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

The following file is part of the Walter E. Heinrichs, Jr. Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

June 1, 1964

Mr. Jerome W. Howard
6556 East McNichols Road
Detroit, Michigan

Re: Water Investigation, E½ NE¼ Section 10, T 14 S, R 16 E, Pima County, Arizona - May 6 to June 1, 1964

Dear Mr. Howard:

In summary, the general situation for water wells on the property continue to be described as fair to poor.

Of the several possibilities considered, none seems particularly outstanding. Perhaps the better site is about 200 ft. northwest from where the Pantano (?) and Gneiss formations are in exposed contact with each other at a point 600 ft. north and 275 ft. west of the southeast corner of the property. Depth to water here is estimated about 150 ft. and depth to the Gneiss about 250 ft. to 350 ft.

The sharp "U" turn in the main wash, which drew the attention ofyou and Mr. Converse, near the SE property corner, is also probably related to the Pantano-Gneiss contact and therefore is not entirely unfavorable. However, a well here would most likely be entirely in gneissic rocks and, although the Pantano formation is generally only a fair to poor aquifer, in most cases, the gneiss may be worse. The other site is favored because of this and because if our dip estimates are correct, it may also provide several different chances for water in one hole--the Pantano alone, its base, the Pantano-gneiss contact, and the gneiss alone.

COPY

A third possibility relates to the small basin or widening of the main wash in the area just to the east, above or before leaving the west boundary of the property. This is a zone where several small tributary or side washes join the main wash and have apparently caused a small bowl-shaped scour in the Pantano formation, the mouth of which provides a site for a possible small dam and pond of about five or so acres, just inside your property.

Seismic data was obtained across the wash at the basin mouth to determine whether a deep sand-gravel filled channel might exist. If deep enough, this would provide an especially favorable water well site. Depth to water table in this area is estimated between 50 ft. and 100 ft. below the surface. However, maximum sand-gravel depth found was only 15 ft. which, except for more shallow run-off recharge, is not particularly more favorable than any other nearby site in the Pantano formation. On the other hand, this could prove favorable for a small dam. Such a dam would be about 300 ft. long and possibly as much as 50 ft. high, but actual design, height, cost, real feasibility, etc. would require special study, and it is only mentioned as an eventual alternate, complement or supplemental possibility which could be most worthwhile. You will note a smaller dam to the west of the property on the aerial photo.

The well site picked in this area is about 1,050 ft. south of Speedway and 400 ft. east of the west property boundary on the north side of the basin; however, except for cloud burst protection and accessibility in the main wash and eventuality of a dam and pond, one site in this basin area seems about as good as another, whether or not a dam is ever built.

Any well drilled should plan to go about 500 ft. deep if possible. At this depth, all of the three above sites have a fair chance of producing around one gallon per minute, or maybe a little more. None of the sites are likely to produce over ten gallons per minute unless extremely fortunate.

Geologically, with exception of extreme southeast corner the property appears completely covered by Pantano (?) type arkose, clay, shale and silt formation to an unknown,

but estimated depth up to 500 feet or more. The southeast corner of the property, SE of a line striking about N 35° E on the average, is underlain by the main granite gneiss mass of the Tanque Verde Mountains. Some old Pre-Cambrian granite is reported to the southwest and could be involved at some unknown depth under the property and most likely this rock and/or the gneiss underlie the Pantano (?) in the area, although schists, quartzite and limestone are also possible.

The 70° NW dip of the Pantano (?)-gneiss contact is our best average estimate from magnetic and resistivity results across it, but actually it may vary from 45° to 90° or even dip to the SE in places. Structurally, it is considered to be a fault with the NW block down and SE block up relatively.

Accompanying this report, in addition to our statement are:

1. Sketch map of area showing proposed well sites, relative magnetic contours and location of seismic and resistivity profiles. 1" = 800' scale.

w/original only (2. Two 1" = 800' scale stereo pair aerial photos of area.)

3. Seismic velocity curve and sectional plot.

4. Three resistivity sectional data work sheets.

w/original only (5. Six magnetic data, raw working tapes (blue line).)

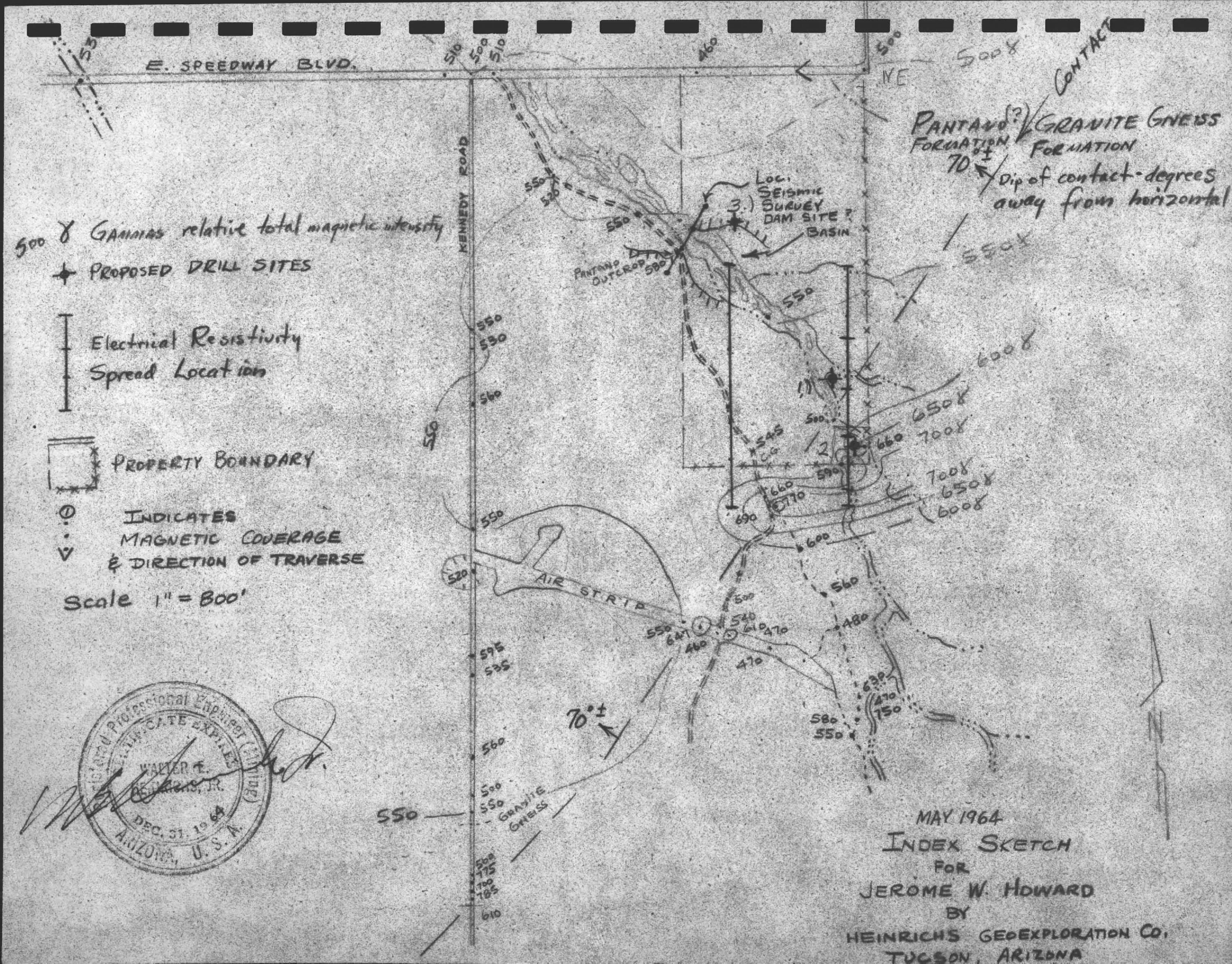
Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

W E Heinrichs Jr.

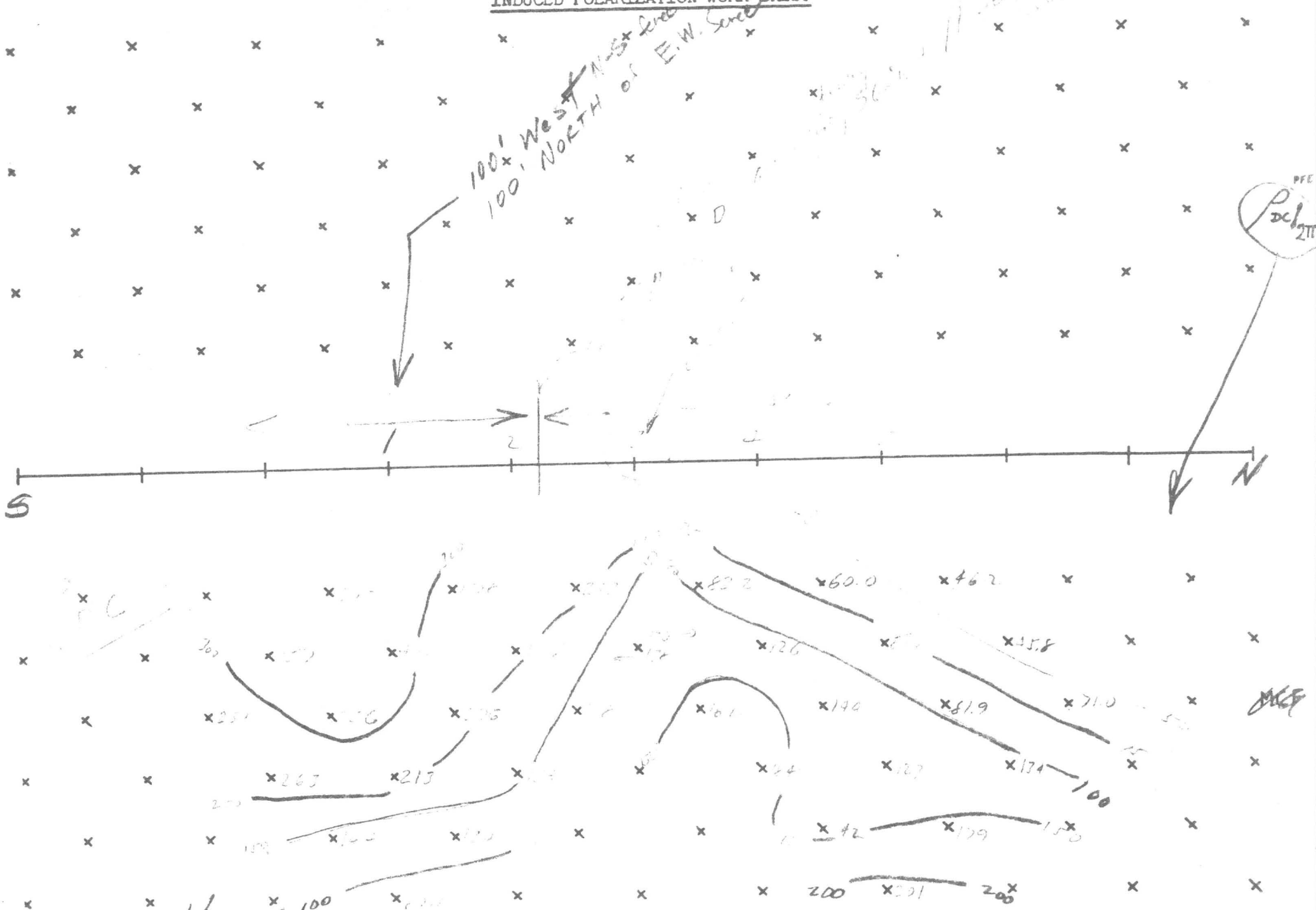
Walter E. Heinrichs, Jr.
President & General Manager

