

**D-C Pressure Case Directional**  
**PCG-K Pressure Case Gamma**

1 : 240

[illegible]

## WELL INFORMATION

<b>MWD Run Number</b>	100	200			
<b>Date run completed</b>	18-Apr-14	04-May-14			
<b>Rig Bit Number</b>	0100	0200			
<b>Bit Size (in)</b>	8.750	6.125			
<b>Tool Nominal OD (in)</b>	6.750	4.750			
<b>Log Start Depth (MD, ft)</b>	1,085.00	8,018.00			
<b>Log End Depth (MD, ft)</b>	8,018.00	17,279.00			
<b>Drill or Wipe</b>	Drill	Drill			
<b>Drill/Wipe Start Date and Time</b>	16-Apr-14 20:00	30-Apr-14 23:40			
<b>Drill/Wipe End Date and Time</b>	18-Apr-14 07:00	03-May-14 03:22			
<b>Min Inc (deg) @ Depth (MD, ft)</b>	0.15 @ 6,712.00	87.19 @ 8,112.00			
<b>Max Inc (deg) @ Depth (MD, ft)</b>	82.86 @ 7,966.00	91.60 @ 12,010.00			
<b>Bit TFA(in2) / Bit Type</b>	0.84 / PDC	1.3 / PDC			
<b>Flow Rate (gpm)</b>	605.82	285.09			
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A			
<b>Fluid Type</b>	Fresh Water Gel	Mineral Oil Bas			
<b>Density (ppg) / Viscosity (spqt)</b>	9.10 / 35.00	9.30 / 62.00			
<b>Filtrate CL (ppm)</b>	1,900.00	69,000.00			
<b>pH / Fluid Loss (mptm)</b>	9.20 / 0	N/A / N/A			
<b>PV (cP) / YP (lbf2)</b>	8 / 6.00	14 / 25.00			
<b>% Solids / % Sand</b>	5 / .35	8.1 / N/A			
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / 62:38			
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A			
<b>Max Tool Temp (deg F) / S</b>	177.04 / 329M	250.05 / 500M			

Max Tool Temp (degF) / Source	177.64 / PCM	253.35 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 177.64	N/A @ 253.35			
Lead MWD Engineer	Ryan White	Ryan White			
Customer Representative	Rick Oman	Rick Oman			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11023840	12361803			
Insert Serial Number	11680880	11227514			
Date and Time Initialized	14-Apr-14 20:13	27-Apr-14 15:43			
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	52.00	47.00			
Software Version	6.21	6.21			
Sub Serial Number	11023840	12361803			
Sonde Serial Number	11638602	11638625			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	198.81	64.44			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	54.49	49.50			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11023840	12361803			
Insert/Sonde Serial Number	11680942	11681081			

## REMARKS

1. All depths are measured bit 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. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.

