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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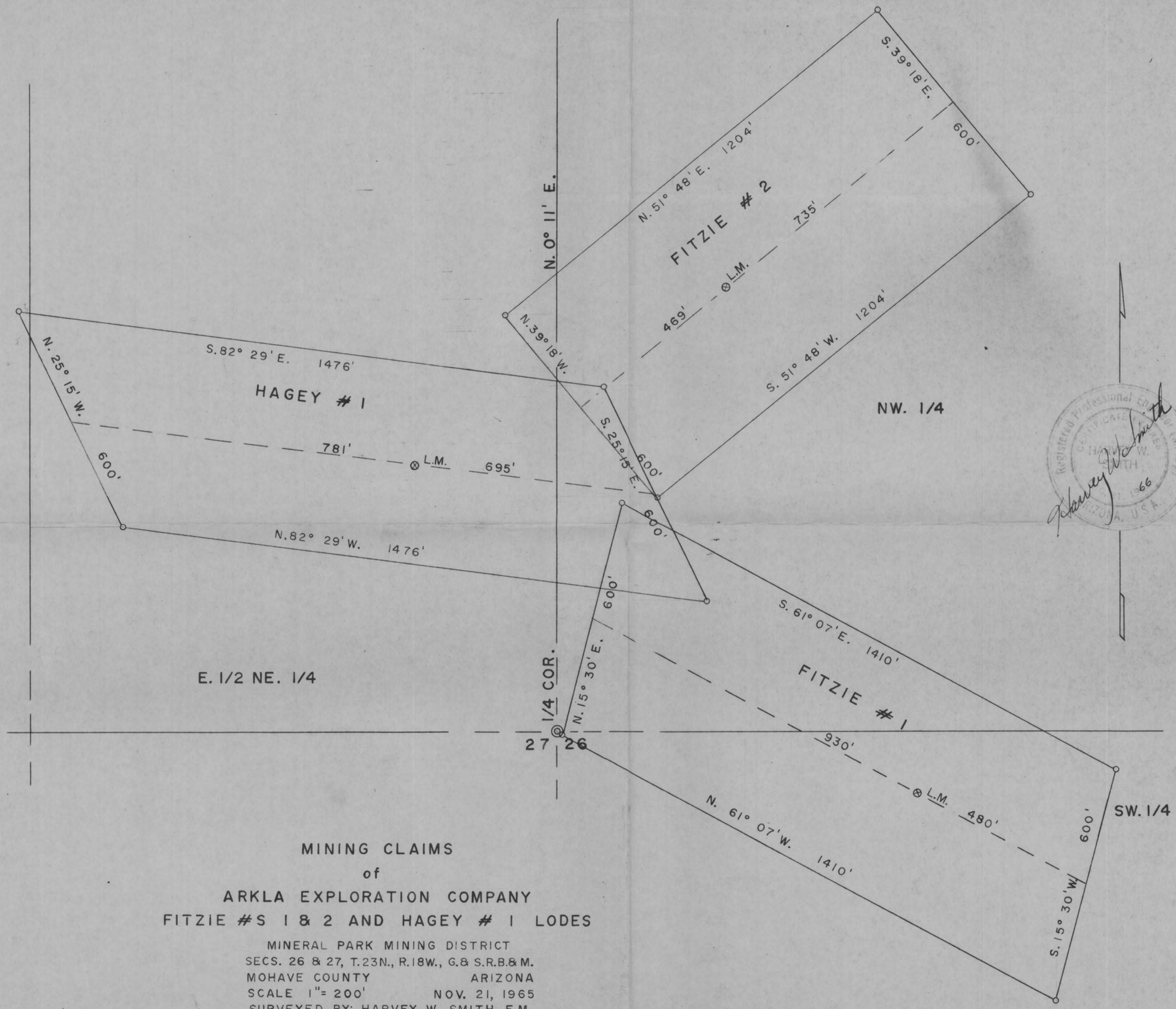

Registered Professional Engineer
CERTIFICATE
HARVEY W.
SMITH
1966
ARIZONA, U.S.A.

Harvey W. Smith

MINING CLAIMS
of
ARKLA EXPLORATION COMPANY
FITZIE #S 1 & 2 AND HAGEY # 1 LODES

MINERAL PARK MINING DISTRICT
SECS. 26 & 27, T.23N., R.18W., G.& S.R.B.& M.
MOHAVE COUNTY ARIZONA
SCALE 1"= 200' NOV. 21, 1965
SURVEYED BY: HARVEY W. SMITH, E.M.
REGISTERED MINING ENGINEER
U.S. MINERAL SURVEYOR

HEINRICHS GEOEXPLORATION COMPANY

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

February 17, 1965

Mr. M. L. Pugh, Chief Geophysicist
Arkansas Louisiana Gas Company
P. O. Box 1734, Slattery Building
Shreveport, Louisiana

Re: Santa Claus, Special Project
Mohave County, Arizona

Dear Pete:

Attached is a letter report with recommendations and conclusions on the special magnetics program carried out February 13 and 14.

The final magnetic map, scale: 1" = 1,000' will follow.

Our billing is sent under separate cover.

Very truly yours,

HEINRICHS GEOEXPLORATION COMPANY

Walter E. Heinrichs, Jr.
President & General Manager

WEH:jh
Enclosure: 3
cc: McCarthy, Kingman, Arizona

LETTER REPORT - INTRODUCTION, CONCLUSIONS & RECOMMENDATIONS

At the request of Arkla Exploration Company, Heinrichs Geoexploration Company of Tucson, Arizona conducted a quick program to evaluate and locate precisely a magnetic anomaly previously discovered by Heinrichs Geoexploration Company Mobile Magnetometer on 16 December 1964 at the Santa Claus Area near Kingman in Mohave County, Arizona. Mr. J. P. Matthews, Jr. was sent via aircraft on February 12 to carry out the field work and was assisted by a helper supplied by Arkla at Kingman. The actual field work was conducted on February 13 and 14 with additional interpretation and drafting done at the GEOEX office in Tucson on February 15, 16 and 17.

The magnetic anomaly as recorded by the "MoMag" was approximately 800 gammas in total intensity. After detailed hand magnetic work was completed, magnetic relief was found to range from approximately 700 gammas to 1,600 gammas in vertical intensity. The center of the observed anomaly is located 700 ft. east and 500 ft. south of the center point of the grid which is at the common end center of claims 11 and 12 of the RAY claim group. The anomaly is roughly circular in shape with a diameter of approximately one mile. The established maximum depth to the upper pole of the causative body, by the half width method, is 1,500 ft. +/- 500 ft. Greater depth accuracy might be available when more background coverage is obtained.

Several small isolated, near surface anomalies are apparent within the area covered, in particular one which reaches a maximum of 3,200 gammas. These anomalies are small, near surface effects and are not considered of any importance.

During conference with Mr. M. L. Pugh on February 15, 1965 a drill hole location was proposed on the magnetic anomaly center at the coordinates mentioned above. This hole should be programmed for a depth of at least 1,800 ft.

Further recommendations include some gravity coverage and additional magnetic work and the use of induced polarization and resistivity techniques. I. P. and resistivity would help to determine the presence of sulfides and together with gravity data would provide earliest optimum appraisal.

A preliminary magnetic contour map and a station location map with corrected values of the Santa Claus area was given to Mr. Pugh on February 16, 1965. The final magnetic map will be to a scale of 1" = 1,000'.

Respectfully submitted,

J. P. Matthews, Jr.
HEINRICHS GEOEXPLORATION COMPANY

HEINRICHS GEOEXPLORATION COMPANY

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

March 2, 1965

Arkansas Louisiana Gas Company
P. O. Box 1734
Shreveport, Louisiana

TEST RUN ON ROCK SAMPLE FROM D. D. H. PETE #3

Sample: at 35.5 ft. (depth?) highly altered iron stained granite.

Resistance Dry: 7,500,000 ohms (Whole Sample)

" Wet: 20,000 ohms in situ ?

Magnetic Susceptibility: Nil four orientations

Specific gravity:
Chip Sample: 2.63125 gm/cc
Whole Sample: 2.44894 gm/cc

by: E. Grover Heinrichs

Gevex Interoffice Ludwig to All Concerned Re: I.P. Procedures.

February 27, 1965 ✓ [illegible]

ERRORS AND MISUNDERSTANDINGS ON THE SANTA CLAUS I. P. FOR DAN, RON AND PHIL AND TO ALL CONCERNED:

1. No consistant line numbering system was used:i.e.,#20 - 21 - 22 - 20 "B" - 1 - 2, yet there were only two lines and one repeat. No means to sort these out was given in the notes or plots.

2. Line 20"B" I believe was plotted looking SW yet indicated AS NORTHEAST.

3. SIX electrodes were used yet only 29 or 30 data points were read per line. Our S.O.P. on FIVE electrodes gives 34 data points per line ~~with~~ so with six electrodes we should get at least 6/5 of 34 or 41 data points (actually 42 and 3 repeats or 45).

4. Line 20N receiver notes, I believe, have the receiving stations indicated 1,000 ft ~~xxxxx~~ too far south making it impossible to know the "n" separation.

5. Several currents were not recorded in the sender notes.

6. Much of the data was plotted at the wrong stations making any interpretation meaningless.

7. Much of the data was computed with the wrong Kn's giving incorrect resistivities.

8. No culture (pipelines, etc) were indicated in the notes or on the plots. Due to the high likelyhood of artificial interference from these features, it is very important to note and record their position.

9. No consistant area name or project name was found on the notes or plots.

10. Continuous strings of DC readings should be averaged as below to minimize S. P. drift effects.

Readings	Sum in Pairs
1	1 + 2
2	2 + 3
3	3 + 4
4	4 + 5
5	5 + 6
6	6 + 7
7	7 + 8
8	Sum and divide by 7 for D.C. average.

11. Several resistivities were computed on the computing sheets incorrectly -- both decimal and value errors were found.

12. It took a day and a half to straighten this mess out and I am not certain I have it correct yet. There was nothing wrong with the current monitor and if the data had been computed and plotted correctly the first time, the repeat line would not have been necessary. Everyone please try harder next time. Meanwhile, we will also try to work in some more I. P. classes or training as soon as possible, as well as a more comprehensive and detailed manual of operations.

HEINRICHS GEOEXPLORATION CO.

Chris S. Ludwig,
Chief Geophysicist

HEINRICHS GEOEXPLORATION COMPANY

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cc: McCarthy, Kingman, Arizona

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The magnetic anomaly as recorded by the "MoMag" was approximately 800 gammas in total intensity. After detailed hand magnetic work was completed, magnetic relief was found to range from approximately 700 gammas to 1,600 gammas in vertical intensity. The center of the observed anomaly is located 700 ft. east and 500 ft. south of the center point of the grid which is at the common end center of claims 11 and 12 of the RAY claim group. The anomaly is roughly circular in shape with a diameter of approximately one mile. The established maximum depth to the upper pole of the causative body, by the half width method, is 1,500 ft. +/- 500 ft. Greater depth accuracy might be available when more background coverage is obtained.

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Respectfully submitted,

J. P. Matthews, Jr.

HEINRICHS GEOEXPLORATION COMPANY

R 19 W

Scale 1000'/INCH

5	4
8	9

4	3
9	10

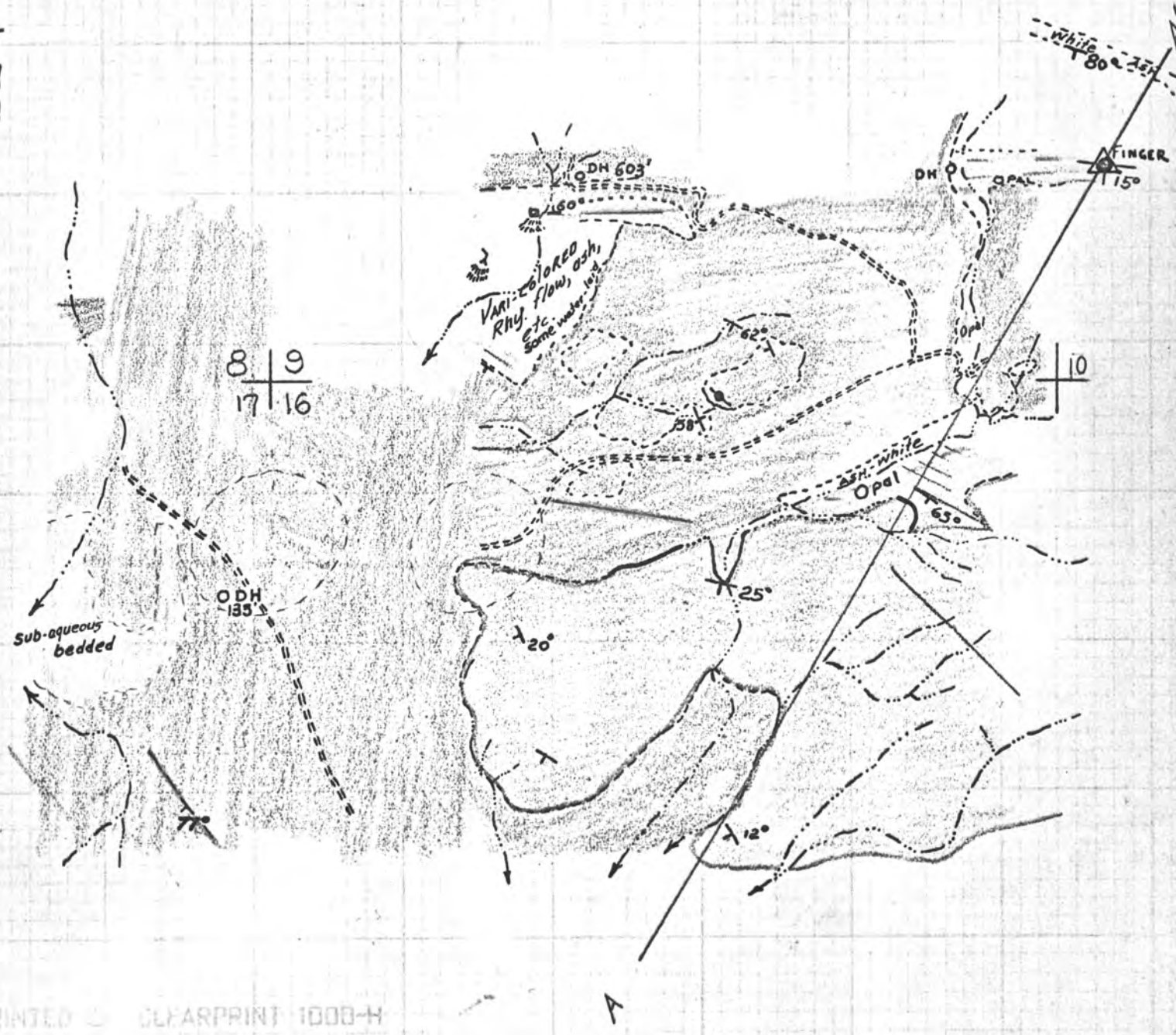
LEGEND

- Alluvium
- Rhyolite flow Pitchstone at base
- ANGULAR UNCON. →
- Lower Rhyolite flows (Opal)
- Rhyolite Intrusives (Dikes)
- Trachyte
- Faults or Veins.

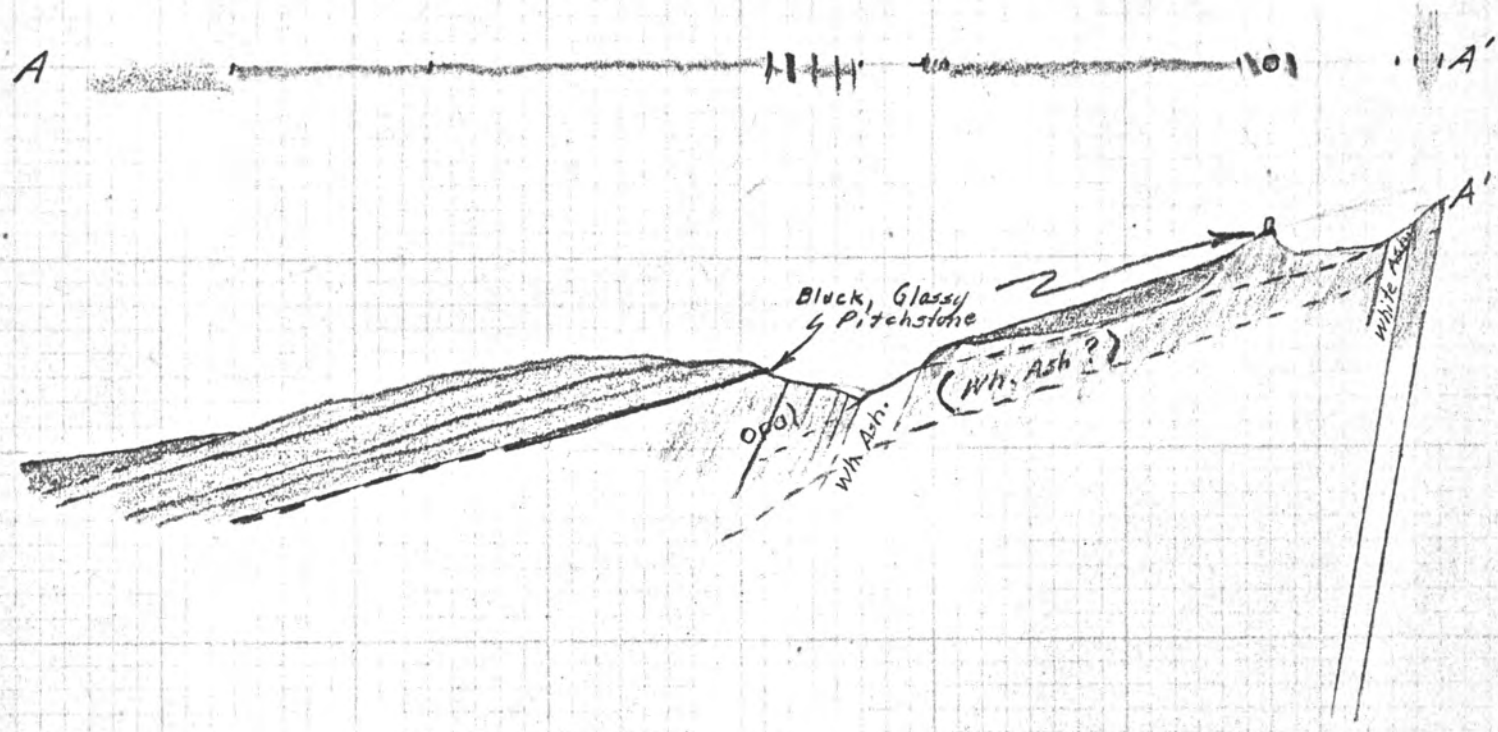
ROADS PLOTTED ON ARKLA BASE 12-18-65 HDH

ARKLA

T 17 N

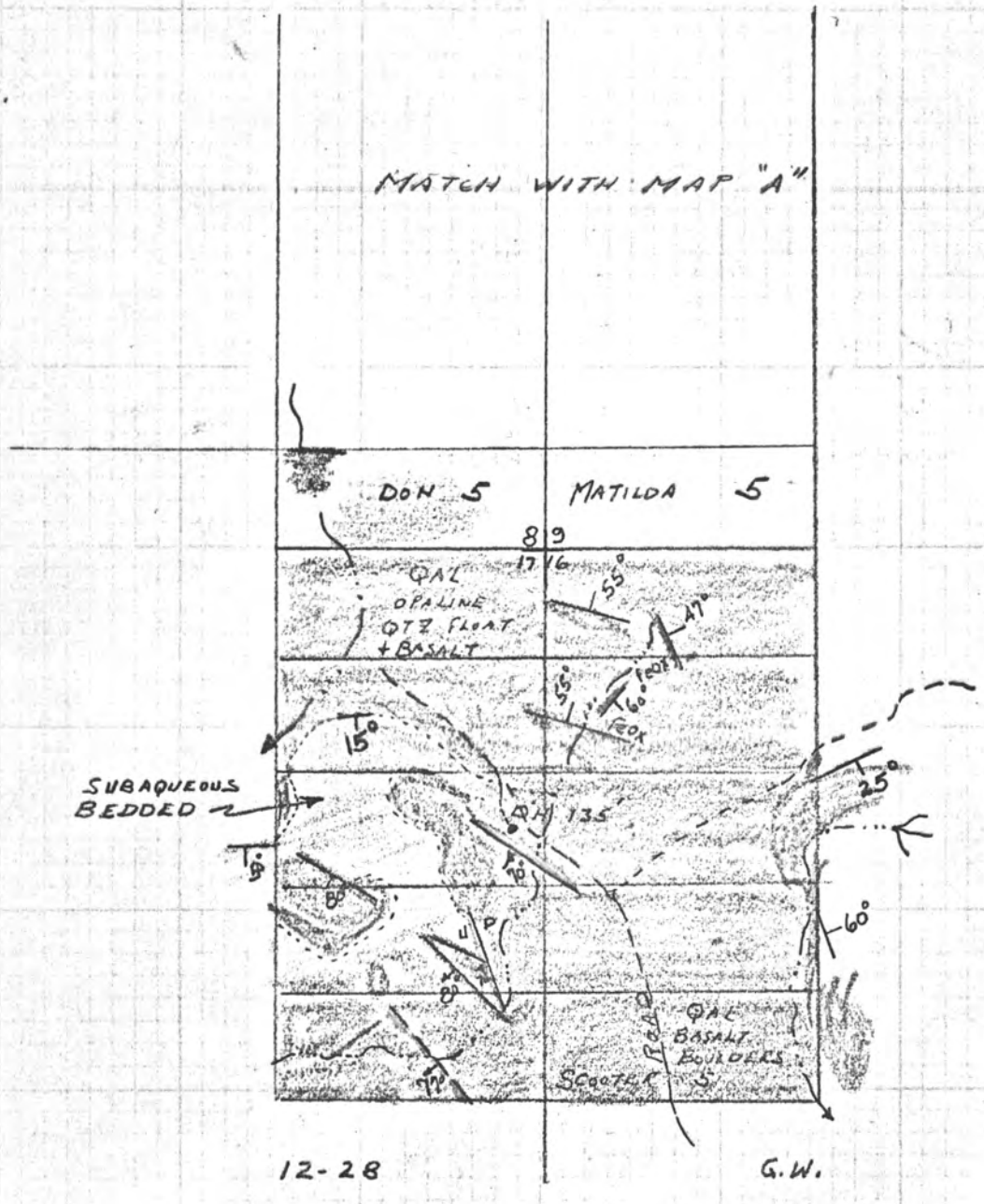


PRINTED ON CLEARPRINT 1000-H



ARKLA

PRINTED ON CLEARPRINT 1000-H



B

MOHAVE TRACT

T 17 N R 19 W

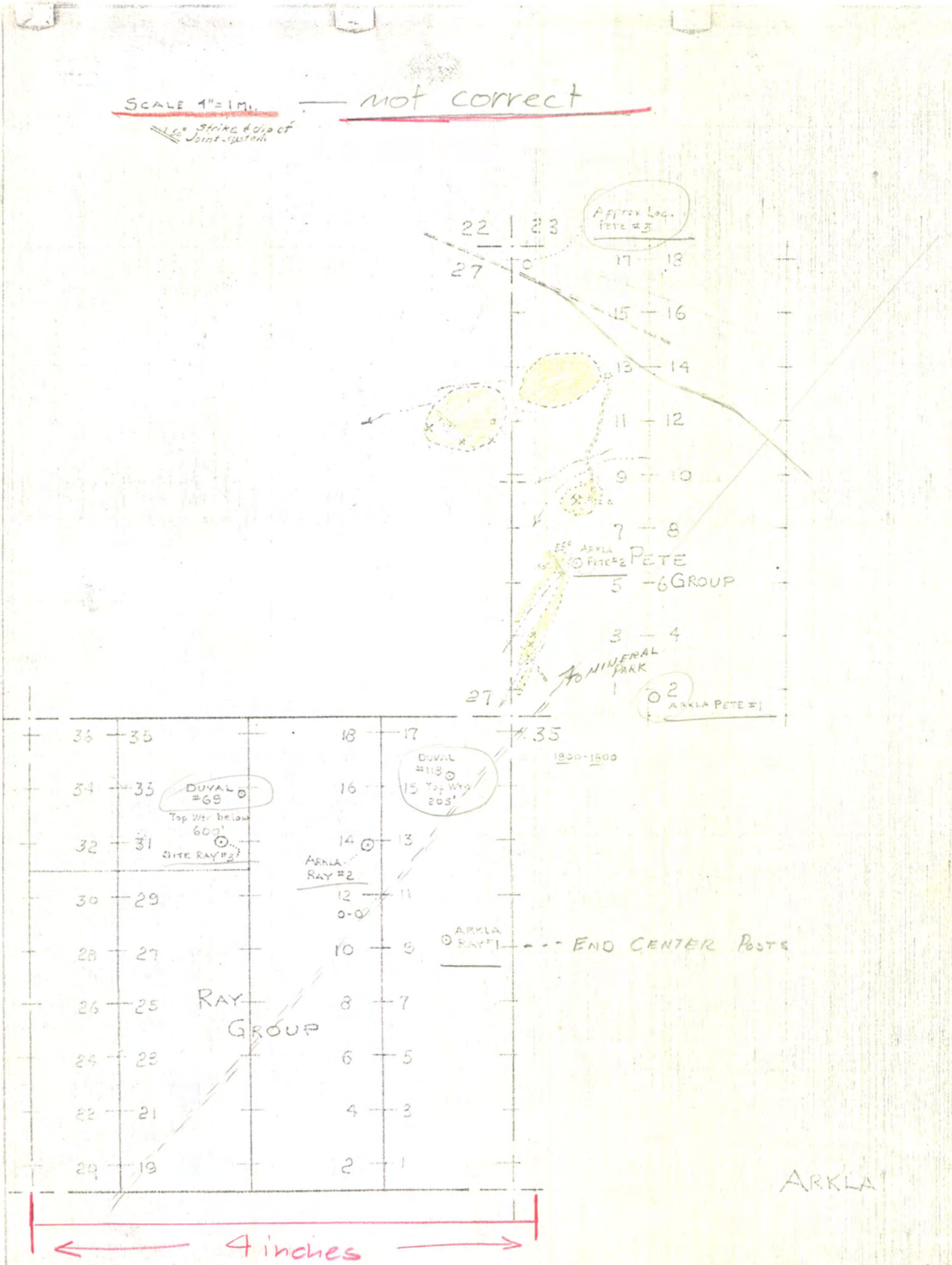
SCALE 1" = 1000'

JOINS MAP "A"

ARKLA

ROADS PLOTTED
ARKLA BASE
2-18-65 HLM

PRINTED ON CLEARPRINT

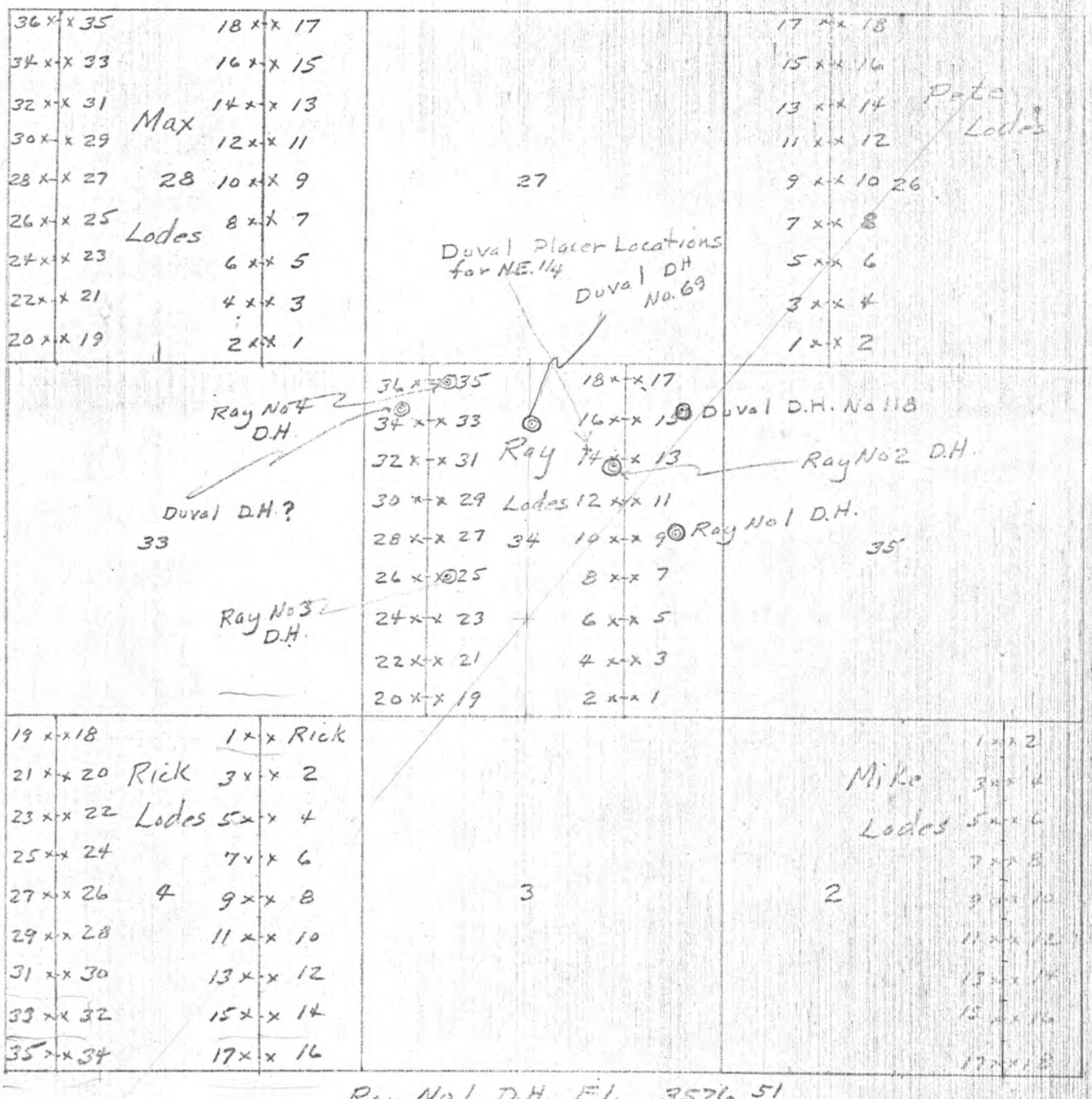

SCALE 1" = 1 Mi.
— not correct
Strike & Dip of Joint-system
Approx Loc. Pete #3
22
23
27
17
18
15
16
13
14
11
12
9
10
7
8
ARKLA Pete #2
PETE GROUP
5
6
3
4
TO MINERAL PARK
1
2
ARKLA PETE #1
27
35
1800-1600
36
35
34
35
DUVAL #69
Top Wtr below 600'
32
31
SITE RAY #2?
18
17
DUVAL #118
15
Top Wtr 205'
16
14
13
ARKLA RAY #2
12
11
0-0
30
29
28
27
ARKLA RAY #1
END CENTER POST
10
9
26
25
RAY GROUP
8
7
24
23
6
5
22
21
4
3
20
19
2
1
ARKLA
4 inches

Drill Hole Locations not correct!

R. 18 W.

T 23 N

T 22 N



Ray No 1 D.H. El. 3576.51

Ray No 2 D.H. El. 3583.72

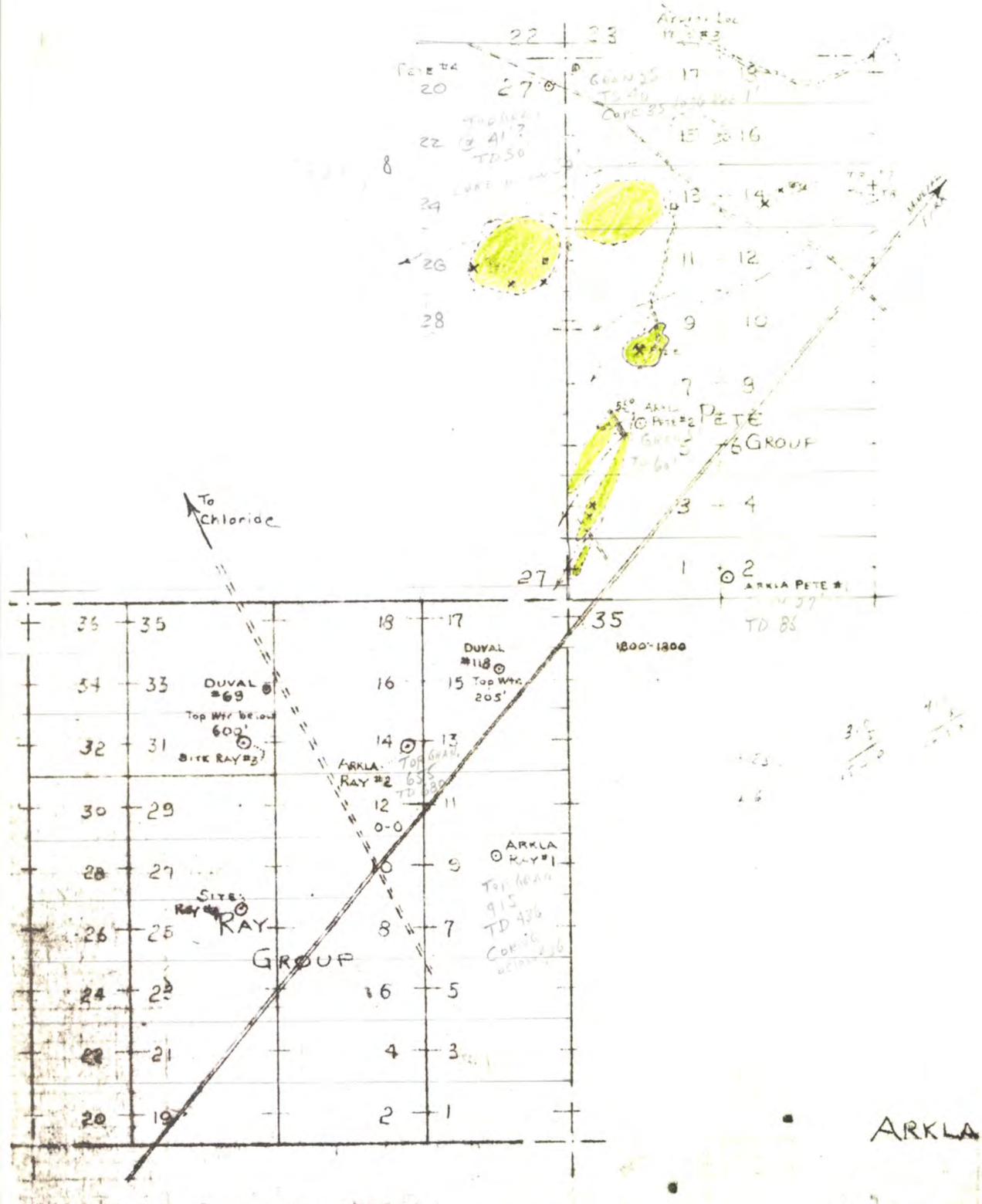
ARKLA EXPLORATION COMPANY

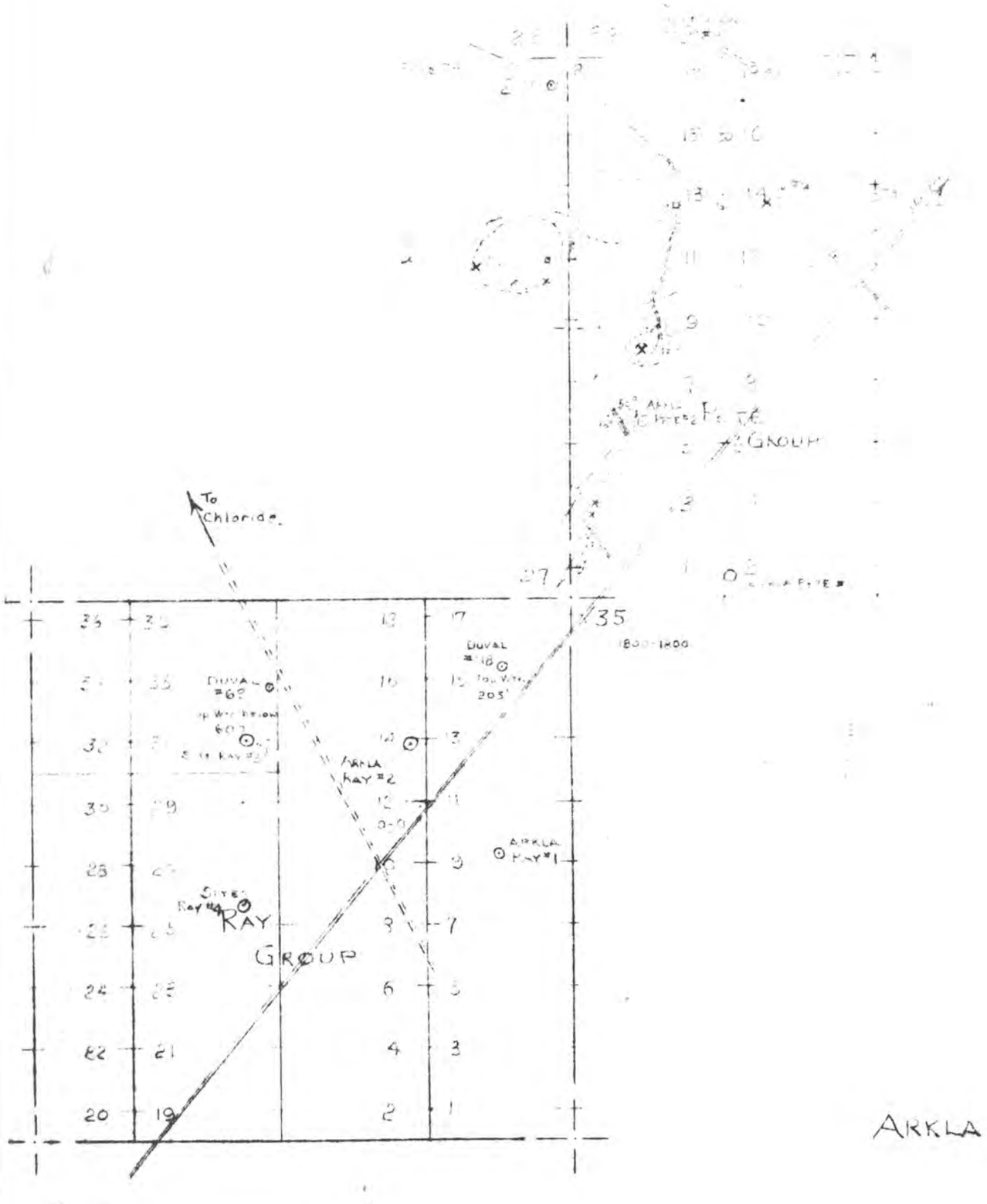
Preliminary Sketch - Ray, Max, Rick, Pete & Mike Lodes

Scale 1: 24000

2

D.H. ok. on this map




To Chloride
GROUP
DUVAL #18
DUVAL #6?
ARKLA RAY #2
ARKLA RAY #1
SITE: Ray #4
RAY
GROUP
ARKLA

2-24-65

ARKLA D.H. RAY #1 TD 436

Top granite 415

Cuttings sent: 1) TD 436
2) 421-434

"GRANITE" appears to be Ithaca Peak GRANITE
REFER TO DING'S MAP of Wallapai Min Dist. 1943

RAY #2 DRILLING AT 605 in Gravel

PETE #1 TD 85'

Top GRANITE 25'

Cuttings sent: 1) TD 85' circ.
2) 32 to 38

PETE #2 TD 60'

Top GRANITE about 5'

PETE #3 spudded 2-24-65 about 10:00AM

TD about 15 (AIR) rigging up for mud

SANTA CLAUSE PROJECT
GEO-CHEM SAMPLING SEC. 2. 22N-18W
SCALE: 500'/INCH
Regular Section Assumed

DONALD P. McCARTHY
MAR. 16, 1985

Spls of CORE from Ray #1
Delivered: 466'
487'
15 cuts 611
777
830
883
910
1034
1153 1500
1236 1601
1360 1700
1365

NOTE: RED OUTCROP = Buff, limonitic Qtz - Granite (Porphyry)
Printed Spl. Sites, ie, 639, 643, 652. Spls. of field rock from Outcrop