WEH:jh
Enclosures: 13 (5)



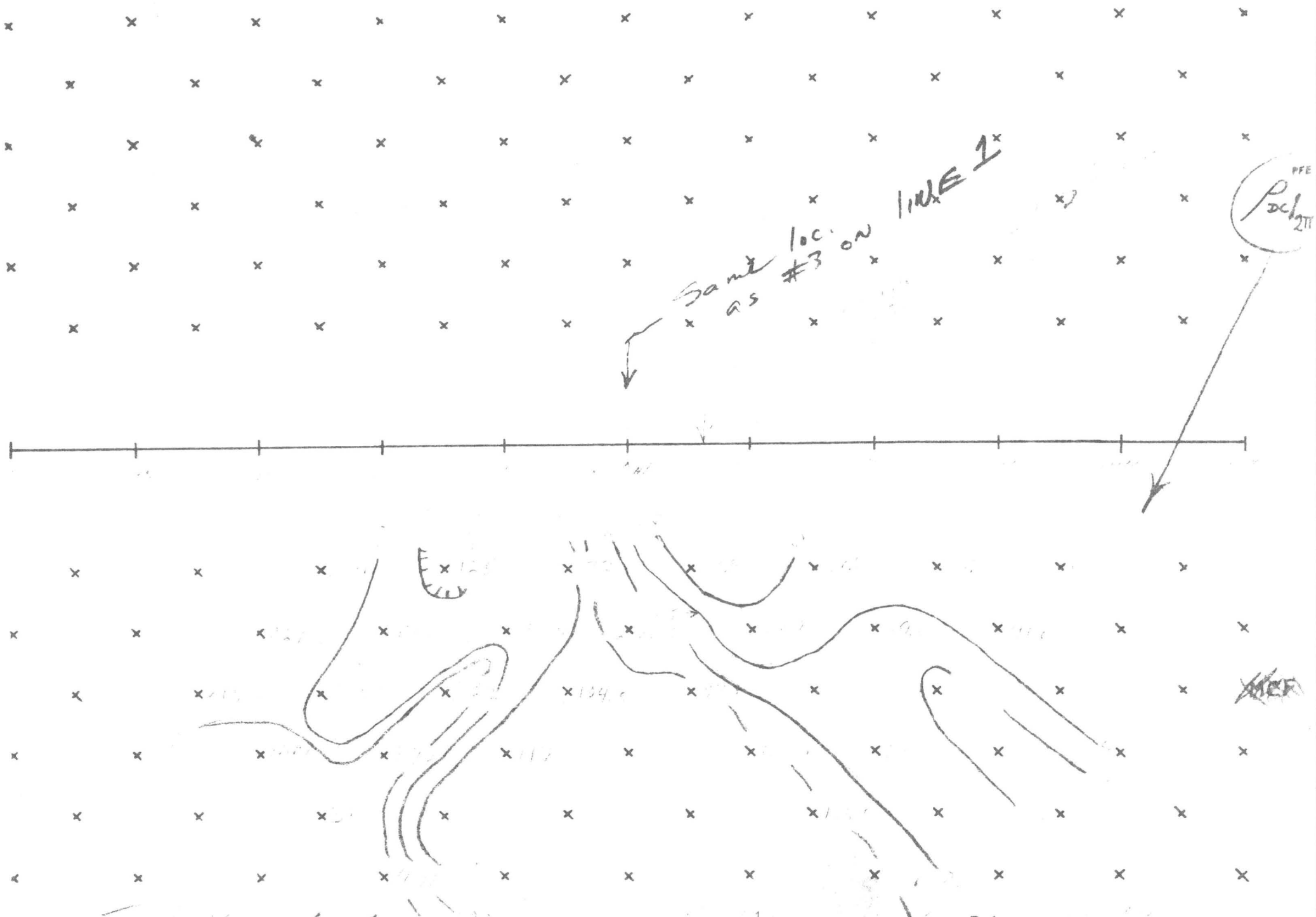
MAY 1964
INDEX SKETCH
FOR
JEROME W. HOWARD
BY
HEINRICHS GEOEXPLORATION CO.
TUCSON, ARIZONA

INDUCED POLARIZATION WORK SHEET



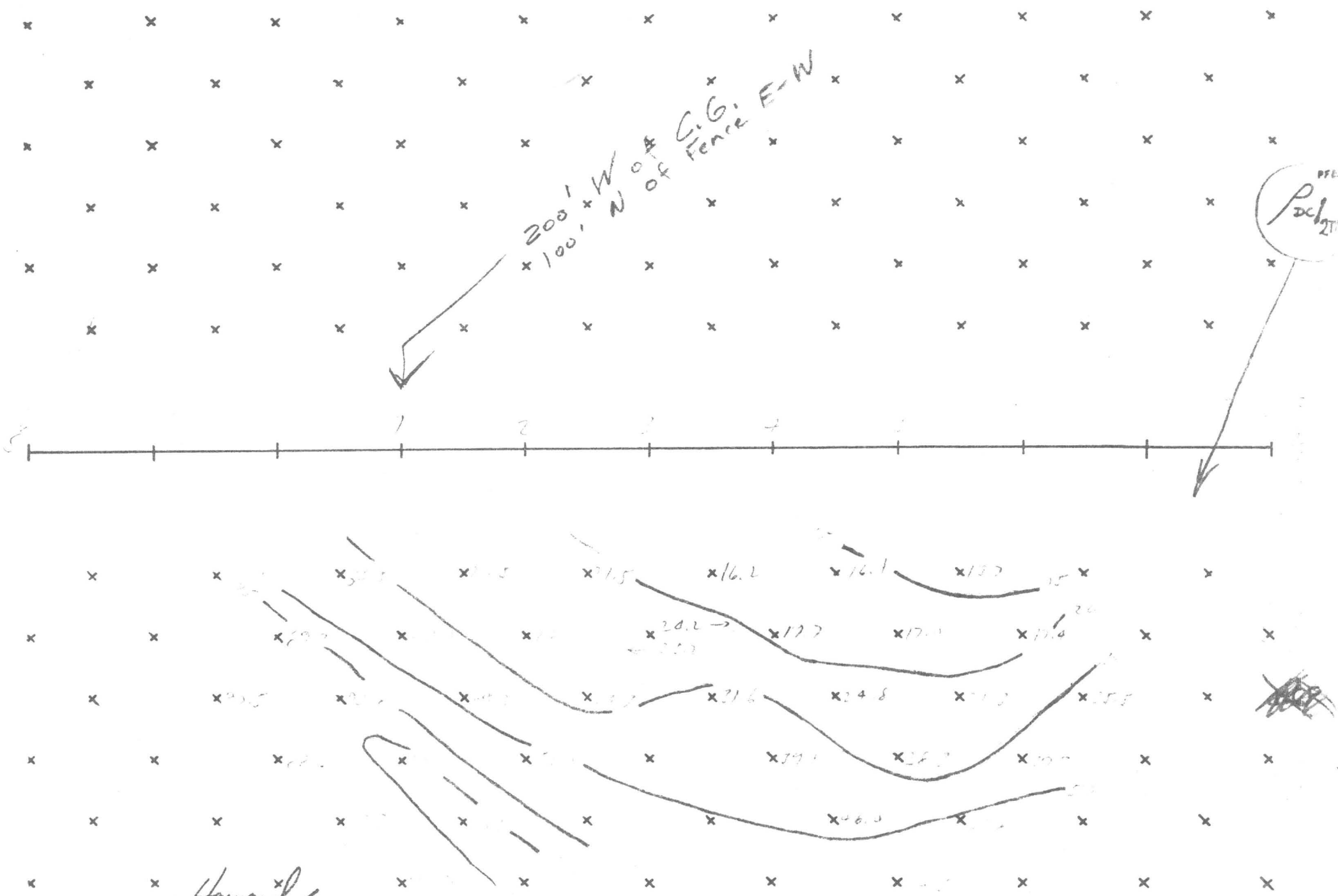
Area Howard I.V. LINE 1 Scale 1" = 250' Date 5-25-64

