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Phone 2949966 Tucson Arizona

Michigan #

Tipton Mich
gen Delivery

January 27, 1966

Mr. Dell Hardy
5341 South Country Club
Tucson, Arizona

Dear Mr. Hardy:

At your request, Heinrichs Geoexploration Company conducted and completed an induced polarization survey in the Baboquivari Mountain Area, Pima County, on January 25, 1966.

One induced polarization line was run giving a total surface coverage of 9000' of which 5250' is subsurface plotted data. The line ran N50E and was centered at the drill hole on claim #1 of the Shamrock Claim group.

The selection of a 750' dipole separation was made to maximize ground coverage per unit time, data resolution, and probability of locating an economically sized porphyry-type sulfide body within about 800' of the surface.

The induced polarization measurements were made with the dual frequency technique on a dipole-dipole electrode configuration. The two frequencies used were 0.05 and 3.0 cycles per second.

The datum is presented on a sectional data sheet showing resistivity, percent frequency effect (PFE) and metallic conduction factor (MCF), contoured in section, and self potential (SP) in profile form. An induced polarization location and interpretation plan is also included.

Heinrichs personnel involved in the field work were John Langs, geophysicist; Ronald Plamer, Rex Montierth, and Harvey Durand, technical assistants. Interpretation, compilation, and report by the Geoex staff in Tucson, Arizona.

A very weak sulfide indication was noted approximately 1125' NE of center, probably resulting from a near surface narrow sulfide feature of less than 1% by volume sulfide. The 60

millivolt self potential (SP) low at approximately 750'NE also shows probable sulfide within about 300' of the surface. As locations are definite only to ± 1/2 dipole (± 325'), both the very weak I.P. anomalism and SP low are probably associated with the same feature. The I.P. does not indicate any increase in strength at depth. Additional SP reconnaissance is recommended as a fast and inexpensive way of detailing this feature for possible increased size, and/or strike length. A sharp resistivity contact is evident at approximately 3000' SW. This feature is probably due to a change in rock type.