4. All data presented is recorded data unless otherwise specified

5. The following smoothing parameters have been applied to the data:

PGRC (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

6. INSITE version 8.0.10 Build 08

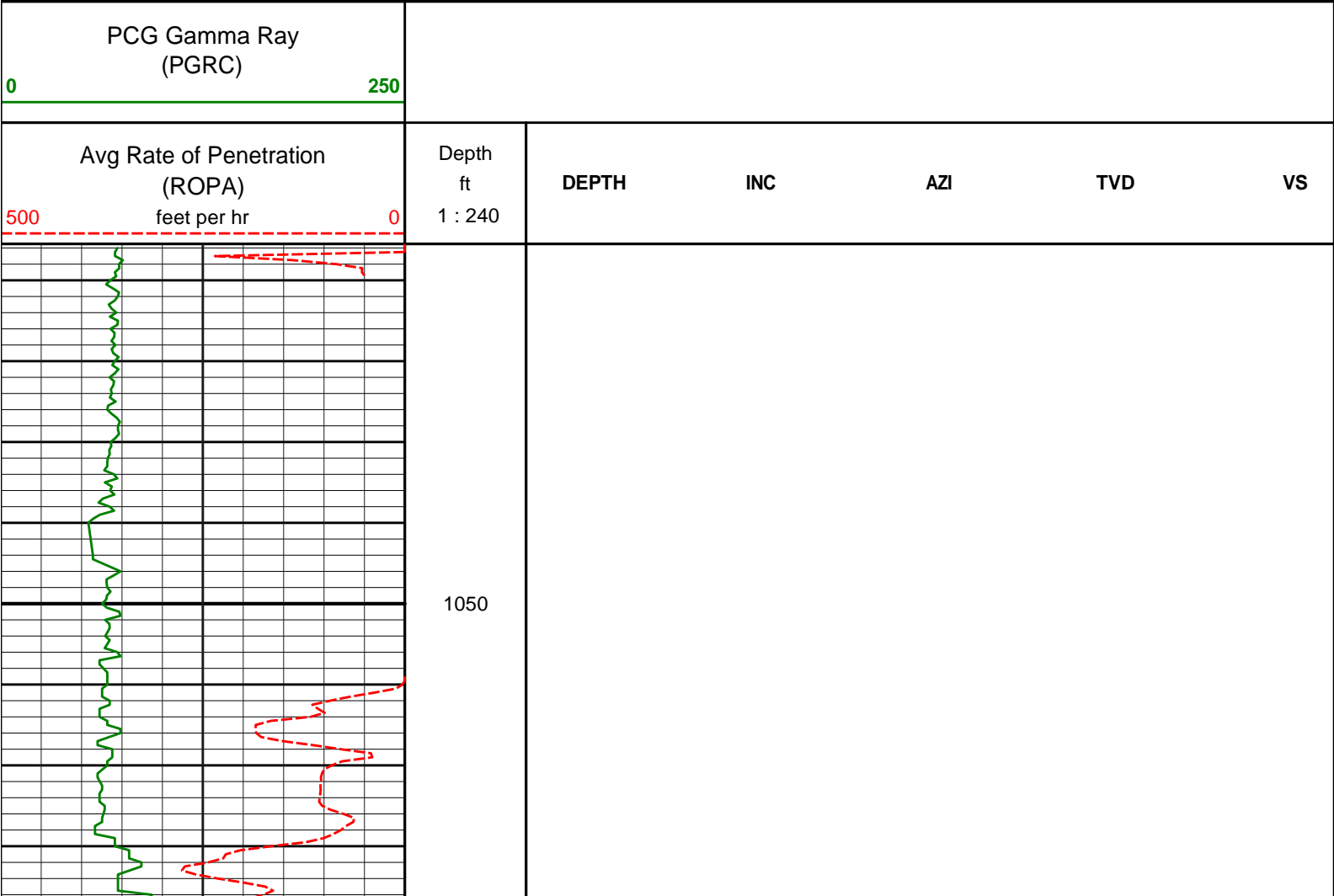
WARRANTY

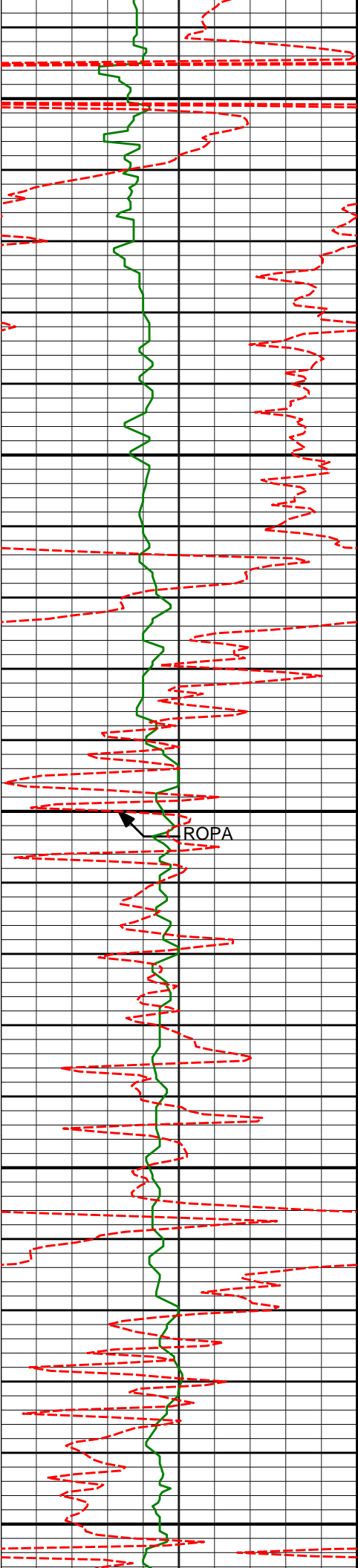
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES 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.

HALLIBURTON

Sperry Drilling

MD 1:240 Detail Log





1100

1111'

0.44°

335.46°

1110.98'

1.30'

1150

1200

ROPA

1206'

0.51°

321.03°

1205.97'

1.97'

1250

1300

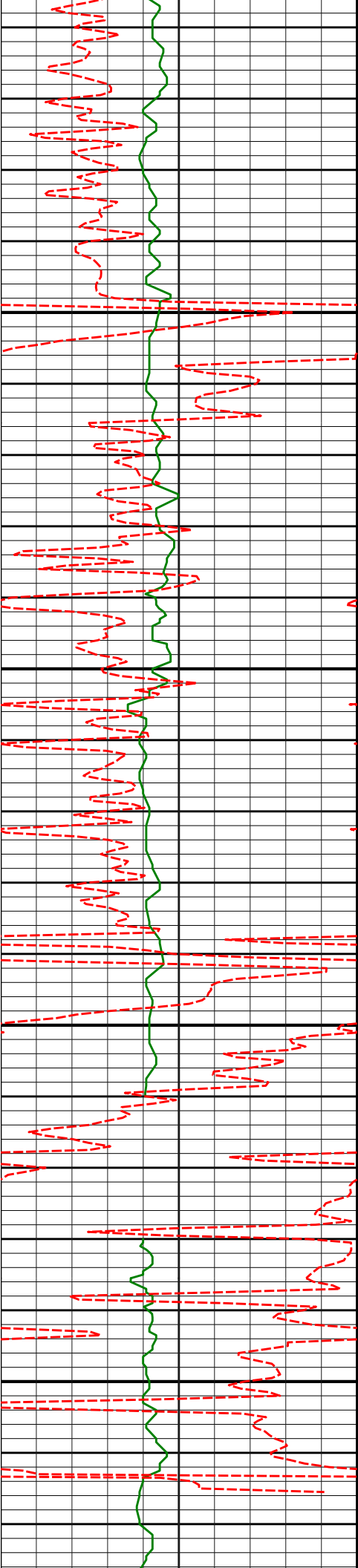
1301'

