CALICO HILLS

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Plates

"An Economic and Geologic Evaluation of the Calico Iron Discovery Walker Reservation, Nevada" R.L. Haxby W.F. Chester

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AN ECONOMIC AND GEOLOGIC EVALUATION OF THE CALICO IRON DISCOVERY WALKER RESERVATION, NEVADA

BY

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WINTER PARK, FLORIDA

SEPTEMBER 1967

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OXY INTER-OFFICE MEMORANDUM

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RICHARD C. MAYBERRY DATE: SEPTEMBER 1967

OM: RONALD L. HAXBY

BJECT: WALKER RESERVATION REPORT - AN ECONOMIC AND GEOLOGIC EVALUATION OF THE CALICO IRON DISCOVERY

THIS REPORT SUMMARIZES THE RESULTS OF A THREE-MONTH (SEPTEMBER-NOVEMBER 1966) EXAMINATION, BY RON HAXBY AND WIL CHESTER, OF THE WALKER-MARTEL MINING COMPANY DATA ON THE CALICO IRON DISCOVERY.

DUE TO AN UNFORTUNATE CIRCUMSTANCE, THE FINAL DRAFT OF THIS REPORT HAS BEEN DELAYED UNTIL THIS TIME. HOWEVER, THE RESERVES WERE COMPUTED FOR YOU IN MARCH 1967.

Ronald L. Haxby

RONALD L. HAXBY

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The section of the report titled ECONOMICS OF MINING THE CALICO IRON DEPOSIT should be of particular interest to management as a hypothetical example is used to show the timing and capital expenditure necessary to put a large scale iron mine into production. It also defines the parameters used in the evaluation. The results are summarized in the following table.

HYPOTHETICAL CALICO MINING COSTS

Iron Ore: Magnetite, Cutoff grade 30% Fe, Average grade 40.1% Fe.
Mining Method: Underground block caving.
Annual Pellet Production: 1,400,000 long tons.
Pellets sold at San Francisco* @ $16 per long ton (25.2¢ LTU).
Capital Investment: $40 million, Preproduction time: 5 years.
Payback period: 6.8 years.
Life of the Mine: 23 years.
Discounted Cash Flow Rate of Return (before taxes, etc.): 12%
Estimated Annual after-tax Profit: $1 million
*Assumption: There will be a market in San Francisco.

CONCLUSIONS

Drilling and geologic inference indicate the presence of a large magnetite deposit with grades and tonnages similar to the calculated inferred reserves. Additional drill is necessary to "prove up" the reserves. The drill costs could reach $4 million and require another two-year exploratory period.

A hypothetical example based on today's prices and a San Francisco market show the property is profitable. However, the pellet price and marketing situation are real problems as Australian iron is forcing prices down which would make the Calico unprofitable unless new technological changes in pelletizing dramatically reduce production costs. Marketing is also a problem. Costs are based on a steel mill or shipping point at San Francisco. Presently, there is not a steel mill there. The value of the iron ore would increase if copper and sulfuric acid (from pyrite and pyrrhotite) could be developed.

RECOMMENDATIONS

A comprehensive engineering and marketing study is recommended because in the near future there will be technological advances in pelletizing methods and recovery of by-products that could dramatically improve the Calico iron-copper-pyrite-pyrrhotite deposit profit potential.

The iron discovery should be drilled out but since the exploration costs would be high, the capital expenditure must be justified by a favorable marketing report.

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SUMMARY

This report presents an economic and geologic evaluation of Occidental Petroleum Corporation's Calico iron discovery on the Walker Indian Reservation, Nevada. The reservation is located 65 miles southeast of Reno, Nevada.

Under a partnership arrangement with the Walker Martel Mining Company of Reno, Nevada, Occidental has conducted a minerals exploration program since 1964. Walker Martel managed all of the past exploration work. Exploration on the Reservation is permitted under an exclusive prospecting permit issued by the Bureau of Indian Affairs and the Paiute Tribe.

The Calico iron discovery is located within the highly mineralized "Walker Lane" zone in western Nevada. The iron mineralization is magnetite and occurs as a pyrometasomatic or igneous metamorphic deposit. The iron (magnetite) zone, as delineated by magnetic anomalies and drilling, appears to be a vertical, sheetlike mass, that is 600 feet wide, 6,000 feet long, and 2,000 feet thick. It is overlain by 1,300 feet of unmineralized volcanic flows.

Five widely spaced diamond drill core holes have been drilled through the iron zone to depths of 3,600 feet. Detailed ground and aerial magnetometer surveys provide evidence of continuous mineralization between drill holes. A significant quantity of copper (130' @ 0.79% Cu) was intersected in one drill hole but the tonnage and distribution of the mineralization is unknown.

Ore reserves are classified as (1) proven, (2) indicated, or (3) inferred. Proven reserves are based on extensive drill hole sampling. Inferred reserves are calculated from a few drill holes and considerable "geologic inference". The Calico iron reserves as shown in the following table are in the inferred category because of the limited drilling and strong dependence on geologic assumptions.

INFERRED CALICO IRON RESERVES
AT VARIOUS CUTOFF GRADES

Cutoff Grade	Tonnage	Average Iron Grade	Average Copper Grade
0% Fe	563M*	24.9% Fe	0.081% Cu
10	483	28.3	0.074
20	359	32.9	0.081
30	188	40.1	0.081
40	88	46.3	0.088
50	20	52.1	0.104

*M = Millions of long tons

INTRODUCTION

The Occidental Petroleum Corporation and Walker-Martel Mining Company have been conducting a minerals exploration program on the Walker River Piaute Indian Reservation since 1964. Walker-Martel, under the partnership arrangement, has managed and supervised the actual exploration. This report presents the results of a three-month evaluation of the data and examination of the prospects by the Occidental Minerals Corporation.

The Reservation is located within the highly mineralized "Walker Lane" zone in north central Nevada and covers a 550 square mile area. An exclusive, renewable prospect permit is held by the Walker-Martel Mining Company.

Several copper and iron prospects have been explored with the greatest efforts directed towards the Calico iron discovery. The Calico target area was originally identified by a magnetic anomaly. A large occurrence of magnetite (Fe_2O_3) was later verified by six deep drill holes. In addition, a significant occurrence of copper was intersected in drill hole CA-3.

Based on the Calico drilling and metallurgical analyses an "inferred" iron reserve estimate has been computed.

Location and Accessibility

The Walker River Reservation is located in west central Nevada (see Figure 1) about 65 air miles southeast of Reno. Schurz, Nevada, is the only town on the Reservation. Highway 95, a major paved road joining Reno to Las Vegas, passes through the center of the Reservation. It is approximately 100 miles by road from Schurz to Reno. The Southern Pacific Railroad crosses the Reservation three miles west of Schurz. There also is a small airport in Schurz.

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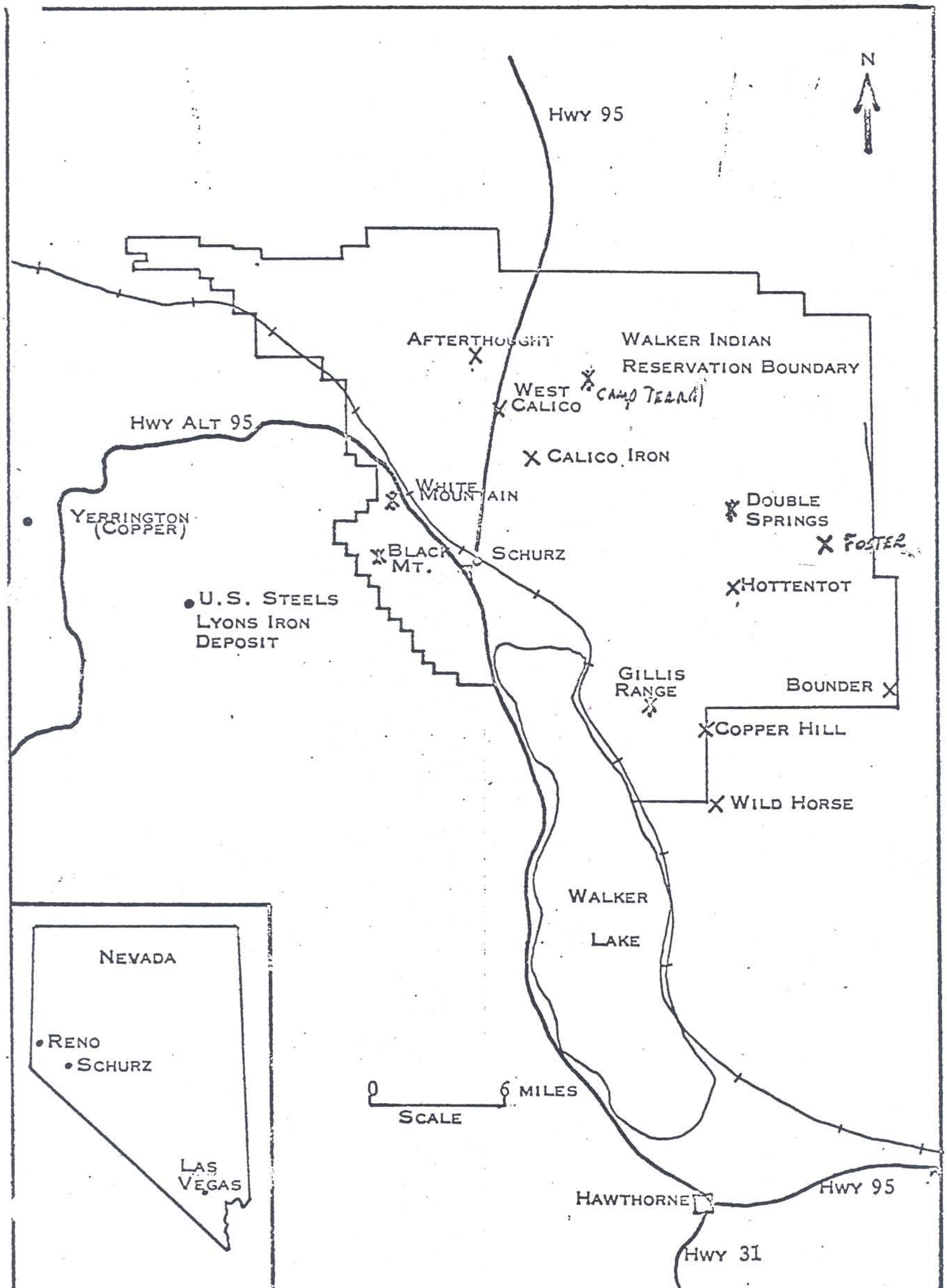

Figure 1 Map of Nevada. Location of the Calico Iron Discovery.

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The Calico iron discovery is located six miles northeast of Schurz and is accessible by dirt roads. Many of the other prospects on the Reservation are accessible on dirt roads and all of them may be reached with a four-wheel drive vehicle.

Topography

The central and eastern part of the Reservation is flat desert with occasional northwest striking ridges. Elevations range from 2,000 to 2,600 feet. The west boundary of the Reservation follows the ~~Wasatch~~ Wassuck Mountain range with elevations up to 6,700 feet.

Climate and Vegetation

An arid to semi-arid climate is characteristic to the Reservation. Snow in the winter is uncommon except in the Wasatch range but is not enough to interfere with a mining operation. Temperatures range from a low of 10° F in the winter to 110°F in the summer.

The vegetation consists of sparse sagebrush and grass and is easily cleared with a bulldozer.

Water

Sufficient water for exploration drilling purposes is available and adequate. Several water wells are located in the alluvium south of the Calico drill area but nothing is known about the depth of yield. Two large reservoirs are located on the Reservation. Weber Reservoir is six miles north of Schurz and Walker Lake Reservoir is about 15 miles south of Schurz. These reservoirs always contain water.

The subsurface water supply has not been extensively tested but more than likely would sustain a major mining operation.

Power, Gas, and Telephone

A natural gas pipeline, a power transmission line, and telephone facilities are available at Schurz.

Facilities

The Occidental and Walker-Martel headquarters are both based in Schurz. Walker-Martel has two office trailers and rents buildings for core storage and an engineering office from the tribe. A new motel and restaurant has just been completed. Daily mail service is available.

Walker Lane Mineral Belt

The principal mining districts in Nevada are aligned along northwest trending "belts" across the State. These belts reflect major stratigraphic and structural controls. Deposits within the mineral belts account for 95 percent of the production of copper, lead, zinc, gold, and silver in Nevada. As shown in Figure 2, the Walker Reservation is located along the "Walker Lane" Belt, as is the Anaconda open-pit copper mine at Yerington and the U. S. Steel iron ore deposit near the Reservation.

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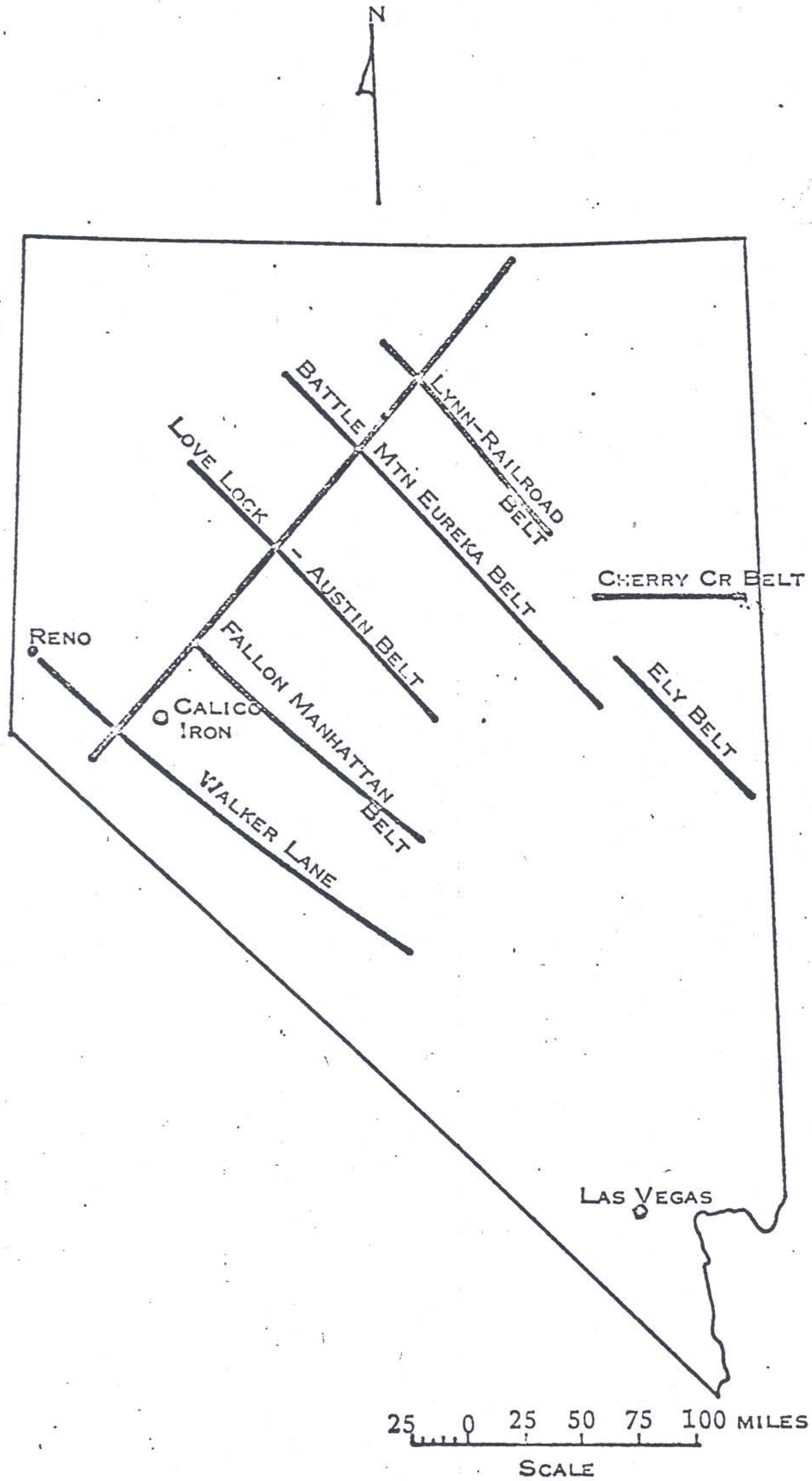

Figure 2 Mineral Belts in Nevada.

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EXPLORATION HISTORY

Many small prospects on the reservation have been mined for copper, gold, and silver since the early 1900's. In 1954 (?) the U. S. Steel Corporation detected a magnetic anomaly over the Calico area while conducting an aerial magnetometer survey over their Lyons iron prospect 10 miles west of Schurz. U. S. Steel attempted to acquire the prospect by staking claims. However, the Indians had just been assigned the mineral rights for the whole Reservation; and they gave an exclusive prospect permit to the Idaho Corporation. The Walker-Martel Mining Company subsequently obtained controlling interest in the Idaho Corporation to help finance the exploration projects. Under this partnership arrangement the prospects listed below were explored by geologic mapping, geophysics, and drilling (see Figure 1, page 7).

1. Afterthought ✓
2. Hottentot ✓
3. Copper Hill Cu Ag
4. Wild Horse WO_3 skarn
5. Bounder ✓
6. Badger ✓
7. Coyote ✓
8. Aspiring ✓

The exploration results were not encouraging, although additional work is justified.

In 1963, the Walker-Martel Mining Company conducted extensive aerial and ground magnetic surveys over the Reservation and further delineated the large magnetic anomaly in the Calico area. At this time, Occidental Petroleum Corporation joined Walker-Martel in a partnership to help finance the drilling of the Calico area. Six deep drill holes in the Calico area have proven the existence of a major mineralized zone of magnetite iron (Fe_2O_3). The prospect is

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STILL IN THE DISCOVERY STAGE BECAUSE OF THE WIDE SPACING OF THE HOLES. HOWEVER, THE DRILL CORE ASSAYS INDICATE A MARGINAL GRADE IRON ORE DEPOSIT THAT WOULD REQUIRE UNDERGROUND MINING METHODS.

IN SEPTEMBER 1966, MR. R. C. MAYBERRY, EXECUTIVE VICE-PRESIDENT OF OCCIDENTAL MINERALS, ASSIGNED RON HAXBY AND WILL CHESTER TO THE RESERVATION TO EVALUATE ALL THE EXPLORATION DATA AND PROSPECTS. THE RESULTS OF THE INVESTIGATION INDICATE SIX OTHER PROSPECTS ON THE RESERVATION ALSO JUSTIFY FURTHER EXPLORATION. THEY ARE AS FOLLOWS: (SEE FIGURE 1)

1. BLACK MOUNTAIN
2. CAMP TERRILL
3. DOUBLE SPRINGS
4. FOSTER
5. FRONT GILLIS RANGE
6. WHITE RANGE

<u>CALICO IRON DISCOVERY</u>

THE CALICO AREA HAS BEEN FIELD MAPPED IN DETAIL BY ED LAWRENCE, CONSULTING GEOLOGIST FOR WALKER-MARTEL. GROUND MAGNETIC LINES VERIFIED THE AERIAL MAGNETIC ANOMALY (SEE FIGURE 3). INDUCED POLARIZATION (I.P.) SURVEYS HAVE BEEN RUN, BUT THE RESULTS ARE INCONCLUSIVE BECAUSE THE DEPTH OF POST-MINERAL VOLCANIC COVER EXCEEDS THE DEPTH PENETRATION OF THE I.P. EQUIPMENT. FIGURE 4 SHOWS THE LOCATION OF THE DRILL HOLES. DRILL HOLE CA-1 WAS DRILLED IN THE CENTER OF THE MAGNETIC ANOMALY AND INTERSECTED HIGH GRADE MAGNETITE (UP TO 60% FE) FROM 1,700 FEET TO 3,600 FEET. DRILL HOLE CA-2 WAS OFFSET 1,400 FEET SOUTH OF CA-1. IT WAS UNMINERALIZED TO 2,306 FEET, THE BOTTOM OF THE HOLE. DRILL HOLE CA-3 IS LOCATED APPROXIMATELY 3,000 FEET SOUTHEAST OF CA-1 ALONG THE SOUTHEASTERN EDGE OF THE ANOMALY. THIS HOLE ENCOUNTERED HIGH GRADE MAGNETITE FROM 2,060 FEET TO 2,750 FEET. IT ALSO

