

GEOLOGICAL REPORT
on the
SAN PEDRO GOLD AND COPPER MINE
SANTA FE COUNTY, NEW MEXICO

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SAN PEDRO COPPER, GOLD, SILVER AND LEAD PROPERTIES

PREFACE

Comprising 21 patented and 14 unpatented lode mining claims in the easily accessible New Placers Mining District of southwestern Santa Fe County, New Mexico, the historic San Pedro Group is one of the Southwest's most prolific producers of copper, gold, silver and lead. Tungsten ore, discovered on these properties in 1945, may provide these famous workings another valuable deposit.

Located 22 airline miles northeast of Albuquerque in the San Pedro Mountain near U. S. Highway 66, these properties are being extensively explored for additional ore reserves by Mercury Uranium and Oil Company with the assistance of the Defense Minerals Exploration Administration. Total cost of exploration is estimated at \$105,300. A. D. M. E. A. loan of half of that amount, or \$52,650, was granted to Mercury on July 27, 1956. The purpose of this exploration program is to prove up additional ore reserves of copper, gold, and silver in the San Pedro Mine and additional lead-silver reserves in the adjoining Carnahan Mine. Exploration may also determine whether tungsten is present in commercial quantities.

Some of the workings of the San Pedro are currently being mined on a limited basis by an individual who pays royalty to Mercury.

The recorded history of the San Pedro dates back to 1832 when the Spaniards took gold and copper by stripping from a still visible outcrop in

the area which was named the Spanish Mine.

The San Pedro Group of claims, including the Carnahan Mine, was acquired by Mercury in a lease - purchase option agreement dated February 9, 1956 with Charles F. Williams and C. L. Bradbury, now deceased, Mercury exercised its option on August 8, 1956, the effective date of the lease-purchase agreement, after preliminary exploration which led to the securing of the D. M. E. A. loan.

Total purchase price is \$260,000, which includes the initial acquisition cost of \$20,000 paid at the time the agreement was signed (\$6,000) and the option to purchase exercised (\$14,000). The remaining \$240,000 will be paid in six years in annual installments of \$40,000 beginning August 8, 1957. All royalties (10% of net smelter returns) will apply on the purchase payments.

Since 1904, the earliest date of authentic detailed mine production records now available from the U. S. Bureau of Mines, through 1941, the San Pedro Mine alone produced 233,666 tons of ore yielding 13,894,793 pounds of copper, 12,453 ounces of gold and 185,733 ounces of silver.

During the latest period of major mining activity in 1940-1941, the San Pedro Mine produced ore at an average rate of 110 tons per day with an average per ton grade of 3.54% copper, 0.056 ounces of gold and 0.81 ounces of silver.

With the discovery in 1945 of tungsten ore in the same workings of the San Pedro Mine, the U. S. Geological Survey estimates tungsten reserves

of 21,000 tons on the basis of known exposures in the mine. Despite the fact that the grade of the tungsten ore is low (0.5%) the increased value of the 21,000 tons ranges from \$6 to \$30 per ton since the tungsten occurs with the copper and gold.

On August 31, 1956, Mercury gave Tom B. Scartaccini of Albuquerque a lease for the mining of certain areas in the old workings approved by Mercury. November 19, 1956, Mr. Scartaccini paid to Mercury royalties totalling \$473.38 from ores he had mined. Operations of the Scartaccini mining are subordinate to any activities of Mercury upon the San Pedro properties. The Scartaccini lease may be cancelled by Mercury upon thirty (30) days notice.

Mild year-round climate is conducive to consistent mining and transportation of ore. A railhead of the Atchison, Topeka and Santa Fe Railroad is located at Los Cerrillos, only 15 1/2 miles northeast of the mine. Highway access to the properties is excellent, via paved U. S. 66 and State 10.

On or before August 8, 1958, Mercury must have in operation upon the property a modern flotation mill of at least 100 tons per day capacity, according to terms of the lease-purchase agreement.

Sufficient water is available on the properties for all purposes.

The Carnahan Mine is completely encompassed by the lode mining claims in the San Pedro group. While no production figures are available, it is known that the Carnahan Mine produced large quantities of silver-bearing galena (lead sulfide) until 1927 when it became idle because of low market prices.

