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James Doyle Sell Mining Collection

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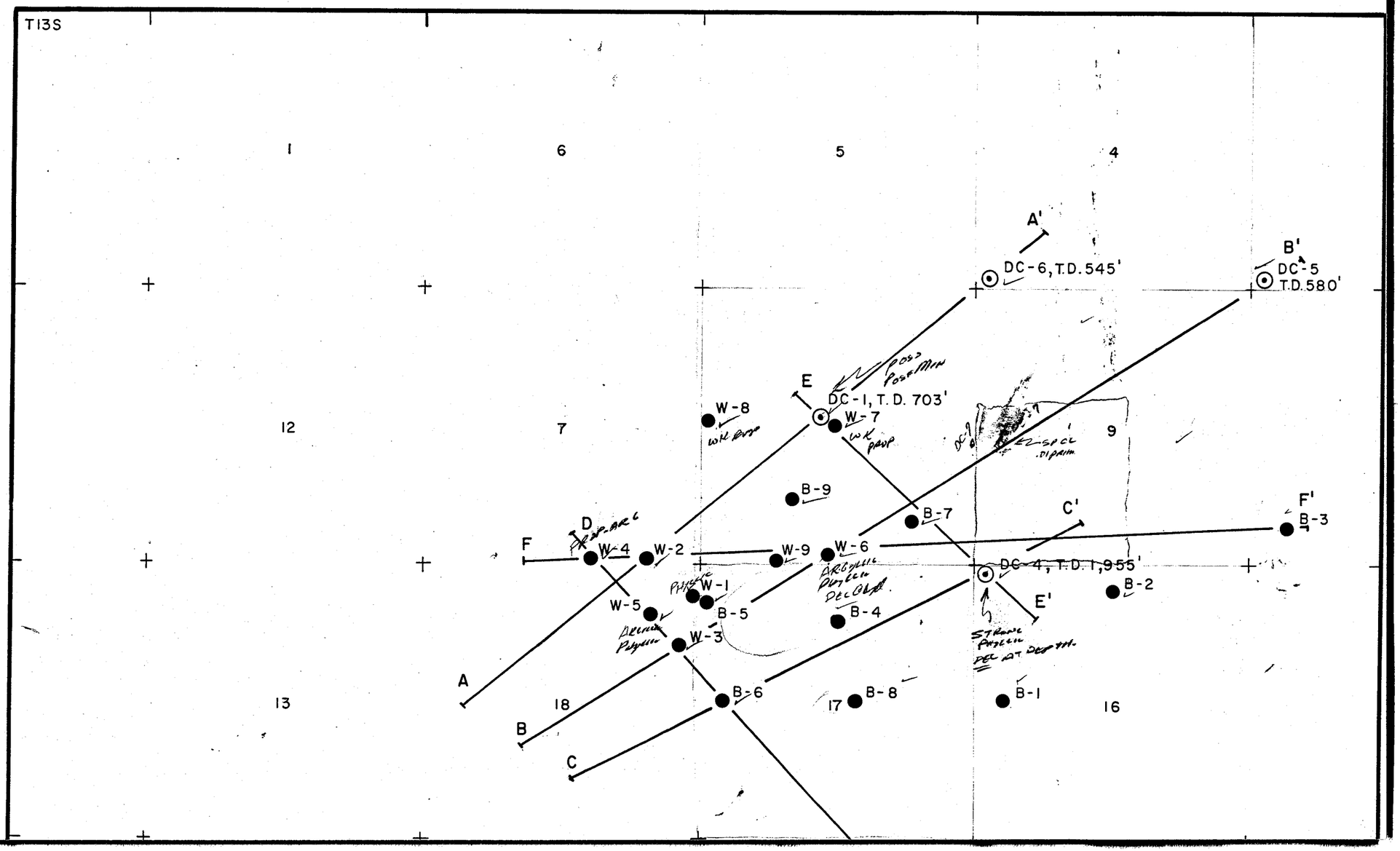
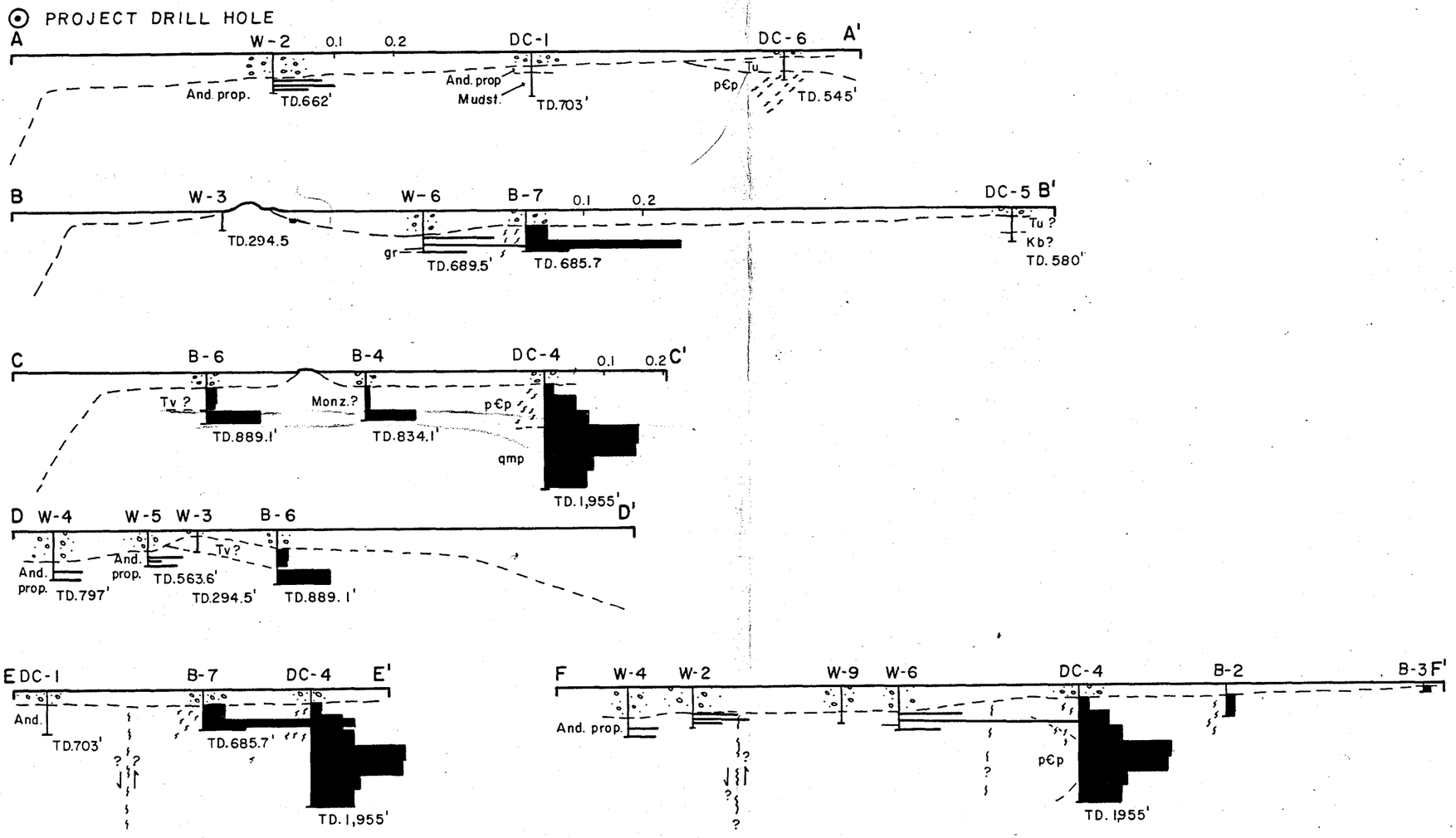

T13S
1
6
5
4
12
7
9
13
18
17
16
A'
B'
DC-6, T.D. 545'
DC-5
T.D. 580'
E
DC-1, T.D. 703'
W-8
W-7
B-9
B-7
C'
F'
B-3
D
F
W-4
W-2
W-9
W-6
DC-4, T.D. 1,955'
B-2
W-1
B-5
B-4
E'
W-5
W-3
A
B-6
B-8
B-1
B
C

CAP PROJECT AREA 10-25 : Previous Drill Holes in Spike-E Hill Area (B-Bear Creek, W-Asarco)



Summary: Drill Hole DC-1

Drill hole DC-1 was collared in postmineral alluvial material and intersected bedrock at a depth of 240 feet. The interval 240-490' included gray-green and purplish-gray andesitic rocks. At 490' drilling intersected a pebbly mudstone which continued to total depth of 703 feet.

Evidence of alteration or mineralization was not recognized in either core or cuttings, and except for the interval 700-703 T.D. copper and molybdenum content appears to be at or below background levels.

Correlation between the strata intersected in DC-1 and other rocks of the Dos Cabezas district is uncertain, but a possible correlation exists between the mudstone member of the Cretaceous Bisbee Group described by Sabins and the mudstone encountered in hole DC-1 in the interval 490-703 T.D.

Assay Summary

Interval		Cu (ppm)	Mo (ppm)
240-703 T.D.	Minimum	20	< 1
	Maximum	117	4
	Average	50	2

Summary: Drill Hole DC-2

Drill hole DC-2 was collared in postmineral alluvial material and continued in that formation to a depth of 540 feet. At 540' drilling intersected gray to purple mudstones and graywackes thought to be of premineral age and possibly correlable with the Bisbee Group of Cretaceous age. Drilling continued in the mudstones to a total depth of 793 feet. Effects of alteration or sulfide mineralization were not recognized in the interval penetrated by DC-2.

Assay Summary

Interval		Cu(ppm)	Mo(ppm)
540-793 T.D.	Minimum	16	<1
	Maximum	67	2
	Average	32	--

Summary: Drill Hole DC-3

Drill hole DC-3 was collared in unconsolidated alluvial material and continued in that formation to a depth of 260 feet. At 260' drilling encountered a conglomeratic mudstone which was moderately indurated and composed principally of medium grained clastic and fine grained extrusive rocks. This unit continued to a depth of 700' where drilling intersected a lavender dacite agglomerate. Drilling continued in the agglomerate to a total depth of 763 feet. The interval 700-763 T.D. is considered to represent premineral Tertiary-Cretaceous rocks at the location drilled. Evidence of alteration or mineralization was not recognized in DC-3.

Assay Summary

Interval		Cu (ppm)	Mo (ppm)
700-763 T.D.	Minimum	43	2
	Maximum	57	4
	Average	46	3

Summary: Drill Hole DC-4

Drill hole DC-4 was collared in postmineral gravels and continued in that formation to a depth of 200 feet. The interval 200-450 consisted of white to greenish-gray sericite schist showing evidence of several percent limonite after sulfides and strong argillic alteration. The interval 450-500 also consisted of altered schist but carried fresh pyrite with thin chalcocite coatings, the presence of which was definitely noted in the copper assays for this interval. The chalcocite zone terminated at 500' and drilling continued in altered quartz-sericite schist carrying several percent sulfides and averaging 0.02-0.05% Cu. The 640-900 included chlorite-sericite schist also carrying several percent sulfides with sparce chalcopyrite. Assays for the this interval are also in the range 0.05% Cu. A second zone of weakly developed chalcocite was noted at approximately 920', this time associated with an altered quartz porphyry in which assay values in the range 0.1% Cu were noted. Copper values increased sharply in the interval 1050-1450 due to a relative increase in chalcopyrite and values in this interval averaged close to 0.2% Cu. The interval 1450-1955 T.D. consisted principally of a quartz-sericite and quartz-sericite chlorite rock carrying several percent sulfides but only 0.06-0.07% Cu. Drilling terminated at 1955 feet on Feb. 16, 1974.

Assay Summary

Interval		Cu (ppm)	Mo (ppm)
200-1955 T.D.	Minimum	50	2
	Maximum	5700	20
	Average	900	5

Summary: Drill Hole DC-5

Drill hole DC-5 was collared in postmineral alluvium and continued in that formation to a depth of 110 feet. The interval 110-420 consisted of agglomerates, tuffs and dacites thought to represent the postmineral Tertiary section in the Dos Cabezas area. At 420' drilling intersected a pinkish-gray well indurated agglomerate which was found to be weakly iron stained but otherwise unaltered and unmineralized. Drilling continued in the agglomerate to a total depth of 580'.

Assay Summary

Interval		Cu(ppm)	Mo(ppm)
420-580 T.D.	Minimum	36	1
	Maximum	83	3
	Average	50	--

Summary: Drill Hole DC-6

Drill hole DC-6 was collared in postmineral alluvium and continued in that formation to a depth of 170 feet. The interval 170-355 consisted of an alternating sequence of light colored tuffs and tuffaceous rocks apparently of postmineral age. At 355' drilling intersected the Pinal schist formation and continued in that formation to a total depth of 545 feet. The schist is light greenish-gray to very dark greenish-gray, shows evidence of weak propylitic alteration and original sulfide content of approximately 1%.

Assay Summary

Interval		Cu (ppm)	Mo (ppm)
350-545 T.D.	Minimum	35	1
	Maximum	269	3
	Average	59	--

Summary: Drill Hole DC-7

Drill hole DC-7 was collared in post mineral alluvium and continued in that formation to a depth of 320 feet. At that depth drilling intersected a bleached sericite schist carrying limonite suggestive of an original sulfide content of approximately 3%. Leaching and oxidation continued to a depth of approximately 600 feet at which point drilling intersected weak pyrite and very sparse chalcocite mineralization. The sparse chalcocite continued to a depth of approximately 700 feet below which it was not observed. Between 700 and T.D. at 1980 drilling alternated between bleached schist and altered quartz porphyry. Both the schist and porphyry showed moderately intense development of quartz-sericite and quartz-sericite-chlorite alteration accompanied by approximately 3% disseminated pyrite. Drilling continued to a T.D. of 1980 feet with only minor variations in lithology and alteration.

Assay results for drill hole DC-7 are given in the accompanying summary.

Assay Summary

Interval		Cu (ppm)	Mo (ppm)
320-1980 T.D.	Minimum	25	2
	Maximum	1050	42
	Average	147	6

Aa-3.8.0

AMERICAN SMELTING AND REFINING COMPANY
Tucson • Arizona

W.E.S.
AUG 12 1964

August 10, 1964

MEMORANDUM FOR W. E. SAEGART

Bear Creek Drilling
Cochise County, Arizona

According to information that John Kinnison gathered from Jack Clark, Bear Creek was drilling for copper in the Sulfur Springs valley. The drilling project was reported to have been initiated by means of water well sludge analysis and was located within the valley proper away from any outcrops.

On August 5, I located one Boyles Brothers' drilling rig run by Bear Creek three miles north of Willcox. (See attached map) Evidence of more than one drill hole was noted along with some claim corners. An old water well churn hole was found on the northwest edge of the Spike-E hills just south of the drilling project. The sludge from this churn hole contained well altered fragments of porphyry rock and some exotic copper staining. The hills themselves are quartzite with much specular hematite found along fractures. No evidence of pervasive alteration or mineralization was found.

The Circle I hills located north of the drilling consist of Pinal schist, Laramide granite and Tertiary volcanics. Except for a few minor pyrite showings along fractures in the schist-type rocks, no pervasive alteration or mineralization was noted.

A later conversation with Bear Creek personnel disclosed the idea that the project was coming to a close due to negative results. The fact that only one drill rig was found and that Bear Creek was reported to have three running at one time might help to confirm the above statement.

David B. Beck
DAVID B. BECK

DBB/jk
Attachment

AR-3.W.0

W.E.S.
AUG 12 1964

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 10, 1964

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David B. Beck
DAVID B. BECK

DBB/jk
Attachment

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 18, 1964

MEMORANDUM FOR DAVID B. BECK

I examined 2 samples which you collected from a water well north of Willcox, No. 1 leached, No. 2 containing py.

No, 1 Porphyry. Vy st alt to sericite, with abundant quartz flooding. Por. texture preserved only by a few outlines of small euhedral feldspar--now gone completely to sericite/clay. Limonite, inside small diss. cubic cavities, is "live" but cavities are mostly empty, suggesting diss. py with some Cc replacement but high py/Cc ratio. Former sulphides est. 3%.

No. 2 Partly oxidized to yellow limonite, and alt. matrix absorbs some green copper salts. Diss. py is partly clean and partly rimmed by a dark film which might be Cc. Sulphides similar to capping (No. 1) at about 3% total.

These samples are very typical of strong porphyry Cu type alteration-mineralization, although I do not think they represent an ore-grade area.

John E. Kinnison
JOHN E. KINNISON

JEK/jk
cc: WESaegart

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 18, 1964

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John E. Kinnison
JOHN E. KINNISON

JEK/jk
cc: WESaegart

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 25, 1964

MEMORANDUM FOR W. E. SAEGART

Bear Creek Drilling
Cochise County, Arizona

Attached is a map showing locations of five Bear Creek diamond drill holes. A day was spent trying to locate drill sites and possible claim corners. Although only five sites were found, probably more are located in the area, possible east of the hiway north of Willcox. Only one group of claims was found in the area. These are located in Sections 2, 3, 4, 5 and 6 in T13S, R25E. They were poorly staked and most of the posts were down, thus other claims in the area might have been missed because of claim posts being on the ground.

The aeromagnetic contours on the attached map come from the U.S.G.S. Geophysical Investigation Map GP-418. The map shows that Bear Creek probably drilled the magnetic low in Section 16 first, then moved westward toward the Spike E Hills. They are presently drilling a hole just east of the hills in Section 17.

A Water Resources Report of the Willcox Basin, prepared by the U.S.G.S., shows that none of the water wells in the area can give us any information on the depth to bedrock or type of bedrock under the alluvium. Eight water samples from wells in Spike E Hills area were sampled for copper and molybdenum. The results are plotted on the attached map.

Due to the fact that all drilling so far has been confined, as far as I can determine, east of the small quartzite hills, I feel that if any ground is open to the west of the churn hole, (Memo, W. E. Saegart, August 10, 1964), we should investigate the possibility of obtaining this ground.

DAVID B. BECK

DBB/jk
cc: DBBeck
2 extra

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
August 28, 1964

MEMORANDUM TO MR. W. E. SAEGART

Cochise County
Willcox Area
Tevistan District
Bear Creek Mining Company

At your request I have investigated the ownership and status in the northern part of Township 13 South, Range 25 East, northeast of Willcox in Cochise County, Arizona. Bear Creek Mining Company has taken options on some private ground, has apparently staked every part of the township where mineral rights were reserved by the Federal government when patent was issued for the surface, and applied for prospecting permits on all State land, but completed their applications on only three parcels.

On the map accompanying this memorandum I have shown the three categories of land, i.e.; wholy private, surface private but mineral rights still in the Federal government, and State land. I have also shown the surface ownership in the northwest part of the township, keyed to the list given below, the land under option to Bear Creek, and the Bear Creek claim groups where their location could be identified. The location certificates filed at Bisbee only rarely contain a description by which the location of the claim could be even approximately plotted, but Mr. Beck found some claim posts in the field, and occasionally Bear Creek would slip in a tie to a section corner, when someone slipped up. The vast majority of the certificates do not even mention the section the claim is in. However, certificates have been filed for well over 300 claims, enough to cover all the Federal mineral rights in all but the most southern part of the township.

The surface ownership, taken from the County Assessor's records, is as follows:

1) Hans T. Kortsen and James Kortsen, Jr. et ux - All Section 3 and 4, N 1/2 Section 9, Lots 1-6 and that part of Lot 11, Northwest of Highway 86, Section 10, SE 1/4, Section 10, and all of Section 15. Bear Creek has a five year option on the N 1/2 of Section 9 (1/2 of the mineral rights belong to others), and on Lots 3, 4, 5 and that part of Lots 6 and 11, Northwest of Highway 86.

2) Edward B. McAleb et ux - N 1/2 Section 5; NE 1/4 and E 1/2 NW 1/4, Section 6; N 1/2 SW 1/4 and SW 1/4 SW 1/4, Section 17; and E 1/2 SE 1/4 SE 1/4 and SW 1/4 SE 1/4, Section 18.

3) E. B. McAlab et ux and Pauline Frances Simmons - SW 1/4, Section 5; W 1/2 NW 1/4 and S 1/2, Section 6; NE 1/4, Section 7; SW 1/4, Section 8; SE 1/4 and SE 1/4 SW 1/4, Section 17; and Lots 5 and 6, or E 1/2 SE 1/4, Section 18.

4) Hugo B. Parmeley - SE 1/4, Section 5.

5) Richard B. Fraker and Bonnie B. Fraker - NW 1/4, Section 7. Bear Creek has a five-year option on this piece which recites that half the mineral rights belong to others.

6) John F. Lane et ux - S 1/2, Section 7.

7) Joe Rubin et ux - E 1/2, Section 8; most of SE 1/4, Section 9; and that part of Lots 12 and 13, Section 10, NW of Highway 86. Bear Creek has an option on all this.

8) Phoenix Title and Trust Company, Trust No. RM 26851 - SW 1/4, Section 9. The Bear Creek-Rubin Agreement includes this tract, so Rubin may have purchased this recently under contract, and because title has not finally passed, the Assessor does not show it. Bear Creek has an option from Phoenix Title and Trust for one-half the mineral rights, so these must have been reserved when the parcel was sold to Rubin.

9) Earl F. Johannsen et ux - NW 1/4, Section 17 and W 1/2 NE 1/4, Section 17 (?). Bear Creek has an option from Tucson Title and Trust Company, Trust No. 10723, for these parcels.

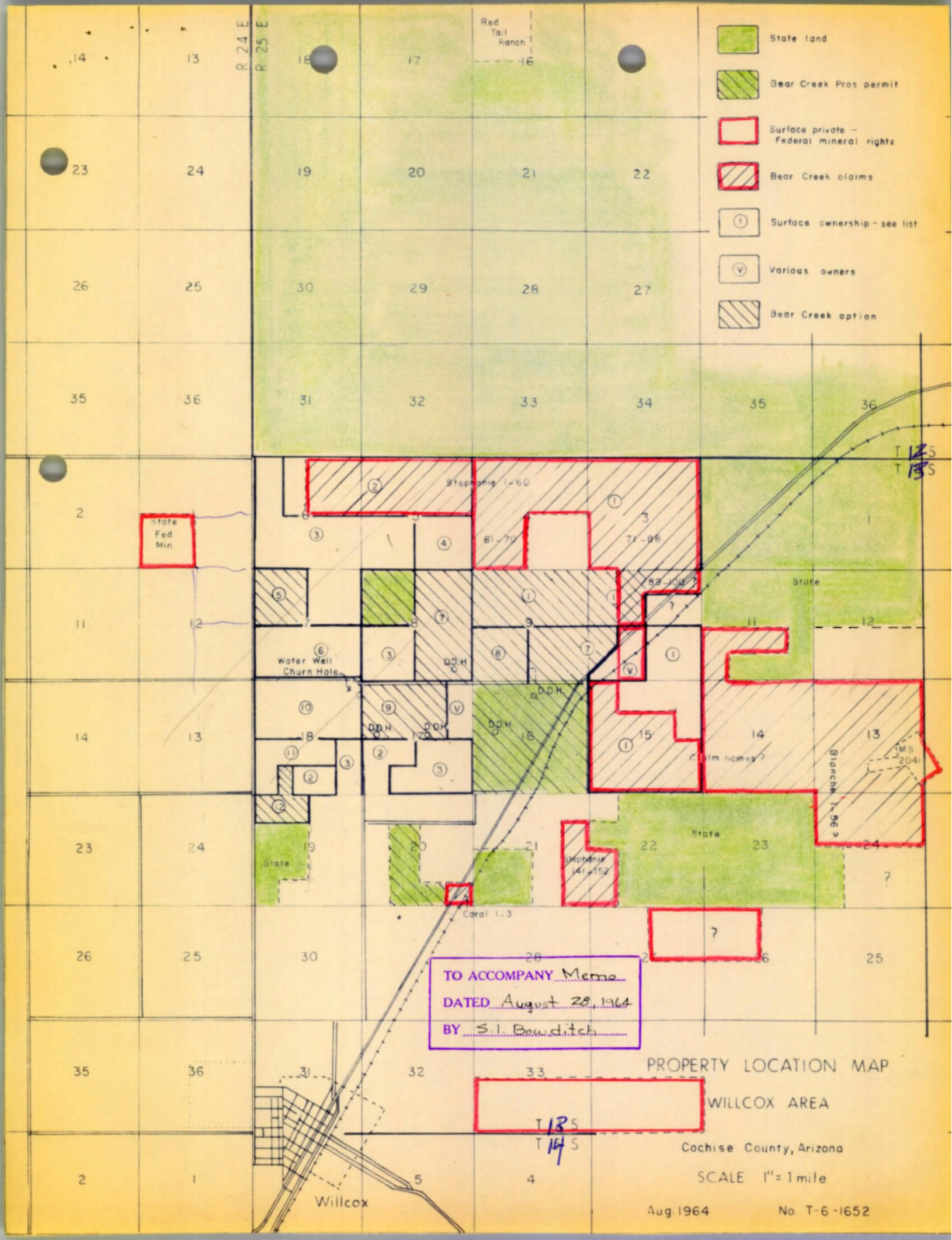
10) Betty Lane - N 1/2, Section 18.

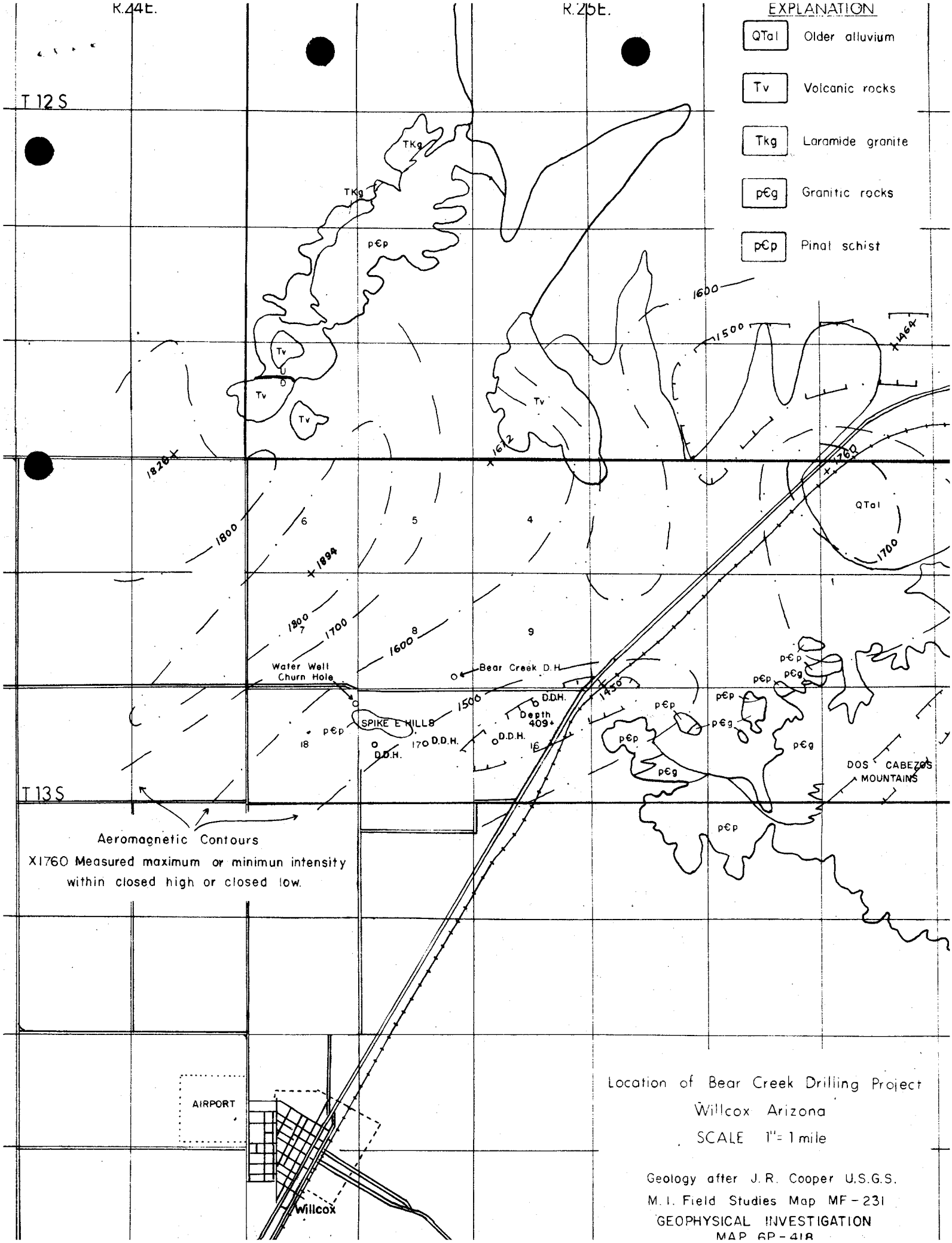
11) Jessie F. McAlab - Lots 3 and 4 (W 1/2 SW 1/4) and NE 1/4 SW 1/4 and NW 1/4 SE 1/4, Section 18.

12) Albert Schwertner - W 1/2 SE 1/4 SW 1/4, Section 18 and N 1/2 NW 1/4 Section 19. Bear Creek has an option on this piece.

S. I. BOWDITCH

SIB/jk
cc: 2 extra


State land
Bear Creek Pros permit
Surface private – Federal mineral rights
Bear Creek claims
Surface ownership – see list
Various owners
Bear Creek option
R 24 E
R 25 E
Red Tail Ranch
T 12 S
T 13 S
T 13 S
T 14 S
State Fed Min.
Stephanie 1-60
81-70
71-88
83-90 ?
State
Water Well
Churn Hole
D.D.H.
Claim names ?
Blanche 1-56 ?
MS 2041
State
Stephanie 141-152
Coral 1-3
Willcox
TO ACCOMPANY Memo
DATED August 28, 1964
BY S.I. Bewditch
PROPERTY LOCATION MAP
WILLCOX AREA
Cochise County, Arizona
SCALE 1" = 1 mile
Aug. 1964
No. T-6-1652


R.24E.
R.25E.
T.12S
T.13S
EXPLANATION
QTal Older alluvium
Tv Volcanic rocks
Tkg Laramide granite
p€g Granitic rocks
p€p Pinal schist
TKg
p€p
Tv
QTal
1600
1500
1464
1612
1760
1820
1800
1894
1700
1450
Water Well
Churn Hole
Bear Creek D.H.
D.D.H.
Depth
409+
SPIKE E HILLS
170 D.D.H.
DOS CABEZOS
MOUNTAINS
Aeromagnetic Contours
X1760 Measured maximum or minimun intensity
within closed high or closed low.
AIRPORT
Willcox
Location of Bear Creek Drilling Project
Willcox Arizona
SCALE 1"= 1 mile
Geology after J.R. Cooper U.S.G.S.
M.I. Field Studies Map MF-231
GEOPHYSICAL INVESTIGATION
MAP GP-418

J. H. C.

SEP 14 1964

personal file

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 1, 1964

Mr. C. P. Pollock, Vice President
American Smelting and Refining Company
120 Broadway
New York, N. Y. 10005

Appropriation Request
Willcox Prospect
Tevlston District
Cochise County, Arizona

Dear Sir:

Enclosed are two memorandums by Mr. D. B. Beck, a memorandum by Mr. J. E. Klanison and a memorandum by Mr. S. E. Bouditch pertaining to the subject prospect.

SUMMARY

A strongly altered and copper mineralized churn drill hole was discovered in August near Willcox, Arizona, by Mr. D. B. Beck. This hole is immediately adjacent to a large block of ground on which Bear Creek Mining Company has been recently drilling. Lack of activity at the present time suggests that Bear Creek may have abandoned this area--for what reasons we do not know. It is concluded that Bear Creek is unaware of the existence of the copper mineralized churn drill hole. This "discovery hole" could be a lead to a porphyry copper deposit concealed under valley fill.

The land immediately west of the "discovery hole" is privately owned. An authorization in the amount of $36,000 is requested to obtain purchase options on 1260 acres including the location of the "discovery hole."

DISCOVERY OF PROSPECT AND REVIEW OF RECENT ACTIVITY

Mr. Beck has located at least five Bear Creek diamond drill holes in an area north of Willcox. The locations, as shown on the enclosed map (Attachment A), are south, southeast and northeast of the outcrop ridge known as Spike-E Hill. While examining outcrops on this hill, Mr. Beck discovered a mineralized churn drill hole collared in alluvium to the northwest. The hole is located, as shown on Attachment A, about 500' from the nearest outcrop on the hill. The mineralization is described under Geology below.

Mr. J. E. Klanison examined rock chips from this hole. His enclosed memorandum also describes the alteration and mineralization of these samples.

In 1953 the U.S.G.S. published the results of an aeromagnetic survey which includes the prospect area. Aeromagnetic contours are sketched on Attachment A. A magnetic low elongated northeast-southwest, occurs in the valley between Willcox and Spike-E Hill. From the description of known Bear Creek drill holes it is obvious that their exploration has been concentrated within the magnetic low. The fact that Bear Creek has not drilled within ½ mile of the mineralized churn drill

hole immediately suggested that they may have overlooked the most important exploration lead in the area.

Bear Creek's drill rig has been moved from its last known location and is apparently no longer in the area. The Bear Creek Field Office in Willcox is empty. From all appearances Bear Creek has, at least for the time being, discontinued their project. There is no way of knowing whether they have permanently abandoned the area or have interupted the drilling program while negotiating for additional property.

Bear Creek controls the northwest part of Section 17. It would have been possible for them to drill a hole within 100-150' east of the churn drill hole showing. The fact that they have not drilled closer than 1/2 mile to such an important lead indicates that they are probably unaware of the existence of this mineralized hole.

GEOLOGY

Yesterday I accompanied Mr. Beck and Mr. Kinnison on another examination of the prospect area. We examined cuttings from the churn drill hole northwest of Spike-E Hill in detail. Bedrock is a strongly sericitized rock having a porphyry texture. Alteration is so intense that the original rock classification is indeterminate from an examination of the cuttings.

The hole penetrated both capping and sulphides. Cuttings of capping show hematite and goethite in partially filled sulphide cavities. Chips from the sulphide zone contain chiefly pyrite which is generally rimmed with chalcocite coatings. Some samples exhibit fairly thick replacement by the secondary copper sulphide. The chalcocite is sometimes surrounded by copper carbonates.

Mr. Kinnison estimated from the size of the pile of mineralized cuttings, including leached capping, that the hole penetrated on the order of 100' of bedrock.

Spike-E Ridge is shown on Cooper's[1] map as Precambrian Pinal schist. Most of the outcrops and talus which we examined were composed of a hard quartzite. The entire outcrop contains generally pervasive specular hematite mineralization, both as disseminations and fracture fillings. Occasionally grains of specularite form outlines which could be after sulphides, but most of this iron oxide appears to be of primary origin.

---

[1] Cooper, J. R. U.S.G.S. Mineral Investigations Field Studies Map MF-231. Reconnaissance Map of the Willcox, Fisher Hills, Cochise, and Dos Cabezas Quadrangles, Cochise and Graham Counties, Arizona.

Moderate amounts of sericite are developed in parts of the outcrop area, presumably where argillaceous impurities originally existed. The sericite may be of hydrothermal origin.

We do not know whether or not the specularite development throughout this outcrop area is mineralogically related to the copper occurrences in the churn drill hole to the northwest.

We examined two of the Bear Creek diamond drill sites south and southeast of the outcrop. Core fragments from these holes show only weak specularite mineralization in quartzite (?). Mr. Beck found the other three Bear Creek drill sites had been bulldozed over, leaving no trace of cuttings or core.

RECOMMENDATIONS

Asarco should follow up Mr. Beck's discovery by attempting to obtain purchase options on all of the private land in Sections 7, 8 and 18 which is not controlled by Bear Creek. This represents a continuous block of land totaling 1260 acres.

I propose that we make offers of up to $25 per acre for one-year options to purchase at up to $250 per acre.

It is likely that Bear Creek has already approached these same owners in an unsuccessful attempt to tie up property. I therefore think it would be inadvisable for Asarco to directly negotiate for land in its own behalf. I would prefer utilizing an intermediary to conceal the fact that the principal is another major mining company. My choice of agent would be Howard Horne and Associates (realtors) who recently negotiated a favorable deal in the purchase of property on our Sacaton project.

In line with these recommendations I request an authorization in the amount of $36,000.

If we are successful in tying up this ground, an additional authorization will be requested to conduct a modest IP survey and drill a minimum of--say, three holes.

Mr. K. E. Richard was briefed on the Willcox prospect in a very preliminary way during his visit here last week. He also saw a sample of leached capping from the churn drill hole. I doubt, however, that he would wish to comment on this proposal without more complete first-hand knowledge.