DONALD P McCARTHY, GEOLOGIST
3-8-65

SANTA CLAUSE PROJECT

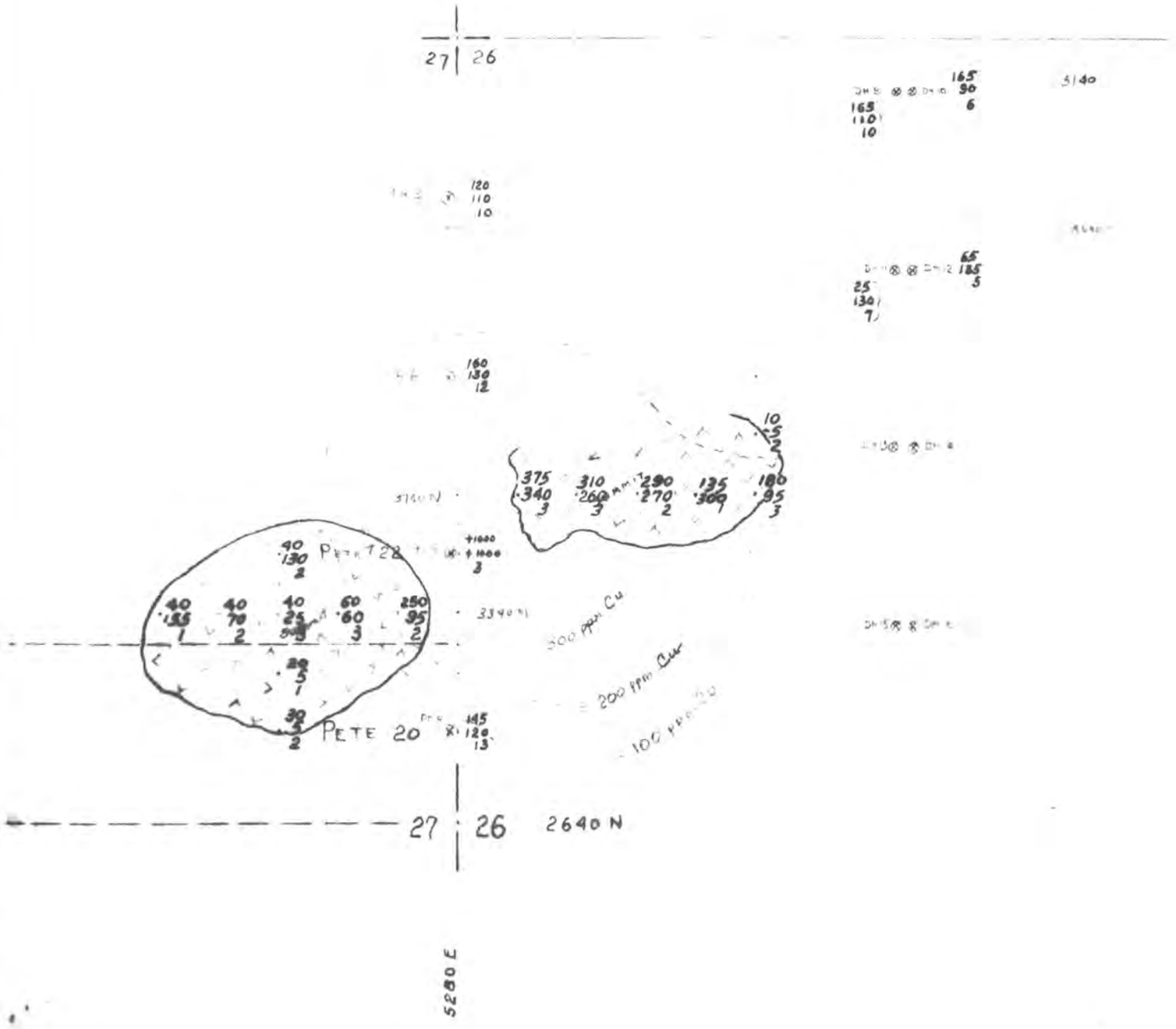
SAMPLING FOR GEO-CHEM DETN'S

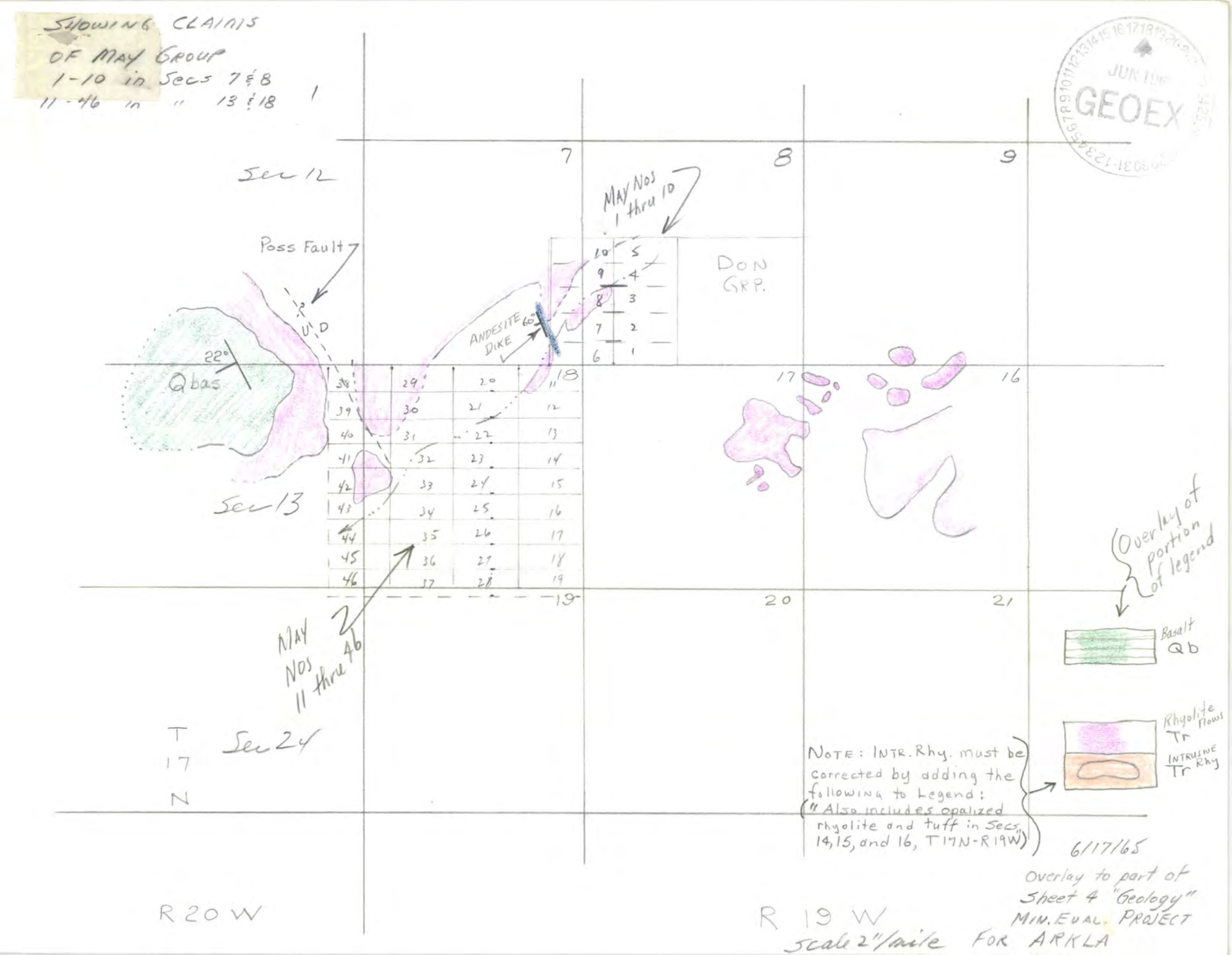
Coordinate system of locations used - ie/ (Sec 27, y' N of S. line - x' E. of W line
(27, yN - xE)

SCALE 500'/Inch

LEGEND
- SAMPLE SITE
- 300 ppm Cu
- 60 " Zn
- 2 " Mo

GRANITE AND related xln. rocks




SHOWING CLAIMS
OF MAY GROUP
1-10 in Secs 7 & 8
11-46 in " 13 & 18
Sec 12
7
8
9
MAY Nos 1 thru 10
Poss Fault
U
D
ANDESITE DIKE 60°
DON GRP.
22°
Qbas
Sec 13
18
17
16
MAY Nos 11 thru 46
Sec 24
19
20
21
T 17 N
R 20 W
R 19 W
Overlay of portion of legend
Basalt Qb
Rhyolite flows Tr
Intrusive Rhy Tr
NOTE: INTR. Rhy. must be corrected by adding the following to Legend: "Also includes opalized rhyolite and tuff in Secs 14, 15, and 16, T17N-R19W)"
6/17/65
Overlay to part of Sheet 4 "Geology" MIN. EVAL. PROJECT
scale 2"/mile FOR ARKLA

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGIC SURVEY

EXPLANATION

- Qal — Alluvium. Includes debris ranging from silt to boulders
- Qv — Gabbro. Commonly medium-grained with a diabasic texture
- pMg — Ithaca Peak granite. Commonly slightly porphyritic. Includes pegmatite and aplite dikes and differentiation facies of porphyritic granite and granite porphyry
- pMc — Chloride granite. Commonly with a granular structure
- pCu — Undifferentiated granite, gneisses, and schists. Predominantly granite of medium grain size, mostly gneissoid, with minor amounts of mafic minerals
- pCa — Amphibolite. Includes minor masses of hornblende schist, biotite schist, chlorite schist, and diorite gneiss

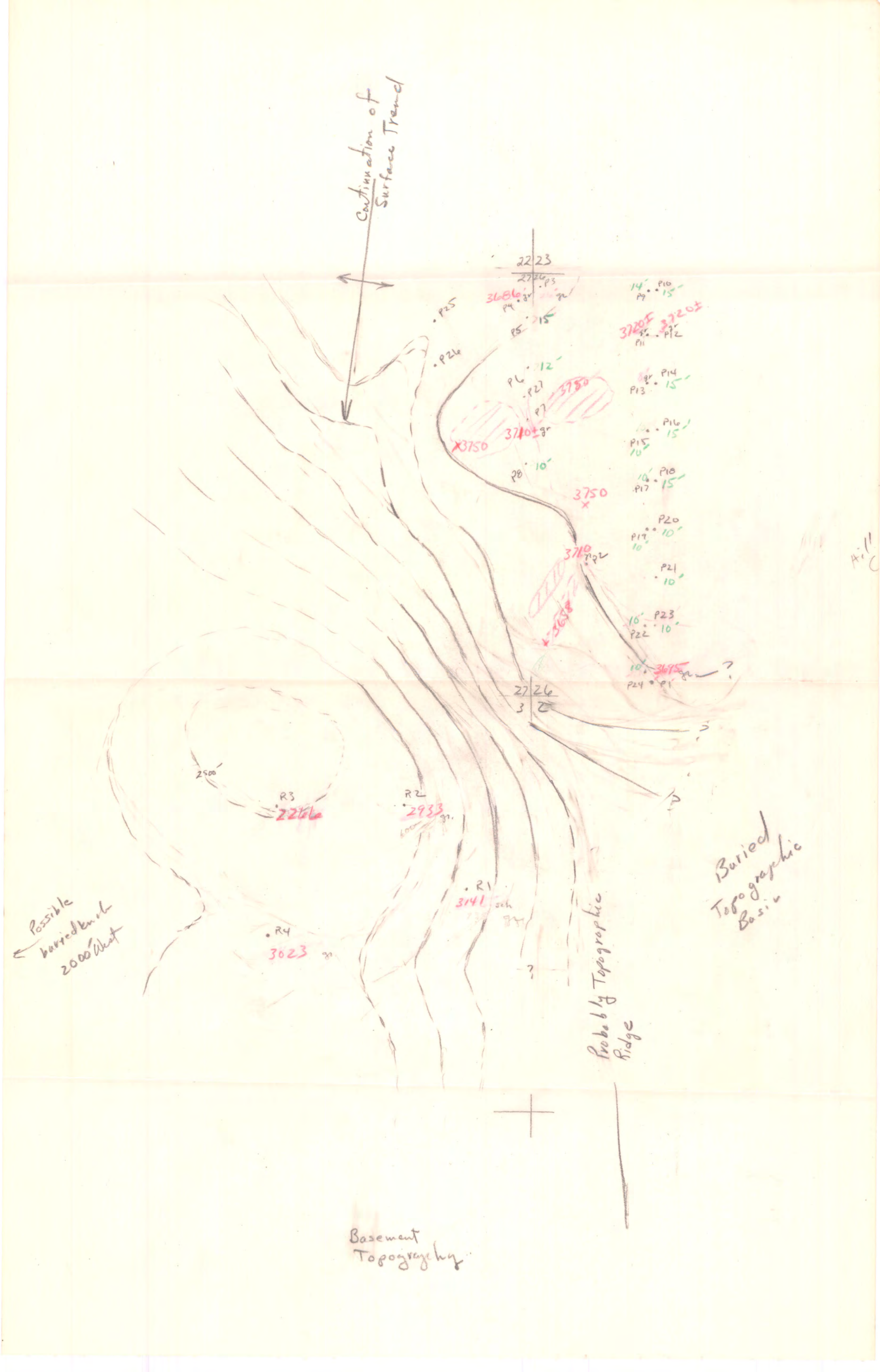
MESOZOIC(?) — QUATERNARY

PRE-CAMBRIAN(?) — PRE-CAMBRIAN

- Rhyolite dike, showing dip
- Diabase dike, showing dip
- Dike of intermediate to basic composition, showing dip
- Contact. Dashed where approximately located
- Indefinite contact
- Fault. Dashed where approximately located. Dotted where concealed
- Vein, showing dip. Dashed where approximately located
- Vertical vein. Dashed where approximately located
- Strike and dip of schistosity or foliation
- Strike of vertical schistosity or foliation
- Strike and dip of joints
- Strike of vertical joints
- Mine
- Prospect
- Open-cut manganese mine

Geology by McClelland G. Tenge and Paul K. Sims, 1943

GEOLOGIC MAP OF THE WALLAPAI MINING DISTRICT, MOHAVE COUNTY, ARIZONA


Continuation of Surface Trend
22 23
27 26
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
P16
P17
P18
P19
P20
P21
P22
P23
P24
P25
P26
P27
3686 gr
3720± gr
3750
3710± gr
3710 gr
3695 gr
27 26
3 2
R1
3141 sch
R2
2933 gr
R3
2266 gr
R4
3023 gr
2500'
Possible buried Topographic 2000' ht
Probable Topographic Ridge
Buried Topographic Basin
Basement Topography

R 18 W

T 23 N

T 22 N

MAX

PETE

PETE No 4

PETE No 3

PETE No 2

PETE No 1

RAY

RAY No 3

RAY No 2

DUVAL

DUVAL No 63

DUVAL No 118

BM 3573

BM 3564

BM 3569

BM 3562

BM 3569

Santa Claus

FENCE LINE

TELEPHONE LINE

POWER LINE

HIGHWAY 93 & 466

0 N-S

50+00 S

100+00 S

STATION 155+00 S

EXPLANATION

- O DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- IP SURVEY LOCATION
  1 2 3 4 5 ELECTRODE STATIONS

ASSUMED GRADIENT OF 1.0 Mgals/1000' WEST

GEOEX Copy

REGIONAL GRADIENT CORRECTED GRAVITY

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION

FOR
ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	4-2-65
DATE: Feb 1965	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

PRELIMINARY

R 18 W

T 23 N

T 22 N

MAX

PETE

RAY

MIKE

Santa Claus

BM 3575

BM 3691

BM 3649

BM 3564

BM 3508

BM 3452

FENCE LINE

TELEPHONE LINE

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. — R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION — 1 2 3 4 5 ELECTRODE STATIONS

N

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION

FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 1 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

Probable fault ?

R 18 W

T 23 N

T 22 N

MAX

RAY

PETE

DUVAL ?

DUVAL No 69

DUVAL No 118

RAY No 3

RAY No 2

RAY No 4

RAY No 1

PETE No 4

PETE No 3

PETE No 2

PETE No 1

BM 3575

BM 3564

BM 3569

BM 3452

Santa Claus

FENCE LINE

TELEPHONE LINE

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

+ Ridge?

?

EXPLANATION

- O DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- 1 · · ⑥ · ► MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- 1 2 3 4 5 I.P SURVEY LOCATION ELECTRODE STATIONS

PRELIMINARY

P = 2.30 gms/cc.

3-31-65

Prelim.

Geoex Copy

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION

FOR

ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	
DATE: Feb 1965	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

R.18 W

T 23 N

T 22 N

PETE No 4 · PETE No 3 · PETE No 5 · PETE No 2 · PETE No 1 · PETE Nos 6 7 8 · RAY · RAY No 3 · RAY No 2 · DUVAL · DUVAL No 1A · DUVAL No 1B · DUVAL No 2 · DUVAL No 3

Santa Claus

POWER LINE · FENCE LINE · PIPE LINE · HIGHWAY 93 & 466 · FENCE LINE

STATION 155+00 S

50+00 S

100+00 S

EXPLANATION

- O DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION
- ELECTRODE STATIONS

CONTOUR INTERVAL = 1 MGAL

DENSITY = 2.3 g/c.c.

O DRILL HOLE LOCATION

BOUGUER GRAVITY

GEOEX Copy

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION

FOR
ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 1 M.G.	REVISIONS
	DATA BY: D.A.	4-2-65
DATE: Feb 1965	SHEET OF	
DRAWN BY:	DRAWING NO.	FILE:

PRELIMINARY

P1

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº PETE 7

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 22 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 22 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 20 FT. DATE STARTED: 3-23-65 DATE COMP: 3-23-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS, %
5			ALLUVIUM: GRAVEL, SAND, SILT, GRANITIC FRAGMENTS	NONE AIR	AX	1'			
10									
15									
20			GRANITE			20			
25			BOTTOM OF HOLE @ 20'						
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
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160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

P 8

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº PETE No 8

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 20 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 22 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 101 FT. DATE STARTED: 3-23-65 DATE COMP: 3-23-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5		[redacted]	ALLUVIUM, GRANITIC GRV, SAND SILT	NONE AIR	4 3/4				
10			TOTAL DEPTH 101'						
15									
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
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115									
120						120			
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140						140			
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160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

p9

COMPOSITE ROTARY DRILL LOG

HOLE Nº PETE 9

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 17 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 14 FT. DATE STARTED: 3-24-65 DATE COMP: 3-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %		
5			ALLUVIUM, GRANTIC GRV SAND SILT	NONE AIR	4 3/4"						
10											
15			TD 14'								
20						20					
25											
30											
35											
40						40					
45											
50											
55											
60						60					
65											
70											
75											
80						80					
85											
90											
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100						100					
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120						120					
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135											
140						140					
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155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					

P-10

ROTARY COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº PETE 10

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 18 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 22 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D: 15 FT. DATE STARTED: 3-24-65 DATE COMP: 3-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5		[redacted]	ALLUVIUM, GRANITIC GRV SD SILT	NONE AIR	4 3/4"				
10									
15			TD 15'						
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
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120						120			
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140						140			
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175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº PETE 11

COMPANY: [illegible] EXPLORATION MINE: _____ CLAIM: PETE 15 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D. 10 FT DATE STARTED: 3-25-65 DATE COMP: 3-25-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM GRANITIC GRS, SOME	NONE AIR	4 3/4				
10									
15									
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
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120						120			
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200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº PETE 12

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 16 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 27 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D. 10 FT. DATE STARTED: 3-24-65 DATE COMP: 3-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS, %
5			ALLUV	NONE AIR	4 3/4"				
10			GRANITE						
15			TD 10'						
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
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160						160			
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170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

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SHEET 1 of

COMPOSITE DIAMOND DRILL LOG

HOLE Nº RAY 1

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: RAY "9" DISTRICT: WILLCOX

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. _____ E.W. _____

BEARING: VERTICAL ANGLE: VERT ELEVATION: _____ FT T.D. _____ FT DATE STARTED: 2-16-65 DATE COMP: _____

SAMPLE	DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC%	MINERALIZATION	ASSAYS %
	5			ALLUVIUM, GRAVEL, SAND, SALT	DRILL MUD	4 3/4"				
	10			1' CALICHE AT 5'		ROCK				
	15									
	20			1/4" GRAVEL, ORTHOCLASE GRANITE (50%)			20			
	25									
	30			QUARTZ (40%) QUARTZ WITH HORN-						
	35						40			
	40			BLENDE INCLUSIONS (20%) DARK						
	45									
	50			BASIC MINERALS (PRINCIPALY OLIVINE						
	55									
	60			BASALT (2%) OTHER 5% CPER CENT IS			60			
	65									
	70			ESTIMATE)			2-17-65			
	75									
	80						80			
	85									
	90									
	95			COARSE SAND WITH INTERMIXED						
	100						100			
	105			LARGE BOULDERS, SAME						
	110									
	115			TYPE.						
	120						120			
	125									
	130									
	135						140			
	140									
	145									
	150									
	155									
	160						160			
	165									
	170									
	175									
	180						180			
	185									
	190									
	195									
	200						200			
	205						2-18-65			
	210									
	215									
	220						220			
	225									
	230									
	235									
	240						240			
	245									
	250									
	255									
	260						260			
	265									
	270									
	275									
	280						280			
	285									
	290									
	295									
	300						300			

R1

SHEET 2 of

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº RAY No 1

COMPANY: ARKLA EXPLORATION MINE: — CLAIM: RAY No. 9 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS. 23N RGE: 15W SEC. 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3576± FT T.D. _____ FT DATE STARTED: 2-11-65 DATE COMP: _____

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS % Au oz/T	Ag oz/T	Cu	Fe%
3305			ALLUVIUM, LARGE BOULDERS		R							
3310			MATRIX OF SAND & SILT									
3315			PRINCIPALLY QUARTZ GRANITE									
3320			OR BASALT FRAGMENTS		A3	2-10-65						
3325												
3330												
3335						340						
3340												
3345												
3350												
3355												
3360						360						
3365												
3370			GREATER % OF DARK SILICEOUS ROCK									
3375			FEW FRAGMENTS OF LIMONITE									
3380						380						
3385			LARGE BOULDERS									
3390												
3395			BROWN CLAY									
4000						400						
4005						2-20-65						
4010			BROWN CLAY & SILT, WEATHERED ROCK									
4015			SILICIFIED GRANITE FRAGMENTS									
4020						420		415				
4025								420	TR	0.2	.025	
4030								425	TR	0.2	.035	
4035	-485		427' PRE-CAMBRIAN SCHIST ALTERED		R			430	TR	0.2	.02	
4040	-436		(DIORITE?) DK GRAY, FINE TEXTURED			2-21-65		435-436	0.01	0.2	.025	
4045				447 NC	NC				TR	0.2	.02	
4050			HOLOCRYSTALLINE, COMPOSED OF BIOTITE									
4055			CHLORITE, SANIDINE & QTZ. MINERALS		NX							
4060			ALIGNED ALONG PLANES OF SCHISTOSITY			7.5						
4065			2 QTZ 60° TO CORE									
4070			GOUGE 12"									
4075	-474		GRANITE, PINK 4015 - 4522									
4080			1"									
4085			4522.6 - 453 FAULT PLANES 40° TO CORE									
4090			1"									
4095												
5200						200						
5205												
5210												
5215	-515		BLEBS of INCLUDED GRANITIC RX									
5220			PYRITE ALIGNED ALONG SCHISTOSE PLANES									
5225	-522		1' 523			2-27		517.1-519.3 pyrite	TR	1.0	0.02	6.20
5230			GRN Sch. Alt. qtz. Diorite w/ chlorite and biotite			520		521	0.01	0.3		
5235			DON					522				
5240			FAULT GOUGE, CLAY & BRECCIATED ROCK									
5245			5% amt. disem. pyrite									
5250			542-547 OCC. sm. PY pocket			540		Pyrite				
5255												
5260			CLAY, PLANES 80° TO CORE					5a-5A Pyrite				
5265			GOUGE AND BRECCIA									
5270						560						
5275			GRY-GRN, soft, fragmented sericite									
5280			PYRITE CUBES IN GR. / CLAY GOUGE									
5285	-584.2-4.4					580		584.2-4.4 qtz	TR	0.3	0.04	
5290	-85											
5295	-95		FAULT GOUGE, QTZ, PYRITE ALONG PLANES			600		95-90 PYRITE 95	.01	0.5	0.02	
5300			MUCH CLAY GOUGE, BRECIATED			606						

GEO CHEM.

Ppm	Cu	Zn	Pb	Mo	Ag
	15	25	35	2	-1
	10	20	85	2	-1
	15	165	40	1	-1
	15	25	35	1	-1
	40	20		1	-1
	60	30		2	-1
	60	30		1	-1
	10	35		-1	1

Cu	Zn	Mo	Ag
10	15	1	-1

Cu	Zn	Pb	Mo	Ag
50	105	220	1	1
20	95	280	3	1

SHEET 3 OF

COMPOSITE DIAMOND DRILL LOG

HOLE Nº 6-1

COMPANY: ARKA EXPLORATION MINE: CLAIM: RAY No. 2 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. E.W.

BEARING: ANGLE: VERT ELEVATION: 3024 FT T.D. FT DATE STARTED: 2-16-65 DATE COMP:

GEOCHEM

DEPTH	ELEV	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING	CORE SIZE	CORE RUNS	CORE REC%	MINERALIZATION	ASSAYS % Au oz/T	Ag oz/T	Cu
605			PRE-C DIORITE? SCHIST		NX						
610			DON 609-655 Lgt orthoclase epidote ? chlorite			3-2-65					
615			Dk. grey-grn quartz chlorite schist					pyrite			
620			622-24 Epidote on fractures; 24-26 limonite on fractures			620					
625			Soft grey clay and f. ech frags					pyrite			
630			fault zone 626-653					pyrite			
635											
640						640					
645											
650											
655			PRIMARILY, QTZ + BIOTITE SCHIST W/			3-3-65					
660			ALIGNED, ACCY SCHISTOSE PLANES 40°			660					
665			TO CORE.								
670			MUCH GOUGE OF CLAY & ROCK FLOUR								
675											
680						680					
685	686										
690											
695	693					.7					
700											
705			702-805 DON			700		pyrite			
710			GRAY QUARTZ-SERICITE, OCC PYRITE								
715	712		GRN clay gouge 711-12'; 715-16'; 727-28					712			
720						720			TR	0.2	0.015
725	724		728-783 chlorite schist, hard, green					724			
730											
735			w/ some dissem pyrite								
740						740					
745								Pyrite			
750								&			
755			Occ thin seam of qtz.					Disseminated			
760						760					
765											
770											
775											
780						780					
785											
790	791		Qtz - Chlorite Sch 784-806								
795											
800	799					800			789	0.01	0.2	0.04
805									797	0.02	0.2	0.025
810									803½	0.005	0.2	0.015
815									805½			
820	819					820			816	TR	0.2	0.01
825	822								822			
830	827		GRANITE, BANDED, W/ SERICITE INCLUSIONS	BC					825-27	TR	0.3	0.015
835			FeOx ALONG FRACTURE PLANES						827-29	TR	0.4	0.06
840					BX	840			832-32½	TR	0.3	0.015
845			845 Top Mx qtz grade to phy & wk chl									Mo
850									848-49	TR	TR	.03	Nil
855									49-50	"	"	"	"
860						860			50-55	"	"	"	"
865									55-57	"	"	"	"
870			Qtz granite						57-65	0.22	0.3	.01	"
875					Twist off 4-3-65				65-67	0.24	0.3	.03	"
880									pyrite 67-75	TR	0.3	.02	"
885						880			75-85	"	0.2	.02	"
890									85-86	NIL	0.2	.02	"
895			Lt grey white quartz granite phy w/num. veinlets of qtz						pyrite 86-87	"	0.2	.025	"
900			and scattered f. pyrite xls, both in vein qtz and granite.						87-88	"	0.2	.03	"
						900			88-92	TR	TR	.015	"

Ppm	Cu	Zn	Pb	Mo	Ag
	50	35	185	-1	1
	20	30	40	0	38
	1				
	15	30	30	3	-1
	5	40	5	1	-1
	30	35	15	2	1
	45	45	10	3	-1
	55	60	10	3	1
	35	60	5	4	-1
	10	35	15	3	-1

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº 13

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 13 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D: 11 FT. DATE STARTED: 3-25-65 DATE COMP: 3-25-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM GRANITIC GRV, SAND & SILT	NONE AIR	4 3/4	11'			
10			GRANITE, LT GRAY						
15			BOTTOM OF HOLE @ 11'						
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
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95									
100						100			
105									
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115									
120						120			
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200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº 14

COMPANY: AERIA EXPLORATION MINE: _____ CLAIM: PETE 14 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 15 FT. DATE STARTED: 3-25-65 DATE COMP: 3-25-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM GRANITIC GRV, SAND SILT	NONE AIR					
10									
15									
20			TD 15'			20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

P 11

ROTARY

COMPOSITE DIAMOND DRILL LOG

HOLE Nº PETE 11 — ? 2 Pete 11 log

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 15 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 27 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 10 FT. DATE STARTED: 3-24-65 DATE COMP: 3-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM	NONE AIR	4 3/4"				
10			GRANITE						
15			TD 10'						
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
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140						140			
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200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

P-4

COMPOSITE DIAMOND DRILL LOG

HOLE Nº P-4

COMPANY: ASARCO EXPLORATION MINE: _____ CLAIM: PETE DISTRICT: _____

COUNTY: _____ STATE: ARIZONA TWS: 23N RGE: 18W SEC: 27 N.S. _____ E.W. _____

BEARING: _____ ANGLE: _____ ELEVATION: 3726.63 FT. T.D. 52'10" FT. DATE STARTED: 2-[illegible] DATE COMP: 2-2-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION GEOCHEM	ASSAYS. % or oz/TON AG	ASSAYS. % or oz/TON AU
5–300			ALLUVIUM FRAGMENTS OF GRANITE AND BIOTITE SCHIST MINERALS: QTZ, ORTHOCLASE, BIOTITE, HORNBLENDE Fe OX BOX WORK GRANITE CLUSTERS QTZ, ORTHOCLASE, BIOTITE, LIMONITE BOTTOM of HOLE 52'10"	NONE AIR / MUD	NC	20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300	PPM SAMPLE CU ZN MO AG 40 260 3 1	 #742 50-52'10" 0-4	 TR

P 3

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº PETE 5

COMPANY: ARELA EXPLORATION MINE: _____ CLAIM: PETE 26 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 27 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D.: 15 FT. DATE STARTED: 3-22-65 DATE COMP: 3-22-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM GRANITE GRAVEL SAND SILT	NONE AIR	4 3/4				
10									
15			BOTTOM OF HOLE @ 15'						
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

P-6

ROTARY

COMPOSITE DIAMOND DRILL LOG

HOLE Nº PETE 6

COMPANY: ARIZONA EXPLORATION MINE: _____ CLAIM: PETE 24 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 22 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D. 12' FT. DATE STARTED: 3-23-65 DATE COMP: 3-23-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5		[redacted]	ALLUVIUM GRANITIC GRAVEL SAND SILT	NONE AIR	4¾				
10			BOTTOM OF HOLE 12'						
15									
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

P-1

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº P1

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PLTE 2 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3715? FT. T.D. 85 FT. DATE STARTED: 2-22-65 DATE COMP: 2-22-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5–85			ALLUVIUM FRAGMENTS OF GRANITE BOULDERS IN SAND, SILT	NONE AIR MIST					
20–85			GRANITE, FOX STAINED		4 3/4"	20, 40, 60, 80			
85			BOTTOM OF HOLE 85'						
100–300						100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300			

P-2

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº P2

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 5 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZONA TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3715.7 FT T.D.: 60 FT. DATE STARTED: 2-23-65 DATE COMP: 2-23-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION GEOCHEM	ASSAYS, %		
5		[redacted]	ALLUVIUM	NONE AIR MUD	43/4"			SAMPLE	NO	746	
10			GRANITE, PARTICLES OF INTERGROWN QTZ +					55' - 60'			
15			ORTHOCLASE STAINED W/ IRON + MANGANESE			20					
20			OXIDES [illegible] MINERALS - BIOTITE								
25											
30											
35						40		PPM			
40											
45											
50											
55						60					
60											
65											
70											
75											
80						80					
85											
90											
95											
100						100					
105											
110											
115											
120						120					
125											
130											
135											
140						140					
145											
150											
155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					

P3

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº P3

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 17 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZONA TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3736¼ FT T.D: 40' FT. DATE STARTED: 2-24-65 DATE COMP: 2-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION GEO CHEM	ASSAYS. % OZ/T AG	ASSAYS. % OZ/T AU
0			SOIL & GRAVEL	NONE AIR / MUD	4 3/4"			SAMPLE	No	737
5			ALLUVIUM, GRANITE PARTICLES COMPOSED OF QTZ, ORTHOCLASE, BIOTITE, HORNBLENDE						35 -	36'
10										
15										
20						20		CU ZN PB AG		
25										
30			GRANITE, SAME MINERAL SEQUENCE		NC			40 2-1 10	0.4	0.01
35										
40			ABUNDANT LIMONITE STAINING AND MANGANESE OXIDE			40				
45										
50										
55										
60						60				
65										
70										
75										
80						80				
85										
90										
95										
100						100				
105										
110										
115										
120						120				
125										
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140						140				
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160						160				
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200						200				
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215										
220						220				
225										
230										
235										
240						240				
245										
250										
255										
260						260				
265										
270										
275										
280						280				
285										
290										
295										
300						300				

BOTTOM of HOLE 40'

R1

SHEET 4 of

COMPOSITE DIAMOND DRILL LOG

HOLE Nº R1

COMPANY: ARGA EXPLORATION CO. MINE: _____ CLAIM: RAY No. 9 DISTRICT: WALAPAI

COUNTY: MOHAVE STATE: ARIZ. TWS: 23N RGE: 15W SEC: 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT. ELEVATION: 3576.5 FT T.D. _____ FT DATE STARTED: 2-16-65 DATE COMP: _____

GEOCHEM PPM Cu	In	Pb	Mo	Ag	DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING	CORE SIZE	CORE RUNS	CORE REC%	MINERALIZATION	ASSAYS. % Au oz/T	Ag oz/T	Cu	Fe %
					905			Top Schist									
45	40	-5	1	-1	910	913							911-915	NIL	0.2	0.03	10.00
60	55	-5	1	-1	915												
45	40	-5	1	1	920	922		Dk-gry, hard biotite-chlorite Schist			920		920-922 Pyrite lens	NIL	0.2	.03	
					925			few qtz seams cross core 10° to 60°									
					930	931 933		Some near vertical.					931-933 Pyrite liner	NIL	0.2	.025	8.60
					935												
					940						940						
					945												
45	65	10	-1	-1	950	950		Schistosity dcant 60° Some limonite					948-950	0.01	0.2	.02	
					955												
					960	961		Some seams w epidote. Quartz Schist 952-56			960		959-961	TR	0.2	.02	8.80
					965												
					970												
20	60	5	-1	-1	975	972		972 Wh. v/fine to gran ptg. Few Sulfides Pyrite, Mol? Trace dk-gry clay seams.					971.5-972.5	TR	0.2	.015	
					980			984 X-ing core 30° to 40°			980		979-981 Pyrite	NIL	0.2	.015	3.00
					985												
					990												
50	80	-5	-1	-1	995	995		GRY Biotite Schist. 992-94 Recem. Breccia, incl. qtz ptg, pyritized.					993-995	TR	0.4	.02	
					1000						1000						
40	75	5	-1	-1	1005	1005		GRY Biotite Schist.					1003-1005	TR	0.3	.02	8.20
					1010												
65	55	10	1	1	1015	1016							1014-1016 Pyrite	TR	0.3	.03	8.00
					1020						1020						
					1025												
					1030												
60	45	15	1	1	1035	1035		Dk-gry to black, hard, biotite Schist					1033-1035	TR	0.2	.03	9.00
					1040						1040						
50	60	10	-1	-1	1045	1046							1044-1046	NIL	0.2	.02	
					1050												
					1055												
					1060						1060		1060-1062	NIL	0.2	.015	8.40
					1065												
					1070												
					1075												
25	40	-5	-1	-1	1080	1082					1080		1080-1082	NIL	0.2	.015	
					1085												
					1090												
					1095												
1100					1100						1100		1099-1101	0.01	0.8	.03	9.80
					1105												
					1110												
					1115			GOUGE, CLAY & SCHIST BRECCIA NORMAL TO CORE									
					1120			1124-1127 VERTICAL QTZ VEIN			1120						
45	35	-5	1	-1	1125	1126		BIOTITE SCHIST MOTTLED DK & LT GRAY, HARD BIOTITE, CHLORITE, QTZ, CLUSTERS OF PYRITE					1124-1126 Pyrite	TR	0.4	.02	
					1130												
					1135												
					1140						1140						
55	45	10	1	-1	1145	1146							1144-1146	NIL	0.4	.025	9.60
1150					1150			1" QTZ W/PYRITE CAVITY									
					1155												
65	40	-5	-1	-1	1160	1158		GRN SHALE PARTINGS 60° + 40° TO CORE THIN VERTICAL QTZ SEAMS FRACTURES			1160		Pyrite 1156-1158 MAGNETITE	NIL	3.0	.025	
					1165			MODERATELY MAGNETIC CORE									
					1170												
					1175												
					1180						1180						
60	45	90	1	-1	1185	1185		0.5' QTZ SEAMS FRACTURES					1183-1185 Fy. Pyrite	NIL	0.8	.025	8.80
					1190												
					1195												
1200					1200						1200						

R1

COMPOSITE DIAMOND DRILL LOG

HOLE Nº R-1

COMPANY: ARGILA EXPLORATION MINE: _____ CLAIM: GAY No. 3 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3516.5 FT T.D: _____ FT. DATE STARTED: 2-16-65 DATE COMP: _____

GEOCHEM PPM 1200 CU ZN PB MO AG	DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. % Au oz/T	Ag oz/T	Cu %	Fe %
	1205	1208		SCHIST, DK-LT GREY MOTTLED, HARD, MASSIVE	MUD	BX	3-21-65		1201-1202 Pyrite	TR	0.6	.015	
55 30 -5 1 -1	1210			PRIN MIN - BIOTITE, Q + CHLORITE. THIN					MAGNETITE				
75 25 25 7 -1	1215	1211-13		GRN SCALE LENSES @ 40° TO CORE					1218-1220	TR	0.4	.02	8.80
60 40 65 4 -1	1220	1219-20		MODERATELY MAGNETIC			20		1225-1229	TR	0.2	.025	8.40
	1225												
	1230												
40 40 55 4 1	1235	1233-35							1234-1235	N.L	0.1	.02	
	1240						40						
40 40 55 2 -1	1245	1243¾-1245½		CORE FOLIATION INCLUSION - ORTHOGNIS					1243.2-1245.2	TR	TR	.02	8.00
	1250			CORE " " "									
	1255	1254-55											
50 15 55 3 1	1260			Light - Gray Granite Schist			60		1256-1258	TR	TR	.03	
	1265												
	1270												
60 25 60 3 -1	1275	1272-74		CORE FOLIATION etc.					1272-1274	TR	TR	.025	7.40
70 25 60 2 -1	1280	1281-84					80		1282-1284	0.005	TR	.02	9.40
	1285												
	1290												
55 -5 50 5 -1	1295	1294-97		Quartz, White, Pink, Hard (See Pol. 1294-1297) →					1294-1297 Pyrite	N.L	TR	.05	3.00
1300	1300			BIOTITE-MAGNETITE SCHIST, WHITE + PINK			1300		1300-1311 MAGNETITE			.03	
105 40 450 1-1	1310	1311		STRONGLY MAGNETIC, PYR + HEMATITE IN									
	1315			IN CLUSTERS ALONG SEAMS									
90 40 135 2-1	1320	1321		FOLIATION IN SCHIST 5° TO CORE			1320		1319-1321 PYRITE			.05	
85 25 75 2 -1	1330	1332							1330-1332			.03	
105 25 50 2 -1	1340	1341		QTZ WITH SCHIST INCLUSIONS + PYRITE			1340		1339-1341			.025	
60 40 45 1 -1	1345												
50 -5 55 3 -1	1350	1350		PYRITE + MAGNETITE IN LT GRA,					1348-1350			.025	
	1355	1355											
40 15 55 3 -1	1360						1360		1353-1355			.015	
	1365	1364		QTZ LT GRAY WITH SCHIST &					1364-1366			.04	
45 5 60 6 -1	1370	1370							1368-1370			.055	
30 -5 55 4 -1	1375	1378		LRG MAGNETITE			1380		1376-1378			.155	
	1380			SCHIST									
	1385			GRANITE, PINK W/ SCHIST INCLUSIONS									
	1390			SCHIST, MOTTLED LT-DK GRAY, BIOTITE +								.035	
40 25 30 2 -1	1395			MAGNETITE					3-26-65				
1400	1400	1399					1400		1397-1399				
	1405			FAULT SEAL SCHIST, QTZ W/ SCHIST INCLUSIONS									
55 40 25 -1 -1	1410	1414							1412-1414 HEMATITE			.035	
	1415			PLANES 40° TO CORE									
	1420			IN QTZ			1420		PYRITE				
45 -5 35 -1 -1	1425	1425		19½, 20, 23 - 24½ ALTERED GRANITE PINK					1423-1425			.02	
	1430												
60 5 35 -1 -1	1435	1434		SCHIST, PINK - MAGNETITE IN MOTTLED GR-					1432-1434 (GROUND CORE)			.015	
	1440			LT GRAY, MAGNETITE TO 5 DEG (WEDGE BIT)			1440						
	1445												
60 35 45 -1 -1	1450	1450							1448-1450 MAGNETITE			.025	
	1455												
50 30 30 1 -1	1460	1459							1457-1459 MAGNETITE PYRITE			.05	
	1465						1460		3-28-65				
	1470												
	1475			GRANITE INCLUSION @ 1480									
	1480						1480						
	1485								1485-1487	TR	0.5	.05	9.00
	1490												
	1495												
1500	1500						1500						

R1

COMPOSITE DIAMOND DRILL LOG

HOLE Nº R1

COMPANY: ARKLA EXPL. CO. MINE: _____ CLAIM: RAY #9 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: _____ RGE: _____ SEC: _____ N.S. _____ E.W. _____

BEARING: _____ ANGLE: _____ ELEVATION: _____ FT. T.D. _____ FT. DATE STARTED: 2-16-65 DATE COMP: _____

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	REC.%	MINERALIZATION	ASSAYS. % Au oz/t	Ag oz/t	Cu %	Fe %
1500					BX	3-29-65		1503½-1506	TRACE	0.4	0.04	7.90
1505			Dk gry blk brsly mottled Schist (Augite)									
1510			Biotite-Magnetite - moderately magnetic									
1515												
1520			1518 Blk f. text Dense Basic Dike - (Basalt)			1520						
1525			1524					1526½-1528	TR	0.4	0.035	8.90
1530			Schist as above - moderately magnetic									
1535						3-30-65						
1540						1540						
1545								1550-1552	TR	0.4	0.045	7.80
1550												
1555												
1560						1560						
1565								1568½-1570½	TR	0.4	0.025	10.40
1570			3-30-65					1579½-1581	TR	0.3	0.04	
1575												
1580						1580						
1585												
1590								1599-1601	TR	0.3	0.02	
1595			6" SILICIFIED GRANITE, SHALE PARTING BUT									
1600			CORE			1600		1608-1610	TR	0.3	0.025	
1605								PYRITE				
1610			CALCITE SEALED FRACTURES LESS MAGNETIC									
1615								1621-1623	NIL	0.3	0.015	
1620			DUMPTZOSE			1620						
1625			(SILICIFIED) MILKY [illegible] GRANITE, PINK,					1626½-1628	NIL	0.3	0.04	
1630			HARD EST 95% QTZ. PYRITE ALONG					1632-1634	NIL	0.3	0.095	
1635			SEALED FRACTURES Some [illegible] clay					1634½-1636	0.005	0.4	0.03	
1640			Vuggy (drusy?) 1639-42 fragmented and soft			1640						
1645			clay core Fault(?)					1647-1649			.02	
1650												
1655			Dk gry mottled biotite-magnetite-schist									
1660						1660						
1665												
1670												
1675								1679-1681			.025	
1680						1680						
1685												
1690											.03	
1695								1694-1696				
1700						1700						
1705			1706									
1710												
1715												
1720						1720						
1725												
1730												
1735												
1740						1740						
1745												
1750												
1755												
1760						1760						
1765												
1770												
1775												
1780						1780						
1785												
1790												
1795												
1800						1800						

R #2

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº RA, #2

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: RAY No 14 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3583.72 FT T.D. 682 FT DATE STARTED: 2-19-65 DATE COMP: 2-24-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS, %
5			ALLUVIUM, GRAVEL, SAND SILT	NONE	4 3/4"				
10			FINE GRAVEL GRANITE FRAGMENTS						
15									
20						20			
25									
30									
35									
40						40			
45									
50			BOULDERS BECOMMING PROGRESSIVELY						
55			LARGER						
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
~~185~~			PIERRE						
190									
~~195~~									
600 6200						200			
6205									
6210									
6215									
6220						220			
6225									
6230									
6235									
6240						240			
6245			BOULDERS, CLAY MATRIX						
6250									
6255			GRANITE						
6260									
6265						260			
6270									
6275									
6280						280			
6285			BOTTOM OF HOLE @ 682'						
6290									
6295									
300						300			

