

Thin Section work. Calico

6000 0148 (0890)
16515 Mallory Drive
Fontana, California
5-20-75

Mr. Robert L. Redmond
1080 Pine Ridge Drive
Reno, Nevada

Dear Mr. Redmond:

Again my apology for the delay: some personal problems arose at the last moment making it impossible to finish on the date I had earlier indicated.

Enclosed is a report on the core samples. They certainly seem to represent iron metasomatism attendant to the emplacement of "granitic" rocks and concomitant introduction of calcium and lesser amounts of other elements into the "granitic" rocks from calcareous or carbonate rocks.. Not knowing the geology of the location of the cores makes it impossible to be completely firm about such as whether some of the rocks were initially calcareous sediments or limestones, etc. I hope that the report will be of use to you. If you have any unanswered questions feel free to ask them.

Costs are as follows:

Thin sections and polished sections	\$60.00
Petrologic, mineralogic, and X-ray analyses time 35 hours @ 6.00/hr	<u>\$210.00</u>

Total cost 270.00

Yours truly,

Douglas M. Norton
Douglas M. Norton

REPORT OF PETROGRAPHIC EXAMINATION

At the request of Mr. Robert Molt 10 drill core samples, supplied by Mr. Robert Redmond, were examined petrographically and mineralogically. A total of 13 thin sections and 7 polished sections were prepared. Additional data were obtained by the use of x-ray diffraction and x-ray fluorescence.

SECTION EXAMINATION

Based on thin section examination the samples appear to fall into essentially three groups based on inferred original nature of the rocks.

1. Slightly metasomatized quartzites (1, 2)
2. Altered dioritic rocks (3, 5, 29)
3. Metasomatized calcareous quartzites or impure carbonate (limestone) (6, 9, 12, 13, 22)

Meta-quartzites

Samples 1 and 2 appear to be metamorphosed impure quartzites.

Quartz

The major constituent in anhedral strained masses.

Sodic Plagioclase

small amount (<1%) albite twins

Potash feldspar

small amount of untwinned small crystals

Carbonate

small amount, generally interstitial, could be either indigenous or introduced.

Chlorite

sample #2 contains small amount of pleochroic green (iron-bearing) chlorite. It occurs interstitial to the quartz and also in fractures in the quartz. Some is altering to a bowlingite-iddingsite-like mineral(s).

Spene and Zircon

are accessories.

Altered dioritic (?) rocks

Samples 3, 5, and ²⁹7, look to be contaminated intrusive igneous rocks of probably dioritic composition. Three shows more igneous features than 5 or 7.29.

Plagioclase

Common to abundant, generally altered and partially replaced. Looks to have been originally an intermediate composition, zoned plagioclase. In part replaced by magnetite. Commonly altered to carbonate and white mica.

Biotite

Partially altered to green chlorite. Commonly contains reticulated intergrowths of fine needles of opaque mineral.

<u>Potash feldspar</u>	Very small amount of untwinned potash feldspar.
<u>Quartz</u>	Small amount of fine grained quartz.
<u>Amphibole</u>	colorless to green hornblende; in part replacing pyroxene. In part probably indigenous to igneous rocks and part probably due to contamination.
<u>Pyroxene</u>	Probably the result of introduction of calcium to form diopsidic pyroxene. In part it is being replaced by opaques. Commonly altering or being replaced by hornblende.
<u>Chlorite</u>	Alteration of biotite, however some maybe due to contamination and not alteration of biotite. Not present in #29. Some iddingsite-bowlingite mineral common in #5.
<u>Epidote</u>	Clinozoisite filling fractures and as alternation of plagioclase. Pistacite occurs as scattered grains.
<u>Carbonate</u>	Introduced(?) as scattered interstitial grains and few thin veinlets. Some occurs as alteration of plagioclase.
<u>Pyrite</u>	Scattered grains in #29.
<u>Accessories</u>	Apatite, zircon, and sphene. In #5 there is a fine grained mineral which resembles scapolite but positive identification was not possible.

Metasomatic calcareous quartzites or sandy carbonates (Sample #6, 9, 12, 18, 22)

Primary minerals

<u>Carbonate</u>	Ranges from major constituent (#12) to minor (#6). It appears to have been original (indigenous) in the rocks where most abundant.
<u>Quartz</u>	Apparently original (primary) mineral in some rocks; others (#18) forms skeletal intergrowths with garnet and maybe replacing quartz. Generally occurs as small anhedral strained grains.

Secondary (Metasomatic or metamorphic)

<u>Epidote</u>	(Clinozoisite to pistacite, biaxial - to +) mostly pistacite (Iron rich) occurs in large quantities in these specimens.
<u>Garnet</u>	Grossularite-type occurs in #12, 9, and 18. Commonly as large zoned and/or skeletal crystals with intergrowths of opaques and quartz. (along 112 faces of garnet).

Hornblende

Green to bluish green hornblende is widespread and in part replaces pyroxene.

Pyroxene

Clinopyroxene near diopside occurs in all but #6. It is colorless commonly subhedral and is in part being replaced by hornblende.

Chlorite

Green chlorite is widespread.

Scapolite(?)

Very fine grained aggregates of colorless minerals is probably scapolite. It has one perfect cleavage, parallel extinction, low birefringence and is uniaxial negative. All these properties fit scapolite, but due to the small size of the crystals, and intimate admixture with other minerals, it could not be definitely identified. It was seen in #18, 9, 22, and 6.

Silene and Zircon

are common accessories.

OPAQUE MINERAL EXAMINATION

Seven polished sections were made from 2 samples (#18 and #22) where conspicuous amounts of opaque minerals were present. Four of these sections were studied in detail.

In all samples magnetite is the predominant mineral; it is estimated to represent between 75% and 85% of the opaque fraction. It is present in different grain sizes occupying large masses surrounding other opaques and ranging downward to small fractions of a mm grains scattered throughout the transparent minerals.

Pyrrhotite is the next most abundant mineral. It can be identified under the ore microscope by its color and anisotropic characteristics. It is present in three forms: (1) as large well formed grains usually surrounded by magnetite, often with pyrite crystals adjacent to or surrounded by the pyrrhotite. (2) as elongate, thin, film-like grains usually separated from pyrite, although occasionally adjacent to pyrite. In this case the pyrrhotite is less closely associated with the transparent minerals than is pyrite. (3) In the third form pyrrhotite has formed in crystallographic parting in garnets. Here it is associated with quartz and other transparent minerals. Minor chalcopyrite(?) occurs as very fine grains with this type frequently.

Pyrite is less abundant than pyrrhotite in all samples but #22 where both are present in approximately equal abundance. Pyrite does not seem closely associated with chalcopyrite.

Chalcopyrite(?) tentatively identified by color and hardness but present only in very small irregular shaped grains. Sample #18, with garnets, has more chalcopyrite than #22.

One other opaque mineral was observed in very minute amounts. It is nearly white under the ore microscope, harder than pyrrhotite, slightly anisotropic. It is closely related to the magnetite in habit and appears most likely hematite.

The presence of abundant magnetite and pyrrhotite was confirmed in #18 and #22 by x-ray diffraction techniques where characteristic lines were identified.

X-ray spectrographic methods indicate that iron dominates in the opaque minerals. At low power settings (20 KV, 10 mA) the rate meter was at full scale 50,000 CPS for the $K\alpha$ line. The $K\beta$ line approximated 50,000 CPS. At a sensitive scaling line profiles were checked for the presence of Ni, Zn, and Cu. In all samples Ni and Zn were undetected with a detection limit less than 0.002%. Very minor amounts of copper, estimated at 0.02% or less, were found in all 7 samples. Each of 3 samples from #18 yielded approximately 2 times the counting rate of the samples from #22. The x-ray measure confirms the ore microscope estimate of the relative abundance of copper mineral in #18 and #22 and gives further evidence for the presence of chalcopyrite.

No paragenetic relationship could be determined from the ore samples studied, but there are suggestions that the pyrrhotite-pyrite-chalcopyrite are contemporaneous.

INTERPRETATION

The most straightforward explanation of the mineralogy and textures, based solely on the 10 specimens, would be:

A sequence or section of sediments in part calcareous and in part quartzites.

Emplacement of diorite bodies. Reaction of the sediments, especially the more calcareous ones (impure limestone(?), and the igneous rocks. Introduction of Fe, Al, Si, and minor Cu into the sediments, especially the calcareous ones, from the intrusion.

This forms the garnet, magnetite-pyrrhotite, scapolite(?), pyroxene, epidote, amphibole, chlorite, chalcopyrite, etc. Contamination of the intrusives by Ca from the calcareous sediments resulting in the alteration of plagioclase and biotite and the formation of pyroxene, hornblende, epidote, carbonate, and scapolite(?). Age relationships such as the replacement of pyroxene by magnetite should not be interpreted as an event removed

in time from the formation of the pyroxene. This type of (skarn) formation has been known in a single episode, to result in several sequences of mineral replacements. Apparently the sequence was governed by the relative rate of movement of the different elements during metasomatism. Generally the most calcareous sediments are the most thoroughly metasomatized.

Note:

"Black lamp" was not available in this study. If core has not been lamped it should be.

ACCIDENTAL MINERALS CORPORATION

801 WEST 40TH AVENUE
WENAT RIVER, COLORADO U.S.A. 80615
TELEPHONE (303) 421-7440

INTER-OFFICE MEMORANDUM

TO: J. Volgamore

DATE: May 8, 1970

COMES: J. Anderson

FROM: N. Horlocker

*Lawrence postulates main intrusive body (Qtz Diorite?)
Probably lies to NE flank of Calico.*

SUBJECT: Porphyry Copper Potential - Calico Area, Walker Res., Nevada

Pursuant to your request I am summarizing my conclusions on the porphyry copper potential of the Calico area.

The texture and intimate association of magnetite and sulfide minerals with the Calc Silicates indicate these minerals were developed pend-contemporaneously. The occasional cross cutting relationship of the chalcopryrite and its tendency to be segregated from the massive magnetite-pyrite-pyrrhotite zones indicate chalcopryrite was the last sulfide to be deposited. This paragenesis is consistant with the paragenesis observed in other iron-copper skarn type deposits and does not require a latter introduction of copper from an extraneous (eg. porphyry copper) source. The local zones of quartz monzonite (?) lack sharp contacts and/or chilled borders with the adjacent quartz diorite, indicative of the later intrusion by a quartz monzonite magma. This suggests the quartz monzonite (?) was either differentiated from the quartz diorite in situ or is a hybrid rock. An entirely passive intrusion by quartz monzonite, however, can not be totally discounted.

It has been observed in the Yerington district that the porphyry-type copper mineralization was precipitated from a hydrothermal system superimposed upon the older contact metasomatic assemblage (including skarn) producing diaphthoritic alteration of the older alteration minerals and chloritization, sericitization, and (silicification) of the intrusive rocks. These characteristics have not been observed in the Calico-area. The lack of significant alteration (and generally weaker mineralization) in the quartz diorite and quartz monzonite(?) indicates these units were in equilibrium with the mineralizing solutions which precipitated the iron and copper.

The lack of significant mineralization in drill holes WC-1, WC-3 and CA-7 and the sharp cut off in the I.P. response indicate a major sulfide system is not to be expected north, east or south of the area drilled. The skarn zone has apparently been downdropped to the west by the border fault. Hole CA-8, drilled in the hanging wall of this fault, did not penetrate pre-mineral rocks, however, the decreased intensity of mineralization in hole CA-2 suggests mineralization decreases to the west.

The only area in which a porphyry copper deposit could occur in the Calico Hills appears to be withing the hanging wall of the border fault west of drill holes (CA-2) and (CA-3). The results of drill hole CA-8 indicate depth to pre-mineral rock in this area may be excessive, although an isopachous map of post-mineral cover suggests the cover thins to the north. Drilling in the hanging wall of the border fault may outline additional tonnages of iron-copper, skarn type mineralization.

It is concluded there are no data indicating a porphyry copper deposit is present in the Calico Hills. The mineralization interpreted in the Calico drill holes is enterpreted to be of the "contact metasomatic" iron-copper type similar to several other such occurances in western Nevada, none of which appear to be related to a porphyry copper system. It is recommended that no additional drilling, be done in the Calico Hills to test for a porphyry copper system.

*Not about further. But for large volume "Cu" Skarn deposit.
10. 2900 11.5.5800.*

see Chalcopryite Plotted

*DIS
is later
WC/CA
D.C. Skarn*

*PL P19/20
inclusion of
Qtz diorite*

*2nd
drill that I.P.
does not work*

*885
possibility
CA-3*

*1 (m) that
drilling will
not?*

is hanging

mining

a know

is this

has been

and no

new

is a

*but does not
include a lot
copper sou*

*Present drill samples (Holes 1 thru 8)
May not be adequate in coverage
to determine any conclusions*

*(possibly short
bottomed @ 2200*

*not eliminate
may be true but does not
asizable SKARN type
Cu depts.*

E.F. Summary Recommendations P 103-104 Thesis.

effects CA 3-4 to prove or disprove zoning.
for Copper.

IP (Pulse) from CA 3 to Brown Knob.

Have hit completely fresh diorite
on flanks of ore body that shows
no Alterations of any type.

Have drilled into diorite nearly
on contact and found sulphide
(Cu) mineralization, but not far from
sedimentary contact.

Drill efforts around any potential
ore strike are 500' maximum, Depths
range from 1200 to 4000'

Fill in drilling on 250' centers
No sulphides found that are not
beneath mag closure and at
least near flank of magnetite

Host rock is Summing (?) LS.
metamorphosed and cut by
FRESH diorite dikes, sills, etc.

Size of area Vertical Unknown
Lateral several thousand feet
in roughly tabular shape.

When they leave the ore body they find
no alteration of any kind

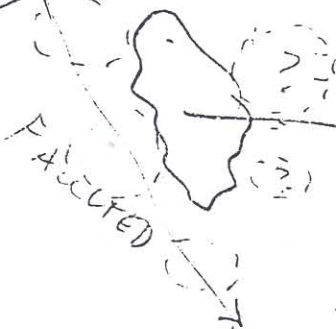
LYON Notes.

showing an irregular higher Cu values.
Foot wall lower grade Cu but present
in some of the lower grades (2000)

These bodies (in stored sense) are not
necessarily clustered around intrusive
center —



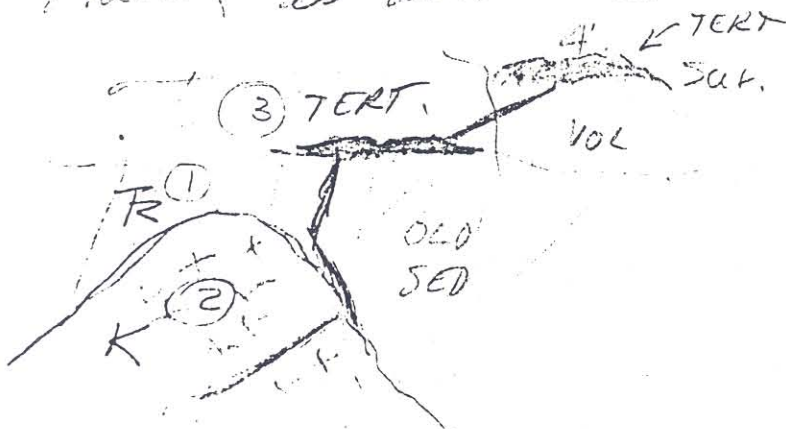
on west side.



Center may be
Qtz. Monz. but
Not known for
sure, as yet.

Sulphides all all beneath May closure.

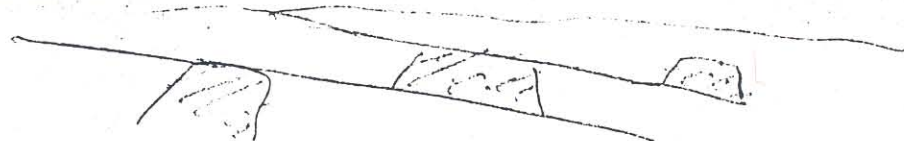
Fresh diorite encountered throughout
filling as dike & small laccolith forms.