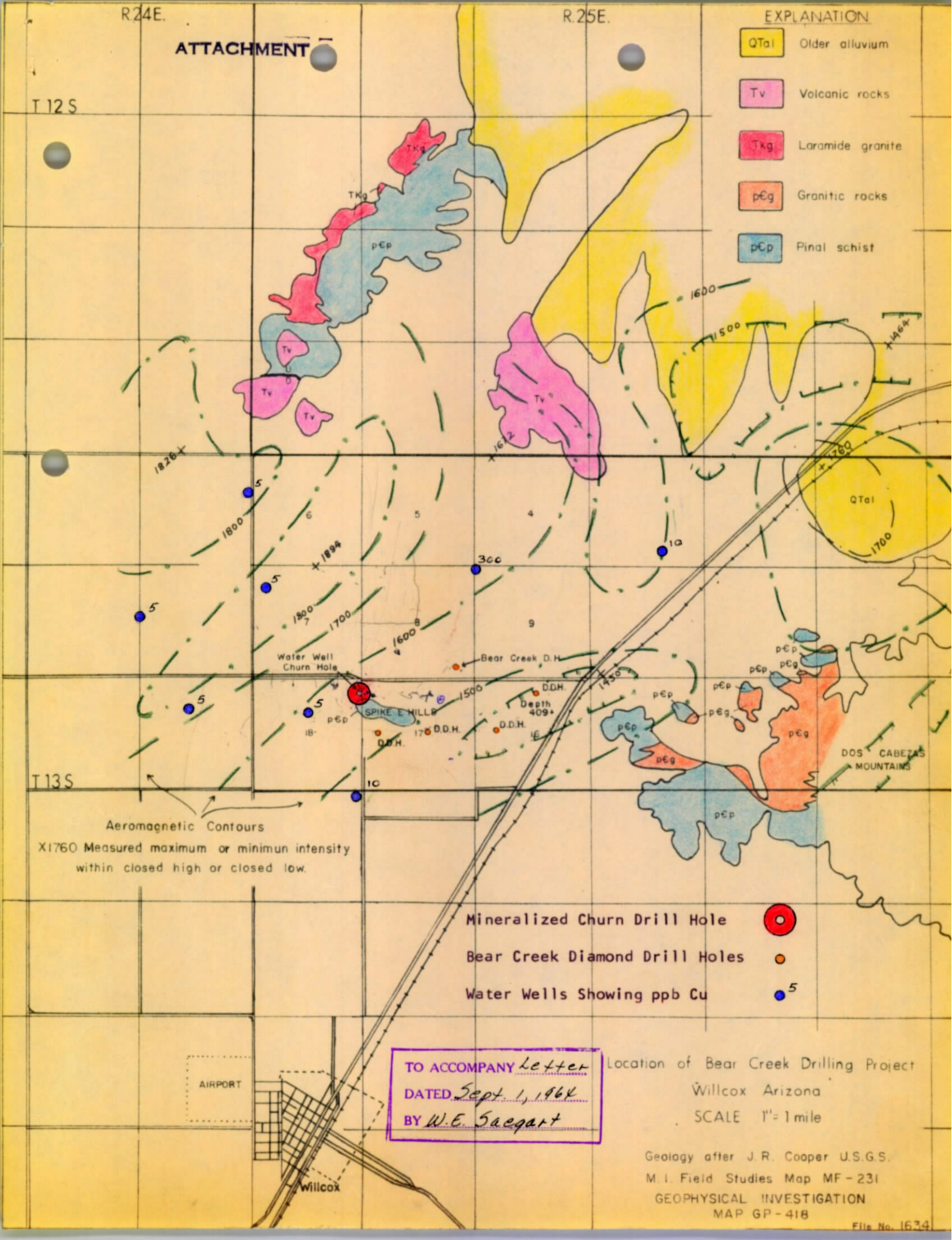
Messrs. Kinnison and Beck agree with the conclusions and authorization request incorporated herein.

Very truly yours,

ORIGINAL SIGNED BY
W. E. SAEGART

W. E. SAEGART

WES/jk
Enclosures
cc: KERichard, w/encls. SIBowditch, w/encls. [illegible], w/encls.
JMCourtright, " JEKinnison, " WESaegart, "


ATTACHMENT
R.24E.
R.25E.
T.12S
T.13S
EXPLANATION
QTal Older alluvium
Tv Volcanic rocks
Tkg Laramide granite
p€g Granitic rocks
p€p Pinal schist
Water Well Churn Hole
Bear Creek D.H.
SPIKE E HILLS
D.D.H.
Depth 409+
DOS CABEZAS MOUNTAINS
Aeromagnetic Contours
X1760 Measured maximum or minimun intensity within closed high or closed low.
Mineralized Churn Drill Hole
Bear Creek Diamond Drill Holes
Water Wells Showing ppb Cu
AIRPORT
Willcox
TO ACCOMPANY Letter
DATED Sept. 1, 1964
BY W.E. Saegart
Location of Bear Creek Drilling Project
Willcox Arizona
SCALE 1" = 1 mile
Geology after J.R. Cooper U.S.G.S.
M.I. Field Studies Map MF-231
GEOPHYSICAL INVESTIGATION
MAP GP-418
File No. 1634

ATTACHMENT B

PROPOSED ASARCO PURCHASE OPTIONS

State land
Bear Creek Pros. permit
Surface private – Federal mineral rights
Bear Creek claims
Surface ownership – see list
Various owners
Bear Creek option

R 24 E
R 25 E
Red Tail Ranch
State Fed. Min.
Stephanie 1-60
81-70
71-98
88-100
State
Water Well
Churn Hole
D.D.H.
Claim names?
Blanche 1-56
MS 2041
State
Stephanie 141-152
Coral 1-3
12 T ~~13~~ S
13 T ~~14~~ S
Willcox
BR 2300
TD 6000

TO ACCOMPANY Letter
DATED Sept. 1, 1964
BY W. E. Sacgart

PROPERTY LOCATION MAP
WILLCOX AREA
T ~~14~~ S 13
T ~~15~~ S 14
Cochise County, Arizona
SCALE 1" = 1 mile
Aug. 1964
No. T-6-1652

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 3, 1964

J. H. C.
SEP 16 1964

K. R.
SEP 14 1964

Mr. C. P. Pollock, Vice President
American Smelting and Refining Company
120 Broadway
New York, N. Y. 10005

Willcox Prospect
Tevlston District
Cochise County, Arizona

Dear Sir:

An error has been noted on one of the maps which was enclosed with my letter of September 1 concerning the subject and on the map attached to Mr. Bowditch's memo of August 28. The township numbers are incorrect on both maps. The township boundary along the north edge of Bear Creek's holdings should be labeled $\frac{T13S}{T13S}$ instead of $\frac{T13S}{T14S}$. Also, the township boundary which passes through the town of Willcox should read $\frac{T13S}{T14S}$ instead of $\frac{T14S}{T15S}$.

Please make these corrections on your maps.

Very truly yours,
ORIGINAL SIGNED BY
W. E. SAEGART
W. E. SAEGART

WES/jk
cc: KERichard - Mexico
JMCourtright - Mexico
SIBowditch
JEKinnison
DBBeck

J. H. C.

SEP 28 1964

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 28, 1964

MEMORANDUM TO J. H. COURTRIGHT

Bear Creek Information
Willcox Prospect
Teviston District
Cochise County, Arizona

On September 23, Mr. Whaley and I went to Willcox to stake some claims in the SW¼ of Section 1, T13S, R24E. We found that Bear Creek had staked this ground on February 27, 1964. While returning to Willcox we located a Boyles Bros. rig in the SW¼ of Section 8, T13S, R25E.

On September 24, I chartered a plane and flew over the Willcox Prospect. While in the air, I located two old Bear Creek drill locations not included on the Bear Creek Drilling Map of August 25, 1964. Both holes were in Section 17, T13S, R25E. Most of the time, while in the air, was spent looking for location pits or evidence of covered pits in Sections 3, 4, 5 and 6 in T13S, R25E. No evidence of any discovery pits ever being dug was seen from the air.

The next day, a ground check was made in Section 1, T13S, R24E and Section 5, T13S, R25E for location pits. No evidence of any discovery pits was found. The two Bear Creek drill holes, seen from the air the day before in the N½ of Section 17, were investigated and located more exactly from the ground. Around both holes a few core chips were found which contained pyrite and maybe a little chalcopyrite in a metasediment (?) rock. One hole was located just across the section line in Section 17 opposite the churn hole. The other hole was located northeast of the Spike-E Hills in Section 17. In the afternoon a check was made at the County Courthouse for any new Bear Creek activity in the Teviston District. No new claims have been filed in this district since last March.

David B. Beck
DAVID B. BECK

DBB/jk
cc: SIBowditch
WESaegart
DBBeck

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona
November 13, 1964

J. H. C.
NOV 13 1964

MEMORANDUM FOR J. H. COURTRIGHT

BEAR CREEK DRILLING
WILLCOX PROSPECT
TEVISTON DISTRICT
COCHISE COUNTY, ARIZONA

On November 10, a ground reconnaissance was made of the Bear Creek ground north of Willcox. No evidence of current drilling was found. Core chips from the last Bear Creek hole, located in the Southwest $\frac{1}{4}$ of Section 8, T13S, R25E, show strong sericitic alteration and moderate pyritic mineralization. Some of the chips had a thin coating of chalcocite on the pyrite. Leached chips were also found which contained limonite after pyrite with some questionable "live limonite" boxwork.

A churn hole, located on the section line between Sections 2 and 11 in T13S, R24E, was visited also. This hole, which is 1270' deep, plans to be drilled to 1500'. The driller showed me a couple of rock chips which he felt were bedrock. After examining the cuttings and the rock chips, it is my opinion that they are presently drilling in a harder conglomerate and have not reached bedrock. No evidence of alteration or mineralization was found in the cuttings.

David B. Beck
DAVID B. BECK

DBB/jk

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

June 10, 1965

J. H. C.
JUN 11 1965

W.E.S.
JUL 7 1965

MR. WES
READ AND RETURN
PREPARE ANSWERS ..... HANDLE .....
FILE ✓ INITIALS .....

TO: J. H. COURTRIGHT

FROM: J. E. KINNISON

WILLCOX PORPHYRY COPPER PROSPECT

When Mr. Beck originally found an old abandoned water well with chalcocite in the sludges, this seemed to be a prospect worth following up. The fact that Mr. Beck has since found two more drill holes, dug by Bear Creek, and which contained lost core chips which showed chalcocite with appreciable copper values adds the significance of size which we could not previously demonstrate.

I have not followed the legal problems of land acquisition other than to note in conversations with Mr. Bowditch that there have been innumberable delays and that the people who own the land are exceedingly difficult to deal with; however, I personally consider this to be one of the best virgin porphyry copper prospects of which we now know in southern Arizona. This memorandum is for the purpose of calling to your attention my strong feelings regarding the prospect.

John E. Kinnison
J. E. KINNISON

JEK/jak
cc: DBBeck
SIBowditch

Ua-3,20A,0 J.H.C.

MR. DBB
READ AND RETURN
PREPARE ANSWERS ..... HANDLE
FILE ✓ INITIALS

GEOPHYSICAL DIVISION
3422 South 700 West
Salt Lake City, Utah

June 24, 1965

I have another copy
W.E.S.

W.E.S.
JUL 7 1965

J. H. C.
JUL 7 1965

Mr. W. E. Saegart
Tucson Office

File

INTERPRETATION OF MAGNETIC SURVEY
WILLCOX PROSPECT
COCHISE COUNTY, ARIZONA

Dear Bill:

Parker Gay's memo of this date, concerning the subject matter, is enclosed. I agree with his interpretations, which are qualified in view of the one mile flight line spacing, and with his recommendations. The main recommendation is for aeromagnetic coverage, which can be accomplished with the Asarco aeromagnetic equipment, provided there is adequate aerial photographic control. Detail gravity and induced polarization surveys may then be judged on the basis of the aeromagnetic survey.

Very truly yours,

R. J. LACY

RJL:ao
Enc.

cc: S. P. Gay
C. K. Moss

GEOPHYSICAL DIVISION
3422 South 700 West
Salt Lake City, Utah

June 24, 1965

MEMORANDUM TO R. J. LACY:

INTERPRETATION OF MAGNETIC SURVEY
WILLCOX PROSPECT
COCHISE COUNTY, ARIZONA

At the request of W. E. Saegart, I have completed an interpretation of U. S. Geological Survey Aeromagnetic Map (GP-418, 1963, flown 1947) in the vicinity of our Willcox prospect, 70 miles east of Tucson. In making this interpretation I relied upon Cooper's map (USGS MF-231, 1960) and Company memorandums for geological information.

For reference I have attached a Xerox print of a portion of the geological map, which is overlain by a direct print taken from the aeromagnetic survey. The geological map carries no legend, as the various lithologic units are marked throughout. Scale of both is 1:62,500.

Several important observations may be made by examining the two maps:

1. Bear Creek does not seem to have been drilling the aeromagnetic low, as none of their holes fall within the "bullseye", and the center of their drilling pattern lies over a mile away from the center of the low. Probably their drilling was guided by some other type of survey, such as I.P.

2. The Pinal "schist", which includes greenstone, phyllite, graywacke, and quartzite, as well as schist, is one of the most magnetic formations in the area, as proven by the magnetic anomalies in the southeast corner of the area shown. One of these anomalies reaches the 1800 gamma contour on the edge of the survey and probably goes higher.

3. The prominent anomaly over Pinal schist in Sections 13 and 18 in the southeast part of the map, which I have labeled "key magnetic body", trends NE-SW, parallel to the strike of the schistosity as shown on the geology map. The schistosity may parallel the bedding as well, since major trends in the Precambrian of southern Arizona exhibit this same general strike.

4. Another interpreted "key magnetic body" across Section 15 in the south-center of the map causes an associated high-low anomaly and also occurs over outcrops of Pinal schist, in part. This low is the same as that near Bear Creek drill holes.

5. A third "key magnetic body" is located near the west edge of the map, and again causes a sharp anomaly trending NE-SW. This same strike is exhibited by the trend of the Circle-I Hills and also by part of the schistosity in these hills.

6. The Tertiary volcanics cause magnetic anomalies in the mapped area as shown by the anomalies over outcrops near the center and the NE portion of the map. Strike of the volcanics on the geology map is NW-SE, and the associated anomalies bear this same trend.

7. Southeast of the area shown, Palezoic sedimentary rocks also strike NW-SE, as do prominent faults in the area, and the trend of the Graham and Dos Cabezas Mountain ranges. This direction corresponds to the predominent Laramide trend in Arizona.

8. The Precambrian granite associated with the Pinal schist appears to be responsible only for weak magnetic anomalies in some cases and none in others. I think more detailed surveying would show the anomalies arising from Precambrian granite are very minor, and that most of the apparent anomalies over it arise from nearby Pinal schist.

9. The Laramide intrusives in this area also apparently cause little or no anomalous magnetic readings. It is possible that the magnetic high northwest of the Circle-I Hills arises from a larger outcrop area of the granite found on the west side of the hills, but I think probably it does not. Arthur Brandt, in an unpublished paper on geophysical exploration in Arizona, states "the Arizona Laramide intrusives are generally only weakly magnetic .... and are frequently in a background of more magnetic basement rocks", i.e. they would cause lows, if anything.

10. The one-mile E-W flight line spacing on the aeromagnetic map was too wide to obtain a complete picture of the aeromagnetic pattern in this area, as many anomalies crossed have widths much less than this, e.g. see the line across the Circle-I Hills on the north side of Section 31. This inadequacy in the survey resulted in confusion, and also a number of errors in construction of the contour map. Consequently the map can only be relied upon for detailed interpretation in areas of long, broad anomalies. This feature hampered the present analysis somewhat, and a considerably improved interpretation could be made by re-flying the area at a one-half mile N-S flight line spacing.

From the above observations the following conclusions may be drawn:

1. The uniform, linear contours and the NE-SW striking anomalies in the SW part of the map infer, in the writer's opinion, that the area drilled by Bear Creek is underlain by a large block of Precambrian Pinal schist. I would say that probably all of Sections 9 through 16 are underlain by this type rock.

2. It is possible that this block of schist may be intruded by nonmagnetic, or weakly magnetic, Precambrian or Laramide intrusives. These

would perhaps show on a more detailed magnetic map, if present, but cannot be detected on the present survey.

3. It is doubtful if the area covered by Sections 9 through 16 contains Tertiary volcanics.

The following recommendations are in order:

1. If the Company is able to secure ground and initiate an exploration program in this area, considerable geological information of value could be obtained from a detailed aeromagnetic survey at 1/2 mile N-S flight line spacing with 1/4 mile fill-in where needed. I believe that rock types and major faults can be indicated to a first approximation, as there is considerable outcrop information to serve as a control on the interpretation.

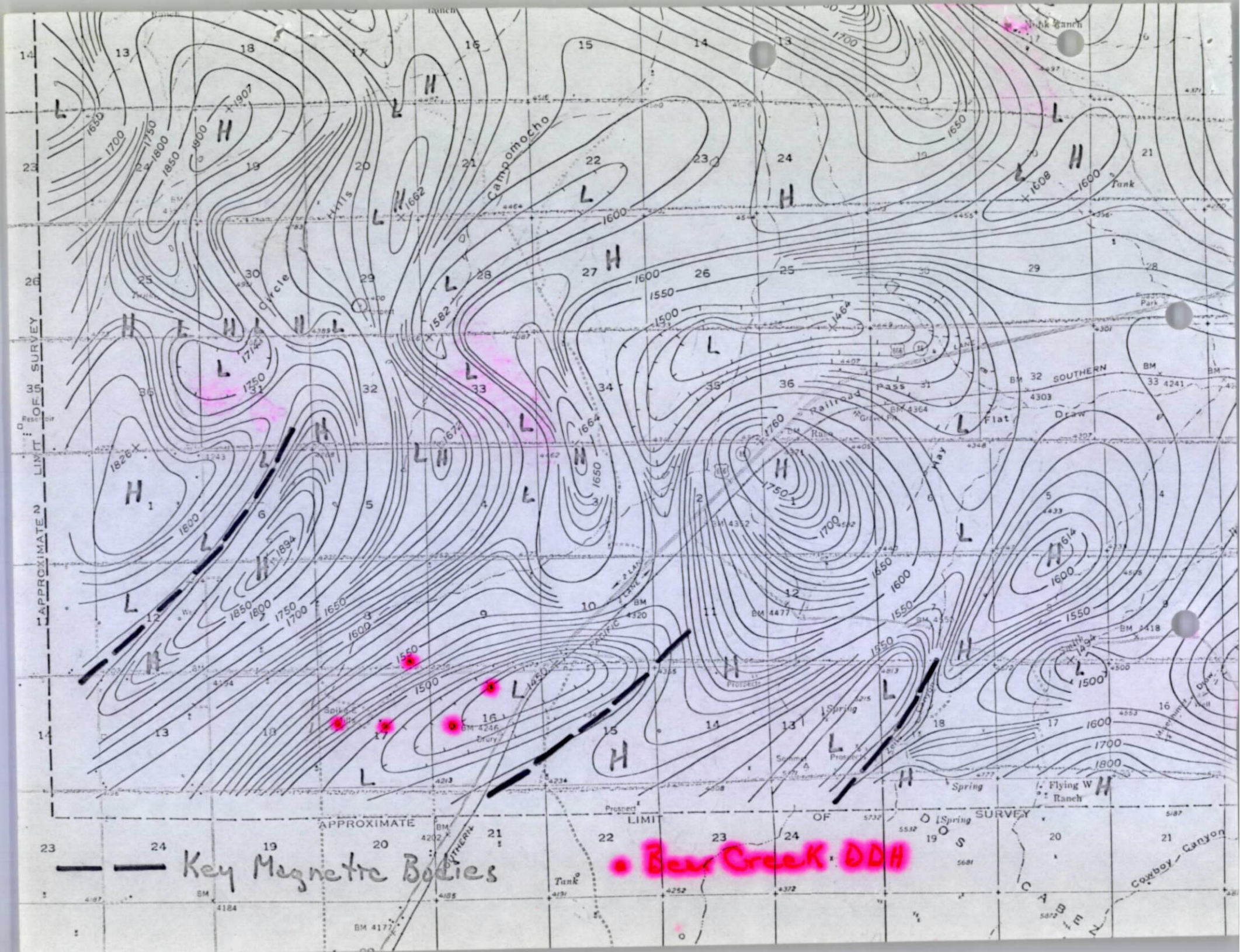
2. For better correlation of magnetics with geology, the recommended survey should include the Circle-I Hills and the northern part of the Dos Cabezas Mountains as far east as the Laramide granite outcrops on the west side of Polecat Canyon.

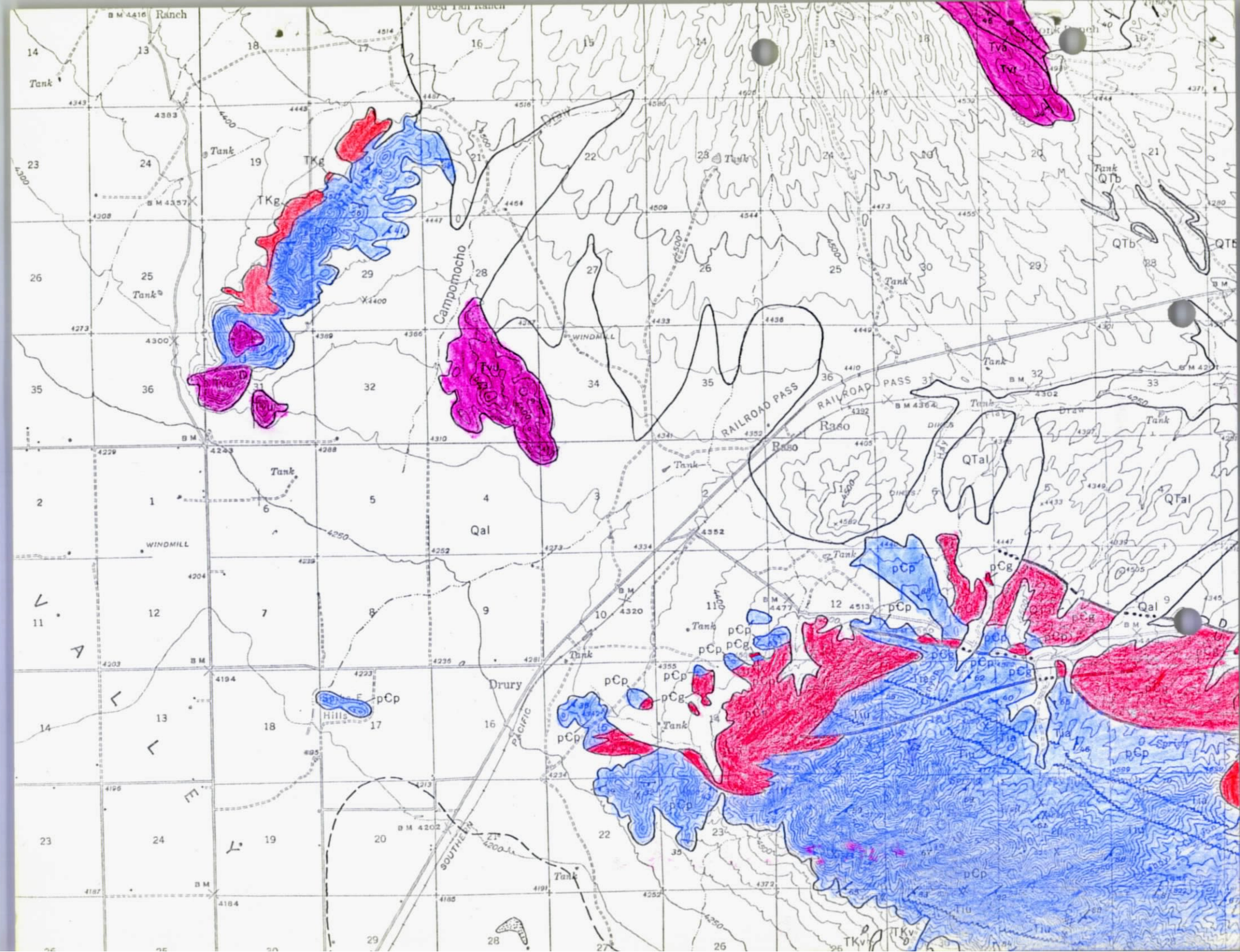
The recommended aeromagnetic survey would serve not only to obtain geological information, but would also aid in interpretation of other geophysical survey methods, such as I.P. and gravity.

SPG:ao
Attachment

S. PARKER GAY, JR.

cc: W. E. Saegart, w/2 encls.


Key Magnetic Bodies
Bear Creek DDH
APPROXIMATE LIMIT OF SURVEY
Campomocho
Hills
Circle
Pass
Flat
Draw
Hay
Spring
Flying W Ranch
Cowboy Canyon
Tank


Ranch
Tank
TKg
pCp
Tvu
Campomocho
WINDMILL
RAILROAD PASS
Paso
Qal
Drury
Hills
PACIFIC
SOUTHERN
pCg
Tvs
Tvr
QTb
QTal
Tia
TKv

Please copy for JHC file.

JHC file copy

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

August 10, 1965

J. H. C.

AUG 25 1965

To: R. J. Lacy

From: W. G. Farley

Relative Gravity
Willcox Prospect
Cochise County, Arizona

This report covers a gravity survey on the Willcox copper prospect in Cochise Co., Arizona.

The purpose of the survey was to determine relative depths to bedrock around the Spike E. Hills and to locate suspected faults to the south and west of the Spike E. Hills.

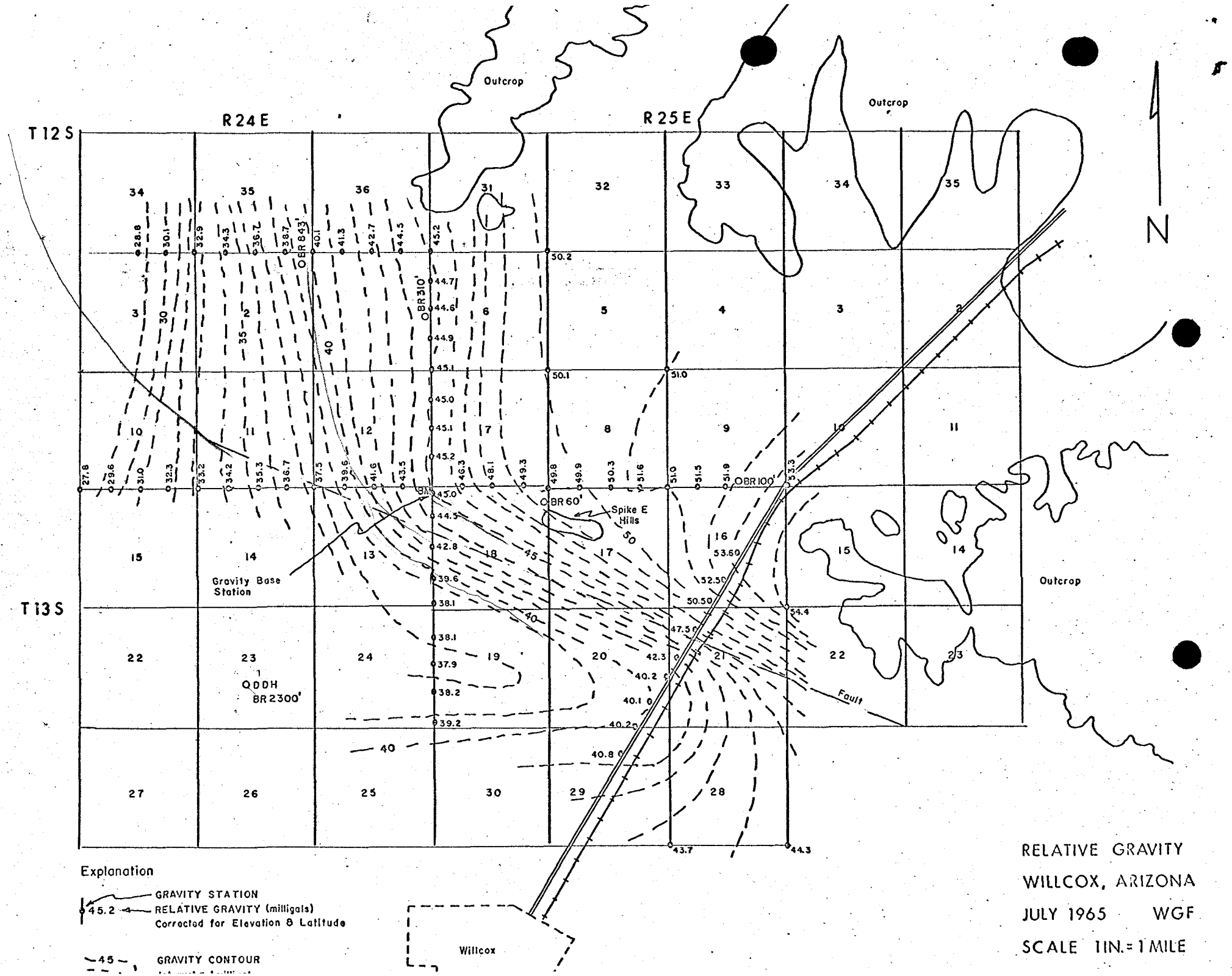
The attached map shows the location of gravity stations with relative gravity values given in milligals. A base station was established at the bench mark in the northeast corner of section 13 to correct the instrument drift. Gravity values were also corrected for elevation and latitude. The corrected values were contoured on a one milligal increment. The contoured gravity suggests a fault about one half mile southwest of the Spike E. Hills with a strike of about North 70° West. South of the suggested fault an oil-gas hole was drilled to bedrock in section 23. (See attached File Memo by Beck) Possible bedrock was encountered at 2300 feet. North of the fault bedrock it is quite shallow in the area surrounding the Spike E. Hills. Bedrock depths were obtained from water well logs in the NE corner of section 2, the NE corner of section 18, the E. side of section 1 and the S. side of section 9.

In the near future an I.P.-resistivity survey will be run near the Spike E. Hills in the shallow bedrock areas suggested by gravity.

Wayne G. Farley

Wayne G. Farley

WGF:bam
Attachments
cc: CPPollock
WESaegart-1 extra



RELATIVE GRAVITY
WILLCOX, ARIZONA
JULY 1965 WGF
SCALE 1 IN. = 1 MILE

FILE MEMORANDUM

Willcox Prospect
Teviston District
Cochise County, Arizona

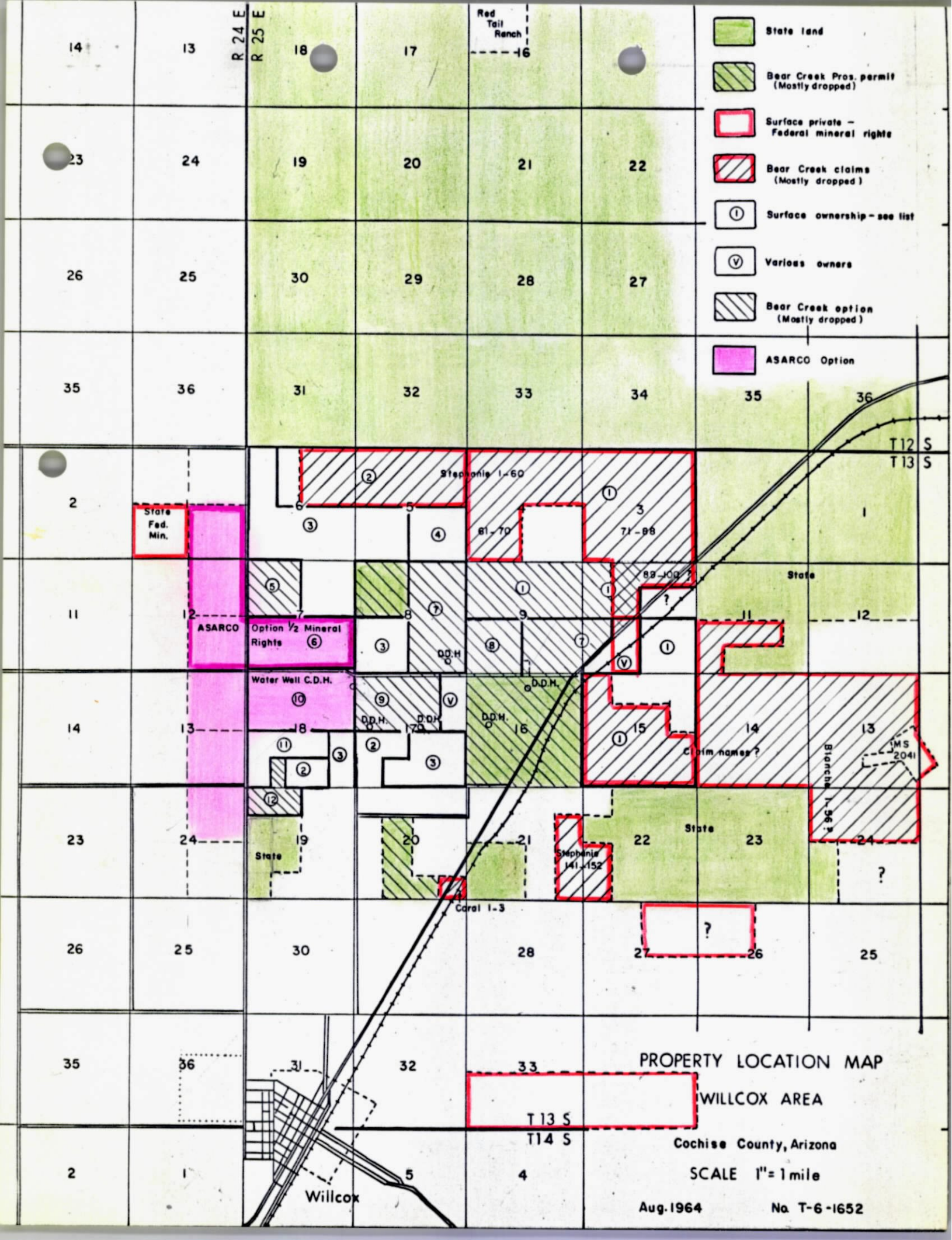
Oil & Gas

Below is a brief log of an OG hole drilled in 1953 to a depth of 6,865'. This hole is located 2-1/2 miles southwest of the Spike E Hills in section 23.

Location (D-13-24)23 ca

Depth	Rock Classification and Remarks
0-700	Alternating beds of clean sand and clay. The sand consisted of well rounded quartz and feldspar.
700-950	Clean sand which consisted of many rock types, generally light in color.
950-1150	The sand grains become reddish in color with possible limonite after pyrite making up 3% of total.
1150-2300	Sands, gravels of various rock types which included schist, quartzite, volcanics, granite and porphyry. Specularite along with possible copper silicates and oxides was noted. Material gradually becoming more mafic.
2300	Possible bedrock. The rock is unaltered and probably a metamorphic of gnessic texture.
2300-6600	The rock type is generally a basic igneous or metamorphic. The cuttings becoming quite dense and uniform at about 6000'. No alteration or mineralization was noted.

David B. Beck



PROPERTY LOCATION MAP

WILLCOX AREA

Cochise County, Arizona

SCALE 1" = 1 mile

Aug. 1964 No. T-6-1652

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 13, 1965

MR. DBB
READ AND RETURN
PREPARE ANSWERS HANDLE
FILE INITIALS

TO: R. J. LACY

FROM: W. G. FARLEY

I. P. AND RESISTIVITY
WILLCOX PROSPECT
COCHISE COUNTY, ARIZONA

During the last half of September and the first half of October, in 10 working days approximately 30 line miles of I. P. - resistivity survey were run in the vicinity of the Spike E. Hills and several miles to the northeast. Most lines were run north - south on a half mile spacing using a wenner 800 foot electrode separation. An anomalous I. P. zone was outlined in the area of the Spike E. Hills. (Map No. 1) The I. P. values (standard calibration) have been contoured on the attached maps. The 5.0 m.v.lv. contour which is believed to outline the sulfide zone is about one mile wide by two miles long. The trend of the zone is northeast - southwest with the center about one half mile northeast of the Spike E. Hills. The southwest end of the anomalous zone is cut off by a gravity indicated fault. The 4.0 m.v.lv. contour probably outlines the surrounding zone of alteration as Bear Creek drilled two holes in section 16 in the 4 m.v.lv. to 5 m.v.lv. zone and reportedly hit no sulfides. Bear Creek supposedly drilled on I. P. information and has drilled four holes in the sulfide zone zone within the 5 m.v.lv. contour. One of these holes was near the center of the anomalous I. P. zone.

sites bulldozed over, no core found!

?

A vertical depth profile (Map No. 2) was run east - west across the anomalous I. P. zone from section corner $\frac{9|10}{16|15}$ three miles westward to section corner $\frac{2|7}{13|18}$. Electrode separations used were 200 feet, 400 feet and 800 feet. The highest reading was 12.6 m.v.lv. with a 800 foot electrode separation. This was obtained 1500 feet west of section corner $\frac{8|9}{17|16}$. A depth calculation at this point indicates the top of sulfides at 220' below the surface. Total sulfide content is calculated to be about 4%. The apparent dip of strongest sulfides is to the east. The true dip would be steeply to the southeast. A depth calculation at section corner $\frac{7|8}{18|17}$, about 500 feet north of ASARCO DDH No. 1, indicates the top of sulfides to be 320 feet below the surface. One thousand feet west of section corner $\frac{7|8}{18|17}$ the calculated depth to the top of sulfides was 490 feet below the surface. Fifteen hundred feet east of the center of the I. P. anomaly, at section corner $\frac{8|9}{17|16}$, the calculated depth was 400 feet.

