AREA
BEAVER
CACTUS
CORE

October 8, 1985

Mr. Phillip M. Wright
University of Utah Research Institute
Earth Science Laboratory
391 Chipeta Way, Suite C
Salt Lake City, Utah 84108

Re: Cactus Data
Beaver County, Utah

Dear Mike:

Sorry about the delay in getting this drill data from the Cactus Mine area for the core that I gave you last June.

As I mentioned, the Cactus files were never completed and as a project discontinued in 1973 and were dumped in dead storage.

I managed to find a map giving the locations of each of the four holes drilled. Holes DDH 520-1,2, and 3 were spudded in with a diamond drill. Hole DDH 520-4 was spudded in with a rotary rig using a 5 inch hammer to a depth of 355 feet. From that depth of the total depth the hole was drilled with a diamond core rig. DDH 520-3 is an angle hole drilled with a bearing of S78°W and a dip of -58° from the horizontal. All the other holes are vertical. Total drilled depth of the holes are as follows:

Hole	Total Depth in Feet
520-1	2975
520-2	2454
520-3	2777 (angle depth)
520-4	875

I couldn't find the lith logs for the holes but did find 100 foot assay composits for all four wells and 100 foot alteration composit diagrams for holes 520-1,2, and 3. As I remember, all four holes were drilled in the Cactus stock which is a Tertiary 39± mybp quartz monzonite (?).

Again I am sorry that I couldn't find more of the data, but I hope this will be of some use.

Hope to see you at one of the geothermal functions shortly.

Best regards.

Sincerely,

STEAM RESERVE CORPORATION

Harry

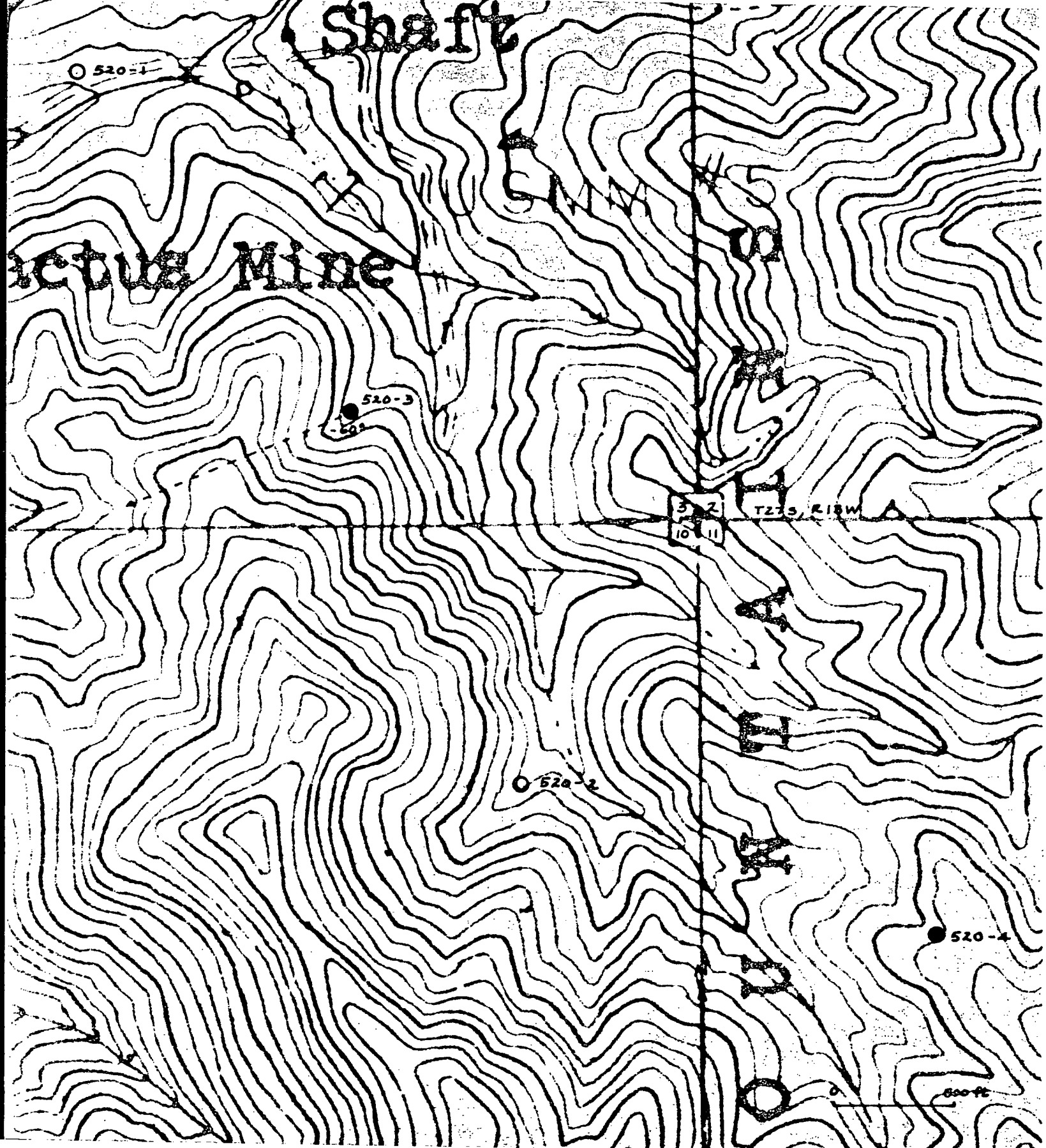
H. J. Olson
Vice President and Operations Manager

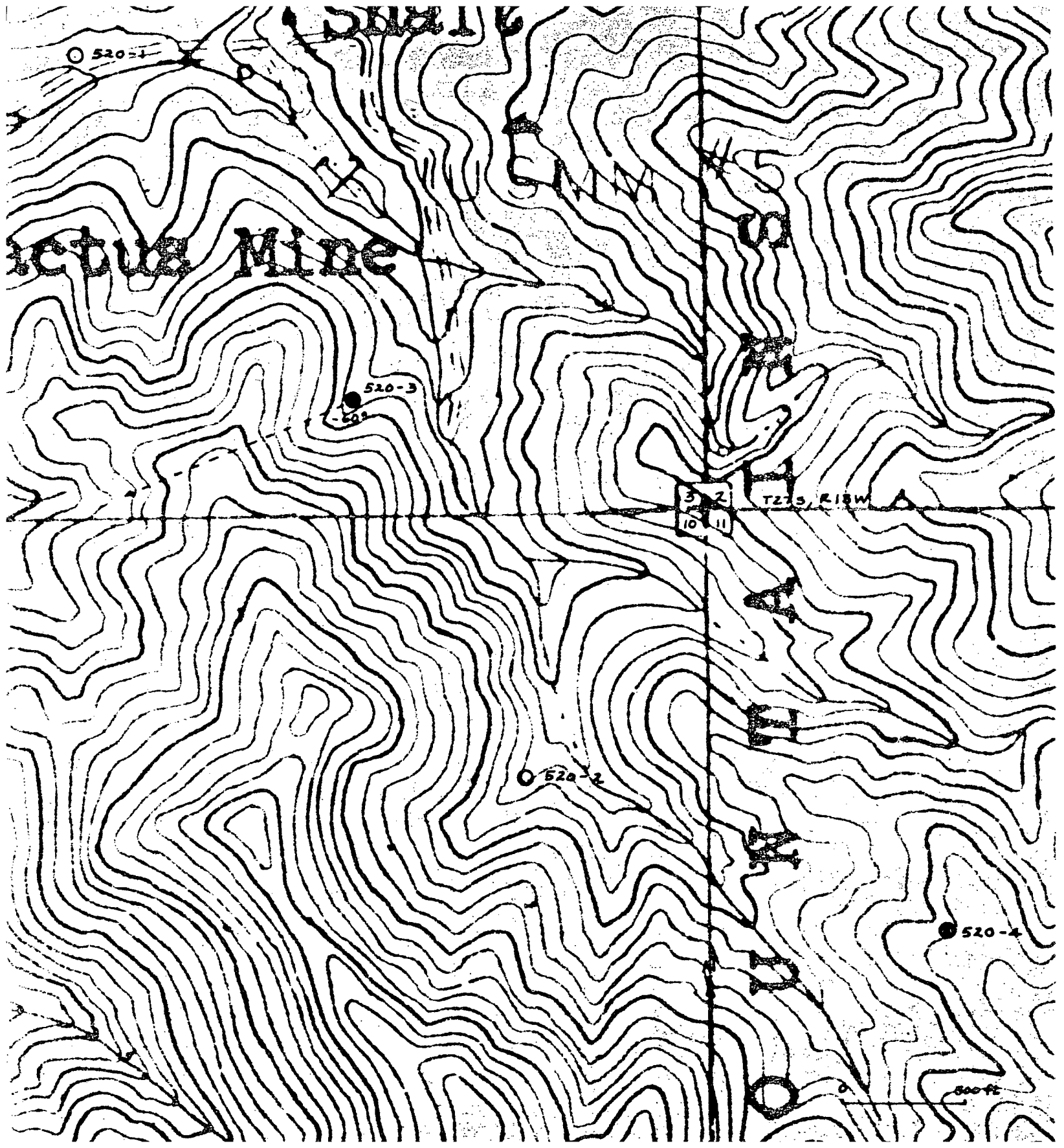
HJO/c

attachment

P.S. Mike I did find a bit log of DDH 520-4 which I am enclosing.

HJ


Shaft
ictus Mine
520-1
520-3
520-2
520-4
T27S, R18W
3
2
10
11
600 ft


520-1
Mine
520-3
3
2
T27S, R18W
10
11
520-2
520-4
0
800 ft

Beaver Co.

Utah

SAMPLE NO.	INTERVAL		CORE REC.	% CORE	PPM			%				
					Mo	Cu	Zn	K_2O	CaO	Na_2O	S	
B7860-64	9.5	100			6	30	15	4.1	3.5	3.6	.26	
B7865-69	100	200			2	60	30	4.1	3.5	3.6	.18	
B7870-74	200	300			<1	65	35	4.2	3.5	3.5	.23	
B7875-79	300	400			<1	75	40	4.2	3.2	3.5	.18	
B7880-84	400	500			6	55	35	4.0	3.1	3.5	.27	
B7885-89	500	600			6	80	35	4.0	3.1	3.8	.05	
B7890-94	600	700			1	40	40	4.0	2.9	3.8	.13	
B7895-99	700	800			5	30	40	4.0	2.9	3.9	.07	
B7900-04	800	900			1	130	30	4.0	3.3	3.9	.04	
B7905-09	900	1000			<1	90	30	3.7	3.5	3.8	.17	
B7910-14	1000	1100			<1	80	35	3.6	3.1	3.8	.22	
B7915-19	1100	1200			<1	90	30	3.8	3.3	3.8	.22	
B7920-24	1200	1300			3	145	35	4.0	3.2	3.6	.33	
B7925-29	1300	1400			10	295	35	3.7	3.2	3.6	.42	
B7930-34	1400	1500			105	.22%	40	4.1	2.9	5.5	.37	
B7935-39	1500	1600			10	250	35	4.0	2.8	3.6	.12	
B7940-42, 44 46-48	1600	1700			23	510	35	4.0	2.9	3.6	.23	
B7949-53 55	1700	1800			32	325	35	3.8	2.8	3.8	.13	
B7957, 59, 61 63-67	1800	1900			42	1035	45	3.7	2.8	3.8	.23	
B7968-72	1900	2000			8	155	40	3.8	3.2	3.9	.17	
B-7973-77	2000	2095			9	225	50	3.6	3.2	3.8	.14	
B-8371-75	2100	2200			17	395	65	3.4	2.7	3.6	.10	
B-8376-80	2200	2300			10	175	35	3.6	2.8	3.8	.10	
B-8381-85	2300	2400			10	300	35	3.6	2.8	3.6	.11	
B-8386-90	2400	2500			20	60	35	3.7	2.8	3.6	.25	
B-8391-95	2500	2600			16	340	30	3.7	2.8	3.8	.21	
B 8396-98 8500	2600	2700			14	140	30	3.6	2.7	3.6	.34	
B 8501-05	2700	2800			9	55	30	3.6	2.6	3.8	.05	
B 8506-10	2800	2900			1	25	30	3.6	2.6	3.8	.03	
B8611-14	2900	2975			2	25	25	3.6	2.6	3.6	.07	
B8370	2095	2100										
B7943, 45	In the 1600-1700 Interval				bx with ign matrix		59	720	30	4.0	2.4	4.0	.35
B7954, 56, 58 60, 62	In the 1700-1800 Interval				aphanitic	dike	185	900	45	5.4	1.4	3.5	.19
B-7954	1785.3	1790.7		"		150	1300					
56	1791.5	1802		"		240	1300					
58	1805	1808.5		"		700	800					
60	1809	1814		"		100	700					
62	1817.2	1817.9		"		30	425					

Beaver Co. 1 OF

Utah

SAMPLE NO.	INTERVAL		CORE REC.	% CORE	PPM Mo	PPM Cu	PPM Zn	% K_2O	% Na_2O	% CaO	% S	
B7998-82	10	100			<1	440	75	3.8	3.4	2.4	.20	.14
B7983-87	100	200			2	450	45	3.7	2.3	2.9	.54	
B7988-92	200	300			2	240	35	3.7	3.5	2.7	.45	
B7993-97	300	400			2	130	35	4.0	3.6	2.5	.35	
B7998-8002	400	500			2	155	35	3.9	3.2	2.4	.49	
B8003-07	500	600			2	100	40	4.1	3.6	2.7	.38	
B8008 B8010-13	600	700			<1	90	30	4.2	3.2	2.4	.46	
B8014-18	700	800			<1	170	25	4.0	3.1	2.2	.66	
B8019-23	800	900			<1	125	25	4.0	3.4	2.2	.39	.43
B8024-28	900	1000			5	80	30	3.9	3.2	2.4	.16	
B8029-33	1000	1100			1	90	30	3.9	3.4	2.4	1.46	
B8034-38	1100	1200			2	60	40	3.9	3.8	2.4	.71	
B8039-43	1200	1300			<1	205	35	3.5	3.5	2.2	.14	
B8044-48	1300	1400			12	40	40	3.5	3.6	2.5	.14	
B8049-53	1400	1500			1	90	35	3.2	3.9	2.7	.13	
B8054-58	1500	1600			5	290	30	3.4	3.5	2.2	.10	.12
B8059-63	1600	1700			3	480	30	3.6	3.5	2.0	.05	
B8064-68	1700	1800			6	855	30	3.7	3.5	2.2	.24	
B8069-73	1800	1900			9	500	30	3.8	3.6	2.2	.11	.12
B8074.75 77-80	1900	2000			22	925	30	4.3	3.5	1.9	.25	
B8081-85	2000	2100			9	375	35	3.6	3.2	2.0	.07	
B8086-90	2100	2200			17	.20%	30	3.6	2.2	1.7	.26	.25
B8091-95	2200	2300			17	565	30	3.7	3.4	1.9	.10	
B8096-99 8200	2300	2400			25	330	30	3.6	3.5	2.0	.05	
B8201-03	2400	2454			22	500	25	3.6	3.5	2.1	.13	
B8039	1200	1220			5	385	35					
B8040	1220	1240			3	120	55					
B8041	1240	1260			9	65	15					
B8009	620.5	622.2	Aplite	like	3	15	15	5.9	2.6	.66	.40	
B8076	1928	1930	"	"	12	650	30	4.0	3.6	1.9	.11	

#520
Beaver Co.
Utah

1 OF

VERTICAL

SAMPLE NO.	INTERVAL		CORE REC.	% CORE	PPM			%			
					Mo	Cu	Zn	K_2O	CaO	Na_2O	S
B8204-08	10	100			5	55	30	3.6	2.2	3.1	.23
B8209-13	100	200			6	110	40	4.0	3.0	3.5	.10
B8214-18	200	300			5	170	40	4.0	2.5	3.2	.41
B8219-23	300	400			5	80	25	3.7	2.9	3.4	.15
B8224-28	400	500			3	95	25	4.0	2.5	3.5	.42
B8229-33	500	600			5	80	25	3.8	2.5	3.4	.24
B8234-38	600	700			3	75	20	3.8	2.2	3.2	.20
B8239-43	700	800			20	50	40	3.6	2.6	3.2	.19
B8244-48	800	900			4	345	35	3.8	2.6	3.4	.18
B8249,50 B8120-22	900	1000			1	540	30	3.7	2.9	3.5	.29
B8123-27	1000	1100			1	355	35	3.7	2.8	3.6	.12
B8128-32	1100	1200			3	390	30	3.5	2.7	3.4	.14
B8133-37	1200	1300			14	530	25	4.1	2.5	3.6	.11
B8251-55	1300	1400			2	485	30	3.8	2.5	3.9	.09
B8256-60	1400	1500			26	480	25	3.7	2.6	3.7	.09
B8261-65	1500	1600			3	275	25	3.6	2.3	3.6	.10
B8266-70	1600	1700			5	215	25	3.7	2.4	3.5	.13
B8271-75	1700	1800			10	420	25	3.6	2.4	3.5	.24
B8276-80	1800	1900			17	.11	25	3.5	2.1	3.5	.19
B8281-85	1900	2000			9	950	25	3.7	2.1	3.8	.21
B8287-91	2000	2100			31	320	30				.09
B8292-96	2100	2200			36	425	30				
B8297-8301	2200	2300			142	325	30	5.0	2.2	3.9	.05
B8302-06	2300	2400			154	310	35	5.0	2.2	3.8	.03
B8307-11	2400	2500			34	90	30	4.8	2.4	3.9	.01
B-8312-16	2500	2600			29	145	40	4.1	2.1	3.5	.03
B8317-21	2600	2700			115	320	40	4.0	2.1	3.6	.04
B8322-25	2700	2777			70	560	40	4.1	1.9	3.4	.05
B8201	1988	1094			34	645	40	2.9	2.9	3.4	.10

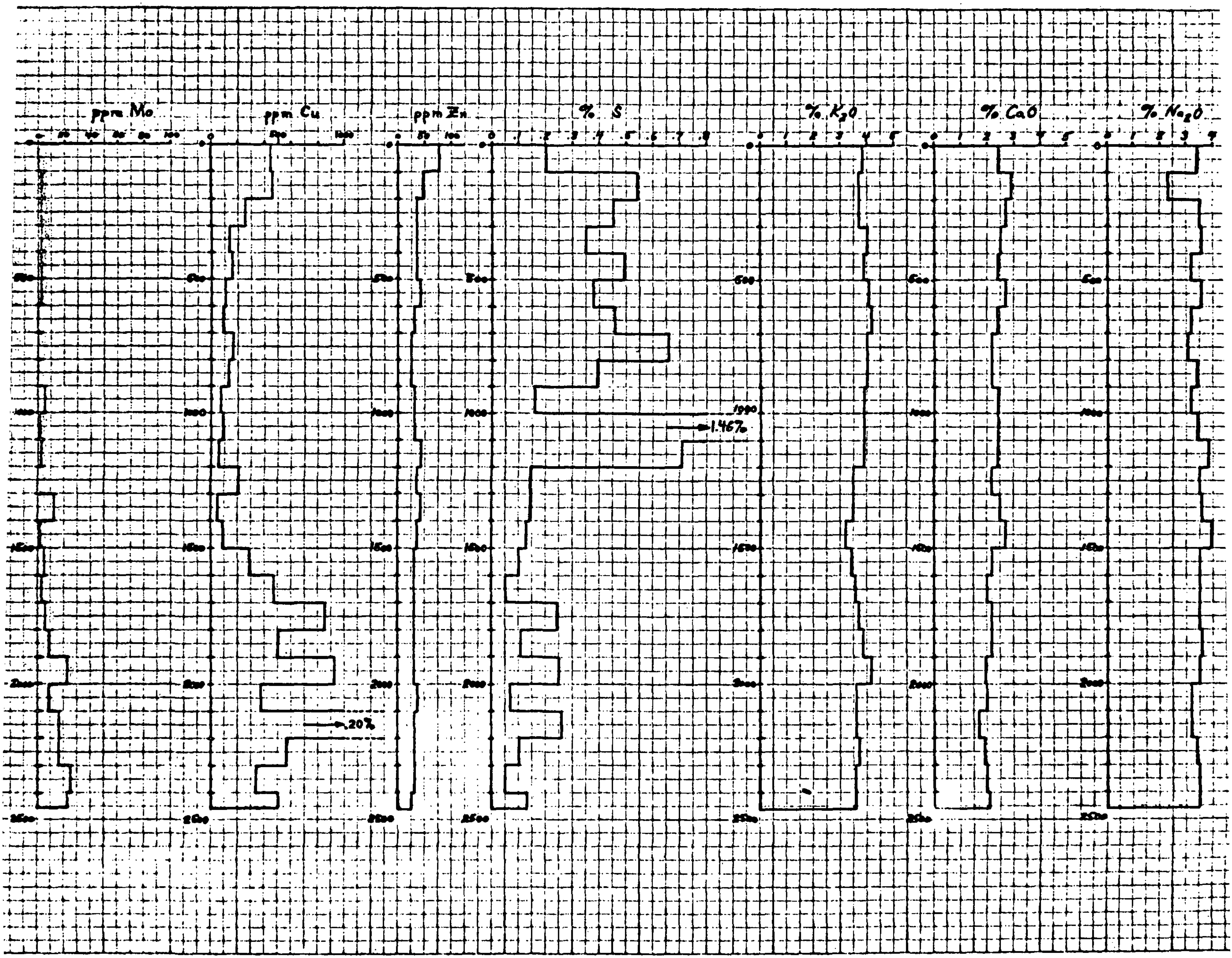
CACTUS
#520
Beaver Co.
Utah

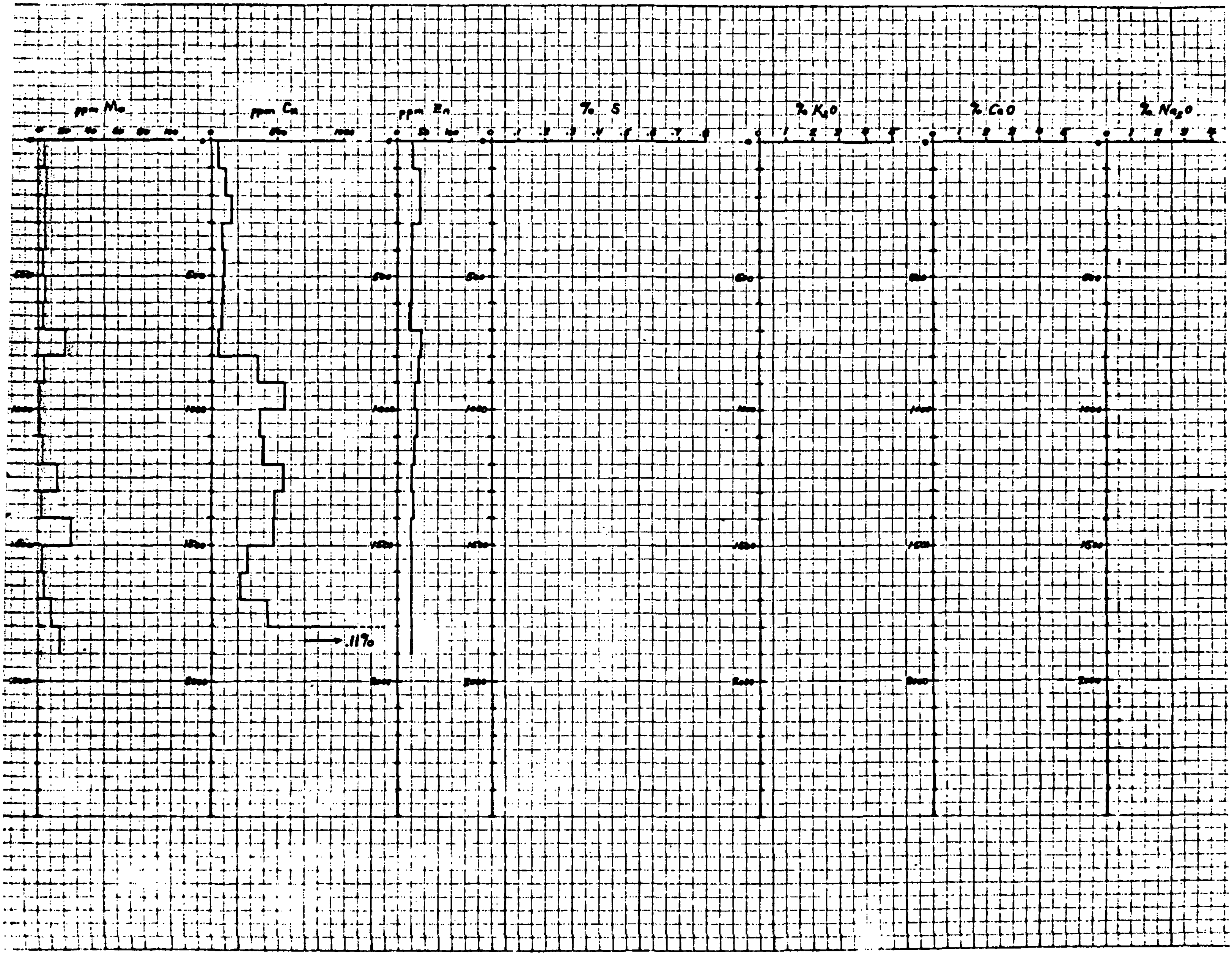
1 OF

LAB _____ METHOD Vertical

SAMPLE NO.	INTERVAL		CORE REC.	% CORE	PPM			%			
					Mo	Cu	Zn	K_2O	CaO	Na_2O	S
B8400-18	0	105			1	80	120	4.8	2.0	3.3	.04
B8419-28	105	200			1	75	90	4.8	2.4	3.7	.08
B8429-38	200	300			17	235	175	4.4	2.6	3.8	1.68
B8439-44	300	354 Td Rotary			23	250	230	4.4	2.5	3.3	1.53
B8445-47	355	400			4	85	75				
B8448-52	400	500			4	80	120				
B8453-57	500	600			<1	75	95				
B8458-62	600	700			60	75	1				
B8463-68	700	800			215	125	17				
B8469-72	800	825			190	85	2				
B8465	740	760			255	105	41				


ppm Mo
ppm Cu
ppm Zn
% S
% K_2O
% CaO
% Na_2O
22%


ppm Mo
ppm Cu
ppm Zn
% S
% K2O
% CaO
% Na2O
1990
1.46%
.20%


ppm Mo
ppm Cu
ppm Zn
% S
% K2O
% CaO
% Na2O
.11%

of Core Logging (DDH's 520-1, 2, & 3)

Alteration

\+ = trace

++ = moderately abundant

+++ = very "

Vein Py, Mag & Tl

\+ = < 1%

++ = 1-3 %

+++ = > 3 %

Dissem. Py, Cp, Mag, & mo

Tr = < 0.1%

For amounts greater than 0.1%, give estimated percent.

Vein Cp & Mo (molybdenite)

\+ = < ½ %

++ = ½-1 %

+++ = > 1%

Items added by KPR during logging

1) **cp/py ratio** = estimates given as ratios : <1/10, <1/10, (<1/7), <1/5, <1/3, <1/2, ~1 ≥1, ≥2, ≥3, ≥5, (≥7), ≥10.

2) **Estimated total-sulfide content :**

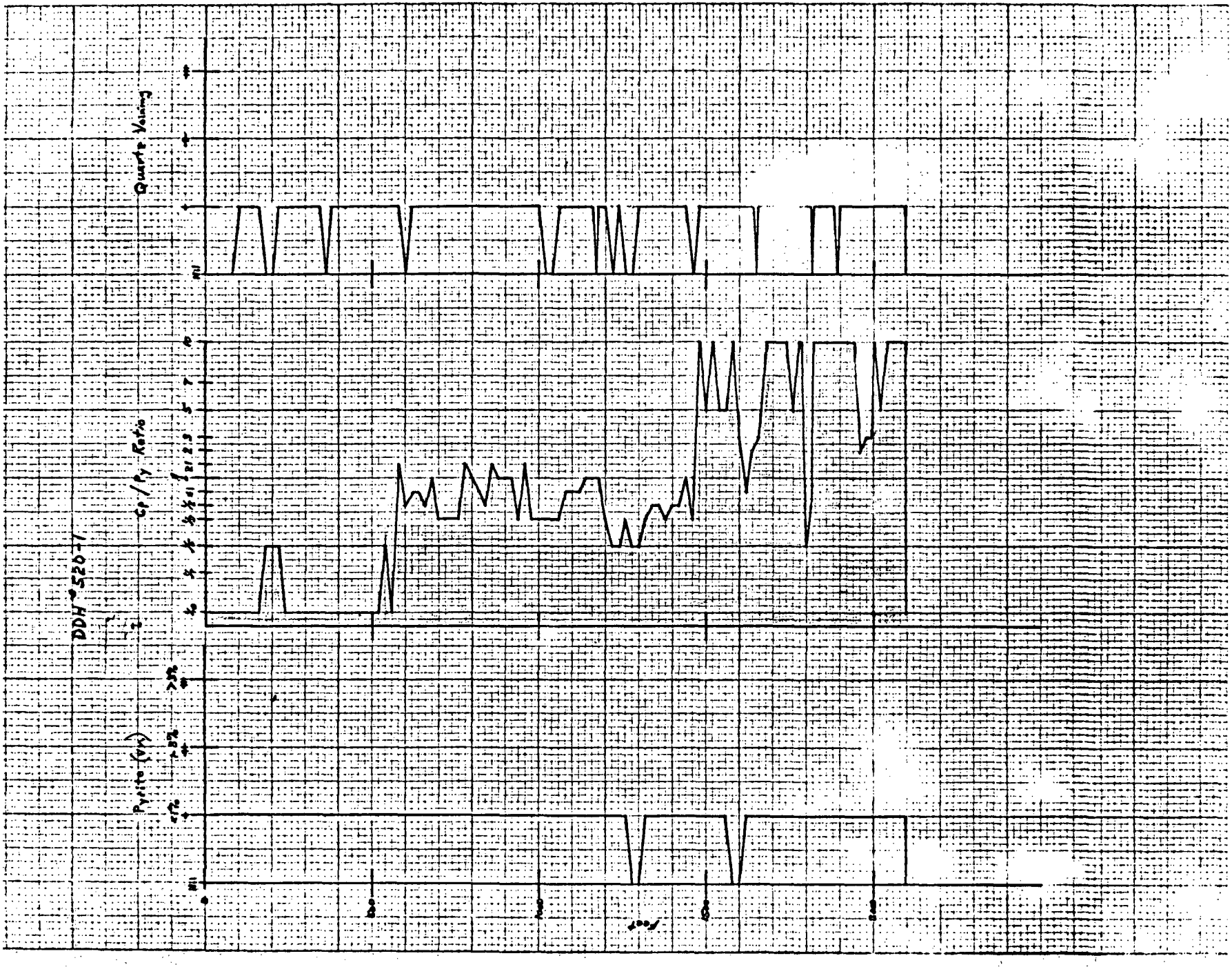
Low 0.0X%	Low 0.X %
" → mod "	" → mod 0.X%
mod → high "	mod → high 0.X%
High 0.0X → Low 0.X%	Values above high 0.X% as percent.

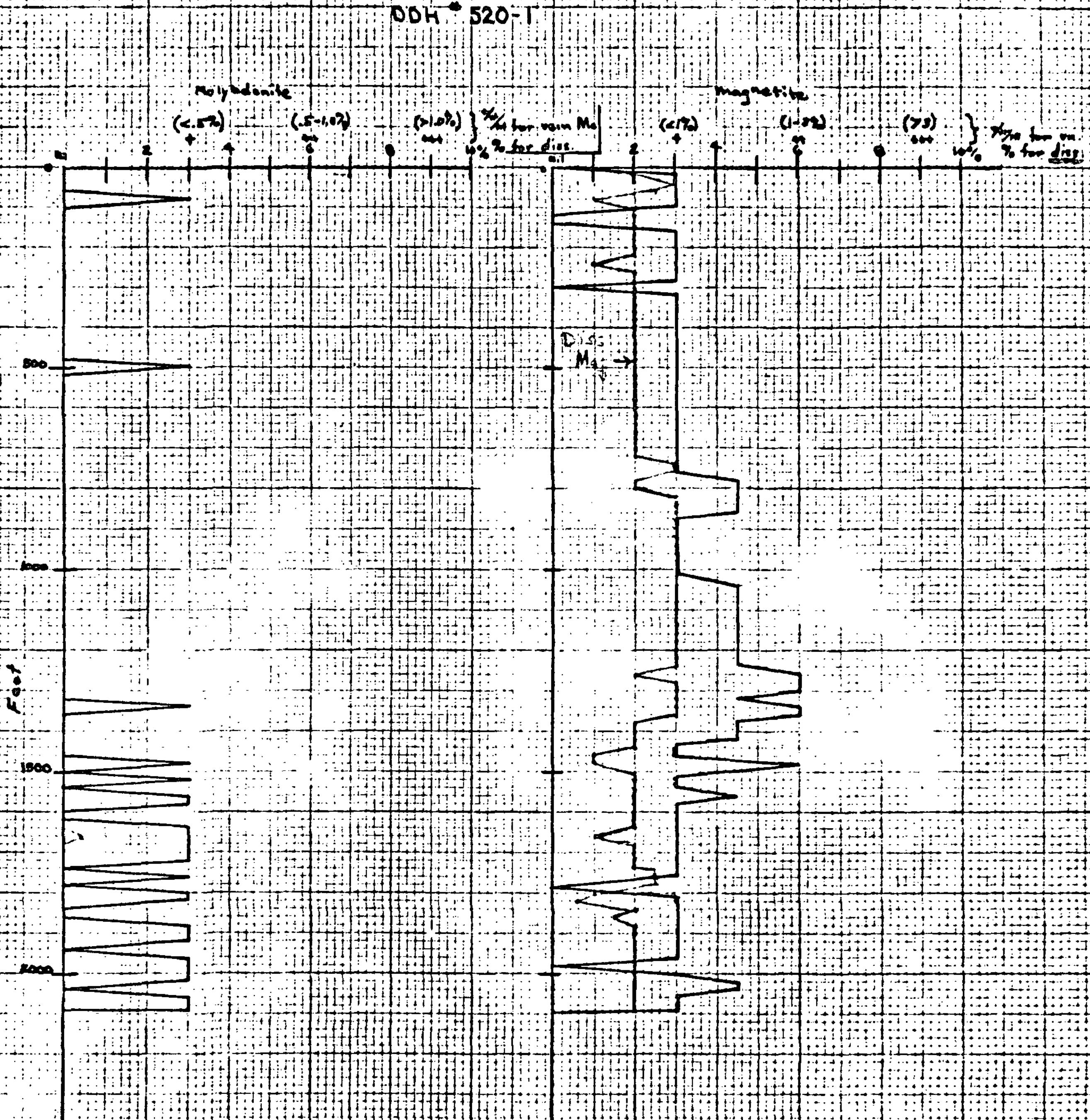
3) Qual → semi-quant estimate of breaking — refers to open fractures, strongly brecciated zones, and tourmalinized zones (± brec. also).

Sl → mod broken — sparse fracturing & jointing; est. < 3/ft exc. as above.

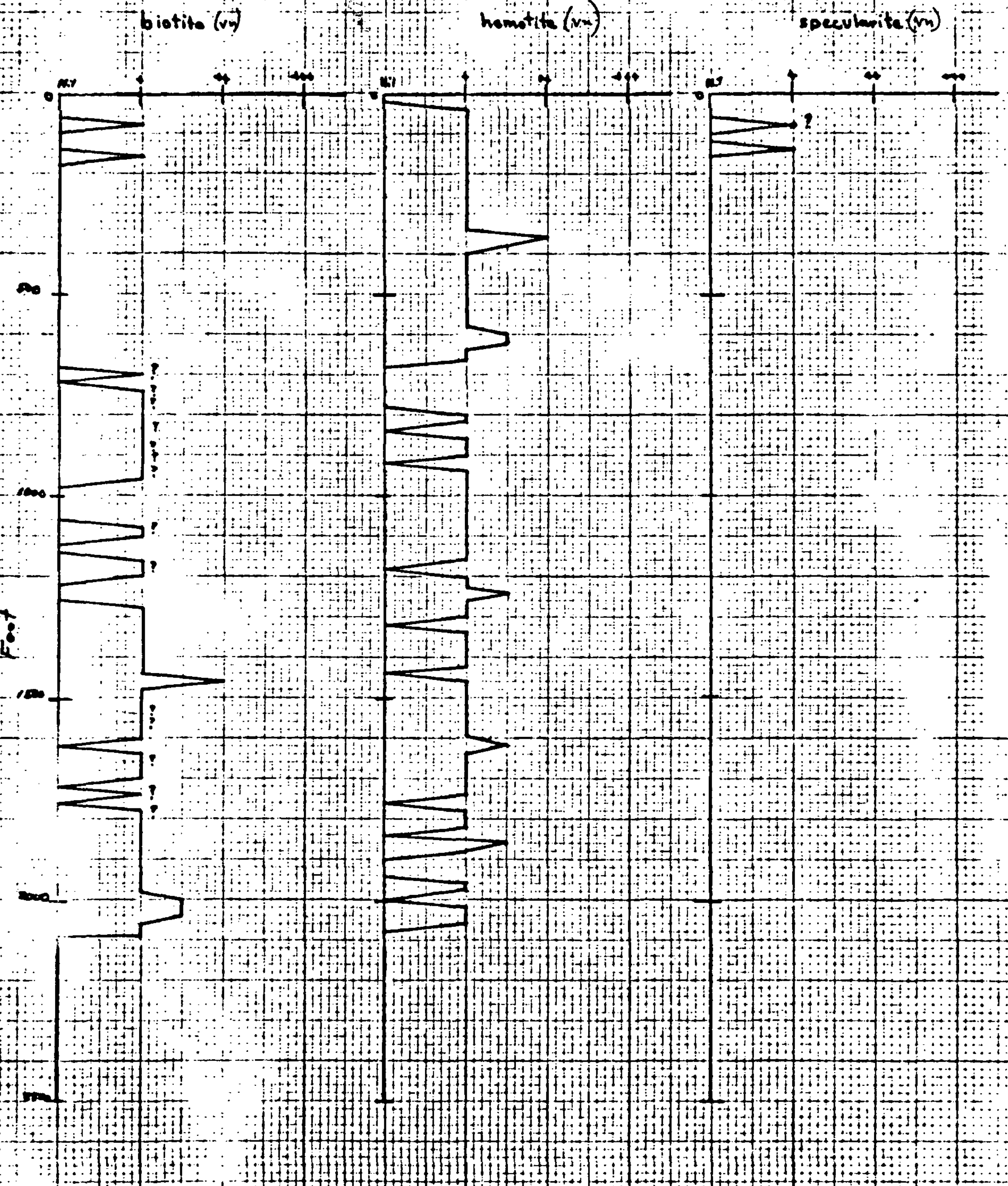
Mod → strongly " — est. 3-5 frac/ft

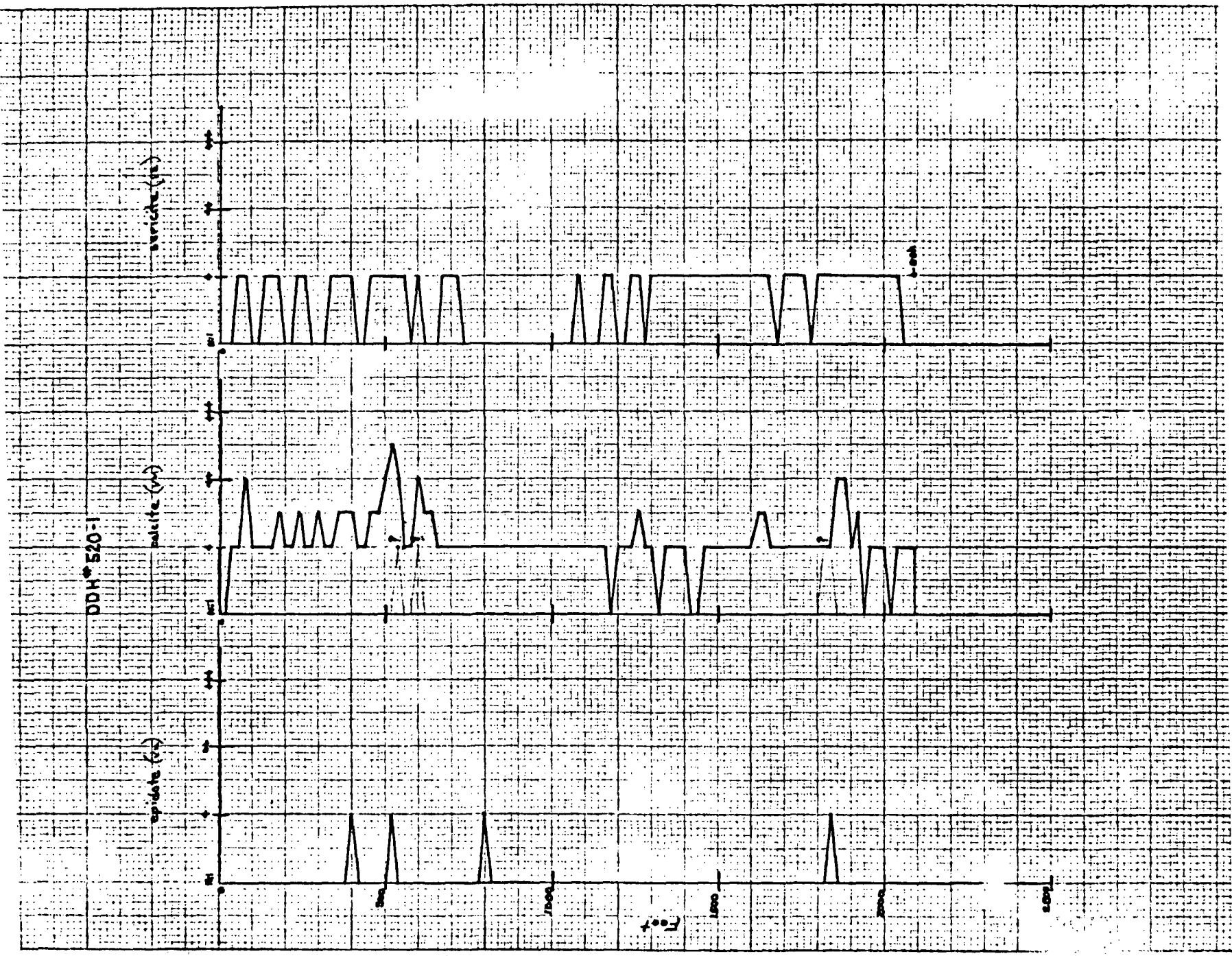
Strongly " — " 5-10 "

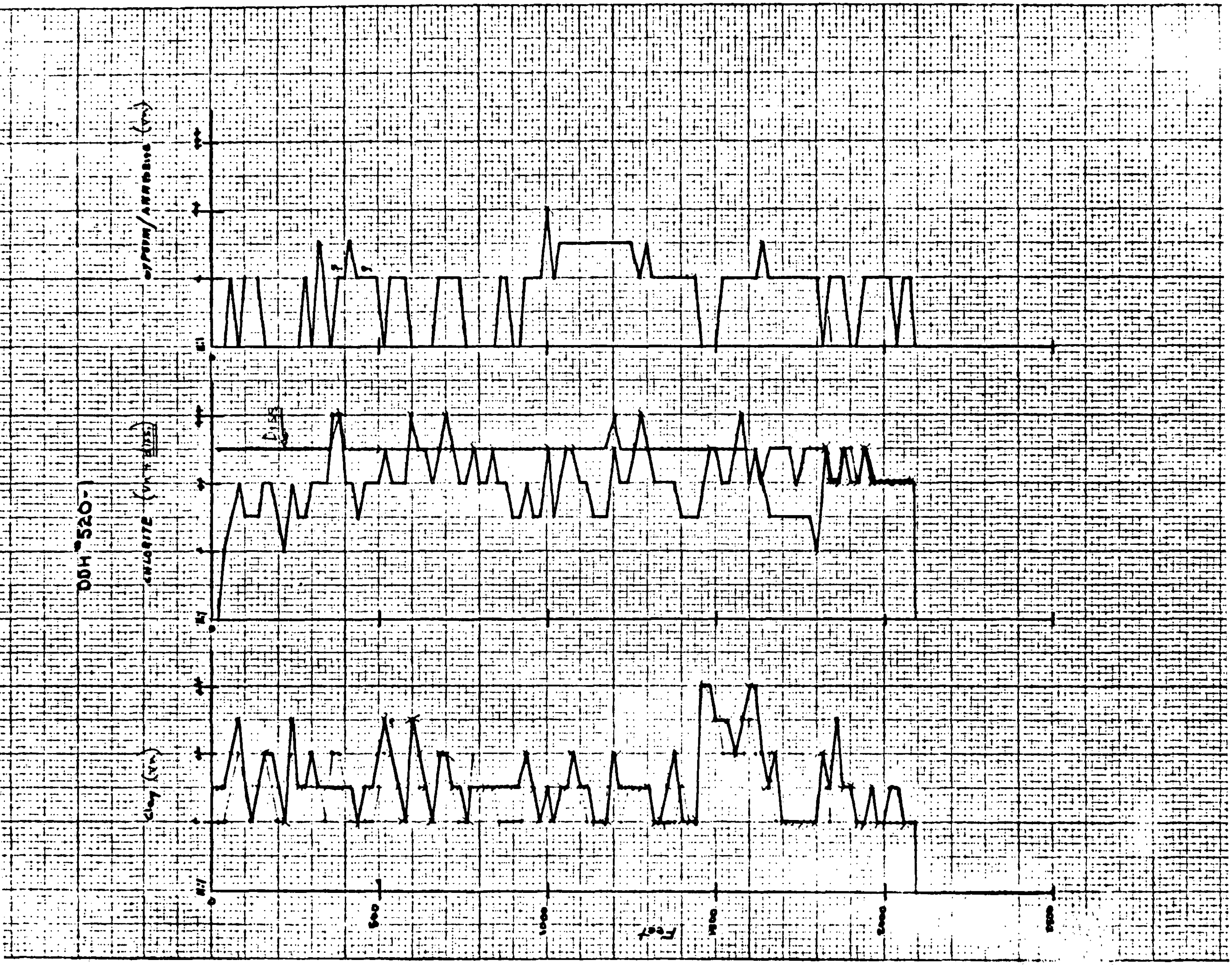


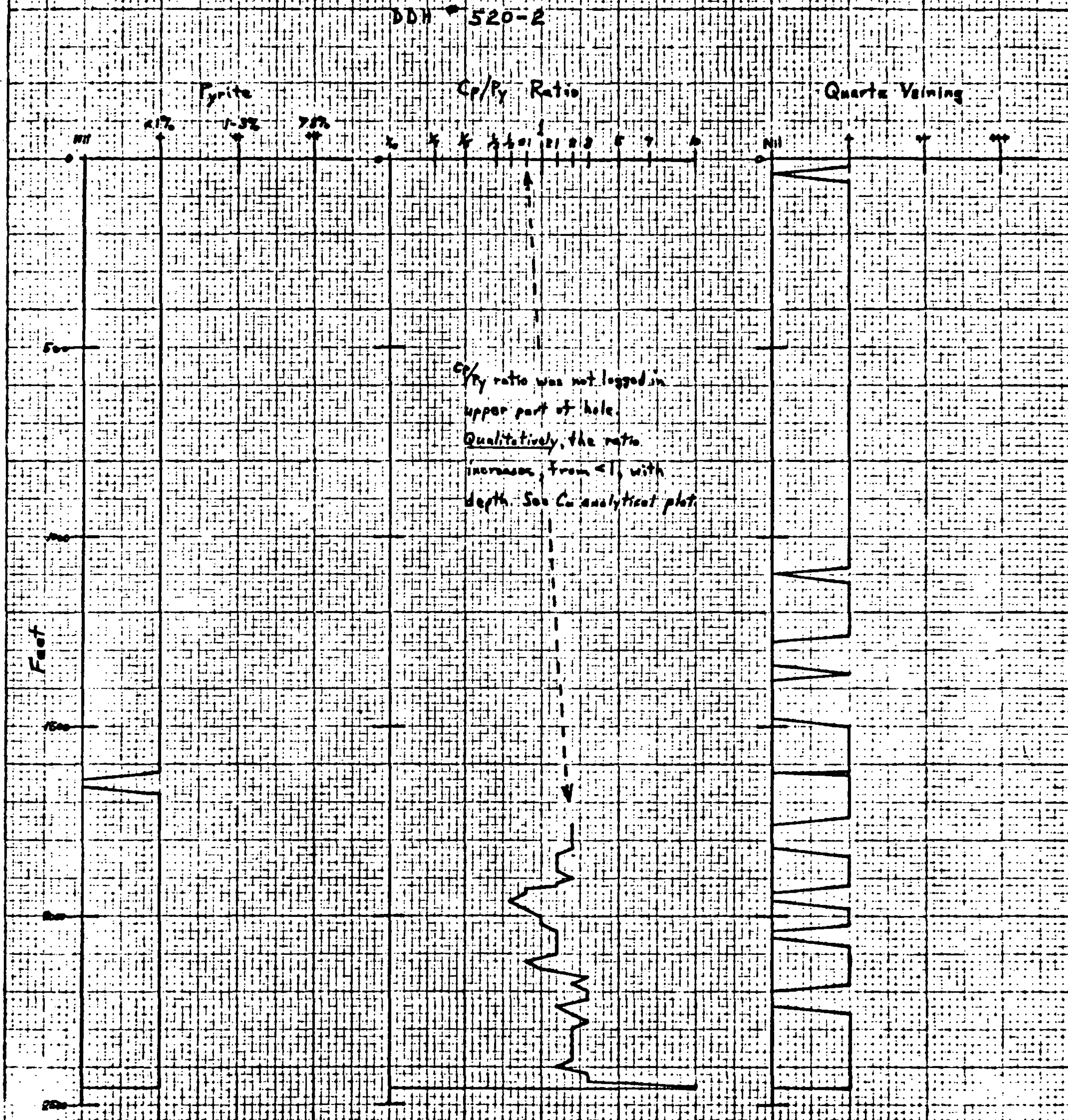


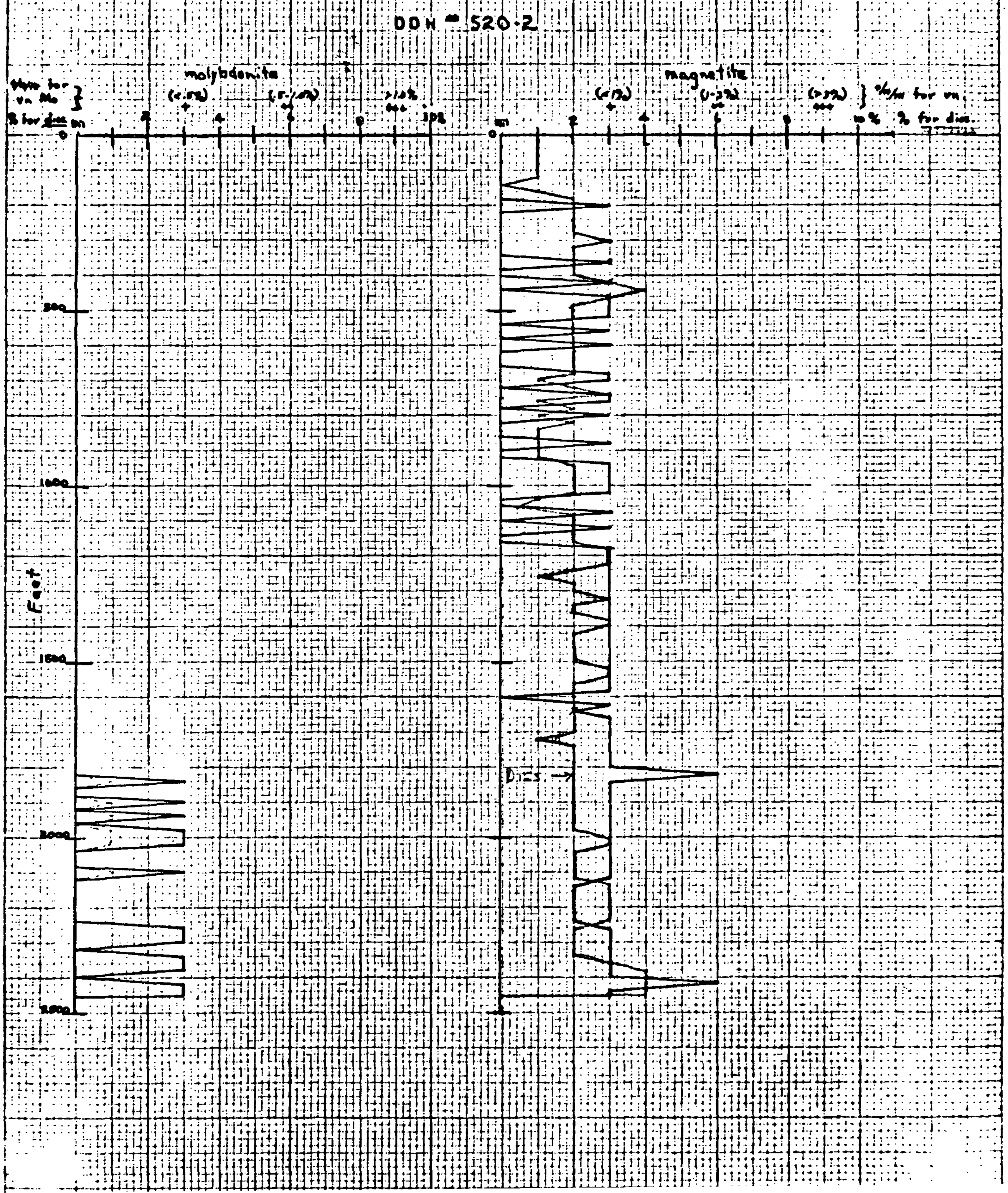
DDH 520-1



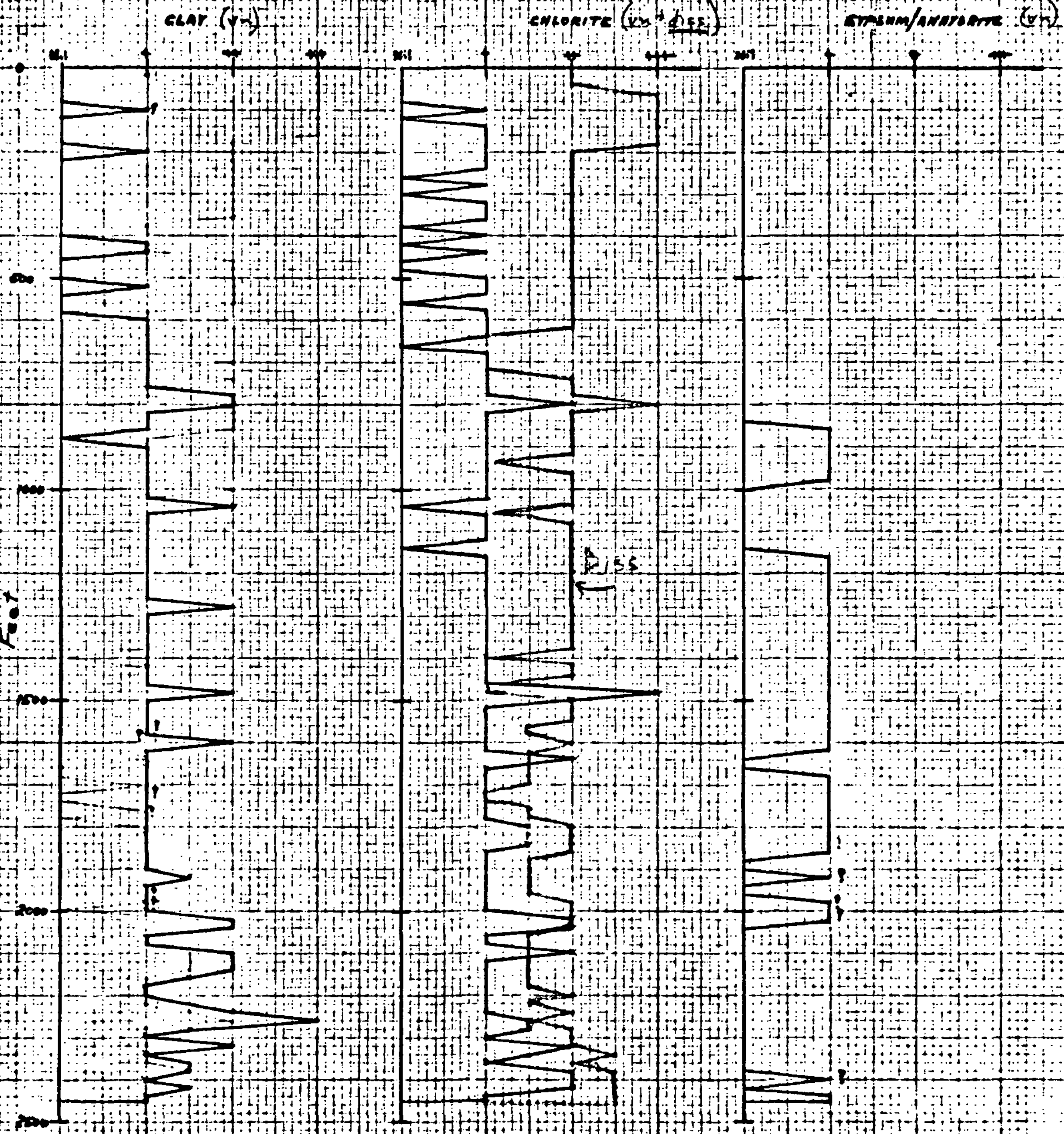


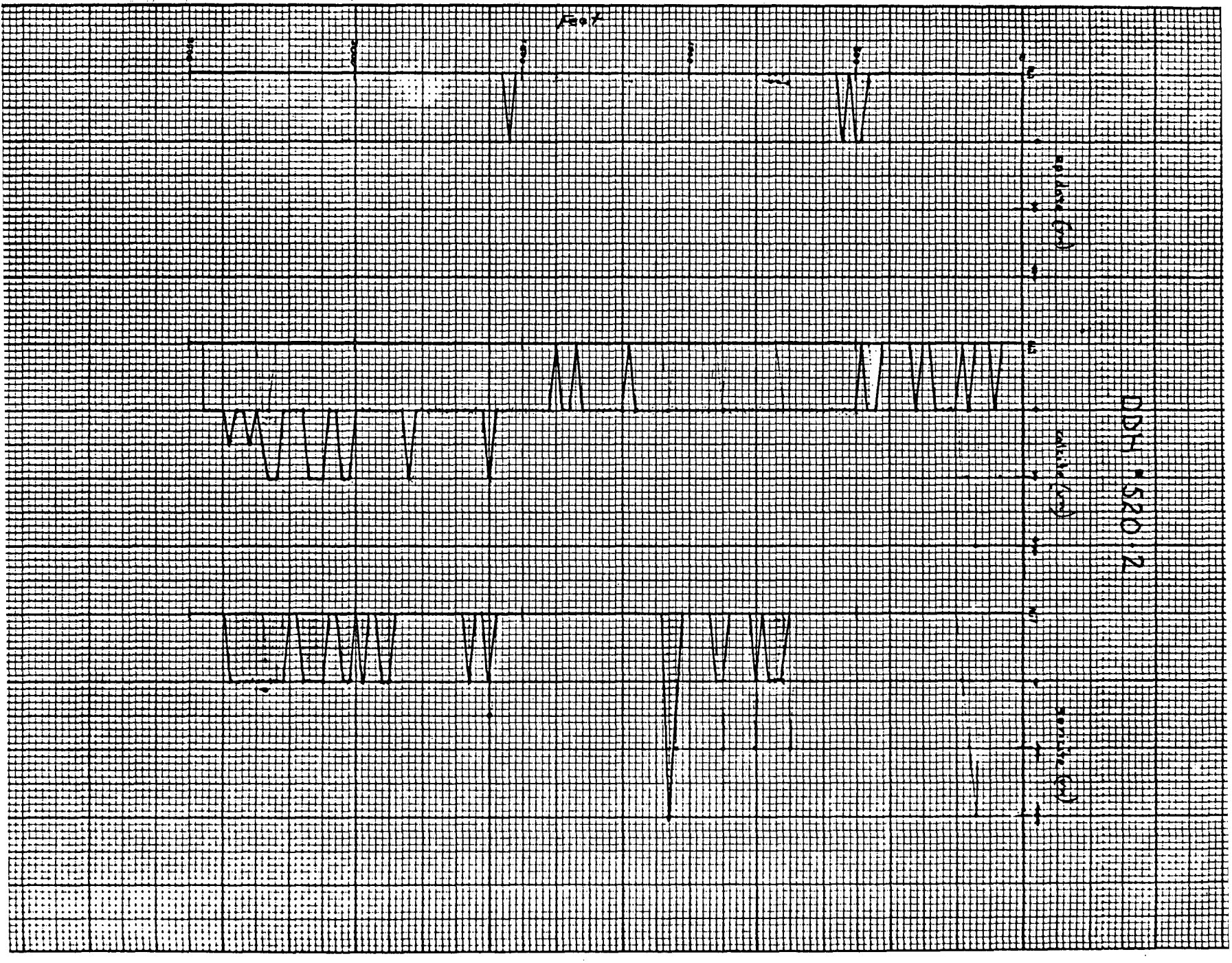





DDH # 520-2
molybdenite
magnetite
% for diss.
Feet

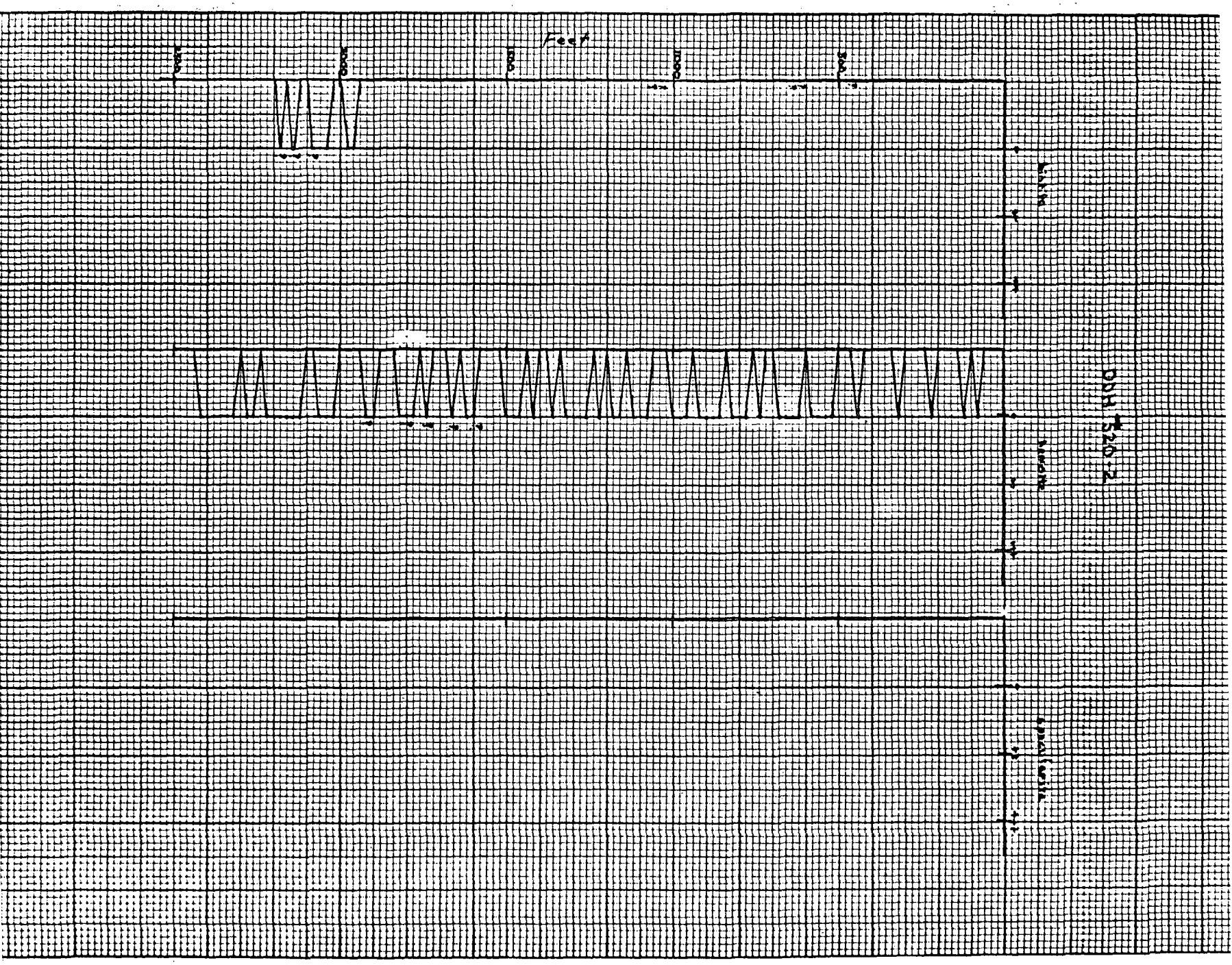
DDH # 520-2

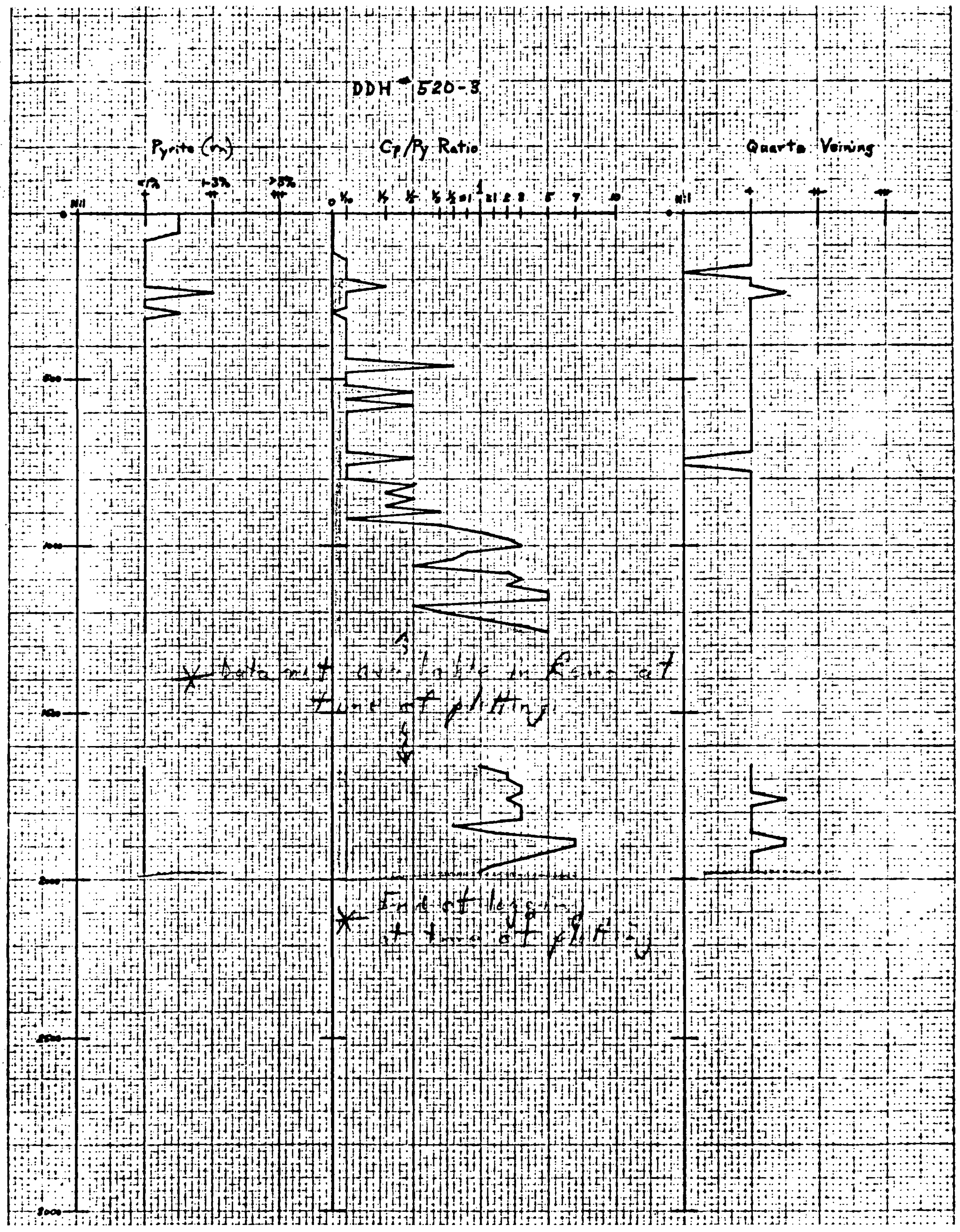




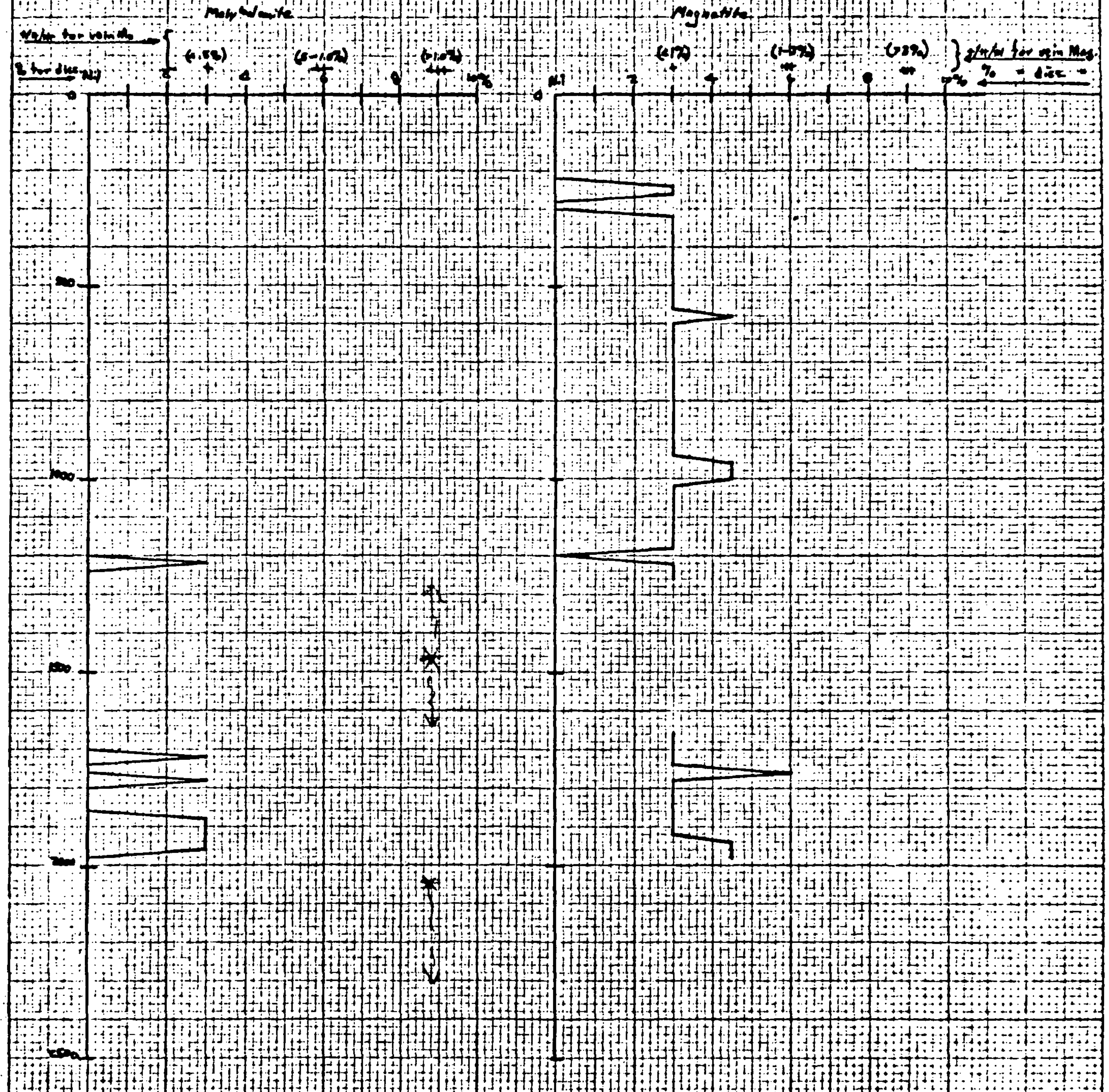
NO. 340R-20 DIETZGEN GRAPH PAPER
20 X 20 PER INCH

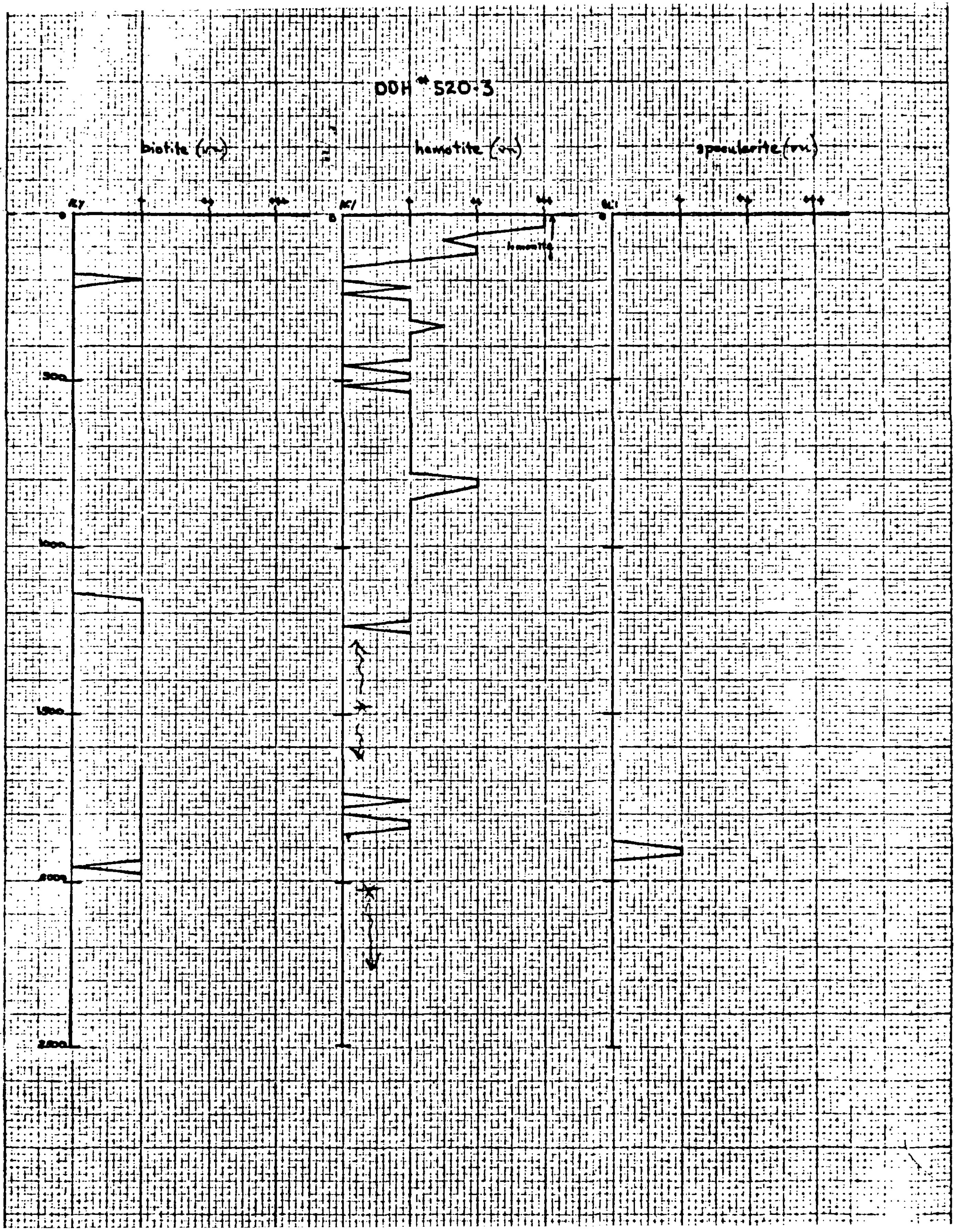
EUGENE DIETZGEN CO.
MADE IN U. S. A.

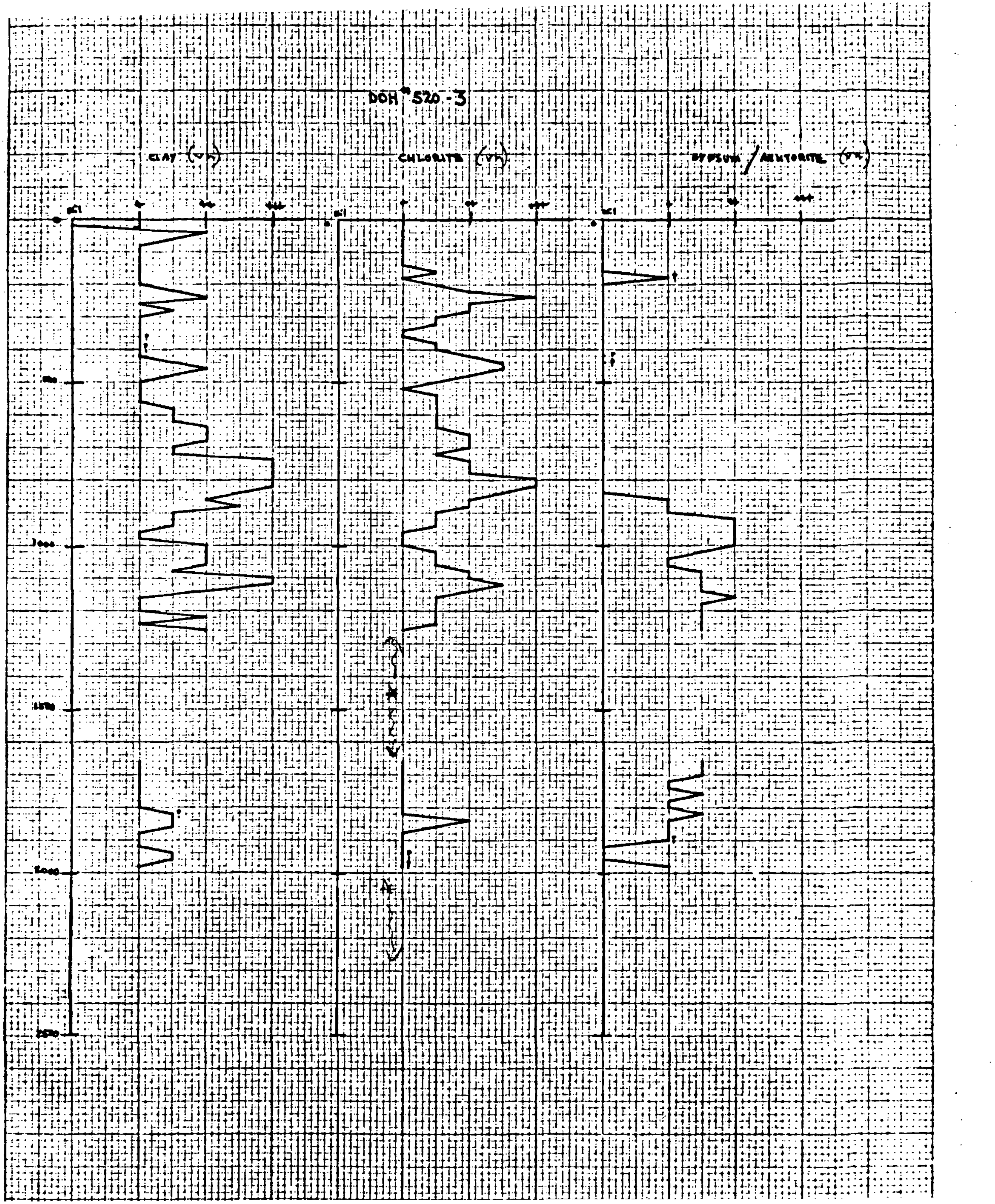


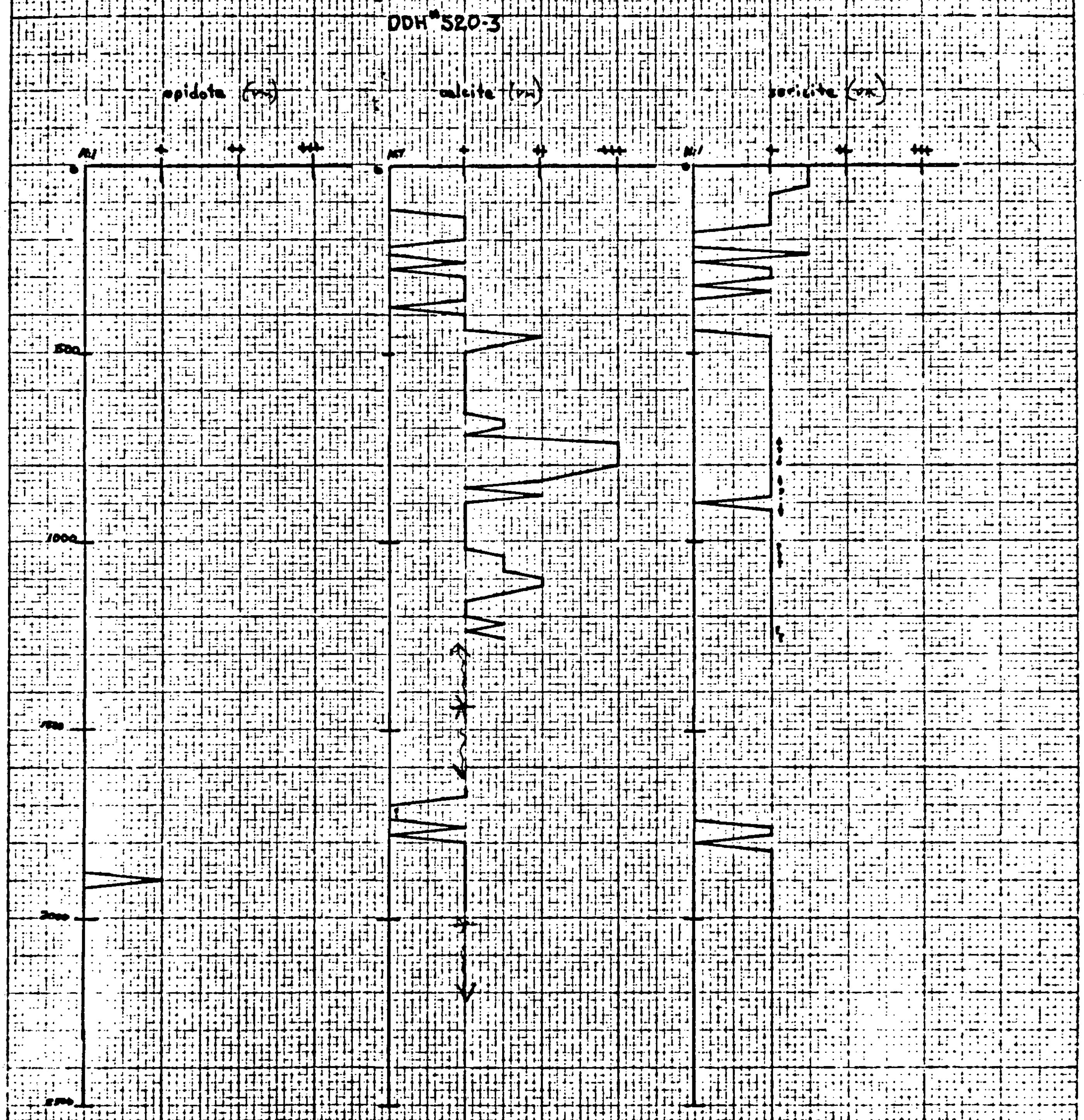


DDH # 520-3








DDH#520-3
epidota (vn)
calcite (vn)
sericite (vx)
Nil
+
++
+++
500
1000
1500
2000
2500

Geologic Log

Rotary Drill Hole 520-4 0'-354'
Diamond - 354'-875'

Interval (ft)	Mineralization: Py Diss	Py Vn	Ccp Diss	Ccp Vn	Mo Diss	Mo Vn	Mag Diss	Mag Vn	M	Rock Type: Lith	color	Tex	Alteration: Clay Diss	Clay Vn	Chl Diss	Chl Vn	Anh Diss	Anh Vn	Ep Diss	Ep Vn	Calc Diss	Calc Vn	Qtz Diss	Qtz Vn	Ser Diss	Ser Vn	K-spar Diss	K-spar Vn	Bio Diss	Bio Vn	Hem	spec	Vein Thickness (in): <.1	.1-.5	.5-1.0	>1.0	Vein Angle: 0-30	30-60	60-90	ccp/py	Remarks
Rotary Cuttings Fm. 0' to 354' - Diamond Drlg 354' to TD																																									
0'-5'	–	–	–	–	–	–	+	–	–	?(?)	FeOx	MED GRAIN	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No sulfides - FeOx
5'-10'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" "
10'-15'	–	–	–	–	–	–	+	–	–	"	"	"	+	–	–	–	–	–	–	–	–	–	–	–	+(?)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " Tgmc(:) strongly FeOx
15'-20'	–	–	–	–	–	–	+	–	–	"	"	"	++	–	–	–	–	–	–	–	–	–	–	–	+(?)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " " "
20-25'	–	–	–	–	–	–	++	–	–	"	"	"	+	–	+	–	–	–	–	–	–	–	–	–	+(?)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " Mod. "
25-30'	–	–	–	–	–	–	++	–	–	"	"	"	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " Mod "
30'-35'	–	–	–	–	–	–	++	–	–	"	"	"	++	–	–	–	–	–	–	–	–	–	–	–	+(?)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " Tgmc. strongly FeOx
35'-40'	–	–	–	–	–	–	++	–	–	"	"	"	++	–	+/++	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " mod "
40'-45'	–	–	–	–	–	–	+	–	–	"	"	"	++	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	+	–	–	–	–	–	–	–	–	" " " - Tgmc-wk "
45'-50'	–	–	–	–	–	–	+	–	–	"	FeOx/Lt Pnk	"	+	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	–	No Sulfides " " "
50'-55'	–	–	–	–	–	–	+	–	–	"	"	"	+	+	+	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	" " " mod. FeOx
55-60'	–	–	–	–	–	–	+	–	–	1	Pnk & Grey	MED Grain	–/+	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	" " " wk. to Fsh.
60'-65'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	" " Tgmc. pred. Fsh.
65'-70'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	" " " " "
70'-75'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
75'-80'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	++	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
80'-85'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	++	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
85'-95'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	++	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
95'-105'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
105-110'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " " " "
110'-120'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " "
120-130'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	" " "
130'-140'	+	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	<1 Very low sulf 0.x% - py diss. w/ Fe-Mgs.
140'-150'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	– No sulfides -
150'-160'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	– " "
160'-170'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	– " "
170'-180'	+	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	<1 " Cu Sulfides
180'-190'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	– No " "
190-200'	–	–	–	–	–	–	+	–	–	"	"	"	–	–	++	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	– " " "
200-210'	++	–	–	–	–	–	+	–	–	"	"	"	–	–	++	–	–	–	+	–	–	–	–	–	+	–	–	–	+(?)	–	–	–	–	–	–	–	–	–	–	–	–	<1 Low sulf 0.x% - py finely diss. in dots w/ Fe-Mgs. alt to chl./epi.

	Mineralization: Py Diss	Py Vn	Ccp Diss	Ccp Vn	Mlb Diss	Mlb Vn	Mag Diss	Mag Vn	Tr	Rock Type: Lith	Color	Tex	Alteration: Clay Diss	Clay Vn	Chl Diss	Chl Vn	GYP Anh Diss	Anh Vn	Bp Diss	Bp Vn	Calc Diss	Calc Vn	Qtz Diss	Qtz Vn	Ser Diss	Ser Vn	K-spar Diss	K-spar Vn	Bio Diss	Bio Vn	Hem	Spec	Vein Thickness (in): 4.1	.1-.5	.5-1.0	1.1-10	Vein Angle: 0-20	20-60	60-90	Remarks: ccp/py
200'-210'	+	-	+	-	-	-	+	-	-	1(?)	Pink & Grey	MED Grain	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≥1 Very low sulf 0.x%
210-220'	+	-	+	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - rock may be more grey than pink-
220'-230'	++	-	-	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 Very low sulf 0.x% - rock as abv.
230'-240'	+	-	-	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - " " "
240'-250'	-	-	-	-	-	-	-	-	-	"	"	"	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	- No sulf 0.x% - " " "
250'-260'	+	-	-	-	-	-	-	-	-	"	"	"	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 Very low sulf 0.x% - " " "
260'-270'	++	-	-/+	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - pink cast more prevs
270'-280'	++	-	-	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - " " " "
280-290	++	-	+(?)	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - encountered H_2O
290-309'	++	-	+(?)	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 " " " " - sample very fine py/ccp(?) tumbled-
300-310'	+	-	+(?)	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 Very low sulf 0.x%
310-320'	+	-	+	+	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	≤1 " " " "
320-330'	++	-	+(?)	-	-	-	-	-	-	GREY FELDSPAR DIKE			-	+	++	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 Low to mod sulf 0.x% - py pred - rx med. to fine. pink-grey feld. dke - not porph.
330-340'	++	-	+(?)	-	-	-	-	-	-	"	"	"	-	-	++	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 As Abv.
340'-350'	+	-	-	-	-	-	-	-	-	1(?)	Pink & Grey	Med Grain	-	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	≤1 Very low sulf 0.x%
350'-354'	++	+	+	-	-	-	-	-	-	"	"	"	-	-	++	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	1	-	-	-	-	-	≤1 " " " "

ASSAY SEPARATELY

BTM ROTARY

11/28/72

(Ft)		Mineralization									Rock Type			Alteration																						Vein Thickness (in)				Vein Angle °				Remarks
		Py		Cp		Mo		Mag		Ti				Clay		Chl		Anh/Gyp		Epi		Calc		Qtz		Ser		K-Spar		Bio		Hem	Spec									
		D	V	D	V	D	V	D	V		Lith	Color	Tex	D	V	D	V	D	V	D	V	D	V	D	V	D	V	D	V													
	355-360	-	+	-	-	-	-	++	+	-	lfg	Gray	fg	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	6	-	-	-	2	2	2	α	Low sulf .x% confined to vns, abundant vert fracts, several fls vns. w/ py, qtz, chl alteration bleached, rock fresh, dark gray-mottled gray & pink
8445-47	360-380	-	++	-	-	-	-	++	-	-	"	Gray Pink	"	-	-	-	+	-	-	-	+	-	+	-	+	-	-	-	+	-	-	-	14	-	-	-	1	3	10	α	Mod sulf w1%, thin indistinct qtz-K-spar vns @ 368-70, strong vert fracts w/py & minor qtz-chl
	380-400	-	++	-	+	-	-	++	+	-	"	"	"	-	-	+	+	-	-	-	+	-	+	-	+	-	-	-	+	-	-	+ fracts	-	11	-	-	-	4	2	5	1/100	Mod sulf w.5% indistinct qtz-K-spar bleached vns, py on fracts, rock essentially unalt
	400-420	-	++	-	-	-	-	++	+	-	"	"	"	-	-	+	+	-	-	+	+	-	+	-	+	-	-	-	+	-	+	-	-	13	-	-	-	4	2	7	α	Mod sulf w.5% highly chl w/disc K-spar @ 411-14, bn bio @ 418, rock becomes grayish
	420-440	-	++	-	-	-	-	++	+	-	"	"	"	-	-	+	+	-	-	+	+	-	+	-	+	-	-	-	+	-	+	+ fracts	-	10	-	-	-	3	1	6	α	Mod sulf w1%, rock grays 425-435 highly broken @ 435-39, highly chl gouge, K-spar, becomes cgl w/some large py xtls, normal gray-pink, fg rock below 439
8848-52	440-460	-	++	-	-	-	-	++	+	-	"	"	"	-	++	+	++	-	-	+	+	+	++	-	+	-	-	-	+	-	-	+ fracts	-	27	-	-	-	6	5	16	α	Mod sulf w 1%, highly fract-gouge @ 445-48 w/blk clay-py zone w/ closely spaced chl-py vns, calc plated on fracts
	460-480	+	++	-	-	-	-	++	?	+	"	"	"	-	+	+	+	-	-	+	+	+	++	-	+	-	-	-	+	-	-	-	-	24	-	-	-	6	4	14	α	Mod sulf w 1.5%, pyritohedrons common py in fracts & matrix, broken zone @ 462-67, thin vert aplite dike w/py @ 460, noticely pinker below 475
	480-500	-	++	-	-	-	-	++	-	+	"	"	mfg	+	-	+	+	-	-	-	+	+	+	-	+	-	-	-	+	-	-	+	-	16	-	-	-	2	3	11	α	Mod sulf w 2%, heavy py on some fracts, strong vert fracts @ 488 & 498-500, narrow aplite dike .1-.2 wide (vert) @ 494-96, Ti associated w/K-spar and bleaching
	500-520	-	++	-	-	-	-	++	-	+	"	"	"	+	-	+	+	-	-	-	+	+	++	-	-	-	-	-	+	-	?	-	-	16	-	-	-	6	3	7	α	Mod sulf w 2%, strong vert fracts w/ py @ 501, 503-4, 508, 510, 511-12, narrow aplite dike w/minor dism py @ 515-17
	520-540	+	++	-	-	-	-	++	-	-	"	"	"	++	++	+	++	-	-	+	+	+	++	-	+	-	-	-	+	-	+	-	-	14	-	-	-	5	2	7	α	Mod sulf w 1%, strong arg-gouge zone @ 533-35, 537-38, local abundant clay, chl & py on fracts
8853-57	540-560	-	++	-	-	-	-	++	-	-	"	"	"	+	+	-	++	-	-	+	++	+	++	-	+	-	-	-	+	-	+	-	-	20	-	-	-	8	3	9	α	Mod sulf w 1% locally abundant on fracts, pink aplite dike w/dism py fracts @ 540-49, contact may be gradational w/fg I (becomes porph) abun chl-epi on fracts below 553
											Aplite	Pink	fg																														
	560-580	-	++	-	-	-	-	++	+	-	lfg	Pink Gray	mfg	-	+	-	++	-	-	-	++	-	++	-	+	-	-	-	+	-	-	+	-	19	-	-	-	3	6	8	α	Mod sulf w 1.5%, calc, chl, epi & py on fracts, otherwise relatively unalt, @ 576 two .1-1 qtz vns w/py in middle & bio on fringe

Interval (ft)		Mineralization									Rock Type			Alteration																				Vein Thickness (in)				Vein Angle °				Remarks
		Py		Cp		Mo		Mag		Tl				Clay		Chl		Anh/Gyp		Epi		Calc		Qtz		Ser		K-Spar		Bio		Hem	Spec									
		D	V	D	V	D	V	D	V		Lith	Color	Tex	D	V	D	V	D	V	D	V	D	V	D	V	D	V	D	V	D	V			<.1	.1-.5	.5-1.0	>1.0	0-30	30-60	60-90	Cp/Py	
											vfg l	Gray	vfg																														@576 vfg l, gray, fg white feld & dark brown laths bio, abundant di & vn py
	580 - 600	++	+	-	-	-	-	+	-	-	"	Light Gray	"	-	-	+	+	-	-	-	-	-	+	-	+	-	-	-	+	-	??	-	-	12	-	-	-	2	4	6	α	Mod sulf w 2.5% dism & fracts, abruptly grades into lfg @ 584 & ou 585, locally dism mag, laths of dk bio locally → chl; may be silicific zone
	600 - 620	+	+	-	-	-	-	++	-	-	"	"	"	-	-	-	+	-	-	-	+	-	+	-	+	-	-	-	+	-	?	+ fract	-	14	-	-	-	4	3	7	α	Mod sulf w 1% dism & vns in vfg light rock, along fracts only in lfg vfg facies grades into lfg @ 604 flat qtz-K-spar vns (.01-.1 thick) common in interval w/ lfg
											lfg	Pink-Gray	mfg																														
	620 - 640	+	+	-	-	-	-	++	-	-	"	"	"	-	-	-	+	-	-	-	+	-	+	-	+	-	-	-	+	-	-	++ fracts	-	13	-	-	-	2	4	7	α	Mod sulf w 1%, blocky fracts @ 34, 637-39 w/ calc vns, qtz-K-spar-p vns common - thin (<.1), thin vfg zon
B8458-62	640 - 660	+	+	-	-	-	-	++	+	-	"	"	"	+	-	+	++	-	++	+	++	+	++	-	+	-	-	-	+	-	-	++ fracts	-	8	-	-	-	2	4	2	α	Mod sulf w 1.5%, blocky fracts common, mag vn @ 643, gyp vns common below 651, rock bleach from 652-59, K-spar vns not common altho bleached rock h dism K-spar, locally plag → sau (green clay)
	660 - 680	+	+	-	-	-	-	++	-	-	"	"	"	-	-	-	+	-	++	-	+	-	-	-	-	-	-	-	+	-	-	+ fract	-	9	-	-	-	2	5	2	α	Low sulf <.5%, gyp vns (.01 wid common, rock relatively unalt py dism in gyp vns
	680 - 700	-	+	-	-	-	-	++	-	-	"	"	"	-	-	-	+	-	++	-	+	-	+	-	+	-	-	-	+	-	-	+ fract	-	8	-	-	-	3	2	3	α	Low sulf <.5%
	700 - 720	-	+	-	-	-	-	++	+	-	"	"	"	-	-	-	+	-	+	-	+	-	+	-	-	-	-	-	+	-	-	—	-	5	-	-	-	1	2	2	α	Low sulf <.5%, fg pink qtz monz porph @ 705.5-09.5 & 712-14, matrix, indistinct white feld phenos, blk bio, & dism py
											Qtz Monz Porph	Pink	fg Porph																														
	720 - 740	++	+	-	-	-	-	+	-	-	lfg	Pink-Gray	mfg	-	-	-	+	-	++	+	-	-	+	-	-	-	-	-	-	-	-	-	+ dism	-	10	-	-	-	4	2	4	α	Mod sulf w 2.5%, pink qtz mo porph @ 721.5, fg pink matrix, indistinct white feld phenos, br bio flak mag clots, Py & epi, gyp vns common - m flat lying - thin, occasional steep chl vn, interval relatively unalt.
											Qtz Monz Porph	Pink	fg Porph																														
B8463-68	740 - 760	++	+	-	-	-	-	+	-	-	"	"	"	-	-	+	+	-	++	+	-	-	+	-	-	-	-	-	-	-	-	-	+ dism	-	7	-	-	-	5	1	1	α	Mod sulf w 2%, calc vn @ 759.5, 756 rock bleached light gray, sil matrics → chl
	760 - 780	+	+	-	+	-	-	+	-	-	lfg	Pink-Gray	mfg	-	-	+	+	-	++	-	-	-	+	-	+	-	-	-	+	-	-	—	-	5	-	-	-	3	1	1	1/100	Mod sulf w 1%, @ 767 pink qtz m porph as above, cp xal in K-spar v 761.5, flat & vert gyp vns, qtz chl vns (flat) in porph
											Qtz Monz Porph	Pink	fg Porph																														
	780 - 800	+	+	+	-	-	-	+	+	-	"	"	"	-	-	-	+	-	++	-	+	+	-	-	+	-	-	-	-	-	-	-	+ dism	-	6	-	-	-	4	1	1	1/10	Mod sulf w 1%, cp blebs w/ py, m calc & chl @ 783, 784, & 791, @ 794 1 vfg, unaltered

Interval (ft)	Mineralization									Rock Type			Alteration																				Vein Thickness (in)				Vein Angle °			Cp/Py	Remarks
	Py		Cp		Mo		Mag		Tr				Clay		Chl		Anh/Gyp		Epi		Calc		Qtz		Ser		K-Spar		Bio		Hem	Spec								
	D	V	D	V	D	V	D	V		Lith	Color	Tex	D	V	D	V	D	V	D	V	D	V	D	V	D	V	D	V	D	V		<.1	.1-.5	.5-1.0	>1.0	0-30	30-60	60-90		
800-820	+	+	+	–	–	–	+	–	–	vfg / Qtz Monz Porph vfg /	Light Grey / Pink / Light Pink-grey	vfg / fg Porph / vfg	–	–	+	+	–	++	+	–	–	+	–	+	–	–	–	–	–	–	–	–	4	–	1	–	3	1	1	1/100	Mod sulf w 1%, lvfg becomes pink w/depth, @ 809.5 qtz monz porph, cp blebs @ 811, grades into pinkish grey lvfg w/indistinct white feld phenos, @ 813, 0.1 qtz-py vn (45°) @ 807, .05 qtz vn (90°) w/chl @ 810
820-840	+	+	–	–	–	–	+	–	–	" Qtz Diorite	" Dark Grey	" fg	–	–	+	+	–	+	–	+	–	+	–	–	–	–	–	–	–	–	–	–	7	–	–	–	5	2	0	α	Low sulf <.5%, rock becomes less altered w/depth, qtz vns common but less than above, @ 835 fg qtz diorite w/ vert qtz vns & minor epi
840-860	+	+	–	–	–	–	+	–	–	"	"	"	–	–	–	+	–	+	–	+	–	–	–	–	–	–	–	–	–	–	–	–	9	–	–	–	1	5	3	α	Low sulf w. 2% qtz diorite, equigran fg, white plag & ho-horn (?) minor chl-epi on fracts, dism fg py
860-875	+	+	–	–	–	–	+	–	–	"	"	"	–	–	–	+	–	+	–	+	–	–	–	–	–	–	–	–	–	–	–	–	6	–	–	–	1	1	4	α	Low sulf w. 2%

3469-72

Mileage

0 Return to Route 89, turn left and continue south to the intersection of Route 4. Turn right and drive west along Clear Creek Canyon. The Pavant Range lies to the right and the Tushar Mountains to the left. This area is part of the High Plateaus which are transitional between the Basin and Range and the Colorado Plateau (Fig. 1).

Clear Creek Canyon lies near the northern edge of the Marysvale Volcanic Field which developed during Oligocene and Miocene time. The field extends south for about 90 km and consists of an older sequence of intermediate composition lava flows, breccias, and ash flow tuffs of the Bullion Canyon Volcanics and a younger largely rhyolitic sequence of ash flow tuffs and lava flows of the Mount Belknap volcanics. Recent geological studies and radiometric age determinations by Steven and others (1978) have clarified many of the stratigraphic and structural relationships in the northern part of the Marysvale volcanic field. This summary draws heavily on their work.

The rocks of the Bullion Canyon Volcanics were erupted between 30 and 22 m.y. ago from stratovolcanoes within the Marysvale Volcanic Field. Ash flow tuffs, derived from local centers and

from sources in the great Basin interfinger with the lava flows and breccias in many parts of the area. About 22 m.y. ago quartz monzonite intrusions were emplaced into the upper portions of the volcanic complex. This intrusive event produced minor base and precious metal mineralization.

Rhyolitic volcanism occurred between 21 and 17 m.y. ago. The Mount Belknap Caldera, which collapsed about 19 m.y. ago in response to voluminous outpourings of Joe Lott Tuff, was the most significant of the rhyolitic centers (Fig. 2). The ash flow tuff spread outward from the central portion of the northern Tushar Mountains and accumulated in the surrounding topographic depressions. Thick accumulations of the Joe Lott Tuff are exposed in Clear Creek Canyon.

The volcanic rocks are overlain by a diverse sequence of sedimentary rocks, air fall tuffs, and basalt flows of the Sevier River Formation. The rocks were deposited in local basins between 14 and 7 m.y. ago.

+.5 The sedimentary rocks along the right hand side of the road belong to the Sevier River Formation. The multicolored outcrops consist of diatomaceous earth. Dark-colored rocks to the left are lava flows and breccias of the Bullion Canyon Volcanics.

+2.7 Joe Lott Tuff forms the cliffs on both sides of the Canyon. The ash flow tuff is poorly welded here but becomes more densely

welded toward the Mount Belknap Caldera. Phenocrysts of quartz, plagioclase, alkali feldspar, and biotite make up approximately 1% of the tuff. Throughout most of the area, the Joe Lott Tuff displays multiple ash flow compound cooling characteristics. Cooling joints are common in the thick sections of the ash flow sheet along Clear Creek.

+3.5 The steep cliffs on either side of the Narrows is the densely welded portion of the Three Creeks Tuff Member of the Bullion Canyon Volcanics. The ash flows were erupted from a poorly defined caldron in the southern part of the Pavant Range 27 m.y. ago (Fig. 2). The Three Creeks Tuff contains nearly 50 percent phenocrysts of plagioclase, hornblende, biotite, and sanidine. This sheet is over 200m thick. The middle and upper parts of the sheet are compositionally similar to the lower part but differ in the degree of welding. The lower part of the sheet is the most widely distributed and is a distinctive marker horizon within the Bullion Canyon Volcanics.

Two miles east of Sulphurdale Cove Fort turnoff. Near the western end of Route 4, the Pavant Range and Tushar Mountains are separated by a major normal fault. To the right, the south-facing slopes in the foreground are composed of intermediate composition lava flows which were erupted from a local volcanic center. The hills in the background are composed of the underlying Cocoñino sandstone (Permian) and Oquirrh limestone (Pennsylvanian). To the left, in the Tushar Mountains, ash flow

tuffs overlie intermediate composition lava flows and flow breccias. These volcanics are preserved in a succession of large-scale gravitional glide blocks which have moved to the west. The prominent white unit on the north-facing slopes is a pooly welded clinoptilolite-bearing tuff derived from an unidentified source area in the Great Basin.

Hydrogen sulfide seeps, small sulfur deposits and locally intense acid alteration related to the geothermal system occur at many places on the western and southern edge of the Pavant Rnge in this area. Union Oil exploration wells Forminco No. 1 and 14-29 are located on the right; 31-33 is on the left.

Mileage?? Continue to the Cove Fort-Sulphurdale exit, and turn left toward Sulphurdale. The cinder cone to the right is part of the Cove Fort Basalt Field.

2.6 miles from Rt.4 ,Turn left at the second dirt road and drive to the Sulphurdale Pit.

STOP 1. Sulphurdale Sulfur Mine. This is the largest of the sulfur deposits in the thermal area. The deposit was discovered by Mormon settlers around 1855 who used the sulfur for making gunpowder. Between 1890 and 1906 the Sulphurdale deposit was a major domestic source of sulfur (Rodriguez, 1960). The deposit is presently being mined for use as fertilizer.

The sulfur occurs in intensely altered alluvium derived from the

surrounding outcrops of Three Creeks Tuff. Native sulfur fills open spaces in the altered rocks, and pyrite and marcasite occur at depths as shallow as 10 feet (Rodriguez, 1960).

Active hydrogen sulfide seeps occur in the central portions of the pit and in places bubble through small pools of water which are probably meteoric in origin. The waters have a pH of about 1. Drill hole 42-7 is located approximately 1 km northeast of the pit.

? Return to cars and drive back to intersection of Route 4. Continue northward into Cove Fort.

? Turn right at Highway Maintenance Yard.

approx .2 miles Turn left onto the dirt road that parallels the base of the Pavant Range. This road follows a major Basin and Range fault. The rocks on the right are intermediate composition lava flows of the Bullion Canyon Volcanics. The Three Creeks Tuff forms the low hills to the left.

approx. .5 miles STOP 2. Rainbow Fluorite Mine. This is one of two fluorite deposits in the Cove Fort area. Both of the deposits are located on the Basin and Range fault. Colorless fluorite in these deposits occurs in brecciated limestone of the Oquirrh Formation.

Native sulfur occurs in the Rainbow pit and is associated with hydrogen sulfide seeps at several locations along this fault.

The outcrops to the west across the valley are composed of Three Creeks Tuff.

Return to Cove Fort.

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_____ 1978b, Cove Fort-Sulphurdale Unit Well Forminco #1, Millard Co., Utah, technical report.

_____ 1978c, Cove Fort-Sulphurdale Unit Well #42-7, Beaver Co., Utah technical report.

UNITED STATES
DEPARTMENT OF THE INTERIOR
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Conservation Division, MS-92
345 Middlefield Road
Menlo Park, CA 94025

NOV 10 1980

→ Joe Moore
Dennis Nielson
Howard Ross
Deb Schrocker

NOV 6 1980

Memorandum

To: Interested Parties

From: Acting Deputy Conservation Manager, Geothermal

Subject: Plan of Development, Utilization, and Injection, R and R Energies, Inc., Federal Leases U-29555, U-29556, and U-29558, Cove Fort-Sulphurdale KGRA, Beaver County, Utah
Ref: 2403-01 U-29555 (POO for EA 150-81)

R and R Energies, Inc., has submitted a Plan of Operation for Development, Utilization, and Injection in accordance with 30 CFR 270.34 to construct two steam transmission pipelines, a plant to produce alcohol, and to inject spent geothermal fluids on Federal Leases U-29555, U-29556, and U-29558 in the Cove Fort-Sulphurdale KGRA, Beaver County, Utah.

A joint Environmental Assessment (EA #150-81) will be prepared by the Office of the Deputy Conservation Manager for Geothermal (DCM, Geothermal) and the Fishlake National Forest for the proposed operations.

You are invited to participate in a field inspection to be led by Mr. Ken Bull, Salt Lake City District Geothermal Supervisor, 1745 West 1700 South, Rm. 2006, Salt Lake City, Utah, on November 13, 1980. Participants are asked to meet at Cove Fort, Utah at 10:00 a.m. on the day of the inspection. A limited number of copies of the Plan will be available at the field inspection. If you are unable to attend the formal inspection, you are encouraged to visit the site at your own convenience. Additional copies of the Plan will be available from the Office of the District Geothermal Supervisor, Salt Lake City, Utah, or R and R Energies, Inc.

We urge you to send written commentary and will appreciate hearing from you even if you are of the opinion that the existing regulations, lease terms, and operational orders provide adequate environmental protection.

All comments concerning the proposed actions should be received no later than December 8, 1980 by:

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U.S. Geological Survey - Conservation Division
345 Middlefield Road, MS-92
Menlo Park, CA 94025
Tel: (415) 323-8111, ext. 2848 (FTS: 467-2848)

All comments will be given serious consideration in the preparation of the Environmental Assessment and any subsequent conditions of approval.

The Office of the Deputy Conservation Manager for Geothermal will routinely distribute copies of the completed EA to the surface managing agency, the lessee, Geothermal Environmental Advisory Panel (GEAP) and the U.S. Fish and Wildlife Service. Other interested parties may receive a copy of the final EA upon request. Copies of the EA will also be available for inspection during normal business hours at the Office of the Deputy Conservation Manager for Geothermal, the District Geothermal Supervisor's Office, and the U.S. Forest Service Supervisor's Office having responsibilities for the area under consideration.

William F. Isherwood

* * * * *

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COVE FORT-SULPHURDALE KGRA AEROMAGNETIC SURVEY

The Cove Fort-Sulphurdale aeromagnetic survey was completed as part of the Department of Energy/Division of Geothermal Energy (DOE/DGE) Industry Coupled Program. The data will assist in an understanding of the geologic controls of geothermal systems, and of the local geology itself. A detailed quantitative interpretation of the data is underway by scientists at the Earth Science Laboratory and this will be released upon completion.

The survey was flown and compiled by Aerial Surveys, Salt Lake City, Utah. The compilation included removal of diurnal variations and the IGRF to arrive at a residual map of total magnetic intensity. The survey was flown in September 1978.

Flight parameters for this survey were:

Flight Altitude: 1000 feet above mean terrain
Flight Line Spacing: Approximately 1/2 kilometer
Flight Line Direction: North-South

Howard P. Ross
Howard P. Ross
Project Manager
Industry Coupled Program

HPR:srm

UNION 76

Memo: E&PE 77-32M

From: W. R. Fillippone

Date: April 18, 1977

Division: Exploration and Production Research

Project: 627-68711

Subject: SEISMIC SURVEY, COVE FORT, UTAH

SUMMARY

During the period from November 9 to November 17, 1976, the research seismic equipment was used to conduct a seismic survey of nine lines in the Cove Fort Area, Utah. Four lines were near the Union No. 1 Well in the NENE Section 29, T25S, R6W, Millard County, Utah, two were near the townsite of Cove Fort, and three were near Sulphurdale, three miles south of Cove Fort. The data are extremely poor, dips are steep, and correlation to lithology is unreliable. (deletion, 1)*

Poor performance of the energy source used resulted from the high altitude (>6000 feet [1829 meters]) and lack of multiplicity of fold, (deletion, 2)*

Dips range from flat to vertical and some are overturned. Five reflection events were selected and correlated from line to line, but much doubt is expressed for their correlations and continuities. No recommendation can be made for a drill site location based on the seismic interpretation. All data were corrected to a datum plane of 6000 feet (1829 meters) above sea level.

INTERPRETATION OF THE LINES

Line 1 has a direction generally S15°W from the SW corner of Section 21, T25S, R6W. It has a total length of 4180 feet (1274 meters). The dip component is approximately 65° southerly on all horizons. Line 2 extends approximately S65°W from this same section corner and has a general dip component of 10° southwest.

The resolution of the shallowest (A) horizon shows a depth of 1400 feet (427 meters) in the southeast quarter of Section 20 and a dip of 55°, S18°E.

Line 3 is a continuation of Line 2 with a general direction of S55°W. Dip components are 12° southwest along the east half and 4° southwest along the west half.

Line 4 has a general direction of S18°E. The dip component along the south half of the line is 13° northwest and 5° southeast for the north half of the line.

Resolution of these dips for horizon (A) at the intersection of these two lines shows a dip of 20°, N60°W at a depth of 2369 feet (722 meters) in the center of Section 29, and a dip of 7°, S49°E at a depth of 2745 feet (837 meters) at the northwest corner of Section 29.

Line 7 is along the west side of Section 30 and runs S12°E. The dip component along this line in the shallow section is 68° northwest. At the north end of the line, a strong southerly component is present but cannot be resolved for lack of a cross component.

Line 8 extends along the Cove Fort Road along the south line of Section 30, has a general direction of N75°W, and a dip component of 36°. Resolution of the dips at the intersection of Lines 7 and 8 for the (A) horizon shows a dip of 76°, N21°W at a depth of 1552 feet (473 meters) at the center of Section 31. Dips from deeper events are vertical and south of this section.

Line 9 is along the road west of Sulphurdale and extends N20°E to tie Lines 10 and 11. The dip component along Line 9 is 38° northeast.

Line 10 extends S79E from the south end of Line 9 and has a dip component of 25° southeast. Resolution of Lines 9 and 10 at horizon (A) shows a dip of 43°, N47°E at a depth of 3957 feet (1206 meters) in the northeast quarter of Section 14, T26S, R7W.

Line 11 extends S75°E from the north end of Line 9 and has a dip component of 35° southeast. Resolution of Lines 9 and 11 at horizon (A) shows a dip of 56°, N60°E at a depth of 4637 feet (1413 meters) in the northeast quarter of Section 11.

Correlative events on the southeast ends of Lines 10 and 11 equivalent to horizon (A) show dips of 23° and 24°, N60°W, at depths of 1739 and 2093 feet (530 and 638 meters), respectively. Projection of this event to the surface suggests it is the top of the Tbc volcanics if the faults have no significant throw.

RECORD SECTIONS

Line 1 composite record section Shot Point 1 has prominent reflection events [illegible] and 1.45 (E) which have a southerly

in the central part of the line from SP 12, traces 1-24. An event at 0.120 second would have a depth of 950 feet (290 meters) below the surface. Strong dips at SP 39 have a north component of 0.530 second per spread or 67° northerly at a depth of 1049 feet (320 meters). The (deletion, 3)*line 1 exhibits these same trends, though all of the data in this area are poorly continuous.

Lines 2 and 3 show a gentle westerly component in very poor data by any source. It is not possible to define any faulting but correlation from east to west does not confirm any major faulting.

Line 4 appears to be gently synclinal, but has some strong events dipping southerly 73° from the north end of the line at a depth of 985 feet (300 meters). Both energy source type sections agree.

Line 8 has many short segments of reflection events which dip strongly west except for very shallow events to 0.5 second which may be adversely affected by the normal move out correlation. These events are probably reflected refractions from the highway nearby. The (deletion, 4)*Line 8 has a number of events which show strong easterly trends, and some nearly flat events in the shallow section. The two sections show agreement only if the low dip segments are picked exclusively.

Line 7 also has flat dips in the shallow section to 0.5 second but all deeper events dip strongly northward.

Line 9 is on alluvial fill with large weathering problems but the reflection events all appear to dip strongly to the north at 40 degrees, though the normal moveout has an abnormal affect on those events, indicating they are at least not in the plane of the record section. Some short segments can be picked that are nearly horizontal.

Lines 10 and 11 show components that dip generally eastward below 0.8 second. Some short segments are nearly horizontal and some in the shallow section on the east ends of the lines show strong west components at 24° dip. One can pick segments on all three lines near Sulphurdale to show that the events under the lines are nearly horizontal to a depth of 6000 feet (1829 meters).

(deletion, 5)*

(deletion, 6)*

Velocity analyses were run on several lines, but because of the steep dip it was difficult to find agreement. A composite velocity analysis yielded a function of VZ = 8852 + 1.12 Z ft/sec (2698 + 1.12 Z m/sec) for normal moveout and depth calculations. Datum was chosen at 6000 feet (1829 meters) above sea level and all traces and shot points were corrected to the flat datum using 2500 feet (762 meters) per second for the weathering velocity and 10,000 feet (3048 meters) per second for the datum correction velocity. Weathering was assumed to be one half the depth from surface to datum since no adequate calculation from refraction breaks was possible. True dips were calculated from components of intersecting lines. All elevations were calculated from transit survey notes tied to the BM at Cove Fort with an elevation of 5998 feet (1828 meters) above sea level. Trace interval was 110 feet (33.5 meters). Twenty-four trace spreads were shot off-end. Nine geophones per trace, fifteen feet (five meters) apart were used. Individual shots were vertically stacked, normal moveout was removed, and datum time corrections were applied. The traces were filtered using a band pass filter from 10-35 Hertz, down 36 db at 5 and 40 Hertz.

ENERGY SOURCES

(deletion, 7)*

Three shots were taken at each shot point and were vertically stacked. The air wave is visible across the record traveling at 1130 feet (344 meters) per second. Shots were made at 100, 165, and 220 feet (33.5, 50, and 67 meters) from the closest trace at each end of the spread and vertically stacked at 165 feet (50 meters) from the center of the end trace. Attempts were made to attenuate the air wave by shooting at 7-foot (two-meter) intervals but little improvement was noted. The air wave is rich in frequencies above 40 Hertz.

(deletion, 8)*

Logistics. Five men from Research and three local laborers were employed to conduct the survey. DFS III instruments in the research recording truck were used recording 24 channels of data on 0.5-inch (12.7 mm) magnetic tape. A step van transported cables, geophones and the energy sources to Cove Fort for field use. Two cars were used for auxiliary transportation and elevation surveying. The weather was cold each morning, with rain on one day, and snow on another. The men were housed in Beaver, Utah, about 30 miles south of Cove Fort. The data were processed at the Union Research Center on a 370/155 IBM computer.

Appendix A

Reasons For Text Deletions

Deletion, 1	Refers to energy source
Deletion, 2	Refers to oil and gas work in another area
Deletion, 3	Refers to energy source
Deletion, 4	Refers to energy source
Deletion, 5	Refers to oil and gas work in another state
Deletion, 6	Refers to oil and gas work in another area
Deletion, 7	Refers to energy source
Deletion, 8	Refers to energy source

Item (1) C. .2) Seismic Survey

A description of the headings for the columnar survey data and weathering correction data is provided below:

Symbol	Description
RODLOC	Rod location
ELEVRD	Elevation of the rod
ELEV. ANG	Elevation angle from the transit rod
FAZ	Foresite azimuth
DISTANCE	Distance
XLOC	X Distance from origin
YLOC	Y Distance from origin
DSCRPT	Description
ATP	Location of transit or shot point

Under "DATUM", the sequential numbers refer to the geophone positions. The second column lists elevations of the positions. The third column contains total corrections to datum.

The weathering factor (line 9) refers to an aerated shallow subsurface section between the water table and surface which varies in thickness and due to aeration is low velocity material. This characteristic of the shallow subsurface is a natural occurrence and makes reflectance events appear crooked.

The formula used for the weathering correction is as follows:

$$T_R + T_W = T_C \text{ , where}$$

T_R = Time in subsurface weathered zone

T_W = Time in weathered layer

T_C = Total correction for specific geophone

The total correction for a specific geophone is the sum of the time in the subsurface weathered zone plus the time in the

weathered layer. It was assumed that the weathered layer is equal to .5 (one-half) of the difference between elevation and datum. The distance of the weathered layer is divided by the velocity in the weathered layer to achieve the time in the weathered layer. And, the distance of the subsurface weathered zone is divided by the velocity of the subsurface weathered zone to achieve the time in the subsurface weathered zone.

$$T_R = \frac{D}{V_R} \text{ and } T_W = \frac{D}{V_W}$$

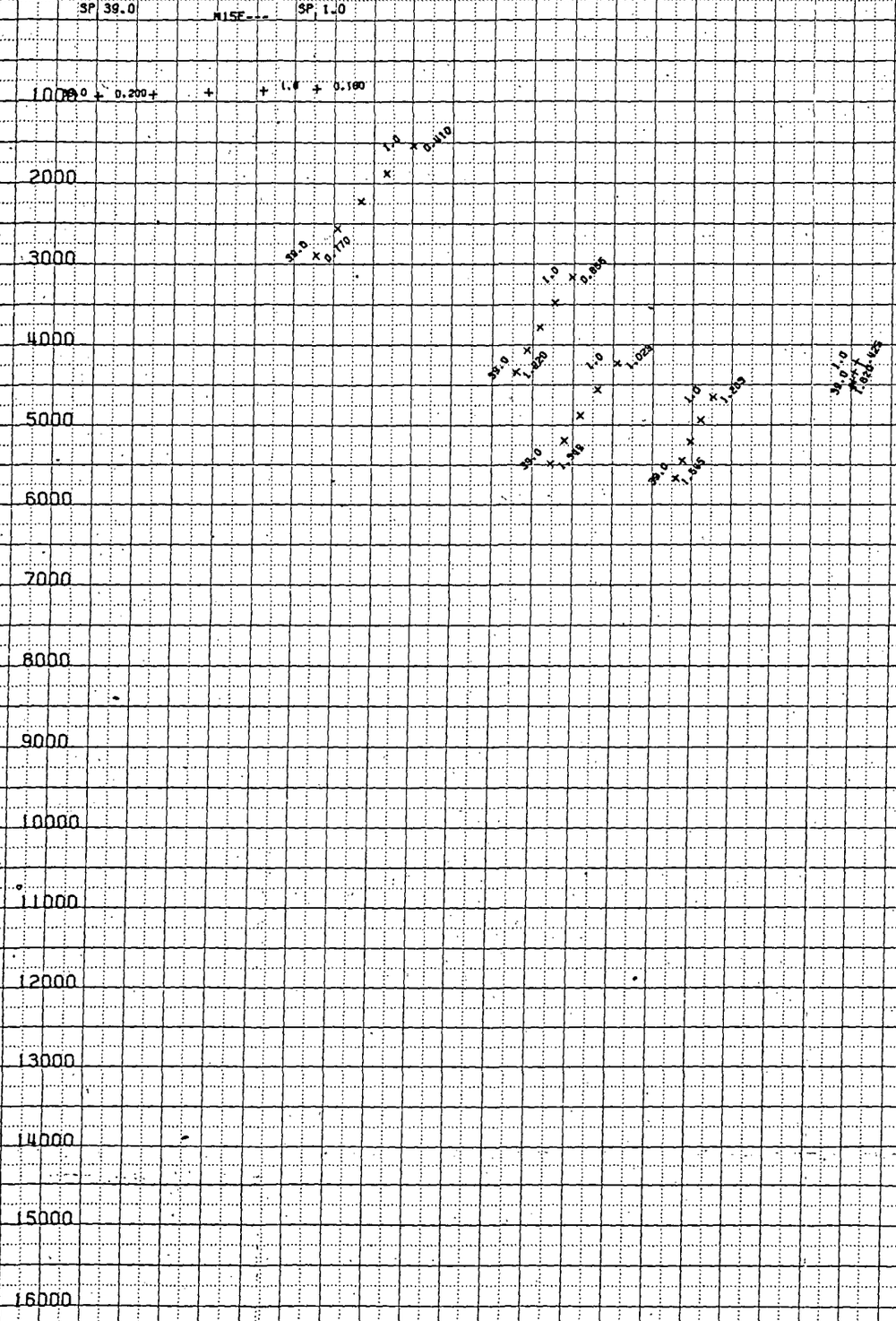
and, $T_R + T_W = T_C$ Total correction for specific geophone.

The last page of tabulations is a velocity analysis. A description of the columnar headings appears below:

Symbol	Description
TD	Reflection time
VRMS	Root Mean Square Velocity
VAVE	Average velocity
DEPTH	Depth
AVE. DENS	Average density from average velocity
HYDR. PRESS.	(Depth) X (.465) = pounds per square inch of Hydrostatic pressure
DINT	Depth Interval
VINT	Interval Velocity
INT. DENS.	Interval Density
PHI	Average porosity of Interval
F.P.	Formation pressure
DELTA T	Interval transit time in microseconds per foot
MUD WT	Drilling weight required to keep hole open
VZ	Linear increase in velocity with depth
VK	Linear increase in velocity with time

Please note that the correct datum plane elevation is 6,000 feet and not 0 (zero) feet as it is indicated on the last page of the tabulations.

UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION
COVE FORT AREA, UTAH
LINE 1, SP 1-39
HORIZONTAL SCALE=1"=2000'
M.A.FILLIPPONE APRIL,1977



LINES 2&3, SP 1.5-26.5

HORIZONTAL SCALE = 1" = 2000.
M.A. FILLIPPONE APRIL, 1977

SP 26.5 N55E SP 13.0 SP 26.5 N55E N65E SP 1.5

1000 28.5 + 0.195 + 13.0 + 0.185 28.5 + 0.200 + + + 1.5 + 0.180

2000

28.5 + 0.310 + 13.0 + 0.425 + 1.5 + 0.680 28.5 + 0.830 + + 1.5 + 0.480

3000

4000

5000

6000 28.5 + 1.035 + 13.0 + 1.050 13.0 + 1.050 28.5 + 1.600 + 1.000 + 1.5 + 0.980

7000 28.5 + 1.242 + 13.0 + 1.155 13.0 + 1.155 1.5 + 1.120 + 1.5 + 1.100 28.5 + 1.170 +

8000 1.5 + 1.290 + 1.5 + 1.270 13.0 + 1.342 28.5 + 1.316 +

9000 28.5 + 1.338 + 13.0 + 1.382

10000 1.5 + 1.505 13.0 + 1.580 + 1.5 + 1.500

11000 28.5 + 1.540 28.5 + 1.580 + 13.0 + 1.580

12000

13000

14000

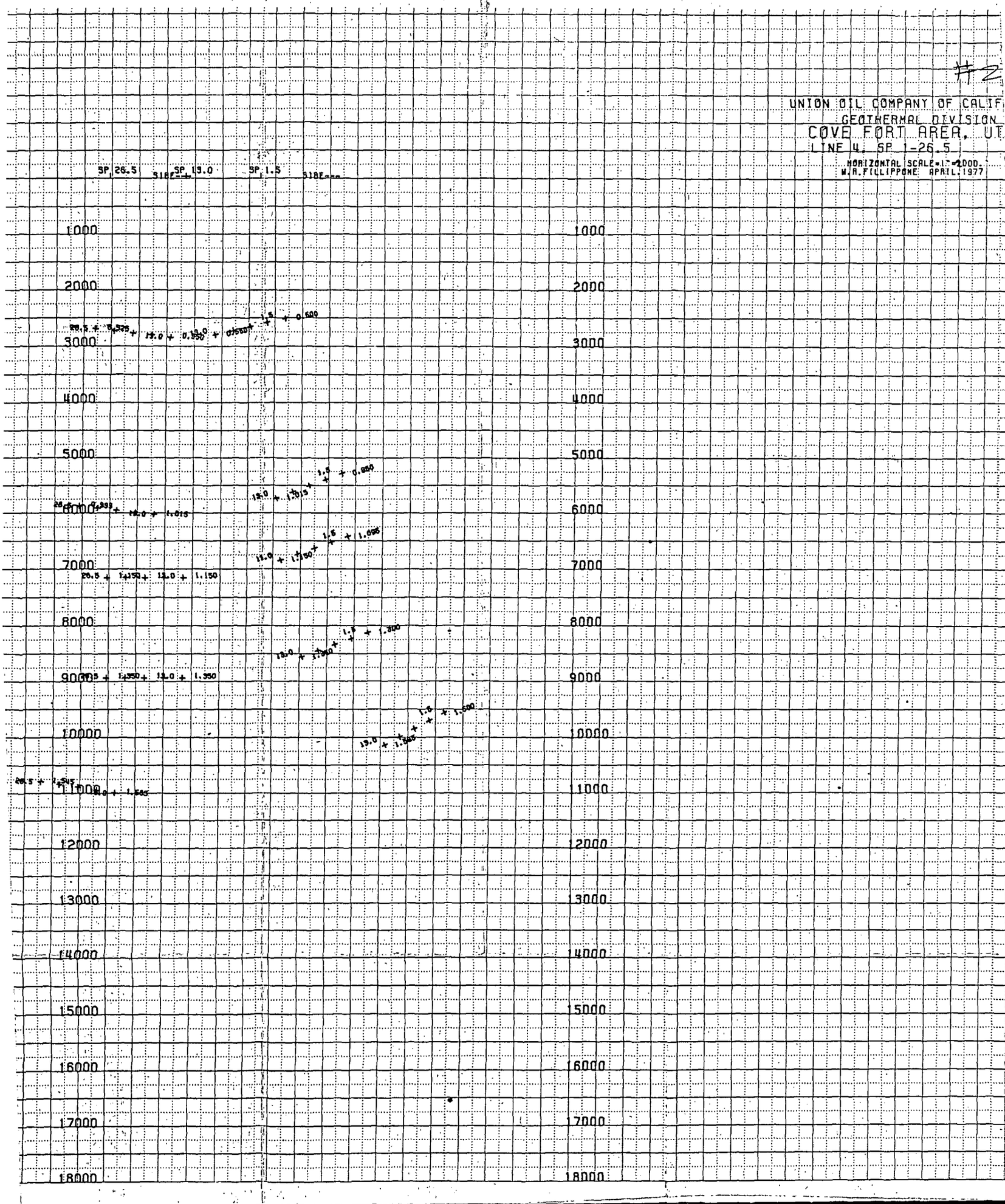
15000

16000

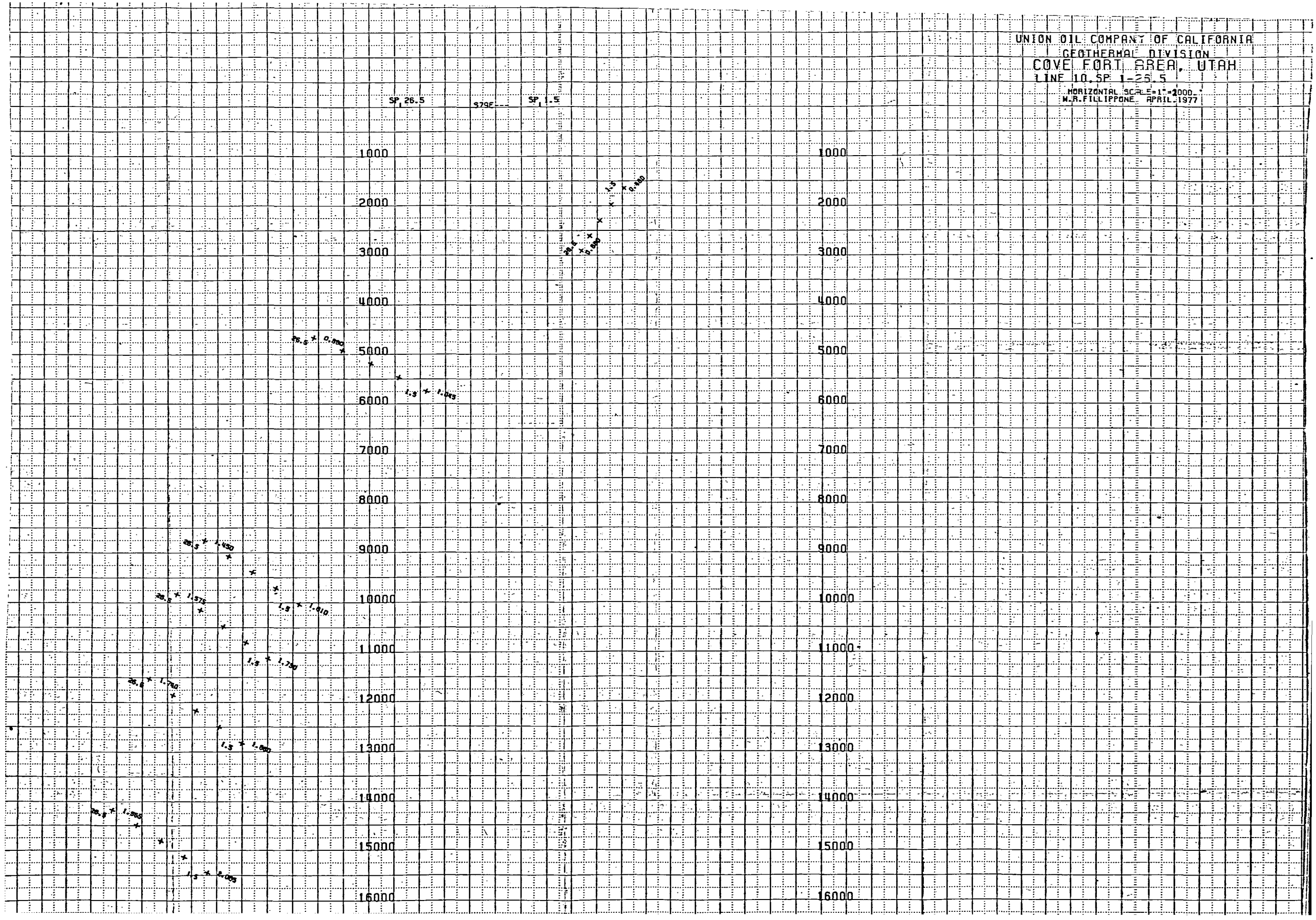
17000

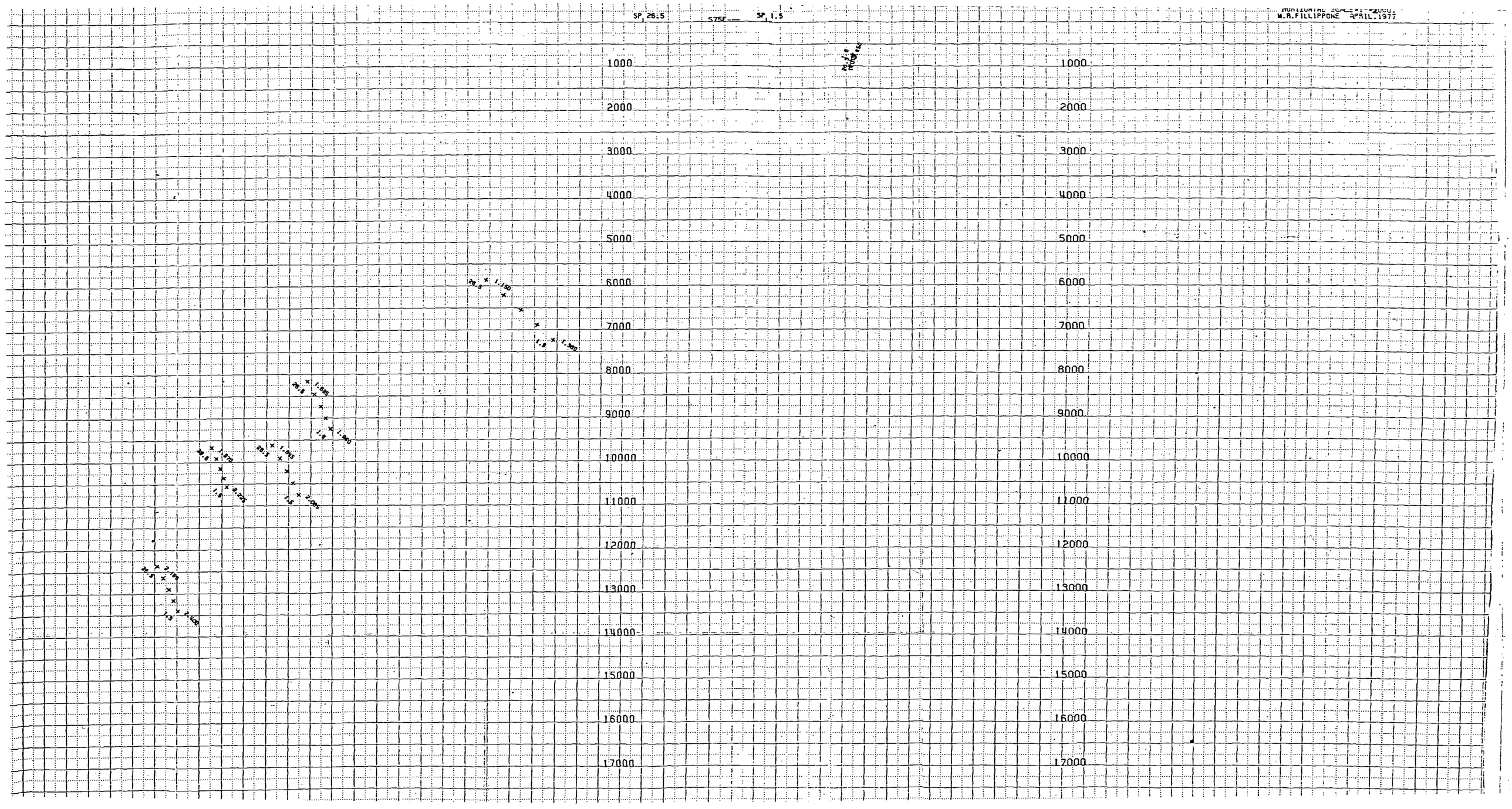
#2

UNION OIL COMPANY OF CALIF
GEOTHERMAL DIVISION
COVE FORT AREA, UT
LINE 4, SP 1-26.5
HORIZONTAL SCALE=1"=2000.
W.A.FILLIPPONE APRIL 1977



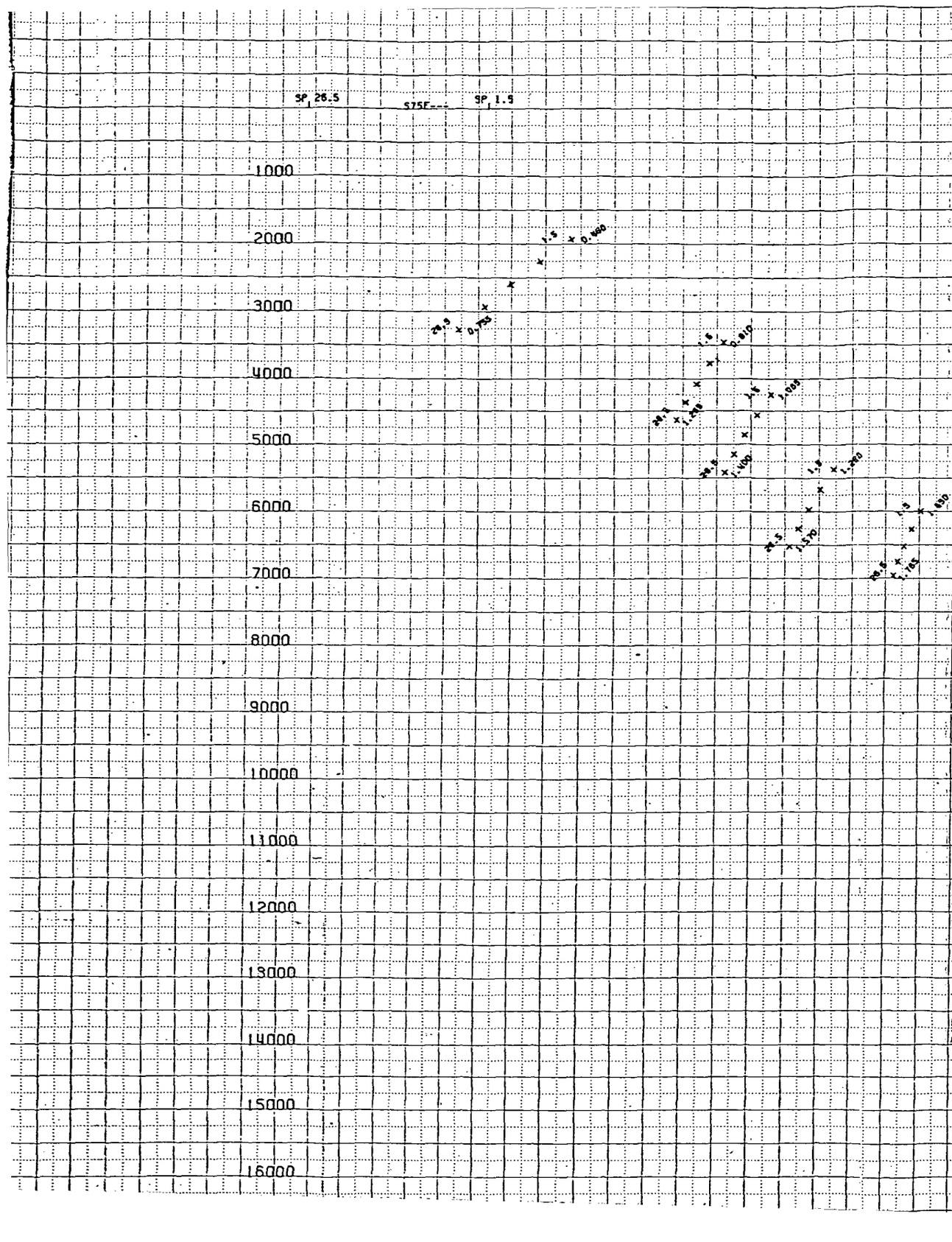
UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION
COVE FORT AREA, UTAH
LINE 10, SP 1-26.5
HORIZONTAL SCALE=1"=1000'
M.R.FILLIPPONE APRIL, 1977




SP 28.5
S75E
SP 1.5
M.R.FILLIPPONE APRIL.1977
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000
17000
28.5 x 1,130
1.5 x 1,980
28.5 x 1,565
1.5 x 1,980
28.5 x 1,975
1.5 x 2,224
28.5 x 1,845
1.5 x 2,090
28.5 x 2,185
1.5 x 2,400

UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION
COVE FORT AREA, UTAH
LINE 8, SP 1-26.5

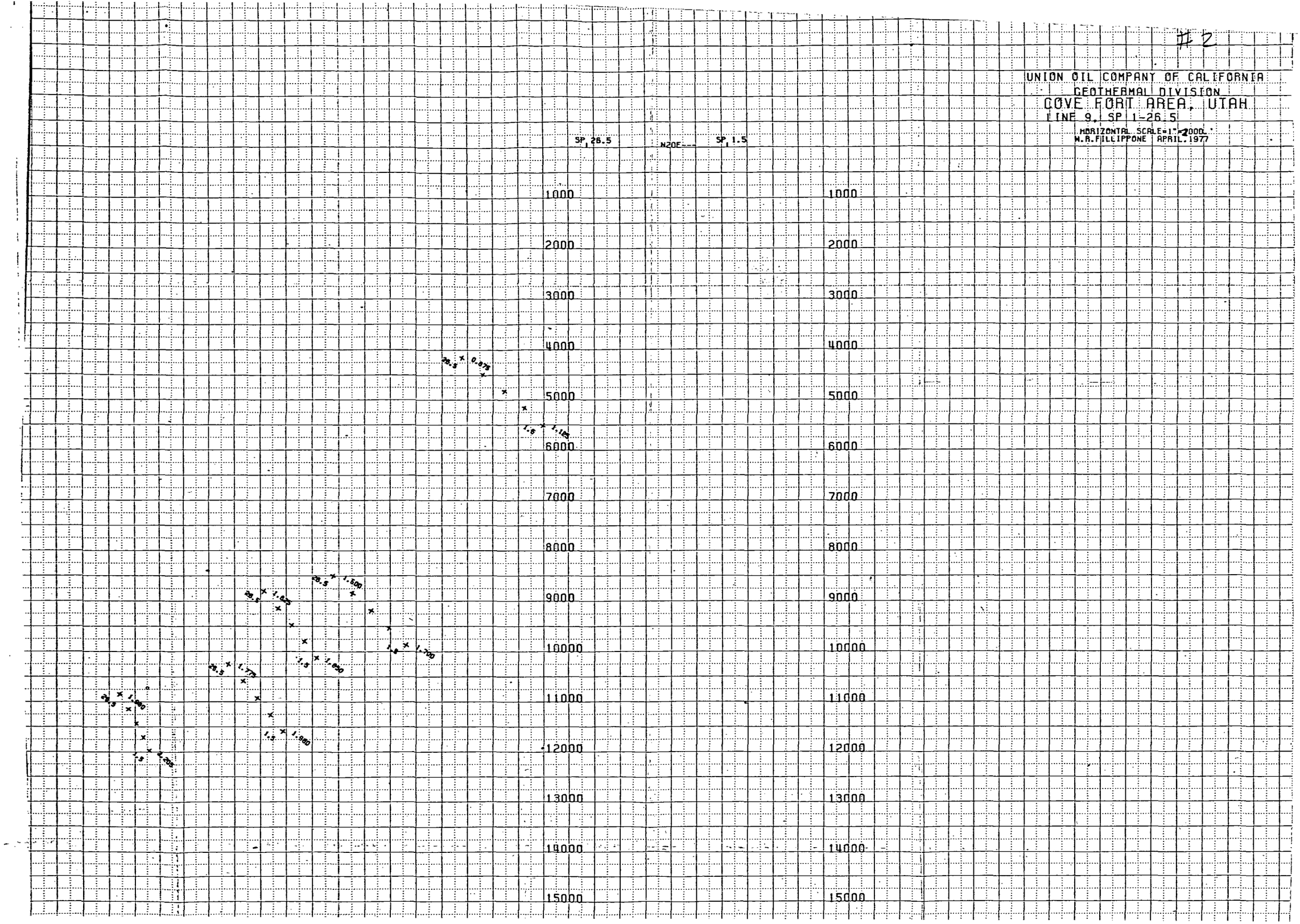
HORIZONTAL SCALE=1"=2000.'
W.A.FILLIPPONE APRIL,1977



1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000

#2

UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION
COVE FORT AREA, UTAH
LINE 9, SP 1-26.5
HORIZONTAL SCALE=1"=2000'
W.R.FILLIPPONE APRIL.1977



#2

UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION
COVE FORT AREA, UTAH
LINE 7, SP 1-26.5
HORIZONTAL SCALE=1"=1000'
W.A.FILLIPPONE APRIL 1977

SP 26.5 SIZE-- SP 1.5

1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000