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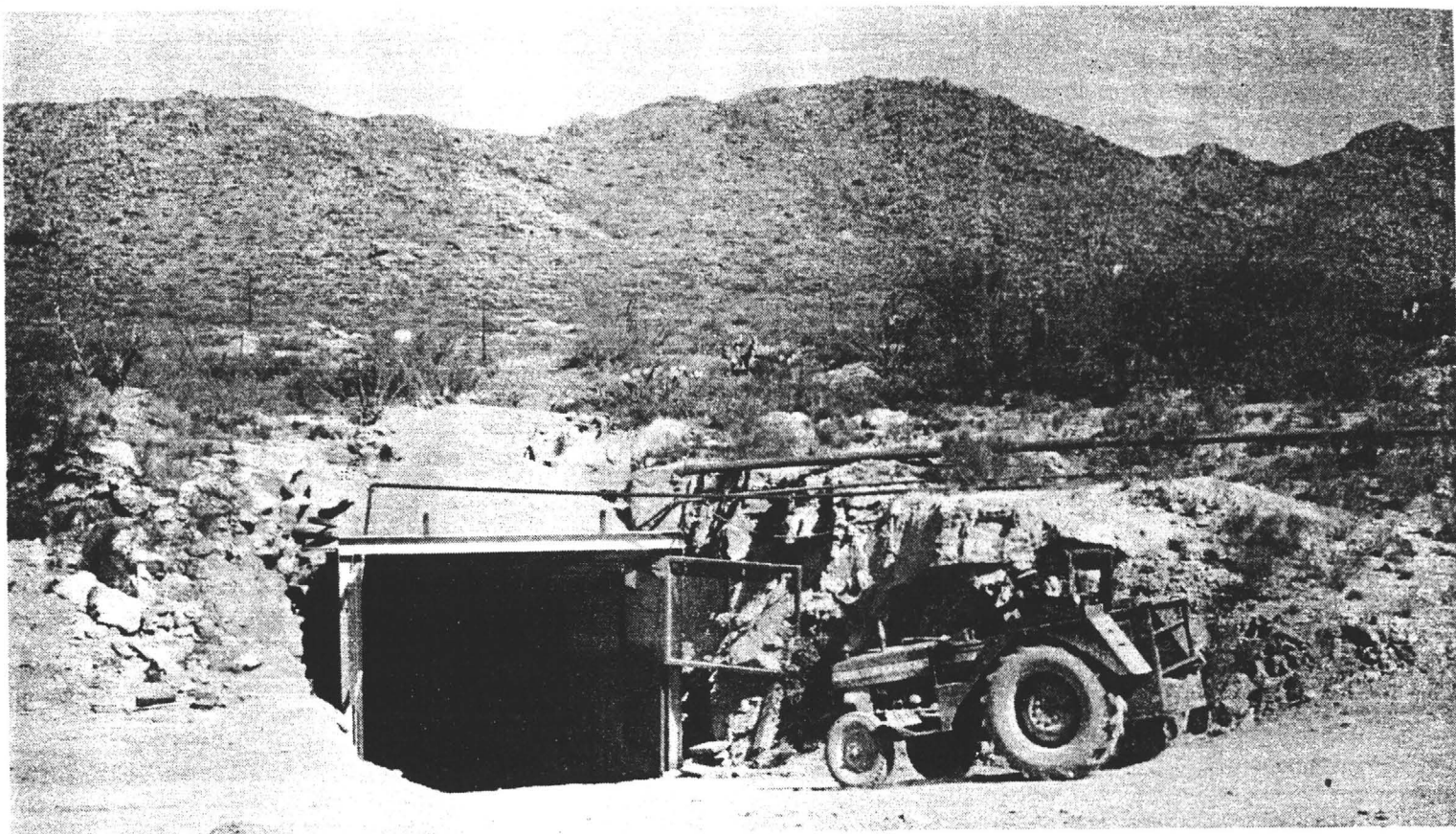
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The "boss buggy" entering the portal of the 3,300-foot-long decline at the Congress mine. The decline, 11 feet high and 15 feet wide, goes down a 12.5 percent grade to reach the ore vein.

Echo Bay expects 100,000 ounces over five years

Saves cost of mill by shipping high-silica ore as copper smelter flux

By Karen Walenga
Staff Reporter

Gold is once again being produced from the old mining region of Congress in west-central Arizona's Yavapai County.

Since bringing its new Congress project on line earlier this year, Echo Bay Mines Ltd. reports output of almost 11,000 ounces of gold as of the end of September from the operation, located about five miles from the community of Congress, southwest of Prescott and northwest of Wickenburg.

Overall, Echo Bay projects that the underground mining project at Congress will produce approximately 20,000 ounces of gold annually during its estimated five-year life.

Echo Bay considers Congress to be a small operation in comparison with the firm's larger precious metals projects, such as Round Mountain and McCoy-Cove in Nevada. However, the company was able to save time and money at Congress because no mill facilities are required. Instead, the unprocessed, high-silica gold ore is transported to a smelter for use as flux.

According to the company, Congress currently has geological reserves of 470,978 tons of ore grading 0.2908 ogt for a mineral

resource of 149,000 ounces of gold.

In addition, a diamond drill exploration program at the property was to begin late this year and continue into 1989, the firm told *PAY DIRT*.

At present, the gold operation is producing approximately 300 tons of ore per day, five days a week, with a 40-member work force.

The project came on line in March and had produced a total 10,954 ounces of gold as of September 30th. Output at Congress for the third quarter was 4,512 ounces, up from 4,151 ounces during the previous three months, according to Echo Bay's financial report for the 1988 third quarter.

Cash production costs at Congress were \$179 per ounce for the third quarter and \$246 per ounce for the first nine months of 1988.

Echo Bay arrived in 1985

As previously reported, Echo Bay began exploration at the Congress site, northwest of Wickenburg, in 1985 and subsequently developed a gold deposit adjacent to an old underground mine.

The company began mining at Congress during the first quarter this year and reached commercial production levels in March, one

year ahead of schedule.

"Phase I and Phase II of the development program had the mine in a very good position to start production sooner than planned," the company explained. "A decline had been driven 3,300 feet and a test stope had been mined which produced 8,000 tons. Also, we made the decision to ship run-of-mine ore to a smelter. There was then no need to build a mill."

Congress mine manager Bob Stoughton told *The Wickenburg Sun* newspaper that shipping the ore directly to the Phelps Dodge Corporation copper smelter at Playas, New Mexico is more lucrative than trying to mill it at the Congress site.

For development of its new underground workings at Congress, Echo Bay pointed out that a decline, measuring 11 feet in height and 15 feet in width, is driven at minus 12.5 percent, cross-cutting at designated elevation points from the ramp to the ore vein, which is then mined by a "shrink stope" method of mining.

Echo Bay has been using none of the old underground workings at Congress. However, a drift was being driven in an area adjacent to some of the old workings.

Congress . . .

In comparing the old Congress mining operations to its new project, Echo Bay noted that the old Congress vein lay at a 26-degree dip and was mined by the "shrinking" method with wooden stulls used for ground support. "Haulage levels were very small with 24-inch rails," the company added.

Using mechanized mining

The new Congress vein "lays at 45-degree slope and is being mined by a 'shrink and end-slice' method," the firm pointed out. "We also use wooden stulls for ground support along with split-sets and landing mats. Our haulage levels are much larger and we remove the ore with Load Haul Dumps (LHD's) and 25-ton trucks."

Further detailing the mining equipment in use at Congress, Echo Bay said it has 3.5-yard Wagner LHD units, 1.5-yard JCI LHDs, 25-ton Wagner trucks, a 13-ton JCI truck, Tamrock jumbo drills, and jacklegs.

The surface facilities for the new Congress operation consist of one building that houses offices, the change room, a warehouse and repair shop. "Vent fans and compressors are mounted away from the building to decrease the noise level," the company said.

Overall, Echo Bay owns and leases a total of approximately 2,400 acres for its Congress operation, with 2,000 acres on public lands administered by the Forest Service and the Bureau of Land Management.



Scott Petsel, mine geologist, inspects the ore vein.

According to *The Wickenburg Sun* newspaper, the area now being mined by Echo Bay was first staked in the early 1880s by Dennis May, who subsequently sold the claims to "Diamond Joe" Reynolds and Frank Murphy.

Operations began at the old Congress mine in 1894 and continued until 1911. During that period, records show almost 700,000 tons of ore were milled and 388,000 ounces of gold were recovered.

The mine then was idle from 1911 through 1935 and was sold by the Congress Mining Corporation for \$26,000. "The property saw very little production and changed hands several times before D.W. Jaquays took ownership and began conducting exploration drilling in the late 1970s," the Wickenburg newspaper reported.

When gold prices increased in 1980, Jaquays began a heap-leaching operation at the Congress property. That project was "only marginally successful," according to the report.

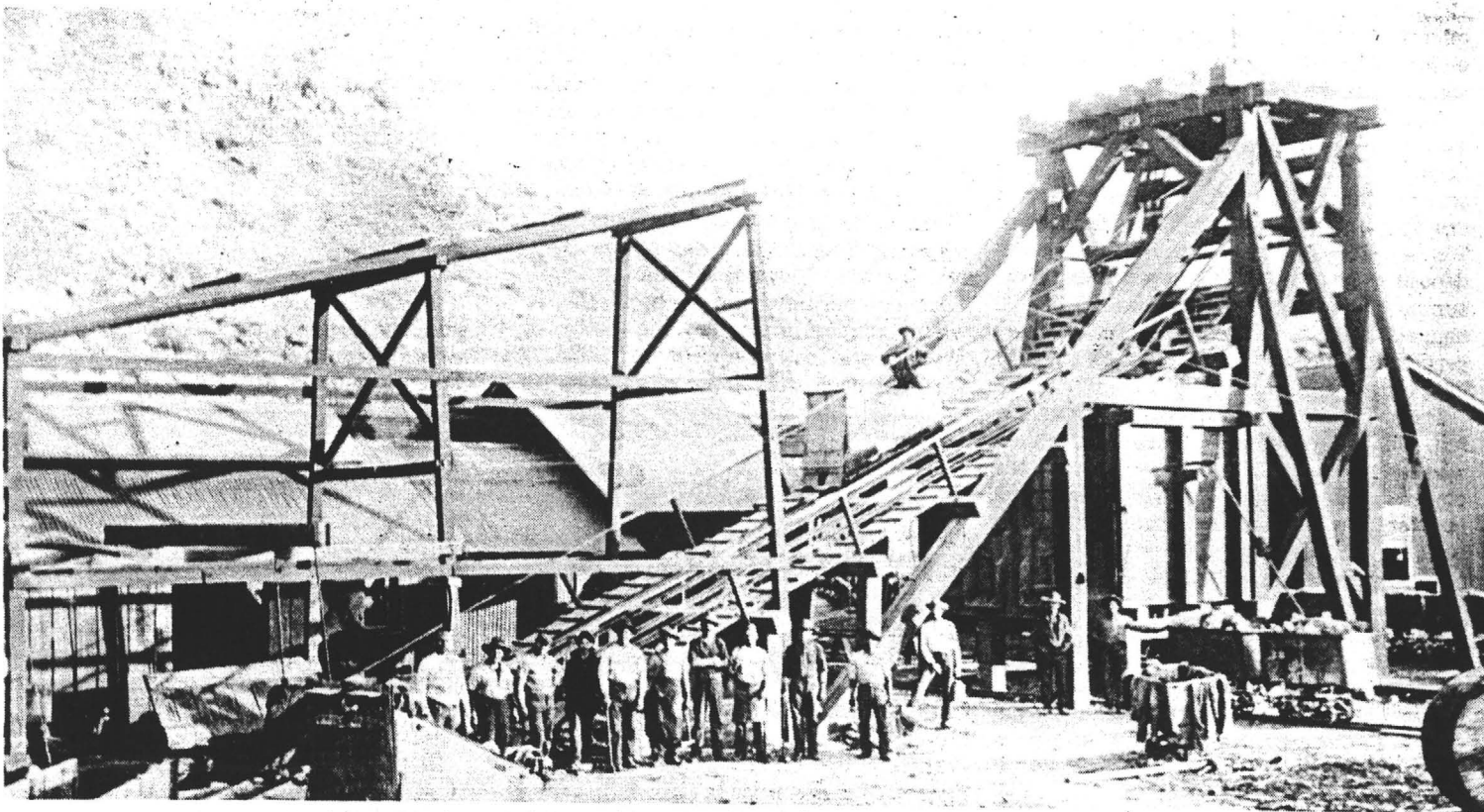
In April 1982, Magic Circle Energy Corporation bought the property from Jaquays and began its own exploratory drilling program. That work resulted in the discovery of the Niagara Vein, a significant new shoot.

Magic Circle then began looking for a joint venture partner, and Echo Bay joined the project in 1984. Echo Bay now holds a 100-percent interest in the Congress project.

Three old mining camps

A short distance to the east of the old Congress mine is a high mountain called Rich Hill. At its foot were three old mining camps, Stanton, Octave and Weaver.

Octave, which began as a placer camp in 1863, was claimed by eight men. The Octave



The No. 3 shaft, also a decline, at the Congress mine on January 26, 1900. According to a notation on the photo, the incline had 4,000 feet of

double track, 40-pound rail and used three-ton skips to bring the ore to the storage bin under the headframe.

Mexican bank rejects bids for sale of Cananea copper mine

By Bill Epler
Staff Reporter

The Mexican government's second attempt to sell the copper mining and processing complex at Cananea in northern Sonora fell through November 8th when bids from two prospective buyers were called inadequate.

Nacional Financiera, the government development bank commonly known as Nafinsa, announced in Mexico City that the offers were insufficient. But it did not disclose the amounts of the offers.

Nafinsa said it would enter "a new chapter to explore new possibilities" for sale of the Cananea properties.

The bidders were Industrias Penoles, an old-line Mexican mining company, and Protexa, an industrial conglomerate based in Monterrey, whose earlier bid had also been rejected. A third company, Corporacion Industrial San Luis, had posted a large deposit

in September to earn the right to bid, but never submitted one.

A sales agreement with Protexa that fell through last May was based on a price of \$910 million in Mexican foreign debt the buyer would have purchased on the open market at about a 50 percent discount.

Industry observers have said all along that the Nafinsa target price of \$800 million to \$900 million was far too high. Nafinsa did not reveal the price it was seeking in the second sale attempt, but a sale at a price much lower than the one announced in the failed previous sales attempt would have embarrassed authorities who were already under fire from

the left for selling off major state-owned companies in an effort to reduce foreign debt.

Rejection of the Cananea offers came about a week after Mexicana de Cobre, the government-dominated firm that owned the copper mine, concentrator and smelter at Nacozari, some 90 miles to the southeast of Cananea, was sold back to its original owner. The sale to Fomento Industrial del Norte, including a symbolic three percent stake to the miners union, was for \$1.3 billion worth of Mexico's foreign debt that was expected to be bought for about 50 percent of face value. (See November issue of Southwest PAY DIRT for details.)

Martin elected Arizona mine inspector

By Bill Epler
Staff Reporter

Republican Douglas Martin, owner of a mining engineering consulting firm in Phoenix, was elected Arizona State Mine Inspector in the November general election.

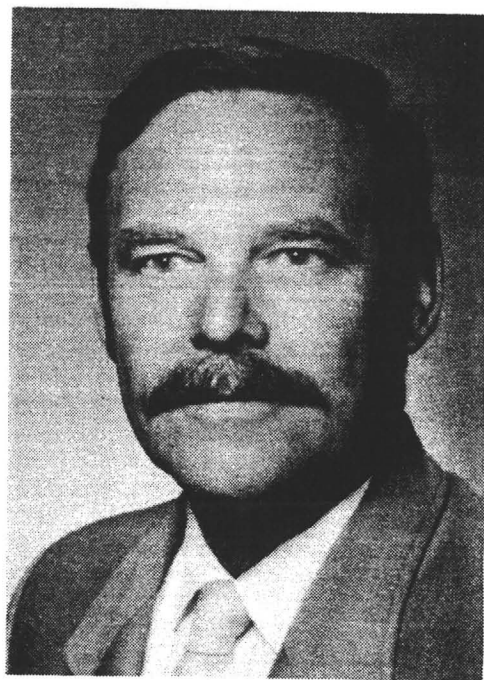
He will succeed James McCutchan, who decided not to seek re-election after several terms.

Martin, 49, benefiting from the heavy Republican vote in Maricopa County in his first try for public office, beat former mine inspector Bert Romero, 69.

Martin received 594,532 votes to Romero's 425,255, a margin of 58 percent to 42 percent. Romero ran strong in the rural counties where there are mining operations, but Martin picked up heavy Republican margins in the Phoenix and Tucson metropolitan areas.

Romero was elected to a two-year term in 1974 during a strong Democratic election, beating incumbent Republican Verne McCutchan, the late father of the current mine inspector. Romero was beaten in his 1976 re-election bid by Verne McCutchan.

Romero resigned a week before his term was to expire after pleading guilty to a misdemeanor fraud charge for billing the state for furniture that one of his deputies, a



long-time crony, had "borrowed" from a bankrupt land development near Nogales for which he had previously worked.

Of Mines And Men

Manitoba nickel producer is formally commissioned

Hudson Bay Mining and Smelting Company Ltd. (HBMS) and Outokumpu Mines Ltd. on November 15th formally commissioned a new high-grade nickel-copper mine at Namew Lake, 40 miles south of Flin Flon in northern Manitoba, Canada.

The (US)\$60 million project, the first underground nickel mine in Canada in nearly a decade, is expected to produce nickel at about (US)\$1.60 per pound.

The on-site advanced-technology mill is to

produce 23.1 million pounds of nickel and 7.7 million pounds of copper in concentrate annually.

The mine, with ore grades substantially higher than an average nickel discovery, currently contains 2.82 million tons of proven and probable reserves grading 2.44 percent nickel and 0.90 percent copper, with small amounts of platinum group metals.

HBMS, which discovered the deposit, owns 60 percent of the project and is the operator. Outokumpu, which designed and constructed the 2,100 tpd, computer-controlled mill, owns the remaining 40 percent.

Congress . . .

mine, developed at a later date, was worked with two shafts that were 1,300 feet deep and from its quartz veins some \$8 million in gold was recovered.

Weaver (or Weaverville) was named after a man by the name of Weaver who bore an unusual first name for a man—Pauline. An experienced desert rat with a knack for getting along with the Indians, Weaver served as a guide for a prospecting party that left La Paz on the Colorado River in 1862 and headed eastward across the desert.

Other principal members of the party were Major A.H. Peeples and Jack Swilling, both to become prominent Arizona pioneers, and several others. A Mexican with the party was crossing a mountain to what was later named Weaver Creek when he stumbled upon a deposit of coarse gold in a depression on the summit and collected a large quantity of gold nuggets. Peeples hurried to the spot and, according to one story, picked up \$7,000 worth of gold nuggets before breakfast.

The spot was named Rich Hill. After its surface gold was skimmed off, some of the men who had hurried to the spot stayed to work the placer ground along Weaver Creek and recovered an estimated \$1 million in coarse gold.

Nearby Stanton also started as a placer camp in 1863 and was originally called Antelope Station. In its thriving days it had a population of about 2,000, but it wasn't long until the placers petered out. A cadre of residents stayed on, but they were mostly a gang of murderous toughs headed by Charles P. Stanton, a deputy county recorder with a checkered past. The settlement was gradually abandoned after Stanton was shot and killed by a local Mexican tough as revenge for an insult on his sister by Stanton.

Ore Possibilities at the Congress Mine

*Geological History of This Interesting Old Property
Suggests Advisability of Further Exploratory
Work and Development*

By W. F. Staunton

Mining Engineer, Los Angeles



W. F. Staunton

THE original locations of the Congress mine in the Martinez mining district, in Yavapai County, Arizona, were made by Dennis May and sold by him to "Diamond Joe" Reynolds about the year 1887 for approximately \$65,000, the purchase having been made by the advice of Frank M. Murphy, of Prescott.

Reynolds developed the property to some extent and built a 20-stamp mill with Frue vanner tables for concentration. No amalgamating plates were used, as there was practically no free gold, all of the value being in the sulphides, which consisted principally of marcasite. The surface ores were much oxidized, in spite of which no saving of consequence could be made by amalgamation or by concentration. The cyanide process was in its infancy then and little known, so that it was commonly said of the Congress mine in its early history that though it showed much good ore, there was no known method of extraction. The finding of sulphides by sinking solved the problem to a certain extent, as such ores were amenable to concentration and the concentrates could be shipped to custom smelters. This furnished the means to profitable operation, but the crude methods employed at that time—fine crushing by stamps followed by simple unclassified concentration on Frue vanners—necessarily resulted in high tailing losses on account of the large amount of sliming that took place. Flotation, as practiced today, was then unknown. Fortunately the tailings from the early operations were saved and were re-treated later by cyanide with good extraction.

The property was operated from March, 1889, to August, 1891, when owing to the death of Mr. Reynolds, and to await the construction of the Santa Fe, Prescott & Phoenix R.R., active operation was suspended except for a certain development work and the enlargement of the mill from 20 to 40 stamps with the necessary additional Frue vanners. The No. 2 shaft had been sunk to a depth on the vein of 1,000 ft., but no stopping had been done below the 650-ft. level.

Production during this early period was as follows:

	Tons	Net Returns
March, 1889, to Aug. 31, 1891, ore shipped.....	1,129.4	\$155,652.29
March, 1889, to Jan. 28, 1891, concentrates shipped..	2,500.8	335,308.87
March, 1891, to Aug. 31, 1891, concentrates shipped..	1,962.8	101,113.73

tions were resumed, continuing thereafter until the end of 1910. In April, 1901, the company was re-organized as the Congress Consolidated Mines Co., Ltd., E. B. Gage continuing as president. The writer had direct supervision, first as superintendent and later as vice-president and general manager, from 1894 to 1910.

The production during this second period was as follows:

	Net Returns
March, 1894, to Dec., 1910, ore and concentrates shipped.....	\$4,259,571.30
March, 1894, to Dec., 1910, cyanide bullion shipped.....	2,797,851.45
	\$7,057,422.75

Thus the total recorded production in actual returns for gold and silver sold was \$7,649,497.64.