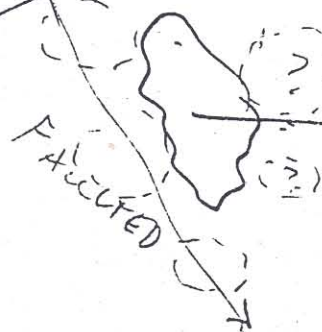
LYON Notes

Hanging wall indicated higher Cu values.
Foot wall lower grade Cu but present
within 2000 to 4000' zone (SKARN)

Ore bodies (in strict sense) are not
necessarily clustered around intrusive
center —



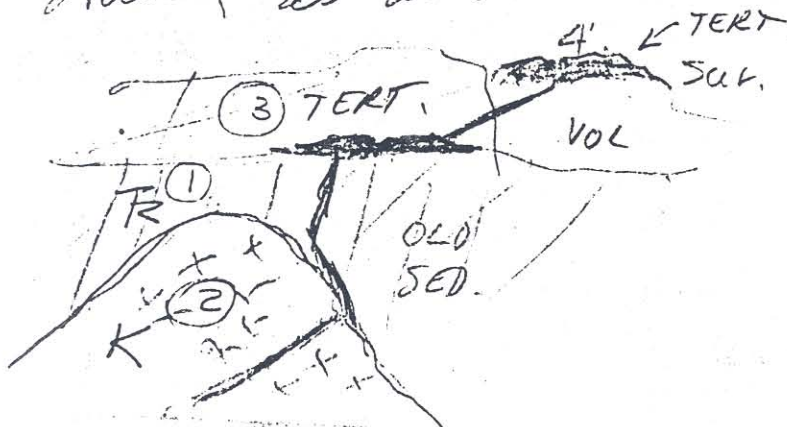
on west side.



Center may be
Q₁₃ Mon. but
Not known for
sure, as yet.

Sulphides are all beneath May closure.

Fresh diorite encountered throughout
drilling as dike & small laccolitic forms.



LYON Notes

May 11, 1970.

- 1) Almost out of present budget-
- 2) Horlock (New man) recommends dropping
no porphyry possibility.
- 3) Don't have another site picked.
- 4) BF-1 down to 2745 still Volcanic
- 5) Elliot does not recommend dropping Res.
- 6) Anderson wants JHU to make decisions
as to new areas for exploration. June 12TH
deadline is influencing exploration decisions.
- 7) Must keep being busy or loose it.
- 8) Will do the work on the Hottentot lease -
- 9) Horlock thinks they should drop Celico soon
also.
- 10) Horlock discounts SKARN type copper deposit.
(Directly reverse of "Doc" Adams thinking.)

OCCIDENTAL MINERALS CORPORATION

6073 WEST 44TH AVENUE
WHEAT RIDGE, COLORADO U.S.A. 80033
TELEPHONE (303) 421-9440

INTER-OFFICE MEMORANDUM

TO: James A. Anderson

DATE: May 18, 1970

COPIES:

FROM: John H. Volgamore

SUBJECT: CONFIDENTIAL INFORMATION - Data on Lyon Deposit, near Yerington, Nevada

The following data was obtained from Sam Sargis, by R. L. Redmond and furnished to me in strict confidence. Mr. Sargis is reluctant to talk with me but opens up to Mr. Redmond with a little bit of information at a time. Whether or not this information is applicable in evaluating the Calico potential remains to be seen.

1. The hanging wall indicated higher copper values. The foot wall shows lower grade copper but it is present.
2. Width of the skarn zone is 2000' to 4000' west
3. The ore bodies (in a strict sense) are not clustered around an intrusive center (at least with the information now available) but are segments of a single ore body that has been offset by a northeast striking, southeast dipping 15° fault.
4. The sulphides are all beneath the Magnetic enclosure, (the intensity was not stated)
5. The drilling has encountered fresh diorite on the flanks of the ore bodies that show no alteration of any type.
6. Holes drilled into the diorite, nearly on the contact, showed copper mineralization, but not far from the sedimentary contact.
7. Drill offsets around any potential ore strike are on 500' centers (maximum), and the depths range from 1200' to 4000'. The fill in drilling is now on 250' centers.
8. No sulphides were found that are not beneath the magnetic closure and at least near the flank of the magnetite. (see note #4)
9. The host rock is Luning ? limestone, metamorphosed and cut by FRESH diorite dikes, sills, etc.
10. Vertical size of the area is unknown but the lateral extent is several thousand feet, in roughly a tabular shape.
11. JHV comments - No explanation of the northeast ore body is available at the present time. U.S. Steel has apparently not drilled the blank space between the southwest and northeast ore bodies to determine if a quartz monzonite intrusive exists. Perhaps the NE ore body is the other flank of a skarn zone, trending northwest through the Lyon area.



Calico Ref. 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24,

Drilling (initiated in 1965)

HOLE	DATE STARTED	DATE COMPLETED	T.D. (ft)	COLLAR ELEV.(ft)	Narrative LOG ?	ASSAYS ?
WC-1	14 July 66	15 Aug 66	1271 ✓		Yes	Cu, Au (Tr)
WC-2	8 Dec 67	19 Jan 68	1379		Yes	
WC-3	6 Jan 68	24 Feb 68?	1535 4185		Yes	Ag, Ag
CA-1	5 Nov 65	31 Aug 66	3633 ✓	4533	Yes	Cu, Fe
CA-2	3 Mar 66	4 May 66	2306 ✓	4423		
CA-3	19 Mar 66	5 July 66	3422 ✓	4375		Cu, Fe
CA-4	2 May 66	7 Apr 67	3325 ✓	4677		Cu, Fe
CA-5	12 May 66	24 Jan 67	3370 ✓	4503		Cu, Fe
CA-6	28 June 66	26 Sept 66	2560 ✓ 22801	4550		Cu, Fe
CA-7	~ June 69	22 July 69	2515		Yes	Cu, Fe

Some Au, Ag

See Lawrence 1969, p. 97

Geophysics

1. 1963 - Aeromag survey 500 ft AGL, $\frac{1}{3}$ mile FL spacing
2. 1965 - Ground mag survey (Tallender vertical field) (see)
3. 1963 - 65 I. P. survey by McPhar
4. 1966 - I. P. survey: traverses perpendicular to original zero line @ 2000 ft intervals
5. See Lawrence, 1967, p. 61
6. ^{1966?} Down-Hole IP surveys made of Holes CA-1, 3,
7. Bouguer gravity map fig 24 - see also p. 92 - "Additional gravity data in the drilling area might extend the anomaly & give a larger estimate of actual mass of the mineral deposit."
8. 1966 Seismic feasibility survey conducted by J.W. Cooksey p. 92-95
9. Heat flow surveys, 1968 by Robt F. Roy p. 96

Geology -

1. Good dh info. p.7 AIME 67-I-311 Put under dlg
2. Description of mineralization " p.7-8
3. " " economics " p.8
4. Deposit dimensions " p.8
5. Haxby, 1967 :
 - A. p. 3. Deposit dimensions, Inferred Iron reserves
 - B. p. 9-10 Exploration History
 - C. p. 16-27 Calico Geology
 - D. p. 28-35 Geol. correlation analyses of Calico dh data
 - E. p. 22-27 Mineralogy & Paragenesis, Metal Distribution, Metamorphic & Mineralization Zoning
 - F. p. 47-54 Calico Iron Reserve Estimate
 - G. p. 63- By-products (Cu as Cp)
6. Lawrence, 1969
 - A. p. 5 production from surrounding mining districts
 - B. p. 13 Summary of Calico Area geol.
 - C. p. 15-31 Petrology
 - D. p. 32-34 Structure
 - E. p. 35 Location map showing WL & assoc. faults (good for Report overview).
 - F. p. 43-53 Econ geol.
 - G. p. 98 Ore reserves
 - H. p. 103 suggestions for prospecting

Calico write up.

1) see phase I (

2) have mas do deposit report & name sim?

3) discuss debitz work

Calico Notes

From

LAWRENCE E F 1969, Geological and Geophysical
Investigations of the mineral deposits of the Calico area
Mineral Co, NV PhD dissertation Uni of California
Riverside 112 p.

- 1) J A Murphy Mackay school, Thin & polished sections p vi
- 2) Production from surrounding area p 5
- 3) * Previous geol investigation p 7-8, good references
- 4) outline of stratigraphy more good Ref p 9-13
- 5) 10 mi apart between Hotchkiss & Calico p 32
- 6) discussion of water here p 36-42
- 7) Econ geol - mentions orthoclase, & microcline p 43
- 8) granitic rocks highly mineralized p 46
- 9) Mas, Pyr, Py, & chp occur in significant amounts in bottom of each hole
∴ The lower limit of mineralization was not reached p 51
- 10) Coloration of Tuff around andesite intrusion in Calico hill
discussed p 53, 26-27, 59
- 11) erosional pond between Calico granite & Test hole p 21
- 12) Afterthought Mas anomaly p 61
- 13) Discussion of depth, width, & depth of Mas anomaly by
Calculation of Parasitic p 67-68
- 14) * Good IP anomaly not drilled p 74
- 15) suggestion for prospecting - 103 seismic
- 16) drill log summary & section etc, Mas & IP n 68-96

Calico General

Bad month Indians BIA Program

- 1) compare ^{Shovel} Lyon, amount of work to that of Calico.
Could there have been as much accomplished at Calico etc.
- 2) overall land problem on per. Compans need exclusive rights, & easy access to BIA data
- 3) Loss of reports, NO Core or cutting left
- 4) The Calico dx will not be mined for a long time unless drilling uncovers additional Cu, AS, Au mineralization
- 5) Geol base, IP, map overlay showing hole drilled & where additional drilling warranted

On December 18, 1965, in a conference between S. G. Sargis and W. L. Wilson in Reno, Nevada, the possibility of a joint-venture on the Lyon Property of Columbia Iron Mining Co., a wholly owned subsidiary of U. S. Steel Co., between U. S. Steel and ~~Bear Creek~~^X Mining Co. was discussed, and the following pertinent facts were brought out:

1. U. S. Steel has already been approached by ASARCO, U. S. Smelting, Refining & Mining Co., Utah Construction & Mining and one other unknown mining company relative to this subject.
2. A "Go" decision has not been made by U. S. Steel on this property. It is being considered vs the "Rex" property in Southern Utah, which is a higher grade iron deposit, but with no copper values present. In the matter of overall economics, the Lyon deposit is probably slightly ahead, but all metallurgy and cost factors for the Lyon have not yet been determined. A decision will likely be forthcoming in about two years to put one of these properties into production.
3. The Atlantic City mine of U. S. Steel in Wyoming is supplying the primary feed for the Provo works of U. S. Steel, but this is in the form of a high silica content pellet, and it cannot be made into a larger pellet, which would be more desirable, because of metallurgical considerations. The Lyon deposit appears capable of supplying a larger pellet, with much lower silica content, because of the carbonate content of the host rock.
4. Their Cedar City mines, in Southwestern Utah, are nearly exhausted, which will leave a deficiency in the ore supply at the Provo works.
5. U. S. Steel has done some drilling beyond the limits of the magnetic highs on the Lyon property, primarily spotted on IP anomalies, and have encountered some copper in this drilling.

In general, this copper is of higher grade than in the magnetite zone, but little of this type of drilling was permitted by the company.

6. There are IP anomalies around the periphery of the iron that could be large copper targets in skarn or possibly even porphyry copper targets.

7. U. S. Steel management may be amenable to a joint venture wherein ~~Bear Creek~~^X would do further exploration at ~~Bear Creek's~~^X expense, primarily seeking copper. If a satisfactory ore body were developed, then ~~Bear Creek~~^X would be the operator and profits would be shared on an equitable basis. If ores containing both iron and copper were mined, they would be milled and the iron concentrate made available to U. S. Steel, at a price to be agreed on (this would have to be less than U. S. Steel's cost of mining and concentrating the iron irrespective of the copper content). Three situations are possibilities: A.--mine known iron-copper orebodies, with Bear Creek taking copper concentrates and USS taking iron concentrates ^{and sharing costs}. B.--discovering new iron-copper ore bodies and mining as above in A. C.--discovering new or further developing already discovered copper deposits, particularly in light of the reported IP anomalies and favorable results obtained drilling some of these, with a split of profits.

An arrangement such as outlined above would seem to be advantageous to both ~~Bear Creek~~^X and USS, as it could materially aid their decision to put this property into production instead of the Rex. ~~Bear Creek probably would be better able to use the copper concentrate than other copper companies because of their smelter situation at McGill.~~

Note: It was not discussed in this meeting, but it is felt that USS owns this property outright, with no royalties owed to anyone.

W. L. Wilson

Mr. Bill Wilson

6000 0148

(0890)

ROBERT E. HOLT
Consulting Geologist
945 Panorama Road
Tucson Arizona
85704

September 1, 1966

Mr. Robert Redmond
Manager
Walker-Martel Mining Company
1080 Pine Ridge Drive
Reno, Nevada

Re: Mineralization - Calico Deposit

Dear Bob:

Some thought should be given to the age of the mineralization of the Calico deposit and its structural setting.

From what little we know of its characteristics they are similar to those of the Lyon deposit and possibly the mineralization is of the same age. Both deposits are completely different from the Yerington deposit and may or may not be of the same age. At Yerington the ore is intimately associated with a cretaceous age quartz monzonite porphyry and only rarely is found to transcend the porphyry into the intruded rocks.

The ore at the Lyon deposit is in skarn and hornfels and the entire ore bearing horizon has been highly altered and flooded with silica. As far as we know the ore bearing horizon is in a metamorphosed zone which has also been flooded with silica. The Lyon ore is closely associated with a monzonite porphyry similar to the ore bearing porphyry at Yerington. There is a porphyry that outcrops northwest of the Calico but as far as I know it has never been encountered in the main Calico drilling.

The ore bearing units at the Calico are thought to be slightly metasomatized quartzites, altered dioritic rocks and metasomatized calcareous quartzites or impure carbonates. It is entirely possible that this is a highly altered and metasomatized section of the Excelsior formation. I realize that little is known of the Excelsior formation and that considerable controversy exists about it being present in this area. However, the units encountered in the Calico drilling appear to be metamorphosed equivalents of Excelsior (?) units which I have mapped in both the Gillis and Wassuk ranges.

Within several of these areas the Excelsior is mineralized. Nowhere have I encountered as much metasomatism or silica flooding within the Excelsior as is present at the Calico. In one area, the Granite-Mountain View district, this phenomenon is present to some extent and I have sent a suite of samples to D. Morton for thin sectioning and study.

9/1/66

C In all probability the three deposits, the Lyon, Yerington and Calico, are of nearly the same age. It is doubtful that the "plumbing" of the three is in any way connected. Genetically they are probably related to the same group of intrusives which apparently are not directly correlative with the Sierra activity as has been suggested for the intrusives in the Wassuk and Gillis ranges. I say this because, generally speaking, very few significant ore bodies have been found with these Sierra intrusives. If the intrusives related to these ore bodies are significantly different from the Sierra intrusives, an ability to recognize them could be a significant prospecting tool.

O The Wassuk intrusive is quite variable and is probably a composite of multiple intrusions contaminated by having assimilated large blocks of Excelsior (?) formation. If the characteristics of the ore bearing intrusive were known it might be possible to sort it out from the main Wassuk massif and help focus our exploration activities. Because of this I strongly recommend more than section work on the Calico core; some on the Hottentot area, and because of the nature of the mineralization, some from your W. C. holes. In addition, emphasis should be placed on determining at least the relative age of the mineralization at the Calico, Hottentot and W.C. areas. In fact, I, personally would consider having an age determination done on the Calico rocks with the knowledge that the data obtained would be more helpful in exploration for another deposit rather than in exploring the Calico.

Y Sincerely,



Robert E. Holt

REH/g

CC: Mr. Bill Wilson
2685 Thomas Jefferson Drive
Reno Nevada

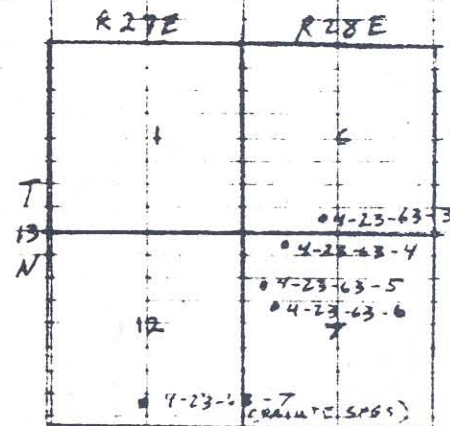
10000 0148 (0890)

File 1 BLACK MTN
1 CALICO
1 DISC. PROSPECTS

GEOCHEMICAL SURVEY

PROJECT: WRPR		WEATHER:		REMARKS:	
DATE:		TOPO SHEET REFERENCE:			
COLLECTOR: W.W. AKW Jr		SOIL <input type="checkbox"/> FRACTURE <input type="checkbox"/> ROCK <input type="checkbox"/> WASH <input type="checkbox"/> STREAM <input type="checkbox"/> SPRING <input type="checkbox"/> PLANT <input type="checkbox"/>			
ANALYSIS BY: HSL		METHOD OF ANALYSIS:			

LINE & STATION	SAMPLE NO.	HEAVY METALS PPM	COPPER COLD	COPPER HOT	LEAD PPM	ZINC PPM	MERC. PPM	ARSENIC PPM	MOLY PPM	
4-23-63	1		<1							DTE ANOM EAST END LITTLE CALICO ER ANOM LITTLE CALICO SW 1/4 Sec 6 T13 R28 NW 1/4 Sec 7 T13 R28 SW 1/4 NW 1/4 Sec 7 T13 R28 PAINTED SPGS ADIT SW 1/4 12-T13 R28
	2		<1							
	3		<1							
	4		1							
	5		-							
	6		<1							
	7		<1							
4-24-63	1		3							BLACK MTN TRAVERSE SEE PHOTO 65-EL 7-29 FOR LOCATIONS
	2		-							
	3		-							
	4		<1							
	5		<1							
	6		4							
	7		1							
	8		-							
	9		1							
	10		1							
	11		1							
	12		1							
	13		15							
	14		<1							
	15		-							
	16		<1							
	17		-							
	18		-							
	19		1							
	20		1							
	21		-							
	22		1							
	23		-							
	24		1							
	25		1							
	26		<1							
	27		-							
	28		-							
	29		-							
	30		-							
	31		<1							
	32		-							
	33		-							
	34		-							
	35		-							
	36		-							



Calico Geochron

19m

6-10-64-1

8000 NW

0

2

7000 NW

0

3

6000 NW

0

4

5000 NW

0-

5

4000 NW

0

6

3000 NW

0-

7

2000 NW

0-

8

2000 SE

0

9

1000 NW

0

10

1000 SE

0

11

"0"

0-

12

dike matl.