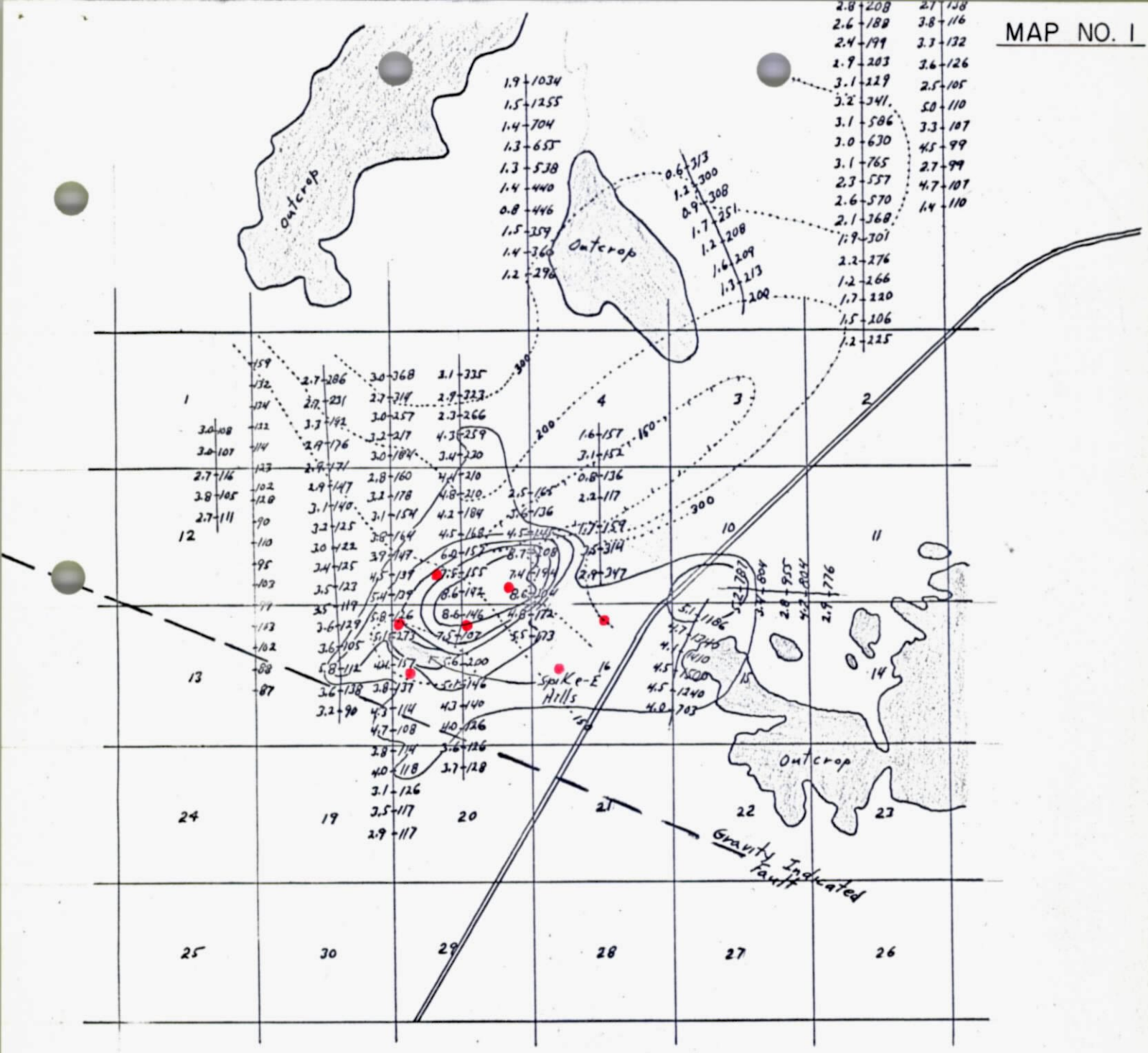
Resistivity indicates shallow bedrock from the outcrops in section 15, one and one-quarter mile westward to section corner $\frac{8|9}{17|16}$. From section corner $\frac{8|9}{17|16}$, one and three-quarter miles westward bedrock is of moderate depth, probably 200 to 500 feet. From a point about 1000 feet east of section corner $\frac{2|7}{13|18}$ bedrock drops off much faster towards the west. The indications of bedrock depth from resistivity data agree with the indications of bedrock depth from the gravity survey.

Wayne G. Farley
WAYNE G. FARLEY

WGF/pjc
cc: CPPollock
JHCourtright
WESaegart
MRStauffer

P. S. Additional I. P. Lines will be run in Sections 12, 13, 17, and 18.

MAP NO. I



EXPLANATION

I. P./ΔV (m.v./v.)

Resistivity (ohm. feet)

4.7 - 250

3.8 - 290

I. P./ΔV contour

Resistivity contour

● Bear Creek D.D.H.

WILCOX PROSPECT

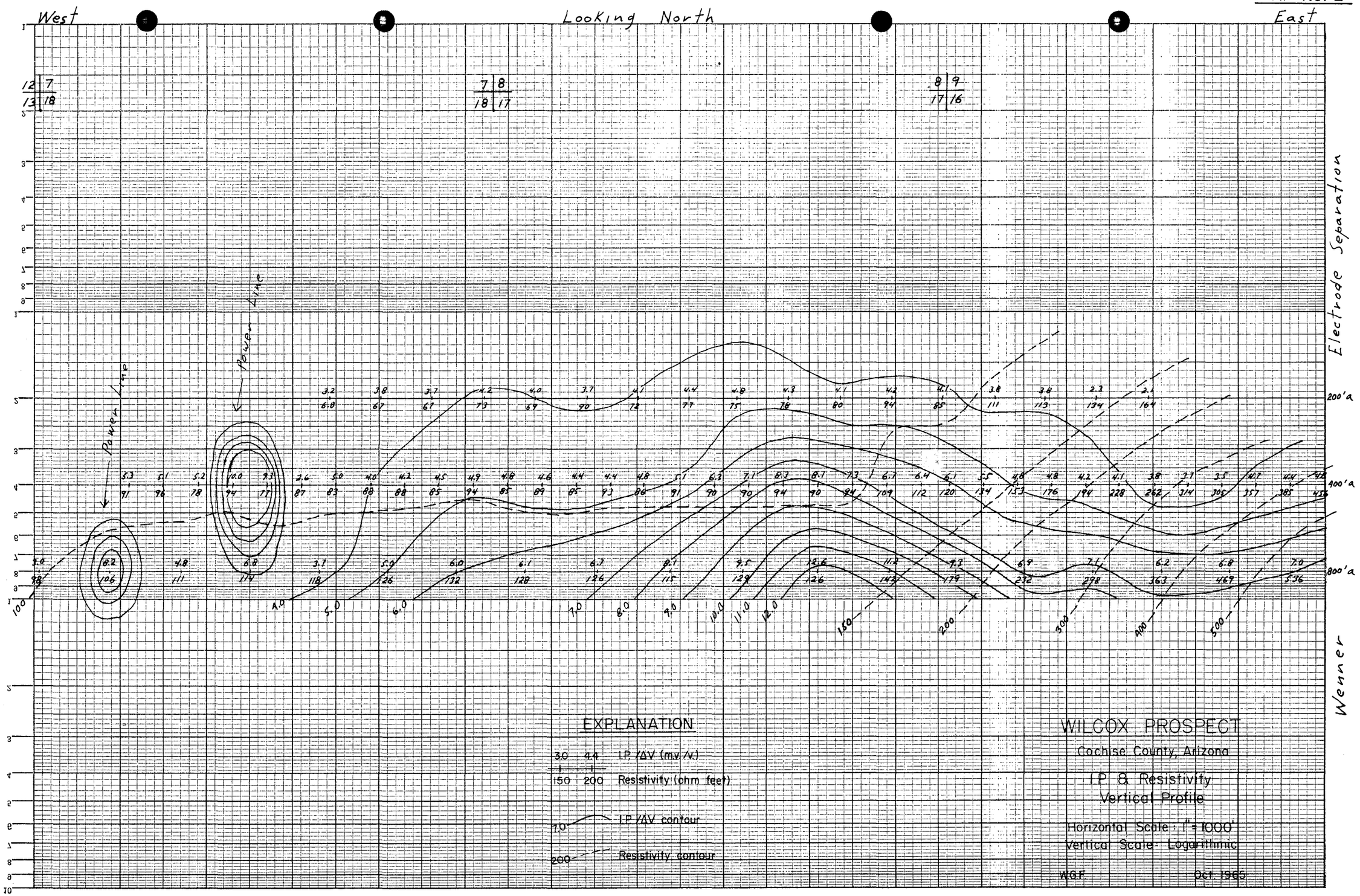
COCHISE COUNTY, ARIZONA

I. P. and RESISTIVITY

scale: 1" = 1 mile Sept. 1965

W. G. F.

MAP NO. 2



K&E KEUFFEL & ESSER CO. MADE IN U.S.A. 359-11-G SEMI-LOGARITHMIC 2 CYCLES X 120 DIVISIONS

W. 8
11/12/65

J. H. C.

NOV 12 1965

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 8, 1965

MR. ~~WES~~, ~~DEB~~
READ AND RETURN
PREPARE ANSWERS ____ HANDLE ____
FILE ✓ INITIALS

To: J. H. Courtright

From: M. R. Stauffer

Initial Drilling
Sept.-Oct. 1965
Willcox Project

During the latter part of September and throughout the month of October, drill holes W-1, W-2 and W-3 were completed. Hole W-4 was drilling at 762 feet the end of October.

Drilling commenced with hole W-1 on Sept. 24, 1965. This hole is located about 50 feet north of the old water well site where copper oxides were noted in churn drill cuttings. Bedrock was encountered at ± 242 feet in a bleached, hydrothermally altered volcanic porphyry. The base of oxidation is placed at ± 392'. No copper oxides were observed.

Rock cored in the sulfide zone was a light gray to green moderately altered volcanic porphyry carrying up to 5% very finely disseminated pyrite. Chalcocite occurs as thin coatings and crusts on the grains of pyrite. The hole was bottomed at 581.0 feet.

Hole W-2, drilled mainly with rock bit, indicated bedrock at ± 450 feet and the base of oxidation at ± 600 feet. This rock was very strongly chloritized, and carried 2 to 3% sulfides as very finely disseminated pyrite. Traces of chalcocite were observed in the gradational oxide-sulfide contact zone from 576 feet to 582 feet. Core intercepts show the rock to be a weakly altered andesite porphyry with scant feldspar phenocrysts. This hole bottomed at 662.0 feet.

Hole W-3 cored quartzite from bedrock at ± 80 feet to a total depth of 294.5 feet. The rock is considered to be a quartzite member of the Precambrian Pinal schist. This quartzite is strongly sheared and fractured, and contains numerous intercepts of fine grained, flow-banded volcanic porphyry with both quartzite and porphyry inclusions. Both the quartzite and porphyry are cut by strong specularite veining. No sulfides were observed.

Hole W-4 encountered bedrock at ± 465 feet in a hard, weakly altered andesite porphyry. Chloritization intensity increased with depth beyond the base of oxidation at ± 600 feet, but is considerably weaker than that observed in hole W-2. Pyrite content is estimated at less than 1% very finely disseminated. No evidence of chalcocite enrichment was noted. W-4 was in progress at 762 feet at months end.

Correlation of cores with results of outcrop mapping in the Circle I Hills to the north indicate the volcanic porphyry of the drilling area to be a series of andesite and dacite flows, with weak to moderate hydrothermal alteration. These are locally coarse grained, approaching an intrusive texture. They include blocks and fragments of the Pinal schist, and are themselves intruded by Laramide granite in the Circle I Hills.

Drilling procedure so far has been generally to rock-bit through gravel overburden, take spot cores to establish bedrock and base of oxidation depths, and then core, with wireline equipment, enough footage to afford an evaluation of alteration and sulfide mineralization commensurate with the goal of an initial drilling program.

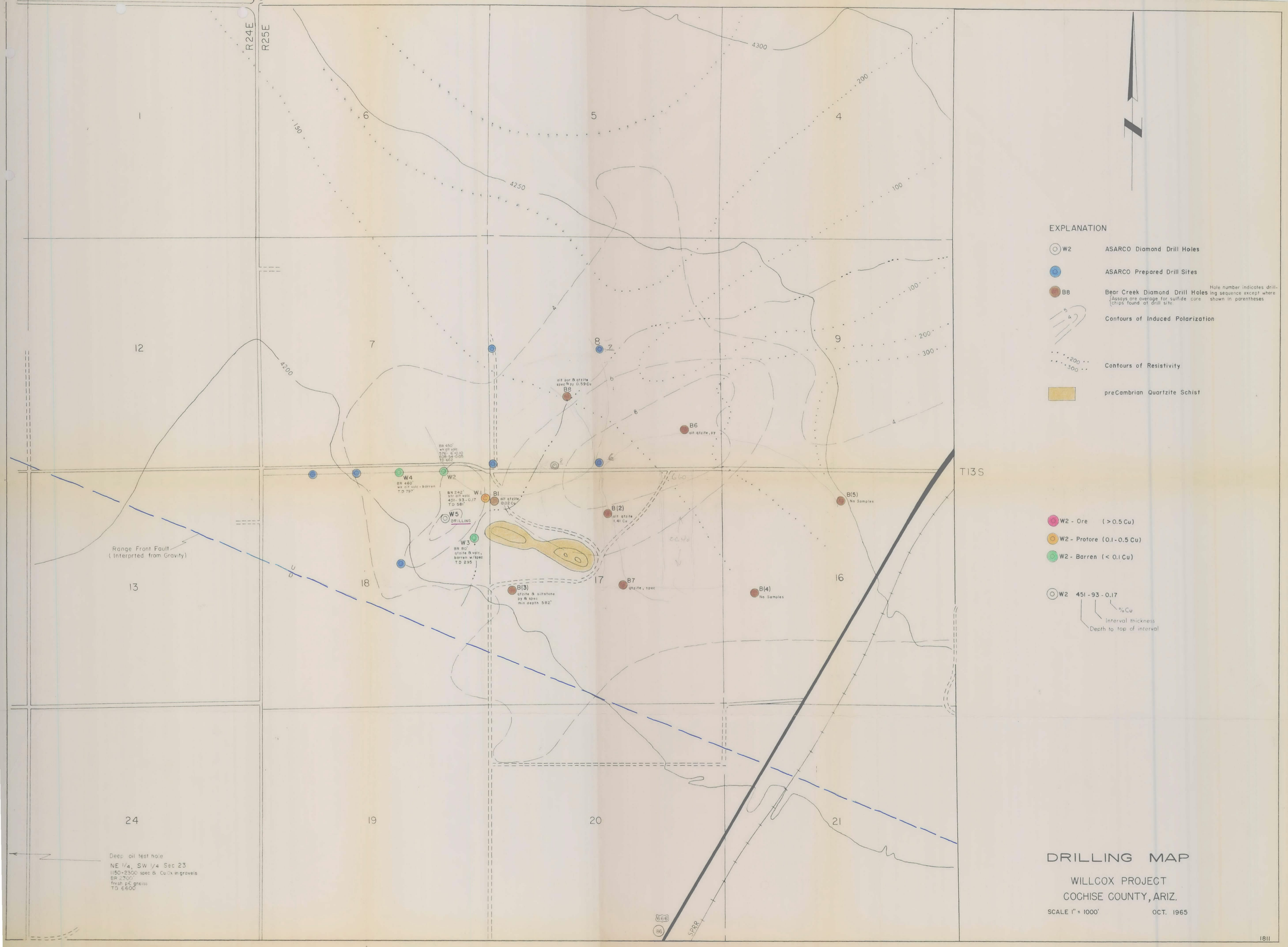
Results of assaying and a breakdown of contract drilling costs are shown as follows:

W-1

Depth	Interval	% Cu
242.0 - 451.0	209.0	0.05
451.0 - 543.9	92.9	0.17
543.9 - 581.0	37.1	0.04

W-2

Depth	Interval	% Cu
462.0 - 466.3	4.3	0.08
576.0 - 582.0	6.0	0.10
608.0 - 662.0	54.0	0.05


R24E
R25E
T13S
1
6
5
4
12
7
8
9
13
18
17
16
24
19
20
21
4300
4250
4200
150
200
100
300
4
6
8
Range Front Fault
(Interpreted from Gravity)
U
D
alt por & qtzite
spec & py 0.59Cu
B8
B6
alt qtzite, py
BR 450'
wk alt volc
576'-6'-0.10
608-54-0.05
TD 662
W4
BR 460'
wk alt volc - barren
TD 797'
W2
BR 242'
str alt volc
451-93-Cu17
TD 581'
W1
B1
alt qtzite
0.02 Cu
W5
DRILLING
W3
BR 80'
qtzite & volc,
barren w/spec
TD 295
B(2)
alt qtzite
1.41 Cu
B(5)
No Samples
B(3)
qtzite & siltstone
py & spec
min depth 582'
B7
qtzite, spec
B(4)
No Samples
Deep oil test hole
NE 1/4, SW 1/4 Sec 23
1150-2300 spec & Cu0x in gravels
BR 2300'
fresh pC gneiss
TD 6600'
666
86
SPRR
EXPLANATION
W2
ASARCO Diamond Drill Holes
ASARCO Prepared Drill Sites
B8
Bear Creek Diamond Drill Holes
Hole number indicates drilling sequence except where shown in parentheses
Assays are average for sulfide core chips found at drill site.
Contours of Induced Polarization
Contours of Resistivity
preCambrian Quartzite Schist
W2 - Ore (> 0.5 Cu)
W2 - Protore (0.1 - 0.5 Cu)
W2 - Barren (< 0.1 Cu)
W2 451 - 93 - 0.17
% Cu
Interval thickness
Depth to top of interval
DRILLING MAP
WILLCOX PROJECT
COCHISE COUNTY, ARIZ.
SCALE 1" = 1000'
OCT. 1965
1811

HAWLEY & HAWLEY

ASSAYERS AND CHEMISTS, INC.

1700 WEST GRANT ROAD - TELEPHONE 622-4836 - POST OFFICE BOX 5934

TUCSON, ARIZONA 85703

Registered Assayers

THE SOUTHWEST'S LEADING ASSAYERS AND REPRESENTATIVES

Branch Representatives at Buyer's Plants:
Phelps Dodge Corp., Douglas, Arizona; ASARCO, El Paso, Amarillo, Texas and Hayden, Arizona

IDENTIFICATION	Gold ozs.	Silver ozs.	Lead %	Copper %	Ox. Copper %	Zinc %	Mo. %
	Hole #						
# 1 462.0 - 466.3	W-2			0.078			
# 2 576.0 - 582.0	W-2			0.104			
# 3 608.0 - 616.4	W-2			0.052			
# 4 616.4 - 625.9	W-2			0.052			
# 5 625.9 - 635.8	W-2			0.039			
# 6 635.8 - 644.9	W-2			0.052			
# 7 644.9 - 654.1	W-2			0.065			
# 8 654.1 - 662.0	W-2			0.052			

J. H. C.
OCT 21 1965

Sec. Tue a copy

MR. Stauffer

READ AND RETURN

PREPARE ANSWERS HANDLE

FILE INITIALS

CC: Mr. M. R. Stauffer
ADD: American Smelting & Refining Co.
CITY: P. O. Box 5795
ADD: Tucson, Arizona
CITY:

REMARKS: "Special"

Analysis Cert. By S. Vaughan

Preparation $ 6.00
Analysis $ 14.00

ACC: ASARCO - STAUFFER

Date Spl. Received 10-14-65

Date Compl. 10-19-65

TUC328563

$ 20.00

Wilcox Project

J. H. C.
NOV 9 1965

W-1

Bedrock 242'
Base oxidation 392'
Mod-st alt volcanic
451 - 93 - 0.17 % cu.
TD - 581

~~581~~
662
294
797
1753

W-2

Bedrock 450'
Base oxidation 600'
wk alt andesite
576 - 6 - 0.10 % cu
608 - 54 - 0.05 % cu.
TD - 662'

W-3

Bedrock 80'
Qtzt w/ st spec.
TD - 294.5'

W-4

Bedrock - 465'
Base oxidation 550'
wk alt andesite
TD - 797

M.R. Stauffer

File -) Willcox

) MA #982 (Property)		MA-1036 (Drilling) Direct	Indirect
(Prior)	10,867.97		
Sept	355.00	1,950.38	2,713.87
Oct	7,399.57	8,528.51	6,450.14
Nov.	2,400.00	(±) 7,925.88	(±) 4,000.00
)			
Total to Date:	#21,022.54	#18,404.77	#13,164.01
		→ (31,568.00)	
Authorization:	#36,000.00	#30,000.00	
Balance:	(+) #14,977.46	(-) #1,568.00	

J. H. G.
NOV 30 1965

DRILLING
BLASTING

METLER BROTHERS DRILLING CO.

Core Drilling Contractors

QUARRYING
TUNNELING

Route 7, Box 945 4001 E. Illinois Street ★ ★ ★ Phone 327-4268 Tucson, Arizona 85714

J. H. C.
DEC 6 1965

December 2, 1965

Order No. T-5570
Sept. 17, 1965

American Smelting & Refining Co.
P.O. Box 5795
Tucson, Arizona

In account with Metler Brothers Drilling Company for drilling your Wilcox Project, Cochise County, Arizona from 1-30 November, 1965.

Hole No. W-4:			
20.0 ft. Continous Coring, 777-797	6.25	125.00	
			125.00
Hole No. W-5:			
429.0 ft. Rotary Drilling w/rock bit	2.75	1,179.75	
18.0 " Reaming	2.75	49.50	
9.0 hrs. Spot Coring	20.00	180.00	
53.0 ft. Continous Coring, 447-500	5.85	310.05	
63.0 " " " 500-563	6.25	393.75	
8.0 sks. Drill Mud (mixed)	2.50	20.00	
1.0 " Cellex		33.23	
1.0 " Dextrid		21.58	
			2,187.86
Hole No. W-6:			
398.5 ft. Rotary Drilling w/rock bit	2.75	1,095.88	
23.5 " Reaming	2.75	64.63	
16.0 hrs. Spot Coring	20.00	320.00	
78.0 ft. Continous Coring, 422-500	5.85	456.30	
189.5 " " " 500-689.5	6.25	1,184.38	
16.0 sks. Drill Mud (mixed)	2.50	40.00	
4.0 " Cellex	33.23	132.92	
2.0 " Q Broxin	15.74	31.48	
2.0 hrs. Casing Time	18.00	36.00	
			3,361.59
Hole No. W-7:			
385.0 ft. Rotary Drilling w/rock bit	2.75	1,058.75	
5.0 " Reaming	2.75	13.75	
6.0 hrs. Spot Coring	20.00	120.00	
7.0 sks. Drill Mud (mixed)	2.50	17.50	
1.0 " Cellex		33.23	
16.0 hrs. Standby Time	8.50	136.00	
			1,379.23
TOTAL AMOUNT DUE			$ 7,053.68

E&OE

OK for payment JH Courtright

For ASARCO

M.R. Stauffer

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

J. H. C.

DEC 10 1965

December 8, 1965

TO: J. H. COURTRIGHT

FROM: M. R. STAUFFER

DRILLING PROGRESS
NOVEMBER, 1965
WILLCOX PROJECT

During the month of November four holes were completed.

Hole W-4, begun in October, was drilled from 777.0 feet to bottom at 797.0 feet. The rock cored was a hard, weakly altered andesite porphyry with less than 1% sulfides as finely disseminated pyrite.

Hole W-5 drilled through gravel to bedrock at ± 350 feet in a soft, altered andesite with local strong limonite after sulfide veinlets. Below the base of oxidation at ± 490 feet, the rock was moderately sericitized, and contained about 5% sulfides as pyrite. Weaker alteration, as clay and chlorite, was found from 546 feet to the bottom at 563.6 feet. No chalcocite was observed.

Hole W-6 encountered bedrock at ± 410 feet in a soft, bleached andesite with locally strong iron oxides. Some of the limonite appeared to be indigenous and "live". At about 561 feet, the rock graded to a gray to red dacite porphyry which was locally altered to clay. At 641 feet, contact was made with a soft, "weathered", medium-grained granite. Alteration in the granite appeared to be essentially supergene, indicating that the granite pre-dates the overlying volcanics. Fractures in the granite are coated with a black mixture of iron and pyrolousite. No sulfides were observed to the final depth of 689.5 feet.

Hole W-7 found bedrock at ± 250 feet. Spot core recovered was a dark red to purple andesite laced with numerous calcite veins. The andesite is hard and not visibly affected by hydrothermal alteration or mineralization. This is not to imply that the volcanic is post-mineral; rather, it is outside the limits of hydrothermal alteration. Final depth was 391.5 feet.

Assay results available and a chart of monthly drilling costs are shown as follows:

Hole	Depth	Interval	% Cu
W-4	698.3-707.0	8.7	0.05
W-4	789.7-796.8	7.1	0.05
W-5	468.5-476.4	7.9	0.06
W-5	486.5-495.4	8.9	0.03
W-5	495.4-504.4	9.0	0.01
W-5	550.0-559.1	9.1	0.05

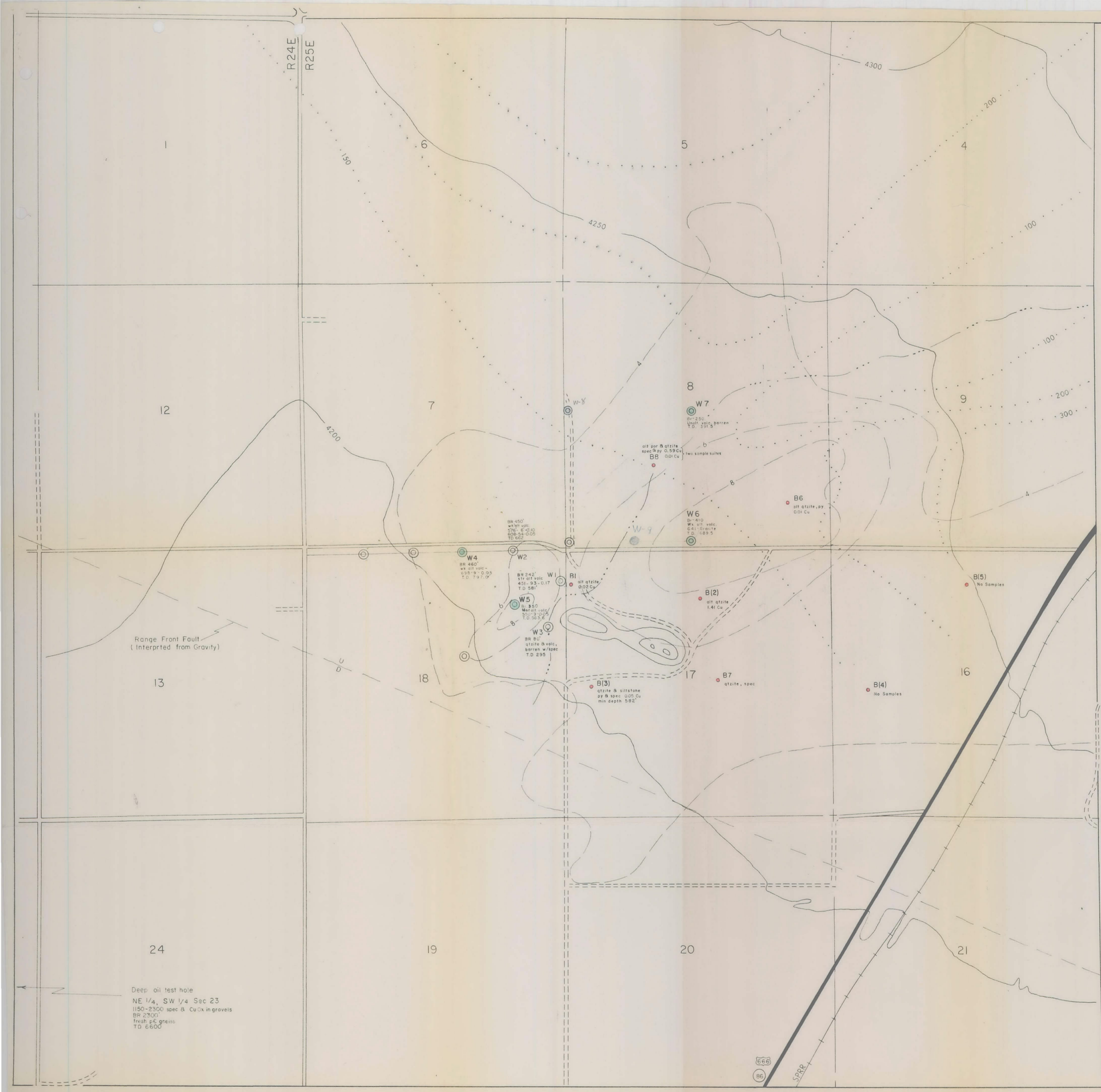
November Contract Drilling Costs

	W-4	W-5	W-6	W-7	Total
Rotary Drilling		1,179.75	1,095.88	1,058.75	3,334.38
Spot Coring		180.00	320.00	120.00	620.00
Wireline Coring	125.00	703.80	1,640.68		2,469.48
Reaming		49.50	64.63	13.75	127.88
Casing Time			36.00		36.00
Drilling Mud		20.00	40.00	17.50	77.50
Additives		54.81	164.40	33.23	252.44
Delay Time				136.00	136.00
Total for November	125.00	2,187.86	3,361.59	1,379.23	7,053.68
Total to Date					17,094.57

M. R. Stauffer

M. R. STAUFFER

MRS/pjc - Attachment
cc: WESaegart, w/ attach.



EXPLANATION

W2	ASARCO Diamond Drill Holes
	ASARCO Prepared Drill Sites
B8	Bear Creek Diamond Drill Holes (Assays are average for sulfide core chips found at drill site. Hole number indicates drilling sequence except where shown in parentheses
5 4	Contours of Induced Polarization
200 300	Contours of Resistivity
	preCambrian Quartzite Schist

W2 - Ore (> 0.5 Cu)

W2 - Protore (0.1 - 0.5 Cu)

W2 - Barren (< 0.1 Cu)

W2 451 - 93 - 0.17

- 451: Depth to top of interval
- 93: Interval thickness
- 0.17: % Cu

DRILLING MAP

WILLCOX PROJECT

COCHISE COUNTY, ARIZ.

SCALE 1" = 1000' OCT. 1965

1811

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

J. H. C.
DEC 27 1965

December 27, 1965

TO: J. H. COURTRIGHT

FROM: M. R. STAUFFER

Drilling Progress
December, 1965
Willcox Project

During the month of December, two holes were completed. Drilling operations were terminated with the completion of hole W-9 on December 11, 1965.

Hole W-8 was drilled with rock bit to 349.0 feet. Study of cuttings indicated bedrock at ± 340 feet. Spot core taken from 349.0 to 353.0 was a dark red to purple andesitic agglomerate with numerous calcite veinlets. The rock is hard, and shows no alteration effects other than chloritization of certain inclusions. Neither sulfides nor limonite after sulfides were observed. The hole was bottomed at 353.0 feet.

Hole W-9 was drilled with rock bit to a final depth at 658.0 feet. Bedrock was intersected by spot coring at 412.0 feet. Core recovered indicated the rock to be a soft, bleached, iron-stained volcanic porphyry with strong clay alteration. A good proportion of the iron oxides is indigenous, possibly after specularite. In terms of alteration and iron oxide distribution, the volcanic porphyry in W-9 is notably similar to that found in hole W-6.

Results of assaying and a breakdown of contract drilling costs for the month are shown as follows. A summary of drilling results, performance, and costs for the Willcox Project will be submitted after all available information has been received.

ASSAYS

Hole	Depth	Interval	% Cu
W-6	419.0-428.0	9.0	0.12
W-6	616.4-626.0	9.6	0.34
W-6	647.3-658.8	11.5	0.07

ok

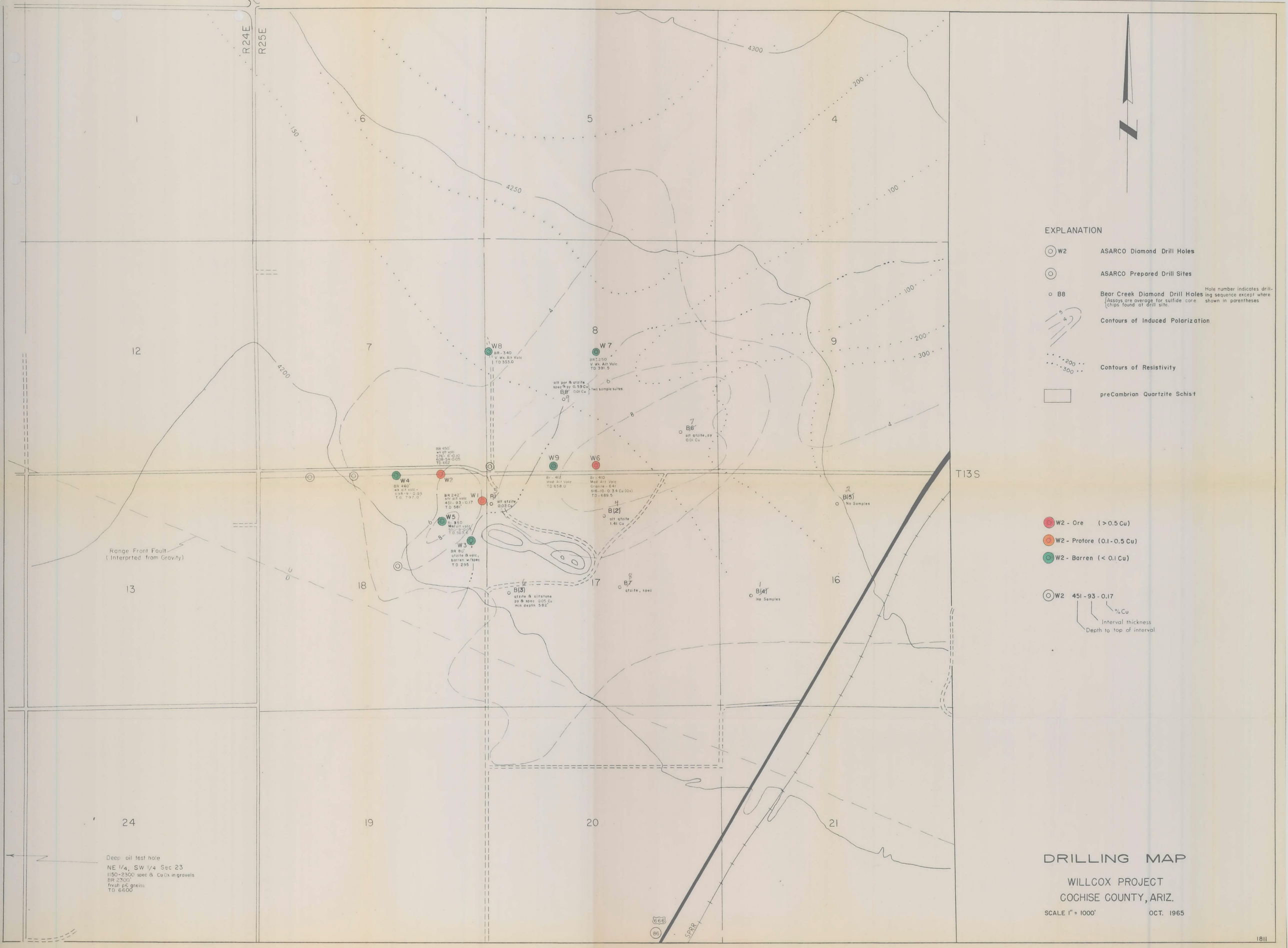
December Contract Drilling Costs

	W-8	W-9	Total
Rotary Drilling	959.75	1,787.50	2,747.25
Spot Coring	40.00	220.00	260.00
Reaming		22.00	22.00
Drilling Mud	15.00	17.50	32.50
Additives	42.59		42.59
Delay Time	8.50		8.50
Total for December	1,065.84	2,047.00	3,112.84
Total to Date			20,207.41