R #3

ROTARY

COMPOSITE ~~DIAMOND~~ DRILL LOG

HOLE Nº BAY NO 3

COMPANY: ARCLA EXPLORATION MINE: _____ CLAIM: BAY 31 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3538 [85] FT. T.D: 1272 FT. DATE STARTED: 2-16-65 DATE COMP: 3-18-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM, GRANITIC GRAVEL, SAND, SILT	NONE AIR					
10				MUD					
15			FINE GRAVELS		4 3/4"				
20						20			
25									
30									
35									
40						40			
45			BOULDERS, (GRANITE) BLOWING						
50			PROGRESSIVELY HARDER						
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
185			BREAK						
190									
195									
1200						200			
1205									
1210					NC				
1215					4 3/4				
1220						220			
1225									
1230									
1235									
1240						240			
1245									
1250									
1255									
1260						260			
1265									
1270					NC				
1275			BOTTOM of HOLE @ 1272						
1280						280			
1285									
1290									
1295									
1300						300			

R #4

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº R-4

COMPANY: ARKLA EXPLORATION MINE: — CLAIM: RAY No 25 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 34 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: 3508 ~~27~~ FT T.D.: 519 FT DATE STARTED: 2-26-65 DATE COMP: 3-21-65

DEPTH	ELEV	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE CASING	CORE SIZE	CORE RUNS	CORE REC%	MINERALIZATION	ASSAYS %
5			ALLUVIUM, GRAVEL, SAND + SILT	NONE AIR MUD	4¾				
10									
15									
20						20			
25									
30									
35									
40						40			
45									
50									
55			GRANITE BOULDERS BECOMING						
60						60			
65			PROGRESSIVELY LARGER						
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
485			BREAK						
490			TOP BEDROCK						
495			BIOTITE GRANITE, WHT TO LT GRAY						
500			MASSIVE			200			
505									
510			PRE ℰ (?)				515		GEOCHEM
515							519	SAMPLE No	CU PB ZN MO AS
520				519	NC	220			
525									
530			BOTTOM OF HOLE 519' 3-21-65	G.W.					
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº PETE 16

COMPANY: ATOMIC EXPLORATION MINE: _____ CLAIM: PETE 12 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT. T.D. 10 FT. DATE STARTED: 3-25-65 DATE COMP: 3-25-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS, %		
5			ALLUVIUM, GRANITIC GRV, SD + SILT	NONE AIR	4 3/4"						
10											
15											
20						20					
25											
30											
35											
40						40					
45											
50											
55											
60						60					
65											
70											
75											
80						80					
85											
90											
95											
100						100					
105											
110											
115											
120						120					
125											
130											
135											
140						140					
145											
150											
155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					

COMPOSITE ~~DIAMOND~~ ROTARY DRILL LOG

HOLE Nº PETE 17

COMPANY: ARKLA EXPLORATION MINE: _____ CLAIM: PETE 9 DISTRICT: WALLAPAI

COUNTY: MOHAVE STATE: ARIZ TWS: 23N RGE: 18W SEC: 26 N.S. _____ E.W. _____

BEARING: _____ ANGLE: VERT ELEVATION: _____ FT T.D.: 16 FT. DATE STARTED: 3-25-65 DATE COMP: 3-25-65

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %
5			ALLUVIUM, GRANITIC GRV SD SI	NONE AIR	4 3/4	11			
10									
15									
20						20			
25									
30									
35									
40						40			
45									
50									
55									
60						60			
65									
70									
75									
80						80			
85									
90									
95									
100						100			
105									
110									
115									
120						120			
125									
130									
135									
140						140			
145									
150									
155									
160						160			
165									
170									
175									
180						180			
185									
190									
195									
200						200			
205									
210									
215									
220						220			
225									
230									
235									
240						240			
245									
250									
255									
260						260			
265									
270									
275									
280						280			
285									
290									
295									
300						300			

COMPOSITE DIAMOND DRILL LOG

HOLE Nº___

COMPANY:_____ MINE:_____ CLAIM:_____ DISTRICT:_____

COUNTY:_____ STATE:_____ TWS:_____ RGE:_____ SEC:___ N.S.___ E.W._____

BEARING:_____ ANGLE:_____ ELEVATION:_____FT. T.D.:_____FT. DATE STARTED:_____ DATE COMP:_____

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS, %		
5											
10											
15											
20						20					
25											
30											
35											
40						40					
45											
50											
55											
60						60					
65											
70											
75											
80						80					
85											
90											
95											
100						100					
105											
110											
115											
120						120					
125											
130											
135											
140						140					
145											
150											
155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					

COMPOSITE DIAMOND DRILL LOG

HOLE Nº ___

COMPANY: _____ MINE: _____ CLAIM: _____ DISTRICT: _____

COUNTY: _____ STATE: _____ TWS: _____ RGE: _____ SEC: ___ N.S. _____ E.W. _____

BEARING: _____ ANGLE: _____ ELEVATION: _____ FT. T.D. _____ FT. DATE STARTED: _____ DATE COMP: _____

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE			MINERAL-IZATION	ASSAYS. %		
					SIZE	RUNS	REC.%				
5											
10											
15											
20						20					
25											
30											
35											
40						40					
45											
50											
55											
60						60					
65											
70											
75											
80						80					
85											
90											
95											
100						100					
105											
110											
115											
120						120					
125											
130											
135											
140						140					
145											
150											
155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					

COMPOSITE DIAMOND DRILL LOG

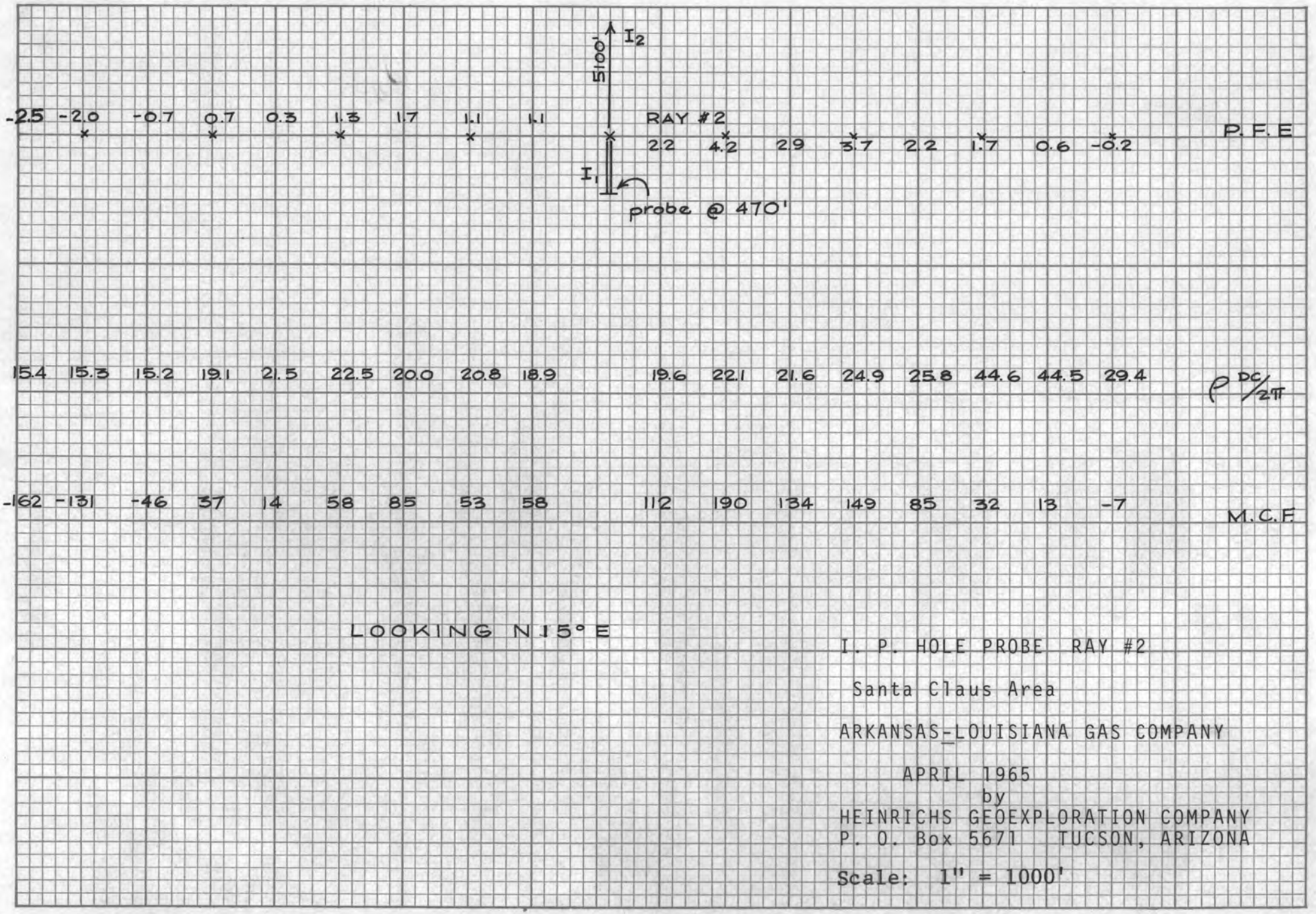
HOLE Nº___

COMPANY:_____ MINE:_____ CLAIM:_____ DISTRICT:_____

COUNTY:_____ STATE:_____ TWS:_____ RGE:_____ SEC:___ N.S.___ E.W._____

BEARING:_____ ANGLE:_____ ELEVATION:_____FT. T.D.:_____FT. DATE STARTED:_____ DATE COMP:_____

DEPTH	ELEV.	ROCK TYPE	GEOLOGIC DESCRIPTION & REMARKS	HOLE: CASING:	CORE SIZE	CORE RUNS	CORE REC.%	MINERALIZATION	ASSAYS. %		
5											
10											
15											
20						20					
25											
30											
35											
40						40					
45											
50											
55											
60						60					
65											
70											
75											
80						80					
85											
90											
95											
100						100					
105											
110											
115											
120						120					
125											
130											
135											
140						140					
145											
150											
155											
160						160					
165											
170											
175											
180						180					
185											
190											
195											
200						200					
205											
210											
215											
220						220					
225											
230											
235											
240						240					
245											
250											
255											
260						260					
265											
270											
275											
280						280					
285											
290											
295											
300						300					



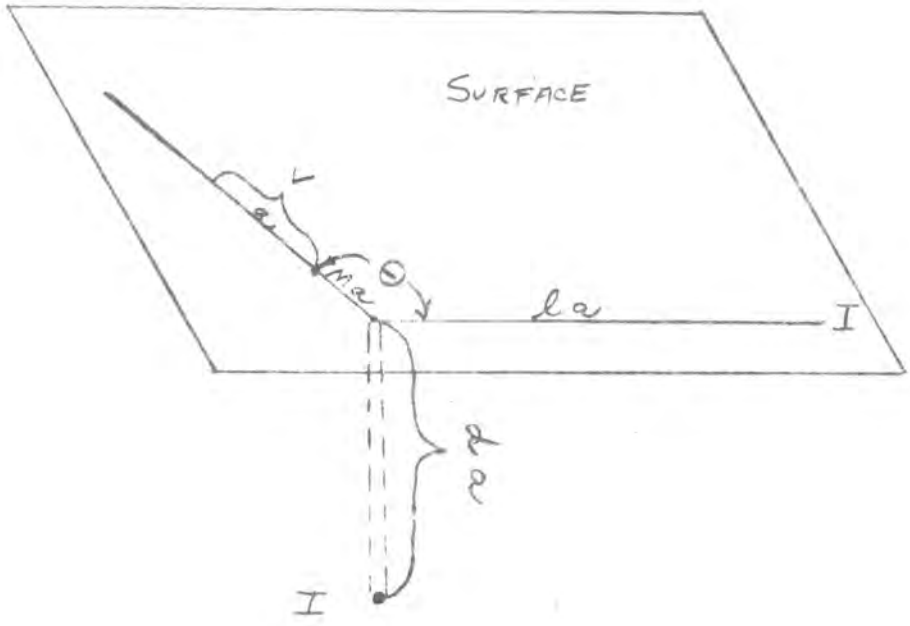
K+E 10 X 10 TO THE INCH 359-5DG
KEUFFEL & ESSER CO. MADE IN U.S.A.

C.S.L.

SANTA CLAUS DOWN THE HOLE
COMPUTATIONS FOR ARKLA

General Equation

$$\frac{\rho_{DC}}{2\pi} = \frac{\frac{aV}{I}}{\left[\frac{1}{\sqrt{n^2+d^2}} - \frac{1}{\sqrt{(n+1)^2+d^2}} + \frac{1}{\sqrt{(n+1)^2+l^2-2(n+1)l\cos\theta}} - \frac{1}{\sqrt{n^2+l^2-2nl\cos\theta}}\right]}$$



SANTA CLAUS AREA
MOHAVE COUNTY ARIZONA

		Miles	Stations Observed	Ft.	Lines	Spreads	
MOMAG (TOTAL INTINSITY)		70.5	CONTINUE		25		
GRAVITY		46.9	510		15		
I P	V			16,500	V	3	
	W			21,000	W	5	
	X			21,000	X	5	
	Y			19,500	Y	4	
	Z			*12,000	Z	2	
				*12,000		2	
				*12,000		2	*DETAIL 500'N
PREMLIMANARY I.P. (6 ELECTRODES)		1000'		13000	1	1	
				13000	2	1	
DOWN HOLE				—10,500	DH	1	
		28.5		150,500	10	26	
VERTICAL MAG		12.6	665	64,500'			
		158.5 miles		TOTAL			COVERAGE IN 9 SECTIONS

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Project SC Line Down hol East Field date 4-21-64 Data page _____ Comp. date 4-22-64 Comp by KH Page _____

(A) Send										Cal		
(B) Receive												
(C) n separation	100	100	30	30	10	10	10	10				
(D) I	7	7	7	7	7	6	6	6				
(E) Vdc (avg)	111.8	63.2	34.95	25.3	17.26	17.10	12.69	6.15			3.04	
(F) DCcal												
(G) Kn x 10^{-3}												
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ	104.4	58.0	33.5	24.3	16.64	16.60	12.44	6.08			2.93	
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.956	→	.981	→	→	→	→	→			.964	
(M) ρ dc/ρac=ExL/K	1.022	1.042	1.029	1.037	1.022	1.017	1.006	.994				
(N) PFE=(M-1)(10^2)								-0.2				
(O) MCF=(M-1)(10^5)/H												

Project _____ Line West Field date _____ Data page _____ Comp. date 4-22-64 / 4-23-64 / 4-24-64 / 4-25-64 Comp by _____

(A) Send											Cal	
(B) Receive												
(C) n separation	100	30	30	10	10	10	3	3	3			
(D) I	6	7	6	6	6	6	6	6	6			
(E) Vdc (avg)	92.2	55.6	27.7	19.60	12.34	7.33	4.32	3.21	2.40		301	
(F) DCcal												
(G) Kn x 10^{-3}												
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ	87.0	58.0	26.8	19.00	12.10	7.14	4.28	3.22	2.42		284	
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$											.961	
(L) AC-DC cal.	.953	.983	→	→	→	→	→	→	→			
(M) ρdc/ρac =ExL/K	1.011	1.011	1.017	1.013	1.003	1.007	.993	.980	.975			
(N) PFE=(M-1)(10^2)	1.1	1.1	1.7	1.3	0.3	0.7	-0.7	-2.0	-2.5			
(O) MCF=(M-1)(10^5)/H												

961 / 953

.961 / 953

INDUCED POLARIZATION SENDER NOTES

project: S. CLAUS Line: DOWNHOLE EAST Date: 4/21/65

Send	12	12	12	12	12	12	12	12	12		CAL	
Receive	5-15	10-20	15-25	20-30	25-35	30-40	35-45	40-50	45-55			
Time											3A	
Range												
Current	7A	7A	7A	7A	7A	6A	6A	6A	6A			
Send												
Receive												
Time												
Range												
Current												

INDUCED POLARIZATION SENDER NOTES

project: S. CLAUS Line: DOWNHOLE WEST Date: 4/21/65

Send	5-15	10-20	15-25	20-30	25-35	30-40	35-45	40-50	45-55		CAL	
Receive												
Time											3A	
Range												
Current	6A	7A	6A	6A	6A	6A	6A	6A				
Send												
Receive												
Time												
Range												
Current												

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: SC Line: PH.2 E Int.Cal _____ Date: 4-21-65

Send												
Rec.	5.0-15	10-20	15-25	20-30	25-35	30-40	35-45	40-50	4-5-55			cal
Time	100	100	30	30	10	10	10	10				
DC-1	53.9 57.8	29.0 34.0	17.8 17.2	12.5 12.8	.842 .840	8.44 8.60 8.82	6.24 6.78	3.22 2.94				152.5 151.5
DC-2	54.0 57.8	29.2 34.0	17.7 17.2	12.5 12.9	.846 8.78	8.28 7.00	5.90 6.80	3.26 2.90				152 152
Σ												
DC-3	54.0	29.2 33.8	17.7 17.3	12.5 12.8	8.56 8.78	8.38 8.86	6.00 6.68	3.26 2.82				152
Dc-4		29.4	17.6 17.3	12.4 12.8	8.52	8.40 8.64	5.94 6.68	3.24 2.84				
Σ	111.8			12.5		8.56	6.00 6.65					
DC-AV	111.8	63.2	34.95	25.3	17.26	17.10	12.69	6.15				304
AC-1	52.2	29.0	16.75	12.15	8.32	8.30	6.22	3.04				146.5
AC-2	52.2	29.0	16.75	12.15	8.32	8.30	6.22	3.04				146.5
Σ	104.4	58.0	33.5	24.3	16.64	16.60	12.44	6.08				293
S. P.	-18.0	+4.5	+11.4	+12.0	-8.2	-11.8	+4.5	-7.9				
AC-N	.02	.03	.02	.02	.03	.04	.03	.03				

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: SC Duhole Line: Duhole W Int.Cal Date:

Send	5-15	10-20	25-25									
Rec.				20-30	25-35	30-40	35-45	40-50	45-55			
Time	100	30	30	10	10	10	3	3	3			
DC-1	46.8 46.4	30.0 29.6	13.4 14.2	9.90 9.60	6.22 6.04	3.44 3.92	2.08 2.25	1.44 1.79 1.66 1.42	1.90 .99			150 151
DC-2	45.9 46.2	30.0 29.7	13.3 14.4	1.02 9.30	6.34 5.96	3.36 4.04	2.00 2.37	1.46 1.79 1.82 1.36	1.47 1.93			158 151
Σ												
DC-3	45.8 46.6	29.9	13.3 14.4	9.80 9.70	6.44 5.90	3.20 4.14	1.96 2.39	1.42 1.97	1.55 1.74			151
Dc-4	45.7 46.8			1.00 9.60	6.52 6.84	3.10	1.89 2.46	1.46 1.98	1.75 1.63			
Σ				1.02 9.40			1.85	1.35	1.81			
DC-AV	92.2	59.6	27.7	19.60	12.34	7.33	4.32	3.21	2.40			301
AC-1	43.5	29.0	13.4	9.50	6.05	3.58	2.14	1.61	1.21			144.5
AC-2	43.5	29.0	13.4	9.50	6.05	3.58	2.14	1.61	1.21			144.5
Σ	87.0	58.0	26.8	19.00	12.10	7.16	4.28	3.22	2.42			289.0
S. P.	-.7	-10.1	-0.0	+8.3	+1.2	+11.0	+12.2	+1.63	-0.6			
AC-N	.02	.02	.02	.02	.02	.02	.02	.02	.02			

. Ray #1 Down Hole data
No good, broken wire touching
casing.

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: SC Line: Down Hole SW Int. Cal 54.5 Date: April 14

Send	Hole		to	45 on	Line	V (Grav 7)					Cal	
Rec.	.5-1.5	1.0-2.0	1.5-2.5	2.0-3.0	2.5-3.5	3.0-4.0	3.5-4.5	4.0-5.0	4.5-5.5	5.0-6.0		
Time	30	10	10	10	10							
DC-1	10.3 9.55	8.20 8.72 8.00	6.44 6.06 6.42	5.48 5.80 4.98	4.20 4.40						147 148	
DC-2	10.3 9.50	8.42 7.88	6.34 6.50	5.58 4.90	4.18 4.46						147 148	
Σ												
DC-3	10.25 .95	8.56 7.78	6.24 6.60	5.64 4.84							147	
Dc-4		8.60 7.68	6.16 6.68	5.66 4.78								
Σ												
DC-AV	19.80	16.35	12.79								295	
AC-1	9.5	7.75	6.12	5.00	4.02						144	
AC-2	9.5	7.75	6.12	5.00							144	
Σ	19.0	15.5	12.24	10.00							288	
S. P.	-1.0	+8.8	-1.6	-1.1								
AC-N	.03	.03	.03	.03								
	2pfc	6.7	2									

Polar

-2 pfc

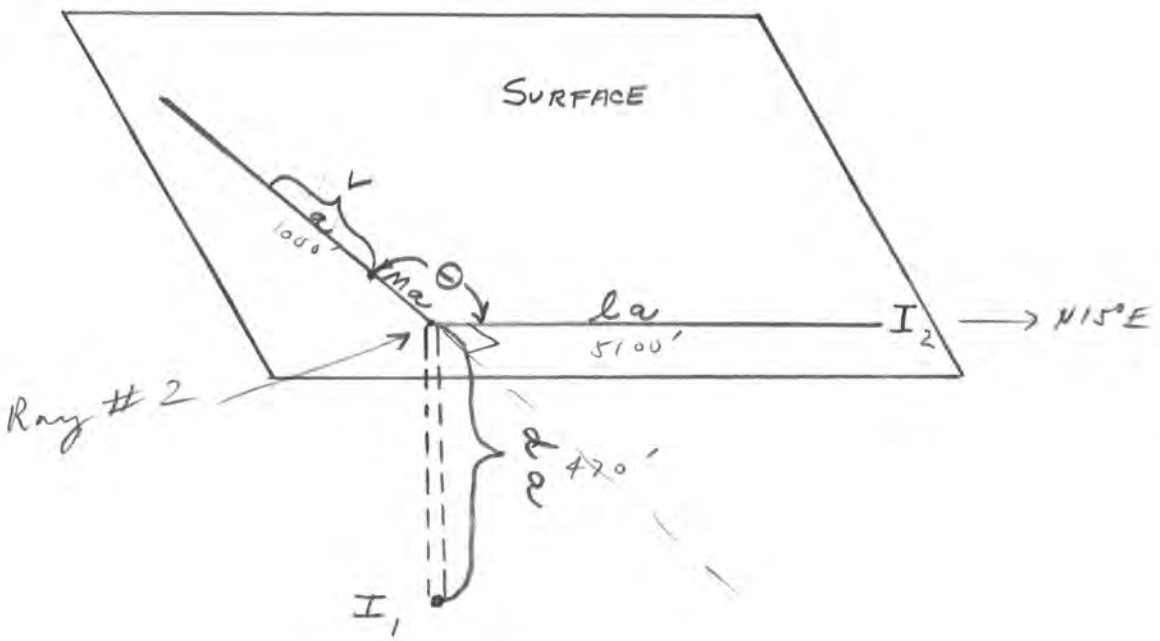
INDUCED POLARIZATION SENDER NOTES

Project: S.C. Line: Date: 4/

Send												
Receive												
Time												
Range												
Current	6A	6A	6A	6A								
Send												
Receive												
Time												
Range												
Current												

SANTA CLAUS DOWN THE HOLE
COMPUTATIONS FOR ARKLA

$$\frac{\rho_{DC}}{2\pi} = \frac{\frac{aV}{I}}{\left[\frac{1}{\sqrt{n^2+d^2}} - \frac{1}{\sqrt{(n+1)^2+d^2}} + \frac{1}{\sqrt{(n+1)^2+l^2-2(n+1)l\cos\theta}} - \frac{1}{\sqrt{n^2+l^2-2nl\cos\theta}}\right]}$$



$\theta = 90°$ $\cos\theta = 0$

$\ell = 0.47$ $a = 1000'$ $\ell = 5.1$

$\ell^2 = 26.01$

n^2	ℓ^2	n
0.25	.2209	$\frac{1}{2}$
1		1
2.25		$1\frac{1}{2}$
4		2
6.25		$2\frac{1}{2}$
9		3
12.25		$3\frac{1}{2}$
16		4
20.25		$4\frac{1}{2}$
25		5
30.25		5.5

$$\frac{1}{\sqrt{n^2+\ell^2}} \qquad \frac{1}{\sqrt{(n+1)^2+\ell^2}} \qquad \frac{1}{\sqrt{n^2+\ell^2}} \qquad \frac{1}{\sqrt{(n+1)^2+\ell^2}}$$

			1	2	3	4
n	n^2	$(n+1)^2$	$n^2+\ell^2$	$(n+1)^2+\ell^2$	$n^2+\ell^2$	$(n+1)^2+\ell^2$
$\frac{1}{2}$	0.25	2.25	.4709	2.4709	26.26	28.26
1	1	4	1.2209	4.2209	27.01	30.01
$1\frac{1}{2}$	2.25	6.25	2.4709	6.4709	28.26	32.26
2	4	9	4.2209	9.2209	30.01	34.01
$2\frac{1}{2}$	6.25	12.25	6.4709	12.4709	32.26	38.26
3	9	16	9.2209	16.2209	34.01	42.01
$3\frac{1}{2}$	12.25	20.25	12.4709	20.4709	38.26	46.26
4	16	25	16.2209	25.2209	42.01	51.01
$4\frac{1}{2}$	20.25	30.25	20.4709	30.4709	46.26	56.26

n	$\sqrt{\text{col 1}}\ (a)$	$-\sqrt{\text{col 2}}$	$+\ -\sqrt{\text{col 3}}$	$+\ \sqrt{\text{col 4}}$
½	.6862215	1.5719096	5.1244511	5.3160135
1	1.1049434	2.0544829	5.1971145	5.4781383
1½	1.5719096	2.5437963	5.3160135 ✓	5.6797887
2	2.0544829	3.0365934	5.4781383 ✓	5.8318093
2½	2.5437963	3.5314161	5.6797887	6.1854668
3	3.0365934	4.0275178	5.8318093	6.4815121
3½	3.5314161	4.5244778	6.1854668	6.8014704
4.	4.0275178	5.0220414	6.4815121	7.1421285
4½	4.5244778	5.5200452	6.8014704	7.5006666
	$\frac{1}{a}$	$-\frac{1}{b}$	$+\frac{1}{c}$	$+\frac{1}{d}$
½	1.4572554	.6361688	.1951428	.1881108
1	.9050237	.4867404	.1924144	.1825437
1½	.6361688	.3931132	.1881108	.1760628
2	.4867404	.3293163	.1835437	.1714733
2½	.3931132	.2831725	.1760628	.1616692
3	.3293163	.2482918	.1714733	.1542849
3½	.2831725	.2210199	.1616692	.1470270
4	.2482918	.1991222	.1542849	.1400142
4½	.2210199	.1811579	.1470270	.1333214

n	$\frac{1}{a} - \frac{1}{b} - \frac{1}{c} + \frac{1}{d}$
½	.8140546
1	.4084126
1½	.2310076
2	.1453537
2½	.0955471
3	.0638361
3½	.0475104
4	.0348989
4½	.0260490

E ½ ✓

	K_n = 1000	V	I	$\rho_{2n} = \frac{V}{I} K_n$	ρFE	MCF
½	1228.4	111.8	7000	19.6	2.2	112
1	2448.5	63.2		22.1	4.2	190
1½	4328.9	34.95		21.6	2.9	134
2	6879.8	25.3		24.9	3.7	149
2½	10466.0	17.26		25.8	2.2	85
3	15665.1	17.10	6000	44.6	1.7	38
3½	21048.0	12.69		44.5	0.6	13
4	28654.2	6.15		29.4	-0.2	-7
4½	38389.2					

W ½

½		92.2	6000	18.9	1.1	58
1		59.6	7000	20.8	1.1	53
1½		27.7	6000	20.0	1.7	85
2		19.60		22.5	1.3	58
2½		12.34		21.5	0.3	14
3		7.33		19.1	0.7	37
3½		4.32		15.2	-0.7	-46
4		3.21		15.3	-2.0	-131
4½		2.40		15.4	-2.5	-162

GEOPHYSICAL INVESTIGATIONS

SANTA CLAUS PROJECT

MOHAVE COUNTY, ARIZONA

for

ARKLA EXPLORATION COMPANY

March - July 1965

by

Heinrichs Geoexploration Company
P. O. Box 5671 Tucson, Arizona

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MAPS, RECORDS AND ILLUSTRATIONS

MAP NO.

1 Drill Hole - Geology - Claim Location - Geophysical Lineation Base Map
2 Magnetic Vertical Intensity Contour
3 MoMag Traverse Location & Magnetic Total Intensity Contour
4 Bouguer Gravity
5 Geology - Drill Hole - Claim Location - Gravity & I.P. Location
6 Regional Gradient Correction Gravity
Dipole Lines V, W, X, Y - 1500'
Dipole Lines - 500'
Line X, Spread 1 & 2
Line Y, Spread 1 & 2
Line Z, Spread 1 & 2
Combined--Gravity-Magnetic Profile Plot
Gravity Computation Sheets - Lines 1 - 12, Lines A, B, & C

INTRODUCTION

Based on encouraging preliminary results of a reconnaissance mobile magnetometer survey performed in the Sacramento Valley area of Mohave County, Arizona for Arkla Exploration Company, more detailed surveys utilizing several geophysical methods were run in the Ithaca Peak portion of the valley, west of Duval Corporation's Mineral Park open pit copper mine.

Prior to detailed mobile magnetic work, a limited area of 12.6 miles was traversed using a Jalander portable vertical intensity magnetometer. This work was requested by Mr. M. L. Pugh and the objective was to find the magnetic peak for the immediate location of a drill site on this high. A drill was standing by awaiting our magnetic results. Technically, this may have been somewhat premature, especially from the standpoint of taking full advantage of geological and geophysical results.

The mobile magnetic survey was run over nine sections on a 1,200 foot grid, totaling 25 profiles and 70.5 miles, and was followed with an induced polarization resistivity survey which totaled 26 spreads, 10 lines and 28.5 miles, a gravity survey totaling 15 lines, 510 stations and 46.9 miles.

Geoex personnel assigned to this project were E. Grover Heinrichs, MoMag operator and Supervisor; Phil Matthews, hand magnetometer operator; George Miguel, field assistant; Dan Anderson, instrument operator; Ron Palmer, survey control; Dave Jones, field assistant; Keith Henson was observer for the induced polarization surveys and electronic technician on all phases of the project.

Records and data were analyzed and interpreted by E. Grover Heinrichs and Chris S. Ludwig, Senior Geophysicist. Copies of records and resultant data were submitted prior to this report and are listed here in the Table of Contents.

CONCLUSIONS AND RECOMMENDATIONS

After a review of all data, and considerable staff discussion, it is our combined opinion that the Santa Claus Project still has a few unanswered, but valid, exploration possibilities in a small confined area east of the major magnetic anomaly and generally located in the western 3/4 of Section 35, T 23 N, R 18 W, overlapping a few hundred feet north and south into Section 26, T 23 N, R 18 W, Section 2 of T 22 N, R 18 W.

The area is almost small enough that it could be checked out with a minimum of three, 2000 foot drill holes without benefit of any further geophysics. However, in view of the depth and cost of drilling required, we recommend some additional geophysics be done first to better refine the drill target area and potential.

Specifically, we suggest more magnetic detail by portable hand magnetometer methods to more precisely define the magnetic lineaments. Four or five E-W profiles equally spaced to cover the W 3/4 of Section 35 should be sufficient. Following the magnetic survey, an I.P.-high current-maximum penetration survey on 1500 foot dipoles should be conducted parallel the Duval haulage road and centered at about Station 70+00 on former I.P. line X and overlapping line W to the southwest and Y to the northeast. Further I.P. studies may be indicated, however, at the moment, it appears that three parallel I.P. lines on 1500 foot dipole spacing would be all that was needed to locate a drill site.

Moreover, it must be emphasized that the 9 sections which were geophysically mapped cover just a small portion of an excellent prospecting area that extends from north of the town of Chloride south approximately 10 miles, and any future plans in the area should include more investigative work, both geological and geophysical, to take advantage of the substantial amount of valuable information accumulated in the area to date.

PROCEDURES

MAGNETIC

The instrument used for recording variations in the total magnetic field is a Gulf Research Corporation, licensed flux-gate type magnetometer, mounted on a Dodge Powerwagon. Variations in the total earth's field are continuously recorded on chart paper in a recorder geared to the vehicle drive. Record is made at whatever speed the vehicle can be driven according to terrain conditions. On this project, most of the coverage was across broken terrain which slowed vehicle speed to approximately 5 to 10 miles per hour. A total of 25 lines and 70.5 miles of record were made.

The instrument was positioned on a sensitivity of 50 gammas per inch, thus giving 250 gammas across the total width of the chart. This type of recorder allows for ten effective chart widths by letting the trace cross the paper and continue again from the other side as necessary. The charts, as run, read from right to left, and looking lengthwise from the start of the record, the higher values are to the right. The profile trace is made by a tapper bar that can be actuated by either the drive of the vehicle or an electronic timing mechanism. In this case, the distance function was used with a mark produced each five feet of travel.

The instrument was positioned at the start of the project to record on a horizontal scale of 400 feet to the inch. The instrument was kept at this scale throughout the survey.

To avoid confusion, values have been plotted at intervals on the records. An arbitrary level of 1000 gammas was set at Base Station No. 1. All values plotted on the records, and contour maps, are relative to this arbitrary base level. Basic control for the project was from topo maps and claims maps prepared by Heinrichs Geoex, based on data from the Arkla Exploration Company personnel in the Kingman area.

The north-south lines by mobile mag were numbered A-1 through A-23 and were approximately 600 to 1200 feet apart. Arrows indicate direction of travel and a bold short line indicates the start or stop of a record. The east-west lines were numbered I through V and were run as control for the north-south traverses.

The instrument used for the portable vertical intensity survey was a Jalander Magnetometer of Finnish manufacture and

line spacing was 300 or 600 feet, with stations every 100 feet along the line.

GRAVITY

A total of 15 gravity lines, including 510 gravity stations and 46.9 profile miles, were observed. A Worden gravity instrument with a scale constant of 0.08887 milligals per scale division was used exclusively for the entire project. The vertical control was established using a self leveling Technica level of Italian manufacture and all elevations were ties to U.S. G. S. B. M. 3564 which is marked "Gravity Base" on the gravity plan maps. The allowable error on the vertical control was $\pm$ 0.1 feet between stations and an overall error no greater than $\pm$ 0.5 feet over the entire nine section area. All vertical control was established by closed loop traverses.

A trial vertical control line using altimeters in place of a level was not successful, and this method was abandoned (note, Line B) because the error exceeded 0.5 milligals and it was felt at the time greater accuracy was necessary for interpretation purposes.

The interpretation was based on two plan maps; (a) Bouguer Gravity; (b) Regional gradient correction and a combined profile of Bouguer Gravity and total intensity magnetics at the same horizontal scale.

Lines were numbered 1 through 12. Line 1 was north-south and located on the common section line between Section 22 and 23, 26 and 27, 34 and 35, 2 and 3. Lines 2 and 3 were north-south, 1200 and 2400 feet easterly, respectively. Lines 4 through 12 were located westerly at 1200 foot intervals. Stations along the line were numbered, starting with 0 at the north end of the project, at the north side of Sections 25, 27 and 28 and increasing to the south in hundreds of feet. Each station was marked with a 12 inch lathe, indicating line and station number, and every 500 feet, station was indicated by a lathe protruding three to four feet from the ground level.

INDUCED POLARIZATION AND RESISTIVITY (See "Basis of I. P. Method")

A phase angle current controlled I. P. sender, utilizing thyratrons for electronic switching and capable of an output of 13 amps at 800 volts, was used throughout this project. This advanced design, high output instrument was used to obtain maximum

possible penetration and dipole spacing of 1500 feet was used routinely except in the northeast portion of the nine sections where dipole spacings were reduced to 500 feet for a more detailed examination of the sub-outcrop in the area. All I. P. lines are identified as I. P. Line A, B, C, etc. and follow the north-south gravity lines. The 500 foot dipole layout is identified by line and spread number.

In the special case of Drill Hole R-2, observations were made along a line 10500 feet long, centered at R-2, using a 1000 foot dipole receiver spread and advancing 500 feet at each setup. The wire to the infinity electrode was 5100 feet long, bearing N 15° E from R-2 and normal to the observation line. Another electrode was lowered 470 feet down Drill Hole R-2 prior to observation. At Drill Hole R-1, work was attempted but because of the great depth (1700'), and the experimental nature of the down-hole electrode wire, the results were not successful.

It is concluded the down-hole electrode wire probably developed a pine hole leak and electrolytically dissolved, or the hole caved in at the bottom of the casing at 835 feet depth. In any case, the wire separated at this point and the effort was abandoned.

INTERPRETATION

The magnetic data suggests a buried hill and/or more concentrated mass or higher grade of magnetite over the magnetic high in the east 1/2 of Section 27, and the magnetic trends on the flanks of the large magnetic high are generally north-south which agrees with the structural trends of the Cerbat Mountains due east.

There is a good possibility that Precambrian rocks outcropping in Section 27 and 26 of T 23 N, R 18 W, extend southeast as a buried topographic or structural feature. This is indicated by the gravity high that is shown on the gradient corrected gravity map, Sheet 6, trending from the north 1/2 Section 27 southeasterly to the W 1/2 Section 35, T 23 N, R 18 W. Thence, bending slightly to the south and continuing off the map at the S 1/2 of Section 2, T 22 N, R 18 W.

The magnetic data in Sections 26 and 27 indicate rather low gradients with many 50 to 100 gamma fluctuations indicating a shallow bedrock granitic condition with several west-southwest-trending magnetic highs caused by shallow dike-like features which may be rather thin as they disappear rapidly with depth to the west.

Two sharp gravity lows, the north one located in the northeast 1/4 of Section 34 and the south one located in the north 1/2 of Section 3 and south 1/2 of Section 34, seem to indicate a deep basin or thickening of the alluvium, and this has later been partly substantiated by Drill Hole R-3 which encountered bedrock at 1270 feet.

The induced polarization and resistivity results are as follows:

Line X (500a) shows high resistivity values near-surface (1-N) and increasing with depth on the northern 1/2 indicating shallow alluvium and thick Precambrian section to 6-W. The southern 1/2 shows lower resistivity values indicating a thicker section of alluvium to the south. Little sulfide concentrations are indicated, although the background PFE is increasing to the north indicating more sulfide to the north.

Line Y (500a), a sharp lower resistivity contrast in the vicinity of 5-S and 10-S, and a slight increase in the PFE values in the same general area, indicate a general increase in sulfides in this area. The overall resistivity values are higher indicating more exposed bedrock, less alluvium on this line. Though a shallow alluvial basin is indicated from Station 30-S to 50-S. Again, as on Line X, the background PFE is increasing to the north.

Line Z (500a), alluvium is increasing in depth to the south. Artificial interference due to a pipe between Stations 40-S and 45-S created some anomalous effects. No significant sulfide pattern is indicated.

Line V (1500a) was observed from Stations 0-S to 150-S only, because the decreasing resistivity values to the south (indicating increasing thickness of alluvium) caused greater noise to signal intensity ratio, making a valid reading impossible further south. No significant sulfides are indicated.

Line W (1500a), near surface and bedrock is indicated northerly deepening alluvium southerly. Inductive coupling effects started to show up on the 3N, 4N, 5N, falsely accentuating the PFE and MCF values. No apparently significant sulfide concentrations are indicated.

Line X (1500a), deepening alluvium to the south and near surface bedrock to the north is indicated. Also, at depth between Stations 60+00 S and 75+00 S,is an indication of sulfide concentrations. This is the most significant sulfide indication from the I.P.

data observed on the project. There was some thought the indication may be caused by spurious effects of a pipe and power line that parallels the paved road to Duval's mine, however, this is the only zone that shows these spurious effects and the pipe and power line were also crossed on Lines V, W, Y, Z.

The magnetic and gravity lineation plog maps #7 and #8 also show many intersections of major lineation in this area. The gravity lineaments seem more general and smoothed out. Thus, the pronounced correlation and agreement of the two methods, and the weak, deep sulfide indication may be significant.

