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James Doyle Sell Mining Collection

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composed mainly of seamed, gold-bearing limonite-stained quartz. It is said to average about \$10 in gold to the ton. The hanging wall of the fissure is regular, but rough. Small faults 2 to 6 feet in throw occur, locally accompanied by overlap and enlargement of the vein. The ore favors the hanging wall, but where the vein overturns on the third level and the hanging wall becomes the foot wall the ore, nearly 1 foot thick, occurs in the foot-wall side.

The ore is free milling, but not so much so as the Eldorado ore, the gold being associated with cerusite. The principal other associated minerals are limonite, hematite, siderite, galena, molybdenite, and wolframite.

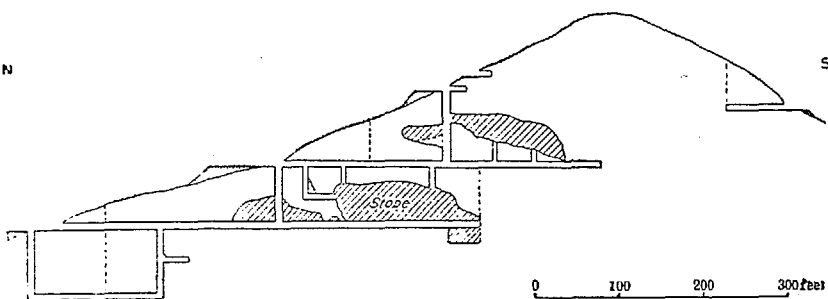


FIGURE 20. —Longitudinal section of O. K. mine, showing stopes.

Excelsior mine.—The Excelsior mine is about a mile northeast of the Eldorado and O. K. mines, in the low foothills near the edge of Hualpai Valley and about 500 feet above it, on the north side of O. K. Wash. The mine is developed to a depth of about 100 feet, principally by inclined shafts, drifts, and stopes, aggregating 500 feet of underground work. The production is reported to be \$5,000.

The country rock is a coarse reddish granite associated with black amphibolite schist. The vein dips about 45° NW. It is from 1 to 4 feet in width and is locally occupied by gouge only. The ore shoot contains deeply iron-stained gold-bearing quartz or ore. It varies from three-fourths to 1 foot in width and occurs mainly on the hanging wall. The ore is said to be cyaniding ore, only a small percentage of the values yielding to amalgamation.

MASCOT MINE.

The Mascot, formerly the Old Homestake mine, is situated north of the Excelsior mine in the foothills at the edge of Hualpai Wash, and is said to contain a vein only 3 inches in width, which, however, is reported to be very rich. It is owned by the Arizona-Minnesota Mining Company.

NEVER-GET-LEFT MINE.

The Never-get-left mine is located in the upper part of a cliff or fault scarp that overlooks the Eldorado mine on the east, from which it is but a few hundred yards distant. It is situated at about 4,500 feet elevation, or 1,600 feet above Hualpai Valley. It is owned by Henry Paully, of Basin, and is developed principally by an adit drift, shallow shafts, and open cuts, aggregating several hundred feet of work.

The country rock is dark gneissoid schist. The structure dips about 50° W., but the principal deposit dips about 80° N. It has a width of 6 or 8 feet and contains mainly iron-stained or copper-stained crushed gold-bearing quartz. The country rock is greatly disturbed by jointing, fracturing, and faulting, and its true character is somewhat doubtful. The mine has been a small producer for some years and was shipping ore in April, 1906.

GOLDEN RULE MINE.

Location and history.—The Golden Rule mine is about 1 mile west of the Never-get-left mine, at the extreme head of O. K. Wash, at about 4,550 feet elevation. It was discovered in the early eighties by Robert Patterson and Saul Rowe, who hauled some of the ore to the Grass Springs mill. Subsequently they leased the mine to Mr. Quackenback, and in 1900 sold it to the present owner, the Arizona-Minnesota Gold Mining Company. This company did but little development work on it till 1906. From May 15 to November 1 it was operated with a force of ten men, but was closed on the latter date. The production of the mine is estimated to be about \$5,000, most of which came from the blanket vein.