0.37°

318.29°

1300.97'

2.54'



1350

1388'

0.31°

310.28°

1387.97'

2.90'

1400

1450

1482'

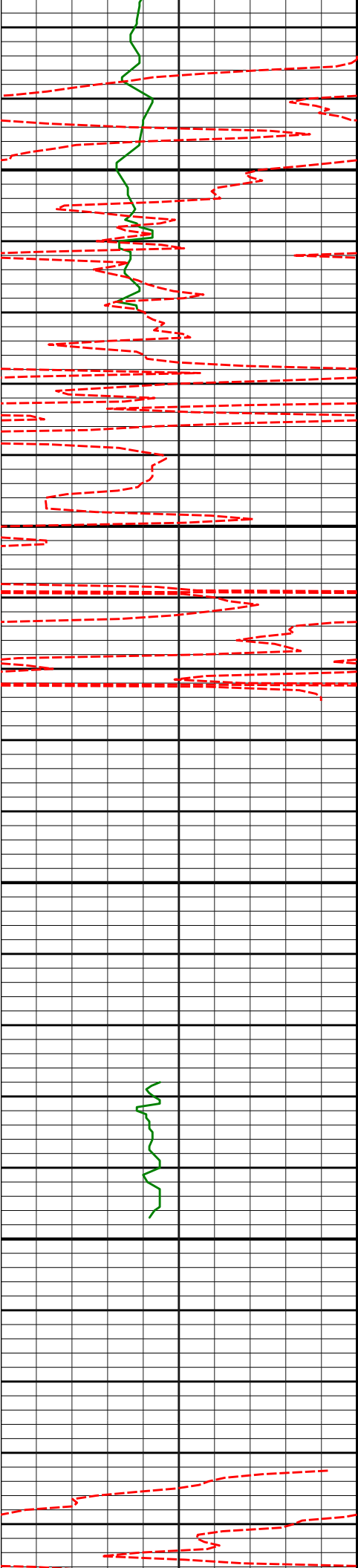
0.54°

289.54°

1481.97'

3.23'

1500



1550

1600

1650

1700

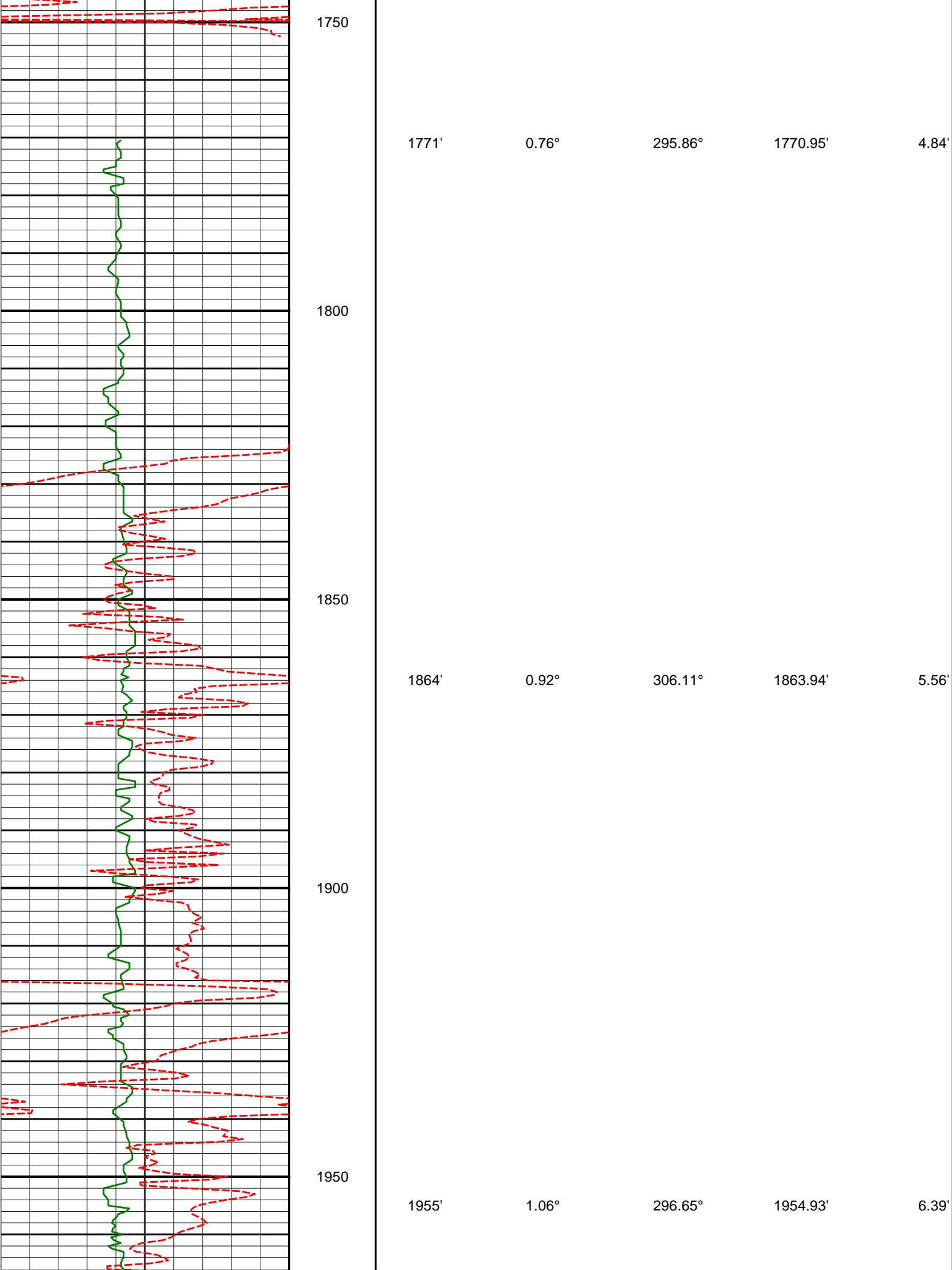
1685'