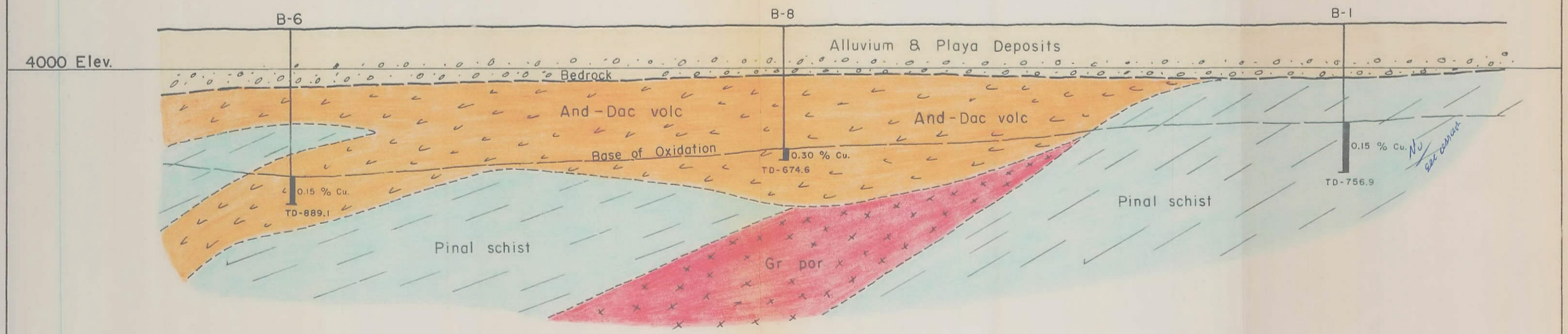
M. R. Stauffer

M. R. Stauffer

MRS/cj


R24E
R25E
T13S
1
6
5
4
12
7
8
9
13
18
17
16
24
19
20
21
4300
4250
4200
150
200
100
300
4
6
8
W8
BR-340
V Wk Alt Volc
TD 353.0
W7
BR-250
V Wk Alt Volc
TD 391.5
alt por & qtzite
spec & py 0.59 Cu
0.01 Cu
two sample suites
B8
B6
alt qtzite, py
0.01 Cu
W9
BR-412
Mod Alt Volc
TD 658.0
W6
BR-410
Mod Alt Volc
Granite-641
616-10-0.34 Cu (Ox)
TD-689.5
BR 450'
wk alt volc
576'-6-0.10
608-94-0.05
TD 662
W2
W4
BR 460'
wk alt volc
598-9-0.05
T.D. 797.0
BR 242'
str alt volc
451-93-0.17
T.D 581'
W1
R1
alt qtzite
0.02 Cu
W5
BR 350
Mod alt volc
350-9-0.07
T.D. 583.6
W3
BR 80'
qtzite & volc,
barren w/spec
T.D 295
B(2)
alt qtzite
1.41 Cu
B(5)
No Samples
B(3)
qtzite & siltstone
py & spec 0.05 Cu
min depth 582'
B7
qtzite, spec
B(4)
No Samples
Range Front Fault
(Interprted from Gravity)
Deep oil test hole
NE 1/4, SW 1/4 Sec 23
1150-2300' spec & CuOx in gravels
BR 2300'
fresh pC gneiss
TD 6600
666
86
SPRR
EXPLANATION
W2 ASARCO Diamond Drill Holes
ASARCO Prepared Drill Sites
B8 Bear Creek Diamond Drill Holes
Hole number indicates drilling sequence except where shown in parentheses
Assays are average for sulfide core chips found at drill site.
Contours of Induced Polarization
Contours of Resistivity
preCambrian Quartzite Schist
W2 - Ore (> 0.5 Cu)
W2 - Protore (0.1 - 0.5 Cu)
W2 - Barren (< 0.1 Cu)
W2 451 - 93 - 0.17
% Cu
Interval thickness
Depth to top of interval
DRILLING MAP
WILLCOX PROJECT
COCHISE COUNTY, ARIZ.
SCALE 1" = 1000'
OCT. 1965
1811

LOOKING NORTH

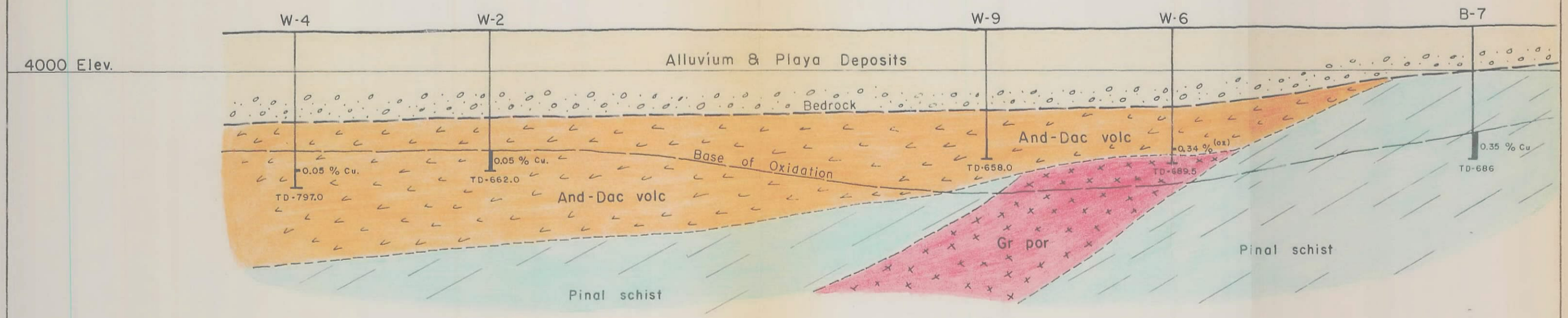


ASARCO
WILLCOX PROJECT

EAST-WEST SECTION D

Scale:	Date	Drawn by	File
1" = 500'	JAN. 1966		

LOOKING NORTH

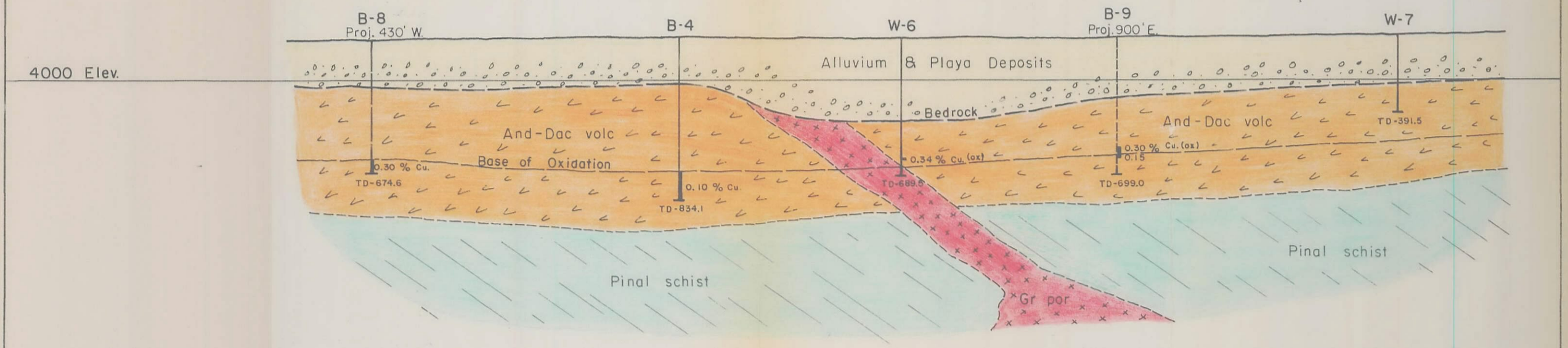


ASARCO
WILLCOX PROJECT

EAST-WEST SECTION C

Scale	Date	Drawn by	File
1" = 500'	JAN. 1966		1838

LOOKING WEST

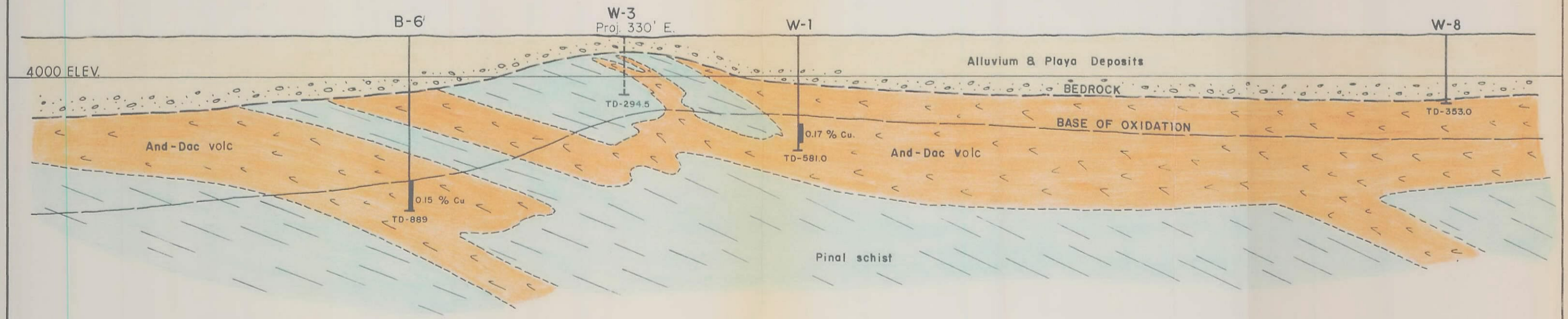


ASARCO
WILLCOX PROJECT

NORTH-SOUTH SECTION B

Scale	Date	Drawn by	File
1" = 500'	JAN. 1966		

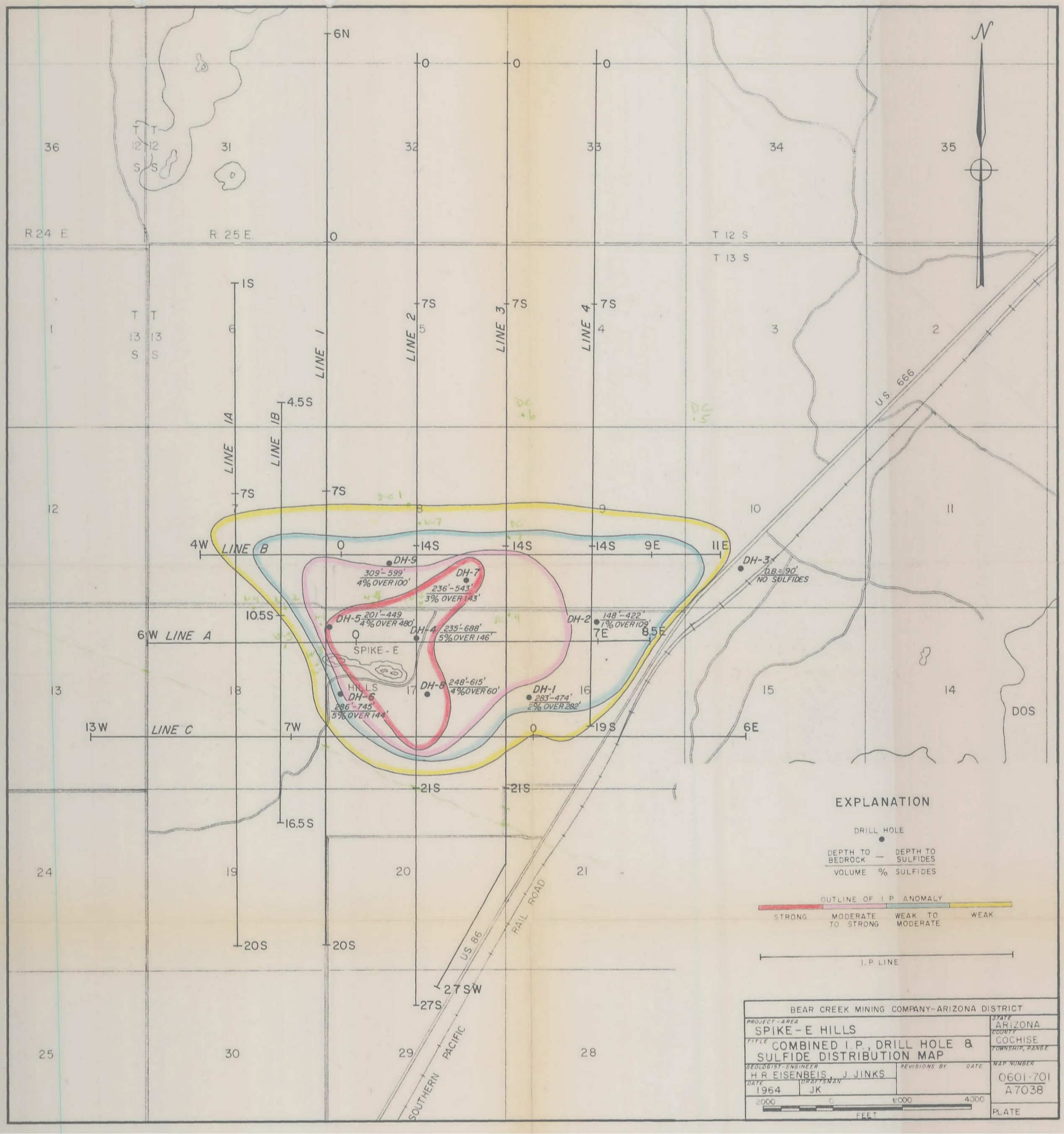
LOOKING WEST



ASARCO
WILLCOX PROJECT

NORTH-SOUTH SECTION A

Scale	Date	Drawn by	File
1" = 500'	JAN. 1966		1837


N
R 24 E
R 25 E
T 12 S
T 13 S
LINE 1
LINE 2
LINE 3
LINE 4
LINE 1A
LINE 1B
LINE B
LINE A
LINE C
4W
6W
13W
7W
9E
11E
8.5E
7E
6E
10.5S
4.5S
16.5S
19S
21S
27S
27SW
20S
DH-9
309'-599'
4% OVER 100'
DH-7
236'-543'
3% OVER 143'
DH-3
D.B.=90'
NO SULFIDES
DH-5
201'-449
4% OVER 480'
DH-4
235'-688'
5% OVER 146'
DH-2
148'-422'
1% OVER 109'
SPIKE - E
HILLS
DH-6
286'-745'
5% OVER 144'
DH-8
248'-615'
4% OVER 60'
DH-1
283'-474'
2% OVER 282'
U.S. 666
U.S. 86
RAIL ROAD
SOUTHERN PACIFIC
DOS
EXPLANATION
DRILL HOLE
DEPTH TO BEDROCK — DEPTH TO SULFIDES
VOLUME % SULFIDES
OUTLINE OF I.P. ANOMALY
STRONG
MODERATE TO STRONG
WEAK TO MODERATE
WEAK
I.P. LINE
BEAR CREEK MINING COMPANY-ARIZONA DISTRICT
PROJECT-AREA
SPIKE-E HILLS
TITLE
COMBINED I.P., DRILL HOLE & SULFIDE DISTRIBUTION MAP
GEOLOGIST-ENGINEER
H.R. EISENBEIS, J. JINKS
DATE
1964
DRAFTSMAN
JK
REVISIONS BY
DATE
2000 0 2000 4000
FEET
STATE
ARIZONA
COUNTY
COCHISE
TOWNSHIP, RANGE
MAP NUMBER
0601-701
A7038
PLATE

SHEET NO. 1

DATE STARTED 4/14/64

DIAMOND DRILL ASSAY LOG

DATE COMPLETED 5/9/64

HOLE NO. SEH-1

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4230' BEDROCK ELEVATION Estimated 3945'

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm	Pb %	Au oz	Ag oz
0	285.0	Rock bit - alluvium												
285.0	295.0	Rock bit - schist							287		10		.005	0.2
295.0	300.0	5.0			NC		8224		279		0			
300.0	308.0	8.0			NXWL				94		5			
308.0	318.2	10.2			"				107		3			
318.2	323.0	4.8			"				13		7			
323.0	335.2	12.2			"				34		10			
335.2	346.7	11.5			"				250		6			
346.7	356.8	10.1			"		8225		230		0		Tr.	0.1
356.8	367.9	11.1			"				86		11			
367.9	379.4	11.5			"				39		12			
379.4	388.6	9.2			"				93		9			
388.6	397.0	8.4			"				220		10			
397.0	408.8	11.8			"		8226		660		3		Tr	0.2
408.8	419.6	10.8			"				58		5			
419.6	427.8	8.2			"				25		3			
427.8	437.2	9.4			"				70		5			
437.2	446.2	9.0			"				119		7			
446.2	456.5	10.3			"		8227		438		0		.005	0.2
456.5	468.7	12.2	schist	#474 SUPE	"		8228		323		0			
468.7	478.2	9.5			"		8229		280		0			
478.2	487.4	9.2			"		8230		146		0		Tr.	0.1
487.4	499.3	11.9			"		8231		413		6			
499.3	508.2	8.9			"		8232		224		0		Tr.	0.1
508.2	517.8	9.6			"		8233		288		0			
517.8	526.0	8.2			"		8234		262		7	Tr.		
526.0	535.3	9.3			"		8235		448		12	Tr.	.005	0.2
535.3	545.0	9.7			"		8236		344		6	Tr.		
545.0	554.3	9.3			"		8237		361		13			
554.3	563.7	9.4			"		8238		379		10		Tr.	0.2
563.7	573.3	9.6			"		8239		284		6			
573.3	585.1	11.8			"		8240		316		7			
585.1	595.1	10.0			"		8241		455		19			
595.1	600.1	5.0			"		8242		1616		38		Tr.	0.2
600.1	611.0	10.9			"		8263		165		6			
611.0	620.4	9.4			"		8264		123		6			
620.4	631.3	10.9			"		8265		45		6			
631.3	638.1	6.8			"		8266		141		7		Tr.	0.1
638.1	647.7	9.6			"		8267		121		10			
647.7	656.2	8.5			"		8268		170		8			
656.2	665.5	9.3			"		8269		216		7			
665.5	676.9	11.4			"		8270		114		9		Tr.	0.1
676.9	686.0	9.1			"		8306		98		8			
686.0	695.1	9.1			"		8307		118		6			

continued

SHEET NO. 2

DATE STARTED 4-14-64

DIAMOND DRILL ASS[illegible] LOG

DATE COMPLETED 5-9-64
Re-entered

HOLE NO. SEH-1

COORDINATES _____ _____ COLLAR ELEVATION _____ BEDROCK ELEVATION _____

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Core Split Cu ppm	Core Split Mo ppm		Core Split Au $	Core Split Ag $		
		continued													
695.1	706.4	11.3	schist		NXWL		8308		155	13					
706.4	715.8	9.4			"		8309		152	10		.005	0.2		
715.8	727.0	11.2			"		8310		133	7					
727.0	737.0	10.0			"		8311		123	7					
737.0	748.0	11.0			"		8312		123	10					
748.0	756.9	8.9			"		8313		110	11		Tr.	0.2		
Bottom 756.9															

SHEET NO. 1

DATE STARTED 4-17-64

DIAMOND DRILL ASSAY LOG

DATE COMPLETED 5-5-64

HOLE NO. SEH-2

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4250 BEDROCK ELEVATION Estimated 4100

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
0	150.0	Rock bit - alluvium												
150.0	160.0	Rock bit - schist												
160.0	165.0	5.0			NC									
165.0	175.5	10.5			NXWL									
175.5	185.0	9.5			"									
185.0	194.0	9.0			"									
194.0	203.3	9.3			"		8273		62		9		Tr.	0.2
203.3	214.9	11.6			"									
214.9	224.2	9.3			"									
224.2	233.7	9.5	Schist		"									
233.7	243.4	9.7			"									
243.4	252.6	9.2			"		8274		58		9		.005	0.3
252.6	261.2	8.6			"									
261.2	270.1	8.9			"									
270.1	279.0	8.9			"		8275		57		10			
279.0	285.9	6.9			"		8276		78		15			
285.9	292.5	6.6	MONZONITE DIKE		"		8277		106		12			
292.5	300.7	8.2			"		8278		110		10		.005	0.3
300.7	309.1	8.4			"		8279		102		11			
309.1	318.2	9.1			"		8280		93		12			
318.2	325.5	7.3			"		8281		108		14			
325.5	334.8	9.3			"		8282		97		13			
334.8	343.5	8.7			"		8283		90		6			
343.5	352.8	9.3			"		8284		357		10		Tr.	0.2
352.8	361.6	8.8			"		8285		185		7			
361.6	369.6	8.0			"		8286		116		3			
369.6	378.9	9.3			"		8287		110		1			
378.9	385.8	6.9			"		8288		127		0			
385.8	395.2	9.4			"		8289		87		0			
395.2	404.5	9.3			"		8290		104		1		Tr.	0.2
404.5	414.6	10.1			"		8291		212		0			
414.6	424.0	9.4		4/501	"		8292		97		5			
424.0	433.7	9.7	Schist		"		8293		129		2			
433.7	443.7	10.0			"		8294		132		2			
443.7	453.2	9.5			"		8295		176		14		Tr.	0.2
453.2	461.9	8.7			"		8296		242		13			
461.9	470.6	8.7			"		8297		156		18			
470.6	480.7	10.1			"		8298		164		7			
480.7	487.0	6.3			"		8299		174		7			
487.0	496.4	9.4			"		8300		115		6			
496.4	506.0	9.6			"		8301		94		6		Tr.	0.1
506.0	512.8	6.8			"		8302		111		4			
512.8	522.2	9.4			"		8303		120		5			
522.2	531.8	9.6			"		8304		114		6			
531.8	541.1	9.3			"		8305		98		5		.005	0.1
	Bottom 541.1													

DATE STARTED 4-30-64

DATE COMPLETED 5-4-64

DIAMOND DRILL ASSAY LOG

SHEET NO. 1

HOLE NO. SEH-3

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4295

BEDROCK ELEVATION Estimated 4207

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S. G.	Sample No.		Cu ppm		Mo ppm				
0	10	Alluvium	Rotary Rock Bit						97		5				
10	20		to 126 feet.						85		5				
20	30								93		6				
30	40		7 7/8 inch hole						77		4				
40	50								80		5				
50	60								119		5				
60	70								122		3				
70	80								115		4				
80	90								113		10				
90	100								91		8				
100	110	Pre-Є							91		4				
110	120	granite							106		4				
120	126								121		3				
	Bottom 126														

Hole drilled for location work

SHEET NO. 2

DATE STARTED _____

DIAMOND DRILL ASSAY LOG

DATE COMPLETED _____

HOLE NO. SEH-4

COORDINATES _____ _____ COLLAR ELEVATION _____ BEDROCK ELEVATION _____

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
	- continued -													
675.7	682.8	7.1			NXWL		8414		233		16			
682.8	691.9	9.1		DT	"		8415		114		28			
691.9	696.8	4.9		50%	"		8416		230		5		.005	0.2
696.8	706.2	9.4			"		8417		308		9			
706.2	715.3	9.1			"		8418		1271		6			
715.3	725.5	10.2			"		8419		615		3			
725.5	732.8	7.3	MONZONITE		"		8420		615		5			
732.8	742.8	10.0			"		8421		627		5		Tr.	0.1
742.8	752.5	9.7			"		8465		598		13			
752.5	761.9	9.4			"		8466		508		12			
761.9	771.5	9.6			"		8467		943		13			
771.5	776.4	4.9			"		8468		1230		23			
776.4	786.1	9.7			"		8469		2214	15%	12		.005	1.1
786.1	796.0	9.9			"		8470		1.288		10			
796.0	806.0	10.0			"		8471	341.5	1460		6			
806.0	815.9	9.9			"		8472	8462 x.2	820	13%	12			
815.9	825.8	9.9			"		8473		615		6			
825.8	834.1	8.3			"		8474		1919		4		.005	1.0
	Bottom 834.1													

SHEET NO. 1

DATE STARTED 5-8-64

DIAMOND DRILL ASSAY LOG

DATE COMPLETED 5-25-64

HOLE NO. SEH-4

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4220

BEDROCK ELEVATION Estimated 3980

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
0	240.0	Rock Bit - alluvium												
240.0	275.8	Rock Bit - capping												
275.8	281.0	5.2			N.C.		8272							
281.0	290.6	9.6			NXWL		8335		83		13		Tr.	0.2
290.6	300.6	10.0			"		8336		64		6			
300.6	310.3	9.7			"		8337		51		12			
310.3	320.1	9.8			"		8338		61		16			
320.1	329.8	9.7			"		8339		47		9		Tr.	0.3
329.8	339.2	9.4			"		8340		50		13			
339.2	349.0	9.8			"		8341		52		7			
349.0	357.8	8.8			"		8342		41		10			
357.8	365.3	7.5			"		8343		39		8		.005	0.3
365.3	375.2	9.9			"		8344		53		9			
375.2	381.6	6.4			"		8345		19		10			
381.6	391.9	10.3			"		8346		31		13			
391.9	402.8	10.9			"		8347		35		9			
402.8	411.9	9.1			"		8348		38		17		Tr.	0.2
411.9	419.6	7.7			"		8349		28		13			
419.6	427.5	7.9			"		8350		33		15			
427.5	437.8	10.3			"		8351		35		12			
437.8	449.8	12.0			"		8352		35		14			
449.8	460.4	10.6	Monzonite		"		8353		50		13		Tr.	0.2
460.4	470.6	10.2			"		8354		47		12			
470.6	479.1	8.5			"		8355		66		7			
479.1	490.6	11.5			"		8356		41		14			
490.6	499.1	8.5			"		8357		49		7			
499.1	508.2	9.1			"		8358		41		6		Tr.	0.1
508.2	518.7	10.5			"		8359		50		6			
518.7	528.4	9.7			"		8360		70		12			
528.4	537.7	9.3			"		8361		61		3			
537.7	548.2	10.5			"		8362		156		11			
548.2	558.9	10.7			"		8363		33		5		.005	0.1
558.9	568.7	9.8			"		8364		33		5			
568.7	578.4	9.7			"		8365		74		4			
578.4	585.7	7.3			"		8366		45		12			
585.7	595.5	9.8			"		8367		33		5			
595.5	607.6	12.1			"		8368		37		12		Tr.	0.2
607.6	615.0	7.4			"		8369		40		5			
615.0	624.8	9.8			"		8370		58		13			
624.8	634.5	9.7			"		8371		52		7			
634.5	645.9	11.4			"		8410		48		9			
645.9	655.9	10.0			"		8411		31		4		Tr.	0.1
655.9	665.8	9.9			"		8412		24		4			
665.8	675.7	9.9			"		8413		60		10			

- Continued -

SHEET NO. 1

DATE STARTED 5-26-64

DIAMOND DRILL ASSAY LOG

DATE COMPLETED 6-11-64

HOLE NO. SEH-5

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4215

BEDROCK ELEVATION Estimated 4014

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu PPM	Mo PPM	Au oz	Ag oz			
0	201		Alluvium												
201.0	211.0	10.0			NXWL		8475		148	6					
211.0	220.7	9.7			"		8476		113	0					
220.7	231.0	10.3			"		8477		100	0					
231.0	241.5	10.5			"		8478		129	0	Tr.	0.3			
241.5	251.2	9.7			"		8479		104	0					
251.2	261.2	10.0			"		8480		77	1					
261.2	271.2	10.0			"		8481		50	3					
271.2	281.0	9.8			"		8482		40	0					
281.0	290.4	9.4			"		8483		43	0	Tr.	0.5			
290.4	300.7	10.3			"		8484		49	6					
300.7	310.8	10.1			"		8485		36	6					
310.8	320.1	9.3			"		8486		57	18					
320.1	329.4	9.3			"		8487		45	7					
329.4	341.3	11.9			"		8488		50	18	Tr.	0.3			
341.3	351.5	10.2			"		8489		95	12					
351.5	361.4	9.9			"		8490		126	12					
361.4	371.4	10.0			"		8491		205	13					
371.4	380.7	9.3			"		8492		179	4					
380.7	390.3	9.6			"		8493		98	16	Tr.	0.3			
390.3	399.3	9.0			"		8494		180	25					
399.3	409.0	8.7			"		8495		122	9					
409.0	415.8	6.8			"		8496		60	6					
415.8	422.0	6.2			"		8497		50	10					
422.0	432.1	10.1	Andesitic Volcanic Agglom.		"		8498		226	18	.005	0.6			
432.1	443.3	11.2			"		8499		369	6					
443.3	449.0	5.7		04	"		8500		341	2					
449.0	460.0	11.0	26.5	501	"		8442	55 Mo = 1340	2296	5	.005	0.7			
460.0	466.9	6.9			"		8501		26	6					
466.9	475.5	8.6			"		8443		1172	2	Tr.	0.5			
475.5	478.0	2.5			"		8502		156	4					
478.0	485.5	7.1			"		8444		697	2	Tr.	0.2			
485.5	495.2	9.7			BXWL		8503		451	0					
495.2	505.4	10.2			"		8504		1034	3					
505.4	515.2	9.8			"		8505		1271	0					
515.2	524.9	9.7	96.1		"		8506	7 Cu = 1443	1968	7					
524.9	533.7	8.8			"		8507		1410	1	.01	0.6			
533.7	543.3	9.6			"		8508		1755	9					
543.3	553.8	10.5			"		8509		492	0					
553.8	563.7	9.9			"		8510		140	0					
563.7	574.1	10.4			"		8511		296	0					
574.1	584.5	10.4			"		8512		697	0	.005	0.4			
584.5	594.9	10.4			"		8513		2706	0					
594.9	605.3	10.4			"		8514		992	0					
	— continued —														
							4447	64%	195'@	[illegible]	ppm =	0.11%			
									216,463.6 ↗						

SHEET NO. 2

DATE STARTED _____

DIAMOND DRILL ASS[illegible]LOG

DATE COMPLETED _____

HOLE NO. SEH-5

COORDINATES _____ _____ COLLAR ELEVATION _____ BEDROCK ELEVATION _____

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
	continued													
605.3	615.2	9.9			BXWL		8515		984		1			
615.2	624.7	9.5			"		8516		1537		1			
624.7	633.9	9.2			"		8517		779		0		Tr.	0.1
633.9	644.0	10.1			"		8518		1291		5			
644.0	652.9	8.9			"		8519		844		5			
652.9	663.6	10.7			"		8520		348		3			
663.6	673.6	10.0			"		8521		627		10			
673.6	683.9	10.3			"		8522		66		0		Tr.	0.1
683.9	694.0	10.1			"		8523		225		0			
694.0	704.1	10.1			"		8524		246		0			
704.1	714.1	10.0			"		8525		259		0			
714.1	724.5	10.4			"		8526		116		10			
724.5	734.2	9.7			"		8527		287		0		.005	0.2
734.2	744.3	10.1	Rhyolitic volcanic Agglomerate		"		8547		2788	5%	0			
744.3	753.3	9.0			"		8548		4970		0			
753.3	763.7	10.4			"		8549		689		0			
763.7	773.1	9.4			"		8550		381		3			
773.1	783.7	10.6			"		8551		861		0		.005	0.5
783.7	794.1	10.4			"		8552		600		0			
794.1	804.4	10.3			"		8553		142		0			
804.4	814.0	9.6			"		8554		197		0			
814.0	824.1	10.1			"		8555		287		0			
824.1	833.9	9.8			"		8556		438		0		Tr.	0.3
833.9	842.1	8.2			"		8557		590		0			
842.1	852.4	10.3			"		8558		659		0			
852.4	860.5	8.1			"		8559		426		0			
860.5	870.6	10.1			"		8560		653		9			
870.6	880.7	10.1			"		8561		451		0		Tr.	0.3
880.7	890.9	10.2			"		8562		374		0			
890.9	901.1	10.2			"		8563		143		0			
901.1	911.2	10.1			"		8564		214		0			
911.2	921.5	10.3			"		8565		158		0			
921.5	928.7	7.2			"		8566		266		0		.005	0.8
	Bottom 928.7													

SHEET NO. 1

DATE STARTED 6-13-6[redacted]

DIAMOND DRILL AS[redacted] LOG

DATE COMPLETED 7-23-64

HOLE NO. SEH-6

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4205

BEDROCK ELEVATION Estimated 3919

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm					
0	254.2			Rock bit												
254.2	266.6		Alluvium		NXWL											
266.6	276.6		"		"											
276.6	285.8		"		"											
285.8	296.8	11.0			"		8576		180		0					
296.8	306.5	9.7			"											
306.5	316.4	9.9			"											
316.4	326.5	10.1			"											
326.5	336.3	9.8			"											
336.3	346.3	10.0			"		8577		170		0					
346.3	356.6	10.3			"											
356.6	366.3	9.7			"											
366.3	376.4	10.1			"											
376.4	383.8	7.4			"											
383.8	393.8	10.0			"		8578		210		0					
393.8	404.3	10.5			"											
404.3	413.9	9.6			"											
413.9	424.0	10.1			"											
424.0	433.6	9.6			"											
433.6	441.3	7.7			"		8586		230		4					
441.3	447.4	6.1			"											
447.4	457.5	10.1			BXWL											
457.5	465.8	8.3			"											
465.8	474.8	9.0			"		8587		102		4					
474.8	481.2	6.4			"											
481.2	491.3	10.1			"											
491.3	500.0	8.7			"											
500.0	511.9	11.9			"		8588		222		6					
511.9	524.1	12.2			"											
524.1	534.6	10.5			"											
534.6	546.0	11.4			"											
546.0	557.5	11.5			"											
557.5	568.6	11.1			"		8594		254		3					
568.6	581.6	13.0			"											
581.6	592.1	10.5			"											
592.1	602.9	10.8			"											
602.9	611.4	8.5			"											
611.4	621.2	9.8			"		8603		41		7					
621.2	633.9	12.7			"											
633.9	643.2	9.3			"											
643.2	651.2	8.0			"											
651.2	662.5	11.3			"											
662.5	674.4	11.9			"		8604		106		16					
674.4	685.0	10.6			"											

Tuffaceous rhyolite (post mineral)

Spike-E Hills Rock silicified rhyolite

rhyolitic volcanic agglomerate

— continued —

SHEET NO. 2

DATE STARTED _____ DIAMOND DRILL ASS[illegible] LOG

DATE COMPLETED _____ HOLE NO. SEH-6

COORDINATES _____ _____ COLLAR ELEVATION _____ BEDROCK ELEVATION _____

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
	— continued —													
685.0	695.6	10.6			BXWL									
695.6	706.6	11.6			"									
706.6	717.9	11.3			"									
717.9	726.8	8.9	1.0		"									
726.8	737.0	10.2			"		8605		386		12			
737.0	747.2	10.2	5.0	0%	"		8606		361		16			
747.2	756.2	9.0	29.1	50	"		8607		1496		14		Tr.	0.1
756.2	765.9	9.7			"		8608	3373.67	935	1231	10			
765.9	776.3	10.4			"		8609		1558		11			
776.3	781.5	5.2			"		8610		132		12			
781.5	789.7	8.2			"		8611		90		10			
789.7	800.0	10.3			"		8612		1353		18		.005	0.2
800.0	810.1	10.1	3.0	111.9	"		8613		726		22			
810.1	817.8	7.7			"		8614	45	1517	1199	17			
817.8	828.0	10.2			"		8615		1271		8			
828.0	838.0	10.0			"		8616		820		6			
838.0	848.5	10.5	4.0		"		8617	3587.33	2091	1741	6		.005	0.2
848.5	858.6	10.1			"		8618		1378		6			
858.6	867.9	9.3			"		8619		410		13			
867.9	877.2	9.3			"		8620		525		7			
877.2	889.1	11.9			"		8621		389		6		Tr.	0.2

Rhyolitic Volcanic Agglomerate

Bottom 889.1

SHEET NO. 1

DATE STARTED 7-24-6[redacted]

DIAMOND DRILL ASS[redacted]LOG

DATE COMPLETED 8-7-64

HOLE NO. SEH-7

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4230

BEDROCK ELEVATION Estimated 3994

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm	Cu %	Mo ppm		Au oz	Ag oz
0	245		Rock bit + Alluvium											
245.0	256.5	11.5	7.0		NXWL		8622		272		8			
256.5	265.8	9.3			"		8623		316		6			
265.8	274.5	8.7			"		8624		287		4			
274.5	284.9	10.4			"		8625		502		2			
284.9	295.2	10.3	5.5		"		8626		1000		3			
295.2	303.5	8.3			"		8627		320		3			
303.5	313.9	10.4			"		8628		556		1			
313.9	323.6	9.7			"		8629		566		0			
323.6	334.5	10.9			"		8630		286		3			
334.5	344.9	10.4			"		8631		156		3			
344.9	354.9	10.0			"		8632		98		1			
354.9	364.7	9.8			"		8633		102		0			
364.7	374.6	9.9			"		8634		122		0			
374.6	384.9	10.3			"		8635		123		6			
384.9	394.7	9.8			"		8636		48		2			
394.7	403.8	9.1			"		8637		83		2			
403.8	413.6	9.8			"		8638		169		1			
413.6	423.0	9.4			"		8639		476		1			
423.0	433.0	10.0			"		8640		260		2			
433.0	441.2	8.2			"		8641		224		1			
441.2	451.2	10.0			"		8642		574		2			
451.2	461.1	9.9			"		8643		296		1			
461.1	470.6	9.5			"		8644		443		7			
470.6	480.2	9.6			"		8645		680		4			
480.2	489.5	9.3			"		8646		676		1			
489.5	499.0	9.5			"		8647		796		5			
499.0	508.6	9.6			"		8648		378		3			
508.6	518.3	9.7			"		8649		266		1			
518.3	530.8	12.5			"		8650		320		7			
ox 530.8	540.8	10.0			"		8651		279		16			
540.8	550.4	9.6			"		8652		4690	.51	6		Tr	0.2
sulf 550.4	560.0	9.6			"		8653		2362	.27	3			
560.0	570.5	10.5			"		8654		1517	.18	1			
570.5	580.2	9.7			"		8655		1230	.14	1			
580.2	590.6	10.4	9.3		"		8656		3997	.38	0	30.00		
590.6	600.5	9.9			"		8657		2878	.31	0		.005	0.3
600.5	607.7	7.2			"		8658		5227	.54	0			
607.7	614.6	6.9			"		8659		3444	.37	0			
614.6	624.9	10.3			"		8660		3468	.34	0		Tr	0.1
624.9	632.1	7.2			"		8661		3174	.32	0		.005	0.2
632.1	642.3	10.2		MONZONITE	BXWL		8662		1616	.19	5			
642.3	651.0	8.7			"		8663		2165	.20	3			
651.0	661.5	10.5			"		8664		3116	.36	7			
661.5	671.6	10.1			"		8665		1476	.17	5	5.54@0.17		
671.6	679.6	8.0		Schist	"		8666		844		6		Tr	0.1
679.6	685.7	6.1			"		8667		550		3			
	432.1	Bottom		685.7										
	536													

Assay Office — Jacobs

0.33

SHEET NO. 1

DATE STARTED 8-8-64

DIAMOND DRILL ASSAY LOG

DATE COMPLETED 8-20-64

HOLE NO. SEH-8

COORDINATES _____ _____

COLLAR ELEVATION Estimate 4210

BEDROCK ELEVATION Estimat 3962

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm		Au oz	Ag oz
0	255.0	ALLUVIUM		Rock bit										
255.0	266.1	11.1			NXWL		8671		98		5			
266.1	275.9	9.8			"									
275.9	285.8	9.9			"									
285.8	295.1	9.3			"									
295.1	304.7	9.6			"									
304.7	314.3	9.6			"		8672		132		6			
314.3	324.2	9.9			"									
324.2	333.0	8.8			"									
333.0	341.5	8.5			"									
341.5	351.0	9.5			"									
351.0	360.7	9.7			"		8673		142		4			
360.7	369.7	9.0			"									
369.7	379.4	9.7			"									
379.4	389.5	10.1			"									
389.5	399.1	9.6			"									
399.1	408.7	9.6	RHYOLITIC Volcanic Agglomerate		"		8674		119		4			
408.7	418.2	9.5			"									
418.2	428.0	9.8			"									
428.0	441.0	13.0			"									
441.0	450.5	9.5			"									
450.5	460.5	10.0			"		8675		86		5			
460.5	469.8	9.3			BXWL									
469.8	480.0	10.2			"									
480.0	490.1	10.1			"									
490.1	500.3	10.2			"									
500.3	511.9	11.6			"		8676		78		3			
511.9	522.6	10.7			"									
522.6	534.3	11.7			"									
534.3	544.6	10.3			"									
544.6	555.6	11.0			"									
555.6	567.1	11.5			"		8677		129		5			
567.1	577.6	10.5			"									
577.6	587.0	9.4			"									
587.0	596.4	9.4			"									
596.4	606.0	9.6			"									
606.0	617.4	11.4		100	"		8678		1082		1			
617.4	627.7	10.3		100	"		8668		5166		0		Tr.	0.2
627.7	635.3	7.6	94		"		8669		124		10			
635.3	643.8	8.5			"		8670	10576.7	2829	2365	4		.005	0.1
643.8	653.5	9.7			"		8679		148		4			
653.5	662.1	8.6			"		8680		3034		3		Tr.	0.1
662.1	674.6	12.5			"		8681		115		3			
	Bottom 674.6													
					60	1966 / 118061.5								

SHEET NO. 1

DATE STARTED 9-18-64

DIAMOND DRILL ASS[illegible] LOG

DATE COMPLETED 10-2-64

HOLE NO. SEH-9

COORDINATES _____ _____

COLLAR ELEVATION Estimated 4225

BEDROCK ELEVATION Estimated 3916

Footage From	Footage To	Interval	Measured Core Recovery	% Recovery	Hole Size	S.G.	Sample No.		Cu ppm		Mo ppm
0	305.0		Rock bit								
305.0	310.0		Alluvium to 309								
310.0	318.6	8.6			NXWL		8682		184		10
318.6	324.1	5.5			"						
324.1	334.8	10.7			"						
334.8	343.5	8.7			"						
343.5	352.5	9.0			"		8683		115		5
352.5	360.0	7.5			BXWL						
360.0	369.6	9.6			"						
369.6	380.0	10.4			"				105		7
380.0	388.5	8.5			"		8684				
388.5	399.0	10.5			"						
399.0	410.0	11.0			"						
410.0	420.0	10.0			"						
420.0	430.0	10.0			"		8685		324		13
430.0	439.8	9.8			"		8686		297		6
439.8	450.0	10.2			"		8687		95		9
450.0	460.0	10.0			"		8688		82		25
460.0	468.6	8.6			"		8689		38		21
468.6	479.6	11.0			"		8690		52		12
479.6	489.4	9.8			"		8691		150		19
489.4	499.4	10.0			"		8692		160		14
499.4	509.8	10.4			"		8693		105		16
509.8	520.0	10.2			"		8694		274		18
520.0	530.0	10.0	RHYOLITIC VOLCANIC AGGLOMERATE		"		8695		3690		12
530.0	540.0	10.0			"		8696		1050		5
540.0	550.0	10.0			"		8697		119		7
550.0	560.0	10.0			"		8698		1804		6
560.0	570.0	10.0			"		8699		86		6
570.0	578.5	8.5			"		8700		3034		6
578.5	589.0	10.5			"		8701		389		4
589.0	599.0	10.0			"		8702		238		5
599.0	609.0	10.0			"		8703		1304		3
609.0	619.0	10.0			"		8704		1124		5
619.0	629.0	10.0			"		8705		886		6
629.0	639.0	10.0			"		8706		640		5
639.0	649.0	10.0			"		8707		550		4
649.0	659.0	10.0			"		8708		533		4
659.0	669.0	10.0			"		8709		344		6
669.0	679.0	10.0			"		8710		344		6
679.0	689.0	10.0			"		8711		656		5
689.0	699.0	10.0			"		8712		632		5
	Bottom 699.0										

DATE: January 29, 1974

TO: J. David Lowell

FROM: Arthur R. Still

RE: Review of Data - Spike E Hill Data

At your request, I have made a review of the data in our files pertaining to the Spike E Hill area. This data consists primarily of:

a) an internal A S & R report (Stauffer to Courtright) of 1/10/1965, (containing Bear Creek and A S & R data),
b) a 1" = 500' map, dated January, 1966, titled "Drill Map - Willcox Project" (showing all drill holes to that date), and
c) the results of our own CAP hole DC-1

As a result of this review the following conclusions have been reached:

1) the rocks exposed in Spike E Hill may not be Precambrian quartzite as mapped by Cooper (USGS MF231,1960), but more probably represent a portion of a highly siliceous rhyolite plug.

2) The copper mineralization in the immediate area of Spike E Hill, as tested by drilling to date by Bear Creek and A S & R, has a primary grade of 0.05 to 0.07%, it occurs in a high py-cp ratio zone in which the total sulfides are - for the most part - in the 3% to 7% by volume range, and the "encouragement" - such as it was - gained by +0.2% intercepts are the result of small, discontinuous supergene zones which have developed from the 0.05 to 0.07% primary grade mineralization.

3) An east-west trending fault of unknown total displacement occurs immediately north of Spike E Hill. This fault may correlate with a major fault mapped in outcrop (by Cooper) about 4 miles to the east of Spike E Hill. In the Spike E Hill area this fault displaces the base of allivial cover, and the top of the sulfide zone, by about 200 ft. (north side down). By working with BCMC sulfide estimates and sub-surface geologic rock type configurations it appears that the north block may have been moved in the range of 2000 to 4000 ft. west relative to the south (Spike E Hill) block, i.e. a left lateral component of displacement.

4) The weak mineralization as known at Spike E Hill may be entirely related to the rhyolitic plug (i.e. Spike E Hill plus rhyolitic "agglomerates" encountered in BCMC drill holes 5, 6 & 8) and/or the small quartz monzonite mass (BCMC drill hole 4), both of which may have been intruded along the zone of weakness created by the major fault discussed in (3) above. However, the mineralization as currently known could also be a part of the high pyrite halo around a major porphyry copper center.

If one assumes that the relatively high sulfide content (3%-7%), in conjunction with the low primary copper grade (0.05-0.07%), at Spike E Hill does represent the high pyrite halo around a porphyry

copper center, which appears to me to be geologically possible, then in my opinion that center would be located either to the southeast or to the northwest*. It appears to me that the area to the southeast has been adequately tested by drilling to date and/or by the existence of barren outcrop. That is to say, there is not sufficient room left to accomodate a "blind" porphyry of significant size. However, the area to the west and northwest is wide open - the only limits being in land availability and depth of cover.

As a result of this review I would suggest that your "area of interest" be moved in the order of 1 to 2 miles west-northwest of the past Spike E Hill area of drilling to test for a porphyry copper center in that direction.

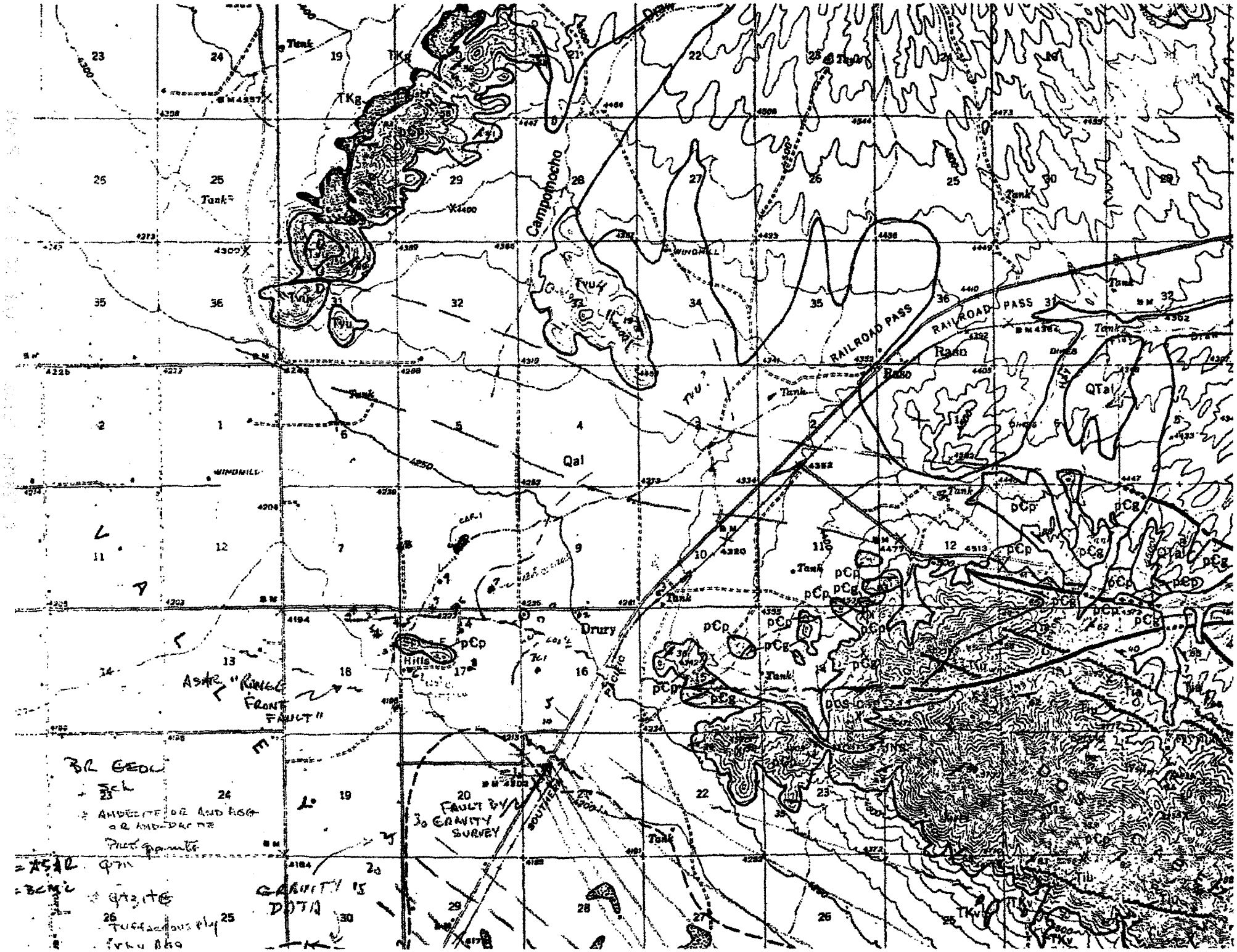
I am attaching a number of plates and sections which I will be happy to go over with you at your convenience.

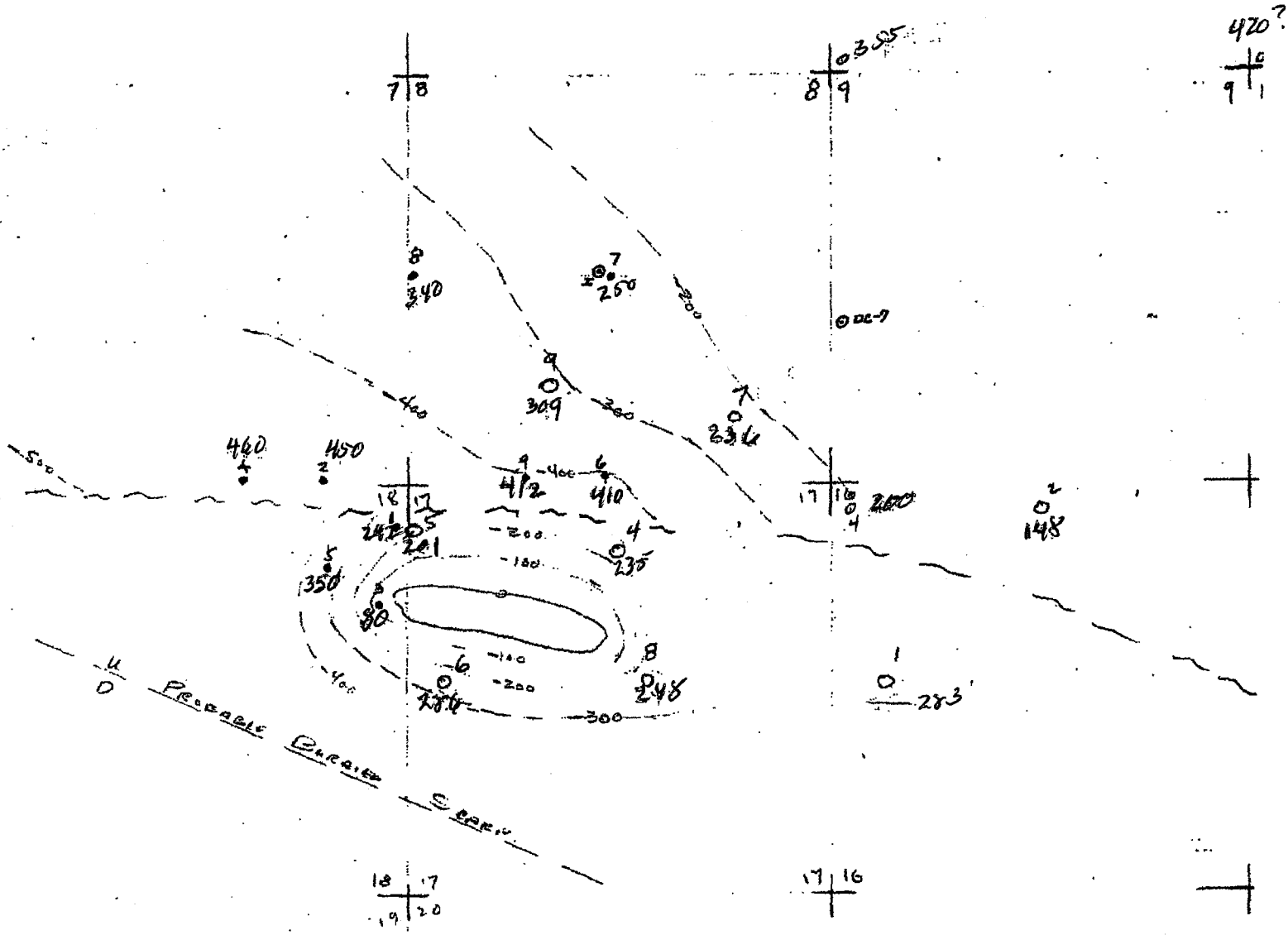
Very truly yours,

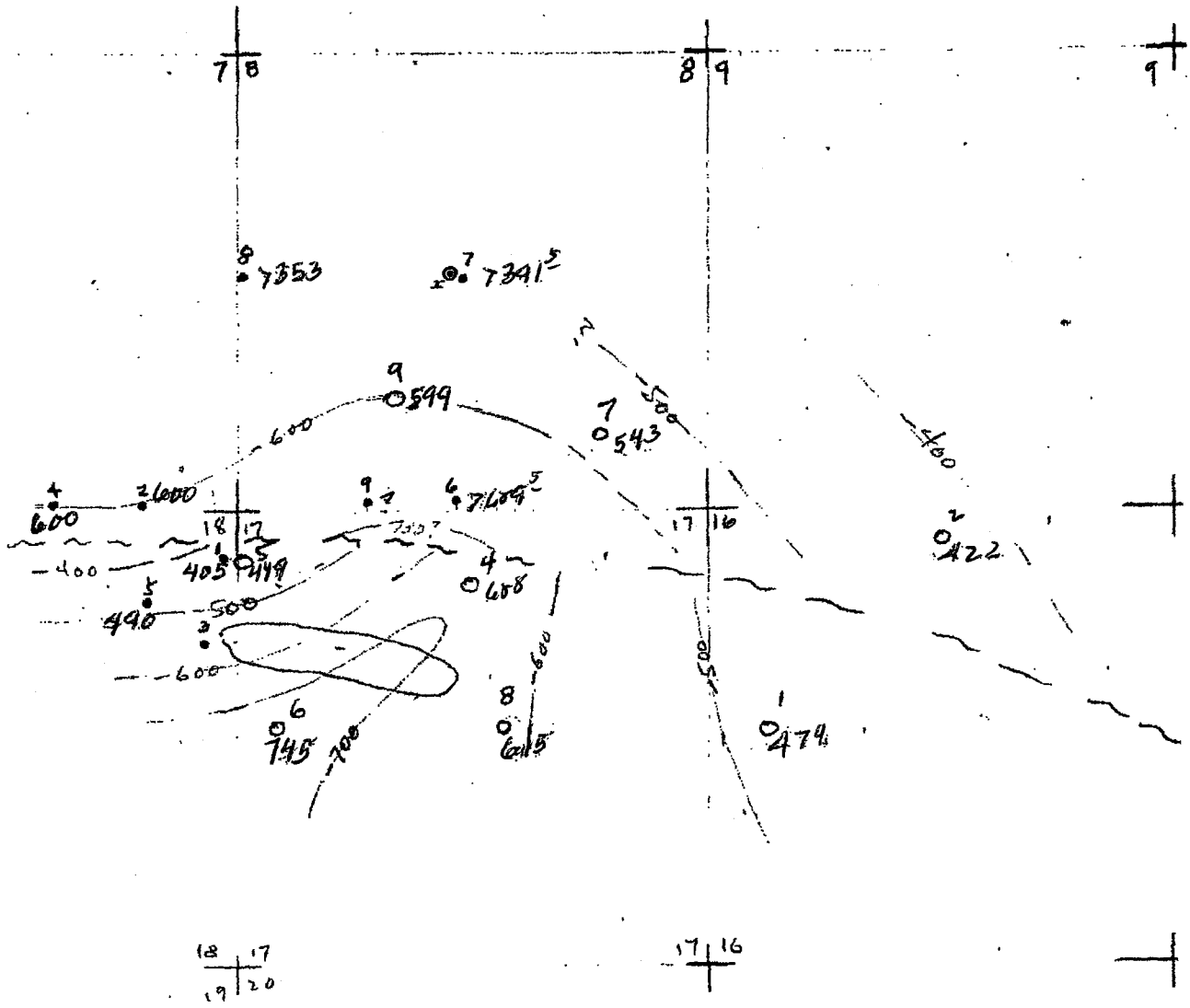
Arthur R. Still

ARS:mw

* Contours of sulfide content (attached) trend NE-SW and thus a "center" would presumably be either SE or NW. Also, the mineralized area is limited to the SW by a "range front fault", to the SE by barren (<0.05% Cu) holes BCMC-1 and BCMC-2, and to the north by our barren CAP DC-1.


Campomocho
RAILROAD PASS
Rand
Drury
Hills
Qal
QTal
pCp
pCg
TKg
TKv
Tvu
Tla
Tlb
Tank
WINDMILL
SOUTHERN PACIFIC
ASAR "RANGE FRONT FAULT"
FAULT BY 3a GRAVITY SURVEY
GRAVITY IS DOTTED


420?
355
340
250
309
236
460
450
412
410
241
350
80
235
148
284
248
283
Probable Curvature Sharp
Depth to Bedrock
1"=2000'
BCMC Drilling
O = BCMC
● = ASTR
⊙ CAP



Depth to Top of Ss

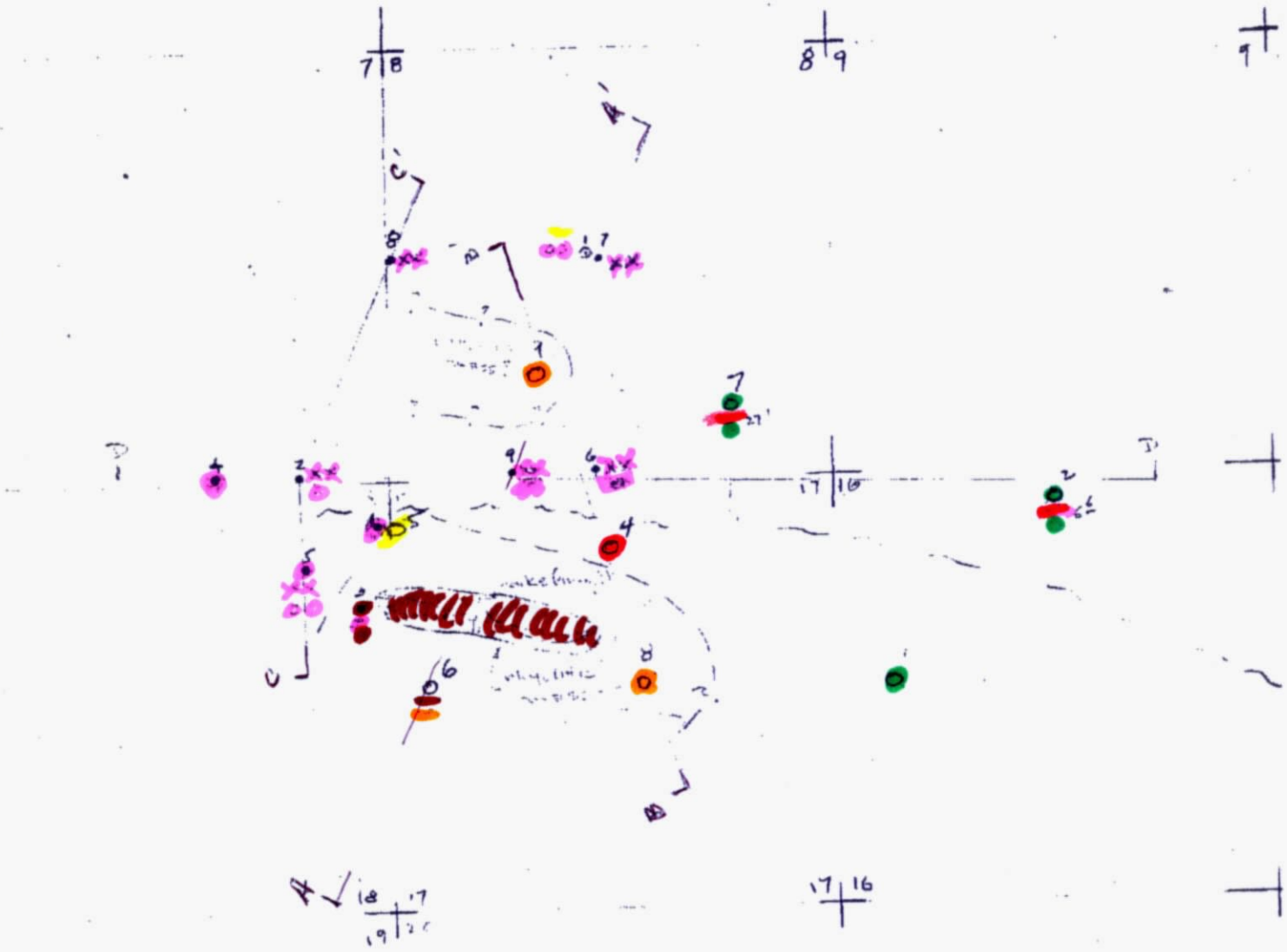
1" = 200'

BCMC

○ = BCMC

● = ASR

⊙ CAP



Predominant geol

- schist
- Spike thell [illegible] pillow rhyolite?
- and[illegible] - Dacite phy
- and[illegible] flows
- and[illegible] agg[illegible]
- granite porp.

- Tuffaceous [illegible]
- rhyolite vol agglom. [illegible]
- m[illegible]

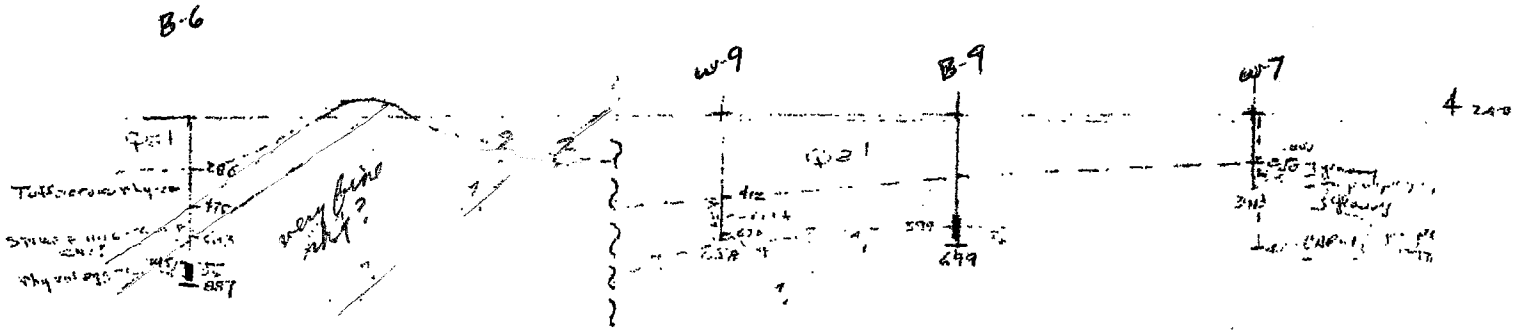
1" = 2000'

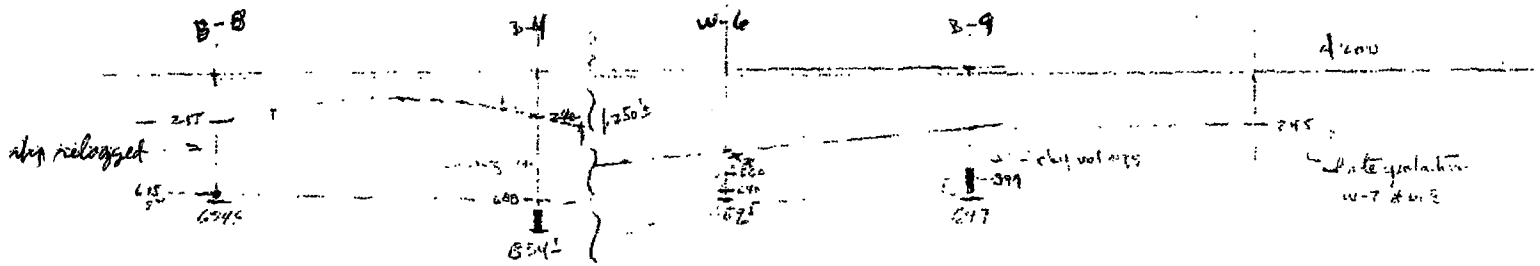
BCMC [illegible] ullivan

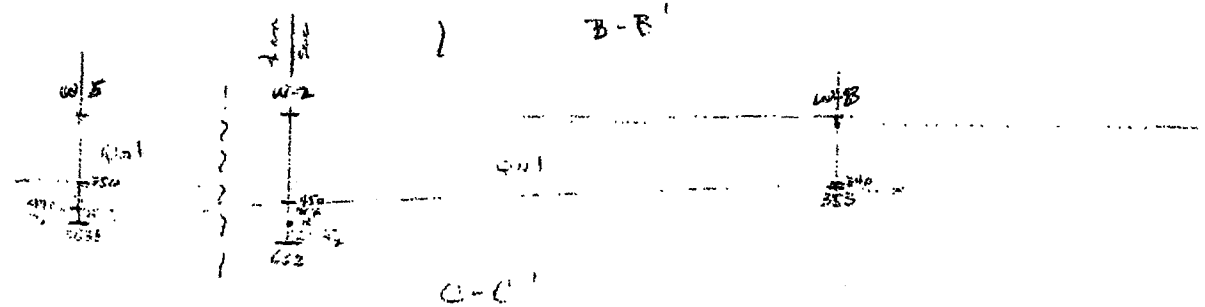
O = BCMC

● = ASAR

⊙ CAP



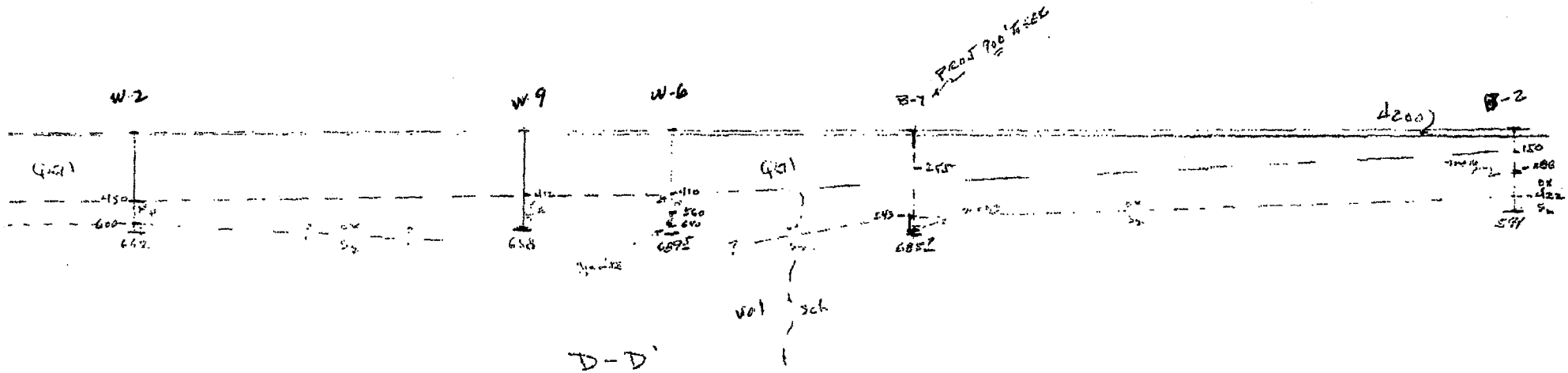


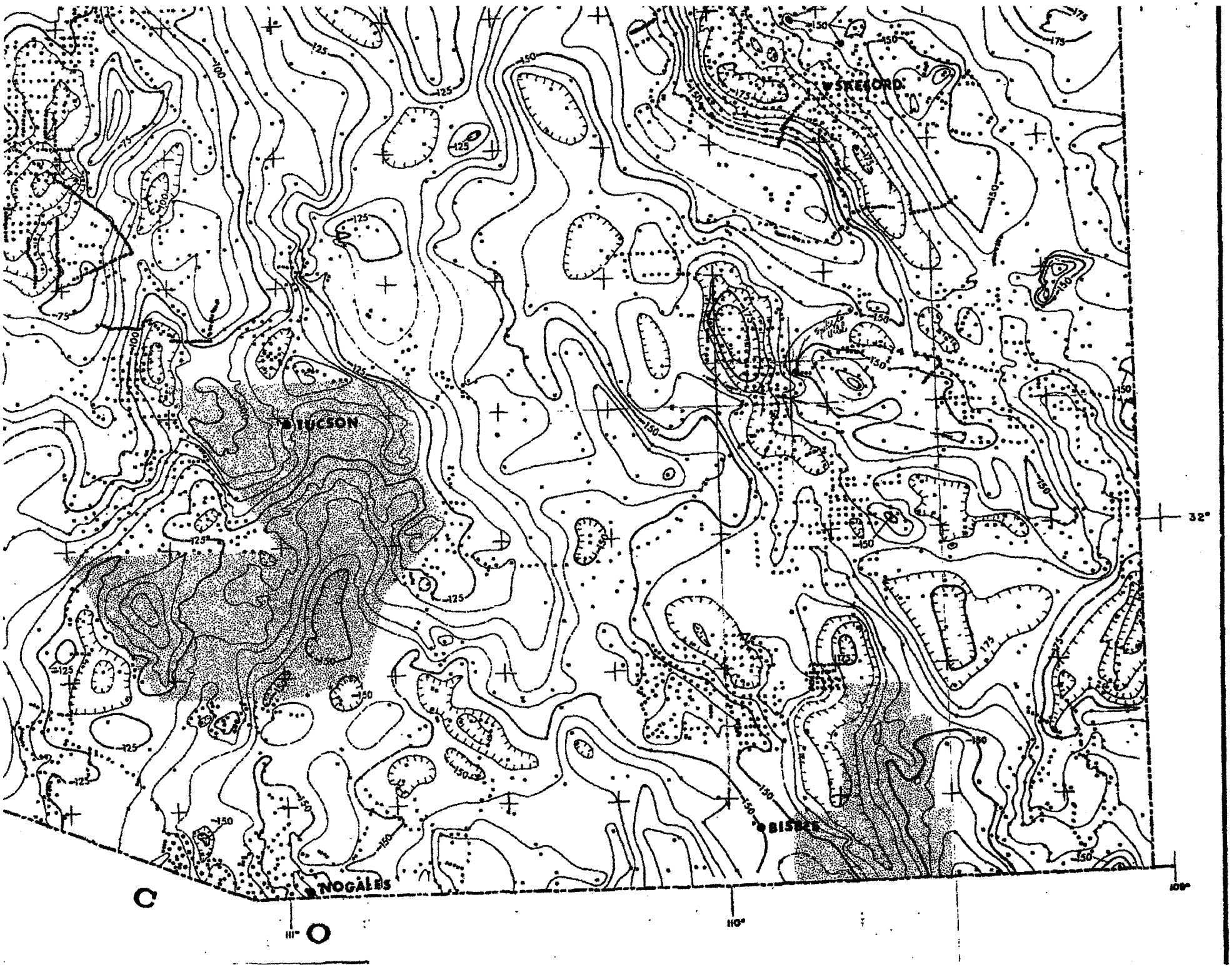


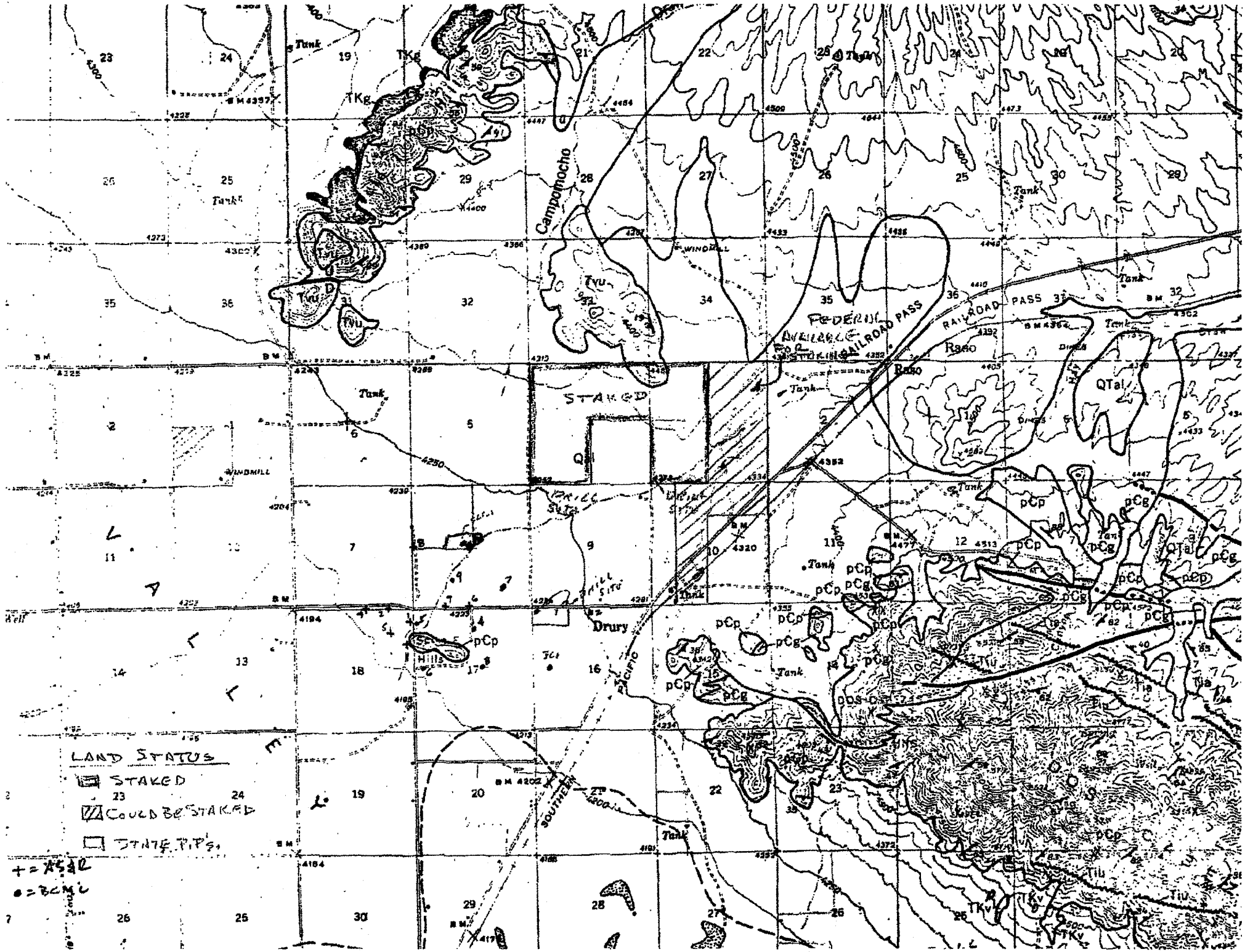
SPIKE E MILES

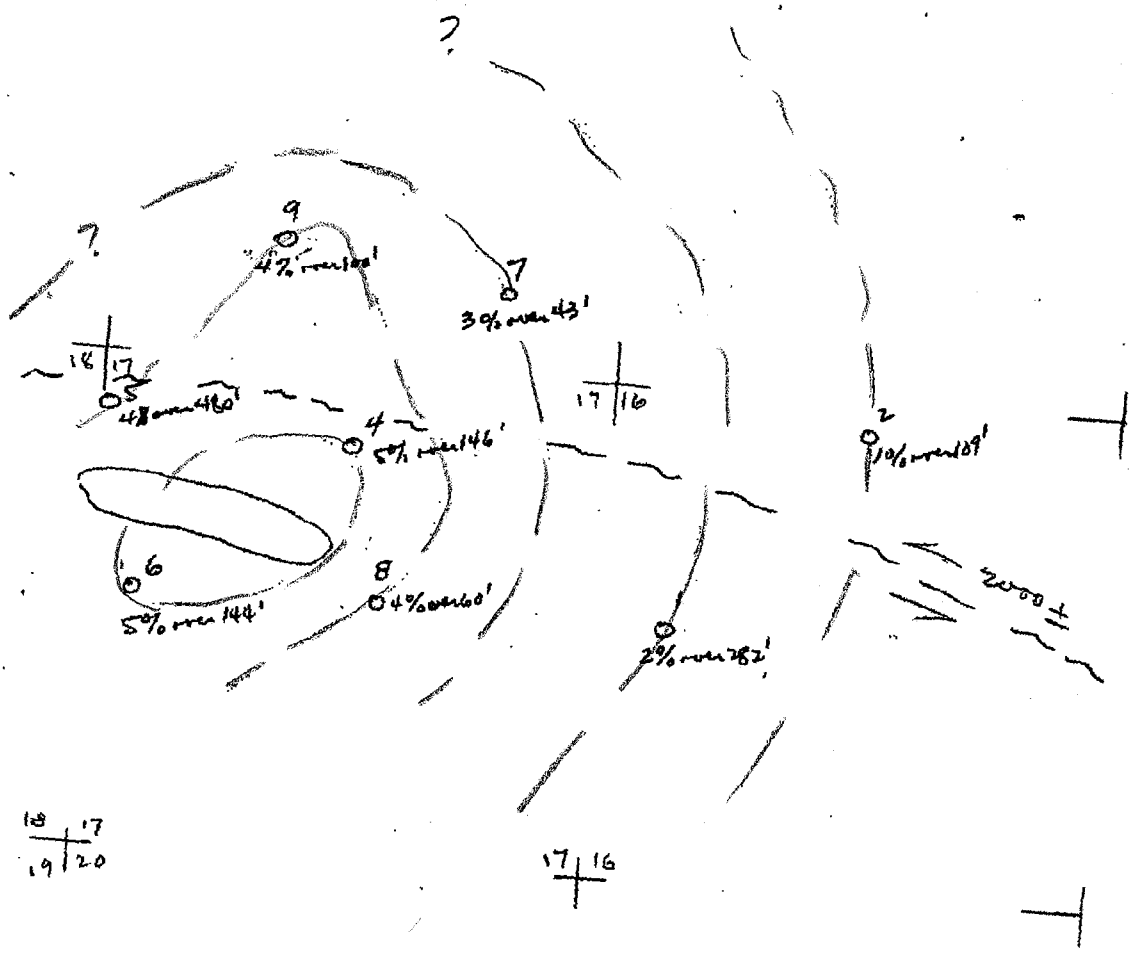
1" = 1000'

D125 1/29/74


W-2
W-9
W-6
B-7
B-2
D-D'


TUCSON
STRESORD
BISBEE
NOGALES
32°
109°
110°
111°
C
O

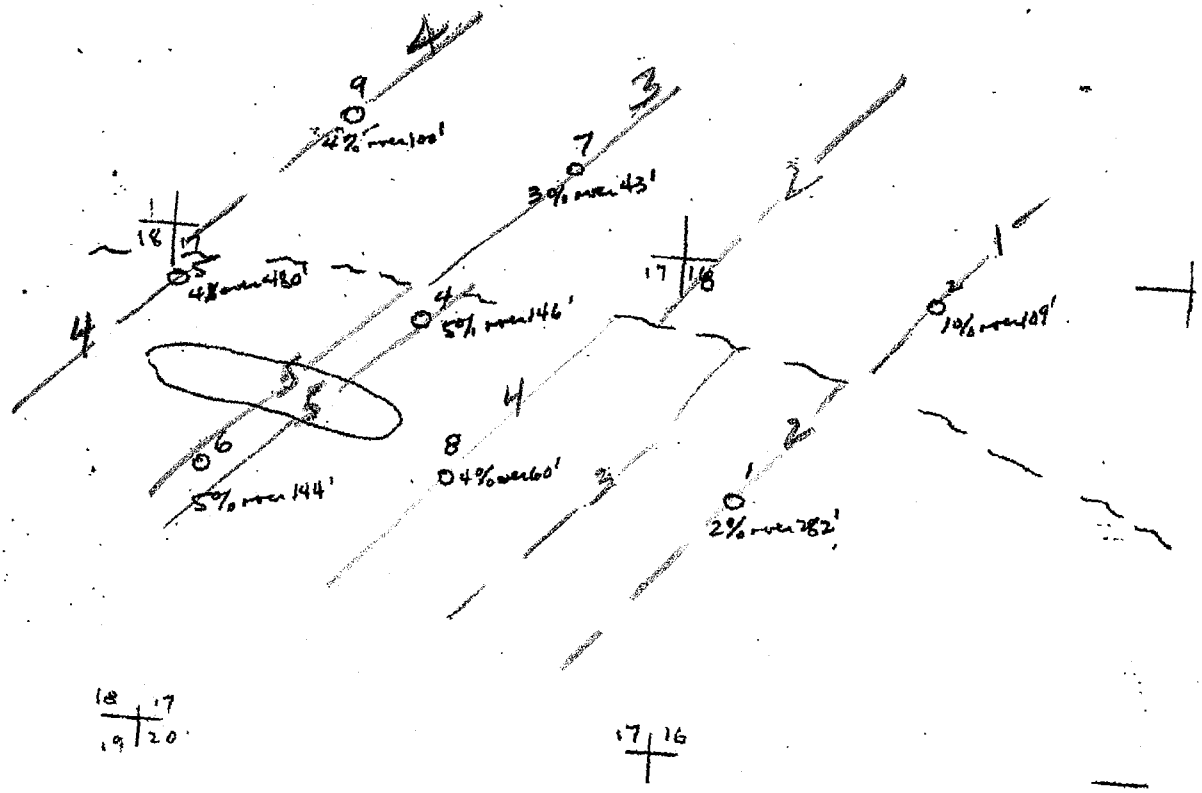

LAND STATUS
STAKED
COULD BE STAKED
STATE TRS.
+ = ASAR
• = BLM
STAKED
FEDERAL AVAILABLE FOR STAKING
RAILROAD PASS
Campamocho
Drury
Hills
Rano
Tank
WINDMILL
DRILL SITE
SOUTHERN PACIFIC
TKg
TKv
Tlu
Tla
QTal
pCp
pCg
pDp



As in
Contour S_2 contour

1" = 2000'
BCMC Drilling

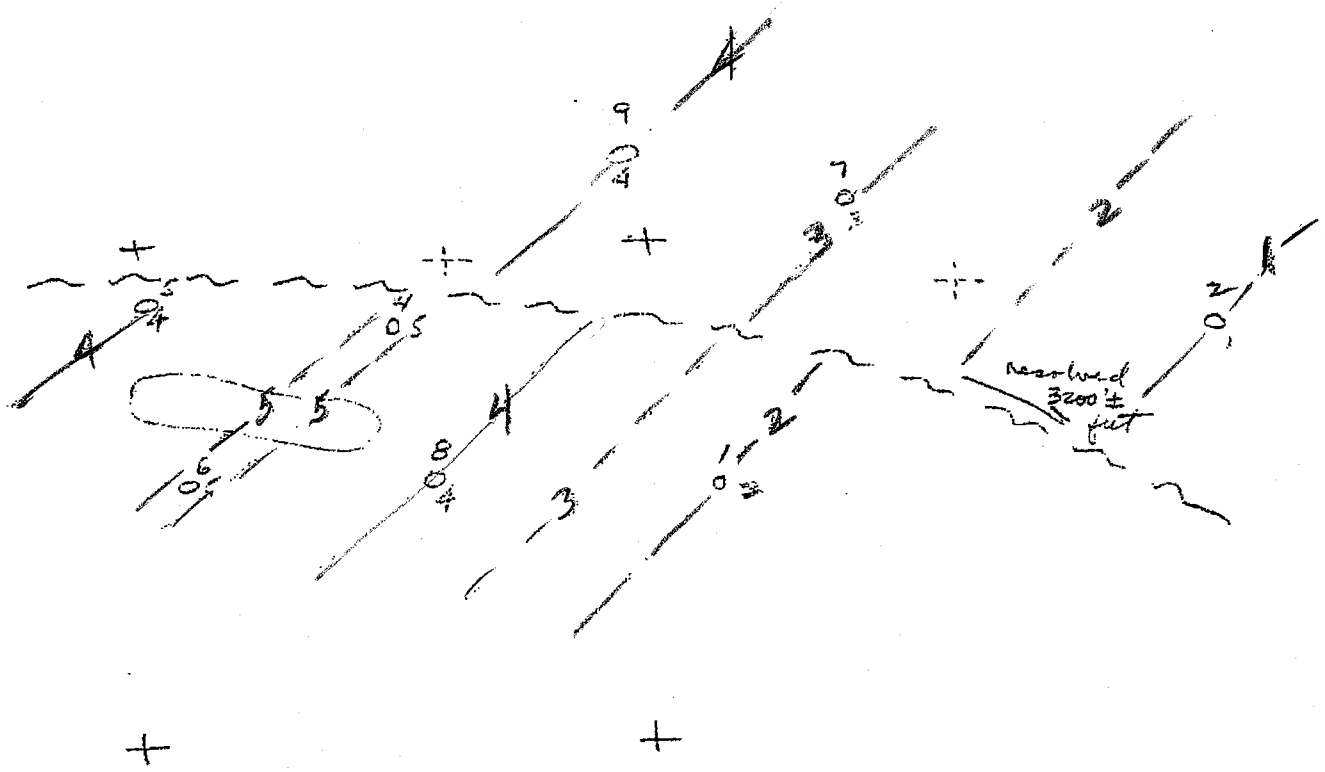
(1)



Or
as is
Contour 5 content

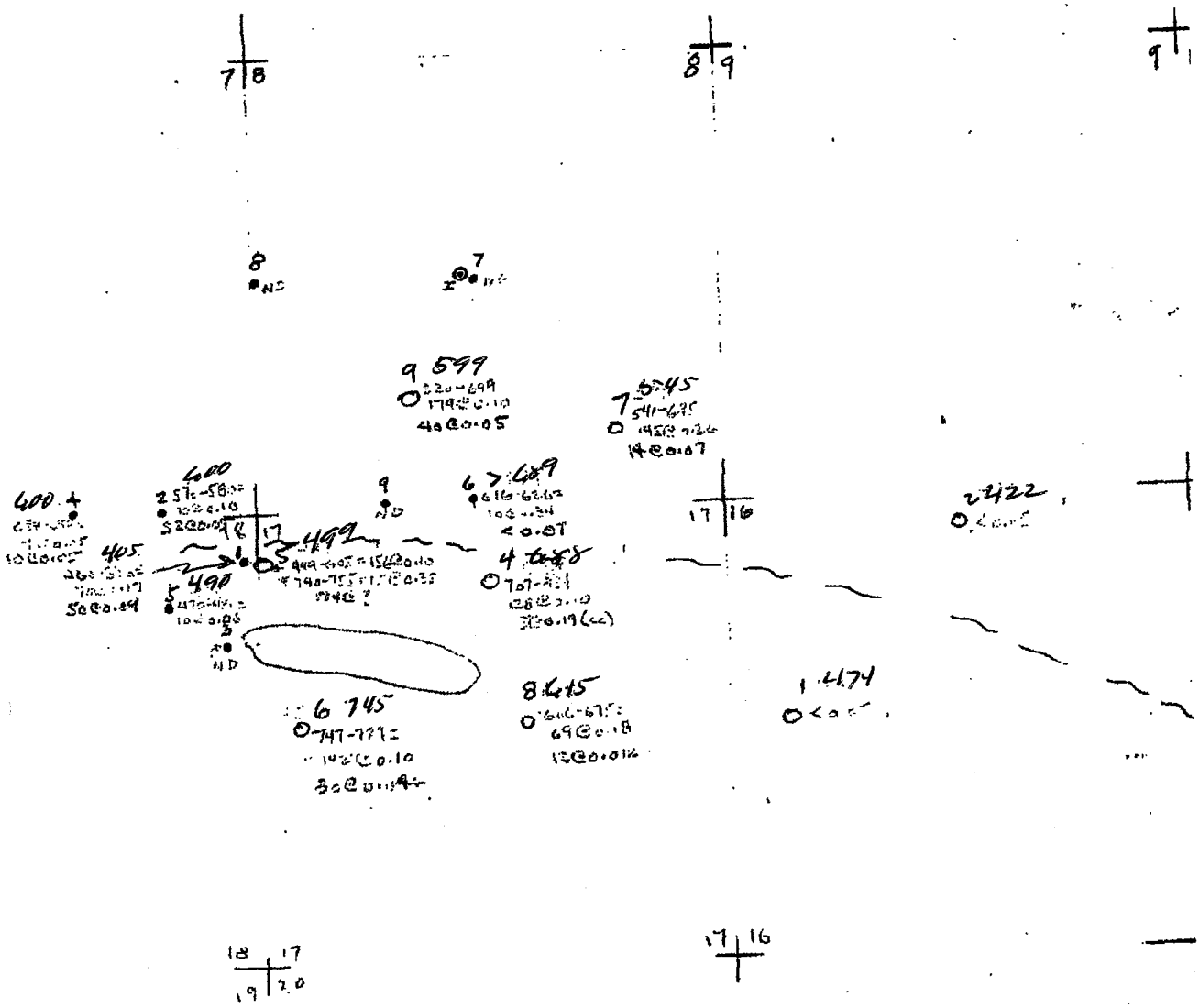
1" = 2000'
BCMC drilling

14



Predisplacement ±
N. block moved 3200'±
East

Bcmc
holes only.



- DEPTH TO TOP. of SULFIDES

— BEST INTERCEPTS
(USUALLY AT OR NEAR BASE OF OXIDATION)
50 ppm cutoff

— ~~AT~~ GRADE AT B.O.H.

ND = No [illegible]

1" = 2000'
BCMC

○ = BCMC
● = ASK
⊙ CAP

Mining Geologist
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California

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Office
(602)327-1888

May 22, 1974

J. D. Lowell
Still, Lowell, and Still
5115 N. Oracle Road
Tucson, Arizona

Subject: Dos Cabezas CAP, Exploration Review, Cochise County, Arizona

Dear Sir:

Following a one-day field examination, and a thorough review of drill results and rock samples, a full verbal report was presented to you on May 3. This letter will summarize my findings and transmit maps and drill logs prepared during this review.

All previous information (including reports, maps, and petrography) was made available to me, including Mr. Still's memo to you of January 29.

MAPS

Attachment A: Bedrock geology.

Attachment B: Contours of depth to bedrock. Since the land surface is very level, this also essentially depicts bedrock topography.

Attachment C: Contours of depth to sulphides, also showing per cent total sulphides and limits of strong pervasive alteration/mineralization.

Attachment D: Contours, depth to bedrock, also showing inferred faults and drill holes with best copper content.

ROCK CORRELATION

Spike E hill is made either of a true quartzite, or of a very siliceous acid volcanic. The dip, as suggested in outcrop and by drill hole correlation, is about 40° south. This quartzite is surrounded by quartz latite--probably a flow. I believe that both these formations are units of the pre-Cambrian, and are probably underlain and also overlain by the more typical pre-Cambrian schist. The quartzite is

probably of limited extent, as it is seen only in outcrop and in two adjacent drill holes.

Monzonite porphyry, probably a small stock, has been penetrated in SEH-4 and DC-4. The two western-most Asarco holes (W-2 and 4) penetrated a dacite porphyry--probably a Cretaceous or early Tertiary flow.

Post-mineral volcanics were intersected by DC-1 and 5, and by W-7 and 8. Asarco W-6 and 9 are considered pre-mineral in the Asarco report; however, I believe otherwise. The attached logs detail this problem. For W-6, I have chosen post-mineral alternative correlations 2A and 3A, as most likely for the lower two units penetrated. The upper unit is surely a post-mineral andesite. Asarco W-9 penetrated rocks correlative to the upper two units in W-6, and also therefore penetrated only the post-mineral section. The above interpretation is at variance with the Asarco conclusions; however, I have considered this matter carefully, and I believe the interpretation here given is the most probable.

DISCUSSION

The principal problem outlined by Mr. Arnold was: if a "copper" center was actually present within the area of principal drilling, how could its presence remain undetected? I believe the answer may lie in the geometry of post-mineral faulting, and the distribution of Tertiary volcanic cover.

The following assumptions are permissible, and in part are indicated by fact:

1. The alteration/mineralization encountered is strong, and is not entirely pyritic--that is, <u>some</u> copper is locally present. Statistically, there <u>should</u> be a cupriferous "center," even if such a center is not actually ore.

2. The zone of better copper mineralization will be cylindrical or elliptical.

3. The volcanics as seen in outcrop to the northeast of Spike E hill strike N-NW and dip 30-50° SW. This is in conformance to dips plotted elsewhere in the Dos Cabezas range and other nearby hills (USGS).

4. The copper "cylinder" thus should have been rotated, so that it now plunges 40-60° NE.

5. The copper center may have a high pyrite "shell" or periphery, partly or entirely surrounding the center.

6. The working hypothesis, then, is that a copper center, more or less cylindrical, probably exists somewhere within Spike E hill zone of alteration/mineralization, and that it now plunges--say--50° NE.

Mr. Still has proposed that a fault, striking easterly, passes north of Spike E hill. The bedrock topography (Att. B and D.) suggests the possibility of such a fault or faults, and the depth of oxidation (top of sulphides, Att. C) suggests modification in harmony with such a fault. The most probable explanation of bedrock geology dictates the presence of the main east-striking fault, and also suggests two possible related faults which form a graben of post-mineral volcanics.

The amount and direction of displacement on the major fault can be only the subject of speculation. General considerations suggest a throw with the north side down; the apparent dip-throw of the schist-quartz latite contact intersected in DC-4 is 600 feet. The amount of horizontal throw, if any, can only be inferred--however, the faults bounding the volcanic graben intersect the major fault at an angle suggesting right-lateral strike slip. Notwithstanding the above speculations, I must emphasize that although the major fault above discussed must certainly exist, present data permits neither the direction nor amount of throw to be defined with confidence.

The most appealing interpretation is that both normal throw and perhaps large right-lateral movement have occured on the principal fault. The graben area results from tension faults in the hanging wall. Under this assumption, the following interpretation is possible:

The pyritic mineralisation encountered south of the fault represents the southwest and southern periphery of the altered zone, which is probably elongated SW. The copper "center" was penetrated on its extreme south edge by DC-4. The increase and then decrease in primary copper sulphides represents--as you have theorized--the effect of drilling past the periphery of the tilted copper cylinder. The principal part of the copper center lies north of the east-striking major fault, but has been shifted east at least 1,000 feet, largely by horizontal motion. Drill holes SEH-7 and 9 penetrated only the southwest flank of the tilted cylinder.

All drilling, thus, has penetrated what, in effect, is a pyritic "footwall" of the tilted copper center. The copper cylinder lies east or northeast of SEH-7. Since IP data suggest that sulphides die out about 3,000 feet NE of SEH-7, it must be supposed that the pyritic "shell" was originally assymetrical, and existed principally around the western periphery of the deposit, and that the copper "center" fades

out into fresh rock through a pyrite-poor zone. Such a "model" certainly has precedent in known deposits--Sacaton for example.

An alternate possibility is that the combined movement along the major fault produced a throw down and to the west. Under such an assumption, SEH-7 and 9 might have penetrated the pyritic shell on the northeast side, or "hanging wall," of the tilted copper cylinder. The copper center would thus be concealed beneath the volcanic graben, and would not have been reached in depth by shallow hole SEH-9. All holes south of the major fault, by this reasoning, penetrated the southwest or "footwall" pyritic shell.

EXPLORATION RECOMMENDATIONS

As discussed earlier, a hole positioned on available land, about 2,000 feet north of DC-4, will quickly serve to indicate whether the hypothesis above favored is correct. Such a hole should be much closer to the "center" (or within it) if major right-lateral movement has been present.

If the second alternative should prove correct, there is no recourse but drilling in section 8, which I am advised poses a difficult property situation.

There is no evidence whatever that copper values increase to the southwest, and accordingly I would be reluctant to recommend an expensive program in that direction, even though the pervasive mineralization is technically "open" in this direction.

Yours very truly,

John E. Kinnison

Attachment A

POST-ORE TERT -	Ta	Andesite & tuff
LARAMIDE —	Mz por	Qtz Monz por
TERT - CRET —	Dac Por	Dacite porphyry
PRE-CAMBRIAN	QL	Qtz Latite
	Qtzt	Quartzite
	sch	Schist

DRILL HOLES

- • ASER (W-1 etc)
- O Bear Creek (SEN-1 etc)
- O Lowell (DC-1 etc)

1" = 2000 ft

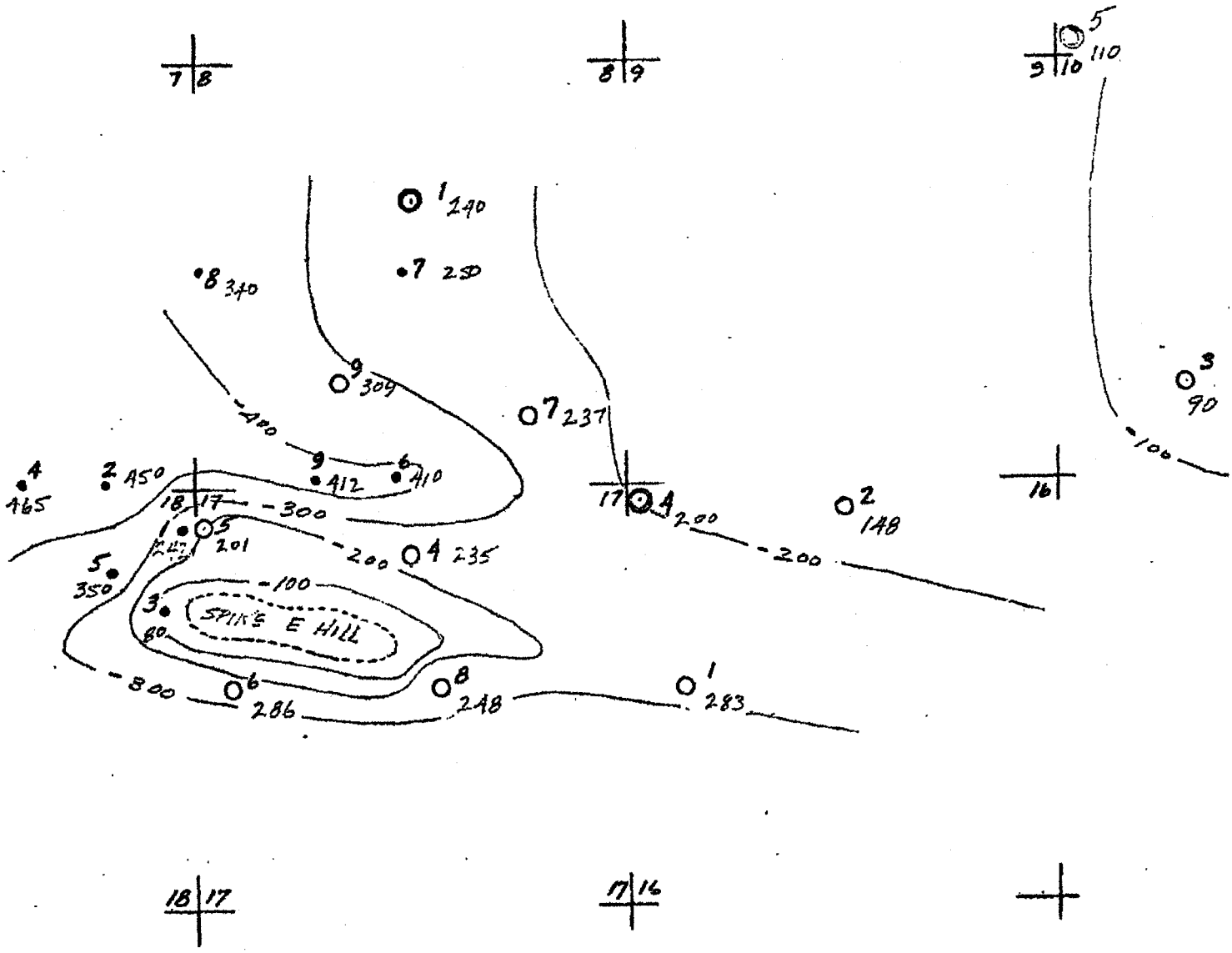
• 9 658
Penetration Depth in Post-ore Rocks
4 • 200 Depth pre-ore Pr

PREPARED FOR J D LOWELL
DOS CABEZAS
-CAP-
Cochise Co, Ariz

BEDROCK GEOLOGY

By JOHN E. KINNISON
Consulting Mining Geologist
April 1974

Attachment B



PREPARED FOR J D LOWELL
DOS CABEZAS
-CAP-
Cochise Co, Ariz

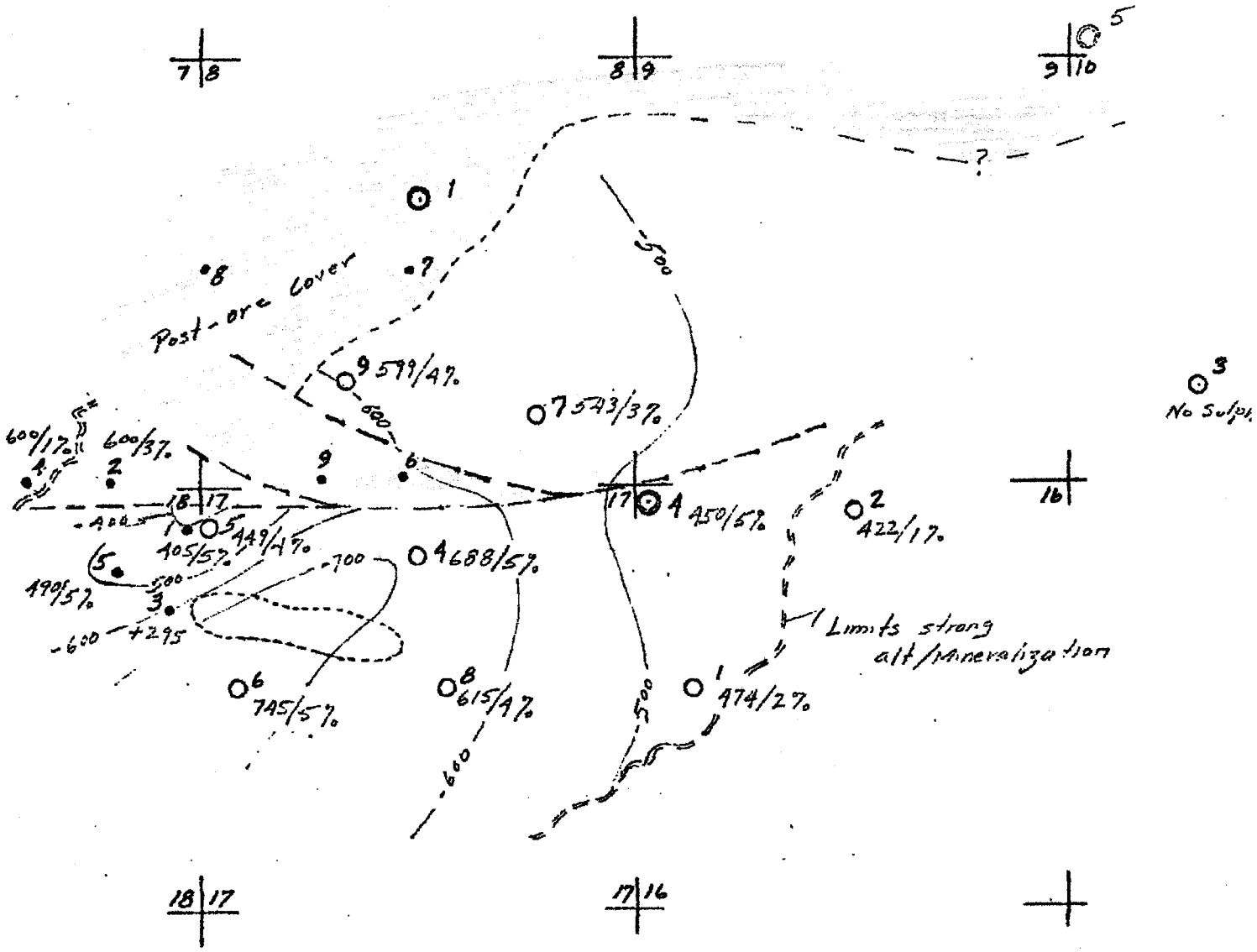
DEPTH to BEDROCK

DRILL HOLES
• ASER (W-1 etc)
O Bear Creek (SEH-1 etc)
O Lowell (DC-1 etc)

1" = 2000 ft

By JOHN E. KINNISON
Consulting Mining Geologist
April 1974

Attachment C



PREPARED FOR J D LOWELL

DOS CABEZAS

-CAP-

Cochise Co, Ariz

DEPTH TO SULPHIDES

DRILL HOLES

- • ASGR (W-1 etc)
- O Bear Creek (SEH-1 etc)
- O Lowell (DC-1 etc)

•8 — Drill Hole

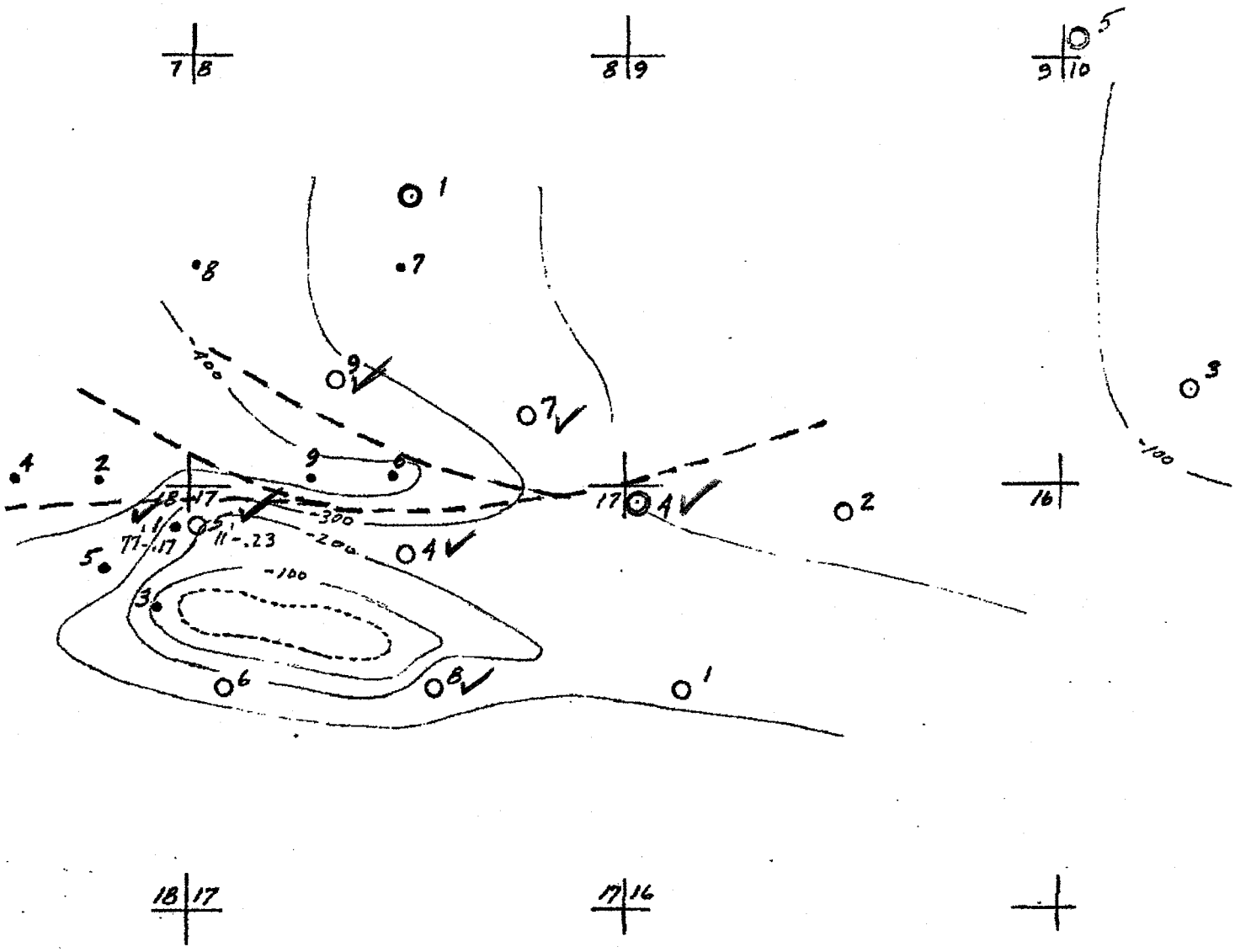
615/4%

% Total Sulph (Vol)

Depth Sulphide

By JOHN E. KINNISON
Consulting Mining Geologist
April 1974

Attachment D



✓ Drill hole with generally better copper content, either as secondary, primary, or both. SEH-7 best Cu.

PREPARED FOR J D LOWELL

DOS CABEZAS

-CAP-

Cochise Co, Ariz

BEDROCK CONTOURS & INFERRED FAULTS

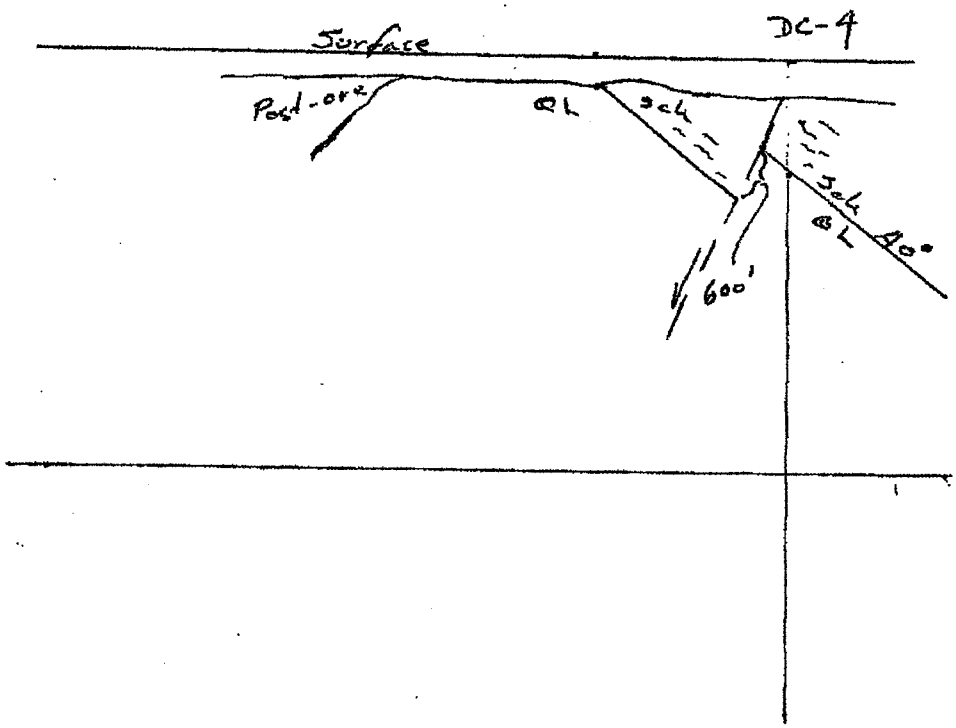
DRILL HOLES

- • AS&R (W-1 etc)
- ○ Bear Creek (SEH-1 etc)
- ○ Lowell (DC-1 etc)

1" = 2000 ft

By JOHN E. KINNISON
Consulting Mining Geologist
April 1974

Supplemental
Attachment



DOS CABEZAS CAP

Cochise County, Arizona

X-SECTION THROUGH
DC-4

Looking NE

Showing apparent displacement
of Schist-Qtz Latite contact

1" = 2000'

JEKinnison

CAP
Dos Cabezas

DRILL HOLE DC-4
T.D. 1955 ft

Alteration

Bedrock depth 200 ft
Top of Sulphides 450 ft
Chalcocite : 450-500

Total Sulphides 5 %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
200 - 1200 Schist	Schist	@ 500 & 720 Sch.
- 1650 Qmp and "Qtz-ser rock	Qtz-latite(?) of w-1 type	@ 918 - Qtz rich sch. - similar to W-1 Qtz lat in appearance.
- 1955 Qmp & Qtz-Ser-chl rock	Qtz monzonite porphyry	@ 1460 - Sample suggests porphyry fert -- but is not so described by Severa Poss correl to W-1 type Qtz-latite rather than intr.
		@ 1953 - Qtz monzonite porph. st. alt - ser + chl.

