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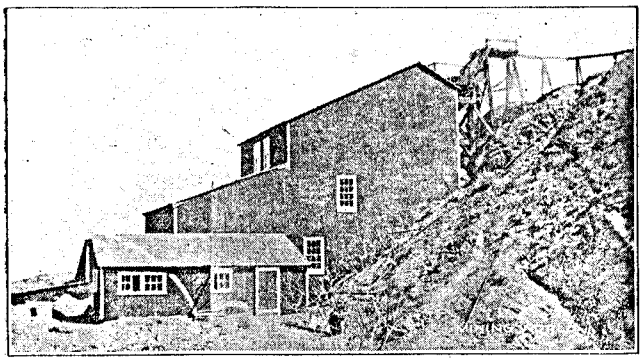
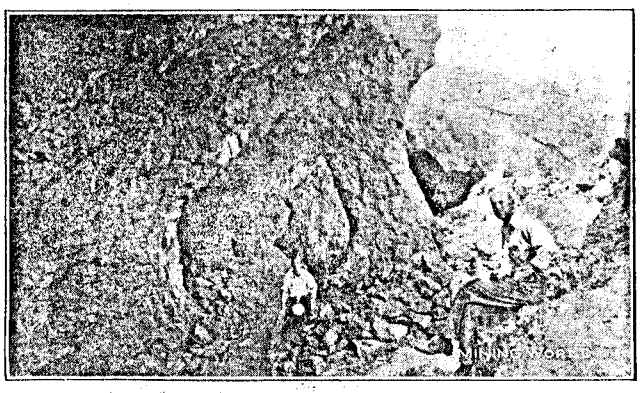
El Dorado Canyon—Mining, Milling and Development

W. A. SCOTT.

El Dorado canyon, in the southeastern part of Clark county, Nevada, has a length of about 11 miles, and drains easterly into the Colorado river. The mining district of that name encompasses the extensive region of igneous formations drained by the main canyon and secondary gulches and washes leading into it. In traversing this canyon from its terminus at the river to its headings near the divide there is an ascent of over 4000 ft. The postoffice and little town of Nelson, situated in the main canyon, 6 miles from its mouth, are 22 miles north of Searchlight, and 45 miles southeast of Las Vegas, both of which are railroad points. Auto stages make regular trips from both those towns to El Dorado canyon. Nelson is on the route between Las Vegas, Nev., and Kingman, Ariz., and one of the auto stages makes three round trips per week between those towns, a distance of over 100 miles, crossing the Colorado by ferry, at the mouth of El Dorado canyon. Most of the supplies and equipment are hauled into the district from Searchlight. Travelers going into the country over the Los Angeles & Salt Lake railroad usually take an El Dorado canyon stage at Las Vegas, but often go out via Searchlight, which is the terminus of a Santa Fe branch.



MILL OF RAND MINING CO.



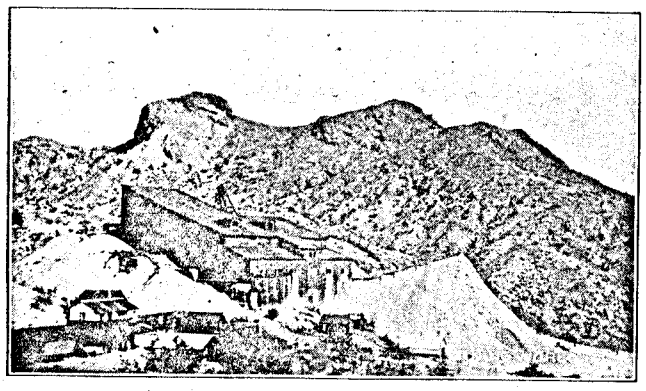
SURFACE WORKINGS ON WALL STREET VEIN.

Geology and Ore Occurrence.