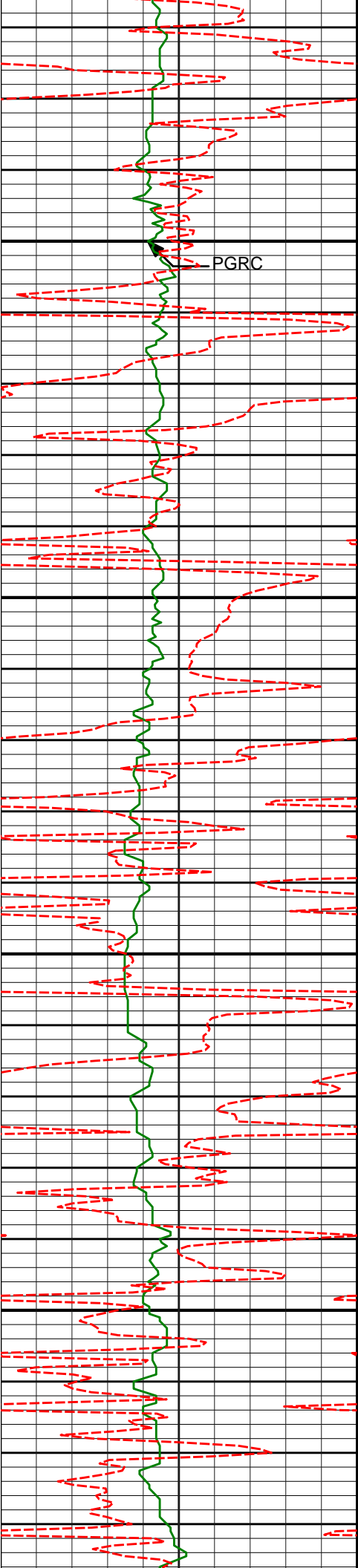
0.60°

315.85°

1684.96'

4.25'





PGRC

2000

2050

2100

2150

2048'

0.41°

99.05°

2047.92'

6.73'

2142'

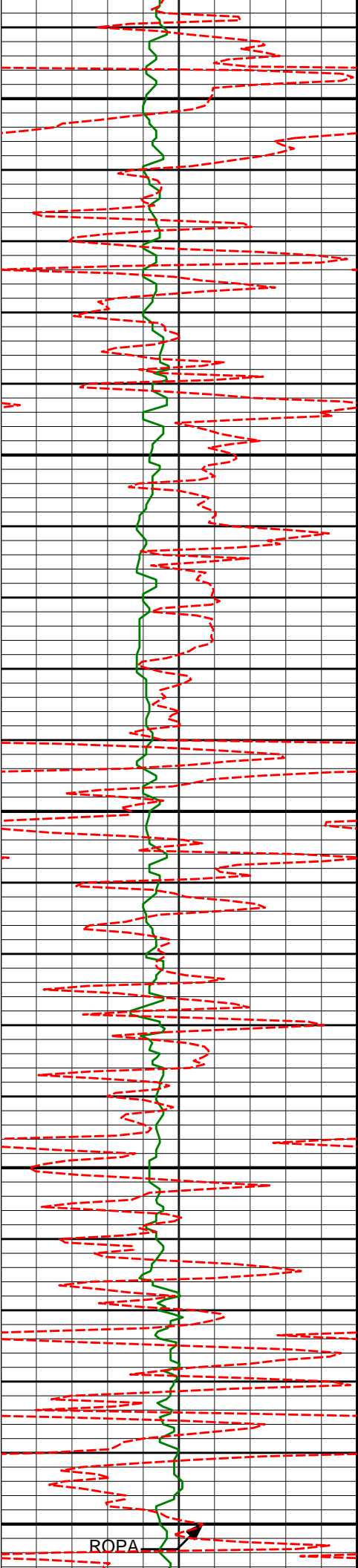
0.46°

129.27°

2141.92'

6.43'





2200

2233'

0.31°

12.42°

2232.92'

6.44'

2250

2300

2325'