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

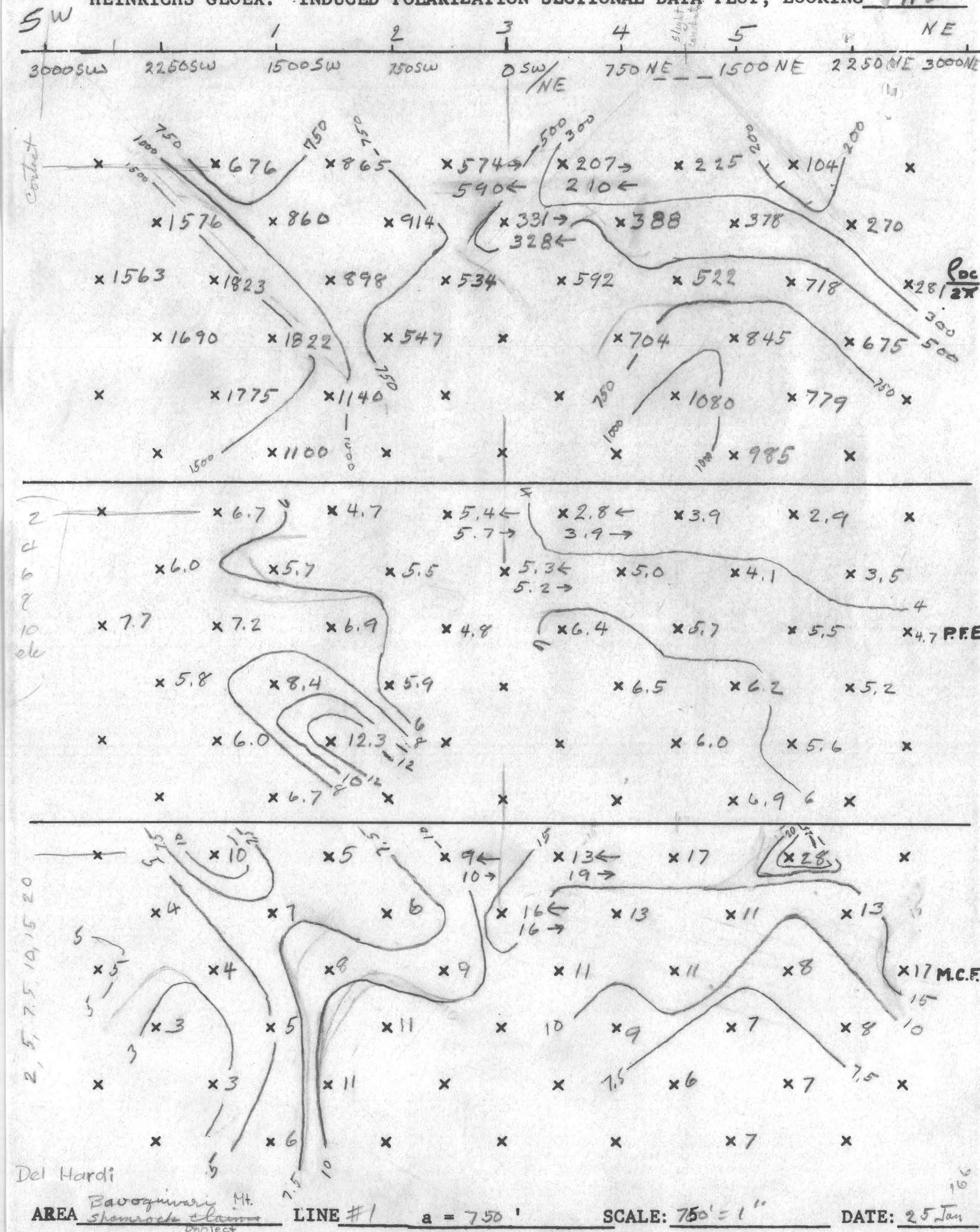
John W. Langs
Geophysicist

Registered Professional Engineer (Mining)
CERTIFICATE EXPIRES
WALTER E. HEINRICHS, JR.
No. 31
ARIZONA, U.S.

APPROVED _____

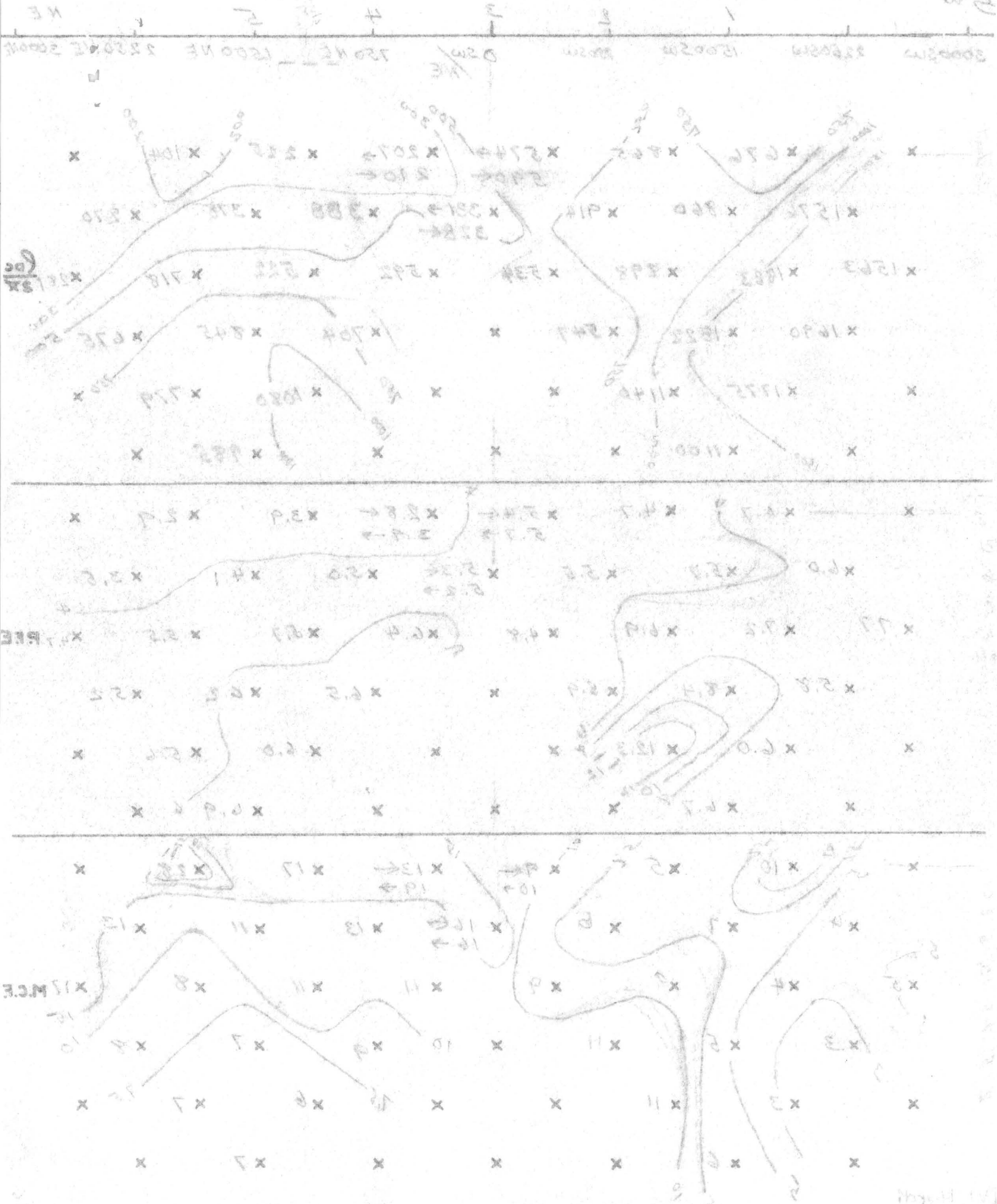
Walter E. Heinrichs, Jr.