In general features the El Dorado canyon region resembles those of Gold Road, Oatman and Boundary Cone, in Arizona, with respect to the prevalence of igneous and volcanic rocks of several classes. G. A. Duncan, manager of the Colorado-Nevada group of mines in El Dorado canyon, who has spent nine years in the district, has given out a statement relative to the formation and ore occurrence of the district, from which the following is taken:

"The district is near the northeastern edge of an extensive monzonite basin. The canyon is the result of erosion along a profound fracture zone, into which intruded an andesite identical with the Comstock andesite. The dip of the old andesite intrusion is toward the north about 40°; and at various places along its course more recent porphyry dikes mark its hanging and foot wall contacts with the monzonite. Near the middle of this andesite filling of the fracture there intruded a strong porphyry dike, showing the same dip as that of the old andesite which it entered, and is exposed for several miles along the canyon floor. Along this more recent dike the ground movements seem to have taken place, the disturbances inviting erosion, with the obvious result that the canyon and

dike have a common course and position. The ground movements along this dike also caused a brecciated condition to a great depth along its walls, affording a channel for the collecting and passage of mineralized solutions, and making this dike now the one unfailing water course of this section. The ore so far found in this district is in, and along side of the main fracture,

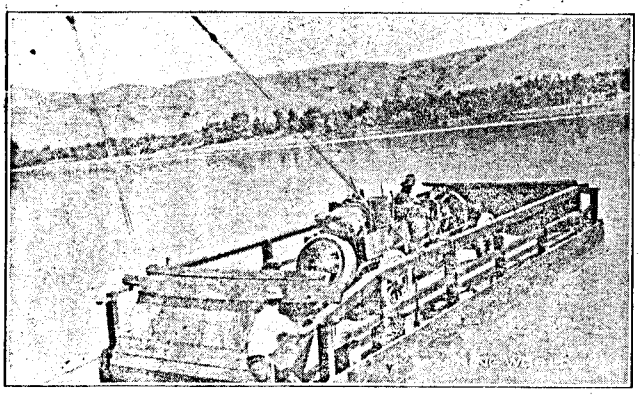


MILL OF COLORADO-NEVADA MINING & MILLING CO.

and in veins departing from it. The outcrop of numerous veins parallel to this dike, and rather close to the old andesite filling of the great fracture, indicate workable ore bodies. Naturally, along so great a shear zone there are departing fractures leading off into adjacent country rock. Mineralizing agencies passed into these fractures, making veins of ore, which, while narrow in comparison to the main fracture vein, have shown some ores of high values."

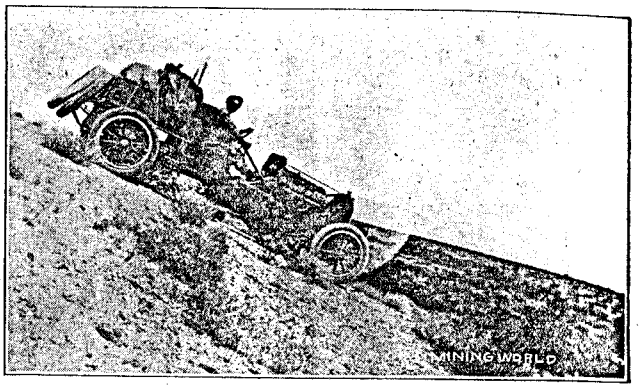
Colorado-Nevada.

In going over a considerable area of the district, four or five centers of activity were observed along the principal canyon and its tributary gulches. One of the most conspicuous of these is the property of the Colo-



COLORADO RIVER FERRY, OPPOSITE EL DORADO CANYON.

rado-Nevada Mining & Milling Co., located on El Dorado canyon proper, 1½ miles below Nelson. The company's holdings comprise the Flagstaff group, on the main fracture zone, and the White Star group covering one of the deflecting veins referred to in the foregoing statement. The ore bodies on the Flagstaff are within the porphyry dike which strikes easterly and westerly along the course of the great fracture. This mineralized porphyry dike stands between andesite walls, and has a dip of about 45° toward the north. The porphyritic material, or vein matter, has undergone various degrees of alteration, making a gangue not entirely uniform in character. The ore consists of sulphides of iron, lead, zinc and copper, carrying gold and silver. The gold exists in free state but appears in fine particles. The silver occurs as argentite, as native silver and associated with galena. The vein bearing this class of ore has been mined to a width of 8 to 25 ft. Operations are carried on through an inclined shaft, which sinks 500 ft. on the dip of the vein, and levels on the vein both east and west from regular stations. The ore hoisted from the Flagstaff shaft, amounting to 60 tons per day, is treated in the company's mill by concentration and cyanidation. The ore is first reduced by a jaw crusher, then passed to a battery of ten 1250-lb. stamps, having 20-mesh screens. The pulp from the stamps is concentrated over two tables, a Wilfley and a Butchart, making a lead and iron concentrate carrying gold and silver. The mid-



