

## PCGK - Pressure Case Gamma



1 : 240

Country	: USA
Field	: Wattenburg
Location	: Lat: 40° 11' 24.70" North Long: 104° 41' 1.96" West
Well	: RW 36N-32HZ
Company	: Anadarko Petroleum
Rig	: PD 464
LOCATION	
Latitude : 40° 11' 24.70" North Longitude : 104° 41' 1.96" West UTM Easting = 1,728,701.194 usft UTM Northing = 14,596,148.763 usft	Company : Anadarko Petroleum Rig : PD 464 Well : RW 36N-32HZ Field : Wattenburg Country : USA API Number : 05-123-44753
Other Services Directional Drilling	

## WELL INFORMATION

MWD Run Number	100				
Date run completed	01-Sep-17				
Rig Bit Number	2				
Bit Size (in)	7.875				
Tool Nominal OD (in)	6.750				
Log Start Depth (MD, ft)	1,878.00				
Log End Depth (MD, ft)	13,054.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	28-Aug-17 17:00				
Drill/Wipe End Date and Time	31-Aug-17 23:00				
Min Inc (deg) @ Depth (MD, ft)	0.57 @ 6,079.00				
Max Inc (deg) @ Depth (MD, ft)	92.47 @ 10,378.00				
Bit TFA(in2) / Bit Type	0.91 / PDC				
Flow Rate (gpm)	580.38				
Max AV (fpm) / CV (fpm) @ MWD	N/A				
Fluid Type	Diesel Mud Base				
Density (ppg) / Viscosity (spqt)	9.25 / 54.00				
Filtrate CL (ppm)	56.00				
pH / API Filtrate (mptm)	N/A / 4				
PV (cP) / YP (lbf/ft <sup>2</sup> )	17 / 10.00				
% Solids / % Sand	8 / 0				
% Oil / Oil:Water Ratio	69.00 / 77:23				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (in 5' Log)	217.72 / 220.1				

Max Tool Temp (degF) / Source	247.78 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 247.78				
Lead MWD Engineer	Brian Neu				
Customer Representative	Luke Rains				

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11382329				
Insert Serial Number	11680814				
Date and Time Initialized	27-Aug-17 20:48				
Date and Time Read	01-Sep-17 06:50				
ECMB SW Version	N/A				

### Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	43.00				
Software Version	6.33				
Sub Serial Number	11382329				
Sonde Serial Number	11478128				
Sensor ID Number	N/A				
Toolface Offset (deg)	231.80				

### Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	45.54				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11382329				
Insert/Sonde Serial Number	11680983				

## REMARKS

1. All depths are measured depths, referenced to the Driller's pipe tally and are measured from the drill floor, 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 following smoothing parameters have been applied to the data:

PGRC (Gamma Ray Corrected):

Interval Resolution: 0.5ft

Interval Distance: 0.6ft

Gap Fill: 3.0ft

ROPA (Average Rate of Penetration):

Interval Resolution: 0.5ft

Interval Distance: 1.2ft

Gap Fill: 3.0ft

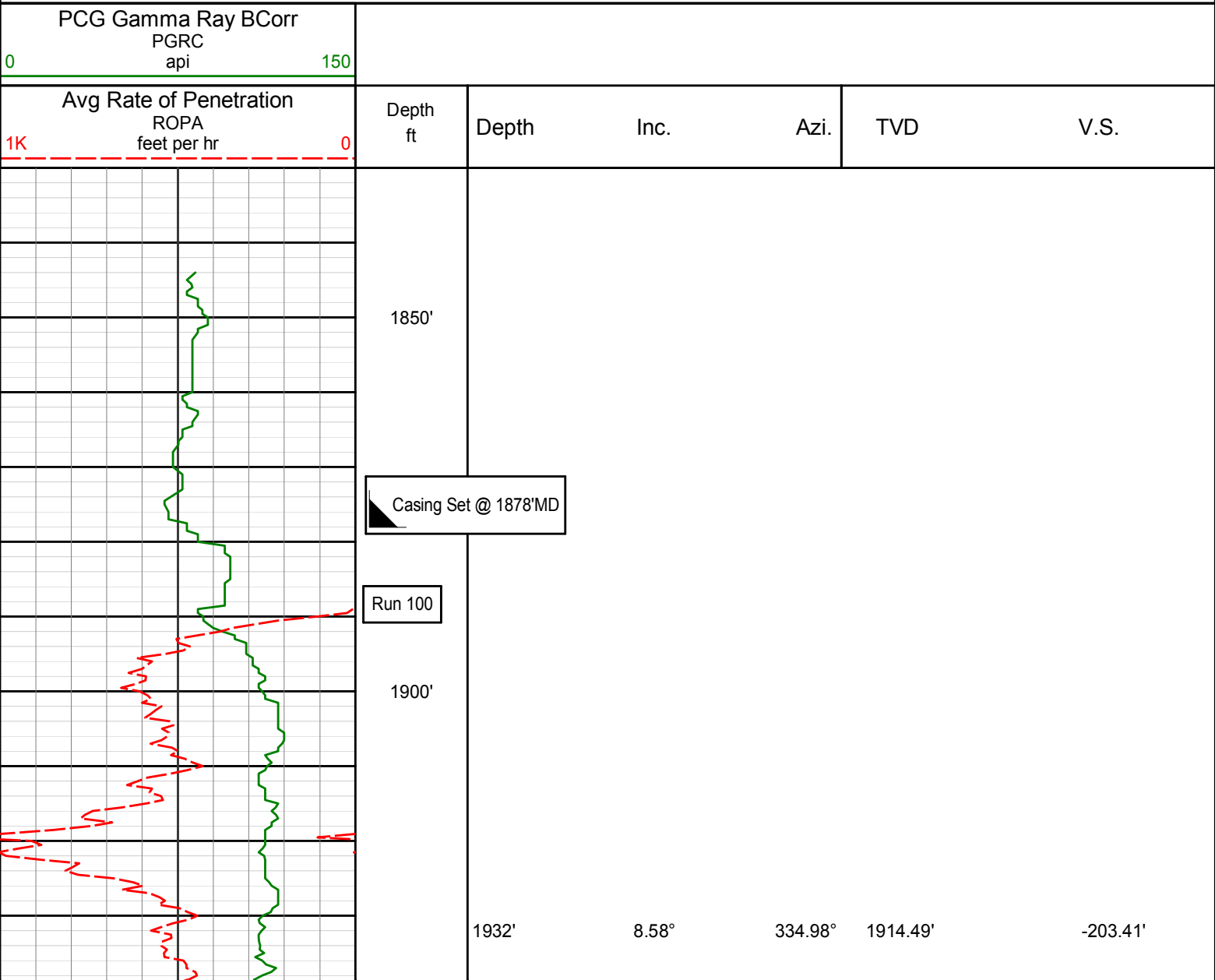
5. Gap in gamma due to ROP at connection.

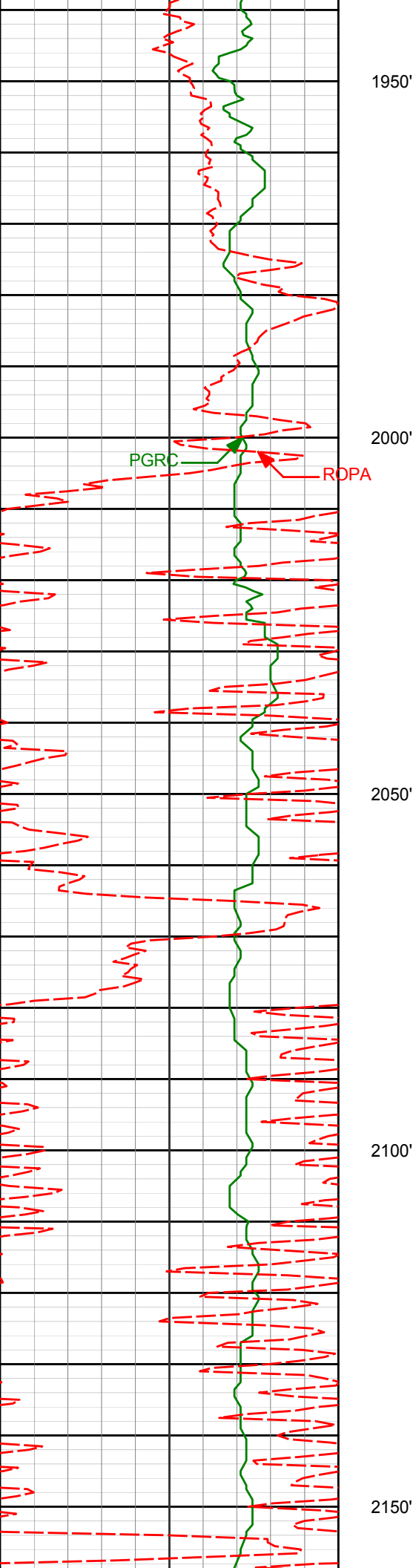
INSITE Version 8.5.2 -MLWD

WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

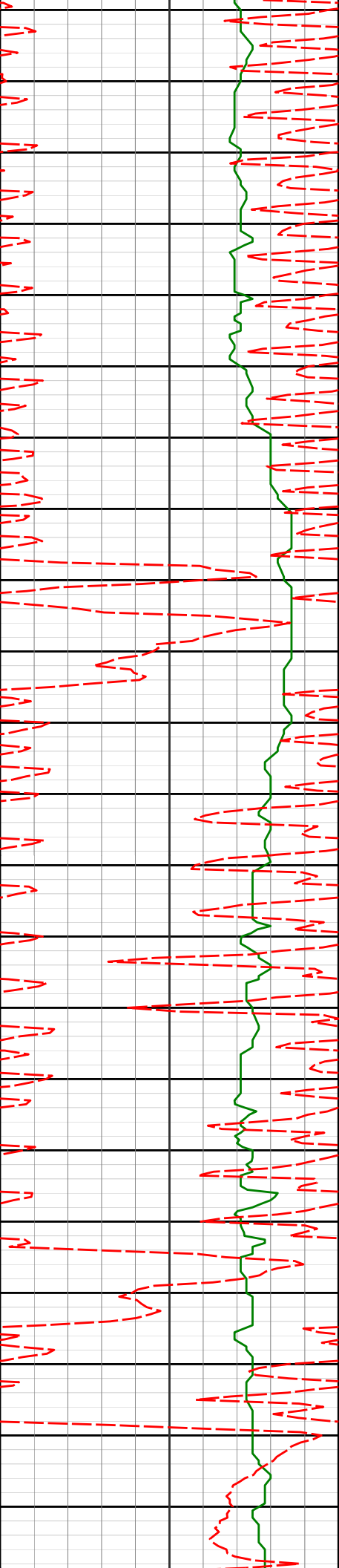
Detail Log 1:240





2021'	10.05°	338.96°	2002.32'	-216.67'
-------	--------	---------	----------	----------

2111'	10.18°	336.01°	2090.92'	-231.26'
-------	--------	---------	----------	----------



2200'

2200'

9.75°

334.04°

2178.58'

-245.21'

2250'

2290'

8.82°

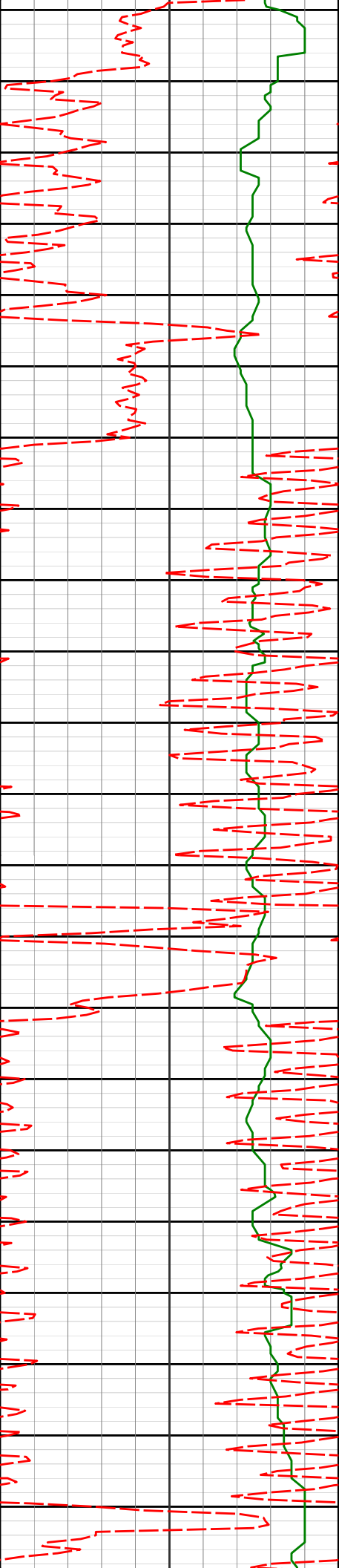
331.35°

2267.40'

-258.11'

2300'

2350'



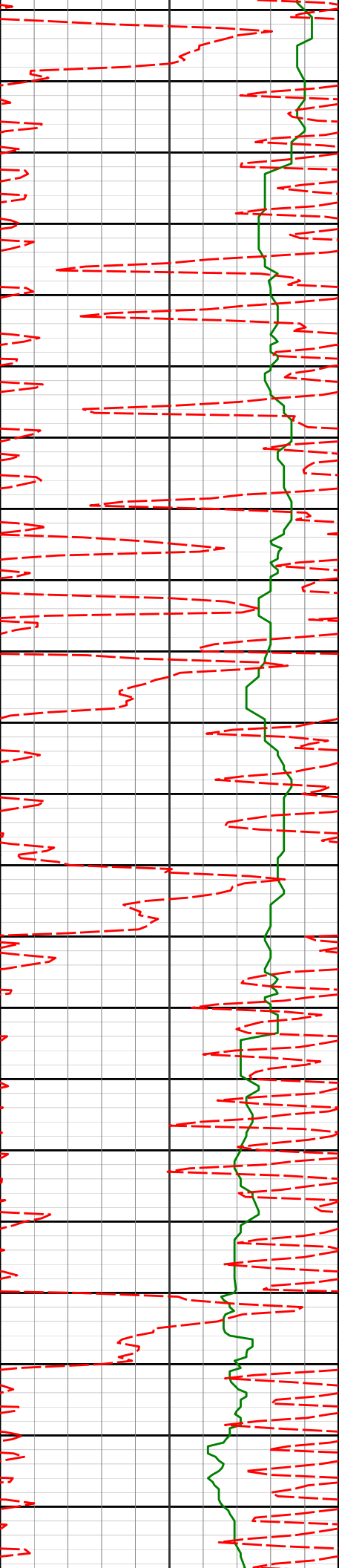
2400'

2450'

2500'

2550'

2379'	11.64°	340.08°	2354.98'	-272.54'
2469'	11.29°	335.49°	2443.18'	-289.09'
2558'	10.76°	330.90°	2530.54'	-304.27'



2600'

2650'

2700'

2750'

2800'

2648'

2738'

9.65°

8.94°

329.29°

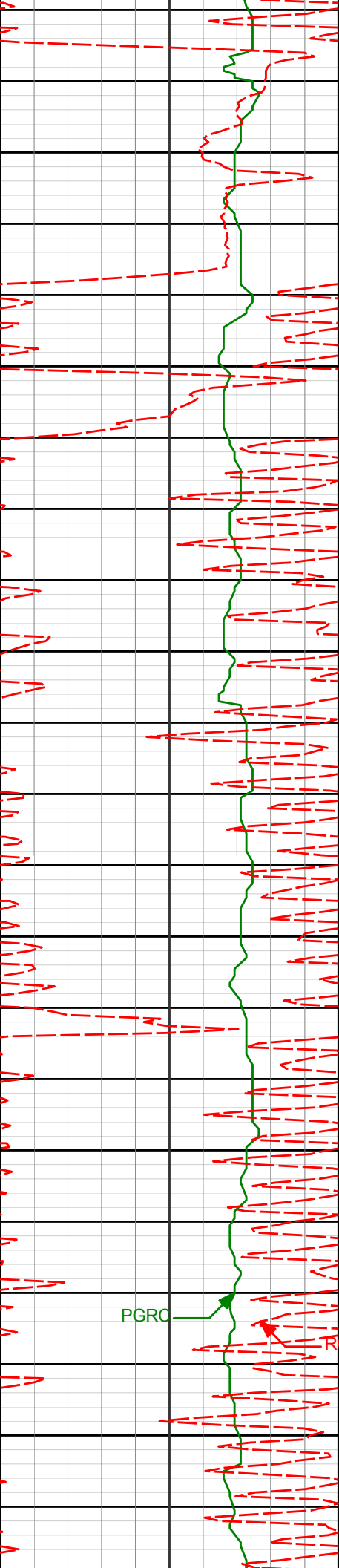
326.12°

2619.11'