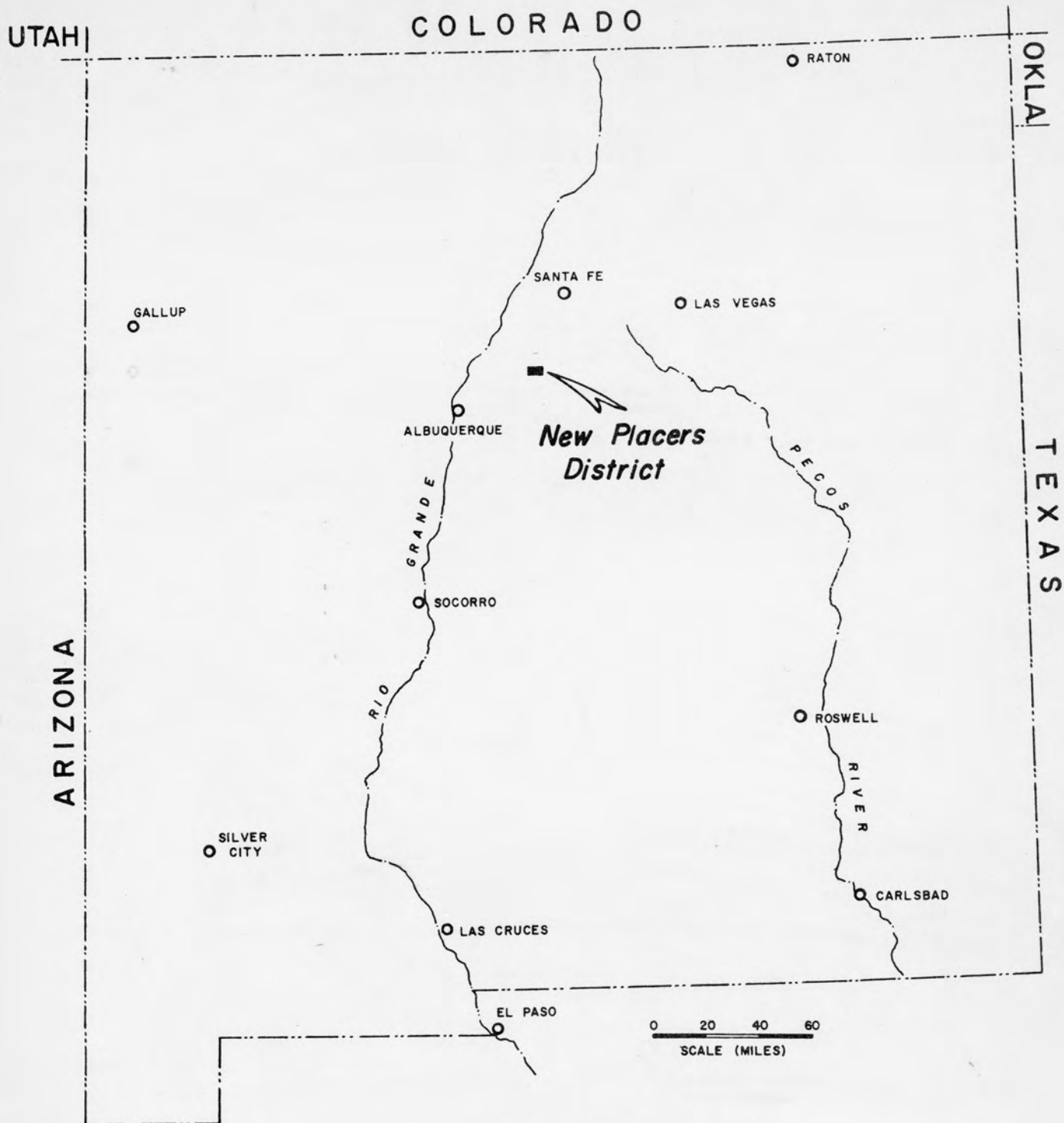
