

PCGC - Pressure Case Gamma
PCDC - Pressure Case Directional

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	22-Mar-14	27-Mar-14			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,245.00	7,655.00			
Log End Depth (MD, ft)	7,655.00	12,265.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	19-Mar-14 21:30	24-Mar-14 11:34			
Drill/Wipe End Date and Time	22-Mar-14 12:45	26-Mar-14 08:37			
Min Inc (deg) @ Depth (MD, ft)	0.19 @ 1,285.00	87.87 @ 8,061.00			
Max Inc (deg) @ Depth (MD, ft)	90.10 @ 7,655.00	91.66 @ 10,534.00			
Bit TFA(in2) / Bit Type	1.18 / PDC	1.24 / PDC			
Flow Rate (gpm)	560.99	283.79			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Polymer			
Density (ppg) / Viscosity (spqt)	9.03 / 43.00	10.20 / 44.00			
Filtrate CL (ppm)	1,500.00	1,400.00			
pH / Fluid Loss (mptm)	9.30 / 4	9.30 / 4			
PV (cP) / YP (lbf2)	12 / 16.00	13 / 18.00			
% Solids / % Sand	9.0 / 1.00	9 / 0.60			
% 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 (degF) @ Depth (MD, ft)	475.01 / 8,061.00	300.51 / 8,061.00			

Max Tool Temp (degF) / Source	175.21 / PCM	239.54 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Matt Busche	Matt Busche			
Customer Representative	Sam Taylor	Sam Taylor			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.76	5.84			
Sub Serial Number	244108	12134682			
Insert Serial Number	11680779	12230081			
Date and Time Initialized	18-Mar-14 22:46	23-Mar-14 18:07			
Date and Time Read	23-Mar-14 14:22	29-Mar-14 15:05			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	44.85	41.36			
Software Version	6.21	6.21			
Sub Serial Number	244108	12134682			
Sonde Serial Number	11833026	11638587			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	227.00	15.06			

Gamma Ray Sensor Information

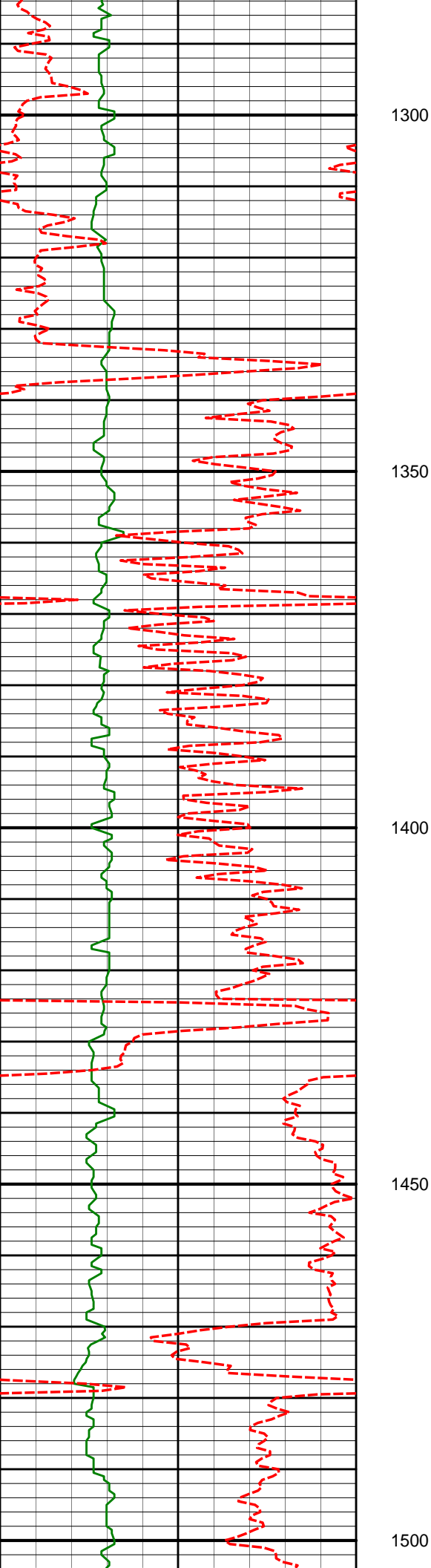
Tool Type	PCG	PCG			
Distance From Bit (ft)	49.80	46.31			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	244108	12134682			
Insert/Sonde Serial Number	11293433	11579846			

REMARKS

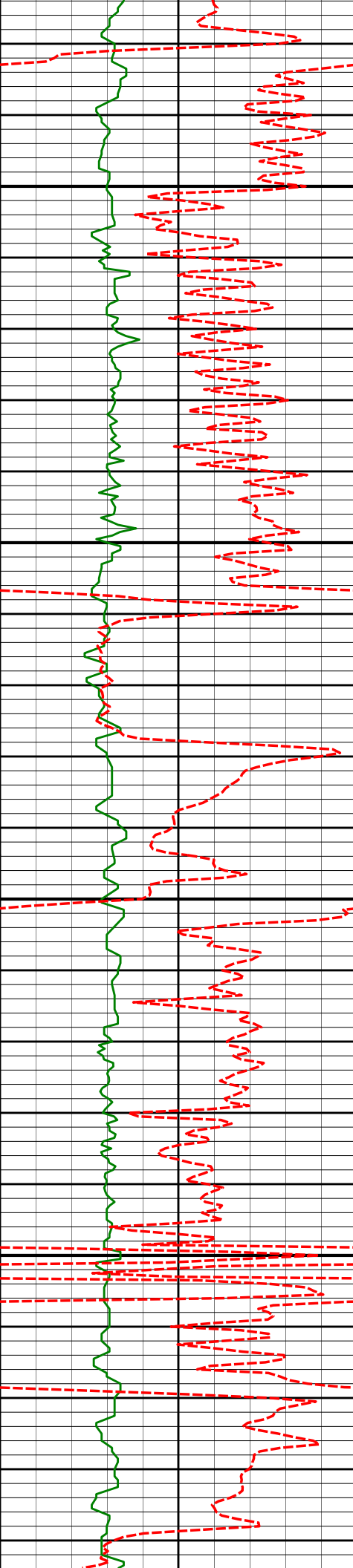
1. All depths are measured depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded data unless otherwise specified.
4. The final survey is a straight line projection to the bit.
5. Gaps were due to computer crashing the first time, and a complete loss of WITS communication the second time. Drilling continued during these periods.
6. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):
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



1285'	0.19°	285.65°	1284.98'	0.91'
1380'	0.36°	300.86°	1379.98'	1.11'
1474'	0.19°	34.63°	1473.98'	1.39'



1750

1759'

6.39°

274.17°

1758.49'

3.76'

1800

1850

1853'

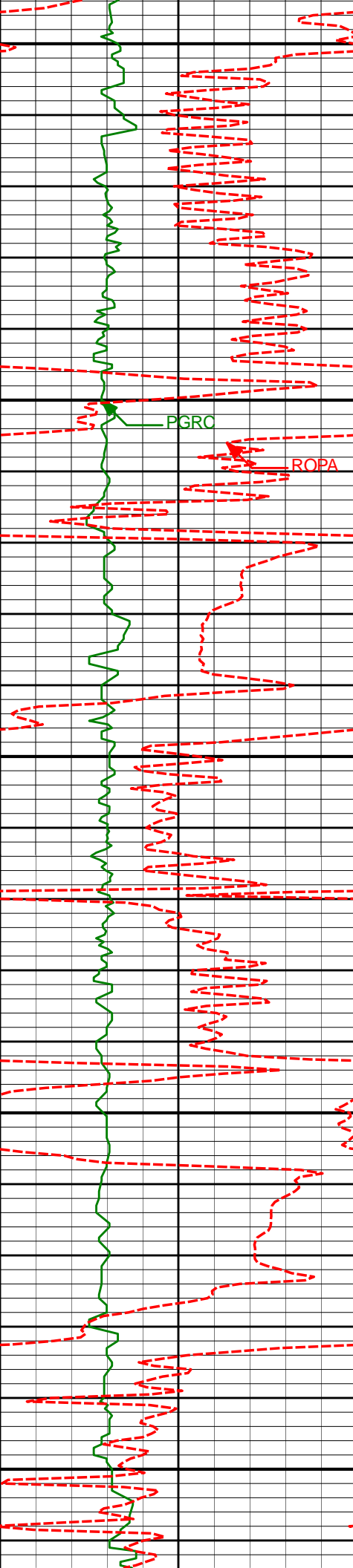
8.66°

277.44°

1851.68'

5.23'

1900



1950

2000

2050

2100

2150

1948'

10.55°

269.66°

1945.34'

6.34'

PGRC

ROPA

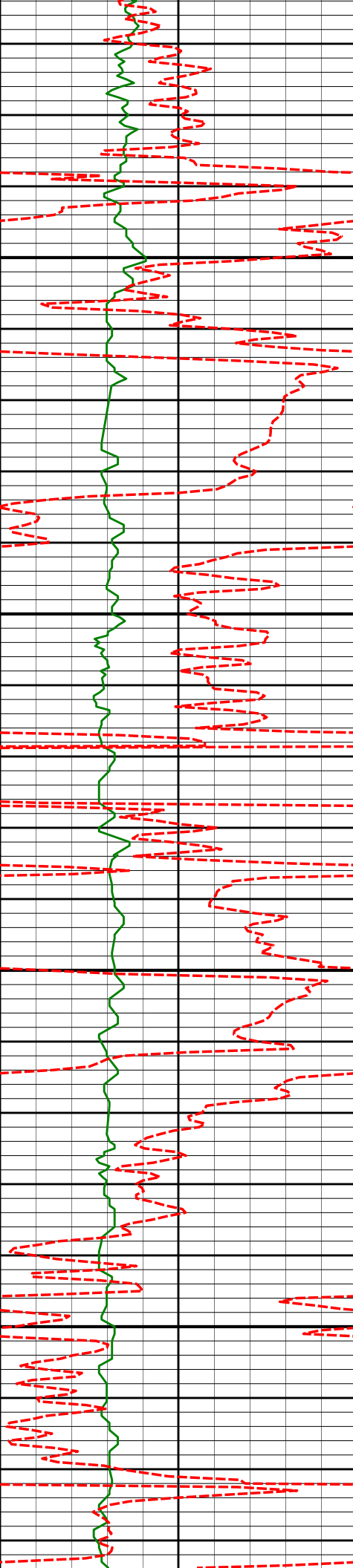
2136'

14.00°

260.37°

2129.04'

3.00'



2200

2230'

15.24°

253.53°

2220.00'

-2.07'

2250

2300

2324'

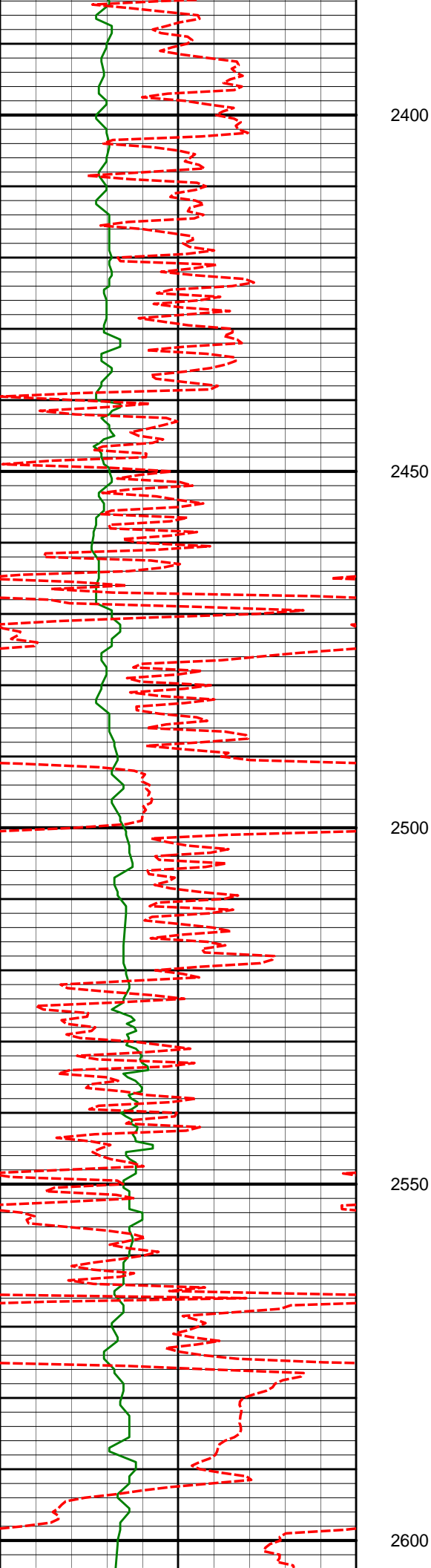
15.72°

250.97°

2310.59'

-9.38'

2350



2400

2418'

14.57°

247.93°

2401.32'

-17.64'

2450

2500

2512'

13.27°

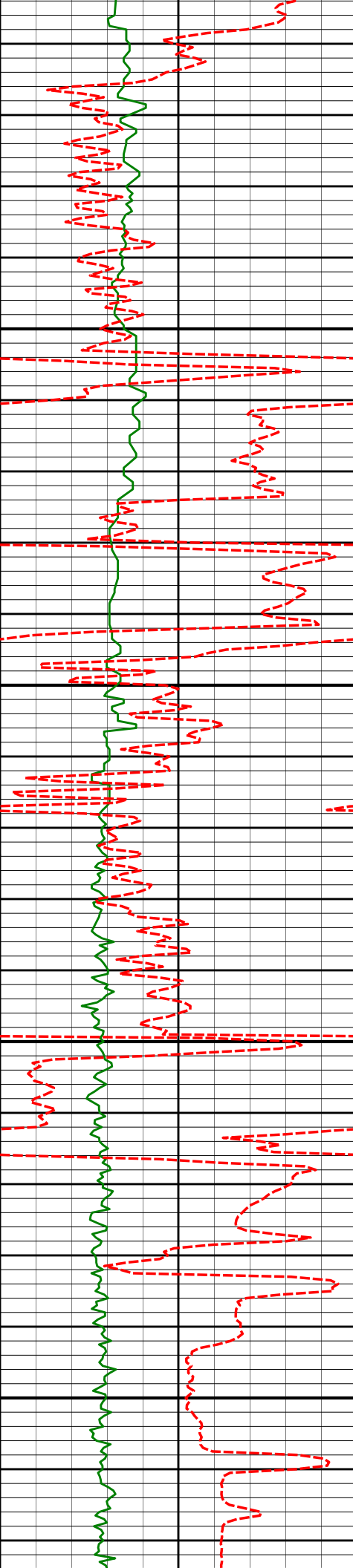
243.85°

2492.56'