0.47°

310.46°

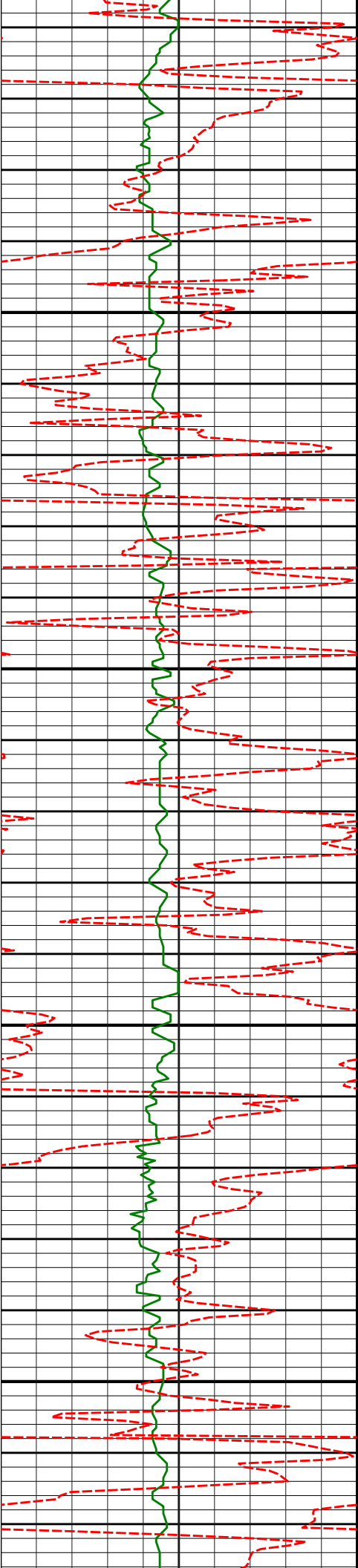
2324.92'

6.93'

2350

2400

ROPA



2417'

2.06°

189.18°

2416.90'

5.55'

2450

2500

2550

2600

2510'

3.20°

186.39°

2509.80'

1.33'

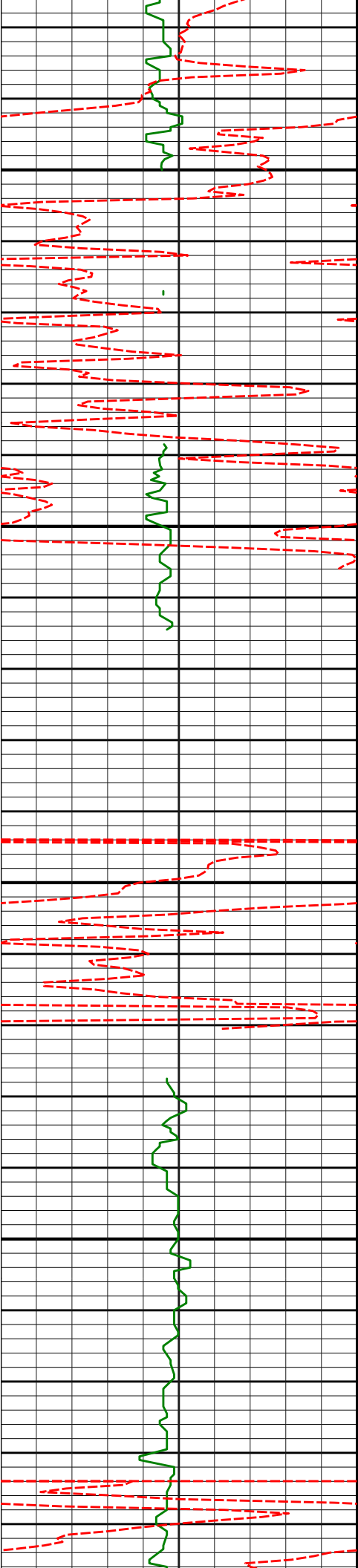
2603'

3.22°

184.17°

2602.65'

-3.85'



2650

2700

2750

2800

2695'

1.31°

140.10°

2694.58'

-7.24'

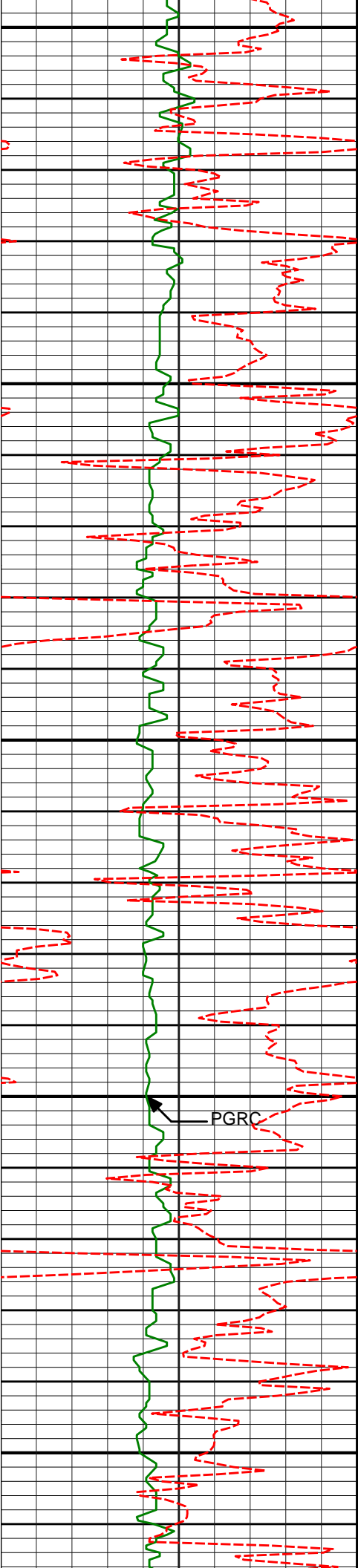
2787'

1.09°

163.75°

2786.56'

-8.90'



2850

2879'

0.74°

216.47°

2878.55'

-10.22'

2900

2950

2971'

0.87°

244.48°

2970.55'

-10.98'