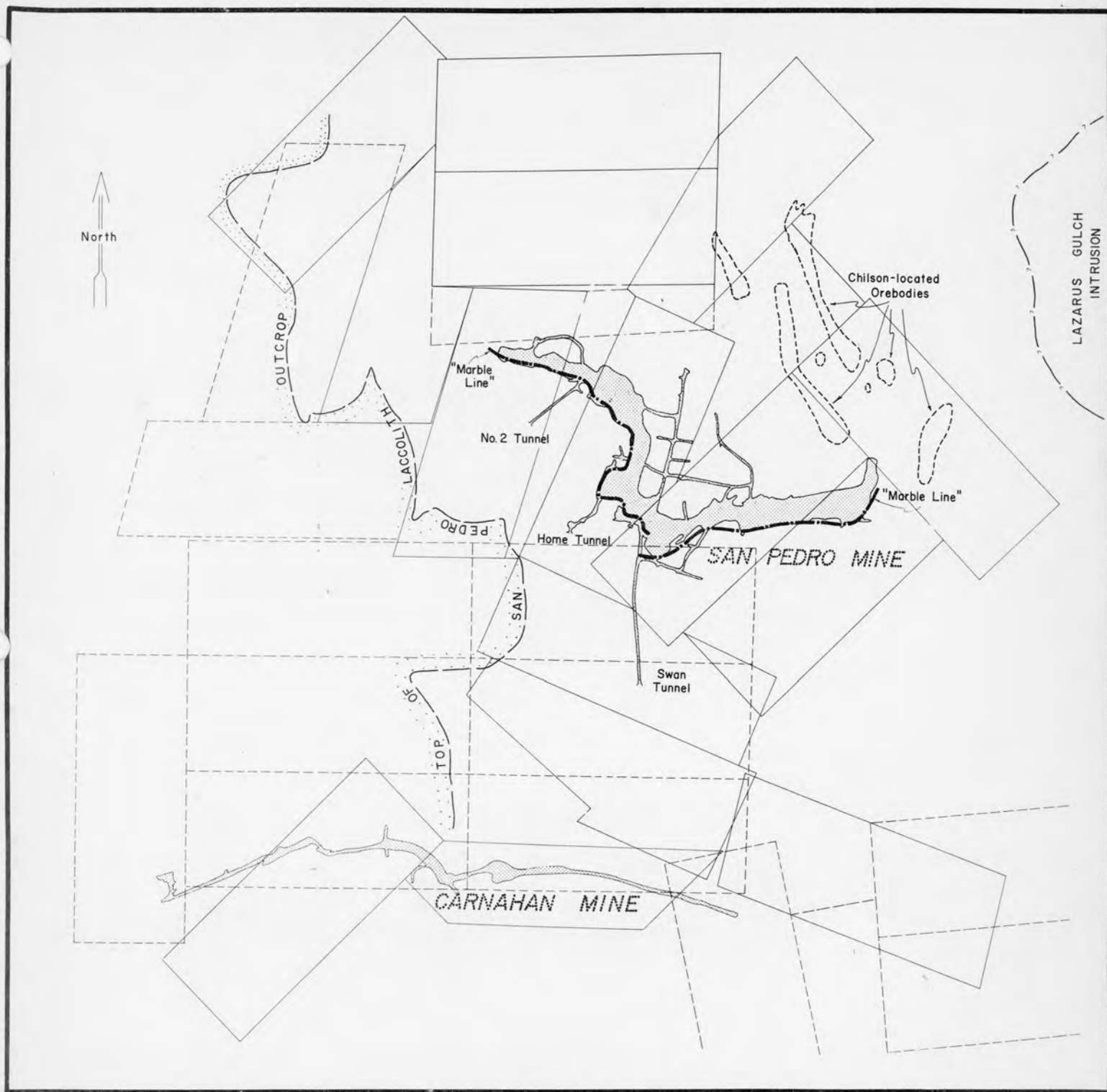