Respectfully submitted,

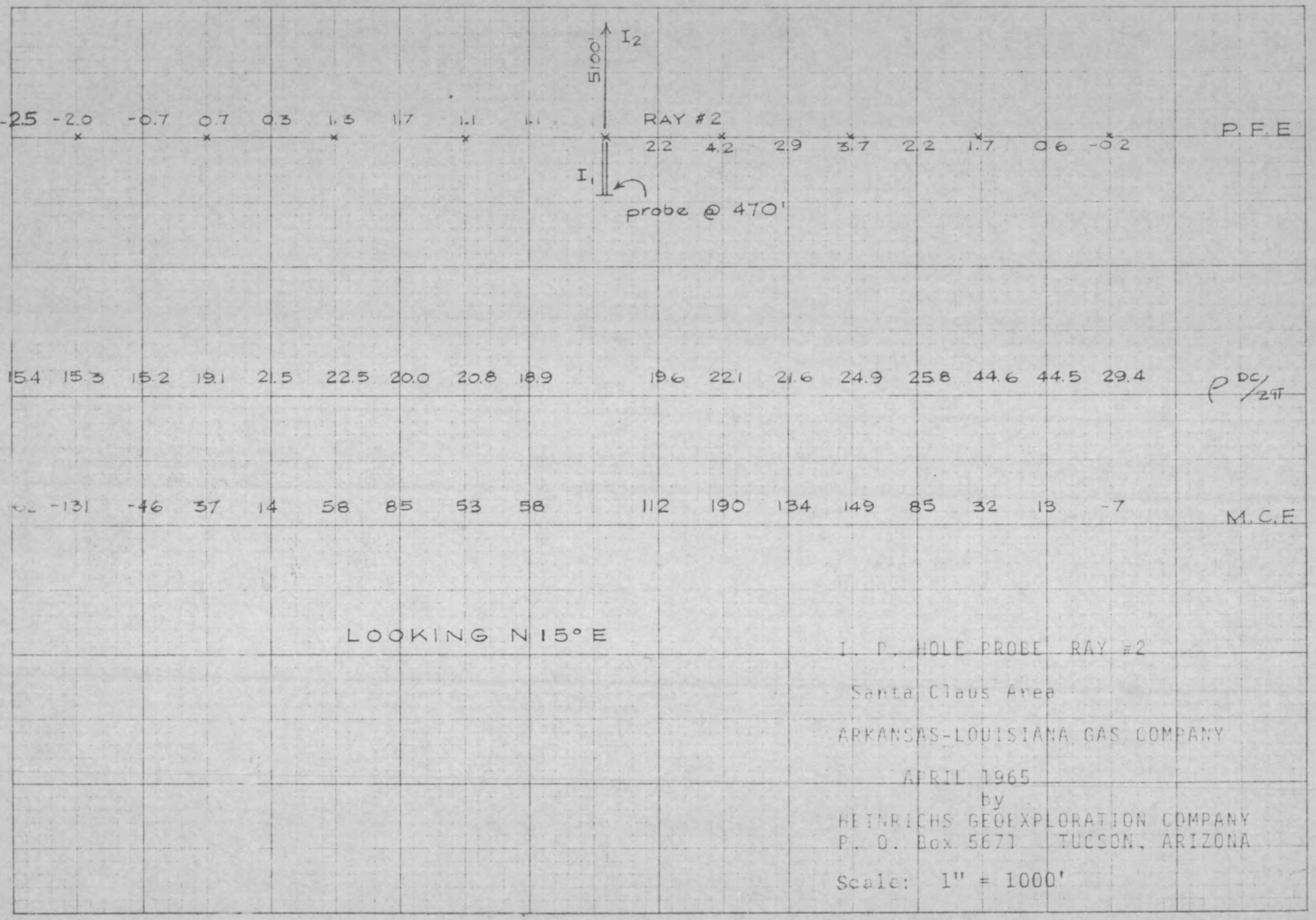
HEINRICHS GEOEXPLORATION COMPANY

E. Grover Heinrichs, Vice President

Approved

Walter E. Heinrichs, Jr.
President & General Manager

November 1, 1965


5100'
I_2
I_1
RAY #2
probe @ 470'
-2.5 -2.0 -0.7 0.7 0.3 1.3 1.7 1.1 1.1
2.2 4.2 2.9 3.7 2.2 1.7 0.6 -0.2
P.F.E
15.4 15.3 15.2 19.1 21.5 22.5 20.0 20.8 18.9
19.6 22.1 21.6 24.9 25.8 44.6 44.5 29.4
ρ DC/2π
-131 -46 37 14 58 85 53 58
112 190 134 149 85 32 13 -7
M.C.F
LOOKING N15°E
I. P. HOLE PROBE RAY #2
Santa Claus Area
ARKANSAS-LOUISIANA GAS COMPANY
APRIL 1965
by
HEINRICHS GEOEXPLORATION COMPANY
P. O. Box 5671 TUCSON, ARIZONA
Scale: 1" = 1000'

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING ____ HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING E T

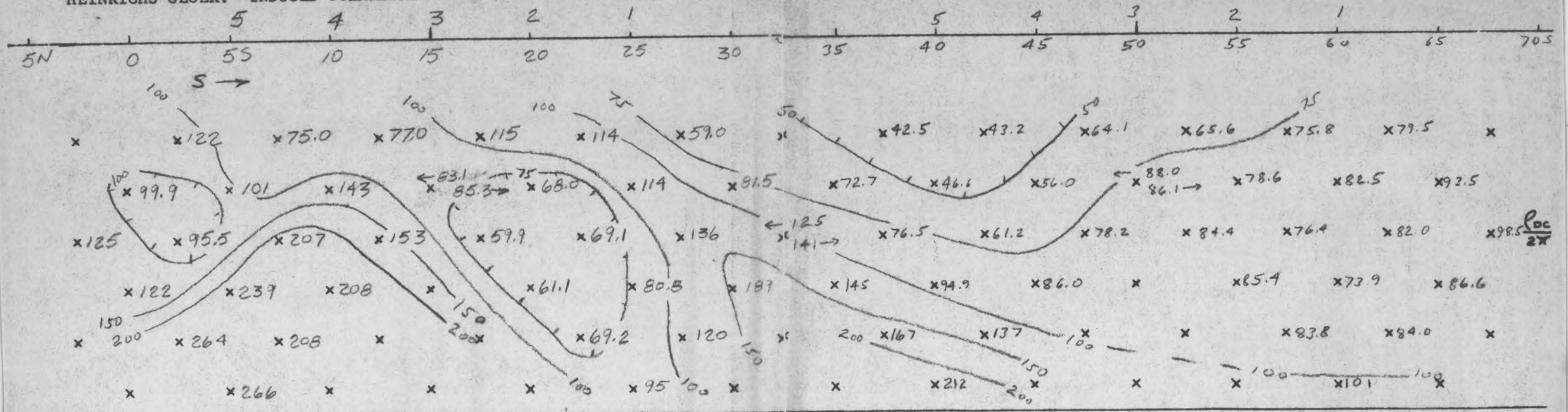
Preliminary

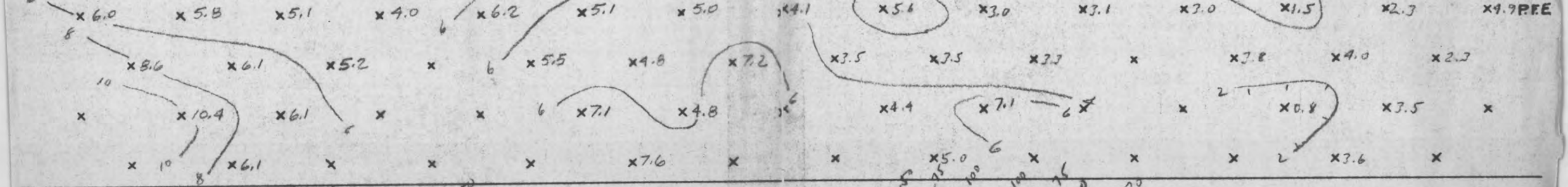
GRAVITY LINE 1

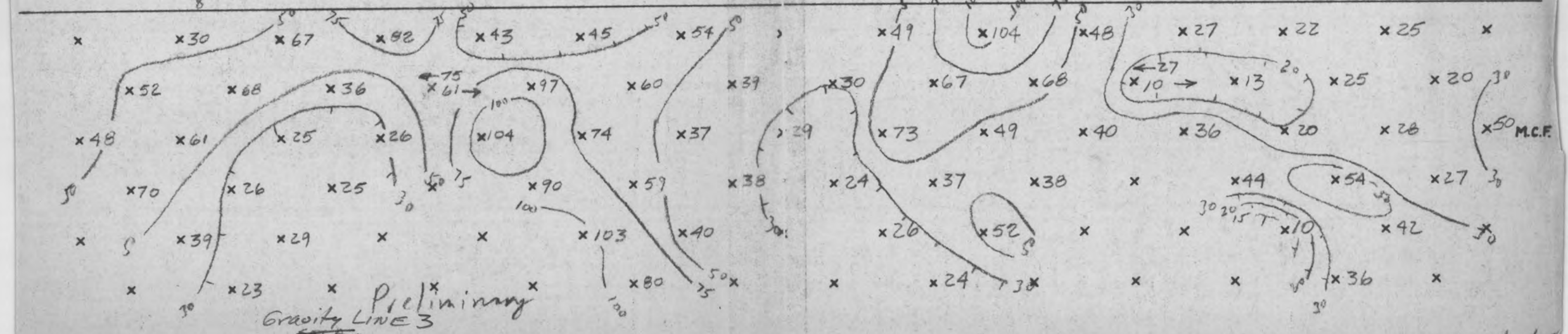
AREA Santa Clause I.P. LINE X a = 500 ' SCALE: 1" 500 DATE: [illegible] LINE ____ a = ' SCALE: ____ DATE: ____

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING E

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



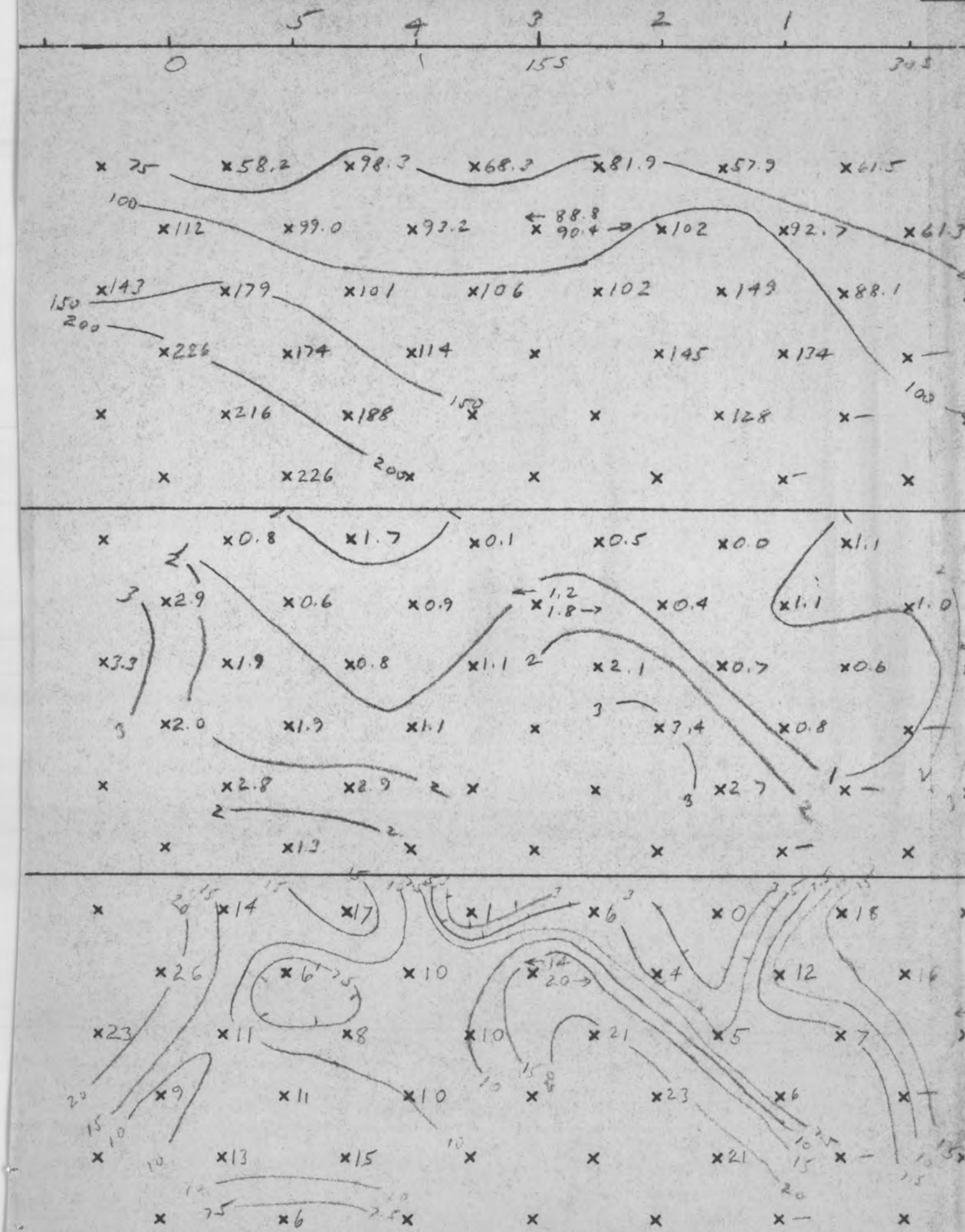




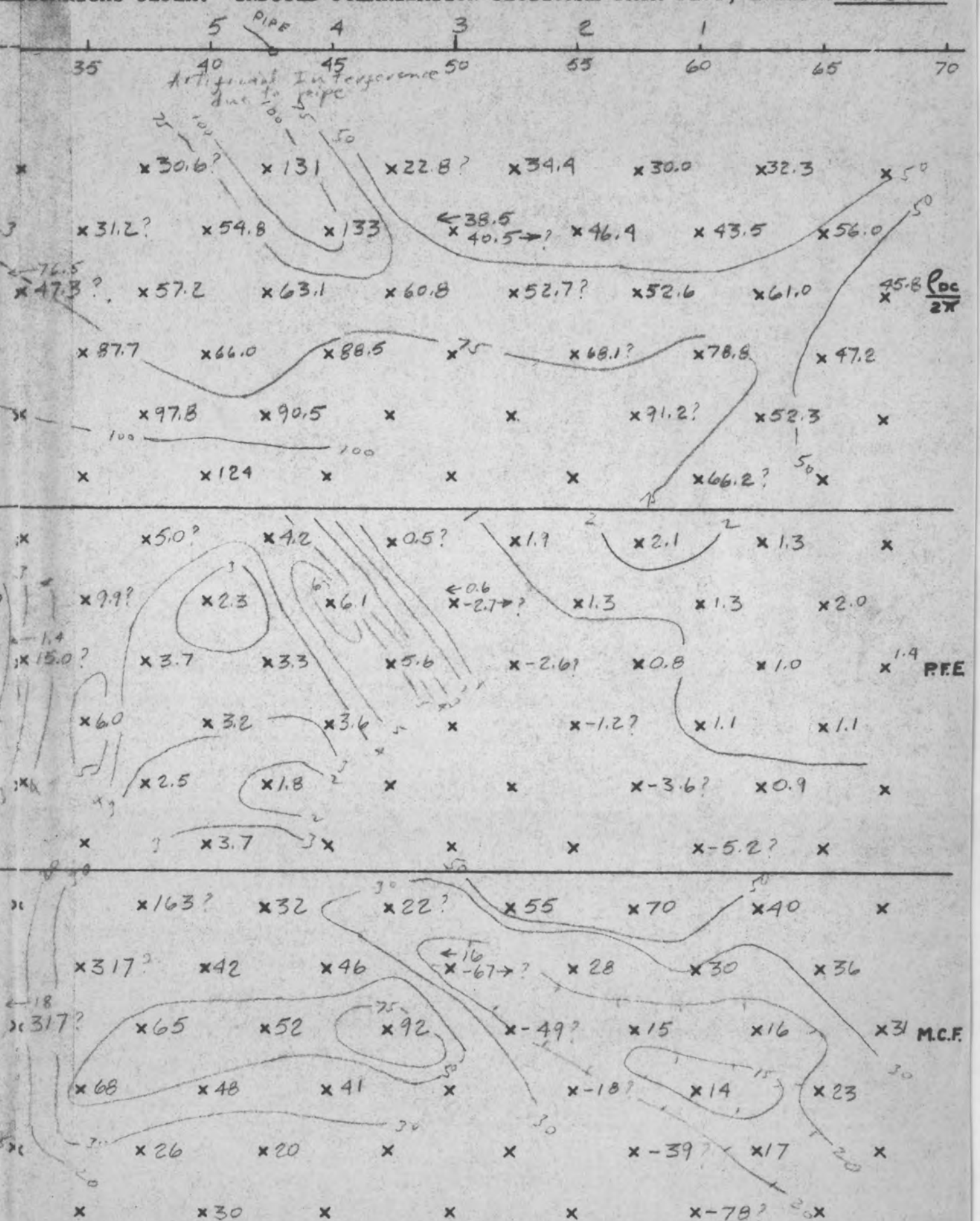
AREA Santa Claus LINE ~~Sta~~ 3 a = 500' SCALE: 1" = 500' DATE: 4/23/65

LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING E



HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST

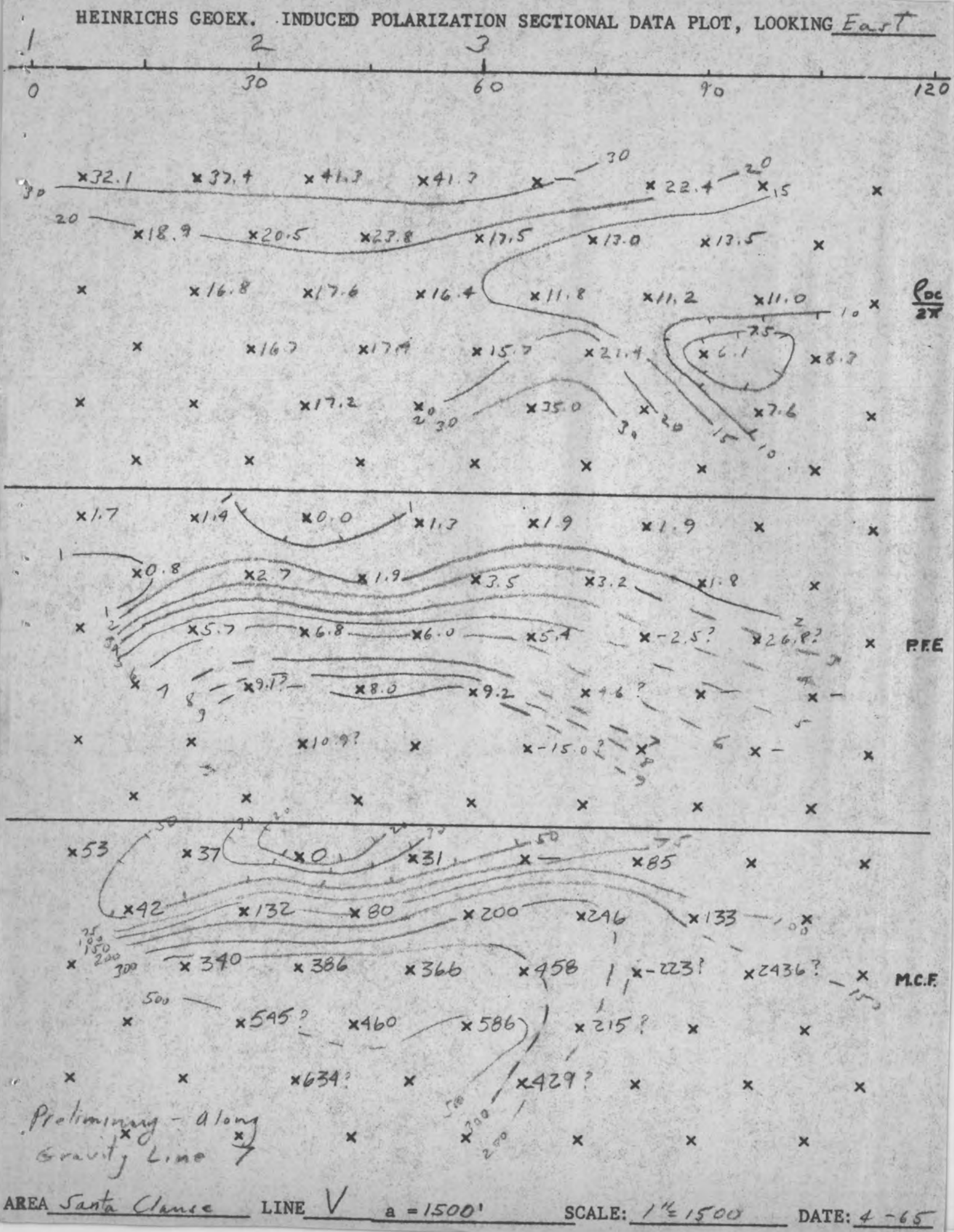


Preliminary Gravity Line 2

Set B

AREA Santa Clause LINE "Z" a = 500 ' SCALE: 1" = 500' DATE: Santa Clause LINE Gr 2 a = 500 ' SCALE: 1" = 500 DATE: 7/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



Preliminary - along Gravity Line

AREA Santa Clause LINE V a = 1500' SCALE: 1" = 1500 DATE: 4-65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

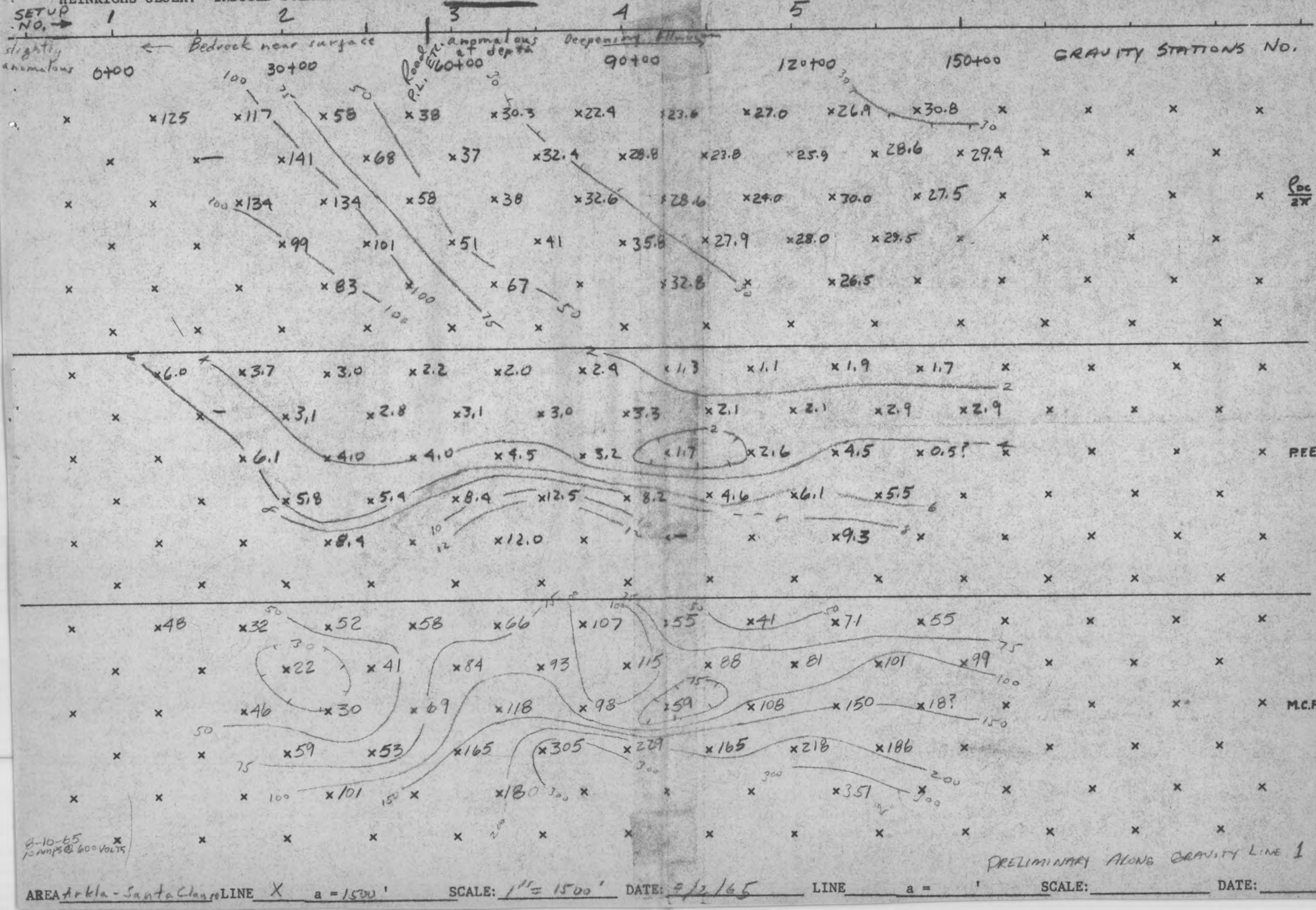
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

PRELIMINARY ALONG GRAVITY LINE 5

AREA ARKLA-SANTA CLAUS LINE W a = 1500' SCALE: 1"=1500 DATE: 1/9/65 LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



PRELIMINARY ALONG GRAVITY LINE 1

AREA Arkla - Santa Clara LINE X a = 1500' SCALE: 1" = 1500' DATE: 9/2/65

LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

Sender setups → 1 2 3 4

Gravity Stations 0 → 15 30 45 60 75 90 105 120 135 150 165 180 195

← Bedrock near surface →

I.P Line Y

Preliminary

Along Gravity Line 3

$\frac{\rho_{DC}}{2\pi}$

P.F.E

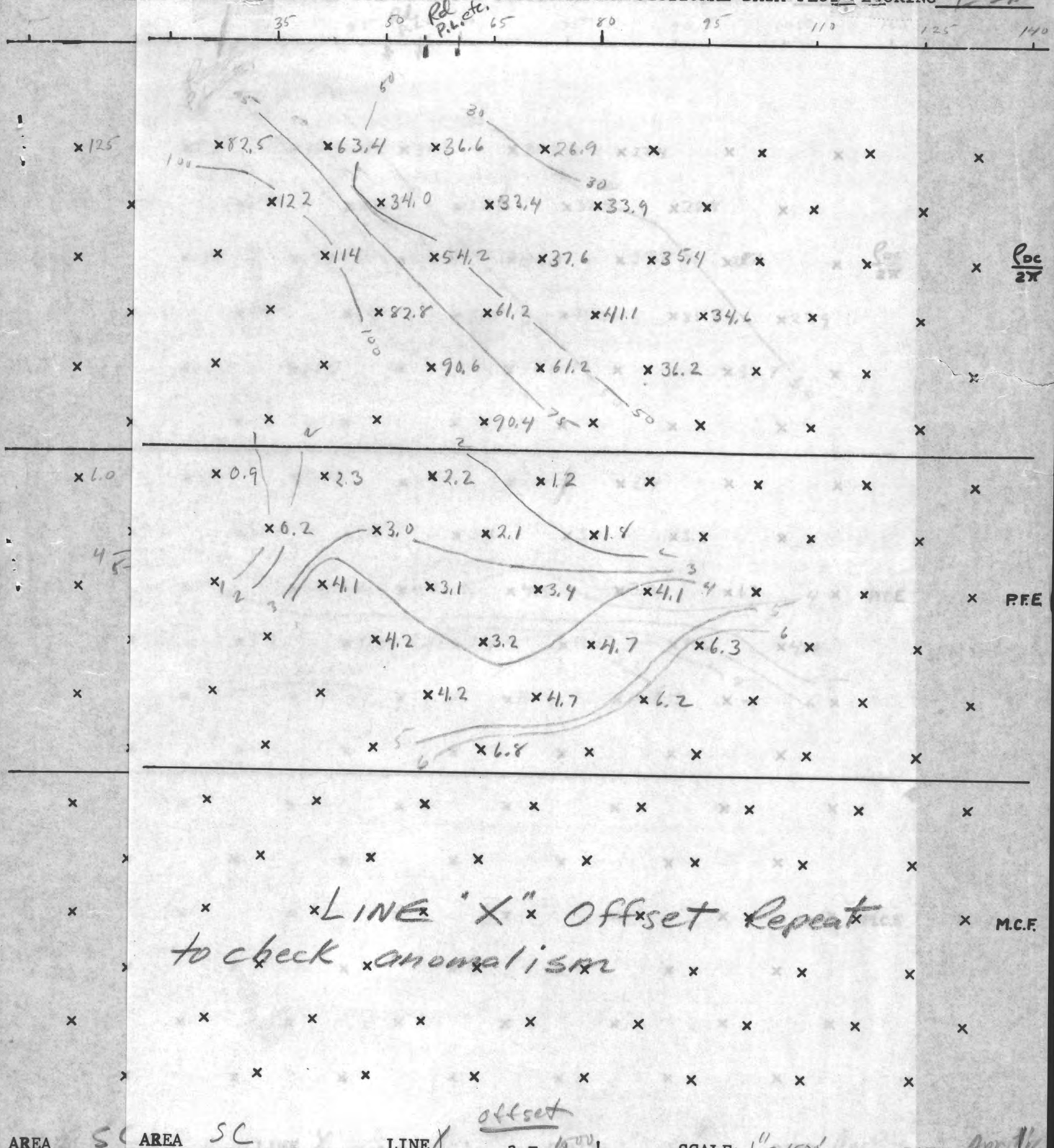
M.C.F

GEOEX Copy

AREA Arkla - Santa Clara LINE Y a = 1500' SCALE: 1"=1500' DATE:

LINE a = ' SCALE: DATE: 4/2/65

HEINRICHS GEOEX. - INDUCED POLARIZATION SECTIONAL DATA PLOT - LOOKING East



AREA SC AREA SC LINE X offset a = 1000' SCALE: 1" = 1500' DATE: April 66

R 18 W

T 23 N

T 22 N

I.P LINE "V"

I.P LINE "W"

I.P LINE "X"

I.P LINE "Y"

I.P LINE "Z"

MAX

PETE

RAY

MIKE

LINE A

LINE B

LINE C

STA. 0 N-S

STA. 50+00 S

STA. 100+00 S

STA. 155+00 S

SPREAD 1

SPREAD 2

SPREAD 3

BM 3575

BM 3564

BM 3563

BM 3505

BM 3452

GRAVITY BASE

DEPTH PROBE 14

Santa Claus

TELEPHONE LINE

FENCE LINE

POWER LINE

PIPE LINE

FENCE LINE

HIGHWAY 93 & 466

GRAVITY 12

GRAVITY 11

GRAVITY 10

GRAVITY 9

GRAVITY 8

GRAVITY 7

GRAVITY 6

GRAVITY 5

GRAVITY 4

GRAVITY 1

GRAVITY 2

GRAVITY 3

N

EXPLANATION

- DRILL HOLE LOCATION & No. — R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- 1 · · ⑥ · ► MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION — I.P. ANOMALISM
- 1 2 3 4 5 ELECTRODE STATIONS

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION GRAVITY - I.P. LOCATION

FOR

ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY	4-22-65
DATE: Feb 1965	SHEET 5 OF 6	6-17-65
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAX

RAY

PETE

RICK

MIKE

MAG. BASE No. 1

MAG. BASE No. 2

MAG. BASE No. 3

Santa Claus

TAILINGS POND

POWER LINE

PIPE LINE

Microwave Sta.
Pump Sta.

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. (R - RAY, P - PETE, D - DUVAL)
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- I · · ⑥ · · → MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION
  1 2 3 4 5 ELECTRODE STATIONS

MAGNETIC SURVEY - TOTAL INTENSITY

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
MOMAG TRAVERSES
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 3 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAX

RAY

PETE

LINE A

LINE B

LINE C

Sta. 65+50

See Inset

Santa Claus

FENCE LINE

TELEPHONE LINE

POWER LINE

PIPE LINE

MIKE

FENCE LINE

HIGHWAY 93 & 466

STA. 0 N-S

STA. 50+00S

STA. 100+00S

STATION 155+00S

BM 3575

BM 3569

BM 3563

BM 3564 GRAVITY BASE

BM 3505

BM 3452

GRAVITY BASE U.S.B.M. 3564

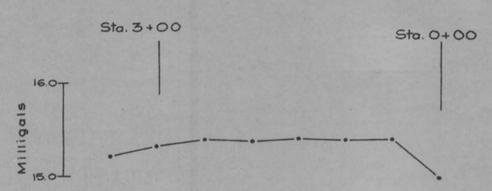
LINE B ALTIMETER VERT. CONTROL ELEV. ERROR 0.5 MILLIGALS. NOT USED IN PLAN - DATA TO BE USED IN VERTICAL SECTION ONLY

N

EXPLANATION

- DRILL HOLE LOCATION & No. — R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- 1 · · ⑥ · ► MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION
  1 2 3 4 5 ELECTRODE STATIONS

INSET LINE A (DETAIL)
PROFILE



LOOKING NORTH-WEST
Scale: 50' = 1"

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
BOUGUER GRAVITY
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 1 mg	REVISIONS
DENSITY = 2.8 grams/c.c.	DATA BY: D.A. & R.P.	6-17-65
DATE: Feb 1965	SHEET 4 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

SANTA CLAUS

BM 3575

BM 3691

BM 3869

BM 3564

BM 3505

X BM 3452

HIGHWAY 93 & 466

EXPLANATION

x x x x GRAVITY STATIONS
..... MAGNETIC TRAVERSE (HAND MAG)
I.P. SURVEY LOCATION
1 2 3 4 5 ELECTRODE STATIONS
• DRILL HOLE LOCATION & No.
R - RAY
P - PETE
D - DUVAL

N

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

MAGNETIC SURVEY
VERTICAL INTENSITY
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 100 ϒ	REVISIONS
	DATA BY: J.P.M. & D.A.	6-17-65
DATE: Feb. 1965	SHEET 2 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAX

PETE

RAY

MIKE

Santa Claus

BM 3575

BM 3564

BM 3569

BM 3505

BM 3452

FENCE LINE

TELEPHONE LINE

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

FENCE LINE

EXPLANATION

- DRILL HOLE LOCATION & No. — R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION — 1 2 3 4 5 ELECTRODE STATIONS

N

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION

FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb. 1965	SHEET 1 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAX

PETE

RAY

MIKE

GRAVITY BASE

BM 3564

BM 3575

BM 3569

BM 3555

BM 1432

Sta. 0 N-S

Sta. 50+00S

Sta. 100+00S

Sta. 155+00

Santa Claus

POWER LINE

PIPE LINE

FENCE LINE

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. (R - RAY, P - PETE, D - DUVAL)
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION
- 1 2 3 4 5 ELECTRODE STATIONS

GRAVITY BASE U.S.B.M. 3564

ASSUMED GRADIENT OF 1.0 Mgals/1000' WEST

LINES A, B & C NOT PLOTTED OR USED IN GRADIENT

N

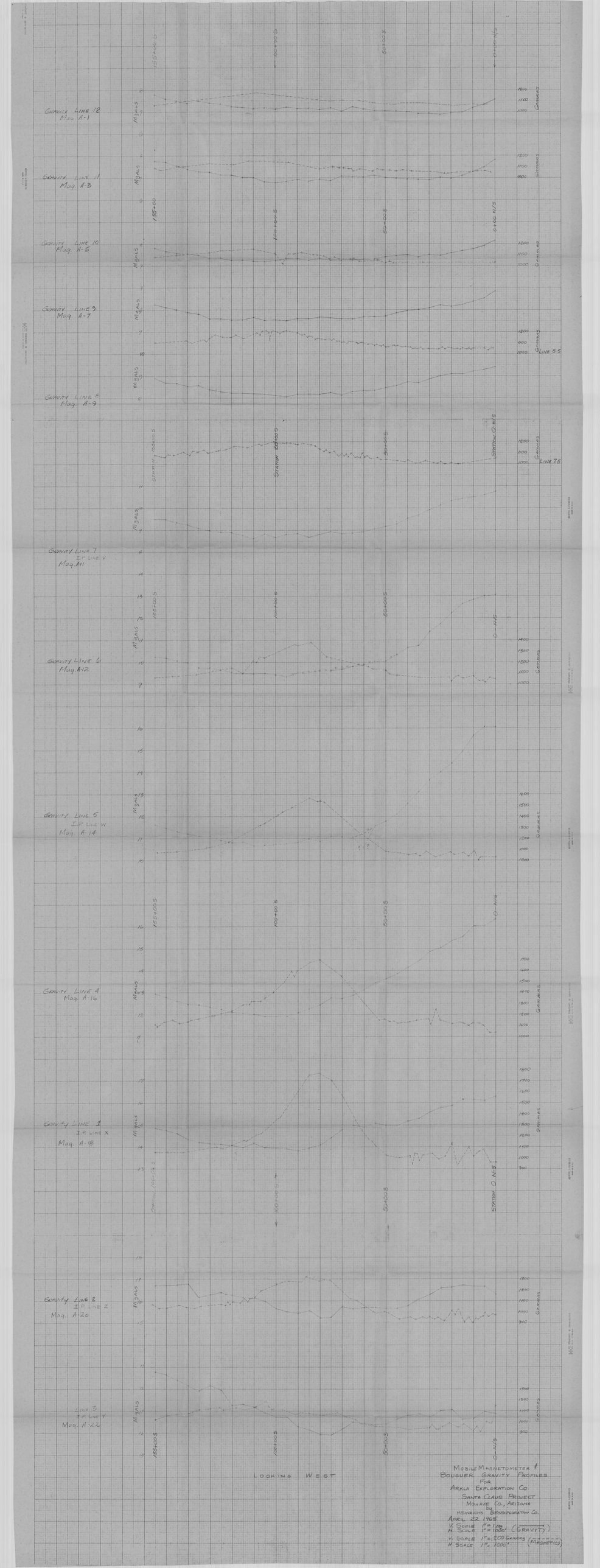
REGIONAL GRADIENT CORRECTION

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
GRAVITY SURVEY
FOR
ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 6 OF 6	
DRAWN BY:	DRAWING NO:	FILE:


Gravity Line 12
Mag. A-1
Gravity Line 11
Mag. A-3
Gravity Line 10
Mag. A-5
Gravity Line 9
Mag. A-7
Gravity Line 8
Mag. A-9
Gravity Line 7
I.P. Line V
Mag. A-11
Gravity Line 6
Mag. A-12
Gravity Line 5
I.P. Line IV
Mag. A-14
Gravity Line 4
Mag. A-16
Gravity Line 3
I.P. Line X
Mag. A-18
Gravity Line 2
I.P. Line Z
Mag. A-20
Line 1
I.P. Line Y
Mag. A-22
Looking West
Mobile Magnetometer & Bouguer Gravity Profiles
For
Arkla Exploration Co
Santa Claus Project
Mohave Co., Arizona
by
Heinrichs Geoexploration Co.
April 22, 1965
H. Scale 1"=1mi
H. Scale 1"=1000' (Gravity)
V. Scale 1"=200 Gamma
H. Scale 1"=1000' (Magnetic)

R 18 W

T 23 N

T 22 N

MAG. BASE No. 1

MAG. BASE No. 2

MAG. BASE No. 3

MIKE

RICK

TAILINGS POND

Santa Claus

Microwave Sta.
Pump Sta.

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. (R - RAY, P - PETE, D - DUVAL)
- ITHACA PEAK GRANITE
- GRAVITY STATIONS
- MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P. SURVEY LOCATION
  12345 ELECTRODE STATIONS
- Fault

Gravity & Magnetic LINEAMENT

MAGNETIC SURVEY - TOTAL INTENSITY

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
MOMAG TRAVERSES
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 3 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAG. BASE No. 1

MAG. BASE No. 2

MAG. BASE No. 3

MAX

RAY

PETE

DUVAL

MIKE

RICK

Santa Claus

Microwave Sta. Pump Sta.

POWER LINE

FENCE LINE

93 & A&G

Hacer Proximo

LINE 15N - 70E
LINE 20S + 30

EXPLANATION

- DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION (12345 ELECTRODE STATIONS)

Magnetic Survey
(Total Intensity)
Preliminary

Unadjusted Traverses

3/29/65

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
MOMAG TRAVERSES
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	
DATE: Feb 1965	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

MAG. BASE No. 1

MAG. BASE No. 2

MAG. BASE No. 3

MAX

RAY

PETE

MIKE

RICK

DUVAL

Santa Claus

Microwave Sta.
Pump Sta.

POWER LINE

PIPE LINE

FENCE LINE

TAILINGS POND

HIGHWAY 93 & 466

BM 3575

BM 3564

BM 3493

EXPLANATION

- O DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION
  12345 ELECTRODE STATIONS

N

Momag Contour
WORK MAP

R 18 W

T 23 N

T 22 N

Surveying & Gravity complete
1 Thru 6 "+"

IP "X" "Y"

½ day more hole Keith Simpson-meter
50 hrs.

Santa Claus

BASE #3
Mag. Base

Gravity Coverage

Total 18 miles N-S
19 miles
No elev. of LINE

Field Work MAP
Momag Traverse

EXPLANATION

O DRILL HOLE LOCATION & No.
ITHACA PEAK GRANITE

EXPLANATION

x x x x GRAVITY STATIONS
..... MAGNETIC TRAVERSE (HAND MAG)
I.P SURVEY LOCATION
1 2 3 4 5 ELECTRODE STATIONS
O DRILL HOLE LOCATION & No.

HEINRICHS GEOEXPLORATION COMPANY P.O. Box 5671 Tucson, Arizona		
COMPOSITE GEOLOGY – MAGNETICS (Vertical) – I.P. LOCATION FOR ARKLA EXPLORATION CO. SANTA CLAUS AREA MOHAVE COUNTY, ARIZONA		
SCALE: 1" = 1000'	CONTOUR INTERVAL: 100'	REVISIONS
	DATA BY: J.P.M. & D.A.	3/5/65
DATE: Feb. 1965	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

OBSOLETE
PRELIMINARY

R 18 W

I.P. "W"

I.P. "X"

I.P. "Y" ← I.P. Lines completed

← Gravity lines completed

T 23 N

T 22 N

MAX

PETE

RAY

DUVAL

RICK

MIKE

MAG. BASE No.

MAG. BASE No. 2

MAG. BASE No. 3

PETE No. 4

PETE No. 5

PETE No. 2

DUVAL No 118

DUVAL No 69

RAY No 2

RAY No 3

RAY No

RAY No 4

BM 3575

BM 3569

BM 3564

BM 3508

BM 3452

Santa Claus

Microwave Sta
Pump Sta.

POWER LINE

PIPE LINE

TELEPHONE LINE

FENCE LINE

LINE 2 I.P.

LINE 1 I.P.

HIGHWAY 93 & 466

0+00

30+00

60+00

90+00

120+00

150+00

Sta. Nos

N

EXPLANATION

- O DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- GRAVITY STATIONS (19½ mi. COMPLETED 3-26-65) 25.6 mi. 3-31-65)
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY) 65.2 mi. COMPLETED (No magnetics this week)
- I P SURVEY LOCATION 9.46 mi. COMPLETED 3-26-65) 12.59 completed 3-31-65)
  1 2 3 4 5 ELECTRODE STATIONS

Geoex Copy
Location & Coverage 3-31-65
Magnetic, I.P., Gravity

GEOEX COPY

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

OBSOLETE
Field Copy

GEOLOGY - DRILL HOLE & CLAIM LOCATION
MOMAG TRAVERSES
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	3-26-65
DATE: Feb 1965	SHEET OF	3-31-65
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

PETE

PETE No 3

PETE No 2

RAY

RAY No 4

RAY No 5

DUVAL

DUVAL No 69

DUVAL No 110

MIKE

BASE 1

BASE 2

BM 3575

BM 3564

BM 3505

BM 3492

BM 3501

BM 3563

Santa Claus

TRAILER

LINE 1

LINE 2

1/4 located in field

Microwave Sta. pump Station

pipeline

93 & 66 line. Highway & r/w Telephone line parallel East side of r/w

Mohave Field

EXPLANATION

- DRILL HOLE LOCATION & No.
- ITHACA PEAK GRANITE
- Telephone or Powerline

EXPLANATION

- x x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- I.P SURVEY LOCATION
- 1 2 3 4 5 ELECTRODE STATIONS
- DRILL HOLE LOCATION & No.

HEINRICHS GEOEXPLORATION COMPANY	
P.O. Box 5671 Tucson, Arizona	
FOR ARKLA EXPLORATION CO.	
SANTA CLAUS AREA MOHAVE COUNTY, ARIZONA	
SCALE: 1" = 1000'	CONTOUR INTERVAL: 100 ft
DATE: Feb. 1965	DATA BY: J.P.M. & D.A.
DRAWN BY:	SHEET OF
	DRAWING NO.:
REVISIONS	
	3/15/65
	FILE:

PRELIMINARY OBSOLETE

Field Data

Ray#2

infinite 300'S 250'W of Sta 15+00
Line 1 la = 5100'

⊥ 470' da a = 1000

E	n anomaly	V_{DC}	W		V_{DC}
2.2	½	111.8/7	1.1	½	92.2/6
4.2	1	63.2/7	1.1		59.6/7
2.9	1½	34.95/7	1.7		27.7/6
3.7	2	25.3/7	1.3		19.60/6
2.2	2⅓	17.26/7	0.3		12.34/6
1.7	3	17.10/6	0.7		7.33/6
0.6	3½	12.69/6	-0.7		4.32/6
-0.2	4	6.15/6	-2.0		3.21/6
			-2.5	4½	2.40/6

900
1300

DC Cal 1.000

50 MFD 25 VOLT Jim @ Inland #TE-1209
Small Sprague electrolytic capacitors

Saturday night

Chris:

There is one more spread, "B" of grav line 2 that hasn't been computed yet. Dan and Ron took the data while I was working on the momag Friday and They might be conned into computing it.

I could sure use $\frac{1}{2}$ doz of the "Basis of the I.P. Method."

Sure is a quite weekend without Dan + Ron.

Walt came through Fri nite + left a mess of wire, didn't say much. Keith [Havn't seen Gruven yet.]

