

PCGK - Pressure Case Gamma

1:600 / 1:240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	17-Feb-14	18-Feb-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.860	6.860			
Log Start Depth (TVD, ft)	647.94	5,947.14			
Log End Depth (TVD, ft)	5,947.14	6,643.70			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	16-Feb-14 10:30	17-Feb-14 16:00			
Drill/Wipe End Date and Time	17-Feb-14 09:10	18-Feb-14 03:43			
Min Inc (deg) @ Depth (TVD, ft)	0.20 @ 5,514.22	1.38 @ 5,986.13			
Max Inc (deg) @ Depth (TVD, ft)	9.87 @ 3,718.60	84.76 @ 6,641.12			
Bit TFA(in2) / Bit Type	0.91 / PDC	1.74 / PDC			
Flow Rate (gpm)	600.00	596.19			
Max AV (fpm) / CV (fpm) @ MWD	NA /	0.0 / 0.0			
Fluid Type	Native/Spud Mud	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.65 / 29.00	9.40 / 38.00			
Filtrate CL (ppm)	1,600.00	2,000.00			
pH / Fluid Loss (mptm)	10.30 / 26	10.10 / 8			
PV (cP) / YP (lbf2)	2 / 2.00	10 / 10.00			
% Solids / % Sand	2.10 / 0.60	5.90 / 0.25			
% Oil / Oil:Water Ratio	NA / NA	NA / NA			
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA			
Max Tool Temp (in F) / S	127.50 / PCM	151.00 / PCM			

Max Tool Temp (degF) / Source	137.50 / PCM	154.30 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 137.50	NA @ 154.30			
Lead MWD Engineer	Kyle Wass	Kyle Wass			
Customer Representative	Jim Turner	Jim Turner			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11342293	11342293			
Insert Serial Number	11680794	11680794			
Date and Time Initialized	15-Feb-14 21:24	15-Feb-14 21:24			
Date and Time Read	18-Feb-14 08:44	18-Feb-14 08:43			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	56.00	54.00			
Software Version	6.21	6.21			
Sub Serial Number	11342293	11342293			
Sonde Serial Number	12177556	12177556			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	73.78	5.86			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.71	47.32			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11342293	11342293			
Insert/Sonde Serial Number	11293391	11293391			

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:
 - 1: 600 Log
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
 - 1: 240 Log
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
 - ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft

Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft

6. Insite Version V8.0.10

WARRANTY

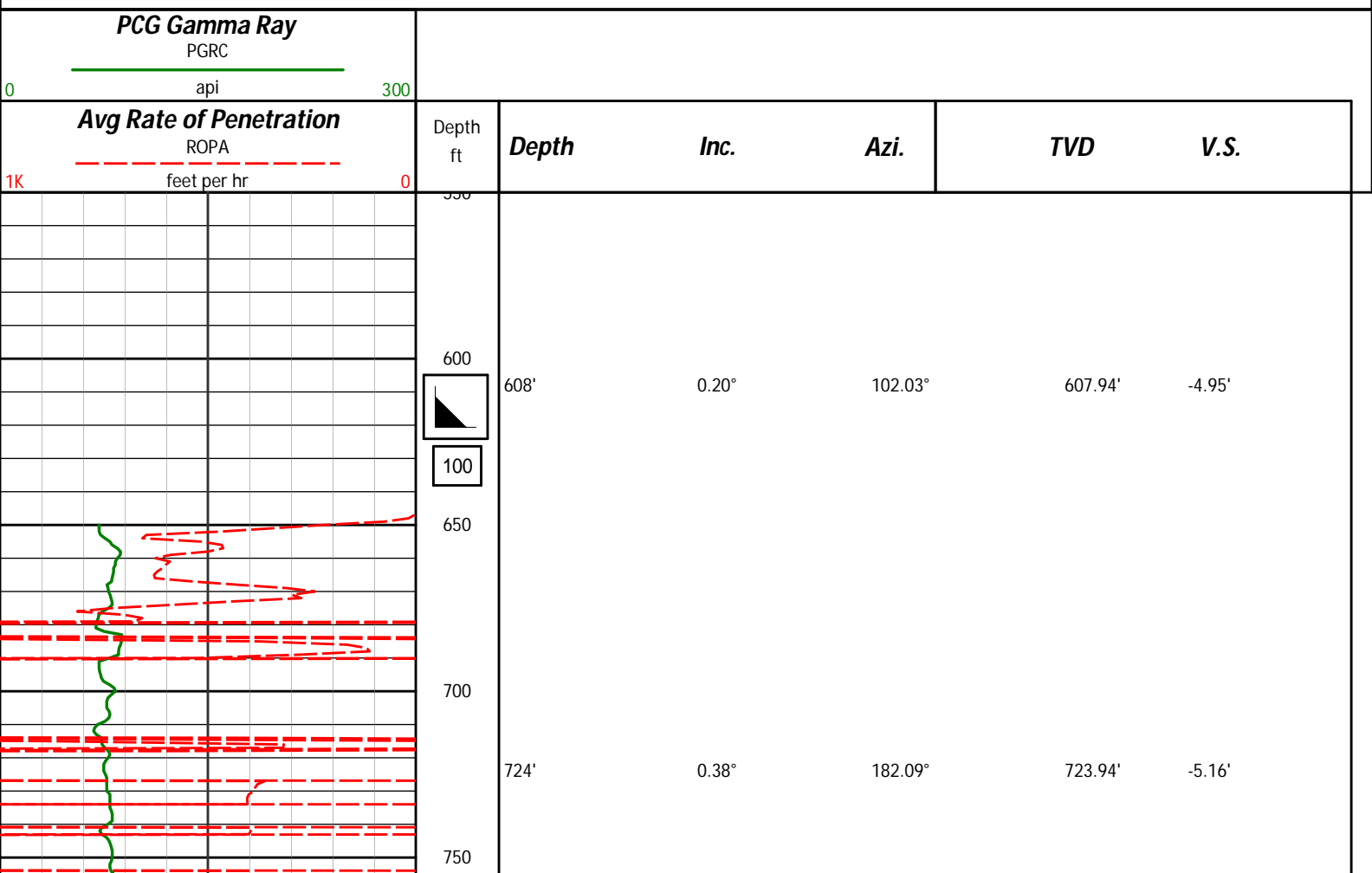
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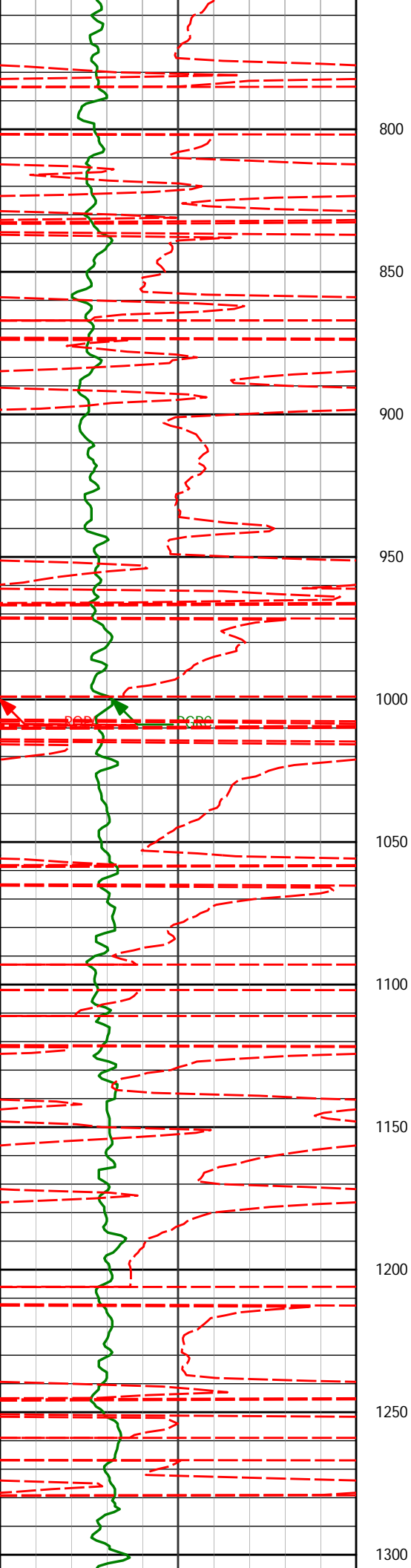
HALLIBURTON