3000

PGRC

3050

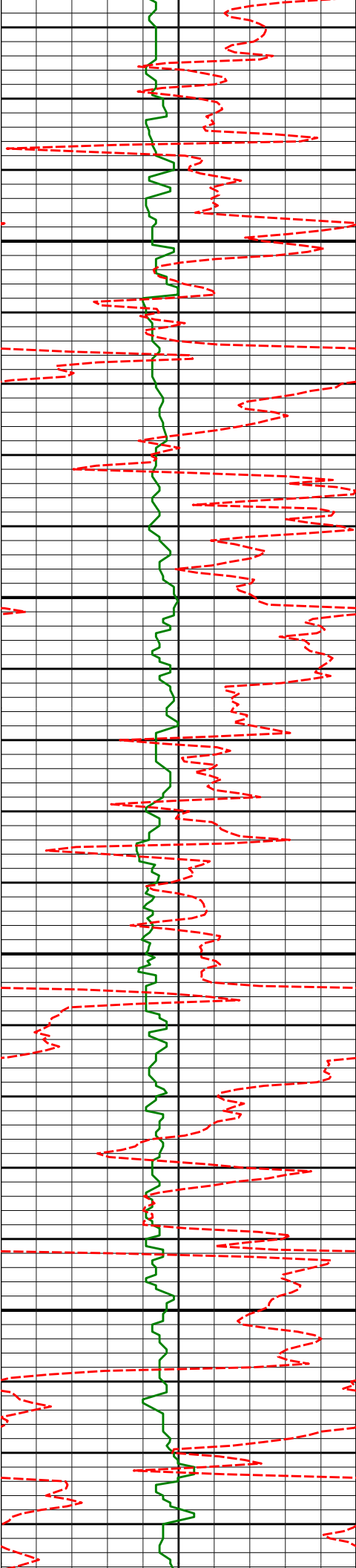
3063'

0.65°

227.05°

3062.54'

-11.62'



3100

3150

3200

3250

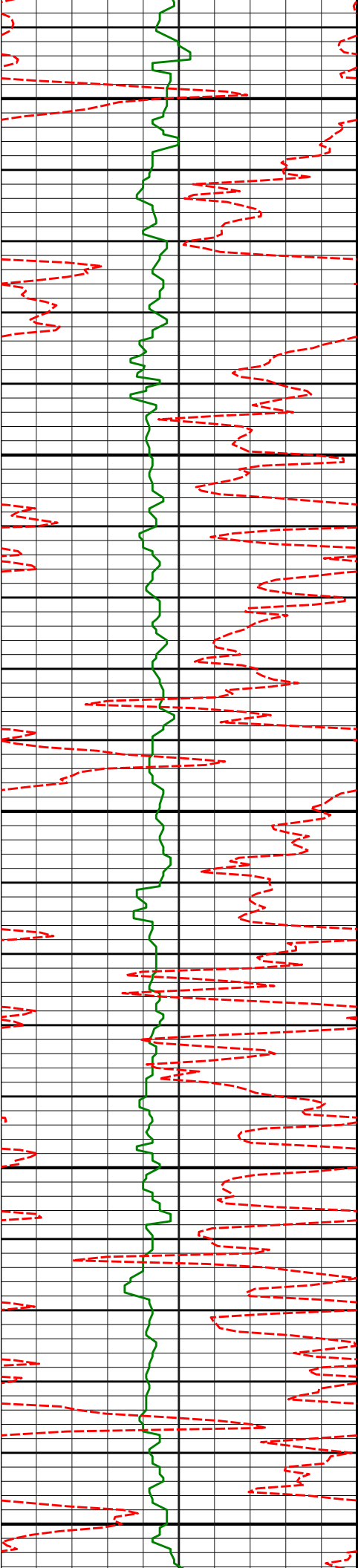
3155'

0.72°

234.47°

3154.53'

-12.30'



3300

3339'

2.00°

2.35°

3338.49'

-9.07'

3350

3400

3431'

2.11°

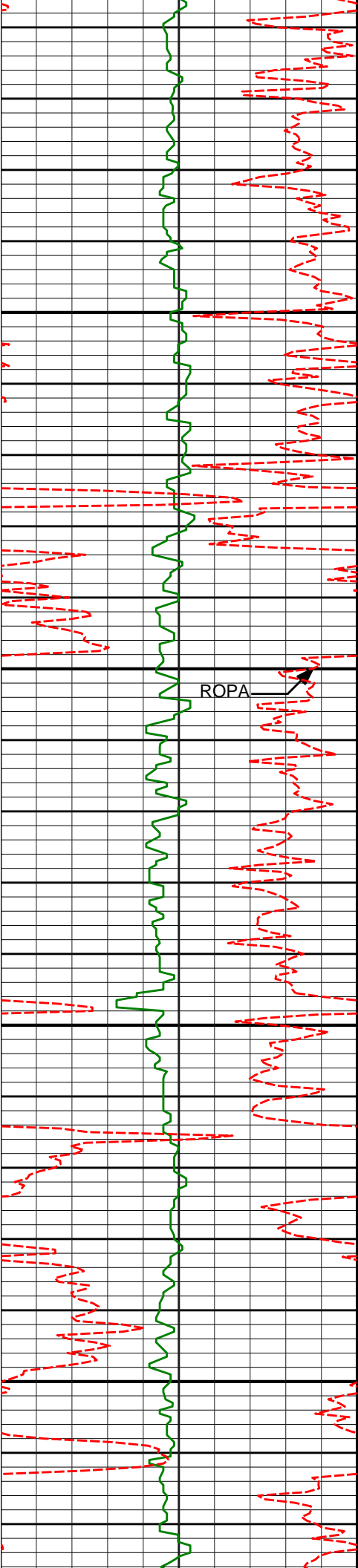
349.40°

3430.43'