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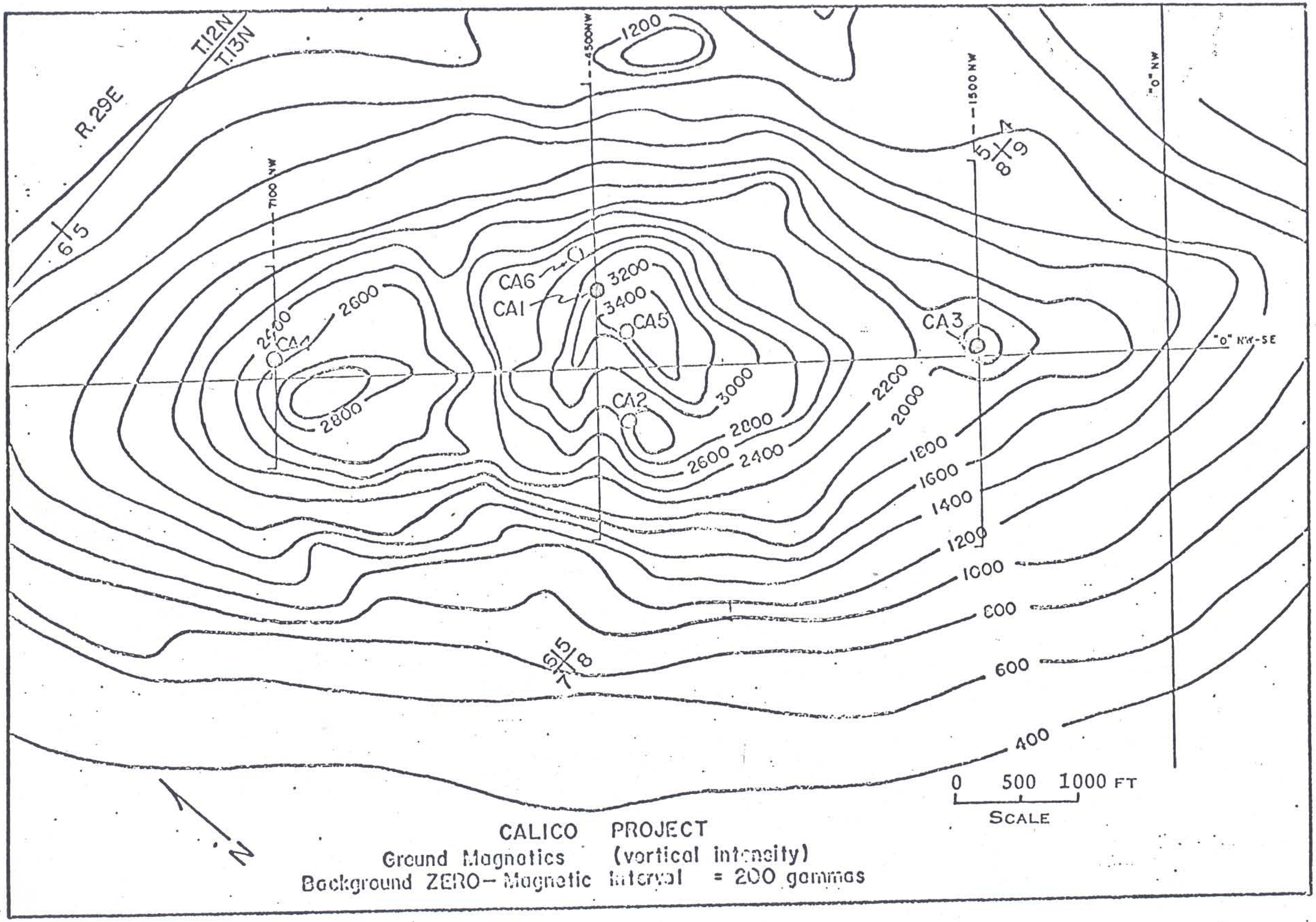

FIGURE 3 CALICO MAGNETIC ANOMALY

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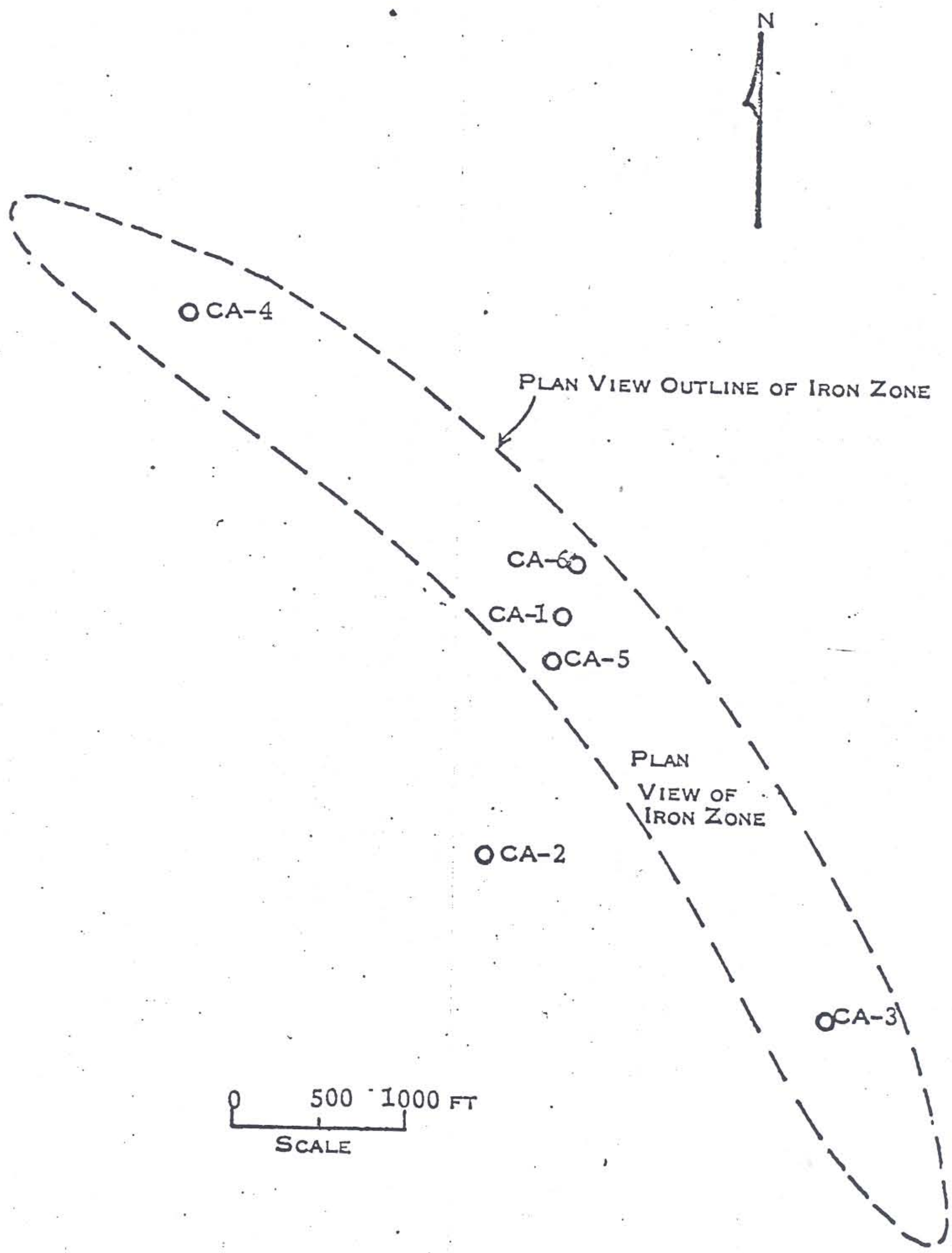

Figure 4 Location of Calico Drill Holes and Approximate Plan View Outline of the Main Iron Zone

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INTERSECTED A 130-FOOT SECTION OF CHALCOPYRITE THAT AVERAGED 0.79% CU, (WHEREAS THE AVERAGE OF COPPER VALUE FOR THE OTHER HOLES IS 0.08% CU). DRILL HOLE CA-4 IS LOCATED 2,700 FEET FROM CA-1 ALONG THE NORTHWEST EDGE OF THE ANOMALY. IT PENETRATED WEAK IRON MINERALIZATION EXCEPT FOR A ZONE FROM 2,400 FEET TO 2,750 FEET. CA-2 IS OUTSIDE OF THE MAIN IRON ZONE. DRILL HOLES CA-5 AND CA-6 ARE OFFSET 300 FEET ON EACH SIDE OF CA-1. CA-6 MAY REPRESENT THE NORTHEAST EDGE OF THE MAIN MAGNETITE MINERALIZATION. CA-5 IS 3,250 FEET DEEP AND INTERSECTED HIGH GRADE MAGNETITE MINERALIZATION FROM 2,750 FEET TO 3,200 FEET. CA-5 MAY INTERSECT THE SOUTHWEST EDGE OF THE MAGNETITE MINERALIZATION.

BECAUSE OF THE EXTREME DISTANCE BETWEEN THE HOLES AND THE VARIATION IN THE GRADE OF IRON MINERALIZATION, THE CALICO IRON PROSPECT REPRESENTS A "DISCOVERY" RATHER THAN AN "ORE DEPOSIT." TABLE I SUMMARIZES THE DRILL HOLE DATA. APPENDIX I LISTS THE INDIVIDUAL HOLE ASSAYS COMPOSITED AT 50 FOOT LEVELS.

TABLE I
CALICO DRILL HOLE DATA

HOLE	COLLAR ELEVATION	DEPTH TO TOP OF IRON ZONE		DEPTH TO BOTTOM OF IRON ZONE	DEPTH TO BOTTOM OF HOLE
CA-1	4533 FT	1308 FT	2319	3627 FT	3627 FT
CA-2	4423	-		-	2306
CA-3	4375	1930	1492	3422	3422
CA-4	4677	1270	2055	3325	3325
CA-5	4503	1315	2055	3370	3370
CA-6	4550	1900	660	2560	2560

GENERAL GEOLOGY

Geologic History of the Reservation

The oldest rocks in the region are Cambrian (?) schists and hornfels. They occur 80 miles south of the Calico deposit in the White Mountains. Overlying the Cambrian rocks are 10,000 feet of Cambro-Ordovician sediments. The Cambrian section was dominately carbonates, now metamorphosed to marble, calc-silicates, and hornfels. The Ordovician rocks are mainly slate and chert.

Overlying the lower Paleozoic section with angular unconformity are 200 feet of Permian sandstone and grit. The Permo-Triassic Excelsior Formation, which is the oldest known formation on the Reservation, overlies the grits and is widespread in this region. The Excelsior formation is dominately a felsic to intermediate volcanic and hypabyssal assemblage, with minor amounts of interbedded limestones.

Overlying the Excelsior formation with a sharp to extreme angular discordance are 14,000 feet of Triassic and Jurassic shales, sandstone, conglomerate, massive limestone, and dolomite, thinly interbedded shate and limestone, and fanglomerate. Portions of this massive carbonate sequence are present within the Reservation and belong to the Luning formation. The mineralization in the Calico is probably in the Luning formation. *

Intruding the section described above are igneous Cretaceous (?) age granitic bodies of intermediate composition believed to be parts of the Sierra Nevada batholith. The granitic rocks, where contaminated by assimilations of volcanics of the Excelsior formations are diorite to gabbroic in composition. Deformation and mineralization are probably related to this intrusive period. *

The Tertiary-Age rocks follow a lengthly erosional period. During this time many of the Cretaceous granitic rocks were uncovered. The Tertiary rocks in the area have been subdivided into three significant groups according to their relative position and are described as pre-Esmeralda, Esmeralda, and post-Esmeralda. The pre-Esmeralda rocks are mainly volcanics and are probably the latest group to receive significant mineralization. The Esmeralda formation is late Tertiary in age and consists of continental and lacustrine sediments and volcanics. Overlying these is the thick sequence of felsic to intermediate volcanic rocks which cover a large part of the State of Nevada. Capping this felsic to intermediate volcanic sequence in many areas are the Tertiary-Quaternary basalts.

CALICO GEOLOGY

General Comments

THE ROCKS OF THE CALICO AREA BELONG TO TWO GENERAL GROUPS: (1) PRE-MINERAL TO MINERAL AGE METAMORPHIC AND GRANITIC ROCKS AND, (2) POST-MINERAL VOLCANIC AND HYPOBYSSAL ROCKS.

THE PRE-MINERAL TO MINERALIZATION AGE ROCKS ARE SEPARATED FROM THE OVERLYING VOLCANIC SEQUENCE BY AN EROSION SURFACE, WHICH, FROM FIELD AND DRILL HOLE DATA, APPEARS TO DIP APPROXIMATELY 10° IN A S40W DIRECTION. THE WNW TRENDING CREST OF THE CALICO HILLS MAY REFLECT A BURIED RIDGE OF PRE-MINERAL ROCKS, AND THE CENTER OF THE AREA DRILLED MAY BE A LOCAL HIGH ON THE SIDE OF THIS RIDGE (SEE PLATE 1).

Pre-Mineral Metamorphic and Igneous Rocks

DIORITIC AND METAMORPHIC ROCKS OUTCROP IN SEVERAL PLACES IN THE CALICO HILLS AND APPEAR IN ALL THE DRILL HOLES. SEE DRILL HOLE LOGS FOR DETAILED DESCRIPTION.

METAMORPHIC ROCKS:

THE METAMORPHICS ARE HORNFELS AND GRANOFELS (SKARN) RANGING FROM APHANITIC TO FINE-GRAINED IN TEXTURE. THE GRAIN SIZE IS USUALLY SO FINE THAT IDENTIFICATION IS POSSIBLE ONLY IN THIN SECTIONS. THE METAMORPHIC ROCKS ARE SHOWN ON PLATE 1 AS HORNFELS, EPIDOTE-RICH SKARN, ACTINOLITE-RICH SKARN, AND GARNET-PYROXENE-RICH SKARN. IN GENERAL, THESE MAY REPRESENT A SEQUENCE OF INCREASING TEMPERATURE METAMORPHIC PRODUCTS. IT IS POSSIBLE THAT THEY MAY REFLECT CHANGES IN ORIGINAL COMPOSITION.

THE RELATIONSHIP OF THE MINERALIZATION TO THE METAMORPHIC TEMPERATURE GRADIENT IS DISCUSSED IN THE METALLIZATION SECTION. THE METAMORPHIC ROCKS locally have a well-defined mineral banding which may represent original bedding. The dip of the banding varies from 80° to 25° and averages 60°. The variations in bedding dip suggest that the metamorphic rocks are folded sediments.

Dioritic Rocks:

The dioritic rocks occur as several large continuous bodies and as numerous small dikes which cut the metamorphics. The dikes are fine to coarse-grained, usually carrying conspicuous amounts of calc-cilicates, and vary in composition from diorite to granodiorite and perhaps quartz monzonite. The amount of diorite in the drill holes decreases with depth and proceeding south from CA-1. The granitic rocks do not have a clear spatial relationship with any sequence of metamorphic assemblages. In several drill holes they are strongly mineralized and may actually be feldspathized and recrystalized sediments. Some of the rock units in CA-3 are included in this category.

A limited amount of microscope work was performed on a group of thin sections from hole CA-1 by Will Chester. This work was not sufficient to draw detailed conclusions, but several general impressions have been formulated: Pyroxene, hornblende, and plagioclase occur in larger percentages in the skarn than described in the drill logs, and garnet somewhat less than would be estimated in hand specimen. Contaminated or hybrid dioritic rock (actually endoskarn?) is more common than shown on Plate 1. (In the pocket.)

In the metamorphics, augite, plagioclase, diopside, and possibly quartz and calcite, are the oldest recognizable minerals. Idocrase and scapolite may belong with this group. The augite is surrounded by hornblende rims, and plagioclase is embayed by epidote and calcite and is recrystallized and albitized. This latter group usually accompanies and appears older than garnet, actinolite, and chlorite. Late calcite with minor quartz and possibly chlorite, can be seen veining magnetite-garnet assemblages.

The diorite was studied in several sections. It showed essentially the same post-crystallization paragenetic sequence of alterations as the skarn and hornfels. One notable textural exception was the fairly clear relic zoning in the albitized plagioclase grains of the diorite which does not appear in feldspar-rich skarn.

If the above represents the paragenetic sequence, then it may present several possibilities for origin as these assemblages are not simple equilibrium groups. The early pyroxene-plagioclase assemblage is usually regarded as one of the highest temperature metamorphic assemblages; higher than garnet-hornblende-actinalite-albite-chlorite which here is later. Several possible explanations may be: (1) The emplacement of the diorite into clayey carbonates marked the period of highest temperatures. During cooling, the interior of the diorites released fluids which metasomatically (prograde metasomatism) altered the earlier formed assemblages and deposited the iron and copper. (2) The plagioclase and augite were primary minerals in a volcanic rock, later metamorphosed by the intrusion of the diorite. (3) The diorite metamorphosed the original wall rocks to a pyroxene-plagiodose assemblage, and a later nearby intrusive produced a second metamorphic period accompanied by mineralization. *

These ideas and original composition of the skarn rocks are important to further exploration for copper and/or iron. If the parent rock were a thick sequence of impure carbonates that is typical of the Luning Formation, a large and fairly continuous favorable horizon may occur. If the parent rock were *

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LIMESTONE AND VOLCANICS TYPICAL OF THE EXCELSIOR FORMATION, UNIFORM MINERALIZATION IN THE LIMESTONE WOULD NOT BE EXPECTED. [Why?] A MORE DETAILED PETROGRAPHIC EXAMINATION OF DRILL CORE SAMPLES IS RECOMMENDED. SINCE THE COPPER AND IRON VALUES DO NOT CORRELATE WITH THE GRANODIORITE, THERE IS THE POSSIBILITY THAT ANOTHER INTRUSIVE DIRECTLY RELATED TO THE MINERALIZATION MAY EXIST IN THE AREA. *

Post-Mineral Volcanic and Intrusive Rocks

Volcanics:

THE CALICO AREA IS COVERED BY 400 FEET TO 2,000 FEET OF LATE TERTIARY VOLCANICS. THE THICKNESS OF THE VOLCANICS INCREASES IN A SOUTHEASTERLY DIRECTION. MOST OF THESE ROCKS ARE ACIDIC TUFFS AND WELDED TUFFS. SEVERAL DACITIC FLOWS HAVE BEEN RECOGNIZED IN THE ROTARY CUTTINGS.

ANDESITE PORPHRY INTRUDES THE TUFFS. THE ANDESITE IS CHARACTERIZED BY A LOW DIP FLOW BANDING.

Intrusive Rocks:

DRILLING INDICATES THAT THE LARGE SURFACE EXPOSURE OF THE ANDESITE IS PROBABLY DUE TO A "MUSHROOMING" OF THE INTRUSIVES AS THEY NEARED THE SURFACE, AND THAT FEEDERS TO DEPTH ARE RELATIVELY SMALL.

MICROSCOPE STUDY OF ONE ANDESITE SAMPLE SHOWS IT TO BE AN UNALTERED, HORNBLENDE ANDESITE PORPHYRY WITH A MINOR ACCESSORY MAGNETITE. [Possible that remnant mag in surface exposures responsi for large mag anomaly?]

IN DRILL HOLE CA-3 THE ANDESITE APPEARS TO HAVE INTRUDED AND DESTROYED THE TOP OF AN IRON-BEARING HORIZON. IT DOES NOT APPEAR WITHIN THE BASEMENT ROCKS IN ANY OF THE OTHER HOLES BUT MAY BE A NEGATIVE FACTOR IN FURTHER EXPLORATION DRILLING. THE UPPER IRON ZONE IN CA-4 ALSO IS OBLITERATED BY A POST-MINERAL DIKE. BASED ON SURFACE GEOLOGY, THERE MAY BE ANOTHER DIKE BETWEEN DRILL HOLES

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CA-1 AND CA-4. IF THE DIKE NARROWS WITH DEPTH, IT WILL NOT EFFECT IRON RESERVES. HOWEVER, THIS DIKE MUST BE ACCURATELY DEFINED BY DRILLING BEFORE FINAL IRON RESERVES CAN BE CALCULATED.

STRUCTURE

THE CALICO AREA LIES EAST OF THE NORTHWEST-TRENDING WALKER LANE LINEAMENT. THE WALKER LANE HAS BEEN DEFINED AS A REGIONAL STRUCTURAL AND TOPOGRAPHIC DISCORDANCE WHICH IS DUE TO RIGHT LATERAL SHEARING WITHIN THE BASEMENT. IT IS 50 TO 80 MILES WIDE.

A GEOLOGIC MAP OF THE CALICO SURFACE PREPARED BY ED LAWRENCE (SEE PLATE 2) SHOWS WELL-DEVELOPED NORTHWEST AND NORTHEAST FAULTING WITH A YOUNGER NORTHEAST FAULT SET. AERIAL PHOTOGRAPHS OF THE CALICO AREA SHOW THE NW AND NE SYSTEMS BUT DO NOT REFLECT POST-VOLCANIC, STRIKE SLIP MOVEMENT.

SUBSURFACE GEOLOGY IS DIFFICULT TO INTERPRET BECAUSE OF THE WIDE SPACING OF THE DRILL HOLES. THE STRONGEST FAULTING AND BRECCIATION OCCURS IN DRILL HOLE CA-2. THE DIFFERENCE IN ELEVATION BETWEEN THE BASE OF THE VOLCANICS AND THE BASEMENT ROCKS IN CA-1 AND CA-6 MAY BE DUE TO FAULTING. *

THE VARIATION IN THE DIP OF THE BEDDING (20° TO 80°) IS PROBABLY A RESULT OF FOLDING. IT IS POSSIBLE THE SEDIMENTS IN THE CALICO AREA FORM AN ANTICLINE. HOWEVER, THE THIN, TABULAR SHAPE OF THE STRONGEST MINERALIZATION SUGGESTS A NORTHWEST FAULT STRUCTURE MAY HAVE, IN PART, LOCALIZED THE MINERALIZATION.

ALTERATION *

POST-MINERAL VOLCANICS:

THE VOLCANIC COVER IN THE CALICO AREA IS POST-MINERAL. THE BRILLIANT RED AND CRIMSON COLARS (RESEMBLING A CALICO QUILT) ARE DUE TO OXIDATION OF FINE,

IRON PARTICLES IN THE TUFFS. NO SULFIDES ARE PRESENT IN THE TUFFS ON THE CALICO SURFACE. THE IRON PARTICLES MAY ORIGINALLY HAVE BEEN ASSOCIATED WITH AN EXPLOSIVE VENT THAT CUT THE IRON-MINERALIZATION. ANOTHER POSSIBILITY IS THAT THE IRON MAY HAVE BEEN A NATURAL EJECTA DURING DEPOSITION OF THE TUFF. *

MINERALIZED SERIES:

MOST OF THE ALTERATION BASEMENT ROCKS HAVE BEEN RELATED TO METAMORPHIC PRODUCTS RATHER THAN HYDROTHERMAL ALTERATIONS. THE CHLORITE-CALCITE-PYRITIC ADDITIONS WHICH APPEAR ALONG FRACTURES OUTSIDE THE STRONGLY MINERALIZED ZONES MIGHT ALSO BE CONSIDERED AS ALTERATION HALOS. THERE IS A WEAK SUGGESTION (OVERLAYS 3 AND 4, PLATE 1) THAT SUCH A HALO MAY BE DEVELOPED AROUND THE CALICO IRON MINERALIZATION.

