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May 20, 1971

Mr. Oscar E. Whitebook, Secretary
Seagull Industries, Inc.
2401 East 17th Street
Suite F
Santa Ana, California 92701

Dear Mr. Whitebook:

We have received your reports and have evaluated the contained information on the Cerro Gordo and Wild Blue properties.

Because of meagre reported copper occurrences in primarily a lead, silver mining district, we feel Essex should not get involved in the Cerro Gordo property at this time. The Wild Blue Placer, also because it is not a copper property, is not the type of thing our management is currently interested in.

The Cerro Gordo report is very well done and has generated sufficient interest that we plan to visit the area at some future date when we are in the general area. We are particularly interested in the Skarn zones and reported copper occurrences in the Keeler Canyon area.

Howard Lanier, General Manager of Copper Operations for Essex, has been in contact with Bishop Paul J. Parish during the past few days, and via a copy of this letter I am informing Mr. Parish of our thoughts on the property submittals.

Thank you very much for the wealth of data sent; it was most helpful to us.

Enclosed you will find the following:

1) Report Cerro Gordo Mining Dist. - by N.A.A. T6-2906/20 with supplemental report attached on Wild Blue Placer property.

Mr. Oscar E. Whitebook
Seagull Industries, Inc.
Santa Ana, California

May 20, 1971

2) Report Cerro Gordo Expl. Program - Summary - 30 Nov. 1966

3) Description and Geology of Mining Properties (Cerro Gordo Mines) - pgs. 5, 6, 8, 9, 10, 11

Very truly yours,

ESSEX INTERNATIONAL, INC.

E. Grover Heinrichs
Asst. Manager of Exploration

EGH:td

cc: Bishop Paul J. Parish
12643 Carinthia Dr.
Whittier, Calif. 90601

cc: H. Lanier

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CERRO GORDO Pb-Zn-Ag., CALIF.

1. Adolph Knopf: Geological Reconnaissance on the Inyo Range etc., USGS PP 110, 1918.

Near Summit of Inyo Range. Production about $7,000,000.

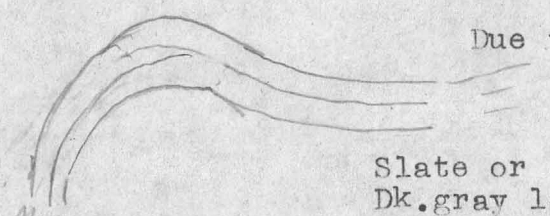
Structure of Inyo Range: Broad anticline, with compmentary syncline on W. Both pitch to S. Axes trend more to NW than trend of present range. In N part anticline occupies most of bready of range; in S part it trends diagonally across range, passing out on E side of range, so that farther S the syncline is dominant structure of range. Pre-C dolomite forms axis of anticline, N half of Bishop quad., successively younger rocks exposed to S. W limb of anticline, equals E limb of synclone, continues to S end of range.

Syncline best shown in part of range E of Keeler; from N.Y.Butte S is dominant structure. Trogh filled with soft Tr seds., flanked on W,E by resistant Carb.rocks. Reflected in topo.

Great intrusive SW of Saline Valley, covered by thin seds., exposed in canyons. Intrusions in general seem to have thrust up the seds. Great faults bound range, some within it.

Cerro Gordo Mine: As shown on regional map, Cerro Gordo lies well down W flank of Inyo anticline; but it lies on a subsidiary anticline, over- west, or down-slope. Trends about N30W; axis plunges steep S; white marble ore-bearer disappears not far S of mine.

Just NW of mine complex NE fltg. Zone a mosaic of small fault blocks.



Due to faulting Knopf apparently not sure of sectio Edwin Kirk in section on stratigraphy of Inyo Range says base of Carb., and Devonia contact exposed at the mine. Possible section:

Slate or shale
Dk.gray ls.
White marble.
Shale 300'
Quartzite 100'.

Whole mine area intensely fractured faults mainly pre-mineral.

NW of mine is a small mass of mp., intruded into shale. Another small body in ls. SE of mine. Probably tops of great granitic mass below. CM altered rk. in vicinity of mine. Mp dike or sill at mine, intruded along shale-ls.contact N20W. Qtz dior.porph.dikes, one strikes N70W. One db.dike, 5', along marble bedding. Rich shoot of Ag-Pb ore replaced a sheared portion of this dike.

Lead Ore Bodies.- Rocks of ore-bearing zone strike N to NW, dip 70° SW. Ore bodies lenticular, conform to trend of wall rocks. Ore zone 1500' long, several hundred ft. wide; main ore rock is the marble, which is finely saccharoidal, pure. Several larger ore shootshad slate FW. PbCarb bodies, to 40' thick; as masses, onion layers about small lump of galena.

HW s.t. dolomitized-cse crystals. Ore guide.

Sulphides: 1.PbS; ZnS, tetrahedrite, py. Zn carb.OBs, in ls walls of lead stopes, as irreg.masses & pipes. Form partly determined by structural features, as beds, joints, and the fracturing that took place after oxidation. As usual, limonite nearest lead stopes, diminishes away, Zn carb.ore becomes pure.

2. Abstr.:Geology of the Cerro Gordo Mine Area, Inyo Co., Calif. C.W. Meriiam.EG vol.44,p.82,1949.

Marble is Devonian;quartzite is interbedded with it;these are the loci for the OBs. On E side of a N-S master fault which separates Devonian from lower Carb.black shales and silicated ls. N-S faults esp.characteristic of this portion of Inyo Mts.

Two major ore chimneys were controlled by fissuring sympathetic to the master fault and by local bedding features of the Devonian qtzitic unit. This qtzitic unit seems esp.favorable for lead-zinc OBs in this area.Quote.

T6-2906/020
Copy

CERRO GORDO MINING DISTRICT

(TECHNICAL REPORT)

30 November 1966

Approved by:

F.G. Compton
Vice President and General Manager
Ocean Systems Operations

D.D. Brown
Director
Strategic Resources Development

This report, initially prepared as an internal document by and for North American-Rockwell, has been edited for presentation by KOHM Mining and Development, Inc., a subsidiary of SEAGULL Industries, Inc., in order to remove any extraneous and / or proprietory information. In no way has the editing process altered any of the technical content of the report, or the conclusions to be drawn from the technical data.

North American Aviation, Inc.

CONTENTS

ILLUSTRATIONS

INTRODUCTION

This report is a synopsis of a minerals exploration program instituted by the Strategic Resources Development group of North American Aviation, Inc. in the Cerro Gordo Mining District, Inyo County, California, during the periods from August 1965 through October 1966. Included is a description of the geological, geochemical, and geophysical investigations as well as associated petrologic and subsequent drilling programs conducted in the area. A general description and a brief history of the district is also included.

During preliminary reconnaissance of the Cerro Gordo area, mine dumps were sampled to determine the economic potential of the dump material. The nature and distribution of assay values in the dumps led to rehabilitation of the Cerro Gordo Mine and an investigation of the possibility of a large disseminated, orebody.

Because of the extensive indications of mineralization throughout the area, a geochemical and geophysical program was instituted. The geochemical techniques used were developed by NAA and are similar to colorimetric methods used by the U. S. G. S. with some modifications. Some of the later analysis work was accomplished with a Perkin-Elmer atomic absorption spectrophotometer in conjunction with the petrologic-geochemical correlation studies. The geophysical equipment used included an ELSEC proton magnetometer and an induced polarization unit (frequency domain) manufactured by Geosciences Incorporated.

HISTORY

The Cerro Gordo strike was made in 1865 by Mexican prospectors. Their accounts of the extremely rich ore found outcropping at the surface attracted Americans to the little town resting at 8000 feet in the Southern Inyo Mountains. So rapid was development that by the fall of 1868, the mine's smelters were producing silver-lead bullion at a faster rate than the United States had ever seen. By 1872, eleven mines were active in the Cerro Gordo district. Of these mines, three outstripped all others in importance. They were the Union, Santa Maria and San Felipe.

Although the Cerro Gordo Mine, a consolidation of the Union, Santa Maria and Felipe mines, has been worked intermittently through 1949, the period between 1869 and 1876 marks the bonanza years. During this time more than half of the mine's lead and about three-fourths of its silver was produced. This amounted to over 22,000 tons of lead and over 3,000,000 ounces of silver. The silver-lead bullion is reported to have contained about 140 ounces of silver per ton at an average value of $300.00 per ton. Total output value during the boom years has been estimated to be about $7,000,000. Payment for the lead alone just about defrayed the cost of smelting at the mine, together with the transportation of the bullion to San Francisco for refining. Before arriving in San Francisco, the ore had to be transported by mule teams across the desert to Los Angeles some 200 miles away. A steady string of about 56 large freight wagons, pulled by 16 to 20 mules, made this three week trip.

Los Angeles profited immensely by the lucrative supply and transportation business, and resulted in its growth from a village to an important city. By 1876 production began to fall, and in 1878 the mine was forced to shut down due to destruction by fire of the Union hoisting works in August 1877.

From 1879 to 1910, sporadic mining activity was in the hands of small companies and leasers. In 1877 the Union shaft, now known as the Belshaw Shaft, was sunk to a depth of 900 feet in quest for inferred extensions of Union and Santa Maria ore. This 31 year period of mining activity produced only a thousandth of the silver output that was produced during the 1869-1876 boom period.

The following eight years (1911-1919), marked the second largest total ore output in the history of Cerro Gordo. Responsible for this revival were L. D. Gordon and Associates who successfully mined rich zinc carbonate for which an eastern market existed. During these years, Cerro Gordo was the major source of the highest grade zinc carbonate ores produced in this country. The mineral smithsonite was the most characteristic of the zinc ores. In addition to zinc, new silver-lead ore bodies were discovered and successfully mined during the 1911-1919 period.

During the next eight year period (1920-1928), the Cerro Gordo Mines Co. (a reorganization of L. D. Gordon and Associates) followed by various leasers, continued to mine old stopes in a modest way. An important ore body was found west of old Cerro Gordo in 1925 by the Estelle Mines Corporation, however, work was stopped in 1928 because of litigation. The ore body was discovered on the La Despreciada claim.

The third and last period of significant Cerro Gordo productivity began in 1929 and lasted until 1933. La Despreciada ore was extracted during this five year period.

The Cerro Gordo Mine was the greatest silver and lead producer in the history of California. Beginning with 1869, total recorded silver yield was of the order of 4,400,000 ounces and total lead production was roughly 37,000 tons. Beginning with 1911, total zinc production has been 12,000 tons. Copper was recovered only in later periods of operation.

Cerro Gordo silver-lead ores were easily smelted and of generally high quality. Most of the lead orebodies were fairly uniform in grade and mineable to country rock walls. Hence, known reserves of marginal grade have never been a significant factor in mine evaluation.

The factual information included in this section was taken from Geological Survey Professional Paper 408, Geology of the Cerro Gordo Mining District, Inyo County, California, by C. W. Merriam, 1963.

T6-2906/020

GENERAL DESCRIPTION OF THE CERRO GORDO AREA

PHYSICAL DESCRIPTION

The Cerro Gordo Mining District derives its name from a linestone peak (9194 ft) located near the southern end of the Inyo Mountains. Together with a northern prolongation known as the White Mountains, the Inyo Mountains occupy a position at the west margin of the Great Basin. The abandoned mining town of Cerro Gordo lies 4600 feet above the town of Keeler in Inyo County on the northeast of Owens (dry) Lake. A gravel road approximately eight miles long connects the old mining town with state highway 190. The steep and winding road is maintained by the Inyo County Road Department (Figure 1). From the mine, the road descends along San Lucas Canyon on the east slope of Cerro Gordo Peak to connect with the road from Lee Flat to the Bonham talc mines. This county road can be travelled by conventional vehicles, but four wheel drive vehicles are necessary for most other roads in the area.

The terrain is quite rugged, characterized by steeply dipping Paleozoic limestones which stand high above the other rock types of the area. Many of the higher peaks and ridges of the region rise 1000 feet above their adjacent gorges, with many slopes approaching 45 degrees.

The town itself sits in the saddle 1000 feet below and west of Cerro Gordo Peak and east of the steep ridge where the Hart Mine is located (Figure 2). Roads lead from the townsite southwest up Buena Vista Peak to the saddle lying between Cerro Gordo and Buena Vista Peaks and west around the ridge leading to Hart Camp and Hart Mine.

The relatively sparse vegetation, found on the lower slopes sagebrush, greasewood, desert holly, rabbitbrush, and salt grass. Scattered stands of Joshua trees occur up to about 7500 feet. Above this altitude the juniper and pinion pine are dominant.

GENERAL GEOLOGY

Strongly folded and faulted sedimentary rocks, Ordovican to Middle Triassic in age, are characteristic of the Cerro Gordo area. Except for the upper part of the Triassic sequence, the rocks are predominently limestones and shales. Important formations of the area included in this group are the Owens Valley limestone, Keeler Canyon limestone, Chainman shale, Tin Mountain limestone, Lost Burro marble, Hidden Valley and Ely Springs dolomite. The Upper Triassic sequence is composed of volcanics and intercalations of terrestrial sediments. The sediments have undergone regional metamorphism resulting in the recrystallization of pure limestones and altering of shales. The Paleozoic and Triassic rocks are intruded by numerous small-to-intermediate sized granitic bodies and andesitic dikes. The adjacent intruded sedimentary rocks show varying degrees of contact metasomatism as well as contact metamorphism. As a result, the Chainman shale and carbonate rocks have been partially to wholly altered to skarn, chlorite, and sericite.

Rock alteration and surface patterns of granitoid rock distribution indicate that the entire southern Inyo range is underlain by plutonic rocks. The granitoid intrusions of the Cerro Gordo area, which most closely resemble quartz monzonite, have been

Figure 1. Cerro Gordo Mine Entry Road. View along county road between Keeler and Cerro Gordo in Cerro Gordo Canyon. Rocks in the foreground are near-vertical resistant limestone beds of the Keeler Canyon formation. Hills in the distance are also Keeler Canyon interbedded limestones and shales.

Figure 2. Aerial view, looking east, of the Cerro Gordo townsite showing the mine dump and workings just below Cerro Gordo Peak. Lower foreground shows road from Keeler leading northeast into town. Road leading from the town to the right goes to the saddle between Cerro Gordo and Buena Vista peaks. The upper of the two roads leading to the southwest corner of the photo goes to Hart Camp and Mine.

inferred to be contemporary with the Sierran intrusion to the west, and therefore late Jurrassic or early Cretaceous in age. A number of the granitoid intrusions can be found aroud Cerro Gordo penetrating various formations. The Hart Camp stock one-half mile west of Cerro Gordo intrudes the Chainman shale. Others include a small stock penetrating the Lost Burro marble one and one-half miles north of Cerro Gordo; the Newsboy stock a mile east; the Cerro Gordo stock penetrating the marble just south of Cerro Gordo Peak; and the small Ignacio stock in Chainman shale one-half mile southwest of Cerro Gordo. Of special importance with respect to the geology of the Cerro Gordo Mine is the Union Dike, intruded along a north trending shear zone which later influenced ore deposition.

Greenish-gray andesitic and dacitic Tertiary rocks are found intruding the larger granitoid bodies in the area. These dikes, which occur in large numbers, commonly strike northwestward, evidently following pervasive northwest shear patterns of the area. Talc mineralization to the north of Cerro Gordo and the silver-lead ores in the Cerro Gordo Mine are associated with this type of intrusion.

The principle geologic structure of the area is a broad, asymmetrical, northwest trending, south plunging anticline. The anticline forms a structural backbone to the Inyo mountains in this area and involves strata from Middle Ordovician through Middle Triassic. The Cerro Gordo orebodies occur in the Lost Burro marble near the axis of this structure.

Faulting in the area is quite complex, and occurs in two stages. The first stage probably occurred contemporaneously with the Sierra Nevada batholith about late Jurassic and/or early Cretaceous time, and is characterized by compressional reverse faulting and folding.

The second stage of faulting was characterized by normal faults. Nearly all of the important faults of the area are normal faults having northerly to northwesterly trends. This stage of northwesterly deformation, which occurred from late Tertiary to Recent times, is characteristic of the Basin and Range Province. The most notable of these normal faults is the north-trending Cerro Gordo fault which figures importantly in detailed discussions of the Cerro Gordo Mine.

MAJOR MINE OPENINGS AND DUMPS

Many mine openings, tunnels, pits and quarries can be found around Cerro Gordo. Several of them were investigated by NAA and their conditions evaluated.

Most noteworthy of the mine openings in the area is the Belshaw shaft and its various levels making up the Cerro Gordo mine proper. The shaft house is located adjacent to the large dump just above the town (Figure 3). There are presently five levels open from the shaft, these being the 86, 400, 550, 700 and 900 foot levels.

Several hundred feet northwest of the shaft lies the Bullion tunnel which is open and accessible. Two large lime quarry pits and two openings to the China stope are located 100 feet above the dump on the side of Cerro Gordo Peak (Figure 3). Several other open stopes and pits are found in this vicinity.

About a mile south of the townsite is the Morning Star Mine situated on a steep ridge overlooking Owens Valley at an elevation of 7725 feet. The mine can be reached

Figure 3. Belshaw Shaft. View taken from the air just above the Belshaw shaft and mine dump. The shaft is housed in buildings in the center of the picture. At extreme left and above the dump are two adjacent quarries in the Lost Burro marble. The two smaller and elongate openings just below the left quarry pit are surface openings to the China stope.

by a road leading south from the main county road a few hundred feet southwest of the townsite. This mine has a large dump and two underground levels connected by a winze that are completely open.

The portal of the low-level Estelle tunnel lies a mile and a half southwest of Cerro Gordo at an elevation of 6080 feet which is 2240 feet below the Belshaw shaft collar. Access to the tunnel is made by a quarter-mile stretch of road leading northeast from the county road about four miles from Keeler. The tunnel is virtually straight, bearing N 70°E for 8100 feet. It is open although very dangerous about half way in due to caving Castle Rock vein workings above. There is only one entrance to this tunnel, outside of which is a large dump.

The Charles Lease tunnel is 2800 feet south of Cerro Gordo at an elevation of 7960 feet. It extends eastward for about 1600 feet and is open and accessible. Access to the tunnel is from the road leading to the Morning Star Mine.

The Ignacio silver mine is in Cerro Gordo Canyon one half-mile southwest of Cerro Gordo. The Ignacio workings comprise more than 4000 feet of tunnel, a glory hole, and many pits and trenches. The principal tunnel workings are now inaccessible.

The Sunset Mine is in Cerro Gordo Canyon just off the county road three-quarters of a mile west of Cerro Gordo at an elevation of 7250 feet. The mine and workings are entirely open.

The Upper Newtown Mine is 1550 feet north of the Belshaw shaft on the east side of San Ducas Canyon at an elevation of 8040 feet. This mine is only partially accessible.

Numerous other mine workings of lesser importance can also be found throughout the area. The locations of the mines mentioned are shown in Plate I.

TYPES OF ORE DEPOSITS

The ore deposits mined in the Cerro Gordo area were of several types. Those of the Cerro Gordo Mine were by far the most significant in both size and richness. In the Cerro Gordo Mine the ores occur as small shoots in fissures, as massive bodies in large, steeply inclined pipes or chimneys, in small isolated pockets, and in siliceous veins. These ores occur mainly in shattered marble of the Devonian Lost Burro formation. In addition, rich ore shoots were extracted from fissured parts of the Jefferson diabase dike. Pipe-like and bedded secondary carbonate zinc orebodies are associated with the massive lead-silver chimney ores. Of special significance with respect to structural ore control are the many small north and northwest trending fissures and fractures which formed in the footwall marbles of the main Cerro Gordo fault. Structures of this nature include (1), the Bullion fissure (2), feeding fissures within and adjacent to the Union chimney (3), ore bearing fissures of the Upper and Lower Newtown mines in San Lucas Canyon, and (4) the Zero fissure vein.

Massive primary orebodies were emplaced as shoots in steeply inclined pipes. The two principle channels of this type, are the Union chimney at the north end of the mine and the Jefferson chimney at the south end.

South of Cerro Gordo, the Morning Star Mine, the Charles Lease tunnel, and the low-level Estelle tunnel were opened to explore siliceous veins. These deposits produced moderate amounts of lead-silver ore, with the exception of one stope in the Morning Star Mine which produced some gold. North trending faults and fissures are important structural and ore-controlling features in these mines.

The factual information included in this section was taken from Geological Survey Professional Paper 408, Geology of the Cerro Gordo Mining District, Inyo County, California, by C. W. Merriam, 1963.

MINE DUMP EVALUATION

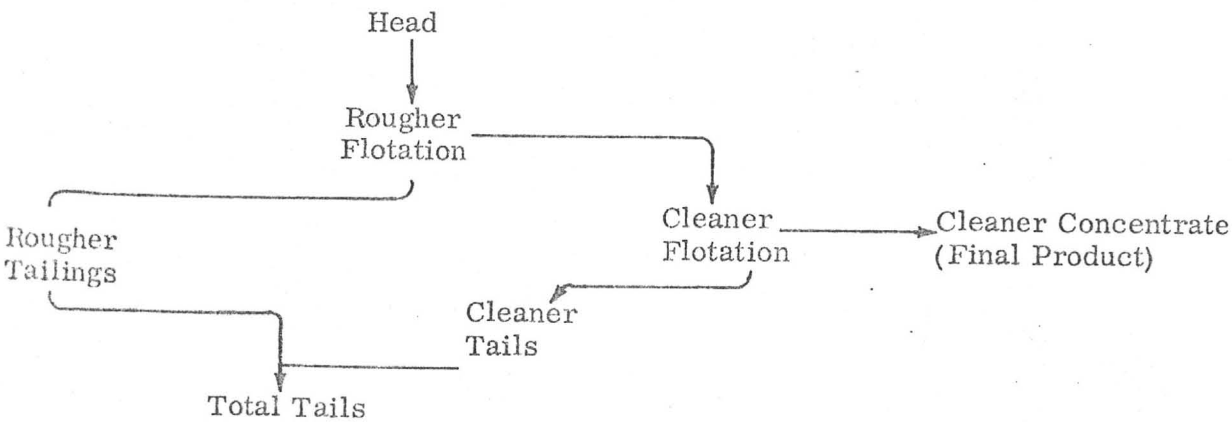
The mine dumps in the vicinity of the Belshaw Shaft were surveyed and sampled early in the program. A total of 160,000 tons of material was calculated in the main dump and 200,000 tons were estimated for all dumps in the vicinity. The initial sampling program indicated that 50 percent of the material was minus 3 mesh and contained gross values in lead, zinc, silver and gold of about $19 per ton.* These samples were collected from 45 holes dug with a back hoe on the top of the main dump. Size analyses were performed in SRD's laboratory and composited samples were assayed at the Eisenhauer Laboratories. This work is described in an SRD report on Project Pine Cone dated October, 1965.

Subsequently, a large cut about 40 feet in depth was made across the main dump. A composite bulk sample totaling about 3000 pounds was collected systematically from the walls of the cut and from around the toe and crest of the dump. This sample was coned, quartered, and placed in four 55-gallon drums.

One of the drums was shipped to Western Machinery Company (WEMCO) in San Francisco for analysis. The results of WEMCO's assayed screen analysis (Figure 4) generally corroborates SRD's earlier analysis for the minus 3 mesh material. In addition, the WEMCO analysis showed that the lead and zinc minerals were about 70 percent nonsulfides and from this they concluded that flotation tests were unwarranted.

A 100 pound representative sample from one of the drums was shipped to the Galigher Company in Salt Lake City for flotation testing. By adding NaHS to sulfidize the oxides, 74.4 percent of the lead and 61.8 percent of the silver was recovered with a total weight recovery in the cleaner concentrate of 2.5 percent. Following are the results of the Galigher tests and an evaluation of the Cerro Gordo dump using these data.

Sample ground to: 83% minus 100 mesh
49% minus 325 mesh



* Price of silver - 1965 - $1.29/oz.

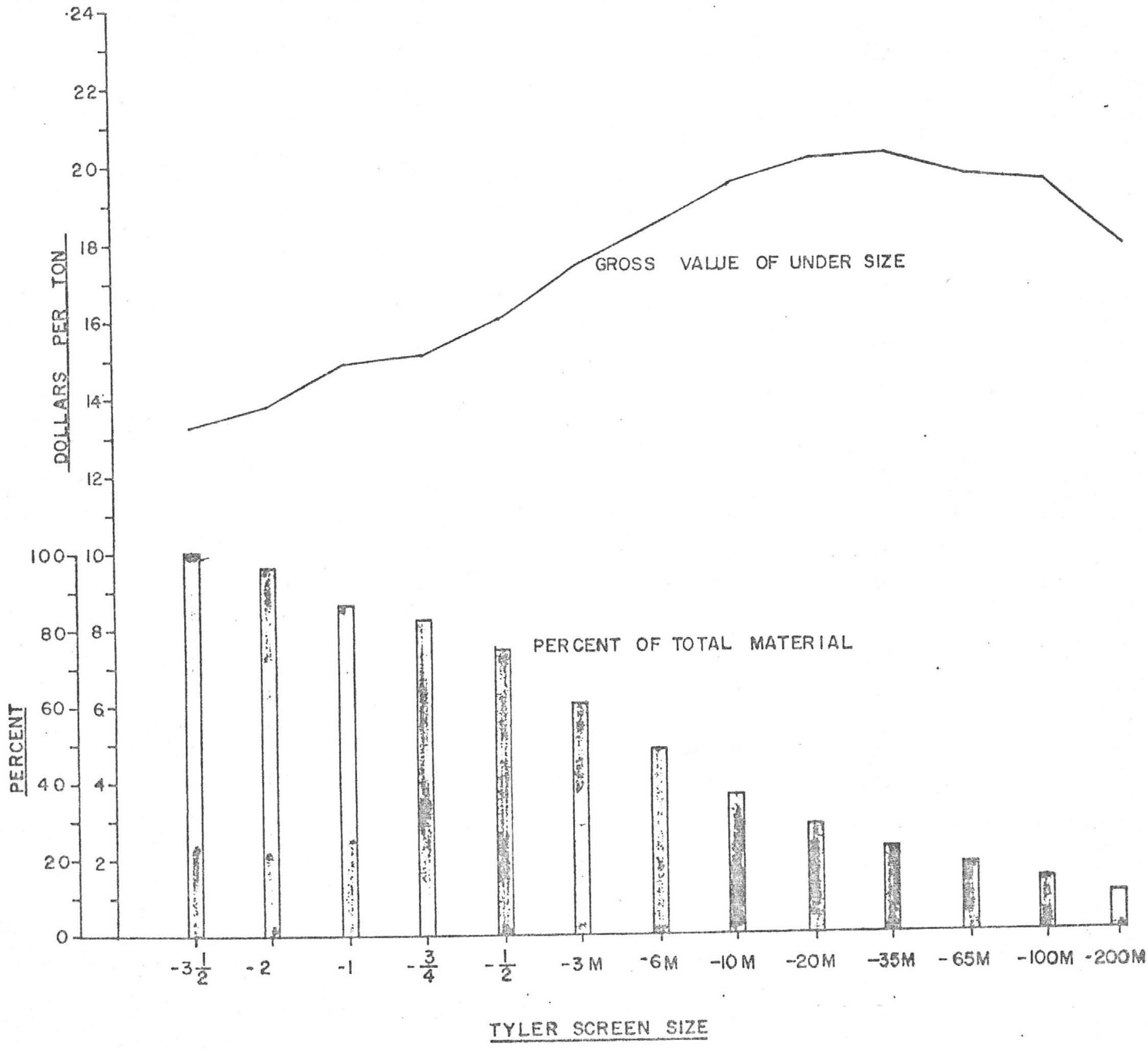


Figure 4. Pine Cone Dump - WEMCO Analysis

Assay

	Wt %	%Pb	%Cu	%Zn	Oz_3Ag	Oz_3Au
Head	100. 0	1. 36	----	1. 63	1. 48	. 010
Rougher Tail	94. 6	. 3			. 5	. 005
Cleaner Tail	2. 9	2. 2			3. 1	. 030
Cleaner Concentrate	2. 5	40. 4	1. 134	2. 19	36. 5	. 175

The metallurgical recovery of the cleaner concentrate, i. e., percentage of total metal in head recovered as concentrate is as follows:

Pb	Ag	Au
74. 4	61. 8	43. 9

Value of concentrate by metal ($):

Pb	Cu	Zn	Ag	Au	Total
121. 20	8. 16	6. 35	47. 08	6. 13	188. 92

EXPLANATION

DIRT ROAD

MINE SHAFT

RAISE OR STOPE HOLING

ADIT

PROSPECT

GEOLOGIC SYMBOLS

STRIKE AND DIP OF BEDDING 25

FAULTING ?—?

BEDDING CONTACT ?—?

THRUST FAULT

ANTICLINAL AXIS

SYNCLINAL AXIS

STRATIGRAPHIC COLUMN

? ? ?	COVERED, STRUCTURE UNKNOWN
K QM	CRETACEOUS (?) QUARTZ MONZONITE INTRUSIVES
P_O	PERMIAN OWENS VALLEY FORMATION (DOES NOT OUTCROP)

ANGULAR CONFORMITY

$P\mathbb{P}_U$	UPPER MEMBER OF THE PERMIAN - PENNSYLVANIAN KEELER CANYON FORMATION 2000' THICKNESS
$P\mathbb{P}_L$	LOWER MEMBER OF THE PERMIAN - PENNSYLVANIAN KEELER CANYON FORMATION 200' THICKNESS
M_C	MISSISSIPPIAN CHAINMAN SHALE 1000' THICKNESS
M_P	MISSISSIPPIAN PERDIDO FORMATION 100' THICKNESS

UNCONFORMITY

M_T	MISSISSIPPIAN TIN MOUNTAIN LIMESTONE 350' THICKNESS
D_L	DEVONIAN LOST BURRO FORMATION 1600' THICKNESS
D_H	DEVONIAN HIDDEN VALLEY DOLOMITE (DOES NOT OUTCROP)

Figure 5. Geologic Symbol Explanation

Upper Member of the Permian-Pennsylvanian Keeler Canyon Formation: platy to blocky, medium grey, impure, fine grained limestone with a banded brown and grey weathering surface.

District Gangue-Rock Alteration

Carbonate Alteration Zones

Carbonates are present in the district as recrystallized dolomite and some siderite, ankerite, kutnahorite, and secondary calcite in sheaths of mineralization surrounding many of the orebodies. These zones frequently can be located at the surface and occur along fractures or shears, primarily in the Lost Burro formation and the lower member of the Keeler Canyon formation. Quartz commonly occurs with the calcite.

Quartz Alteration

Quartz occurs in barren veins, in sparsely mineralized veins, and in major ore shoots. Quartz veins are typical of the Lost Burro formation, skarn zones in the lower member of the Keeler Canyon formation, shears and fractures in the Chainman shale and quartz monzonite intrusives and along fault contacts between formations.

Sericite Alteration

Sericite alteration of feldspars is extremely strong in some of the quartz monzonite intrusives, particularly where accompanied by foliation due to stress. It is also present in the Chainman shale near the western contact with the Keeler Canyon formation where intrusives have welled up along the contact (Figure 6).

Skarn Alteration

Skarn mineralization grades from incipient to massive replacement by magmatic silica and iron bearing fluids, particularly in the lower member of the Keeler Canyon formation, but to some extent in the intrusives and the adjacent Chainman shale (Figure 6). Skarn minerals include grossularite, quartz, epidote and calcite.

Chlorite-Quartz-Specularite Alteration

This assemblage is related to skarn mineralization and is found in the Chainman shale adjacent to the skarn (Figure 6).

Limonite Alteration

Limonite occurs primarily in shear zones and is the result of the electrochemical breakdown of pyrite by oxidation. Decomposition is controlled by the circulation of meteoric water. Limonitization of ore minerals is also present in the Cerro Gordo district.

Pyrolusite Alteration

Pyrolusite occurs as dendrites along numerous fractures in the Chainman shale and the lower member of the Keeler Canyon formation. It has deposited from meteoric waters.