GEOLOGY—CONGRESS VEIN IN GRANITE

The country rock is granite, the westerly slope of the Bradshaw Mountains. A series of greenstone trap dikes exists over an area of several square miles, having a strike that is generally east and west and dipping north 20 to 30 deg. These dikes are generally mineralized to some extent and the Congress vein is in one of them and perhaps it can be said that the dike is the vein, for ore occurs in it in all possible positions from one granite wall to the other but generally near the footwall and accompanied by a clay selvage. The dike has a thickness of about 15 ft. Another series of dikes of fine-grained quartz porphyry is of later origin, apparently post-mineral, and strike northeasterly with nearly vertical dip. The following analysis of an average specimen of the greenstone was reported from the Sheffield Scientific School: SiO₂, 52.20 per cent; Al₂O₃, 13.40; FeO, 9.75; MnO, 1.90; CaO, 9.60; and MgO, 1.16.

There are other veins, entirely in the granite and unaccompanied by the greenstone so characteristic of the Congress vein. These strike east and west, but dip more steeply, from 40 to 50 deg. The development of quartz is more extensive than in the Congress vein and the average grade is lower. One of these veins, the Niagara, carried large bodies of ore of commercial grade to a depth of 2,000 ft. A characteristic of these all-granite veins is the presence of a small amount of galena and higher silver contents.

Minor faulting is in evidence throughout the mine workings and there has been considerable relative movement of the walls of the Congress vein, resulting in local crumpling of the greenstone. The mine workings terminate to the east against a heavy fault, beyond which the vein has not been definitely located. This fault cuts off both the Congress and Niagara veins.

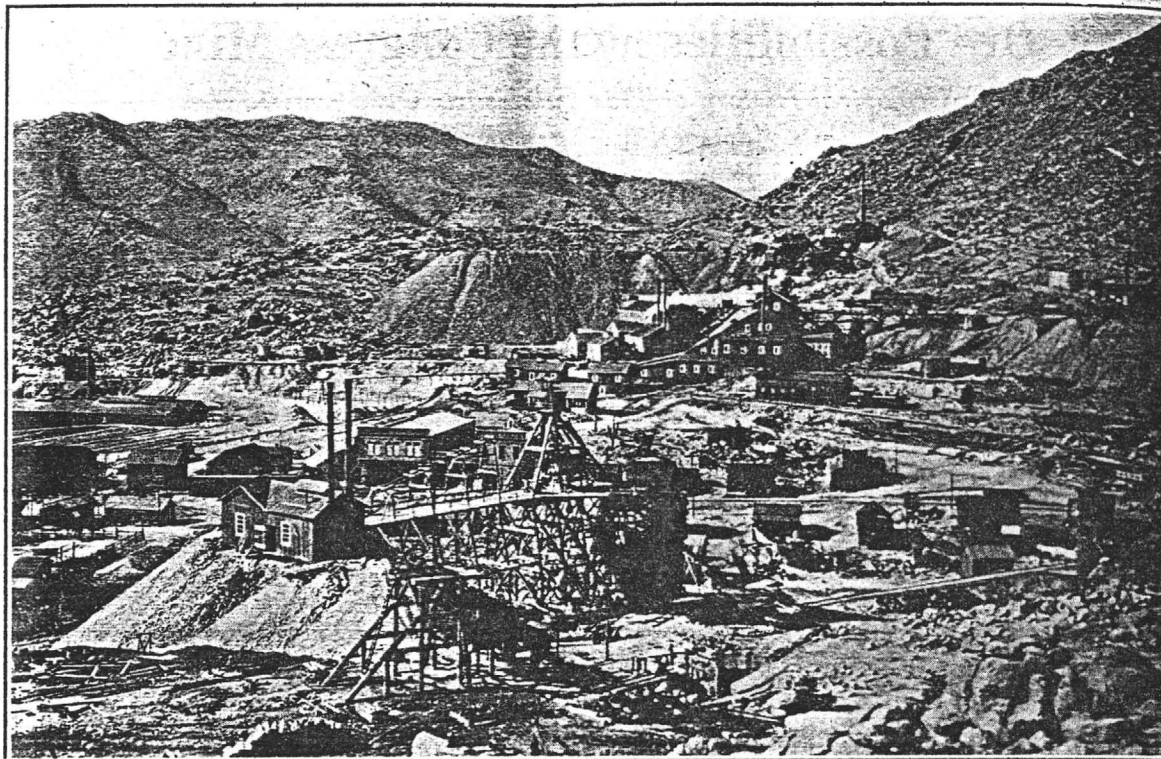
MINE WORKINGS DRY

The mines were practically dry down to the deepest point reached, 4,000 ft. on the Congress vein at an approximate inclination of 25 deg. from the horizontal.

No mine pumps were ever put in or needed.

Although the Congress vein is continuous and well

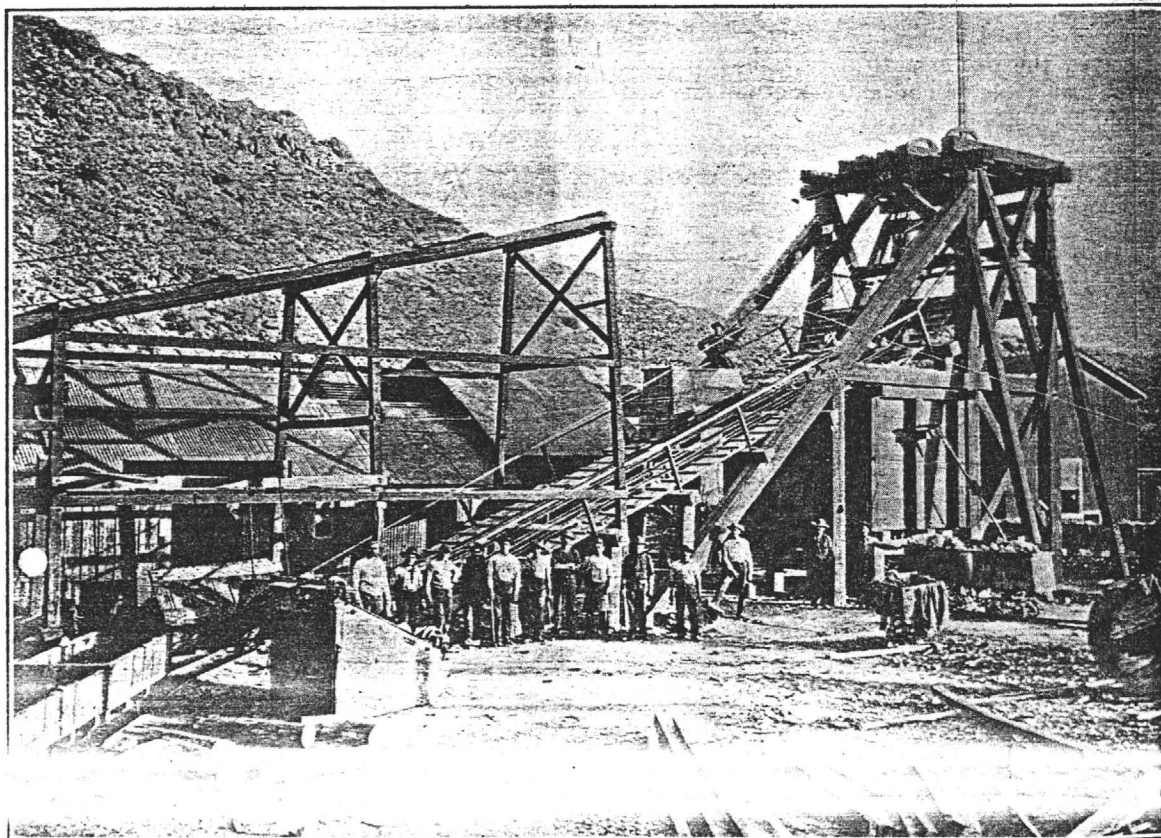
company, the name of which then was the Congress Consolidated Mines Co., with E. B. Gage, president, and active opera-



Congress mine, Arizona, about 1905. At left is cyanide plant. No. 5 shaft on Niagara vein in foreground. Above stamp mills (in center) is No. 2 shaft and at right is No. 1 shaft, both on Congress vein

defined for a mile or more to the west of the mine workings and shows both the characteristic quartz and sulphides, the pay ore was practically confined to a shoot in the vein pitching to the northwest and coinciding closely with the intersection of one of the fissure

veins in the granite. The granite vein is faulted by the Congress vein so that the intersection is obscure in the mine workings. The portion of the granite vein in the hanging wall of the Congress carried bodies of pay ore.



No. 3 shaft on Congress vein. It is 4,000 ft. deep on a 25-degree incline

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The Congress pay shoot varied greatly in length on different levels, being longest on the 650 ft. level, where it was stoped continuously for 1,800 ft. The average thickness of pay ore was less than 3 ft. Several pinches were met in following the vein down, the most serious being at the 1,700-ft. level, where there was no stoping ground. On the theory that if pay ore existed below that point it would probably be found on the general line of trend of the ore shoot above, a deep prospecting winze was sunk from the 1,700-ft. level, in the vein but with a northwesterly pitch corresponding to the established trend of the pay ore in the upper workings. This winze was sunk 1,000 ft. and bore out fully the theory upon which it was projected, the pay ore coming in again as good as ever after a few hundred feet of lean ground.

The 3,900-ft. level was the deepest point at which any considerable amount of development was done. For several levels above this there had been a gradual pinching of the pay shoot, which became small and irregular, although retaining its mineralogical characteristics and the small amount of sulphides which remained still showing the characteristically high gold contents, about 7 oz. per ton. The conditions were similar to those existing at other horizons in the mine where persistent deeper work had been rewarded by expansion of the ore shoot to normal size.

Seven shafts were sunk, all of them inclines following the veins. Three of these were on the Congress vein, designated as No. 1 (1,100 ft.), No. 2 (1,700 ft.) and No. 3 (4,000 ft.). On the Niagara vein three shafts were also sunk, No. 4 (1,000 ft.), No. 5 (2,050 ft.) and No. 6 (1,800 ft.). On the Queen of the Hills vein one shaft was sunk to a depth of 200 ft. below the tunnel level.

TOTAL TONNAGE PRODUCED 692,332

Figures on tonnage of crude ore are not available for the first period from March 3, 1889, to Aug. 31, 1891, but on account of the great uniformity of the ore they may be closely approximated from the figures of the later period, on which basis the amount of ore milled

in the first period appears to have been about 70,000 tons, all of which came from the Congress vein, as also did the shipping ore, together making a total of 71,129 tons. In the second period the amount of ore milled was 617,542 tons and shipping ore 3,661 tons, a total of 621,203 tons. The figures may be grouped as follows:

	From Congress, Tons	From Niagara, Tons	From Queen of the Hills, Tons	Total, Tons
March 3, 1889, to Aug. 31, 1891.....	71,129	71,129
March 1, 1894, to Dec. 31, 1910.....	307,863	293,215	20,125	621,203
	379,022	293,215	20,125	692,332

The recorded production of gold and silver in shipments shows a total of 388,477 oz. of gold and 345,598 oz. of silver. As this came from 692,332 tons of ore, a recovery is indicated of \$11.81 a ton, gold being figured at \$20.67 and silver at 60c. per ounce. Average tailing assays were about \$1.20, which indicates a gross average value of all ore mined of \$13.01.

The history of the Congress mine, its remarkable persistence due probably to its association with an intrusive dike of profoundly deep origin, and the existence of similar parallel veins in both hanging and footwall over a wide belt, suggest a careful study of the whole situation to determine the feasibility of a broadly planned scheme of exploration by means of a vertical shaft so arranged as to cut the Congress vein at greater depth than has been attained and incidentally to cut and explore the other similar veins, many of which not cut by the shaft could be reached by crosscuts.

Brass Direct from Mixed Ores

A process described by A. W. Guertler in *Metall und Erz* (1926, 23, 325) produces brass in a novel way. By melting sulphide ores of lead and zinc with metallic copper in excess, copper matte and a mixture of metallic lead, copper, and zinc are formed, which separate, in the liquid state, into a layer rich in lead with little zinc, lead, and a copper-zinc layer with little lead. The last-named is melted with copper and yields a serviceable brass.



The Alderson-McKay property at Rouyn

ECHO BAY MINES LTD. (ECO-Albert,T,M)

EXPLORATION STARTING - John Zigarlick, president, reports that Echo Bay Mines Ltd. have signed a letter of intent to ON U.S. GOLD PROPERTY explore for gold on the Congress property near Phoenix, Arizona, owned by Magic Circle Energy Corporation of Oklahoma City. Echo Bay expect to spend \$250,000 U.S. in surface drilling on the property by 31Dec84. If results warrant, Echo Bay could spend up to a total of \$7,200,000 by 1988 to earn 51% interest in the Congress property.

Although recorded history of the old Congress mine is limited, records obtained by Magic Circle indicate about 388,000 troy ounces of gold and 346,000 of silver were produced between 1889 and 1911. Since 1982, Magic Circle have spent \$2,200,000 U.S. drilling the property and have established gold mineralization as well as the continuity of two previously mined veins. Mr. Zigarlick notes that the property will provide a possible opportunity for Echo Bay to establish a precious metals operation in the U.S.

Echo Bay own and operate Canada's third largest gold mine, the Lupin mine, in the Northwest Territories. The company seek precious metals properties in Canada and the U.S. through joint ventures, acquisitions and exploration.

GEOLOGY AND MINERALIZATION
OF THE
CONGRESS MINE

Prepared for the Arizona Geological Society
AGS Spring Field Trip
April 20, 1985

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LOCATION

The Congress Mine lies in the southeastern part of Yavapai County, central Arizona. The property occupies parts of Sections 10, 11, 14, 15, 22, 23, and 24 in T.10N, R.6W and Section 18, T.10N, R.5W.

It is situated along the southeastern edge of the Date Creek Mountains at an elevation of 3,400 feet above sea level.

HISTORY AND PAST PRODUCTION

The original Congress claims were located in 1887. A 20-stamp mill was constructed to process the ore and was operated until 1891, at which time a three-year shutdown occurred.

Work resumed in 1894 by the Congress Gold Company, which now enjoyed the convenience of a rail spur off the then recently-completed Phoenix to Prescott line. The mill was expanded to 40 stamps. At this time the No. 2 Congress shaft was 1000-feet deep with stoping restricted to above the 650 level.

The mine operated continuously from 1894 to 1911. During this period the cyanide process was introduced to greatly improve recoveries and another 40 stamps were added. The total official tonnage shipped or milled during this period is recorded as 692,332 tons, of which 370,022 tons were mined from the Congress vein with an average recovery of about 0.70 opt Au, 293,215 tons with an average recovery of about 0.415 opt Au from the Niagara vein, and 20,125 tons at 0.40 opt Au from the Queen of the Hills vein. A total of 388,477 oz. of Au and 345,598 oz. Ag were recovered. In addition to the above totals, substantial values were left in the mine fills and ore dumps.

From 1911 to 1935 operations at Congress were principally confined to retreatment of small portions of the mill tailings and ore dumps and robbing pillars. An estimated 50,000 tons of dump and tailings were treated.

A 300 TPD counter-current cyanide mill along with a power plant was erected in 1937. From 1938 to 1942, 385,505 tons of material (276,372 tons from tailings, 106,629 tons from dumps) were treated. The mill head averaged 0.094 opt Au with a recovery rate of about 69%.

The property saw very little production from 1942 to the present. Around 1980, with the gold price rise, a heap leach operation of crushed dump rocks operated for several years.

LOCAL GEOLOGY

LITHOLOGY

The Congress Mining District and surrounding Date Creek Mountains are comprised almost entirely of Early Proterozoic granitic intrusive rocks belonging to the 1320 m.y. to 1460 m.y. central Arizona batholith. The granitic rocks range in composition from coarse-grained granite to granodiorite and contain swarms of coeval pegmatite and aplite dikes comprising 10 to 15% of the rock unit. The granite also contains numerous house-size inclusions of partially digested metasediments (gneiss, biotite schist and quartzite). A few small lenses and dike-like amphibolite bodies of probably early Proterozoic age also cut the granite.

The Proterozoic granitic rocks have been intruded by four types of younger dikes that are, from oldest to youngest: east-west trending "greenstone" diabase dikes; northwest trending andesite porphyry dikes; northeast trending latite porphyry dikes; and northeast trending rhyolite dikes (previously termed alaskite).

Previous workers in the district have considered the greenstone dikes and gold mineralization Tertiary in age. However, a Late Proterozoic age (1080 m.y. to 1180 m.y.) has not been ruled out for the dikes or mineralization. The andesite, latite and rhyolite dikes are all post-mineralization.

STRUCTURE

Foliation in Precambrian igneous rocks is indistinct and variable, but an east-west strike and northerly dip appear to be the most common attitude observed in the area. Older metasedimentary inclusions in the granite have a N35°W foliation, coincident with the regional grain of the area.

There are at least six recognized periods of fault movement in the Congress area. From oldest to youngest, they are:

1. Minor pre-mineral thrusting from the north in Precambrian granite dipping 20° to 25° north (Congress Vein);
2. Pre-mineral west-northwest faults, dipping 40° to 45° north, (Niagara Vein);
3. Minor post-mineral movement on west-northwest thrust faults;
4. Cenozoic normal faults, striking N20°W to N30°W;
5. Cenozoic normal faults, striking N30°E to N50°E;
6. Basin and Range faulting striking N0°W to N20°W.

The minor east-west trending, north dipping thrust faults appear to be the oldest of the six main periods of faulting

and are probably Late Proterozoic or Early Tertiary in age. Thrusting appears the simplest explanation for these shallow dipping greenstones. The amount of displacement on the thrusts is not known, but is probably small.

GOLD MINERALIZATION

The Congress Mining District has produced a minimum of 388,000 ounces of gold from relatively high-grade ore shoots in hypogene auriferous quartz veins. The district ranks second in primary gold production in Arizona. Essentially all of the district's gold production has come from two vein systems: The Congress and Niagara veins.

CONGRESS VEIN

The location of the Congress ore shoot was controlled by the intersection of the Congress greenstone dike with the Cross vein. This line of intersection accounts for the northerly rake of mineralization along which stoping was conducted nearly continuously down to the 3100 level and exploration with minor production to the 3900 level. The orebody obtained a maximum width of 1300 feet on the 650 level. Ore widths varied in the shoot from 3 to 7 feet.

The location and strength of quartz veining in the Congress vein was controlled by pre-mineral movement that broke and shattered the greenstone and granite providing open spaces for auriferous quartz-pyrite deposition. The pre-mineral displacement between the hanging and footwalls of the Congress dike was probably small, but sufficient to provide enough fracturing to act as a favorable conduit for the circulation of hydrothermal fluids. There is no reported change in vein mineralogy between the surface and the deepest mine workings, excluding surface oxidation.

NIAGARA VEIN

The Niagara vein strikes west-northwest, dips 41° north, and is located about 250 feet south of the Congress vein. The Niagara vein is a mineralized fault cutting Precambrian granitic rocks. Unlike the Congress vein, which it parallels in outcrop, the Niagara vein does not follow a greenstone dike and has the steeper dip, characteristic of most of the quartz veins in granite. The Niagara vein has been mined in four different areas along a strike length of 4000 feet.

The character of the Niagara vein ranges from a narrow zone of broken and hydrothermally altered granite with a little disseminated pyrite, to massive quartz vein material up to 14 feet thick with sharp wallrock contacts. In Niagara ore zones, the quartz vein averages 3 to 5 feet in thickness, usually with an additional 3 to 5 feet of altered granite wallrock containing a large proportion of quartz stringers and veinlets. The quartz stringer zone commonly constitutes ore grade material. The mineralogy of the Niagara vein material is similar to the Congress vein and consists of quartz, carbonate, pyrite, galena, chalcopyrite, hemitite, gold and silver. The galena and silver content is higher and the average gold grade is lower than in the Congress vein.

STRUCTURAL ORE CONTROLS

Pre-ore faulting and secondary permeability within the vein hosting structures appear to be the most significant structural controls on mineralization. Portions of the east-west trending greenstone dikes and east-west trending 40° north dipping faults were open to circulating hydrothermal solutions during the mineralizing period. Undulations and dilations in the walls of mineralized structures also appear to have increased secondary permeability and consequently, mineralization.

CHEMICAL CONTROLS

Wallrock chemistry does not appear to be as important a factor in controlling mineralization as structure. The higher mafic content of the greenstone dikes may in part account for the higher overall grade of the Congress vein ore. It has been noted in drill cores from the Niagara vein that pegmatitic wallrocks are generally less favorable for good ore (pyrite) deposition than granite wallrocks, and that a higher mafic content of the granite (granodiorite) generally corresponds to higher gold content.

VEIN MINERALOGY

The auriferous quartz veins are composed predominantly of vein quartz along with variable, but generally minor, amounts of carbonates. Pyrite, galena, and chalcopyrite are the only sulfides megascopically identifiable. Molybdenite has been tentatively identified in trace amounts. Reddish-brown hemitite is locally abundant as an oxidation product of pyrite. Gold probably occurs as micron-sized particles in pyrite.

NEW NIAGARA OREBODY

OREBODY CHARACTERISTICS

The Niagara orebody appears to be a classic fissure quartz vein deposit. The vein structure strikes N45°W and dips at about 41° to the northeast. The main ore shoot is oblique to the strike and dip of the structure, trending east-west. Several subsidiary shoots deviate from the main shoot.

Mineralization and Alteration

Mineralization in the new Niagara orebody is similar to areas previously mined in the Niagara structure. Mineralization in the orebody occurs in two basic styles, with the one common denominator observed in all mineralization being the presence of quartz and pyrite. High grade (+1 opt Au) mineralization will contain 10 to 25% sulfides over two feet. The higher grade mineralization usually occurs as a discrete vein of massive quartz from 1 to 14 feet thick with minor amounts of sulfides. The second style of mineralization has been termed the quartz stringer zone. The quartz stringer zone consists of 20 to 70% quartz veinlets flooding altered wallrock. The zone is generally lower grade to barren and usually envelopes the main quartz vein both on the foot and hanging walls.

As no definitive alteration analysis has been conducted on the core, the breakdown of alteration types is tentative, based only on visual identification. Alteration associated with mineralization appears to be relatively simple. Chloritic/propylitic and argillic alteration are the most common alteration types. The chloritic alteration assemblage consists of chlorite + quartz + pyrite that grades into propylitic alteration with the addition of epidote. Both the chloritic and propylitic alteration assemblages, which are closely associated, may contain carbonate, clay, K-feldspar, magnetite, biotite, sericite, and fluorite in minor amounts.

