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8/31/64 Hecla Twin Buttes

Grover: 9:AM

We did not quickly find the Hecla data this morning.

W.

Level Survey for Hecla Mining Co.

(1)

8-26-69

Line 1

Sta	+	H.I.	−	Elev	Remarks
#2 30+00				100.00	
#1 0+00	5.66	105.66	7.77	94.89	✓
			3.40	102.26	✓
	4.69	106.95	1.27	105.68	✓
9+00	7.18	112.96	4.41	108.45	✓
			2.52	110.34	✓
18+00	12.02	122.36	3.89	118.47	✓
	4.91	123.38	0.46	122.92	✓
27+00	9.28	132.20	7.94	124.26	✓
36+00			9.30	122.90	✓
	4.95	127.85	11.55	116.30	✓
	1.28	117.58	12.13	105.45	✓
	3.29	108.74	9.10	99.64	✓
45+00	5.47	105.11	5.43	99.68	✓
	11.10	110.78	0.82	109.96	✓
	12.49	122.45	1.09	121.36	✓
	12.73	134.09	0.53	133.56	✓
54+00	5.84	139.40	1.40	138.00	✓
	8.00	146.00	0.93	145.07	✓
63+00	4.28	149.35	9.65	139.70	✓
	10.07	149.77	3.83	145.94	✓
72+00	10.17	156.11	4.36	151.75	✓
			1.09	155.02	✓
	9.95	164.97	2.15	162.82	✓
81+00	5.48	168.30	10.94	157.36	✓
			7.70	160.60	✓
	6.15	166.75	5.12	161.63	✓
#1 135+00	7.56	169.19	2.40	166.79	✓

Starting point - Elev. (Cu Portion)

Line 2 - 30+00 E

ORIGINAL COPR. 1910 BY J. C. PARKER

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

LEFAX, PHILADELPHIA, 7 PA. MADE IN U.S.A.

ORIGINAL COPR. 1910 BY J. C. PARKER

Level Survey for Heela Line 1

(2)

8-28-64

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

Sta	+	H. I.	−	Elev	Remarks
#1 135+00				166.79	Taking off Sta 135+00 line 1 for Superior location Duval road.
90+00	1.93	168.72	8.92	159.80	✓
	9.58	169.38	8.48	160.90	✓
99+00	8.05	168.95	4.89	164.06	✓
	3.91	167.97	7.76	160.21	✓
108+00	5.45	165.66	4.12	161.54	✓
	Between line 1 & 2				
	1.27	162.81	13.29	149.52	✓
	1.11	150.63	12.40	138.23	✓
	0.20	138.43	13.19	125.24	✓
	2.76	128.00			
	line 2				
108+00			11.03	116.97	✓
			2.15	125.25	✓
99+00	6.57	131.82	8.76	123.06	✓
#1 155+00	8.18	131.24	5.83	125.41	✓
90+00			8.82	122.42	✓
81+00	8.16	130.52	7.12	123.40	✓
72+00	2.36	125.76	6.53	119.23	✓
63+00	3.20	122.43	12.95	109.48	✓
	8.18	117.66	10.70	106.96	✓
	0.93	107.89	6.17	101.72	✓
54+00	2.13	103.85	11.59	92.26	✓
			2.85	101.00	✓
45+00	7.69	108.69	14.45	94.24	✓
	4.67	98.91	12.91	86.00	✓
	0.79	86.79	12.38	74.41	✓
36+00	1.81	76.22	7.82	68.40	✓

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ORIGINAL COPR. 1910 BY J. C. PARKER

Level Survey (3) 8-28-64

for Hecla Line 2

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

Sta	+	H.I.	-	Elev	Remarks
36+00				68.40	
	11.88	80.28	1.40	78.88	✓
	12.17	91.05	0.33	90.72	✓
27+00	8.41	99.13	14.02	85.11	✓
18+00	9.07	94.18	9.70	84.48	✓
	3.99	88.47	12.49	75.98	✓
9+00	0.68	76.66	12.83	63.83	✓
			1.65	75.01	✓
	10.16	85.17	7.20	77.97	✓
0+00	4.32	82.29	11.00	71.29	✓
	Between lines 1 & 2				
	11.53	82.82	0.79	82.03	✓
	10.87	92.90	2.50	90.40	✓
#2 30+00	9.90	100.30	1.28	99.02	✓
					=78
					9-1-64

LEVELS BETWEEN LINES 2-3

#2 63+00				109.48	✓
	1.98	111.46	12.63	98.83	✓
	2.81	101.64	12.52	89.12	✓
#3 63+00	2.14	91.26	10.72	80.54	✓
	6.15	86.69	5.19	81.50	✓
72+00	5.81	87.31	4.87	82.44	✓
			7.36	79.95	✓
	9.19	89.14	0.89	88.25	✓
81+00	5.44	93.69	8.97	84.72	✓
			9.65	84.04	✓
90+00	6.52	90.56	4.17	86.39	✓
			7.01	83.55	✓

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ORIGINAL COPR. 1910 BY J. C. PARKER

LEVEL SURVEY
HECLA : LINE #3

(4) 9-1-64

TR.MK. REG. U.S. PAT. OF

STA	+	HI	—	Elev	
				83.00	
	4.70	87.70	4.63	83.72	
90+00	6.86	90.58	5.25	85.33	
			3.33	86.70	
108+00	8.80	95.50	7.36	88.14	
	12.47	100.6	3.46	97.15	
	12.81	109.96	1.18	108.78	
	12.76	121.54	0.97	120.78	
	9.46	130.00	4.61	125.39	
90+00	6.87	131.13	8.09	123.07	123.06
36+00				80.54	
	5.79	86.33	7.06	79.27	
54+00	3.58	82.85	11.93	70.92	
	3.84	74.76	13.08	61.68	
	0.61	62.29	11.96	50.33	
45+00	9.13	59.46	11.30	48.16	
			5.92	54.54	
	8.80	63.34	7.96	55.38	
	1.01	56.39	9.70	46.69	
36+00	5.35	52.04	12.54	39.50	
			4.79	47.25	
	7.71	54.96	2.71	52.25	
27+00	7.76	60.01	3.96	56.05	56.05
	2.22	58.27	12.00	46.27	
	2.10	58.37	12.42	45.95	
18+00	4.58	40.53	11.71	23.82	30.02
			5.05	31.48	38.68
	11.31	26.17	5.23	43.57	44.77

Checked DM

7
42
7

LEFAX, PHILADELPHIA, 7 PA. MADE IN U.S.A.

72.07
39.30
32.77

72.81
39.95
32.86

OLD
+.74

[illegible]
28.82
.46

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. Hecla Line #3 4 9-1-64

TR.MK. REG. U.S. PAT. OF

Sts	+	BT	−	Elev		
				20.95	143.57	44.77
	1.29	22.24	4.89	17.35	39.97	
9+00	8.90	26.25	3.47	22.78	145.46	45.46
			8.09	18.16	40.78	
0+00	7.41	25.57	8.24	17.33	139.95	40.00
	11.07	28.40	1.07	27.33	49.95	
	11.42	38.75	1.07	37.68	60.30	
	9.86	47.54	0.93	46.61	69.23	
	9.20	57.50	5.24	51.92	74.58	
	2.81	64.77	4.58	60.19	172.81	72.07
0+00	Line #2				172.07	
	3.21	75.28	11.04	64.24		
	1.57	65.81	11.70	54.11		
	3.53	57.64	12.45	45.19		
#3 0+00	2.37	47.56	8.26	139.30		
			9.08	38.48		
9+00	7.45	45.93	1.21	44.72		
	3.17	47.89	13.01	34.88		
	10.97	45.85	0.84	45.01		
	3.51	48.52	10.34	38.18		
18+00	2.57	40.75	11.47	129.28		

Check on South End of Line #3

LEFAX, PHILADELPHIA, 7 PA. MADE IN U.S.A.

LEVEL SURVEY ⑤ 9-3-64

HECLA LINE #4

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

STA	+	HI	−	ELEV	
108+00	LINE #3			188.14	
	1.72	89.86	13.07	76.79	✓
	2.08	78.87	11.85	67.02	✓
#4	0.57	67.59	12.77	54.82	✓
108+00	4.16	58.98	7.34	151.64	✓
			S 9.65	49.33	✓
99+00	7.08	56.41	10.94	145.47	✓
	10.91	56.38	10.64	45.74	✓
90+00	7.96	53.70	6.07	147.63	✓
			S 6.89	46.81	✓
	4.01	50.82	6.90	43.92	✓
72+00	6.29	50.21	6.98	143.23	✓
	6.87	50.10	6.95	143.15	✓
63+00	7.14	50.29	7.66	143.63	✓
			S 10.47	40.82	39.82 ✓
	5.02	45.84	9.32	35.52	✓
54+00	5.85	42.37	2.11	139.26	✓
			S 11.89	29.48	✓
45+00	4.88	35.36	4.76	129.60	✓
			S 12.99	21.37	✓
36+00	1.89	24.26	6.79	116.47	✓
			S 1.38	21.88	✓
27+00	7.30	30.18	7.07	122.11	✓
	1.75	24.86	13.20	10.66	✓
18+00	9.52	21.18	6.72	113.46	✓
	8.84	23.30	10.97	11.33	✓
9+00	11.36	23.69	6.34	116.35	✓
			S 11.42	11.27	✓
0+00	8.31	20.58	9.33	110.25	✓

Checked DA

Pickup #82!

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Hecla Level Survey 6

9-3-64

LINE #4

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

STA	+	HI	−	ELEV		
4/18+00				113.46		
	13.00	27.46	7.23	19.23		
	12.74	32.97	1.85	30.12		
	10.65	41.77	3.55	37.22		
	9.09	47.31	9.14	37.17		
	30 1	41 18	10.58	29.60	29.28	+.32
9+00				147.63		
	5.21	52.84	7.97	44.87 ✓		
5/+00	4.60	49.52	6.01	43.51 ✓		
	LINE 4 to LINE 5					
108+00	(LINE #4)			151.64 ✓		
	2.60	54.24	11.86	42.38 ✓		
	1.15	44.53	13.18	30.35 ✓		
	1.71	32.06	12.11	19.95 ✓		
P 7	5.05	25.00	6.41	18.59 ✓		
108+00	6.80	25.39	8.34	117.05	108+00	LN 5
108+00	LINE #5			117.05		
	5.77	122.82	12.74	110.08	Add 100	
	7.10	117.18	7.07	110.11	To All	
5/99+00	4.16	114 27	4.15	110.12	PREVIOUSE	
			5 4.88	109.39	Elevations	
90+00	4.13	113.52	5.35	108.17		
	7.45	115.62	8.84	106.78		
81+00	4.21	110.99	10.11	100.88		
			5 6.66	104 33		

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SURVEY FOR ①

9-1-64

HECLA - GRAVITY

LINE #5

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

STA	+	HI	−	ELEV
				104.33
	5.86	110.19	3.51	106.68
72+00	4.81	111.49	6.12	105.37
			56.67	104.82
63+00	7.05	111.87	6.33	105.54
	5.68	111.22	8.72	102.50
54+00	4.94	107.44	6.82	100.62
	5.03	104.65	5.77	99.88
45+00	3.31	103.19	11.44	91.75
	9.39	101.14	11.30	89.84
36+00	11.74	101.58	7.84	93.74
	10.20	103.94	1.98	101.96
	8.58	110.54	3.76	106.78
	9.93	116.71	2.98	113.73
27+00	7.11	120.84	4.32	116.52
				116.47
			Tie	+.05
5/36+00				93.74
	3.20	96.94	8.96	87.98
27+00	9.77	95.75	7.07	90.68
	3.45	92.13	4.45	89.68
	1.37	89.05	11.80	79.25
18+00	2.56	79.81	6.43	75.38
			56.33	75.48
	12.02	85.50	5.41	82.09
9+00	6.76	86.85	5.75	83.10
			S 74	81.41
	5.08	84.49	11.05	75.44
0+00	3.47	76.91	12.27	66.24

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ORIGINAL COPR. 1910 BY J. C. PARKER

LEVEL SURVEY (8) 9-8-64

HECLA GRAVITY

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

STD	+	HI	−	ELEV	
9+00	LINE #5			93.10	
	11.65	92.75	1.07	91.68	93.68
	11.73	103.41	1.39	102.02	104.02
	11.55	113.57	0.67	112.90	114.90
9+00	4.79	116.69	3.33	113.36	116.36
					116.35
				Tie	+0.01

LEFAX, PHILADELPHIA, 7 PA. MADE IN U.S.A.

Hecla
Twin Buttes

Grover,

I will be in tomorrow to go out on the Hecla job. IF you lay out the map and tell Don to come in at 6 o'clock we can get most of it laid out for surveying and gravity Monday.

Ron

X X X X X X

1800
200

raise 50ℽ

End of Rec 5

Road & Power line

−800

−805

−810

−815

−820

−795

−815

−815

0 10 20 30 40 50 60 70 80 90 100

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

Rec 5 ↑ S
Line 4 108+00 Gravity
1374' W of E Sideline
Sec 9

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

RECORD NO. 5 DATE 9-24-64

SENSITIVITY 50ℽ GAMMAS / ½ In S.D

HORIZONTAL SCALE 400 FT./In

LOCATION Twin Buttes Mining District
Pima Co., Arizona

0 10 20 30 40 50 60 70 80 90 100

End of Rec3 4.00 PM
Line 1 0+00

690
700
0 10 20 30 40 50 60 70 80 90 100
150' N Line 2 0+00
700
715
705
710
740
715
740
1/2 Cor 1/4 1/4
Line 4 0+00
0 10 20 30 40 50 60 70 80 90 100
740
740
735
720
730
725
745

Repeat Rec3 ↑W
3-B

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.
RECORD NO 3 repeat DATE 9-24-64
SENSITIVITY 50 γ GAMMAS / in S.D.
HORIZONTAL SCALE 400 FT./in.
LOCATION Twin Buttes Mining District
Pima Co., Arizona

0 10 20 30 40 50 60 70 80 90 100

OK

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

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

790

NE Cor Sec 9 1:25 P.M

— 810

— 780

— 800

— 780

— 810

C.G Rd — 800

— 785

— 825

— 795

— 810

— 760

— 775

0 10 20 30 40 50 60 70 80 90 100

Repeat Rec 1 ↑E 1:15 P.M

1-B

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

RECORD NO. 1 repeat DATE 9-24-64

SENSITIVITY 50γ GAMMAS /½ in S.D

HORIZONTAL SCALE 400 FT./in

LOCATION Twin Buttes Mining District
Pima Co., Arizona

THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U. S. A. CHART NO. 17

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

0 10 20 30 40 50 60 70 80 90 100

820

Power line end of Rec 7

770

820
770
830
755

765

Cross Rec 4

780
760
775
805
770
780
790

CG
815

Rec 8 center N end Sec 9
at C.G. S.W on Main road ↑SW

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

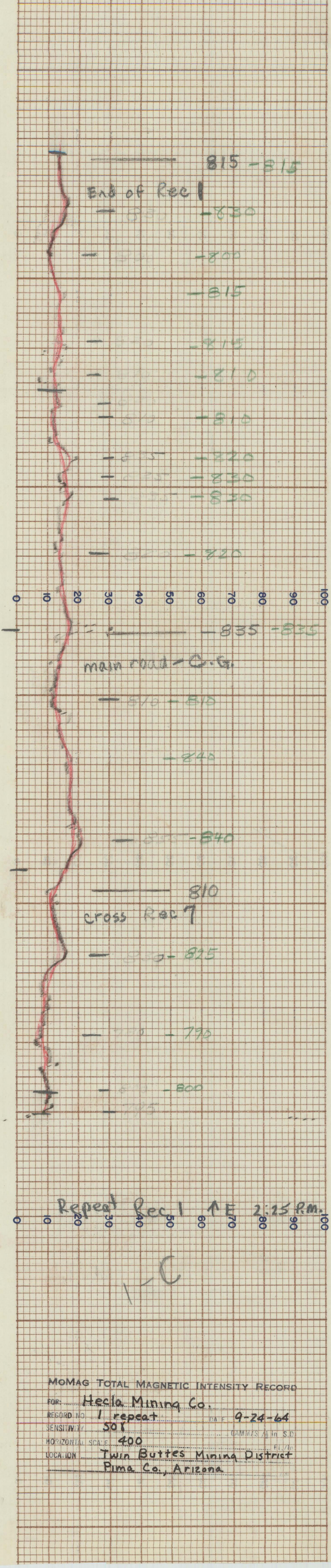
RECORD NO. 8 DATE 9-24-64

SENSITIVITY 508

HORIZONTAL SCALE 400

LOCATION Twin Buttes Mining District
Pima Co., Arizona

0 10 20 30 40 50 60 70 80 90 100



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

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

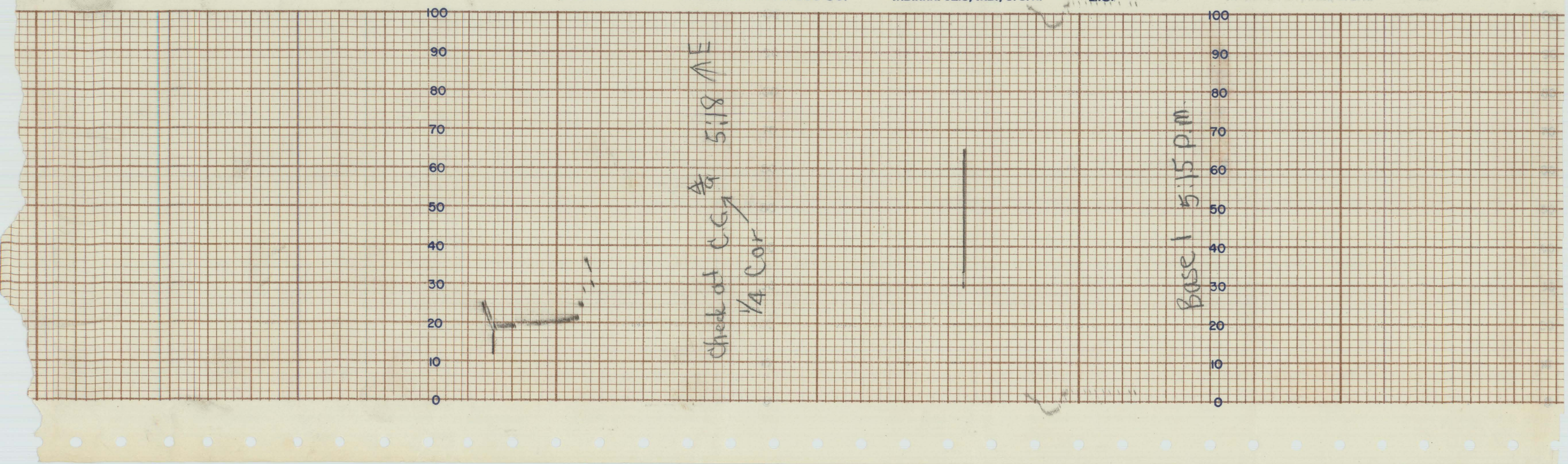
RECORD NO. 1 repeat DATE 9-24-64

SENSITIVITY 50γ GAMMAS/½ in. S.D.

HORIZONTAL SCALE 400 FT./in.

LOCATION Twin Buttes Mining District
Pima Co., Arizona

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



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

End of Rec 9
cross Rec 3

Line 3 otos

50' Gap Badwash

1/4 cor 16/21

0 10 20 30 40 50 60 70 80 90 100

770
Powerline
730

775
Trail road

Powerline Road
780

D.D. 5285

CATTLE G.

Rec 9 Start at same place as Rec 8 ↑S

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

RECORD NO. 9 DATE 9-24-64

SENSITIVITY 50γ GAMMAS / 2 in S.D

HORIZONTAL SCALE 400 FT./in.

LOCATION Twin Buttes Mining District
Pima Co., Arizona

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

820

NW Cor Sec 9
End Rec 4

-810
-800
-800
-790

Main road

-800
-830
-800
-850

Power Line
& Rd

-800
-780
-790
-750

POWER LINE
-740

NW Cor Sec 16
12:45 P.M.

-750
-740
740
700

100' Gap Bedwash

Bedwash Gap

90'

GAP bedwash

SW Cor Sec 16

700

Rec 4 ↑N
SW Cor Sec 16

MoMag TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

RECORD NO. 4 DATE 9-24-64

SENSITIVITY 50γ GAMMAS / 1 in. SQ.

HORIZONTAL SCALE 400 Ft./in.

LOCATION Twin Buttes Mining District
Pima Co., Arizona

4

0 10 20 30 40 50 60 70 80 90 100

K

INSTRUMENTAL ADJ. 100γ

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

End of Rec 2
SE Cor Sec 16

LINE 5 0+00

0 10 20 30 40 50 60 70 80 90 100

Wash

50' Gap Bad Wash

Power Line

0 10 20 30 40 50 60 70 80 90 100

100' Gap Bad Wash

SE Cor Sec 9

Road

Power Line

0 10 20 30 40 50 60 70 80 90 100

Rec. 2
NE Cor Sec 9

N

MoMag Total Magnetic Intensity Record

For: Hecla Mining Co.

Record No. 2 Date 9-24-64

Sensitivity 50γ Gam

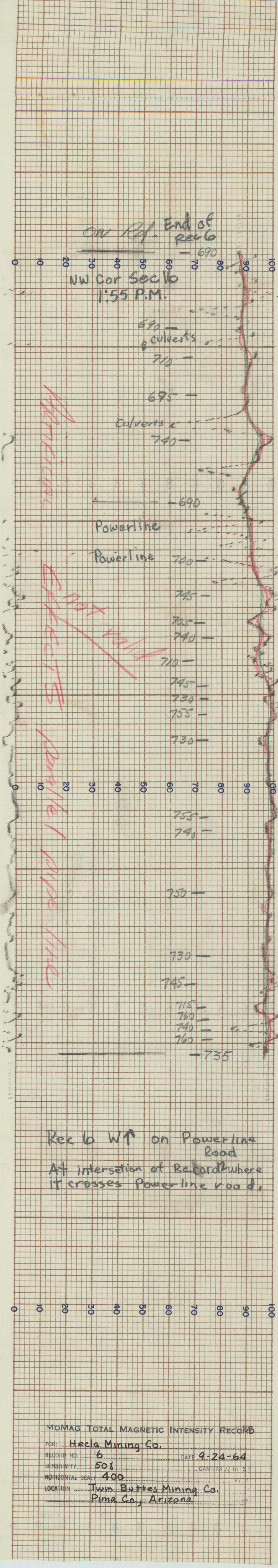
Horizontal Scale 400

Location Twin Buttes Mining District
Pima Co., Arizona

The Esterline-Angus Co. Indianapolis, Ind., U. S. A. Chart No. 17491X

Made in U. S. A. The Esterline-Angus Co. Indianapolis, Ind., U. S. A. E.S.

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



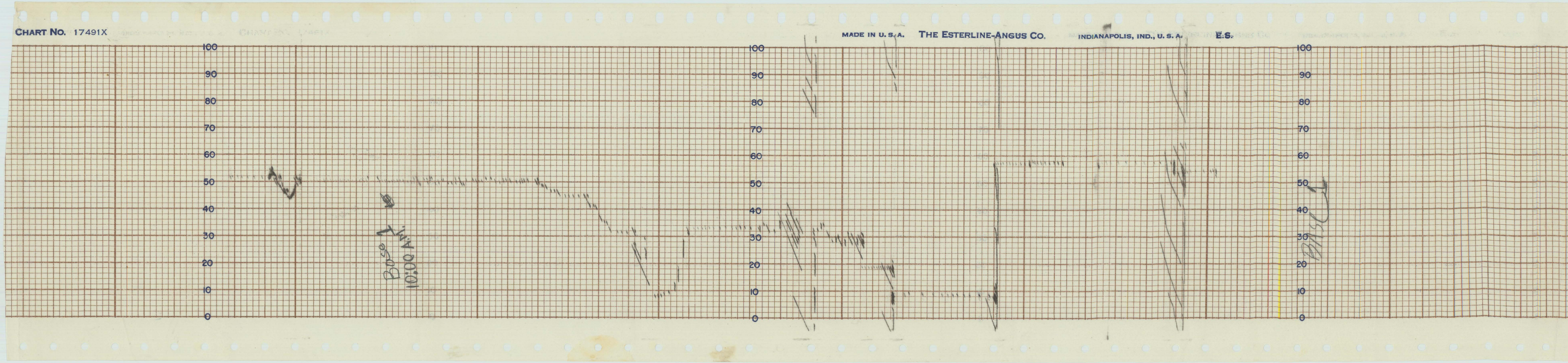
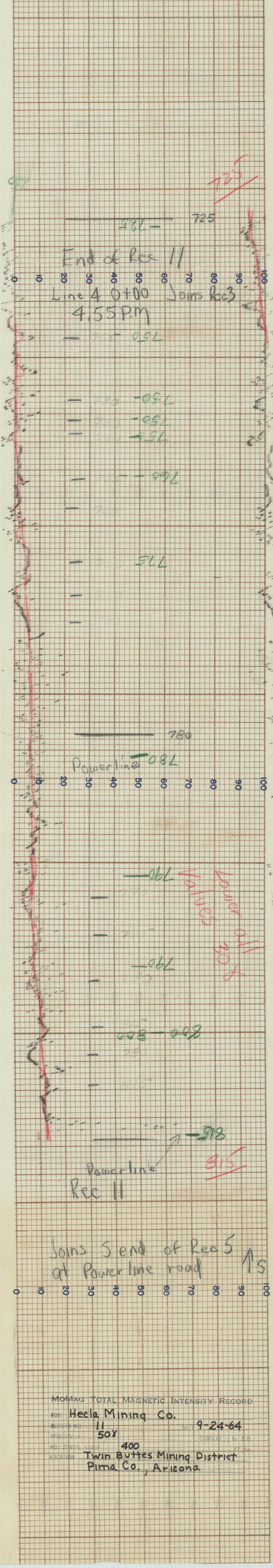
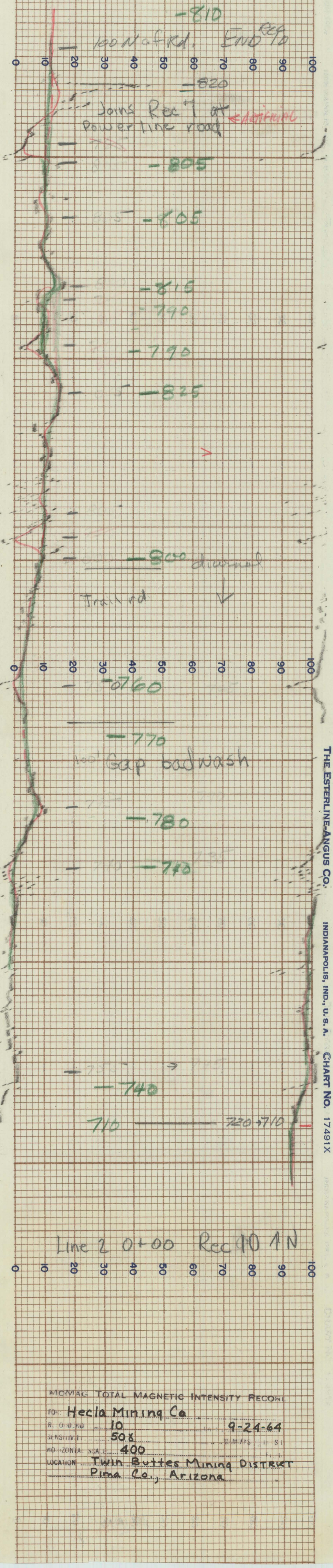


CHART NO. 17491X
MADE IN U. S. A. THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U. S. A. E.S.
100
90
80
70
60
50
40
30
20
10
0
Dose 1
10:00 AM



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

INDIANAPOLIS, IND., U. S. A. E.S.



MONAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co

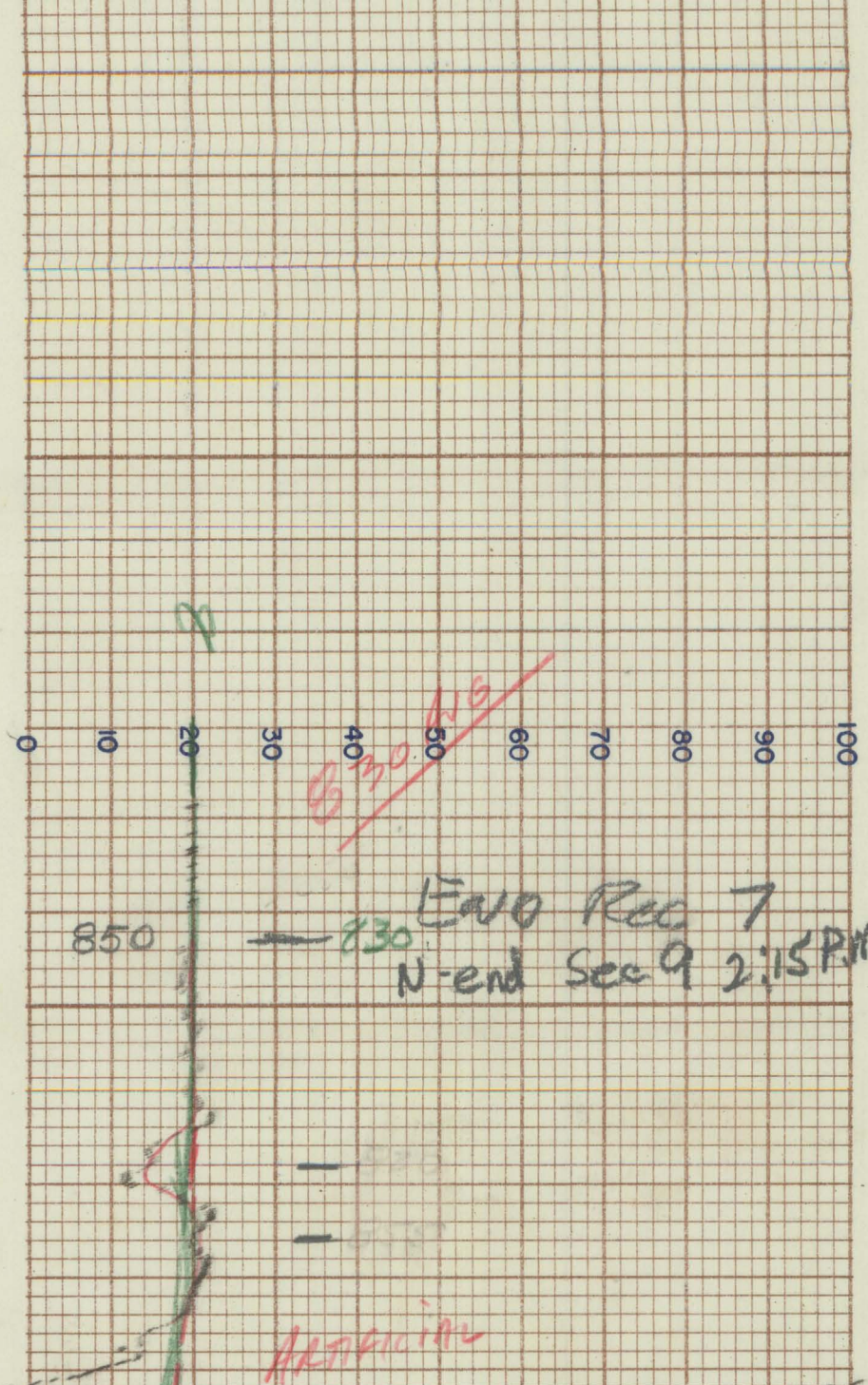
RECORD NO. 10 DATE 9-24-64

SENSITIVITY 50x GAMMAS IN SCALE

HORIZONTAL SCALE 400

LOCATION Twin Buttes Mining DISTRICT
Pima Co., Arizona

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



Rec 7 ↑N Line 2 at
Intersection of Power line road
Pipe affects.

MOMAG TOTAL MAGNETIC INTENSITY RECORD

FOR: Hecla Mining Co.

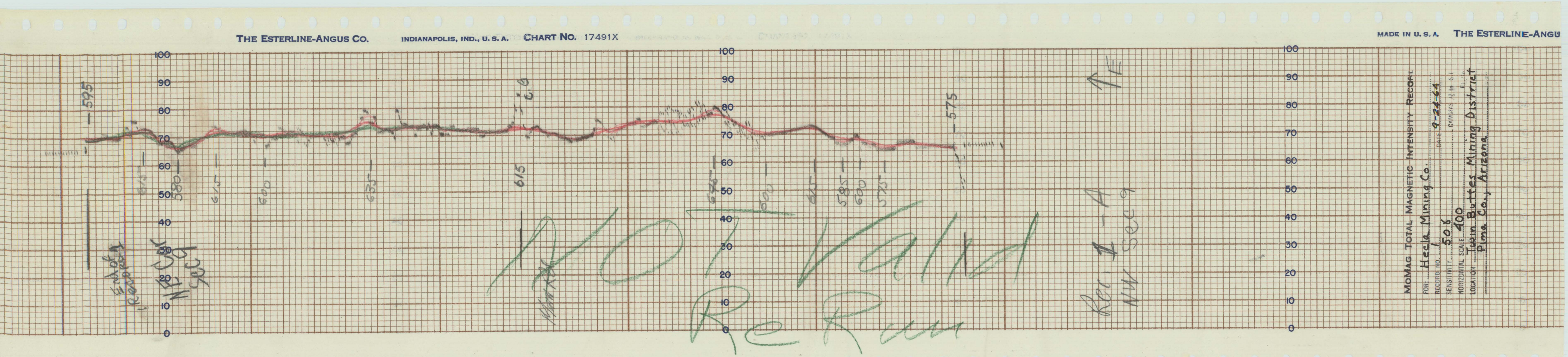
RECORD NO. 7 DATE 9-24-64

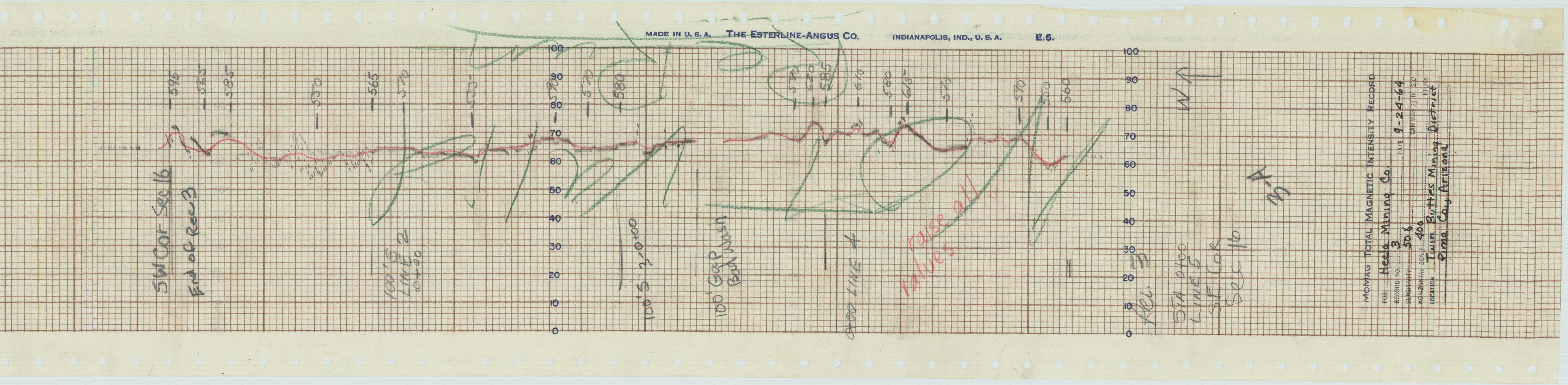
SENSITIVITY 506 GAMMAS / ½ in. S.D.

HORIZONTAL SCALE 400 FT. / in.

LOCATION Twin Buttes Mining District
Pima Co., Arizona

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


THE ESTERLINE-ANGUS CO.
INDIANAPOLIS, IND., U. S. A.
CHART NO. 17491X
MADE IN U. S. A.
THE ESTERLINE-ANGU
MoMAG TOTAL MAGNETIC INTENSITY RECORD
FOR: Hecla Mining Co.
RECORD NO. 1
DATE 9-24-64
SENSITIVITY 508
HORIZONTAL SCALE 400
LOCATION Twin Buttes Mining District
Pima Co., Arizona
Not Valid
Re Run
Rec 1-A
NW Sec 9
NE Cor Sec 9
End of Record 1
595
575
615
580
600
635
675
585
575
100
90
80
70
60
50
40
30
20
10
0


MADE IN U.S.A. THE ESTERLINE-ANGUS CO. INDIANAPOLIS, IND., U.S.A. E.S.
MOMAG TOTAL MAGNETIC INTENSITY RECORD
FOR: Hecla Mining Co.
RECORD NO. 3
DATE 9-24-64
SENSITIVITY 50γ
GAMMAS/1/2 in. S.D.
HORIZONTAL SCALE 400 FT./in
LOCATION Twin Buttes Mining District
Pima Co., Arizona
SW Cor Sec 16
End of Rec 3
100'S LINE 2 0+00
100'S 2-0+00
100' Gap Bad Wash
0+00 LINE 4
raise all values
Rec. 3
STA 0+00 LINE 5 SE Cor Sec 16
3-A
W

Read Nettleton

600.0 .1 .06 mg/ft

Base .0978 .006 .01

569.0 .1 .1

567.8 .5

12

Field Read	Drift Day-Day & Daily	Correct Reads	I .0978 corr mg	Miles N of base	II × 1.174 lat corr mg	Elev ft	III × 0.06025 mg Bg/Ft

I + II + III (→ no.) — x for plotting ← use

1st mg

drift correct reading & day-day reading 502.7 S.D. × scale constant (0.0978 milligal / scale division)

= 49.70 (milligals) (I)

.09780

North

900

Base line (latitude) — sin 20 mg/mile

900/5280 miles → Two sig. figs. = 0.17 mile

10800/5280 = 2.05 miles N of base

2.05 miles × (−1.174 mg/mile) = −2.41 mg (II)

Elevations in feet say 194.89 ft

σ (density) of 2.65 g/cc → 0.06025 mg/ft combined F.A. & Bouguer

194.89 ft × 0.06025 mg/ft ⇒ 11.74 mg (III')

I + II + III = 49.70 + (−2.41) + 11.74

= 59.03 → 59.0

194
5.06
11.64

59.03 −32 27.0
32.66 −32 0.7
10.41 → 5.41
1.03
−.49
−1.69

I + II + III'

NOTE

To CONVERT these ELEVATIONS to Sea level A FACTOR of 2947.08 MUST Be added to these ASSUMED ELEVATIONS

D.A.

9-23-64

Level Survey For Hecla Mining Co. Gravity Project Twin Buttes Area

Line #1	Station	Elevation
	0+00	194.89
	9+00	208.45
	18+00	218.47
	27+00	224.26
	36+00	222.90
	45+00	299.68
	54+00	238.00
	63+00	239.70
	72+00	251.75
	81+00	257.36
	90+00	259.80
	99+00	264.06
	108+00	261.54

Line #2		
	0+00	172.02
	9+00	164.46
	18+00	185.00
	27+00	185.53
	36+00	168.71
	45+00	194.45
	54+00	192.36
	63+00	209.48
	72+00	219.23
	81+00	223.40
	90+00	222.42
	99+00	223.06
	108+00	216.97

PAGE #2

HECLA LEVELS for GRAVITY PROJECT

LINE #3	STATION	ELEVATION
1	0+00	140.04
2	9+00	145.46
3	18+00	130.02
4	27+00	156.05
5	36+00	139.50
6	45+00	148.16
7	54+00	170.92
8	63+00	180.54
9	72+00	182.44
10	81+00	184.72
11	90+00	186.39
12	99+00	185.33
13	108+00	188.14 Tie -0.01

LINE #4		
	0+00	110.25
	9+00	116.35
	18+00	113.46
	27+00	122.11
	36+00	116.47
	45+00	129.60
	54+00	139.26
	63+00	143.63
	72+00	143.23
	81+00	143.51
	90+00	147.63
	99+00	145.47
	108+00	151.64

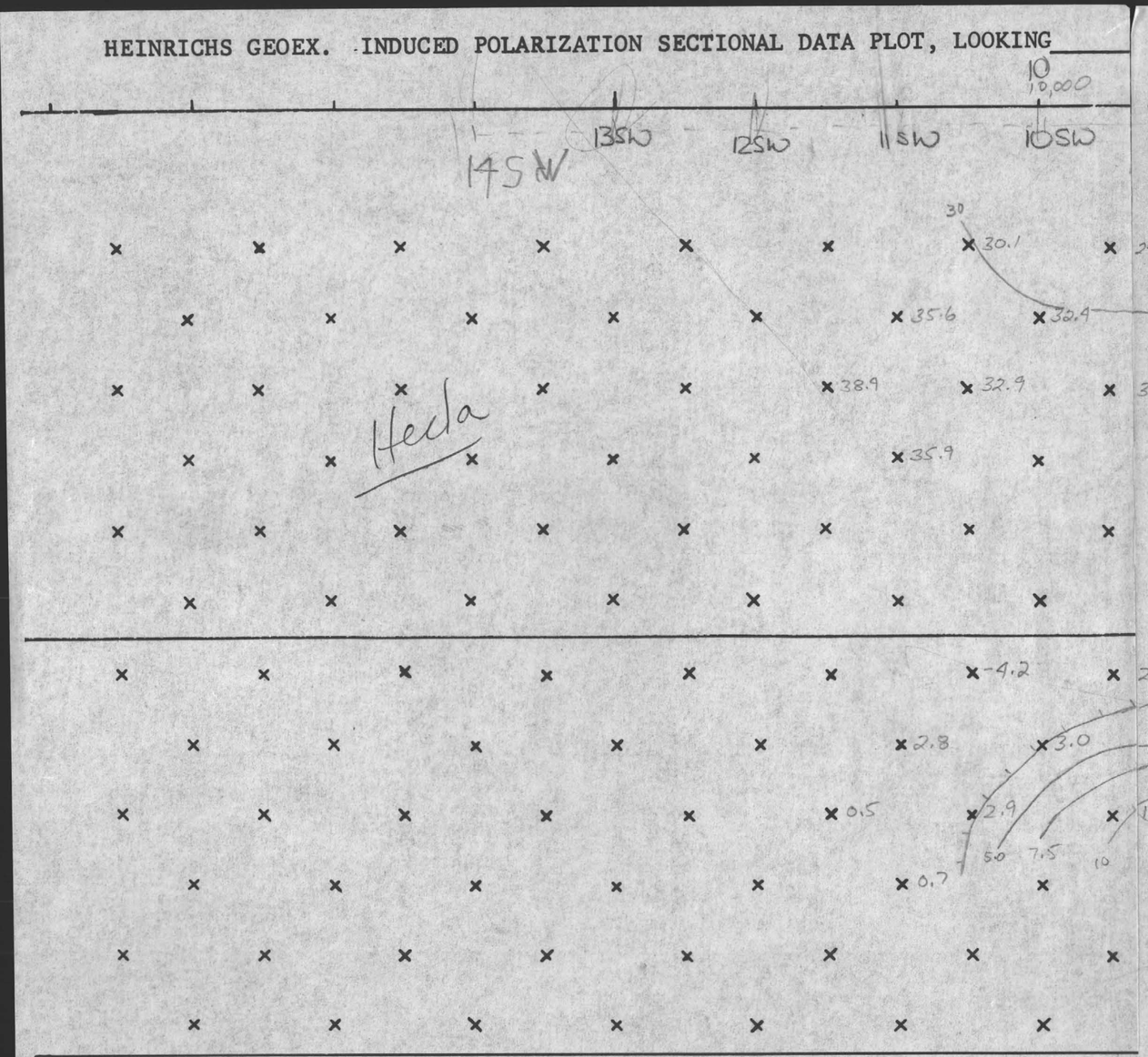
HECLA LEVEL SURVEY GRAVITY
PROJECT TWIN BUTTES AREA

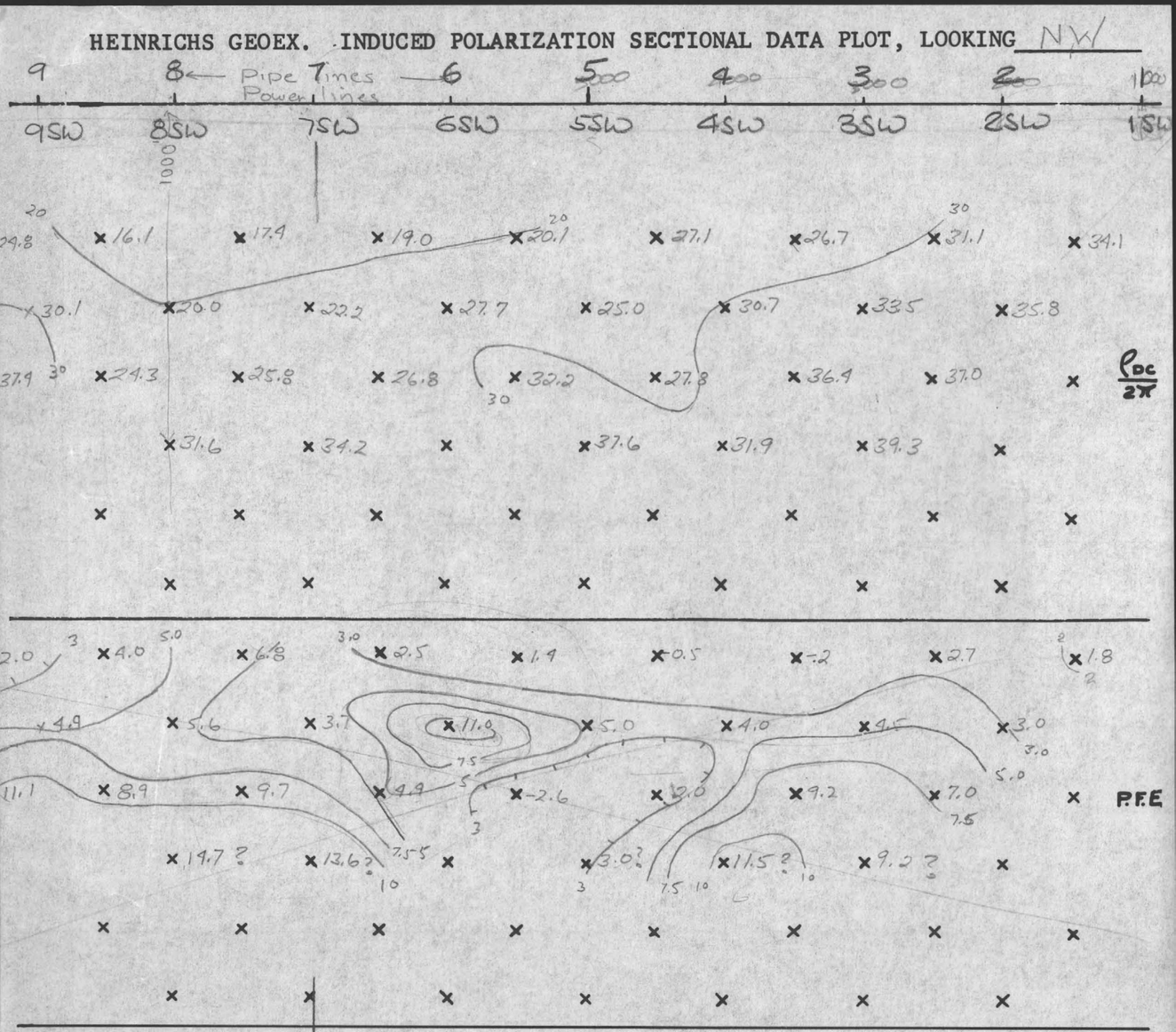
LINE #5

STATION	ELEVATION
0+00	66.24
9+00	83.10
18+00	75.38
27+00	90.68
36+00	93.74
45+00	91.75
54+00	100.62
63+00	105.54
72+00	105.37
81+00	100.88
90+00	108.17
99+00	110.12
108+00	117.05

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING

HEINRICHS GEOEX. INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING NW



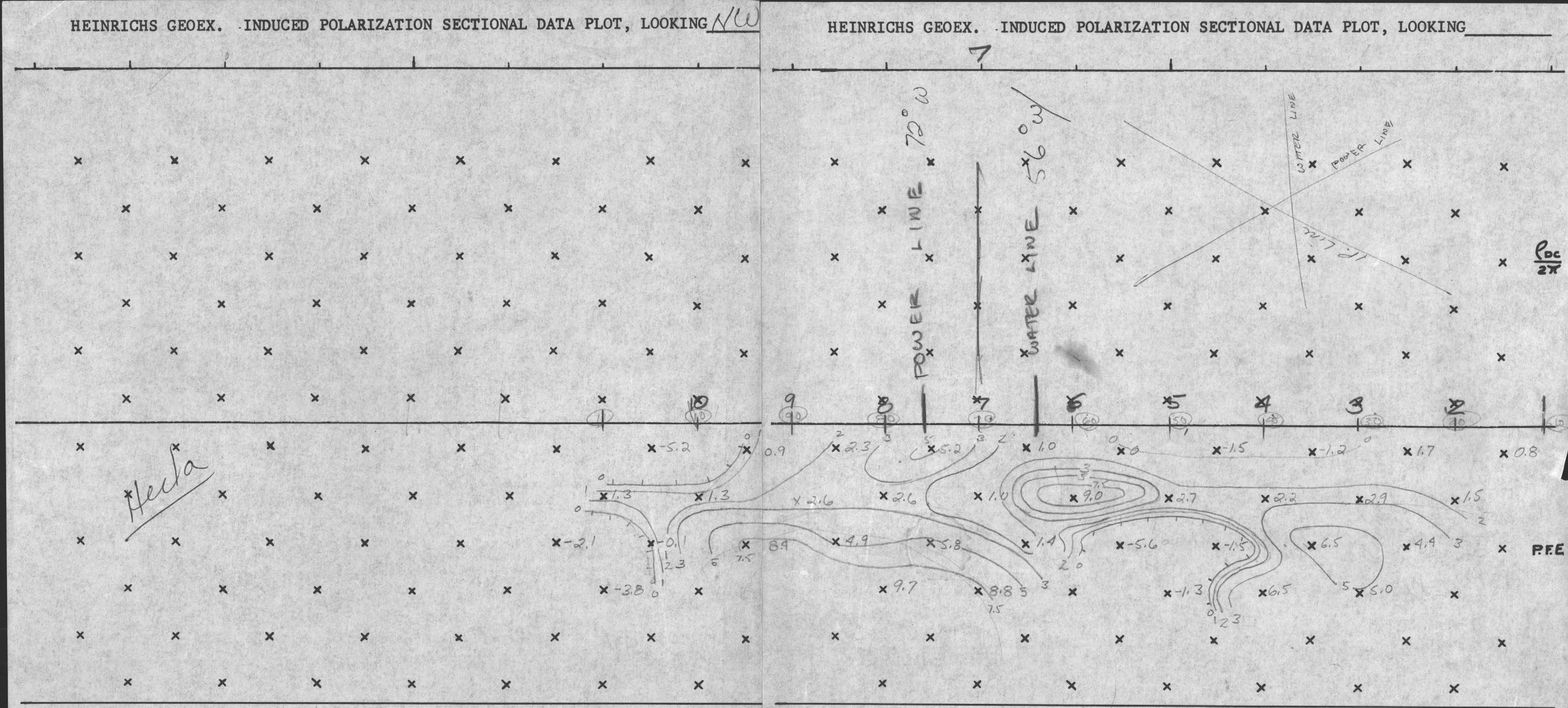


AREA Twin Buttes LINE 1 a = 1000 ' SCALE: 1"=1000' DATE:

AREA LINE a = ' SCALE: DATE:

HEINRICHS GEOEX. -INDUCED POLARIZATION SECTIONAL DATA PLOT, LOOKING N/W

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



AREA Twin Rattles LINE 1 a = 1000' SCALE: 1" = 1000' DATE: _____

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

3556

GEOPHYSICAL SURVEYS

Sec. 9 & 16, R 13 E, T 18 S
TWIN BUTTES MINING DISTRICT

Pima County, Arizona

for

THE HECLA MINING COMPANY

August to October 1964

by

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

TABLE OF CONTENTS

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Introduction	1
Conclusions & Recommendations	2
Procedures	2
Interpretation	3
Basis of I. P. Method	1a

In Pocket:

I. P. Survey Location Map

Gravity Map

Magnetic Map

I. P. Sectional Data Sheet

INTRODUCTION

From August 24, 1964 to October 20, 1964 Heinrichs Geoexploration Co., at the request of The Hecla Mining Co. conducted geophysical surveys in Sec. 9 & 16, R 13E, T 18S in the Twin Buttes Mining District, Pima County, Arizona. Geophysical work included ground magnetics, gravity, induced polarization and resistivity.

The purpose of the magnetic work was to map the possible extension of the Anaconda mineralization to the north~~(east)~~. west The gravity work was done in an attempt to determine the depth to bedrock and show any regional trends and strong changes in rock densities at depth. Induced polarization and resistivity was used to locate sulfide mineralization to a depth of at least 1,500 ft.

The magnetic and gravity data are presented in contoured plan on a base map of the area. In addition, the gravity is shown in profile.

The induced polarization and resistivity data are plotted on sectional data sheets, showing apparent resistivity, percent frequency effect, and metallic conduction factor contoured in vertical section.

GEOEX personnel on this project were Mr. Peter Beuden, party chief; Dan Anderson, Marcel Leduc, Ron Palmer and John Beeler, field assistants. The magnetics was done by Mr. E. Grover Heinrichs. Interpretation and report by John P. Matthews, Jr. and John W. Langs II.

CONCLUSIONS AND RECOMMENDATIONS

1. The magnetic and gravity work both indicate a regional increase in depth to bedrock to the southeast.

2. The greatest area of interest suggested by the magnetics is located at D.D.H. #11 which is currently being drilled.

3. The gravity high which may be indicative of sulfides is located at the gravity station which lies 2,700 ft. east and 1,000 ft. south of the northwest corner of Section 16.

4. The strongest induced polarization anomaly in the area surveyed is from 7,000 to 10,000 ft. southwest. This anomaly lies on the fringe of both the magnetic and the gravity high. It is moderate in strength and appears to increase with depth.

5. The small I. P. anomaly at 3,500 ft. southwest may be related to the one mentioned in #4 above. The presence of the power line and buried pipe line complicate the interpretation between the two areas of anomalism.

6. Pending results of D.D.H. #11, additional induced polarization could further map the mineralized zone and evaluate the gravity anomaly.

PROCEDURES

1. Magnetics. A total of approximately 13.7 line miles of traverse were run, including five north-south lines at quarter mile spacing as well as a portion of the Duval road and the Duval water line road which were within Sec. 9 and 16.

The magnetic data was obtained with 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 a chart paper in a recorder geared to the vehicle drive.

The instrument was positioned to record on a sensitivity of 50 gammas per half inch of chart vertically, and 400 ft per inch horizontally.

An arbitrary base level was selected and changes in the earth's magnetic intensity were measured relative to this arbitrary base level.

2. Gravity. A total of 65 stations were run on north-south lines at an interval of 900 ft. and a line spacing of one quarter mile. The stations were located by Brunton and chain and then accurately leveled. Maximum elevation error between stations was less than 0.1 feet, and the elevation tie with the original starting point was 0.2 feet.

A worden gravity meter with a scale constant of 0.09780 was used. The combined Bouguer and free air correction factor was 0.06025 milligals per foot, using a density factor of 2.65 and a latitude correction factor of 1.174 milligals per mile from station 0+00.

A depth estimate was made on profile C-C'. First the line was corrected for the regional gradient and then a depth was calculated by use of the half width method.

3. Induced Polarization and Resistivity. A total of 14,000 line feet of induced polarization and resistivity were run yeilding 10,000 ft. of subsurface information. The line was run through the northeast corner of Section 9 on a bearing south 30° west, extending 13,000 ft. southwest and 1,000 ft. northeast from that point.

The data were obtained using the dual frequency induced polarization method, employing a dipole-dipole electrode configuration. A dipole spacing of 1,000 ft. was used in order that data would be obtained to a depth of at least 1,500 ft.

Because of the low resistivity and the large dipole spacings, all frequency effects were increased by the adverse effects of electro-magnetic coupling. The frequency effects plotted have all been corrected for this coupling.

INTERPRETATION

1. Magnetics. The magnetics in Sections 9 and 16 show, in general, only a regional picture. There is a large magnetic high in the northern half of Section 9 which may reflect an extension of the Anaconda mineralization. The other magnetic anomalies in the area seem to be closely related to the general

magnetic high in Section 9. To the south the magnetic intensity drops off, possibly indicating a greater depth to the magnetic source material.

2. Gravity. The gravity data shows that the depth to bedrock increases regionally to the south and east. A 1.1 milligal anomalous high is coincident with the gravity station 2,700 ft. east and 1,000 ft. south of the northwest corner of Section 16. This increase reflects a greater sub-surface density which may result from a shallower depth to bedrock, a rock type change or possibly a greater sulfide content.

Depth estimates were calculated on profile C-C' and indicate a depth of 550 ft. to the center of a buried horizontal cylinder, or 715 ft to the center of a buried sphere. These estimates, tenuously based on three data points, reflect the maximum depth of burial.

3. Induced Polarization. There are two anomalies which show up on this line. The first at 3,500 ft. southwest is quite small in extent and at most indicates only weak sulfide mineralization. The other anomaly is located from approximately 7,000 ft. to 10,000 ft southwest. This anomaly is moderate in effect and probably increases with depth. The total sulfides by volume as indicated by the metallic conduction factor are about 1.5% +/- 50%. The southwestern end of this anomaly is cut off sharply at 10,000 ft. SW. The northeastern end presents a complex picture; high frequency effects adjoining fairly strong negative effects. These are probably caused in large part by the power lines and particularly by the water pipe. While their effects may be considerable, they still do not account for the total anomalism observed. If the effects of the pipe line and power line were not present, it is also possible that the two anomalies would merge into one large anomaly.

The resistivities show a two layer case with the upper layer lower in resistivity than the lower layer. The thickness of the upper layer of alluvium at 2,500 ft. and 7,000 ft southwest is about 500 ft. +/- 25%. From 3,000 - 10,000 ft southwest the resistivities are somewhat lower, indicating the possibility of a trough, a change in rock type, or an increase in sulfide content.

Respectfully submitted,

HEINRICHS GEOEXPLORATION CO.

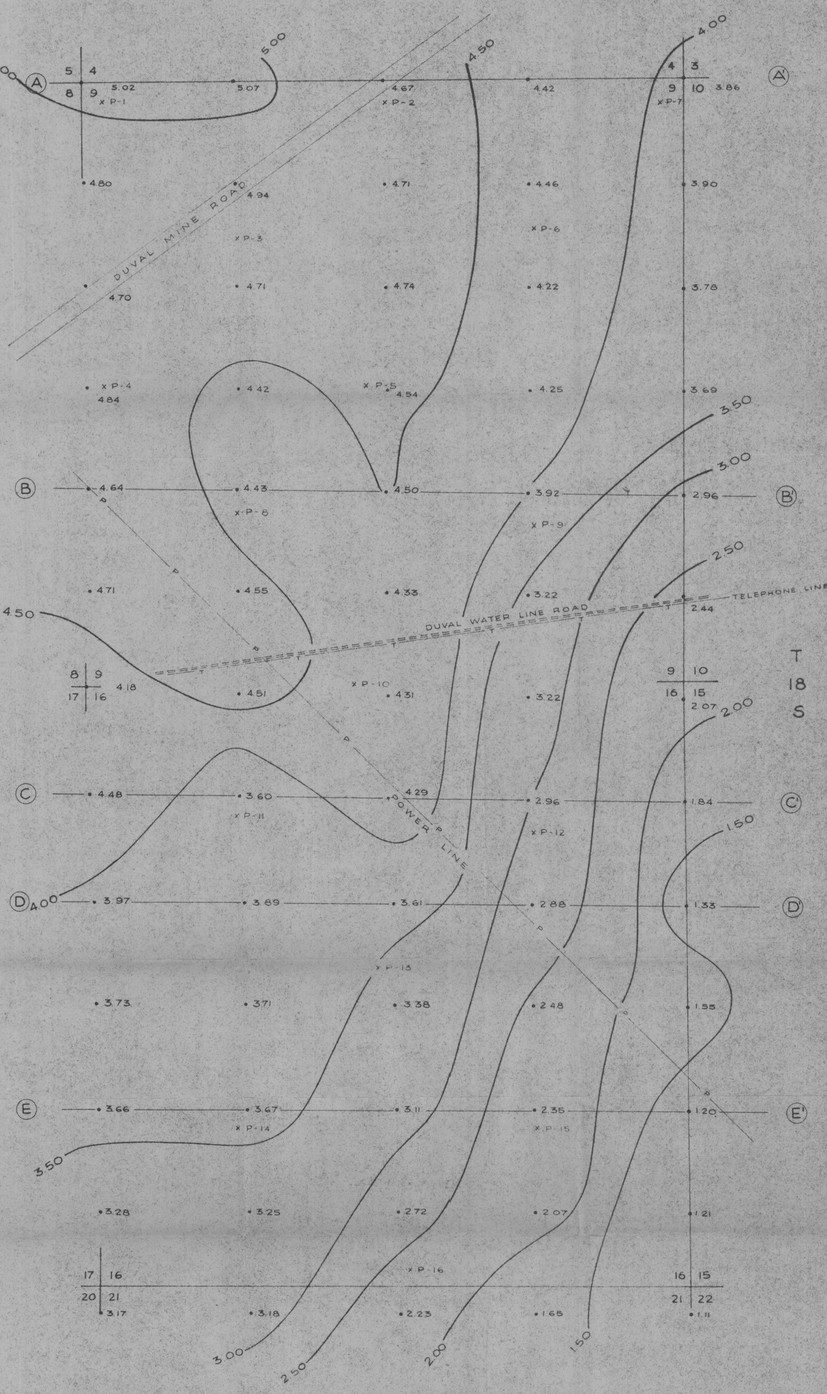
J. P. Matthews, Jr.
Geophysicist

John W. Langs
Geophysicist

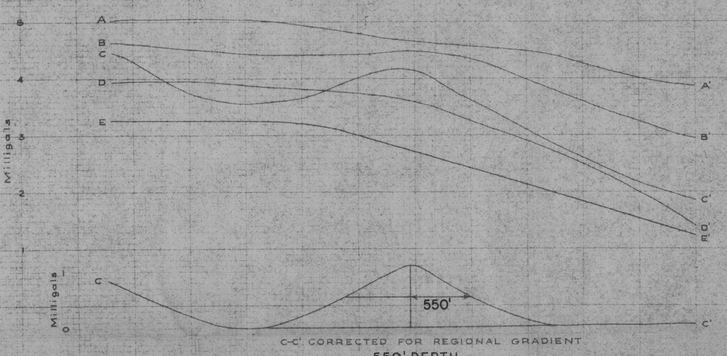
E. Grover Heinrichs
Vice President

October 20, 1964
P. O. Box 5671
Tucson, Arizona

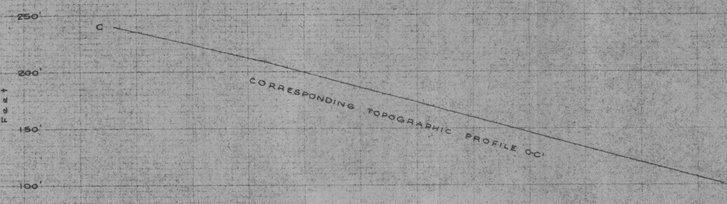
R 13 E



GRAVITY DEPTH ESTIMATION



C-C' CORRECTED FOR REGIONAL GRADIENT
= 550' DEPTH



DENSITY 2.65 gr./c.c.

N

HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson Arizona

GRAVITY SURVEY
FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE 1" = 500'	CONTOUR INTERVAL	REVISIONS
	DATA BY J.P.M. & J.W.L.	
DATE OCT 1964	SHEET 1 OF 4	
DRAWN BY: I.b.	DRAWING NO.	FILE:

R 13 E

T 18 S

DUVAL MINE ROAD

DUVAL WATER LINE ROAD

TELEPHONE LINE

POWER LINE

P

T

0 0

2 2SW

3 3SW

4 4SW

5 5SW

6 6SW

7 7SW

8 8SW

9 9SW

10 10SW

11SW

12SW

13SW

14SW

x P-1 x P-2 x P-3 x P-4 x P-5 x P-6 x P-7 x P-8 x P-9 x P-10 x P-11 x P-12 x P-13 x P-14 x P-15 x P-16

5 4 / 8 9

4 3 / 9 10

8 9 / 17 16

9 10 / 16 15

17 16 / 20 21

16 15 / 21 22

N

10 9 8 7 6 INDICATES INDUCED POLARIZATION
12SW 10SW 8SW 6SW SURVEY LOCATION, ELECTRODES & STATIONS

ANOMALY STRENGTH MODERATE

ANOMALY STRENGTH WEAK

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

INDUCED POLARIZATION SURVEY
LOCATION MAP
FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J. P. M.	
DATE: OCT. 1964	SHEET 2 OF 4	
DRAWN BY:	DRAWING NO.:	FILE:

R 13 E

T 18 S

DUVAL MINE ROAD

DUVAL WATER LINE ROAD

TELEPHONE LINE

POWER P LINE

800

850

750

700

X P-1 X P-2 X P-3 X P-4 X P-5 X P-6 X P-7 X P-8 X P-9 X P-10 X P-11 X P-12 X P-13 X P-14 X P-15 X P-16

5 4 / 8 9 — 4 3 / 9 10 — 8 9 / 17 16 — 9 10 / 16 15 — 17 16 / 20 21 — 16 15 / 21 22

N

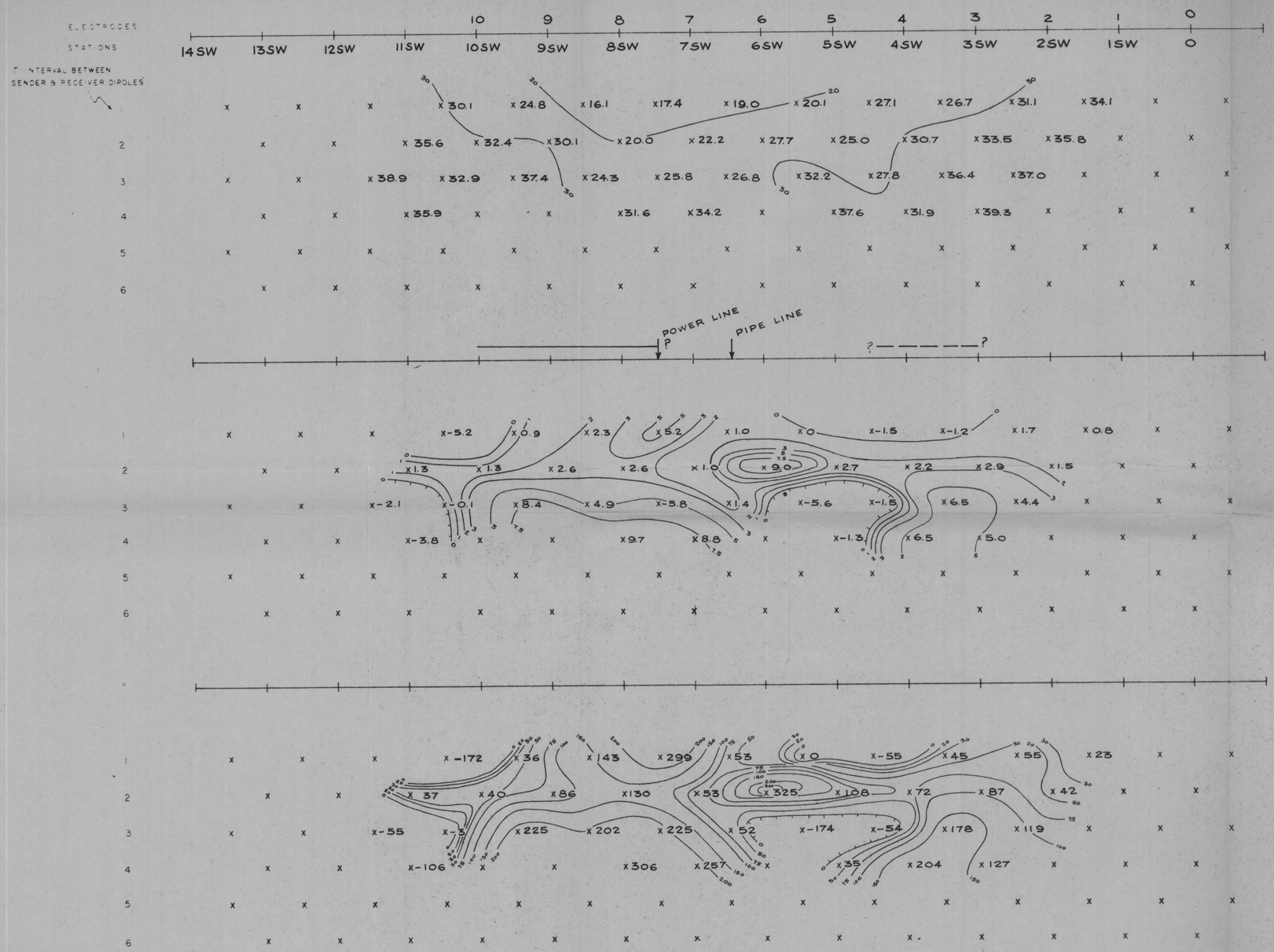
HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

MAGNETIC SURVEY
TOTAL INTENSITY

FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL: 50ϒ	REVISIONS
	DATA BY: J. P M J.W.L, E.G.H.	
DATE: OCT. 1964	SHEET 3 OF 4	
DRAWN BY:	DRAWING NO.:	FILE:



APPARENT RESISTIVITY (ρ_a) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 C.P.S.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 C.P.S.

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)

$$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$$

CONTOUR INTERVAL LOGARITHMIC

EXPLANATION

ELECTRODE ARRAY: 1000' — n x 1000' — 1000'
SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH

VERY WEAK — WEAK — MODERATE — STRONG

LOOKING NW

TWIN BUTTES AREA
PIMA COUNTY, ARIZ.

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 1000' DATE: OCT. 1964

FOR

THE HECLA MINING CO.

SHEET 4 OF 4

STITZER, PAFFORD & ASSOC. SURVEYORS ENGINEERS
TUCSON, ARIZONA

STADIA SURVEY &
DRILL HOLE LOCATION
SECTIONS 9 & 16, T18S, R13E.
FOR HECLA MINING CO.

DRAWN BY JHS	CKD. BY DWC	REVISED	
SCALE 1" = 500'		AUGUST 1964	#4875

STATION	FIELD READ	DRIFT DAY-DAY DAILY	CORRECTED READING	X CAL FACTOR .09780			Miles N of Base Line 0+00	X -1.174 LAT CORR		ELEVATION IN FEET	X .06025 Ft/Ft.	X	Density 2.65	
1 - 108 + 00	5077	0	5077	4965	4965		204	- 239		26159	1576		6302	502
2 - 108 + 00	5356	-.1	5355	5237	5239		209			21697	1307		6307	507
3 - 108 + 00	5488	-.2	5486	5365	5372		209			18819	1139		6267	467
4 - 108 + 00	5696	-.3	5693	5568	5567		209			15169	914		6242	442
5 - 108 + 00	5853	-.4	5849	5720	5720		209			11705	705		6186	386
4 - 108 + 00	5695	-.4	5691	5566										
3 - 108 + 00	5504	-.5	5499	5378										
2 - 108 + 00	5364	-.5	5359	5241										
1 - 108 + 00	5085	-.8	5077	4965										
3 - 108 + 00	6102	-.609 0	5493	5372	5372									
1 - 54 + 00	5623		5019	4909	4904		102	120		23800	1434		6218	418
2 - 54 + 00	5935		5326	5209	5212		102			19236	1159		6251	451
3 - 54 + 00	6053		5444	5324	5321		102			17092	1030		6231	431
4 - 54 + 00	6133		5529	5402	5408		102			13926	839		6122	322
5 - 54 + 00	6254		5615	5521	5521		102			10062	606		6007	207
4 - 54 + 00	6135		5526	5404										
3 - 54 + 00	6046		5937	5317										
2 - 54 + 00	5941		5332	5215										
1 - 54 + 00	5623		5019	4904										
3 - 108 + 00	6125	-2.3	5493	5372										
1 - 108 + 00 Base	5652	-575 0	5077	4965			204	239		26159	1576		6302	502
1 - 99 + 00	5598	-.9	5019	4909			187	220		24406	1471		6280	480
1 - 90 + 00	5598	-.8	5015	4905			170	200		22980	1385		6270	470
1 - 81 + 00	5609	-1.0	5029	4913			153	180		21736	1310		6284	484
1 - 72 + 00	5607	-1.5	5017	4907			136	160		21175	1277		6264	464
1 - 63 + 00	5671	-1.7	5079	4967			119	140		20970	1264		6271	471
1 - 54 + 00 Base	5608	-598 -1.9 0	5019	4904			102	120		20300	1434		6218	418
1 - 45 + 00	5858	-.3	5261	5145			85	100		19968	1203	1203	6251	448 Corrected
1 - 36 + 00	5645	-.6	5045	4934			68	80		22296	1343		6197	397
1 - 27 + 00	5596	-1.0	4992	4882			51	60		22926	1381		6173	373
1 - 18 + 00	5607	-1.3	5000	4890			34	40		21847	1316		6166	366
1 - 9 + 00	5112	-1.6	5002	4892			17	20		20895	1256		6128	328
1 - 0 + 00	5666	-1.8	5054	4943			0	00		19989	1174		6117	317
2 - 0 + 00	5815	-2.5	5196	5082			0	00		17202	1036		6118	318
2 - 9 + 00	5892	-2.8	5270	5154			17	20		16946	991		6125	325
2 - 18 + 00	5832	-3.1	5207	5092			34	40		18500	1115		6167	367
2 - 27 + 00	5856	-3.9	5228	5113			51	60		18553	1118		6171	371
2 - 36 + 00	6003	-3.8	5371	5253			68	80		16871	1016		6189	389
2 - 45 + 00	5836	-4.0	5202	5088			85	100		19945	1172		6160	360
2 - 54 + 00 Base	5967	638 -4.9 0	5329	5212			102	120		19236	1159		6251	451
2 - 63 + 00	5874	+1.2	5298	5183			119	140		20948	1262		6255	455
2 - 72 + 00	5816	+1.8	5196	5082			136	160		21923	1321		6243	443
2 - 81 + 00	5798	+3.0	5190	5076			153	180		22340	1346		6292	492
2 - 90 + 00	5848	+3.6	5246	5131			170	200		22242	1340		6271	471
2 - 99 + 00	5882	+4.2	5286	5170			187	220		22306	1344		6294	494
2 - 108 + 00 Base	5935	+6.0	5357	5239			204	239		21697	1307		6307	507

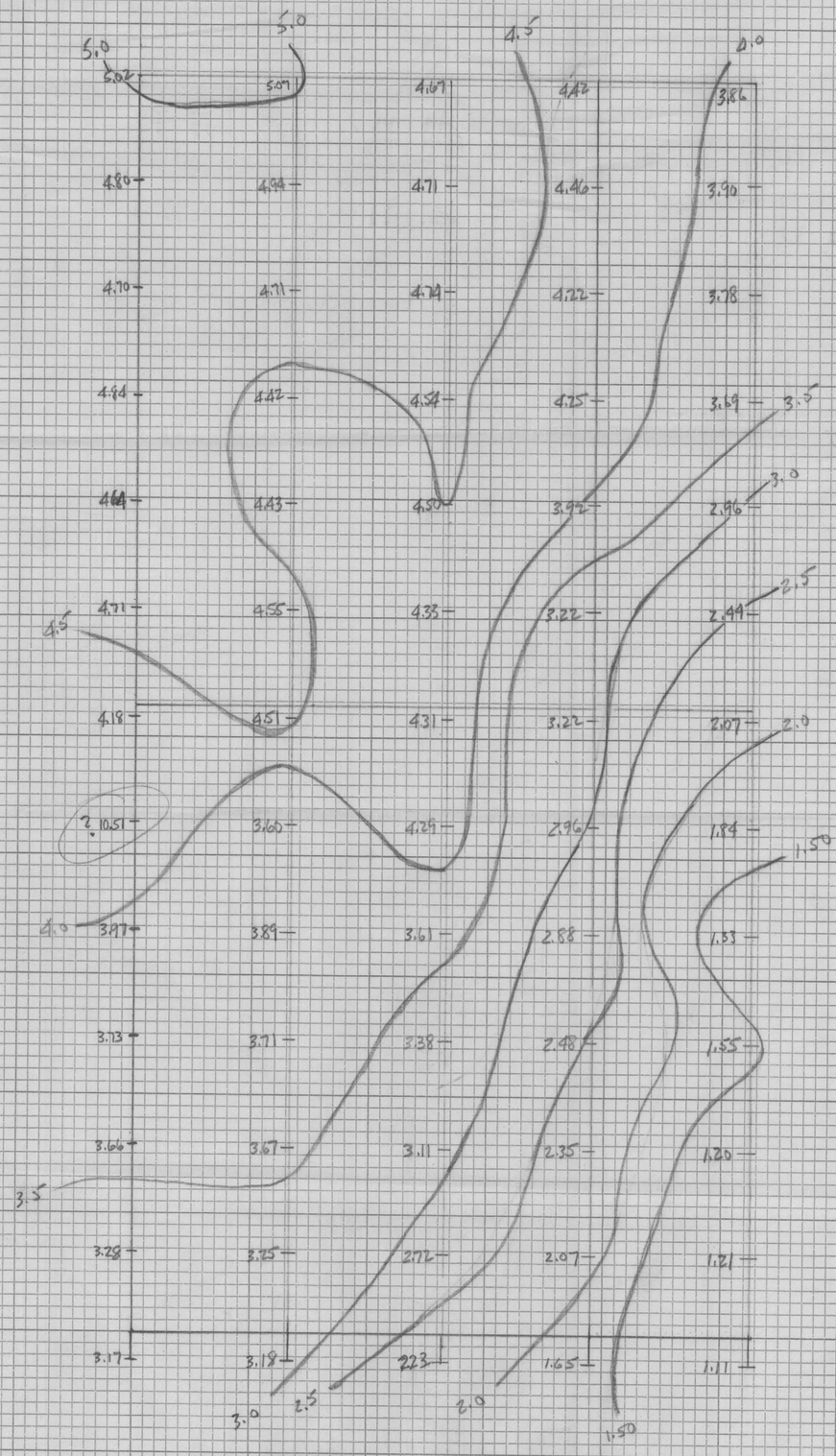
WH
Heda Report -
Twin Buttes
P+Mev

45-568 3118

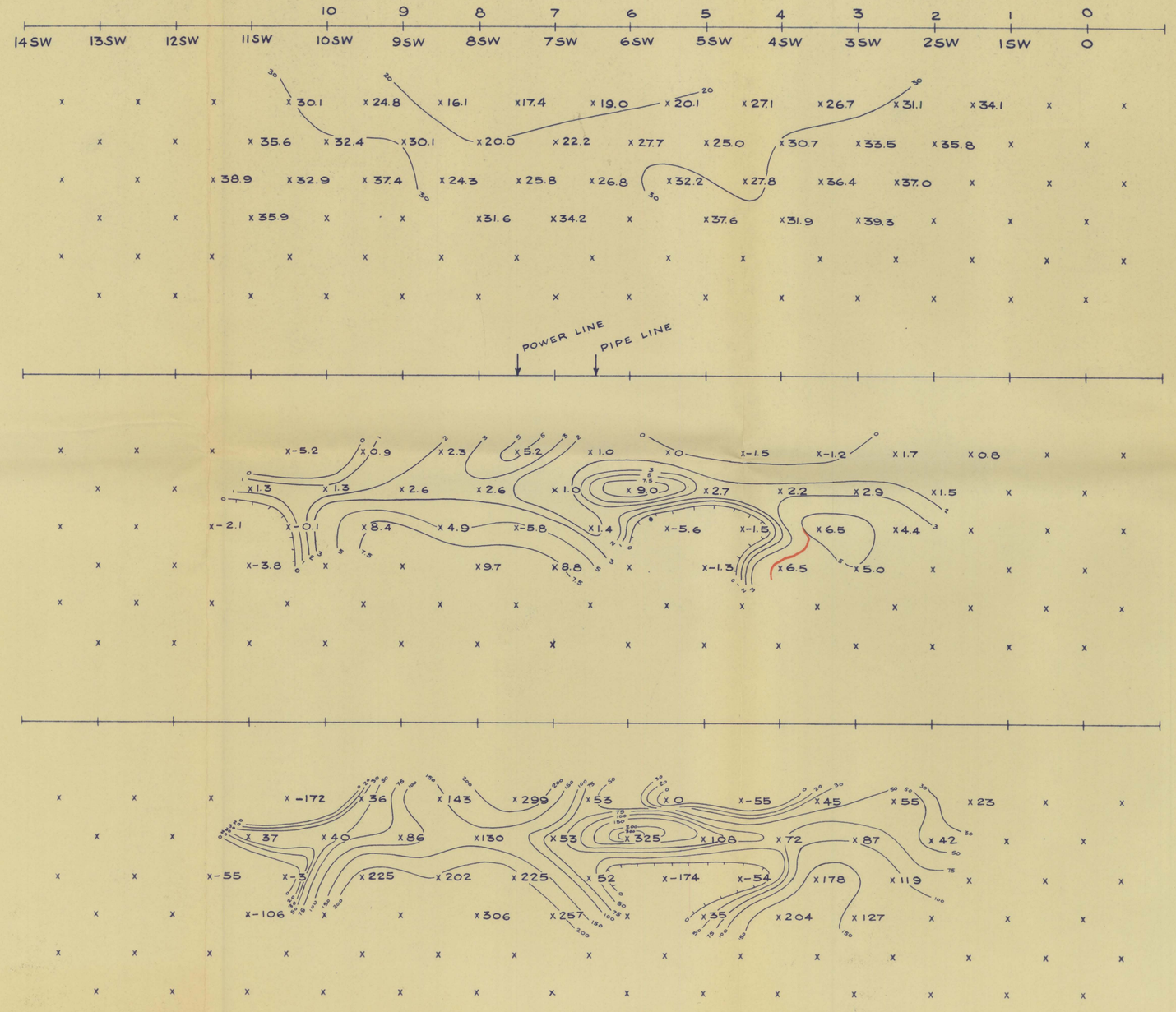
Neda - Twin Buttes Page 2

Station	Field Reading	Day-Day Daily		Corrected Reading	X Cal Factor .09780		Miles N of Base Line 0+00	X -1.174 Lat Corr	Elevation in Feet	X .06025 Mg/feet	X	Density 2.65	
5-108+00 Base	65567	-718	0	58499	57120	209		-239	11705	705	61186		386
5-99+00	66087		-1.4	58776	57397	187		220	11012	663	61190		390
5-90+00	55994		2.1	(58858) 48355	(57226) 47798	170		200	10817	658	(61728) 61200	2	378
5-81+00	66117		2.9	58710	57141	153		180	10088	608	61169		369
5-72+00	65115		5.0	57417	56021	136		160	10537	635	60996		296
5-63+00	64948		5.7	56673	55548	119		140	10554	636	60949		249
5-54+00 Base	69121	7716	6.8 0	56445	55321	102		120	10062	606	60007		207
5-45+00	64130		+.1	56455	55331	85		100	9175	553	59984		184
5+36+00	63946		.1	55711	54488	68		80	9374	565	59933		133
5-27+00	63666		.2	55972	54969	51		60	9068	546	59555		155
5-18+00	64003		.3	56230	55006	34		40	7538	454	59720		120
5-09+00	63329		.4	55562	54340	17		20	8316	501	59721		121
5-0+00	64907		.5	56836	55512	0		00	6629	399	59711		111
4-0+00	61187		.9	54210	53001	0		00	11025	664	59765		165
4-09+00	63212		1.0	54446	53226	17		20	11635	701	60007		207
4-18+00	63278		1.0	55512	53391	34		40	11396	686	60035		235
4-27+00	62588		1.1	54913	53372	51		60	12211	736	60098		298
4-36+00	63352		1.3	55589	54366	68		80	11647	702	60088		288
4-45+00	63011		1.3	55337	54115	85		100	12960	781	60096		296
4-54+00 Base	62888	-723	1.3 .0	55525	54403	102		120	13926	839	61322		322
4-63+00	62883		-.2	55518	53397	119		140	14363	865	61220		320
4-72+00	63379		.4	56112	54889	136		160	14323	863	61912		392
4-81+00	64433		.5	56665	55440	153		180	14351	865	62025		425
4-90+00	64926		.6	56957	55533	170		200	14763	889	62222		422
4-99+00	64987		.8	57116	55690	187		220	14547	876	62296		496
4-108+00 Base	64965		1.0	56972	55567	209		239	15164	914	62393		493
3-108+00 Base	62665	-772	0	54993	53372	209		239	18814	11334	62367		467
3-99+00	62665		.2	54995	53374	187		220	18533	11117	62271		471
3-90+00	62339		.4	54711	53351	170		200	18639	11123	62279		479
3-81+00	62209		.9	54941	53321	153		180	18472	11113	62259		459
3-72+00	61991		1.1	54730	53311	136		160	18249	11099	62250		450
3-63+00	61163		1.3	54094	52285	119		140	18054	11088	62233		433
3-54+00 Base	61197	-796	1.6 0	54941	53321	102		120	17092	11030	62351		431
3-45+00	63319		0	55558	54436	85		100	14816	893	62329		429
3-36+00	62777		+.1	55222	54101	68		80	13950	890	61161		361
3-27+00	61131		.1	53776	52558	51		60	15605	940	61138		338
3-18+00	62443		.2	54889	53668	34		40	13002	783	61111		311
3-09+00	60887		.2	53333	52116	17		20	14546	876	60723		278
3-0+00	60556		.3	52996	51779	0		00	14004	844	60623		223
3-108+00 Base	62946		.3	54993	53372	209		239	18814	11334	62367		467

Hecla Co.
Mining Co.
Demetrie Wash Area



K&E STANDARD ®
10 X 10 TO THE INCH



APPARENT RESISTIVITY (ρ_a) IN UNITS OF OHM FEET

CONTOUR INTERVAL LOGARITHMIC

SENDER FREQUENCY: 0.05 C.P.S.

PERCENT FREQUENCY EFFECT (PFE)

CONTOUR INTERVAL CONSTANT

SENDER FREQUENCIES: 0.05 & 3.0 C.P.S

APPARENT "METALLIC CONDUCTION" FACTOR (MCF)

$(MCF = \frac{PFE \times 1000}{\rho_{DC}})$

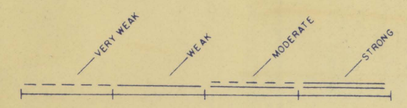
CONTOUR INTERVAL LOGARITHMIC

EXPLANATION

ELECTRODE ARRAY: 1000' — n x 1000' — 1000'

SENDER DIPOLE — RECEIVER DIPOLE

RELATIVE ANOMALY STRENGTH



LOOKING NW

TWIN BUTTES AREA
PIMA COUNTY, ARIZ.

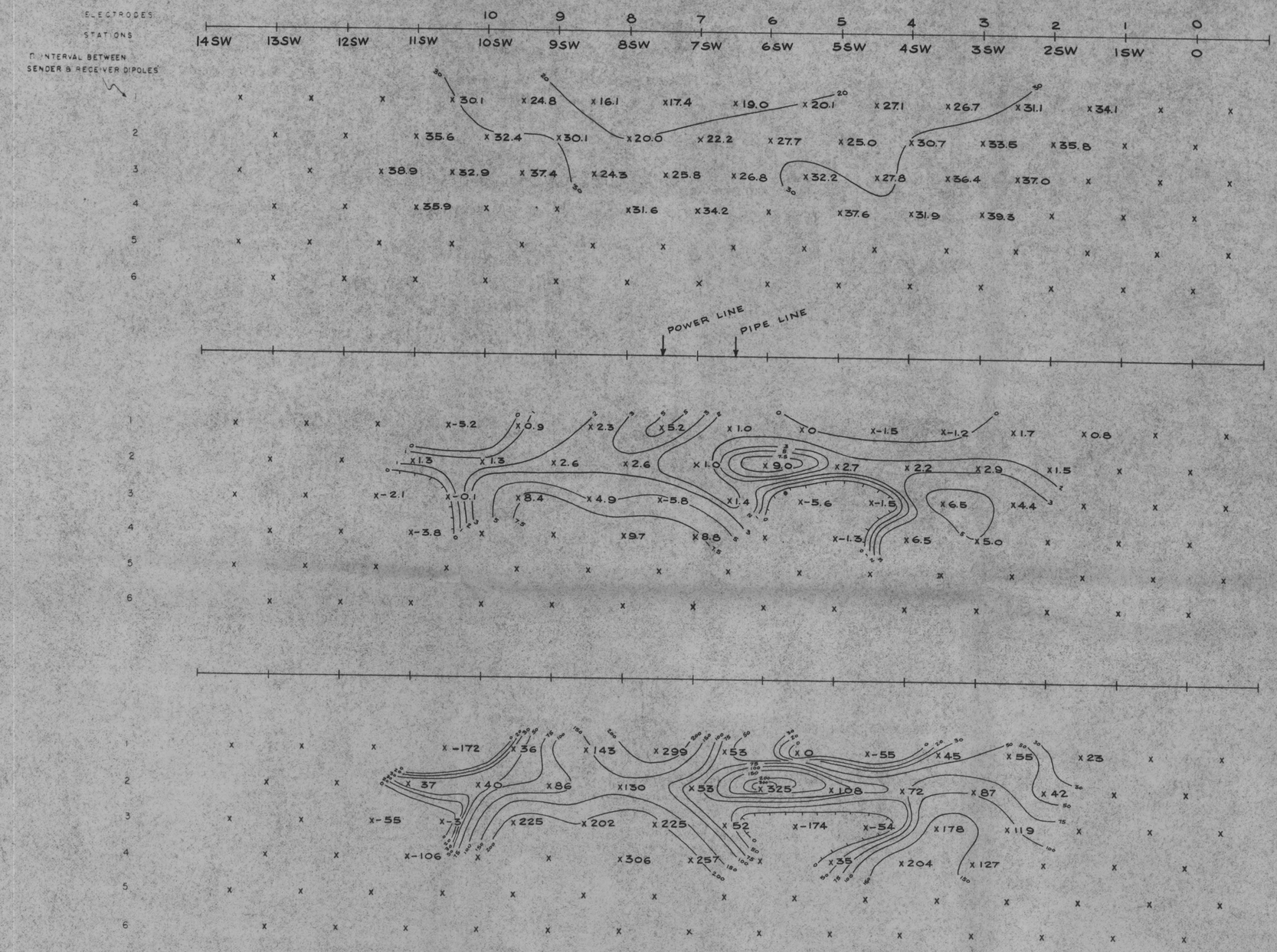
SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY

SCALE: 1" = 1000' DATE: OCT. 1964

FOR

THE HECLA MINING CO.



APPARENT RESISTIVITY (ρ_{DC}) IN UNITS OF OHM-FEET

CONTOUR INTERVAL LOGARITHMIC
SENDER FREQUENCY: 0.05 C.P.S.

PERCENT FREQUENCY EFFECT (PFE)
CONTOUR INTERVAL CONSTANT
SENDER FREQUENCIES: 0.05 & 3.0 C.P.S.

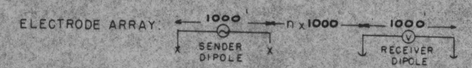
APPARENT "METALLIC CONDUCTION" FACTOR (MCF)

$$\left(MCF = \frac{PFE \times 1000}{\rho_{DC}}\right)$$

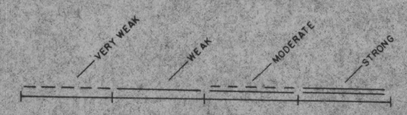
CONTOUR INTERVAL LOGARITHMIC

EXPLANATION

ELECTRODE ARRAY:



RELATIVE ANOMALY STRENGTH



LOOKING NW

TWIN BUTTES AREA
PIMA COUNTY, ARIZ.

SECTIONAL DATA SHEET
LINE NO. 1
INDUCED POLARIZATION TRAVERSE

HEINRICHS GEOEXPLORATION COMPANY
SCALE: 1" = 1000' DATE: OCT. 1964

FOR

THE HECLA MINING CO.

R 13 E

T 18 S

Fd B.C. pin (not G.L.O.)

SE WG 35
SW WG 36

SW JAN 53
SE JAN 52

SE JAN 53

Fd. MKd St.

P-1 P-2 P-3 P-4 P-5 P-6 P-7 P-8 P-9 P-10 P-11 P12 P-13 P-14 P-15 P-16

5 | 4 — 8 | 9 — 4 | 3 — 9 | 10

16 | 15 — Fd MKd Stone

17 | 16 — 20 | 21 Fd MKd St. — 21 | 22 Fd MKd St.

Fd St. MKd Sec Cor

Fd St. MKd Sec Cor

-2+05 — 0+00 — -2+05 — 0+00

1320' — 2640' — 1374

S 53° 03' E Rec.

54°26'

200'

45°

290'

℄ 7+73

12+00 — 11+00 — 24+82 — 11+10 — 12+00 — 36+00 — 37+00 — 51+00 — 62+50 — 54+00 — 76+00 — 90+00 — 90+52

0+50

Duval Mine Road

Road Maps BB. P16

150'

P Power Line P

Duval Water Line Road

T Telephone Line T

℄ 45+80 — ℄ 49+04 — ℄ 49+44 — ℄ 45+46 — ℄ 45+86

82°20'

46°01'

℄ 71+56

36+00

22146

To Twin Buttes Rd
Intersects TB Rd
.15 Mi. S. of Duval Rd

42°24' — 47°54' — 40°45' — 45°14'

1750' — 1945' — 1640' — 1985'

178'

Staked complete
Orange & yellow flag

Ron Palmer
402 W.
Franklin St.
Hagerstown Maryland
return 7/14/64

REGISTERED LAND SURVEYOR
CERTIFICATE EXPIRES
JOHN H. STITZER
DEC. 31, 19
ARIZONA U.S.A.

STITZER, PAFFORD & ASSOC. SURVEYORS ENGINEERS
TUCSON, ARIZONA

STADIA SURVEY & DRILL HOLE LOCATION

SECTIONS 9 & 16, T18S, R13E.
FOR HECLA MINING CO.

DRAWN BY JHS	CKD. BY DWC	REVISED	
SCALE 1" = 500'		AUGUST 1964	#4875

R 13 E

T 18 S

5 | 4
8 | 9

Fd B.C. pin (not G.L.O.)

253.0

45°

P-1

SW JAN 53
SE JAN 52

0+00

555 B.R.

1320'

-2+05

SE WG 35
SW WG 36

SE JAN 53

S 53°03' 42" W Rec.

200'

P-2

0+00

2640'

-2+05

4 | 3
9 | 10

45°

290'

P-7

Fd. MKd ST.

1374

54°26'

℄ 7+73

DUVAL MINE ROAD

ROAD MAPS BB. P16

150'

12+00 P-3

0+50

11+00 P-6

0+50

P-4 — 24+82 — P-5

11+10

0+00

12+00

0+50

N 30° E

36+00 P-8

0+50

37+00 P-9

0+50

℄ 45+80

℄ 49+04

℄ 49+44

℄ 45+46

℄ 45+86

Duval Water Line Road

Telephone Line

82°20'

51+00 P-10

370 B.R.

11+00

9 | 10
16 | 15

Fd MKd Stone

62+50 P-11

0+50

64+00 P12 900 B.R.

0+50

46°01'

℄ 71+56

76+00 P-13

13+00

90+00
90+52 P-14

42°24'

47°54'

1750'

1945'

1640'

178'

P-16

90+00 P-15

40°45'

45°14'

1285'

0+50

17 | 16
20 | 21 Fd MKd St.

Fd MKd St.
1/4 corn.

16 | 15
21 | 22 Fd MKd St.

REGISTERED LAND SURVEYOR
CERTIFICATE EXPIRES
JOHN H. STITZER
DEC. 31, 19
ARIZONA U.S.A.

STITZER, PAFFORD & ASSOC. SURVEYORS ENGINEERS
TUCSON, ARIZONA

STADIA SURVEY & DRILL HOLE LOCATION

SECTIONS 9 & 16, T18S, R13E.
FOR HECLA MINING CO.

DRAWN BY JHS	CKD. BY DWC	REVISED	
SCALE 1" = 500'		AUGUST 1964	#4875

R 13 E

DUVAL MINE ROAD

DUVAL WATER LINE ROAD

TELEPHONE LINE

POWER P LINE

T 18 S

N

Ready for Drafting

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

Magnetic Survey
(Total Intensity)

FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL: 50'	REVISIONS
	DATA BY: R.P.M. J.W.L. EGH	
DATE: ~~SEPT.~~ Oct. 1964	SHEET 3 OF 4	
DRAWN BY: I.B.	DRAWING NO.:	FILE:

R 13 E

DUVAL MINE ROAD

DUVAL WATER LINE ROAD

TELEPHONE LINE

POWER LINE

T 18 S

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

FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J. P. M.	
DATE: SEPT. 1964	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

R 13 E

T 18 S

DUVAL MINE ROAD

DUVAL WATER LINE ROAD

TELEPHONE LINE

POWER LINE

X P-1 X P-2 X P-3 X P-4 X P-5 X P-6 X P-7 X P-8 X P-9 X P-10 X P-11 X P-12 X P-13 X P-14 X P-15 X P-16

N

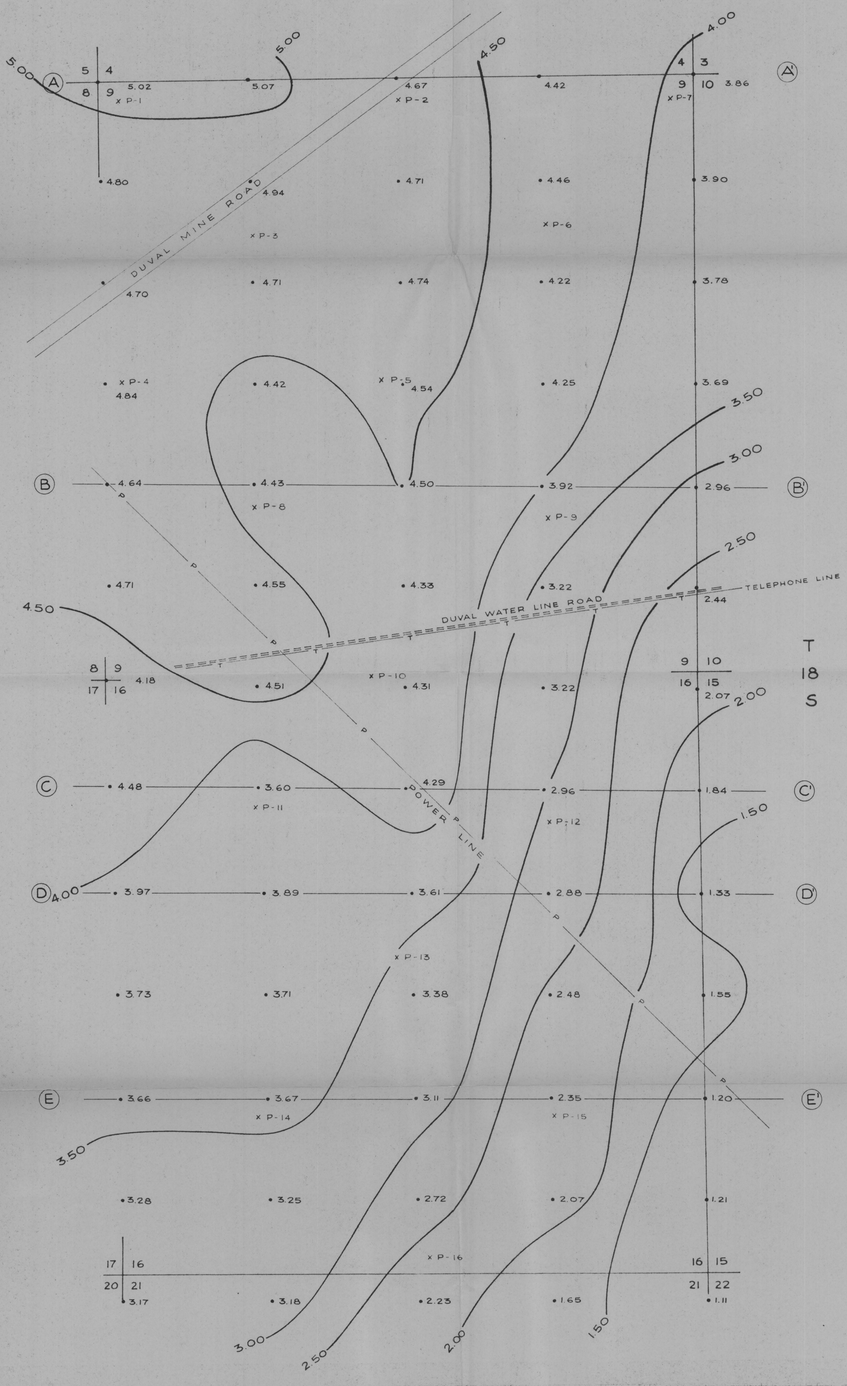
HEINRICHS GEOEXPLORATION COMPANY
P.O. Box 5671 Tucson, Arizona

FOR
HECLA MINING COMPANY

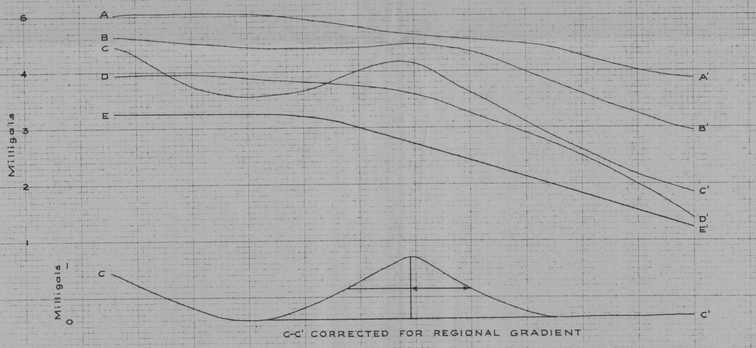
TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J. P M.	
DATE: SEPT. 1964	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:

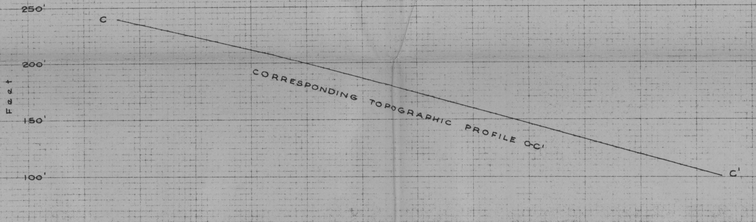
R 13 E



GRAVITY DEPTH ESTIMATION



C-C' CORRECTED FOR REGIONAL GRADIENT



N

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

GRAVITY SURVEY
FOR
HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J.P.M. & J.W.L.	
DATE: OCT. 1964	SHEET OF	
DRAWN BY: I. b.	DRAWING NO.	FILE:

R 13 E

T 18 S

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

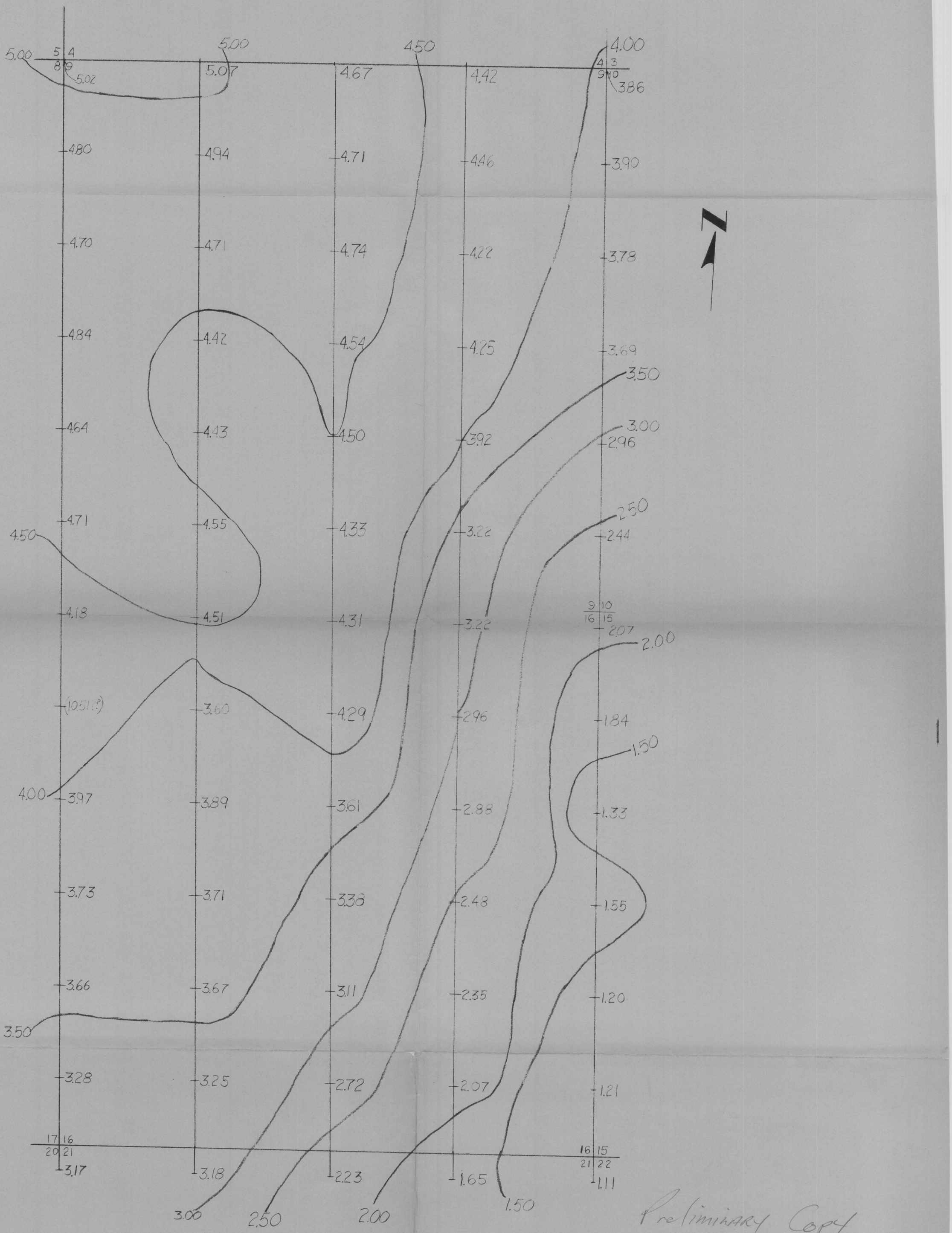
GRAVITY SURVEY

FOR

HECLA MINING COMPANY

TWIN BUTTES AREA
PIMA COUNTY, ARIZONA

SCALE: 1" = 500'	CONTOUR INTERVAL:	REVISIONS
	DATA BY: J. P. M.	
DATE: SEPT. 1964	SHEET OF	
DRAWN BY:	DRAWING NO.:	FILE:



Preliminary Copy

GRAVITY SURVEY DATA FOR
The Hecla Mining Company

Scale 1" = 500' CONTOUR INTERVAL 0.5 Milligals

9/23/64