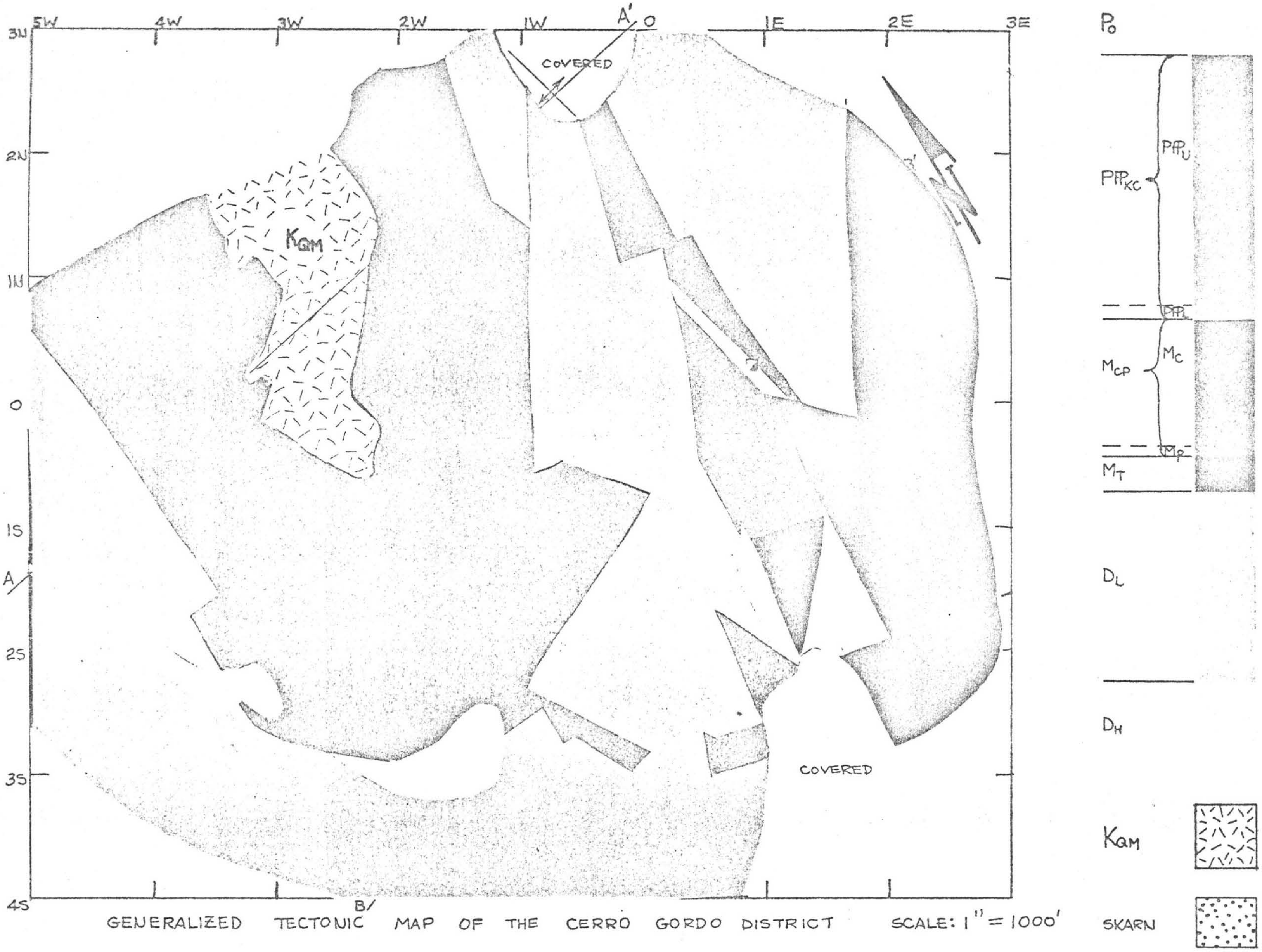


Figure 6. Generalized Tectonic Map of the Cerro Gordo District

Aragonite

Aragonite occurs as incrustations throughout the district and is found lining solution cavities and filling fissures. Much of the aragonite is altering to calcite, particularly in vicinities of abundant meteoric water.

Tectonic History (Refer to Figures 6, 7, 8 and 9)

The formation of the Inyo mountain range was accompanied by a general NE-SW trending compressive stress resulting in a series of NW trending parallel folds and thrust faults. Following compression, upwarping took place due to the upward rise of the underlying Sierra Nevada Batholith. Local upwellings of magma forced their way upward along planes of weakness, notably along the axes of folds. The resulting rise of magma caused ruptures in the overlying rocks along the axes of folding as well as other orientations, and the magma forced its way into some of these ruptures.

Disjointed anticlines and synclines are explained by vertical stress differences between adjacent tectonic blocks causing normal faulting as an adjustment to tensional stresses. The slippage of blocks in the Cerro Gordo area was aided by the Chainman shale which acted as a lubricant for the more competent blocks to glide over.

The latest faults are cross faults which formed as the strata made adjustments to new stresses as well as to the release of former stresses. Occasionally, reactivation of movement along faults has resulted in segmenting of intrusives by the same shears which they followed originally.

Origin of Sheeting in the Devonian Lost Burro Limestone

The existence of steep west-dipping, north trending sheeting or fracture cleavage is of paramount importance in the localization of ore deposits in the Cerro Gordo region because the sheeting has provided planes of weakness for mineralizing fluids to permeate.

The sheeting is confined mostly to Lost Burro limestone, but it is also present in the overlying Tin Mountain limestone. The inherent quality which has allowed the marbleized limestone to become sheeted is its extreme competency or brittleness.

The type and orientation of stresses involved may be discerned from several lines of evidence (Figure 10). Field exposures have several recurring features, notably the development of tension gash fractures filled with calcite, and other secondary tension fractures which form acute-to-obtuse angles with the cleavage. Facing north along strike of the cleavage, the tension fractures consistently bend northward to the right and southward to the left. Disharmonic microfolds along the cleavage planes tend to "drag"; the east sides move north and the west sides move south. Bedding and related primary depositional features have been similarly distorted (Figure 10).

Essentially horizintal differential stresses in the north-south direction have acted to shear the limestone and to cause secondary tension fractures to develop from the resulting torsion.

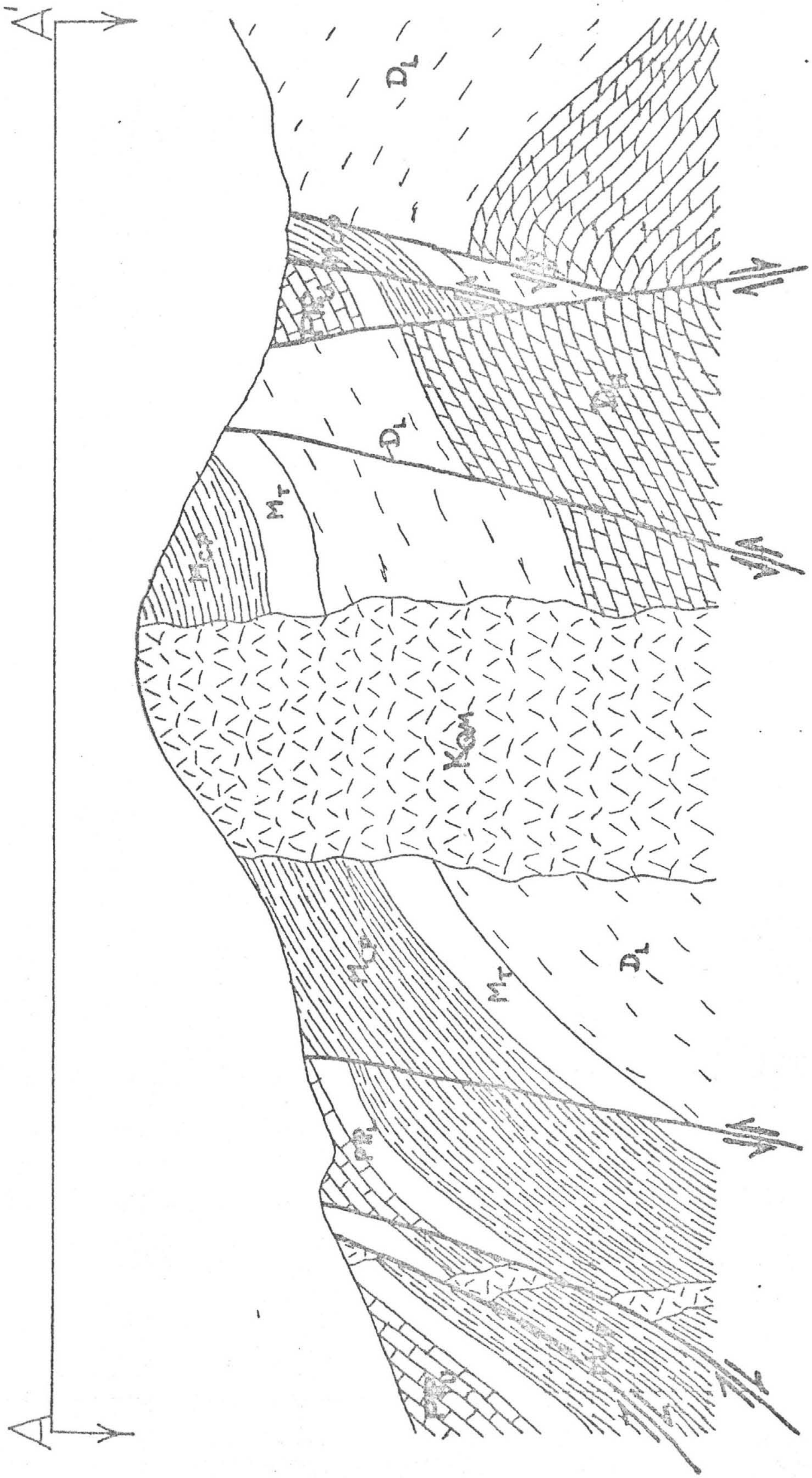


Figure 7. Idealized Cross-Section A–A' Facing Northwest
Scale: 1'' = 1000'

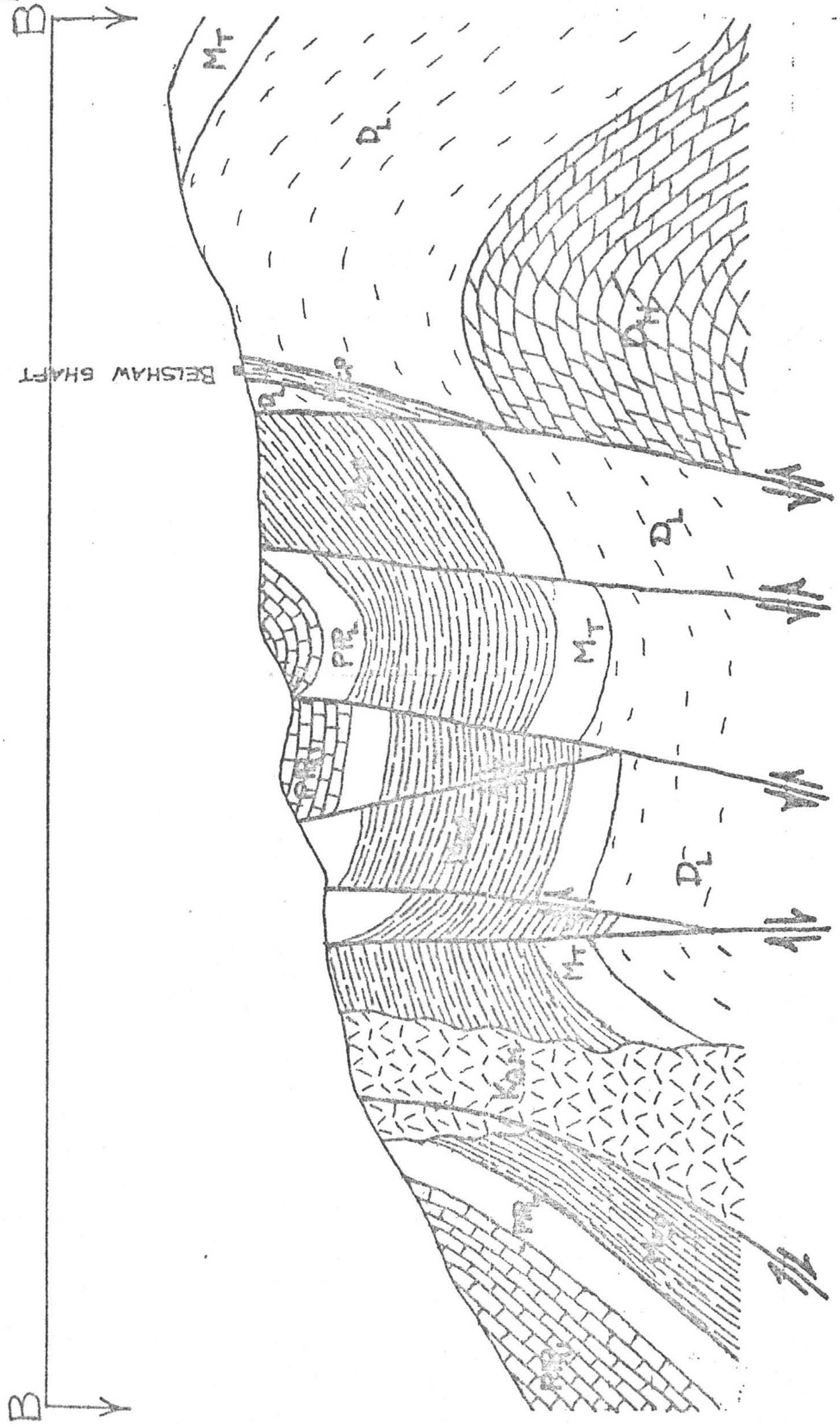


Figure 8. Idealized Cross-Section B–B' Facing Northwest
Scale: 1" = 1000'

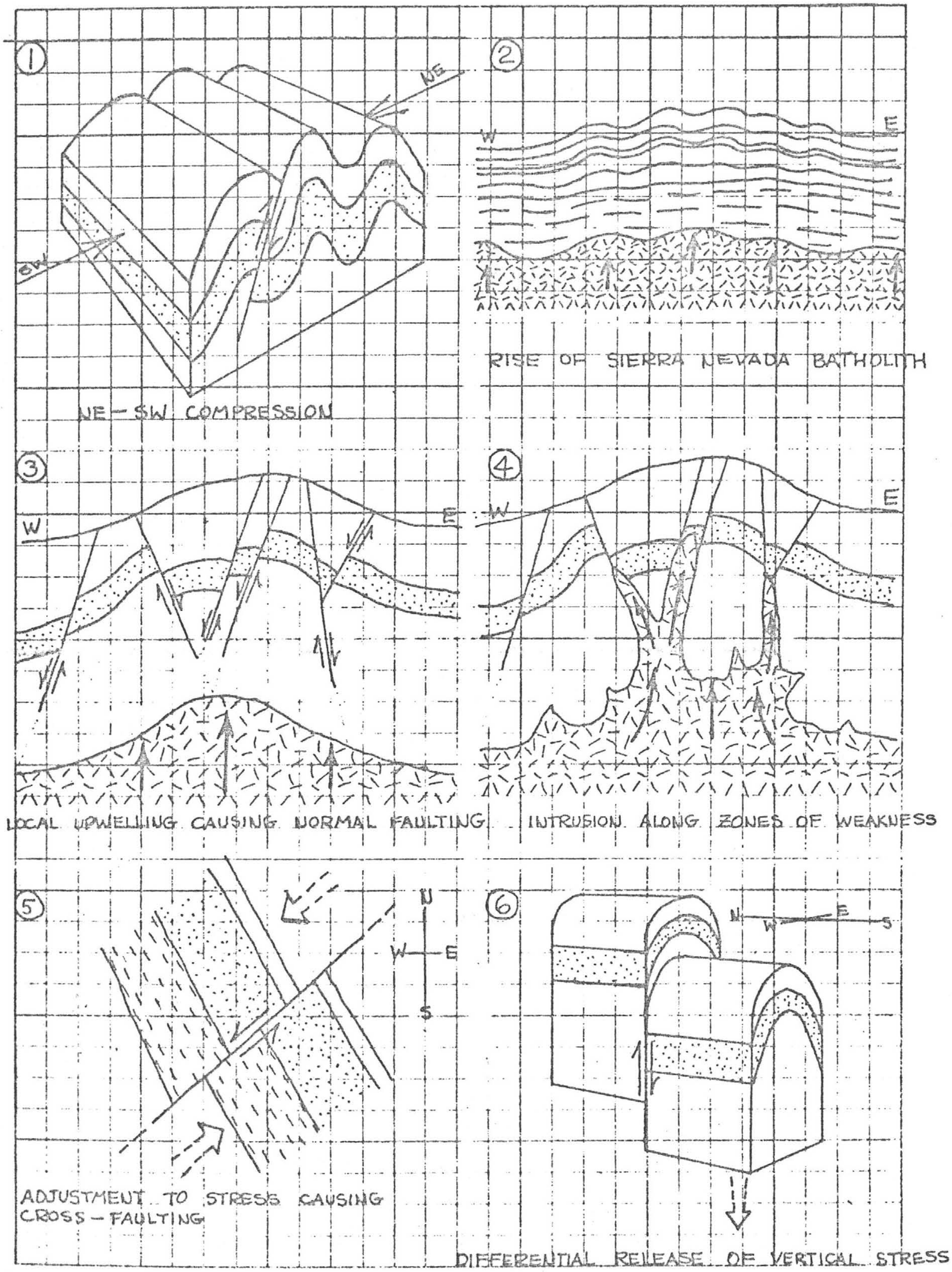


Figure 9. Tectonic History

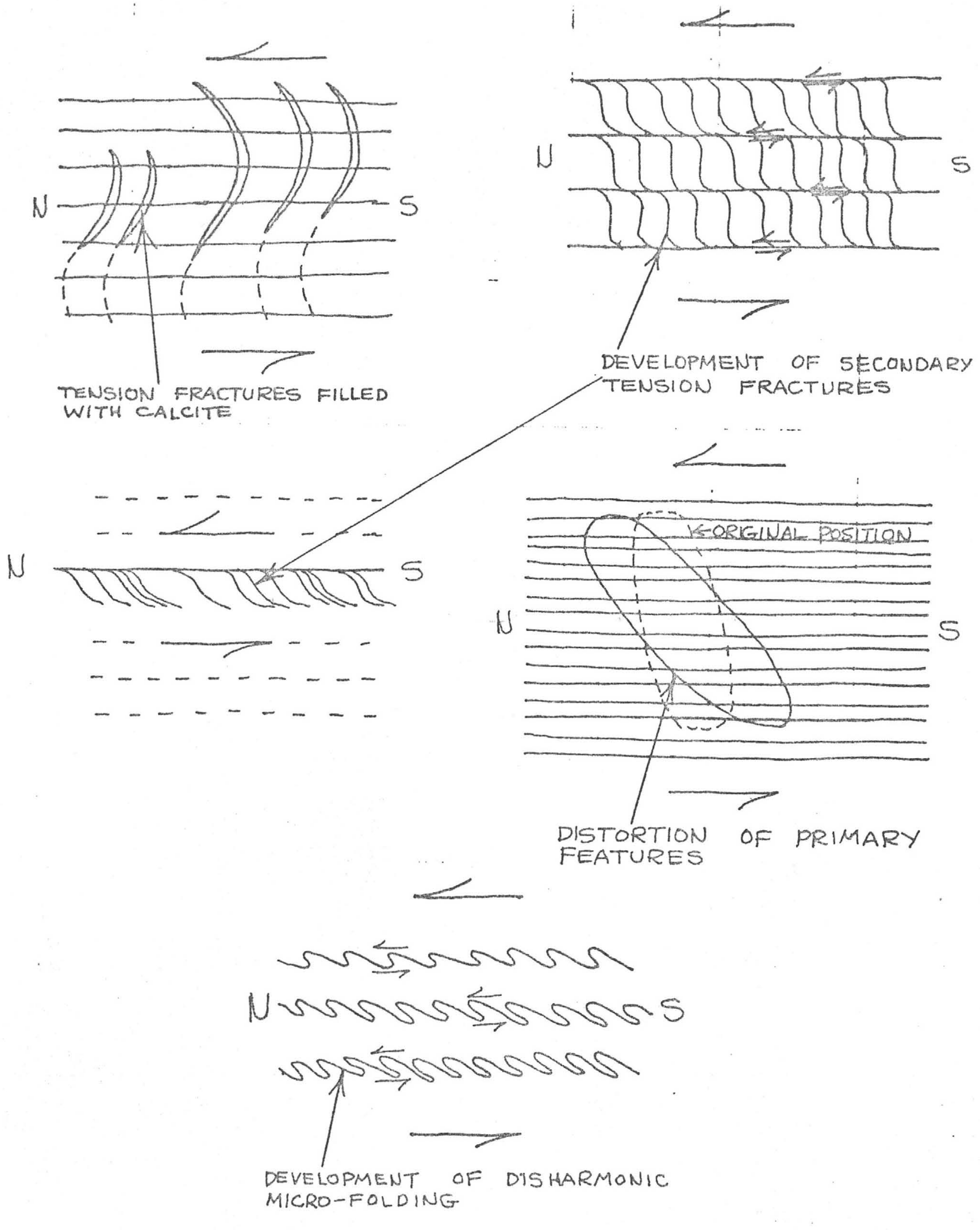


Figure 10. Origin of Sheeting in the Lost Burro Formation

Keeler Canyon Skarn Zone

The skarn zone in the lower Keeler Canyon formation southwest of Cerro Gordo Mine, was intensively investigated during this program. This zone was delineated on the geochemical maps and considerable evidence of mineralization is visible on the surface. The skarn zone has many characteristics indicating the existence of a large potential underlying orebody. The most striking features are the pervasiveness of mineralization along its one and a half-mile strike length, and its highly sheared and fractured condition. At the northwest end (not on the grid maps), the zone is covered by a thrust plate of the upper member of the Keeler Canyon formation and in the southeast, the zone passes under thick alluvium, indicating that the zone extends beyond the surface outcrops in both directions.

This belt has been the focus of several phases of disturbance, including strong northwest trending shearing, block faulting, step faulting, and late stage fracturing. Fracturing is so thorough that the term "linear stockwork" is probably applicable. These features, along with the presence of numerous segmented intrusives and the sheath of skarn mineralization, indicate that this area has been a zone of considerable tectonic weakness throughout a long period of geologic time.

It is noteworthy that intense skarn alteration occurs here, but not in the vicinity of the Cerro Gordo mines. Another striking feature is the abundance of some minerals which rarely occur at Cerro Gordo, including mercury (cinnabar), gold, molybdenum (wulfenite), bismuth (native bismuth, bismuthinite), copper, (bornite), tungsten (wolframite, scheelite), vanadium (vanadinite), and traces of nickel. Spectrographic analyses show that significant amounts of rare earths also occur. Of particular significance also, is the development of strong chlorite, sericite, quartz, and specularite alteration which border the skarn primarily on the east side. This alteration undoubtedly extends far below the surface.

A geochemical survey indicated that high gold and silver anomalies follow the strike of this zone, and magnetic and induced polarization anomalies also occur along it.

The conclusion is that a large orebody may exist in the Lost Burro formation underlying the outcropping skarn zone. Because of the brittle sheeted nature of the Lost Burro limestone, the skarn is probably stronger here than in the Keeler Canyon formation. Tin Mountain limestone and Chainman shale form a barrier with a thickness of over 1000 feet which could have trapped ascending mineralizing solutions and formed a "blanket" of extremely rich ore underneath. The frequent, but sporadic stringers of mineralization occuring at the surface could represent leakages of mineralization from this major orebody (Figure 11).

Emplacement would be due to deposition by late-stage magmatic ore-bearing fluids in a highly disturbed zone in reactive limestone overlain by a semi-impermeable barrier. This deposit would be classified as contact metasomatic, and outlying deposits at Cerro Gordo would fall in the range of mesothermal deposition.

Surface mineralization indicates that this "blanket" could include ores of copper, lead, gold, silver, zinc, tungsten, vanadium, and rare earths. The predominance of copper over lead-zinc mineralization in the skarn zone is in accordance with the principles of zoned deposits in which copper forms an inner shell of mineralization and lead, silver, and zinc are deposited peripheral to it. The high grade shoots of the Cerro Gordo mines would, therefore, represent minor outliers of the main orebody.

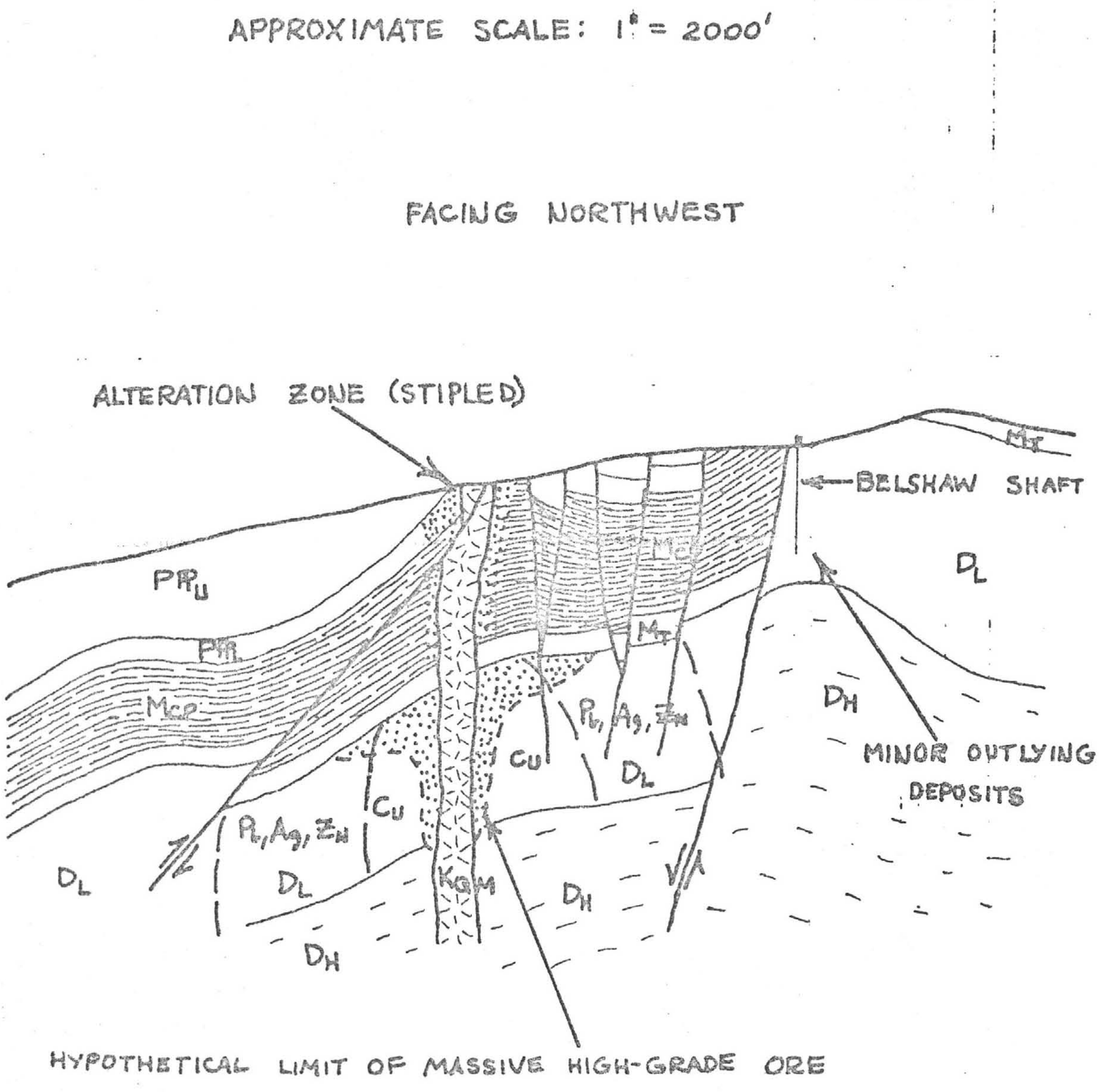


Figure 11. Hypothetical Contact-Metasomatic Orebody

GEOCHEMICAL SURVEYS

A geochemical survey was conducted over a one square mile area at Cerro Gordo. Nearly 5800 residual soil samples were collected using the surveyed grid system for control. North-south lines were surveyed 500 feet apart with flagged stakes at 50-foot intervals. Sample points were then located by pacing between the surveyed lines. The samples were collected on a 50-foot grid throughout most of the area with the material being taken from a depth of about six inches and screened to minus 100 mesh.

Analyses for gold and silver were performed on each soil sample by the application of wet chemical techniques. The procedure used one gram of minus 100 mesh soil sample. Samples to be tested for silver were dissolved in 8 M nitric acid and those to be analyzed for gold were dissolved in aqua regia. In both cases, the metal was then extracted from the acid by means of an organic reagent. The reagent used for gold was isopropyl ether and the reagent used for silver analyses was an acetate solution. The metallic ions were dyed using Rhodamine - B for gold and a mixture of dithizone and benzene for silver. A portion of the dyed solution was pipetted into a pyrex optical cell and its value in absorption units was read on a Beckman DB spectrophotometer.

The absorption values for gold and silver were plotted on separate overlays of the base map and these plots were subsequently contoured (Plates III and IV). The background values at Cerro Gordo were found to be several times higher than values observed in other areas of California and Nevada surveyed by the same techniques.

Several anomalous areas for both silver and gold are depicted on the respective plots. On Plate IV, there are nine areas showing high silver values. In the first of these areas (20S/16W, 22S/16W, 25S/16W and 22S/18W) four small anomalies show high concentrations of silver. Each of these can be directly correlated with mine dumps associated with the Ignacio Mine. Another anomalous area associated with the Ignacio workings is located at 22S/8W.

The two high anomalies located at (27S/17W and 27S/19W) are associated with a contact zone between the Chainman shale and intrusive quartz monzonite. Surface mineralization in the form of quartz veins is abundant in this area. Another moderate geochemical anomaly (29S/11W) is associated with faulted contacts between blocks of Chainman shale and quartz monzonite. Small mine workings in this area are probably influencing factors on the high silver values. The high values at 27S/2E are associated with abundant surface mineralization in an area occupied by blocks of Keeler Canyon limestone, Chainman shale and skarn in fault contact. Anomalies in the general region of 10N/2W are associated with the Omega dump; so is the anomalous region trending northwesterly down canyon from this point. Several areas of substantially high silver values could not be explained by mining contamination or by any observable mineralization. One of these areas extends from 8N/1W to 8N/5W and others at 13N/7W and 17N/9W fall into this category.

There are five areas of unusually high gold values (Plate III). Only one area (8N/1E) cannot be explained by mine contamination nor surface evidence of mineralization. The high values at 22S/17W and 25S/15W are associated with the Ignacio workings.

The main Cerro Gordo mine dump is probably responsible for the anomaly at 2S/8E. The high region near 16N/3W, situated down hill from the Omega tunnel, is probably contaminated by the Omega workings.

SRD geochemical techniques have proved most effective in locating areas of mineral concentration as indicated by those anomalies that could be explained by previous mining effort. Several strong anomalies were discovered that are unexplainable by previous mining effort but which were not more intensively investigated due to lack of time. Other areas to the north and west have been geochemically sampled but the samples have not been processed by the lab due to the curtailment of the program. These soil samples have been retained and are available from NAA.

PETROLOGIC - GEOCHEMICAL CORRELATION

Introduction

Late in the program, suites of rock samples representing the major lithologies in the Cerro Gordo area were collected and subjected to assay by atomic absorption spectrophotometry (AAS) to determine lead, zinc, silver, copper, mercury and gold.

Areas to be sampled were chosen as to obtain maximum exposure of fresh outcrop, and several new roads offered excellent sites for sample collection. The samples were taken at 50 to 75 foot intervals, except on line M with 3 to 5 pounds of representative sample being taken at each point. All samples were thoroughly studied and identified, thin and polished sections being made when necessary. Samples were then crushed to minus 100 mesh for AAS analysis. The results are shown in Table 1.

Sample Preparation and Assay Techniques

Analyses for gold, mercury and copper were conducted on a Perkin-Elmer Model 303 atomic absorption spectrophotometer equipped with a double beam optical system and a DCR-1 direct readout unit. Analyses for silver, zinc and lead have not been completed. Samples were analyzed in an oxygen-acetylene flame. With the exception of the mercury lamp (an arc-discharge lamp), all source lamps were of the hollow cathode variety.

After sample preparation the samples were aspirated directly from the test tubes. The AAS unit was set for maximum sensitivity with the set concentration at 9999. Standards selected to cover possible concentration ranges for the elements in the samples were prepared from 1000 ppm stock solutions and deionized water. These standards were run before the first sample, after each 20 samples and after the last sample. The samples were read from the tubes, each sample reading being followed by a wash in deionized water and the reading of a blank consisting of distilled water and the acid used to dissolve the samples. Blank readings were adjusted to read from 100 to 200 and necessary adjustments were made after the reading of a blank. Gas flow, aspiration rate and energy level were kept constant throughout the readings. The readings for the standards were plotted against their concentrations giving working curves from which the sample readings were obtained.

Table 1. Analysis for Gold, Mercury and Copper

(Values given in parts per million)

Sample	Mercury	Gold	Copper	Rock Type
M-1	95	.13	72	Monzonite
M-2	140	.15	--	Monzonite
M-3	81	.10	90	Monzonite
M-4	80	.10	62	Monzonite
M-5	100	.15	265	Monzonite
M-6	53	.10	107	Monzonite
M-7	43	.02	325	Fault Gouge
M-8	125	.27	0	Fault Gouge
M-9	145	.22	82	Fault Gouge
M-10	73	.07	60	Fault Gouge
M-11	45	.12	122	Chlorite
M-12	65	.22	5	Chlorite
M-15	40	.12	270	Shale
N-1	260	.32	16	Limestone
N-2	305	.33	60	Limestone
N-3	516	.37	7	Limestone
N-4	235	.20	15	Limestone
N-5	315	.30	20	Limestone
N-6	219	.32	0	Limestone
O-1	130	.12	0	Shale
O-2	95	.15	5	Shale
O-3	120	.05	26	Shale
O-4	280	.13	60	Shale

Table 1 (Cont).