The chloritic/propylitic assemblage extends anywhere from a few inches to 50 feet away from the vein, with the average being less than 15 feet. The width of alteration is largely dependent on the degree of structural preparation. Alteration intensity decreases away from the vein. The alteration zone is widespread at the base of the main ore shoot and becomes much more narrow updip from the shoot and upper parts of the shoot itself.

Argillic alteration does not appear to be associated with mineralization, but with post-ore structures. The argillic alteration is very pale green to white in color and is closely restricted to structures.

Paul Gilmour,
Consulting Mining Geologist,
3838 Calle de Soto,
Tucson AZ 85716
Ph: (602) 326-5450

October 26, 1988

Dr. Hugo T. Dummett,
Westmont Mining Inc.,
2341 South Friebus Ave.,
Tucson AZ 85713

Dear Hugo,

Please find enclosed the material which I promised (threatened?) to send on the Congress (Yavapai County, Arizona) gold property which is owned by the brothers Robert and Salisbury Adams.

I was first recommended to do a job for the Adams brothers by the late Jack Splane. They asked me to visit the claims to ensure that suitable notices were on the ground, the claims posts in good order, and so on. That was nearly 20 years ago. At most, they asked me to do the same thing maybe one other time. I have never met either of the gentlemen in the flesh and can't tell you much about them. Robert evidently is an attorney with an address in San Francisco. Salisbury lives and works in Jackson, Wyoming. I can say that they are always extremely courteous and considerate on the phone and in our infrequent correspondence - and that they have always paid my modest bills very promptly. As I think I told you on the phone, they asked me to make noises about the availability of their ground a few months ago and then - for reasons of their own - they asked me to back off for a bit. They then recently revived the request.

Apropos your remarks about the grade of the material Echo Bay is (was) mining: I think it was Nyal Niemuth of the Arizona Bureau of Mineral Resources who told me that before deciding to ship gold-bearing flux the company hadn't done enough exploration to know how large (or small?) the potential might be and whether or not shipping "ore" constituted the best course. So I cannot understand why those involved chose to haul the material directly to a smelter - rather than, say, investigate the potential and, if justified, contemplate the installation of a suitable treatment plant....?

At any rate, at this point I will leave you to your deliberations over this and similar questions. If I can be of any further assistance, please do not hesitate to give me a call.

Thanking you for your attention, I am,

Yours sincerely,



Paul Gilmour.

Enc:
mg/PG

HERMSDORF CLAIMS

MARTINEZ DISTRICT
YAVAPAI COUNTY, ARIZONA

for
AMERICAN SHIELD COMPANY

by
RICHARD E. CRIBBS
January 15, 1980

INTRODUCTION

A brief examination of the Hermsdorf property was made on November 1 and 2, 1979 at the request of Mr. W. C. Ulland. The purposes of the examination were to determine the merit of the property as a gold prospect, determine ownership of the surrounding area, and recommend an exploration plan.

The considerable amount of information on the property that is in the files is not repeated in this report.

The morning of November 1st I went to the Bureau of Land Management in Phoenix to obtain land ownership status maps of the township. A brief stop was made at the Arizona Department of Mineral Resources in Phoenix to check the mine and prospect files, but only one brief mention of the property was found.

The mill at the Congress mine, which is close to the Hermsdorf property, is in operation. The superintendent informed me that he expects to mill 300 to 400 tons of dump material per day, and that preparations are being made to mine underground in two years. He stated that he is not interested in custom milling.

LOCATION AND ACCESS

The Hermsdorf property consists of three patented claims, the Emil Hermsdorf, George Washington, and Lincoln. The claims are four miles north of Congress, Arizona, and $1\frac{1}{2}$ miles northwest of the Congress mine. The property is in the Martinez district of southern Yavapai County.

The George Washington claim can be reached from the north by an old jeep trail starting at the Congress-Hillside road near where the road crosses the railroad tracks. The jeep trail is overgrown with trees and shrubs, but a day or two of work with an axe and shovel would make it passable for a vehicle.

A road that is passable by car extends from Congress to 2,000 feet west of the Congress mine and then to the east end of the Emil Hermsdorf claim. The road crosses claims owned by the Congress Consolidated Gold Mining Company, is posted with no trespassing signs, and is guarded from the mine. I believe that the road can legally be used as an access to the claims, however.

LAND STATUS

Three accompanying maps are copies of BLM maps showing the land status and the names of surveyed (mostly patented) claims in the vicinity of the Hermsdorf property. Maps showing the unpatented mining claims in the state are being prepared by the BLM, but are not yet available.

I walked the jeep trail north from the George Washington claim and did not observe any recent claim posts or assessment work.

Mr. J. L. Kleiner, Superintendent, Congress Consolidated Gold Mining Company, informed me that the area south and east of the Emil Hermsdorf has been completely staked by his company.

GEOLOGY OF THE DISTRICT

The Martinez district is within the Date Creek Mountains. Coarse-grained Precambrian granite is intruded by greenstone dikes. The gold deposits are in quartz veins with pyrite and some galena, and usually follow the footwalls of the gently dipping greenstone dikes.

The Weaver district is east of the Martinez district, and the geology of the two districts is very similar.

Copies of articles describing the Martinez and Weaver districts are attached.

Mining activity to 1940 is described by C.G. Barth, Jr., "Mines of the Weaver and Martinez Districts", The Mining Journal, v. 24, no. 1 (1940). Mining activity, including the Reese mine northeast of the Hermsdorf property, is described by O.H. Metzger, "Gold Mining and Milling in the Wickenburg Area, Maricopa and Yavapai Counties, Arizona", U.S. Bureau of Mines IC 6991 (1938). Mining activity prior to 1911 is described by C. Hafer, "Mining in Southwest Yavapai County, Arizona", The Mining World, v. 34 (1911). The Congress mine is described by W.F. Staunton, "Ore Possibilities at the Congress Mine", Engineering and Mining Journal, v. 122 (1926).

GEOLOGY

Topography of the claim area is steep. Elevations range from 3470 feet to 3920 feet. There is abundant granite outcrop, but softer granite and greenstone dikes are mostly covered with colluvium.

An inclined shaft and a line of trenches are located in the western half of the Emil Hermsdorf claim in the footwall of a greenstone dike that intrudes the granite. The dike strikes approximately N70W and dips about 20° to the north. A similar dike about 300 feet to the northeast is indicated by float on the hillside. I did not attempt to trace these dikes on the surface, but a similar dike occurs in the more extensive workings located 1,400 feet to the northwest on the George Washington claim.

A greenstone dike at the eastern end of the Emil Hermsdorf strikes approximately east-west and dips gently to the north. A projection of the dike a thousand feet to the west would be about 200 feet vertically below the dike in the line of trenches.

The greenstone dikes vary from massive to sheared and schistose. Some contain limonite derived from disseminated pyrite.

Any mineralization that may have been exposed by the inclined shaft and trenching is now completely covered by caving. The best descriptions of the mineralization are probably the reports by V.H. Verity, particularly one dated September 15, 1949. According to Verity the mineralization on the Emil Hermsdorf is mostly a quartz stringer, but at one place in the drift at the bottom of the shaft it widened to nearly three feet. Assays reported by Verity are not encouraging for such narrow widths.

No mineralization was found in the greenstone dikes similar to what has been reported from the Congress mine. Four samples of dike were collected and are described in Table I. The samples contain no detectable traces of gold.

SOIL SAMPLING

A few soil and stream sediment samples were collected so as to evaluate geochemical exploration methods in this district. Samples were sieved to minus 80 mesh and shipped to Chemex Labs Ltd. in Vancouver, B.C. for gold analysis.

Ten soil samples were collected at 50-foot intervals on a line extending from 100 feet below the vein on the Emil Hermsdorf to the top of the ridge, as shown on an accompanying map. The samples below the vein were taken so as to avoid any obvious contamination from the trenching.

Duplicate analyses on a sample taken 50 feet below the vein are 600 and 640 ppb Au. Analyses on a sample 100 feet below the vein are 150 and 30 ppb Au.

Anomalous gold was also found below the greenstone dike that occurs 300 feet northeast of the trenched vein. No trenches were observed in the vicinity of this anomaly. Duplicate analyses on a sample just below the dike are 260 and 300 ppb Au. Analyses on a sample 50 feet farther downhill are 50 and 30 ppb Au. The six other soil samples contain less than 10 ppb Au.

The reproducibility of analyses on these samples is very good for gold, and indicates that the gold in the soil is fine grained. Based on this limited testing, soil sampling appears to be an excellent exploration method for locating gold veins in the district.

The soil anomalies are perhaps somewhat stronger than what might be expected from the vein widths and grades that have been reported from this claim.

STREAM SEDIMENT SAMPLING

Seven stream sediment samples were collected from small drainages in the immediate vicinity of the patented claims. None of these drainages cover the known mineralization on the Emil Hermsdorf or George Washington claims.

Two of the samples contain detectable gold, 40 ppb in D-2 and 50 ppb in D-3, but gold was not detected in the reanalysis of these samples.

Fine-grained gold, such as apparently occurs in the anomalous soil samples, will be incorporated in the stream sediment. Gold content of stream sediment is usually somewhat higher than the average gold content of the soil it drains.

The soil sample line averages about 100 ppb Au over 500 feet, but stream sediment from this area could not be sampled because of contamination from the mine dump.

Based on the results of this sampling, it is unlikely that mineralization of interest occurs at the surface within any of the sampled drainages.

CONCLUSIONS AND RECOMMENDATIONS

The exploration potential of this property depends primarily on (1) the possibility that the greenstone dike overlying the quartz vein might carry low-grade mineralization, and (2) the possibility that the vein is an extension of the Congress vein.

The exposed greenstone dikes on the Emil Hermsdorf and George Washington claims are stained with limonite from disseminated pyrite, but have very little quartz veining. Four samples of the dikes do not contain detectable traces of gold.

Staunton (1926) states that the Congress vein is continuous and well defined for a mile or more to the west of the mine workings. If the vein on the Emil Hermsdorf is a faulted segment of this vein, it must have moved northward thousands of feet on a north-south fault, or upward on an east-west fault. In either case it must have been originally deposited more than a mile from the Congress orebody. The claim map shows other claim groups that are on veins that conceivably might also be faulted segments of the vein. No evidence, however, has been presented for faulting of this magnitude.

I consider it much more likely that the veins and greenstone dikes on the Hermsdorf property are just several of many in this district.

The stream sediment sampling did not locate any previously unknown areas of mineralization at the surface within or adjacent to the claims.

The only exploration method that seems feasible is to drift on the greenstone dikes looking for better vein widths and grades. Drifts would probably require timbering, and the work would be very expensive. The chances for finding a large tonnage of ore are poor.

I do not recommend this particular property for additional exploration.

Richard E. Cribbs

January 15, 1980

TABLE I

SAMPLES OF GREENSTONE DIKE

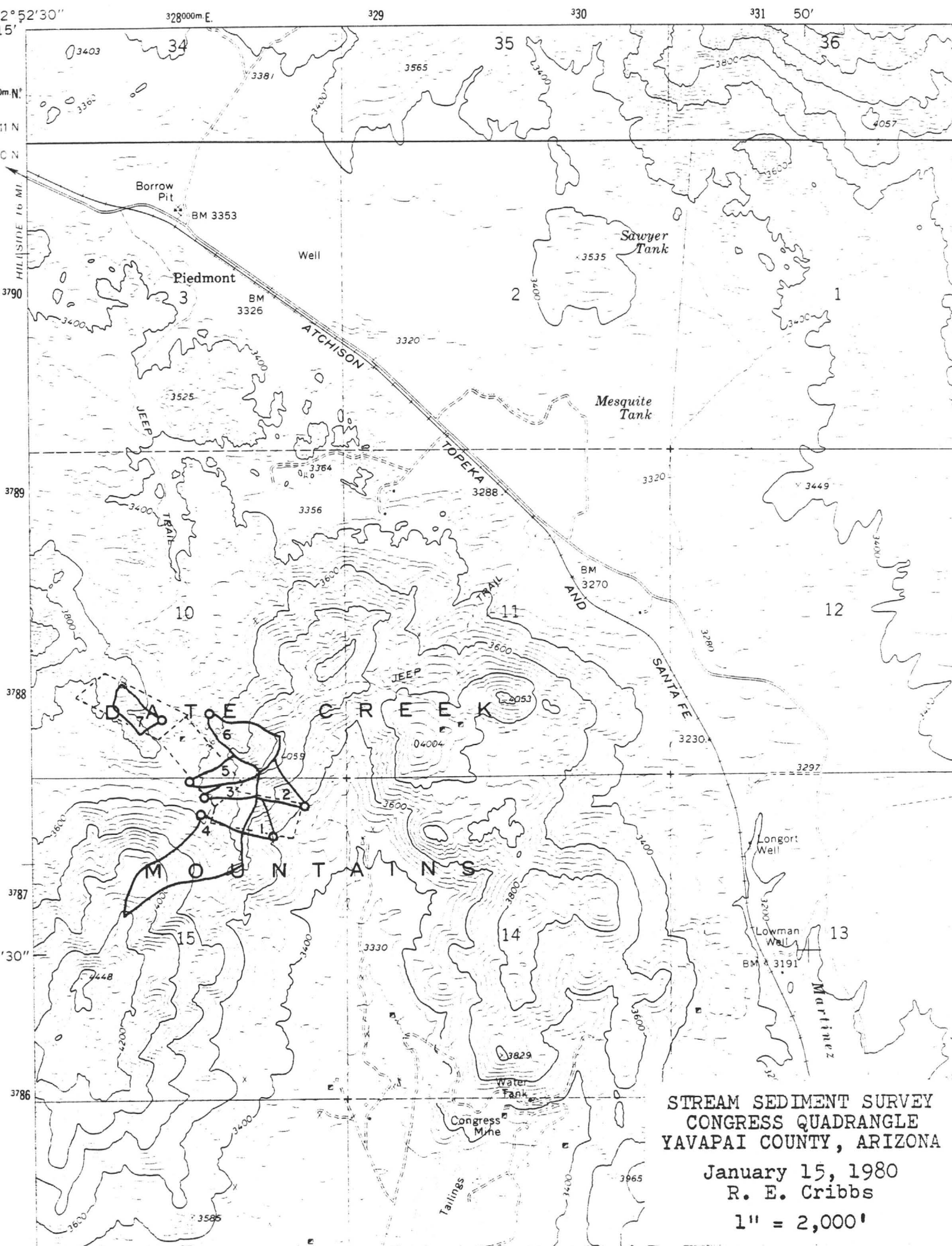
Sample	ppb Au	Location and Description
R-2	<10	6' vertical chip at adit on Emil Hermsdorf. Unmineralized greenstone. No quartz observed.
R-3	<10	5' vertical chip above inclined adit at east end of Emil Hermsdorf. Unmineralized greenstone. No quartz observed. Quartz vein pieces on dump.
R-5	<10	5' vertical chip at inclined shaft on Emil Hermsdorf. Greenstone with disseminated limonite. No quartz observed.
R-6	<10	Dump on George Washington. Pieces of massive greenstone with disseminated pyrite. No quartz observed.

TABLE II
SOIL SAMPLES

Sample	ppb Au	ppb Au
S 1	<10	
S 2	<10	
S 3	<10	
S 4	<10	
S 5	50	30
S 6	260	300
S 7	<10	
S 8	<10	
S 9	600	640
S 10	150	30

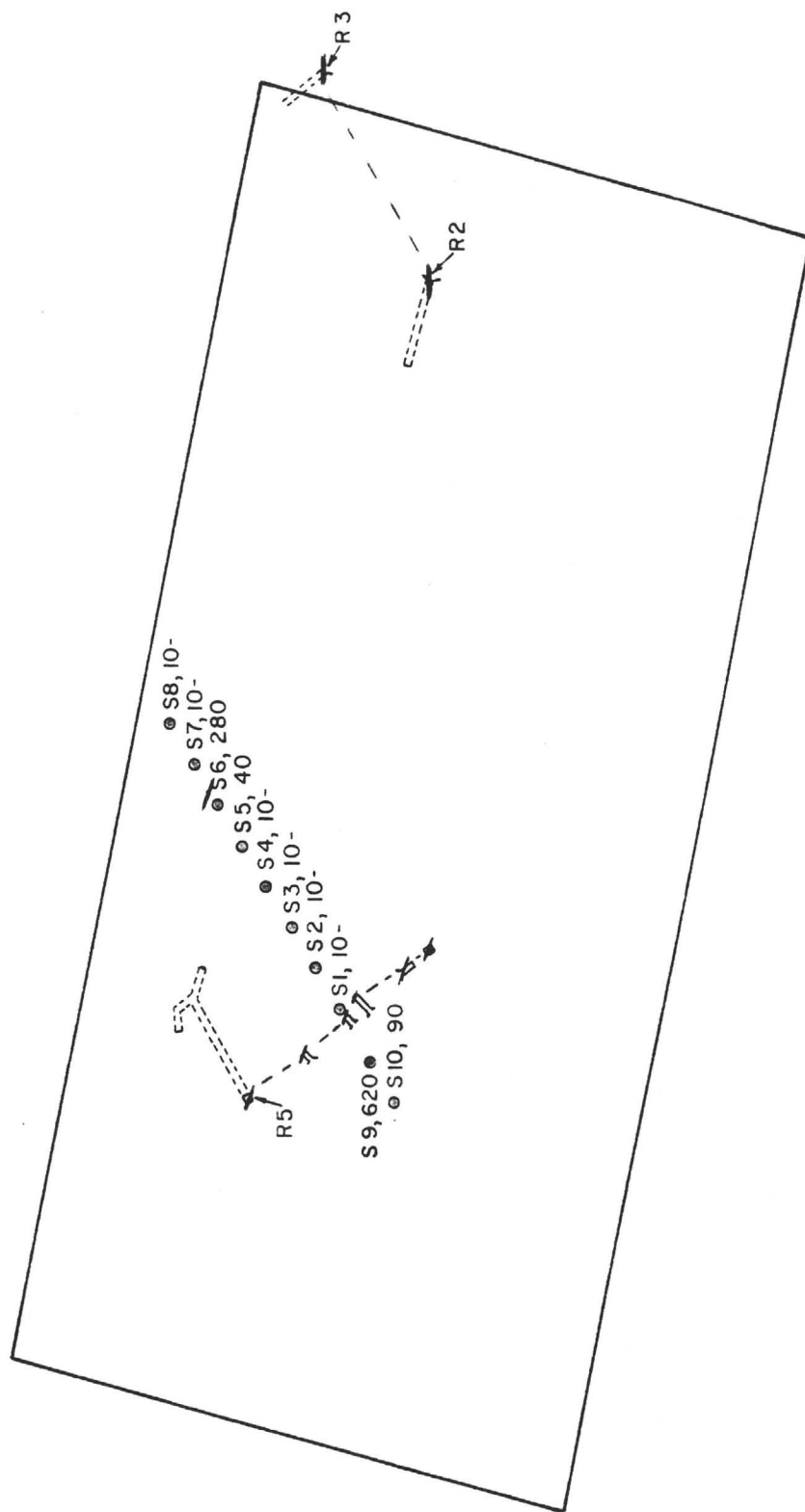
TABLE III
STREAM SEDIMENT SAMPLES

Sample	ppb Au	ppb Au
D 1	<10	
D 2	40	<10
D 3	50	<10
D 4	<10	
D 5	<10	
D 6	<10	
D 7	<10	



STREAM SEDIMENT SURVEY
CONGRESS QUADRANGLE
YAVAPAI COUNTY, ARIZONA
January 15, 1980
R. E. Cribbs
1" = 2,000'

N

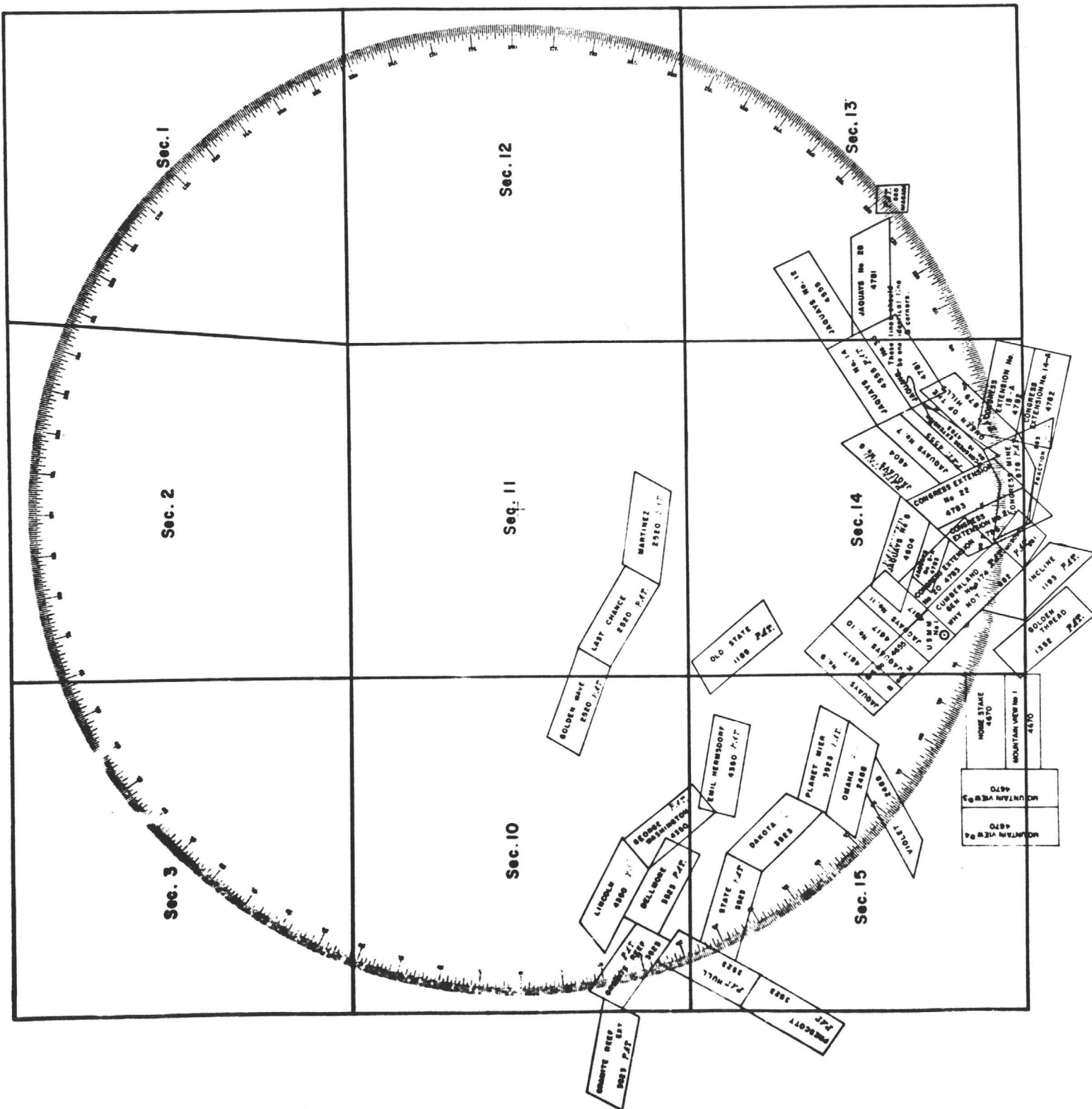


SAMPLE LOCATIONS
EMIL HERMSDORF CLAIM
MARTINEZ DISTRICT
YAVAPAI COUNTY, ARIZONA
January 15, 1980
R. E. Cribbs
1" = 200'

— GREENSTONE DIKE
○ S2 SOIL SAMPLE, ppb Au
→ R2 ROCK SAMPLE

NE 1/4, T.10N., R.6W.
WEAVER DIST.
MARTINEZ DIST.
Scale Reduced 50%

309





212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [REDACTED] 984-0221
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 51464

TO: R.E. Cribbs
1558 South Brown Ave.,
Tucson, Arizona,
U.S.A. 85710

INVOICE NO. 33861

RECEIVED November 8, 1979

ANALYSED November 16, 1979

ATTN:

PULPS



MEMBER
CANADIAN TESTING
ASSOCIATION

CERTIFIED BY:

Mining in Southwest Yavapai County, Arizona

By Claud Hafer.

