacturing industries of San Joaquin County and, together with the cheap water transportation to San Francisco Bay, gives the city of Stockton an enviable advantage over other valley cities. Most of the natural gas wells of the county that have produced or are producing at the present time are located in the vicinity of Stockton. It has been stated before that the flow of water with the flow of gas is merely "incidental and not the necessary concomitant of gas." I did not find this to be altogether correct as in nearly all cases where the flow of water has diminished, the gas also has diminished, and at the present time some of the wells are being "forced;" in other words, the gas is forced back into the well to create a greater flow of water, as a greater flow invariably carries an increased flow of gas. The gas wells at the state asylum are kept alive and producing by this method. The wells at this institution are becoming filled up with sand and the supply of gas is now hardly adequate for their use. The officials consider that a natural gas well is a paying investment and would like to have a new well bored for their increasing demand. The first gas well in the county was bored, not for gas, in fact it was not known that gas lay in the strata below, but was drilled in order to get a flow of artesian water that would flow into one of the sloughs, thereby clearing the slough of stagnant water and removing objectionable odors. When the water was tapped gas also began to flow and the casing was capped and later a gasometer was put on the top and the gas was sold to a few customers. This company put down one other well and has a franchise from the city of Stockton for its pipe mains and supplies about 250 customers, but are not extending the business. This company, called the Central Natural Gas Company, and the Western States Gas and Electric Company, are the only two companies that are marketing the gas. There are several other gas wells owned by individuals, the gas from which is used locally for fuel and light.

Central Natural Gas Company. This company owns two gas wells located in the town limits of Stockton. The first well, or No. 1, was put down about eighteen years ago at American street and Miner avenue and went to a depth of about 1400 feet. Began drilling in 1893 and finished in 1899. The original flow was 32,000 cu. ft. but now flows 5000 cu. ft. per day. No. 2 well, which is located on Mr. Hoyle Greenwood's property at 229 North San Joaquin street, was drilled with a rig similar to the Keystone drill, to a total depth of 2838 feet about

seven years ago. The well was started with a 16-inch casing and this was reduced to 14, 12, 10 and finally to 6-inch casing at the bottom. The original flow was 100,000 cu. ft. per day.

Analysis of the Gas.

	Per cent by volume	Second analysis
Heavy hydrocarbon CNH_2N	.0	.0
Marsh gas CH_4	73.2	76.4
Hydrogen H_2	.0	.0
Carbonic oxide CO	0.9	0.1
Carbonic acid gas CO_2	0.1	0.4
Oxygen O_2	0.3	0.3
Residual nitrogen N_2	25.5	22.8
Specific gravity (Air-1)	0.663	
Gross B. T. U.	788	819
Per cent combustible	74.1	
Noncombustible	25.9	

Sulphur 60 grams per 100,000 feet.
Heats of combustion used for B. T. U. calculation: CNH_2N 2,000, CO 343, CH_4 1073, H_2 344,
Temperature of the water at a depth of 2,838 feet was 104°. Temperature at the present time is 95°.

The flow of gas from the No. 2 well at the present time is from 30,000 to 40,000 cu. ft. per 24 hours, calculated from the amount sold to customers, there being no meter connected. No log has been kept of

Central Natural Gas Company's well at 229 North San Joaquin street, Stockton, San Joaquin County, California.

the well, but Mr. Greenwood says that strata of sand and gravel were encountered from the surface to a depth of 350 feet, also blue clay and lava, and from that point down cobblestones were encountered. Gas was tapped at the 1200-foot point and was accompanied with water. Water always accompanies the gas.

The No. 1 well has not been producing gas for some time and needs to be cleaned out and new casing put in. The company has 250 customers and a franchise for its pipes in the city but is not extending its scope of operations.

The water flowing from the wells is not used for any purpose but flows into the sloughs, thereby keeping them free from stagnation. N. E. Carpenter is president of the company, 29 North Grant street, and Hoyle Greenwood is secretary, 229 North San Joaquin street.

Clark Gas Well. This well is located at Lincoln and South streets, in the city limits of Stockton, and is owned by Mrs. Percival. It was bored twenty-five years ago and had a gas flow for some years but has now ceased flowing.

Court House Gas Well. Located in the yard of the jail in Stockton and was started in 1890 and bored to a depth of 1900 feet. The casing at the top was 12 inches in diameter. It had a flow of 30,000 cubic feet per day, but is now dead.

Cowan Gas Well. Located on West Lane road, six miles from Stockton, and owned by T. C. Cowan. The well was drilled twenty-three years ago to a depth of 1160 feet. Enough gas flowed to supply the domestic demand for lighting and fuel. The water flowing from the well is not used as it is injurious to vegetable life. This well is still producing.