INDUCED POLARIZATION WORK SHEET

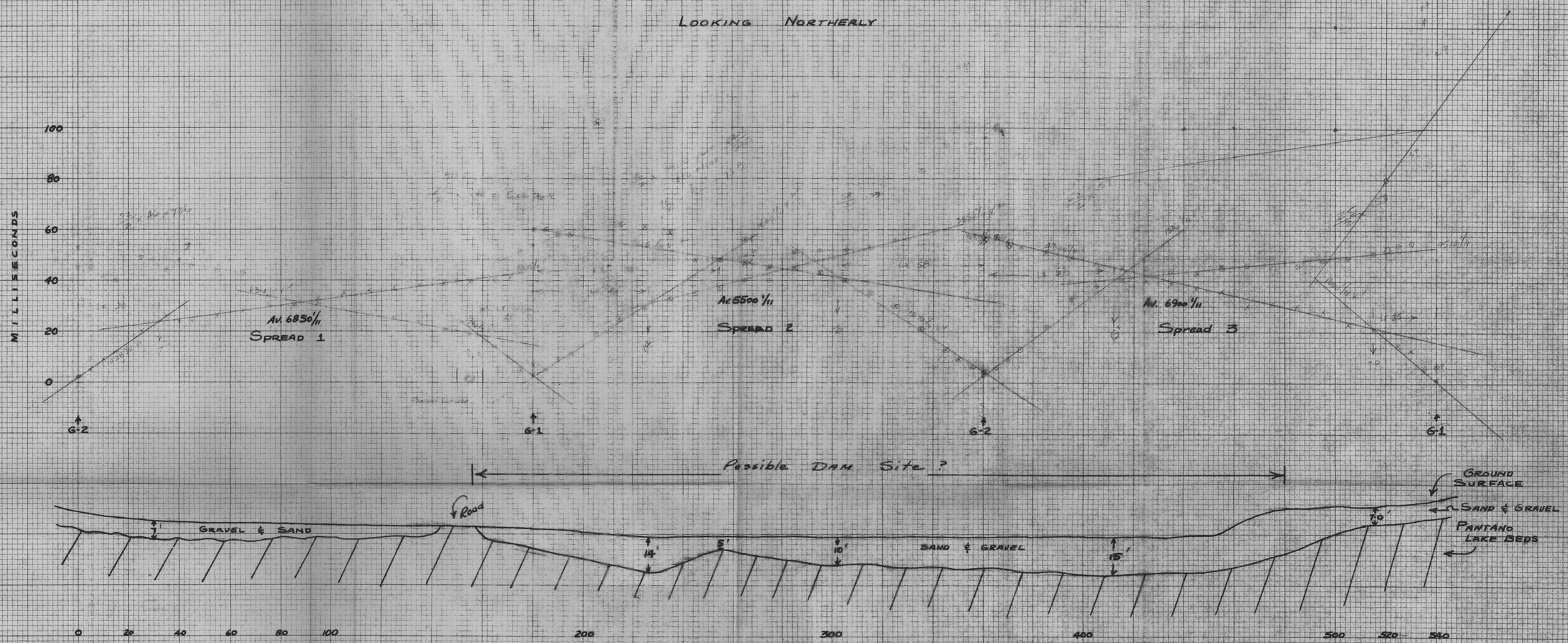


Area Hazard Line 1 Scale Date

INDUCED POLARIZATION WORK SHEET



Area Howard LINE 2 T.V. Scale Date 5/26/64



VELOCITY CURVE & SECTIONAL PLOT
SEISMIC SURVEY

FOR
JEROME W. HOWARD

BY
HEINRICHS GEOEXPLORATION CO.
P.O. BOX 5671 TUCSON, ARIZ. 85703

E ½ NE ¼, SEC. 10, T14S, R16E.
PIMA COUNTY, ARIZONA

SCALE: HOR. 1" = 20'
VERT. 1" = 20 MILLISECONDS

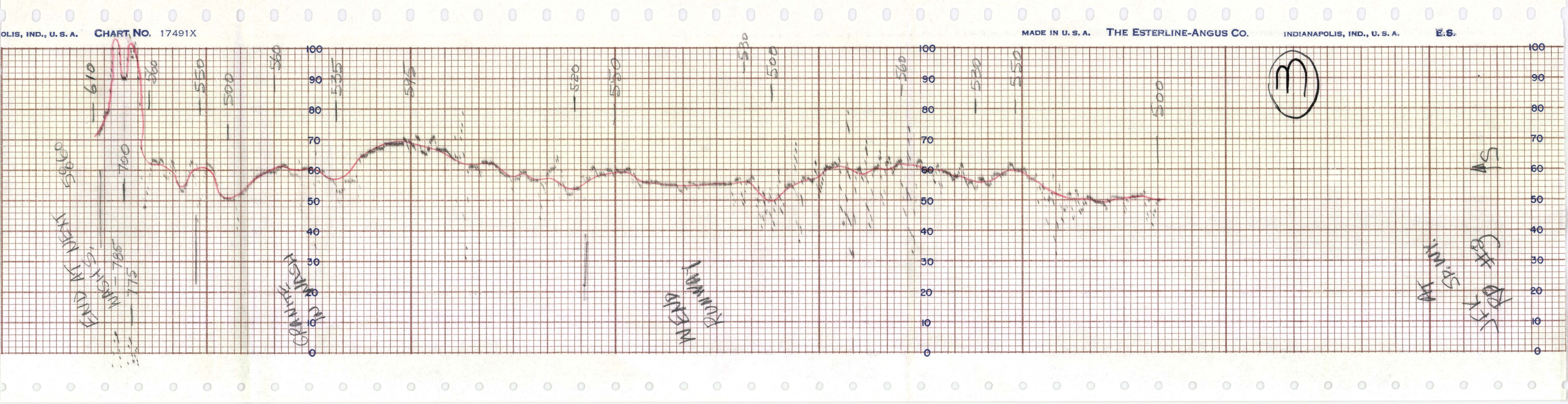
DATE: MAY, 1964

DATA BY: E.G.H.

THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U. S. A. CHART NO. 17491X MADE IN U.S.A. THE ESTE

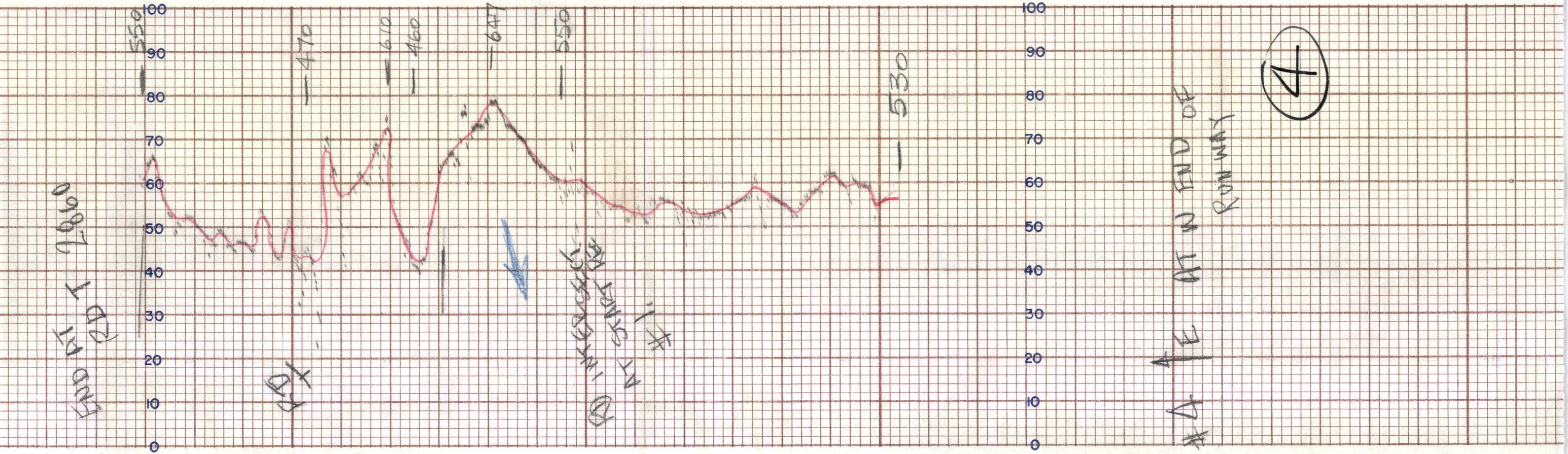
THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U.S.A. CHART NO. 17491X

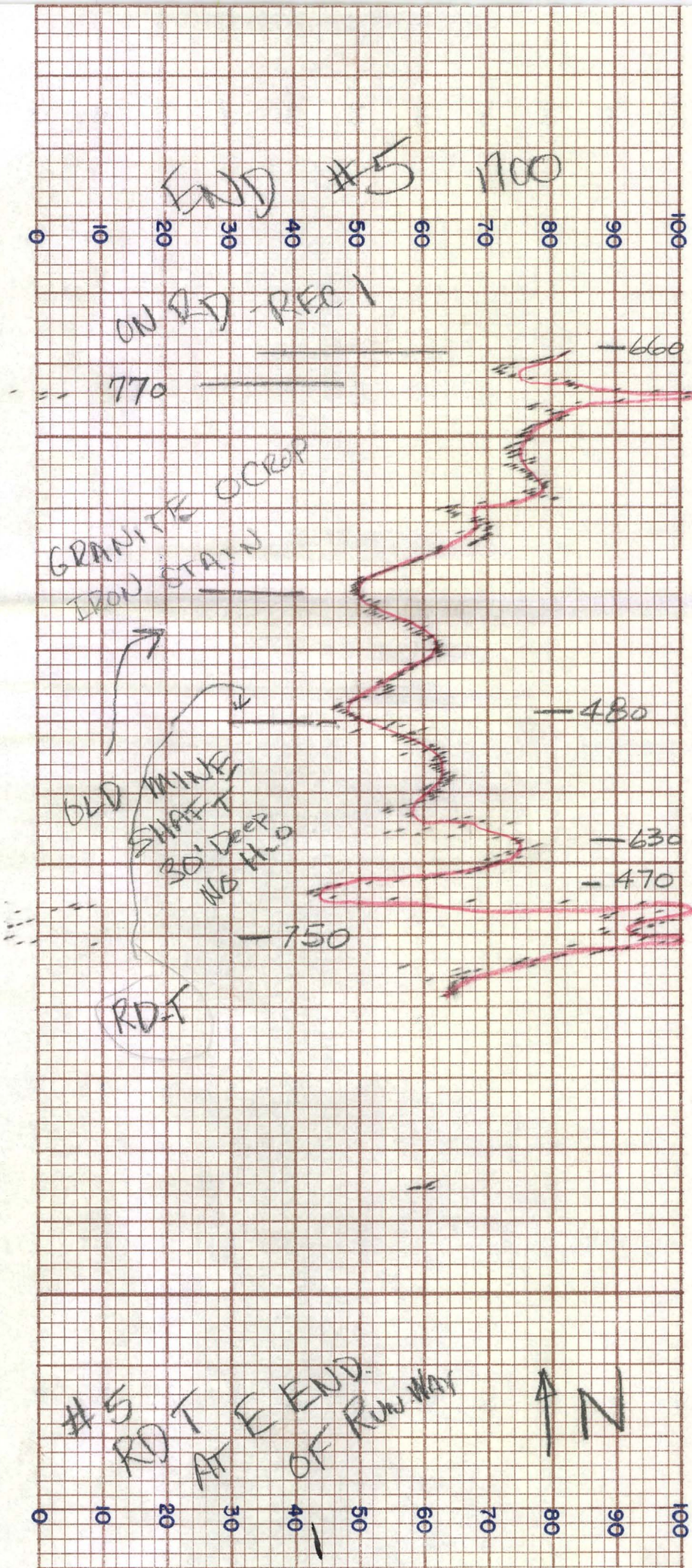
MADE IN U.S.A. THE ESTERLINE-ANGUS



OLIS, IND., U. S. A.
CHART NO. 17491X
MADE IN U. S. A.
THE ESTERLINE-ANGUS CO.
INDIANAPOLIS, IND., U. S. A.
E.S.
3
END AT NEXT WASH S.
GRANITE IN WASH
WEAD RUNWAY
AT SP. WY.
JFK RD #8

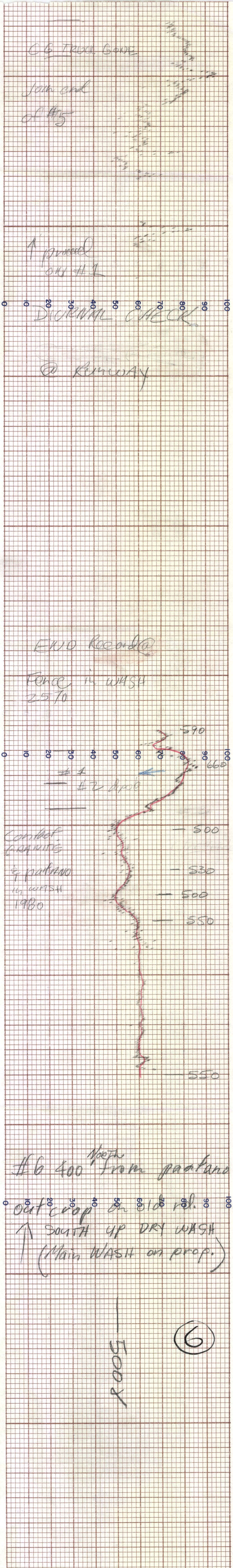
MADE IN U. S. A. THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U. S. A. E.S.

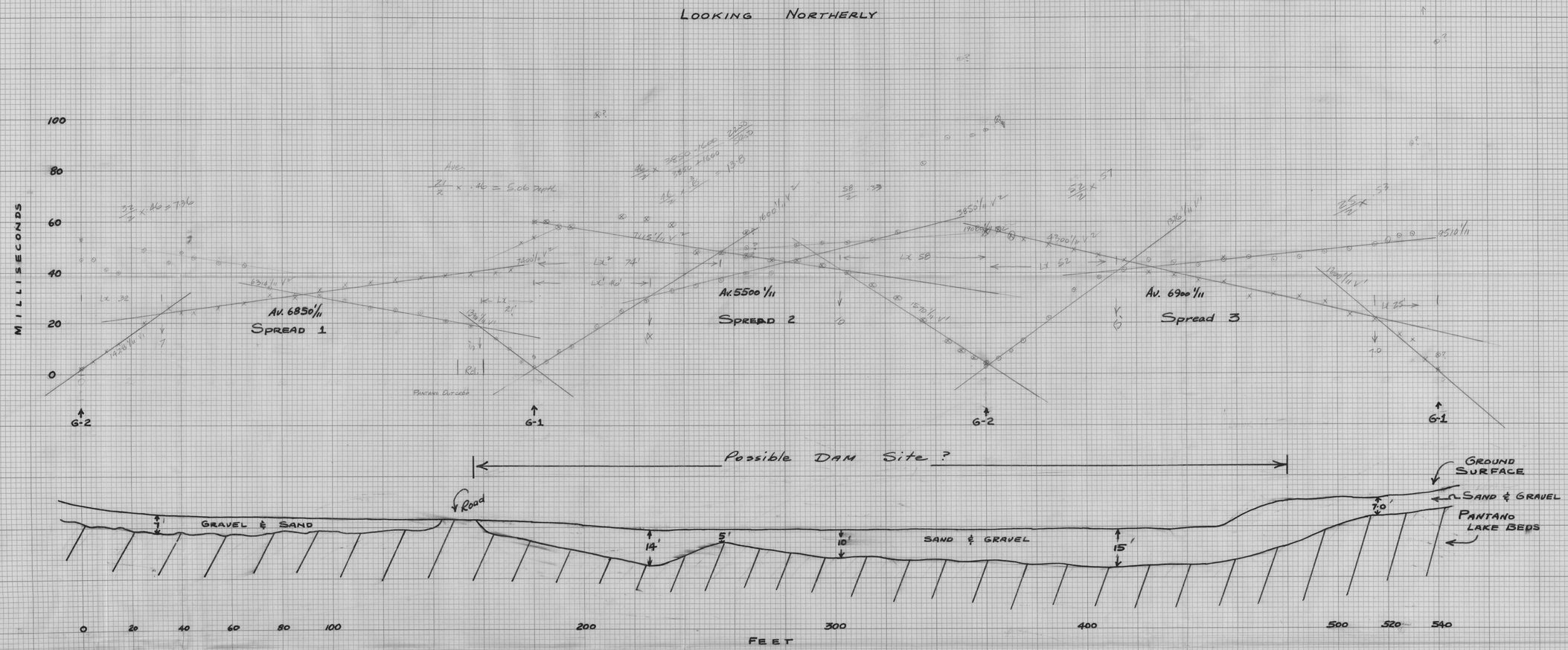




THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U. S. A. CHART NO. 17491X

5


C G Truck Gone
South end
of #5
1 proved
on #1
0 10 20 30 40 50 60 70 80 90 100
Diorite check
@ Runway
END Recorder
Force in WASH
2570
590
660
#1
#2 depth
500
530
500
550
Contact
Granite
& paleno
in WASH
1980
550
#6 400 North from paleno
outcrop on old rd.
SOUTH UP DRY WASH
(Main WASH on prop.)
1500
6



VELOCITY CURVE & SECTIONAL PLOT
SEISMIC SURVEY

FOR

JEROME W. HOWARD

BY

HEINRICHS GEOEXPLORATION CO.
P.O. BOX 5671 TUCSON, ARIZ. 85703

E ½ NE ¼, SEC. 10, T.14S., R.16E.
PIMA COUNTY, ARIZONA

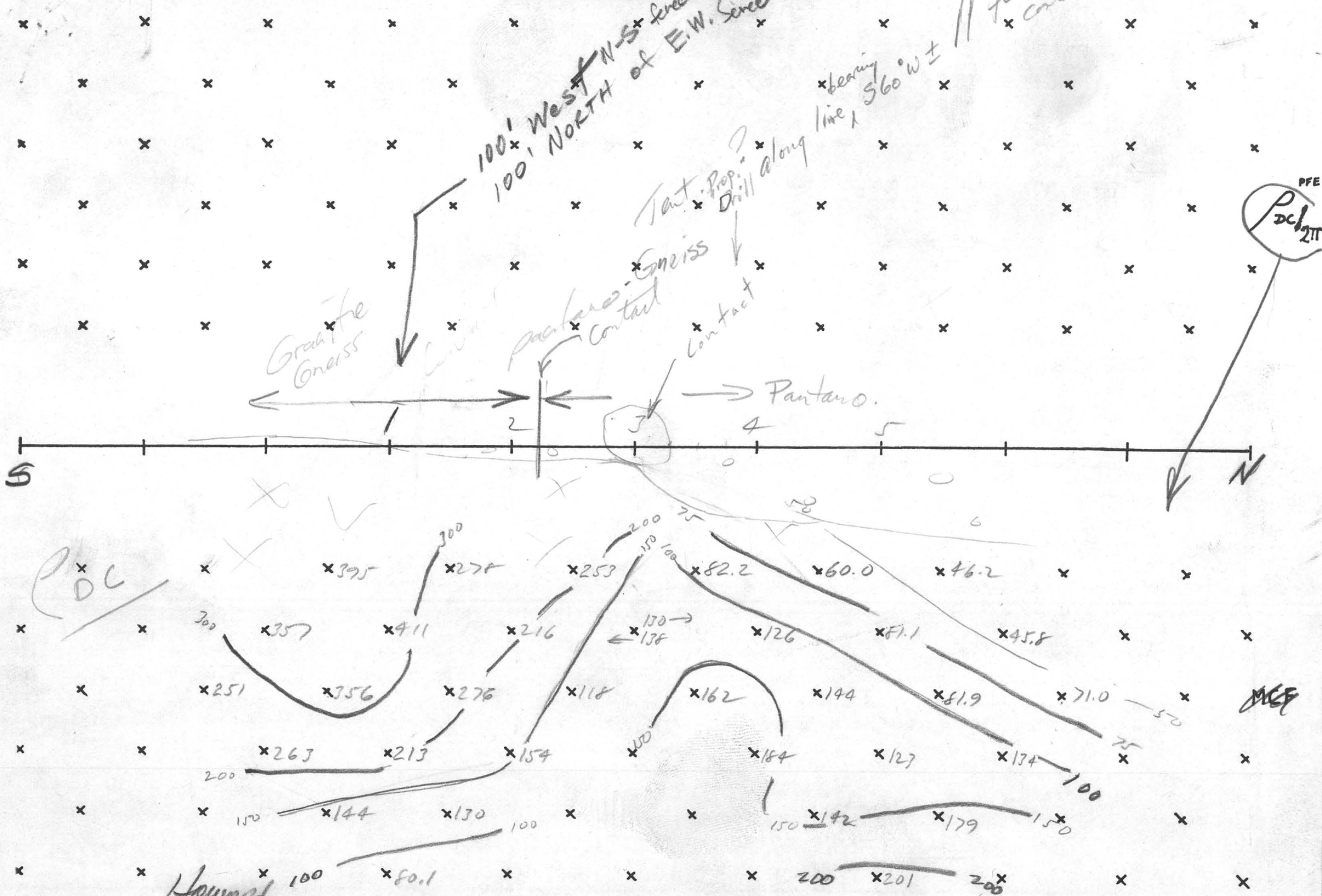
SCALE: HOR. 1" = 20'
VERT. 1" = 20 MILLISECONDS

DATE: MAY, 1964

DATA BY: E.G.H.

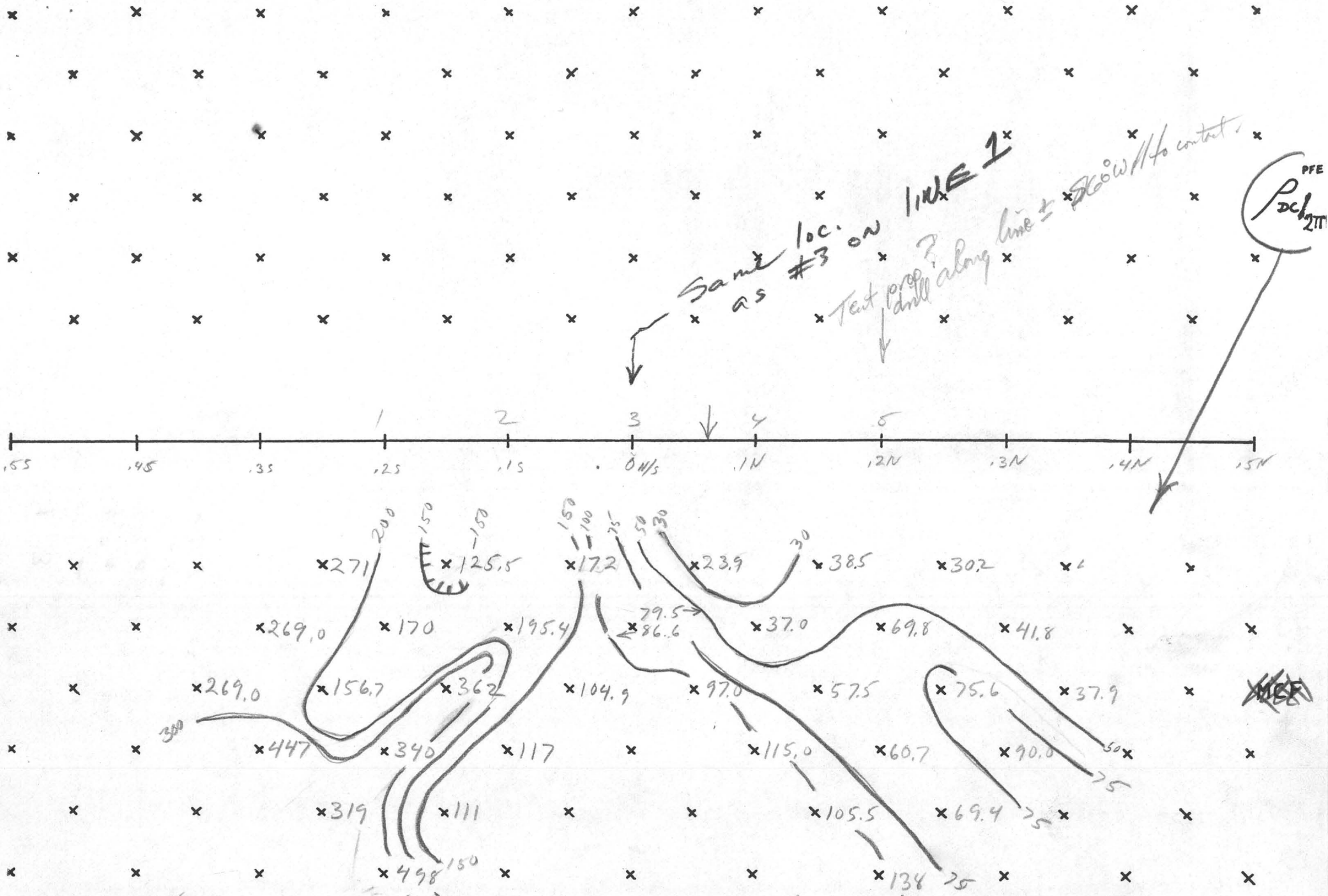
Look! West

INDUCED POLARIZATION WORK SHEET



Area T.V. Howard LINE 1 Scale 1" = 250" Date 5-25-64

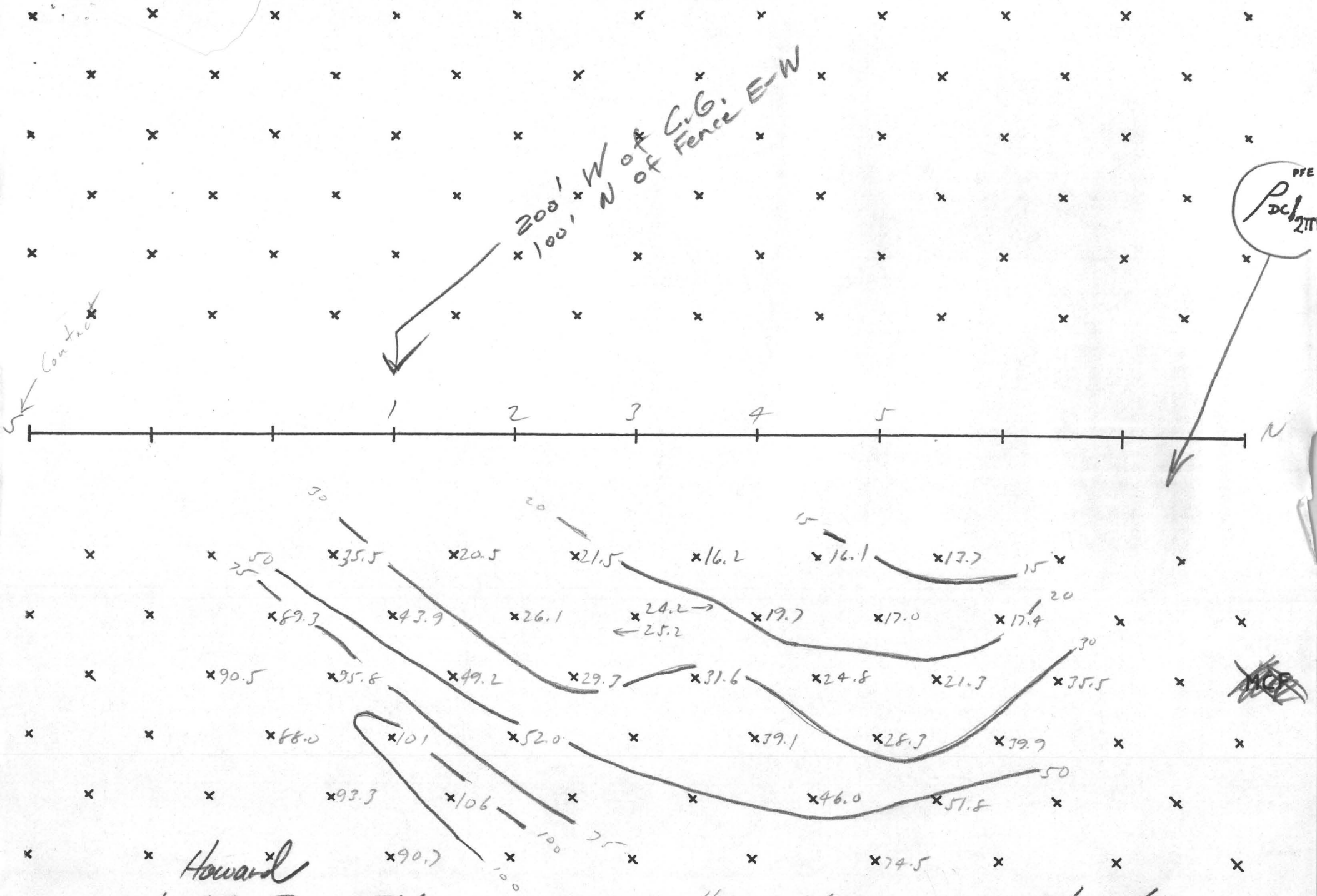
INDUCED POLARIZATION WORK SHEET



Area TV Howard Line 1 Spread 2 Scale 1" = 100' Date 5-26-64

2

INDUCED POLARIZATION WORK SHEET



Area Howard LINE 2 T.V. Scale 1" = 250' Date 5/26/64

INDUCED POLARIZATION SENDER NOTES

Project: T.V. Line: 1 Spr 1 S½ Date: 5-25-64

Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
Receive	→		→			→				→		
Time	13:00	13:03	13:10	13:12	13:14	13:22	13:23	13:24	13:26	13:32	13:33	13:34
Range												
Current	1600	1000	1400	1600	1000	1000	1400	1600	1000	1000	1400	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→				→		2-3					
Time	13:35	13:39	13:41	13:42	13:43		1250					
Range												
Current	1000	1000	1400	1600	1000		300					

INDUCED POLARIZATION SENDER NOTES

Project: T.V. Line: I Spy I N½ Date: 5-25-69

Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
Receive	→	→	→	→	→	→	→	→	→	→	→	→
Time	14:11	14:12	14:18	14:22	14:23	14:30	14:32	14:34	14:35	14:39	14:40	14:41
Range												
Current	1400	1000	1600	1400	1000	1000	1600	1400	1000	1000	1600	1400
Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	→	→	→	→	→		3-4					
Time	14:42	14:47	14:48	14:49	14:50		14:08					
Range												
Current	100	1000	1600	1400	1000		300					

INDUCED POLARIZATION SENDER NOTES

Project: T.V. Line: 1 Spr 2 N½ Date: 5-26-64

Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
Receive	→		→		→		→		→		→	
Time	7:54	7:55	8:03	8:04	8:05	8:10	8:11	8:12	8:13	8:19	8:20	8:21
Range												
Current	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	→	→	→	→	→		3-4					
Time							7:45					
Range	8:22	8:29	8:30	8:31	8:32							
Current	1000	1000	1000	1000	1000		300					

INDUCED POLARIZATION SENDER NOTES

Project: TV Line: 1Sp x 2.5½ Date: 5-26-64

Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
Receive	→		→		→	→			→	→		
Time	9:08	9:09	9:22	9:23	9:24	9:28	9:29	9:30	9:31	9:38	9:39	9:40
Range												
Current	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→	→			→		2-3					
Time	9:41	10:50	10:51	10:52	10:53		9:00					
Range												
Current	1000	1000	1000	1000	1000		300					

a = 250

(5)

INDUCED POLARIZATION SENDER NOTES

Project: T.V. Line: 2 Spx1 N½ Date: 5-26-63

Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
Receive	→	→	→	→	→	→	→	→	→	→	→	→
Time	12:18	12:20	12:29	12:30	12:31	12:41	12:42	12:43	12:44	12:51	12:52	12:53
Range												
Current	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	→	→	→	→	→		3-4					
Time	12:54	12:59	13:00	13:01	13:02		12:14					
Range												
Current	1200	1200	1200	1200	1200		300					

a = 250

⑥

INDUCED POLARIZATION SENDER NOTES

Project: T.V Line: 2 spr 2 Date: 5-26-64

Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
Receive	→		→		→	→			→	→		
Time	13:24	13:25	13:31	13:32	13:33	13:39	13:39	13:40	13:41	13:45	13:46	13:47
Range												
Current	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→	→			→		2-3					
Time	13:48	13:55	13:56	13:57	13:58		13:20					
Range												
Current	1200	1200	1200	1200	1200		300					

INDUCED POLARIZATION - RECEIVER NOTES PAGE 1

500'N
100'N
SEC 10

Project: T.V. Line: 1 Spd. 1 S1/2 Int.Cal 5.4mv Date: 5-25-64

Send	34	45	23	34	45	12	23	34	45	12	23	34
Rec. S1/2	12	→	23	→	→	34	→	→	→	95	→	→
Time	1:00		1:10			1:25				1:32		
DC-1/26	.30	.03	.30	.10	.01	.30	.1	.03	.01	.10	.03	.03
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	254	21.6	243	54.1	7.44	248	89.9	27.6	4.82	55.8	31.2	10.7
AC-2	253	21.7	244	54.2	7.42	248	90.0	27.7	4.80	55.9	31.1	10.65
Σ	507	43.3	487	108.3	14.86	496	179.9	55.3	9.62	111.7	62.3	21.35
S. P. mv	-11	→	+17.3	→	+17.7	-22.6	→	→	-24.7	+15.1		
AC-N	.4	→	.35	→	→	.30	→	→	→	.25	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: TV Line: 1 Spd 1 5 1/2 Int.Cal Date: 5-25-64

Send	45	12	23	34	45	CAL-23	CAL					
Rec.	→	56	→	→	→	23	23					
Time	1:37	11:42				1:00						
DC-1/R6	.003	.03	.03	.01	.003	.03						
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	2.32	15.75	11.55	4.10	.95	14.1						
AC-2	2.325	15.70	11.55	4.12	.94	14.1						
Σ	4.65	31.45	27.1	8.22	1.89	28.2						
S. P.	+18.2	+1.6	→	→	→	+3.4						
AC-N	.25	.26	→	→	→	→						

INDUCED POLARIZATION - RECEIVER NOTES PAGE 3

Project: T.V. Line: 1 Spd 1 N½ Int.Cal Date: 5-25-64

Send	23	12	34	23	12	45	34	23	12	45	34	23
Rec. N½	12	→	23	→	→	34	→	→	→	45	→	→
Time	2:15		2:22			2:32				2:40		
DC-1/RG	.10	.03	.10	.03	.03	.03	.03	.03	.01	.01	.01	.01
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	71.5	20.1	59.5	27.25	10.03	28.7	20.1	12.6	5.7	7.1	8.14	5.35
AC-2	71.4	20.1	59.4	27.30	10.04	28.6	20.1	12.6	5.7	7.1	8.13	5.35
Σ	142.9	40.2	118.9	54.55	20.07	57.3	40.2	25.2	11.4	14.2	16.27	10.70
S. P.	-8.0	→	+9.15	→	+6.5	-4.4	→	→	-5.3	+4.5	→	→
AC-N	.45	.45	.25	→	.26	.20	→	→	→	.10	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 4

Project: T.U. Line: 1 Spd 1 N 1/2 Int.Cal Date: 5-25-64

Send	12	45	34	23	12	CAL						
Rec.	→	56	→	→	→	3-4						
Time	2:45	2:49				2:10						
DC-1/R6	.003	.01	.01	.01	.003							
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	2.525	4.4	6.65	4.45	2.23	14.0						
AC-2	2.510	4.39	6.66	4.43	2.22	13.9						
Σ	5.03	8.79	13.31	8.88	4.45	27.9						
S. P.	+4.5	-9.0	→	→	-8.9							
AC-N	.16	.18	→	→	.12							

INDUCED POLARIZATION - RECEIVER NOTES PAGE 5

Project: T.V. Line: 1 Spd2 N½ Int.Cal 50 Date: 5-26-64

Send	23	12	34	23	12	45	34	23	12	45	34	23
Rec. N½	12N	12N	23N	→	→	34N	→	→	→	45	→	→
Time		7:53										
DC-1/RG	.1	.1	.1	.03	.03	.1	.03	.01	.01	.03	.03	.01
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	38.0	31.8	61.0	14.6	15.4	47.9	27.6	9.1	9.1	16.75	12.0	4.8
AC-2	37.9	31.9	61.0	14.7	15.3	48.0	27.6	9.15	9.1	16.75	12.0	4.8
Σ	75.9	62.7	122.0	29.3	30.7	95.9	55.2	18.25	18.2	33.50	24.0	9.6
S. P.	+4.9mv	→	+2.1	→	→	-.3	→	→	→	+5.3	→	→
AC-N	.06	→	.06		.06	.08	→	→	→	.08	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 6

Project: TV Line: 15pd2 N1/2 Int.Cal 50 Date: 5/26/84

Send	12	45	34	23	12	CAL	CAL					
Rec.	45	56	→	→	→	34						
Time	8.27					7:45						
DC-1/R6	.01	.01	.01	.003	.01	.03						
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	4.75	6.45	7.1	3.12	3.9	14.2						
AC-2	4.75	6.45	7.1	3.125	3.9	14.3						
Σ	9.50	12.90	14.2	6.245	7.8	28.5						
S. P.	+5.3	-18.0	-20.1	→	→	-20.1						
AC-N	.08	.08	→	→	→	→						

INDUCED POLARIZATION - RECEIVER NOTES PAGE 7

Project: TV Line: 1 Sp/2 S1/2 Int.Cal 49.9 Date: 5/26/64

Send	34	45	23	34	45	12	23	34	45	12	23	34
Rec. S1/2	12S	→	23S	→	→	34S	→	→	→	45S	→	→
Time	8:55		9:19			9:25				9:32		
DC-1/RG	.3	.1	.3	.3	.03	1.0	.1	.1	.01	.30	.03	.03
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	270	34.2	197	126	16.5	426	67.0	57.0	9.70	106	24.75	26.8
AC-2	270	34.2	198	126	16.5	427	67.0	57.0	9.75	106	24.65	26.8
Σ	540	68.4	395	152	33.0	853	134.0	114.0	19.45	212	49.40	53.6
S. P.	-23.2	→	-34.1	→	→	-31.5				-11.4	→	→
AC-N	.18	→	1.2	→	→	.10	→	→	→	.10	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 8

Project: TV Line: 1 Spd 2.5 1/2 Int.Cal 49.8 Date: 5/26/64

Send	45	12	23	34	45	CAL						
Rec.	→	565	→	→	→							
Time	9:38	9:45				9:08						
DC-1 /R6	.01	.1	.03	.03	.003	.03						
DC-2												
Σ												
DC-3												
DC-4												
Σ												
DC-AV												
AC-1	4.95	42.4	10.25	14.3	2.0	14.2						
AC-2	4.97	42.3	10.25	14.4	1.99	14.2						
Σ	9.92	84.7	20.50	28.7	3.99	28.4						
S. P.	-10.8	+.3	→	→	→	→						
AC-N	.1	.1	→	→	→	→						

INDUCED POLARIZATION - RECEIVER NOTES PAGE 9

Project: TV Line: 2 Spd 1 N1/2 Int.Cal _____ Date: 5/26/14

Send	23	12	34	23	12	45	34	23	12	45	34	23
Rec. N	12	12	23	→	→	34	→	→	→	45	→	→
Time	12:15		12:25			12:35			12:40	12:45		
DC-1/RG	.03	.03	.03	.01	.003	.03	.003	.003	.003	.01	.003	.003
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	12.2	4.55	12.1	3.7	2.38	10.25	3.2+	1.85	1.48	3.25	1.62	1.08
AC-2	12.2	4.56	12.0	3.7	2.36	10.3	3.2+	1.87	1.46	3.30	1.59	1.05
Σ	24.4	9.11	24.1	7.4	4.74	20.55	6.4	3.72	2.94	6.55	3.21	2.13
S. P.	-22.5	→	-24.5	→	→	+18.1	+18.1	→	→	-13.8	-13.8	→
AC-N	.22	→	.22	→	→	.22	→	→	→	.20	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 10

Project: TU Line: 2 Spd 1 N 1/2 Int.Cal Date: 5/26/84

Send	12	45	34	23	12	45	34	23	12		CAL	
Rec.	45	56	→	→	→	67	→	→	→		34	
Time		12:55									12:10	
DC-1 RG	.001	.003	.003	.003								
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	1.00	2.70	1.50	1.12	1.0						14.1	
AC-2	.975	2.65	1.50	1.11	1.0						14.1	
Σ	1.975	5.35	3.00	2.23	2.0						28.2	
S. P.	-13.4	-5.9	→	→	→							
AC-N	.20	.22	→	→	→							

INDUCED POLARIZATION - RECEIVER NOTES PAGE 11

Project: TV Line: 2 Spd / 1.5 1/2 Int.Cal Date: 5/20/64

Send	34	45	23	34	45	12	23	34	45	12	23	34
Rec. S	12	→	23	→	→	34	→	→	→	45	→	→
Time	1:20		1:30				1:35			1:42		
DC-1/RG	.03	.01	.03	.01	.003	.03	.01	.01	.003	.03	.01	.01
DC-2												
Σ												
DC-3												
Dc-4												
Σ												
DC-AV												
AC-1	16.15	4.71	15.4	4.9	2.2	26.7	8.25	3.7	1.98	16.8	7.2	3.85
AC-2	16.2	4.75	15.4	4.92	2.2	26.7	8.25	3.7	1.92	16.75	7.3	3.70
Σ	32.35	9.46	30.8	9.82	4.4	53.4	16.50	7.4	3.90	33.55	14.5	7.55
S. P.	+6.1	→	-8.0	→	→	0	0	0	0	-4.4	→	→
AC-N	.4	→	.26	→	→	.24	→	→	→	.25	→	→

INDUCED POLARIZATION - RECEIVER NOTES PAGE 12

Project: TV Line: 2 Spd 1 S1/2 Int.Cal _____ Date: 5/26/64

Send	45	12	23	34	45	12	23	34	45		CAL	
Rec. S	→	56	→	→	→	67	→	→	→		23	
Time	1:45	1:50									1:18	
DC-1/R6	.003	.01	.01	.003	.003							
DC-2												
Σ												
DC-3												
Dc-4	WIND											
Σ												
DC-AV												
AC-1	2.20	6.8	3.3	2.0	1.25						14.1	
AC-2	2.35	6.8	3.3	2.0	1.25						14.1	
Σ	4.55	13.6	6.6	4.0	2.50						28.2	
S. P.	-.44	+2.7	→	→	→							
AC-N	.25	.30	→	→	→							

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 1

Project T.V. Line 1 Spy 1 5½ Field date 5-25-64 Data page _____ Comp. date _____. Comp by _____

(A) Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
(B) Receive	→		→			→				→		
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1600	1000	1400	1600	1000	1000	1400	1600	1000	1000	1400	1600
(E) ~~Vdc~~ AC (avg)	507	433	487	108.3	14.86	496	179.9	55.3	9.62	111.7	62.3	21.35
(F) DCcal USED	1.069											
(G) Kn x 10^{-3}	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5	15
(H) ρ dc=ExFxGx10^3/D	253	138	278	216	118	395	411	276	154	357	356	213
(I) Vac Σ												
(J) AC noise x 2	.80	.80	.70	.70	.70	.60	.60	.60	.60	.50	.80	.50
(K) Vac(corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

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

(A) Send	4-5	1-2	2-3	3-4	4-5		CAL					
(B) Receive	→				→		2-3					
(C) n separation	5	3	4	5	6							
(D) I	1000	1000	1400	1600	1000		300					
(E) ~~Vdc~~ (avg) AC	4.65	31.45	23.1	9.22	1.99		28.2					
(F) DCcal					→		1.06A					
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	130	251	263	144	80.1							
(I) Vac Σ												
(J) AC noise x 2	.50	.52	.52	.52	.52							
(K) Vac (corr) $=\sqrt{I^2 - J^2}$					1.79							
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 2

Project TV Line 7SPX7N½ Field date 5-25-64 Data page _____ Comp. date _____. Comp by _____

(A) Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2,3
(B) Receive	→	→	→	→	→	→	→	→	→	→	→	→
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1400	1000	1600	1400	1000	1000	1600	1400	1000	1000	1600	1400
(E) Vdc (~~avg~~) AC	142.9	40.2	118.9	54.55	20.07	57.3	40.2	25.2	11.4	14.2	16.27	10.70
(F) DCcal												
(G) Kn x 10^{-3}	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5	15
(H) ρ dc=ExFxGx10^3/D	82.2	130	60.0	126	162	46.2	81.1	144	184	45.8	81.9	123
(I) Vac Σ												
(J) AC noise x 2	.90	.90	.50	.50	.52	.40	.40	.40	.40	.20	.20	.20
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

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

(A) Send	1-2	4-5	3-4	2-3	1-2		CAL					
(B) Receive	→	→	→	→	→		3-4					
(C) n separation	5	3	4	5	6							
(D) I	1000	1000	1600	1400	1000		300					
(E) Vdc (~~avg~~)	5.03	8.79	13.31	8.88	4.45		27.9					
(F) DCcal							1076					
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	147	71.0	134	179	201							
(I) Vac Σ	(142)											
(J) AC noise x 2	.32	.56	.30	.28	.24							
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 3

Project T.V. Line 1 spr 2 N½ Field date 5-26-64 Data page _____ Comp. date _____. Comp by _____

(A) Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
(B) Receive	→											
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1000											
(E) Vdc (avg) AC	75.9	62.7	122.0	29.3	30.7	95.9	55.2	18.25	18.2	33.50	24.0	9.6
(F) DCcal	23.9	79.5	38.5	37.0	97.0	30.2	69.8	57.5	115.0	41.8	75.6	60.7
(G) Kn x 10^{-3}	.35	1.2	.3	1.2	3.0	.3	1.2	3.0	6.0	1.2	3.0	6.0
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) =$\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

Project T.V. Line 1 spr 2 N Field date 5-26-64 Data page _____ Comp. date _____ Comp by _____

(A) Send	1-2	4-5	3-4	2-3	1-2		CAL					
(B) Receive	→											
(C) n separation	5	3	4	5	6							
(D) I	1000						300					
(E) Vdc (avg)	9.50	12.90	14.2	6.245	7.8		28.5					
(F) DCcal	105.5	37.9	90.0	69.4	139		1.052					
(G) Kn x 10^{-3}	10.5	3.0	6.0	10.5	16.8							
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) =$\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 4

Project T.V. Line 1 Sp x 2 S 1/2 Field date 5-26-64 Data page _____ Comp. date _____. Comp by _____

(A) Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
(B) Receive	→	→	→	→	→	→	→	→	→	→	→	→
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1000	→	→	→	→	→	→	→	→	→	→	→
(E) ~~Vdc~~ (avg) AC	540	68.4	395	153	33.0	853	134.0	114.0	18.45	212	44.40	536
(F) DCcal	171.5	866	125.5	195.4	104.9	271	170	362	117	269.0	156.7	340
(G) Kn x 10^{-3}	.3	1.2	.3	1.2	3.0	.3	1.2	3.0	6.0	1.2	3.0	6.0
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

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

(A) Send	4-5	1-2	2-3	3-4	4-5		CAL					
(B) Receive	→	→	→	→	→		2-3					
(C) n separation	5	3	4	5	6							
(D) I	1000	→	→	→	→		300					
(E) Vdc (avg)	9.92	84.7	70.50	28.7	3.99		28.4					
(F) DCcal	111.1	269.0	447	319	498		1,058					
(G) Kn x 10^{-3}	10.5	3.0	6.0	10.5	16.8							
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 5

Project TV Line 2Spd 1N½ Field date 5/26/64 Data page 9 Comp. date 5/26/64 . Comp by NW

(A) Send	23	12	34	23	12	45	34	23	12	45	34	23
(B) Receive N	12	→	23	→	→	34	→	→	→	45	→	→
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I mA	1.2K	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)												
(F) DCcal												
(G) Kn x 10^{-3}	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5	15
(H) ρ dc=ExFxGx10^3/D	16.2	24.2	16.1	19.7	31.6	13.7	17.0	24.8	39.1	17.4	21.3	28.3
(I) Vac Σ	24.4	9.11	24.1	7.4	4.75	20.55	6.4	3.72	2.94	6.55	3.21	2.13
(J) AC noise x 2	.44	.44	.44	.44	.44	.44	.44	.44	.44	.40	.40	.40
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

Project TV Line 2Spd 1N½ Field date 5/26/64 Data page 10 Comp. date 5/26/64 Comp by NW

(A) Send	12	45	34	23	12	CAL						
(B) Receive	→	56	→	→	→	34						
(C) n separation	5	3	4	5	6							
(D) I	1.2K	→	→	→	→	300						
(E) Vdc (avg)						28.2						
(F) DCcal						1.064						
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	46.0	35.5	39.9	51.8	74.5							
(I) Vac Σ	1.975	5.35	3.00	2.23	2.0							
(J) AC noise x 2	.40	.44	→	→	→							
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 6

Project TV Line 2Sp/ S1/2 Field date 5/26/64 Data page 11 Comp. date 5/26/64. Comp by WW

(A) Send	34	45	23	34	45	12	23	34	45	12	23	34
(B) Receive	12	→	23	→	→	34	→	→	→	45	→	→
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I (MA)	1200	1.2K	1.2K	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)												
(F) DCcal	1.064											
(G) Kn x 10^{-3}	.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5	15
(H) ρ dc=ExFxGx10^3/D	21.5	25.2	20.5	26.1	24.3	35.5	43.9	49.2	52.0	89.3	95.8	101
(I) Vac Σ	32.35	9.46	30.8	9.82	4.4	5.34	16.50	7.4	3.90	33.55	14.5	7.55
(J) AC noise x 2	.8	→	.52	→	→	.48	→	→	→	.50	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.												
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

Project TV. Line 2Sp/ S1/2 Field date 5/26/64 Data page 12 Comp. date 5/26/64 Comp by WW

(A) Send	45	12	23	34	45	CAL						
(B) Receive	→	56	→	→	→	23						
(C) n separation	5	3	4	5	6							
(D) I /ma	1.2K	→	→	→	→	300						
(E) Vdc (avg)												
(F) DCcal												
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	106	90.5	88.0	93.3	90.7							
(I) Vac Σ	4.55	13.6	6.6	4.0	2.50	28.2						
(J) AC noise x 2	→	.60	→	→	→							
(K) Vac (corr) = $\sqrt{I^2 - J^2}$					2.43							
(L) AC-DC cal.												
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

RECORD OF SEISMIC SURVEY

Job No. HOWARD H_2O

Location TANQUE VERDE AREA

Date 5/28/64

Purpose

Engineer

Local Geology

Survey Line No. 1 Direction

Page 1 of

Survey Line Location At Pantano Outcrop near main WASH @ Rd Bearing N. 50° E - S. 50° W.

Set up 1

GEOPHONE LOC. N. #1	#2	IMPACT DISTANCE #1	#2	TRAVEL-TIMES Geophone #1					Geophone #2						
20' E of Rd.	135 W of Rd	0	180	3	3				3	54	54	54			
		"	"												
		5	175	5	5				5	52	52				
		10	170	10	10	10			10	40	41				
		15	165	14	14	14			14	40	40	40			
→	middle rd.	25	155	19	19				19	39	39	39			
		35	145	21	22	20			21	38	38	39	39	39	
		45	135	21	24	24	24		24	38	39	38	38		
		55	125	24	25	25			25	38	37	37	37		
		65	115	26	26					35	36	36			
		75	105	29	27	29	30	29		35	35				
		85	95	31	31					33	33				
		95	85	30	31	32	31	31		30	30				
		105	75	42	34	34	34			31	31				
		115	65	43	43					34	28	28	28		
		125	55	44	44	44				26	26	26			
		135	45	48	46	46	46			24	24				
		140	40	48	49	48	48			24	26	23	24	24	
		145	35	44	45	37	43	42		26	26	26			
		155	25	80	49	49	49			19	19	20			
		165	15	47	40	40	40			12	12	12			
		170	10	51	41	41	41			8	9	9			
		175	5	43	43	43				5	5	5			
		180	0	53	44	43	53			2	2	2			
				44	44	43									

REMARKS:

RECORD OF SEISMIC SURVEY

Job No. Howard H_2O

Location

Date 5/28/64

Purpose

Engineer

Local Geology

Survey Line No. Direction

Page 3 of

Survey Line Location

Set up 3

GEOPHONE LOC. N. #1	#2	IMPACT DISTANCE		TRAVEL-TIMES Geophone #1						Geophone #2						
180' E	Same	180	0	57	56	56	56			3	3	3				
of #2	as #2	175	5	99	100/100	100/99	57	58/57		6	6	6				
	on	170	10	55	56	56	56			3	13	9	9	13	9	
		165	15	55	82	56	56	56/56		16	13	13	13			
		155	25	53	53	57	53	54		22	21	22				
#1		145	35	50	50	51	51			33	33	33				
located		135	45	48	49	49				38	38	38				
approx		125	55	46	47	47	48			41	41	41				
85' E		115	65	44	45	45	45			45	45	45				
of bank		105	75	40	40	40				45	44	44	44			
of dry		95	85	38	38	39				44	43	43	43			
wash		85	95	36	37	38				45	45	45	45			
bottom		75	105	36	36	36				46	46	46	46			
		65	115	32	30	31	34	32		45	43	46	45	45		
		"	"	33	33	33										
		55	125	28	30	30	30			46	44	46/38	46	46	46	
		45	135	28	28	28				47	48	48	48			
		35	145	23	23	23	23			49	49	49	49			
		25	155	21	21	21				51	51	51				
		15	165	16	14	16	17	17		53	52	51	51	52	52/52	
		10	170	8	8	13/13	13/12			179/54	177/55	90/55	90/54	55		
		5	175	2	3	5	5	5		51	204	204	204	205	204	
		0	180	7/1	7/1	7/1	7/2	1		131	131	131	131			

REMARKS:

RECORD OF SEISMIC SURVEY

Job No. Howard H_2O

Location _____

Date 5/28/64

Purpose _____

Engineer _____

Local Geology _____

Survey Line No. _____ Direction _____

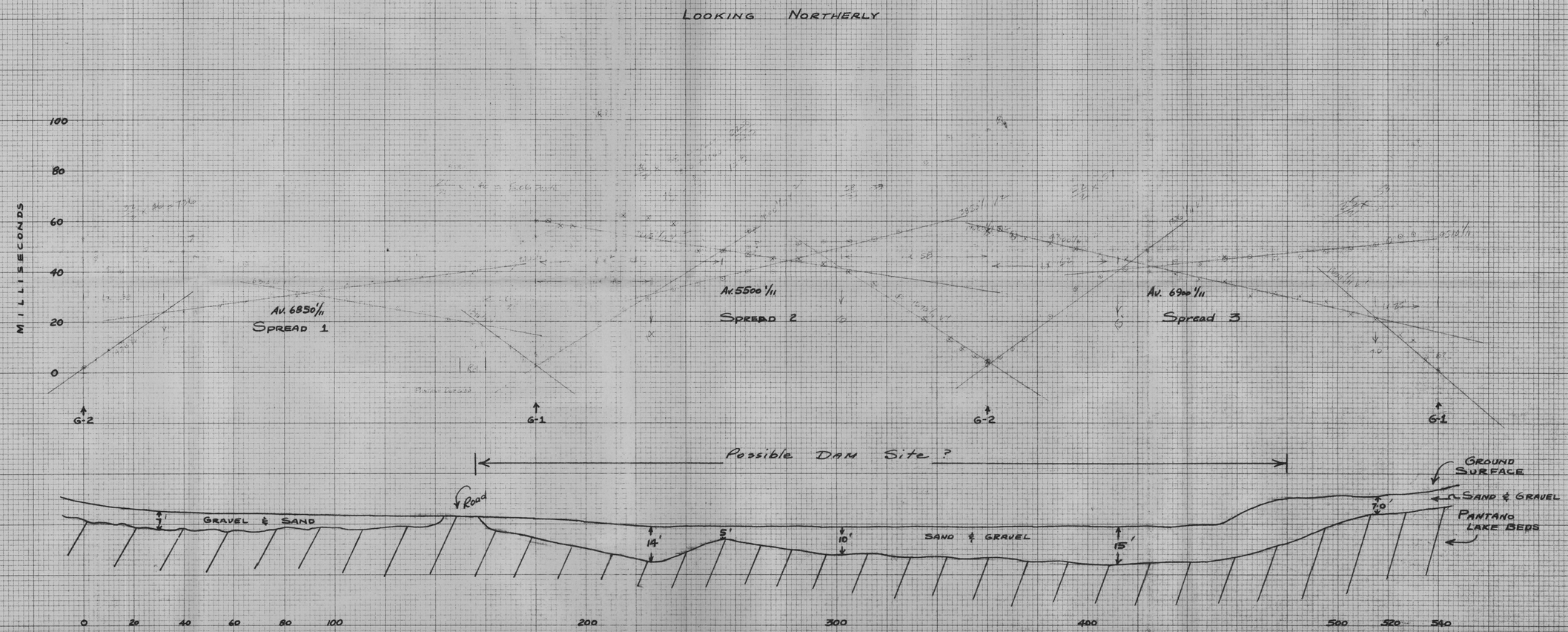
Page 2 of _____

Survey Line Location _____

Setup 2

GEOPHONE LOC. N. #1	#2	IMPACT DISTANCE		TRAVEL-TIMES Geophone #1						Geophone #2						
Same	180 E.	0	180	7	7	7				~~295~~	~~295~~	190				
as	of									60	60	60	61			
page 1	# 1	5	175	4	5	5	5			60	60	60				
on bearing of		10	170	9	8	9	9			58	58	58				
1		15	165	11	11	10	12			58	58	58				
		25	155	19	19	19				102	102	102	101			
		35	145	24	25	25	25			62	62	62				
		45	135	37	29	29	29			61	61	61				
		55	125	32	33	33				60	60	59				
		65	115	34	35	35				48	48	48				
		75	105	47	37	38	37	38		48	48	48				
		85	95	50	40	50	41	40		56	47	56	56	47	48	
		"	"	41	40					47	56					
		95	85	40	49	50	50	41		45	44	45	45			
				50	50											
		105	75	52	52	51				45	45	45				
		115	65	52	52	52				43	43	43				
		125	55	52	53	52				40	40	40				
		135	45	~~40~~	53	54	53	53		36	35	35				
		145	35	55	56	56	55			30	30	30				
		155	25	83	83	83				20	21	21	21			
		165	15	93	93	93	119	119		13	13	13				
		170	10	123	123	124				9	9	10				
		175	5	94	94	95				6	2	6	6			
		180	0	96	97	96				2	4	4	4			

