



**1:240 / 1:600**

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	28-Jan-13	30-Jan-13			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	675.00	6,237.00			
Log End Depth (MD, ft)	6,237.00	7,380.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	27-Jan-13 07:30	28-Jan-13 00:30			
Drill/Wipe End Date and Time	28-Jan-13 10:45	29-Jan-13 21:30			
Min Inc (deg) @ Depth (MD, ft)	.06 @ 1,935.00	.75 @ 6,285.00			
Max Inc (deg) @ Depth (MD, ft)	13.87 @ 2,789.00	85.02 @ 7,380.00			
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC			
Flow Rate (gpm)	580.00	547.20			
Max AV (fpm) / CV (fpm) @ MWD	477.0 /	445.1 /			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.40 / 28.00	9.83 / 40.00			
Filtrate CL (ppm)	1,800.00	2,400.00			
pH / Fluid Loss (mptm)	9.00 / 0	9.80 / 9			
PV (cP) / YP (lbf2)	2 / 2.00	13 / 13.00			
% Solids / % Sand	.7 / .01	11 / .1			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (deg F) / S	450.00 / PDC	300.00 / PDC			

Max Tool Temp (degF) / Source	150.10 / PCM	209.00 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Kyle Wass	Kyle Wass			
Customer Representative	Jim Turner	Jim Turner			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.76			
Sub Serial Number	11024568	11024568			
Insert Serial Number	11620309	11620309			
Date and Time Initialized	25-Jan-13 17:30	25-Jan-13 17:30			
Date and Time Read	30-Jan-13 04:05	30-Jan-13 04:12			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	55.00			
Software Version	6.21	6.21			
Sub Serial Number	11024568	11024568			
Sonde Serial Number	11638477	11638477			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	230.20	313.39			

### Gamma Ray Sensor Information

Tool Type	N/A	PCG			
Distance From Bit (ft)	N/A	48.13			
Recorded Sample Period (sec)	N/A				
Software Version	N/A	8.15			
Sub Serial Number	N/A	11024568			
Insert/Sonde Serial Number	N/A	11292593			

## REMARKS

1. All depths are calibrated to driller's pipe tally and are true vertical depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:  
PGRC (Gamma CG):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft  
  
ROPA (Average Rate Of Penetration):  
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill: 3.0 ft
6. Insite Version 7.4.1