Development.—The mine is developed by a 75-foot shaft, about 300 feet of drift, stopes, and a 25° incline about 100 feet long and 20 to 40 feet in width, the incline being on the south, where the deposits occur in the form of a blanket vein. The workings are contained within a horizontal distance of about 700 feet and a vertical distance of about 100 feet. The mine is handicapped by lack of water, which has to be hauled from the Cyclopic mine or from Basin, in Hualpai Valley.

Geology and ore deposits.—The country rock is the pre-Cambrian gneiss and schist. The fissure vein containing the principal part of the deposits strikes N. 20° E. and dips about 70° ESE. The crop-pings, which in part are prominent, form a reef of iron-stained, firmly cemented quartz breccia. The vein is best exposed in the north drift. It is about 2½ feet in average width and contains gold-bearing normal vein quartz, locally crushed, recemented, and iron-stained. Associated with it on either side is a sheet of pale grayish or whitish

gouge. The vein is said to yield good values throughout, the average being about \$10 in gold to the ton, but the honeycombed quartz is the richest part of it.

At 120 feet in from the mouth of the drift the vein is abruptly cut off by a fault, immediately beyond which occurs a dark schistose rock that may be an intrusive. Near the fault the vein enlarges to about 12 feet in width, the enlargement being mainly on the foot-wall side and containing much honeycombed quartz, and the ore, greatly increased in quantity, is said to contain higher values. Some of it averaged about \$100 a ton in a large chamber, from which much ore has been removed.

The fault fades north at an angle of about 10°. It is a normal one and the lost portion of the vein has risen toward the southeast. The amount of throw was not determined, but it is probably not very great. Beyond the fault the drift extends about 100 feet on the projected course of the vein which, however, has not been found.

On the south the deposits occur in a blanket vein, which is 3 to 5 feet thick, dips about 25° SE., and is probably a portion of the vein in the north drift, for it straightens up in that direction toward the top of the hill. The blanket portion has been mined over an area of about 100 feet along the strike and a breadth of 35 feet down the dip, and it probably produced good values.

CYCLOPIC MINE.

Location and history.—The Cyclopic mine is located in the southeastern part of the district, about 5 miles southwest of the Eldorado mine, near the head of Cyclopic Wash, at about 4,500 feet elevation, on open ground. It was discovered in the early eighties by Patterson, Rowe, and Glen, and about 1896 it was leased to a Seattle company. In 1901, with the Golden Rule mine, it was sold to Robbins & Walker, of Minneapolis, who milled some ore. The coarse tailings still on the ground are said to contain about \$7 in gold to the ton. Since 1904 the mine has been owned by the Cyclopic Gold Mining Company, of Denver. A considerable amount of bullion is said to have been produced, but the exact amount was not ascertained.

Developments.—The mine is developed mainly by shallow, mostly inclined shafts, drifts, and crosscuts to a maximum depth of about 70 feet, but most of the workings do not extend below 30 feet. The developments probably aggregate about 1,000 feet of work.

As the mine is located in a broad wash, some of the workings have become filled with wash debris at times of flood. The principal equipments are an Ellspass mill, operated by a 26-horsepower engine, and a cyanide plant. The water supply is pumped by a small gasoline plant from the west side of the range, several miles distant.

Geology.—The country rock is a medium-grained coarsely porphyritic granite. It outcrops in association with the deposits and forms the foothills immediately on the southwest. Paralleling this rock the wash, and the deposits on the northeast, and constituting the ridge on which the office and other buildings stand, is a fine-grained reddish granitic rock, with which is associated some of the same biotite granite that underlies the Eldorado mine. In contact with the deposits, particularly to the northwest, there is also a coarse red pegmatite.