0

13

little Calico 10N 0

Trans to data
shut B-30-65 wsw

GEOCHEMICAL SURVEY

File. CALICO
6000 0148 (0890)

PROJECT: WRPR	WEATHER:	REMARKS:
DATE: 6-18-64	TOPO SHEET REFERENCE:	
COLLECTOR: WJW - KLR	SOIL <input checked="" type="checkbox"/> FRACTURE <input type="checkbox"/> ROCK <input type="checkbox"/> WASH <input type="checkbox"/> STREAM <input type="checkbox"/> SPRING <input type="checkbox"/> PLANT <input type="checkbox"/>	

ANALYSIS BY: WJW	METHOD OF ANALYSIS: REMAIRE HG DETECTOR
---------------------	--

LINE & STATION	SAMPLE NO.	HEAVY METALS PPM	COPPER COLD	COPPER HOT	LEAD PPM	ZINC PPM	MERC. PPM	ARSENIC PPM	MOLY PPM			
6-10-64-1	2						0			CALICO BASE LINE (LP)	7000 NW	
	3						0				7000 NW	
	4						0				6000 NW	
	5						0				5000 NW	
	6						0				4000 NW	
	7						0				3000 NW	
	8						0				2000 NW	
	9						0				2000 SE	
	10						0				1000 NW	
	11						0				1000 SE	
	12						0				0	
	13						0			LITTLE CALICO DIRT MATL		
										" " IP LINE 10N		

JOHN S. SUMNER

728 N. Sawtelle
Tucson, Arizona 85716
January 14, 1967

Mr. R. L. Haxby
5550 N. Maria Drive
Tucson, Arizona 85704

Dear Ron:

The laboratory results of the susceptibility measuring program are enclosed. I have checked over the data and calculations, and they are in order.

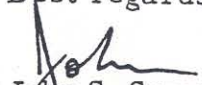
You probably recall that the magnetic susceptibility of pure magnetite is roughly 0.3 emu/cc which would show as 300,000 on the enclosed table because of the factor 10^6 . Thus if the relationship of susceptibility to magnetite content of a rock were completely linear, sample CA1 1641' with a susceptibility of $130,000 \times 10^{-6}$ emu/cc would mean that this specimen has about 44% magnetite by volume. By analyses of this sort, specimens can be speedily and economically rough-assayed, once the procedure is set up. Accuracy of this assay technique can be judged by comparison of susceptibility with the estimated magnetite content given in Table 1 of my report of November 25, 1966.

Susceptibility-to-magnetite relationships are of course not quite linear; this seems to depend mainly on geologic factors such as grain size and foliation. However within a particular rock type an empirical correlation within acceptable limits usually can be reached.

Comparison of actual susceptibilities as shown on the enclosed table, with the assumed value used in the interpretation of my November 25, 1966 report, is generally within 10 percent. Thus geophysical interpretation of size and grade of the Calico magnetite body is supported by these laboratory measurements. Magnetic remanence and sampling interval remain as the major uncertainties.

If you have any further questions or comments on this work, please call me.

Best regards,


John S. Sumner

Encl:
cc: R. Mayberry

MAGNETIC SUSCEPTIBILITY VALUES FROM THE
CALICO AREA, MINERAL COUNTY, NEVADA

<u>Sample</u>	<u>Susceptibility x 10⁶ in emu/cc</u>
CA1 1641'	130,000
CA1 2628'	161,500
CA1 3200' (a and b)	29,800
CA2 1140'	45
CA2 2661'	48
CA3 1941'	746
CA3 2875'	850
CA3 3055'	4,320
CA3 3085'	1,620
CA3 3414'	29,400
CA3 ?	120,700
CA4 1423'	120
CA4 2114'	73,000
CA5 1330'	34,400
CA5 2150'	127,000
A (by CA2)	1,030
B (by CA1)	795
C (on CA1)	210
D (N of CA?)	123
E (Ridge)	168

Geomagnetics Laboratory
University of Arizona
January, 1967

6000 0142 (029)

JOHN S. SUMNER

728 N. Sawtelle
Tucson, Arizona 85716
November 3, 1966

Mr. R. L. Harby
% Walker Martel Mining Co.
100 Washington Street
Reno, Nevada

Dear Ron:

My report "Analysis of Geophysics on the Walker River Reservation, Mineral County, Nevada" is enclosed. It summarizes my thoughts and opinions after reviewing the available geophysical exploration data.

Our laboratory processing of the core and rock samples from the Walker Reservation is not yet completed. I will forward this information to you about the middle of November, and it will be an appendix to this report.

The Calico magnetite deposit appears to be fairly continuous, judging from the magnetic data, all the way from CA-3 to CA-4, with a minor offset or dike about 1000 feet northwest of CA-1 and CA-5. The variability along strike should be about the same as that encountered down-dip in CA-1 and CA-5. The average width of the deposit seems to average about 400 feet as calculated from the magnetic anomaly, although this may be conservative.

Future drilling on the Calico iron deposit would be more to develop tonnage and grade, rather than for discovery. Perhaps the southeast end should be investigated first, to see if the copper trend has any sort of pattern. Direct geophysical prospecting for the copper found by hole CA-3 does not seem feasible at this time. This better grade material is, of course, over one-half mile below the surface, and the zone does not have any particularly distinctive properties which are definitely amenable to geophysics. The laboratory physical property studies of these specimens will be well worth noting.

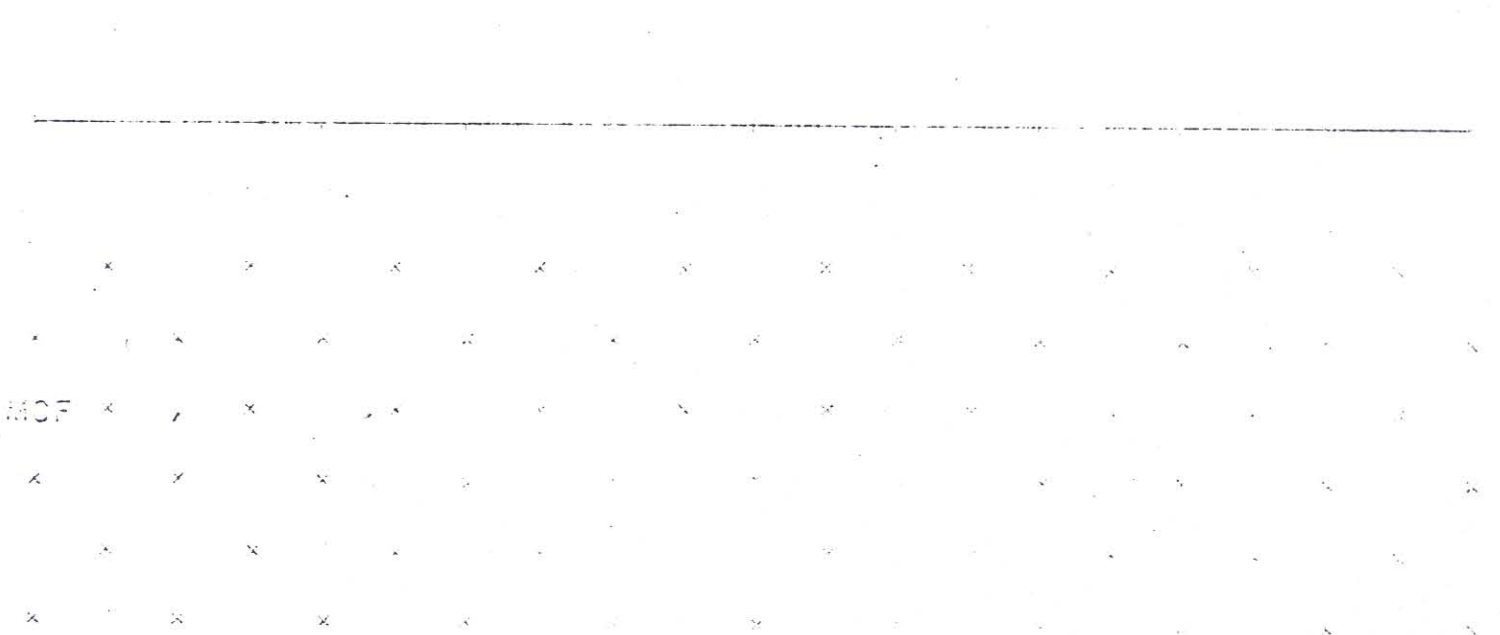
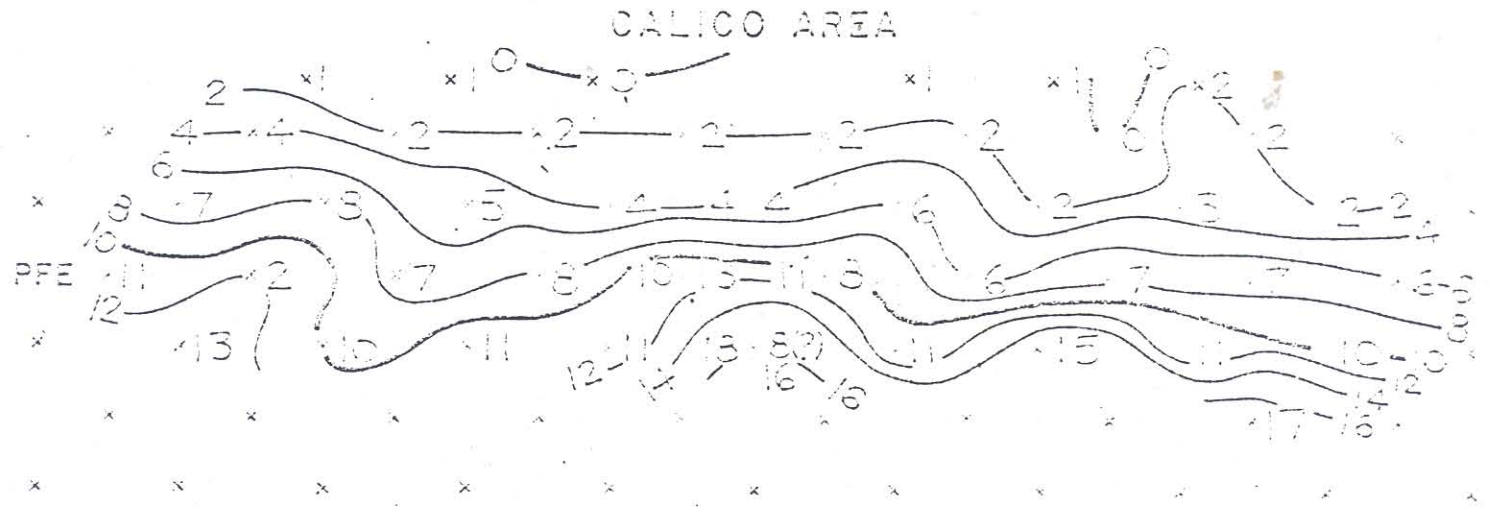
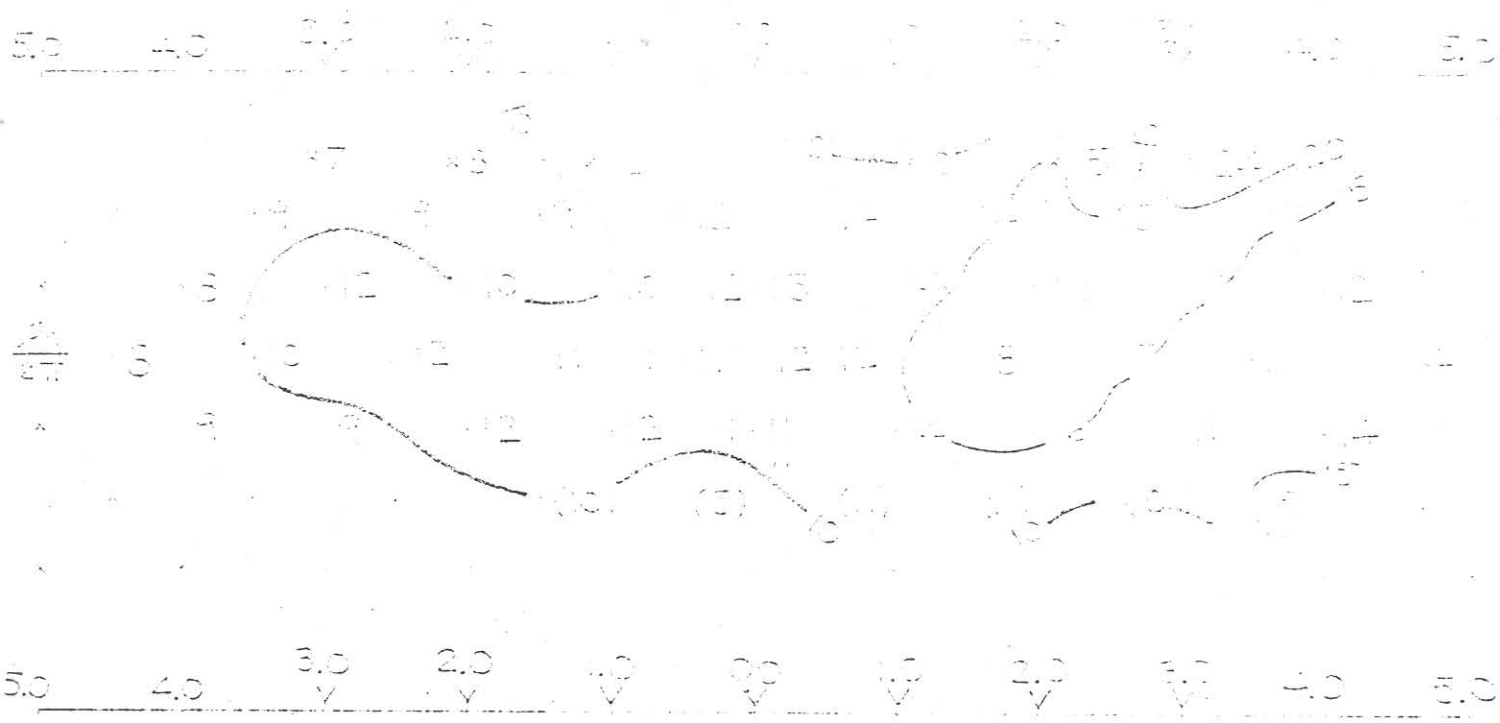
If you have any questions or comments about this report, please let me know.

Best regards,

John S. Sumner
John S. Sumner

Encl:

cc: R. E. MacDougall
C. G. Schwenk



AREA WALKER RIVER _____

TRANS. 45 _____

() DENOTES A.C. READING ONLY

Memorandum to R. L. Redmond

From: W. L. Wilson

Subject: Down the hole IP Measurements by Bear Creek Mining Co. On Calico.


Date: July 29, 1966

On July 5, 1966, Ton Nettlebeek, Districk Geologist for Bear Creek Mining Co. delivered to W. L. Wilson the down-the-hole IP and Resistivity logs which they had run on the Drill Holes CA 1 and CA 3, copies of which are attached.

