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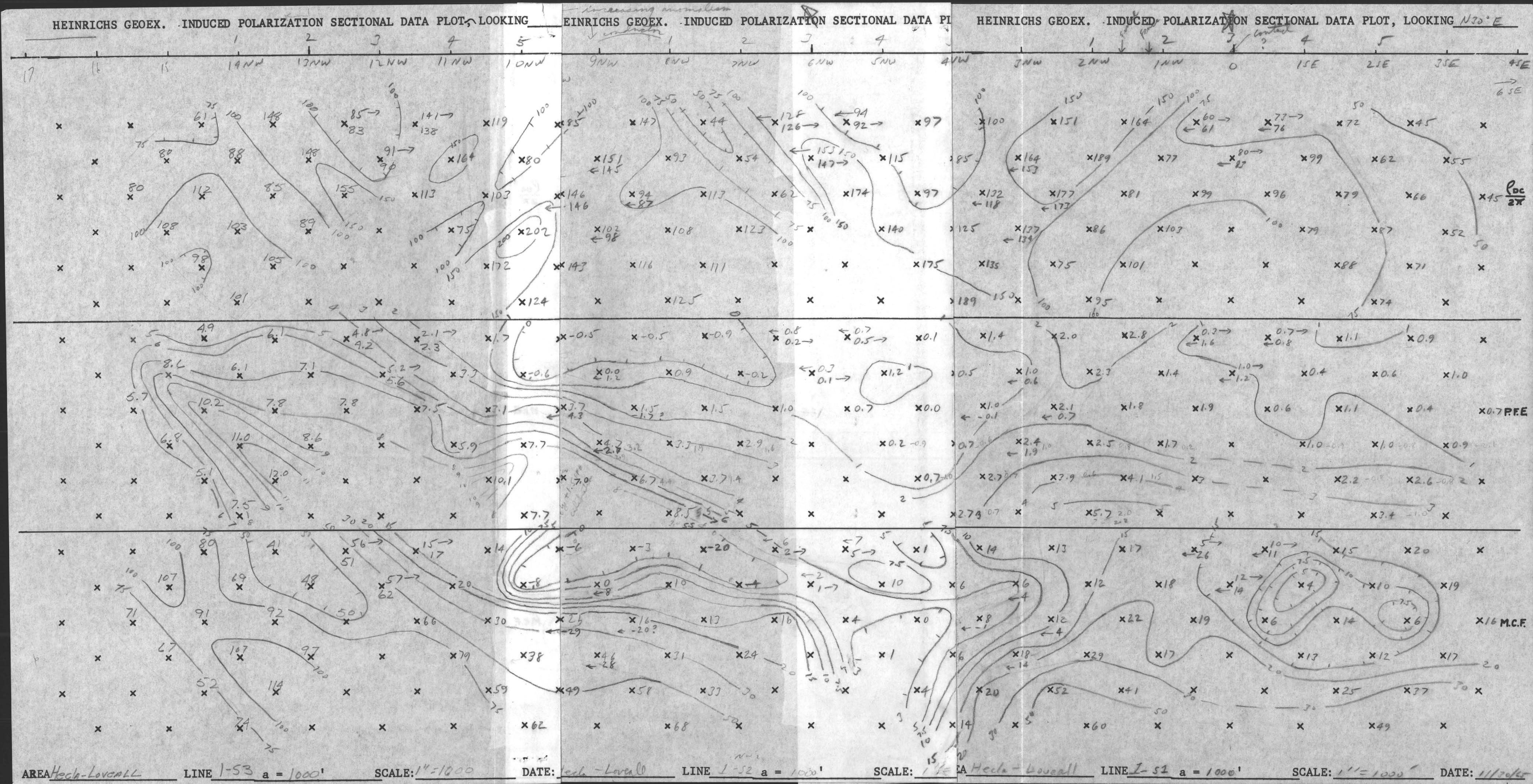
HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N30°E



AREA Hecla-Loveall LINE 1-53 a = 1000' SCALE: 1" = 1000 DATE: Hecla - Loveall LINE 1-52 a = 1000' SCALE: 1" = AREA Hecla - Loveall LINE 1-51 a = 1000' SCALE: 1" = 1000' DATE: 11/20/65

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 1

Project: Mecla Loveall Line: NW½ 1 - Spr. 1 Int.Cal _____ Date: 11/29/65

Send	4-5	3-4	4-5	2-3	2-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3
Rec.	0-1 NW	1-2 NW	→	2-3 NW	→	→	3-4 NW	→	→	→	4-5 NW	→
~~Amp~~ Time	300	100	30	300	30	30	300	100	30	10	100	30
DC-1	83.5 82.5	65.0 68.0	22.6 22.6	182	21.3 21.4	11.2 11.2	111 111	51.8 51.8	9.1	5.90 5.97	29.7	19.6
DC-2	83.5 84.0	67.8 67.8	23.2 22.2	182	21.2 21.3	10.7 10.6	111 111	52.2 52.2	8.9	5.97 5.83	30.7	19.6
Σ	167 163.5	135.8 135.8	45.8 45.8	364	42.5 42.7	21.9 21.9	222 222	104.0 104.0	18.0	11.37 11.30	60.4	39.2
DC-3	83.5	67.8	23.2	182	21.2 21.3	10.7 10.6	111	52.2	8.9 9.1	5.83 5.82 5.94 5.60	30.7	19.6
Dc-4	83.5	68.0	22.6	182	21.4 21.6	11.2 11.3	111	51.8	9.1 8.9	5.98 5.60 5.82 5.79	29.7	19.6
Σ	167	135.8	45.8	364	42.6 42.9	21.9 21.9	222	104.0	18.0 18.0	11.31 11.42 11.27 11.34	60.4	39.2
DC-AV	167.1	135.8	45.8	364	42.6	21.9	222	104.0	18.0	11.33	60.4	39.20
AC-1	83	66.6	22.6	177	21.0	10.8	108.5	50.9	8.85	5.58	29.9	19.20
AC-2	83	66.9	22.6	177	21.0	10.7	109.0	50.8	8.85	5.58	29.9	19.15
Σ	166.0	133.5	45.2	354	42.0	21.5	217.5	101.7	17.7	11.16	59.8	38.35
S. P.	+1.3	-21.6	→	-6.9	→	→	-17.5	→	→	→	-15.0	→
AC-N	.15	.05	→	.05	→	→	.05	→	→	→	.04	→
F.C.	97	97	→	97	→	→	97	→	→	→	97	→

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 2

Project: Heck Lovendl Line: 1-51 - NW½ Int.Cal _____ Date: 11/29/65

Send	1-4	4-5	1-2	2-3	3-4	4-5		C A6				
Rec.	→	→	5-6 NW	→	→	→		2-3				
~~Time~~ Range	10	10	30	30	3	3		300				
DC-1	4.55 4.00 4.96 5.12	3.05 3.38 3.35 3.41	10.0 9.9 9.9 9.7	7.8 6.9 6.9 8.3	2.15 2.18 2.65 2.55	1.78 1.74 1.93 2.04		111				
DC-2	4.96 5.12 4.53 4.26	3.35 3.46 3.22 3.63	9.8 9.7 9.7 9.8	7.2 8.3 8.2 6.9	2.65 2.55 2.21 2.10	1.93 2.04 1.80 1.65		110				
Σ	9.51 9.52 9.49 9.72	6.40 6.84 6.57 6.28	19.8 19.6 19.1 19.5	15.0 15.2 15.1 15.2	4.80 4.75 4.86 4.65	3.71 3.83 3.73 3.69		221				
DC-3	4.53 8.44 5.01 4.90	3.22 2.63 2.89 3.23	9.8 9.8 9.7 9.6	7.2 7.3 7.9 8.2	2.21 2.10 2.53 2.58	1.80 1.65 1.92 2.05		110				
Dc-4	5.00 4.90 4.44 4.40	2.89 3.23 3.38 3.53	9.4 9.6 9.6 9.9	7.9 8.2 7.3 6.9	2.53 2.58 2.11 2.18	1.92 2.05 1.76 1.71		111				
Σ	9.53 9.34 9.45 9.30	6.11 6.06 6.27 6.76	19.2 19.6 19.5 19.5	15.1 15.3 15.2 15.1	4.74 4.68 4.64 4.76	3.72 3.70 3.68 3.76		221				
DC-AV	9.43	6.41	19.45	15.17	4.73	3.73		221				
AC-1	4.60	3.08	9.60	7.4	2.28	1.77		110				
AC-2	4.60	3.07	9.65	7.4	2.27	1.76		111				
Σ	9.20	6.15	19.25	14.80	4.55	3.53		221				
S. P.	→	→	-19.8	→	→	→						
AC-N	→	→	.05	→	→	→						
I.C.	→	→	97	→	→	→						

INDUCED POLARIZATION SENDER NOTES

Project: Loveall Line: 1 w 1/2 Date: 11-29-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	3A	3A	3A	3A	3A	3A	2A	3A	3A	3A	2A	3A
Send	3/4	4/5	1/2	2/3	3/4	4/5			cal. 2/3			
Receive	→	→	→	→	→	→						
Time												
Range												
Current	3A	3A	2A	3A	3A	3A			1000			

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 3

Project: Hecla Loveall Line: 1-51-5E ½ (N60°W-S60°W) Int.Cal Date: 11/29/65

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.	0-15E	1-25E	→	2-35E	→	→	3-45E	→	→	→	4-55E	→
~~Time~~ Range	100	300	30	300	100	10	100	30	30	10	30	30
DC-1	46.3 46.5	83	15.4 14.8	83.5	28.8	7.40 7.57 7.06 6.80	51.0	17.8 17.6	8.9 9.2	3.06 3.19 2.93 2.82	14.8 14.8	8.7 7.0 6.3 8.1
DC-2	45.3 45.7	84	15.0 15.6	81	27.7	7.08 6.80 7.60 7.77	51.3	17.7 17.7	9.2 8.9	2.93 2.82 3.00 3.20	16.2 16.7	6.3 8.1 8.9 7.0
Σ	91.6 91.8	167	30.4 30.4	164.5	56.5	14.48 14.47 14.66 14.57	102.3	35.5 35.3	18.1 18.1	5.99 6.01 5.99 6.03	31.0 31.5	15.0 15.1 15.2 15.1
DC-3	45.3 45.3	84	15.0 15.6	81	27.7 28.7	7.60 7.73 7.05 6.69	51.3	17.7 17.7	8.9	2.98 3.21 2.97 2.85	16.2 14.3 16.7 16.3	7.2 8.0
Dc-4	46.5 46.5	83	15.5 14.8	83.5	28.7 27.8	7.05 6.69 7.77 7.67	51.6	17.7 17.6	9.2	3.00 2.82 3.5 3.19	14.4 16.3 14.8 14.6	8.0 7.0
Σ	91.8 91.8	167	30.5 30.4	164.5	56.4 56.5	14.65 14.62 14.78 14.56	102.3	35.4 35.2	18.1	5.96 6.03 6.12 6.04	31.0 30.1 31.5 30.9	15.2 15.0
DC-AV	91.8	167	30.4	164.5	56.5	14.60	102.3	35.4	18.1	6.01	31.2	15.1
AC-1	45.0	81.5	14.8	80	27.7	7.13 +	49.9	17.3	8.8	2.92	15.2	7.4
AC-2	45.0	81.5	14.8	80	27.6	7.15	49.9	17.3	8.8	2.93	15.2	7.4
Σ	90.0	163	29.6	160.0	55.3	14.28	99.8	34.6	17.6	5.85	30.4	14.8
S. P.	-28.5	-3.0	→	-19.3	→	→	-13.2	→	→	→	-16.8	→
AC-N	.05	.05	→	.04	→	→	.03	→	→	→	.03	→
F.C.	97	97	→	97	→	→	97	→	→	→	97	→

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 4

Project: Hecla Loveall Line: 1-51-SE ½ Int.Cal _____ Date: 11/29/45

Send	2-3	1-2	4-5	3-4	2-3	1-2		CDL				
Rec.	→	→	5-6SE	→	→	→		3-4				
~~Time~~ Range	10	3	10	10	3	3		300				
DC-1	5.17 5.32 4.85 4.62	1.98 2.15 1.90 1.84	5.00 5.20 5.21 5.01	3.10 2.57	2.29 2.51 2.26 4.98	.98 1.07		114	Pot	check		
DC-2	4.85 0.57 5.04 5.20	1.90 1.60 1.932.29	5.25 5.07 5.04 5.25	2.95 3.06	2.292.06 2.39 2.68	1.02 .93		114	—	15.4		
Σ	10.02 9.89 9.89 9.82	3.88 3.75 3.83 3.83	10.25 10.27 10.25 10.26	6.05 5.97	4.56 4.58 4.65 4.68	2.00 2.00		228				
DC-3	5.06 5.17 4.70 4.80	2.03 2.02 1.77 1.63	5.02 5.23 5.17 5.20	2.95 2.96 3.00 3.10	2.40 2.63 2.27 1.95	.93 .89		114	corr	15.14		
Dc-4	4.73 4.84 5.18 5.18	1.76 1.22 2.02 2.21	5.17 5.13 5.22 5.15	2.00 3.05 2.99 2.87	2.22 1.97 2.40 2.63	1.07 .91		114				
Σ	9.79 9.97 9.88 9.98	3.79 3.94 3.79 3.64	10.39 10.36 10.39 10.35	5.95 6.01 5.99 5.97	4.62 4.60 4.63 4.58	2.00 2.00		228				
DC-AV	9.90	3.81	10.30	5.99	4.61	2.00		228				
AC-1	4.82	1.83	5.03	2.92	2.21	.95		112				
AC-2	4.81	1.83	5.03	2.92	2.21	.95		112				
Σ	9.63	3.66	10.06	5.84	4.42	1.90		224				
S. P.	→	→	-22.2	→	→	→						
AC-N	→	→	.03	→	→	→						
I.C.	→	→	97	→	→	→						

INDUCED POLARIZATION SENDER NOTES

Project: Lowell Line: 1 E 1/2 Date: 11-29-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	2A	3A	2A	3A	3A	2A	3A	3A	3A	2A	3A	3A
Send	2/3	1/2	4/5	3/4	2/3	1/2		dal				
Receive	→	→	→	→	→	→		3/4				
Time												
Range												
Current	3A	2A	3A	3A	3A	2A		1A				

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 1

Project Hecla - Loveall Line 1 - S1 - NW½ Field date 11/29/65 Data page 1 & 2 Comp. date 11/30/65 Comp by C.S.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	0-1 NW	1-2 NW	→	2-3 NW	→	→	3-4 NW	→	→	→	4-5 NW	→
(C) n separation												
(D) I	3000	→	→	→	→	→	2000	3000	→	→	2000	3000
(E) Vdc (avg)	167.1	135.8	45.8	364	42.6	21.9	222	104.0	18.0	11.33	60.4	39.20
(F) DCcal	0.453	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	3	3	12	3	12	30	3	12	30	60	12	30
(H) ρ dc=ExFxGx10^3/D	75.7	61.4	82.9	164	77.1	99.0	151	189	81.4	103	164	177
(I) Vac Σ	166.0	133.5	45.2	354	42.0	21.5	217.5	101.7	17.7	11.16	59.8	38.35
(J) AC noise x 2	0.K											
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.000	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1.008	1.016	1.012	1.028	1.014	1.019	1.020	1.023	1.018	1.017	1.010	1.021
(N) PFE=(M-1)(10^2)	0.8	1.6	1.2	2.8	1.4	1.9	2.0	2.3	1.8	1.7	1.0	2.1
(O) MCF=(M-1)(10^5)/H	11	26	14	17	18	19	13	12	22	17	6	12

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	→	→	5-6 NW	→	→	→		2-3				
(C) n separation												
(D) I	→	→	2000	3000	→	→		1000				
(E) Vdc (avg)	9.43	6.41	19.45	15.17	4.73	3.73		221				
(F) DCcal	→	→	→	→	→	→		.453				
(G) Kn x 10^{-3}	60	105	30	60	105	168						
(H) ρ dc=ExFxGx10^3/D	85.5	101	132	137	75.0	94.5						
(I) Vac Σ	9.20	6.15	19.25	14.80	4.55	3.53		221				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		1.000				
(M) ρdc/ρac =ExL/K	1.025	1.041	1.010	1.024	1.039	1.057						
(N) PFE=(M-1)(10^2)	2.5	4.1	1.0	2.4	3.9	5.7						
(O) MCF=(M-1)(10^5)/H	29	41	8	18	52	60						

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 2

Project Hecla-Loveall Line L-S1-SE½ Field date 11/29/65 Data page 3 & 4 Comp. date 11/30/65 Comp by C.S.L. & D.W.L.

(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	0-1SE	1-2SE	→	2-3SE	→	→	3-4SE	→	→	→	4-5SE	—
(C) n separation												
(D) I	2000	3000	2000	3000	3000	2000	3000	→	→	2000	3000	—
(E) Vdc (avg)	91.8	167	30.4	164.5	56.5	14.60	102.3	35.4	18.1	6.01	31.2	15.1
(F) DCcal	.438	—	—	—	—	—	—	—	—	—	—	—
(G) Kn x 10^{-3}	3	3	12	3	12	30	3	12	30	60	12	30
(H) ρ dc=ExFxGx10^3/D	60.3	73.2	80.0	72.0	99	960	44.8	620	793	78.9	54.7	66.1
(I) Vac Σ	90.0	163	29.6	160.0	55.3	14.28	99.8	34.6	17.6	5.85	30.4	14.8
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.983	—	—	—	—	—	—	—	—	—	—	—
(M) ρ dc/ρac=ExL/K	1003	1007	1010	1011	1004	1006	1009	1006	1011	1010	1010	1004
(N) PFE=(M-1)(10^2)	.3	.7	1	1.1	.4	.6	.9	.6	1.1	1	1	.4
(O) MCF=(M-1)(10^5)/H	5	10	12	15	4	6	20	10	14	13	19	6

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

(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		C4L				
(B) Receive	→	→	5-6SE	→	→	→		3-4				
(C) n separation												
(D) I	→	2000	3000	→	→	2000		1000				
(E) Vdc (avg)	9.90	3.81	10.30	5.99	4.61	2.00		228				
(F) DCcal	—	—	—	—	—	→		.438				
(G) Kn x 10^{-3}	60	105	30	60	105	168						
(H) ρ dc=ExFxGx10^3/D	86.6	87.5	45.1	52.4	70.6	73.5						
(I) Vac Σ	9.63	3.66	10.06	5.84	4.42	1.90		224				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	—	—	—	—	—	→		.983				
(M) ρdc/ρac =ExL/K	1010	1022	1007	1009	1026	1034						
(N) PFE=(M-1)(10^2)	1	2.2	.7	.9	2.6	3.4						
(O) MCF=(M-1)(10^5)/H	12	25	16	17	37	49						

INDUCED POLARIZATION - RECEIVER NOTES PAGE 1

Project: Hecla Loveall Line: 1 Spr II N60°W Int.Cal _____ Date: 11-29-65

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	6-7000	7-8000 →		8-9000	→		9000-10,000	→				
Time	300	300	100	100	30	10	300	30	30	10		
DC-1	107.0	145.0	42.8	49.8	15.5	7.20 7.10	110.0	26.1	12.5 13.0	7.15 7.00		
DC-2	106	144.5	43.8	49.5	15.1	6.85 7.00	112.0	26.0	12.5 13.0	6.82 6.82		
Σ	106.8	144.8	43.3		15.3	7.18 4.85	111.0			7.35		
DC-3	106.	145	42.5	49.8	15.5	7.00 7.05	111.0	26.5 26.5		6.82 7.20		
Dc-4	107.5	144.5	43.8	49.5	15.1	7.08 6.98	111.0	26.4 26.2		6.80 7.18		
Σ	106.8	144.8	43.2		15.3		111.0		12.75			
DC-AV	106.6	144.8	43.2	49.65	15.3	7.03	111.0	26.3	12.75	6.97		
AC-1	104.0	141.0	42.4	49.2	15.05	6.85	109.5	25.6	12.35	6.65		
AC-2	"	"	42.2	"	"	6.82	"	"	12.32	"		
Σ	104.0	141.0	42.3	49.2	15.05	6.835	109.5	25.6	12.33	6.65		
S. P.	-18.3	-23.4		-17.9			-14.7					
AC-N	.05	.10		.05			.04					

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: Loveall Line: 1 spr2 Int.Cal _____ Date: 11-29-65

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		2-3		
Rec.	10-11000	→	→	→	11-12000	→	→	→		CAL		
Time	100	30	10	10	30	10	10	3		300		
DC-1	85.0 86.0	10.7 10.6	6.00 6.00	3.42 3.80	10.9 10.9	5.55 5.92	3.60 3.85	2.46 2.45		113		
DC-2	83.0 88.0	10.7 10.6	6.40 5.95	3.30 4.00	10.7 11.5	5.62 5.92	3.75 3.75	2.59 2.33		113		
Σ	85.5		6.08 6.25	3.35 3.82	10.4 11.4	5.88 5.65	3.78 3.60	2.44 2.73		113		
DC-3			5.95 6.28	3.38 3.60	10.4 11.7	5.90 5.90	4.00 3.55	2.51 2.77		113.		
Dc-4			5.82 6.42	3.82 3.20	10.0 11.7	5.78 5.68	4.20 3.30	2.20 2.85		113		
Σ	85.5	10.65					3.78	2.53				
DC-AV	85.5	10.65	6.10	3.57	10.98	5.78	3.75	2.52		113		
AC-1	84.0	10.30	5.80	3.38	10.4	5.42	3.45	2.28		118.0		
AC-2	"	"	"	"	"	"				111.0		
Σ	84.0	10.30	5.80	3.38	10.4	5.42	3.45	2.28		111		
S. P.	-20.9				-21.1							
AC-N	.04				.04							

INDUCED POLARIZATION SENDER NOTES

Project: Hecla Lovell Line: 1 Spd. 2 w/2 Date: 11-30-65

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	→	→		→		→	→			→	→	
Time												
Range												
Current	3A	3A	3A	3A	3A	3A	2A	3A	3A	3A	2A	3A
Send	3/4	4/5	1/2	2/3	3/4	4/5		cal.				
Receive	→	→	→	→	→	→		2/3				
Time												
Range												
Current	3A	3A	2A	3A	3A	3A		1A				

INDUCED POLARIZATION - RECEIVER NOTES PAGE 1

Project: Hecla Loveall Line: 1 Spr R 560 E Int.Cal Date: 11-30-65

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	6-5000	5-4000	→	4-3000	→	→	3-2000	→	→	→		
Time	300	300	100	300	100	30	300	30	30	10		
DC-1	96.0	105.0	28.2	111.0	33.0	13.2 13.6	114.0	24.5	11.3 10.7	5.58 4.85		
DC-2	95.5	105.5	27.8	111.0	32.5	12.9 13.4	114.0	23.9	11.5 10.8	5.50 5.40		
Σ	95.8	105.25	28.0		32.8	12.9 13.6	114.0	24.20	11.2 11.0	5.50 5.18		
DC-3	96.0	105.0	28.5	111.0	32.2	12.8 13.7	114	24.5	11.5 10.7	5.62 5.10		
Dc-4	95.5	105.5	27.5	111.0	33.2	12.5 13.6	114	24.0	11.4 10.8	5.50 5.05		
Σ	95.8		28.0	111.0	32.7		114.0	24.25				
DC-AV	95.8	105.25	28.0	111.0	32.75	13.22	114.0	24.22	11.09	5.33		
AC-1	94.0	104.0	27.5	109.0	31.8	12.9	110.5	23.7	10.9	5.22		
AC-2	94.0	104.0	27.5	"	"	"	110.5	"	"	5.25		
Σ	94.0	104.0	27.5	109.0	31.8	12.9	110.5	23.7	10.9	5.23		
S. P.	-24.3	-25.2		-8.8			-23.0					
AC-N	.08	.06		.05			.06					

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: Loveall Line: 1 sprR 560E Int.Cal _____ Date: 11-30-65

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		3-4		
Rec.	2-1000	→	→	→	1000-0	→	→	→		CAL		
Time	100	30	10	10	30	10	10	3		300		
DC-1	43.5	13.2 13.5	7.15 7.10	3.75 3.82	19.5 19.7	6.90 8.42	4.28 4.55	2.40 2.61		114.0		
DC-2	43.5	13.2 13.6	7.25 7.20	4.00 3.98	20.1 19.3	7.60 7.95	3.70 4.92	2.46 2.65		114.0		
Σ	43.5	13.5 13.5	6.98 7.00	3.72 3.58	19.7 19.8	7.00 7.90	4.00 5.08	2.50 2.60				
DC-3	43.5	13.6 13.4	7.08 7.25	3.75 3.92	20.4 19.9	7.65 7.88	3.68 5.45	2.80 2.62		114.0		
Dc-4	43.5	13.4 13.3	7.20 7.20	3.75 3.65	19.9 19.4	7.28 8.00	3.60 4.80	2.62 2.51		114.0		
Σ												
DC-AV	43.5	13.42	7.14	3.79	19.77	7.66	4.41	2.57		114.0		
AC-1	42.8	13.20	6.95	3.70	19.3	7.38	4.22	2.46		112.0		
AC-2	42.5	13.20	6.98	"	"	7.40	"			112.0		
Σ	42.5	13.20	6.97	3.70	19.3	7.39	4.22	2.46		112.0		
S. P.	-21.9				-20.9							
AC-N	.06				.06							

INDUCED POLARIZATION SENDER NOTES

Project: Hecla-Loveall Line: 1 Spd. 2 E 1/2 Date: 12-1-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	2A	3A	2A	3A	3A	2A	3A	3A	3A	2A	3A	3A
Send	2/3	1/2	4/5	3/4	2/3	1/2		cal.				
Receive	→	→	→	→	→	→		3/4				
Time												
Range												
Current	3A	2A	3A	3A	3A	3A		1A				

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

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Project Hecla - Lovcall Line 1-52-NW½ Field date 11/30/65 Data page _____ Comp. date 12/1/65. Comp by C.S.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	6-7NW	7-8NW	→	8-9NW	→	→	9-10NW	→	→	→	10-11NW	→
(C) n separation												
(D) I	3000	→	→	→	→	→	2000	3000	→	→	2000	3000
(E) Vdc (avg)	106.6	144.8	43.2	49.65	15.30	7.03	111.0	26.3	12.75	6.97	85.50	10.65
(F) DCcal	.885	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	3	3	12	3	12	30	3	12	30	60	12	30
(H) ρdc=ExFxGx10^3/D	94	128	153	44	54	62	147	93	113	123	151	94
(I) Vac Σ	104.0	141.0	42.3	49.20	15.05	6.835	109.5	25.6	12.32	6.65	84.0	10.30
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.982	→	→	→	→	→	→	→	→	→	→	→
(M) ρdc/ρac=ExL/K	1.007	1.008	1.003	.991	.998	1.010	.995	1.009	1.015	1.029	1.000	1.015
(N) PFE=(M-1)(10^2)	0.7	0.8	0.3	-0.9	-0.2	1.0	-0.5	0.9	1.5	2.9	0.0	1.5
(O) MCF=(M-1)(10^5)/H	7	6	2	-20	-4	16	-3	10	13	24	0	16

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	→	→	11-12NW	→	→	→		2-3				
(C) n separation												
(D) I	→	→	2000	3000	→	→		1000				
(E) Vdc (avg)	6.10	3.57	10.98	5.78	3.75	2.52		11.3				
(F) DCcal	→	→	→	→	→	→		.885				
(G) Kn x 10^{-3}	60	105	30	60	105	168						
(H) ρdc=ExFxGx10^3/D	108	111	146	102	116	125						
(I) Vac Σ	5.80	3.38	10.4	5.42	3.45	2.28		111				
(J) AC noise x 2	1.033	1.037	1.037	1.047	1.067	1.085						
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		.982				
(M) ρdc/ρac =ExL/K	→	→	→	→	→	→						
(N) PFE=(M-1)(10^2)	3.3	3.7	3.7	4.7	6.7	8.5						
(O) MCF=(M-1)(10^5)/H	31	33	25	46	58	68						

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

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Project Hecla - Lovell Line 1-S pr. 2-SE½ Field date 12/1/65 Data page _____ Comp. date 12/2/65. Comp by C.S.L.

(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	6-5NW	5-4NW	→	4-3NW	→	→	3-2NW	→	→	→	2-1NW	→
(C) n separation												
(D) I	2000	3000	2000	3000	→	2000	3000	→	→	2000	3000	→
(E) Vdc (avg)	95.8	105.3	28.0	111.0	32.75	13.22	114.0	24.22	11.09	5.33	43.5	13.42
(F) DCcal	.877	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	3	3	12	3	12	30	3	12	30	60	12	30
(H) ρ dc=ExFxGx10^3/D	126	92	147	97	115	174	100	85	97	140	153	118
(I) Vac Σ	94.0	103.0	27.5	109.0	31.80	12.90	110.5	23.3	10.9	5.23	42.5	13.20
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.983	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1.002	1.005	1.001	1.001	1.012	1.007	1.014	1.005	1.000	1.002	1.006	.999
(N) PFE=(M-1)(10^2)	0.2	0.5	0.1	0.1	1.2	0.3	1.4	0.5	0.0	0.2	0.6	-0.1
(O) MCF=(M-1)(10^5)/H	2	5	1	1	10	4	14	6	0	1	4	-1

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	→	→	1-0NW	→	→	→		3-4				
(C) n separation												
(D) I	→	2000	3000	→	→	2000		1000				
(E) Vdc (avg)	7.14	3.79	19.77	7.66	4.41	2.57		114.0				
(F) DCcal	→	→	→	→	→	→		.877				
(G) Kn x 10^{-3}	60	105	30	60	105	168						
(H) ρ dc=ExFxGx10^3/D	125	175	173	134	135	189						
(I) Vac Σ	6.97	3.70	19.30	7.39	4.22	2.46		112.0				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		.983				
(M) ρdc/ρac =ExL/K	1.007	1.007	1.007	1.019	1.027	1.027						
(N) PFE=(M-1)(10^2)	0.3	0.3	0.3	1.9	2.3	2.3						
(O) MCF=(M-1)(10^5)/H	6	4	4	14	20	14						

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: Loreall Line: 1 Spr 3 S60E Int.Cal Date:

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		3-4		
Rec.	8-7000			→	7-6000			→		CAL		
Time	100	30	30	10	30	10	10	3				
DC-1	34.5 34.5	16.7 16.5	11.4 11.6	5.65 5.58	8.50 8.10	5.58 5.58	4.38 4.95	2.36 2.57		114.0		
DC-2	34.5 34.5	16.7 16.5	11.4 11.6	5.80 5.40	8.60 8.00		4.40 4.90	2.50 2.54		114.0		
Σ					8.30	5.58						
DC-3				5.55 5.65		5.55 5.55	4.85 4.45	2.38 2.75		114.0		
Dc-4				5.90 5.30			4.18 5.20	2.15 2.90		114.0		
Σ	34.5	16.6	11.5		8.30	5.55						
DC-AV				5.60		5.56	4.66	2.52				
AC-1	33.5	15.7	10.5	5.00	8.30	5.32	4.28	2.30		110.5		
AC-2	"	15.6	"	"	"	"	"	"		110.5		
Σ		15.65										
S. P.	+100.0				+50.1							
AC-N	.05											

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INDUCED POLARIZATION - RECEIVER NOTES PAGE 1

Project: Hecla Lovejoy Line: 1 spr 3 S60°E Int.Cal 98.0 Date: 12-6-65

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	12-10000	11-10000	→	10-9000	→	→	9-8000	→	→	→		
Time	300	300	30	300	100	30	300	30	30	10		
DC-1	96.0	160.0	26.2 25.8	135.0	46.0 47.5	12.7 13.0	80	22.6	11.6	4.60 3.95		
DC-2	97.0	161.0	26.4 25.6	136.0	46.0 47.5	12.6 13.1	82	22.8	11.9	4.75 3.85		
Σ	96.5	160.5	26.0	135.5			81.0	22.7	11.75			
DC-3	97.0	160.0		135.0			80	22.6	11.6	4.80 3.80		
Dc-4	96.0	161.0		136.0			82	22.8	11.9	4.82 3.80		
Σ	96.5	160.5	26.0	135.5	46.75	12.85	81.0	22.7	11.75			
DC-AV										4.30		
AC-1	90.0	155.0	24.4	131.0	44.5	11.8	80.0	22.45	11.2	4.00		
AC-2	91.0	154	24.2	"	"	11.7	"	"	"	3.98		
Σ	90.5	154.5	24.3			11.75						
S. P.	+0.3	-34.2		+130.8			+251.6					
AC-N	.05	.05		.04			.03					

P	a	1,5-00
12		
30		
60		
105		
168		

INDUCED POLARIZATION SENDER NOTES

Project: Hecla-Lovecall Line: 1 Spd.3 E1/2 Date: 12-6-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	3A	3A	3A	3A	3A	3A	2.5	3A	3A	3A	2.5	3A
Send	2/3	1/2	4/5	3/4	2/3	1/2		cal				
Receive	→	→	→	→	→	→		3/4				
Time												
Range												
Current	3A	3A	2.5	3A	3A	3A		1A				

198

202

INDUCED POLARIZATION - RECEIVER NOTES PAGE 3

Project: Hecla LOVEALL Line: L Sp3 N60°W Int.Cal 97.5 Date: 12-7-65

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	12-1300	13-1400	→	14-1500	→	→	15-16	→	→	→		
Time	300	300	30	300	100	30	100	30	30	10		
DC-1	132.0	95.0	21.8	168.0	42.2	15.1 14.4	70.0	24.3	9.3	4.18 4.28		
DC-2	130.0	95.0	21.1	169.0	42.2	14.95 14.50	69.5	26.3	10.1	4.18 4.18		
Σ	131.0	95.0	21.45	168.5	42.2		69.75	25.3	9.70			
DC-3	131.0	95.0	21.9	168.0	42.5	15.20 14.25	70.5	25.2	9.3	4.12 4.42		
Dc-4	130.5	95.0	21.1	169.0	42.2	15.10 14.50	69.5	25.5	10.1	4.18 4.18		
Σ	130.75		21.50		42.35		70.0	25.35	9.70			
DC-AV	130.9	95.0	21.48	168.5	42.3	14.75	69.9	25.33	9.70	4.22		
AC-1	126.0	89.5	20.0	156.0	38.8	13.50	65.5	23.45	8.80	3.82		
AC-2	125.5	"	"	"	"	13.40	"	"	8.90	"		
Σ	125.7	89.5	20.0	156.0	38.8	13.45	65.5	23.45	8.85	3.82		
S. P.	+3.5	+11.1		-7.7			+32.6					
AC-N	.07	.06		.06			.04					

57.3
69.6

INDUCED POLARIZATION - RECEIVER NOTES PAGE 4

Project: LOVEALL Line: 1 Spr 3 11/60°W Int.Cal _____ Date: 12-7-65

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		2-3		
Rec.	16-17000	→	→	→	17-18000	→	→	→		CAL		
Time	30	30	10	3	30	10	10	3		300		
DC-1	22.1	12.7	5.80 5.85	2.80 2.94	8.7 9.6	6.22 6.05	3.32 3.08	1.74 1.80		114.0		114
DC-2	23.3	12.9	5.75 6.05	2.65 3.15	8.5 9.8	6.15 6.20	3.42 2.85	1.46 1.83		114.0		114
Σ	22.7	12.8				5.80 6.60	3.22 3.32	1.67 1.72				
DC-3	22.9	12.6	5.75 5.90	2.92 2.59	8.1 10.1	6.12 6.22	3.00 3.40	1.65 1.80		114.0		114.0
Dc-4	22.4	12.9	5.70 6.00	2.94 2.81	7.9 10.4	6.18 6.30	3.30 3.00	1.66 1.75		114.0		114.0
Σ	22.65	12.75										
DC-AV	22.68	12.78	5.85	2.85	9.14	6.18	3.19	1.71				
AC-1	20.50	11.4	5.18	2.50	8.5	5.68	2.98	1.56		110.5		110.5
AC-2	"	"	"	"	"	5.70	"			"		
Σ	20.50	11.40	5.18	2.50	8.50	5.69	2.98	1.56				INT.CAL
S. P.	-2.6				+12.7							97.0
AC-N	.04				.05							

INDUCED POLARIZATION SENDER NOTES

Project: Heda-Loveall Line: 1 Spd. 3 W 1/2 Date: 12-7-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	2.5	3.0	2.5	3.0	3.0	2.5	3.0	3.0	3.0	2.5	3.0	3.0
Send	3/4	4/5	1/2	2/3	3/4	4/5		cal. 2/3				
Receive	→	→	→	→	→	→						
Time												
Range												
Current	3.0	2.5	3.0	3.0	3.0	2.5		1.0				

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

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Project Hecla - Loveall Line 1 - Spr. 2-SE Field date 12/6/65 Data page _____ Comp. date 12/7/65. Comp by C.S.L.

(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
(B) Receive	12-11 AW	11-10 SE	→	10-9 SE	→	→	9-8 SE	→	→	→		
(C) n separation												
(D) I amps	3	3	3	3	3	3	2.5	3	3	3		
(E) Vdc (avg)	96.5	160.5	26.0	135.5	46.75	12.85	81.0	22.7	11.75	4.30		
(F) DCcal	.877	→	→	→	→	→	→	→	→	→		
(G) Kn x 10^{-3}	3	3	12	3	12	30	3	12	30	60		
(H) ρ dc=ExFxGx10^3/D	85	141	91	119	164	113	8.5	80	103	75		
(I) Vac Σ	90.5	154.5	24.3	131.0	44.50	11.75	80.0	22.45	11.20	3.99		
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. USED	.983	→	→	→	→	→	→	→	→	→		
(M) ρ dc/ρac=ExL/K	1048	1021	1052	1017	1033	1075	.995	.994	1031	1059		
(N) PFE=(M-1)(10^2)	4.8	2.1	5.2	1.7	3.3	7.5	-.5	-.6	3.1	5.9		
(O) MCF=(M-1)(10^5)/H	56	15	57	14	20	66	-6	-8	30	79		

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

(A) Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		CAL		
(B) Receive	8-7 SE	→	→	→	7-6 SE	→	→	→		3-4		
(C) n separation												
(D) I	2.5	3	3	3	2.5	3	3	3		1000		
(E) Vdc (avg)	34.5	16.6	11.5	5.60	8.30	5.56	4.66	2.52		114.0		
(F) DCcal	→	→	→	→	→	→	→	→		.877		
(G) Kn x 10^{-3}	12	30	60	105	30	60	105	168				
(H) ρ dc=ExFxGx10^3/D	145	146	202	172	87	98	143	124				
(I) Vac Σ	33.5	15.65	10.5	5.00	8.30	5.32	4.28	2.30		110.5 ?		
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→	→	→		~~.962~~	use .983	
(M) ρdc/ρac =ExL/K	1012	1043	1077	1101	.983	1027	1070	1077				
(N) PFE=(M-1)(10^2)	1.2	4.3	7.7	10.1	-1.7	2.7	7.0	7.7				
(O) MCF=(M-1)(10^5)/H	8	29	38	59	-20	28	49	62				

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page 8

Project Hecla-Lovell Line 1-Spr. 3-NW Field date 12/7/65 Data page _____ Comp. date 12/7/65. Comp by C.S.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	12-13NW	13-14NW	→	14-15NW	→	→	15-16NW	→	→	→	16-17NW	→
(C) n separation												
(D) I amps 3	2.5	3	2.5	3	3	2.5	3	3	3	2.5	3	3
(E) Vdc (avg) 2	130.9	95.0	21.48	168.5	42.3	14.75	69.9	25.33	9.70	4.22	22.65	12.78
(F) DCcal	.877	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3} 1	3	3	12	3	12	30	3	12	30	60	12	30
(H) ρ dc=ExFxGx10^3/D →	138	83	90	148	148	155	61	88	85	89	80	112
(I) Vac Σ →	125.7	89.5	20.0	156.0	38.8	13.45	65.5	23.45	8.85	3.82	20.50	11.40
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal. USED	.983	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1.023	1.024	1.056	1.061	1.071	1.078	1.049	1.061	1.078	1.086	1.086	1.102
(N) PFE=(M-1)(10^2) →	2.3	4.2	5.6	6.1	7.1	7.8	4.9	6.1	7.8	8.6	8.6	10.2
(O) MCF=(M-1)(10^5)/H →	17	51	62	41	48	50	80	69	92	97	107	91

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

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		2-3				
(B) Receive	→	→	17-18NW	→	→	→		CAL				
(C) n separation												
(D) I	3	2.5	3	3	3	2.5		1.000				
(E) Vdc (avg)	5.85	2.85	9.14	6.18	3.19	1.71		114.0				
(F) DCcal	→	→	→	→	→	→		.877				
(G) Kn x 10^{-3}	60	105	30	60	105	168						
(H) ρ dc=ExFxGx10^3/D	103	105	80	104	98	101						
(I) Vac Σ	5.18	2.50	8.50	5.69	2.98	1.56		110.5				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		~~.969~~	.983			
(M) ρdc/ρac =ExL/K	1.110	1.120	1.057	1.068	1.051	1.075						
(N) PFE=(M-1)(10^2)	11.0	12.0	5.7	6.8	5.1	7.5						
(O) MCF=(M-1)(10^5)/H	107	114	71	63	52	74						

.983
.969

HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5671 TUCSON, ARIZONA

DATE OUT 11-26-58

I. P INVENTORY

DATE IN _____

CREDIT CARDS _____

VEHICLE No: GMC

CREW No: _____

	MAJOR COMPONENTS	GEOX NO.	DESCRIPTION
2	SENDER	Mk 2B 5643 sm	— Madden
	RECEIVER		
1	CURRENT MONITOR	4643 M	
✓	GENERATOR MONITOR		
1	GENERATOR	5 & 5	
1	SIMPSON METER	#1	
1	BATTERY CHECKER (EICO) BATTERIES	#1	
	TRANSCEIVERS		
4	POROUS POTS		
5	REELS		
2	REEL HANDLES		
1	AUTO REELER W/V BELTS	✓	
✓	WIRE 8000'		

MISC. EQUIPMENT & SUPPLIES

✓	RESISTOR (CALIBRATED)	✓	P. POT CONTAINER
	CAPACITORS	✓	SATURATED $CuSO_4$ JUG
	CONNECTOR LEADS	✓	TARP
✓	A) GENERATOR TO MONITOR	✓	RAGS
✓	B) MONITOR TO SENDER	✓	OIL FOR GENERATOR
✓	C) POT LEADS (2)	✓	300' CHAIN
	~~HATCHET~~	✓	JUMPER CABLES
1	PICK	✓	TOOL BOX
1	G PICK	✓	FOIL
2	SHOVELS	✓	$CuSO_4$ CRYSTALS
1	FUNNEL	✓	SALT
X	5 GAL. GAS SPOUT	✓	FLAGGING
1	5 GAL. WATER CANS (DRINKING)		BRUNTON COMPASS
	SPARE PARTS BOX - FUSES (SENDER & RECEIVER)		~~CANTEENS~~
		✓	WATER CAN PACK BOARDS
		✓	ELECTRICAL TAPE
		✓	SOLDERING IRON - SOLDER
		✓	STEEL WOOL.

ALSO:

	SECTIONAL DATA SHEETS
	RECEIVER NOTES
	SENDER NOTES
	COMPUTATION SHEETS
	TIME TICKETS
	CREW SHEETS
	INDUSTRIAL COMMISSION FORMS
	STATIONERY
	NOTE PADS
	CLIP BOARD

RECEIVED BY Ron Palmer for Day Anderson

PROJECT Hecla (Sasabe)

CARTER'S

Midnight

CARTER'S

Midnight

MADE IN U.S.A.

CARTER'S

Midnight

CARTER'S

Midnight

HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5671 TUCSON, ARIZONA

DATE OUT 11-26-58

I. P INVENTORY

DATE IN _____

CREDIT CARDS

VEHICLE No: GMC

CREW No:

	MAJOR COMPONENTS		GEOX NO.	DESCRIPTION
2	SENDER	Mk 28	5643 SM	- Madlen
	RECEIVER			
1	CURRENT MONITOR		4648 M	
✓	GENERATOR MONITOR			
1	GENERATOR		5 & 5	
1	SIMPSON METER		#1	
1	BATTERY CHECKER (EICO) BATTERIES		#1	
	TRANSCEIVERS			
4	PORCUS POLES			
5	REELS			
2	REEL HANDLES			
1	AUTO REELER W/ REELS		✓	
✓	WIRE 8000'			

	MISC. EQUIPMENT & SUPPLIES		
✓	RESISTOR (CALIBRATED)	✓	POT CONTAINER
	CAPACITORS	✓	SATURATED $CuSO_4$ JUG
	CONNECTOR LEADS	✓	TAPE
✓	A) GENERATOR TO MONITOR	✓	RAGS
✓	B) MONITOR TO SENDER	✓	CABLE FOR GENERATOR
✓	C) POT LEADS (2)	✓	100' CHAIN
	~~ATTACHE~~	✓	JUMPER CABLES
1	PICK	✓	TOOL BOX
1	C PICK	✓	TOOL
2	SHOVELS	✓	$CuSO_4$ CRYSTALS
1	FUNNEL	✓	SALT
X	5 GAL. GAS SPOUT	✓	FLAGGING
1	5 GAL. WATER CANS (DRINKING)		BRUNTON COMPASS
	SPARE PARTS BOX - FUSES (SENDER & RECEIVER)		~~CANTEENS~~
		✓	WATER CAN RACK BOARDS
		✓	ELECTRICAL TAPE
		✓	SOLDERING IRON - SOLDER
	ALSO:	✓	STEEL WOOL.
	SECTIONAL DATA SHEETS		
	RECEIVER NOTES		
	SENDER NOTES		
	COMPUTATION SHEETS		
	TIME TICKETS		
	CREW SHEETS		
	INDUSTRIAL COMMISSION FORMS		
	STATIONERY		
	NOTE PADS		
	CLIP BOARD		

RECEIVED BY Ron Palmer for Day Anderson

PROJECT Herla (Sawyer)

INDUCED POLARIZATION - RECEIVER NOTES PAGE 1

Project: Hecla Lovell Line: 2 Spr1 N55W Int.Cal 98.0 Date: 12-2-65

Send	4-5	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5		
Rec.	0-1500	15-3000	→	3-1500	→	→	45-60	→	→	→		
Time	100	300	30	100	30	10	100	30	10	10		
DC-1	65.8	86.0	11.9 12.0	44.5	10.2 10.6	3.60 3.00	51.0 48.8	14.5 13.9	6.55 6.45	2.82 3.10		
DC-2	65.8	84.0	11.5 12.2	43.9	10.6 9.7	3.50 3.30	52.0 48.0	14.8 13.8	6.05 7.00	2.78 3.00		
Σ		85.0	11.0	44.2	10.5 10.8	3.10 3.88			6.20 6.25	3.45 2.22		
DC-3	65.8	85.0	12.7 11.9	44.5	10.0 10.0	2.92 3.00	50.0 50.0	14.5 13.7	6.45 6.38	2.80 3.60		
Dc-4	65.8	83.0	10.9 12.9	43.9	10.7 10.3	3.95 3.00	49.5 50.5	14.6 13.2	6.00 7.00	3.00		
Σ		84.0		44.2								
DC-AV	65.8	84.5	11.89	44.2	10.34	3.32	50.0	14.13	6.43	2.99		
AC-1	65.0	84.0	11.8	43.8	10.05	3.20	49.5	13.9	6.10	2.80		
AC-2	65.0	"	"	"	"	"	"	"	6.05	2.78		
Σ	65.5	84.0	11.8	43.8	10.05	3.20	49.5	13.9	6.17	2.79		
S. P.	+11.4	+2.2		+12.0			+6.6					
AC-N	.07	.08		.05	.08		.06	.10				

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: Lovell Line: 2 Spr 1-1155W Int.Cal _____ Date: 12-2-65

Send	1-2	2-3	3-4	4-5	1-2	2-3	3-4	4-5		2-3 (1)	(3)	
Rec.	60-75	→		→	75-90	→		→		CAL		
Time	30	30	10	10	10	10	10	3		300		
DC-1	21.5 21.3	10.3 9.4	5.82 6.20	2.95 2.40	8.80 7.85	5.72 4.98	3.75 3.55	1.65 1.82		112.5		
DC-2	22.4 20.0	11.0 9.4	4.42 6.50	2.38 2.80	9.45 7.35	5.78 4.72	3.82 3.50	1.60 1.90		112.5		
Σ		10.8 9.2	6.18 5.42	2.42 2.30	9.88 7.10	5.62 5.00	3.62 3.35	1.60 2.10		112.5		
DC-3	22.6 20.3	10.5 9.6	5.85 6.25	2.62 2.18	8.62 8.15	5.98 4.55	3.82 3.28	1.44 1.44		112.5		
Dc-4	22.9 20.6	10.2 10.2	5.12 6.78	2.80 2.18	9.18 7.45	6.05 4.35				112.5		.98?
Σ										112.5		
DC-AV	21.45	10.06	5.80	2.52	8.38	5.27	3.59	1.722		112.5		
AC-1	20.5	9.5	5.45	2.40	8.10	5.05	3.40	1.65		113.0		
AC-2	"	"	"	"	"	"	"	1.64		113.0		
Σ	20.5	9.50	5.45	2.40	8.10	5.05	3.40	1.64		113.0		
S. P.	+15.4				+23.4							
AC-N	.10				.08	.12						

↑.15 DC

ICPS-AC

INDUCED POLARIZATION SENDER NOTES

Project: Hecla-Lovcall Line: 2 Spd. 1 w/2 Date: 12-2-65

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	→	→	→	→	→	→	→	→	→	→	→	→
Time												
Range												
Current	3A	3.5A	3A	3.5A	3.5A	3A	3A	3.5A	3.5A	3A	3A	3.5A
Send	3/4	4/5	1/2	2/3	3/4	4/5		cal.				
Receive	→	→	→	→	→	→		2/3				
Time												
Range												
Current	3.5A	2.5A	3A	3A	3A	2A		1A				

INDUCED POLARIZATION - RECEIVER NOTES PAGE 3

Project: Flecla Lovell Line: 2 Spr/ 555E Int.Cal 98.0 Date: 12-3-65

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-1500	15-3000	→	3-4500	→	→	4-5-6000		→	→		
Time	100	100	30	100	30	10	100	30	10	10		
DC-1	72.2	66.5	11.7 12.0	52.5 52.5	12.0 11.6	4.10 3.95	46.0 46.8	13.2 13.1	6.35 6.05	3.42 3.18		
DC-2	72.2	66.5	11.6 12.1	52.5 51.0	12.1 11.6	4.15 3.95	45.8 47.0	13.1 13.2	6.25 6.08	3.55 3.00		
Σ			11.85				46.4	13.15		3.62 2.98		
DC-3	72.2	66.5		52.5 51.0	12.1 11.6	3.90 4.05			6.35 6.05	3.60 2.88		
Dc-4	72.2	66.5		52.8 50.8	12.1 11.6	4.08 3.82			6.38 5.95	3.98 2.58		
Σ			11.85				46.4	13.15				
DC-AV	72.2	66.5	11.85	52.0	11.84	4.00	46.4	13.15	6.18	3.28		
AC-1	71.8	66.0	11.6	51.5	11.9	3.88	46.2	13.0	6.12	3.22		
AC-2	"	66.2	11.7	51.5	"	3.90	"	"	6.15	"		
Σ	71.8	66.1	11.65	51.5	11.90	3.89	46.2	13.00	6.13	3.22		
S. P.	+9.7	+0.8		+14.8			+2.0					
AC-N	.15	.08		.06			.06-.09					

Fence Line 500' west of Electrode #6

INDUCED POLARIZATION - RECEIVER NOTES PAGE 4

Project: Lovell Line: 2-Spl-555 E Int.Cal Date: 12-3-65

Send	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		3-4		
Rec.	60-70			→	75-90			→		CPL		
Time	30	10	10	3	10	~~8~~ 10	3	3		300		
DC-1	12.0 11.0	6.42 6.72	4.00 3.92	2.56 2.65	3.98 4.10	3.40 3.25	2.47 2.37	1.89 1.81		115.5		
DC-2	12.3 10.9	6.42 6.75	3.85 4.30	2.68 2.59	3.78 4.28	3.48 3.15	2.60 2.35	1.80 1.87		115.5		
Σ					3.68 4.35	3.75 3.00	2.56 2.44	1.86		231		
DC-3	12.4 10.7	6.25 6.95	3.60 4.35	2.80 2.44	3.65 4.38	3.78 2.99	2.75 2.05	1.78 1.92		115.5		
Dc-4	12.6 10.4	6.52 6.42	3.75 4.25	2.78 2.72	3.65 4.40	3.78 2.95	2.41 2.50	1.72 2.18		115.5		
Σ												
DC-AV	11.59	6.56	4.07	2.64	4.03	3.35	2.45	1.87		115.5	231	
AC-1	11.55	6.45	3.90	2.55	3.98	3.28	2.34	1.78		116.0		
AC-2	"	"	"	2.55	"	3.25	2.35	"		116.0		
Σ	11.55	6.45	3.90	2.55	3.98	3.27	2.35	1.78		116.0		
S. P.	+18.3				-3.9							
AC-N	.07				.08							
										67	+00 S E	

(Fence Line 580' E of Sta 60+00 S E) (Crossed Rd At Sta ~~82~~ +00)

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Hecla - Lovell Line: 2 Spr #1 555E Int.Cal Date: 12-3-65

Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2		
Rec.	0-1500	15-3000	→	30-45	→	→	45-60	→	→	→		
Time												
DC-1	3A	3A	3A	3A	3A	3A	2A	3A	3A	3A		
DC-2												
Σ	4-5	3-4	2-3	1-2	4-5	3-4	2-3	1-2		Cal		
DC-3	60-75	→	→	→	75-90	→	→	→		3/4		
Dc-4										1A		
Σ	2A	3A	3A	3A	2A	3A	3A	3A				
DC-AV												
AC-1												
AC-2												
Σ												
S. P.												
AC-N												

1500' a

3	4.5
12	18
30	45
60	90
105	157.5
168	252

a — na — a

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

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Project Hecla - Lovell Line 2 - Spr. 1 - NW Field date 12/2/65 Data page _____ Comp. date 12/3/65 Comp by C.S.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	0-1.5 NW	1.5-3.0 NW	→	3.0-4.5 NW	→	→	4.5-6.0 NW	→	→	→	6.0-7.5 NW	→
(C) n separation												
(D) I amps	3	3.5	3	3.5	3.5	3	3	3.5	3.5	3	3	3.5
(E) Vdc (avg)	65.8	84.5	11.89	44.2	10.34	3.32	50.0	14.13	6.43	2.97	21.45	10.06
(F) DCcal	.889	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3} 1500'a	4.5	4.5	18	4.5	18	45	4.5	18	45	90	18	45
(H) ρ dc=ExFxGx10^3/D	88	97	63	51	47	44	67	65	73	79	114	115
(I) Vac Σ ρac	65.5	84.0	11.80	43.8	10.05	3.20	49.5	13.90	6.18	2.79	20.50	9.50
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	→	→	→	→	→	→	→	→	→	→	→	→
(L) AC-DC cal.	1.004	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K dcx/ac	1.009	1.010	1.012	1.013	1.033	1.042	1.014	1.021	1.045	1.069	1.053	1.063
(N) PFE=(M-1)(10^2)	0.9	1.0	1.2	1.3	3.3	4.2	1.4	2.1	4.5	6.9	5.3	6.3
(O) MCF=(M-1)(10^5)/H	10	10	19	25	70	95	21	32	62	87	46	55

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

(A) Send	3-4	4-5	1-2	2-3	3-4	4-5		< 4L				
(B) Receive	→	→	7.5-9.0 NW	→	→	→		2-3				
(C) n separation												
(D) I	3.5	2.5	3	3	3	2		100				
(E) Vdc (avg)	5.80	2.52	8.38	5.27	3.59	1.706		112.5				
(F) DCcal	→	→	→	→	→	→		.889				
(G) Kn x 10^{-3}	90	157.5	45	90	157.5	252						
(H) ρ dc=ExFxGx10^3/D	133	141	112	141	168	191						
(I) Vac Σ	5.45	2.40	8.10	5.05	3.40	1.645		113.0				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		1.004				
(M) ρdc/ρac =ExL/K	1.068	1.054	1.039	1.048	1.060	1.054						
(N) PFE=(M-1)(10^2)	6.8	5.4	3.9	4.8	6.0	5.4						
(O) MCF=(M-1)(10^5)/H	51	38	35	34	36	28						

7000

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

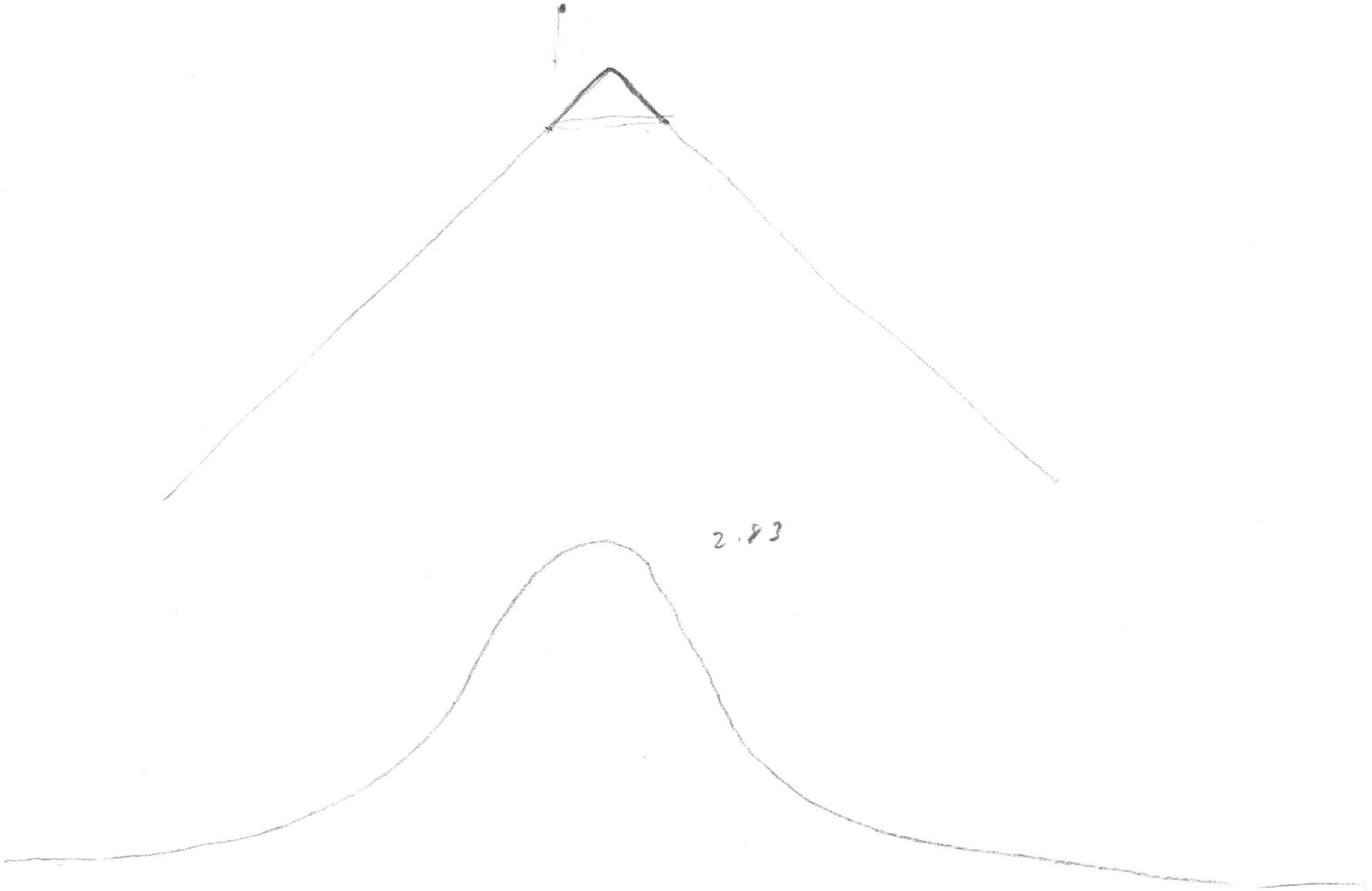
Page 6

Project Hecla-Lovell Line 2-51-5E½ Field date 12/3/65 Data page _____ Comp. date 12/4/65. Comp by C.S.L.

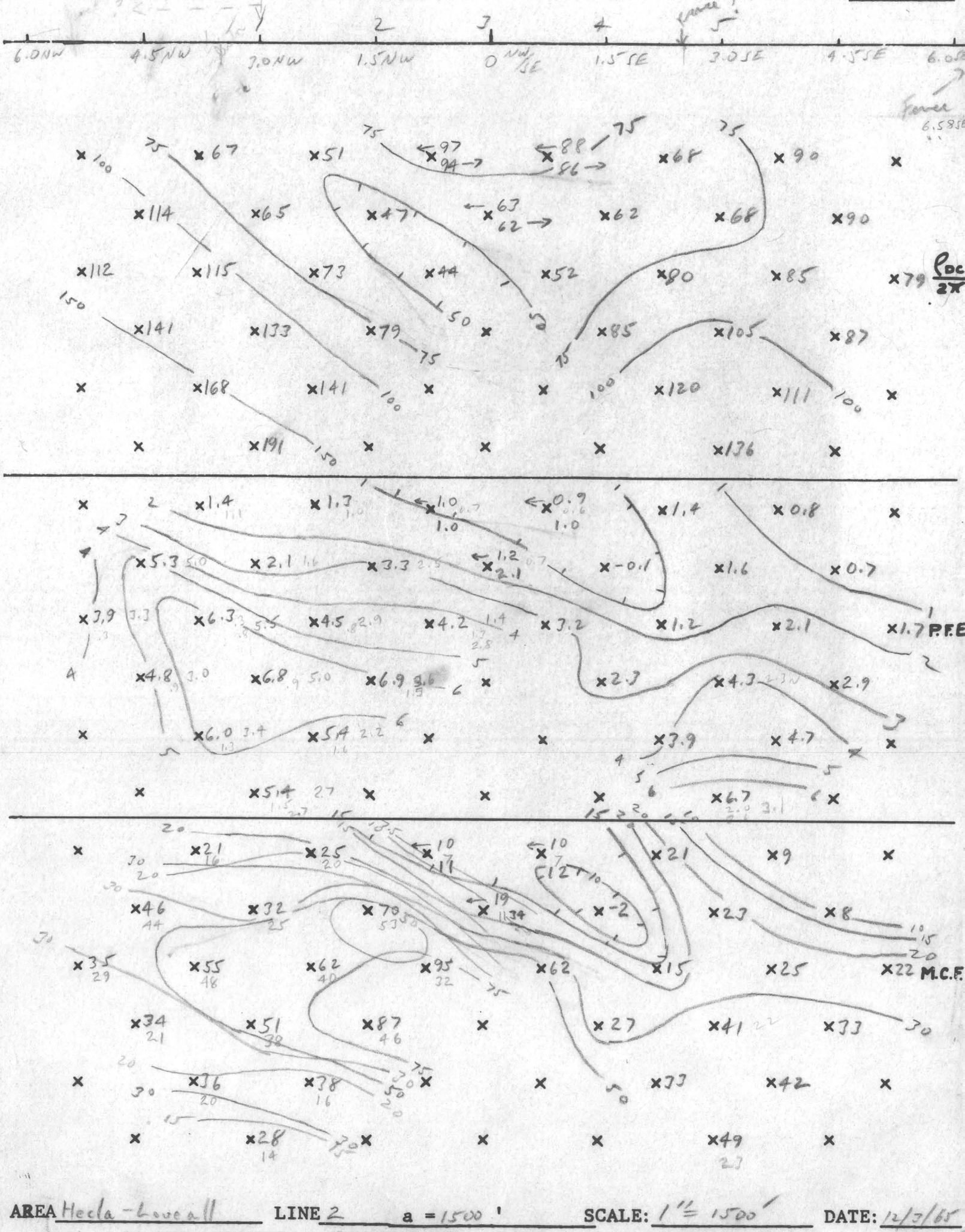
(A) Send	1-2	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4
(B) Receive	0-1.5SE	1.5-3.0SE	→	3.0-4.5SE	→	→	4.5-6.0SE	→	→	→	6.0-7.5SE	→
(C) n separation												
(D) I amperes	3	3	3	3	3	3	2	3	3	3	2	3
(E) Vdc (avg)	72.2	66.5	11.85	52.0	11.84	4.00	46.4	13.15	6.18	3.28	11.59	6.56
(F) DCcal	.866	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	4.5	4.5	18	4.5	18	45	4.5	18	45	90	18	45
(H) ρ dc=ExFxGx10^3/D	94	86	62	68	62	52	90	68	80	85	90	85
(I) Vac Σ	71.8	66.1	11.65	51.5	11.90	3.89	46.2	13.00	6.13	3.22	11.55	6.45
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	1.004	→	→	→	→	→	→	→	→	→	→	→
(M) ρ dc/ρac=ExL/K	1.010	1.010	1.021	1.014	0.999	1.032	1.008	1.016	1.012	1.023	1.007	1.021
(N) PFE=(M-1)(10^2)	1.0	1.0	2.1	1.4	-0.1	3.2	0.8	1.6	1.2	2.3	0.7	2.1
(O) MCF=(M-1)(10^5)/H	11	12	34	21	-2.	62	9	23	15	27	8	25

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

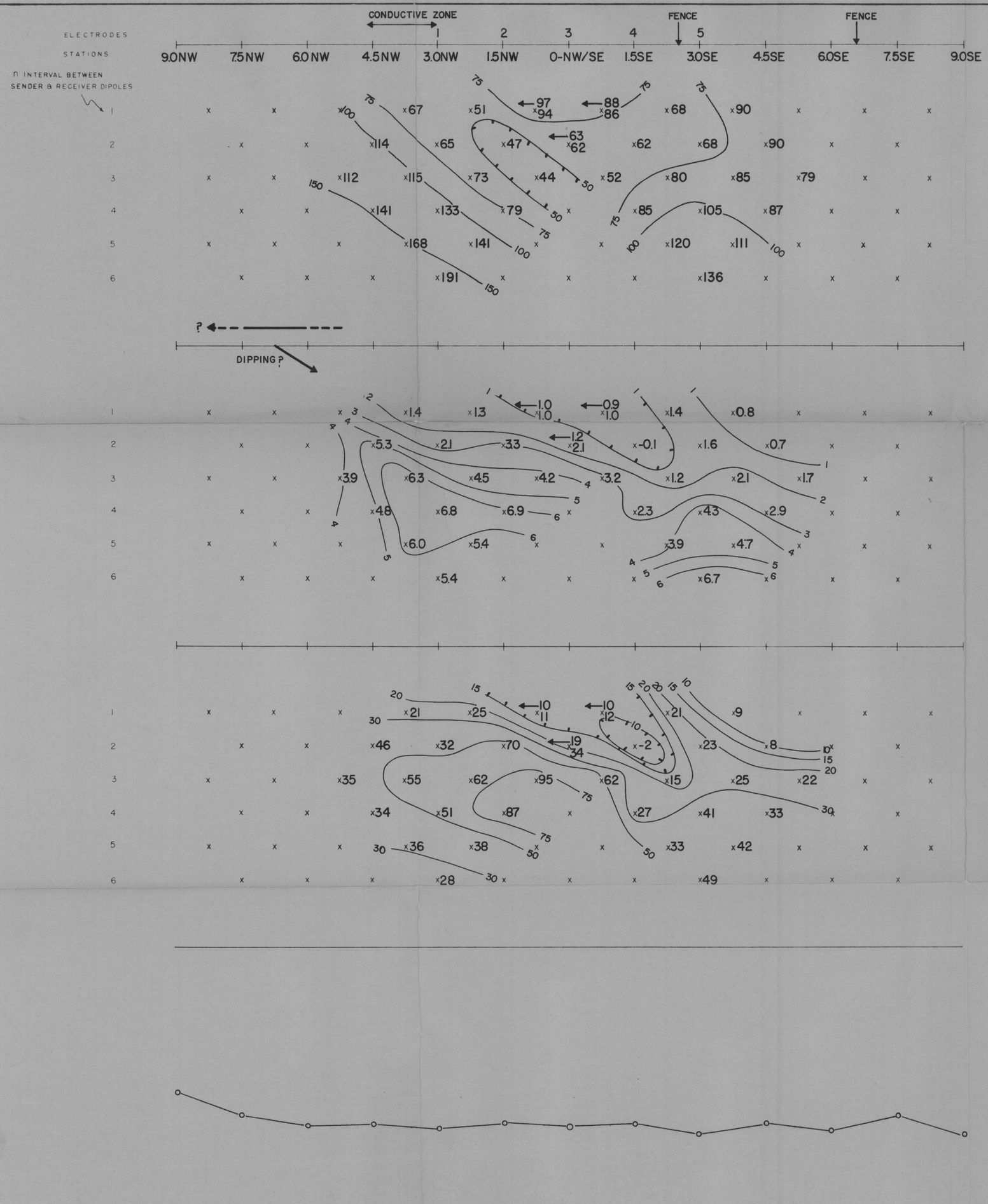
(A) Send	2-3	1-2	4-5	3-4	2-3	1-2		C.L.L				
(B) Receive	→	→	7.5-9.0SE	→	→	→		3-4				
(C) n separation												
(D) I	3	3	2	3	3	3		1				
(E) Vdc (avg)	4.05	2.64	4.03	3.35	2.45	1.87		115.5				
(F) DCcal	→	→	→	→	→	→		.866				
(G) Kn x 10^{-3}	90	157.5	45	90	157.5	252						
(H) ρ dc=ExFxGx10^3/D	105	120	79	87	111	136						
(I) Vac Σ	3.90	2.55	3.98	3.27	2.35	1.78		116.0				
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	→	→	→	→	→	→		1.004				
(M) ρdc/ρac =ExL/K	1.043	1.039	1.017	1.029	1.047	1.047						
(N) PFE=(M-1)(10^2)	4.3	3.9	1.7	2.9	4.7	6.7						
(O) MCF=(M-1)(10^5)/H	41	33	22	33	42	49						


2.83

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N 35° E



AREA Hecla - Lovell LINE 2 a = 1500' SCALE: 1" = 1500' DATE: 12/3/65



EXPLANATION

ELECTRODE ARRAY: 1500' — n x 1500' — 1500'

SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING N 35°E

GEOEX

LOVEALL AREA

SECTIONAL DATA SHEET

LINE NO. 2

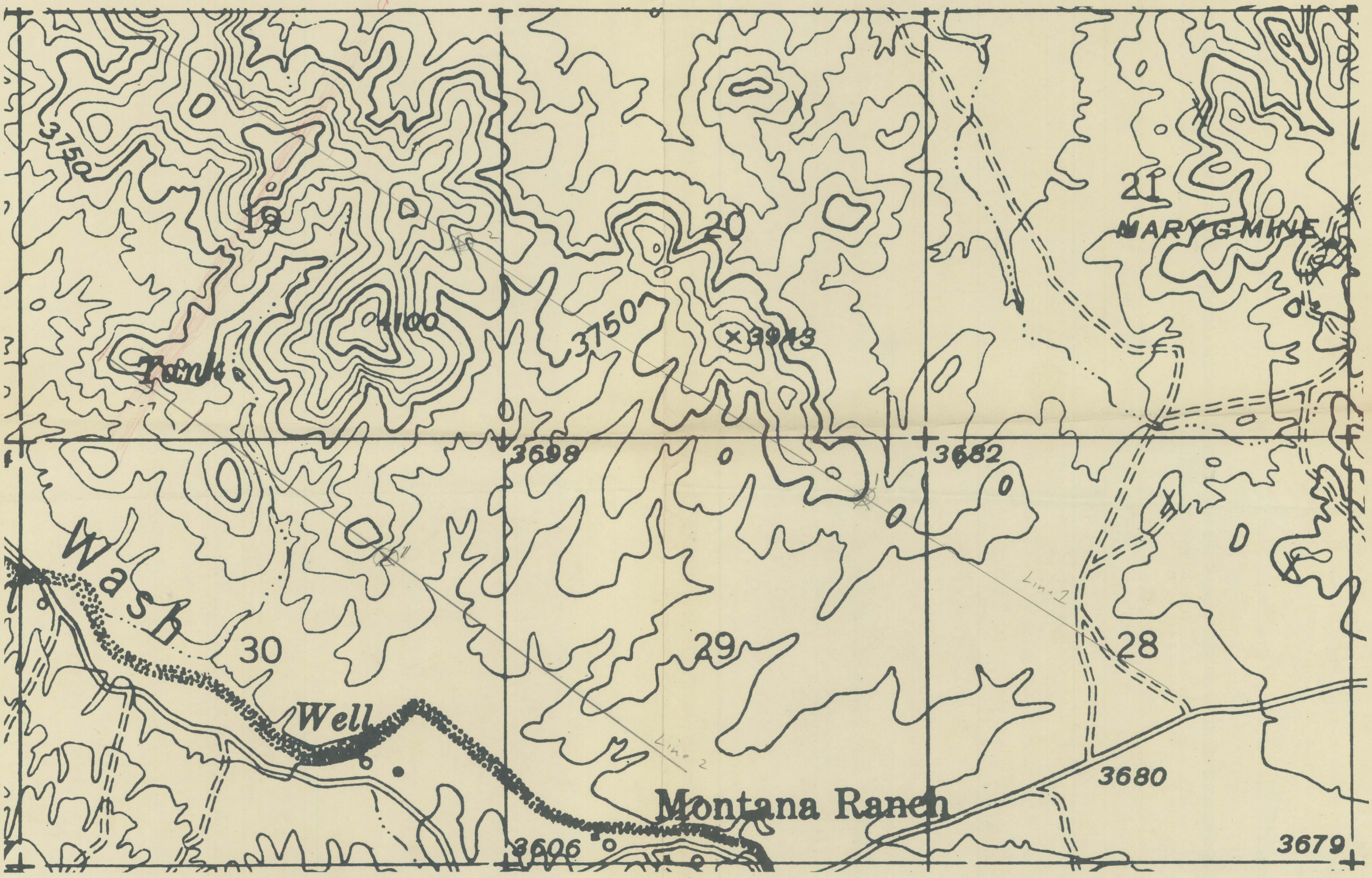
INDUCED POLARIZATION TRAVERSE

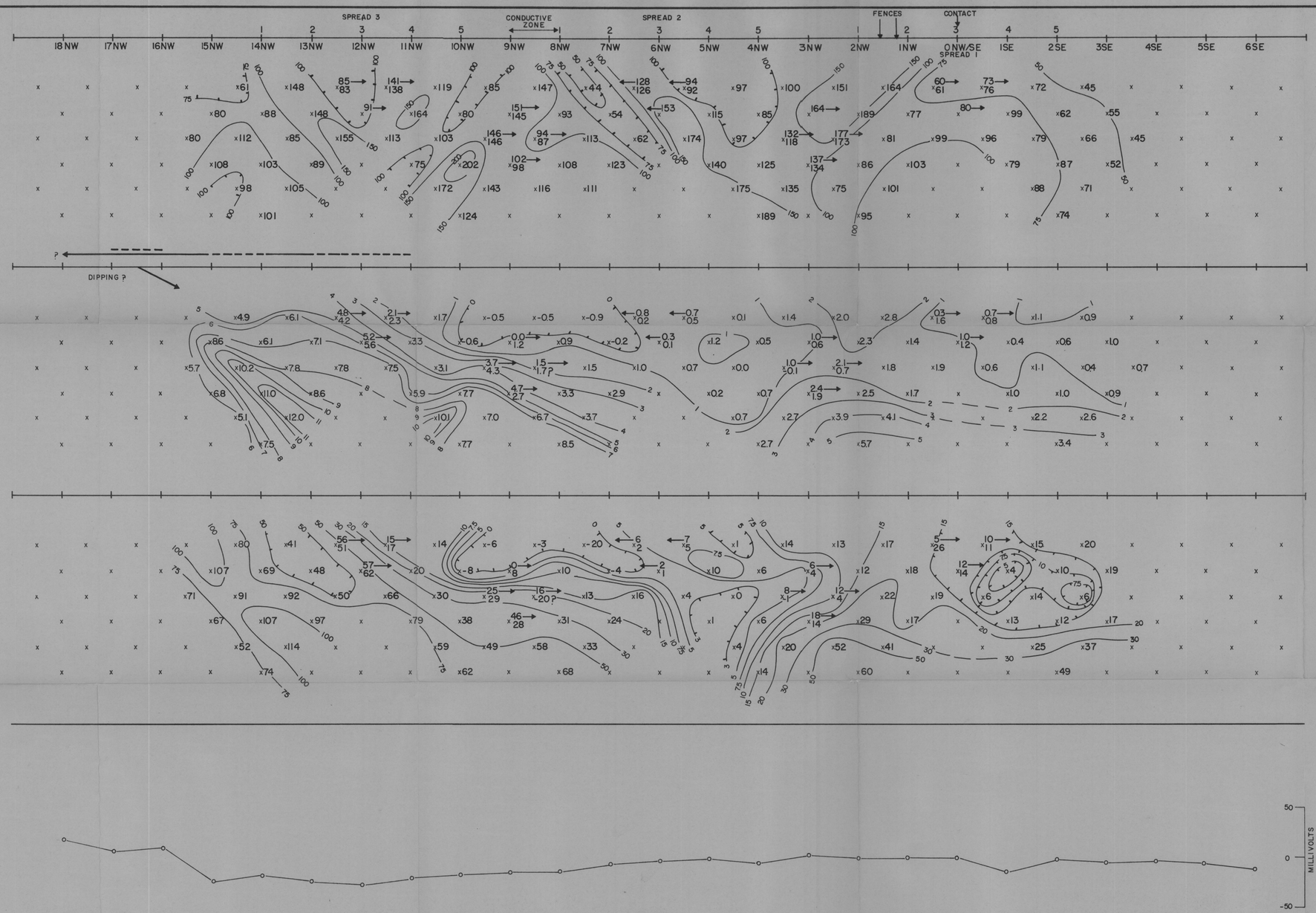
HEINRICHS GEOEXPLORATION COMPANY

SCALE: 1" = 1500' DATE: DEC. 1965

FOR

HECLA MINING COMPANY


3750
19
20
21
MARYG MINE
4100
3750
×3943
Trink
3698
3682
Wash
30
29
28
Line 1
Line 2
Well
3680
Montana Ranch
3606
3679



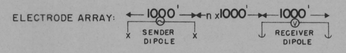
APPARENT RESISTIVITY (ρ_a) IN UNITS OF OHM FEET
CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 c.p.s.

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

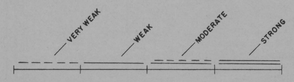
APPARENT "METALLIC CONDUCTION" FACTOR (MCF)
$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$
CONTOUR INTERVAL LOGARITHMIC

EXPLANATION

ELECTRODE ARRAY:



RELATIVE ANOMALY STRENGTH



LOOKING N 30° E

GEOEX

LOVEALL AREA

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY

SCALE: 1" = 1000' DATE: DEC. 1965

FOR

HECLA MINING COMPANY

R 9 E
R 10 E
T 20 S
18NW
9 NW
ALTERNATE STRIKES OF ANOMALY
DIPPING
SPREAD 3
SPREAD 2
SPREAD 1
CONDUCTIVE ZONE
CONDUCTIVE ZONE
0-NW/SE
0-NW/SE CONTACT
6SE
LINE 1
9SE
LINE 2
13
18
17
16
24
19
20
21
25
30
29
28
36
31
32
33
RELATIVE ANOMALY STRENGTH
VERY WEAK
WEAK
MODERATE
STRONG
PIMA COUNTY, ARIZ.
GEOEX
HEINRICHS GEOEXPLORATION CO.
POST OFFICE BOX 5671, TUCSON, ARIZONA, 85703
INDUCED POLARIZATION LOCATION & INTERPRETATION PLAN
LOVEALL AREA
FOR
HECLA MINING COMPANY
Scale 1" = 1000'
Date DEC. 1965

HEINRICHS GEOEXPLORATION COMPANY

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

December 10, 1965

Hecla Mining Company
2020 E. 13th Street
Tucson, Arizona

Attn: Mr. James Quinlan

Gentlemen:

This is a brief report on the Induced Polarization Survey done at your request on the Loveall Prospect, Pima County, Arizona from November 29 through December 7, 1965. Enclosed are the sectional data sheets for Lines 1 and 2, and a location and interpretation plan.

Line 1 was oriented about N 60° W and consists of three spreads of 1000 foot dipoles, end to end, giving a total surface coverage of 24,000 feet, of which 19,000 feet is continuous subsurface plotted data. Line 2 was oriented about N 55° W and consists of one spread of 1500 foot dipoles giving 18,000 feet of surface coverage, of which 10,500 feet is subsurface plotted data.

Both lines were surveyed on a dipole-dipole electrode configuration using the dual frequency induced polarization method. Frequencies of 0.05 and 3.0 cycles were used on Line 1, and 0.05 and 1.0 cycles per second on Line 2. The lower "AC" frequency used on Line 2 was to cut down on any inductive coupling resulting from the large dipole spacing.

Within the zone of initial interest, no induced polarization effects other than normal background variations and a slight increase with depth due to inductive coupling interference were noted. We believe that on Line 1 the maximum effective penetration was about 1500 feet, and on Line 2,

2,000 feet, and that no disseminated sulfide mineralization of more than 1% by volume having dimensions comparable to the depths of penetration and a shape other than a thin sheet occurs in the vicinity of the lines. Of course, certain types of thin veins or small lenses would likely have been missed. Otherwise, therefore, no further work is recommended here.

On the northwest fringe of the initial area of interest, however, an anomaly was found northwest of 11 NW on Line 1 and northwest of 5.25 NW on Line 2. The strongest anomalism appears between 16 NW and 17 NW, Line 1, and between 3.0 NW and 4.5 NW, Line 2; being moderate in strength on Line 1 and weak on Line 2. On Line 1, the depth to the source is likely within 300 feet of the surface and on Line 2, about 500 feet. On both lines, the source appears to be dipping easterly and may be due to a tabular body. Depending on whether the weak or moderate zone on Line 1 is connected with the weak anomaly on Line 2, a north-south or a north-northwest strike is possible.

The source of the anomaly is likely due to 0.5 to 2% sulfide by volume integrated over the widths indicated, with the higher percentage associated with the strongest anomalism. If the anomaly is due to a source more narrow than the zone indicated, a definite possibility, the percentage sulfide could be possibly greater than 2% by volume.

It is recommended that if geology is favorable, additional induced polarization be done in this area to better determine the strike extent and width of this zone. The lines could be extended further northwest and new lines run about east-west (normal to strike) north and south of the present work. On the basis of this additional work, accurate drill hole locations can likely be determined.

The resistivities indicate a conductive zone somewhere between 8 NW and 9 NW, Line 1, probably connecting with a conductive zone between 3.0 NW and 4.5 NW, Line 2. This could be due to a dike, shear zone, or more conductive volcanic or arkose horizon. There is no associated sulfide anomalism. An electrical contact appears near 0 NW/SE, Line 1, with more conductive material to the southeast.

Self potentials show only background variations along the lines, suggesting no near-surface oxidizing sulfides in quantity.

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

Chris S. Ludwig

Chris S. Ludwig, Senior Geophysicist

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Enc: 3 sets of the following maps:

Induced Polarization Location & Interpretation Plan
Sectional Data Sheet
Line 1
Line 2
orig & 2 cc of report