REGIONAL METALLIZATION *

NO CLEAR ZONING PATTERN FOR MINERALIZATION OCCURS IN THE REGION SURROUNDING THE CALICO AREA (SEE NEVADA MINERAL COUNTY GEOLOGIC BULLETIN). THE MAP OF ALL MINERAL DEPOSITS IN THE REGION SHOWS ONLY THAT HIGH-TEMPERATURE MINERALIZATION IS SOMEWHAT MORE COMMON IN THE CALICO HILLS' VICINITY THAN IN THE PERIPHERAL AREAS OF MINERAL COUNTY.

GOLD AND COPPER MINERALIZATION OCCURS IN THE TERRILL HILLS THREE MILES NORTHEAST OF THE CALICO AREA. SEVERAL SMALL IRON, TUNGSTEN, COPPER, AND LEAD OCCURRENCES CAN BE FOUND TO THE EAST AND SOUTH. } *

CLASSIFICATION OF THE CALICO DEPOSIT *

THE CALICO MINERALIZATION BELONGS IN A PYROMETASOMATIC OR IGNEOUS METAMORPHIC CATEGORY. THIS IS A HIGH TEMPERATURE TYPE OF MINERALIZATION, CLOSELY RELATED TO AN IGNEOUS CONTACT, AND ONE IN WHICH MINERALIZING FLUIDS MOVE OUTWARD

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(OR UPWARD) IN A SOLID FRONT. THE MINERALIZATION FALLS INTO A HIGH-SULFUR, IRON-COPPER CHEMICAL CATEGORY.

MINERALOGY AND PARAGENESIS:

THE CALICO SEQUENCE OF METALLIZATION IS AS FOLLOWS:

(2) PYRRHOTITE, (3) PYRITE, AND (4) CHALCOPYRITE. TRACES OF SPHALERITE AND GALENA APPEAR IN DRILL HOLE CA-4. CHEMICAL ANALYSES INDICATE TRACE AMOUNTS OF ILMENITE AND NICKLE SULFIDES, BUT THESE HAVE NOT BEEN DEFINITELY IDENTIFIED.

MICROSCOPE STUDY AND BENEFICIATION RESPONSE SHOW THAT MAGNETITE, PYRRHOTITE, AND CHALCOPYRITE HAVE BEEN, IN PART, CONTEMPORANEOUSLY DEPOSITED. HAND SPECIMEN STUDY SHOWS THAT PYRRHOTITE IS IN PART YOUNGER THAN MAGNETITE, AND THAT CHALCOPYRITE IS IN PART YOUNGER THAN PYRRHOTITE. PYRITE IS CONTEMPORANEOUS WITH MAGNETITE, AND OFTEN APPEARS CONTEMPORANEOUS WITH PYRRHOTITE. PYRITE VEINLETS CUT BOTH PYRRHOTITE AND MAGNETITE AND IN SEVERAL PLACES CONTAIN CHALCOPYRITE. FIGURE 5 IS A PICTORIAL REPRESENTATION OF THE MINERAL DEPOSITIONAL SEQUENCE.

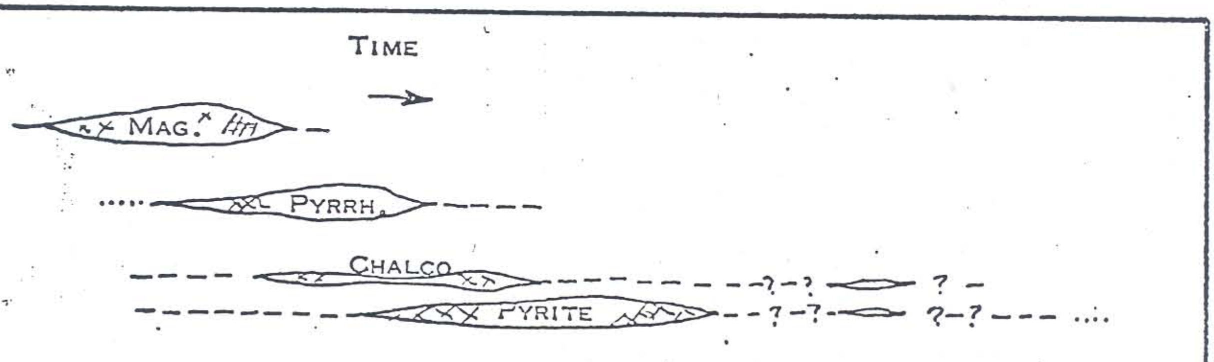

FIGURE 5 CALICO MINERAL EXPOSIONTIONAL SEQUENCE

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The high-grade copper intercept below the iron zone in drill hole CA-3 shows much of the pyrite-chalcopyrite mineralization to be fracture controlled and associated with calcite. This may represent a second late stage of chalcopyrite-pyrite mineralization.

Metal Distribution:

A graphic presentation of metal distribution is given on Plate 1, Overlay 1A; and detailed descriptions are reported on drill hole logs by Ed Lawrence.

Drill hole CA-1 shows two distinct zones of high-grade iron. The upper zone (1,777 ft. - 2,286 ft. depth) averages 44.7% total iron over 508 feet. The lower zone (2,765 ft. - 3,525 ft. depth) averages 47.9% iron over 741.5 feet. There is one high-iron zone (2,048 - 2,660 ft. depth) in drill hole CA-3, averaging 40.1% total iron over 612 feet. It is not known whether the high-iron zone in hole CA-3 correlates with the upper or lower zone in CA-1. Several small, iron-rich horizons appear in holes CA-5 and CA-6, and may correlate with the upper zone of hole CA-1. Drill hole CA-4 intersects a spotty distribution of high iron values near the hole.

The iron mineralization is visualized as either a steeply-dipping tabular body up to 600 feet wide, or a group of closely spaced sheet-like bodies. The iron zone has a strike length of at least 5,700 feet as indicated in drill holes CA-4, CA-1, and CA-3.

Iron ore-body size

Chalcopyrite mineralization is weak and averages 0.08% Cu for all the holes. The best values generally occur outside high-iron zones. The only significant occurrence of copper is in CA-3 where a 130 foot section (2,775 ft. - 2,905 ft. depth) averages 0.79% Cu. This higher grade copper zone appears in

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A CARBONATE-RICH ROCK THAT IS NOT COMMON IN THE OTHER HOLES. IT IS DIFFICULT TO RELATE THIS ZONE TO AN OVERALL TREND IN THE MINERAL DEPOSIT OR TO DESCRIBE A TREND USING THIS ZONE AS A BASIS.

COPPER ASSAY COMPOSITES OF DRILL HOLES CA-1, CA-3, CA-4, CA-5, AND CA-6 (SEE APPENDIX I) SHOW THAT VALUES GENERALLY ARE SLIGHTLY HIGHER IN CA-1, CA-4, AND CA-6 THAN IN THE OTHER HOLES, WITH THE BEST OVERALL VALUES IN CA-1.

ZONING:

THE DRILL HOLES ARE WIDE SPACED AND CUT A VARIETY OR ROCK UNITS. FOR THIS REASON, IT IS DIFFICULT TO DESCRIBE AN OVERALL ZONING PATTERN. HOWEVER, PETROGRAPHIC WORK, COMPUTER CORRELATIONS, AND DRILL HOLE LOGS SUGGEST THAT THERE ARE TWO DISTINCT ZONING PHASES TO CONSIDER.

THE FIRST ZONING PHASE IS THE RESULT OF A GRANITIC INTRUSION INTO SEDIMENTS, AND PROBABLY REFLECTS A TEMPERATURE GRADIENT. INTRUSIVE HEAT AND FLUIDS RECRYSTALLIZED THE SEDIMENTS AND ALTERED THEIR BASIC CHEMISTRY. THE SEQUENCE OUTWARD FROM THE IGNEOUS SOURCE IS DIORITE, HYBRID ROCK OR DIORITE WITH CALCSILICATES, GARNET-PYROXENE-RICH SKARN, AMPHIBOLE-RICH SKARN, EPIDOTE-RICH SKARN, HORNFELISIC SKARN, HORNFELS, AND METASEDIMENTS. DECREASED GRAIN-SIZE AND LOWER TEMPERATURE MINERALOGY ALSO OCCURS OUTWARD FROM THE INTRUSIVE CENTER.

THE SECOND ZONING PHASE IS A RESULT OF PHYSICOCHEMICAL MINERALIZATION GRADIENT AND PROBABLY OCCURRED LATER THAN THE METAMORPHISM WHICH RESULTED IN A SEQUENCE OF MAGNETITE, MAGNETITE PLUS PYRRHOTITE, THEN INTO MAGNETITE, PYRITE-CALCITE-CHALCOPYRITE, AND FINALLY A WEAK HALO OF PYRITE PROCEEDING OUTWARD FROM THE MINERALIZING CENTER.

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These two zoning phases do not completely overlap in the Calico deposit because the direction in which the mineralization is zoned is not exactly parallel to the direction of strongest change in the metamorphic zoning. Study of the drill logs shows that strong iron mineralization commonly occurs at the boundary between garnet-pyroxene-rich skarn and actinolite-rich skarn. However, mineralization also occurs in the diorite and in the hornfels, thus crosscutting metamorphic zones.

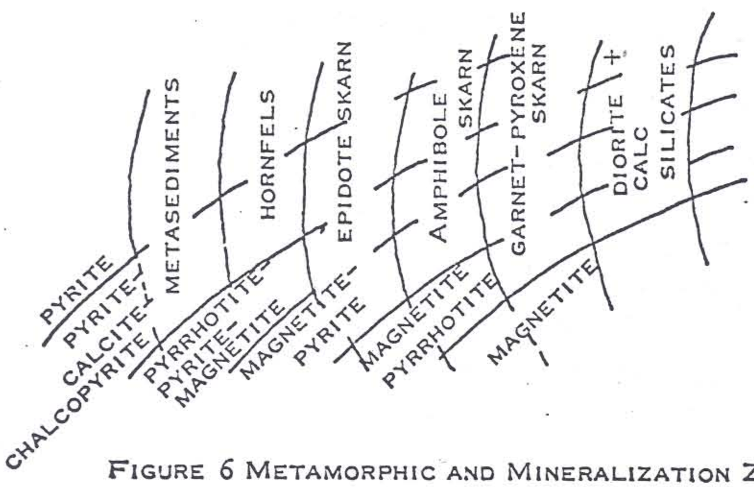

Figure 6 Metamorphic and Mineralization Zoning

Several zoning features in above diagram are worth noting: (1) Both mineralogic and metamorphic zoning patterns should be considered when positioning drill holes. (2) The oblique gradient directions of the two zoning systems could be explained by one intrusive action, but open the possibility of a second intrusion. (3) The most favorable iron horizon lies in the higher temperature skarn and hybrid diorite zones.

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The most intense metamorphism and mineralization occurs in the vicinity of CA-1 and the lowest intensity near CA-2. As a Rule of Thumb: ANY GARNET-PYROXENE-RICH SKARN ZONE SHOULD BE PENETRATED BY DRILLING AS IRON OCCURS COMMONLY IN THE FOOTWALL (OR BELOW) THAT ZONE.

Surrounding a high iron zone carbonate and pyrite decrease and pyrrhotite and chlorite increase. Chlorite forms a thin fringe around the iron-rich zones.

Based on the above interpretation it appears that CA-1 has passed through the skarn series into hornfels in the footwall of the mineralized zone.

Drill hole CA-2 is in the weak pyrite-metasediment hornfels zones.

Drill hole CA-3 penetrates the magnetite-pyrite-hybrid diorite zones; probably on the edge of intense mineralization. It is bottomed in hornfels and is probably below the mineralized zone.

Drill hole CA-4 intersected an erratic section of magnetite mineralization. Based on the magnetic anomaly the hole is centered on the northwest end of the iron zone, and the core assays seem to verify this. At a depth of 2,254 feet the hole penetrated a two foot section of galena (PbS) and sphalerite (ZnS) associated with pyrite, pyrrhotite, chalcopyrite and magnetite. * Ga, Sp

Drill hole CA-5 was cut off at 2,400 feet in skarn-hornfelsic skarn-pyrrhotite-pyrite-magnetite zones in July, 1966. Geologic and alteration studies suggested it was a zone of intense mineralization that was continuous and dipping 70° - 75° to the southwest. The hole was deepened to 3,500 feet in February, 1967, and intersected a 200 feet zone of magnetite with grades up to 55%. *

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Drill hole CA-6 has the same relative position as CA-5. It is drilled ong the fringe of intense mineralization to a depth of 2,600 feet. Geologic d alteration studies indicate the hole is bottomed above a strong iron zone at is continuous and dips 70° - 75° to the northeast. CA-6 should intersect gh grade iron at [illegible] feet. [illegible]

igin of the Mi[illegible]

The mineralization appears to be localized in an irregular, convex-northward ayment in a granitic contact zone. There is a suggestion that the contact dips [illegible] to the north. The best hypothesis of origin at this time is that the neralization moved outward from the intrusive.

The granitic rock seen in the drill holes is dioritic and slightly to strongly [illegible]. This may be due to its own fluids passing out through previously cooled orite. However, there are large quartz monzonite and granite exposures north- st and southeast of the Calico Hills, and the possibility of a second intrusion the Calico area should be considered. The thin tabular concentration of +30% gnetite also suggests some structural feature such as a fault either acted as barrier or, actually localized the mineralization.

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GEOLOGIC CORRELATION ANALYSES OF THE CALICO DRILL HOLE DATA

ONE OF THE TECHNIQUES USED TO EVALUATE THE DRILL HOLE DATA HAS BEEN TO QUANTITIZE ALL THE GEOLOGIC VARIABLES, AS DEFINED BY THE GEOLOGIST, AND PERFORM LINEAR REGRESSION AND CORRELATION ANALYSES TO DETERMINE THE COMBINATIONS OF VARIABLES THAT ARE SIGNIFICANTLY RELATED TO MINERALIZATION.

THE CORRELATIONS WERE COMPUTED BY R. HAXBY ON THE IBM 1620 COMPUTER AT THE UNIVERSITY OF NEVADA IN RENO.

QUANITIZING GEOLOGIC VARIABLES

THE FOLLOWING GEOLOGIC VARIABLES FOR DRILL HOLES CA-1, CA-2, CA-3, CA-4, CA-6, AND WC-1 WERE QUANTITIZED AND PUNCHED ON DATA CARDS:

1. DEPTH
2. ROCK TYPE
   - A. QUARTZ DIORITE
   - B. ANDESITE (POST-MINERAL)
   - C. SKARN
   - D. HORNFELSIC SKARN
   - E. HORNFEL
   - F. CALC-SILICATE
3. % GARNET   % = VOLUME PERCENT
4. % EPIDOTE
5. % ACTINOLITE
6. % CHLORITE
7. % CARBONATE
8. % SILICA
9. % HORNBLENDE
10. % ARGELLIC ALTERATION

11. % Diopside

12. % Plagioclase

13. Degrees Fracture dip

14. Degrees Bedding dip

15. Degrees Fault dip

16. Degrees Fault rake

17. Ft. Breccia

18. % Quartz

19. % Pyrite (visual estimate)

20. % Magnetite (visual estimate)

21. % Chalcopyrite (visual estimate)

22. % Pyrrhotite (visual estimate)

23. Total iron assay

24. Total copper assay

The correlation procedure compares each of the above variables with all of the others. Correlations were run for individual rock types within each drill hole. Thus, it is possible to evaluate the characteristics of any particular rock type from any of the holes and, just as important, to compare relationships between holes.

Only those correlations above the 95% confidence level (5% level of significance) were accepted for analyses. *

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Rock Types

Six major rock types are recognized in the Calico zone of mineralization. They are as follows:

1. Quartz diorite
2. Andesite (post-mineral)
3. Skarn
4. Hornfelsic skarn
5. Hornfel
6. Calc-silicate

Computed Mean Values

*

The mean values (averages) for each rock type in each hole were computed and several important variables are shown in the following tables.

TABLE II

Mean Value for Copper

Hole	Quartz Diorite	Andesite	Skarn	Hornfelsic Skarn	Hornfel	Calc Silicate
CA-1	0.08%		0.09%	0.10%		
CA-3	0.25%			0.07%	0.05%	0.06%
CA-4	0.05%	0.04%	0.06%			

Summary - There is considerable variation in the values but the absolute values are very low. The most favorable rock for copper appears to be a hornfelsic skarn and skarn, in CA1 and quartz diorite in CA3. The rock associated with 130-foot section of copper in CA1 is very limey and probably is a hybrid rock.

shouldn't this be CA-3 ?

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TABLE III

MEAN VALUES FOR IRON

HOLE	QUARTZ DIORITE	ANDESITE	SKARN	HORNFELSIC SKARN	HORNFEL	CALC SILICATE
CA-1	16.7%		38.7%	34.5%		
CA-3	29.3%			25.1%	41.2%	11.7%
CA-4	19.8%	13.0%	22.0%			

SUMMARY - THE MOST FAVORABLE VALUES OCCUR IN A HORNFEL SKARN AND SKARN. IT IS INTERESTING TO NOTE THE BEST MAGNETITE MINERALIZATION IN CA-1 OCCURS IN A SKARN AND HORNFELSIC SKARN WHEREAS GOOD MAGNETITE MINERALIZATION IS RELATED TO THE QUARTZ-DIORITE-CALC-SILICATE HYBRID ROCK IN CA-3. THIS SUGGESTS THAT THE MINERALIZATION MAY BE LOCALIZED BY A STRUCTURAL FEATURE RATHER THAN STRICTLY A FAVORABLE BED REPLACEMENT.

TABLE IV

MEAN VALUES FOR PYRRHOTITE

HOLE	QUARTZ DIORITE	SKARN	HORNFEL SKARN	HORNFEL	CALC SILICATE
CA-1	4.6%		11.5%	9.5%	
CA-2					
CA-3	0.5%		0.02%	0.3%	1.8%
CA-4	2.0%	1.7%			
CA-6	6.7%		5.6%	7.5%	

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Summary - The skarn in CA-1 has the highest mean percentage of pyrrhotite and CA-6 is next. CA-6, CA-5 (not plotted) and CA-4 also have a relatively greater pyrrhotite content than CA-3. Pyrrhotite is a high temperature mineral and could be associated with the center of mineralization.

TABLE V

Mean Value for Pyrite

Hole	Quartz Diorite	Skarn	Hornfel Skarn	Hornfel	Calc Silicate	Andesite
CA-1	9.8%	3.14%	2.3%			
CA-2	0.1%					0.8%
CA-3	4.8%		16.2%	8.6%	3.8%	
CA-4	3.4%	3.4%				3.1%
CA-6	1.0%	1.0%	1.0%			

Summary - The distribution of pyrite is different than pyrrhotite. CA-3 is characterized by a high pyrite content whereas it has a low pyrrhotite.

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TABLE VI

MEAN VALUES FOR GARNET

Hole	Quartz Diorite	Skarn	Hornfel Skarn	Hornfel	Calc Silicate
CA-1	15.0%	20.0%	20.6%		
CA-2	1.4%		0.2%		
CA-3	1.6%	10.5%	9.0%	5.4%	1.0%
CA-4	3.2%	10.5%			
CA-6		17.7%			

SUMMARY - THE HEAVIEST GARNET DEVELOPMENT OCCURS IN THE SKARN AND HORNFEL SKARN IN DRILL HOLES CA-1, CA-4, AND CA-6. IT IS INTERESTING TO NOTE THAT CA-3, THE HOLE WITH ORE GRADE MAGNETITE AND SIGNIFICANT QUANTITIES OF COPPER (130 FT. @ 0.79% CU), HAD A RELATIVELY MINOR AMOUNT OF GARNET. GARNET IS THE HIGHEST TEMPERATURE METAMORPHIC PRODUCT ASSOCIATED WITH THE MAGNETITE AND COULD BE CONSIDERED THE CENTER OF THE METAMORPHISM IN THE AREA. GARNET PROVIDES THE MOST FAVORABLE HOST FOR MAGNETITE IN ONE AREA BUT NOT THE OTHER. THIS ALSO SUGGESTS MINERALIZATION WHICH IS CONTROLLED BY A STRUCTURAL FEATURE THAT CUTS THE VARIOUS ROCK TYPES.

CORRELATION SUMMARIES

QUARTZ DIORITE:

GARNET AND MAGNETITE DECREASED WITH DEPTH IN CA-3 WHEREAS IT INCREASED IN CA-1. THIS SUGGESTS THAT TWO AREAS ARE IN A SLIGHTLY DIFFERENT GEOLOGIC ENVIRONMENT. CHALCOPYRITE IS ASSOCIATED WITH SILICIFICATION WHEREAS MAGNETITE CLOSELY

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CORRELATES WITH ACTINOLITE. CHLORITE GENERALLY INCREASES AS THE COPPER CONTENT AND SILICIFICATION DECREASES. CHLORITE MAY REPRESENT A ZONING FEATURE. IN GENERAL, THE COPPER CONTENT INCREASES WITH THE MAGNETITE.

POST-MINERAL ANDESITE:

THE POST-MINERAL ANDESITE IS THE IGNEOUS ROCK THAT INTRUDES THE MINERALIZED ZONE AND OVERLYING TUFFS AND IS EXTRUSIVE ON THE SURFACE. THE MINERALIZATION IN THE ANDESITE IS PROBABLY DUE TO ASSIMILATED FRAGMENTS OF THE IRON FORMATION. THIS ROCK OCCURS IN DRILL HOLES CA-3 AND CA-4. CHLORITE INCREASES WITH DEPTH AND MAGNETITE HAS A NEGATIVE CORRELATION WITH CHLORITE.