This district, of which Congress is the most important camp, lies tributary to the Santa Fe, Phoenix & Prescott railroad in southwestern Yavapai county. The country is the desert land typical of southern Arizona, with occasional buttes and higher ridges of mountains. Weaver and Date creek, rising abruptly above the flats.

The valley of Martinez creek, from which the district takes its name, is comparatively wide, and is deeply scored in places with transverse washes that are ordinarily dry, save when converted into floods by a cloud burst or heavy storm.

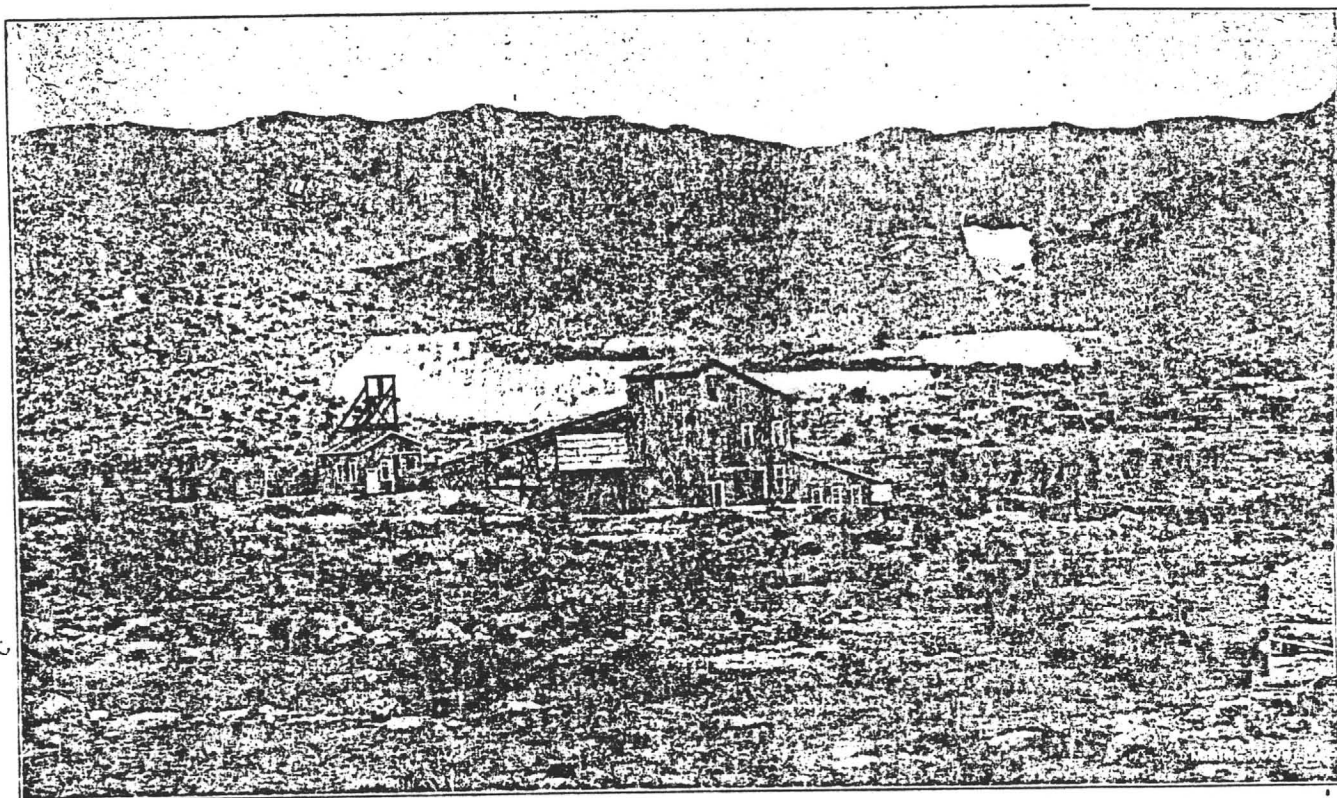
Elevation varies from about 3000 ft. in

in a report of 1899, says in reference to the occurrence of ore in the diorite: "Its position and appearance suggest that it occupies what have been the exceedingly flat lenticular cavities, produced by the fracture of the dike along the plane of its dip, followed by sufficient movement along the line of fracture to leave such cavities, by reason of the inequalities of fracture. There is no evidence of the replacement of the greenstone (diorite) by the quartz, the whole appearance being that of the filling of pre-existing cavities by deposition from mineral waters. The

tensively developed by drifts and lenses.

The ore is hoisted in self-dumping skips and hauled from the ore sockets at the shaft mouth by rail to the company's 40-stamp mill. Concentration without amalgamation is practiced and the tailings are cyanided.

The sands are caught in settling boxes and trammed to leaching tanks; the slimes are thickened in pointed boxes and the thick pulp discharged into the slime-treatment tanks. The method of agitation is rather unusual, the pulp passes from the bottoms of the tanks to a centrifugal pump, and is discharged into the top of the tank through a pipe mounted



Congress, Ariz., United Gold Mining Co.'s Mine and Mill in Foreground. Congress Mine in Background.

the lowlands to 6000 or more on the highest peaks.

The country rock is largely granite, intersected with dioritic and rhyolitic dikes. In many cases the ores are found in the diorite dikes, often near the contact, with granite foot and diorite hanging wall. The diorite is often schistose and in places the granite is gneissoidal and grades into a dark mica schist.

Some of the veins occur entirely in granite, the trend of most of those having been developed being approximately east and west, and the dip north. They are typical quartz veins, varying from mere stringers up to 6 and 8 ft. in width.

The ores are partly oxidized near the surface, and pyritic at lower levels; galena and copper sulphide occurring as auxiliary minerals.

valuable contents of the vein have been quite likely derived from the greenstone by segregation and in filtration."

While the district has produced no phenomenal mines, one, the Congress, is known to have been a large producer and has been in operation for more than the past two decades.

This property is connected with the railroad at Congress Junction by a 4-mile standard-gauge road owned by the mining corporation. The mine is well equipped, the deepest shaft is 4000 ft. on the incline and represents the maximum depth to which any gold vein has been explored in the territory. The veins here are rather flat dipping at from 20 to 40°. At present operations are being carried on through No. 5 shaft on the Niagara vein, about 2000 ft. deep and the ore

centrally over it. This pipe is fitted with a ball and socket joint and is swung from one side to the other, and kept moving continuously around the perimeter of the tank. The pump discharges with considerable pressure and as the tanks are of large diameter and shallow, the entire contents are well agitated.

Formerly the tailings from the stamp mill were roasted in a Brown horseshoe furnace, still on the place, previous to cyaniding. Steam power is employed with crude oil and coal as fuel.

The company has well-equipped shops, a large store that would do credit to any city in the country, a boarding house and hospital. Water is supplied from two pump stations at Martinez and Date creeks, 1 and 7 miles distant.

A little to the southwest of the Congress is the mine and mill of the United

Gold Mines Co. The shaft here is sunk about 700 ft. on a vein dipping about 22°. The mine is being aggressively developed. The ore is from 2½ to 3½ ft. in width where exposed, and is in diorite.

A 15-hp. Fairbanks-Morse gasoline hoist raises the ore to the surface by skip, which dumps either into the ore or waste bin; this being regulated by a switch under control of the operator. A traveling belt conveys the ore to the mill bin, 50 ft. or more away and at least 25 ft. higher than the discharge gate of the shaft bin.

An ordinary jaw crusher is mounted above the mill bin for crushing the coarse rock. In the mill are 4 Nissen stamps, 3 Wilfley tables and a belt and bucket elevator to lift the tailings to sufficient height to flow to the cyanide plant located outside of the mill building.

The cyanide plant is arranged for

rastra, the remains of which can be still seen.

There are two veins outcropping within 50 ft. of one another, the Last Chance, on which most of the development work has been done, and the Back vein; the first is in diorite near the granite contact on the foot-wall side, and dips 35°. The Back vein is entirely in granite on the foot-wall side of the Last Chance, with a dip of 45°.

The Last Chance has been developed by an incline 580 ft. deep, and from this drifts and raises have developed the ore bodies. A crosscut tunnel cuts the diorite dike at 1310 ft. below the outcrop. On this level drifts go 250 ft. east and 1100 ft. west of the tunnel, and recently work was in progress on an up-raise to connect with the inclined shaft, to provide a means for getting the ore out via the tunnel level. Some ore has

son the scene suggests one of the farming districts of the middle west rather than the desert. The manager's house surrounded with its little grove and flourishing garden serve as an example of what can be done to beautify and make comfortable the waste places of earth. All of this has been made possible by the construction of a concreted dam at an advantageous place on the north side of the valley, at the base of the Weaver mountains. This impounds the drainage from a considerable area, and the water resulting from winter rains and an occasional heavy storm during the summer, provides a sufficient supply for irrigation.

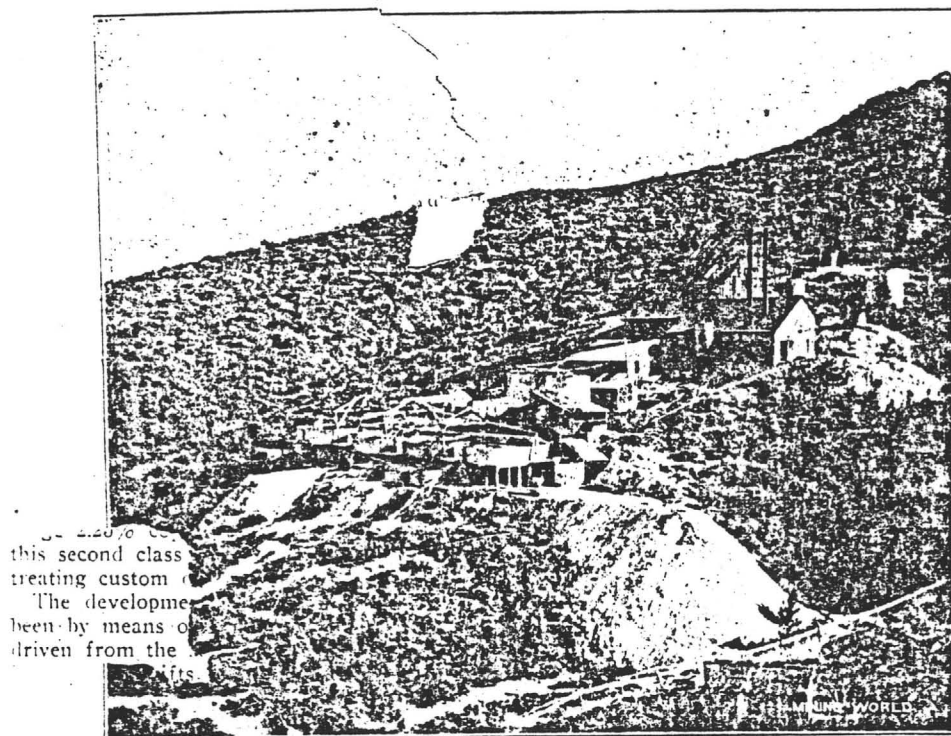
About 4 miles from Congress, at the mouth of Fools' gulch, a narrow canyon leading up into the Weaver mountains, is the Alvarado mine, at present not in operation. The vein here is along the granite diorite contact, and about 4 ft. wide. There are two (inclines) working shafts 1100 ft. deep, connected on the 300 and 1000-ft. levels. A fault nearly east and west, and practically vertical, has disturbed the vein to some extent, the faulted portion 50 ft. along the strike being moved into the hanging wall a distance of 16 ft. The shafts are provided with hoisting machinery. Self dumping skips discharge into bins at the surface, from which the ore can be trammed to the crusher bin, feeding a Blake crusher. From the crusher a conveyor belt extends to the mill 160 ft. away, and 50 ft. lower. The mill is well built and in splendid condition, and contains 20 stamps of 1050 and 1250-lbs. each; hydraulic classifier, tube mill for regrinding sands, slime thickeners, Hendryx and Butters agitators, and a 60-leaf Butter's filter, with the Merrill system of precipitation. Air is used for underground pumping and drilling.

Going up Fools' gulch dioritic rocks seem to be much more in evidence than in the western portions of the district, and the outcrops are less oxidized in appearance. Perhaps these rocks may be related to the Yavapai schists so abundant in the Bradshaw mountains to the east, and described in the Bradshaw Mountains Folio of the U. S. Geological Survey.

At Yarnell is a store and postoffice, and though high in the mountains is situated in a park-like basin surrounded by higher peaks.

Antelope peak to the east is a black, basaltic looking mountain and one of the highest in the range. The Yarnell mine was operated some years ago at this place, but is now apparently abandoned. An old stamp mill is yet on the property, built near the portal of a long crosscut tunnel, that formerly served as the haulage tunnel of the mine; from this tunnel two drifts are accessible, one driven on a quartz vein typical of the district, and the other along what is apparently granite of fine texture, extremely siliceous, crushed and iron stained.

At the York mine southwest of the Yarnell, a small vein varying from 6 ins. to 2 ft. has been developed by several shafts, the deepest of which is 400 ft. This vein dips at a low angle, 10 to 15°.



Monica Mine and Mill.

this second class treating custom

The developme been by means of driven from the

hydraulic classification, and the subsequent leaching of the sands, the slimes thickened and the clear water returned to mill, the thick pulp to be pumped to slime tanks by centrifugal pump. These tanks are high and narrow, and agitation is accomplished by pumping the pulp from the bottom and discharging at the top of the tank. Close extractions are said to have been made on sand and slimes, the slimes being of unusually high grade.

On the opposite side of the Date Creek range from Congress are the claims of the Coronado Co., in many ways one of the best situated locations in the district, being directly on the line of the railway and the topography admitting of tunnel work to a depth of over 1000 ft.

There are a number of veins on which work has been done and years ago the outcrops were mined and milled by ar-

been found in the lower drifts and up-raise.

A shaft 300 ft. deep has been sunk on a vein to the west of this, known as the Golden Wave, which the writer is inclined to believe will prove to be an extension of the Last Chance if the underground development is connected, or if a proper topographical survey is made.

The tunnel and drifts are equipped with track and cars, an air-operated hoist is located at the foot of the raise to hoist and lower the cars. Air drills are used for drifting and raising.

A concentrating and cyaniding mill are proposed as a future improvement, to be located on the hillside below the tunnel portal.

A feature in connection with mining here is the farm owned by this company. Some 70 acres are under cultivation and in passing here during the growing sea-

Cuts show the outcrop for hundreds of feet. Drifting is being done on the 400-ft level, and in high-grade ore. Nearer the surface a good deal of ore has been stoped and shipped. In some of the cuts on this vein the ore is heavy with galena, which will be a valuable by-product when the mine reaches the producing stage.

At the 400-ft. level the ore is oxidized to a much greater extent than is usual in the district and in addition to the free gold and oxide of iron, contains sulphide of iron, and either the carbonate or other oxidized lead mineral. From Yarnell the road to Kirkland (at present the most accessible railroad station) leads through People's valley, a mountain basin devoted to agriculture and grazing. Turning off from the main road a branch leads to the Monica mine situated at an elevation of 5200 ft. near the crest of the range. The vein is entirely in granite, with an east-west trend and dipping north about 30° from the horizontal. To the north are outcrops of green schists, and the operations of an old mine known as the Model, seem to have been confined entirely to the schists, as no granite can be seen on the old dumps.

Entrance to the Monica mine is gained through a tunnel 986 ft. long, which cuts the vein at 1000 ft. depth; on this level drifts extend east and west 1100 ft. A winze has been sunk below the tunnel and is said to be 50 ft. deep, now filled with water. There are levels at 100, 200, 400, 500, 600 and 700 ft., with stopes above, but none below the 700-ft. level. The ore visible in the sides and backs of the stopes will average between 3 and 4 ft. in thickness. A raise extends from the 1000 ft. level, to the 400-ft. level, and in this a dike of decomposed grayish rock was cut at 800 ft., and the same rock apparently was encountered in the 1000-ft. drift 250 ft. west of the raise. This dike is similar to cross dikes observed in the Coronado and other mines and is probably rhyolite. The ore shot down in the stopes to the chutes below is trammed to the bins at the shaft or raise, through which it is delivered to the tunnel level. An air-operated hoist at the foot of this raise pulls the empty skip up the slope and controls the passage of the load down; the cable passes over a sheave at the upper end of the raise. At the 400-ft. level is an offset, and a shaft makes the connection with the surface. All the ore above is delivered to this level by cars, the loaded one going down pulling the empty back and controlled by a brake. From the tunnel a track goes to the 20-stamp mill, which is fitted for amalgamating and cyaniding. After passing the plates the pulp is classified, the sand is leached in ordinary sand tanks, and slimes are agitated by compressed air. The power plant includes two oil-fired boilers, a 4-drill compressor, a 7½-kw. generator, and 40-hp. engine. A little timber, Arizona cedar and piñon, is found near the mine. Kirkland, 14 miles away, is the nearest supply point. Freight costs are \$6 per ton. The fuel, crude oil, is hauled in the company's tank wagons; crude oil is used in the assay furnace also, giving satis-

coming from the mine, and the supply for boilers and domestic use is obtained from Model creek, below the mine; both a steam and gasoline pump are installed for lifting the water to a concrete reservoir near the tunnel portal. The property is well provided with necessary houses, shops, etc. At present the mill is not in operation and only a few men are working in the mine. The Octave, the Rincon and the Mildred companies holdings, to the south of Fools' gulch, may also be properly considered as belonging to this same district. During the past year little has been done at any of these properties, aside from the construction of a mill at the Mildred. It is reported that work will soon be commenced at the Rincon.

The cost of hauling crude oil to mines located in the Weaver mountains renders the question of power a serious one, and puts a tremendous handicap on a low-grade mine. It is possible that wires from a hydro-electric plant to the northeast may be brought in, or a steam distillate or producer gas plant may be

located near the mine, and the supply for boilers and domestic use is obtained from Model creek, below the mine; both a steam and gasoline pump are installed for lifting the water to a concrete reservoir near the tunnel portal.

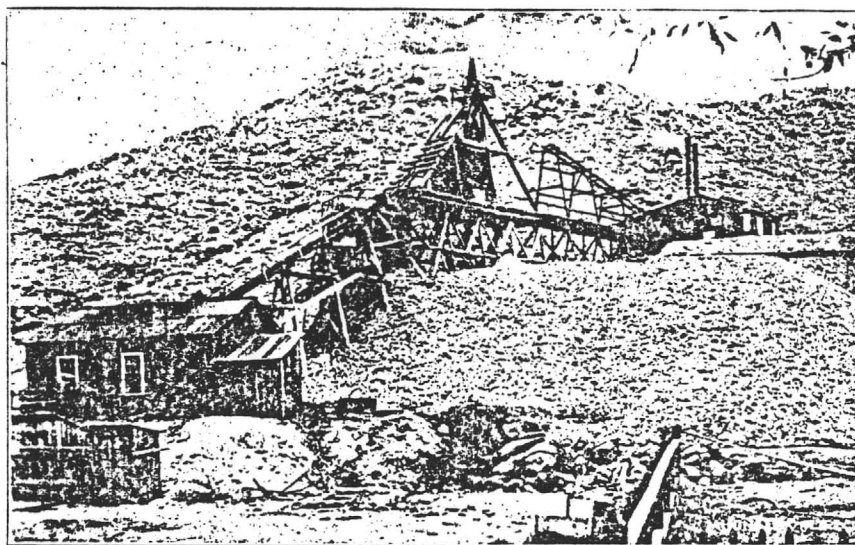
Billiton Tin in 1910.

The Billiton tin mines in the Dutch East Indies are owned and operated by private interests, while the associated deposits of the nearby island of Banka are owned by the Dutch government. The output of the Billiton mines is sold at auction at the beginning of each month, the auction for Billiton tin being held at Batavia, Java. The Banka tin is shipped to Holland and is auctioned at Amsterdam.

The Billiton output in 1910 as compared with preceding years was as follows:

Year	Output in "blocks"	Average price (florins)
1910	66,000	109.06
1909	66,500	94.76
1908	66,600	92.95
1907	66,700	122.43
1906	58,000	128.07
1905	81,300	97.64
1904	95,900	88.43

The market unit for Billiton tin, as auctioned at Batavia, comprises 100 "blocks," which weigh 57 pikul, or about



Congress Consolidated Shaft No. 5.

located on the railroad to supply power to the different camps. Such a plant is located at Wickenburg 15 miles south of Congress Junction, owned by the Octave mine; as that mine is not operating the plant is closed.