-26.53'

2550

2600



2650

2700

2750

2800

2607'

14.83°

244.61°

2584.72'

-36.25'

2701'

14.74°

246.08°

2675.61'

-45.94'

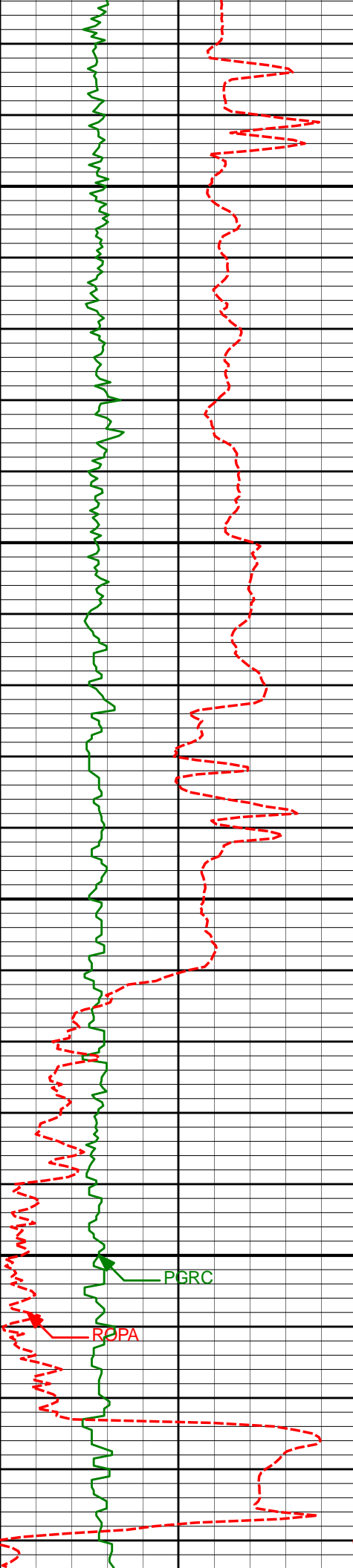
2795'

16.08°

247.27°

2766.23'

-55.49'



2850

2900

2950

3000

2889'

17.09°

247.76°

2856.31'

-65.38'

2983'

17.87°

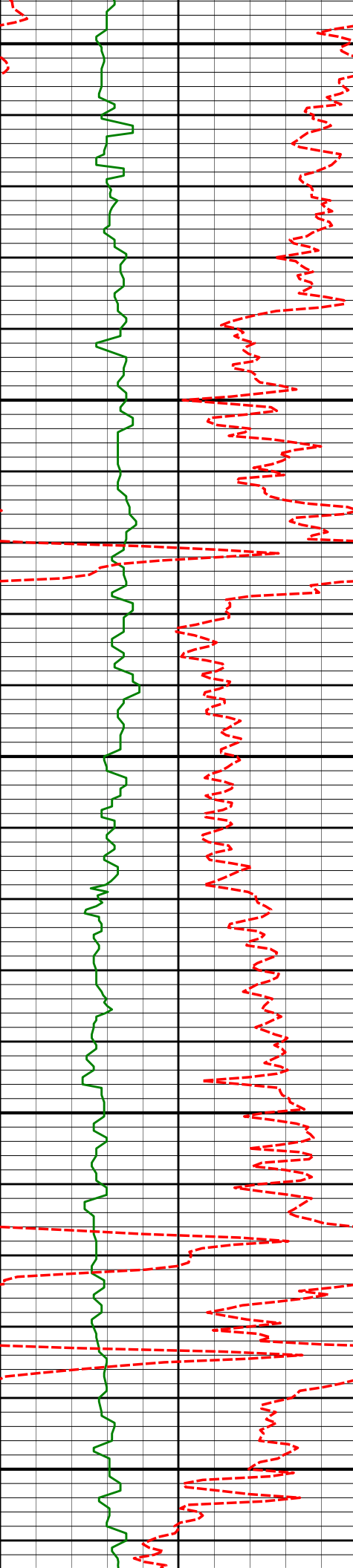
248.01°

2945.97'

-75.63'

PGRC

RPPA



3050

3077'

16.66°

246.19°

3035.74'

-86.10'

3100

3150

3172'

14.98°

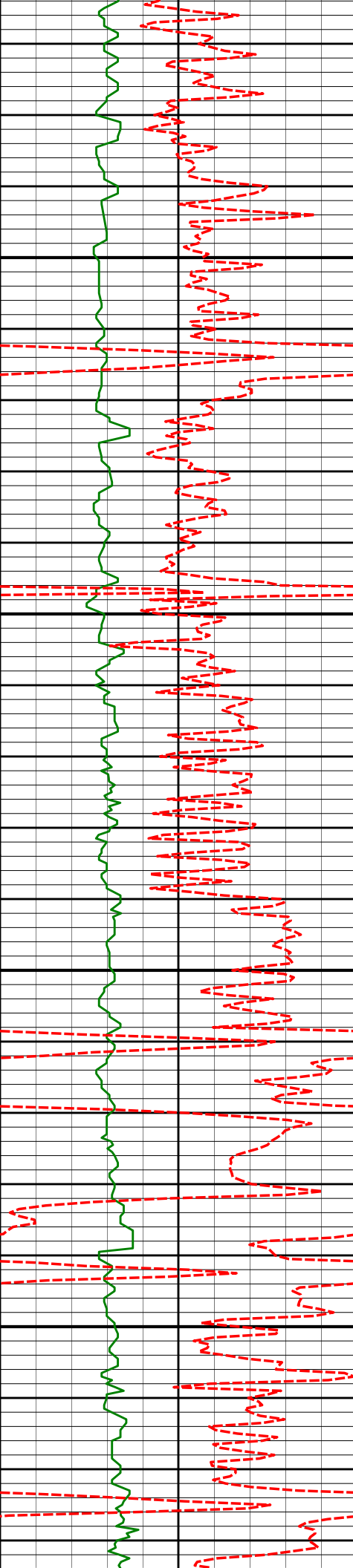
244.80°

3127.13'

-96.48'

3200

3250



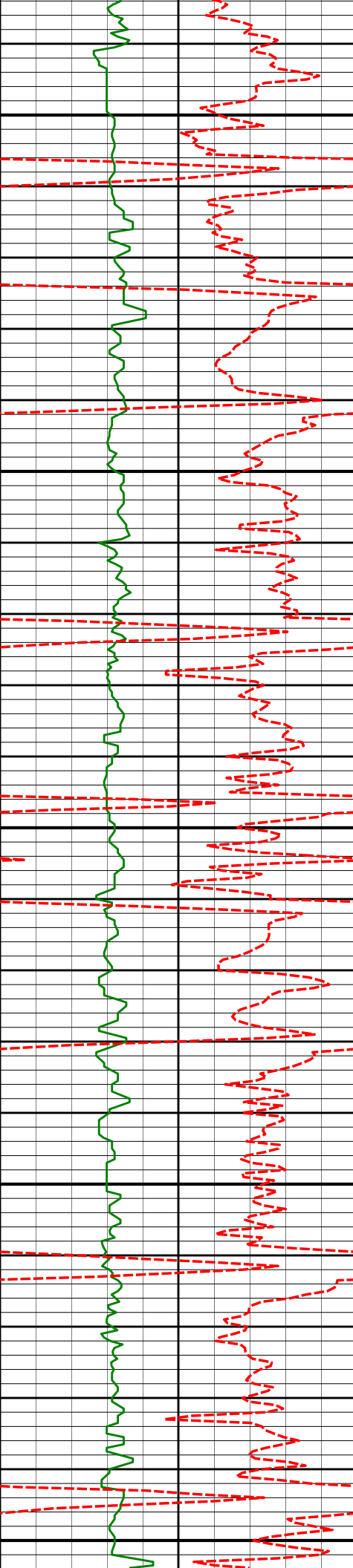
3300

3350

3400

3450

3266'	14.27°	243.09°	3218.09'	-106.59'
3360'	12.41°	239.77°	3309.55'	-116.64'
3455'	11.86°	246.13°	3402.43'	-125.47'



3500

3550

3600

3650

3700

3550'

11.75°

251.70°

3495.42'

-132.20'

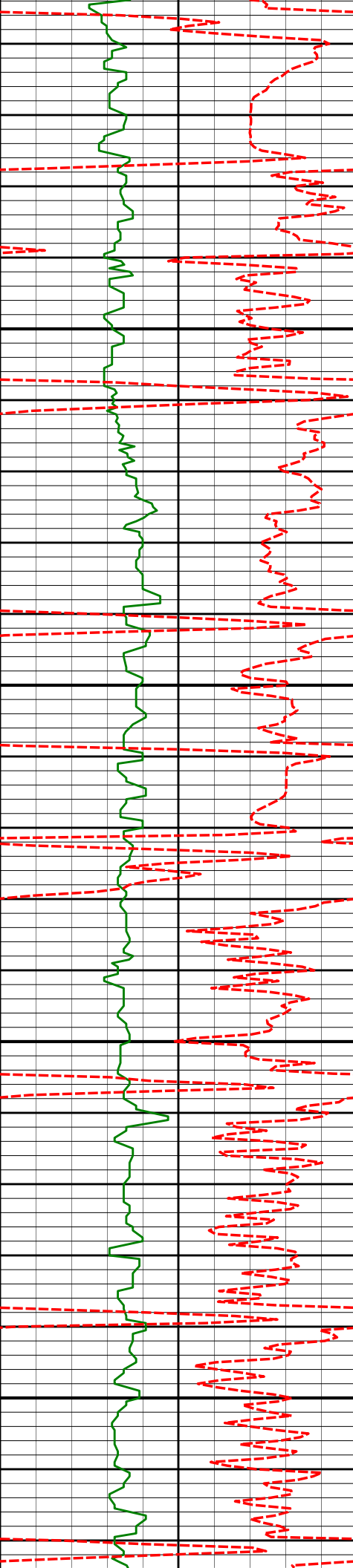
3645'

12.17°

259.02°

3588.37'

-136.87'



3750

3800

3850

3900

3740'

13.78°

256.86°

3680.94'

-141.05'

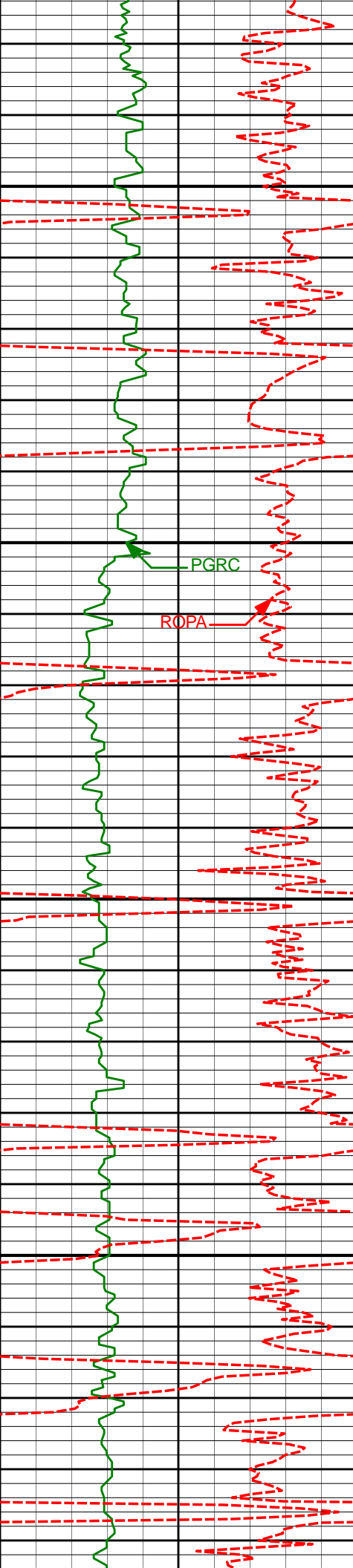
3836'

14.71°

254.15°

3773.99'

-146.64'



3950

4000

4050

4100

3931'

13.20°

252.84°

3866.18'

-152.82'

4026'

14.86°

253.35°

3958.34'

-159.19'

4121'

14.61°

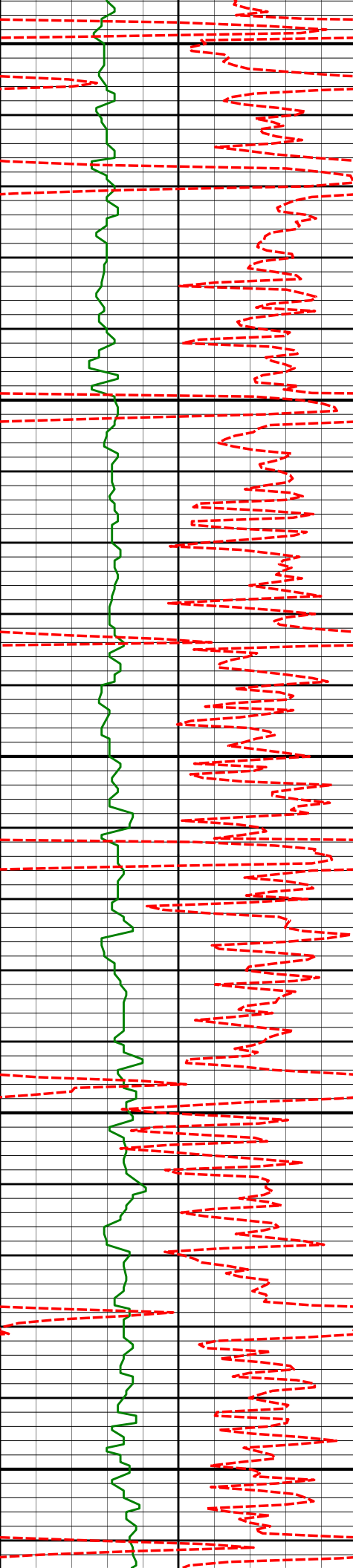
254.78°

4050.22'