-5.79'

3450

3500



3523'	2.15°	352.02°	3522.36'	-2.41'
-------	-------	---------	----------	--------

3550

3600

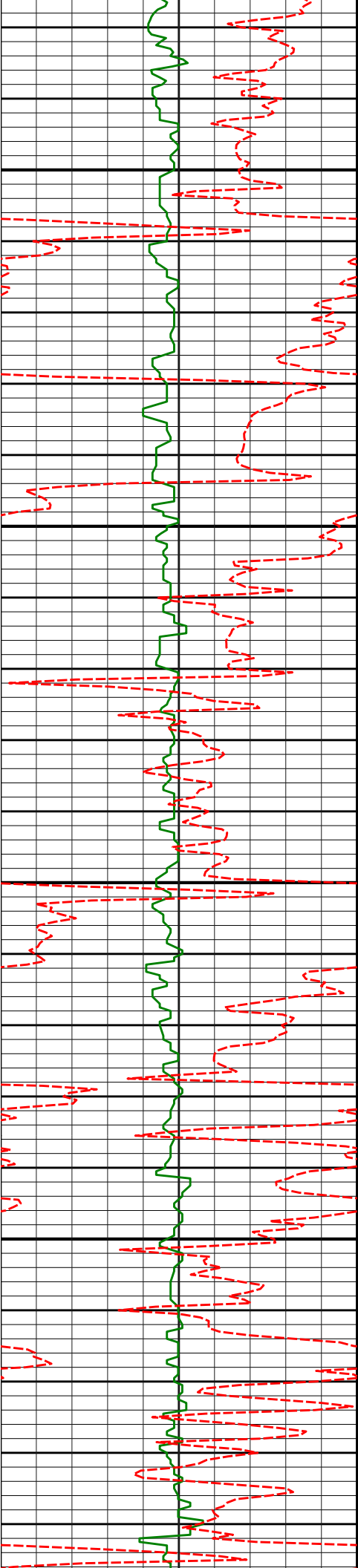
ROPA

3615'	1.35°	343.62°	3614.32'	0.35'
-------	-------	---------	----------	-------

3650

3700

3706'	1.48°	336.35°	3705.29'	2.46'
-------	-------	---------	----------	-------



3750

3800

3850

3900

3798'

1.62°

76.72°

3797.27'

3.84'

3890'

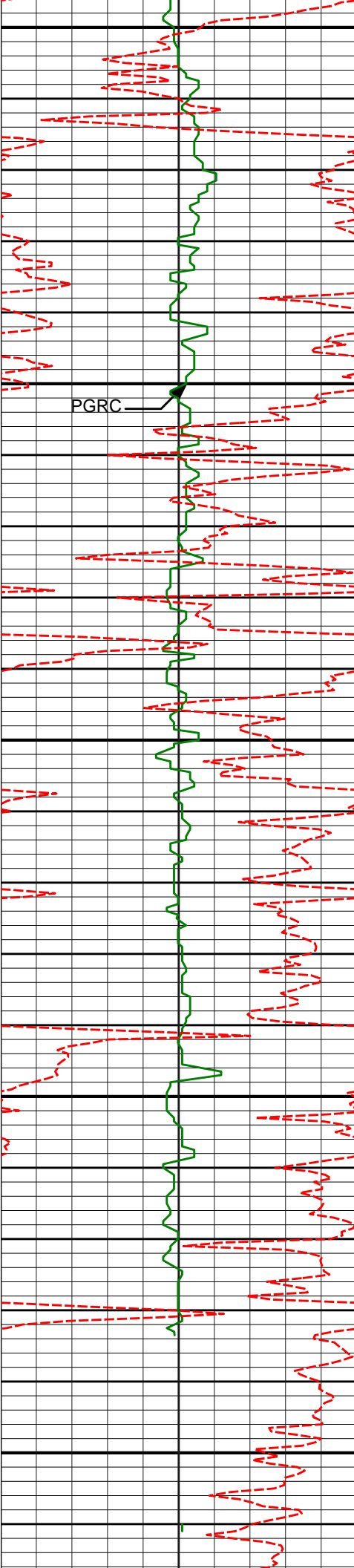
1.67°

86.37°

3889.23'

4.18'





3950

3982'

1.51°

93.16°

3981.20'

4.16'

PGRC

4000

4050

4073'

1.24°

115.80°

4072.17'

3.63'