At present operations are not particularly active, through this section, although it seems to have enjoyed considerable development in the past. It is of course difficult to determine to any degree of certainty, the profit producing ability of the mines by a few trips through them. From the nature of the underground openings, the ore shoots in certain cases have undoubtedly been of good size and of frequent occurrence. Internal troubles among the companies operating in the field have been the causes of interference with the proper prosecution of the work at some of the properties, and scarcity of pay ore at others, as in all mining countries. It is quite probable that the district will

135.87 lbs. The Dutch florin is the equivalent of 40 cts. and 2 mills in U. S. gold currency.

The average prices at the monthly auctions in 1910 at Batavia were as follows:

Date	Florins
January 3	105.45
February 2	105.70
March 2	105.24
April 6	106.31
May 4	105.24
June 8	105.51
July 6	105.51
August 3	106.40
September 7	112.20
October 5	111.72
November 9	117.90
December 7	121.50

The year showed, on the whole, a rising market, permitting Billiton to partake of the general recovery in conditions which the entire Malaysian tin region enjoyed in the latter part of 1910. As in previous years the 1910 output of Billiton tin was consumed chiefly in Austria and France. The French firm of Maintz & Co. were the principal dealers.

Ore Possibilities at the Congress Mine

*Geological History of This Interesting Old Property
Suggests Advisability of Further Exploratory
Work and Development*

By W. F. Staunton

Mining Engineer, Los Angeles



W. F. Staunton

THE original locations of the Congress mine in the Martinez mining district, in Yavapai County, Arizona, were made by Dennis May and sold by him to "Diamond Joe" Reynolds about the year 1887 for approximately \$65,000, the purchase having been made by the advice of Frank M. Murphy, of Prescott. Reynolds developed the property to some extent and built a 20-stamp mill with Frue vanner tables for concentration. No amalgamating plates were used, as there was practically no free gold, all of the value being in the sulphides, which consisted principally of marcasite. The surface ores were much oxidized, in spite of which no saving of consequence could be made by amalgamation or by concentration. The cyanide process was in its infancy then and little known, so that it was commonly said of the Congress mine in its early history that though it showed much good ore, there was no known method of extraction. The finding of sulphides by sinking solved the problem to a certain extent, as such ores were amenable to concentration and the concentrates could be shipped to custom smelters. This furnished the means to profitable operation, but the crude methods employed at that time—fine crushing by stamps followed by simple unclassified concentration on Frue vanners—necessarily resulted in high tailing losses on account of the large amount of sliming that took place. Flotation, as practiced today, was then unknown. Fortunately the tailings from the early operations were saved and were re-treated later by cyanide with good extraction.

The property was operated from March, 1889, to August, 1891, when owing to the death of Mr. Reynolds, and to await the construction of the Santa Fe, Prescott & Phoenix R.R., active operation was suspended except for a certain development work and the enlargement of the mill from 20 to 40 stamps with the necessary additional Frue vanners. The No. 2 shaft had been sunk to a depth on the vein of 1,000 ft., but no stoping had been done below the 650-ft. level.

Production during this early period was as follows:

	Tons	Net Returns
March 3, 1889, to Aug. 31, 1891, ore shipped.....	1,129.4	\$155,652.29
Sept. 26, 1889, to Jan. 28, 1891, concentrates shipped..	2,503.8	335,308.87
June 3, 1891, to Aug. 31, 1891, concentrates shipped..	1,062.8	101,113.73
	4,693.0	\$592,074.89

In March, 1894, new interests acquired control of the company, the name of which then was the Congress Gold Co., with E. B. Gage, president, and active opera-

tions were resumed, continuing thereafter until the end of 1910. In April, 1901, the company was reorganized as the Congress Consolidated Mines Co., Ltd., E. B. Gage continuing as president. The writer had direct supervision, first as superintendent and later as vice-president and general manager, from 1894 to 1910.

The production during this second period was as follows:

	Net Returns
March, 1894, to Dec., 1910, ore and concentrates shipped.....	\$4,259,571.30
March, 1894, to Dec., 1910, cyanide bullion shipped.....	2,797,851.45
	\$7,057,422.75

Thus the total recorded production in actual returns for gold and silver sold was \$7,649,497.64.

GEOLOGY—CONGRESS VEIN IN GRANITE

The country rock is granite, the westerly slope of the Bradshaw Mountains. A series of greenstone trap dikes exists over an area of several square miles, having a strike that is generally east and west and dipping north 20 to 30 deg. These dikes are generally mineralized to some extent and the Congress vein is in one of them and perhaps it can be said that the dike is the vein, for ore occurs in it in all possible positions from one granite wall to the other but generally near the footwall and accompanied by a clay selvage. The dike has a thickness of about 15 ft. Another series of dikes of fine-grained quartz porphyry is of later origin, apparently post-mineral, and strike northeasterly with nearly vertical dip. The following analysis of an average specimen of the greenstone was reported from the Sheffield Scientific School: SiO₂, 52.20 per cent; Al₂O₃, 13.40; FeO, 9.75; MnO, 1.90; CaO, 9.60; and MgO, 1.16.

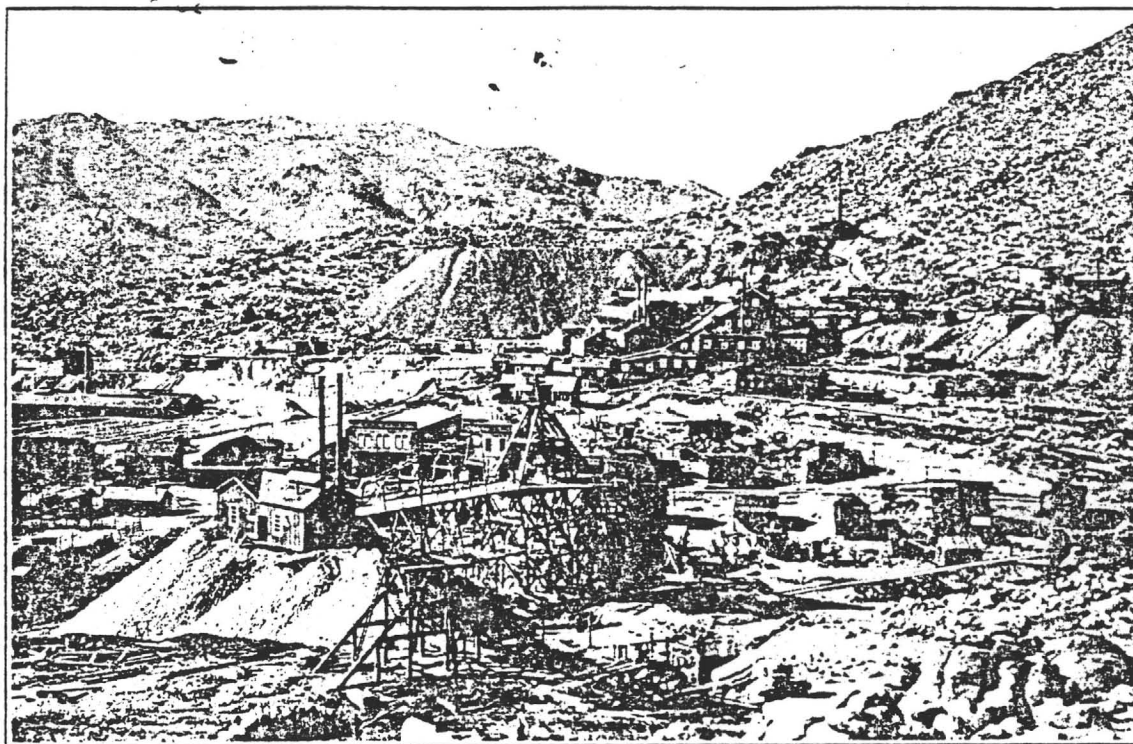
There are other veins, entirely in the granite and unaccompanied by the greenstone so characteristic of the Congress vein. These strike east and west, but dip more steeply, from 40 to 50 deg. The development of quartz is more extensive than in the Congress vein and the average grade is lower. One of these veins, the Niagara, carried large bodies of ore of commercial grade to a depth of 2,000 ft. A characteristic of these all-granite veins is the presence of a small amount of galena and higher silver contents.

Minor faulting is in evidence throughout the mine workings and there has been considerable relative movement of the walls of the Congress vein, resulting in local crumpling of the greenstone. The mine workings terminate to the east against a heavy fault, beyond which the vein has not been definitely located. This fault cuts off both the Congress and Niagara veins.

MINE WORKINGS DRY

The mines were practically dry down to the deepest point reached, 4,000 ft. on the Congress vein at an approximate inclination of 25 deg. from the horizontal, the small amount of surface water which found its way in being easily handled by bailing tanks in the shafts. No mine pumps were ever put in or needed.

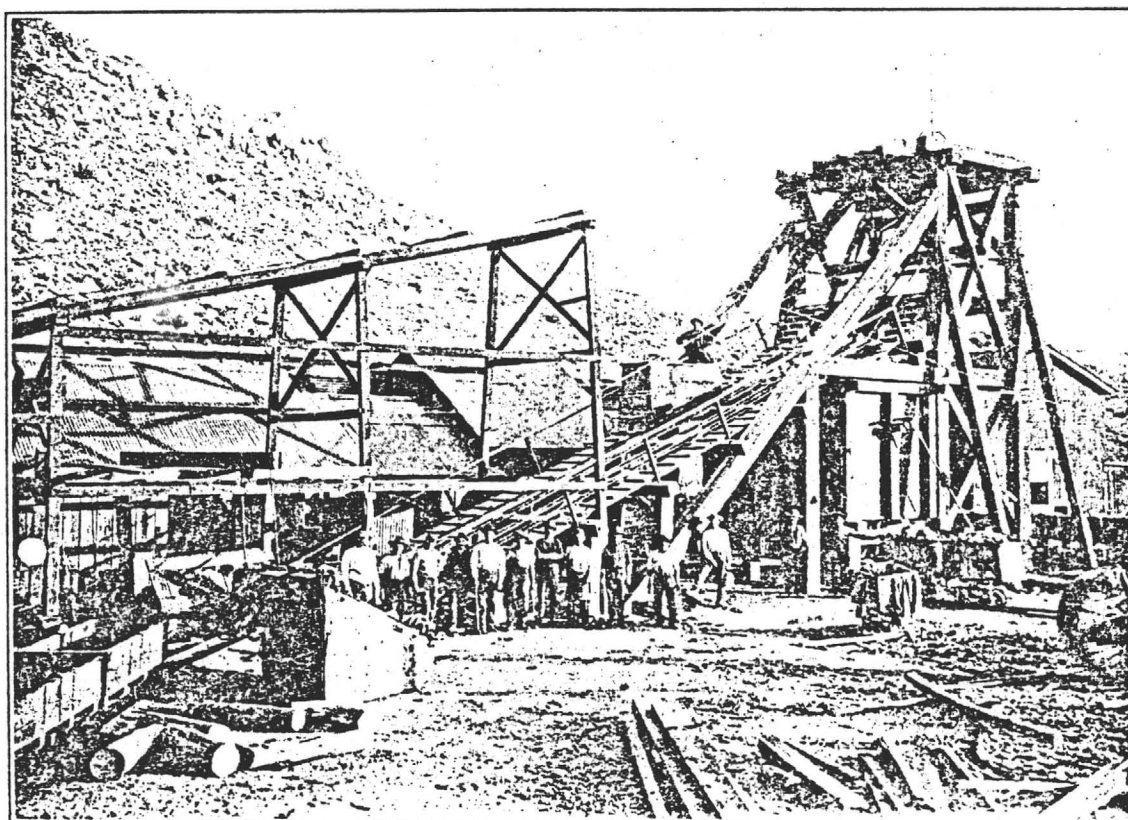
Although the Congress vein is continuous and well



Congress mine, Arizona, about 1905. At left is cyanide plant. No. 5 shaft on Niagara vein in foreground. Above stamp mills (in center) is No. 2 shaft and at right is No. 1 shaft, both on Congress vein

defined for a mile or more to the west of the mine workings and shows both the characteristic quartz and sulphides, the pay ore was practically confined to a shoot in the vein pitching to the northwest and coinciding closely with the intersection of one of the fissure

veins in the granite. The granite vein is faulted by the Congress vein so that the intersection is obscure in the mine workings. The portion of the granite vein in the hanging wall of the Congress carried bodies of pay ore.



The Congress pay shoot varied greatly in length on different levels, being longest on the 650 ft. level, where it was stoped continuously for 1,800 ft. The average thickness of pay ore was less than 3 ft. Several pinches were met in following the vein down, the most serious being at the 1,700-ft. level, where there was no stoping ground. On the theory that if pay ore existed below that point it would probably be found on the general line of trend of the ore shoot above, a deep prospecting winze was sunk from the 1,700-ft. level, in the vein but with a northwesterly pitch corresponding to the established trend of the pay ore in the upper workings. This winze was sunk 1,000 ft. and bore out fully the theory upon which it was projected, the pay ore coming in again as good as ever after a few hundred feet of lean ground.

The 3,900-ft. level was the deepest point at which any considerable amount of development was done. For several levels above this there had been a gradual pinching of the pay shoot, which became small and irregular, although retaining its mineralogical characteristics and the small amount of sulphides which remained still showing the characteristically high gold contents, about 7 oz. per ton. The conditions were similar to those existing at other horizons in the mine where persistent deeper work had been rewarded by expansion of the ore shoot to normal size.

Seven shafts were sunk, all of them inclines following the veins. Three of these were on the Congress vein, designated as No. 1 (1,100 ft.), No. 2 (1,700 ft.) and No. 3 (4,000 ft.). On the Niagara vein three shafts were also sunk, No. 4 (1,000 ft.), No. 5 (2,050 ft.) and No. 6 (1,800 ft.). On the Queen of the Hills vein one shaft was sunk to a depth of 200 ft. below the tunnel level.

TOTAL TONNAGE PRODUCED 692,332

Figures on tonnage of crude ore are not available for the first period from March 3, 1889, to Aug. 31, 1891, but on account of the great uniformity of the ore they may be closely approximated from the figures of the later period, on which basis the amount of ore milled

in the first period appears to have been about 70,000 tons, all of which came from the Congress vein, as also did the shipping ore, together making a total of 71,129 tons. In the second period the amount of ore milled was 617,542 tons and shipping ore 3,661 tons, a total of 621,203 tons. The figures may be grouped as follows:

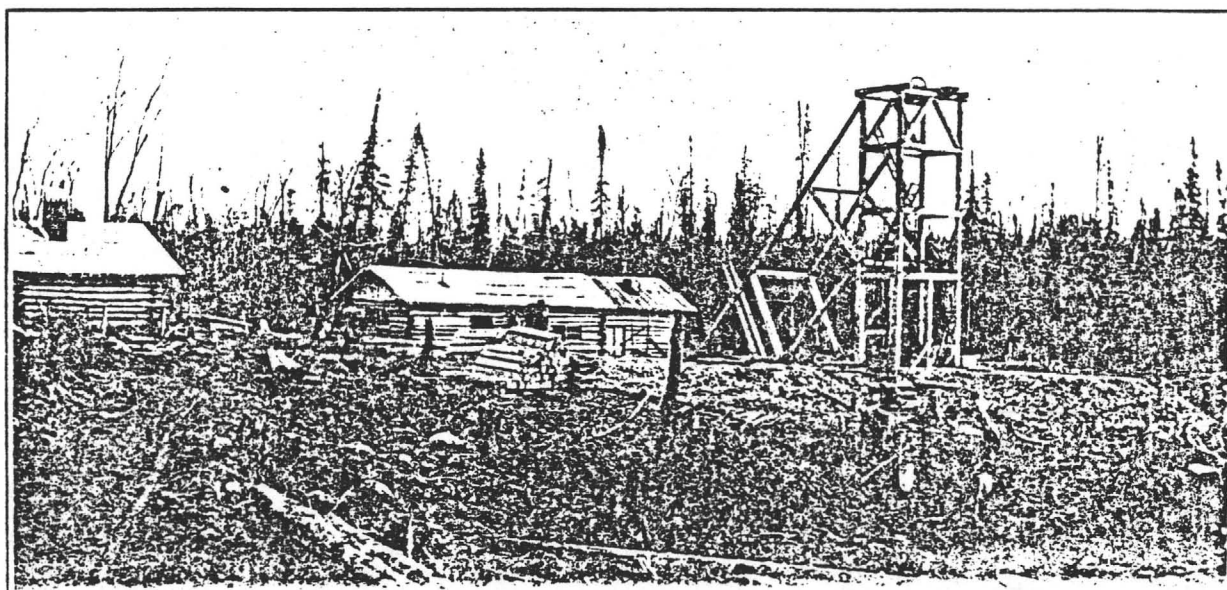
	From Congress, Tons	From Niagara, Tons	From Queen of the Hills, Tons	Total, Tons
March 3, 1889, to Aug. 31, 1891.....	71,129			71,129
March 1, 1894, to Dec. 31, 1910.....	307,863	293,215	20,125	621,203
	379,022	293,215	20,125	692,332

The recorded production of gold and silver in shipments shows a total of 388,477 oz. of gold and 345,598 oz. of silver. As this came from 692,332 tons of ore, a recovery is indicated of \$11.81 a ton, gold being figured at \$20.67 and silver at 60c. per ounce. Average tailing assays were about \$1.20, which indicates a gross average value of all ore mined of \$13.01.

The history of the Congress mine, its remarkable persistence due probably to its association with an intrusive dike of profoundly deep origin, and the existence of similar parallel veins in both hanging and footwall over a wide belt, suggest a careful study of the whole situation to determine the feasibility of a broadly planned scheme of exploration by means of a vertical shaft so arranged as to cut the Congress vein at greater depth than has been attained and incidentally to cut and explore the other similar veins, many of which not cut by the shaft could be reached by crosscuts.

Brass Direct from Mixed Ores

A process described by A. W. Guertler in *Metall und Erz* (1926, 23, 325) produces brass in a novel way. By melting sulphide ores of lead and zinc with metallic copper in excess, copper matte and a mixture of metallic lead, copper, and zinc are formed, which separate, in the liquid state, into a layer rich in lead with little zinc, lead, and a copper-zinc layer with little lead. The last-named is melted with copper and yields a serviceable brass.



Excerpts from "Gold Mining & Milling
in the Wickenburg Area, Moh & Yav. Co. Arizona" I.C. 6991

1938

The Bagdad and Hillside mines in the Eureka district make enough water for present milling purposes without reclaiming any. Most of the mines in the Vulture, Big Horn, and Weaver districts depend on wells and mine water for milling. The Octave mine, in the foothills of the Weaver district, gets its water from a spring 7 miles from the property.

In the Vulture and the Big Horn districts, south of Wickenburg, the water table is from 500 to 700 feet from the surface. In the Weaver Mountains the Yarnell Mining Co. developed a sufficient water supply from two drilled wells, 62 and 87 feet deep, but in most sections of the Weaver district the water table is deeper.

Eight-inch wells can be drilled by contract for \$2.50 a foot for the first 100 feet. The price increases by increments of 50 cents per foot for each 100 feet in excess of the first 100 feet. The contractor sets the casing, if it is necessary, but the owner must buy the casing and deliver it at the well. The cost of 8-inch casing is about \$1.50 a foot.

WEAVER AND MARTINEZ DISTRICTS

Location

The Weaver district is in southern Yavapai County, about 15 miles north of Wickenburg in the vicinity of Stanton and Octave. It includes the mines in the south foothills of the Weaver Mountains as well as those in the vicinity of Yarnell at the top of the range. The Martinez district is just west of the Weaver district in the vicinity of Congress Junction and the Date Creek Mountains. It is sometimes considered a part of the Weaver district.

Topography

The southern part of the districts is in the foothills of the Weaver and Date Creek Mountains at an elevation of about 3,800 feet. The Weaver Mountains rise abruptly to 5,500 to 6,000 feet. The Date Creek Mountains are lower.

Geology

The country rock is mostly granite and similar rocks intruded by basic dikes. The main gold-bearing veins of the district bear northeasterly and southwesterly and dip to the northwest at 20° to 30°. They consist of quartz filling in fault fissures and contain gold-bearing sulphides of lead, copper, and iron.