Sperry Drilling Services

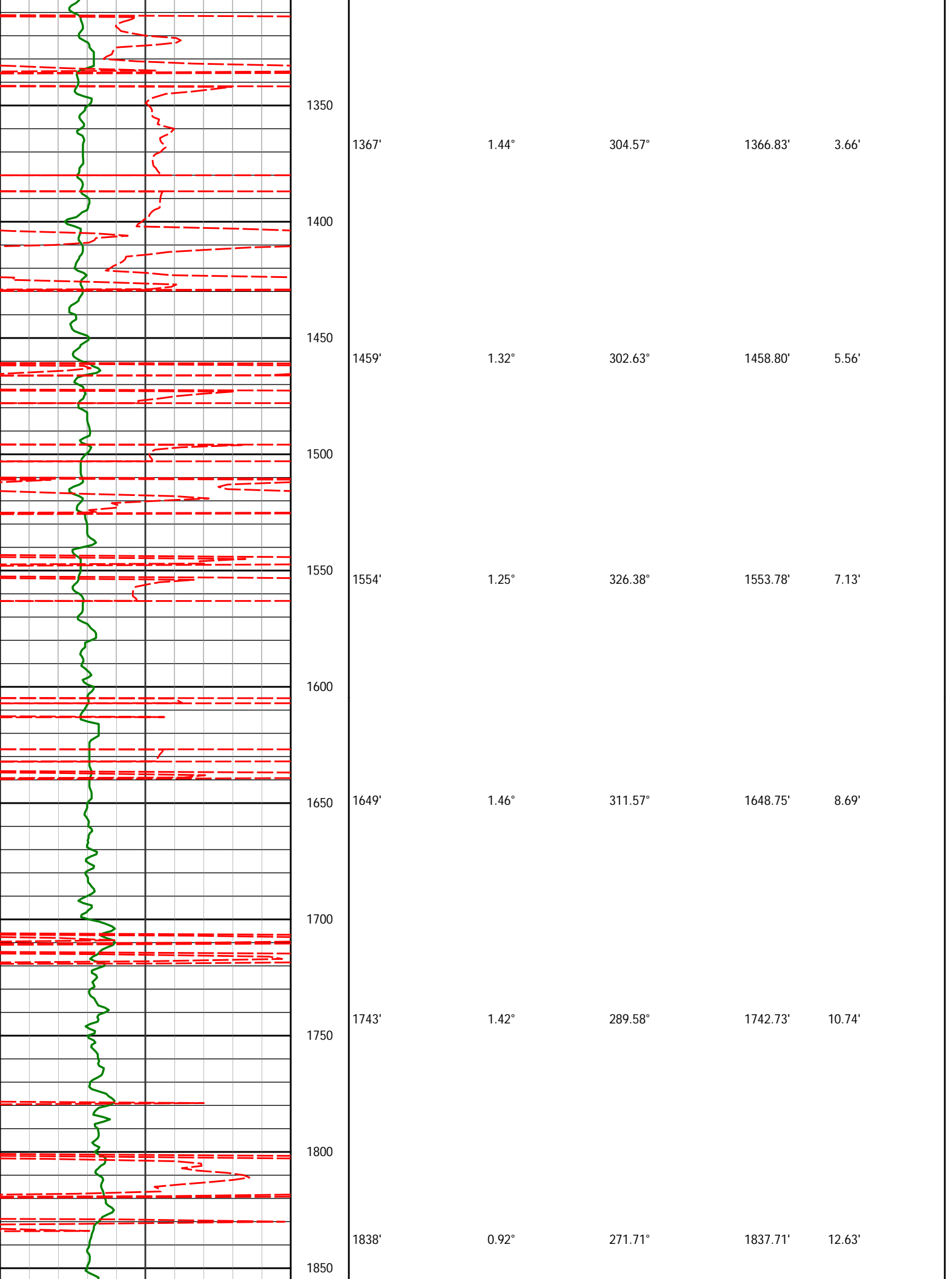
TVD Correlation Log 1:600

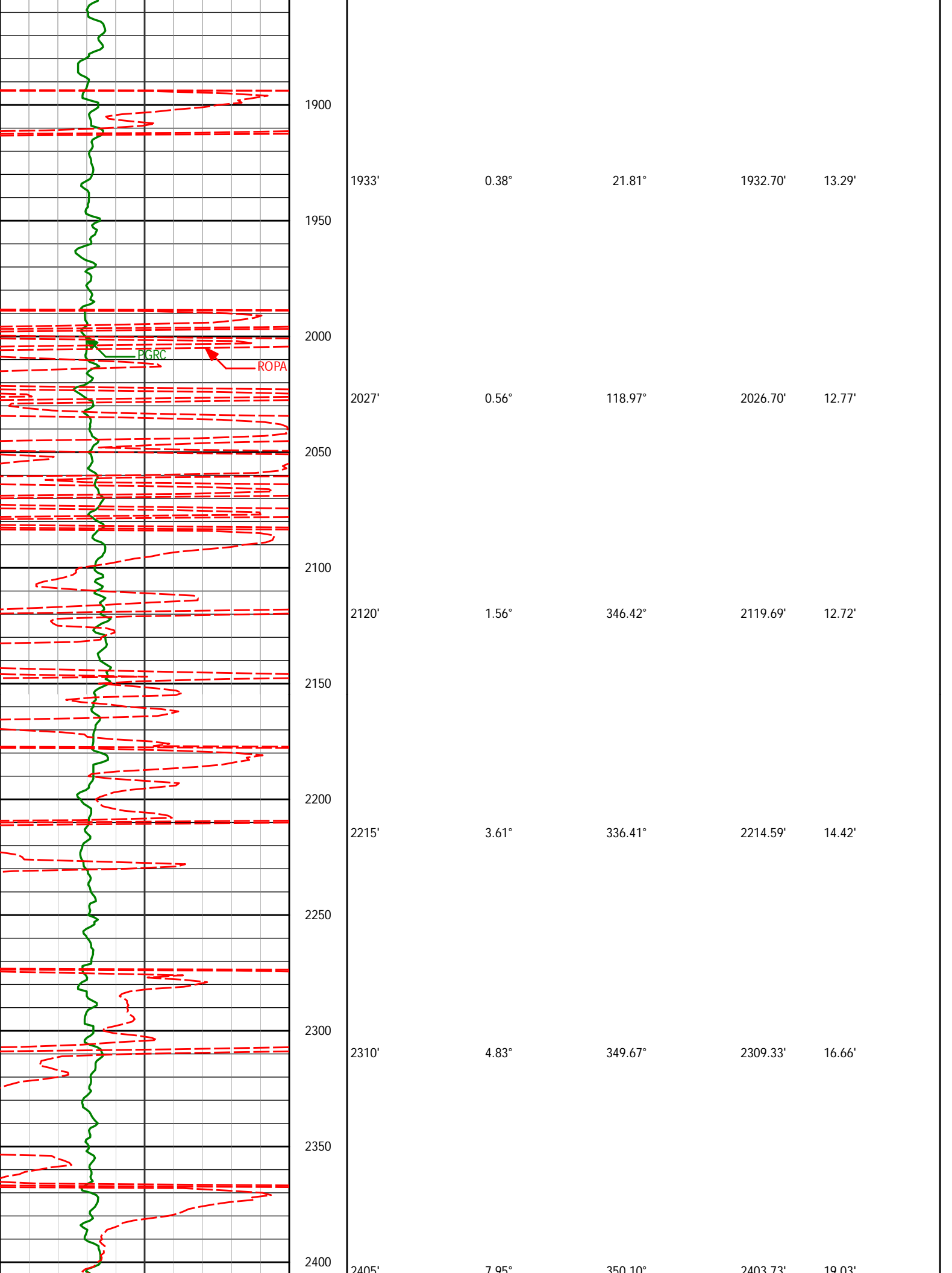
Noble Energy
Wells Ranch AA35-69-1AHNB
H&P 321
Sec. 36-T6N-R63W

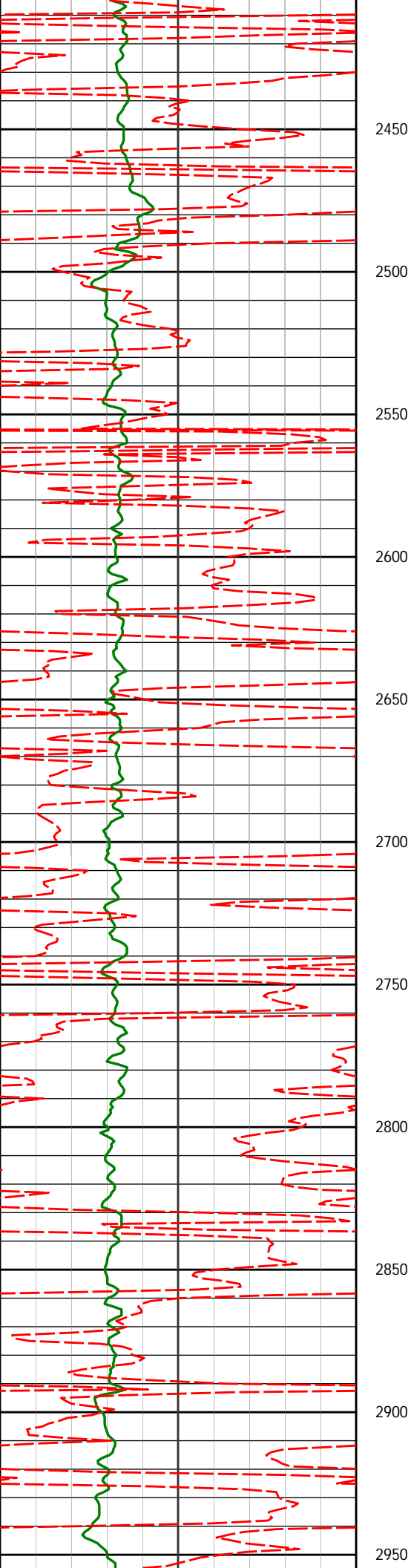




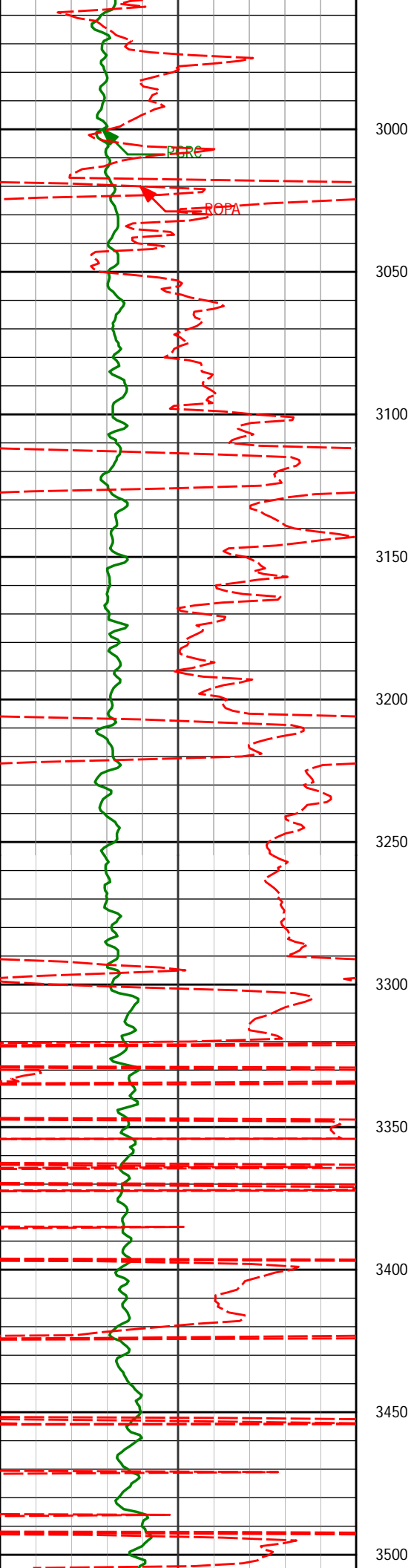
816'	0.25°	134.62°	815.94'	-5.31'
909'	0.83°	304.55°	908.93'	-4.89'
1000'	1.13°	309.90°	999.92'	-3.61'
1092'	1.64°	290.73°	1091.89'	-1.64'
1183'	0.93°	289.64°	1182.87'	0.31'
1275'	1.14°	298.43°	1274.85'	1.85'



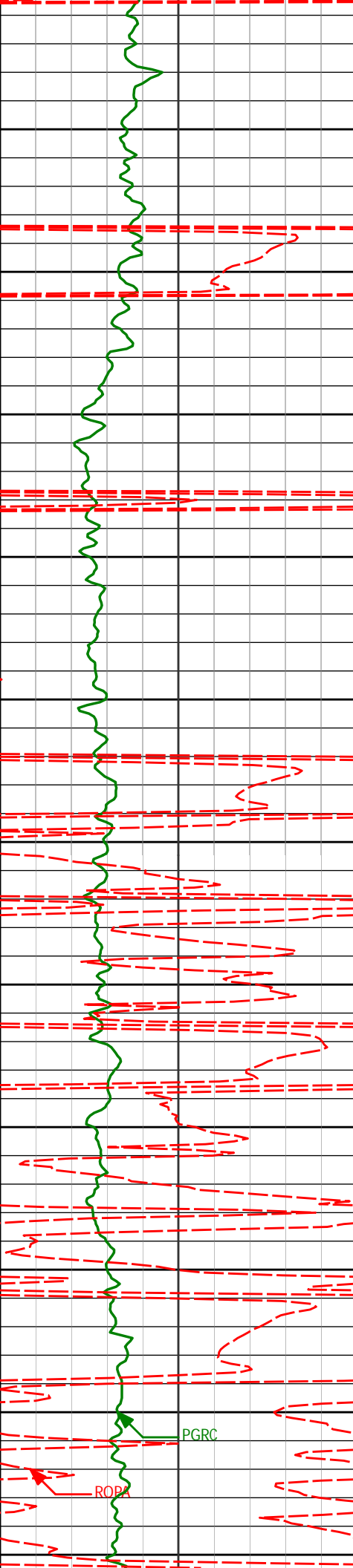




2400		7.75°	330.16°	2400.73'	17.03'
2450					
2500	2500'	8.37°	348.64°	2497.77'	22.17'
2550					
2595'	2595'	8.54°	349.98°	2591.73'	25.44'
2600					
2650					
2689'	2689'	7.56°	346.62°	2684.81'	28.73'
2700					
2750					
2784'	2784'	7.55°	344.58°	2778.98'	32.43'
2800					
2850					
2879'	2879'	8.13°	348.40°	2873.10'	36.06'
2900					
2950					



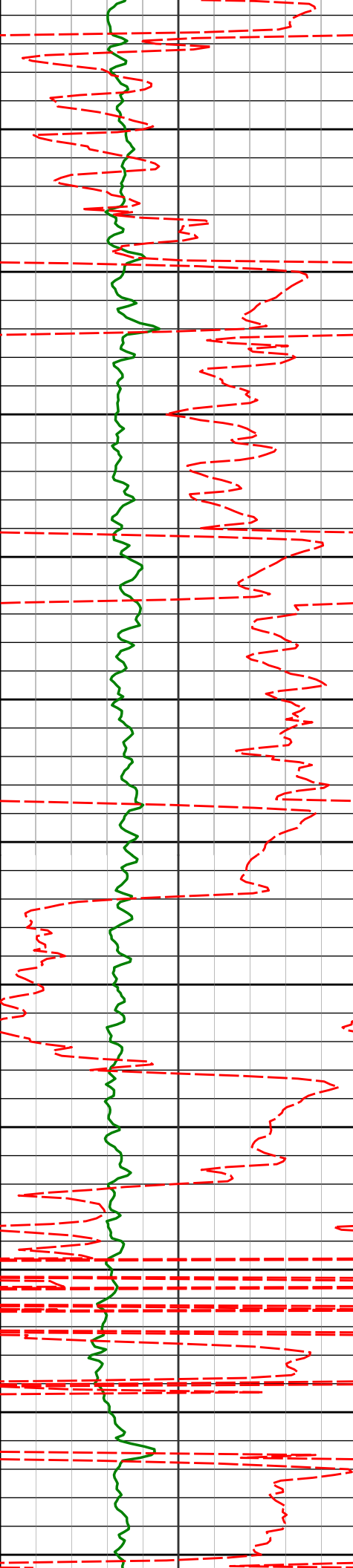
2974'	8.88°	347.58°	2967.05'	39.67'
3000				
3068'	9.07°	345.48°	3059.90'	43.79'
3100				
3163'	7.31°	343.12°	3153.93'	48.07'
3200				
3258'	7.25°	343.71°	3248.16'	52.07'
3300				
3353'	7.37°	341.14°	3342.39'	56.29'
3400				
3448'	7.52°	343.37°	3436.59'	60.62'
3500				



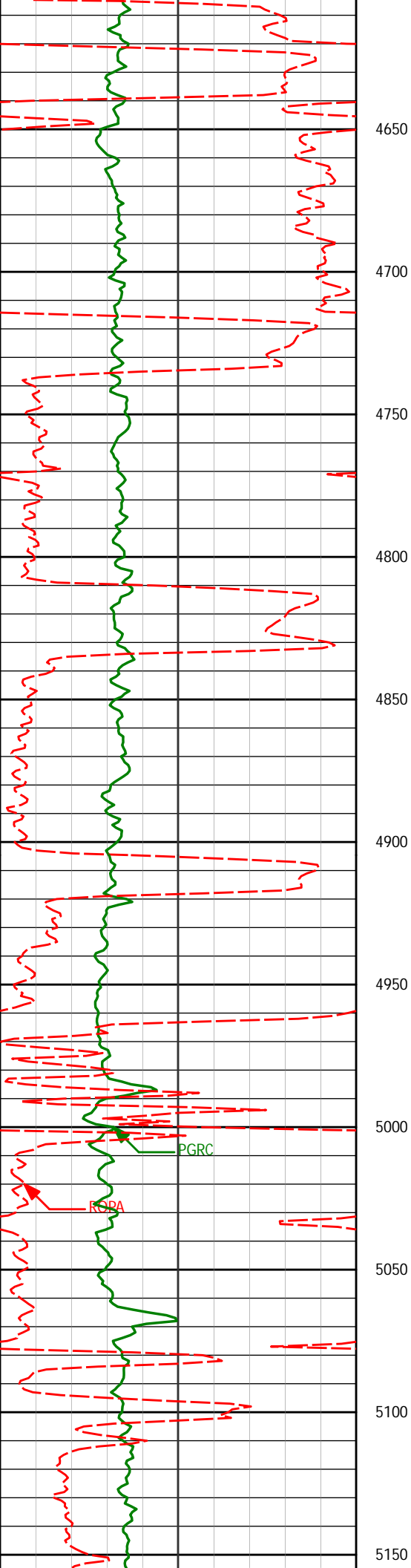
3550	3543'	7.31°	342.79°	3530.79'	64.77'
3600					
3650	3638'	8.82°	354.09°	3624.86'	67.95'
3700					
3750	3733'	9.87°	353.50°	3718.60'	70.38'
3800					
3850	3828'	9.56°	350.80°	3812.23'	73.35'
3900					
3950	3923'	9.18°	347.52°	3905.97'	77.00'
4000	4018'	7.12°	345.12°	4000.00'	80.80'
4050					

PGRC

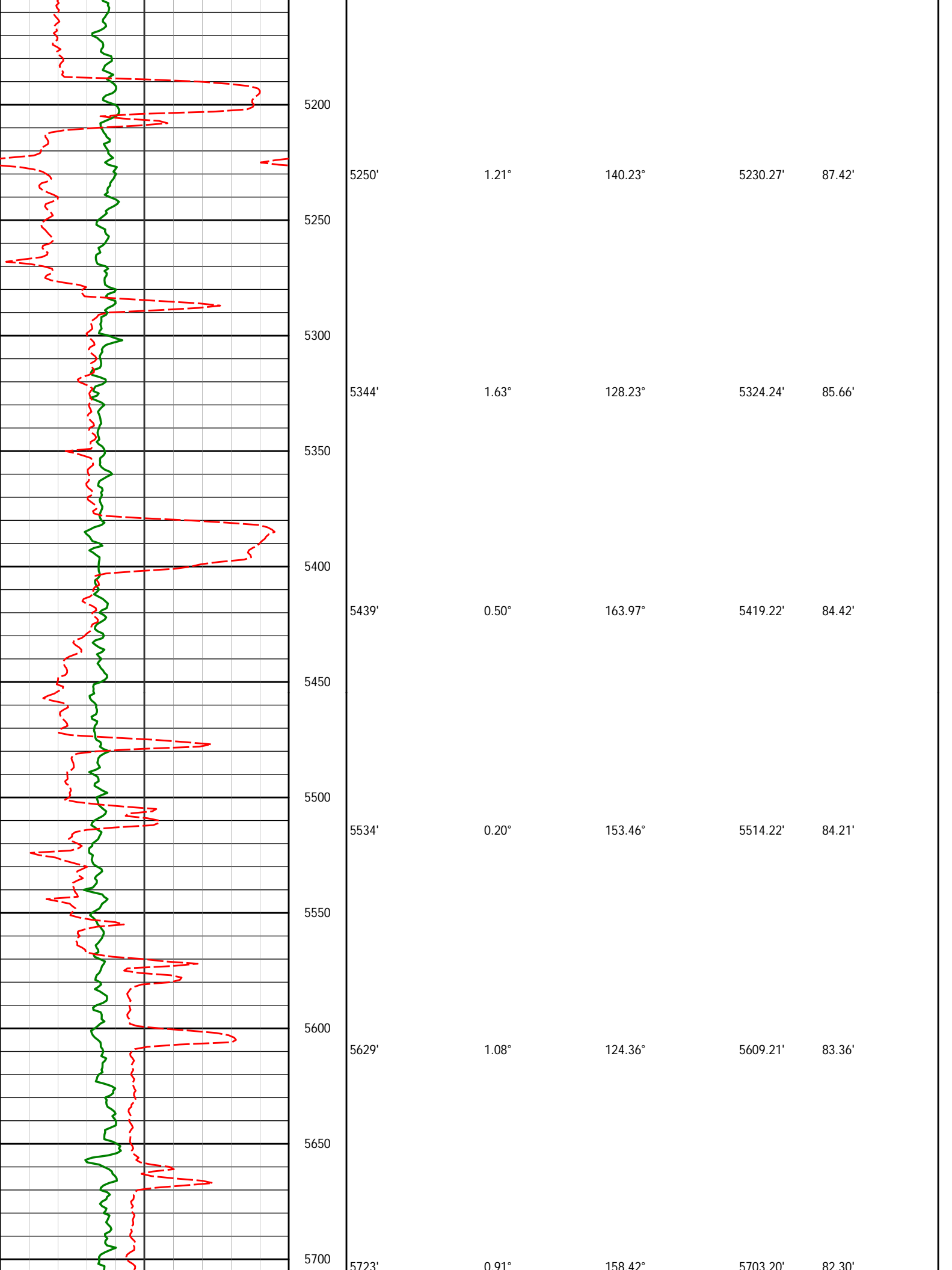
ROPA

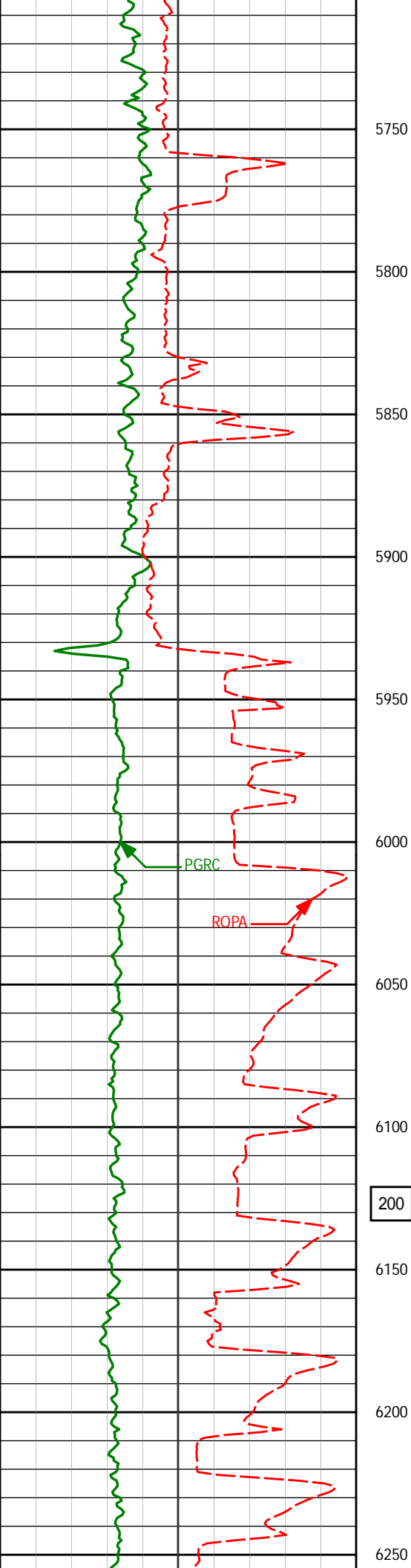


4100	4112'	6.64°	348.51°	4093.33'	83.92'
4150					
4200	4207'	5.06°	353.77°	4187.83'	85.94'
4250					
4300	4302'	3.82°	346.34°	4282.54'	87.50'
4350					
4400	4396'	2.17°	347.26°	4376.41'	88.87'
4450					
4500	4491'	0.76°	15.47°	4471.38'	89.21'
4550					
4600	4586'	1.68°	32.23°	4566.36'	88.39'

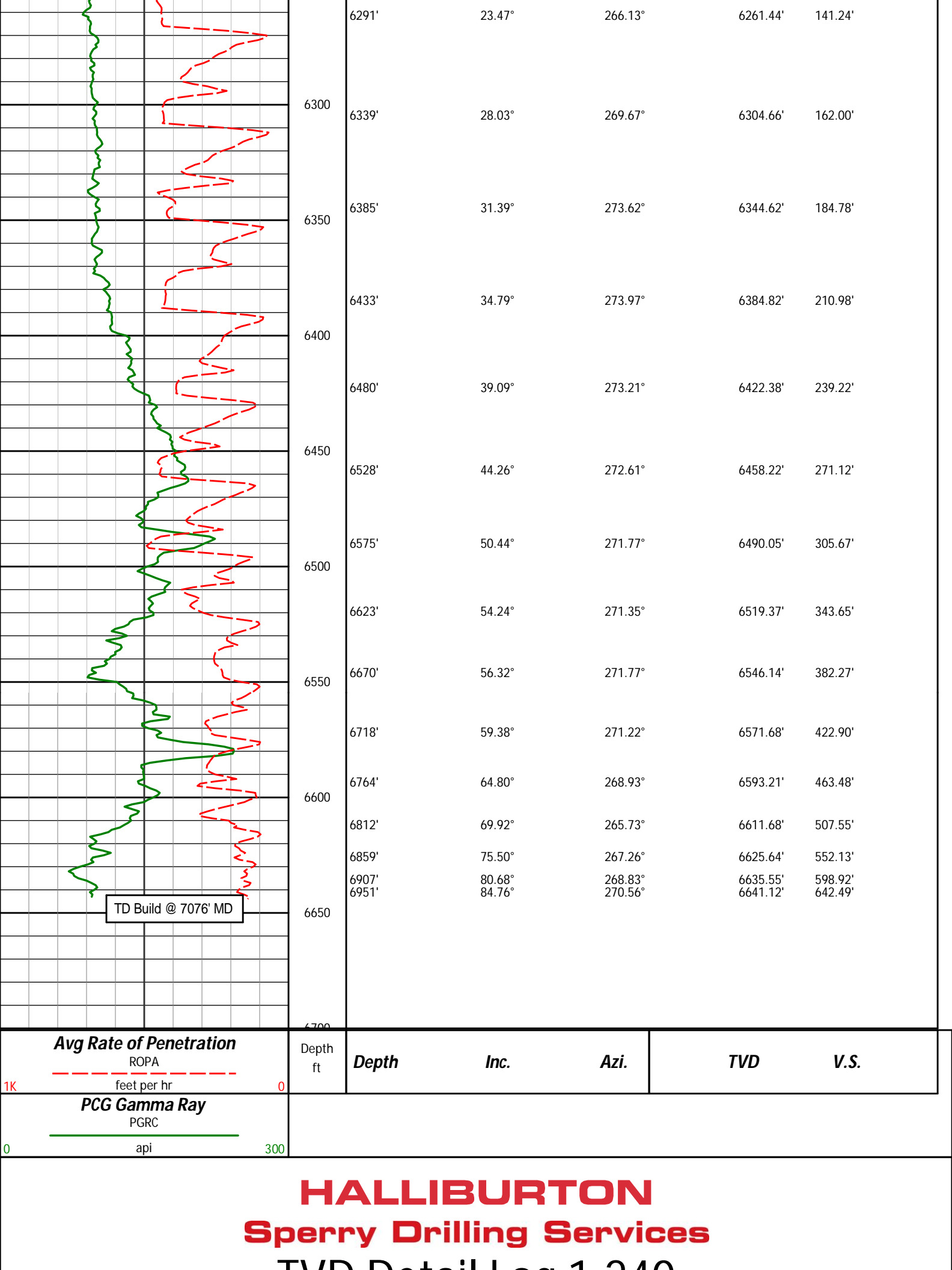


4681'	1.02°	12.20°	4661.33'	87.57'
4775'	0.80°	356.42°	4755.32'	87.51'
4870'	0.57°	257.10°	4850.31'	88.04'
4965'	1.11°	210.84°	4945.30'	88.93'
5060'	1.05°	177.30°	5040.29'	89.27'
5155'	0.68°	107.45°	5135.28'	88.64'



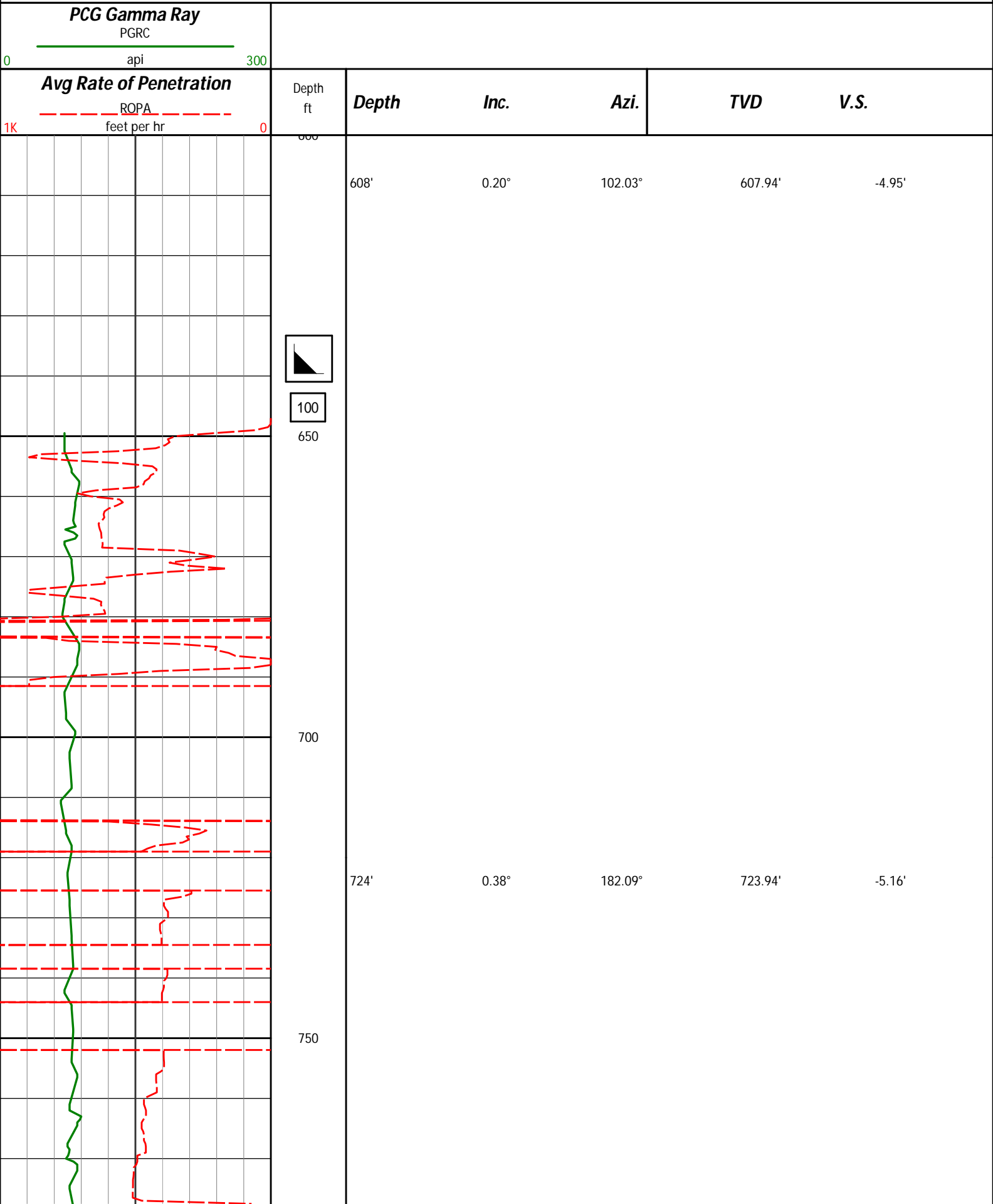


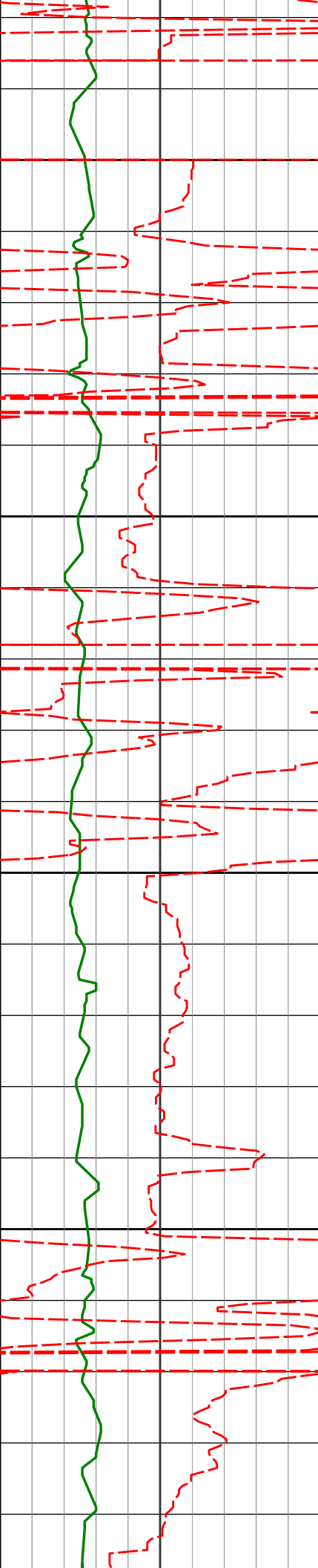
5750				
5800	5818'	1.09°	155.78°	5798.18' 81.57'
5850				
5900	5911'	1.63°	123.08°	5891.16' 80.03'
5950				
5976'	5976'	1.46°	110.23°	5956.14' 78.44'
6000	6006'	1.38°	114.36°	5986.13' 77.74'
6054'	6054'	3.76°	247.26°	6034.10' 78.62'
6101'	6101'	12.10°	258.84°	6080.61' 84.80'
6149'	6149'	14.50°	258.97°	6127.32' 95.52'
6196'	6196'	17.75°	262.13°	6172.46' 108.27'
6244'	6244'	20.34°	268.95°	6217.84' 123.79'
6250				



TVD Detail Log T:240

Noble Energy
Wells Ranch AA35-69-1AHNB
H&P 321
Sec. 36-T6N-R63W





800

816'

0.25°

134.62°

815.94'

-5.31'

850

900

909'

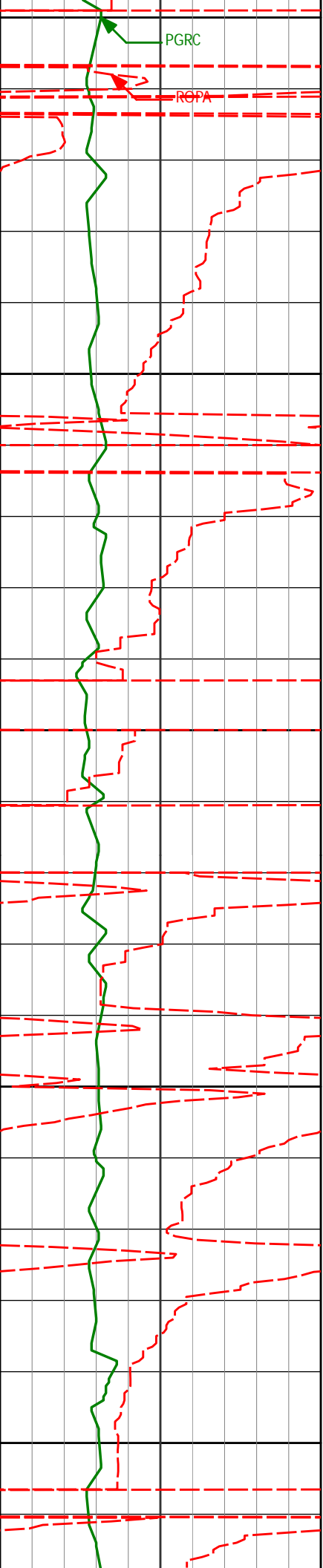
0.83°

304.55°

908.93'

-4.89'

950



1000

1050

1100

1150

1200

1000'

1092'

1183'

1.13°

1.64°

0.93°

309.90°

290.73°

289.64°

999.92'

1091.89'

1182.87'

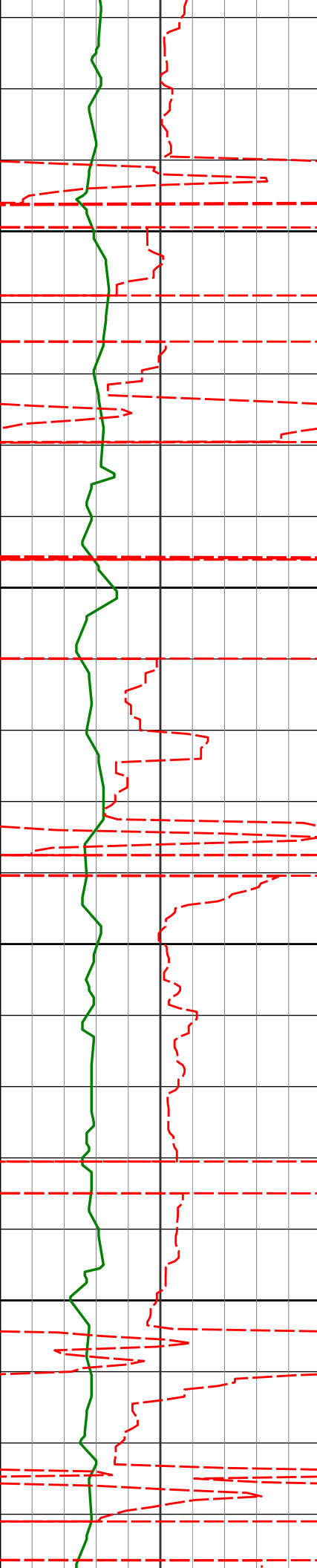
-3.61'

-1.64'

0.31'

PGRC

ROPA



1250

1300

1350

1400

1275'

 1.14°

298.43°

1274.85'

1.85'

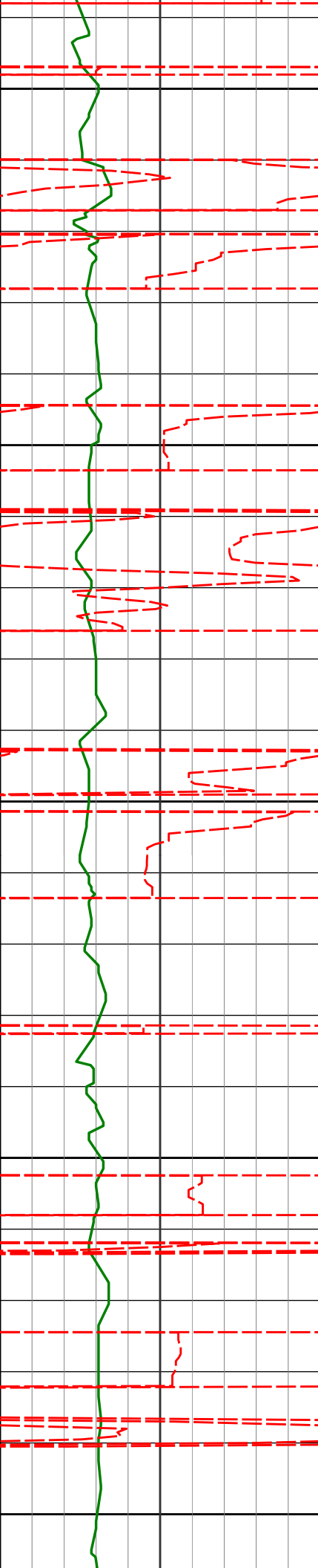
1367'

 1.44°

304.57°

1366.83'

3.66'



1450

1459'

1.32°

302.63°

1458.80'

5.56'

1500

1550

1554'

1.25°

326.38°

1553.78'

7.13'

1600

1650

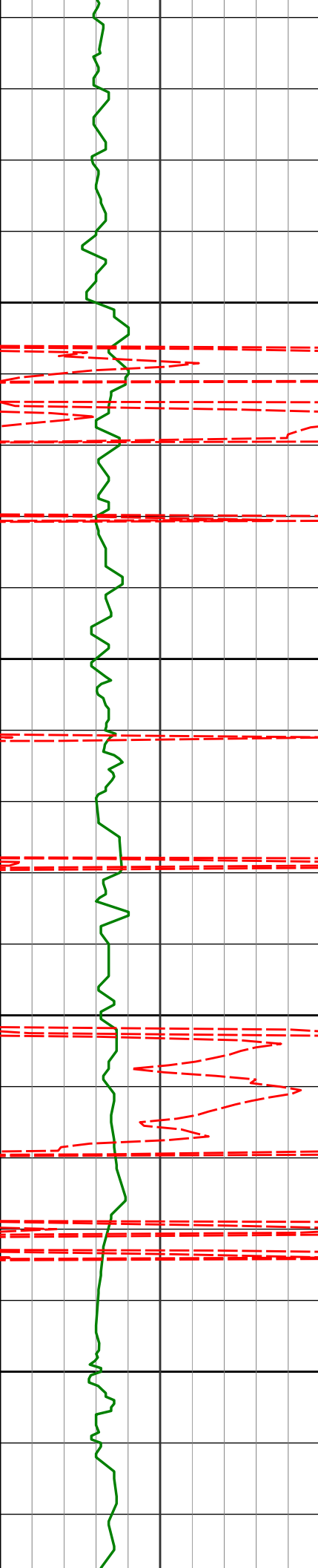
1649'

1.46°

311.57°

1648.75'

8.69'



1700

1743'

1.42°

289.58°

1742.73'

10.74'

1750

1800

1838'

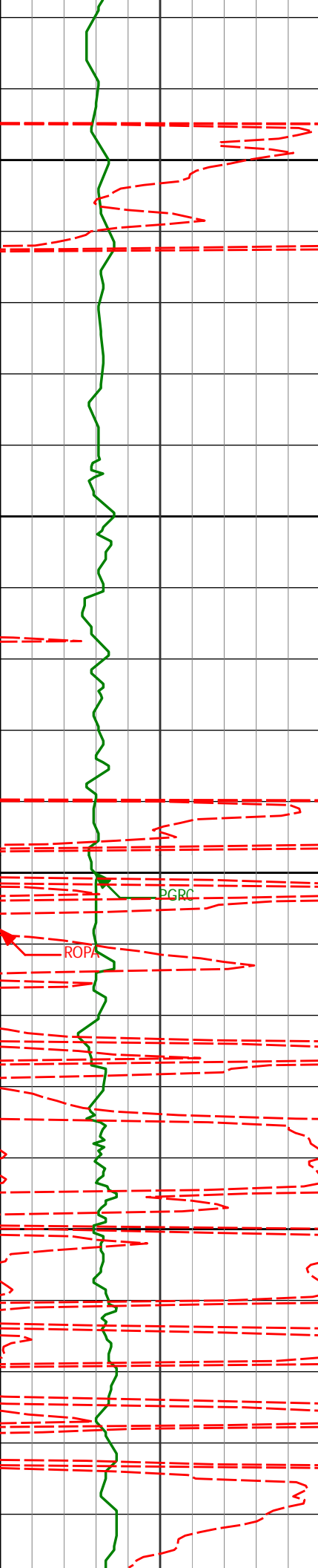
0.92°

271.71°

1837.71'

12.63'

1850



1900

1933'

0.38°

21.81°

1932.70'

13.29'

1950

2000

2027'

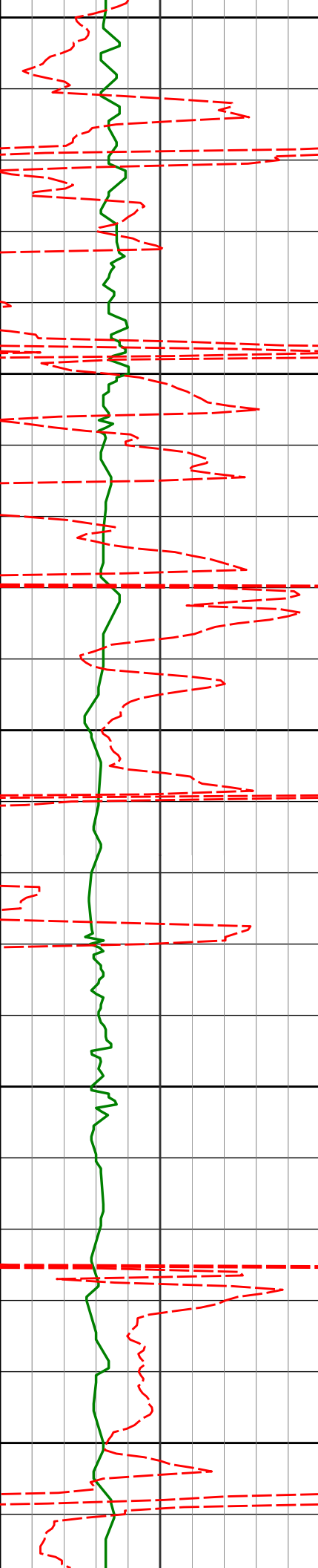
0.56°

118.97°

2026.70'

12.77'

2050



2100

2120'

1.56°

346.42°

2119.69'

12.72'

2150

2200

2215'

3.61°

336.41°

2214.59'

14.42'

2250

2300

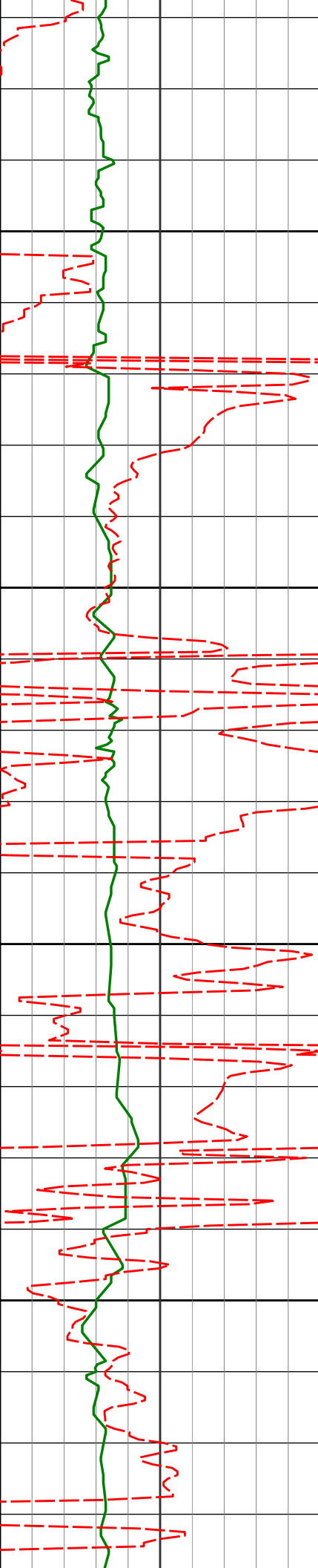
2310'

4.83°

349.67°

2309.33'

16.66'



2350

2400

2450

2500

2405'

7.95°

350.10°

2403.73'

19.03'

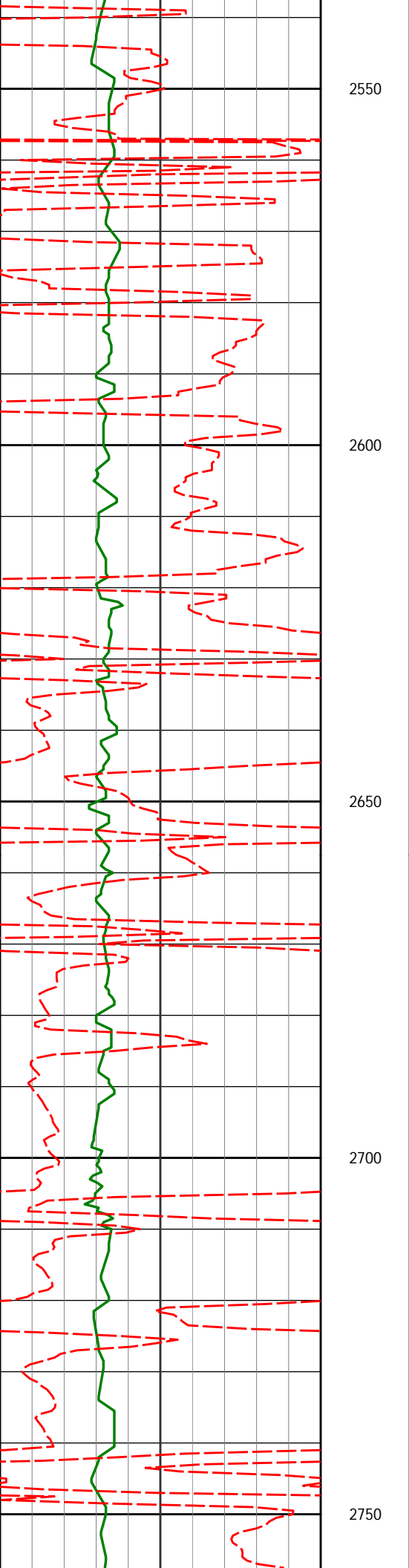
2500'

8.37°

348.64°

2497.77'

22.17'



2595'

8.54°

349.98°

2591.73'

25.44'

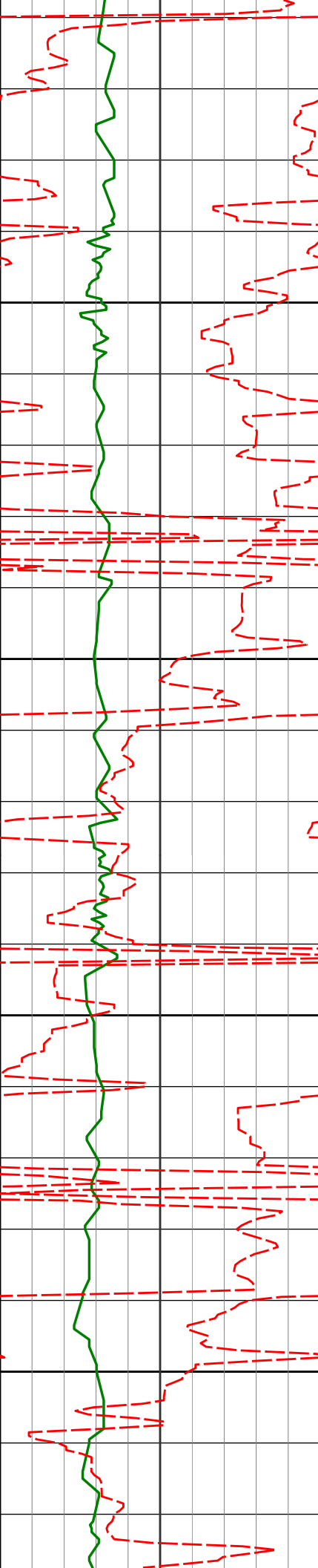
2689'

7.56°

346.62°

2684.81'

28.73'



2800

2850

2900

2950

2784'

7.55°

344.58°

2778.98'

32.43'

2879'

8.13°

348.40°

2873.10'

36.06'

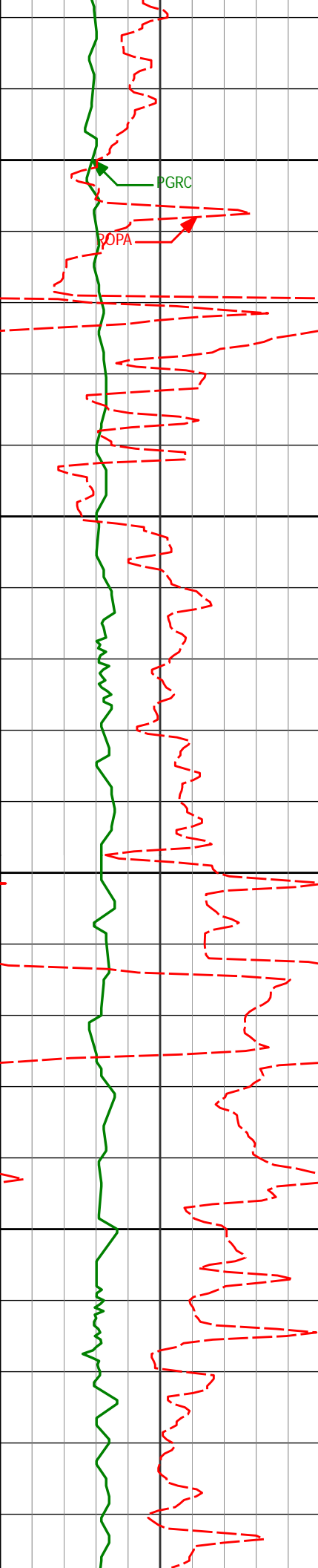
2974'

8.88°

347.58°

2967.05'

39.67'



3000

3050

3100

3150

3068'

9.07°

345.48°

3059.90'

43.79'

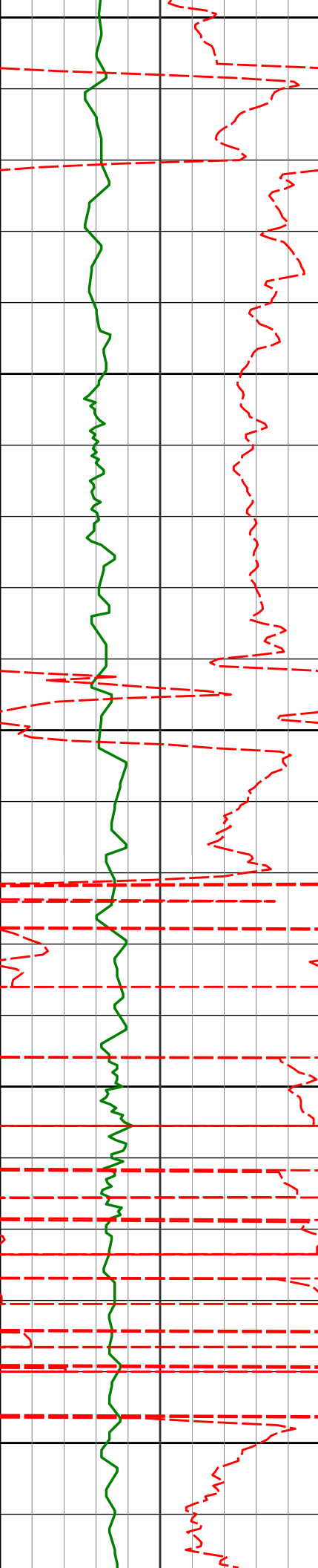
3163'

7.31°

343.12°

3153.93'

48.07'



3200

3250

3300

3350

3400

3258'

7.25°

343.71°

3248.16'

52.07'

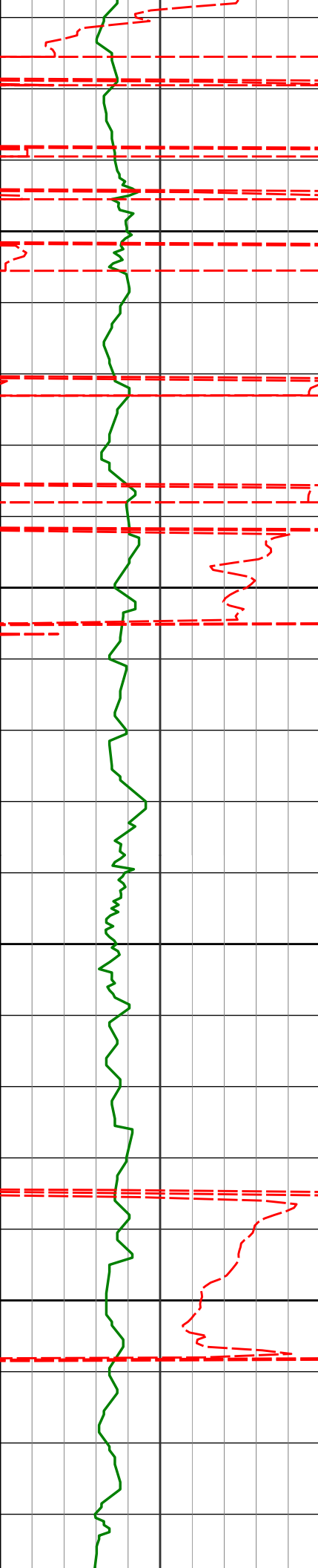
3353'

7.37°

341.14°

3342.39'

56.29'



3448'

7.52°

343.37°

3436.59'

60.62'

3450

3500

3543'

7.31°

342.79°

3530.79'

64.77'

3550

3600

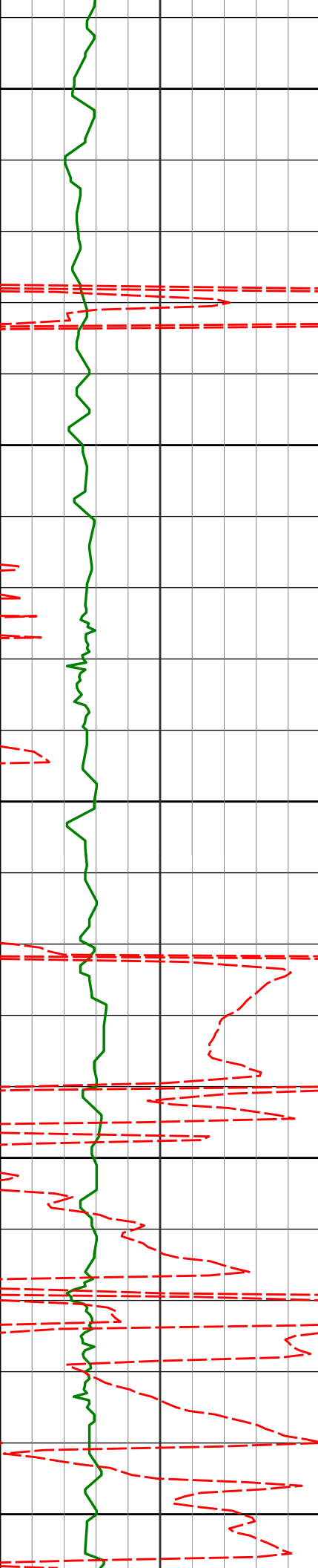
3638'

8.82°

354.09°

3624.86'

67.95'



3650

3700

3750

3800

3850

3733'

9.87°

353.50°

3718.60'

70.38'

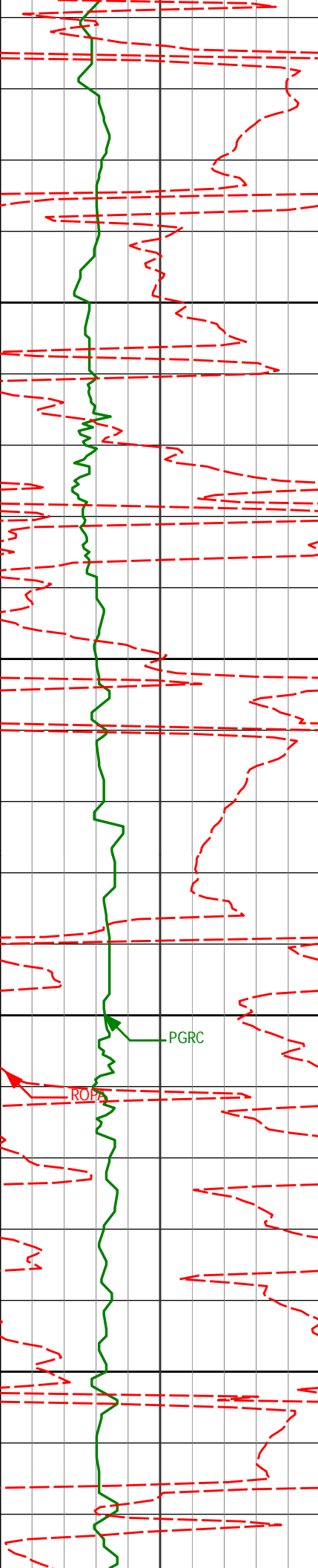
3828'

9.56°

350.80°

3812.23'

73.35'



3900

3923'

9.18°

347.52°

3905.97'

77.00'

3950

4000

4018'

7.12°

345.12°

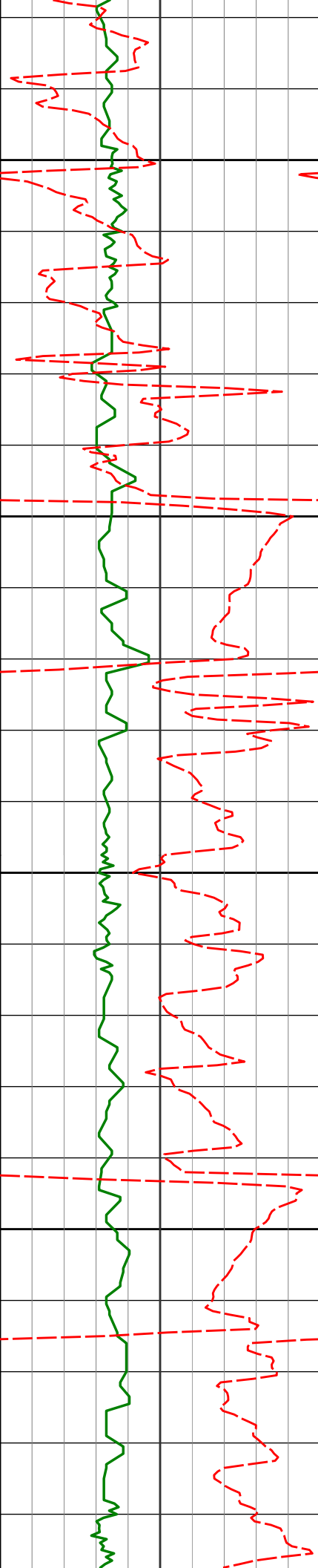
4000.00'

80.80'

4050

PGRC

ROPS



4112'

6.64°

348.51°

4093.33'

83.92'

4100

4150

4207'

5.06°

353.77°

4187.83'

85.94'

4200

4250

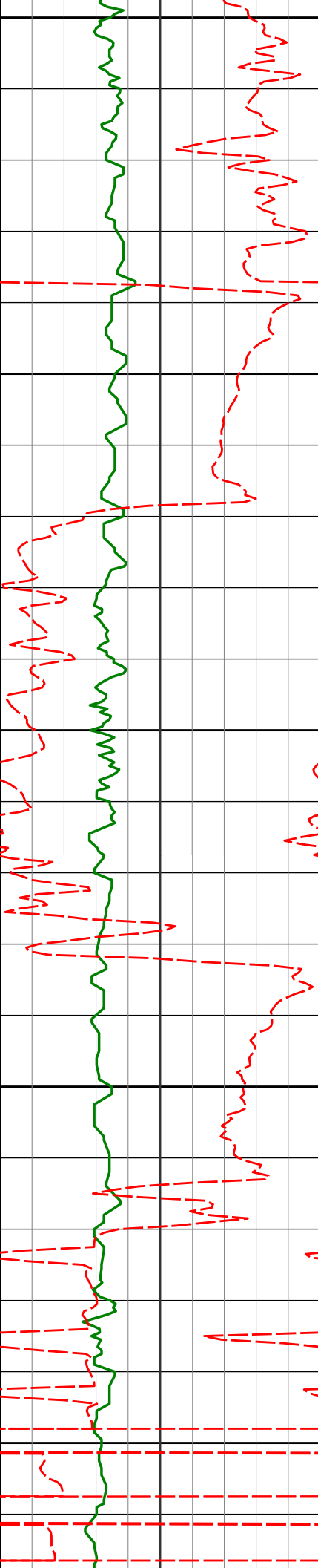
4302'

3.82°

346.34°

4282.54'

87.50'



4300

4350

4400

4450

4500

4396'

2.17°

347.26°

4376.41'

88.87'

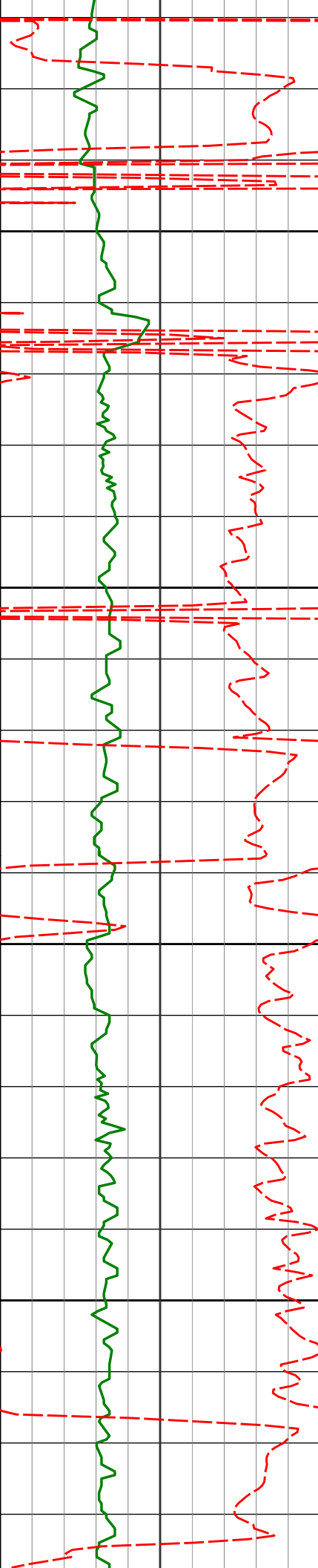
4491'

0.76°

15.47°

4471.38'

89.21'



4550

4586'

1.68°

32.23°

4566.36'

88.39'

4600

4650

4681'

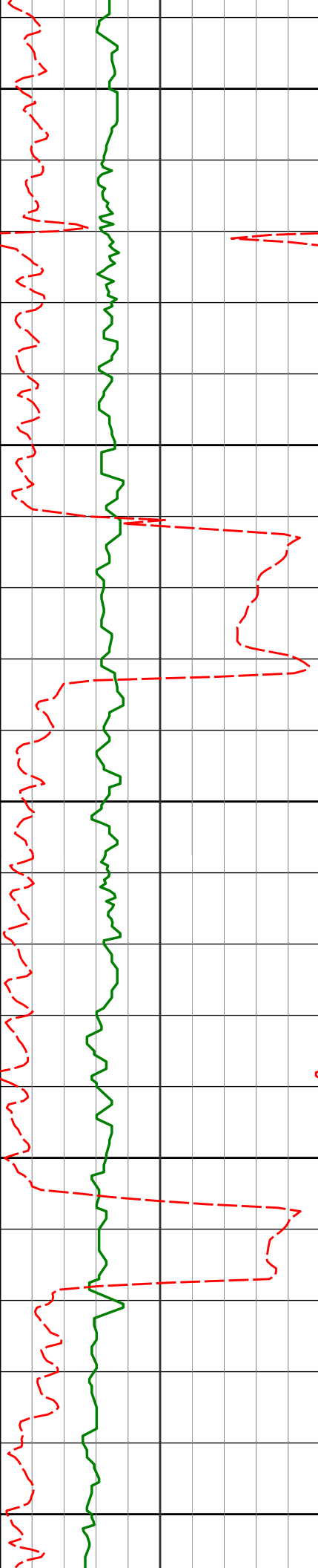
1.02°

12.20°

4661.33'

87.57'

4700



4750

4775'

0.80°

356.42°

4755.32'

87.51'

4800

4850

4870'

0.57°

257.10°

4850.31'

88.04'

4900

4950

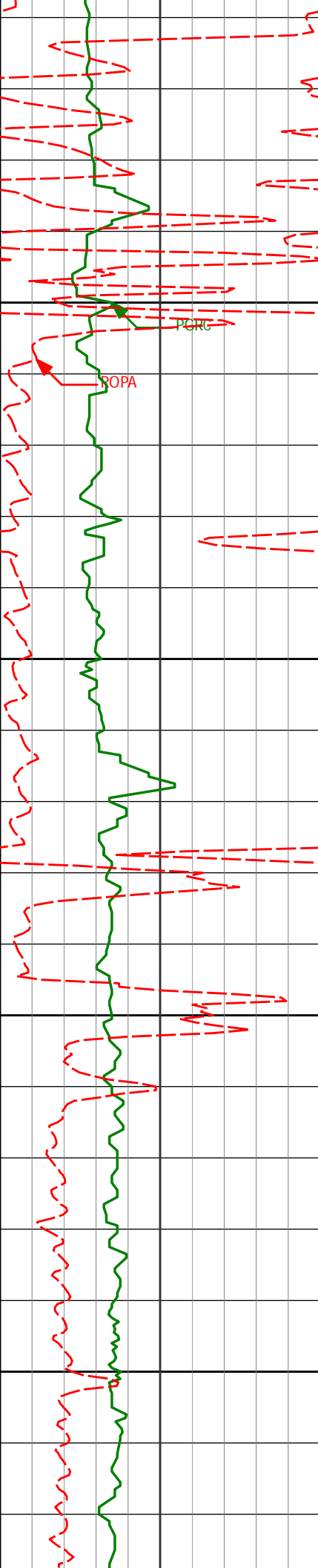
4965'

1.11°

210.84°

4945.30'

88.93'



5000

5060'

1.05°

177.30°

5040.29'

89.27'

5050

5100

5155'

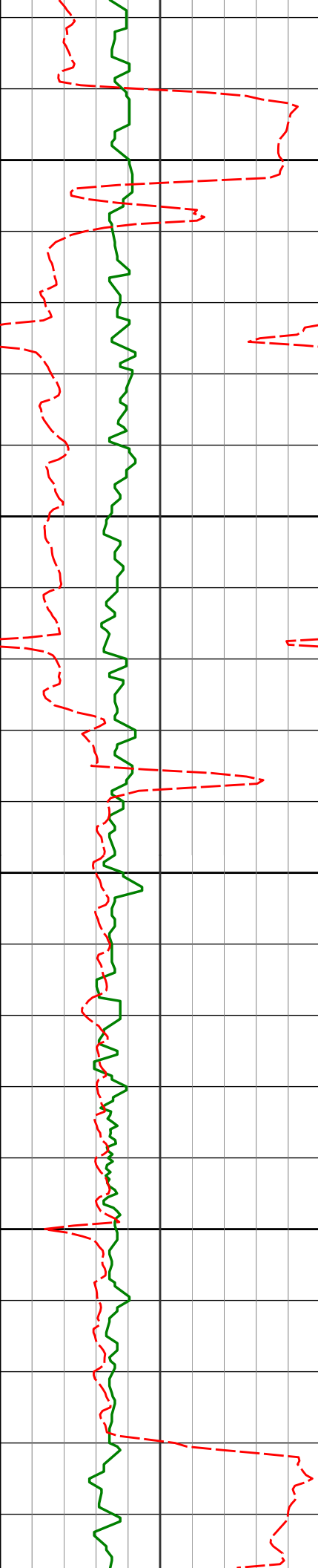
0.68°

107.45°

5135.28'

88.64'

5150



5200

5250'

1.21°

140.23°

5230.27'

87.42'

5250

5300

5344'

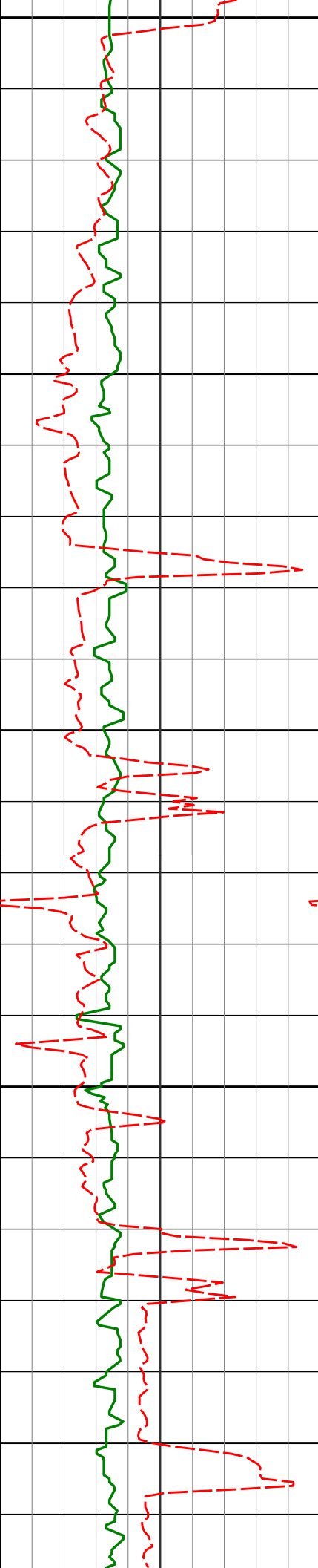
1.63°

128.23°

5324.24'

85.66'

5350



5400

5439'

0.50°

163.97°

5419.22'

84.42'

5450

5500

5534'

0.20°

153.46°

5514.22'

84.21'

5550

5600

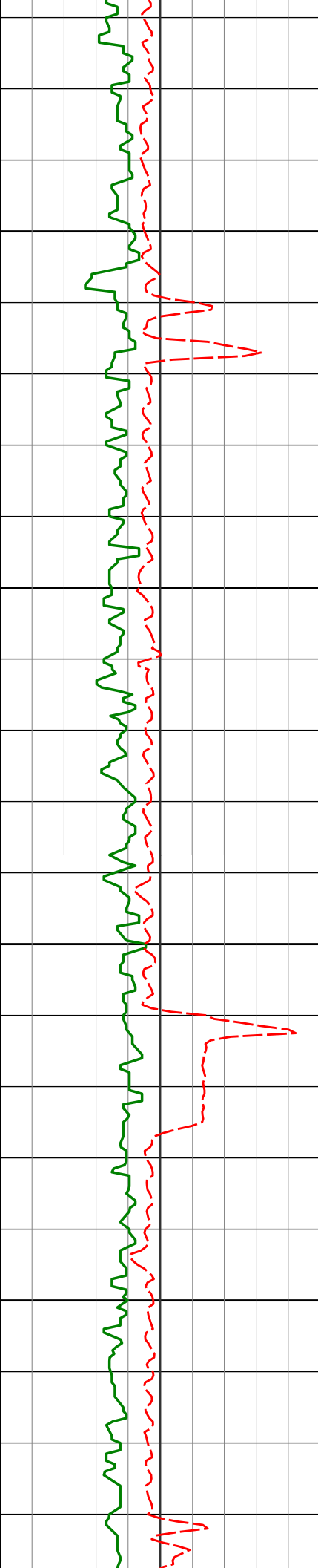
5629'

1.08°

124.36°

5609.21'

83.36'



5650

5700

5750

5800

5723'

0.91°

158.42°

5703.20'

82.30'

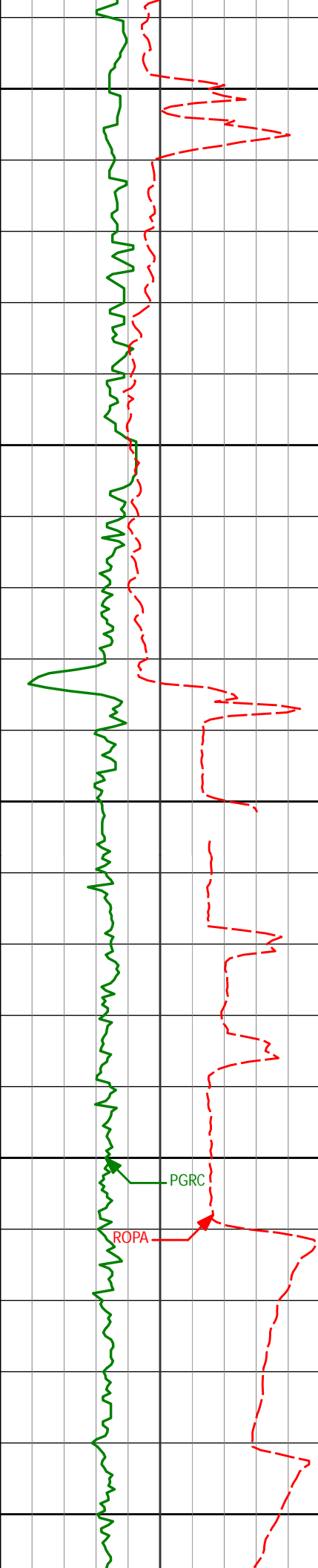
5818'

1.09°

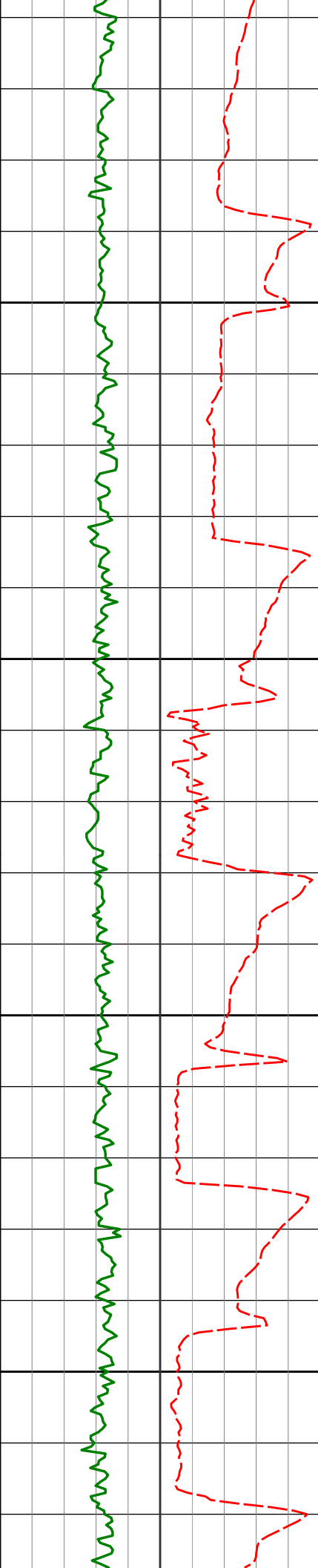
155.78°

5798.18'

81.57'



5850					
	5911'	1.63°	123.08°	5891.16'	80.03'
5900					
5950					
200	5976'	1.46°	110.23°	5956.14'	78.44'
	6006'	1.38°	114.36°	5986.13'	77.74'
6000					
	6054'	3.76°	247.26°	6034.10'	78.62'
6050					



6101'

6100

6149'

6150

6196'

6200

6244'

6250

6101'

6149'

6196'

6244'

6291'

12.10°

14.50°

17.75°

20.34°

23.47°

258.84°

258.97°

262.13°

268.95°

266.13°

6080.61'

6127.32'

6172.46'

6217.84'

6261.44'

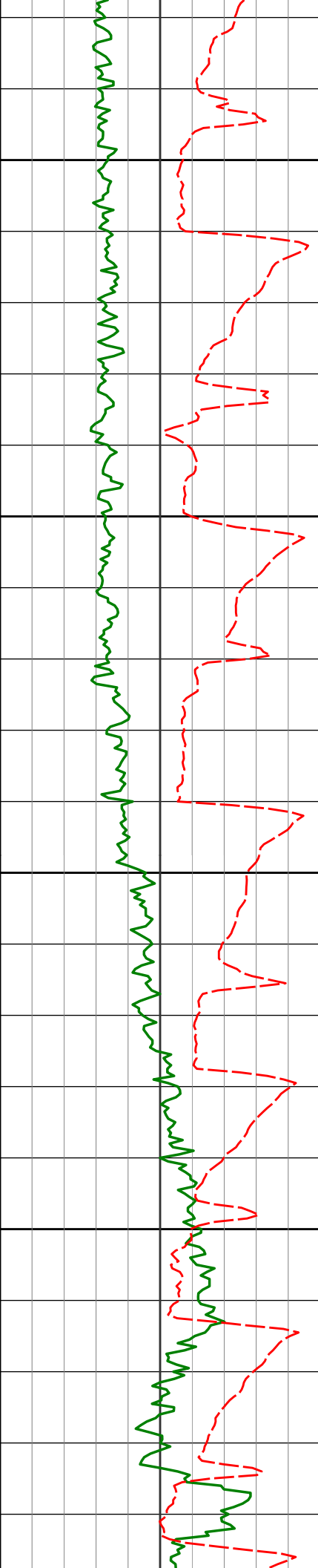
84.80'

95.52'

108.27'

123.79'

141.24'



6300

6339'

28.03°

269.67°

6304.66'

162.00'

6350

6385'

31.39°

273.62°

6344.62'

184.78'

6400

6433'

34.79°

273.97°

6384.82'

210.98'

6450

6480'

39.09°

273.21°

6422.38'

239.22'

6528'

44.26°

272.61°

6458.22'

271.12'

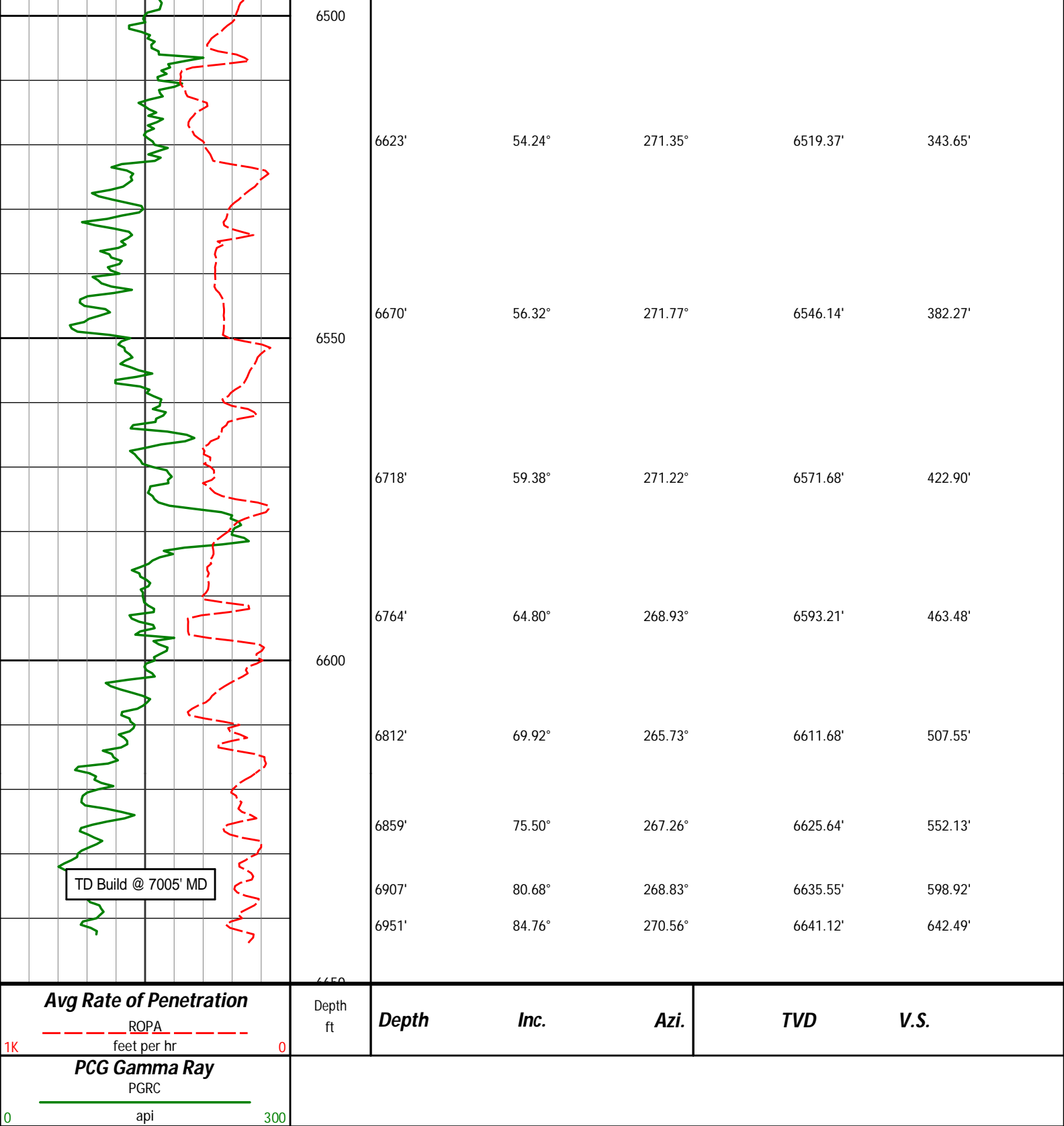
6575'

50.44°

271.77°

6490.05'

305.67'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA35-69-1HNB
Wattenburg
Weld Colorado
USA
CA-XX-0901058459

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
241.00	1.00	145.13	240.99	1.73 S	1.20 E	-1.29	0.41
487.00	1.10	145.33	486.95	5.43 S	3.77 E	-4.04	0.04
608.00	0.20	102.03	607.94	6.43 S	4.64 E	-4.95	0.80
724.00	0.38	182.09	723.94	6.85 S	4.82 E	-5.16	0.34
816.00	0.25	134.62	815.94	7.30 S	4.96 E	-5.31	0.30
909.00	0.83	304.55	908.93	7.06 S	4.55 E	-4.89	1.16
1000.00	1.13	309.90	999.92	6.11 S	3.31 E	-3.61	0.34
1092.00	1.64	290.73	1091.89	5.06 S	1.39 E	-1.64	0.74
1183.00	0.93	289.64	1182.87	4.35 S	0.53 W	0.31	0.78
1275.00	1.14	298.43	1274.85	3.67 S	2.03 W	1.85	0.29
1367.00	1.44	304.57	1366.83	2.58 S	3.79 W	3.66	0.36
1459.00	1.32	302.63	1458.80	1.35 S	5.64 W	5.56	0.14
1554.00	1.25	326.38	1553.78	0.10 N	7.13 W	7.13	0.56
1649.00	1.46	311.57	1648.75	1.77 N	8.61 W	8.69	0.43
1743.00	1.42	289.58	1742.73	2.95 N	10.60 W	10.74	0.59
1838.00	0.92	271.71	1837.71	3.37 N	12.47 W	12.63	0.65
1933.00	0.38	21.81	1932.70	3.69 N	13.12 W	13.29	1.17
2027.00	0.56	118.97	2026.70	3.75 N	12.60 W	12.77	0.76
2120.00	1.56	346.42	2119.69	4.76 N	12.50 W	12.72	2.13
2215.00	3.61	336.41	2214.59	8.76 N	14.00 W	14.42	2.20
2310.00	4.83	349.67	2309.33	15.44 N	15.92 W	16.66	1.64
2405.00	7.95	350.10	2403.73	25.85 N	17.76 W	19.03	3.28
2500.00	8.37	348.64	2497.77	39.10 N	20.26 W	22.17	0.49
2595.00	8.54	349.98	2591.73	52.82 N	22.84 W	25.44	0.27
2689.00	7.56	346.62	2684.81	65.71 N	25.49 W	28.73	1.16
2784.00	7.55	344.58	2778.98	77.81 N	28.60 W	32.43	0.28
2879.00	8.13	348.40	2873.10	90.41 N	31.61 W	36.06	0.82
2974.00	8.88	347.58	2967.05	104.15 N	34.53 W	39.67	0.80
3068.00	9.07	345.48	3059.90	118.41 N	37.95 W	43.79	0.40
3163.00	7.31	343.12	3153.93	131.44 N	41.58 W	48.07	1.89
3258.00	7.25	343.71	3248.16	142.98 N	45.02 W	52.07	0.10
3353.00	7.37	341.14	3342.39	154.50 N	48.67 W	56.29	0.37
3448.00	7.52	343.37	3436.59	166.22 N	52.42 W	60.62	0.34
3543.00	7.31	342.79	3530.79	177.95 N	55.99 W	64.77	0.23
3638.00	8.82	354.09	3624.86	190.97 N	58.53 W	67.95	2.30
3733.00	9.87	353.50	3718.60	206.30 N	60.20 W	70.38	1.11
3828.00	9.56	350.80	3812.23	222.18 N	62.38 W	73.35	0.58
3923.00	9.18	347.52	3905.97	237.37 N	65.28 W	77.00	0.69
4018.00	7.12	345.12	4000.00	250.46 N	68.43 W	80.80	2.20
4112.00	6.64	348.51	4093.33	261.41 N	71.01 W	83.92	0.67
4207.00	5.06	353.77	4187.83	270.96 N	72.56 W	85.94	1.75
4302.00	3.82	346.34	4282.54	278.20 N	73.76 W	87.50	1.44
4396.00	2.17	347.26	4376.41	282.98 N	74.89 W	88.87	1.76
4491.00	0.76	15.47	4471.38	285.34 N	75.12 W	89.21	1.62
4586.00	1.68	32.23	4566.36	287.13 N	74.21 W	88.39	1.03
4681.00	1.02	12.20	4661.33	289.13 N	73.29 W	87.57	0.84
4775.00	0.80	356.42	4755.32	290.60 N	73.15 W	87.51	0.35
4870.00	0.57	257.10	4850.31	291.16 N	73.65 W	88.04	1.11
4965.00	1.11	210.84	4945.30	290.26 N	74.59 W	88.93	0.87
5060.00	1.05	177.30	5040.29	288.60 N	75.02 W	89.27	0.66
5155.00	0.68	107.45	5135.28	287.57 N	74.44 W	88.64	1.09
5250.00	1.21	140.23	5230.27	286.63 N	73.26 W	87.42	0.78
5344.00	1.63	128.23	5324.24	285.03 N	71.57 W	85.66	0.55
5439.00	0.50	163.97	5419.22	283.80 N	70.40 W	84.42	1.32
5534.00	0.20	153.46	5514.22	283.25 N	70.21 W	84.21	0.32
5629.00	1.08	124.36	5609.21	282.60 N	69.40 W	83.36	0.96
5723.00	0.91	158.42	5703.20	281.41 N	68.39 W	82.30	0.64
5818.00	1.09	155.78	5798.18	279.88 N	67.74 W	81.57	0.20
5911.00	1.63	123.08	5891.16	278.35 N	66.27 W	80.03	0.99
5976.00	1.46	110.23	5956.14	277.56 N	64.72 W	78.44	0.59
6006.00	1.38	114.36	5986.13	277.28 N	64.03 W	77.74	0.43
6054.00	3.76	247.26	6034.10	276.43 N	64.96 W	78.62	10.01
6101.00	12.10	258.84	6080.61	274.88 N	71.22 W	84.80	17.98
6149.00	14.50	258.97	6127.32	272.76 N	82.06 W	95.52	5.00
6196.00	17.75	262.13	6172.46	270.65 N	94.93 W	108.27	7.16
6244.00	20.34	268.95	6217.84	269.49 N	110.53 W	123.79	7.11
6291.00	23.47	266.13	6261.44	268.71 N	128.04 W	141.24	7.02
6339.00	28.03	269.67	6304.66	268.00 N	148.86 W	162.00	10.02
6385.00	31.39	273.62	6344.62	268.70 N	171.64 W	184.78	8.45
6433.00	34.79	273.97	6384.82	270.43 N	197.78 W	210.98	7.09

6480.00	39.09	273.21	6422.38	272.19 N	225.96 W	239.22	9.20
6528.00	44.26	272.61	6458.22	273.80 N	257.83 W	271.12	10.80
6575.00	50.44	271.77	6490.05	275.11 N	292.36 W	305.67	13.21
6623.00	54.24	271.35	6519.37	276.14 N	330.33 W	343.65	7.95
6670.00	56.32	271.77	6546.14	277.20 N	368.95 W	382.27	4.49
6718.00	59.38	271.22	6571.68	278.25 N	409.57 W	422.90	6.45
6764.00	64.80	268.93	6593.21	278.29 N	450.20 W	463.48	12.58
6812.00	69.92	265.73	6611.68	276.20 N	494.43 W	507.55	12.31
6859.00	75.50	267.26	6625.64	273.47 N	539.20 W	552.13	12.27
6907.00	80.68	268.83	6635.55	271.87 N	586.12 W	598.92	11.26
6951.00	84.76	270.56	6641.12	271.64 N	629.76 W	642.49	10.06

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 DIRECTION OF 272.85 DEGREES (GRID)
A TOTAL CORRECTION OF 7.63 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6951.00 FEET
IS 685.85 FEET ALONG 293.33 DEGREES (GRID)**

**First Three survey's are from 3rd party source (Muulti Shot EMS) and provided by CO-man on location before drilling.
MD 241 Inc 1.0 Azi 145.13
MD 487 Inc 1.1 Azi 145.33
MD 608 Inc 0.2 Azi 102.03**

**Tied in @ Surface
Magnetic direction of 7.633 has been added to AZI for grid direction correction.**