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING NW



AREA Bavoquivari Mt. Shamrock claim project LINE #1 a = 750' SCALE: 750' = 1" DATE: 25 Jan 1966

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING



AREA _____ LINE _____ SCALE: _____ DATE: _____

INDUCED POLARIZATION SENDER NOTES

Project: SHAMROCK Line: I SW½ Date: 1-25-66

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Receive	SW 0-.75	SW .75-1.5	→	SW 1.5 2.25	→	→	SW 2.25 3.0	→	→	→	SW 3.0-3.75	→
Time												
Range												
Current	2000	2000	2000	1400	2000	2000	1200	1400	2000	2000	1200	1400

Send	3-4	4-5	1-2	2-3	3-4	4-5		2-3				
Receive	→	→	SW 3.75 4.25	→	→	→		CAL				
Time												
Range												
Current	2000	2000	1200	1400	2000	2000		1000				

INDUCED POLARIZATION SENDER NOTES

Project: Shamrock Line: I NE 1/2 Date: 1-25-66

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
Receive	0-.75 NE	.75 1.5 NE	→	1.5-2.25 NE	→	→	2.25-3.0	→	→	→	3-3.75 NE	—
Time												
Range												
Current	1200	1400	1200	2000	1400	1200	2000	2000	1400	1200	2000	2000
Send	2-3	1-2	4-5	3-4	2-3	1-2		3-4	3-4			
Receive	→	→	3.75 4.5 NE	→	→	→		CAL	CAL			
Time												
Range												
Current	1400	1200	2000	2000	1400	1200		1000	1000			

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: Shamrock Claims Line: 1 SW ½ Int.Cal ✓ Date: 25

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Rec.	0-750 SW	750-1500	→	15-2250 SW		→	22.5-3000			→	3000-3750	
~~Time~~ Range	300	1000	300	1000	300	100	1000	300	300	100	1000	300
DC-1	215 210	594 599 600 599	86 80	615 612 } 613.5	232 232 } 232	53.5 53.9 55.2 55.2	409 413	154 152	92 90	27.7 28.0		127 131
DC-2	210 215	600 595	80 87	612 615 } 613.5	232 231 } 231.5	55.2 55.2 54.1 52.8	413 409	152 152	90 92	28.0 27.3		131 128
Σ	212.5	597.5 599 599	83 83.5	613.5	231.75	54.3 54.5 54.6 54.0	411 411	153 152	91 91	27.9 27.6		129 129.5
DC-3	215 210	595 600	87 79	615 612 } 613.5	231 232 } 231.5	54.1 53.1 } 53.6	409 413	152 153		27.3 28.2	240 239	128 131
Dc-4		600 599				53.1 53.9 } 53.5		153 153		28.2 26.9	239 240	
Σ	212.5*	597.5 599.5 *	83.2*	613.5	231.5	53.55		152.5 153.5		27.75 27.55		129.5
DC-AV	212.5	598	83.2	613.5*	231.5*	54.1*	411*	152.6*	91*	27.7*	239.5	129.3*
AC-1	204	560	78	579	216	50.9	380	143	84	25.8	223	119
AC-2	204	560	78	577	217	51.0	360	143	84	25.8	223	118
Σ	204	560	78	578	216.5	50.95	380	143*	84	25.8	223	119
S. P.	+40	-8.7	→	+12	→	→	+9.5	→	→	→	+4.5	
AC-N	0	0				0	0					
		Top hill										

* - Slight I.P. Effect

Line 1

Centered at drill hole claim #1

Strike N50E

1-2 2-3 3-4 4-5

1200 1400 2000 2000

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Shamrock Del Hondy Line: 1 SW½ Int.Cal _____ Date: _____

Send	3-4	4-5	1-2	2-3	3-4	4-5		Cal				
Rec.	→	→	3750 945	→	→	→		2-3				
Time Range	300	100	300	100	100	30		300				
DC-1	90 94	32. 3.0 31.2 33.2	95 95	58.2 61.5	52.0 51.0	20.3 19.6 19.9 19.7		114 114 } 114				
DC-2	94 91	31.2 30.5	95 95	61.5 59.1	51.0 51.7	19.9 19.7		114 114 } 114				
Σ	92.0 92.5	33.2 33.2 31.7		59.75 60.3	51.5 51.35	20.15 19.65 19.8		114				
DC-3	91 93	30.5 33.0		59.1 61.0	51.7 51.0	19.7 20.4						
Dc-4		33.0 30.0		61.0 59.5		20.4 19.6						
Σ	92	33.5 33.0		59.55 60.25	51.35	20.0						
DC-AV	92.3+	33.0+	95	59.94	51.4	19.9		114				
AC-1	84	29	87	56.0	47.9	18.4		112				
AC-2	84	29	87	55.8	47.8	18.4		113				
Σ	84	29	87	55.9	47.85	18.4		112.5				
S. P.			-37									
AC-N		.4										
			0									

349 1.15
330

(349)(1200 718
598 2000 698

598 -107
560

212.5 2000
296
1400
146.5

1-2 (50.3)(1200
83.22 (2000)

(50.3) 83.2 .98 = 5
147.8 78.0

148
.9
4.3
4.9
249

INDUCED POLARIZATION - RECEIVER NOTES

PAGE _____

Project: Shamrock Dam Line: 1 # NE ½ Int.Cal _____ Date: 25 Ja

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
Rec.	0-250	150-1500	→	15 → 2287	→	→	225-3000	→	→	→	30-3750	→
Time	1000	300	100	1000	300	100	300	300	100	30	100	100
DC-1	342 344 354 356	146 147	49.5 51.2		72 70 68 67	36.2 36.2 34.9 34.5	106 105	96 97	35.2 37.0	21 21.9	67.9 67.8 68.2 69.5	69.5 77.0
DC-2	354 356 343 343	147 146	51.2 49.3	231 225	68 67 71 71	34.9 34.5 38 36.8	105 105	97 95	37.0 38.3	21.9 21.7	68.2 69.8 66.7 65.8	73.5 70.0
Σ	348 350 348.5 349.5		50.35 50.20	228	70 68.5 69.5 69.0	3.1 2.7 4.9 3.3	105 105	96.5 96	2.2 2.5 3.3	21.45	67.95	
DC-3	343 343 355 355	146 147	49.3 51.4	225 231	71 67	38 36.8 36.2 35.0		95 95	38.3 35.9 39.0 35.0	21.7 20.4	66.7 65.8 70.5 70.5	70.0 71.8 71.8 73.8
Dc-4	355 344			231 228	67 70	36.2 35.0 36.2 36.2			39.0 37.0 35.9 37.3	20.4 21.3	70.5 70.5 67.8 67.0	73.8 76.1 76.1 70.3
Σ	349 349 349.5		50.4	228 229.5	69 68.5	6.2 3.8 4.4 3.2		95	7.3 3.9 4.9 4.3	21.4	68.66	72.8
DC-AV	349	146.5	50.3	228.5	69.8	31.6 36.0	105	95.8	37.0	21.4	68.30	72.8
AC-1	330	141	47.8	220	66	33.9	102	92	35	20.1	66.0	69
AC-2	330	141	47.8	220	65	33.8	102	92	35	20.1	66.0	69
Σ	330	141	47.8	220	65.5	33.85	102	92	35	20.1	66	69
S. P.	-7.4	+27 →	→	+24 →	→	→	+9.6	→	→	→	+10.4	
AC-N	0	0 →	→	0 →	→	→						

30-37.50

1-2

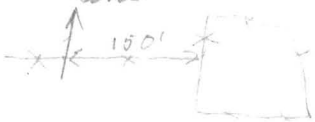
17.9
19.5
19.6
16.4
16.4
22.1
22.1
16.2
16.2
20.5
20.5
15.4
15.4
23.1

18.657

Fence Crosses line at

3950 NE

line



at 3600 NE

Fence crosses line

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Shamrock Del Hardy Line: 1 NE 1/2 Line 1 Int.Cal _____ Date: _____

2nd cal End of day cal

Send	2-3	1-2	4-5	3-4	2-3	1-2	1-2	3-4	3-4			
Rec.	→	→	3750+5	→	→	→	R=	300				
Time	100	30	100	100	30	30						
DC-1	28.2 29.0 31.0 30.0	20.1 21.1 21.7 15.8	28.8 28.3	33.5 35.0	15.4 16.3 15.9 15.6	11.1 8.8 7.9 12.8	9.1 9.2 13.0 13.0	11.5 114	115 114			
DC-2	31.0 30.0 30.0 29.0	21.7 15.8 16.2 19.2	28.3 29.5	35.0 33.3	15.9 15.4	11.9 8.6 9.2 12.8	13.0 13.0 9.2 9.4	114 114	114 114			
Σ	29.77	18.95										
DC-3	3.0 29.0 32.5 30.1	16.2 19.2 17.2 21.0	29.5 28.5	33.3 35.0	15.4 16.3	9.2 8.6 11.8 11.6		114 114	114 114			
Dc-4	32.5 30.1 29.0 28.0	17.2 21.0 20.4 17.9	28.5 29.0			11.8 11.6 8.8 9.1						
Σ	30.15	18.76										
DC-AV	29.96	18.76	28.8	34.18	15.78	10.69		114				
AC-1	28.2	17.6	27.5	32.5	14.9	10		114	114			
AC-2	28.2	17.8	27.5	32.5	15.0	10		114	114			
Σ	28.2	17.7	27.5	32.5	14.95	10						
S. P.			-.6									
AC-N												

HP

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Shamrock Del Hardy Line 1 NE½ Field date 25 Jan Data page_____ Comp. date 26 Jan. Comp by JWL

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-750NE	750-1500	→	15-2250	→	→	2250-3000	→	→	→	3000-3750	→
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	1.2	1.4	1.2	2	1.4	1.2	2	2	1.4	1.2	2	2
(E) Vdc (avg) ①	349	146.5	50.3	228.5	68.8	36.0	105	95.8	37.0	21.4	68.30	72.8
(F) DCcal	.8772	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	2.25	2.25	9	2.25	9	22.5	2.25	9	22.5	45	9	22.5
(H) ρdc=ExFxGx10^3/D	574	206.5	331	225	388	592	104	378	522	704	270	718
(I) Vac Σ 2	330	141	47.8	220	65.5	33.85	102	92	35	20.1	66	69
(J) AC noise x 2												
(K) Vac(corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1	→	→	→	→	→	→	→	→	→	→	→
(M) ρdc/ρac=ExL/K	1057	1039	1052	1039	1050	1064	1029	1041	1057	1065	1035	1055
(N) PFE=(M-1)(10^2)	5.7	3.9	5.2	3.9	5.0	6.4	2.9	4.1	5.7	6.5	3.5	5.5
(O) MCF=(M-1)(10^5)/H	10	19	16	17	13	11	28	11	11	9	13	8

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		Cal				
(B) Receive	→	→	3750-4500	→	→	→						
(C) n separation	4	5	3	4	5	6						
(D) I	1.4	1.2	2	2	1.4	1.2		1000				
(E) Vdc (avg)	29.96	18.76	28.8	34.18	15.78	10.69		114				
(F) DCcal	→	→	→	→	→	→		.8772				
(G) Kn x 10^{-3}	45	78.75	22.25	45	78.75	126						
(H) ρdc=ExFxGx10^3/D	845	1080	281	675	779	985						
(I) Vac Σ	28.2	17.7	27.5	32.5	14.95	10		114				
(J) AC noise x 2												
(K) Vac (corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		1				
(M) ρdc/ρac =ExL/K	1062	1060	1047	1052	1056	1069						
(N) PFE=(M-1)(10^2)	6.2	6.0	4.7	5.2	5.6	6.9						
(O) MCF=(M-1)(10^5)/H	7	6	17	8	7	7						

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Shamrock Del Hardy Line 1 SW½ Field date 25 Jan Data page_____ Comp. date 26 Jan. Comp by J.W.L

(A) Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
(B) Receive	0-750SW	750-1500SW	→	1500-2250	→	→	2250-3000	→	→	→	30-3750	→
(C) n separation	1	1	2	1	2	3	1	2	3	4	2	3
(D) I	2,000	2,000	2,000	1,400	2,000	2,000	1,200	1,400	2,000	2,000	1,200	1,400
(E) Vdc (avg) ①	212.5	598	83.2	613.5	231.5	54.1	411	152.6	91	27.7	239.5	129.3
(F) DCcal	.8772	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	2.25	2.25	9	2.25	9	22.5	2.25	9	22.5	45	9	22.5
(H) ρ dc=ExFxGx10^3/D	209.7	590.1	328.4	864.9	913.8	533.9	676	860.5	898	546.7	1576	1823
(I) Vac Σ ②	204	560	78	578	216.5	50.95	380	143	84	25.8	223	119
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.9868											
(M) ρ dc/ρac=ExL/K	1.0279	1.0538	1.0526	1.0474	1.0552	1.0478	1.0673	1.0569	1.0691	1.0595	1.0598	1.0722
(N) PFE=(M-1)(10^2)	02.8	05.4	5.3	4.7	5.5	4.8	6.7	5.7	6.9	5.9	6.0	7.2
(O) MCF=(M-1)(10^5)/H	13	9	16	5	6	9	10	7	8	11	4	4

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

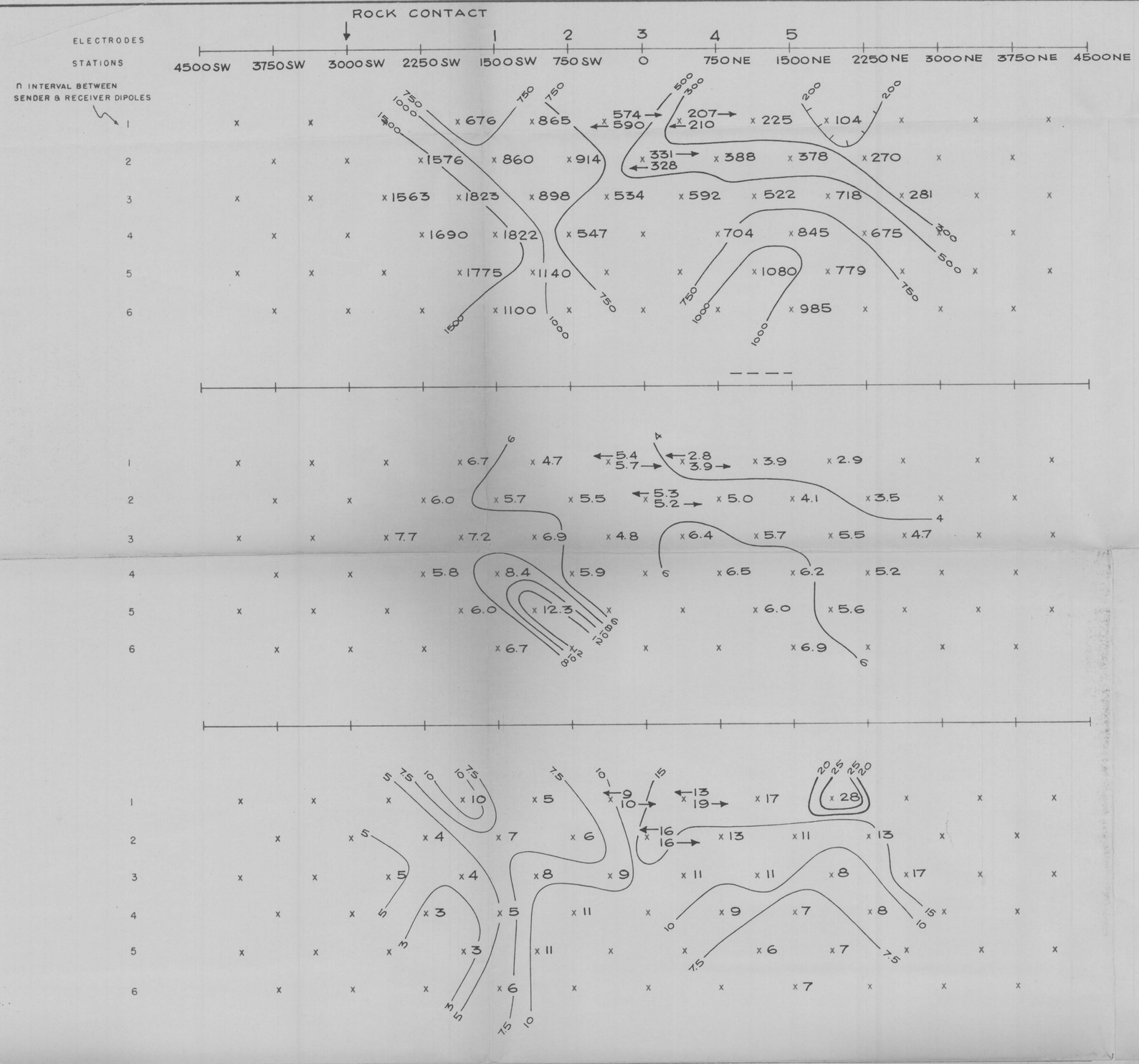
(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		Cal				
(B) Receive	→	→	3750-4500	→	→	→		2-3				
(C) n separation	4	5	3	4	5	6						
(D) I	2,000	2,000	1,200	1400	2,000	2,000		1000				
(E) Vdc (avg)	92.3	33.0	95	59.94	51.4	19.9		114				
(F) DCcal	→	→	→	→	→	→		.8772				
(G) Kn x 10^{-3}	45	78.75	22.5	45	78.75	126						
(H) ρ dc=ExFxGx10^3/D	1822	1140	1563	1690	1775	1100						
(I) Vac Σ	84	29	87	55.9	47.85	18.4		112.5				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.								.9868				
(M) ρdc/ρac =ExL/K	1.0843	1.1229	1.0775	1.0581	1.0600	1.0673						
(N) PFE=(M-1)(10^2)	8.4	12.3	7.7	5.8	6.0	6.7						
(O) MCF=(M-1)(10^5)/H	5	11	5	3	3	6						

1140 | 1000

Location:

Line strikes N50E and

is centered at drill hole on claim #1, Shamrock claim group, Pima county, Arizona



EXPLANATION

ELECTRODE ARRAY: 750' — n x 750' — 750'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NW

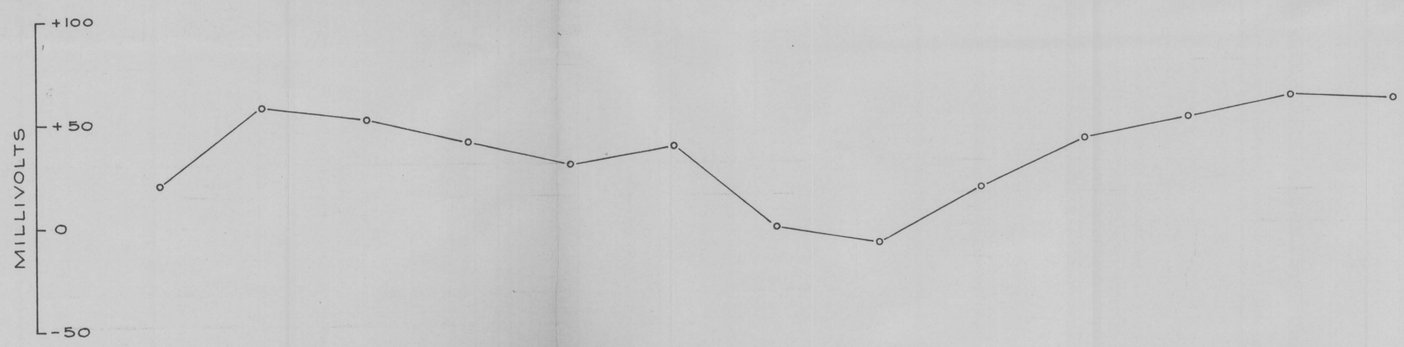
SHAMROCK PROJECT
BABOQUIVARI MT. AREA
PIMA COUNTY, ARIZONA

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 750' DATE: JAN. 1966

FOR
DELMER HARDY
&
GROVER BINGHAM

SELF POTENTIAL



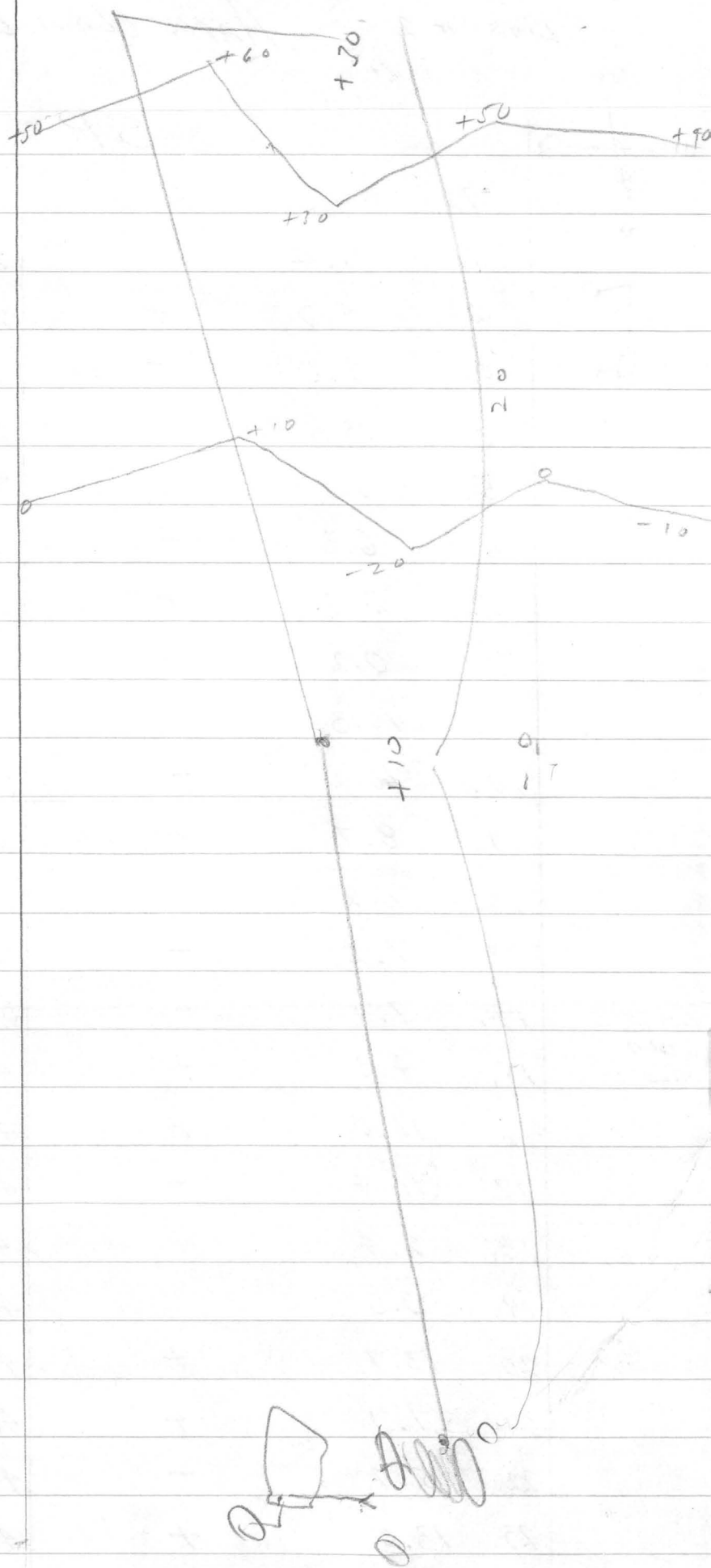
LOCATION:
LINE 1 STRIKES N50°E AND IS CENTERED AT DRILL HOLE ON CLAIM #1, SHAMROCK CLAIMS, PIMA COUNTY, ARIZONA.

NORTH

50 FT SPACING TO HERE

600 FT SPACING

STA.	MV	SIGN
51.	11.2	—
52.	15.7	+
53.	11.2	+
54.	12.5	+
55.	4.2	—
56.	2.6	—
57.	0.9	+
58.	2.4	—
59.	6.6	—
60.	5.0	+
61.	12.0	—
62.	15.4	+
63.	17.0	—
64.	END OF LINE	
65.		
66.		
67.		
68.		
69.		
70.		