5½ spd "B"

as taken in field

APR 1965 GEOEX

34.3	Tie	2.1
36.6		1.6
26.2		1.6
28.6		1.0
33.4		1.0
29.2		0.2
33.4		1.0
35.0		1.0
38.1		1.5
38.6		0.6
31.6		0.6
34.9		2.2
35.8		1.0
		0.4
29.4		3.0
31.6		1.6
35.2		2.9
35.1		

I counted them - they are all There.

Chris: Fast + Sloppy

but here it is.

I didn't get to the last spd of V, will send later,

K,

It's not as good as I thought.

+ enclosed is the down hole staff.

Thursday Noon

Chris: Just finish the computing and am headed down to get the Generator back. We may get a spread today, but there might be too much wind to get good D.C.'s,

I havn't been compiling the MCF's since I don't know if you want to convert them pfc's to a 3 cps base.

Pay checks didn't make it today, there are going to be some very unhappy people around here I think,

Please tell Grover I am <u>st, ll</u> looking for a letter from him,

Next time I am on the phone (or a letter if it would be a while) I would sure appreciate it if you could fill me in on what is going on with Mike's sender ect, in Tucson.

Best of luck, Chris.

Keith

Mo May records under separate cover – registered.

5280 ft.

10560
5280
15840

INDUCED POLARIZATION SENDER NOTES

project: _____ Line: _____ Date: _____

Send												
Receive												
Time												
Range												
Current												
Send												
Receive												
Time												
Range												
Current												

GEOEX APR 1965

Line V spd 1
(same format as W+X)

$\frac{\rho dc}{2\pi}$	pfe
	1.7
32.1	1.4
37.4	0.8
18.9	2.7
26.5	5.7
16.8	6.8
17.6	9.1
16.7	8.0
17.4	10.5
17.2	

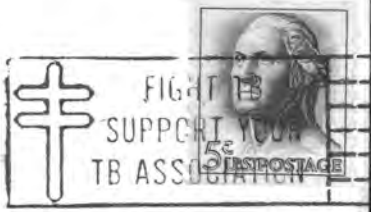
ρdc spd 2	pfe
41.3	0.0
41.3	1.3
23.8	1.9
17.5	3.5
16.4	6.0
11.8	5.4
15.7	9.2
21.4	4.6
35.2	−15.0

Pipe located 150' N of station 120
cause of negative pfe + odd ρdc,

will try to move further from pipe away on next time by K.

Keith Henson
801 Spring St
Kingman Ariz

KINGMAN, ARIZ.
APR 20
PM
1965



Heinrichs George
Box 5671
Tucson, Arizona

Chris:

The 13.1 above a 133 + 54.8 may be a range error (by Ron)
this would make it 41.6
What happened to last weeks expense clear?
Thanks for the "Basis", chow sheet Hero

AUXILIO

$\sqrt{\frac{MCF}{80}} = 9.5$ by vol ±

Tuesday Morn
April 20

APR 1965
GEOEX

Chris!

There is a pipe, between Electrodes 4 + 5 which accounts for the strange looking data on spread B grav line 2.

I don't think that the reciprocity theorem holds for Pfe's when there are non-linear polarization voltages involved.

It's almost noon and the Ms Mgg should be ready in a little while.

Keith

APR 1965 GEOEX

Yesterday

APR 1965 GEOEX

Chris:

Pay checks came yesterday, I.P. notes + the capacitors today. The notes have me worried, you must know more about this job then I do to send a $\frac{3}{4}$" stack of them.

It took all day Thursday to put in the pits for the perpendicular line.

Yesterday I got wiped out by the PC noise. Here's the somations for the last 3 ~~stations~~ points read, Currents were 10 Amp

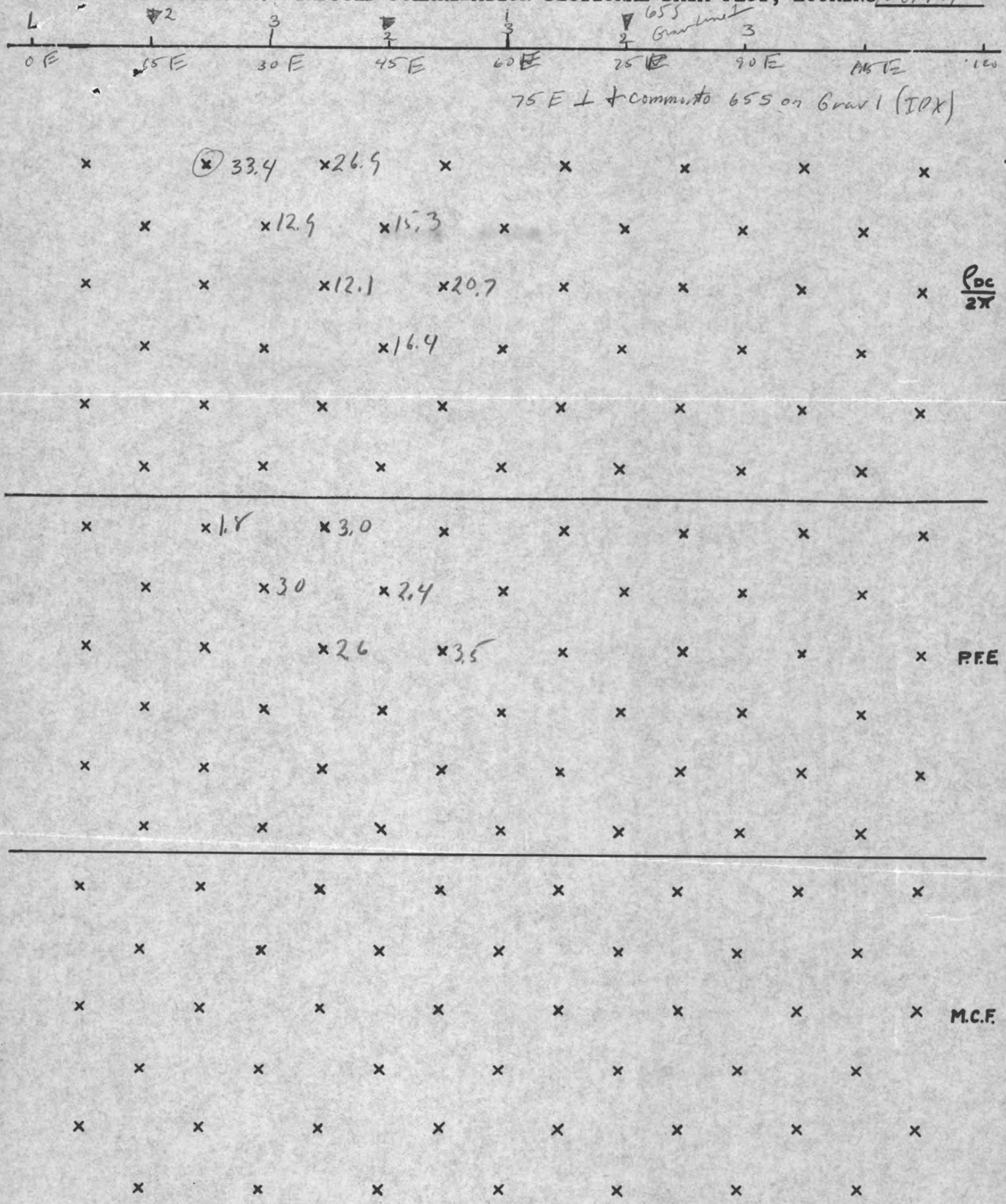
Send 12 Rec 60-75 E		Send 23 Rec. 75-90 E		1.97	
				1.93	
				1.83	
2.60		4.60		1.62	
2.55		4.60		1.62	
2.51		4.40		1.48	
2.67		4.15		1.44	Av 1.69
2.73		4.70			
2.74		5.06		1.23	
2.68	Av 2.64	4.84	Av = 4.62	1.37	
				1.61	
2.68		4.38		1.61	
2.64		4.36		1.74	
2.59		4.39		1.94	
2.63		4.41		2.10	
2.72		4.38		1.96	
2.79		4.40		1.76	
2.80		4.56		1.79	
2.90	Av 2.72	4.64	Av = 4.43	2.01	
				2.19	
				2.16	
				2.46	
				2.22	Av$_2$ 2.05
				1.82	
$\frac{Av_1}{Av_2} - 1 = 3\%$		$\frac{Av_1}{Av_2} - 1 = 5\%$		$\frac{Av_2}{Av_1} - 1 = 21\%$	

This is the first time I have ever been stopped by D.C. drift, but when it ~~drifts~~ oscillates at about the same rate as the DC switches I give up. We sat out there and watched it for about an hour before giving up, and it got worse.

Well, here's hopping for better luck next week.

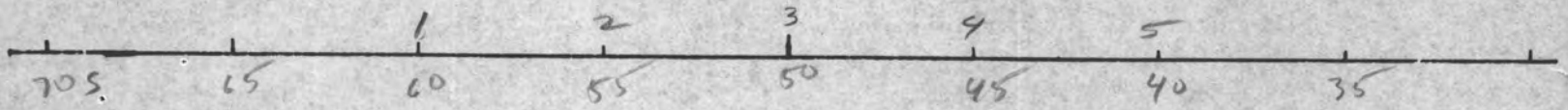
Keith

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING North



AREA Santa Clause LINE ⊥ a = 1500' SCALE: 1" = 500' DATE: April 65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West



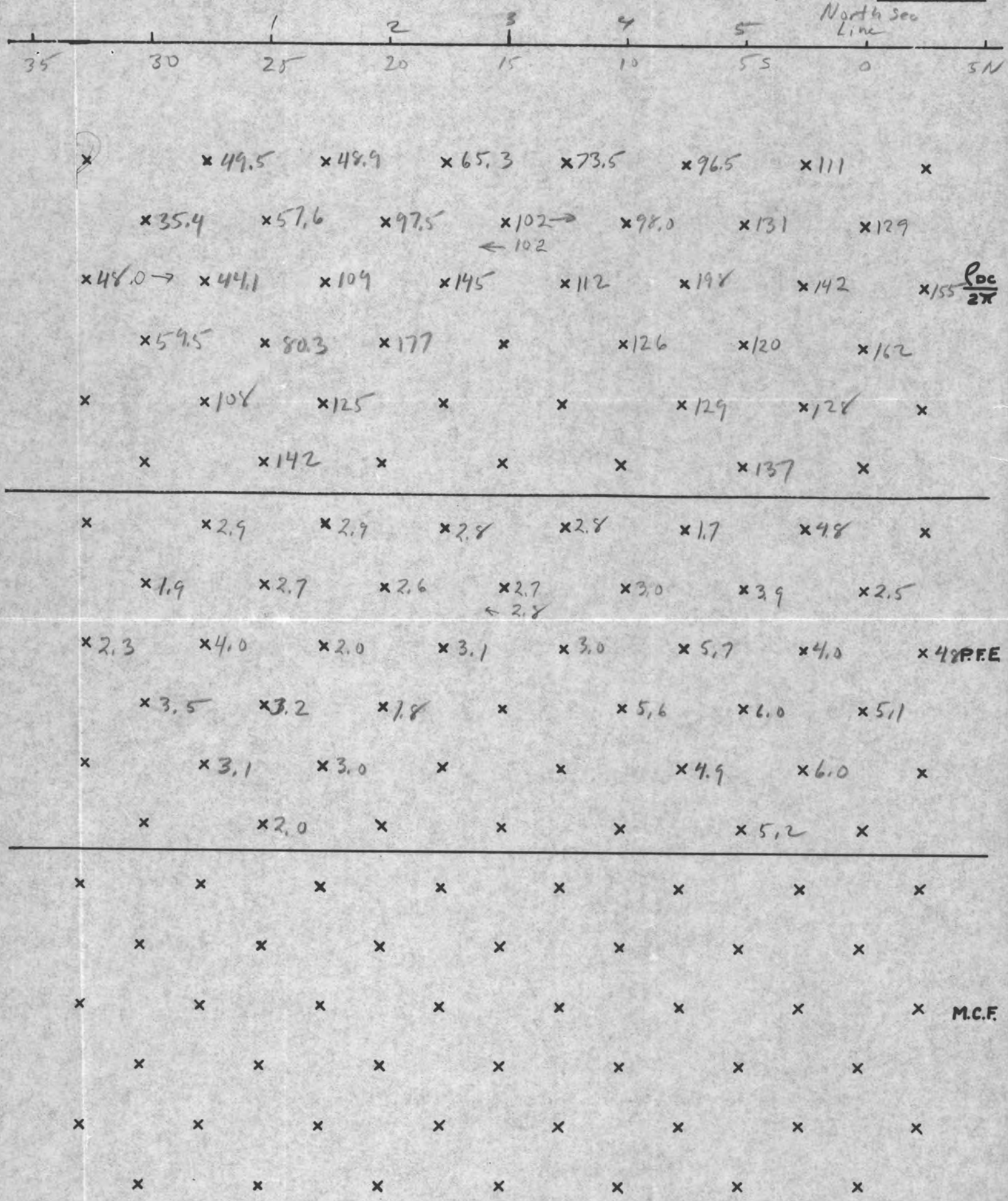
×	×29.2	×26.2	×14.3	×40.5	×86.5	×57.2	×
×38.6	×33.4	×28.6	×35.4 ← 36.6	×31.0	×47.2	×45.0	
×29.4	×31.6	×35.0	×33.4	×29.2	×58.7	×46.7	×47.4 ρ_{DC}
×31.6	×34.9	×38.1	×	×56.5	×62.0	×49.0	
×	×35.2	×35.8	×	×	×60.2	×65.0	×
×	×35.1	×	×	×	×64.0	×	

×	×0.2	×1.6	×2.1	×2.0	×3.1	×1.3	×
×0.6	×1.0	×1.0	×1.8 ← 1.6	×2.5	×1.9	×2.3	
×0.4	×0.6	×1.0	×1.0	×1.8	×2.1	×1.2	×2.4 P.F.E
×3.0	×2.2	×1.5	×	×2.6	×2.0	×2.0	
×	×1.6	×1.0	×	×	×2.0	×2.2	×
×	×2.9	×	×	×	×3.0	×	

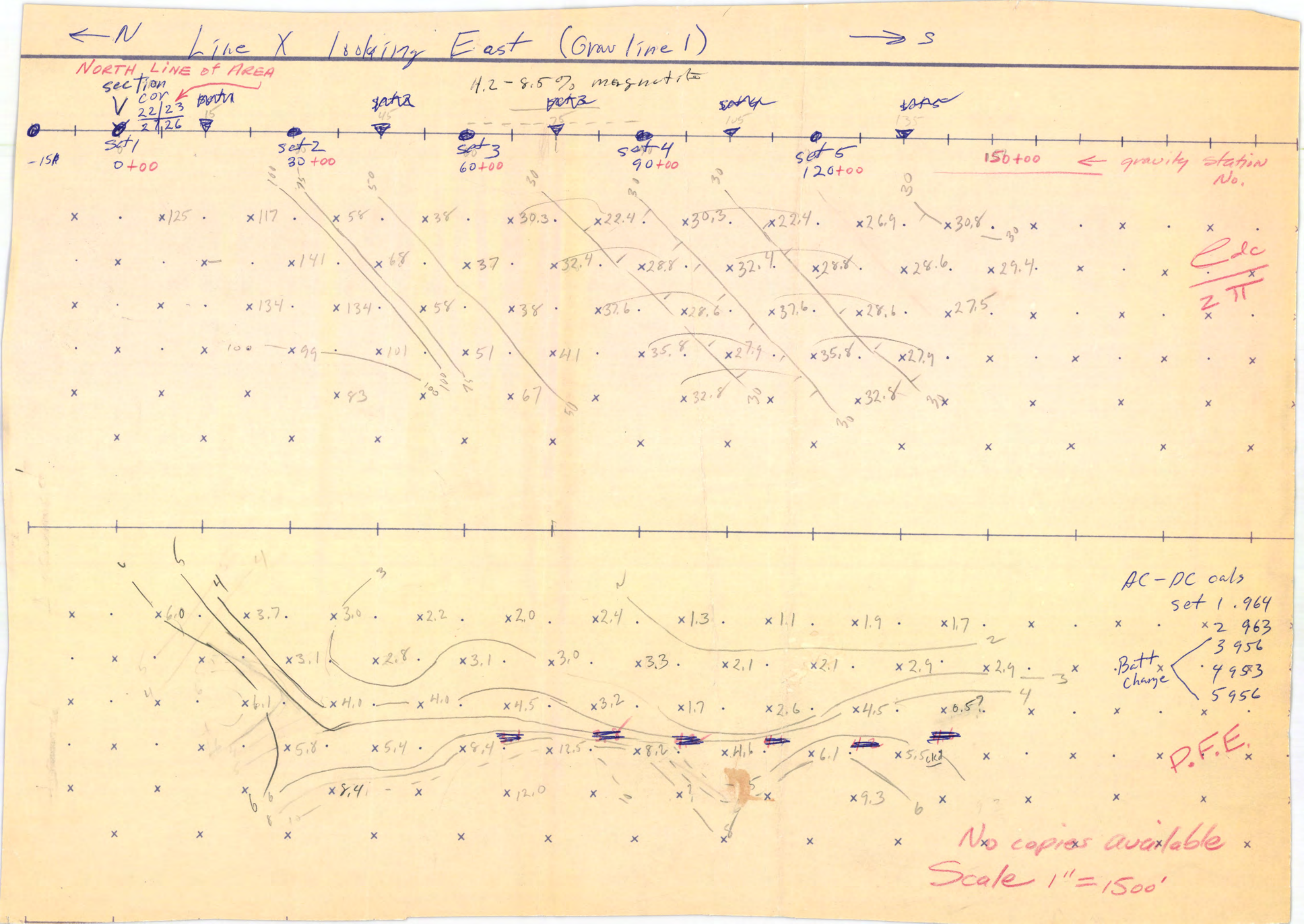
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	
×	×	×	×	×	×	×	× M.C.F.
×	×	×	×	×	×	×	
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	

AREA SC LINE X sp $\frac{B}{a}$ = 500 ' SCALE: 1" = 500' DATE: April 14

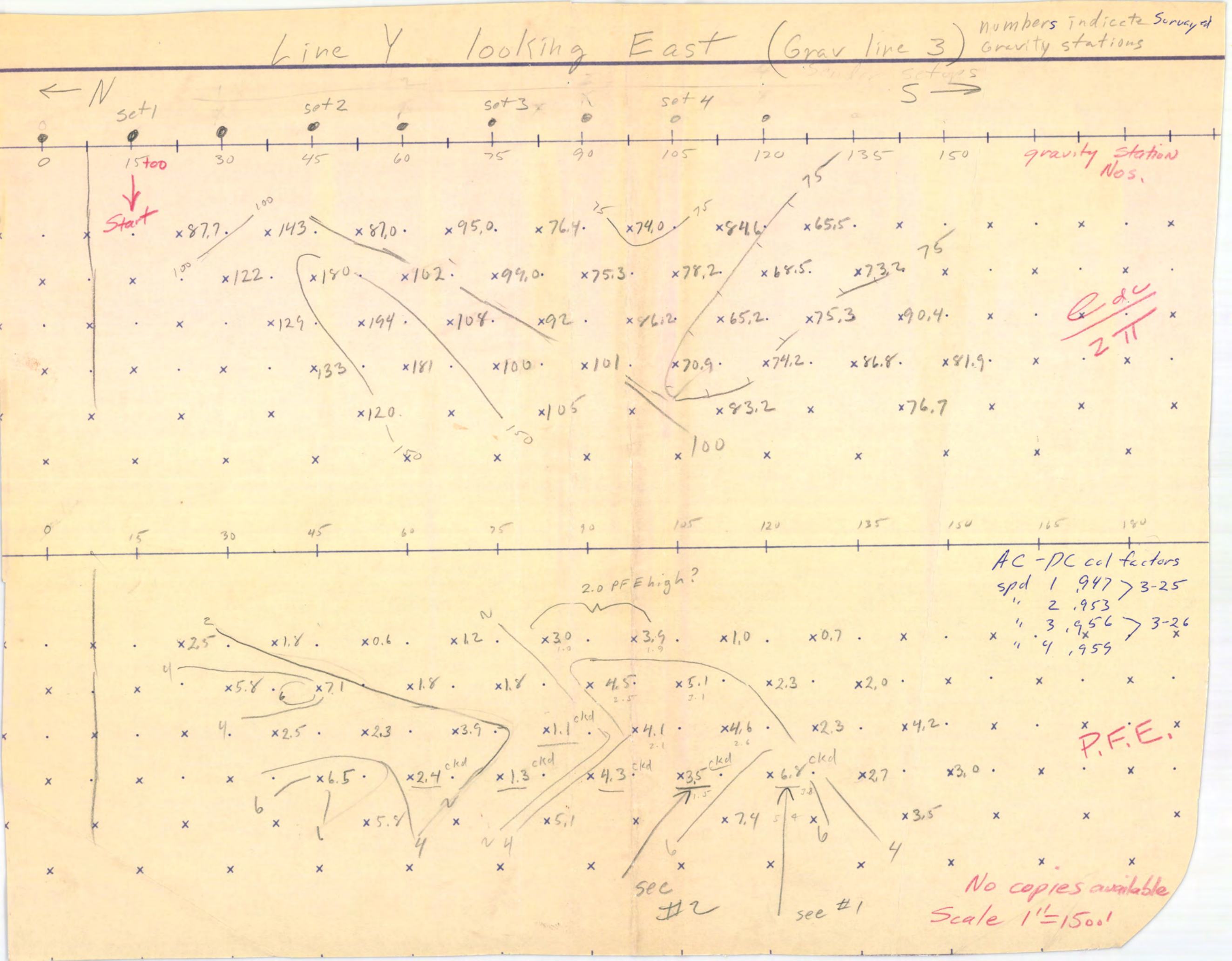
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West



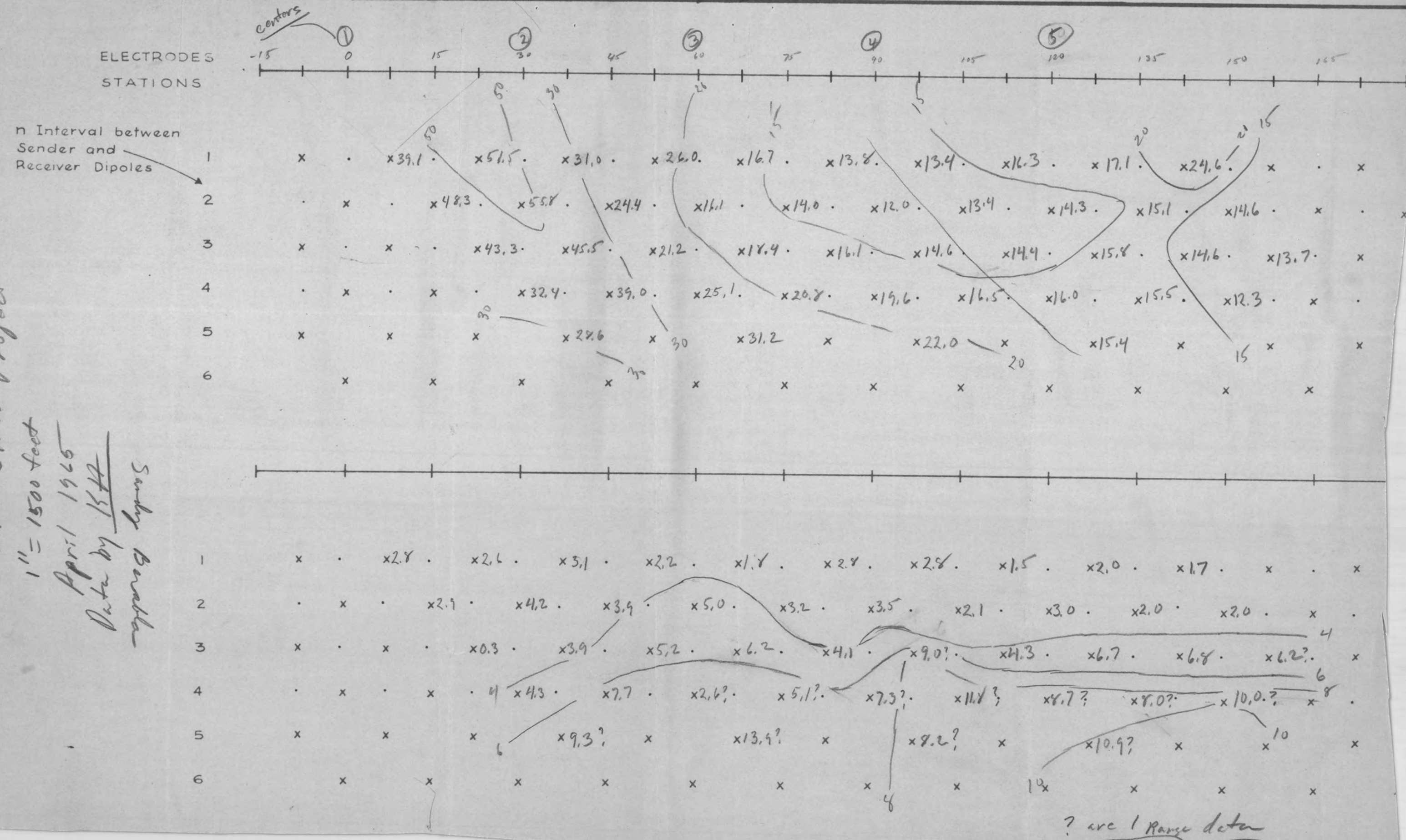
AREA SC LINE Xspl Aa = 500 ' SCALE: 1" = 500 DATE: Apr 1 14



← N
Line X looking East (Grav line 1)
→ S
NORTH LINE of AREA
section cor
22/23
27/26
4.2 - 8.5% magnetite
set 1
0+00
set 2
30+00
set 3
60+00
set 4
90+00
set 5
120+00
150+00
← gravity station No.
Cdc / 2π
AC-DC cals
set 1 .964
2 963
3 956
4 953
5 956
Batt change
P.F.E.
No copies available
Scale 1" = 1500'


Line Y looking East (Grav line 3)
numbers indicate Surveyed Gravity stations
← N
S →
set 1
set 2
set 3
set 4
0
15 too
30
45
60
75
90
105
120
135
150
gravity station Nos.
Start
87.7
143
87.0
95.0
76.4
74.0
84.6
65.5
122
180
102
99.0
75.3
78.2
68.5
73.2
129
194
108
92
86.2
65.2
75.3
90.4
133
181
100
101
70.9
74.2
86.8
81.9
120
105
83.2
76.7
100
75
150
e dc / 2π
0
15
30
45
60
75
90
105
120
135
150
165
180
AC - DC cal factors
spd 1 .947 > 3-25
" 2 .953
" 3 .956 > 3-26
" 4 .959
2.0 PFE high?
2.5
1.8
0.6
1.2
3.0
3.9
1.0
0.7
5.8
7.1
1.8
1.8
4.5
5.1
2.3
2.0
2.5
2.3
3.9
1.1 ckd
4.1
4.6
2.3
4.2
6.5
2.4 ckd
1.3 ckd
4.3 ckd
3.5 ckd
6.8 ckd
2.7
3.0
5.8
5.1
7.4
3.5
P.F.E.
see #2
see #1
No copies available
Scale 1" = 1500'

Line W (gravlines) Looking East



Santa Claus Project
1" = 1500 feet
April 1965
Data by KH
Sandy Barabba

? are 1 Range data

Line Y (Gravity Line 3) looking East

ELECTRODES
STATIONS

0 15 30 45 60 75 90 105 120 135 150 165 180

n Interval between Sender and Receiver Dipoles →

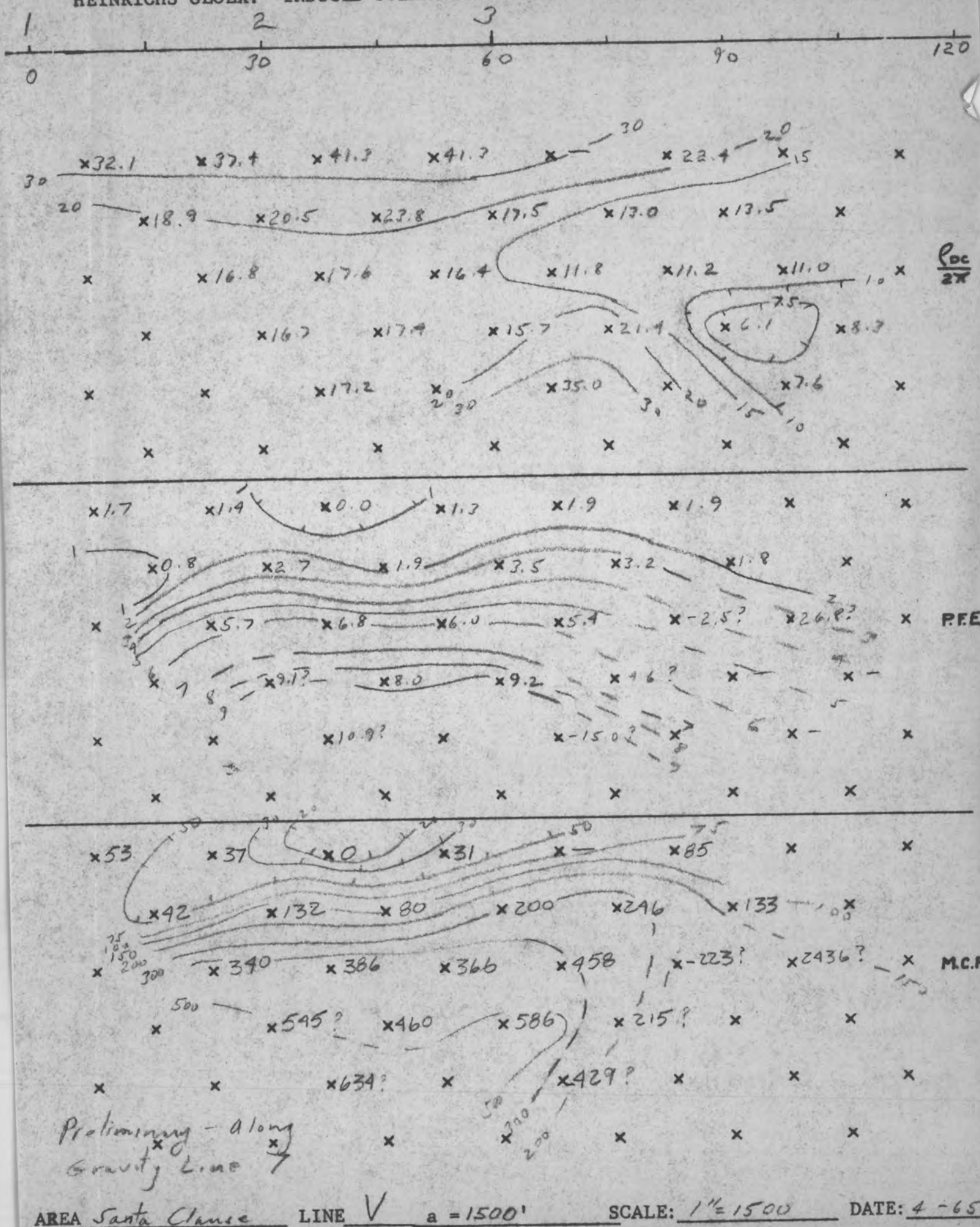
n																			
1	x	.	x	.	x87.7	.	x143	.	x87.0	.	x95.0	.	x76.4	.	x74.0	.	x84.6	.	x65.5	.	x59.3	.	x56.1	.	x	.	x
2	.	x	.	x	.	x122	.	x180	.	x102	.	x99.0	.	x75.3	.	x78.2	.	x68.5	.	x73.2	.	x74.2	.	x51.3	.	x	.
3	x	.	x	.	x	.	x129	.	x194	.	x108	.	x92	.	x86.2	.	x65.2	.	x75.3	.	x90.4	.	x72.3	.	x57.6	.	x
4	.	x	.	x	.	x	.	x133	.	x181	.	x100	.	x101	.	x70.9	.	x74.2	.	x86.8	.	x81.9	.	x77.5	.	x52.5	
5	x		x		x		x		x120		x		x105		x		x83.2		x		x76.7		x		x68.2		x
6		x		x		x		x		x		x		x		x		x		x		x		x		

Santa Claus Project
1" = 1500'
April 1965
Data by HH

n																			
1	x	.	x	.	x2.5	.	x1.8	.	x0.6	.	x1.2	.	x3.0	.	x3.9	.	x1.0	.	x0.7	.	x1.5	.	x2.1	.	x	.	x
2	.	x	.	x	.	x5.8	.	x7.1 (ckd)	.	x1.8	.	x1.8	.	x4.5	.	x5.1	.	x2.3	.	x2.0	.	x2.5	.	x2.8	.	x	.
3	x	.	x	.	x	.	x2.5	.	x2.3	.	x3.9	.	x1.1	.	x4.1	.	x4.6	.	x2.3	.	x4.2	.	x3.2	.	x3.0	.	x
4	.	x	.	x	.	x	.	x6.5	.	x2.4	.	x1.3	.	x4.3	.	x3.5	.	x6.8	.	x2.7	.	x3.0	.	x4.9	.	x3.8	.
5	x		x		x		x		x5.8		x		x5.1		x		x7.4		x		x3.5		x		x4.8		x
6		x		x		x		x		x		x		x		x		x		x		x		x		

Work copies
Do Not Use

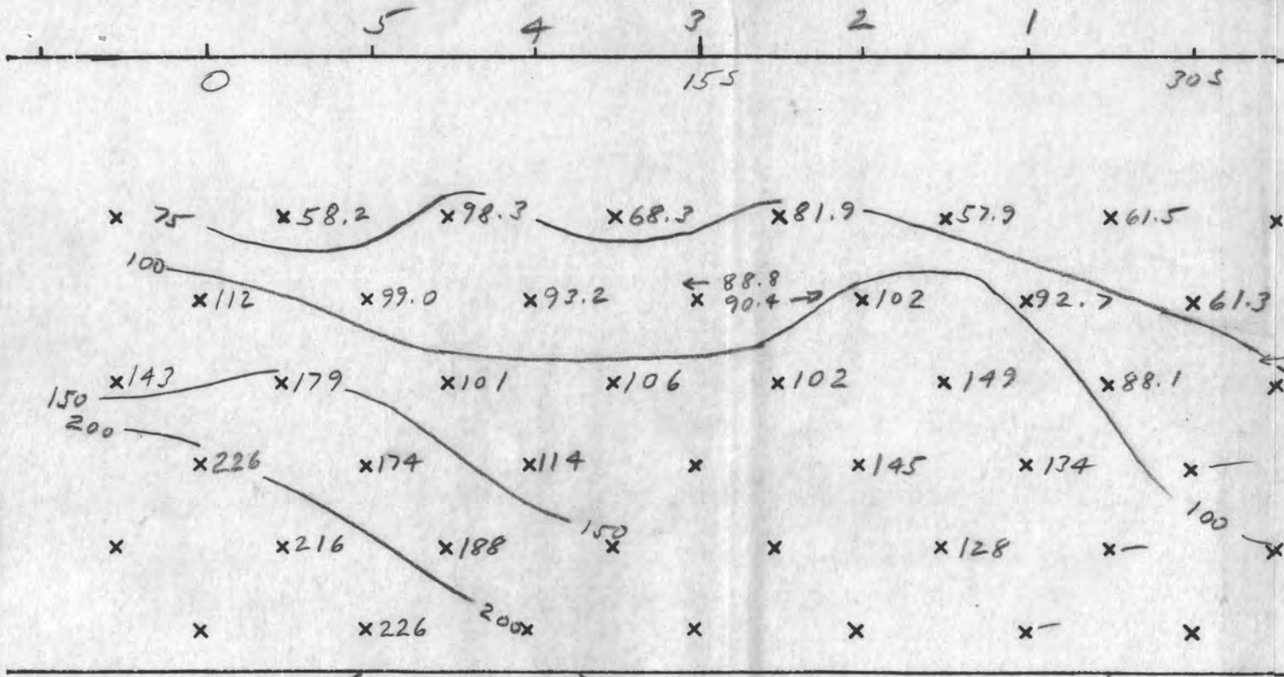
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



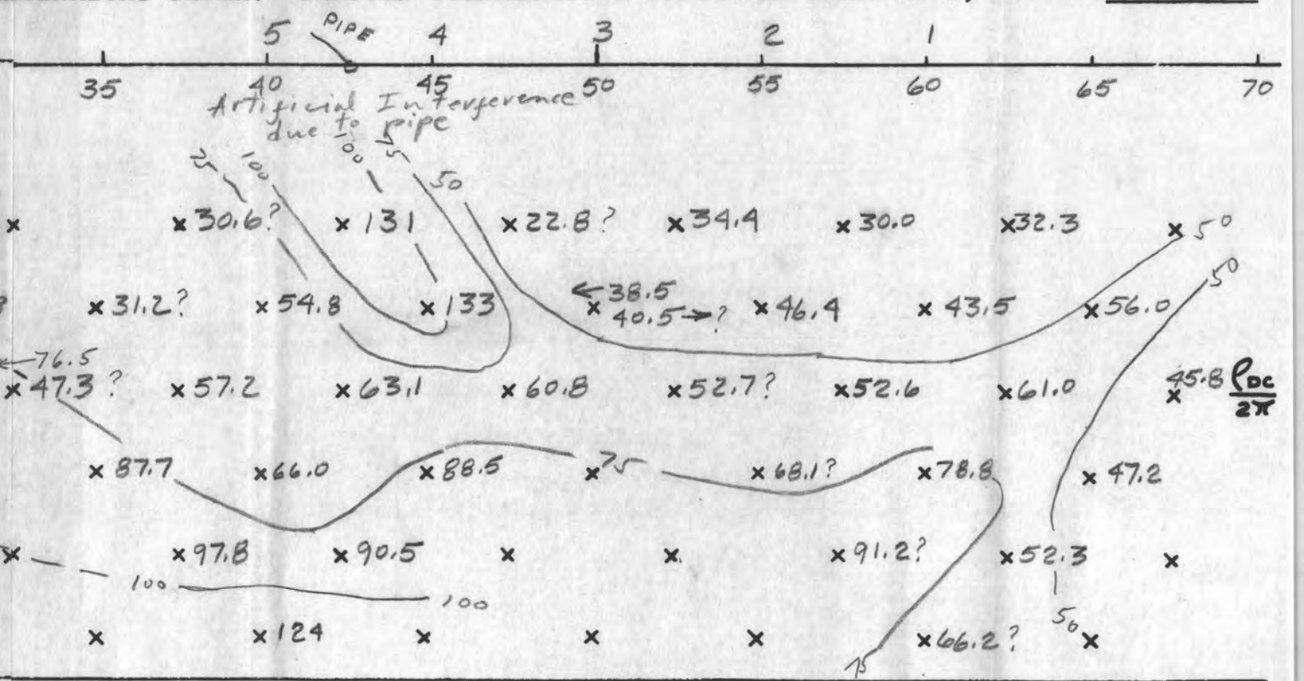
Preliminary - along Gravity Line

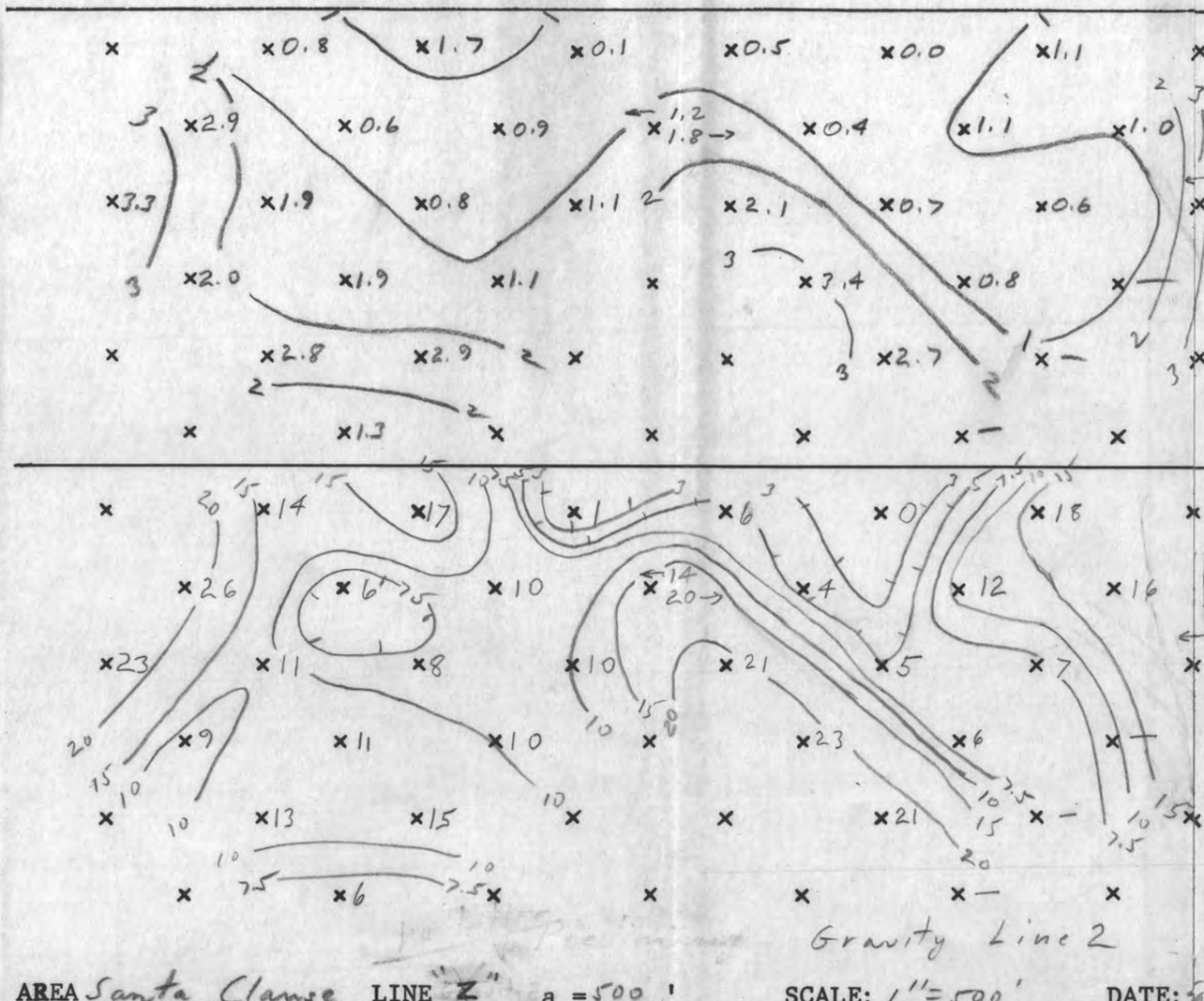
AREA Santa Clause LINE V a = 1500' SCALE: 1" = 1500 DATE: 4 - 65