CA 1 This hole was surveyed from 1370 to 1510'. The bottom of the casing was at about 1320'. He reported that CA 1 was dry and that they had to use sponges around the electrodes to make contact with the walls of the hole. Their geophysicist felt that the data was good to 1510', and below that the sponges hung up on the walls and/or did not make adequate contact to take the measurements. The hole was probed to 1900' and was open. They felt that they could make measurements in the future below 1510' if the hole were re-filled with fluid. The outstanding electrical feature of this hole insofar as they were able to make the measurements, is a strong resistivity contrast in the zone 1470-1490. Below this, the resistivity is extremely low, on the order of 1 ohm-foot. Above this zone it was on the order of 8 to 10 ohm-feet. PFE's were from 5 to 9 throughout the zone of measurement.

CA 3 This hole was surveyed from 2300 to about 2600'. The bottom of the casing is about 2200'. All resistivities were on the order of 1 ohm-foot or lower. The lowest was 0.3 ohm feet. PFEs were moderate, considering the tenor of mineralization, ranging from about 2.5 to 11%. All measurements in this hole were taken in the ore zone.

The geophysicist who performed the field work (Jerry Van Voorhis) stated that the PFEs would be about 30% higher if they had used the set of frequencies used by McPhar in their surface IP work in this area (0.05 and 1.25 c/s in contrast with the set of 0.1 and 1.0 c/s used by Bear Creek).


W. L. Wilson

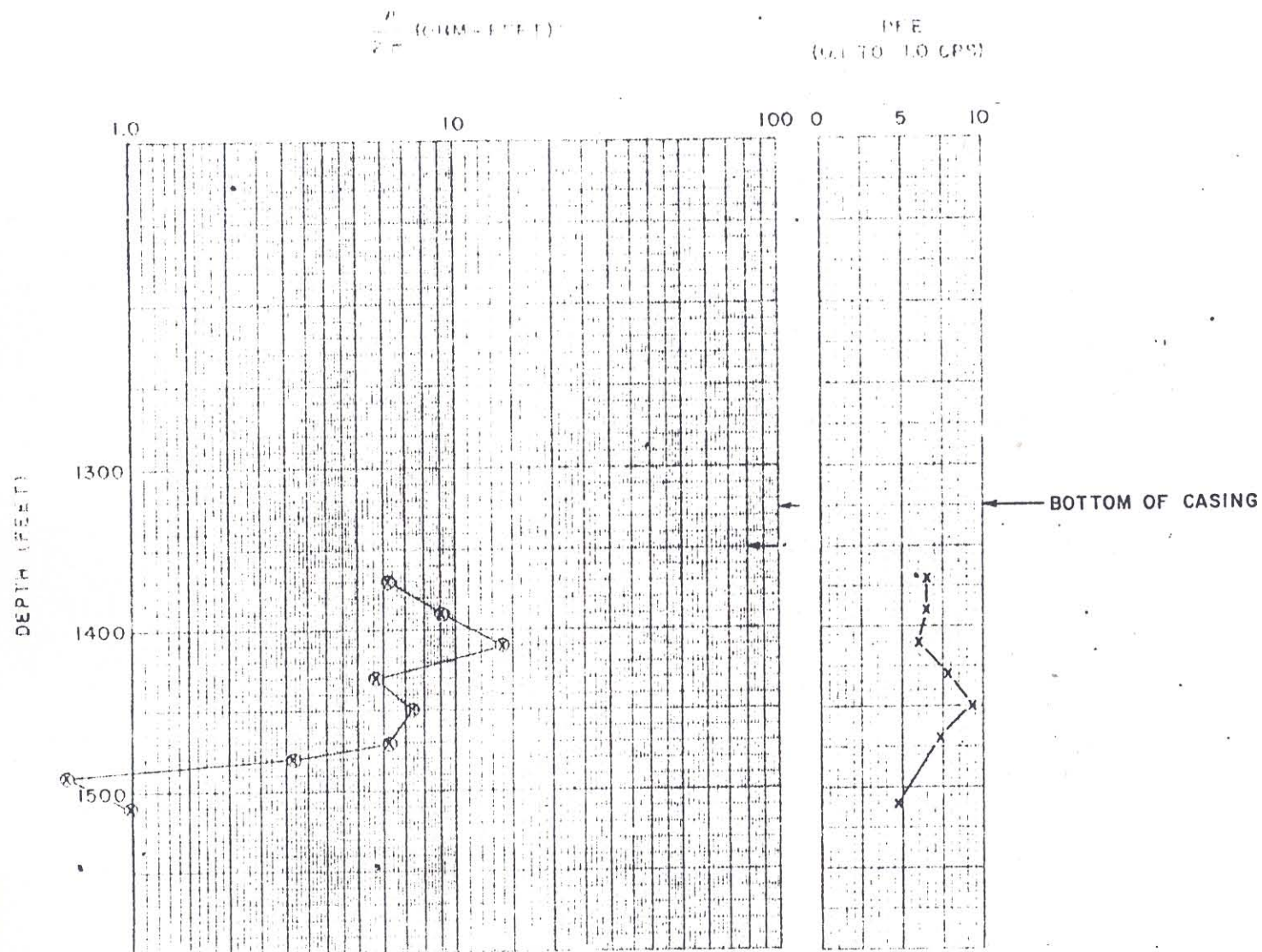
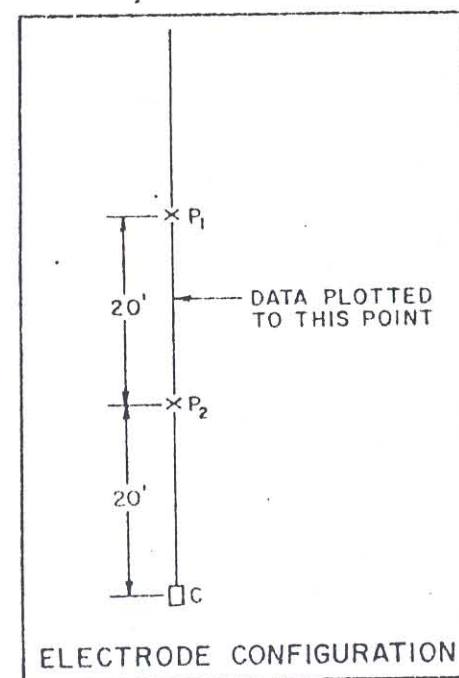


FIGURE 1. ELECTRICAL LOG OF DRILL HOLE CA-144



$$\frac{\rho}{2\pi} \text{ (OHM-Feet)}$$

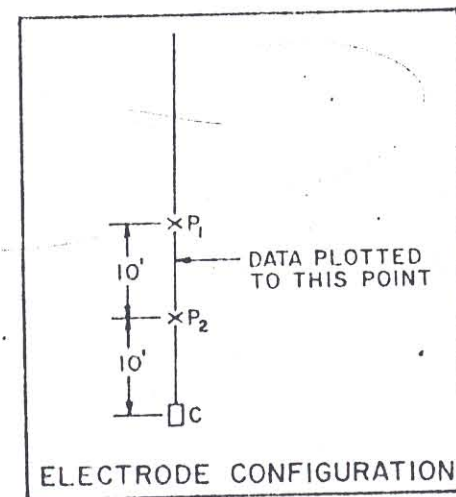
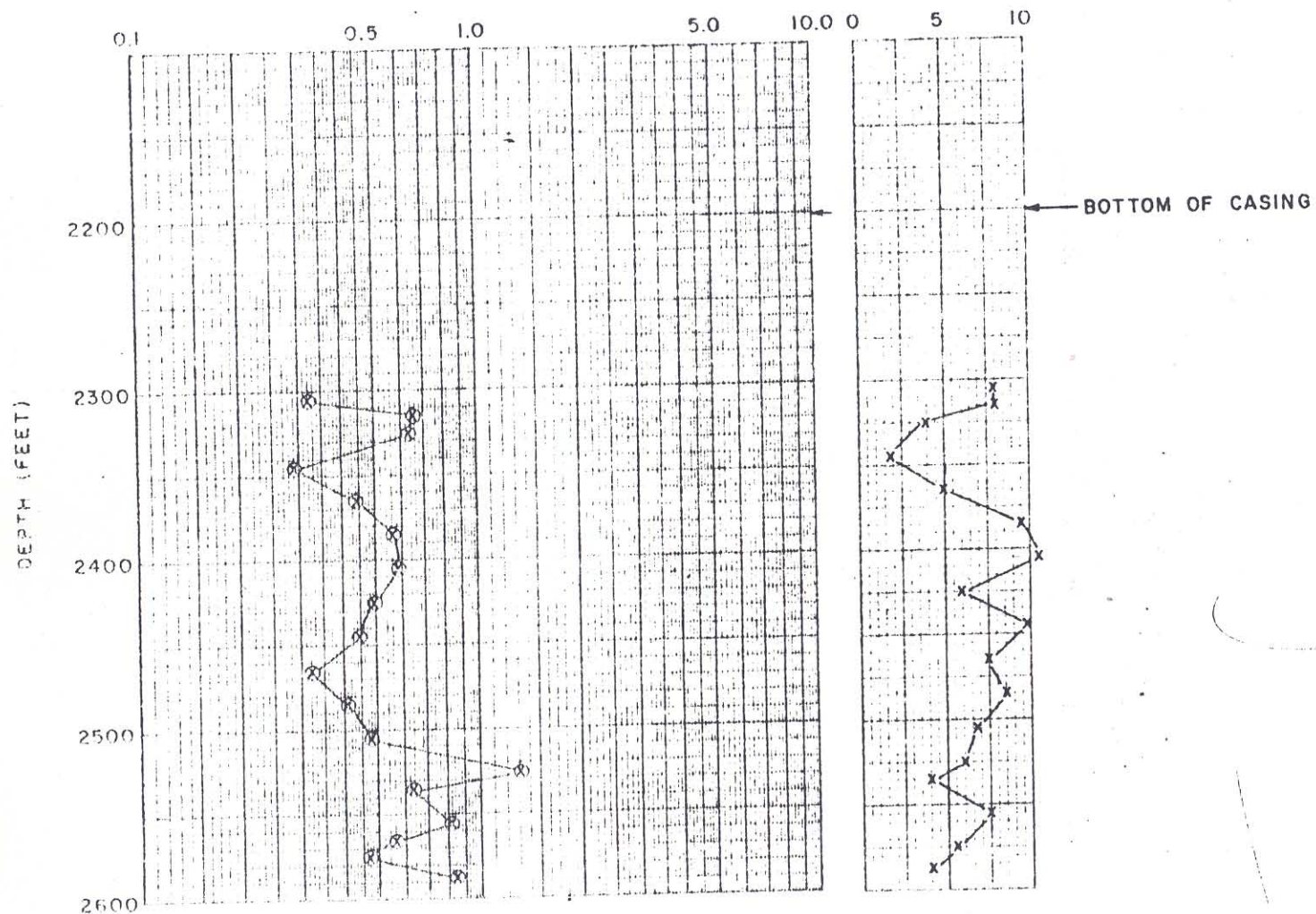
$$\text{PFE (0.1 TO 10 CPS)}$$


FIGURE 2. ELECTRICAL LOG OF DRILL HOLE CA-3.

SPEED MESSAGE

TO W L W

FROM

RLRSUBJECT INFO TO BEAR CREEK.DATE July 6 19 66

Unless we receive Bear Creek info covering the Northern lights dist (western Wassuk Range) information we give them will only be that part of the drill log covered by their down hole logging. This area will include assays, visual log and that portion of the narrative log which applies.

SIGNED

RLR

evaluation of DRILL HOLE DATA ON THE CALICO PROSPECT AS OF SEPTEMBER 9, 1966

Hole Designation	Date Started	Date Completed	Hole Diam.	Depth from	to	Type Drilling
<u>CA-1</u>	5 Nov 65		6"	0	10'	Rotary
			5 5/8"	10'	335'	Rotary
			5 1/8"	335'	820'	Rotary
		1 Dec 65	4 3/4"	820'	1332'	Rotary
	4 Dec 65	19 Feb 66	NX	1332'	2640'	Core
	1 Jul 66	31 Aug 66	BX	2640'	3633'	Core
<u>CA-2</u>	3 Mar 66		6"	0	10'	Rotary
		17 Mar 66	5 1/8"	10'	1100'	Rotary
	21 Mar 66	4 May 66	NX	1100'	2306'	Core
<u>CA-3</u>	19 Mar 66		6"	0	10'	Rotary
		9 Apr 66	5 1/8"	10'	1625'	Rotary
	4 May 66		NX	1625'	2155'	Core
		5 Jul 66	BX	2155'	3422'	Core
<u>CA-4</u>	2 May 66	28 May 66	5 1/8"	0	1110'	Rotary
	30 Jun 66	3 Aug 66	NX	1110'	2439'	Core
<u>CA-5</u>	12 May 66	23 May 66	5 1/8"	0	1300'	Rotary
	1 Sep 66	current	NX	1300'		Core
<u>CA-6</u>	28 Jun 66	9 Jul 66	5 1/8"	0	1415'	Rotary
	17 Aug 66	current	NX	1415'		Core
<u>WC-1</u>	14 Jul 66	21 Jul 66	5 1/8"	0	426'	Rotary
	26 Jul 66	15 Aug 66	NX	426'	1271'	Core

15,786'

COLORADO SCHOOL OF MINES RESEARCH FOUNDATION, INC.

GOLDEN, COLORADO 80402

March 17, 1966

CSMRF Project No. 260211

Mr. Robert L. Redmond
Walker-Martel Mining Company
1080 Pine Ridge Drive
Reno, Nevada

Dear Mr. Redmond:

The purpose of this letter is to give you a progress report summarizing the information we have obtained to date on your iron-copper ore from Nevada. We have completed petrographic work for mineral identification, head analyses, Davis tube tests for mesh of grind-grade of concentrate relationships, and a few exploratory flotation tests. The latter are concerned with sulfur reduction in the magnetic concentrate and recovery of copper.

The sample for the initial test work was prepared as an approximate composite. Each 10-foot increment sample was split in half using one split for the composite. We did not use equal weights of each interval sample because this would result in a composite too small for the planned test program. The weight of some increments was very small. We can prepare a weighted composite for a final process check later in the work if this seems advisable.

The petrographic work confirmed the presence of magnetite, chalcopyrite, pyrite, and pyrrhotite. Typical gangue minerals such as augite, calcite, feldspar, etc., are present. Ninety-eight per cent of the magnetite is liberated at 150 mesh; however, some gangue minerals remain locked in the magnetite at this size. Chalcopyrite grains occur in sizes approximately minus 150 mesh.

Chemical analysis of a head sample gave the following:

Fe	46.8	%
Cu	0.059	%
S	3.08	%
P	0.03	%

These results indicate a very encouraging iron content but much lower copper content than some ores of this type in Nevada. It is likely that additional drilling will demonstrate a higher copper content; accordingly, our test program will include studies for copper recovery although for this particular sample the copper economics are questionable.

The first group of tests were designed to determine the mesh of grind-grade of iron concentrate relationship obtainable by magnetic separation. This consisted of a series of three Davis tube tests in which the mesh of grind was varied from a nominal 35 mesh to a nominal 200 mesh. Laboratory notes on the three Davis tube tests are attached. The results may be summarized as follows:

Davis Tube Test No.	Weight % Passing 325 Mesh	Magnetic Concentrate Weight %	Magnetic Concentrate Chemical Analysis			Per Cent Recovery Fe
			Fe %	Cu %	S %	
1	28.9	67.8	62.4	0.016	2.58	89.5
2	56.6	59.5	67.8	0.006	1.92	85.0
3	85.6	59.2	69.4	0.005	2.52	86.4

These results demonstrate that satisfactory concentrate can be made at a grind of about 55 per cent minus 325 mesh. It is possible that a little finer grind may be necessary for satisfactory pelletizing. Iron recoveries appear to be satisfactory since the ore contains other iron-bearing minerals such as pyrite, chalcopyrite, and pyrrhotite. The drop in sulfur content to 1.92 per cent obtained in Test No. 2 may not be significant; we plan to check this later. At present, we are assuming the magnetic concentrate will contain about 2.5 per cent sulfur.

Mr. Robert L. Redmond
Walker-Martel Mining Co.
Page Number 3
March 17, 1966

A petrographic examination will be made to determine the nature of the sulfur in the magnetic concentrate. Presumably it is pyrrhotite, but it is important to determine whether it is liberated or not. In the meantime, we are proceeding with a few exploratory flotation tests. We plan to make preliminary studies of various treatment schemes such as (a) a bulk sulfide flotation before magnetic separation followed by selective flotation for a copper concentrate, and (b) magnetic separation followed by flotation of the nonmagnetic product for a copper concentrate and flotation of the magnetic product for pyrrhotite removal.

Considerable variations are possible within these two broad categories. At the present time we do not have progress on flotation work to report.

Our experience with ore of this type has shown that high sulfur in the magnetic concentrate resulting from the presence of pyrrhotite can be a difficult problem. Selective flotation often is not too efficient and can result in important iron losses. If our preliminary flotation work is unsatisfactory, we believe consideration should be given to a study of sulfur removal during pellet firing. We have the necessary equipment to perform pelletizing operations, and to investigate sulfur removal with respect to variations in the pellet firing process.