History and Production

The first discoveries in the Weaver district were made in about 1860, but very little work was done until after 1895. About this time a party of eight men purchased what is today known as the Octave mine and organized the Octave Gold Mining Co. The vein was mined to a depth of about 2,000 feet on

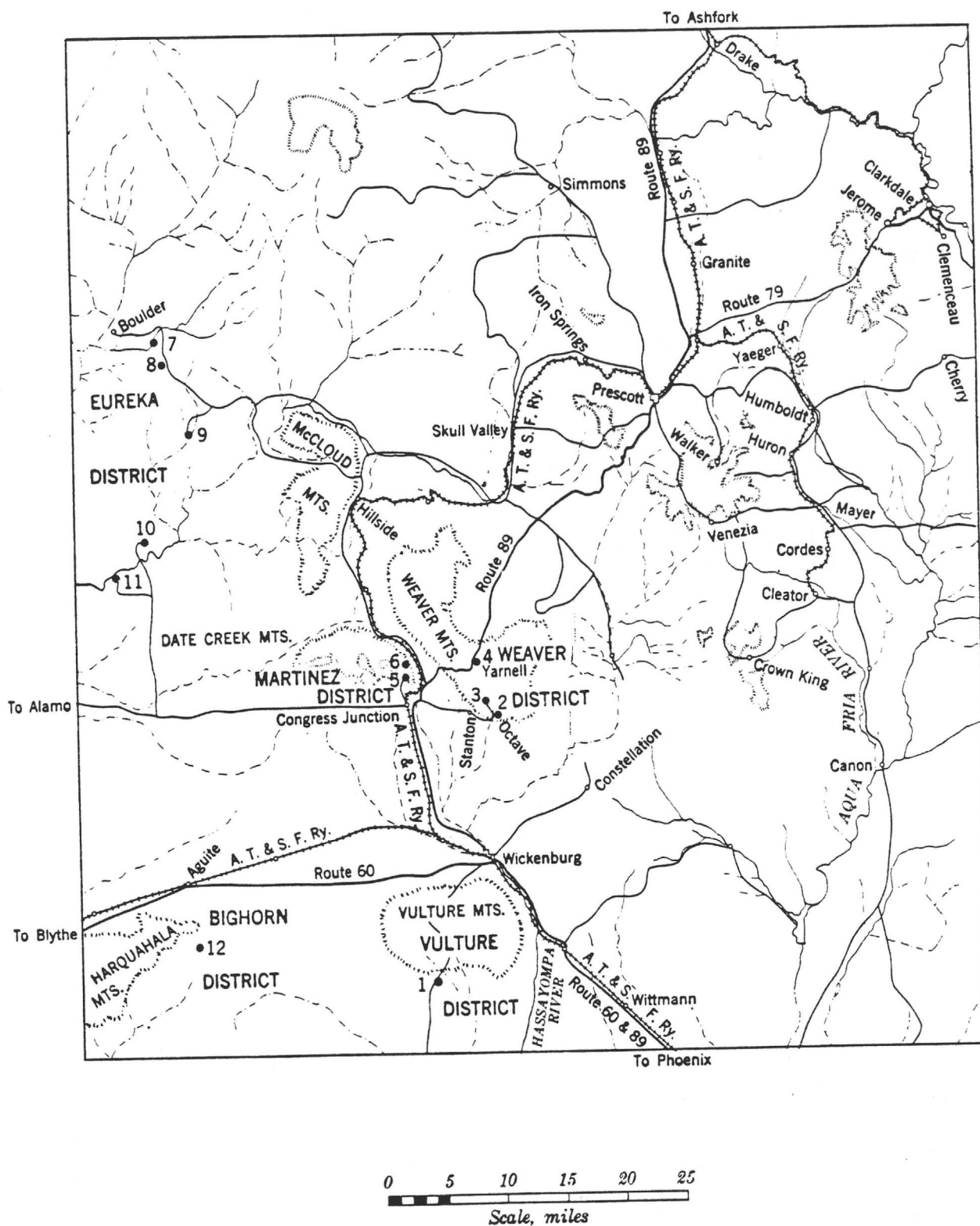


Figure 1.—Map of Wickenburg area and surrounding territory. Mines: 1, Vulture; 2, Octave; 3, Johnson; 4, Yarnell; 5, Congress; 6, Reese; 7, Hillside; 8, Bagdad; 9, Comstock Dexter; 10, Oro Bueno; 11, Arizona Homestake; 12, Pump.

the incline, the ore being treated in a 40-stamp mill equipped for amalgamation, table concentration, and cyanidation. The property was sold in 1907, and up to 1934 three companies made attempts to operate it. Late in 1934 it was acquired by the American Smelting and Refining Co., which is operating it at present. Most of the other properties in the district were opened about 1900 or a little later.

The Congress mine,^{4/} discovered sometime prior to 1887, was the first discovery in the Martinez district. It was operated intermittently from 1889 to 1910, during which time the net return on bullion and concentrates was over \$7,500,000. Practically all of the other mines in the district were opened shortly after the Prescott-Phoenix branch of the Santa Fe Railroad was built in 1895.

The production of the Weaver district from 1908 to 1934^{5/} is as follows:

Year	Value	
	Lode gold	Total metals
1908.....	\$158,000	\$161,863
1909.....	34,112	34,438
1910.....	-	26,448
1911.....	12,236	12,844
1912.....	4,839	4,839
1913.....	-	7,506
1914.....	4,199	4,210
1915.....	-	7,168
1916.....	19,102	20,693
1917.....	-	13,375
1918.....	-	-
1919.....	1,000	1,000
1920.....	-	-
1921.....	-	-
1922.....	-	1,301
1923.....	-	-
1924.....	250	-
1925.....	-	-
1926.....	901	901
1927.....	-	-
1928.....	4,245	4,533
1929.....	72,701	77,576
1930.....	3,488	4,218
1931.....	6,860	6,958
1932.....	13,778	13,846
1933.....	12,084	12,182
1934.....	37,956 ^{1/}	38,657 ^{1/}
Total.....	335,751	454,556

^{1/}Minerals Yearbook, Statistical Appendix, 1935, p. 226.

^{4/} Wilson, Eldred D., Cunningham, J. B., Butler, G. M., Arizona Lode Gold Mines and Gold Mining: Arizona Bureau of Mines Bull. 137, Aug. 15, 1934, pp. 69-73.

^{5/} Elsing, Morris J., and Heineman, Robert E. S., Arizona Metals Production: Arizona Bureau of Mines Bull. 140, 1936, p. 87.

Production of the Weaver and Martinez districts, by mines, is as follows:

Weaver district:		
Octave mine, 1895-1929.....	\$1,900,000	
Monica mine, 1916-1917.....	30,000	
Martinez district:		
Congress mine, 1887-1910.....	8,710,000	
Total.....	10,640,000	

Octave Mine

Situation

The Octave mine is about 12 miles east of Congress Junction and about 3 miles southeast of the village of Stanton in the foothills of the Weaver Mountains. The mine is at Octave, which has a population of 200 to 250, a post office, and a school for 50 to 75 pupils. A fair road runs from the mine to Congress Junction, the nearest railroad station.

Water Supply

The principal water supply, consisting of 40 to 50 gallons per minute, comes from Antelope Springs about 8 miles northwest of the property. The water is piped in a 3- and 4-inch pipe line from the spring to the mine and the mill. During the dry season, or in case the pipe line from the spring breaks or freezes, an auxiliary supply of water is furnished from an old shaft. This would probably be sufficient in almost any emergency, as there are several thousand feet of old workings under water. A multistage pump operated by a 20-horsepower motor is kept at the water level, 330 feet vertically below the collar.

Topography and Geology

The elevation at the mine portal is about 5,400 feet. The country is rough, having been cut by deep arroyas from the Weaver Mountains, but just below the mill to the south it becomes rolling and flattens out to a fairly level plain.

The country rock, granitic in character, is locally known as granodiorite. It is rather fine-grained and probably slightly more basic than true granite. The Octave vein bears N. 70° E. and dips from 18° to 25° to the north; the width ranges from a few inches to 6 feet. The vein is made up of two distinct kinds of quartz, a white and a blue variety, probably representing two distinct periods of mineralization. The white variety is the more persistent and contains nearly all the commercial ore. It has a certain amount of banding and contains galena, chalcopyrite, bornite, pyrite, and gold in appreciable quantities. The blue variety is only slightly mineralized. In places, however, it may be mineralized enough to pay for mining and milling. It occurs above or below the white quartz and generally must be broken with it.

the deposit. Additions are made to the upper end of this pipe as the deposit is built up. Water is pumped from the thickener to the mill storage tanks.

Freight and smelter.-- The company delivers the concentrates at the village of Yarnell, where the flotation concentrate is picked up by a trucking company and taken to the smelter at El Paso. The concentrate is often stored in the trucking company's warehouse at Phoenix until it is convenient to take it to El Paso with other freight. This causes long delays and, consequently, the arrangement has not been entirely satisfactory.

The trucking rates to El Paso are \$10 a ton, which is about \$1 a ton more than the railroad rate from Congress Junction for carload lots of ore of the same class. The railroad rates are not taken advantage of because it requires too long to produce a carload of concentrates. The trucking to Congress Junction would just about offset the difference in rates.

Total marketing costs are about \$25 per ton of concentrate.

Reese Mine

Situation

The Reese mine is in the Martinez district at the summit of the Date Creek Mountains, about 6 miles due north of Congress Junction. It is served by a passable branch road from the Congress Junction-Hillside Highway, which lies about a mile to the east of the mine.

The property consists of 2 patented and 11 unpatented claims. It is owned by J. L. Reese of Congress Junction and is operated under lease by R. F. Thatcher of Wickenburg.

Topography and Geology

The Date Creek Mountains are low but quite rugged. The highest peaks are about 4,500 feet above sea level. The summit of the range at the mine is about 3,800 feet above sea level.

The country rock is granite with diorite intruded along the plane of the vein. The vein bears northwest and southeast and dips to the northeast at about 30°. At the southern end of the property the vein consists principally of quartz, which varies in thickness from 2 to 4 feet. The principal minerals are gold-bearing sulphides of iron, lead, and copper, with some zinc. At the northern part of the property the vein seems to be more altered and oxidized. The best ore occurs with yellow and brown oxides of iron.

Development

The property is developed extensively through two inclined shafts on the vein. One shaft at the southern part of the property is 1,180 feet deep and the other at the northern part is 300 feet deep. The bottom of the south

shaft connects with the surface by an adit crosscut 700 feet long. There are a number of levels from each of these shafts, but the extent of the workings is unknown because of caving.

Equipment

Mine equipment consists of a gasoline hoist, a gasoline compressor, and two jackhammers. Besides this, it was necessary to buy a truck for hauling groceries and taking the men to and from work.

Mining Methods

Mining was started in the upper levels of the south shaft in March 1936. Shipments from this part of the mine ran from \$9 to \$15 a ton in gold. Later on this part of the mine was abandoned and mining was begun on the upper level of the north shaft. Shipments from here run from \$40 to \$60 a ton in gold.

Mining consists of stripping from 2 to 3 feet of waste rock from above the ore by blasting and then digging the ore loose with a pick. The ore ranges in thickness from 6 to 18 inches. Appreciable amounts of gold seem to occur in the fractured parts of the rock adjacent to the vein, as samples of the fines from the waste dump run up to \$8 a ton in gold.

Drilling is done with mounted jackhammers using 7/8-inch hollow steel and chisel bits. The steel is sharpened at the mine.

In November 1936 operations consisted of mining above the first level south of the shaft and drifting south on the same level. By careful mining, the grade of the ore was kept at \$40 to \$60 a ton. Carload shipments of 45 to 50 tons each are made to the Magma smelter at Superior about every two weeks.

Labor

The payroll in November was as follows:

			<u>Per day</u>
3 miners	@	\$5.00	\$15.00
4 muckers	@	4.00	16.00
2 hoistmen	@	5.00	10.00
1 cook	@	2.00	2.00
Total			<u>43.00</u>

The hoistman runs the hoist, takes care of the compressor, and does the topping. Quarters are furnished, but there is a charge of \$1 a day for board.

Trucking, Freight, and Smelter

Trucking rates to Congress Junction are \$1.50 a ton. If the road from the main highway to the mine were improved, this rate probably could be cut to \$1 a ton. For 80,000-pound minimum cars, the freight rates from Congress Junction to the Magma smelter at Superior are as follows:

<u>Metal value</u>	<u>Rate per ton</u>
Up to \$15	\$2.14
\$15 to \$20	2.40
\$20 to \$25	2.50
\$25 to \$30	2.60

For metal values over \$30, the rates are the same for 80,000 minimum cars as for 60,000 minimum cars. (See freight rates for the Wickenburg area, page 8.)

Treatment charges are \$5.50 a ton for ores having metal values up to \$15 a ton and 10 percent additional of the gross value of the ore for any value over \$15.

Costs

Total equipment and operating costs, from the time the mine started in March 1936 to September 1, 1936 are as follows:

Equipment:

Gasoline hoist	\$250.00
Gasoline compressor	1,350.00 (not paid for)
Rock drills	133.00
Picks and shovels	63.00
Drill steel	22.00
Pipe, hoses, etc.	250.00
Haulage	<u>90.00</u>
Total	2,163.00

The truck was purchased on a time-payment plan and the payments are figured as operating expenses.

I. C. 6991

Operating expenses:

March 1, 1935 to August 30, 1936.

Total, 802.47 tons.

	<u>Total</u>	<u>Per ton</u>
Labor	\$4,200.00	\$5.23
Gasoline for hoist and compressor	490.00	.61
Lubricating oil	66.00	.08
Powder	173.00	.21
Caps and fuse	127.00	.16
Groceries	1,475.00	1.84
Ore hauling	720.00	.90
Gas and oil for truck	246.00	.31
Cash payment on truck	375.00	.47
Assaying	96.00	.12
Repairs on old truck	74.00	.09
Tires and tubes	61.00	.08
Timber	220.00	.27
Total	<u>\$8,323.00</u>	<u>10.37</u>

Smelter Receipts

Dry tons	Assav value	Freight per dry ton ^{1/}	Treatment per dry ton	Receipts
46.16	\$ 9.66	\$ 2.17	\$ 3.50	\$ 184.58
49.41	11.59	3.97	3.50	203.02
45.76	9.02	2.20	3.50	152.00
51.27	11.27	2.17	3.50	288.44
47.39	8.05	2.18	3.50	112.46
51.70	6.44	2.16	3.50	40.25
49.60	15.45	2.56	3.55	462.19
50.95	14.16	2.61	3.50	411.05
52.88	16.10	2.60	3.61	523.36
44.60	18.99	2.56	3.90	557.82
51.43	15.45	2.62	3.55	479.14
45.23	12.88	2.66	3.50	303.95
40.27	21.57	2.98	4.16	583.64
36.31	23.90	3.20	4.39	592.58
31.77	35.42	3.20	5.54	847.11
33.65	40.80	7.05	6.00	936.64
42.63	62.79	4.27	6.00	2,243.01
31.46	21.57	2.70	4.16	462.19
802.47				<u>\$9,383.43</u>

^{1/} Freight includes demurrage.

Underground equipment consists of two double-drum electric hoists for slushing, three motor-driven blowers, a 2-stage centrifugal pump, an air pump for sinking, and several drifters and jackhammers with mountings.

Power

Power is purchased from the Arizona Power Corporation. The transformers are furnished by the power company.

Labor

In November 1936 the payroll was as follows:

8 miners	@	\$4.50	\$36.00
10 muckers	@	4.00	40.00
2 hoistmen	@	4.50	9.00
1 blacksmith	@	5.00	5.00
1 shift boss	@	6.00	6.00
Total			96.00

The slusher operators are rated as miners.

Congress Mine^{6/} (Idle)

Topography and Geology

The Congress mine is 3 miles by road northwest of Congress Junction. It is in a comparatively level country at the southern base of the Date Creek Mountains at an elevation of 3,400 feet.

The country rock consists of a coarse-grained granite intruded by basic dikes. There are several veins on the property, the principal ones being the Congress, the Niagra, and the Queen of the Hills. The Congress vein bears roughly east and west and dips to the north at 20° to 30°. It occurs largely within a basic greenstone dike with the ore shoots mostly near the footwall. The vein filling consists principally of quartz, with considerable amounts of iron sulphide. Galena is rarely present.

History and Production

The property was located sometime previous to 1887, when it was sold to "Diamond Joe" Reynolds for \$65,000. Reynolds did some development work and built a 20-stamp mill with vanner tables for concentrating the ore. Amalgamation was never very successful, although the ore near the surface was highly oxidized. Very little was known of the cyanide process at this time, and as a result of metallurgical difficulties the early operations were not profitable.

^{6/} Wilson, Eldred D., Cunningham, J. B., and Butler, G. M., Arizona Lode Gold Mines and Gold Mining: Arizona Bureau of Mines Bull. 137, Aug. 15, 1934, pp. 69-73.

Operations became more successful when the development work was carried to the lower sulphide levels, where the ore was better suited to gravity concentration. Good recoveries were impossible, however, because of inefficient grinding by stamps and concentrating without classifying. Later on, tailings from these early operations were treated by cyanidation with a good extraction.

The property was operated by Reynolds from March 1889 until his death in August 1891. During the three years that followed, production was discontinued, but the shaft was sunk to a depth of 1,000 feet on the dip of the vein, the mill was enlarged from 20 stamps to 40 stamps, and additional necessary vanners were added. Later on, cyanide tanks were added.

In 1894 production was resumed under new ownership. Except for a reorganization of the company in 1901, operations continued without interruption until 1910. By that time, practically all of the known ore reserves were exhausted and operations were discontinued. In 1920, the surface equipment, and a 4-mile railroad leading from Congress Junction to the mine were dismantled. In 1923, 1925, 1926, and 1931 lessees shipped a few cars of ore from the property. In 1928 several thousand tons of mine dump material was treated by combined gravity concentration and flotation. In 1931 the Southwest Metal Extraction Corporation treated 10,000 tons of mill tailings by cyanidation. In 1934 the Illinois Mining Corporation began treating mine dump material in a plant equipped with ball mill, tables, and cyanide tanks, but operations were suspended after a few weeks' run.

The total recorded production from 1899 until 1910 was \$7,649,497. Of this, \$155,652 was from crude ore, \$4,695,994 from concentrates, and \$2,797,851 from cyanide bullion. The production in bullion was 383,477 ounces of gold and 345,598 ounces of silver. As this was from 692,332 tons of ore, a net recovery of \$11.81 a ton is indicated, figuring gold at \$20.67 and silver at \$0.60 an ounce. The tailings assay about \$1.20 a ton, which indicates a gross value of about \$13.00 a ton.

Development

The mine is developed very extensively through seven shafts. Nos. 1, 2, and 3 shafts are on the Congress vein and are 1,100, 1,700 and 4,000 feet deep, respectively. Nos. 4, 5, and 6 shafts are on the Niagara vein and are 1,000, 2,050, and 1,800 feet deep, respectively. No. 7 shaft is on the Queen of the Hills vein and is 200 feet below the tunnel level.

The length of the ore shoot on the Congress vein varied greatly on different levels. On the 650 level it was stoped continuously for 1,800 feet on the strike. The average thickness of the ore throughout the mine was less than 3 feet. Several pinches occurred along the dip of the vein, the most serious being on the 1,700-foot level, where there was no stoping ground at all. From this level a 1,000-foot winze was sunk at the projected extension of the ore shoot above. The first few hundred feet of this went through lean ground, but after that the ore came in again as rich as ever. The 3,900-foot

level was the lowest level at which any considerable amount of ore was mined. There was a gradual pinching of the ore shoot for several levels above. The vein became narrow and irregular although it maintained its general mineralogical character and gold content.

The Niagra vein is entirely in granite, unaccompanied by basic intrusives. It was productive of commercial ore to a depth of 2,000 feet. It dips to the north at 40° to 50° and contains more quartz than the Congress vein.

The all-granite veins are characterized by more galena and higher silver values than the veins that occur in conjunction with basic intrusive dikes.

The production of the mine, by veins, is as follows:

<u>Vein</u>	<u>Tons</u>
Congress	378,992
Niagra	293,215
Queen of the Hills	20,125
Total	692,332

VULTURE AND BIG HORN DISTRICTS

The Vulture and the Big Horn districts are in northern Maricopa County to the south and southwest of Wickenburg. The Vulture district includes the Vulture Mountains just south of Wickenburg and the Big Horn district includes the Big Horn Mountains and the eastern edge of the Harqua Hala Mountains to the southwest of Wickenburg.

The Vulture and the Big Horn Mountains consist in part of andesite and rhyolite flows on a basement of schist and granite. The veins are mostly in granite and near the granite schist contacts. A number of veins in the volcanic andesites and rhyolites have been prospected, but nearly all of the productive mines have been developed on veins in the granite or schist.

Vulture Mine^{1/}

Topography and Geology

The Vulture mine is in the Vulture mining district in Maricopa County, 14 miles by road southwest of Wickenburg. It is at the southern edge of the Vulture Mountains at an altitude of about 2,000 feet. At the Vulture mine the country is moderately hilly, but farther to the north it becomes more precipitous and rugged.

The vein system is in a fault zone that strikes roughly east and west and dips to the north at about 45° . The footwall of the vein consists of schist, the laminations of which are roughly parallel to the vein in dip and strike. The hanging wall consists of a dike of granite-porphry about 80 feet wide.

^{1/} Wilson, Cunningham, and Butler, work cited. (See footnote 6, p. 157.)

Date June 21, 1939

Mine Piedmont

District Martinez

Location

Former name West Congress

Owner John M. Price

Address Congress

Operator

President

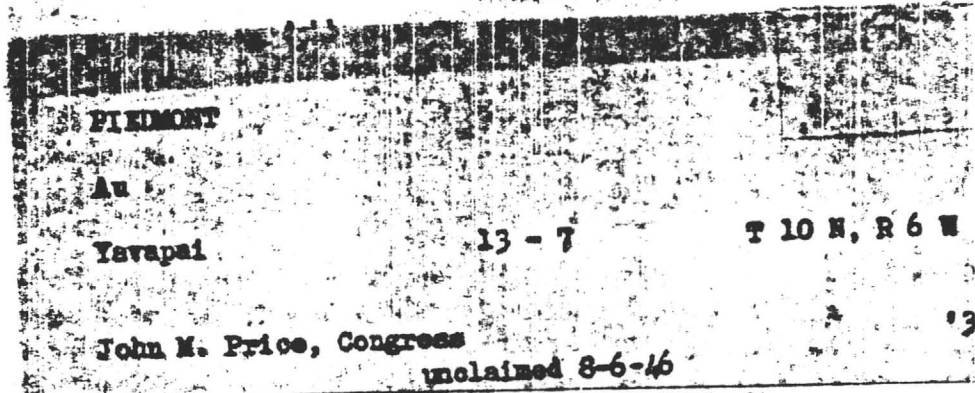
Mine Supt.

Principal Metals Gold

Production Rate

Power: Amt. & Type

Operations: Present Driving levels in hillside and unwatering and retimbering shaft



Operations Planned To install milling equipment

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Number Claims, Title, etc. Six locations - possessory title

Description: Topog. & Geog. Situated on divide between South branch of Martinez wash and the head of Sols Wash.

Mine Workings: Amt. & Condition

Shaft 200 feet with levels 100 feet east and west
Fair condition

(over)

Geology & Mineralization ~~Within the Date Creek granite area.~~
porphyry dike-partly silicified. It is the faulted west extension
of the Congress vein.

Ore: Positive & Probable, Ore Dumps, Tailings

Mine, Mill Equipment & Flow Sheet

Road Conditions, Route A branch road from the Date Creek highway - 2 miles

Water Supply The shaft is the present supply - for increased supply Martinez wash.

Brief History Purchased by present owner from Emil Hermsdorf who located same in 1919.

Special Problems, Reports Filed

THE ARIZONA DEPARTMENT OF MINERAL RESOURCES
MAKES NO REPRESENTATION AS TO THE ACCURACY
OF THE CONTENTS OF THESE DOCUMENTS.

Remarks

If property for sale: Price, terms and address to negotiate.

Signed..... John M. Price

Use additional sheets if necessary.