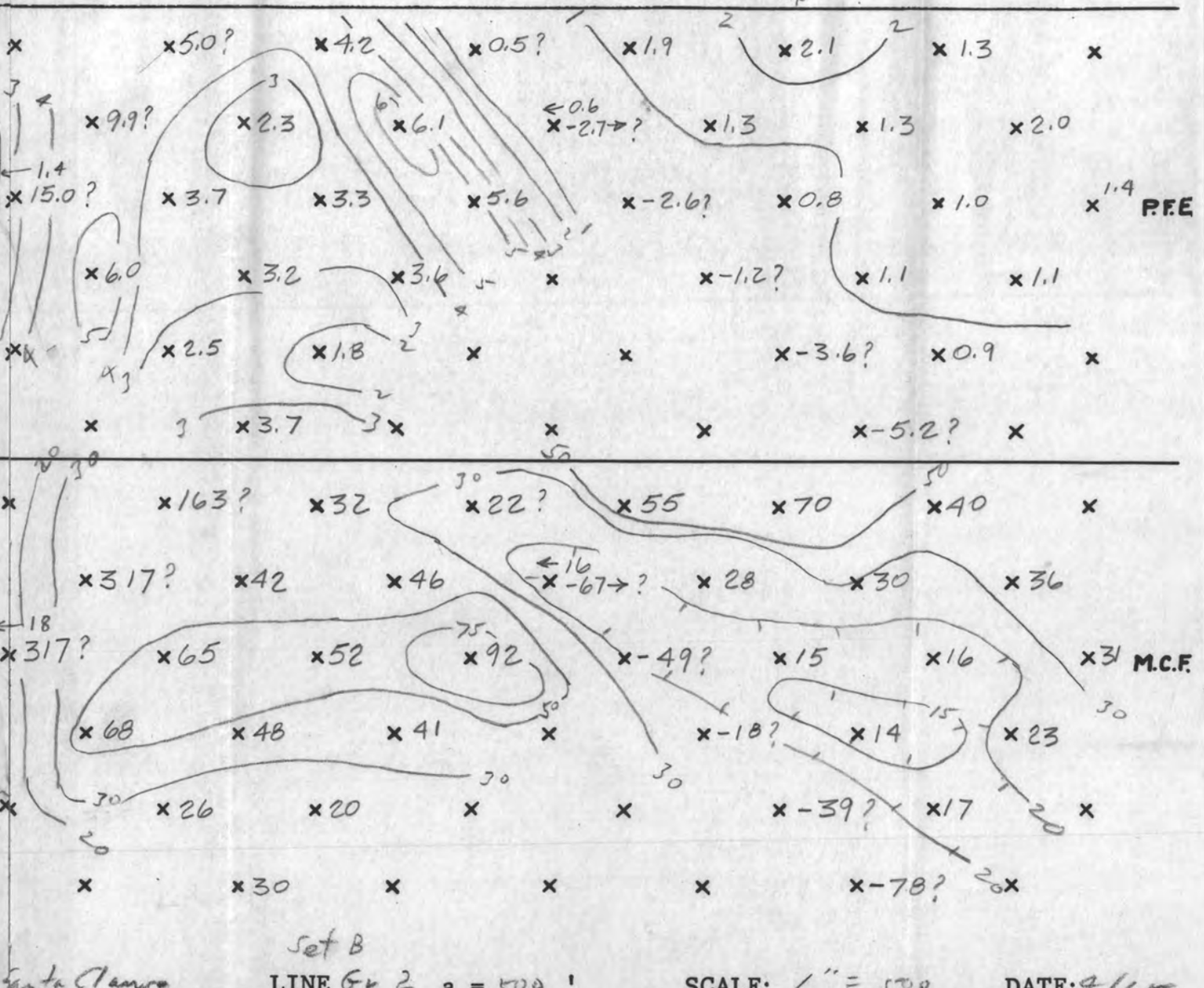
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST



HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST







AREA Santa Clause LINE "Z" a = 500 ' SCALE: 1"=500' DATE: Santa Clause

LINE Gr 2 a = 500 ' SCALE: 1" = 500 DATE: 4/64

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

Preliminary

GRAVITY LINE 1

AREA Santa Clause I.P. LINE X a = 500 ' SCALE: 1" = 500' DATE: 4/20/65

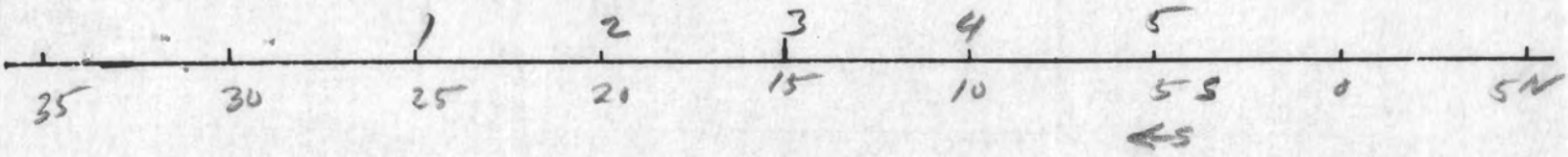
LINE a = ' SCALE: DATE:

Do Not Duplicate

Use one's looking

East

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West



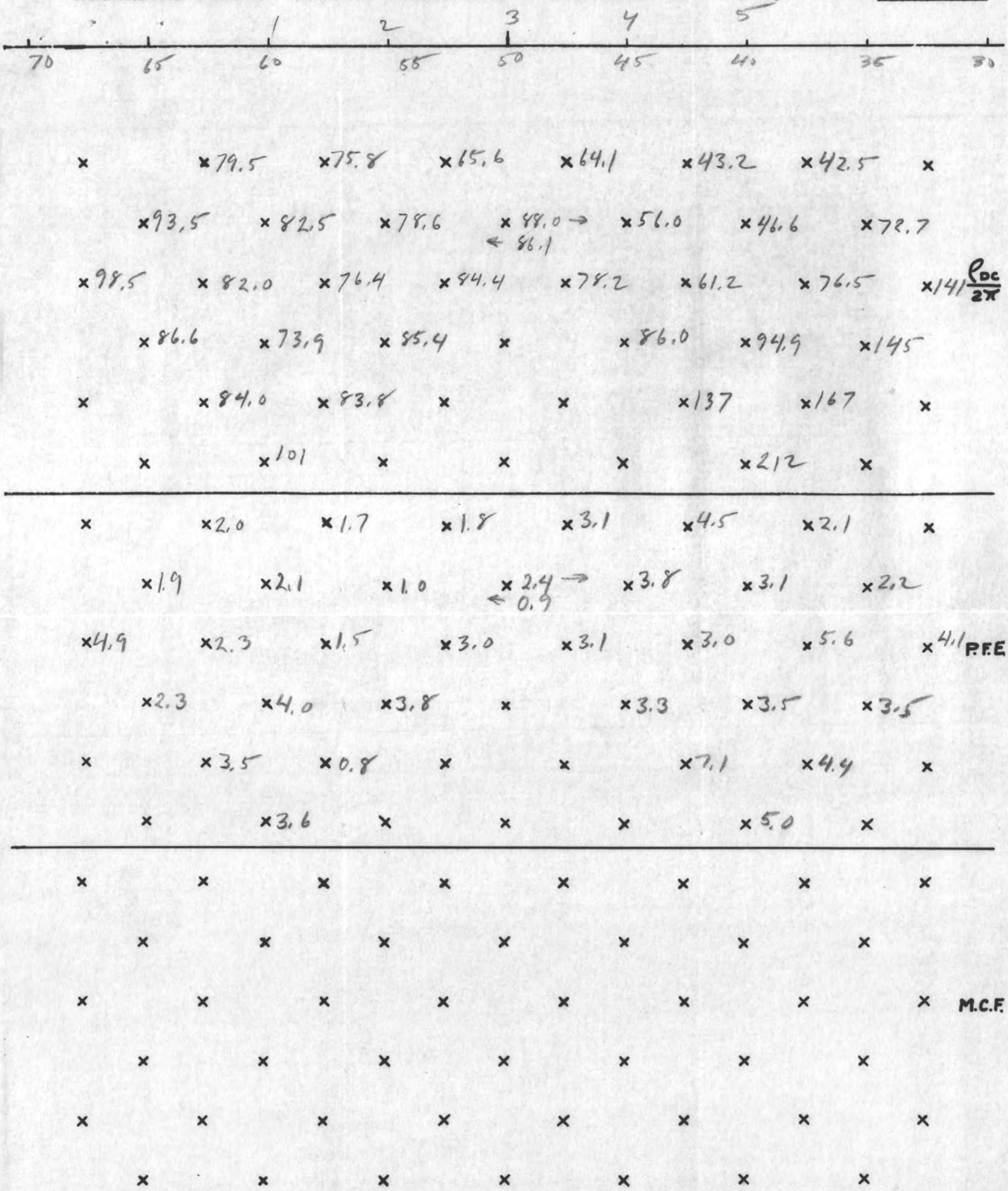
×	×59.0	×114	×115	×77.0	×75.0	×122	×
	×81.5	×114	×68.0	×93.1→ ←85.3	×143	×101	×99.9
×125	×136	×69.1	×59.9	×153	×207	×95.5	×125 $\frac{\rho_{DC}}{2\pi}$
	×184	×80.8	×61.1	×	×208	×239	×122
×	×120	×69.2	×	×	×208	×264	×
	×	×95	×	×	×	×266	×

×	×3.2	×5.1	×5.0	×6.3	×5.0	×3.7	×
	×3.2	×6.8	×6.6	×6.2→ ←5.2	×5.2	×6.9	×5.2
×	×5.0	×5.1	×6.2	×4.0	×5.1	×5.8	×6.0 P.F.E
	×7.2	×4.8	×5.5	×	×5.2	×6.1	×8.6
×	×4.8	×7.1	×	×	×6.1	×10.4	×
	×	×76	×	×	×	×61	×

×	×54	×45	×43	×82	×67	×30	×
	×39	×60	×97	×75→ ←61	×36	×68	×52
×	×37	×74	×104	×26	×25	×61	×48 M.C.F.
	×38	×59	×90	×	×25	×26	×70
×	×40	×103	×	×	×29	×39	×
	×	×80	×	×	×	×23	×

AREA Santa Clause LINE set A Grid 3 a = 600' SCALE: 1" = 500' DATE: April '65

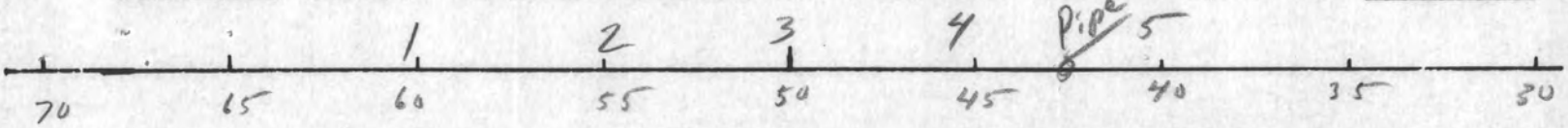
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West



Observed by R.P. Comp by K H

AREA Sante Clause LINE Grav3 set 2 a = 500' SCALE: 1" = 500' DATE: April 65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West



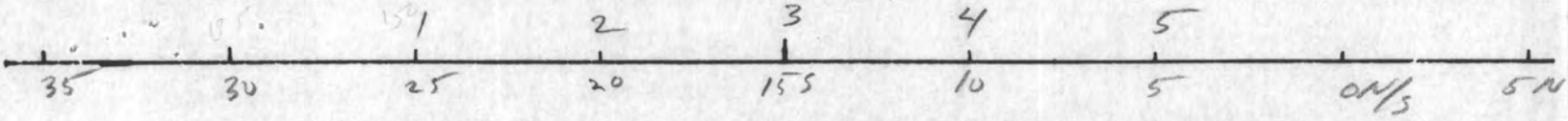
×	×32.3	×30.0	×34.4	×22.8	×131	×30.6	×
×56.0	× 43.5	×46.4	×38.5→ ←40.5	×133	×54.8	×31.2	
×45.8	×61.0	×52.6	×52.7	×60.8	×63.1	×57.2	×47.3 $\frac{\rho_{DC}}{2\pi}$
×47.2	×78.8	×68.1	×	× 85.5	×66.0	×87.7	
×	×52.3	×91.2	×	×	×90.5	×97.8	×
×	× 66.2	×	×	×	×124	×	

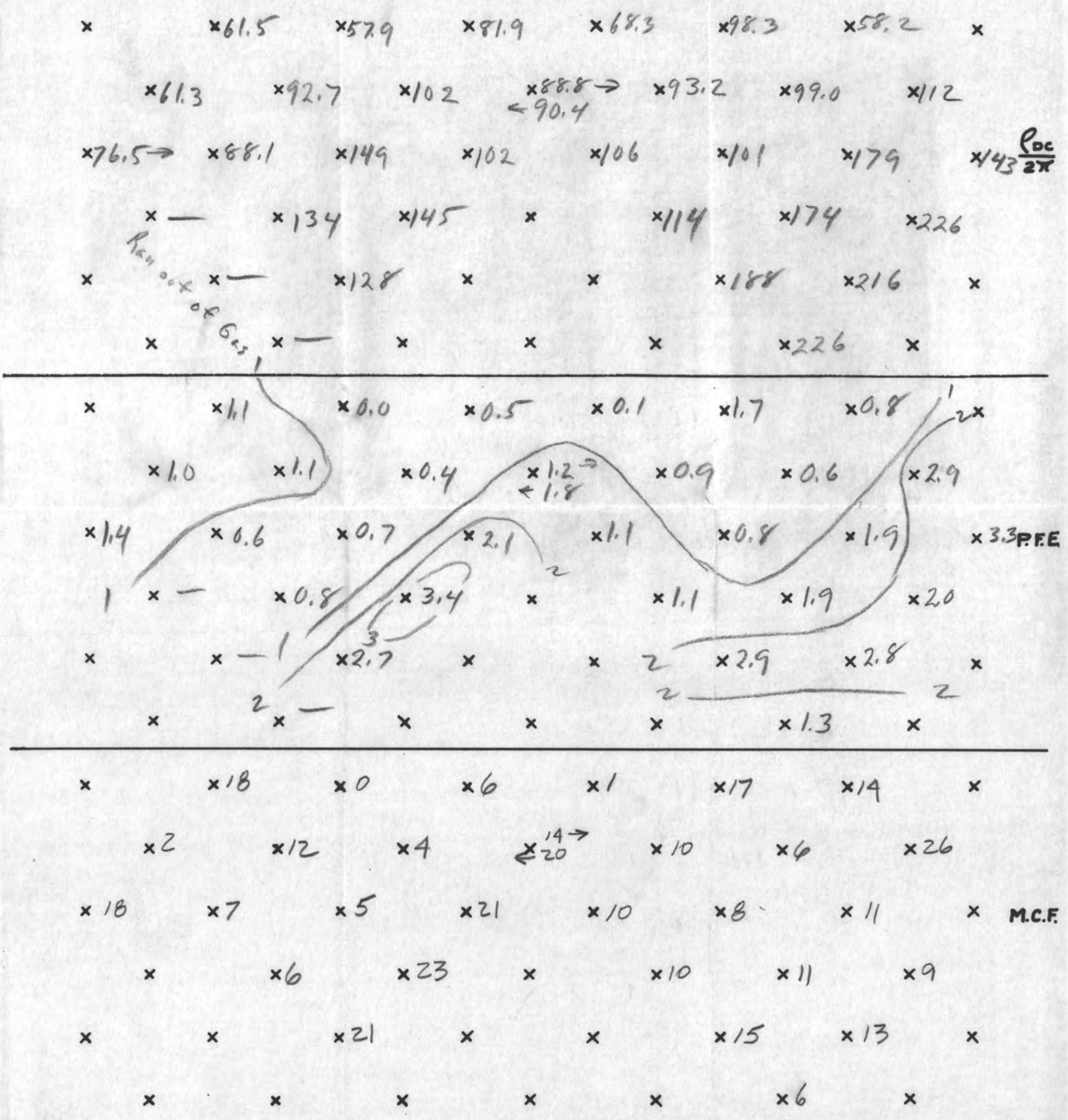
×	× 1.3	×2.1	×1.9	× 0.5	× 4.2	× 5.0	×
×2.0	× 1.3	× 1.3	× 0.6→ ←-2.7	× 6.1	× 2.3	× 9.9	
× 1.4	× 1.0	× 0.8	×-2.6	× 5.6	× 3.3	× 3.7	× 15.8 P.F.E
× 1.1	× 1.1	× -1.2	×	× 3.6	× 3.2	× 6.0	
×	× 0.9	× -3.6	×	×	× 1.8	× 2.5	×
×	× -5.2	×	×	×	× 3.7	×	

×	× 40	×70	×55	×22	×32	×163	×
×36	×30	×28	×16→ ←-67	× 46	× 42	×317	
× 31	×16	×15	×-49	× 92	× 52	× 65	×317 M.C.F.
×23	× 14	×18	×	×41	× 48	× 68	
×	×17	×39	×	×	× 20	×26	×
×	× -78	×	×	×	×30	×	

AREA Santa Clause LINE Grov 2 S+B a = 500 ' SCALE: 1" = 500 ' DATE: April 65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West





AREA Santa Claise LINE Grid 2 a = 500 ' SCALE: 1" = 500' DATE: April 65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING W

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING West

P.F.E.

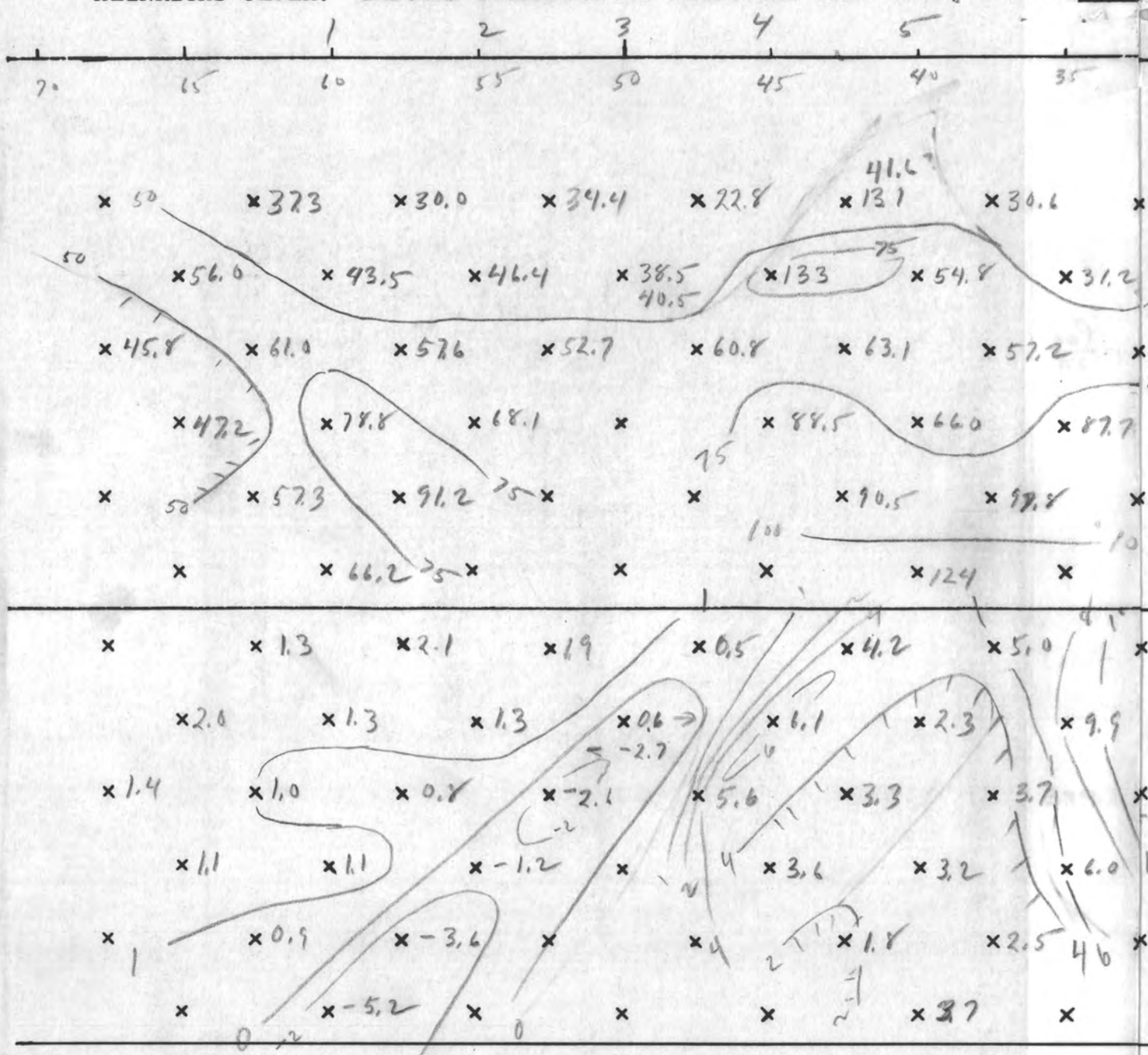
M.C.F.

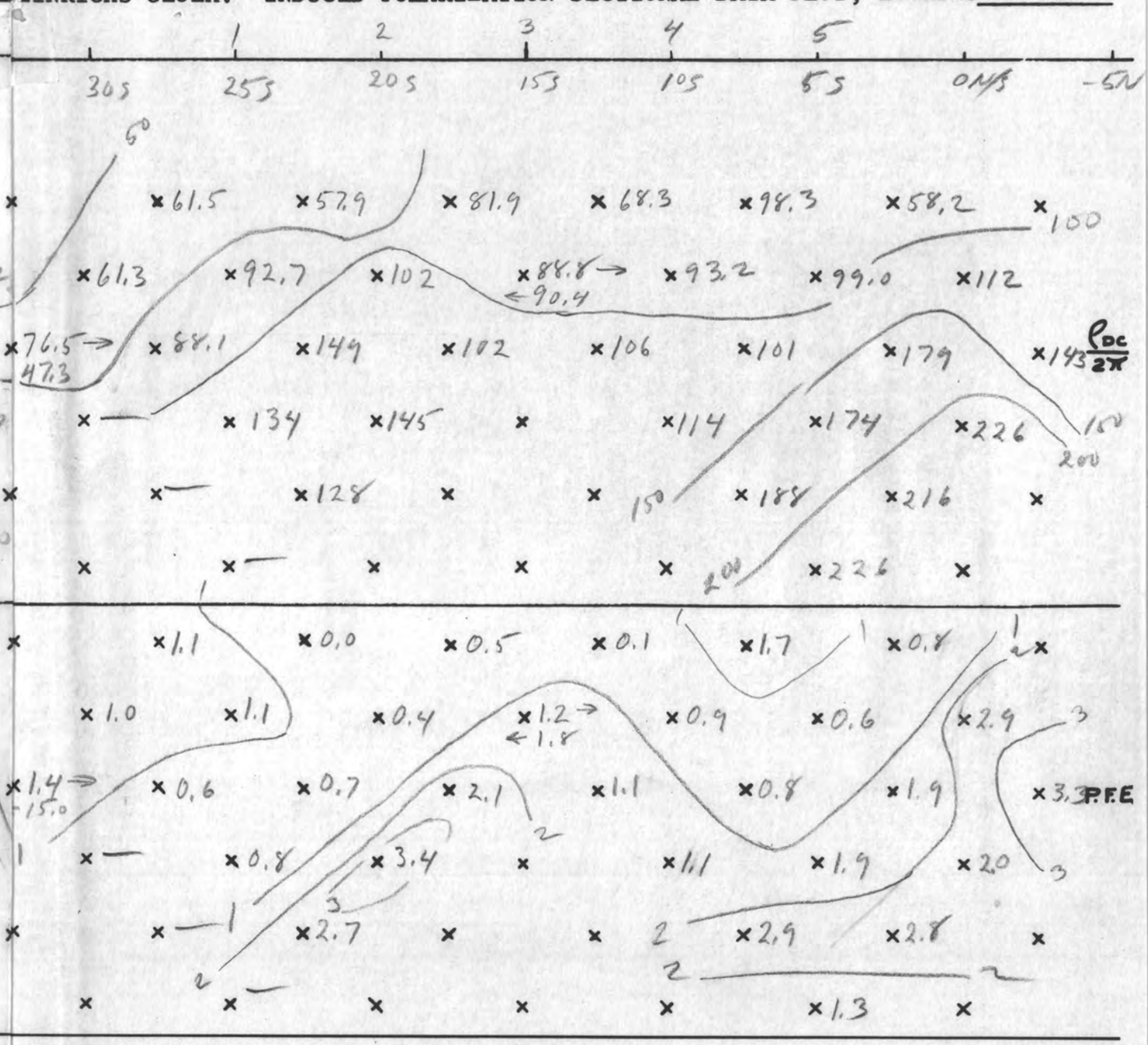
AREA Santa Clause LINE Grav3 set 2 a = 500' SCALE: 1"=500' DATE: April 65

AREA Santa Clause LINE Grav3 set A a = 500' SCALE: 1"=500' DATE: April 65

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

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





P.F.E.

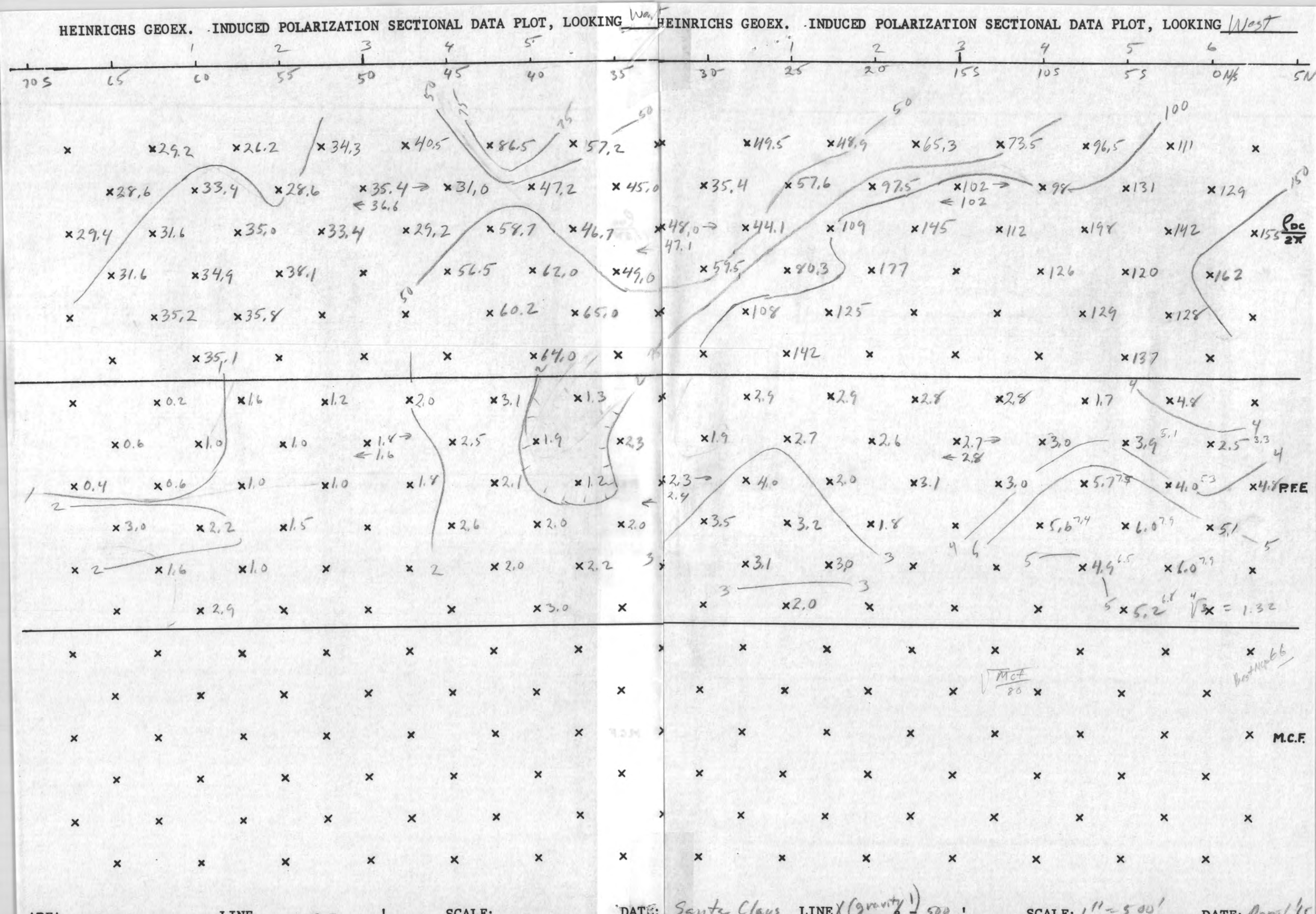
M.C.F.

AREA Santa Clause LINE Grid 2 a = 500' Set B SCALE: 1"=500' DATE: Santa Claus

LINE Grid 2 a = 500' Set A SCALE: 1"=500 DATE: April 65

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

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



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

Santa Claus LINE X (gravity!) a = 500 ' SCALE: 1" = 500' DATE: April '65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

15 30 45 60 75 90 105 120 Pump Sta.

×32.1	× 37.4	×41.3	× 41.3	× ?	×22.4	×	×	
	×18.9	× 20.5	×23.8	×17.5	× 13.0	×13.5	×	
×	×16.8	×17.6	×16.4	×11.8	×11.2	×11.0	×	$\frac{\rho_{DC}}{2\pi}$
	×	×16.7	× 17.4	×15.7	×21.4?	× 6.1	× 8.3	
×	×	×17.2	×	×35.?	×	×7.6	×	
	×	×	×	×	×	×		

×1.7	×1.4	×0.0	× 1.3	×1.9	× 1.9	×	×	
	×0.8	×2.7	×1.9	×3.5	×3,2	×1.8	×	
×	×5.7	×6.8	×6.0	×5.4	×-2.5?	×26.8?	×	P.F.E
	×	×9.1?	×8.0	×9.2	×4.6X	× —	× —	
×	×	×10.9?	×	×-15.0X	×	× -	×	
	×	×	×	×	×	×		

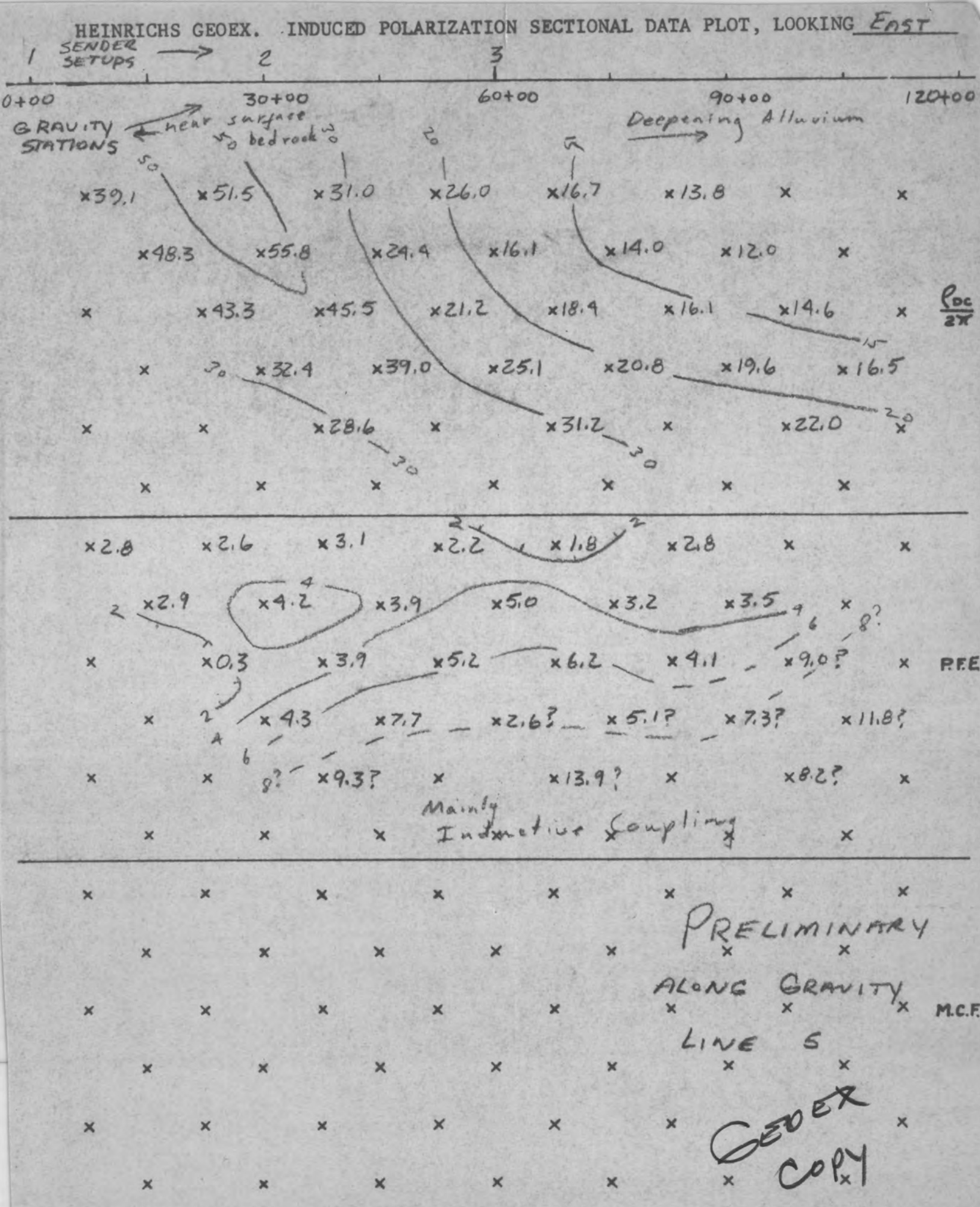
×	×	×	×	×	×	×	×	
	×	×	×	×	×	×		
×	×	×	×	×	×	×	×	M.C.F.
	×	×	×	×	×	×		
×	×	×	×	×	×	×	×	

?'s are 1 range data - X's are due to interference.

	×	×	×	×	×	×		

AREA SC LINE V a = 1500 ' SCALE: 1" = 1500' DATE: April '65

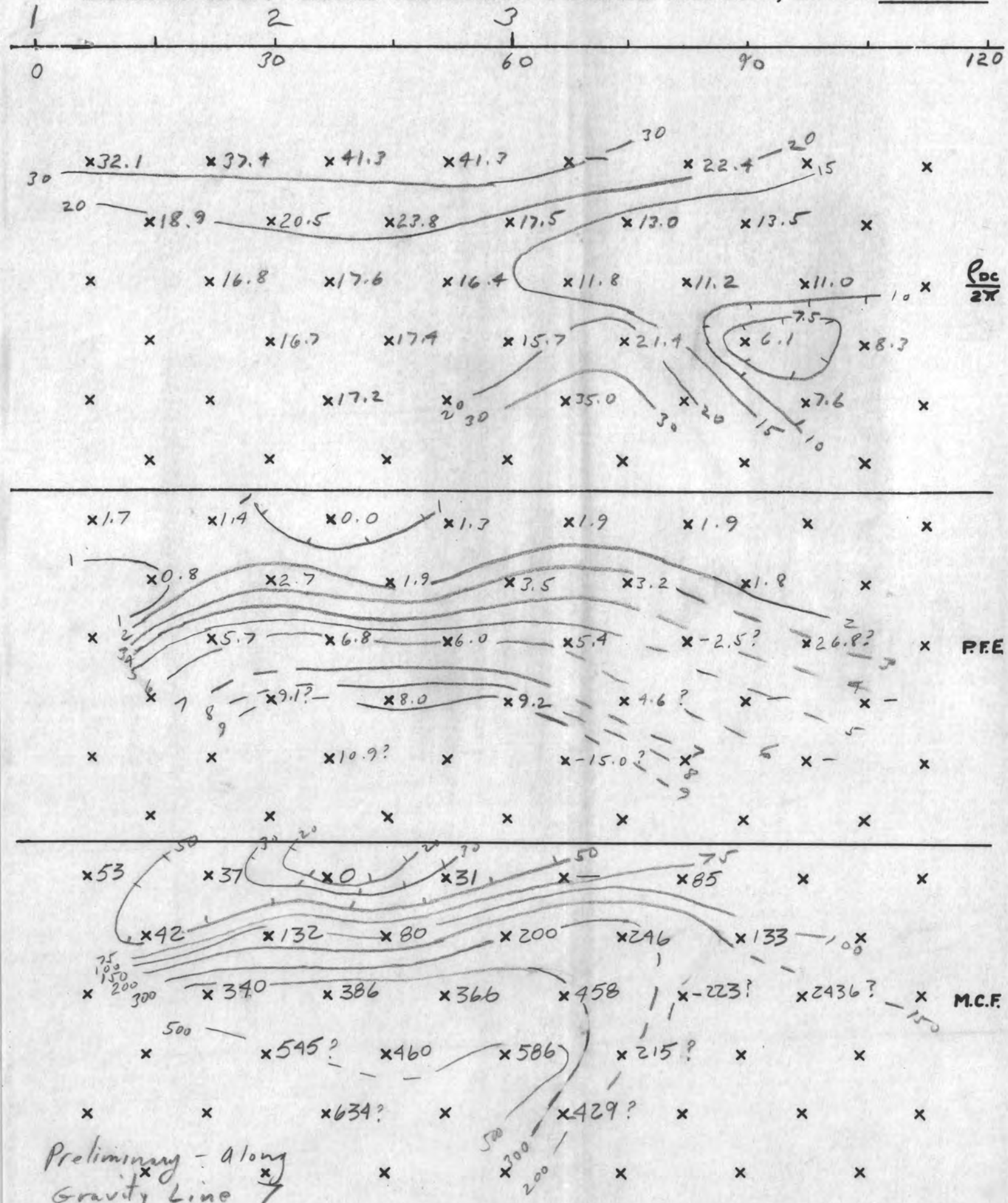
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST



AREA ARKLA-SANTA CLAUS LINE W a = 1500' SCALE: 1"=1500 DATE: 4-2-65

Complect originals
I.P. Data Santa Clause
Area 1500' dipoles.