Yours very truly,


Burt C. Mariacher, Manager
Metallurgical Division

BCM:ebh

enclosures: Davis Tube Tests No. 1, 2, and 3.

cc: Mr. T. B. Counselman
Mr. H. E. Roberts

DESCRIPTION OF SAMPLE OF CALICO ORE SUBMITTED TO COLORADO SCHOOL OF MINES RESEARCH FOUNDATION, INC., FOR METALLURGICAL TESTING.

The basic sample for this work was obtained by a vertical drill test, designated drill hole CA-1, located on the magnetic anomaly on the Calico Prospect. This hole was drilled by rotary techniques from the surface to 1332', and was continued from 1332' to 2640' with NX wireline core drilling techniques. Core recovery was in excess of 95% throughout the hole. The core was placed in core boxes, and the mineralized portions were split longitudinally with a hand core splitter, and one-half of the core was placed in sample bags, each identified with a unique number, and the other half returned to the core box. The portion in the sample bags was sent to Union Assay Office, P. O. Box 1528, Salt Lake City, Utah, for iron and copper assays. After assaying, the rejects from these samples were then returned to Walker-Martel Mining Co. in Reno.

For purposes of this metallurgical testing, the entire bags of rejects from samples 1013R to 1050 R, inclusive, and 1101R to 1120R, inclusive, representing the drill hole interval 1766.0' to 2286.0', a distance of 520', were shipped to Colorado School of Mines Research Foundation, Inc., together with instructions as to the type of testing desired. Colorado School of Mines Research Foundation is still in possession of approximately one-half of each bag of rejects, the balance having been used in the testing. Walker-Martel has possession of the assay pulps and the other one-half of the raw core, stored in the core boxes, which is available for further testing or examination.

All the above work was done in accordance with standard practices used in the mining industry, by technical personnel of Walker-Martel's staff, and it is felt that this sample fairly represents the interval in the drill hole from which it was taken.

Written by W.L.M.
9-9-66

BECHTEL CORPORATION



ENGINEERS-CONSTRUCTORS

TWO TWENTY BUSH STREET SAN FRANCISCO, CALIF. 94119

September 21, 1966

Mr. William L. Wilson
Walker-Martel Mining Company
100 Washington Street
Reno, Nevada

Dear Mr. Wilson:

I was recently informed by Bob Shoemaker of your interest in the capabilities of Bechtel Corporation to perform an engineering feasibility study for your iron ore properties in Nevada. We look forward with interest to your pending visit to our San Francisco offices to meet our representatives who have had broad experience in the preparation of similar iron ore assignments and to discuss with you your interesting project.

As a matter of information to you prior to your visit, we are enclosing herewith a copy of a recent brochure which we have prepared setting forth the qualifications of the Bechtel Corporation in the field of engineering and construction of iron ore beneficiation and pelletizing plants. We trust this will be of interest to you and will acquaint you with the depth and extent of our present activities as well as those of our past accomplishments. We are very proud of our overall experience in the iron ore industry and have had the opportunity to be of service to the majority of the major iron producing companies in the United States, Canada and abroad.

Thank you for your interest in Bechtel and we look forward to your early visit.

Very truly yours,

H. C. Lynch,
Executive Engineer

Qualifications
FOR
ENGINEERING AND CONSTRUCTION
OF
IRON ORE BENEFICIATION AND PELLETIZING PLANTS



BEGYTEL CORPORATION
SAN FRANCISCO, CALIFORNIA

April 1966

MEMORANDUM

From: WLW
To: Kay
Re: Miscellaneous gold prospects, Walker
River Reservation
Date: July 24, 1974

As time permits, you should make a reconnaissance of the Calico area, as it has been reported that there were several shallow pits dug for gold mineralization. I think that these are on the North side of the Calico Hills, but they may also be on the East and West ends, and it would be a good idea to scout these out and to sample the dumps for gold, silver, arsenic and mercury.

V Twsp. Plats

Idaho Mining Corporation

OFFICE: 591 - 25 ROAD
MAIL: P.O. BOX 2183
GRAND JUNCTION, COLORADO 81501
PHONE: 303 - 243-7806

February 10, 1978

Walker River Paiute Tribe
Schurz, Nevada 89427

Att'n: Chairman

Re: Mineral Prospecting Permit Contract
Number 14-20-H53-313

Gentlemen:

Pursuant to paragraph 2 of the above-referenced prospecting permit covering Tribal lands, please be advised that Idaho Mining Corporation hereby gives notice that it wishes to apply for leases on the following described lands:

1.	<u>Township 14 North, Range 29 East:</u>	<i>West Calico</i>	Acres:
	Section 31	SE $\frac{1}{4}$	160
	Section 32	All	640

	<u>Township 13 North, Range 29 East:</u>	<i>Calico</i>	
	Section 5	All	640
	Section 6	E $\frac{1}{2}$	320
	Section 7	NE $\frac{1}{4}$	160
	Section 8	All	640
			<hr/>
	Total Acres:	2,560	

2.	<u>Township 14 North, Range 29 East:</u>	
	Section 33.	S $\frac{1}{2}$ 320

	<u>Township 13 North, Range 29 East:</u>	<i>Little Calico</i>	
	Section 3	S $\frac{1}{2}$	320
	Section 4	All	640
	Section 9	All	640
	Section 10	All	640
			<hr/>
	Total Acres:	2,560	

3. Township 12 North, Range 30 East: *Hottentot* Acres:

Section 1	All, except that portion in present lease	627
Section 2	All, except that portion in present lease	627
Section 12	N $\frac{1}{2}$, except that portion in present lease	320

Township 12 North, Range 31 East: *Bodger*

Section 6	All	623
Section 7	N $\frac{1}{2}$	<u>318.5</u>

Total Acreage:	2,515.5
Less 240 acres in existing lease,	
Net Acreage Approx.	2,275.5

The existing Hottentot Lease, Contract # 14-20-0450-5727, encompasses approximately 180 acres in Section 2, 30 acres in Section 1, and 30 acres in Section 12. As you may be aware, the lands selected are in portions of Townships which are unsurveyed insofar as the public land surveys go, and therefore, according to terms of the permit, the actual description of the lands to be leased will be by metes and bounds, and it will be Idaho's responsibility to have the lands surveyed and substantial monuments posted at the corners thereof. The acreages noted above for unsurveyed sections 1, 2, 6, 7 and 12 are as shown on the Bureau of Land Management's Protraction Diagram for the townships in question, and it is our desire that when the lands are surveyed and posted, that we follow the protraction diagram, so that when the lands are finally surveyed by the cadastral engineers, the lease description will conform to the section line boundaries which will be established by such survey.

Maps are attached showing the areas encompassed by the proposed leases. Having notified you of the desire to take these leases under terms of the prospecting permit, we will await word from the Bureau of Indian Affairs as to how to proceed to effectuate the actual leasing.

Yours Very Truly,

IDAHO MINING CORPORATION

Hand delivered a copy of this document to Tribal Chairman office, Schurz, (Harry Hernandez) at 2:30 pm, Feb. 13, 1978

N.I.A. Office said they had rec'd. Mailed copy 2/13/78.

By W. L. Wilson
W. L. Wilson

WLW/jb

cc: Superintendent,
Nevada Indian Agency
Stewart, Nevada

and A. K. Wilson, Jr.
Reno, Nevada

Rec'd at Tribal Chairman's Office on 2-13-78.

By Harry Hernandez

M E M O R A N D U M

TO: FILES
FROM: WLW
RE: CALICO - CYPRUS
Date: March 22, 1979

On this date, I called Cliff Mark to see if they might be interested in the Hottentot/Badger area, even though they were not going to be interested in the Calico deposits. He said that they would not be interested in that, as they have several higher priorities than that, and they had taken it up at the management committee meeting yesterday, and decided not to proceed with it. He stated that he had sent a letter advising us of this, but we have not yet received it.

WLW

XC to 1000
6000 0148 (0890)

Cyprus Mines Corporation

555 South Flower Street
Los Angeles, California 90071
Telephone 213) 489-3700

Cable Selmud Losangeles
Telex 67-4601

March 19, 1979

Mr. W. L. Wilson, President
Idaho Mining Corporation
P. O. Box 2183
Grand Junction, CO 81501

RE: Calico Iron Deposit

Dear Bill:

Your letter regarding the Calico Iron Deposit brings back a lot of old memories. Memories of claim staking at midnight on an Indian Reservation hoping the Indians would not scalp us! Followed by dozers, drill rigs, etc.

As it turned out nobody wins a case like that. Both U. S. Steel and the Indians lost a good financial opportunity to develop this expensive target.

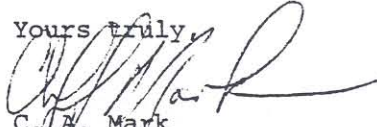
As you have found out, as well, it is a very expensive and long drawn out process from an anomaly to an orebody. Even the Pumpkin Hollow, Lyon County, U. S. Steel Deposit along with their high grade copper zone is still not being mined as yet.

After a review of the Calico property and the various targets involved our Executive Management has rejected it due to the fact it would be a very expensive long-range project to undertake. Due to our present exploration budget limitations we still have to be selective and put priorities on the new projects we select.

Maybe sometime in the future when our budgets for exploration have been increased we could take a crack at the Calico. I am certainly convinced you have a major mineral district under control on the Walker Indian Reservation - the only problem is most of it is covered by post mineral volcanics, which makes the exploration costs extremely high.

Thank you for thinking again of Cyprus and please keep us advised in the future status of the property.

Yours truly,


C. A. Mark
Chief Geologist and
Manager of Exploration

CAM:pr

cc:AAB

CYPRUS

Idaho Mining Corporation

OFFICE: 537-A ROOD AVENUE
MAIL: P. O. BOX 2183
GRAND JUNCTION, COLORADO 81501
PHONE 303-243-7806

September 11, 1974

Phillip M. Wright, Chief
U. S. Operations
Kennecott Exploration, Inc.
2300 West 1700 South
Salt Lake City, Utah 84104

Re: Calico Deposits, Walker River
Indian Reservation - Nevada

Dear Mr. Wright:

Thank you for your letter of September 9th, requesting permission to run IP tests over the Calico deposit. As you probably know, Bear Creek Mining Company ran some IP tests over this deposit in the mid-1960s, and various service companies have run extensive IP surveys over this deposit. Generally, it is not responsive to this method; however, your new system, with which I am not familiar, may very well do better than has been our experience in the past.

Also, as you may be aware, we have a similar deposit to the Calico, named the Hottentot Deposit, about 12 miles Southeast of the Calico, and it is much smaller, on the order of 5 million tons; however, it is also situated close to the surface and varies from a modest outcrop to a depth of 4- to 500 feet. We have also done extensive IP testing over this property, and we have a great deal of drill hole information to indicate the nature of the mineralization. This deposit, also, virtually defies detection by IP methods used in the past, which we attribute to various causes, the principal of which being extremely low resistivity, on the order of 3 to 10 ohm/feet, and to the massive nature of the mineralization, which, within the parts of the ore body which are unoxidized, consists of pyrite, pyrrhotite, chalcopyrite, and magnetite. Apparently, the massive nature of the mineralization is in part responsible for the low resistivities, and in fact causes almost direct shorts through the ore body.

Mr. Wright
September 11, 1974
Page 2

At any rate, if you desire to test your instrumentation over either or both of these deposits, we would welcome such a test, provided, as you offered, that we would be delivered copies of the data which was generated. I am sure we would also like the opportunity to discuss the test results with your geophysicist. We should be happy to cooperate with you in this matter, and if you need more formal evidence of our permission than this letter, please contact me.

Very truly yours,

IDAHO MINING CORPORATION

By W. L. Wilson
W. L. Wilson

WLW/jw

Xc: Mr. M. D. Reagan
Bear Creek Mining Company, 7821 E. Sprague
Spokane, Washington 99213

Mr. A. K. Wilson, Jr.



Kennecott Exploration, Inc.
Exploration Services Department

**Geophysics
Division
Operations**

September 9, 1974

Mr. W. L. Wilson, President
Idaho Mining Company
P.O. Box 2183
Grand Junction, Colorado 81501

Dear Mr. Wilson:


As you may or may not know, Kennecott has developed and is currently using a unique system of instrumentation for induced polarization (IP) prospecting. We have been testing this instrumentation over buried sulfide systems for the past several years, and I wonder if it would be possible to run a brief test over the Calico sulfide system on the Walker River Indian Reservation in Nevada, which I understand that your company holds.

For your background information, and in case you do not already know, IP is a method of detecting electrically conducting sulfide minerals in rocks. Because small amounts of sulfide (on the order of 1 wt. %) can be detected, the technique has obvious application to prospecting for disseminated sulfide deposits as well as to deposits containing higher concentrations of sulfides, such as skarns and massive sulfides.

What we have in mind at Calico would probably involve 1 or 2 IP lines across the deposit, and would take 2 to 4 days. We have an IP crew nearby, and could probably do this work before the end of September. You would, of course, receive a copy of the data which we would generate.

Under these circumstances, would you be willing to grant approval for this test survey? I appreciate your consideration in this regard.

Sincerely,


Philip M. Wright
Chief, U.S. Operations

PMW:ss

cc: M. D. Regan
Bear Creek Mining Company
Spokane Office



Kennecott Exploration, Inc.
Exploration Services Department

Geophysics
Division
Operations

December 3, 1974

Mr. W. L. Wilson, President
Idaho Mining Corporation
P.O. Box 2183
Grand Junction, Colorado 81501

Dear Mr. Wilson:

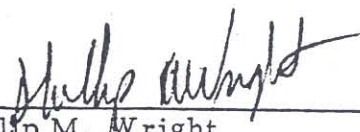
Attached are two copies of a brief report by Howard Ross, one of our senior geophysicists, on our IP tests at Calico and Hottentot. I would like to express our appreciation for your permission to conduct these tests, and I hope that you find the results of interest.

Kennecott's IP system, which we call VIP for vector IP, is different and of more capability from what is generally commercially available. It detects a phase angle lag between transmitted and received signals as a measure of the IP effect. Therefore the IP data which we are submitting with this report are in milliradians of phase angle, where one radian is, of course, about 57 degrees of angle. To convert to standard frequency domain, pfe, divide by about 5, and the conversion to time domain milliseconds is very roughly one-to-one. This should allow you to compare with other IP data you may have.

As you will see from the report, we found a clear anomaly over the Calico deposit, but none over the Hottentot deposit. Descriptions of Hottentot mineralization would indicate that it should be an IP responder, and so lack of an anomaly is not understood at this time.

Again, thanks for permission to do this work.

Sincerely,


Phillip M. Wright
Chief, U.S. Operations

PMW:ss

Enclosure

INDUCED POLARIZATION TEST SURVEYS
OF THE
CALICO AND HOTTENTOT DEPOSITS
(IDAHO MINING CORPORATION)
WALKER RIVER INDIAN RESERVATION
MINERAL COUNTY, NEVADA

by
Howard Ross

November, 1974

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November, 1974



SUMMARY AND CONCLUSIONS

VIP tests were conducted over the Calico and Hottentot magnetite deposits of Idaho Mining Corporation on the Walker River Indian Reservation, Mineral County, Nevada. The KEI VIP system clearly delineated the Calico deposit beneath 1,300 feet of conductive overburden, recording phase values in excess of 40 milliradians. Interpretation of this profile suggests that either the deposit is shallower to the north, or a response in overlying volcanics contributes to the net response.

A VIP line of 200-foot dipoles was also completed across the Hottentot deposit with very different results. Although the deposit is quite small (about 5 million tons) it is shallow and should have been detected. A weak pattern of 5-7 milliradian values in a background of 2-5 mils indicates the mineralization is essentially nonresponsive. The massive nature of the mineralization may provide nearly complete electronic conduction between the sulfide grains and the magnetite-hematite.

INTRODUCTION

In September, 1974, P. M. Wright requested and received permission to conduct induced polarization tests over the Calico and Hottentot deposits of Idaho Mining Corporation. These buried magnetite deposits are located on the Walker River Indian Reservation, Mineral County, Nevada approximately 40 and 30 miles north of Hawthorne, Nevada (Figure 2). Since many previous surveys had failed to detect significant IP anomalies over these deposits (Elliot, 1969; Schwenk, 1966; Wright, 1966) this was viewed as an important and demanding test of the KEI IP system. The IP crew was completing survey work in the Hawthorne area and no new mobilization was necessary to conduct the tests.