Figure 1.
INDEX MAP
of NEW MEXICO
Showing Location of New Placers District
(Including the San Pedro Mine)



MERCURY URANIUM and OIL CORPORATION

COMPOSITE PLAN OF GEOLOGY AND WORKINGS

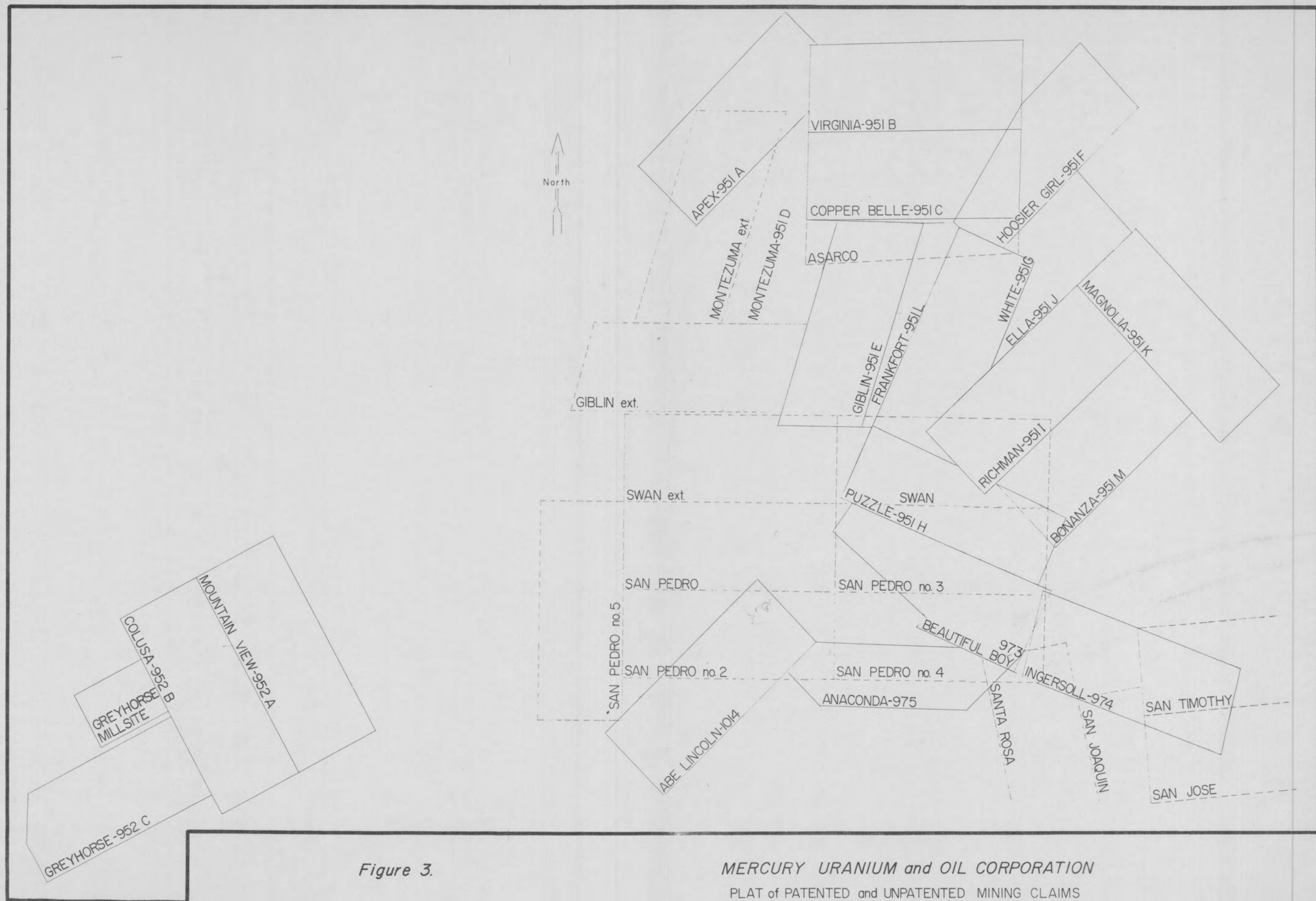
SAN PEDRO and CARNAHAN MINES

SANTA FE COUNTY, New Mexico

Henry S. Birdseye Nov, 1956

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Scale(feet)



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SUMMARY AND RECOMMENDATIONS

Since 1904, the San Pedro Mine has yielded 13,894,793 pounds of copper, 12,453 ounces of gold, and 185,733 ounces of silver from a contact metamorphic deposit in the Madera limestone of Carboniferous age. Operation of the mine has been intermittent due to fluctuations in the price of copper. During the latest period of activity, in 1940 and 1941, the mine produced ore at an average rate of about 110 tons per day, with an average grade of 3.54% copper, plus 0.056 ounces of gold and 0.81 ounces of silver to the ton.