Mines of the Weaver and Martinez Districts

IN THE "History of Arizona" by Hon. Richard E. Sloan and Ward R. Adams, we read that on December 29, 1863, the then appointed Territorial Governor, John N. Goodwin, issued a proclamation at Granite, later to become the county seat of Yavapai County under the name of Prescott, to the effect that he would that day under the power vested in him by Act of Congress, proceed to organize a temporary government for the territory. Three judicial districts were proclaimed, and it is interesting to note that the now ruined town of Weaver, the center of placer mining in Yavapai County, two miles north of the present town of Octave, was an important town in the third judicial district. Arizona's first legal election took place July 18, 1864, and Henry A. Bigelow, a miner and a resident of Weaver, was elected a member of the first council.

By 1870 Weaver was no longer important, mining having waned between 1865 and 1874 due to the depredations of the Indians and difficult transportation, as well as to the exhaustion of the easily recovered placer gold. Following 1874 an influx of immigrant miners came to work at the Vulture mine, already an important producer, some 20 miles south of this area. From that time, lode-gold mining has been carried on somewhat intermittently until the present day.

Many lode prospects were located before and during this period. The Congress mine is reported to have been located in 1864, followed by the Octave, Planet and Saturn, Dixie, Yarnell, Zieger, Johnson, and numerous others.

In 1887 the Congress mine was purchased by the colorful "Diamond" Joe Reynolds of New York and operated by him until his death in 1891. He had endeavored to interest the territorial legislature in the idea of a subsidy for construction of a railroad to connect Ashfork to the north with Phoenix to the south. On his death this task fell into the hands of Frank Murphy, his western manager. An act was passed granting this subsidy, only to be vetoed by President Harrison. The legislature, however, finally backed Murphy to the extent of granting an exemption of taxation for a period of 20 years when he finally induced certain officers of the Atchison, Topeka and Santa Fe Railway to organize and build a branch line. Work started at Ashfork, January 22, 1892, and the line was completed to Phoenix in March of 1895.

Mining in this area immediately took on new life, with healthy and unhealthy promotions at the above-mentioned properties. Economic conditions changed and copper became more important than the precious

The Octave, Congress, Yarnell, and Alvarado were important mines in the early days of Southern Yavapai County, Arizona. They once again have returned to the lists of producers and since their reopening have accounted for the amazing total of \$2,200,000. A number of other properties in the Weaver and Martinez districts give promise that they, too, may enter the producing ranks.

metals. Marginal properties failed completely, while others still maintained their organizations. Finally, in 1910 the Congress mine gave up and in 1920 the plant was dismantled. The Planet and Saturn did not last long; the Dixie was exhausted early at a depth of 1,000 feet; the Octave, though reorganized several times, had reached a depth of over 2,000 feet. The Octave held on to the last having made its final attempt in 1928 and 1929. All of these mines left a record of production and maps, and in the case of the Congress mine, several thousands of tons of tailings and dumps.

WHEN President Roosevelt, in 1934, issued a proclamation raising the price of gold to \$35.00, each of these properties immediately received the attention it deserved from the mining fraternity. Now, in place of the Weaver of the sixties, we have the flourishing villages of Octave, Yarnell, and Congress.

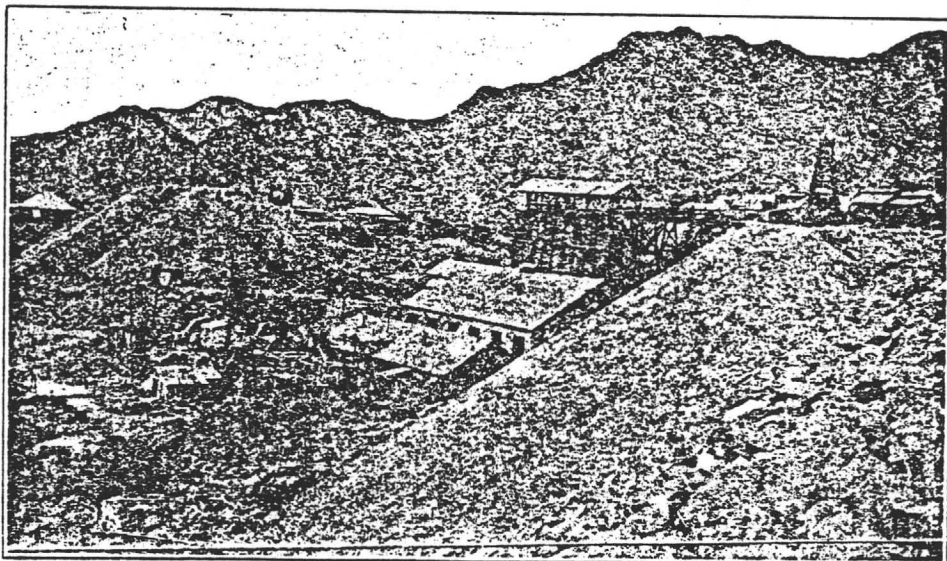
In May of 1934 the American Smelting and Refining Company investigated the possibilities of the Octave mine. Six months later it was modernizing the old plant and was soon on the producing list.

The old Planet-Saturn, now known as the Alvarado, became the object of investigation and finally, with the assistance of an RFC loan, it, too, entered the list of producers with a modern plant.

The tailings and dumps of the Congress mine, still held by the Murphy Estate, were purchased outright. They, too, with the aid of an RFC loan, have a modern plant in full operation.

The last to enter the lists is the Yarnell mine which, since January of 1940, has been pouring its wealth into the community.

Southern Yavapai County is being made over. Yarnell, a rather recent town, has been fully modernized with water and electricity and has become the residential area for the Alvarado and Yarnell mines. Congress, on the railroad, has been improved and will soon have full electrical facilities. Octave, the company-owned village, has been expanded far beyond the company's property. Schools have been built in Yarnell, and school facilities at Octave and Congress have been doubled. Attendance at the schools is worthy of notice. At Octave, daily attendance has risen from an average of 14 in 1932 to 50 in 1939; Congress in 1932 averaged 47 pupils per day and now has reached almost 70; Yarnell, where no school existed until 1936, started with a daily attendance of 11 pupils and has reached better than 30. The average daily attendance of 150 children in the district means an increase of 200 per cent since 1932.



Ore bins, flotation and cyanide plant of the Arizona Eastern Gold Mines Company at Octave, Arizona. The plant is treating 90 tons of ore daily.

*Field Engineer, Arizona State Department of Mineral Resources, Prescott, Arizona.

The population increase of the district has not been determined, but the properties are employing in the neighborhood of 200 men, with an average monthly payroll of \$35,000. Mining supplies, purchased mostly within the county of Yavapai, exceed \$11,000; power consumption at the mines is approximately \$6,000; and the mills handle 600 tons of ore daily, the value from which is in part represented by bullion sent to the mint at San Francisco, California.

THE Weaver and Martinez districts lie at the base of the Weaver and Date Creek mountains in southern Yavapai County. From the desert floor, at an elevation of approximately 3,000 feet above sea level, the mountains rise abruptly to an elevation of 6,000 feet. The area is cut by deeply eroded canyons trending generally southward. A major paved highway, State No. 89, passes practically between the two districts leading northward to Prescott, a distance of 45 miles, and southward to Phoenix, a distance of 77 miles. Congress, a rail station on the Santa Fe railroad, is the center of the district's business activities. From Congress it is eight miles northward to the Yarnell mine; seven miles northeast to the Alvarado mine; three miles north to the Congress mine; and 10 miles east to Octave and the Octave mine, all over well maintained county highways.

The climate is typical of desert areas at this elevation, very rarely reaching below freezing in the winter, but attaining a height of 110 degrees in the mid-summer months.

The country rocks are Pre-Cambrian schists, granites, and quartz diorites, as well as a highly acid-phase Alaskite represented by the well-known Rich Hill (famous in placer days). The quartz diorite of the Octave vicinity varies from a normal to highly basic phases and is intruded by numerous dikes of pegmatite and aplite. The schists are the normal Yavapai schists of both sedimentary and igneous origin. The granites of the eastern and Martinez vicinity are coarse-grained typical Bradshaw granites. Cutting all formations are pre-mineral dikes of greenstone or diorite with an easterly-northeasterly strike. Post-mineral dikes of rhyolite and andesite are found, as well as a series of fine-grained diabase dikes striking and dipping in many directions. Major and minor faulting and regional jointing have had a marked effect on the topography of the districts.

The veins are generally northeastward trending with dips varying from 20 degrees to 45 degrees northwestward. They have been classed by Waldemar Lindgren as of mesothermal, quartz, pyrite, galena type. The quartz generally is massive to laminated grayish white and the mineral occurs in bunches and disseminations as galena, pyrite, and chalcopryite. The precious metals occur within the sulphides, though occasional free gold is observed. Veins vary from inches to six feet in width.

The Congress, the Alvarado, and the Johnson veins occur on the footwall of the above-mentioned pre-mineral diorite dikes and at times silicification and mineraliza-



A general view of the Liberty Hills Gold Mines, Ltd. From left to right are shown the office, headframe and hoist house, crushing and conveying equipment, cyanide plant, precipitation plant, and tailings.

tion extend deeply into the wall of the dike. As has been mentioned by early writers on the Congress mine, the dike, at times, is the vein.

The Dixie vein, the Leviathan vein, and the Octave vein have no such diorite hanging-wall, the Dixie being entirely in the granite, the Leviathan in the schist, and the Octave in the quartz diorite.

Most observers agree that the veins occur along thrust faults. Veins associated with the diorite dikes apparently have a higher silver content than those occurring entirely in the granites, schists, and quartz diorites.

THE CONGRESS mine, operated by the Congress Mining Corporation, W. A. Leddell, general manager, is handling by cyanidation 300 tons daily of mixed tailings and dumps from the old operation. The tailings are shoveled to trucks, hauled to a bin from which they are conveyed to a storage bin, thence through feeders to a 5 x 8 ball mill in closed circuit with a Dorr Duplex classifier. The classifier product is pumped from a sump to a thickener, then passed through a series of agitators and thickeners to a tailings launder through which it flows to a pond. Precipitation is by means of the Merrill-Crowe process through a plate and frame filter. Precipitate is melted in an oil-fired furnace and then forwarded to the mint.

Dumps are handled by a Caterpillar-drawn dump-type carry-all to a receiving bin under which trucks are placed. The ore is then carried to a coarse-ore bin, passed through a jaw-type crusher, and conveyed to the vibrating screen. The undersize is conveyed direct to the tailings conveyor. The oversize passes through a gyratory crusher and meets the tailings conveyor with the undersize. The ratio between tailings and dumps is approximately 175 tons tailings to 125 tons of dumps.

Power for the plant is supplied by a 250-horsepower Worthington Diesel-electric with an auxiliary 80-horsepower Atlas Diesel-electric as a standby.

Water is supplied from the old mine and from a pumping plant on Martinez Creek a mile distant.

LIBERTY Hill Gold Mines, Ltd., L. L. Farnham, general manager, is operating on a daily capacity of 105 tons, milling by a continuous-decantation cyanide plant. The main operating shaft, over 1,500 feet in depth, has levels at 100-foot intervals with approximately 7,000 feet of levels.

Operations at present are confined to mining on the 800 to the 1,300 levels, with eight drills on a two-shift basis maintaining the mill capacity. Development consists of sinking and extending the lower levels to the southwest. The vein dips on an average of 28 degrees and the ore is drawn from the stopes by means of a two-drum slusher into cars that are hand trammed to and dumped into a two-ton skip. Detachable bits are used exclusively.

The surface plant consists of a 75-horsepower hoist, 275-cubic foot Ingersoll single-stage compressor and a 1,000-cubic foot Imperial-type Ingersoll-Rand compressor.

Ore is hoisted to a tippie at the headframe where it passes directly to a crusher on a sorting belt, thence through a Simplex vibrating screen rather ingeniously placed, the oversize to 15-inch by 30-inch rolls, reconveyed by a chain elevator to conveyor belt, thence to the steel mill-bin. Adjustable feed belt conveyor carries the ore to a 4 x 8 ball mill in closed circuit with a Dorr Duplex classifier. Classifier oversize is pumped to a table set above the ball-mill floor. Table tails run to last thickener of the continuous-decantation plant while middlings and concentrates are returned to the ball mill for a regrind. This procedure has boosted the capacity of an otherwise 75-ton plant to approximately 105 tons. Classifier overflow passes through a series of thickeners and agitators and, due to the need for saving water, tailings are filtered by an Eimco-Oliver filter. Solution is precipitated by the Merrill-Crowe process with the bag-type filters. Precipitate is melted in an oil-fired furnace. Tailings are stacked with a two-drum, 50-horsepower hoist. Power is purchased from the Arizona Power Corporation. Ample water is supplied by the mine and two shallow wells in a nearby wash.

THE OCTAVE mine, owned by the Arizona Eastern Gold Mines Company, is being operated by the American Smelting and Refining Company, LaMont West, general superintendent. The ore is treated on a 90-ton daily basis in a combined flotation and continuous-decantation cyanide mill.

The mine is developed to a depth of 2,200 feet by means of several shafts and a reported 150,000 feet of lateral work. The vein dips approximately 30 degrees and has a width varying from inches to six feet. Ore is drawn from the stopes by

a two-drum slusher hoist, delivered to skip by hand tramping. Round lugged steel is used exclusively.

The surface plant consists of a single-drum electric hoist at No. 3 shaft, a 600-cubic foot Sullivan angle-compound compressor, a Chicago Pneumatic air-cooled 400-cubic foot compressor and necessary shop equipment. Ore is delivered to a bin in the headframe, hand-trammed to mill bins, thence through a Wheeling 9 x 16 crusher to mill bin, and 6 x 6 ball mill in closed circuit with Dorr Duplex classifier; thence to six Denver-Fahrenwald cells which extract 70 per cent of the values as concentrates, which in turn are filtered and dried, then shipped to A. S. & R. at El Paso. Flotation tails are dewatered and delivered to two Denver agitators, thence through three dewatering thickeners to a tailings pond. Solution is precipitated by Merrill-Crowe process through plate-type filter. Precipitate is shipped to Selby Smelter at San Francisco.

The entire plant is fully electrified and power purchased from the Arizona Power Corporation. The finest of water is carried by an eight-mile pipeline from a spring to the camp. Mine water has supplied the mill during unwatering operations.

THE YARNELL mine, owned by the Security Trust Company of Prescott, is being operated by the Winslow Gold Mining Company of Yarnell, Mark Gemmill, general manager. Starting the first of the year with a newly installed cyanide plant, it has now reached a capacity of 125 tons daily.

The mine is developed mostly by drift tunnels to a depth of 250 feet with 1,500 feet of lateral work. The vein, dipping at approximately 40 degrees, is a little different in character from the previously described properties. A mineralized shear zone extends over 100 feet in width, and the major work is confined at present to the hanging-wall side of the zone. Mineralization occurs in and into both the foot-wall and hanging-wall of a major fault and consists of scattered mineralized lenses of quartz and pyrite impregnated granite. Mining must be checked by daily assays as the eye cannot always make the determination.

Ore is mined by a modified shrinkage method and machines can readily supply the mill when working on two shifts as at present. Ore is trammed to the storage bin, thence through a Pacific 10 x 20 crusher, to conveyor, to mill bin, thence to a 6 x 6 modified Straub ball mill in closed circuit with Dorr Duplex classifier to agitation and decantation thickeners to tailings pond. Precipitation is by means of Merrill-Crowe process with the use of bag filters. Precipitate is melted in an oil-fired furnace and sent to the mint.

The surface plant consists of a 350-cubic foot Gardner-Denver compressor, with accessory shops. Power is purchased from the Arizona Power Corporation. Water is obtained from drilled wells.

These four properties—the Octave mill which began production early in 1934; the Alvarado and Congress mills which started about June, 1938; and, lastly, the Yarnell mill in January, 1940—are now responsible

for the rather amazing gross of approximately \$2,200,000.

Several other properties have made minor contributions to the above. Among them should be mentioned the Senate mine, near the old Congress; the Golden Key mine, an extension of the Niagara vein of the old Congress mine; the Sullivan mine, south of the Congress; the Johnson mine, three miles north of the Octave; the York mine, east of the Yarnell; and the Klon-dyke property near the Alvarado. North of the old Congress are two properties, the Golden Wave and Piedmont, that have had some minor production. All these properties are well worthy of attention as their similarity of occurrence to those now in production is such as to lead one to believe that they, too, with the proper expenditure of investigative capital, could enter the producing ranks.

COOLEY GRAVEL HAS STARTED PRODUCTION IN MONTANA

THE Cooley Gravel Company, C. G. Cooley of Chillicothe, Missouri, president, has resumed dredging operations after moving its dragline gold dredge from the Pactolus placer at Pinecliffe, Colorado, to a deposit on Indian Creek near Townsend, Montana.

The dredge has been revamped to include jigs for gold recovery and individual electric motor drives have replaced Diesel power. The mechanical gold recovery equipment design was made with the assistance of the Pan-American Engineering Company of Oakland, California. Controls to all electric motors are incorporated in a central control panel. Excavation is done by means of the new type of Bucyrus-Monighan walking dragline, which is powered by a 2,300-volt, 125-horsepower motor, with Ward-Leonard electric swinging system. The company estimates that 100,000 cubic yards will be run through the Bodinson washing plant during the first month of operation. Since Indian Creek is an intermittent stream a high-pressure pump and 5,000 feet of eight-inch pipe line are used as stand-by fresh water supply units. Testing of the deposit indicates from 5 to 10 years of life for the operation.

L. M. Cooley of Townsend is manager; V. C. Wright, superintendent; Hal Sayre, mining engineer; J. D. Brittain, foreman; and Morgan Williams, bookkeeper.

TWENTY THOUSAND DOLLAR PLANT AT CALEDONIA PLACER

THE Caledonia Development Company has in operation a \$20,000 washing plant at its property one mile east of Downieville, in Sierra County, California.

The plant is a dryland dredge, supplemented by a small hydraulic monitor. Equipment includes a No. 105 1¼-yard Northwest shovel feeding a 24 by 54 trommel, via a 9½ by 10½ hopper. The trommel has 10 feet of blank, five feet of ¾-inch perforation, five feet of ½-inch perforation, and two feet of nugget slots.

The trommel dumps onto a 36-inch by 60-foot stacker operated by a 15-horsepower motor and reduction gear. Fines

are caught in a 33 by 36-inch by 6-foot box and are pumped to a header box by a six-inch Kimball-Krogh gravel pump where they pass over two 10-foot Hungarian riffles and are dumped into two 36-inch steel launders. These empty onto two 36-inch Draper jigs. The jig concentrates pass over a 16-inch by 8-foot long tom and finally over a 30-inch by 6-foot amalgam plate and a No. 4 Deister concentrating table. The rejects are passed by flume to the river.

The unit is completely electrified and water is pumped to a penstock by two 75-horsepower General Electric motors at 1,000 gallons per minute. Water is returned for washing under a 95-foot head. Estimated capacity of the plant is 1,000 yards per shift.

Roger E. Jones is president of the Caledonia company and Charles F. Jasper is general manager, both of Downieville.

OLD VULTURE MINE IS SCENE OF EXTENSIVE OPERATIONS

THE East Vulture Mining Company, Wickenburg, Arizona, under the direction of Ernest R. Dickie, president and general manager, is conducting mining and milling operations on a large scale at the old Vulture mine near Wickenburg.

The 650-foot level has been reached in the old Vulture shaft and it is planned to sink to 750 feet. Miners are drifting on the 600-foot level, from which three raises have been driven. On the 500-foot level a raise encountered ore which was stated to average \$8 in gold. A 1½-yard shovel is used to handle material from the glory hole and 100 tons a day are treated in the mill, together with some ore obtained in development work.

The company purchased a 300-horsepower Union Diesel engine from Veta Mines, Inc., and a four by eight Marcy ball mill, which will bring the crushing capacity of its plant up to 200 tons per day, an amount which can be handled satisfactorily by the cyanide equipment. It is estimated that several hundred thousand tons of mill-grade ore are available above the 100-foot level. The present cost of handling ore to the mill bin ranges from 30 to 50 cents per ton. Last month's operations were reported to show a profit on \$2.15 heads.

A hole has been churn-drilled cutting old stopes on the 800-foot level and a turbine pump installed in the hole to furnish necessary mill water. This pump is keeping the water below the 600-foot level while sinking is going ahead. Old workings in the mine reached a depth of 1,550 feet by step winzes from several levels. The vein dips about 38 degrees.

Dickie was employed by United Verde Extension in the original sinking of the shaft in 1931. He then took over a lease on the underground workings and shipped ore to Hayden. He continued to work for A. B. Peach, contractor, who had been in charge of development work at the Vulture and who, with Geo. W. Prince, later obtained a lease on the mine. In 1936 Dickie took over the Peach lease from the Vulture Mining and Milling Company.