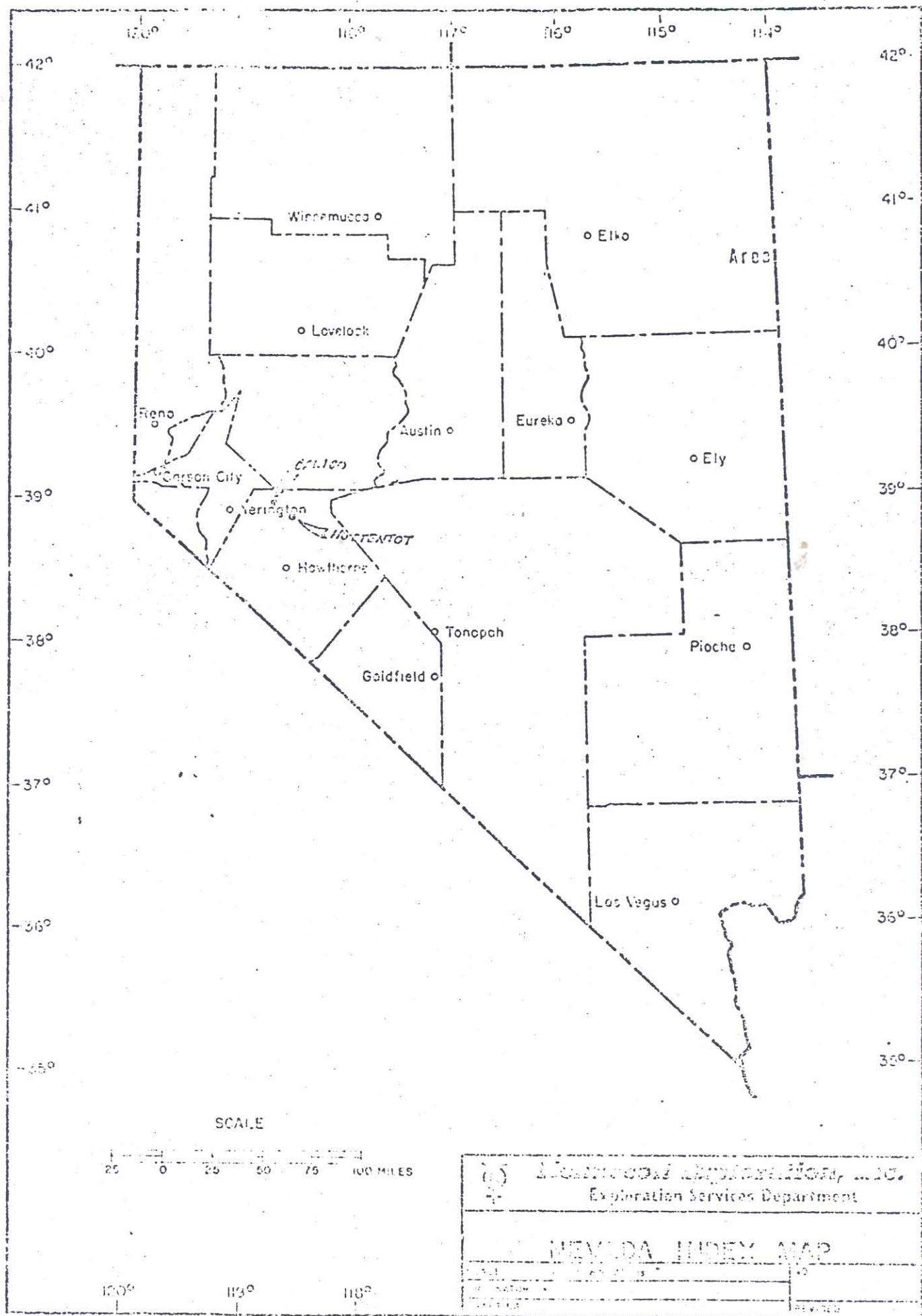


Figure 1

GEOLOGY AND MINERALIZATION

The geology and mineralization of the Calico and Hottentot deposits are described in varying detail by Haxby, 1967; Wright, 1966; Lawrence and Wilson, 1965. In addition copies of various drill logs are available as a result of previous evaluations of these properties by Bear Creek.

Calico

In the Calico area Triassic and Jurassic volcanics and sediments of the Excelsior and Luning formations have been intruded by Cretaceous diorites and quartz monzonites related to the Sierra Nevada Batholith. Most of the mineralization appears to be developed in the Luning formation. Post-mineral faulting was followed by the deposition of Tertiary felsic to intermediate volcanics, erosion, and the deposition of gravels and lake deposits in topographically low areas. The unmineralized volcanics extend to depths of 1,300 feet (CA-5, CA-6), 1,308 feet (CA-1) and 1,393 feet (CA-2) beneath VIP Line 1 and to 1,160 (CA-4) and 1,922 feet (CA-3) on strike with mineralization away from the VIP line. Immediately beneath these volcanics small amounts of sulfides were noted in diorite or skarn with massive magnetite generally 1,450 feet or deeper. In holes CA-1 and CA-3 massive magnetite intercepts with pyrite, pyrrhotite, and chalcopyrite continue intermittently to depths of 3,627 and 3,422 feet respectively.

The drilling and magnetic data together indicate a mineralized zone more than 6,000 feet long striking northwest, perhaps 1,500 feet wide in suboutcrop pattern, dipping about 45° southwest and plunging to the southeast. Not all of this volume is massive magnetite; the iron zone, not fully delineated by drilling, may be only 800 to 1,000 feet wide. Sulfides are often 2-10 percent but the average copper grade for all holes is 0.08%. The only significant copper occurrence is 130-foot section (2,775-2,905 feet) which averages 0.79% Cu in CA-3. The inferred iron reserves are 272 million tons averaging 36.2% Fe with a 25% Fe cut off grade (Haxby and Chester, 1967).

Hottentot

Although the general geology of the Hottentot area is the same as the Calico Hills, few pre-Tertiary outcrops are known. Small outcrops of a dioritic intrusive and two slivers of metamorphic rocks associated with the intrusive occur within the area drilled at Hottentot. Postmineral cover includes Tertiary quartz-latitude tuff, intermediate volcanic flows and Tertiary or Quaternary mafic flows and plugs. A small amount of calc-silicate rock was intersected in a drill hole near the iron mineralization. The mineralization occurs as pods and irregular lenses within the diorite and consists of magnetite, hematite, pyrite, chalcopyrite, and traces of galena. Massive magnetite-hematite was intersected at depths of 41 to 177 feet in drill holes H-3, -4, -5, -6 along VIP Line 1. From 60 to 140 feet of massive mineralization

was intersected by these holes often separated by zones of diorite. The postmineral cover was dacite (H-3) or quartz-latitude tuff (H-6) which contained 2-3% magnetite (Lawrence and Wilson, 1966). The total tonnage of the Hottentot deposit is quite small, on the order of 5 million tons (Wilson, 1974) of more than 50% iron.

GEOPHYSICS

The Calico and Hottentot deposits give rise to large aeromagnetic anomalies (1,800 and 1,000 gammas, respectively) which were instrumental in their discovery (Wright, 1966). No attempt is made to review the aeromagnetic interpretation in this report.

Induced polarization surveys have been conducted over these deposits by McPhar Geophysics, Ltd.; Huntex, Ltd.; and Kennecott from 1966 to 1969 without obtaining an interpretable sulfide response (Elliott, 1969; Wright, 1966; Schwenk, 1966). Low resistivity overburden, electromagnetic coupling, telluric noise at low frequencies and the massive nature of the mineralization have all been discussed as explanations for the failure of induced polarization to detect these deposits. The present work was directed at testing the KEI induced polarization equipment over these deposits.

Calico VIP

Figure 3 shows the location of VIP Line 1 at a scale of 1:62,500. VIP Line 1 (1,000-foot dipoles) was centered approximately 60 feet north of CA-6 and trends approximately N. 20° E. (Fig. 4). The transmitted current was between 16 and 20 amps. The VIP line and several drill holes are located in a narrow canyon which cuts 200 to 500 feet through Tertiary volcanics. The line crosses the axis of the magnetite deposit at 45 to 65 degrees (Figs. 3 and 4). The VIP data are shown in Figure 5. A very clear phase anomaly (over 40 milliradians) is observed with well defined cutoffs to the north and south of the anomalous body. The removal of electromagnetic coupling effects using our standard techniques may not be adequate for the southern half of this line where apparent resistivities are below 10 ohm-meters. Thus the phase values plotted for the south portion may include 5 to 20 mils of coupling for separations greater than 4. This is not suggested however by the fairly uniform 6 to 11 mils of phase ($n = 1$ to $n = 6$) south of the known mineralized area where apparent resistivities vary from 3 to 13 ohm-meters. In any case a well-defined VIP anomaly of at least 40 mils (coupling-free) has been observed.

An interpretation of these data by comparison with theoretical 3-D models (Hohmann, 1974) presents some problems. First the profile crosses the body at 45° to 65° rather than 90°. Secondly the known depth to mineralization directly under the profile is about 1,300 feet, yet anomalous phase values are recorded on $n = 1$ and $n = 2$ directly over the main source. Possible explanations are a minor, localized response in the volcanics directly above the deposit

(not evident from incomplete drill logs) or a shallower portion of the deposit north or northwest of CA-6 but within 500 feet of the line. The large observed phase values (25 to 40 mils) would seem to require an unreasonably high intrinsic phase for a body more than 1,000 feet deep. The IP data suggest a northeast dip to the mineralization, but this may be due in part to the angle between the strike of the deposit and the direction of the IP line.

Hottentot VIP

The location of the Hottentot test VIP line is shown in Figure 6. The line is centered 100 feet southeast of H-3 and trends approximately S. 75° E. across H-6. A two-hundred-foot dipole spacing was used because of the small size and shallow depth of the deposit. The transmitted current was between 9 and 15 amps. The data are shown in Figure 7. The entire range of phase values is 2 to 7 milliradians which is considered low even for 'background.' The only suggestion of an IP response is the 5 to 7 mil pattern beneath the drilled area and this is not interpretable. Even the 2-5% magnetite reported in rhyolite tuff from 0-177 feet in H-6 does not give a response. The apparent resistivities vary from 8 to 43 ohm-meters and should not prevent detection of any significant IP response which may be present. The best explanation for the lack of an IP response would seem to be the very massive nature of the mineralization (often more than 50 percent iron as hematite and magnetite) which may result in almost continuous electronic conduction, even between sulfide and oxide mineralization. Electromagnetic coupling, telluric noise, and signal strengths presented no problems in VIP measurements at Hottentot.

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Wilson, W. L., 1974, IP tests at the Calico deposits, Walker River Indian Reservation, Nevada: Letter to P. M. Wright, KEI-GDO dated September 11.

Wright, P. M., 1966, A review of geophysical data from the Walker River Indian Reservation, KES-GDO report, December.



Kennecott Exploration, Inc.
Exploration Services Department

6000 0148 (0890)
XC Kay
12/9/74
**Geophysics
Division
Operations**

December 3, 1974

Mr. W. L. Wilson, President
Idaho Mining Corporation
P.O. Box 2183
Grand Junction, Colorado 81501

Dear Mr. Wilson:

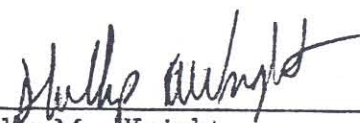
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Sincerely,



Phillip M. Wright
Chief, U.S. Operations

PMW:ss

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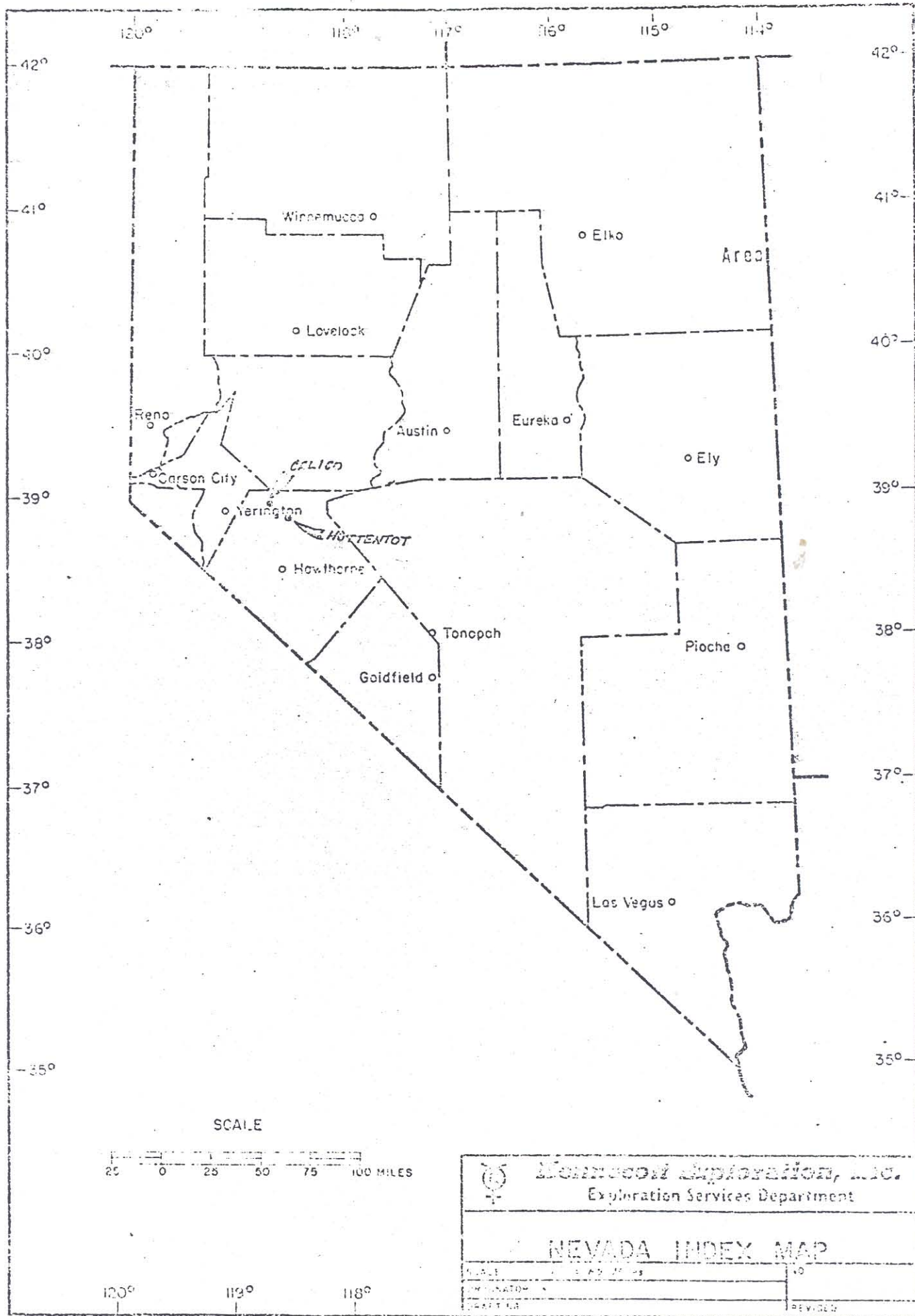


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Hottentot VIP

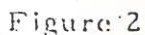
The location of the Hottentot test VIP line is shown in Figure 6. The line is centered 100 feet southeast of H-3 and trends approximately S. 75° E. across H-6. A two-hundred-foot dipole spacing was used because of the small size and shallow depth of the deposit. The transmitted current was between 9 and 15 amps. The data are shown in Figure 7. The entire range of phase values is 2 to 7 milliradians which is considered low even for 'background.' The only suggestion of an IP response is the 5 to 7 mil pattern beneath the drilled area and this is not interpretable. Even the 2-5% magnetite reported in rhyolite tuff from 0-177 feet in H-6 does not give a response. The apparent resistivities vary from 8 to 43 ohm-meters and should not prevent detection of any significant IP response which may be present. The best explanation for the lack of an IP response would seem to be the very massive nature of the mineralization (often more than 50 percent iron as hematite and magnetite) which may result in almost continuous electronic conduction, even between sulfide and oxide mineralization. Electromagnetic coupling, telluric noise, and signal strengths presented no problems in VIP measurements at Hottentot.