Chalcopyrite is the chief ore mineral, occurring in marmorized limestone. The ore deposits are elongated but irregular in outline, and thus far have been followed in a rough semi-circle around the southwest, south and southeast flanks of San Pedro Mountain. The most consistent and recognizable ore guide is called the "marble line," which is the contact between the ore-bearing limestone and the barren marble which borders it. All of the orebodies mined thus far have been in very close proximity to the marble line.

In 1945, tungsten ore was discovered in certain workings of the San Pedro Mine. Personnel of the U. S. Geological Survey estimate tungsten reserves of 21,000 tons on the basis of present exposures within the mine. Although

the grade of the tungsten ore is rather low (0.5%), the fact that it occurs with the copper and gold values should add from \$6 to \$30 per ton to the 21,000 tons.

Mercury Uranium and Oil Company, which has leased the lode mining claims encompassing the San Pedro Mine and the Carnahan Mine to the south, has obtained a Defense Minerals Exploration Administration loan for the purpose of extending and delimiting the ore reserves of the San Pedro mine. The features of the program to be undertaken are outlined in this report, and will include diamond coring, exploratory drifting, winzing, and raising, and assaying of samples for copper, gold and tungsten.

The proposed plan of exploration should add materially to the value of the ore reserves of the San Pedro Mine. It is my belief that additional ore deposits will be found in proximity to the old workings. However, it is also my opinion that there is a strong possibility that known ore zones may be extended to the north from both ends of the old workings, and it may ultimately be seen that the copper-gold mineralization entirely encircles San Pedro Mountain, forming a "halo" around the intrusive center. Therefore, I particularly recommend appropriate drilling to determine the validity of the ore extensions indicated by the Chilson geophysical survey conducted in 1938, in the northeastern portion of the claim area.

INTRODUCTION

Location

The 21 patented and 14 unpatented lode mining claims encompassing the

San Pedro gold and copper mine and the Carnahan lead mine are in Township 12 North, Range 7 East, in southwestern Santa Fe County, New Mexico. The mines are 22 airline miles northeast of the Albuquerque city limits, in what is known as the New Placers Mining District.

Access

Excellent access to the mines from Albuquerque is provided by U. S. Highway 66 for a distance of 7 miles east from the city limits, thence northeast on New Mexico Highway 10 for thirteen miles to the vicinity of Golden, whence a dirt road leads one-half mile to the mines. The year-round climate is rather mild, and the occasional winter snowstorms and summer thunderstorms should not hinder either mining or haulage of ore. The nearest railhead is at Los Cerrillos, 15.5 road miles to the northeast, which is served by the Atchison, Topeka and Santa Fe Railway.

History of the San Pedro Mine

The San Pedro gold and copper mine has a long and interesting history dating back to its recorded discovery by the Spaniards in 1832. Apparently the earliest mining consisted of stripping along a gold- and copper-bearing outcrop which is still visible and is called the "Spanish mine." The modern history of the mine dates from about 1879, when underground mining of the ore values began. In 1889, the mine was acquired by Lewisohn interests of New York, operating as the Santa Fe Gold and Copper Company. In subsequent years the mine has been operated intermittently, with production governed

mainly by fluctuations in the price of copper. Known periods of inactivity were from 1892 to 1899, 1903-1905, 1908-1911, 1919-1922, 1931-1933, and from 1942 to the leasing of the property by Mercury Uranium and Oil Company in 1956. Raskob Mining Interests, Inc., purchased the property in 1938, and during 1939 installed mine equipment, carried on diamond drilling and constructed a mill. From February, 1940 to August, 1941, about 70 men were employed in exploration, development, mining, and milling. In this 18-month period, 61,522 tons of ore was mined, yielding 3,449 ounces of gold, 49,879 ounces of silver, and 4,364,786 pounds of copper. Detailed records of mine production are available only from 1904 to date. These indicate cumulative totals from 1904 through 1941 of 233,666 tons of ore, yielding 12,453 ounces of gold, 185,733 ounces of silver, 13,894,793 pounds of copper.