Crown Mills Gas Well. Located at the Crown flour mill and was drilled in 1887 to a depth of 1330 feet. It has a 9-inch casing and formerly flowed at the rate of 7000 cu. ft., but is now dead. The gas was used for lighting the mill and also for fuel in the boiler house.

Lathrop Gas Well. Located in the town of Lathrop. It was drilled in 1888 to a depth of 1420 feet and had 8-inch casing from top to bottom. The flow of water rose two feet above the collar of the casing and was estimated at 300,000 gallons per 24 hours. The well also produced 3000 cu. ft. of gas per day, but has been dead for a long period.

Roberts Island Gas Well. Located on the Kidd ranch on Roberts Island. It was drilled about twenty-five years ago and had a small flow of gas, but is dead now.

Salmon Gas Well. Located on Atlanta road just below French Camp, ¼ of a mile from Sharp Lane. It was bored about thirty years ago and had a small flow of gas, but is dead now.

St. Agnes College Wells. Located in the grounds of St. Agnes Convent in Stockton. The two wells were drilled to a depth of 960 and 1720 feet respectively and had 10-inch casing. They produced 25,000 cu. ft. of gas per day, which was used for fuel and illuminating purposes in the convent. The wells are filled with sand and are dead now.

Stockton State Hospital Wells, Nos. 1 and 2. Located at the hospital for the insane at Stockton. Well No. 1 was drilled about twenty years ago to a depth of 1600 feet with 8-inch casing. It has been dry for three years. The temperature of the water was 84° and highly charged with magnesia and iron.

Well No. 2 was drilled at about the same time as well No. 1, with 16-inch casing at the top. This well is being "forced" at the present time to increase the flow of gas. The water is conveyed to a swimming pool for the patients' use. The gas is used for cooking purposes about the asylum, but the supply is not equal to the demand as the flow is not over 900 cu. ft. per day. The well is badly filled with sand.

Western States Gas and Electric Company Gas Wells. The Western States Gas and Electric Company is an incorporated company with its home office in San Francisco and doing business in Stockton with its local office at 44 North Sutter street. H. M. Byllesby of Chicago is president; Samuel Kahn of Stockton, vice president and general manager, and Allen L. Chickering of San Francisco, secretary. The company owns an extensive gas manufacturing plant and electric plant as well as sixteen natural gas wells, five of which have ceased to flow. The natural gas is all piped to the central plant and mixed with the manufactured gas and then goes to the consumer. The company owns most of the natural gas wells now producing. The water flowing from their wells is not utilized except in the case of the Jackson No. 2 well, which supplies water for the swimming tank of the Jackson baths which adjoin.

Natural Gas Wells owned by Western States Gas and Electric Company of Stockton, California:

Well No. 1.

Located at Lafayette and Lincoln streets.
Began drilling in 1892 and finished in 1896.
Total depth of 1702 feet.
Twelve and 8-inch casing.
Not flowing at present.
Original flow was 15,400 cu. ft. per day.
Water flow was 200 gallons per minute.
Well is now dead.

Well No. 2.

Formerly owned by the Stockton Natural Gas Company.
Located at Lafayette and Lincoln streets.
Began drilling in 1886 and finished in 1888.
Twelve-inch and 7-inch casing.
Original flow was 87,000 cu. ft. per day.
Water flow was 1500 gallons per minute.
Well is now dead.

Well No. 3.

Formerly owned by the Stockton Natural Gas Company.
Located at Lafayette and Lincoln streets.
Began drilling in 1888 and finished in 1890.
Total depth of 1890 feet.
Twelve-inch and 6-inch casing.
Original flow was 40,000 cu. ft. per day.
Flowing now 12,000 cu. ft. per day.
Temperature of water is 86°.

CH_4	67.1%
CO	0.6%
CO_2	0.2%
O	0.5%
N	31.6%

Well No. 4.

Formerly owned by the Northern Natural Gas Company.
Located at Grant and Fremont streets.
Began drilling in 1892 and finished in 1894.
Total depth of 1720 feet.
Twelve and 6-inch casing.
Original flow was 20,000 cu. ft. per day.
Flows now at rate of 5000 cu. ft. per day.
Original flow of water was 1800 gallons per minute, but much less now.
Temperature of water is 83° F.

CH_4	57.9%
CO	0.6%
CO_2	0.2%
O	0.8%
N	40.5%

Well No. 5.

Located at North and Hunter streets.
Began drilling in 1895 and finished in 1896.
Total depth of 2071 feet.
Twelve and 6-inch casing.
Original flow was 43,300 cu. ft.
Flow is now 30,000 cu. ft. per day.
Flow of water is 300 gallons per minute.
Temperature of water is 86° F.

CH_4	64.5%
CO	0.7%
CO_2	0.4%
O	0.6%
N	33.8%

Well No. 6.

Located at Anderson and Pilgrim streets.
Started in 1895 and finished in 1896.
Total depth of 1810 feet.
Twelve-inch casing at the top and 7-inch at bottom.
Original flow was 28,899 cu. ft. per day.
Flow now 16,000 cu. ft. per day.
Water flow 800 gallons per minute.
Temperature of water is 86° F.

CH_4	67.2%
CO	0.3%
CO_2	0.4%
O	0.7%
N	31.4%

Well No. 7.

Located at Miner avenue and Harrison street.
Started in 1898 and finished in 1900.
Total depth of 2230 feet.
Twelve, 10½, 9, and 7½-inch casing.
Original flow was 72,000 cu. ft. per day.
Flow now is 35,000 cu. ft. per day.
Water flow was 1800 gallons per minute.
Water flow now is 300 gallons per minute.
Temperature of the water is 93° F.

CH_4	66.0%
CO	0.9%
CO_2	0.2%
O	0.6%
N	32.3%

Well No. 8.

Located at El Dorado, between Channel and Miner streets.
Started in 1904 and finished in 1912.
Total depth of 3178 feet.
Sixteen, 14½, 13, 12, 9, 6½-inch casing.
Formerly flowed 60,000 cu. ft. per day.
Now flows 39,000 cu. ft. per day.
Water flow about 504,000 gallons per day.
Temperature of water, 94° F.
Well cost about $75,000.

CH_4	73.5%
CO	0.6%
O	0.2%
N	25.3%

(See attached sheet of log, page 194.)

Well No. 9.

Located at Miner avenue and East street.
Started in 1902 and finished in 1908.
Total depth of 2603 feet.
Sixteen, 14½, 13 and 12-inch casing.
Formerly flowed 120,000 cu. ft. per day.
Now flows 85,000 cu. ft. per day.
Water flow is 720,000 gallons per day.
Temperature of water is 96° F.

CH_4	70.8%
CO	0.5%
CO_2	0.1%
O	0.3%
N	28.3%

(See attached sheet of log, page 195.)

Well No. 10.

Formerly belonged to Northern Natural Gas Company.
Located at Acacia, between San Joaquin and Hunter streets.
No record of time the well was drilled.
Total depth, 2006 feet.
Twelve, 10½, 8½, 7 and 6-inch casing.
No record of original flow.
One of the oldest wells in this district.
Well is now dead.

CH_4	66.0%
CO	1.4%
CO_2	0.4%
O	0.9%
N	31.3%

Citizens No. 1.

Formerly owned by the Citizens Natural Gas Company.
Located on Commerce street, between Rose and Vine streets.
No records of the well to be obtained.
Water flowed at rate of 800 gallons per minute.
Well is now dead.

Citizens No. 2.

Formerly owned by the Citizens Natural Gas Company.
Located at North and Addison streets.
Total depth is 1850 feet.
Twelve, 10 and 8-inch casing.
Present flow is 39,000 feet per day.
Temperature of the water is 86° F.

CH_4	68.1%
CO	0.4%
CO_2	0.3%
O	0.7%
N	30.5%

Jackson No. 1.

Originally owned by John Jackson.
Located at San Joaquin and Tenth streets.
Started in 1894 and finished in 1896.
Total depth of 1702 feet.
Twelve and 6-inch casing.
Originally flowed 30,000 cu. ft. per day.
Well is now dead.
Water flow 600 gallons per minute.

CH_4	59.5%
CO	0.6%
CO_2	0.4%
O	0.4%
N	39.1%

(For both Jackson No. 1 and No. 2.)

Jackson No. 2.

Formerly belonged to John Jackson.
Located at San Joaquin and Tenth streets.
Started in 1895 and finished in 1898.
Total depth of 1600 feet.
Twelve and 7-inch casing.
Flowing originally 35,000 cu. ft. per day.
Now flows 6,000 cu. ft. per day.
Water flow originally 600 gallons per minute.
Temperature of water 84° F.

Jackson No. 2 well at Jackson Baths, belonging to the Western States Gas and Electric Company of Stockton, San Joaquin County, California.

Glass Works Well No. 1.

Formerly belonged to Stockton Window Glass Company.
Located at San Joaquin and Fourteenth streets.
Well drilled in about 1904.
Total depth 2000 feet.
Twelve and 6-inch casing.
Flows 16,000 cu. ft. per day.
Water flow about 250 gallons per minute.
Temperature of water 92° F.

CH_4	69.8%
CO	0.7%
CO_2	0.4%
O	0.3%
N	28.8%

Gasometer and meter of a natural gas well in Stockton, belonging to the Western States Gas and Electric Company.

Glass Works Well No. 2.

Formerly owned by the Stockton Window Glass Company.
Located at San Joaquin and Fourteenth streets.
No record of the date when the well was drilled. Think it was drilled about 1904.
Total depth 2100 feet.
Twelve and 6-inch casing.
Flows 7000 cu. ft. per day.
Water flow about 150 gallons per minute.
Temperature of water is 90° F.

Log of Well No. 7.

Formation.	Feet	to	feet.
Adobe	0		3
Yellow clay	3		24
Blue clay	24		45
Sand and small stone	45		51
Blue clay	51		154
Cemented blue clay	154		164
Coarse sand	164		184
Clay	184		190
Sand, gravel and stone	190		238
Blue clay	238		242
Loose sand	242		340
Blue clay	340		354
Cement sand	354		651
Blue clay	651		655
Loose sand	655		726
Clay	726		731
Sand	731		768
Clay	768		786
Sand and cemented clay	786		840
Tough blue clay	840		897
Hard clay	897		915
Tough clay	915		928
Hard clay	928		963
Coarse clay	963		1,076
Clay	1,076		1,083
Sand	1,083		1,115
Clay	1,115		1,122
Loose sand	1,122		1,174
Clay	1,174		1,212
Coarse sand and stone	1,212		1,274
Small stone	1,274		1,290
Hard clay	1,290		1,346
Packed sand	1,346		1,354
Hard clay	1,354		1,382
Sand and pebbles	1,382		1,386
Hard clay	1,386		1,436
Coarse sand	1,436		1,439
Tough clay	1,439		1,452
Hard clay	1,452		1,517
Tough clay	1,517		1,532
Hard clay	1,532		1,560
Sand	1,560		1,563
Hard clay	1,563		1,594
Tough clay	1,594		1,598
Hard clay	1,598		1,674
Sand	1,674		1,689
Clay	1,689		1,723
Loose sand	1,723		1,733
Clay	1,733		1,777
Loose sand	1,777		1,795
Clay	1,795		1,798
Sand	1,798		1,804
Clay	1,804		1,811
Loose sand	1,811		1,813
Clay	1,813		1,868
Loose sand	1,838		1,883
Clay	1,886		1,961
Sand	1,931		1,969
Clay	1,969		2,053
Loose sand	2,053		2,063
Clay	2,063		2,068
Loose sand	2,068		2,093
Clay	2,093		2,193
Sand	2,193		2,194
Hard cemented clay	2,194		2,206
Loose sand	2,206		2,213
Hard cemented clay	2,213		2,222
Loose sand	2,222		2,230

Log of Well No. 8.

Formation.	Feet	to	feet.
Clay	0		25
Sand	25		29
Clay	29		65
Sand	65		68
Clay	68		196
Gravel	196		202
Clay	202		220
Gravel	220		232
Clay	232		334
Sand	334		345
Clay	345		384
Sand	384		390
Clay	390		440
Sand	440		448
Clay	448		680
Sand	680		700
Clay	700		710
Sand	710		728
Clay	728		760
Sand	760		768
Clay	768		818
Sand	818		826
Clay	823		975
Sand	975		982
Clay	982		1,019
Sand	1,019		1,030
Clay	1,030		1,243
Gravel	1,243		1,253
Clay	1,253		1,460
Sand	1,460		1,468
Clay	1,438		1,616
Sand	1,616		1,619
Clay	1,619		1,725
Sand	1,725		1,738
Clay	1,738		1,960
Sand	1,960		1,970
Red clay	1,970		1,980
Yellow clay	1,980		2,000
Blue and white clay	2,000		2,120
Sand	2,120		2,132
Sticky blue clay	2,132		2,600
Sand	2,600		2,607
Gravel	2,607		2,648
Blue clay	2,648		2,700
Red clay	2,700		2,790
Black clay	2,790		2,800
Sand	2,800		2,845
Gravel	2,845		2,880
Sand	2,880		2,900
Gravel	2,900		2,907
Brown clay	2,907		3,060
Black sand	3,060		3,175
Blue clay	3,175		3,178

Log of Well No. 9.

Formation.	Feet	to	feet.
Adobe	0		2
Yellow clay	2		14
Sand	14		17
Clay	17		82
Blue clay	82		174
Yellow clay	174		190
Sand	190		220
Blue clay	220		232
Black sand	232		240
Blue clay	240		445
Sand	445		450
Blue clay	450		485
Coarse white sand	485		492
Blue clay	492		584
Sand	584		588
Blue clay	588		605
Sand	605		614
Blue clay	614		698
Sand	698		705
Blue clay	705		1,056
Coarse sand	1,056		1,061
Blue clay	1,061		1,190
Coarse sand	1,190		1,205
Hard blue clay	1,205		1,338
Cemented sand and stone	1,338		1,343
Clay	1,343		1,475
Cemented sand and stone	1,475		1,483
Clay	1,483		1,608
Loose sand and stone	1,608		1,620
Clay	1,620		1,850
Sand and stone	1,850		1,853
Sand and clay in thin layers	1,853		2,018
Red, white and blue clay	2,018		2,025
Sand	2,025		2,032
Clay	2,032		2,038
Sand	2,038		2,044
Clay	2,044		2,070
Sand	2,070		2,176
Clay	2,176		2,186
Sand	2,186		2,196
Clay and sand in thin layers	2,196		2,500
Clay	2,500		2,600
Sand	2,600		2,603

The first flow of gas was struck at 2025 feet.

The next flow at 2044 feet, and the third flow at 2176 feet.

The best flow of gas was struck at 2600 feet.

This well is the best that the company owns.

MANGANESE.

The characteristic occurrences of manganese in California are in the form of black oxide associated as layers and pockets with the jasper lenses of the Franciscan formation of probable Jurassic age. Manganite seems to be the most prevalent variety of manganese encountered in the Livermore range of hills.

Manganese Prospect. This property consists of the SE. ¼ of Sec. 2, T. 4 S., R. 4 E., and about 1½ miles south by road of the branch line of the Western Pacific Railroad which runs to the Tesla coal mine. The land was formerly owned by J. Caire, who sold it to J. Treadwell and it is now in the hands of Frank J. Symmes, trustee,

Manganese prospect in Sec. 11, T. 4 S., R. 4 E., M. D. M., owned by the Winship Estate. Photo by Walter W. Bradley.

491 California street, San Francisco. According to the Tenth Mineralogist Report, about 2000 feet of tunneling has been done and some stoping, which have caved. No work has been done on the property for eight years. The manganese is in the jasper formation and the lenses vary from one to ten feet in width. There are many manganese coatings on the cherts in these hills but they are not of sufficient purity to be of commercial value.

Manganese Prospect. In Sec. 11, T. 4 S., R. 4 E., M. D. M., owned by the Winship Estate, 354 Pine street, San Francisco, and leased by D. P. and F. M. Doak, of the Rialto Building, San Francisco. This prospect has been working the last few months and has been developing manganese ore.

(See U. S. Geological Survey, Bulletin No. 427, for further reference to Manganese of the State.)

WATER.

The county is well supplied with subterranean water and water from irrigation ditches. Many of the farms of the county rely on their wells for irrigating. Care must be exercised in selecting a water well location that it is not in close proximity to a gas well. Cases have been known where the deeper gas well has contaminated the water well by the gas penetrating the water strata and flowing with the water to the water well. This is especially likely when the casing of the gas well has been worn away thus giving free access to the water strata.

The principal irrigation district of the county takes its water from the Stanislaus River at Knights Ferry in Stanislaus County. This water is owned jointly by the South San Joaquin irrigation district and the Oakdale irrigation district of Stanislaus County, and irrigates 137,000 acres of farm land. There are eight miles of main canal, lateral canals and a storage reservoir with a capacity of 184,000 acre feet.

Woodbridge Canal and Irrigation Company. This company takes water from the Mokelumne River at the town of Woodbridge, and also water from the Calaveras River at the town of Bellota. This company, with its system of canals, irrigates the greater portion of the county north and east of Stockton.

There is another ditch that brings water from Mokelumne River in Calaveras County. This ditch enters San Joaquin County at its northeast corner and supplies water for that section. It is seen that the irrigation problem is thoroughly solved and insures good crops at all times.

Stockton water district.

The city of Stockton is supplied with water from wells which are owned by the Pacific Gas and Electric Company. The water bearing strata are encountered between the depths of 550 feet and 557 feet. The logs of the wells are similar to those of the gas wells. The total solids held in solution amount to 20.85 grains per gallon and are chiefly calcium and magnesium carbonates, a little silica and some alumina. The free ammonia present amounts to 0.062 parts per million parts of water. The albuminoid ammonia amounts to 0.126 parts per million.

PACIFIC GAS AND ELECTRIC COMPANY.

Stockton Water District. Wells at Pumping Station No. 1.

Number	Diameter of casing	Depth	Date of construction	Date last time cleaned	Depth last time cleaned	Location	Cost	Abandoned
1	8-inch at top, 6-inch below 800 feet	1,100	1882	Feb., 1912	1,000	Northeast corner old tract	$2,500 00	
2	6-inch at top, 5-inch below 650 feet	930	1884			Northwest corner of lot, brick sump	2,000 00	
3	8-inch throughout	1,040	1885		955	In street south of pit	2,500 00	1912
4	10-inch throughout	560	1891	Jan. 30, 1914	560½		2,000 00	
5	8-inch throughout	218	1895				2,000 00	
6	8-inch throughout	218	1895				2,500 00	
7	8-inch throughout	300	1895				2,500 00	
8	8-inch throughout	577	1895				2,500 00	
9	12-inch throughout	770	1900	Jan. 16, 1914	770		2,600 00	
10	20-inch throughout	223	1902	Jan. 20, 1914	223		1,612 00	
11	12-inch throughout	950	1906	Jan. 22, 1914	950		3,200 00	
12	14-inch at top, 12-inch below 268 feet	1,002	1907	Jan. 23, 1914	1,002		3,400 00	
13	14-inch at top, 12-inch below 250 feet	1,050	1908-9	Jan. 26, 1914	1,043		3,700 00	
14	20-inch throughout	223	1910	Jan. 15, 1914	223		1,200 00	
15	14-inch 225 feet, 12-inch 605 feet, 10-inch 223 feet	1,053	1911	Feb. 15, 1913	1,053		3,491 53	
16	16-inch 239 feet, 14-inch 598½ feet, 12-inch 214½ feet	1,502	1912	Mar., 1913	1,052		4,283 76	
17	17-inch throughout	201	1912				4,514 81	
18	14-inch top, 12-inch below 861 feet	1,124	1913				4,514 81	
19	16-inch 250 feet, 14-inch 236 feet 12-inch 159 feet	674	1913-4					

There used to be sixty 2-inch wells at Pump Station No. 1, all abandoned between 1906 and 1910.

Wells at Pump Station No. 2.

1	12-inch at top, 10-inch below 632 feet	667	1903	Jan. 9, 1914	667			
2	12-inch at top, 10-inch below 594 feet	807	1904	Jan. 10, 1914	798			
3	14-inch at top, 12-inch below 260 feet	975	1909	Jan. 5, 1914	932			
4	14-inch at top, 12-inch below 250 feet, 10-inch below 800 feet	875	1909	Jan. 12, 1914	872			
5	12-inch throughout	671	1912	Jan. 10, 1914	370	Bottom 300 feet caved		

Yearly consumption of water by the city of Stockton.

Year	Gallons consumed	Year	Gallons consumed
1893	678,910,112	1903	796,401,859
1894	515,675,810	1904	708,797,128
1895	704,028,212	1905	837,814,614
1896	679,037,239	1906	942,683,776
1897	781,830,337	1907	943,575,767
1898	936,958,406	1908	1,057,675,182
1899	981,052,765	1909	1,057,552,130
1900	646,591,937	1910	1,166,756,023
1901	648,469,829	1911	1,205,951,517
1902	774,989,079		

Costs—$1.50 per foot for drilling 12-inch to 16-inch well to 1000 feet.

WINDOW GLASS.

Stockton Window Glass Company Plant. This plant, which is located in the suburbs of the city of Stockton, is owned by the Western States Gas and Electric Company of Stockton and was built in 1901. It was operated for a time but closed down in 1908. It is on a spur track of the Southern Pacific Railroad and has a complete equipment for the manufacture of common window glass, chipped glass and fancy glass for signs, doors, etc. Oil is used as fuel. The plant was formerly owned by the California Trust Company and after being in the law courts for some time, was bought by the Western States Gas and Electric Company in 1911. Capital was not available to put it on a good financial footing. The sand is brought from Monterey County and is a beach sand. The lime comes from San Francisco, soda from Pennsylvania Chemical Company, and salt cake from Point Richmond.

Stockton Window Glass Plant at Stockton, San Joaquin County, California, owned by the Western States Gas and Electric Company.

STANISLAUS COUNTY.

By F. L. LOWELL, FIELD ASSISTANT.

Field work in September, 1914.

Stanislaus County, which comprises 951,000 acres of land, extends from the eastern foothills of the Coast Range on the southwest and runs across the San Joaquin Valley in a northeasterly direction to the western foothills of the Sierra Nevada mountains. Most of the land is under cultivation and very little mineral is found within its boundary. In the southwestern part of the county, beginning at Mt. Boardman in the Coast Range, some quicksilver, manganese and magnesite are found, and a little further east silica, sand and clays are found. The central portion of the county is devoted exclusively to farming, fruit raising, and stock raising, and no mineral is encountered until the northeastern part of the county is reached in the Sierra Nevada foothills. Gravel from the Stanislaus River at Oakdale is utilized for road purposes, and at Knights Ferry, on the Stanislaus River, some ochre is shipped each year. The principal mining operations in the county are at La Grange, where gold dredging is carried on with success. There are five irrigation projects in the county which give an ample supply of water for all the land not served by wells.

BUILDING MATERIALS.

Red Brick.

Craycroft Brick Yard. Owned by the Modesto Repressed Brick Company and located on a 20-acre piece of land on the outskirts of the city of Modesto. The plant was established in 1907 and consists of two boilers, brick trays, 700-barrel oil tank and residence. The clay is obtained on the ground and is worked up by horse power and molded by hand. The brick is sold from $8 to $10 per thousand and is used mostly in local building operations.

Gravel.

Brichetto Bros. Gravel Pit. This gravel pit is located in the bed of the Stanislaus River near Oakdale, in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M. The gravel ranges in size from very fine to coarse boulders and is used for road work.

Dixon Gravel Pit. Owned by Mrs. Dixon, of Oakdale, and located in the bed of the Stanislaus River. The gravel is used on the roads and for concrete work.

Dorsey Bros. Gravel Pit. Owned by E. W. and E. S. Dorsey, of Oakdale, and located in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M., near Oakdale on the Stanislaus River. There is a road to the gravel pit, and the material is sold for road work.

Craycroft brick yard at Modesto, owned by the Mcdesto Repressed Brick Company, of Modesto.

Gold dredge belonging to the La Grange Gold Dredging Company, at La Grange, on the Tuolumne River.

Wheeler Gravel Pit. Owned by W. F. Wheeler, of Oakdale, and located in Secs. 10 and 11, T. 2 S., R. 10 E., M. D. M., on the Calaveras River. The land is patented. The gravel is used on the roads and for concrete work. The gravel is sold at 25 cents per wagon load at the pit.

Clay.

A good clay suitable for brick is located in Secs. 20 and 21, T. 5 S., R. 7 E., M. D. M., and owned by J. J. Cummins and Thomas H. Wolf, of San Francisco. The clay is located on a 320-acre piece of patented land, about 3½ miles northeast of Patterson on the Southern Pacific Railroad. The clay contains about 60% silica, 24% alumina, 3% iron, and a little magnesia. It is not being used at present.

GOLD.

There are no gold mines in the county that are being operated at the present time. There is a gold dredge owned by the La Grange Gold Dredging Company that is operating on the Tuolumne River near La Grange.

La Grange Gold Dredging Company. Owns one dredge on the Tuolumne River, having 7 cubic feet close connected buckets, shaking screens, Holmes gold-saving tables, belt tailing conveyor and digs 32 feet below water level. It works on spuds. The company owns 200 acres of dredging ground that averages 35 feet deep. The gravel is medium coarse and the bedrock is soft. The ground was prospected by drills. (See State Mining Bureau Bulletin No. 67, "Gold Dredging in California.")

Alto Gold Mine. Owned by the California-Calaveras Mining Company, of 356 Pine street, San Francisco, and located in the eastern half of the Calaveras Grant in the Knights Ferry district. The Calaveras Grant consists of 7200 acres of land and is located partly in Calaveras County and partly in Stanislaus County. This mine had a vertical shaft 400 feet deep, one crosscut 400 feet long, another 200 feet long and a glory hole 600 feet long and 400 feet wide. There formerly was a 40-stamp mill and other equipment, but this has fallen to decay. This property has been in litigation since 1908 and information was very hard to obtain as the mine has not been working for some time.

MAGNESIA.

About 440 acres of land in T. 6 S., R. 6 E., have recently been taken up and about 50 acres of this 440 are located as magnesia land. Three claims are located on El Puerto Creek, about 15 miles from Patterson on the Southern Pacific Railroad.

According to analysis the ores are reported to contain 42.88% magnesia and 0.223% CaO. The ore occurs as stringers in serpentine formation. This ore has been recarbonized by exposure to the atmosphere and will require a slight calcining before use. It is soluble in hydrochloric acid and the resulting magnesium chloride is serviceable in making tile and fire brick. The property is owned by Howard A. Broughton and associates, 520 Rialto Building, San Francisco.

MANGANESE.

Manganese is now one of the most important minerals in this county that is attracting attention at the present time. It is to be found in the southwestern part of the county, in the eastern part of the Coast Range of mountains between Santa Clara County and Stanislaus County. The development work so far has not been very extensive as manganese from California has not been in very great demand until recently.

California Manganese Company Mine. Consists of five unpatented claims and 2160 acres of patented land located in Secs. 9, 11, 15, 21, 22, 27, 28, 33 and 34, T. 6 S., R. 5 E., about 35 miles from Livermore by wagon road. Most of this property is in Stanislaus County but a little is across the border and in Santa Clara County. The manganese is in lenses between sandstone and quartzite and the ores are manganite and pyrolusite. The development consists of two tunnels, one 15 feet and the other 20 feet long, and open cuts. This property is 25 miles from Patterson on the Southern Pacific Railroad and a wagon road is contemplated that will connect the mine with this shipping point. There is very little mining equipment on the property.

Manganese Prospect. This is a prospect in Sec. 8, T. 6 S., R. 6 E., M. D. M., that has a little trenching done on it. Could not get any further information about it. (See U. S. G. S., Bull. No. 427, on manganese.)

OCHRE.

Yellow ochre is mined to a limited extent and a few hundred tons are shipped to San Francisco each year.

Voyle Ochre Mine. Located in Sec. 29, T. 1 S., R. 12 E., M. D. M., at Knights Ferry on the Stanislaus River. The mine is on unpatented land. A small tunnel 50 feet long has been run into the face of the hill, but there is no equipment. About 150 tons of yellow ochre are shipped to W. P. Fuller & Company each year. It is owned by the California Ochre Mining Company, 126 Mission street, San Francisco.

Manganese croppings on the property of the California Manganese Company, California.

Voyle Ochre Mine at Knights Ferry, owned by the California Ochre Mining Company, of San Francisco.

QUICKSILVER.

Adobe Valley Quicksilver Mine. This was formerly known as the Stanislaus Quicksilver mine and is now owned by E. P. Newhall, box 354, Livermore, and located in Secs. 23 and 24, T. 5 S., R. 5 E., M. D. M., about 24 miles from Westley on the Southern Pacific Railroad. The property consists of 960 acres of patented land. The development consists of a 180-foot double-compartment vertical shaft. The ore is said to average 0.8% quicksilver. There is no equipment and the mine has been idle for some years.

Newhall Quicksilver Mine. This was formerly known as the Deer Park Quicksilver mine, two thirds of which is owned by E. P. Newhall, and located in Secs. 31, 32, T. 5 S., R. 5 E., M. D. M., about 22 miles from Patterson. The property consists of eleven claims of 220 acres, upon which a little development work has been done, but it has been idle for years.

Phœnix Quicksilver Group. This was formerly known as the Summit and Grayson mines, owned by Mrs. Emma Rose, of New York, and located in Secs. 20, 21, 22 and 29, T. 6 S., R. 5 E., M. D. M., 24 miles from Patterson. There are seven patented claims, four millsites and

160 acres of timber land and also six unpatented claims. The mine is being retimbered and opened up by the owners. The Orestimba mine, of 2300 acres of patented land, also belongs to this group (see "The Quicksilver Resources of California," issued by the State Mining Bureau; also State Mineralogist Reports X and XIII).

SILICA.

There is some comparatively pure silica in ledge formation and also silica sand in the county suitable for glass manufacture, but at present it is a considerable distance from cheap transportation.

Croppings of silica, owned by the California Silica Company, of San Francisco.

California Silica Company. Consists of 40 acres located in the SE. ¼ of Sec. 4, T. 6 S., R. 6 E., M. D. M., 12 miles up El Puerto Creek from the town of Patterson. The analysis of the silica by George James Company, gives water 0.8%, iron none, and silica 99.2%. The analysis by Smith, Emery & Company gives silica 99.783%, alumina 0.21% and iron oxide 0.007%. Only assessment work has been done. The width of the vein is 5 to 20 feet.

Silica Sand. Located on a 320-acre patented piece in Sec. 20, T. 5 S., R. 7 E., M. D. M., and owned by J. J. Cummings and Thomas Wolf, 2231 Ashby avenue, Berkeley. The sand is said to be 97% to 99% pure in silica. It is very fine grained.

WATER.

This county is considered one of the best watered counties of the State and is served by five irrigating systems, as well as numerous wells sunk by individual farmers. Perhaps as an illustration of the ample supply of water that is obtained from wells, that of the city of Oakdale might be mentioned. This well is situated in the city limits and is 217 feet deep. The first 50 feet is walled up and the remainder of the well is cased with 10-inch casing. The well supplies, by pumping, enough water for the city's consumption, both domestic, street sprinkling and a swimming pool. Approximately 327,000 gallons are pumped every twelve hours during the summer months.

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