Sample	Mercury	Gold	Copper	Rock Type
O-5A	177	--	10	Shale
O-5B	125	.15	30	Shale
O-6	99	.07	132	Shale
P-1	30	.05	41	Monzonite
P-2	28	.10	25	Monzonite
P-3	3	.02	17	Monzonite
P-4	10	0	17	Monzonite
P-5	7	0	57	Monzonite
P-6	17	0	0	Shale
P-7A	2	0	0	Shale
P-7B	10	0	0	Quartz Vein
P-8	7	0	60	Shale
P-9A	131	.2	191	Monzonite
P-9B	92	.12	535	Shale
P-9C	230	.2	32	Granite
P-10	85	.12	400	Monzonite
P-11A	135	.27	538	Shale
P-11B	92	.07	177	Lime
P-11C	51	.12	480	Skarn
P-12	165	.25	21	Skarn
P-13	200	.22	15	Skarn
P-14A	378	.40	25	Limestone
P-14B	92	.10	13	Shale
P-15	479	.15	20	Limestone

Lithologies

Line M (Figure 12)

Line M runs east to west across a north-south trending fault which brings a quartz monzonite porphyry into contact with the upper portion of the Chainman shale. The monzonite is gray-green in color with large k-feldspar phenocrysts in a medium grained ground mass dotted with black amphibole crystals; the monzonite becomes phyllitic and highly sericitized near the fault. The fault itself is nearly vertical, with a zone of hydrothermal alteration some 30 feet wide. This zone is heavily mineralized with argentiferous galena, friebergite, sphalerite, chalcopyrite and secondary lead zinc and copper minerals in a leached siliceous matrix. On the west side of the fault, interbedded shales and limestones of the Chainman have been highly chloritized and skarnified with the development of grossularite epidote and other calc-silicates in the carbonate layers. Samples were taken at 10 foot intervals to 100 feet on either side of the fault.

Lines N and O (Figure 13)

Lines N and O run northeast to southwest along a new road exposing the Chainman shale — Keeler Canyon Formation contact. Line N covers some 600 feet of the lower Keeler Canyon carbonates; Line O covers an approximately equal amount of the upper portion of the Chainman shale. The Keeler Canyon at this locality consists of massive, medium grained gray marbles grading downwards into more thinly bedded, dark gray, flaggy limes and interbedded black pyritic shales. The "golf ball bed" described by Merriam was observed and sampled. Irregular bodies and lenses of coarse crystalline calcite are numerous, and in places the limes are quite pyritic. No signs of primary mineralization were found.

The Chainman shale exposed along the sample line is a maroon to greenish thinly bedded fissile shale with interbeds of deep gray to black fine grained limes. The shale is silicified in part, and often cut by small irregular stringers of quartz. The contact between the Keeler Canyon and Chainman shale is a gradational sedimentary contact at this locality.

Line P (Figure 14)

Line P extends east to west along a ridge with excellent exposures of monzonite, shale and limestone. The easternmost mass of monzonite is extremely leached and altered to a fine grained brown sercitic material. The contact of the monzonite with the chainman shales to the west is marked by extensive chloritization of the shale with minor development of epidote and magnetite. Numerous quartz stringers and small bodies of quartzo-feldspathic material dot the contact and some secondary copper staining may be seen. The Keeler Canyon - Chainman shale contact is marked by the presence of thinly bedded black pyritic shales and interbedded fine grained black limes. The more massive limes in the lower part of the Keeler Canyon have been extensively skarnified with development of skarn beds from three inches to several feet in width parallel to the bedding in the sediments. The garnet is a greenish to yellow brown grossularite which may be massive or in clusters of euhedral crystals. The interstices between euhedral garnets may be filled with copper sulfides - bornite, covellite digenite and chalcopyrite being identified. Native bismuth, tetrahedrite and pyrite are occasionally present. The more euhedral grossularite crystals often show a strong zonation. Magnetite, vesuvianite, epidote and large masses of coarsely recrystallized carbonates may also be present in the skarn.

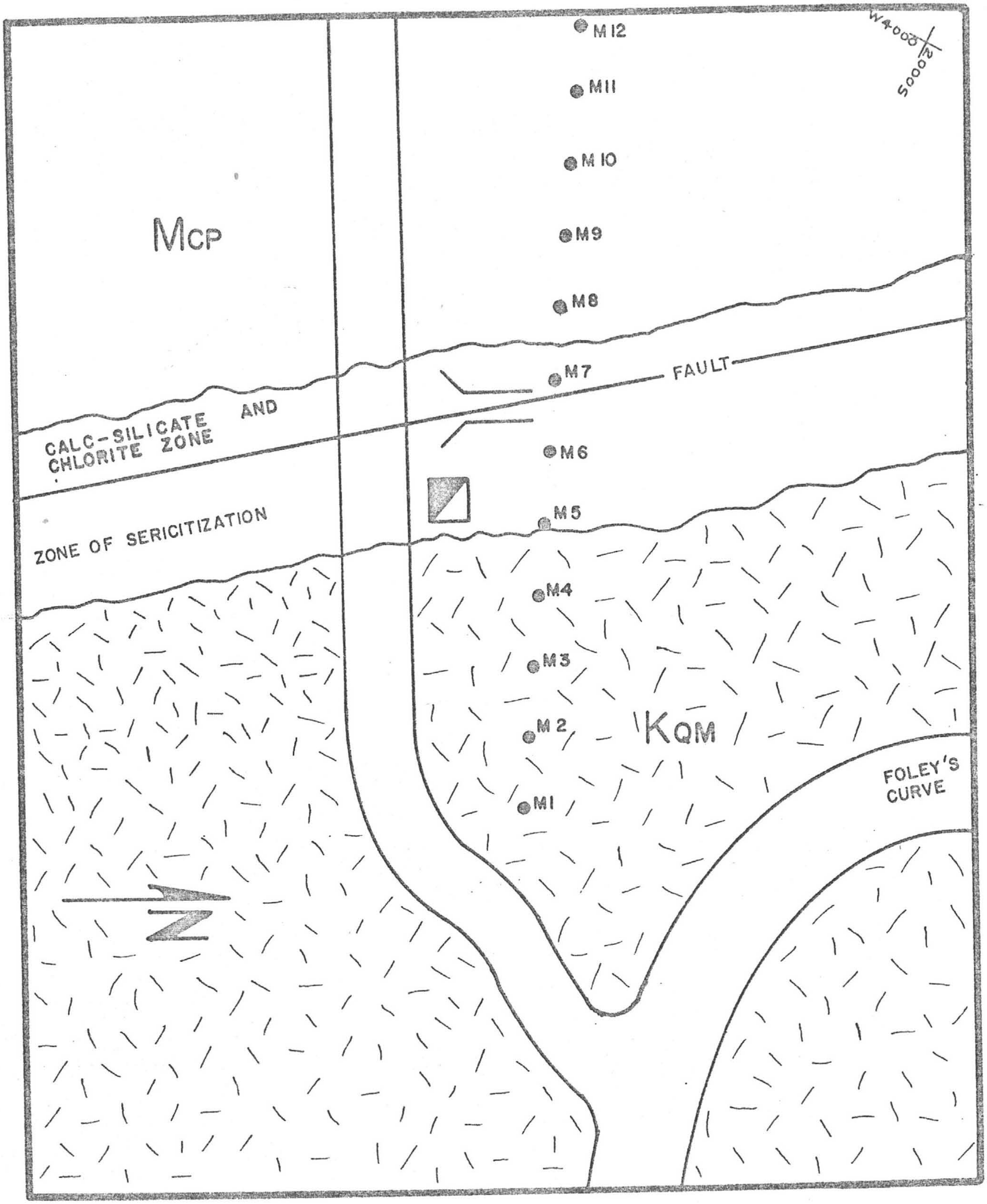


Figure 12. Locations of Samples "M"

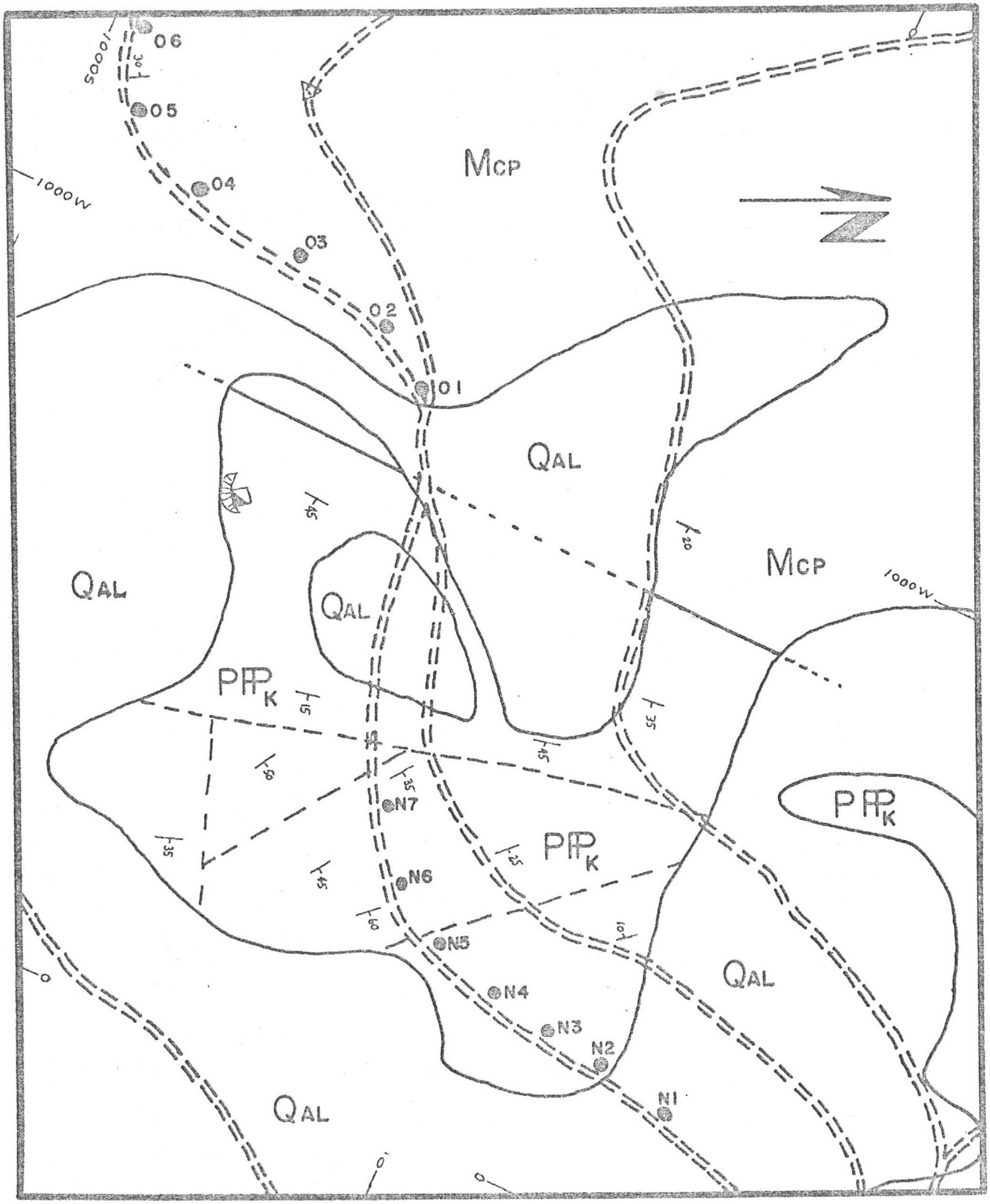


Figure 13. Locations of Samples "N" and "O"

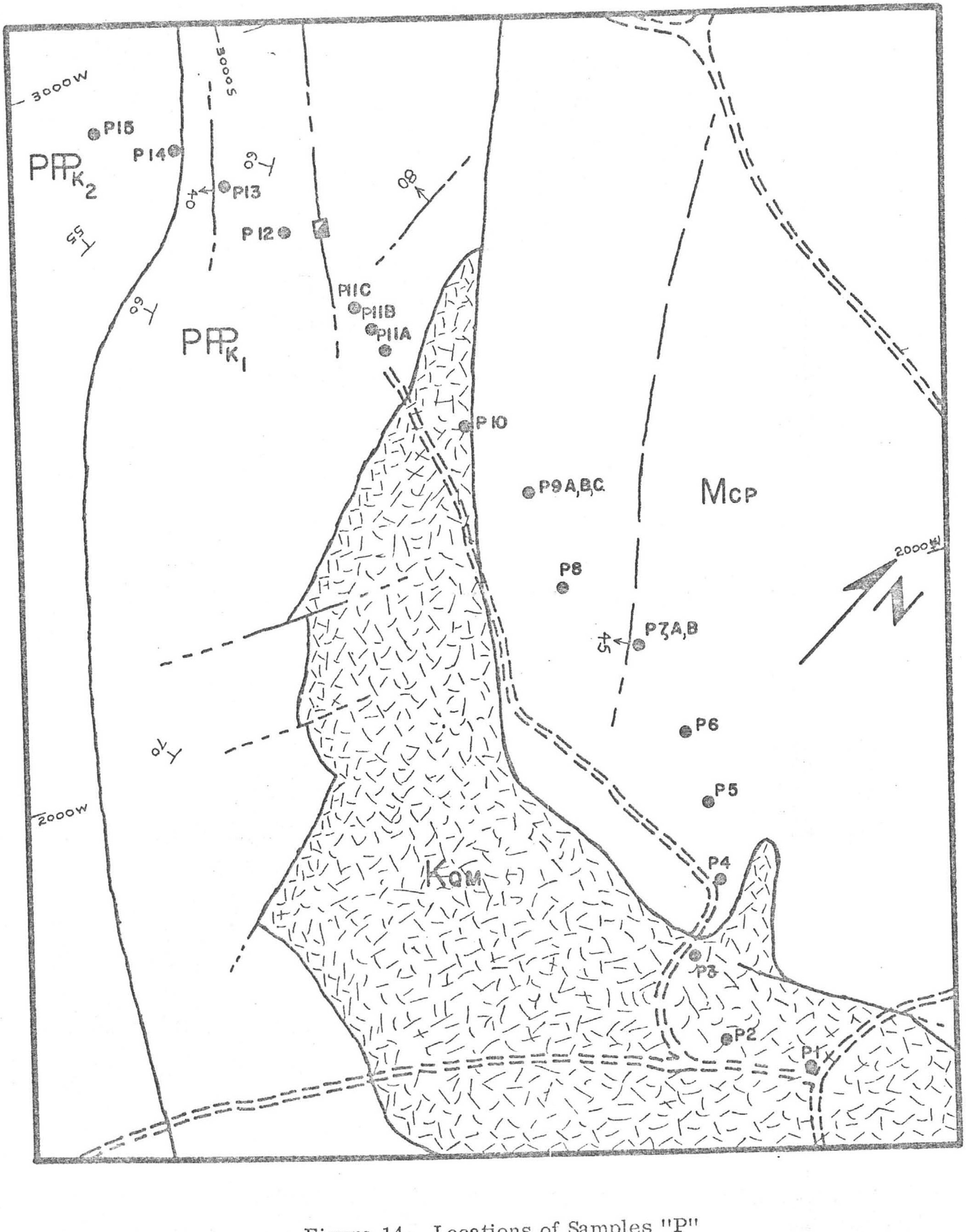


Figure 14. Locations of Samples "P"

Results

Thin section studies have not been completed, but from the present data it appears that mercury at Cerro Gordo has formed a diffusion halo, being concentrated both lithologically and structurally. SRD studies indicate mercury to be an excellent indicator of gold. A strong correlation between gold and mercury values exists, particularly in limestones. This is well shown in Figure 15. Mercury shows little or no correlation with copper. Mercury and gold have concentrated primarily in limes and skarn; copper essentially in skarn. The shales and monzonite are relatively poor in all three metals.

GEOPHYSICAL SURVEYS

Magnetometer

An ELSEC Proton Precession Magnetometer, capable of accuracy to within 2 gammas, was used by SRD in the Cerro Gordo area. A crew of two men was needed to operate the magnetometer; one to carry the remote s sensing head and the other to carry the body of the instrument and record the readings. The grid system surveyed by SRD was used as a base for the magnetometer surveys. A 300-foot spacing was used for general reconnaissance surveys while a 50-foot spacing wax used for detailed work. Based on geochemical anomalies, a magnetometer survey using the detailed spacing was run over an area approximately one-half mile southwest of the Cerro Gordo townsite. The resulting data were contoured (Plate V). Anomalies in the 100 gamma range are apparent; one centered at 33S/18W and another centered at 28S/1W. Each of these areas was strongly altered to skarn.

Induced Polarization

The variable-frequency induced polarization method used by SRD is basically a measurement of the resistance of the ground at two different frequencies. Small differences typically on the order of 5 to 20 percent in ground resistance are indicative of the presence of electronic conductors. These conductors include metallic sulfides and graphite.

The three factors measured with this method are apparent resistivity, frequency effect, and the metal conduction factor. The resistivity is expressed in ohm-meters and is a measure of the resistance to the current flow. This can be computed from the voltage appearing at the receiving electrodes due to a current injected into the ground at the sending electrodes. The frequency effect is the change in voltage appearing at the receiving electrodes due to a change in the sending frequency (the current remains constant). The metal conduction factor is calculated as follows: MCF = Frequency Effect x 10^3/Resistivity^2. It has a wide range of values, typically from 0 to 10 up to 10,000 and the significance of any metal factor value has to be judged in the light of the background values and the patterns established.

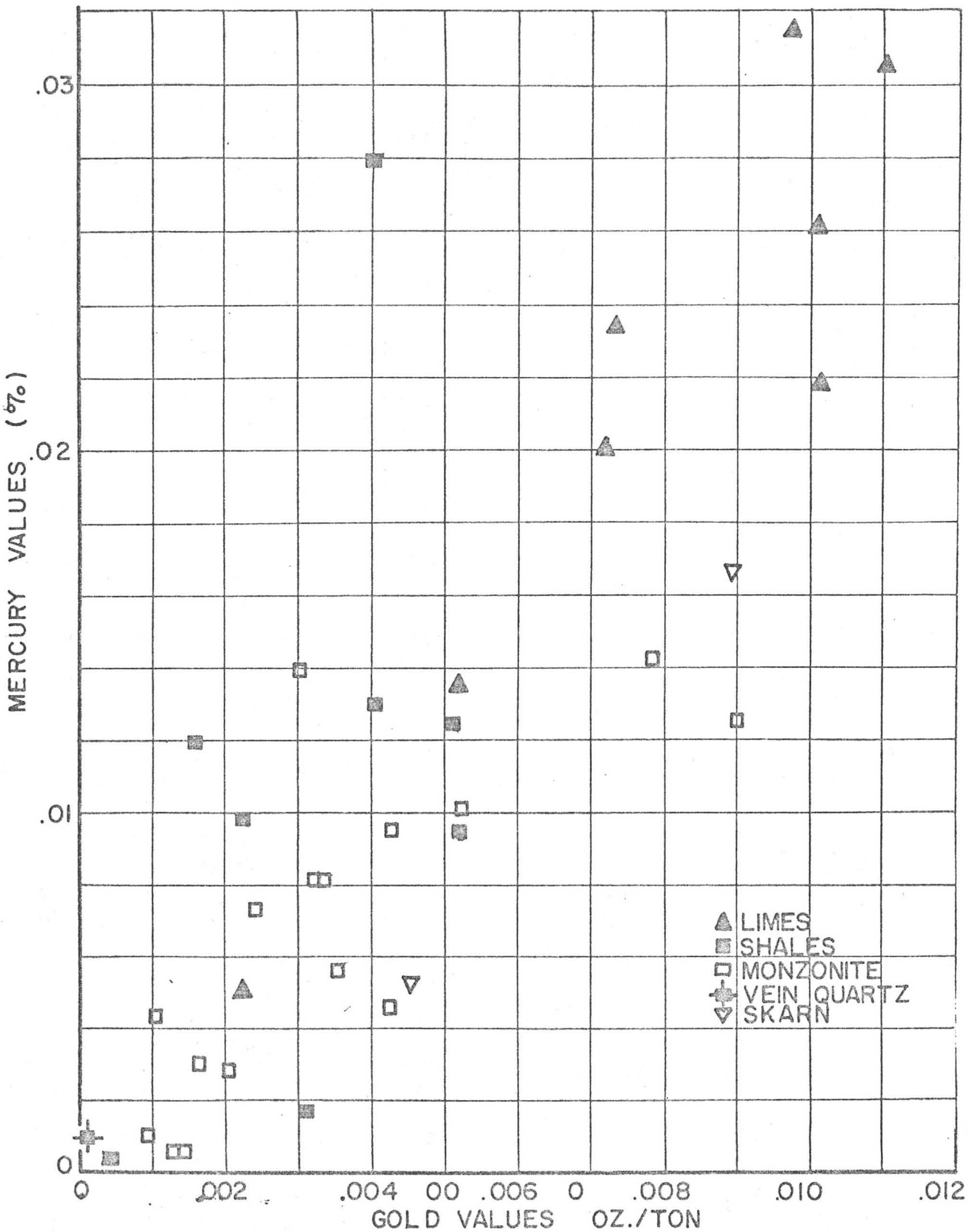


Figure 15. Gold-Mercury Values

Several traverses were made over geochemically anomalous areas. These traverses followed the grid used for geochemical sampling and the locations are recorded on the base map. (Plate I). The results are shown in Figures 16 through 31.

The dipole-dipole electrode array was used for all surveys with electrode spacing varying from 50 feet to 400 feet. Initially, frequencies of 5 and 0.05 cycles per second were used on surveys CG-1, CG-2 and CG-3 (Figures 16, 17, and 18). However, it became necessary to use 3 and 0.3 cycles per second due to considerable ground noise in the area.

Surveys CG-11 and CG-13 (Figures 29 and 30) both show anomalous areas at 2.5 west. These traverses are separated by 450 feet, but show an area of interest at the same coordinate. This indicates a sizable deposit if the source of the anomaly is economic mineralization. No drilling was performed in this area to investigate the recorded anomaly.

DRILLING

A surface drilling program was undertaken in an attempt to ascertain the source of anomalous values observed on the geochemical survey. The initial drilling was intended to sample only the relatively near surface material immediately underlying the geochemical anomalies. It was felt that by using an air-track drill, a large number of holes could be drilled at a reasonable expense to investigate the rather extensive mineralized zone of the Keeler Canyon formation as outlined by geochemistry and geologic mapping. To accomplish this, a Joy five and one quarter-inch air-track drill with a 900 cfm compressor was obtained. A sample was collected for every 10 feet of depth with the aid of a homemade cyclone collector and a sample splitter. A total of 95 holes varying in depth from 10 to 70 feet and totaling 3700 feet were drilled with this equipment. The locations of these holes are shown on Plate I.

The samples were assayed for gold, silver and mercury by the Eisenhauer Laboratories with the exception of the samples from the last fifteen holes which were analyzed in the SRD laboratory with the AAS equipment. From the results of these assays the values observed in many of the holes were high enough to encourage speculation as to the possibility of more intense mineralization at depth. Also, this amount of mineralization was found to be present in various areas containing a Keeler Canyon-Chainman shale contact and some intrusive activity.