Mercury Uranium and Oil Company, on February 9, 1956, signed a lease-purchase agreement with Mr. Charles F. Williams and Mr. C. L. Bradbury (now deceased). On February 22, 1956, Mercury applied for a Defense Minerals Exploration Act loan, under which the Federal Government would share the cost of an extensive exploration program to extend and delimit the ore reserves of the mine. The initial phase of the exploration will consist of diamond drilling, exploratory drifting, winzing, and raising, and assaying of samples from drilling and drifting for copper, gold and tungsten trioxide. Contingent upon the results of the initial phase, a secondary phase is planned, to include further drilling, drifting, and sampling. Total cost of both stages of exploration is estimated at \$105,300. A D. M. E. A. loan for half that

amount, or \$52,650, was granted to Mercury on July 27, 1956. At this writing, Mercury Uranium and Oil Company has completed all surface drilling locations, and is now surveying underground locations. A diamond drilling (coring) contract was let during November, 1956.

History of the Carnahan Mine

The Carnahan Mine, one-half mile south of the San Pedro Mine, was originally known as the Lincoln-Lucky Mine. It was developed soon after the San Pedro Mine, and was worked intermittently until 1927. Except for some prospecting by lessees, it has been idle since then. Although the Carnahan Mine has a considerable production of silver-bearing galena (lead sulfide) to its credit, no production figures are available. The Carnahan Mine is completely encompassed by the lode mining claims leased by Mercury Uranium and Oil Company from Messrs. Williams and Bradbury.

Acknowledgments

In the preparation of this report, the writer has drawn freely from previous reports and evaluations of the mine by Waldemar Lindgren, Augustus Locke and E. H. Perry, T. D. Benjovsky, the U. S. Bureau of Mines, the U. S. Geological Survey, and Sherwin F. Kelly. Data and opinions contained therein were considered and are gratefully acknowledged.

GEOLOGIC SETTING

Geologic Column

The sedimentary rocks in the vicinity of the San Pedro Mountains are

Carboniferous (Mississippian and Pennsylvanian) and Permian in age. In ascending order, the Magdalena group, consisting of the Sandia formation and the Madera limestone lies unconformably upon the Precambrian basement complex. Above the Magdalena group are the Abo "red beds" of Permian age, which have been eroded to the extent that remnants are found only in the northern and easterly portions of the mountains. The sedimentary strata of the Magdalena group have been intruded by two main bodies of Early Tertiary igneous rocks: the upper is a sill of quartz or rhyolite porphyry from 40 to 65 feet thick; the lower is a complex granodiorite porphyry laccolith of much greater thickness which caused the formation of the San Pedro Mountains through doming of the overlying sedimentary sequence. Erosion has removed most of the sedimentaries overlying the core of the mountains. However, in the central part, Carboniferous (Magdalena group) rocks remain to a maximum thickness of 700 feet.

Structure

As mentioned above the San Pedro Mountains originated through the intrusion of a laccolith of granodiorite porphyry (called syenite by the U. S. Geological Survey) between strata of sedimentary rocks. The entire series of sedimentary strata and interbedded intrusives dips to the East from 10 to 15 degrees. Two nearly-vertical faults have been recognized in the mine workings, although additional ones may be obscured by talus slopes over the outcrops. The more prominent one is called the Shaft fault because the Richman shaft is situated in the fault plane. About 180 feet west of the

Shaft fault, which has a net slip of some 250 feet, is the West Stope fault, showing displacement of about five feet. A zone of fissures extends for roughly 200 feet to the east and west of the north-trending Shaft fault.

Physiography

The San Pedro Mountains are in the northern part of the Basin and Range province of central New Mexico. This province is characterized by north-trending alignments of mountain ranges, separated by parallel intermontane basins. The San Pedro Mountains rise 1,500 feet above the alluvial flatlands, attaining a maximum elevation of 8,375 feet. Erosion has proceeded to advanced maturity, and the mountain slopes are moderately steep, with heavy growths of scrub vegetation which largely obscure surface geology. The surface expression of the prominent Shaft fault, for example, is a gully occupying a small saddle in the mountain. Talus slopes and vegetation undoubtedly mask many other significant geologic features.

