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MAGNETIC RECONNAISSANCE SURVEY

over

COWDEN MINE AREA

T20N, R6W
YAVAPAI COUNTY, ARIZONA

for

Hale C. Tognoni

August 1961

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

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In Map Pocket

Map - Composite showing MoMag results.

Original magnetic records--------one copy only.

INTRODUCTION

At the request of Mr. Hale C. Tognoni, Attorney-at-law of Phoenix, Arizona, Heinrichs Geoexploration Company of Tucson made a one day reconnaissance magnetic survey over a group of mining claims on the Cowden Ranch, Yavapai County, Arizona. Most of the claims are in Section 22, T20N, R6W, G.& S.R.B.& M and consist of 14 patented and 11 unpatented claims. A continuous recording, mobile magnetometer was used and magnetic profile records were obtained on August 22, 1961.

CONCLUSIONS AND RECOMMENDATIONS

Considerable magnetic anomalism was disclosed over and around the claim group. However this can be related almost entirely to the volcanic rocks in the area, apparently andesitic in composition and possibly mostly extrusive. Contacts between the volcanics and limestone (or other sedimentary formations if present) showed marked magnetic contrast. No definite magnetic association was disclosed over iron outcrops.

Additional coverage with the mobile magnetometer is not considered practical or desirable. Any future geophysical investigation of this iron occurence should concentrate on electrical methods and, if over all potential justifies it, gravity work over and around the known ore bodies. This might be later supplemented with detail hand magnetometer readings

taken at the electrical or gravity stations. In addition some hand magnetometer coverage should be obtained in areas where the mobile unit could not drive.

RESULTS

Magnetically, exceptionally good correlation was obtained with known geology. The volcanic rocks are the cause of erratic magnetic readings varying over 1,000 gammas and are typical of the rapid changes in magnetic susceptibility for this rock type. Over the limestones the profiles are relatively flat and smooth with little magnetic variations. Contacts between the two rock types are generally abrupt and pronounced.

Because of the sharp variations in the volcanic material it is not practical to present the results in contour form. The traverses have been plotted on the map and interpreted formational changes are presented in color.

Fourteen traverses were made over and around the claims, for a total of just over 12.25 miles of profiles. In addition a traverse was run on the road from the north end of the claims almost to Seligman for another profile of over 15 miles.

Some samples of the iron ore were taken and susceptibility checks made on them in the Tucson office. The ore is found to be slightly magnetic. Thus it would be possible to map ore occurences in the limestone, if it is found possible to differentiate between ore and volcanics. From the present work this

is not possible although there is a subtle suggestion of change in character of the anomalous variations around the iron outcrops and workings.

If, at any time, a relationship is established for iron occurence at contacts between the limestone and andesite, the best way to map the contacts accurately would be by detailed magnetics.

On the run north to Seligman a couple of narrow zones of high anomalism were crossed. These are on the order of 6,000 gammas each and indicate either a magnetite concentration and/or polarization. Casual observation in driving over them suggests they are from effects contained in schist or metamorphic rocks, close to or in contact with the basalt flows to the north. Some ground observations in this vicinity may be justified.

PROCEDURES

The instrument used is a flux-gate type, total intensity, magnetometer (Gulf Oil Corporation Licensed), mounted on a Dodge Powerwagon. Variations in the earth's total magnetic field are continuously recorded on chart paper in a recorder geared to the vehicle drive. Record is made at whatever speed the vehicle can be driven, according to terrain conditions. On this project some profiles were made on roads and existing trails and some were off road traverses.

The instrument was positioned, for this project, to record on a sensitivity of 100 gammas per half inch of chart vertically, thus giving 1,000 gammas across the total width of the chart. On Record #15, the profile going north to Seligman, it was necessary due to high anomalism to change the sensitivity to 500 gammas per ½ inch or 5,000 gammas across the page. This type of recorder allows for 10 effective chart widths by letting the trace cross the paper and continue again from the other side as necessary. The charts, as run, read looking lengthwise from the start of the record with the higher values to the right.

The profile trace is made by a tapper bar that can be actuated by either the drive of the vehicle or an electronic timing mechanism. In normal usage the distance function is used. As the magnetic gradient sometimes changed rapidly on this project it was necessary to use the time basis occasionally.

For this project the instrument was positioned to record on a horizontal scale of 200 ft. to the inch.

An arbitrary base level was selected, at the start of the project, and assigned a value of 1,000 gammas. This level was positioned to the middle of the chart paper and all values plotted on the records are relative to this arbitrary base. To avoid confusion, values have been marked in red pencil at intervals on the records.

Certain natural and cultural features noted in passing were marked on the records for control. Basic control was from a map furnished by Mr. Tognoni.

Personnel involved in this work are permanent employees of Heinrichs Geoexploration Company and under the direct supervision of Mr. Walter E. Heinrichs, Jr., President. Mr. Heinrichs is a registered Professional Engineer with 25 years experience in mining geology and geophysics. Mr. David Graff with 8 years experience in electronics and geophysics and Mr. John W. Marlatt who has 7 years experiance in geology and geophysics operated the instrument and gathered and processed the data. Mr. Franklin A. Seward, Jr., geophysicist, 12 years experiance, assisted in evaluation of results.

Respectfully submitted,

HEINRICHS GEOEXPLORATION CO.

Registered Professional Engineer Mining
CERTIFICATE EXPIRES
WALTER E.
HEINRICHS, JR.
DEC. 31, 19 61
ARIZONA, U. S. A.

Walter E. Heinrichs, Jr.
President & General Manager

August 29, 1961
P. O. Box 5671
Tucson, Arizona

Geophysical Data
~~and~~ Geology maps etc.
Tognoni Job

Cu Queen
Pebble Mill
Pipe Area

LEFAX PHILADELPHIA 7, PA. MADE IN U.S.A. ORIGINAL COPR. 19 J. C. PARKER

FAS
JWM
TR.MK. REG. US. PAT. OFF

JALANDER Sur.
5 Copper Queen

Feb 22, 1963 Line 2

Sta	Sol	Read	Con'	Info	
Base	+1	106		9:45	
30s	+1	93		10:06	
29s		95			
28		97			
27		89			
26		87			
25s		94		10:09	~~Basalt~~
24		157			Basalt
23		181			"
22		82			Gran.
21		73			"
20s		123		10:13	"
19s		100			
18		84			
17		83			
16		80			Bat Creek
15s		81		10:17	
14		97			
13		80			
12		81			
11		124			
10s		112			
9		115			
8		100		10:24	
7		98			
6		92			

Cu Queen Line #2

Sta	Range				TR.MK. REG. US. PAT. OFF
5S	+1	116			
Base		103			1027 at mine Scrap Plate
4S		45			
4S o Offset		80			
3S		105			
2S		108			
1S		106			
0S		93			
1M		95			
2		80			
3		87			
4		82			
5M		85			1039 Dump
6		102			
7		96			
8		88			
9		101			
10M		91			1043
11		102			
12		101			
13		125			
14		97			
15M		92			1047
16M		88			
17M		86			
18		84			
19		84			Low Cu Queen
20		92			
21		82			
22		85			
23		80			

LEFAX PHILADELPHIA 7, PA. MADE IN U.S.A. ORIGINAL COPR. 19 J. C. PARKER

Cu Queen

Line #2

Sta	Range				TR.MK. REG. US. PAT. OF
24M	+1	77			
25M		81			
26		96			1055
27		80			
28		76			
29		83			
30M	+1	82			1058
BASE		101			11:06

ORIGINAL COPR. 19 J. C. PARKER
LEFAX PHILADELPHIA 7, PA. MADE IN U.S.A.

PEBBLE MILL Feb 26/8

Line #1

STA.	SCALE	READ	AMX
30W	+1	97	111
29	+1	97	111
28	+1	96	110
27	+1	96	110
26	+1	97	111
25	+1	94	108
24	+1	93	107
23	+1	92	106
22	+1	97	111
21	+1	92	106
20	+1	88	102
19	+1	91	105
18	+1	92	106
17	+1	90	104
16	+1	88	102
15	+1	88	102
14	+1	90	104
13	+1	93	107
12	+1	84	98
11	+1	85	99
10	+1	86	100
9	+1	86	100
8	+1	87	101
7	+1	83	97
6	+1	86	100
5	+1	89	103
4	+1	83	97
3	+1	84	98
2	+1	88	102
1	+1	86	100
0	+1	83	BASE 97

TR.MK. REG. US. PAT. OFF.
ORIGINAL COPR. 19 J. C. PARKER
LEFAX PHILADELPHIA 7, PA. MADE IN U.S.A.

Feb 27, 1963
Pebble Mill

Sta	Sep	Pue	Co
0	+1	[illegible]	
1E	+1	97	
2E	+1	[illegible]	
3E	+1	[illegible]	
4E	[illegible]	98	
5E	+1	[illegible]	
6E	+1	102	
7E	+1	96	
8E	+1	98	
9E	+1	97	
10E	+1	98	
11E	+1	98	
12E	+1	94	
13E	+1	93	
14E	+1	96	
15E	+1	100	
16E	+1	102	
17E	+1	102	
18E	+1	102	
19E	+1	106	
20E	+1	104	
21E	+1	121	
22E	+1	117	
23E	+1	123	
24E	+1	116	
25E	+1	120	
26E	+1	130	
27E	+1		

TR. MK REG. U.S. PAT. OFF.

INFO
BISC

ORIGINAL COPR. 1910 BY J. C. PARKER
LEFAX. PHILADELPHIA 7, PA. MADE IN U.S.A.

Pebble Mill #2 28 Feb 1963 w/2.

Sta	Scale	Read	Corr		Info
29 w	+1	97			
28	"	96			
27	"	96			
26		98			
25 w		93			
24		95			
23		96			
22		93			
21		95			
20 w		96			
19		93			
18		93			
17		94			
16		88			
15 w		85			
14		87			
13		85			
12		84			
11		84			
10 w		83			
9		83			
8		84			
7		87			
6		88			
5 w		90			
4		84			
3		83			
2		84			
1		87			
0		88			

21 March 1963

Pebble Mill - Line #2

E 1/2

Sta	Scale	Read	Conv	Info.
0	+1	88		Base
1 E		96		
2		88		
3		87		
4		86		
5 E		97		
6		97		
7		93		
8		87		
9		88		
10 E		87		
11		87		
12		88		
13		83		Wash
14		87		
15 E		96		
16		91		
17		101		
18		117		Volcanic? float
19		107		
20 E		117		
21		94		
22		98		
23		98		
24		82		
25 E		103		
26		101		
27		102		
28		118		
29		120		
30 E				

TR.MK. REG. US. PAT. OF
J. C. PARKER
IGINAL COPR. 19
LEFAX LADELPHIA 7, PA DE IN U.S.A.

5/March

Pipe

0W	+	104
1E	"	122
2E	"	114
3E	"	118
4E		106
5E		114
6E		113
7E		128
8E		136
9E		125
10E		117

2 center IP gp
top pipe

TR.MK. REG. US. PAT. OFF.
ORIGINAL COPR. 19 J. C. PARKER
LEFAX PHILADELPHIA 7, PA. MADE IN U.S.A.

10.46
8.5
1.96
2
3.92

606

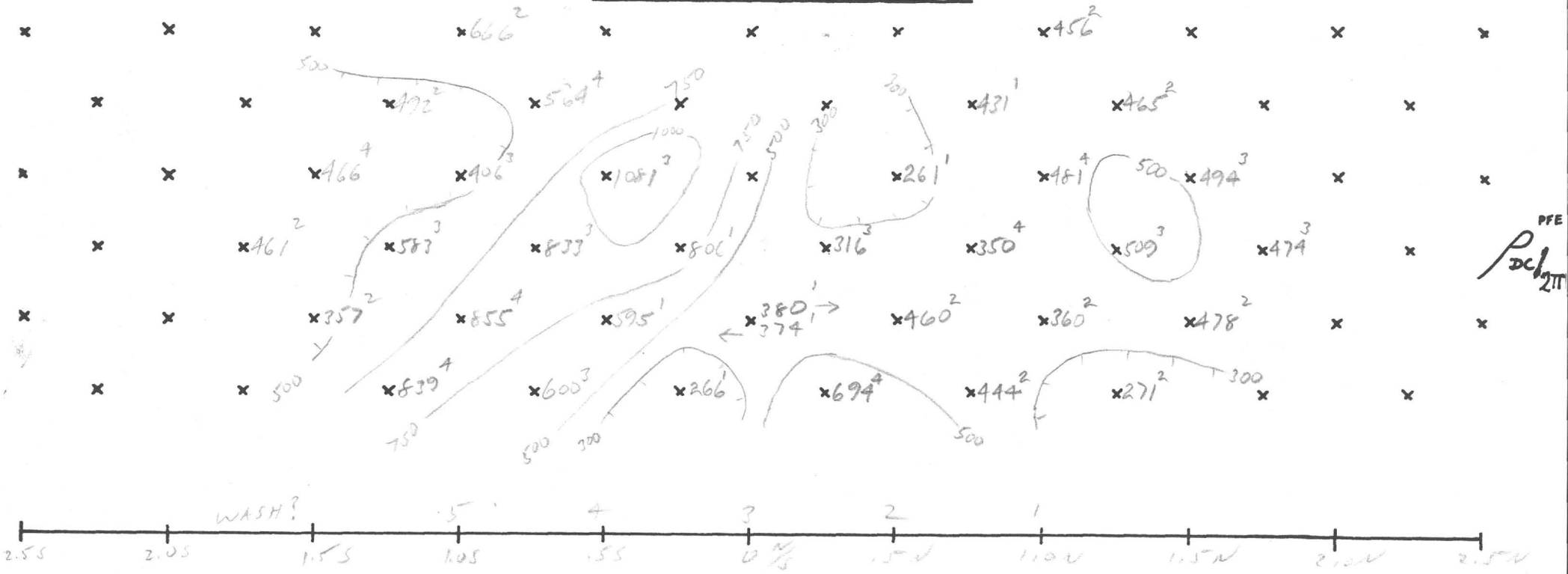
5486919

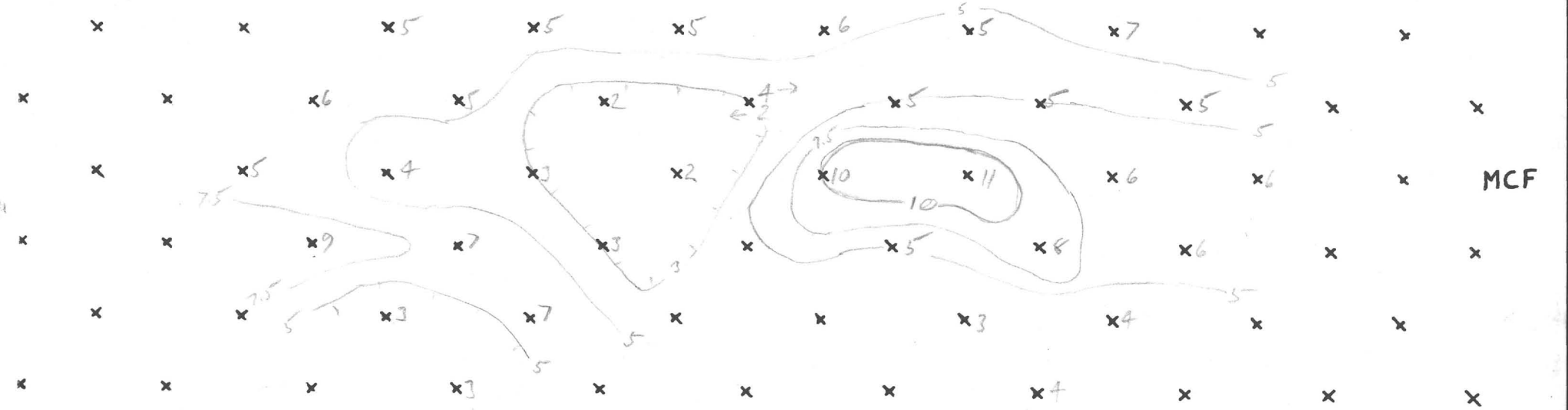
11.25
8
3.25

11.25
5.50
5.75
5.75
11.50
1.50

1092
5
5.72

INDUCED POLARIZATION WORK SHEET





Area Cu Queen Line 1 N1 Scale 1" = 500' Date 2/20/-8

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 1

Project: Gu Gunsa Line: 1 N ½ (Orange) Int.Cal 52.8 Date: 2/19/63

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
Rec.	.5-1.0N	→	1.0-1.5N	→	→	1.5-2.0N	→	→	→	2.0-2.5N	→	
~~Time~~ Range	1000	100	1000 300	100	30	300	100	100 30	10	100	100	30
DC-1	445.0	61.0	283 287	73.8	20.4	174	58.0	22.3 22.6	8.03	76.3	32.6	15.8
DC-2	445.0	61.3	282 285	73.0	20.2	175	57.2	22.0 23.1	8.68	76.8	32.5	15.1
Σ	890.0	121.8 122.3	565 572	147.8	40.6	349	115.2	44.3 45.7	16.71	153.1	65.1	30.9
DC-3	445.0	61.5	283 287	73.9	20.4	174	58.0	22.3 22.6	8.03	76.3	32.6	15.8
Dc-4	445.0	61.0	282 285	73.9	20.2	175	57.2	22.0 23.1	6.68	76.8	32.5	15.1
Σ	890.0	121.8 121.5	565 572	147.8	40.6	349	115.2	44.3 45.7	16.71	153.1	65.1	30.9
DC-AV	890.0	121.8	565 572	147.8	40.6	349.0	115.2	44.3 45.7	16.71	153.1	65.1	30.9
AC-1	400.0	55.8	259 258	67.0	18.3	159.0	52.8	20.2 20.3	7.59	69.4	29.9	13.9
AC-2	400.0	55.8	260 260	67.0	18.3	160.0	52.6	20.2 20.5	7.61	69.5	29.9	13.9
Σ	800.0	111.6	519 518	134.0	36.6	319.0	105.4	40.4 40.8	15.20	138.9	59.8	27.8
S. P.	+5.1	→	-2.0	→	→	+1.8	→	→	→	+8.5	→	
AC-N	<	0	.02	→	→	.01	→	→	→	.03	→	
Ω	500Ω		300Ω			300Ω				500Ω		

INDUCED POLARIZATION - RECEIVER NOTES PAGE 2

Project: Cu Queen Line: Orange 1 - N½ Int.Cal 52.6 Date: 2/19/63

Send	4-5	1-2	2-3	3-4	4-5	C+2					
Rec.	→	2.5-3.0V	→	→	→	1-2					
~~Time~~ Range	10	100	30	10	10	100	30	100	30	100	30
DC-1	7.85 7.84	30.2	16.0	8.63	5.22	21.3	21.6	26.1	26.7	31.7	Pcg
DC-2	7.93 7.95	30.6	15.7	8.39	5.22	21.0	21.8	26.2	27.0	31.8	
Σ	15.81 15.79	60.8	31.7	17.02	10.44	42.3	43.4	52.3	53.7	63.7	
DC-3	7.98 7.97	30.3	16.0	8.63	5.20	21.3	21.6	26.1	26.7	31.7	
Dc-4	7.88 7.95	30.5	15.7	8.39	5.24	21.0	21.8	26.2	27.0	31.8	
Σ	15.86 15.92	60.8	31.7	17.02	10.44	42.3	43.4	52.3	53.7	63.7	✓
DC-AV	15.84	60.8	31.7	17.02	10.44	42.3	43.4	52.3	53.7	63.7	
AC-1	7.21	27.9	14.4	7.70	4.79	19.9	19.9	24.6	24.8	29.8	29.3
AC-2	7.23	28.0	14.3	7.70	4.79	19.9	19.9	24.8	24.9	29.7	
Σ	14.44	55.9	28.7	15.40	9.58	39.8	39.8	49.4	49.7	59.5	
S. P.	→	+5.6	→	→	→						
AC-N	→	.03	→	→	→						
Ω		700Ω									

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 3

Project: Cu Queen Line: 1 Orange 5 1/2 Int.Cal 42.8 Date: 2/19/63

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
Rec.	.5-1.05	→	1.0-1.55	→	→	1.5-2.05	→	→	→	2.0-2.55	→	
~~Time~~ Range	300	100	1000	300 100	100	1000	300	100	100	100	100 30	30
DC-1	170	60.0	385	96 94.8	52.0	537	137	52.9	34.6	57.9	25.8 26.5	11.8
DC-2	171	60.1	385	95 96	51.5	539	137	54.0	34.8	56.8	23.8 24.0	14.2
Σ	341	120.1	770	191 190.8	103.5	1076	274	106.9	69.4	114.7	49.6 50.5	26.0
DC-3	170	60.0	385	96 94.8	52.0	537	137	52.9	34.6	57.9	25.9 26.4	12.5 12.9
Dc-4	171	60.1	385	95 96.0	51.5	539	137	54.0	34.8	56.8	23.7 24.1	13.3 13.3
Σ	341	120.1	770	191 190.8	103.5	1076	274	106.9	69.4	114.7	49.6 50.5	26.1 26.2
DC-AV	341	120.1	770	191 190.8	103.5	1076	274	106.9	69.4	114.7	49.6 50.5	26.1
AC-1	157	55.7	353	88.5 86.9	47.8	482	123	48.5	31.7	52.3	22.6 22.9	11.9
AC-2	157	55.7	351	88.5 88.9	47.7	482	123	48.5	31.6	52.5	22.7 22.9	11.9
Σ	314	111.4	704	177.0 175.8	95.5	964	246	97.0	63.3	104.8	45.3 45.8	23.8
S. P.	+0.6	→	+6.7	→	→	+3.8	→	→	→	←	←	←
AC-N	.03	→	.03	→	→	.05	→	→	→	←	←	←
Ω	400Ω		700Ω	→	→	800Ω				500Ω		

INDUCED POLARIZATION SENDER NOTES

N 25° E
E Tier

Project: Cu Queen Line: #1 - N 1/2 Date: 19/Feb/63

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	5-1#	→	1.0-1.5#	→		1.5-2#	→		→	2-2.5#	→	
Time	900	→	→	→	→	→	→	→	→	→	→	→
Range	x2	→	→	→	→	→	→	→	→	→	→	→
Current	1800	→	→	→	→	→	→	→	→	→	→	→

Send	4-5	1-2	2-3	3-4	4-5		1-2	→	→			
Receive	2-2.5#	2.5-3#	→	→	→		CAL.	→	→			
Time	900	→	→	→	→							
Range	2	→	→	→	→		1	1	1			
Current	1800	→	→	→	→		400	500	600			

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 4

Project: Cu Queen Line: Grange 1 - 5½ Int.Cal 52.8 Date: 2/19/63

Send	1-2	4-5	3-4	2-3	1-2	CAL						
Rec.	→	2.5-3.05			→	4-5						
Time Range	30	100 30	30	10	10	100 30	100	30	100	30	100	
DC-1	10.0	30.0 29.7	15.0	9.2 9.05	7.70 7.7	15.9 16.2	20.9	21.3	26.2	26.8	31.8	
DC-2	10.7	28.3 30.2	15.0	8.82 9.03	7.6 7.6	15.9 16.2	21.0	21.4	26.2	26.9	31.9	
Σ	20.7	58.3 59.9	30.0	18.02 18.08	15.3 15.3	31.8 32.4	41.9	42.7	52.4	53.7	63.7	
DC-3	10.0	30.0 29.6	15.0	9.02 9.01	7.7	15.9 16.2	20.9	21.3	26.2	26.8	31.8	
Dc-4	10.7	28.3 30.3	15.0	9.05 9.04	7.6	15.9 16.2	21.0	21.4	26.2	26.9	31.9	
Σ	20.7	58.3 59.9	30.0	18.07 18.05	15.3	31.8 32.4	41.9	42.7	52.4	53.7	63.7	
DC-AV	20.7	58.3 59.9	30.0	18.05	15.3	31.8 32.4	41.9	42.7	52.4	53.7	63.7	
AC-1	9.40	26.9 26.9	13.45	8.15	6.95	14.5 15.0	19.8	19.8	24.6	24.7	29.9	
AC-2	9.35	26.9 26.8	13.45	8.19	6.95	14.5 14.9	19.8	19.9	24.8	24.7	29.8	
Σ	18.75	53.8 53.7	26.9	16.34	13.9	29.0 29.9	39.6	39.7	49.4	49.4	59.7	
S. P.	-5.0	+1.2	→									
AC-N	.03	.03	→									
Ω		500 Ω										

INDUCED POLARIZATION SENDER NOTES

Project: Cu Queen Line: #1 - 5 1/2 Date: 19/Feb/83

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	.5-1.0s	→	1.0-1.5s	→		1.5-2.0s	→			2.0-2.5s	→	
Time	900	→										
Range	x2	→										
Current	1800	→										
Send	1-2	4-5	3-4	2-3	1-2		3-4					
Receive	2.0-2.5s	2.5-3s	→				CAL					
Time	900	→					300	400	500	600		
Range	x2	→					1	x1	x1	x1		
Current	1800	→					300	400	500	600		

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Copper Queen Line 1 - N1/2 Field date 19 Jan 63 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	.5-1.0"	→	1.0-1.5"	→	→	1.5-2.0"	→	→	→	2.0-2.5"	→	→
(C) n separation % S.D.	40	56	26 86	67	61	53	53	20 66	76	69	30	46
(D) I	1800	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	890	121.8	565 572	147.8	40.6	349	115.2	44.3 45.7	16.71	153.1	65.1	30.9
(F) DCcal USED	.935	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	694	380	444	460	316	271	360	350	261	478	509	481
(I) Vac Σ	800	111.6	519 518	134.0	36.6	319	105.4	40.4 40.8	15.20	138.9	59.8	27.8
(J) AC noise x 2	o.k.	→	→	→	→	→	→	→	→	→	→	→
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.938	.931	.944 .918	.926	.929	.932	.932	.947 .927	.923	.926	.942	.935
(M) ρ dc/ρac=ExL/K	1.042	1.014	1.026 1.016 21	1.021	1.030	1.020	1.019	1.039 1.039	1.014	1.022	1.028	1.039
(N) PFE=(M-1)(10^2)	4	1	2	2	3	2	2	4	1	2	3	4
(O) MCF=(M-1)(10^5)/H	6	4	5	5	10	7	5	11	5	5	6	8

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5		1-2	→	→	→	→	→
(B) Receive	2.0-2.5"	2.5-3"	→	→	→		CAL	→	→	→	→	→
(C) n separation	72	28	48	77	48		20	66	25	43	30	
(D) I	1800	→	→	→	→		400	400	500	500	600	
(E) Vdc (avg)	15.84	60.8	31.7	17.02	10.44		42.3	43.4	52.3	53.7	63.7	
(F) DCcal	→	→	→	→	→		.946	.923	.947	.931	.943	
(G) Kn x 10^{-3}	52.5	15	30	525	84				~.935			
(H) ρ dc=ExFxGx10^3/D	431	474	494	465	456							
(I) Vac Σ	14.44	55.9	26.7	15.40	9.58		39.8	39.8	49.4	49.7	59.5	
(J) AC noise x 2	→	→	→	→	→							
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.924	.943	.934	.922	.934		.941	.919	.945	.925	.934	
(M) ρdc/ρac =ExL/K	1.013	1.027	1.031	1.020	1.020							
(N) PFE=(M-1)(10^2)	1	3	3	2	2							
(O) MCF=(M-1)(10^5)/H	3	6	6	4	4							

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

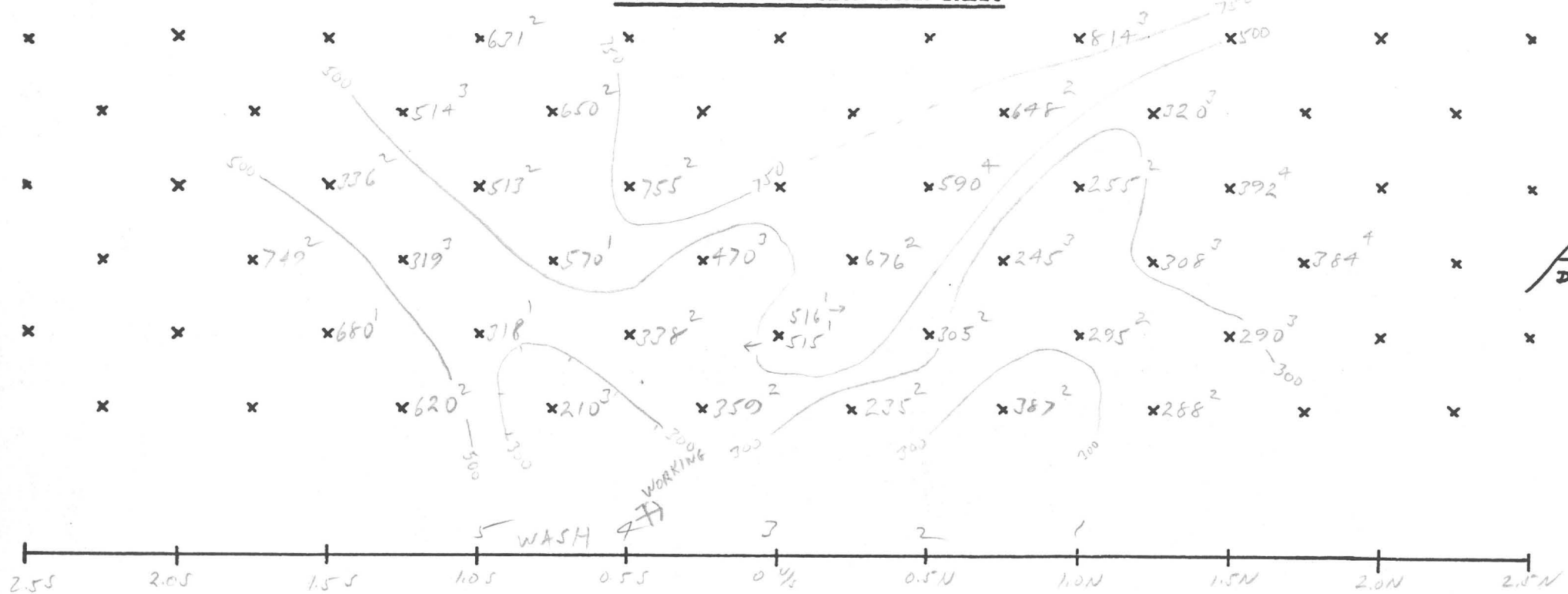
Project Copper Queen Line 1 – 5½ Field date_____ Data page_____ Comp. date_____. Comp by_____

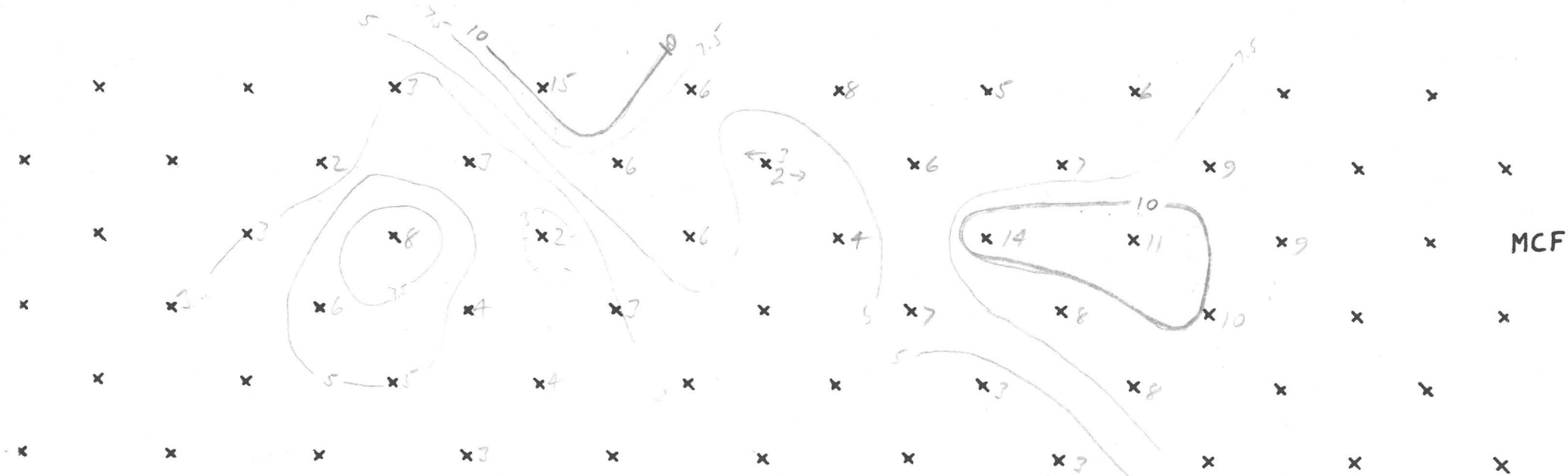
(A) Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
(B) Receive												
(C) ~~n separation~~ % S.θ	52	56	35	29 87	48	48	41	49	32	52	23 76	40
(D) I	1800											
(E) Vdc (avg)	341	120.1	770	191 190.8	103.5	1076	274	106.9	69.4	114.7	49.6 50.5	26.1
(F) DCcal USED	.935											
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	15	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	266	374	600	595	806	839	855	833	1081	757	583	406
(I) Vac Σ	314	111.4	204	177 173.8	95.5	964	246	97.0	63.3	104.8	45.3 45.8	23.8
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.933	.931	.940	.943 .918	.934	.934	.937	.934	.941	.933	.945 .923	.938
(M) ρ dc/ρac=ExL/K	1.012	1.006	1.029	1.017 1.009	1.013	1.042	1.043	1.029	1.031	1.020	1.033 1.019	1.029
(N) PFE=(M-1)(10^2)	1	1	3	1 13	1	4	4	3	3	2	3 26	3
(O) MCF=(M-1)(10^5)/H	5	2	5	2	2	5	5	3	3	6	4	7

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	4-5	3-4	2-3	1-2		4-5	→	→	→	→	→
(B) Receive							CAL	→	→	→	→	→
(C) ~~n separation~~ % S.θ	31	27 89	45	82	70							
(D) I								on separate sheet				
(E) Vdc (avg)	20.7	58.3 59.9	30.0	18.05	15.3							
(F) DCcal												
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	564	461	466	492	666							
(I) Vac Σ	18.75	538 33.7	26.9	16.34	13.9							
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.942	.944 .917	.936	.920	.925							
(M) ρdc/ρac =ExL/K	1.040	1.022 1.022	1.043	1.016	1.019							
(N) PFE=(M-1)(10^2)	4	2	4	2	2							
(O) MCF=(M-1)(10^5)/H	7	5	9	3	3							

INDUCED POLARIZATION WORK SHEET





Area Cu Queen Line 2 N & S ½ Scale 1" = 500' Date 3/1/63

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 7

Project: Cu Queen Line: 2 N½ Int.Cal 52.6 Date: 2/20/63

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
Rec.	.5-1.0N	→	1.0-1.5N	→	→	1.5-2.0N	→	→	→	2.0-2.5N	→	→
~~Time~~ Range	300	100	300	100	100 30	300	100	30	30	100	30	30 10
DC-1	100	50.8	249	33.2	23.0 25.9	185	47.4	10.0	11.5	46.4	20.1	13.0 9.2
DC-2	100.5	50.4	247	32.0	25.5 27.6	185	47.8	11.0	11.6	46.7	19.3	13.5 9.9
Σ	200.5	101.2	496	65.2	52.5 53.5	370	95.2	21.0	23.1	93.1	39.4	26.3 10.91
DC-3	100	50.8	249	33.2	23.0 25.9	185	47.4	10.0	11.4	46.3	19.3	13.0 5.42
Dc-4	100.5	50.4	247	32.0	25.5 27.6	185	47.8	11.0	11.7	46.8	19.8 19.8	13.8 5.49
Σ	200.5	101.2	496	65.2	52.5 53.5	370	95.2	21.0	23.1	93.1	39.5 39.5	26.3 10.91
DC-AV	200.5	101.2	496	65.2	52.5 53.5	370	95.2	21.0	23.1	93.1	39.5	26.3 10.91
AC-1	92.5	46.5	225	30.0	24.0 27.0	169	43.5	9.50	10.35	42.4	17.9	11.9 9.9
AC-2	92.0	46.6	225	30.0	24.2 24.2	169	43.5	9.50	10.35	42.3	17.9	11.9 9.8
Σ	184.8	93.1	450	60.0	48.2 48.1	338	87.0	19.00	20.7	84.7	35.8	23.8 9.95
S. P.	-6.9	→	+0.9	→	→	+7.7	→	→	→	-7.7	→	→
AC-N	.03	→	.03	→	→	.02	→	→	→	0.01	→	→
Ω	500		400			500				400		

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Cu Queen Line: 2 - N½ Blue Int.Cal 52.6 Date: 2/20/67

Send	4-5	1-2	2-3	3-4	4-5	CAL						
Rec.	→	2.5-3.0V			→	1-2						
Time Range	10	100 3.0	30	10	10	100	30	100	30	100	30	100
DC-1	7.27	24.2 25.0	12.3	3.94	5.66	15.8	16.2	20.9	21.6	26.2	27.0	31.8
DC-2	7.21	24.5 24.7	12.9	3.87	5.72	15.8	16.2	21.0	21.5	26.2	27.0	31.8
Σ	14.50	48.7 49.7	25.2	7.81	11.38	31.6	32.4	41.9	43.1	52.4	54.0	63.6
DC-3	7.25	24.2 25.0	12.3	3.94	5.69	15.8	16.2	20.9	21.6	26.2	27.0	31.8
Dc-4	7.25	24.5 24.7	12.9	3.87	5.69	15.8	16.2	21.0	21.5	26.2	27.0	31.8
Σ	14.50	48.7 49.7	25.2	7.81	11.38	31.6	32.4	41.9	43.1	52.4	54.0	63.6
DC-AV	14.50	48.7 49.7	25.2	7.81	11.38	31.6	32.4	41.9	43.1	52.4	54.0	63.6
AC-1	6.58	22.1 22.2	11.4	3.55	5.15	14.5	14.7	19.7	19.9	24.7	24.7	29.9
AC-2	6.57	22.1 22.2	11.3	3.56	5.17	14.6	14.9	19.8	19.9	24.7	24.7	29.8
Σ	13.15	44.2 44.4	22.7	7.11	10.32	29.1	29.8	39.7	39.8	49.4	49.4	59.7
S. P.	→	-1.0	→	→	→							
AC-N	→	.01	→	→	→			Good				
		400										

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 5

Project: Cu Queen Line: 2 - 5½ (Blue) Int.Cal 52.8 Date: 2/20/63

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
Rec.	.5-1.05	→	1.0-1.55	→	→	1.5-2.05	→	→	→	2.0-2.55	→	→
~~Time~~ Range	1000 300	100	300	100	100	1000 300	100	100	100 30	100	30	30
DC-1	240 243	85.8	111	56.6	31.3	241 244	41.2	36.0	24.4 25.1	66.1	16.6	17.3
DC-2	239 241	86.8	111	56.5	31.7	242 247	42.8	37.2	24.3 25.3	67.5	17.1	17.1
Σ	479 484	172.6	222	113.1	63.0	483 491	84.0	73.2	48.7 50.4	133.6	33.7	34.4
DC-3	240 243	85.9	111	56.7	31.3	241 244	41.3	36.0	24.4 25.1	66.1	16.6	17.3
Dc-4	239 241	86.7	111	56.6	31.7	242 247	42.7	37.2	24.3 25.3	67.5	17.1	17.1
Σ	479 484	172.6	222	113.3	63.0	483 491	84.0	73.2	48.7 50.4	133.6	33.7	34.4
DC-AV	479 484	172.6	222	113.2	63.0	483 491	84.0	73.2	48.7 50.4	133.6	33.7	34.4
AC-1	220 220	78.5	101	51.7	28.6	221 223	38.9	33.9	22.7 22.7	61.1	15.3	15.2
AC-2	220 220	78.7	100	51.8	28.7	223 224	38.6	33.7	22.6 22.6	61.3	15.3	15.2
Σ	440 440	157.2	201	103.5	57.3	444 447	77.5	67.6	45.3 45.3	122.4	30.6	31.4
S.P.	-5.2	→	+0.5			+2.9			→	-5.9		
AC-N	.05	→	.04	→		.03			→	0.3		
Ω	900		900			800				500		

INDUCED POLARIZATION SENDER NOTES

Project: Copper Queen Line: #2 – N1/2 Date: 20/Feb/63

Send	3-4	4-5	5-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	5-3	3-4
Receive	.5"-1.0"	→	1.0-1.5"	→		1.5-2.0"	→			2.0-2.5"	→	
Time	600	550	900	600	550	900	900	600	550	900	900	600
Range	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2
Current	1200	1100	1800	1200	1100	1800	1800	1200	1100	1800	1800	1200

Send	4-5	1-2	2-3	3-4	4-5		2-3					
Receive	2.0-2.5"	2.5-3.0"	→				CAL					
Time	550	900	900	600	550		300	400	500	600		
Range	x2	x2	x2	x2	x2		x1	x1	x1	x1		
Current	1100	1800	1800	1200	1100		300	400	500	600		

INDUCED POLARIZATION - RECEIVER NOTES

PAGE 6

Project: Cu Queen Line: 2 5½ Blue Int.Cal 52.6 Date: 2/20/69

Send	1-2	4-5	3-4	2-3	1-2	CAL	→	→	→	→	→	→
Rec.	→	2.5-2.05	→	→	→	4-5	→	→	→	→	→	→
~~Time~~ Range	30	100 30	10	30 30	10	100	30	100	30	100	30	100
DC-1	12.3	28.7 30.0	8.76 8.71	9.9 9.99	7.62 7.45	17.5	18.0	22.9	23.3	28.0	28.9	33.6
DC-2	12.6	29.9 29.0	8.90 8.99	9.8 9.80	7.61 7.65	17.5	18.0	22.9	23.3	28.0	25.8	33.7
Σ	24.9	58.6 59.0	17.66 17.70	19.7 19.79	15.23 15.10	35.0	36.0	45.8	46.6	56.0	57.7	67.3
DC-3	12.3	28.6 30.0	8.82 8.93	9.80 9.99	7.55 7.42	17.5	18.0	22.9	23.3	28.0	25.9	33.6
Dc-4	12.6	30.0 29.2	8.89 8.85	9.85 9.80	7.66 7.42	17.5	18.0	22.9	23.3	28.0	25.8	33.7
Σ	24.9	58.6 59.0	17.71 17.78	19.7 19.79	15.21 15.84	35.0	36.0	45.8	46.6	56.0	57.7	67.3
DC-AV	24.9	58.6 59.0	17.71	19.7 19.74	15.09	35.0	36.0	45.6	46.6	56.0	57.7	67.3
AC-1	11.3	26.6 26.6	8.02	9.00 8.85	6.81	16.2	16.4	21.3	21.2	26.0	25.7	30.7
AC-2	11.4	27.0 26.8	8.00	9.05 8.85	6.87	16.1	16.3	21.1	21.1	26.0	25.9	30.7
Σ	22.7	53.6 53.4	16.02	18.05 17.70	13.68	32.3	32.7	42.4	42.3	52.0	51.6	61.4
S. P.	→	+3.7										
AC-N	→	.03	→	→	→	POOR	QUALITY					
ρ		250										

INDUCED POLARIZATION SENDER NOTES

Project: Cu Queen Line: #2 - 5 1/2 Date: 20/Feb/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	.5s-1.0s	→	1.0-1.5s	→		1.5-2.0s	→			2.0-2.5s	→	
Time	940	940	740	940	940	550	740	940	940	550	740	940
Range	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2
Current	1880	1880	1480	1880	1880	1100	1480	1880	1880	1100	1480	1880

Send	1-2	4-5	3-4	2-3	1-2		4-5	→				
Receive	2.0-2.5s	2.5-3s	→				CAL					
Time	940	550	740	940	940		340	440	540	640		
Range	x2	x2	x2	x2	x2		x1	x1	x1	x1		
Current	1880	1100	1480	1880	1880		340	440	540	640		

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Copper Queen Line 2 - N½ Field date 2/20/63 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	.5-1.0"	→	1.0-1.5"	→	→	1.5-2.0"	→	→	→	2.0-2.5"	→	→
(C) n separation % S.D.	31	47	75	30	24 80	56	44	32	34	42	30 40	50
(D) I	1200	1100	1800	1200	1100	1800	1800	1200	1100	1800	1800 1200	1200
(E) Vdc (avg)	200.5	101.2	496	65.2	525 53.5	370	95.2	21.0	23.1	93.1	39.5 26.3	10.91
(F) DCcal USED	.935											
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	235	516	387	305	676	288	295	245	590	290	308 307	255
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	184.8	93.1	450	60.0	482 481	338	87.0	19.00	20.7	84.7	35.8 23.8	9.95
(L) AC-DC cal.	.937	.932	.924	.937	.939 .923	.930	.933	.936	.936	.934	.937 .934	.931
(M) ρ dc/ρac=ExL/K	1.019	1.012	1.019	1.019	1.022 1.026	1.018	1.021	1.034	1.044	1.027	1.033 1.032	1.020
(N) PFE=(M-1)(10^2)	2	1	2	2	2 3	2	2	3	4	3	3	2
(O) MCF=(M-1)(10^5)/H	8	2	5	6	4	6	7	14	7	9	11	8

Project_____ Line .937 1.032 1.027 .926 Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5		1-2					
(B) Receive	2.0-2.5"	2.5-3"	→	→	→		CAL					
(C) n separation	66	22 74	38	36	52							
(D) I	1100	1800	1800	1200	1100							
(E) Vdc (avg)	14.50	48.7 49.7	25.2	7.81	11.38							
(F) DCcal					→							
(G) Kn x 10^{-3}	52.5	15	30	525	84							
(H) ρ dc=ExFxGx10^3/D	648	384	392	320	814							
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	13.15	44.2 44.4	22.7	7.11	10.32							
(L) AC-DC cal.	.927	.939 .925	.935	.935	.931							
(M) ρdc/ρac =ExL/K	1.021	1.034 1.036	1.038	1.027	1.026							
(N) PFE=(M-1)(10^2)	2	4	4	3	3							
(O) MCF=(M-1)(10^5)/H	3	9	10	8	3							

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

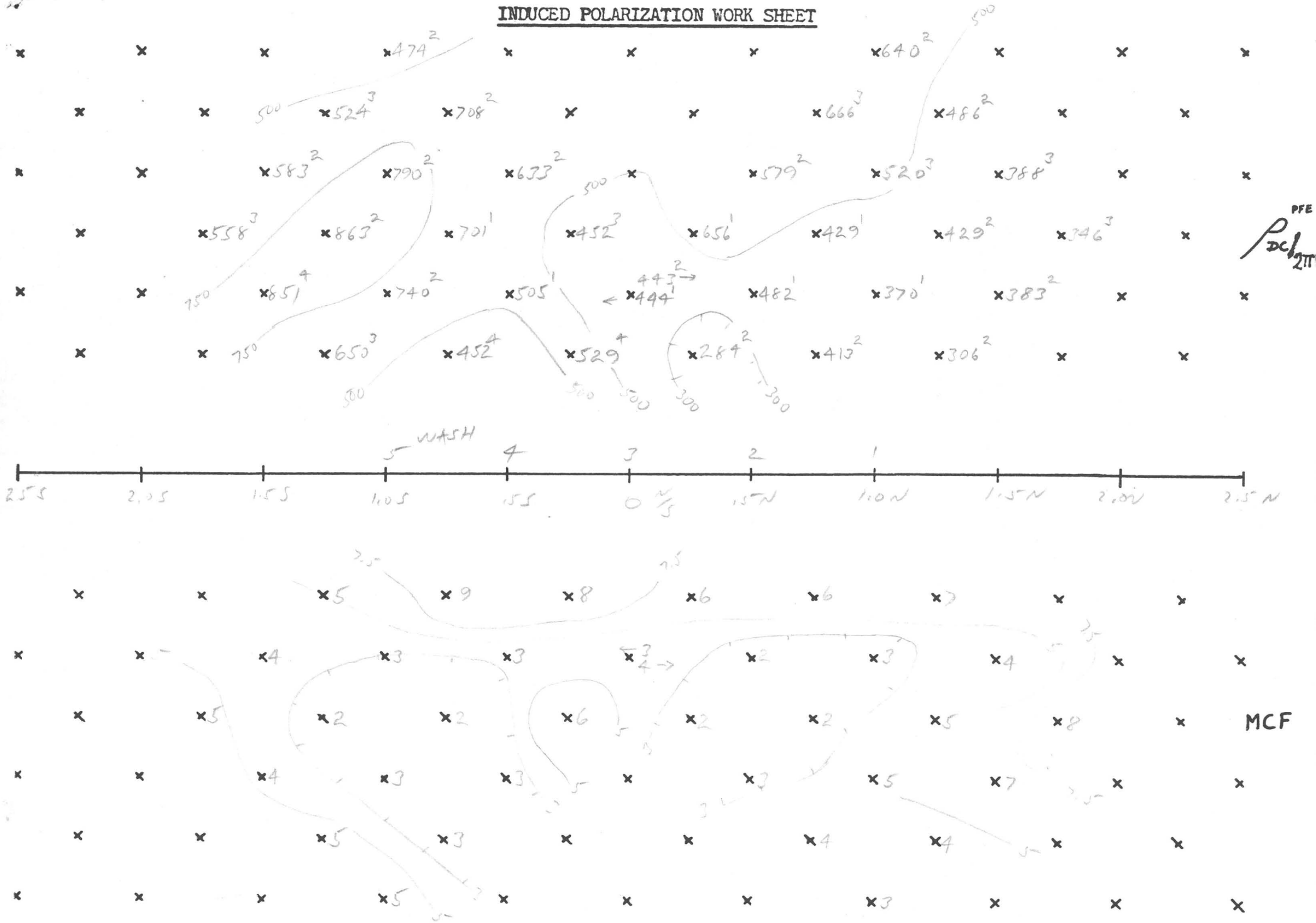
Project Copper Queen Line 2 5½ Field date 2/20/63 Data page_____ Comp. date_____. Comp by_____

(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~~ % 5.0	22 73	79	78	52	29	22 74	39	34	23 75	61	51	52
(D) I	1880	1880	1480	1880	1680	1100	1480	1680	1880	1100	1480	1680
(E) Vdc (avg)	470 484	172.6	222	113.2	63.0	483 491	64.0	73.2	48.7 50.4	123.6	33.7	34.4
(F) DCcal USED	.935											
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D 2	359	515	210	338	470	620	318	570	755	680	319	513
(I) Vac Σ	440 440	157.2	201	103.5	57.3	444 447	77.5	67.6	45.3 45.3	122.4	30.6	31.4
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.937 .927	.925	.935	.931	.935	.937 .927	.933	.934	.936 .926	.929	.931	.931
(M) ρ dc/ρac=ExL/K 1	1.020 1.020	1.014	1.032	1.019	1.029	1.020 1.020	1.011	1.011	1.009 1.029	1.012	1.026	1.020
(N) PFE=(M-1)(10^2)	2	1	3	2	3	2	1	1	2	1	3	2
(O) MCF=(M-1)(10^5)/H	6	3	15	6	6	3	3	2	3	2	8	4

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	4-5	3-4	2-3	1-2		4-5	→	→	→	→	→
(B) Receive							CAL	→	→	→	→	→
(C) ~~n separation~~ % 5.0	38	27 89	80	50 89	62							
(D) I	1880	1100	1480	1880	1880							
(E) Vdc (avg)	24.9	58.6 59.0	17.21	19.2 19.4	15.03							
(F) DCcal	→	→	→	→	→							
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	650	749	336	514	631							
(I) Vac Σ	22.7	53.6 53.4	16.02	18.05 17.70	13.68							
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.933	.936 .927	.925	.935 .923	.927							
(M) ρdc/ρac =ExL/K	1.023	1.022 1.020	1.021	1.021 1.029	1.022							
(N) PFE=(M-1)(10^2)	2	2	2	3	2							
(O) MCF=(M-1)(10^5)/H	4	3	6	5	3							

INDUCED POLARIZATION WORK SHEET



Area Cu Queen Line 3 N 85½ Scale 1" = 500' Date 3/1/63

INDUCED POLARIZATION - RECEIVER NOTES PAGE 11

Project: Cu Queen Line: 3 - N½ White Int.Cal 52.7 Date: 2/21/68

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
Rec.	.5-1.0N	→	1.0-1.5N	→	→	1.5-2.0N	→	→	→	2.0-2.5N	→	
~~Range~~ Time	300	100	1000	100	100	300	100	100	30	100	30	30
DC-1	183	70.5	265	76.9	42.0	197	59.7	27.0	18.5	60.8	27.3	16.9
DC-2	181	71.4	265	77.8	42.0	195	58.5	28.0	18.5	62.0	27.7	16.4
Σ	364	141.9	530	154.7	84.3	392	118.2	55.0	37.0	122.8	55.0	33.3
DC-3	183	70.5 70.6	265	76.9	42.0	197	59.7 59.8	27.0	18.5	60.8	27.3	16.8
Dc-4	181	71.5 71.5	265	77.8	42.3	195	58.6 58.6	28.0	18.5	62.0	27.7	16.5
Σ	364	142.0 142.1	530	154.7	84.3	392	118.4 118.4	55.0	37.0	122.8	55.0	33.3
DC-AV	364	142.0	530	154.7	84.3	392	118.4	55.0	37.0	122.8	55.0	33.3
AC-1	166	64.6	243	70.6	38.9	178	54.3	25.6	16.8	56.0	24.9	15.1
AC-2	167	64.7	243	71.0	38.9	178	54.5	25.6	16.9	56.2	24.8	15.1
Σ	333	129.3	486	141.6	77.8	356	108.8	51.2	33.7	112.2	49.7	30.2
S. P.	-2.5	→	+3.1	→	→	-5.0	→	→	→	-2.5	→	
AC-N	.02	→	.02	→	→	.02	→	→	→	.01	→	
Ω	400		500			500				400		

INDUCED POLARIZATION - RECEIVER NOTES PAGE 12

Project: Cu Queen Line: 3 - N½ Int.Cal 53.0 Date: 2/21/67

Send	4-5	1-2	2-3	3-4	4-5	CAL						
Rec.	→	2.5-3.0	→		→	1-2						
~~Range~~ Time	30	30	30	10	10	100	30	100	30	100	30	100
DC-1	12.1	22.4	12.7	8.83 8.86	7.33	16.0	16.7	20.9	21.5	26.4	27.0	31.9
DC-2	12.3	22.0	12.1	8.91 8.99	7.30	15.8	16.3	21.0	21.6	26.3	27.1	31.8
Σ	24.4	44.4	24.8	17.25	14.63	31.8	32.6	41.9	43.1	52.7	54.1	63.7
DC-3	12.1	22.0	12.7	8.83 8.85	7.33	16.0	16.7	20.9	21.5	26.3	27.0	31.9
Dc-4	12.3	22.4	12.1	9.00 9.02	7.30	15.8	16.3	21.0	21.6	26.4	27.1	31.8
Σ	24.4	44.4	24.8	17.83	14.63	31.8	32.6	41.9	43.1	52.7	54.1	63.7
DC-AV	24.4	44.4	24.8	17.80	14.63	31.8	32.6	41.9	43.1	52.7	54.1	63.7
AC-1	11.1	20.0	11.3	8.06	6.63	14.6	15.0	19.9	19.9	24.6	24.6	29.9
AC-2	11.1	20.1	11.3	8.06	6.64	15.0	15.1	19.9	19.8	24.8	24.8	29.9
Σ	22.2	40.1	22.6	16.12	13.27	29.6	30.1	39.8	39.7	49.4	49.4	59.8
S. P.	→	+2.7	→		→							
AC-N	→	.01	→		→							
Ω		500										

INDUCED POLARIZATION SENDER NOTES

Project: Cu Queen Line: #3- N 1/2 Date: 21 Feb 83

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	900	–	–	–	–	–	–	–	–	–	–	→
Range	x 2	–	–	–	–	–	–	–	–	–	–	→
Current	1800	→										
Send	4-5	1-2	2-3	3-4	4-5		1-3					
Receive							CAL					
Time	900	–	–	–	–		300	400	500	600		
Range	x 2	–	–	–	–		x 1	x 1	x 1	x 1		
Current	1800	→			→		300	400	500	600		

INDUCED POLARIZATION - RECEIVER NOTES PAGE 9

Project: La Queen Line: White 3 - 5½ Int.Cal 53.0 Date: 2/21/68

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
Rec.	.5-1.05	→	1.0-1.55	→	→	1.5-2.05	→	→	→	2.0-2.55	→	→
~~Time~~ Range	1000	100	1000	100	100	10000	300	100	30	300	100	30
DC-1	338	71.5	289	80.0	29.8	417	119	45.3	20.4	136	54.6	25.8
DC-2	339	70.6	291	81.8	28.2	417	118	44.6	20.2	137	56.0	24.8
Σ	677	142.1	580	161.8	58.0	834	237	89.9	40.6	273	110.6	50.6
DC-3	338	71.6	289	80.0	28.8	417	119	45.3	20.5	136	54.7	25.3
Dc-4	339	70.5	291	81.8	29.2	417	118	44.6	20.1	137	55.9	25.3
Σ	677	142.1	580	161.8	58.0	834	237	89.9	40.6	273	110.6	50.6
DC-AV	677	142.1	580	161.8	58.0	834	237	89.9	40.6	273	110.6	50.6
AC-1	306	65.2	261	73.6	26.5	378	109	41.3	18.5	123	50.6	22.8
AC-2	304	65.0	261	73.6	26.4	377	108	41.4	18.4	123	50.6	22.9
Σ	610	130.2	522	147.2	52.9	755	217	82.7	36.9	246	101.2	45.7
S. P.	+5.9	→	-6.6	→	→	-0.7	→	→	→	-1.8	→	→
AC-N	.03	→	.05	→	→	.04	→	→	→	.07	→	→
Ω	800		800			800				700		

INDUCED POLARIZATION - RECEIVER NOTES PAGE 10

Project: Cu Queen Line: 3 - 5½ (White) Int.Cal 52.8 Date: 2/21/67

Send	1-2	4-5	3-4	2-3	1-2	CAL						
Rec.	→	2.5-3.05	→	→	→	4-5						
~~Time~~ Range	30	100	30	30	10	100	30	100	30	100	30	100
DC-1	13.1	35.5	19.2	9.6	5.40	15.8	16.3	21.0	21.6	26.3	27.1	31.7
DC-2	12.8	36.0	16.2	9.6	5.45	15.8	16.2	20.9	21.7	26.3	27.1	31.7
Σ	25.9	71.5	37.4	19.2	10.85	31.6	32.5	41.9	43.3	52.6	54.2	63.4
DC-3	13.1	35.5	18.6	9.6	5.37 5.40	15.8	16.3	21.0	21.6	26.3	27.1	31.7
Dc-4	12.8	36.0	18.8	9.6	5.50 5.47	15.8	16.2	20.9	21.7	26.3	27.1	31.7
Σ	25.9	71.5	37.4	19.2	10.87 10.87	31.6	32.5	41.9	43.3	52.6	54.2	63.4
DC-AV	25.9	71.5	37.4	19.2	10.86	31.6	32.5	41.9	43.3	52.6	54.2	63.4
AC-1	11.9	32.4	17.0	8.8	4.95	14.5	14.9	19.9	19.8	24.8	24.8	29.6
AC-2	11.8	32.6	16.9	8.7	4.93	14.5	14.9	19.9	19.9	24.6	24.6	29.7
Σ	23.7	65.0	33.9	17.5	9.88	29.0	29.8	39.8	39.7	49.4	49.4	59.3
S. P.	→	-1.7	→	→	→							
AC-N	→	.02	→	→	→							
Ω		900										

INDUCED POLARIZATION SENDER NOTES

Project: Cu Queen Line: #3 - 5 1/2 Date: 21/Feb/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	.5s-1.0s	→	1.0-1.5s	→		1.5-2.0s	→			2.0-2.5s	→	
Time	900	–	–	–	–	–	–	–	–	–	–	→
Range	x2	–	–	–	–	–	–	–	–	–	–	→
Current	1800	→										

Send	1-2	4-5	3-4	2-3	1-2		3-4	→				
Receive	2.0-2.5s	2.5-3s	→				CAL.					
Time	900	900	→				300	400	500	600		
Range	x2	x2	→				x1	x1	x1	x1		
Current	1800	1800	→				300	400	500	600		

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Copper Queen Line 3 N½ Field date_____ Data page_____ Comp. date 3/1/62. 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	.5-1.0"	→	1.0-1.5"	→	→	1.5-2.0"	→	→	→	2.0-2.5"	→	→
(C) ~~n separation~~ S.O.	55	65	24	71	39	59	54	26	58	56	83	50
(D) I	1800	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	364	142.0	530	154.7	84.3	392	118.4	55.0	37.0	122.8	55.0	33.3
(F) DCcal USED	.935	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	284	443	413	482	656	306	370	429	579	383	429	520
(I) Vac Σ	33.3	129.3	486	141.6	77.8	356	108.8	51.2	33.7	112.2	49.7	30.2
(J) AC noise x 2												
(K) Vac(corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.930	.927	.939	.926	.934	.929	.930	.938	.929	.930	.922	.931
(M) ρ dc/ρac=ExL/K	1.017	1.019	1.023	1.011	1.011	1.021	1.012	1.007	1.020	1.017	1.020	1.027
(N) PFE=(M-1)(10^2)	2	2	2	1	1	2	1	1	2	2	2	3
(O) MCF=(M-1)(10^5)/H	6	4	6	2	2	7	3	2	3	4	5	5

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5		1-2					
(B) Receive	2.0-2.5"	2.5-3"	→	→	→		CAL					
(C) n separation	37	67	38	81	66							
(D) I	→	→	→	→	→							
(E) Vdc (avg)	24.4	44.4	24.8	17.80	14.63							
(F) DCcal	→	→	→	→	→							
(G) Kn x 10^{-3}	52.5	15	30	525	84							
(H) ρ dc=ExFxGx10^3/D	666	346	388	486	640							
(I) Vac Σ	22.2	40.1	22.6	16.12	13.27							
(J) AC noise x 2												
(K) Vac (corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.935	.927	.935	.923	.927							
(M) ρdc/ρac =ExL/K	1.029	1.027	1.026	1.019	1.022							
(N) PFE=(M-1)(10^2)	3	3	3	2	2							
(O) MCF=(M-1)(10^5)/H	4	8	7	4	3							

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Copper Queen Line 3 5½ Field date_____ 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 7.5.8	31	65	26	74	27	38	38	41	62	41	51	78
(D) I	1800											
(E) Vdc (avg)	677	142.1	580	161.8	58.0	834	237	89.9	40.6	273	110.6	50.6
(F) DCcal USED	.935											
(G) Kn x 10^{-3}	15	6	15	6	15	15	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	529	444	452	505	452	650	740	701	633	851	863	790
(I) Vac Σ	610	130.2	522	147.2	52.9	755	217	82.7	36.9	246	101.2	45.7
(J) AC noise x 2												
(K) Vac(corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.937	.927	.938	.924	.938	.935	.935	.934	.928	.934	.931	.924
(M) ρ dc/ρac=ExL/K	1.040	1.012	1.041	1.014	1.029	1.032	1.020	1.014	1.021	1.036	1.017	1.022
(N) PFE=(M-1)(10^2)	4	1	4	1	3	3	2	1	2	4	2	2
(O) MCF=(M-1)(10^5)/H	8	3	9	3	6	5	3	2	3	4	2	3

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	4-5	3-4	2-3	1-2		4-5					
(B) Receive							CAL					
(C) n separation 7.5.8	40	33	57	29	49							
(D) I												
(E) Vdc (avg)	25.9	71.5	37.4	19.2	10.86							
(F) DCcal												
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	708	558	583	524	474							
(I) Vac Σ	23.7	65.0	33.9	17.5	9.88							
(J) AC noise x 2												
(K) Vac (corr) $=\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.934	.936	.929	.937	.932							
(M) ρdc/ρac =ExL/K	1.020	1.030	1.023	1.028	1.024							
(N) PFE=(M-1)(10^2)	2	3	2	3	2							
(O) MCF=(M-1)(10^5)/H	3	5	4	5	5							

CALIBRATIONS

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

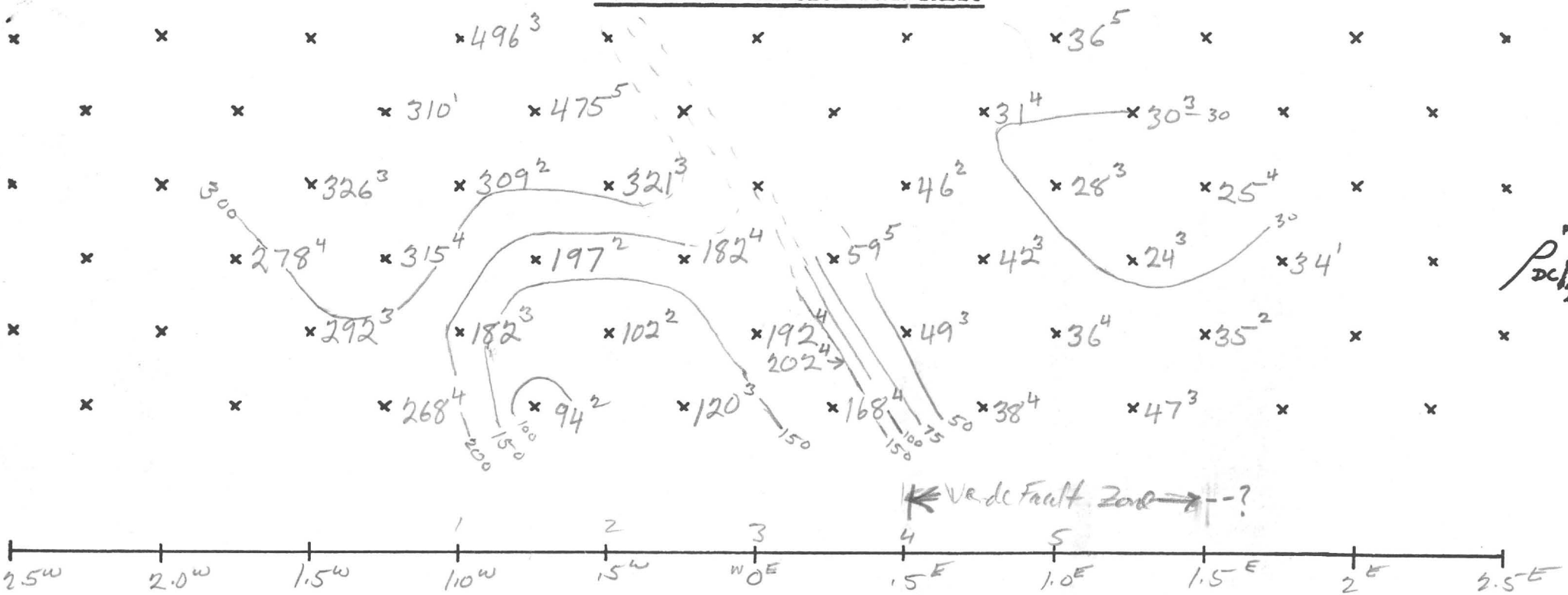
Project Gu Queen Line_____ Field date_____ Data page_____ Comp. date_____. Comp by_____

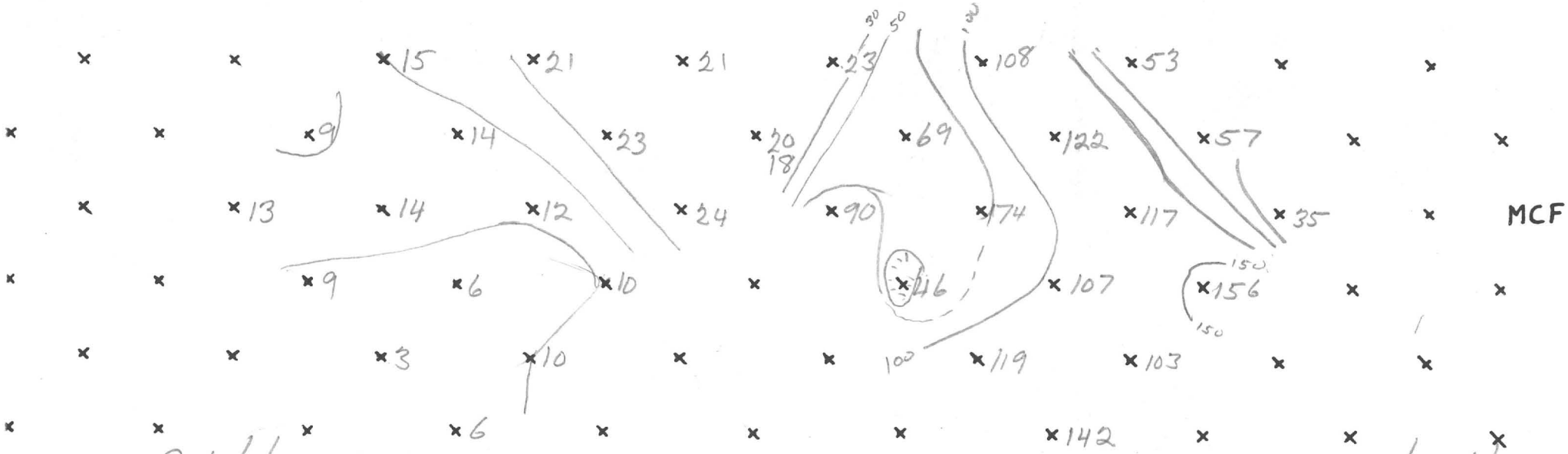
	Line 1							← Line 2				
(A) Send	CAL	→	→	→	→	→	→					
(B) Receive	4-5	→	→	→	→	→	→					
(C) n separation S.D.	15	50	20	66	25	82	30	16	54	21	70	26
(D) I	300	300	400	400	500	500	600	340	340	440	440	540
(E) Vdc (avg)	31.8	32.4	41.9	42.7	52.4	53.7	63.7	35.0	36.0	45.8	46.6	56.0
(F) DCcal	.944	.926	.956	.938	.955	.932	.942	.971	.945	.961	.945	.964
(G) Kn x 10^{-3}												
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ	29.0	29.2	39.6	39.7	49.4	49.4	59.7	32.3	32.7	42.4	42.7	52.0
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.913	.924	.946	.929	.943	.920	.938	.923	.910	.926	.909	.930
(M) ρ dc/ρac=ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

Project_____ ← Line 2 Line_____ → Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send												
(B) Receive												
(C) n separation	86	31	15	50	20	66	25	82	30			
(D) I	540	640	300	300	400	400	500	500	600			
(E) Vdc (avg)	57.7	67.3	31.6	32.4	41.2	43.1	52.9	54.0	63.6			
(F) DCcal	.936	.951	.950	.926	.955	.929	.955	.927	.934			
(G) Kn x 10^{-3}												
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ	51.6	61.4	29.1	29.8	39.7	39.8	49.4	49.4	59.1			
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.895	.913	.922	.920	.948	.924	.943	.915	.940			
(M) ρdc/ρac =ExL/K												
(N) PFE=(M-1)(10^2)												
(O) MCF=(M-1)(10^5)/H												

INDUCED POLARIZATION WORK SHEET





Area Pebble Mill - Line #1 Scale 1" = 500' Date (Field 27) Feb 63

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: # 1 - E 1/2 Int.Cal 53.0 Date: 27/Feb

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
Rec.	.5-1E	→	1-1.5E	→	→	1.5-2E	→	→	→	2-2.5E	→	→
Time	300	100	30	10	10	100	10	10	3	10	3	3
DC-1	112	33.8	22.5	7.25	3.42	31.5	5.97	2.82	1.52	5.90	1.63	1.00
DC-2	112	33.5	22.9	7.35	3.59	31.5	5.97	2.82	1.52	5.90	1.63	.91
Σ	224	67.3	45.4	14.60	7.01	63.0	11.94	5.64	3.04	11.80	3.26	1.91
DC-3	112	33.8	22.4	7.25	3.43	31.5	5.97	2.85	1.51	5.90	1.63	.98
Dc-4	112	33.5	23.0	7.35	3.59	31.5	5.97	2.80	1.53	5.90	1.63	.93
Σ	224	67.3	45.4	14.60	7.01	63.0	11.94	5.65	3.04	11.80	3.26	1.91
DC-AV	224	67.3	45.4	14.60	7.01	63.0	11.94	5.65	3.04	11.80	3.26	1.91
AC-1	101	30.2	20.3	6.55	3.17	28.8	5.32	2.57	1.39	5.39	1.48	.87
AC-2	101	30.2	20.2	6.55	3.12	28.8	5.32	2.57	1.39	5.39	1.48	.87
Σ	202	60.4	40.5	13.10	6.24	57.6	10.64	5.14	2.78	10.78	2.96	1.74
S. P.		+0.3	-1.5	→	-1	0 ±0.1	0	0	0	-6.0		
AC-N												
	30	30	60	66	31	29	53	26	42	54	45	2[illegible]

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: _____ Line: #1 - E/2 Int.Cal _____ Date: 27/Feb

Send	1-2	4-5	3-4	2-3	1-2	4-5						
Rec.	2-3.5					CAL						
Time	3	3	3	3	3	100	30	100	30	30	100	
DC-1	.59	2.4 2.3	.78 .85	.52 .59	.42	22.0	22.6	27.9	28.1	16.9	16.5	
DC-2	.59	2.15 2.25	.89 .81	.64 .57	.43	22.0	22.5	27.9	28.2	16.9	16.5	
Σ	1.18	4.55 4.55	1.67 1.66	1.16	.85	44.0	45.1	55.8	56.3	33.8	33.0	
DC-3	.51	2.35	.74 .80	.61	.41	22.0	22.6	27.9	28.1	16.9	16.5	
Dc-4	.61	2.20	.92 .86	.55	.44	22.0	22.5	27.9	28.2	16.9	16.5	
Σ	1.18	4.55	1.66 1.66	1.16	.85	44.0	45.1	55.8	56.3	33.8	33.0	
DC-AV	1.18	4.55	1.66	1.16	.85	44.0	45.1	55.8	56.3	33.8	33.0	
AC-1	.53	2.08	.75	.53	.38	20.7	20.9	26.0	25.9	15.7	15.8	
AC-2	.54	2.09	.75	.53	.38	20.7	20.9	26.1	25.8	15.7	15.8	
Σ	1.07	4.17	1.50	1.06	.76	41.4	41.8	52.1	51.7	31.4	31.6	
S. P.	-6.5	-3.5				0-.5	+6.7 mv.					
AC-N												
	18	63	22	16	12	21	63	26	78	47	16	

INDUCED POLARIZATION SENDER NOTES

Project: _____ Line: 1 E ½ Date: FEB 27 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	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2
Range	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Current	1800	1800	1600	1600	1600	1800	1800	1800	1800	1800	1800	1800
Send	1-2	4-5	3-4	2-3	1-2		4-5					
Receive	→	→	→	→	→							
Time	x2						x1	x1	x1			
Range	2.0						30	30	20			
Current	1800						400	500	300			

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INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebblemill Line: #1 - W½ Int.Cal 53.5 Date: 26/Feb

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
Rec.	.5-10ω	→	10-1.5ω	→	→	1.5-20	→	→	→	2.0-25	→	→
Time	100 300	100 R	100	30	30	300	100	30R	30	100	100	30
DC-1	80.0 80.0	32.1	62.0	17.1	12.2	178	29.8	13.2	10.6	48.5	20.8	10.3
DC-2	79.5 80.0	32.0	62.5	17.0	12.1	180	31.0	13.1	10.8	49.0	21.2	10.3
Σ	159.5 160	64.1	124.5	34.1	24.3	358	60.8	26.3	21.4	97.5	42.0	20.6
DC-3	80.0 80.0	32.1	62.5	17.1	12.2	178	29.8	13.2	10.6	48.5	20.9	10.3
Dc-4	79.5 80.0	32.0	62.0	17.0	12.1	180	31.0	13.1	10.8	49.0	21.1	10.3
Σ	159.5 160	64.1	124.5	34.1	24.3	358	60.8	26.3	21.4	97.5	42.0	20.6
DC-AV	159.5 160	64.1	124.5	34.1	24.3	358	60.8	26.3	21.4	97.5	42.0	20.6
AC-1	73.0 73.0	29.0	56.8	15.5	10.9	160	27.8	12.0	9.7	44.2	18.9	9.5
AC-2	72.2 72.0	29.0	56.8	15.5	10.9	161	27.8	12.0	9.7	44.4	18.9	9.5
Σ	145.2 145	58.0	113.6	31.0	21.8	321	55.6	24.0	19.4	88.6	37.8	19.0
S. P.	-6.2		+8.1									
AC-N	0											
	73 22	29	57	47	33	48	28	36	29	44	19	29

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Line: #1-W½ Int.Cal Date: 26/Feb

Send	4-5	1-2	2-3	3-4	4-5		CAL					
Rec.	2-2.5	2.5-3.0	→				1-2					
Time	30	30	30	10	10		100R	30R	100	30	100R	
DC-1	8.9	18.4	10.8	6.20 6.45	5.95 5.82		22.6	22.0	27.9	27.9	33.0	
DC-2	9.2	18.6	10.9	6.65 6.40	5.85 5.98		22.4	22.0	27.9	28.1	33.0	
Σ	18.1	37.0	21.7	12.85 12.85	11.80 11.80		45.0	44.0	55.8	56.0	66.0	
DC-3	8.9	18.4	10.8	6.30 6.15	5.85 5.90		22.6	22.0	27.9	27.9	33.0	
Dc-4	9.2	18.6	10.9	6.58 6.05	6.00 5.90		22.4	22.0	27.9	28.1	33.0	
Σ	18.1	37.0	21.7	12.88 12.80	11.85 11.80		45.0	44.0	55.8	56.0	66.0	
DC-AV	18.1	37.0	21.7	12.85	11.81		45.0	44.0	55.8	56.0	66.0	
AC-1	8.1	16.7	9.8	5.92	5.35		20.1	20.2	25.5	25.3	30.5	
AC-2	8.1	16.6	9.8	5.90	5.35		20.1	20.2	25.7	25.2	30.5	
Σ	16.2	33.3	19.6	11.82	10.70		40.2	40.4	51.2	50.6	61.0	
S. P.	2	-5.2										
AC-N												
	24	50	30	59	54		20	61	26	76	31	

INDUCED POLARIZATION SENDER NOTES

Project: _____ Line: 1 W ½ Date: FEB 26 63

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	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2	x2
Range	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Current	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Send	4-5	1-2	2-3	3-4	4-5	CAL	1-2					
Receive	→			→								
Time	x2	x2	x2	x2	x2		x1	x1	x1			
Range	2.0	2.0	2.0	2.0	2.0		.30	.30	.30			
Current	1800	1800	1800	1800	1800		400	500	600			

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Pebble Mill Line # 1-W 1/2 Field date 26/Feb/83 Data page_____ Comp. date_____. Comp by FAS

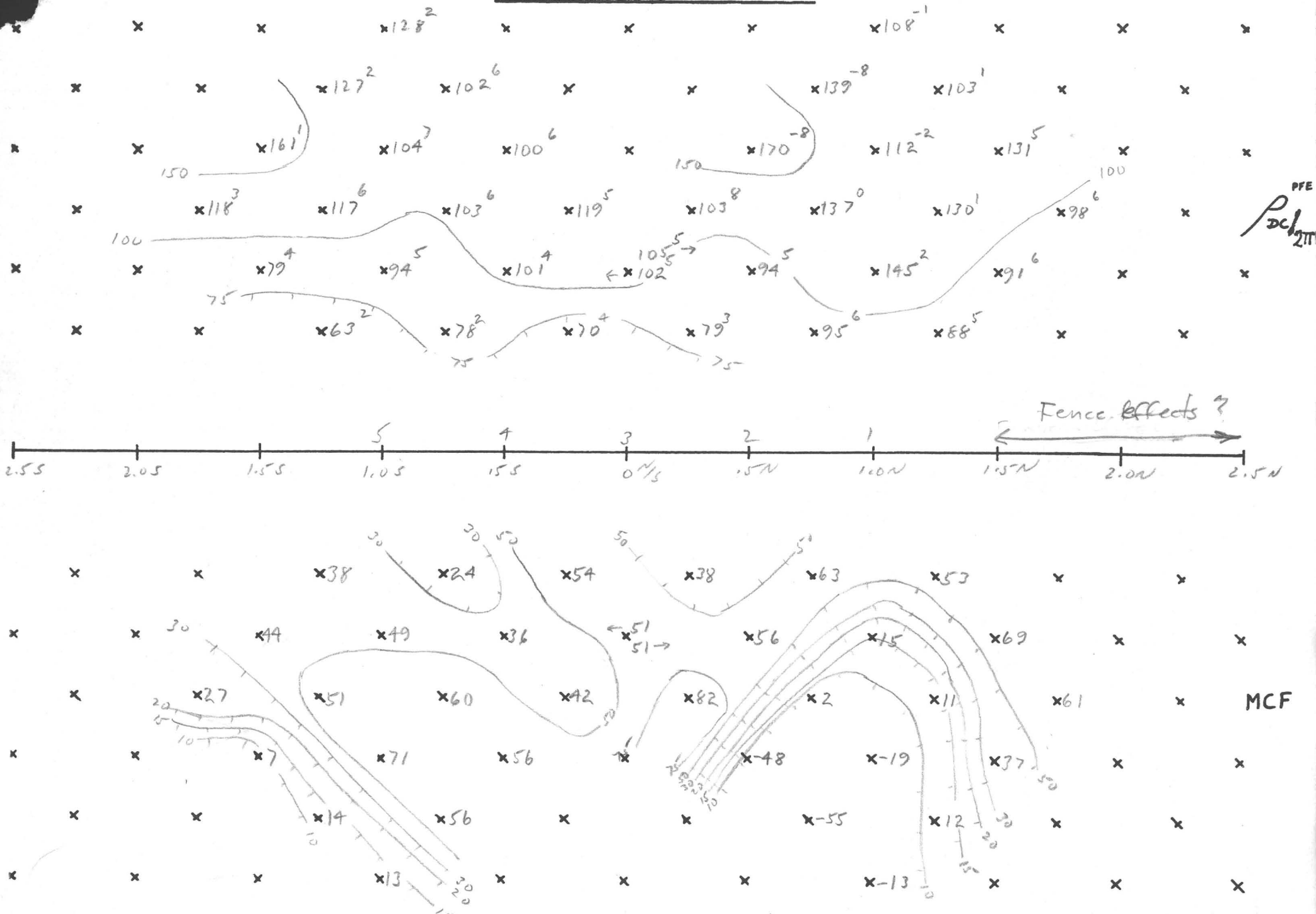
(A) Send	3-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
(B) Receive	.5-1.0w	→	1.0-1.5w	→	→	1.5-2.0w	→	→	→	2.0-2.5w	→	→
(C) ~~n separation~~ % SD	73 22	29	57	47	33	48	28	36	29	44	19	29
(D) I	1800	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	159.5 160	64.1	124.5	34.1	24.3	358	60.8	26.3	21.4	97.5	42.0	30.6
(F) DCcal	.900	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	120	192	94	102	182	268	182	197	321	292	315	309
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	145.2 145	58.0	113.6	31.0	21.8	321	55.6	24.0	19.4	88.6	37.8	19.0
(L) AC-DC cal.	.925 .939	.937	.930	.932	.936	.932	.937	.935	.937	.933	.940	.937
(M) ρ dc/ρac=ExL/K	1.016 1.025 1.034	1.035	1.020	1.024	1.043	1.040	1.025	1.024	1.033	1.026	1.044	1.018
(N) PFE=(M-1)(10^2)	3	4	2	2	4	4	3	2	3	3	4	2
(O) MCF=(M-1)(10^5)/H	21	18	21	23	24	15	14	12	10	9	14	6

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

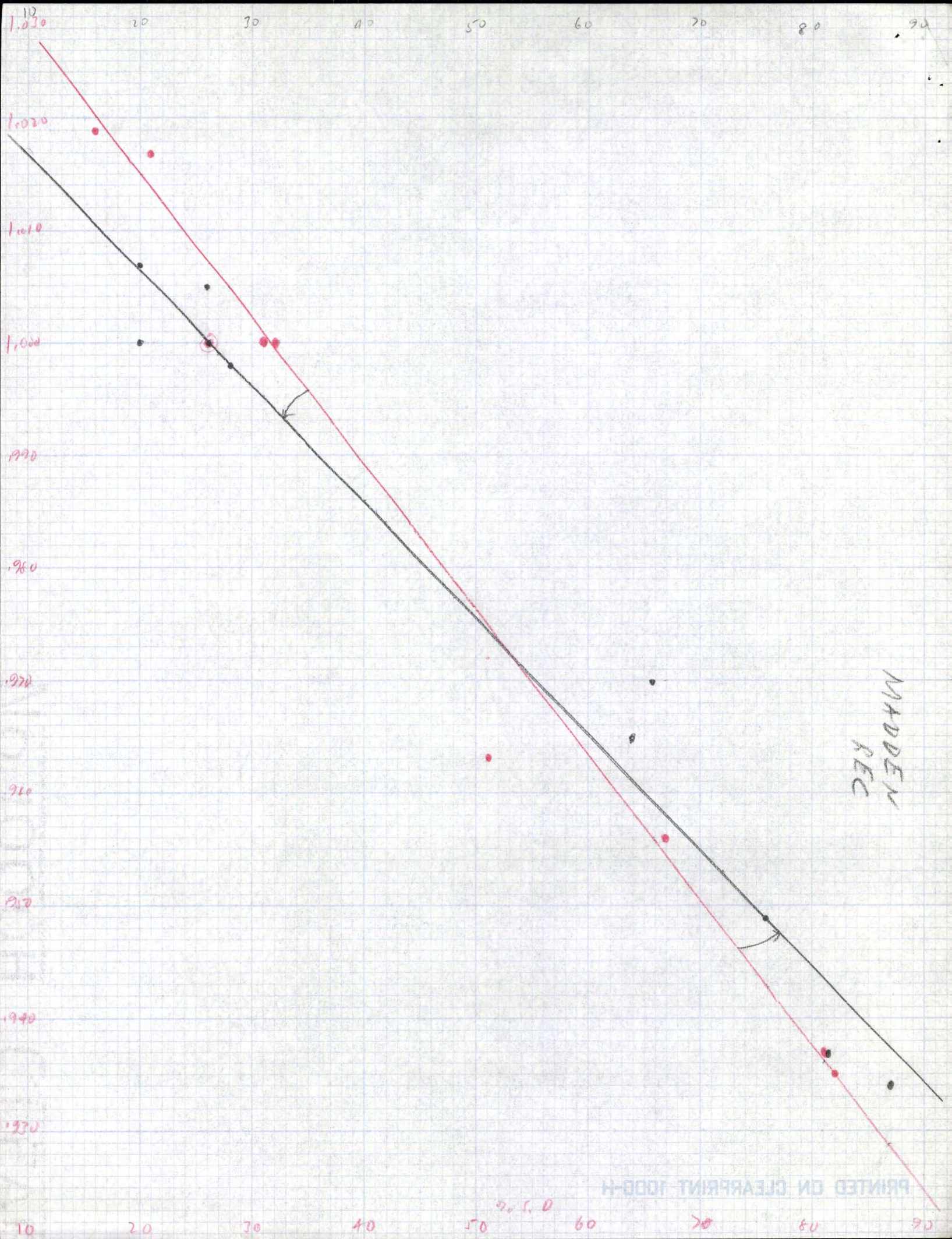
(A) Send	4-5	1-2	2-3	3-4	4-5		1-2					
(B) Receive	2.0-2.5w	2.5-3w	→	→	→		CAL					
(C) n separation % SD	24	50	30	59	54		20	61	26	76	31	
(D) I	1800	→	→	→	→		400	400	500	500	600	
(E) Vdc (avg)	18.1	37.0	21.7	12.85	11.81		45.0	44.0	55.8	56.0	66.0	
(F) DCcal	.900	→	→	→	→		.890	.910	.895	.893	.908	
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	475	278	326	310	496							
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	16.2	33.3	19.6	11.82	10.70		40.2	40.4	51.2	50.6	61.0	
(L) AC-DC cal.	.938	.931	.937	.929	.930		.894	.920	.918	.905	.924	
(M) ρdc/ρac =ExL/K	1.048	1.036	1.030	1.009	1.028							
(N) PFE=(M-1)(10^2)	5	4	3	1	3							
(O) MCF=(M-1)(10^5)/H	10	13	9	3	6							

WADDEN REC

INDUCED POLARIZATION WORK SHEET



Area PEBBLE MILL LINE 4 ~~N/S~~ Scale 1" = 500' Date 3/12/63


1.030
1.020
1.010
1.000
.990
.980
.970
.960
.950
.940
.930
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20
30
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50
60
70
80
90
MADDEN
REC

INDUCED POLARIZATION - RECEIVER NOTES PAGE 49.0 46.0 → 40

Project: Pebble Mill Line: Recv #4 - N 1/2 Int.Cal 24.00 Date: 4 March 83

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
Rec.	.5-1.0" →		1-1.5"	→		1.5-2"	→			2-2.5"	→	
~~Time~~	100	30	100	30	10	100	30	10	10	30 R	10	10
DC-1	43.8	11.0	40.0	13.1	4.22	42.5	15.1	7.65	neg pol 3.45	9.5	5.40	neg pol 3.00
DC-2	44.0	10.9	39.5	13.0	4.35	43.5	15.2	7.55	3.65	9.5	5.40	3.20
Σ	87.8	21.9	79.5	26.1	8.57	86.0	30.3	15.20	7.10	19.0	10.80	6.20
DC-3	43.8	11.0	40.0	13.1	4.22	42.5	15.1	7.65	3.45	9.5	5.40	3.00
Dc-4	44.0	10.9	39.5	13.0	4.35	43.5	15.2	7.55	3.65	9.5	5.40	3.20
Σ	87.8	21.9	79.5	26.1	8.57	86.0	30.3	15.20	7.10	19.0	10.80	6.20
DC-AV	87.8	21.9	79.5	26.1	8.57	86.0	30.3	15.20	7.10	19.0	10.80	6.20
AC-1	42.0	10.3	37.6	12.2	3.90	40.5	14.5	7.22	3.82	8.9	5.18	3.15
AC-2	41.8	10.3	37.2	12.2	3.90	40.5	14.5	7.22	3.82	8.9	5.18	3.15
Σ	83.8	20.6	74.2	24.4	7.80	81.0	29.0	14.44	7.64	17.8	10.36	6.30
S. P.	+4.0		+4.4			+6.1				-4.0		
AC-N												
SP0 - .5" = -6.2									Fence?			Fence

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: #I #II 4 - N 1/2 Int.Cal Date: 4 March 63

Some drift

Send	4-5	1-2	2-3	3-4	4-5		1-2					
Rec.	2-2.5	2.5-3					CAL					
Time	3	10	10?	3	3		100	30	100	30	30	100
DC-1	1.48 1.45	4.2	2.60 2.65	1.62	.72 .75		20.5	21.0	26.0	26.1		31.0
DC-2	1.85 1.81	4.00	2.85 2.80	1.65	.88 .82		20.8	21.0	26.0	26.0		31.0
Σ	3.33 3.26	8.20	5.45 5.45	3.27	1.60 1.57		41.3	42.0	52.0	52.1		62.0
DC-3	1.48 1.49	4.2	2.62	1.62	.90 .75		20.5	21.0	26.0	26.1		31.0
Dc-4	1.83 1.80	4.00	2.82	1.65	.70 .85		20.8	21.0	26.0	26.0		31.0
Σ	3.31 3.29	8.20	5.44	3.27	1.60 1.60		41.3	42.0	52.0	52.1		62.0
DC-AV	3.30	8.20	5.45	3.27	1.60		41.3	42.0	52.0	52.1		62.0
AC-1	1.72	3.82	2.60	1.57	0.81		21.0	20.0	26.0	24.4	28.6	31.0
AC-2	1.74	3.82	2.60	1.57	0.81		21.0	20.1	26.0	24.4	28.6	31.0
Σ	3.46	7.64	5.20	3.14	1.62		42.0	40.1	52.0	48.8		62.0
S. P.												
AC-N												

INDUCED POLARIZATION SENDER NOTES

Project: Pebble Mill Line: 4 N 6 Date: March 4 63

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	8x2	6x2	6x2	8x2	8x2	7x2	6x2	8x2	6x2	6x2	6x2	8x2
Range	1.50	1.0	1.0	1.50	1.50	1.50	1.0	1.50	1.0	1.0	1.0	1.50
Current	1600	1200	1200	1600	1200	1400	1200	1600	1200	1200	1200	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→		→		→		1-2					
Time	6x2	6x2	6x2	8x2	6x2		1x4	1x5	1x3			
Range	1.0	1.0	1.0	1.50	1.0		.30	.30	.30			
Current	1200	1200	1200	1600	1200		400	500	600? 300			

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project PEBBLE MILL Line 4 - N½ Field date 3/4/63 Data page_____ Comp. date 3/12/63. Comp by_____

% S.D.	42	34	37	41	39	41	48	72	38	30	52	32
(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	.5-1.0N →		1.0-1.5N →			1.5-2.0N →				2.0-2.5N →		
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1600	1200	1200	1600	1200	1400	1200	1600	1200	1200	1200	1600
(E) Vdc (avg)	87.8	21.9	29.5	26.1	8.57	86.0	30.3	15.20	7.10	19.0	10.80	6.20
(F) DCcal USED	.960 →											
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρdc=ExFxGx10^3/D	79	105	95	94	103	88	145	137	170	91	130	112
(I) Vac Σ	83.8	20.6	24.2	24.4	7.80	81.0	29.0	14.44	7.64	17.8	10.36	6.30
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.983	.992	.989	.985	.987	.985	.978	.953	.988	.996	.973	.994
(M) ρdc/ρac=ExL/K	1.030	1.054	1.060	1.053	1.084	1.047	1.022	1.003	.919	1.063	1.014	.979
(N) PFE=(M-1)(10^2)	3	5	6	5	8	5	2	0	-8	6	1	-2
(O) MCF=(M-1)(10^5)/H	38	51	63	56	82	53	15	2	-48	69	11	-19

Project_____ Line 58 38 Field date 26 52 27 Data page_____ Comp. date 21 67 26 Comp by 81 31

(A) Send	4-5	1-2	2-3	3-4	4-5							
(B) Receive	→	2.5-3.0N	→									
(C) n separation	5	3	4	5	6							
(D) I	1200	1200	1200	1600	1200			400	400	500	500	600
(E) Vdc (avg)	3.70	8.20	5.45	3.27	1.60			41.3	42.0	52.0	52.1	62.0
(F) DCcal	→							.968	.953	.961	.959	.968
(G) Kn x 10^{-3}	52.5	15	30	52.5	84				~.960			
(H) ρdc=ExFxGx10^3/D	139	98	131	103	108							
(I) Vac Σ	3.46	7.64	5.20	3.14	1.62			42.0	40.1	52.0	48.8	62.0
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.967	.988	1.000	.973	.999			1.017	.956	1.000	.937	1.000
(M) ρdc/ρac =ExL/K	.923	1.060	1.049	1.012	.986							
(N) PFE=(M-1)(10^2)	-8	6	5	1	-1							
(O) MCF=(M-1)(10^5)/H	-55	61	37	12	-13							

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INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble MW Line: #4 - 5 1/2 Int.Cal 49.0 Date: 5/March 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
Rec.	65-1.05 →		10-1.55	→		15-2.35	←		→	2-2.5	→	
Time	100 30	30	100	30	10	100 30	30	10	10 3	30 10	10	10 3
DC-1	29.2 29.0	10.9	43.5	10.7	5.00	26.8 26.0	12.7	4.35	2.05 2.09	8.2 8.35	6.42	2.10 2.19
DC-2	29.2 29.0	10.3	43.5	10.4	4.90	26.0 26.9	13.3	4.25	2.05 2.10	8.3 8.22	6.55	2.19 2.18
Σ	58.4 58.0	21.2	87.0	21.1	9.90	52.8 52.9	26.0	8.60	4.10 4.19	16.5 16.57	12.97	4.29 4.37
DC-3	29.2 29.0	10.9	43.5	10.7	5.00	26.8 26.0	12.7	4.35	2.05 2.09	8.2 8.30	6.42	2.10 2.20
Dc-4	29.2 29.0	10.3	43.5	10.4	4.90	26.0 26.9	13.3	4.25	2.05 2.10	8.3 8.25	6.55	2.19 2.17
Σ	58.4 58.0	21.2	87.0	21.1	9.90	52.8 52.9	26.0	8.60	4.10 4.19	16.5 16.55	12.97	4.29 4.37
DC-AV	58.4 58.0	21.2	87.0	21.1	9.90	52.8 52.9	26.0	8.60	4.10 4.19	16.5 16.56	12.97	4.29 4.37
AC-1	28.2 26.3	10.0	42.0	10.1	4.62	26.0 24.3	12.3	3.99	1.95 1.91	8.0 7.58	5.90	1.90 1.97
AC-2	28.0 26.0	10.0	42.0	10.1	4.62	25.8 24.1	12.2	3.99	1.95 1.91	7.9 7.55	5.90	1.98 1.97
Σ	56.2 52.3	20.0	84.0	20.2	9.24	51.8 48.4	24.5	7.98	3.90 3.82	15.9 15.13	11.80	3.98 3.94
S. P.	+26.1		-24.3			+1.4				+1.7		
AC-N												

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: #4 - S 1/2 Int.Cal Date: 5/Mwebb

* DeHorse

Send	1-2	4-5	3-4	2-3	1-2		4-5					
Rec.	2-2.5s	2.5-3.0s					CAL					
Time	3	10	10	3			100	30	30	100	100	30
DC-1	1.22	4.85	4.45 ~~4.45~~	1.50	.91		26.2	26.2		31.8	15.5	15.8
DC-2	1.22	4.95	4.50	1.54	.99		26.2	26.2		32.0	15.5	16.0
Σ	2.44	9.80	8.95	3.04	1.90							
DC-3	1.22	4.85	4.45	1.52	.89		26.2	26.2		31.8	15.5	15.9
Dc-4	1.22	4.95	4.50	1.50	1.01		26.2	26.2		32.0	15.5	15.9
Σ	2.44	9.80	8.95	3.02	1.90							
DC-AV	2.44	9.80	8.95	3.03	1.90		52.4	52.4		63.8	31.0	31.8
AC-1	1.14	4.65	4.35	1.45	.93		26.2	24.5	28.8	32.0	15.8	15.3
AC-2	1.14	4.65	4.35	1.46	.93		26.2	24.5		31.8	15.8	15.3
Σ	2.28	9.30	8.70	2.91	1.86		52.4	49.0		63.8	31.6	30.6
S. P.	+3.3						0-.5s	=+4.8				
AC-N												
							-0-					

INDUCED POLARIZATION SENDER NOTES

Project: Pebble Mil Line: 4 S ½ Date: March 5 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	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x6	2x6	2x6	2x8	2x6
Range	1.0	1.0	1.50	1.0	1.0	1.0	1.50	1.0	1.0	1.0	1.50	1.0
Current	1200	1200	1600	1200	1200	1200	1600	1200	1200	1200	1600	1200

Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	>	—	—	—	>		4-5					
Time	2x6	2x6	2x8	2x6	2x6		1x5	1x6	1x3			
Range	1.0	1.0	1.50	1.0	1.0		.50	.50	.20			
Current	1200	1200	1600	1200	1200		500	600	300			

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

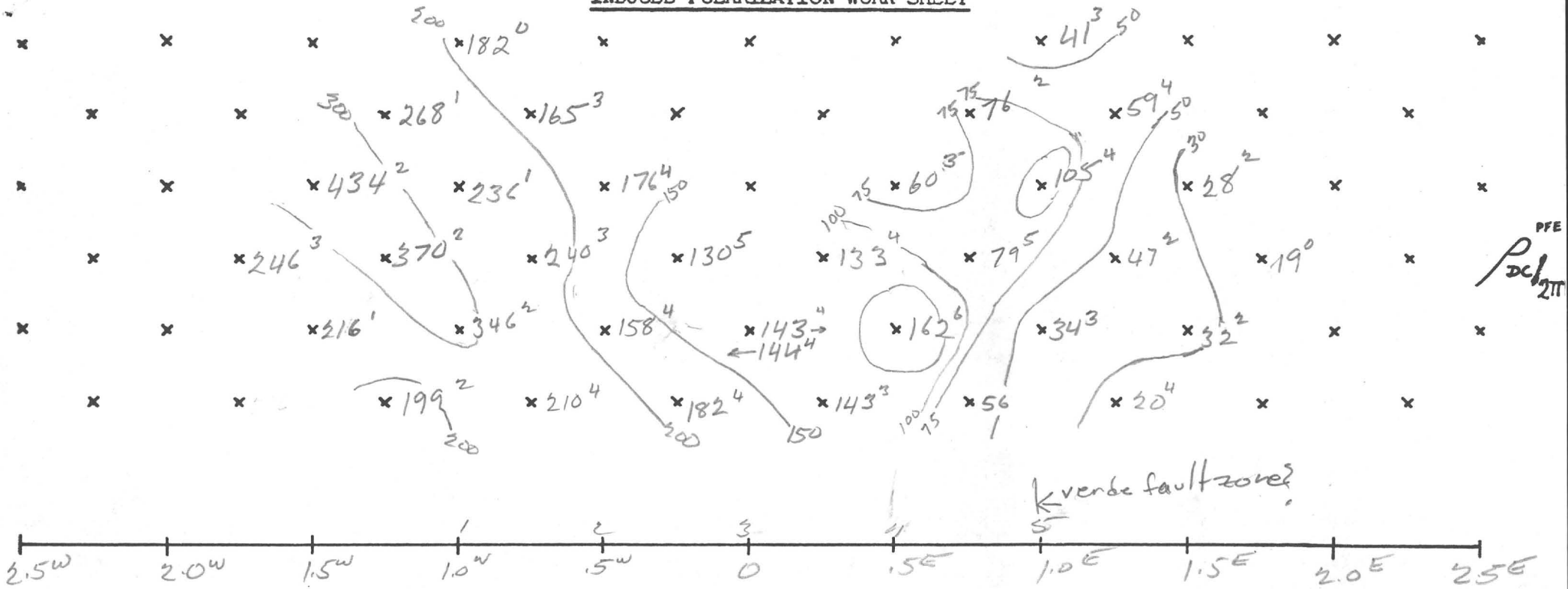
Project PEBBLE MILL Line 4 - 5½ Field date 3/15/63 Data page_____ Comp. date 3/12/63 Comp by_____

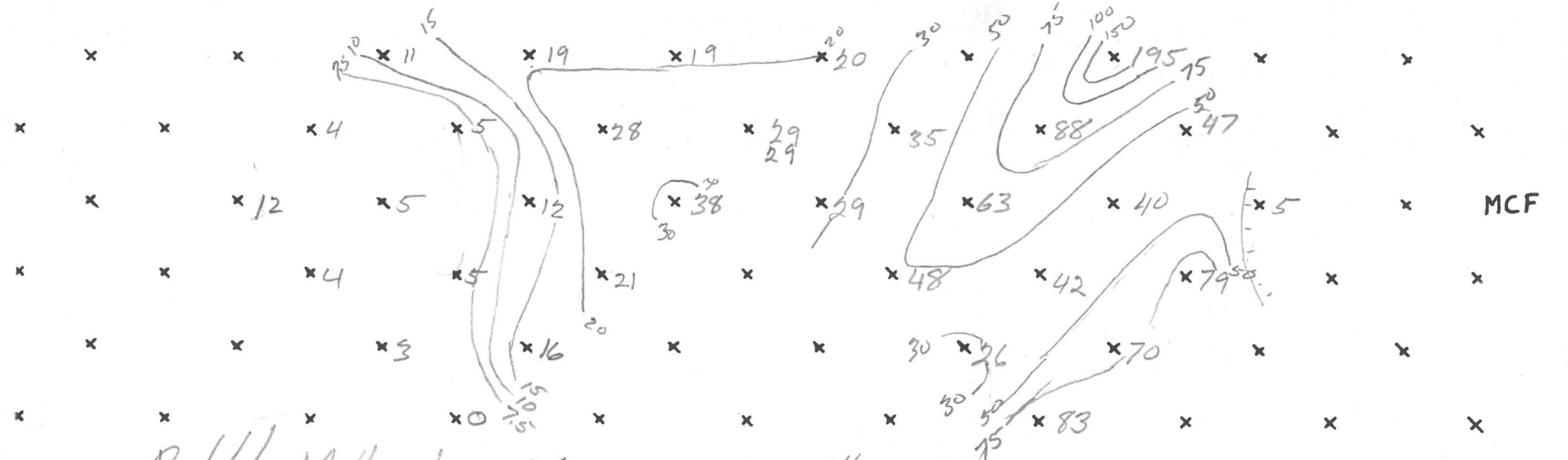
	9.50	28 87	33	42	34	46	26 81	41	40	30 64	26 76	59	20 66
(A) Send		2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
(B) Receive		.5-1.05	→	1.0-1.55	→	→	1.5-2.05	→	→	→	2.0-2.55	→	→
(C) n separation		1	2	1	2	3	1	2	3	4	2	3	4
(D) I		1200	1200	1600	1200	1200	1200	1600	1200	1200	1200	1600	1200
(E) Vdc (avg)		58.4 58.0	21.2	82.0	21.1	9.90	52.8 52.9	86.0	8.60	4.10 4.19	16.5 16.56	12.97	4.29 4.37
(F) DCcal USED		.950	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}		1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D		70	102	78	101	119	63	94	103	100	79	117	104
(I) Vac Σ		56.2 52.3	20.0	84.0	20.2	9.24	51.8 48.4	24.5	7.98	3.90 3.82	159 15.13	11.80	3.98 3.94
(J) AC noise x 2													
(K) Vac(corr) = $\sqrt{I^2 - J^2}$													
(L) AC-DC cal.		.998 .937	.993	.984	.992	.979	1.000 .943	.985	.986	1.007 .961	1.000 .943	.966	1.007 .959
(M) ρ dc/ρac=ExL/K		1.036 1.039	1.052	1.019	1.036	1.050	1.020 1.028	1.046	1.062	1.059 1.053	1.038 1.032	1.060	1.082 1.066
(N) PFE=(M-1)(10^2)		4 38	5	2	4	5	2 24	5	6	6 56	4 35	6	7 34
(O) MCF=(M-1)(10^5)/H		54	51	24	36	42	38	49	60	56	44	51	71

Project_____ Line 38 47 Field date 44 48 31 Data page 26 Comp. date 82 32 16 Comp by 51

(A) Send	1-2	4-5	3-4	2-3	1-2							
(B) Receive	→	2.5-3.05	→	→	→							
(C) n separation	5	3	4	5	6							
(D) I	1200	1200	1600	1200	1200		500	500	600	300	300	
(E) Vdc (avg)	2.44	9.80	8.95	3.03	1.90		52.4	52.4	63.8	31.0	31.8	
(F) DCcal	→	→	→	→	→		.954	.954	.941	.968	.944	
(G) Kn x 10^{-3}	52.5	15	30	52.5	84				~.960			
(H) ρ dc=ExFxGx10^3/D	102	118	161	127	128							
(I) Vac Σ	2.28	9.30	8.20	2.91	1.86		52.4	49.0	63.8	31.6	30.6	
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.988	.979	.982	.977	.995		1.000	.935	1.000	1.019	.962	
(M) ρdc/ρac =ExL/K	1.057	1.032	1.011	1.018	1.017							
(N) PFE=(M-1)(10^2)	6	3	1	2	2							
(O) MCF=(M-1)(10^5)/H	56	27	7	14	13							

INDUCED POLARIZATION WORK SHEET





Area Pebble Mill Line #2 Scale 1" = 500 Date

INDUCED POLARIZATION - RECEIVER NOTES PAGE _____

Project: Pebble Mill Line: #2 W 1/2 Int.Cal 43.0 Date: 1/March 83

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
Rec.	.5-10"	→	1.0-15"	→	→	1.5-20"	→	→	→	2-25"	→	→
Time Range	300	30	300	30	10	300	100	30	10	100	30	10
DC-1	122	18.8	125	23.6	7.82	118	51.0	14.2	5.42 5.20	32.2	21.9	7.0
DC-2	121	18.7	124	23.2	7.62	118	51.7	14.2	5.00 5.22	32.0	21.9	7.0
Σ	243	37.5	249	46.8	15.44	236	102.7	28.4	10.42 10.42	64.2	43.8	14.0
DC-3	122	18.7	125	23.4	7.70	118	51.0	14.2	5.00	32.2	21.8	7.0
Dc-4	121	18.8	124	23.4	7.70	118	51.7	14.2	5.42	32.0	22.0	7.0
Σ	243	37.5	249	46.8	15.40	236	102.7	28.4	10.42	64.2	43.8	14.0
DC-AV	243	37.5	249	46.8	15.42	236	102.7	28.4	10.42	64.2	43.8	14.0
AC-1	110	16.7	112	20.8	6.82	108	46.8	12.9	4.67	29.7	20.0	6.39
AC-2	110	16.8	112	20.8	6.82	108	47.2	12.9	4.70	30.0	20.0	6.42
Σ	220	33.5	224	41.6	13.64	216	94.0	25.8	9.37	59.7	40.0	12.81
S. P.	-1.4		-65			+7.9						
AC-N												
	33	51	34	63	68	33	47	39	47	30	60	64

INDUCED POLARIZATION - RECEIVER NOTES PAGE 3

Project: Pebble Mill Line: # 2-W½ Int.Cal ' Date: 1/March 63

Send	4-5	1-2	2-3	3-4	4-5		1-2					
Rec.	2-2.5W	2.5-3W	→				CAL					
Time	10	30	30	10	3		30	100	30	100	30	100
DC-1	2.8	14.9	12.9	4.25 4.75	2.08 1.91		17.0	16.8	22.7	22.5	28.7	28.0
DC-2	2.78	14.2	12.8	4.90 4.25	1.75 1.93		17.1	17.0	22.8	22.5	28.1	28.0
Σ	5.58	29.1	25.7	9.15 9.00	3.83 3.84		34.1	33.8	45.5	45.0	57.3	56.0
DC-3	2.8	14.9	12.9	4.75 4.75	1.79 2.15		17.0	16.8	22.7	22.5	28.7	28.0
Dc-4	2.78	14.2	12.8	4.30 4.30	2.08 1.72		17.1	17.0	22.8	22.5	28.6	28.0
Σ	5.58	29.1	25.7	9.05 9.05	3.87 3.87		34.1	33.8	45.5	45.0	57.3	56.0
DC-AV	5.58	29.1	25.7	9.06	3.85		34.1	33.8	45.5	45.0	57.3	56.0
AC-1	2.55	13.2	11.8	4.20	1.79		16.0	15.9	21.1	21.5	26.1	26.5
AC-2	2.55	13.2	11.8	4.19	1.79		16.0	16.0	21.1	21.5	26.1	26.5
Σ	5.10	26.4	23.6	8.39	3.58		32.0	31.9	42.2	43.0	52.2	53.0
S. P.												
AC-N												
	26	40	36	42	54							

INDUCED POLARIZATION SENDER NOTES

Project: Pebble-Hill Line: 2 W½ Date: MARCH, 1963

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	9x2	7x2	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8	2x8
Range	2.0	1.50	1.50	1.50	1.50	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Current	1800	1400	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→				→		1-2					
Time	2x8	2x8	2x8	2x8	2x8		3x1	4x1	5x1			
Range	2.0	2.0	2.0	2.0	2.0		.20	30	30			
Current	1600	1600	1600	1600	1600		300	400	500			

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Pebble Mill Line E 2 w½ Field date 1 March 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	.5w-1.0w	→	1.0-1.5w	→	→	1.5-2.0w	→	→	→	2.0-2.5w	→	→
(C) ~~n separation~~ %SD	33	51	34	63	68	33	47	39	47	30	60	64
(D) I	1800	1400	1600	1600	1600	→	→	→	→	→	→	→
(E) Vdc (avg)	243	37.5	249	468	15.42	236	102.7	28.4	10.45	64.3	43.8	14.0
(F) DCcal	.900	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	182	144	210	158	130	199	346	240	176	216	370	236
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	220	33.5	224	41.6	13.64	216	94.0	25.8	9.37	59.7	40.0	12.81
(L) AC-DC cal.	.936	.931	.936	.928	.926	.936	.932	.934	.932	.937	.929	.927
(M) ρ dc/ρac=ExL/K	1.035	1.042	1.041	1.044	1.049	1.022	1.018	1.028	1.037	1.008	1.018	1.012
(N) PFE=(M-1)(10^2)	4	4	4	4	5	2	2	3	4	1	2	1
(O) MCF=(M-1)(10^5)/H	19	29	19	28	38	11	5	12	21	4	5	5

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5		1-2	→	→	→	→	→
(B) Receive	2.0-2.5w	0.5-3w	→	→	→		CAL					
(C) ~~n separation~~ %SD	26	40	36	42	54		48	16	63	22	78	27
(D) I	1600	→	→	→	→		300	300	400	400	500	500
(E) Vdc (avg)	5.58	29.1	25.7	9.06	3.85		34.1	33.8	45.5	45.0	57.3	56.0
(F) DCcal	.900	→	→	→	→		.881	.888	.879	.890	.874	.894
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	145	246	434	268	182							
(I) Vac Σ	165											
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	5.10	26.4	23.6	8.39	3.58		32.0	31.9	42.2	43.0	52.2	53.0
(L) AC-DC cal.	.938	.934	.935	.934	.930		.938	.944	.927	.956	.913	.947
(M) ρdc/ρac =ExL/K	1.027	1.029	1.017	1.009	1.000							
(N) PFE=(M-1)(10^2)	3	3	2	1	0							
(O) MCF=(M-1)(10^5)/H	16	12	4	3	0							

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: Repeated #2 w/2 (A6-3) Int.Cal 53.0 Date: 28/Feb

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
Rec.	.5-1w	→	1-1.5w	→		1.5-2w	→	→	→	2.5-3w	→	→
Time	300	30R	300R	30R	10R	300	100	30	10	30	30	10
DC-1	12.5	21.5	12.3	23.0	7.7	11.7	51.0	14.1	3.7 3.7	25.0	16.6	7.12 6.98
DC-2	12.3	21.7	12.4	23.3	7.9	11.7	51.5	14.4	3.99 4.05	24.5	16.8	7.05 7.18
Σ	24.8	43.2	24.7	46.3	15.6	23.4	102.5	28.5	7.69 7.75	49.5	33.4	14.17 14.16
DC-3	12.5	21.5	12.3	23.0	7.7	11.7	51.0	14.1	3.93.8 3.7	25.0	16.6	7.22 7.12
Dc-4	12.3	21.7	12.4	23.3	7.85	11.7	51.5	14.4	3.9 4.0 4.02	24.5	16.8	6.98 7.10
Σ	24.8	42.2	24.7	46.3	15.55	23.4	102.5	28.5	7.80 7.80 7.72	49.5	33.4	14.20 14.22
DC-AV	24.8	43.2	24.7	46.3	15.57	23.4	102.5	28.5	7.75	49.5	33.4	14.19
AC-1	111	19.0	109	20.3	6.62	104	45.9	12.6	3.30	21.2	14.5	5.50
AC-2	111	18.9	109	20.3	6.67	104	45.9	12.4	3.30	21.2	14.3	5.50
Σ	222	37.9	218	40.6	13.29	208	91.8	25.0	6.60	42.4	28.8	11.0
S. P.	-9.7	-12.4	+2.2									
AC-N	0 →											
	33	57	33	61	67	31	46	37	33	64	43	55

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: #2 w 1/2 Int.Cal. Date: 28/Feb

Send	4-5	1-2	2-3	3-4	4-5		1-2	→				
Rec.	2-2.5"	2.5-3"	→				CAL	→				
Time	3						100R	30R	100R	30R	100R	30R
DC-1	2.22 2.06						16.7	17.0	22.1	22.5	27.9	28.3
DC-2	1.98 2.20						16.7	17.1	22.1	22.4	27.9	28.2
Σ	4.20 4.26						33					
DC-3	2.05 2.00						16.7	17.0	22.1	22.5	27.9	28.3
Dc-4	2.18 2.22						16.7	17.1	22.1	22.4	27.9	28.2
Σ	4.23 4.22											
DC-AV	4.23						33.4	34.1	44.1	44.9	55.8	56.5
AC-1	1.57						15.9	15.9	21.0	20.9	26.1	25.9
AC-2	1.43						16.0	15.8	21.0	21.0	26.2	25.9
Σ	2.96						31.9	31.7	42.0	41.9	52.3	51.8
S. P.	18.8						0-.5" = +18.6					
AC-N												
	45						16	48	21	63	26	78

INDUCED POLARIZATION N.G. SENDER NOTES

Project: Pebble Hill Line: #2 W½ Date: FEB 28 63

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	→	→ Curving		→		→			→	→		
Time	9×2	9×2	8×2	8×2	8×2	8×2	8×2	8×2	6×2	6×2	6×2	8×2
Range	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	2.0
Current	1800	1800	1600	1600	1600	1600	1600	1600	1200	1200	1200	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→	→			→		1-2					
Time	6×2						×1	×1	×1			
Range	1.0						.20	.30	.30			
Current	1200						300	400	500			

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Pebble Mill Line #2-W/2 Field date 28 Feb 87 Data page_____ Comp. date_____. Comp by_____

first run Repeated

(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	.5-1W	→	1-1.5W		→	1.5-2W		→		2-2.5W		→
(C) n ~~separation~~ % SD	33	57	33	61	67	31	46	37	33	64	43	55
(D) I	1800	1800	1600	1600					1200	1200	1200	1600
(E) Vdc (avg)	248	43.2	247	46.3	15.57	234	102.5	28.5	7.75	49.5	33.4	14.19
(F) DCcal	.900											
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	186	129	208	156	131	198	346	240	174			239
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	222	37.9	218	40.6	13.29	20.8	91.8	25.0	6.60	42.4	28.8	11.0
(L) AC-DC cal.	.936	.930	.936	.928	.926	.931	.932	.934	.936	.927	.934	.930
(M) ρ dc/ρac=ExL/K	1.047	1.060	1.060	1.058	1.087	1.048	1.040	1.062	1.000	1.081	1.083	1.260
(N) PFE=(M-1)(10^2)	5	6	6	6	9	5	4	6	10	8	8	20
(O) MCF=(M-1)(10^5)/H												

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5						1-2					→
(B) Receive	2-2.5W						CAL					→
(C) n ~~separation~~ % SD	45						16	48	21	63	26	78
(D) I	1200						500	300	400	400	500	500
(E) Vdc (avg)	4.23						33.4	34.1	44.1	44.9	55.8	56.5
(F) DCcal	.900						.898	.880	.907	.897	.896	.885
(G) Kn x 10^{-3}	52.5											
(H) ρ dc=ExFxGx10^3/D												
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	2.96						31.9	31.7	42.0	41.9	52.3	51.8
(L) AC-DC cal.	.932						.956	.930	.952	.933	.937	.917
(M) ρdc/ρac =ExL/K	1.331											
(N) PFE=(M-1)(10^2)	33											
(O) MCF=(M-1)(10^5)/H												

Floyd
Note wrong current ~~4-5~~ .5-1W

Chris (Low) Bad Rec Batt - A.C.

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: PebbleMill Line: Line#2 ± 1/2 Int.Cal Date: 1/March

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
Rec.	.5-1ω →		1-1.5ω	→		1.5-2ω	→		→	2-2.5ω	→	
Time	100	30	100	30	10	30	10	10	3	10	10	10
DC-1	85.0	21.4	33.0	24.3	7.85	11.6	5.25 5.00	4.58 4.55	1.78 1.75	4.82	2.70	3.10
DC-2	85.0	21.1	33.5	23.7	7.95	11.9	4.85 5.15	4.80 4.78	1.73 1.78	4.80	2.90	3.10
Σ	170	42.5	66.5	48.0	15.8	23.5	10.10 10.15	9.38 9.33	3.51 3.53	9.62	5.60	6.20
DC-3	85.0	21.4	33.0	24.3	7.90	12.0	5.40 4.90	4.52 4.50	1.85 1.85	4.81	2.70	3.10
Dc-4	85.0	21.1	33.5	23.7	7.90	11.5	4.70 5.20	4.79 4.80	1.68 1.70	4.81	2.90	3.10
Σ	170	42.5	66.5	48.0	15.8	23.5	10.10 10.10	9.31 9.30	3.53 3.55	9.62	5.60	6.20
DC-AV	170	42.5	66.5	48.0	15.8	23.5	10.11	9.33	3.53	9.62	5.60	6.20
AC-1	76.5	18.9	32.0	21.0	7.05	10.6	4.58	4.13	1.60	4.42	2.58	2.78
AC-2	76.2	18.9	32.0	21.2	7.05	10.6	4.58	4.15	1.60	4.42	2.58	2.78
Σ	152.7	37.8	64.0	42.2	14.10	21.2	9.16	8.28	3.20	8.84	5.16	5.56
S. P.	+6.6 →		-14.1			-2.4				-10.1		
AC-N	76	58										
S.P 0	→ .56	-7.1	32	64	71	32	46	42	48	44	26	28

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: #2-E 1/2 Int.Cal Date: 1/March

Send	1-2	4-5	3-4	2-3	1-2		4-5	→	→	→	→	→
Rec.	2-2.5E	2.5-3E	→	→	→		PAR					
Time	3R	3	3	3			100	30	100	30	100	30
DC-1	1.30	1.25 1.24	.93 .97	.86 .91	.43 .39		16.3	16.8	22.0	22.3	27.7	28.0
DC-2	1.27	1.05 1.06	.73 .71	1.14 1.09	.44 .48		16.3	16.8	22.0	22.3	27.7	28.0
Σ	2.57	2.30 2.30	1.66 1.68	2.00 2.00	.87 .87							
DC-3	1.30	1.32 1.20	.90	.89	.41		16.3	16.8	22.0	22.3	27.7	28.0
Dc-4	1.27	0.98 1.10	.78	1.11	.46		16.3	16.8	22.0	22.3	27.7	28.0
Σ	2.57	2.30	1.68	2.00	.87							
DC-AV	2.57	2.30	1.68	2.00	.87		32.6	33.6	44.0	44.6	55.4	56.0
AC-1	1.18	1.07	0.77	.90	.39		15.7	15.7	20.8	20.7	25.9	25.4
AC-2	1.18	1.08	0.77	.90	.40		15.7	15.7	20.8	20.7	26.1	25.4
Σ	2.36	2.15	1.54	1.80	.79		31.4	31.4	41.6	41.4	52.0	50.8
S. P.												
AC-N												
	35	32	23	27	12		16	47	21	62	26	76

INDUCED POLARIZATION SENDER NOTES

Project: Pebble-Hill Line: 2 E ½ Date: MARCH 1, 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	8×2	8×2	8×2	8×2	8×2	8×2	8×2	8×2	8×2	8×2	8×2	8×2
Range	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.50	1.50	1.50	2.0	2.0
Current	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	→		→		→		3-4					
Time	8×2	8×2	8×2	8×2	8×2		3×1	4×1	5×1			
Range	2.0	2.0	2.0	2.0	2.0		.20	.20	.30			
Current	1600	1600	1600	1600	1600		300	400	500			

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

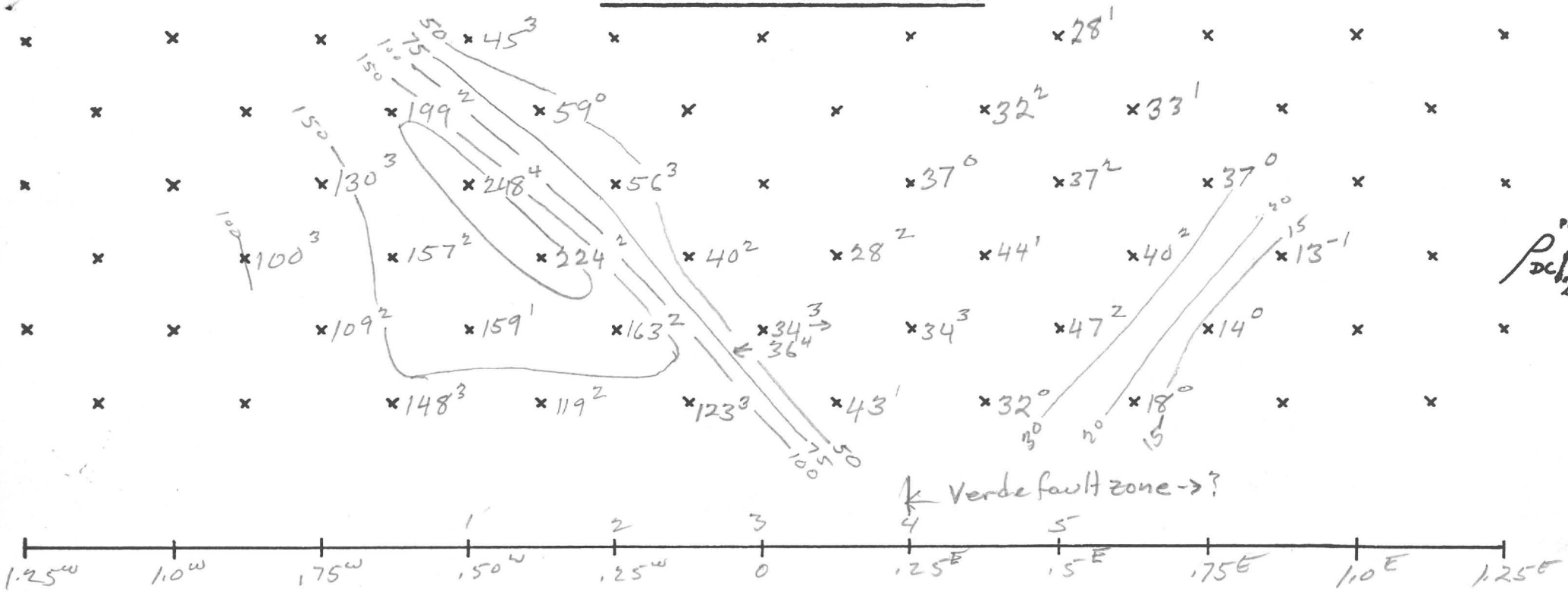
Project Pebble Mill Line 2-E 1/2 Field date 1 March 03 Data page_____ Comp. date_____. Comp by_____

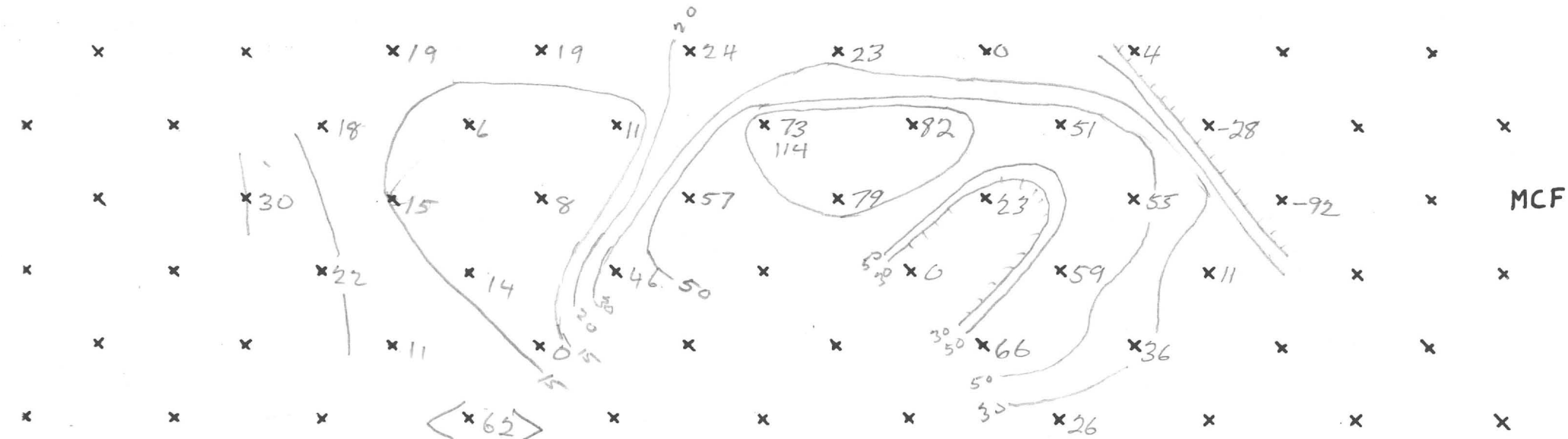
(A) Send	2-3	1-2	3-4	2-3	1-2	4-5	3-4	2-3	1-2	4-5	3-4	2-3
(B) Receive	.5-1.0E	→	1.0-1.5E	→	→	1.5-2.0E	→	→	→	2.0-2.5E	→	→
(C) ~~n separation~~ % SD	76	58	32	64	71	32	46	42	48	44	56	28
(D) I	1600	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	170	42.5	66.5	48.0	15.8	23.5	10.11	9.33	3.53	9.62	5.60	6.50
(F) DCcal	.900	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	1.5	6	1.5	6	15	1.5	6	15	30	6	15	30
(H) ρ dc=ExFxGx10^3/D	143	143	56	162	133	20	34	79	60	32	47	105
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	152.7	37.8	64.0	45.2	14.10	21.2	9.16	8.28	3.20	8.84	5.14	5.56
(L) AC-DC cal.	.924	.929	.936	.928	.926	.936	.933	.934	.932	.933	.938	.937
(M) ρ dc/ρac=ExL/K	1.029	1.042	[illegible]	1.057	1.039	1.039	1.030	1.050	1.029	1.015	1.019	1.044
(N) PFE=(M-1)(10^2)	3	4		6	4	4	3	5	3	2	2	4
(O) MCF=(M-1)(10^5)/H	20	29		35	29	195	88	63	48	47	40	42

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	4-5	3-4	2-3	1-2		4-5	→	→	→	→	→
(B) Receive	2.0-2.5E	2.5-3E	→	→	→		CAL	→	→	→	→	→
(C) ~~n separation~~ % SD	35	32	23	27	12		16	47	21	62	26	76
(D) I	1600	→	→	→	→		300	300	400	400	500	500
(E) Vdc (avg)	2.57	2.30	1.68	2.00	.87		32.6	33.6	44.0	44.6	55.4	56.0
(F) DCcal	.900	→	→	→	→		.921	.894	.910	.898	.903	.893
(G) Kn x 10^{-3}	52.5	15	30	52.5	84							
(H) ρ dc=ExFxGx10^3/D	76	19	28	59	41							
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	2.36	2.15	1.54	1.80	.79		31.4	31.4	41.6	41.4	52.0	50.8
(L) AC-DC cal.	.936	.936	.939	.938	.940		.963	.935	.946	.930	.940	.907
(M) ρdc/ρac =ExL/K	1.020	1.001	1.022	1.041	1.034							
(N) PFE=(M-1)(10^2)	2	0	2	4	3							
(O) MCF=(M-1)(10^5)/H	26	5	79	70	83							

INDUCED POLARIZATION WORK SHEET





MCF

Area Pebble Mill Line # 3 Scale 1" = 250' Date

INDUCED POLARIZATION - RECEIVER NOTES #2 PAGE

Project: Pebble Mill Line: #3-W'/4 a = 25' Int.Cal 56.2 Date: 4/March/

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
Rec.	.25-.5"	→	.5-.75	→		.75-1.0"	→		→	1-1.25"	→	
Time	300	30	300	100	10	300	100	100	10	100	30 100	30
DC-1	155	11.5	149	51.5	5.05	186	49.8	27.7	3.62	37.0	20.0 19.7	15.6
DC-2	154	11.4	149	51.0	5.05	185	49.8	27.7	3.42	37.5	20.0 19.2	15.6
Σ	309	22.9	298	102.5	10.10	371	99.6	55.4	7.04	74.5	40.0 38.9	31.2
DC-3	155	11.5	149	51.5	5.05	186	49.8	27.7	3.62	37.0	20.0 19.7	15.6
Dc-4	154	11.4	149	51.0	5.05	185	49.8	27.7	3.42	37.5	20.0 19.2	15.6
Σ	309	22.9	298	102.5	10.10	371	99.6	55.4	7.04	74.5	40.0 38.9	
DC-AV	309	22.9	298	102.5	10.10	371	99.6	55.4	7.04	74.5	40.0 38.9	31.2
AC-1	140	10.3	136	46.8	4.60	168	46.0	25.5	3.22	34.2	18.0 18.0	14.0
AC-2	140	10.3	136	47.0	4.60	168	46.0	25.5	3.20	34.2	18.0 18.0	14.1
Σ	280	20.6	272	93.8	9.20	336	92.0	51.0	6.42	68.4	36.0 36.0	28.1
S. P.	-9.2		+10.9			-8.7				+6.1		
AC-N												
	42	31	41	47	46	50	46	26	32	34	54 18	42

INDUCED POLARIZATION - RECEIVER NOTES #2 PAGE

Project: _____ Line: #3 w/2 Int.Cal _____ Date: 4 March

	*											
Send	4-5	1-2	2-3	3-4	4-5							
Rec.	1.0-1.25	1.25-1.5										
Time	3	30	10	10	3		100	300	100	300	100	300
DC-1	2.10	12.9	8.15	7.30	9.7		71.0	71.0	82.5	82	59.5	59
DC-2	2.10	12.2	8.22	6.98	10.5		71.0	71.0	82.5	82	59.5	59
Σ	4.2	25.1	16.37	14.28	2.02		142					
DC-3	2.10	12.9	8.15	7.30	9.7		71.0	71.0	82.5	82	59.5	59
Dc-4	2.10	12.2	8.22	6.98	10.5		71.0	71.0	82.5	82	59.5	59
Σ	4.20	25.1	16.37	14.28	2.02							
DC-AV	4.20	25.1	16.37	14.28	2.02		142	142	165	164	119	118
AC-1	1.95	11.4	7.45	6.47	.92		66.2	67	77	77	56	55
AC-2	1.95	11.4	7.45	6.47	.92		66.2	67	77	77	55.5	55
Σ	3.90	22.8	14.90	12.94	1.84		132.4	134	154	154	111.5	110
S. P.							0-.85	= +6.7				
AC-N	59											
* DC Noise	33	75	65	28			66	20	77	23	56	17

INDUCED POLARIZATION SENDER NOTES

Project: Pebble-Mill Line: 3 W½ Date: March 5 63

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	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2
Range	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Current	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→	→					1-2					
Time	8x2	8x2	8x2	8x2	8x2		6x2	7x2	5x2			
Range	1.50	1.50	1.50	1.50	1.50		1.50	1.50	1.0			
Current	1600	1600	1600	1600	1600		1200	1400	1000			

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project Pebble Mill Line # 3-W/2 Field date 4/March 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	.125-.5"	→	.5-.75"	→	→	.75-1.0"	→	→	→	1.0-1.25"	→	→
(C) n ~~separation~~ % SD	42	31	41	47	46	50	46	26	32	34	54 18	42
(D) I	1600	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	309	229	298	102.5	10.10	371	99.6	55.4	7.04	74.5	40.0 38.9	31.2
(F) DCcal	.850	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}	.75	3	.75	3	7.5	75	3	75	15	3	7.5	15
(H) ρ dc=ExFxGx10^3/D	123	36	119	163	40	148	159	224	56	109	157	248
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	2.80	20.6	27.2	93.8	9.20	336	92.0	51.0	6.42	68.4	36.0 36.0	28.1
(L) AC-DC cal.	.934	.937	.934	.932	.932	.931	.932	.938	.936	.936	.930 .940	.934
(M) ρ dc/ρac=ExL/K	1.030	1.041	1.022	1.018	1.023	1.028	1.010	1.019	1.026	1.020	1.033 1.034 1.016	1.035
(N) PFE=(M-1)(10^2)	3	4	2	2	2	3	1	2	3	2	2	4
(O) MCF=(M-1)(10^5)/H	24	114	19	11	57	19	6	8	46	18	15	14

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5		1-2					
(B) Receive	1.0-1.25"	1.25-1.5"	→	→	→		CAL					
(C) n ~~separation~~ % SD	59	33	75	65	28		66	20	77	23	56	17
(D) I	1600	→	→	→	→		1200	1200	1400	1400	1000	1000
(E) Vdc (avg)	4.20	25.1	16.37	14.28	2.02		142	142	165	164	119	118
(F) DCcal	.850	→	→	→	→		.846	.846	.849	.854	.841	.849
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	59	100	130	199	45							
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	3.90	22.8	14.90	12.94	1.84		132.4	134	154	154	111.5	110.
(L) AC-DC cal.	.929	.936	.924	.927	.937		933	944	934	.940	937	.933
(M) ρdc/ρac =ExL/K	1.000	1.030	1.028	1.022	1.028							
(N) PFE=(M-1)(10^2)	0	3	3	2	3							
(O) MCF=(M-1)(10^5)/H	0	30	22	11	62							

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble Mill Line: #3 - E 1/2 (a=250) Int.Cal 56.5 Date: 2/March 63

rezeroed meter

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 *
Rec.	.25-.5E	→	.5-.75E	→	→	.75-1.0E	→	→	→	1.0-1.25E	→	→
Time	100	30	100	30	10	30	30	10	3	10	10	3
DC-1	53.5	10.6	39.8	11.0	3.55	22.5	14.7	5.50	2.35	11.98	5.50	2.25 2.32
DC-2	53.5	10.6	39.8	10.5	3.55	22.7	14.7	5.57	2.33	4.90	5.70	2.37 2.30
Σ	107.0	21.2	79.6	21.5	7.10	45.2	29.4	11.07	4.68	9.88	11.20	4.62 4.62
DC-3	53.5	10.6	39.8	11.0	3.55	22.5	14.7	5.50	2.37	4.98	5.50	2.22 2.37
Dc-4	53.5	10.6	39.8	10.5	3.55	22.7	14.7	5.57	2.30	4.90	5.70	2.42 2.25
Σ	107.0	21.2	79.6	21.5	7.10	45.2	29.4	11.07	4.67	9.88	11.20	4.64 4.62
DC-AV	107.0	21.2	79.6	21.5	7.10	45.2	29.4	11.07	4.68	9.88	11.20	4.62
AC-1	49.5	9.7	37.2	9.8	3.25	20.9	13.4	5.10	2.17	4.62	5.10	2.12
AC-2	49.2	9.7	37.5	9.8	3.25	21.0	13.4	5.10	2.17	4.62	5.10	2.12
Σ	98.7	19.4	74.7	19.6	6.50	41.9	26.8	10.20	4.34	9.24	10.20	4.24
S. P.	-3.3		+1.0			+2.0				+1.5		
AC-N	0	0	0									
	49	29	37	29	33	63	40	51	65	46	51	24

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pebble MWI Line: #3-E 1/2 Int.Cal Date: 2/March

Send	1-2	4-5	3-4	2-3	1-2		4-5					
Rec.	10-1.25E	1.25-1.5E					CAL					
Time	3	3	3	3	3		300	100	100	300	100	300
DC-1	1.15 1.15	1.78 1.78	2.59	1.19	1.70 1.68		93	93.5	81	81.0	70.5	71
DC-2	1.13 1.13	1.90 1.89	2.68	1.21	1.57 1.59		93	93.0	81.5	81.0	70.2	71
Σ	2.28 2.28	3.67	5.27	2.40	1.27 1.27		186					
DC-3	1.16 1.17	1.92 1.92	2.59	1.18	.70		93	93.5	81	81	70.5	71
Dc-4	1.12 1.12	1.75 1.75	2.68	1.22	.57		93	93.0	81.5	81	70.2	71
Σ	2.28 2.29	3.67 3.67	5.27	2.40	1.27							
DC-AV	2.28	3.67	5.27	2.40	1.27		186	186.5	162.5	162	140.7	142
AC-1	1.04	1.73	2.42	1.11	0.59		88.0	87.0	76.5	77	66.0	66
AC-2	1.05	1.73	2.43	1.11	0.59		88.0	87.0	76.5	77	65.9	66
Σ	2.09	3.46	4.85	2.22	1.18		176	174	153.0	154	131.9	132
S. P.												
AC-N	33	52	73	33	18							
	*	wind	noise	- very	high	on DC	26	87	77	22	66	20

INDUCED POLARIZATION SENDER NOTES

Project: Pebble Mill Line: 3 E ½ Date: March-2-63

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	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	9x2	9x2	9x2
Range	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Current	1600	1600	1600	1600	1600	1600	1600	1600	1600	1800	1900	1600
Send	1-2	4-5	3-4	2-3	1-2		CA4					
Receive	→				→		4-5					
Time	8x2	9x2	9x2	8x2			8x2	7x2	6x2			
Range	1.50	1.50	1.50	1.50			2.0	1.50	1.50			
Current	1600	1800	1900	1600			1600	1400	1200			

HEINRICHS GEOEXPLORATION COMPANY

INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

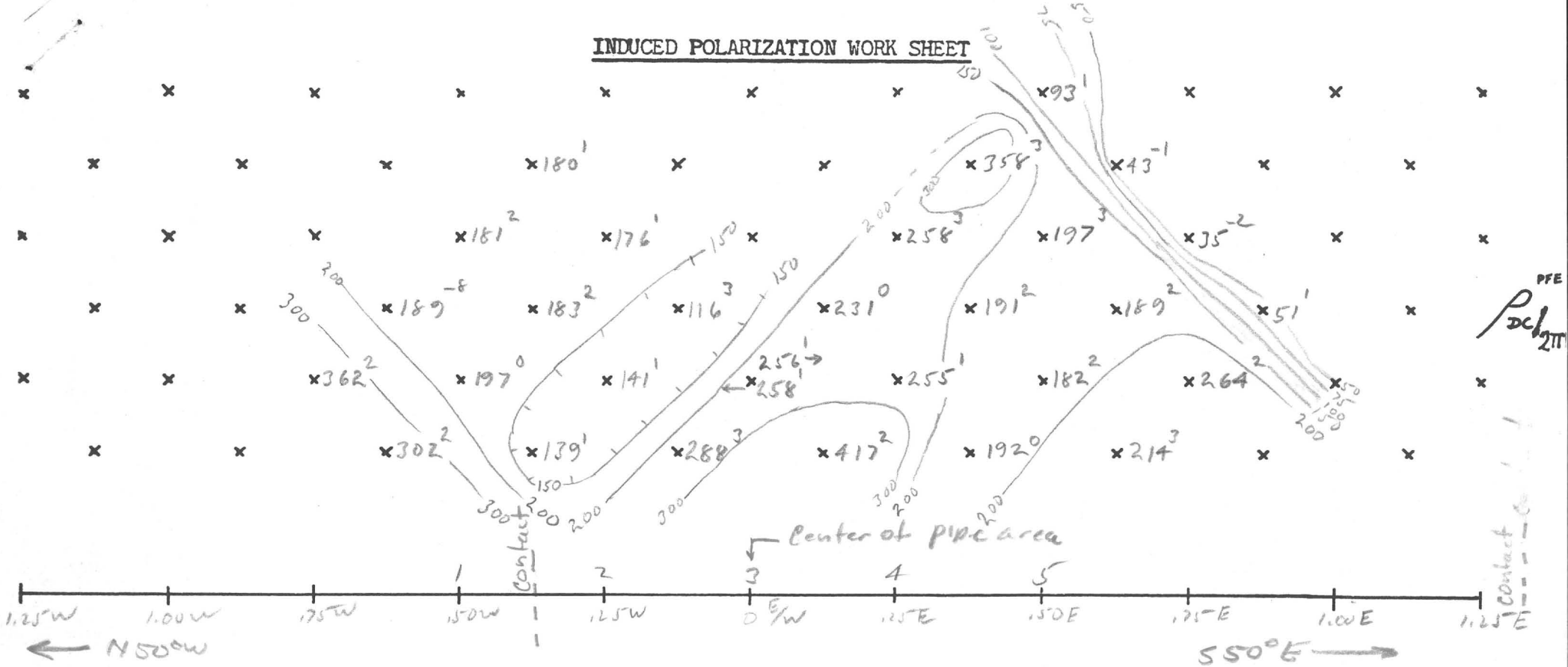
Project Pebble Mill Line #3 -E/2 Field date 2/March/83 Data page_____ Comp. date_____. Comp by_____

(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	.25-.5E	→	.5-.75E		→	.75-1.0E			→	1.0-1.25E		→
(C) ~~n separation~~ % SD	49	29	37	29	33	63	40	51	65	46	51	24
(D) I	1600								→	1800	1800	1600
(E) Vdc (avg)	107	21.2	79.6	21.5	7.10	45.2	29.4	11.07	4.67	9.88	11.20	4.62
(F) DCcal	.880											→
(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	43	34	32	34	28	18	47	44	37	14	40	37
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$	98.7	19.4	74.7	19.6	6.50	41.9	26.8	10.20	4.34	9.34	10.20	4.24
(L) AC-DC cal.	.932	.937	.935	.937	.936	.928	.934	.931	.927	.932	.931	.939
(M) ρ dc/ρac=ExL/K	1.010	1.025	1.000	1.028	1.022	1.002	1.024	1.010	1.000	.996	1.022	1.022
(N) PFE=(M-1)(10^2)	1	3	0	3	2	0	2	1	0	0	2	2
(O) MCF=(M-1)(10^5)/H	23	73	0	82	79	4	51	29	0	-28	55	59

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	1-2	4-5	3-4	2-3	1-2							
(B) Receive	1.0-1.25E	1.25-1.5E			→							
(C) ~~n separation~~ % SD	32	52	73	33	18		26	87	77	22	66	20
(D) I	1600	1800	1800	1600	1600		1600	1600	1400	1400	1200	1200
(E) Vdc (avg)	2.28	3.67	5.27	3.40	1.27		186	186.5	162.5	162	140.7	142
(F) DCcal	.850				→		.861	.857	.862	.856	.855	.846
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	32	13	37	33	28							
(I) Vac Σ												
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$	2.09	3.46	4.85	2.22	1.18		176	174	153	154	131.9	132
(L) AC-DC cal.	.936	.931	.925	.936	.940		.947	.934	.942	.951	.938	.930
(M) ρdc/ρac =ExL/K	1.021	.968	1.004	1.012	1.011							
(N) PFE=(M-1)(10^2)	2	-1	0	1	1							
(O) MCF=(M-1)(10^5)/H	66	-92	11	36	26							

INDUCED POLARIZATION WORK SHEET



Area PIPE ~~LINE~~ Area 2 E & W ½ Scale 1" = 250' Date 3/12/63

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pipe - ~~Lou~~ Line: Line #1 w/2 Int.Cal 56.5 Date: 5 March 63

Send	2-4	4-5	2-3	3-4	4-5	1-2	2-3	3-4	4-5	1-2	2-3	3-4
Rec.	.25-.5	→	.5-.175	→	→	.75-1.0	→	→	→	1.0-1.25	→	→
Time	1000	100	300	100	30	1000	100	30	30	300	100	30
DC-1	380	86.0	183	46.5	15.5	400	64.5	23.9	11.5	120	25.0	12.2
DC-2	382	85.0	184	47.0	15.2	400	65.8	24.7	11.8	120	25.2	11.8
Σ	762	171.0	367	93.5	30.7	800	130.3	48.6	23.3	240	50.2	24.0
DC-3	380	85.5 85.0	183	46.2	15.5	400	64.5	23.9	11.5	120	25.0	12.2
Dc-4	382	86.0 85.8	184	47.2	15.2	400	65.8	24.7	11.8	120	25.2	11.8
Σ	762	171.5 170.8	367	93.4	30.7	800	130.3	48.6	23.3	240	50.2	24.0
DC-AV	762	171.1	367	93.5	30.7	800	130.3	48.6	23.3	240	50.2	24.0
AC-1	345.0	78.5	168	43.2	13.9	365	60.5	22.1	10.8	110	26.0	11.0
AC-2	345.0	78.5	168	43.2	13.9	365	60.5	22.1	10.7	110	25.2	11.0
Σ	690	157.0	336	86.4	27.8	730	121.0	44.2	21.5	220	51.2	22.0
S. P.	-2.1		+5.5			+23.1						
AC-N												

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: PIPE Line: LINE #1 W½ Int.Cal Date: 5 May 1

Send	4-5											
Rec.	1.00-1.25											
Time	10						100	300				
DC-1	6.82						100	99				
DC-2	6.80						100	99				
Σ	13.62											
DC-3	6.82						100	99				
Dc-4	6.80						100	99				
Σ	13.62											
DC-AV	13.62						200	198				
AC-1	6.27						90.5	92.0				
AC-2	6.30						90.5	92.				
Σ	12.57						181.0	184				
S. P.												
AC-N												
							0-.35	ω = +17.5				

INDUCED POLARIZATION SENDER NOTES

Project: Lockey Pipe Line: 1 W Date: March 5 73

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	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2
Range	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Current	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Send	4-5	1-2	2-3	3-4	4-5		CAL					
Receive	→				→		1-2					
Time	8x2						8x2					
Range	1.50						1.50					
Current	1600						1600					

HEINRICHS GEOEXPLORATION COMPANY
INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project PIPE Line 1 - W ½ Field date 3/5/63 Data page_____ Comp. date 3/12/63. Comp by L.S.L

	9.5.0. 35	39	56	43	46	37	61	74	36	37	26	37
(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	.25-.50 W	→	.50-.75 W	→	→	.75-1.00 W	→	→	→	1.00-1.25 W	→	→
(C) n separation	1	2	1	2	3	1	2	3	4	2	3	4
(D) I	1600	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)	762	171.1	367	93.5	30.7	800	130.3	48.6	23.3	240	50.2	24.0
(F) DCcal USED	.805	→	→	→	→	→	→	→	→	→	→	→
(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	288	258	139	141	116	302	197	183	176	362	189	181
(I) Vac Σ	690	157.0	336	86.4	27.8	730	121.0	44.2	21.5	220	51.2	22.0
(J) AC noise x 2												
(K) Vac(corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.935	.923	.930	.933	.932	.935	.928	.925	.935	.935	.938	.935
(M) ρ dc/ρac=ExL/K	1.031	1.009	1.014	1.010	1.029	1.024	1.000	1.017	1.013	1.020	.920	1.020
(N) PFE=(M-1)(10^2)	3	1	1	1	3	2	0	2	1	2	-8	2
(O) MCF=(M-1)(10^5)/H	11	4	10	7	25	8	0	9	7	6	-42	11

Project_____ Line 63 Field date_____ Data page_____ Comp. date_____ Comp by_____

(A) Send	4-5	1-2	2-3	3-4	4-5							
(B) Receive	→	1.25-1.50 W	→	→	→							
(C) n separation	5	3	4	5	6			OTHER HALF				
(D) I	→	→	→	→	→							
(E) Vdc (avg)	13.62											
(F) DCcal	→	→	→	→	→							
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42							
(H) ρ dc=ExFxGx10^3/D	180											
(I) Vac Σ	12.57											
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.928											
(M) ρdc/ρac =ExL/K	1.008											
(N) PFE=(M-1)(10^2)	1											
(O) MCF=(M-1)(10^5)/H	4											

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pipe Line: #1 E1/2 Int.Cal 56.5 Date: 5/March/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
Rec.	.25-.5	→	.5-.75	→	→	.75-1.0	→	→	→	1.0-1.25	→	
Time	1000	100	300	100	100	300	100	30 100	30	100 300	30	
DC-1	542	83.0	250	82.0	30.2	278	59.2	25.1 24.5	16.9	85.8 86	24.3	13.1
DC-2	542	83.5	250	84.0	29.8	277	59.5	25.2 24.5	16.8	86.2 86	24.8	12.6
Σ	1084	166.5	500	166.0	60.0	555	118.7	50.3 49.0	33.7	172 172	49.1	25.7
DC-3	542	83.0	250	82.0	29.8	278	59.2	25.1 24.5	16.9	85.8 86	24.9	13.1
Dc-4	542	83.5	250	84.0	30.2	277	59.5	25.2 24.7	16.8	86.2 86	24.2	12.6
Σ	1084	166.5	500	166.0	60.0	555	118.7	50.3 49.0	33.7	172 172	49.1	25.7
DC-AV	1084	1665	500	166.0	60.0	555	118.7	50.3 49.0	33.7	172 172	49.1	25.7
AC-1	495	75.8	230	75.8	28.2	248	54.5	22.7 22.7	15.2	78.7 78.0	22.3	11.7
AC-2	495	75.8	230	76.2	28.0	248	54.2	22.7 22.7	15.2	78.7 78.0	22.3	11.7
Σ	990	151.6	460	152.0	56.2	496	108.7	45.4 45.4	30.4	157.4 156.0	44.6	23.4
S. P.	+9.4	~~+10~~	-3.0			+2.1				+2.6		
AC-N												

INDUCED POLARIZATION - RECEIVER NOTES PAGE

Project: Pipe Line: #1 E1/2 Int.Cal 3 Date: 5 March

Send	1-2	4-5	3-4	2-3	1-2		4-5					
Rec.	1.0-1.25	1.25-1.5	→				CAL					
Time	30	10	3	3	3		100	100	300	100	300	
DC-1	13.3	6.55	2.32	1.61	2.21		43.0	49	49	96	96	
DC-2	13.3	6.58	2.28	1.58	2.12		43.0	49	49	96	96	
Σ	26.6	13.13	4.60	3.19	4.33		86.0	98	98	192	192	
DC-3	13.3	6.55	2.31	1.61	2.21		43	49	49	96	96	
Dc-4	13.3	6.58	2.29	1.58	2.12		43.0	49	49	96	96	
Σ	26.6	13.13	4.60	3.19	4.33		86.0	98	98	192	192	
DC-AV	26.6	13.13	4.60	3.19	4.33		86.0	98	98	192	192	
AC-1	12.0	6.05	2.17	1.50	1.99		40.5	46.2	46	89	89	
AC-2	12.0	6.05	2.18	1.49	1.99		40.2	46.2	46	89	90	
Σ	24.0	12.10	4.35	2.99	3.98		80.7	92.4	92	178	179	
S. P.		-14.0					0-.25	E= +28				
AC-N												

INDUCED POLARIZATION SENDER NOTES

Project: LUCKY DIPE Line: 1 E ½ Date: MARCH 5 73

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	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2	8x2
Range	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.0	2.0	2.0
Current	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Send	1-2	4-5	3-4	2-3	1-2		CAL					
Receive	→			→			4-5					
Time	8x2	8x2	8x2	8x2	8x2		1x1	1x1	2x5			
Range	2.0	2.0	2.0	2.0	2.0		.75	.75	1.50			
Current	1600	1600	1600	1600	1600		700	800	1600			

a = 250'

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INDUCED POLARIZATION SURVEY COMPUTATION SHEET

Page_____

Project PIPE Line 1 - E½ Field date 3/5/63 Data page_____ Comp. date 3/12/63. Comp by C.S.L.

	9.5.0.	50	76	77	76	28	83	54	76 23	51	79 26	74	39
(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		.25-.5E	→	.5-.75E	→	→	.75-1.00E	→	→	→	1.00-1.25E	→	→
(C) n separation		1	2	1	2	3	1	2	3	4	2	3	4
(D) I		1600	→	→	→	→	→	→	→	→	→	→	→
(E) Vdc (avg)		1084	166.5	500	166.0	60.0	555	118.7	50.3 49.0	33.7	172 172	49.1	25.7
(F) DCcal	USED	.820	→	→	→	→	→	→	→	→	→	→	→
(G) Kn x 10^{-3}		.75	3	.75	3	7.5	.75	3	7.5	15	3	7.5	15
(H) ρdc=ExFxGx10^3/D		417	256	192	255	231	214	182	191	258	264	189	197
(I) Vac Σ		990	151.6	460	152.0	56.2	496	108.7	45.4 45.4	30.4	157.4 156.0	44.6	23.4
(J) AC noise x 2													
(K) Vac(corr) = $\sqrt{I^2 - J^2}$													
(L) AC-DC cal.		.931	924	.924	.927	.937	.922	.930	.924 .939	.931	.923 .938	.925	.934
(M) ρdc/ρac=ExL/K		1.020	1.014	1.003	1.011	1.000	1.030	1.015	1.020 1.016	1.032	1.009 1.033	1.019	1.026
(N) PFE=(M-1)(10^2)		2	1	0	1	0	3	2	2 18	3	2 21	2	3
(O) MCF=(M-1)(10^5)/H		5	5	2	4	0	14	8	9	12	8	10	13

Project_____ Line_____ Field date_____ Data page_____ Comp. date_____ Comp by_____

	40	61	73	50	66	90	40	46	15	89	30	31
(A) Send	1-2	4-5	3-4	2-3	1-2							
(B) Receive	→	1.25-1.50E	→	→	→							
(C) n separation	5	3	4	5	6							
(D) I	→	→	→	→	→	1600	700	800	800	1600	1600	1600
(E) Vdc (avg)	26.6	13.13	4.60	3.19	4.33	200	86.0	98.0	98.0	192	192	198
(F) DCcal	→	→	→	→	→	.800	.814	.816	.816	.834	.834	.809
(G) Kn x 10^{-3}	26.25	7.5	15	26.25	42				~.820			
(H) ρdc=ExFxGx10^3/D	358	51	35	43	93							
(I) Vac Σ	24.0	12.10	4.35	2.99	3.98	161.0	80.7	92.4	92	178	179	184
(J) AC noise x 2												
(K) Vac (corr) = $\sqrt{I^2 - J^2}$												
(L) AC-DC cal.	.934	.928	.925	.931	.927	.905	.934	.943	.939	.928	.933	.930
(M) ρdc/ρac =ExL/K	1.034	1.008	.980	.994	1.009							
(N) PFE=(M-1)(10^2)	3	1	-2	-1	1							
(O) MCF=(M-1)(10^5)/H	10	16	-57	-14	10							

Copper

Pebble Mill etc

Fusion Tube #	Sample # (Line)	Tube Anal	%	ppm
1	✓ 5 - 0.25 E	1	1.5	75
2	3 — 1.5 E	2	2.5	125
3	✓ 5 — 1.25 E	3	1.5	75
4	4 — 1S	4	1.2	60
5	✓ 5 — 1.5 E	5	1.2	60
6	✓ 5 — 0.5 E	6	1.4	70
7	3 — 1.25 W	7	4.0 4.5	200 250
8	✓ 5 — 0.75 E	8	1.5	75
9	4 — 1.5 S	9	1.0	50
10	4 — 2.5 S	10	0.8	40
11	3 — 1.25 E	1	1.2	60
12	4 — 3.0 S	2	0.8	40
13	3 — 1.0 W	3	4.0×2=8.0 6.0+	400
14	4 — 0.5 W	4	4.0	200
15	4 — 1.0 W	5	2.5	125
16	4 — 1.5 W	6	2.5×2=5.0 6.0	250 300 275
17	3 — 0.75 E	7	2.2	110
18	3 — 0.25 W	8	2.0	100
19	✓ 5 — 1.0 E	9	0.8	40
20	3 — 0.5 W	10	1.7	85
21	4 — 2.0 W	11	4×2=8.0 6.0+	400
22	3 — 0.25 E	12	4.0	200
23	3 — 0.5 E	13	1.2	60
24	✓ 5 — 0.75 W	14	0.6	30
25	4 — 0.5 S	15	1.5	75
26	2 — 2.5 E	16	0.6	30
27	3 — 0.75 W	17	2.2	110

Copper

Fusion Tube #	Sample #	Tube Anal.	γ	ppm
28	3 – 1.0E	18	4.5	225
29	3 – 1.5E	19	1.5	75
30	4 – 2.0S	20	1.0	50
31	4 – 2.5N	1	2.0	100
32	✓ 5 – 0.5N	2	0.4	20
33	✓ 5 – 0.25N	3	0.4	20
34	✓ 5 – 1.0N	4	0.8	40
35	✓ 5 – 1.25N	5	0.2	10
36	2 – 2.0E	6	0.8	40
37	2 – 1.5E	7	1.2	60
38	2 – 1.0E	8	1.5	75
39	4 – 3.0N	9	1.0	50
40	2 – 0.5E	10	3.0	150
41	2 – 3.0E	11	0.3	15
42	2 – 2.5N	12	1.2	60
43	2 – 1.5N	13	4.0	200
44	2 – 0.5N	14	2.5	125
45	1 – 1.0N	15	2×3.0 6.0	600
46	1 – 3.0N	16	0.8	40
47	1 – 0.5N	17	4.5	225
48	1 – 2.5N	18	0.8	40
49	1 – 2.0N	19	1.0	50
50	1 – 1.5N	20	3.0	150
51	1 – 1.0E	1	2.5×2 5.0	250
52	2 – 2.0N	2	2.5	125
53	1 – 2.5E	3	2.0	100
54	2 – 1.0N	4	6.0	300

Copper

Fusion Tube #	Sample #	Anal Tube	%	
55	1 – 1.5E	5	2.0	100
56	2 – 3.0W	6	1.5	75
57	1 – 2.0E	7	1.5	75
58	1 – 5.0E	8	6.0	300
59	1 – 3.0E	9	0.8	40

Moly

Pebble Mill etc.

$\frac{1}{11} \times \frac{10}{5} = 20$

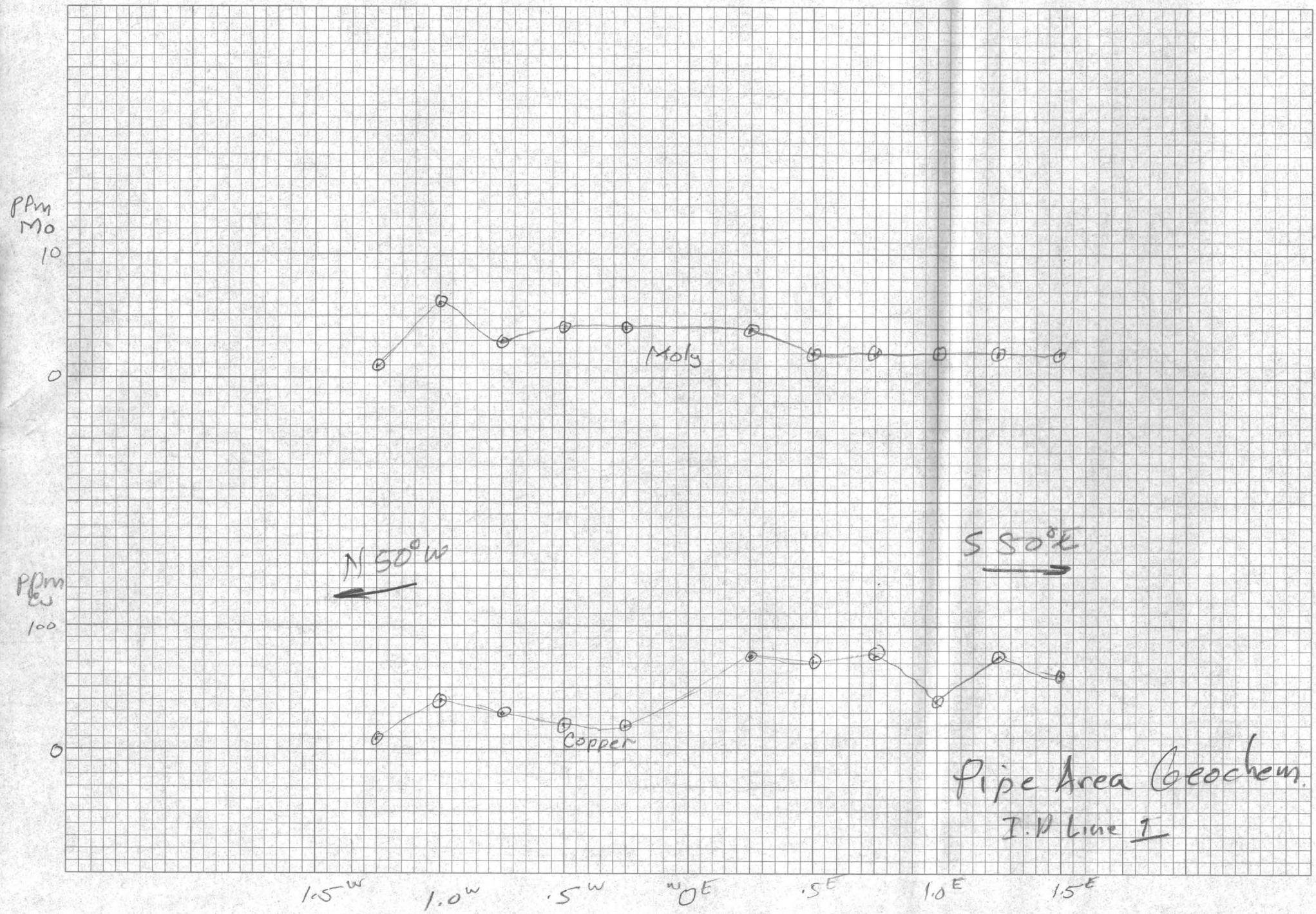
Fusion Tube #	Sample #	Analysis Tube #	γ	DPM No = 20γ	From Cu Alg.	
105	Lime 5 — 0.25 E	1	0.20	4		
106	3 — 1.5 E	2	0.30	6		
107	5 — 1.25 E	3	0.10	2		
108	4 — 1.00 S	4	0.20	4		
109	5 — 1.5 E	5	0.10	2		
110	5 — 0.5 E	6	0.10	2	1 0.10	2
111	3 — 1.25 W	7	0.60	12	0.55	11
112	5 — 0.75 E	8	0.10	2		
113	4 — 1.5 S	9	0.40	8		
114	4 — 2.5 S	10	0.10	2		
115	3 — 1.25 E	11	0.20	4		
116	4 — 3.0 S	12	0.20	4		
117	3 — 1.0 W	13	0.30	6		
118	4 — 0.5 N	14	0.20	4		
119	4 — 1.0 N	1	0.30	6		
120	4 — 1.5 N	2	0.30	6		
121	3 — 0.75 E	3	0.20	4		
122	3 — 0.25 W	4	0.40	8		
123	5 — 1.0 E	5	0.10	2		
124	3 — 0.5 W	6	0.50	10		
125	4 — 2.0 N	7	0.35	7		
126	3 — 0.25 E	8	0.40	8		
127	3 — 0.5 E	9	0.15	3		
128	5 — 0.75 W	10	0.15	3		
129	4 — 0.5 S	1	0.35	7		
130	2 — 2.5 E	2	0.15	3		
131	3 — 0.75 W	3	0.40	8		

Moly

Fusion Tube #	Sample #	Analysis tube #	γ	PPM	
132	3 – 1.0 E	4	0.15	3	
133	3 – 1.5 E	5	0.30	6	
134	4 – 2.0 S	6	0.35	7	
135	4 – 2.5 N	7	0.45	9	
136 ✓	5 – 0.5 W	8	0.20	4	
137 ✓	5 – 0.25 W	9	0.20	4	
138 ✓	5 – 1.0 W	10	0.30	6	
139 ✓	5 – 1.25 W	11	0.05	1	
140	2 – 2.0 E	12	0.05	1	
141	2 – 1.5 E	13	0.40	8	
142	2 – 1.0 E	~~14~~	0.30	6	
143	4 – 3.0 N	1	0.15	3	
144	2 – 0.5 E	2	0.40	8	
145	2 – 3.0 E	3	0.00	0	3 0.05 1
146	2 – 2.5 W	4	0.15	3	
147	2 – 1.5 W	5	0.40	8	
148	2 – 0.5 W	6	0.45	9	
149	1 – 1.0 W	7	0.40	8	
150	1 – 3.0 W	8	0.05	1	
151	1 – 0.5 W	9	0.35	7	
152	1 – 2.5 W	10	0.10	2	
153	1 – 2.0 W	11	0.10	2	
154	1 – 1.5 W	12	0.30	6	
155	1 – 1.0 E	13	0.80	16.	+ ave 16
156	2 – 2.0 W	14	0.35	7	
157	1 – 2.5 E	1	0.15	3	
158	2 – 1.5 W	2	0.25	5	

Moly

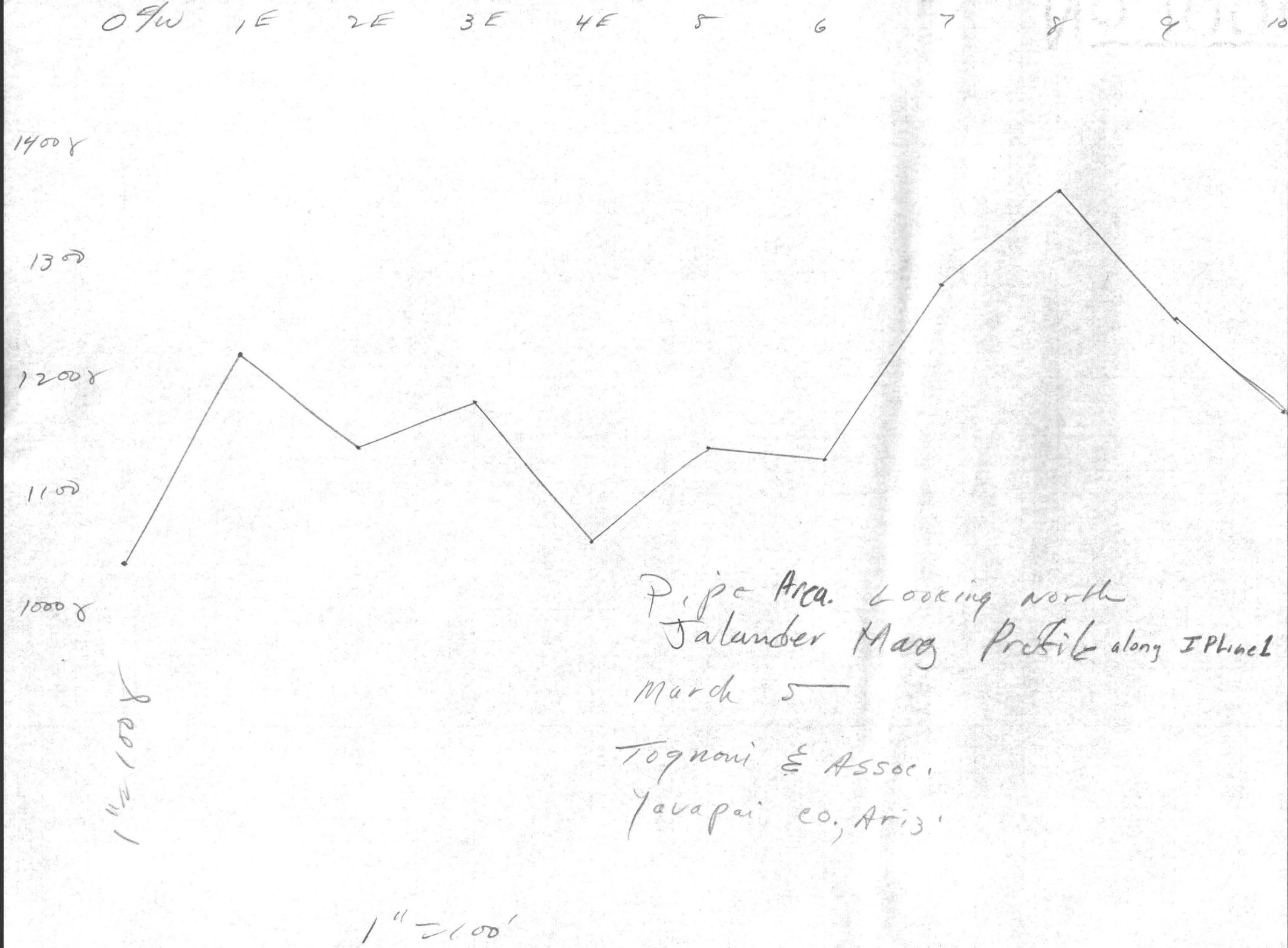
Fusion Tube #	Sample #	Analysis Tube #	γ	PPM Mo
159	1 – 1.5E	3	0.20	4
160	2 – 3.0W	4	0.20	4
161	1 – 2.0E	5	0.20	4
162	1 – 5.0E	6	0.25	5
163	1 – 3.0E	7	0.05	1



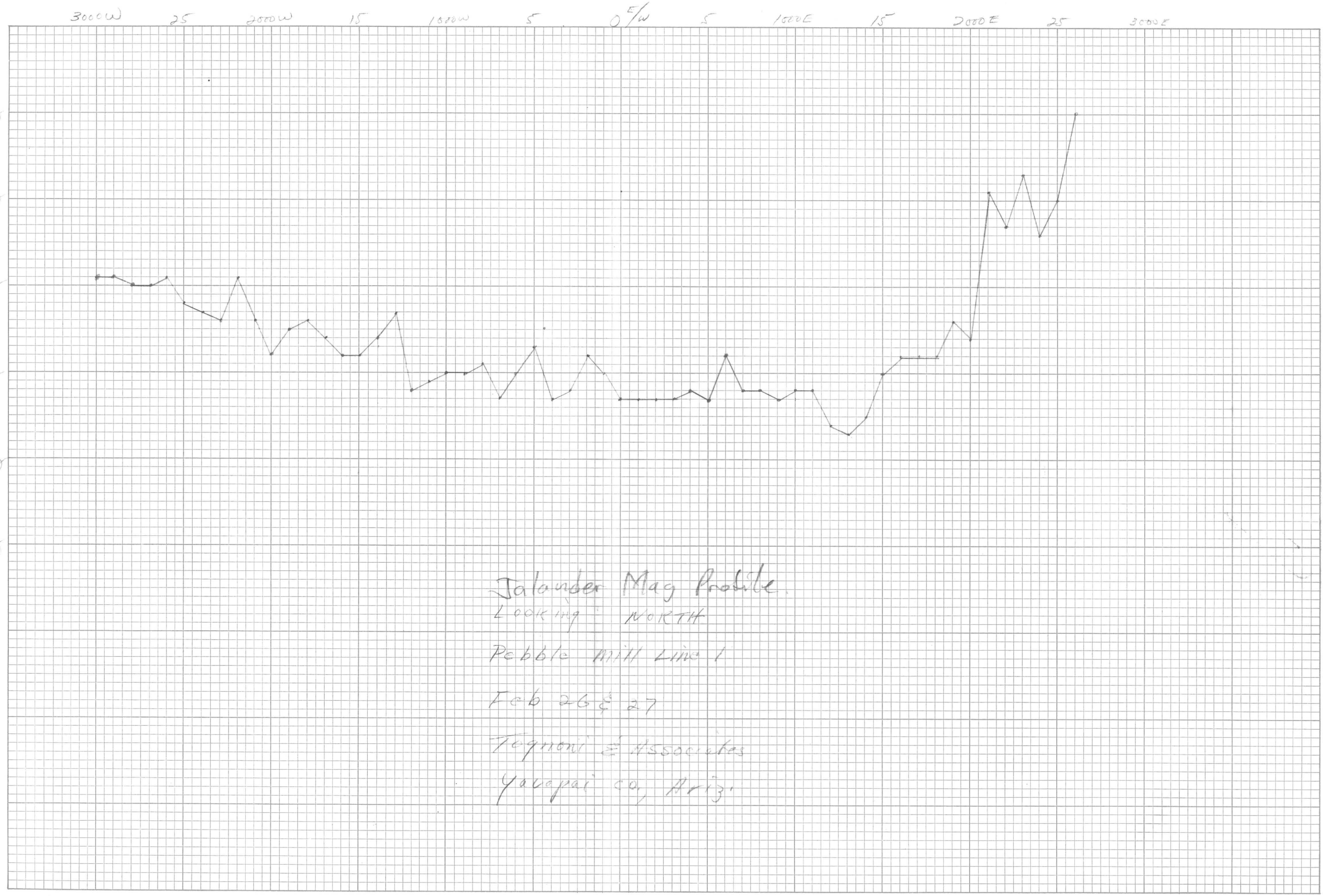
Pipe Area Geochem.

I.P Line 1

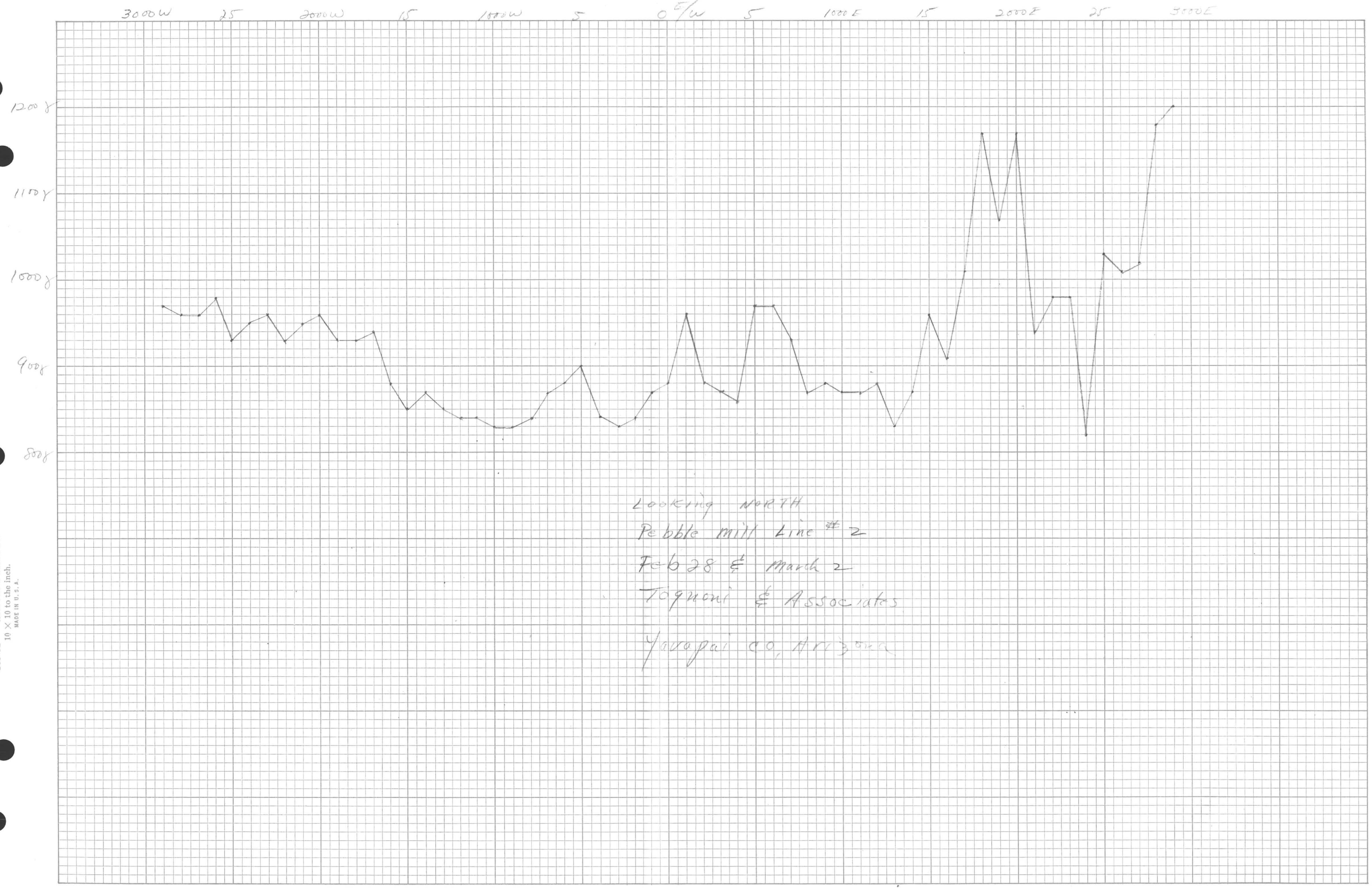
NO. 340R-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH
EUGENE DIETZGEN CO.
MADE IN U. S. A.



Pipe Area. Looking north
Talander Mag Profile along I Plane 1
March 5
Tognoni & Assoc.
Yavapai Co., Ariz.



358-5L KEUFFEL & ESSER CO.
10 × 10 to the inch.
MADE IN U.S.A.



358-5L KEUFFEL & ESSER CO.
10 × 10 to the inch.
MADE IN U.S.A.

GEOPHYSICAL EXAMINATION
of
COPPER QUEEN, PEBBLE MILL AND PIPE AREAS

Yavapai County, Arizona

COPY

for
GREY EAGLE MINING CORP.

February, March 1963

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

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Summary	8

MAPS

Copper Queen Area I. P. Line 1, 2 & 3 (Sectional Data Sheets)
Magnetic Profile, Line 2
Pebble Mill Area, I. P. Lines 1, 2, 3, & 4 (Sectional Data Sheets)
Magnetics Line 1 and Line 2
Pipe Area, I. P. Line 1
Magnetics, Line 1
Geochem, Line 1

In Pocket

Copper Queen Area, Plan Map
Pebble Mill Area, Plan Map

COPY

INTRODUCTION

From February 18 through March 6, 1963, Heinrichs Geoexploration Co. conducted geophysical investigations over the Copper Queen, Pebble Mill and Pipe Area properties of the Grey Eagle Mining Corporation. This work was performed at the request of Hale C. Tognoni of Tognoni and Associates, by Mr. Franklin A. Seward, Jr., engineer in charge with Mr. C. S. Ludwig, Mr. J. W. Marlatt and F. F. Hanly assisting with Mr. W. E. Heinrichs, Jr. consulting.

The total work completed includes some eight line miles of induced polarization data, approximately 200 magnetometer stations and some 60 geochemical analyses.

Following completion of the main assignment, the writer visited the Logan Mine near Cherry in the company of Mr. C. A. Wombacher and geologist Mr. Gene Nelson in an effort to determine feasibilities of possible future geophysical examination of this area.

This report shall treat the geophysical results in each of the three areas surveyed independently.

Included with the report are plan geophysical overlay survey maps of the Copper Queen Mine Claim Map and the topographic-claim map of the Pebble Mill area, Induced Polarization sectional data sheets of each of the eight I. P. lines surveyed, three on the Copper Queen, four on Pebble Mill and one on Pipe area, magnet-

ometer profiles of the four magnetometer lines, one on Copper Queen, two on Pebble Mill and one on Pipe Area and a geochemical profile of the line on the Pipe Area. Geochemical data of the Copper Queen and Pebble Mill areas is plotted on the respective plan maps. Parts per million (ppm),Molybdenum (Mo), Copper (Cu).

COPPER QUEEN MINE AREA

Conclusions and Recommendations

1. No really significant I. P. anomalism was encountered in the survey and it is therefore concluded that total volume percentage of sulfide does not exceed 0.5% on an overall average down to about 750' to 1,000' deep under the area covered.

The resistivity data does not show any significant major structural trends and the self potential data (not plotted) shows little relief, diminishing the probability of any important shallow massive (vein type) sulfides in an oxidizing-reducing environment. Of course, small oxidized stringers are known and at some depth these undoubtedly will become sulfide stringers, but all results indicate these are probably quite small and of marginal economic potential. Incidently, in very similar environment not too far to the southwest, considerable work to 1,000' deep did <u>not</u> encounter any significant sulfides.

2. Magnetometer results were random, typical of granitic environment in the southwest with no correlation to observable mineralization developed. A magnetic high south of the claim

group is related to basalt outcrop and otherwise is not likely of any economic significance.

3. Geochemical analyses show no correlation to the mapped mineralization zone and in fact the only truly anomalous sample was obtained from dump material at 0.5N on Line 2.

4. In light of these negative results no further geophysical examination is recommended at this time.

Procedures

Three I. P. lines were run in the Copper Queen area, each centered at the end centers between the two end-on claims in each tier and run parallel to the claim sidelines. 500 ft. dipoles were used so that each line covers a total of 3,000 ft. in both directions from center.

Geochemical samples were obtained at 250 ft. intervals along each of the lines. However, only those from Line 2 were analysed for copper in view of the rather negative results obtained on that line.

Magnetics were run only on Line 2 for the same reasons and in order that equivalent time in any case could be spent on the other apparently more potentially favorable possibilities.

I. P. Interpretation

The sectional data sheets show the D. C. resistivity plotted above the horizontal line with the percent frequency effect (PFE) plotted as a superscript thereto. The so called

metallic conduction factor (MCF) which is a computed value to "normalize" the PFE value as an aid to interpretation, is plotted below the line. Normally PFE's of 0 +/- 5% are considered as marginal, and 10% to be background, 5% to 10% plus as definitely anomalous. However, this scaling of values will vary to some degree conditional upon variable geological (earth electrical)conditions.

No frequency effects were observed in this area in excess of 4%.

THE PEBBLE MILL AREA

Conclusions and Recommendations

1. Very weak or questionable anomalous values were obtained on only one (Line 4) of the four I. P. lines and these may very well be related to parallel proximity of Line 4 to a grounded barbed wire fence. It is concluded that in no instance with the above mentioned possible exception does the total sulfide volume percentage exceed 1%, down to about 1,000'.

2. Magnetometer results on the two lines run (I.P. Lines 1 and 2) show a gradual minor negative gradient from west to east as the Verde Fault is approached. Magnetic highs across the Verde Fault to the east are most probably related to basaltic flows in the Verde formation, the float of which can be seen on the surface.

3. Geochemical results provide the most interesting picture, although perhaps of only marginal economic significance

on account of the lack of strong I. P. response. Nevertheless there is a definite molybdenum and copper anomaly which averages about twice background. The cause is uncertain and may bear further study.

4. Thus, the results are not entirely discouraging since the general area also holds considerable geologic interest in similarity and proximity with the Jerome deposits and their environment, and from the favorable local mineralogy and structure. Therefore, additional deeper and broader reconnaissance geology, geochem and geophysics, especially to the northwest toward Jerome and to the southeast across Cherry Creek road and a little additional detail and/or deeper coverage in the area already examined, seems warranted.

Procedures

Three of the I. P. lines were run on 500 ft. dipoles in the locations plotted on the plan map. One (Line 3) was run on 250 ft. dipoles to cover the gold bearing shist outcrop west of the Verde fault and crossing the fault zone.

Geochemical samples were taken at all but the center I. P. stations. Magnetics were run on I. P. lines #1 and #2. Again the self potential results did not seem to warrant plotting.

I. P. Interpretation

Background frequency effects are perhaps slightly higher in the Pebble Mill Area than in the Copper Queen Area that may

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indicate a slightly higher (though apparently insignificant) general concentration of average sulfide mineralization in this area. The apparently slightly anomalous metal factors seem mainly related to the sharp resistivity contrast and pattern crossing the Verde Fault Zone. Line 4 which roughly parallels the Verde Fault Zone in the hanging wall, shows a slightly (perhaps twice background) anomalous pattern in both the PFE's and the MCF's at considerable depth, from about 1.0N to 2.5S which may be of more than just academic interest. The unknown quantity here is the grounded barbed wire fence which parallels the line over a considerable portion. An E-W line through about station 1.0S might serve to write this minor anomaly off; however, the considerable depth indicated would probably require a dipole spacing of 500 ft. and the other geometric factor of width might preclude definition.

The apparent resistivities in this area (particularly on the hanging wall side of the fault zone) are sufficiently high that penetration is expected to have exceeded 1,000 ft. However the vague possibility exists that intense alteration and oxidation of possibly pre-existing sulfides has gone to depths greater than the electrical penetration. Summarizing, it must be concluded that large concentrations of sulfides (especially disseminated sulfides) do not exist in the immediate area of the surveyed lines other than the possibility of their existence

in relatively narrow geometries (depth, width, extent, grade, etc., or relatively small vein type structures), not detectable within the size of electrode spacings (500' and 250') used in order to be able to adequately process and cover the greatest possible volume in the area.

THE PIPE AREA

1. No I. P. anomaly was detected in the area surveyed and the only point of major interest is the two contacts delineated in the resistivity data at between .25W and .50W and of more importance the contact between 1.25E and 1.50E.

2. The geochemical analyses were all of background magnitude with a minor increase downhill to the SE which may be related to minor mineralization of the geologically interesting structure observed at the top of the hill.

3. Magnetic data is somewhat random with the exact correlation to exposed or known features being indefinite.

4. Pending more geologic evaluation it could prove advisable to examine the obvious resistivity (structural) contact existing between stations 1.25E and 1.5E by prolonging this line to the southeast.

Procedures

The I. P. line was centered at the top of the hill in the bulldozed area surrounding the pipe and run N 50° W - S 50° E

at 250 ft. dipole spacing. Geochem samples were taken at each electrode location and magnetics were run from the center of the I. P. line SE for about 1,000 ft. Self potential data were measured, but were not considered worth plotting.

Interpretation

Other than the definitely interesting contact observed in the resistivity data and mentioned above there was nothing of geophysical anomalous significance noted in the area surveyed.

SUMMARY

No positive targets for examination by drilling or heavy exploration means were defined by the geophysical work in any of the three areas examined. The only further geophysical work that might be considered right now would be reconnaissance extension of the I. P. coverage over the Verde Fault Zone from the Pebble Mill area to the SE, a limited amount of I. P. detail in the immediate vicinity of the Verde Fault between lines 1 and 2 and crossing Line 4 at its southern end and perhaps further geochemical detail over the anomalous area mapped.

It is believed that the Copper Queen Mine area has been effectively written off as far as currently economic disseminated sulfide mineralization is concerned, as has been the Pipe Area with the possible exception cited.

Feasibility consideration of geophysical investigations in the Logan Mine area is suggested to be held in abeyance pending

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further geologic evaluation by Mr. Nelson and our being briefed on his results.

The symbol (γ) used on the magnetic profiles is the Greek letter gamma and refers to units of magnetic intensity.

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

Franklin A. Seward, Jr.
Geophysical Engineer

Walter E. Heinrichs, Jr.
President & General Manager

March 22, 1963
P. O. Box 5671
Tucson, Arizona

COPY

GRAY EAGLE MINING CORPORATION

T.14N., R.3E., G.& S.R.B.& M.
YAVAPAI COUNTY, ARIZONA

TOPOGRAPHIC MAP
BY

MADDOCK ENGINEERS INTERNATIONAL

Scale 1" = 200' Contour Interval 25'

INFORMATION

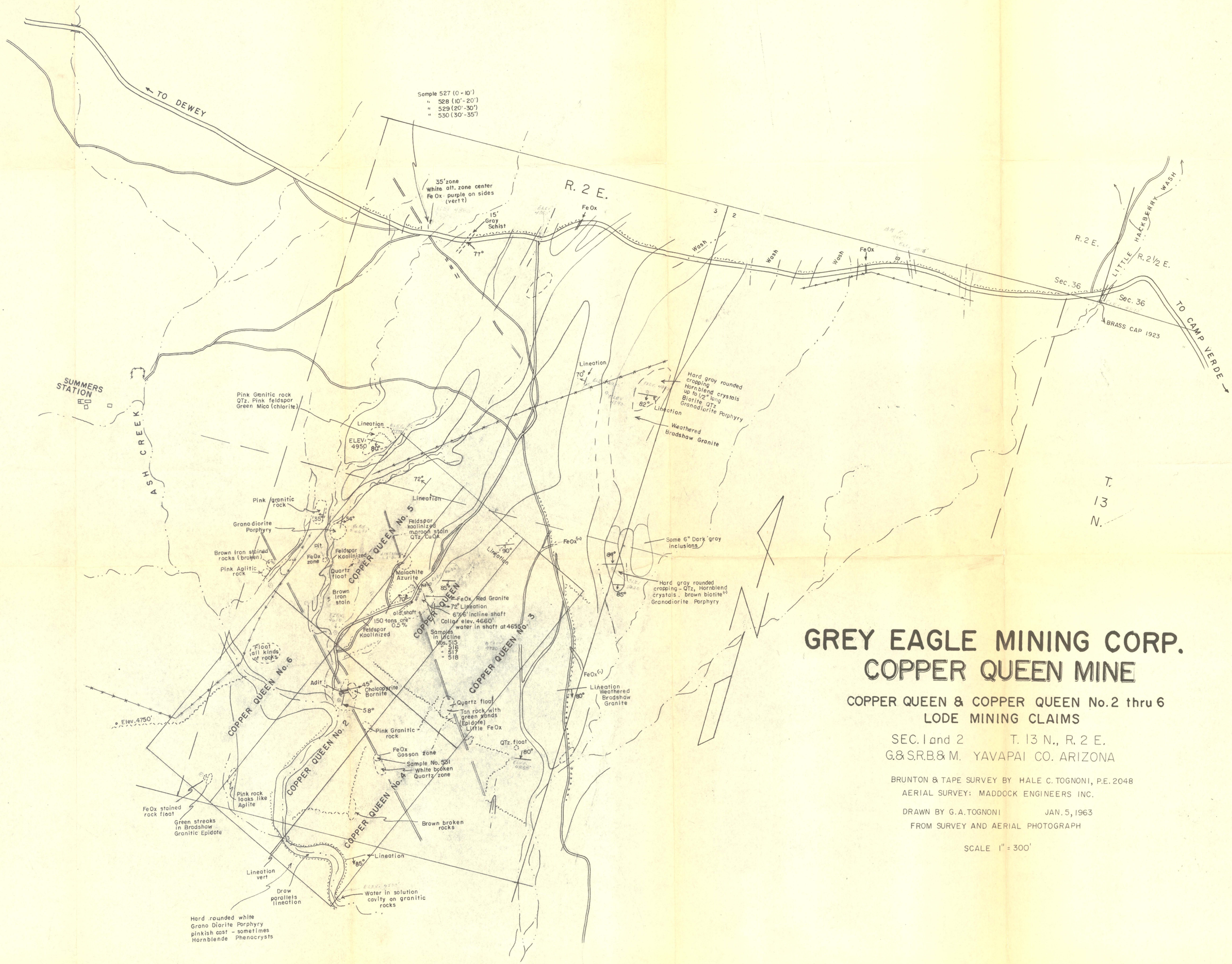
- Road
- No.2 Mobile Magnetometer Traverse with direction & number of traverse
- Volcanics - andesite or basalt
- Limestone

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

MAGNETIC RECONNAISSANCE
FOR
HALE C. TOGNONI

COWDEN MINE AREA
YAVAPAI COUNTY, ARIZONA

SCALE: 1" = 300'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: H. C. T. & J. W. M.	
DATE: Aug. 1961	SHEET 1 OF 1	
DRAWN BY: I. B.	DRAWING NO.:	FILE:



GREY EAGLE MINING CORP.
COPPER QUEEN MINE

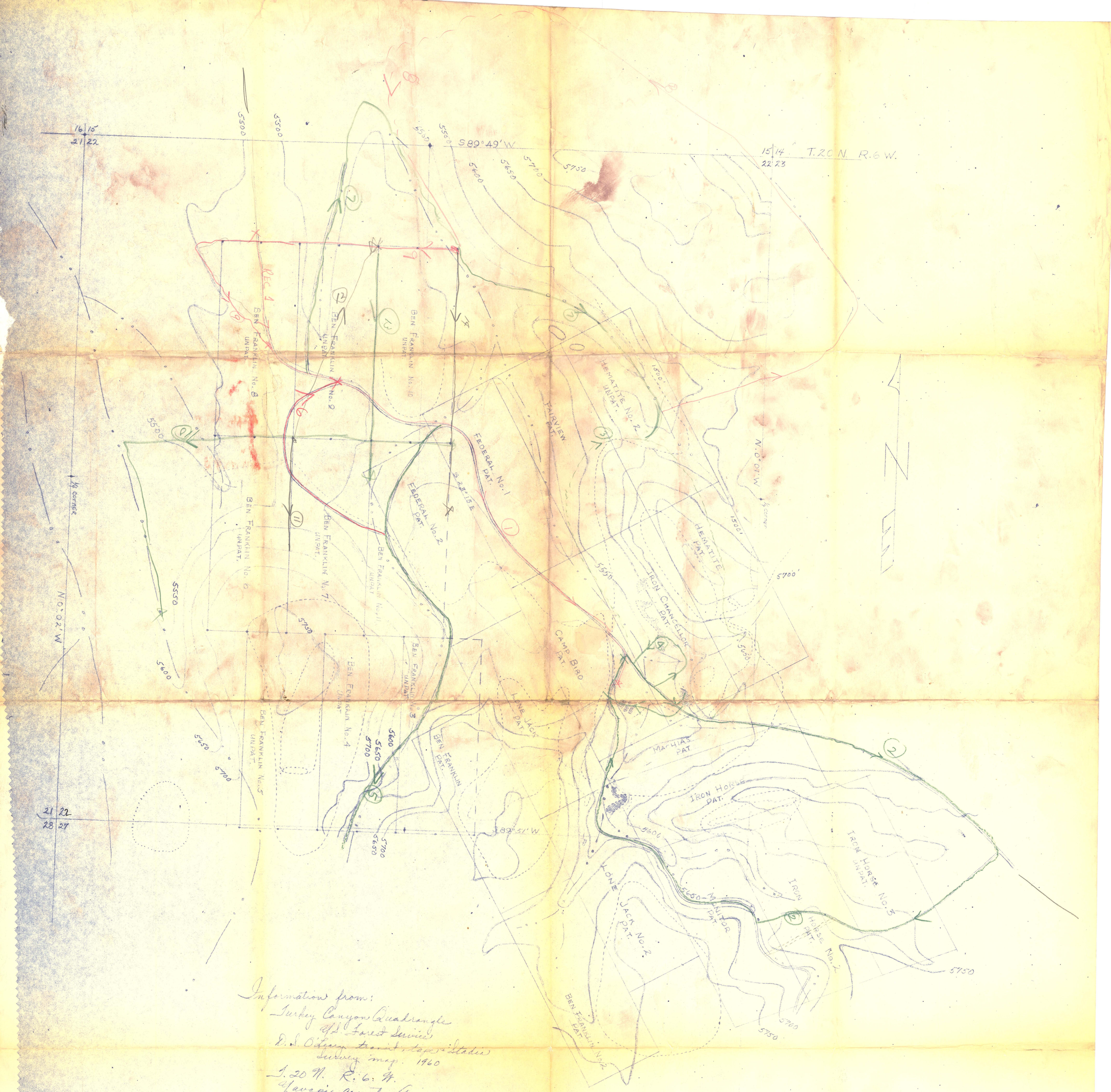
COPPER QUEEN & COPPER QUEEN No. 2 thru 6 LODE MINING CLAIMS

SEC. 1 and 2 T. 13 N., R. 2 E.
G.& S.R.B.& M. YAVAPAI CO. ARIZONA

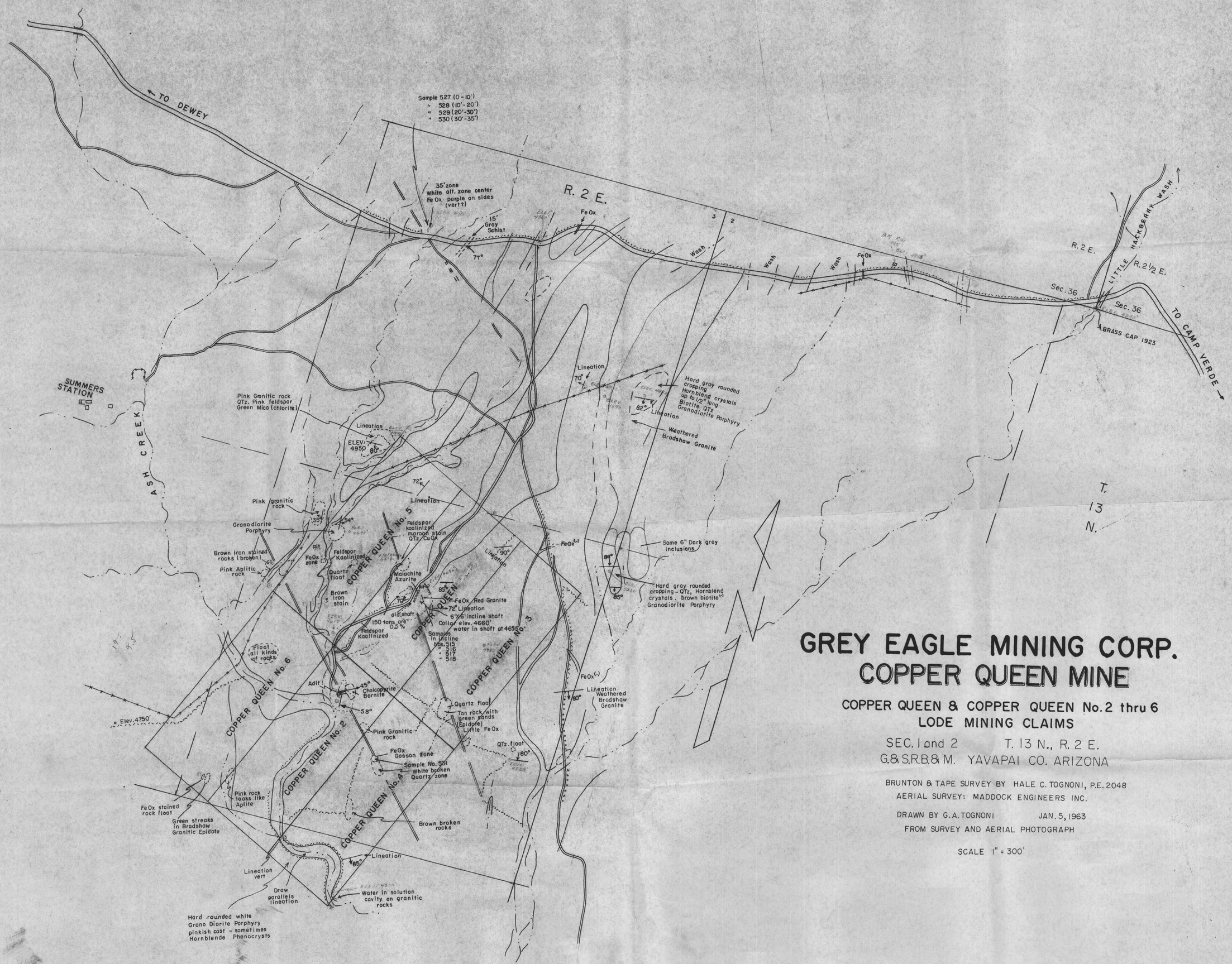
BRUNTON & TAPE SURVEY BY HALE C. TOGNONI, P.E. 2048
AERIAL SURVEY: MADDOCK ENGINEERS INC.

DRAWN BY G.A. TOGNONI JAN. 5, 1963
FROM SURVEY AND AERIAL PHOTOGRAPH

SCALE 1" = 300'



Information from:
Turkey Canyon Quadrangle
U.S. Forest Service
D. J. O'Leary transit, tape & stadia
Survey mag. 1960
T. 20 N. R. 6 W.
Navajo county, Ariz
Aug. 17, 1961
Drawn by G. A. Tognoni



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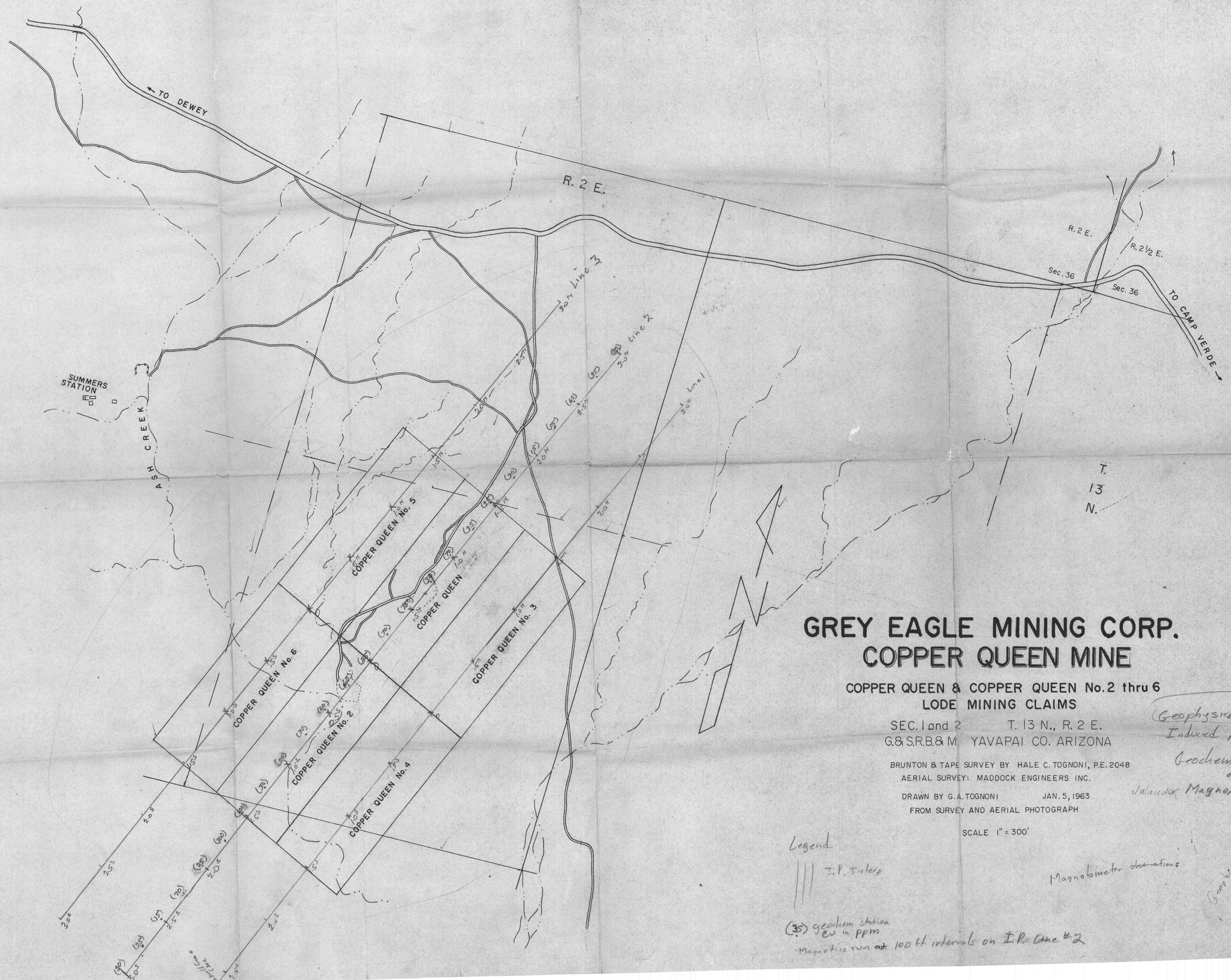

GREY EAGLE MINING CORP.
COPPER QUEEN MINE

COPPER QUEEN & COPPER QUEEN No. 2 thru 6
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DRAWN BY G.A. TOGNONI JAN. 5, 1963
FROM SURVEY AND AERIAL PHOTOGRAPH

SCALE 1" = 300'

Geophysical Survey Overlay
Induced Polarization survey
Geochemical Survey
and
Jalaudor Magnetometer survey

Legend

I.P. Interp

Magnetometer observations

(35) geochem station
Cu in ppm

Magnetics run at 100 ft intervals on I.P. Line #2

Geochem