Deposits.—The deposits are ill defined and not well understood. They consist of gold-bearing iron-stained breccias and sands of very quartz, in a few places somewhat resembling conglomerate. This material is cemented by silica and iron oxide, but is in part loosely coherent. It trends from a point near the mill N. 57° W. up the wash and is contained in, and for the most part seems to occupy, an area three-fourths of a mile in length by about 200 feet or more in width. Prominent reefs of silicified iron-stained breccia several or more feet in width outcrop several feet above the surface. They are in practically all respects identical with the croppings of the Golden Rule and other veins that have been described. They do not, however, as a rule, continue in depth in the manner of a fissure vein, nor seem to have any definite fissure wall, but usually at a short distance below the surface give way to less firm material having an imperfect synclinal structure. In the northern part, the pseudovein croppings dip toward each other and their attitude suggests that they may be synclinal limbs of the same vein deposit.

From the principal openings near the mill in the southeastern part of the deposit the croppings representing the main or Cyclopic vein extend N. 57° W. They are continuous for the first 400 feet and are accompanied by some underlying vein quartz or ore and show ore in sight at both ends of the 400-foot excavation. Between this vicinity, however, and the northwest limits of the deposits, the croppings of the vein are interrupted, and some pits and cuts have failed to find ore there.

The croppings of the other vein extend without interruption from a point about one-fourth of a mile northwest of the principal opening for a distance of 350 feet to the northwest. They are nearly parallel with the main vein, from which they are about 350 feet distant.

The ore thus far has been derived mostly from these veins, but crosscuts 80 feet or more in length have been run in a considerable portion of the deposits between them and report fair values, which, however, seem to occur in lines or zones paralleling the deposits. Practically no mining has been done below a depth of about 30 feet. Near this level there is reported to occur a bed of red clay or gouge, which was formerly supposed to mark the lower limit of the ore, but

of the mine than in the oxide zone near the surface. Its run of mine, roughly computed from a record of the output from October 10, 1885, to March 6, 1901, is about as follows: Silver 160 ounces and gold 2 ounces to the ton; lead, 12 to 20 per cent.

Production.—The production is reported to be \$1,300,000, that of silver alone amounting to about \$1,000,000; and several thousand dollars' worth of medium-grade ore are said to now lie on the dump. The output was mostly made between the autumns of 1885 and 1892. During this period 3,687 tons of ore are reported, according to smelter return sheets, to have contained about 402,000 ounces of silver, 1180 ounces of gold, and 515,760 pounds of lead. Later, about 1900 to 1902, about 17,550 ounces of silver, 180 ounces of gold, and 114,360 pounds of lead are said to have been obtained from 330 tons of concentrates.

MINES OF CANYON STATION WASH.

In Canyon Station Wash, about a mile north of C. O. D. Wash, there are reported to be several small mines, of which the most important seem to be the Baden-Baden, King, and Queen mines, said to be owned by Lewis Davidson, of Kingman.

MINES IN "TOP OF STOCKTON HILL" AREA.

The "top of Stockton Hill" is situated in the northwestern part of the district, at the crest of the range, between the northern part of the Cerbat district on the west and the heads of I. X. L. and C. O. D. washes on the east. The mines include the Cincinnati, Miner's Hope, Blue Bell, Fountain Head, Brown, and others, the most important of which seems to be the Cincinnati. It is situated near the crest of the range about midway between Lane Springs and I. X. L. basins. It has not been worked for many years, but is regarded as a good property.

GOLD BASIN DISTRICT.

GENERAL FEATURES.

The Gold Basin mining district, of which Basin is the post-office, is situated in the eastern part of the White Hills (fig. 18). It extends over a hilly area about 6 miles in diameter, sloping to Hualpai Wash on the east, and ranges from 2,900 to 5,000 feet in elevation. The northeastern portion, where most of the mines are situated, is rugged, being marked by longitudinal fault scarps and scored by

The mine is said to contain no copper above the 200-foot level, but in an opening about half a mile west of the mine and about 500 feet above it, on what is thought to be the C. O. D. vein, the ore, which here occurs in a milk-white quartz gangue, consists chiefly of hornite and chalcopryite, with some zinc blende, and about \$20 in gold to

several deep transverse washes, of which the principal ones are Banker, O. K., and Cyclopic, situated about 2 miles apart. The nearest railway station is Hackberry, 40 miles to the south, with which connection is made by stage line. Colorado River lies 16 miles to the north. Mineral was first discovered here early in the seventies, but remoteness from the base of supplies, together with scarcity of fuel and water, renders operations expensive and has materially retarded developments. Nevertheless, considerable progress has been made and much ore has been produced and worked in arrastres and mills.