2707.93'

-318.09'

-330.37'



2827'

10.39°

330.45°

2795.67'

-343.08'

2850'

2900'

2916'

11.24°

334.49°

2883.09'

-357.89'

2950'

3000'

PGRC

ROPA

3006'

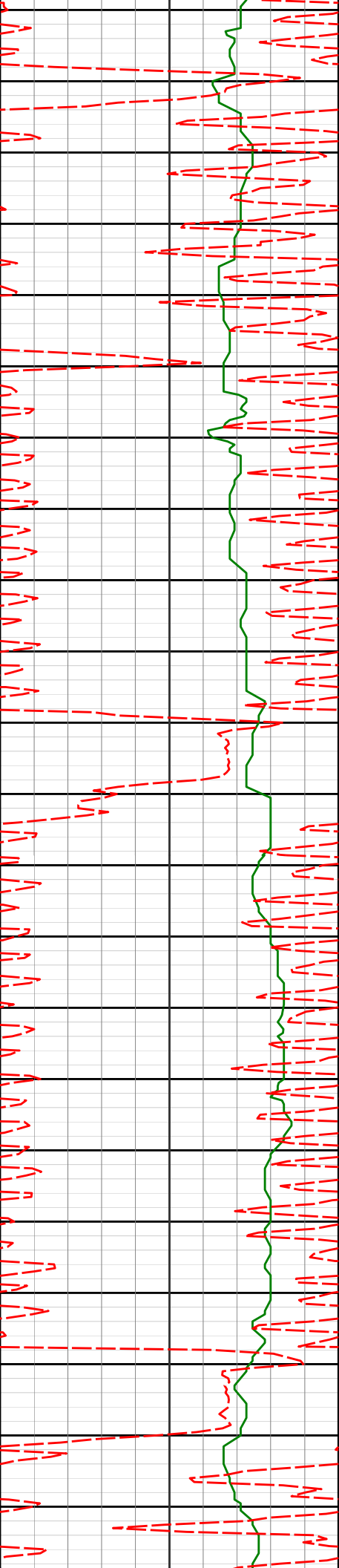
10.90°

332.28°

2971.41'

-373.32'





3050'

3096'

10.39°

331.56°

3059.86'

-387.98'

3100'

3150'

3185'

9.60°

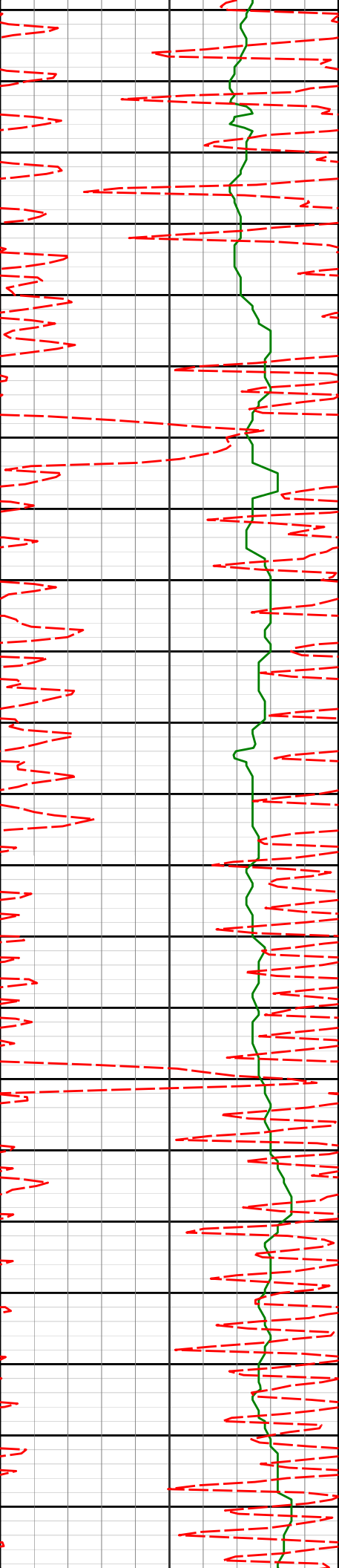
331.26°

3147.51'

-401.54'

3200'

3250'



3275'

8.75°

330.21°

3236.36'

-414.06'

3300'

3350'

3365'

8.10°

330.13°

3325.39'

-425.49'

3400'

3450'

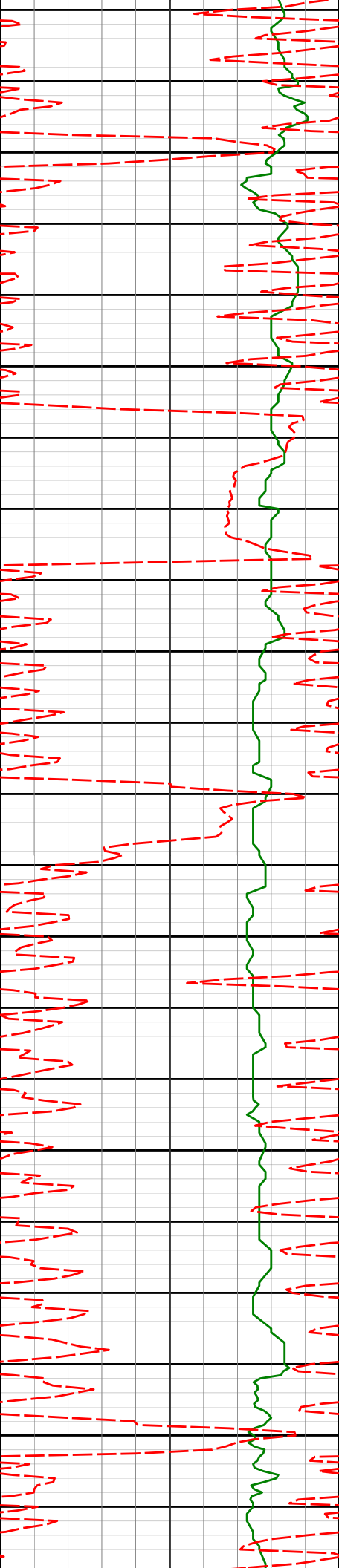
3454'

7.26°

332.45°

3413.59'

-435.91'



3500'

3544'

9.13°

329.38°

3502.66'

-447.10'

3550'

3600'

3633'

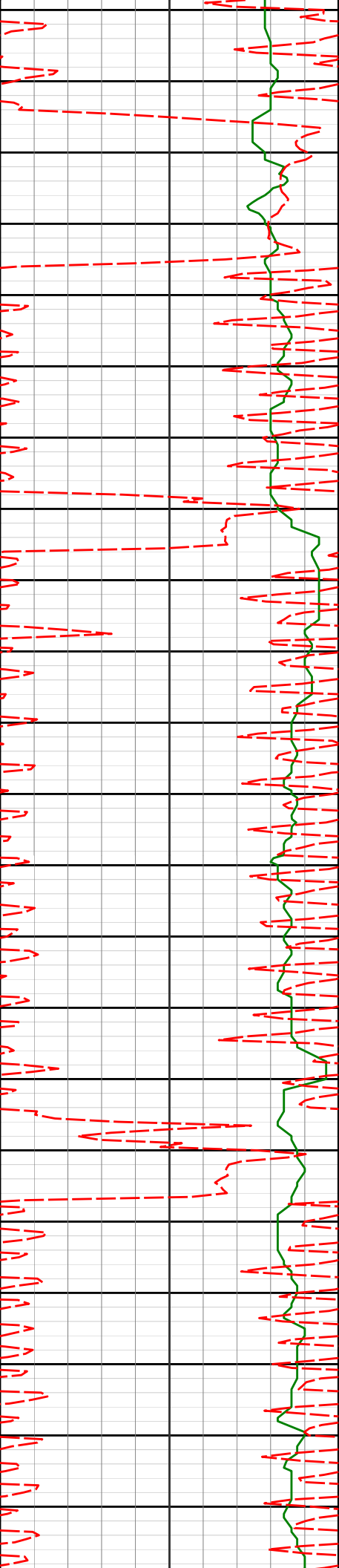
9.49°

330.79°

3590.49'

-459.57'

3650'



3723'

10.63°

335.30°

3679.11'

-473.59'

3750'

3800'

3813'

10.23°

335.00°

3767.62'

-488.37'

3850'

3900'

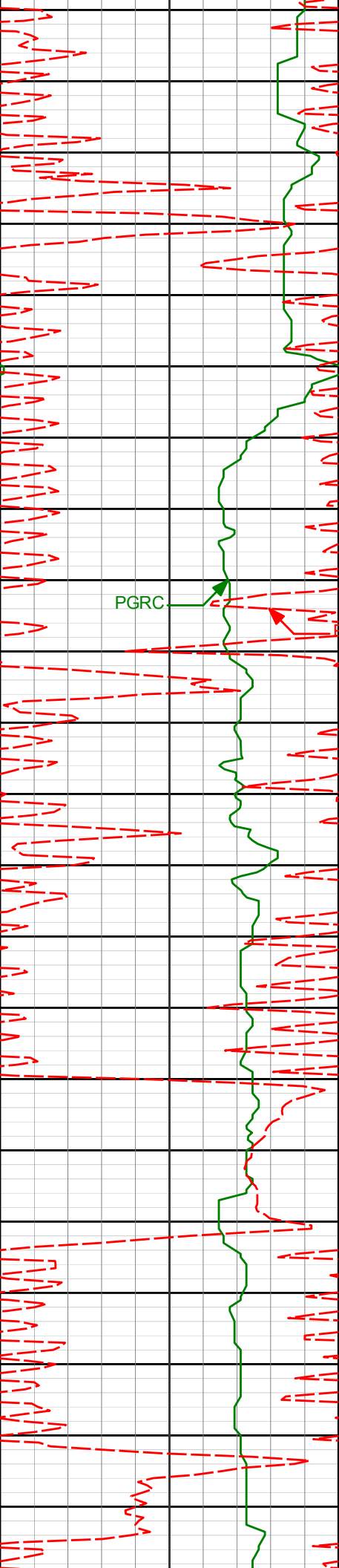
3902'

8.92°

334.06°

3855.38'

-501.73'



3950'

3992'

8.55°

332.11°

3944.33'

-513.91'

4000'

PGRC

ROPA

4050'

4081'

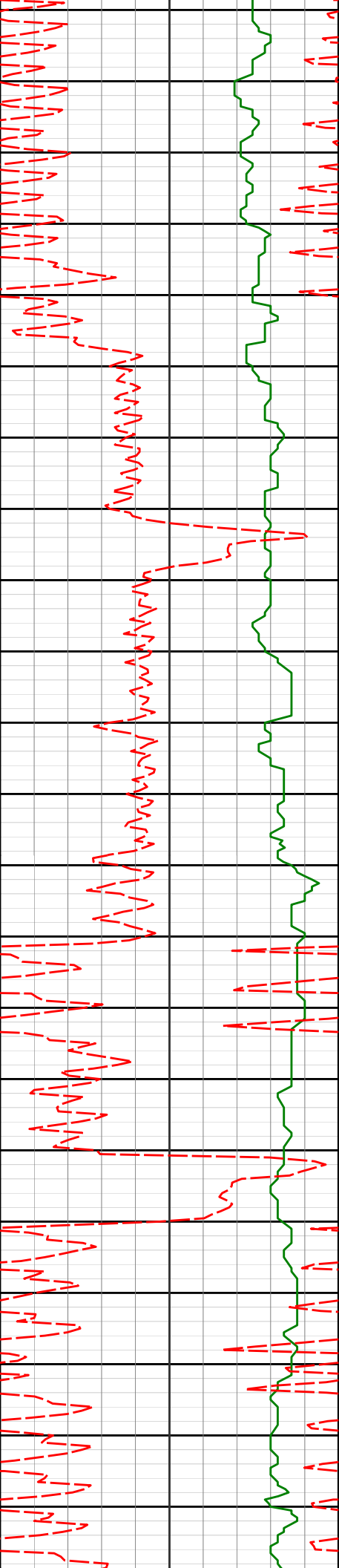
10.47°

337.50°

4032.11'

-527.22'

4100'



4150'

4171'

10.75°

339.57°

4120.57'

-542.63'

4200'

4250'

4260'

9.81°

336.65°

4208.14'

-557.36'

4300'

4350'

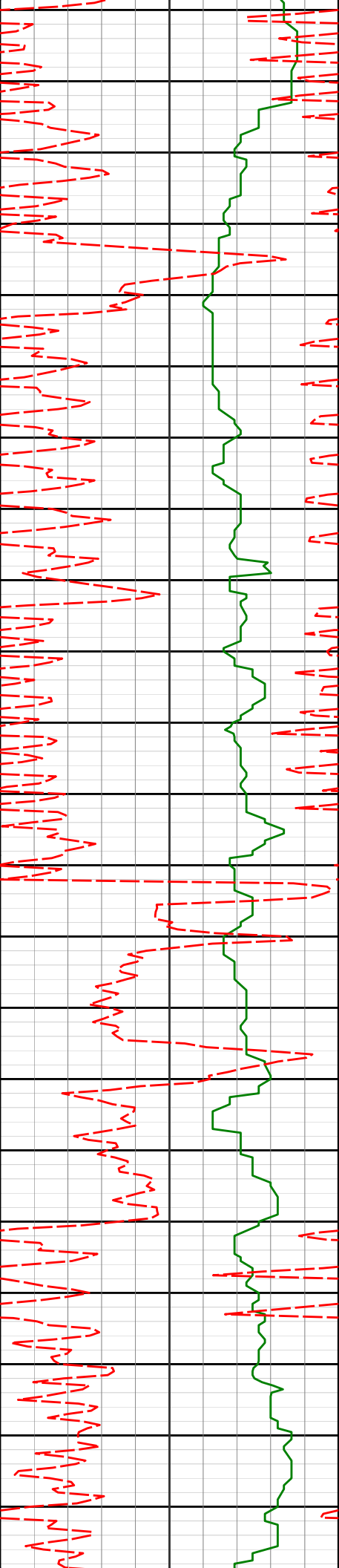
4350'

8.54°

335.28°

4296.99'

-570.47'



4400'

4450'

4500'

4550'

4464'

8.10°

332.39°

4409.79'

-585.27'

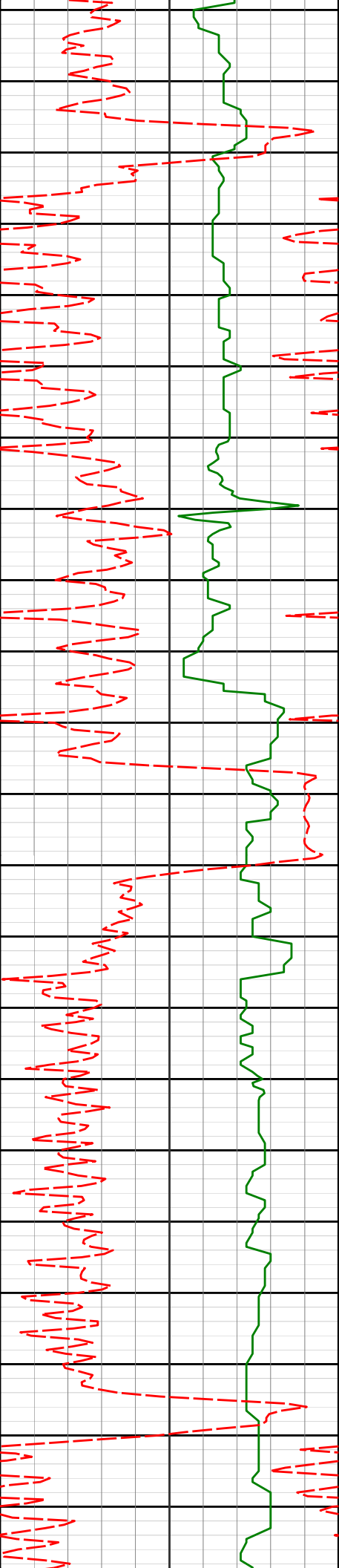
4554'

7.96°

332.91°

4498.90'

-596.43'



4600'

4643'

7.61°

333.52°

4587.08'

-607.18'

4650'

4700'

4733'

6.41°

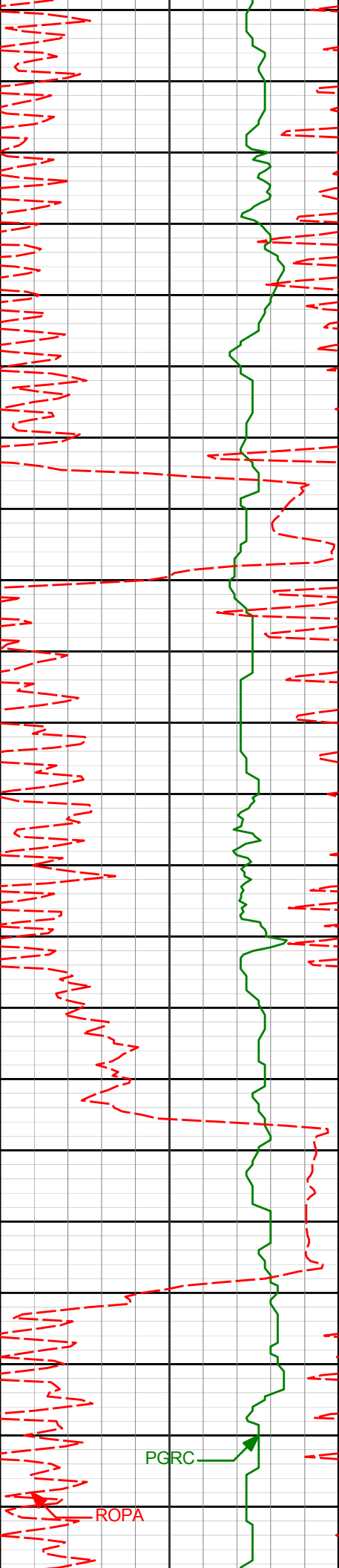
323.80°

4676.41'

-616.56'

4750'





4823' 5.56° 322.33° 4765.92' -624.06'

4850'

4900'

4912' 5.46° 331.10° 4854.51' -631.18'

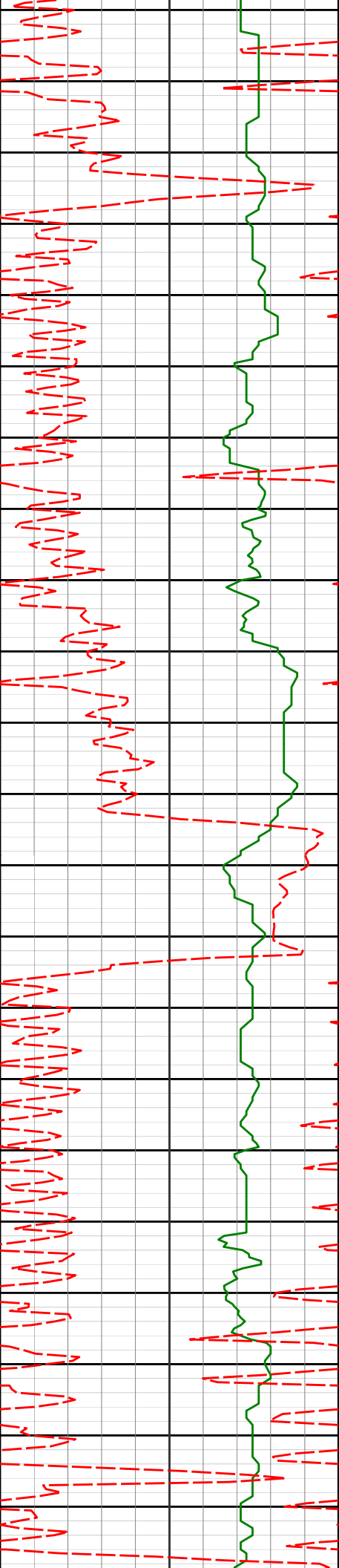
4950'

5000'

5002' 3.82° 356.17° 4944.22' -637.92'

PGRC

ROPA



5050'

5092'

3.72°

349.43°

5034.03'

-643.78'

5100'

5150'

5182'

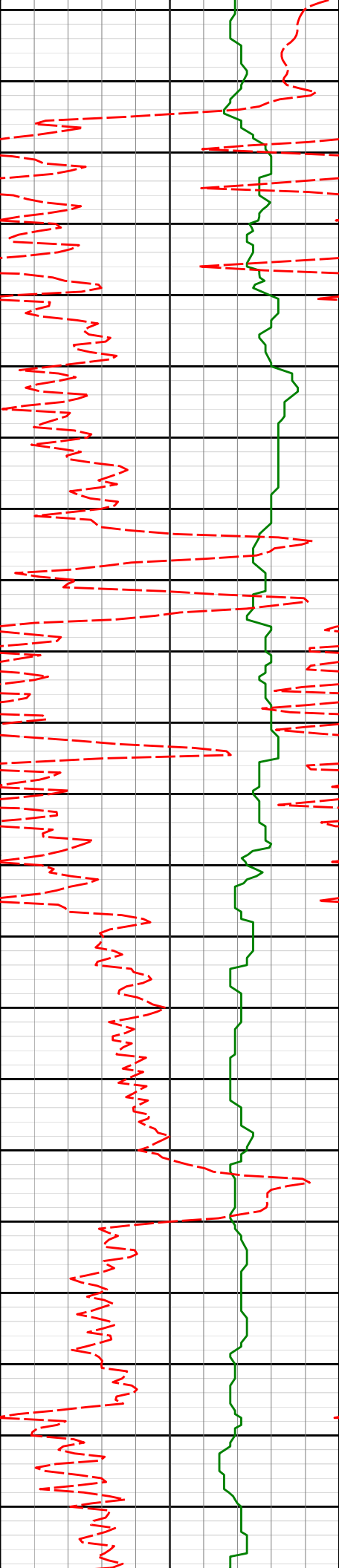
1.01°

341.94°

5123.94'

-647.40'

5200'



5250'

5271'

1.52°

193.53°

5212.93'

-647.00'

5300'

5350'

5361'

1.65°

192.88°

5302.90'

-644.57'

5400'

5450'

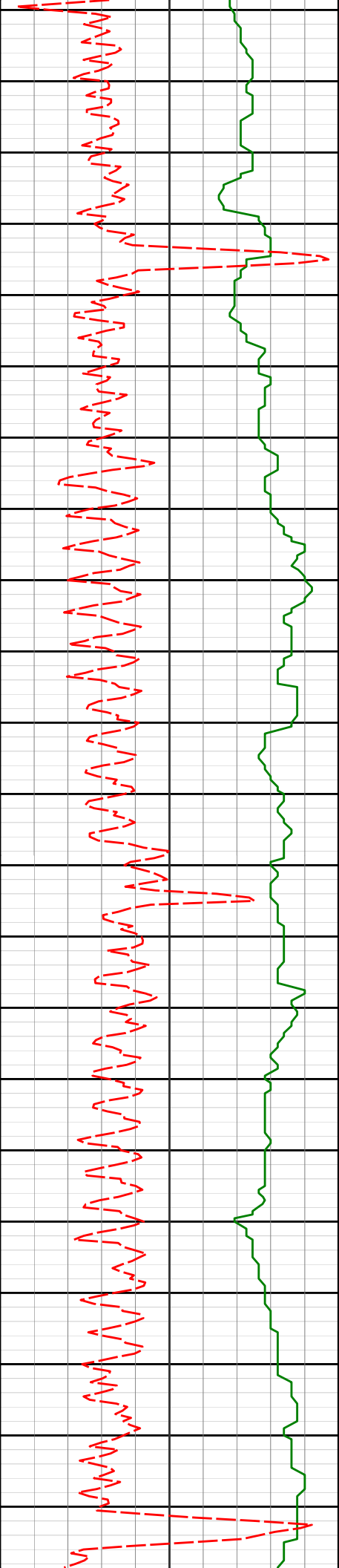
5451'

1.79°

193.08°

5392.86'

-641.93'



5500'

5540'

1.73°

207.78°

5481.82'

-639.39'

5550'

5600'

5630'

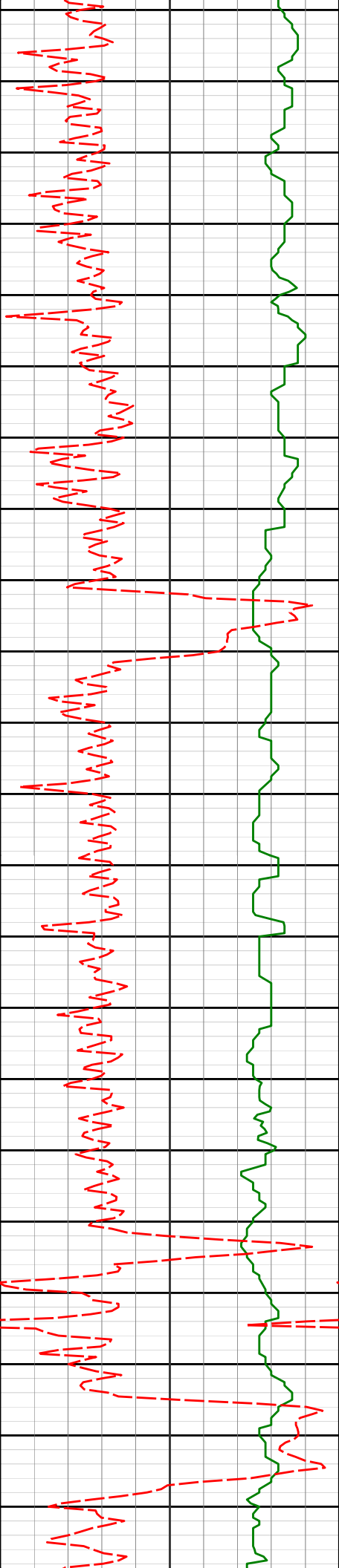
1.90°

216.75°

5571.77'

-637.00'

5650'



5700'

5720'

1.76°

196.51°

5661.73'

-634.48'

5750'

5800'

5810'

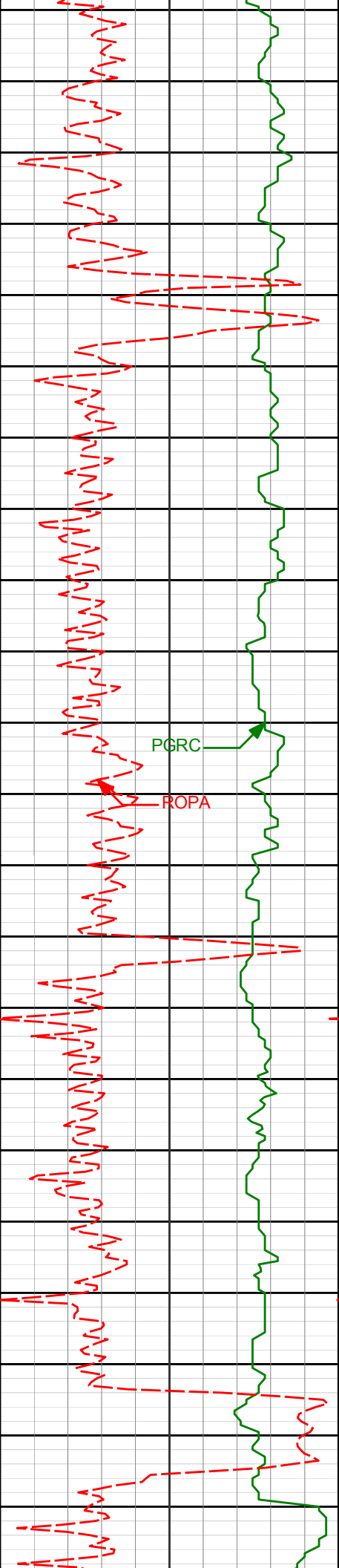
1.74°

195.56°

5751.69'

-631.84'

5850'



5900'

5950'

6000'

6050'

6100'

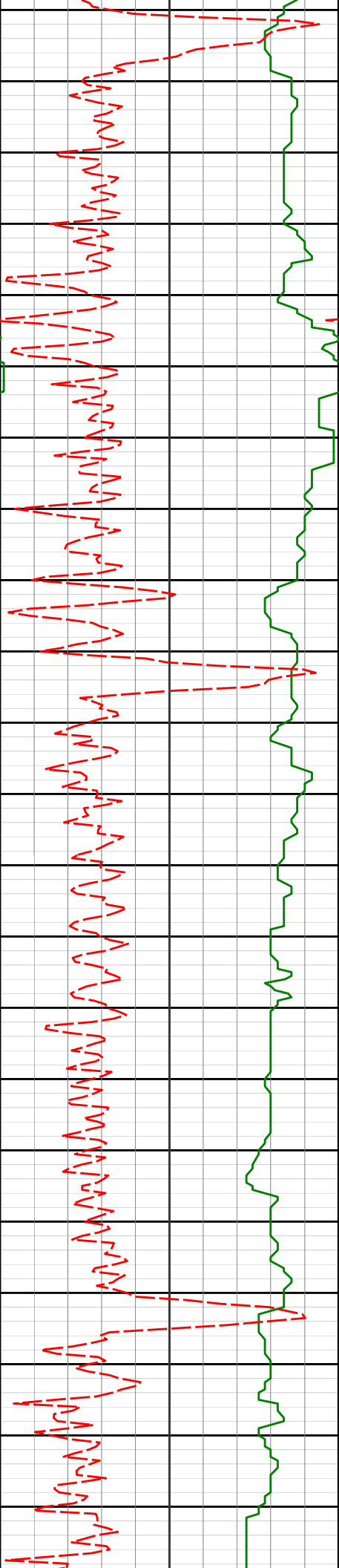
PGRC

ROPA

5899'	1.13°	126.90°	5840.66'	-630.01'
-------	-------	---------	----------	----------

5989'	1.16°	156.18°	5930.65'	-628.64'
-------	-------	---------	----------	----------

6079'	0.57°	153.55°	6020.64'	-627.41'
-------	-------	---------	----------	----------



6150'

6168'

1.05°

46.76°

6109.63'

-627.58'

6200'

6250'

6258'

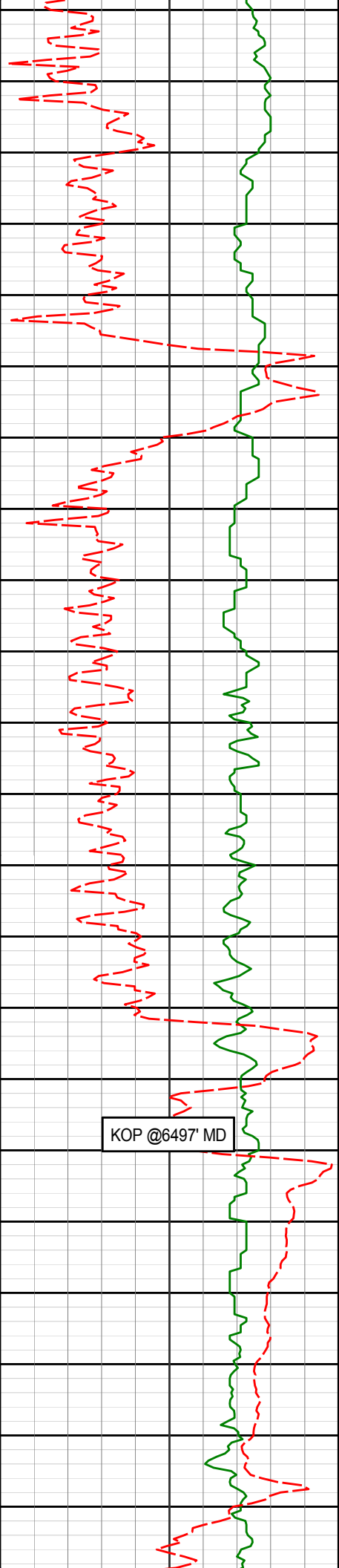
1.28°

2.97°

6199.61'

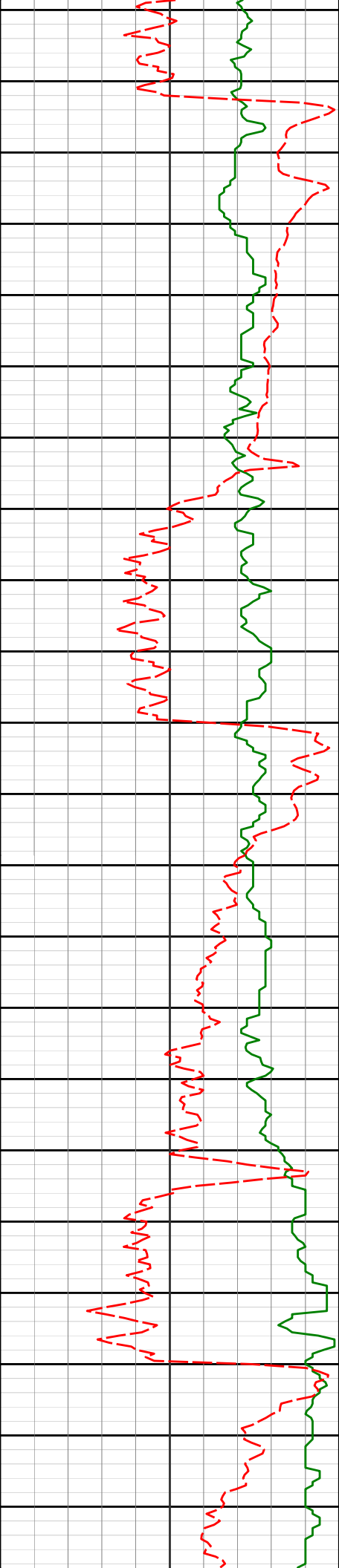
-629.14'

6300'



6350'	6348'	1.43°	334.40°	6289.59'	-631.16'
6400'					
6437'		1.55°	326.16°	6378.56'	-633.16'
6450'					
6500'					
6527'		4.69°	183.52°	6468.47'	-630.49'
6550'					





6600'

6617'

12.26°

188.34°

6557.43'

-617.34'

6650'

6700'

6706'

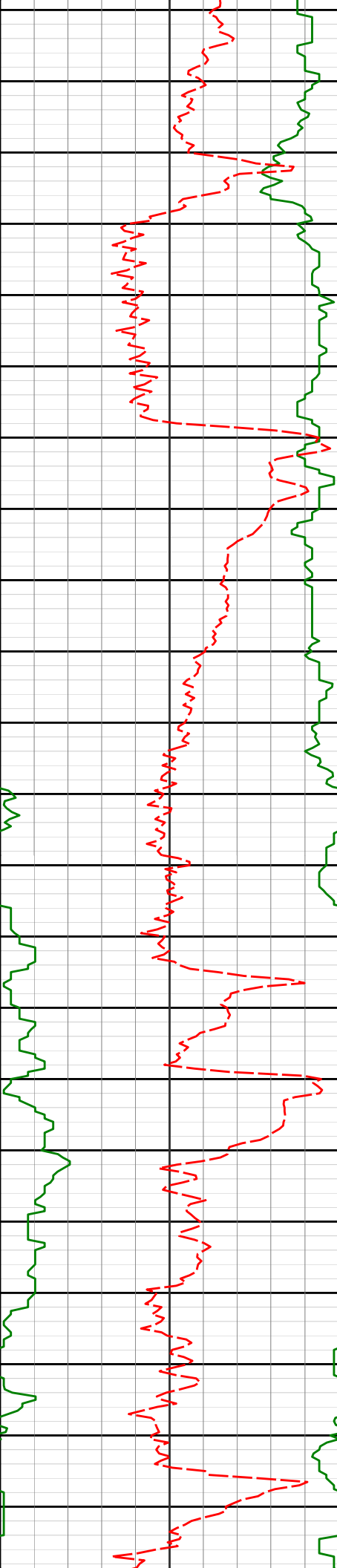
20.37°

177.52°

6642.79'

-592.47'

6750'



6800'

6850'

6900'

6950'

6796'

25.49°

181.43°

6725.66'

-557.45'

6886'

33.61°

179.97°

6803.89'

-513.10'

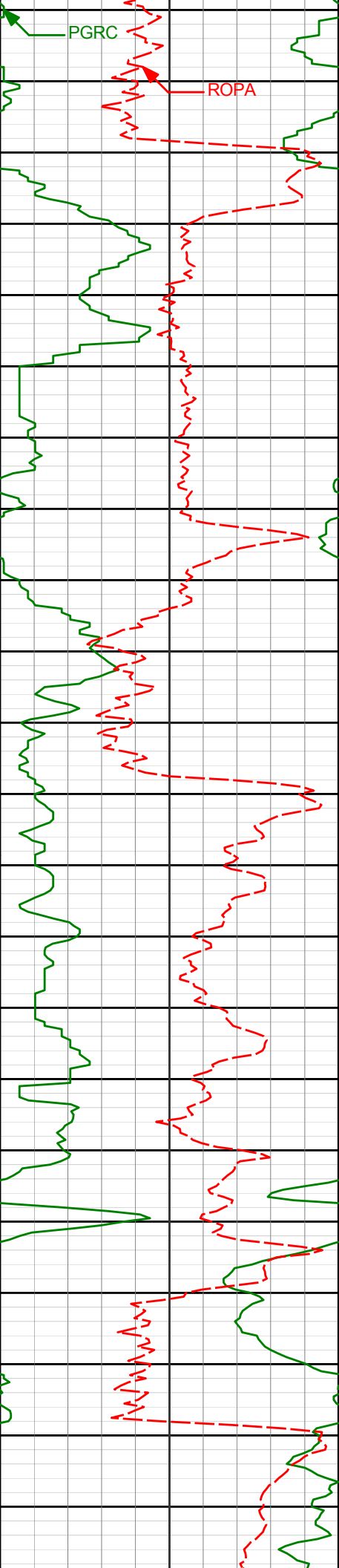
6976'

45.74°

178.73°

6873.04'

-455.76'



PGRC

ROPA

7065'

51.29°

181.30°

6931.97'

-389.13'

7050'

7100'

7150'

7155'

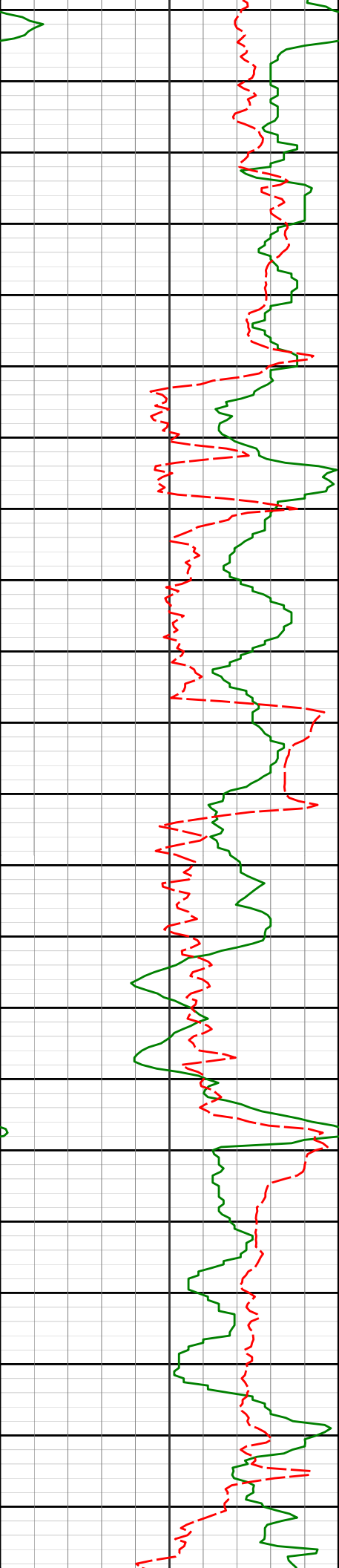
58.31°

177.12°

6983.83'

-315.67'

7200'



7250'

7300'

7350'

7400'

7244'

70.49°

176.02°

7022.22'

-235.71'

7334'

74.66°

177.67°

7049.17'

-150.00'

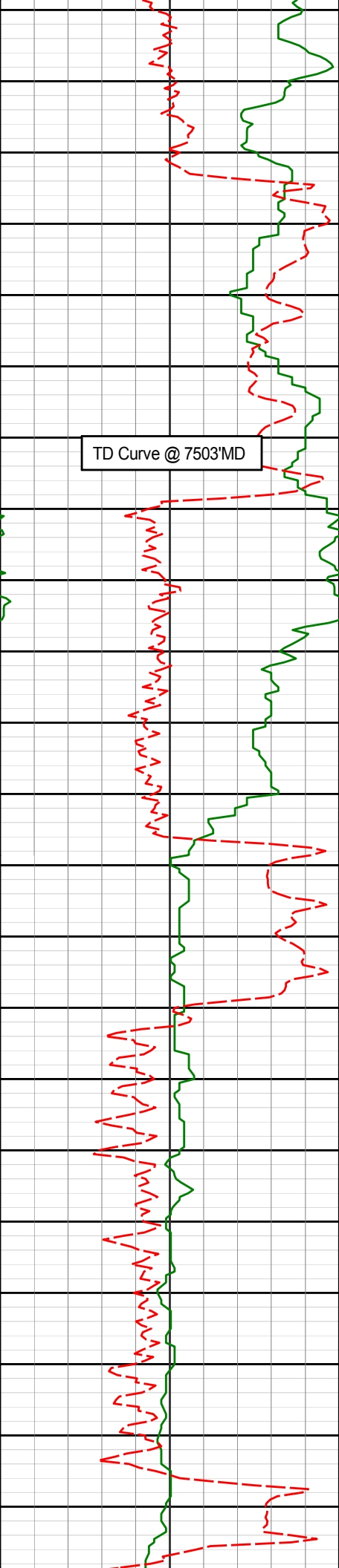
7424'

82.31°

180.40°

7067.13'

-61.90'



7450'

7500'

7550'

7600'

7650'

TD Curve @ 7503'MD

7514'

88.18°

181.70°

7074.58'

27.74'

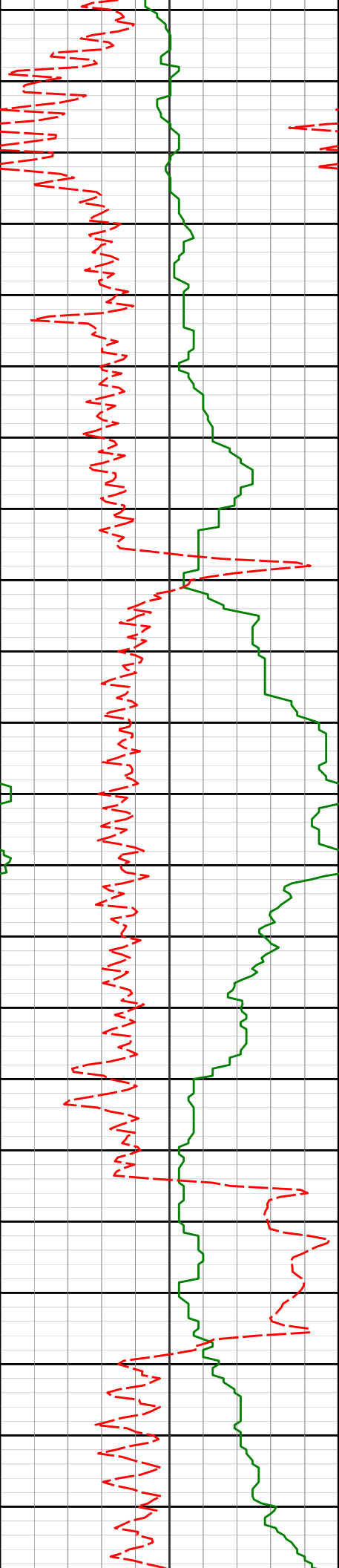
7603'

89.23°

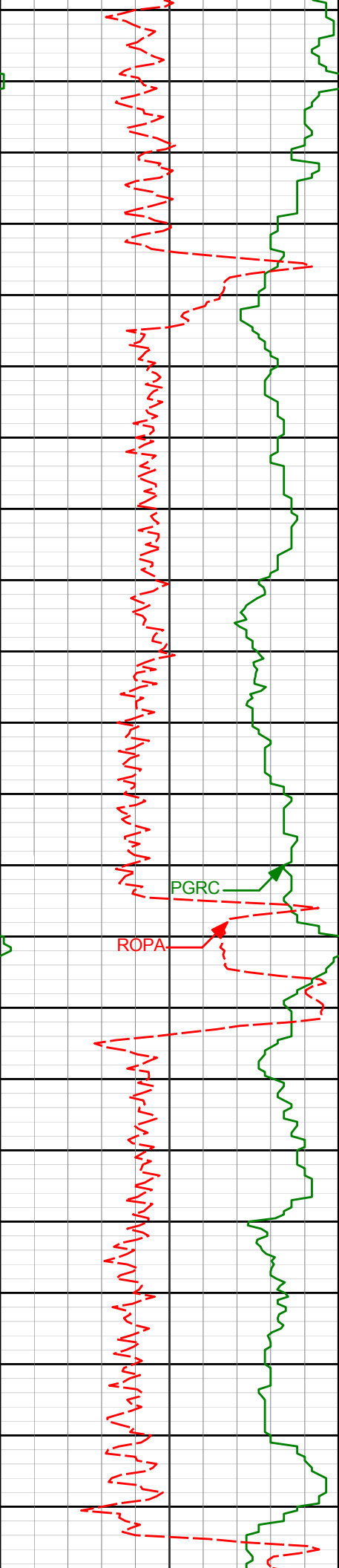
181.74°

7076.59'

116.68'



7692'	88.83°	181.18°	7078.10'	205.64'
7700'				
7750'				
7782'	88.46°	181.31°	7080.23'	295.60'
7800'				
7850'				
7872'	91.26°	181.90°	7080.44'	385.55'



7900'

7950'

7962'

91.54°

181.50°

7078.24'

475.49'

8000'

PGRC

ROPA

8050'

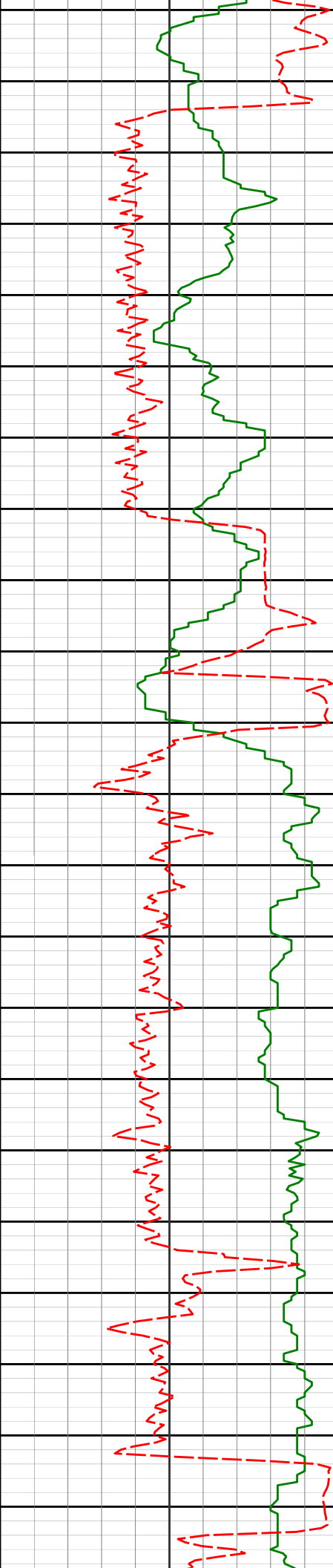
8051'

91.45°

181.28°

7075.92'

564.44'



8100'

8141'

91.02°

179.86°

7073.98'

654.41'

8150'

8200'

8231'

91.02°

180.07°

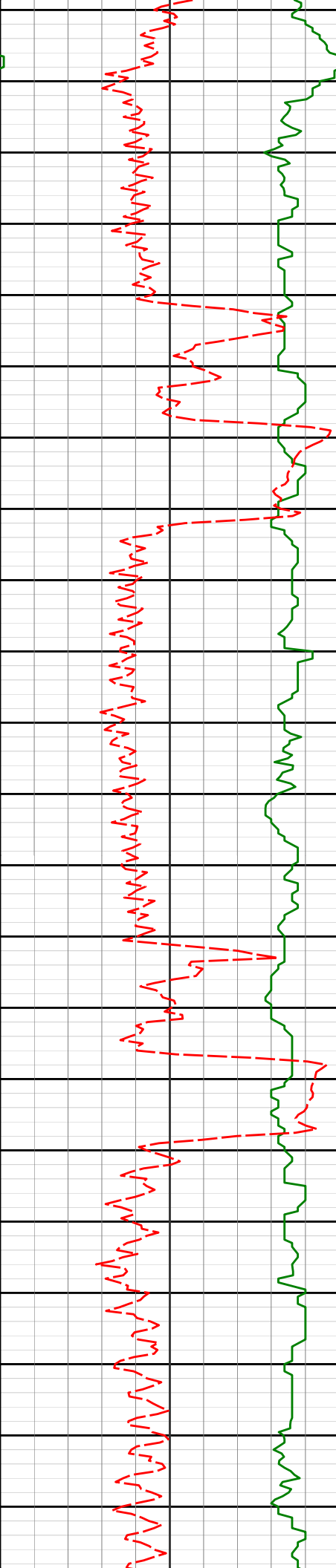
7072.39'

744.39'

8250'

8300'





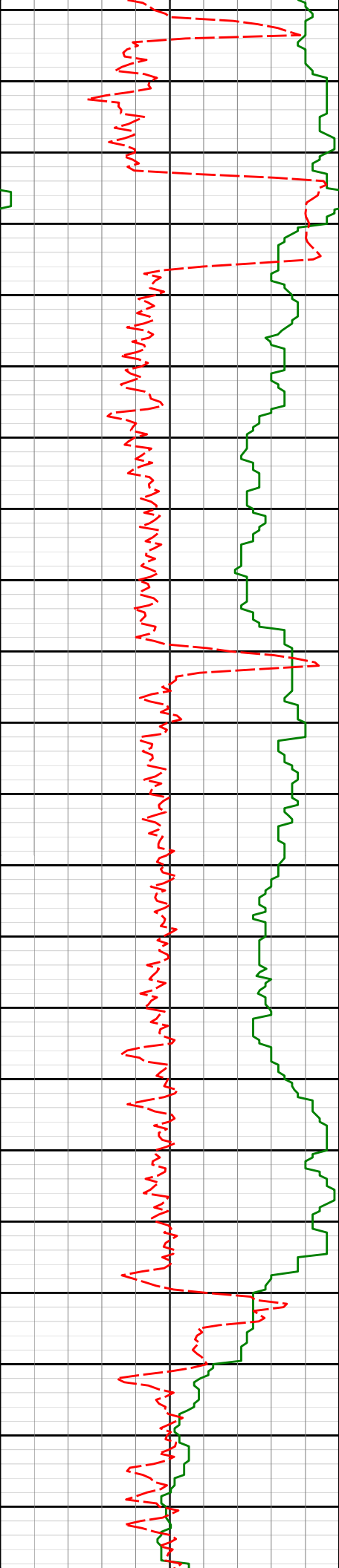
8350'

8400'

8450'

8500'

8320'	89.78°	179.53°	7071.76'	833.39'
8410'	89.23°	177.98°	7072.54'	923.36'
8499'	88.89°	179.21°	7074.00'	1012.32'



8550'

8589'

87.29°

179.62°

7077.00'

1102.26'

8600'

8650'

8679'

87.23°

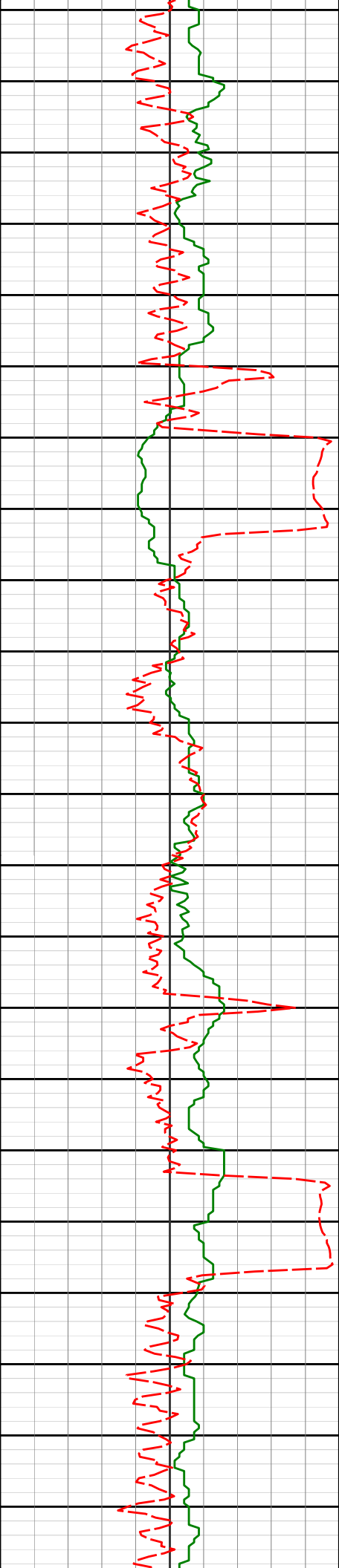
179.34°

7081.31'

1192.15'

8700'

8750'



8768'

86.82°

178.84°

7085.93'

1281.02'

8800'

8850'

8854'

88.46°

179.09°

7089.47'

1366.92'

8900'

8950'

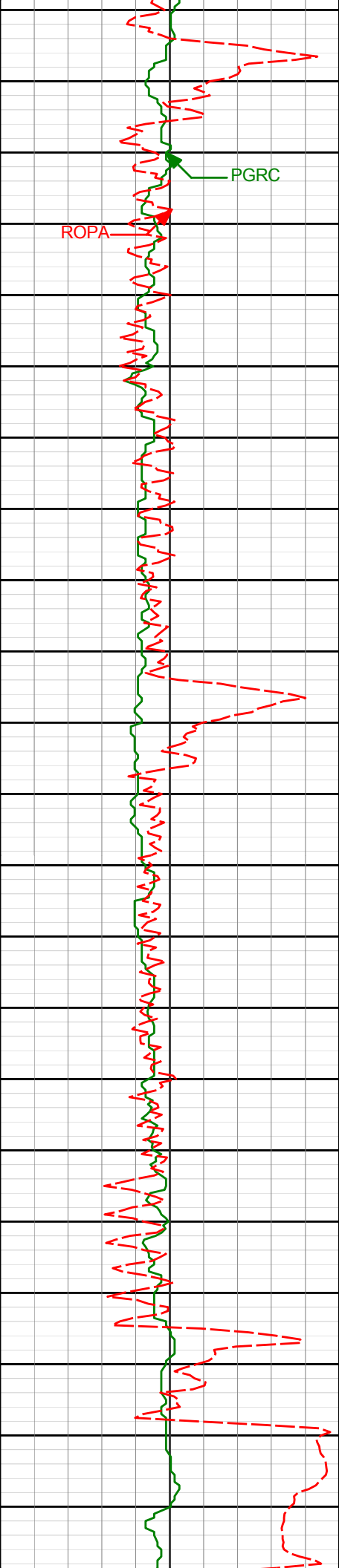
8944'

90.18°

178.79°

7090.53'

1456.90'



9034'

90.15°

177.91°

7090.27'

1546.85'

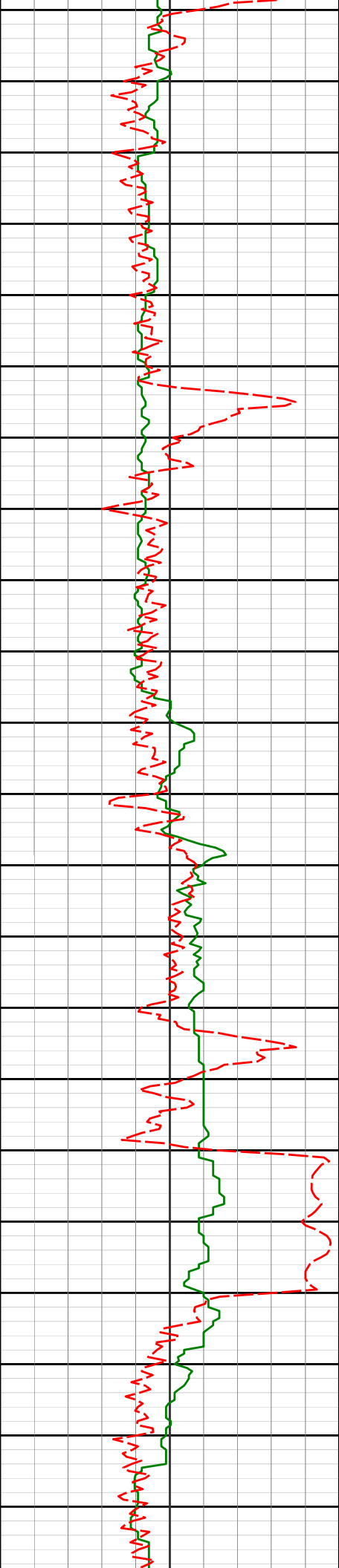
9123'

91.02°

177.47°

7089.36'

1635.77'



9200'

9213'

89.97°

179.50°

7088.58'

1725.73'

9250'

9300'

9303'

91.11°

179.59°

7087.73'

1815.72'

9350'

9400'

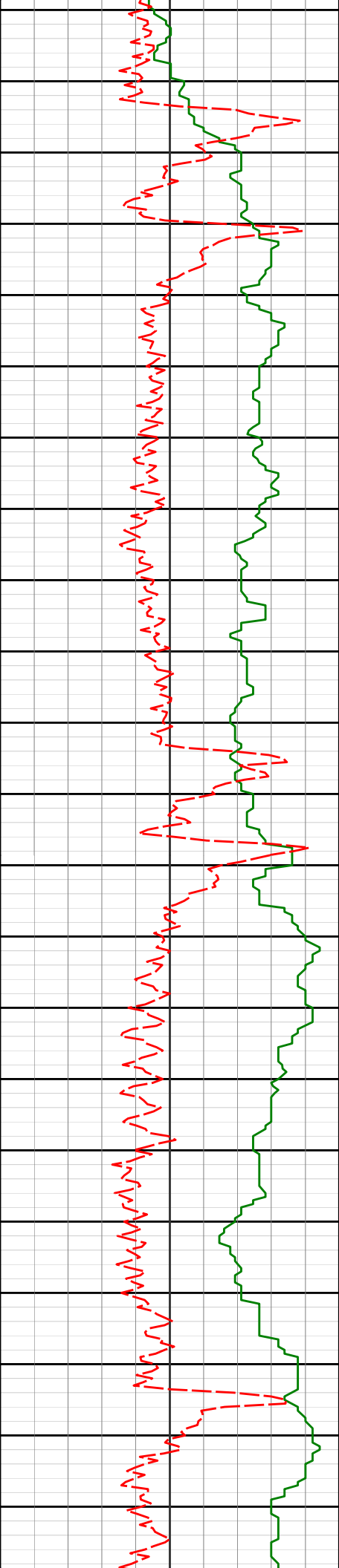
9392'

89.38°

180.30°

7087.35'

1904.71'



9450'

9482'

89.26°

179.64°

7088.42'

1994.71'

9500'

9550'

9571'

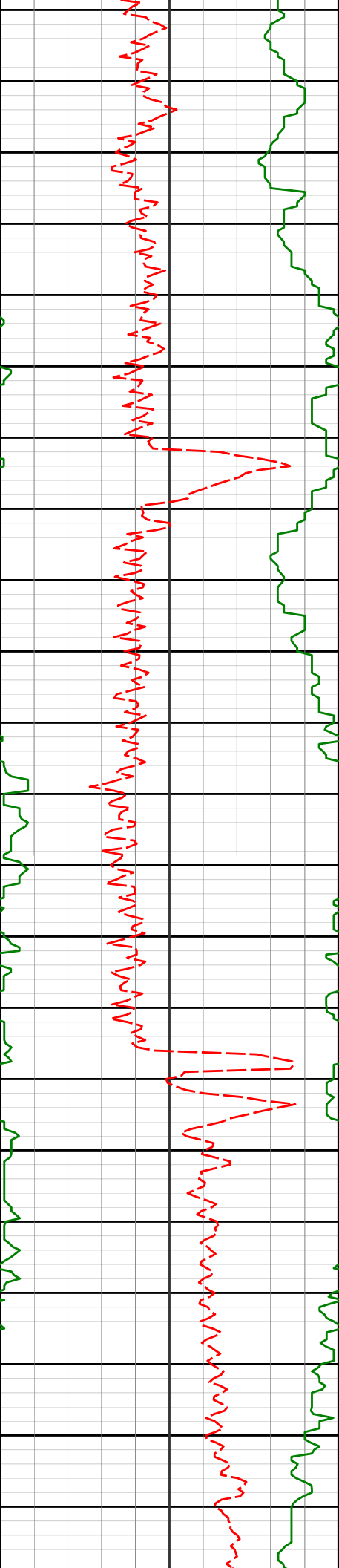
89.11°

179.61°

7089.69'

2083.70'

9600'



9650'

9661'

89.11°

179.66°

7091.09'

2173.68'

9700'

9750'

9751'

88.77°

179.62°

7092.76'

2263.66'

9800'

9840'

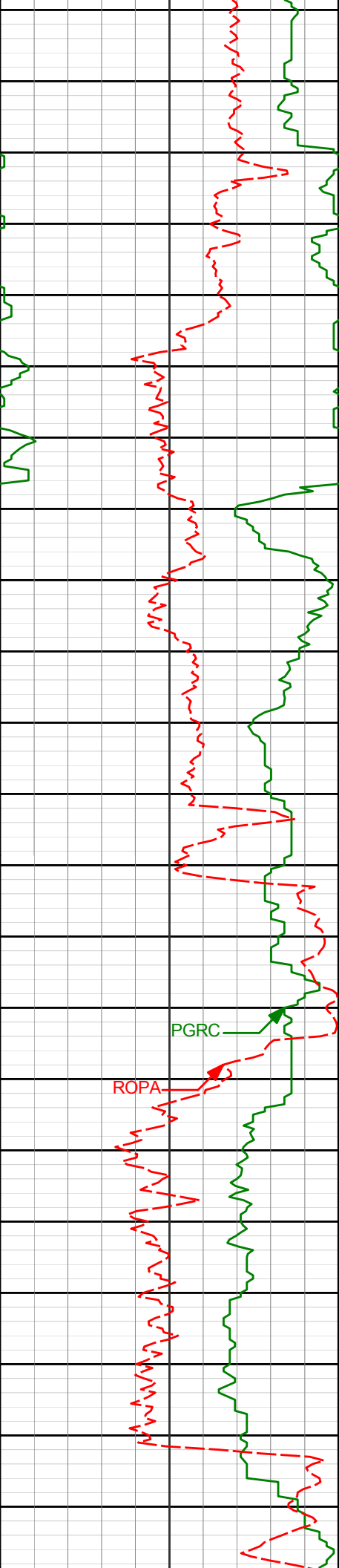
88.37°

179.23°

7094.98'

2352.63'

9850'



9900'

9930'

87.72°

178.87°

7098.06'

2442.56'

9950'

10000'

PGRC

ROPA

10020'

87.35°

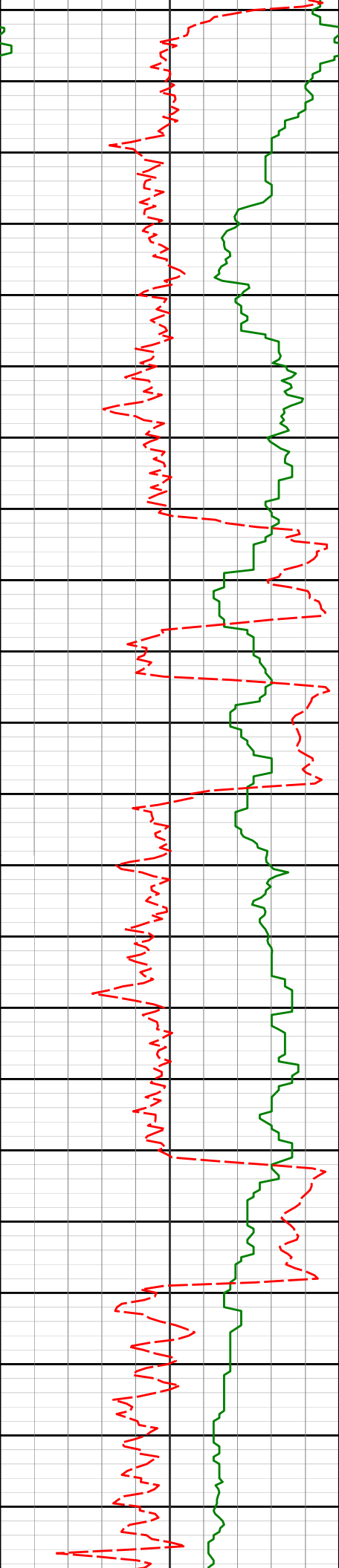
179.19°

7101.93'

2532.46'

10050'





10100'

10109'

88.83°

179.84°

7104.90'

2621.41'

10150'

10200'

10199'

89.48°

182.40°

7106.22'

2711.38'

10250'

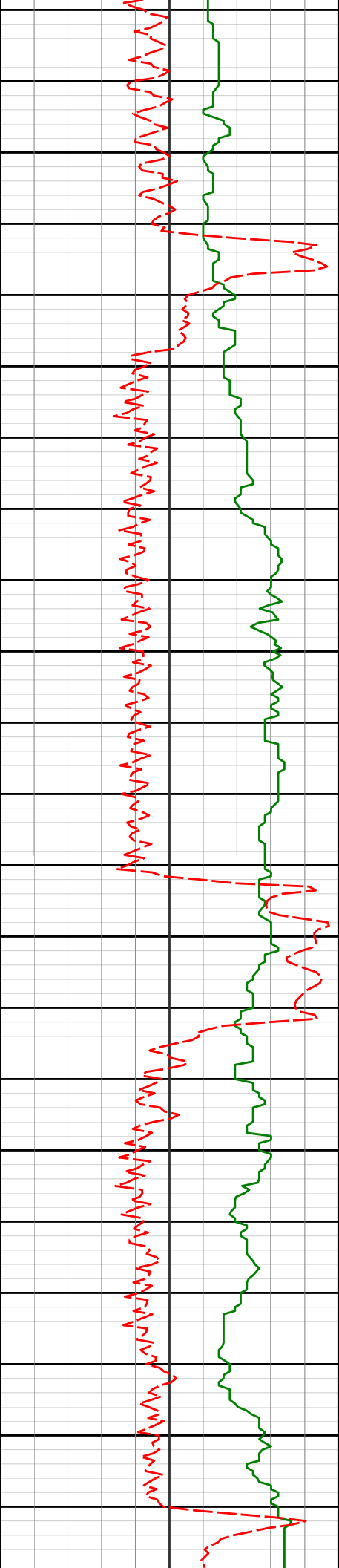
10288'

91.82°

184.41°

7105.22'

2800.21'



10378'

92.47°

185.00°

7101.86'

2889.85'

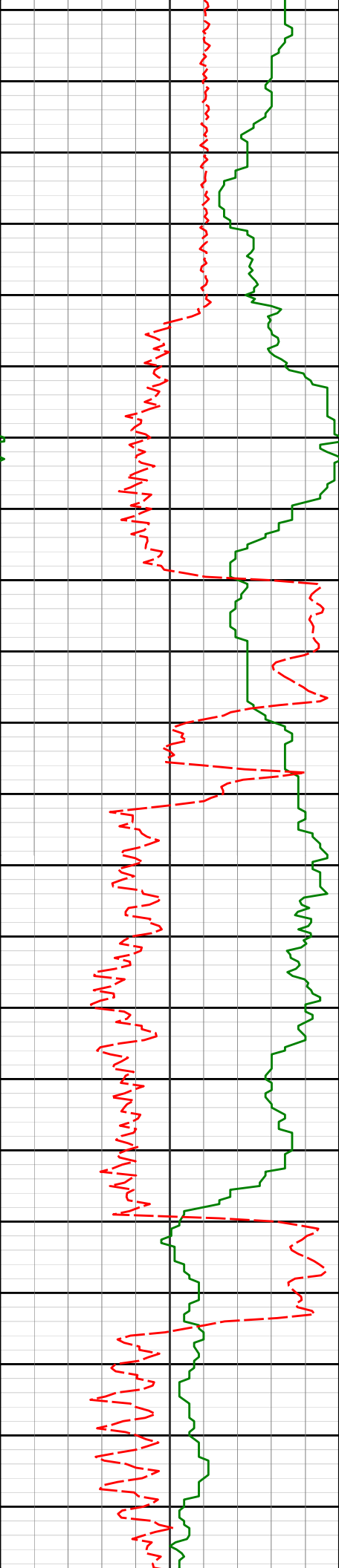
10467'

91.69°

184.16°

7098.63'

2978.51'



10550'

10557'

91.73°

184.41°

7095.94'

3068.23'

10600'

10650'

10647'

91.05°

182.67°

7093.76'

3158.04'

10700'

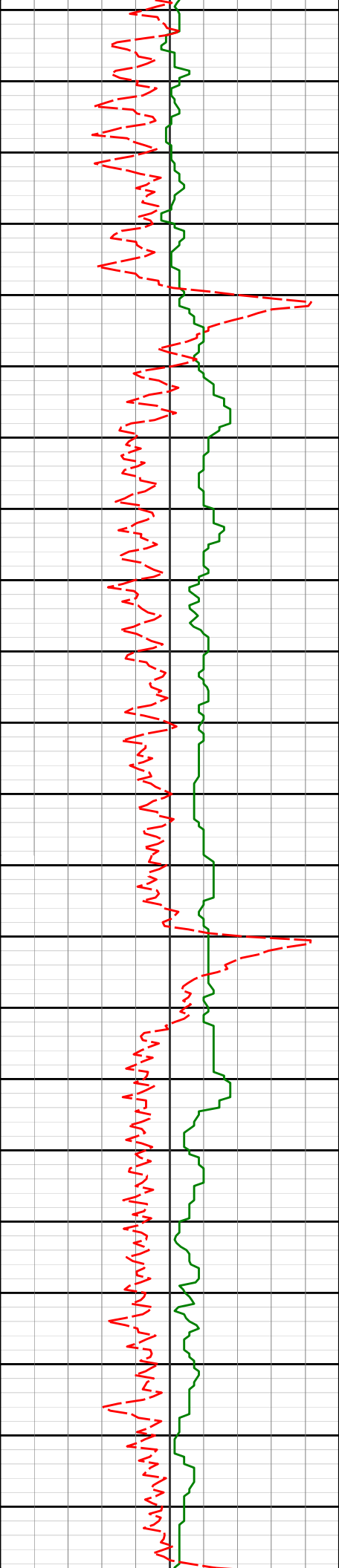
10737'

90.28°

181.47°

7092.72'

3247.97'



10750'

10800'

10850'

10900'

10950'

10826'

90.77°

180.73°

7091.91'

3336.95'

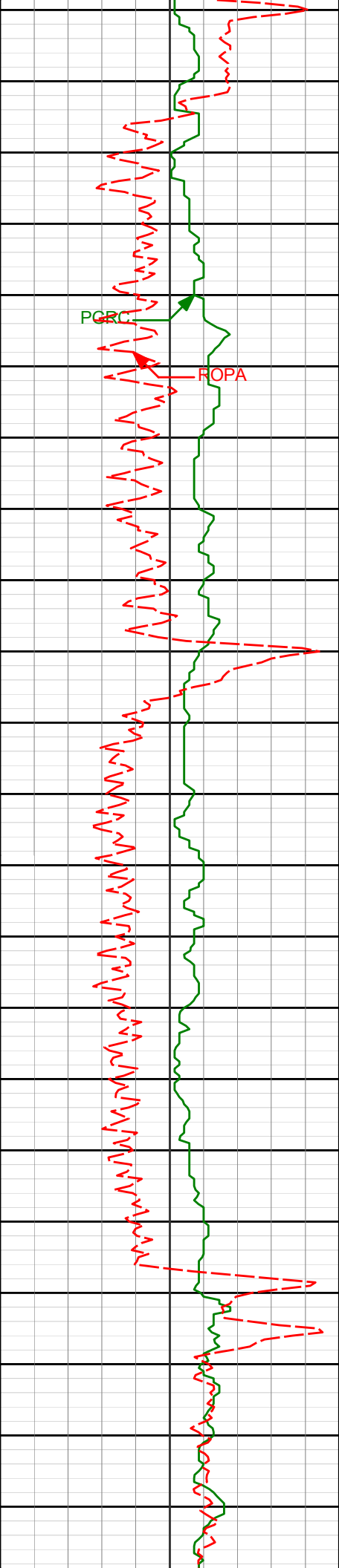
10916'

90.62°

180.08°

7090.82'

3426.95'



11000'

11005'

91.76°

180.20°

7088.98'

3515.93'

11050'

11100'

11095'

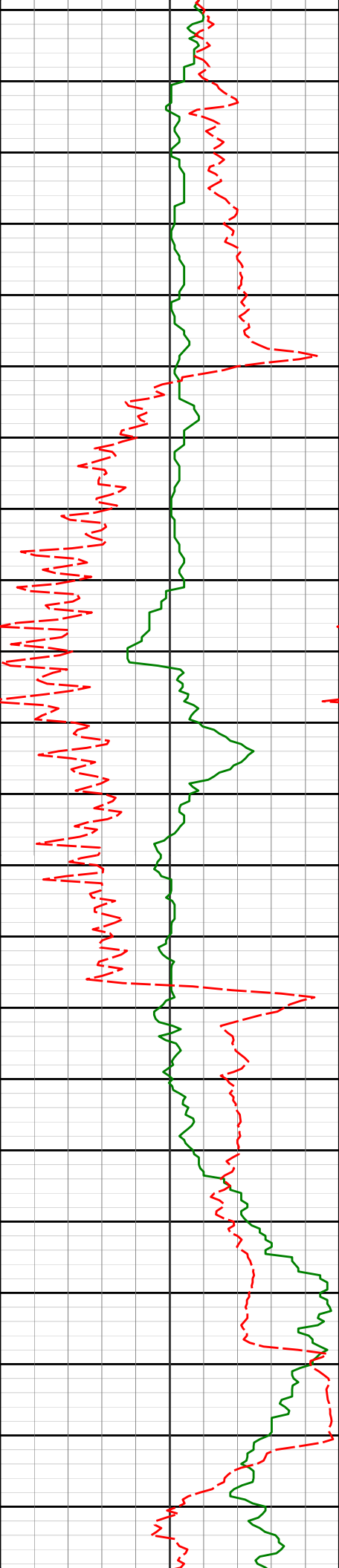
91.11°

179.09°

7086.73'

3605.89'

11150'



11184'

91.14°

179.06°

7084.98'

3694.86'

11200'

11250'

11274'

92.22°

179.02°

7082.34'

3784.81'

11300'

11350'

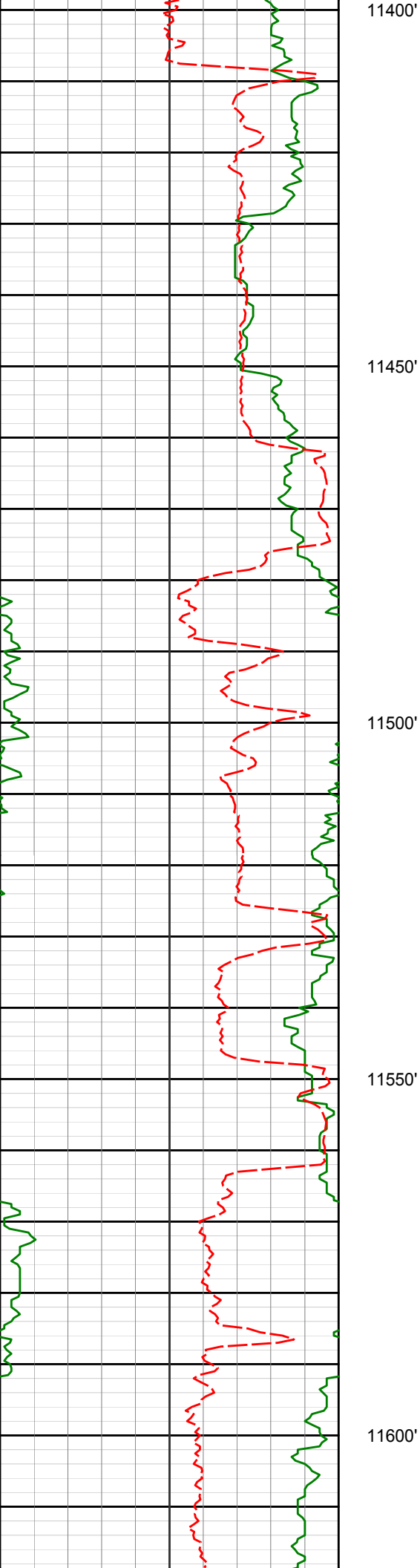
11364'

91.88°

178.45°

7079.12'

3874.73'



11453'

91.33°

178.15°

7076.63'

3963.65'

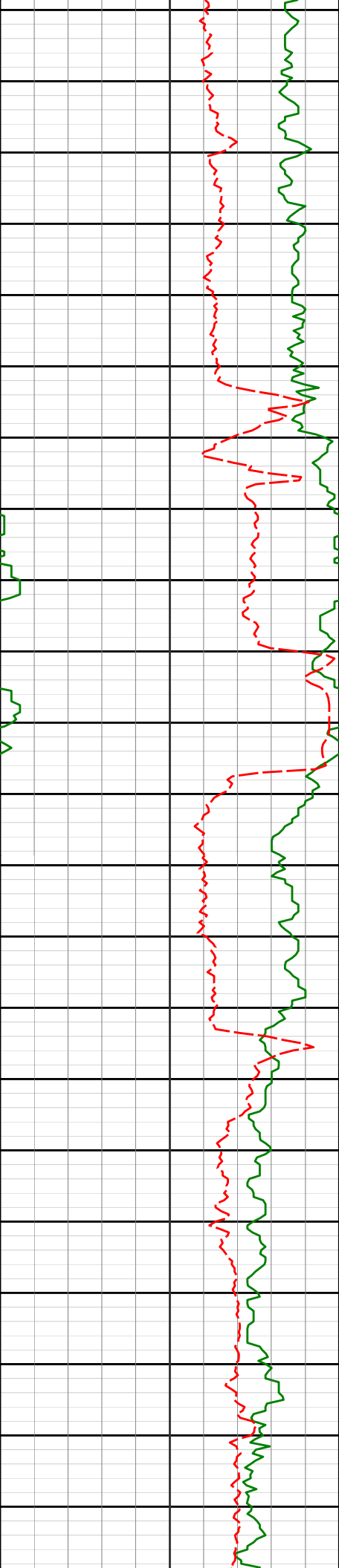
11543'

89.91°

178.52°

7075.66'

4053.60'



11632'

89.88°

179.17°

7075.83'

4142.58'

11650'

11700'

11722'

88.86°

179.60°

7076.82'

4232.56'

11750'

11800'

11812'

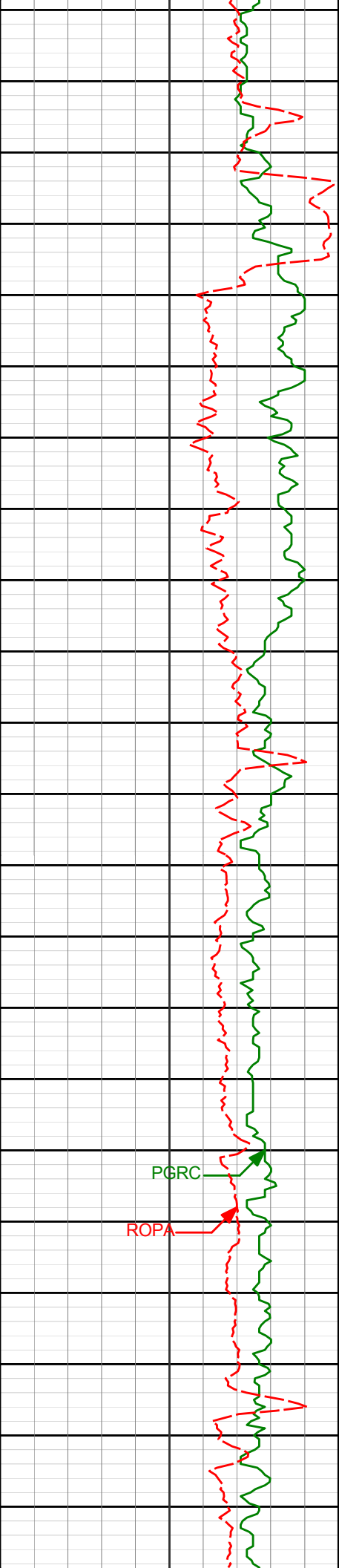
89.51°

180.39°

7078.11'

4322.55'





11850'

11900'

11950'

12000'

12050'

11902'

88.92°

180.74°

7079.34'

4412.54'

11991'

90.03°

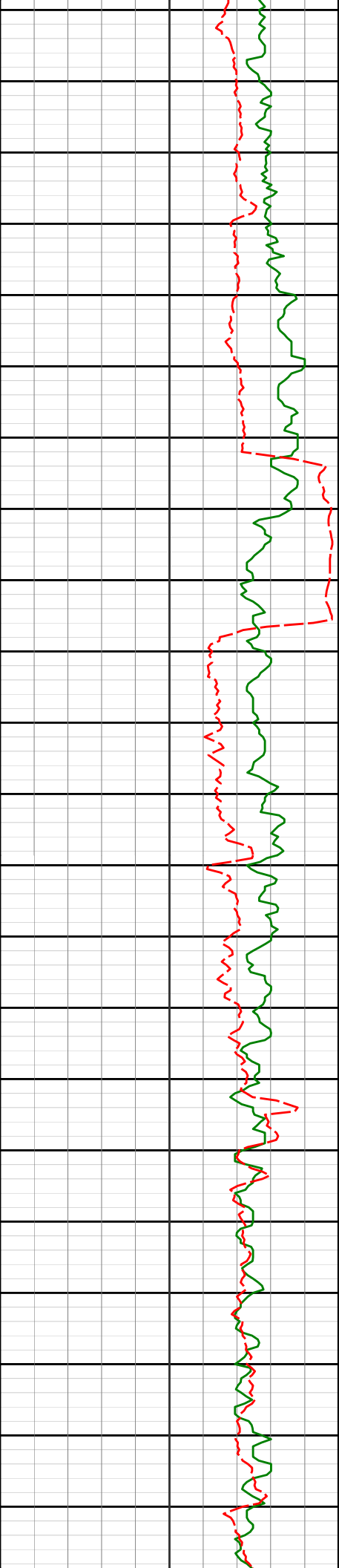
180.56°

7080.15'

4501.53'

PGRC

ROPA



12081'

90.92°

179.88°

7079.40'

4591.53'

12100'

12150'

12171'

89.54°

179.86°

7079.04'

4681.52'

12200'

12250'

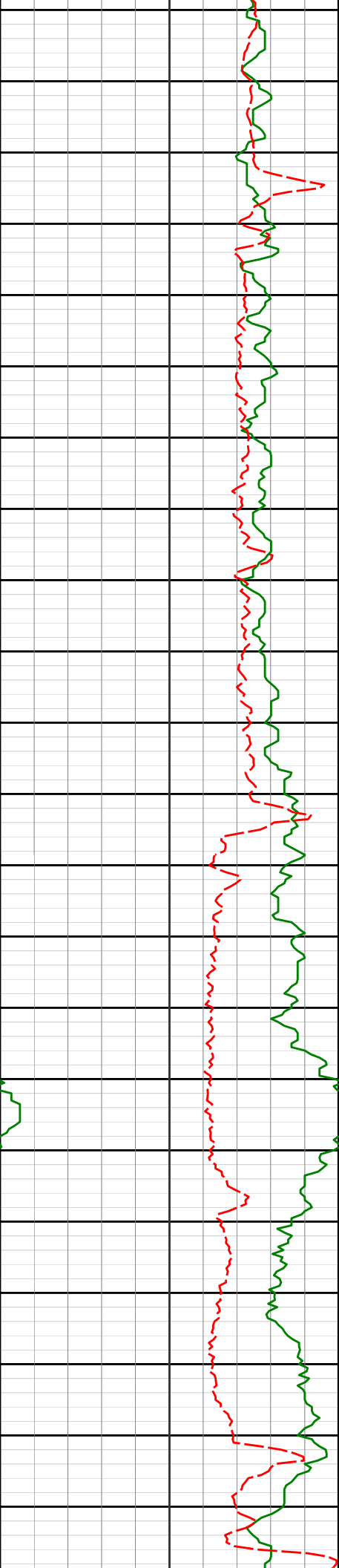
12260'

89.88°

178.67°

7079.50'

4770.51'



12300'

12350'

12400'

12450'

12350'

12440'

90.03°

90.74°

178.12°

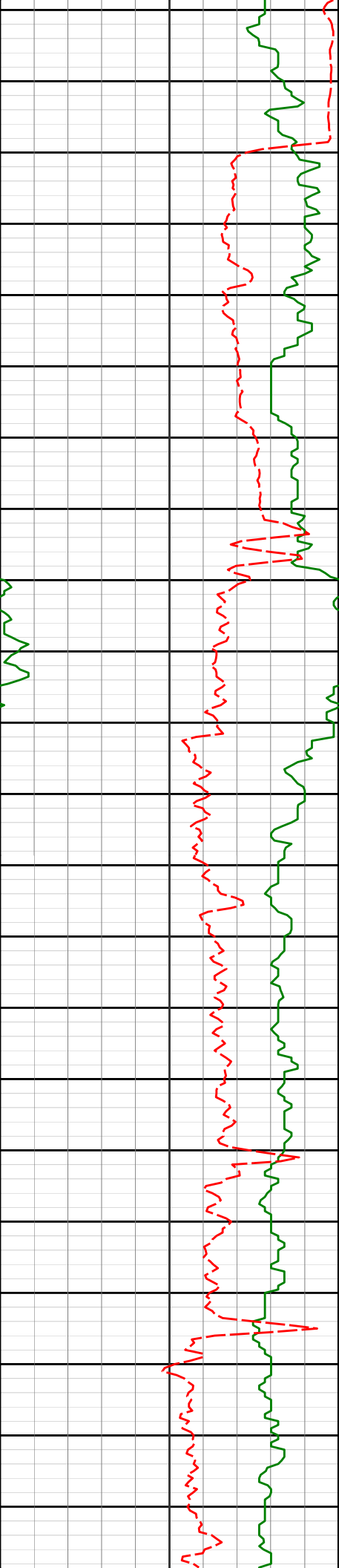
178.00°

7079.57'

7078.96'

4860.47'

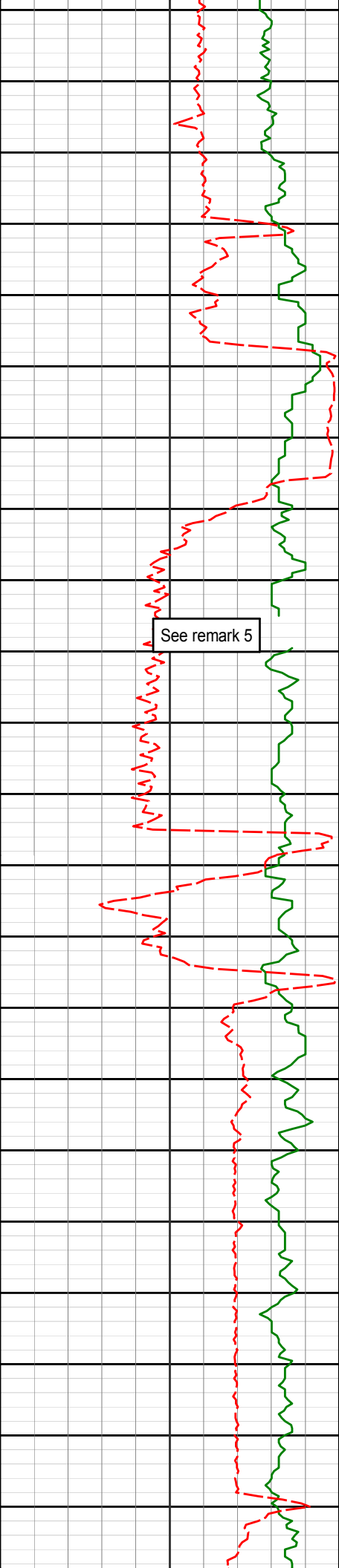
4950.42'



12529'	88.24°	177.00°	7079.75'	5039.31'
--------	--------	---------	----------	----------

12619'	88.77°	177.00°	7082.10'	5129.15'
--------	--------	---------	----------	----------

12708'	89.26°	176.21°	7083.64'	5217.98'
--------	--------	---------	----------	----------



12750'

12800'

12850'

12900'

See remark 5

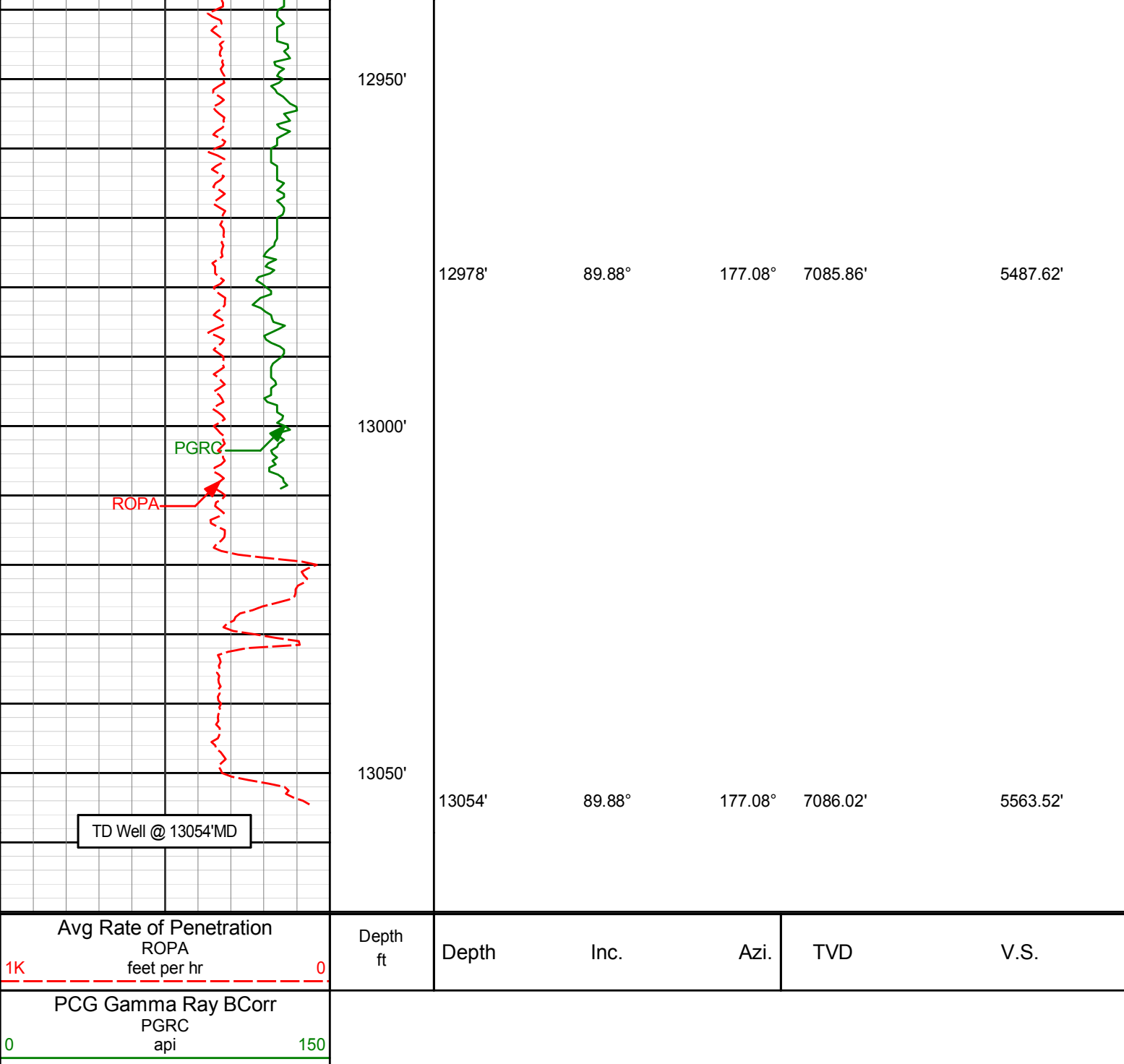
12798'

89.38°

177.60°

7084.70'

5307.83'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Anadarko Petroleum  
RW 36N-32HZ  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0904218776

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
13.00	0.00	0.00	13.00	0.00 N	0.00 E	0.00	0.00
132.00	1.10	316.48	131.99	0.83 N	0.79 W	-0.83	0.92
163.00	0.97	315.51	162.99	1.23 N	1.18 W	-1.23	0.42
185.00	0.97	315.51	184.99	1.23 N	1.18 W	-1.23	0.42

195.00	0.97	315.51	194.98	1.62 N	1.56 W	-1.62	0.00
227.00	0.92	344.78	226.98	2.06 N	1.81 W	-2.06	1.50
259.00	1.54	343.81	258.97	2.72 N	2.00 W	-2.72	1.94
290.00	1.76	340.56	289.96	3.57 N	2.27 W	-3.57	0.77
322.00	1.58	346.88	321.94	4.46 N	2.54 W	-4.46	0.80
354.00	2.33	349.35	353.93	5.53 N	2.76 W	-5.53	2.36
385.00	2.86	338.19	384.89	6.87 N	3.16 W	-6.86	2.35
417.00	3.52	342.05	416.84	8.54 N	3.76 W	-8.54	2.17
449.00	3.56	341.09	448.78	10.42 N	4.39 W	-10.41	0.22
512.00	4.57	333.27	511.62	14.51 N	6.15 W	-14.50	1.83
544.00	5.40	335.99	543.50	17.02 N	7.34 W	-17.02	2.70
575.00	5.71	333.53	574.36	19.74 N	8.62 W	-19.73	1.26
612.00	5.40	333.35	611.18	22.94 N	10.22 W	-22.93	0.84
638.00	5.45	330.10	637.07	25.10 N	11.38 W	-25.09	1.20
670.00	5.36	329.84	668.93	27.71 N	12.89 W	-27.70	0.29
702.00	5.53	328.96	700.78	30.33 N	14.44 W	-30.31	0.59
765.00	6.02	330.63	763.46	35.81 N	17.62 W	-35.79	0.82
797.00	6.06	328.08	795.28	38.70 N	19.34 W	-38.68	0.85
829.00	6.72	330.72	827.08	41.77 N	21.15 W	-41.74	2.26
860.00	6.99	326.85	857.86	44.93 N	23.06 W	-44.90	1.73
892.00	7.65	331.77	889.60	48.44 N	25.14 W	-48.41	2.84
923.00	7.95	328.17	920.32	52.08 N	27.24 W	-52.04	1.85
987.00	8.53	331.51	983.66	60.01 N	31.84 W	-59.97	1.17
1018.00	8.70	329.57	1014.31	64.05 N	34.13 W	-64.01	1.09
1050.00	9.14	329.13	1045.92	68.32 N	36.66 W	-68.28	1.39
1082.00	9.18	332.30	1077.51	72.76 N	39.15 W	-72.71	1.58
1113.00	9.93	334.06	1108.08	77.36 N	41.47 W	-77.30	2.60
1145.00	9.49	332.47	1139.62	82.18 N	43.89 W	-82.12	1.61
1177.00	9.93	330.45	1171.16	86.92 N	46.47 W	-86.86	1.74
1208.00	10.41	331.51	1201.68	91.70 N	49.13 W	-91.64	1.66
1240.00	10.94	332.21	1233.12	96.93 N	51.92 W	-96.87	1.71
1272.00	11.07	330.28	1264.53	102.28 N	54.86 W	-102.22	1.22
1303.00	11.34	328.78	1294.94	107.47 N	57.91 W	-107.40	1.28
1335.00	11.56	329.22	1326.31	112.92 N	61.19 W	-112.85	0.74
1366.00	11.60	330.19	1356.68	118.29 N	64.33 W	-118.21	0.64
1398.00	11.78	329.83	1388.01	123.91 N	67.57 W	-123.83	0.61
1430.00	11.47	332.56	1419.36	129.56 N	70.67 W	-129.47	1.97
1461.00	11.34	333.27	1449.74	135.01 N	73.47 W	-134.92	0.62
1493.00	10.15	331.60	1481.18	140.30 N	76.22 W	-140.21	3.84
1525.00	10.72	332.21	1512.65	145.42 N	78.95 W	-145.32	1.81
1557.00	10.55	333.71	1544.10	150.68 N	81.64 W	-150.58	1.02
1588.00	10.46	332.34	1574.58	155.71 N	84.20 W	-155.61	0.86
1620.00	10.10	335.46	1606.07	160.84 N	86.71 W	-160.73	2.07
1682.00	9.01	336.78	1667.21	170.25 N	90.88 W	-170.13	1.79
1714.00	8.70	334.84	1698.83	174.74 N	92.90 W	-174.63	1.35
1746.00	8.75	335.55	1730.46	179.15 N	94.94 W	-179.03	0.37
1778.00	8.08	335.29	1762.11	183.40 N	96.89 W	-183.29	2.10
1809.00	8.04	333.71	1792.81	187.33 N	98.76 W	-187.21	0.73
1839.00	8.31	334.76	1822.50	191.17 N	100.61 W	-191.05	1.03
1932.00	8.58	334.98	1914.49	203.54 N	106.41 W	-203.41	0.29
2021.00	10.05	338.96	2002.32	216.80 N	112.01 W	-216.67	1.81
2111.00	10.18	336.01	2090.92	231.40 N	118.06 W	-231.26	0.59
2200.00	9.75	334.04	2178.58	245.37 N	124.56 W	-245.21	0.62
2290.00	8.82	331.35	2267.40	258.27 N	131.20 W	-258.11	1.13
2379.00	11.64	340.08	2354.98	272.71 N	137.54 W	-272.54	3.61
2469.00	11.29	335.49	2443.18	289.27 N	144.28 W	-289.09	1.09
2558.00	10.76	330.90	2530.54	304.45 N	151.94 W	-304.27	1.15
2648.00	9.65	329.29	2619.11	318.28 N	159.88 W	-318.09	1.27
2738.00	8.94	326.12	2707.93	330.57 N	167.63 W	-330.37	0.98
2827.00	10.39	330.45	2795.67	343.30 N	175.44 W	-343.08	1.83
2916.00	11.24	334.49	2883.09	358.11 N	183.14 W	-357.89	1.27
3006.00	10.90	332.28	2971.41	373.56 N	190.87 W	-373.32	0.60
3096.00	10.39	331.56	3059.86	388.23 N	198.70 W	-387.98	0.59
3185.00	9.60	331.26	3147.51	401.79 N	206.09 W	-401.54	0.89
3275.00	8.75	330.21	3236.36	414.32 N	213.10 W	-414.06	0.96
3365.00	8.10	330.13	3325.39	425.76 N	219.66 W	-425.49	0.73
3454.00	7.26	332.45	3413.59	436.19 N	225.39 W	-435.91	1.00
3544.00	9.13	329.38	3502.66	447.38 N	231.66 W	-447.10	2.13
3633.00	9.49	330.79	3590.49	459.87 N	238.84 W	-459.57	0.48
3723.00	10.63	335.30	3679.11	473.89 N	245.93 W	-473.59	1.54
3813.00	10.23	335.00	3767.62	488.68 N	252.78 W	-488.37	0.45
3902.00	8.92	334.06	3855.38	502.05 N	259.14 W	-501.73	1.48
3992.00	8.55	332.11	3944.33	514.23 N	265.32 W	-513.91	0.53
4081.00	10.47	337.50	4032.11	527.55 N	271.51 W	-527.22	2.38
4171.00	10.75	339.57	4120.57	542.97 N	277.56 W	-542.63	0.52

4260.00	9.81	336.65	4208.14	557.70 N	283.47 W	-557.36	1.20
4350.00	8.54	335.28	4296.99	570.82 N	289.30 W	-570.47	1.43
4464.00	8.10	332.39	4409.79	585.63 N	296.56 W	-585.27	0.54
4554.00	7.96	332.91	4498.90	596.80 N	302.34 W	-596.43	0.17
4643.00	7.61	333.52	4587.08	607.56 N	307.77 W	-607.18	0.41
4733.00	6.41	323.80	4676.41	616.94 N	313.40 W	-616.56	1.87
4823.00	5.56	322.33	4765.92	624.45 N	319.03 W	-624.06	0.96
4912.00	5.46	331.10	4854.51	631.57 N	323.71 W	-631.18	0.95
5002.00	3.82	356.17	4944.22	638.32 N	325.98 W	-637.92	2.86
5092.00	3.72	349.43	5034.03	644.18 N	326.72 W	-643.78	0.50
5182.00	1.01	341.94	5123.94	647.80 N	327.50 W	-647.40	3.03
5271.00	1.52	193.53	5212.93	647.40 N	328.02 W	-647.00	2.74
5361.00	1.65	192.88	5302.90	644.97 N	328.59 W	-644.57	0.15
5451.00	1.79	193.08	5392.86	642.34 N	329.20 W	-641.93	0.15
5540.00	1.73	207.78	5481.82	639.80 N	330.13 W	-639.39	0.51
5630.00	1.90	216.75	5571.77	637.40 N	331.66 W	-637.00	0.37
5720.00	1.76	196.51	5661.73	634.88 N	332.94 W	-634.48	0.73
5810.00	1.74	195.56	5751.69	632.24 N	333.70 W	-631.84	0.04
5899.00	1.13	126.90	5840.66	630.42 N	333.36 W	-630.01	1.90
5989.00	1.16	156.18	5930.65	629.05 N	332.28 W	-628.64	0.64
6079.00	0.57	153.55	6020.64	627.82 N	331.71 W	-627.41	0.66
6168.00	1.05	46.76	6109.63	627.98 N	330.92 W	-627.58	1.50
6258.00	1.28	2.97	6199.61	629.55 N	330.27 W	-629.14	0.99
6348.00	1.43	334.40	6289.59	631.56 N	330.70 W	-631.16	0.76
6437.00	1.55	326.16	6378.56	633.56 N	331.85 W	-633.16	0.27
6527.00	4.69	183.52	6468.47	630.90 N	332.76 W	-630.49	6.66
6617.00	12.26	188.34	6557.43	617.75 N	334.37 W	-617.34	8.44
6706.00	20.37	177.52	6642.79	592.88 N	335.07 W	-592.47	9.69
6796.00	25.49	181.43	6725.66	557.85 N	334.88 W	-557.45	5.94
6886.00	33.61	179.97	6803.89	513.51 N	335.35 W	-513.10	9.05
6976.00	45.74	178.73	6873.04	456.17 N	334.62 W	-455.76	13.51
7065.00	51.29	181.30	6931.97	389.53 N	334.71 W	-389.13	6.60
7155.00	58.31	177.12	6983.83	316.07 N	333.58 W	-315.67	8.67
7244.00	70.49	176.02	7022.22	236.11 N	328.76 W	-235.71	13.73
7334.00	74.66	177.67	7049.17	150.39 N	324.05 W	-150.00	4.95
7424.00	82.31	180.40	7067.13	62.29 N	322.59 W	-61.90	9.00
7514.00	88.18	181.70	7074.58	27.34 S	324.24 W	27.74	6.68
7603.00	89.23	181.74	7076.59	116.28 S	326.92 W	116.68	1.18
7692.00	88.83	181.18	7078.10	205.24 S	329.18 W	205.64	0.78
7782.00	88.46	181.31	7080.23	295.19 S	331.14 W	295.60	0.44
7872.00	91.26	181.90	7080.44	385.15 S	333.66 W	385.55	3.18
7962.00	91.54	181.50	7078.24	475.08 S	336.32 W	475.49	0.54
8051.00	91.45	181.28	7075.92	564.02 S	338.48 W	564.44	0.27
8141.00	91.02	179.86	7073.98	654.00 S	339.38 W	654.41	1.65
8231.00	91.02	180.07	7072.39	743.98 S	339.33 W	744.39	0.23
8320.00	89.78	179.53	7071.76	832.98 S	339.02 W	833.39	1.51
8410.00	89.23	177.98	7072.54	922.95 S	337.06 W	923.36	1.83
8499.00	88.89	179.21	7074.00	1011.91 S	334.87 W	1012.32	1.44
8589.00	87.29	179.62	7077.00	1101.85 S	333.96 W	1102.26	1.84
8679.00	87.23	179.34	7081.31	1191.74 S	333.14 W	1192.15	0.32
8768.00	86.82	178.84	7085.93	1280.61 S	331.73 W	1281.02	0.73
8854.00	88.46	179.09	7089.47	1366.52 S	330.17 W	1366.92	1.93
8944.00	90.18	178.79	7090.53	1456.50 S	328.51 W	1456.90	1.95
9034.00	90.15	177.91	7090.27	1546.46 S	325.92 W	1546.85	0.97
9123.00	91.02	177.47	7089.36	1635.38 S	322.34 W	1635.77	1.09
9213.00	89.97	179.50	7088.58	1725.34 S	319.96 W	1725.73	2.53
9303.00	91.11	179.59	7087.73	1815.33 S	319.24 W	1815.72	1.27
9392.00	89.38	180.30	7087.35	1904.33 S	319.16 W	1904.71	2.10
9482.00	89.26	179.64	7088.42	1994.32 S	319.11 W	1994.71	0.75
9571.00	89.11	179.61	7089.69	2083.31 S	318.53 W	2083.70	0.18
9661.00	89.11	179.66	7091.09	2173.30 S	317.96 W	2173.68	0.05
9751.00	88.77	179.62	7092.76	2263.28 S	317.39 W	2263.66	0.38
9840.00	88.37	179.23	7094.98	2352.25 S	316.50 W	2352.63	0.63
9930.00	87.72	178.87	7098.06	2442.18 S	315.00 W	2442.56	0.82
10020.00	87.35	179.19	7101.93	2532.08 S	313.48 W	2532.46	0.55
10109.00	88.83	179.84	7104.90	2621.03 S	312.74 W	2621.41	1.82
10199.00	89.48	182.40	7106.22	2710.99 S	314.50 W	2711.38	2.93
10288.00	91.82	184.41	7105.22	2799.82 S	319.79 W	2800.21	3.47
10378.00	92.47	185.00	7101.86	2889.45 S	327.16 W	2889.85	0.97
10467.00	91.69	184.16	7098.63	2978.11 S	334.26 W	2978.51	1.28
10557.00	91.73	184.41	7095.94	3067.82 S	340.98 W	3068.23	0.28
10647.00	91.05	182.67	7093.76	3157.62 S	346.53 W	3158.04	2.08
10737.00	90.28	181.47	7092.72	3247.55 S	349.77 W	3247.97	1.58
10826.00	90.77	180.73	7091.91	3336.53 S	351.48 W	3336.95	0.99



10916.00	90.62	180.08	7090.82	3426.52 S	352.13 W	3426.95	0.75
11005.00	91.76	180.20	7088.98	3515.50 S	352.35 W	3515.93	1.29
11095.00	91.11	179.09	7086.73	3605.47 S	351.79 W	3605.89	1.43
11184.00	91.14	179.06	7084.98	3694.44 S	350.36 W	3694.86	0.04
11274.00	92.22	179.02	7082.34	3784.38 S	348.85 W	3784.81	1.20
11364.00	91.88	178.45	7079.12	3874.30 S	346.87 W	3874.73	0.74
11453.00	91.33	178.15	7076.63	3963.23 S	344.24 W	3963.65	0.71
11543.00	89.91	178.52	7075.66	4053.18 S	341.63 W	4053.60	1.63
11632.00	89.88	179.17	7075.83	4142.17 S	339.83 W	4142.58	0.73
11722.00	88.86	179.60	7076.82	4232.15 S	338.86 W	4232.56	1.23
11812.00	89.51	180.39	7078.11	4322.14 S	338.86 W	4322.55	1.14
11902.00	88.92	180.74	7079.34	4412.13 S	339.75 W	4412.54	0.76
11991.00	90.03	180.56	7080.15	4501.12 S	340.76 W	4501.53	1.26
12081.00	90.92	179.88	7079.40	4591.11 S	341.10 W	4591.53	1.25
12171.00	89.54	179.86	7079.04	4681.11 S	340.89 W	4681.52	1.54
12260.00	89.88	178.67	7079.50	4770.10 S	339.75 W	4770.51	1.38
12350.00	90.03	178.12	7079.57	4860.06 S	337.23 W	4860.47	0.63
12440.00	90.74	178.00	7078.96	4950.01 S	334.18 W	4950.42	0.80
12529.00	88.24	177.00	7079.75	5038.91 S	330.30 W	5039.31	3.02
12619.00	88.77	177.00	7082.10	5128.76 S	325.60 W	5129.15	0.58
12708.00	89.26	176.21	7083.64	5217.59 S	320.33 W	5217.98	1.05
12798.00	89.38	177.60	7084.70	5307.45 S	315.47 W	5307.83	1.55
12978.00	89.88	177.08	7085.86	5487.25 S	307.12 W	5487.62	0.40
13054.00	89.88	177.08	7086.02	5563.15 S	303.25 W	5563.52	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 180.07 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.22 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 13054.00 FEET  
IS 5571.41 FEET ALONG 183.12 DEGREES (TRUE)**

**Surveys from 132' to 1839' provided by third party  
First Sperry Survey at 1932'.  
Last survey is a projection to bit @ 13054'TD.**