-165.49'

PGRC

ROPA



4150

4200

4250

4300

4350

4248'

14.01°

252.30°

4173.28'

-173.93'

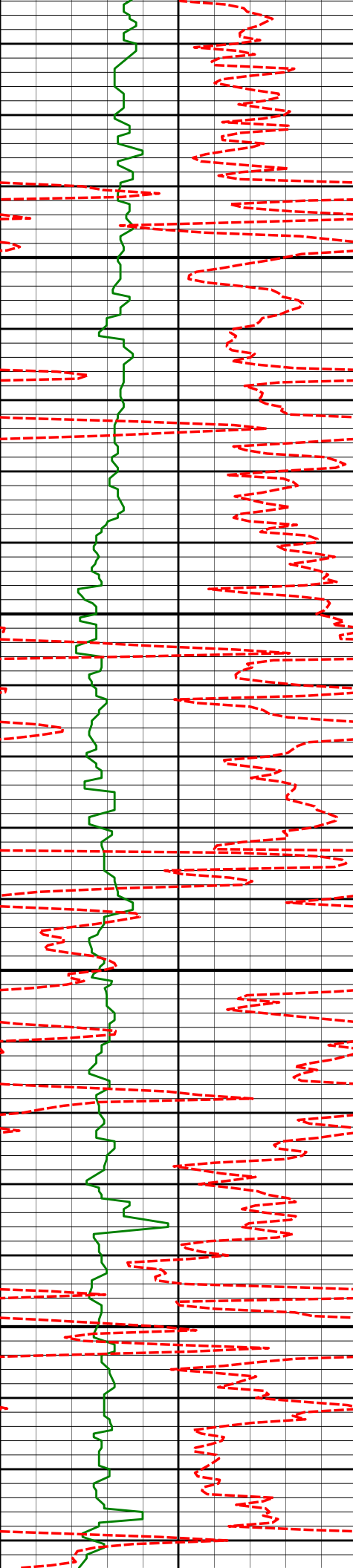
4311'

12.94°

252.42°

4234.55'

-178.18'



4400

4406'

11.61°

249.17°

4327.37'

-184.51'

4450

4500

4501'

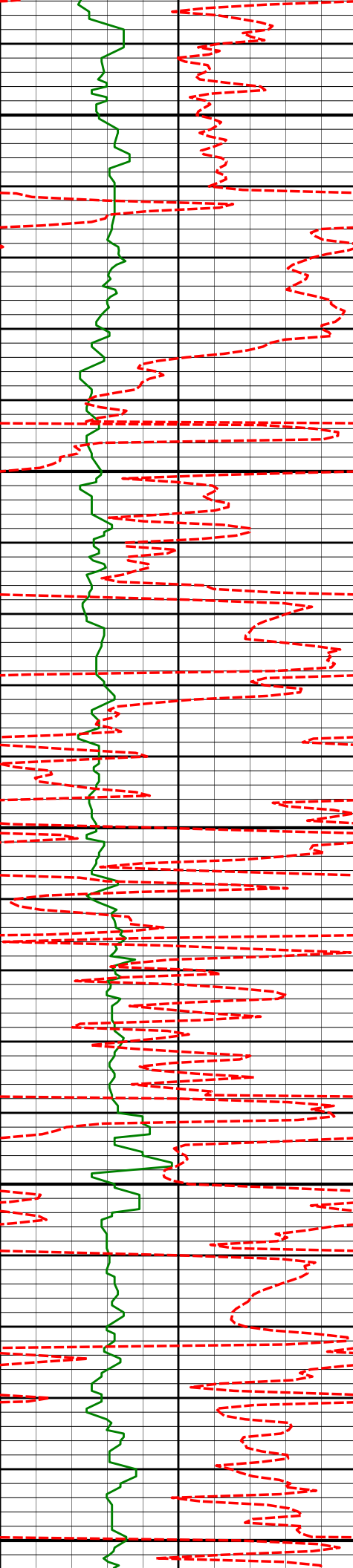
10.92°

250.14°

4420.54'

-190.71'

4550



4600

4597'

10.22°

249.74°

4514.91'

-196.51'

4650

4700

4750

4800

4692'

8.72°

246.16°

4608.62'

-202.13'

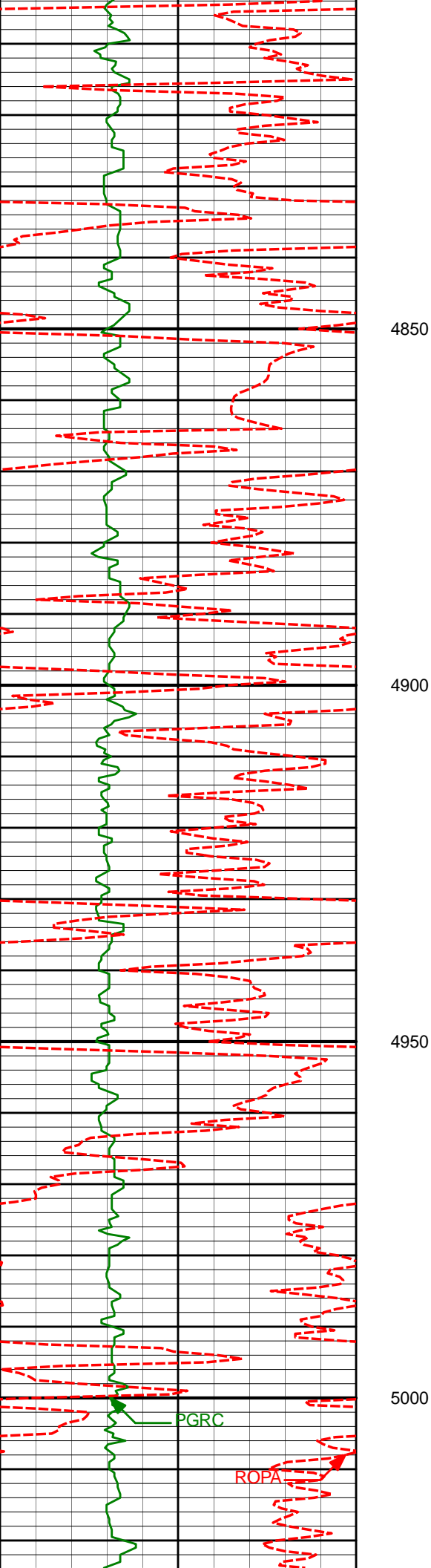
4787'

7.03°

240.57°

4702.72'

-207.73'



4850

4882'

3.71°

227.23°

4797.29'

-212.57'

4900

4950

4977'

2.75°

224.14°

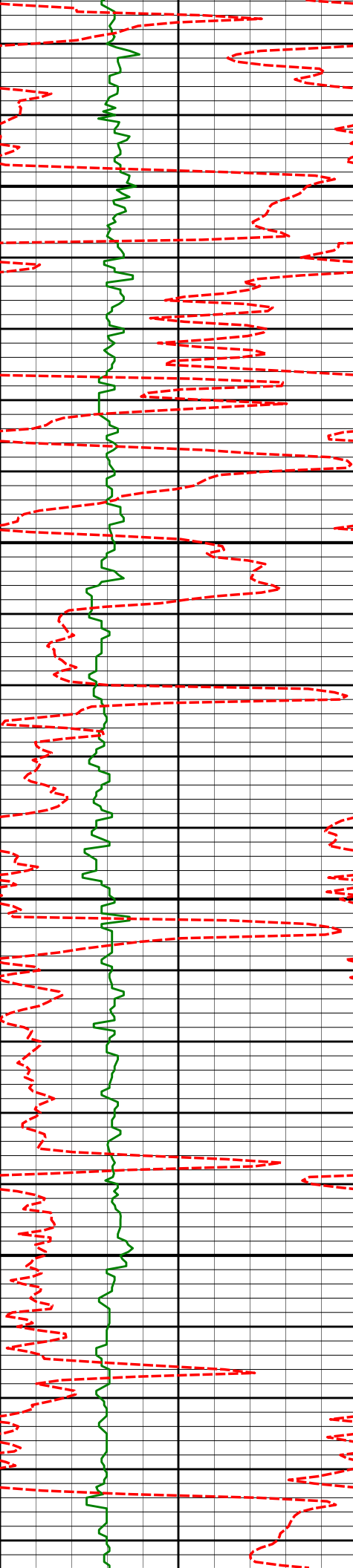
4892.14'

-216.24'

5000

PGRC

ROPA



5050

5072'

2.11°

255.59°

4987.06'

-218.26'

5100

5150

5168'

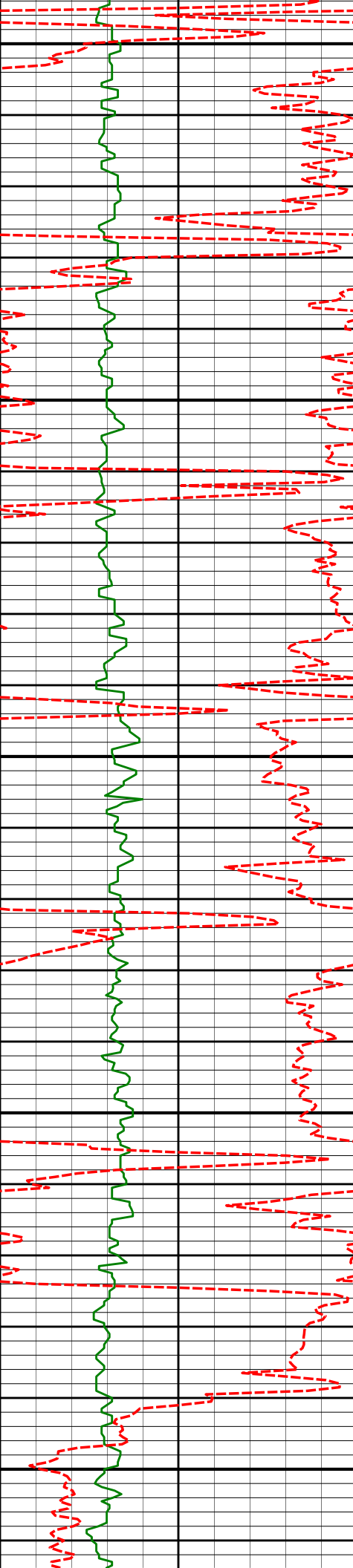
1.87°

253.17°

5083.00'

-219.10'

5200



5250

5263'

0.86°

329.98°

5177.98'

-218.91'

5300

5350

5358'

1.21°

326.28°

5272.96'

-217.44'

5400

5450

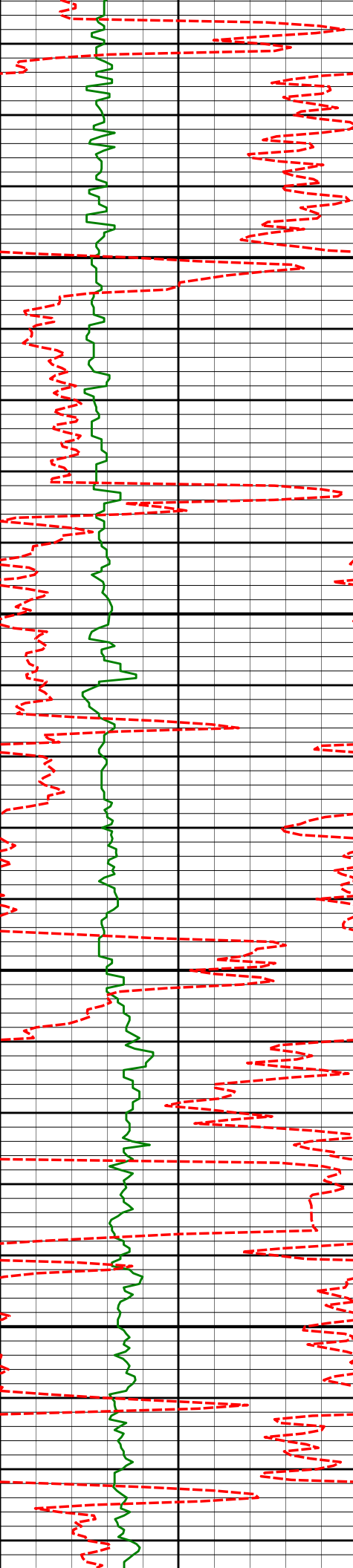
5453'

0.81°

162.32°

5367.96'

-217.25'



5500

5550

5600

5650

5580'

0.58°

154.37°

5494.95'

-218.69'

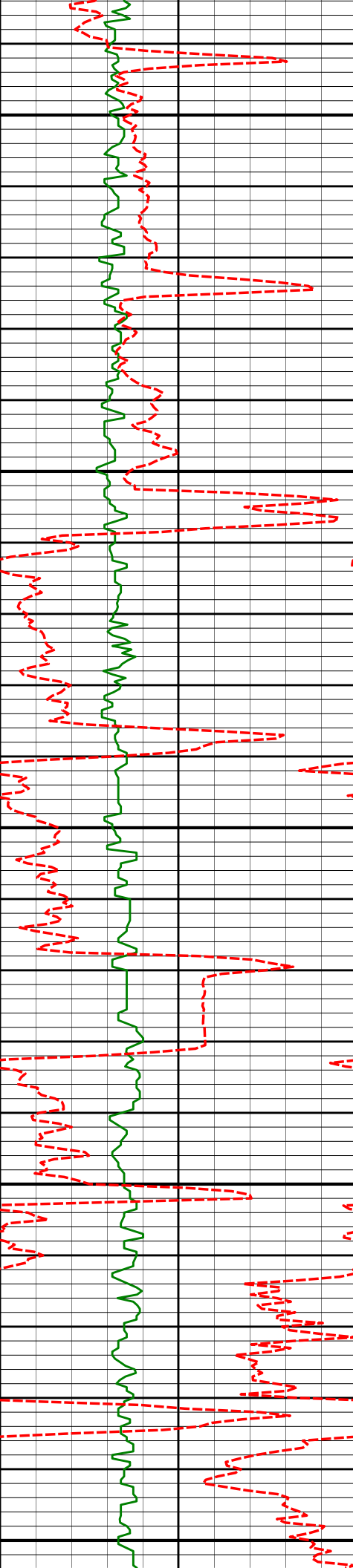
5643'