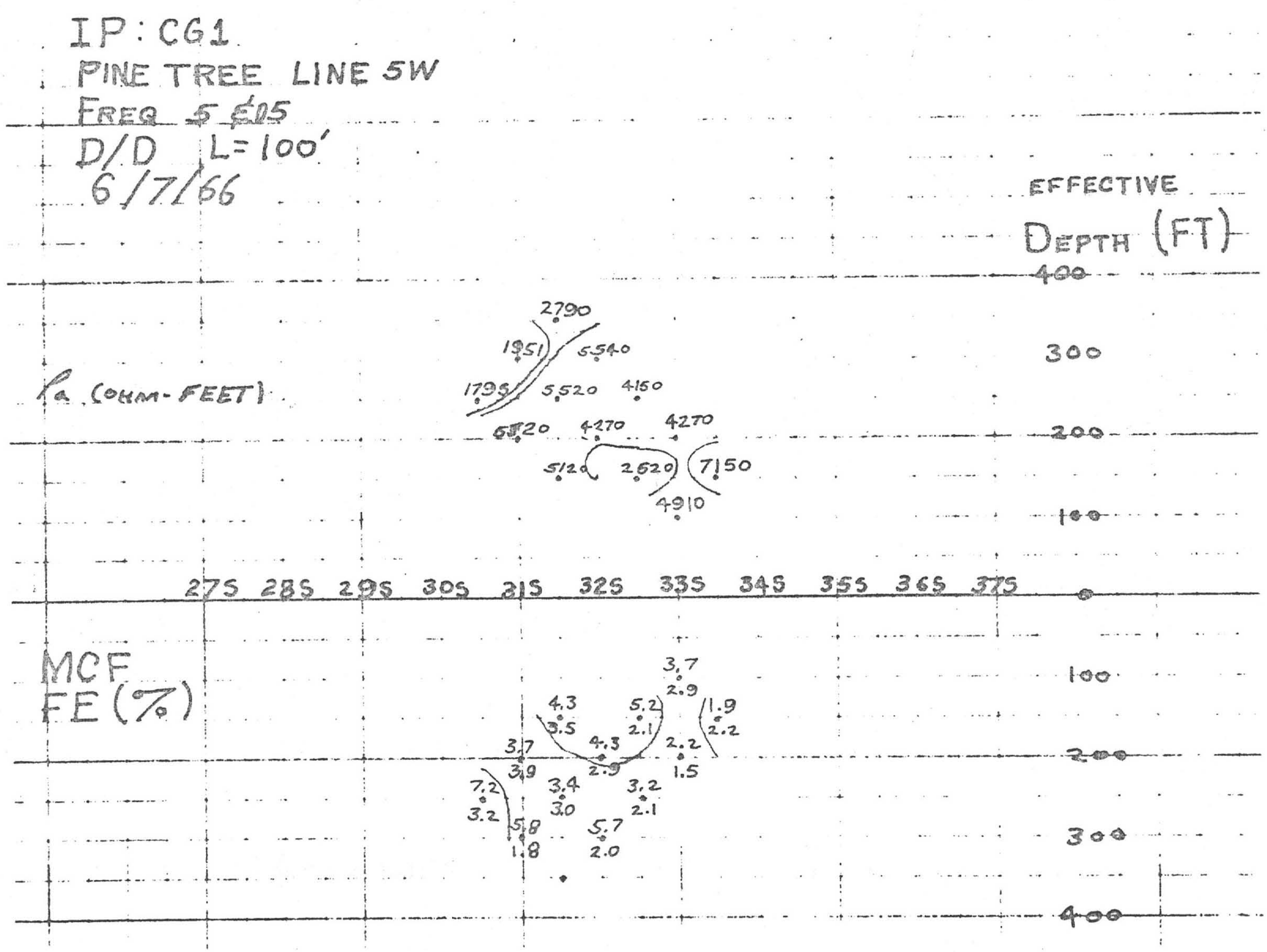


Figure 16. Induced Polarization Survey Results

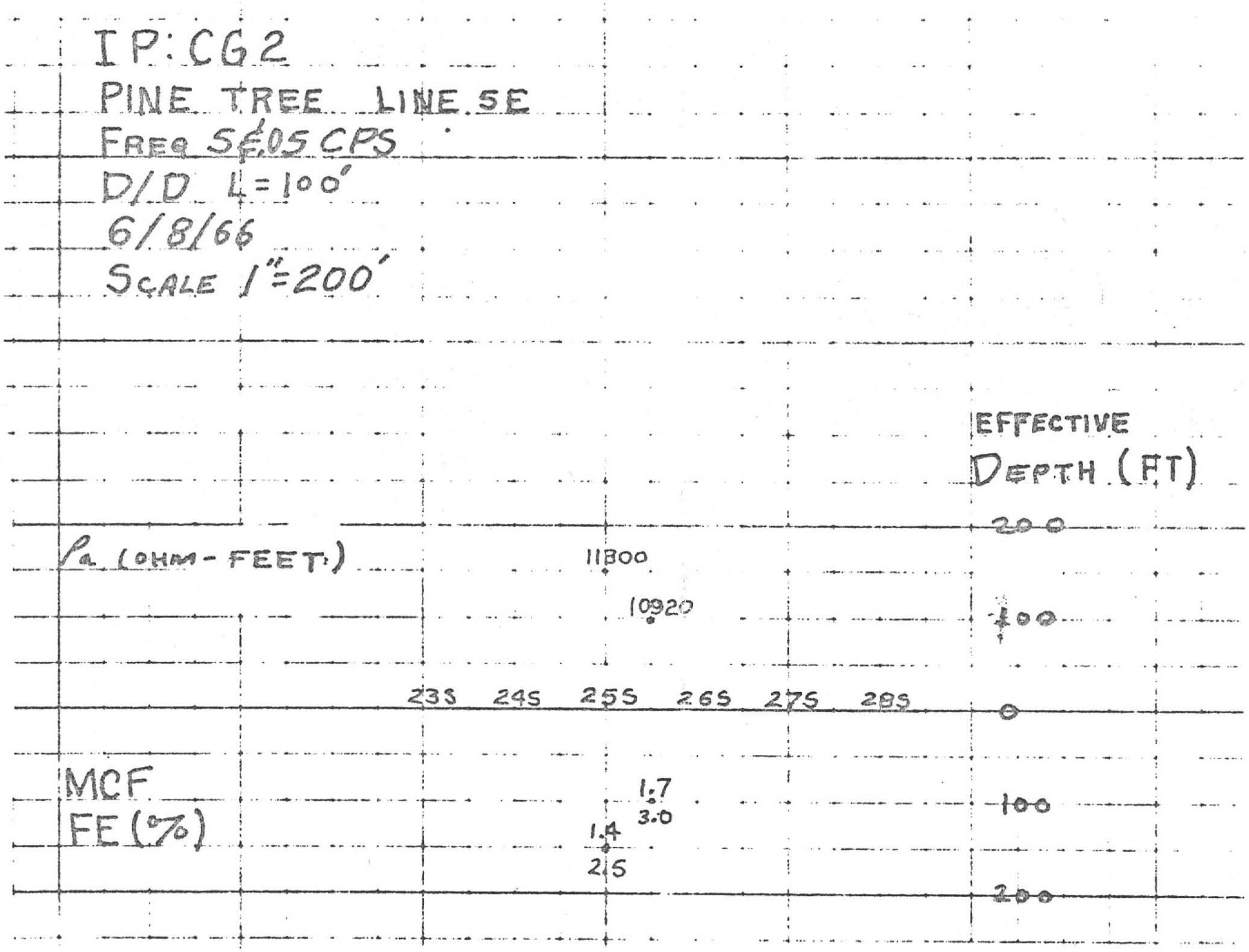


Figure 17. Induced Polarization Survey Results

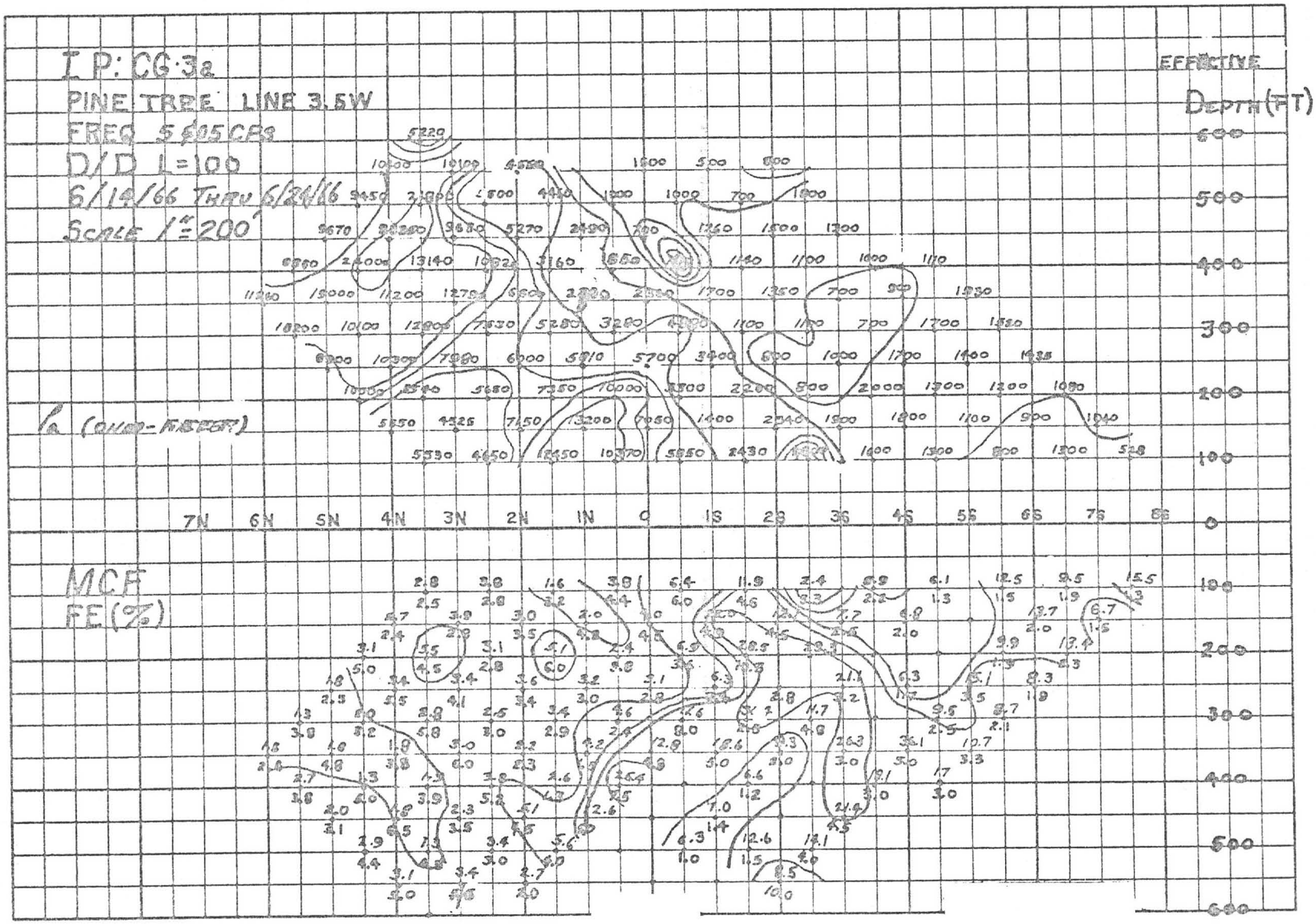


Figure 18. Induced Polarization Survey Results

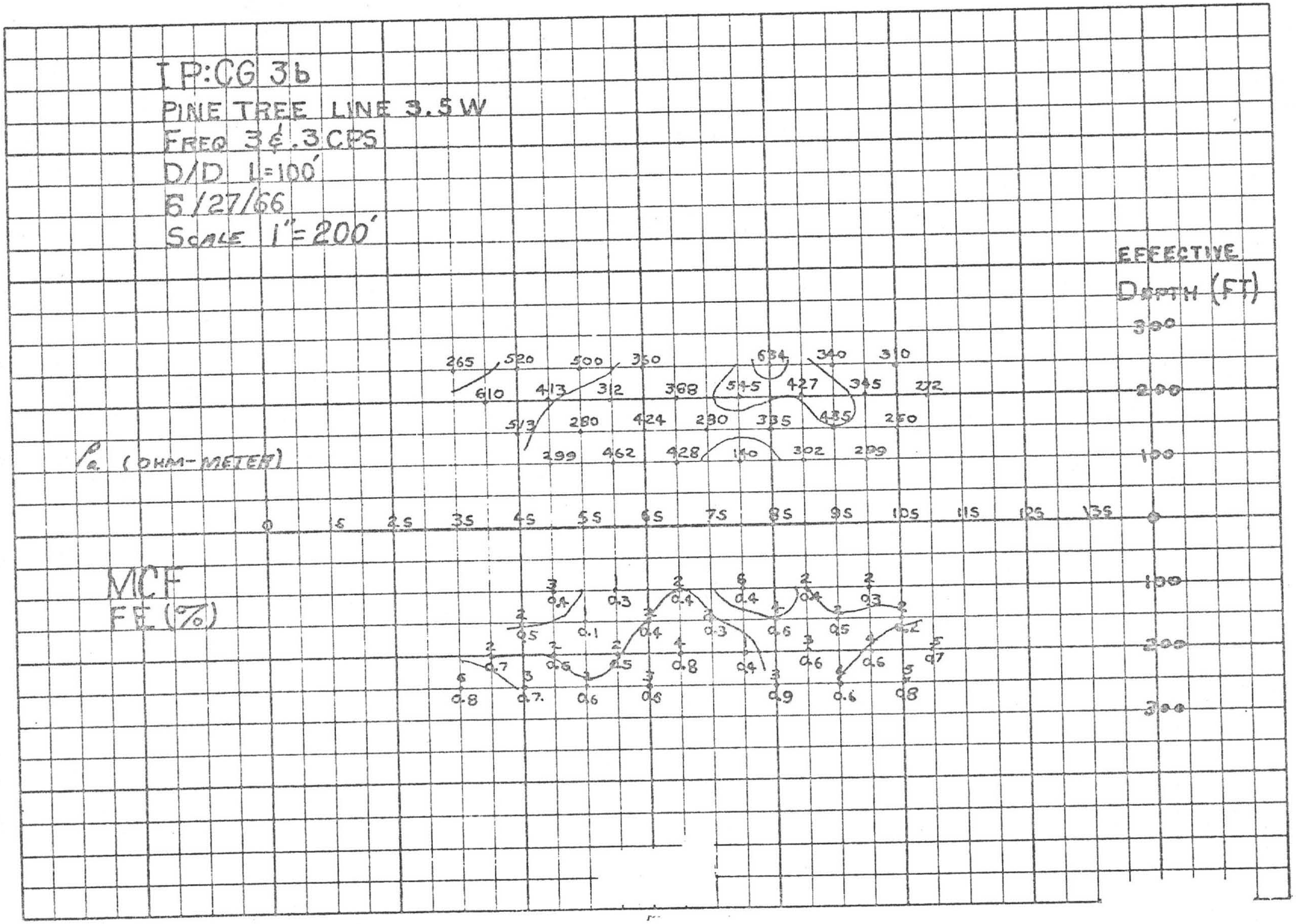


Figure 19. Induced Polarization Survey Results

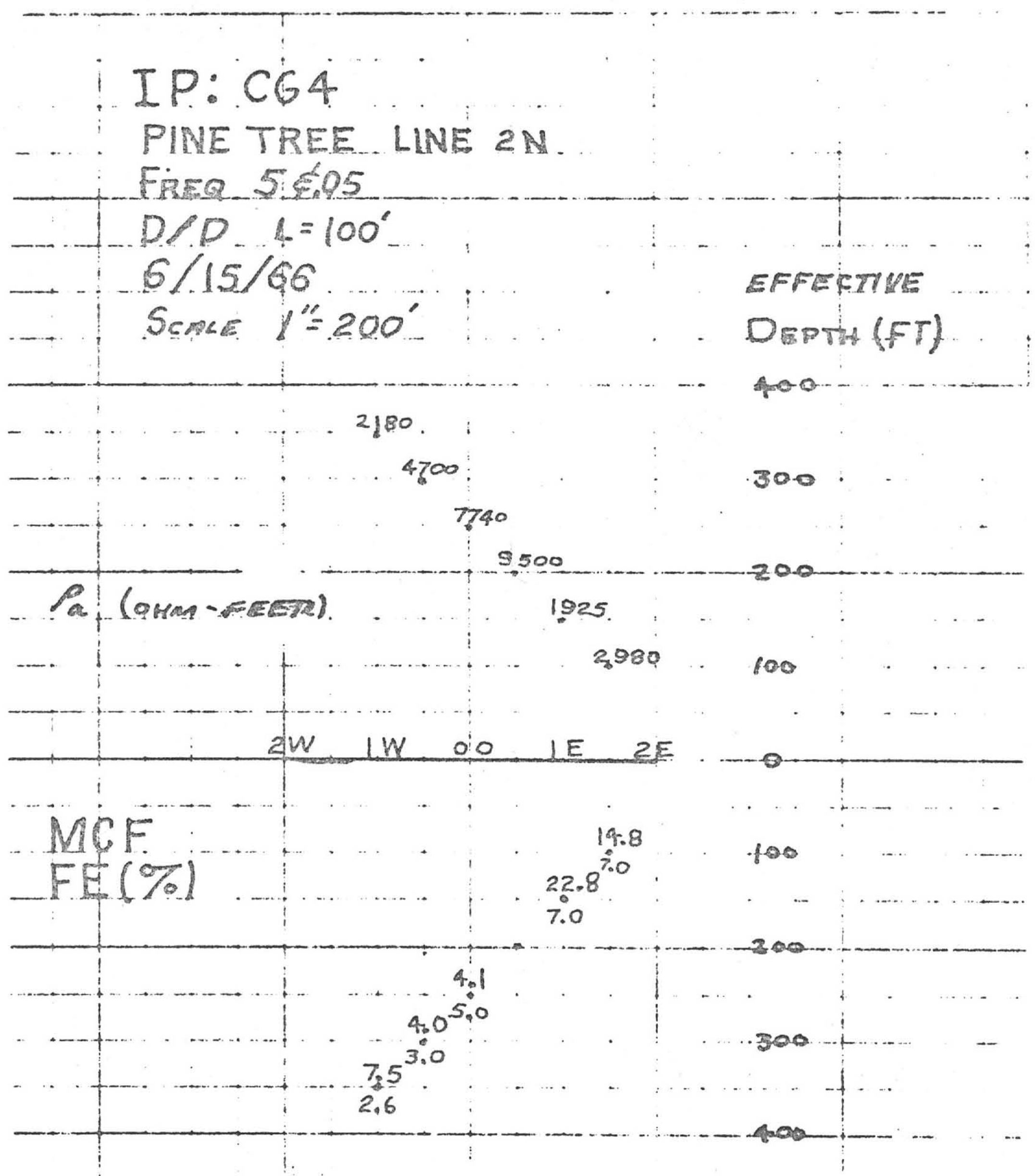


Figure 20. Induced Polarization Survey Results

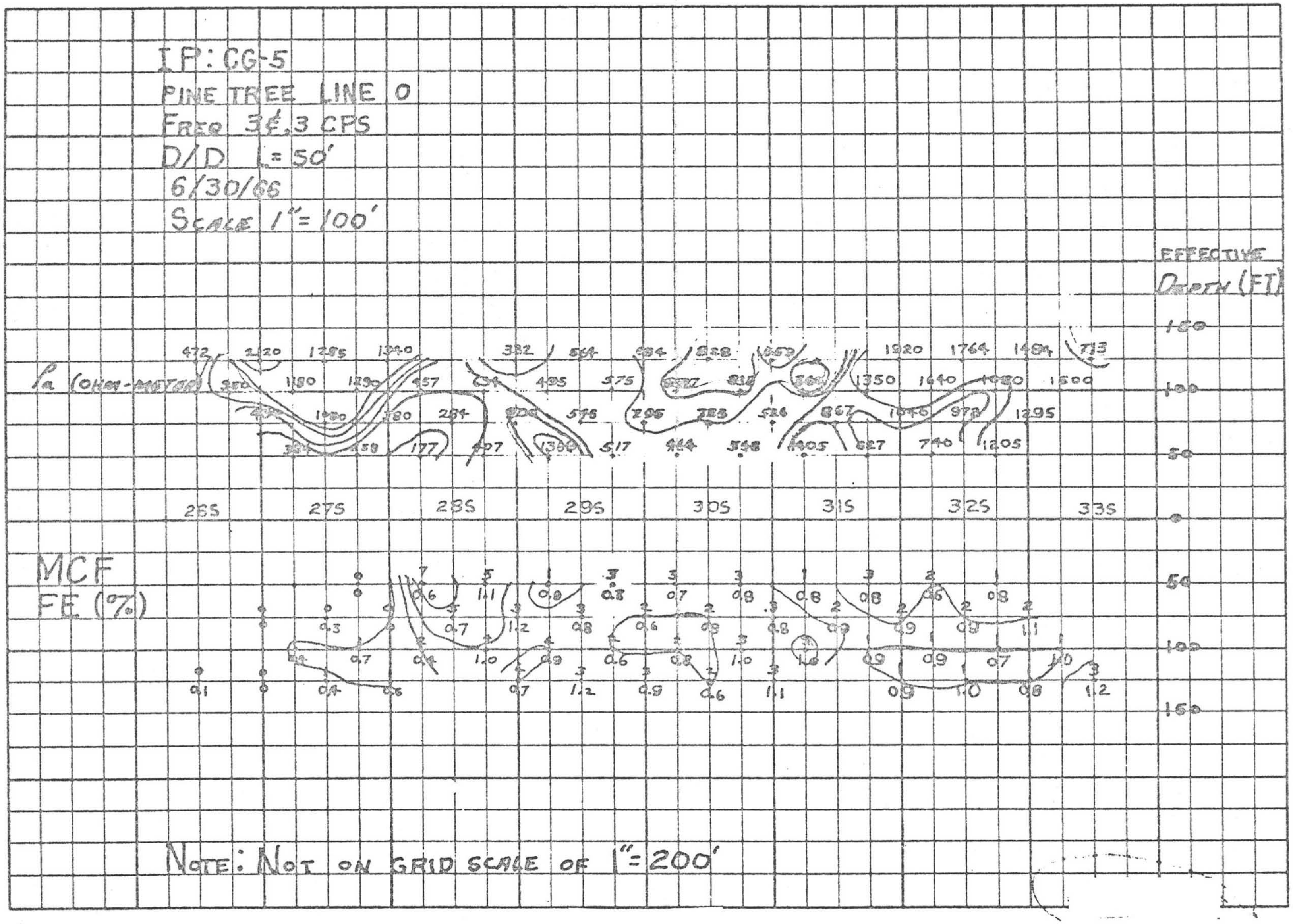


Figure 21. Induced Polarization Survey Results

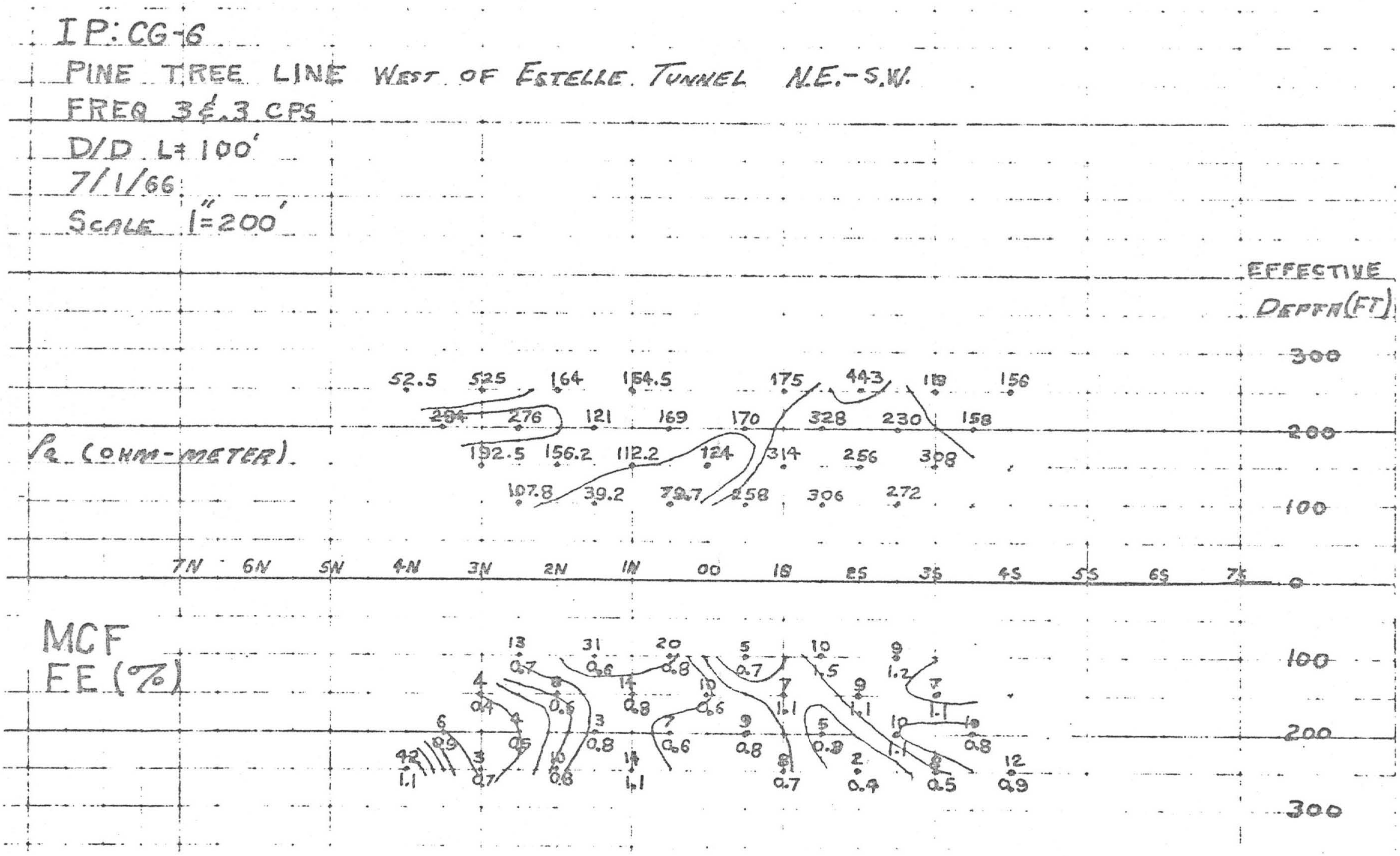


Figure 22. Induced Polarization Survey Results

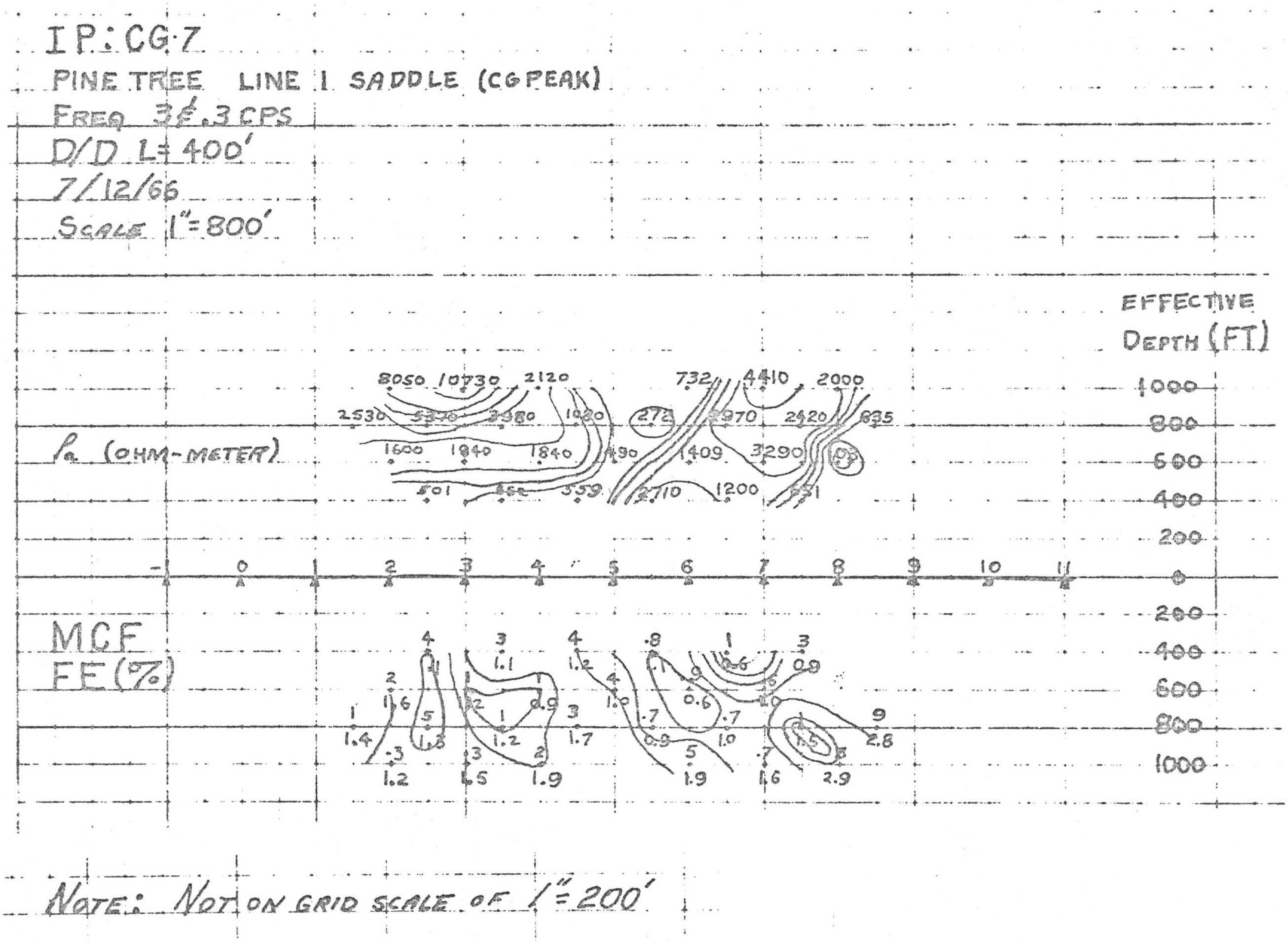


Figure 23. Induced Polarization Survey Results

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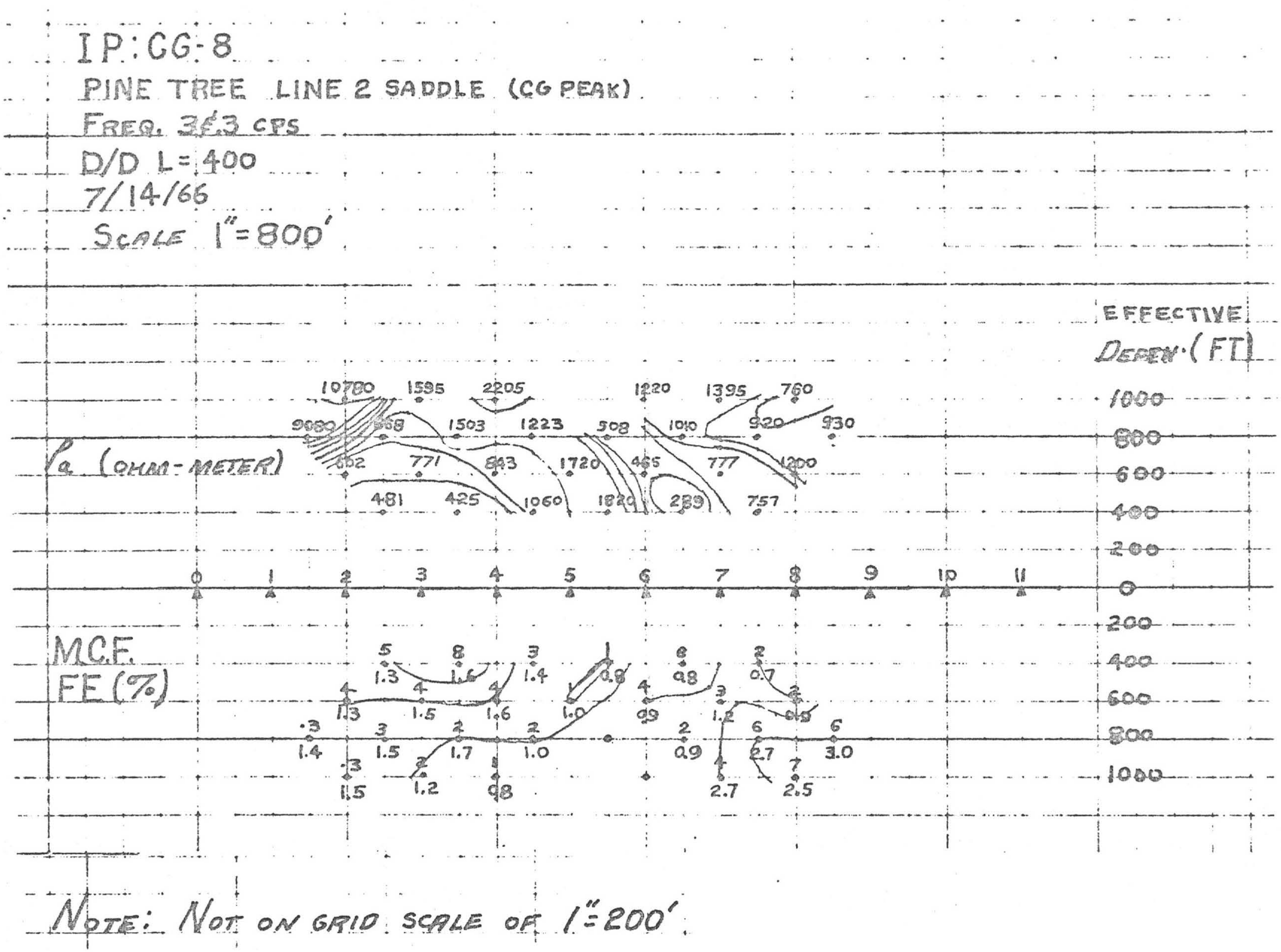

Figure 24. Induced Polarization Survey Results

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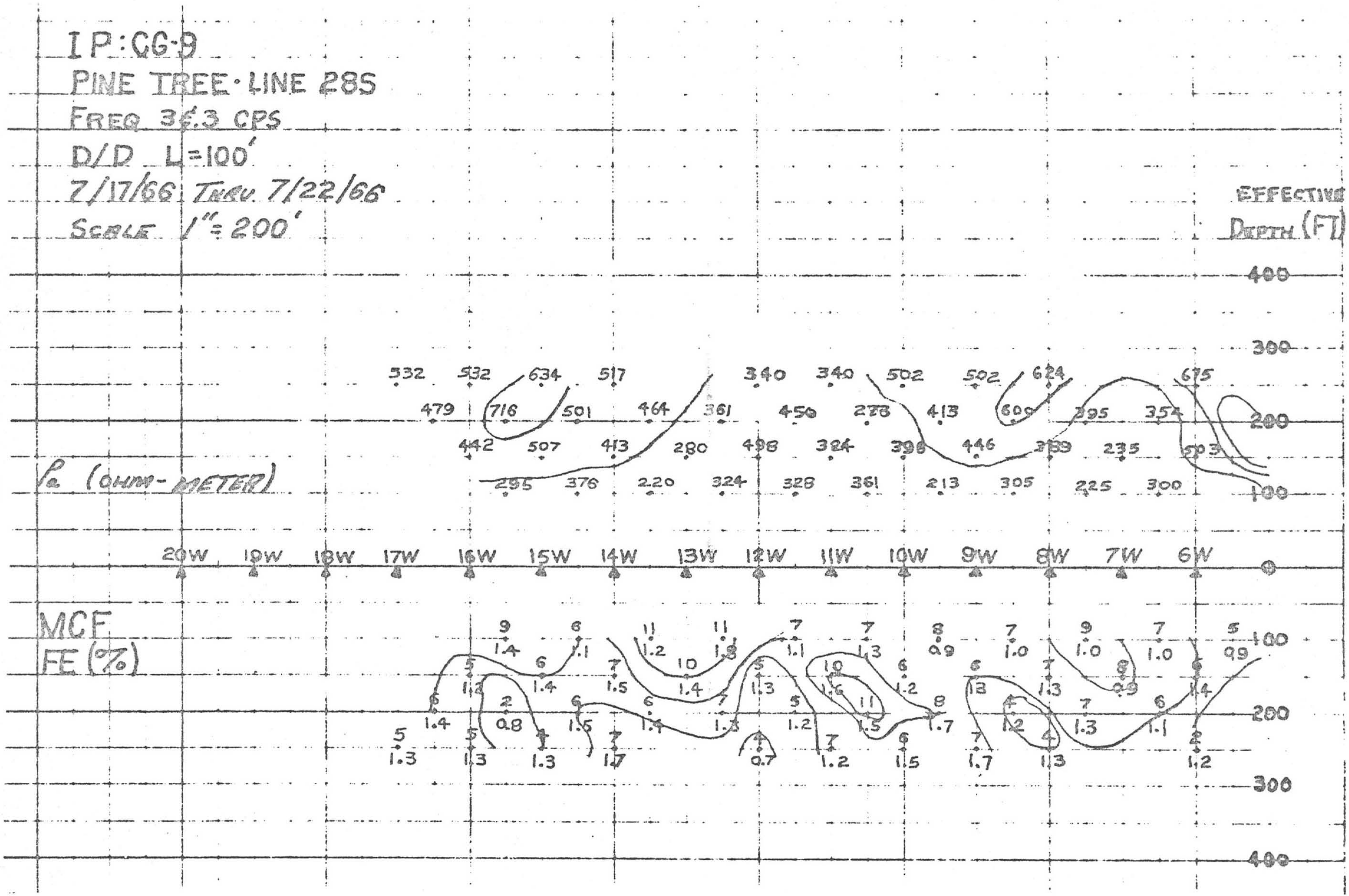