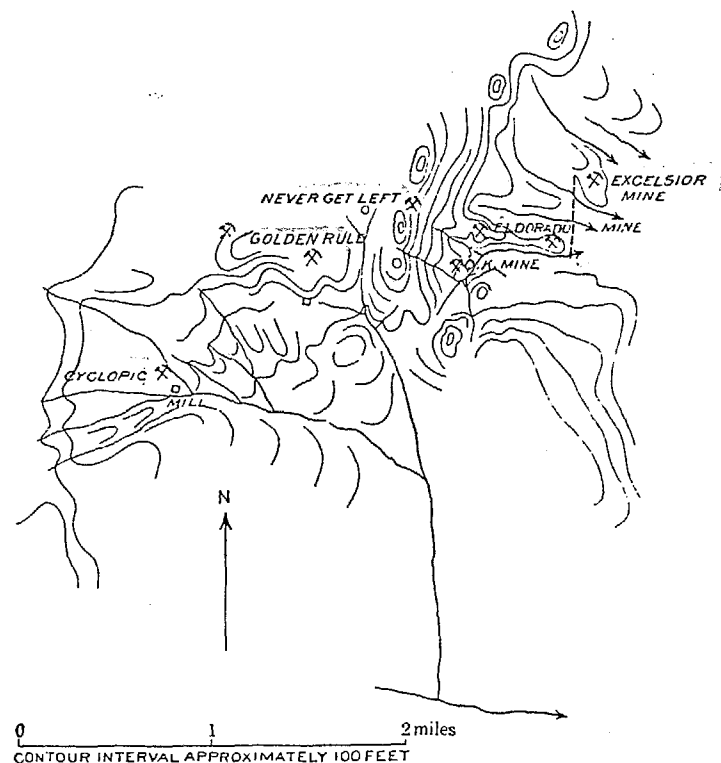


FIGURE 18.—Sketch map of Gold Basin district.

The deposits occur mainly in fissure veins in the pre-Cambrian crystalline rocks. The veins dip southeastward or northwestward, mainly at angles of 40° or 70°. The gangue is quartz, in places with siderite, and the metal is gold, mostly free milling, but it is associated with lead or copper ores, copper stain being a good indication of the gold values. Pyrite, chalcopryite, galena, molybdenite, and wolframite are found, but the ore is largely oxidized, the water level not having been reached. Among the oxidized products are limonite, malachite, cerusite, and vanadinite.

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The district contains about half a dozen small mines and about an equal number of good-looking prospects. The relative location of the most important is shown in the small sketch map (fig. 18). The principal mines are the Eldorado, Excelsior, Golden Rule, Jim Blaine, Never-get-left, O. K., and Cyclopic. The production of the district is given as more than \$100,000, most of which came from the Eldorado mine.

ELDORADO MINE.

Location and history.—The Eldorado mine is located in the high foothills in the eastern part of the district, at about 4,000 feet elevation and 1,000 feet above Hualpai Wash, which is about 2 miles distant. The mine is reached by wagon road, over which most of the ore was hauled to the Basin or O. K. mill, 4 miles distant in Hualpai Valley. This mill, which was burnt while in operation in August, 1906, contained 10 stamps and a cyanide plant.