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

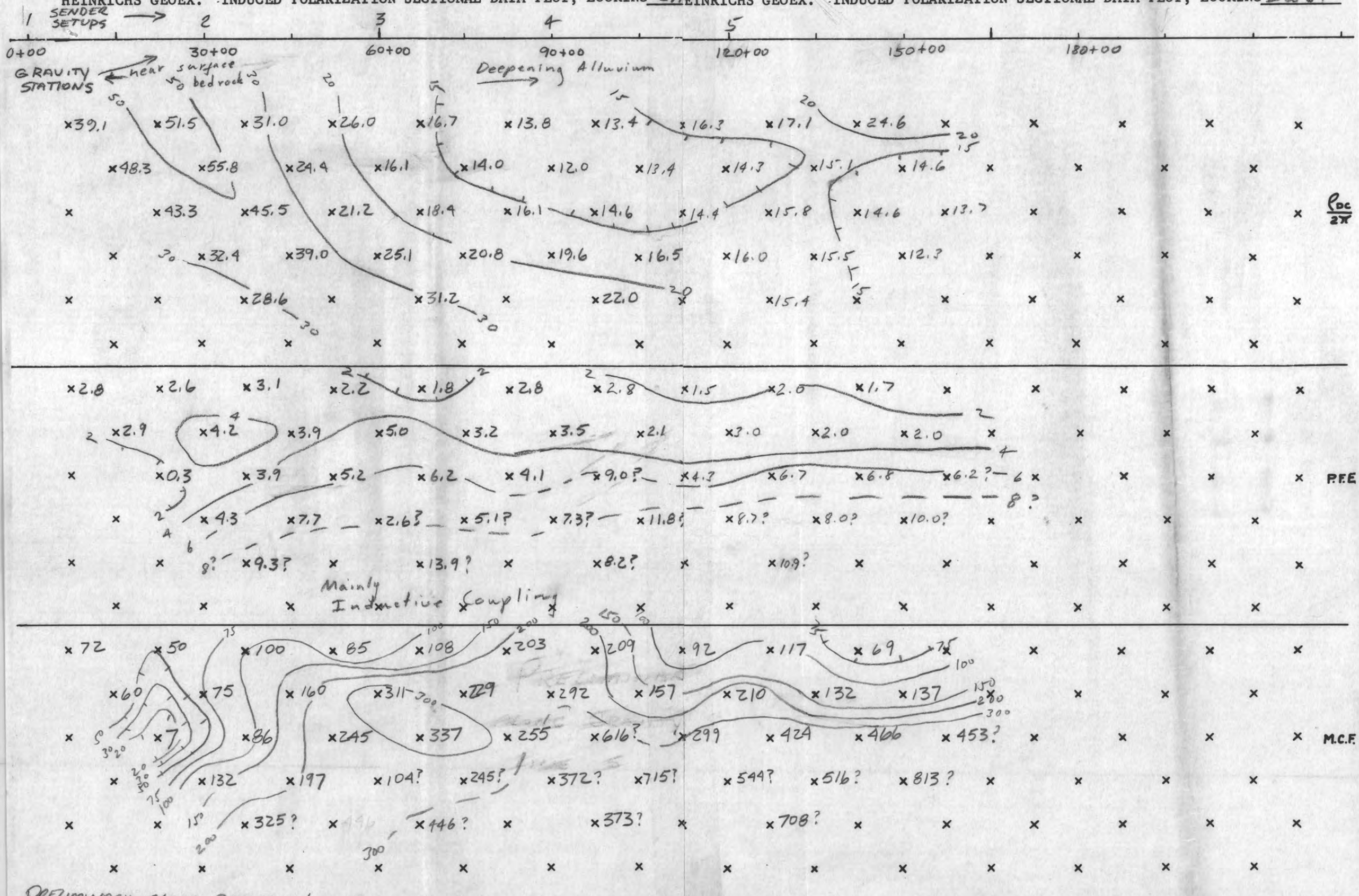


Preliminary - along Gravity Line

AREA Santa Clause LINE V a = 1500' SCALE: 1" = 1500 DATE: 4-65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



PRELIMINARY ALONG GRAVITY LINE 5

AREA ARKLA-SANTA CLAUS LINE W a = 1500' SCALE: 1"=1500 DATE: 4/9/65 LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

8-10-65
10 AMPS @ 600 VOLTS

PRELIMINARY ALONG GRAVITY LINE 1

AREA Arkla - Santa Clause LINE X a = 1500' SCALE: 1" = 1500' DATE: 4/2/65 LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

AREA Arkla - Santa Clause LINE Y a = 1500' SCALE: 1"=1500' DATE:

LINE a = ' SCALE: DATE: 4/2/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EA

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

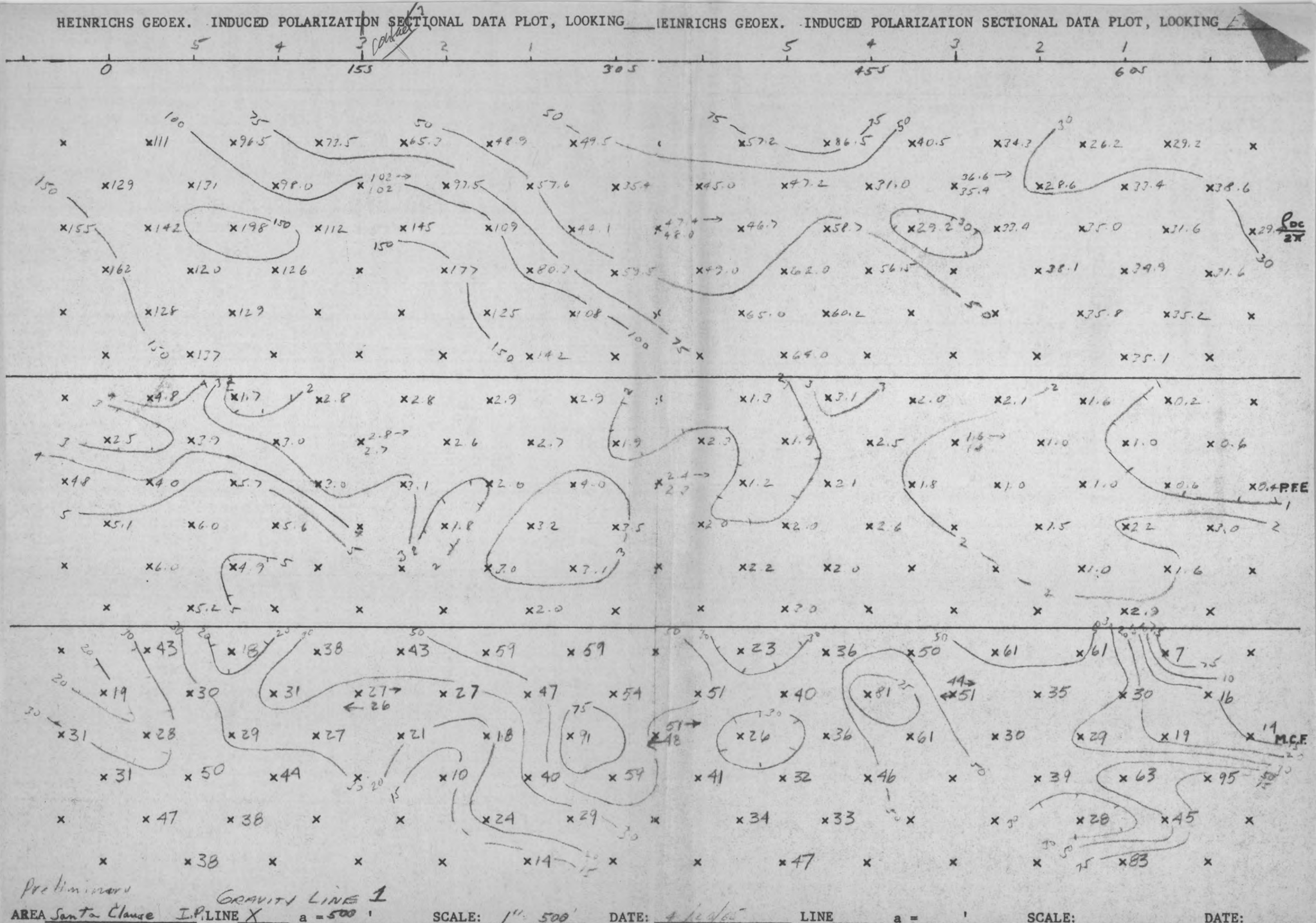
SET A

AREA SANTA CLAUS LINE QR. 3 a = 500' SCALE: 1" = 500' DATE:

LINE a = ' SCALE: DATE: 4/23/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING



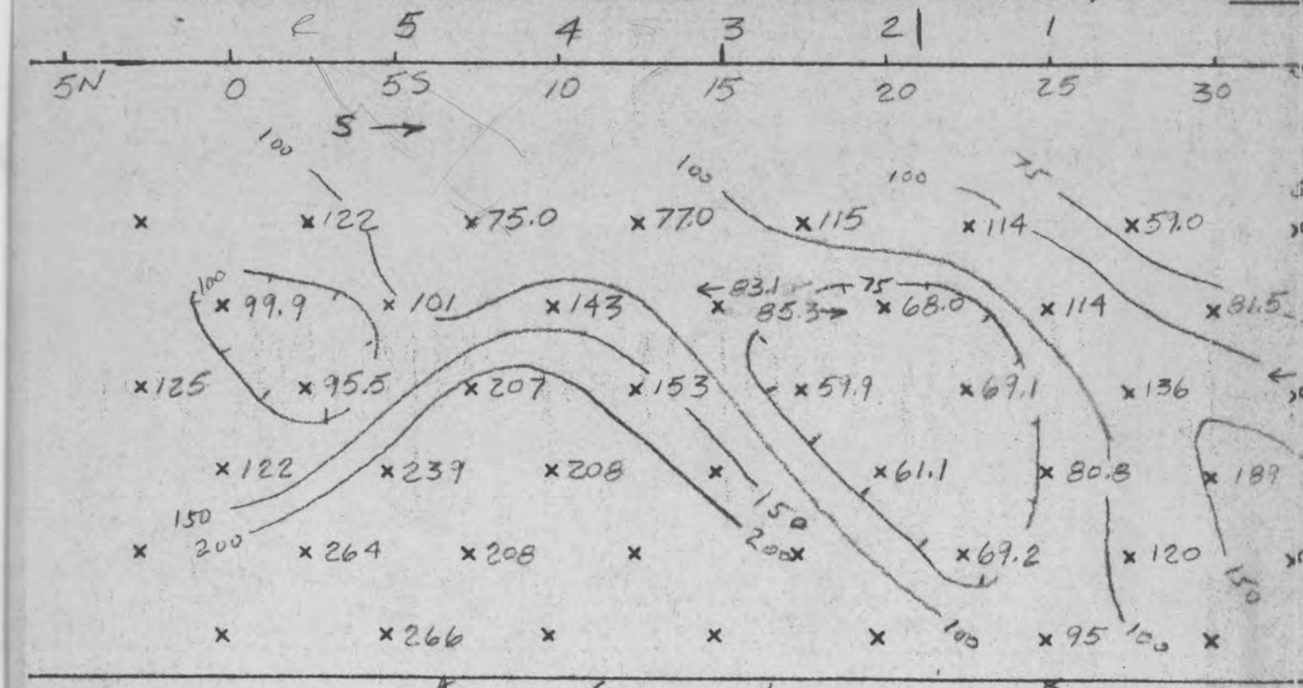
Preliminary

GRAVITY LINE 1

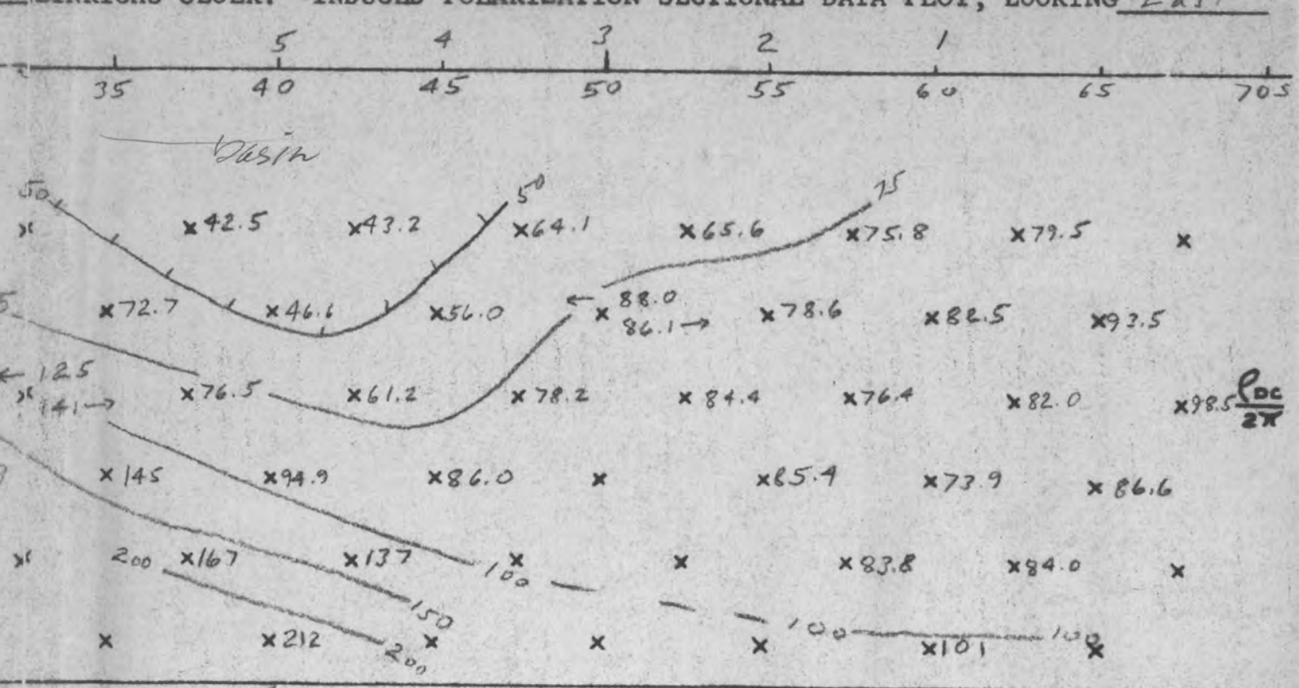
AREA Santa Clause I.P. LINE X a = 500' SCALE: 1" = 500' DATE: 4/26/65

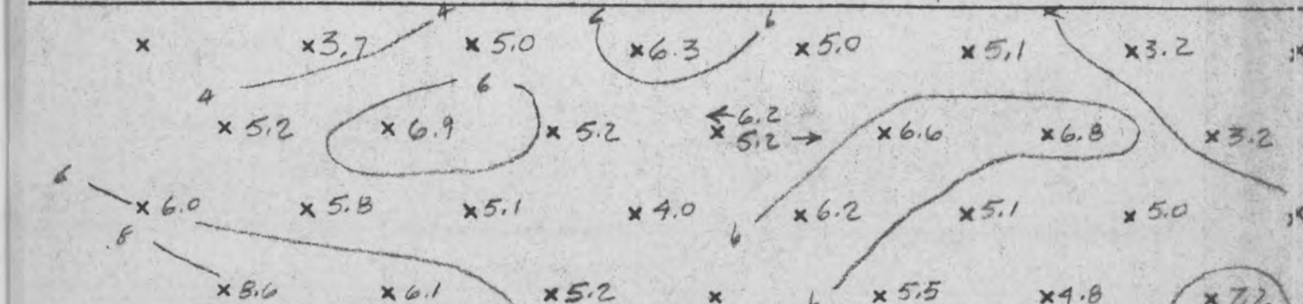
LINE a = ' SCALE: DATE:

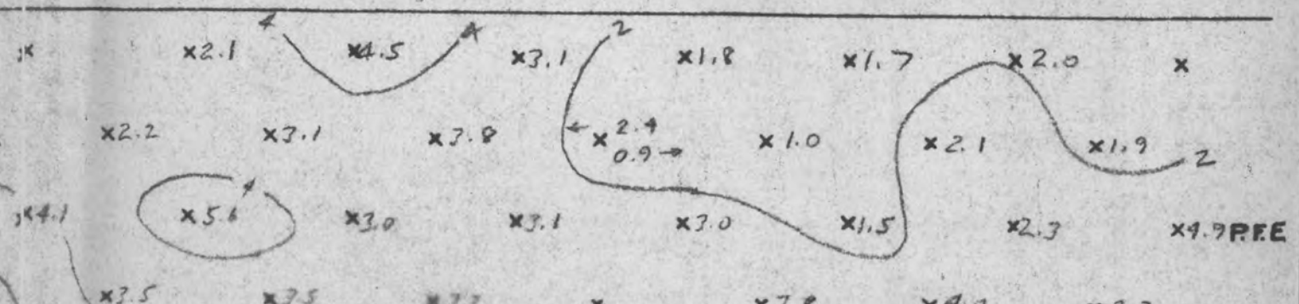
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING E

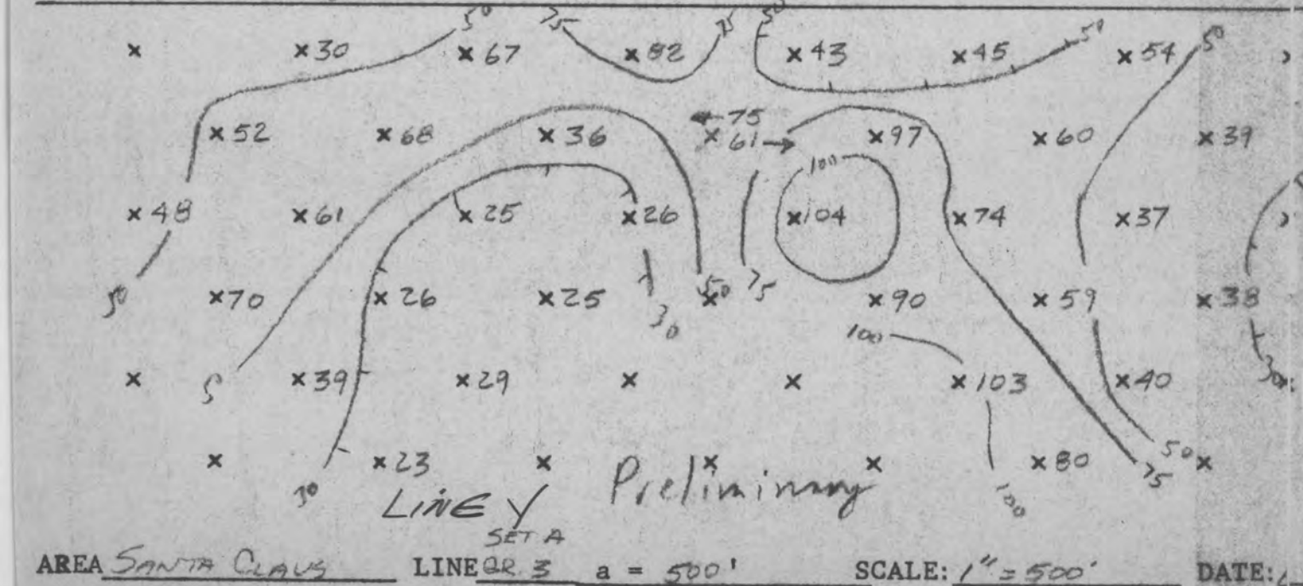


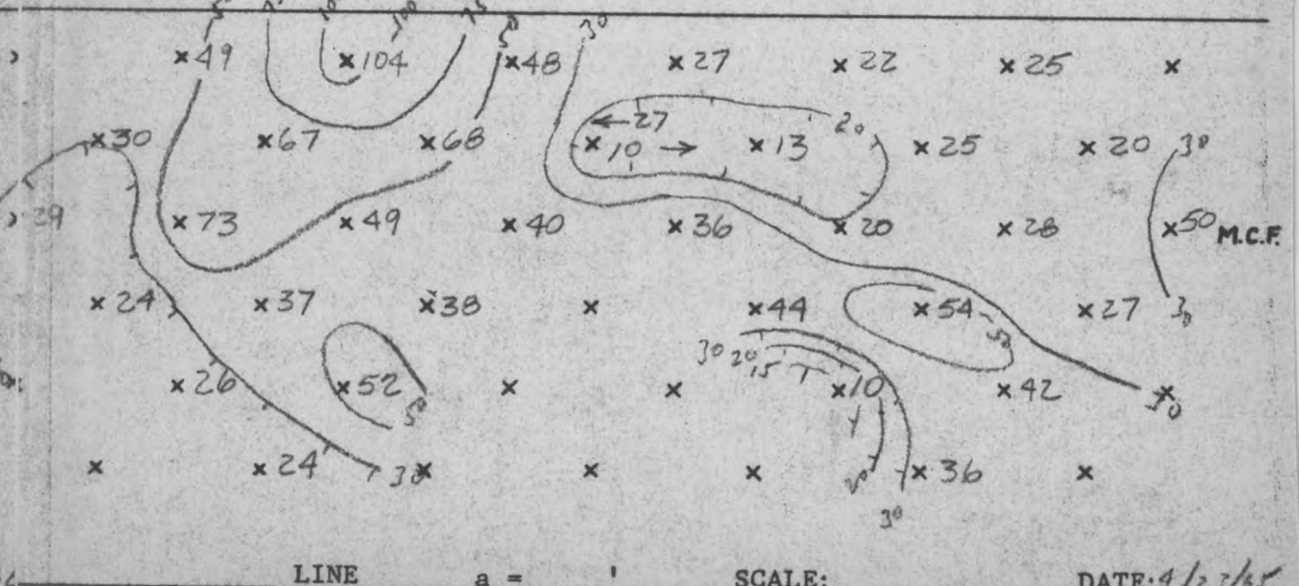
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East









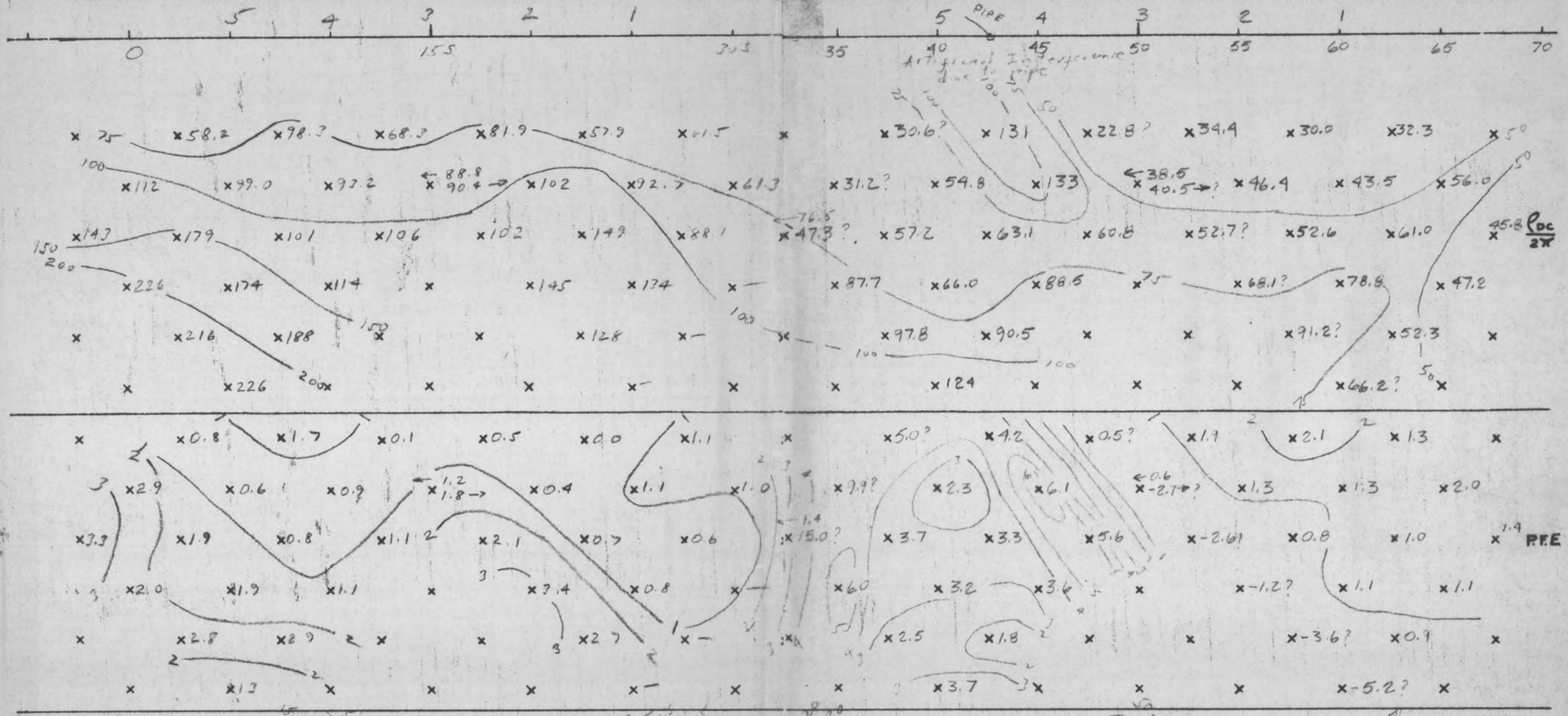


AREA Santa Claus LINE GR 3 a = 500' SCALE: 1" = 500' DATE: /

LINE a = ' SCALE: DATE: 4/23/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING E

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST

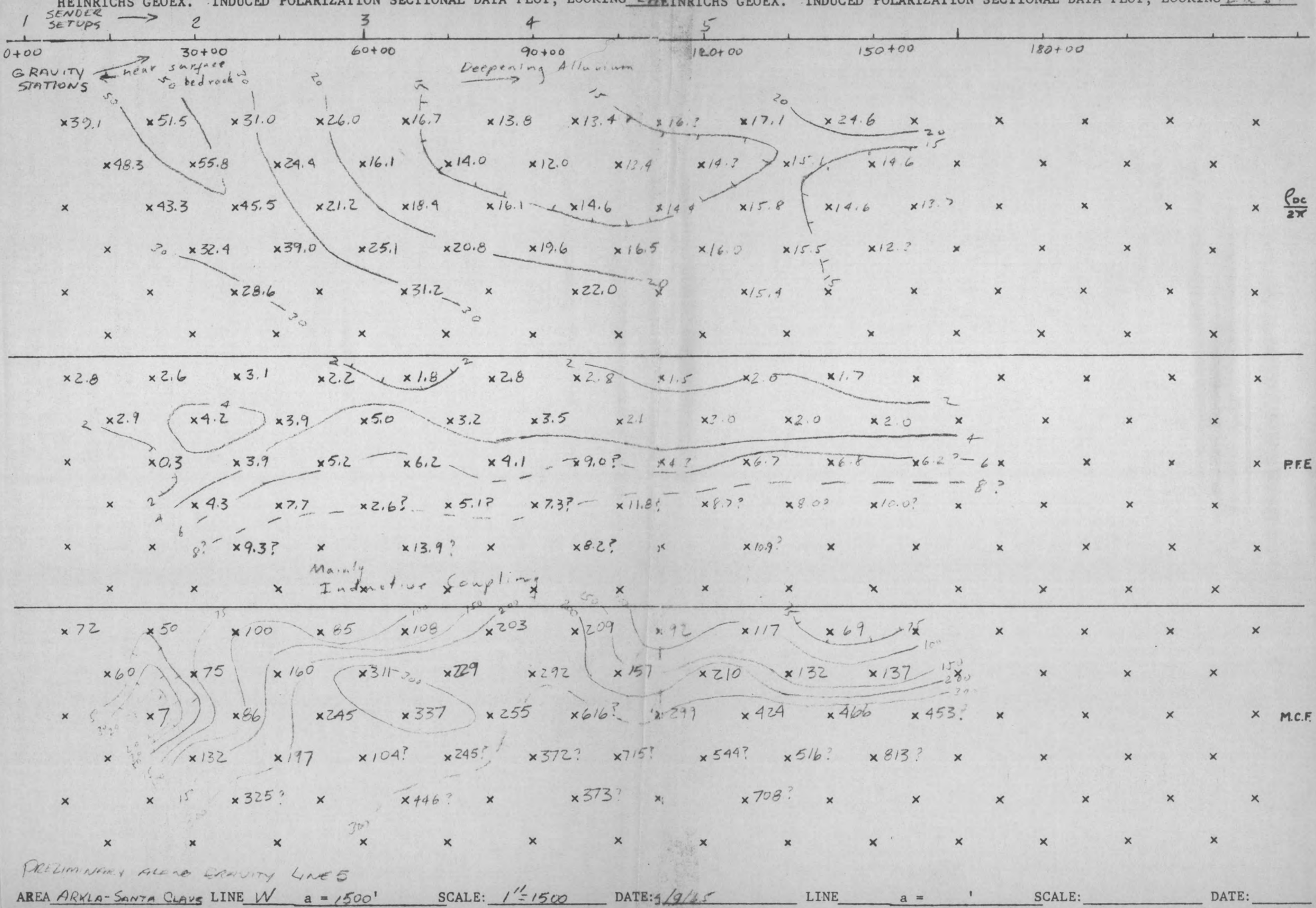


AREA Santa Clause LINE "Z" a = 500 ' SCALE: 1" = 500' DATE: Santa Clause

LINE Gr 2 a = 500 ' SCALE: 1" = 500' DATE: 9/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



PRELIMINARY ALONG GRAVITY LINE 5

AREA ARKLA-SANTA CLAUS LINE W a = 1500' SCALE: 1"=1500 DATE: 4/9/65 LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

Sender setups → 1 2 3 4

Gravity stations → 15 30 45 60 75 90 105 120 135 150

← Bedrock near surface →

I.P Line Y

Preliminary

Along Gravity Line 3

$\frac{\rho_{DC}}{2\pi}$

P.F.E

M.C.F

AREA Arkla - Santa Claus LINE Y a = 1500' SCALE: 1"=1500' DATE:

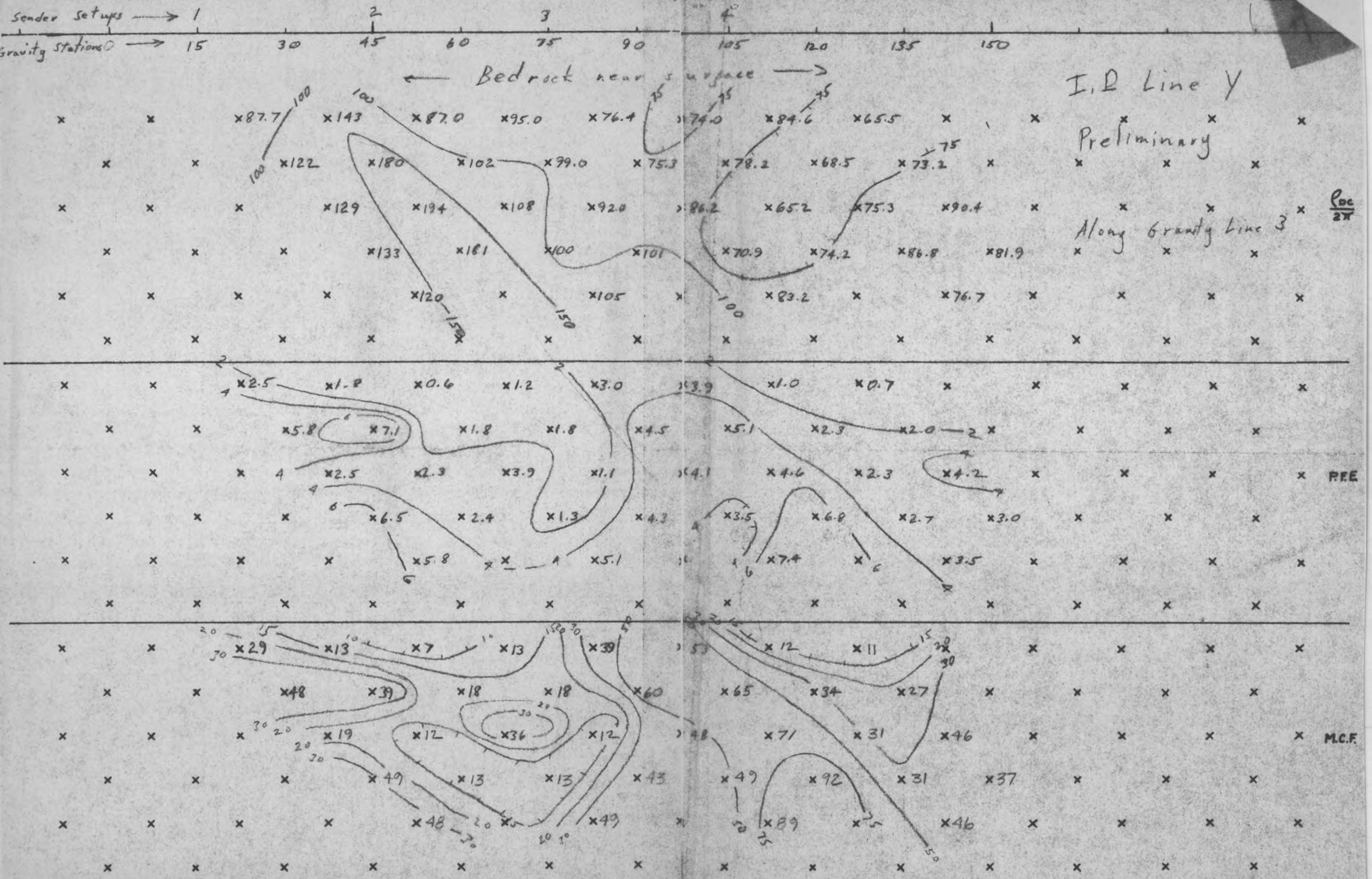
LINE a = ' SCALE: DATE: 4/2/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING ____ HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

AREA Arkla-Santa Clause LINE X a = 1500' SCALE: 1" = 1500' DATE: 9/2/65 LINE ____ a = ____' SCALE: ____ DATE: ____

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING



AREA Arkla - Santa Clause LINE Y a = 1500' SCALE: 1" = 1500' DATE: LINE a = ' SCALE: DATE: 4/2/65

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East

8-10-65
10 amps @ 600 volts

PRELIMINARY ALONG GRAVITY LINE 1

AREA Arkla - Santa Clara LINE X a = 1500' SCALE: 1" = 1500' DATE: 9/2/65 LINE a = ' SCALE: DATE:

REPORT OF GEOPHYSICAL SURVEY

PREPARED FOR AFFIDAVIT OF LABOR.

This is a report of a geophysical survey of the claims hereinafter described, done as a part of the requirements for annual labor for the period from September 1, 1964 to September 1, 1965.

These claims consist of a contiguous group situated in Sections 26, 27, T23N, R18W, G & S R B & M in Mohave County, Arizona. The claims are owned by Arkla Exploration Company and the work was performed by the undersigned at the request of and at the expense of said owners.

The claims are more particularly described on the claim notices which are recorded in the records of Mohave County, Arizona as follows:

NAME OF CLAIM	DOCKET	PAGE
Pfitzie 1	3Z	154
Pfitzie 2	3Z	158
Hagey 1	3Z	592

The work was done on these claims and was done for the benefit of the group as a whole. The geophysical work done consists of five magnetic profiles and two induced polarization profiles and three gravity profiles. The location of the work performed in relation to points of discovery and boundaries of the claims and the nature and extent thereof is shown on plats identified as: Location Index for Geophysical Surveys, Five mobile magnetic tapes portions of Lines A-16, A-17, A-18, A-19, A-20; Induced Polarization Sectional Data sheets, Lines "X" and "Z"; the eight plats are further identified as Santa Claus Project, Mohave County, Arizona, Heinrichs Geoexploration Company, March and April 1965 for Arkla Exploration Company and are attached hereto by this reference and are made a part hereof.

The cost of the geophysical work done on the group of claims during this assessment period was in excess of three hundred dollars ($300.00). The basic findings from the geophysical work are as indicated on the attached plats.

All of this geophysical work was done under the direction of Mr. Walter E. Heinrichs, Jr., President & General Manager of Heinrichs Geoexploration Company, Tucson, Arizona at the request of said owners. The persons who worked on said survey in addition to Mr. Walter E. Heinrichs are as follows: E. Grover Heinrichs, Ronald E. Palmer, Dan Anderson, Gene Jaurez, Keith Henson, John Beeler, Dave Jones, George Miguel and Chris S. Ludwig, all employees of Heinrichs Geoexploration Company.

Mr. Walter E. Heinrichs, Jr., is a registered professional mining engineer, No. 2447, State of Arizona, with many years of experience in making geophysical surveys, and all of the other persons performing said work are either graduate geophysical engineers, geologists, technicians or helpers.

Walter E. Heinrichs, Jr.

STATE OF ARIZONA)
) ss.
COUNTY OF MOHAVE)

WALTER E. HEINRICHS, JR., being first duly sworn deposes and says:

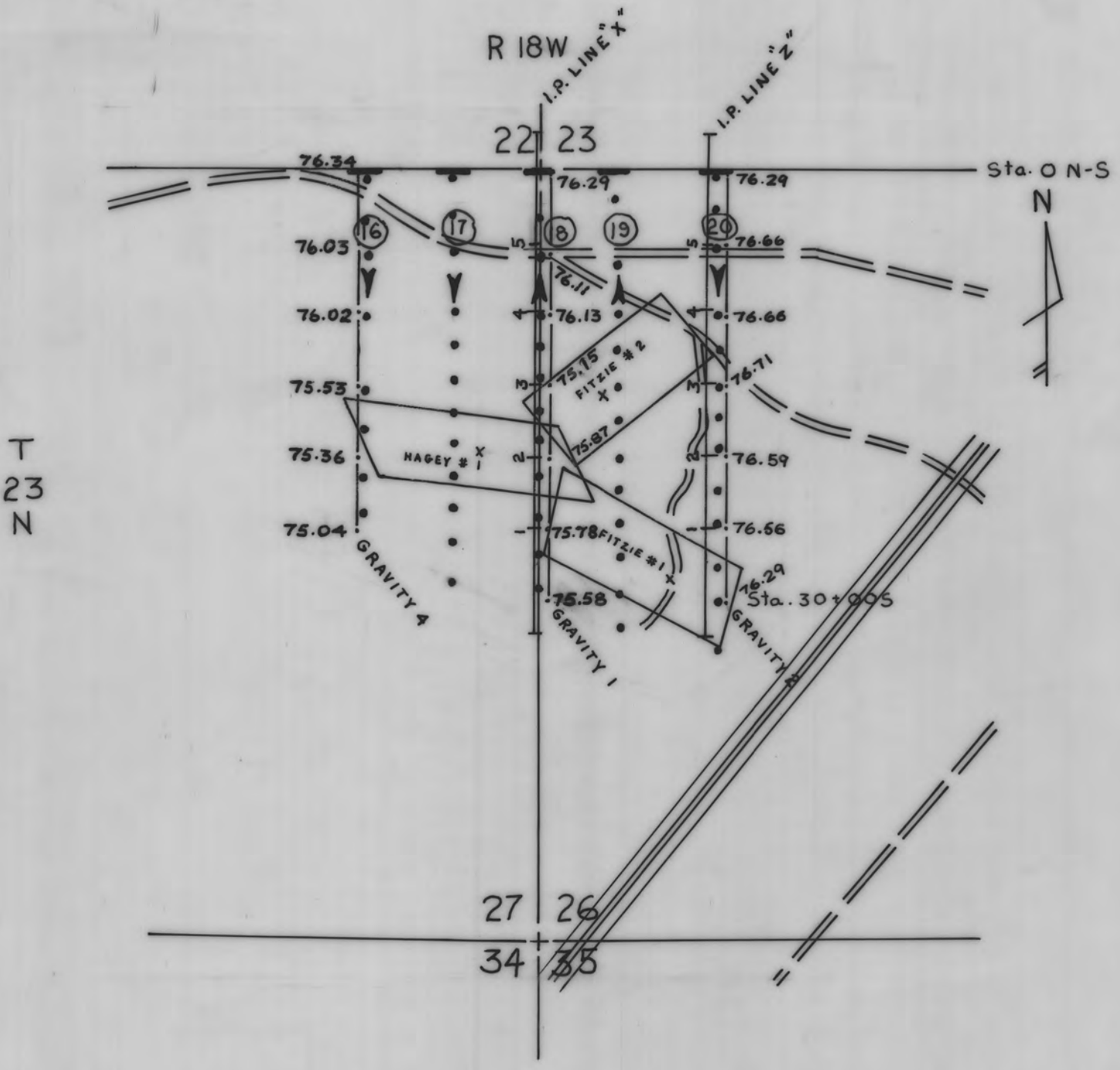
That he is the President & general Manager of Heinrichs Geoexploration Company of Tucson, Arizona; that he has read the foregoing report of Geophysical Survey, knows the contents thereof, and that the same is true.

Walter E. Heinrichs, Jr.

Subscribed and sworn to before me this 26th day of November, 1965.

Notary Public

My commission expires: July 20, 1969

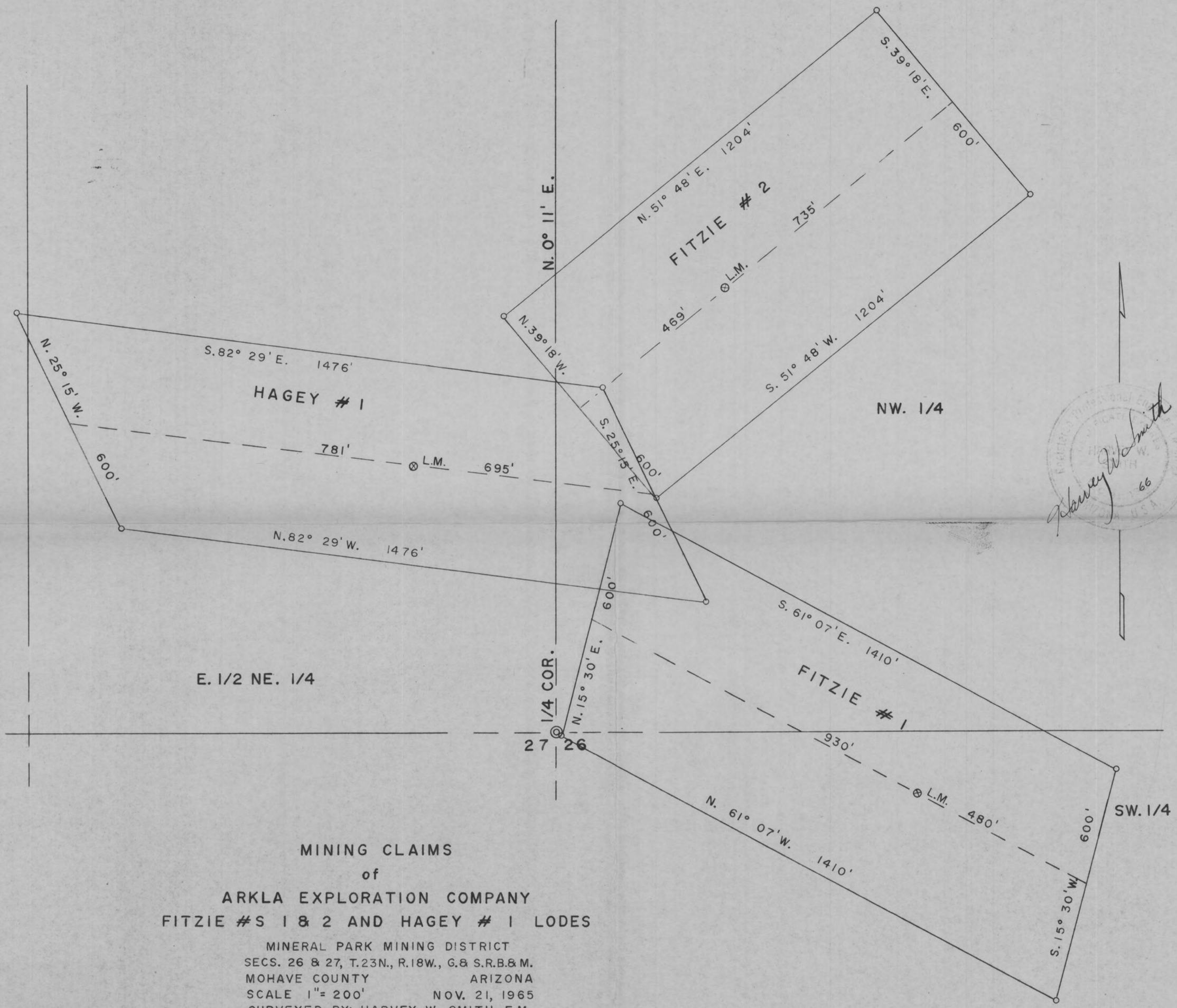


LOCATION INDEX
for
GEOPHYSICAL SURVEYS
Santa Claus Project Mohave County, Arizona
for
ARKLA EXPLORATION COMPANY
by
HEINRICHS GEOEXPLORATION COMPANY
P. O. Box 5671 Tucson, Arizona
November 1965

Scale: 1" = 1,000"

2.65 g/cc = Density
75.00 Indicates Gravity in Milligals
Indicates Induced Polarization
(17) • • Indicates Mobile Magnetics
Indicates Gravity Surveys
x Indicates Location Monument

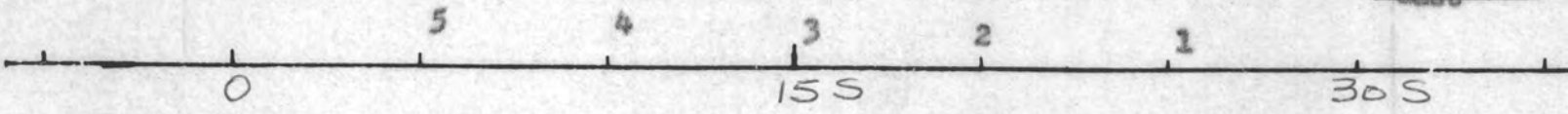
Claims surveyed by Harvey W. Smith
Registered Mining Engineer
U.S. Mineral Surveyor

