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0009

Volume 2 ; Book 4

# TOMBSTONE

## Mining District

Cochise County

ARIZONA

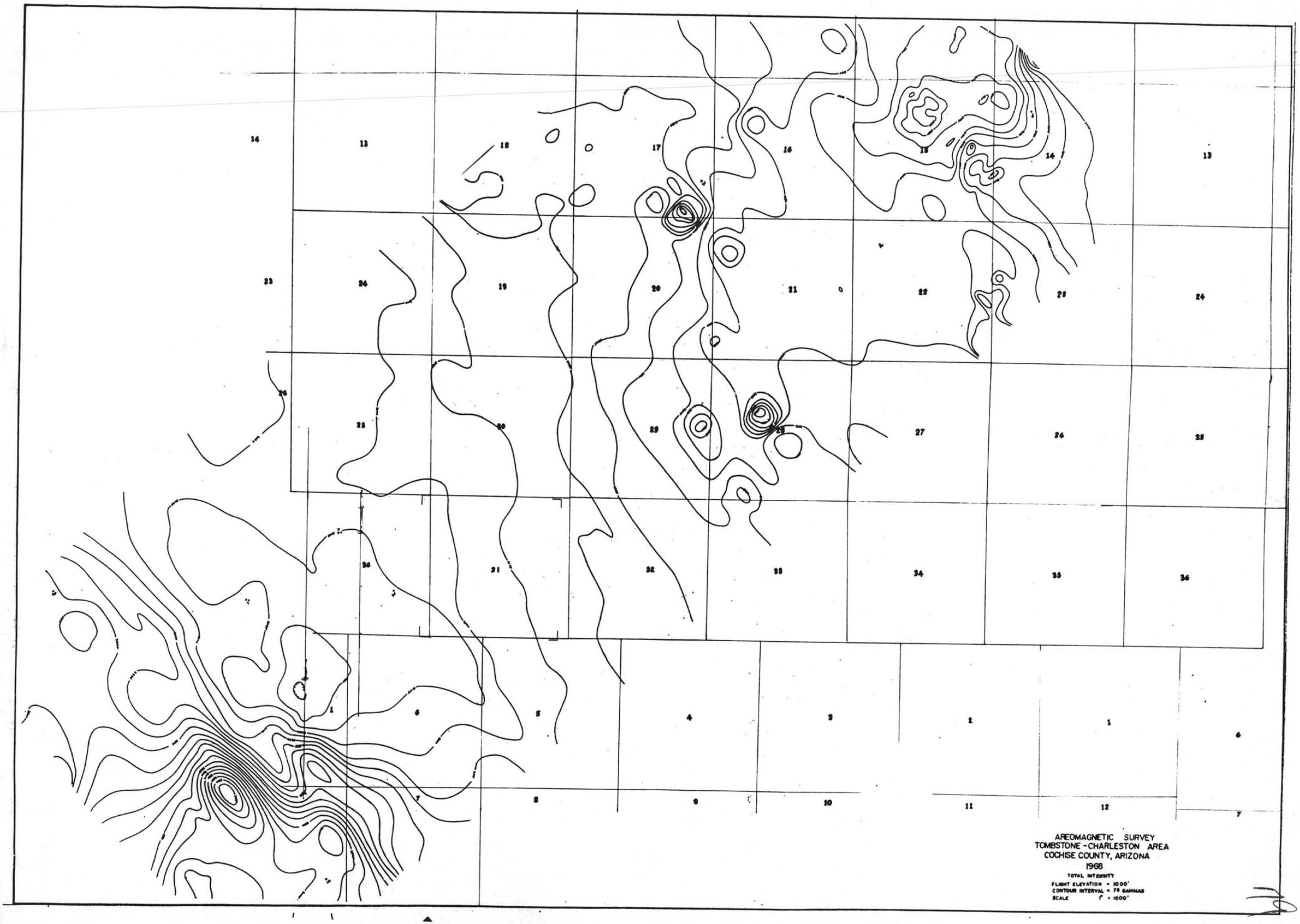
Charleston Mine Area Reports
1968 to 1984


**Southwestern Exploration Associates**

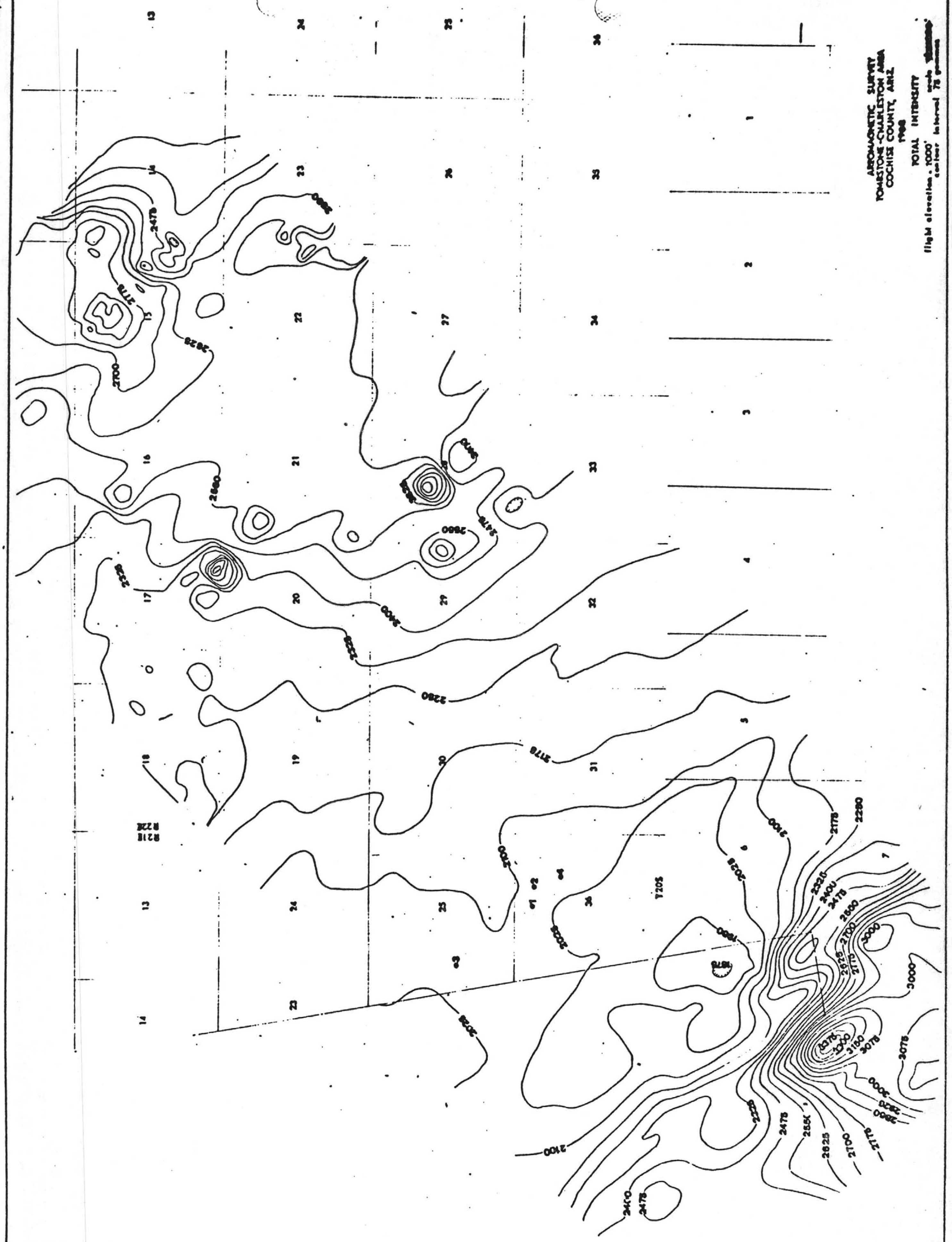
**Mineral Exploration & Natural Resource Consultants**

**Tucson, Arizona**

AEROMAG MAPS
1968


AREOMAGNETIC SURVEY
TOMBSTONE-CHARLESTON AREA
COCHISE COUNTY, ARIZONA
1968
TOTAL INTENSITY
FLIGHT ELEVATION = 1000'
CONTOUR INTERVAL = 75 GAMMAS
SCALE 1" = 1000'

SAUC CONTOUR'S 18



C.A. Cosgrove (1-17-68)

OFFICE CORRESPONDENCE

JAMES STEWART COMPANY

361

Tues, July 17 '68

To: M. S. Horne
Interstate Inn
Falls Church, Virginia

Call from Clyde Davis and McCay Smith shortly after you left. Clyde was sorry to have missed you.

One ore body indicated 800 to 1,000 feet Northeast of hole #1. The center of another ore body, the largest, is indicated to the south - 1 1/4 miles south and 1/4 mile west of Hole #1.

McCay was not through. He and Clyde were going to work more this afternoon. They will call re their contemplated trip. Sounds encouraging.

C. A. Cosgrove

CAC:jm

P. S. I am sending Kelly Plans for site 7, 226 acres. They will have bids tomorrow and would like your approval of Basic Plan, as soon as prudent. He will have Specs Tomorrow -

Cosgrove (7-22-68)

362

# M E M O R A N D U M

To: M. S. Horne

Date: July 22, 1968

From: C. A. Cosgrove

Re: Charleston Mine

Meeting this date with Clyde Davis and McCay Smith to review progress regarding their magnetic work. Mr. McCay Smith had the following tracings of a 4 square mile area centered ± on Charleston Mine.

Straight magnetic at surface showing magnetic lines as contours with its 1st and 2nd dirivitives.

Magnetic map at 500'into ground.

Information observed on these maps was non-conclusive but indicated several things. Most important was the need to produce the magnetic at 1500 feet and 2500 feet into the ground with the 2nd dirivitive function plotted. The trend from ground to -500 feet definitely points this out as the anomolies are apparently developing in a rather large area to the north east of Hole 2. Another anomoly shows on the ground level near the air strip.

There is definite correlation between ore limits located by Dal and the magnetic anomolies.

Clyde Davis is scheduled down here on Thursday and Friday of this week and will bring copies, preferably transparancies, of the work to date with the additional data noted above. This would be an excellent package for Bear Creek. If the work done to date can be considered as a guide the center of the ore mass lays about 2500 feet from Hole 2, with a small anomoly highlight about 400' from Hole 2.

Clyde has done a geological map with Holes 1 and 2 plotted in Section. He proposes to redo this with some refinements and have this data available.

C. A. Cosgrove

CAC:jm

360

E

August 2, 1968

Mr. Clyde Davis
c/o M. S. Horne
(Delivered Personally)

Dear Clyde:

In your meeting with your relative-professor and McKay Smith, it would be well if you can determine the following:

1. Preferred ore zone areas from present mapping.

2. Check out how far afield the ore may be from the specific influence.

3. What is the value of second derivitive work over the downward continuation or must both be used together?

4. Was there any over flight-information developed to the south?

I have marked the withdrawal areas south of Section 36 on the prints as returned to you. However, there are some patented claims within the withdrawal area which perhaps could be obtained should it be found required. Any information as to interpreting these magnetic anomolies would be desired information.

Nothing is to be given Kennecott before the results of your meeting are discussed with Mr. Horne.

C. A. Cosgrove

CAC:ef

Cosgrove (94-08)

September 19, 1968

MEMORANDUM TO FILE

Re: Charleston

Received the following prints from Geotec on 9-17-68, one print only of each

Filed As

Group I (A) Total High Intensity Map
(B) 1st Downward Continuation
(C) 2nd " "
(D) 3rd " "

Group II(A) Map R-1 dated Sept. 10, 1968
(B) Map R-2 " " "

Group III(A) Flight Line Map Data
(B) Blow up of Government Survey Map

Total 8 prints should be kept in office and not ~~disturbed~~ disbursed.

C. A. Cosgrove

CAC:jm

ID survey - CAB GPD
Nicholas Carousso (11-4-68)

11-4-68

67

# REPORT ON THE INDUCED POLARIZATION SURVEY ON THE CAB CLAIM GROUP, TOMBSTONE AREA COCHISE COUNTY, ARIZONA

# REPORT ON THE INDUCED POLARIZATION SURVEY ON THE CAB CLAIM GROUP, TOMBSTONE AREA COCHISE COUNTY, ARIZONA

## I
## INTRODUCTION

At he request of Mr. C. T. Henderson, the reconnaissance induced polarization survey initiated in October 1967, on the CAB Claim Group near Tombstone, Arizona, was continued during October 1968. The property is situated several miles southwest of Tombstone.

The ore potential of this area is expected to be from moderate to considerable depth. The induced polarization and resistivity survey was attempted to assist in locating any zones of mineralization that might be present at depth.

## II
## PRESENTATION OF RESULTS

The induced polarization and resistivity result is shown on the data plot enclosed with this report.

Three lines were surveyed for the reconnaissance induced polarization survey during the October 1967 effort, however, only LINE NO. 1 and LINE NO. 3 were geophysically surveyed at that time. The present effort includes LINE NO. 2.

LINE NO. 2 500' electrode spacing

Enclosed with this report is a plan map of the CAB Claim Group at a scale of 1:24000. The definite and probable induced polarization anomalies are indicated by solid and broken bars respectively on this plan map. These bars represent the surface projection of the anomalous zones as interpretated from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i. e. when using 500' spreads the position of a narrow sulfide body

can only be determined to lie between two stations 500' apart. In order to locate sources at greater depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with the source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

## III
## DISCUSSION OF RESULTS

The apparent resistivities measured during the reconnaissance survey indicate that the area is structurally quite complex.

Interpretation of the data indicate two definite anomalies, one from 10 N to 5 S, and the other from 32 S to 43 S; also four probable anomalies, one from 54 N to 42 N, another from 20 S to 32 S, and another from 43 S to 49 S, and another from 55 S to 60 S.

LINE NO. 2, correlates fairly well with LINES NOS. 1 and 3, and indicates that the mineraized zones have good lineal continuity.

It should be mentioned that the induced polarization survey lines were run north-south, whereas the suspected trend of possible mineralization was considered to bear northeast to southwest. The north-south bearing was used to assist in defining narrow mineralized zones, if present, as they would be oriented within the geometry of the electrode spread for most effective detection.

## IV
## CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance induced polarization survey of this area indicated definite and probable anomalies and certainly warrants further investigation.

LINE NO. 2, which was surveyed, correlates fairly well with LINES NOS. 1 and 3, and indicates that the mineralized zones have good lineal continuity.

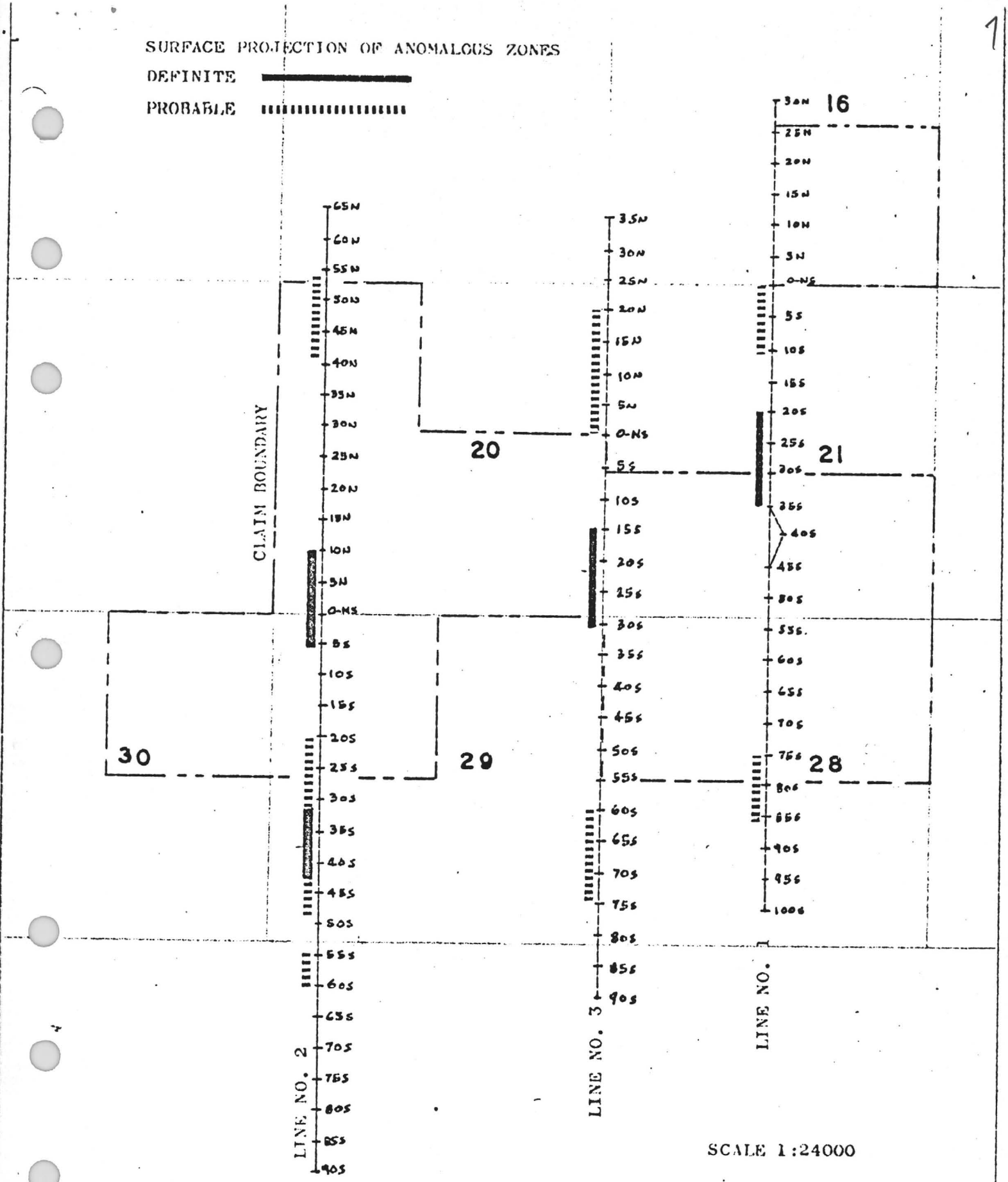
It is strongly recommended that at least one line be surveyed across LINES NOS. 1, 2 and 3, to substantiate the anomalous zones. This should be conducted using 500' dipole lengths.

The definite and probable IP anomalous areas could also be surveyed using 1000' dipole lengths to assist in verifying the data developed by the n-5 and n-6 dipole-dipole separations.

Respectfully submitted,

Nicholas H Carouso

Nicholas H. Carouso 11/4/68




INDUCED POLARIZATION AND RESISTIVITY SURVEY
CAB CLAIM GROUP, TOMBSTONE AREA, COCHISE CTY.-ARIZ.

OCT. 1967, REVISED OCT. 1968

burying aluminum foil in pits wetted with brine. Observations were made in accordance with a symmetrical dipole-dipole configuration where the distance between the receiver or potential electrodes was kept equal to the distance between adjacent electrode pairs. Generally the receiving dipole is separated by one to six dipole units ("n" separation) from the sending dipole. A precisely controlled square wave current was sent through a sending dipole at 0.05 and 3.0 cycles per second from which, at the receiving dipole, a D. C. and an A. C. voltage was measured, respectively. By knowing the geometry involved (the dipole length or spacing and the separation distance between the two receiving-sending dipole pairs), along with the two voltages, an apparent D. C. and an A. C. resistivity was calculated. From these apparent resistivities, their percentage difference was determined, thus giving the Percent Frequency Effect (PFE). A third quantity proportional to PFE and inversely proportional to D. C. resistivity, called Metallic Conduction Factor (MCF) was computed in order to somewhat normalize PFE for variations in ground conductivity purely as a technical interpretational aid.

The IP technique was developed primarily for porphyry type deposits and is perhaps the only reliable means of detecting hidden disseminated sulfides. However, the IP method works just as well or perhaps better on semi-massive to massive sulfides, contrary to some of the earlier thinking, for it gives increased response with increased volume percentage of sulfides.

# THE INDUCED POLARIZATION METHOD

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conductors.

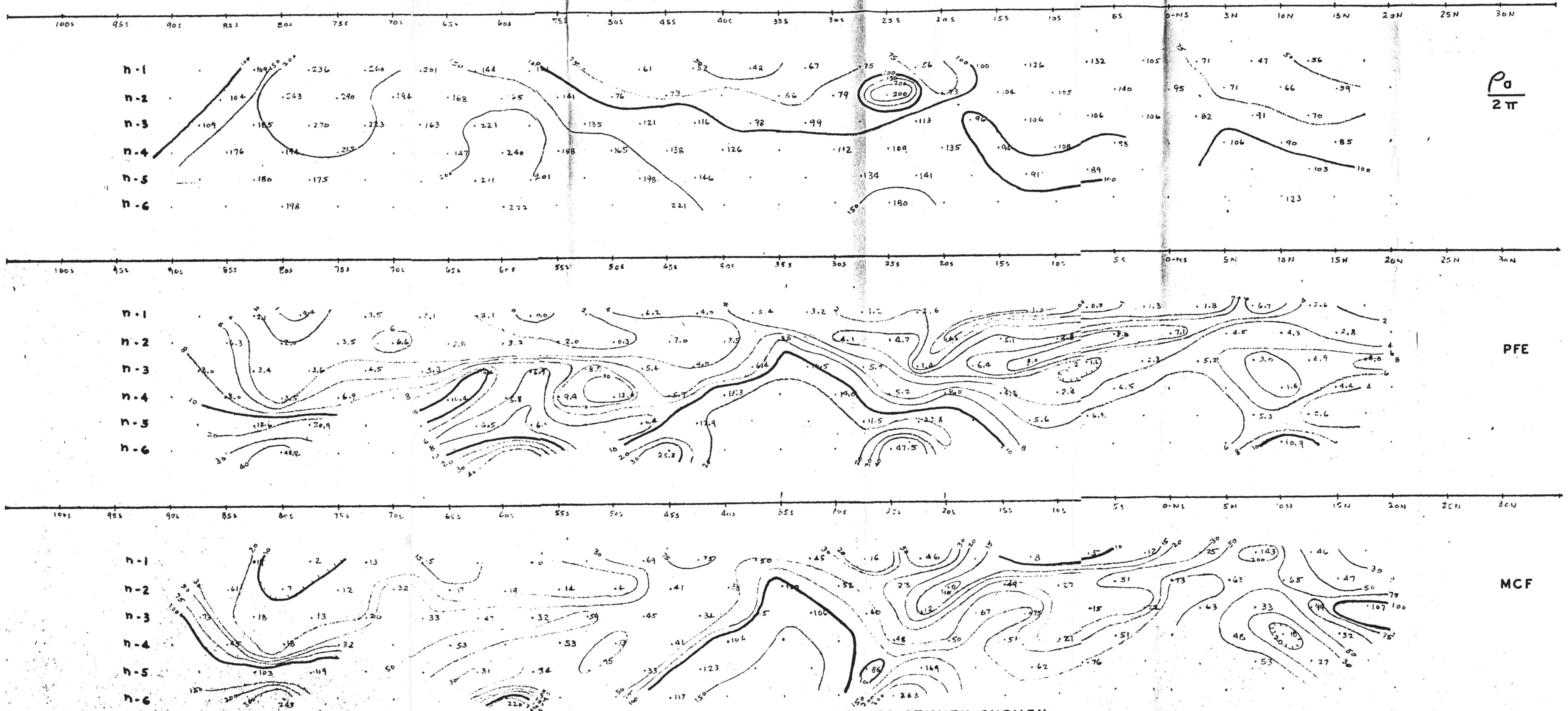
This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains electronic conductors such as base metal sulfides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock or soil; i. e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization described above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a D. C. current is allowed to flow through the rock; i. e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in a mineralized rock.

When the D. C. voltage used to create this D. C. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their steady state. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

Now if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed.

In this induced polarization reconnaissance survey, five equally spaced co-linear current electrodes were placed in the ground by

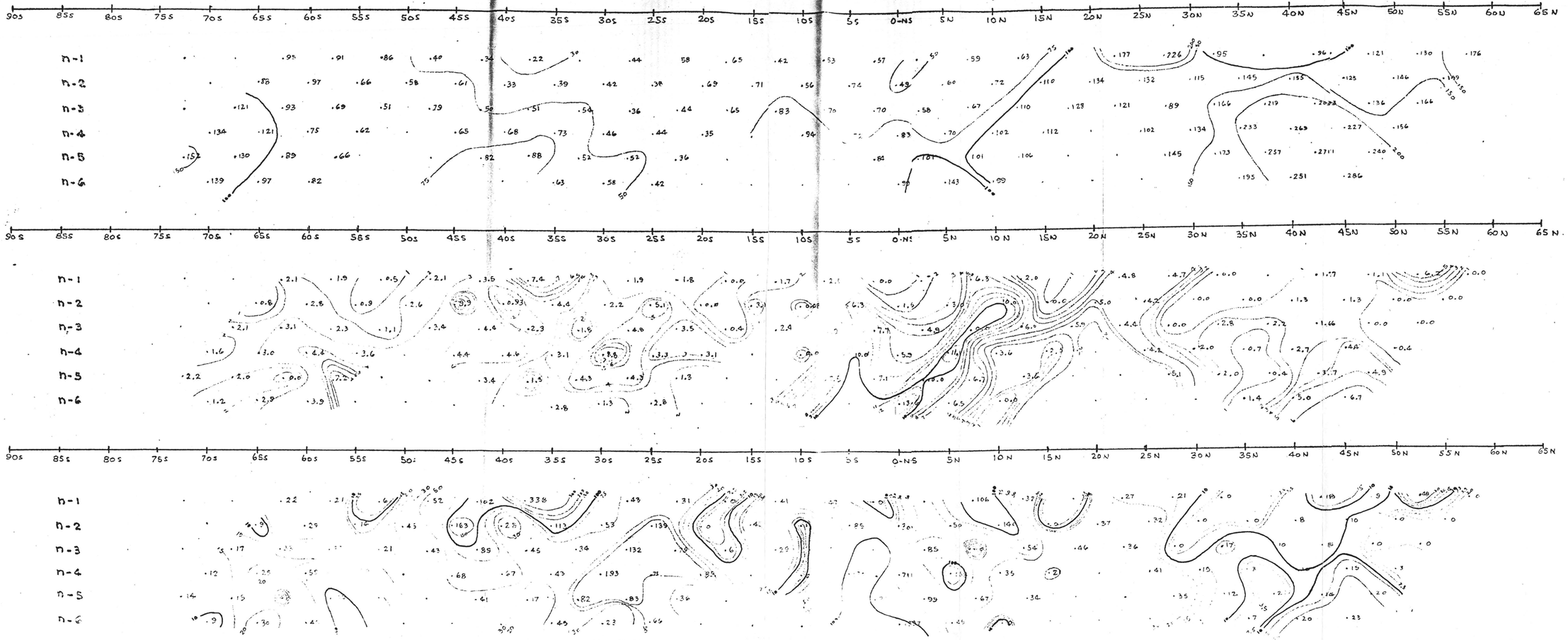



INDUCED POLARIZATION AND RESISTIVITY SURVEY

CAR CLAIM GROUP TOMBSTONE AREA COCHISE CTY.- ARIZ.

SCALE - 3/4" = 500'

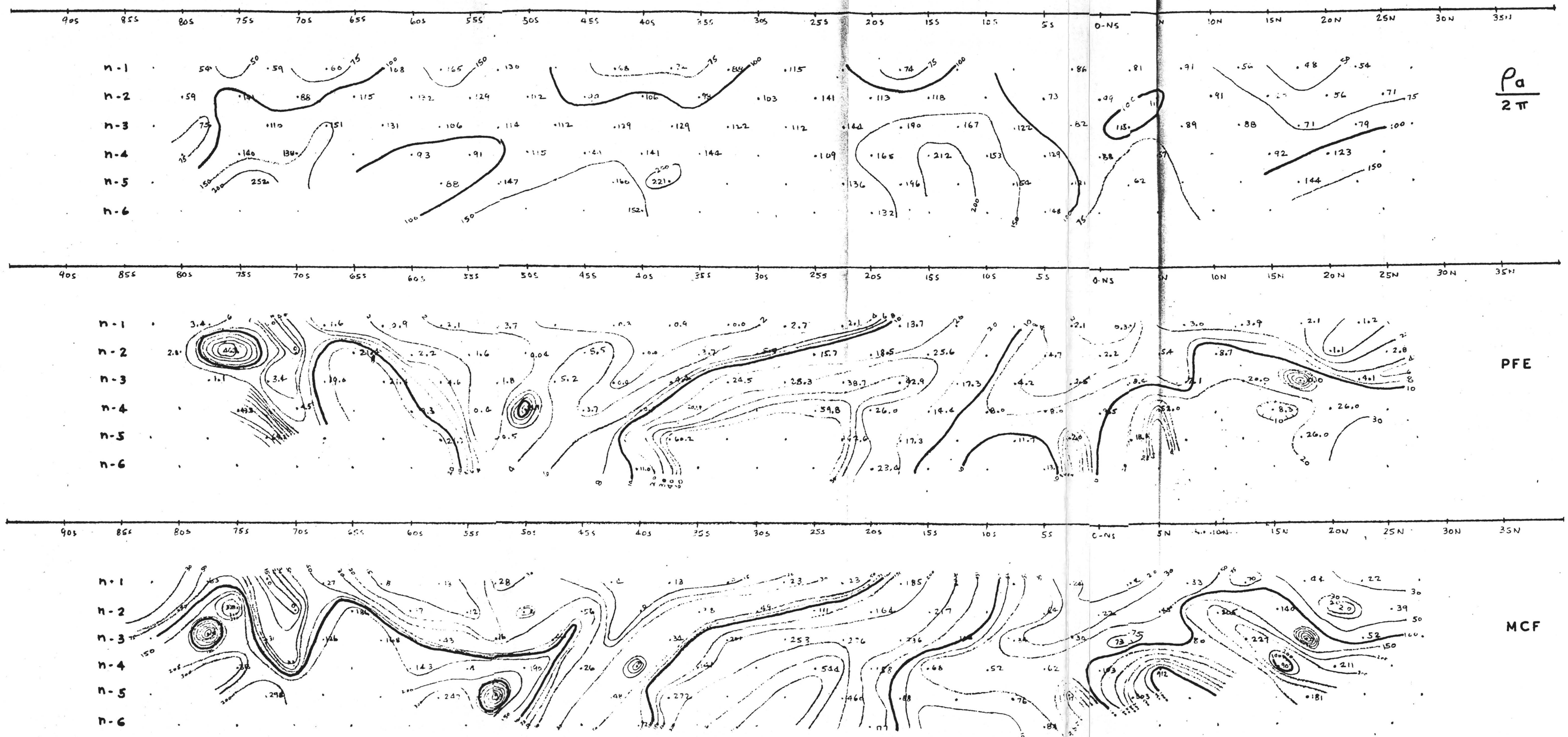
OCT. 1967




LINE NO. 2

INDUCED POLARIZATION AN[illegible]TIVITY SURVEY
CAB CLAIM GROUP, TOMBSTONE [illegible]. COCHISE CTY.-ARIZ.

SCALE- [illegible]/4"= 500'  OCT. 1968




INDUCED POLARIZATION AND RESISTIVITY SURVEY

CAB CLAIM GROUP, TOMBSTONE AREA, COCHISE CTY.-ARIZ.

Cos&Prod(12-13-68)

358

December 13, 1968

**AIRMAIL - SPECIAL DELIVERY**

Mr. H. Clyde Davis
859-E 2730 North
Provo, Utah 84601

Dear Clyde:

Enclosed are copies of the Freesh reports with his layout showing results of Astra's work. Much of this work is on adjacent property to Charleston on the northeast trend.

Very truly yours,

C. A. Cosgrove

CAC:ef
Encls.

See trend for enclosures sent

Cosgrove (10-18-69)

MEMORANDUM TO FILE

December 19, 1968

RE: Phone Conversation with McKay Smith re Aerial Magnetics.

In a conversation this date with McKay Smith, I mentioned the variation of scale on points 4, 5, 6, 7, and 8. This he will check and will call back.

Flight was run on a ground plus 1000' base elevation using a grid of 340'. The total intensity map is the magnetic at that elevation.

His first downward continuation is at 340 feet lower, the second at 680 feet lower, both still above ground base.

The original work was flown at 500' high. The first downward was 1500' in the ground. The second was 2500' in the ground.

They feel (his group and Clyde) that this mineralization is going to be relatively shallow.

He wants to come down to Charleston and run IP's on these anomalies for correlation and verification data. This would be at his own cost with his equipment. The thought is that Clyde and/or I could work with him for a few days on this, reducing and mapping as we go.

He will forward more workable drawings. His group is now in theprocess of data correlation - original and new work.

Deeper downwards are being run.

He said the anomaly outlined in color is only the heart and the ore body has several areas of good "very probables".

C. A. Cosgrove

CAC:ef

Loyd A. Hewitt (3-11-69)

Hewitt Enterprises Box 978 A Sandy, Utah 84070 801 571-0157

Clarence

March 11, 1969

RECEIVED
MAR 17 1969
JAMES STEWART COMPANY
PHOENIX, ARIZONA

Mr. M. S. Horne
James Stewart Company
707 Mayer Central Bldg.
3033 North Central Avenue
Phoenix, Arizona 85012

Dear Mr. Horne,

Enclosed please find a preliminary map of the induced polarization traverse lines in the Charleston Mine Area (Tombstone, Arizona.

Two traverse lines were made totaling 22,500 feet. Induced polarization and resistivity data was taken along these traverses. Hewitt Enterprises D. C. Pulse equipment was used. This incorporates a 4-second energizing current and a 0.8 second residual integration of the induced polarization voltage. A Wenner electrode configuration was used with a 1,000 foot depth penetration spread. The resultant resistivity and polarization profiles are plotted in ohm feet and millivolt seconds per volt respectively.

INTERPRETATION

Only two areas of anomalous polarization were found. One between 0 North and 2500 South on line 1 and one centered at 6500 South on line 2. The anomalies in both cases are rather weak. This may be caused by the considerable depth to sulphides. However, no detailed efforts on either anomaly were conducted to determine if this is so.

It is felt that these anomalies do represent mineralization at depth and they do occurr in areas where prospecting for economic minerals has been done.

We believe the induced polarization method is a positive tool for prospecting in this area since no extraneous polarization effects were noted. However, it is felt that in some areas where the mineralization is deep, a modified electrode configuration must be used to insure greater depth of penetration. Further detailed studies would be required before exact drill

A1



target locations could be recommended.

Thank you for the opportunity to be of service.

Sincerely yours,

HEWITT ENTERPRISES

Loyd A. Hewitt

Loyd A. Hewitt

LAH/ikr

cc: Mr. C. A. Cosgrove
James Stewart Company
707 Mayer Central Bldg.
3033 North Central Avenue
Phoenix, Arizona 85012

Mr. H. Clyde Davis
Director, Mineral Development
Brigham Young University
A-362 Smoot Adm. Bldg.
Provo, Utah 84601

Mr. F. McKay Smith
President, Computer Update
72 East 4th South
Salt Lake City, Utah 84111

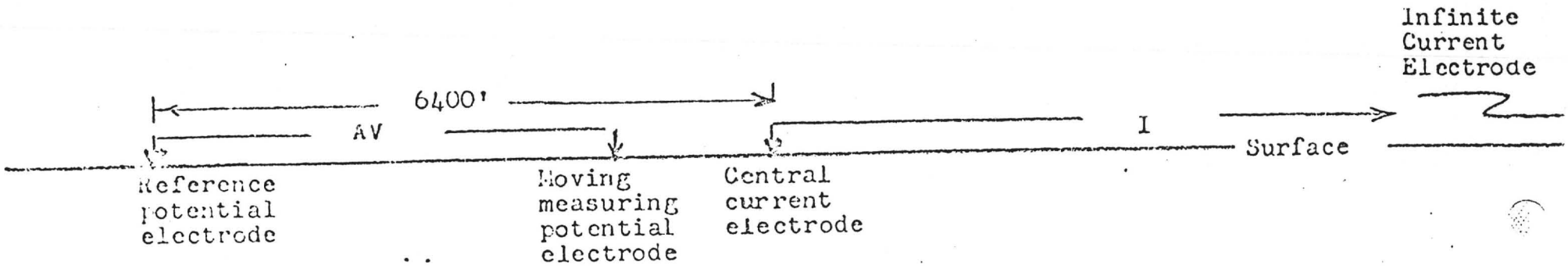
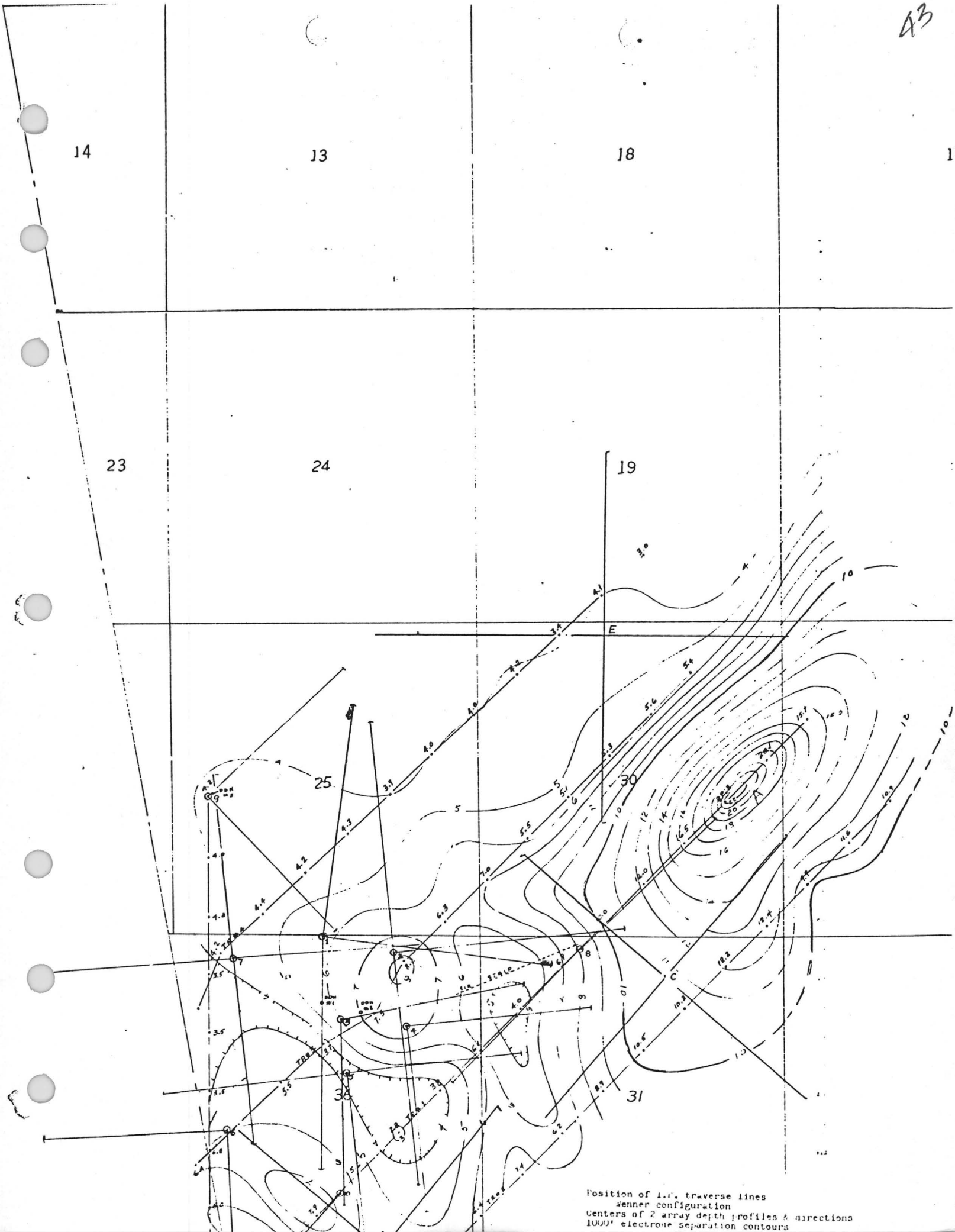


Fig. 1

Modified 2 array electrode configurat




Position of I.P. traverse lines
Wenner configuration
Centers of 2 array depth profiles & directions
1000' electrode separation contours

Copy rose (3-19-69)

I didn't find any of this material as yet - map found.

March 19, 1969

Mr. Loyd A. Hewitt
Hewitt Enterprises
Box 978A
Sandy, Utah 84070

Dear Loyd:

I am enclosing a map of the Charleston-Tombstone Mining District with the locations of approximately 80 samples taken on March 17 and 18 being sent to you under separate cover for purposes of geochemical analysis. As previously discussed, we have not taken any samples in the Talus areas for the fill plain. The areas primarily covered were the more obvious mineralized zones, plus some typical various outcroppings as they occurred. Included also are a few typical samples of the various sectors of the sericite pit, together with an average sample. You will note the fluctuation in mineralization as it occurs.

The parcel being sent to you under separate cover contains physical samples, all numbered consecutively 1 through 74.

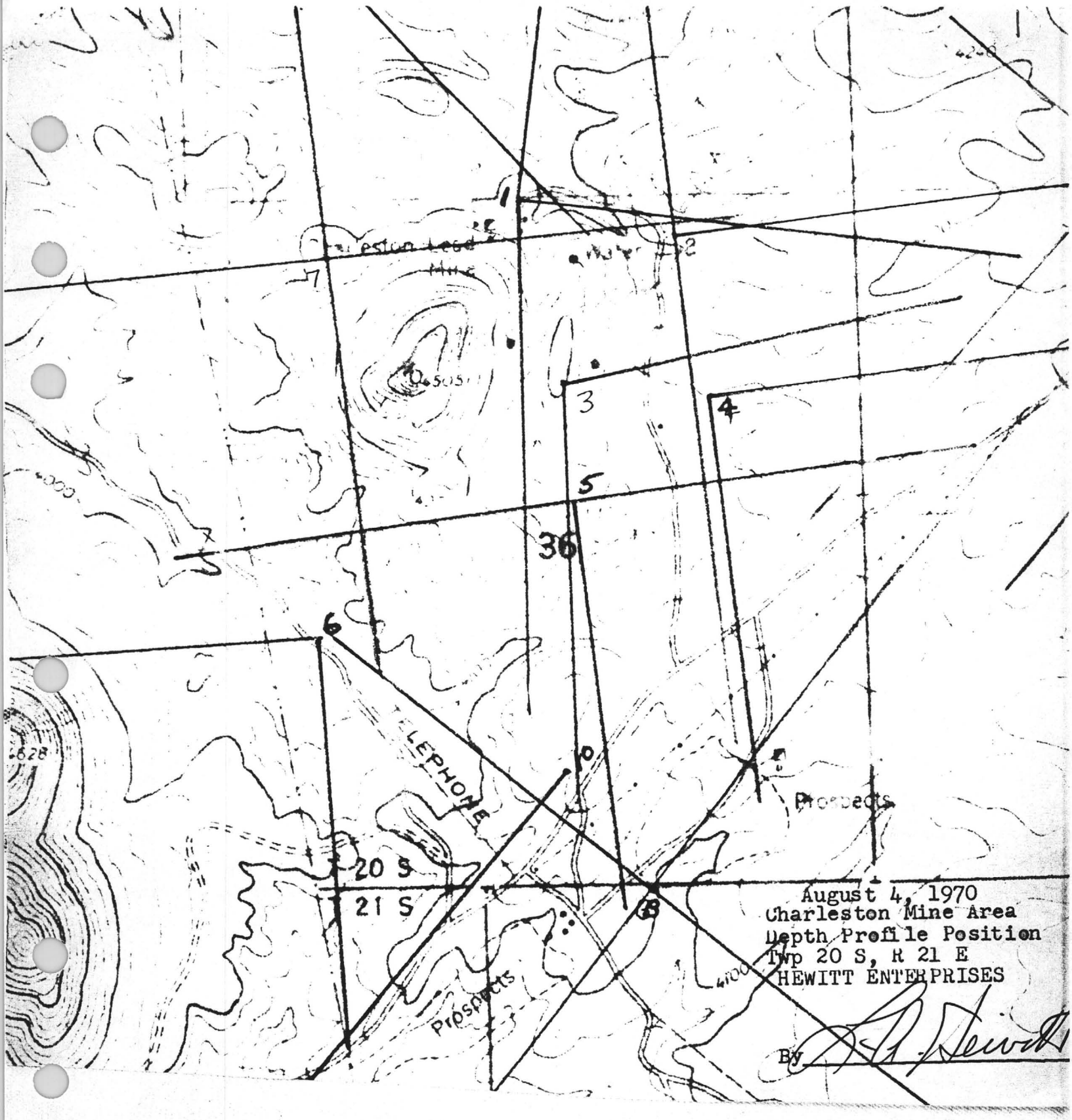
If more sampling is needed, please advise.

Yours very truly,

JAMES STEWART COMPANY

C. A. Cosgrove

CAC:ef
Encl.
cc Clyde Davis


1
2
3
4
5
6
7
36
20 S
21 S
TELEPHONE
Prospects
Prospects
August 4, 1970
Charleston Mine Area
Depth Profile Position
Twp 20 S, R 21 E
HEWITT ENTERPRISES
By

M. S. Horne (5-20-69)

May 20, 1969

Mr. H. Clyde Davis
Director, Mineral Development
A-362 ASB
Brigham Young University
Provo, Utah 84601

Dear Clyde:

Confirming our telephone conversation with you today the work being done by Loyd Hewitt is progressing and coming along very nicely and is very encouraging. As a matter of fact, they will be reaching a point by the end of this week that he will be in a position to recommend a further drilling program.

It will be very much appreciated if you will arrange to meet with us at the mine Tuesday morning May 27, to review all of Hewitt's data and evaluate it f rom a Geological standpoint and determine with him the next 3 or 4 drill holes. It appears that we are going to have to drill very deep holes-up to 5000 feet.

If you can be here in Phoenix Monday May 26, I will arrange to get us to the mine on Tuesday morning.

You know that we have spent more than $500,000 to date on this property and we are prepared to spend substantial additional sums on further exporation. Assuming that the property bares fruit as indicated, arrangements will be made whereby the Brigham Young University will materially benefit, either directly or indirectly, particularly because of your valuable technical advice.

Very truly yours,

JAMES STEWART COMPANY

M. S. Horne
President

MSH:id

M. S. Horne (6-16-69)

355

**MEMORANDUM TO FILE** June 16, 1969

RE: Charleston -- Telephone Report by Loyd Hewitt

Loyd Hewitt called me this day from Southern Utah where he is enroute to Tombstone and Lordsburg, New Mexico. He advised that they have completed their work at Charleston.

They made three additional deep probes: One at the east end of the Airport, one at 6 "Void" which is now #8, and also one at Hole #3. The east end of the Airport showed a good anomaly both east and west; however, not quite as strong as compared with Probes 4 and 5, for example.

They got absolutely nothing at Hole #3. This is the only spot in all of their probes where they had a complete blank. He advised that they ran both east and south. The south line ran approximately 3200' south from Hole #3. Loyd feels that there is a major fault running within a few hundred feet north of Probe 7 and Hole #1 that separates our Charleston area from everything north of there.

Probe 8 (Old 6 "Void") showed very good, the same as Probes 5 and 6.

They did not make any probes in Boquillas. He said it would be necessary to reset their lines. Their surface (1000' depth) probes indicated a good anomaly all the way from Probe 8 to the river. In some cases they picked up good sulphides at a depth of 150 feet. Loyd recommended that nothing further be done in the way of IP work until we have drilled our next hole. ~~At this point~~ He thinks the ore body might extend all the way from Section 36 westward and southwestward to the river -- even under the large hill on the Boquillas. This area would include the north end of Section 1 and the northwest corner of Section 6.

We will be drilling our next hole at a point in Charleston where it would not have any particularly significance to either the Boquillas or to Sections 1 and 6. He recommends that we drill this as a tight hole. Therefore, because of this drilling, we should not hurt our chances particularly in negotiating with Boquillas or people in 1 and 6 if we decided we should pick up some of those areas. Loyd did recommend, however, that if a favorable option could be obtained from Boquillas at this time, it would be desirable.

We discussed what type of deal might be presented to Boquillas. He suggested that they give us a free option for an 18 to 24 month period during which time we would have to either drill on their property, or drill a deep hole within a certain number of feet of their property and give them the results of such drilling. At the end of two years, he suggested that we pay them a minimum of $25,000 a year against a standard 5% royalty.

Loyd is going to select himself a number of additional samples for chemical analysis. He expects to have a report and conclusions completed within two weeks. He said he felt better about the property today than ever -- that we have either got a lot of pyrite or a lot of sulphide, and the indications are that it is sulphide ore.

I reviewed again with him our proposed program of drilling, that as soon as we hit something significant in our proposed new hole we would then immediately start a second hole. During this same time, he felt that the additional geological work should be done by Clyde, and also during the same time, the additional IP work should be done by him, primarily on the area to the south and west.

MSH:ef

M. S. Horne

Log # 1 Hem. #(3-14-69)

8

RECEIVED

AUG 14 1969

JAMES STEWART COMPANY
PHOENIX, ARIZONA

CHARLESTON MINE AREA

TOMBSTONE, ARIZONA

During May and June, 1969, a geophysical survey was conducted in the Charleston Mine area. This survey was subsequent to an earlier test (note March 11, 1969, tests at Charleston Mine area). In the earlier test, a penetration depth of 1,000 feet was not sufficient to penetrate sulphides believed to lie below this area.

The survey area of interest includes Sections 19, 20, 29, 30, 31 and 32, Township 30 S, Range 22 E; Sections 5 and 6, Township 31 S, Range 22 E; Sections 25 and 36, Township 30 S, Range 21 E; and part of the Boquillas land grant west of Sections 25 and 36.

Generally of interest is a pediment area approximately six miles southwest of Tombstone, Arizona. Several hills rise abruptly from the pediment. One of these hills at the Charleston Mine is called "Gum Drop" locally. The hill is primarily quartz latite and andesite, underlain by older volcanics and metasediments. West of "Gum Drop" lie several more hills within the Boquillas land grant. Earlier mapping by USGS and cursory examination, indicate these hills to be composed of Uncle Sam porphyry. Most of the low lying areas are mapped as volcanics. However, in the mine area some sediments are observed. West of Bronco Hill, to the south, several granodiorite ridges are seen.

From the regional magnetic map, the Charleston Mine area appears to be an embayment of sediments and volcanics between two large intrusive masses. One mass to the east underlying the entire

Tombstone district appears to be granodiorite. The other intrusive mass of granodiorite lies to the west in the San Pedro river valley. This intrusive is exposed in several low mounds west of Bronco Hill. The sedimentary section in the Charleston area may be noted as a magnetic low on the aerial magnetic map. Diamond Drill hole No. 2 shows the sedimentary section to be at least 3000 feet thick near the Charleston mine.

From surface evidence, the rocks noted as Bronco Volcanics, rather than being a distinct member, may in part be a hydrothermally altered meta volcanic. Within this altered area numerous mineralized shear zones, quartz veins, quartz manganese veins and sericite zones are noted. The general trend of these structures is North 45° East. Initial geochemical tests indicate the quartz veins and near vicinity to have abnormally higher values in copper, lead, zinc and silver; whereas, the pyrite and sericite zones contain minor amounts. It would seem that several stages of mineralization and alteration have taken place in the area under investigation. The sericite and pyrite are probably the most recent of any hydrothermal activity in the area and may be the least significant economically.

## Drill Hole #2 Analysis

Drill hole #2 gives an excellent analysis of what rocks exist in the sedimentary embayment of interest. From the core log it appears that the altered volcanic section is approximately 800 feet thick. These volcanics are highly altered with many bleached zones, some sericite and silicification. Mineralization with pyrite etc. appears to be minor. No economic minerals of importance seem to be present in the volcanic section.

DECLASSIFIED

The sedimentary section from 800 to 3000 feet are primarily bedded quartzites, silt stones, tactites and arkose. Much hydrothermal alteration is present. The bedding plane is approximately 50° to the core axis.

Many sections of interesting mineralization are encountered in drill hole #2, note enclosed log and assays. The following sections are felt to be significant:

| | |
|---|---|
| 1005 - 1008 | 1850 - 1854 |
| 1028 - 1032 | 2261 - 2272 |
| 1175 - 1185 | 2515 - 2526 |
| 1726 - 1737 | 2947 - 2961 |

The above sections are noted for their lead, zinc, or copper content or the combination thereof. It is thought to be significant that zoning appears to be prevelant downward. This is based on the increasing copper to lead zinc ratio. An 1820 foot assay for Au and Mo is noted. These values added to the copper or lead zinc would be significant. It is felt that the gold and molybdenum values should exist in the zones herein mentioned. Assays in these sections would be warranted.

## Drill Hole #1

At drill hole #1, the volcanic section appears to be about 330 feet thick. The bedding is more nearly 60° average to the core axis. The sedimentary section in this hole is very similar to that in hole #2, except the alteration associated with the mineralization is less intense. Sericite is most abundant. Logs and assays for hole #1 are included in this report.

## Geophysical Survey

On the basis of stated preliminary assumptions, induced

polarization and resistivity surveys were conducted in the area of interest. This consisted of two preliminary lines, note L. A. Hewitt report March 11, 1969. Four other traverse lines Tr 1, Tr 2, Tr 3 and Tr 4 were made over the area of interest. These four traverses cover about 70,000 feet, using a nominal depth penetration of less than 1000 feet. Ten depth profiles were also made in the area of interest.

The 1000 foot depth traverses were made primarily to ascertain the general distribution of shallow sulphides. Three anomalies were found which are probably related to sulphides. (A, B, C.) Anomaly A is coincident with a very strong altered and sheared zone in andesite. Abundant sericite is noted along with many fractures containing limonite filling. The altered zone bears approximately North 45° East. A width of 2000 feet and a length of 3000 feet is probably a good estimate of the anomalous source limits. The depth to sulphides on this anomaly is probably less than 200 feet, 2% sulphide is estimated. Several rock samples over this anomaly suggested that the sulphide mineral is predominately pyrite.

Anomaly B, like A, lies on a strong sheared and altered area striking approximately North 45° East. Like anomaly A, there is abundant sericite and limonite. The depth to sulphides on this anomaly is estimated to be less than 200 feet also, 1% sulphide is estimated. Associated with the altered zone underlying anomaly B are several quartz veins bordering the south edge of the shear. Copper minerals, principally oxides, are associated with these quartz veins. Geochemical samples over zone B contain anomalous amounts of copper. The copper values probably are associated with copper minerals in the quartz veins, rather than with the pyrite mineralized altered zone.

Anomaly C is a small anomaly at the Charleston Mine. This anomaly appears to be associated with pyrite mineralization seen in the old workings and in drill hole #1.

12

Ten depth profiles were conducted to determine the presence of sulphides in the sedimentary section below the volcanics. The profiles were made with a two array system in order that maximum depth penetration might be realized. All depth profiles, with the exception of DP3, indicated the presence of polarizable material. It is believed that the predominate effect is related to metallic sulphides, primarily pyrite. After examination of the core and the contained mineralization, it is realized that the curves will not fit theoretical plots for a homogeneous medium. The mineralization is very heterogeneous and therefore field curves are at best a good approximation, as far as depth calculations and sulphide percentages are concerned. The following is a depth estimate and percentage estimate for different probes. The percentages are based on an infinite depth to the bottom of sulphides.

| Probe No. | Depth | Percent Sulphides |
|---|---|---|
| #1 | 200 feet | 1% or less |
| | 800 feet | 1% but increases eastward |
| #2 | 1000 feet | 1.5% increasing eastward |
| #3 | 800 feet | 1% or less increasing eastward |
| #4 | 900 feet | 1 to 1.5% |
| #5 | 1000 feet | 1.5 to 2.0% |
| #6 | 800 feet | 1% increasing south |
| #7 | 700 feet | 1 to 2% |
| #8 | 200 feet | 1% or less, deep section cannot be determined |
| #9 | 300 feet or less | less than .3% |
| #10 | 500 feet | 1% |

It appears that section 36 and southwestward is the principle zone of interest. In the area outlined, a deep zone of sulphides seems to be present. It is probable that this deeper zone of sulphide mineralization is confined to a sedimentary section, which has been highly altered and heavily mineralized locally. Though the sulphide percentage estimates seem low, it is of little significance, considering the type of potential ore body that might exist.

It appears from the geologic data, drilling results and geophysics that an area of mineralization has been found. The fact that a large area may be mineralized is of importance. However, we cannot construct a geologic picture sufficiently good to give us specific drilling targets. Based on what we know, it is required that a hole or two be drilled in the area southeast of DDH#2 and possibly southwest. In order that we test this mineralized zone and yet geologically tie to DDH#2, a drill hole is recommended somewhere between Depth Profiles 4 and 5. The hole should be designed to drill at least 1000 to 2000 feet into the mineralized sediments. If indeed DDH#4 encounters economic mineralization it appears a definite pattern be planned to utilize geophysical hole probing to better guide a continued effort. Based on the outcome of DDH#4, it should be considered that holes 1, 2, and 4 be kept open for logging purposes with plastic pipe.

This property is probably typical of a new generation of prospecting in North America. Exploration for new deposits at the depths considered here taxes our present technology to the limit. However, the need for, and possibilities for, new deep seated deposits is high and should be rewarding.

HEWITT ENTERPRISES
by L. A. Hewitt

Hem:H (plates) 8-4-69

Update Previous Roughs Draft. 1A

RECEIVED

AUG 14 1969

JAMES STEWART COMPANY
PHOENIX, ARIZONA

CHARLESTON MINE AREA

TOMBSTONE, ARIZONA

During May and June, 1969, a geophysical survey was conducted in the (Tombstone Mining District Charleston Mine area.) This survey was subsequent to an earlier test (note March 11, 1969, tests at Charleston Mine area). (In the earlier test, a penetration depth of 1,000 feet was not sufficient to penetrate sulphides believed omit to lie below this area.)

(The survey area of interest includes Sections ~~19,~~ 20, 29, 30, 31 and 32, Township 30 S, Range 22 E; Sections 5 and 6, Township 31 S, Range 22 E; Sections 25 and 36, Township 30 S, Range 21 E; and part of the Boquillas land grant west of Sections 25 and 36.) omit

Generally of interest is a pediment area approximately six miles southwest of Tombstone, Arizona. Several hills rise abruptly from the pediment. One of these hills at the Charleston Mine is called "Gum Drop" locally. The hill is primarily quartz latite and andesite, underlain by older volcanics and metasediments. West of "Gum Drop" lie several more hills within the Boquillas land grant. Earlier mapping by USGS and cursory examination, indicate these hills to be composed of Uncle Sam porphyry. Most of the low lying areas are mapped as volcanics. However, in the mine area some sediments are observed. West of Bronco Hill, to the south, several granodiorite ridges are seen.

(From the regional omit magnetic map, the Charleston Mine area appears to be an embayment of sediments and volcanics between two large intrusive masses. One mass to the east underlying the entire

omit

The sedimentary section from 800 to 3000 feet are primarily bedded quartzites, silt stones, tactites and arkose. Much hydrothermal alteration is present. The bedding plane is approximately 50° to the core axis.

Many sections of interesting mineralization are encountered in drill hole #2, note enclosed log and assays. The following sections are felt to be significant:

| | |
|---|---|
| 1005 - 1008 | 1850 - 1854 |
| 1028 - 1032 | 2261 - 2272 |
| 1175 - 1185 | 2515 - 2526 |
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The above sections are noted for their lead, zinc, or copper content or the combination thereof. It is thought to be significant that zoning appears to be prevelant downward. This is based on the increasing copper lead zinc ratio. An 1820 foot assay for Au and Mo is noted. These values added to the copper or lead zinc would be significant. It is felt that the gold and molybdenum values should exist in the zones herein mentioned. Assays in these sections would be warranted.

## Drill Hole #1

At drill hole #1, the volcanic section appears to be about 330 feet thick. The bedding is more nearly 60° average to the core axis. The sedimentary section in this hole is very similar to that in hole #2, except the alteration associated with the mineralization is less intense. Sericite is most abundant. Logs and assays for hole #1 are included in this report.

## Geophysical Survey

RECEIVED

On the basis of stated preliminary assumptions, induced

Tombstone district appears to be granodiorite. The other intrusive mass of granodiorite lies to the west in the San Pedro river valley. This intrusive is exposed in several low mounds west of Bronco Hill. The sedimentary section in the Charleston area may be noted as a magnetic low on the aerial magnetic map. Diamond Drill hole No. 2 shows the sedimentary section to be at least 3000 feet thick near the Charleston mine.)

From surface evidence, the rocks noted as Bronco Volcanics, rather than being a distinct member, may in part be a hydrothermally altered meta volcanic. Within this altered area numerous mineralized shear zones, quartz veins, quartz manganese veins and sericite zones are noted. The general trend of these structures is North 45° East. Initial geochemical tests indicate the quartz veins and near vicinity to have abnormally higher values in copper, lead, zinc and silver; whereas, the pyrite and sericite zones contain minor amounts. It would seem that several stages of mineralization and alteration have taken place in the area under investigation. The sericite and pyrite are probably the most recent of any hydrothermal activity in the area and may be the least significant economically.

( omit

## Drill Hole #2 Analysis

Drill hole #2 gives an excellent analysis of what rocks exist in the sedimentary embayment of interest. From the core log it appears that the altered volcanic section is approximately 800 feet thick. These volcanics are highly altered with many bleached zones, some sericite and silicification. Mineralization with pyrite etc. appears to be minor. No economic minerals of importance seem to be present in the volcanic section. )

RECEIVED

17

polarization and resistivity surveys were conducted in the area of interest. This consisted of two preliminary lines, note L. A. Hewitt report March 11, 1969. Four other traverse lines Tr 1, Tr 2, Tr 3 and Tr 4 were made over the area of interest. These four traverses cover about 70,000 feet, using a nominal depth penetration of less than 1000 feet. Ten depth profiles were also made in the area of interest.

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18

omit

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omit

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| #10 | 500 feet | 1% |

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HEWITT ENTERPRISES
by L. A. Hewitt

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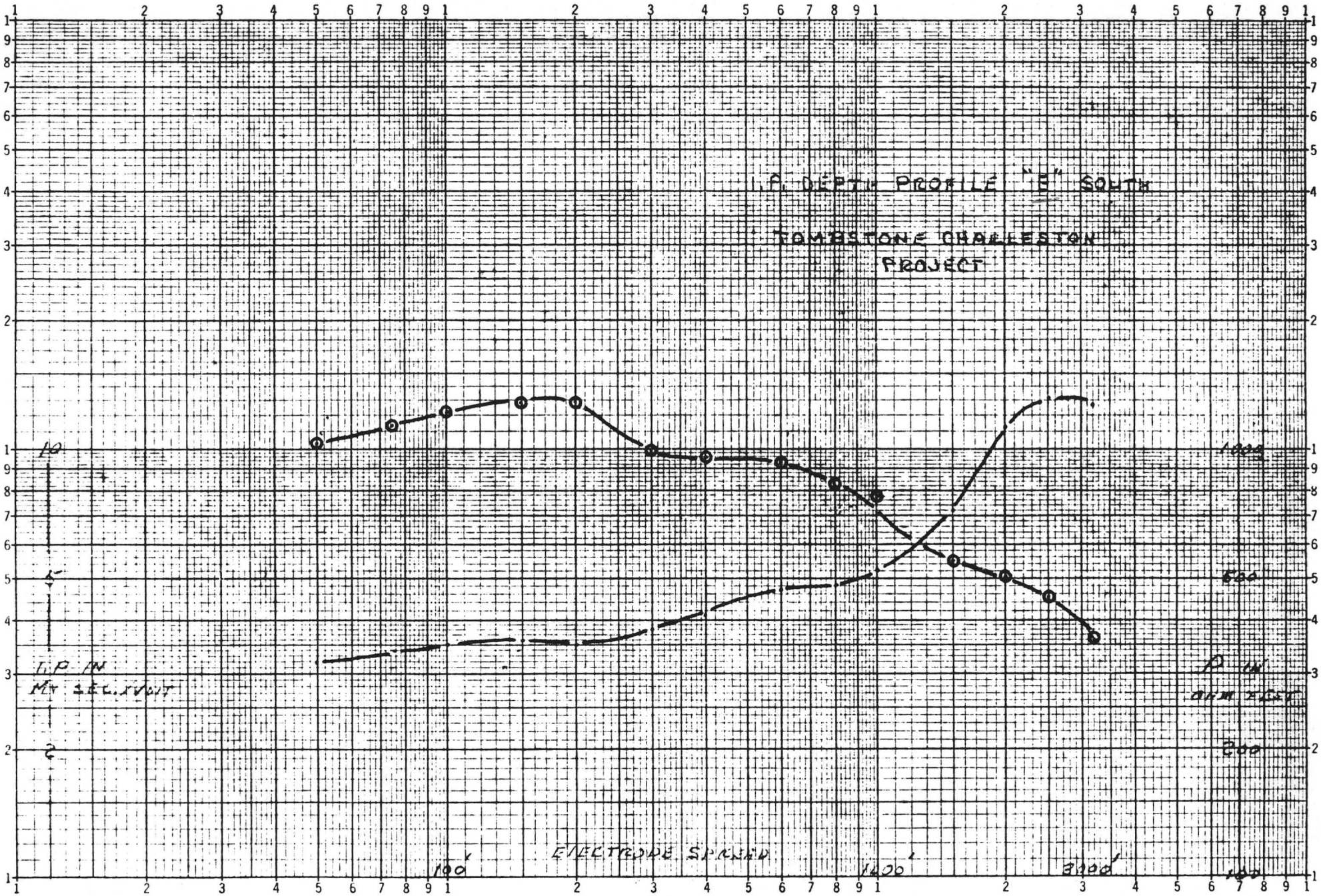
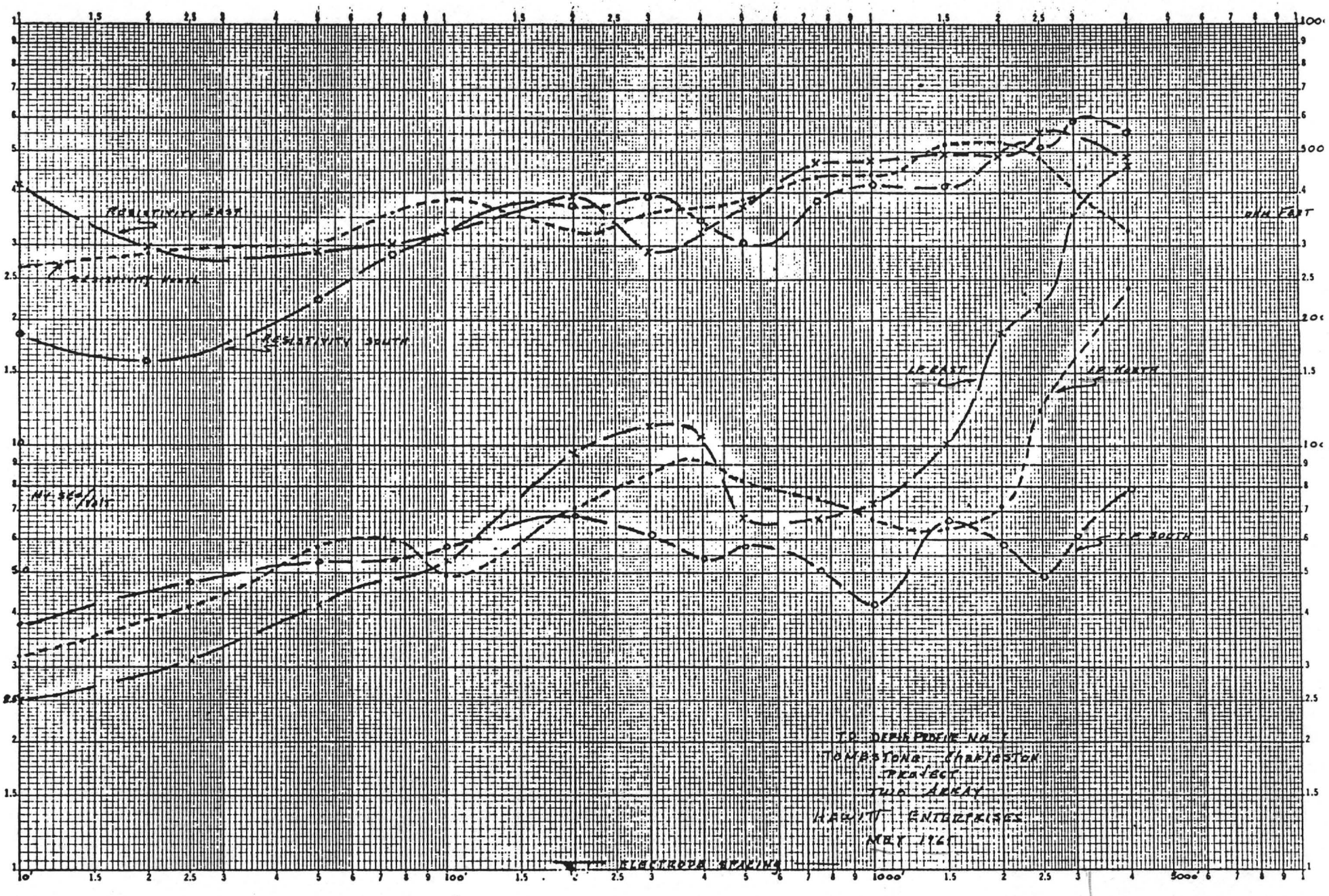
KEUFFEL & ESSER CO.






K+E LOGARITHMIC 47 7323
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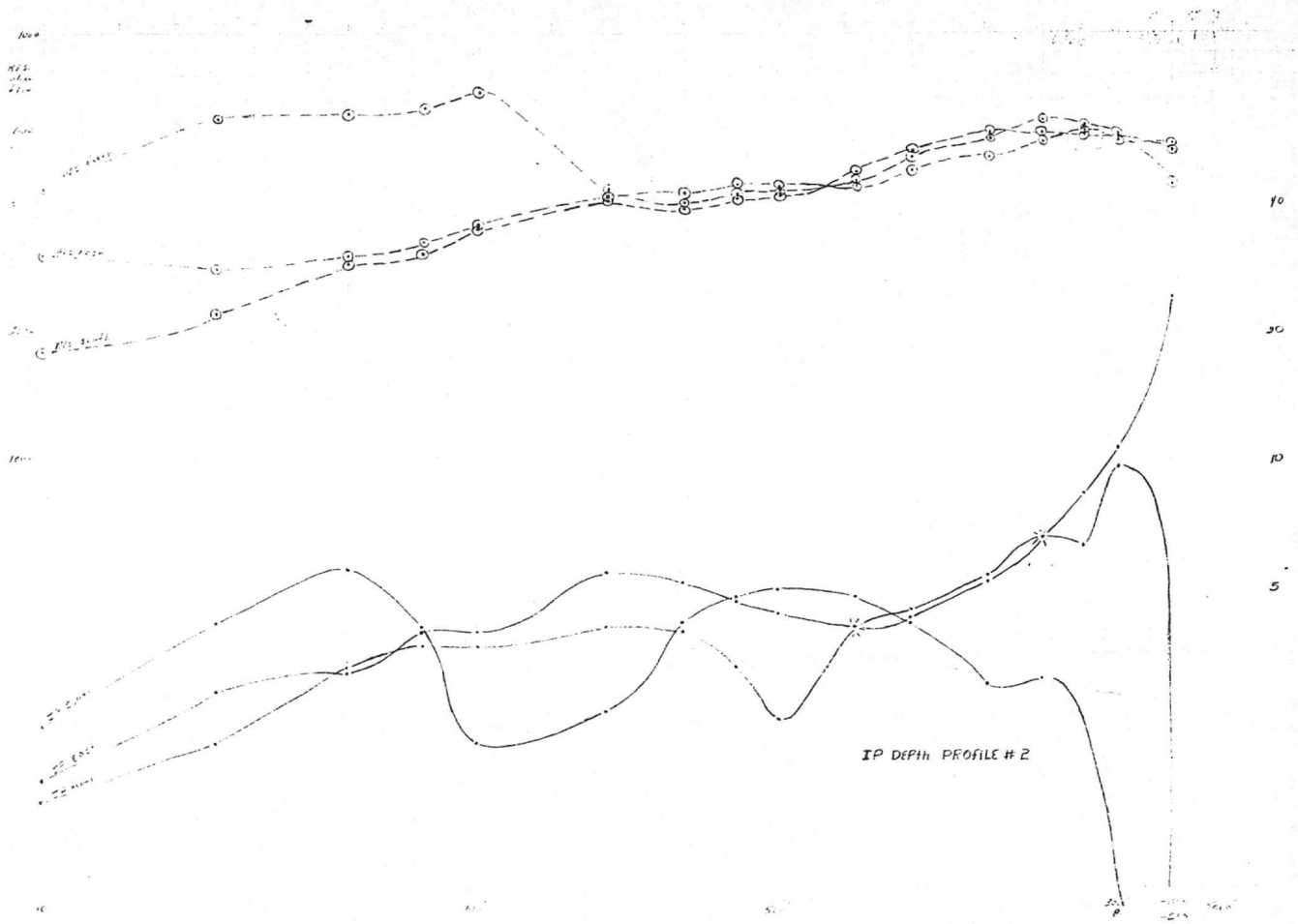
KEUFFEL & ESSER CO.
MADE IN U.S.A.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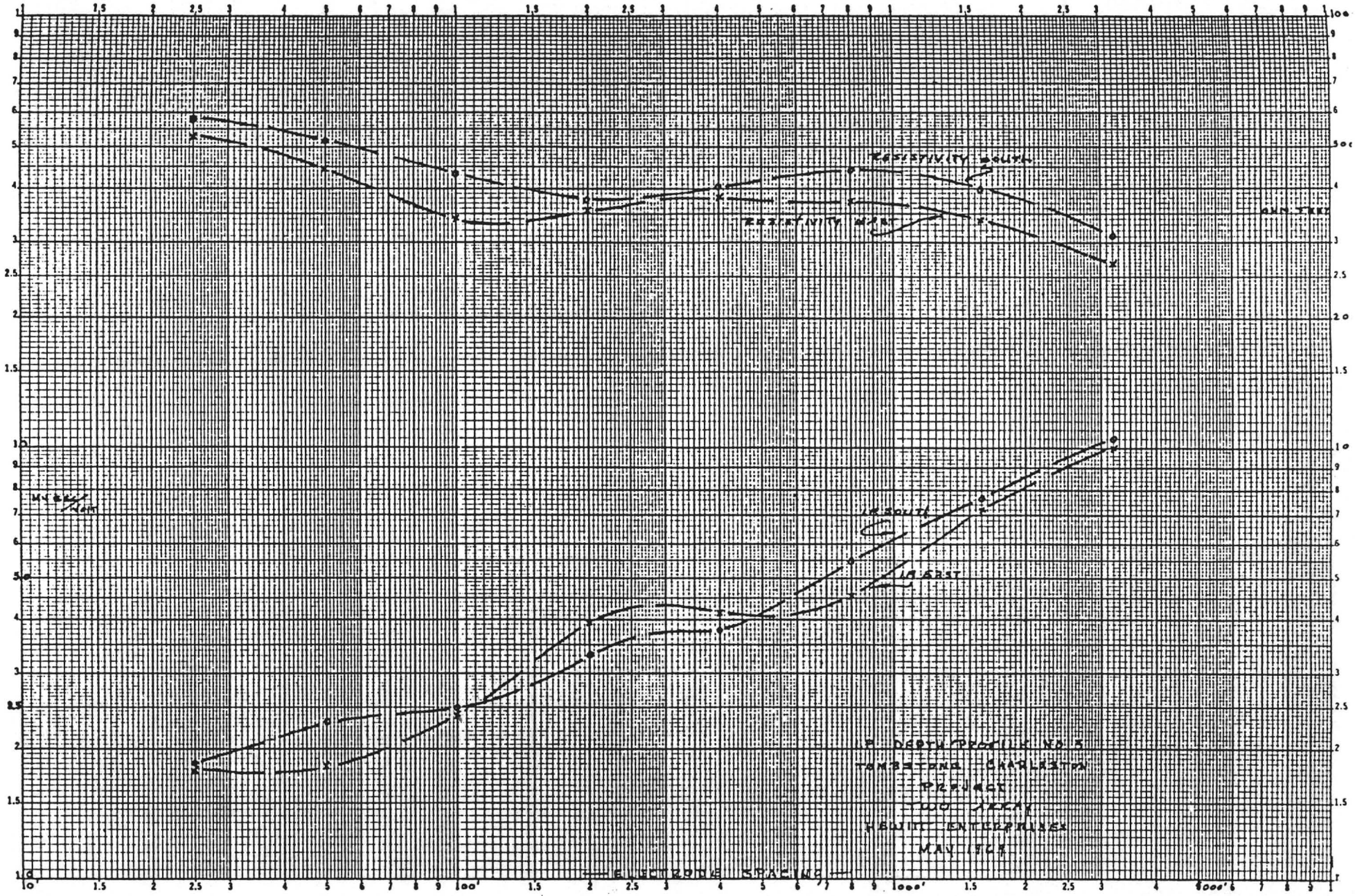


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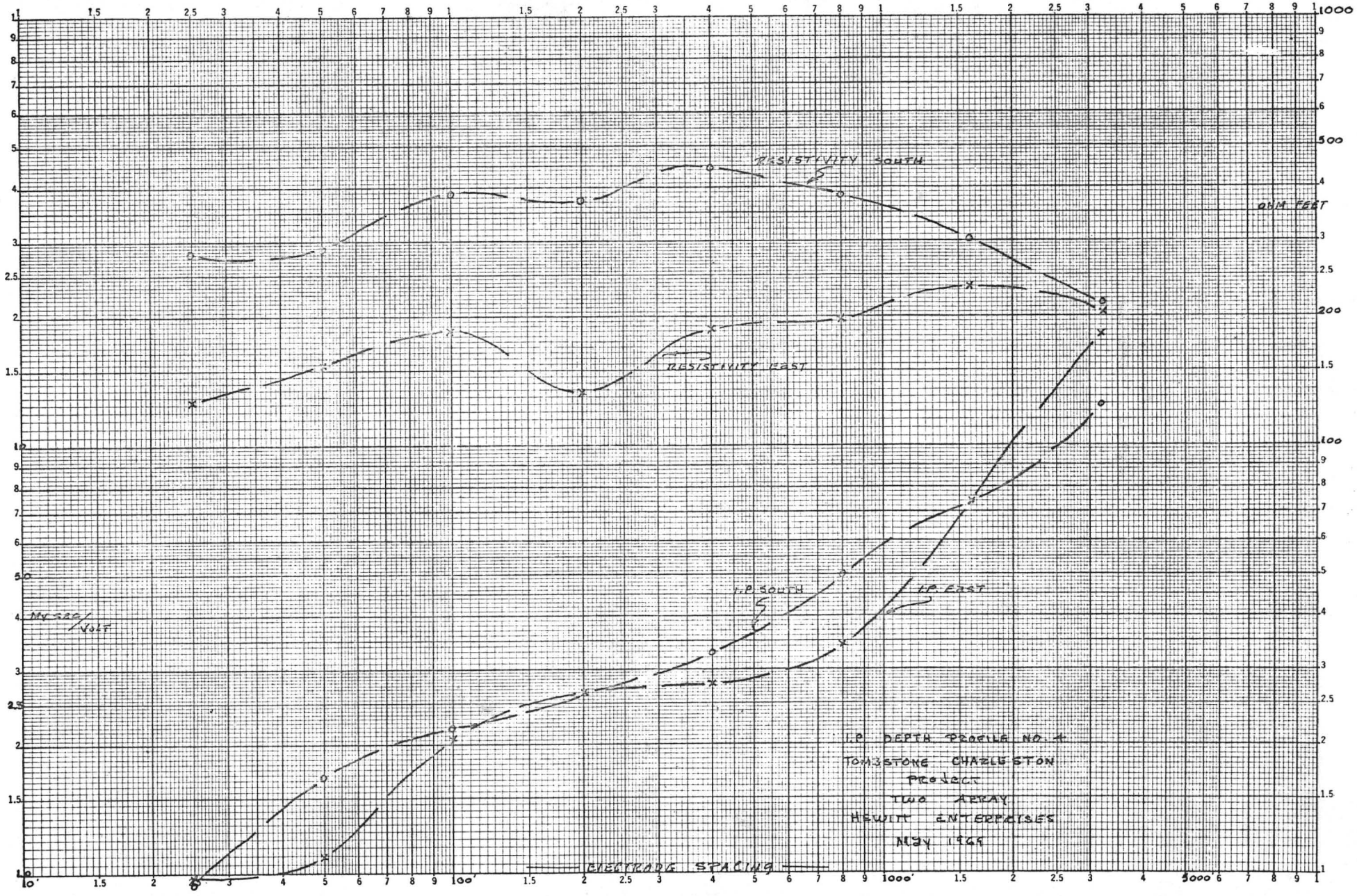


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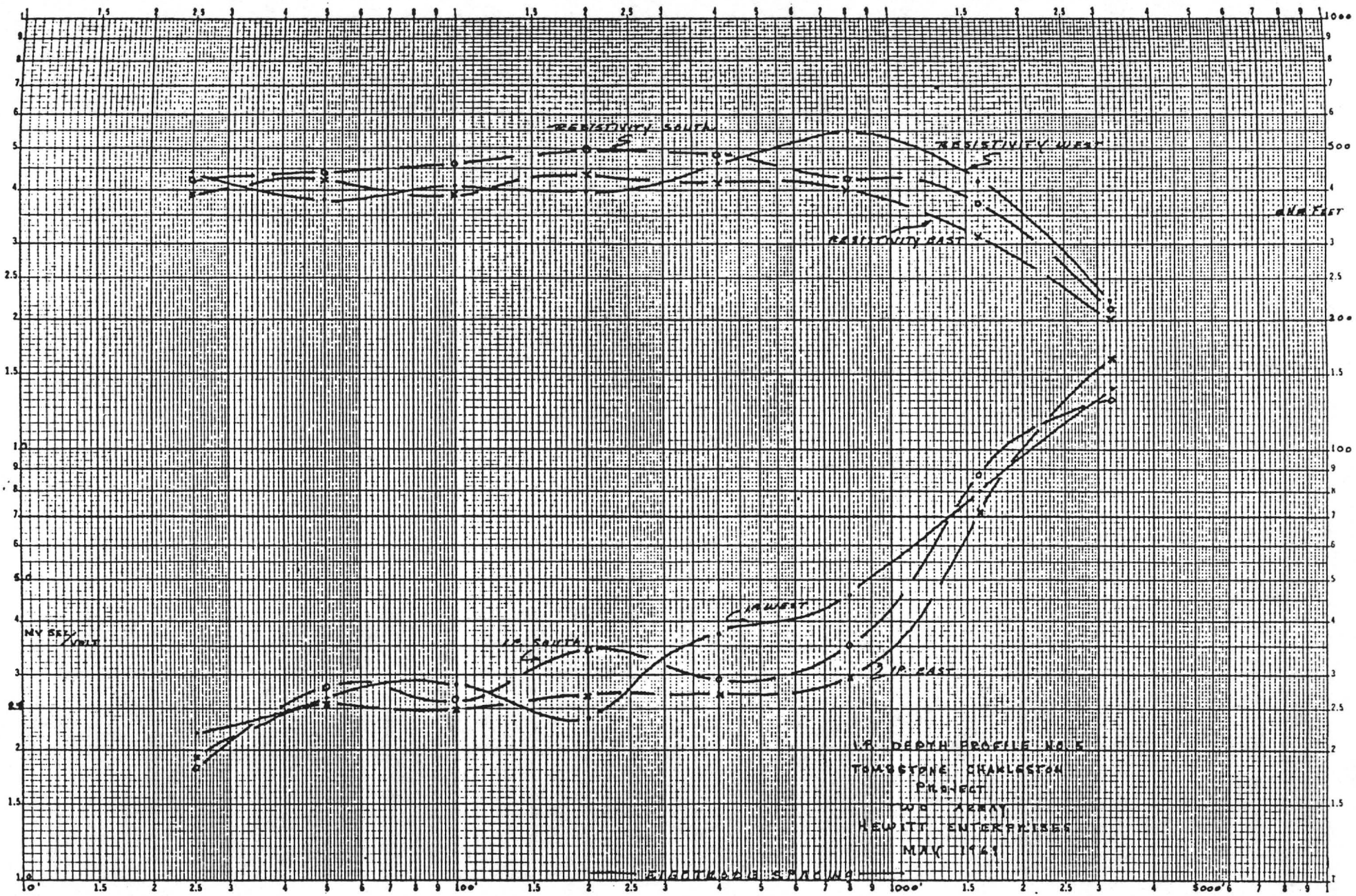
KEUFFEL & ESSER CO.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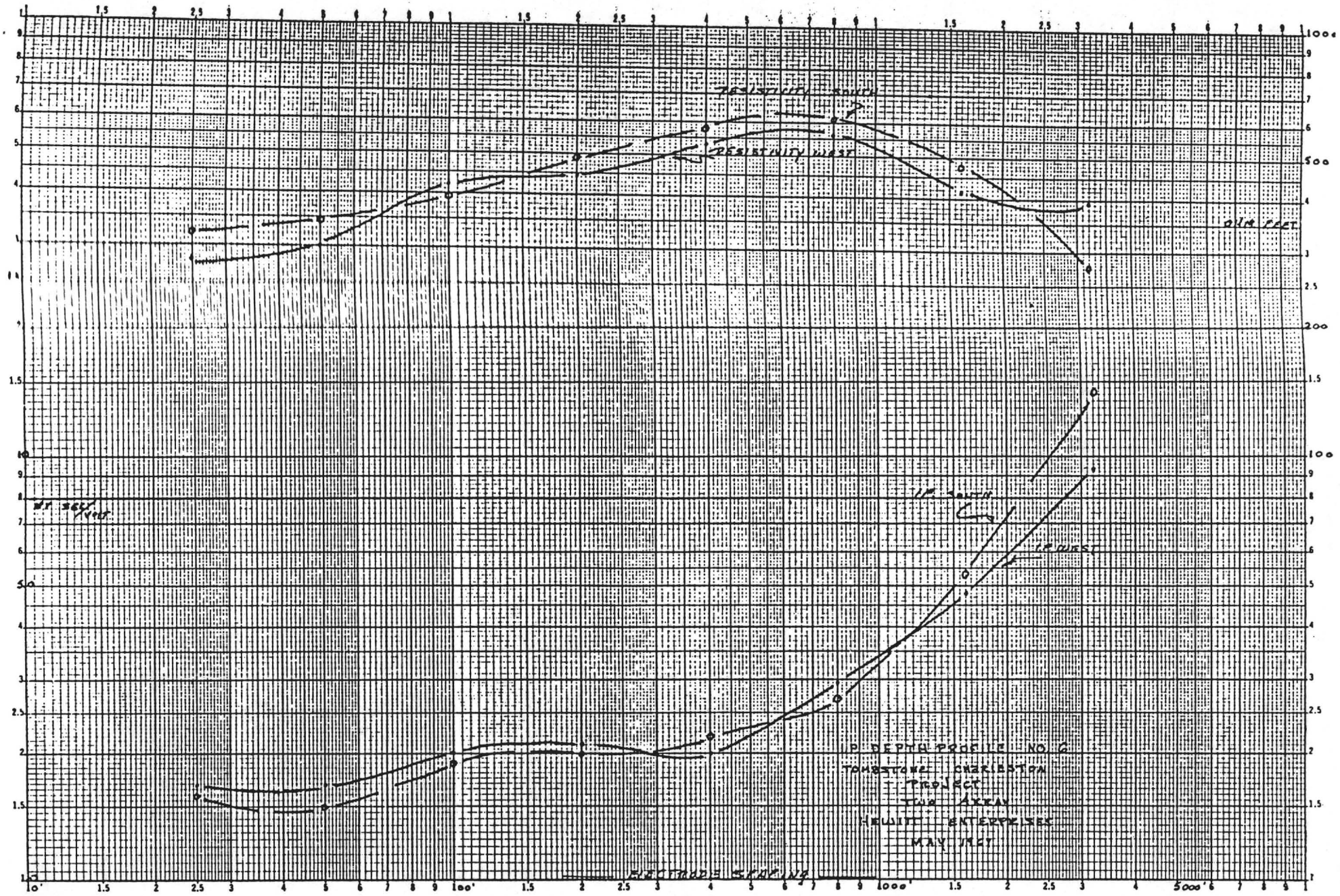
RESISTIVITY WEST
RESISTIVITY EAST
OHM FEET
MV SELF POTENTIAL
SP SOUTH
SP WEST
SP EAST
1.5 DEPTH PROFILE NO. 5
TOMBSTONE CHARLESTON
PROJECT
WD ARRAY
HEWITT ENTERPRISES
MAY 1969
ELECTRODE SPACING

24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RESISTIVITY WEST
OHM FEET
MV SECT/AMP
IP SOUTH
IP WEST
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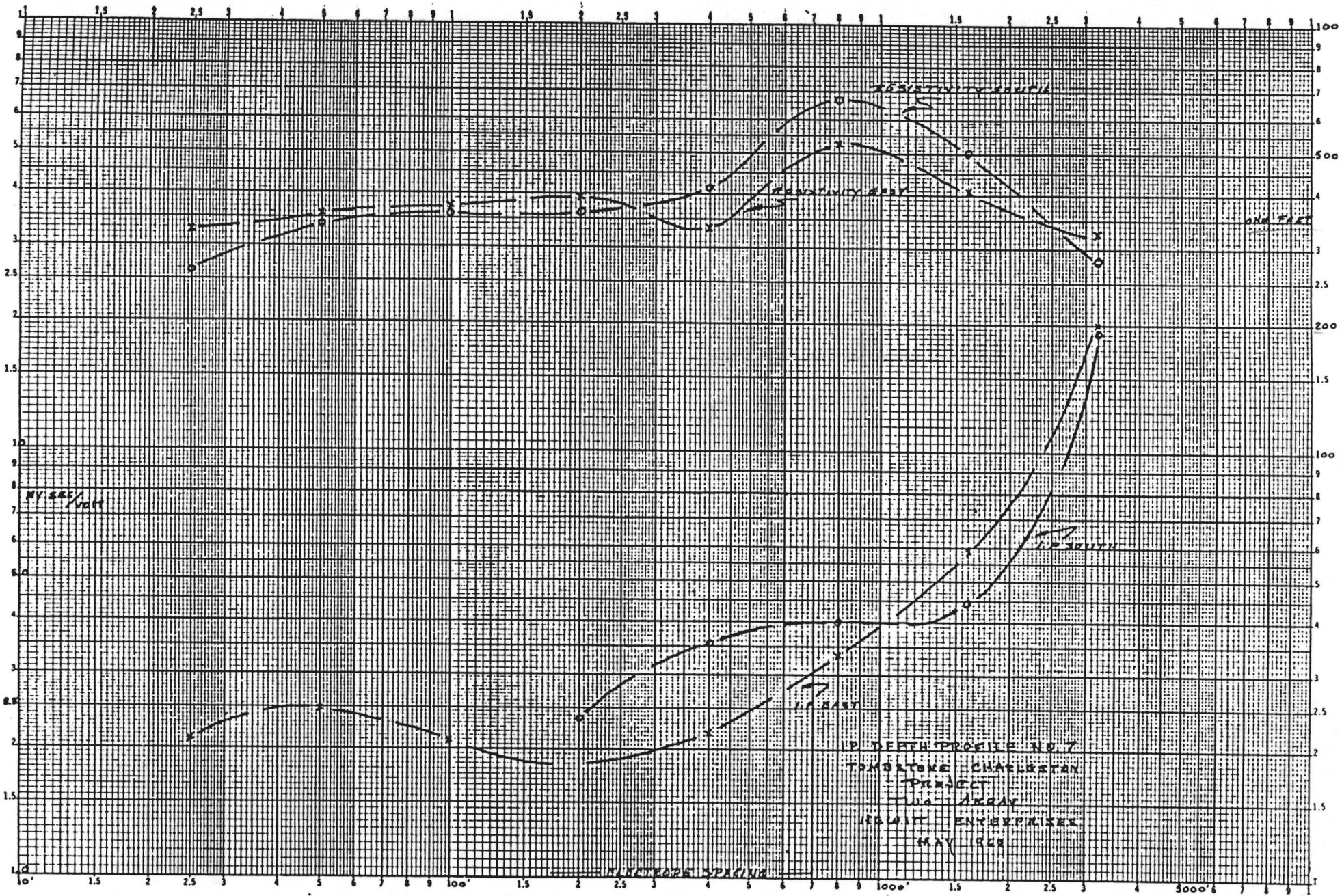
TOMBSTONE CHARLESTON
PROJECT
TWO ARRAY
HEWITT ENTERPRISES
MAY 1967
ELECTRODE SPACING
10'
100'
1000'
5000'

K+E 359-13 SEMI-LOGARITHMIC 3 CYCLES KEUFFEL & ESSER CO.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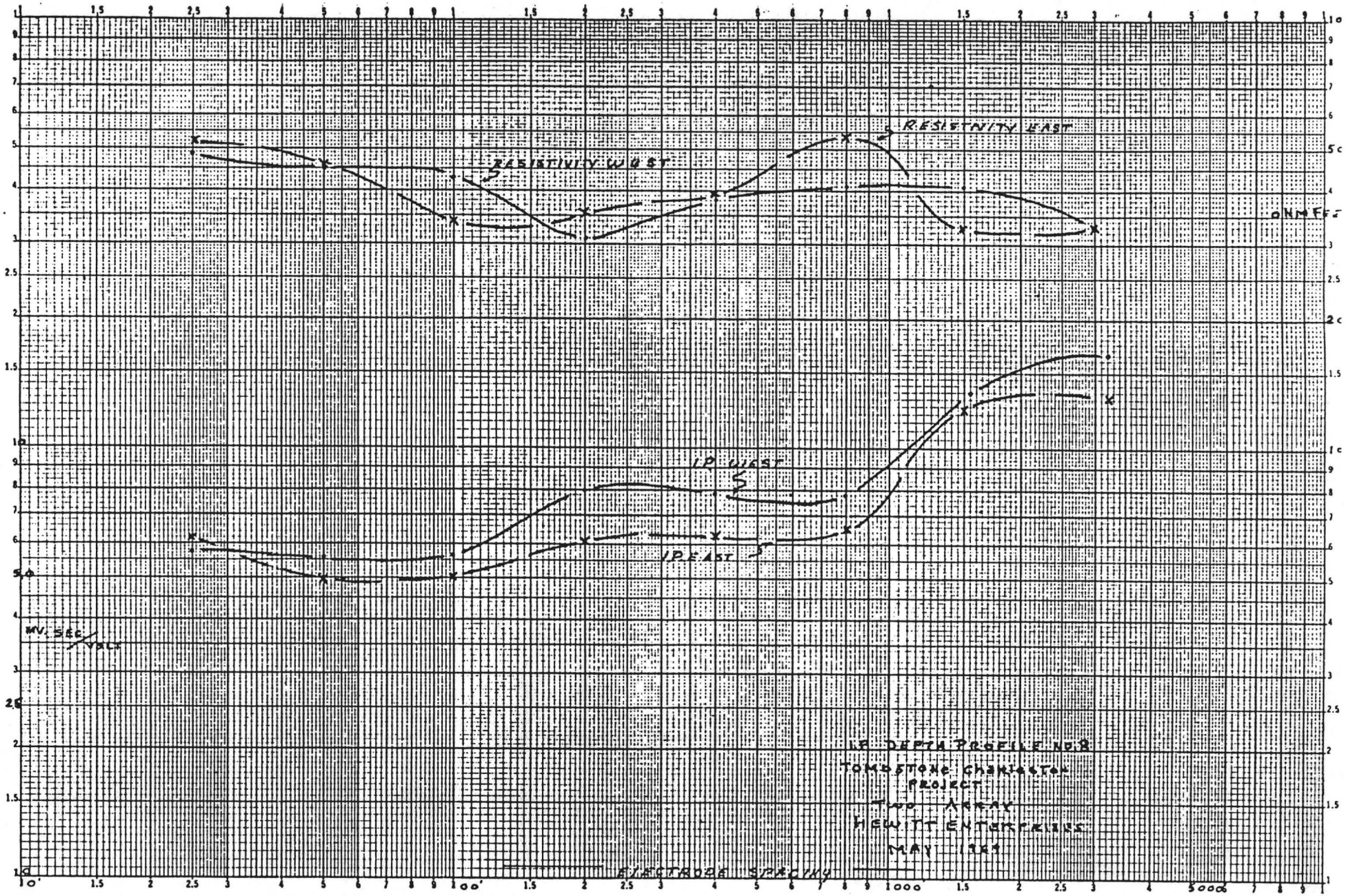
RESISTIVITY ABSP
OHM FEET
MV SEC/VOLT
UP SOUTH
UP EAST
1D DEPTH PROFILE NO. 7
TOMBSTONE CHARLESTON
PROJECT
TWO ARRAY
ROWITT ENTERPRISES
MAY 1988
ELECTRODE SPACING

26

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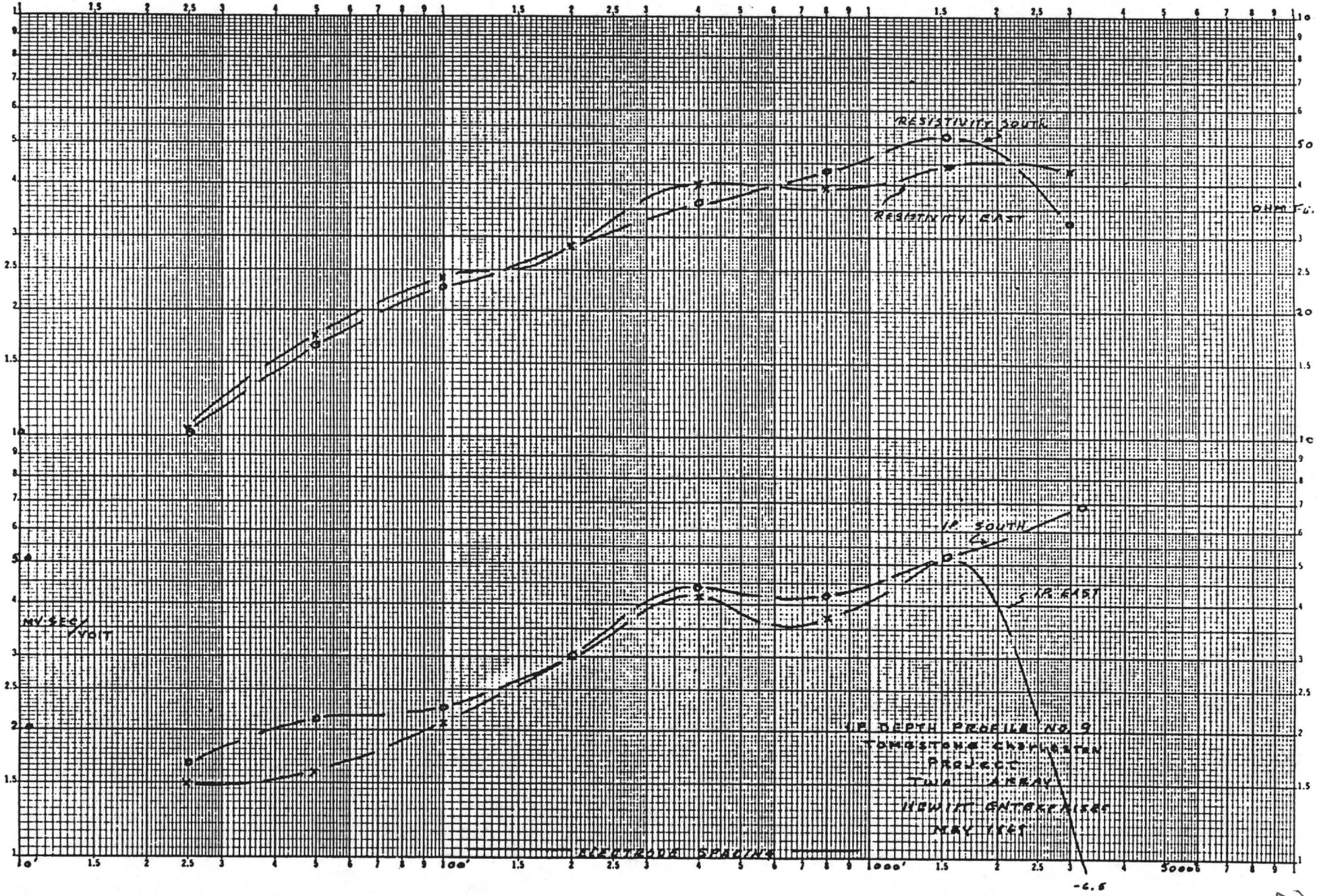


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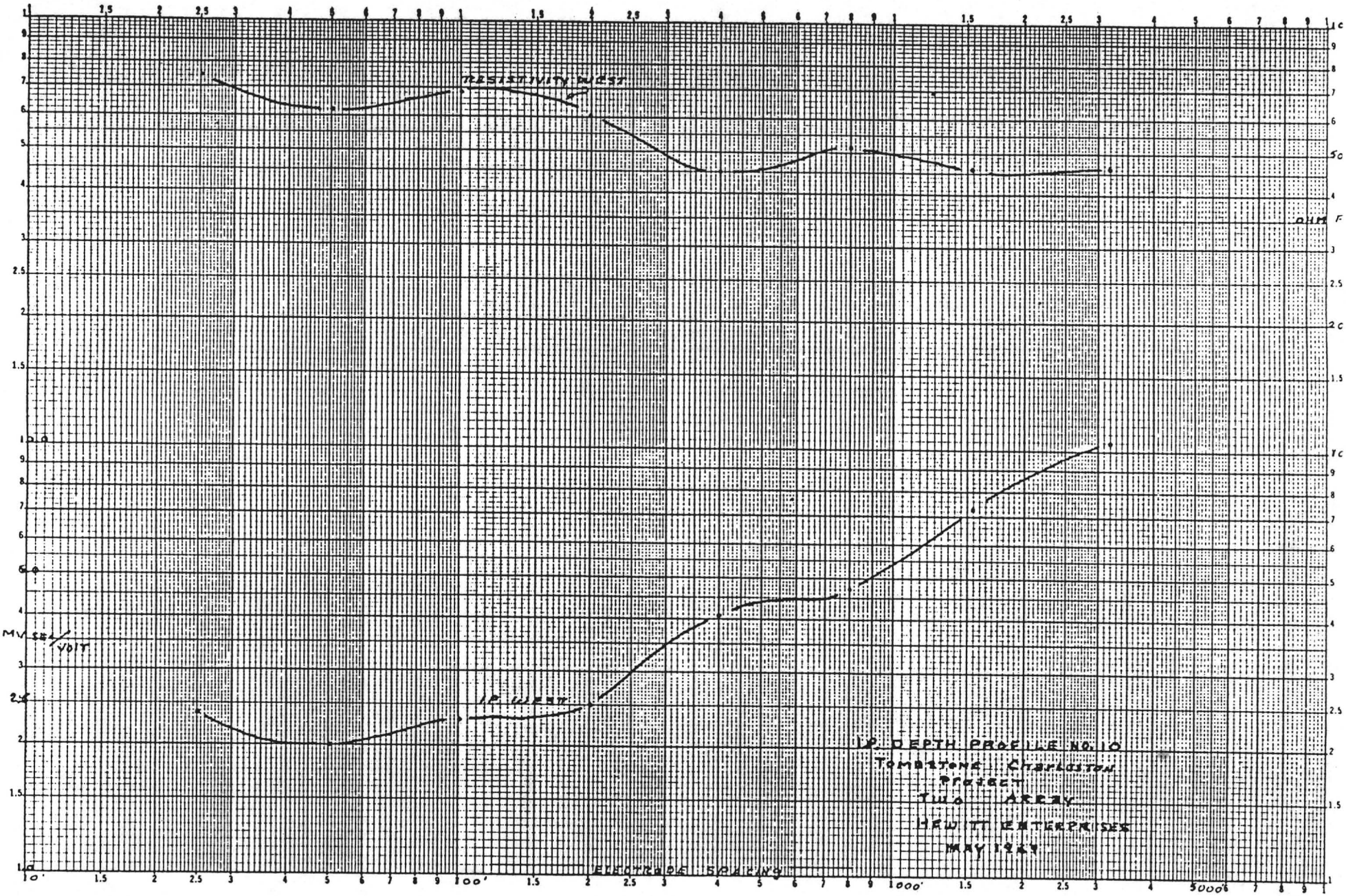


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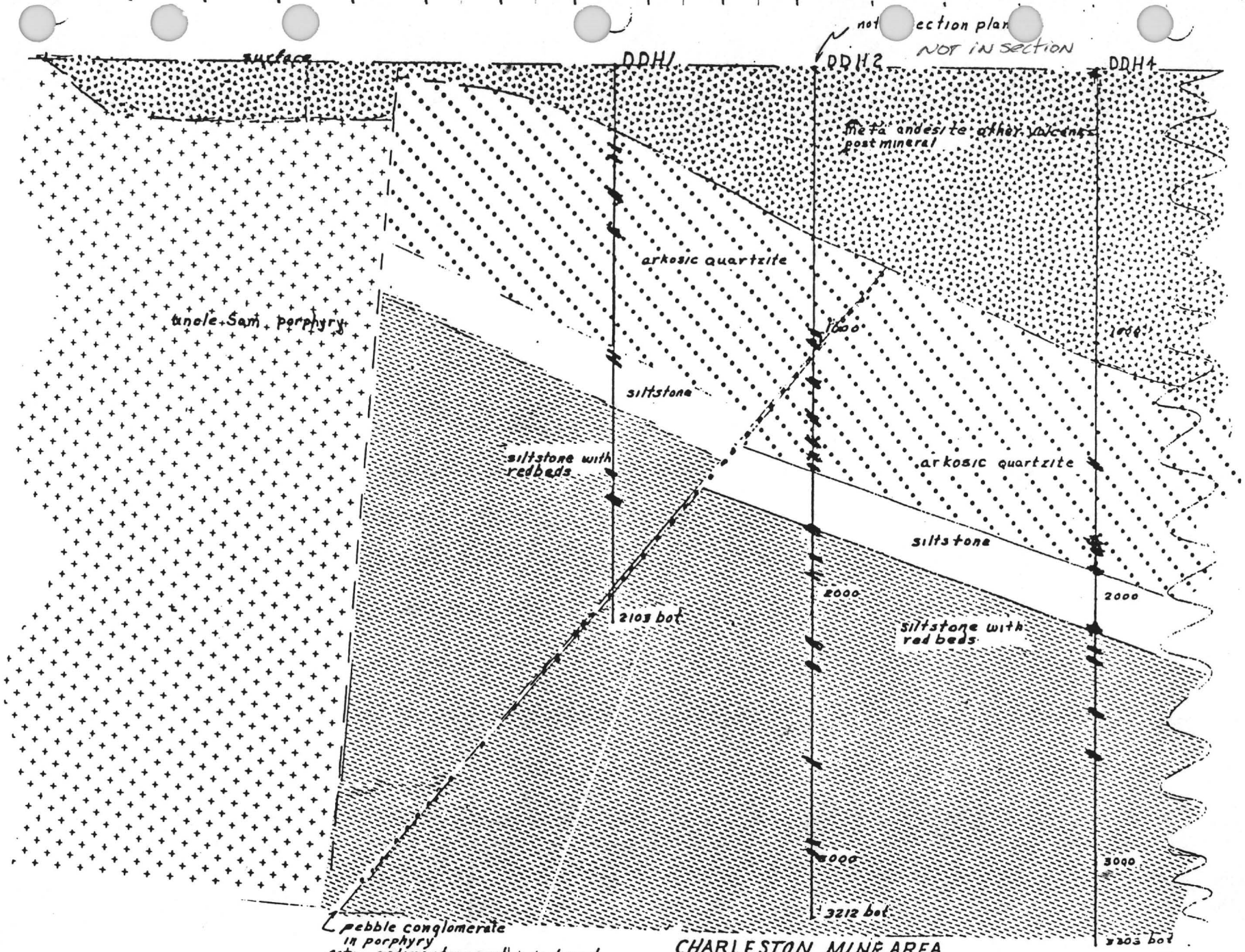
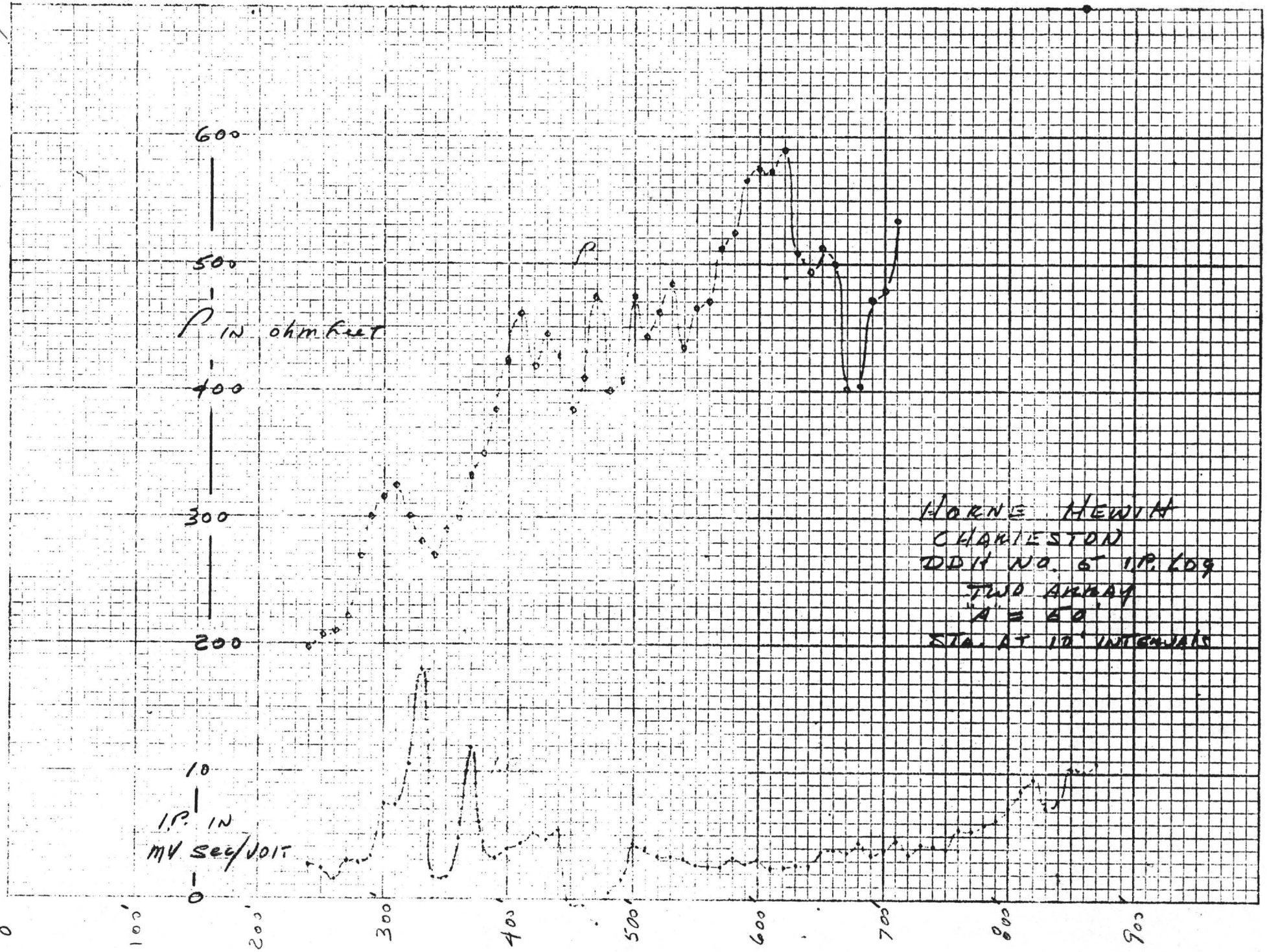


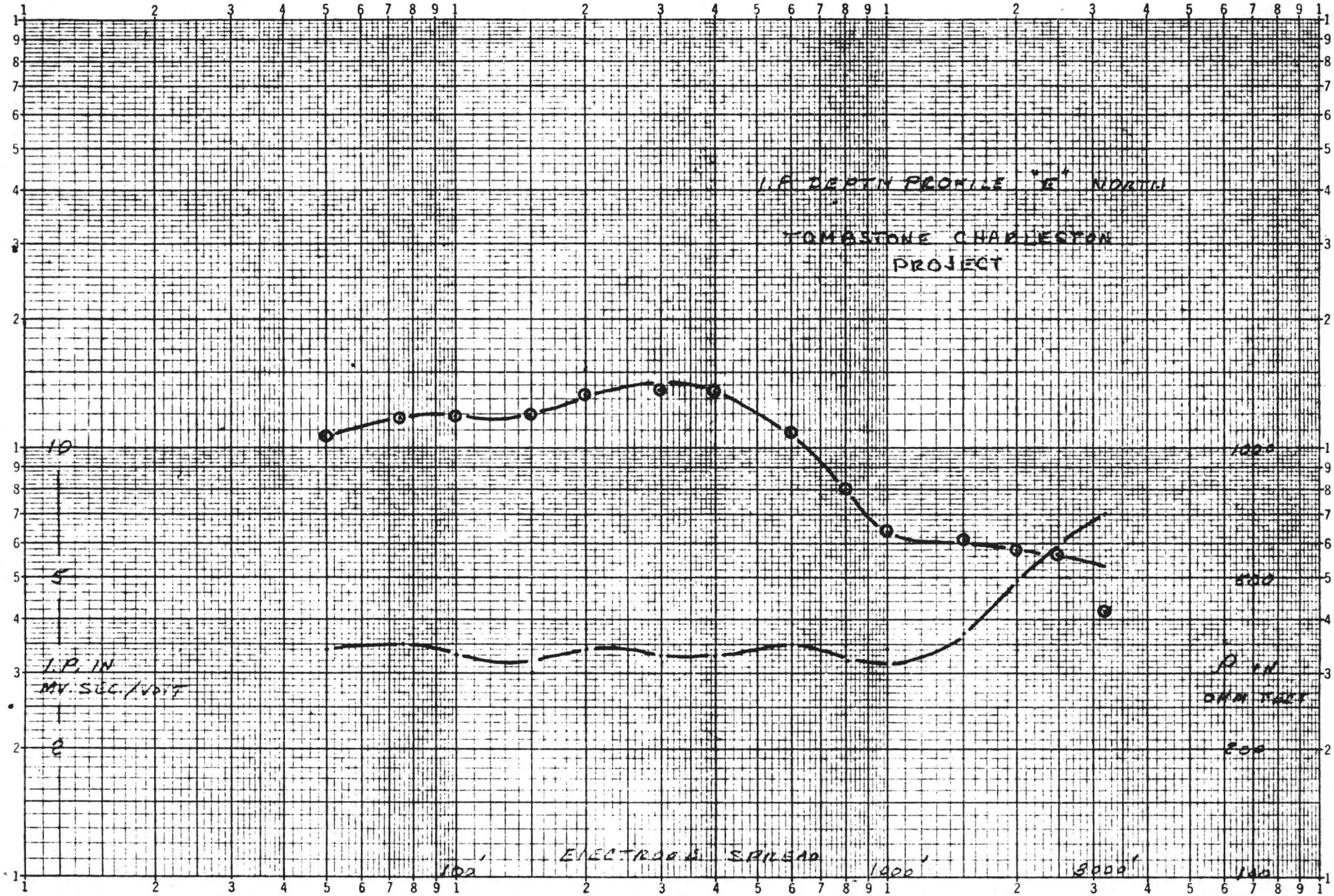

CHARLESTON MINE AREA
very generalized
Proposed section looking N.E.
scale 1" = 500

30


600
500
400
300
200
10
0
ρ IN ohm feet
I.P. IN MV sec/volt
ρ
HORNE HEWITT
CHARLESTON
DDH NO. 6 I.P. LOG
TWO ARRAY
"A" = 60'
STA. AT 10' INTERVALS
0
100
200
300
400
500
600
700
800
900

K+E LOGARITHMIC 46 7323
2 X 3 CYCLES MADE IN U.S.A.
KEUFFEL & ESSER CO.

6. File



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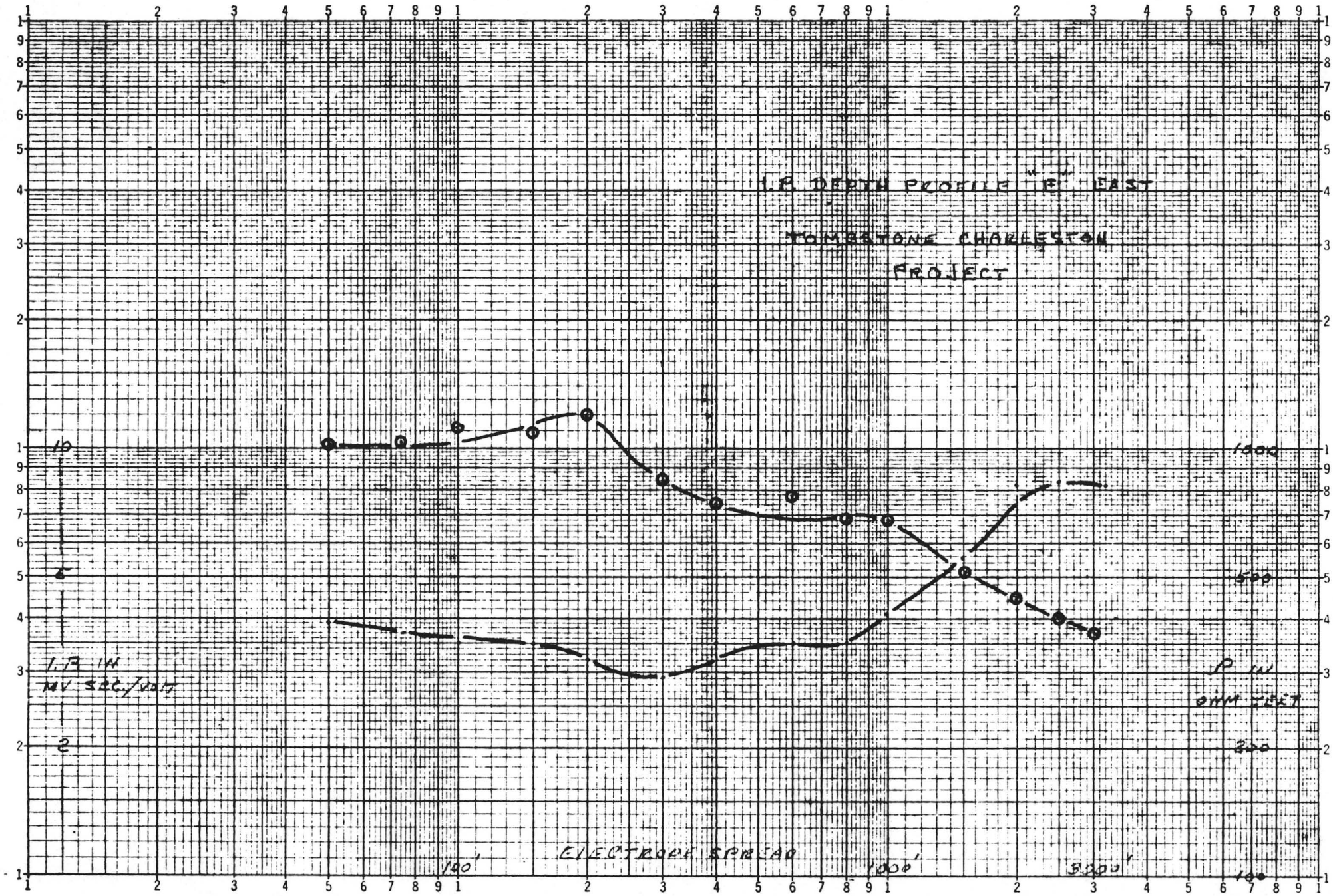
KEUFFEL & ESSER CO.



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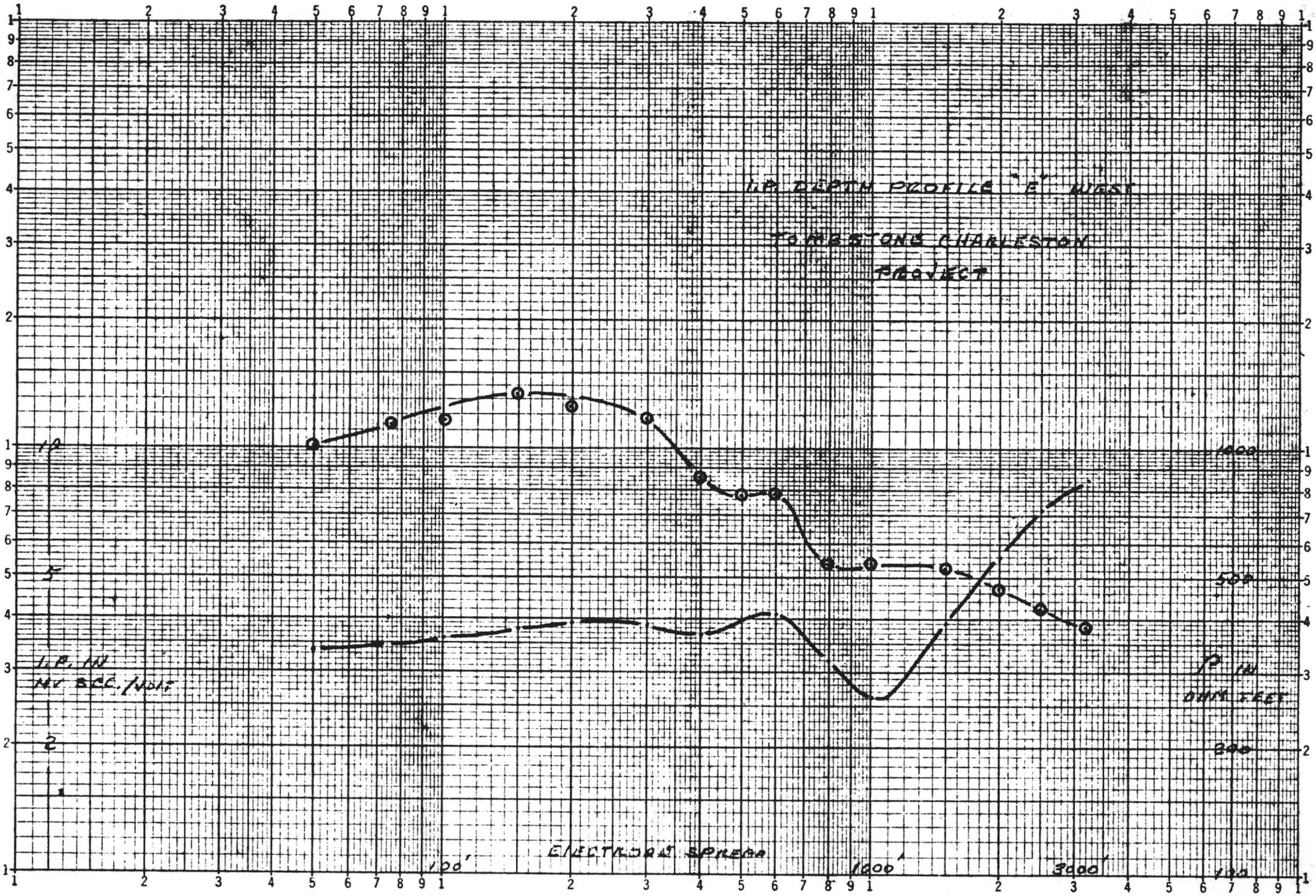

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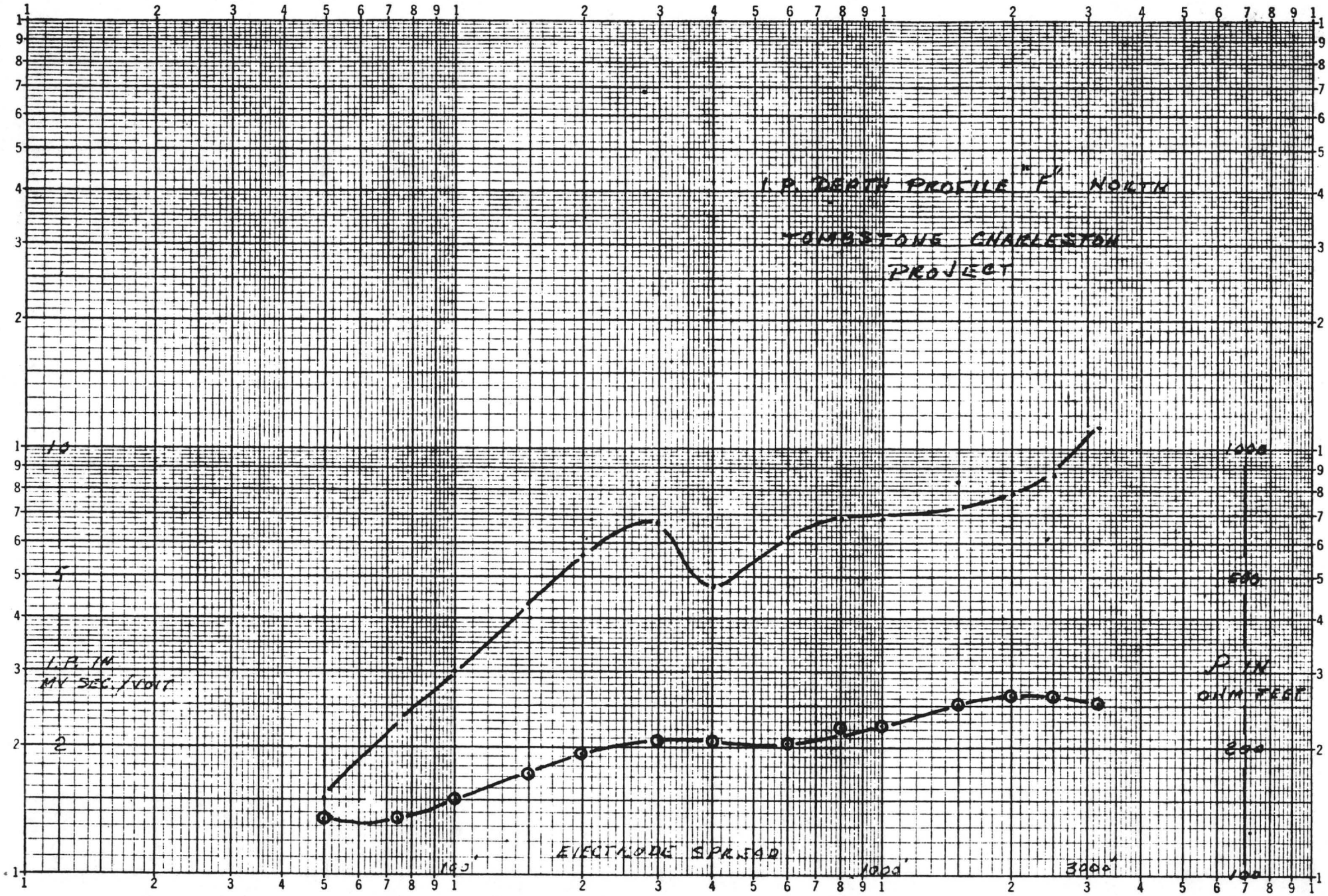

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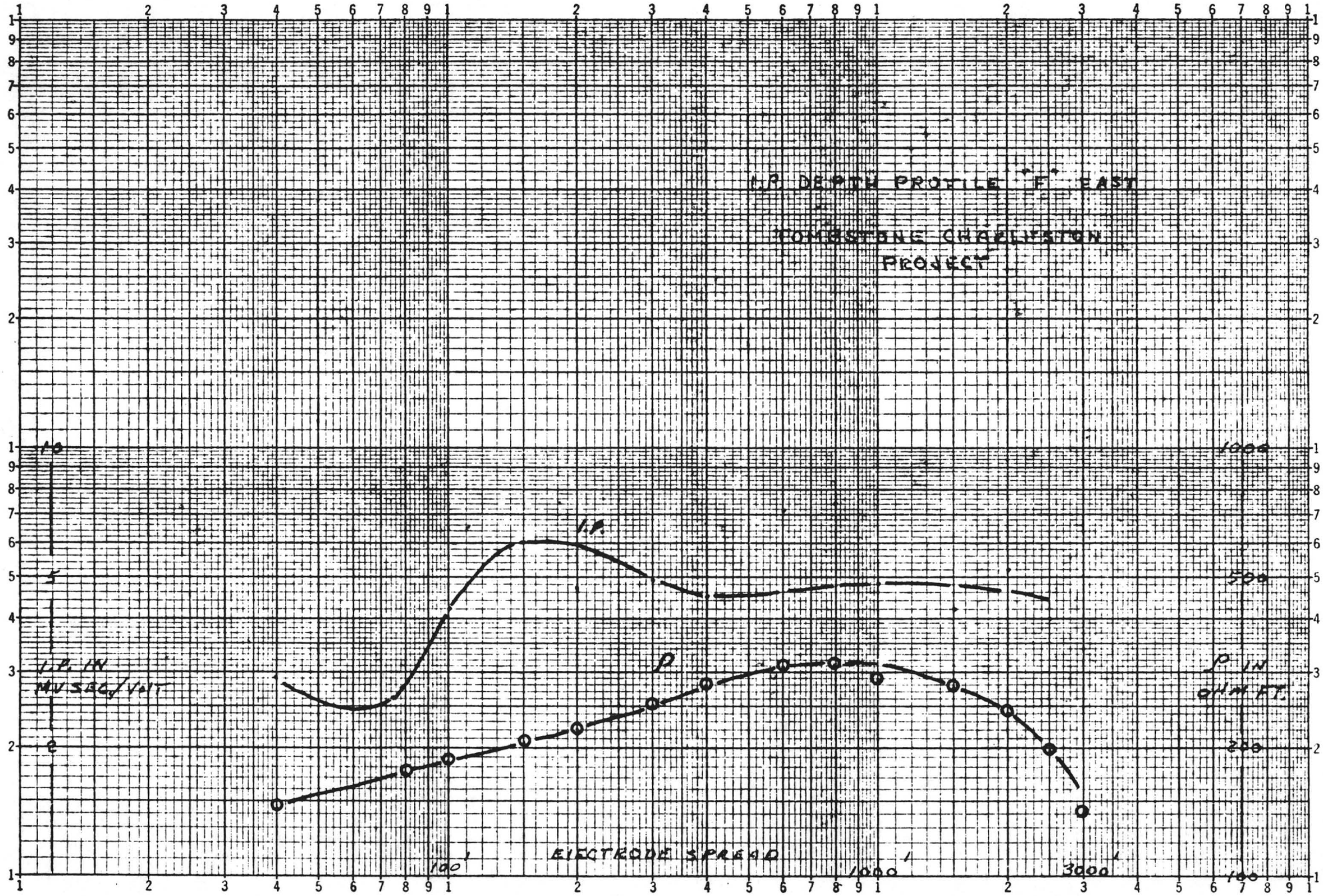
KEUFFEL & ESSER CO.



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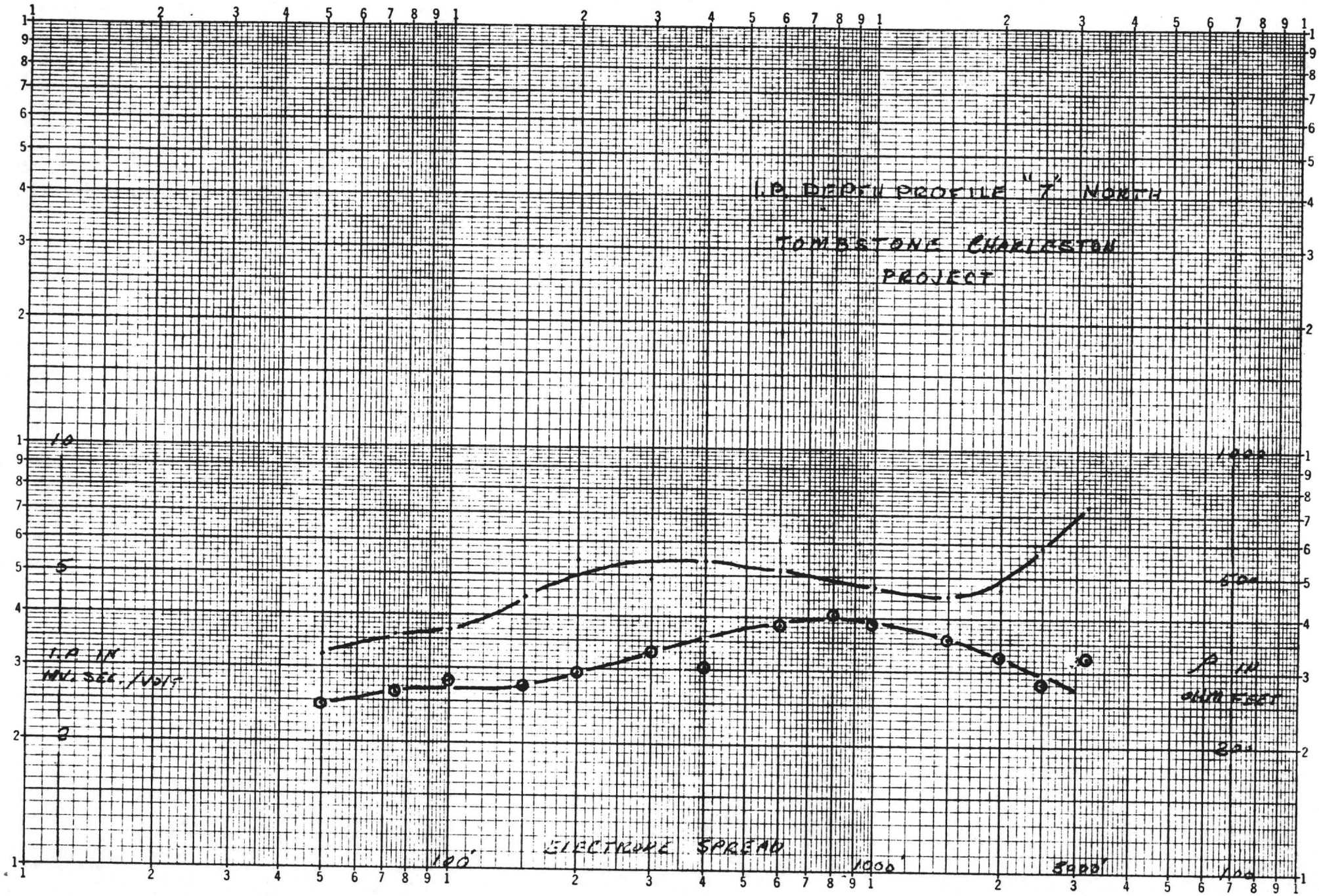
KEUFFEL & ESSER CO.



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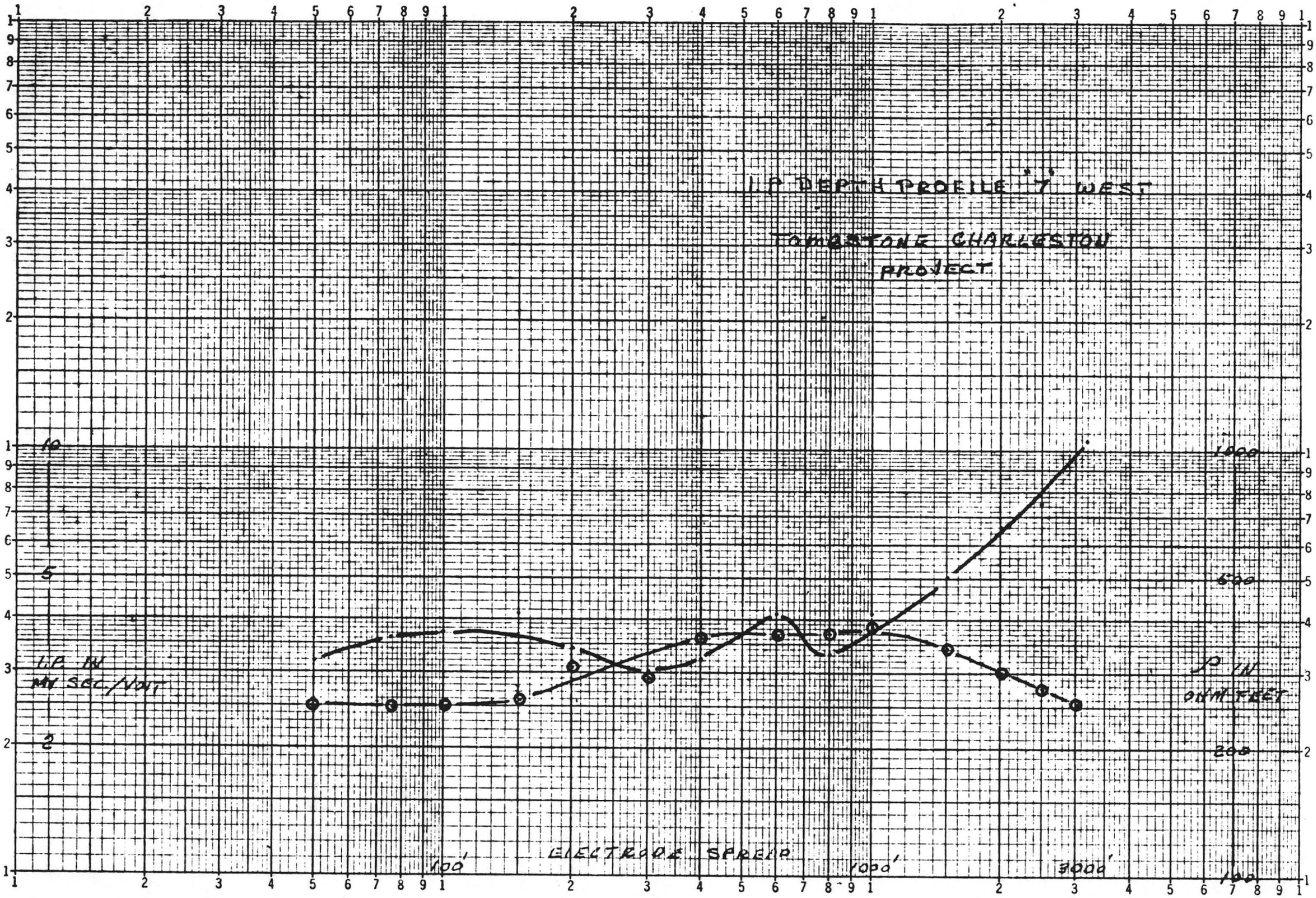

I.P. Profiles (425-C1)

I.P./Res. Data (11/65)

To MSH

Charleston Mine
Hewitt Probes
Nov. 1969
Resistivity

44

IP
Probe A

| | North | South | East | West | N | S | E | W |
|---|---|---|---|---|---|---|---|---|
| 50' | 4.6 | 4.1 | 5.4 | 5.0 | 638 | 396 | 403 | 257 |
| 75' | 5.6 | 6.8 | 6.9 | 6.5 | 360 | 356 | 367 | 240 |
| 100' | 5.1 | 6.4 | 8.2 | – | 335 | 341 | 272 | – |
| 150' | 6.7 | 8.7 | 9.1 | 7.8 | 249 | 378 | 284 | 247 |
| 200' | 7.2 | 10.3 | 9.2 | 11.4 | 269 | 368 | 327 | 261 |
| 300' | 8.9 | 15.8 | 10.5 | 6.5 | 261 | 340 | 347 | 317 |
| 400' | 7.5 | 10.5 | 10.8 | 9.8 | 293 | 362 | 371 | 315 |
| 600' | 5.8 | 8.8 | 8.2 | 9.0 | 366 | 363 | 395 | 344 |
| 800' | 7.4 | 7.7 | 10.5 | 10.3 | 396 | 373 | 431 | 313 |
| 1000' | 10.7 | 9.0 | 11.8 | 10.8 | 366 | 383 | 587 | 311 |
| 1500' | 10.0 | 13.8 | 15.0 | 8.1 | 366 | 411 | 539 | 329 |
| 2000' | 6.0 | 13.8 | 19.1 | 11.7 | 363 | 454 | 477 | 335 |
| 2500' | 10.5 | 18.5 | 24.5 | 20.0 | 332 | 425 | 387 | 322 |
| 3200' | 9.7 | 20.0 | 30.2 | 16.4 | 369 | 396 | 349 | 312 |

Charleston Mine
Hewitt Probes -
Nov 1969

45

PROBE B.

| | IP | | | | Resistivity | | | |
|---|---|---|---|---|---|---|---|---|
| | N | S | E | W | N | S ? | E | W |
| 50 | 4.2 | | 4.0 | 5.6 | 148 | | 173 | 157 |
| 75 | 4.8 | | 4.2 | 6.3 | 164 | | 190 | 174 |
| 100 | 4.7 | | 4.4 | 5.5 | 193 | | 212 | 179 |
| 150 | 6.5 | | 4.1 | 5.2 | 198 | | 251 | 221 |
| 200 | 2.7 | | 5.7 | 6.4 | 244 | | 292 | 250 |
| 300 | 6.2 | | 5.0 | 5.0 | 274 | | 325 | 277 |
| 400 | 6.2 | | 5.0 | 5.5 | 330 | | 331 | 320 |
| 600 | 4.5 | | 7.3 | 7.9 | 305 | | 341 | 395 |
| 800 | 5.4 | | 6.5 | 6.5 | 285 | | 364 | 391 |
| 1000 | 5.7 | | 5.9 | 7.1 | 270 | | 354 | 403 |
| 1500 | 6.8 | | 7.0 | 8.6 | 294 | | 342 | 420 |
| 2000 | 7.9 | | 10.6 | 9.7 | 331 | | 348 | 400 |
| 2500 | 9.0 | | 11.6 | 11.3 | 337 | | 201 | 381 |
| 3200 | 11.7 | 4.9 | 15.3 | 15.5 | 300 | | 266 | 306 |

To MSH

Probe C
IP

Charleston Mine
Hewitt Probes
Nov 1969

Resistivity -

46

| | N | S. | E | W | N | S | E | W |
|---|---|---|---|---|---|---|---|---|
| 50 | 3.9 | 3.6 | 5.0 | 4.5 | 354 | 249 | 296 | 326 |
| 75 | 4.5 | 4.5 | 4.6 | 5.0 | 305 | 295 | 287 | 307 |
| 100 | 3.6 | 5.6 | 4.4 | 5.3 | 269 | 293 | 662 | 294 |
| 150 | 4.5 | 7.2 | 5.2 | 5.3 | 246 | 280 | 268 | 286 |
| 200 | 5.0 | 5.5 | 5.2 | 3.7 | 256 | 300 | 265 | 289 |
| 300 | 5.3 | 5.6 | 6.4 | 5.8 | 265 | 335 | 298 | 299 |
| 400 | 6.2 | 5.5 | 6.6 | 4.9 | 291 | 323 | 294 | 304 |
| 600 | 5.6 | 4.6 | 9.1 | 8.8 | 292 | 376 | 293 | 220 |
| 800 | 6.1 | 5.1 | 8.3 | 8.7 | 280 | 398 | 296 | 313 |
| 1000 | 6.8 | 4.7 | 7.2 | 6.2 | 284 | 450 | 297 | 296 |
| 1500 | 7.6 | 3.5 | 8.8 | 3.5 | 290 | 484 | 340 | 256 |
| 2000 | 8.1 | 3.1 | 5.7 | 2.1 | 262 | 569 | 297 | 241 |
| 2500 | 12.5 | – | 6.5 | 2.0 | 254 | 650 | 313 | 222 |
| 3200 | 15.5 | 1.7 | 7.9 | 0 | 265 | 705 | 295 | 216 |

Note

Charleston –
Nov 1969

A1

Probe D

| | IP | | | Resistivity | | |
|---|---|---|---|---|---|---|
| | N | E | W | N | E | W |
| 50 | 2.0 | 2.2 | | 428 | 407 | |
| 75 | 3.9 | 2.0 | | 369 | 366 | |
| 100 | 3.4 | 1.8 | | 360 | 363 | |
| 150 | 3.6 | 2.2 | | 398 | 400 | |
| 200 | 3.4 | 2.1 | | 406 | 397 | |
| 300 | 4.9 | 2.1 | | 478 | 484 | |
| 400 | 4.7 | 2.6 | | 552 | 521 | |
| 600 | 4.8 | 2.7 | | 642 | 588 | |
| 800 | 6.3 | 2.6 | | 670 | 655 | |
| 1000 | 7.1 | 2.8 | | 825 | 693 | |
| 1500 | 8.1 | 2.1 | | 650 | 704 | |
| 2000 | 11.3 x | 1.0 | | 628 | 650 | |
| 2500 | 10.1 | – | | 635 | 595 | |
| 3200 | 8.8 | — | | 570 | 634 | |

x Influence from "A" ?

12/2/69

Charleston - Geophysics
Work 11/20 - 11/26

Probe E.

| | IP | | | | Resistivity | | | |
|---|---|---|---|---|---|---|---|---|
| | N | E | S | W | N | E | S | W |
| 50' | 3.4 | 3.8 | 3.2 | 3.3 | 1065 | 1021 | 1030 | 1020 |
| 75' | 3.5 | 3.8 | 3.4 | 3.9 | 1179 | 1020 | 1142 | 1136 |
| 100 | 3.3 | 3.5 | 3.5 | 3.5 | 1183 | 1112 | 1212 | 1171 |
| 150 | 3.2 | 3.5 | 3.6 | 3.6 | 1189 | 1081 | 1289 | 1346 |
| 200 | 3.4 | 3.2 | 3.5 | 3.9 | 1315 | 1192 | 1291 | 1250 |
| 300 | 3.2 | 2.9 | 3.8 | 3.8 | 1329 | 839 | 998 | 1173 |
| 400 | 3.3 | 3.5 | 4.1 | 3.8 | 1345 | 741 | 959 | 854 |
| 600 | 3.6 | 3.5 | 4.7 | 4.3 | 1075 | 769 | 921 | 786 |
| 800 | 3.4 | 3.5 | 4.8 | 3.2 | 800 | 677 | 824 | 529 |
| 1000 | 3.7 | 4.1 | 5.2 | 3.2 | 638 | 671 | 768 | 538 |
| 1500 | 3.7 | 5.5 | 7.2 | 3.9 | 604 | 504 | 538 | 525 |
| 2000 | 4.9 | 8.2 | 11.4 | 5.5 | 577 | 442 | 502 | 467 |
| 2500 | 5.2 | 8.3 | 13.2 | 7.3 | 562 | 389 | 450 | 421 |
| 3200 | 7.3 | 8.2 | 12.7 | 9.1 | 415 | 375 | 354 | 379 |

Charleston

Nov 1969

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Probe E

IP

Resistivity

| | W | N | E | S | W |
|---|---|---|---|---|---|
| 50 | 3.3 | 3.4 | 3.8 | | 1020 |
| 75 | 3.9 | 3.5 | 3.8 | | 1136 |
| 100 | 3.5 | 3.3 | 3.5 | | 1171 |
| 150 | 3.1 | 3.2 | 3.5 | | 1341 |
| 200 | 3.9 | 3.4 | 3.2 | | 1250 |
| 300 | 3.8 | 3.2 | 2.9 | | 1173 |
| 400 | 3.8 | 3.1 | 3.5 | | 854 |
| 600 | 4.3 | 3.4 | 3.5 | | 781 |
| 800 | 3.2 | 3.4 | 3.5 | | 529 |
| 1000 | 3.2 | 3.7 | 4.1 | | 538 |
| 1500 | 3.9 | 3.7 | 5.5 | | 525 |
| 2000 | 5.5 | 4.9 | 8.2 | | 467 |
| 2500 | 7.3 | 5.2 | 8.3 | | 421 |
| 3200 | 9.1 | 7.3 | 8.2 | 12.0 | 379 |

12-2-69

Charleston - Geophysics

Probe 7

Work done 11/25 & 11/26 /69.

| | IP North | IP West | Resistance North | Resistance West |
|---|---|---|---|---|
| 50 | 3.2 | 3.2 | 244 | 251 |
| 75 | 3.6 | 3.6 | 261 | 254 |
| 100 | 3.7 | 3.7 | 261 | 253 |
| 150 | 4.4 | 4.1 | 278 | 271 |
| 200 | 5.4 | 3.4 | 270 | 310 |
| 300 | 4.9 | 3.0 | 295 | 339 |
| 400 | 5.4 | 3.2 | 328 | 357 |
| 600 | 5.1 | 4.1 | | 370 |
| 800 | 5.2 | 3.3 | | 368 |
| 1000 | 4.7 | 4.3 | | 385 |
| 1500 | 4.5 | 5.0 | | 338 |
| 2000 | 4.7 | 6.6 | | 297 |
| 2500 | 5.9 | 7.5 | | 275 |
| 3200 | 7.3 | 10.5 | | 254 |

Computer Update Proms.

51

# TIME-SHARING COMPUTER GEOPHYSICS AERIAL SURVEYS

COMPUTER UPDATE

[illegible] PHYSICAL PROGRAMS

AIRBORNE GEOPHYSICAL ACQUISITION AND REDUCTION
SURFACE TO SURFACE CALCULATIONS
PROFILE ANALYSIS OF FIELD GEOPHYSICAL DATA
UPWARD CONTINUATION OF CONSERVATIVE FIELD DATA (MAGNETIC, GRAVITATIONAL, ETC.)
DOWNWARD CONTINUATION OF CONSERVATIVE FIELD DATA (MAGNETIC, GRAVITATIONAL, ETC.)
COMPILATION OF DATA-CURVES FOR INTERPRETATION OF FIELD RESULTS
COMPILATION OF DATA-TABLES FOR INTERPRETATION OF FIELD RESULTS
THEORETICAL AND EMPIRICAL STUDIES WITH RESISTIVITY AND INDUCED POLARIZATION DATA, USING VARIOUS SUB-SURFACE GEOMETRICS AND ELECTRODE ARRAYS
PLOT ROUTINES FOR PROFILE DATA, WITH DERIVATIVES
GRAVITY DATA, WITH HIGHER ORDER ANALYSIS
GRIDDED DATA IN RAW OR DIFFERENTIAL FORM
SOLUTION OF SUBSURFACE PROBLEMS
ANALOG AND DIGITAL PLOTTING
DISPLAYS ON CRT OF ANALOG COMPUTED CONSERVATIVE FIELDS, (MAGNETIC, GRAVITY, ETC.)
CONTOURING DATA (PRINTED ON CALCOMP PLOTTER)
GRID INTERPOLATION AND CONTOURING ROUTINES
DERIVATIVES, HIGHER ORDER POLYNOMIAL SURFACES
SECOND DEGREE MAGNETIC AND GRAVITY CURVES OR TABULATIONS WITH DERIVATIVES
ELECTROMAGNETIC PROSPECTING DATA SOLUTIONS
PROCESSING AND CORRECTING OF RAW FIELD DATA, SUCH AS GRAVITY, SEISMIC, AND MAGNETIC
ANALYSIS OF DISTRIBUTION FOR SEARCH FOR ANOMALOUS PATTERN
SPECTRAL ANALYSIS OF TIME (SCINTILLOMETER)
NOISE ERRADICATION AND FILTERING BY COMMUNICATIONS THEORY TECHNIQUE AND NUMERICAL METHODS
MAP ANALYSIS
BEST-FIT POLYNOMIAL SURFACE METHODS, DERIVATIVES
TERRAIN CORRECTION PROBLEMS, FOR SURFACE AND SUB-SURFACE GRAVITY CORRECTIONS
REGIONAL CORRECTION FOR MAGNETIC AND GRAVITATIONAL MAPS
RESISTIVITY MODEL PLOTTING
HIGHER ORDER EQUATION SOLVING
RESISTIVITY AND I.P. FIELD DATA
TREND SURFACE ANALYSIS
REGIONAL CORRECTIONS OF DATA TAKING INTO ACCOUNT BIAS
DESIGN OF AN OPTIMUM DRILLING GRID
CRITICAL PATH SCHEDULING
LINEAR PROGRAMMING (INCLUDING PERT/COST)
MATHEMATICAL MODEL PROCESS
ENGINEERING APPLICATIONS
COORDINATES OF DRILL DATA
COORDINATES DATA PLOT
COMPOSIT ASSAY
ASSAY PLOT
CONTOUR PLOT OF RANDOM DATA
CONTOUR PLOT OF GRID DATA
INFLUENCE FUNCTIONS FOR ASSAY ANALYSIS
SMOOTH SURFACE INTERPOLATION
SMOOTH SURFACE
POLYGON PLOTTER
POLYGON BLOCK CONVERSION
MINE [illegible]
ORE RESERVE ESTIMATION USING NUMEROUS METHODS (TRIANGULATIONS, POLYGON, STATISTICAL)
FINANCIAL ANALYSIS OF MINES
APPLICATIONS IN MINE DESIGN AND DEVELOPMENT
CALCULATE PIT LIMITS AND PIT EXPANSION
SURVEYING CALCULATIONS
OPTIMIZE PRODUCTION FOR CONTROLLED GRADES
OPTIMUM MINING AND UPGRADING OPERATIONS
OPTIMUM OPEN PIT DESIGN
OPTIMIZE AND CONTROL HAULAGE SYSTEMS
OPTIMUM BENCH HEIGHT
OPTIMUM CUT-OFF GRADE
OPTIMUM PRODUCTION RATE
MAPS OF ORIGINAL DATA SUBDIVIDED INTO EACH BENCH
MAPS OF EVALUATED DATA FOR EACH PRODUCTION BLOCK IN EACH BENCH
STOCKPILE MATERIAL CALCULATION
WASTE-ORE REQUIREMENTS
DRILL HOLE DATA PROCESSING
ORE RESERVES FOR VARIOUS CUT-OFF GRADES BY BENCH
FUTURE DRILLING REQUIREMENTS PLANNING
NUMEROUS PIT SLOPES
NUMEROUS BENCH REFERENCE ELEVATIONS
GRADE REQUIREMENTS TO THE MILL
USE OF GEOLOGICAL DATA FOR ORE RESERVES AND PLANNING
PRODUCTION SCHEDULING
ORE BLENDING AND GRADING
PROCESS CONTROLS
FEASIBILITY STUDIES
ECONOMIC EVALUATION
DESIGN OF CONTROL SYSTEM
CUT AND FILL CALCULATIONS
STATISTICAL AND NUMERICAL ANALYSIS
MULTIPLE REGRESSION ANALYSIS
MULTIPLE CORRELATION ANALYSIS
SIMPLE LINEAR REGRESSION
QUADRATIC REGRESSION FOR 2 AND 3 INDEPENDENT VARIABLES
QUADRATIC REGRESSION EVALUATION
ANALYSIS OF VARIANCE
QUADRATIC EQUATION CONTOUR PLOT
POLYNOMIAL REGRESSION (X+Y) WITH INTERACTIONS AND EVALUATION
FREQUENCY DISTRIBUTIONS ANALYSIS
GENERAL REGRESSION EVALUATION
REGRESSION WITH STANDARD ERRORS OF FORECASTS
SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS
MATRIX MANIPULATION PACKAGE
LEAST SQUARES POLYNOMIAL CURVE FIT
CURVE FITTING PROGRAM
ORTHOGONAL POLYNOMIALS
EIGENVALUES
LINEAR REGRESSION ANALYSIS OF COMBINATIONS OF VARIABLES
EXPONENTIAL CURVE FITTING PROGRAM
NON-LINEAR CURVE FITTING PROGRAM
TIME SERIES ANALYSIS
FACTOR ANALYSIS
STATISTICAL ANALYSIS OF DATA FOR PATTERN RECOGNITION
AUTOCORRELATION ANALYSIS
STATISTICAL ANALYSIS OF DRILL-HOLE DATA
CHI-SQUARE TEST FOR FIT OF POISSON, NEGATIVE BINOMINAL, LOGARITHMIC, T DISTRIBUTION, LOGNORMAL DISTRIBUTION

[illegible] WELL PROGRAM [illegible]

## COMPUTER UPDATE PROVIDES VALUABLE TOOLS

**COMPUTER UPDATE** *USES RECOGNIZED PROCEDURES FOR THE PERFORMANCE OF AN AIRBORNE SURVEY AS AIDS TO GEOLOGICAL MAPPING.*
*A DETAILED GROUND AIRBORNE SURVEY IS A PERMANENT RECORD OF A SET OF FACTS AND INCREASES IN VALUE AS MORE BECOMES KNOWN ABOUT THE GEOLOGY AND AS NEW TECHNIQUES ARE INCORPORATED BECAUSE THESE FACTS CAN THEN BE EXAMINED IN THE LIGHT OF THE NEW KNOWLEDGE WHICH HAS BEEN BROUGHT FORTH. THE AIRBORNE SURVEY USUALLY CONTAINS MUCH MORE INFORMATION THAN CAN BE EXTRACTED AT THE FIRST INTERPRETATION, AND THROUGH THE USE OF COMPUTER ANALYSIS AND PROGRAMS DESIGNED TO RESTUDY THE DATA WITH DIFFERENT PROGRAMS, IT BECOMES QUICKLY AND ACCURATELY A TOOL FOR FUTURE INTERPRETATION. THE WORK DONE MAY STILL BE AS USEFUL 10, 20 OR 50 YEARS IN THE FUTURE AS IT IS AT THE TIME THE ORIGINAL FACTS ARE RECORDED.*
*AIRBORNE MAPPING CAN REVEAL MAJOR INFORMATION WHICH IS NOT READILY APPARENT IN EARLY STAGES OF GROUND MAPPING AND WHICH CANNOT BE RECOGNIZED IN THE FIELD.*

*INFORMATION AND IDEAS PROVIDED BY DIGITAL SURVEYS MAKE MAJOR CONTRIBUTIONS TO MINERAL OR OIL EXPLORATION PROGRAMS. THE INTERPRETATION OF A DIGITAL MAP REQUIRES THE CLOSEST COOPERATION BETWEEN A TEAM OF GEOLOGISTS AND GEOPHYSICISTS.*

*THE HIGH SENSITIVITY INSTRUMENTS HAVE ALSO NECESSITATED THAT THE SURVEY'S DATA BE DIGITALLY RECORDED IN ORDER TO MAKE FULL USE OF THE HIGHER RESOLUTION AVAILABLE. THIS WILL PERMIT THE COMPILATION OF THE MAPS TO BE AUTOMATED AS MUCH AS POSSIBLE.*

*AS NEW METHODS COME OUT YOUR INFORMATION WOULD BE IN A FORM INTELLIGIBLE TO THESE NEW METHODS.*

## AERIAL SURVEYS

**COMPUTER UPDATE'S** *AIRBORNE ACQUISITION CONSISTS OF THREE METHODS IN GENERAL.*

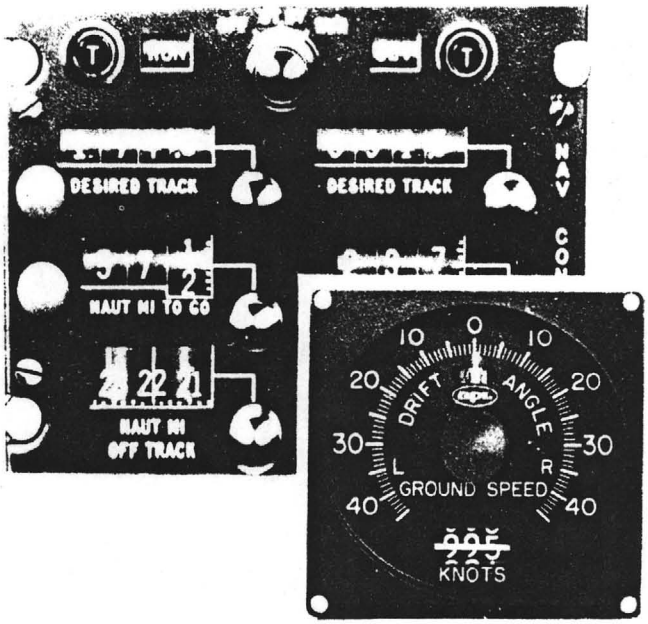
### PHASE ONE

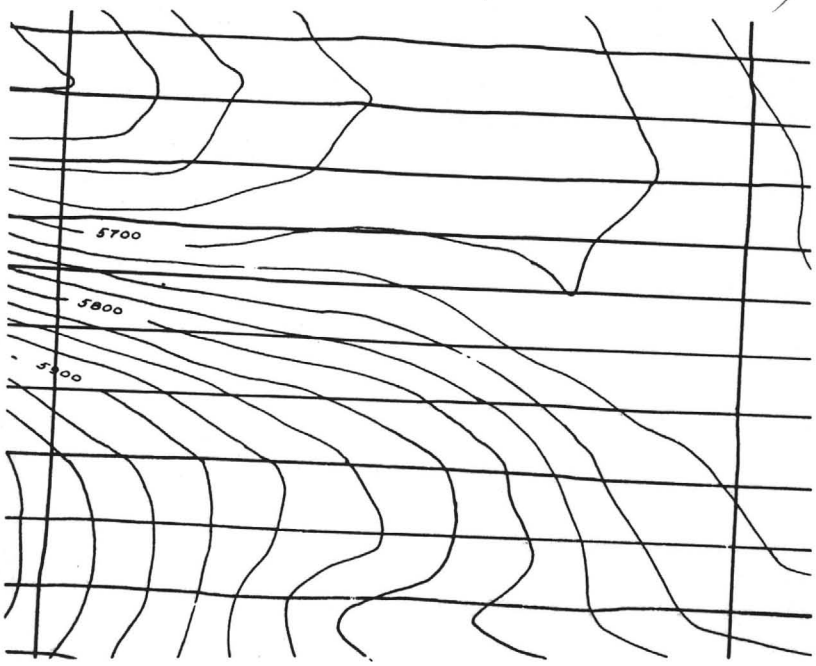
*AN AIRPLANE EQUIPPED WITH SUCH INSTRUMENTS AS MAGNETOMETER, SCINTELLOMETER, RADAR ALTIMETER, AND A CAMERA FOR STRIP PHOTOGRAPHY. THE OUTPUT OF THESE INSTRUMENTS IS IN ANALOG FORM. IF A MOSAIC IS AVAILABLE OF THE GROUND TO BE FLOWN, THIS IS OBTAINED. IF NOT, ONE IS PREPARED. FLIGHT LINES ARE DRAWN OVER THIS MOSAIC AND CORRECTION TIES ARE DETERMINED. AS THE FIELD IS BEING FLOWN, THE STRIP CAMERA IS RECORDING EXACTLY WHERE THE AIRPLANE IS WITH RESPECT TO THE GROUND. THE CAMERA IS ALSO RECORDING THE NUMBER CORRESPONDING TO OUR INSTRUMENTS' DATA.*
*FROM THIS POINT PREVIOUS TO THE COMPUTER, LARGE AMOUNTS OF HAND REDUCTION HAS BEEN NECESSARY.* **COMPUTER UPDATE** *HAS USED THE COMPUTER AS A TOOL ALONG WITH A DIGITIZER TO SPEED UP THE JOB OF DATA REDUCTION OF FLIGHT INFORMATION. THE OUTCOME IS IN THE FORM OF CONTOURED MAPS.*

### PHASE TWO

*IN ADDITION TO THE EQUIPMENT IN PHASE ONE WE ADD A RECORDER AND A MULTIPLEXER TO THE EQUIPMENT ON THE PLANE. THIS GIVES US THE INFORMATION IN A FORM READILY AVAILABLE TO THE COMPUTER. WE THEN DIGITIZE OUR GROUND CONTROL AND MERGE THIS WITH THE FLIGHT INFORMATION TO GIVE US OUR COMPUTER OUTPUT OF CONTOURED MAPS. WITH THIS METHOD, WE ALSO HAVE THE CAPABILITY OF CORRECTING, WHILE YET IN THE COMPUTER FOR SUCH THINGS AS ALTITUDE.*

DOWN TO EARTH RESULTS




## PHASE THREE

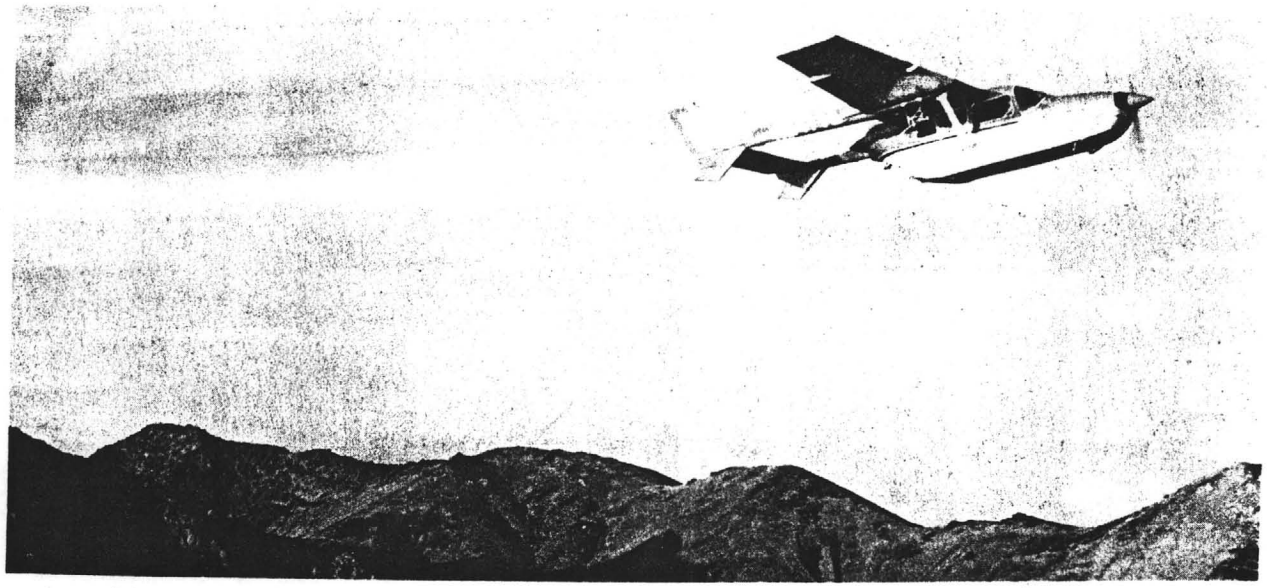
*THE ADDITION OF DOPPLER RADAR TO THE EQUIPMENT OF PHASE TWO AND PUTTING THIS INFORMATION ALSO ONTO TAPE GIVES US THE FLEXIBILITY OF KNOWING WHERE THE AIRPLANE IS WITH RESPECT TO A POINT ON THE GROUND. THIS, ALONG WITH SOME CAMERA CONTROL, PROVIDES US WITH AN ALMOST COMPLETELY COMPUTERIZED METHOD OF DATA REDUCTION OF AIRBORNE INFORMATION. PHASE THREE IS VERY FLEXIBLE. WE CAN HANDLE SITUATIONS WHERE OFFSHORE AIRBORNE MEASUREMENTS ARE BEING TAKEN WITHOUT THE USE OF THE MORE EXPENSIVE* **SHORAN.**

**COMPUTER UPDATE** *HAS SPENT A GREAT DEAL OF TIME AND MONEY WORKING OUT THESE SYSTEMS AND HAS HAD TO SOLVE MANY PROBLEMS SUCH AS NOISE ERRADICATION, AND EXTRANEOUS INFORMATION.*

**COMPUTER UPDATE** *SUCCESSFULLY DEVELOPS, MONITORS AND EXECUTES THE SYSTEMS NECESSARY FOR QUALITY AIRBORNE DATA ACQUISITION. THROUGH THE USE OF SPECIALLY INSTRUMENTED AIRCRAFT* **COMPUTER UPDATE** *GIVES ASSURANCE OF THE LATEST RECOGNIZED THEORETICAL STUDIES WHICH ALLOWS* **COMPUTER UPDATE** *TO MAINTAIN STANDARDS THAT ARE AGGRESSIVE, LEADING TO A RELIABLE REPUTATION AND GROWING TO MEET EVER INCREASING COMPETITIVE DEMANDS. SUCH STANDARDS OF DATA ACQUISITION ALLOW FOR MAXIMUM QUALITY IN DATA REDUCTION AND INTERPRETATION OF SCIENTIFIC AND GEOLOGICAL STUDIES.*
*THE DATA ACQUISITION CAPABILITY OF* **COMPUTER UPDATE** *IS AN EXTENSION OF THE APPLICATION OF MATHEMATICAL AND COMPUTER TECHNIQUES FOR THE IMPROVEMENT OF MINERAL, OIL AND WATER EXPLORATION AND AIR POLLUTION. PROPERTY EVALUATION, FUEL EXPLORATION AND ALL AIRBORNE GEOPHYSICAL AND SCIENTIFIC EXPLORATIONS.*

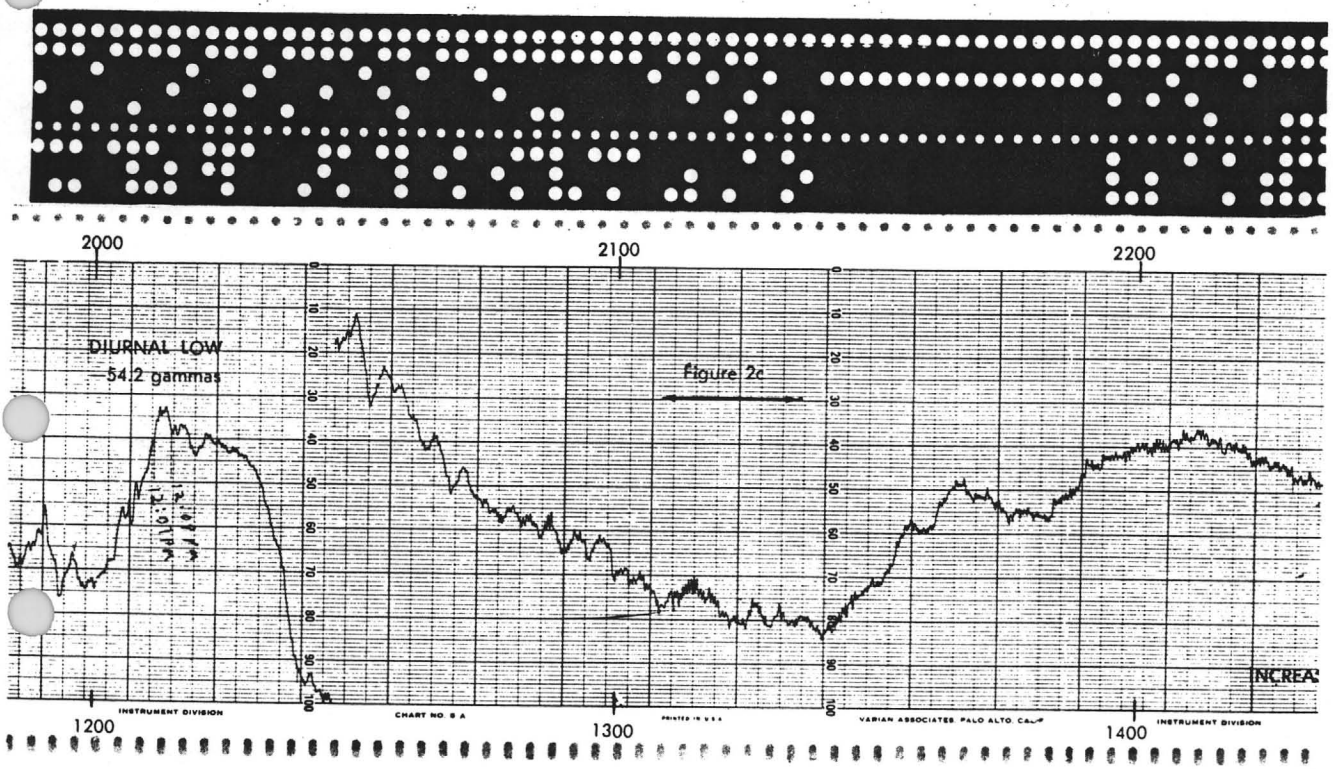
*THE NEED FOR HIGHER QUALITY INFORMATION NECESSITATES THE APPLICATION OF COMPUTERS IN ORDER TO MAXIMIZE PROFITS.* **COMPUTER UPDATE'S** *EXTENSIVE AERO SURVEYS RESULT IN A BETTER UNDERSTANDING OF THE STRUCTURE AND ROCK COMPOSITIONS OF THE EARTH'S CRUST. THIS ALLOWS GEOLOGISTS AND GEOPHYSICISTS TO HAVE A BASIS FOR CONFIRMING GEOLOGICAL FEATURES WHICH HERETOFORE HAVE BEEN OBSCURE.*

**USE COMPUTER COMPATIBLE METHODS**

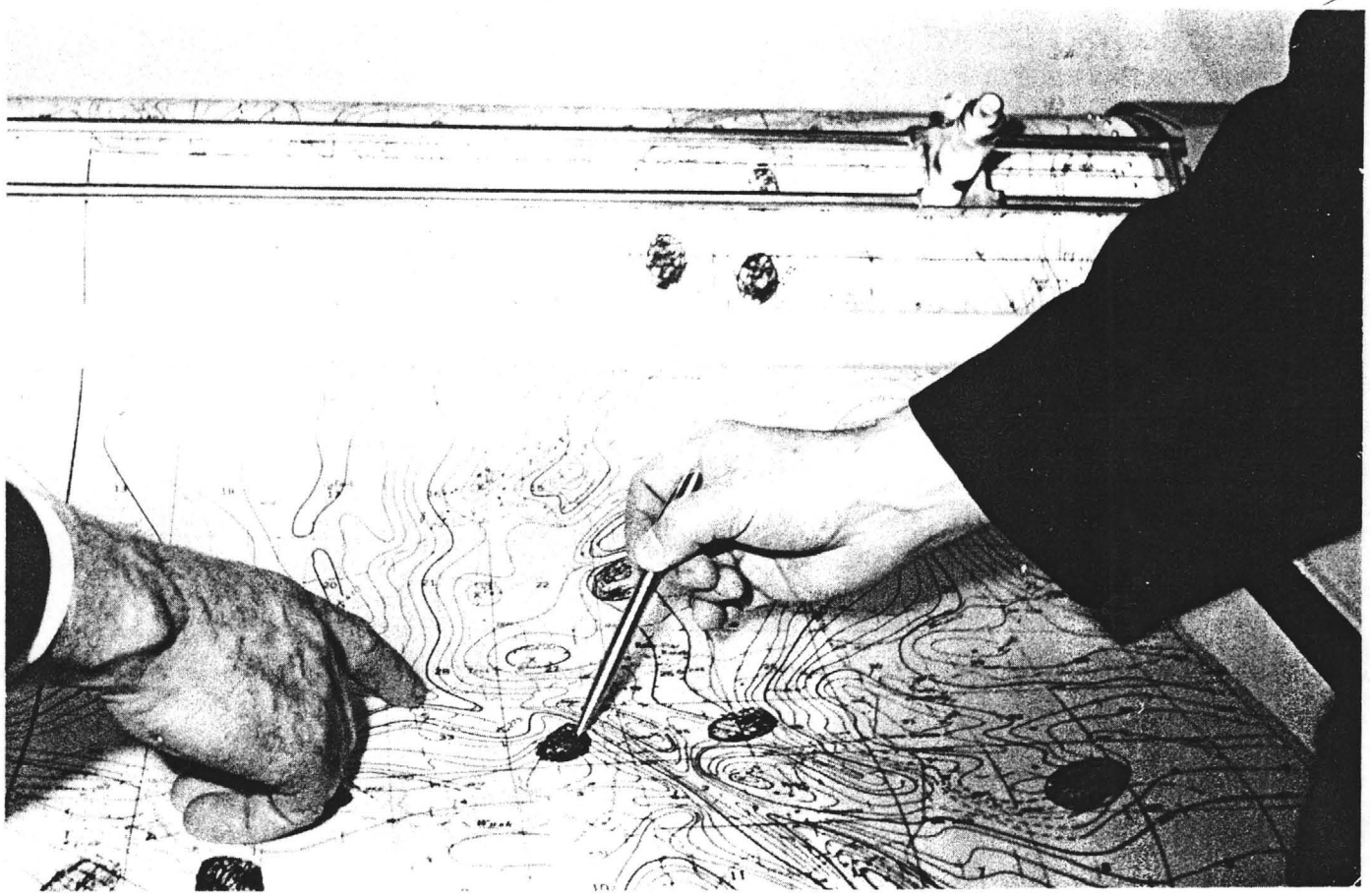


## AERO MAGNETIC SURVEYS

*IN AERIAL SURVEYING THE MAGNETOMETER IS FLOWN BACK AND FORTH AT A FIXED SPECIFIED ALTITUDE ALONG A SERIES OF PREDETERMINED FLIGHT LINES. THESE ARE GENERALLY CHOSEN TO RUN AT RIGHT ANGLES TO THE MAIN TREND OF GEOLOGICAL FEATURES, AND THEY ARE PARALLEL TO EACH OTHER AT VARYING INTERVALS. AS THE SURVEY PROGRESSES, THE BASE VALUE OF THE MAGNETOMETER MAY DRIFT AND THE EARTH'S FIELD CHANGE IN STRENGTH. ACCORDINGLY THE SURVEYOR ALSO FLIES A NUMBER OF CONTROL LINES ACROSS THE PATTERN, RAPIDLY OBTAINING A SET OF SECOND READINGS AT THE INTERSECTION WITH THE FLIGHT LINES. THESE VALUES ARE USED TO CORRECT FOR DRIFT IN THE INSTRUMENT AND THE FIELD.*




DATA TAKEN IN ANALOG AND DIGITAL FORM



## GEOPHYSICAL DATA REDUCTION

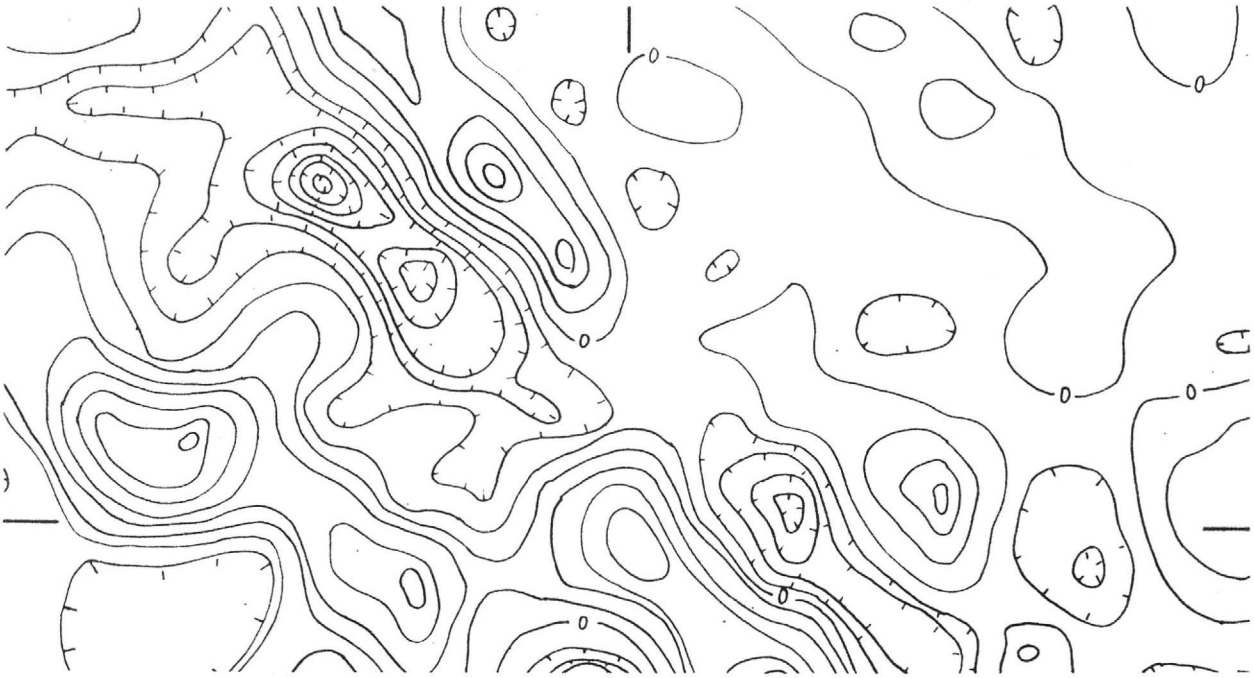
*IN ORDER TO PROPERLY EVALUATE THE FEASIBILITY OF MARGINAL VENTURES, MORE AND MORE INFORMATION MUST BE EXTRACTED FROM AVAILABLE DATA. THIS NEED FOR HIGHER QUALITY INFORMATION NECESSITATES THE APPLICATION OF COMPUTER ORIENTED TECHNIQUES IN ORDER TO MAXIMIZE PROFITS AND MINIMIZE ERROR DUE TO OUTMODED METHODS OF DATA EXTRACTION. THE DATA PROCESSING AND ANALYSIS OF* **COMPUTER UPDATE** *IS AN EXTENSION OF THE APPLICATION OF MATHEMATICAL AND COMPUTER TECHNIQUES.*

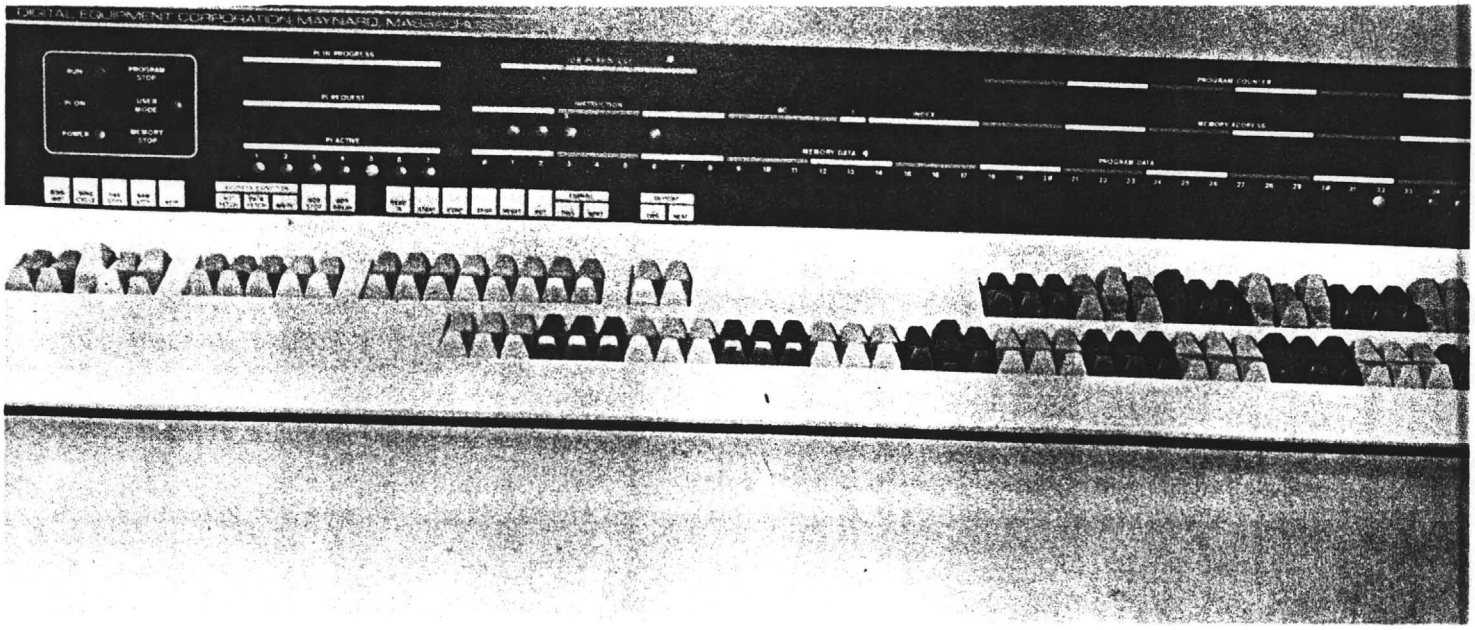
*GEOPHYSICAL DATA REDUCTION IS PARTICULARLY AMENABLE TO AUTOMATIC COMPUTATION BECAUSE OF THE QUANTITATIVE NATURE OF THE DATA. RESULTS CAN BE MADE AVAILABLE TO FIELD PERSONNEL OR RESEARCHERS QUICKLY BECAUSE OF THE ACCURACY AND SPEED OF COMPUTERS. FROM DETERMINATION OF THE TYPE OF SOURCE DATA AVAILABLE,* **COMPUTER UPDATE** *CAN DETERMINE FROM THE USER'S REQUIREMENTS AND OPERATIONAL PLANS THE PATTERN OF EACH STEP IN DATA TRANSMISSION FROM SOURCE TO ULTIMATE USER. THIS ANALYSIS CAN THEN BE NOTED AND ANALYZED BY THE COMPUTER TO DETERMINE THE PATTERN OF REPORTS AND DATA REDUCTION BY A SYSTEM CAPABLE OF PROCESSING VOLUMES OF INFORMATION SMOOTHLY AND RAPIDLY.*

## SAVE TIME AND COSTS

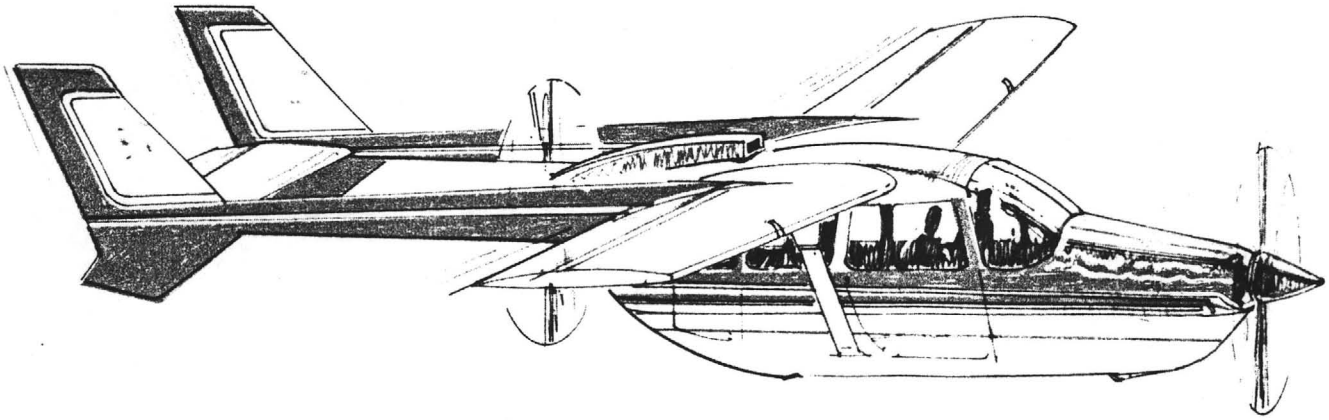
## REDUCTION OF EXISTING DATA

*UNNUMBERED AMOUNTS HAVE BEEN SPENT BY MANY CORPORATIONS AND INDIVIDUALS FOR GEOPHYSICAL DATA WHICH HAS BEEN PROCESSED INTO CONTOUR MAPS. IT IS NOW POSSIBLE THROUGH SOPHISTICATED, AUTOMATED METHODS TO REDIGITIZE THIS INFORMATION AND EXPOSE IT TO A MORE EXACT SCRUTINY REVEALING EVALUATIONS THAT WERE PREVIOUSLY NOT POSSIBLE BECAUSE OF LIMITED DATA INTERPRETATION.*
*SOME OF THESE BINDING LIMITATIONS CAN BE REMOVED THROUGH* **COMPUTER UPDATE'S** *EXPANDED KNOWLEDGE OF DATA REDUCTION. NUMERICAL ANALYSES WILL BE AUTHORITATIVELY PERFORMED BY* **COMPUTER UPDATE'S** *QUALIFIED STAFF IN COMPUTER KNOW–HOW AND WITH THE AID OF A MOST UP–TO–DATE, TIME–SHARING COMPUTER SYSTEM* **COMPUTER UPDATE** *WILL AFFORD THE OWNER OF THE DATA A DEEPER INSIGHT INTO THE VALUE OF HIS AVAILABLE INFORMATION.*



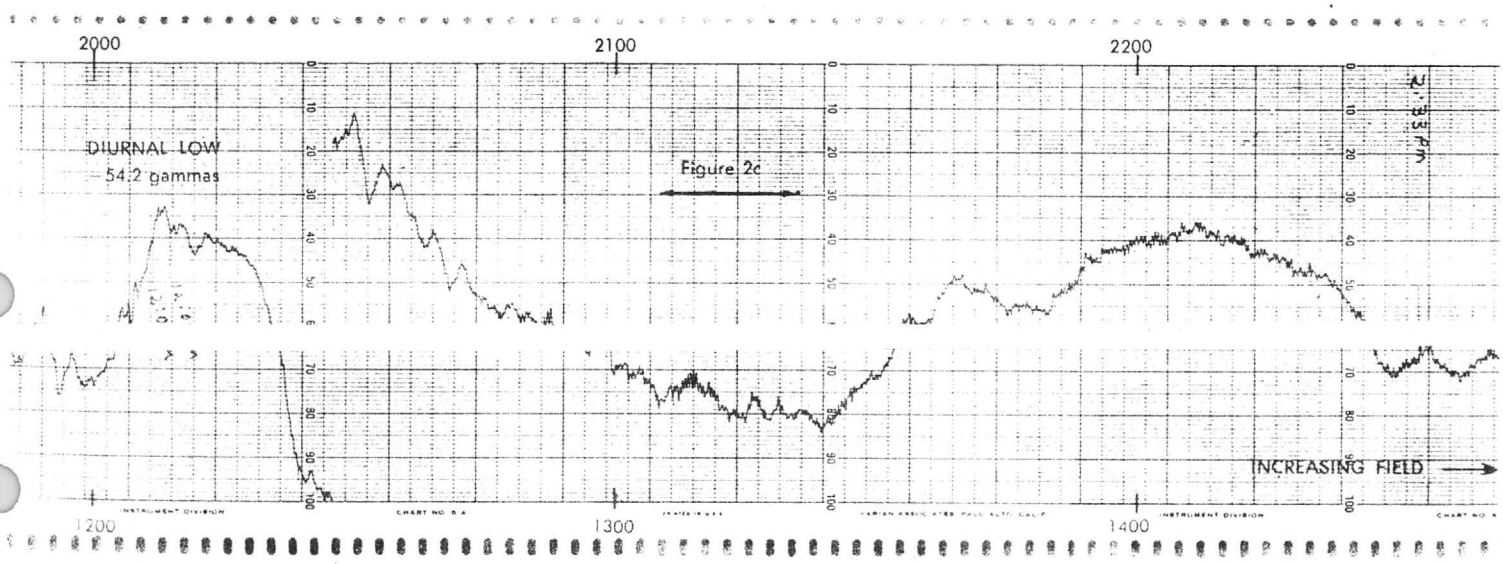


**SECOND LOOK AT OLD DATA**

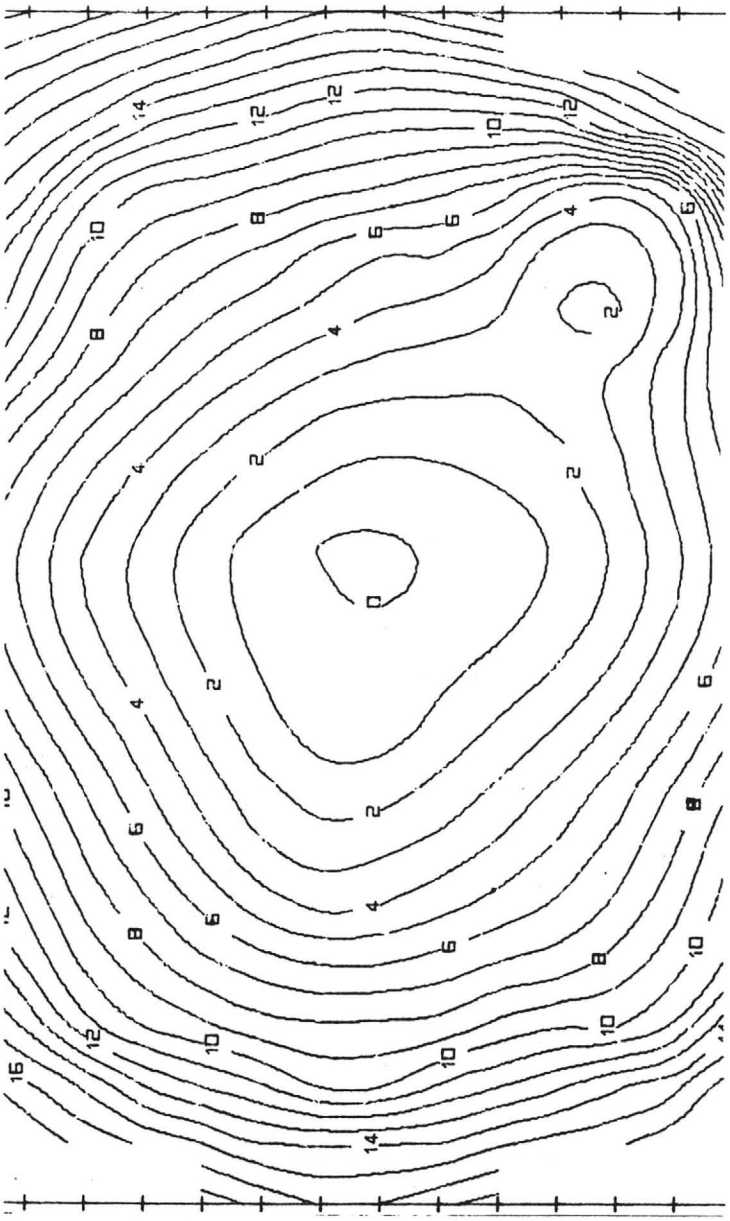


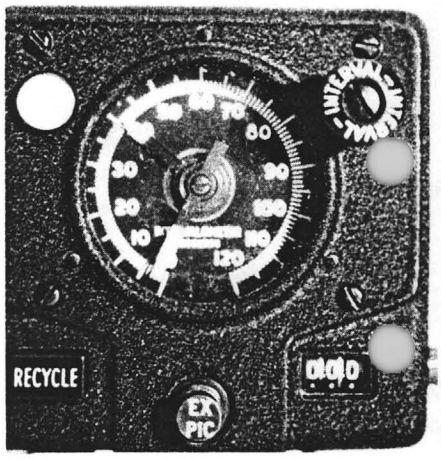
## SCINTILLOMETER DATA ACQUISITION

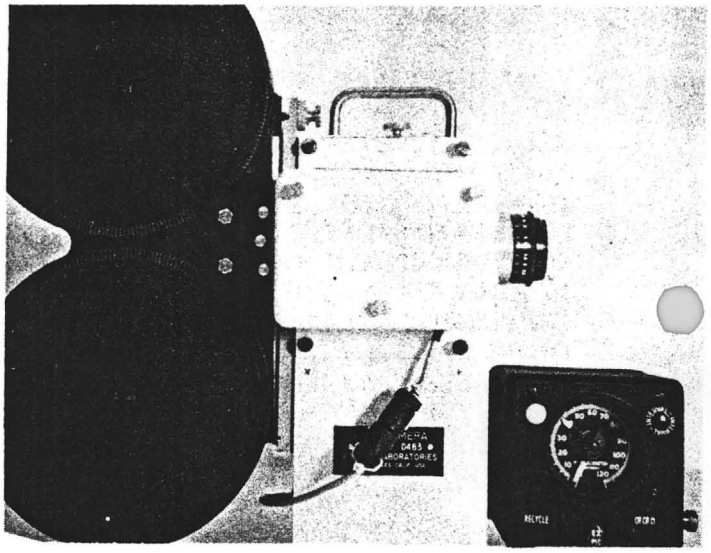
*THE SCINTILLOMETER IS FAST BECOMING A TOOL FOR FINDING BOTH MINERALS AND OIL. IN MINERALS IT IS CONCERNED WITH THE RADIO-ACTIVE PROPERTIES OF MINERALS. IN OIL IT IS CONCERNED WITH THE VOIDS OF RADIO-ACTIVE PARTICLES AT THE SURFACE OF THE EARTH.* **COMPUTER UPDATE** *IS PRESENTLY CARRYING OUT RESEARCH WITH THE SCINTILLOMETER SINCE WE EXPECT IT TO BE OF EVER INCREASING IMPORTANCE IN GEOPHYSICS IN GENERAL.*
*THE PURPOSE OF CAREFUL AIRBORNE DATA ACQUISITION AND REDUCTION OF THE VARIOUS INSTRUMENTS MENTIONED IS TO PROVIDE A BASIS FOR STUDY AND DECISIONS. THIS NOW WILL GIVE ONE A NECESSARY TOOL TO PROCEED WITH THE MORE ABSOLUTE, BUT MORE EXPENSIVE GROUND WORK.* **COMPUTER UPDATE,** *THROUGH ITS SUBSIDIARIES AND ASSOCIATES CAN OFFER SUCH*




**FOUR WINDOWS – POTASSIUM, THORIUM, URANIUM, TOTAL**





**OUTLINE OF SOME COMPUTER UPDATE COMPUTER TECHNIQUES**

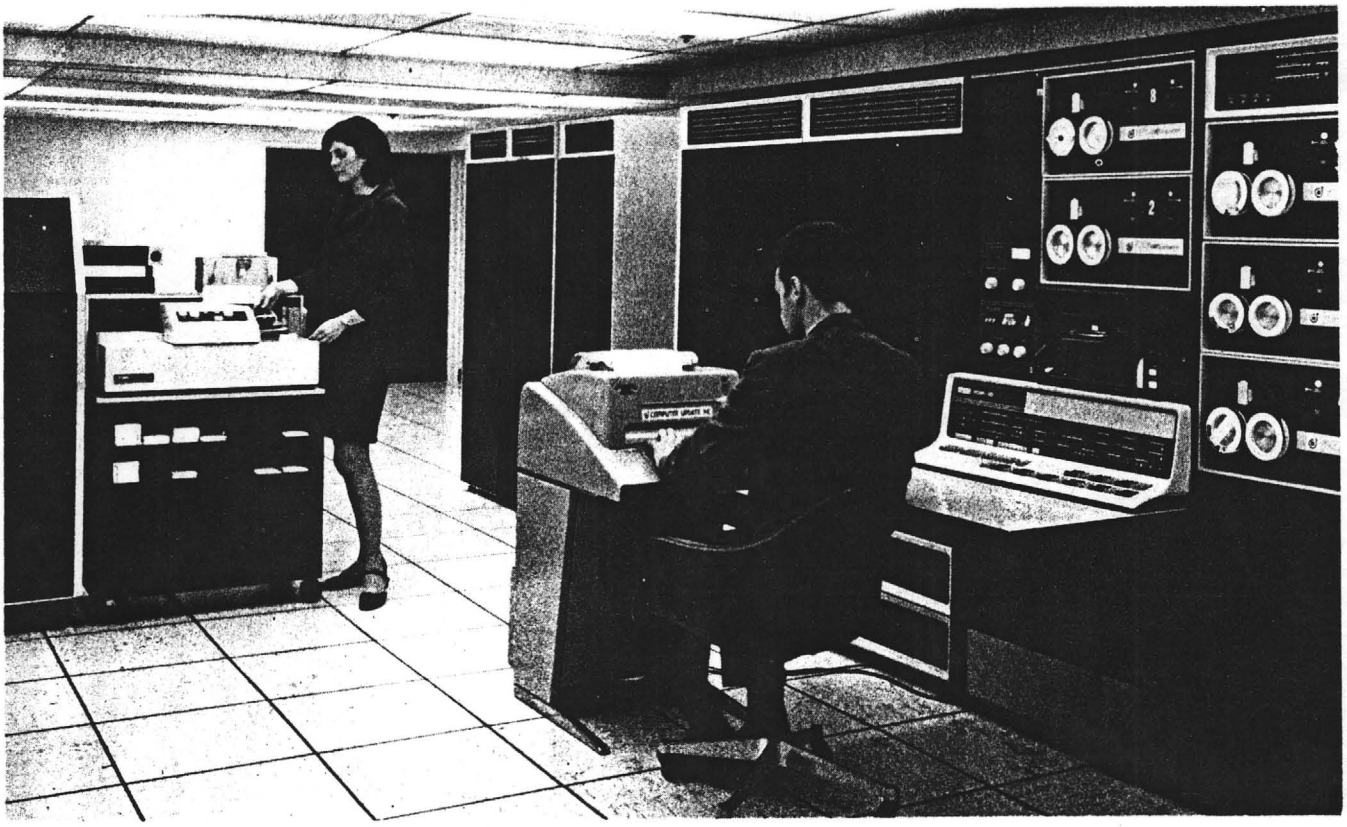
*AUTOMATIC DIGITIZING OF FLIGHT INFORMATION*
*AUTOMATIC DIGITIZING OF MAPS*
*COMPUTER REDUCTION OF AIRBORNE DATA*
*PROFILE PRINTOUTS*
*ANALOG PLOTTING*
*DIGITAL PLOTTING*
*DATA–TABLES*
*EXPANDING DATA*
*SHRINKING DATA*
*STATISTICAL ANALYSIS*
*ANALYSIS OF DISTRIBUTIONS*
*PROFILE ANALYSIS*
*MAP ANALYSIS*
*POINT TO SURFACE CALCULATIONS*
*SURFACE TO SURFACE CALCULATIONS*
*HIGH ORDER EQUATION SOLVING*

SQUEEZE MORE INFORMATION OUT OF ORIGINAL DATA

## COMPUTER GRAPHICS

*TO ASSIST IN EVALUATION OF COLLECTED DATA WE OFFER COMPUTER GRAPHIC SERVICES WHICH PROVIDE A RAPID AND ECONOMIC CORRELATION OF QUANTITATIVE DATA SUCH AS MAGNETIC, GRAVITY, SEISMIC, ALTIMETER, INDUCED POLARIZATION AND OTHER DATA IN THE FORM OF GRID AND CONTOUR MAPS, PROFILES AND COMBINED OVERLAYS AND MANY OTHER FORMS OF GRAPHIC REPRESENTATION OF ACQUIRED DATA. THESE GRAPHICS ARE GENERATED AS NORMAL OUTPUT OF HARDWARE COMPATIBLE CAPABILITIES AND SERVE THE USER IN BETTER UNDERSTANDING THE ACCENTUATION OF GEOPHYSICAL ANOMALIES.*

**EXTRACT MORE FROM YOUR DATA**



## GEOPHYSICAL TIME-SHARING

**COMPUTER UPDATE** *OFFERS, FOR THE FIRST TIME IN THE WESTERN STATES, THE TIME-SHARING ADVANTAGE OF A PDP 10 SYSTEM.* **COMPUTER UPDATE** *PROVIDES GENERAL PURPOSE TIME-SHARING WITH MULTIPLE CORE SWAPPING.*

**COMPUTER UPDATE'S** *TIME-SHARING SYSTEM IS VERY MUCH AVAILABLE AND TIME TESTED. WE ARE NOT PROMISING A SYSTEM WHICH WILL BE AVAILABLE, OR A SECOND GENERATION COMPUTER TRYING TO TIME-SHARE; WE ARE TIME-SHARING WITH TIME TESTED SOFTWARE ON A COMPUTER THAT WAS DESIGNED AS A TIME-SHARING COMPUTER.*

*WE OFFER A THIRD GENERATION TIME-SHARING SERVICE WITH INTERACTIVE MULTIPLE LANGUAGE ADVANTAGES.*

**COMPUTER UPDATE'S** *PDP 10 SYSTEM IS A MULTIUSER, MULTIPROGRAMMING SYSTEM WHEREIN MULTIPLE INDEPENDENT PROGRAMS SHARE TIME AND MEMORY SPACE. THE PDP SYSTEM IS ESPECIALLY DESIGNED TO ACCOMMODATE CONVERSATIONAL BATCH PROCESSING AND REAL-TIME JOBS CONCURRENTLY.*

## HARDWARE-SOFTWARE FLEXIBILITY

**COMPUTER UPDATE'S** *FULLY INTEGRATED HARDWARE-SOFTWARE ALLOWS FOR OPTIMUM USER FLEXIBILITY.*

**COMPUTER UPDATE** *CAN INCORPORATE ANY SET OF PERIPHERAL DEVICES OF A MULTIUSER, MULTIPROGRAMMING CONFIGURATION THROUGH OUR TERMINAL SYSTEMS DIVISION.*

*AS A USER YOU ARE NOT LIMITED TO ONE INFLEXIBLE LANGUAGE, BUT YOU MAY CHOOSE FROM OVER SIXTY FULLY INTERACTIVE LANGUAGES.*

*A SOPHISTICATED INTEGRATED HARDWARE-SOFTWARE SYSTEM GIVES THE USER A COMPLETE SERVICE THAT MEETS THE VARIED DEMANDS OF USER REQUIREMENTS.*

**COMPUTER UPDATE'S** *PDP 10 SYSTEM IS GEARED TO A WIDE RANGE OF APPLICATIONS THAT REQUIRE INTERACTIVE TIME-SHARING SERVICES, CONCURRENT INPUT/OUTPUT AND FAST COMPUTATION.*

TIME-SHARING IS A TOOL, NOT A TOY.

## COMPUTER UPDATE TIME-SHARING ADVANTAGES

*POWERFUL JOB-ORIENTED TIME-SHARING PERFORMANCE WITH 36-BIT WORDS FOR HIGH SINGLE WORD PRECISION. WITH 366 INSTRUCTIONS MAKING ONE HOUR OF OUR PDP 10 TIME WORTH THREE TO ELEVEN HOURS OF OTHERS' SERVICES. OUR COMPUTER CONTAINS OVER 360 MAJOR INSTRUCTIONS WHICH MAKE THE PROGRAM SHORTER, MAKE PROGRAMS RUN FASTER AND OCCUPY LESS STORAGE.*

*WITH THE POWER OF THE ORDER CODE WE PERFORM PROBLEMS WITH FEWER INSTRUCTIONS BY APPLYING FULL PDP PERFORMANCE. YOU, AS A USER, CAN EXPERIENCE FASTER JOB RESPONSE TIME, MORE CONVENIENT OPERATION AND DIFFERENT CATEGORIES OF TASKS RANGING FROM AN INTERACTIVE "CONVERSATIONAL" MODE TO ENTERING DATA FOR PROCESSING AND FINAL OUTPUT.*

## ADVANTAGES

- *NO LONG DISTANCE COSTS*
- *SOPHISTICATED I/O SOFTWARE*
- *QUICK TERMINAL RESPONSES*
- *POWERFUL JOB-ORIENTED FEATURES*
- *HIGH-SPEED PROGRAM SWAPPING*
- *32K (36-BIT WORD) EXPANDABLE TO 256K*
- *36-BIT WORDS PROVIDE HIGH ACCURACY SINGLE PRECISION*
- *366 INSTRUCTIONS INCLUDING*
  - *ALL BOOLEAN OPERATIONS*
  - *PROGRAMMED OPERATIONS*
  - *IMMEDIATE OPERATIONS*
  - *FLEXIBLE BYTE MANIPULATION*
- *FLOATING POINT*
- *MULTILEVEL INDIRECT ADDRESSING*
- *MULTILEVEL INDEXING*
- *16 GENERAL PURPOSE REGISTERS*
  - *16 ACCUMULATORS*
  - *15 INDEX REGISTERS*
  - *HIGH SPEED PROGRAM LOOPS*
- *TIME PROVEN SOFTWARE*
  - *OVER 1,000,000 CONSOLE HOURS EXPERIENCE*

**YOU ARE AS CLOSE AS YOUR TELEPHONE**

## SYSTEM PROGRAMS

**AID**
*RESEARCH ORIENTED CONVERSATIONAL LANGUAGE FOR THE SCIENTIST AND ENGINEER. LANGUAGE IS DIRECT AND EASY TO LEARN.*

**FORTRAN IV**
*ASA STANDARD SINGLE-PASS COMPILER WITH HIGHLY OPTIMIZED OBJECT CODE. FULLY EXPLOITS OUR POWERFUL INSTRUCTION SET.*

**MACRO ASSEMBLER**
*FLEXIBLE DEVICE INDEPENDENT ASSEMBLY LANGUAGE WITH SOPHISTICATED MACRO INSTRUCTION FACILITIES. MACRO HAS MANY SPECIAL DATA GENERATING, CONDITIONAL ASSEMBLY, LISTING AND CONTROL PSEUDO-OPERATIONS.*

**PIP** *(Peripheral Interchange Program)*
*TRANSFERS ALPHANUMERIC OR BINARY DATA FROM OR TO ANY I/O DEVICE WITH OPTIONAL EDITING, SEQUENCING, MERGING, AND SYNTAX CHECKING FEATURES.*

**TECO**
*PERFORMS SIMPLE EDITING FUNCTIONS AS WELL AS HIGHLY SOPHISTICATED SEARCH, MATCH, AND SUBSTITUTE OPERATIONS. POWERFUL ONE-PASS SYNTAX-DIRECTED COMPILER WHICH ACCEPTS INPUT FROM ANY INPUT DEVICE.*

**LISP**
*A GENERAL-PURPOSE PROGRAMMING LANGUAGE WHICH UTILIZES A LIST-STRUCTURE STORAGE SCHEME FOR BOTH PROGRAM AND DATA.*
*SUITED ESPECIALLY FOR MANIPULATION OF SYMBOLIC QUANTITIES.*

**DDT** *(Dynamic Debugging Technique)*
*FAMOUS ON-LINE SYMBOLIC DEBUGGING AID WITH MORE THAN 50 COMMANDS, PERMITTING DYNAMIC INTERACTION WITH RUNNING PROGRAMS.*

**SCIENCE LIBRARY**
*MORE THAN 110 LIBRARY ROUTINES INCLUDING DOUBLE PRECISION AND COMPLEX FUNCTIONS.*

**BASIC**
*BASIC PROVIDES AN EASY-TO-USE LANGUAGE FOR THE BEGINNING NOVICE AND ALLOWS HIM TO ACCOMPLISH USEFUL WORK EVEN BEFORE HE HAS LEARNED ABOUT THE USEFUL FEATURES OF THE* **COMPUTER UPDATE** *LANGUAGES.*

## IMPORTANCE

*IN RECOGNITION OF THE MAGNITUDE, SCOPE AND SECURITY ASPECTS OF ALL CONTRACT DATA,* **COMPUTER UPDATE** *IS PREPARED TO PLACE RESPONSIBILITY FOR CONTRACT PERFORMANCE AT A TOP LEVEL OF ITS ORGANIZATION. HAVING THE CAPABILITY TO PERFORM IN IMPORTANT PROCUREMENTS,* **COMPUTER UPDATE** *IS PREPARED TO COMMIT THE NECESSARY TECHNICAL RESOURCES TO THE SUCCESSFUL PERFORMANCE ON CONTRACTS.*

COMPUTER UPDATE

72 EAST 4th SOUTH
SALT LAKE CITY, UTAH 84111
(801) 363-4593

Bear Creek Report &
Whitehouse Dozer (12-16-69)

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GEOPHYSICS

An aeromagnetic survey has been flown over the area. There is a magnetic high over the granodiorite stock to the southwest, but very little magnetic relief over the mine area itself. Several ground mag profiles have been run, however, the results are difficult to interpret. The geophysics was carried out by Hewitt Enterprises of Salt Lake City.

Hewitt's equipment, which is a simplified form of the pulse system, had been used previously by Whishaw and found to be somewhat unsatisfactory. Most geophysicists would doubt its ability to record meaningful results from over 2,000' depth.

I.P.

Two contoured I.P. maps accompany this report. There is a very impressive anomaly about 10,000 ft long running NE-SW centered about the mine with values up to 20 milliseconds; about 10 milliseconds would be considered anomalous. This anomaly is stated to represent several per cent sulphide at 2,000' - 2,300' depth.

GEOLOGY

A rough geological map of the mine area, on a blow-up of the 1-24,000 scale 7½ topographic sheet is attached. (Geology 1" - 500').

Five units have been mapped:

1. Uncle Sam Porphyry.
2. Purple Volcanic
3. White Tuff
4. Brown Volcanic
5. Recent Gravel and Overburden

(1) The "Uncle Sam Porphyry", Miocene to Pliocene in age intrudes the white tuff. Two miles southwest of the mine, granodiorite of the same age occurs.

The intrusives associated with the majority of the copper deposits in the southwest are of Laramide age, late Cretaceous to early Tertiary. The mineralizing stock at Bisbee is older Jurassic. This suggests that the Uncle Sam porphyry stock is not the source of the mineralization in the

Bear Creek Report 1&D

12-16-69

# CHARLESTON MINE COCHISE COUNTY, ARIZONA

## HISTORY

There is nothing in the records of the Bureau of Mines in Tucson but a few newspaper cuttings. The mine was probably found in the early part of the century. The structure in the open pit was mined from underground workings during the second world war, with an indicated production of 20 tons per day in 1944. A concentrate running 25-30% combined metal (presumably Pb-Zn) was sent to a mill in Bisbee. In 1950, the mine was bought by four Texans, but there is no record of production under this new ownership.

The James Stuart Company, (present owners) bought the property for a reported one quarter million dollars in 1957.

Clark Hughes and Harlowe Jones mined the open pit and the dumps north of the mine which are stated to contain 10,000 tons of ore running 10% combined Pb and Zn, presumably all oxidized. A small mill was built to concentrate the sericite associated with the ore, and $25,000 worth of concentrate was sold to Western Chemical Company for $150 per ton. It was apparently used as a paint filler. C. Cosgrove, Horne's field engineer suggests a new mill to concentrate the sericite could be built for $600,000 and production from such a mill could recapture all the money invested in the property to date. The property was again optioned and five holes at 45° N were drilled to intersect the structure 75' below the bottom of the pit. These are said to have intersected 10' - 20' of sericite.

## DEEP DRILLING

Hole #1 was spotted on the basis of geophysics (Air Mag) and to intersect the Charleston mine structure.

Hole #3 is in the middle of the Uncle Sam porphyry stock, at least 1,000' from the nearest contact.

Holes #2 and #4 were stated to have been located on the basis of geophysics (I.P.).

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drill holes. The Charleston Hill and a large area to the north of the mine is Uncle Sam porphyry.

(2) The purple volcanic varies from a tuff resembling a purple argillite to an agglomerate or breccia with porphyry fragments. In part, it is true porphyry with white feldspar phenocrysts. It varies in color from purple to gray-brown. Outcrops can be distinguished from a distance and most areas of this unit have been sketched in. All varieties are assumed to be the same unit, but the contact, in places, appears to be intrusive into the white tuff and the Uncle Sam porphyry and tends to occur near the contact between the two.

The purple porphyry in DD #1 has limey fragments and limey matrix, but this type was not seen on the surface.

Two limestone boulders were noted, but they were probably inclusions weathered from the Uncle Sam porphyry and limestone and conglomerate pebbles were seen in the gravels south of DD #4.

(3) The white tuff covers a large area in the vicinity of the mine. It is a hard, white rock - interbedded and sufficiently altered, so that individual ash particles can no longer be recognized. In some areas, it contains fragments up to 6" across, but more usually, 1" - 2".

(4) The brown volcanic occurs to the south of the mine. It may be the same unit as the purple volcanic but consists of predominantly brown and gray tuff, agglomerate and porphyry. Some of the gray tuff is slightly silty.

Generally, there is no bedding in the volcanics. The few attitudes on the map may be of jointing.

MINERALIZATION

Charleston Lead Mine - Open Pit

The open pit has been sunk on the area of the old underground workings. The plan of the geology is roughly projected to the level of the south end of the pit.

The pit is on an E.W. structure zone of altered rock about 1,000' wide and appears to be on the contact between the Uncle Sam porphyry of the Charleston hill and white tuff to the north.

The west end of the pit shows strong shearing over about 6'. The rest of the zone is highly altered, but comparatively unsheared. The alteration is principally the formation of the sericite in the white tuff, which, in places, is almost completely altered. Pyrite is abundant in parts of the tuff, but no other sulphides were seen. This is presumably the zone from which the lead-zinc ore was mined in the past. Material from the pit has been stockpiled north of the mine (see geology map) which amounts to 10,000 to 15,000 tons stated to run about 10% combined Pb Zn.

Forty five degree holes intersecting the zone 75' below the pit are stated to show 10'-20' of sericite. The trench 1,000' to the west of the pit (see sketch plan) is probably on the same zone. An area on strike to the east, below the water tower, has been stripped by a bulldozer, but the zone appears to have pinched out.

Samples C.P.1 - C.P.7 are from the open pit (see plan of pit). Mineralization in DD holes 1, 3, and 4 occurs between 1,000' and 3,000' below the surface. (See tabulation of significant drill hole intersections based on C. Davis assays). Most of the intersections are in the sedimentary beds, although, in places, porphyry is mineralized.

It is difficult to correlate the mineralization between the holes. The best intersection is in hole #4 1791.5'-1822' 30 - 5' 2.36% Cu. Copper values tend to increase with depth in the vicinity of the mine. The mineralization in the drill holes appears to be unconnected with that in the open pit.

The mineralization is probably in the Bisbee formation (Cretaceous) while the surface rocks are the overlying Bronco Group of late Cretaceous or Tertiary age.

Scattered mineralization occurs over a vertical section of nearly 2,000' and has probably not been bottomed.

Holes #1, #2, and #4 are on the I. P. anomaly, but to the east and south of its center.

CONCLUSIONS

The Charleston Mine structure has not been explored in depth. There is the possibility of economic lead-zinc mineralization and also marketable

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sericite from this structure.

The mineralization in DD holes #1, #2 and #4 is widely scattered in small intersections over 2,000' of section. The best intersection is 30' of 2.3% Cu at 1800'. To prove up an economic tonnage of this type of ore (10,000,000 tons?) would be a very expensive proposition at this depth and with such narrow intersections.

Most copper mineralization in Arizona is associated with intrusive monzonite porphyry bodies. Mineralization spreads out from the porphyry into the intruded rocks, which also, in many cases, constitute ore.

The most attractive possibility at the Charleston property is that the mineralization in holes #1, #2, and #4 may be peripheral to a porphyry copper deposit. Such a deposit may be indicated by the I. P. anomaly centered over the mine area.

It is suggested that the I. P. data be examined by our geophysical department. If there is any doubt about its validity, an arrangement should be made whereby we can check the anomaly on the ground by a different I. P. system. If the anomaly is verified, a drilling program based on the geophysics would be justified.

If it were not verified, the property would be still worth some attention. However, it could then only be explored by a drilling program stepping out from the present drill holes in an effort to find consistent mineralization or the porphyry source. This might prove very expensive and frustrating. The surface geology is of no help, being in a horizon above the mineralization.

A number of the porphyry copper deposits in Arizona have been discovered as a result of the exploration of just such a situation as this. (Pima, Mission, Twin Buttes, VeBol, Lake Shore and possibly others).

End

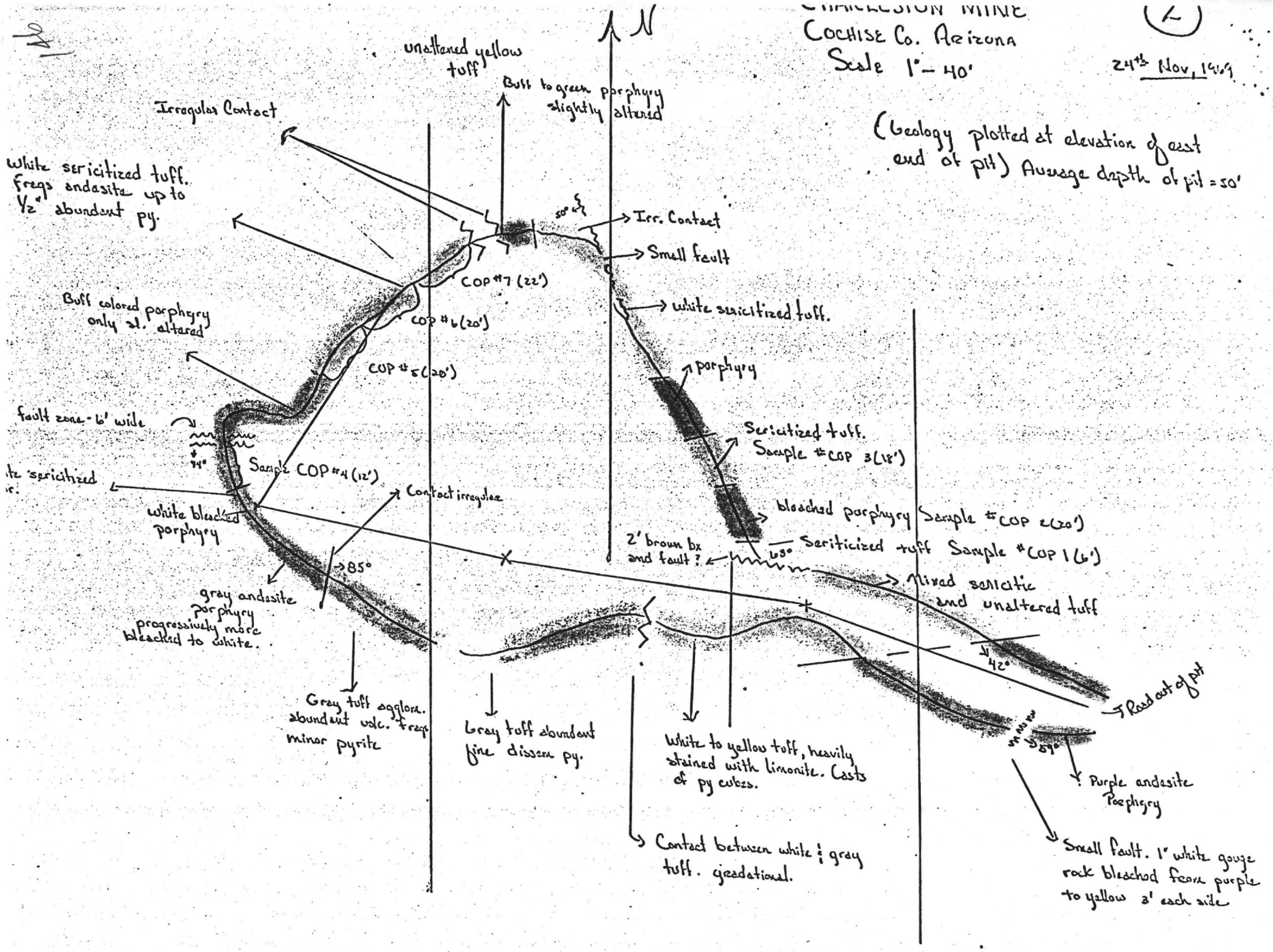
Q.G. Whishaw
(Ed.) R. E. Wager

CHARLESTON MINE
COCHISE Co. Arizona
Scale 1" – 40'

(1)

24th Nov, 1969

(Geology plotted at elevation of east end of pit) Average depth of pit = 50'



HOLE # 1

| From | | To | Length - Ft. | Pb | Zn | Cu | Ag |
|---|---|---|---|---|---|---|---|
| 1102 | - | 1106 | 4 | - | - | .5 | 1.0 |
| 1632 | - | 1636 | 4 | 5.6 | 8.05 | - | - |

2103 Bottom of Hole

HOLE # 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1005 | - | 1008 | 3 | 4.88 | 9.20 | .43 | - |
| 1028 | - | 1032 | 4 | .60 | 5.0 | - | - |
| 1726 | - | 1737 | 11 | .44 | 3.56 | - | - |
| 1858 | - | 1862 | 4 | .34 | .7 | - | - |
| 1923 | - | - | ? | - | 14.7 | - | - |
| 2261 | - | 2272 | 11 | - | - | 3.30 | .70 |
| 2640 | - | - | ? | - | 26.2 | - | - |
| 2957 | - | 2961 | 4 | - | - | - | - |

3200 Bottom of Hole

HOLE # 3 Nil

HOLE # 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1478 | - | 1501 | 23 | .40 | 1.81 | - | - |
| 1791.5 | - | 1802 | 10.5 | .23 | .45 | 4.95 | .5 |
| 1810 | - | 1822 | 12 | .28 | .08 | 1.65 | .6 |
| 1791.5 | - | 1822 | 30.5 | - | - | 2.36 | - |
| 2099 | - | 2104 | 5 | - | - | .77 | - |
| 2230.5 | - | 2236 | 5.5 | - | - | .67 | - |

3415 Bottom of Hole

December 16, 1969

DDH 3
55°
Dump
Dump
Dump
70°
65°
Water
Landing Strip
DDH 1
DDH 2
DDH 4
LEGEND
Uncle Sam Porphyry
Purple Tuff
Tuff (undifferentiated) White and Gray
Brown Tuff
Alluvium Gravel
CHARLESTON MINE AREA
ARIZONA, USA
Scale 1" = 500'

INO I.P. Survey (1-14-70)

Bear Creek 2
Inco

# REPORT ON I.P. SURVEYS

# ON CHARLESTON MINE

January 14, 1970

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It is very difficult to draw definite conclusions concerning the cause of the I. P. anomalies in the vicinity of Charleston Mine as very little is known about:

(a) the survey technique
(b) the line direction
(c) the line interval
(d) the spacing of readings
(e) the electrode configuration

and nothing is known about the instrument that was used.

However, if we assume

1. "A" on the 3,200 foot depth (?) map refers to electrode spacing
2. The northeast trending lines on the 1,000 foot depth (?) map are the lines read
3. That the numbers marked on these lines are I. P. readings
4. That the reading interval is the same as the indicated depth (?) and the same as the electrode spacing (as can be inferred from the 1,000 foot depth map)
5. The two surveys were conducted by competent people and/or at the same time

Then the strong anomaly (over 30 units, possibly millisecs) is probably a one reading anomaly and thus suspect. If it is a one reading anomaly, this may explain why lines and readings were not put on the 3,200 foot depth (?) map.

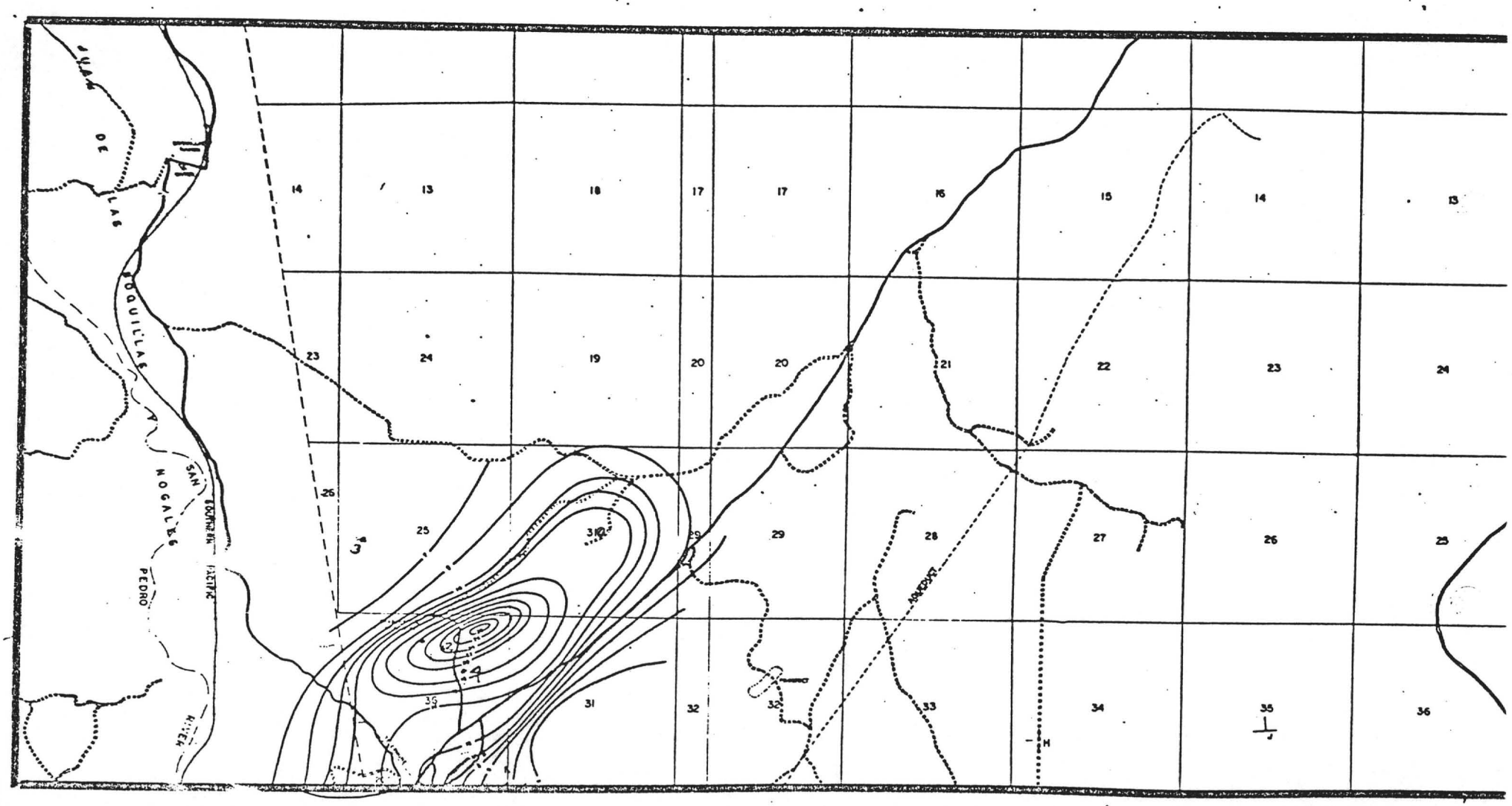
However, if we assume that the strong anomaly on the 3,200 foot depth (?) map is a valid anomaly, it must be caused by something at depth as readings of this magnitude do not occur on the 1,000 foot depth (?) map in the same vicinity.

What is meant by "at depth" in the previous paragraph is related to the instrument, electrode configuration, and electrode separation and thus is very difficult to comment on.

However, I would expect something in the order of 700 feet to 2,000 feet. Again, this conclusion is partly based on the assumption that the lines read in the field are those shown on the 1,000 foot depth (?) map.

If holes two and four were spotted on the basis of the I. P. results, it is surprising that at least one hole is not located in the centre of the anomaly.

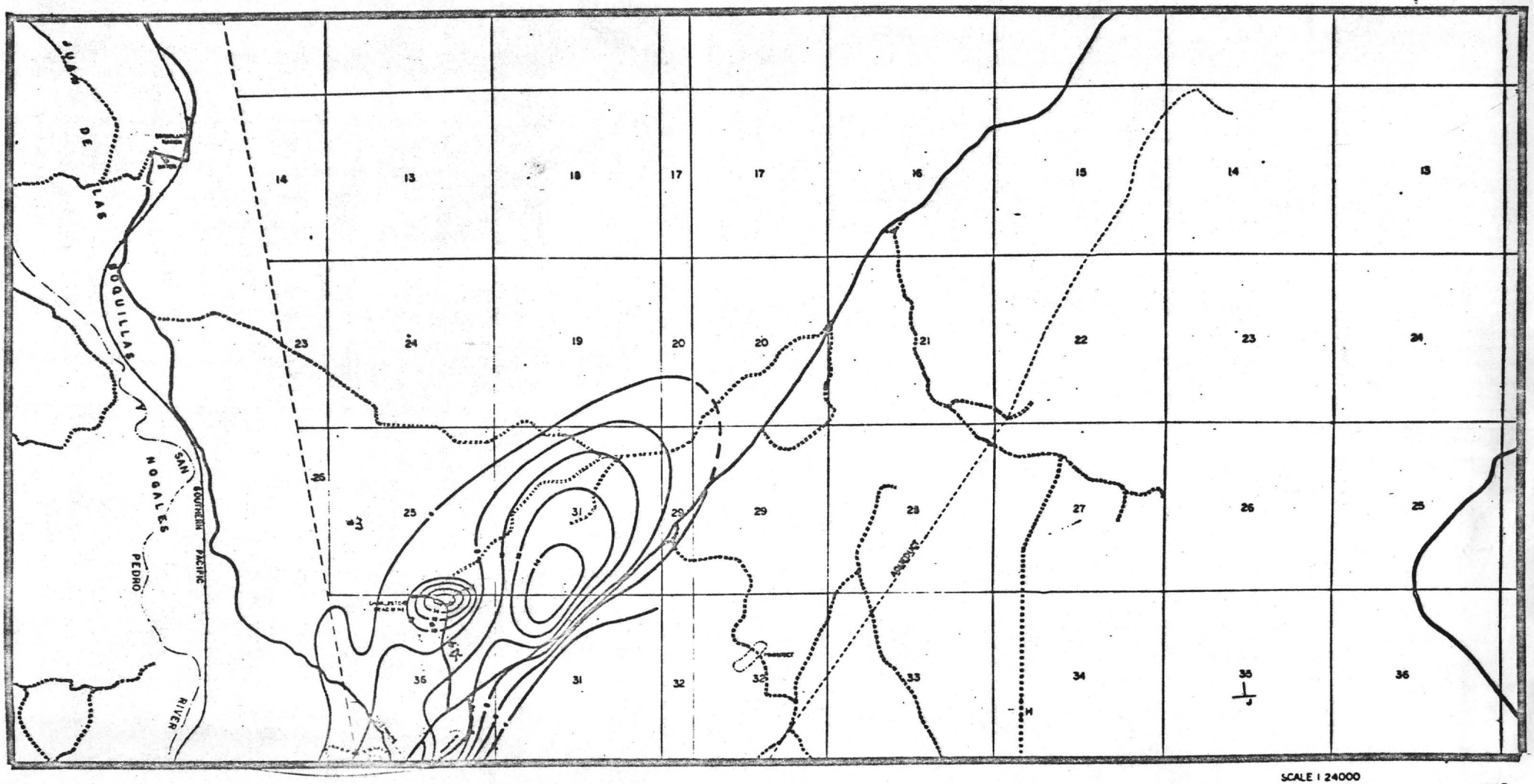
The strong I. P. anomaly on the 1,000 foot depth (?) map appears to be a valid anomaly as several anomalous readings are recorded. This anomaly may warrant drilling. Again it is surprising that some of the drilling was not performed in the vicinity of this anomaly, if the drilling program was based, at least in part, on the I. P. results.




TOMBSTONE – CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
"A" = 3200'
SCALE 1" = 1000'

TRUE NORTH
MAGNETIC

SCALE 1:24000




TOMBSTONE – CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
SCALE 1" = 2000'
SCALE 1" = 1000'

TRUE NORTH
MAGNETIC

SCALE 1 24000
1 MILE

4-4

MS. Horne (S18-70)

May 18, 1970

Mr. Loyd A. Hewitt
Hewitt Enterprises
R. D. 1 - Box 978A
Sandy, Utah 84070

Dear Loyd:

We have received assay reports for April 3, April 13, April 15, April 27 and April 29 from American Analytical and Research Laboratories in Tucson. We have no way of identifying these reports. Therefore, as received they are meaningless to us.

It is quite important that we be supplied promptly all geophysical data and that it be properly identified so that it is meaningful. The cooperation of you and your staff in this respect would be very much appreciated.

Very truly yours,

M. S. Horne

MSH:ef

7/25/74

Mr. Cosgrove:

Should this be followed up anymore?

eunice

No file

5/14/70

CAC

Are these for Montezuma -- or where should they be filed?

eunice

I wish I knew we need copy

CAC?

3226 East 46th Street

Phone 624-0049

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE April 15, 1970

| SAMPLE MARKED | GOLD OZ / TON | SILVER OZ / TON | PER CENT COPPER | PERCENT LEAD | PERCENT ZINC | PERCENT MOLYBDENUM | PERCENT IRON | |
|---|---|---|---|---|---|---|---|---|
| # 2 | .008 | 0.23 | 0.07 | | | | | |

RECEIVED

MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

REGISTERED ASSAYER
CERTIFICATE NO. 6852
PETE S. SCORSO
Date Signed 4/15/70
Arizona U. S. A.

CHARGES $ 5.25

ASSAYER - CHEMIST

3226 East 46th Street

Phone 624-0049

114

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE April 3, 1970

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | COPPER | PERCENT LEAD | ZINC | PERCENT MOLYBDENUM | PERCENT IRON | |
|---|---|---|---|---|---|---|---|---|
| PL-16 | | | 59 | | 47 | 5 | | |
| PL-17 | | | 55 | | 71 | 10 | | |
| PL-18 | | | 35 | | 88 | 7 | | |
| PL-19 | | | 26 | | 69 | 12 | | |
| PL-20 | | | 35 | | 49 | 10 | | |
| PL-21 | | | 41 | | 45 | 3 | | |

RECEIVED

MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

4/3/70

CHARGES $ 27.00

ASSAYER-CHEMIST

3226 East 46th Street

Phone 624-0049

115

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE April 3, 1970

| SAMPLE MARKED | PPM GOLD | PPM SILVER | PPM COPPER | PERCENT LEAD | PPM ZINC | PERCENT MOLYBDENUM | PERCENT IRON | |
|---|---|---|---|---|---|---|---|---|
| S-1 | | 4.0 | 34 | | 18 | 13 | | |
| S-2 | | 5.0 | 41 | | 16 | 5 | | |
| S-3 | | 3.5 | 15 | | 22 | 5 | | |
| S-4 | | 3.0 | 29 | | 16 | 4 | | |
| S-5 | | 1.5 | 30 | | 13 | 10 | | |
| S-6 | | 4.0 | 18 | | 13 | 5 | | |
| S-7 | | 2.5 | 25 | | 10 | 4 | | |
| S-8 | | 3.5 | 32 | | 14 | 3 | | |
| S-9 | | 5.0 | 30 | | 14 | 6 | | |

RECEIVED

MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

REGISTERED ASSAYER
CERTIFICATE NO. 6882
PEDRO S. FLORES
Tucson Arizona U.S.A.

4/3/70

CHARGES $ 54.00

ASSAYER-CHEMIST

East 10th Street

116

Phone 624-0049

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE April 3, 1970

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PPM [redacted] COPPER | PERCENT LEAD | PPM [redacted] ZINC | PPM [redacted] MOLYBDENUM | PERCENT IRON |
|---|---|---|---|---|---|---|---|
| 16 | | | 32 | | 28 | 18 | |
| 17 | | | 46 | | 18 | 5 | |
| 18 | | | 39 | | 19 | 5 | |
| 19 | | | 25 | | 24 | 3 | |
| 20 | | | 26 | | 15 | 2 | |
| 21 | | | 20 | | 24 | 2 | |
| 22 | | | 43 | | 35 | 2 | |
| 23 | | | 37 | | 14 | 1 | |
| 24 | | | 38 | | 16 | 1 | |
| 25 | | | 34 | | 16 | 2 | |
| 26 | | | 35 | | 13 | 2 | |
| 27 | | | 20 | | 32 | 2 | |
| 28 | | | 34 | | 17 | -1 | |
| 29 | | | 32 | | 14 | 1 | |
| 30 | | | 41 | | 15 | 4 | |

RECEIVED

MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

4/30/70

CHARGES $ 67.50

ASSAYER - CHEMIST

3226 East 46th Street

Phone 624-0049

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprise

DATE April 13, 1970

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PPM ~~XXXXXX~~ COPPER | PERCENT LEAD | PPM ~~XXXXXX~~ ZINC | PPM ~~XXXXXX~~ MOLYBDENUM | PERCENT IRON | |
|---|---|---|---|---|---|---|---|---|
| | | | 39 | | 20 | 5 | | |

RECEIVED

MAY 12 1970

JAMES STEWART CO.

PHOENIX, ARIZONA

4/13/70

CHARGES $ 4.50

ASSAYER - CHEMIST

3226 East 46th Street

Phone 624-0049

118

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 85713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE April 27, 1970

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PER CENT COPPER | PERCENT LEAD | PERCENT ZINC | PERCENT MOLYBDENUM | PERCENT IRON | Percent Ni |
|---|---|---|---|---|---|---|---|---|
| D 1-398 | Nil | 0.02 | 0.03 | | | | | .004 |

RECEIVED

MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

REGISTERED ASSAYER
SERIAL NO. 5352
PETE S. FLORES
Date Signed 4/27/70
Arizona U.S.A.

CHARGES $ 6.25

ASSAYER-CHEMIST

3226 East 46th Street

Pho 11-0049

119

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS - CHEMISTS - METALLURGISTS

TUCSON, ARIZONA 713

SAMPLE SUBMITTED BY Hewitt Enterprises

DATE Apr. 2 1970

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PER CENT COPPER | PERCENT LEAD | PERCENT ZINC | PPM MOLYBDENUM | PERCENT IRON |
|---|---|---|---|---|---|---|---|
| 385 | Trace | 0.12 | 0.06 | 0.06 | | 5 | |
| 417 | Trace | 0.11 | 0.06 | 0.08 | | 3 | |
| 463 | Trace | 0.13 | 0.07 | 0.08 | | 9 | |

RECEIVED

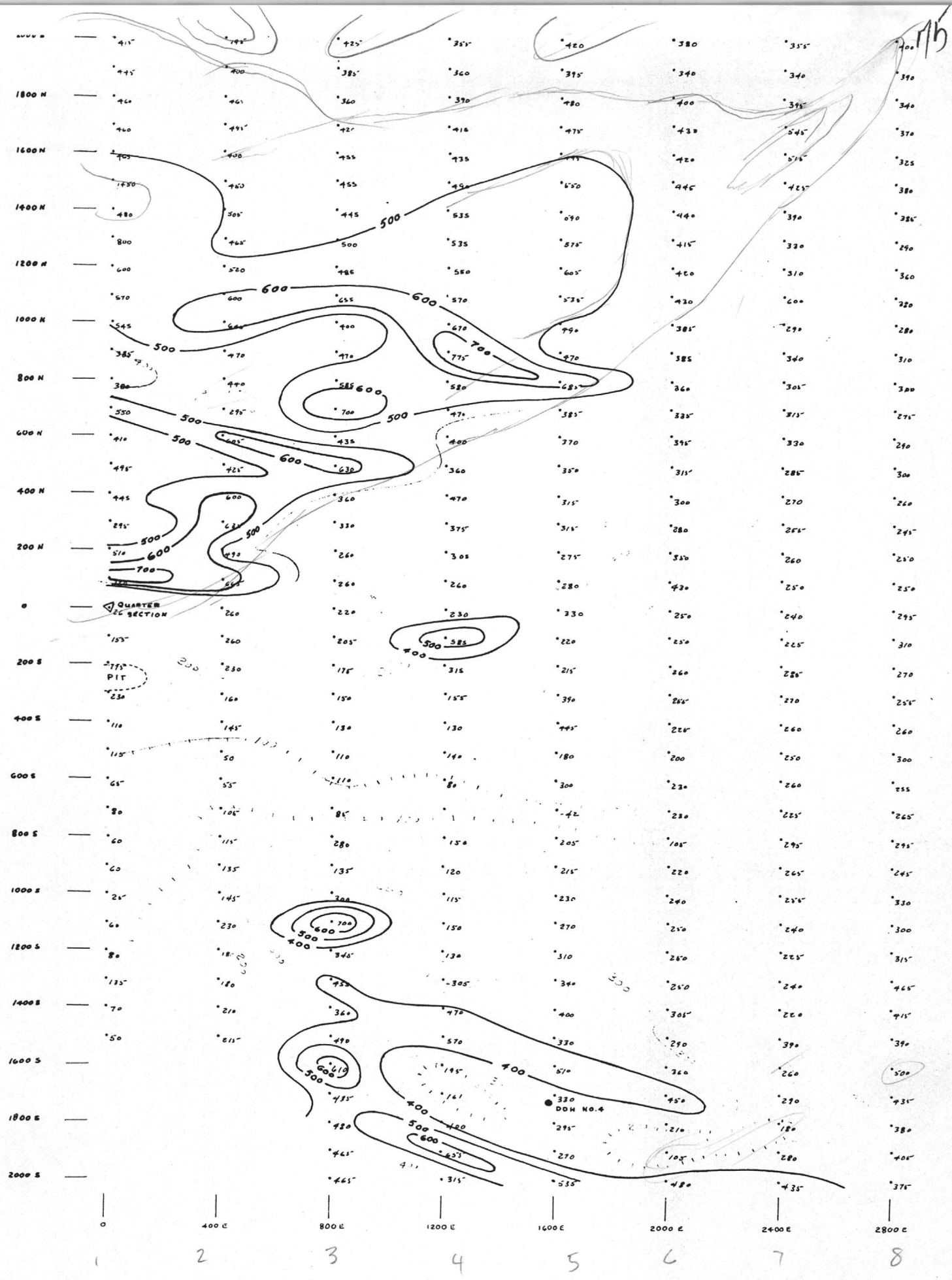
MAY 12 1970

JAMES STEWART COMPANY
PHOENIX, ARIZONA

4/29/70

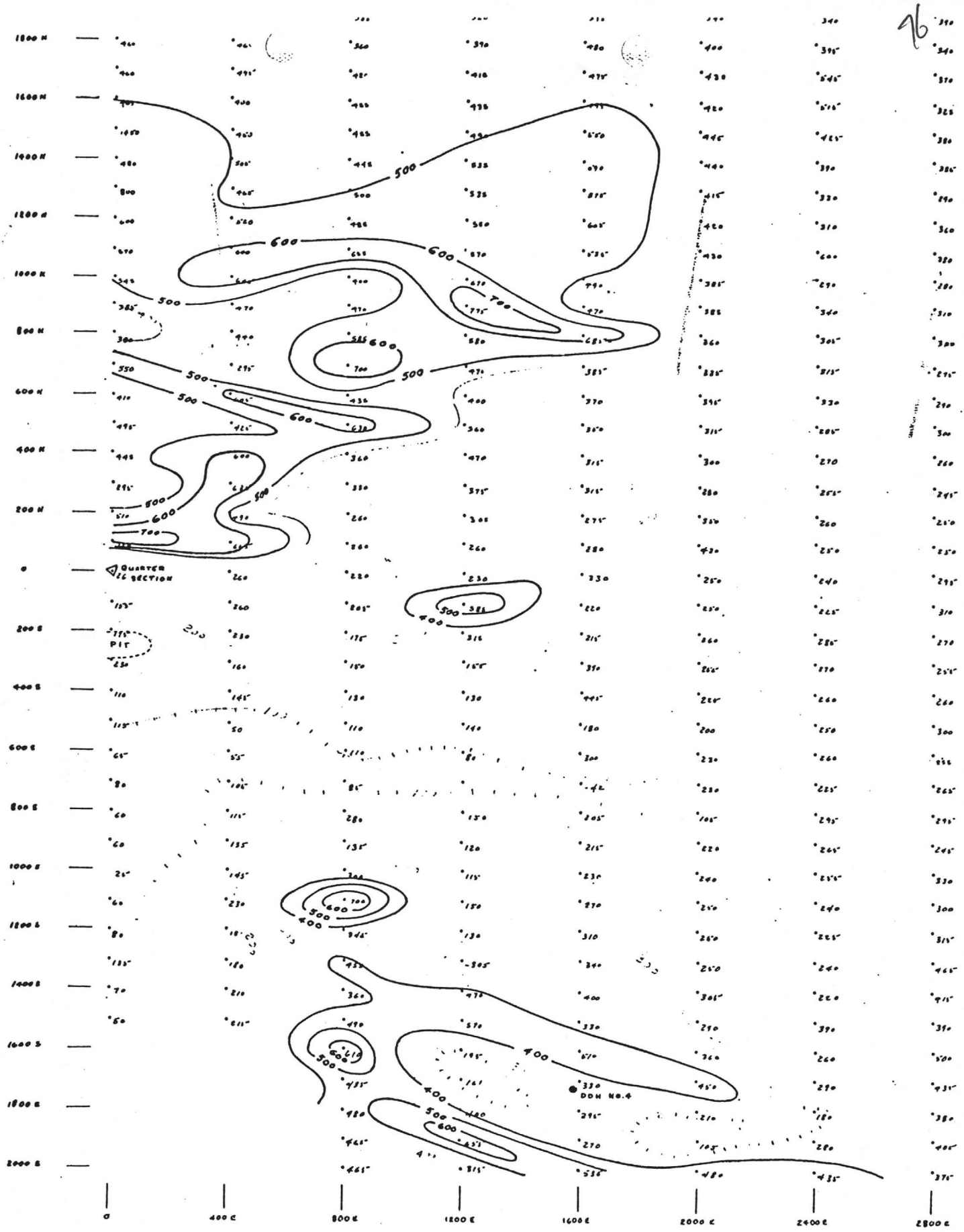
CHARGES $ 28.50

ASSAYER-CHEMIST



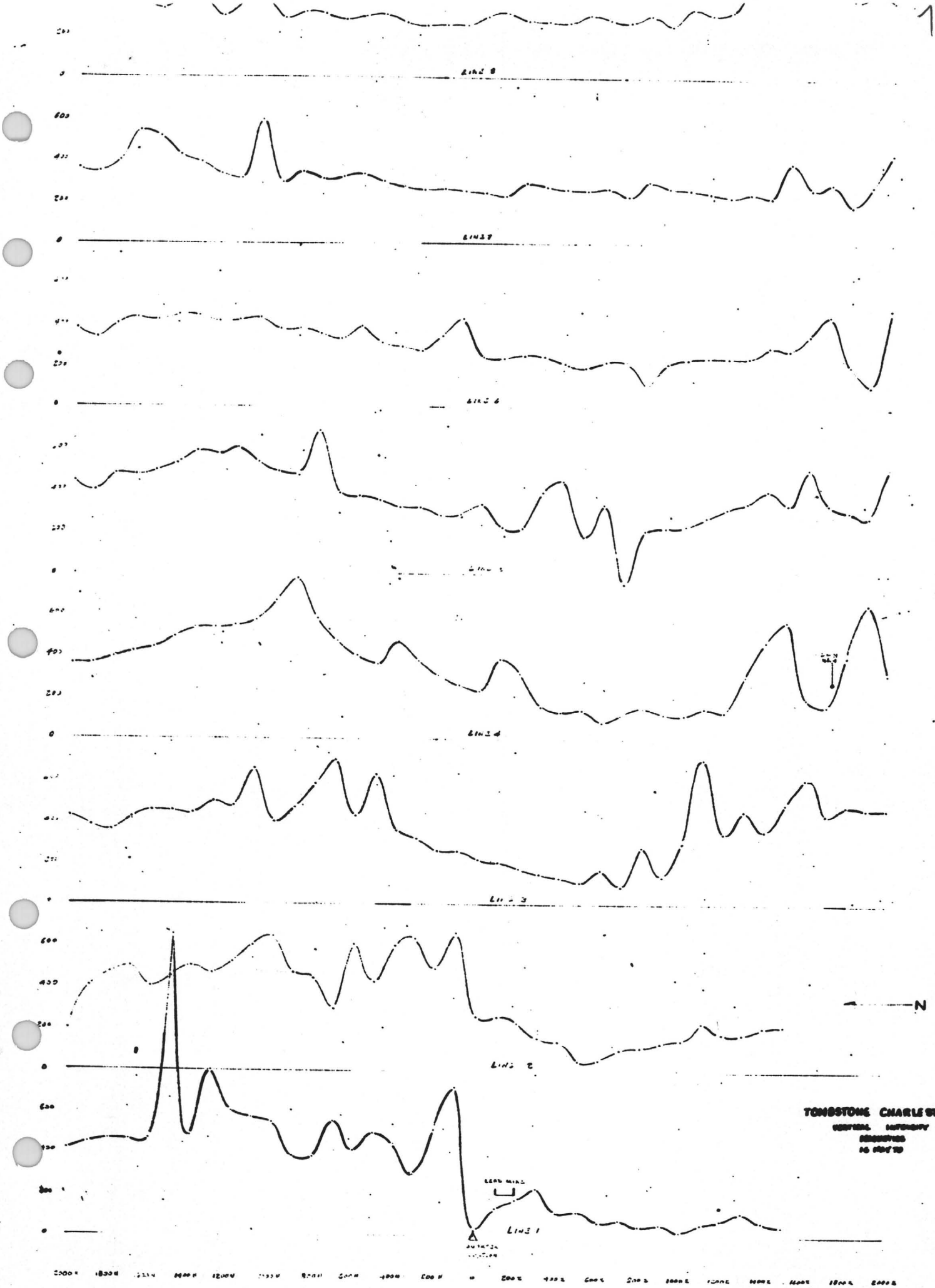

TOMBSTONE CHARLESTON

VERTICAL INTENSITY
MAGNETICS
16 MAY 70




TOMBSTONE CHARLESTON

VERTICAL INTENSITY
MAGNETICS
16 MAY 70


LINE 8
LINE 7
LINE 6
LINE 5
LINE 4
LINE 3
LINE 2
LINE 1
N
TOMBSTONE CHARLESTON.
LEAD WIRE

Loyd A. Hewitt (8-10-70)

Hewitt Enterprises 12415 South 960 East Draper, Utah 84020 801 571-1911 Off. 801 571-0157 Res.

124

# THE CHARLESTON MINE PROJECT
## DATA COMPELATION
## REPORT

August 10, 1970

The Charleston Mine area lies approximately six miles south west of Tombstone, Arizona. The property is reached by the Charleston highway.

In the Charleston Mine area a large zone of mineralization has been discovered. The zone appears to be at least two miles long and 3/4 mile wide. The estimated size of this zone of mineralization is based primarily on deep induced polarization prospecting. Three preliminary drill holes have tested this zone in the immediate vicinity of the old Charleston Lead Mine. All three holes have encountered ore grade mineralization of copper, lead, zinc and silver. These three holes have, in part, covered only a small area within the mineralized zone. A fourth hole, drilled off the mineralized zone, encountered very little mineralization.

The exploration done, to this date on the mineralized zone, suggests an economic mineral deposit to be present. The nature of the ore indicates the operation would be underground, generally along bedding planes. This, ofcourse, is only conjecture needing much better information for a basis of evaluation.

Since a large zone of mineralization appears to exis it is a good possibility that the Charleston deposits are related to a mineralized intrusive monzonite porphyry similar to those of Bisbee, Mission, San Manuel, and others near by.

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In conjunction with the deep mineralization found, the old Charleston Lead Mine itself should not be overlooked. The mineralization in the old Charleston Lead Mine appears to be unrelated to the deeper material. However, this may be due to a time factor and a long series of mineralization periods. The old Charleston Lead Mine may, at depths, contain sufficient reserves of Pb, Zn, Ag, and sericite to be of economic importance.

Further drilling of the mineralized zone is suggested, both to test the ore in the wide spaced holes 1, 2, and 4, and the general area. The drilling is by far the most important next step in exploration.

## CLAIMS AREA

For the most part, the zone of mineralization is covered by mineral mining claims and state mineral leases. These properties are controlled by Horne Enterprises, 3033 North Central Avenue, Phoenix, Arizona.

## GEOPHYSICS

Three phases of geophysical exploration were conducted in the Charleston area. Preliminary airborne magnetics covered the general area of interest. This was followed by very broad selected geochemical sampling and then induced polarization plus a small amount of ground magnetics.

## AIRBORNE MAGNETICS

The general area covered by the magnetic survey is underlain by outcrops of different rock groups, which have a significant susceptibility difference. At the Schieffelin monument and

126

in the area surrounding, the Schieffelin granodiorite is exposed. Rock samples of this material are fairly magnetic. At the lower end of the Boquillas Land grant, on both sides of the San Pedro River, granodiorite similar to that at the Schieffelin monument is observed. Although in the Boquillas area the rock may be closer to monzonite and is more magnetic. North of the Charleston Mine many outcrops of the Uncle Sam porphyry are observed. This porphyry seems to be andesitic and is surprisingly non-magnetic. Southeast of the Charleston Mine and vicinity, rock outcrops are principally undifferentiated gray and white tuffs with sills and dikes of magnetic andesites and other basic flows. The tuffs are non-magnetic.

From the airborne magnetics the entire Tombstone district appears to be underlain by Schieffelin granodiorite. In most cases this intrusive lies at depths less than 1,000 feet. The intrusive lies as far westward as Section 39, Twp 20 S, R 22 E. A similar intrusive underlies the San Pedro River valley west of the surveyed area. Regional magnetics suggest the San Pedro River intrusive to be far larger in size than the Schieffelin granodiorite.

Between these intrusives lies the Charleston basin. Magnetically the rocks in this basin all appear to be similar. However, the surface geology suggests otherwise. With the abundance of magnetic andesite dikes and sills in the tuffaceous flows it would seem, if the vertical extent of this section were great, there would be some aggregate magnetic effect. Since this is not the case, two choices are possible: the tuffs are underlain at reasonably shallow depths by non-magnetic Uncle Sam porphyry or sediments. Our original interpretation was that sedimentary rocks

underlie the tuffs. This is borne out in drill holes 1, 2 & 4.

The Uncle Sam porphyry is found to be surprisingly uniform magnetically, almost as if it were a sediment rather than an intrusive sill or extrusive flow. This porphyry seems to have very little relationship to other igneous rocks in the area.

## SURFACE MAGNETICS

Some of the igneous dikes, especially the andesite porphyries in drill holes 2 and 4, are altered and mineralized. Also they are fairly magnetic. Some surface profiles in the vicinity of the Charleston Mine indicate the possibility of an intrusive dike striking northeastward and paralleling the interpreted major mineralization zone along its north side. The significance of a porphyry mass in this area is not yet known. Additional information from further drilling will undoubtedly shed some light here.

## SURFACE GEOLOGY

In the Charleston basin six geologic units may be observed.

1. Schieffelin granodiorite
2. Uncle Sam porphyry
3. Purple volcanics
4. White volcanic tuffs
5. Green to gray volcanics
6. Recent gravels and soils

1. The Schieffelin granodiorite mass underlying the Tombstone district and the San Pedro River valley is thought by this writer to be older than any of the other units observed, except for the cretaceous Bisbee formation. In the San Pedro River valley

the contacts with the volcanic series show the granodiorite to be much weathered before the deposition of the volcanics. It is believed this unit to be older than the volcanics or the Uncle Sam porphyry.

2. The Uncle Sam porphyry is reported to be of Miocene age and, as stated before, the true nature and age of this unit is not known. It is reported that this unit intrudes the white tuffaceous volcanics but this age relationship is doubted. The porphyry covers a large area to the north of Charleston.

3. The purple volcanics vary from purple tuffs to brown argillites and includes agglomerates with some porphyry fragments. In places these rocks appear to have intruded the white tuffs.

4. White volcanic tuffs cover a large portion of the mine area and southwestward. The rock appears to be bleached and altered along shear zones which strike N 45° E. The rock is very hard and a great amount of silica has been introduced.

5. The green to gray volcanics appear much the same as the purple volcanics and are very similar in mineral composition. They are probably the same unit with insufficient iron for a reddish or purple appearance.

## SURFACE MINERALOGY

Numerous shears are noted in a zone one and a half miles wide and striking N 45° E, through the Charleston basin. These shears vary from bleached zones with kaolin and sericite to quartz manganese veins. Parallel to the Charleston highway is a shear zone nearly five miles long and 300 feet wide. This zone has much bleaching by hydrothermal solutions and numerous veinlets of

limonite after pyrite. In most places this zone carries very minor traces of copper, with the exception of the southwest end. On the southwest end of this zone quartz veins with minor copper silicates are present.

Near the central part of the suggested Charleston mineralized area, numerous quartz manganese veins are observed. These veins contain larger amounts of copper than the shear zones.

On the north edge of the outlined mineralized zone the Charleston Mine occupies a shear zone in the volcanics. The shear is noted by considerable sericite alteration containing galena, sphalerite and pyrite. This zone appears to be the only one in any way related to the deep mineralization, and that is questionable.

The only relationship of the surface mineralization to the deeper sulphides is that secondary hydrothermal solution from recent or post mineral faulting may have carried minor amounts of mineral through the overlying volcanics. This in part is the reason for giving emphasis to the deeper sulphide zone.

## SURFACE GEOCHEMISTRY

In the Charleston basin numerous veins, shears, and altered zones are noted. The great majority of these zones strike N 45° E. As mentioned earlier, three types of mineralized shears are noted. It was felt that these zones, even though they appear to be post mineral, may contain secondary deposition of minerals, especially the quartz manganese veins. Rock sample tests of the three groups indicate anomalous amounts of copper, zinc, and silver in the quartz manganese veins. The mineralized shears with kaolin, limonite, and

bleaching contained the smallest amounts of these elements, only slightly above the fresher volcanic tuffs. These samples though inconclusive do aid in encouraging the possibility of ore mineralization in the underlying subsurface, outlined by the induced polarization.

## INDUCED POLARIZATION

Initial tests made on the Charleston basin, using a Wenner configuration with a 1,000 foot electrode spread, indicated nothing of a polarizing nature at depths less than 1,000 feet. Later tests, using this same configuration, suggest that a shallow zone of mineralization exists in the eastern part of the area, Section 30, Twp 20 S, R 22 E. The depth to this zone is estimated to be approximately 185 feet.

With a modified 2 array (note fig. 1) electrode configuration, depth spacings of 3200 feet were attainable. This consisted of placing one current electrode at electrical infinity and the other at the depth station. A reference potential electrode was placed in the direction of the moving potential electrode at 6400 feet from the current energizing electrode. Resistivity and IP readings were made, out from the current electrode, between the reference pot and the moving potential electrode.

Expanders were made in four quadrants, in most cases, depending on accessibility. By doing a sufficient number of these expanders, data was deemed dense enough to contour. Data values were plotted half way between the current electrode and the moving potential electrode for any given depth separation. For example, the IP value would be 10 milliseconds at 1600 feet from the

current center. This value was thus plotted at 800 feet in the direction of the reference pot. The data points were then contoured. Note that contours for 2000 and 3000 feet separations are enclosed. The 2000 and 3000 foot contour maps are from data using the modified 2 array configuration. The 1000 foot electrode separation contour map is based on data from Wenner array traverses as mentioned before. Several typical depth curves are enclosed.

Measurements were made using D.C. power-pulses of 4 seconds at 5 to 6 kw. A .35 second delay was used before an IP integration of 0.8 seconds took place. The D.C. pulse system is repetitious for several cycles to give a good repeatable impressed EMF and IP value. The Hewitt Enterprises system is comparable with the Newmont or Huntex methods.

The induced polarization results indicate that a buried polarizer lies beneath the volcanic cover in the Charleston area. The zone appears to be elongated in a northeast southwest direction, striking approximately N 45° E. It appears that this polarization represents sulphide mineralization, having a width of 3000 feet minimum and at least 2 miles in strike length. An average depth to sulphides is estimated at 1000 feet below the surface. From the results of DD#4 it appears that an average total sulphide percentage for the whole mineralized zone may be approximately 3%.

## GEOLOGIC SECTION

The enclosed geologic section is based on drill holes 1, 2, 3, and 4. The principle rocks of the section are post mineral Bronco volcanics, the Bisbee formation sediments and the Uncle Sam porphyry. The contact between the post mineral volcanics and the

underlying sediments is noticeably a basal conglomerate. The Bisbee formation in this area consists of bands of quartzites, arkose, redbeds, argillites and silicified limestones. It is most difficult, if not impossible, to find a marker bed which is identifiable across any two drill holes. The section interpretation is based primarily on the predominance of redbeds or quartzite.

## MINERALIZATION

Ore mineralization encountered in the drilling consists of, in order of importance, sphalerite, chalcopyrite, galena, and silver. The mineralization is generally associated with the more arkosic sections of the Bisbee formation. However, in many places mineralization occurs in an andesitic porphyry which seems to be abundant as narrow dikes and sills within the Bisbee formation. The stronger ore sections show considerable sericite and quartz alteration.

Mineralization appears to be disseminated along bedding in most cases, although sections of massive sulphide may form veins.

From the polished sections data enclosed in this report, it appears that several phases of mineralization occurred in this deposit. Pyrite and quartz seem to be the predominant minerals in several of these stages. The polished sample studies suggest the galena and sphalerite are closely associated. The chalcopyrite and silver also appear to be closely related. Since several stages of mineralization seem to be present in the deposit, economic importance may be considerably enhanced.

133

## CONCLUSIONS

Several sections of mineable ore have been encountered in the drilling to date. The reader is referred to the enclosed assay summaries and drill hole logs for an evaluation of the drilling results. Even though many sections of ore grade material were encountered, it is difficult to relate ore in one hole to the next, because of the wide spaced drilling. However, sufficient mineralization has been found to warrant both the use of definitive drilling on shorter hole spacings and general exploration drilling.

It is important that a very minimum number of holes, within the suggested large mineralized area, have found economic mineralization. It is quite possible that this mineralization lies within the vicinity of a significant porphyry copper deposit.

The geologic environment appears to be favorable to economic mineralization. This, in conjunction with the wide zone of interpreted sulphide mineralization, encourages continued exploration and development. Those familiar with recent mineral discoveries in the southwest will realize that each of them were the result of exploration in situations such as this. We appraise this property to be worthy of a vigorous exploration program.

HEWITT ENTERPRISES

Loyd A. Hewitt

Loyd A. Hewitt

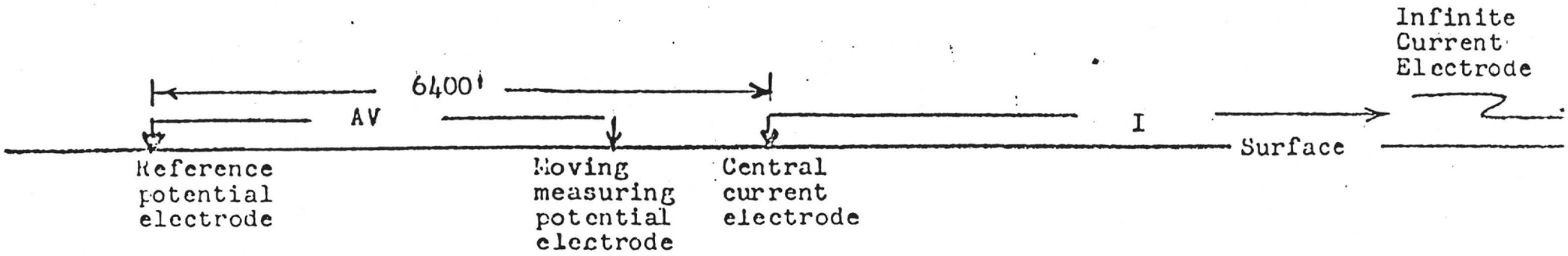
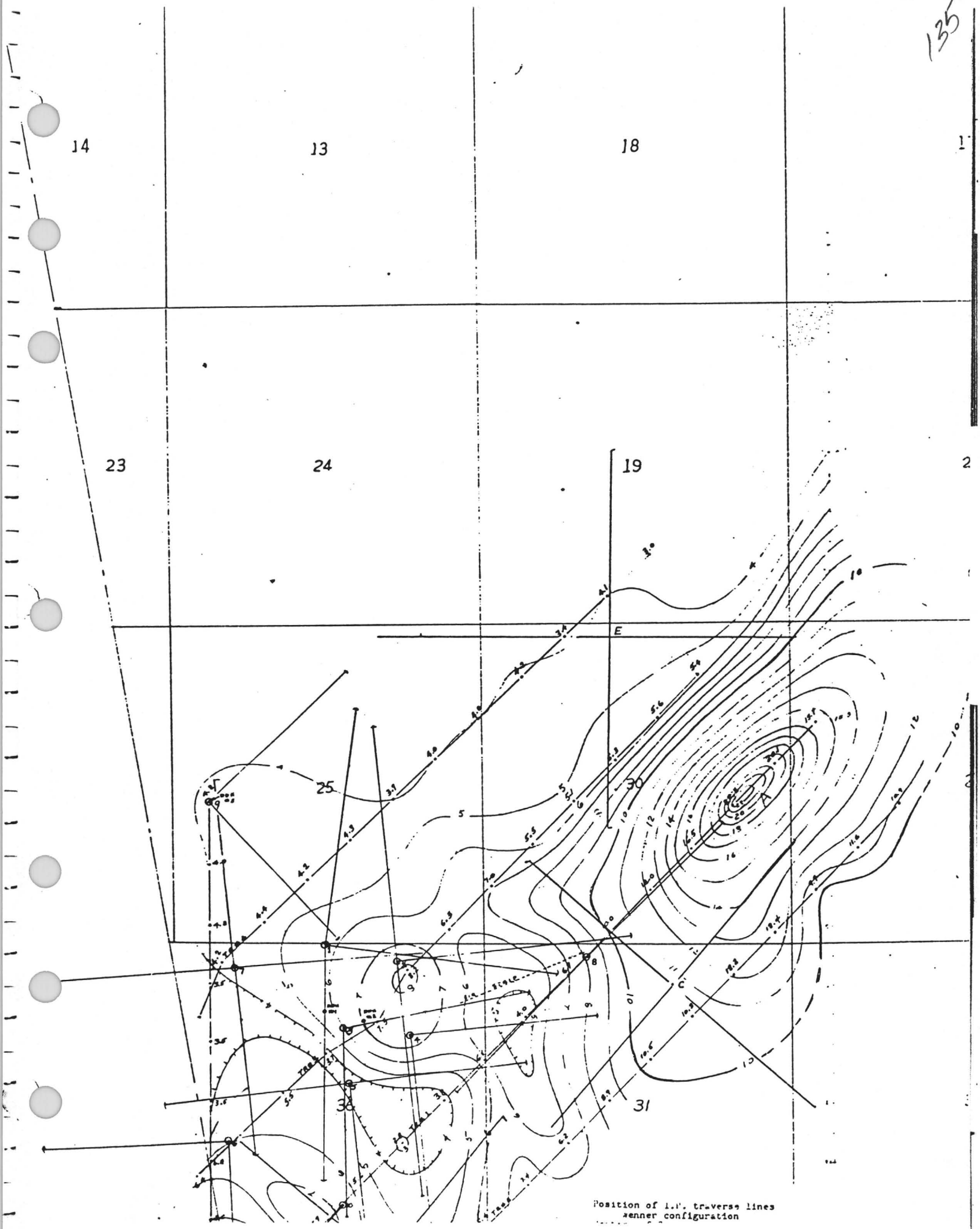
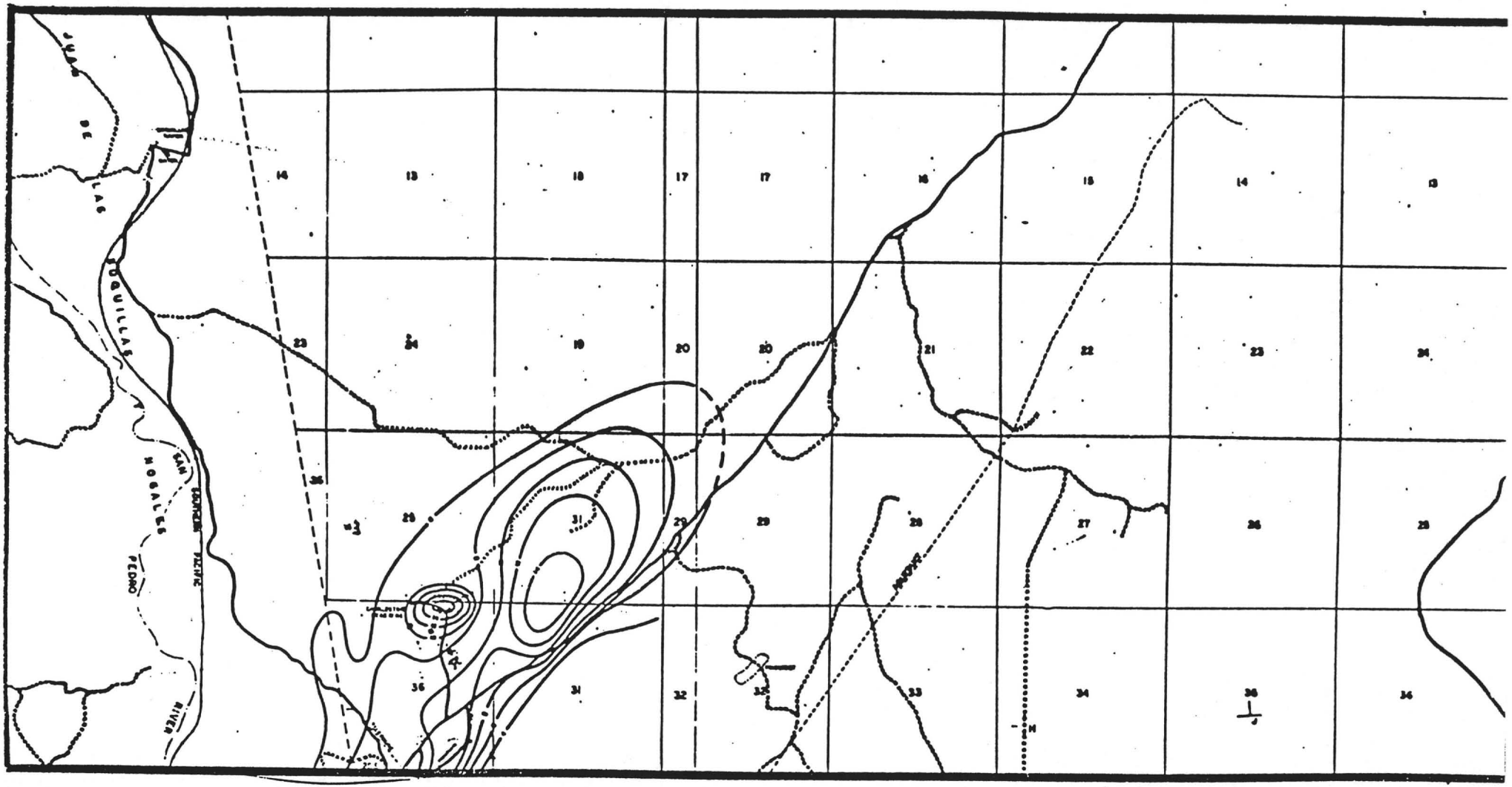


Fig. 1

Modified 2 array electrode configurati




Position of I.P. traverse lines
Jenner configuration

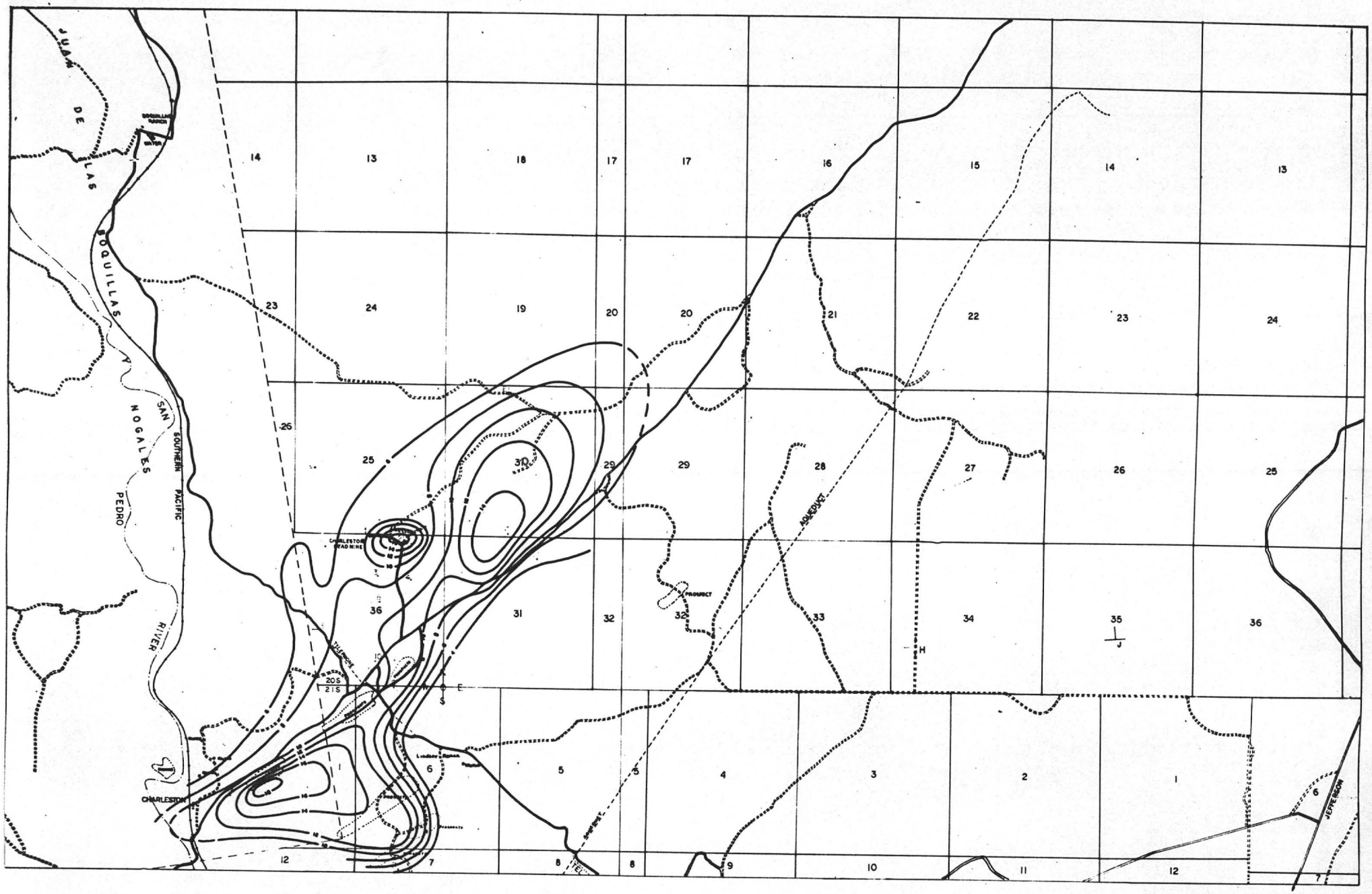



TOMBSTONE - CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
SCALE 1" = 2000'
SCALE 1" = 1000'

TRUE NORTH
MAGNETIC

SCALE 1:24000

136

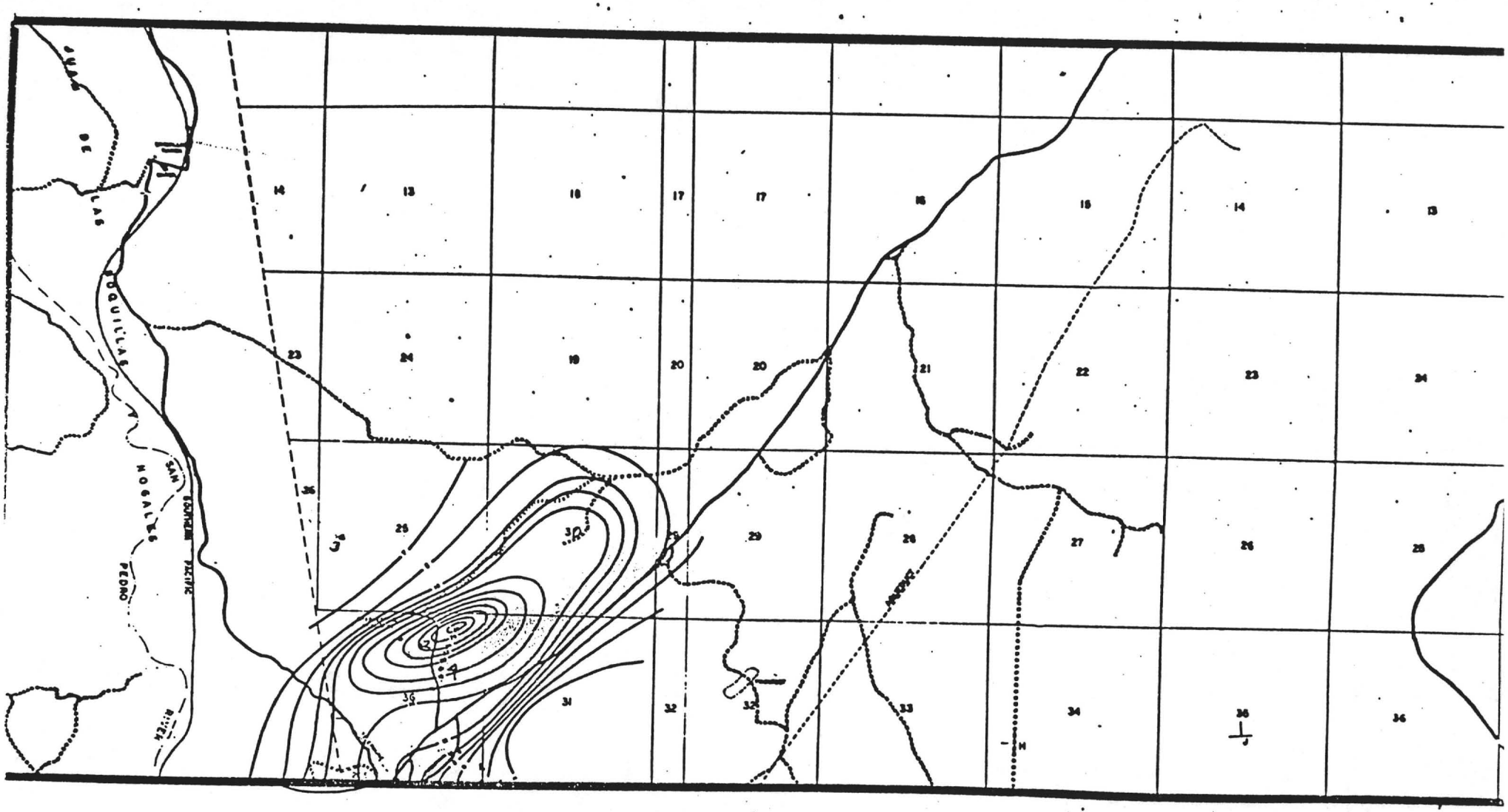



TOMBSTONE – CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
"X" = 2000'
SCALE 1" = 1000'

TRUE NORTH
13°
MAGNETIC

SCALE 1:24000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000

5


SAN PEDRO
SOUTHERN PACIFIC
MOGALLES
PEDRO
RIVER
MOUNT
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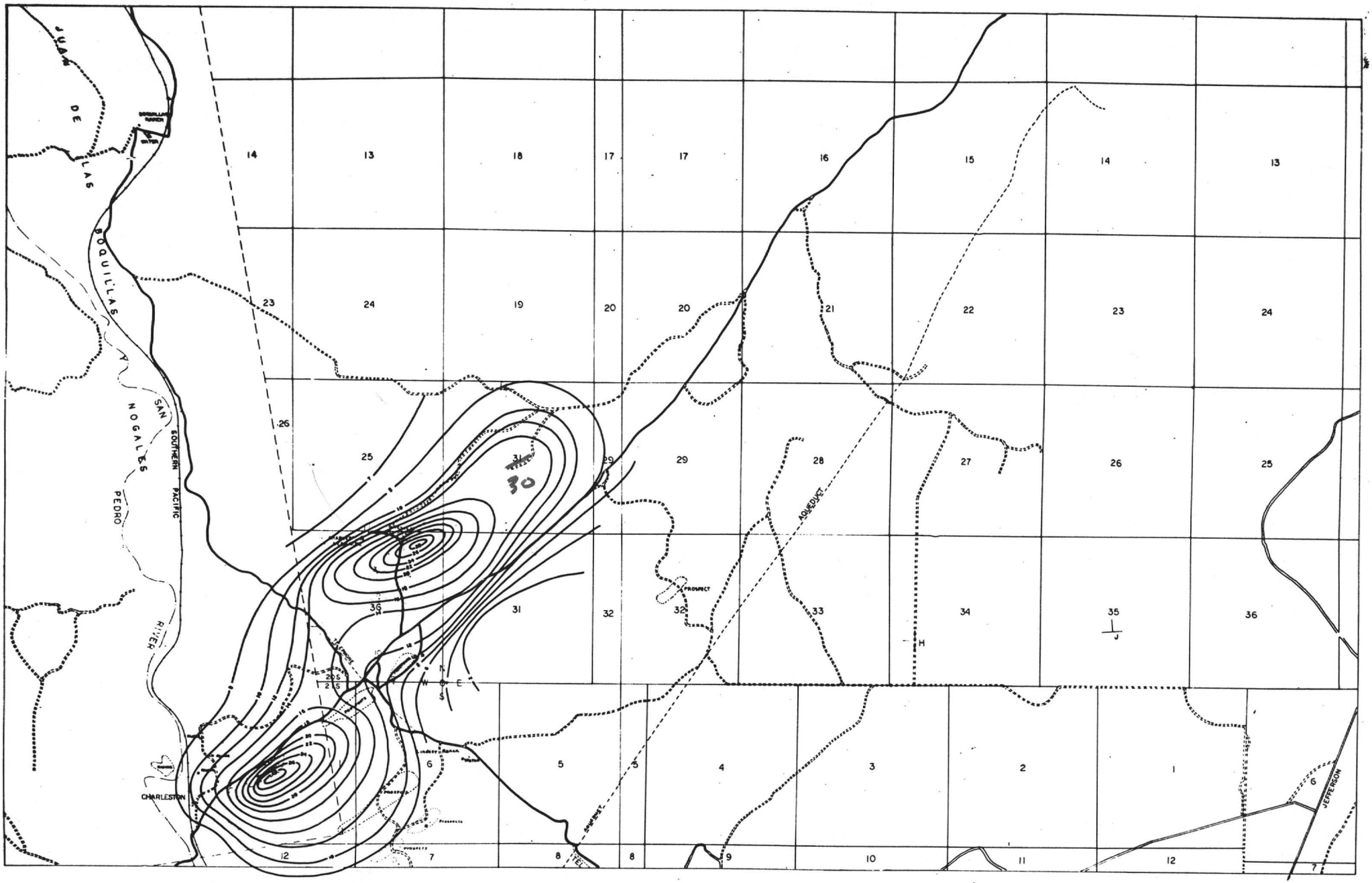
34
35
36
36
SCALE 1:24000
1 MILE
TOMBSTONE - CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
SCALE 1" = 1000'
TRUE NORTH
MAGNETIC

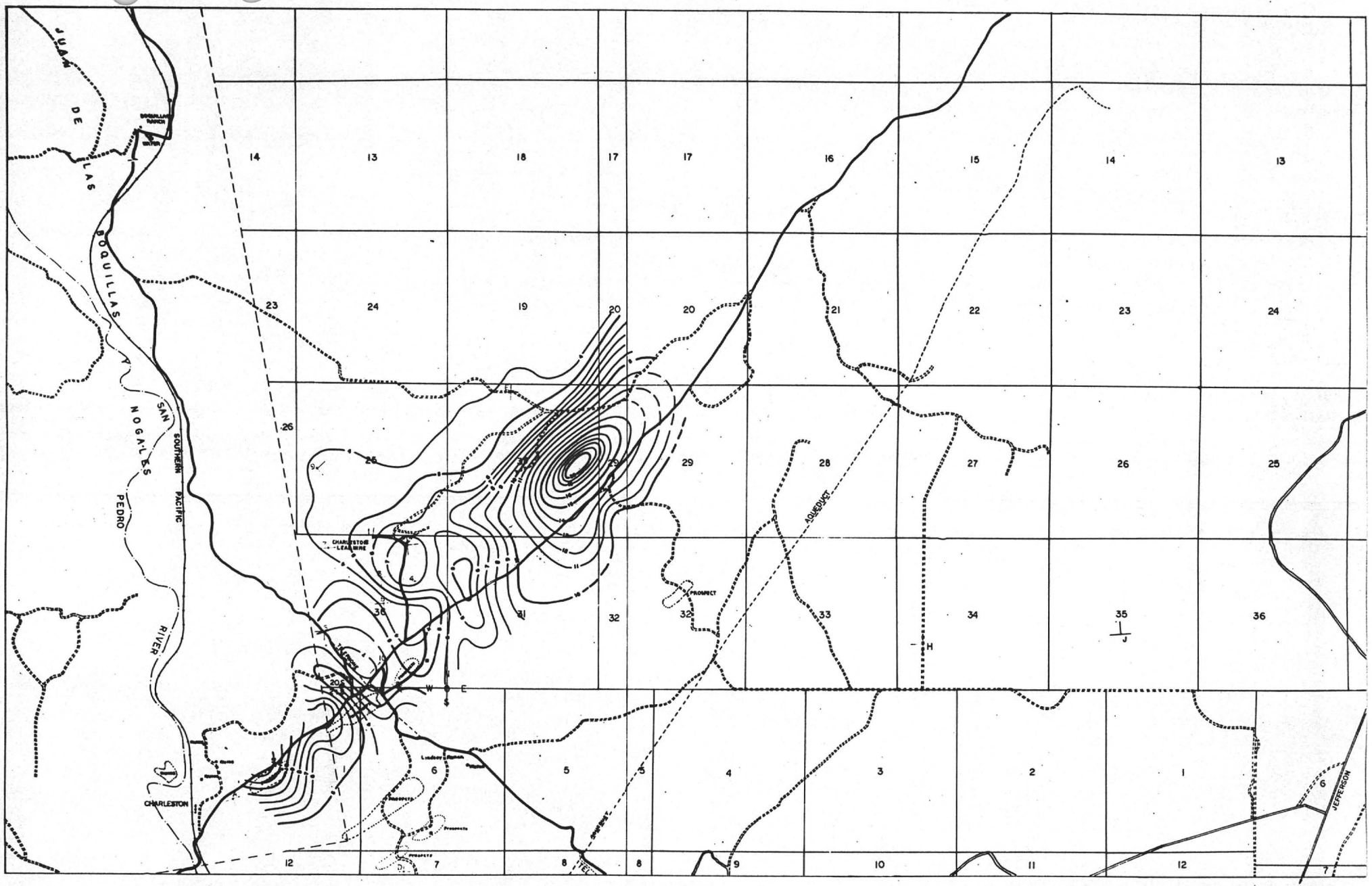
137




TOMBSTONE – CHARLESTON PROJECT
INDUCED POLARIZATION CONTOURS
"A" = 3200'
SCALE 1" = 1000'

TRUE NORTH
13°
MAGNETIC

SCALE 1:24000
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000
0




TOMBSTONE – CHARLESTON PROJECT
INDUCED POLAPIZATION CONTOURS
"A" = 1000'
SCALE 1" = 1000'

TRUE NORTH
13°
MAGNETIC

SCALE 1:24000 12,000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000

4

H. Clyde Davis (1-19-71)

A-387 ASB
Mineral Development

University Development
Brigham Young University
Provo, Utah 84601

RECEIVED
JAN 22 1971
JAMES STEWART COMPANY
PHOENIX, ARIZONA

3-4

January 19, 1971

Mr. Seth Horne
Seth Horne Development Corp.
Mayer Central Building
3033 North Central Avenue
Phoenix, Arizona 85012

Dear Seth:

Re: Telephone Conversation Pertaining to Geologic and Aero-magnetic Maps of Southern Arizona.

In talking with the University of Arizona, candidate Mr. Sumner, we can secure aero-magnetic maps and geologic maps of the same scale for approximately $850 to $900.

I will make whatever adjustments are necessary if it is less than the $900 you will be sending me.

Regards,

H. Clyde Davis
pn

H. Clyde Davis, Director
Mineral Development

HCD:pn

H. Clyde Davis (8-24-71)

I never found anything on this survey

859 East 2730 North
Provo, Utah 84601
August 24, 1971

James Stewart Company
Mayer Central Building
3033 North Central Avenue
Phoenix, Arizona 85012

Attention: Mr. C. A. Cosgrove--Geo-chemical Survey

Dear Mr. Cosgrove:

I have completed a geo-chemical survey on your mining property which is located in the NE 1/4, and E 1/2 NW 1/4 of Section 20 of Township 20 South, Range 22 East of Cochise County, Arizona.

Three lines were run known as A, B, and C with each having nine samples, as indicated on the map and the assay and contour lines on the map enclosed.

This property is located in a good geological environment and the geo-chemical survey indicates mineralized target in depth.

Sincerely,

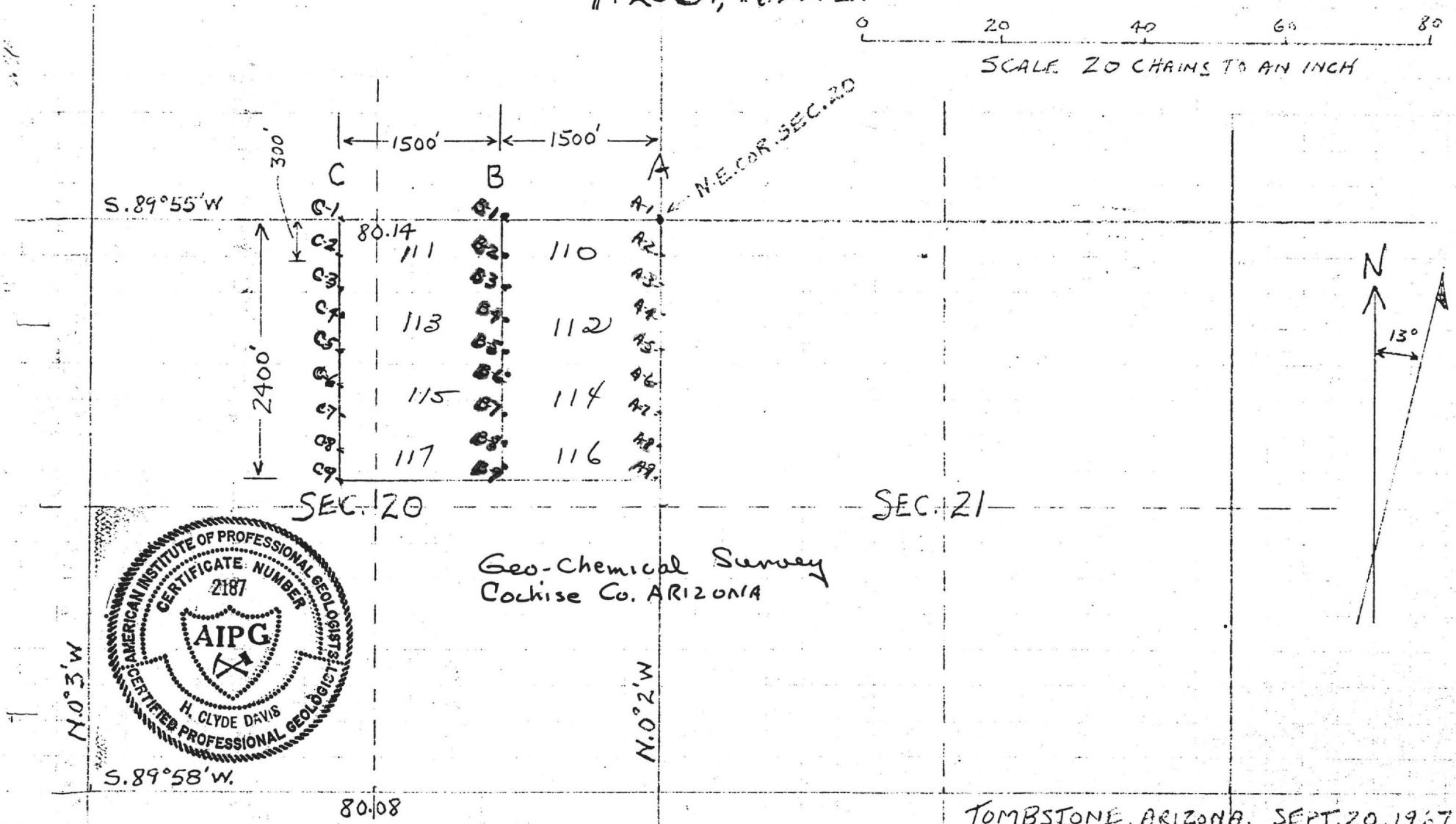
H. Clyde Davis
Consulting Geologist

HCD:pn

Enclosure

Consulting fee: $520.00
Expenses

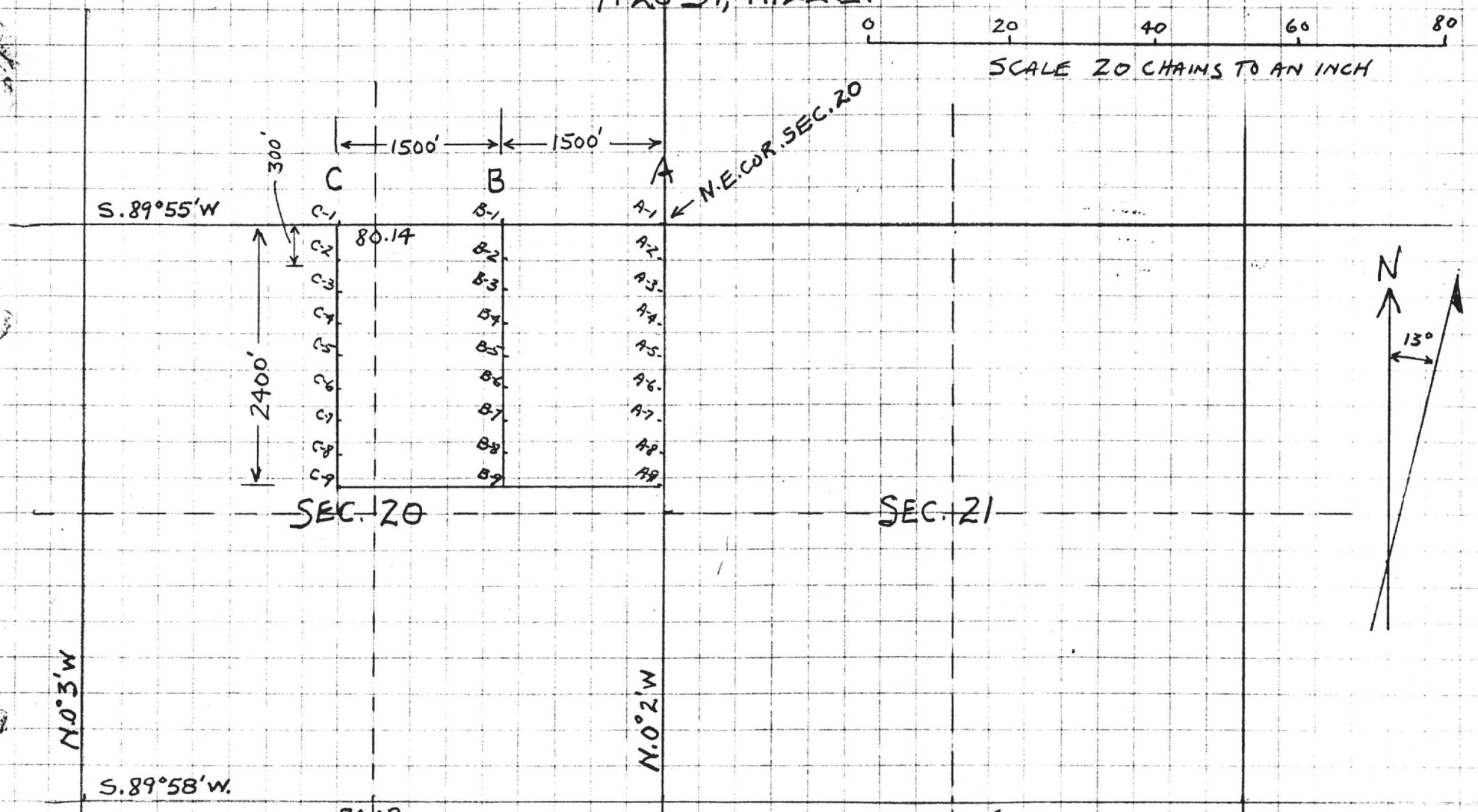
# T.20S., R.22E.




TOMBSTONE, ARIZONA. SEPT. 20, 1967

E: USING FACTORS AS ILLUSTRATED ABOVE AND STARTING AT AN INITIAL POINT BEING THE N.E. CORNER OF SEC. 20, T.20S., R.22E., GILA & SALT RIVER MERIDIAN, ARIZONA, WHICH IS MARKED BY A CAIRN OF ROCKS SURROUNDING AN OBLONG STONE, WITH THIS OBLONG STONE BEARING THREE (3) HORIZONTAL MARKS (≡) ON SOUTH FACE AND FOUR HORIZONTAL MARKS (≡) ON EAST FACE, MEASURE AND INSTALL MONUMENT MARKERS FOR CLARENCE COSGROVE ON LINES SOUTH FROM POINTS A, B & C ON THE NORTH SECTION LINE OF SEC. 20, T. 20 S., R. 22 E., AS SHOWN ON FIELD MAP ABOVE.

Charles W. Freeh

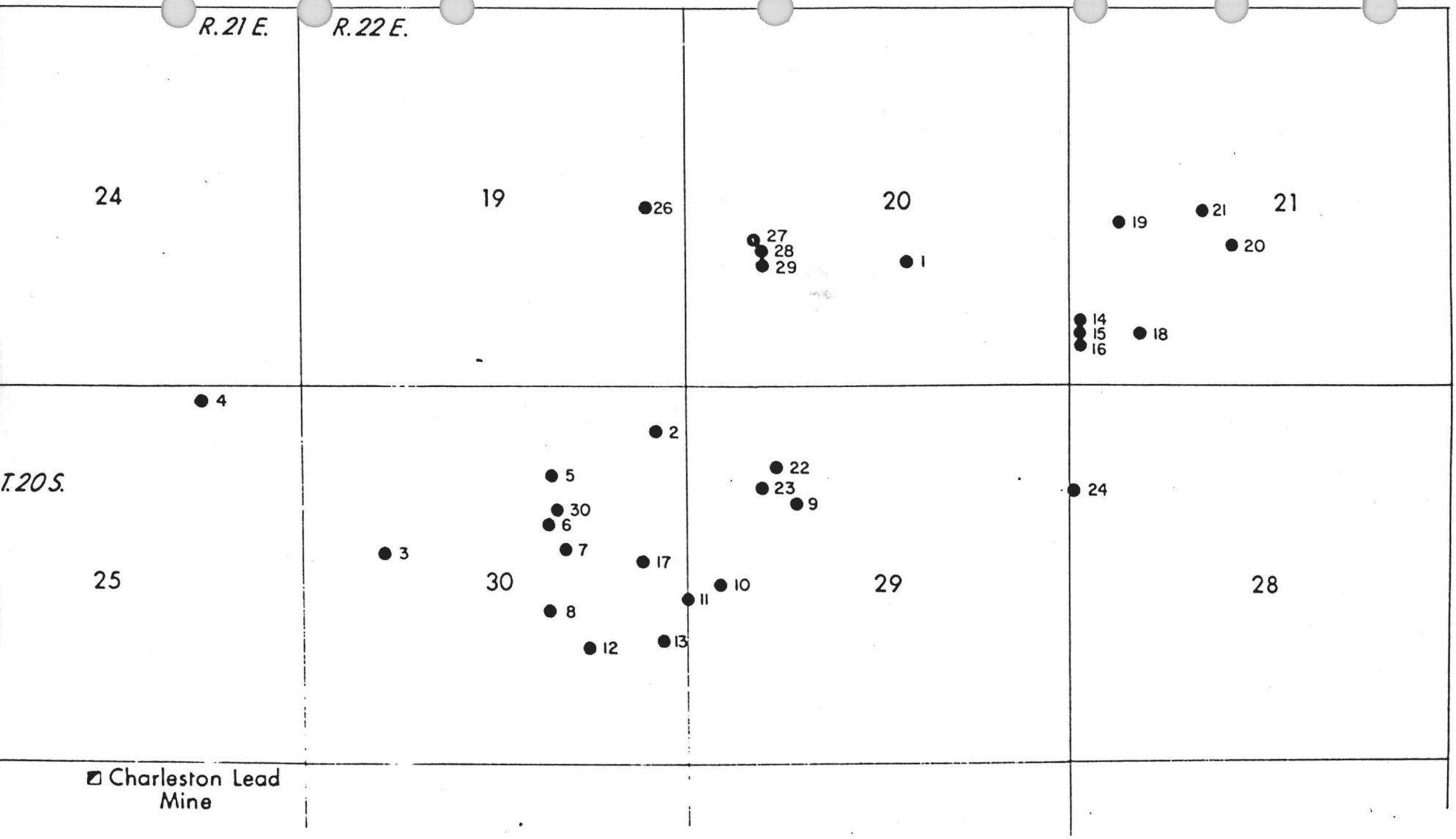



TOMBSTONE, ARIZONA. SEPT. 20, 1967

NOTE: USING FACTORS AS ILLUSTRATED ABOVE AND STARTING AT AN INITIAL POINT BEING THE N.E. CORNER OF SEC. 20, T. 20 S., R. 22 E., GILA & SALT RIVER MERIDIAN, ARIZONA, WHICH IS MARKED BY A CAIRN OF ROCKS SURROUNDING AN OBLONG STONE, WITH THIS OBLONG STONE BEARING THREE (3) HORIZONTAL MARKS (≡) ON SOUTH FACE AND FOUR HORIZONTAL MARKS (≡) ON EAST FACE, MEASURE AND INSTALL MONUMENT MARKERS FOR CLARENCE COSGROVE ON LINES SOUTH FROM POINTS A, B & C ON THE NORTH SECTION LINE OF SEC. 20, T. 20 S., R. 22 E., AS SHOWN ON FIELD MAP ABOVE.

Charles W. Faulk

Geochem Survey (8/73)




# SAMPLE SITES
## GEOCHEMICAL OVERLAY
## CHARLESTON MINING DISTRICT
## COCHISE CO., ARIZONA

scale 1:24,000 SEPT., 1973

mn 2650a

3220 East 46th Street

Phone ~~621-0049~~ 889-5759

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS · CHEMISTS · METALLURGISTS

TUCSON, ARIZONA 85

JUL 2 1973

SAMPLE SUBMITTED BY American Smelting & Refining Co. DATE June 30, 1973

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PPM COPPER | PPM LEAD | PPM ZINC | PPM MOLYBDENUM | PERCENT IRON |
|---|---|---|---|---|---|---|---|
| TB - 1 | | | 20 | 131 | 22 | 25 | ✓ |
| TB - 2 | | | 48 | 81 | 24 | 25 | |
| TB - 3 | | | 161 | 2000+ | 71 | 33 | |
| TB - 4 | | | 14 | 183 | 8 | 40 | |
| TB - 5 | | | 68 | 724 | 666 | 53 | |
| TB - 6 | | | 23 | 96 | 17 | 20 | |
| TB - 7 | | | 46 | 44 | 34 | 17 | |
| TB - 8 | | | 41 | 40 | 18 | 16 | |
| TB - 9 | | | 14 | 66 | 8 | 32 | |
| TB -10 | | | 92 | 44 | 11 | 20 | |
| TB -11 | | | 35 | 33 | 79 | 17 | |
| TB -12 | | | 26 | 39 | 9 | 13 | |
| TB -13 | | | 19 | 65 | 61 | 17 | |
| TB -14 | | | 11 | 21 | 59 | 22 | |
| TB -15 | | | 21 | 22 | 57 | 25 | |
| TB -16 | | | 36 | 18 | 91 | 20 | |

REGISTERED ASSAYER CERTIFICATE NO. 8857 PETE G. FLORES Date Signed 6/30/73 Arizona U.S.A.

Invoice # 9411

3226 East 46th Street

Phone 624-0049

# AMERICAN ANALYTICAL and RESEARCH LABORATORIES

ASSAYERS · CHEMISTS · METALLURGISTS

TUCSON, ARIZONA 857

SAMPLE SUBMITTED BY American Smelting & Refining Company

DATE August 29, 1973

| SAMPLE MARKED | GOLD OZ./TON | SILVER OZ./TON | PPM COPPER | PPM LEAD | PPM ZINC | PPM MOLYBDENUM | PERCENT IRON | |
|---|---|---|---|---|---|---|---|---|
| TB - 17 | | | 39 | 200 | 24 | 19 | | |
| TB - 18 | | | 108 | 107 | 49 | 14 | | |
| TB - 19 | | | 26 | 42 | 25 | 13 | | |
| TB - 20 | | | 40 | 90 | 30 | 14 | | |
| TB - 21 | | | 25 | 49 | 57 | 10 | | |
| TB - 22 | | | 23 | 189 | 21 | 11 | | |
| TB - 23 | | | 25 | 105 | 17 | 19 | | |
| TB - 24 | | | 33 | 133 | 50 | 23 | | |
| TB - 25 | | | 54 | 879 | 29 | 12 | | |
| TB - 26 | | | 30 | 31 | 63 | 13 | | |
| TB - 27 | | | 37 | 129 | 61 | 12 | | |
| TB - 28 | | | 26 | 36 | 69 | 11 | | |
| TB - 29 | | | 68 | 38 | 107 | 12 | | |
| TB - 30 | | | 28 | 40 | 80 | 16 | | |
| [redacted] | | | [redacted] | [redacted] | [redacted] | [redacted] | | |

8/29/73

Invoice # 9716

Chas Sutter (1-15-74)

CHARLESTON MINES:

Attached is a record of shipments and sales of bulk semi-concentrates of zinc, lead and copper sulphides. This ore was mined and milled at the Charleston mine over a period years in the course of annual assessment work and development work which consisted of sinking four shafts all under 80 ft depth and the driving of 600 feet of drifts that followed the footwall side of the course of the vein which varies in width from ten to 100 feet wide, and is exposed on the surface over 3000 feet long, through the center of the twelve Mary Jo claims.

This vein named the Sericite Vein is one of several veins contained in a highly altered zone that appears to be 800 to 1000 feet wide between walls of Quartz-Monzonit Granite known in the area as Uncle Sam Porphyry - the Sericite Vein being the most prominent was selected for development work. (It is known as the Gilluly Fault)

This vein gangue is a white clay which the Arizona Bureau of Mines indentified as "Sericite, a finely divided variety of Muscovite Mica" which they said should find some use in industry.

This clay gangue was produced by hydro-thermal action - it contains crystals of the sulphides Sphalerite, Galena, Pyrite and some nuggets of native copper having an assay value of 10 to 15 per cent. (See record of shipments assays)

For the reason that the smallest of sericite causes an uncontollable frothing in a flotation circuit, the crude sericite ore must be washed before the sulphides can be floated. This was a problem but after many tests and experiments my old partner H.L.Zebold who was a mill man and had solved many like problems, designed and we built in 1947, an ore bin and a washing plant that worked like a charm, it was this plant that produced the 1271 tons of sulphides shown on the shipping record attached, totally clay free. Un-fortunately the Stewart Company destroyed this plant maliciously in 1961. It can be rebuilt from my plans and my experience with a larger capacity for about $250,000.oo, which can include components to produce a clean marketable sericite product. (Whipple and Coppock have no exclusive ideas in this respect)

The drying process of the finished sericite product is the greatest problem. My efforts and my concern were to try to prove the extent of the ore vein - my production and sales of ore were purely incidential to my development work - the ground was hard to hold so I had to keep my drifts narrow but several augur holes proved the ore thirty feet and more wider than my drifts, in some cases. I was handicapped by low metal prices and a lack of water for washing the ore and a lack of money, and for the last 17 years the mine has suffered from lack of competence and good faith on the part of the James Stewart Company.

1/15/1974

Chas. K. Sutter President

Charleston Mines

JAN
Phoenix, Arizona

186

RECORD OF METAL SEMI-CONCENTRATES
MINED, WASHED AND SHIPPED BY THE
CHARLESTON MINES, TOMBSTONE, ARIZ.

AUG 30 1973

NOTE: The place of underground origin of each lot shipped is indicated on the attached map of the underground workings, by numbered circles corresponding to the lot number. This information should convey a general idea of the over-all quality of the ore as these shipments were mined from a number of widely separated places in the mine.

| LOT NO. | DATE | DRY TONS | Ag. oz. | Cu. % | Pb. % | Zn. % | MILL PAYMENTS |
|---|---|---|---|---|---|---|---|
| 1 | 10/47 | 125.50 | 1.30 | 0.70 | 7.40 | 12.7 | $ 1855.70 |
| 2 | 5/48 | 44.32 | 1.32 | 0.80 | 10.60 | 14.4 | 1448.97 |
| 3 | 6/48 | 82.16 | 1.20 | 0.85 | 10.20 | 12.0 | 2283.18 |
| 4 | 7/48 | 51.57 | 1.00 | 0.75 | 9.40 | 10.2 | 1438.91 |
| 5 | 8/48 | 47.15 | 1.20 | 0.70 | 9.40 | 9.0 | 1328.24 |
| 6 | 9/48 | 38.97 | 1.05 | 0.60 | 8.90 | 11.2 | 1059.33 |
| 7 | 10/48 | 44.64 | 1.20 | 0.37 | 6.85 | 12.20 | 1108.00 |
| 8 | 10/48 | 49.65 | 1.80 | 0.60 | 9.70 | 15.60 | 1865.74 |
| 9 | 11/48 | 33.51 | 1.60 | 0.62 | 9.90 | 14.60 | 1431.90 |
| 10 | 12/48 | 42.95 | 1.20 | 0.60 | 7.30 | 9.00 | 1085.61 |
| 11 | 12/48 | 37.62 | 1.30 | 0.75 | 9.10 | 14.8 | 1472.74 |
| 12 | 2/49 | 33.06 | 1.20 | 0.61 | 7.15 | 10.0 | 927.18 |
| 13 | 3/49 | 39.74 | 0.80 | 0.40 | 5.65 | 8.55 | 742.61 |
| 14 | 4/49 | 34.86 | 0.80 | 0.32 | 5.50 | 9.45 | 409.24 |
| 15 | 5/49 | 41.47 | 1.40 | 0.55 | 7.75 | 12.90 | 873.15 |
| 16 | 6/49 | 55.81 | 3.40 | 1.25 | 15.50 | 22.30 | 2125.14 |
| 17 | 8/49 | 38.01 | 1.70 | 0.75 | 7.30 | 11.50 | 546.93 |
| 18 | 9/49 | 40.13 | 1.70 | 1.05 | 10.40 | 15.2 | 915.28 |
| 19 | 9/50 | 58.10 | 1.20 | 1.05 | 11.00 | 15.9 | 2473.43 |
| 20 | 10/50 | 70.55 | 2.28 | 1.42 | 17.10 | 27.3 | 5326.52 |
| 21 | 10/50 | 26.90 | 1.32 | 0.97 | 10.36 | 11.5 | 913.89 |
| 22 | 10/50 | 32.17 | 1.80 | 1.25 | 13.80 | 21.0 | 1854.19 |
| 23 | 12/50 | 27.12 | 0.90 | 0.45 | 5.40 | 9.8 | 844.10 |
| 24 | 6/51 | 122.04 | 1.56 | 0.20 | 7.80 | 11.8 | 3825.87 |
| 25 | 5/52 | 28.48 | 1.68 | 0.60 | 10.80 | 16.2 | 1377.42 |
| 26 | 6/52 | 25.40 | 1.25 | 0.92 | 10.00 | 15.8 | 762.00 |
| 27 | 6/52 | 100.00 crude | 0.65 | 0.46 | 4.60 | 3.20 | 950.00 |
| | | 1371.08 tons | | | | | $ 41243.27 |

Lot No. 27 was 100 tons of newly mined crude sericite ore that was sold to the Tombstone Flotation Mill at $10.00 per ton mine site less 5% for moisture, for the purpose of testing whether or not the unwashed crude ore could be milled by flotation - the test was not satisfactory for the reason that the talcose content caused uncontrollable frothing in the flotation circuit. The Sericite crude ore must be washed before the sulphides can be milled by flotation.

The other 26 lots totaling 1271 dry tons were washed bulk semi-concentrates resulting from approximately 4000 tons of crude sericite ore that was run through the washing plant and the sericite thus removed. These 26 shipments of washed semi-concentrates gave a NET mill return of $40,293.27, an average of $31.70 per ton, after deducts for freight, milling and smelting charges, which charges amounted to about 50% of the gross - the above figures represent about half the assay value of the ore shipped.

Lots 18 and 20 came from a winze sunk in the floor of the 72 foot level at a point about 30 feet east of the bottom of No. 5 Brother George shaft. It appears that the ore and the sericite improve in quantity and quality with depth.

The above shipments was ore that was produced from development work of a period of several years. A few other shipments made by Lessees were made in more recent years of which there is no record. It has been determined in recent years that the Sericite product of the Washing plant has a value of approximately $60--$70.00 per ton. It has been estimated that at least 500,000 tons of recoverable sericite ore exists in the vein.

Charleston Mines

cm

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3

Lot #3

# Shattuck Denn Mining Corporation

**DENN BRANCH—BISBEE, ARIZONA**

## ORE SETTLEMENT

SHIPPER Charleston Lead Mines

SETTLEMENT DATE 7-15-48

NAME OF MINE:

MILL LOT NO. 54

| Car Number | Date Received | Shippers Lot Number | Pounds of Ore Wet | % Moist | Dry | Net Dry Tons |
|---|---|---|---|---|---|---|
| | | | | | 87402 | |
| S. P. 11227 | 6-24-48 | 2 | 92140 | 4.6 | 879.02 | |
| S. P. 11251 | 6-24-48 | 3 | 79760 | 4.2 | 76410 | |
| TOTALS | | | 171900 | | 164312 | 82.156 |

PAYMENTS: 5 15

| Gross Assay | | | Gross Units of Metals | | Per Cent Paid For | Units of Metal Paid For | | Metal Prices | Amounts |
|---|---|---|---|---|---|---|---|---|---|
| Gold | .003 | Ozs. | .246 | Ozs. | — | — | Ozs. | $ — | $ — |
| Silver | 1.20 | Ozs. | 98.59 | Ozs. | 74.78 | 73.73 | Ozs. | .888 | 65.47 |
| Copper | .85 | % | 1397 | Lbs. | 70.44 | 984 | Lbs. | .1504 | 147.96 |
| Lead | 10.20 | % | 16760 | Lbs. | 70.06 | 11742 | Lbs. | .1565 | 1837.62 |
| Zinc | 12.00 | % | 19717 | Lbs. | 67.70 | 13348 | Lbs. | .1158 | 1545.70 |

| | | | |
|---|---|---|---|
| TOTAL PAYMENTS | | | 3596.75 |
| DEDUCTIONS: Concentrates Freight | | 203.90 | |
| Transportation Tax | | 11.10 | |
| Concentrates Treatment | | 611.22 | |
| Milling | | 410.78 | |
| NET MILL VALUE | | | 1237.00 |
| Processing Fee ( % of Net Mill Value) | | | 2359.75 |
| NET SETTLEMENT VALUE | | | |
| Ore Freight 85.950 Wet Tons @ $ .89 | | | 76.57 |
| Ore Transportation Tax | | | |
| Umpire Penalty | | | |
| BALANCE DUE SHIPPER | | | 2283.18 |

V50714

#3 charge on May 30 last over diff - 80 lbs

@ 5.00 per ton -

Loading + hauling @ 1.50 per ton

Made By

Approved By

14547

#V13426

FORM H-32 2M 7-49 HB 128608

FINAL SETTLEMENT

AMERICAN SMELTING AND REFINING COMPANY

# ORE SETTLEMENT

Lot 20

188

Date October 16, 1950

Mill Lot No. EMC-2

Mine Lot No.

From Mine Brother George Claim (Charleston Lead Mines Company)

Bought of N. J. Eiden & A. E. McCrea Lessees

Address Box 634, Tombstone, Arizona

Shipping Point Tombstone, Arizona

Schedule Tr-15

**WEIGHT**

| NET WET LBS. | Moisture % | NET DRY LBS. | NET DRY TONS |
|---|---|---|---|
| 145770 | 3.2 | 141105 | 70.5525 |

**METAL PRICES—of Settlement Date** October 3, 1950

| METAL | QUOTATION | | DEDUCTION | NET QUOTATION | Percent Paid | NET PRICE PAID |
|---|---|---|---|---|---|---|
| Gold | | $/oz. | | | | |
| Silver | 90.000 | ¢/oz. | 1.500 | 88.500 | 100 | $ .88500 |
| Lead | 16.000 | ¢/lb. | 2.800 | 13.200 | 100 | .13200 |
| Copper | 24.075 | ¢/lb. | 8.920 | 15.155 | 100 | .15155 |
| Zinc | 17.500 | ¢/lb. | 7.375 | 10.125 | 100 | .10125 |
| | | ¢/lb. | | | | |

**ASSAYS** / **CONTENTS**

| | AU—oz. | AG—oz. | PB—% | CU—% | ZN—% | AU—oz. | AG—oz. | PB—lbs. | CU—lbs. | ZN—lbs. |
|---|---|---|---|---|---|---|---|---|---|---|
| A. S. & R. | - | 2.28 | 17.70 | 1.42 | 27.35 | | | | | |
| Non-Sulfide | | | 0.60 | | | | | | | |
| Hawley | .003 | | | | | | | | | |
| FINAL SETTLEMENT | | | | | | | | | | |
| Settlement | .003 | 2.28 | 17.10 | 1.42 | 27.35 | 0.212 | 160.86 | 24129 | 2004 | 38592 |

**PAYMENTS FOR METALS**

LIQUIDATION

| METAL | ASSAY | | DEDUCTED | NET ASSAY | EQUIVALENT IN LBS. OR OZS. | PERCENT PAID FOR | NET PAID FOR | | RATE | PER DRY TON | TOTAL AMOUNT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gold | | Oz. | | | No Pay | | | Oz. | $ | $ | $ |
| Silver | 2.28 | Oz. | 0.50 | 1.78 | 1.78 | 80 | 1.424 | Oz. | .88500 | 1.26 | 88.90 |
| Lead | 17.10 | % | 1.00 | 16.10 | 322.00 | 80 | 257.600 | lbs. | .13200 | 34.00 | 2398.78 |
| Copper | 1.42 | % | 0.40 | 1.02 | 20.40 | 75 | 15.300 | lbs. | .15155 | 2.32 | 163.83 |
| Zinc | 27.35 | % | 1.00 | 26.35 | 527.00 | 79.5 | 418.965 | lbs. | .10125 | 42.42 | 2992.84 |
| 45.87 | TOTAL PAYMENTS FOR METALS | | | | | | | | | 80.00 | 5644.20 |

**DEDUCTIONS**

| | | AMOUNT | |
|---|---|---|---|
| Treatment 70.5525 Dry Tons @ $ 4.50 Per Dry Ton | | $ 317.49 | 5326.52 |
| Royalty: Pay Charleston Lead Mines Company, Box 347, Tombstone, Arizona: 25% of $5326.71 | | 1331.68 | |
| Hauling: Pay Joseph T. Castles III, Box 517, Tombstone, Arizona | | | |
| 72.8850 wet tons @ $5.30 | 386.29 | | |
| 3% Federal Transportation Tax | 11.59 | 397.88 | |
| Other: Pay American Smelting and Refining Company: Cash Advanced 10/6/50 | advanced → | 3300.00 | |
| TOTAL DEDUCTIONS | | 5347.05 | 5347.05 |
| BALANCE DUE SHIPPER | | | 297.15 |

5644.20
317.49
5326.71
1331.68

#5

FINAL SETTLEMENT

Orig: & 2cc: E&M cc: Vo, WCW, CPEM Tr-2.4, Tr-9.1.2 Correct /S/ K. V. D. Steinen Approved /S/ L. H. Chapman

Lot 29

FINAL SETTLEMENT

AMERICAN SMELTING AND REFINING COMPANY

# ORE SETTLEMENT

189

Date June 22, 1951
Mill Lot No. S-1
Mine Lot No. 5
From Mine BROTHER GEORGE CLAIM
Schedule No. (Charleston Lead Mines C

Bought of Charleston Lead Mines Company
Address c/o Chas. H. Suiter, Box 347, Tombstone, Arizona
Shipping Point Tombstone, Arizona

Tr-20

**WEIGHT**

| NET WET LBS. | Moisture % | NET DRY LBS. | NET DRY TONS |
|---|---|---|---|
| 253980 | 3.9 | 244075 | 122.0375 |

**METAL PRICES—of Settlement Date** June 16, 1951

| METAL | QUOTATION | | DEDUCTION | NET QUOTATION | Percent Paid | NET PRICE PAID |
|---|---|---|---|---|---|---|
| Gold | | $/oz. | | | | |
| Silver | 90.000 | ¢/oz. | 1.500 | 88.500 | 100 | $ .88500 |
| Lead | 17.000 | ¢/lb. | 2.800 | 14.200 | 100 | .14200 |
| Copper | 24.075 | ¢/lb. | 6.900 | 17.175 | 100 | .17175 |
| Zinc | 17.500 | ¢/lb. | 6.595 | 10.905 | 100 | .10905 |
| | | ¢/lb. | | | | |

**ASSAYS**

| BY | AU—oz. | AG—oz. | PB—% | CU—% | ZN—% |
|---|---|---|---|---|---|
| S.& R. | - | 1.56 | 7.80 | 0.44 | 11.80 |
| Settlement | - | 1.56 | 7.80 | 0.44 | 11.80 |

**CONTENTS**

| AU—oz. | AG—oz. | PB—lbs. | CU—lbs. | ZN—lbs. |
|---|---|---|---|---|
| - | 190.38 | 19038 | 1074 | 28801 |

FINAL SETTLEMENT

**PAYMENTS FOR METALS**

LIQUIDATION

| METAL | ASSAY | | DEDUCTED | NET ASSAY | EQUIVALENT IN LBS. OR OZS. | PERCENT PAID FOR | NET PAID FOR | | RATE | PER DRY TON | TOTAL AMOUNT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gold | - | Oz. | | | | | | Oz. | $ | $ | $ |
| Silver | 1.56 | Oz. | 0.20 | 1.36 | 1.36 | 75 | 1.02 | Oz. | .88500 | .90 | 109.83 |
| Lead | 7.80 | % | 0.30 | 7.50 | 150. | 75 | 112.5 | lbs. | .14200 | 15.98 ✓ | 1950.16 |
| Copper | 0.44 | % | 0.20 | 0.24 | 4.8 | 60 | 2.88 | lbs. | .17175 | .49 | 59.80 |
| Zinc | 11.80 | % | 0.50 | 11.30 | 226. | 75 | 169.5 | lbs. | .10905 | 18.48 ✓ | 2255.25 |
| 21.40 | TOTAL PAYMENTS FOR METALS | | | | | | | | | 35.85 ✓ | 4375.04 ✓ |

**DEDUCTIONS**

| | | | | AMOUNT |
|---|---|---|---|---|
| Treatment | 122.0375 | Dry Tons @ $ 4.50 | Per Dry Ton | $ 549.17 ✓ |

$ 35.85
4.50
31.35
6.00 per ton trucking
25.35 - 70 miles to Mill
per ton net → $ 25.35 net - before mining cost -
West drift from #5 shaft
72' level

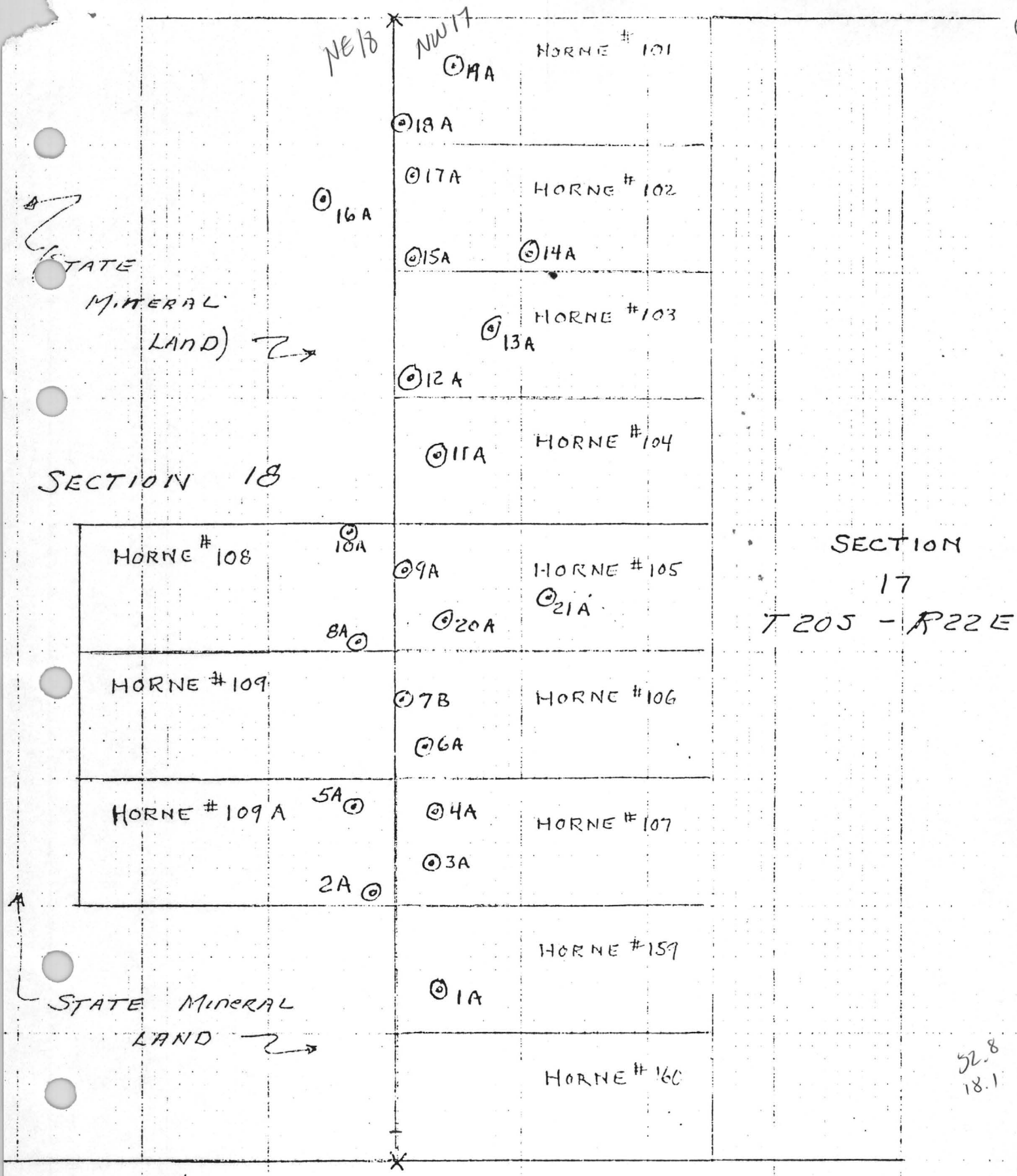
TOTAL DEDUCTIONS 549.17

**BALANCE DUE SHIPPER** 3825.87 ✓

FINAL SETTLEMENT

Orig: & 2cc: CPb.MCo. cc: Vo, WCW, Tr-2.4, Tr-9.1.2 Correct [signature] Approved [signature]

Horne Claim Geochem
Samples (8/8-10/74)




52.8
18.1

⊙ SAMPLES-GEOCHEM
8-9-74 & 8-10-74

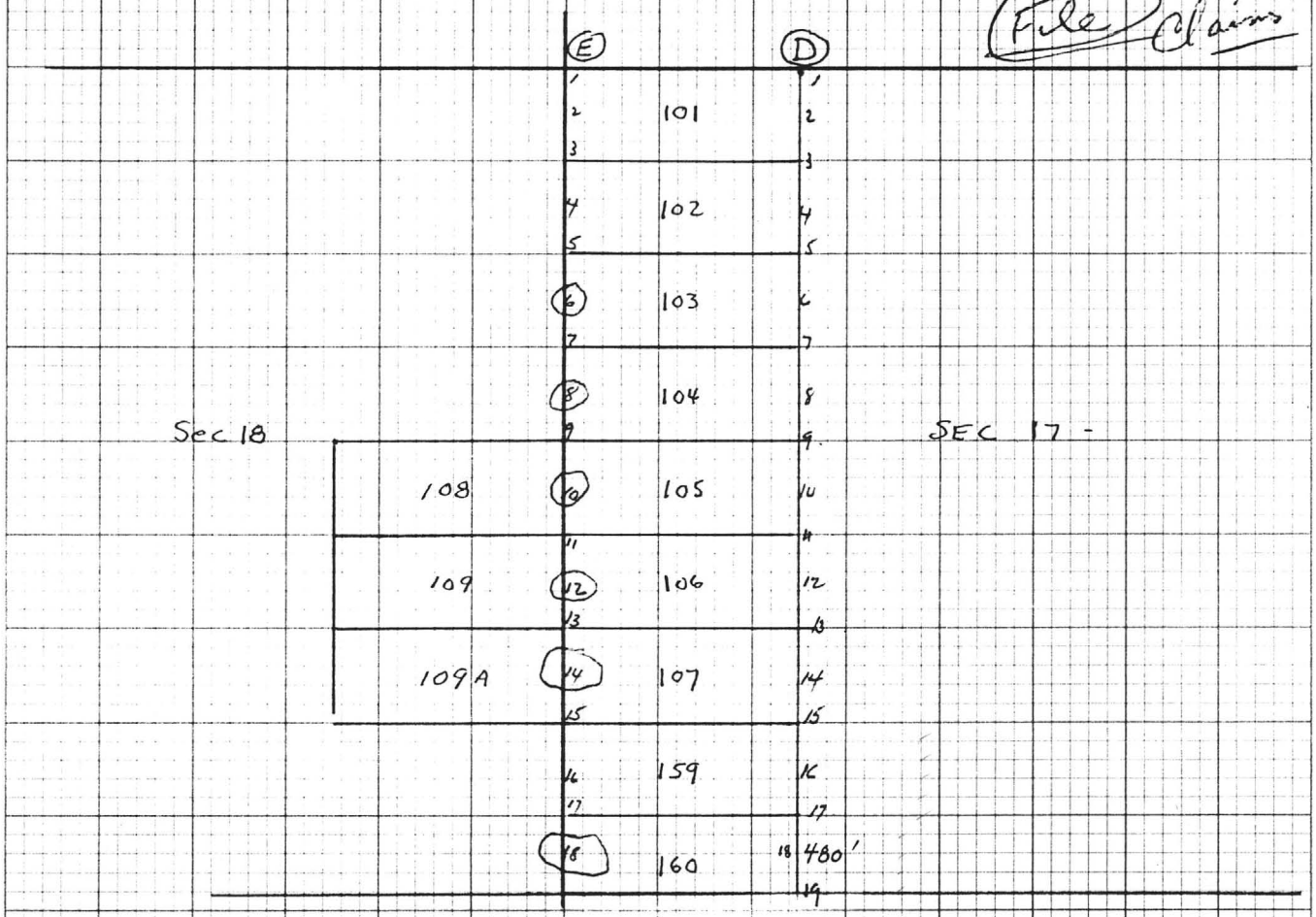
12-280

Limestone

T20S R22E

83

File Claims




OFFSETS

E1 - 60' N (EW Fence)
E2 - 60 South EW Rock Ridge
E11 - South Bank - Sandy Wash
E12 - 500' E of windmill
D-1 48' N Fence
D5 86' N of NNE - SSW Road
D-8 - 65' South of Position South Bank Large Wash
D-9 - 40' South of Position South Bank of Wash -

18 = 160

16 = 107 A

101 in 103 E 4

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

# CERTIFICATE OF ANALYSIS

| ITEM NO. | SAMPLE IDENTIFICATION | Ag ppm | Cu ppm | Mo ppm |
|---|---|---|---|---|
| 1 | 1A | <0.2 | 5 | |
| 2 | 2 | 0.2 | 5 | |
| 3 | 3 | 1.0 | 5 | |
| 4 | 4 | 0.6 | 5 | |
| 5 | 5 | <0.2 | 5 | |
| 6 | 6A | 0.2 | 5 | |
| 7 | 7B | 0.6 | 10 | |
| 8 | 8A | 0.2 | 5 | |
| 9 | 9 | 0.8 | 5 | 2 |
| 10 | 10 | 700. | 550 | 140 |
| 11 | 11 | 18. | 5 | |
| 12 | 12 | 1.4 | 5 | |
| 13 | 13 | <0.2 | 5 | |
| 14 | 14 | 0.2 | 5 | 2 |
| 15 | 15 | 1.8 | 5 | 2 |
| 16 | 16 | 0.4 | 5 | |
| 17 | 17 | <0.2 | 5 | |
| 18 | 18 | <0.2 | 5 | |
| 19 | 19 | 0.4 | 5 | |
| 20 | 20 | 14. | 5 | |
| 21 | 21 | 4.2 | 5 | 12 |
| 22 | 22A | 2.0 | 5 | 12 |

TO:
Mr. C. A Cosgrove
1923 West Osborn Road
Phoenix, Arizona 85016

REMARKS:
Trace analysis

CERTIFIED BY:

| DATE REC'D: | DATE COMPL.: | JOB NUMBER: |
|---|---|---|
| 8/19/74 | 8/26/74 | 741625 |

81

2

MEMORANDUM

August 12, 1974

To: M. S. Horne

Re: Geochem Survey

There is attached a copy of the sampling accomplished to date.

I have halted this work pending further discussion with you pertaining to these claims.

C. A. Cosgrove

CAC:vs
Attachment

Armstrong

C.A. Cosgrove (8-26-74)

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# GEOLOGICAL

# &

# GEOCHEMICAL

# STUDY

FOR: M. S. Horne
3033 North Central Avenue
Phoenix, Arizona

August 26, 1974

BY: C. A. Cosgrove, Mining Consultant
Working under supervision of:
H. Clyde Davis, B.S; M.S.
Geologist & Mineral Director

## LOCATION

The area covered under this study lies in the west 1/4 of Section 17 T 20 S R 22 E and forms a portion of the west slope of Uncle Sam Hill, about 3 miles southwest of Tombstone. There are 12 claims, 9 of which are in Section 17 and 3 of which are in Section 18. (See claim map appended to this report). These claims are listed as follows:

| | |
|---|---|
| Horne | #101 |
| Horne | #102 |
| Horne | #103 |
| Horne | #104 |
| Horne | #105 |
| Horne | #106 |
| Horne | #107 |
| Horne | #108 |
| Horne | #109 |
| Horne | #109-A |
| Horne | #159 |
| Horne | #160 |

## GEOLOGY

This area is covered by an intrusive Latite Porphyry locally known as the Uncle Sam Porphyry. The principal outcrops of this porphyry are on the Uncle Sam Hill, the Three Brothers Hills to the north and west. Similar outcrops are also evident to the south near Charleston.

This porphyry is relatively resistant to erosion thus forming the craggy hills adjacent to the valley pediments. This porphyry has invaded the Bronco Volcanics, the Bisbee Formation, the Colina Limestone and the Epitaph Dolomite. This porphyry is probably younger than all the adjacent rocks except the Schieffelin Granodiorite and the Valley Fill of the San Pedro Trough. This intrusion is undoubtedly of the Tertiary period.

North of Uncle Sam Hill a deep embayment in the contact between the porphyry and the Bisbee formation, which forms the floor of the valley, suggests that the Bisbee underlies the porphyry at a comparatively shallow depth. This has been reported in the State of Maine mine, which penetrate

a considerable body of shale on the bottom level, at an elevation of about 4,300 feet (Butler, Wilson, and Rasor, 1938, p. 101). The floor at this part of the intrusion is therefore probably at a comparatively shallow depth, but farther southeast, near the Tombstone-Charleston road, the exposed contact becomes nearly vertical and cuts the bedding of the country rock at a high angle. Throughout the area between this road and the ridge extending north from Ajax Hill, the porphyry forms highly irregular masses that cut the Bisbee formation without regard to its bedding. A significant feature of this area is the mass of Uncle Sam porphyry following the major fault that farther north separates the Bisbee formation on the west from the Bolsa quartzite on the east. This fault was undoubtedly formed at the time of the major deformation of the Tombstone district. It had a minimum displacement of 5,000 feet and must extend to a considerable depth. The porphyry is frozen to both walls of this fault and has not been notably deformed since its emplacement, showing that the intrusion occurred after the major local orogeny.

A notable feature of the porphyry is the fracture (and strewing out of the resulting fragments) of a large proportion of the phenocrysts.

The groundmass ranges from vitric to microcrystalline, with a maximum grain size of about 0.04 millimeter, though more usually the groundmass crystals do not exceed 0.01 millimeter. Where determinable, the groundmass plagioclase is near $An_{30}$ in composition and is contained, along with chlorite or biotite, in an intergrowth of orthoclase and quartz or glass.

Accessory minerals include magnetite, apatite, zircon, and sphene, but much of the sphene is a product of the alteration of biotite and presumable ilmenite. A few specimens contain rosettes of tourmaline, dichroic in greenish brown and brown. Some of this porphyry is mildly altered, with sericite, epidote, and albite developed in the plagioclase crystals and the mafic minerals altered to chlorite. Calcite is also present in some of the rocks.

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CHEMICAL ANALYSIS OF UNCLE SAM PORPHYRY

| | |
|---|---|
| $SiO_2$ | 67.60 |
| $Al_2O_3$ | 16.22 |
| $Fe_2O_3$ | 2.01 |
| FeO | 1.08 |
| MgO | .91 |
| CaO | 2.91 |
| $Na_2O$ | 3.79 |
| $K_2O$ | 3.58 |
| $H_2O+$ | .92 |
| $H_2O$ | .28 |
| $TiO_2$ | .41 |
| $P_2O_5$ | .19 |
| MnO | .10 |
| $ZrO_2$ | -------- |
| $O_2$ | -------- |

The area under study has been cut by one minor fault or fracture. This bears north 40° east from the center of west line of Section 17. Radiating from this zone are numerous fractures which show filling by secondary mineral solutions - and considerable alteration to the porphyry in proximity to the zone.

A study was made of the high altitude photography by NASA to determine major structural factors effecting the possible implacement of ore bearing solutions. A copy of an enlargement of this photography is attached herewith - This study was considered in the conclusion formed at the end of this report.

## GEOCHEMICAL

Following the geological survey and preliminary surface study, it was determined that a geochemical reconnaissance would be the best practical method to locate anomalous mineralized areas for further study and drilling. Surface rock sampling was accomplished in accordance with the sample map attached herewith.

Geochemical results were determined by Skyline Labs, Inc., and are as follows:

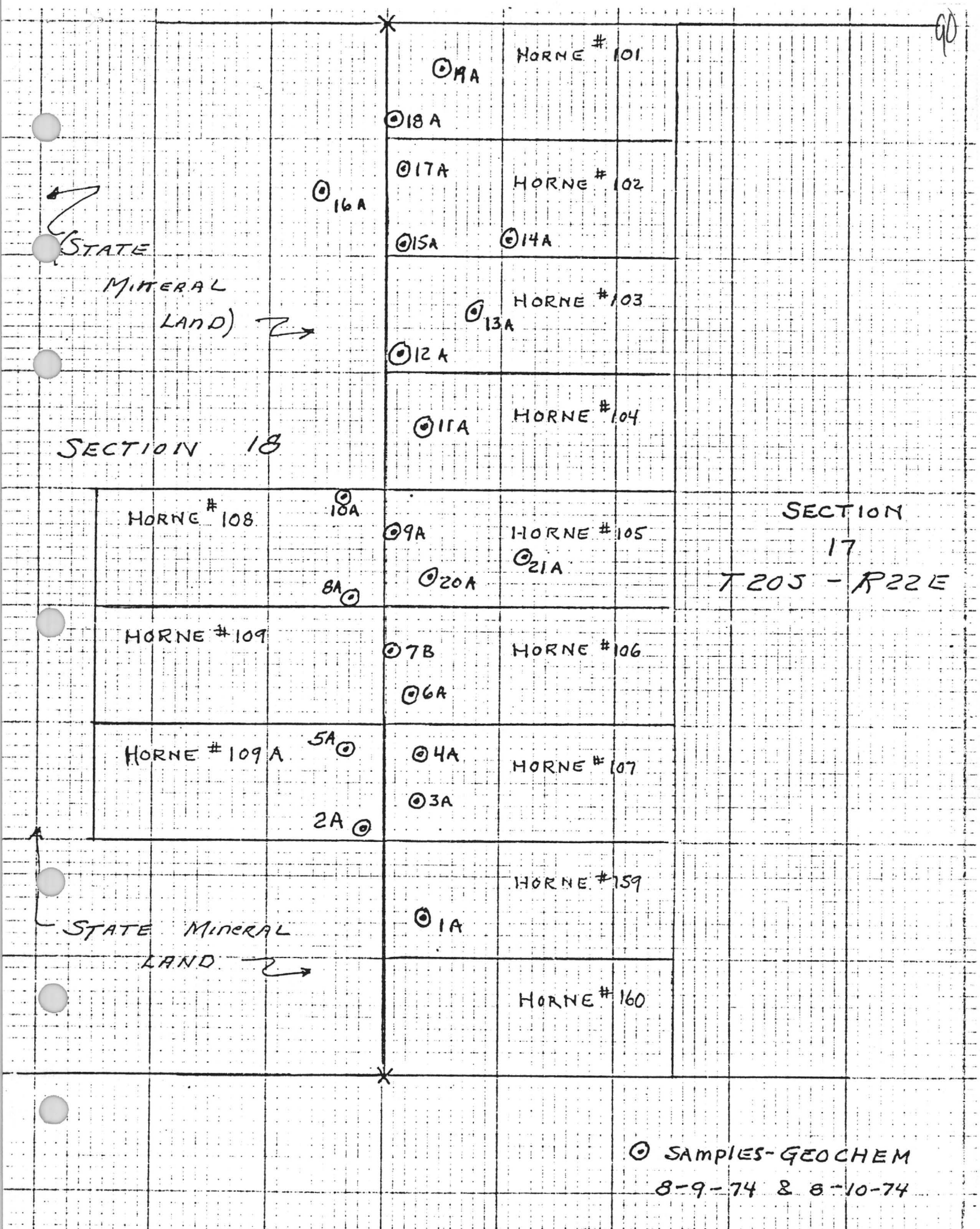
| SAMPLE IDENTIFICATION | Ag ppm | Cu ppm | Mo ppm |
|---|---|---|---|
| 1A | <0.2 | 5 | |
| 2 | 0.2 | 5 | |
| 3 | 1.0 | 5 | |
| 4 | 0.6 | 5 | |
| 5 | <0.2 | 5 | |
| 6A | 0.2 | 5 | |
| 7B | 0.6 | 10 | |
| 8A | 0.2 | 5 | |
| 9 | 0.8 | 5 | 2 |
| 10 | 700. | 550 | 140 |
| 11 | 18. | 5 | |
| 12 | 1.4 | 5 | |
| 13 | <0.2 | 5 | |
| 14 | 0.2 | 5 | 2 |
| 15 | 1.8 | 5 | 2 |
| 16 | 0.4 | 5 | |
| 17 | <0.2 | 5 | |
| 18 | <0.2 | 5 | |
| 19 | 0.4 | 5 | |
| 20 | 14. | 5 | |
| 21 | 4.2 | 5 | 12 |
| 22A | 2.0 | 5 | 12 |

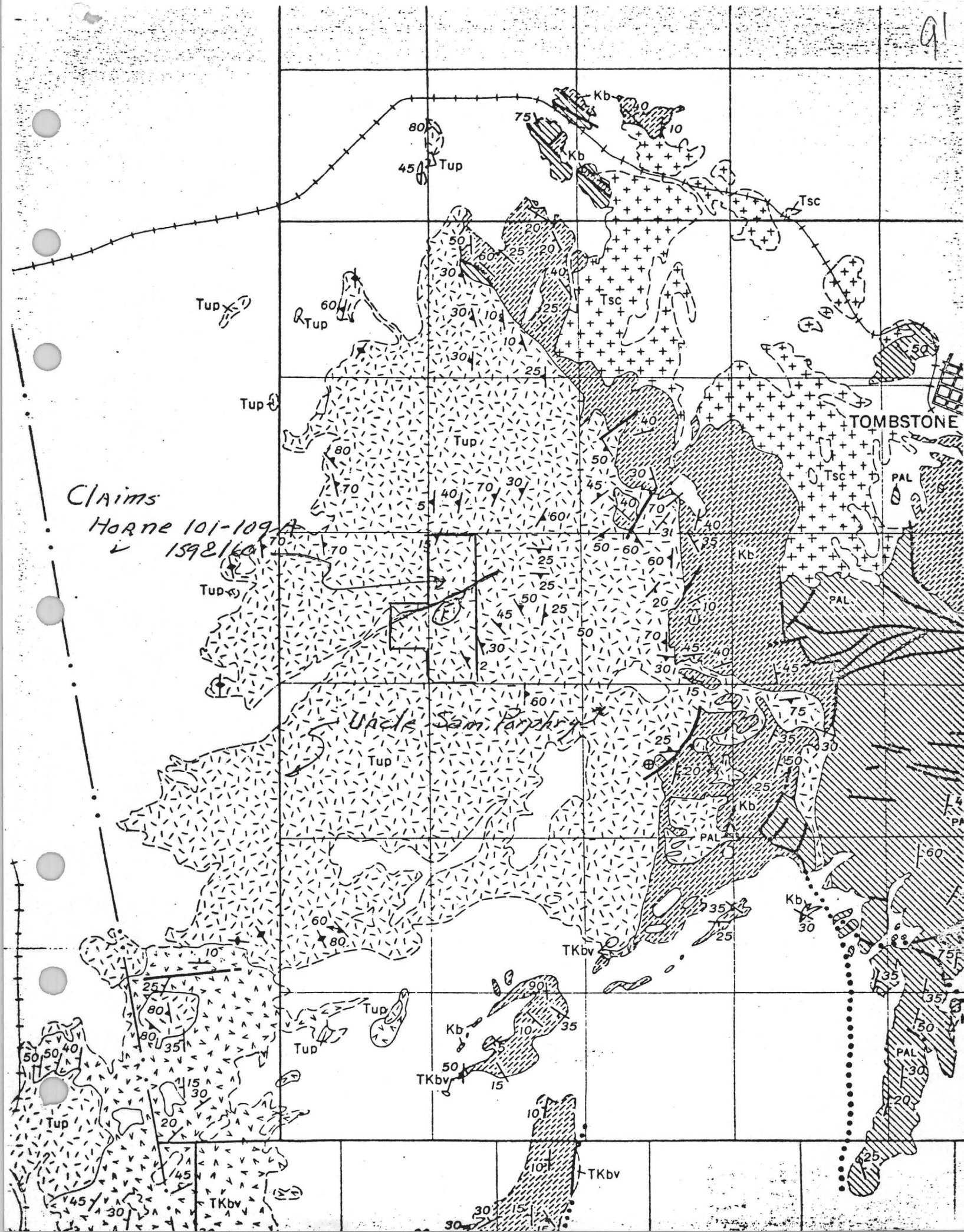
Conclusions: It is evident that two anomalous areas exist which warrant detailed study. It is therefore recommended that an examination program consisting of drilling, testing and studies proceed to delineate mineralized areas. This examination program should be evaluated by feasibility reports as each step is concluded.

This geological examination and research study together with the geochemical sampling was accomplished by C. A. Cosgrove, Mining Consultant, working under the direction and supervision of H. Clyde Davis, B.S; M.S., Geologist and Mineral Director for Brigham Young University.

C. A. Cosgrove,
Mining Consultant

H. Clyde Davis,
Geologist


HORNE # 101
19A
18A
17A
HORNE # 102
16A
15A
14A
STATE MINERAL LAND
HORNE # 103
13A
12A
HORNE # 104
11A
SECTION 18
HORNE # 108
10A
9A
HORNE # 105
21A
20A
8A
SECTION 17
T 20S - R 22E
HORNE # 109
7B
HORNE # 106
6A
HORNE # 109 A
5A
4A
HORNE # 107
3A
2A
HORNE # 159
1A
STATE MINERAL LAND
HORNE # 160
⊙ SAMPLES-GEOCHEM
8-9-74 & 8-10-74


91
Kb
Tup
Tsc
TOMBSTONE
PAL
Claims
Horne 101-109 A
1592160
Uncle Sam Parking
TKbv

G2

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

# CERTIFICATE OF ANALYSIS

Charles E. Thompson
Arizona Registered Assayer No. 9427
William L. Lehmbeck
Arizona Registered Assayer No. 9425

| SAMPLE IDENTIFICATION | GOLD ppm | SILVER | COPPER | LEAD | ZINC | MO | Mn ppm | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 A | 0.12 | | | | | | 156000 | | |

See Report - Hovne 100-109 A 159 & 160 (Limestone) assay of reject ea

TO:
Mr. C.A. Cosgrove
1923 West Osborn Road
Phoenix, Arizona 85016

REMARKS:
Trace analysis
1 Gold (0.02 ppm) - $2.50
1 Manganese - $2.00

CERTIFIED BY:

CHARGES:
PREPARATION $
ANALYSIS $ 4.50

| DATE REC'D: | DATE COMPL.: | JOB NUMBER: | $ |
|---|---|---|---|
| | 9/6/74 | 741625-A | 4.50 |

there may be an area of 110-117

SKYLINE LABS, INC.
Hawley & Hawley, Assayers and Chemists Division
1700 W. Grant Rd., P.O. Box 50106, Tucson, Arizona 85703
(602) 622-4836

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

931

# CERTIFICATE OF ANALYSIS

| ITEM NO. | SAMPLE IDENTIFICATION | Ag ppm | Cu ppm | Mo ppm |
|---|---|---|---|---|
| 1 | B - 1 | 2.6 | | |
| 2 | 2 | 1.2 | | |
| 3 | 3 | 0.2 | | |
| 4 | 4 | <0.2 | | |
| 5 | 5 | <0.2 | | |
| 6 | 6 | 7.2 | | |
| 7 | 7 | 3.6 | | |
| 8 | 8 | 0.8 | | |
| 9 | 9 | <0.2 | | |
| 10 | 10 | 7.4 | | |
| 11 | 11 | 2.8 | | |
| 12 | 12 | <0.2 | | |
| 13 | 13 | 3.0 | | |
| 14 | 14 | 5.4 | | |
| 15 | 15 | 0.4 | | |
| 16 | B - 16 | 1.8 | | |
| 17 | 2 - 5 | 2.8 | 25 | 14 |
| 18 | 2 - 1-A | 1.0 | 5 | |
| 19 | 2 - H 102 E | <0.2 | | |

Further Study of Harmon group - 100-109A 159-160

TO:
Mr. C. A. Cosgrove
1923 West Osborn Road
Phoenix, Arizona 85015

cc: Pacific Palisades, California

REMARKS:
Trace analysis

CERTIFIED BY:

DATE REC'D: 9/4/74
DATE COMPL.: 9/10/74
JOB NUMBER: 741777

John R. King (8-26-75)

120

ASARCO Incorporated
Tucson Arizona

August 26, 1975

TO: W. L. Kurtz

FROM: J. R. King

Charleston Project
Cochise County, Arizona

This report is submitted on the Charleston Project with all drill hole logs and assays attached. A geologic and land status map shows the drill hole locations relative to the Stewart Mines, Ltd. property.

SUMMARY AND CONCLUSIONS

Between March 25, 1974 and August 8, 1975, ASARCO Incorporated drilled four holes, totalling 13,347 feet, on the land held in partnership with Stewart Mines, Limited. Three of the holes (Chs-1, 2, & 3) were diamond drill holes, all located in sec. 30 (see Att. A). The fourth drill hole (CP-1) is a rotary hole, 395 feet deep, located in sec. 36.

No economic mineralization was encountered and the last diamond drill hole, Chs-3, was terminated on August 8, 1975.

GENERAL GEOLOGY

The Charleston Mining District encompasses roughly thirty square miles and premineral bedrock within this area consists of Cretaceous clastic and volcanic rock and Laramide intrusives (see Att. A). Sedimentary rocks of the Cretaceous Bisbee Group crop out approximately 1.5 miles to the east and southeast of the old Charleston Lead Mine. Sedimentary rocks of the Bisbee Group were also encountered at depth in the Charleston drill holes. Volcanics of the Cretaceous Bronco Formation overlie the Bisbee sediments. Intruding both of the above are Laramide granodiorite and andesite porphyry dikes and plugs.

DRILL HOLE SUMMARY

DDH Chs-1 was collared on March 25, 1974 and was terminated at a depth of 4002' on July 10th after drilling 1000' of NC core, 1947' of NX core, and 1055' of BX core. Attachment B is the geologic log for the hole and Attachment C lists all the assays for the hole. The hole was collared in strongly altered and mineralized breccia and was bottomed in weakly altered and mineralized granodiorite porphyry. The best assay was ten feet (2844-2854') of .41% Cu.

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DDH Chs-2 was collared on July 15, 1974 and was abandoned because of caving at 3415 feet after drilling 1012' of NC core, 1990' of NX core, and 413' of BX core. A wedge was set at 2496' and drill hole Chs-2W was initiated on November 21, 1974. Drill hole Chs-2W was drilled to a depth of 5028 feet (March 5, 1975). Attachments D & E are the geologic logs and assays, respectively, for drill holes Chs-2 & 2W. Drill hole Chs-2 was collared in "Uncle Sam" porphyry, penetrated into "Bronco" volcanics at approximately 650', Bisbee Group sediments at 1327', and probable Paleozoic marbles at 4828'. No economic mineralization was encountered, although one small ten-foot intercept of 1% copper was encountered at 4205-4215'.

Drill hole Chs-3 was collared on June 9, 1975 and bottomed on August 8, 1975 at a depth of 3003 feet. NC core drilling was stopped at 631 feet and NX core drilling continued to the bottom of the hole. Attachments F & G are the geologic log and assays, respectively, of the hole. The geology of the hole is similar to DDH Chs-1. The significant difference between the holes is that Chs-3 intercepted much lower copper grade mineralization. The best assay was 940 ppm (2789-2799').

GEOCHEMISTRY

Attachment H shows the geochemical sample sites and Attachment I lists the geochemical values for these samples.

GEOPHYSICAL

No geophysical surveys were conducted for ASARCO Incorporated over the property.

LAND STATUS

A land status map outlining the land held by Stewart Mines, Limited accompanies this report as Attachment J.

John R. King

John R. King

JRK:lb
Atts.

C.A. Bossano (10-11-75)

#7352

To
Clyde Davis
859 E. 2730 North
Provo Utah.

FROM
C. H. Cosgrove
350 Adero Way
Pacific Palisades Ca

Subject Charleston Mine - Tombstone Arizona Date 10/11/75

MESSAGE: Mr Horne asked that I contact you for your thoughts on an Idea that occurred to me. The fault running east & west at the mine itself is approx 1 mile long & Heavily altered with Sericite. - The contact between the Bronco Volcanics and the Uncle Sam Porphyry lies about 1800' north and parallels this fault. This contact is also 600' to 800' south of our Hole #3. The first hole drilled by Asarco was on the extention of this contact about 1½ miles east of the Pit area.

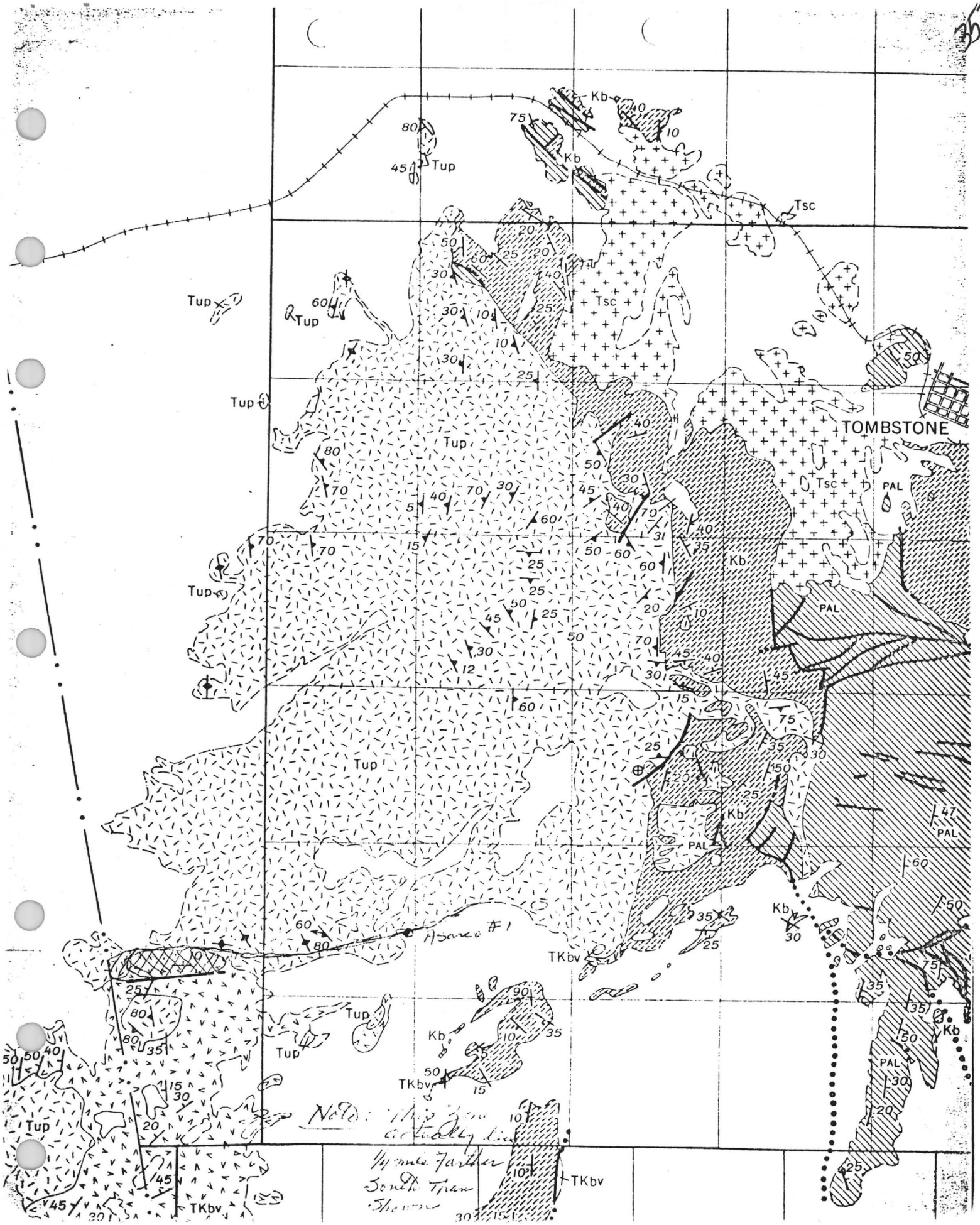
My thought was that if the mineral solutions came in along the contact of the Uncle Sam, they could possibly be trapped in the shattered zone of meta sediments between the fault and the contact (?) Possibly a good drill target. Would appreciate receiving your thoughts. See sketch

Signed CHC

Rediform 4S 468 ☐ NO REPLY NECESSARY ☐ REPLY REQUESTED—USE REVERSE SIDE

Copy - M. S. Horne

RECEIVED
OCT 14 1975
JAMES STEWART COMPANY
PHOENIX, ARIZONA


TOMBSTONE
Tup
Tsc
Kb
PAL
TKbv
Asarco #1
Note: This fault actually lies
½ mile farther South than shown

Sec 36 Geochem (5/80)

SECTION 36

TOWNSHIP 20 S. RANGE 22 E.

→ BY CHARLESTON LEAD MINE

74 958

20-26-3

S1808 109

# SOUTHWESTERN ASSAYERS & CHEMISTS, INC.

WIL WRIGHT
ARIZONA REG. NO. 5875

DNYANENDRA A. SHAH
ARIZONA REG. NO. 8888

REGISTERED ASSAYERS
P. O. BOX 7517
TUCSON, ARIZONA 85725

710 E. EVANS BLVD.
PHONE 602-884-5811
884-5812

Mr. James Stewart Company
Mr. Roger P. Smith
707 Mayer Central Bldg.-3033 N. Central Ave.
Phoenix, Arizona 85012

JOB # 024525
RECEIVED 5-14-80
REPORTED 5-21-80

| SAMPLE NUMBER | GOLD OZ.* | SILVER ~~oz.~~ PPM | LEAD ppm | COPPER PPM | ZINC % | | MOLYBDENUM % |
|---|---|---|---|---|---|---|---|
| 1 | | < 1 | 53 | 60 | | | |
| 2 | | < 1 | 26 | 26 | | | |
| 3 | | < 1 | 28 | 18 | | | |
| 4 | | < 1 | 29 | 19 | | | |
| 5 | | < 1 | 28 | 30 | | | |
| 6 | | < 1 | 40 | 57 | | | |
| 7 | | < 1 | 24 | 34 | | | |
| 8 | | < 1 | 24 | 32 | | | |
| 9 | | < 1 | 100 | 31 | | | |
| 10 | | < 1 | 22 | 21 | | | |
| 11 | | < 1 | 18 | 14 | | | |
| 12 | | < 1 | 21 | 78 | | | |
| 13 | | < 1 | 19 | 22 | | | |
| 14 | | < 1 | 23 | 51 | | | |
| 15 | | < 1 | 22 | 53 | | | |
| 16 | | < 1 | 19 | 29 | | | |
| 17 | | < 1 | 50 | 126 | | | |
| 18 | | < 1 | 99 | 432 | | | |
| 19 | | < 1 | 55 | 276 | | | |
| 20 | | < 1 | 27 | 78 | | | |
| 21 | | < 1 | 14 | 14 | | | |
| 22 | | < 1 | 90 | 16 | | | |
| 23 | | < 1 | 49 | 98 | | | |
| 24 | | < 1 | 14 | 14 | | | |
| 25 | | < 1 | 19 | 200 | | | |
| 26 | | < 1 | 95 | .52% | | | |
| 27 | | < 1 | 162 | .86% | | | |
| 28 | | < 1 | 112 | .35% | | | |

REGISTERED ASSAYER CERTIFICATE NO. 8888 Dnyanendra Amrutlal Shah DATE SIGNED 5-21-80 Arizona U.S.A.

1 ppm = 0.0001%  1 troy oz./ton = 34.286 ppm  1 ppm = 0.0292 troy oz./ton

* Gold and Silver reported in troy oz. per 2,000 lb. ton

Horne #110-117 Geochem
(9/81)

INVOICE NO. 6230 108

Assay

RECEIVED SEP 11 1981

LINDROOS LABORATORIES
P. O. Box 672
Tombstone, AZ 85638

I believe this work was done by W.W. Grace on 10-1-77

JAMES STEWART CO.

SOLD TO James Stewart

STREET & NO.

CITY

SHIPPED TO

STREET & NO.

CITY

| CUSTOMER'S ORDER | SALESMAN | TERMS | VIA | F.O.B. | DATE |
|---|---|---|---|---|---|
| | | | | | |

| | | | | |
|---|---|---|---|---|
| Fire Assays | Ag | | Au | |
| #1 West side of Wash | .07 | | Nil | |
| #2 East side of Wash | TR | | Nil | |
| #3 Due East of Wash 100 yds | .02 | | Nil | |
| #4 20 yds N.E. of #3 | .04 | | Nil | |
| #5 20 yds E of #4 | .92 | | TR | |
| #6 | .04 | | Nil | |
| #7 | TR | | Nil | |
| #8 | TR | | Nil | |
| #9 | TR | | Nil | |
| | | | | |
| Shaker Tests | | | | |
| #1 West side of Wash | .03 | | Nil | |
| #4 20 yds N.E. of #3 | .02 | | Nil | |
| #5 20 yds E. of #4 | .24 | | TR | |

REDIFORM®

7H 736

# INVOICE

HMCO Report (1982)

HOUSTON INTERNATIONAL MINERALS

MEMORANDUM

DATE: MARCH 8, 1982

TO: NIL MUKHERJEE

FROM: ED SPEER

SUBJECT: PRECIOUS METAL POTENTIAL, TOMBSTONE DISTRICT, ARIZONA

The Tombstone district offers excellent potential for the discovery of gold and silver in subvolcanic deposits associated with breccia pipes (Golden Sunlight and Ortiz types), felsic intrusives (Battle Mtn. type), calcareous sediment replacements (Battle Mtn. and Carlin types) and skarns.

Inferred open pitable reserves of 1.36 million ozs Au and 43.64 million ozs Ag are calculated for 2 of 13 suspected target zones plus a previously leached heap.

This review is in response to a submittal by J.A. Briscoe and Associates (January 8, 1982), Tucson, Arizona, offering the sale of 54 square miles of mineral rights in the Tombstone district, including 1.76 square miles of patented claims in the heart of the district (see attached submittal). My earlier memo to Web Stickney (August 21, 1981), regarding the Tombstone district is herein summarized and updated (see attached memo). Two published articles on Tombstone, plus miscellaneous assay sheets and diagrams are also attached.

## Recommendations

I recommend that HIMCO pursue reconnaissance exploration in the Tombstone district. HIMCO should notify J.A. Briscoe and Associates that we are interested in his proposal and thereby hopefully receive additional data as offered. A three to five day visit to Tucson and Tombstone to review existing data, examine and sample outcrop, open pit, and underground exposures, and inspect old core is recommended as the next step.

## Location

Tombstone district, Tombstone Hills, Cochise County, Arizona (see map).

## Type of Mineralization

Epithermal (to mesothermal) precious metals (Au and Ag) with base metals (Pb, Cu, Zn, Mn). This silver-dominated system (Ag/Au ratio of 5-200:1) occurs in subvolcanic intruded sedimentary rock environments.

## Past Production

An estimated 1.5 million tons of ore were mined from 1878 to 1970 with an average grade of 0.163 oz/t Au, 2.2 oz/t Ag, 30 lb/t Pb, 2 lb/t Cu, and 0.8 lb/t Zn. Since the metal contents varied greatly in different deposits within the district, these values were necessarily locally much higher. Also these average grades were calcualted from the reported quantities of metals produced, thus they reflect the recovery grades, which are necessarily somewhat lower than the actual ore grade. Some of the previously mined bonanza ores were extremely high grade as indicated by a recent sample from the Contention zone that ran 13.267 oz/t Au and 453.35 oz/t Ag (see attached assay sheet) and a sample from the State of Maine mine area that is rumored to have run 1,400 oz/t Ag.

At current metal values, the gold produced would be worth three times as much as the silver produced, thereby making Tombstone a "gold district" rather than a "silver district."

| | | | |
|---|---|---|---|
| 245,000 ozs Au | $400/oz | $ 98,000,000 | 68% |
| 3,300,000 ozs Ag | $9/oz | 29,700,000 | 20% |
| 45,000,000 lbs Pb | $0.31/lb | 13,950,000 | 10% |
| 3,018,000 lbs Cu | $0.80/lb | 2,414,400 | 1.6% |
| 1,179,000 lbs Zn | $0.43/lb | 506,970 | 0.4% |
| Current Value of Past Production | | $144,571,370 | 100% |

## Mining History

Major mining camp from 1879 to 1900 and mining activity continues today. The district has numerous inactive mines, some 900 to 1,000 feet deep, and was owned by both Newmont and Duval in the past. The current major owner is Tombstone Development Company (TDC). The 1.76 square miles of patented claims in the heart of the district plus 0.58 square miles of adjacent unpatented claims (18) are leased to Tombstone Exploration, Inc. (TEI), who have been operating a 1,000 to 3,000 tpd open pit and heap leach facility at the Contention deposit since 1979.

## Development of Property to Date

A. TDC land (offered for lease or sale)

1. Patented land (1.76 $mi^2$) - 90% of district's production; at least 10 major inactive mines, mostly inaccessible, however approximately two miles of underground workings are still accessible in the Empire and Sulphuret anticline areas; active open pit mine (1,000 to 3,000 tpd) on the Contention deposit; numerous inactive small mines and prospect pits; several 2,000 foot deep core holes by Newmont in the 1950's.

2. Unpatented claims (464, 10.94 $mi^2$) - adjacent to patented land and elsewhere; numerous inactive small mines and prospect pits; limited shallow drilling.

3. State Prospecting Permit land (41.0 $mi^2$) - peripheral to the district; numerous inactive prospect pits; limited shallow drilling.

B. Non-TDC land - small parcels of patented, unpatented, and State Prospecting Permit land; several active small open pit and heap leach operations (State of Maine and Dry Hill Mines); one active small underground mine (Tombstone Extension); numerous inactive small mines and prospect pits.

## Current Exploration Activity

No district-wide comprehensive exploration program has been conducted since Newmont's efforts in the 1950's. Since then the majority of the land has belonged to companies too small to fund extensive exploration. Recent interest and minor activity by: ASARCO, Newmont, Occidental, Phelps Dodge, First Mississippi Corp., Teton, and J.A. Briscoe and Associates (for TDC). The district and surrounding areas are essentially tied up by TDC and Briscoe, who do not have sufficient funds for exploration. Recent core drilling at nearby Charleston Lead Mine. Also recent core drilling by HIMCO that intersected porphyry copper mineralization on Tenneco's Little Boquillas fee lands along the San Pedro River to the west.

## Host Rocks

Cambrian through Pennsylvanian calcareous sediments and Cretaceous volcanics, volcaniclastics, and clastic and calcareous sediments, all intruded by intermediate to felsic Laramide magmas. Mineralization, alteration and ore deposits occurred in all rock types.

## Mineralization

Argentiferous and auroriferous base metal sulfides (galena, tetrahedrite, pyrite) with sphalerite, chalcopyrite, and alabandite (MnS) reportedly comprised the hypogene ore minerals, however recently identified tellurium oxysalts are widespread and abundant, indicating primary tellurides were present. Oxide zone mineralization is easily leachable silver halides and free gold. District wide Ag:Au ratio is 13:1 based on production figures, however this varied from >200:1 to <5:1 in individual ore deposits. Assay sheets and lists of identified minerals are attached.

## Alteration

Contact metamorphic hornfels and calc-silicates developed in the intruded sedimentary rocks while widespread hydrothermal argillization, adularization and silicification (opal) affected both sediments and intrusives. Most of the ore mined in the Empire anticline, Sulphuret anticline and the Contention dike zones (approximately 60% of the district's production) occurred in, adjacent to, or above the "novaculite" unit which probably is an adularia and silica (opal) alteration feature of shales and siltstones. Those areas which were the most permeable, such as fractured shales and siltstones, intrusive contact zones, tightly folded bedded limestones, and faults provided channelways for circulating hydrothermal solutions and underwent the most intense alteration and mineralization. Buchanan's "Epithermal Precious Metal Vein Model" (see attached) is applicable although alteration and mineralization are not restricted to veins. The boiling level probably migrated vertically numerous times, giving rise to a "telescoped" system (precious metals were mined to 1,000 foot depth and base metals increased with depth; drilled intercepts indicate precious metals and base metals also exist at 2,000 foot depth).

Possible Targets

The numerous potential targets listed in my earlier memo (see attached) range from near surface open pitable deposits to deep porphyry environments. The following description of the open pitable (<400') targets is of the most concern to HIMCO at this time. The map on the following page shows 13 potential open pit deposits centered on the following previously mined areas:

1. Contention dike zone (including Empire dike zone)
2. Empire anticline zone (Toughout, Goodenough, Girard, Empire, Skip Shaft and Silver Thread Mines).
3. Vizina Mine
4. Northwest Shaft-Defense fissure zone
5. Sulphuret anticline zone (Sulphuret and Westside Mines)
6. Oregon and Prompter Mines
7. Lucky Cuss, Old Guard and Herschel Mines
8. Bunker Hill Mine
9. Ingersol Mine (not on TDC ground)
10. Emerald Mine
11. Tribute Mine
12. Luck Sure Mine
13. Comet Mine

Actual tonnages and grades are unknown, except for the Contention dike and Empire anticline zones where limited data is given below. None of these targets have been drilled, including the Contention dike zone being open pitted by TEI.

In addition, numerous undiscovered, generally deep, targets exist; however, several may be within open pitable depths. Favorable areas shown in yellow on the map are:

1. Northwest continuation of Empire anticline zone.
2. Southeast continuation of Empire anticline zone.
3. All areas along Prompter Fault
4. Tombstone Extension Mine - Emerald Gulch area (east of map area).
5. Schieffelin Granodiorite - carbonate sediment contact zones covered by gravel.
6. "Novaculite" outcrop areas (possible alteration zones along caldera ring fractures).

## Inferred Open Pitable Reserves on TDC Ground

Two of the 13 potential open pit deposits plus a previously leached heap are presented:

| Area | Tons (millions) Waste | Tons (millions) Ore | Grade (ozs/t) Au | Grade (ozs/t) Ag | Ozs. (millions) Au | Ozs. (millions) Ag |
|---|---|---|---|---|---|---|
| Contention Dike | 18.75 | 6.25 | 0.163 | 2.20 | 1.02 | 13.75 |
| Empire Anticline | 24.75 | 8.25 | 0.033 | 3.49 | 0.27 | 28.79 |
| Composit Heap | 0.00 | 0.68 | 0.010 | 1.61 | 0.07 | 1.10 |
| | | | | | 1.36 | 43.64 |

The Contention dike zone, which is mineralized for 4,800 feet of its 7,000 foot strike length, probably produced 40% of the district's total dollar production. The dike probably represents the subvolcanic feeder zone for eruptive volcanics (Uncle Sam Porphyry welded tuff) correlative to the Schieffelin Granodiorite intrusive. The dike has many similarities to the subvolcanic environments of the Golden Sunlight, Ortiz and Battle Mountain deposits. Mineralization extends from the surface to 900-1,000 feet deep where mining stopped due to labor problems and lowered silver prices; however only the upper 400' is considered open pitable.

The south end of the Contention dike zone is currently being open pitted by Tombstone Exploration, Inc., however the operation is probably unprofitable due to poor mining practices and lack of drilled reserves. TEI might be interested in outside exploration and mining expertise help.

The Contention dike potential open pitable zone extends 4,800 feet and possibly contains 25.0 million tons (200' x 4,800' x 400' ÷ 15 cu ft/t; 600,000 tons eliminated for stoped areas). It seems reasonable to assume as much as 25%, or 6.25 million tons, may be ore. The average grade is unknown; however, most of the district's gold reportedly came from this zone, which, coupled with the average district-wide production grades of 0.163 oz/t Au and 2.2 oz/t Ag, makes the early TEI pit sample averages of 0.014 oz/t Au and 1.01 oz/t Ag appear too low. Therefore, the district-wide grades are used in the inferred reserve summary given above. Assay sheets for some high grade samples from the TEI pit are attached.

The Empire anticline potential open pit zone (Toughnut, Goodenough, Girard, Empire, Skip Shaft and Silver Thread Mines) intersects the Contention dike zone and probably produced 20% of the district's total dollar production. The anticline hosts saddle reef, dike contact,

and fault deposits in sharply folded limestones, shales and quartzites of the Cretaceous Bisbee Formation and the Permian portion of the Naco Group. The Empire anticline deposits are similar to the subvolcanic intruded sediment environments of Battle Mountain, Nevada.

The Empire anticline potential open pit zone possibly contains 33.0 million tons (1,800' x 700' x 400' ÷ 15 cu ft/t; 600,000 tons eliminated for stoped areas), of which 25%, or 8.25 million tons may be ore. Average grade is poorly known, however, recent sampling of a small underground portion of the zone gave the following very favorable results:

| Samples | No. of Samples | Grade (Range) (ozs/t) Au | Ag |
|---|---|---|---|
| Total | 93 (100%) | 0.023 (0.005-0.275) | 2.69 (0.01-47.96) |
| Greater than 0.010 Au | 58 (62%) | 0.0328 (0.015-0.275) | 3.49 (0.36-47.96) |
| Less than 0.011 Au | 35 (38%) | 0.0069 (0.005-0.01) | 1.36 (0.01-4.89) |

These samples were collected by Dames and Moore (for TEI) under my supervision in 1980. The Dames and Moore consulting report, with sample locations and assay results, is attached. The samples were channel cuts across suspected mineralized structures along stope walls in the Girard Mine (GUM) and therefore are lower grade than the ore actually mined. The area sampled extends from 20 feet to 400 feet below the surface. Only four samples (4.3%) contained less than $5 combined Au and Ag value ($400/oz and $9/oz) and the average grade of the 58 samples (62%) that ran greater than 0.01 oz/t Au was 0.0328 oz/t Au and 3.49 oz/t Ag, which is equivalent to the DeLamar Silver Mine, Idaho (0.033 oz/t Au and 3.30 oz/t Ag). The inferred reserves for the Empire anticline given in the table above are based on the greater than 0.01 oz/t Au sample results just described.

The Composit Heap contains approximately 680,000 tons of waste rock from the old mines in the district. It was cyanide leached, without crushing, by 71 Minerals from 1975 until 1977 and produced approximately 300,000 ozs Ag and 5,000 ozs Au. Periodic leaching and sampling by TEI indicate recoverable values are still present and the average grade is probably 0.01 oz/t Au and 1.61 oz/t Ag, however identifiable areas of the heap are higher grade. Miscellaneous assays are given on attached assay sheets.

## SUMMARY

1. The Tombstone district is a major mining district which has produced 245,000 ozs Au and 3,300,000 ozs Ag plus Pb, Cu and Zn, from Paleozoic and Cretaceous sediments intruded by Laramide magmas in subvolcanic environments.

2. The Tombstone district contains at least 13 open pit targets in areas of old mines, two of which have inferred reserves of 14.5 million tons @ 0.089 oz/t Au and 2.93 oz/t Ag (1,291,000 ozs Au and 42,540,000 ozs Ag). Inferred reserves of 680,000 tons @ 0.01 oz/t Au and 1.61 oz/t Ag also exist in a previously leached heap.

3. The Tombstone district contains numerous other open pit and deeper hypothetical targets amenable to discovery by mapping, sampling, geophysics, and drilling.

4. The Tombstone district is essentially owned by Tombstone Development Company while J.A. Briscoe and Associates (for TDC) own as much as 50 $mi^2$ of mineral rights on adjacent and peripheral land.

5. TDC and Briscoe are offering to sell title to all of their land, or to lease any land not already leased.

6. Tombstone Exploration, Inc. currently has under lease from TDC, 12 of the 13 potential open pit targets identified in this memo. TEI is open pit mining on one of the targets, and is looking for joint venture partners to develop other targets.

7. It is recommended that HIMCO's precious metals group pursue exploration in the Tombstone district. A three to five day visit to Tucson and Tombstone to review existing data, examine and sample favorable outcrop, open pit, and underground exposures, and inspect old core should be the next step.

Ed Speer

Ed Speer

ES/sdw

Attachments

State Land Lease
Application Denied (3/25/13)

STATE LAND DEPARTMENT OF THE STATE OF ARIZONA
BEFORE THE STATE LAND COMMISSIONER

102

30 day appeal ? Sept. 10

| | |
|---|---|
| IN THE MATTER OF MINERAL LEASE APPLICATION NO. 11-86254 ON THE STATE LAND DESCRIBED THEREIN. | DECISION AND ORDER |
| APPLICANT: JAMES STEWART COMPANY | |

The files of the Arizona State Land Department (the Department) reflect that:

1. On March 25, 1983, James Stewart Co. filed Mineral Lease Application No. 11-86254, for the State Trust land described therein.

2. Review of said application by the Department's Mineral Section determined that applicant has provided insufficient proof of discovery of a valuable mineral deposit.

The Department, therefore, finds that it is not in the best interest of the State Trust to approve Application No. 11-86254.

IT IS ORDERED THAT Mineral Lease Application No. 11-86254, be and the same, hereby is denied.

This Order is effective immediately.

GIVEN under my hand and the official seal of the Arizona State Land Department this 10th day of August, 1984.

STATE LAND DEPARTMENT SEAL

STATE LAND COMMISSIONER

Certified No. 389281 James Stewart Company
3033 North Central Avenue, Suite 707
Phoenix, Arizona 85012

Copy to: Russell A. Kolsrud, Attorney General's Office

75/84-85

| ROUTING ORDER | | INITIALS | DATE ROUTED | ROUTING ORDER | | INITIALS | DATE ROUTED |
|---|---|---|---|---|---|---|---|
| | COMMISSIONER | | | | INFO RESOURCES | | |
| | DEPUTY COMM | | | | SURVEY & MAPNG | | |
| | ADMIN SERVICES | | | | CARTOGPH INFO | | |
| | ACCOUNTING | | | | NATURAL RESOURCES | | |
| | DATA PROCESSING | | | | NRCD | | |
| | SALES ACCOUNTING | | | | RANGE | | |
| | PERSONNEL | | | 1 | MINERALS | | |
| | OFFICE SERVICES | | | | HYDROLOGY | | |
| | CONTRACTS & RECDS | | | | FORESTRY | | |
| | LEASING | | | | FORESTY MGMT | | |
| | CASE EXAMINER | | | | FIRE MGMT | | |
| | RECORDS | | | | SHOP PHX DIST OF | | |
| | URBAN & COM DEV | | | | FLAG DIST OFF | | |
| | URBAN PLANNING | | | | PRESCT DIST OFF | | |
| | SELECT & EXCHNGS | | | | TUC DIST OFF | | |
| | APPRAISAL | | | | BOARD OF APPEALS | | |
| | TUCSON OFFICE | | | | | | |

INITIALS ABOVE WITHOUT COMMENT SHALL INDICATE NO FACTS AVAILABLE OR NO CONTRIBUTION WITHIN DISCIPLINE OF ASSIGNMENT TO ALTER OR NEGATE ACTION PROPOSED

103
Mineral lease APP M-86254

The above mineral lease application was filed March 25, 1983, by the James Stewart Company as a conversion of two prospecting permits, 08-81903 and 08-77664. The minerals of interest are lead, zinc and silver, with minor gold and copper. The parcels involved are located near Charleston, in Cochise County, in Section 36, T. 20 S., R. 21 E. The area covered by the application is 451.77 acres; the rest of Section 36 contains patented claims pertaining to the old Charleston Lead Mine. The property was examined on July 26, 1984.

The 451.77 acres of state land was broken down into 28 claims, the JS group, ranging in size from 1.46 acres to 20.00 acres. The James Stewart Company submitted assays for all but three of the claims; these three were the JS-6, JS-20 and JS-21 claims. Of the remaining 25 claims, only one, JS-19, had an assay that constituted ore-grade material.

The JS-19 sample appears to have been taken from an old shallow mine working on the claim. Using E&MJ's June metal prices, the combined value of the ore runs $165 per ton (in the ground). Principal values are in zinc and silver.

One drill hole--Hole No. 4--on claim JS-14 intersected some good grade mineralization (copper, zinc and silver), but intervals were, for the most part, less than three feet and depths were greater than 1470 feet. Considerably more exploration work is needed to determine whether this mineralization is worth the cost of sinking a shaft to such depths (1478 ft. to 2238 ft.).

The applicant's plan of operations calls only for trenching with a backhoe to locate minerals, and drill new holes and deepen existing ones. This is another way of saying that sufficient reserves have not been developed to date to start a mining operation in the near future (if at all). Trenching and drilling can, and should, be done under the existing prospecting permits (08-81903 has been cancelled, but was refiled as 08-89409).



WHEN IT RELATES TO A MATTER CALLING FOR FINAL ACTION BY THE DEPARTMENT, THIS SHEET SHALL BE KEPT AS A PERMANENT WORK PRODUCT RECORD BY THE DIVISION OF PERMANENT RECORD. WORK PRODUCT IS NOT PUBLIC RECORD.

104

In summary, the applicant has failed to prove the existence of a valuable mineral deposit or deposits on the state lands under discussion. I recommend that this lease application be denied.

ECS

2385

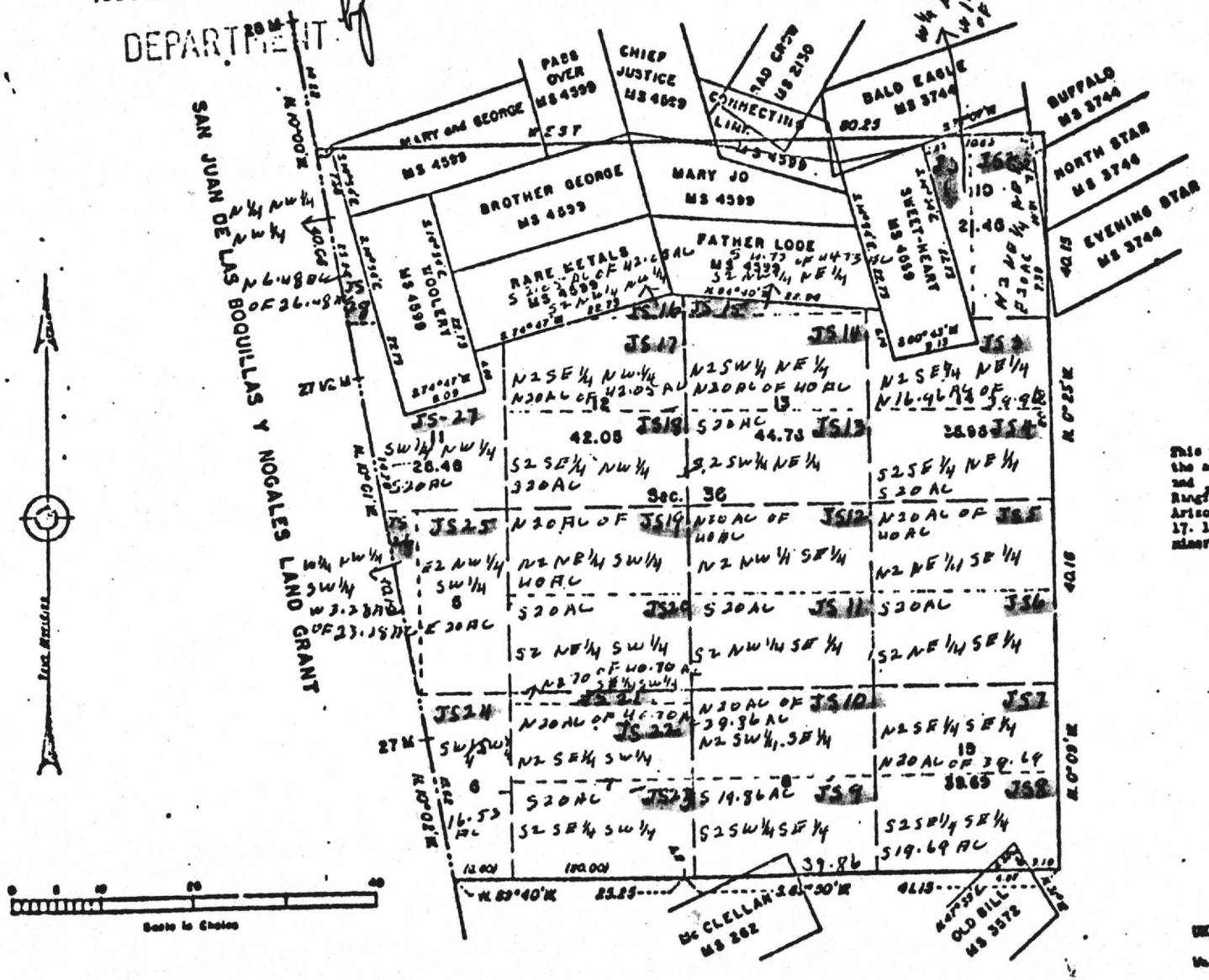
# TOWNSHIP 20 SOUTH, RANGE 21 EAST, OF THE GILA AND SALT RIVER MERIDIAN, ARIZONA

## SUPPLEMENTAL PLAT OF SEC. 36

STATE OF ARIZONA
1993 MAR 25 PM 2:51
DEPARTMENT

51655
17-131

OFFICIALLY FILED 9-10-1963




This plat showing amended lotting created by the segregation of Mineral Survey Nos. 3572 and 4599 in section 36, Township 20 South Range 21 East, Gila and Salt River Meridian, Arizona, is based on the plat accepted May 17, 1945 and the record of the approved mineral surveys.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Washington, D.C. July 30, 1963

This plat, showing amended lottings, is based upon the official records, and having been correctly prepared in accordance with the regulations, is hereby accepted.

For the Director

JAMES STEWART CO.

COPPER STATE ANALYTICAL LABS, INC.
DNYANENDRA A. SHAH
ARIZONA REG. NO. 8888
REGISTERED ASSAYER
P. O. BOX 7517
TUCSON, ARIZONA 85725
710 E. EVANS BLVD.
PHONE 602-884-5811
884-5812

106

James Stewart Co.
Suite 707
303 N. Central Ave.
Phoenix, AZ 85012

JOB# 002006
RECEIVED 3/10/83
REPORTED 3/23/83
INVOICE# C 2311

| SAMPLE NUMBER | Ag opt | Au ppm | Ag ppm | Zn ppm | Pb ppm | Cu ppm | Mo ppm |
|---|---|---|---|---|---|---|---|
| JS - | | | | | | .0224% | |
| 1 | | 0.08 | 0.7 | 20 | 14 | 224 | 8 |
| 2 | | 0.12 | 0.6 | 16 | 14 | 22 | 8 |
| 3 | | 0.10 | 1.2 | 38 | 32 | 50 | 2 |
| 4 | | 0.10 | 11.0 | 226 | 0.28% | 148 | 2 |
| 5 | | 0.18 | 2.6 | 18 | 112 | 0.33% | 2 |
| 7 | | 0.44 | 16.0 | 400 | 0.28% | 0.27% | 14 |
| 8 | | 0.64 | 7.1 | 222 | 0.79% | 200 | 84 |
| 9 | | 0.10 | 3.0 | 216 | 1.46% | 110 | 60 |
| 10 | | 0.08 | 0.4 | 16 | 146 | 20 | 4 |
| 11 | | 0.12 | 4.4 | 294 | 0.71% | 170 | 2 |
| 12 | | 0.10 | 1.8 | 12 | 114 | 124 | 38 |
| 15 | | 0.08 | 0.8 | 28 | 50 | 12 | 2 |
| 16 | | 0.09 | 0.8 | 26 | 24 | 14 | 2 |
| 17 | | 0.06 | 0.4 | 10 | 20 | 14 | 4 |
| 18 | | 0.06 | 0.4 | 12 | 12 | 12 | 4 |
| 19 | 6.11 | 0.58 | >100 | 8.15% | 1.46% | 0.81% | 44 |
| 22 | | 0.10 | 1.2 | 384 | 146 | 80 | 1 |
| 23 | | 0.08 | 1.8 | 300 | 98 | 40 | 2 |
| 24 | | 0.06 | 0.6 | 104 | 42 | 22 | <1 |
| 25 | | 0.05 | 0.6 | 40 | 30 | 14 | <1 |
| 26 | | 0.08 | 0.6 | 32 | 14 | 12 | 4 |
| 27 | | 0.06 | 0.4 | 22 | 20 | 30 | 4 |
| 28 | | 0.10 | 0.8 | 26 | 18 | 12 | 2 |

REGISTERED ASSAYER
CERTIFICATE NO.
8888
Dnyanendra
Amrutlal Shah
DATE SIGNED 3-23
Arizona U.S.A.

1 ppm = 0.0001%  1 troy oz./ton = 34.286 ppm  1 ppm = 0.0292 troy oz./ton

* Gold and Silver reported in troy oz. per 2,000 lb. ton.

005

File: James Stewart Co.
Settle Horne
Charlestone Leadville
Tombstone MD
Cochise Co, Az

# COPPER STATE ANALYTICAL LAB, INC.

COMPLETE ANALYTICAL SERVICES — CSA

P. O. BOX 7517
TUCSON, ARIZONA 85725
PH: (602) 884-5811

BILL TO:

James A. Brisco $ Asso.
5701 E. Glenn #120
Tucosn, Az. 85712

**INVOICE:** C 7073
JOB NO: 5594
DATE: 06/18/87
ACCOUNT NO:
P. O. NO:
PROJECT:

COPY TO:

For Stuwart Mines

**PAY FROM THIS INVOICE — NO OTHER STATEMENT WILL BE SENT**

| ANALYTICAL CHARGES | | | | OTHER CHARGES | |
|---|---|---|---|---|---|
| QUANTITY | DESCRIPTION | UNIT COST | AMOUNT | DESCRIPTION | AMOUNT |
| 13 | Gold (FA/AA) | $5.75 | $74.75 | | |
| 13 | Silver | $2.60 | $33.80 | | |
| 13 | Copper | $2.00 | $26.00 | | |
| 13 | Lead | $1.80 | $23.40 | | |
| 13 | Zinc | $1.60 | $20.80 | | |
| 13 | Molybdenum | $2.60 | $33.80 | | |
| 13 | Vanadium | $2.60 | $33.80 | | |
| 13 | Arsenic | $4.50 | $58.50 | | |
| 13 | Antimony | $4.75 | $61.75 | | |
| 13 | Mercury | $3.50 | $45.50 | | |
| 4 | Copper, Zinc assay | $1.25 | $5.00 | | |
| 4 | Pb, Zn (wet) 73% | $6.75 | $27.00 | | |
| 13 | Sample prep | $3.00 | $39.00 | | |
| ANALYTICAL CHARGES | | | $483.10 | OTHER CHARGES | |
| Advance | | | $860.00 | ANALYTICAL CHARGES | |
| TOTAL ANALYTICAL Credit Left | | | $376.90 | Total Credit | ($376.90) |

I don't think they are however. - call & check

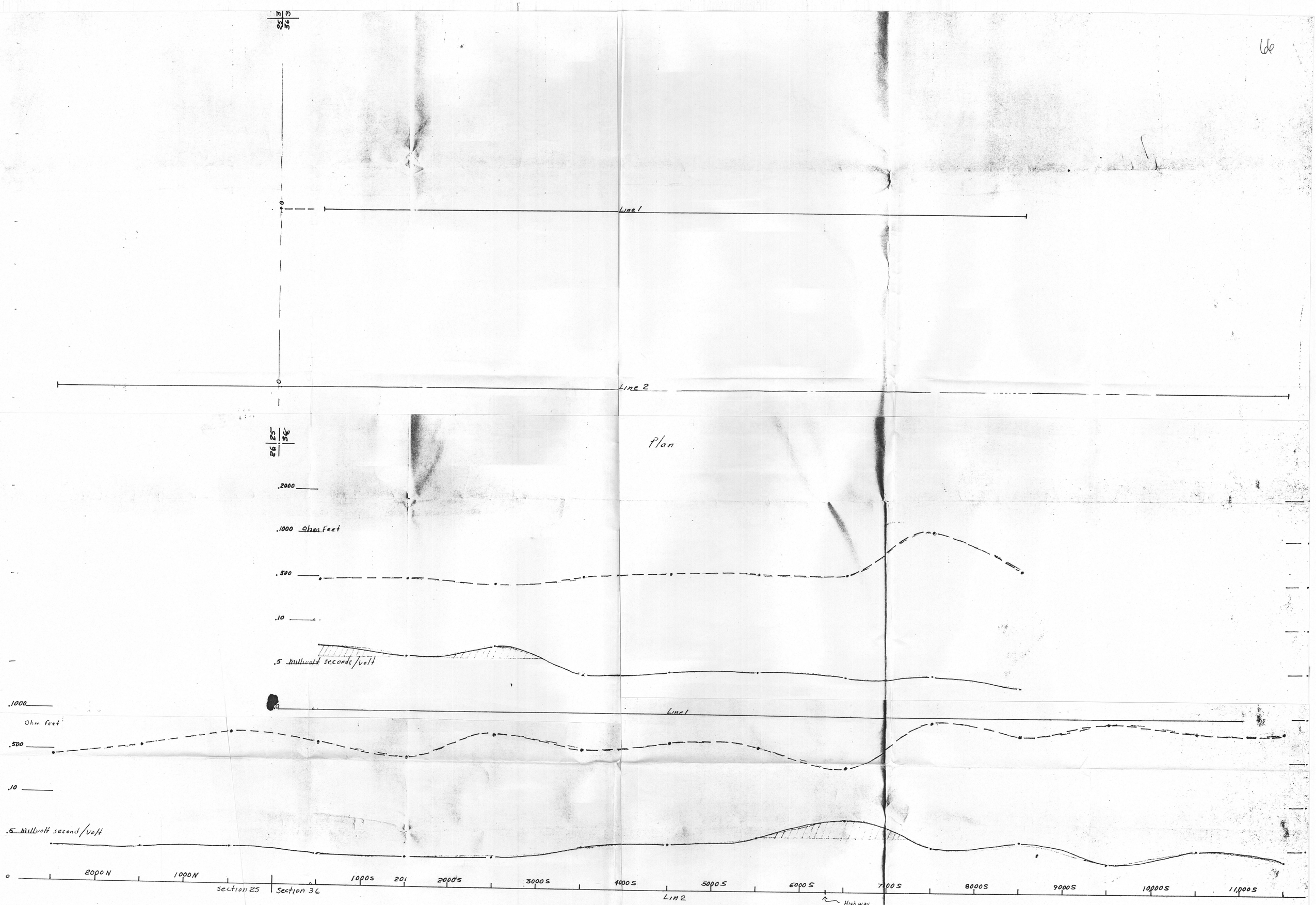
Nadee - We never used this credit should be able to get money back if they are still in business

NET 10 DAYS

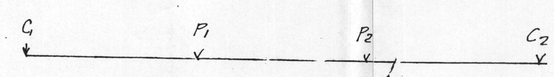
Thank You

Rev. 1/18/88 HB

007




Preliminary Map




Possible Mineralized Areas

Eletrode Spacing 1000 feet

Wenner Configuration

Induced Polarization and Resistivity Profiles

Stewart Copper Prospect

Tombstone Area, Cochise County, Arizona

Scale 1" = 500'

- - - - Resistivity

——— Induced Polarization

Hewitt Enterprises, Salt Lake City, Utah

7-25-67