REMARKS:



VELOCITY CURVE & SECTIONAL PLOT
SEISMIC SURVEY

FOR
JEROME W. HOWARD

BY
HEINRICHS GEOEXPLORATION CO.
P.O. BOX 5671 TUCSON, ARIZ. 85703

E ½ NE ¼, SEC. 10, T.14S., R.16E.
PIMA COUNTY, ARIZONA

SCALE: HOR. 1" = 20'
VERT. 1" = 20 MILLISECONDS

DATE: MAY, 1964

DATA BY: E.G.H.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Dr. DeVries
Ave 24 W.T.
2650 Elev.
150'
150
50
70

RINCON VALLEY QUADRANGLE
ARIZONA—PIMA CO.
15 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1954. Field check 1957

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

13°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1957

SCALE 1:62500

1 ½ 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

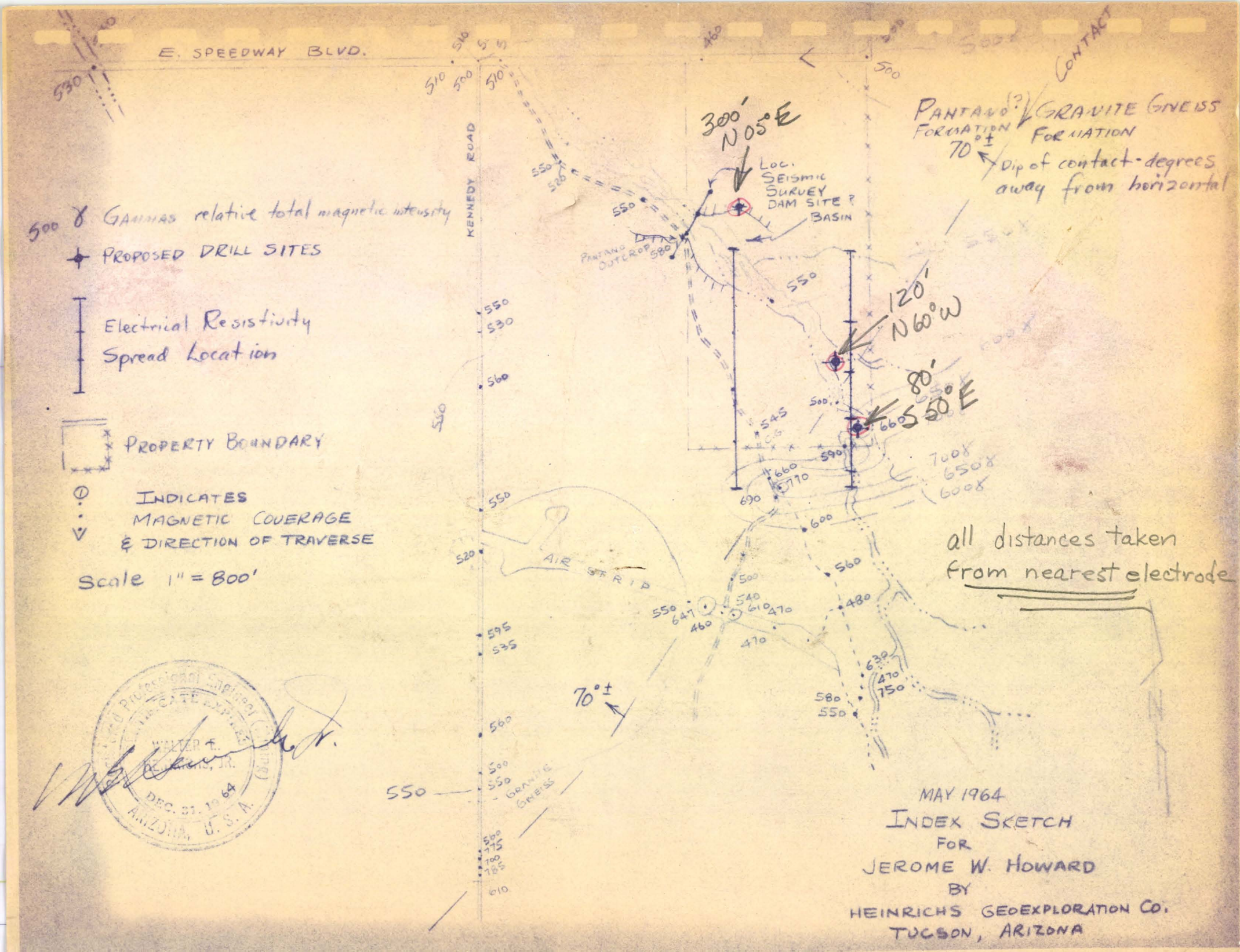
ARIZONA
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U. S. Route — State Route

RINCON VALLEY, ARIZ.
N3200—W11030/15
1957

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



MAY 1964
INDEX SKETCH
FOR
JEROME W. HOWARD
BY
HEINRICHS GEOEXPLORATION CO.
TUCSON, ARIZONA

HEINRICHS GEOEXPLORATION COMPANY

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

May 19, 1964

MAY 1964 GEOEX

Mr. Jerome W. Howard
6556 E. McNichols Road
Detroit, Michigan

Dear Mr. Howard:

This will confirm yesterday's telephone conversation with you and prior conversations with Mr. Jack Barry concerning water well site investigations in the E½ of the NW¼ of Section 10, T 14 S, R 16 E, G&SRB&M, Pima County, Arizona.

We have reviewed the factual data regarding water possibilities and problems in this area and as you know there have been many dry wells and most of those which were not dry have been very small producers--of the order of one gallon per minute or so--suitable for a family or two. Therefore, the probability for large wells in the area is not good. Technically, there are about three possibilities for water wells and these are: 1). Deeper gravel or alluvial zones which extend into the underlying tighter so called "red-beds" to a depth somewhat below the water table levels in the area. 2). An aquifer sand or gravel zone within or at the base of the red beds. 3). Fault zones or fissures.

We have been told that the main wash through the property cuts down into or very near the red beds. If this is the case, this would tend to reduce chances right in or nearby the wash itself. However, this is one of the better indicated possibilities as resulted in your excursion with Mr. Converse. Possibly a fault zone or fissure may be involved.

Our present schedule is to examine all of these possibilities on the ground this week and next week to conduct geophysical field investigations into the subsurface conditions. As stated to you over the phone, these results will be available by the end of next week.

Our services for this work will be charged on a daily fee basis plus expenses as follows: Local staff research, compilation and report---$100.00 per day; three man geophysical field crew at $250.00 per operating day; vehicles--$10.00 per day plus $0.10 per mile. From these figures we estimate an overall cost to you of approximately $1,500.00. Payment within ten days of receipt of billing, less 1%, or net 30 days. Our report to you would be in triplicate.

If this meets with your approval you may so indicate and we would appreciate your prompt return of one of the attached copies of this letter executed as provided below for your convenience.

Two copies of this letter are also being sent to your home address at 230 Moran Road, Grosse Point Farms, Michigan.

Sincerely yours,
HEINRICHS GEOEXPLORATION CO.

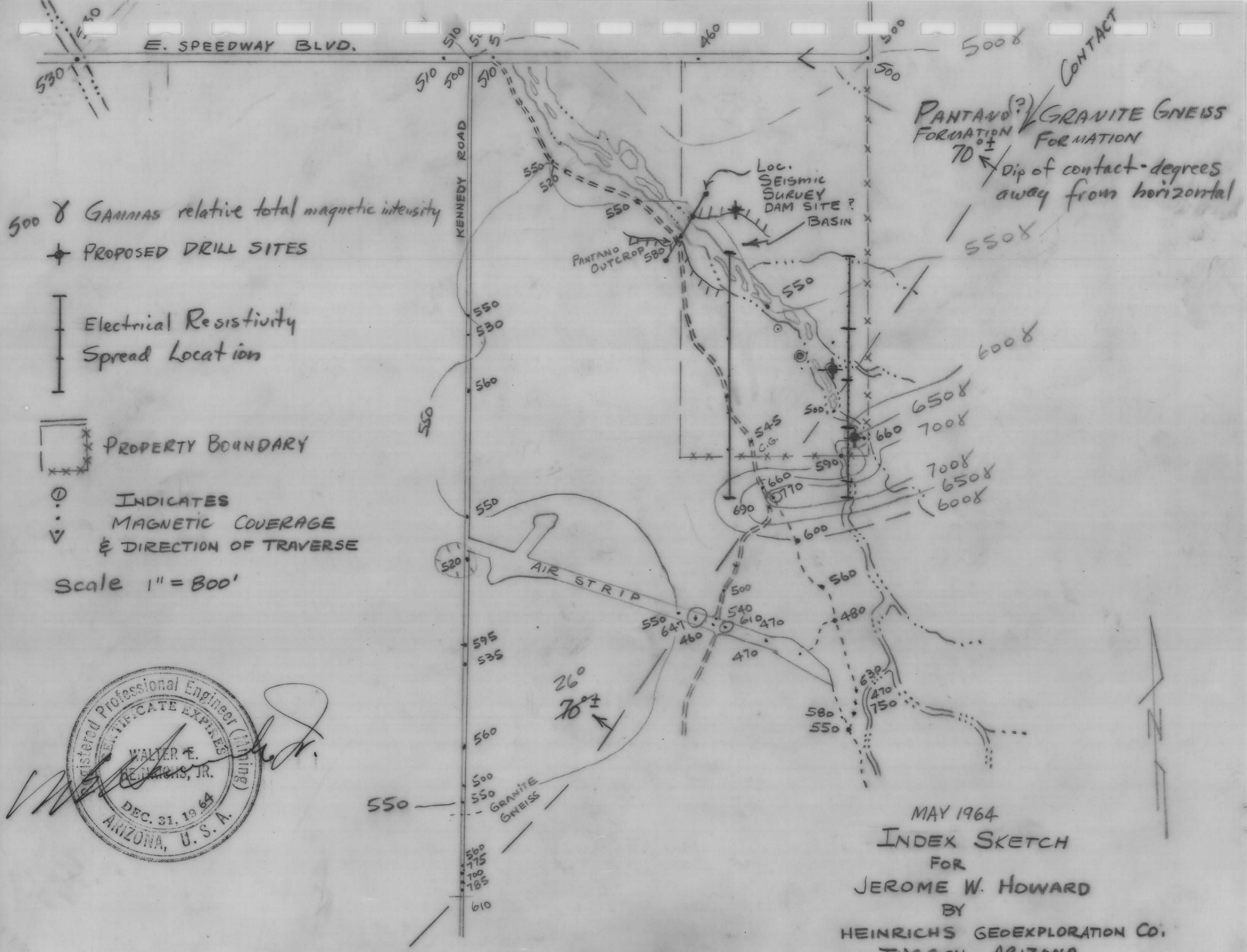
Walter E. Heinrichs, Jr.
President & General Manager

WEH:jh
cc: Extra Encl.

Date: May 21, 1964

By: Jerome W. Howard
Mr. J. W. Howard

MAY 1964 GEOEX



Registered Professional Engineer (Mining)
CERTIFICATE EXPIRES
WALTER E. HEINRICHS, JR.
DEC. 31, 1964
ARIZONA, U.S.A.

MAY 1964

INDEX SKETCH

FOR

JEROME W. HOWARD

BY

HEINRICHS GEOEXPLORATION CO.

TUCSON, ARIZONA