Figure 25. Induced Polarization Survey Results

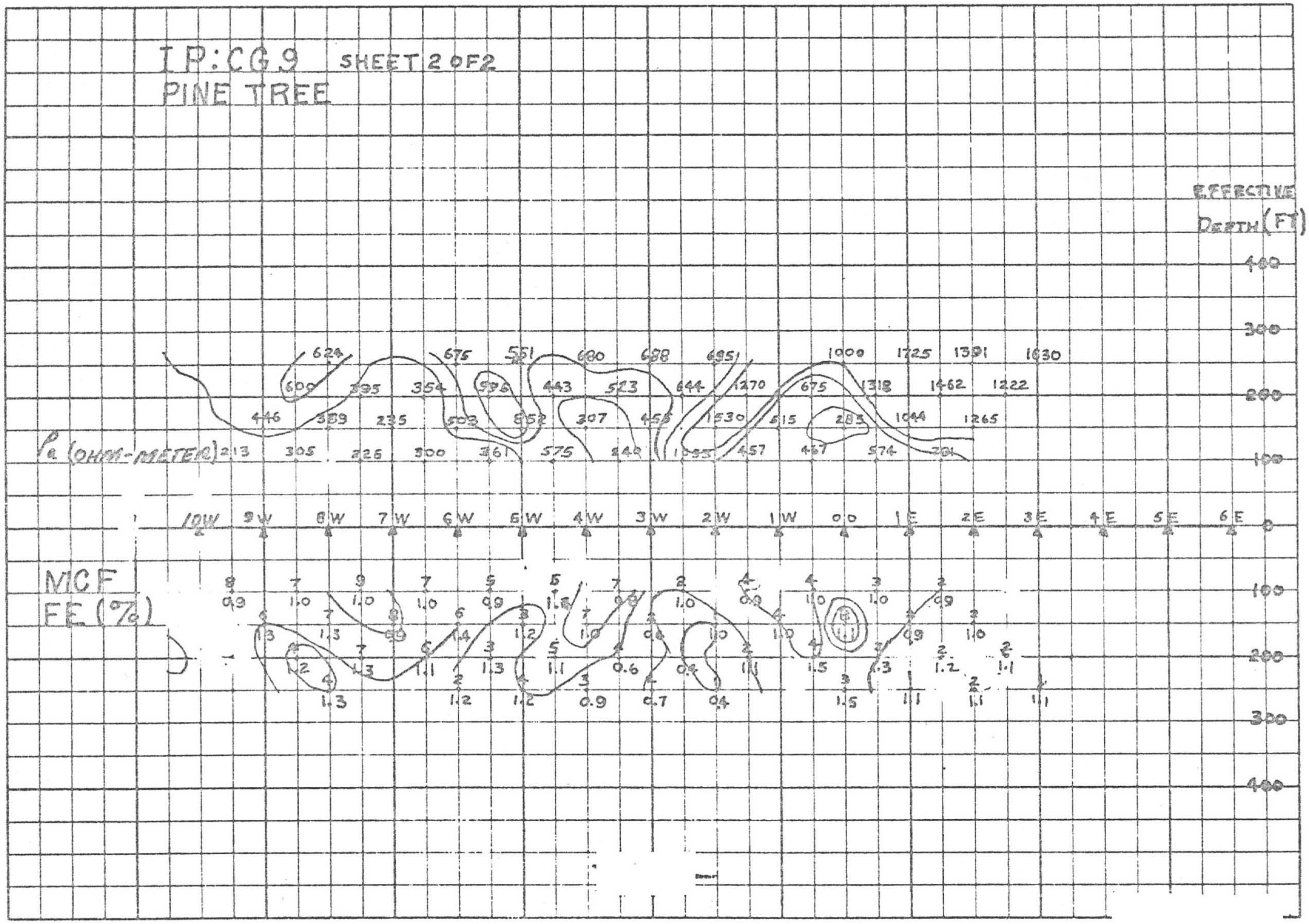


Figure 26. Induced Polarization Survey Results

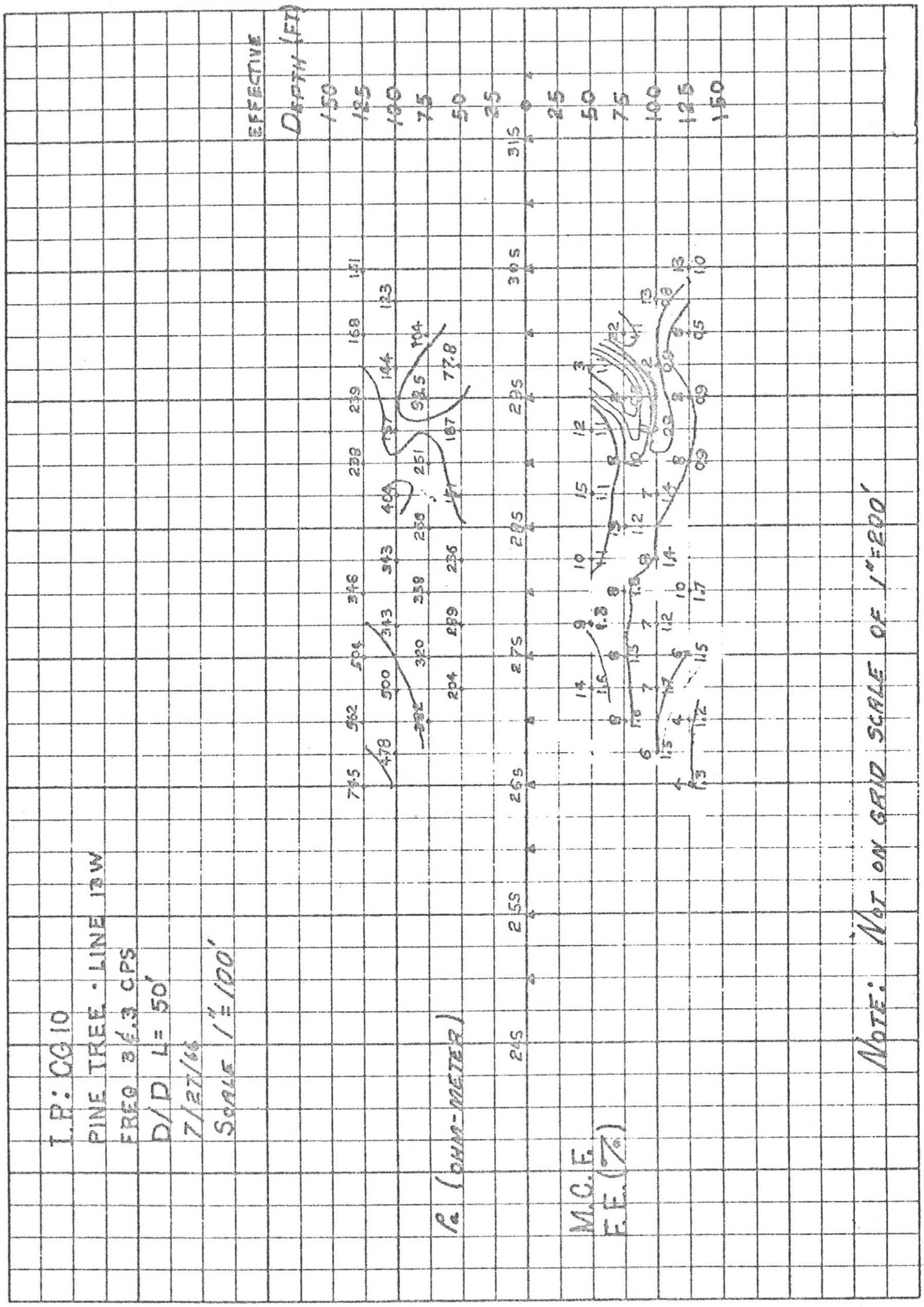


Figure 27. Induced Polarization Survey Results

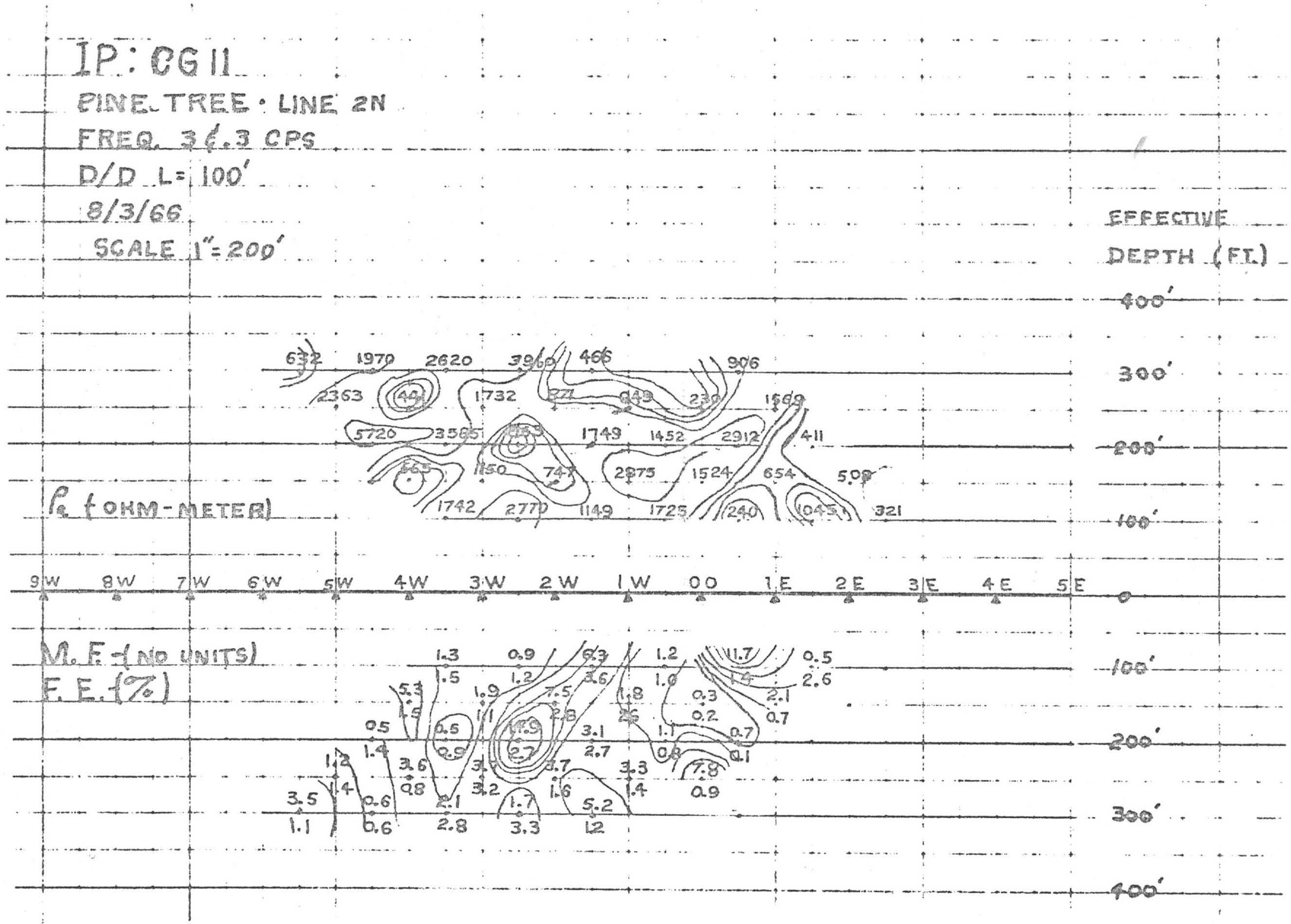


Figure 28. Induced Polarization Survey Results

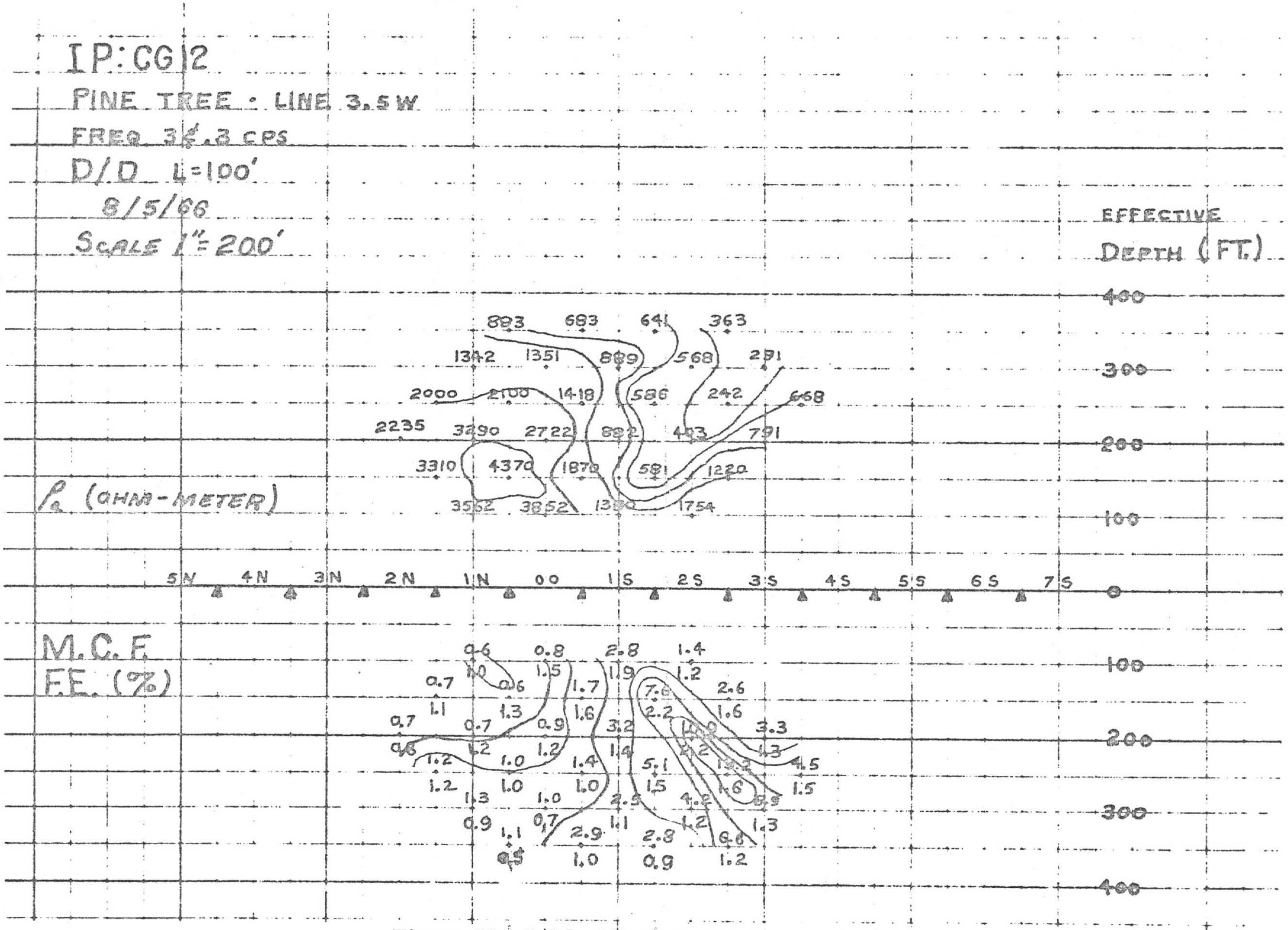


Figure 29. Induced Polarization Survey Results

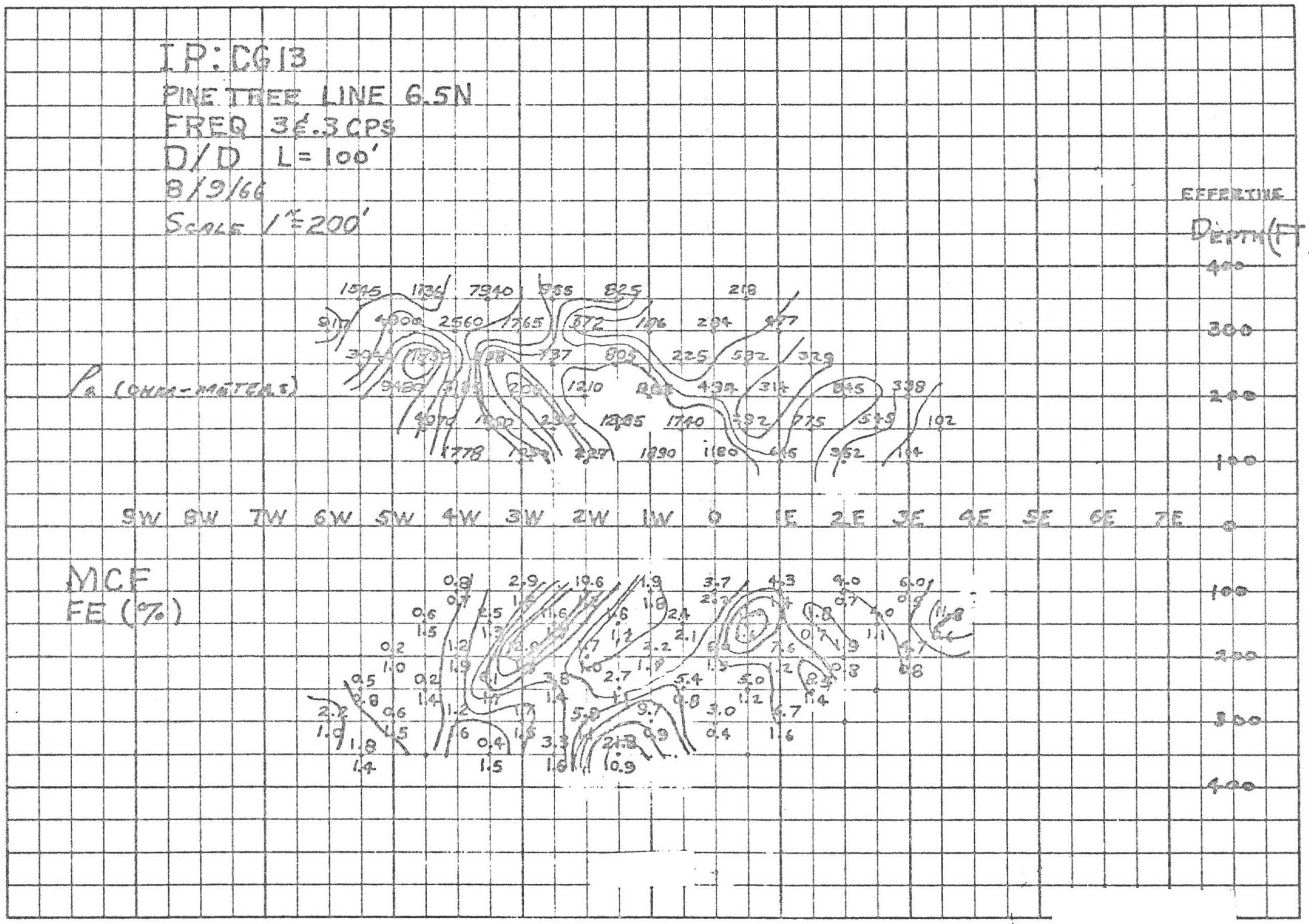


Figure 30. Induced Polarization Survey Results

COMPANY OFFICIAL
(Not to be disclosed to unauthorized persons)
T6-2906/020

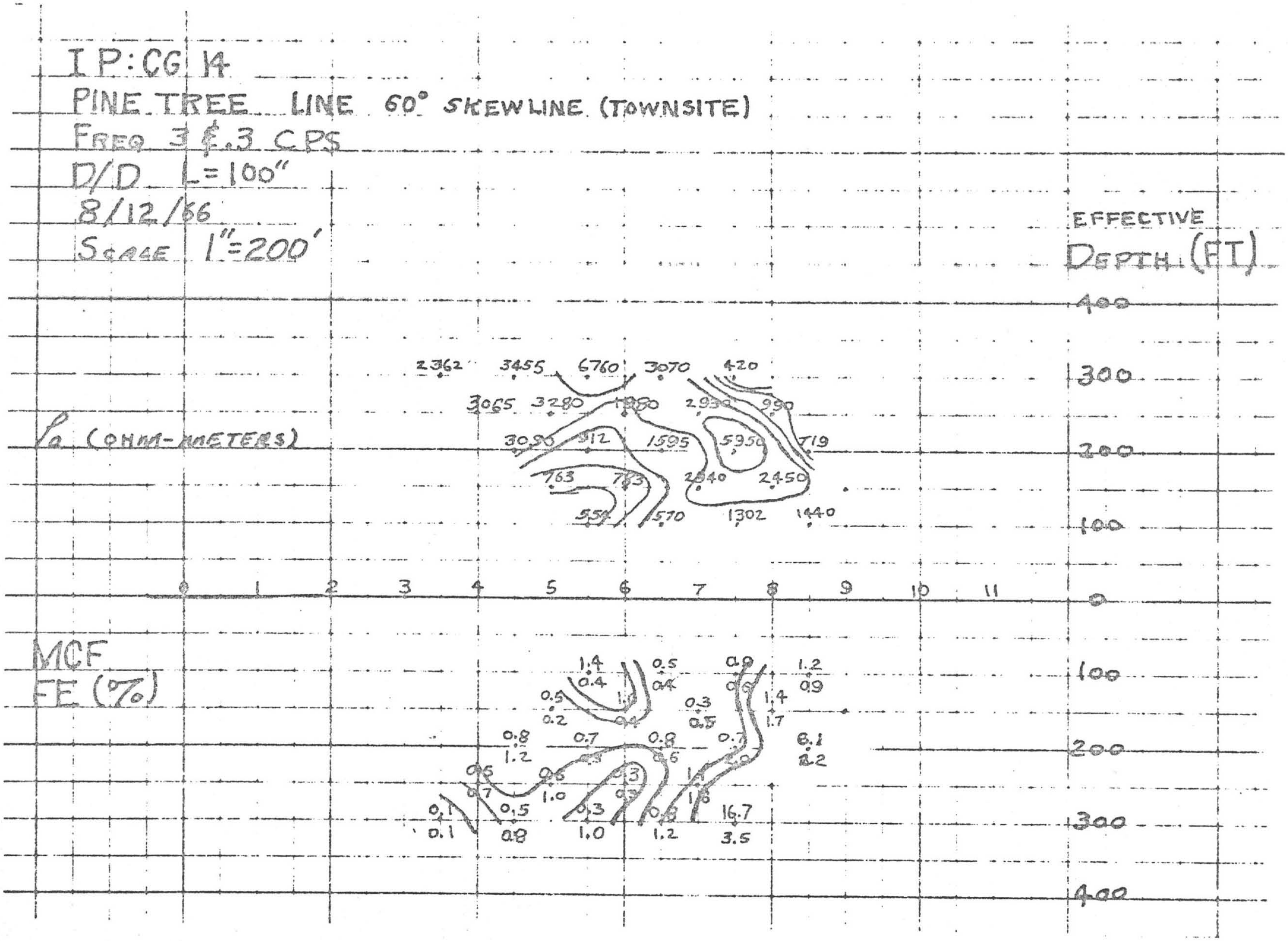


Figure 31. Induced Polarization Survey Results

SUBSURFACE (See Figures 32 through 41)

MINE REHABILITATION

Based on encouraging surface indications and in order to investigate the property as completely as possible, it was decided to gain entry to the main Cerro Gordo workings. No development work was done on outlying smaller mines.

The Belshaw Shaft is a 900-foot deep vertical opening. The cross section dimension is approximately 4 feet by 8 feet including a 4 by 5 cageway and 2 by 4 manway with ladder. All of the necessary hoisting equipment was in place; only a power source was required. A diesel generator was rented for the electric hoist motor requiring 440 volts. A 100 KW generator would hoist men, but would be overloaded when hoisting mine material from the lower levels. A 200 KW generator brought in later supplied sufficient power for all hoisting as well as for operation of a stationary Ingersoll Rand piston compressor. The 3/4-inch wire hoist rope is in reasonably good condition; no shrinkage or stretch was observed during all usage.

Five of the six main levels were open at the shaft. The 200 level was caved and dangerous to pass. The 200 level also opens to the surface at the Omega Tunnel, however, another cave 300 feet from the shaft prohibited entry to ascertain the extent of the caving at the shaft. Therefore, the 200 level was timbered off at the shaft and most of that level was not investigated. The restricted portal of the Omega Tunnel has been mucked out to provide an auxiliary exit.

Two caved areas just north of the shaft, one on each of the 700 and 900 levels, were opened to permit investigation of fairly extensive workings, and to complete the auxiliary exit system from the 900 level. All ladders have been left in place and signs have been placed at appropriate locations in the exit system. Numerous sublevels can be reached from this auxiliary exit and many others can be reached with portable ladders.

Some additional exploration tunneling had been done since the existing maps were completed, probably during World War II. These workings have been defined by tape and compass traverse and added to the existing maps. Impassable caves have also been indicated.

To supply water requirements at the field office, the piston pump on the 700 level was activated. The pump produced about 250 gallons per day when pumped about every other day.

UNDERGROUND CHIP SAMPLING

The objective of the chip sampling was to determine whether and to what extent vein mineralization permeated the country rock. All accessible workings in the immediate Cerro Gordo Mining District were investigated. Sample locations within the Cerro Gordo Mine are shown on individual level maps and samples taken in outlying workings are shown on the topographic map designated Plate I. Individual tunnels were numbered; veins in those tunnels were lettered; and samples for that vein or structure were numbered. Thus, an individual sample may be designated 19 B 3.

COMPANY OFFICIAL

(Not to be disclosed to unauthorized persons)

T6-2906/020

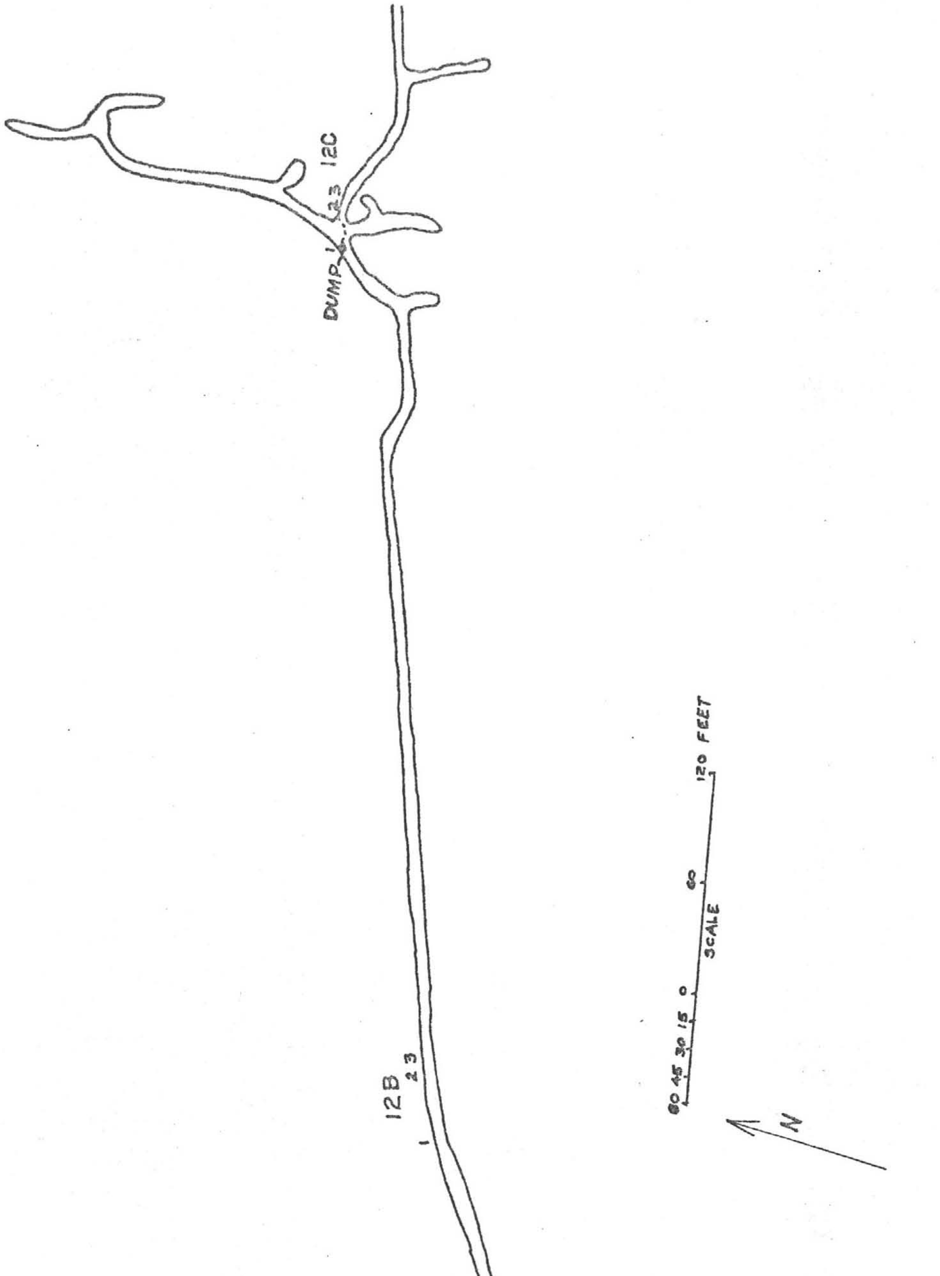


Figure 40. Morningstar Mine - 1400 Foot Level

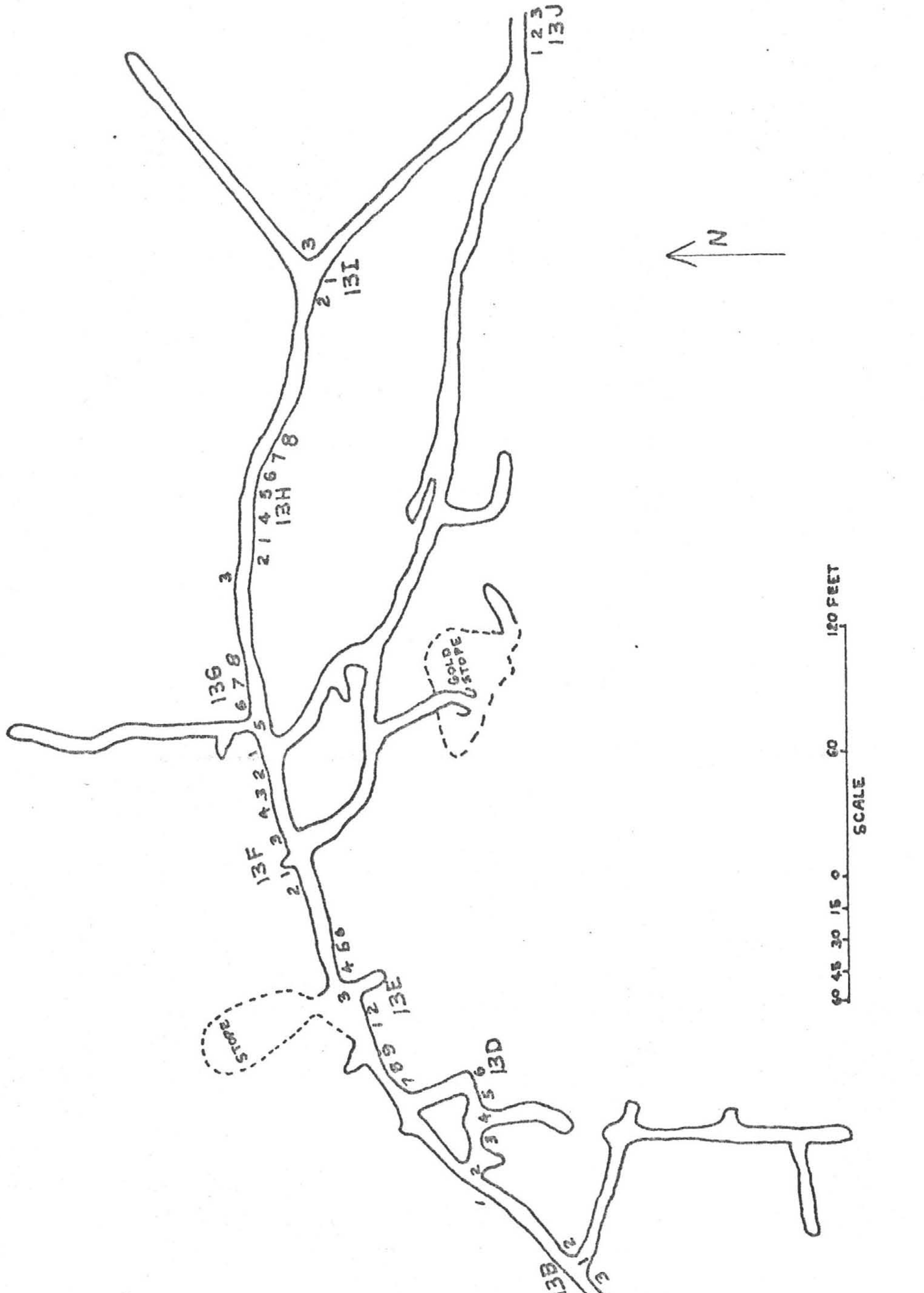


Figure 41. Morningstar Mine - 1700 Foot Level

All rock types encountered in the mines were sampled, whether obviously mineralized or not. The Cerro Gordo Mine rocks included altered and unaltered limestones, shales, and monzonite and andesite dikes. Outlying rocks consisted of shattered or solid limestones (some intensely silicified) and altered shales.

Samples were taken at 10 foot longitudinal increments generally in workings perpendicular to geologic structure. Varying numbers of samples were taken proximate to different veins, however, the vein itself was usually included as the center of the first sample. Initially, samples were assayed for gold, silver, lead, zinc,and sometimes copper. These assays indicated that no other ore minerals could be expected without an anomalous value in gold or silver. Later samples were only assayed for the precious metals unless others were visibly apparent.

Assay reports suggest the following:

1. The dispersion of metals in the country rock of the Cerro Gordo Mine is not of sufficient value to constitute a large scale low-grade orebody. There is, however, a relatively high background of silver. Apparently in the range of 1/4 to 1/2 ounce per ton.

2. The most consistent assays of value were in the lower horizon of the Keeler Canyon formation near the Sunset mine and in the Chainman shale southeast of the Ventura Mine. Close to quartz veins and veinlets, the Chainman shale assays approximately 0. 06 oz gold and 0. 70 oz silver.

UNDERGROUND DRILLING

The underground drilling program was initiated to provide samples from within the country rock where structure and mineralization suggested potential. They were also intended to correlate with the chip samples.

Two reverse circulation percussion air drills were used. The Cerro Gordo mine was drilled on the 400 and 550 levels. Initially, a 315 cfm portable compressor was used alone, but when two drills were operating at the 400 and 550 levels, it became necessary to start the I. R. 1200 cfm stationary compressor. When one drill and the 315 cfm compressor were moved to the Morningstar Mine, the stationary compressor supplied all the air satisfactorily even though no receiver was in the line.

The permanent air line in the shaft was good at least down to the 550 level. Some of the original steel pipe air line was used on the levels, but drilling near the Jefferson stope on the 400 level required about 750 feet of 1-1/2-inch plastic line.

A horizontal hole depth of 50 feet was desired, however, the average depth for all drilling was 37 feet. Locations are shown on the individual level underground maps. Holes and footages are respectively: 25 holes for 875 feet on the 400 level; 13 holes for 556 feet on the 550 level and 7 holes for 251 feet in the Morningstar.

The reverse circulation samples are considered quite reliable. Occasionally caving enlarged the hole, but even soft oxides were recovered. Five-foot increments were taken and later split to compile a composite hole sample for analysis. Portions of each increment are stored in the blacksmith shop near the shaft collar. Drill hole assays correlated to the general background value as indicated by the chip sampling.

LAND AND LEGAL

Plate 6 is an aerial photo of the Cerro Gordo area referencing the major portion of NAA controlled property. These properties consist of both secured and unsecured land with the acreage totaled below by claim group.

27 patented claims totaling 364 acres under lease-option agreement.

11 unpatented claims totaling 148 acres under lease-option agreement.

16 patented claims totaling 297 acres owned by NAA.

72 unpatented claims totaling 1,090 acres located by NAA.

61 unpatented millsites totaling 290 acres located by NAA.

All of the unpatented claims have been surveyed, discovery and boundary markers installed and the required discovery work performed and recorded.

Rental of the above lease-option agreement property is at a rate of Five Hundred Dollars ($500.00) per month, payable in advance on the first day of each month during the term (and each extension) thereof.

Figure 42 summarizes individual costs and a total cost by month for retention of these lands until August 1, 1968.

All expenses incurred as property owner such as taxes, annual assessment work, etc., will be paid by Mrs. Barbara Lee Coman, the property owner.

Buyers shall have the right and option to extend this lease for two (2) successive periods of six (6) months each, beginning November 1, 1966, and May 1, 1967, upon the same rental terms and conditions, by notice in writing to Owners, in the case of the first extension, not less than thirty (30) days before November 1, 1966, and in the case of the second extension, not less than thirty (30) days prior to May 1, 1967.

On September 27, 1966, the first 6 months-lease period was exercised extending the lease to May 1, 1967. Mrs. Barbara Lee Coman will revise the original Brown-Coman lease-option agreement giving NAA the right and option to extend this lease for four (4) successive periods of six (6) months each.

Unpatented lease and option claims and millsites were included in a quiet title action in which a decree quieting title in Barbara Lee Coman, individually and as administratrix of the Estate of Wally Wilson, was entered on September 12, 1966.

Patented lease and option claims are the subject of Coman vs. Steel, a quiet title action pending in Inyo Superior Court. A motion to sever Summit #2 claim from the remainder of the claims has been granted. The order of severance was appealed by California Counties Investment Company, Inc., the owner of the Occident claim which is overlapped by Summit #2. The appeal has now been dismissed and the bulk of the patented claims can now be set for a default trial. It is anticipated that California Counties may appeal the final judgment, but it is not believed this appeal would be successful.

PROJECT PINE TREE N.A.A. COST PER MONTH

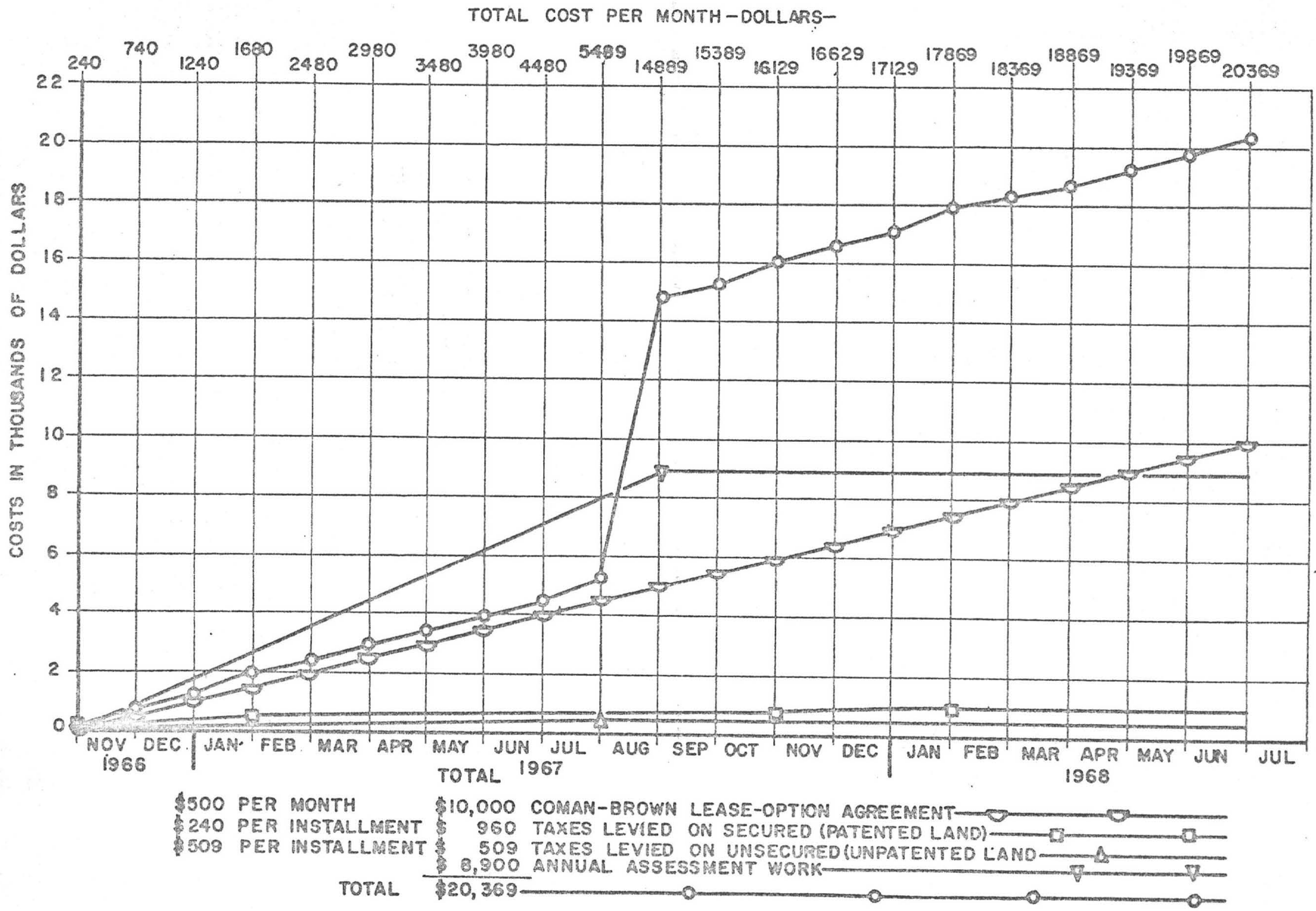


Figure 42. Cost Summary

A cross-complaint was filed by California Counties against Barbara Coman, D.D. Brown and North American regarding Summit #2. As much as six months could easily elapse before the trial of this cross-complaint and the Summit #2 severance action. It is anticipated that title to Summit #2 would then be quieted in Barbara Coman, except to the extent it overlaps the Occident claim. California Counties would, of course, have the right to appeal this judgment, thus consuming up to 18 months to two years time.

In addition to the above properties, approximately two city blocks of patented land, plus three unpatented millsites included in the lease-option agreement, are located in or near the town of Keeler.

SUMMARY

The evaluation to the Cerro Gordo mine including the underground workings and the dumps is considered complete. The values in the dumps are largely in lead and zinc and range up to $40 per ton in some zones of the dump.

The primary purpose of the underground investigation was to determine if commercial mineralization was disseminated in the country rock and to evaluate the possibility of discovering new high grade orebodies. The chip sampling and air drilling program did not probe deeply into the country rock, but did establish the tenor of the disseminated mineralization. A considerable amount of mineralization has permeated the country rock throughout the mine area. The importance of this lies in possible correlations with information gained from the surface program for the purpose of locating hidden orebodied elsewhere in the area and for theorizing about a deep seated source of mineralization.

The surface exploration program indicated rather extensive mineralization in the outcrop areas of the lower Keeler Canyon formation. This zone of interest extends for more than one mile along the flank of the anticline west of Cerro Gordo. A large portion of this area was sampled but geochemical analyses were not completed. Preliminary AAS data indicated high metallic buildup across the contact zone in the area north of the original survey. A program to evaluate this entire zone should include complete geochemical analyses for several elements with the AAS system, correlation of the AAS relults with the earlier wet geochemical analyses, geophysical surveys across the zone and several deep drill holes to investigate mineralization at depth.

Further study may show that the zone further north is more favorable for commercial mineralization in the near-surface.

Conclusion: The most obvious possibility to consider is the existence of a large buried ore deposit emplaced at depth with the observed surface mineralization being an expression of leakage patterns from such a deposit. As outlined earlier in this report, Chainman shale may have served as a barrier to trap the major portion of the mineralizing solution.

If it is in the interest of management to go beyond this instrumentation validation program, this possibility of a major underground orebody represents, together with the large amount of background technical data that has been gathered, a unique opportunity to enter the mining industry with minimum risk and a high potential for success.

RF69-0/12

RF69-0/

Copy

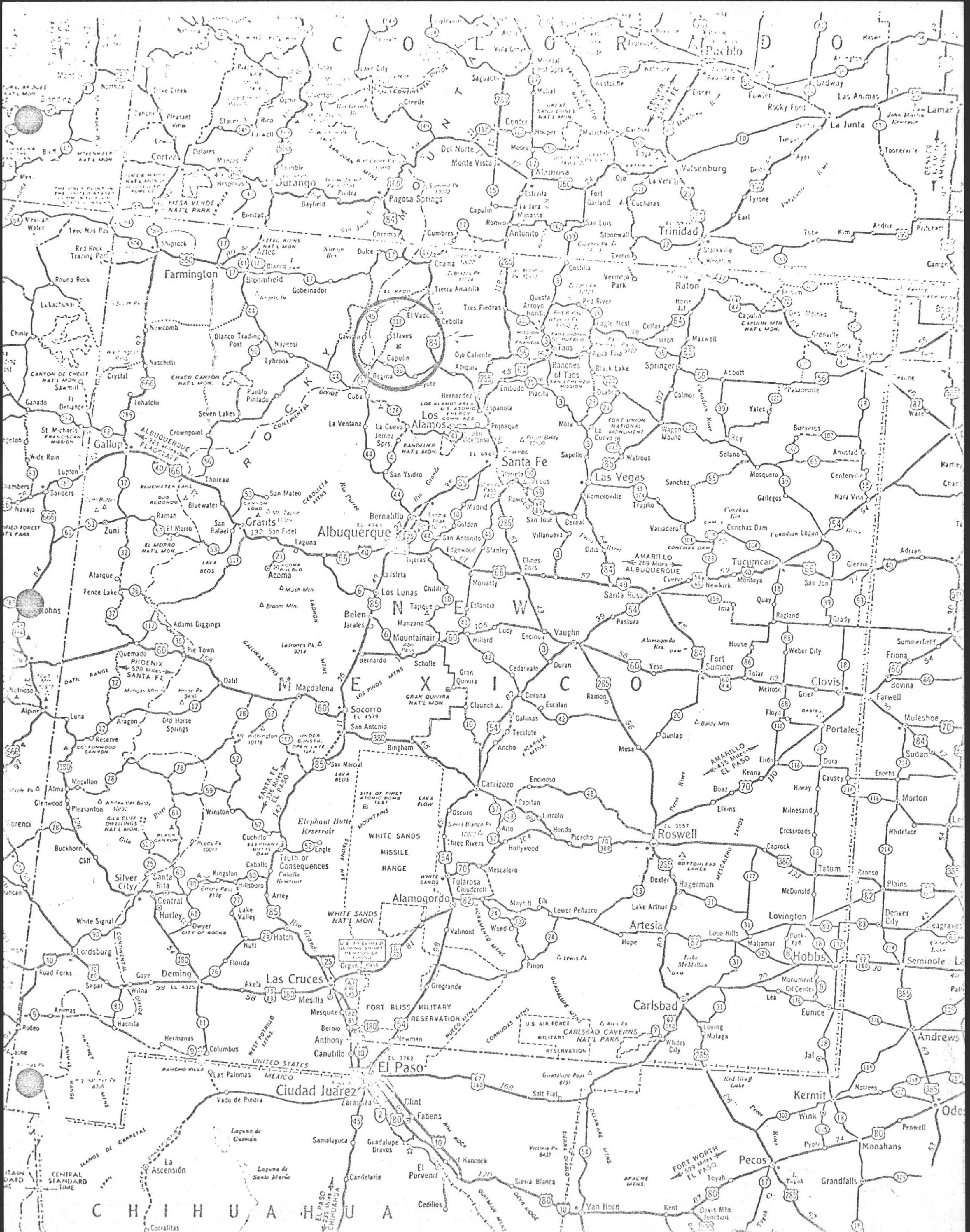
WILD BLUE CLAIMS

(ASSAYS)

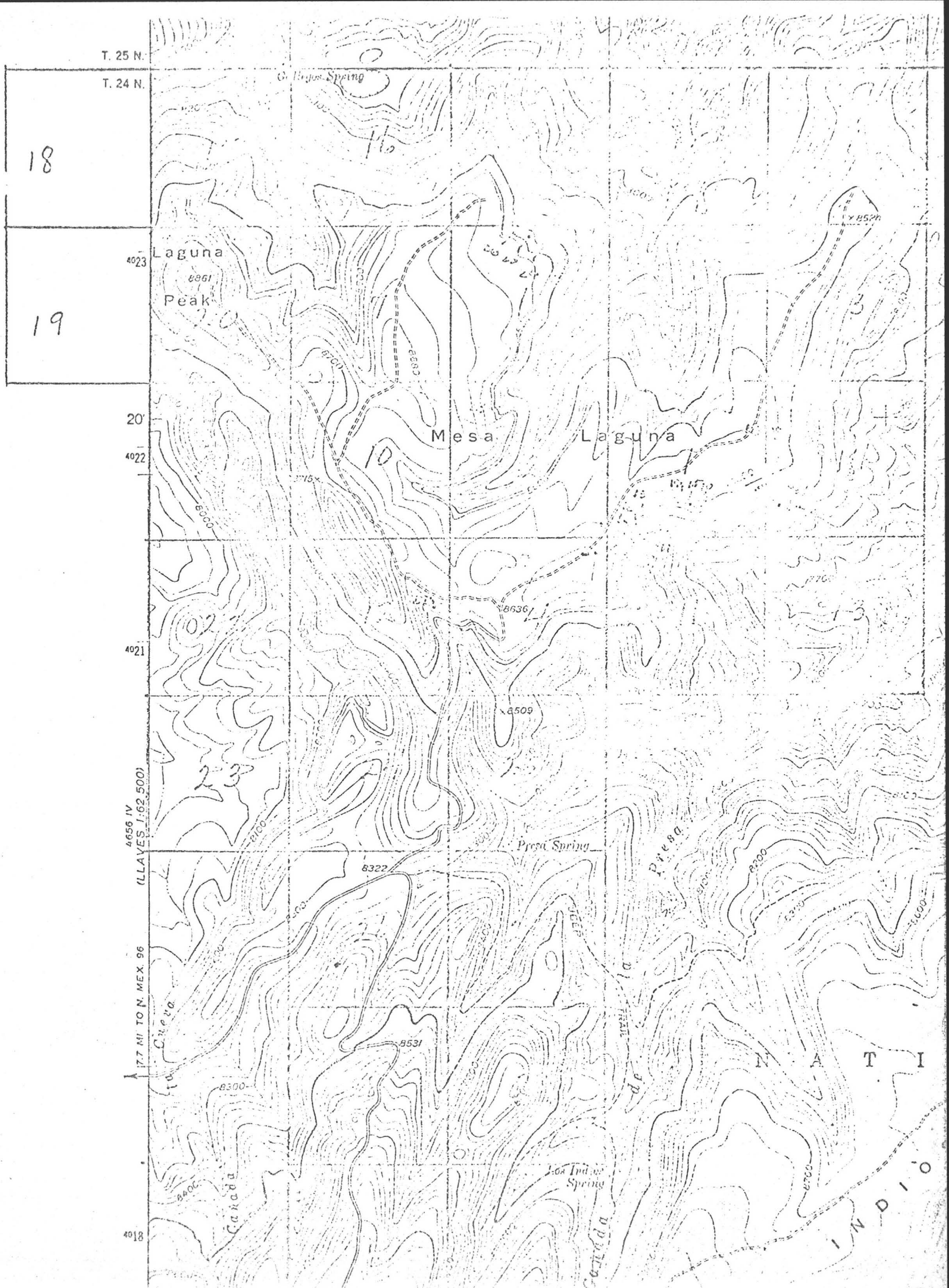
Wild Blue Claims:

KMD possesses some 4800 acres of placer claims in New Mexico. These claims have a potential of producing approximately three billion dollars worth of gold, in gross values, according to best estimates.

After the research program outlined herein (Tab 5) and the installation of a 10,000 ton per day processing facility, it is reasonable to project a $12,000,000 per year net profit operation. This deposit is vast and at the rate of 10,000 tons per day could sustain a 50 year operation. This estimate is based on gold values alone and discounts any return from silver or platinum values known to be present.



COLORADO
NEW MEXICO
CHIHUAHUA
ROCKY MOUNTAINS
CONTINENTAL DIVIDE
Pueblo
Rocky Ford
La Junta
Las Animas
Lamar
Walsenburg
Trinidad
Alamosa
Monte Vista
Del Norte
Pagosa Springs
Durango
Cortez
Mancos
MESA VERDE NAT'L PARK
Farmington
Aztec
Bloomfield
Shiprock
Chama
Tierra Amarilla
El Vado
Cebolla
Llaves
Capulin
Regina
Gavilan
Cuba
Raton
Springer
Clayton
Taos
Ranches of Taos
Questa
Red River
Eagle Nest
Cimarron
Espanola
Los Alamos
Santa Fe
Las Vegas
Gallup
Grants
Albuquerque
Bernalillo
Los Lunas
Belen
Socorro
Magdalena
Tucumcari
Santa Rosa
Vaughn
Fort Sumner
Clovis
Portales
Roswell
Artesia
Carlsbad
Hobbs
Lovington
Alamogordo
Tularosa
Carrizozo
WHITE SANDS MISSILE RANGE
Truth or Consequences
Silver City
Lordsburg
Deming
Las Cruces
El Paso
Ciudad Juarez
Pecos
Kermit
Monahans
Van Horn
ALBUQUERQUE 321 Miles FLAGSTAFF
PHOENIX 528 Miles SANTA FE
SANTA FE 336 Miles EL PASO
AMARILLO 269 Miles ALBUQUERQUE
AMARILLO 415 Miles EL PASO
FORT WORTH 593 Miles EL PASO
FORT BLISS MILITARY RESERVATION
CARLSBAD CAVERNS NAT'L PARK
UNITED STATES
MEXICO
CENTRAL STANDARD TIME



T. 25 N.
T. 24 N.
18
19
Gallegos Spring
16
Laguna
8861
Peak
4023
20'
4022
4021
4018
Mesa Laguna
10
8715
8600
8700
8636
8509
8528
23
Presa Spring
8322
8531
8300
8400
8100
Presa
Cueva
Canada
Canada de
Jeep Trail
Indian Spring
N A T I
I N D I O
4656 IV
(LLAVES 1:62 500)
7.7 MI TO N. MEX. 96

LABORATORY REPORT

SMITH-EMERY COMPANY

ESTABLISHED 1910

CHEMISTS - ENGINEERS

781 EAST WASHINGTON BOULEVARD

LOS ANGELES 21, CALIFORNIA

ABORATORY
Vo. 467985

Date September 29, 1959

ample Metal

eceived 9-23-59 Marked

ubmitted by Robert B. Orton,
1420 Via Vista Drive,
Redlands, California.

REPORT OF TEST

Gold, ounces per ton, by Fire Assay ------ 187.00 ounces/ton

Value at $35.00 per ounce ---------- $6,545.00 per ton

S.W. Engineering

Respectfully submitted,

Smith-Emery Co.
CHEMISTS AND ENGINEERS
S.L.S.

"A"

E. Wille
P.O.Box 796
Tahoe City, Calif.

REPORT OF ASSAY

Labty. No.	Mark	Gold, per ton Troy Oz. $35.00 Oz.			
C108557	Head From Top Discovery # 1 Wild Blue	Trace			
58	Top Sample From Discovery # 1 Reduced from Ten Lbs.	1.92	67.20	+ 20% = Loss	80.64
59	Heads Discover # 2 Wild Blue	.005	.17		
60	Discovery # 2 Reduced From Seven Lbs.	1.80	63.00	+ 20% = Loss	75.60

Here is the last assay report from Abbott & Hanks of San Francisco :
57 and # 58 are the same samples.
57 was without my process.
58 was after my processing.
59 was without my process
60 was after my processing.

This, I believe will show beyond all doubt, that the process I am using will recover the gold.
The 20 % loss was due to the shipping and handling. This is a rough estimate.

Ernest W. Wille

5

Richmond 9-3411

ASSAY REPORT

SMITH-EMERY COMPANY

ESTABLISHED 1910
ASSAYERS AND CHEMISTS
781 EAST WASHINGTON BOULEVARD
LOS ANGELES 21, CALIFORNIA

COPY

Sample [illegible]

Received 5-12-60

Submitted by Robert B. Orton,
1420 Via Vista Drive,
Redlands, California.

Gold, @ $35.00 per oz.
Silver, @ $ 0.905 per oz.

Date May 16, 1960

NUMBER	MARK	PER TON OF 2000 LBS.				COPPER	LEAD	ZINC
		GOLD		SILVER				
		OUNCES	VALUE	OUNCES	VALUE	PER CENT	PER CENT	PER CENT
475406	"Sample reduced by flotation from (5) five) lbs. of ore"	4.87	$170.45	WB - 13				

Respectfully submitted,

Smith-Emery Co.

ASSAYERS AND CHEMISTS

Graham Co.

6

Richmond 9-3411

ASSAY REPORT

SMITH-EMERY COMPANY

ESTABLISHED 1910
ASSAYERS AND CHEMISTS
731 EAST WASHINGTON BOULEVARD
LOS ANGELES 21, CALIFORNIA

Sample Pulp

Received 6/3/60

Submitted by Robert B. Orton,
1420 Via Vista Drive,
Redlands, California.

Gold, @ $35.00 *per oz.*
Silver, @ $ 0.905 *per oz.*

Date June 9, 1960

NUMBER	MARK	PER TON OF 2000 LBS. GOLD		SILVER		COPPER	LEAD	ZINC
		OUNCES	VALUE	OUNCES	VALUE	PER CENT	PER CENT	PER CENT
476214	"Sample #1 reduced from 5 lbs. ore"	0.08	$2.80					
476215	"Sample #2 reduced from 3 lbs. ore"	0.12	$4.20	WB - 10				
47[illegible]6	"Sample #3 reduced from 1 lb. ore"	0.24	$8.40	WB - 12				

Respectfully submitted,

[signature]

ASSAYERS AND CHEMISTS

7

MINING
METALLURGY
CHEMISTRY

ORE TESTING
PLANT DESIGN
METALLURGICAL RESEARCH
ASSAYS & ANALYSES

HARLEY A. SILL
CONSULTING ENGINEER
1011 SOUTH FIGUEROA STREET
LOS ANGELES 15

February 7, 1962

Mr. Curt Hight
2453 Bloomington Blvd.
Riverside, California

AMALGAMATION TEST

WB-8

Description	Gold Ounces	Gold Value
Heads	0.5	$ 17.50
Amalgamation Taild	0.14	4.90
Recovery	0.75	* Estimated 0.6 Fine Gold

* Charges Paid $8.00

Harley A. Sill
Consulting Engineer

8

767-2581
369-0613

Robert E. Craig

MINING CONSULTANT

11844 ART STREET
SUN VALLEY, CALIF.

Analysis No. 10734
April 4, 1966

Samples submitted by;
Major L. Herrin
600 Fairway Avenue
Redlands, California.

Sample No. #1-WB-4
Au - Gold .104 oz. per ton = $3.64 per ton
Ag - Silver .09 oz. per ton = 12¢ per ton
Pt - Platinum .108 oz. per ton = $13.50 per ton

Sample No. #2-WB-11
Au - Gold .179 oz. per ton = $6.26 per ton
Ag - Silver .10 oz. per ton = 13¢ per ton
Pt - Platinum .147 oz. per ton = $18.37 per ton

Sample No. #3-WB-3
Au - Gold .087 oz. per ton = $3.04 per ton
Ag - Silver .05 oz. per ton = 6¢ per ton
Pt - Platinum .112 oz. per ton = $14.00 per ton

Sample No. #4-WB-11 Layer #2
Au - Gold .091 oz. per ton = $3.19 per ton
Ag - Silver .07 oz. per ton = 9¢ per ton
Pt - Platinum .117 oz. per ton = $14.63 per ton

Sample No.#5-WB-2
Au - Gold .172 oz. per ton = $6.02 per ton
Ag - Silver .09 oz. per ton = 12¢ per ton
Pt - Platinum .107 oz. per ton = $13.37 per ton

Sample No. #6-WB-1 Layer
Au - Gold .088 oz. per ton = $3.08 per ton
Ag - Silver .06 oz. per ton = 8¢ per ton
Pt - Platinum .201 oz. per ton = $25.12 per ton

Sample No. #7 Layer #1
Au - Gold .112 oz. per ton = $3.92 per ton
Ag - Silver .08 oz. per ton = 10¢ per ton
Pt - Platinum .142 oz. per ton = $17.75 per ton

Sample No. #9-WB-14 Layer #1
Au - Gold .028 oz. per ton = 98¢ per ton
Ag - Silver = Traces
Pt - Platinum .072 oz. per ton = $9.00 per ton

Sample No. 11-WB-1
Au - Gold .178 oz. per ton = $6.23 per ton
Ag - Silver .10 oz. per ton = 13¢ per ton
Pt - Platinum .175 oz. per ton = $21.87 per ton

Sample No.#12-WB-11
Au - Gold .056 oz. per ton = $1.96 per ton
Ag - Silver .04 oz. per ton = 5¢ per ton
Pt - Platinum .078 oz. per ton = $9.75 per ton

Gold @$35.00
Silver @$1.29
Platinum @$125.00

Analysis and report; by
Robert E. Craig
Robert E. Craig E.M.M.S.

9

Assay-Chemical Division

ABBOT A. HANKS

ESTABLISHED 1866

1300 SANSOME STREET • SAN FRANCISCO, CALIFORNIA 94111 • TELEPHONE (415) 434-0166

Assayers
Chemists
Spectrographers
Mining Consultation
Representatives
Inspectors
Samplers

REPORT OF ASSAY

July 22, 19[illegible]

Deposited by [illegible] S. [illegible]
[illegible] Ave., N. E.
Albuquerque, New Mexico

Sample of Ore

Labty. No.	Mark	GOLD, per ton of 2,000 lbs. Troy Ounces	GOLD, Value at $35.00 oz.	SILVER, per ton of 2,000 lbs. Troy Ounces	SILVER, Value at	Percentages
3240-1	No. 1	1.50	52.50	WB-9		No [illegible] [illegible]
2	No. 2	0.22	7.70	WB-10		[illegible]

ASSAY-CHEMICAL DIVISION
ABBOT A. HANKS
By [signature]
CHARLES J. [illegible]

cc

10

CA-106

767-2681
369-0613

Robert E. Craig

MINING CONSULTANT

11344 ART STREET
SUN VALLEY, CALIF.

Analysis No. 8954-F
July 19, 1966

Samples submitted by;
Lex Herrin
600 Fairway Drive
Redlands, California.

Sample No. #1-WB-4

Au - Gold	.92 oz. per ton
Ag - Silver	.70 oz. per ton
Pt - Platinum	.26 oz. per ton
Pd - Palladium	.11 oz. per ton

Sample No. WB - 11

Au - Gold	.671 oz. per ton
Ag - Silver	1.09 oz. per ton
Pt - Platinum	.07 oz. per ton
Pd - Palladium	.21 oz. per ton

Sample No. #3 WB - 1

Au - Gold	.85 oz. per ton
Ag - Silver	2.60 oz. per ton
Pt - Platinum	.23 oz. per ton
Pd - Palladium	.41 oz. per ton

Sample No. #4 WB - 5

Au - Gold	.09 oz. per ton
Ag - Silver	.37 oz. per ton
Pt - Platinum	.15 oz. per ton
Pd - Palladium	.22 oz. per ton

Sample No. #5 WB - 5 West Side

Au - Gold	.201 oz. per ton
Ag - Silver	1.43 oz. per ton
Pt - Platinum	.07 oz. per ton
Pd - Palladium	.41 oz. per ton

Sample No. #6 WB? - East Side

Au - Gold	.889 oz. per ton
Ag - Silver	.71 oz. per ton
Pt - Platinum	.092 oz. per ton
Pd - Palladium	.12 oz. per ton

Analysis and report; by

Robert E. Craig

Robert E. Craig

11

August 4, 1966

Sample Obtained From
Lex Hermin
600 Fairway Drive
Redlands, California

Sample	Metal Content (Oz. per Ton) Au	Ag	Pt	Pd
1. (WB-4)	1.14	1.3	0.06	--
2. (WB-11)	0.38	2.32	--	--
3. (WB-1)	1.55	3.5	0.127	--
4. (WB-5)	---	0.66	--	--
5. (WB-5W)	0.286	2.92	--	--
6. (WB-6)	1.4	0.92	0.095	--

Method of Analysis

References:

1. "Determination of Gold, Silver, and Platinum by Dithizone" Analyst Vol. 76, 1951.

2. "Colorimetric Determination of Trace Metals," E.B. Sandell, 1950.

3. "Standard Methods of Chemical Analysis," W.W. Scott, 1939.

Procedure:

1. 30g from thoroughly mixed sample.

2. Collected gold, silver, and transition metals in lead by crucible process. Fluxed in reducing atmosphere in muffle furnace.

3. Cupeled resulting lead button containing metals of interest in muffle furnace.

4. Dissolved Ag & Pd in H_2SO_4; Au, Pt and other transition metals remain in ~~solution.~~ RESIDUE.

5. Gold, Palladium, and Platinum form dithizonates in dilute mineral acid solution. The quantity of dithizonate used gives an accurate measure of

the metals present.

6. Palladium was separated from the other metals by extraction of its dimethylglyoxime complex with cholorofom.

7. Gold was extracted with dithizone from dilute hydraulic acid solution. Sodium bromide was added to prevent extraction of silver.

8. a. In dilute acid, platinous chloride reacts with dithizone, and platinum can be extracted, after removal of the gold, by reducing the platinic to platinous chloride by addition of stannous chloride.

b. Platinum was also determined by oxidizing to the perchlorate and passing the solution through a Dowex 50 column (Platinum passes, whereby the other metals remain in the column). The solution is then made acid by hydraulic acid and reduced by stannous chloride. Transmittancy is then determined by use of a colorimeter, and compared with a standard.

9. Silver was determined by evaporating the solution obtained at step 6a, to dryness with nitric acid and precipitating the silver with hydrochloric acid, and then firing and weighing. The weight obtained when subtracted from the weight of the metal bead from cupellation is the measure of silver.

B. B. Nolan

B. B. NOLAN
B.S., CH. E.; M.S., CH.

August 5, 1966

Mr. Lexie E. Herrin
604 Beech Street
Vandenberg AFB, Calif.

Dear Sir:

Subject: Sample Ore Assays

The following are the results of the ten samples submitted for analysis.

Sample No.	Gold oz/ton	Silver oz/ton	Platinum oz/ton	Paladium oz/ton
1	.912	1.15	.088	.029
2	.412	1.85	---	.029
3	.206	1.09	.265	.059
4	1.210	2.85	.059	---
5	---	1.88	.235	.020
6	.795	---	.118	---
7	.559	1.59	---	.059
8	Lost sample in assay			
9	.676	1.09	.206	---
10	Lost sample in assay			
8 Sample Aug	.497 oz/ton	1.44 oz/ton	.121 oz/ton	.001 oz/ton

B.B. Nolan

B.B. NOLAN
B.S. Ch.E., M.S., Ch.

October 14, 1966

Mr. Lexie E. Herrin
604 Beech Street
Vandenberg AFB, Calif.

Dear Sir:

Subject: Sample Ore Assays

The following are the results of the ten samples submitted for analysis.

Sample No.	Gold oz/ton	Silver oz/ton	Platinum oz/ton	Paladium oz/ton
H&H 1	.617	2.58	.059	.029
H&H 2	.235	1.62	---	.059
H&H 3	.735	1.06	.088	---
H&H 4	.765	1.23	.147	.029
H&H 5	.910	1.67	.088	---
H&H 6	---	.264	---	---
H&H 7	.059	.35	---	---
H&H 8	.559	1.94	.176	.029
H&H 9	.794	1.82	.235	---
H&H 10	.176	1.14	.088	.059
10 Sample Aug	.46 oz/ton	1.37 oz/ton	.085 oz/ton	.020 oz/ton

B.B. Nolan

B.B. NOLAN
B.S. Ch.E., M.S., Ch.

15

767-2681
369-0613

Robert E. Craig

MINING CONSULTANT

11844 ART STREET
SUN VALLEY, CALIF.

Analysis No. 10501
October 20, 1966

Samples submitted by;
Lex Herron &
Harold Hedrick

(SUBJECT) Bulk samples removed from Wild Blue Placer New Mexico.

Sample No. #1

Au - Gold .401 oz. per ton	= $14.03 per ton
Ag - Silver .27 oz. per ton	= 39¢ per ton
Pt - Platinum .057 oz. per ton	= $5.70 per ton
Pd - Palladium .042 oz. per ton	= $1.18 per ton
Total	$21.30 per ton

Sample No. #2

Au - Gold .598 oz. per ton	= $20.93 per ton
Ag - Silver .39 oz. per ton	= 50¢ per ton
Pt - Platinum .062 oz. per ton	= $6.20 per ton
Pd - Palladium .052 oz. per ton	= $1.46 per ton
Total	$29.09 per ton

Sample #3

Au - Gold .427 oz. per ton	= $14.94 per ton
Ag - Silver .17 oz. per ton	= 22¢ per ton
Pt - Platinum .078 oz. per ton	= $7.80 per ton
Pd - Palladium .059 oz. per ton	= $1.65 per ton
Total	$24.61 per ton

Sample No. #4

Au - Gold .284 oz. per ton	= $9.94 per ton
Ag - Silver .19 oz. per ton	= 25¢ per ton
Pt - Platinum .037 oz. per ton	= $3.70 per ton
Pd - Palladium .021 oz. per ton	= 87¢ per ton
Total	$14.76 per ton

Sample No. #5

Au - Gold .309 oz. per ton	= $10.81 per ton
Ag - Silver .08 oz. per ton	= 10¢ per ton
Pt - Platinum .048 oz. per ton	= $4.80 per ton
Pd - Palladium .021 oz. per ton	= 59¢ per ton
Total	$16.30 per ton

Sample No. #6

Au - Gold .410 oz. per ton	= $14.38 per ton
Ag - Silver .31 oz. per ton	= 40¢ per ton
Pt - Platinum .027 oz. per ton	= $2.70 per ton
Pd - Palladium	= Traces

767-2081
369-0613

Robert E. Craig

MINING CONSULTANT

11844 ART STREET
SUN VALLEY, CALIF.

Sample No. #7

Au - Gold .899 oz. per ton	= $31.46 per ton
Ag - Silver .38 oz. per ton	= 49¢ per ton
Pt - Platinum .042 oz. per ton	= $4.20 per ton
Pd - Palladium .031 oz. per ton	= 87¢ per ton
Total	$37.02 per ton

Sample No. #8

Au - Gold .502 oz. per ton	= $17.57 per ton
Ag - Silver .97 oz. per ton	= $1.25 per ton
Pt - Platinum .019 oz. per ton	= $1.90 per ton
Pd - Palladium	= Traces
Total	$20.72 per ton

Sample No. #9

Au - Gold .720 oz. per ton	= $25.20 per ton
Ag - Silver 1.31 oz. per ton	= $1.69 per ton
Pt - Platinum .029 oz. per ton	= $2.90 per ton
Pd - Palladium .041 oz. per ton	= $1.15 per ton
Total	$30.94 per tom

Sample No. #10

Au - Gold .042 oz. per ton	= $1.47 per ton
Ag - Silver .27 oz. per ton	= 35¢ per ton
Pt - Platinum .149 oz. per ton	= $14.90 per ton
Pd - Palladium .321 oz. per ton	= $8.99 per ton
Total	$25.71 per ton

Average of 10 samples $\frac{\$237.93}{10}$ = $23.79 per ton

(NOTE) Gold @$35.00 per oz
Silver @$1.29 per oz.
Platinum @$100.00 per oz.
Palladium @$28.00 per oz.

Analysis and report; by

Robert E. Craig

Robert E. Craig E.M.

October 21, 1966

Mr. Lexie E. Herrin
604 Beech Street
Vandenberg AFB, Calif.

The following are the results of the 10.1 to 1 ore concentrate submitted for assay. The values are an average of six runs on the same concentrate.

	Gold Oz/Ton	Silver Oz/Ton	Platinum Oz/Ton	Paladium Oz/Ton
Average	9.67	14.19	1.41	.36

B. B. Nolan,
B.S. Ch. E., M.S. Ch.

18

MARTIN METALS, INC.
1321 WILSON STREET
LOS ANGELES, CALIFORNIA 90021
TELEPHONE (Area Code 213) 627-7755
SMELTERS AND REFINERS OF PRECIOUS METALS, CHEMICAL WASTES & RESIDUES
CABLE ADDRESS: MARLOY

Oct. 28, 1966

H.E. HEDRICK
4219 Dauntless Drive
Palos Verdes Estates, Calif.

Re: R.T. 4580 - Ore Sample for Evaluation

Dear Mr. Hedrick:

The results on your ore sample concentrated 10.1 to 1 are as follows:

Gold	-	8.0 oz. per ton
Platinum	-	2.0 oz. per ton

Yours very truly,

MARTIN METALS, INC.

Philip R. Olsin

Philip R. Olsin
Chemist

PRO/ds

19

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

AREA V

BUILDING 20
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

Mineral Resource Office

November 23, 1966

Major L. E. Herrin
604 Beech St.
Vandenberg AFB, California

Dear Major Herrin:

Some free gold was observed in your concentrate. The presence of silver was verified, but it was difficult to determine the significance due to your treatment of the sample. Spectroscopic examination indicated the possible presence of platinum and palladium, but this could not be verified by qualitative chemical tests.

The U.S. Bureau of Mines offers a free identification to the general public which does not include assaying of prospectors' samples. If assays are desirable, samples will have to be submitted to a commercial laboratory.

Yours very truly,

H. C. Meeves
Geologist

DMP-1780-1

ENGELHARD INDUSTRIES, INC.

REFINING DIVISION
113 ASTOR STREET, NEWARK, N. J. 07114
TELEPHONE: AREA CODE 201-242-2700

NEWARK, NEW JERSEY

DATE December 7, 1966

TO MR. William Schmidt, Jr.

SUBJECT H. E. Hedrick

COPIES TO H. Robinson

We have just completed the analysis of the sample of concentrate from H. E. Hedrick which you left with us during your last visit to Newark, and are attaching herewith our assay report in duplicate under the signature of Mr. Harold Robinson, Head of the Analytical Laboratory.

Although it does indicate the gold, silver and platinum to be present we would not be interested in acquiring this type of material as it would require a blast furnace operation and we do not have this type of equipment to date, therefore, it would be more to the interest of the American Metal Company, 1270 Avenue of the Americas, New York, New York, 10020 to the attention of Mr.Paul Pirigyi.

We would suggest that they be approached to determine if they would be interested in acquiring the material.

We also acknowledge receipt of the check in the amount of fifty dollars in payment for the analysis.

H H Mortimer

H. H. Mortimer

HHM:gw
Encls:

21
Form E14911-1

RESE[illegible]H & DEVELOPMENT DIVISION

ASSAY DEPARTMENT
113 ASTOR STREET
NEWARK, N.J. 07114
242-2700

CERTIFICATE OF CHEMICAL ANALYSIS

Assay No. N 20921

TO: H. E. Hedrick
4219 Dauntless Drive
Palos Verdis Pen. California
90274

MATERIAL: Sample of Concentrate

MARKED:

Gold	14.3	OZ/TON
Silver	37.1	OZ/TON
Platinum	1.7	OZ/TON
Osmiridium	None Detected	
Palladium	None Detected	

REMARKS:

H. Robinson
H. Robinson
HEAD, ASSAY DEPARTMENT

DATE: December 6, 1966

FORM EI-5823

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ROBERT E. CRAIG & CO.

MINING GEOLOGISTS
11844 ART STREET
SUN VALLEY, CALIFORNIA
899-0613 767-2681

Analysis No. 7125
January 13, 1967

Samples submitted by;
Lex Herron for
Kohm Mining Co.
604 Beach Street
Vandenburg Air Force Base,
California.

Sample No. #1 North

Au - Gold .287 oz. per ton	= $10.04 per ton
Ag - Silver .10 oz. per ton	= 24¢ per ton
Pt - Platinum .098 oz. per ton	= $9.80 per ton
Pd - Palladium .24 oz. per ton	= $6.72 per ton

Sample No. #2 East Old Road

Au - Gold .309 oz. per ton	= $10.81 per ton
Ag - Silver .21 oz. per ton	= 27¢ per ton
Pt - Platinum .107 oz. per ton	= 10.70 per ton
Pd - Palladium .31 oz. per ton	= $8.68 per ton

Sample No. #3 South

Au - Gold .087 oz. per ton	= $3.04 per ton
Ag - Silver .09 oz. per ton	= 12¢ per ton
Pt - Platinum .073 oz. per ton	= $7.30 per ton
Pd - Palladium .18 oz. per ton	= %5.04 per ton

Sample No. #4 East

Au - Gold .481 oz. per ton	= $16.83 per ton
Ag - Silver .34 oz. per ton	= 44¢ per ton
Pt - Platinum .147 oz. per ton	= $14.70, per ton
Pd - Palladium .38 oz. per ton	= $10.64 per ton

Gold @$35.00 per oz
Silver @$1.29 per oz.
Platinum @$100.00 per oz.
Palladium @$28.00 per oz.

Analysis and report, by
Robert E. Craig
Robert E. Craig

ROBERT E. CRAIG & CO.

MINING GEOLOGISTS
11044 ART STREET
SUN VALLEY, CALIFORNIA
899-0613 767-2681
★ Home

Analysis No. 7165

Samples submitted by;
Kohm Mining & Development Co.
Suite 808 Wilshire Blvd.
Los Angeles, California.

Sample No. Last Three By Hedrick

#1

Au - Gold .311 oz. per ton	= $10.88 per ton
Ag - Silver .79 oz. per ton	= $ 1.02 per ton
Pt - Platinum .089 oz. per ton	= $11.12 per ton
Pd - Palladium .297 oz. per ton	= $ 8.31 per ton
	$31.33 per ton

#2

Au - Gold .107 oz. per ton	= $3.74 per ton
Ag - Silver .300 oz. per ton	= ..39¢ per ton
Pt - Platinum .021 oz. per ton	= $2.62 per ton
Pd - Palladium .079 oz. per ton	= $2.21 per ton
	$8.96 per ton

#3

Au - Gold .308 oz. per ton	= $10.78 per ton
Ag - Silver 1.40 oz. per ton	= $ 1.81 per ton
Pt - Platinum .200 oz. per ton	= $25.00 per ton
Pd - Palladium .670 oz. per ton	= $18.76 per ton
	$56.35 per ton

Analysis and report; by

Robert E. Craig
Robert E. Craig

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN ORE PURCHASING DEPARTMENT
P. O. BOX 5795, TUCSON, ARIZONA 85703

May 26, 1967

REED F. WELCH
MANAGER

1150 NORTH 7TH AVENUE
TELEPHONE 602-792-3010

Major Lexie R. Herrin
804 Beech Street
Vandenberg AFB, California 93437

Dear Major Herrin:

The assay office has just reported the content of the small sample received May 24th, as follows:

Oz. per Ton	
Gold	Silver
20.35	108.8

Of course, this is very high grade and no doubt more than you expected judging from your telephone conversations. The only thing you lack is quantity; otherwise the product would be very good.

If you continue making concentrate and accumulate 1000-2000 pounds of similar material, I would be most happy to accommodate your shipping to our El Paso Smelter. This could be delivered by truck by making arrangements with me prior to the date of departure.

Yours very truly,

Reed F. Welch

REED F. WELCH

P.S. Please send me a specimen of your crude ore.

25

ED. EISENHAUER, JR.
G. EISENHAUER RAYMOND
LAWRENCE EARL RAYMOND

The EISENHAUER LABORATORIES
316-322 South San Pedro Street
Phone 622-9328 (Code 213) · LOS ANGELES, CALIF. 90013

Established 1916
ASSAYERS
METALLURGISTS
CHEMISTS
ORE TESTING

June 2/67

Henry Kersting
Los Angeles
California

Subject: Assay of Metal Bead

Gold fineness	26.20
Silver fineness	825.10
Platinum fineness	1.12

Respectfully submitted,

The Eibenhauer Laboratories

Ed. Eisenhauer, Jr.

Ed. Eisenhauer, Jr.

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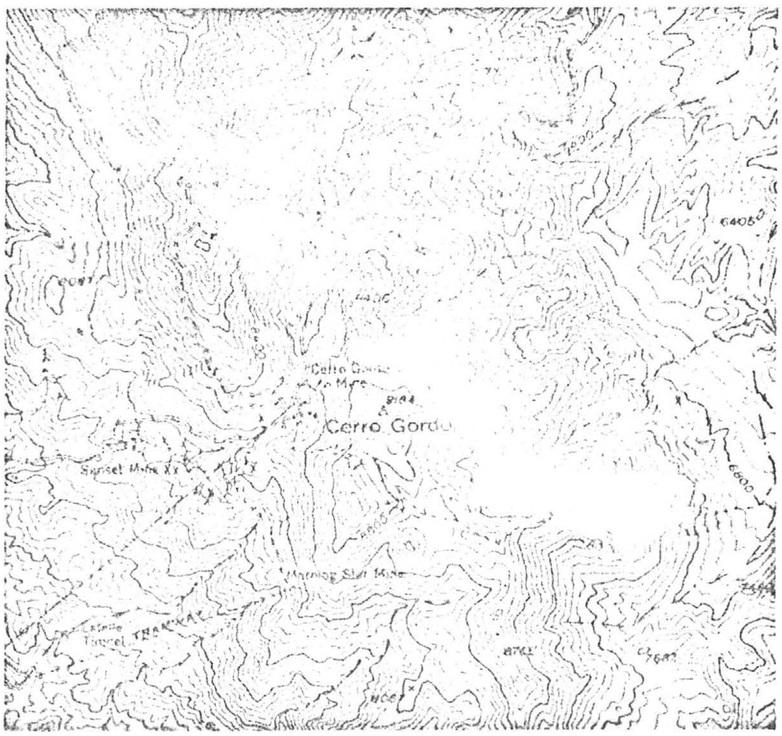
CERRO GORDO
MINERAL EXPLORATION PROGRAM

(SUMMARY)

30 November 1966

A BRIEF RESUME OF EXPLORATIONS CONDUCTED
BY THE STRATEGIC RESOURCES GROUP OF
NORTH AMERICAN AVIATION, INC.
DURING 1965 AND 1966



North American Aviation, Inc.

INTRODUCTION

The Strategic Resources Development (SRD) group of North American Aviation has been actively involved in minerals exploration in the Cerro Gordo Mining District of Inyo County, California from September through December 1965 and May through September 1966. Initial investigation of dump materials led to underground studies and was later expanded to extensive surface studies of geology, geochemistry and geophysics.

The prime capability of SRD was to locate, delineate and evaluate commercial ore deposits. The philosophy was to apply the most modern instrumentation to maximize efficiency in mineral exploration. An example of the validity of this approach was the ability of SRD's Geochemical Laboratory to analyze 1,000 samples per week as contrasted to 200 per week by a U. S. Geological Survey group similarly staffed and equipped. SRD maintained its own land investigation group to provide a complete service from title search through land survey to acquisition.

Technical and advisory assistance was furnished by the following prominent consultants.

Ira B. Joralemon

Mr. Joralemon has been a consultant since 1922. He has examined many hundreds of mines in twenty-four countries on four continents, including mines of all the metals from uranium to iron, as well as potash, phosphate and other non-metallics. Mr. Joralemon recommended and helped in development of New Cornelia Copper Company (now New Cornelia Branch of Phelps Dodge Corp.); United Verde Extension Mining Co.; Bralorne Mines Ltd.; and other valuable mines. For the past few years Mr. Joralemon has been involved primarily with mine valuation.

Peter Joralemon

Dr. Joralemon has served as chief geologist, Getchell Mine, Nevada; geologist and general superintendent, New Park Mining Co., Utah; and Director of Exploration for Lucky Mac Uranium Corp.

Dudley L. Davis

Mr. Davis has served as chief geologist for E. E. Lewis Inc. evaluating mining properties and operation of mines specializing in uranium. He has done extensive consulting work in base metals, placer gold, quicksilver, and minerals exploration. Mr. Davis has extensive experience in supervising drilling programs and operating mines. As chief, Section "A" U.S. Atomic Energy Commission Mr. Davis supervised five geologists in evaluating uranium mines on the Colorado Plateau.

Robert E. Cannon

Mr. Cannon is consulting in the development of metal mine mechanization by design of new equipment and modification of existing mining methods. He was retained for three years by a major U. S. Steel company as a consultant to supervise complete operating and economic planning and negotiate financing a 100 million dollar mine development.

HISTORY

The Cerro Gordo strike was discovered in 1865 by Mexican prospectors. Their accounts of the extremely rich ore found outcropping at the surface attracted Americans to the little town resting at 8000 feet in the Southern Inyo Mountains. So rapid was development that by the fall of 1868, the mine's smelters were producing silver-lead bullion at a faster rate than the United States had ever seen. By 1872, eleven mines were active in the Cerro Gordo district. Of these mines, three outstripped all others in importance. They were the Union, Santa Maria and San Felipe mines.

Although the Cerro Gordo, a consolidation of the Union, Santa Maria and San Felipe Mines, has been worked intermittently through 1949, the period between 1869 and 1876 marks the bonanza years. During this time more than half of the mine's lead and about three-fourths of its silver was produced. This amounted to over 22,000 tons of lead and over 3,000,000 ounces of silver. The silver-lead bullion is reported to have contained about 140 ounces of silver per ton at an average value of $300.00 per ton. Total output value during the boom years has been estimated to be about $7,000,000. Payment for the lead alone just about defrayed the cost of smelting at the mine, together with the transportation of the bullion to San Francisco for refining. Before arriving in San Francisco, the ore had to be transported by mule teams across the desert to Los Angeles some 200 miles away. A steady string of about 56 large freight wagons, pulled by 16 to 20 mules, made this three week trip.

Los Angeles profited immensely by the lucrative supply and transportation business, which resulted in its growth from a village to an important city. By 1876, production began to fall, and in 1878 the mine was forced to shut down due to destruction by fire of the Union hoisting works in August 1877.

From 1879 to 1910, sporadic mining activity was in the hands of small companies and leasers. In 1877 new vertical Union shaft, now known as the Belshaw Shaft, was sunk to a depth of 900 feet in quest for inferred extensions of Union and Santa Maria ore. This 31 year period of mining activity produced only a thousandth of the silver output that was produced during the 1869 - 1876 boom period.

The following eight years (1911-1919), marked the second largest total ore output in the history of Cerro Gordo. Responsible for this revival were L. D. Gordon and Associates who successfully mined rich zinc carbonate for which an eastern market existed. During these years, Cerro Gordo was the major source of the highest grade zinc carbonate ores produced in this country. The mineral smithsonite was most characteristic of the zinc ores. In addition to zinc, new silver-lead ore bodies were discovered and successfully mined during the 1911-1919 period.

During the next eight year period (1920-1928), the Cerro Gordo Mines Co. (a reorganization of L. D. Gordon and Associates) followed by various leasers, continued to mine old stopes in a modest way. An important ore body was found west of old Cerro Gordo in 1925 by the Estelle Mines Corporation, work was stopped in 1928 because of litigation. The ore body was discovered on the La Despreciada claim.

The third and last period of significant Cerro Gordo productivity began in 1929 and lasted until 1933. La Despreciada ore was extracted during this five year period.

The Cerro Gordo Mine was the greatest silver and lead producer in the history of California. Beginning with 1869, total recorded silver yield was of the order of 4,400,000 ounces and total lead production was roughly 37,000 tons. Beginning with 1911, total zinc production has been 12,000 tons. Copper was recovered only in later periods of operation.

Cerro Gordo silver-lead ores were easily smelted and of generally high quality. Most of the lead ore bodies were fairly uniform in grade and mineble to country rock walls. Hence, known reserves of marginal grade have never been a significant factor in mine evaluation.

The factual information included in this section was taken from Geological Survey Professional Paper 408, Geology of the Cerro Gordo Mining District, Inyo County, California, by C. W. Merriam, 1963.

GENERAL DESCRIPTION OF THE CERRO GORDO AREA

The Cerro Gordo Mining District derives its name from a limestone peak (9194 ft) located near the southern end of the Inyo Mountains. Together with a northern prolongation known as the White Mountains, the Inyo Mountains occupy a position at the west margin of the Great Basin. The abandoned mining town of Cerro Gordo lies 4600 feet above the town of Keeler in Inyo County on the northeast side of Owens (dry) Lake. A county dedicated gravel road approximately eight miles long connects the old mining town with state highway 190. The steep and winding road is maintained by the Inyo County Road Department. From the mine, the road descends along San Lucas Canyon on the east slope of Cerro Gordo Peak to connect with the road from Lee Flat to the Bonham talc mines. This county road can be traveled by conventional vehicles, but four wheel drive vehicles are necessary for most other roads in the area.

The terrain is quite rugged, characterized by steeply dipping Paleozoic limestones which stand high above the other rock types of the area. Many of the higher peaks and ridges of the region rise 1000 feet above their adjacent gorges, with many slopes approaching 45 degrees.

The strata at Cerro Gordo have been highly folded, sheared, and fractured to form a rugged topography characterized by towering cliffs, saddles, and steep canyons. High peaks and ridges rise 1,000 feet above their bases and display massive outcroppings of fractured and mineralized cliff-forming limestones. These limestones are crossed by numerous veins of limonite which provide a striking contrast to the lighter rocks.

The townsite itself sits in a saddle 1000 feet below and west of Cerro Gordo Peak and east of the steep ridge where the mine is located. Roads lead from the townsite southwest up Buena Vista Peak to the saddle lying between Cerro Gordo and Buena Vista Peaks and west around the ridge leading to Hart Camp and Hart Mine.

Figure 1 shows the area in which North American has conducted mineral explorations and indicates the types of surveys which were accomplished. Drilling was also attempted over this zone but the maximum depth attained was approximately 200 feet. This depth was insufficient to verify any part ot the ore deposition hypothesis. Following are brief descriptions of the various surveys made by North American and the resulting findings.

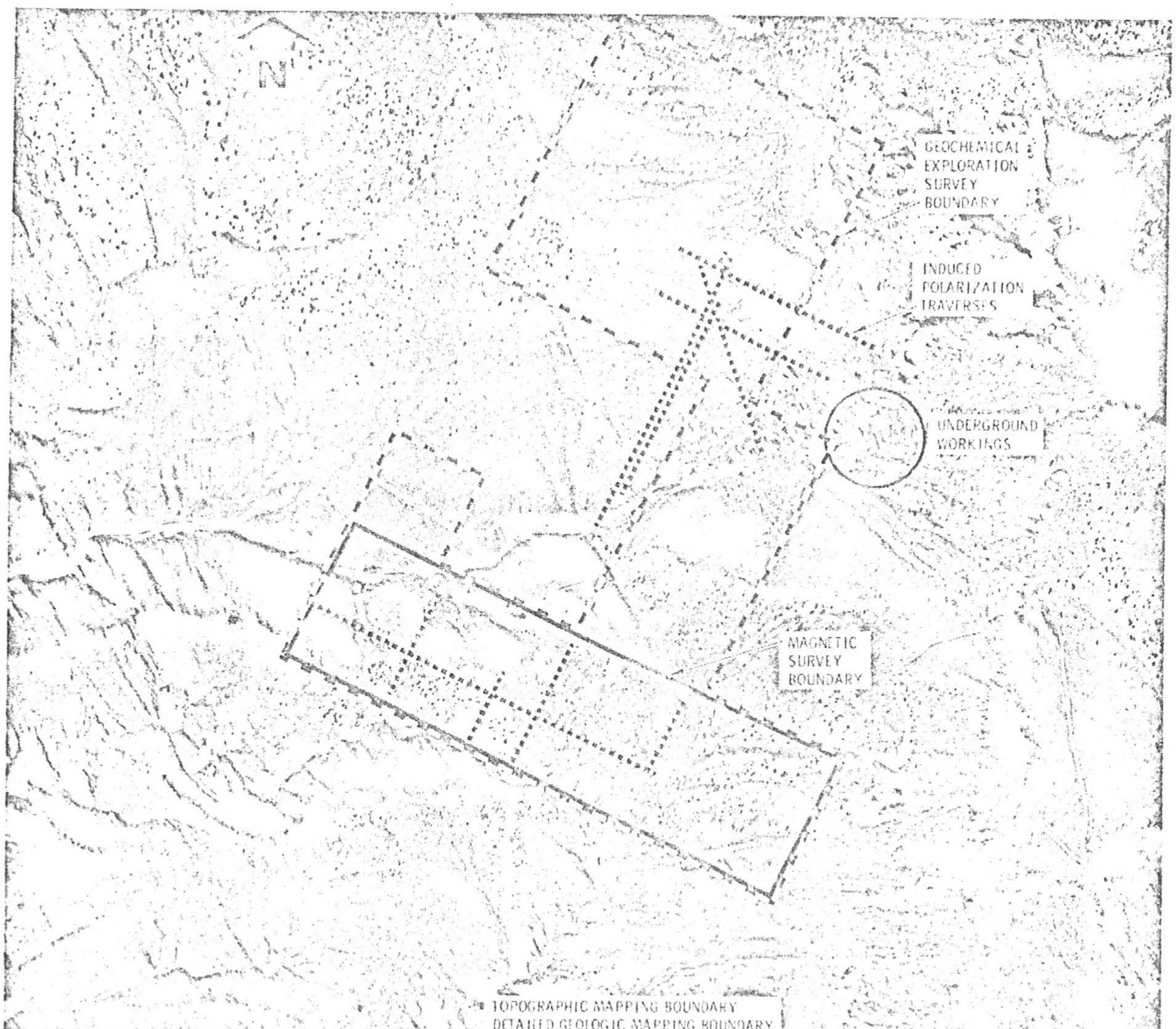


Figure 1. Areas Surveyed by North American Aviation, Inc.

GEOCHEMICAL SURVEYS

A geochemical survey was conducted over a one square mile area at Cerro Gordo. Nearly 5800 residual soil samples were collected here using the surveyed grid system for control. North-south lines were surveyed 500 feet apart with flagged stakes at 50-foot intervals. Sample points were then located between the surveyed lines. The samples were collected on a 50-foot grid throughout most of the area with the material being taken from a depth of six inches and screened to minus 100 mesh. (Figure 2)

Figure 2. Sample Screen

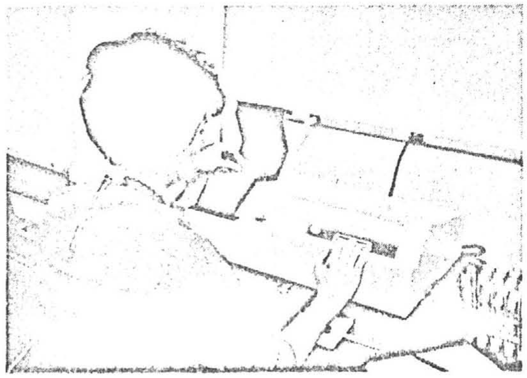


Figure 3. Spectrophotometer

Analyses for gold and silver were performed on each soil sample by the application of wet chemical techniques. The procedure used one gram of minus 100 mesh soil sample. Samples to be tested for silver were dissolved in 8 M nitric acid and those to be analyzed for gold were dissolved in aqua regia. In both cases, the metal was then extracted from the acid by means of an organic reagent. The reagent used for gold was isopropyl ether and the reagent used for silver analyses was an acetate solution. The metallic ions were dyed using Rhodamine - B for gold and a mixture of dithizone and benzene for silver. A portion of the dyed solution was pipetted into a pyrex optical cell and its value in absorption units was read on a Beckman DB spectrophotometer (Figure 3). Figure 4 shows the North American Laboratory at Santa Ana, California.

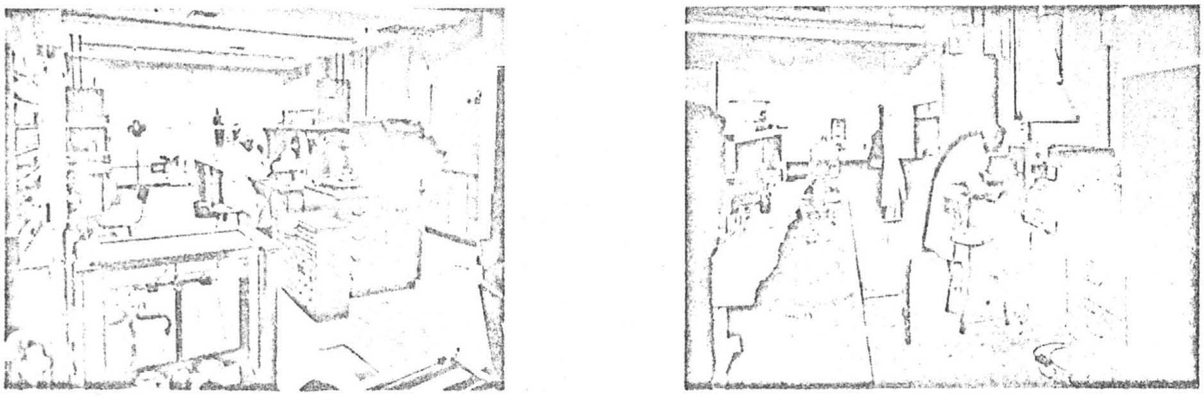


Figure 4. NAA Geochemical Laboratory at Santa Ana, California

The absorption values for gold and silver were plotted on separate overlays of the base map and these plots were subsequently contoured. The background values at Cerro Gordo were found to be several times higher than values observed in other areas of California and Nevada surveyed by the same techniques.

ATOMIC ABSORPTION SPECTROPHOTOMETER ANALYSES

Late in the program, suites of rock samples representing the major lithologies in the Cerro Gordo area were collected and subjected to assay by atomic absorption spectrophotometry (AAS) to determine lead, zinc, silver, copper, mercury and gold.

Areas to be sampled were chosen as to obtain maximum exposure of fresh outcrop, several new roads offered excellent sites for sample collection. The samples were taken at 50 to 75 foot intervals with 3 to 5 pounds of representative sample being taken at each point. All samples were thoroughly studied and identified, thin and polished sections being made when necessary. Samples were then crushed to minus 100 mesh for AAS analysis.

Sample Preparation and Assay Techniques

Analyses for gold, mercury and copper were conducted on Perkin-Elmer Model 303 atomic absorption spectrophotometer equipped with a double beam optical system and a DCR-1 direct readout unit (Figure 5). Analyses for silver, zinc and lead have not been completed. Samples were analyzed in an oxygen-acetylene flame. With the exception of the mercury lamp (an arc-discharge lamp), all source lamps were of the hollow cathode variety.

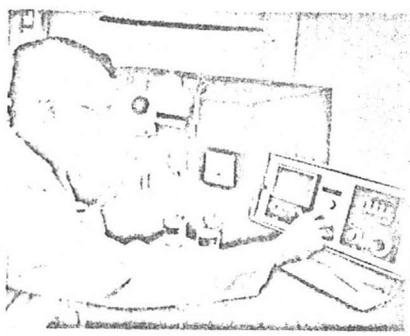


Figure 5. Atomic Absorption Spectrophotometer

Figure 6. Proton Precession Magnetometer

MAGNETOMETER SURVEYS

An ELSEC Proton Precession Magnetometer, capable of accuracy to within 2 gammas (Figure 6) was used by SRD in the Cerro Gordo area. A crew of two men was used to operate the magnetometer; one to carry the remote sensing head and the other to carry the body of the instrument and record the readings. The grid system surveyed by SRD was used as a base for the magnetometer surveys. A 300-foot spacing was used for general reconnaissance surveys while a 50-foot spacing was used for detailed work. Based on geochemical anomalies, a magnetometer survey using the detailed spacing was run over an area approximately one-half mile southwest of the Cerro Gordo townsite and the resulting data were contoured. A few small anomalies in the 100 gamma range were recorded in areas strongly altered to skarn. Shallow drilling to a maximum depth of seventy feet was performed in one area but drilling problems terminated this effort.

INDUCED POLARIZATION SURVEYS

The variable-frequency induced polarization method used by SRD (Figure 7) is basically a measurement of the resistance of the ground at two different frequencies. Small differences in ground resistance are indicative of the presence of electronic conductors. These conductors include metallic sulfides and graphite.

The three factors measured with this method are apparent resistivity, frequency effect, and the metal conduction factor. The resistivity is expressed in ohm-meters and is a measure of the resistance to the current flow. This can be computed from the voltage appearing at the receiving electrodes due to a current injected into the ground at the sending electrodes. The frequency effect is the change in voltage appearing at the receiving electrodes due to a change in the sending frequency (the current remains constant). The metal conduction factor is calculated.

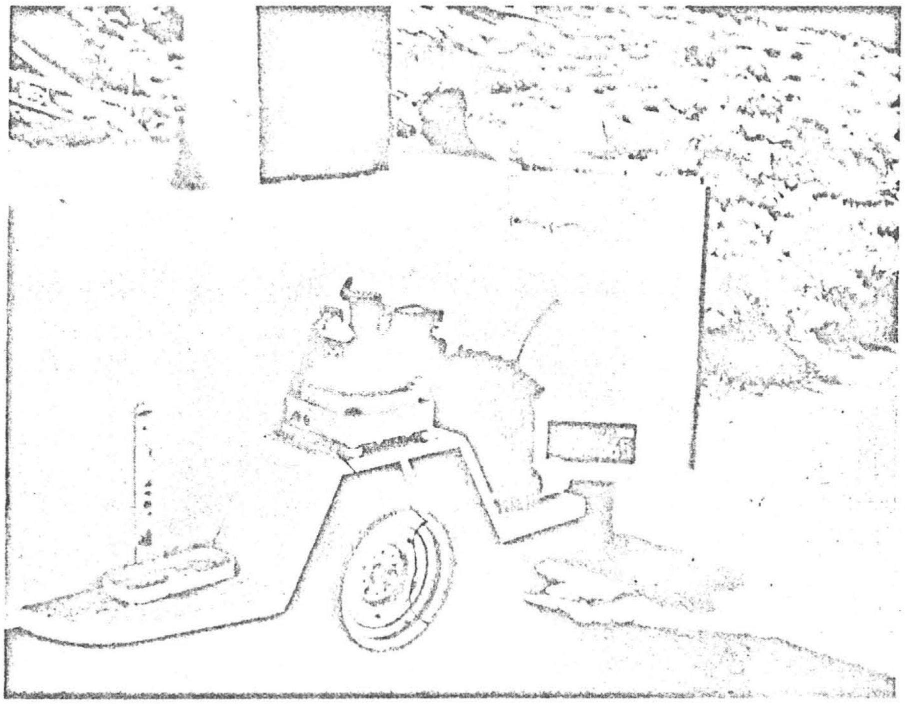


Figure 7. Variable-Frequency Induced Polarization Equipment System

Several traverses were made over geochemically anomalous areas. These traverses followed the grid used for geochemical sampling and the locations are recorded on the base map.

The dipole-dipole electrode array was used for all surveys with electrode spacing varying from 50 feet to 400 feet. Initially, frequencies of 5 and 0.05 cycles per second were used on surveys however, it became necessary to use 3 and 0.3 cycles per second due to considerable ground noise in the area.

Several minor anomalies were recorded which are of a magnitude to be expected in this area of scattered, pocket-type mineralization. Only one of these anomalies was drilled, and this to a depth of less than 100 feet. This penetration was not sufficient to evaluate the anomaly since the IP data shows the anomalous zone to be at an approximate depth of 400 feet.