SKARN:

THERE IS A POSITIVE CORRELATION BETWEEN GARNET AND EPIDOTE, AND, EPIDOTE AND PYRITE. THE RELATIONSHIP BETWEEN THESE TWO METAMORPHIC PRODUCTS APPEARS TO BE A ZONING PATTERN. DRILL CORE SHOWS A GARNET ZONE JUST ABOVE THE MAGNETITE, A GARNTE-ACTINOLITE ZONE ASSOCIATED WITH THE MAGNETITE, AND A CHLORITE-PYRITE ZONE BELOW THE MAGNETITE.

GARNET ALSO HAS A POSITIVE CORRELATION WITH BEDDING DIP. THE BEDDING APPEARS TO INCREASE IN DIP WITH DEPTH AS DOES THE GARNET. THE MEAN IRON VALUES SHOW THE SKARN TO CONTAIN THE BEST GRADE OF MAGNETITE.

ACTINOLITE HAS A POSITIVE CORRELATION WITH CHLORITE AND CARBONATE AND A NEGATIVE CORRELATION WITH MAGNETITE OCCURRENCE. CHLORITE ALSO INCREASES WITH PYRITE. CARBONATE INCREASES AS FRACTURE DIP DECREASES. FLAT DIPPING CALCITE VEINLETS ARE COMMON AND THIN SECTION STUDIES SHOW THEY CUT MOST OTHER ROCK UNITS AND MINERALIZATION.

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Hornfelsic Skarn:

Actinolite is closely correlated to magnetite and both have a negative correlation with chalcopyrite. Again, chalcopyrite and magnetite have a negative correlation with chlorite which supports the theory that chlorite is the outer fringe of the zoning sequence. Epidote, however, is positively related to chalcopyrite but decreases as magnetite increases. Apparently epidote occurs just outside of the iron zone but may be an indication to a favorable copper environment. Pyrite also has a positive correlation with chalcopyrite. This relationship may be important since drill holes CA-4 and WC-1, which have not been drilled to depth, have an unusually large quantity of pyrite.

METALLURGICAL CHARACTERISTICS OF THE CALICO MAGNETITE

Magnetite samples collected from the drill core have been analyzed by the Arizona Bureau of Mines, Lerch Brother Inc., and the Colorado School of Mines Research Foundation. The metallurgical and beneficiation tests were conducted on these core samples to determine impurities and obtain information on the technical feasibility of pelletizing the ore by conventional methods.

Magnetic Separation

Magnetic separation is a convenient method for evaluating iron ores to determine their response to beneficiation. Table VII shows the results of wet magnetic separation tests performed on six drill core samples by the Arizona Bureau of Mines. The six samples represent a range in total iron content from 10% Fe to 60% Fe. Magnetic iron recovery in the concentrate ranges from 50.8% to 93.5%. Grinding to a finer mesh size would probably increase recovery. As would be expected the higher the total iron content (grade) the higher the magnetic iron recovery. The reason for this is that a higher percentage of the total iron assay in the low grade samples (10 – 30%) is due to iron silicates and pyrrhotite in the rock.

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TABLE VII

WET MAGNETIC SEPARATION*
OF SELECTED CALICO SAMPLES

THE FOLLOWING RESULTS WERE OBTAINED ON CONCENTRATING THE IRON BY A WET MAGNETIC. SAMPLES WERE GROUND TO -150 MESH.

.L HOLE	DEPTH	PRODUCT	WEIGHT PERCENT	PERCENT IRON	DISTRIBUTION PERCENT IRON
-3	2,567.0 FT.	HEADS	100.0	8.2**	100.0
		CONCENTRATE	6.4	65.1	50.8
		MIDDLING	4.5	18.3	10.0
		TAILING	89.1	3.5	39.2
-1	2,495.0FT.	HEADS	100.0	19.8**	100.0
		CONCENTRATE	19.2	62.9**	60.8
		MIDDLING	2.8	19.6	2.8
		TAILING	78.0	9.0	36.4
-1	1,924.0 FT.	HEADS	100.0	28.9*	100.0
		CONCENTRATE	34.4	60.1	71.7
		TAILING	65.6	12.5	28.3
-1	1,870 FT.	HEADS	100.0	39.5**	100.0
		CONCENTRATE	43.5	61.5	67.8
		TAILING	56.5	22.5	32.2
-1	2,191.0 FT.	HEADS	100.0	50.8**	100.0
		CONCENTRATE	63.1	64.9	80.6
		TAILING	36.9	26.7	19.4
-1	2,414.0 FT.	HEAD	100.0	61.7**	100.0
		CONCENTRATE	85.9	67.1	93.5
		MIDDLING	5.7	38.9	3.6
		TAILING	8.4	21.0	2.9

*PERFORMED BY THE ARIZONA BUREAU OF MINES. NO ATTEMPT WAS MADE TO CONCENTRATE THE COPPER IN THE SAMPLES.

**CALCULATED - THE IRON IN THE TAILING CONSISTED OF SPECULAR IRON OR HEMATITE, PYRITE AND LOCKED MAGNETITE IN SILICATES AND QUARTZ. THE SILICIA CONTENT COULD BE LOWERED BY FLOTATION AFTER MAGNETIC CONCENTRATION. THIS TEST WAS NOT ON THESE SAMPLES.

Silica and Other Impurities

Since the late 1950's, the chemical and physical requirements for blast furnace feeds have increased. In general, silica in the concentrate must be less than 8%. Another way of expressing this quality standard is the ratio of Fe to SiO_2. A ratio of 10 to 1 is a minimum with higher ratios preferred. Other objectionable impurities are phosphorous (P), sulfur (S), slumina (Al_2O_3), and titania (TiO_2). Table VIII shows the chemical analyses of some of the samples included in Table VII. The chemical analyses were performed by Lerch Brothers in Hibbing, Minnesota. From Table VIII it appears that all of the concentrate impurities are well within acceptable limits.

Beneficiation Tests

Walker-Martel contracted the Colorado School of Mines Research Foundation, Inc., to conduct a preliminary beneficiation test on core samples from drill hole CA-1. The objective was to determine the feasibility of producing a marketable iron pellet and also a chalcopyrite product from the ore. Conventional beneficiation techniques such as flotation, magnetic separation, and roasting were employed.

The beneficiation sample was the assay rejects from a 550 ft. section of drill hole CA-1. It represented the hole intervals 1,766.0 ft. to 2,286 ft.

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TABLE VIII
CHEMICAL ANALYSES OF SELECTED CALICO SAMPLES

Drill Hole	Depth	Product	%Fe Grade	%Silica*	%Sulfur**	%Phosphorous	%Alumina	%Titania ***	Ratio Fe to SiO_2
CA-1	2495 ft	Heads	19.8% Fe						
		Concentrate	62.9	3.87	1.84	0.024	2.02	0.01	16:1
		Tails	9.0	45.15	2.65	0.144	14.15	0.04	
CA-1	1924 ft	Heads	28.9						
		Concentrate	60.1	5.05	1.87	0.039	1.71	0.01	12:1
		Tails	12.5	30.64	1.67	0.084	10.02	0.04	
CA-1	1870 ft	Heads	39.5						
		Concentrate	61.5	4.00	3.30	0.018	1.44	0.01	15:1
		Tails	22.5	30.64	4.67	0.084	10.02	0.04	
CA-1	2414 ft	Heads	61.7						
		Concentrate	67.1	1.31	1.92	0.018	0.80	0.01	51:1
		Middling	38.9	15.97	9.21	0.093	4.52	0.01	
		Tails	21.0	26.27	11.69	0.249	6.72	0.04	

* Silica is in the form of quartz and iron silicate minerals.

** Sulfur is in the form of pyrite, pyrrhotite and chalcopyrite.

*** Titania probably occurs as rutile.

Analysis by Lerch Bros.

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SUMMARY:

THE FOLLOWING IS A SUMMARY OF THE BENEFICIATION STUDIES PERFORMED BY THE COLORADO SCHOOL OF MINES RESEARCH FOUNDATION, INC., ON A NX CORE SAMPLE SUBMITTED BY WALKER-MARTEL.

1. CHEMICAL ANALYSIS OF A COMPOSITE SAMPLE FOR MAJOR CONSTITUENTS AND THE IMPORTANT CONTAMINANTS GAVE THE FOLLOWING RESULTS:

FE %	S %	CU %	P %
46.8	3.08	0.059	0.03

THESE VALUES MAY BE SLIGHTLY HIGH BECAUSE THE MANNER OF COMPOSITING THE SAMPLE COULD HAVE RESULTED IN A MINOR DEFICIENCY IN NON-MINERALIZED MATERIAL.

2. MAGNETIC CONCENTRATION OF THE MAGNETITE USING A DAVIS TUBE SEPARATOR AND FEED RANGING IN SIZE FROM NOMINAL MINUS 35 TO MINUS 200 MESH YIELDED PRODUCTS CONTAINING 62 TO 69 PERCENT IRON, LESS THAN 0.02 PERCENT COPPER, BUT HIGH SULFUR CONTENT FROM 1.9 TO 2.5 PERCENT.

3. A NOMINAL MINUS 100 MESH GRIND CONTAINING 56.6 PERCENT MINUS 325 MESH PRODUCED A MAGNETIC CONCENTRATE AS FOLLOWS:

	CHEMICAL ANALYSIS			PERCENT
WEIGHT %	FE %	CU %	S %	DISTRIBUTION FE
59.5	67.8	0.006	1.92	85.0

4. WHEN A PELLETIZED MAGNETIC CONCENTRATE CONTAINING 3.5 PERCENT SULFUR WAS ROASTED AT 2250°F, THE SULFUR CONTENT WAS REDUCED TO LESS THAN 0.01 PERCENT.

5. THE PELLETS HAD GOOD RESISTANCE TO SPALLING DURING FIRING AND THE ROASTED PELLETS APPEARED TO HAVE SUITABLE STRENGTH PROPERTIES.

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6. Flotation of sulfide material from the magnetic concentrate gave a product containing 65.3 percent iron, and 0.20 percent sulfur with a recovery of 78.9 percent of the iron based on the original feed.

7. High recovery of the chalcopyrite by flotation in a product containing 12.6 percent copper was obtained. The small amount of concentrate produced limited reliable testing for ultimate grade.

8. The work index of the ore as determined by the Bond grindability system was 13.03, slightly lower than average taconite.

9. Magnetite, pyrrhotite, chalcopyrite, and pyrite are the minerals of major importance. In general, the composite sample had a 150 mesh particle size liberation for the magnetite mineral.

10. The ore represented by this NX core sample from one drill hole had satisfactory beneficiation characteristics using techniques currently practiced in the iron ore industry.

Recommendations

The results of the preliminary test work conducted to date on the ore as represented by one drill hole indicate that further exploration of the deposit with laboratory studies conducted on the drill cores is warranted.

The areas of laboratory studies which should be investigated are listed as follows:

Magnetic Concentration:

Studies are required to determine the extent to which dry cobbing and wet magnetic roughing stages can be used in the production of a magnetic concentrate. In conjunction with this, grindability tests would be required for the cobbing and

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ROUGHING CONCENTRATES SO THE MAGNETIC SEPARATION-GRINDING CIRCUIT CAN BE DESIGNED.

FLOTATION:

IT IS LIKELY THAT ADDITIONAL DRILLING WILL SHOW THAT THE ORE BODY CONTAINS A HIGHER COPPER CONTENT THAN WAS PRESENT IN THIS FIRST DRILL CORE. IF SO, FLOTATION STUDIES SHOULD BE MADE TO DEVELOP INFORMATION RELATED TO THE ECONOMICS OF PRODUCING A CHALCOPYRITE BY-PRODUCT. THIS STUDY WOULD INCLUDE DETERMINING GRINDING REQUIREMENTS (SUBSTANTIAL COPPER MAY BE PRESENT IN THE NONMAGNETICS FROM COARSE COBBING), COPPER RECOVERY, AND GRADE OF CONCENTRATE.

FURTHER WORK ON FLOTATION TO REDUCE THE SULFUR CONTENT OF THE IRON CONCENTRATE IS NOT ANTICIPATED BECAUSE IT APPEARS THAT THIS MAY BE ACCOMPLISHED READILY IN THE PELLET FIRING OPERATION.

PELLETIZING AND PELLET FIRING:

A STUDY SHOULD BE MADE OF THE FACTORS WHICH INFLUENCE THE STRENGTH OF GREEN AND DRIED PELLETS. THESE FACTORS WOULD INCLUDE THE PARTICLE SIZE DISTRIBUTION OF A MAGNETIC CONCENTRATE, AND THE TYPE AND AMOUNT OF BINDER.

THE TIME AND TEMPERATURE FOR FIRING THE PELLETS SHOULD BE INVESTIGATED. THESE WOULD BE EVALUATED BY DETERMINING THEIR EFFECT ON SULFUR REMOVAL, AND ON THE PELLET RESISTANCE TO ABRASION, COMPRESSION, AND SPALLING.

ECONOMIC ESTIMATES:

WHEN SUFFICIENT DATA ARE AVAILABLE FROM DRILL CORES TO ESTABLISH MORE RELIABLY THE ORE BODY CHARACTERISTICS AND TEST WORK HAS BEEN COMPLETED ON REPRESENTATIVE MATERIAL, ESTIMATES CAN BE UNDERTAKEN TO DEVELOP INFORMATION ON CAPITAL INVESTMENT AND OPERATING COSTS.

Petrographic Analysis

The Calico Sample was submitted to the Colorado School of Mines Research Foundation for petrographic examination to determine the liberation size of the magnetic and chalcopyrite and the essential mineralogy of the gangue material found in the ore.

The composite sample was screened at 48 and 200M, and magnetic and heavy liquid separations were conducted on the resulting two fractures to facilitate the X-ray and petrographic studies on these fractions.

The -48 + 200M head sample was subjected to a heavy liquid separation with methylene iodide (D + 3.3). The lighter material consisted mainly of the gangue material. This was examined in a petrographic study, and for further verification a portion was submitted for determination by X-ray. A wet magnetic separation was made on the +3.3 sp gr fraction to separate the magnetite and pyrrhotite from this fraction. A polished section was then made of the nonmagnetic material to determine if pyrite and chalcopyrite were the only metallic minerals present.

A wet magnetic separation was made on the -200M sample to separate the magnetite and pyrrhotite from this fraction. By elutriation, the nonmagnetic fraction was subsequently separated into two fractions; the light minerals resulting from this separation were submitted for analysis by X-ray diffraction.

A polished section of randomly picked +10M material was made for a liberation size study of the ore minerals. The petrographic study of the translucent minerals was done through oil immersion examination of crushed fragments.

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RESULTS

TUDY OF THE POLISHED SECTION SHOWED THE OPAQUE MINERALOGY OF THE COMPOSITE TO CONSIST OF MAGNETITE, CHALCOPYRITE, PYRITE, AND PYRRHOTITE.

PETROGRAPHIC STUDY OF THE -3.3 SP GR FRACTION SHOWED THE TRANSLUCENT .S TO BE AUGITE, DIOPSIDE, CALCITE, FELDSPAR (ANDESINE), AND A TRACE OF

THE X-RAY ANALYSIS OF THE ELUTRIATION "LIGHTS" SHOWED ESSENTIALLY THE IMPOSITION AS THE COARSER FRACTION.

HE LIBERATION SIZE STUDY IS BASED ON A 317 GRAIN COUNT AND IS CONTAINED IN LOWING TABLES:

TABLE IX

IZE DISTRIBUTION OF MAGNETITE PARTICLES IN GANGUE

	A Number of Grains	Units	A x B	Weight %	Cumulative %
20	1	50	50	18.4	18
28	2	25	50	18.4	37
35	2	12.5	25	9.2	46
48	4	6.2	24.4	12.6	55
65	11	3.1	34.1	8.1	68
100	15	1.5	22.5	6.2	76
+150	24	0.7	16.8	16.6	82
+200	15	0.3	45.0	0.8	98.5
+270	22	0.1	2.2	0.3	99.3
+400	13	0.05	0.7	0.2	99.6
+26	32	0.02	0.6	0.2	99.8
-18	21	0.01	0.2	0.1	99.9
	11	0.005	0.06	0.02	
			271.56		

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TABLE X

SIZE DISTRIBUTION OF GANGUE PARTICLES IN MAGNETITE

MESH	A NUMBER OF GRAINS	B UNITS	A x B	WEIGHT %	CUMULATIVE %
-35 +48	1	50.0	50.0	15.3	15
-48 +65	2	25.0	50.0	15.3	31
-65 +100	5	12.5	62.5	19.1	50
-100 +150	9	6.2	55.8	17.0	67
-150 +200	13	3.1	40.3	12.3	79
-200 +270	26	1.5	39.0	11.9	91
-270 +400	24	0.7	16.8	5.1	96
-400 +26	36	0.3	10.8	3.2	99.2
-26 +18	21	0.1	2.1	0.6	99.8
-18	7	0.05	0.4	0.1	99.9
			327.7		

DISCUSSION

CHALCOPYRITE GENERALLY WAS FOUND OCCURRING LOCKED IN THE MAGNETITE GRAINS AND NOT OCCURRING IN THE GANGUE MINERALS. AS OBSERVED FROM THE TABLES, THE ORE MINERALS WERE FOUND TO HAVE A COARSER SIZE DISTRIBUTION THAN THE GANGUE MINERALS; BUT THE RELATIVE ABUNDANCE OF THE TWO CATEGORIES WAS NOT DETERMINED. A POINT COUNT WAS NOT MADE OF THE GANGUE AND THE ORE MINERALS, AS THIS WOULD HAVE REQUIRED NUMEROUS POLISHED SECTIONS TO HAVE BEEN MADE AND STUDIED TO HAVE REPRESENTATIVE SAMPLING.

CONCLUSIONS

MAGNETITE GRAINS LOCKED IN THE GANGUE ARE 98% LIBERATED AT -150M. THE GANGUE MINERALS LOCKED IN THE MAGNETITE ARE ONLY 79% LIBERATED AT -150M.

THE CHALCOPYRITE GRAINS COUNTED DID NOT OCCUR IN SUFFICIENT AMOUNT TO HAVE A VALID SIZE DISTRIBUTION; HOWEVER, IT IS SIGNIFICANT TO NOTE THAT NONE LARGER THAN 104 OR -150M WERE OBSERVED.

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THE ESSENTIAL MINERALOGY OF THIS IRON-COPPER ORE APPEARS TO BE MAGNETITE, CHALCOPYRITE, PYRITE, PYRRHOTITE, AUGITE, DIOPSIDE, CALCITE, AND ANDESINE, A PLAGIOCLASE FELDSPAR.

A SAMPLE OF THE MAGNETIC CONCENTRATE OBTAINED FROM A FLOTATION TEST WAS SUBMITTED FOR PETROGRAPHIC EXAMINATION TO DETERMINE THE NATURE OF THE SULFIDE CONTAMINANT.

A MINERALOGRAPHIC MODAL ANALYSIS OF THIS SAMPLE GAVE THE RESULTS AS LISTED IN THE FOLLOWING TABLE.

MODAL ANALYSIS

MINERAL	APPROXIMATE WEIGHT %
MAGNETITE	91.5
PYRRHOTITE (LOCKED)	0.6
PYRRHOTITE (LIBERATED)	0.0
PYRITE (LOCKED)	3.4
PYRITE (LIBERATED)	2.1
GANGUE	2.5

THE LOCKED PYRITE AND PYRRHOTITE RANGED IN SIZE FROM 14 MICRONS TO 56 MICRONS. THE AVERAGE SIZE OF THE LIBERATED PYRITE WAS FOUND TO BE APPROXIMATELY 14 MICRONS.

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CALICO IRON RESERVE ESTIMATE

THE ACCURACY OF AN IRON RESERVE ESTIMATE DEPENDS UPON THE DRILL HOLE SPACING AND CONTINUITY OF MINERALIZATION BETWEEN HOLES. IT IS VERY IMPORTANT IN PREPARING AN ORE ESTIMATE TO DESIGNATE THE CLASS OF ORE BASED ON THE AMOUNT OF DRILL HOLE AND SAMPLE DATA. THREE RESERVE ESTIMATE CLASSIFICATIONS ARE AS FOLLOWS:

PROVEN ORE - THE ORE ZONE HAS BEEN DRILLED AND SAMPLED ON A CLOSE ENOUGH GRID, AND THE GEOLOGICAL CHARACTER IS SO WELL DEFINED, THAT THE SIZE, SHAPE, AND MINERAL CONTENT ARE WELL ESTABLISHED. THE CALCULATED TONNAGE AND GRADE SHOULD BE ACCURATE WITHIN 10%.

INDICATED ORE - THE TONNAGE AND GRADE ARE COMPUTED PARTLY FROM SPECIFIC SAMPLING AND PARTLY FROM PROJECTION FOR A REASONABLE DISTANCE BY GEOLOGIC INFERENCE. THE DRILL HOLES OR SAMPLE SITES ARE TOO WIDELY SPACED TO COMPLETELY OUTLINE THE ORE ZONE AND GRADE.

INFERRED ORE - THE TONNAGE AND GRADE ARE BASED LARGELY ON A BROAD KNOWLEDGE OF THE GEOLOGIC CHARACTER OF THE DEPOSIT AND FOR WHICH THERE ARE FEW, IF ANY, DRILL HOLE SAMPLES OR MEASUREMENTS. DEPOSITS THAT ARE COMPLETELY CONCEALED MAY BE INCLUDED IF THERE IS SPECIFIC GEOLOGIC EVIDENCE OF THEIR PRESENCE.

THE CALICO IRON "INFERRED" RESERVE CLASSIFICATION

THE DATA AVAILABLE FOR CALCULATING THE CALICO IRON ORE RESERVE INCLUDES DRILL HOLES CA-1, CA-3, CA-4, CA-5, AND CA-6, WHICH PENETRATE ORE GRADE MATERIAL, AND A MAGNETOMETER SURVEY WHICH SUGGESTS CONTINUITY BETWEEN HOLES. A RESERVE BASED ON THIS DATA IS CLASSIFIED AS "INFERRED ORE".