MINERAL SURVEY

No. 4350

ARIZONA

04/133

CLAIM OF

ROBERT M. ADAMS COMPANY

KNOWN AS THE

EMIL HERMSDORF,
GEORGE WASHINGTON
AND LINCOLN LODS

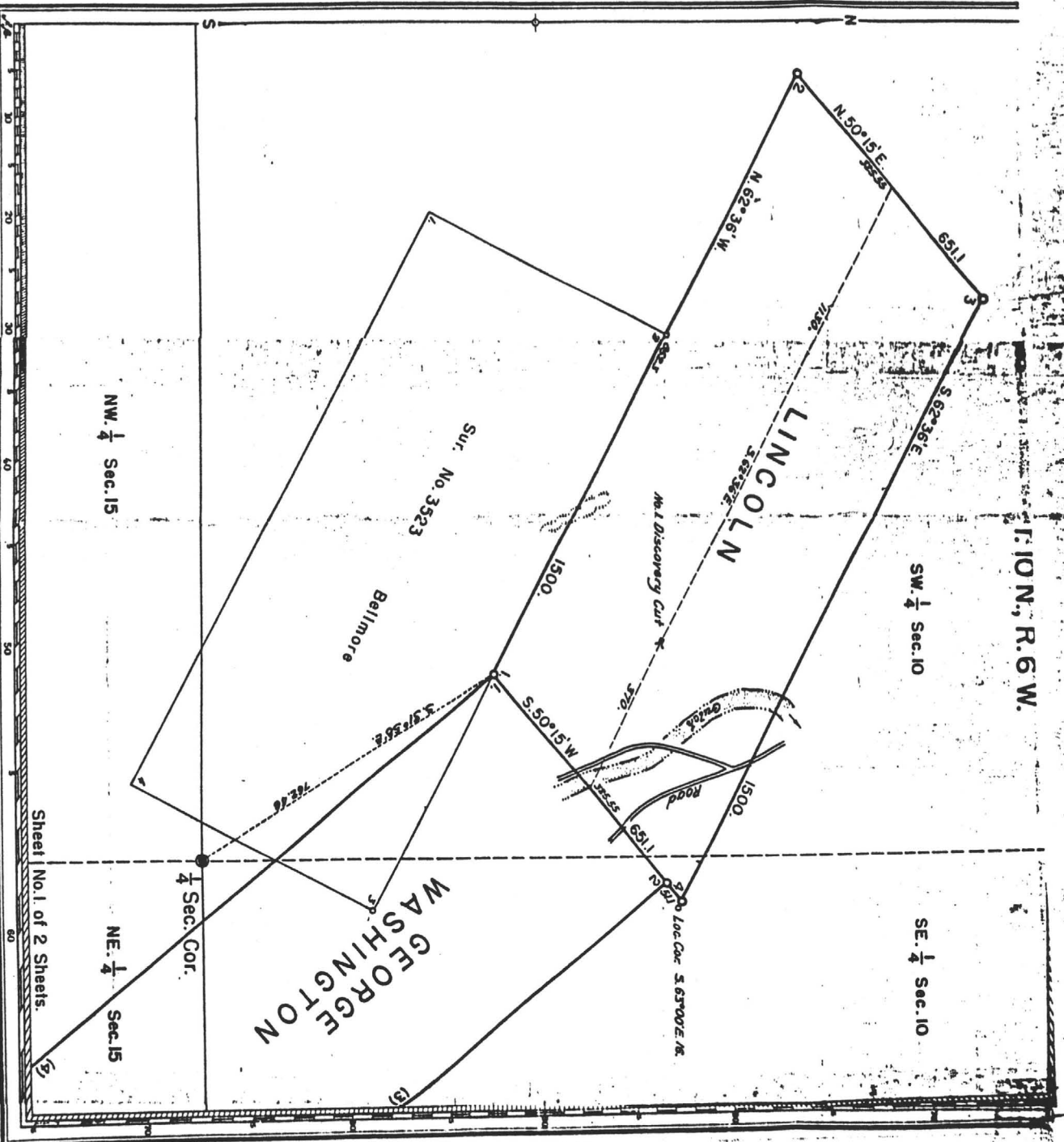
SITUATE IN

Secs. 10 & 15, T. 10 N., R. 6 W.
Gila and Salt River Meridian
YAVAPAI COUNTY
Marinez Mining District
Arizona Land District

Magnetic Declination, 14° 15' East



Surveyed, Dec. 18 to Dec. 31, 1950,
By Robert Lenon, Mineral Surveyor.



LINCOLN

TION, R. 6 W.

MINERAL SURVEY
No. 4350
ARIZONA

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

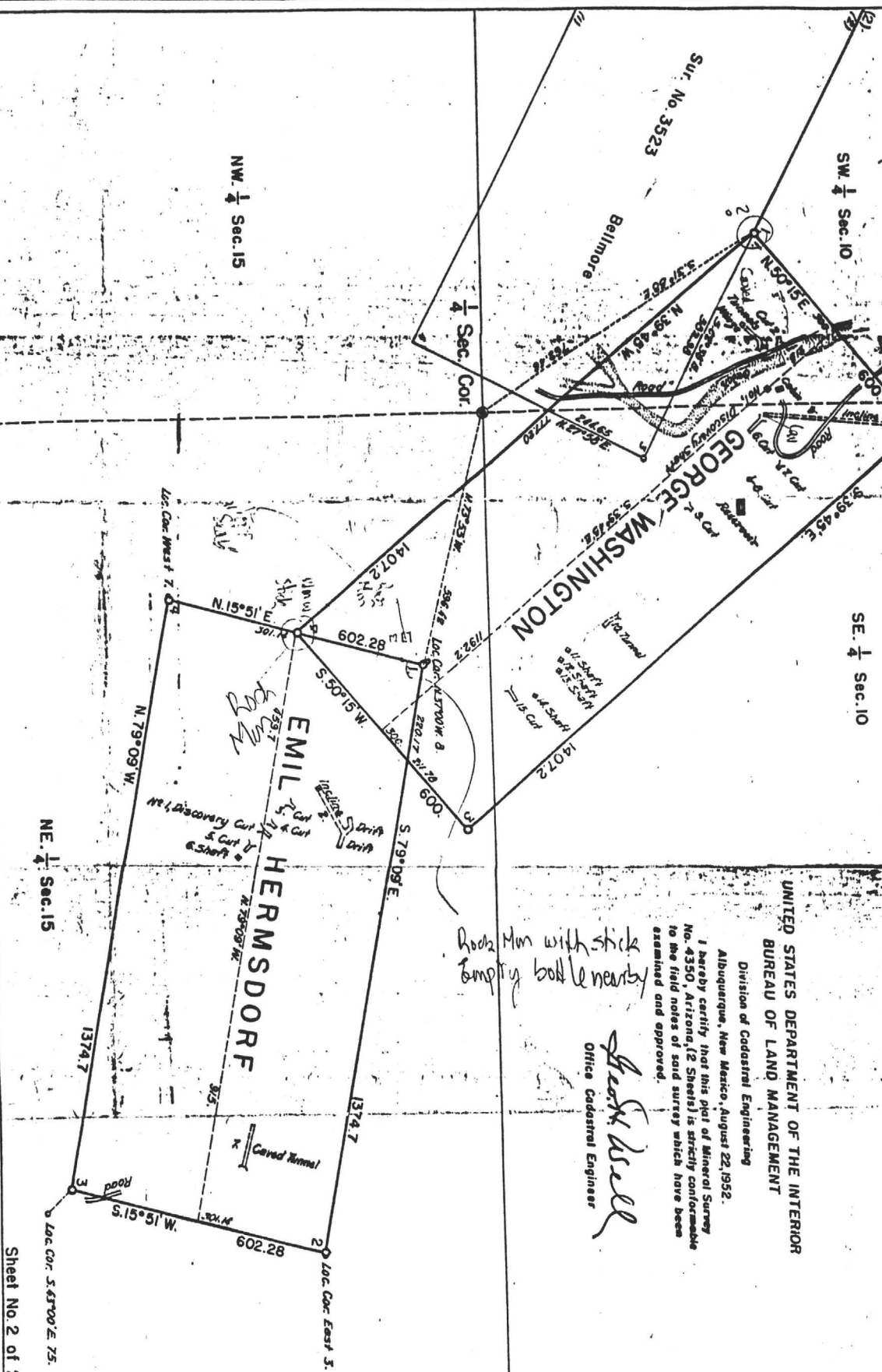
Division of Cadastral Engineering

Albuquerque, New Mexico, August 22, 1952.

I hereby certify that this plot of Mineral Survey No. 4350, Arizona, (2 Sheets) is strictly conformable to the field notes of said survey which have been examined and approved.

Office Cadastre Engineer

Rocky Man with stick
Empty bottle nearby



Sheet No.2 of 2 Sheets.

MINERAL SURVEY No. 4350 ARIZONA

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Division of Cadastral Engineering

Albuquerque, New Mexico, August 22, 1952.

I hereby certify that this plat of Mineral Survey No. 4350, Arizona, (2 Sheets) is strictly conformable to the field notes of said survey which have been examined and approved.

Geo. H. Well
Office Cadastral Engineer

*Body Map with which
bottle number*

T. 10 N., R. 6 W.

SE. $\frac{1}{4}$ Sec. 10

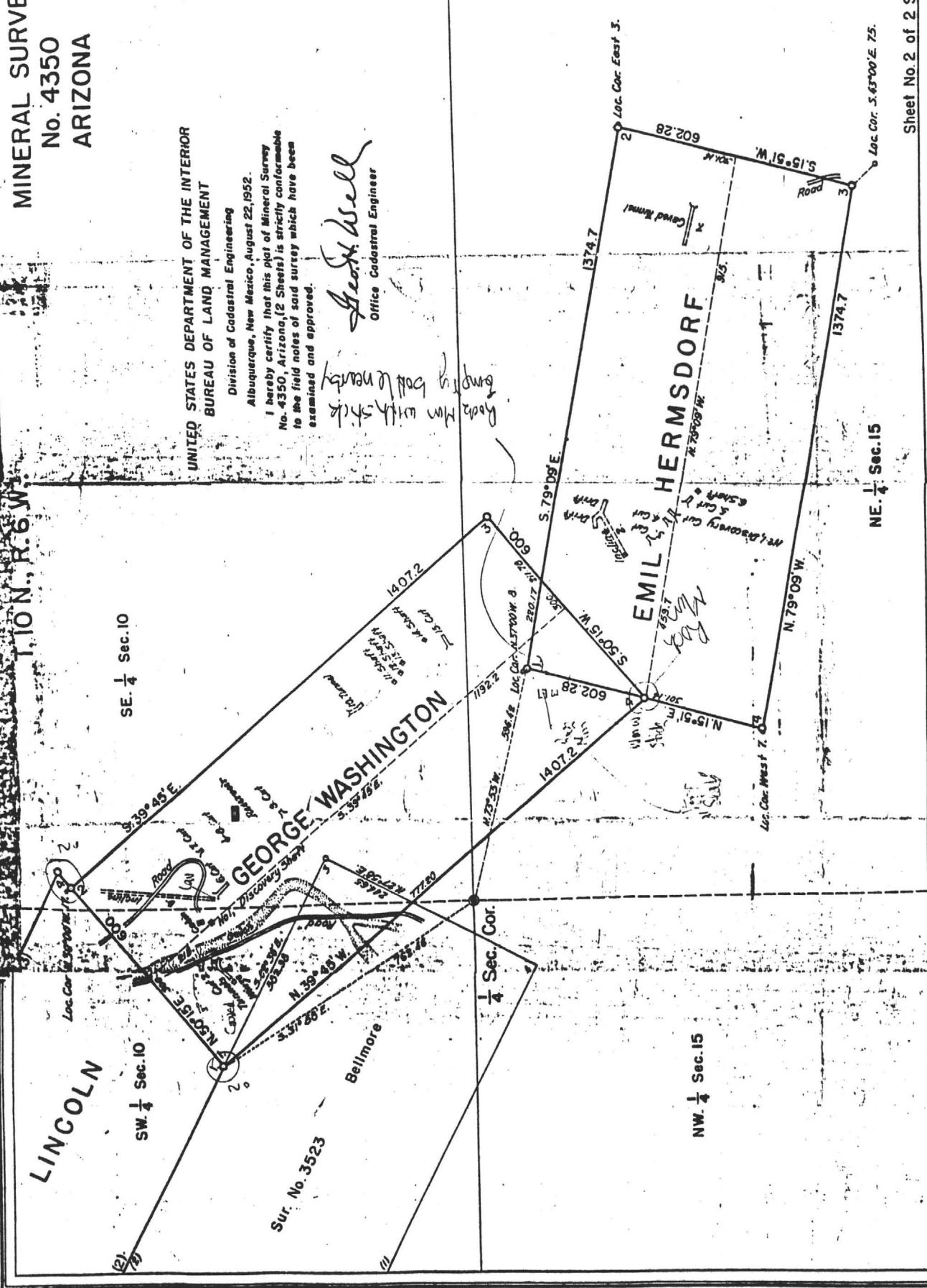
SW. $\frac{1}{4}$ Sec. 10

$\frac{1}{4}$ Sec. Cor.

NW. $\frac{1}{4}$ Sec. 15

NE. $\frac{1}{4}$ Sec. 15

Sheet No. 2 of 2 Sheets.



MINERAL SURVEY
No. 4350
ARIZONA

04/33

CLAIM OF

ROBERT M. ADAMS COMPANY

KNOWN AS THE

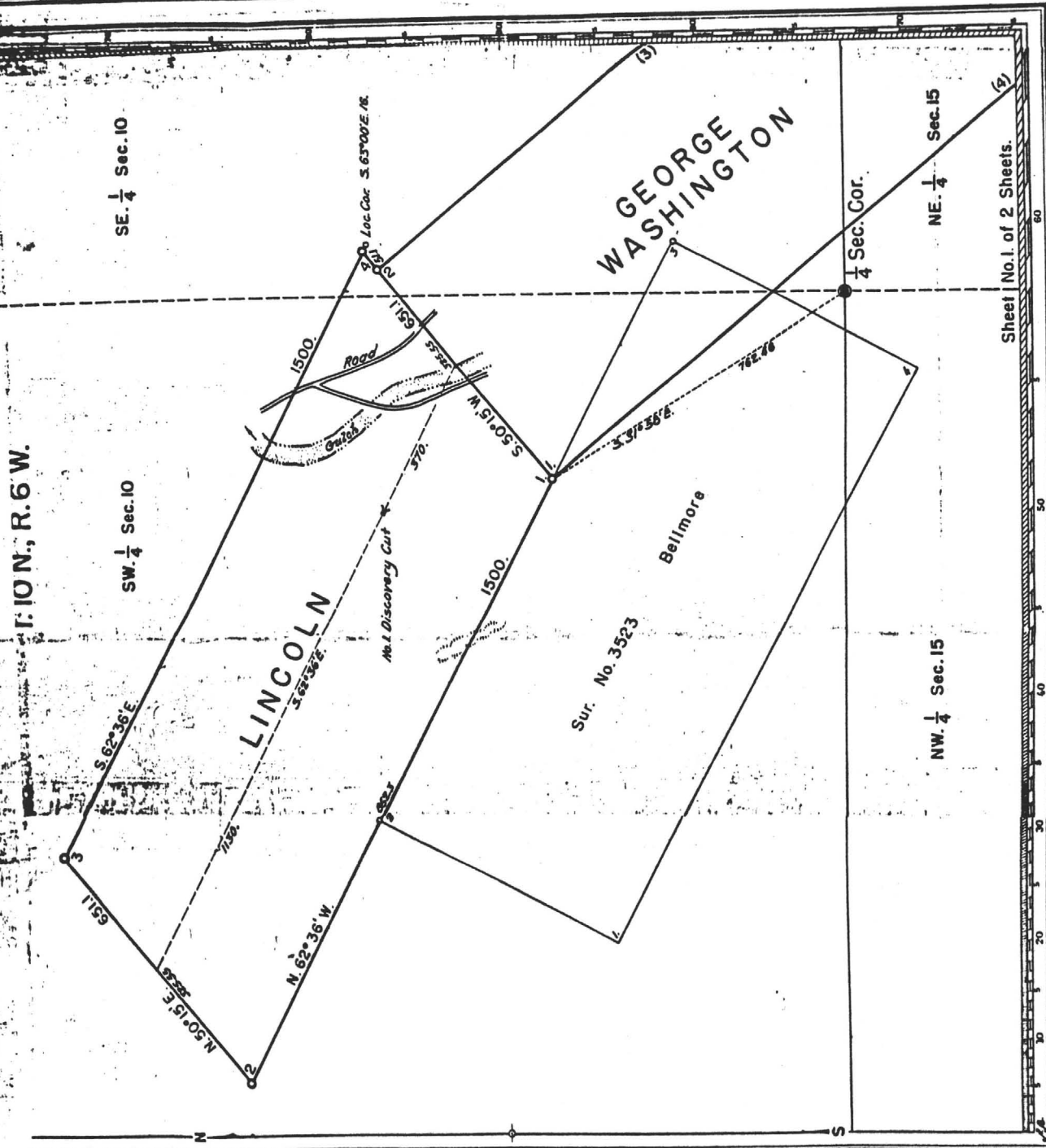
**EMIL HERMSDORF,
 GEORGE WASHINGTON
 AND LINCOLN LODES**

SITUATE IN
 Secs. 10 & 15, T. 10 N., R. 6 W.
 Gila and Salt River Meridian
 YAVAPAI COUNTY
 Martinez Mining District
 Arizona Land District



Magnetic Declination, 14° 15' East

Surveyed, Dec. 18 to Dec. 31, 1950,
 By Robert Lenon, Mineral Surveyor.



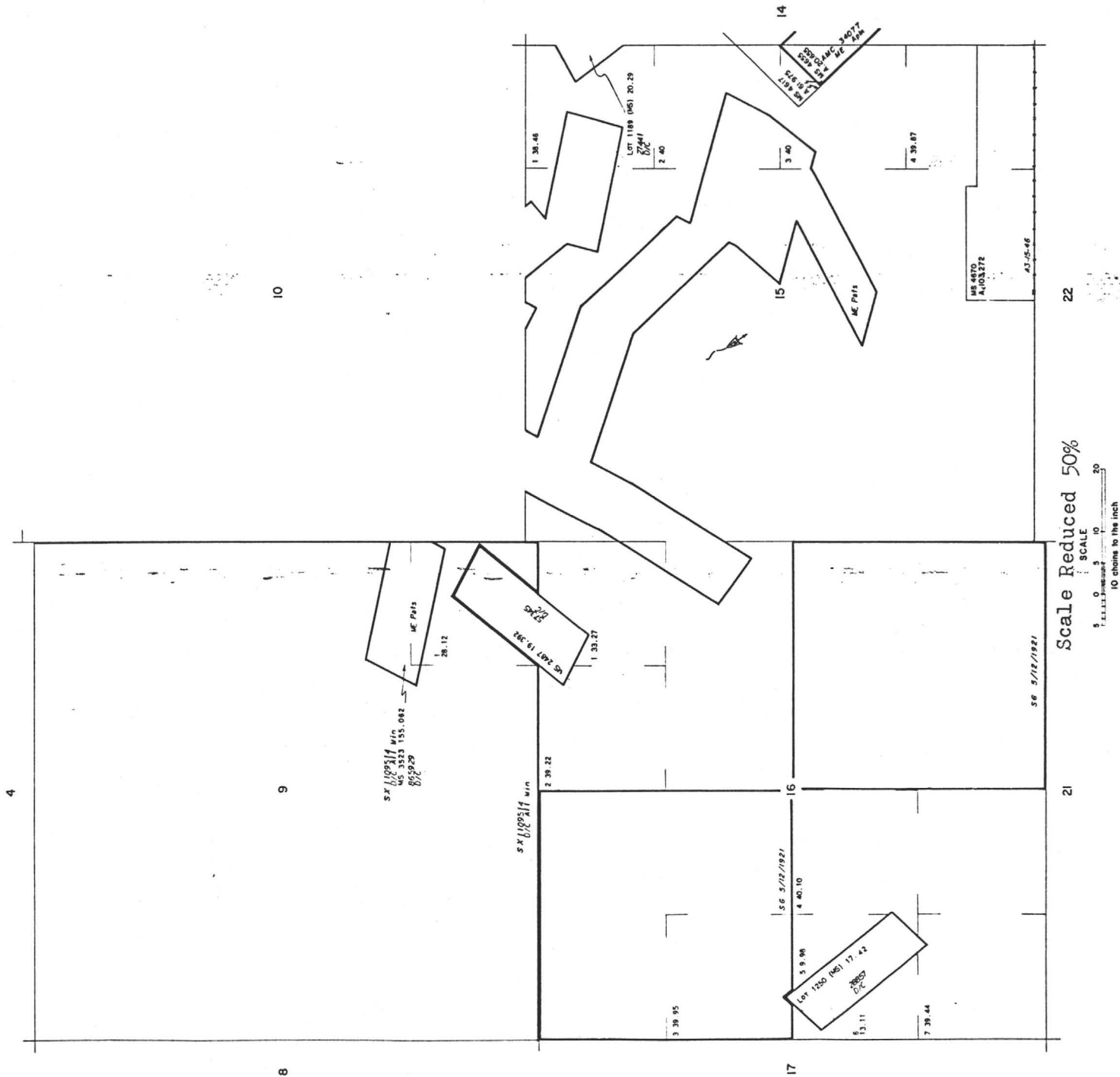
STATUS OF PUBLIC DOMAIN
LAND AND MINERAL TITLES

**MTP
SUPPL Sec 9,15,16**

[illegible]

FOR ORDERS EFFECTING DISPOSAL OR USE OF
UNIDENTIFIED LANDS WITHDRAWN FOR CLASSIFIC,
MINERALS, WATER AND/OR OTHER PUBLIC PURP,
REFER TO INDEX OF MISCELLANEOUS DOCUMENT

OST MO 2

[illegible]

STATUS OF PUBLIC DOMAIN
LAND AND MINERAL TITLES[illegible]

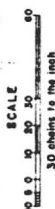
FOR ORDERS EFFECTING DISPOSAL OR USE OF UNIDENTIFIED LANDS WITHDRAWN FOR CLASSIFIED MINERALS, WATER AND/OR OTHER PUBLIC PURPOSES REFER TO INDEX OF MISCELLANEOUS DOCUMENTS

DIST NO 2

[illegible]

Lat 34°09' 29" N
Long. 112°49' 46" W

Scale Reduced 50%



34° 15' N
114° 00' W
MALpais Mesa

O'NEILL PASS QUADRANGLE
ARIZONA-YAVAPAI CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

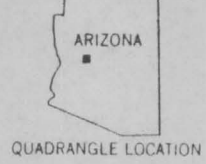
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CONGRESS QUADRANGLE
ARIZONA-YAVAPAI CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

34° 15' N
114° 00' W
PEEPES FALL



114° 00' W
34° 07' 30" N
LEW RANCH SE



ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U.S. Route

COMPOSITE OF U.S.G.S. 7 1/2 QUADRANGLES
CONGRESS AND O'NEIL PASS, ARIZONA
SHOWING THE LOCATION OF THE GEORGE WASHINGTON
GROUP OF PATENTED CLAIMS.

SCALE = 1:24,000

O'NEILL PASS
N3407.5 - W112° 52' 30"

1969
AMS 3452 III NW-SERIES V898

114° 00' W
34° 07' 30" N
1:24,000
18 MILS
1° 01' 18 MILS
149° 15' 258 MILS
1969 MAGNETIC NORTH
ECLINATION AT CENTER OF SHEET

SCALE 1:24,000
CONTOUR INTERVAL 40
DATUM IS MEAN SEA LEV

34° 07' 30" N
114° 00' W
SAN POWELL

THIS MAP COMPLIES WITH NATIONAL MAP ACT
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS