CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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LEGEND

- DOLOMITIZATION
- SILICIFICATION
- ARGILLIZATION
- MARBILIZATION
- CALCITE VEINLETS
- EPIDOTIZATION

- MINE WORKINGS AT CHANCE MINE 160 LEVEL
- MINE WORKINGS AT CHANCE MINE 220 LEVEL

ALTERATION OVERLAY

CHANCE MINE

SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA

SCALE : 1" = 100'

DANIEL L. E. HUCKINS

OCT., 1963

THE CHANCE MINE, SWISSHELM MINING DISTRICT

SWISSHELM MOUNTAINS, COCHISE COUNTY, ARIZONA

The Chance Mine lies approximately 40 miles due north of Douglas, Arizona, and is located in Section 12, Range 27 East, Township 20 South, of the Gila and Salt River base line.

The property consists of 14 unpatented lode mining claims; the ownership of these claims is as follows:

> Eight (8) claims are held by the writer under a lease-option-to-purchase agreement with Mr. J. F. Rydbom, their owner. This agreement will expire in January of 1966. The claims held under the terms of the agreement are the Chance Claims Numbers 1, 2, 3, and 4; the Crest claims Numbers 1, 2, and 3; and the Keystone Claim. The positions of the Chance Number 1 Claim and the Chance Number 3 Claim are shown on the accompaning 200 scale map.
>
> The remaining six (6) claims are held by the writer and are the Marble Hill Claims Numbers 1, 2, and 3; and the Mine Ridge Claims Numbers 1, 2, and 3. The positions of these claims are also shown on the above map.

Rocks present in the area range from pre-Cambrian granite and formations of the pre-Cambrian Apache group to Tertiary and Quaternary alluvial material as well as recent stream gravels and talus materials.

In the immediate area of the property the Naco limestone of Carboniferous age has been overthrust onto the Cambrian Abrigo limestone along a major North-South trending thrust fault, here referred to

as the "Master" thrust, of probable early Tertiary age. This major structure has been intruded by a "sill" of well-brecciated porphoritic andesite of which several phases are present. Subsequent to the intrusion of the andesite, some continued minor thrust movement occurred, followed by hydrothermal alteration of the andesite and the overlying Naco limestone and finally by the emplacement of ore.

The vast bulk of the ore mined from the Chance and the adjoining Scribner Mine has been taken from oxidized replacement ore-bodies in the Naco limestone at or immediately above its contact with the underlying andesite sill. The largest ore-bodies are localized near the base of a synclinal roll of the andesite-Naco contact, as indicated on the vertical sections accompaning the 100 scale geologic surface plan.

The Chance Mine on the Chance Number 1 Claim is developed by a 230 foot vertical shaft with levels at 160 and 220 feet. Almost all the production from this mine was made from the 220 level which is at the andesite-Naco contact. The 160 level connects with the Scribner Mine workings.

The Scribner Mine on the Mountain Queen Claim is developed by a vertical shaft to a depth of perhaps 210 feet. The ore mined from this property came from the areas outlined in plan view on the 100 scale alteration overlay. While the bulk of the ore came from the 160 level and above, some ore was developed and mined from a sublevel in the andesite below the 160 level workings.

Figures from the Minerals Yearbook, 1947 through 1954, indicate that the main ore zone of the Scribner Mine at the andesite-Naco contact produced some 24,000 tons of ore which contained 0.05 to 0.10 oz. Au, 3.6 to 5.4 oz. Ag, 0.05 to 0.15% Cu, 8.8 to 15.7% Pb, and less than 1.3% Zn.

The underground workings of both mines are now inaccessible due to impassability and/or unsafe conditions. The water table presently stands at the 160 level in the Chance shaft.

In November, 1963, the writer's diamond drill hole $C\text{-}3_2$ cut 6.5 feet of massive sulfide ore at a depth of 204.6 feet which assayed 15.6% Pb, 12.5% Zn, 0.68% Cu, 0.05 oz. Au and 12.8 oz. Ag. This ore is presumed to represent the extension of the main ore zone at the andesite-Naco contact worked in the Scribner Mine. Core recovery was good (91%) and almost all the core recovered from the intersection is unoxidized sulfide ore. This material evidently represents the hypogene equivalent of the oxidized ore taken from the Scribner Mine.

The Master thrust fault continues to the South of drill hole $C\text{-}3_2$ for at least one-half mile and should favorable conditions persist, the presence of a significant tonnage of ore is possible.

Respectfully submitted,

Daniel L. E. Huckins

Daniel L. E. Huckins
December 1963

Ing Misc

11/4/63

Dan Huckins, Geol.

1173 A-E Seneca St.

MA 3-1312:

Chance Mine

Swisshelms, Cochise County

ARIZ 600' x 1500'

300
3600

300' - 500' = 6000'
3,500

300'
12
1600

300' @

1800'

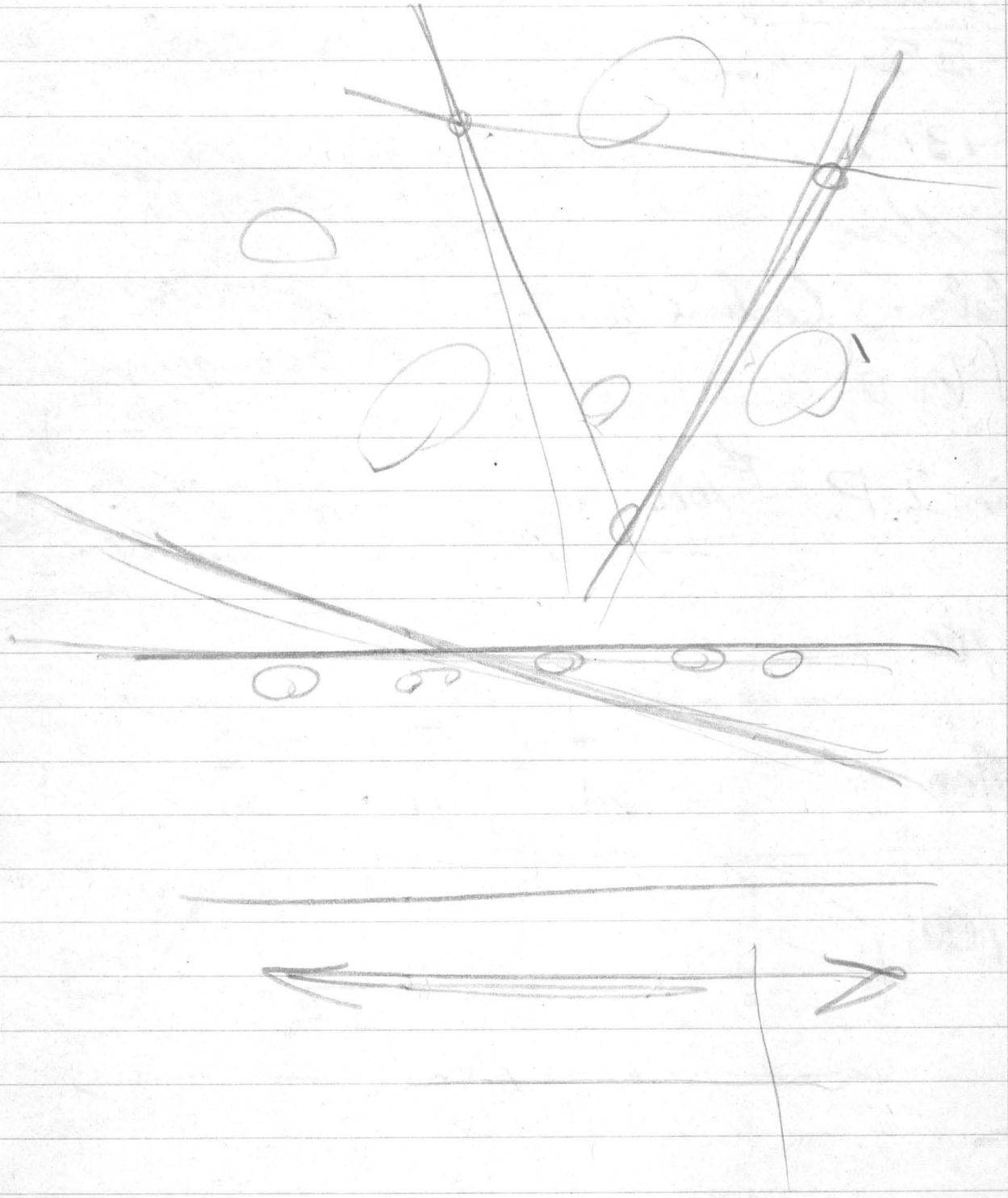
5800'

300' 300' 300' 300'

1 Claim I.P. - $1000.00 - 2 days ±

may take 3 days $1500.00 ±

MGH, Chris, & EGH.



2/3/64

Dan Huckins (Chance Mine) called -:

25 on list to present

4 interested

2 years from to purchase.

75000 tons.

over riding royalty

$500,000.00

$500.00/mo 1st 6 mos.

LEGEND

BEDDING

SHEARING

THRUST FAULT

NORMAL FAULT

ALLUVIUM

QUARTZ PORPHYRY BRECCIA

ANDESITE PORPHYRY

PORPHORITIC ANDESITE

NACO LIMESTONE

ABRIGO LIMESTONE

GEOLOGIC SURFACE PLAN

CHANCE MINE

SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA

SCALE : 1" = 100'

ELEVATIONS RELATIVE CHANCE MINE SHAFT COLLAR TAKEN AS 500'

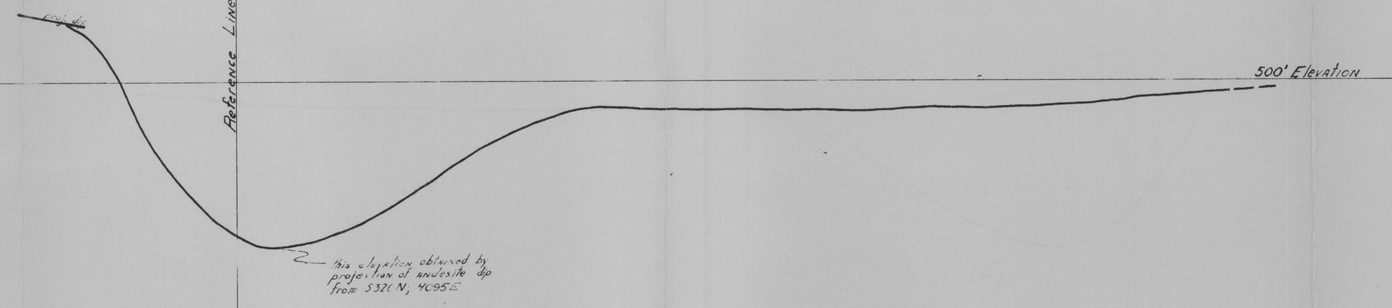
MAGNETIC DECLINATION TAKEN AS N 13° 00' E

DANIEL L. E. HUCKINS

OCT., 1963

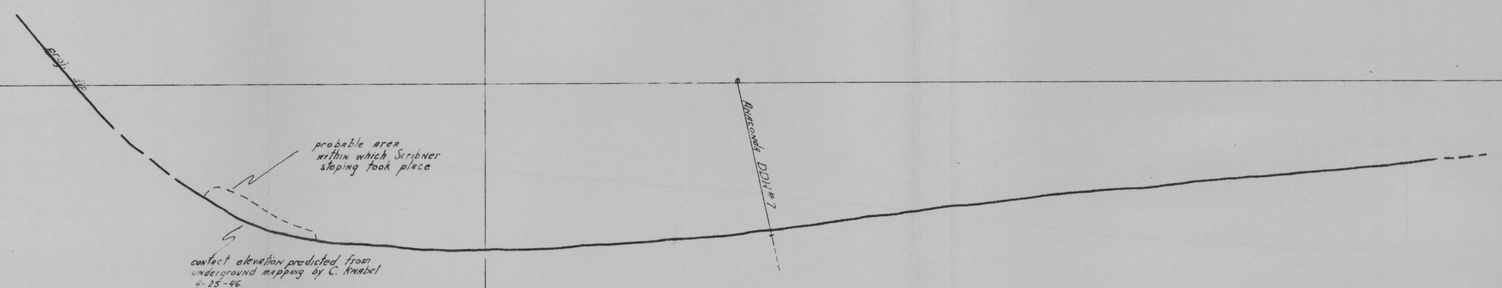
A

A'



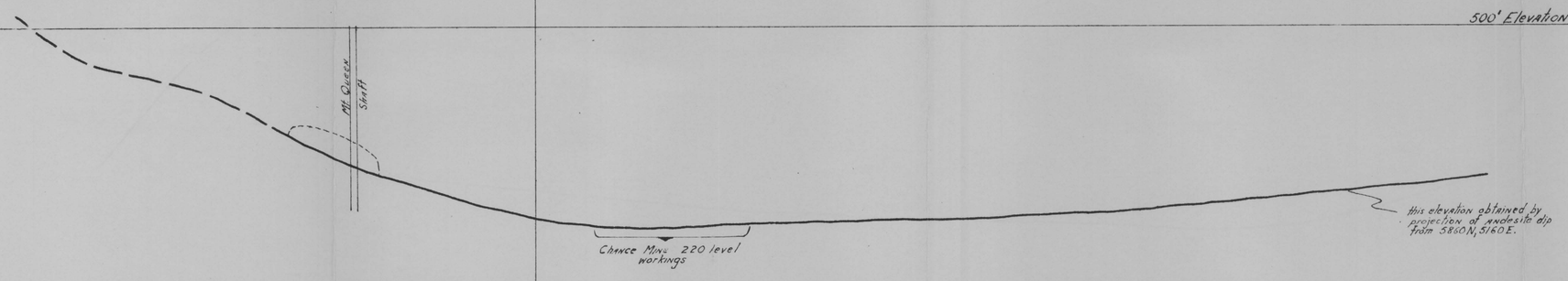
B

B'



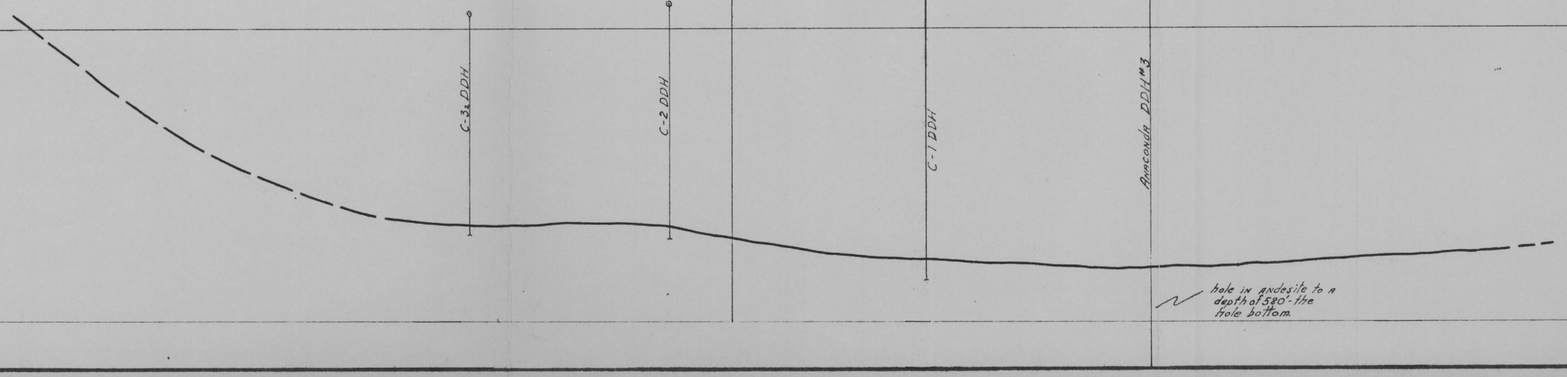
C

C'



D

D'



VERTICAL GEOLOGIC CROSS SECTIONS

CHANCE MINE

SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA

HORIZONTAL & VERTICAL SCALES: 1" = 100'

VIEW LOOKING NORTHWEST

CONTACT SHOWN IS THAT OF THE HANGING WALL OF THE ANDESITE SILL — NACO LIMESTONE IS THE OVERLYING ROCK

DANIEL L. E. HUCKINS

NOV. 1963

LEGEND
BEDDING
SHEARING
THRUST FAULT
NORMAL FAULT
ALLUVIUM
QUARTZ PORPHYRY BRECCIA
ANDESITE PORPHYRY
PORPHORITIC ANDESITE
NACO LIMESTONE
ABRIGO LIMESTONE
7000 N
6000 N
5000 N
4000 N
3000 E
4000 E
5000 E
6000 E
7000 E
8000 E
Marble Hill #1
Marble Hill #2
Marble Hill #3
Disc.
GEOLOGIC SURFACE PLAN
CHANCE MINE
SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA
SCALE : 1" = 200'
MAGNETIC DECLINATION TAKEN AS N 13° 00' E
DANIEL L. E. HUCKINS
NOV., 1963

COPY

INDUCED POLARIZATION SURVEY

CHANCE MINE AREA

COCHISE COUNTY, ARIZONA

for

DANIEL L. E. HUCKINS

December 1964

by

HEINRICHS GEOEXPLORATION COMPANY
P. O. Box 5671 Tucson, Arizona

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Introduction ----------2

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Basis of I.P. Method----------1a

In Pocket:

Four Sectional Data Sheets

One Location and MCF Plan Map

COPY

INTRODUCTION

From December 21 through December 23, 1964, Heinrichs Geoexploration Company, at the request of Daniel L. E. Huckins undertook and completed an induced polarization and resistivity survey over a portion of the Chance Mine Area located in the Swisshelm Mining District, Cochise County, Arizona.

The survey was run using the dual frequency induced polarization method, employing frequencies of 3 cps. and .05 cps. A total of 9,400 line feet were covered yielding 5,400 ft. of subsurface information. A dipole-dipole electrode array with a spacing of 200 ft. was used in an attempt to obtain relatively detailed subsurface information to a depth in excess of 250 ft. which is necessary for the detection of the probable ore bodies in the area, which are relatively small but massive sulfide occurrences. Four lines were run in the course of the work; Lines 1, 2 and 3 on a bearing N70°E and Line 4 bearing N35°W.

The data are plotted on sectional data sheets showing the apparent resistivity, percent frequency effect and metallic conduction factor, all contoured in vertical section.

The metallic conduction factor is plotted in plan with the line locations on the geologic base map supplied by Mr. Huckins. Also included in the text is a regional location map of the area.

GEOEX personnel involved in this project were Mr. Fred M. Johnson and Mr. John P. Matthews, Jr., geophysicists and Rex Montierth and H. R. Moulinet, geophysical technicians.

COPY

CONCLUSIONS AND RECOMMENDATIONS

1. Induced polarization shows moderately anomalous values contained in a zone trending NW-SE generally along Line 4. Anomalous values were also observed over C-3. West of the andesite intrusive, in the abrigo limestone there is a slight increase in PFE's; however, there is insufficient data to fully evaluate this area.

2. The resistivity indicates an anomalous zone which corresponds fairly well with the PFE anomaly. To the east the high resistivities map the deepening limestone layer. To the west the resistivity maps the andesite intrusive and in general the presence of the underlying abrigo limestone. Line 4 shows the chert beds to the south and/or the presence of a cross fault which may be of important significance.

3. Based on the geophysics, the most likely location for a drill hole would be 100 ft. east of C-8. Two other possible drill targets in order of interest lie 100 ft. east and approximately 200 ft. south of C-8 and 475 ft. east and 200 ft. south of C-8 respectively.

4. Further geologic and geophysical study would be helpful to further evaluate the area west of the andesite intrusive which gives a slight I. P. response.

COPY

INTERPRETATION

Line 1 was centered 30 ft. east and 10 ft. south of C-4 and run on a bearing N70°E. This line ran over C-3 which encountered 6½ ft. of massive sulfide mineralization at a depth of 205 ft. From 0 - 200 ft. east is a zone of slight I. P. anomalism which corresponds with the sulfide zone sampled by C-3. There is a slight increase in polarization west of the andesite intrusive. The resistivity data indicates a horizontal contact which was calculated to lie at a depth of 200 ft., the lower layer being of considerably lower resistivity as might be given by a massive sulfide zone. Beyond 200 ft. east the resistivities increase rapidly indicating the dipping limestone beds which increase in depth to the east. There is a low resistivity zone located 300 ft.

west of the center point which probably reflects the lower resistivity of the andesite intrusive, this effect is masked at depth by the limestone beds above and below it.

Line 2 was run parallel to Line 1 with the center point located 210 ft. east and 300 ft. south of C-8. There were slight frequency effects noted on the line approximately 200 ft. east of the center point. The resistivity shows an anomalous zone about 200 ft. west to 200 ft. east of the center point. There is a contact located about at the center point which correlates well with a northwest trending fault shown on the geology map. The resistivity again increases to the east due to the deepening of the limestone and the influence of known chert beds. These chert beds may also be a contributing factor in the extremely high resistivities mapped by the prior two lines. From 400 ft. west to the end of the line the resistivities again decrease probably due to the andesite.

Line 3 was run parallel to Line 1 with the center point located 30 ft. south and 10 ft. east of C-8. The only significant I. P. effects noted on this line are located from 0 - 300 ft. east of the center point. This coincides with a relative resistivity low on this line. To the east the deepening of the limestone beds is reflected by the high resistivities. To the west the resistivity picture is quite complex; however, the near surface resistivity low is undoubtedly caused by the andesite intrusive. Beyond the low, the resistivity increases due to the effect of the abrigo limestone which crops out on the surface.

Line 4 was run on a bearing N35°W with the center point located 300 ft. east and 210 ft. south of C-8. The purpose of this line was to survey the ground within the northwest, southeast trending zone of possible mineralization. The highest frequency effects are located about 600 ft. north of the center point in the vicinity of C-3. The resistivity is also decreasing close to C-3. The slight resistivity low about 100 ft. north of the center point is on the fringe of the anomaly mapped by Lines 2 and 3. The high resistivity to the south is a result of chert beds or may possibly be caused by a cross fault. If the latter is true, this fault may be of primary geologic importance.

COPY

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

J. P. Matthews, Jr.
Geophysicist

Approved:

C. S. Ludwig
Sr. Geophysicist

January 8, 1965
P. O. Box 5671
Tucson, Arizona

COPY

ROAD LOG TO THE CHANCE MINE, SWISSHELM MOUNTAINS, ARIZONA

The Swisshelm Mountains are approached from either the North or South, via U. S. Highway 666, which connects the town of Douglas with Arizona Highway 86. About midway between Mileposts 29 and 30, on Highway 666, a well-traveled road (the Rucker Canyon Road) leads to the Swisshelm Mountains. The road signs on Highway 666 read "Rucker Canyon" with an arrow pointing East.

Milepost 0.0 - Turn off highway 666 on Rucker Canyon Road.

Milepost 3.7 - A side road enters the main road from the left.

Milepost 9.2 - Road forks, a sign at this junction reads "Kuykendall." Take the right fork, within another mile and one-half the buildings of the Moore Ranch are visible at the end of a long straight stretch of the road.

Milepost 11.8 - Moore Ranch buildings on the left-hand side of the road. The main road immediately turns to the right and crosses Rucker Canyon Wash. There are two channels. 100 feet past the second or South Channel, a one-lane road turns off to the right. Take this road. Within 150 yards it passes between some canals on the left and a field on the right--in another 200 yards this road turns into the main canyon here leading into the Swisshelm Mountains.

Milepost 14.1 - Side road from a nearby ranch house joins the road you are on--bear right.

Milepost 14.9 - A large stock tank is passed which lies about 100 yards off the road to the right. Within another 100 yards the road turns into the drainage in which the Chance Mine is located. Stay on the road in this main drainage.

Milepost 16.1 - Residence of Mr. J. F. Rydbom. The mine is just beyong this point on the other side of a small hill which lies immediately south of Mr. Rydbom's house.

Hudson, Dan [3/29/65

311' bott hole. Very fine grained mineral.

Pb - Ag ratio

12" mineralized

30 power Binoc

3' Ag high (but) not ore.

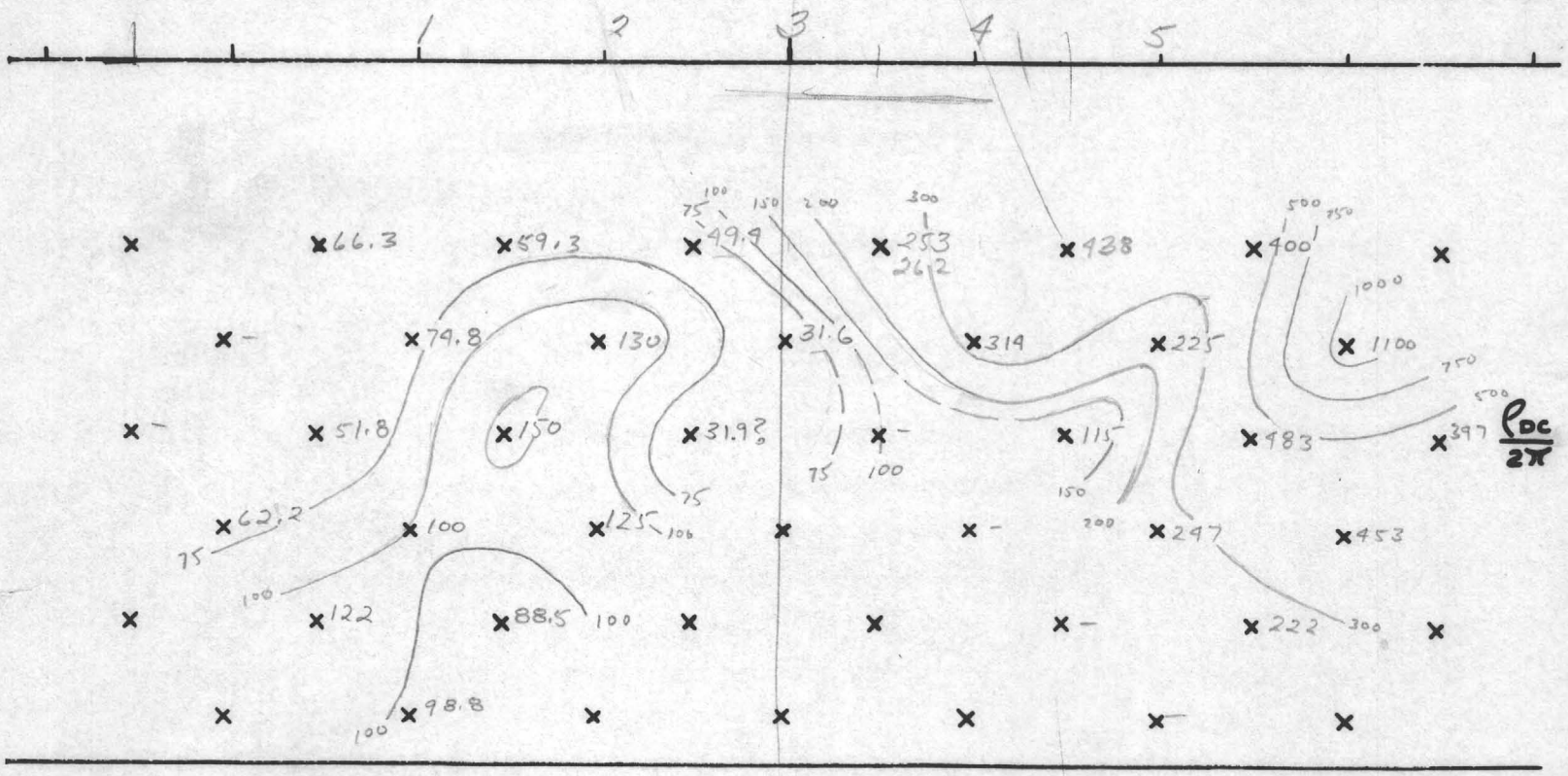
Dike? more coarse than

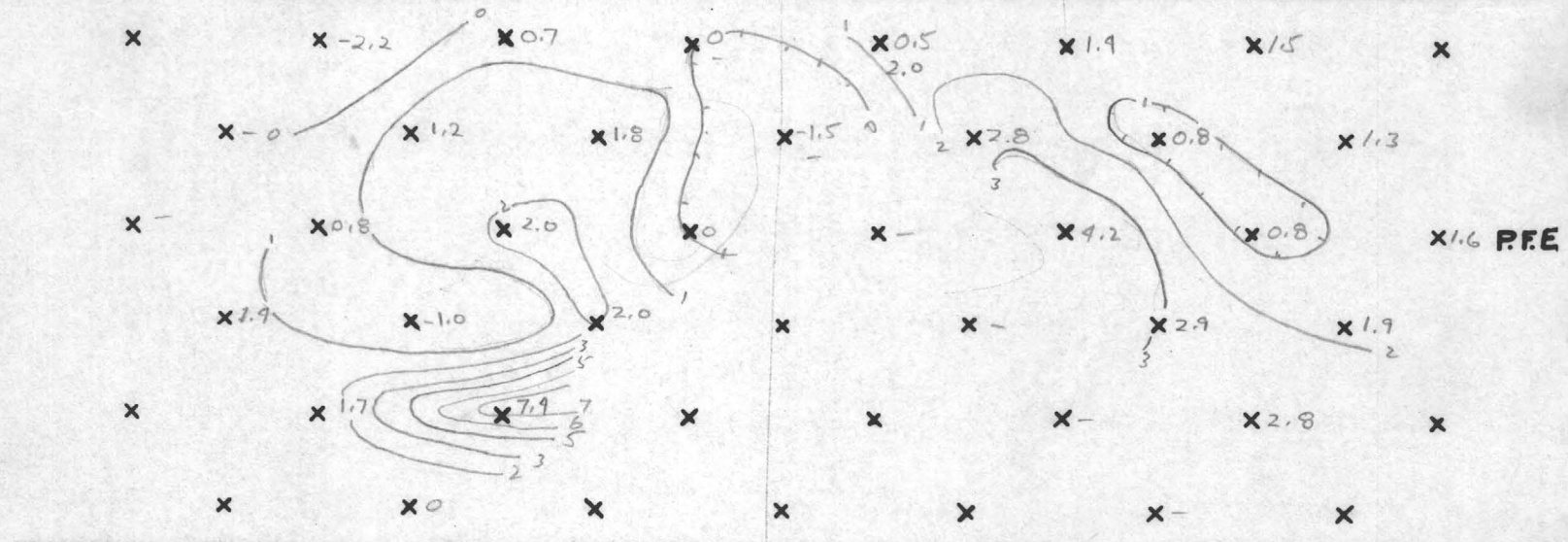
andesite sill

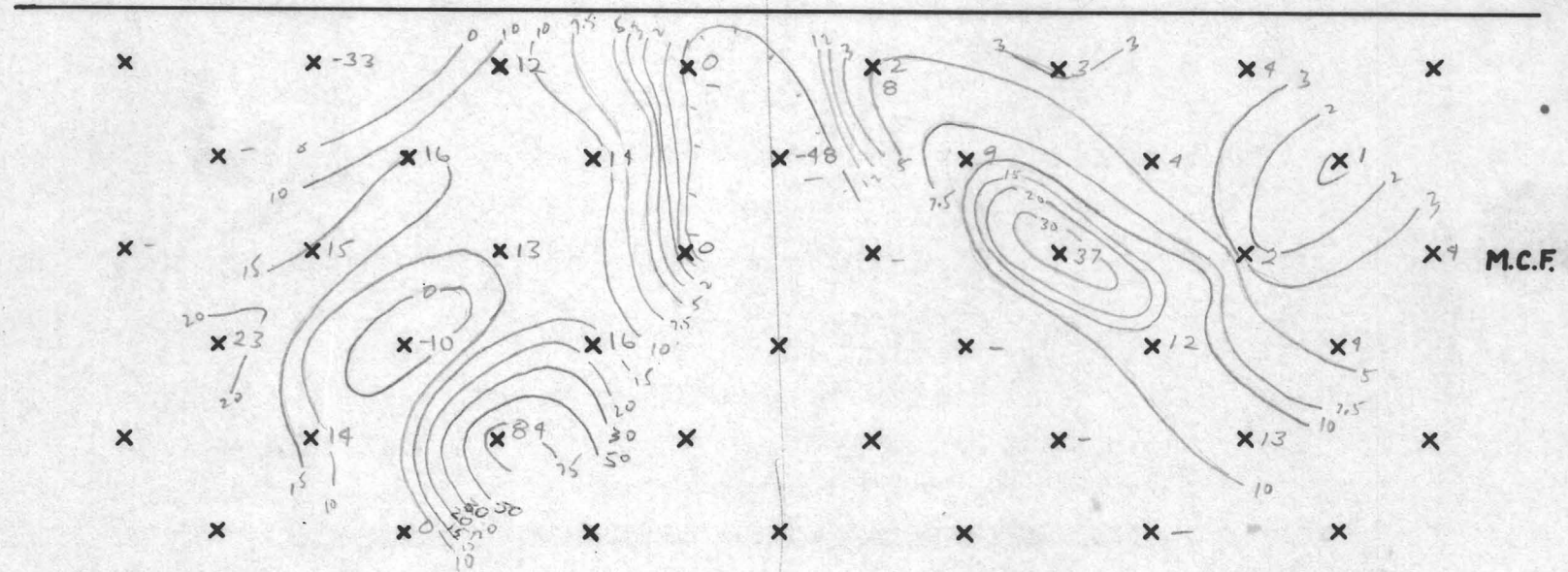
Red breccia on surface might be remanent of old or previous orebody.

More work - 500' deep? 2 Mos from now?
call Pi or Sat for Monday morning, get together Chris & Phil sometime?
cw.

HEINRICHS GEOEX. -INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N







AREA Chance Mine LINE 2 a = 200' SCALE: 1" = 200' DATE: 12-29-64

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 2 E Int.Cal _____ Date: 22 Dec

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	05	5-10	→	10-15		→	15-20			→		
Time												
DC-1	300 312	→		360 370	93 90		165 168	38.5 39.1	13.5 13.8			
DC-2	300 312			360 370	93 90		165 168	38.5 39.1	13.5 13.8			
Σ		612		730	183		333		27.3			
DC-3	300 312			360 370	93 90		165 168	38.5 39.1	13.4 13.0			
Dc-4	300 312			360 370	93 90		165 168	38.5 39.1	13.4 13.0			
Σ		612		730	183		333	77.6	26.9			
DC-AV		612		730	183		333		26.9			
AC-1	300			360	89		164	38.5	12.9			
AC-2	300			360	89		164	38.5	12.9			
Σ		600		720	178		328	77.0	25.8			
S. P.	-2.0	+5.0		-2.5			+11.1					
AC-N	.01	.03		.02			.02					
1.0		1.6		1.5			1.5					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 2 E Int.Cal _____ Date: 22 Dec

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2			CAL	
Rec.	20-25	→	→	→	25-30	→	→	→				
Time												
DC-1	115 114	40.0 40.5	13.9 14.7	16.2 16.9	1	18.2 19.5	6.8 8.0				25	
DC-2	115 114	40.0 40.5	13.9 14.7	16.2 16.9		18.2 19.5	6.8 8.0				25	
Σ	229	80.5	28.6	↳	33.1	37.7						
DC-3	115 114	40.0 40.5	14.0 15.0	16.2 16.9		18.2 19.5	6.8 8.0				25	
Dc-4	115 114	40.0 40.5	14.0 15.0	16.2 16.9		18.2 19.5	6.8 8.0				25	
Σ	229	80.5	28.8	↳	33.1	37.7						
DC-AV	229				33.1	37.7	19.8					
AC-1	113	39.9	14.0	16.2		18.5	7.2				25	
AC-2	113	39.9	14.0	16.3		18.5	7.2				25	
Σ	226	79.8	28.0	↳	32.6	37.0						
S. P.	43.0			-24.9								
AC-N	.03			.02								
I.C	45			45								

INDUCED POLARIZATION SENDER NOTES

Project: HUKINS Line: 11 Date: 12-22-64

Send	2-3	3-4	2-3	4-5	3-4	2-3	4-5	3-4	2-3	4-5	3-4	2-3
Receive	2-4N	4-6N	→	6-8N	→	→	8-1N	→	→	1-12N	→	→
Time												
Range												
Current	1400	1000	1400	500	1000	1400	500	1000	1400	500	1000	1400
Send												
Receive												
Time												
Range												
Current												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 2 W Int.Cal _____ Date: 22 DEC

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-5	5-10	→	10-15	→	→	15-20	→	→	→		
Time	300	100	10	300								
DC-1	107 108	41.5 42.6	3.2 3.5	70 71	27 28	17.0 15.6	22 23	22 22.5	12.2 13.3	2.6 2.7		
DC-2	107 108	42.0 42.0	3.2 3.5	70 71	27 28	17.0 15.6	22 23	22 22.5	12.2 13.3	2.6 2.7		
Σ	215	84.0	6.7	141	55	32.6	45	44.5	25.5	5.3		
DC-3	107 108	42.0 42.0	3.2 3.5	70 71	27 28	17.0 15.6	22 23	22. 22.5	12.2 13.3	2.6 2.7		
Dc-4	107 108	42.0 42.0	3.2 3.5	70 71	27 28	17.0 15.6	22 23	22 22.5	12.2 13.3	2.6 2.7		
Σ	215	84.0	6.7	141	55	32.6	45	44.5	25.5	5.3		
DC-AV	215	84.0	6.7	141	55	32.6	45	44.5	25.5	5.3		
AC-1	107	42	3.4	70	27	16.3	23	22	12.5	2.6		
AC-2	107	42	3.4	70	27	16.3	23	22	12.5	2.6		
Σ	214	84	6.8	140	54	32.6	46	44	25.0	5.2		
S. P.	-21.0	+17.4	→	-9.3	→	→	-8.7	.		+7.6		
AC-N	.01	.01	→	.01	→	→	61 45					
L.C.	45	45		45								

INDUCED POLARIZATION SENDER NOTES

Project: HUKINS Line: II Date: 12-22-64

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Receive	0-.25	.2-.45	→	.4-.65	→	→	.6-.85	→	→	→	8-15	→
Time												
Range												
Current	500	1000	500	1400	1000	600	400	1400	1000	500	—	1400

Send	3-4	4.5	1-2	2-3	3.4	4-5						
Receive	→	→	1-1,25	→	→	→						
Time												
Range												
Current	1000	500	—	1400	1600	500						

CAL 1000

INDUCED POLARIZATION - RECEIVER NOTES PAGE_____

Project: CHANCE Line: 2-W Int.Cal_____ Date:_____

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5				
Rec.	20-25	→	→	→	25-30	→	→	→				
Time												
DC-1		6.1 6.2	4.1 4.4	1.05 1.10		3.6 3.8	3.1 2.8	.70 .80			51.0	
DC-2		6.1 6.2	4.1 4.4	1.05 1.10		3.6 3.8	3.1 2.8	.70 .80			51.0	
Σ		12.3	8.5	2.15		7.4	5.9					
DC-3		6.1 6.2	4.1 4.4	1.05 1.10		3.6 3.8	3.1 2.8	.70 .80				
Dc-4		6.1 6.2	4.1 4.4	1.05 1.10		3.6 3.8	3.1 2.8	.70 .80				
Σ		12.3	8.5	2.15		7.4	5.9	.50				
DC-AV		12.3	8.5	2.15		7.4	5.9					
AC-1	.13	6.1	4.3	1.0	.36	3.7	2.9	.75			51.0	
AC-2		6.1	4.3	1.0		3.6	2.9	.75			51.0	
Σ		12.2	8.6	2.0		7.3	5.8					
S. P.	+6.5				+6.1							
AC-N	.07				.03							
IC	45				45							

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page _____

Project CHANCE Line 2E 200' Field date 12-22-69 Data page _____ Comp. date 12-29-69 Comp by J.P.M.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-2	2-4	→	4-6	—	→	6-8	—	—	→	8-10	—
(C) n separation		1000	—	1000	300	—	300	100	30	—	300	100
(D) I	—	1400	—	1000	1400	—	500	1000	1400	—	500	1000
(E) Vdc (avg)	~~612~~	612	—	730	183	—	333	77.6	26.9	—	229	80.5
(F) DCcal	1.0	—	—	—	—	—	—	—	—	—	—	—
(G) Kn x 10^{-3}	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12	2.4	6
(H) ρ dc=ExFxGx10^3/D	—	262	—	438	314	—	400	225	115	—	1100	483
(I) Vac Σ	—	600	—	720	178	—	328	77.0	25.8	—	226	79.8
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.0	—	—	—	—	—	—	—	—	—	—	—
(M) ρ dc/ρac=ExL/K	—	1.029	—	1.019	1.028	—	1.015	1.008	1.042	—	1.013	1.008
(N) PFE=(M-1)(10^2)	—	2.9	—	1.4	2.8	—	1.5	0.8	4.2	—	1.3	0.8
(O) MCF=(M-1)(10^5)/H	—	8	—	3	9	—	4	4	37	—	1	2

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		CAL				
(B) Receive	8-10	→	10-12	—	—	→		~~500~~				
(C) n separation	30	—	30	30	30	—						
(D) I	1400	—	500	1000	1400	—						
(E) Vdc (avg)	28.8	—	33.1	37.7	14.8			50				
(F) DCcal	1.0	—	—	—	—	—						
(G) Kn x 10^{-3}	12	21	6	12	21	33.6						
(H) ρ dc=ExFxGx10^3/D	247	—	397	453	222							
(I) Vac Σ	28	—	32.6	37.0	14.9	—		50				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.0	—	—	—	—	→						
(M) ρdc/ρac =ExL/K	1.029	—	1.016	1.019	1.028							
(N) PFE=(M-1)(10^2)	2.9	—	1.6	1.9	2.8							
(O) MCF=(M-1)(10^5)/H	12	—	4	4	13							

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page ____

Project CHANCE Line 200' 2 10½ Field date 12-22-69 Data page ____ Comp. date 12-29-69 Comp by J.P.M

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-2	2-4	→	4-6	→	→	6-8	→	→	→	8-10	→
(C) n separation												
(D) I	500	1000	500	1400	1000	600?	400	1900	1000	500	—	1400
(E) Vdc (avg)	215	84.0	6.7	141	55	32.6	45	44.5	25.5	5.3	—	12.3
(F) DCcal	.981	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12	2.4	6
(H) ρ dc=ExFxGx10^3/D	253	49.4	31.6	59.3	130	319	66.3	74.8	150	125		51.8
(I) Vac Σ	219	84.0	6.8	140	59	32.6	46	44	25.0	5.2	—	12.2
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1.005	0	.985	1.007	1.018	0	.978	1.012	1.020	1.020	—	1.008
(N) PFE=(M-1)(10^2)	0.5	0	-1.5	0.7	1.8	0	-2.2	1.2	2.0	2.0	—	0.8
(O) MCF=(M-1)(10^5)/H	2	0	-48	12	19	0	-33	16	13	16		15

Project ____ Line ____ Field date ____ Data page ____ Comp. date ____ Comp by ____

(A) Send	3-4	4-5	1-2	2-3	3-4	45		CAL				
(B) Receive	8-10	→	10-12	→	→	→		→	→	→	→	→
(C) n separation												
(D) I	1000	500	—	1400	1000	500		1000				
(E) Vdc (avg)	8.5	2.15	—	7.4	5.9	1.50		102				
(F) DCcal	.981	→	→	→	→	→	→	.981	→	→	→	→
(G) Kn x 10^{-3}	12	21	6	12	21	33.6						
(H) ρ dc=ExFxGx10^3/D	100	88.5		62.2	122	98.8						
(I) Vac Σ	8.6	2.0	—	7.3	5.8	1.50						
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$								102				
(L) AC-DC cal.	1.	→	→	→	→	→	→	1.000	→	→	→	→
(M) ρdc/ρac =ExL/K	.990	1.014	—	1.014	1.017	0						
(N) PFE=(M-1)(10^2)	-1.0	7.4	—	1.4	1.7	0						
(O) MCF=(M-1)(10^5)/H	-10	84	—	23	19	0						

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 3 E Int.Cal _____ Date: 23/12

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-5	5-10	→	10-15	→	→	15-20			→		
Time												
DC-1	20.5 21.5	72 72	11.8 11.8	113 115	8.5 9.2	1.85 1.82	290 281	47 48	8.5 8.1	1.92 1.9		
DC-2	20.5 21.5	72 72	11.8 11.8	113 115	8.5 9.2	1.85 1.82	290 281	47 48	8.5 8.1	1.92 1.9		
Σ	42.0	144	23.6	228	17.7							
DC-3	20.5 21.5	72 72	11.8 11.8	113 115	8.5 9.2	1.85 1.82	290 281	47 48	8.5 8.1	1.92 1.9		
Dc-4	20.5 21.5	72 72	11.8 11.8	113 115	8.5 9.2	1.85 1.82	290 281	47 48	8.5 8.1	1.92 1.90		
Σ	42.0	144	23.6	228	17.7	3.67	571	95	16.6	3.82		
DC-AV	42.0	144	23.6	228	17.7							
AC-1	120	70	11.8	110	8.8	1.77	281	45.5	8.2	1.9		
AC-2	20	70	11.8	110	8.7	1.77	281	45.5	8.2	1.9		
Σ	40	140	23.6	220	17.5	3.54	562	91.0	16.4	3.8		
S. P.	-15.5	+4.5		-4.6			+2.0					
AC-N	.02	.03		.04			.03					
	45	45		45			45					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 3 E Int.Cal _____ Date: 23/12

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		CAL		
Rec.	20-25	→	→	→	25-30	→	→	→				
Time												
DC-1	117 120	32 33	4.9 4.95	1.25 1.28	25 25	12 12	2.4 2.4	.65 .63		20.1		
DC-2	117 120	32 33	4.9 4.95	1.25 1.28	25 25	12 12	2.4 2.4	.65 .63				
Σ					50	24						
DC-3	117 120	32 33	4.9 4.95	1.25 1.28	25 25	12 12	2.4 2.4	.65 .63		20.1		
Dc-4	117 120	32 33	4.9 4.95	1.25 1.28	25 25	12 12	2.4 2.4	.65 .63				
Σ	237.0	6.5	9.85	2.53	50	24	4.8	1.28				
DC-AV					50	24						
AC-1	117	32	4.9	1.24	24	10	2.38	.60		20.1		
AC-2	117	32	4.9	1.24	24	10	2.38	.60		20.1		
Σ	239	69	9.8	2.48	48	20	4.76	1.2				
S. P.	-6.2				+1.3							
AC-N	.03				.03							
I.C.	45				46							

INDUCED POLARIZATION SENDER NOTES

Project: HUKINS Line: III Date: 12-23-64

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
Receive	0-.2N	.2-.4N	→	.4-.6N	→		.6-.8N	→			.8-1N	—
Time												
Range												
Current	600	600	600	400	400	400	400	400	600	600	500	600

Send	2-3	1-2	4-5	3-4	2-3	1-2						
Receive	→		1-1.2N	→								
Time												
Range												
Current	600	600	500	600	600	600						

CAL 400

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 3 4L Int.Cal _____ Date: 23/12

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	5-5	5-10	→	10-15	→	→	15-20	→	→	→		
Time												
DC-1	59 59	20 20	9.0 9.0	15.9 16.1	9.5 9.3	6.5 6.3	23 22	5.1 5.1	4.15 4.25	3.1 3.3		
DC-2	59 59	20 20	9.0 9.0	15.9 16.1	9.5 9.3	6.5 6.3	23 22	5.1 5.1	4.15 4.25	3.1 3.3		
Σ		40	18.0		18.8	12.8	45	10.2				
DC-3	59 59	20 20	9.0 9.0	15.9 16.1	9.5 9.3	6.5 6.3	23 22	5.1 5.1	4.15 4.25	3.1 3.3		
Dc-4	59 59	20 20	9.0 9.0	15.9 16.1	9.5 9.3	6.5 6.3	23 22	5.1 5.1	4.15 4.25	3.1 3.3		
Σ		40	18.0		18.8	12.8	45	10.2				
DC-AV	118	40	18.0	32.0	18.8	12.8	45	10.2	8.40	6.9		
AC-1	59	20	8.9	15.9	9.3	6.3	21.5	5.05	4.15	3.15		
AC-2	59	20	8.9	15.9	9.3	6.3	21.5	5.05	4.15	3.15		
Σ	118	40	17.8	31.8	18.6	12.6	43.0	10.1	8.3	6.3		
S. P.	+7.5	-6.2		+17.9			-11.9					
AC-N	.03	.04		.02			.03					
	16	45	45		45		46					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 3 4 Int.Cal _____ Date: 23/07

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5				
Rec.	20-25	→	→	→	25-30	→	→	→				
Time												
DC-1	128 120	3.9 3.9	3.6 3.6	2.8 3.0	6.0 7.0	2.1 2.0	2.1 2.2	1.75 1.78				
DC-2	128 120	3.9 3.9	3.6 3.6	2.8 3.0	6.0 7.0	2.1 2.0	2.1 2.2	1.75 1.78				
Σ				5.8		4.1	4.3					
DC-3	128 120	3.9 3.9	3.6 3.6	2.8 3.0	6.0 7.0	2.1 2.0	2.1 2.2	1.75 1.78				
Dc-4	128 120	3.9 3.9	3.6 3.6	2.8 3.0	6.0 7.0	2.1 2.0	2.1 2.2	1.75 1.78				
Σ				5.8		4.1	4.3					
DC-AV	248	7.8	7.2	5.8	13.0	4.1	4.3	3.53				
AC-1	123	3.8	3.55	2.8	6.0	2.0	2.0	1.7				
AC-2	121	3.8	3.55	2.8	6.0	2.0	2.0	1.7				
Σ	244	7.6	7.10	5.6	12.0	4.0	4.0	3.4				
S. P.	-0.5				+121							
AC-N	.03				.03							
	45				45							

INDUCED POLARIZATION SENDER NOTES

Project: HUKINS Line: III Date: 12-23-64

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Receive	0-.25	.2-.45	→	4-6S	→	→	6-8S	→	→	→	.8-1S	~
Time												
Range												
Current	500	600	500	600	600	500	600	600	600	500	600	600

Send	3-4	4-5	1-2	2-3	3-4	4-5						
Receive	→	→	1-1.2S	→	→	→						
Time												
Range												
Current	600	500	600	600	600	500						

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project HUCKINS Line 3 E Field date 12/23/64 Data page_____ Comp. date 12/28/64 Comp by JPM FMJ

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	0-2	2-4	→	4-6		→	6-8			→		
(C) n separation	30	300	30	300	30	3	1000	100	30	3		
(D) I	600	600	600	400	400	400	400	400	600	600		
(E) Vdc (avg)	42	144	23.6	228	17.7	3.67	571	95	16.6	3.82		
(F) DCcal	.996	→								→		
(G) Kn x 10^{-3}	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12		
(H) ρ dc=ExFxGx10^3/D	41.8	144	94.0	341	106	54.8	850	568	166	76.0		
(I) Vac Σ	40	140	23.6	220	17.5	3.54	562	91.0	16.4	3.8		
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1	991	→	991	→	1.01	984	→	→	1.01		
(M) ρ dc/ρac=ExL/K	1.05	1.019	0	1.028	1.010	1.047	0	1.043	1.013	1.005		
(N) PFE=(M-1)(10^2)	5.0	1.9	0	2.8	1.0	4.7	0	4.3	1.3	0.5		
(O) MCF=(M-1)(10^5)/H	120	13	0	8	9	86	0	8	8	7		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-0		CAL		
(B) Receive	8-10	→	→	→	10-12	→	→	→		400		
(C) n separation	300	100	10	3	100	30	10	1				
(D) I	500	600	600	600	500	600	600	600				
(E) Vdc (avg)	237	65	9.85	2.53	50	24	4.8	1.28		40.2		
(F) DCcal	.996	→	→	→	→	→	→	→				
(G) Kn x 10^{-3}	2.4	6	12	21	6	12	21	33.6				
(H) ρ dc=ExFxGx10^3/D	1134	648	196	88.2	597	478	167	71.4				
(I) Vac Σ	234	64	9.8	2.48	48	20	4.76	1.20		40.2		
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	991	→	1.006	1.01	→	→	1.006	1.005				
(M) ρdc/ρac =ExL/K	1.004	1.016	1.010	1.030	1.041	1.20	1.013	1.072				
(N) PFE=(M-1)(10^2)	0.4	1.6	1.0	3.0	4.1	20.0	1.3	7.2				
(O) MCF=(M-1)(10^5)/H	0	2	5	34	7	42	8	101				

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project HUCKINS Line 3-W Field date 12/23/64 Data page_____ Comp. date_____. Comp by JCH FMJ.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive	.02	2.4	→	4-6	→	→	6-8	→	→	→		
(C) n separation	100	30	30	30	30	30	100	10	10	10		
(D) I	500	600	500	600	600	500	600	600	600	500		
(E) Vdc (avg)	118	40	18	32	18.8	12.8	45	10.2	8.4	6.4		
(F) DCcal	.996	→	→	→	→	→	→	→	→	→		
(G) Kn x 10^{-3}	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12		
(H) ρ dc=ExFxGx10^3/D	141	39.9	86.0	31.9	74.8	153	44.8	40.6	83.6	153		
(I) Vac Σ	118	40	17.8	31.8	18.6	12.6	43	10.1	8.3	6.3		
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	—	—	—	—	—	—	—	1.006	1.006	1.006		
(M) ρ dc/ρac=ExL/K	0	0	1.010	1.006	1.010	1.016	1.046	1.016	1.018	1.022		
(N) PFE=(M-1)(10^2)	0	0	1.0	0.6	1.0	1.6	4.6	1.6	1.8	2.2		
(O) MCF=(M-1)(10^5)/H	0	0	12	19	13	10	103	39	22	14		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		CAL		
(B) Receive	8-10	→	→	→	10-12	→	→	→		400		
(C) n separation	100	10	10	10	30	10	10	3				
(D) I	600	600	600	500	600	600	600	500				
(E) Vdc (avg)	248	7.8	7.2	5.8	13.0	4.1	4.3	3.53		40.2		
(F) DCcal	.996	→	→	→	→	→	→	→				
(G) Kn x 10^{-3}	2.4	6	12	21	6	12	21	33.6				
(H) ρ dc=ExFxGx10^3/D	98.6?	77.6	143	243	130	81.7	150	236				
(I) Vac Σ	244	7.6	7.1	5.6	12.0	4.0	4.0	3.4		40.2		
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	—	1.006	1.006	1.006	—	1.006	1.006	1.01				
(M) ρdc/ρac =ExL/K	1.016	1.032	1.020	1.041	1.090	1.030	1.081	1.048				
(N) PFE=(M-1)(10^2)	1.6	3.2	2.0	4.1	9.0	3.0	8.1	4.8				
(O) MCF=(M-1)(10^5)/H	16	41	14	17	69	37	54	20				

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: _____ Line: 4 N Int.Cal _____ Date: 23 /12

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-5	5-10	→	10-15	→	→	15-20	→	→	→		
Time												
DC-1	103 103	165 165	17 17.5	27 26	13 13.6	2.7 2.8	72 72	25.5 27	9.0 9.8	2.4 2.6		
DC-2	102 102	165 165	17 17.5	27 26	13 13.6	2.7 2.7	72 72	25.5 27	9.0 9.8	2.4 2.6		
Σ	206											
DC-3	103 103	165 165	17 17.5	27 26	13 13.6	2.7 2.8	72 72	25.5 27	9.0 9.8	2.4 2.6		
Dc-4	103 102	165 165	17 17.5	27 26	13 13.6	2.7 2.8	72 72	25.5 27	9.0 9.8	2.4 2.6		
Σ												
DC-AV	206	230	34.5	153	26.6	5.5	144	52.5	18.8	4.8		
AC-1	100	160	17	75	13.2	2.7	70	25	9.2	2.35		
AC-2	100	160	17	75	13.2	2.7	70	26	9.2	2.3		
Σ	200	220	34	150	26.4	5.4	140	51	18.4	4.65		
S. P.	+1.3	-1.5		-16			+16.5					
AC-N	.03	.05		.03			.03					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 4-N Int.Cal _____ Date: 23/12

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2			CAL	
Rec.	20.25	→	→	→	25.30	→	→	→				
Time												
DC-1	13.5 13.5	6.7 6.7	2.6 2.75	.85 .83	2.5 2.8	1.57 1.61	.72 .74	.26 .28			20.1	
DC-2	13.5 13.5	6.7 6.7	2.6 2.75	.85 .83	2.5 2.8	1.57 1.61	.72 .74	.26 .28			20.1	
Σ												
DC-3	13.5 13.5	6.7 6.7	2.6 2.75	.85 .83	2.5 2.8	1.57 1.61	.72 .74	.26 .28				
Dc-4	13.5 13.5	6.7 6.7	2.6 2.75	.85 .83	2.5 2.8	1.57 1.61	.72 .74	.26 .28				
Σ												
DC-AV	27.0	13.4	5.35	1.68	5.3	3.18	1.46	.54			40.2	
AC-1	13.5	6.5	2.7	.83	2.55	1.57	.71	.26			20.1	
AC-2	13.3	6.5	2.7	.82	2.55	1.56	.7	.26			20.1	
Σ	26.8	13.0	5.4	1.65	5.10	3.13	1.41	.52			40.2	
S. P.	-12.0				-10.2							
AC-N	.03				.03							

INDUCED POLARIZATION SENDER NOTES

Project: HUKINS Line: TN Date: 12-23-64

Send	1-2 4-5	2-3 3-4	1-2 4-5	3-4 2-3	2-3 3-4	1-2 4-5	4-5 1-2	3-4 2-3	2-3 3-4	1-2 4-5	4-5 1-2	3-4 2-3
Receive	0-2W	2-4W	→	4-6W	→		6-8W	→	→		8-1W	▷
Time	↑ N	↑ N		↑ N			↑ N				↑ N	
Range												
Current	400	400	400	400	400	400	400	400	400	400	400	400

Send	2-3 3-4	1-2 4-5	4-5 1-2	3-4 2-3	2-3 3-4	1-2 4-5						
Receive	→	→	1-1.2W	→	→							
Time												
Range												
Current	400	400	400	400	400	400						

INDUCED POLARIZATION - RECEIVER NOTES PAG _____

Project: CHANCE Line: 4 S Int.Cal _____ Date: 23/12

Send	4-5	5-6	6-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	05	5-10	→	10-15	→	→	15-20	→	→	→		
Time												
DC-1	130 135	104 102	16.4 15.5	340 340	18.8 19.2	4.1 4.1	720 725	55 57	4.9 4.95	1.35 1.35		
DC-2	130 135	104 102	16.4 15.5	340 340	18.8 19.2	4.1 4.1	720 725	55 57	4.9 4.95	1.35 1.35		
Σ									✓			
DC-3	130 135	104 102	16.4 15.5	340 340	18.8 19.2	4.1 4.1	720 725	55 57	4.9 4.95	1.35 1.35		
Dc-4	130 135	104 102	16.4 15.5	340 340	18.8 19.2	4.1 4.1	720 725	55 57	4.9 4.95	1.35 1.35		
Σ	265	206	31.9	680	38.0	8.2	1445	112	9.85	2.70		
DC-AV	265	206	31.9	680	38.0	8.2	1445	112	9.85	2.70		
AC-1	130	100	16.5	330	18.7	4.1	715	54	4.8	1.35		
AC-2	130	100	15.5	339	18.7	4.1	715	54	4.8	1.35		
Σ	260	200	31.0	669	37.4	8.2	1430	108	9.6	2.70		
S. P.	+9.6	+9.4		-18.6			-10.1					
AC-N	.02	.02					.03					
	45											

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: HUCKINS Line: 4 S Int.Cal Date: 12/25/64

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5			CAL	
Rec.	2025				25-30							
Time												
DC-1	155 153	1.71 1.74	4.0 4.0	1.55 1.56	65 68	8.5 9.4	3.5 3.3	1.1 1.35			20.1	
DC-2	153 153	1.71 1.74	4.0 4.0	1.55 1.56	65 68	8.5 9.4	3.5 3.3	1.1 1.35			20.1	
Σ											40.2	
DC-3	155 153	1.71 1.74	4.0 4.0	1.55 1.56	65 68	8.5 9.4	3.5 3.3	1.1 1.35			20.1	
Dc-4	155 153	1.71 1.74	4.0 4.0	1.55 1.56	65 68	8.5 9.4	3.5 3.3	1.1 1.35			20.1	
Σ	20.8	3.45	8.4	3.11	133	17.9	6.8	2.45			40.2	
DC-AV	308	3.45	8.4	3.11	133	17.9	6.8	2.45			40.2	
AC-1	149	1.7	4.2	1.54	64	8.7	3.35	1.2			20.1	
AC-2	149	1.68	4.2	1.53	64	8.7	3.3	1.19			20.1	
Σ	298	3.38	8.4	3.07	128	17.4	6.65	2.39			40.2	
S. P.	+1.2				-42							
AC-N	1.03				.05							

INDUCED POLARIZATION SENDER NOTES

Project: HUCKINS Line: IV Date: 12-23-64

Send	4-5 1-2	3-4 2-3	4-5 1-2	2-3 3-4	3-4 2-3	4-5 1-2	1-2 4-5	2-3 3-4	3-4 2-3	4-5 1-2	1-2 4-5	2-3 3-4
Receive	0-2E	2-4E	→	4-6E	→	→	6-8E	→	→	→	8-1E	→
Time		↑ 5		↑ 5			↑ 5				↑ 5	
Range												
Current	400	400	400	400	400	400	400	400	400	400	400	400
Send	3-4 2-3	4-5 1-2	1-2 4-5	2-3 3-4	3-4 2-3	4-5 1-2						
Receive	→	→	1-1.2E	→	→	→						
Time			↑ 5									
Range												
Current	400	400	400	400	400	400						

CAL 400

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project HUCKINS Line 4 N Field date 12/23/64 Data page_____ Comp. date 12/28/64. Comp by F.M.J.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	0-2	2-4 →	→	4-6 →	→	→	6-8 →	→	→	→		
(C) n separation												
(D) I 2	400	400	400	400	400	400	400	400	400	400		
(E) Vdc (avg) 2 3	206	230	34.5	15 3	26.6	5.5	144	52.5	18.8	4.8		
(F) DCcal	.996 →	→	→	→	→	→	→	→	→	→		
(G) Kn x 10^{-3} 1	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12		
(H) ρ dc=ExFxGx10^3/D 0	308	345	206	128	159	82.2	215	314	281	148		
(I) Vac Σ 3	200	220	34	150	26.4	5.4	140	51	18.4	4.65		
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. 1	.991	.991	1	1	1	1.006	1	1	1	1.006		
(M) ρ dc/ρac=ExL/K	1.020	1.036	1.015	1.020	1.008	1.025	1.029	1.029	1.021	1.039		
(N) PFE=(M-1)(10^2)	2.0	3.6	1.5	2.0	0.8	2.5	2.9	2.9	2.1	3.9		
(O) MCF=(M-1)(10^5)/H	7	10	7	9	5	30	14	9	7	27		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		CAL		
(B) Receive	8-10 →	→	→	→	10-12 →	→	→	→		400		
(C) n separation												
(D) I 2	400	400	400	400	400	400	400	400				
(E) Vdc (avg) 2 3	27.0	13.4	5.35	1.68	5.3	3.18	1.46	.54		40.2		
(F) DCcal	.996 →	→	→	→	→	→	→	→				
(G) Kn x 10^{-3} 1	2.4	6	12	24	264	12	24	33.6				
(H) ρ dc=ExFxGx10^3/D 0	160	200	160	87.7	79.2	95.0	76.3	45.2				
(I) Vac Σ K	26.8	13.0	5.4	1.65	5.10	3.13	1.41	.52		40.2		
(J) AC noise x 2								.06				
(K) Vac (corr) = $\sqrt{I^2 - J^2}$								.516				
(L) AC-DC cal. 1	1	1	1.006	1.010	1.006	1.010	1.010	1.005				
(M) ρdc/ρac =ExL/K	1.008	1.031	.996	1.029	1.045	1.025	1.047	1.052				
(N) PFE=(M-1)(10^2)	0.8	3.1	-0.4	2.9	4.5	2.5	4.7	5.2				
(O) MCF=(M-1)(10^5)/H	5	16	-3	33	57	26	62	115				

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET 12/ Page_____

Project HUCKINS Line 4 5 Field date 12/23/64 Data page_____ Comp. date 28/64. Comp by F.M.J.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
(B) Receive	0-2	2-4 →		4-6 →		→	6-8 →			→		
(C) n separation												
(D) I 2	400	400	400	400	400	400	400	400	400	400		
(E) Vdc (avg) 2 3	265	206	31.9	680	38.0	8.2	1445	112	9.85	2.7		
(F) DCcal	.996 →									→		
(G) Kn x 10^{-3} 1	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12		
(H) ρ dc=ExFxGx10^3/D ⓪	396	308	191	1016	227	122	2160	673	147	80.5		
(I) Vac Σ 2 →	260	200	31.0	669	37.4	8.2	1430	108	9.6	2.7		
(J) AC noise x 2 3												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. 1	.991	.991	1	.984	1	1.006	.984	1	1.006	1.010		
(M) ρ dc/ρac=ExL/K	1.010	1.026	1.030	0	1.016	1.006	.993	1.037	1.032	1.018		
(N) PFE=(M-1)(10^2)	1.0	2.6	3.0	0	1.6	0.6	-0.7	3.7	3.2	1.0		
(O) MCF=(M-1)(10^5)/H	3	8	16	0	7	5	0	6	22	12		

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		CAL		
(B) Receive	8-10 →			→	10-12 →			→		400		
(C) n separation												
(D) I 2	400	400	400	400	400	400	400	400		~~40.7~~		
(E) Vdc (avg) 3	~~.308~~	~~3.45~~	8.4	3.11	133	17.9	6.8	2.45		~~20.1~~		
(F) DCcal	.996 →							→				
(G) Kn x 10^{-3} 1	2.4	6	12	21	6	12	21	33.6				
(H) ρ dc=ExFxGx10^3/D ⓪	1840	515	251	163	1988	~~535~~	355	205		40.2		
(I) Vac Σ	298	3.28	8.4	3.07	128	17.4	6.65	2.39		~~20.1~~		
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.991	~~1.010~~	1.006	1.010	1	1	1.006	1.010				
(M) ρdc/ρac =ExL/K	1.024	1.050	1.006	1.023	1.039	1.029	1.028	1.036				
(N) PFE=(M-1)(10^2)	2.4	5.0	0.6	2.3	3.9	2.9	2.8	3.6				
(O) MCF=(M-1)(10^5)/H	1	10	2	14	2	5	8	18				

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 1 - GOING E Int.Cal _____ Date: 21 DEC

Send	4-5	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-5	5-10	→	10-15	→	→	15-20	→	→	→		
Time												
DC-1	97.5 98.0	251 251	40.0 41.3	251.0 255.0	40.0 40.5	8.7 9.2	201 203	56.8 56.8	17.7 17.8	5.02 5.21		
DC-2	97.5 98.0	251 251	40.0 41.3	251.0 255.0	40.0 40.5	8.7 9.2	201 203	56.8 56.8	17.7 17.8	5.06 5.28		
Σ		502	81.3	506	80.5	17.9	404	113.6	35.5	10.23 10.28		
DC-3	97.0 98.0	252 252	40.0 41.3	252.0 255	39.5 40.5	8.7 9.2	201 203	56.8 56.8	18.0 17.8	512.8 49.2		
Dc-4	97.0 980	252 252	40.0 41.3	251.0 255.0	39.5 40.5	8.7 9.2	201 203	56.8 56.8	18.0 17.8	53.0 49.0		
Σ		504	81.3	506	80.0	17.9	404	113.6	35.8	10.20 10.02		
DC-AV	195.25	503	81.3	506	80.25	17.9	404	113.6	35.65	10.22		
AC-1	97.5	247.0	40.7	249.0	39.5	8.7	198.5	55.3	17.4	5.02		
AC-2	97.0	247.0	40.5	249.0	39.5	8.7	198.5	55.3	17.7	5.02		
Σ	194.5	494	81.2	498	79.0	17.4	397.0	110.6	35.1	10.04		
S. P.	-10.9	-2.9	→	-11.6	→	→	+6.2	→	→	→		
AC-N	-02	.02	→	.01	.01	.01	.02	→	→	→		
I.C	45	45	→	45	→	→	45	→	→	→		

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: CHANCE Line: 1 GOING E Int.Cal _____ Date: 21 DEC

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		CAN			
Rec.	20-25	→	→	→	25-30	→	→	→					
Time													
DC-1	126.0 126.0	48.5 48.5	14.2 14.4	4.50 4.85	82.0 83.0	38.0 39.0	11.0 12.5	3.6 3.7					
DC-2	126.0 126.0	48.5 48.5	14.2 14.4	4.50 4.85	82.0 83.0	38.0 39.0	11.0 12.5	3.6 3.7		49.5 49.5			
Σ		97.0	28.6	9.35									
DC-3	126.0 126.0	48.2 48.5	14.2 14.5	4.50 4.85	82.0 83.0	38.0 39.0	11.0 12.5	3.6 3.7		49.5 49.5			
Dc-4	126.0 126.0	48.2 48.5	14.2 14.5	4.50 4.85	82.0 83.0	38.0 39.0	11.0 12.5	3.6 3.7					
Σ		96.7	28.7	9.35	165	77	23.5	7.3					
DC-AV	252	96.8	28.7	9.35	165					99.0			
AC-1	125.0	48.0	14.2	4.6	80.0	38.0	11.5	3.6		49.5			
AC-2	125.0	48.0	14.2	4.6	80.0	38.0	11.5	3.6		49.5			
Σ	250	96	28.4	9.2	160	76	23.0	7.2		99.0			
S. P.	+4.9	→	→	→	+7.4								
AC-N	.02	→	→	→	.02	→	→	→					
I.C.	45	→	→	→	45	→	→	→					

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

.Project: CHANCE Line: 1 GOING W Int.Cal _____ Date: 21 DEC

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-5	2-3	3-4	4-5		
Rec.	0-5	5-10	→	10-15	→	→	15-20	→	→	→		
Time												
DC-1	225.0 226.0	102 105	33.0 35.5	32.5 32.5	13.8 13.7	8.0 8.4	72.0 72.0	19.1 19.4	13.8 14.0	9.4 9.5		
DC-2	225.0 226.0	102 105	33.0 35.5	32.5 32.5	14.0 13.7	8.0 8.4	72.0 72.0	19.1 19.4	13.8 14.0	9.4 9.5		
Σ	451.0	207	68.5	65.0	27.7	16.4	144.0	38.5	27.8	18.9		
DC-3	225.0 226.0	102 105	33.0 35.5	32.5 32.5	14.0 13.7	8.0 8.4	72.0 72.0	19.1 19.4	13.8 14.0	9.4 9.5		
Dc-4	225.0 226.0	102 105	33.0 35.5	32.5 32.5	14.0 13.7	8.0 8.4	72.0 72.0	19.1 19.4	13.8 14.0	9.4 9.5		
Σ	451.0	207	68.50	65.0	27.7	16.4	144	38.5	27.8	18.9		
DC-AV	451.0	207	68.5	65.0	27.7	16.4	144	38.5	27.8	18.9		
AC-1	210	104	33.5	32.5	13.8	8.0	71.0	19.0	13.6	9.4		
AC-2	210	104	33.5	32.5	13.8	8.0	71.0	19.0	13.6	9.4		
Σ	420	208	67.0	65.0	27.6	16.0	142	38.0	27.2	18.8		
S. P.	-3.8	+32.7	→	-33.8			+4.2					
AC-N	.02	.02	→	.02			.02					
I.C.	45	45		45			45					

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: CHANCE Line: 1 GOING W Int.Cal Date: 21 DEC

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5			CAL	
Rec.	20-25	→		→	25-30	→	→	5				
Time												
DC-1	21.0 22.0	8.5 8.6	6.9 7.2	4.7 4.9							49.0	
DC-2	21.0 22.0	8.5 8.6	6.9 7.2	4.7 4.9							49.0	
Σ	43.0	17.1	14.1	9.6							98	
DC-3	21.0 22.0	8.5 8.6	6.9 7.2	4.7 4.9							49.0	
Dc-4	21.0 22.0	8.5 8.6	6.9 7.2	4.7 4.9							49.0	
Σ	43.0	17.1	14.1	9.6							98.0	
DC-AV	43.0	17.1	14.1	9.6							98.0	
AC-1	21.0	8.3	6.7	4.7							49.0	
AC-2	21.0	8.3	6.7	4.7							49.0	
Σ	42.0	16.6	13.4	9.4							98.0	
S. P.	+3.4											
AC-N	.02											
I.C	45											

INDUCED POLARIZATION SENDER NOTES

project: HUCKINS Line: I Date: 12-21-64

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
Receive	0-.2N	.2-.4N	→	.4-.6N	→	→	.6-.8N	→	→	→	.8-1N	—
Time												
Range												
Current	1600	1400	1600	1600	1600	2000	1200	1400	1600	2000	1400	1600

Send	2-3	1-2	4-5	3-4	2-3	1-2						
Receive	→	→	1-1.2N	→	→	→						
Time												
Range												
Current	1600	2000	1200	1600	1600	1800						

CAL 1000

INDUCED POLARIZATION SENDER NOTES

Project: HUCKINS Line: I Date: 12-21-64

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Receive	0-.25	.2-.45	→	.4-.65	←	←	.6-.85	←	←	→	.8-1.5	—
Time												
Range												
Current	1200	1600	1200	1600	1600	1200	1800	1600	1600	1200	1800	1600
Send	3-4	4-5										
Receive	←	→										
Time												
Range												
Current	1600	1200										

33.6

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project CHANCE Line 1 E 1/2 Field date 12-21-64 Data page_____ Comp. date 12-23-64. Comp by J.P.M.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-2	2-4	→	4-6	→	→	6-8	→	→	→	8-10	→
(C) n separation	300	300	100	300	100	30	300	300	30	10	300	100
(D) I 2	1600	1400	1600	1600	1600	2000	1200	1400	1600	2000	1400	1600
(E) Vdc (avg) 2	195.25	503	81.3	506	80.25	17.9	409	113.6	35.65	10.22	252	96.8
(F) DCcal 1	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12	2.4	6
(G) Kn x 10^{-3}	1.01	→	→	→	→	→	→	→	→	→	→	→
(H) ρ dc=ExFxGx10^3/D	74.0	218	123	191	122	54.2	204	197	135	61.9	436	367
(I) Vac Σ 3	199.5	494	81.2	498	79.0	17.4	397	110.6	35.1	10.09	250	96
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. 1	991	991	—	991	—	—	991	991	—	1.006	991	—
(M) ρ dc/ρac=ExL/K	995	1.010	1.002	1.004	1.016	1.030	1.010	1.019	1.016	1.023	0	1.008
(N) PFE=(M-1)(10^2)	−0.5	1.0	0.2	0.4	1.6	3.0	1.0	1.9	1.6	2.3	0	0.8
(O) MCF=(M-1)(10^5)/H	−7	5	2	2	13	55	5	10	12	37	0	2
	−16.4	−2.9		−11.6			+6.2				+4.9	

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		CAL				
(B) Receive	8-10	→	10-12	→	→	→						
(C) n separation	30	10	300	100	30	10						
(D) I	1600	2000	1200	1600	1600	1800						
(E) Vdc (avg) 2	28.7	9.35	165	77	23.5	7.3		99.0				
(F) DCcal	1.01	→	→	→	→	→						
(G) Kn x 10^{-3}	12	21	6	12	21	33.6						
(H) ρ dc=ExFxGx10^3/D	217	99	835	583	312	137						
(I) Vac Σ	~~250~~	~~96~~	~~28.4~~	~~9.2~~	~~160~~	~~76~~						
(J) AC noise x 2 3	28.4	9.2	160	76	23.0	7.2		99.0				
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. 1	—	1.006	991	—	—	1.006		1.000				
(M) ρdc/ρac =ExL/K	1.010	1.023	1.022	1.014	1021	1.014						
(N) PFE=(M-1)(10^2)	1.0	2.3	2.2	1.4	2.1	1.4						
(O) MCF=(M-1)(10^5)/H	5	23	3	2	7	10						
			+7.4									

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

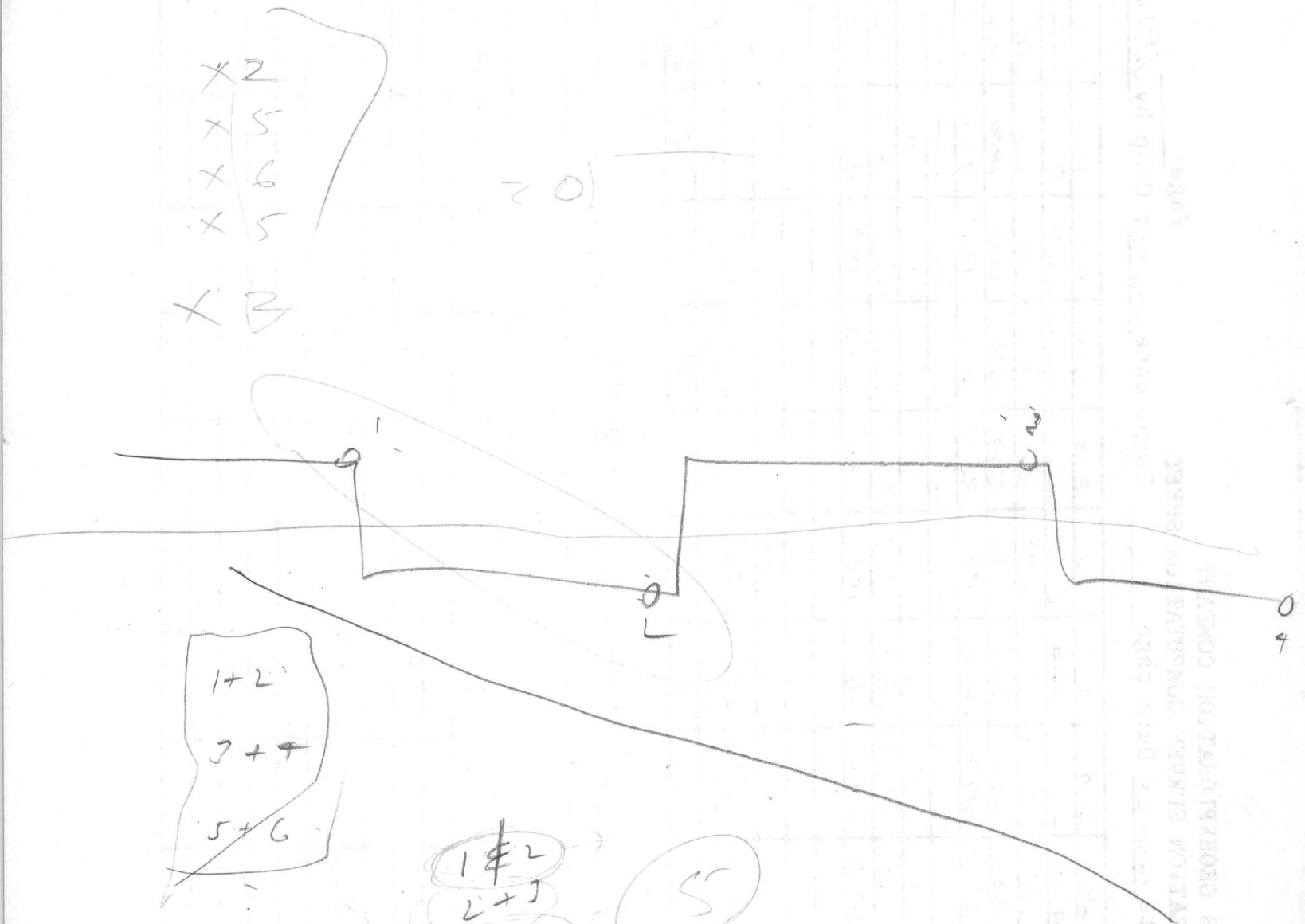
Page 1

Project CHANCE Line W ½ Field date 12-21-69 Data page _____ Comp. date 12-23-69 Comp by J.P.M.

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-2	2-4	→	4-6	→	→	6-8	→	→	→	8-10	→
(C) n separation	300	300	100	100	30	30	300	30	30	30	30	30
(D) I (2)	1200	1600	1200	1600	1600	1200	1800	1600	1600	1200	1800	1600
(E) Vdc (avg) (2)	451.0	207	68.5	65.0	27.7	16.4	144	38.5	27.8	18.9	43.0	17.1
(F) DCcal	1.020	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3} (1)	.6	.6	2.4	.6	2.4	6	.6	2.4	6	12	2.4	6
(H) ρ dc=ExFxGx10^3/D	230	79.3	140	24.8	42.3	83.7	49.0	58.9	106	193	58.5	65.5
(I) Vac Σ	420	208	67.0	65.0	27.6	16.0	142	38.2	27.2	18.8	42.0	16.6
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.991	991	—	—	—	—	991	—	—	—	—	—
(M) ρ dc/ρac=ExL/K	106.1	98.2	1.022	0	1.009	1.025	1.005	1.008	1.004	1.006	1.024	1.030
(N) PFE=(M-1)(10^2)	6.1	-1.3	2.2	0	0.4	2.5	0.5	0.8	0.4	0.6	2.4	3.0
(O) MCF=(M-1)(10^5)/H	27	-6	16	0	9	30	10	14	4	3	42	45.8
	-3.8	+32.7 →	→	-33.8	→	→	+4.2	→	→	→	+3.4	→

Project _____ Line _____ Field date _____ Data page _____ Comp. date _____ Comp by _____

(A) Send	3-4	4-5		CAL.								
(B) Receive	8-10	→										
(C) n separation	10	10										
(D) I	1600	1200										
(E) Vdc (avg)	14.1	9.6		98								
(F) DCcal	1.020	→		1.020								
(G) Kn x 10^{-3}	12	21										
(H) ρ dc=ExFxGx10^3/D	108	178										
(I) Vac Σ	13.9	9.9		98								
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.006	1.006		1.000								
(M) ρdc/ρac =ExL/K	1.058	1.037										
(N) PFE=(M-1)(10^2)	5.8	3.7										
(O) MCF=(M-1)(10^5)/H	54	21										
	3.4 →											



$\rho_1 = 230 \frac{\Omega ft}{2\pi}$

$\rho_2 = 12 \frac{\Omega ft}{2\pi}$

$h = 200'$

$230\left(\frac{1+.90}{1+.90}\right)$

$230\left(\frac{1.90}{.10}\right)$

$230\left(\frac{.10}{1.90}\right) =$

$\frac{230}{19}$

$.10\overline{)1.90}$ (19)

HEINRICHS GEOEXPLORATION COMPANY

806 WEST GRANT ROAD, TUCSON, ARIZONA, 85703. P.O. BOX 5671. PHONE: (AREA CODE 602) 623-0578

December 14, 1964

Mr. Daniel L. E. Huckins
P. O. Box 5073
Tucson, Arizona

Re: Proposed I. P. Survey
Cochise County, Arizona

Dear Mr. Huckins:

We are pleased to submit the following quotation for the proposed project in Cochise County, Arizona:

3 Man IP Crew, per day	$250.00
Vehicle Rental, per day	10.00
Mileage, per mile	.10
Living Expenses	At cost
Reproductions, misc. expenses	At cost
Report, 2 copies; compilation, computing, drafting, conferences per staff day	100.00
Standby Time: inclement weather or client request, 1/2 daily rate	125.00

We request a $500.00 advance to mobilize our crew.

If the foregoing meets with your approval, so indicate by signing and returning the carbon copy of this letter.

Very truly yours,

HEINRICHS GEOEXPLORATION COMPANY

E. Grover Heinrichs

E. Grover Heinrichs, Vice-President

APPROVED:

Daniel L E Huckins Dec 14 1964

Daniel L. E. Huckins Date

December 14, 1964

COPY

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HEINRICHS GEOEXPLORATION COMPANY

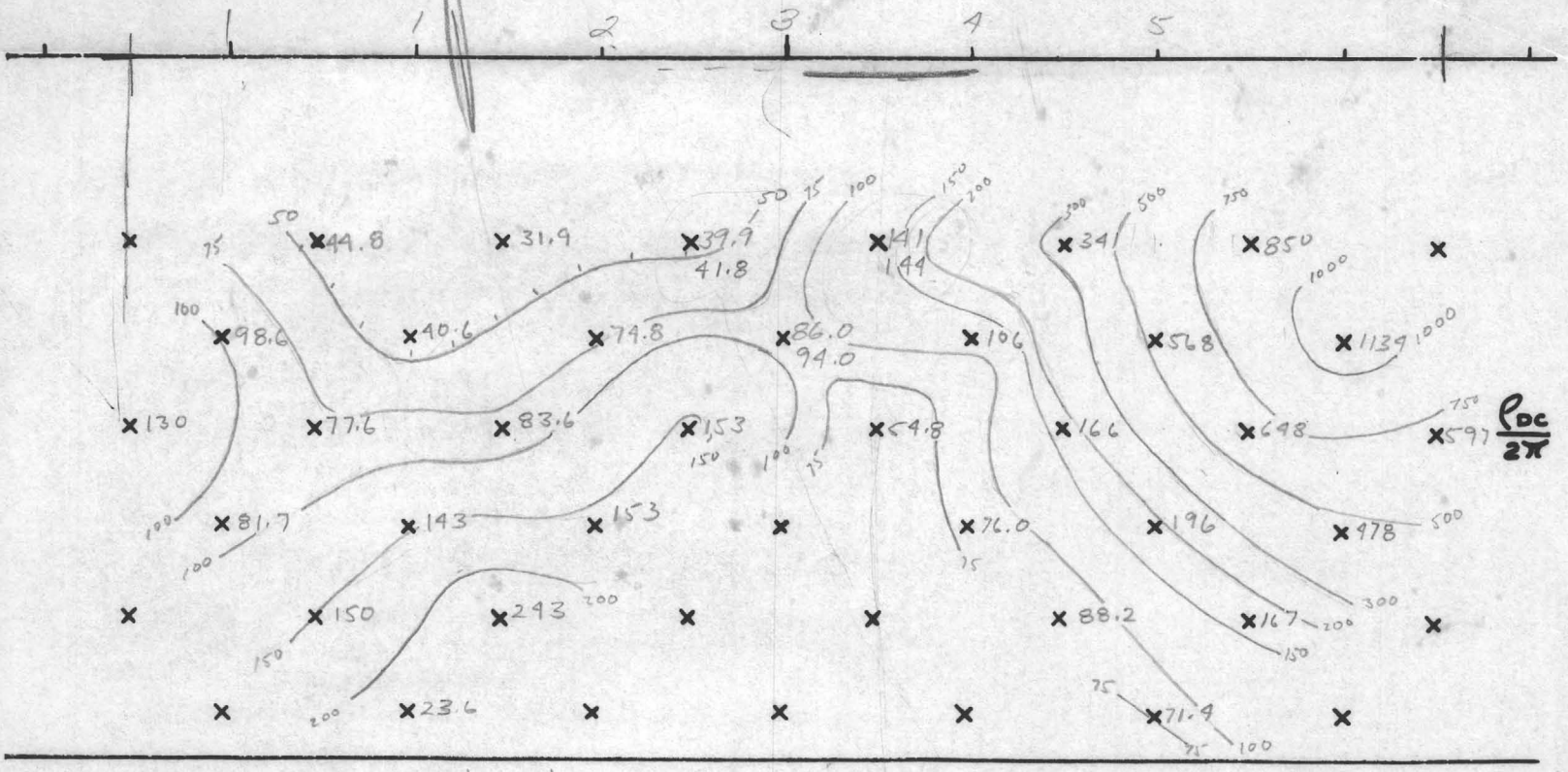
APPROVED:

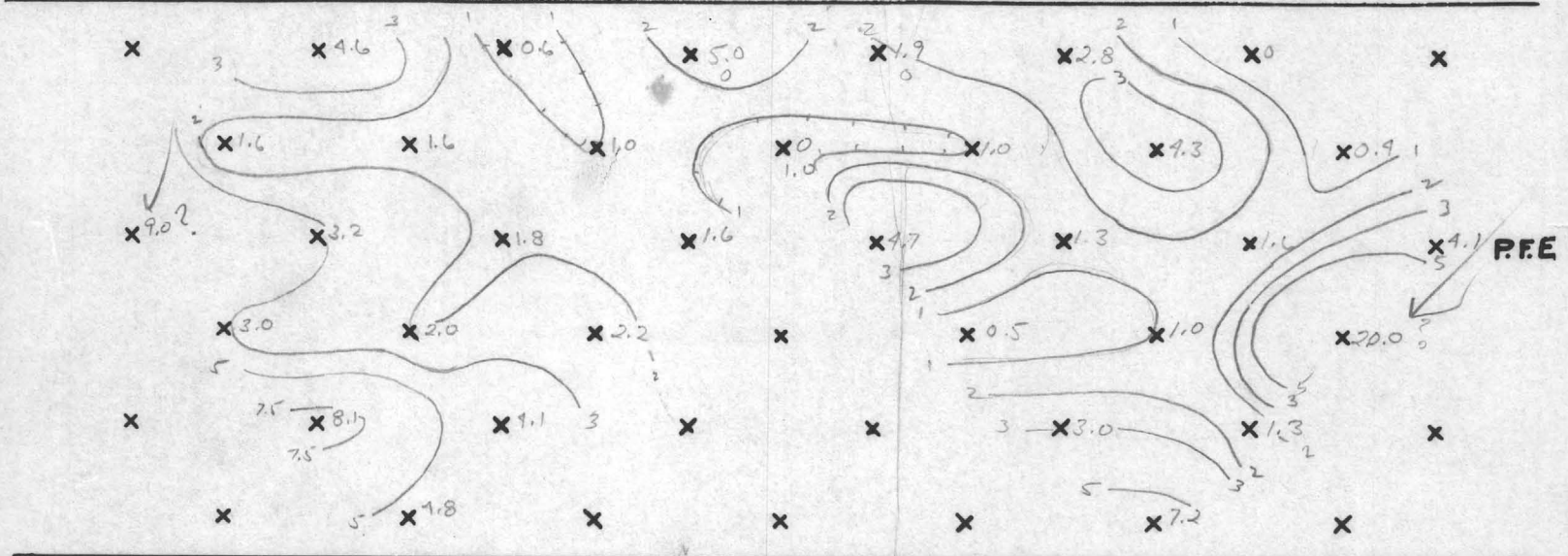
E. Grover Heinrichs, Vice-President

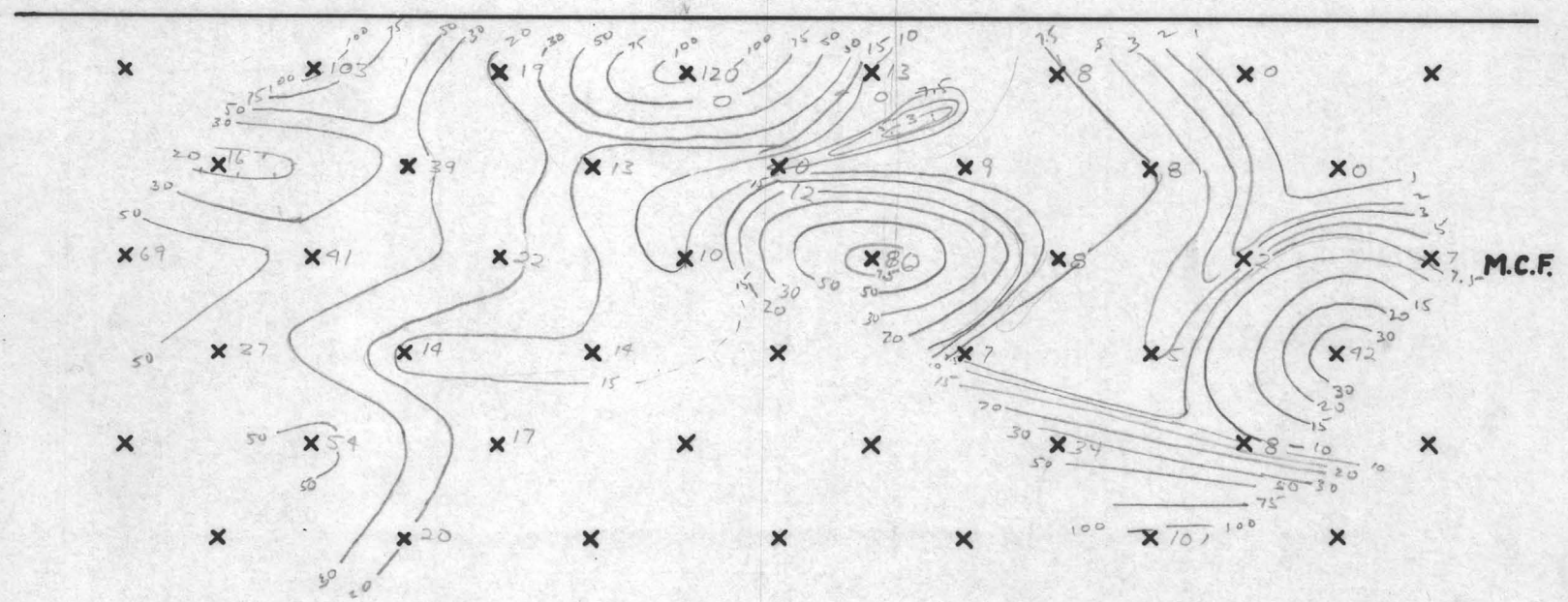
_____

Daniel L. E. Huckins Date_____

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N

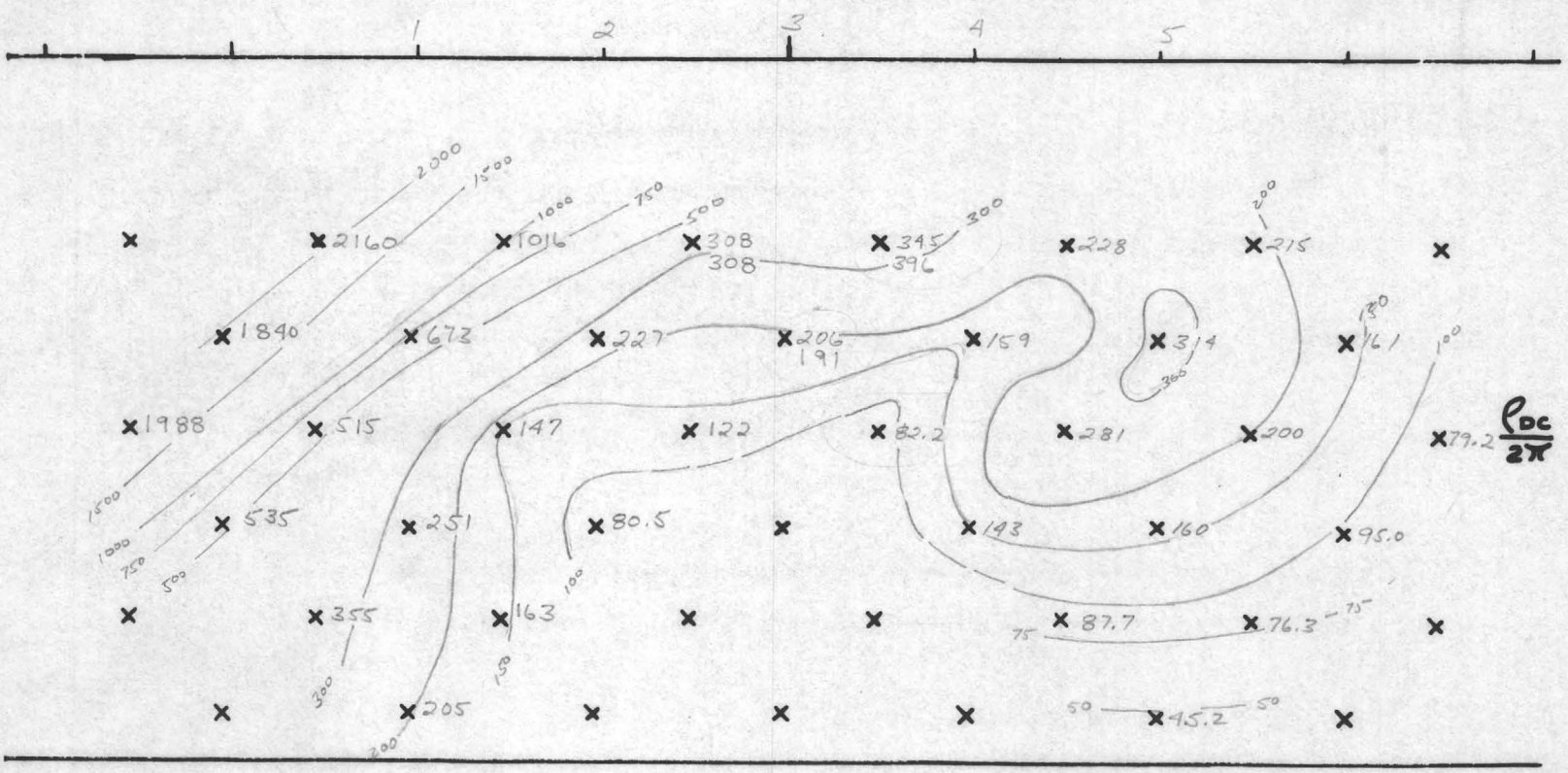


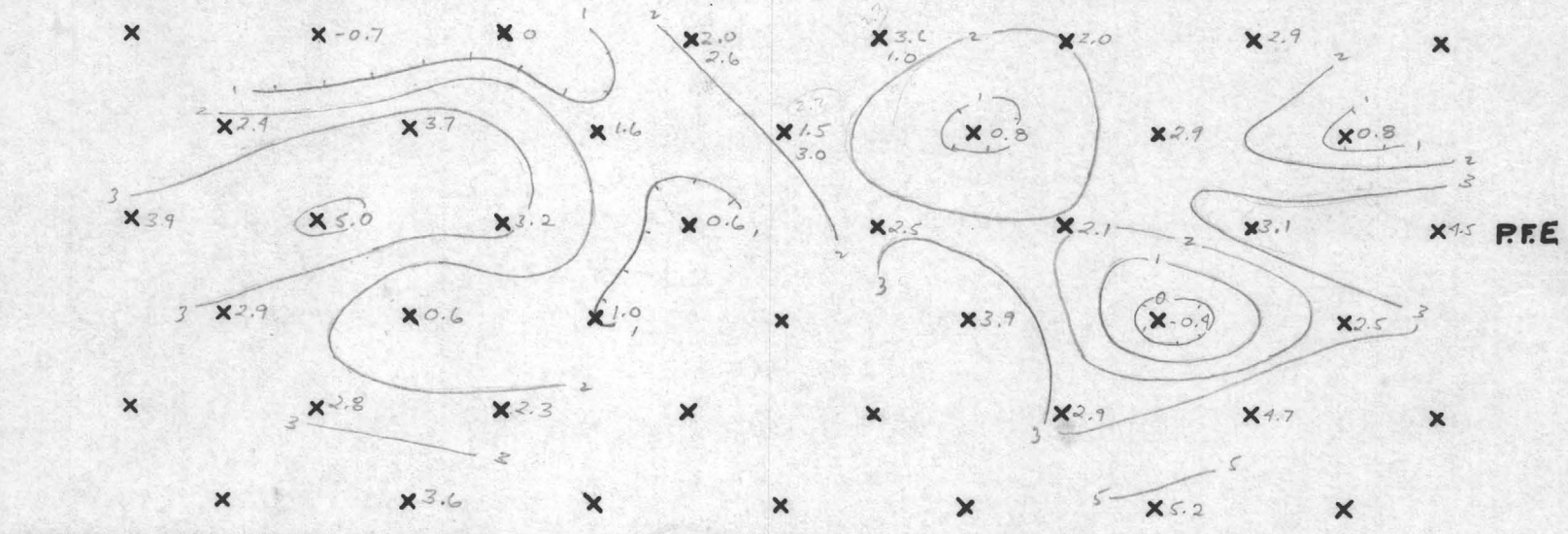


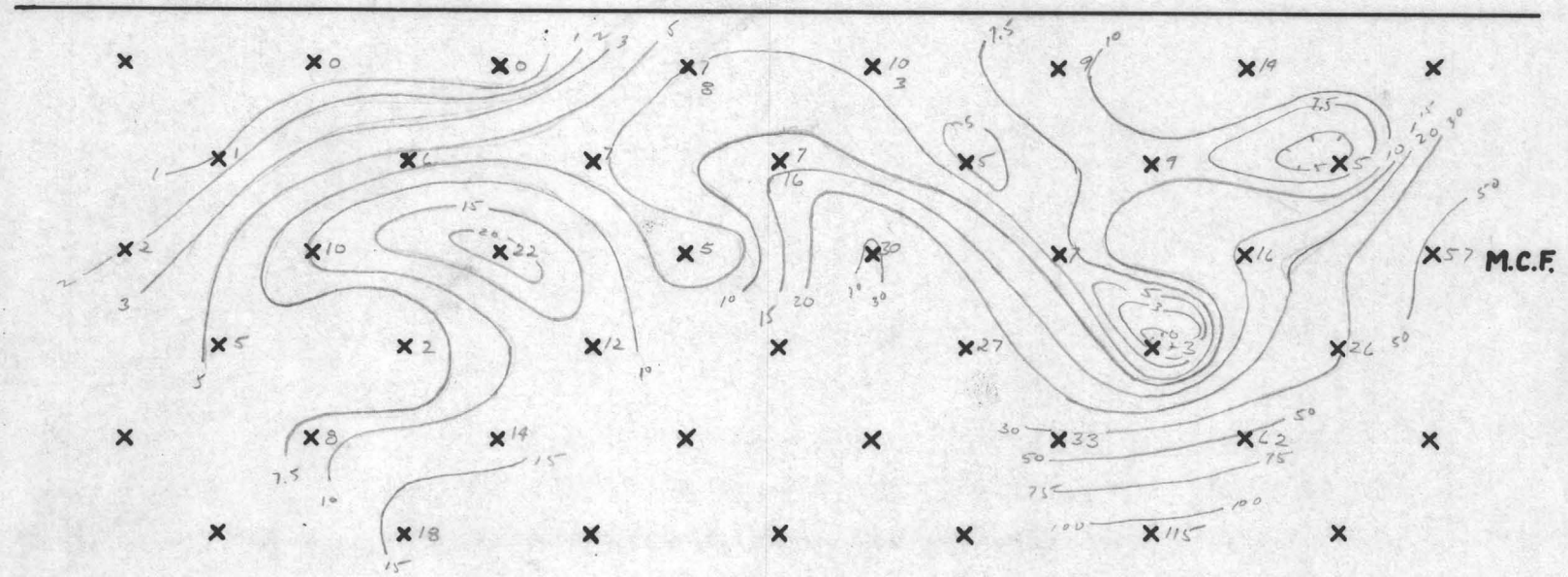


AREA _____ LINE 3 a = ' SCALE: _____ DATE: _____

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING W

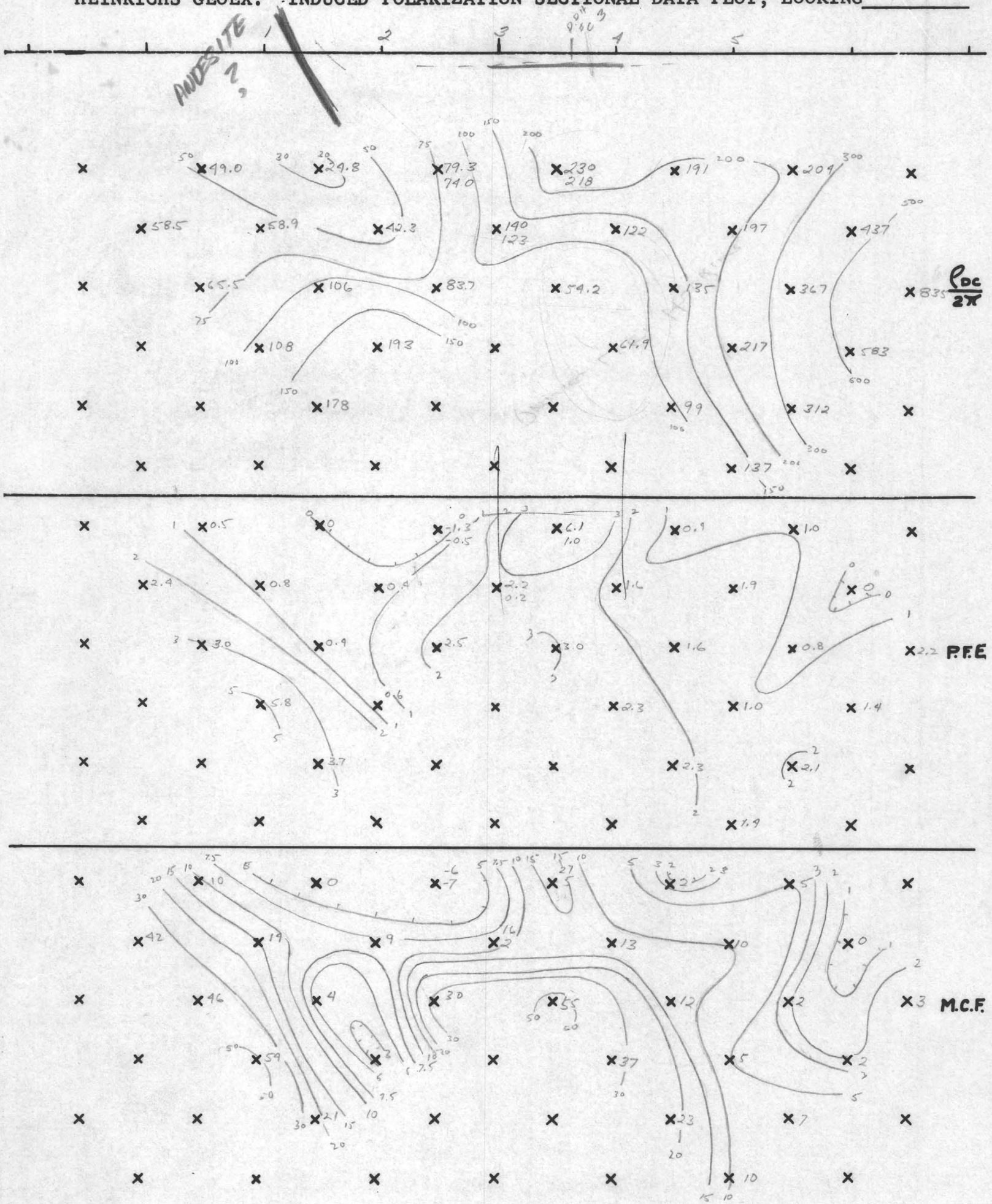






AREA _____ LINE A a = ' SCALE: _____ DATE: _____

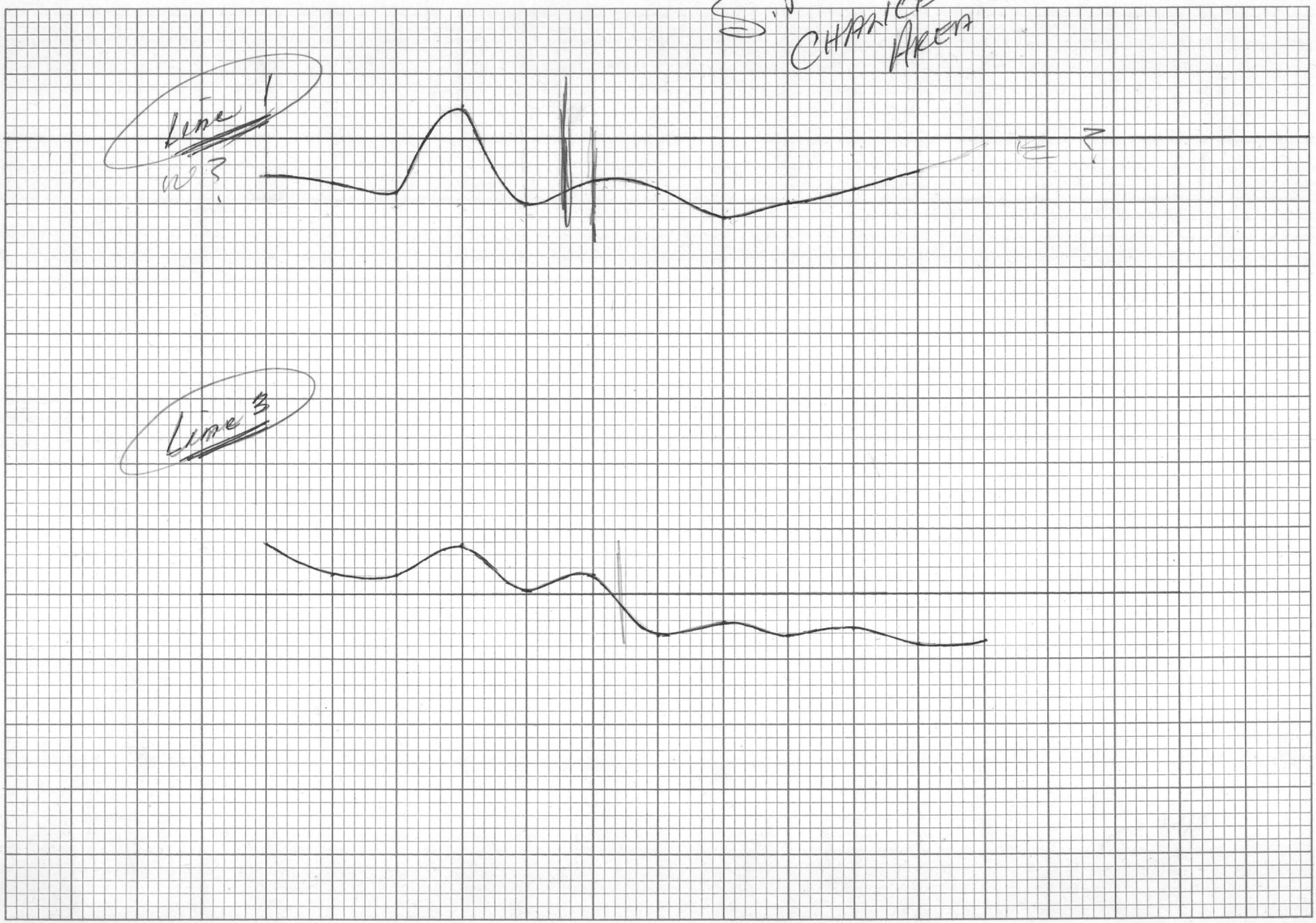
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N

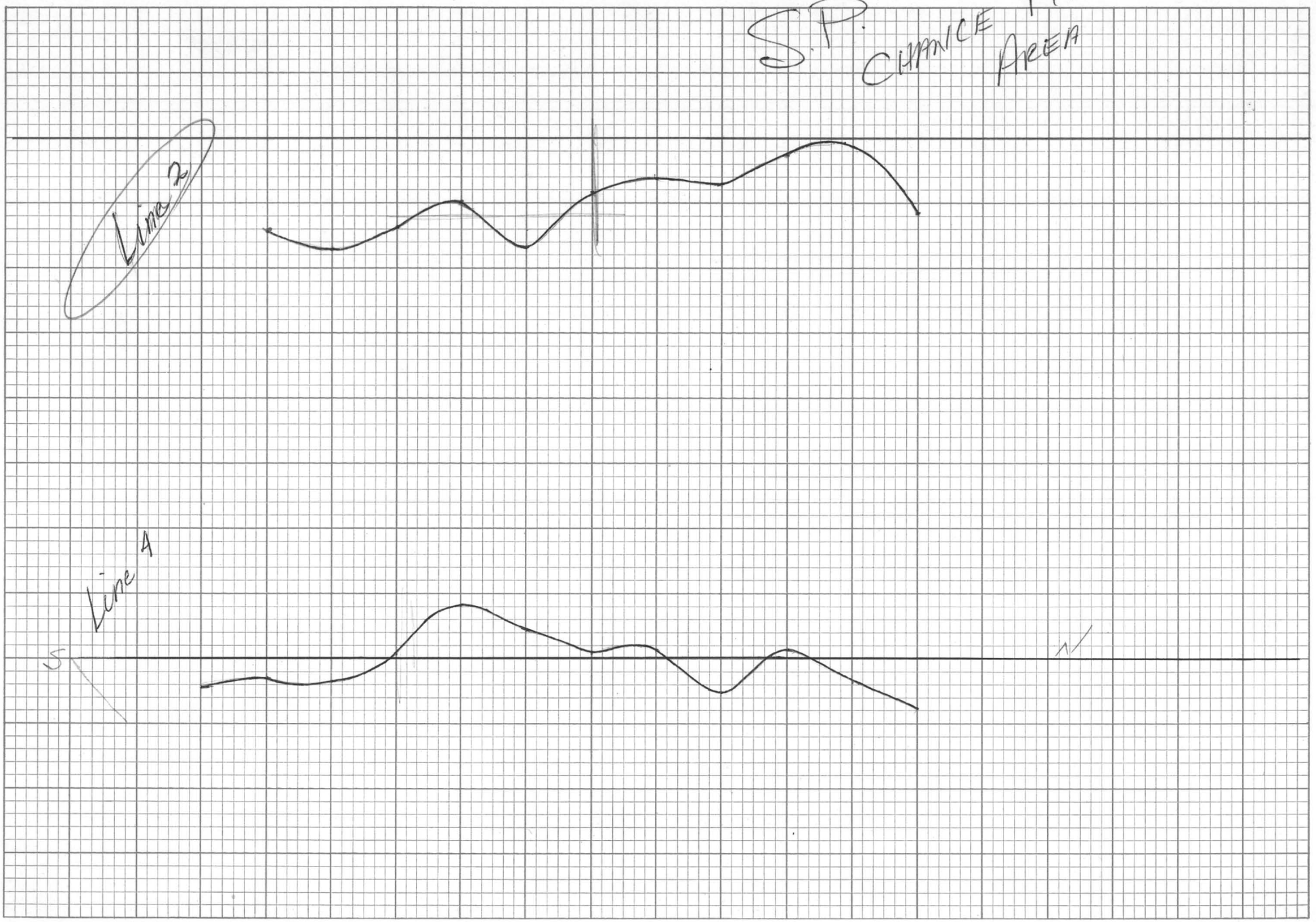


AREA CHANCE MINE LINE 1 a = 200 ' SCALE: 1"=200 DATE: 12-29-69

K+E 10 X 12 TO THE INCH 358-20
KEUFFEL & ESSER CO. MADE IN U.S.A.

S.P.
CHANCE MINE
AREA





K+E 10 X 12 TO THE INCH 358-20
KEUFFEL & ESSER CO. MADE IN U.S.A.

GEOLOGIC SURFACE PLAN
CHANCE MINE
SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA

SCALE: 1" = 100'

ELEVATIONS RELATIVE CHANCE MINE SHAFT COLLAR TAKEN AS 500'

MAGNETIC DECLINATION TAKEN AS N 13° 00' E

DANIEL L. E. HUCKINS — OCT, 196

200' DIPOLES
LINES 1, 2, 3 N 70° E
LINE 4 N 35° W

493' 493' 471' 443' 400' 451' 418' 469' 470' 478' 472' 562' 563' 613' SHALLOW PIT 567' 543' 490' 515' 501' 533' 509' 536' 508' 525'

ANACONDA

Change Shaft 500'

Chance Draw

South Draw

Master Thrust Zone

Mt. Queen Shaft

STOPES ON SURFACE

C-1 C-2 C-3 C-4 C-5 C-6 C-7 C-8

CHERT BEDS

BRECCIA

ABRIGO

ANDESITE

ABRIGO

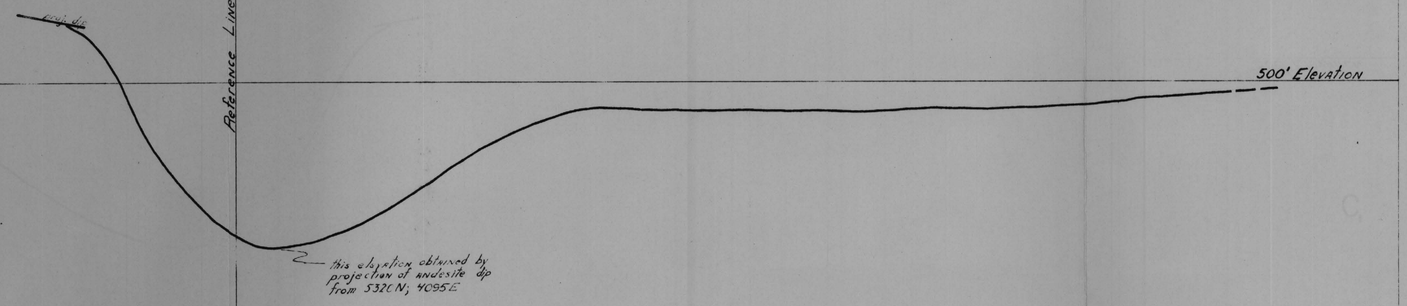
6000N 5500N 5000N 4500N 4000N 3500N 3000N 2500N 2000N

4000E 4500E 5000E 5500E 6000E 6500E

LEGEND
BEDDING
SHEARING
THRUST FAULT
NORMAL FAULT
ALLUVIUM
QUARTZ PORPHYRY BRECCIA
ANDESITE PORPHYRY
PORPHORITIC ANDESITE
NACO LIMESTONE
ABRIGO LIMESTONE
6000N
5500N
5000N
4500N
4000E
4500E
5000E
5500E
6000E
6500E
Anaconda DDH #7
Anaconda DDH #3
Chance Shaft 500'
Chance Draw
C-1 DDH
mylonitized rock
Top Thrust
Mt. Queen Shaft
C-2 DDH 525'
Chance Fault
stopes on surface
Mine Thrust
Master Thrust Zone
C-3 DDH 515'
South Draw
andesite?
outcrop pattern syncline?
same beds
fault gouge
GEOLOGIC SURFACE PLAN
CHANCE MINE
SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA
SCALE : 1" = 100'
ELEVATIONS RELATIVE CHANCE MINE SHAFT COLLAR TAKEN AS 500'
MAGNETIC DECLINATION TAKEN AS N 13° 00' E
DANIEL L. E. HUCKINS
OCT., 1963

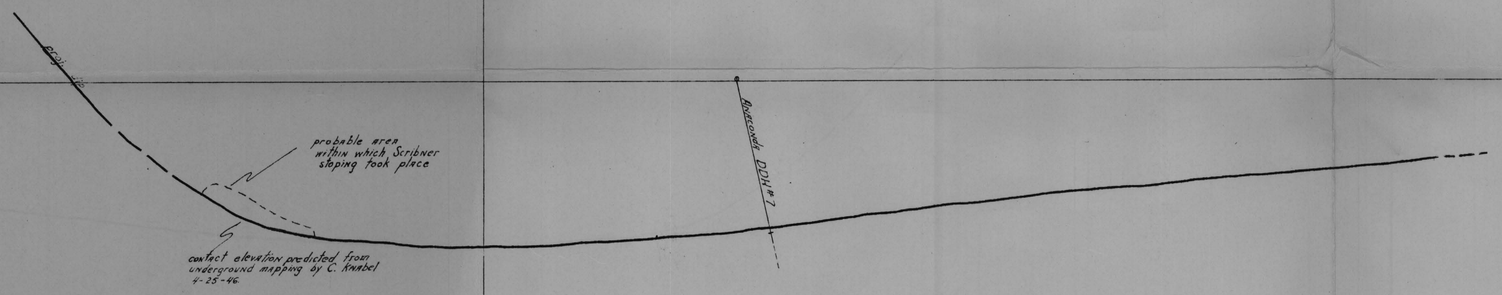
A

A'



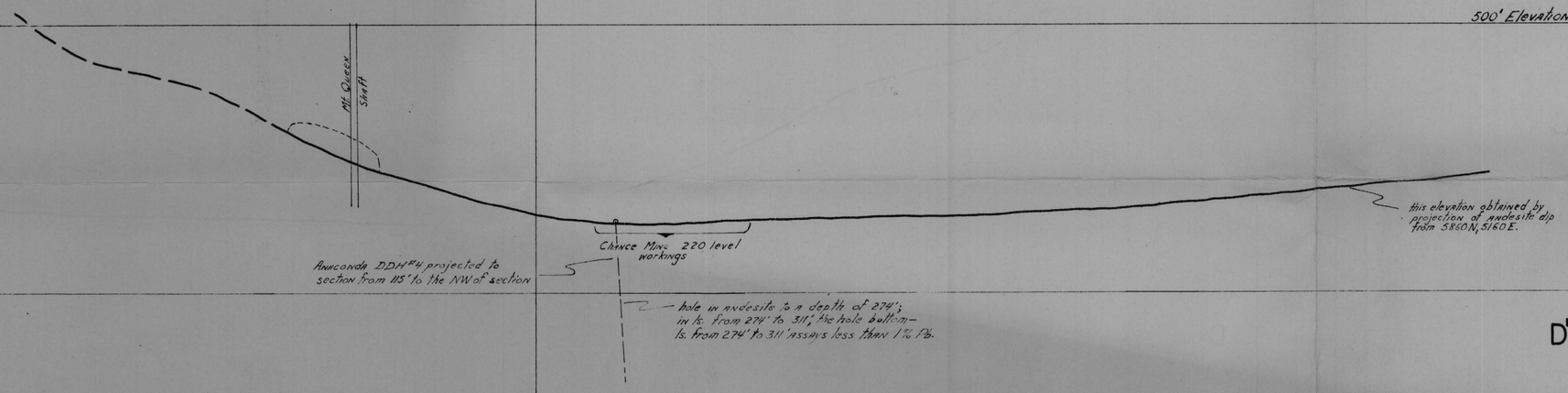
B

B'



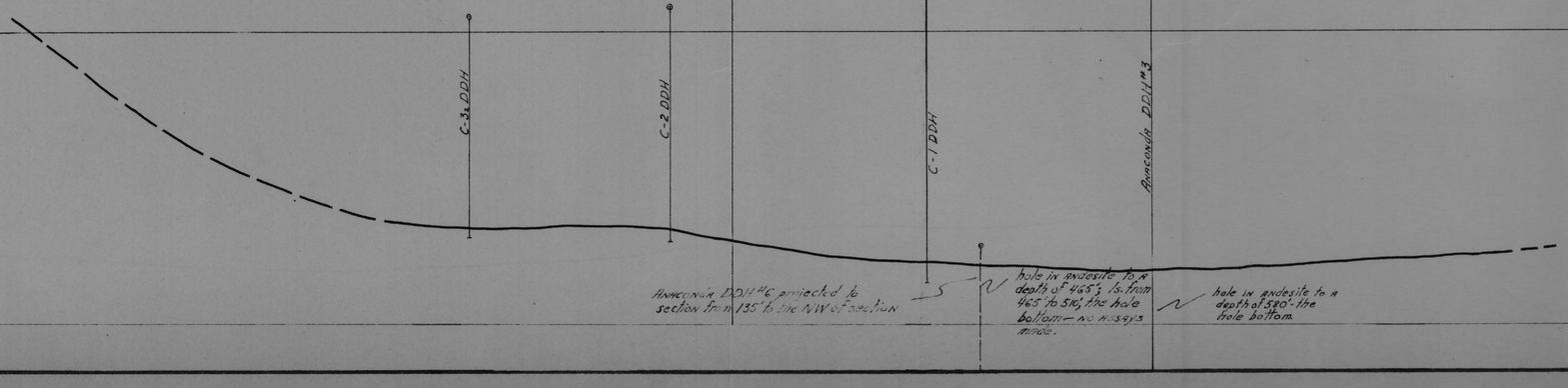
C

C'



D

D'



VERTICAL GEOLOGIC CROSS SECTIONS

CHANCE MINE

SWISSHELM MINING DISTRICT, COCHISE CO., ARIZONA

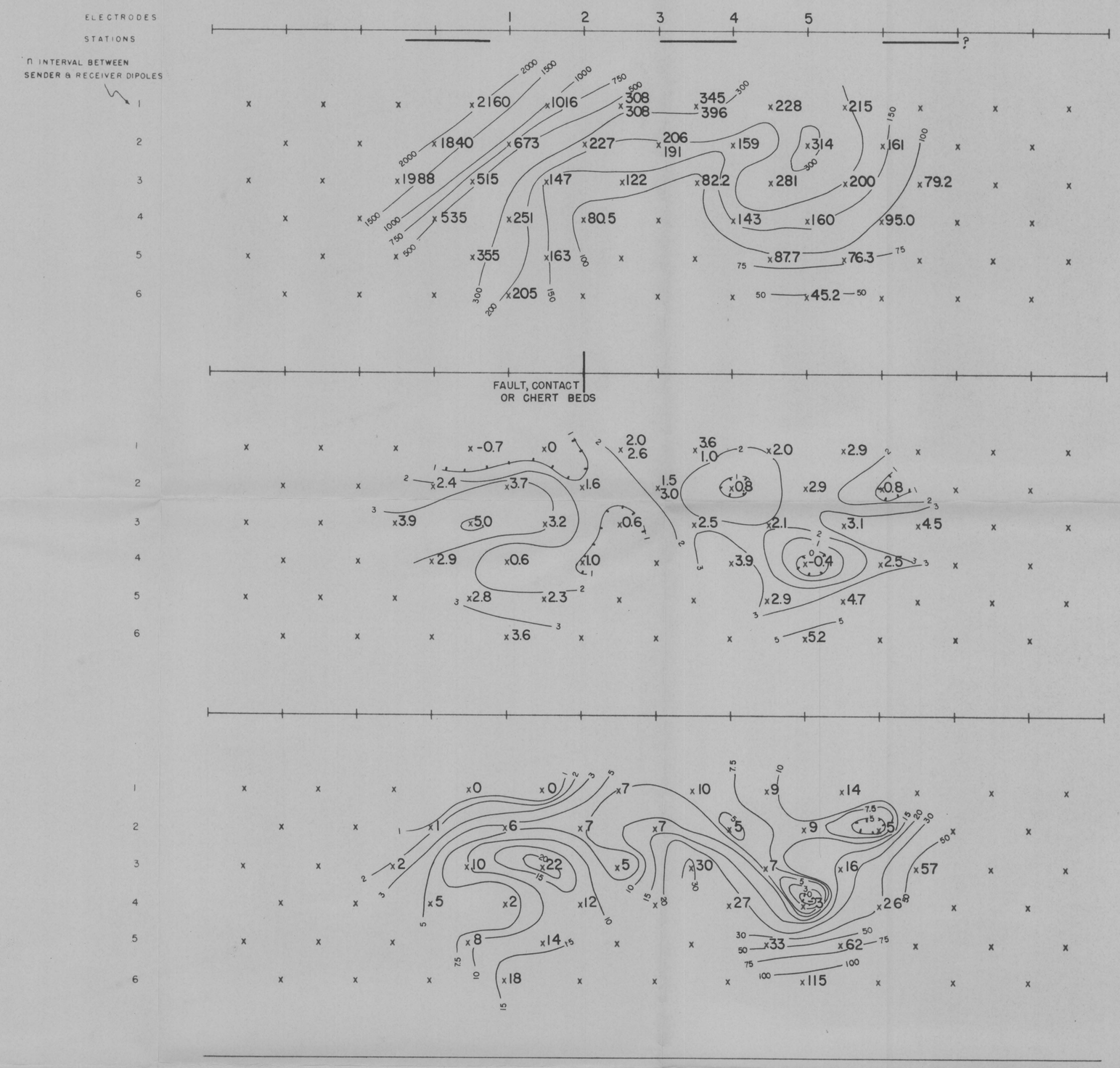
HORIZONTAL & VERTICAL SCALES: 1" = 100'

VIEW LOOKING NORTHWEST

CONTACT SHOWN IS THAT OF THE HANGING WALL OF THE ANDESITE SILL — NACO LIMESTONE IS THE OVERLYING ROCK

DANIEL L. E. HUCKINS

NOV. 1963



APPARENT RESISTIVITY ($\rho_a = \frac{DC}{2\pi}$) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 c.p.s.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 c.p.s

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
$(MCF = \frac{PFE \times 1000}{\rho_a \frac{DC}{2\pi}})$
CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY: 200' — n x — 200'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NORTH

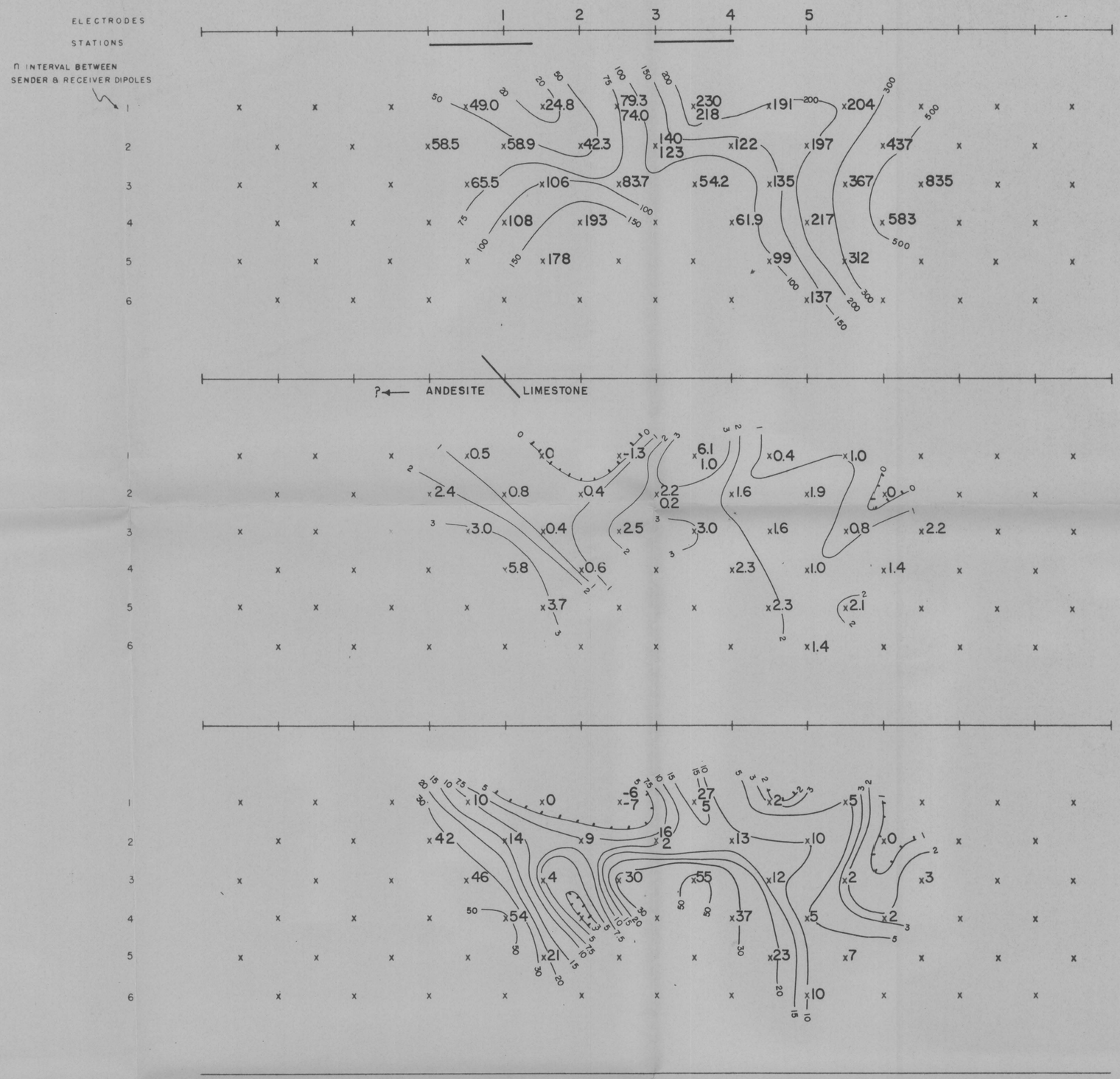
CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 4
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR

DANIEL L.E. HUCKINS



EXPLANATION

ELECTRODE ARRAY: 200' n x SENDER DIPOLE; 200' RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

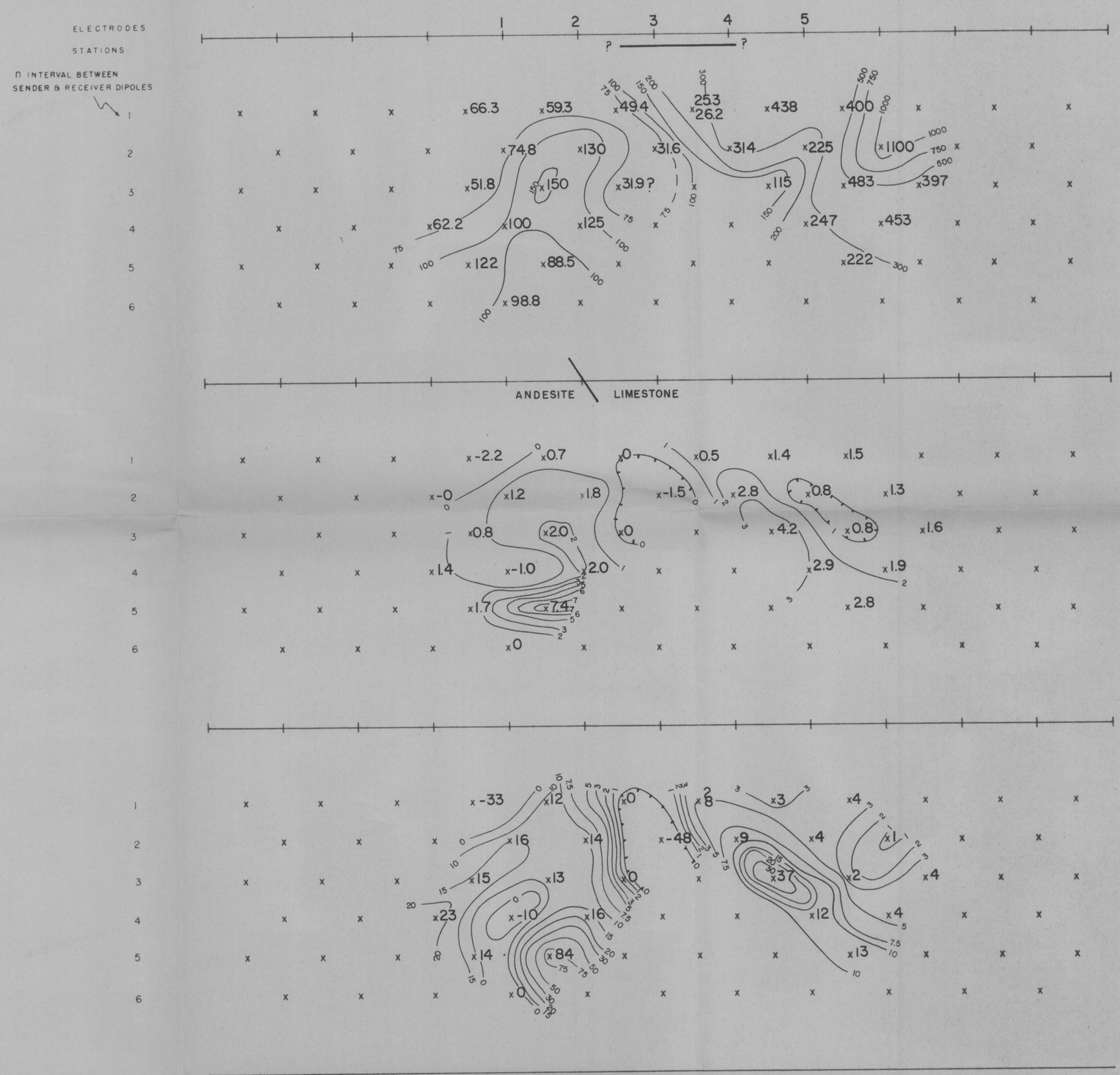
LOOKING NORTH

CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR
DANIEL L.E. HUCKINS



APPARENT RESISTIVITY ($\rho \frac{DC}{2\pi}$) IN UNITS OF OHM FEET

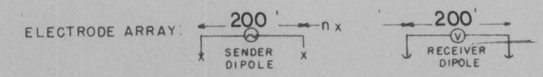
CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 C.P.S.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 C.P.S.

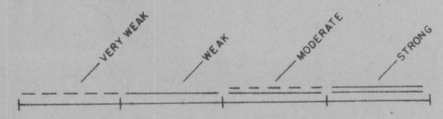
APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
$(MCF = \frac{PFE \times 1000}{\rho \frac{DC}{2\pi}})$
CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION



RELATIVE ANOMALY STRENGTH



LOOKING NORTH

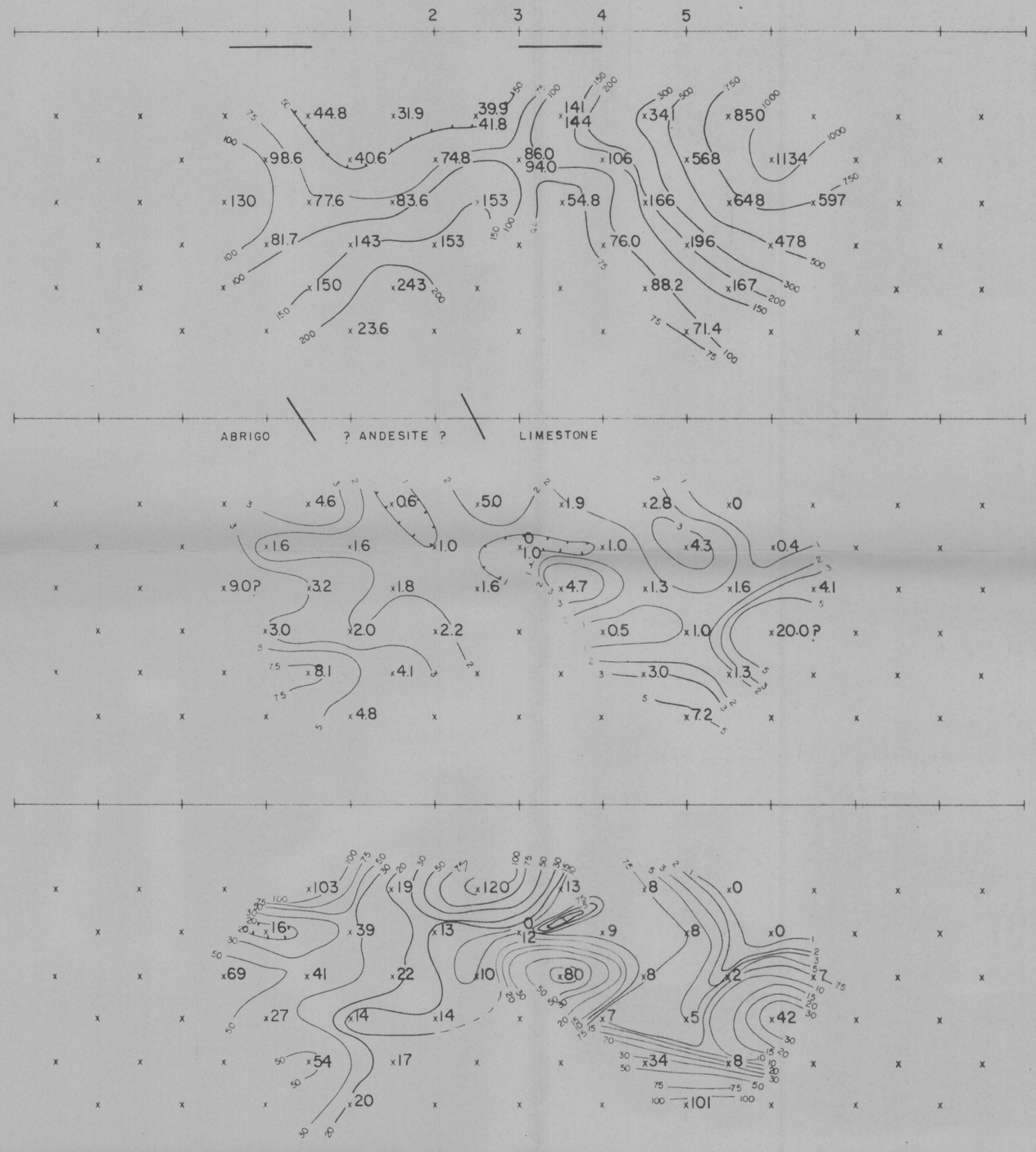
CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 2
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR

DANIEL L.E. HUCKINS



APPARENT RESISTIVITY (ρ_{DC}) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY 0.05 CPS

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 CPS

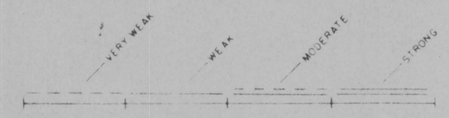
APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$
CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY — 200' — n x — 200' —
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH



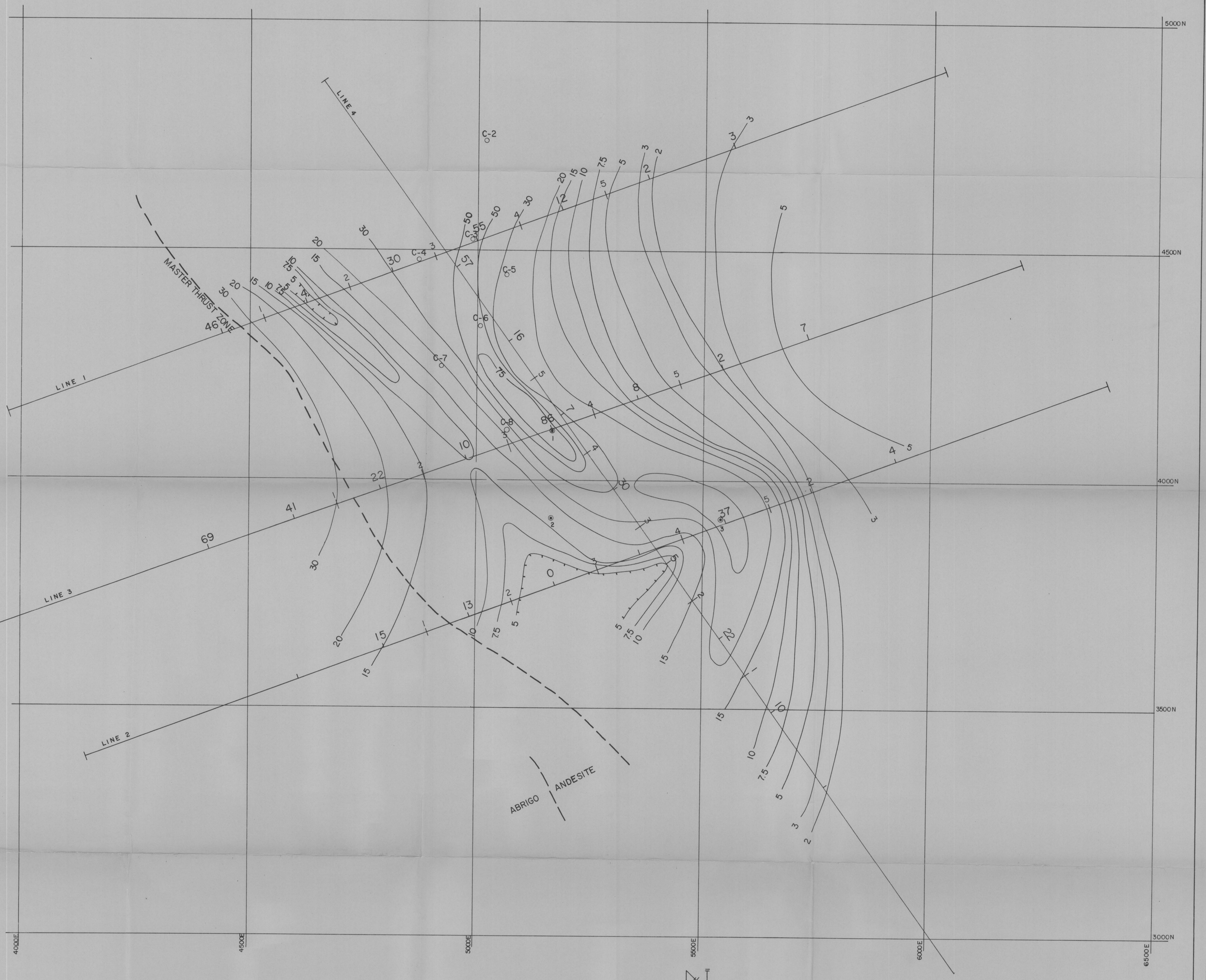
LOOKING NORTH

CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 3
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR
DANIEL L.E. HUCKINS



○ C-3 = D.D.H.

◉ P I = PROPOSED D.D.H.

HEINRICHS GEOEXPLORATION COMPANY		
P.O. Box 5671 Tucson, Arizona		
INDUCED POLARIZATION SURVEY METALLIC CONDUCTION FACTOR 3n SEPARATION FOR DANIEL L.E. HUCKINS		
CHANCE MINE AREA COCHISE COUNTY, ARIZ.		
SCALE: 1" = 100'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J.P.M	
DATE: DEC. 1964	SHEET 1 OF 1	
DRAWN BY: H.R.M.	DRAWING NO.:	FILE:

INDUCED POLARIZATION SURVEY

CHANCE MINE AREA

COCHISE COUNTY, ARIZONA

for

DANIEL L. E. HUCKINS

December 1964

by

HEINRICHS GEOEXPLORATION COMPANY
P. O. Box 5671 Tucson, Arizona

TABLE OF CONTENTS

Page

Location of lines----------1

Introduction ----------2

Conclusions & Recommendations----------3

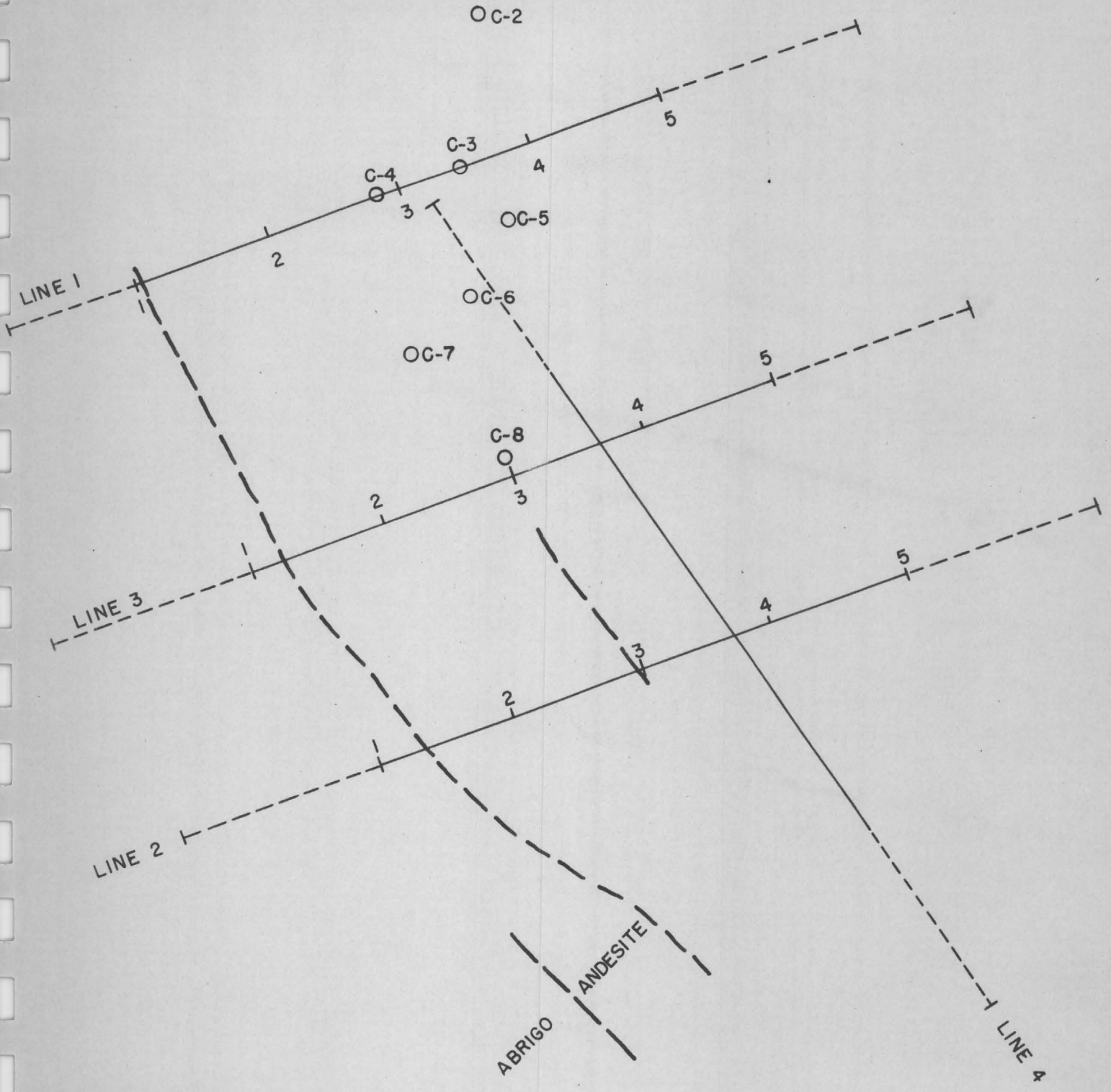
Interpretation----------3

Basis of I.P. Method----------1a

In Pocket:

Four Sectional Data Sheets

One Location and MCF Plan Map



O C-3 = D.D.H.

LOCATION OF I.P. SURVEY LINES
CHANCE MINE AREA

INTRODUCTION

From December 21 through December 23, 1964, Heinrichs Geoexploration Company, at the request of Daniel L. E. Huckins undertook and completed an induced polarization and resistivity survey over a portion of the Chance Mine Area located in the Swisshelm Mining District, Cochise County, Arizona.

The survey was run using the dual frequency induced polarization method, employing frequencies of 3 cps. and .05 cps. A total of 9,400 line feet were covered yielding 5,400 ft. of subsurface information. A dipole-dipole electrode array with a spacing of 200 ft. was used in an attempt to obtain relatively detailed subsurface information to a depth in excess of 250 ft. which is necessary for the detection of the probable ore bodies in the area, which are relatively small but massive sulfide occurrences. Four lines were run in the course of the work; Lines 1, 2 and 3 on a bearing N70°E and Line 4 bearing N35°W.

The data are plotted on sectional data sheets showing the apparent resistivity, percent frequency effect and metallic conduction factor, all contoured in vertical section.

The metallic conduction factor is plotted in plan with the line locations on the geologic base map supplied by Mr. Huckins. Also included in the text is a regional location map of the area.

GEOEX personnel involved in this project were Mr. Fred M. Johnson and Mr. John P. Matthews, Jr., geophysicists and Rex Montierth and H. R. Moulinet, geophysical technicians.

CONCLUSIONS AND RECOMMENDATIONS

1. Induced polarization shows moderately anomalous values contained in a zone trending NW-SE generally along Line 4. Anomalous values were also observed over C-3. West of the andesite intrusive, in the abrigo limestone there is a slight increase in PFE's; however, there is insufficient data to fully evaluate this area.

2. The resistivity indicates an anomalous zone which corresponds fairly well with the PFE anomaly. To the east the high resistivities map the deepening limestone layer. To the west the resistivity maps the andesite intrusive and in general the presence of the underlying abrigo limestone. Line 4 shows the chert beds to the south and/or the presence of a cross fault which may be of important significance.

3. Based on the geophysics, the most likely location for a drill hole would be 100 ft. east of C-8. Two other possible drill targets in order of interest lie 100 ft. east and approximately 200 ft. south of C-8 and 475 ft. east and 200 ft. south of C-8 respectively.

4. Further geologic and geophysical study would be helpful to further evaluate the area west of the andesite intrusive which gives a slight I. P. response.

INTERPRETATION

Line 1 was centered 30 ft. east and 10 ft. south of C-4 and run on a bearing N70°E. This line ran over C-3 which encountered 6½ ft. of massive sulfide mineralization at a depth of 205 ft. From 0 - 200 ft. east is a zone of slight I. P. anomalism which corresponds with the sulfide zone sampled by C-3. There is a slight increase in polarization west of the andesite intrusive. The resistivity data indicates a horizontal contact which was calculated to lie at a depth of 200 ft., the lower layer being of considerably lower resistivity as might be given by a massive sulfide zone. Beyond 200 ft. east the resistivities increase rapidly indicating the dipping limestone beds which increase in depth to the east. There is a low resistivity zone located 300 ft.

west of the center point which probably reflects the lower resistivity of the andesite intrusive, this effect is masked at depth by the limestone beds above and below it.

Line 2 was run parallel to Line 1 with the center point located 210 ft. east and 300 ft. south of C-8. There were slight frequency effects noted on the line approximately 200 ft. east of the center point. The resistivity shows an anomalous zone about 200 ft. west to 200 ft. east of the center point. There is a contact located about at the center point which correlates well with a northwest trending fault shown on the geology map. The resistivity again increases to the east due to the deepening of the limestone and the influence of known chert beds. These chert beds may also be a contributing factor in the extremely high resistivities mapped by the prior two lines. From 400 ft. west to the end of the line the resistivities again decrease probably due to the andesite.

Line 3 was run parallel to Line 1 with the center point located 30 ft. south and 10 ft. east of C-8. The only significant I. P. effects noted on this line are located from 0 - 300 ft. east of the center point. This coincides with a relative resistivity low on this line. To the east the deepening of the limestone beds is reflected by the high resistivities. To the west the resistivity picture is quite complex; however, the near surface resistivity low is undoubtedly caused by the andesite intrusive. Beyond the low, the resistivity increases due to the effect of the abrigo limestone which crops out on the surface.

Line 4 was run on a bearing N35°W with the center point located 300 ft. east and 210 ft. south of C-8. The purpose of this line was to survey the ground within the northwest, southeast trending zone of possible mineralization. The highest frequency effects are located about 600 ft. north of the center point in the vicinity of C-3. The resistivity is also decreasing close to C-3. The slight resistivity low about 100 ft. north of the center point is on the fringe of the anomaly mapped by Lines 2 and 3. The high resistivity to the south is a result of chert beds or may possibly be caused by a cross fault. If the latter is true, this fault may be of primary geologic importance.

Respectfully submitted,

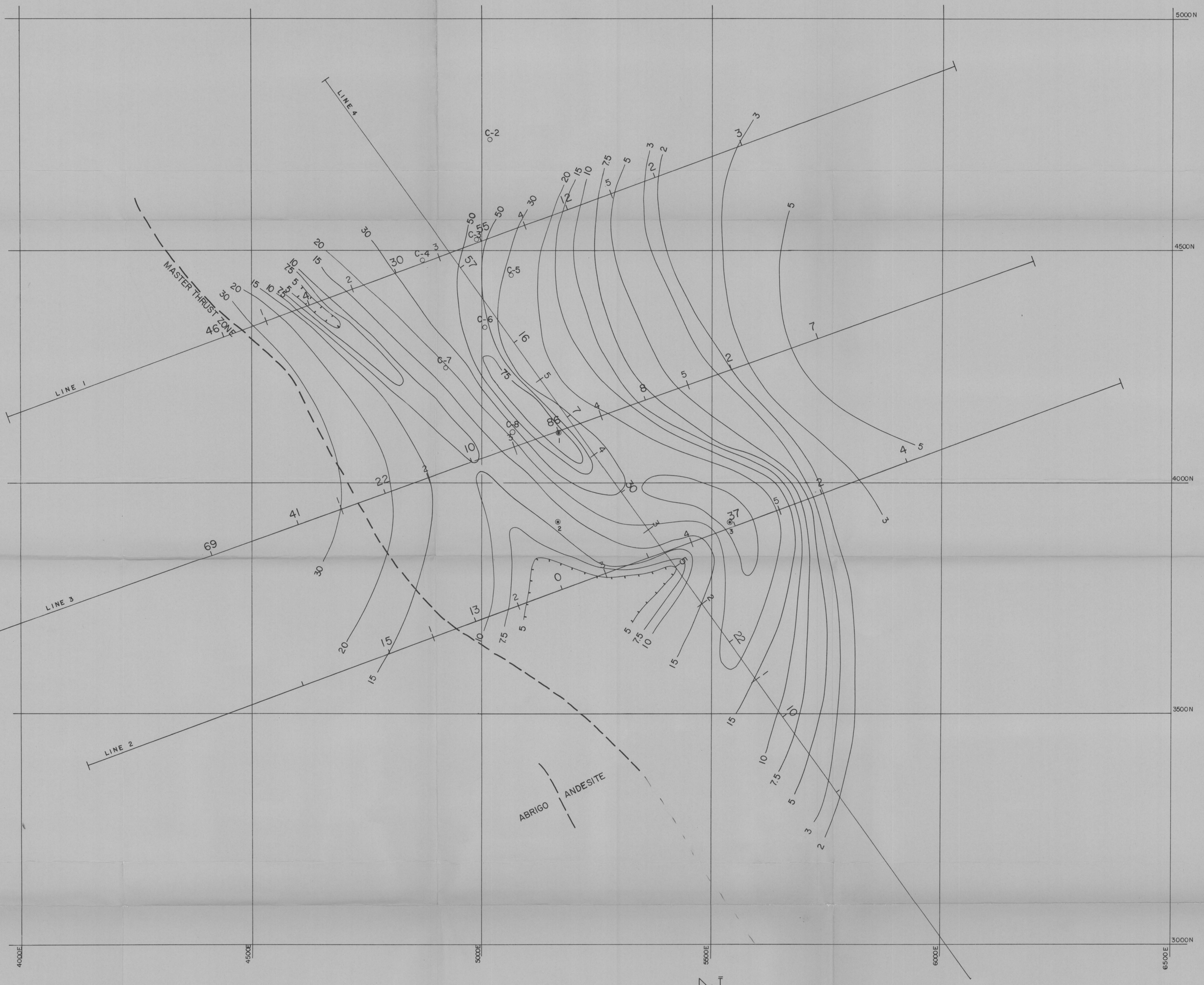
HEINRICHS GEOEXPLORATION COMPANY

J. P. Matthews, Jr.
Geophysicist

Approved:

C. S. Ludwig
Sr. Geophysicist

January 8, 1965
P. O. Box 5671
Tucson, Arizona



○ C-3 = D.D.H.

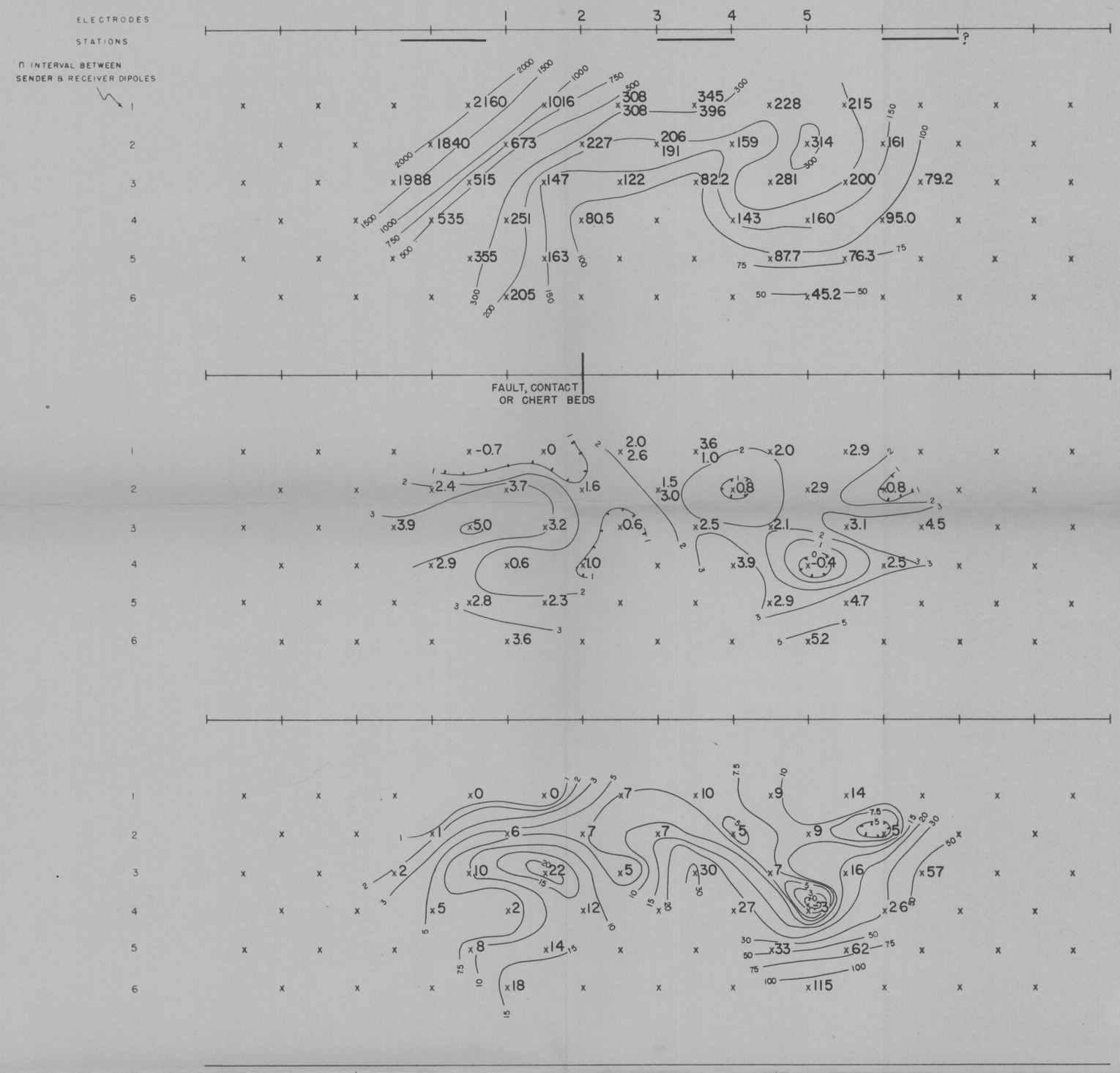
◉ P1 = PROPOSED D.D.H.

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

INDUCED POLARIZATION SURVEY
METALLIC CONDUCTION FACTOR
3n SEPARATION
FOR
DANIEL L.E. HUCKINS

CHANCE MINE AREA
COCHISE COUNTY, ARIZ.

SCALE: 1" = 100'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J.P.M	
DATE: DEC. 1964	SHEET 1 OF 1	
DRAWN BY: H.R.M.	DRAWING NO.:	FILE:



APPARENT RESISTIVITY (ρ_{DC}) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 c.p.s.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 c.p.s.

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)

$$(MCF = \frac{PFE \times 1000}{\rho_{DC}/2\pi})$$

CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY: 200' n x 200'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NORTH

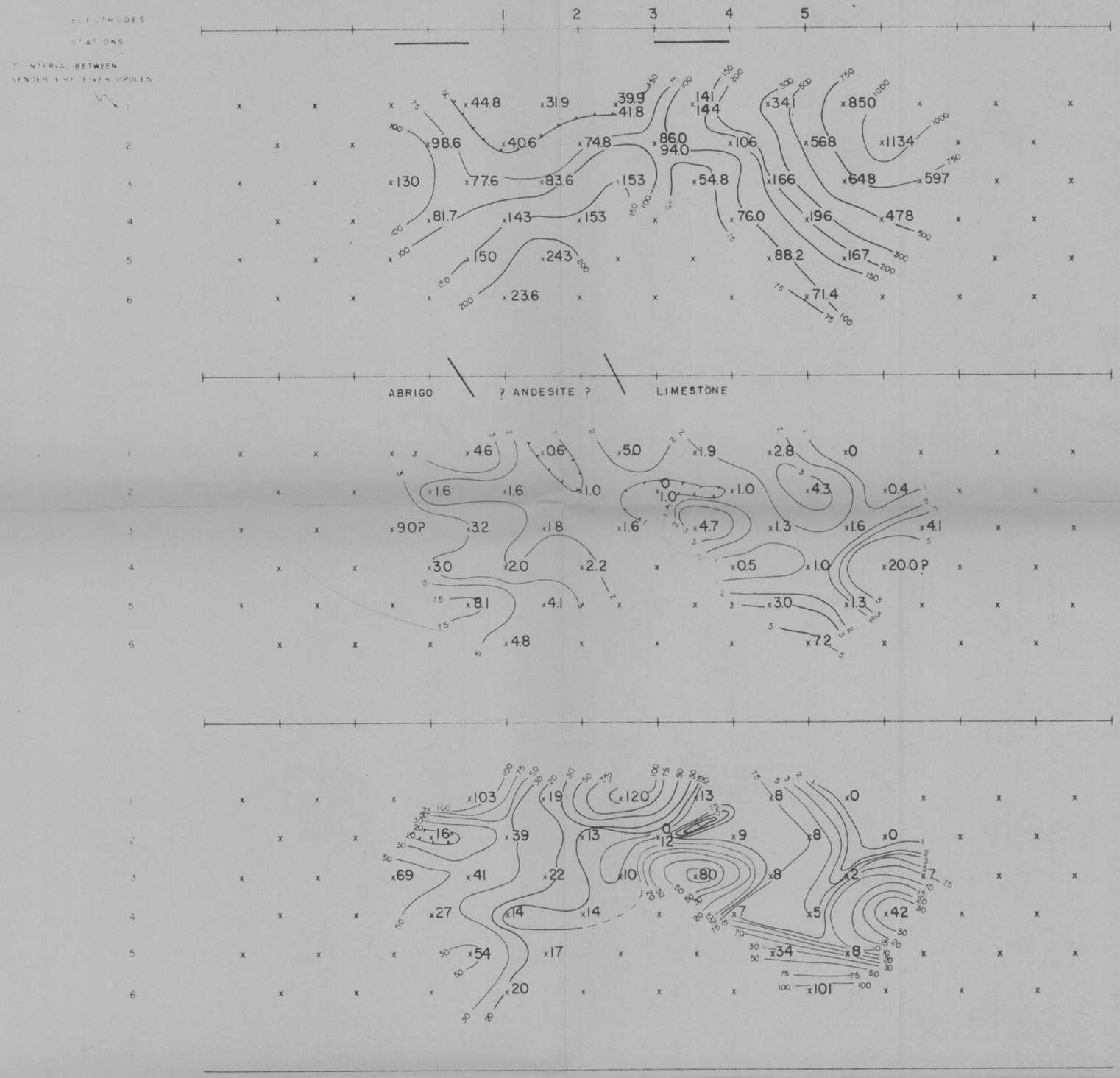
CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 4
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR

DANIEL L.E. HUCKINS



APPARENT RESISTIVITY (ρ_a) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY 0.05 CPS

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES 0.05 & 3.0 CPS

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
(MCF = $\frac{PFE \times 1000}{\rho DC}$)
CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY — 200' — na — 200 —

SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NORTH

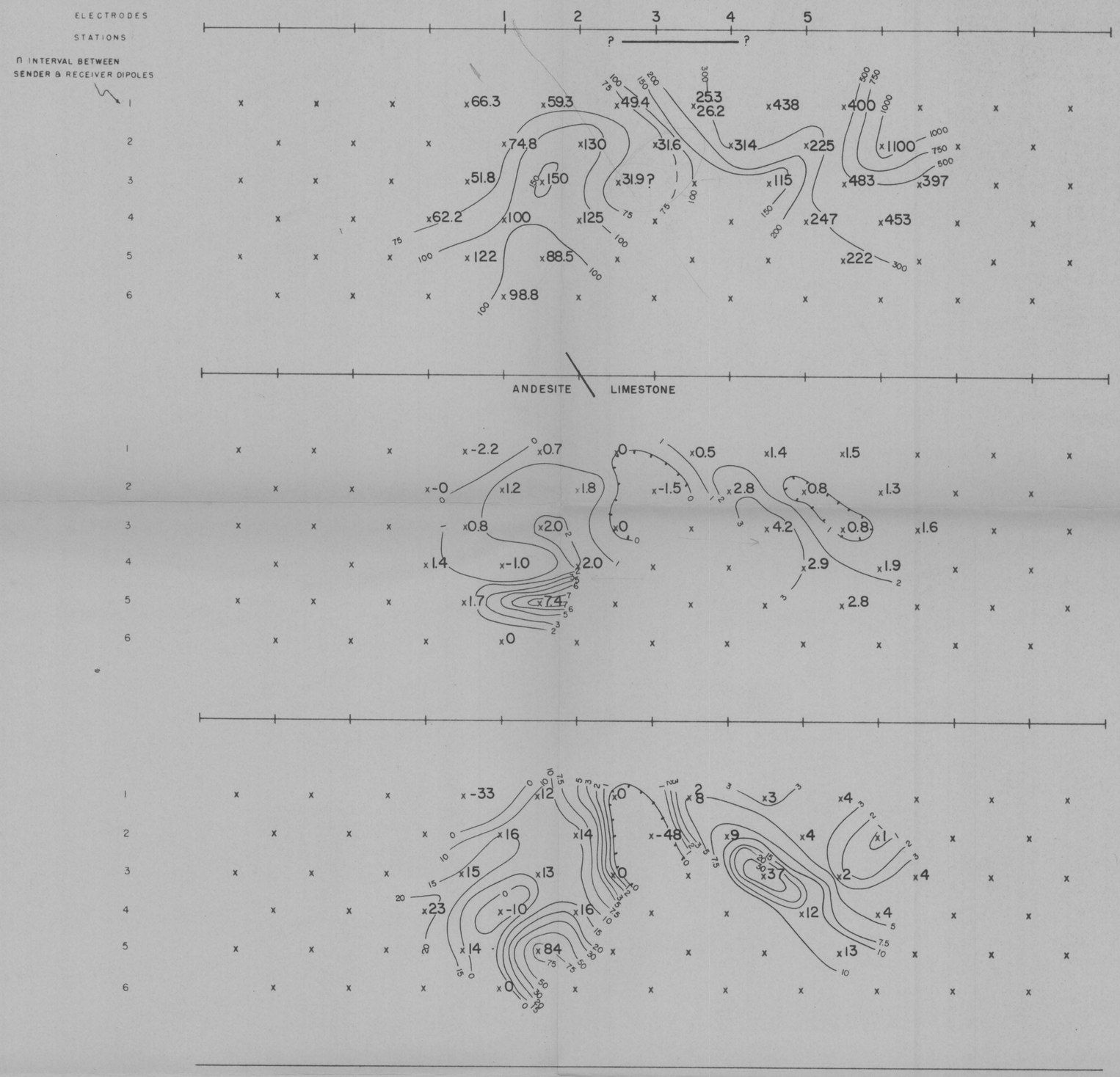
CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 3
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR

DANIEL L.E. HUCKINS



APPARENT RESISTIVITY (ρ_{DC}) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 c.p.s.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 c.p.s.

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$
CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY: 200' n x 200'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NORTH

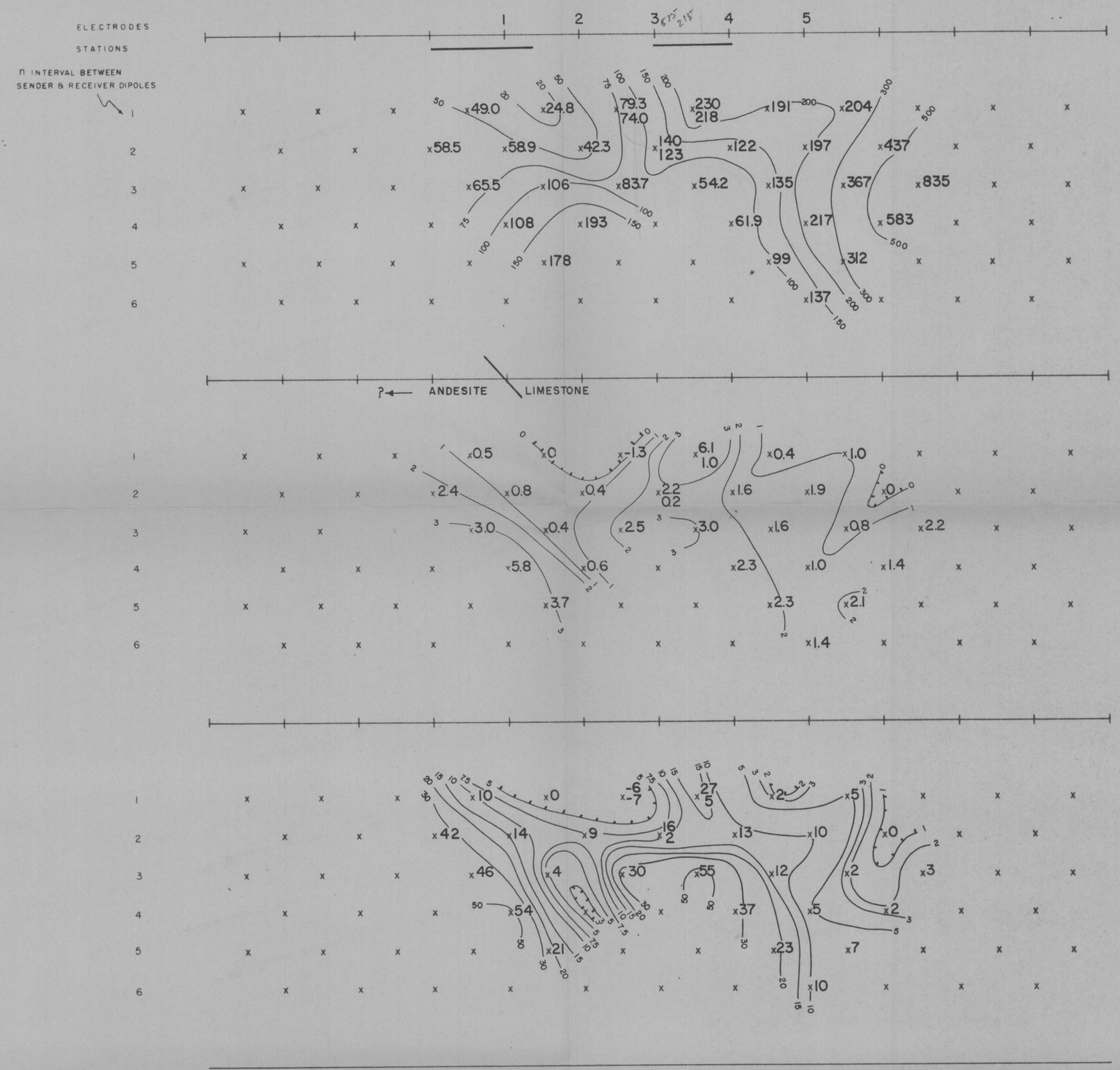
CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 2
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR

DANIEL L.E. HUCKINS



APPARENT RESISTIVITY (ρ_{DC}) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 c.p.s.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 c.p.s.

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)

$$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$$

CONTOUR INTERVAL LOGARITHMIC

SELF POTENTIAL
SURFACE PROFILE
GEOLOGY, ETC.

EXPLANATION

ELECTRODE ARRAY: 200' — n x — 200'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NORTH

CHANCE MINE AREA

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 200' DATE: DEC. 1964

FOR
DANIEL L.E. HUCKINS

RESEARCH