Figure 7 shows the location of the drill holes. Plate 1 illustrates a three-dimensional picture of the drill holes and mineralization.

The reserve calculations are based on drill holes CA-1, CA-3, CA-4, CA-5, and CA-6.

Composite Assay Interval:

The assays for each of the six holes have been composited at 50 foot level intervals (see Appendix I). A 50-foot interval is used so variations in grade over short distances would show up.

Drill holes CA-4, CA-1, and CA-3 and the magnetic anomaly (see Figure 3, page 11) indicate the length of the mineralization. Drill holes CA-5 and CA-6 indicate the width of the central part of the mineralized zone. Drill holes CA-5, CA-1, and CA-6 show the highest grade magnetite occurs in the center of the tabular mass and decreases outward in width. Drill hole CA-1 penetrates the center of the mineralized zone down to 2,500 feet. The zone apparently dips to the west below 2,700-3,000 feet as hole CA-1 intersects weaker mineralization and CA-5 iron assays increase.

Because the decrease in grade with increasing width will have an effect on tonnage at certain cut-off grades, the reserves have been calculated for iron zone widths of 100, 200, 400, and 600 feet.

Area of Influence:

Figure 7 shows the basic reserve configuration.

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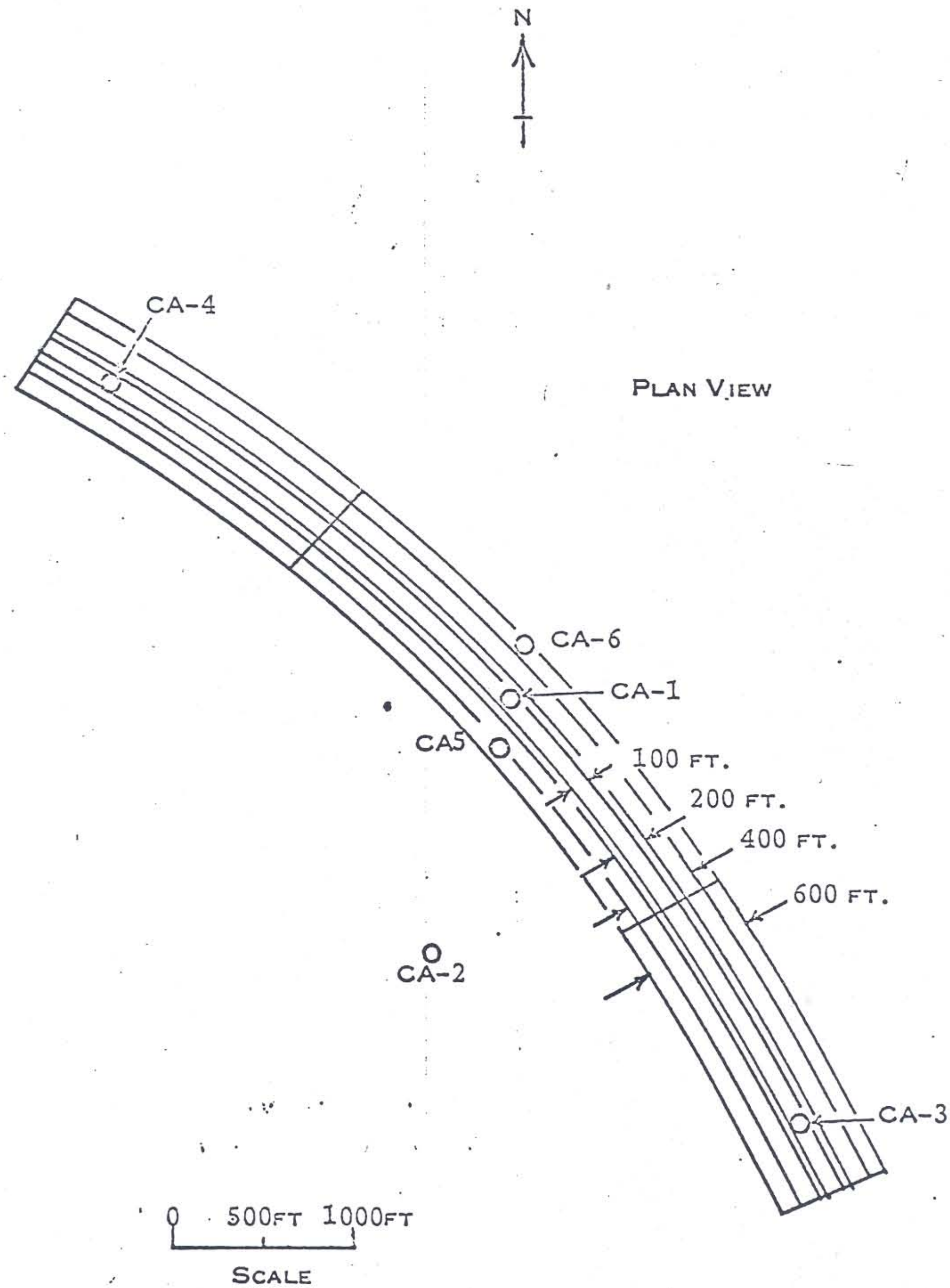

FIGURE 7 AREA OF INFLUENCE FOR CALICO RESERVE CALCULATIONS

A level plan similar to Figure 7 is drawn for each level.

First, a longitudinal section is drawn including all +30%Fe (Plate 1). This shows the basic shape of the mineralized zone. If each of the holes CA-4, CA-1, and CA-3 on a level has an assay value, the area of influence is extended one half the distance between the holes. If one of the holes does not have assay value, the area of influence is dependent upon the apparent geologic shape of the mineralized zone. The same principle is applied to the outside areas of influence to the northwest of CA-4 and southeast of CA-3. Iron and copper values are assigned to each 100, 200, 400, and 600 foot block. Where a hole did not fall within a block, the value is calculated by linear interpolation. The 200 foot block are assigned the same value as the 100 foot block. The 400 foot blocks are interpolated. It is not possible to interpolate values at CA-4 because it is the only hole to work with.

However, "hypothetical" values for the 600 foot blocks on each side of CA-4 and CA-3 are calculated by assuming the mineralization and assays will decrease or increase at the same rate as they do between hole CA-6, CA-1, and CA-5. As an example refer to Figure 7 now:

Hole	Fe	Cu	%Factor
CA-6	31.1	.094	66% (46.6 x .66 = 31.1)
CA-1	46.6	.097	-
CA-5	22.9	.049	49%

Then applying the % factor to holes CA-4 and CA-3 the outer block values are calculated as follows:

Hole	%Factor	%Fe CA-4	%Cu CA-4
East-600 ft CA-4	66	26.9 = (40.7 x .66)	0.074 = (.113 x .66)
West 600 ft CA-4	49	19.9	0.055
East 600 ft CA-3	66	24.9	0.075
West 600 ft CA-3	66	18.3	0.039

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\LL OF THE DRILL HOLES HAVE NOT ALL BEEN DRILLED TO THE SAME DEPTH. IN THOSE NCES WHERE GEOLOGIC INFERENCE INDICATES THE MINERALIZED ZONE EXTENDS INTO ; NOT DRILLED AN AVERAGE VALUE FOR THE HOLE IS CALCULATED. BY AVERAGING ALL :S IN EACH OF THE HOLES CA-1, CA-4, CA-5, AND CA-6 THE FOLLOWING RELATION- EXISTS:

ON THE AVERAGE

CA-4 = .77 CA-1
CA-6 = .60 CA-5

FIGURES 8 AND 9 SHOW THE APPROXIMATE SHAPE OF THE IRON BASED ON YS. NOTE THAT THE IRON ZONE HAS A NEAR VERTICAL, TABULAR SHAPE THAT DIPS TO AST AT DEPTH. THE HIGHEST IRON VALUES ARE IN THE CENTER.

ZONE RESERVES:

THE RESERVES HAVE BEEN CALCULATED FOR THE FOLLOWING MINERALIZED ZONE WIDTHS.

WIDTH
100 FT.
200
400
600

A RESERVE SUMMARY FOR EACH 50 FOOT LEVEL IS IN APPENDIX. II. IT INCLUDES TONNAGE AND AVERAGE GRADE (IRON AND COPPER) FOR EACH WIDTH ON EACH LEVEL AND CUMULATIVE TONNAGE AND GRADE FROM THE TOP TO BOTTOM FOR EACH WIDTH ON EACH L.

THE IRON VALUES IN THE MINERALIZED ZONE RANGE FROM 0% FE TO 65% FE. THEREFORE, RESERVES ARE COMPUTED AT VARIOUS IRON CUTOFF GRADES TO SHOW THE DECREASE IN IAGE WITH AN INCREASE IN GRADE.

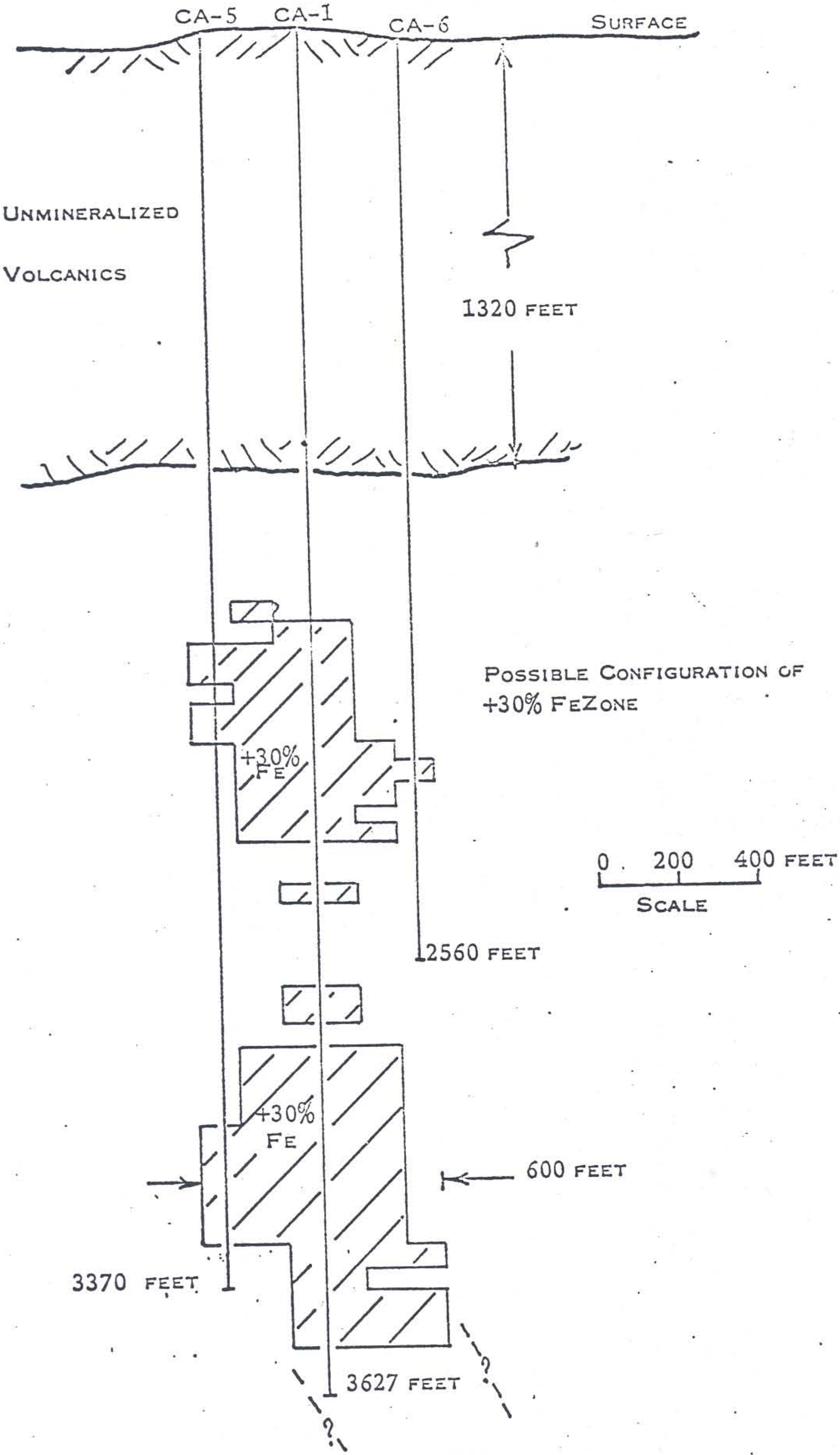

FIGURE 8 CROSS SECTION OF +30% FE ZONE THROUGH DRILL HOLES CA-5, CA-1, AND CA-3

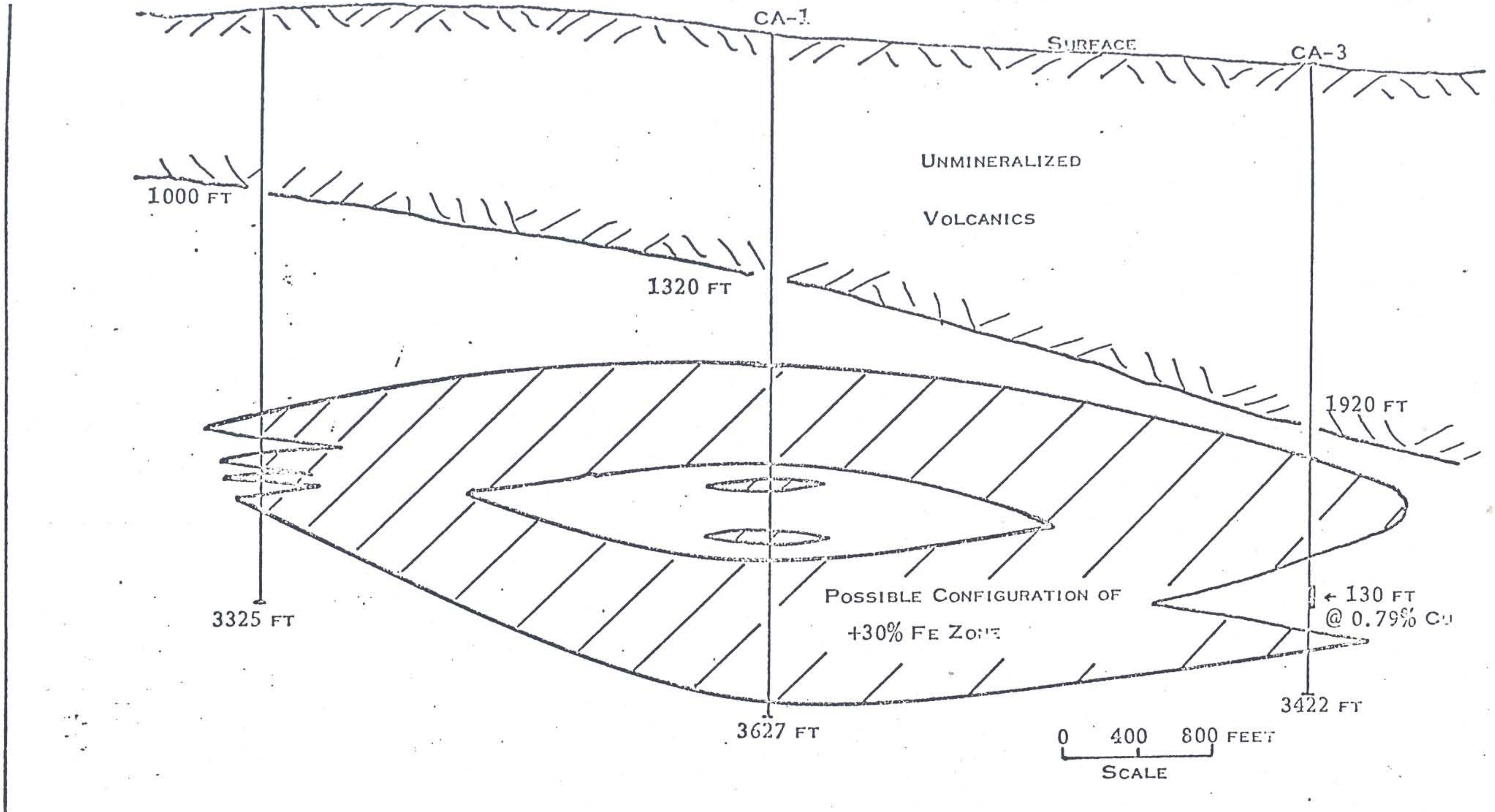

FIGURE 9 LONGITUDINAL SECTION OF +30% FE ZONE THROUGH DRILL HOLES CA-4, CA-1, AND CA-3

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Table XI summarizes the reserves for various cutoff grades. A tonnage factor of 11 cubic feet per long ton is used for all calculations because of the geologic uncertainties in extrapolating outward from the drill holes. When the deposit is drilled out, more exact specific gravities will be available and the tonnage factor will vary depending on the iron grade.

TABLE XI
"INFERRED" CALICO IRON RESERVES

Cutoff Grade	Inferred Tonnage	Average %Fe	Average %Cu
0%Fe	563 M*	24.9% Fe	0.081% Cu
10	483	28.3	0.074
20	359	32.9	0.081
25	272	36.2	0.082
30	188	40.1	0.080
35	132	43.5	0.083
40	88	46.3	0.088
45	57	48.7	0.094
50	20	52.1	0.104
55	2.6	55.7	0.099

* M = Millions of long tons.

It is interesting to note that the average copper grade in Table XI does not consistently increase in grade, with an increasing cutoff grade, as the iron does. The reason for this is that the over-all copper grade is 0.08% Cu, although hole CA-3 intersected a 130-foot section with an average grade of 0.80% Cu (see Figure 1). The iron associated with the highest copper values (1,550 level) is less than 10% Fe. Therefore, the high copper values are included in the total tonnage at a 0% Fe cutoff but not included in the 10% Fe cutoff values. The decrease in copper grade from the 50% to 55% Fe cutoff grade points is due to the very small local tonnage of +55% Fe with a lower average copper value.

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MINING METHODS

SOME OF THE FACTORS THAT DETERMINE THE FEASIBILITY OF MINING A MINERAL DEPO ARE AS FOLLOWS:

1. MINING METHOD.
2. CUTOFF GRADE OF THE ORE.
3. AVERAGE GRADE OF THE ORE.
4. DISTRIBUTION AND CONTINUITY OF THE ORE.

UNDERGROUND BLOCK CAVING

FIGURES 8 & 9 (PP 52 & 53) SHOW CROSS SECTIONS OF THE CALICO IRON ZONE THROUG DRILL HOLES CA-6, CA-1, AND CA-5. THE CROSS SECTIONS SHOW THAT BECAUSE OF TH DEPTH OF COMMERCIAL GRADE MINERALIZATION THE DEPOSIT CAN BE MINED ONLY BY UNDER GROUND TECHNIQUES. THERE ARE 1,330 FEET OF POST-MINERAL VOLCANICS OVERLYING TH MINERALIZED ZONE. THE CHEAPEST UNDERGROUND MINING METHOD IS BLOCK CAVING AS IT DONE AT THE CLIMAX, COLORADO MOLYBDENUM MINE AND THE SAN MANUEL, ARIZONA C MINE. BLOCK CAVING PERMITS A LOW COST, LARGE TONNAGE, MINING OPERATION.

BLOCK CAVING IS DEPENDENT UPON (1) A LARGE TONNAGE OF ORE, AND (2) FRACTU SYSTEMS AND ROCK STRENGTH OF THE ORE ZONE AND OVERLYING WASTE ROCK. IN ORDER T GET AN IDEA OF THE BLOCK CAVING POTENTIAL OF THE IRON ZONE, WALKER-MARTEL CONT MR. ED BORCHERT AND MR. W. STILL, EXPERT CONSULTANT MINING ENGINEERS IN BLOC CAVING TECHNIQUES, TO EXAMINE THE DRILL CORE FROM ALL OF THE HOLES. BOTH INDICA THAT THE GEOLOGIC CHARACTERISTICS OF THE ROCK WOULD PERMIT A BLOCK CAVING TYPE C OPERATION.

MINING COSTS FOR AN EFFICIENT BLOCK CAVE TYPE OPERATION ARE AROUND $1.50 PE MINED. BASED ON THE CROSS SECTIONS ABOUT 75% OF THE ORE COULD BE RECOVERED BY

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...SE OF THE LIMITED DRILL HOLE DATA AND GEOLOGICALLY INFERRED DISTRIBUTION OF ...RE, IT IS NOT PRACTICAL TO MAKE A DETAILED MINE PLAN AT THIS TIME.

CUTOFF GRADE AND AVERAGE GRADE OF THE IRON ZONE

IN ALL MINING OPERATIONS THERE IS A LOWER ORE CUTOFF GRADE THAT MAY BE ECONOMI... MINED. IN ADDITION, AN AVERAGE MINE RUN GRADE MUST ALSO BE MAINTAINED. ... XII SHOWS SEVERAL EXISTING UNDERGROUND IRON MINES, THEIR GRADE AND MINING ...ODS. THE AVERAGE GRADE FOR THESE MINES RANGES BETWEEN 30% FE TO 46% FE AND ...AGES 34.4% FE. IN ORDER TO MAINTAIN AN AVERAGE GRADE OF 40.1% FE FOR THE ...D, THE RESERVE FIGURES IN TABLE XI, PAGE 54 , SHOW A CUTOFF GRADE OF 30% FE ... TOTAL TONNAGE OF 188 MILLION TONS. THE 30% FE CUTOFF GRADE WOULD PROBABLY ...ASONABLE FOR THIS TYPE OF AN OPERATION.