ORE OCCURRENCES AT THE SAN PEDRO MINE AND FACTORS GOVERNING THEM

Contact Metamorphism

Ore deposits in the San Pedro mine are the result of contact metamorphism, a process in which the limestone of the Magdalena group was altered by hot, high-pressure metalliferous solutions accompanying the emplacement of the intrusive sill and laccolith. Along the contact of the limestone and the intrusive rocks above and below is a zone in which the limestone has been

largely altered to garnet. "Outside" of the garnetized zone, i. e., further away from the intrusive center, is the ore zone proper, in which limestone has been altered largely to marble, and in which the ore consists of blotches and streaks of chalcopyrite (copper-iron sulfide), plus considerable values of gold and silver. Outside of the ore zone, in turn, is a zone of barren marble which is recognizable for a distance of more than 2,000 feet in the mine workings, and which may be an ore guide where it is reported to crop out on the north flank of San Pedro Mountain. Thus, development to date has shown the ore to occupy an elongated zone whose outer limit has been called the "marble line" by Locke and Perry (1916), and which is the contact of the mineralized zone with the barren marble. Forty years ago, Locke and Perry predicted that the marble line and ore might turn to the north, near the east end of the then active workings. Subsequent development proved this prediction correct. It therefore appears quite possible that contact metamorphism may have occurred roughly in the shape of a halo entirely surrounding the intrusive center(s).

Factors Limiting the Ore Occurrence

During the long history of the San Pedro Mine, certain geologic factors have been recognized as apparently critical in the ore occurrence. These are listed below:

- (1) The ore occurs in a series of marble beds lying between the quartz porphyry sill and the granodiorite porphyry laccolith.

(2) Virtually all of the ore has come from the beds lying within 150 feet vertically below the porphyry sill, and, moreover, from the lower 60 to 75 feet of these beds. Locke and Perry designate the rocks of the lower 60 to 75 feet the "favorable series," and the marble beds in the favorable series they call the "favorable beds."

(3) In the "favorable beds" the ore production has been from the vicinity of the "marble line."

(4) Two faults are known from the mine workings, and these are bounded by a shear zone some 400 feet wide. The faults and fissures trend from North to North 20° East. The considerable prospecting which has been done along the faults and fissures has failed to reveal any association of the ore with the fractures. Hence, it is believed that the fractures are "post-mineral," i. e., they formed after the ore was emplaced and do not exert any control of the ore deposits.

(5) In view of (4), it is necessary to assume that any faulting which seems to terminate ore deposits, does not actually do so, but simply displaces the ore horizons, requiring further exploration to relocate the ore across the faulting.

(6) While several orebodies have been found 50 to 100 feet away from the marble line, nevertheless, its importance has been amply sustained, and the mine workings suggest that virtually all important orebodies are within 100 to 200 feet of the marble line.

THE SAN PEDRO MINE: PRESENT STATUS

As stated above, cumulative ore production from the San Pedro mine from 1904 through 1941 totalled 233,666 tons. Many thousands of feet of underground workings have resulted from the extraction of ore, extending from the old Spanish Mine on the west down the dips of the beds for 2,400 feet to the lowest and most recent workings which were active in 1941. No attempt will be made here to describe the workings in detail. All stoping has been by open-stope methods, with irregularly-spaced pillars to support the back. The ground is hard and stands well in most places, although some caving has occurred in the older abandoned workings. Natural ventilation is reported to have served well even for the bottom stopes.

THE SAN PEDRO MINE: PLANNED DEVELOPMENT

Ore Minerals and Grade

The 233,666 tons of ore mined from 1904 through 1941 yielded 13,894,793 pounds of copper, 12,453 ounces of gold, and 185,733 ounces of silver. These figures indicate an over-all average grade of 3% copper, with 0.053 ounces of gold and 0.8 ounces of silver to the ton. Since the mine was last active, tungsten has been discovered in certain workings. The U. S. Geological Survey estimated in 1945 that 21,000 tons of tungsten ore averaging perhaps 0.5% tungsten oxide could be assumed on the basis of present exposures. Occurring with copper and gold ores, it is estimated that the tungsten would add from \$6 to \$30 per ton to the value of the 21,000 tons. Further investigation of the

tungsten reserves is warranted and is outlined below. A small tungsten mine was in operation as recently as 1954 on the north edge of San Pedro Mountain, adjacent to the San Pedro property.

Plan of Exploration

Mercury Uranium and Oil Company has commenced the exploration of the San Pedro mine to extend and delimit the ore reserves. Under the terms of the D. M. E. A. loan granted on July 27, 1956, Stage 1 of the exploration will consist of the following:

- (1) 29 diamond drill holes not to exceed 5700' of drilling
- (2) Not to exceed 350 feet of drifting to the North from Stope 31-11
- (3) Not to exceed 100 feet of drifting to the North from Stope #1 to test for the extension of the #1 orebody.
- (4) Not to exceed 50 feet of drifting in approximately ten drifts, each five feet long for diamond drill stations.
- (5) Not to exceed 100 feet of raising to provide for approximately ten raises, each ten feet high for diamond drill stations.
- (6) Not to exceed 180 samples of diamond core shall be assayed for copper, gold, and tungsten trioxide.
- (7) Not to exceed 60 samples of drift mineralization shall be assayed for copper, gold, and tungsten trioxide.

Contingent upon the results of Stage 1, and subject to the approval of the Government, Stage 2 will then be undertaken, to consist of the following:

- (1) Not to exceed 2000 feet of diamond drilling.

- (2) Not to exceed 200 feet of drifting.
- (3) Not to exceed 150 feet of raising.
- (4) Not to exceed 150 feet of winzing.
- (5) Not to exceed 65 diamond core samples to be assayed for copper, gold, and tungsten trioxide.
- (6) Not to exceed 50 samples of mineralization from drifts, raises, and winzes to be assayed for copper, gold, and tungsten trioxide.

Estimated cost of Stage 1 is \$67,650, and of Stage 2 is \$37,650.

Chilson Radio Survey

In September and October, 1938, a reconnaissance geophysical survey was conducted in the northeastern portion of the subject property by Daniel G. Chilson, employing the Chilson Radio Process for locating sulfide orebodies. This survey indicated substantial extensions of the orebodies beyond the most easterly workings of the mine. While the validity of the geophysical method must await diamond drilling of the favorable area, it is noteworthy that the indicated ore deposits closely follow the presumed trend of the "marble line" described above. Therefore, diamond drilling of the strongest anomalies appears warranted.

THE CARNAHAN MINE

General Geology

The Carnahan Mine, a half-mile south of the San Pedro Mine, shows lead and silver mineralization in limestone of the Madera formation below the granodiorite porphyry laccolith which underlies the ore at the San Pedro

Mine. The deposit is a flat-lying pipe-like replacement in limestone beds near the intersection of those beds with steeply-dipping fractures striking northeast to east. Other fractures with a more nearly north-south trend cut the northeast fractures and appear to have localized short lateral projections from the pipe.

Mineralization

The ore is said to have consisted of galena, zinc blende, pyrite, and some chalcopyrite in quartz and calcite gangue. The mineralogy of the primary ore is unknown because the deposit is much oxidized throughout the accessible workings. Near the surface, cerusite, limonite, and oxidized manganese ores have been observed. The shale beds exposed in the Carnahan Mine have been bleached and indurated. The limestone beds appear relatively unaltered except that they are commonly stained by iron and manganese oxides.

Mine Workings

The accessible workings consist of: (1) an incline which is approximately in the plane of the beds, and which is open for about 13,000 feet; (2) a few short inclines parallel to the main incline and ten to twenty feet stratigraphically above or below it; and (3) several small stopes and short lateral drifts to the north and south. The main incline is caved at its intersection with a fault zone about 1300 feet from the portal. The principal stopes are said to be east of this fault and are now inaccessible; therefore, a thorough examination of the mine is at present impossible. According to

verbal reports from miners who are familiar with the workings, the ore in the extreme east end of the mine is cut off by a fault. This fault has not been found on the surface.

Respectfully submitted

Original signed by:
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