Two other surveys both show anomalous areas. These traverses are separated by 400 feet, but show an area of interest at the same coordinate. This indicates a sizable deposit if the source of the anomaly is economic mineralization. No drilling was performed in this area to investigate the recorded anomaly.

UNDERGROUND SAMPLING PROGRAM

Chip samples were taken in nearly every accessible underground working in the district. The intent was to determine the degree to which vein mineralization permeated the country rock.

An underground drilling program was initiated to follow-up the chip sampling. Two reverse circulation percussion air drills were used with both a 315 cfm portable compressor and a 1200 cfm stationary piston compressor.

The permanent air line down the shaft is usable plus some of the line on individual levels. Total drilling consisted of 38 holes in the Cerro Gordo mine and 7 in the Morningstar for a combined total of 1680 feet.

All hoisting equipment at the shaft is in good operating condition. Approximately 9000 feet of workings were accessible from the shaft and another 4000 feet were made available by opening a few caves. Included in this additional 4000 feet is the portal of the Omega Tunnel (200 level) which is the opening for the auxiliary exit. An additional 8200 feet of the mapped workings are not accessible due to caves.

SKARN AREA

An area of prime interest was detected at a late stage in the program through geochemical and geophysical surveys. Data derived from this area led to a detailed field mapping program which disclosed a linear skarn zone west of the mining area in the lower member of the Keeler Canyon formation. It is noteworthy that intense skarn alteration occurs here but not in the vicinity of the Cerro Gordo mines. The zone is overlain by a thrust sheet in the northwest and by thick alluvium in the southeast, indicating that it extends beyond the outcrops in both directions. The most striking features of the zone are the pervasiveness of weak to moderate mineralization along its one and a half-mile strike length, and its highly sheared and fractured condition. Also, Chainman shale is scarcely altered in the mining area but strongly altered to chlorite and sericite adjacent to the skarn. Still another point of interest is the predominance of copper mineralization within the skarn area, whereas Cerro Gordo is characterized by lead, silver, and zinc mineralization.

One explanation for these features is that the Chainman shale has acted as a semi-impermeable barrier to trap ascending mineralizing solutions and formed a "blanket" of rich ores in the underlying Lost Burro limestone. Sporadic small stringers of mineralization along the skarn could represent leakages of mineralization from this orebody. The predominance of copper over lead-zinc mineralization in the skarn zone is in accordance with the principles of district zoning, in which copper forms an inner "shell" and lead, silver, and zinc are deposited in the periphery. High-grade shoots of the Cerro Gordo mines could, therefore, represent minor exposed outliers in an upthrown fault block. The thorough "stockwork-like" fracturing of the skarn area could be explained by collapse due to oxidation of underlying ore deposits.

SUMMARY AND CONCLUSIONS

The exploration program at Cerro Gordo was curtailed before all phases were completed so a final evaluation of the potential of the area must be somewhat inconclusive, particularly regarding potentially commercial deposits in the outlying area. The evaluation for the Cerro Gordo mine including the underground workings and the dumps is considered complete. The values in the dumps are largely in lead and zinc and range up to $40 per ton in some zones of the dump.

The primary purpose of the underground investigation was to determine if commercial mineralization was disseminated in the country rock and to evaluate the possibility of discovering new high grade orebodies. The chip sampling and air drilling program did not probe deeply into the country rock, but did establish the tenor of the disseminated mineralization. Although not of commercial grade, a considerable amount of mineralization has permeated the country rock throughout the mine area. The importance of this lies in possible correlations with information gained from the surface program for the purpose of locating hidden orebodies elsewhere in the area and for theorizing about a deep seated source of mineralization.

The surface exploration program indicated rather extensive mineralization in the outcrop areas of the lower Keeler Canyon formation. This zone of interest extends far more than one mile along the flank of the anticline west of Cerro Gordo and was not thoroughly investigated due to curtailment of the program. A large portion of this area was sampled but geochemical analyses were not completed. Preliminary AAS data indicated high metallic buildup across the contact zone in the area north of the original survey. A program to evaluate this entire zone was to have included complete geochemical analyses for several elements with the AAS system, correlation of the AAS results with the earlier wet geochemical analyses, geophysical surveys across the zone and several deep drill holes to investigate mineralization at depth. The drilling that was done in this program proved that drilling is very difficult in this area.

An interesting possibility to consider is the existence of a large buried ore deposit emplaced at depth with the observed surface mineralization being an expression of leakage patterns from such a deposit. As outlined earlier in this report, Chainman shale may have served as a barrier to trap the major portion of the mineralizing solutions. An investigation of this possibility would require additional study. Figure 8 summarizes in tabular form the accomplishments of North American on which such a study might be based.

LAND AND LEGAL

Included herewith is an aerial photo of the Cerro Gordo area where NAA's property is located. These properties consist of both secured and unsecured land with the acreage totaled below by claim group.

27 patented claims totaling 364 acres under lease-option agreement.

11 unpatented claims totaling 148 acres under lease-option agreement.

16 patented claims totaling 297 acres owned by NAA.

72 unpatented claims totaling 1,090 acres located by NAA.

61 unpatented millsites totaling 290 acres located by NAA.

All of the unpatented claims have been surveyed, discovery and boundry markers installed and the required discovery work performed and recorded.

In addition to the above properties, approximately two city blocks of patented land, plus three unpatented millsites included in the lease-option agreement, are located in or near the town of Keeler.

A two part technical report representing program results, conclusions, assay results etc. has been prepared by NAA's Strategic Resources Group and may be reviewed with management approval.

		Assays			
Project	Area Covered	Gold	Silver	Other	Remarks
Topographic Mapping	1.4 sq mi	-	-	-	5 ft Contour interval
Geological Mapping	1.3 sq mi	-	-	-	Detailed survey
Land Controlled	3.9 sq mi	-	-	-	Owned, claimed, under lease-option
Geochemical Exploration Survey	0.4 sq mi	4511	4736	-	Detailed 50 ft grid sampling
Magnetic Survey	0.2 sq mi	-	-	-	2,400 Reading taken
Induced Polarization Survey	15,200 lin. ft	-	-	-	To depths of 1,000 ft
Air-track Drilling	3,700 ft	286*	351*	-	95 Holes (70 ft max depth)
Rotary Drilling	642 ft	56*	48*	-	4 Holes (209 ft max depth)
Subsurface Drilling	1,680 ft	45	45*	-	45 Holes (ft max depth)
Subsurface Chip Sampling	All accessible under ground workings	314*	314*	-	
Mine Relabilitation	1,300 ft opened	-	-	-	
Other Assays	-	-	-	500* (Approx)	Grab sample, other elements

*Denotes Contract Assays

Figure 8. Summary of Data Obtained in the Cerro Gordo Exploration Program

III. DESCRIPTION AND GEOLOGY OF THE MINING PROPERTIES

CERRO GORDO MINES

General Description

The Cerro Gordo Mining District derives its name from a limestone peak (9194 ft) located near the southern end of the Inyo Mountains. Together with a northern prolongation known as the White Mountains, the Inyo Mountains occupy a position at the west margin of the Great Basin. The abandoned mining town of Cerro Gordo lies 4600 feet above the town of Keeler in Inyo County on the northeast side of Owens (dry) Lake. A county dedicated gravel road approximately eight miles long connects the old mining town with State Highway 190. The road is maintained by the Inyo County Road Department. From the mine, the road descends along San Lucas Canyon on the east slope of Cerro Gordo Peak to connect with the road from Lee Flat to the Bonham talc mines. This county road can be traveled by conventional vehicles, but four wheel drive vehicles are necessary for most other roads in the area.

The terrain is quite rugged, characterized by steeply dipping Paleozoic limestones which stand high above the other rock types of the area. Many of the higher peaks and ridges of the region rise 1000 feet above their adjacent gorges, with many slopes approaching 45 degrees.

The strata at Cerro Gordo have been highly folded, sheared, and fractured to form a rugged topography characterized by towering cliffs, saddles, and steep canyons. High peaks and ridges rise 1,000 feet above their bases and display massive outcroppings of fractured and mineralized cliff-forming limestones. These limestones are crossed by numerous veins of limonite which provide a striking contrast to the lighter rocks.

The townsite itself sits in a saddle 1000 feet below and west of Cerro Gordo Peak and east of the steep ridge where the mine is located. Roads lead from the townsite southwest up Buena Vista Peak to the saddle lying between Cerro Gordo and Buena Vista Peaks and west around the ridge leading to Hart Camp and Hart Mine.

Geology

All of the principal silver-lead mining areas in Inyo County are located in similar geologic environments that consist of massive carbonate rocks that have been highly folded and fractured, and intruded by igneous rock and sills. There appears to be a very close association between the ore bodies and the intrusive igneous rocks.

In particular, the southern Inyo Range in which Cerro Gordo is located, comprises strongly folded and faulted sedimentary rocks which range in age from Ordovician to Middle Triassis. Except for the upper part of the triassis sequence, which is largely volcanic, the formations are largely limestones, dolomites, quartzite, and shales. Large numbers of small to medium sized granite bodies, aplites, and andesite dikes have penetrated the sedimentary rocks causing varying degrees of contact and hydrotherman metamorphism.

The principal ore bodies of Cerro Gordo are located in the Chainman shale and the Lost Burro formation. The Chainman shale is approximately a 1,000 ft. thick formation comprised of dark-gray to black carbonaceous shale, silty shale, fine sandstone and limestone. In the Cerro Gordo mine area the formation has been widely affected by low-grade metamorphism. North of the mine the formation becomes more highly altered where granitoid rocks are in evidence.

The Lost Burro formation is a 1,600 ft. thick sequence of massive, cliff-forming marble and limestone of white to bluish-gray color. This formation has been found to be the best host rock for replacement ore bodies in the area. The best ore bodies in the Cerro Gordo mines were found in the Lost Burro formation.

IV. MINING POTENTIAL, STATUS, AND DEVELOPMENT

CERRO GORDO MINES

Mining Potential

The Inyo County silver-lead region has produced a substantial amount of silver and lead from near surface ore bodies. All of the mines to date have been located by surface prospecting and in all cases ore grade material has outcropped at the surface. It would be reasonable to believe that only a very small fraction of the ore bodies that exist in the region have been located since most areas are covered by alluviam, talus, and volcanic rocks. Also, it would be expected that the majority of the ore bodies in existence in the region would not extend to the surface.

The major ore bodies in the region all contain a large percentage of sulfides and will respond well to modern geophysical methods, especially to induced polarization surveys. As far as is known only one major exploration program has been carried out in the region where advantage was taken of modern techniques in geophysics and geochemistry. This program was carried out by North American Rockwell at Cerro Gordo. The results of this survey indicate a major potential for the skarn zone at Cerro Gordo, but the program was terminated prior to the completion of the necessary geophysical surveys and the area was never drilled to depth to check the source of the high geochemical anomaly.

The size of the skarn zone area, approximately one by one and one-half miles, indicates that it could be an area above a very major ore body. It is felt that the ore bodies mined at Cerro Gordo may represent only small offshoots of such a major ore body in the region. Such a major ore body could contain several hundred thousand tons of ore and represent many millions of dollars. For example, an ore body 1,000 ft. square and 120 ft. thick would contain about 10,000,000 tons of ore; and if it averaged $25 per ton, the ore mined at Cerro Gordo averaged about $125-$150 per ton, would represent some $250,000,000 in gross value. The location of such an ore body is well within the range of reasonable expectation.

In addition to the potential of finding a major ore body at Cerro Gordo, it has been established that dumps from prior working contain gross values of over $2,000,000 and that there are approximately 10,000 tons of blocked out ore remaining in the mine itself. The main dumps on the property consist of over 150,000 tons of material that averages about $14 per ton. It is felt that this material could be processed at a profit by hauling to a mill located at Darwin that is presently processing ore from the Darwin mines. Profits from such an operation could be expected to range from $3 to $6 per ton depending upon the recoveries obtained. It may also be expected that profits of from $10 to $30 per ton may be realized from the proven ore in the mine itself.

The Belmont mine has had considerable production and all of it from shallow workings. However the mineralized vein on which the mine is located is several thousand feet in length. This feature could represent a major ore control in the area. There are two possibilities for major ore discoveries at the Belmont. There is the possibility that at depth the entire vein system is mineralized and that such an ore body would consist of a vein several feet in thickness and extend downward several hundred feet in depth. The second possibility is that the fault in which the vein is located serves as a control feature and that at depth replacement bodies of the Cerro Gordo type may be found. In either case substantial profits could be realized from an operation at the Belmont mine.

The two prime targets for further exploration at present are the skarn zone near Cerro Gordo and the Belmont mine. These two areas are of greatest interest at present because of past history and recent evaluation programs. However the entire surrounding region is of great interest due to its favorable geologic setting.

Present Status

Recent evaluation programs at Cerro Gordo and Belmont properties by North American Rockwell and other qualified persons indicate that these properties warrant a major exploration and drilling program.

North American Rockwell expended considerable effort on the Cerro Gordo property before terminating their program. During this program an extensive detailed geochemical sampling and analysis program was undertaken. Induced polarization and magnetic surveys were conducted in the area and the underground workings were opened and explored.

The prime result of this effort was the delineation of a skarn zone north of the old Cerro Gordo workings through a geochemical survey. This zone is approximately one mile wide and one and one-half miles in length. Throughout the area high values for silver and gold were found. Further investigation of the area revealed intensive alteration of the rocks due to hydrothermal action. The geochemical survey was followed by a limited induced polarization survey with positive results. However this survey was not completed before termination of the program.

It is strongly felt that the skarn zone may lie above a major ore deposit and that the Cerro Gordo mines may only represent leakage stringers from such a deposit.

During the underground exploration program the Belshaw shaft was reconditioned and the mine hoist and compressor repaired. This equipment is in excellent condition and the shaft is in good repair to the 900 ft. level.

It was confirmed that the bottom of the mined ore bodies appeared to be at faults that were post mineralization and that in all probability the ore bodies extended to deeper depths.

Some shallow drilling was performed underground but the equipment used was not capable of reaching suspected ore that may be displaced downward extensions of the mined ore bodies.

Other underground drifts and stopes in the area were also explored. In particular it was determined that the Estelle tunnel was generally in good shape. This is important because this tunnel was driven at a level some 2,200 ft. below the collar of the Belshaw shaft. The tunnel has a total length of about 8,000 ft. at that level. About 7,500 ft. from the adit a 660 ft. raise was driven and a drift driven toward the Jefferson stope. This drift extends to within a few hundred feet of the downward extensions of the mined areas and would intersect such an extension about 600 feet below the 900 ft. level of the mine. An excellent way to explore the Cerro Gordo mines at depth would be to extend this drift to a point under the Jefferson stope and then perform underground drilling from the drift.

Recently the Belmont mine has had a geologic survey performed on it as well as some limited geophysical studies. Reports by geologist D. L. Davis and Geonics, Inc. indicate that the mine has excellent potential and that additional geophysics should be performed on the property followed by a diamond drilling program.

Overall recent evaluation program on both the Cerro Gordo and Belmont mines give positive results and provide a basis for extending the programs initiated earlier.

Mine and Mill Development

The goal of the proposed program is to locate and prove through drilling a major ore body of several million tons of ore. By using the planned approach it is felt that such an ore body could be located in the Cerro Gordo area or that the Wild Blue claims in New Mexico could produce such an operation. Time-wise it is felt that such an ore body can be proven two years into the program.

Once such an ore body has been proven it will be necessary to develop the ore body for mining and to build a mill to process the ore. The mining and milling operation would be geared to handle several thousand tons per day depending on the size and nature of the ore body. An underground mining operation on good quality ore would probably range from two to three thousand tons per day while an open pit operation would probably be three or four times as large.

The optimum size of the operation cannot be determined until a specific ore body has been proven, but for a major mine an operation that will last at least ten years should be established. As an example of a major operation on an ore body such as described earlier for the Cerro Gordo area, 10,000,000 tons of ore with values of $25 per ton, a 3,000 ton per day operation would last about ten years.

Assuming a 3,000 ton per day underground mining operation 350 days per year, the total ore processed would be slightly over 1,000,000 tons per year. Such an operation would require a capital investment of some $10,000,000, have a gross of about $25,000,000 per year, and realize a gross profit of about $13,000,000 per year of which about $7,000,000 per year would be taxable income. The detail breakdown of these dollars would be as follows:

Capital Expenditures

Mill	$4.5 M
Mine Equipment	2.0 M
	$6.5 M
25% Contingency	1.4 M
Total Capital	$7.9 M
Operating Expenses	$1.2 M
Total Cash	$9.1 M

Mill costs based on $1,500 per ton ore per 24 hrs.
($1,500/ton/day) X (3,000 tons/day) = $4,500,000

Operating expenses based on 100 men @ $12,000 per yr.

Operating detail -

Gross income	$25. M	1,000,000 tons @ $25/ton
less mining	5.0 M	estimated $5/ton
less milling	4.0 M	estimated $4/ton
less overhead	3.0 M	
gross profit	13.0 M	
less depletion 22%	5.5 M	
less depreciation	0.9 M	
taxable income	6.8	
50% tax	3.9 M	
	3.9 M	

Total Retained Income 9.4 M (after tax + depletion)

Return on Investment + 100%/yr.

THE CARLIN GOLD MINING OPERATION

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INTRODUCTION

High on the crest of the Tuscarora mountains at an elevation between 6500 and 7000 feet, Newmont found a large deposit of sub-micron size gold. The ore is being processed and produced at Carlin Gold Mining Co.'s (wholly owned by Newmont Mining Corp.) 2000 ton per day cyanide plant. This deposit is situated in the old Lynn Mining District in Northern Eureka County, Nevada. Since the turn of the century prospectors have labored here washing gold from placers by both the wet and dry methods. Some of the early production came from silicified shales of the Ordovician Vinini formation in the upper plate rocks of the Robert Mt. thrust fault, and from narrow gold mineralized faults and dikes. All of this early production was gold that could readily be seen and panned by the conventional method.

The gold mineralization in the Carlin deposit is probably Tertiary in age and occurs in irregular fingers and lenses replacing Silurian-Devonian dolomitic siltstone and silty dolomitic limestone in the lower-plate rocks within the Lynn "window". This is in close proximity to the Roberts Mt. thrust fault that moved siliceous volcanic western assemblage rocks easterly and southerly for distances on the order of 100 miles from their original place of deposition. These rocks override the eastern or carbonate assemblage rocks that are exposed within the Lynn "window".

Gold values vary considerably both vertically and horizontally and do not seem to be consistantly related to associated metals, some of which are often used as "indicators", such as mercury, arsenic, copper, etc. Barite, pyrite, and iron oxides are the most easily observed minerals in the mine area. Galena and cinnabar have been observed and native arsenic has been identified. Some silicification of the ore strata has occurred by the introduction of hydro-thermal quartz through minute fractures. The only igneous rocks observed in the mine area are narrow feldspar porphyry dikes. These are usually highly altered and in some instances gold mineralized.

DISCOVERY AND DEVELOPMENT

In 1961 the U. S. Geological Survey published a report, "Alignment of Mining Districts in North-Central Nevada", which reviewed over 30 years of study, mapping, and interpretation of the complex structures and stratigraphy of the region. Shortly after the release of this report, Newmont geologists began an intensive mapping and sampling program that took them to most of Northeastern Nevada and finally to the Lynn area. In September of 1962 they brought in an Ingersoll-Rand Drillmaster to test some of their theories and gather additional geological information. This drill was capable of drilling a 4 3/4 inch hole to a depth of 250 feet. It was used as a rotary drill in softer formation with a tri-cone bit. By changing to a down-the-hole hammer the harder siliceous rocks could be drilled. Dry cuttings were collected and samples taken on regular five foot intervals. The third hole drilled cut gold values of good grade. This lead was pursued with good results, and the drilling program was intensified. More drills were brought in, which included rotary and diamond drills. It was soon discovered that diamond drilling was too costly and core recovery very poor. This was due to several reasons; badly fractured rock that damaged bits and caused excessive wear to core barrels, large cracks that took much water and circulation materials, very slow progress due to cementation and crooked holes. Because of these and other problems, this type of drilling was kept to a minimum and the orebody was de-limited by rotary drilling.

By the fall of 1963, it was evident that an orebody of major proportions had been found and ore blocked out in sufficient quantities to warrant construction of a 2000 ton per day cyanide plant. Underground work was initiated to obtain metallurgical samples from geologically different formations. Drill cuttings from several sections of the orebody were taken and sent to Newmont laboratories for metallurgical evaluation. As this work was in progress, pit plans were formulated and studies made of ways to strip the orebody. A suitable road had to be constructed to the minesite capable of transporting equipment and traffic necessary for construction. Water had to be found, and power brought in. Tailings and waste dump areas located and drilled.

These were only a few of the problems that had to be solved before the mine could be brought in production.

MINE STRIPPING AND PLANT CONSTRUCTION

The spring of 1964 saw much activity. Contracts were awarded for mine stripping and plant construction. A portion of one ridge was leveled to accomodate the plant and service facilities. Building and equipment foundations were poured and construction started in full swing. At the same time, scrapers, and tractors equipped with rippers began stripping 3½ million tons of overburden from the orebody. What the scrapers could not move, was drilled, blasted, and loaded by large shovels and trucked to waste dumps.

MINING

Presently mining is being done with a 3½ yard Bucyrus-Erie shovel, a 2½ yard Northwest shovel, and a 5 yard Michigan loader. These machines load 30 ton Haulpak trucks two shifts a day five days per week, from twenty foot benches. The 3½ yard shovel is used almost exclusively for waste removal while the 2½ yard machine loads both ore and waste. The loader is used mainly for ore blending, but is also used for general pit cleanup and to load waste in areas and in material it can handle. We found that these machines can load up to 3000 tons of material per shift if it is well shot and not too rocky.

The ore is mined at the rate of 3000 tons per day to supply the mill seven days a week. The ore is hauled and deposited on the stockpile located near the crusher. This stockpile is maintained between 20 and 30 thousand tons.

Blasting is done with pre-mixed ammonium nitrate and prima cord, in holes spaced from 10 x 10 to 15 x 15 depending on the material. Since there is no visual ore control, all blast holes are sampled and assayed. They are also numbered and surveyed. This enables re-location of ore holes after a blast. These holes can then be marked as a guide to the shovel operator. This method gives good grade control.

ASSAYING

The necessity of sampling and assaying all material in or near the ore zones ahead of mining, created a problem due to the lengthy time it took to receive results by fire assaying. This led to a comprehensive study of all known methods of gold assaying in hopes of finding a method of assay which would give reliable results quickly. As a result of this study, assaying by Atomic Absorption was adopted.

In this kind of assaying the gold in the samples is taken into solution by mixing the pulp with an equivalent weight of hot 0.25 percent NaCN solution. A small amount of lime is added to assure alkalinity. The samples are mechanically shaken for approximately 15 minutes, then vacuum filtered, and the filtrate presented to the flame aspirator on the atomic absorption instrument. The read-out is automatically charted on the recorder. This value is then compared against a standard curve plotted from samples of known gold value.

Carlin ore now being mined is ideally suited for this kind of assaying due to the sub-micron size gold and the porosity of the rock. The method is fast; once the sample is prepared the assay can be obtained in about 20 minutes. Mill solution samples that require no preparation are run through the instrument and an assay obtained in about 1½ minutes. Accuracy can be attested to recordings of barren solutions assaying 0.0005 ounces of gold per ton. To achieve this kind of accuracy, the ore must be amenable to cyanidation. At the present time nearly all mine and mill samples are assayed by atomic absorption.

PART II - THE MILL

CRUSHING

The crusher is fed by a front-end loader from the ore stockpile located nearby. This is necessary because of the high clay content of some Carlin ores and blending can be done with less sticky ores, thereby alleviated many problems in the crushing circuit. The run of the mine ore is crushed to a 4 to 5 inch product by a Pioneer 42" x 48" jaw crusher. A 5½ foot Symons standard cone crusher, operating in closed circuit with a double deck Tyler vibrating screen, reduces this material to 1 inch size and the ore is deposited in three cylindrical steel bins located within the main mill building. These bins provide a total live storage capacity of approximately 4000 tons ahead of the ball mill. Each bin is equipped with high-level switches and an alarm is annunciated at the crusher control panel when the bin is full.

GRINDING AND LEACHING

Mill feed from the fine ore bins to a Marcy 10 x 10 ball mill is automatically controlled, weighed and chart recorded in the mill main control room. Grinding is to 6 percent plus 48 mesh and 55 to 60 percent minus 200. Cyanide solutions are maintained at a strength of .025 percent and is fed automatically to the ball mill from a central source. Classification is by cycloning in closed circuit with the grinding mill with the overflow density maintained at or near 50 percent solids. The pulp is delivered from the cyclones to one of four agitator leach tanks in series. To aid in gold dissolution, air at the rate of 25 cfm and 25 psi is introduced into each agitator. These four agitators allow 16 hours of contact leaching time and to prevent short circuiting, the feed is forced downward at its point of introduction by the agitator propellor to insure circulation of the pulp through its full leach cycle. Lime slurry is added as the pulp enters the first agitator.

THICKENING

The success of any conventional cyanide flowsheet depends upon the efficiencies of washing stages in the counter-current decantation circuit. Carlin has five heavy duty, Dorr-Oliver thickeners. By using a fairly high pH (11.5) and adding a flocculating agent, very rapid settling rates are achieved with Carlin ores. Thickener feeds are repulped with counter-flow solutions to permit flocculation break-up and cyanide solution release from the flocs. Thickener densities are maintained at 50 percent solids.

The thickeners are 125 feet in diameter and are located outside the mill building even though winter temperatures may drop well below zero. A central pumping station and all accessory pipe lines and drive mechanisms that service the thickeners are housed permitting the operators to perform all their regular duties without going outside the mill building.

PRECIPITATION AND REFINING

The precipitation by zinc dust has been recognized for many years as the most efficient and economical method of precipitating gold from cyanide solutions. The primary requisites for complete and efficient precipitation are thorough clarification and deaeration of the cyanide solutions.

The pregnant solution reporting to the mill from No. 1 thickener is clarified to remove all slimes and leave a crystal clear solution free from all colloidal material. This is accomplished by pumping the pregnant solution through three cylindrical, pressure leaf type filters at the rate of 1200 gpm. Pre-coating with diatomaceous earth "filter-aid" assures maximum filtration and prevents blinding of the filter leaves.

The clarified or filtered solution is then deaerated to remove all dissolved oxygen. A Cochrane two stage cold water vacuum deaerator unit is used. This unit was designed to deliver 1200 gpm of effluent not to exceed 0.1 ppm oxygen. Two Kinney vacuum pumps provide vacuum for the deaerator tower.

The clarified-deaerated solution is withdrawn from the bottom of the tower by a single-stage centrifugal pump submerged in solution to prevent the re-entry of air through the pump gland. The pump discharges the solution to three Shriver, regular type, side feed, plate and frame, filter presses. An emulsion of zinc dust and barren solution is added at the pump discharge to precipitate the gold. Through the use of an indicating flow meter, the flow through each filter can be measured. Barren solution from the presses is added to the feed of No. 5 thickener to aid in maintaining plant solution balance.

Precipitate removal from the presses is achieved by cutting the filter paper draped over each plate, opening the joints between the plates and frames, and dropping the dried precipitate into a tray placed beneath the press.

The precipitates are charged in batches to a Lindberg rotating melting furnace. Each batch from this oil fired furnace produces a large bullion button which is recovered from the slag pot cone. These are remelted in the final pour to form finished gold bars.

TAILINGS

Tailings are carried through a 10 inch wood stave pipe line over a distance of 2350 feet and deposited behind a storage dam built of compacted impervious earth to an initial height of 90 feet with a crest length of 900 feet. Due to the rapid drop in the topography, this dam will have to be raised to an ultimate height of 225 feet with a crest of 2000 feet. Materials used to raise this dam will be sands reclaimed from the tailings supplemented by mine waste.

AUTOMATION

The Carlin mill is highly automated from two control centers. One center, located in the crusher building, controls all activity from haulage truck signalling through the two-stage crushing, to the fine ore bins. The second and main instrument control center is centrally located within the mill building. This controls activities from grinding, through five stage counter current decantation, clarification, deaeration, and precipitation. Altogether there are 175 control, alarm, and recording functions contained in the two centers. Most of the mill operation and its charted recordings can be observed from this main control room.

WATER AND POWER

Water for the mill is pumped at the rate of 500 gpm from a well located approximately 2½ miles west of the plant and at an elevation of 1000 feet lower. Water in this well comes from a major east-west block fault that elevated Ordovician Eureka quartzite alongside Silurian Robert Mt. limestone. This water is several hundred feet higher than the main water table in Boulder Valley a couple of miles to the west.

Power for the project is supplied by Sierra Pacific Power Co. A new 47 mile transmission line carries 67,000 volts of electricity from Battle Mt, Nevada, to the plant site. In the event of a general power failure, a standby power plant (250 kw) is maintained to operate specific items of equipment and to provide emergency lighting.

REFRACTORY ORES

Some refractory ores to the existing mill circuit are present outside the main orebody now being mined. These occur in three forms; as carbonaceous matter in which the carbon acts as a precipitant; as ore with finely disseminated pyrite that causes acidic conditions; and as gold locked in quartz that cannot be exposed to cyanide. Tonnages and areas of refractory ore have pretty well been delineated and all possible means and methods are being explored to find an efficient and economical way of treating these ores.

CONCLUSION

Pouring of the first gold bar early in May, 1965, climaxed three and one half years that saw the initial mapping and sampling, drilling, discovery, and development of one of the largest precious metal deposits found in the United States in over 25 years, with ore reserves over 11 million tons, and the design and construction of the most modern cyanide plant in the world today. Production from this mill makes Carlin Gold Mining Co. the second largest gold producer in the United States, exceeded only by the fabulous Homestake Mine.

AKNOWLEDGEMENT

The foregoing is a brief summary of the geology, mining, and milling at Carlin Gold. A comprehensive paper on milling, metallurgy, and other details written by Frank W. McQuiston, Jr., Vice-President, and Robert W. Hernlund, Senior Metallurgist, Newmont Mining Corporation, was published in the November 1965, issue of the Mining Congress Journal. Also a detailed article on geology by Byron S. Hardie, Newmont geologist, is to appear in a Bureau of Mines publication in the near future. Considerable information was used from these articles in preparation of this paper. The author presented a more detailed paper on mining activities at the Phoenix, Arizona, A. I. M. E. meeting held in October, 1965.

COUNTY:	COUNTRY:	STATE:	NAME OF PROPERTY:
Inyo County	U.S.A.	CALIF.	Cerro Gordo Mine

DISTRICT OR AREA:	METALS:	ACCOUNT NUMBER:	NUMBER:
Cerro Gordo Mng. DIST.	Pb. & Ag	C005	80

GENERAL DESCRIPTION: Enriched shoots or fissures & massive bodies in steep inclined pipes & sm

EXAMINED BY: Peter & IRA Joralemon
DATE: 11/1966

BRIEFED BY: —

DATE:

STATUS: Available for lease option from Seagull Industries

TYPE OF DEPOSIT:

GEOLOGY Strongly folded & faulted Sedimentary rocks, Ordovician to Middle triassic age
Rocks mainly limestones & shales.
As a result of intruded sediments showing varying degrees of contact metasomatism & metamorphism, the shales & carbonate rocks have been partially or wholly altered to SKARN, chlorite & sericite

LOCATION:

ELEVATION: 8000'

LAT: **LONG:**

ACCESS: 4600 ft. above town of Keeler in Inyo County on N.E. side of Owens (Dry) Lake 4wld is necessary

DEVELOPMENT: Numerous working tunnels, pits, shafts 22,000 T. Lead & over 3,000,000 oz. Silver produced reportedly

MINERALIZATION: Lead, Zinc, minor occurences of copper

PROPERTY & OWNERSHIP: Kohm Mining & Development, Inc. a subsidiary of Seagull Industries, Inc.
27 patented lease option
11 unpatented " "
16 patented ownership ? NAA
72 unpatented " "
61 millsites " "

GEOPHYSICS: Magnetics survey, total intensity using Elsec Proton Precession +/- 2γ. I.P. survey using frequency type inst.

AERIAL PHOTOGRAPHS: ?

GEOCHEMISTRY: Surveys conducted over a one square mile area. 5800 residual samples taken. Analyses was for Au, Ag, Cu,

TOPOGRAPHIC MAPS:

MAPS & REPORTS: U.S.G.S. P.P. 408 by C.W. Merriam, 1963
North American Aviation, Inc. Report T6-2906/20

MINERAL PROSPECT DEPOSIT DATA SHEET

ESSEX INTERNATIONAL, INC.
1704 WEST GRANT RD., TUCSON, ARIZONA 85705
PHONE (602) 624-7421

BY: E.G.H.

DATE: 5-18-71

NAME OF PROPERTY:	NUMBER:

REFERENCES:

PRODUCTION & RESERVES	SAMPLES:
? See development	

METALLURGY:	ENGINEERING:
?	

FACILITIES:	EXPLORATION POSSIBILITIES:
Numerous blgs. condition unknown.	

ADDITIONAL INFORMATION OR SKETCH MAP: