



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	12-Jun-13	13-Jun-13	16-Jun-13		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.75		
Log Start Depth (TVD, ft)	630.98	6,010.19	6,779.96		
Log End Depth (TVD, ft)	6,010.19	6,779.96	6,787.24		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	11-Jun-13 12:09	12-Jun-13 16:15	14-Jun-13 23:15		
Drill/Wipe End Date and Time	12-Jun-13 05:17	13-Jun-13 11:03	16-Jun-13 14:30		
Min Inc (deg) @ Depth (TVD, ft)	.04 @ 1,747.97	.50 @ 6,015.19	83.25 @ 6,787.65		
Max Inc (deg) @ Depth (TVD, ft)	13.38 @ 3,161.90	79.55 @ 6,771.50	93.7 @ 6,788.56		
Bit TFA(in2) / Bit Type	.75 / N/A	.90 / PDC	.46 / PDC		
Flow Rate (gpm)	583.40	574.09	291.79		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	479.8 / N/A		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.60 / 31.00	9.25 / 36.00	9.35 / 36		
Filtrate CL (ppm)	1,900.00	1,200.00	1,900		
pH / Fluid Loss (mptm)	11.50 / 39	8.40 / 18	10.4 / 10.4		
PV (cP) / YP (Ihf2)	4 / 1.00	7 / 7.00	11 / 6		
% Solids / % Sand	2.20 / 0.50	4.00 / 0.15	5.2 / 0.05		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	0.2 / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Min Tool Temp (in) F / C	145.00 / 63.00	127.00 / 53.00	217.00 / 81.00		

Max Tool Temp (degF) / Source	145.90 / PCM	167.00 / PCM	217.60 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 145.90	N/A @ 167.00	N/A @ 217.6		
Lead MWD Engineer	Chris Befort	Chris Befort	Chris Befort		
Customer Representative	Jim Turner	Jim Turner	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.76		
Sub Serial Number	11341341	11341341	12134687		
Insert Serial Number	11227549	11227549	11227560		
Date and Time Initialized	10-Jun-13 21:03	10-Jun-13 21:03	14-Jun-13 02:28		
Date and Time Read	13-Jun-13 17:40	13-Jun-13 17:47	17-Jun-13 02:06		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58	55	66		
Software Version	6.21	6.21	6.21		
Sub Serial Number	10926371	10926371	12134687		
Sonde Serial Number	11638498	11638498	11297582		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	244.44	358.39	320.95		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.97	48.16	68.93		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341341	11341341	12134687		
Insert/Sonde Serial Number	11293344	11293344	11293348		

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 Distance: 1.2 ft

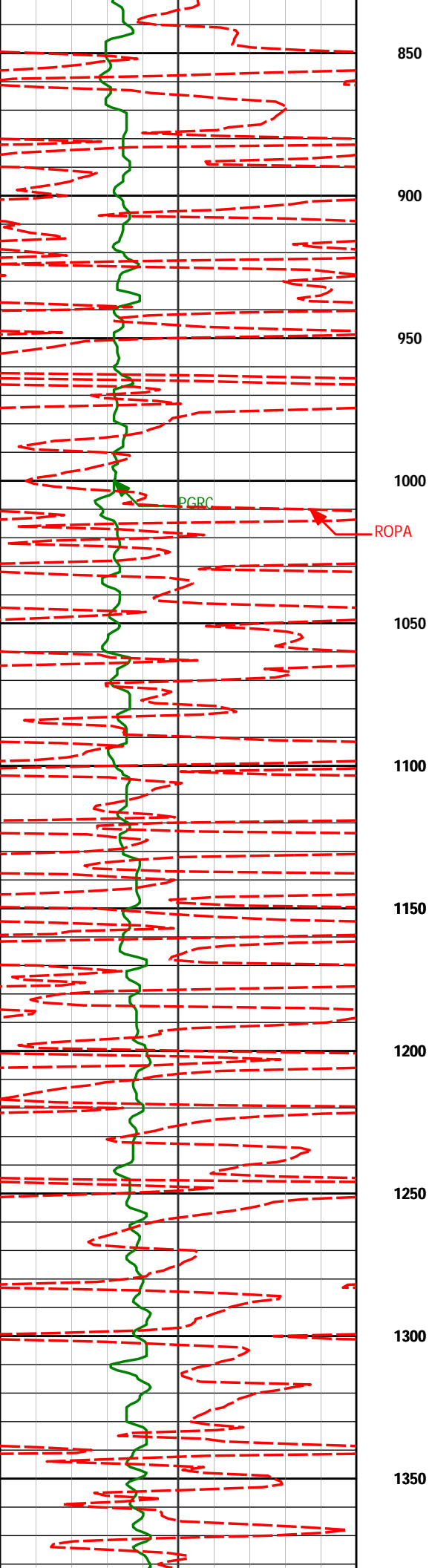
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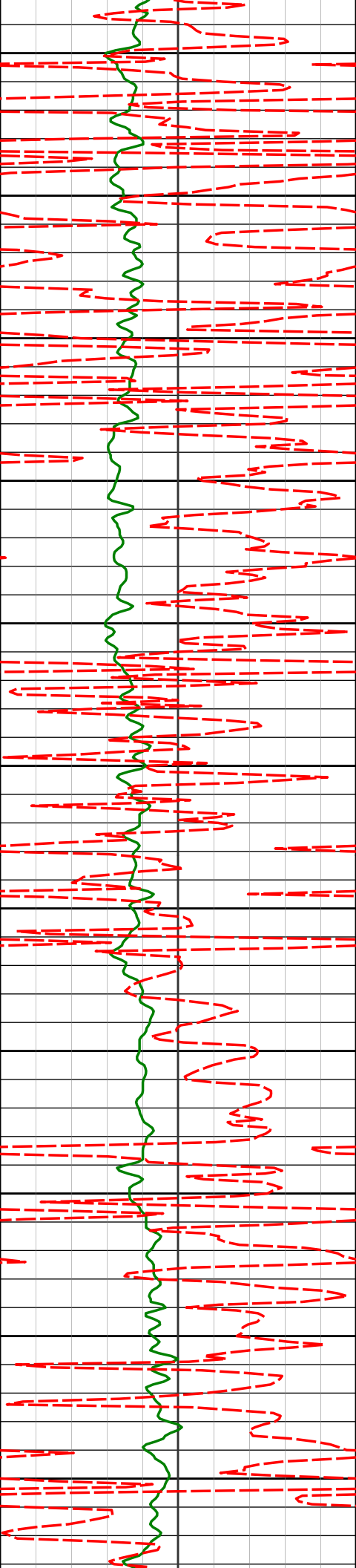
HALLIBURTONSperry Drilling Services**TVD Detail Log 1:600**

Noble Energy
Wells Ranch AE05-67HN
H&P 321
Sec. 6-T6N-R62W





850				
900				
912'	0.22°	155.12°	911.98'	-0.16'
950				
1000				
1004'	0.34°	158.85°	1003.98'	0.00'
1050				
1100				
1096'	0.25°	148.86°	1095.98'	0.19'
1150				
1188'	0.16°	151.31°	1187.98'	0.34'
1200				
1250				
1280'	0.15°	28.56°	1279.98'	0.46'
1300				
1350				
1371'	0.09°	152.02°	1370.98'	0.55'



1400

1450

1500

1550

1600

1650

1700

1750

1800

1850

1900

1463'

0.40°

43.99°

1462.98'

0.82'

1558'

0.25°

56.63°

1557.98'

1.23'

1653'

0.16°

15.28°

1652.97'

1.45'

1748'

0.04°

76.18°

1747.97'

1.52'

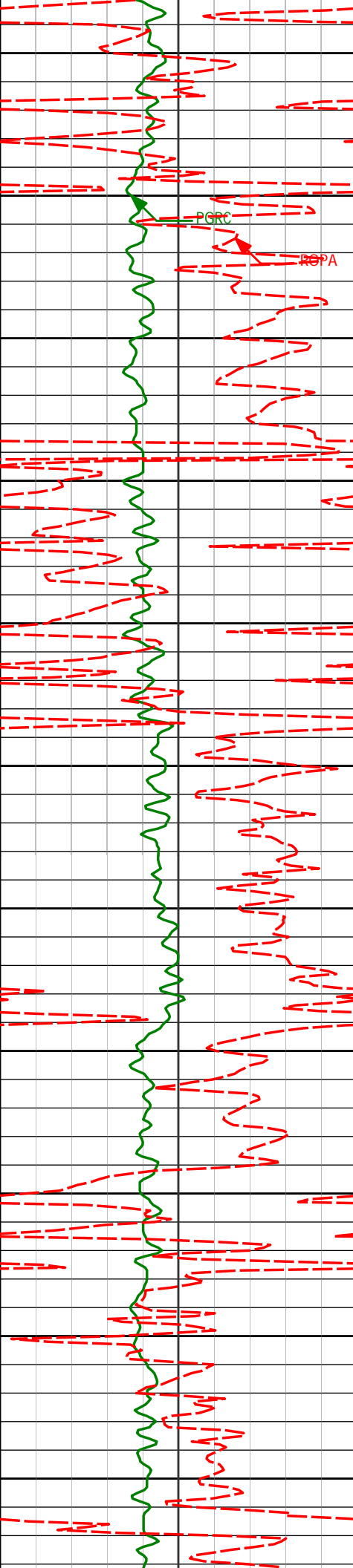
1842'

0.24°

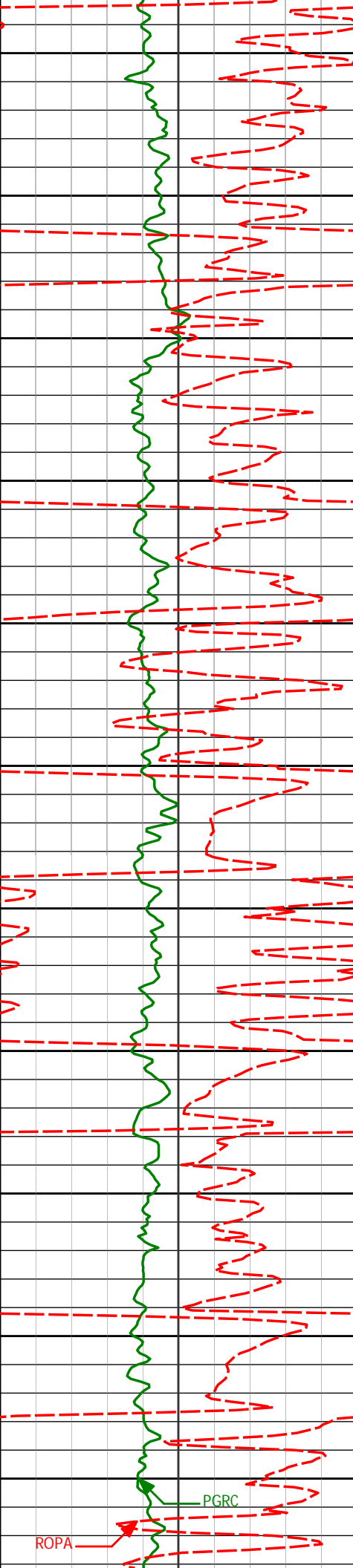
353.68°

1841.97'

1.54'



1950	1937'	0.18°	196.86°	1936.97'	1.48'
2000					
2050	2032'	0.55°	144.99°	2031.97'	1.68'
2100					
2150	2127'	0.46°	184.52°	2126.97'	1.88'
2200					
2250	2222'	0.39°	194.57°	2221.97'	1.74'
2300					
2350	2316'	0.25°	301.36°	2315.97'	1.48'
2400					
2450	2411'	0.39°	261.03°	2410.96'	0.99'



2500

2550

2600

2650

2700

2750

2800

2850

2900

2950

3000

2506'

1.05°

49.43°

2505.96'

1.35'

2601'

1.92°

48.62°

2600.93'

3.26'

2696'

4.30°

62.92°

2695.78'

7.72'

2791'

7.32°

73.19°

2790.29'

16.80'

2886'

9.31°

71.09°

2884.28'

30.01'

2980'

11.85°

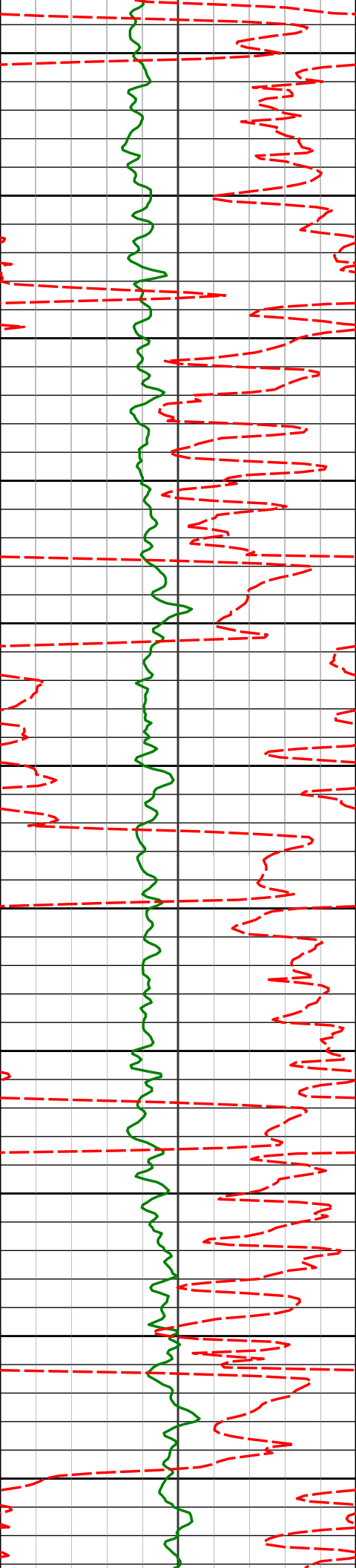
66.56°

2976.68'

46.28'

PGRC

ROPA



3050

3075'

13.13°

67.69°

3069.43'

65.49'

3100

3170'

13.38°

67.04°

3161.90'

85.89'

3150

3200

3250

3265'

10.55°

64.05°

3254.82'

104.12'

3300

3350

3360'

7.64°

62.85°

3348.62'

117.80'

3400

3450

3455'

6.48°

67.73°

3442.90'

128.55'

3500

3550

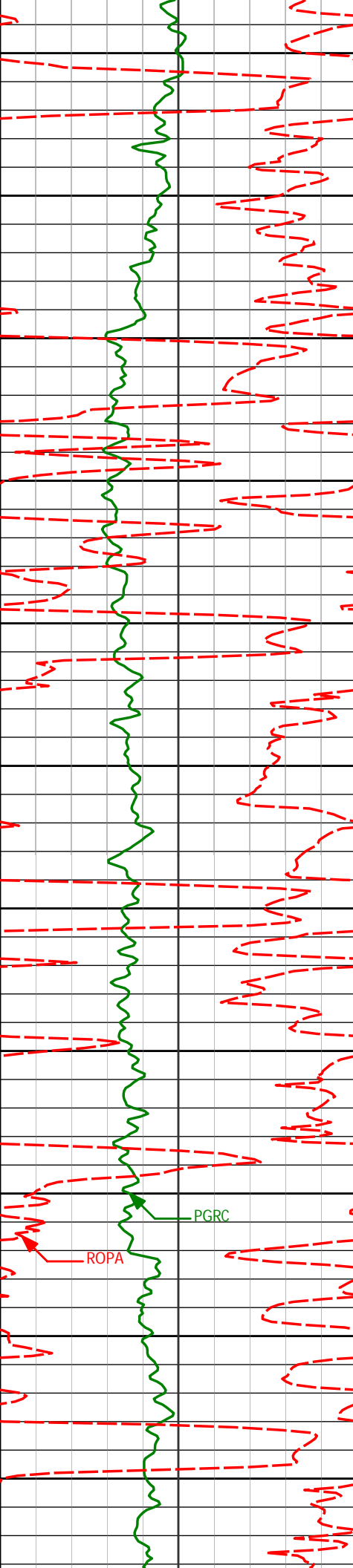
3549'

3.16°

61.26°

3536.55'

135.84'



3600

3644'

2.01°

59.45°

3631.46'

139.65'

3650

3700

3739'

1.18°

21.80°

3726.42'

141.51'

3750

3800

3834'

1.71°

315.08°

3821.40'

140.94'

3850

3900

3929'

1.45°

286.52°

3916.36'

138.84'

3950

4000

4024'

1.55°

289.82°

4011.33'

136.51'

4050

4100

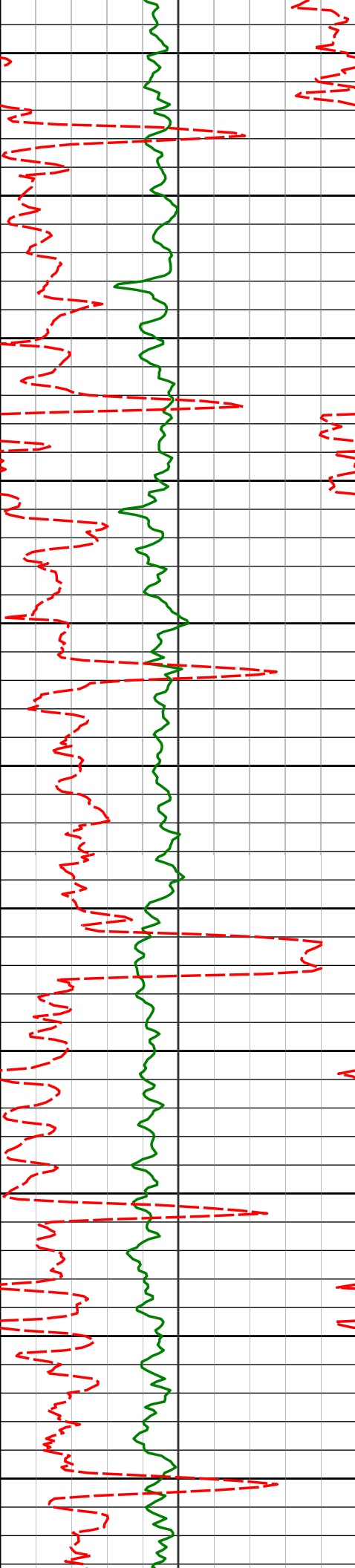
4119'

0.90°

292.72°

4106.31'

134.64'



4150

4200

4250

4300

4350

4400

4450

4500

4550

4600

4650

4214'

0.36°

318.55°

4201.30'

133.78'

4309'

0.57°

303.75°

4296.30'

133.21'

4403'

1.02°

343.37°

4390.29'

132.62'

4498'

0.19°

4.56°

4485.28'

132.43'

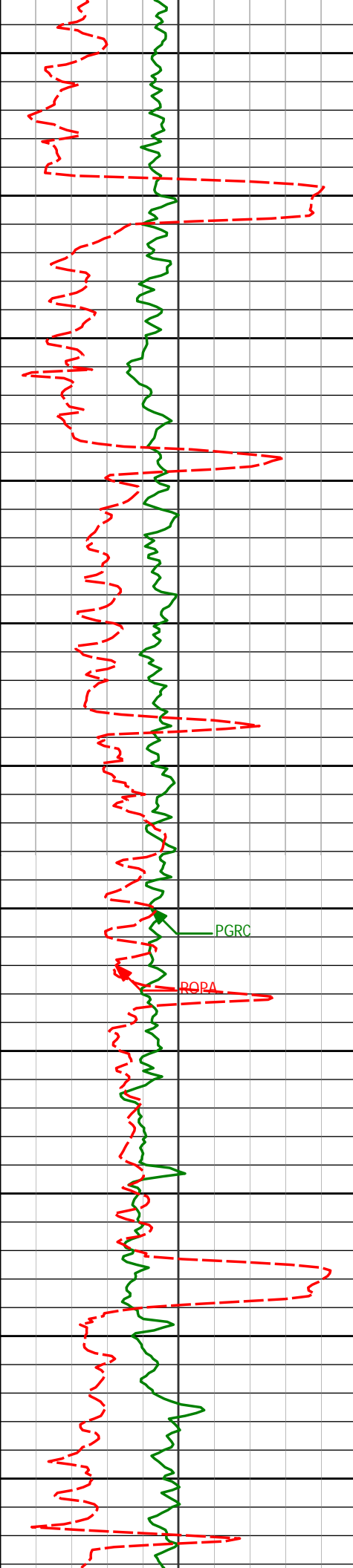
4593'

0.28°

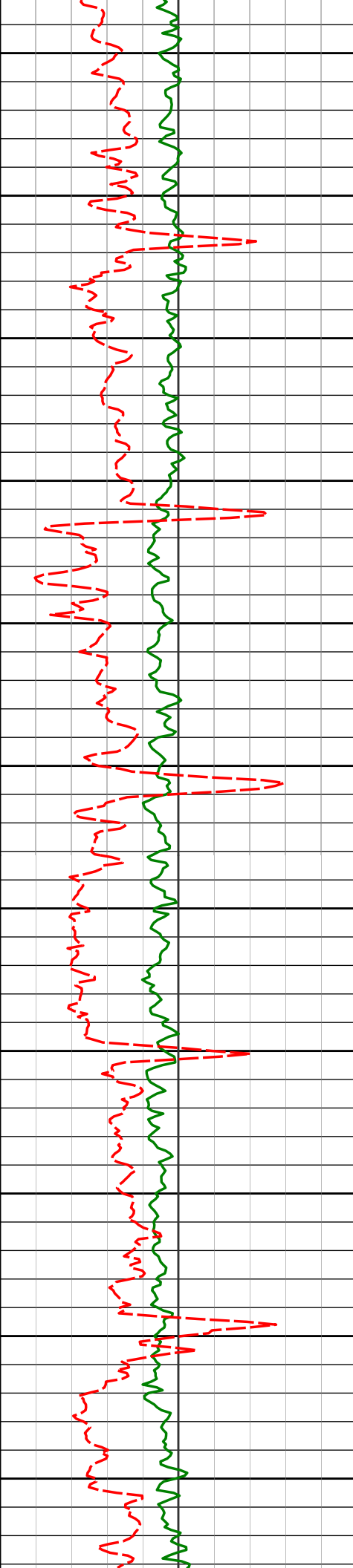
27.34°

4580.28'

132.56'



4688'	0.54°	33.33°	4675.28'	132.93'
4700				
4750				
4783'	0.93°	179.38°	4770.28'	133.17'
4800				
4850				
4878'	1.04°	169.55°	4865.26'	133.27'
4900				
4950				
4973'	1.38°	173.76°	4960.24'	133.48'
5000				
5068'	1.36°	166.12°	5055.21'	133.79'
5100				
5150				
5163'	0.17°	163.37°	5150.20'	134.06'
5200				



5250

5258'

0.13°

7.43°

5245.20'

134.11'

5300

5350

5353'

0.10°

247.41°

5340.20'

134.05'

5400

5450

5447'

0.47°

140.38°

5434.20'

134.21'

5500

5550

5542'

0.46°

136.51°

5529.20'

134.70'

5600

5650

5637'

0.45°

158.97°

5624.20'

135.07'

5700

5750

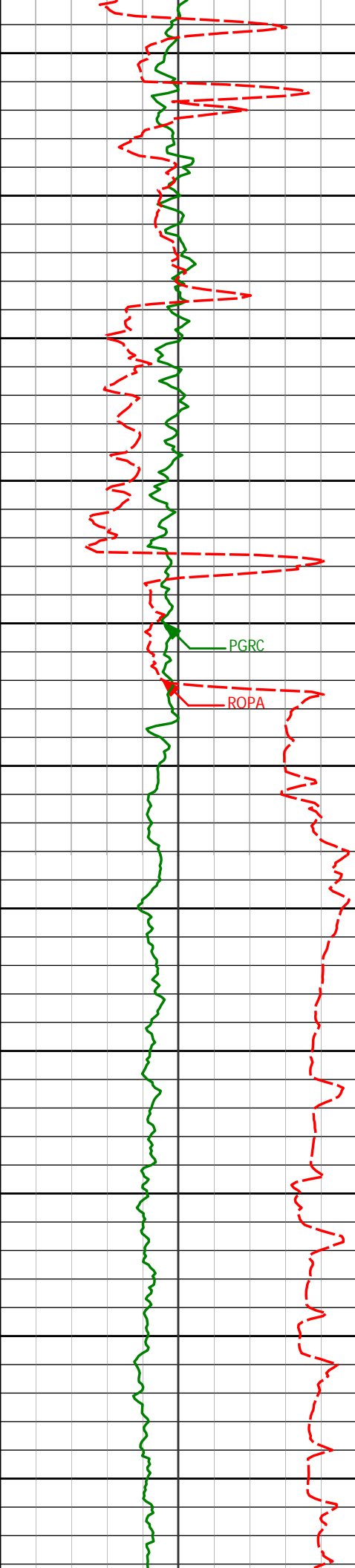
5732'

0.43°

135.86°

5719.19'

135.43'



5800

5827'

0.39°

142.07°

5814.19'

135.87'

5850

5900

5922'

0.10°

346.37°

5909.19'

136.04'

5950

5965'

0.07°

174.10°

5952.19'

136.03'

6000

200

6028'

0.50°

145.20°

6015.19'

136.19'

6050

6100

6110'

3.08°

97.97°

6097.14'

138.54'

6150

6158'

8.89°

91.26°

6144.86'

143.52'

6200

6204'

12.75°

89.67°

6190.04'

152.15'

6250

6252'

15.99°

88.14°

6236.53'

164.05'

6300

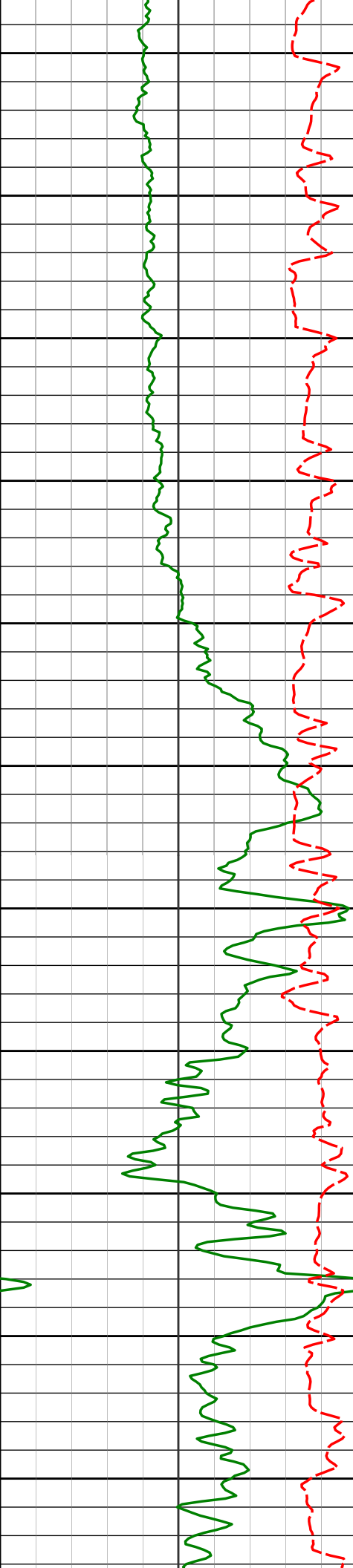
6299'

19.11°

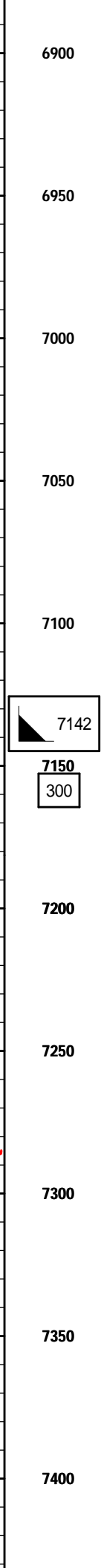
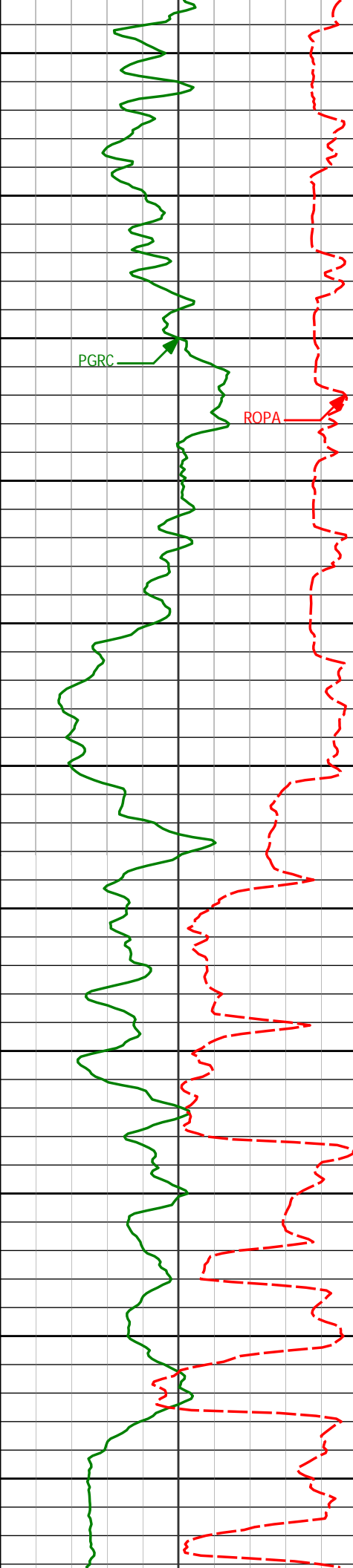
88.41°

6281.34'

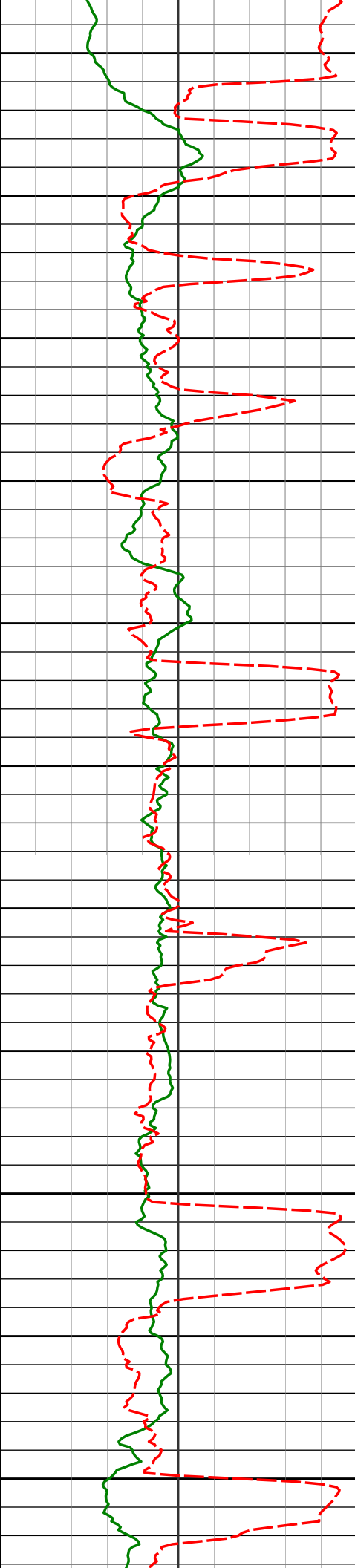
178.22'



6350	6347'	22.32°	87.46°	6326.23'	195.20'
6400	6394'	25.46°	87.46°	6369.19'	214.23'
6450	6442'	27.94°	89.21°	6412.07'	235.80'
6500	6489'	31.92°	88.48°	6452.80'	259.24'
6550	6537'	34.25°	86.18°	6493.01'	285.43'
6600	6584'	39.04°	85.67°	6530.71'	313.46'
6650	6632'	43.42°	86.67°	6566.80'	345.08'
6700	6679'	46.46°	88.85°	6600.06'	378.27'
6750	6727'	51.79°	89.33°	6631.47'	414.54'
6800	6774'	58.17°	89.27°	6658.42'	453.00'
6850	6822'	62.01°	88.58°	6682.36'	494.59'
	6868'	65.44°	86.79°	6702.72'	535.83'



6916'	68.82°	85.81°	6721.37'	580.03'
6964'	71.06°	85.74°	6737.83'	625.09'
7012'	74.16°	86.81°	6752.18'	670.87'
7058'	77.08°	88.75°	6763.60'	715.42'
7097'	79.55°	90.26°	6771.50'	753.59'
7176'	84.14°	91.62°	6782.71'	831.66'
7221'	83.25°	91.47°	6787.65'	876.30'
7316'	84.40°	89.49°	6797.88'	970.64'
7410'	89.63°	89.33°	6802.78'	1064.45'



7450

7500

7550

7600

7650

7700

7750

7800

7850

7900

7950

7505'

92.00°

87.52°

6801.42'

1159.43'

7600'

93.06°

87.68°

6797.23'

1254.33'

7695'

90.92°

88.75°

6793.93'

1349.27'

7789'

88.71°

86.72°

6794.23'

1443.26'

7884'

90.80°

87.70°

6794.64'

1538.24'

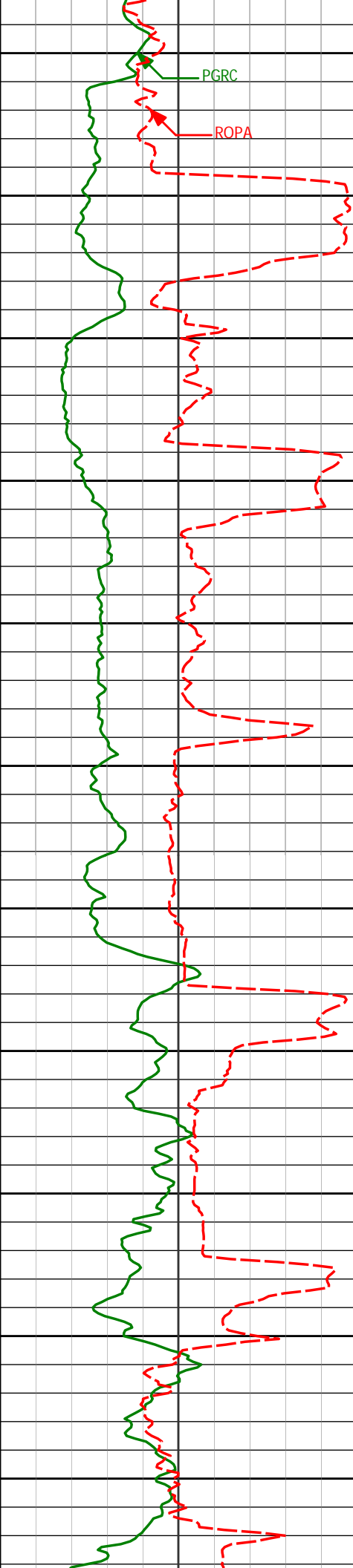
7979'

90.22°

86.66°

6793.79'

1633.23'



8000

8050

8100

8150

8200

8250

8300

8350

8400

8450

8500

8073'

90.95°

87.61°

6792.83'

1727.21'

8168'

91.73°

89.37°

6790.61'

1822.18'

8263'

91.42°

88.85°

6788.01'

1917.12'

8358'

91.27°

90.58°

6785.78'

2012.04'

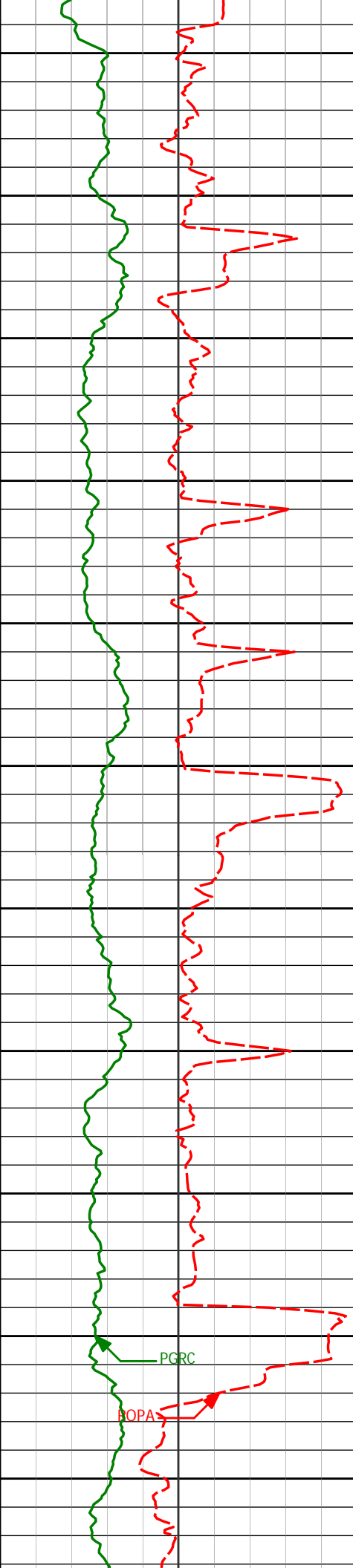
8453'

90.00°

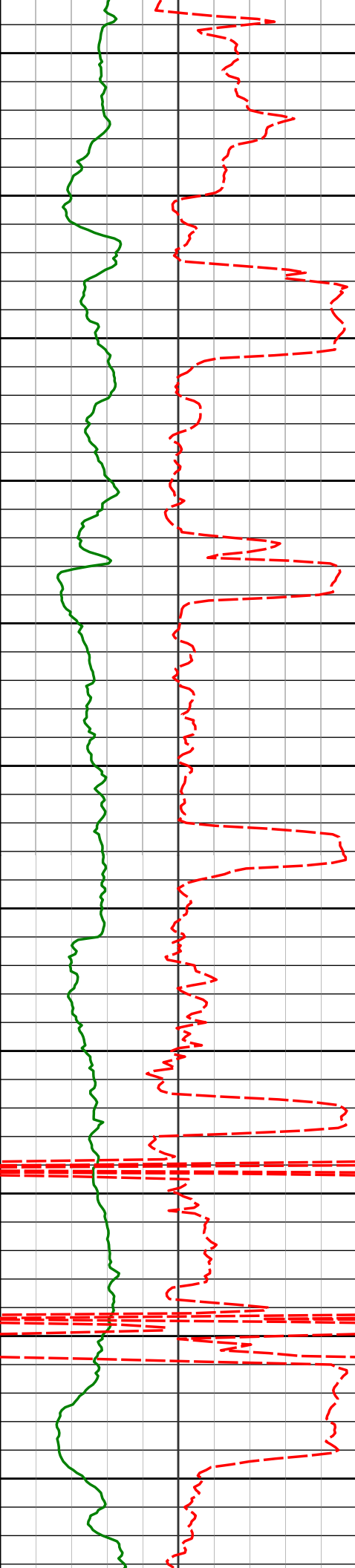
90.80°

6784.73'

2106.92'



8550	8548'	90.22°	90.38°	6784.56'	2201.82'
8600					
8650	8643'	90.31°	89.84°	6784.12'	2296.75'
8700					
8750	8737'	89.17°	89.11°	6784.55'	2390.71'
8800					
8850	8832'	90.31°	89.11°	6784.99'	2485.69'
8900					
8950	8927'	91.20°	89.42°	6783.74'	2580.65'
9000					
9050	9022'	89.29°	87.58°	6783.33'	2675.64'



9100

9117'

88.21°

86.64°

6785.40'

2770.60'

9150

9200

9211'

88.95°

87.70°

6787.72'

2864.56'

9250

9300

9306'

89.41°

87.47°

6789.07'

2959.55'

9350

9400

9401'

89.63°

87.98°

6789.87'

3054.55'

9450

9500

9496'

89.14°

86.27°

6790.89'

3149.53'

9550

9600

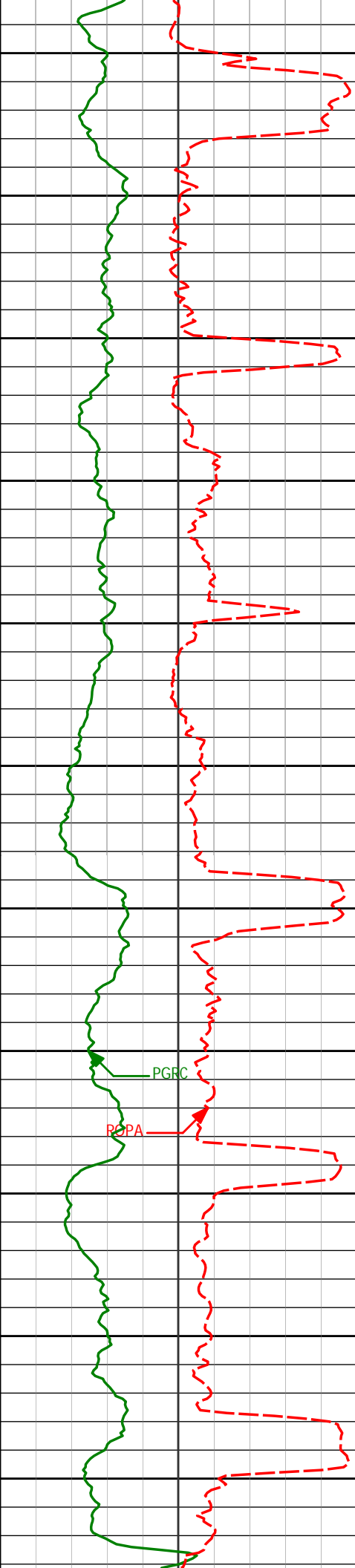
9590'

93.70°

89.79°

6788.56'

3243.46'



9650

9685'

92.03°

88.51°

6783.82'

3338.31'

9700

9750

9780'

90.37°

89.86°

6781.83'

3433.26'

9800

9850

9875'

89.20°

88.67°

6782.18'

3528.23'

9900

9950

9970'

89.63°

89.58°

6783.15'

3623.21'

10000

10050

10064'

93.23°

91.00°

6780.81'

3717.08'

10100

10150

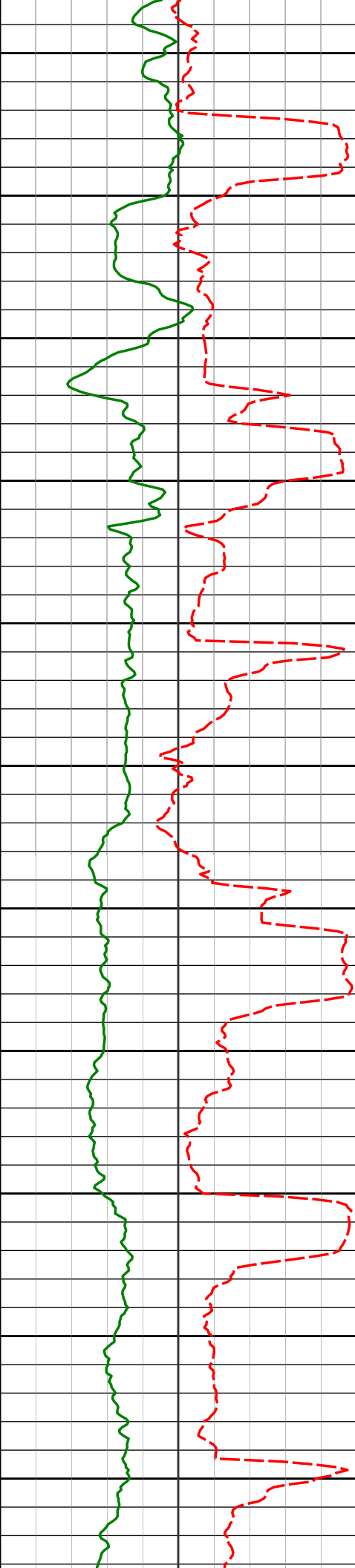
10159'

90.90°

91.08°

6777.39'

3811.87'



10200

10250

10300

10350

10400

10450

10500

10550

10600

10650

10700

10254'

90.18°

88.46°

6776.50'

3906.81'

10349'

89.60°

87.40°

6776.68'

4001.80'

10443'

88.36°

86.56°

6778.35'

4095.77'

10538'

89.60°

87.24°

6780.04'

4190.74'

10633'

90.22°

88.93°

6780.19'

4285.74'

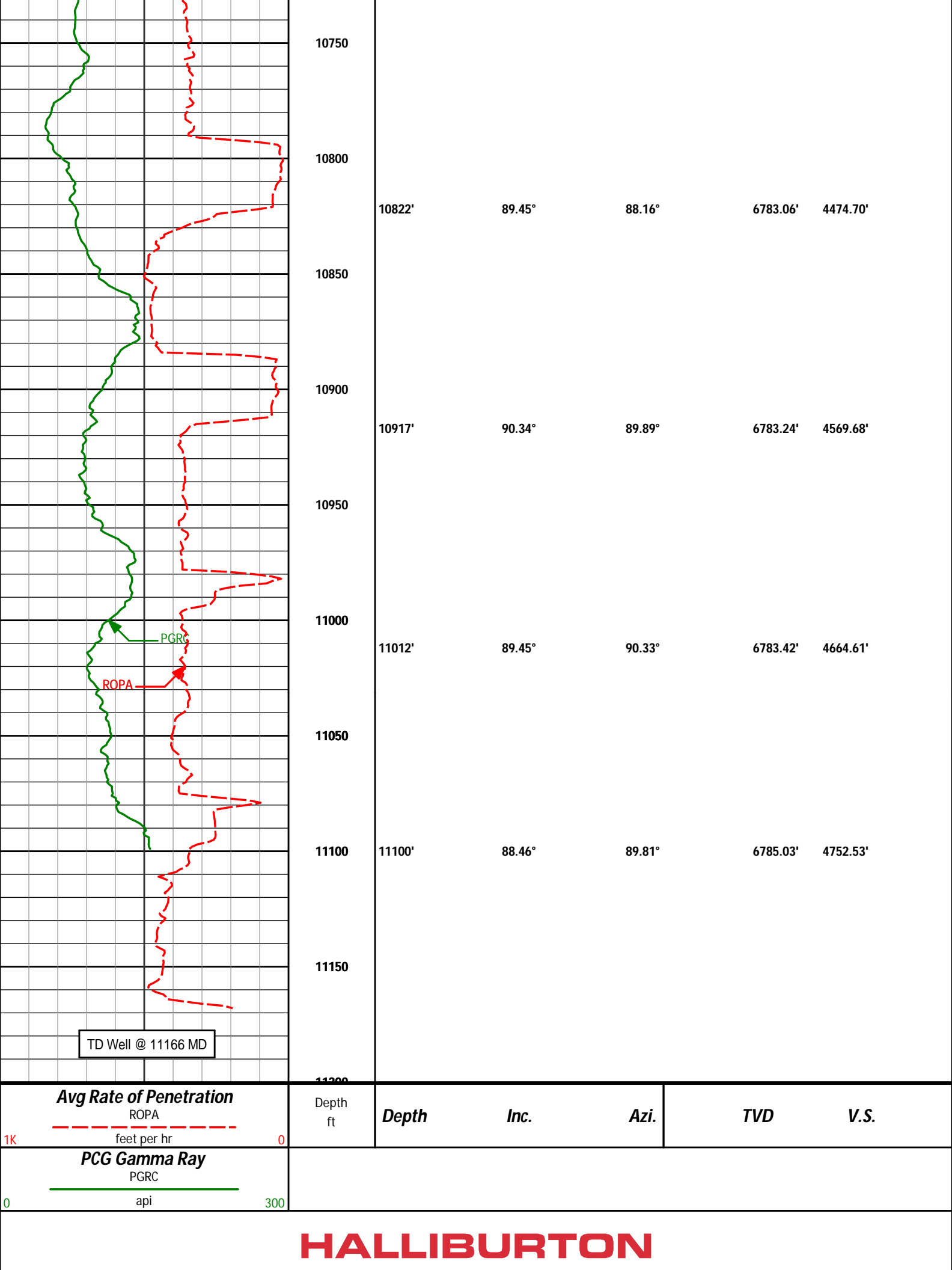
10727'

88.43°

87.77°

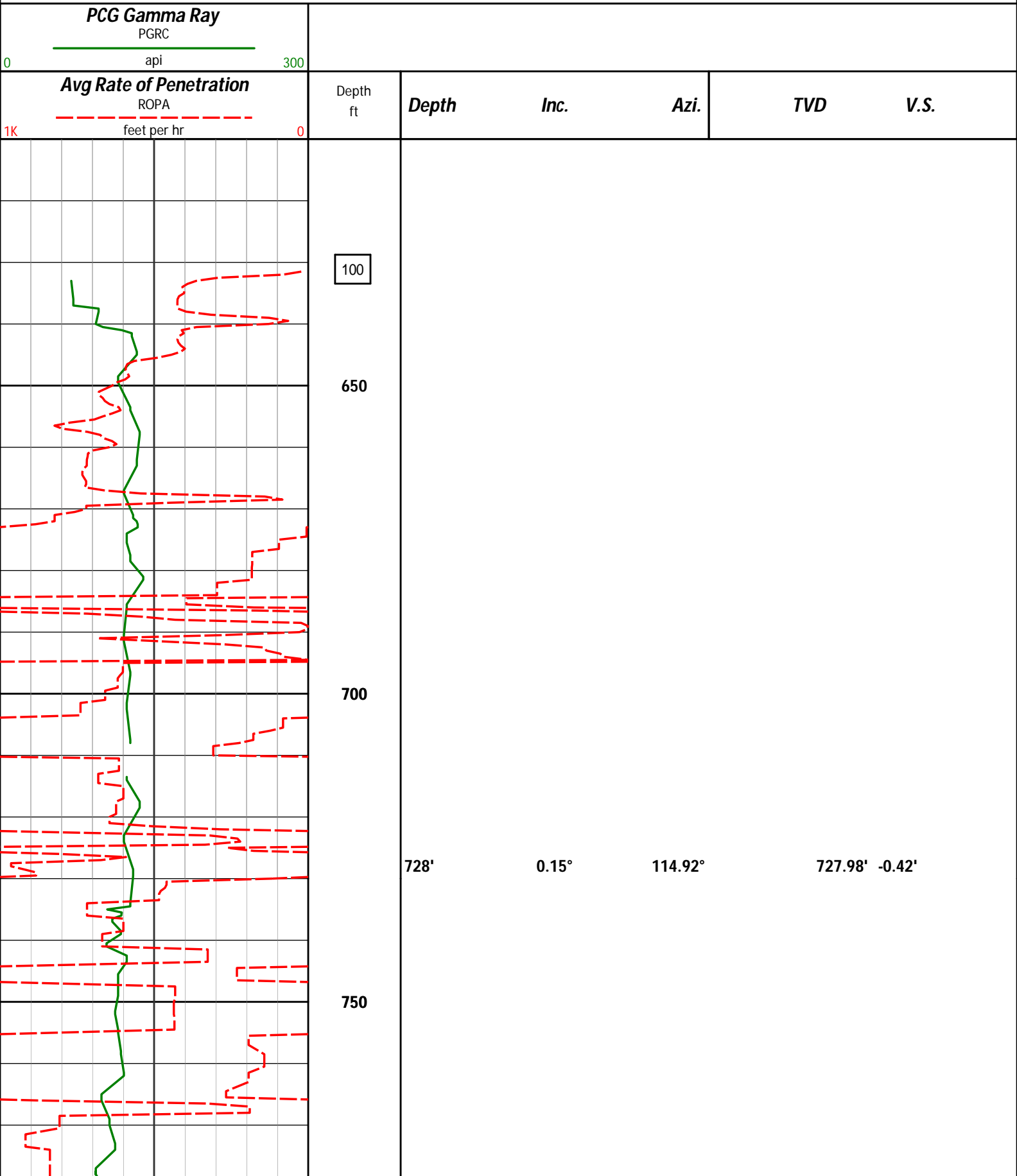
6781.30'

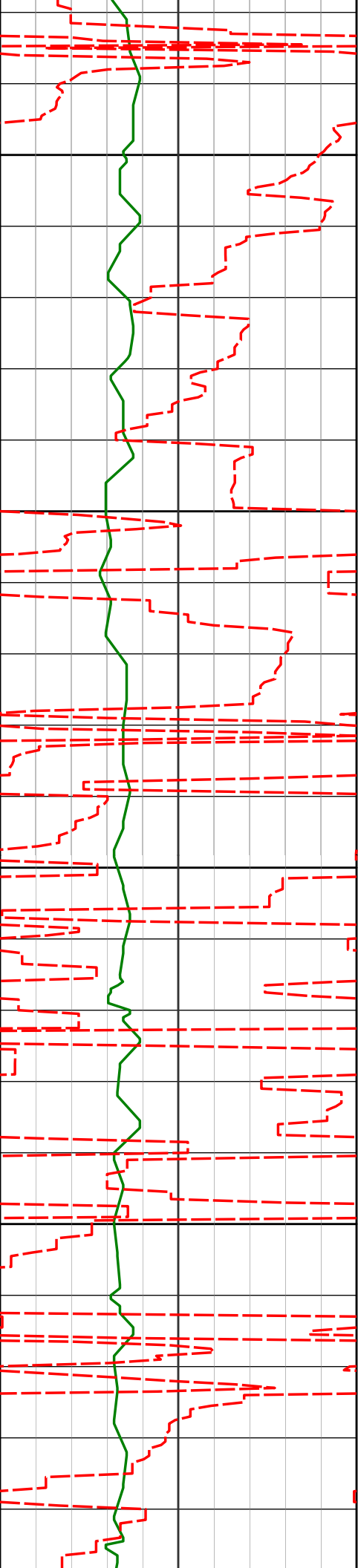
4379.72'



TVD Detail Log 1:240

Noble Energy
Wells Ranch AE05-67HN
H&P 321
Sec. 6-T6N-R62W





800

820'

0.28°

167.17°

819.98' -0.27'

850

900

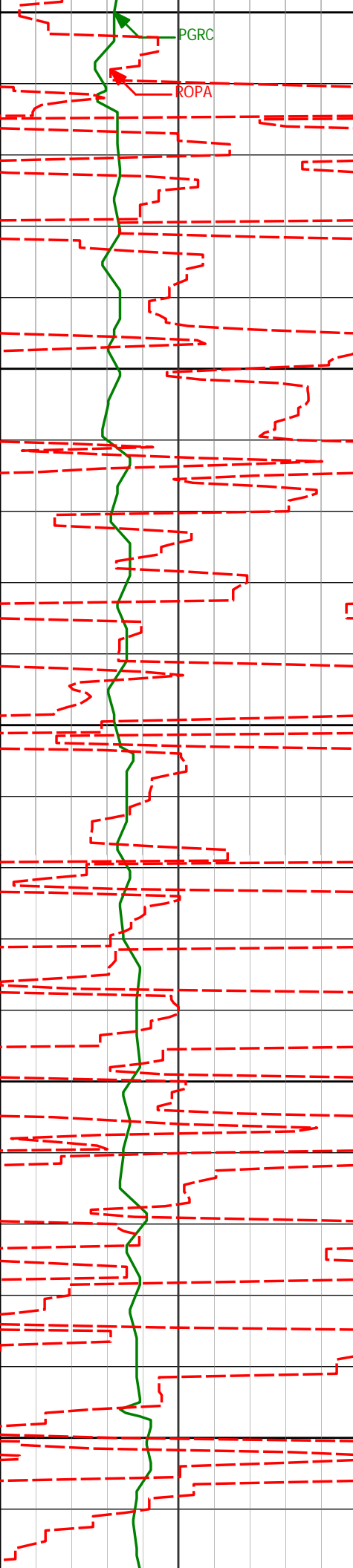
912'

0.22°

155.12°

911.98' -0.16'

950



1000

1004'

0.34°

158.85°

1003.98' 0.00'

1050

1100

1096'

0.25°

148.86°

1095.98' 0.19'

1150

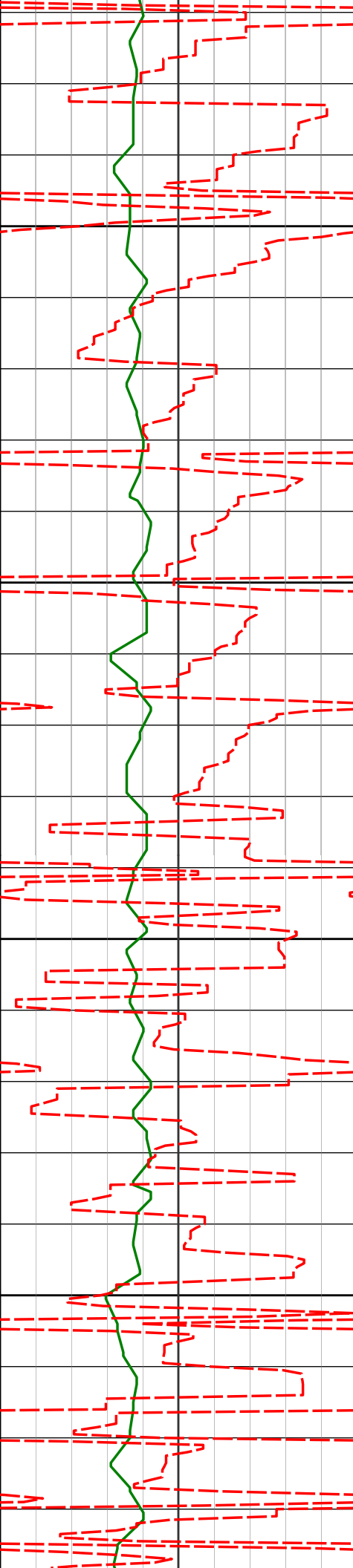
1200

1188'

0.16°

151.31°

1187.98' 0.34'



1250

1280'

0.15°

28.56°

1279.98' 0.46'

1300

1350

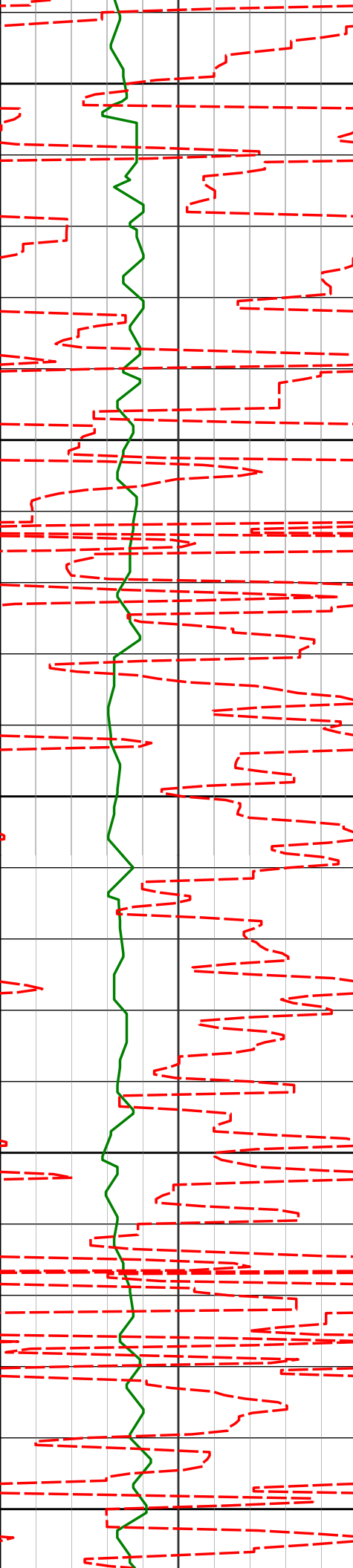
1371'

0.09°

152.02°

1370.98' 0.55'

1400



1450

1463'

0.40°

43.99°

1462.98' 0.82'

1500

1550

1558'

0.25°

56.63°

1557.98' 1.23'

1600

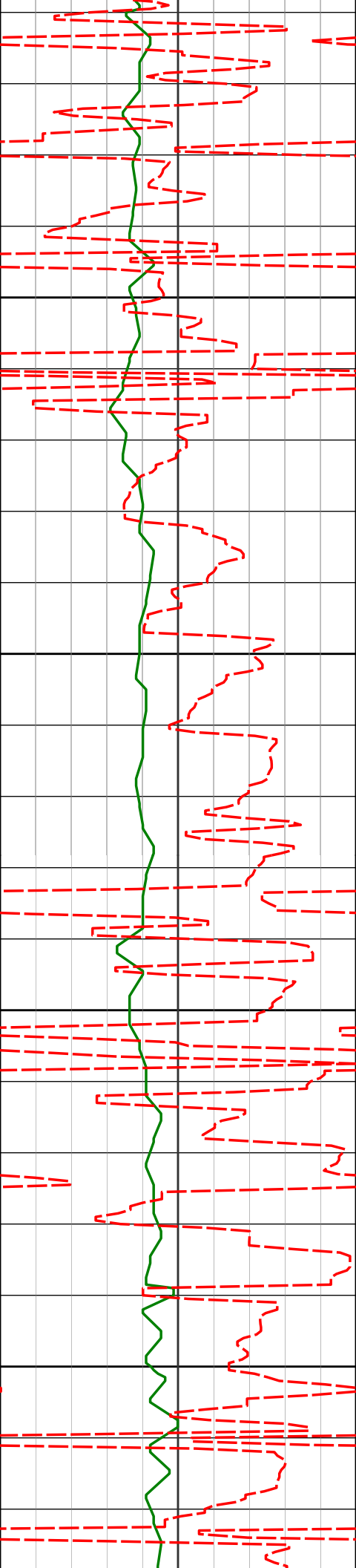
1650

1653'

0.16°

15.28°

1652.97' 1.45'



1700

1750

1800

1850

1748'

0.04°

76.18°

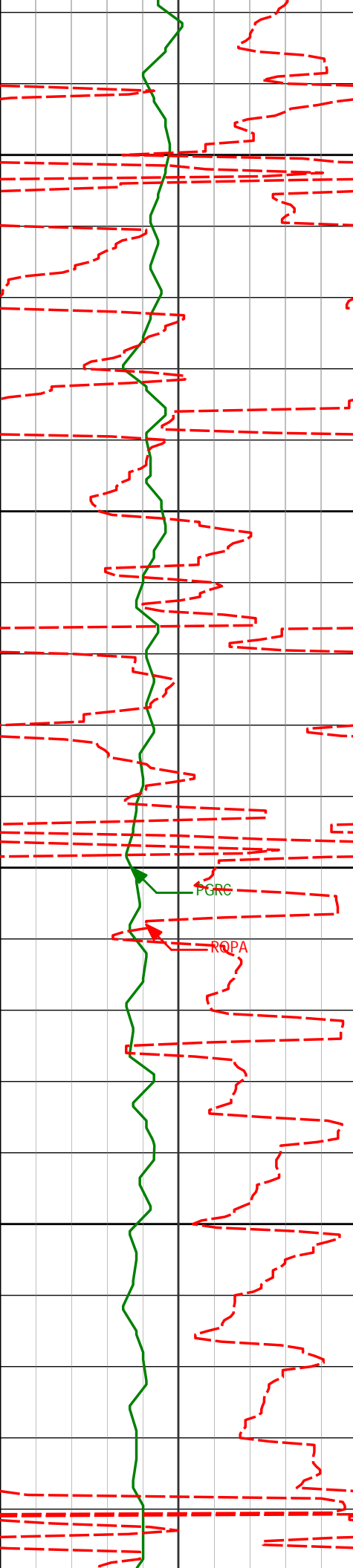
1747.97' 1.52'

1842'

0.24°

353.68°

1841.97' 1.54'



1900

1937'

0.18°

196.86°

1936.97' 1.48'

1950

2000

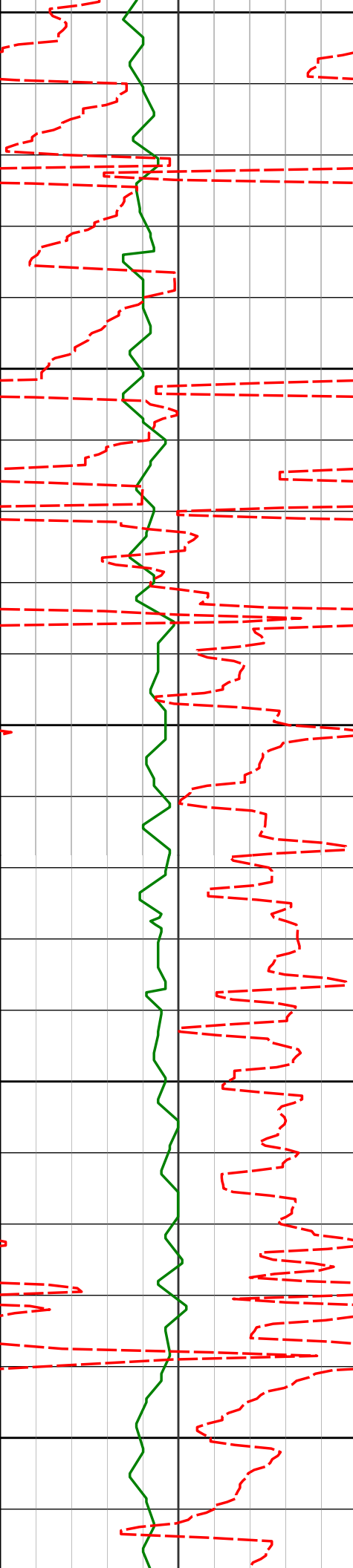
2050

2032'

0.55°

144.99°

2031.97' 1.68'



2100

2127'

0.46°

184.52°

2126.97' 1.88'

2150

2200

2222'

0.39°

194.57°

2221.97' 1.74'

2250

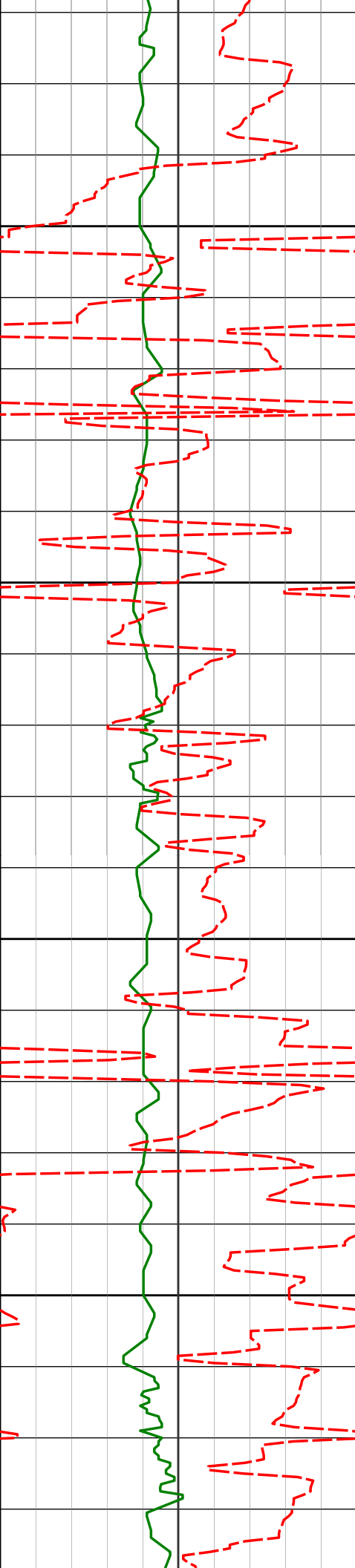
2300

2316'

0.25°

301.36°

2315.97' 1.48'



2350

2400

2450

2500

2411'

0.39°

261.03°

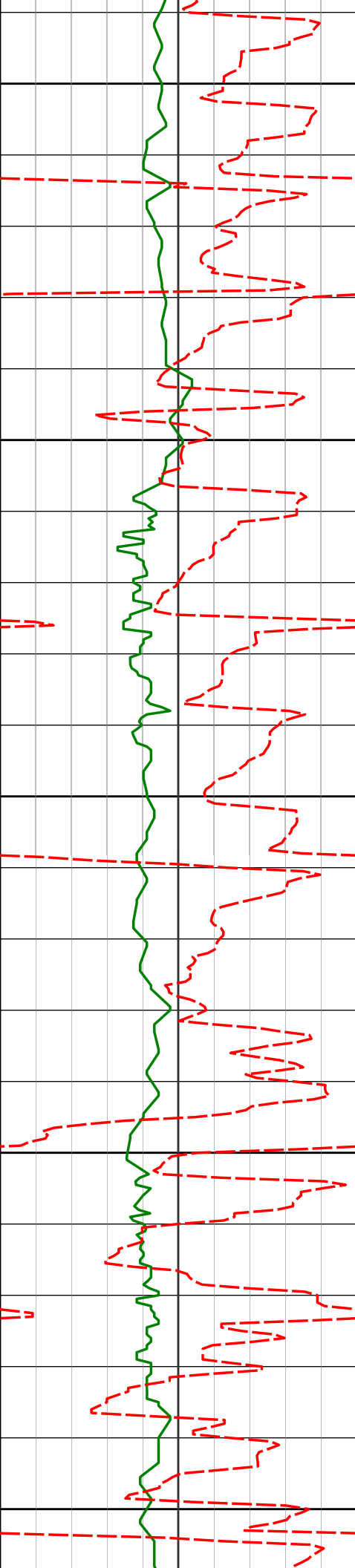
2410.96' 0.99'

2506'

1.05°

49.43°

2505.96' 1.35'



2550

2600

2650

2700

2750

2601'

1.92°

48.62°

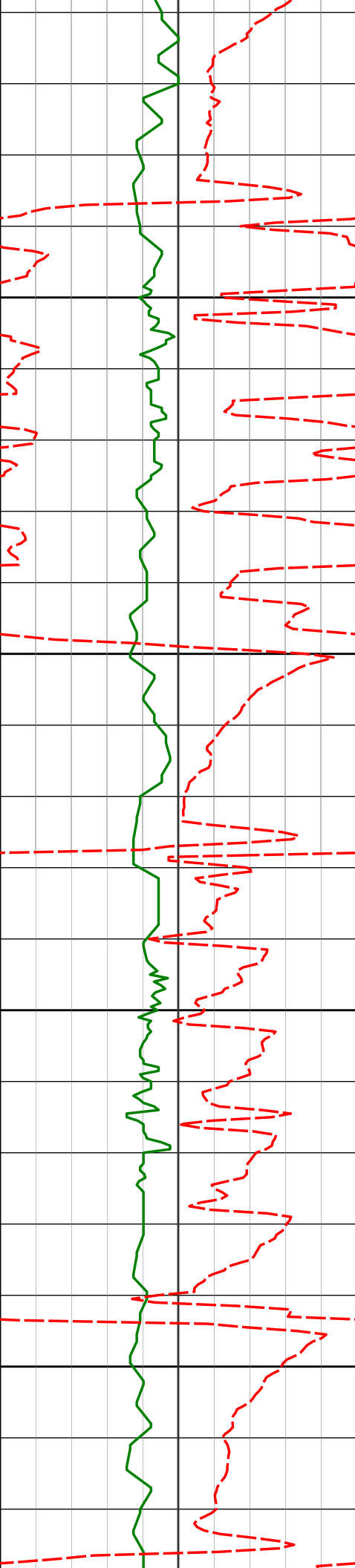
2600.93' 3.26'

2696'

4.30°

62.92°

2695.78' 7.72'



2800

2850

2900

2950

2791'

7.32°

73.19°

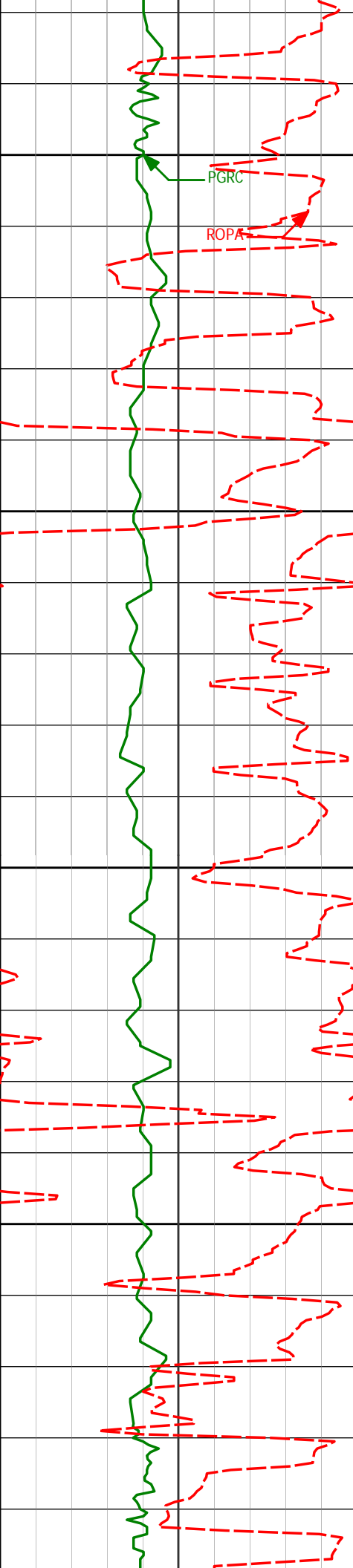
2790.29'16.80'

2886'

9.31°

71.09°

2884.28'30.01'



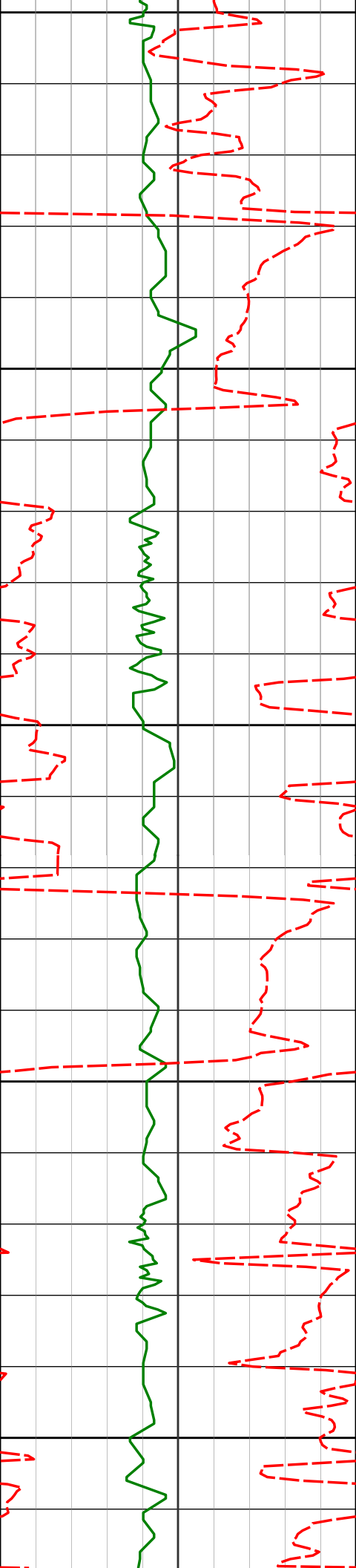
3000

3050

3100

3150

2980'	11.85°	66.56°	2976.68'46.28'
3075'	13.13°	67.69°	3069.43'45.49'
3170'	13.38°	67.04°	3161.90'45.89'



3200

3250

3300

3350

3400

3265'

10.55°

64.05°

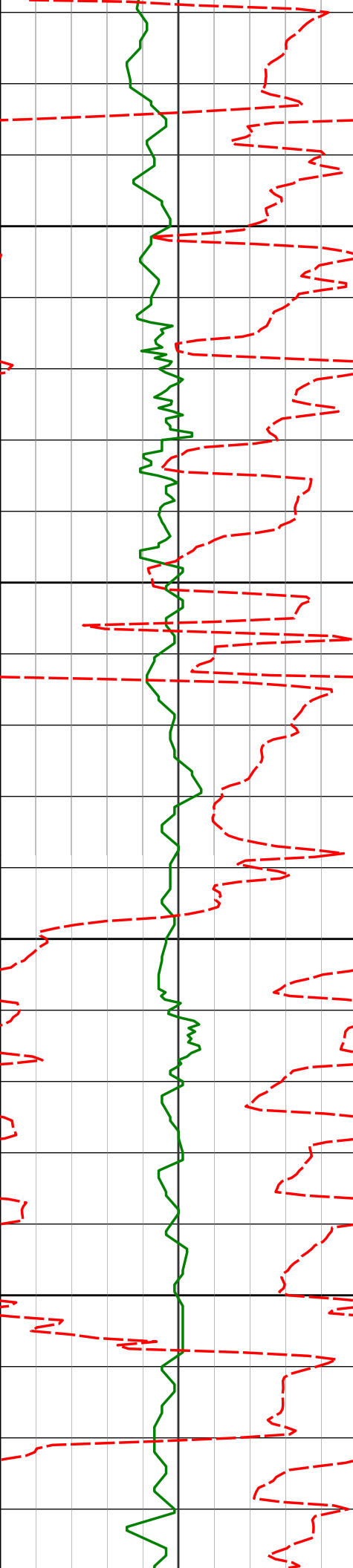
3254.82' 104.12'

3360'

7.64°

62.85°

3348.62' 17.80'



3450

3500

3550

3600

3455'

3549'

6.48°

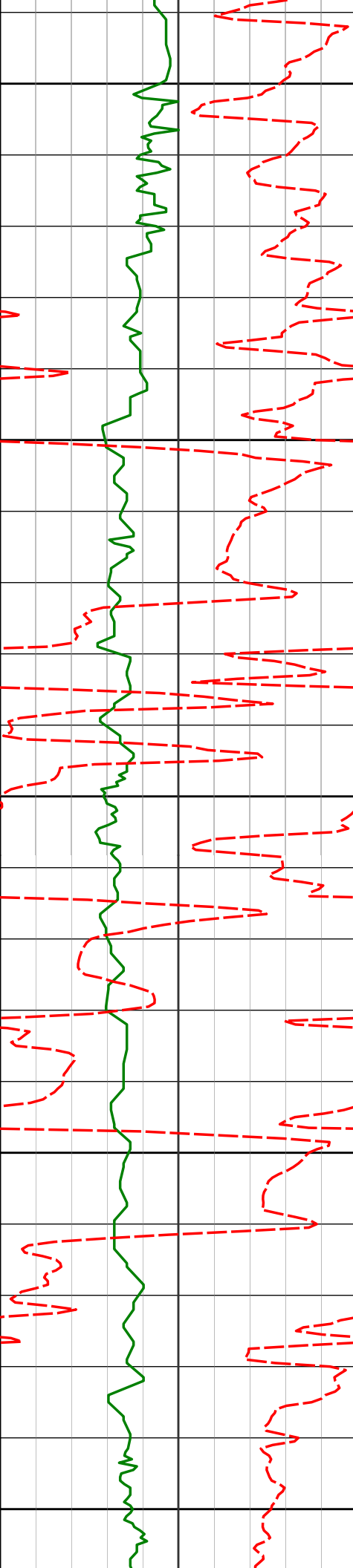
3.16°

67.73°

61.26°

3442.90'28.55'

3536.55'35.84'



3650

3700

3750

3800

3850

3644'

2.01°

59.45°

3631.46'39.65'

3739'

1.18°

21.80°

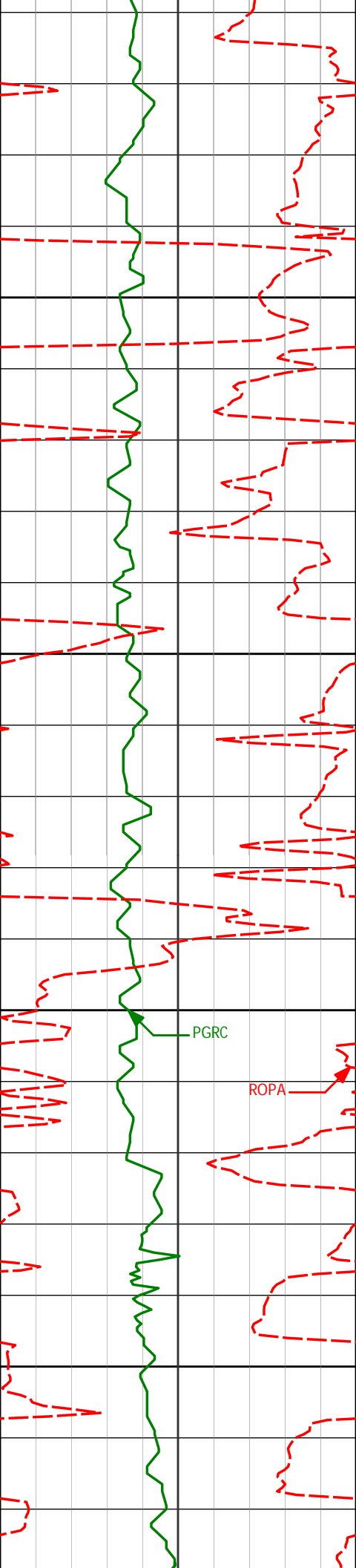
3726.42'41.51'

3834'

1.71°

315.08°

3821.40'40.94'



3900

3950

4000

4050

3929'

1.45°

286.52°

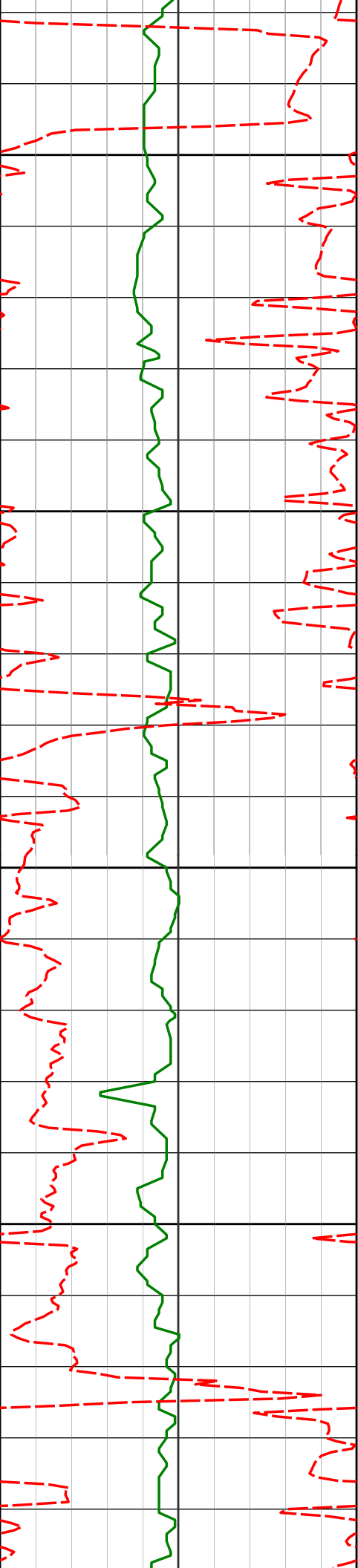
3916.34'38.84'

4024'

1.55°

289.82°

4011.33'36.51'



4100

4119'

0.90°

292.72°

4106.31'34.64'

4150

4200

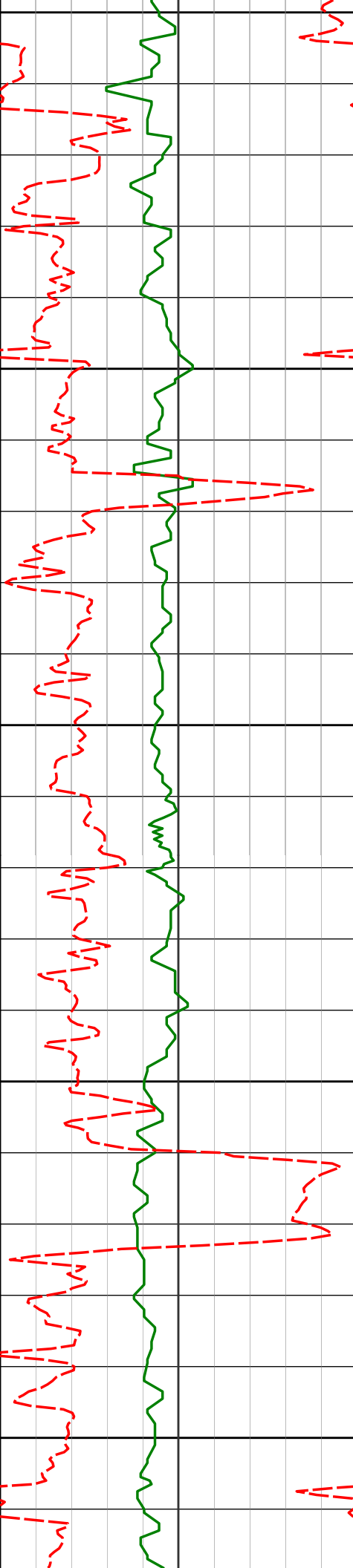
4214'

0.36°

318.55°

4201.30'33.78'

4250



4300

4309'

0.57°

303.75°

4296.30'33.21'

4350

4400

4403'

1.02°

343.37°

4390.29'32.62'

4450

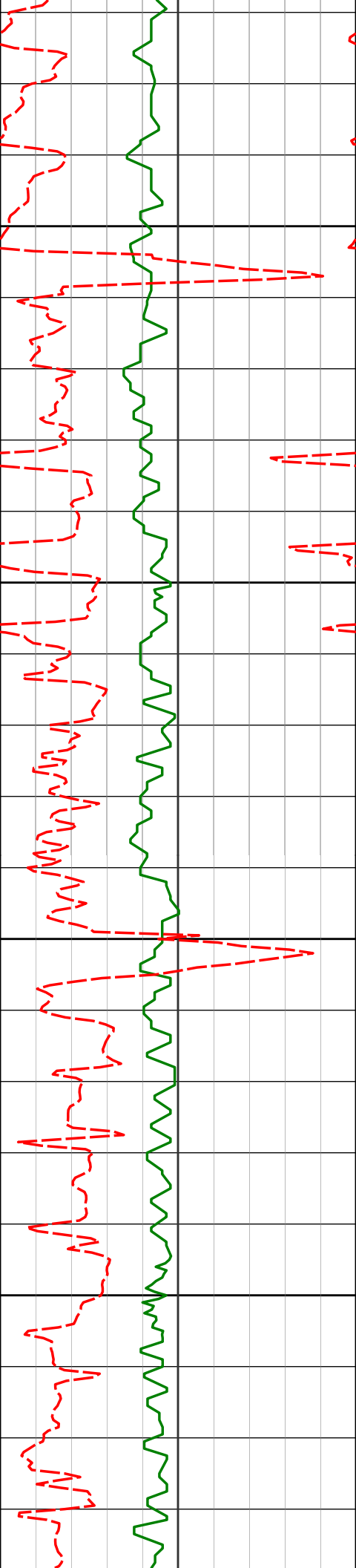
4500

4498'

0.19°

4.56°

4485.28'32.43'



4550

4593'

0.28°

27.34°

4580.28'32.56'

4600

4650

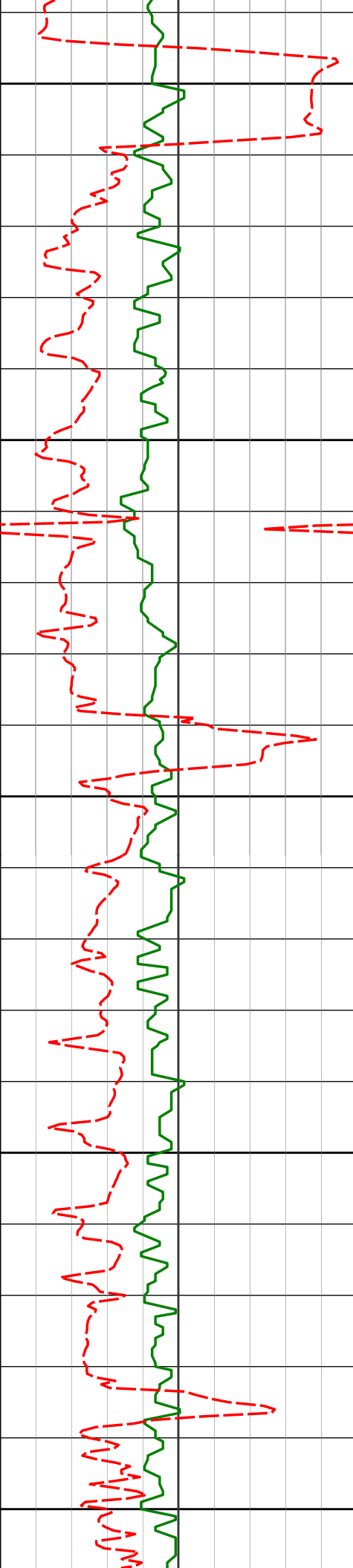
4688'

0.54°

33.33°

4675.28'32.93'

4700



4750

4783'

0.93°

179.38°

4770.28'33.17'

4800

4850

4878'

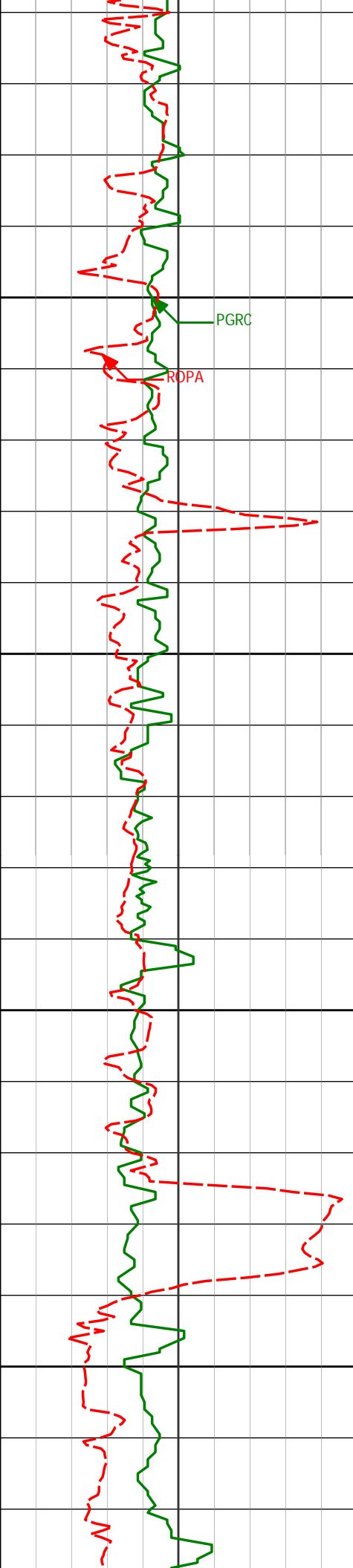
1.04°

169.55°

4865.26'33.27'

4900

4950



5000

5050

5100

5150

4973'

1.38°

173.76°

4960.24'33.48'

5068'

1.36°

166.12°

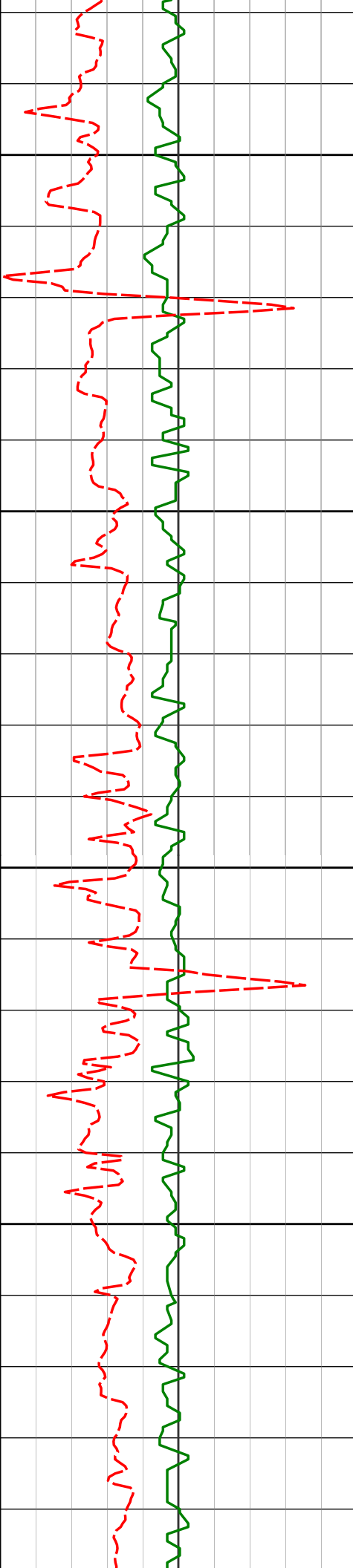
5055.21'33.79'

5163'

0.17°

163.37°

5150.20'34.06'



5200

5250

5300

5350

5258'

0.13°

7.43°

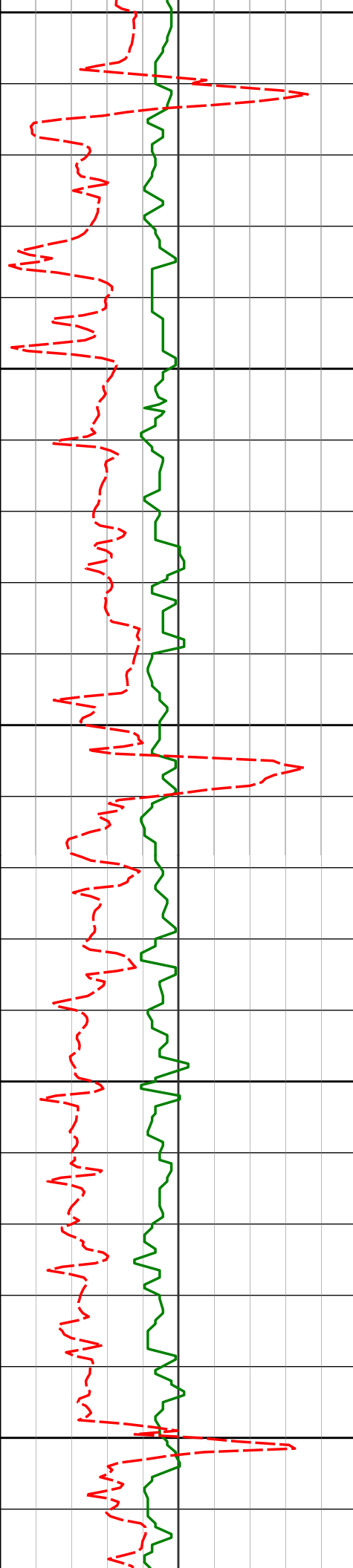
5245.20'34.11'

5353'

0.10°

247.41°

5340.20'34.05'



5400

5450

5500

5550

5600

5447'

0.47°

140.38°

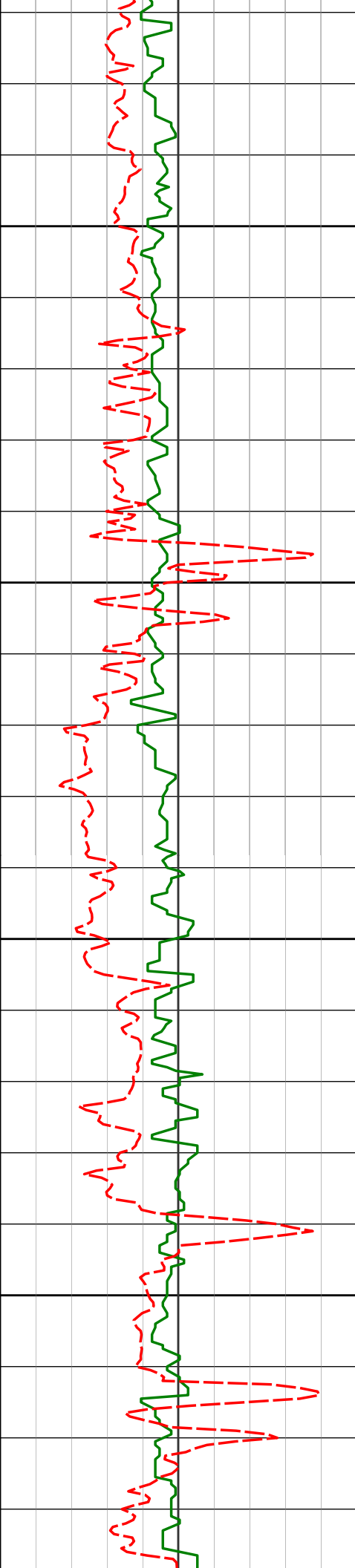
5434.20'34.21'

5542'

0.46°

136.51°

5529.20'34.70'



5637'

0.45°

158.97°

5624.20'35.07'

5650

5700

5732'

0.43°

135.86°

5719.19'35.43'

5750

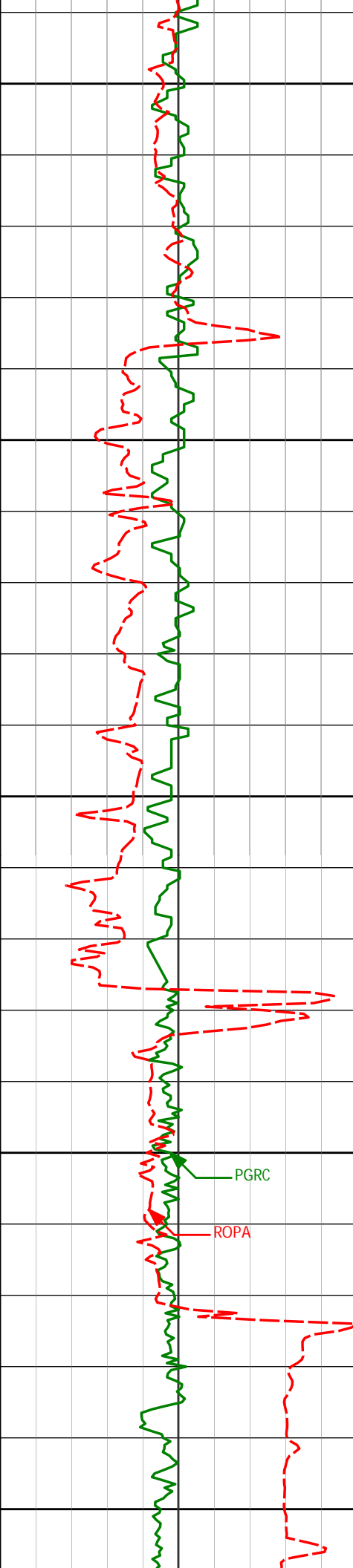
5800

5827'

0.39°

142.07°

5814.19'35.87'



5850

5900

5950

6000

6050

5922'

0.10°

346.37°

5909.19'36.04'

5965'

0.07°

174.10°

5952.19'36.03'

6028'

0.50°

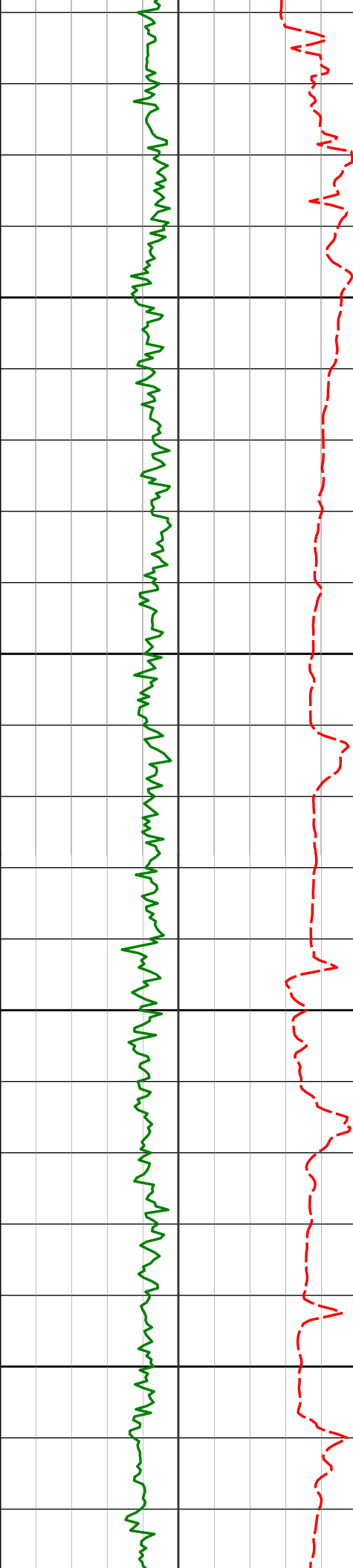
145.20°

6015.19'36.19'

200

PGRC

ROPA



6100

6110'

3.08°

97.97°

6097.14'38.54'

6150

6158'

8.89°

91.26°

6144.86'43.52'

6200

6204'

12.75°

89.67°

6190.04'52.15'

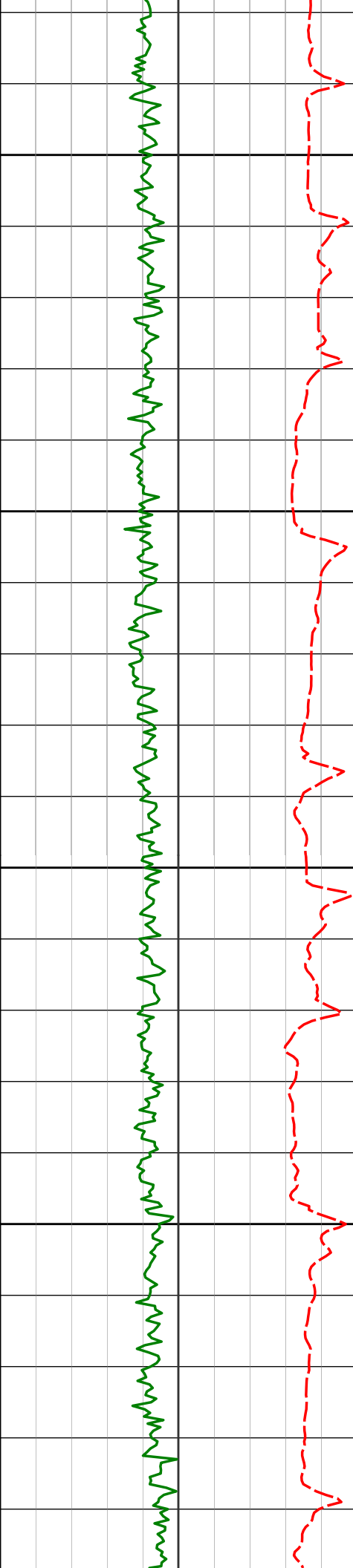
6250

6252'

15.99°

88.14°

6236.53'64.05'



6300

6299'

19.11°

88.41°

6281.3478.22'

6350

6347'

22.32°

87.46°

6326.2395.20'

6400

6394'

25.46°

87.46°

6369.1214.23'

6450

6442'

27.94°

89.21°

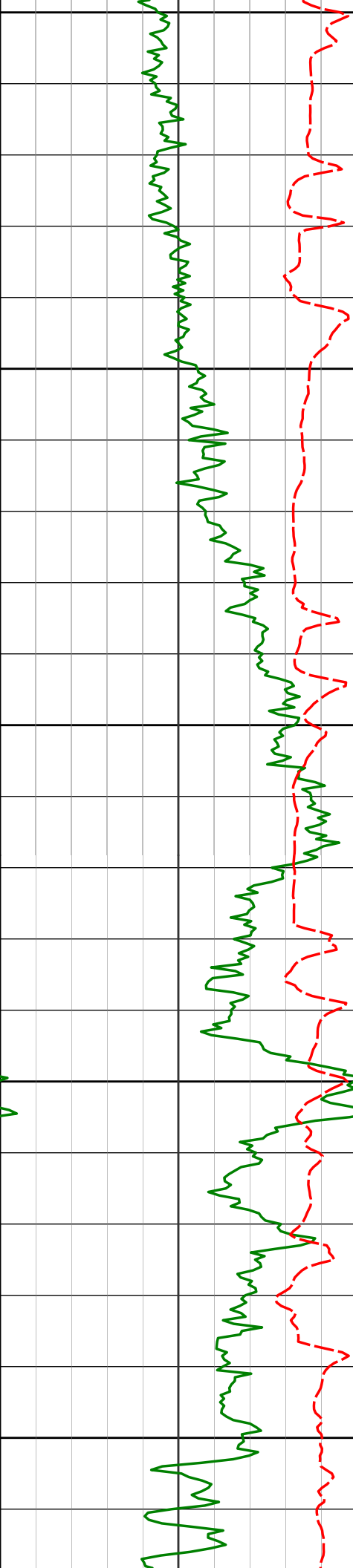
6412.0235.80'

6489'

31.92°

88.48°

6452.8059.24'



6500

6537'

34.25°

86.18°

6493.02' 85.43'

6550

6584'

39.04°

85.67°

6530.73' 83.46'

6600

6632'

43.42°

86.67°

6566.83' 84.08'

6650

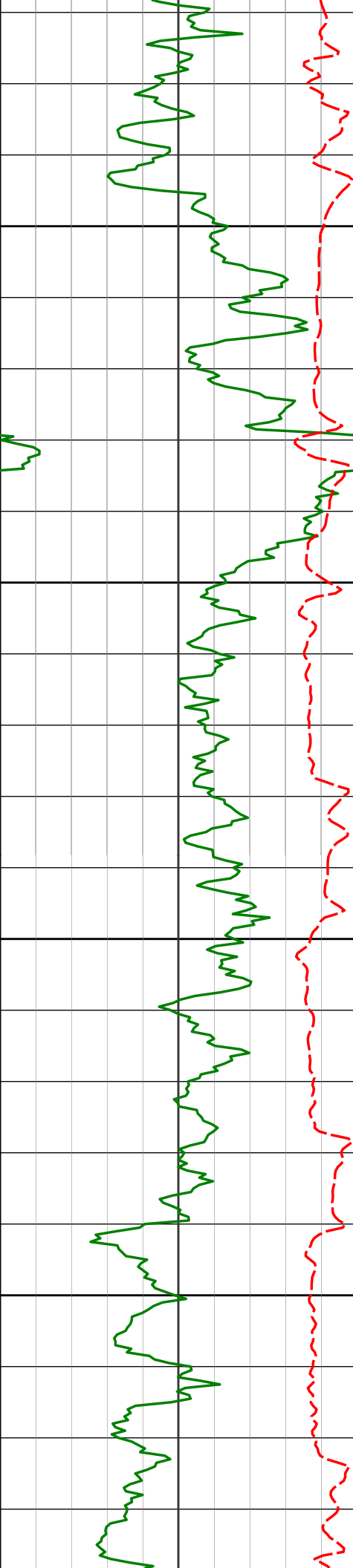
6679'

46.46°

88.85°

6600.06' 87.27'

6700



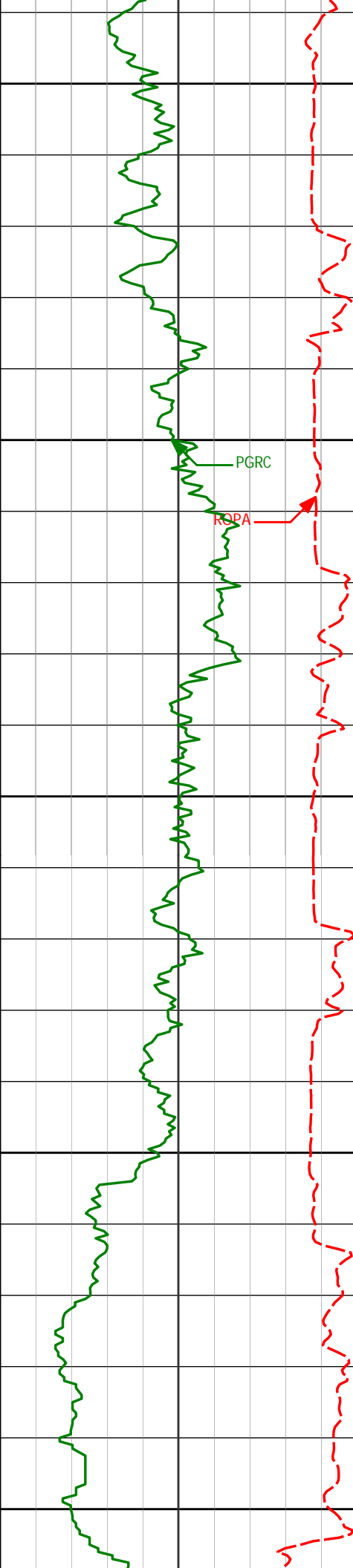
6750

6800

6850

6900

6727'	51.79°	89.33°	6631.47'	14.54'
6774'	58.17°	89.27°	6658.42'	53.00'
6822'	62.01°	88.58°	6682.34'	94.59'
6868'	65.44°	86.79°	6702.72'	35.83'
6916'	68.82°	85.81°	6721.37'	80.03'



6950

6964'

71.06°

85.74°

6737.8325.09'

7000

PGRC

7012'

74.16°

86.81°

6752.1870.87'

RCPA

7050

7058'

77.08°

88.75°

6763.6015.42'

7100

7097'

79.55°

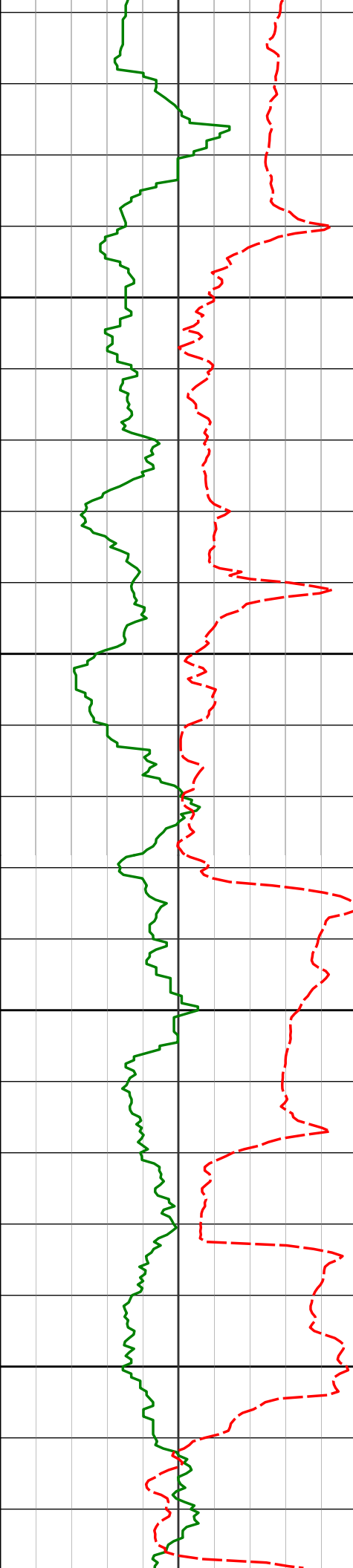
90.26°

6771.5053.59'



7150

300



7200

7250

7300

7350

7176'

84.14°

91.62°

6782.7831.66'

7221'

83.25°

91.47°

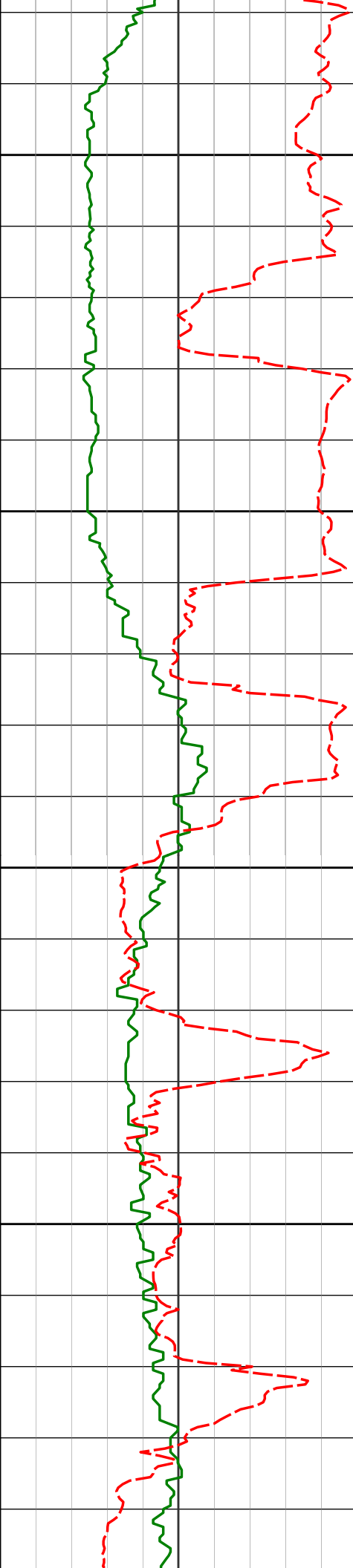
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7316'

84.40°

89.49°

6797.8970.64'



7400

7450

7500

7550

7410'

89.63°

89.33°

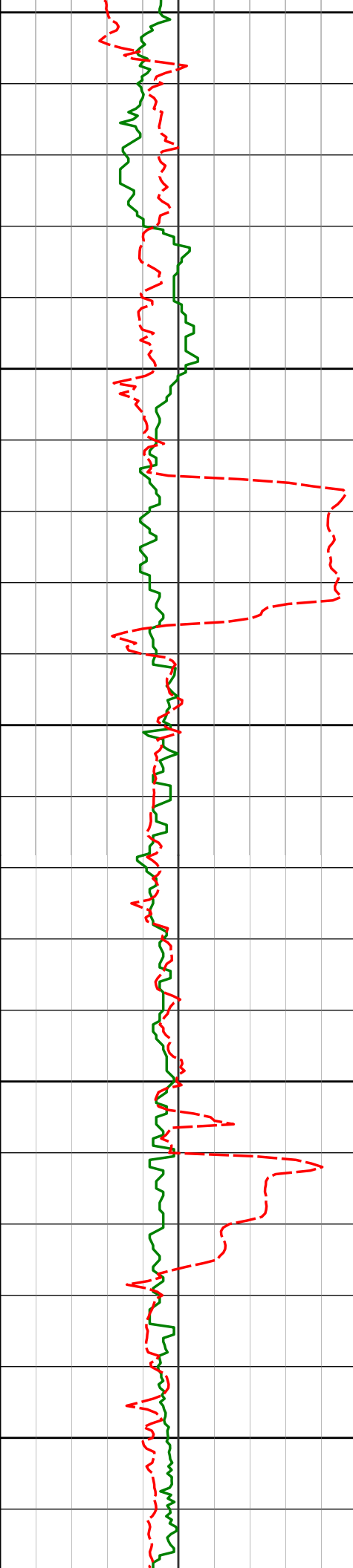
6802.78' 64.45'

7505'

92.00°

87.52°

6801.42' 59.43'



7600

7650

7700

7750

7800

7600'

7695'

7789'

93.06°

90.92°

88.71°

87.68°

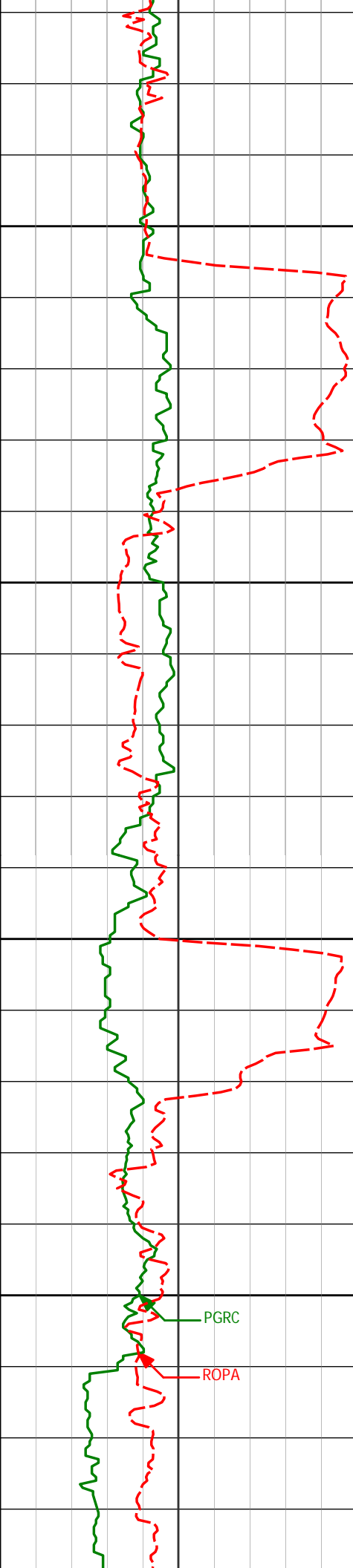
88.75°

86.72°

6797.2354.33'

6793.9349.27'

6794.2343.26'



7850

7900

7950

8000

PGRC

ROPA

7884'

90.80°

87.70°

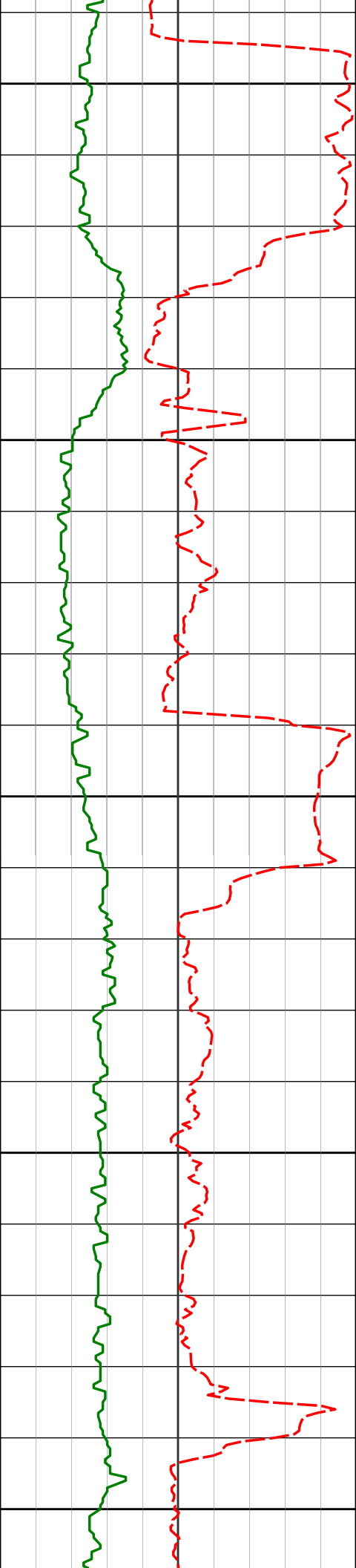
6794.6538.24'

7979'

90.22°

86.66°

6793.7533.23'



8050

8073'

90.95°

87.61°

6792.8327.21'

8100

8150

8168'

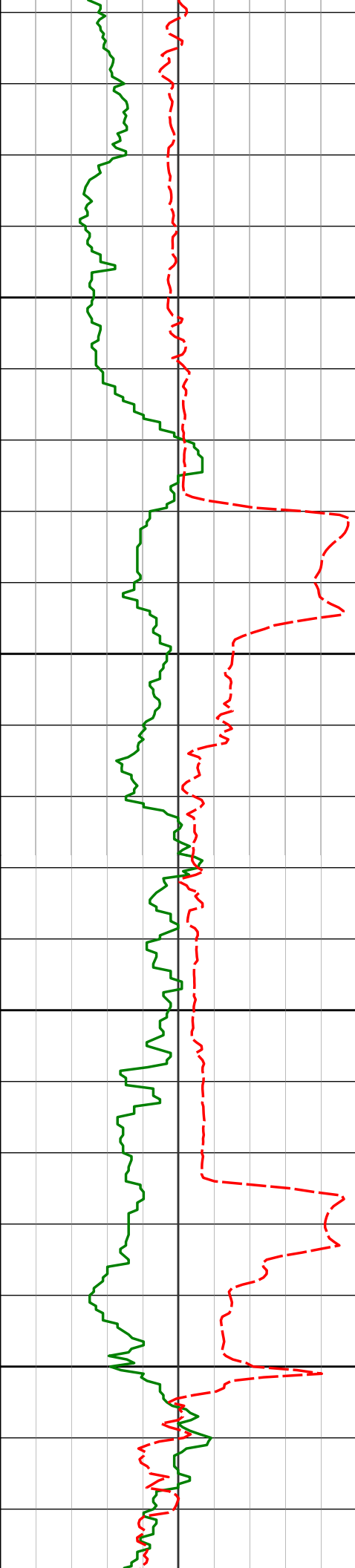
91.73°

89.37°

6790.4822.18'

8200

8250



8263'

91.42°

88.85°

6788.0717.12'

8300

8350

8358'

91.27°

90.58°

6785.2812.04'

8400

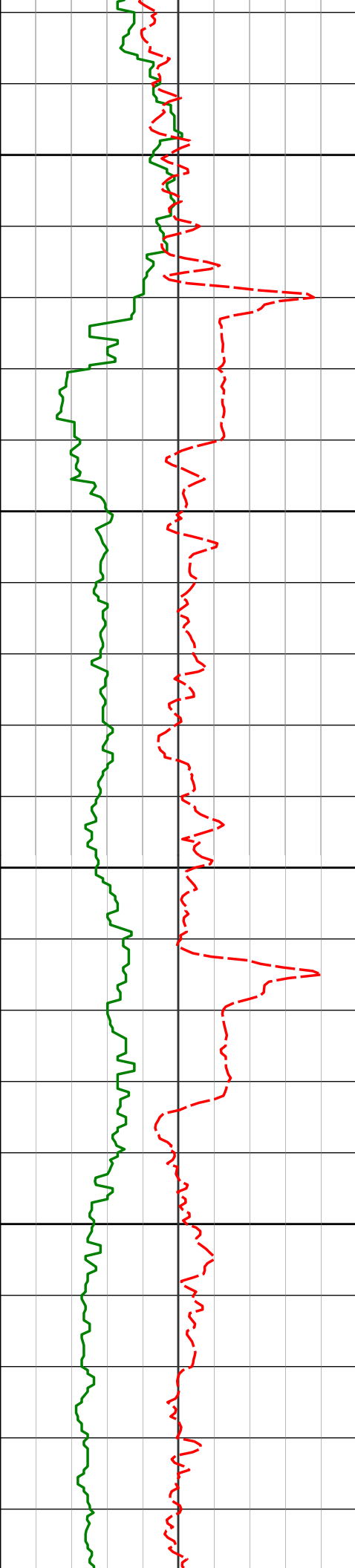
8450

8453'

90.00°

90.80°

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8500

8550

8600

8650

8548'

90.22°

90.38°

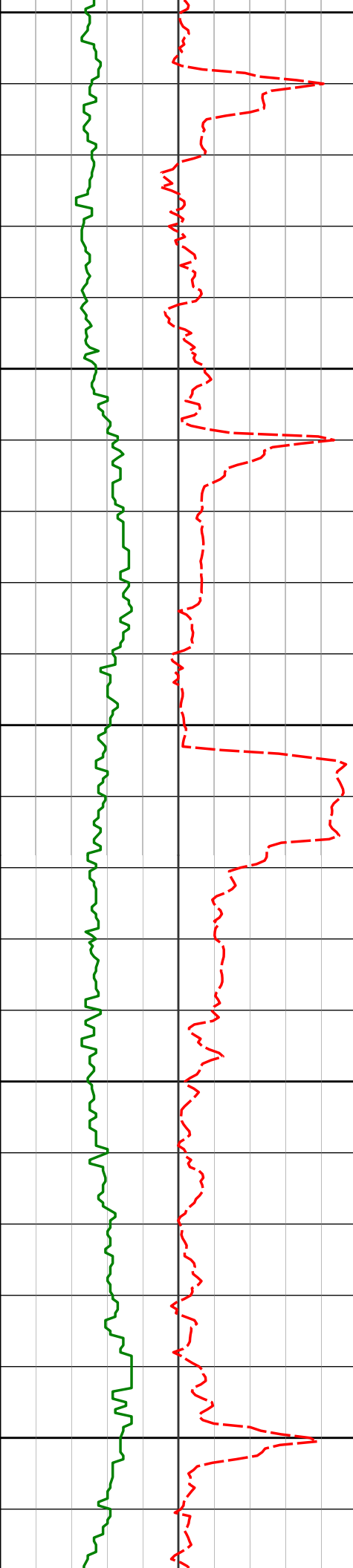
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8643'

90.31°

89.84°

6784.1296.75'



8700

8737'

89.17°

89.11°

6784.23' 90.71'

8750

8800

8832'

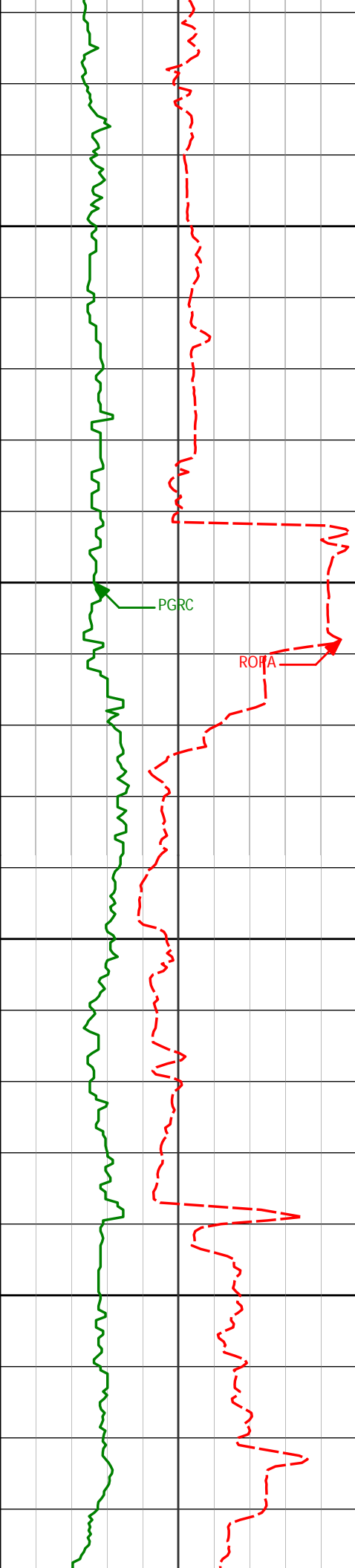
90.31°

89.11°

6784.24' 85.69'

8850

8900



8950

9000

9050

9100

8927'

91.20°

89.42°

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9022'

89.29°

87.58°

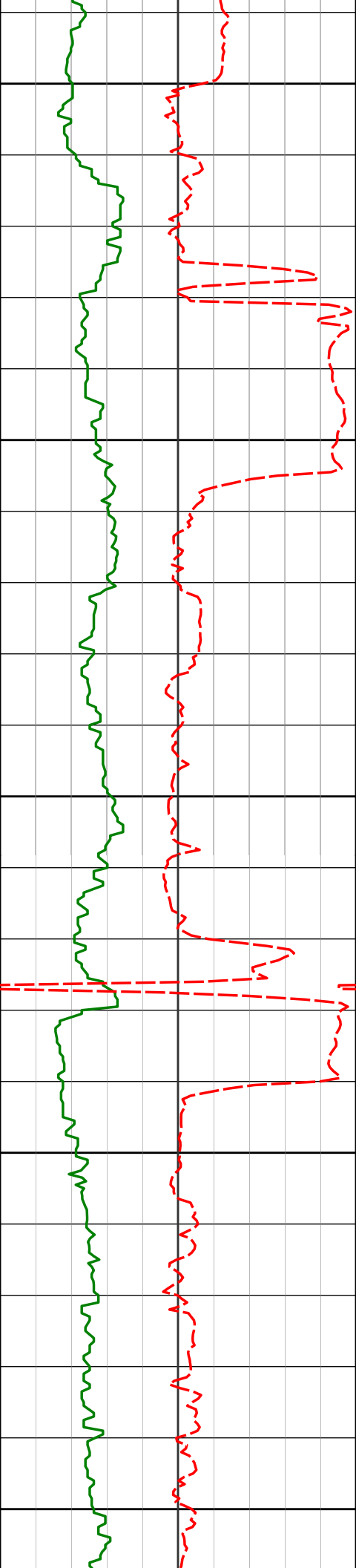
6783.3175.64'

9117'

88.21°

86.64°

6785.4070.60'



9150

9200

9250

9300

9350

9211'

88.95°

87.70°

6787.22'

64.56'

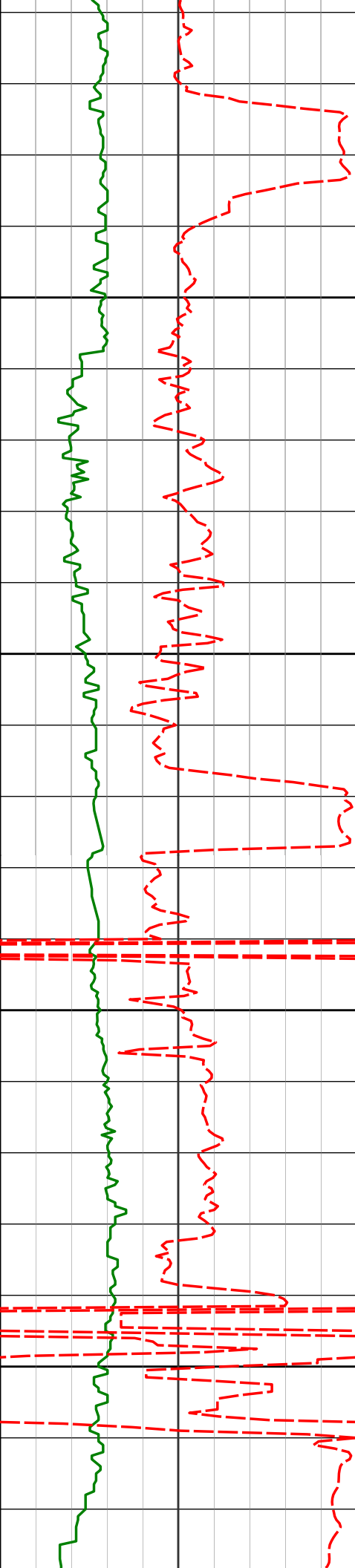
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89.41°

87.47°

6789.07'

59.55'



9400

9450

9500

9550

9401'

9496'

89.63°

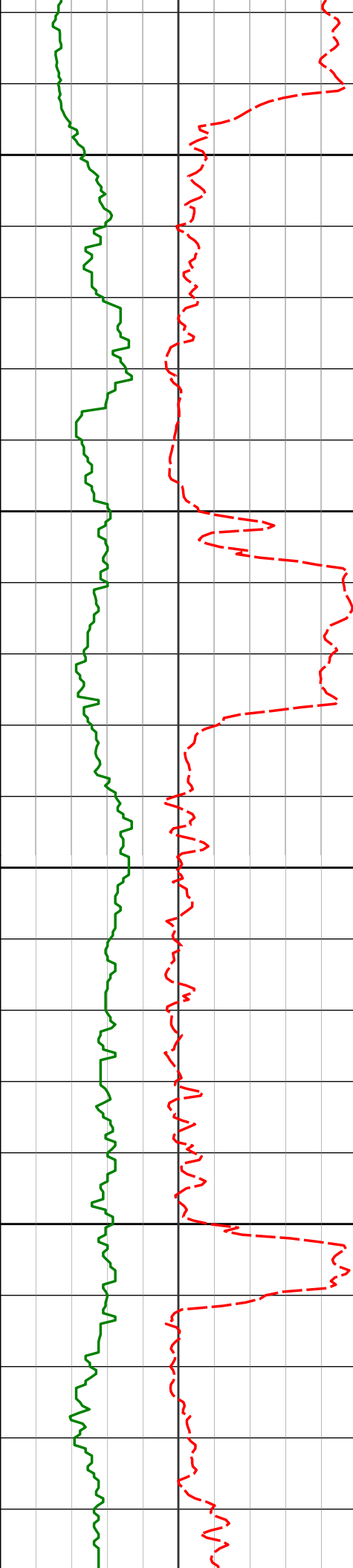
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87.98°

86.27°

6789.8754.55'

6790.8949.53'



9600

9650

9700

9750

9590'

93.70°

89.79°

6788.52' 43.46'

9685'

92.03°

88.51°

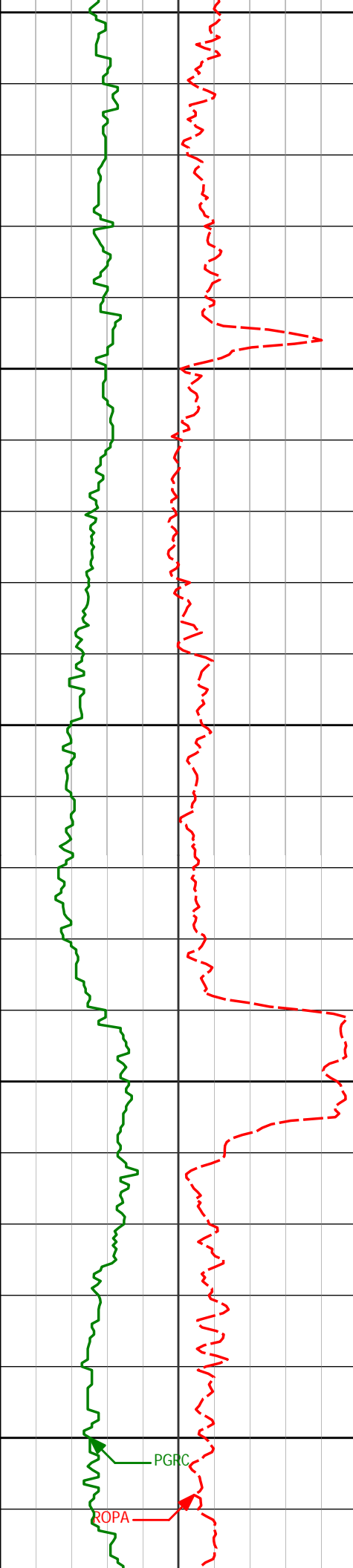
6783.32' 38.31'

9780'

90.37°

89.86°

6781.34' 33.26'



9800

9850

9900

9950

10000

9875'

89.20°

88.67°

6782.15' 28.23'

9970'

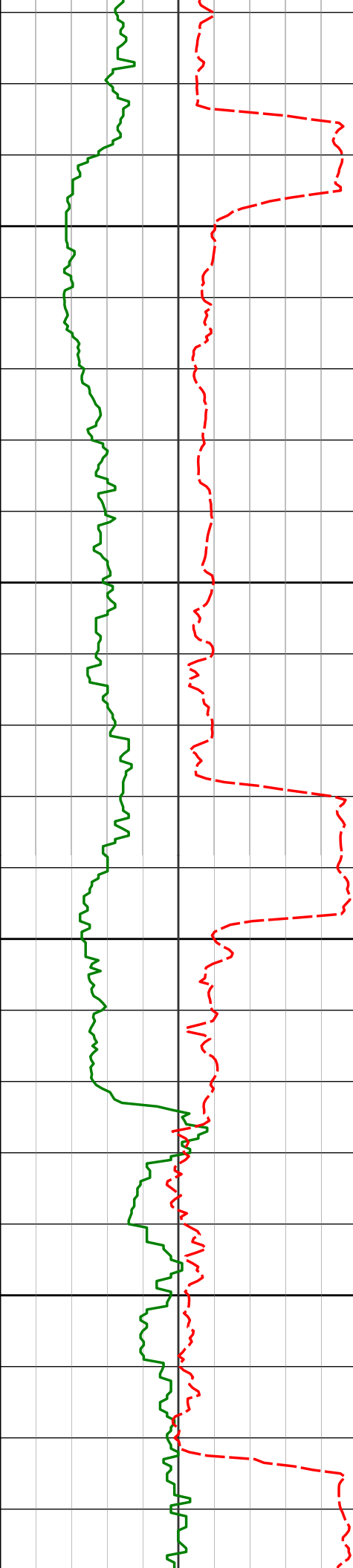
89.63°

89.58°

6783.15' 23.21'

PGRC

ROPA



10050

10100

10150

10200

10064'

93.23°

91.00°

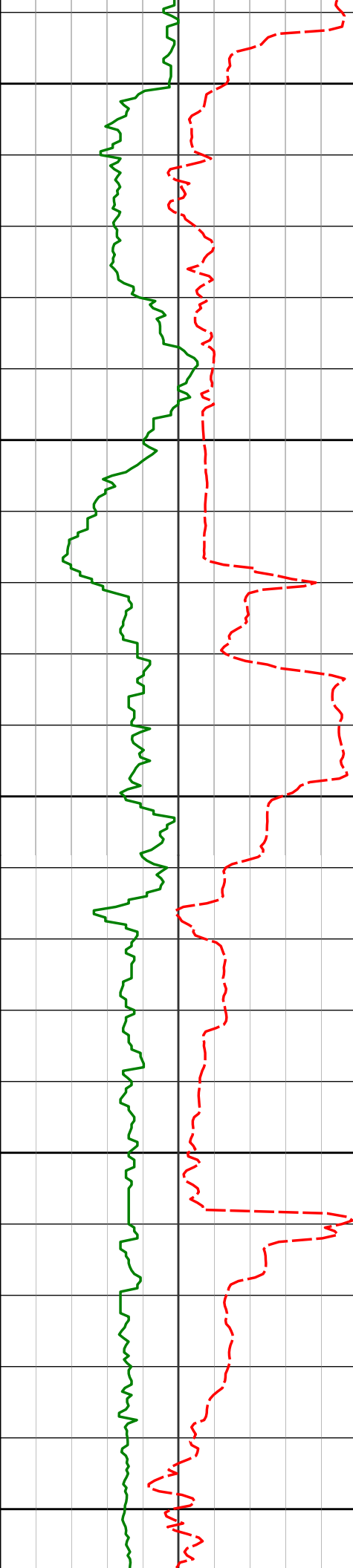
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10159'

90.90°

91.08°

6777.38'11.87'



10250

10254'

90.18°

88.46°

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10300

10350

10349'

89.60°

87.40°

6776.48' 6776.80'

10400

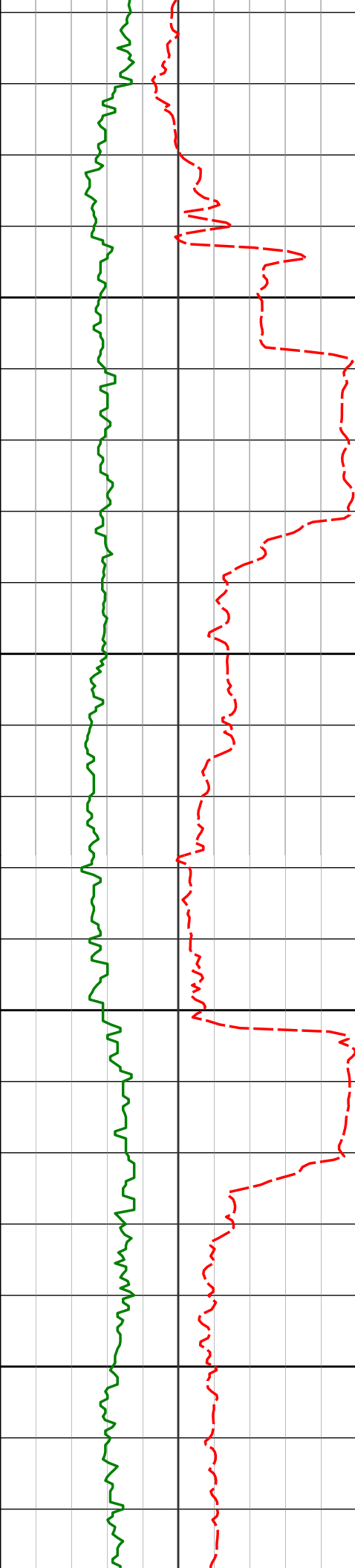
10450

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88.36°

86.56°

6778.15' 6778.77'



10500

10550

10600

10650

10538'

89.60°

87.24°

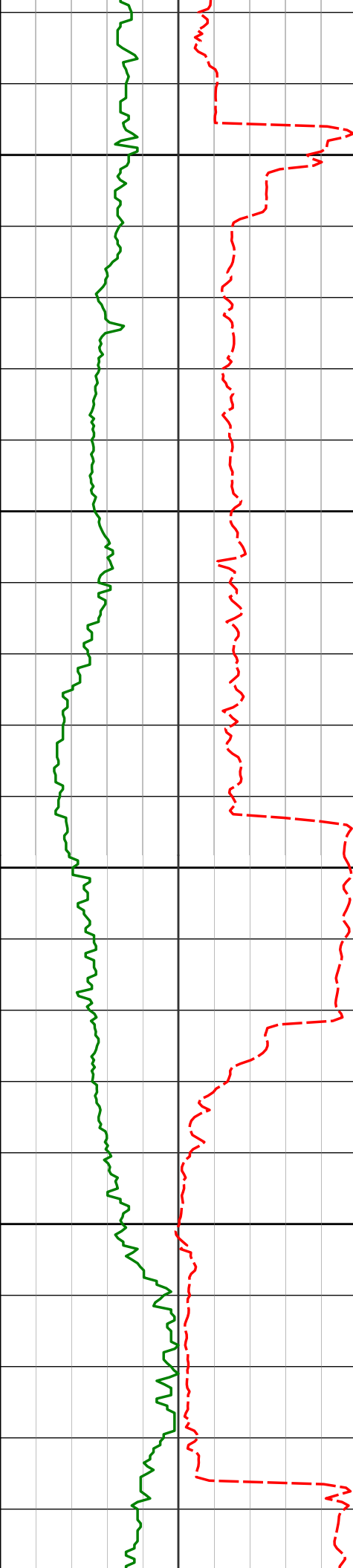
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10633'

90.22°

88.93°

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10700

10750

10800

10850

10727'

88.43°

87.77°

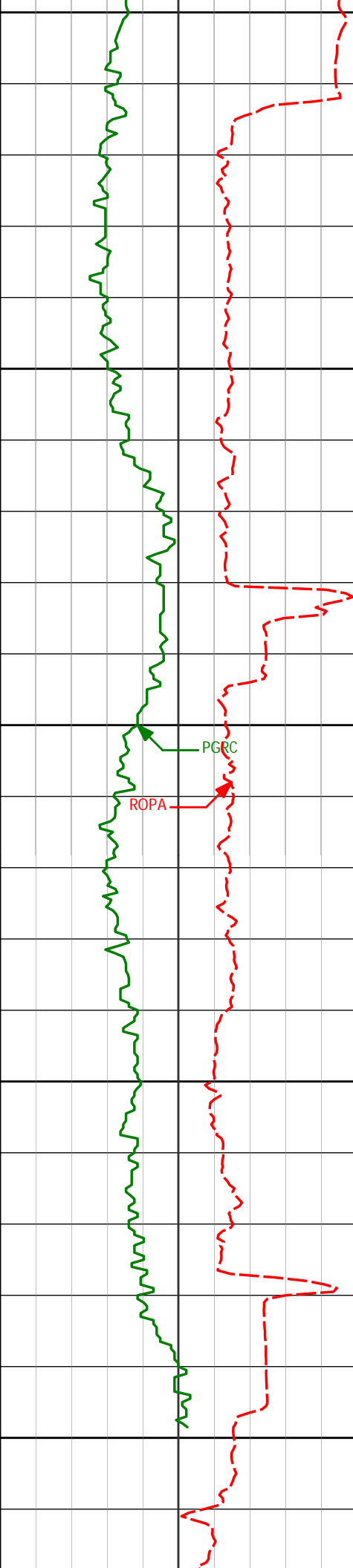
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10822'

89.45°

88.16°

6783.4474.70'



10900

10917'

90.34°

89.89°

6783.2569.68'

10950

11000

PGRC
ROPA

11012'

89.45°

90.33°

6783.4264.61'

11050

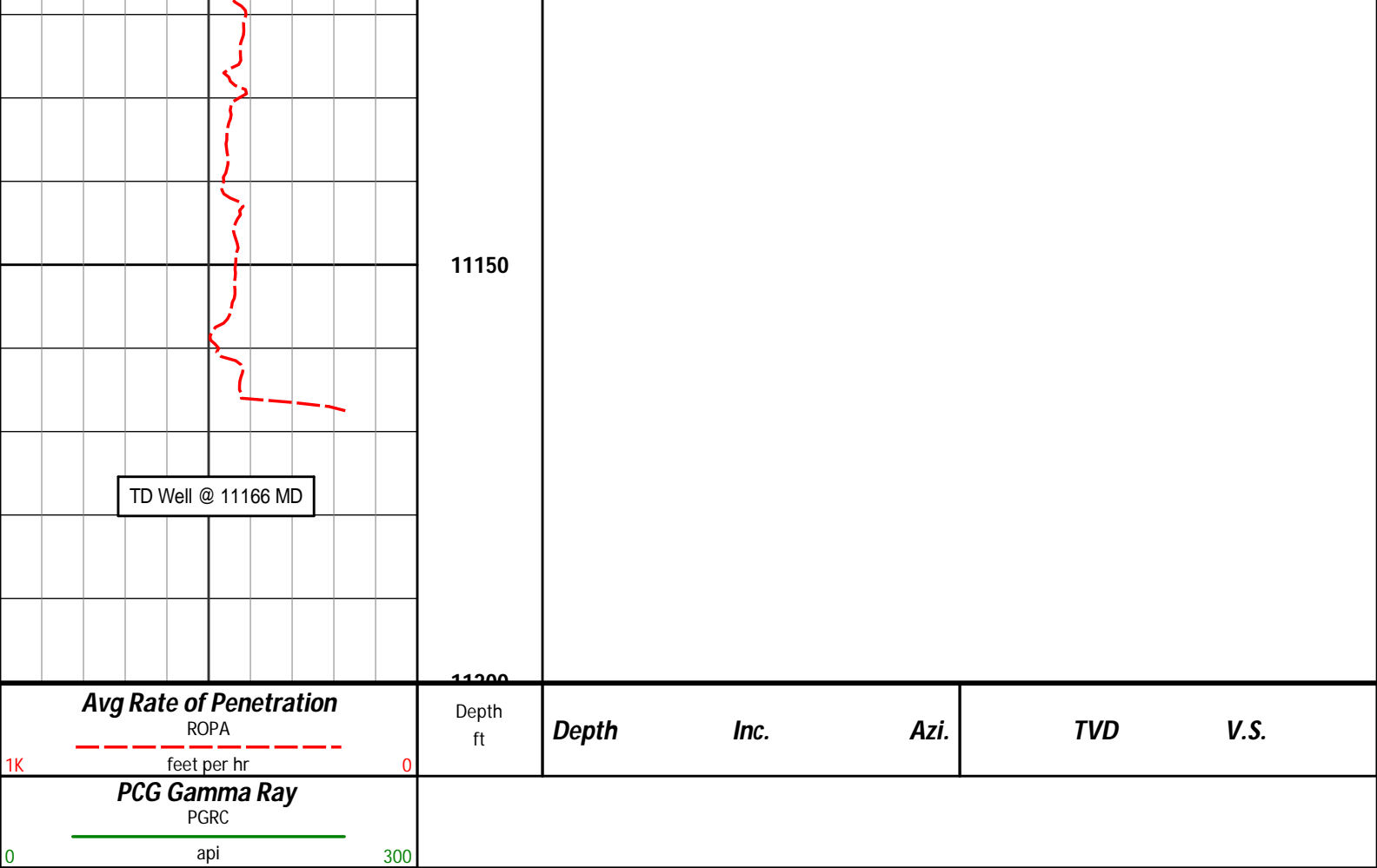
11100

11100'

88.46°

89.81°

6785.0352.53'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE05-67HN
Wattenberg
Weld Colorado
USA
CA-XX-0900481593

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
281.00	0.70	178.71	280.99	1.72 S	0.04 E	-0.02	0.25
600.00	0.20	220.31	599.98	4.09 S	0.28 W	-0.43	0.18
728.00	0.15	114.92	727.98	4.33 S	0.27 W	-0.42	0.22
820.00	0.28	167.17	819.98	4.61 S	0.10 W	-0.27	0.25
912.00	0.22	155.12	911.98	4.99 S	0.02 E	-0.16	0.09
1004.00	0.34	158.85	1003.98	5.41 S	0.20 E	0.00	0.13
1096.00	0.25	148.86	1095.98	5.84 S	0.40 E	0.19	0.12
1188.00	0.16	151.31	1187.98	6.12 S	0.57 E	0.34	0.10
1280.00	0.15	28.56	1279.98	6.13 S	0.69 E	0.46	0.30
1371.00	0.09	152.02	1370.98	6.08 S	0.78 E	0.55	0.24
1463.00	0.40	43.99	1462.98	5.91 S	1.03 E	0.82	0.48
1558.00	0.25	56.63	1557.98	5.56 S	1.44 E	1.23	0.18
1653.00	0.16	15.28	1652.97	5.32 S	1.64 E	1.45	0.18
1748.00	0.04	76.18	1747.97	5.18 S	1.71 E	1.52	0.15
1842.00	0.24	353.68	1841.97	4.98 S	1.73 E	1.54	0.25
1937.00	0.18	196.86	1936.97	4.92 S	1.66 E	1.48	0.43
2032.00	0.55	144.99	2031.97	5.44 S	1.88 E	1.68	0.48
2127.00	0.46	184.52	2126.97	6.19 S	2.11 E	1.88	0.37
2222.00	0.39	194.57	2221.97	6.88 S	2.00 E	1.74	0.11
2316.00	0.25	301.36	2315.97	7.09 S	1.74 E	1.48	0.55

2310.00	0.23	261.38	2313.97	7.03 S	1.74 E	0.99	0.33
2411.00	0.39	261.03	2410.96	1.25 E	1.25 E	0.99	0.27
2506.00	1.05	49.43	2505.96	6.52 S	1.59 E	1.35	1.46
2601.00	1.92	48.62	2600.93	4.90 S	3.45 E	3.26	0.92
2696.00	4.30	62.92	2695.78	2.23 S	7.81 E	7.72	2.61
2791.00	7.32	73.19	2790.29	1.14 N	16.77 E	16.80	3.35
2886.00	9.31	71.09	2884.28	5.38 N	29.83 E	30.01	2.13
2980.00	11.85	66.56	2976.68	11.69 N	45.89 E	46.28	2.84
3075.00	13.13	67.69	3069.43	19.67 N	64.82 E	65.49	1.37
3170.00	13.38	67.04	3161.90	28.05 N	84.92 E	85.89	0.31
3265.00	10.55	64.05	3254.82	36.15 N	102.87 E	104.12	3.05
3360.00	7.64	62.85	3348.62	42.84 N	116.31 E	117.80	3.07
3455.00	6.48	67.73	3442.90	47.75 N	126.89 E	128.55	1.38
3549.00	3.16	61.26	3536.55	51.01 N	134.07 E	135.84	3.57
3644.00	2.01	59.45	3631.46	53.12 N	137.81 E	139.65	1.21
3739.00	1.18	21.80	3726.42	54.87 N	139.60 E	141.51	1.37
3834.00	1.71	315.08	3821.40	56.78 N	138.96 E	140.94	1.74
3929.00	1.45	286.52	3916.36	58.12 N	136.81 E	138.84	0.86
4024.00	1.55	289.82	4011.33	58.90 N	134.45 E	136.51	0.14
4119.00	0.90	292.72	4106.31	59.62 N	132.56 E	134.64	0.69
4214.00	0.36	318.55	4201.30	60.13 N	131.67 E	133.78	0.63
4309.00	0.57	303.75	4296.30	60.62 N	131.08 E	133.21	0.25
4403.00	1.02	343.37	4390.29	61.68 N	130.46 E	132.62	0.73
4498.00	0.19	4.56	4485.28	62.65 N	130.23 E	132.43	0.90
4593.00	0.28	27.34	4580.28	63.01 N	130.35 E	132.56	0.14
4688.00	0.54	33.33	4675.28	63.59 N	130.70 E	132.93	0.28
4783.00	0.93	179.38	4770.28	63.19 N	130.95 E	133.17	1.49
4878.00	1.04	169.55	4865.26	61.57 N	131.11 E	133.27	0.21
4973.00	1.38	173.76	4960.24	59.58 N	131.40 E	133.48	0.38
5068.00	1.36	166.12	5055.21	57.35 N	131.79 E	133.79	0.19
5163.00	0.17	163.37	5150.20	56.12 N	132.10 E	134.06	1.26
5258.00	0.13	7.43	5245.20	56.09 N	132.15 E	134.11	0.30
5353.00	0.10	247.41	5340.20	56.16 N	132.09 E	134.05	0.21
5447.00	0.47	140.38	5434.20	55.84 N	132.26 E	134.21	0.54
5542.00	0.46	136.51	5529.20	55.26 N	132.77 E	134.70	0.04
5637.00	0.45	158.97	5624.20	54.64 N	133.17 E	135.07	0.19
5732.00	0.43	135.86	5719.19	54.04 N	133.55 E	135.43	0.19
5827.00	0.39	142.07	5814.19	53.52 N	134.00 E	135.87	0.06
5922.00	0.10	346.37	5909.19	53.34 N	134.18 E	136.04	0.51
5965.00	0.07	174.10	5952.19	53.35 N	134.18 E	136.03	0.39
6028.00	0.50	145.20	6015.19	53.09 N	134.34 E	136.19	0.70
6110.00	3.08	97.97	6097.14	52.49 N	136.72 E	138.54	3.37
6158.00	8.89	91.26	6144.86	52.23 N	141.71 E	143.52	12.19
6204.00	12.75	89.67	6190.04	52.18 N	150.34 E	152.15	8.40
6252.00	15.99	88.14	6236.53	52.43 N	162.25 E	164.05	6.79
6299.00	19.11	88.41	6281.34	52.85 N	176.41 E	178.22	6.66
6347.00	22.32	87.46	6326.23	53.47 N	193.38 E	195.20	6.72
6394.00	25.46	87.46	6369.19	54.31 N	212.39 E	214.23	6.69
6442.00	27.94	89.21	6412.07	54.93 N	233.95 E	235.80	5.42
6489.00	31.92	88.48	6452.80	55.41 N	257.39 E	259.24	8.49
6537.00	34.25	86.18	6493.01	56.65 N	283.56 E	285.43	5.52
6584.00	39.04	85.67	6530.71	58.65 N	311.53 E	313.46	10.22
6632.00	43.42	86.67	6566.80	60.75 N	343.09 E	345.08	9.23
6679.00	46.46	88.85	6600.06	62.03 N	376.26 E	378.27	7.25
6727.00	51.79	89.33	6631.47	62.60 N	412.54 E	414.54	11.12
6774.00	58.17	89.27	6658.42	63.07 N	451.00 E	453.00	13.58
6822.00	62.01	88.58	6682.36	63.85 N	492.59 E	494.59	8.09
6868.00	65.44	86.79	6702.72	65.52 N	533.80 E	535.83	8.24
6916.00	68.82	85.81	6721.37	68.38 N	577.92 E	580.03	7.29
6964.00	71.06	85.74	6737.83	71.70 N	622.89 E	625.09	4.67
7012.00	74.16	86.81	6752.18	74.68 N	668.59 E	670.87	6.80
7058.00	77.08	88.75	6763.60	76.40 N	713.11 E	715.42	7.55
7097.00	79.55	90.26	6771.50	76.72 N	751.29 E	753.59	7.38
7176.00	84.14	91.62	6782.71	75.43 N	829.46 E	831.66	6.05
7221.00	83.25	91.47	6787.65	74.23 N	874.17 E	876.30	2.01
7316.00	84.40	89.49	6797.88	73.44 N	968.61 E	970.64	2.40
7410.00	89.63	89.33	6802.78	74.40 N	1062.45 E	1064.45	5.57
7505.00	92.00	87.52	6801.42	77.02 N	1157.39 E	1159.43	3.15
7600.00	93.06	87.68	6797.23	80.99 N	1252.21 E	1254.33	1.12
7695.00	90.92	88.75	6793.93	83.94 N	1347.10 E	1349.27	2.51
7789.00	88.71	86.72	6794.23	87.66 N	1441.02 E	1443.26	3.20
7884.00	90.80	87.70	6794.64	92.28 N	1535.90 E	1538.24	2.44
7979.00	90.22	86.66	6793.79	96.95 N	1630.78 E	1633.23	1.26
8073.00	90.95	87.61	6792.83	101.65 N	1724.65 E	1727.21	1.28
8168.00	91.73	89.37	6790.61	104.15 N	1819.59 E	1822.18	2.02

8263.00	91.42	88.85	6788.01	105.62 N	1914.54 E	1917.12	0.64
8358.00	91.27	90.58	6785.78	106.09 N	2009.51 E	2012.04	1.83
8453.00	90.00	90.80	6784.73	104.94 N	2104.50 E	2106.92	1.35
8548.00	90.22	90.38	6784.56	103.97 N	2199.49 E	2201.82	0.50
8643.00	90.31	89.84	6784.12	103.79 N	2294.49 E	2296.75	0.58
8737.00	89.17	89.11	6784.55	104.65 N	2388.48 E	2390.71	1.44
8832.00	90.31	89.11	6784.99	106.13 N	2483.47 E	2485.69	1.20
8927.00	91.20	89.42	6783.74	107.35 N	2578.45 E	2580.65	1.00
9022.00	89.29	87.58	6783.33	109.83 N	2673.41 E	2675.64	2.79
9117.00	88.21	86.64	6785.40	114.62 N	2768.26 E	2770.60	1.51
9211.00	88.95	87.70	6787.72	119.26 N	2862.12 E	2864.56	1.38
9306.00	89.41	87.47	6789.07	123.26 N	2957.02 E	2959.55	0.54
9401.00	89.63	87.98	6789.87	127.02 N	3051.95 E	3054.55	0.59
9496.00	89.14	86.27	6790.89	131.78 N	3146.82 E	3149.53	1.88
9590.00	93.70	89.79	6788.56	135.02 N	3240.69 E	3243.46	6.13
9685.00	92.03	88.51	6783.82	136.42 N	3335.56 E	3338.31	2.21
9780.00	90.37	89.86	6781.83	137.77 N	3430.52 E	3433.26	2.25
9875.00	89.20	88.67	6782.18	138.98 N	3525.51 E	3528.23	1.76
9970.00	89.63	89.58	6783.15	140.43 N	3620.49 E	3623.21	1.06
10064.00	93.23	91.00	6780.81	139.96 N	3714.45 E	3717.08	4.11
10159.00	90.90	91.08	6777.39	138.23 N	3809.36 E	3811.87	2.45
10254.00	90.18	88.46	6776.50	138.61 N	3904.35 E	3906.81	2.86
10349.00	89.60	87.40	6776.68	142.05 N	3999.28 E	4001.80	1.28
10443.00	88.36	86.56	6778.35	147.00 N	4093.14 E	4095.77	1.59
10538.00	89.60	87.24	6780.04	152.15 N	4187.98 E	4190.74	1.49
10633.00	90.22	88.93	6780.19	155.33 N	4282.92 E	4285.74	1.89
10727.00	88.43	87.77	6781.30	158.04 N	4376.87 E	4379.72	2.26
10822.00	89.45	88.16	6783.06	161.41 N	4471.79 E	4474.70	1.15
10917.00	90.34	89.89	6783.24	163.02 N	4566.77 E	4569.68	2.05
11012.00	89.45	90.33	6783.42	162.84 N	4661.77 E	4664.61	1.05
11100.00	88.46	89.81	6785.03	162.74 N	4749.76 E	4752.53	1.27

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 87.91 DEGREES (GRID)
A TOTAL CORRECTION OF 7.67 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11100.00 FEET
IS 4752.54 FEET ALONG 88.04 DEGREES (GRID)

First two survey are from 3rd party source (Multi Shot EMS) and provided by CO-man on location before drilling.
Depth 281.00 Inc 0.70 Azi 178.71
Depth 600.00 Inc 0.20 Azi 220.31
Tied in @ Surface