DISTRIBUTION AND CONTINUITY OF THE ORE

A BLOCK CAVE TYPE OF OPERATION IS MOST EFFECTIVE FOR A LARGE TONNAGE OF ORE THAT ...RTICALLY AND CONTINUOUSLY DISTRIBUTED. AN ERRATIC MINERALIZED ZONE CANNOT ...MICALLY BE MINED BY BLOCK CAVE TECHNIQUES BECAUSE OF THE HIGH DILUTION FACTOR. ...E 7 SHOWS THE DISTRIBUTION AND CONTINUITY OF THE IRON ZONE THROUGH HOLES CA-5, ..., AND CA-6 FOR A 30% CUTOFF GRADE. THERE IS AN UPPER AND LOWER ZONE OF RELA...Y CONTINUOUS "ORE" THAT COULD PROBABLY BE MINED BY BLOCK CAVE TECHNIQUES. THE ... DEPTH OF THE UPPER ZONE IS 2,000 FEET BELOW THE SURFACE; AND THE AVERAGE ...H OF THE LOWER ZONE IS 3,100 FEET BELOW THE SURFACE. IT IS IMPORTANT TO NOTE ...MANY OF THE IRON VALUES HAVE BEEN INTERPOLATED FROM DRILL HOLES CA-6, CA-1, ...CA-5. THE ACTUAL SHAPE OF THE MINERALIZED ZONE CHANGES TO THE NORTHWEST AND ...HEAST. THIS IS ALSO SHOWN IN PLATE 1, OVERLAY 1.

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TABLE XII
AVERAGE GRADE FOR UNDERGROUND
IRON MINES

Area	Type of Ore	Approx. Grade, %	Mining Method
Cornwall District, Pa.	Magnetite	36-42	Block caving
Iron Mountain, Mo.	Magnetite-hematite	35	Horizontal open stoping
Meramec Mine, Mo.	Magnetite-hematite	45+	Long hole Shrinkage
Adirondacks, N. Y.	Magnetite	25-45	Inclined room and pillar
Birmingham, Ala.	Sedimentary hematite	30-37	Room and pillar
Algoma Ore, Michicipoten, Ont.	Siderite	30-35	Sub-level stoping
Lorraine District France	Oolitic Is	30	Room and pillar
Dangkalan Mine, Larap, P. I.	Magnetite	38	Sub-level stoping
Mo-i-rona Mine Norway	Magnetite-hematite	32	
Kamaishi Mine Japan	Magnetite	32	Sub-level stoping
Saizgitter District Germany	Hematite	30	Block caving

Underground: Ave. =34.4% Fe

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ECONOMICS OF MINING THE CALICO IRON DEPOSIT
A HYPOTHETICAL EXAMPLE

THIS SECTION OF THE REPORT PRESENTS A HYPOTHETICAL EXAMPLE FOR MINING THE CALICO IRON DEPOSIT. THE PURPOSE OF THE EXAMPLE IS TO INTRODUCE TO MANAGEMENT THE CAPITAL INVESTMENT AND OPERATING COSTS OF SUCH A VENTURE.

COSTS AND PRICES ARE ESTIMATED FROM UP-TO-DATE IRON INDUSTRY AVERAGES. THE BASIC REQUIREMENT IS TO GENERATE AN AFTER TAX NET PROFIT OF $1 MILLION PER YEAR. IF A GREATER PROFIT IS DESIRED, THE OPERATING COSTS WILL STAY ABOUT THE SAME BUT CAPITAL INVESTMENT WILL INCREASE PROPORTIONATELY TO THE PROFIT. FOR INSTANCE, IF A $2 MILLION ANNUAL NET PROFIT IS REQUIRED, THE CAPITAL INVESTMENT WILL DOUBLE.

THE ONLY SALABLE PRODUCT IS AN IRON PELLET. IT IS POSSIBLE THAT THE COPPER, PYRRHOTITE, AND PYRITE BY-PRODUCTS ALSO HAVE SOME VALUE BUT THEY ARE NOT CONSIDERED AT THIS TIME.

IRON RESERVES

IRON ORE: MAGNETITE
CUT-OFF GRADE: 30% FE, AVERAGE: 40% FE
MINING METHOD: UNDERGROUND BLOCK CAVING - 70% RECOVERY
RESERVES:

	DISCOUNT FACTOR	DISCOUNTED RESERVES
PROVEN . . . .NONE	0%	-
INDICATED . . .NONE	30%	-
INFERRED . . .188,000,000 TONS*	50%	94,000,000 TONS

RECOVERABLE RESERVES: 0.70 x 94,000,000 = 66,000,000 TONS
RATIO OF CONCENTRATION = 2.26 TO 1.0
ANNUAL ORE PRODUCTION: 2,825,000 TONS
LIFE OF THE MINE: 23 YEARS

* ALL TONNAGE FIGURES REFER TO LONG TONS (2240 LBS.)

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RATIO OF CONCENTRATION

AVERAGE IRON GRADE: 40.1% FE
MAGNETITE RECOVERY: 70%
RECOVERY GRADE: 0.70 x 40.1 = 28.1% FE
PELLET GRADE: 63.5% FE
RATIO OF CONCENTRATION: $\frac{63.5}{28.1}$ = 2.26 TO 1.00*

* EXPLANATION - 2.26 TONS OF IRON ORE MUST BE MINED TO PRODUCE ONE TON OF CONCENTRATE.

ESTIMATED PREPRODUCTION TIME AND CAPITAL INVESTMENT

DRILLING, PLANNING, AND UNDERGROUND DEVELOPMENT TAKES ABOUT FIVE YEARS. THE ESTIMATED CAPITAL INVESTMENT COSTS ARE AS FOLLOWS:

YEAR	ITEM	CAPITAL INVESTMENT
BEG. 1	DRILLING	$2,000,000
END 1	DRILLING	2,000,000
3	PLANNING, SHAFT	4,000,000
4	SHAFT + MINE EQUIPMENT + PLANT	20,000,000
5	PREPRODUCTION + MINE + PLANT	10,000,000
	TOTAL CAPITAL INVESTMENT	$40,000,000

IT MUST BE EMPHASIZED THAT THIS IS AN EXAMPLE BASED ON INFERRED RESERVES. IN ACTUAL PRACTICE, CAPITAL INVESTMENT IS BASED MAINLY ON PROVEN RESERVES. ADDITIONAL DRILLING IS NECESSARY ON THE CALICO TO PUT THE INFERRED RESERVES INTO THE PROVEN CATEGORY.

Estimated Operating Costs

Table XIII summarizes the unit operating costs. It is assumed the nearest steel mill is in San Francisco. The royalty includes a net smelter return to the Indians and other nonparticipating partners.

TABLE XIII
ESTIMATED CALICO OPERATING COSTS*

	$/Long ton ore	$/Long ton pellet**
Block cave mining	$1.50	$ 3.39
Beneficiation		
Grinding and Concentration	1.03	2.33
Pellet agglomeration		
Regrinding		0.74
Pelletizing		1.36
General Costs		
Overhead, stockpile, loading, rail		0.73
Subtotal - Operating cost		8.55
Payments		
Royalty		0.15
State and local taxes		0.29
Federal income tax		0.95
Amortization		2.51
Total Operating Cost		12.45
Transporation - Schurz to San Francisco***		2.75
Total Cost Delivered		$15.20/Long ton pellet

* Costs are based on iron industry averages.
** Ratio of concentration 2:26 to 1.0.
*** Assume a steel mill at San Francisco. (None there now.)

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Net Profit

The net profit, based on operating costs, are as follows:

	¢/LTU*	$/TON PELLET
Value of ore as of 9/6/67	25.20¢	$16.00
Total Operating cost	23.93	15.20
Total Net Profit	1.27¢/LTU	$ 0.80/TON PELLET

Estimated annual pellet production . . . . 1,250,000 long tons/year

Estimated annual net profit after taxes, depletion, and depreciation $1,000,000

* LTU = long ton unit. For example, 63.5% Fe pellets = 63.5 ltu. At a price 25.2¢/ltu the total value = 63.5 x 25.2 = $16.00/ton pellet

Discounted Cash Flow Analyses

There are many methods of economically evaluating a mineral deposit to etermine the rate of return on capital investment and each corporation has ifferent techniques.

The following cash flow analyses is applicable to the present exploration hase of the Calico deposit. It is based on net income before depletion, depre- iation, and taxes. No cost of money is provided in the return on investment alculation because the aim of the measure is to determine a before-tax percent eturn to compare with the cost of money.

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CASH FLOW RATE OF RETURN

GROSS PELLET VALUE @ 25.2¢/LTU . . . . $16.00/LONG·TON

OPERATING COSTS*

MINING COST 8.55

TRANSPORATION 2.75

OPERATING COST . . . . $11.30/LONG TON PELLET

NET VALUE OF PELLET $16.00 - $11.30 = $4.70/LONG TON

ANNUAL NET INCOME* $5,875,000

PAYBACK PERIOD = $\frac{\$40,000,000}{\$5,875,000}$ = 6.8 YEARS

* BEFORE DEPLETION, DEPRECIATION, AND TAXES.

TABLE XIV SHOWS THAT A 12% DISCOUNTED CASH FLOW RATE-OF-RETURN ON THE 0 MILLION INVESTMENT CAN BE EXPECTED FOR THE HYPOTHETICAL CALICO EXAMPLE. ADDI-ONAL DRILLING WOULD PROBABLY "PROVE UP" MOST OF THE INFERRED ORE WHICH WOULD CREASE THE LIFE OF THE MINE AND ALSO RAISE THE RATE OF RETURN UP TO ABOUT 15%.

TABLE XIV
CALICO CASH FLOW TABLE

		INVESTMENT	CASH FLOW*
BEGINNING OF YEAR	1	$ 2,000,000	
END OF YEAR	1	2,000,000	
	2	2,000,000	
	3	4,000,000	
	4	20,000,000	
	5	10,000,000	
	6		$5,875,000**
	.		
	.		
	.		
	28		5,875,000

DISCOUNTED CASH FLOW RATE OF RETURN = 12%

* NET INCOME PLUS DEPLETION, DEPRECIATION, AND TAXES

** ASSUME A UNIFORM INCOME OVER THE LIFE OF THE MINE FOR THE HYPOTHETICAL EXAMPLE.

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REDUCING PELLET COSTS

As shown in Table XIII, page 60, pellitizing costs account for 14% of the total production costs. In addition, a considerable part of the plant capital expense is for furnaces to produce the pellet.

The Grangesberg Company in Sweden is testing a new method for producing iron pellets without heating and possibly at one fifth the cost of conventional methods. Presently, furnaces are used to heat powdered ore to 1,400° C. to produce pellets.

Another scientific breakthrough in steel making is under investigation by the Quebec Iron Titanium Corporation in Canada. They are working on a new process to reduce iron ore to a powder that could be converted directly into steel. If the process proves feasible, this technique might eliminate the need to make pellets and also dramatically effect the present steel making techniques.

All of these new advances in technology must thoroughly be evaluated before decisions are made to put the iron property into production. If either of the above techniques work or are feasible, the total operating cost per ton of concentrate would be dramatically reduced as well as a reduction in total capital expenditures for supporting pellet making equipment.

BY-PRODUCTS

There is a possibility that copper and sulfur by-products could be recovered from the iron ore during beneficiation.

Copper:

The overall average copper grade is 0.08% copper. This is equivalent to 1.8 pounds copper per long ton and at best would add an additional 20 cents per ton

PROFIT. THE COPPER OCCURS AS CHALCOPYRITE ($CuFeS_2$). HOWEVER, DRILL HOLE CA-3 INTERSECTED A 130 FOOT SECTION OF CHALCOPYRITE AVERAGING 0.79% CU. SINCE ONLY ONE HOLE INTERSECTED THIS HIGH GRADE ZONE, THE EXTENT AND DISTRIBUTION OF THIS OCCURRENCE IS NOT KNOWN. THE COLORADO SCHOOL OF MINES RESEARCH FOUNDATION BENEFICIATION TESTS ON THE IRON SAMPLES FROM DRILL HOLE CA-1 ALSO INCLUDED FLOTATION STUDIES ON THE SULFIDE MATERIAL FROM THE MAGNETIC CONCENTRATION. THEY CONCLUDED A HIGH RECOVERY OF THE CHALCOPYRITE BY FLOTATION IS POSSIBLE AND THEY MADE A CONCENTRATE OF 12.6% CU. THEIR CONCLUSIONS WERE THAT ADDITIONAL FLOTATION TESTS SHOULD BE MADE TO DEVELOP INFORMATION RELATED TO THE ECONOMICS OF PRODUCING A CHALCOPYRITE BY-PRODUCT. THIS STUDY WOULD INCLUDE DETERMINING (1) GRINDING REQUIREMENTS AS SUBSTANTIAL COPPER MAY BE PRESENT IN THE NONMAGNETICS FROM COARSE COBBING, (2) COPPER RECOVERY, AND (3) GRADE OF CONCENTRATE.

SULFUR FROM PYRRHOTITE

CONSIDERABLE PYRITE (FeS_2) AND PYRRHOTITE (FeS) ARE ASSOCIATED WITH THE IRON MINERALIZATION. LOCAL ZONES CONTAIN UP TO 30 PERCENT PYRRHOTITE ALTHOUGH THE AVERAGE FOR THE IRON ZONE IS PROBABLY AROUND 6 PERCENT. IF A FLOTATION CIRCUIT WERE INSTALLED FOR COPPER, ALL SULFIDES WOULD BE RECOVERED. ONE OF THE FALCONBRIDGE NICKEL COMPANY'S IRON MINES IN CANADA HAS A SPECIAL PYRRHOTITE RECOVERY SYSTEM FROM WHICH A SULFUR BY-PRODUCT IS PRODUCED BY ROASTING. THE DETAILS AND ECONOMICS OF THE PROCESS ARE NOT AVAILABLE. DORR-OLIVER, INC., INSTALLED THE EQUIPMENT.

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AUSTRALIAN IRON COMPETITION

The large, low cost, open pit iron mines in Australia are forcing the world iron prices down to 21¢/LTU (versus 24.2¢/LTU for the Calico) and possibly lower in the next few years. Australia is becoming Japan's largest supplier. Japan previously was one of the major buyers of U. S. exported iron. There also is a possibility that Australia can economically export their iron into the U. S. Since it would be a minimum of five years to put the Calico property into production, a comprehensive marketing study is necessary to guarantee the mine will be competitive by the time it starts to produce. However, a world political situation can immediately change supply and demand requirements.

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APPENDIX I

CALICO IRON RESERVE ASSAY VALUES

COMPOSITED AT 50 FOOT LEVELS

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APPENDIX I
CALICO IRON RESERVE ASSAY VALUES
COMPOSITED AT 50 FOOT LEVELS*

	CA-1		CA-3		CA-4		CA-5		CA-6	
LEVEL	%FE	%CU	%FE	%CU	%FE	%CU	%FE	%CU	%FE	%CU
3150	1.3	.007								
3100	12.0	.049					24.3	.069		
3050	9.4	.044					29.2	.037		
3000	0.0	.000					18.9	.031		
2950	15.9	.060			0.00	.051	26.7	.072		
2900	13.4	.166			0.0	.094	25.8	.053		
2850	17.3	.037			17.4	.033	22.8	.052		
2800	20.5	.091			22.4	.036	24.8	.051		
2750	31.2	.053			13.2	.018	24.2	.060		
2700	40.3	.067			2.6	.023	30.2	.060		
2650	44.4	.083			6.3	.012	33.7	.061		
2600	39.7	.091			2.7	.010	28.0	.074	11.2	.100
2550	39.3	.088			5.8	.032	43.8	.086	10.8	.098
2500	50.7	.081			8.1	.021	38.0	.081	5.5	.067
2450	42.0	.084			31.7	.081	26.8	.052	22.8	.079
2400	46.6	.097			40.7	.113	22.9	.049	31.1	.094
2350	43.9	.093			23.5	.047	22.1	.042	29.6	.074
2300	47.1	.077	26.0	.016	19.5	.038	27.6	.070	11.8	.054
2250	51.4	.146	47.4	.031	33.4	.083	26.5	.039	16.3	.050
2200	10.7	.044	37.8	.026	19.5	.075	20.4	.045	20.0	.060
2150	17.0	.076	35.2	.038	39.8	.115	25.7	.046	15.4	.064
2100	34.0	.106	39.6	.020	24.6	.092	17.7	.045	16.0	.048
2050	28.6	.080	22.6	.012	38.7	.089	16.9	.081	24.1	.053
2000	27.8	.125	41.4	.050	23.0	.069	23.3	.073	17.2	.067
1950	19.8	.175	41.5	.056	14.8	.039	21.6	.087	13.0	.052
1900	27.0	.101	31.2	.101	14.6	.029	17.0	.077	(10.0	.046)**

CONTINUED ON NEXT PAGE.

APPENDIX I CONT.
CALICO IRON RESERVE ASSAY VALUES
COMPOSITED AT 50 FOOT LEVELS*

LEVEL	CA-1 %FE	CA-1 %CU	CA-3 %FE	CA-3 %CU	CA-4 %FE	CA-4 %CU	CA-5 %FE	CA-5 %CU	CA-6 %FE	CA-6 %CU
1850	32.0	.085	48.2	.102	14.0	.052	27.3	.052	(16.3	.031)
1800	32.0	.085	48.2	.102	13.7	.046	27.3	.053	(16.7	.035)
1750	22.5	.072	32.4	.057	13.8	.027	26.7	.058	(16.0	.031)
1700	38.7	.081	39.9	.068	17.6	.060	26.8	.075	(23.2	.049)
1650	54.5	.126	27.8	.032	-	-	29.2	.050	(17.5	.030)
1600	55.7	.099	24.0	.053	-	-	29.8	.051	(17.9	.059)
1550	47.3	.088	8.6	1.187	12.8	.025	16.2	.061	(28.4	.053)
1500	47.3	.120	20.0	.540	10.2	.028	34.1	.205	(20.5	.120)
1450	45.3	.114	7.3	.390	17.8	.070	34.4	.347	(20.7	.070)
1400	45.3	.117	14.0	.041	8.2	.025	47.1	.076	(28.2	.070)
1350	47.7	.065	29.2	.033	10.5	.035	50.2	.113	(28.6	.039)
1300	48.7	.086	25.1	.091			51.3	.088	(29.2	.052)
1250	40.6	.102	31.5	.098			34.3	.068	(24.4	.061)
1200	50.4	.079	32.8	.095			9.4	.042	(30.2	.047)
1150	46.3	.055	15.4	.047			2.7	.035	(1.4	.021)
1100	51.3	.088	12.1	.055			0.0	.043	(51.3	.088)
1050	46.3	.088	6.4	.054					(46.3	.088)
1000	45.6	.095	13.0	.075					(45.6	.095)
950	23.8	.161	25.6	.118					(23.8	.161)

* COLLAR ELEVATIONS: CA-1: 4533 FT., CA-2: 4423 FT., CA-3: 4375 FT., CA-4: 4677 FT., CA-5: 4503 FT., CA-6: 4550 FT.

** PARENTHESES INDICATES AN EXTRAPOLATED VALUE.

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APPENDIX II

CALICO IRON RESERVES ON 50 FOOT LEVELS

CUTOFF GRADE 30% FE

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EXPLANATION:

FOR EACH LEVEL A SEPARATE RESERVE TONNAGE AND GRADE IS CALCULATED FOR THE FOLLOWING WIDTHS:

100 FT. WIDTH
200 FT. WIDTH
400 FT. WIDTH
600 FT. WIDTH

IN ADDITION, A CUMULATIVE TONNAGE FOR THE 600 WIDTH IS TOTALED FOR EACH LEVEL STARTING AT THE TOP LEVEL.

THE TONNAGES ARE COMPUTED IN DOUBLE PRECISION, AND THE FIGURES ARE LISTED IN EXPOTENTIAL FORM WHICH IS EASILY CONVERTED AS FOLLOWS:

2800 LEVEL

EXPONENTIAL FORM = 0.1315182D 07

NORMAL FORM = 1,318,182 LONG TONS

// EXEC.