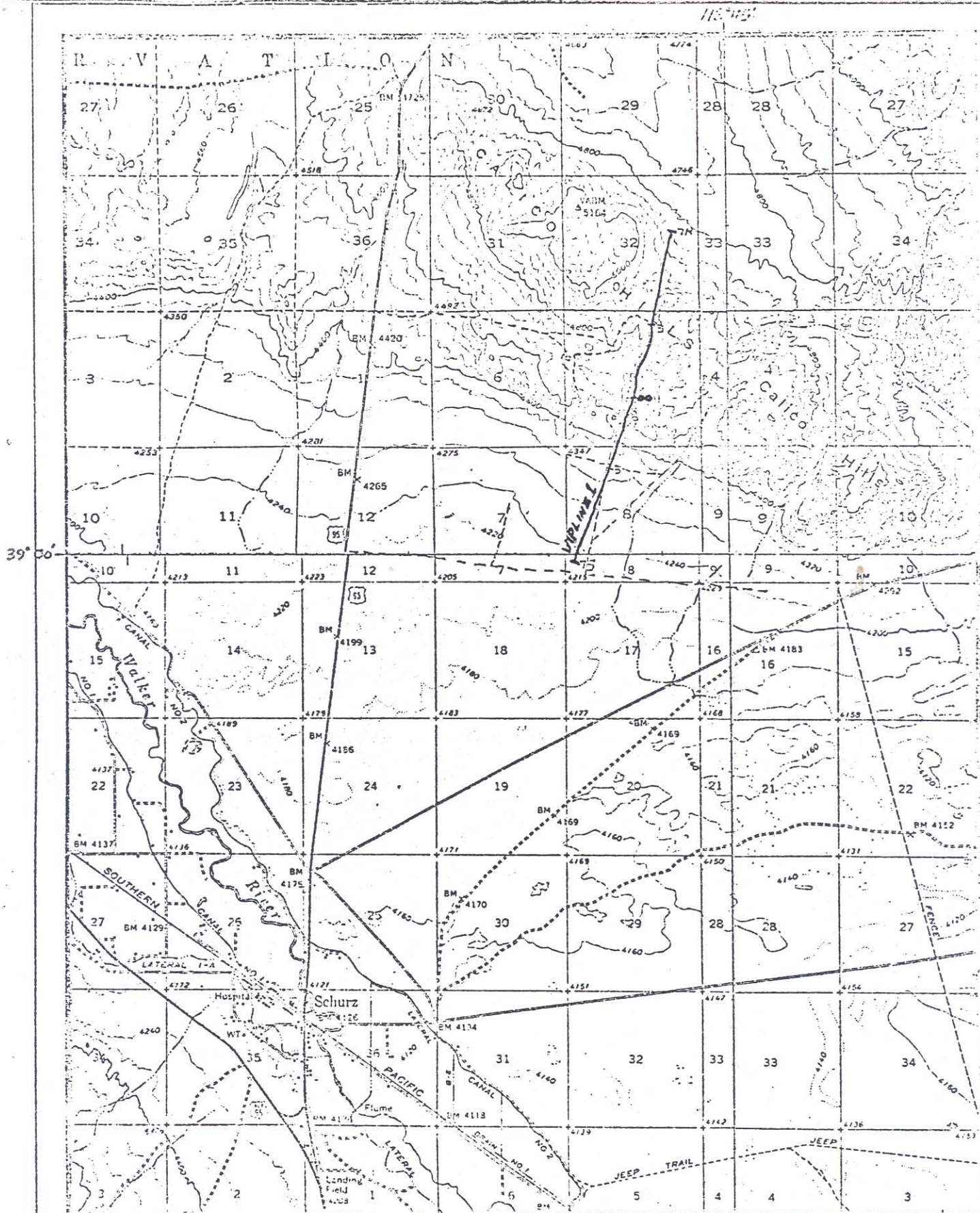
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Wright, P. M., 1966, A review of geophysical data from the Walker River Indian Reservation, KES-GDO report, December.





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GEOPHYSICS DIVISION

U. S. OPERATIONS

Topographic Map Locating CALICO VIPLINE 1, MINERAL CO., NEVADA

SCALE: 1:62,500 C.I.: 40' DATA BY: J.M.S. DATE: NOV. 1974 NO.:

Figure 3

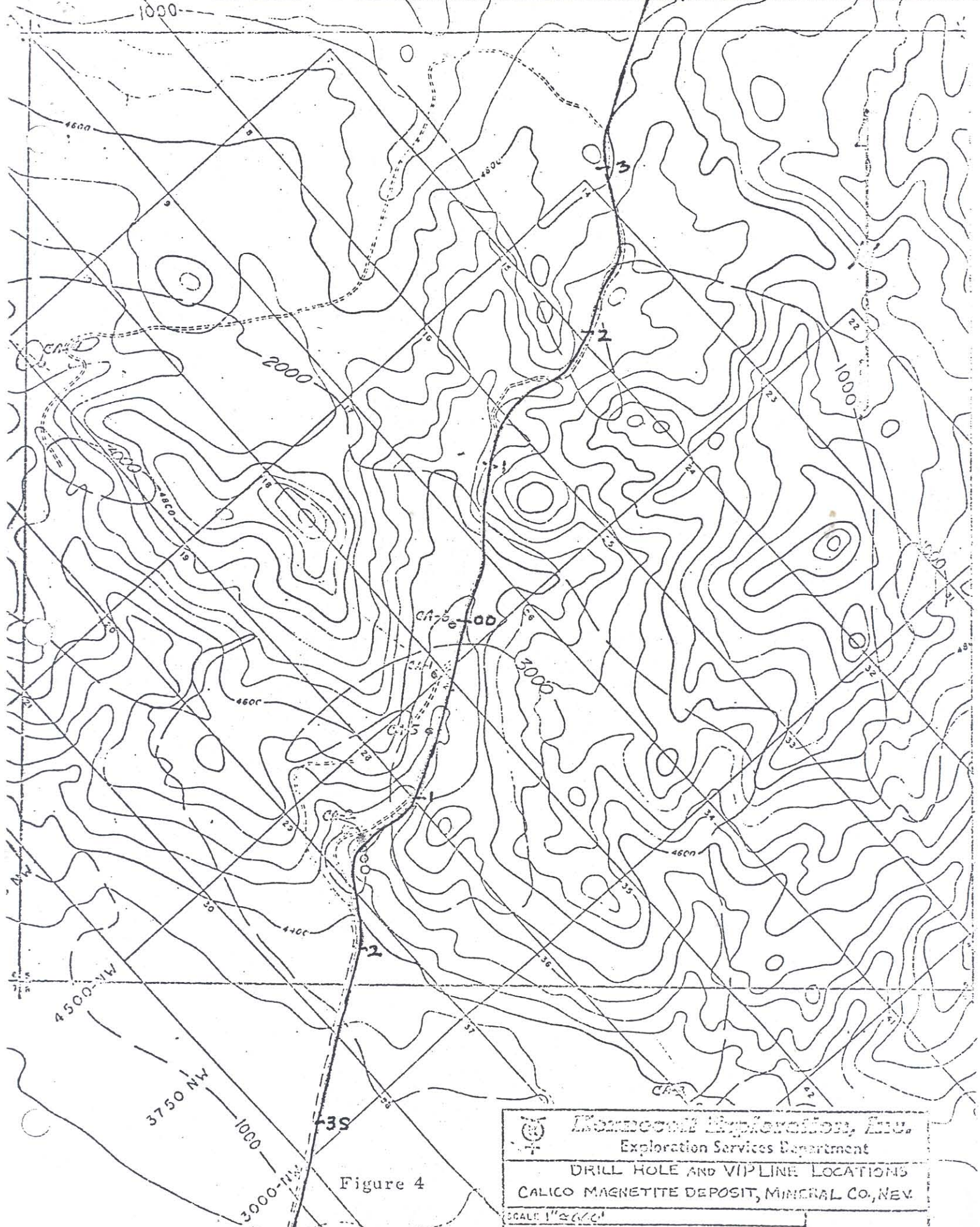



Figure 4

	Kennecott Exploration, Inc. Exploration Services Department	
	DRILL HOLE AND VIPLINE LOCATIONS CALICO MAGNETITE DEPOSIT, MINERAL CO., NEV.	
SCALE 1" = 660'		
ORIGINATOR		
DRAFTER H. R. [unclear]		

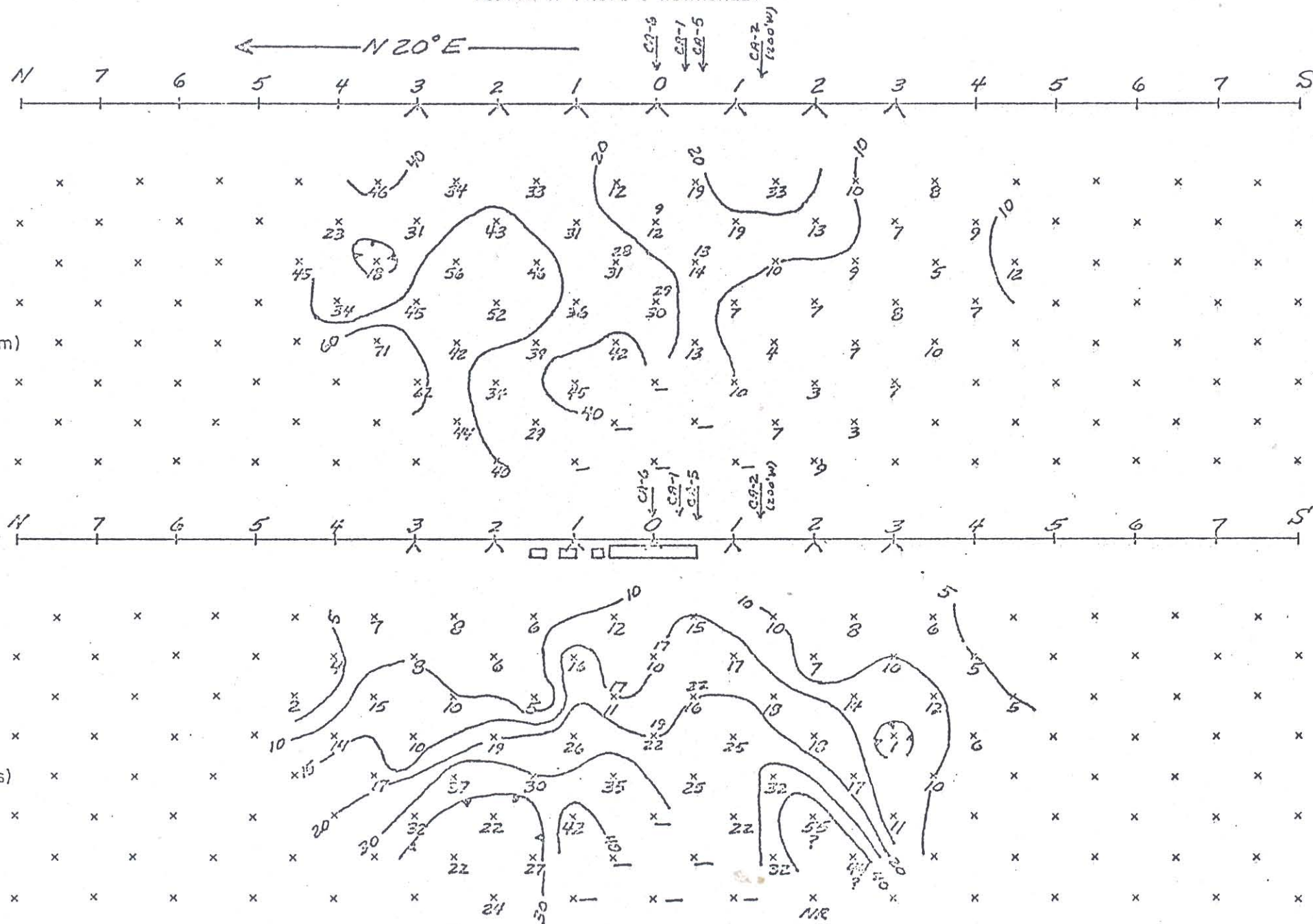
KENNECOTT EXPLORATION INC. - GEOPHYSICS DIVISION OPERATIONS
VECTOR IP PROFILE WORKSHEET

Kennecott

Exploration Services

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Figure 5



AREA CALICO MAGNETITE DEPOSIT STATE NEVADA LINE NO. 1 DATA BY H.P. ROSS DATE OCTOBER 24, 1974
TRANSMITTER FT-20 RECEIVER MR-17, #2, #4 DIPOLE - DIPOLE ARRAY $a = \underline{1000}$ FEET

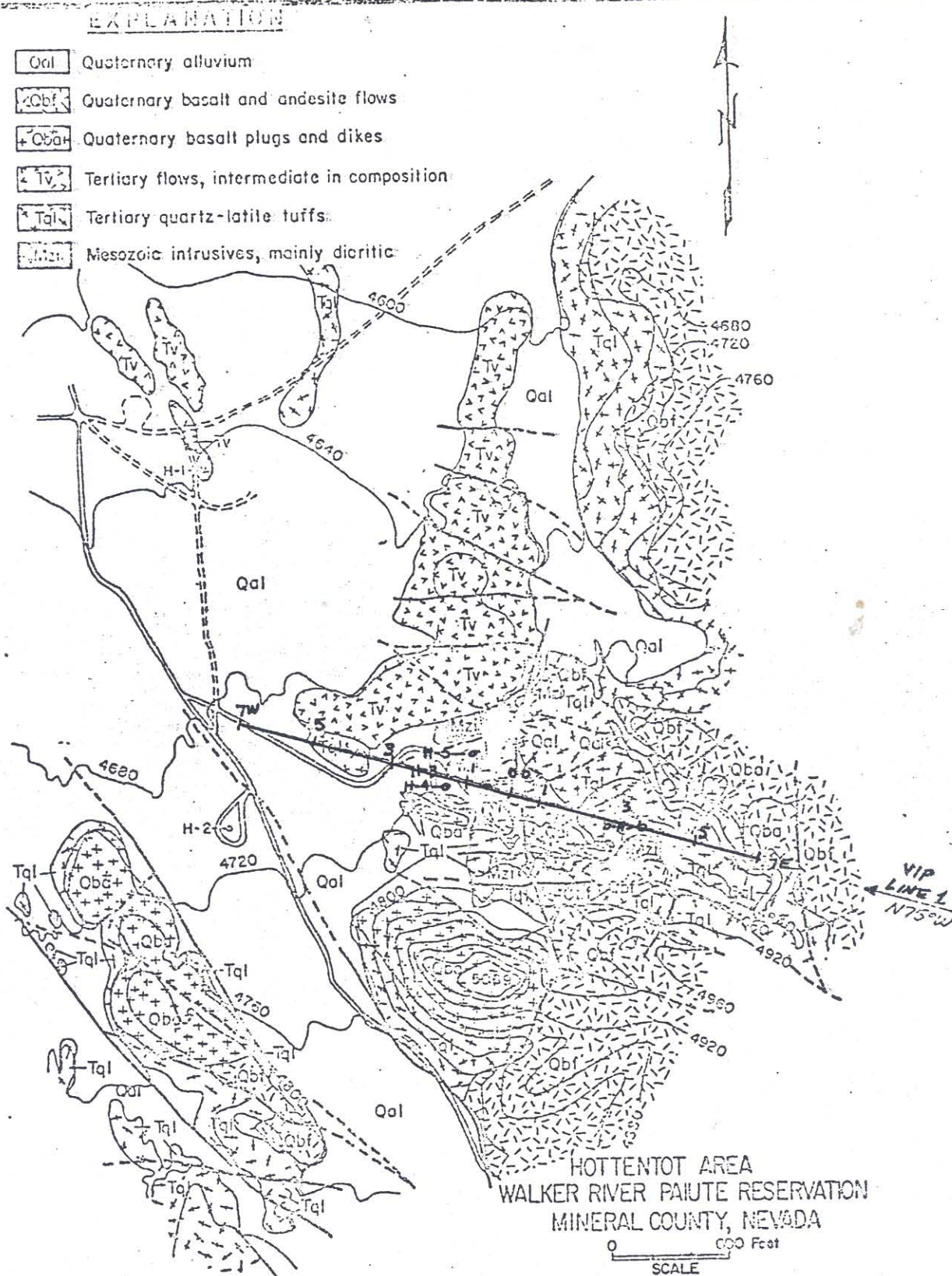


FIGURE 2. Geologic map of a part of the Hottentot area.
KENNECOTT EXPLORATION INC. - EXPLORATION SERVICES DEPARTMENT
GEOPHYSICS DIVISION — U. S. OPERATIONS
VIP LINE 1, HOTTENTOT MAGNETITE DEPOSIT, MINERAL CO., NEVADA
SCALE: 1"=770' C.I.: DATA BY: H.R. K. DATE: NOV. 1974; NO.:

Figure 6

KENNECOTT EXPLORATION INC. - GEOPHYSICS DIVISION OPERATIONS
VECTOR IP PROJ. WORKSHEET

← N 75° W →

W 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 E

ρ_o (Ωm)