PROSPECTING IN NEVADA WITH AUTO.

dlings and tailings from the tables are passed to a Dorr classifier and a tube mill, operating in closed circuit, and the cyanide treatment which follows consists of the Dorr system of continuous counter-current and decantation. During the last 4 months the mill operated on ore which assayed an average of $14.49 per ton and made a recovery by concentration and cyanide treatment of $13.62 per ton, or 94%. Water for mill work is bailed from the mine, and at times there is hardly a sufficient supply. Power is supplied by gasoline engines, in which California "tops" is used as fuel. The 100-hp. engine, by which the stamps and tube mill are operated, is a De Laverne, the four others, aggregating 150-hp., are the Fairbanks-Morse type. The company's White Star group has been considerably developed, but is not producing. The vein outcropping of the main fissure in the Flagstaff gave very low assays, and this is the case as to the secondary parallel veins. It is by sinking to some depth that the metals are found concentrated in regular ore bodies. In the Flagstaff mine, according to Manager Duncan, the gold and silver in the ore runs in the ratio of 30% gold and 70%

silver, in value; but as greater depth is gained the gold increases and is mostly associated with the sulphide of iron.

Techatticup Mine.

The Techatticup belongs to the Wharton estate and is being operated under option to Chas. L. Denison. It is situated on the mountain side, facing Techatticup wash, a branch of the main canyon, and is about a mile north of the Colorado-Nevada. The Techatticup vein runs nearly parallel to the main fracture vein herein described and is considered one of the offshoots therefrom. This is a comparatively narrow vein, in andesite, and has a dip varying from 20 to 80° to the north. The width of ore ranges from a mere seam to 6 ft. The gangue is composed of calcite and quartz, carrying gold and silver in sulphides of iron, lead, zinc and copper, assaying about $20. Besides the principal vein, striking east-west, there is a branch vein coming into it from the southeast, called the Savage. This branch vein is likewise a fissure in the andesite and other characteristics are the same as those of the Techatticup vein. In the latter vein 90% of the value is in gold, the iron running 5%, zinc 2%, lead 2% and copper 1%. Ore in the Savage vein runs high in silver, much of which occurs as a chloride. In both veins the ore exists in shoots and other bodies, not continuous. Material between such shoots is mineralized but much of it is too low grade to be mined profitably. The 600-ft. inclined shaft was sunk close to the junction of the Techatticup and Savage veins, drifts therefrom extending into both. In general, the inclination of the shaft follows the dip of the vein, but in places where the vein flattens out considerably the shaft is some distance off the vein in the foot wall. There are five working levels, the longest drift east of the shaft being 600 ft. and the farthest west being 400 ft. A crosscut tunnel runs in 300 ft. to the shaft, connecting with it 150 ft. below the collar. This crosscut is on a level with the crusher floor and all ore is hauled out that way. Hoist and compressor are operated by gasoline engines, using "tops," or 40 to 44 gravity gas oil. Other shafts have been sunk on the property for development purposes. A cyanidation plant on the property treats 50 tons of ore per day. The ore is reduced to 4 mesh by a jaw crusher and two sets of rolls. At that size it enters a 5 by 22-ft. tube mill, using flint pebbles, by which it is so pulverized that 80% of it will pass 200 mesh. The cyanide solution is introduced in the tube mill. In passing this pulp to a Dorr classifier, the coarser sand is returned to the tube mill. The slimes pass to Dorr agitators and thickeners, carrying out the system of continuous counter-current and decantation leaching. In this work it is stated that an extraction of 90% is made. R. T. Walker is general superintendent; mine foreman, Frank Hoin; mill men, Roy Leach and G. M. Cotherton.

Wharton Estate.

This property is in control of the Girard Trust Co. as trustee, Philadelphia, represented in this district by G. S. Borden. It has 22 patented claims in this locality, not including the Techatticup group. They are located in various parts of the district. All are idle excepting in two or three places where ground has been leased. The most noteworthy of all is the Wall Street group, on El Dorado canyon, a mile above Nelson. In earlier years gold and silver ore of the value of over $1,000,000 was mined and milled. This was taken from a vein 10 to 15 ft. wide, striking east-west, with a dip of 40° south. The ore was mined to a depth of 80 ft. and a length of about 100. Much of the ore is said to have milled $250, and was hauled to a stamp mill on the river, in which the gold and silver was recovered by amalgamation. Records show that the ore contained 1 oz. gold to 3 ozs. silver. There is now some water in the bottom of the workings. The property was located in 1871 and came into possession of Wharton in 1892. While the Wall Street has been idle during the last 16 years, it has an interesting history and is today a show place in the district. In that locality some of the richest ore thus far found in the district has been uncovered by surface cuts and shallow shafts.

The Rand.

Rand Mining Co. owns 32 claims formerly controlled by the Black Hawk Mining Co. Under the management of Robert Dunbar, Pittsburgh, operations were resumed in February, 1916, with L. C. Campbell as superintendent. The location is on the south side of Copper canyon, on the Searchlight road, about 2 miles west of the Wall Street. The holdings cover 1½ miles on the strike of an east-west fissure vein in monzonite-porphyry. The vein has a varying dip to the north. It has been opened by a 500-ft. inclined shaft, following approximately the general dip of the vein. Water came in at 400 ft. and workings below that level are now submerged. A big tonnage of oxidized ore was formerly mined in stopes near the surface. The sulphides were found at and below the 100-ft. level. Ore now being stoped above the 300 level occurs in defined lenses, the gangue being quartz, spar and altered rock. The gold is largely free and amalgamable, the sulphides being those of iron, lead, zinc and antimony. The lead is accompanied by silver. An electric duplex plunger pump, stationed at the 400-ft. level, is used for lifting water to a tank on the surface for mill work. In the shaft house is a gasoline engine for operating a skip in the incline and an air compressor. The Venus shaft, 1200 ft. west of main shaft, contains a supply of water and this is considered in a separate basin. An electric pump is stationed at the 200 level of the Venus whereby water is furnished for domestic and other uses at the camp. Electric power is produced by a Westinghouse generator, driven by a gasoline engine in the mill. This is used for lighting and for pumping operations. The milling plant, consisting of 10 stamps, amalgamating plates and two Deister tables, is operating with one shift, but this is to be increased to two shifts. The pulp from the plates runs into a classifier,

the heavy material passing to a sand table and the lighter to a slimer, making lead and zinc concentrates of different grades. The tailings are being impounded. This camp is 2000 ft. higher than that of the Techatticup and is 800 ft. higher than the Wall Street.

This is one of active centers previously referred to. The Quaker City, on a parallel vein lying north of the Rand, belongs to the Wharton estate, and south of the Rand is the Enterprise group, having a parallel vein formerly opened by an adit level, and on which development is being undertaken by present owners, including E. P. Jeanes, C. E. L. Gresh, H. H. Johnson and Leonard & Co. Existing workings show a fair grade of ore. Other holdings in this locality are on strong veins that will probably justify development. The Occidental-El Dorado, half way between the Rand Rand Wall Street, is well developed by tunnels and shafts and equipped with hoist, air-compressor and cyanide plant. It has been idle several years, but it is possible that operations may be resumed.

Carnation Lode.

This group of 20 claims, lying north and west of the Wall Street, belongs to W. H. Evans and is under a 5-year lease to A. Welk, C. A. Spencer and W. H. Kirchner. These men, who were formerly in Good Spring district, are exploring and developing, and recently struck a 5-ft. face of ore in a 20-ft. shaft. Other veins on the group have been opened by 60 and 40-ft. shafts, exposing pay ore. Assays of the rich ore in the 20-ft. shaft, according to the assay certificates, showed up as follows: Sample No. 1, 3.85 ozs. gold and 32.56 ozs. silver; No. 2, gold, 127.61 ozs., silver, 1246.9 ozs. No. 3, in three parts, gave gold, 12.08 ozs., 6.8 ozs., 3.8 ozs., respectively, and gave in silver 106.12 ozs., 71.6 ozs. and 28.8 ozs., respectively. All this ore consisted of sulphides, the fold being apparently free. Ore taken from other shallow workings assayed $8 to $12 per ton. Specimens taken from a high grade streak in the 20-ft. shaft ran over $3000 per ton in gold and silver. This leasing firm announces that a small mill of 25 to 50 tons capacity will be erected this fall for amalgamation and concentration.

These rich strikes on ground adjacent to the old Wall Street are making this another active center in the district. The lessees named have let a number of sub-leases, one of these being to Jas. German, M. E. Fisher and Chas. Herman, who have taken over the Lombard Street claim for 5 years. Their development has exposed pay ore 18 ins. wide in a 5-ft. vein.

About 1500 ft. farther down the canyon, apparently on the same mineral belt, is the El Dorado-Empire, in the hands of C. E. L. Gresh and associates. Ore of good grade has been found in a 70-ft. shaft, over which they have a gasoline hoist.

Clark M. Alvord has two groups of claims partly developed. One is the Skylark, located between the Techatticup and the Colorado-Nevada. He has an east-west vein in andesite, on which some ore has been blocked out. The ore is similar to that of the two mines in that locality. A small shipment of sorted ore sampled $55 per ton. His other group is the San Juan, extending to both sides of El Dorado canyon, half a mile below Nelson. Development by adit levels exposed sulphide ore, assaying $4 gold, 7 ozs. silver, 18% zinc and 17% lead. There are four parallel veins. A crosscut is being driven to cut the San Juan vein at a depth of 400 ft.

J. B. Caldwell purchased the Little Eohippus, located one-half mile east of Colorado-Nevada, of J. E. Babcock. Surface work has disclosed some ore on an east-west dike of porphyry. He expects to install a gasoline hoist and air-compressor and develop the property.

Allcock & Wells, Nelson, have some development on the Champion group, located on January wash. This wash enters the main canyon in the vicinity of the Colorado-Nevada. It is claimed there are four veins on the group, opened to some extent by adit levels and winzes. The ore contains gold and silver in sulphides of iron, lead and zinc.

Knob hill, at the head of January wash, is the location of a number of properties, some of which are well developed. Included in these are the El Dorado-Star, Empire, Ben-Ezra and Rich Hill. Among other properties farther east are the Capital, the Wallace and Astor-El Dorado. The Knob hill region was not visited.

New Aluminum Smelting Plant.

The Aluminum Ore Co., a subsidiary of the Aluminum Co. of America, Pittsburgh, has bought a tract of 200 acres or more at Sollers Point, near Sparrows Point, Md., on which it proposes to build a plant for refining bauxite, from which aluminum is extracted. The company has maintained at East St. Louis, Ill., for some years a similar plant, obtaining the bauxite from Arkansas, Georgia and Alabama. The capacity of the new plant at Sollers Point will be much smaller than that of the plant at East St. Louis, but it will be enlarged when the demands of the company make this imperative. The new plant will be built by the engineering organization of the Aluminum Co. of America, which is fully equipped to do the work. C. B. Fox, general superintendent of the East St. Louis plant, will be in regular consultation with the company's engineers in Pittsburgh during the progress of the construction work. The Sollers Point plant is expected to cost somewhat in excess of $1,000,000 and to be in operation early in 1918. The Aluminum Co. of America is the largest manufacturer of pure aluminum in the world, its principal plants being located at Merryville, Tenn.; Baden, N. C.; New Kensington, Pa.; East St. Louis, Ill.; Niagara Falls and Messina, N. Y., and at Shawinigan Falls, Quebec. The last named plant is operated by the Northern Aluminum Co. of Canada, an identified interest of the Aluminum Co. of America. The company has several smaller plants at other locations.