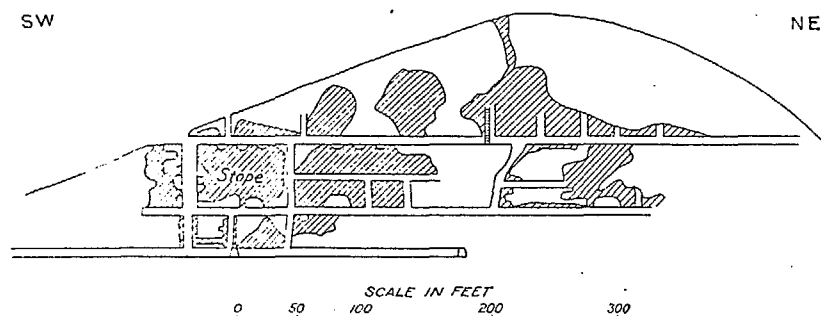


FIGURE 19.—Longitudinal section of Eldorado mine, showing stopes.

The mine was discovered late in the seventies and produced the first bullion taken from the district, much of its ore being at first worked in arrastres. It is owned by the Arizona-Minnesota Gold Mining Company, of Minneapolis. The production is reported to be \$65,000, of which \$5,000 was produced prior to 1902.

Developments.—The mine is developed principally by about 2,000 feet of tunnels and drifts and 40,000 cubic feet of stopes on three levels, aggregating probably about 90,000 cubic feet of underground work and distributed approximately as shown in the accompanying diagram (fig. 19). The lower tunnel trends about N. 33° E. and strikes the vein at about 200 feet in from the mouth. From this point the drift extends about 200 feet to the northeast.

Geology.—The country rock is a reddish schistose medium-grained granite. On the northeast, however, as shown at the surface and in the bottom of the mine, this rock gives way to a dark friable biotite granite. The contact between the two rocks dips about 30° W. It

is usually sharp and is probably a fault plane, which seems to cut off the vein on the northeast.

Veins and ores.—The deposit is a fissure vein, which strikes about N. 50° E. and dips 65° SE. It is continuous from the apex at the crest of the ridge to the contact in the lower tunnel of the mine and is stoped out through most of this extent. The walls are fair, but not regular. The vein averages several feet and the ore shoot about 20 inches in width. It contains iron-stained, free-milling gold-quartz ore, and is reported to average from \$12 to \$15 a ton in gold. The other associated minerals are malachite, lead carbonate, and vanadinite, the last occurring locally as incrustations of crystals one-fourth inch in maximum length. The principal mill treatment given to the ore was crushing, plate amalgamation, and cyanidation.

Just northwest of the apex of the vein above described and about 80 feet above it is the blanket vein, which is exposed for a length of 600 feet and a width of about 100 feet and which has contributed largely to the output of the mine. It dips about 25° E.

O. K. AND EXCELSIOR MINES.

The O. K. and Excelsior mines were discovered and located by three prospectors, Patterson, Rowe, and Fox, early in the eighties. They worked the ores in arrastres and hauled some to the 4-stamp mill at Grass Springs. In 1886 the O. K. was sold to a Kansas City company, which at once put up the O. K. mill in Hualpai Valley and ran it intermittently from 1887 to 1890. The mill burned down in 1893, but was rebuilt in 1896 and operated by lessees for a time, and then again shut down. It started once more early in 1902 and ran intermittently until 1906, when it burned down while in operation. The water used at the mills was piped from the springs or water tunnels in the upper part of Grand Wash Cliffs, 7 miles to the northeast. The mines are now owned by the Arizona-Minnesota Gold Mining Company.

O. K. mine.—The O. K. mine is about half a mile south of the Eldorado mine and about 100 feet below it, on the opposite side of O. K. Wash. The mine is developed mainly by adit drifts, winzes, and stopes on four levels. There is about 1,600 feet of underground work, distributed approximately as shown in the section (fig. 20). The production is reported to be about \$25,000.

The country rock is a dark biotite granite, about the same as that which occurs in the bottom of the Eldorado mine. The strike is N. 30° E., with dip vertical. Slickensides pitch northeast-east toward the mouth of the drifts at angles of about 35°.

The vein trends N. 65° E., but curves to the north in its course and dips about 75° NW. It averages about 18 inches in width and is