WARRANTY

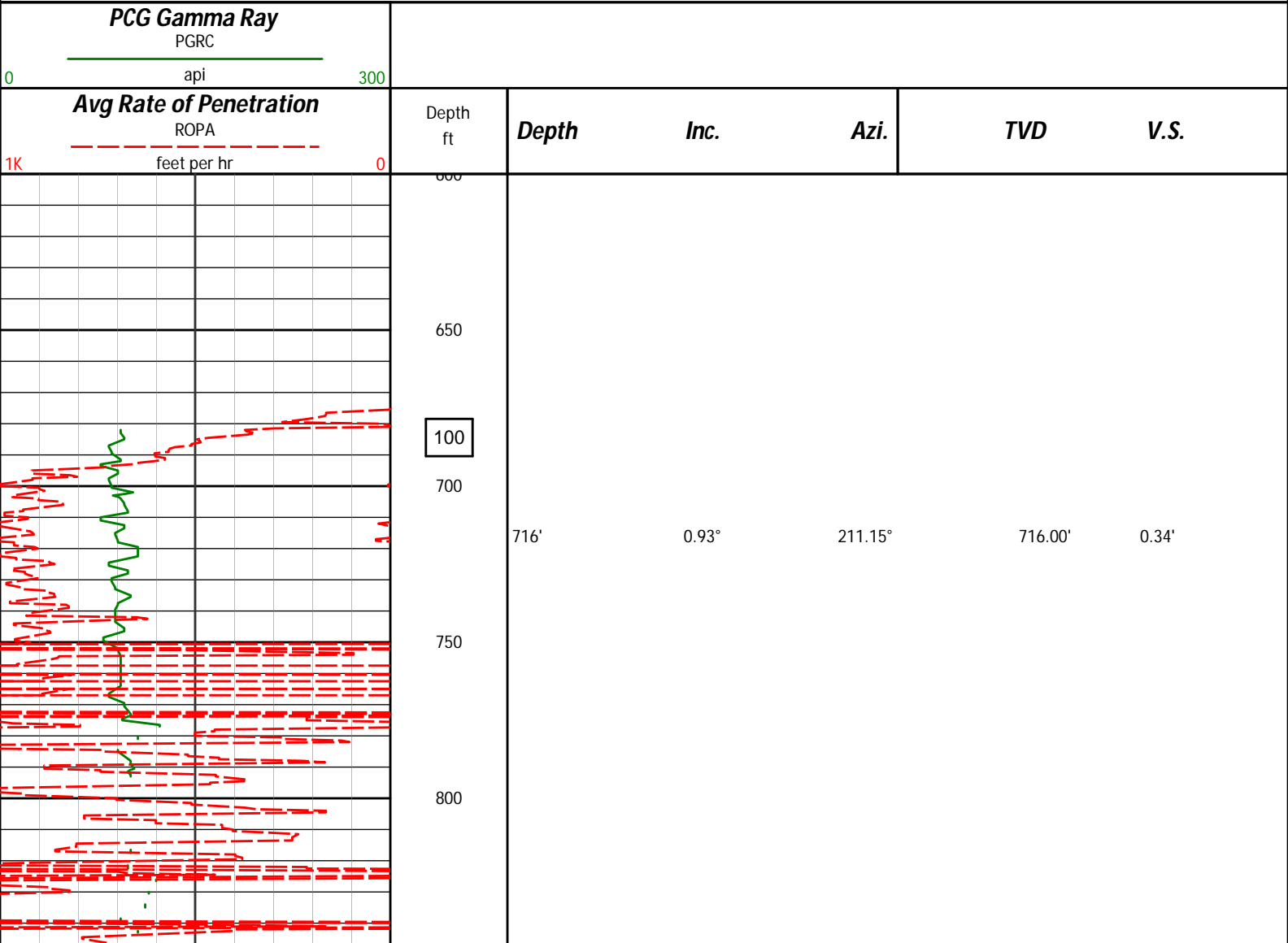
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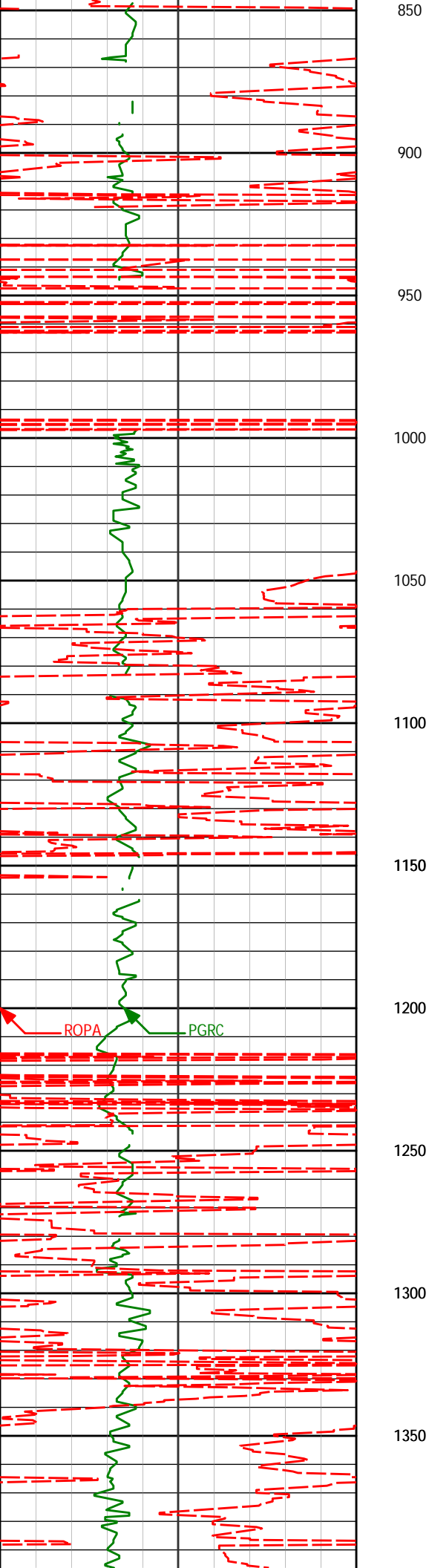
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Sperry Drilling Services

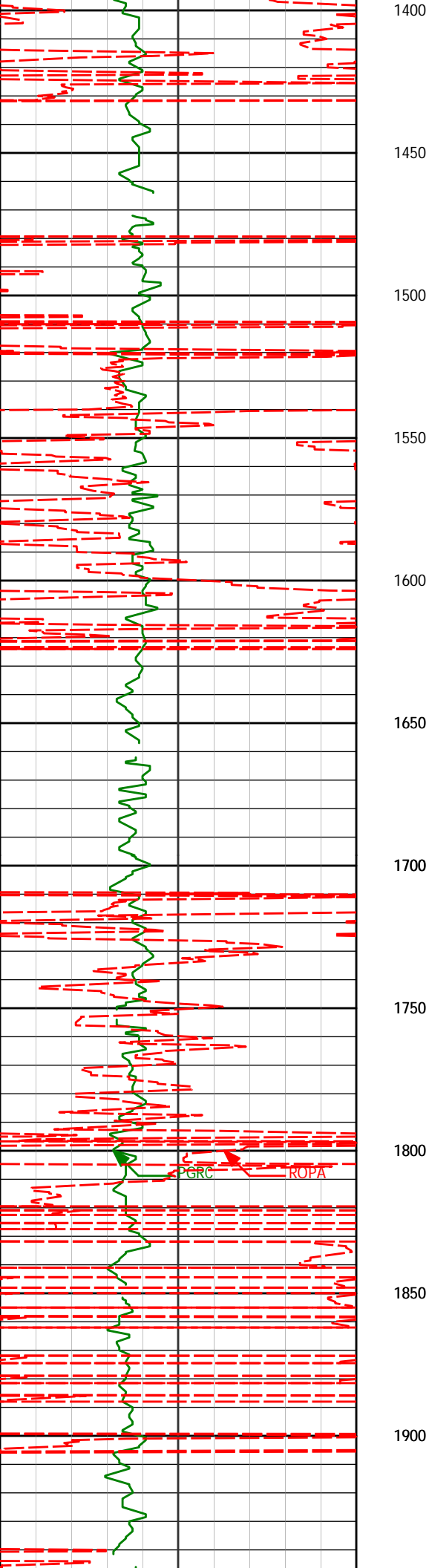
TVD Main Log 1:600

Noble Energy  
LDS E35-79HC  
HP 321  
T6N R65W





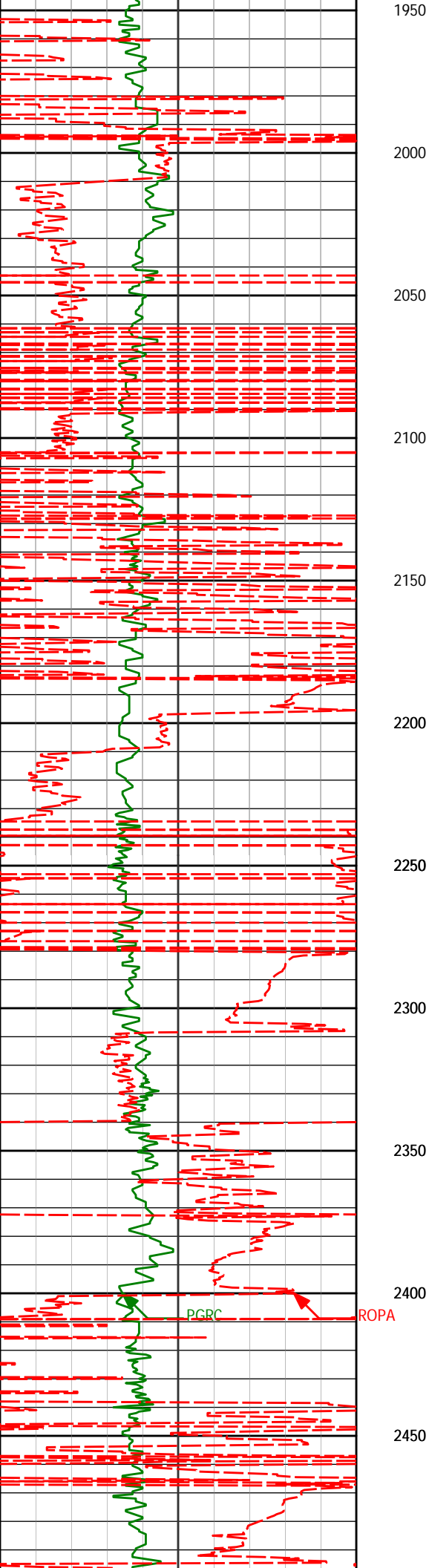
991'	1.27°	204.68°	990.95'	4.86'
1083'	0.68°	150.51°	1082.94'	6.25'
1368'	0.33°	86.18°	1367.93'	7.76'



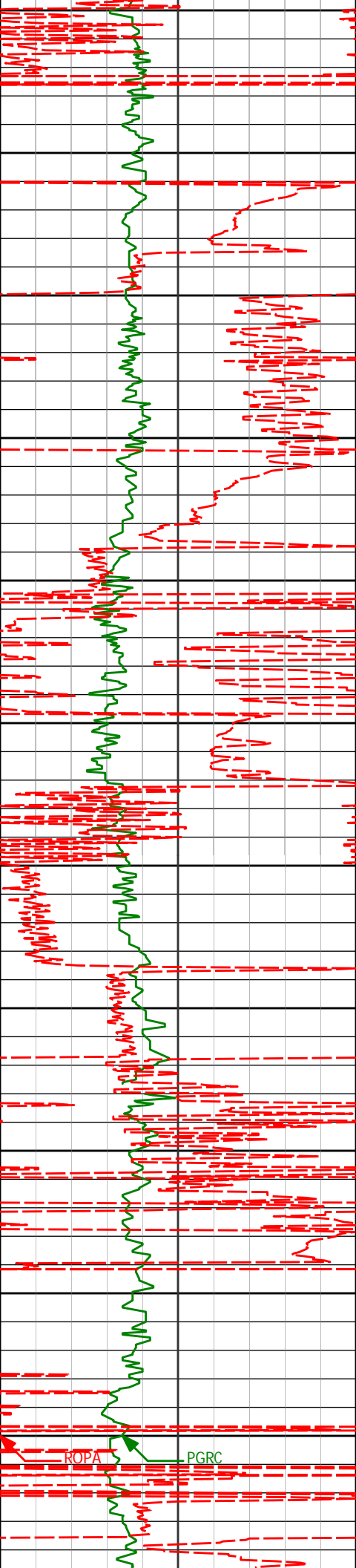
1652'	0.56°	40.55°	1651.92'	6.76'
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PGRC ROPA

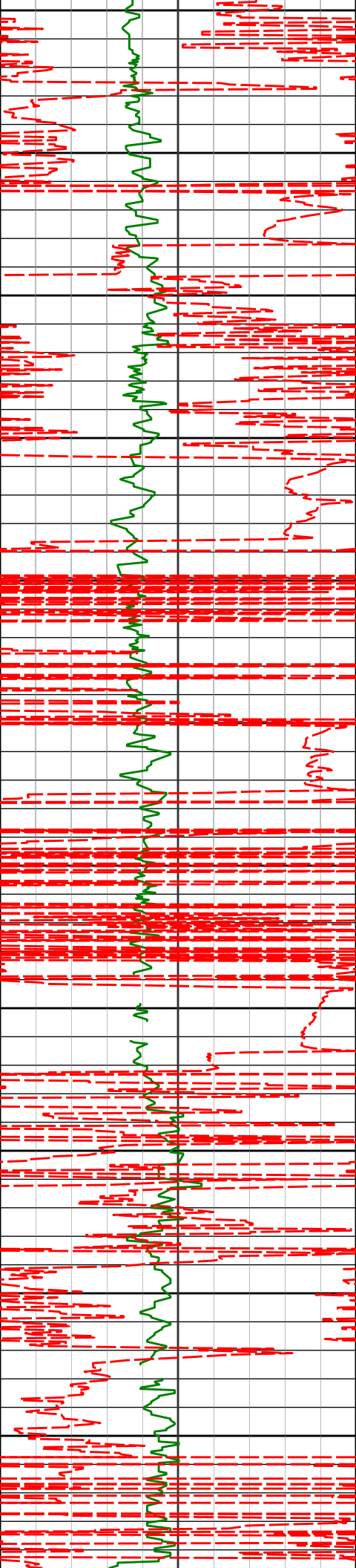
1935'	0.06°	124.00°	1934.91'	5.86'
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2125'	0.19°	27.85°	2124.91'	5.65'
2220'	0.83°	54.37°	2219.91'	5.15'
2315'	3.03°	35.89°	2314.85'	2.84'
2409'	5.56°	34.17°	2408.58'	-2.70'



2500	2504'	8.53°	32.00°	2502.85'	-12.10'
2550					
2600	2599'	9.53°	35.42°	2596.67'	-23.99'
2650					
2700	2694'	11.71°	39.22°	2690.04'	-37.23'
2750					
2800	2789'	13.87°	39.13°	2782.68'	-52.74'
2850					
2900	2883'	13.13°	38.27°	2874.08'	-69.04'
2950					
3000	2978'	13.18°	40.70°	2966.59'	-84.90'



3050

3073'

12.58°

39.99°

3059.20'

-100.22'

3100

3150

3168'

11.58°

38.04°

3152.09'

-114.91'

3200

3250

3263'

12.33°

43.48°

3245.03'

-129.01'

3300

3350

3358'

12.74°

37.93°

3337.77'

-143.83'

3400

3450

3453'

12.79°

42.51°

3430.43'

-159.04'

3500

3550

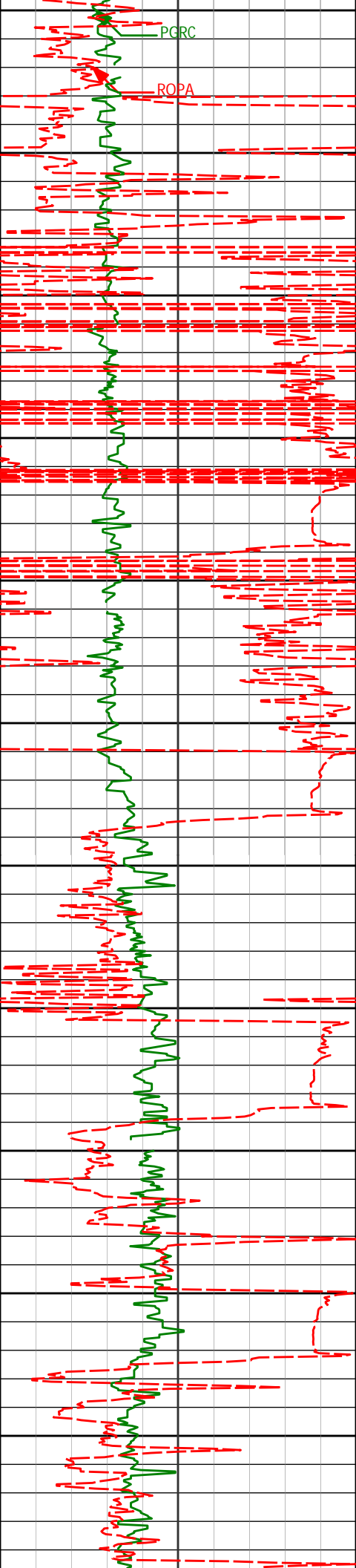
3547'

10.57°

41.50°

3522.48'

-172.41'



3600

3642'

9.69°

40.15°

3616.00'

-184.39'

3650

3700

3737'

9.17°

40.66°

3709.71'

-195.64'

3750

3800

3832'

7.23°

39.91°

3803.74'

-205.44'

3850

3900

3927'

5.76°

29.54°

3898.13'

-213.80'

3950

4000

4022'

2.71°

21.17°

3992.86'

-219.85'

4050

4100

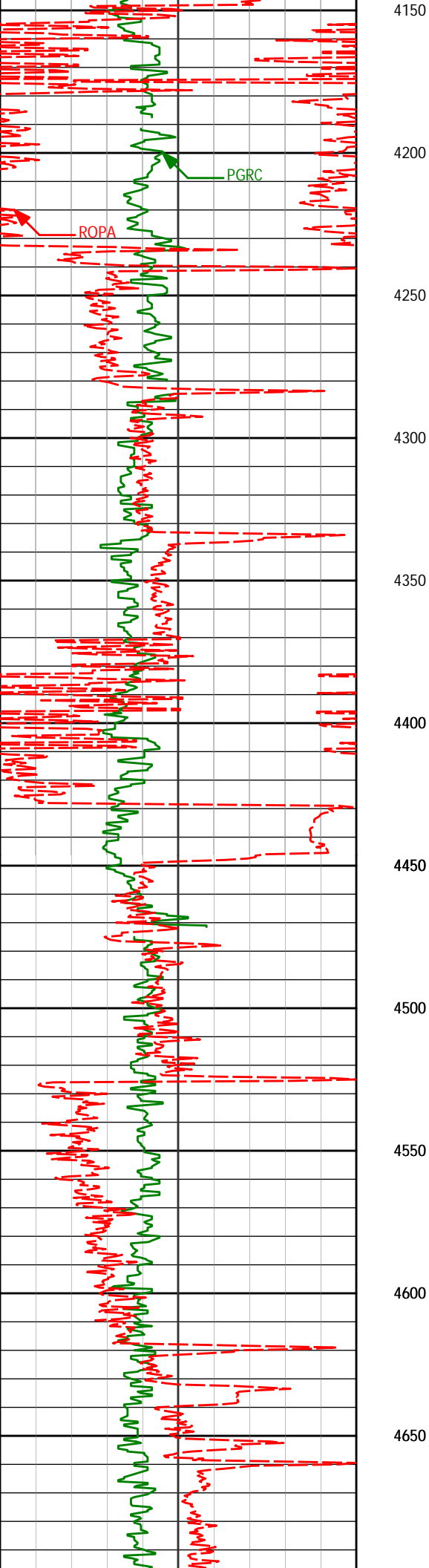
4117'

1.25°

323.33°

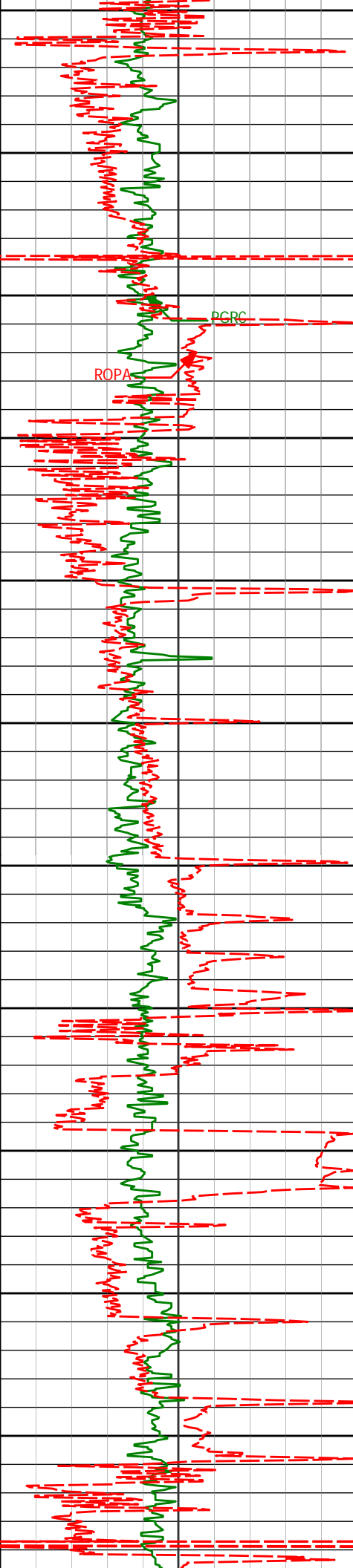
4087.81'

-222.75'



4401' 1.94° 341.59° 4371.70' -229.99'

4496' 0.65° 358.84° 4466.67' -232.09'



4700

4750

4800

4850

4900

4950

5000

5050

5100

5150

5200

4781'

0.98°

149.75°

4751.66'

-231.54'

5065'

2.18°

173.03°

5035.55'

-224.00'

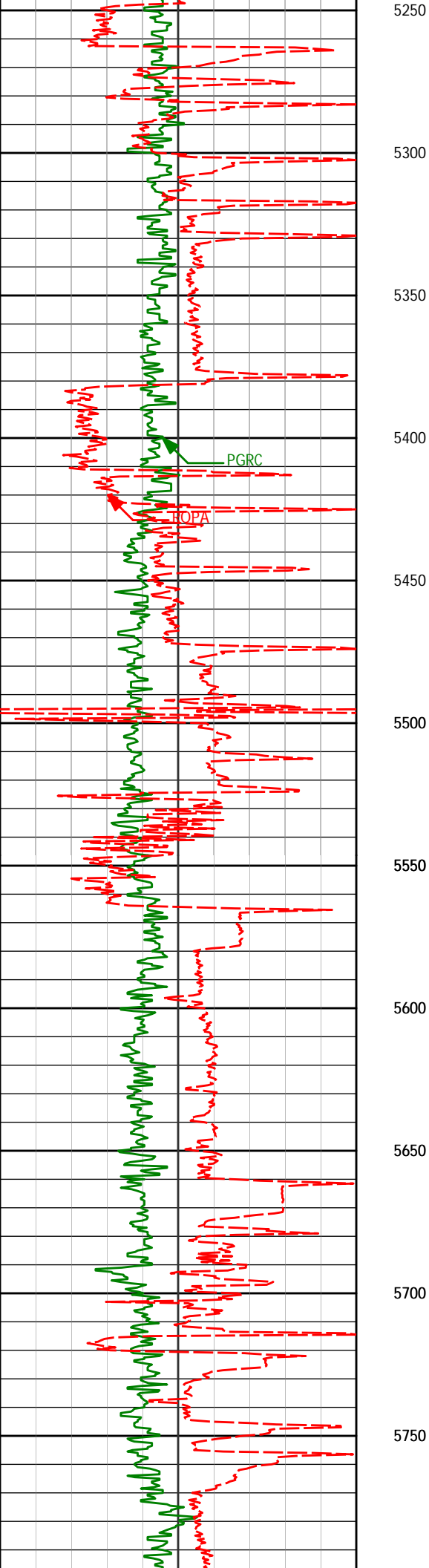
5160'

0.60°

244.73°

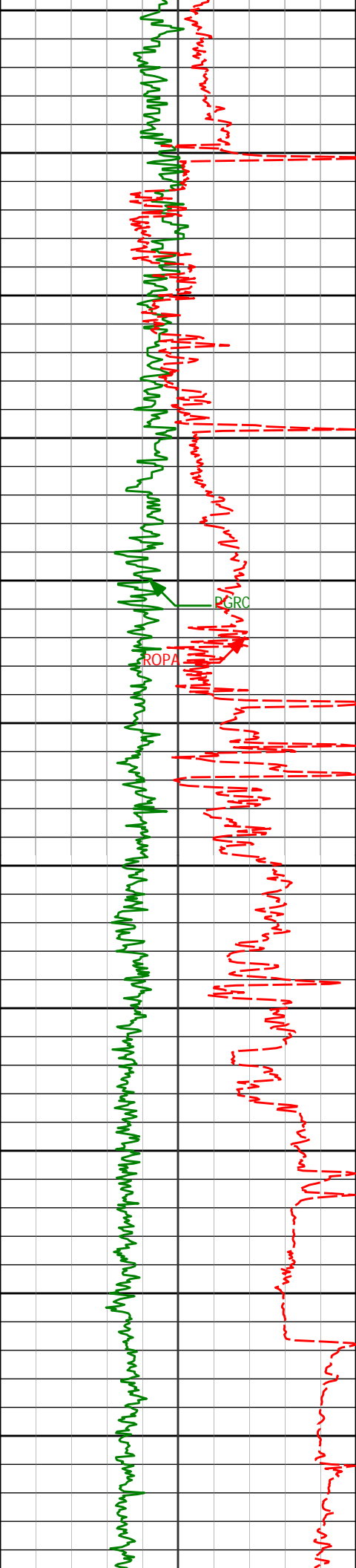
5130.52'

-222.01'

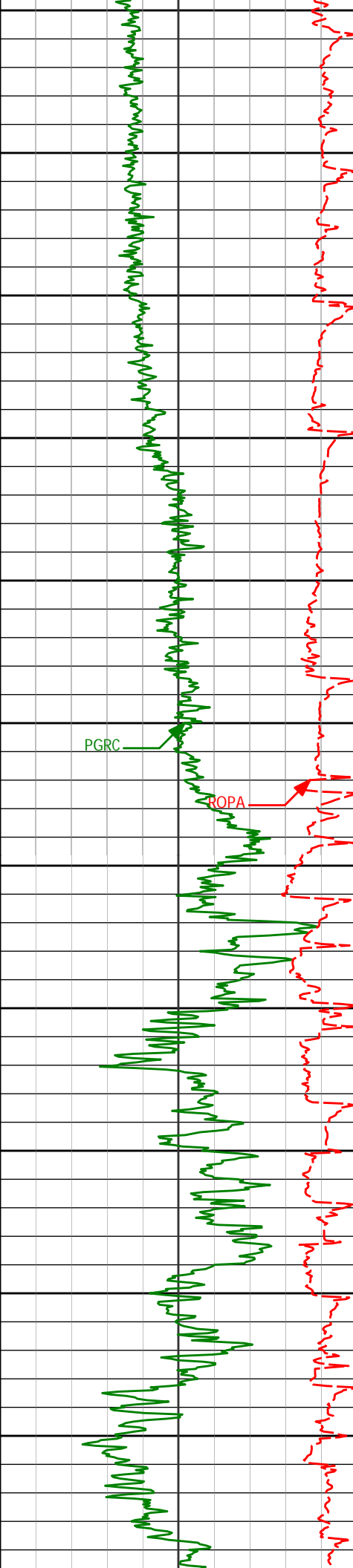


5445'	0.91°	267.85°	5415.50'	-221.50'
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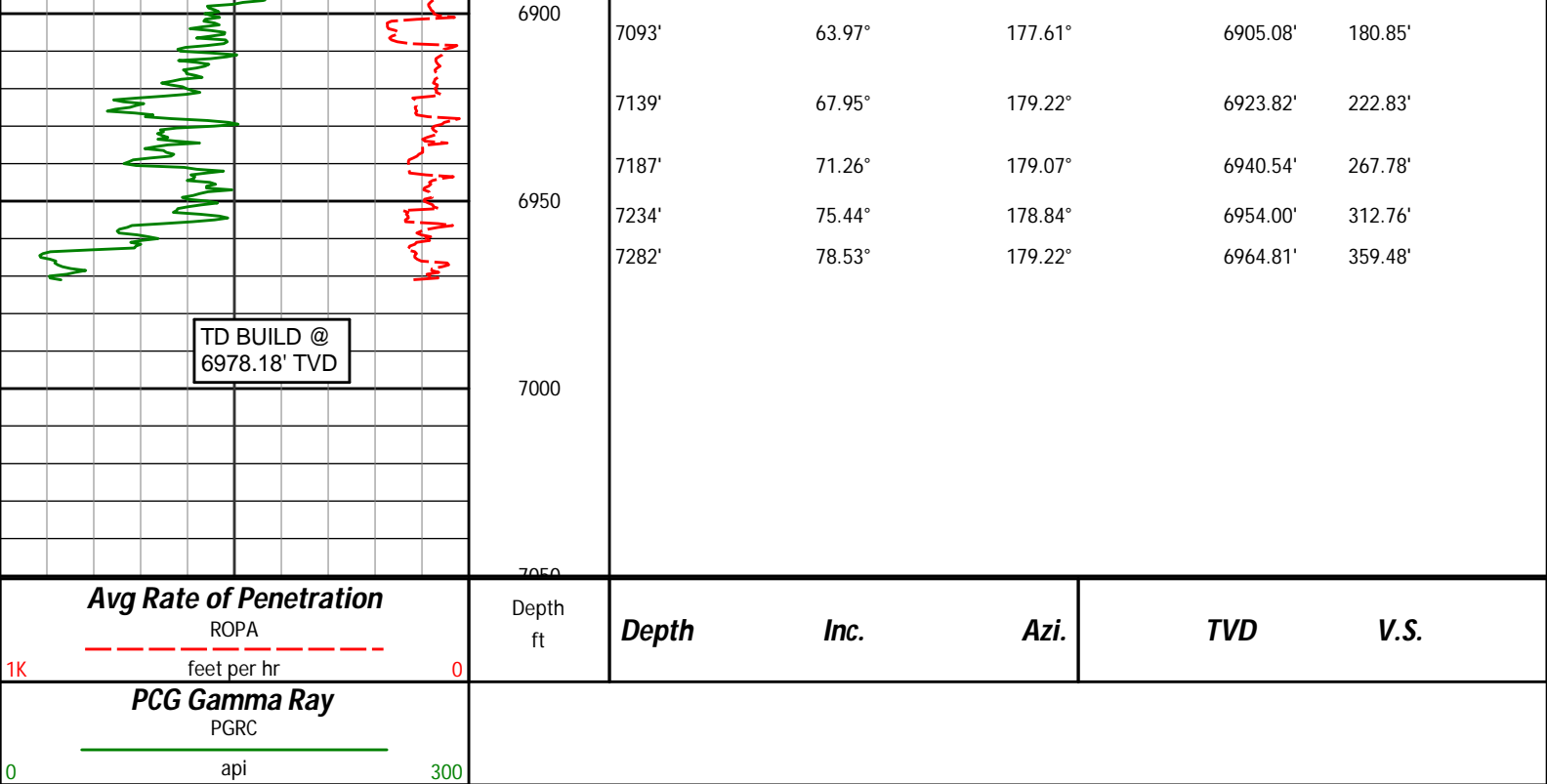
5729'	0.13°	64.57°	5699.49'	-221.67'
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5800				
5850				
5900				
5950				
6000	6014'	0.76°	34.30°	5984.48' -223.29'
6050				
6100				
<div>KOP</div>				
6150	6181'	0.98°	44.91°	6151.46' -225.12'
6200				
<div>200</div>	6242'	0.77°	46.91°	6212.45' -225.73'
<div>KOP</div>				
6250	6285'	0.75°	56.44°	6255.45' -226.06'
6300	6333'	2.53°	160.52°	6303.43' -225.20'



6350	6380'	6.22°	180.30°	6350.29'	-221.66'
6400	6428'	9.97°	177.60°	6397.80'	-214.91'
6450	6475'	13.19°	174.94°	6443.84'	-205.48'
6500					
6550	6570'	22.48°	182.36°	6534.19'	-176.51'
6600	6618'	29.70°	181.71°	6577.27'	-155.50'
6650	6665'	35.27°	179.15°	6616.90'	-130.33'
6700	6713'	38.34°	177.78°	6655.33'	-101.59'
6750	6760'	40.80°	177.49°	6691.55'	-71.65'
	6808'	42.37°	176.87°	6727.46'	-39.80'
6800	6855'	44.36°	178.43°	6761.63'	-7.54'
	6903'	46.74°	179.13°	6795.24'	26.70'
	6950'	50.51°	177.27°	6826.30'	61.95'
6850	6998'	53.54°	177.52°	6855.83'	99.78'
	7045'	58.64°	177.81°	6882.04'	138.77'



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
LDS E35-79HC  
Wattenburg  
Weld Colorado  
USA  
CA-XX-9001315793

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
665.00	0.00	0.00	665.00	0.00 N	0.00 E	0.00	TIE-IN
716.00	0.93	211.15	716.00	0.35 S	0.21 W	0.34	1.82
991.00	1.27	204.68	990.95	5.02 S	2.63 W	4.86	0.13
1083.00	0.68	150.51	1082.94	6.42 S	2.79 W	6.25	1.12
1368.00	0.33	86.18	1367.93	7.84 S	1.13 W	7.76	0.22
1652.00	0.56	40.55	1651.92	6.73 S	0.59 E	6.76	0.14
1935.00	0.06	124.00	1934.91	5.78 S	1.61 E	5.86	0.20
2125.00	0.19	27.85	2124.91	5.56 S	1.84 E	5.65	0.11
2220.00	0.83	54.37	2219.91	5.02 S	2.47 E	5.15	0.70
2315.00	3.03	35.89	2314.85	2.58 S	4.50 E	2.84	2.38
2409.00	5.56	34.17	2408.58	3.19 N	8.51 E	-2.70	2.69
2504.00	8.53	32.00	2502.85	12.98 N	14.83 E	-12.10	3.14
2599.00	9.53	35.42	2596.67	25.37 N	23.12 E	-23.99	1.19
2694.00	11.71	39.22	2690.04	39.25 N	33.78 E	-37.23	2.41
2789.00	13.87	39.13	2782.68	55.55 N	47.07 E	-52.74	2.28
2883.00	13.13	38.27	2874.08	72.68 N	60.79 E	-69.04	0.82
2978.00	13.18	40.70	2966.59	89.36 N	74.53 E	-84.90	0.58
3073.00	12.58	39.99	3059.20	105.49 N	88.24 E	-100.22	0.65
3168.00	11.58	38.04	3152.09	120.93 N	100.77 E	-114.91	1.14
3263.00	12.33	43.48	3245.03	135.80 N	113.62 E	-129.01	1.42
3358.00	12.74	37.93	3337.77	151.42 N	127.04 E	-143.83	1.34
3453.00	12.79	42.51	3430.43	167.44 N	140.59 E	-159.04	1.07
3547.00	10.57	41.50	3522.48	181.56 N	153.33 E	-172.41	2.37
3642.00	9.69	40.15	3616.00	194.20 N	164.26 E	-184.39	0.96
3737.00	9.17	40.66	3709.71	206.05 N	174.34 E	-195.64	0.55
3832.00	7.23	39.91	3803.74	216.37 N	183.11 E	-205.44	2.05
3927.00	5.76	29.54	3898.13	225.10 N	189.29 E	-213.80	1.97
4022.00	2.71	21.17	3992.86	231.34 N	192.45 E	-219.85	3.27

4117.00	1.25	323.33	4087.81	234.27 N	192.64 E	-222.75	2.42
4401.00	1.94	341.59	4371.70	241.32 N	189.27 E	-229.99	0.30
4496.00	0.65	358.84	4466.67	243.39 N	188.75 E	-232.09	1.41
4781.00	0.98	149.75	4751.66	242.92 N	189.94 E	-231.54	0.55
5065.00	2.18	173.03	5035.55	235.47 N	191.81 E	-224.00	0.47
5160.00	0.60	244.73	5130.52	233.47 N	191.58 E	-222.01	2.18
5445.00	0.91	267.85	5415.50	232.75 N	187.98 E	-221.50	0.15
5729.00	0.13	64.57	5699.49	232.80 N	186.02 E	-221.67	0.36
6014.00	0.76	34.30	5984.48	234.50 N	187.37 E	-223.29	0.23
6181.00	0.98	44.91	6151.46	236.43 N	189.01 E	-225.12	0.16
6242.00	0.77	46.91	6212.45	237.08 N	189.67 E	-225.73	0.35
6285.00	0.75	56.44	6255.45	237.43 N	190.12 E	-226.06	0.30
6333.00	2.53	160.52	6303.43	236.61 N	190.73 E	-225.20	5.85
6380.00	6.22	180.30	6350.29	233.08 N	191.06 E	-221.66	8.36
6428.00	9.97	177.60	6397.80	226.33 N	191.22 E	-214.91	7.86
6475.00	13.19	174.94	6443.84	216.92 N	191.87 E	-205.48	6.94
6570.00	22.48	182.36	6534.19	187.91 N	192.08 E	-176.51	10.05
6618.00	29.70	181.71	6577.27	166.83 N	191.34 E	-155.50	15.06
6665.00	35.27	179.15	6616.90	141.60 N	191.19 E	-130.33	12.21
6713.00	38.34	177.78	6655.33	112.86 N	191.98 E	-101.59	6.60
6760.00	40.80	177.49	6691.55	82.95 N	193.21 E	-71.65	5.26
6808.00	42.37	176.87	6727.46	51.13 N	194.78 E	-39.80	3.38
6855.00	44.36	178.43	6761.63	18.89 N	196.10 E	-7.54	4.80
6903.00	46.74	179.13	6795.24	15.36 S	196.82 E	26.70	5.07
6950.00	50.51	177.27	6826.30	50.61 S	197.95 E	61.95	8.56
6998.00	53.54	177.52	6855.83	88.40 S	199.67 E	99.78	6.32
7045.00	58.64	177.81	6882.04	127.36 S	201.25 E	138.77	10.87
7093.00	63.97	177.61	6905.08	169.42 S	202.94 E	180.85	11.09
7139.00	67.95	179.22	6923.82	211.40 S	204.09 E	222.83	9.23
7187.00	71.26	179.07	6940.54	256.38 S	204.76 E	267.78	6.91
7234.00	75.44	178.84	6954.00	301.39 S	205.58 E	312.76	8.90
7282.00	78.53	179.22	6964.81	348.15 S	206.38 E	359.48	6.49
7325.00	82.14	178.84	6972.03	390.53 S	207.10 E	401.83	8.43

**CALCULATION BASED ON MINIMUM CURVATURE METHOD**

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT  
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD  
VERTICAL SECTION IS COMPUTED ALONG A CLOSURE OF 152.06 DEGREES (GRID)  
A TOTAL CORRECTION OF 8.08 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7325.00 FEET  
IS 442.04 FEET ALONG 152.06 DEGREES (GRID)**