Assays (Rotary Samples)

200 - 450' - 250' - Gen. .01-.02% Cu Leached Capping.
- 500 - 50' - .07% Cu Cc zone
- 600 - 100' - ± .04% Cu pri Sulph
- 1050' - 450' - gen. increasing curve to ± .12% Cu
- 1450 - 400' - Major Section of higher Values. Peak* at .57% Cu @ 1100'; decreasing then to ± .12% Cu
- 1955 - 505' - ± .08% Cu

*Peak Values Cc enriched

Comments or notes

CAP
Dos Cabezas

DRILL HOLE SEH-1
T.D. 756 ft

Bedrock depth 283 ft

Top of Sulphides 474 ft

Alteration
Unknown

Chalcocite: None indicated by assays

Total Sulphides 2 %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
Schist	Schist	—

Assays

<.04 % Cu in both leached and sulph zones
except: @595 - 10' - .16 % Cu

Comments or notes

CAP
Dos Cabezas

DRILL HOLE SEH 2
T.D. 541 ft

Bedrock depth 148 ft
Top of Sulphides 422 ft
Chalcocite : —

Total Sulphides 1 %

Alteration

Unknown but prob wk or prop.

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Schist; 286-293 Mz dike	Schist	

Assays
< .02 % Cu

Comments or notes

CAP
Das Cabezas

DRILL HOLE SEH - 3
T.D. 126 ft

Bedrock depth 90 ft
Top of Sulphides – ft
Chalcocite : –

Alteration
Fresh

Total Sulphides None %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
pЄgr	pЄgr	

Assays

.01 ave

Comments or notes

CAP
Dos Cabezas

DRILL HOLE SEH - 4
T.D. 834 ft

Bedrock depth 235 ft
Top of Sulphides 688 ft
Chalcocite : ?

Total Sulphides 5 %

Alteration

Not Known

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Monzonite.	Qtz Monzonite por	

Assays

275 - 675	- 400'	- < .01 % Cu	Leached capping	
- 692	- 17'	- .015 % Cu	" "	
- 706	- 14'	- .025 % Cu	Sulphides	142' @ .10 % Cu
- 715	- 9	- .12 % Cu	"	
- 762	- 47	- .06 % Cu	"	
- 834	- 72	- .13 % Cu		

Comments or notes

Cc not indicated by assays. Cu is presumed to be all primary

CAP
Dos Cabezas

DRILL HOLE SEH-5
T.D. 929 ft

Bedrock depth 201 ft
Top of Sulphides 449 ft
Chalcocite : 460' - 605'+

Total Sulphides 1 %

Alteration

Not known

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Rhyolitic Vol Agglom.	Quartz latite See W-1 rock unit.	

Assays

201 - 422	- 221'	- .01 % Cu	leached Capping
- 449	- 27'	- .03 % Cu	"
- 460	- 11'	- .23 % Cu	Prob Cc
- 605	- 145'	- .09 % Cu	Range <.01 - .27 % -- prob Cc enriched.

End of Assay log (Rest missing)

Comments or notes

CAP
Dos Cabezas

DRILL HOLE SEH-6
T.D. 889 ft

Bedrock depth 286 ft
Top of Sulphides 745 ft
Chalcocite :

Total Sulphides 5 %

Alteration

Not known

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
1) 286-475 Tuffac. Rhy Post-min.	1) Qtz - latite (?) w-l rock	
2) - 603 Silic Rhy (Spoke E Hills rock)	2) Quartzite -	
3) - 889 Rhy Vol. Ash	3) Qtz-latite w-l rock	

Assays

Spot assays unit 1 - .02 % Cu Ave
" Unit 2 - .02 " "
" Unit 3 - .02
} leached zone

727 - 747' - 20' - .04% Cu - leached
- 889 - 142' - .09% Cu - Sulph - prob Cu enriched
range .01 - .20% Cu

Comments or notes

CAP
Dos Cabezas

DRILL HOLE SEH-7
T.D. 686 ft

Bedrock depth 236 ft

Top of Sulphides 543 ft

Alteration

Not Known

Chalcocite : 543 – TD. indicated by assays

Total Sulphides 3 %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
Schist	Schist	
Alz dike 614-651'		

Assays

245 - 541 - 296' - .04 % Cu Leached Capping
- 672 - 131 - .31 % Cu Prob. Cc
686 - 14 - .07 % Cu Cc diminishing

Comments or notes

Decreasing grades, from .51% Cu in 1st run below
Base of oxidation, clearly indicate Cc zone

CAP
Dos Cabezas

DRILL HOLE SEH-8
T.D. 675 ft

Bedrock depth 248 ft

Alteration
Not Known

Top of Sulphides 615 ft

Chalcocite : 615 - TD indicated by assays.

Total Sulphides 4 %

BEDROCK DETAILS		JEK - Descrip of samples
Original log	Correlation	
Rhyolitic Vol. aggl.	Qtz latite of W-1 type	

Assays

Spot assays - .01 % Cu (Leached zone)

Continous assays:

606 - 617 - 11' - .11 % Cu (Leached zone)

- 675 - 58 - .19 % Cu prob. Cc

Comments or notes

Erratic assays 617 - 675 (.01 - .52)
suggest local Cc enrich., or a leached
Cc zone as in SEH-9

CAP
Dos Cabezas

DRILL HOLE SEH-9
T.D. 699 ft

Bedrock depth 309 ft
Top of Sulphides 599 ft
Chalcocite :

Total Sulphides ± 7%

Alteration
Not Known

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Rhyolitic Vol. Agg	Qtz-latite of W.I type (possibly)	

Assays

310 - 520 - 210' - .015% Cu leached Zone
- 599 - 79 - .13% Cu leached Cc zone?
- 629 - 30 - .11 Cu Prob Cc
- 699 - 70 - .05 Cu Prob diminishing Cc enrichment.

Comments or notes

520-599 given as above top of sulphides. Probably represents leached (erratic grade .01-.37% Cu) and possibly oxidized Cc zone.

CAP
Dos Cabezas

DRILL HOLE W-1
T.D. 581 ft

Bedrock depth 242 ft

Top of Sulphides 405 ft

Alteration

Chalcocite : Films on py. Best Cu zone is due to enrichment

Total Sulphides 5 %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
Andesite/dacite porph.	Quartz latite; also found in W-5; prob W-3, SE-6, SE-8.	@ 550' fn gr Rhy or qtz st ser alt. 5% py w/rims of Cc 570' - Same, without Cc 580 - Same, poss. minor films of Cc on py.

Assays

242 - 405	(leached)		.05 % Cu
- 468		Cc/py	.08
- 545 - 77'		Cc/py	- .17
- 581		Py	.04

Comments or notes

fine grained cont - no schistosity, but could be part of a volcanic seq in the pre-Cambrian, closely related stratigraph. to the Spike E 4 1/2 qtzt. Possible correl to DC-4 @ 918 which does show schistose features.

CAP
Dos Cabezas

DRILL HOLE W-2
T.D. 662 ft

Bedrock depth 450 ft
Top of Sulphides 600 ft
Chalcocite :

Total Sulphides 3 %

Alteration

Clay, Chl in sulph zone.
(CASARCO data)

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Andesite flows, andesite porph.	Prob part of Dacite porph unit.. see W-4	None

Assays

Very low.
Spot assays: @ 462' - 4' - .08 % Cu leached
576 - 6' - .10 (Tr. Cu) leached zone
608 - 54 - .05 sulph (py)

Comments or notes

Prob represents only moderate mineralization

CAP
Dos Cabezas

DRILL HOLE W-3
T.D. 295 ft

Bedrock depth 80 ft

Top of Sulphides Not Reached ft

Chalcocite : None

Total Sulphides ? %

Alteration

St spec + hem.

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Quartzite w/ dacite porph 130-170	Spike E Hills qtzt + Quartz latite like W-1	—

Assays

None made

Comments or notes

Degree of mineral. not certain. Prob much like the outcrop.

CAP
Dos Cabezas

DRILL HOLE W-4
T.D. 797 ft

Bedrock depth 465 ft
Top of Sulphides 600 ft
Chalcocite : None

Total Sulphides ±1 %

Alteration
wk clay, chl (Asarco)

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
Andesite porph	Dacite porphyry	@794' - ½ wk alt - feld to clay. No sulphides

Assays

Spot assays @ 689 - 9' - .05 % Cu
790 - 7 - .05

Comments or notes

Fringe of alteration/mineralization

CAP
Dos Cabezas

DRILL HOLE W-5
T.D. 563 ft

Bedrock depth 350 ft
Top of Sulphides 490 ft
Chalcocite : None

Total Sulphides 5 %

Alteration

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Andesite por (leached) And.-Dac flows and agglomerates (sulphide zone)	Quartz latite correl. to W-1 rock.	@ 500' Rhy or Qtz latite - same as W-1. St ser/clay. Sulph all py.

Assays

@ 468 - 8' - .06 % Cu
486 - 18' - .02
550 - 9' - .05

Comments or notes

CAP
Dos Cabezas

DRILL HOLE W-6
T.D. 690 ft

Bedrock depth 410 ft

Top of Sulphides Not Reached ft

Chalcocite : None

Total Sulphides 7* % (prob error)

Alteration

BEDROCK DETAILS

Original log

1) 410-560 And. flows St clay, Fe ox.
2) -640 Dacite por.
3) -690 Granite por.

Correlation

1) Post-ore volcanics
2) & 3) - See attach sheet.

JEK - Descrip of samples

1) @522' - And. or Q. latite Bx text - funny looking rock. Deuteric? alt - No hm/sulp but st Fe ox flooding.
2) @ 610 - And/dac por. No hydro. Min/alt. Poss deuter alt of feld.

@ 669 & 689' Quartz monz or Quartz latite. Devit gla groundmass (See J. Severa) suggests latite class - por flow rock.

Assays

@ 419-9' - .12% ox Cu
616-10' - .34 "
647-11 - .07 "
} prob exotic.

Comments or notes

* Total sulphide est based on limonite in leached zone in Andesite unit. Exam. of specimens suggests to me that nearly all. lim/hem may be transp or alted ferromag mins.

Continued- Sheet 2

CAP
Dos Cabezas

DRILL HOLE W-6
T.D. ___ ft

Bedrock depth ___ ft
Top of Sulphides ___ ft
Chalcocite :
Total Sulphides ___ %

Alteration

BEDROCK DETAILS

Original log | Correlation | JEK - Descrip of Samples

Correlation of units 2 & 3: Two alt. possible--

Unit 2 A) Dacite por of pre-min (see W-4) type. Either fresh or minor propyl. fringe zone.
B) Post-min -- Qtz latite (Severa) flow. General freshness of rock suggests this more likely than to be K vol.

Unit 3 A) Pre-mineral intrusive porph - vy wk to nil mineral
B) Post-mineral flow. Glassy groundmass (Severa) suggests this most likely even though megascopically the rock looks like a q-m porph.

Assays

Comments or notes

JEK believes alternate B is more prob than A.

CAP
Dos Cabezas

DRILL HOLE W-7
T.D. 392 ft

Bedrock depth 250 ft

Alteration

Top of Sulphides None ft

Chalcocite : None

Total Sulphides — %

BEDROCK DETAILS		
Original log	Correlation	JEK - Descrip of samples
Andesite flow	Post-ore andesite	Fresh Andesite; or basalt (Severn) Samples @ 303 & 391

Assays

Comments or notes

CAP
Dos Cabezas

DRILL HOLE W-8
T.D. 353 ft

Bedrock depth 340 ft
Top of Sulphides — ft
Chalcocite : —

Total Sulphides — %

Alteration

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
Andesite flow wk chl alt	Post-ore sequence See W-7	Andesitic tuff. Fresh

Assays

None

Comments or notes

—

CAP
Dos Cabezas

DRILL HOLE W-9
T.D. 658 ft

Bedrock depth 412 ft

Alteration

Top of Sulphides Not Reached ft

Chalcocite : —

Total Sulphides — %

BEDROCK DETAILS

Original log	Correlation	JEK - Descrip of samples
1) Andesite flow, st. clay, ser alt. St. Fe ox.	1) Post-ore and like unit 1 in W-6	—
2) Dacite porph WK chl alt.	2) Same correl. problem as in W-6 unit 2. Prob post-ore	

Assays

None

Comments or notes

Files enroute by separate transmittal

Cyprus Metals Company

Robert G. Blair

Date: 10/17/91

To: Clark

Clark - I'm glad you reminded me. I'd set it on my upper shelf 2 months ago and had temporarily forgot about it. At that time I read through the entire

CYPRUS

Cyprus Metals Company

Robert G. Blair

Date:

To: file and concluded 1) The hole prior to CAP weren't as "hot" as I had remembered and 2) CAP did a fairly good job (espec. because of the bad prob. of testing most of the permissive area. Consequently my

CYPRUS

Cyprus Metals Company

Robert G. Blair

Date:

To: enthusiasm is very much under control & I'd find it v. difficult to recc as a target. One nagging question:

My sampling (see enclosed) shows the presence of low but nonetheless substantial gold (3 ppm) in a cross from the

Cyprus Metals Company

Robert G. Blair

Date:

To: specularite area at far east end of Spike E Hill. Is their high gold in any of the drilling done to C.? The few very assay #'s found in your collection of data do show an values. Are there any pulps or cor left from 1970's? Call me when you return to discuss. In meantime many Thanks

U

Clark - unproofed memos excuse typos

DATE: May 2, 1991

TO: File

FROM: R.G. Blair

SUBJECT: Spike E. Hill Samples, Cochise County, AZ

1) Massive grey silicified rock with ghost-like lithic? Fragments (.1-2.0 cm) and quartz phenocrysts in apharitic matrix. Rock is >90% SO_2 with small 1-3 mm vigs or voids. Precursor is probably a tuff (mesozoic?). This unit makes up all of the Spike E Hills outcrop, except for the unsilicified tuff represented by sample below.

2) White, bedded but unwelded lithic-crystal (feldspar) tuff with strong clay development and maroon, (lively) box work after sulfide, now rimmed with Fe_2O_3. This outcrop in trench in saddle between two crests of the Spike E ridge. It actually looks like this argillized tuff may underlie the entire Spike-E Hill area but the massive silicified tuff(?) float and outcrop covers ~95% of surface.

3) Massive usually red metallic.
Lustered specular hematite replacement body in silicified to argillized tuff. Area was dozed and prospected. Two old drill holes sited near here ~500 feet apart.

RGB/kmw

CAP 10-23
Pos Cabezas
Return to Airport
Stole Room.

CONE GEOCHEMICAL INC.
810 Quail Street, Suite 1
Lakewood, Colorado 80215
(303) 232-8371

Job 91-0587
29-May-91

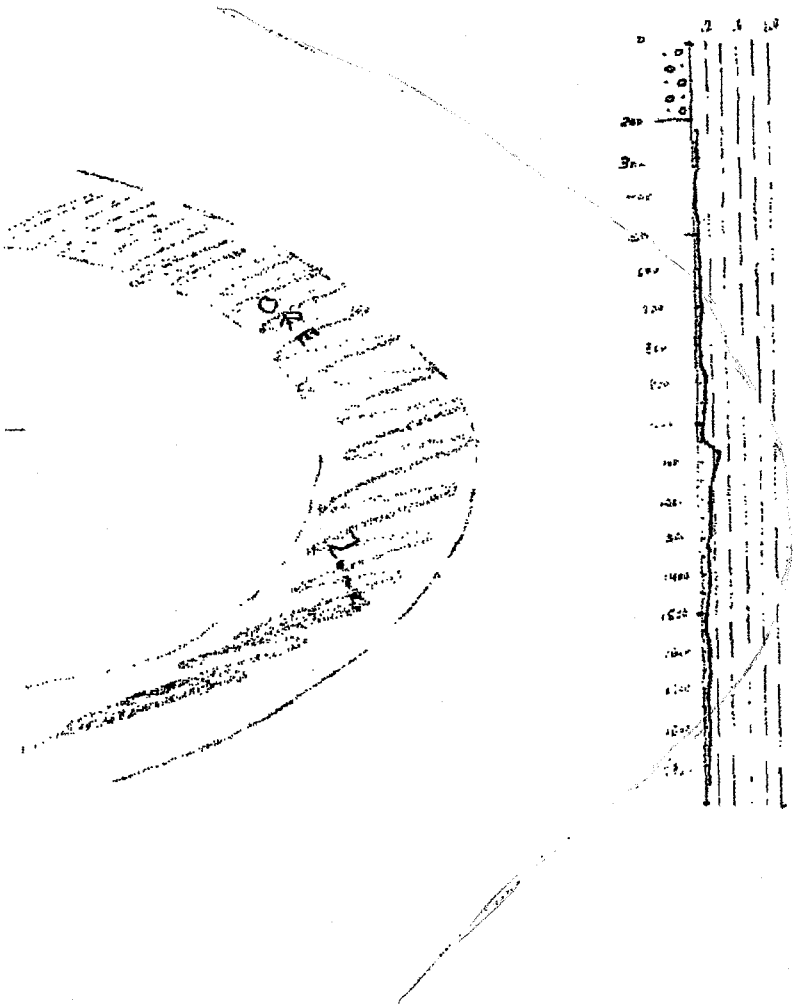
ANALYTICAL REPORT

PO #
PROJECT

Robert G. Blair
Cyprus Metals Co.
P.O.Box 3299
Englewood, CO 80155

SAMPLE NUMBER	PPM AU	PPM CU	PPM TL
SEH 1	0.008	19	
SEH 2	0.003	18	
SEH 3	0.355	7	
MEQ-18 348.5	0.007	97	
MEQ-18 376	0.335	6500	
MEQ-18 378.9	0.346	5600	
MEQ-18 379	0.281	8500	<.2
MEQ-18 383.7	0.006	56	
MEQ-18 387	0.006	20	
MEQ-18 387.2	0.013	155	
MEQ-18 391	0.011	113	
MEQ-18 391.7	0.009	530	
MEQ-18 396	0.394	1.36%	<.2
MEQ-18 399.5	0.007	63	
MEQ-18 401	0.014	290	
METHOD	A.A.	A.A.	A.A.
DIGESTION	FA/30G	4Acid	4Acid

D. C-4
Geomorphic Mapping (Cm)



Petrographic Report
Dos Cabezas
C.A.P. Area 10-25

by Jay Severa
3/11/74
Western Petrographic

Sample No.: DC-OTCP

Name: Schist

Mineralogy:	Approximate %
quartz	65
sericite	30
chlorite	2
garnet	2
leucoxene	1
zircon	tr

Petrography:

This schist is composed of alternating bands, mainly of the following types: quartz; sericite-quartz; and sericite-chlorite-leucoxene. The rock has an overall patchy character, caused primarily by variations in the average quartz grain size in different patches or bands. The quartz grains tend to be fairly uniform in size in each patch, and range in average diameter from 0.01 or 0.02 mm in some to 1 mm in a few irregular veinlets. Some of these veinlets are obviously secondary, but are apparently premetamorphic, and have been strongly contorted during metamorphism. The foliation also has undergone some contortion.

Small garnet crystals, averaging about 0.01 mm in size, are scattered throughout the rock, (generally associated with the sericite-rich bands).

Metamorphism and associated or subsequent deformation appear to be primarily responsible for the present condition of the sample; no subsequent hydrothermal effects can be differentiated.

Sample No.: DC-1 300'

Name: Basalt (or andesite?)

Mineralogy:	Approximate %
plagioclase	55
pyroxene (pigeonite?)	28
hematite	2
magnetite	8
leucoxene	2
carbonate	2
serpentine	1
sericite	2
clays	tr

Petrography:

The phenocrysts in this sample consist of pyroxene (apparently pigeonite) and altered olivine(?). The pyroxene is almost entirely fresh and unaltered, and forms generally euhedral crystals 0.5 to 1 mm in diameter. The olivine(?) phenocrysts, also averaging 0.5 to 1 mm, have been completely altered to rims of iron oxides enclosing fine-grained masses of serpentine, clays, leucoxene, and sericite.

The groundmass is composed of fine-grained (0.1mm) plagioclase laths and pyroxene grains. The plagioclase is often slightly argillized. Small grains of magnetite, altering to hematite, are abundant.

Calcite veinlets are fairly common, and serpentine and clays are sometimes associated with the calcite in these veins.

This rock appears to have undergone no hydrothermal alteration (except for narrow zones along veinlets of secondary or alteration minerals).

Sample No.: DC-1 700'

Name: Agglomerate

Mineralogy: (Listed in approximate decreasing order of abundance)

calcite
iron oxides
quartz
plagioclase
sericite
leucoxene

Petrography:

This sample is an agglomeratic mixture of lithic fragments (primarily basaltic or andesitic), crystal fragments (primarily quartz and plagioclase), and devitrified glass. Hematite is abundant in the groundmass, along with minor leucoxene (probably derived from the alteration of former ferromagnesian minerals, ilmenite, etc.).

The plagioclase crystals are about 90% altered to calcite-clay mixtures, with occasional sericite. The fine-grained plagioclase crystals occurring in the rock fragments are also generally highly altered.

This rock has been devitrified and somewhat altered, although possible hydrothermal effects appear to have been relatively limited. Except for minor sericite in the feldspars, the maximum alteration would be propylitic (or very weak argillic), but weathering, groundwater, etc., under the proper conditions, could probably produce most of the alteration effects now present.

Sample No.: DC-2 790'

Name: Basalt (andesite?)

Mineralogy:	Approximate %
plagioclase	65
devitrifying glass	18
hematite	8
hornblende (after pyroxene)	3
sericite/other micaceous alteration products	2
magnetite	2
leucoxene	2
K-feldspar	tr
calcite	tr

Petrography:

This rock has a pilotaxitic texture. Phenocrysts of plagioclase up to 2 mm in length, often with albitic rims, are partially replaced by K-feldspar, clays, calcite, leucoxene, and other fine-grained alteration products. The alteration often proceeds from crystal cores outward. The plagioclase phenocrysts have been about 40% altered.

Former pyroxene phenocrysts occur as altered crystals averaging about 0.5 mm in diameter. The original pyroxene has been completely altered to hornblende, leucoxene, iron oxides, white micas, and other fine-grained alteration products.

Chlorite occurs as shreds and patches in the groundmass, which is composed essentially of plagioclase laths, devitrifying glass and oxidized magnetite. The groundmass plagioclase is generally fresh.

This rock has undergone very little to no hydrothermal alteration.

Sample No.: DC-3 760'

Name: Andesite (or basalt?)

Mineralogy:	Approximate %
plagioclase	70
hematite	10
magnetite	3
leucoxene	2
clays	5
chlorite	8
quartz (secondary)	2

Petrography:

The plagioclase phenocrysts range from 0.3 to 2 mm in diameter in this sample. They have been altered (to a total extent of about 15%) primarily to clays and iron oxides. Relicts of mafic phenocrysts are present as remnants up to 2 mm long, some having the elongated prismatic outlines of hornblende, but most were probably pyroxene. These have been altered to rims of hematite and magnetite enclosing clays, leucoxene, chlorite, and micaceous alteration products.

What appear to have been cavities or vesicles in the original rock have been filled in by chalcedonic quartz. The groundmass contains hematite dispersed in a fine-grained mass of plagioclase, chlorite, and leucoxene. The groundmass plagioclase crystals are generally fresh or only slightly altered.

The effects of any possible alteration are extremely slight.

Sample No.: DC-4 500'

Name: Schist

Mineralogy:	Approximate %
quartz	60
sericite	35
sulfides (pyrite)	3
leucoxene	2

Petrography:

The quartz in this sample occurs primarily as grains averaging 0.1 mm, and is intimately intergrown with sericite. Occasional larger grains of quartz, up to about 2 mm in diameter, are present. Sericite occurs interstitially with the quartz, as well as forming separate bands and lenses, giving the rock a strong schistose fabric.

Pyrite occurs as disseminated grains up to 0.5 mm across, often spaced along fractures. Leucoxene occurs in patches about 0.05 mm across and as small, disseminated grains throughout the rock.

Because of the extensive metamorphism, recrystallization, and quartz flooding, no separate effects due solely to hydrothermal alteration can be definitely made. However, the overall texture, the amount and distribution of pyrite, etc., make a hydrothermal origin seem likely for much of the present mineralogy and texture, and the rock therefore may be in the phyllic stage.

Sample No.: DC-4 720'

Name: Schist

Mineralogy:	Approximate %
quartz	45
clays	8
chlorite	15
sericite	25
leucoxene	2
sulfides	3
magnetite	1
hematite	1
zircon	tr

Petrography:

In this sample, quartz, occurring as irregular veins and lenses, averages about 0.05 mm in grain size, with some grains reaching 1 mm. The sericite, chlorite, and clays occur as segregations, generally following the planar fabric defined by the quartz veins and lenses. Patches of chlorite, leucoxene, and iron oxides within these segregations appear in many cases to be alteration products of ferromagnesian minerals.

Compared to Sample No. DC-4 500', this rock shows an increase in chlorite, clays, and iron oxides, and a decrease in sericite. It also has a somewhat coarser texture. The sulfides are primarily pyrite and chalcopyrite, with some chalcocite(?).

The development of the chlorite and sericite may be hydrothermal in part, but since the extent of metamorphism is unknown, the relative importance of hydrothermal alteration vs. metamorphism cannot be accurately ascertained in this sample. However, judging from the alteration of the rocks above and below this sample in Drill Hole DC-4, the alteration may be largely hydrothermal.

Sample No.: DC-4 918'

Name: Schist

Mineralogy:	Approximate %
quartz	50
sericite	45
sulfides (pyrite)	4
leucoxene	tr
iron oxides	1

Petrography:

Quartz occurs in this rock as grains 0.01 to 0.3 mm in diameter. The grain size tends to be fairly uniform within a given veinlet or lens, but the average size varies considerably in different veinlets and lenses, giving a rough, planar fabric to the rock. Quartz also occurs commonly as secondary veinlets cutting across the rock. The sericite forms patches and flecks interstitial to the lenses and veinlets of quartz.

Sulfides, primarily pyrite, occur as disseminated grains up to 0.5 mm across, and as ragged veinlets. Hematite surrounds some of these, and also occurs separately in 1 mm patches.

Leucoxene is very finely disseminated through the rock. Compared to the other samples from this drill hole, this rock is less schistose and higher in sericite; and has lost the clays and chlorite of DC-4 720'.

The patchy nature of the quartz and sericite in this sample, and especially the variability of the quartz grain size indicates a probable hydrothermal origin of the present assemblage. Although all original features have been destroyed, the present texture is typical of many intermediate intrusive rocks (such as quartz monzonite porphyries) which have undergone strong phyllic alteration, quartz, flooding, etc.

Sample No.: DC-4 1460'

Name: Quartz-sericite rock

Mineralogy:	Approximate %
quartz	50
sericite	43
chlorite	3
clays	1
sulfides	3
muscovite	tr

Petrography:

In this sample, quartz occurs as grains averaging about 0.25 mm across in unoriented lenses, in mixtures with sericite, and as larger grains up to 2 mm occurring randomly in the rock. Sericite occurs as interstitial disseminations and as an alteration product of minerals or inclusions in irregular patches up to 4 mm across. Some patches of muscovite occur intergrown with opaques as an alteration of biotite.

Chlorite occurs as shreds associated with sericite, leucoxene, and clays, possibly as alteration products marking the former site of ferromagnesian minerals.

The alteration of this sample is very similar to that of Sample DC-4 918', although apparently slightly less in intensity.

Sample No.: DC-4 1953'

Name: Altered quartz monzonite(?) porphyry

Mineralogy:	Approximate %
quartz	40
plagioclase	2
clays	5
sericite	3
calcite	30
chlorite	10
leucoxene	2
magnetite	5
sulfides	1
iron oxides	2
zircon	tr

Petrography:

In this sample, fairly abundant phenocrysts of feldspar up to 2 mm across have been about 90% altered to calcite, clays, and sericite. Only small fragments of the original fedsl pars remain in these patches. Phenocrysts of ferromagnesian minerals up to 2 mm in size have been completely altered to chlorite, leucoxene, iron oxides, minor sericite, and carbonate. Subhedral to anhedral quartz phenocrysts range up to 0.3 mm in diameter.

The groundmass is composed of 0.02 mm grains of quartz and calcite, with minor chlorite, sericite, leucoxene, and clays.

This rock, although highly altered, has the typical appearance of a quartz monzonite porphyry. The alteration pattern is difficult to understand, and this rock may be a hybrid of some type. The clays and sericite would normally indicate argillic to phyllic alteration, but the extensive calcite and lesser chlorite in the groundmass, along with only very minor sericite, is more characteristic of propylitic alteration. Also, no K-feldspar remains. Although this sample is not mineralized, it seems likely that intense alteration and mineralization could produce assemblages and textures found in the samples from this drill hole at 918 and 1460 feet; and possibly those at 500 and 720 feet, although the latter two could easily represent another rock type.

Sample No.: W-1 550'

Name: Quartz sericite rock (of volcanic or hypabyssal origin)

Mineralogy:	Approximate %
sericite/clays	50
quartz	43
sulfides	5
leucoxene	tr
zoisite(?)	2
zircon	tr

Petrography:

Sericite occurs in patches replacing former feldspar(?), etc., and fine shreds intimately intergrown with quartz. The fine-grained groundmass quartz occurs in grains up to 0.05 mm in diameter, and in lenses and patches (in which the grain boundaries are often strongly sutured). Clays and sericite are common in the groundmass. Quartz also occurs as up to 2 mm crystals, apparently phenocrysts, which often show embayments and resorption features. Much of the quartz seems to have been secondarily introduced.

Sulfides (primarily pyrite) occur as disseminated grains up to 0.2 mm in size, often edged with or set in leucoxene. Small grains, apparently of zoisite(?), occur as subhedral to euhedral crystals averaging about 0.3 mm in size, primarily in some of the sericitic patches (possibly those which were derived from former plagioclase phenocrysts).

The alteration of this rock is evidently phyllic, and silicification was apparently fairly strong.

Sample No.: W-1 570'

Name: Quartz-sericite rock (of volcanic or hypabyssal origin)

Mineralogy:	Approximate %
sericite	50
quartz	45
leucoxene	1
sulfides	3
muscovite	tr
clays	tr
zoisite(?)	1

Petrography:

This sample is very similar to W-1 550', but has a greater amount of sericite. Much of this sericite occupies apparent sites of replaced phenocrysts ranging up to 4 mm across, and the remainder occurs as interstitial fillings between the quartz grains. Muscovite patches occur up to 2 mm in size and often contain interlayered leucoxene. These patches represent former ferromagnesian phenocrysts.

Quartz occurs in grains ranging up to 0.1 mm in diameter which are often separated from each other by sericite shreds. Larger, partially resorbed quartz grains up to 1.5 mm in diameter are present. Some clays are also present in the sample. Zoisite(?) occurs as anhedral grains about 0.3 mm in size disseminated through the rock.

Sulfides (primarily pyrite) are present above irregular veinlets, and as disseminated grains ranging up to 0.5 mm across. They are often edged by leucoxene.

This rock shows phyllic alteration.

Sample No.: W-1 580'

Name: Quartz-sericite rock (of volcanic or hypabyssal origin)

Mineralogy:	Approximate %
sericite	72
quartz	15
clays	4
sulfides	6
leucoxene	3
muscovite	tr
zircon	tr

Petrography:

This sample is basically similar to W-1 570', but with even more abundant sericite. The sericite apparently has replaced former feldspar phenocrysts which ranged up to 2 mm in size. It also is a replacement product (along with muscovite and leucoxene) of former ferromagnesian minerals which ranged up to 2 mm in diameter. The original fine-grained groundmass has now been altered to a fine-grained mixture of quartz and sericite. Zoisite(?) in euhedral, 0.01 mm crystals, occurs in some veinlets.

The sulfides are primarily of pyrite occurring along fractures and as disseminated grains throughout the rock. The grains range in size up to about 1 mm, sometimes apparently in the sites of former ferromagnesian minerals. Leucoxene is disseminated throughout the rock.

The sericitization of this sample indicates strong phyllic alteration. Also, this sample appears to have undergone brecciation.

Sample No.: W-4 794'

Name: Altered quartz latite(?)

Mineralogy:	Approximate %
quartz	20
clays	30
calcite	40
sericite	tr
leucoxene	4
hematite	4
magnetite	2

Petrography:

This sample is apparently an extrusive rock which has been largely altered to clays, calcite, and white micas. The former phenocrysts of hornblende(?) or biotite, which ranged up to 3 mm in size, are now altered to clays, calcite, sericite, leucoxene, and are generally rimmed by hematite and magnetite.

Feldspar phenocrysts, up to 3 mm in length, are now completely altered to clays, sericite, and minor quartz. In many of these relicts, calcite is more abundant than clays; in others, it is largely absent. Apparently original quartz grains ranging up to 0.1 mm are present.

The groundmass is now largely altered to a fine-grained mass of clays, calcite, and white micas.

Although alteration has destroyed the feldspars, making exact classification impossible, the rock still has its overall original volcanic (tuffaceous?) appearance, and seems of acidic to intermediate original composition. The alteration is apparently propylitic to argillic.

Sample No.: W-5 500'

Name: Altered quartz latite(?)

Mineralogy:	Approximate %
clays	30
quartz	20
sericite	40
sulfides	8
leucoxene	2
muscovite	tr
zoisite(?)	tr
zircon	tr

Petrography:

In this sample, almost all of the original groundmass and phenocryst minerals have been completely altered. Feldspar phenocrysts ranging up to 2 mm in length have been completely altered to sericite, clays, and quartz. Sulfides often occur within the sites of former ferromagnesian(?) phenocrysts. Biotite phenocrysts up to 2 mm long have been completely altered to muscovite and interlayered leucoxene.

Quartz occurs as a groundmass constituent, ranging up to 0.1 mm in grain size. A few scattered quartz grains up to 1 mm across represent original small phenocrysts. The rest of the groundmass is composed of clays and sericite.

Sulfides (primarily pyrite) are abundant, and occur as disseminated grains ranging up to 1 mm across, and as a fine-grained replacement of ferromagnesian minerals.

This rock has undergone strong argillic to phyllic alteration.

Sample No.: W-6 522'

Name: Altered quartz latite(?)

Mineralogy:

	Approximate %
quartz	75
clays	19
hematite	5
sericite	1
zircon	tr

Petrography:

In this sample, the original rock minerals have been largely altered, leaving very little evidence of their original forms. Very faint outlines remain of possible feldspar phenocryts ranging up to about 0.5 mm in size. These have been altered to clays, quartz, and sericite. A few fresh cores of plagioclase remain. Some of the original ferromagnesian minerals may have been located in areas now occupied by hematite in patches ranging up to 0.5 mm across. Quartz grains which reach 4 mm but average about 0.5 mm, may represent original phenocrysts and grains. Quartz is being recrystallized, and the larger grains often exhibit flamboyant extinction, indicating stress. Some resorption features are present.

The groundmass is composed of fine-grained quartz, ranging up to about 0.02 mm in size, and clays. Iron oxide minerals have filled fractures in the rock, which has a somewhat brecciated appearance. Earlier veinlets have been raggedly filled with sericite. Some of the hematite patches may be replacing sulfides, but most may be replacing magnetite. Leucoxene occurs as disseminated patches which range up to about 0.02 mm across.

This rock has been sericitized, silicified, and argillized.

Sample No.: W-6 610'

Name: Altered quartz latite(?)

Mineralogy: (Listed in approximate decreasing order of abundance)

clays
quartz
iron oxides
leucoxene
plagioclase
magnetite
zircon

Petrography:

In this sample, phenocrysts of feldspar up to 3 mm in length have been almost completely altered to clays and quartz in a very fine-grained intergrowth of alteration products. The fresher phenocrysts of plagioclase are being altered around their borders, generally with fairly distinct boundaries between the alteration products and the fresh mineral. Larger patches of a very fine grained, almost isotropic mass of alteration products (primarily clays) may also be sites of former ferromagnesian minerals.

The groundmass of the rock is made up of abundant, very finely disseminated hematite, magnetite, and leucoxene set in a mosaic of 0.1 mm quartz grains and clay patches. Oxidation has been so extensive that any possible former sulfides have been completely destroyed.

This rock is similar in some respects to Sample W-6 522', but is somewhat less altered, to the argillic facies.

Sample No.: W-6 669'

Name: Altered quartz latite(?)

Mineralogy:	Approximate %
plagioclase	35
clays	5
K-feldspar	40
quartz	10
sericite	4
hematite	2
magnetite	2
muscovite	1
leucoxene	1

Petrography:

In this sample, phenocrysts of plagioclase ranging up to 2 mm in length have been altered (about 20%) to clays, sericite, and recrystallized quartz. Some of the phenocrysts display argillized cores, but most of the alteration seems to have proceeded from the edges inward, and along fractures in the crystals. Larger K-feldspar phenocrysts are still fresh. Former mafic (biotite in part) phenocrysts up to about 3 mm long have been completely altered, primarily to hematite, magnetite, leucoxene, and sericite.

The groundmass was originally largely glassy, and is now devitrifying to quartz and K-feldspar, and altering to clays and sericite. Disseminated throughout this groundmass are very fine-grained hematite, magnetite, and leucoxene.

Hydrothermal alteration has apparently resulted in minor argillization of the feldspars and groundmass, and possibly the destruction of the ferromagnesian minerals. (However, some of the alteration may be due to processes of devitrification, groundwater action, etc.)

Sample No.: W-6 688'

Name: Quartz latite?