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
3100	100	0.0	0.0	0.0			
3100	200	0.0	0.0	0.0			
3100	400	0.0	0.0	0.0			
3100	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
3050	100	0.0	0.0	0.0			
3050	200	0.0	0.0	0.0			
3050	400	0.0	0.0	0.0			
3050	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
3000	100	0.0	0.0	0.0			
3000	200	0.0	0.0	0.0			
3000	400	0.0	0.0	0.0			
3000	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2950	100	0.0	0.0	0.0			
2950	200	0.0	0.0	0.0			
2950	400	0.0	0.0	0.0			
2950	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

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CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2900	100	0.0	0.0	0.0			
2900	200	0.0	0.0	0.0			
2900	400	0.0	0.0	0.0			
2900	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2850	100	0.0	0.0	0.0			
2850	200	0.0	0.0	0.0			
2850	400	0.0	0.0	0.0			
2850	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.0	0.0	0.0

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2800	100	0.0	0.0	0.0			
2800	200	0.0	0.0	0.0			
2800	400	0.1318182D 07	42.6	0.071			
2800	600	0.0	0.0	0.0			
TOTAL =		0.1318182D 07	42.6	0.071	0.1318182D 07	42.6	0.071

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2750	100	0.1322727D 07	31.2	0.053			
2750	200	0.2645454D 07	31.2	0.053			
2750	400	0.0	0.0	0.0			
2750	600	0.0	0.0	0.0			
TOTAL =		0.2645454D 07	31.2	0.053	0.3963636D 07	35.0	0.059

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2700	100	0.1454546D 07	39.4	0.021			
2700	200	0.2909092D 07	39.4	0.021			
2700	400	0.4204547D 07	38.1	0.034			
2700	600	0.5500002D 07	36.2	0.040			
TOTAL =		0.5500002D 07	36.2	0.040	0.9463638D 07	35.7	0.048

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CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
2650	100	0.1568182D 07	42.9	0.080			
2650	200	0.3136365D 07	42.9	0.080			
2650	400	0.4704547D 07	41.1	0.077			
2650	600	0.6000002D 07	39.5	0.073			
TOTAL =		0.6000002D 07	39.5	0.073	0.1546364D 08	37.2	0.058

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
2600	100	0.1618182D 07	38.1	0.087			
2600	200	0.3236365D 07	38.1	0.087			
2600	400	0.4531820D 07	36.9	0.086			
2600	600	0.0	0.0	0.0			
TOTAL =		0.4531820D 07	36.9	0.086	0.1999546D 08	37.1	0.064

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
2550	100	0.1713636D 07	37.4	0.084			
2550	200	0.3427273D 07	37.4	0.084			
2550	400	0.5140909D 07	38.1	0.084			
2550	600	0.6854545D 07	39.0	0.084			
TOTAL =		0.6854545D 07	39.0	0.084	0.2685000D 08	37.6	0.069

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
2500	100	0.1777273D 07	48.0	0.077			
2500	200	0.3554545D 07	48.0	0.077			
2500	400	0.5331817D 07	46.0	0.077			
2500	600	0.7109089D 07	43.5	0.077			
TOTAL =		0.7109089D 07	43.5	0.077	0.3395909D 08	38.8	0.071

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
2450	100	0.2663636D 07	37.1	0.080			
2450	200	0.5327273D 07	37.1	0.080			
2450	400	0.7927273D 07	35.9	0.078			
2450	600	0.0	0.0	0.0			
TOTAL =		0.7927273D 07	35.9	0.078	0.4188637D 08	38.3	0.072

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CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2400	100	0.2663637D 07	42.8	0.098			
2400	200	0.5327274D 07	42.8	0.098			
2400	400	0.1008636D 08	38.9	0.092			
2400	600	0.1138182D 08	38.0	0.092			
TOTAL =		0.1138182D 08	38.0	0.092	0.5326819D 08	38.2	0.076

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2350	100	0.1945455D 07	44.3	0.087			
2350	200	0.3890910D 07	44.3	0.087			
2350	400	0.6481820D 07	40.4	0.080			
2350	600	0.0	0.0	0.0			
TOTAL =		0.6481820D 07	40.4	0.080	0.5975001D 08	38.5	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2300	100	0.1295455D 07	47.1	0.077			
2300	200	0.2590910D 07	47.1	0.077			
2300	400	0.3886365D 07	43.8	0.076			
2300	600	0.0	0.0	0.0			
TOTAL =		0.3886365D 07	43.8	0.076	0.6363637D 08	38.8	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2250	100	0.2900000D 07	45.2	0.097			
2250	200	0.5800001D 07	45.2	0.097			
2250	400	0.9963637D 07	41.1	0.085			
2250	600	0.0	0.0	0.0			
TOTAL =		0.9963637D 07	41.1	0.085	0.7360001D 08	39.1	0.078

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2200	100	0.8445455D 06	37.8	0.026			
2200	200	0.1689091D 07	37.8	0.026			
2200	400	0.0	0.0	0.0			
2200	600	0.0	0.0	0.0			
TOTAL =		0.1689091D 07	37.8	0.026	0.7528910D 08	39.1	0.077

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CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2150	100	0.1636364D 07	37.5	0.076			
2150	200	0.3272727D 07	37.5	0.076			
2150	400	0.0	0.0	0.0			
2150	600	0.0	0.0	0.0			
TOTAL =		0.3272727D 07	37.5	0.076	0.7856183D 08	39.0	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2100	100	0.2113637D 07	36.2	0.073			
2100	200	0.4227273D 07	36.2	0.073			
2100	400	0.5045455D 07	35.2	0.063			
2100	600	0.0	0.0	0.0			
TOTAL =		0.5045455D 07	35.2	0.063	0.8360728D 08	38.8	0.076

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2050	100	0.8181818D 06	37.7	0.098			
2050	200	0.1636364D 07	37.7	0.098			
2050	400	0.3272727D 07	35.4	0.087			
2050	600	0.4090908D 07	34.8	0.085			
TOTAL =		0.4090908D 07	34.8	0.085	0.8769819D 08	38.6	0.076

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
2000	100	0.8181818D 06	41.4	0.050			
2000	200	0.1636364D 07	41.4	0.050			
2000	400	0.3272727D 07	38.6	0.046			
2000	600	0.4090908D 07	37.8	0.046			
TOTAL =		0.4090908D 07	37.8	0.046	0.9178910D 08	38.6	0.075

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE LEVEL INTERVAL = 50 FT.

LVL	WIDTH	LEVEL TOTALS TONS	%FE	%CU	ACCUMULATED TOTALS TONS	%FE	%CU
1950	100	0.8181818D 06	41.5	0.056			
1950	200	0.1636364D 07	41.5	0.056			
1950	400	0.3272727D 07	39.3	0.054			
1950	600	0.4090908D 07	39.8	0.055			
TOTAL =		0.4090908D 07	39.8	0.055	0.9588001D 08	38.6	0.074

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                    CALICO IRON RESERVES
     CUTOFF GRADE = 30.0 % FE               LEVEL INTERVAL = 50 FT.
...........LEVEL TOTALS.............  ...ACCUMULATED TOTALS.....
LVL  WIDTH       TONS          %FE   %CU          TONS          %FE %CU
1900 100    0.8181818D 06    31.2 0.101
1900 200    0.1636364D 07    31.2 0.101
1900 400    0.0               0.0 0.0
1900 600    0.0               0.0 0.0
TOTAL =     0.1636364D 07    31.2 0.101   0.9751637D 08   38.5 0.074

                    CALICO IRON RESERVES
     CUTOFF GRADE = 30.0 % FE               LEVEL INTERVAL = 50 FT.
...........LEVEL TOTALS.............  ...ACCUMULATED TOTALS.....
LVL  WIDTH       TONS          %FE   %CU          TONS          %FE %CU
1850 100    0.2113637D 07    38.3 0.092
1850 200    0.4227274D 07    38.3 0.092
1850 400    0.5863637D 07    38.9 0.090
1850 600    0.6681818D 07    39.2 0.090
TOTAL =     0.6681818D 07    39.2 0.090   0.1041982D 09   38.5 0.075

                    CALICO IRON RESERVES
     CUTOFF GRADE = 30.0 % FE               LEVEL INTERVAL = 50 FT.
...........LEVEL TOTALS.............  ...ACCUMULATED TOTALS.....
LVL  WIDTH       TONS          %FE   %CU          TONS          %FE %CU
1800 100    0.2113637D 07    38.3 0.092
1800 200    0.4227274D 07    38.3 0.092
1800 400    0.5863637D 07    39.5 0.090
1800 600    0.6681818D 07    40.8 0.090
TOTAL =     0.6681818D 07    40.8 0.090   0.1108800D 09   38.7 0.076

                    CALICO IRON RESERVES
     CUTOFF GRADE = 30.0 % FE               LEVEL INTERVAL = 50 FT.
...........LEVEL TOTALS.............  ...ACCUMULATED TOTALS.....
LVL  WIDTH       TONS          %FE   %CU          TONS          %FE %CU
1750 100    0.8181818D 06    32.4 0.057
1750 200    0.1636364D 07    32.4 0.057
1750 400    0.2454545D 07    33.4 0.059
1750 600    0.3272727D 07    34.6 0.061
TOTAL =     0.3272727D 07    34.6 0.061   0.1141527D 09   38.5 0.076