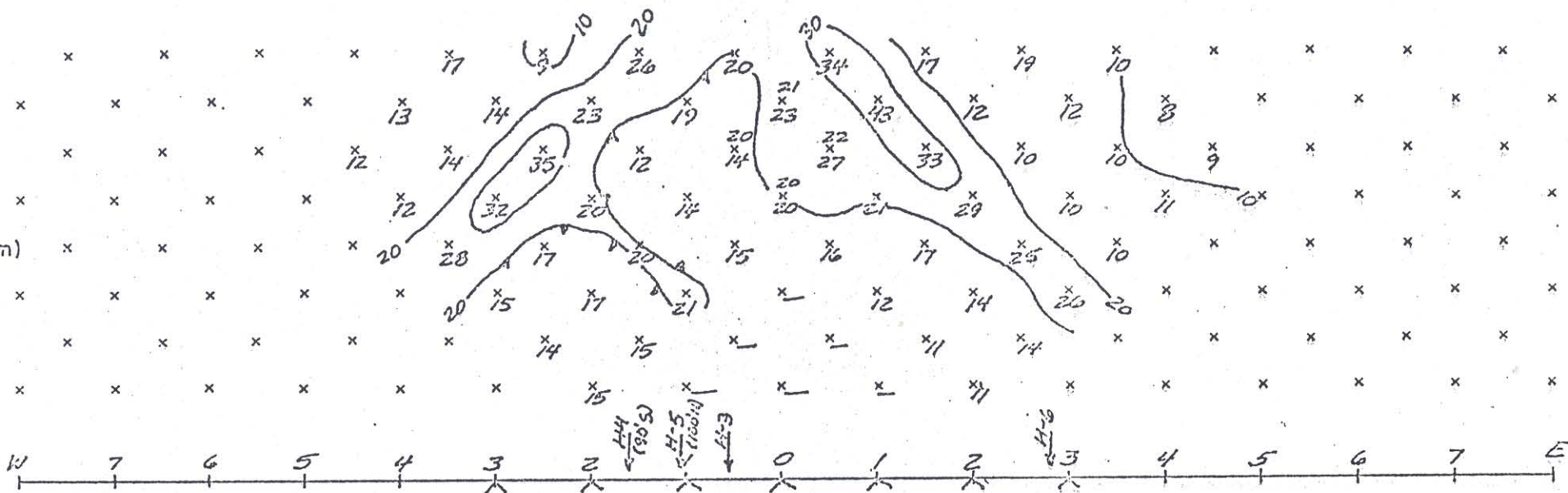
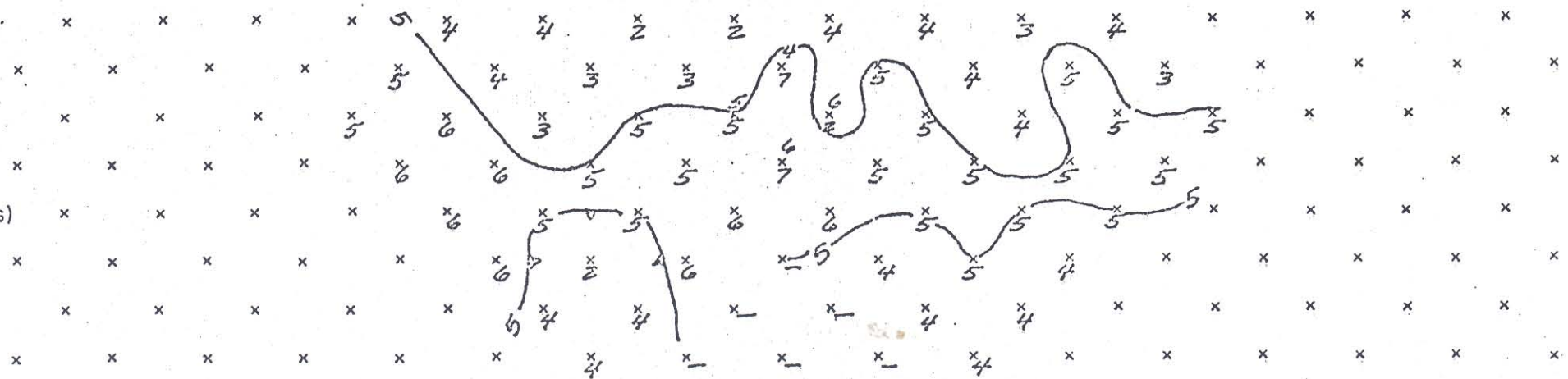


Figure 7

W 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 E

ρ_e (mils)



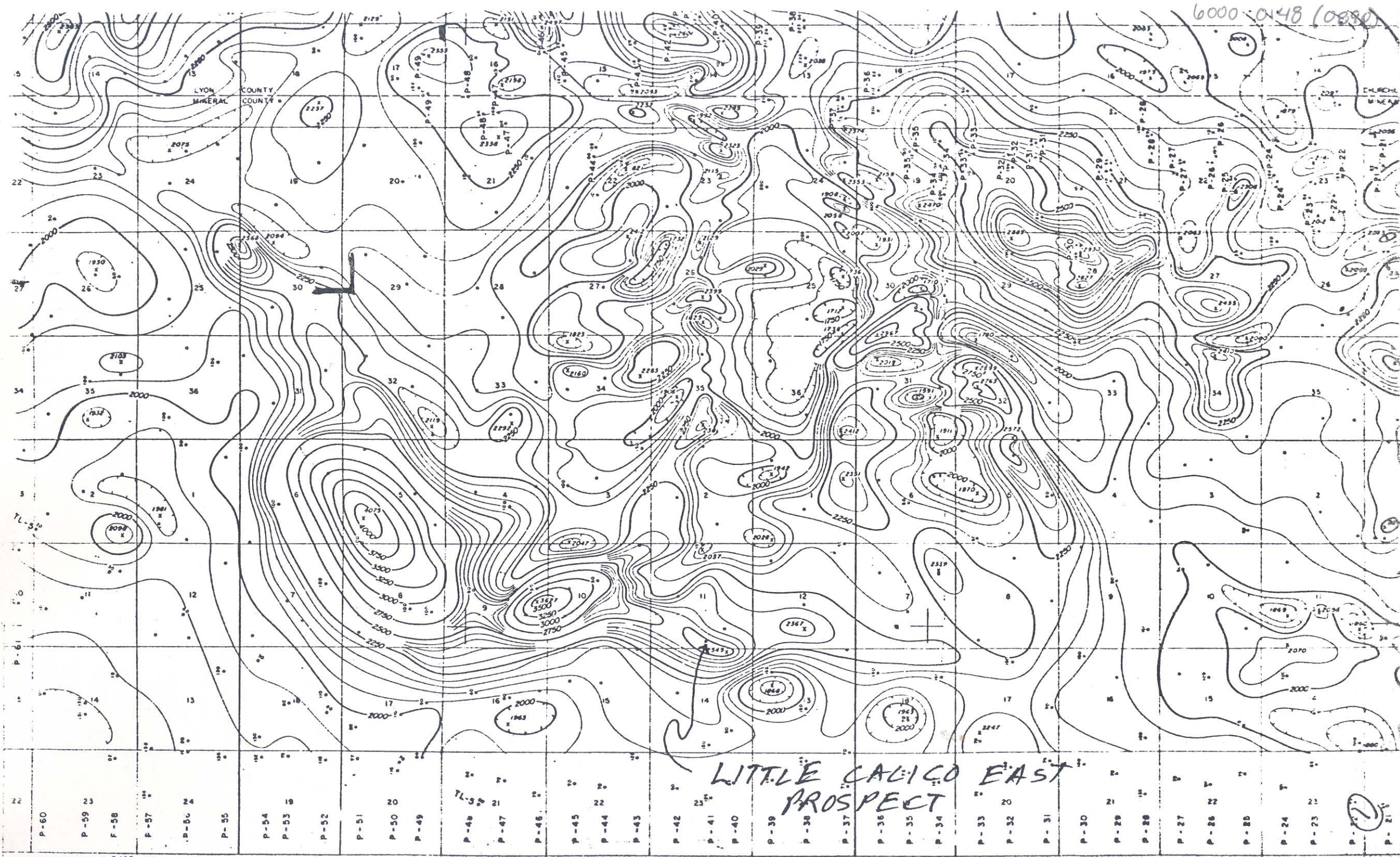
AREA HOTTENTOT MAGNETITE DEPOSIT STATE NEVADA LINE NO. 1 DATA BY H.P. ROSS DATE OCTOBER 25, 1974

TRANSMITTER FT-20 RECEIVER MR. IV, #3, #6

DIPOLE - DIPOLE ARRAY

a = 200 FEET

6000 0148 (0880)



LITTLE CALICO EAST
PROSPECT

1

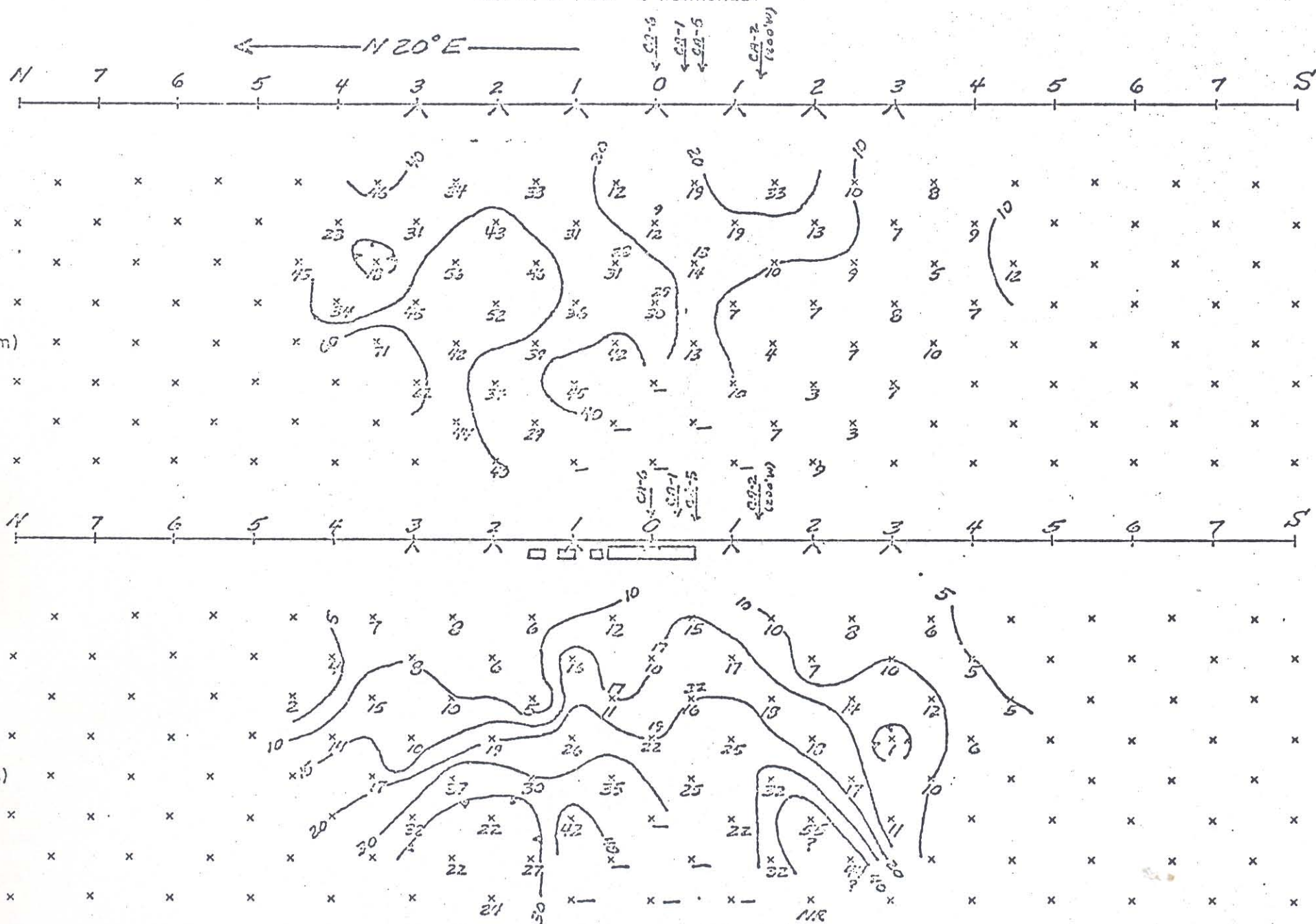
6000 0148 (0890)

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Figure 5



AREA CALICO MAGNETITE DEPOSIT STATE NEVADA LINE NO. 1 DATA BY H. PROSS DATE OCTOBER 24, 1974

TRANSMITTER FT-20 RECEIVER MR-22, 23, 24

DIPOLE - DIPOLE ARRAY

a = 1000 FEET

6000 0148 (0890)

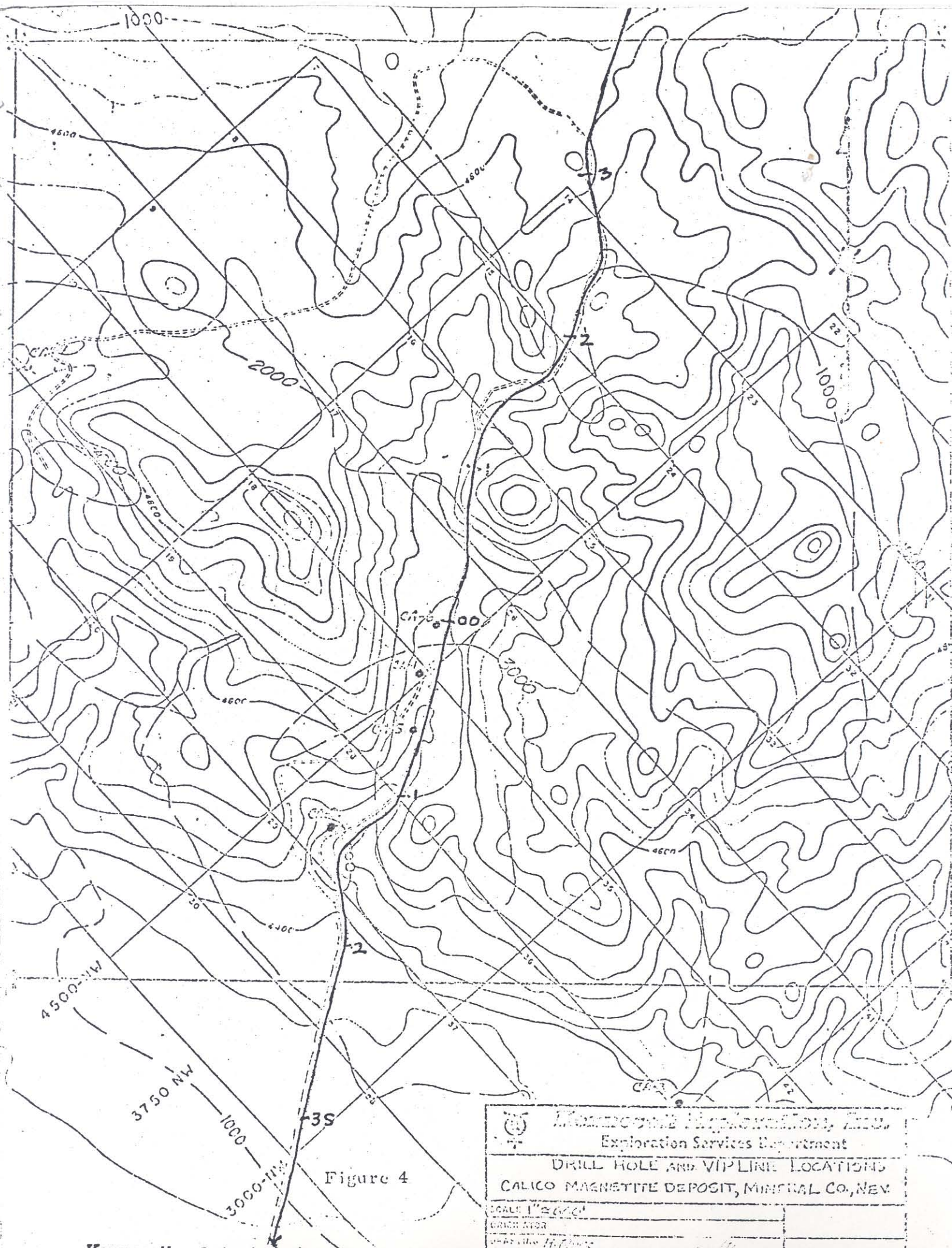



Figure 4

	Kennecott Exploration, Inc.
	Exploration Services Department
	DRILL HOLE AND VIPLINE LOCATIONS
	CALICO MAGNETITE DEPOSIT, MINERAL CO., NEV.
SCALE 1"=200'	
GRAPHIC SCALE	
DATE: 11/1/88	
BY: [Signature]	
CHECKED BY: [Signature]	
APPROVED BY: [Signature]	