Mineralogy:

	Approximate %
plagioclase (highly altered)	5
clays	17
sericite	9
K-feldspar	45
quartz	15
leucoxene	4
hematite	5

Petrography:

In this sample, plagioclase phenocrysts which range up to about 3 mm in length have been about 80% altered to clays and sericite, with minor replacement by K-feldspar. Some of the crystals have been completely altered, while others are about 50% intact. A ferromagnesian mineral occurring as phenocrysts up to about 1.5 mm across has been altered completely, generally to hematite, sericite, leucoxene, and magnetite. There are some crystals of muscovite about 2 mm long containing sericite and leucoxene, which are apparently after biotite.

Phenocrysts of K-feldspar up to 3 mm long have been only slightly altered to sericite. Quartz phenocrysts up to 2 mm across show slight resorption.

The groundmass is a very fine-grained intergrowth of clays, some sericite, and devitrified glass. Very fine-grained hematite, magnetite, and leucoxene are scattered throughout.

The hydrothermal alteration has apparently affected the plagioclase and ferromagnesian minerals, with primarily argillic products resulting.

Sample No.: W-7 303'

Name: Basalt

Mineralogy:	Approximate %
plagioclase	70
hematite	10
carbonate	7
clays	2
magnetite	2
leucoxene	2
quartz	2
white micas	5
zircon	tr

Petrography:

In this sample, phenocrysts of pyroxene(?) which ranged up to 0.5 mm in size, have been completely altered to clays, white micas, and chalcedonic quartz, enclosed in rims of magnetite and iron oxides.

The groundmass is made up of very finely disseminated magnetite and hematite in a felty mass of very fine-grained plagioclase. Minor clays, sericite, leucoxene, and calcite occur in the groundmass. The fine-grained plagioclase is usually fairly fresh.

Small veinlets of calcite with minor quartz cut through the rock. One 0.3 mm grain of quartz surrounded by a fine clay intergrowth, is probably an altered inclusion.

The alteration in this rock may be due to weathering and ground water processes, rather than to hydrothermal alteration, although it may be propylitic in part.

Sample No.: W-7 390.7'

Name: Basalt

Mineralogy:	Approximate %
Plagioclase	45
hematite	10
calcite	40
magnetite	2
clays	1
leucoxene	2
sericite	tr
quartz	tr

Petrography:

In this rock, the phenocrysts have been completely altered. Phenocrysts of pyroxene(?) which ranged up to 0.5 mm in diameter now consist of rims of hematite, magnetite, and minor leucoxene enclosing carbonates with additional iron oxides and leucoxene. Rare phenocrysts of former feldspar, up to 0.3 mm in length, are now completely altered to sericite and other fine-grained alteration products.

The groundmass is composed of a very fine-grained mass of plagioclase crystals and very abundant calcite. The groundmass has abundant, very finely disseminated hematite and magnetite, with minor leucoxene.

This rock has been propylitically altered.

Sample No.: W-8 350'

Name: Tuff

Mineralogy: (Listed in approximate decreasing order of abundance)

clays
plagioclase
iron oxides
quartz
K-feldspar
magnetite
white micas
chlorite
leucoxene

Petrography:

This relatively basic tuff contains crystal fragments, lithic fragments, and devitrified glass shards set in a fine-grained, devitrified groundmass. Plagioclase fragments which range between 0.1 and 0.5 mm have been altered (up to 100%) to clays. The overall alteration of the plagioclase is about 20%. Fresh, anhedral K-feldspar fragments range up to about 0.2 mm diameter.

Devitrified glass shards about 0.5 to 1 mm long and small basalt fragments are set in a fine-grained, devitrified groundmass which is altering to quartz, chlorite, clays, hematite, magnetite, leucoxene, and sericite.

The overall hydrothermal alteration of this sample, except for local sericitization of the plagioclase, is apparently no stronger than weakly propylitic at most.

Sample No.: SHE-OTCP

Name: Jasperoid

Mineralogy:

	Approximate %
quartz	98
hematite	1
leucoxene	1
zircon	tr

Petrography:

This sample is composed of fine-grained, recrystallized quartz with a jasperoidal texture. The grain size of the quartz varies considerably in different areas of the rock, giving it an overall patchy appearance. In general, the range in average grain size in the different patches is from about 0.02 to 0.1 mm in diameter. Trace amounts of hematite and leucoxene occur as very fine disseminations in the rock, and trace amounts of zircon are present.

Although this jasperioid consists now almost entirely of recrystallized quartz with no original textures or features apparent, the overall patchy nature indicates a nonhomogeneity of the original rock.

3/97

FINAL DRILLING REPORT

WILLCOX ENZYME LEACH ANOMALY
Cochise County, Arizona

CAP II, LLC

by David M. Brown

INTRODUCTION

The Willcox Enzyme Leach anomaly is one of the initial areas selected for drill testing by the CAP II group. The area of interest is located in the Railroad Pass area approximately four miles NE of the town of Willcox, Arizona (Fig. 1). This area is situated within a covered area known to contain porphyry-type copper mineralization from the results of exploration drilling during the 1970's and early 1980's. The target area covers approximately five square miles of prospective ground indicated from earlier geochemical and drilling data. The target model and geochemical results were summarized in a 1996 CAP II report by Jim Sell (March, 1996 memo to David Lowell), in which the results of drilling by Bear Creek, ASARCO, and CAP I were integrated with preliminary CAP II enzyme leach sample results. The combined data suggested a possible buried target in Section 9, a privately-owned Section where no previous drilling had been conducted (Fig. 2).

A CAP II agreement with the previous land owner (Barry Peacock) expired in mid 1996, and during the Option term the owner sold the property to another land developer, Mr. Loren Pratt. In late 1996, CAP II negotiated a short-term Option with this new owner and a test hole was commenced in early January, 1997. This conventional rotary hole, WIL-1, was terminated at a depth of 1360 feet near the end of January. Although the hole intersected chlorite-sericite-pyrite alteration in Precambrian schist, geochem values were low, and it is suspected that the hole was drilled within the eastern propylitic fringe of the porphyry system. However, the drilling results tend to substantiate the presence of a subeconomic Cu-Mo porphyry system as the source of a weak to moderate strength enzyme leach anomaly.

TARGET DESCRIPTION

The Willcox Enzyme Leach anomaly is a large circular-shaped feature approximately five km in diameter, characterized by a central low surrounded by an annular-shaped ring of anomalous values. This is illustrated by Fig. 5 and Fig. 6, which are contour maps of two of the more diagnostic elements (Au and Cu). These plots display a subtle arcuate pattern of high values surrounding a central low. The interpreted interior low coincides reasonably well with the central drill-defined zone of low grade Cu and quartz-sericite-pyite alteration. The annular-shaped anomaly is defined by various elements including Au, As, Cu, Mo, Zn, Cl, and I. As with many EZL anomalies, the central causative body cannot be precisely located, but is generally interpreted to lie somewhere in Sections 8 or 9 (Fig. 2 and Fig. 4).

The location of CAP II hole WIL-1 was determined by merging alteration and mineralization vectors from previous drilling with enzyme leach geochemical data. Previous Bear Creek, ASARCO, and CAP I drill holes located to the west and southwest of Section 9 intersected sericitic alteration in Precambrian schist and Laramide(?) quartz porphyry. This alteration, containing up to 0.2 - 0.3% Cu, was permissive of a stronger zone of mineralization to the northeast, based on contouring of Cu values and bedrock alteration zoning patterns.

The foregoing summary emphasizes that the Willcox target was based in large part on the basis of inferred alteration/mineralization trends from previous drill holes. The enzyme leach data is permissive of a buried porphyry system in the general vicinity of the drillhole-defined target, but the grade and geometry of the system are not precisely defined by the enzyme leach data.

DRILLING RESULTS

Drill hole WIL-1 encountered bedrock at a depth of approximately 360 feet, beneath unconsolidated alluvial deposits. At a depth of 360 feet the hole intersected Precambrian Pinal Schist with partially oxidized pyrite to a depth of about 685 feet. From 685 feet to 1235 feet, the hole encountered Pinal Schist with an average of approximately 3-4% disseminated pyrite. The schist is altered to a mixture of chlorite, sericite, and quartz representing a strong propylitic assemblage. At a depth of 1235 feet, the hole intersected an intermediate composition intrusive rock, possibly a granodiorite. This intrusive rock is characterized by chloritic alteration and less than 1% disseminated pyrite. The hole was terminated at a depth of 1360 feet, after a spot core was taken from 1350 - 1360 feet.

Geochemical assays of the hole were low for the analyzed elements Cu, Mo, Au, and Ag. Sporadic Cu values in the range of 0.02% are associated with observed traces of chalcopyrite. Very weakly anomalous Au values (maximum 0.05 ppm) are present locally. These results are consistent with the outer propylitic halo of a porphyry system.

A NE-oriented cross section through the Spike E Hills buried sulfide system is presented as Figure 3. On this section, the central quartz-sericite-pyrite zone is interpreted to be a lenticular body located above a Laramide(?) pluton. This interpretation is very speculative, since most of the drill holes in the project area were not deep enough to intersect the top of the suspected pluton. However, based on the occurrence of barren intrusive rocks encountered at the bottom of holes WIL-1, B-4, and W-6, the sulfide mineralization is suspected to lie within a SW-plunging block of Pinal Schist above a weakly altered pluton of intermediate composition (Fig. 3).

The quartz porphyry intersected in CAP I hole DC-4 is interpreted as a possible Precambrian metavolcanic unit, rather than a Laramide porphyritic dike. This is the conclusion reached in 1974 by John Kinnison, based on his examination of CAP I and Bear Creek/ASARCO drill samples. I also suspect that the mineralization/alteration cuts off abruptly at the intrusive/schist contact, as depicted on the cross section. This interpretation suggests the possibility that the contact is a low

angle fault, which has horizontally displaced the alteration/mineralization from its original position.

SPECULATION CONCERNING REGIONAL STRUCTURE

The proposed structural model differs from previous interpretations by John Kinnison (1974) and Jim Sell (1996), which postulated a rotated copper "cylinder" plunging 40-60° NE, based on the tilting direction of post-mineral Tertiary volcanics. However, the current structural model would explain the eastward termination of I.P. anomalies in the vicinity of hole WIL-1, as interpreted from previous geophysical studies. According to the model proposed in this report, the sulfide-copper zone is a SW-plunging lenticular body which pinches out towards the east, as depicted diagramatically in section on Fig. 3. The age and origin of the apparently rootless sulfide system are uncertain; the mineralization could be Laramide, Tertiary, or even Precambrian in age.

There is a strong possibility that the Spike E Hills sulfide system is an allochthanous slice of a larger mineralized system, as mentioned in the previous section. This possibility is suggested by the apparent abrupt termination of strong alteration and sulfides at the contact with the suspected underlying intrusive body. It is also based on evidence of shearing noted near the contact in hole WIL-1. A likely sense of movement may be inferred from the regional Basin and Range extension direction in SE Arizona (ENE-WSW), and the observed SW dip of outcropping Tertiary volcanics. Based on these two parameters, and assuming that the Railroad Pass area is the locus of a buried Tertiary flat fault system, the likely sense of displacement is from west to east, as suggested on Fig. 3. Whether the displacement occurs along a single spoon-shaped listric fault, as depicted on the cross section, or from a series of listric faults, cannot be determined from the existing data.

SUMMARY AND CONCLUSIONS

The exploration results summarized in this report demonstrate that the Willcox enzyme leach anomaly is a bona fide surface expression of a buried porphyry system, which has been partially delineated by previous drilling near the Spike E Hills. The depth-grade relationship of enzyme leach anomalies is poorly understood, and appears to depend on complex structural and lithologic factors. For this reason, the Willcox results cannot be interpreted too rigidly with respect to the location and grade of the causative body. However, some general conclusions can be inferred from comparison of the EZL data to results from known porphyry copper deposits. In terms of amplitude, the Willcox results are variable: some commodity elements are relatively low compared to calibration studies (e.g. Cu, Au), while other elements are relatively high (e.g. Zn, Mo). In terms of depth, the sulfide source at Willcox is moderately deep (500 - 1,000 feet), or about half the depth of the Kalamazoo deposit, by comparison. Overall, the Willcox anomaly appears to

rank somewhere in the middle of CAP II anomalies in terms of strength and consistency.

The CAP II drilling results tend to confirm the previously-interpreted geometry and grade of the *buried porphyry system near the Spike E Hills. It is likely that hole WIL-1 was drilled in the* eastern propylitic fringe of the sulfide system (Fig. 4). The probable center of the system is defined by several previous holes located west of hole *WIL-1 (Fig. 2)*, which encountered low grade Cu sulfide mineralization (0.1 - 0.3%) associated with quartz-sericite alteration in Precambrian Pinal Schist and quartz porphyry of unknown age. The CAP II drilling results were negative in terms of intersecting ore-grade mineralization. However, the enzyme leach sampling should be viewed as another successful test study over a buried porphyry copper system. The enzyme leach results appear to fairly accurately outline the limits of the drill-defined copper mineralization present east of the Spike E Hills.

RECOMMENDATIONS

It is recommended that the access agreement with Mr. Pratt be terminated as soon as possible. No further drilling is recommended in the Willcox target area at the present time, and the CAP II drill hole has been abandoned in accordance with State regulations. However, considering the possibility that the main anomaly is displaced from a nearby root zone, it is recommended that *additional sampling be conducted both east and west of the Spike E Hills area, in order to* evaluate the possibility of a higher grade porphyry system.

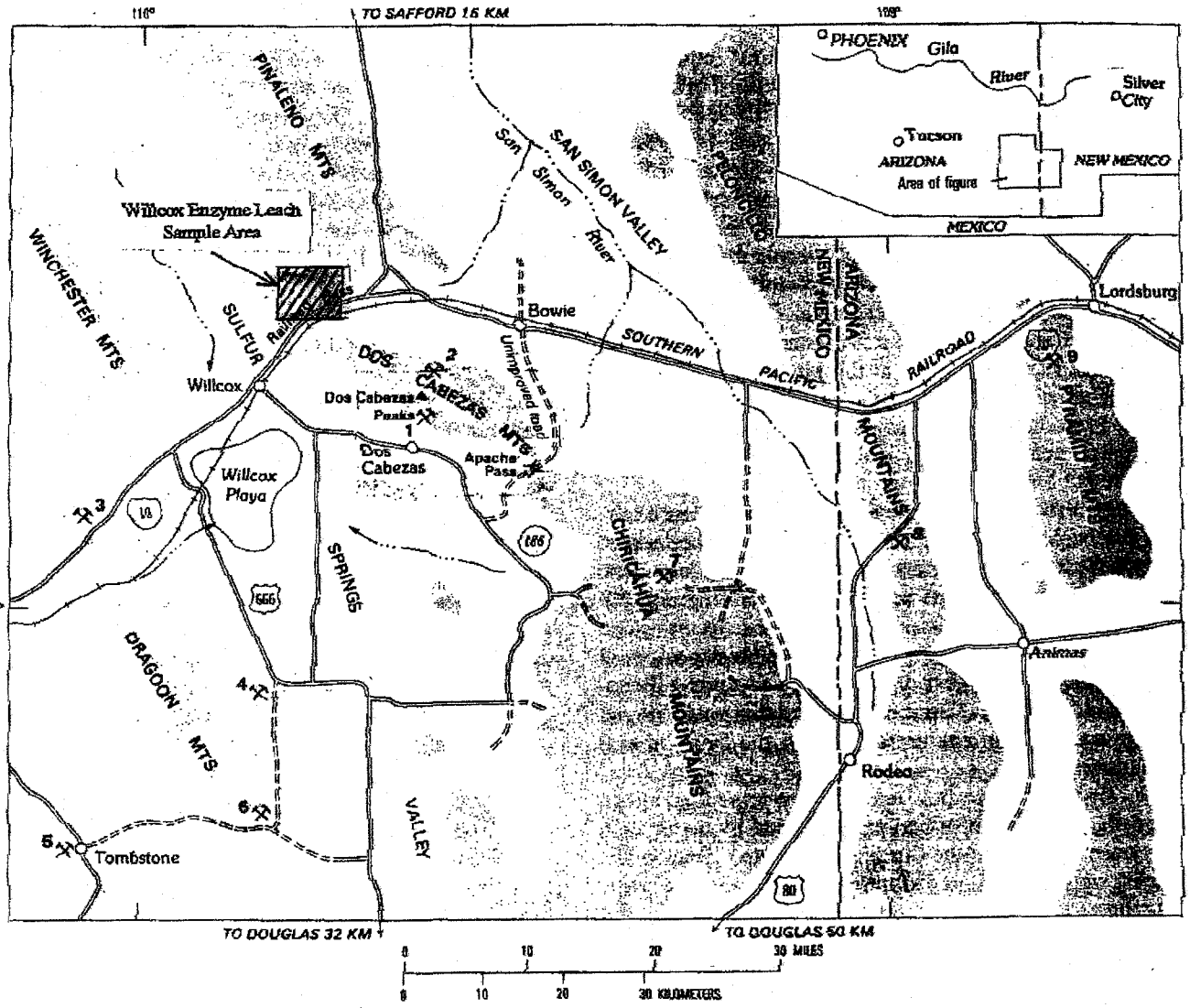


FIGURE 1

LOCATION OF CAP II WILLCOX PROJECT

Cochise County, Arizona

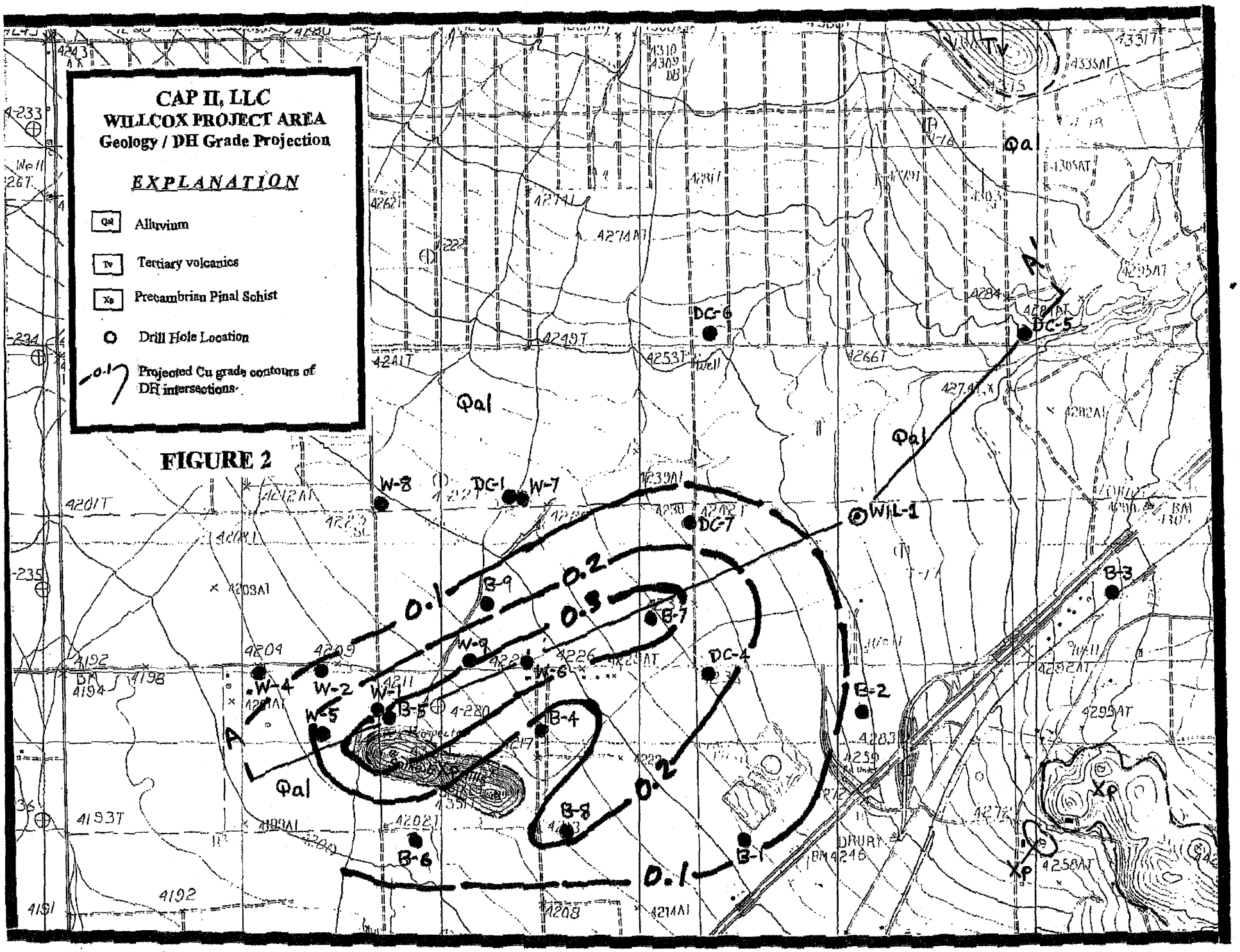
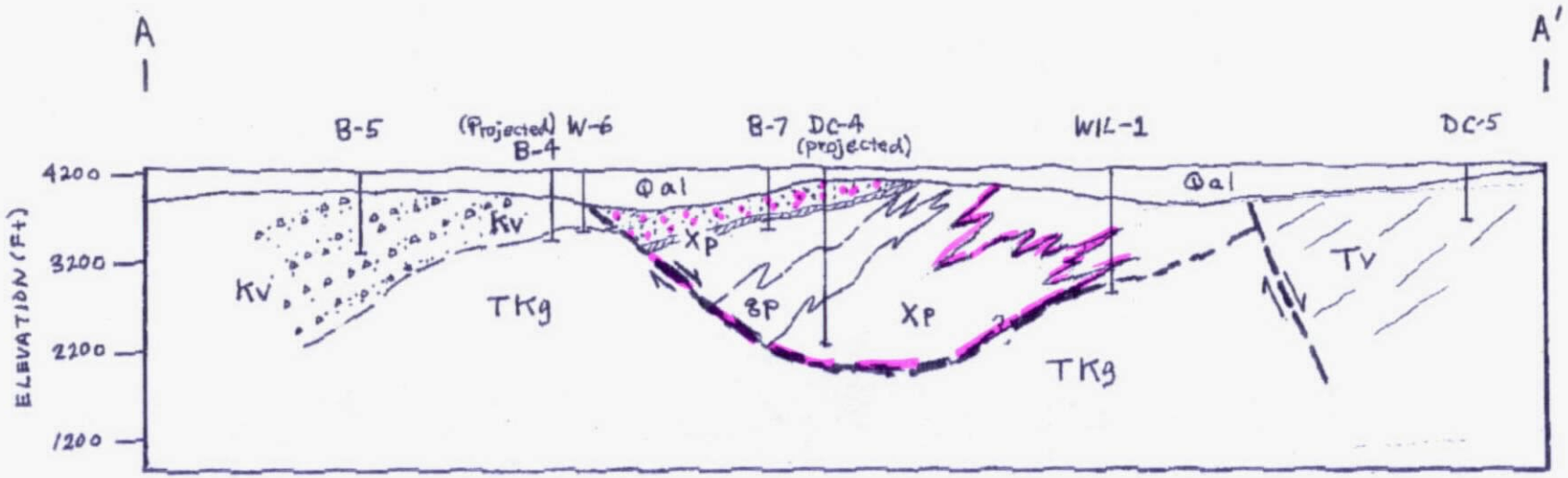

CAP II, LLC
WILLCOX PROJECT AREA
Geology / DH Grade Projection
EXPLANATION
Qal Alluvium
Tv Tertiary volcanics
Xp Precambrian Pinal Schist
Drill Hole Location
0.1 Projected Cu grade contours of DH intersections
FIGURE 2
Qal
Tv
Xp
A
A'
DC-6
DC-5
DC-7
DC-1
DC-4
W-8
W-7
W-9
W-6
W-4
W-2
W-1
W-5
WIL-1
B-9
B-7
B-5
B-4
B-8
B-6
B-1
B-2
B-3
0.1
0.2
0.3
0.2
0.1
DRURY

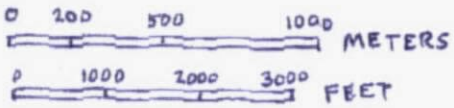
FIGURE 3

CAP II WILLCOX PROJECT

SPIKE E HILLS AREA, CROSS SECTION A - A'



EXPLANATION



- Qal — Alluvium
- Tv — Tertiary volcanics (postmineral)
- TKg — Laramide(?) plutonic rocks: granodiorite, monzonite, etc
- Kv — Laramide or Cretaceous volcanics (premineral): agglomerate, flows, tuffs
- qp — Quartz Porphyry (possible Precambrian metarhyolite?)
- Xp — Precambrian Pinal Schist

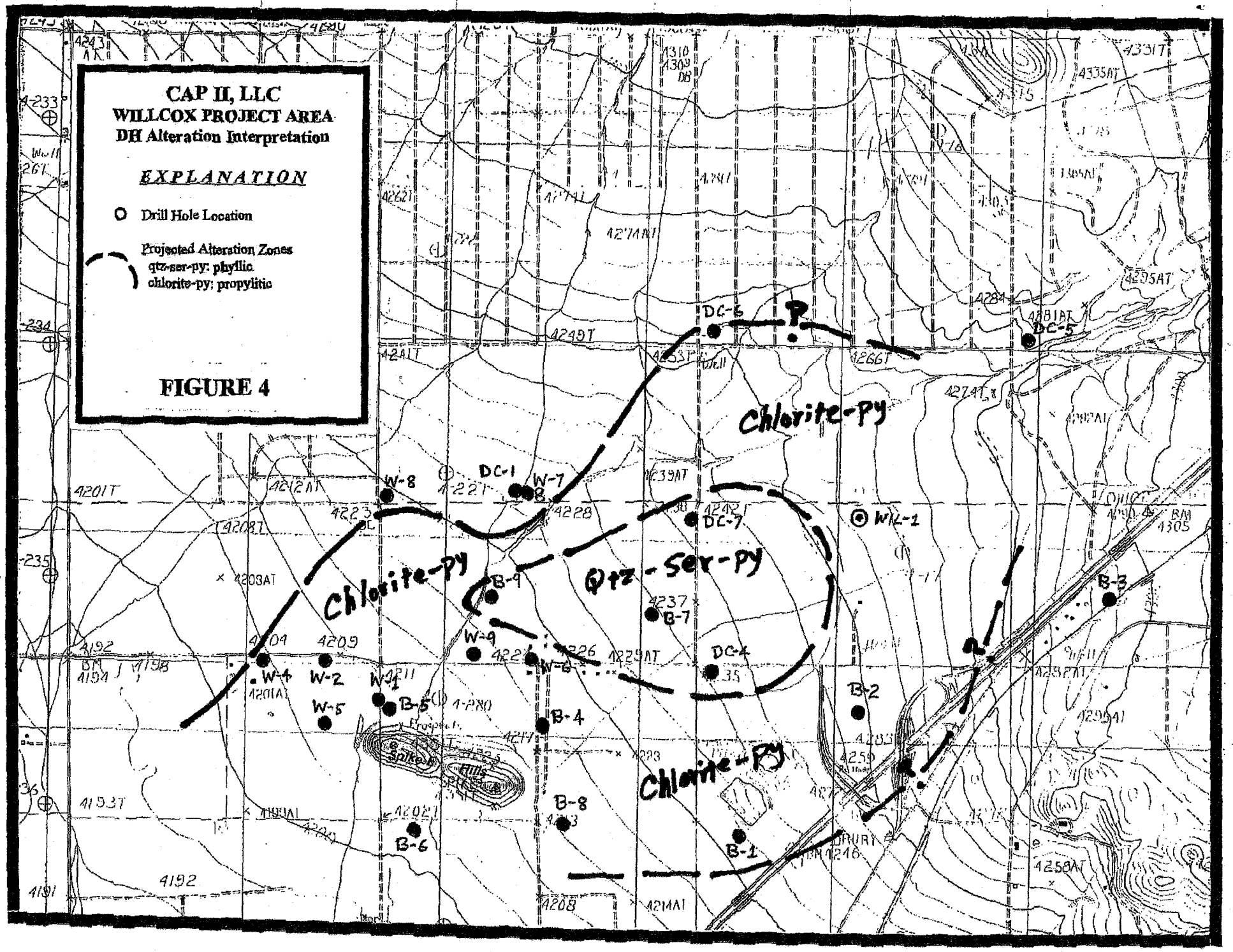
Drill Hole

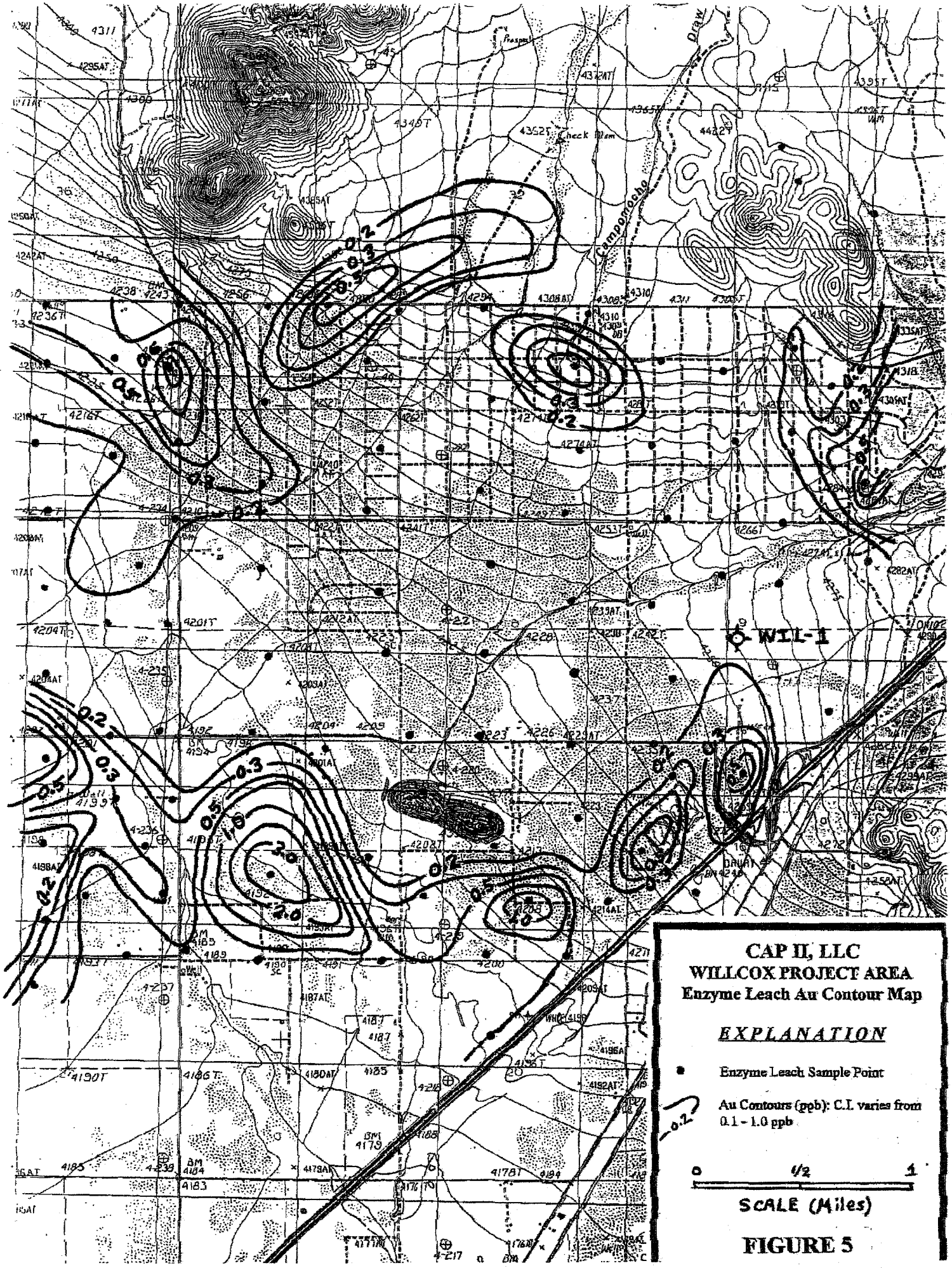
B-4	Bear Creek
W-6	ASARCO
DC-4	CAP I
WIL-1	CAP II

Generalized zone of quartz-sericite alteration with > 5% pyrite

Leached Capping (diagrammatic)

Chalcocite blanket (diagrammatic)


CAP II, LLC
WILLCOX PROJECT AREA
DH Alteration Interpretation
EXPLANATION
Drill Hole Location
Projected Alteration Zones
qtz-ser-py: phyllic
chlorite-py: propylitic
FIGURE 4
Chlorite-Py
Qtz-Ser-Py
Chlorite-Py
Chlorite-Py
DC-6
DC-5
DC-1
W-8
W-7
DC-7
WIL-1
B-9
B-7
W-9
DC-4
B-3
W-4
W-2
W-1
W-5
B-5
B-4
B-2
B-8
B-6
B-1



CAP II, LLC
WILLCOX PROJECT AREA
Enzyme Leach Au Contour Map

EXPLANATION

● Enzyme Leach Sample Point

Au Contours (ppb): C.I. varies from 0.1 - 1.0 ppb

0 1/2 1

SCALE (Miles)

FIGURE 5

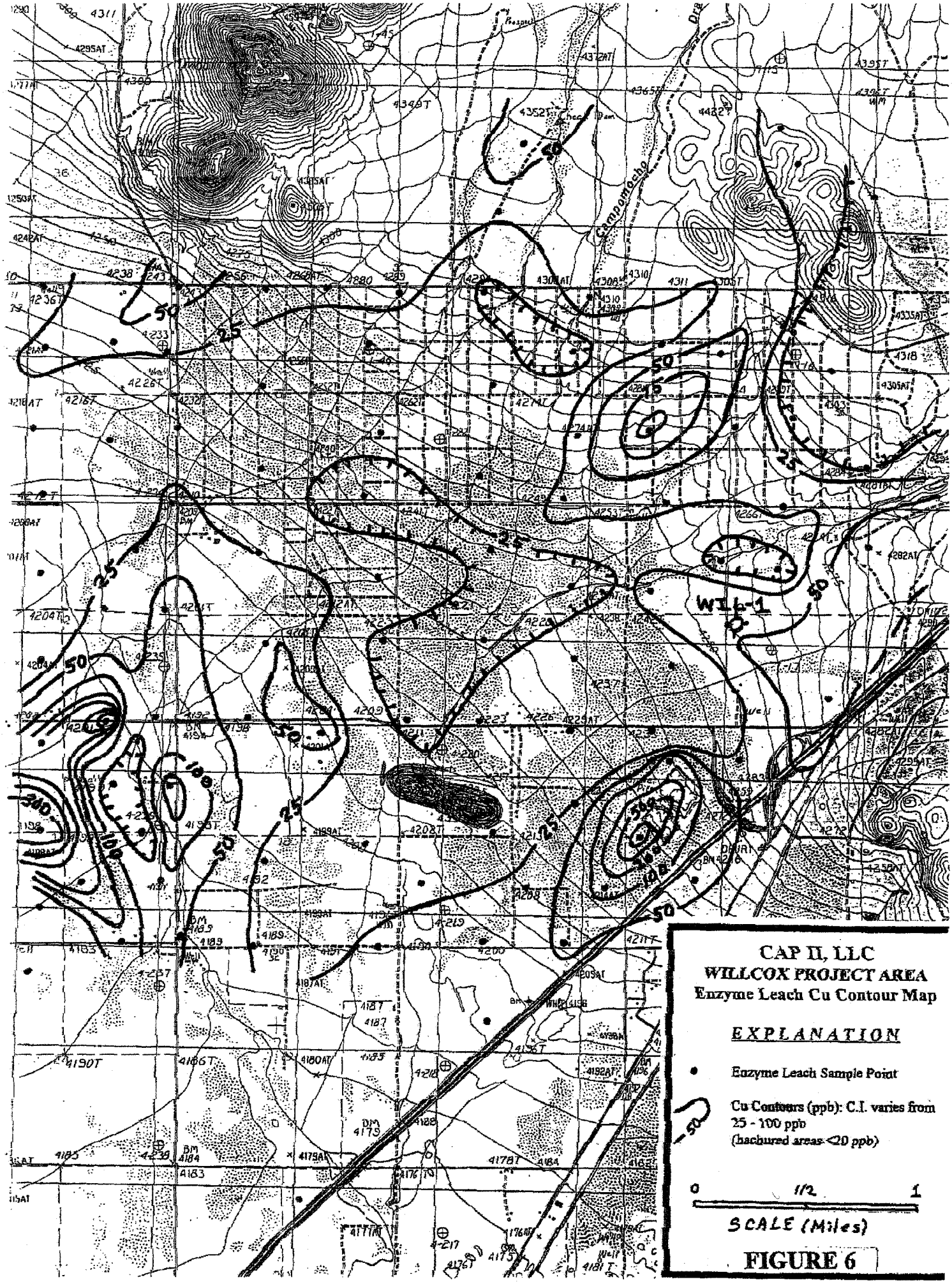

WIL-1
Campamento
50
25
100
300
CAP II, LLC
WILLCOX PROJECT AREA
Enzyme Leach Cu Contour Map
EXPLANATION
Enzyme Leach Sample Point
Cu Contours (ppb): C.I. varies from 25 - 100 ppb
(hachured areas <20 ppb)
0
1/2
1
SCALE (Miles)

FIGURE 6