                    CALICO IRON RESERVES
     CUTOFF GRADE = 30.0 % FE               LEVEL INTERVAL = 50 FT.
...........LEVEL TOTALS.............  ...ACCUMULATED TOTALS.....
LVL  WIDTH       TONS          %FE   %CU          TONS          %FE %CU
1700 100    0.2113637D 07    39.2 0.076
1700 200    0.4227274D 07    39.2 0.076
1700 400    0.8454546D 07    35.7 0.071
1700 600    0.0               0.0 0.0
TOTAL =     0.8454546D 07    35.7 0.071   0.1226073D 09   38.3 0.075
```

6000 0101 (0890)

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1650	100	0.1693182D 07	51.6	0.119			
1650	200	0.3386365D 07	51.6	0.119			
1650	400	0.6375002D 07	45.2	0.101			
1650	600	0.0	0.0	0.0			
TOTAL =		0.6375002D 07	45.2	0.101	0.1289823D 09	38.7	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1600	100	0.1568182D 07	53.5	0.095			
1600	200	0.3136365D 07	53.5	0.095			
1600	400	0.5340910D 07	45.9	0.083			
1600	600	0.0	0.0	0.0			
TOTAL =		0.5340910D 07	45.9	0.083	0.1343232D 09	39.0	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1550	100	0.1454546D 07	46.1	0.086			
1550	200	0.2909092D 07	46.1	0.086			
1550	400	0.3500001D 07	44.2	0.083			
1550	600	0.0	0.0	0.0			
TOTAL =		0.3500001D 07	44.2	0.083	0.1378232D 09	39.1	0.077

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1500	100	0.1454546D 07	46.1	0.117			
1500	200	0.2909092D 07	46.1	0.117			
1500	400	0.5045456D 07	41.8	0.109			
1500	600	0.5204547D 07	41.6	0.112			
TOTAL =		0.5204547D 07	41.6	0.112	0.1430277D 09	39.2	0.078

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1450	100	0.1363637D 07	44.8	0.116			
1450	200	0.2727274D 07	44.8	0.116			
1450	400	0.4636365D 07	39.4	0.107			
1450	600	0.4704546D 07	39.3	0.110			
TOTAL =		0.4704546D 07	39.3	0.110	0.1477323D 09	39.2	0.079

6000 0101 (0890)

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1150	100	0.1068182D 07	46.3	0.055			
1150	200	0.2136364D 07	46.3	0.055			
1150	400	0.0	0.0	0.0			
1150	600	0.0	0.0	0.0			
TOTAL =		0.2136364D 07	46.3	0.055	0.1787096D 09	39.7	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1100	100	0.1045455D 07	51.3	0.088			
1100	200	0.2090910D 07	51.3	0.088			
1100	400	0.3136365D 07	51.3	0.088			
1100	600	0.4181820D 07	51.3	0.088			
TOTAL =		0.4181820D 07	51.3	0.088	0.1828914D 09	40.0	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1050	100	0.0	0.0	0.0			
1050	200	0.0	0.0	0.0			
1050	400	0.8636364D 06	46.3	0.088			
1050	600	0.1727273D 07	46.3	0.088			
TOTAL =		0.1727273D 07	46.3	0.088	0.1846186D 09	40.0	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1000	100	0.8636364D 06	45.6	0.095			
1000	200	0.1727273D 07	45.6	0.095			
1000	400	0.2590909D 07	45.6	0.095			
1000	600	0.3454546D 07	45.6	0.095			
TOTAL =		0.3454546D 07	45.6	0.095	0.1880732D 09	40.1	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE   LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
950	100	0.0	0.0	0.0			
950	200	0.0	0.0	0.0			
950	400	0.0	0.0	0.0			
950	600	0.0	0.0	0.0			
TOTAL =		0.0	0.0	0.0	0.1880732D 09	40.1	0.080

6000 0101 (0890)

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1400	100	0.1272727D 07	45.3	0.117			
1400	200	0.2545454D 07	45.3	0.117			
1400	400	0.4386362D 07	42.9	0.108			
1400	600	0.4954544D 07	43.4	0.104			
TOTAL =		0.4954544D 07	43.4	0.104	0.1526868D 09	39.3	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1350	100	0.1227273D 07	47.7	0.065			
1350	200	0.2454546D 07	47.7	0.065			
1350	400	0.4500000D 07	45.3	0.066			
1350	600	0.6136363D 07	44.0	0.068			
TOTAL =		0.6136363D 07	44.0	0.068	0.1588232D 09	39.5	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1300	100	0.1113636D 07	48.7	0.086			
1300	200	0.2227272D 07	48.7	0.086			
1300	400	0.4159089D 07	46.3	0.082			
1300	600	0.4977271D 07	47.1	0.083			
TOTAL =		0.4977271D 07	47.1	0.083	0.1638005D 09	39.7	0.080

CALICO IRON RESERVES

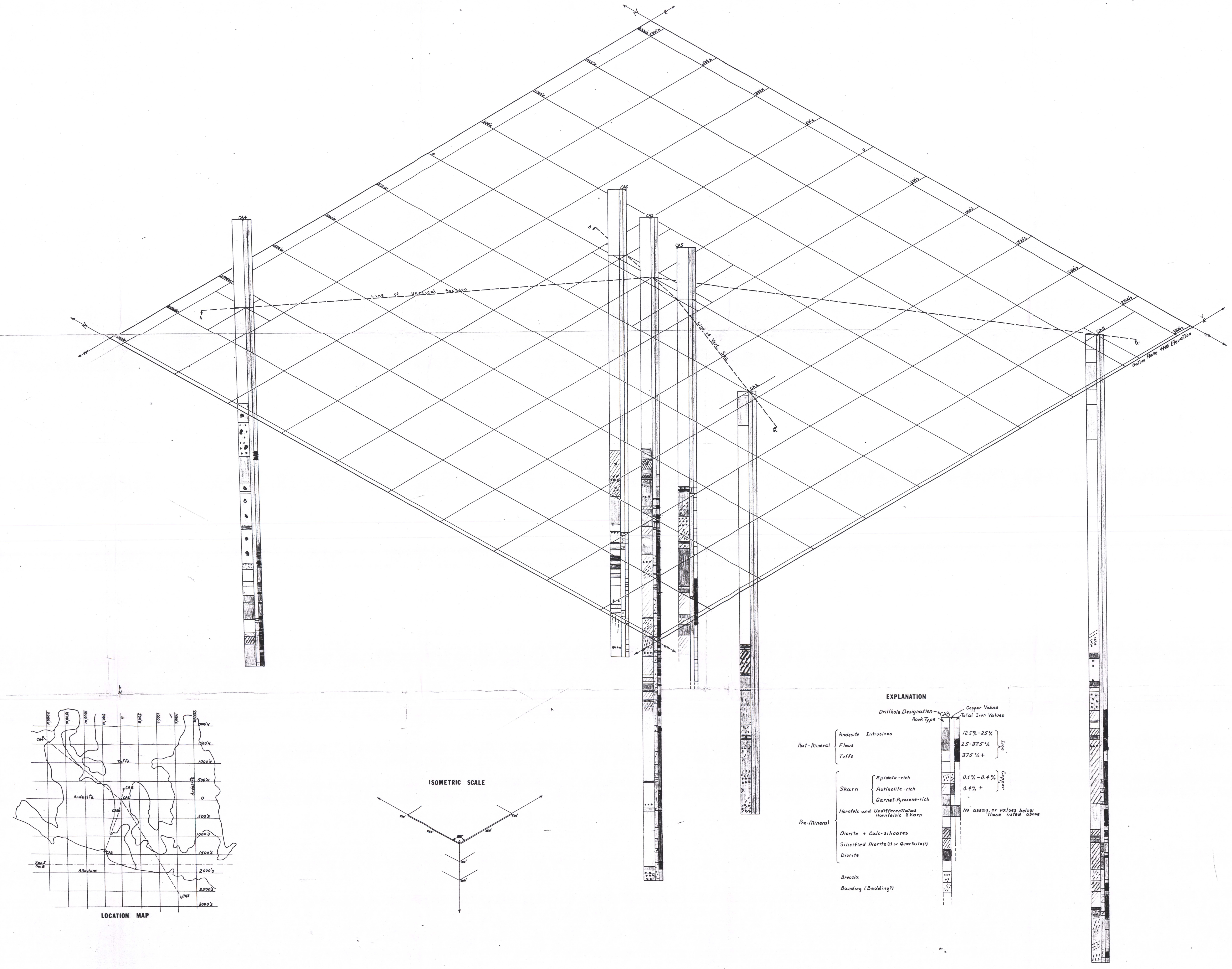
CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1250	100	0.1977273D 07	36.7	0.100			
1250	200	0.3954546D 07	36.7	0.100			
1250	400	0.5931819D 07	36.0	0.094			
1250	600	0.6772728D 07	35.8	0.091			
TOTAL =		0.6772728D 07	35.8	0.091	0.1705732D 09	39.6	0.080

CALICO IRON RESERVES

CUTOFF GRADE = 30.0 % FE — LEVEL INTERVAL = 50 FT.

LVL	WIDTH	TONS	%FE	%CU	ACCUMULATED TONS	%FE	%CU
1200	100	0.1818182D 07	44.2	0.085			
1200	200	0.3636363D 07	44.2	0.085			
1200	400	0.4818181D 07	43.3	0.079			
1200	600	0.5999999D 07	40.7	0.073			
TOTAL =		0.5999999D 07	40.7	0.073	0.1765732D 09	39.6	0.080



ISOMETRIC PERSPECTIVE AND CROSS-SECTIONS OF THE CALICO AREA

Sections 5 & 8, T.13N., R.29E.

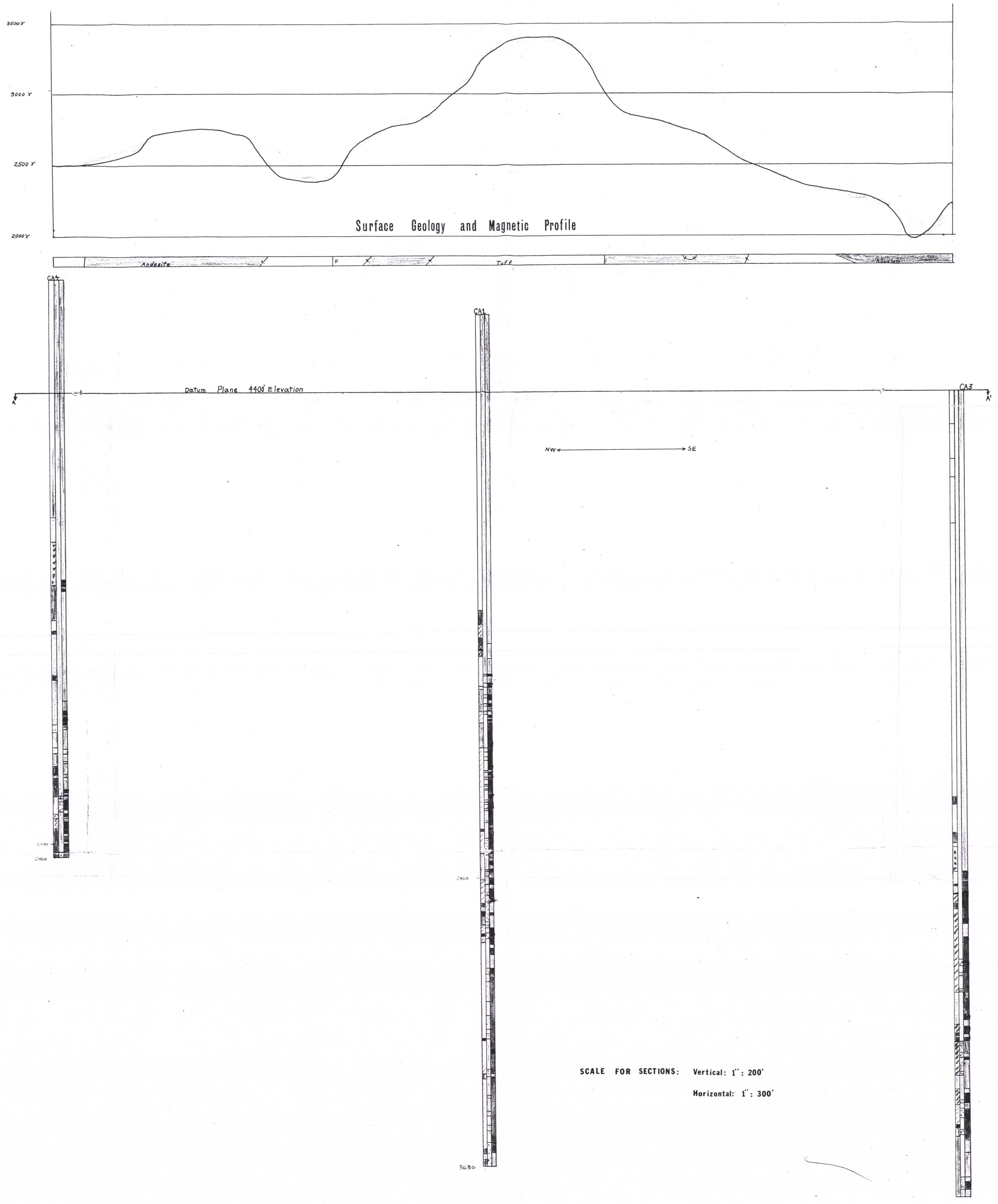
Walker Reservation, Nevada

OCCIDENTAL INTERNATIONAL CORPORATION

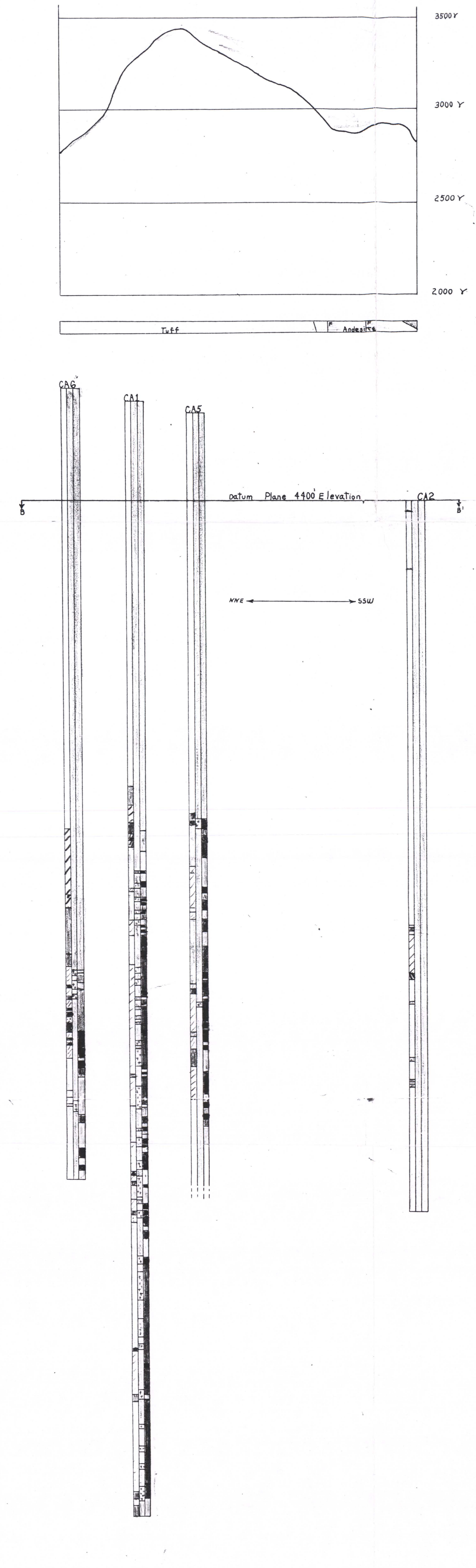
W. F. Chester; data from logs by E. Lawrence

December, 1966

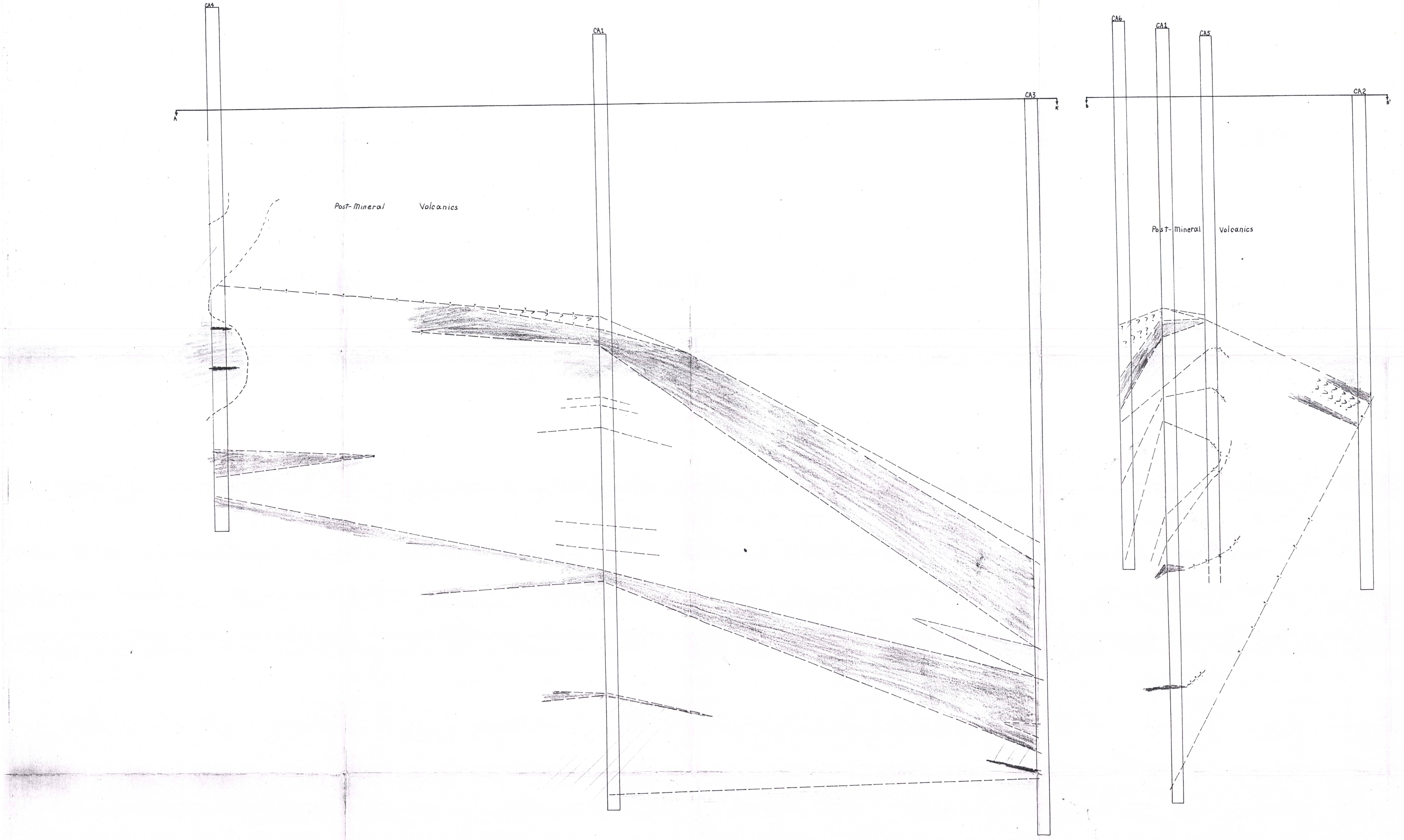
Plate 1



SECTION A - A'



SECTION B - B'



OVERLAY 2: *Possible Rock Correlations In The Calico Deposit*

W. F. C. *12/66*

Plate 1

PLATE 1
OVERLAY 2
POSSIBLE ROCK CORRELATIONS IN
THE CALICO DEPOSIT

6000 0101 (0890)

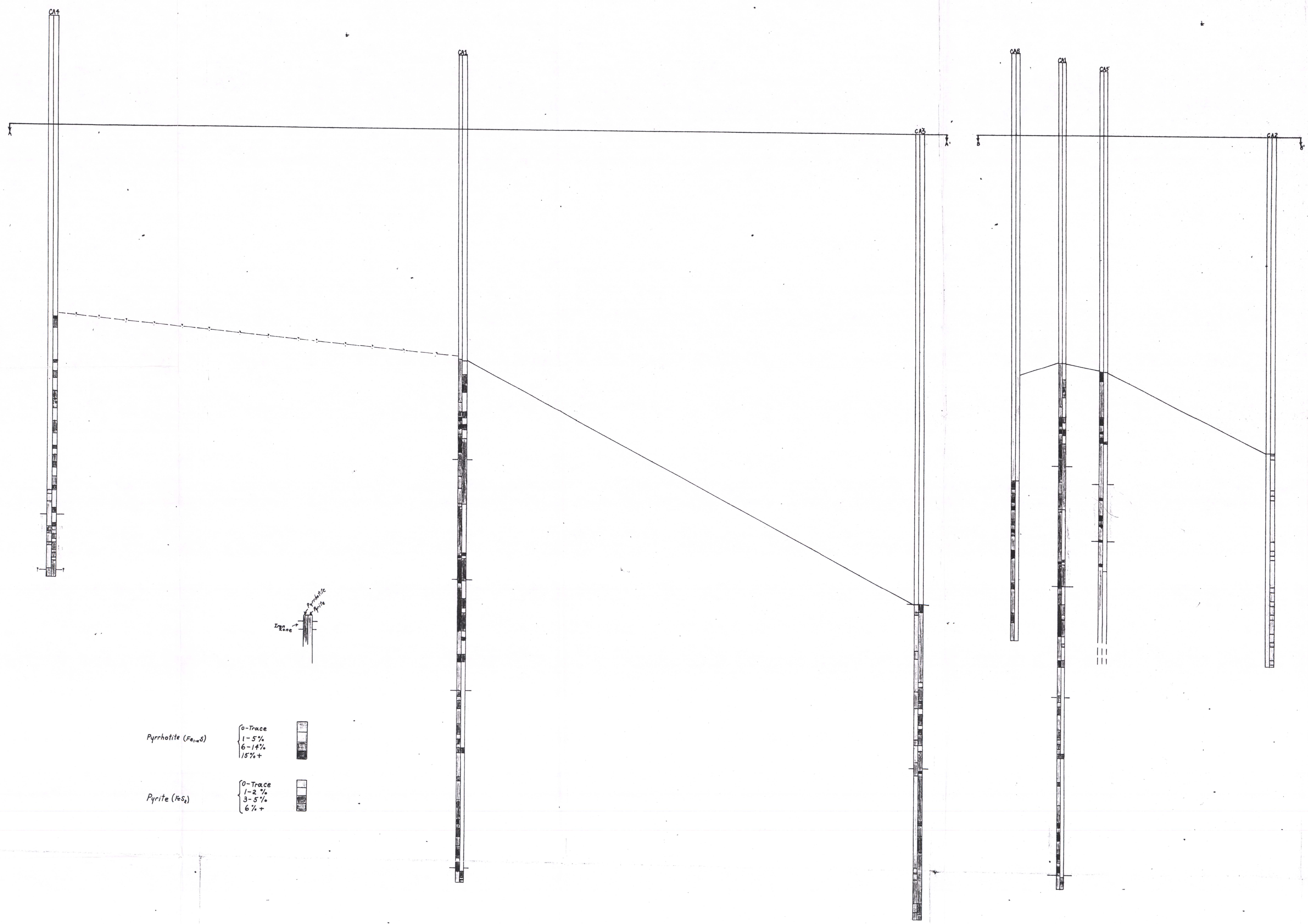


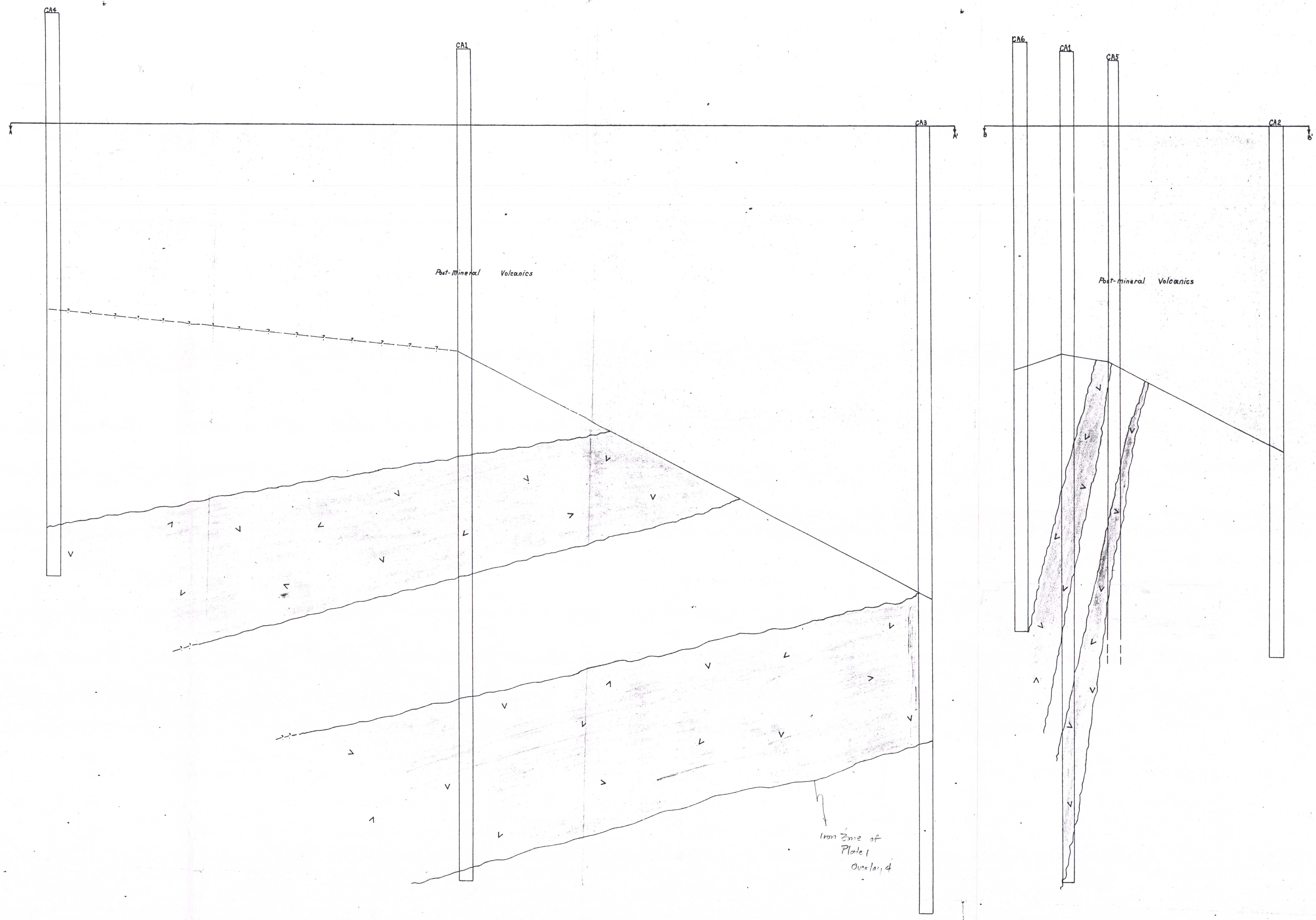
PLATE 1
OVERLAY 3
PYRITE-PYRRHOTITE
IN THE CALICO DEPOSIT

OVERLAY 3: *Pyrite–Pyrrhotite In The Calico Deposit*

Plate 1

W. F. C. 12/66

6000 0101 (0890)



OVERLAY 1b: A Possible Configuration For The Calico Deposit

W.F.C. 12/66

Plate 1

PLATE 1
OVERLAY 1a
A POSSIBLE CONFIGURATION FOR THE CALICO
DEPOSIT: TWO PARALLEL VEINS

6000 0101 (0840)

BASE U.S. GEOLOGICAL SURVEY WEBER RESERVOIR AND ALLEN SPRINGS 15' QUAD.

GEOLOGY BY E.F. LAWRENCE

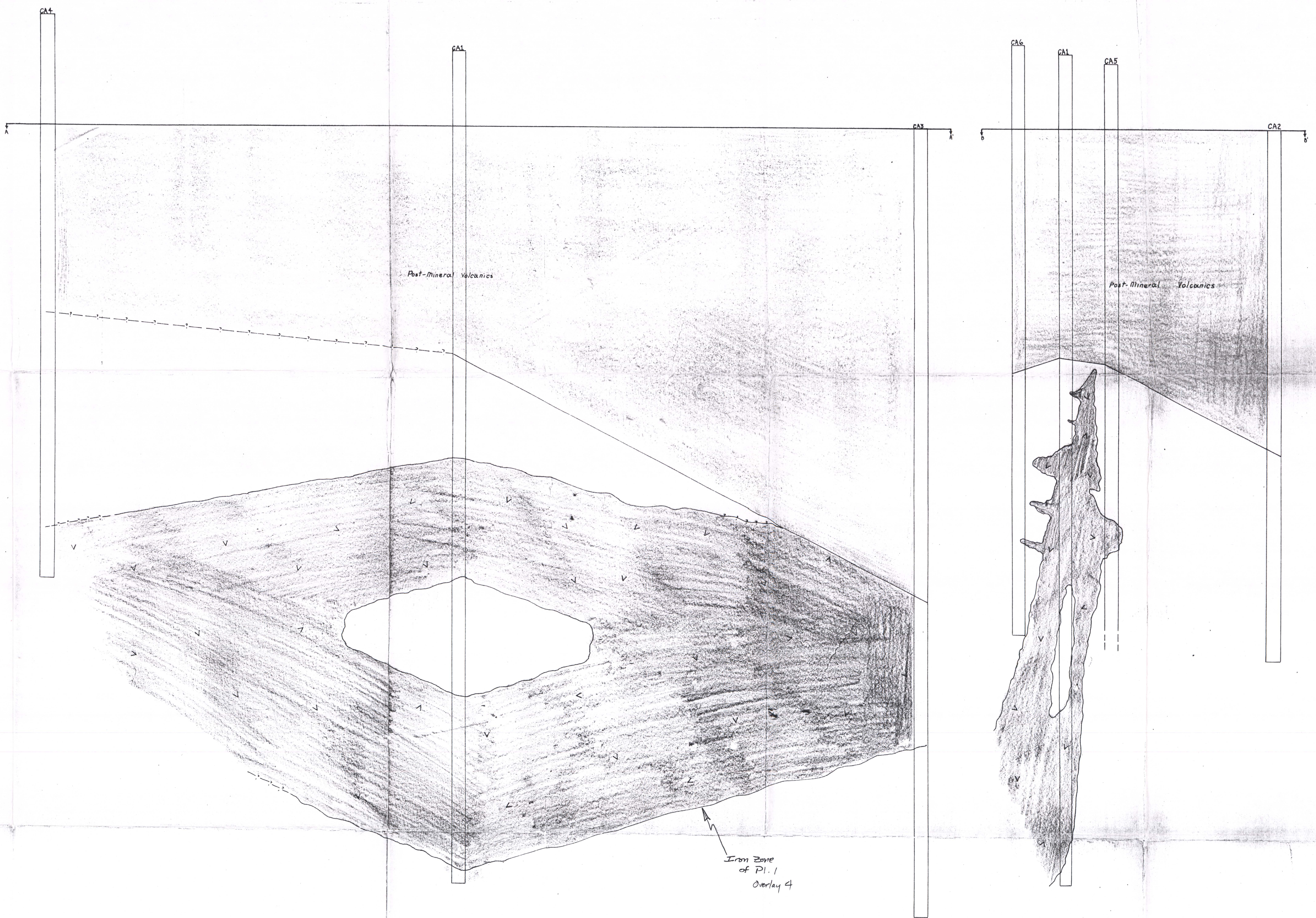
CALICO AREA, WALKER RIVER PAIUTE RESERVATION, SCHURZ, MINERAL COUNTY, NEVADA

SCALE 1:12000

1000 0 1000 2000 3000 4000 5000 FEET

CONTOUR INTERVAL 40 FEET

6000 0101 (0890)

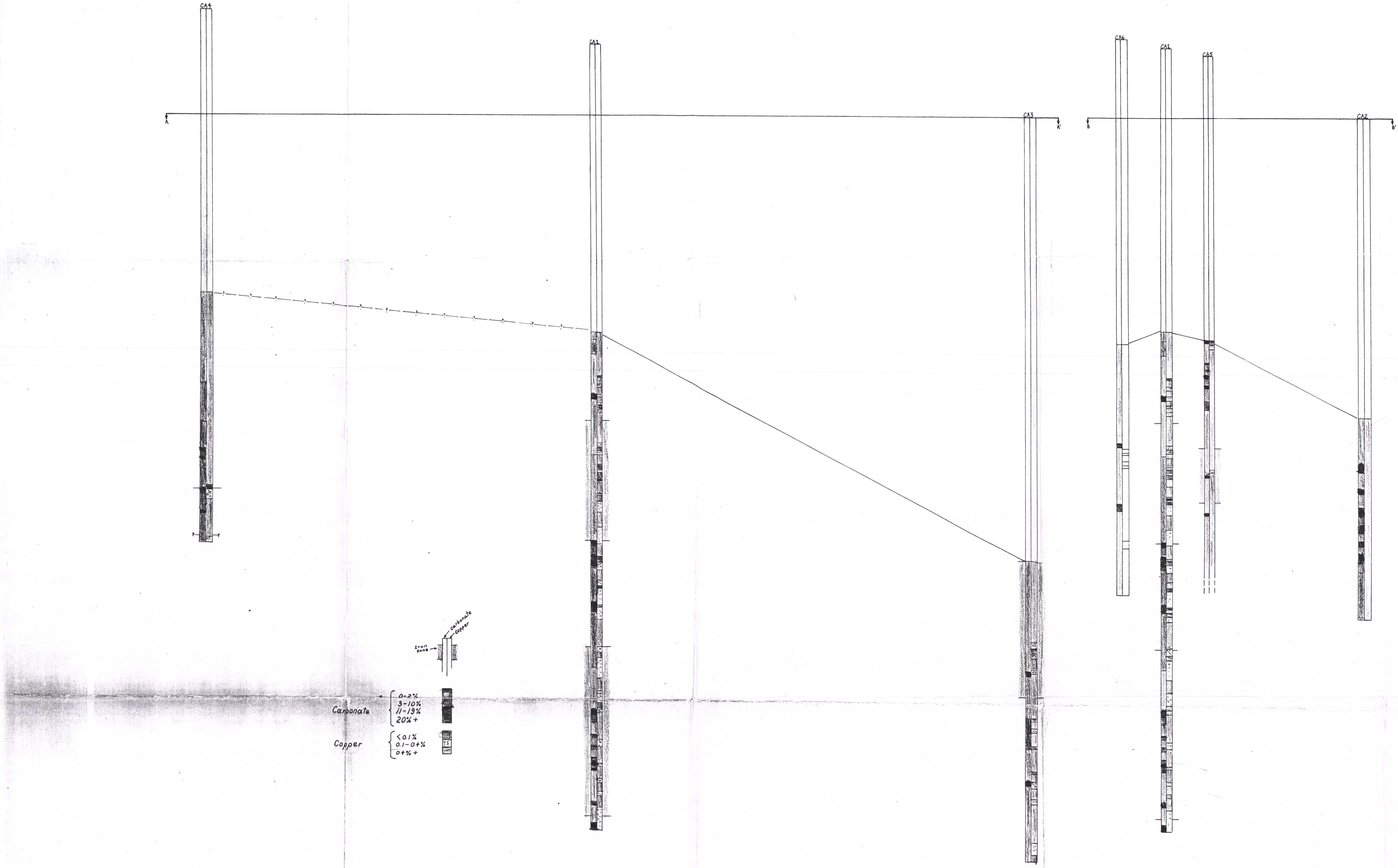


OVERLAY 1a: *A Possible Configuration For The Calico Deposit*

W.F.C. 12/66

Plate 1

PLATE 1
OVERLAY 1A
A POSSIBLE CONFIGURATION FOR THE CALICO
DEPOSIT: ONE VEIN SYSTEM



OVERLAY 4: *Carbonate-Copper In The Calico Deposit*

Plate 1

W. F. C. 12/66

PLATE 1
OVERLAY 4

CARBONATE-COPPER

IN THE CALICO DEPOSIT