0.43°

274.53°

5557.95'

-218.96'



5700

5739'

0.57°

294.15°

5653.94'

-218.72'

5750

5800

5834'

0.83°

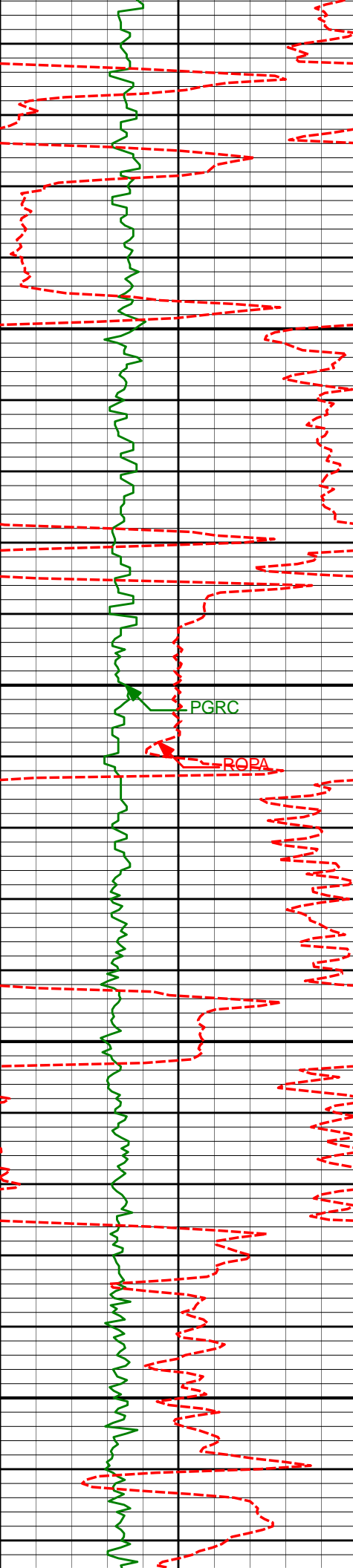
290.36°

5748.93'

-218.27'

5850

5900



5929'

5950

6000

6050

6100

5929'

0.86°

267.74°

5843.92'

-218.04'

6024'

0.89°

261.62°

5938.91'

-217.90'

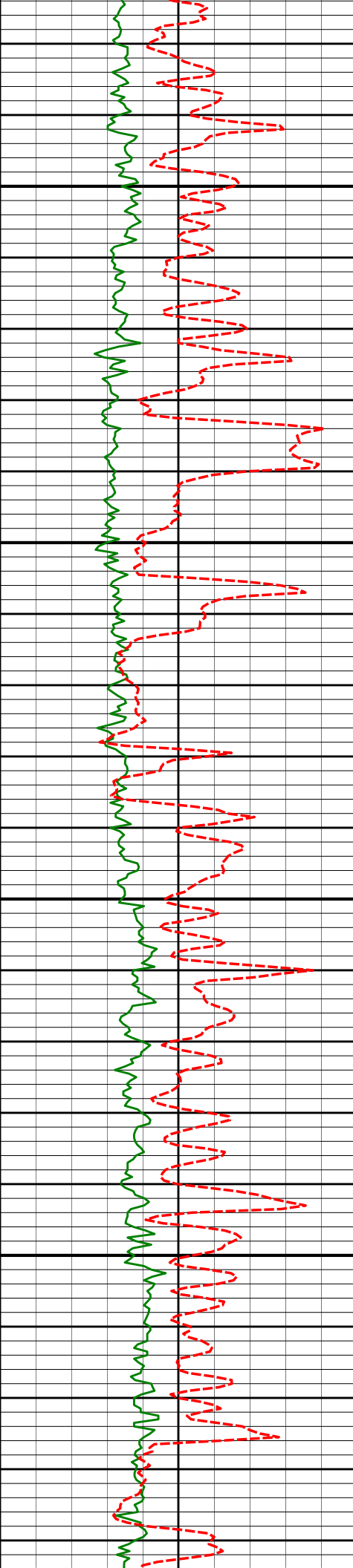
6119'

1.11°

250.63°

6033.90'

-218.03'



6150

6200

6250

6300

6246'

0.34°

255.29°

6160.89'

-218.51'

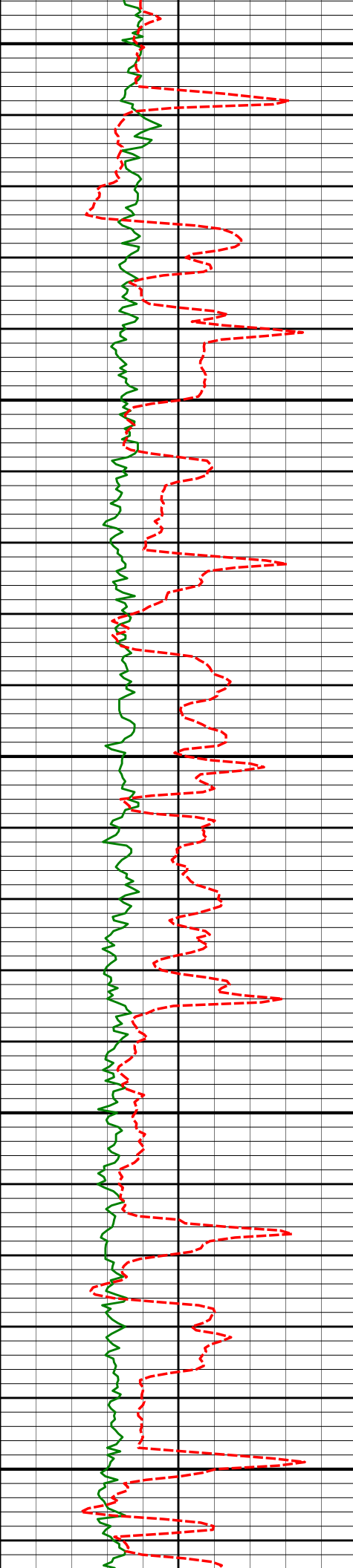
6309'

0.28°

2.83°

6223.89'

-218.40'



6350

6400

6450

6500

6550

6404'

0.57°

326.10°

6318.89'

-217.77'

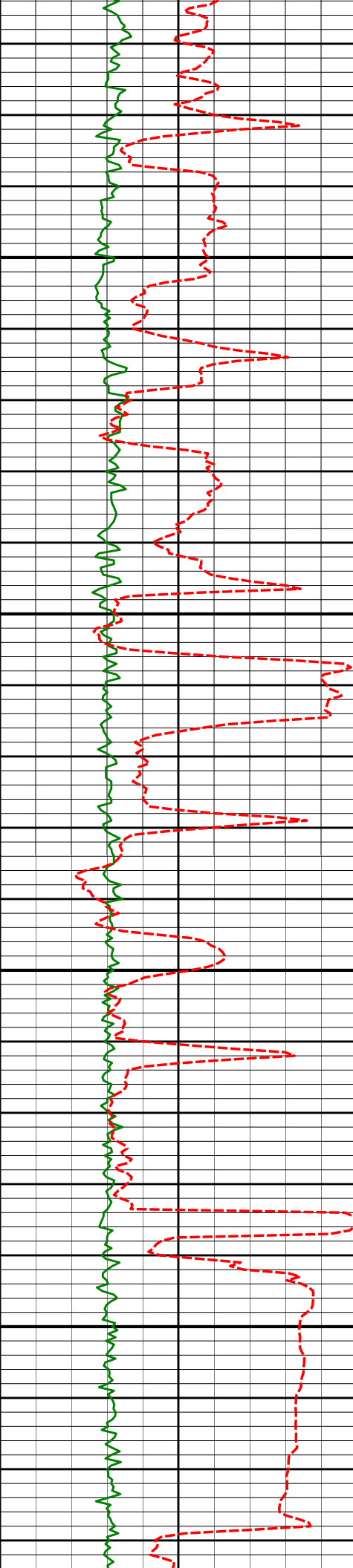
6500'

0.86°

246.24°

6414.88'

-217.65'



6600

6650

6700

6750

6595'

1.91°

254.22°

6509.85'

-218.34'

6690'

1.43°

246.45°

6604.81'

-219.21'

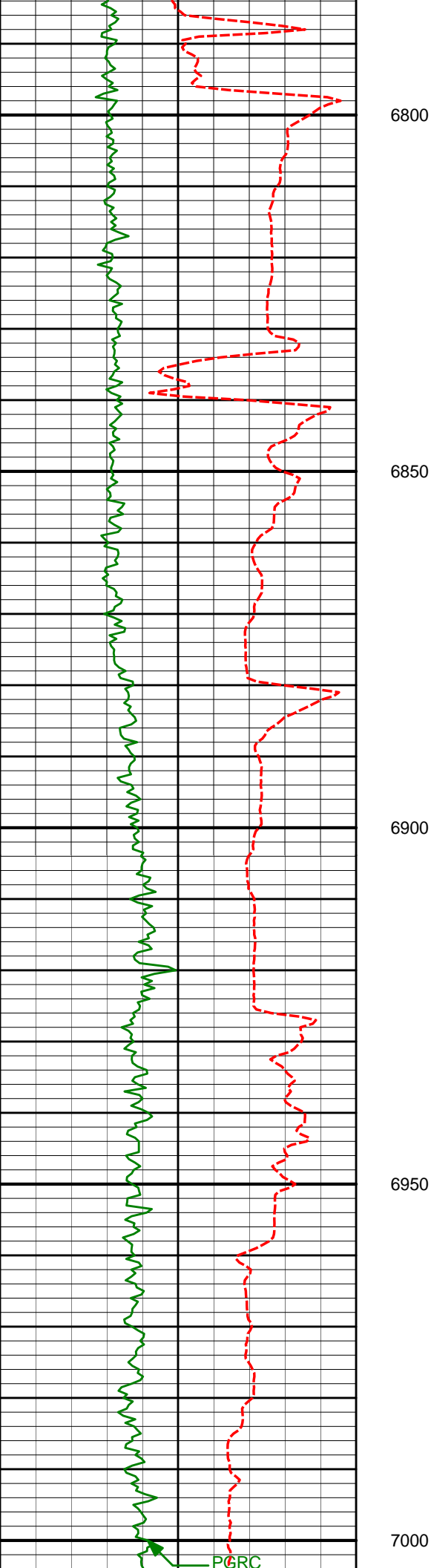
6738'

1.43°

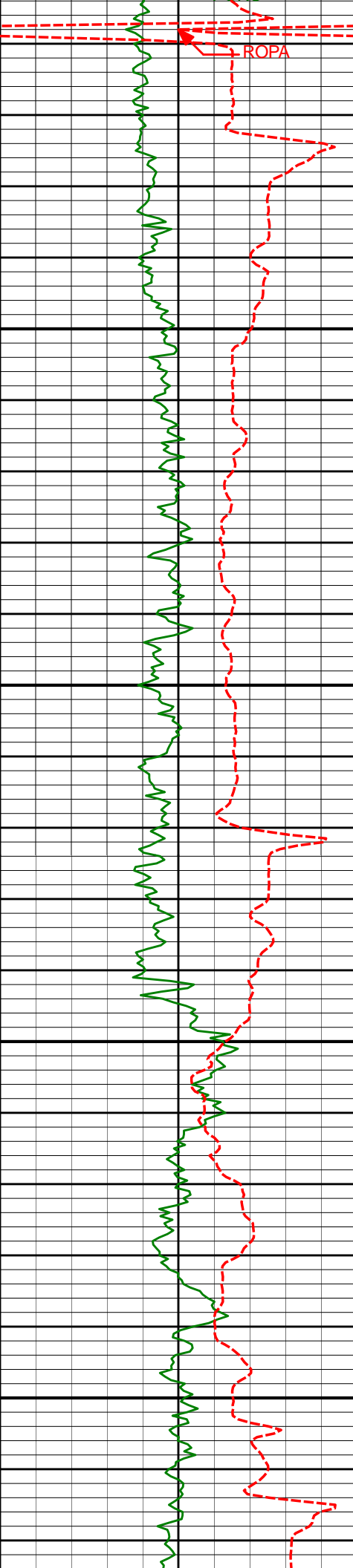
276.53°

6652.80'

-219.36'



6785'	3.74°	349.11°	6699.75'	-217.78'
6833'	7.11°	1.59°	6747.53'	-213.26'
6880'	11.38°	7.95°	6793.91'	-205.77'
6928'	16.23°	7.57°	6840.51'	-194.45'
6975'	20.61°	6.65°	6885.09'	-179.74'



7050

7100

7150

7200

7023'

25.60°

6.86°

6929.23'

-161.08'

7070'

30.49°

6.82°

6970.70'

-139.19'

7118'

35.92°

6.86°

7010.85'

-113.14'

7165'

41.59°

6.29°

7047.48'

-83.98'

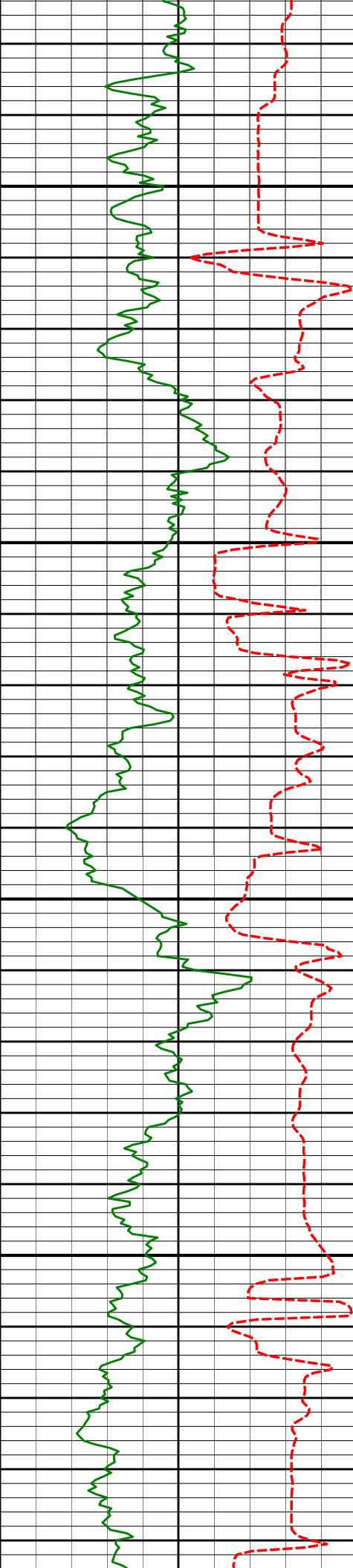
7213'

47.82°

3.05°

7081.59'

-50.39'



7250

7260'

53.35°

0.73°

7111.42'

-14.14'

7300

7308'

57.98°

1.21°

7138.49'

25.47'

7350

7355'

61.30°

359.53°

7162.24'

66.01'

7400

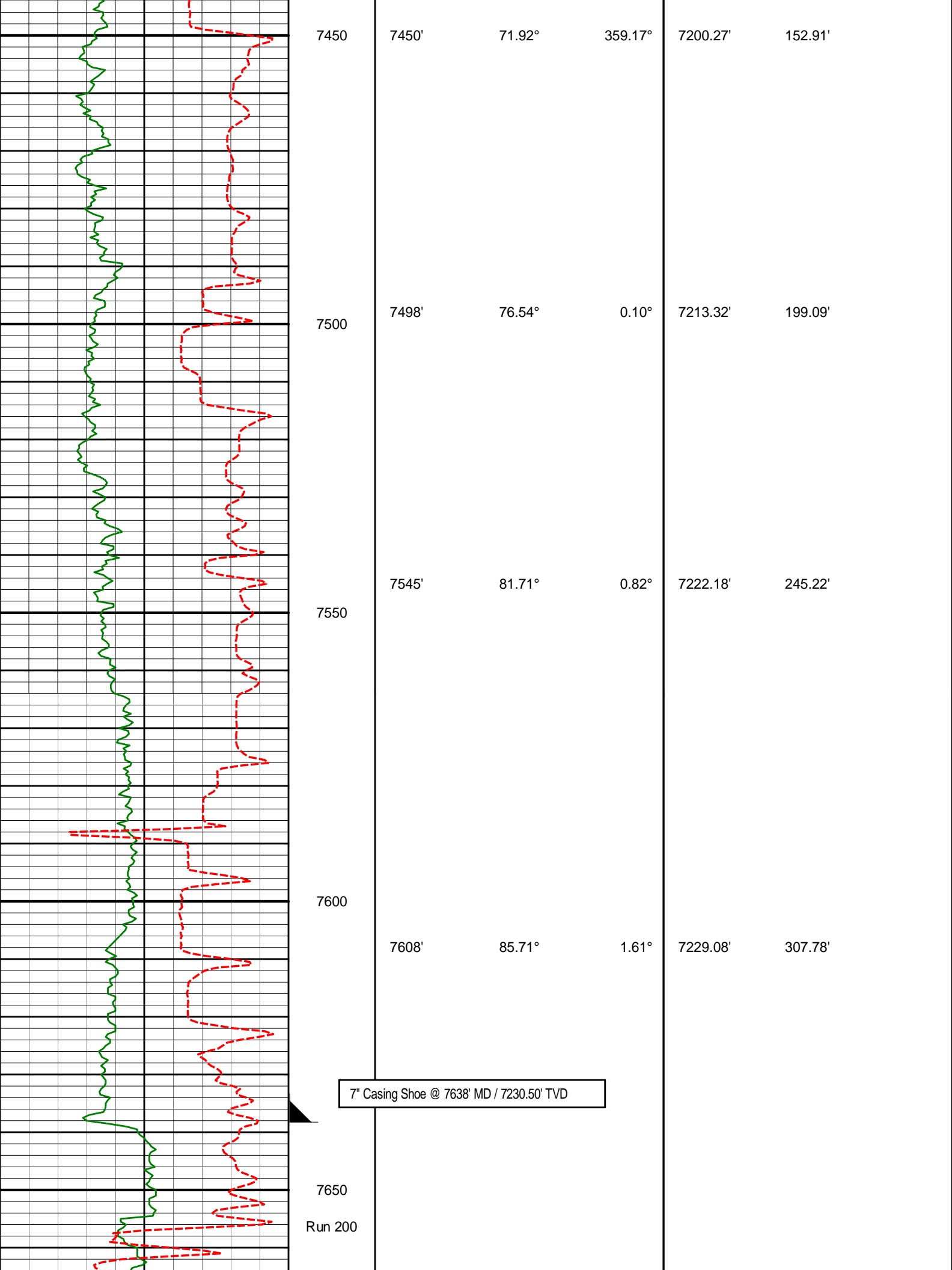
7403'

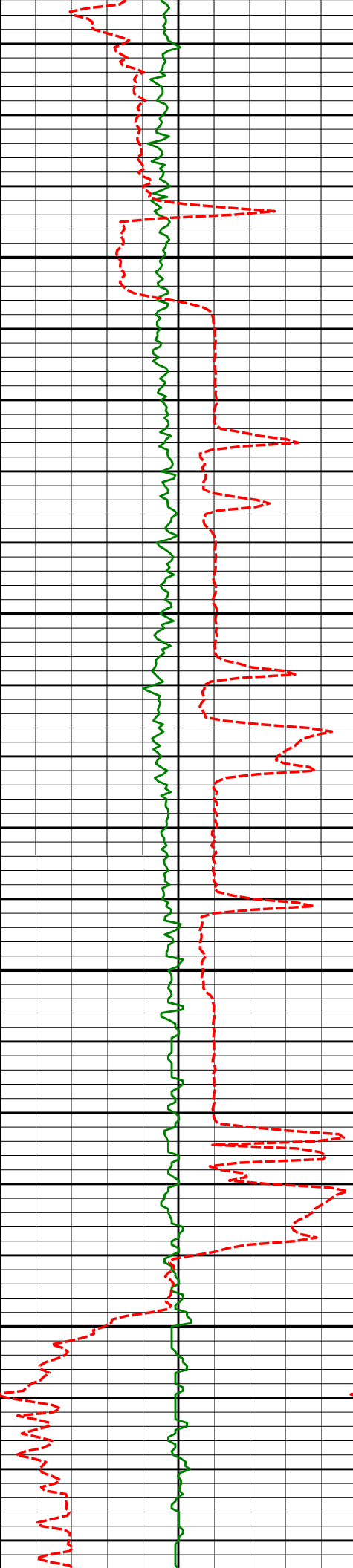
66.17°

359.68°

7183.47'

109.04'





7680'

89.63°

1.06°

7232.01'

379.66'

7700

7750

7776'

88.74°

0.26°

7233.38'

475.62'

7800

7850

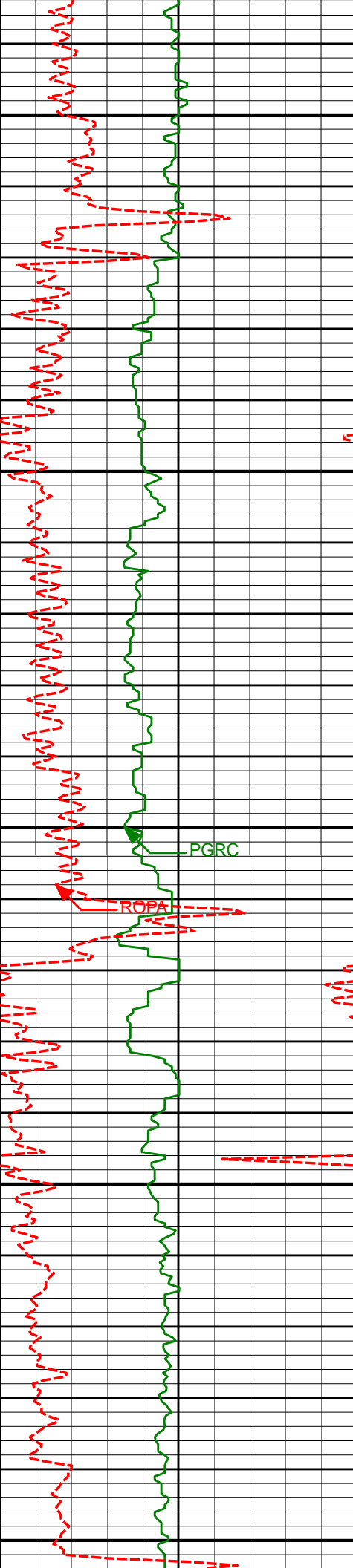
7870'

88.15°

359.47°

7235.93'

569.57'



7900

7950

8000

8050

8100

PGRC

ROPAL

7966'

88.12°

359.22°

7239.05'

665.52'

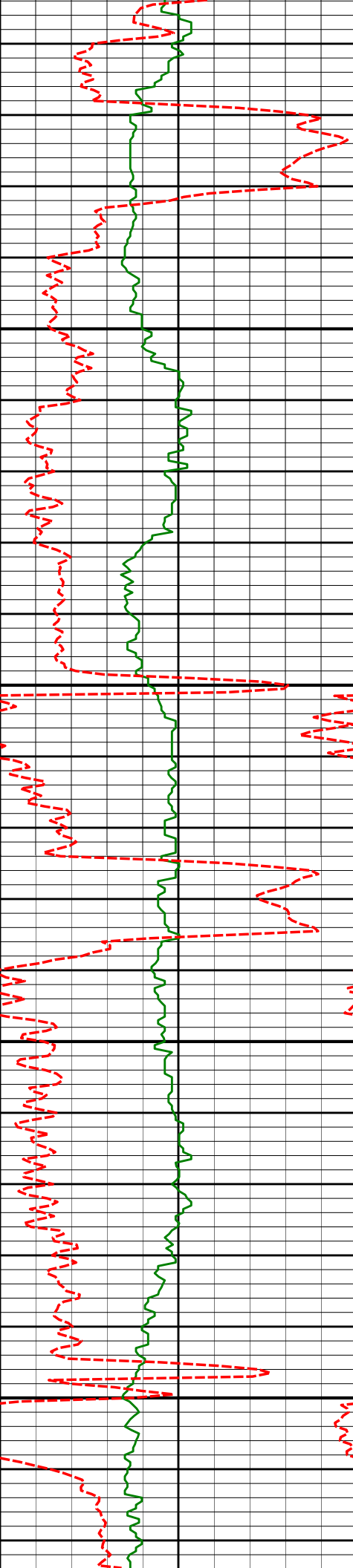
8061'

87.87°

359.13°

7242.37'

760.46'



8150

8156'

88.37°

358.42°

7245.49'

855.41'

8200

8250

8251'

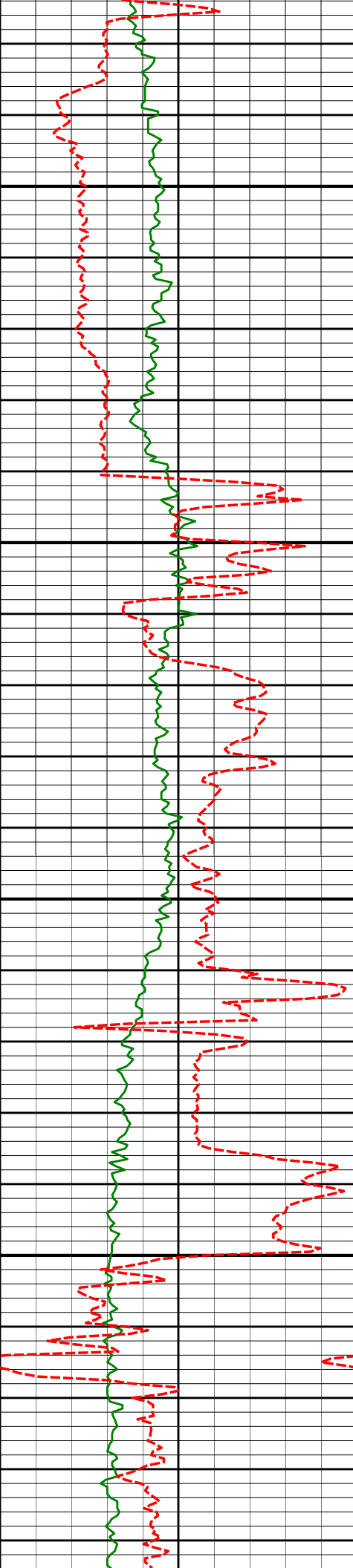
89.35°

358.48°

7247.38'

950.38'

8300



8350

8400

8450

8500

8346'

89.23°

357.94°

7248.56'

1045.36'

8441'

88.98°

357.60°

7250.04'

1140.32'

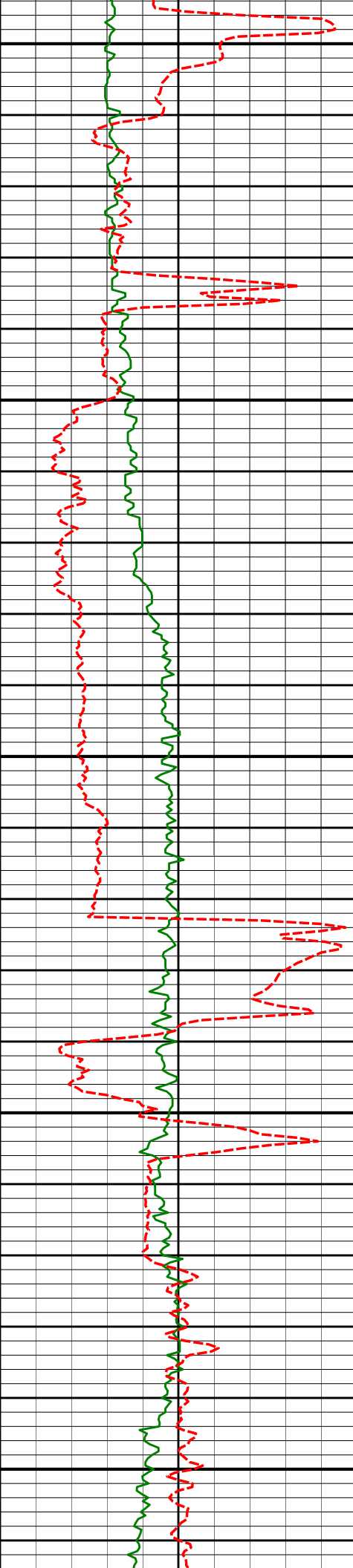
8536'

90.37°

357.94°

7250.58'

1235.29'



8550

8600

8650

8700

8750

8632'

89.91°

357.65°

7250.35'

1331.26'

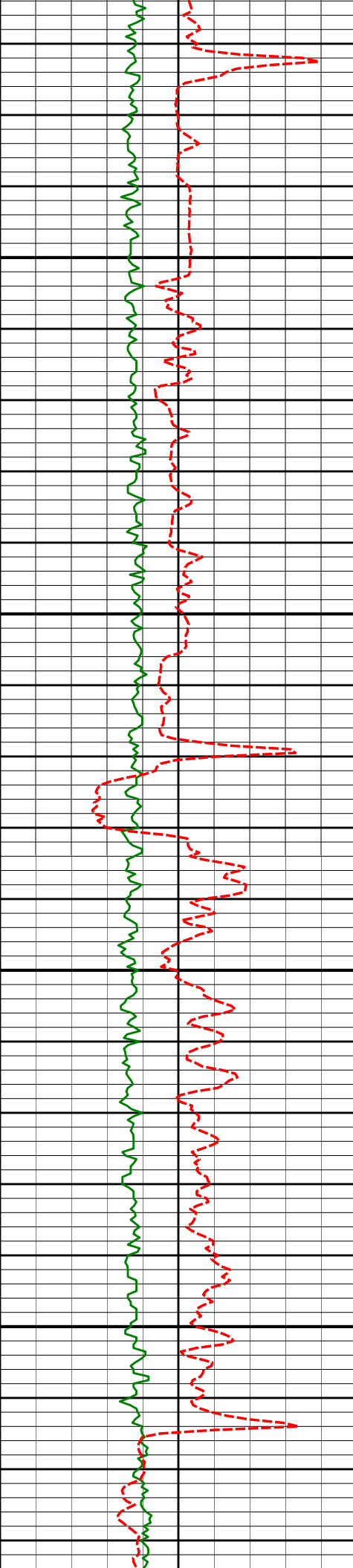
8727'

90.59°

357.84°

7249.94'

1426.23'



8800

8822'

90.22°

358.64°

7249.28'

1521.21'

8850

8900

8917'

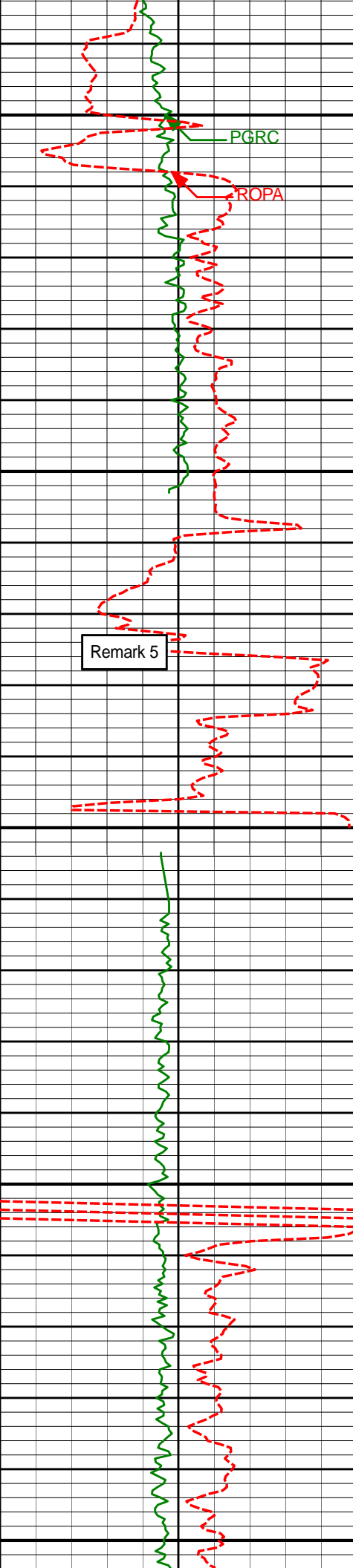
89.48°

359.52°

7249.53'

1616.21'

8950



9000

9012'

89.35°

359.40°

7250.50'

1711.21'

9050

9100

9107'

90.25°

358.92°

7250.83'

1806.20'

9150

9200

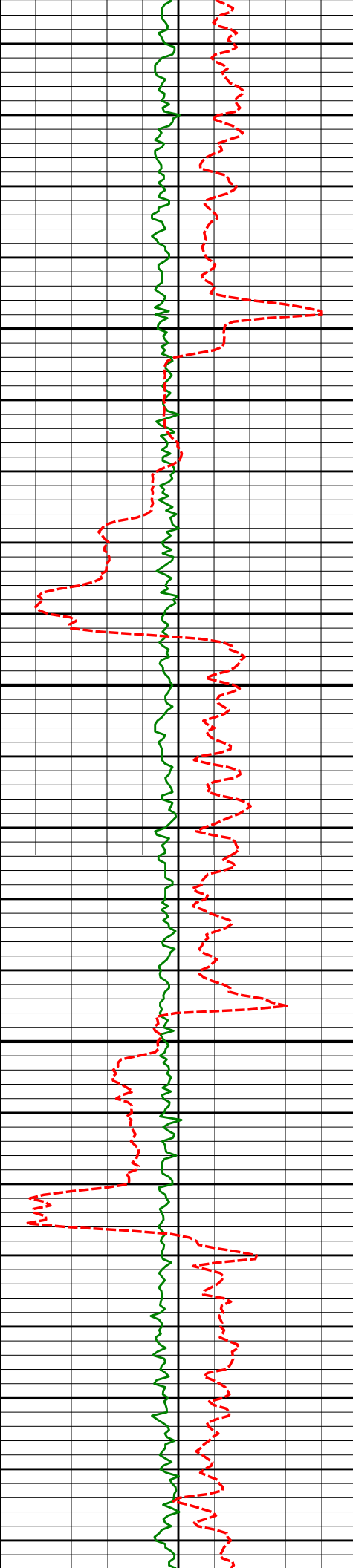
9202'

90.06°

358.62°

7250.58'

1901.20'



9250

9300

9350

9400

9298'

90.43°

358.90°

7250.17'

1997.20'

9393'

90.74°

358.75°

7249.19'

2092.19'



9450

9488'

90.95°

358.30°

7247.79'

2187.17'

9500

9550

9583'

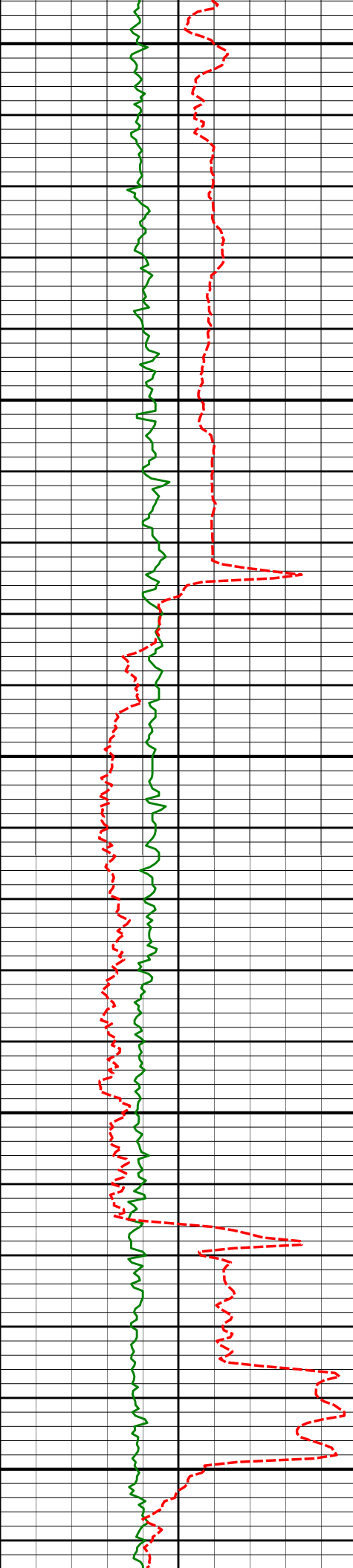
90.37°

358.44°

7246.69'

2282.16'

9600



9650

9678'

90.12°

358.37°

7246.28'

2377.15'

9700

9750

9773'

89.85°

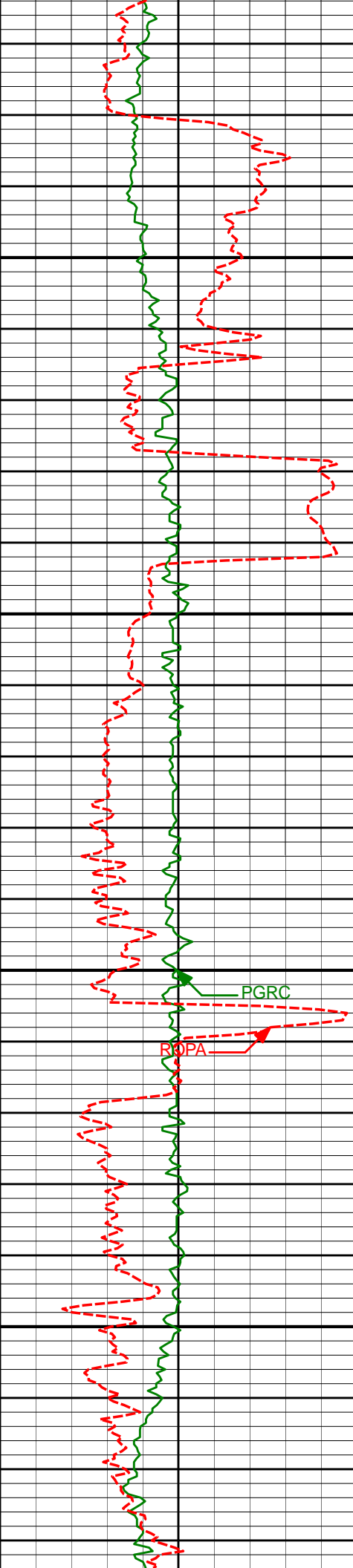
357.89°

7246.31'

2472.13'

9800

9850



9900

9950

10000

10050

9868'

89.35°

358.71°

7246.97'

2567.12'

9964'

90.09°

359.92°

7247.44'

2663.11'

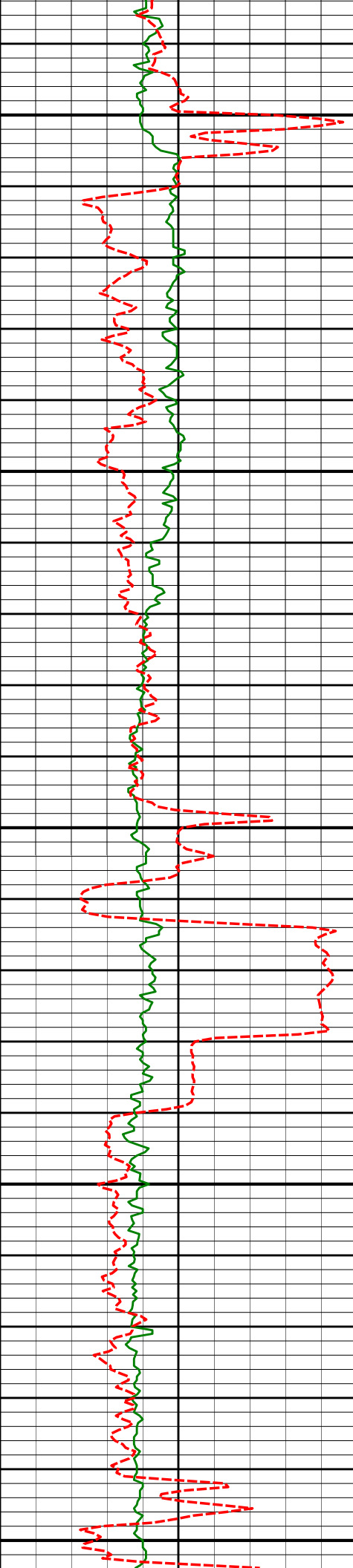
10059'

90.00°

359.81°

7247.36'

2758.11'



10100

10150

10200

10250

10300

10154'

89.60°

358.96°

7247.69'

2853.10'

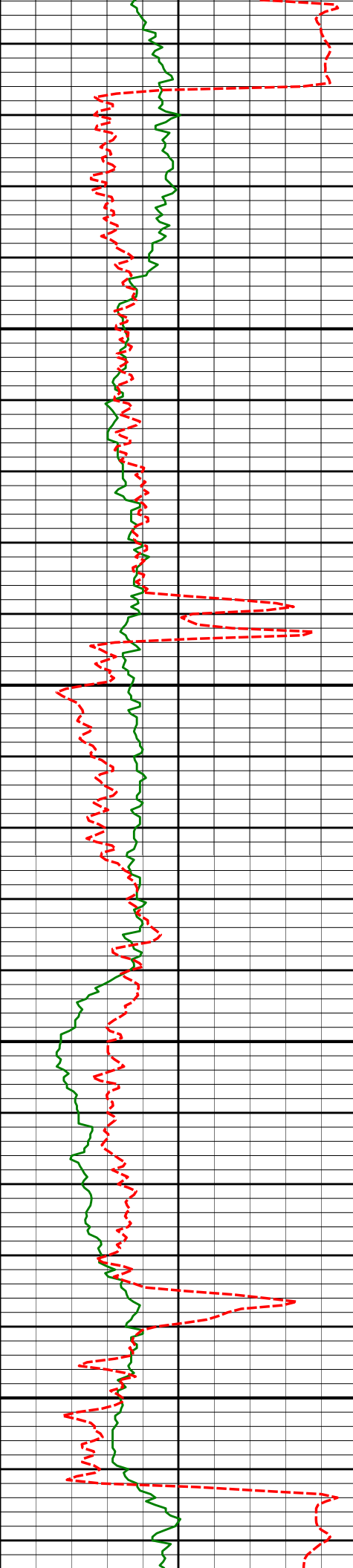
10249'

89.75°

359.97°

7248.23'

2948.10'



10350

10400

10450

10500

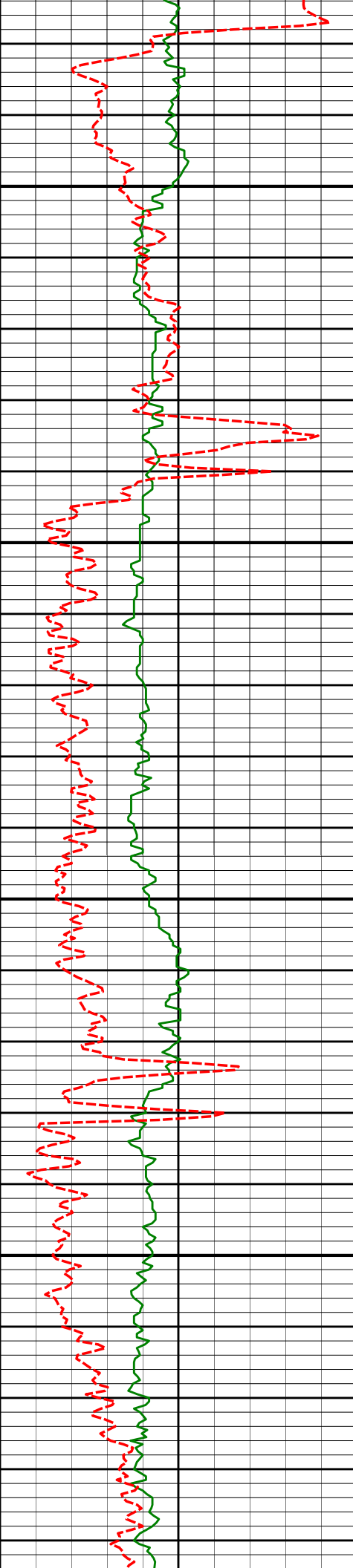
10344'

90.77°

359.92°

7247.80'

3043.09'



10550

10600

10650

10700

10534'

91.66°

359.59°

7243.77'

3233.03'

10630'

91.29°

358.70°

7241.29'

3329.00'

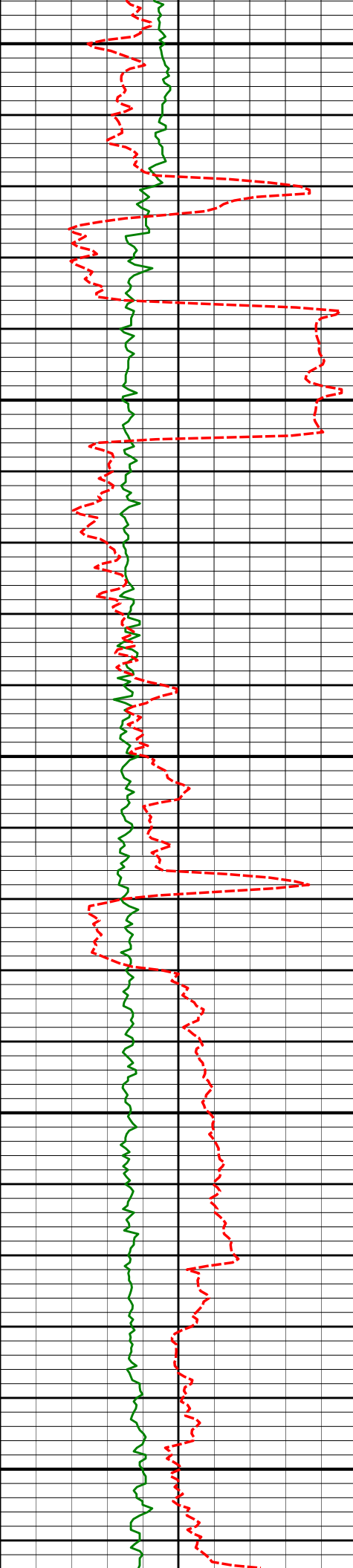
10725'

90.90°

357.36°

7239.47'

3423.96'



10750

10800

10850

10900

10950

10820'

89.54°

358.51°

7239.11'

3518.94'

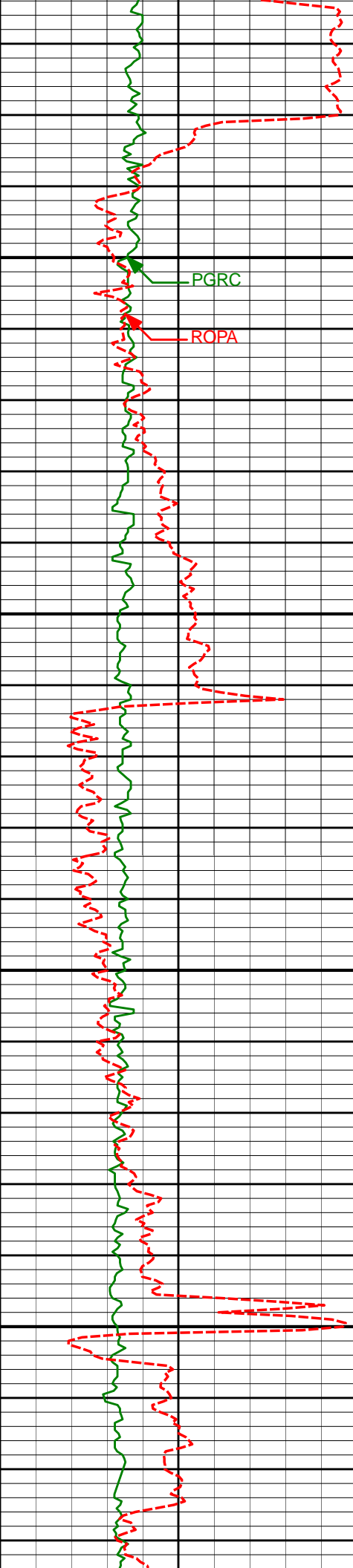
10915'

89.11°

358.25°

7240.24'

3613.92'



11000

11050

11100

11150

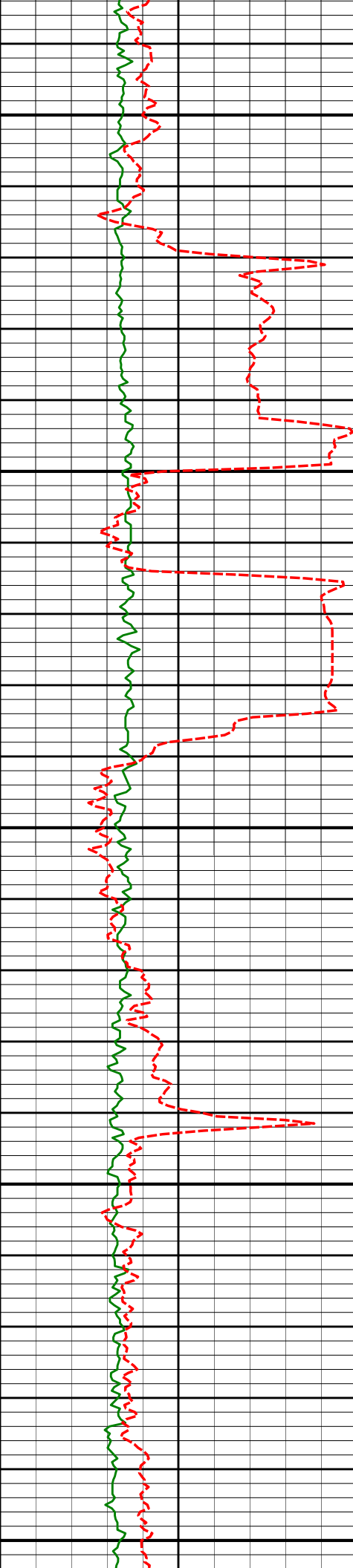
11010'

89.94°

359.28°

7241.03'

3708.91'



11200

11201'

89.01°

357.53°

7242.77'

3899.88'

11250

11300

11296'

90.99°

358.02°

7242.77'

3994.84'

11350

11400

11391'

90.56°

356.77°

7241.49'

4089.79'



11450

11486'

91.60°

0.64°

7239.70'

4184.75'

11500

11550

11581'

91.60°

0.86°

7237.05'

4279.68'

Remark 5

11600



11650

11676'

91.42°

0.24°

7234.55'

4374.61'

11700

11750

11771'

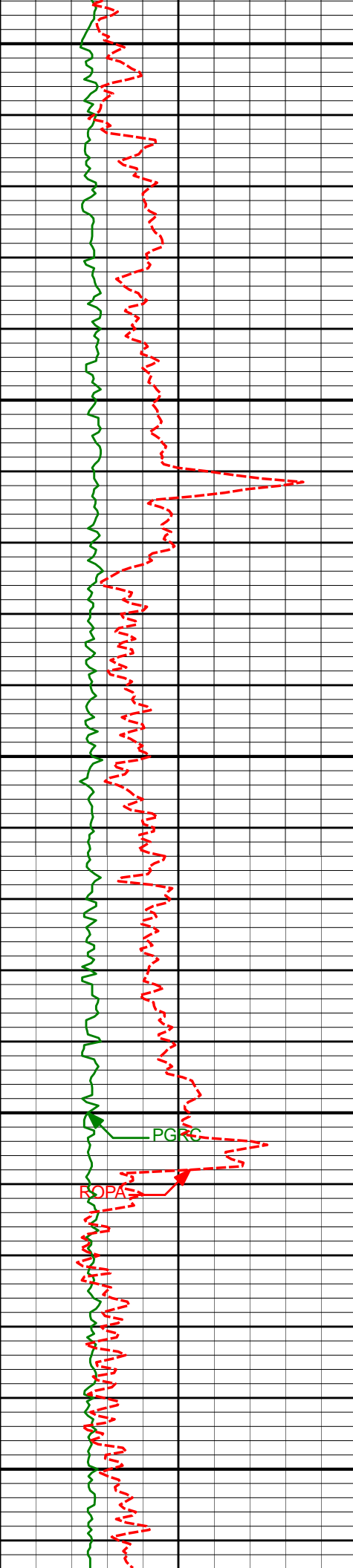
91.33°

359.80°

7232.27'

4469.58'

11800



11850

11866'

89.42°

358.21°

7231.66'

4564.57'

11900

11950

11961'

90.37°

358.44°

7231.84'

4659.56'

12000

PG

ROPA

12050

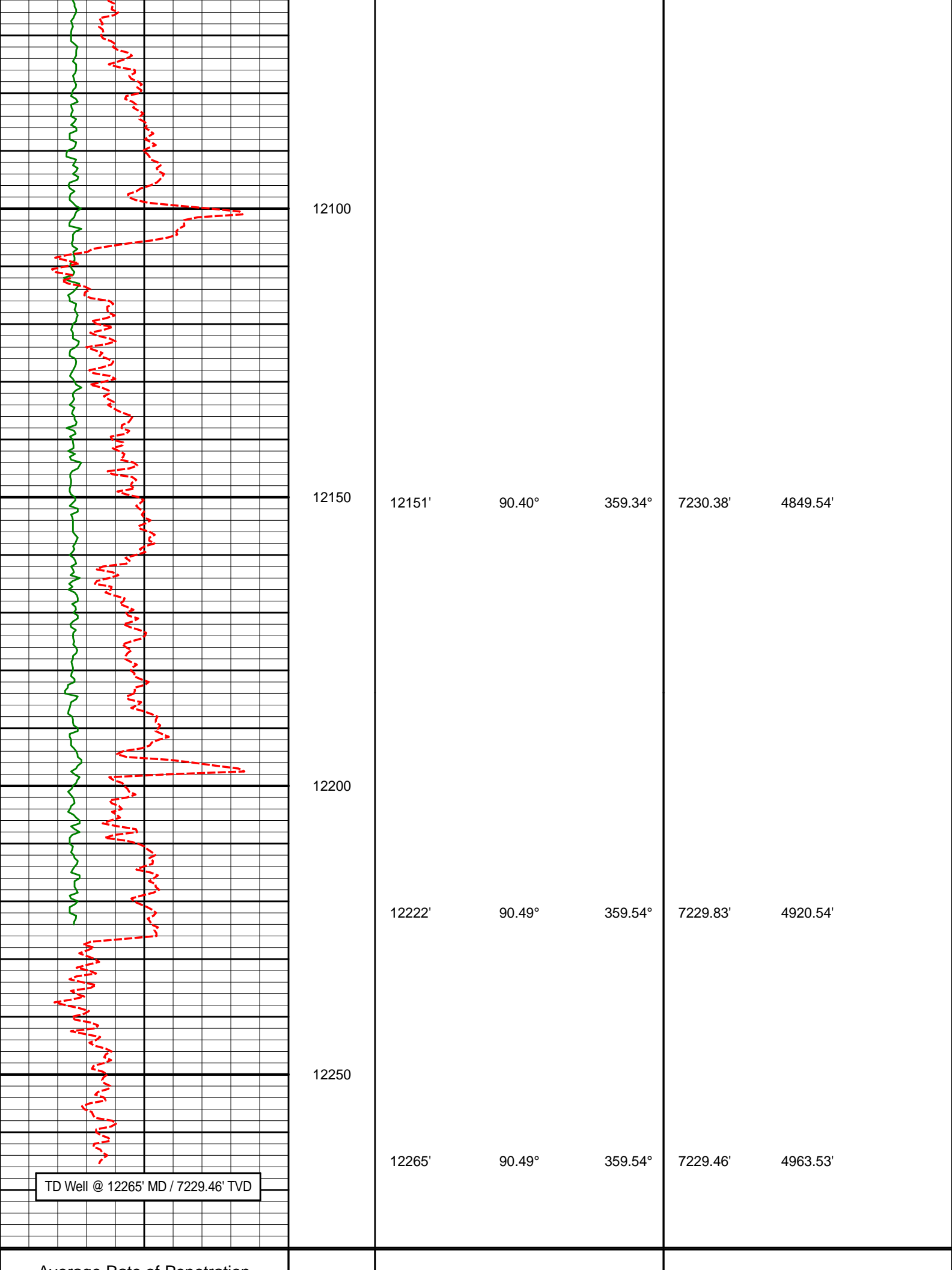
12056'

90.49°

358.45°

7231.12'

4754.55'



12100

12150

12200

12250

12151'

90.40°

359.34°

7230.38'

4849.54'

12222'

90.49°

359.54°

7229.83'

4920.54'

12265'

90.49°

359.54°

7229.46'

4963.53'

TD Well @ 12265' MD / 7229.46' TVD

Average Rate of Penetration

Average Rate of Penetration (ROPA) feet per hr	Depth				TVD	V/S	
500	0	Depth	Inc	Azi			
PCG Gamma Ray BCorr (PGRC) api							
0	300						

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation
Ferge 30N-14HZ
Wattenberg
Weld Colorado
USA
CA-XX-0901100809

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1140.00	0.61	33.08	1139.98	0.20 N	0.02 W	0.20	TIE-IN
1285.00	0.19	285.65	1284.98	0.91 N	0.17 E	0.91	0.48
1380.00	0.36	300.86	1379.98	1.11 N	0.24 W	1.11	0.19
1474.00	0.19	34.63	1473.98	1.39 N	0.40 W	1.39	0.44
1665.00	3.56	279.93	1664.85	2.67 N	6.07 W	2.76	1.91
1759.00	6.39	274.17	1758.49	3.55 N	14.16 W	3.76	3.05
1853.00	8.66	277.44	1851.68	4.85 N	26.40 W	5.23	2.46
1948.00	10.55	269.66	1945.34	5.73 N	42.19 W	6.34	2.41
2136.00	14.00	260.37	2129.04	1.82 N	81.83 W	3.00	2.11
2230.00	15.24	253.53	2220.00	3.59 S	104.89 W	-2.07	2.26
2324.00	15.72	250.97	2310.59	11.24 S	128.78 W	-9.38	0.89
2418.00	14.57	247.93	2401.32	19.84 S	151.78 W	-17.64	1.49
2512.00	13.27	243.85	2492.56	29.04 S	172.42 W	-26.53	1.73
2607.00	14.83	244.61	2584.72	39.05 S	193.19 W	-36.25	1.65
2701.00	14.74	246.08	2675.61	49.06 S	214.99 W	-45.94	0.41
2795.00	16.08	247.27	2766.23	58.94 S	237.93 W	-55.49	1.46
2889.00	17.09	247.76	2856.31	69.20 S	262.72 W	-65.38	1.08
2983.00	17.87	248.01	2945.97	79.83 S	288.88 W	-75.63	0.83
3077.00	16.66	246.19	3035.74	90.67 S	314.58 W	-86.10	1.41
3172.00	14.98	244.80	3127.13	101.39 S	338.15 W	-96.48	1.81
3266.00	14.27	243.09	3218.09	111.81 S	359.47 W	-106.59	0.88
3360.00	12.41	239.77	3309.55	122.14 S	378.53 W	-116.64	2.14
3455.00	11.86	246.13	3402.43	131.23 S	396.28 W	-125.47	1.52
3550.00	11.75	251.70	3495.42	138.22 S	414.39 W	-132.20	1.20
3645.00	12.17	259.02	3588.37	143.16 S	433.41 W	-136.87	1.66
3740.00	13.78	256.86	3680.94	147.64 S	454.26 W	-141.05	1.77
3836.00	14.71	254.15	3773.99	153.57 S	477.12 W	-146.64	1.19
3931.00	13.20	252.84	3866.18	160.06 S	499.09 W	-152.82	1.62
4026.00	14.86	253.35	3958.34	166.76 S	521.12 W	-159.19	1.75
4121.00	14.61	254.78	4050.22	173.39 S	544.35 W	-165.49	0.46
4248.00	14.01	252.30	4173.28	182.27 S	574.46 W	-173.93	0.68
4311.00	12.94	252.42	4234.55	186.72 S	588.45 W	-178.18	1.70
4406.00	11.61	249.17	4327.37	193.33 S	607.52 W	-184.51	1.58
4501.00	10.92	250.14	4420.54	199.79 S	624.92 W	-190.71	0.75
4597.00	10.22	249.74	4514.91	205.83 S	641.46 W	-196.51	0.73
4692.00	8.72	246.16	4608.62	211.66 S	655.96 W	-202.13	1.70
4787.00	7.03	240.57	4702.72	217.42 S	667.61 W	-207.73	1.95
4882.00	3.71	227.23	4797.29	222.37 S	674.93 W	-212.57	3.71
4977.00	2.75	224.14	4892.14	226.09 S	678.77 W	-216.24	1.03
5072.00	2.11	255.59	4987.06	228.16 S	682.05 W	-218.26	1.53
5168.00	1.87	253.17	5083.00	229.06 S	685.26 W	-219.10	0.26
5263.00	0.86	329.98	5177.98	228.89 S	687.10 W	-218.91	1.97
5358.00	1.21	326.28	5272.96	227.44 S	688.02 W	-217.44	0.37
5453.00	0.81	162.32	5367.96	227.24 S	688.37 W	-217.25	2.11
5580.00	0.58	154.37	5494.95	228.68 S	687.82 W	-218.69	0.20
5643.00	0.43	274.53	5557.95	228.94 S	687.92 W	-218.96	1.39
5739.00	0.57	294.15	5653.94	228.72 S	688.71 W	-218.72	0.23

5834.00	0.83	290.36	5748.93	228.29 S	689.79 W	-218.27	0.28
5929.00	0.86	267.74	5843.92	228.08 S	691.15 W	-218.04	0.35
6024.00	0.89	281.82	5938.91	227.95 S	692.58 W	-217.90	0.23
6119.00	1.11	250.63	6033.90	228.11 S	694.17 W	-218.03	0.61
6246.00	0.34	255.29	6160.89	228.61 S	695.70 W	-218.51	0.61
6309.00	0.28	2.83	6223.89	228.51 S	695.87 W	-218.40	0.80
6404.00	0.57	326.10	6318.89	227.88 S	696.12 W	-217.77	0.40
6500.00	0.86	246.24	6414.88	227.78 S	697.05 W	-217.65	0.98
6595.00	1.91	254.22	6509.85	228.49 S	699.22 W	-218.34	1.12
6690.00	1.43	246.45	6604.81	229.40 S	701.83 W	-219.21	0.56
6738.00	1.43	276.53	6652.80	229.57 S	702.98 W	-219.36	1.55
6785.00	3.74	349.11	6699.75	228.00 S	703.85 W	-217.78	7.62
6833.00	7.11	1.59	6747.53	223.49 S	704.06 W	-213.26	7.40
6880.00	11.38	7.95	6793.91	215.98 S	703.34 W	-205.77	9.33
6928.00	16.23	7.57	6840.51	204.64 S	701.80 W	-194.45	10.11
6975.00	20.61	6.65	6885.09	189.90 S	699.98 W	-179.74	9.34
7023.00	25.60	6.86	6929.23	171.20 S	697.76 W	-161.08	10.40
7070.00	30.49	6.82	6970.70	149.27 S	695.13 W	-139.19	10.40
7118.00	35.92	6.86	7010.85	123.18 S	692.00 W	-113.14	11.31
7165.00	41.59	6.29	7047.48	93.96 S	688.64 W	-83.98	12.09
7213.00	47.82	3.05	7081.59	60.33 S	685.95 W	-50.39	13.82
7260.00	53.35	0.73	7111.42	24.06 S	684.78 W	-14.14	12.37
7308.00	57.98	1.21	7138.49	15.56 N	684.10 W	25.47	9.68
7355.00	61.30	359.53	7162.24	56.11 N	683.85 W	66.01	7.71
7403.00	66.17	359.68	7183.47	99.14 N	684.15 W	109.04	10.15
7450.00	71.92	359.17	7200.27	143.01 N	684.59 W	152.91	12.28
7498.00	76.54	0.10	7213.32	189.19 N	684.88 W	199.09	9.80
7545.00	81.71	0.82	7222.18	235.33 N	684.51 W	245.22	11.10
7608.00	85.71	1.61	7229.08	297.92 N	683.18 W	307.78	6.47
7680.00	89.63	1.06	7232.01	369.83 N	681.50 W	379.66	5.50
7776.00	88.74	0.26	7233.38	465.81 N	680.40 W	475.62	1.25
7870.00	88.15	359.47	7235.93	559.77 N	680.62 W	569.57	1.05
7966.00	88.12	359.22	7239.05	655.71 N	681.71 W	665.52	0.26
8061.00	87.87	359.13	7242.37	750.65 N	683.08 W	760.46	0.28
8156.00	88.37	358.42	7245.49	845.57 N	685.11 W	855.41	0.91
8251.00	89.35	358.48	7247.38	940.52 N	687.68 W	950.38	1.03
8346.00	89.23	357.94	7248.56	1035.46 N	690.65 W	1045.36	0.58
8441.00	88.98	357.60	7250.04	1130.38 N	694.34 W	1140.32	0.44
8536.00	90.37	357.94	7250.58	1225.30 N	698.04 W	1235.29	1.51
8632.00	89.91	357.65	7250.35	1321.23 N	701.73 W	1331.26	0.57
8727.00	90.59	357.84	7249.94	1416.16 N	705.47 W	1426.23	0.74
8822.00	90.22	358.64	7249.28	1511.11 N	708.39 W	1521.21	0.93
8917.00	89.48	359.52	7249.53	1606.10 N	709.91 W	1616.21	1.21
9012.00	89.35	359.40	7250.50	1701.09 N	710.80 W	1711.21	0.18
9107.00	90.25	358.92	7250.83	1796.07 N	712.19 W	1806.20	1.07
9202.00	90.06	358.62	7250.58	1891.05 N	714.22 W	1901.20	0.37
9298.00	90.43	358.90	7250.17	1987.03 N	716.30 W	1997.20	0.48
9393.00	90.74	358.75	7249.19	2082.00 N	718.24 W	2092.19	0.36
9488.00	90.95	358.30	7247.79	2176.96 N	720.68 W	2187.17	0.52
9583.00	90.37	358.44	7246.69	2271.92 N	723.38 W	2282.16	0.63
9678.00	90.12	358.37	7246.28	2366.88 N	726.03 W	2377.15	0.27
9773.00	89.85	357.89	7246.31	2461.83 N	729.13 W	2472.13	0.58
9868.00	89.35	358.71	7246.97	2556.78 N	731.95 W	2567.12	1.01
9964.00	90.09	359.92	7247.44	2652.77 N	733.09 W	2663.11	1.48
10059.00	90.00	359.81	7247.36	2747.77 N	733.31 W	2758.11	0.15
10154.00	89.60	358.96	7247.69	2842.76 N	734.33 W	2853.10	0.99
10249.00	89.75	359.97	7248.23	2937.76 N	735.22 W	2948.10	1.08
10344.00	90.77	359.92	7247.80	3032.76 N	735.31 W	3043.09	1.08
10534.00	91.66	359.59	7243.77	3222.71 N	736.13 W	3233.03	0.50
10630.00	91.29	358.70	7241.29	3318.66 N	737.56 W	3329.00	1.01
10725.00	90.90	357.36	7239.47	3413.59 N	740.82 W	3423.96	1.47
10820.00	89.54	358.51	7239.11	3508.52 N	744.25 W	3518.94	1.87
10915.00	89.11	358.25	7240.24	3603.48 N	746.93 W	3613.92	0.53
11010.00	89.94	359.28	7241.03	3698.45 N	748.98 W	3708.91	1.39
11201.00	89.01	357.53	7242.77	3889.36 N	754.29 W	3899.88	1.04
11296.00	90.99	358.02	7242.77	3984.28 N	757.98 W	3994.84	2.14
11391.00	90.56	356.77	7241.49	4079.17 N	762.30 W	4089.79	1.39
11486.00	91.60	0.64	7239.70	4174.11 N	764.44 W	4184.75	4.22
11581.00	91.60	0.86	7237.05	4269.07 N	763.19 W	4279.68	0.23
11676.00	91.42	0.24	7234.55	4364.03 N	762.28 W	4374.61	0.69
11771.00	91.33	359.80	7232.27	4459.00 N	762.25 W	4469.58	0.47
11866.00	89.42	358.21	7231.66	4553.98 N	763.89 W	4564.57	2.62
11961.00	90.37	358.44	7231.84	4648.94 N	766.67 W	4659.56	1.03
12056.00	90.49	358.45	7231.12	4743.90 N	769.25 W	4754.55	0.13
12151.00	90.40	358.24	7230.28	4838.88 N	771.08 W	4849.54	0.04

12151.00	90.40	359.34	7230.38	4838.88 N	771.08 W	4849.34	0.94
12222.00	90.49	359.54	7229.83	4909.87 N	771.77 W	4920.54	0.32
12265.00	90.49	359.54	7229.46	4952.87 N	772.12 W	4963.53	0.01

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 359.17 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.51 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12265.00 FEET
IS 5012.69 FEET ALONG 351.14 DEGREES (TRUE)**

All directional surveys tied on to the last gyro survey at 1140' MD. Final survey is a straight-line projection to the bit.

Date Printed:30 March 2014