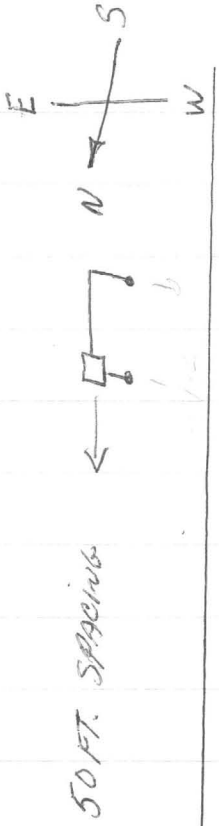


8 AM. NOV. 19. 1966

LINE # 2

HAPPY CLAIM LEASE GROUP

DEL. HARDY
GROVER BINGHAM



SP

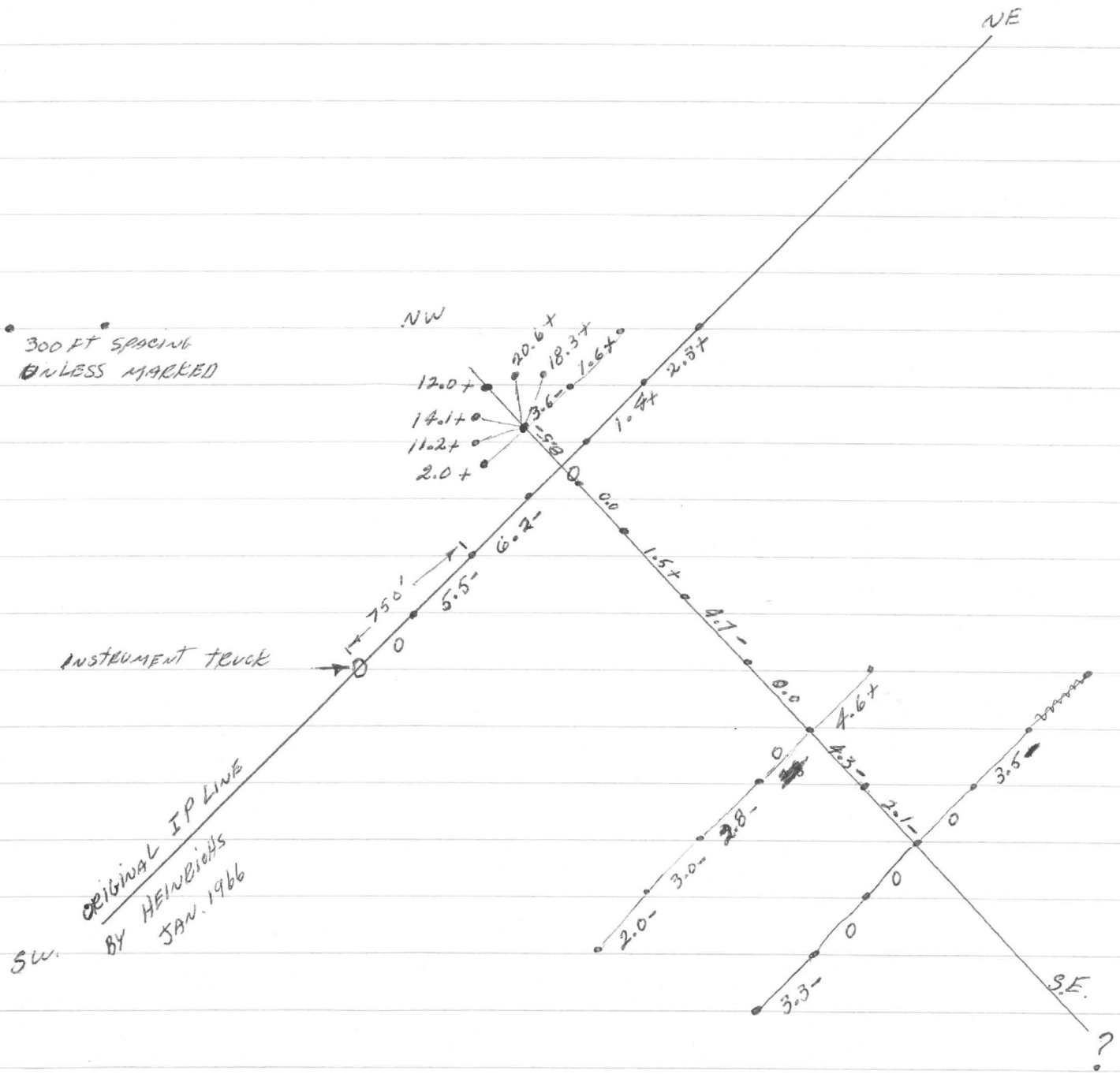
STA.	MV	SIGN		STA	MV	SIGN	
1.	9.4	+	9.4	26.	1.4	−	
2.	5.0	+	14.4	27.	0.8	+	
3.	5.0	−	9.4	28.	14.7	+	
4.	13.5	+	22.9	29.	10.0	−	
5.	0.0		22.9	30.	7.5	+	
6.	6.3	−	16.6	31.	1.7	+	
7.	3.1	+	19.7	32.	17.4	−	
8.	0.2	+	19.9	33.	12.1	+	
9.	10.3	+	30.2	34.	0.1	+	
10.	10.2	−	20.0	35.	3.5	−	CENTER SADDLE
11.	8.7	+	28.7	36.	5.4	+	
12.	11.2	+		37.	9.0	+	
13.	7.2	+		38.	1.6	−	
14.	7.1	−		39.	7.4	−	
15.	4.3	+		40.	16.4	+	
16.	11.0	+		41.	8.3	+	
17.	11.4	+		42.	7.6	−	
18.	2.4	+		43.	3.0	−	
19.	0.0			44.	6.1	+	
20.	13.7	+		45.	1.2	+	
21.	1.1	+		46.	4.7	+	
22.	5.7	−		47.	4.4	−	
23.	13.0	+		48.	1.1	+	
24.	4.0	−		49.	2.8	+	
25.	8.0	+		50.	6.0	+	

OLD MINE

SHAMROCK CLAIM GROUP

DEL. HARDY
& GROVER BINGHAM

NOV. 21. 1966

SP. TESTS

POLARITY IS CORRECT.