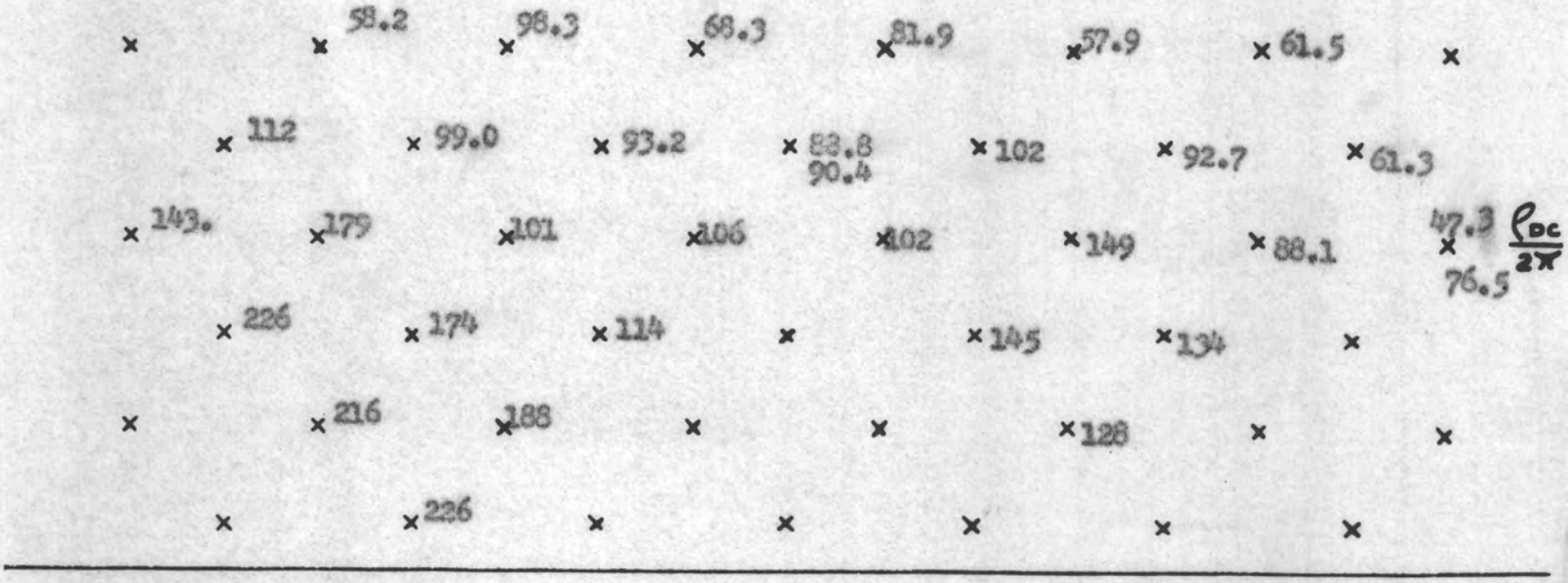


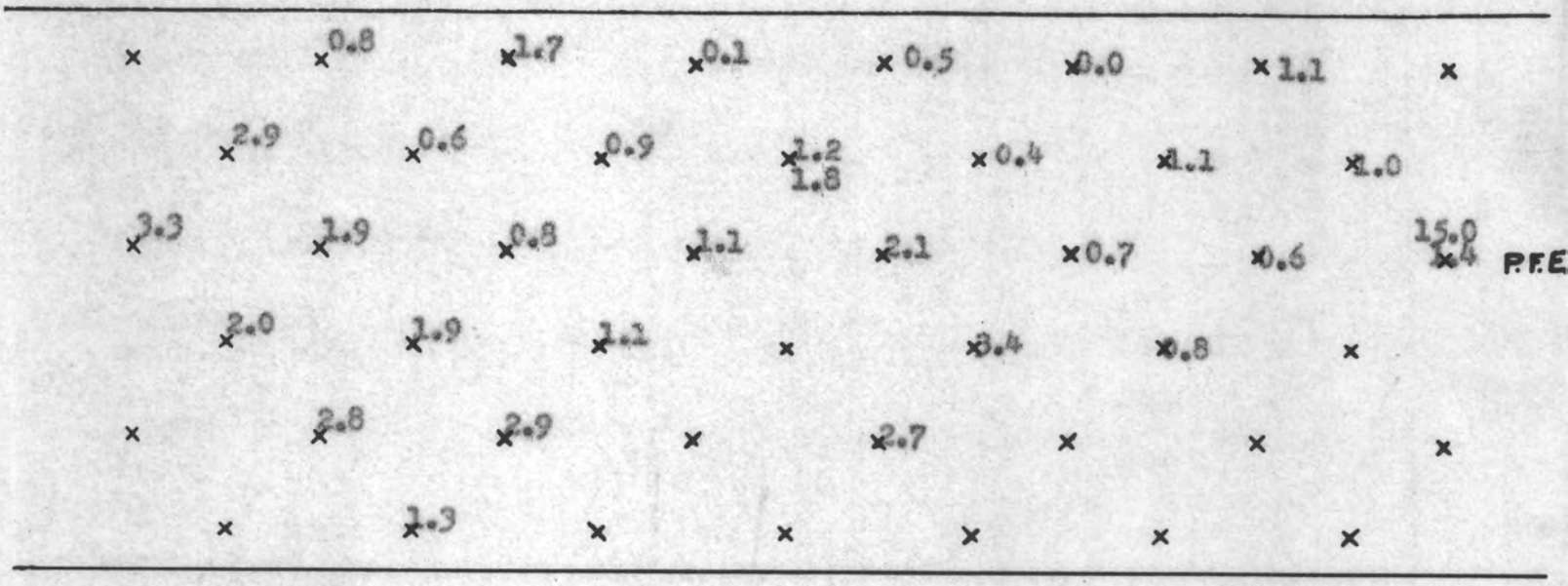
MINING CLAIMS
of
ARKLA EXPLORATION COMPANY
FITZIE #S 1 & 2 AND HAGEY # 1 LODES

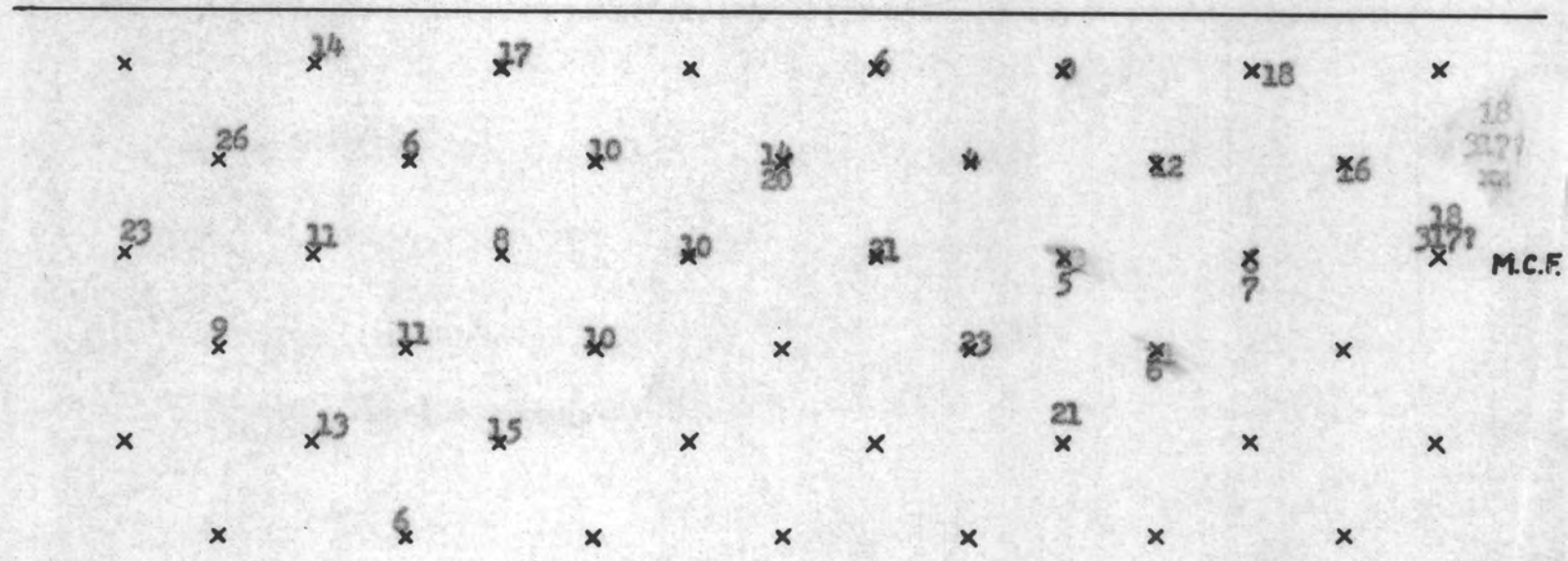
MINERAL PARK MINING DISTRICT
SECS. 26 & 27, T.23N., R.18W., G.& S.R.B.&M.
MOHAVE COUNTY ARIZONA
SCALE 1"= 200' NOV. 21, 1965
SURVEYED BY: HARVEY W. SMITH, E.M.
REGISTERED MINING ENGINEER
U.S. MINERAL SURVEYOR

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING East



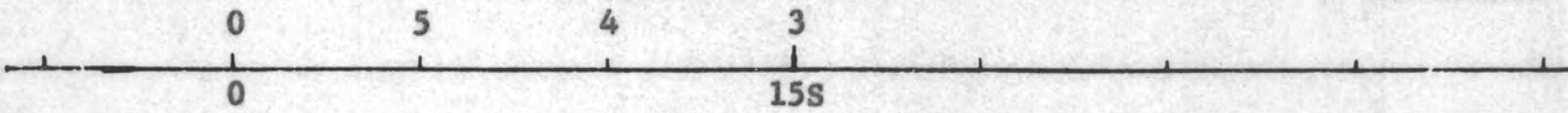






AREA Santa Claus LINE "Z" a = 500 ' SCALE: Gravity Line 2 1"=500 DATE:

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING EAST

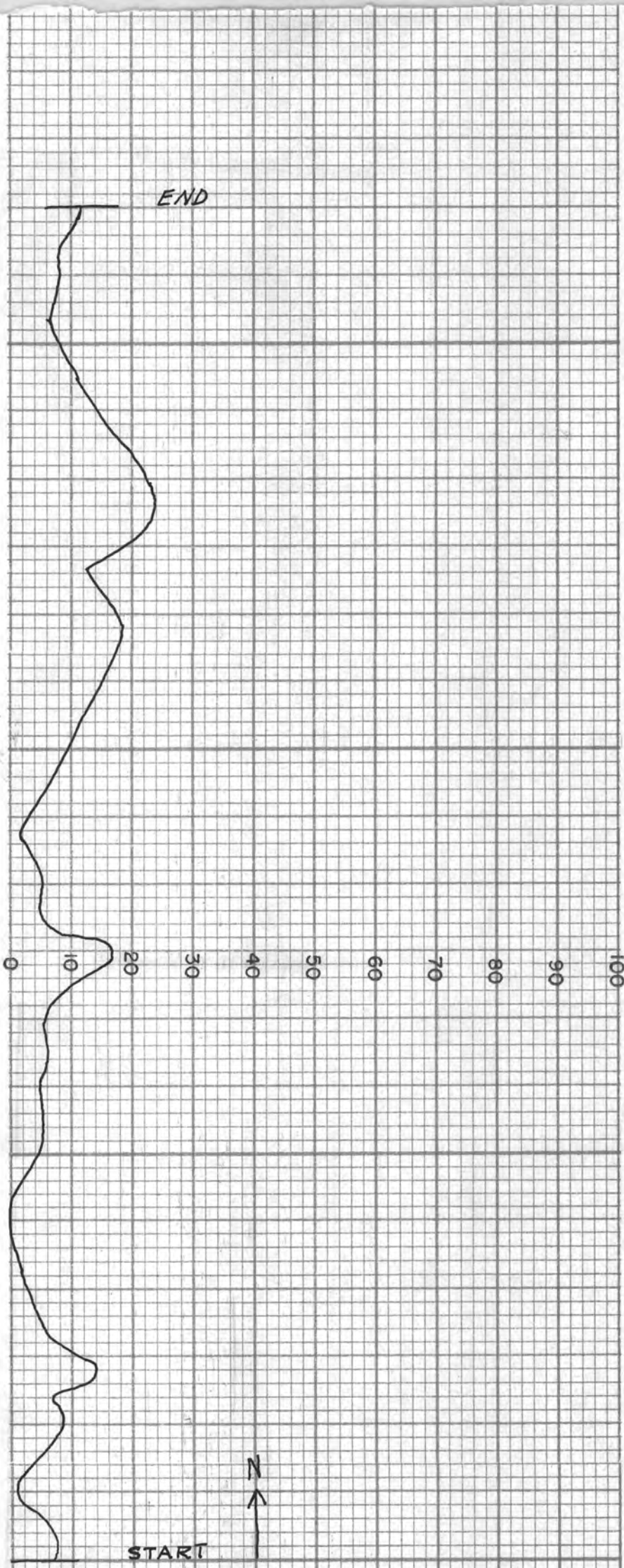


×	×111	×96.5	×73.5	×65.3	×	×	×		
×129	×131	× 98	×102	×97.5	×	×			
×155	×142	×198	×112	×145	×	×	×	$\frac{\rho_{DC}}{2\pi}$	
×162	×120	×126	×	×177	×	×			
×	×128	×129	×	×	×	×	×		
×	×137	×	×	×	×	×			

×	×4.8	×1.7	×2.8	×2.8	×	×	×		
×2.5	×3.9	×3.0	×2.8	× 2.6	×	×			
×4.8	×4.0	×5.7	×3.0	×3.1	×	×	×	P.F.E.	
×5.1	×6.0	×5.6	×	×1.8	×	×			
×	×6.0	×4.9	×	×	×	×	×		
×	×	×	×	×	×	×			

×	×43	×18	×38	× 43	×	×	×		
×19	×30	×31	×27	×27	×	×			
×31	×28	×29	×27	×21	×	×	×	M.C.F.	
×31	×50	×44	×10	×10	×	×			
×	×47	×38	×	×	×	×	×		
×	×38	×	×	×	×	×			

AREA SANTA CLAUS I. PLINE X a = 500 ' SCALE: 1"=500' DATE: 4-20-65



ERLINE ANGUS

INDIANAPOLIS, IND., U.S.A.

CHART No. 17491X

For Affidavit of Labor

HEINRICHS GEOEXPLORATION CO.

BOX 5671 TUCSON, ARIZONA 85703

Phone: (AREA 602) 623-0578

GEOPHYSICAL ENGINEERS

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: ARKLA EXPLORATION Co.

RECORD NO. A-19 DATE MAR. 1965

SENSITIVITY 200 GAMMAS /½ in.

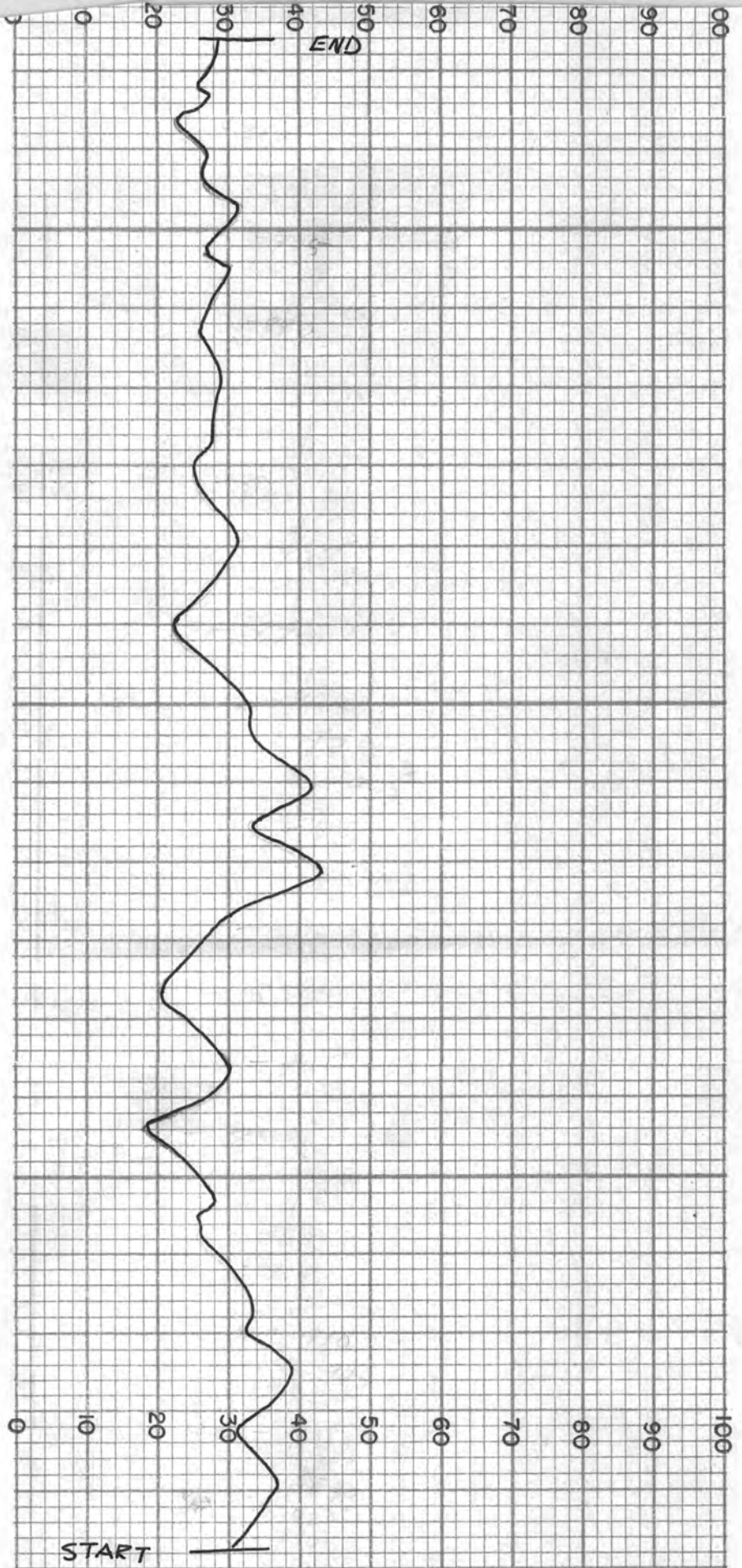
HORIZONTAL SCALE 400 FT./in.

LOCATION SANTA CLAUS AREA

Mohave Co., Arizona

0 10 20 30 40 50 60 70 80 90 100

A-19



ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART No. 17491X

S

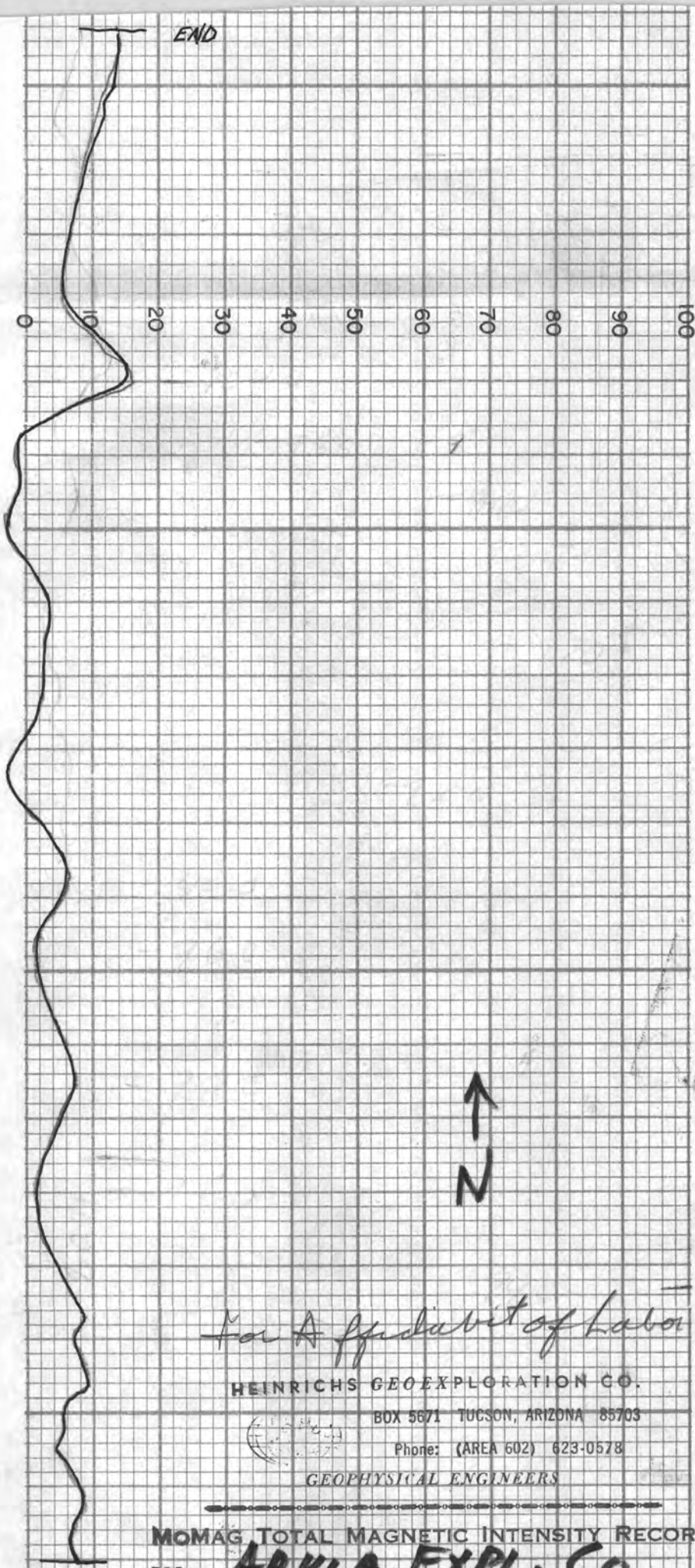
For Affidavit of Labor

HEINRICHS GEOEXPLORATION CO.
BOX 5671 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0978
GEOPHYSICAL ENGINEERS

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: ARKLA EXPL CO.
RECORD NO. A-20 DATE 3-11-65
SENSITIVITY 50 GAMMAS /½ in.
HORIZONTAL SCALE 400 FT./in.
LOCATION S-C. MOHAVE CO. ARIZONA

A-20



MADE IN U.S.A. ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. E.S.

for Affidavit of Labor

HEINRICHS *GEOEXPLORATION CO.*

BOX 5671 TUCSON, ARIZONA 85703

Phone: (AREA 602) 623-0578

GEOPHYSICAL ENGINEERS

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: ARKLA EXPL. Co.

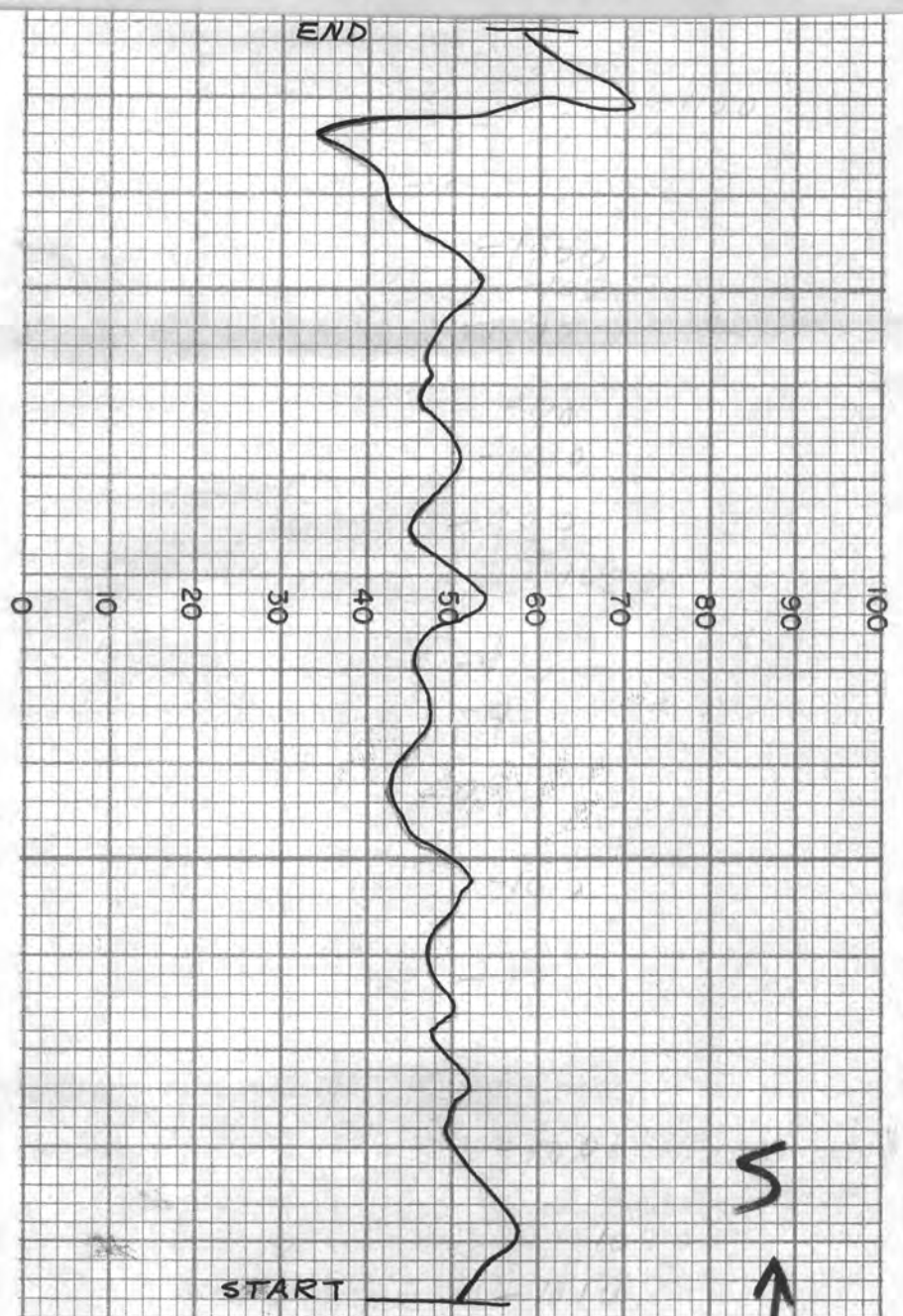
RECORD NO. A-17 DATE 3-17-65

SENSITIVITY S-0 GAMMAS /½ In.

HORIZONTAL SCALE 400 FT/In.

LOCATION S.C. MOHAVE Co. ARIZ

A-17



ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. CHART No. 17491X

HEINRICHS GEOEXPLORATION CO.
BOX 5671 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0578
GEOPHYSICAL ENGINEERS

MoMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: ARKLA EXPL. CO.
RECORD NO. 416 DATE 3-11-65
SENSITIVITY 50 GAMMAS / ½ In.
HORIZONTAL SCALE 400 FT./In.
LOCATION S.C. MOHAVE CO. ARIZ

A-16

for Affidavit of Labor

0
10
20
30
40
50
60
70
80
90
100

MADE IN U.S.A. ESTERLINE ANGUS INDIANAPOLIS, IND., U.S.A. E.S.

End Rec. A-18 AT North line Sec. 27

Road

0 10 20 30 40 50 60 70 80 90 100

N

HEINRICHS GEOEXPLORATION CO.
BOX 5671 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0578
GEOPHYSICAL ENGINEERS

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: ARKLA EXPLORATION Co.

RECORD NO. A-18 DATE MAR. 1965

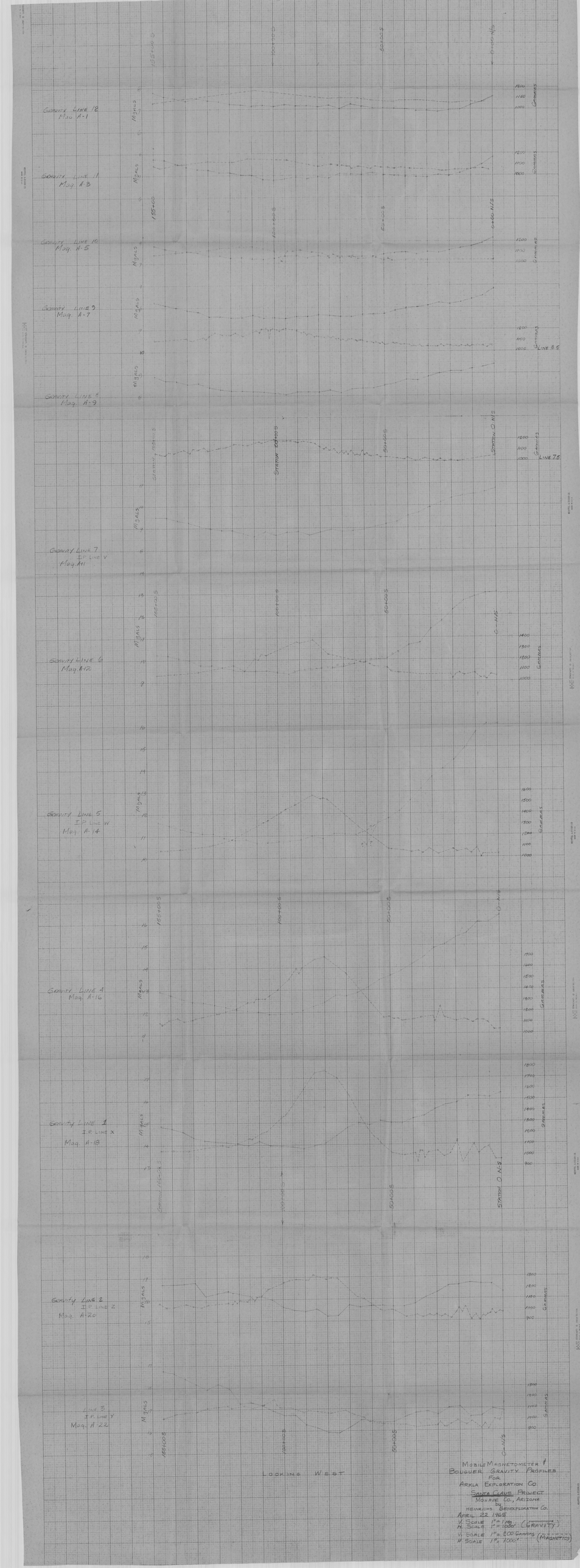
SENSITIVITY 200 GAMMAS /½ in.

HORIZONTAL SCALE 400 FT./in.

LOCATION SANTA CLAUS AREA
MOHAVE Co., ARIZONA

A-18

for affidavit of
Labor



Mobile Magnetometer &
Bouguer Gravity Profiles
For
Arkla Exploration Co.
Santa Claus Project
Mohave Co., Arizona
by
Heinrichs Geoexploration Co.
April 22 1965
V. Scale 1" = 1 Mg.
H. Scale 1" = 1050' (Gravity)
V. Scale 1" = 200 Gammas
H. Scale 1" = 1000' (Magnetics)

R 18 W

T 23 N

T 22 N

MAX

PETE

RAY

MIKE

LINE A

LINE B

LINE C

STA. 0 N-S

STA. 50+00S

STA. 100+00S

STATION 155+00S

Sta 65+50

See inset

BM 3575

BM 3569

BM 3564 GRAVITY BASE

BM 3508

BM 3452

Santa Claus

FENCE LINE

TELEPHONE LINE

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

FENCE LINE

LINE B ALTIMETER VERT. CONTROL
ELEV. ERROR 0.5 MILLIGALS.
NOT USED IN PLAN - DATA TO BE
USED IN VERTICAL SECTION ONLY

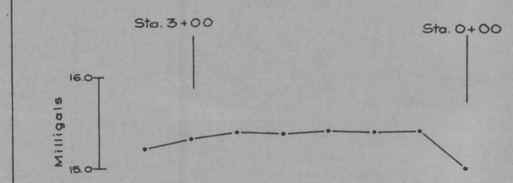
GRAVITY BASE U.S.B.M. 3564

N

EXPLANATION

- DRILL HOLE LOCATION & No. (R - RAY, P - PETE, D - DUVAL)
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No. & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION
  12345 ELECTRODE STATIONS

INSET LINE A (DETAIL) PROFILE



LOOKING NORTH-WEST
Scale: 50' = 1"

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
BOUGUER GRAVITY
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 1 mg	REVISIONS
DENSITY = 2.5 grams/c.c.	DATA BY: D.A. & R.P.	6-17-65
DATE: Feb 1965	SHEET 4 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N.

T 22 N.

I.P LINE "V"

I.P LINE "W"

I.P LINE "X"

I.P LINE "Z"

I.P LINE "Y"

MAX

PETE

RAY

MIKE

STA. 0 N-S

STA. 50+00S

STA. 100+00 S

STA. 155+00 S

LINE A

LINE B

LINE C

SPREAD 1

SPREAD 2

GRAVITY 1

GRAVITY 2

GRAVITY 3

GRAVITY 4

GRAVITY 5

GRAVITY 6

GRAVITY 7

GRAVITY 8

GRAVITY 9

GRAVITY 10

GRAVITY 11

GRAVITY 12

GRAVITY BASE

DEPTH PROBE 14

BM 3575

BM 3569

BM 3564

BM 3509

BM 3452

Santa Claus

TELEPHONE LINE

FENCE LINE

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

SENCE LINE

EXPLANATION

- DRILL HOLE LOCATION & No. R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I.P SURVEY LOCATION (1 2 3 4 5 ELECTRODE STATIONS)
- I.P. ANOMALISM

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
GRAVITY - I.P. LOCATION
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	4-22-65
DATE: Feb 1965	SHEET 5 OF 6	6-17-65
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

Sta. 0 N-S

Sta. 50+00S

Sta. 100+00S

Sta. 155+00

MAX

RAY

PETE

MIKE

GRAVITY BASE

BM 3564

BM 3575

BM 3569

BM 3503

BM 1452

Santa Claus

POWER LINE

PIPE LINE

FENCE LINE

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. — R - RAY, P - PETE, D - DUVAL
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION
  1 2 3 4 5 ELECTRODE STATIONS

GRAVITY BASE U.S.B.M. 3564

ASSUMED GRADIENT OF 1.0 Mgals/1000' WEST

LINES A, B & C NOT PLOTTED OR USED IN GRADIENT

N

REGIONAL GRADIENT CORRECTION

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
GRAVITY SURVEY
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 6 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

Sta. 0 N-S

Sta. 50+00 S

Sta. 100+00 S

Sta. 155+00

MAX

RAY

PETE

MIKE

GRAVITY BASE

BM 3564

BM 3575

BM 3569

Santa Claus

POWER LINE

PIPE LINE

HIGHWAY 93 & 466

EXPLANATION

- DRILL HOLE LOCATION & No. (R - RAY, P - PETE, D - DUVAL)
- ITHACA PEAK GRANITE
- x x x GRAVITY STATIONS
- ..... MAGNETIC TRAVERSE (HAND MAG)
- MOMAG TRAVERSE No & DIRECTION (TOTAL MAGNETIC INTENSITY)
- I P SURVEY LOCATION (1 2 3 4 5 ELECTRODE STATIONS)
- — Fault

GRAVITY BASE U.S.B.M. 3564

ASSUMED GRADIENT OF 1.0 Mgals/1000' WEST

LINES A, B & C NOT PLOTTED OR USED IN GRADIENT

Gravity LINEAMENT

REGIONAL GRADIENT CORRECTION

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

GEOLOGY - DRILL HOLE & CLAIM LOCATION
GRAVITY SURVEY
FOR
ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE 1" = 1000'	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	6-17-65
DATE: Feb 1965	SHEET 6 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 19 W

R 18 W

T 19 N

T 18 N

T 17 N

114°20'

114°10'

35°00'

34°50'

9A

VOLCANICS

9B

15A

MATTIE

STAN

SPAR

CHUCK

BADGER

Line 9

Line 10

Line 11

Line 12

No Road or Trail

ANOMALY 59A
is 53,200' from this point

D-24

U.S. HIGHWAY 66

D-20

CALIENTE

DON

MATILDA

LIL

FINGER

7A

TED

6A

CLINT

SCOOTER

BILL

N SIDE EXT

N SIDE

SIDE

AGUA DE ORO

PAY CHECK

3B

D-21

3A

WEST END

KLANER - DOOLIN - KAOLIN MINE

Line 16

R.R.

SANTA FE

To Ford

YUCCA

53 A

52 B

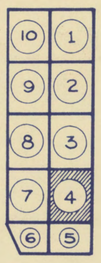
55A

52A

D-22

ADJOINING TOWNSHIPS NOT INTENDED TO MATCH EXACTLY, DUE TO VARIABLE SCALES & BASE DATA.

MAP INDEX



3B INDICATES ANOMALY

12345 / 10 I.P. SURVEY LOCATION
Electrode Stations & Center

ARKLA LEASED LAND

P PATENTED MINING CLAIM

• DH 2 DIAMOND DRILL HOLE

MOMAG TRAVERSE, No. & DIRECTION (TOTAL MAGNETIC INTENSITY)

COMPILED FROM INFORMATION SUPPLIED BY:
ARIZONA & CALIFORNIA STATE GEOLOGY
U.S. BUREAU OF LAND MANAGEMENT
DOERINGSFELD, AMUEDO & IVEY
U.S. GEOLOGICAL SURVEY
ARKLA GEOLOGISTS
GEOEX

N

MOMAG TRAVERSES

0 1 2 MILES

Field MAP

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

MINING EVALUATION PROJECT
FOR
ARKLA EXPLORATION CO.
MOHAVE COUNTY, ARIZONA

SCALE: 2" = 1 mile ±	CONTOUR INTERVAL:	REVISIONS
	DATA BY:	
DATE: Feb. 1965	SHEET 4 OF 10	
DRAWN BY:	DRAWING NO.:	FILE:

HEINRICHS GEOEXPLORATION COMPANY
808 W. Grant Road • P. O. Box 6071
Tucson, Arizona 85703
Phone: (Area 602) 623-0578

HEINRICHS GEOEX
GEOPHYSICAL ENGINEERS
TUCSON, ARIZONA

PRELIMARY

o proposed Drill Site No. 1

2/15/65

ARKLA Expl. Co.
Santa Claus Proj.

Magnetics Vertical Intensity

Scale 1"=200'

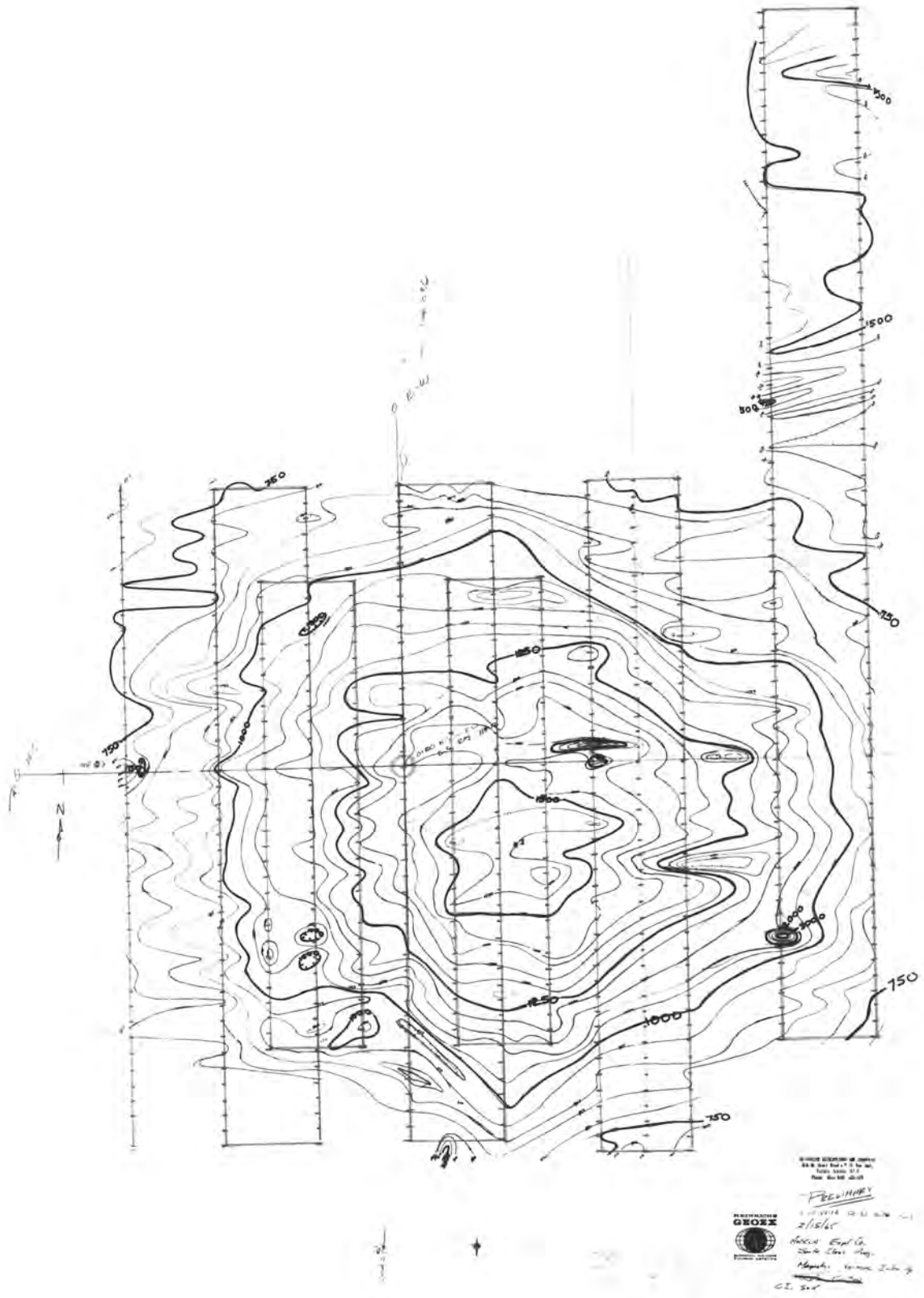
C.I. 50γ

line 6E South —4300'— North

Vertical Mag
Santa Claus
3/65

LINE

Vertical Map
Santa Ana
3/65



Scale: 1" = 1000' ±

R 18 W

T 23 N

T 22 N

SANTA CLAUS

BM 3573

BM 3691

BM 3564

BM 3505

BM 3452

BM 3663

HIGHWAY 93 & 466

EXPLANATION

x x x x GRAVITY STATIONS
..... MAGNETIC TRAVERSE (HAND MAG)
I.P SURVEY LOCATION
1 2 3 4 5 ELECTRODE STATIONS
• DRILL HOLE LOCATION & No.
R - RAY
P - PETE
D - DUVAL

N

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

MAGNETIC SURVEY
VERTICAL INTENSITY
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 100 γ	REVISIONS
	DATA BY: J.P.M. & D.A.	6-17-65
DATE: Feb. 1965	SHEET 2 OF 6	
DRAWN BY:	DRAWING NO.:	FILE:

R 18 W

T 23 N

T 22 N

SANTA CLAUS

BM 3575

3691

BM 3543

BM-3564

BM3505

X BM 3452

LINE 2

LINE 1

HIGHWAY 93 & 466

N

EXPLANATION

x x x x GRAVITY STATIONS
..... MAGNETIC TRAVERSE (HAND MAG)
+++++ I.P. SURVEY LOCATION
1 2 3 4 5 ELECTRODE STATIONS
o DRILL HOLE LOCATION & No.

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

MAGNETIC SURVEY
VERTICAL INTENSITY
FOR
ARKLA EXPLORATION CO

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 100 γ	REVISIONS
	DATA BY: J.P.M. & D.A.	
DATE: Feb. 1965	SHEET OF	
DRAWN BY:	DRAWING NO.	FILE:

2/23/65

PRELIMINARY

R 18 W

T 23 N

T 22 N

MAX

PETE

RAY

RICK

MIKE

PETE No. 3

PETE No. 2

PETE No. 1

RAY No. 4

DUVAL ?

DUVAL No. 6?

DUVAL No. 11?

RAY No. 3

RAY No. 2

RAY No. 1

RAY No. 5

BM 3575

BM 3564

BM 3503

BM 3492

Santa Claus

LINE 2

LINE 1

HIGHWAY 93 & 466

EXPLANATION

0 DRILL HOLE LOCATION & No.

ITHACA PEAK GRANITE

EXPLANATION

x x x x GRAVITY STATIONS

..... MAGNETIC TRAVERSE (HAND MAG)

I.P SURVEY LOCATION

1 2 3 4 5 ELECTRODE STATIONS

0 DRILL HOLE LOCATION & No.

N

RED - TOPOGRAPHY OF BEDROCK

Mc Carthy Map

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

COMPOSITE
GEOLOGY - MAGNETICS (Vertical) - I.P LOCATION
FOR
ARKLA EXPLORATION CO.

SANTA CLAUS AREA
MOHAVE COUNTY, ARIZONA

SCALE: 1" = 1000'	CONTOUR INTERVAL: 100 ft	REVISIONS
	DATA BY: J.P.M. & D.A.	3/5/65
DATE: Feb. 1965	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

PRELIMINARY