4100

4150

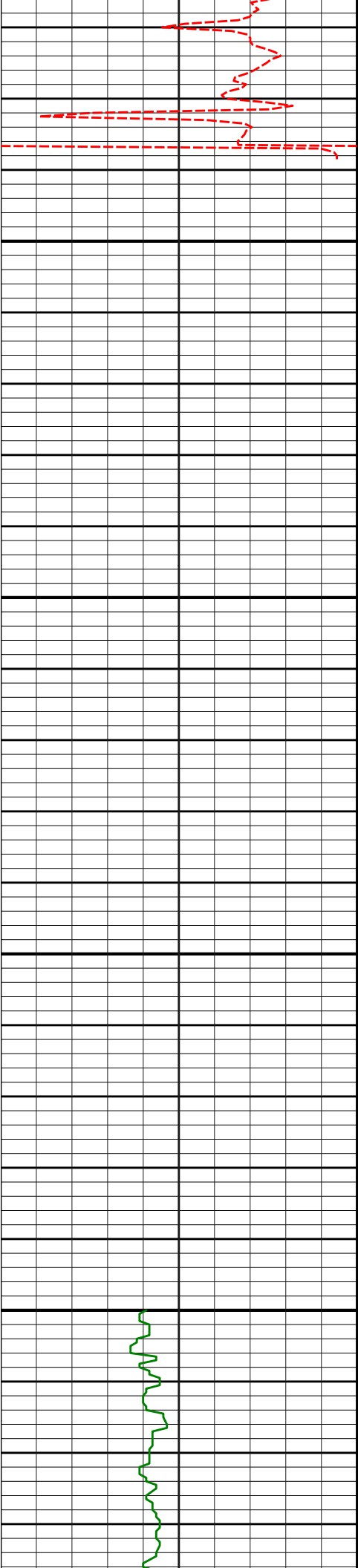
4165'

1.42°

111.21°

4164.15'

2.75'



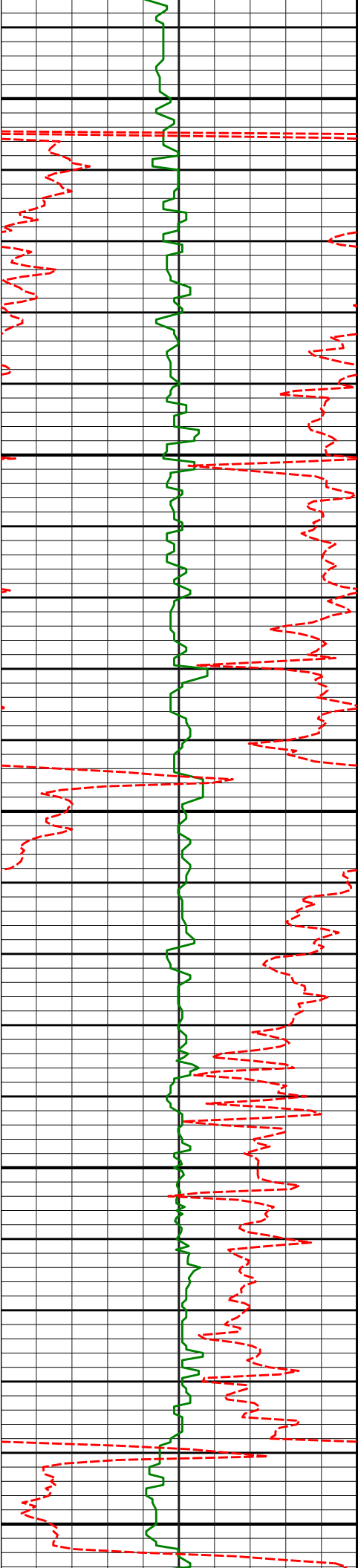
4200

4250

4300

4350

425	Loss of Detection, Geo Steer decided to drill ahead			4256.13'	1.84'
4352'	1.09°	138.50°	4351.11'	0.66'	



4400

4450

4500

4550

4600

4446'

1.02°

141.55°

4445.10'

-0.68'

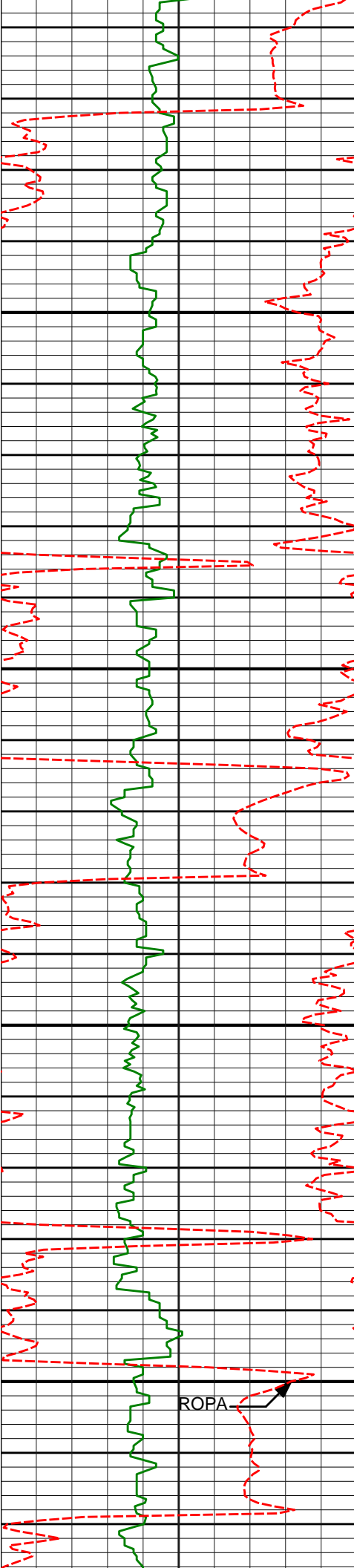
4541'

0.75°

144.08°

4540.08'

-1.86'



4650

4700

4750

4800

4635'

2.70°

92.42°

4634.04'

-2.49'

4729'

3.94°

88.38°

4727.88'

-2.58'

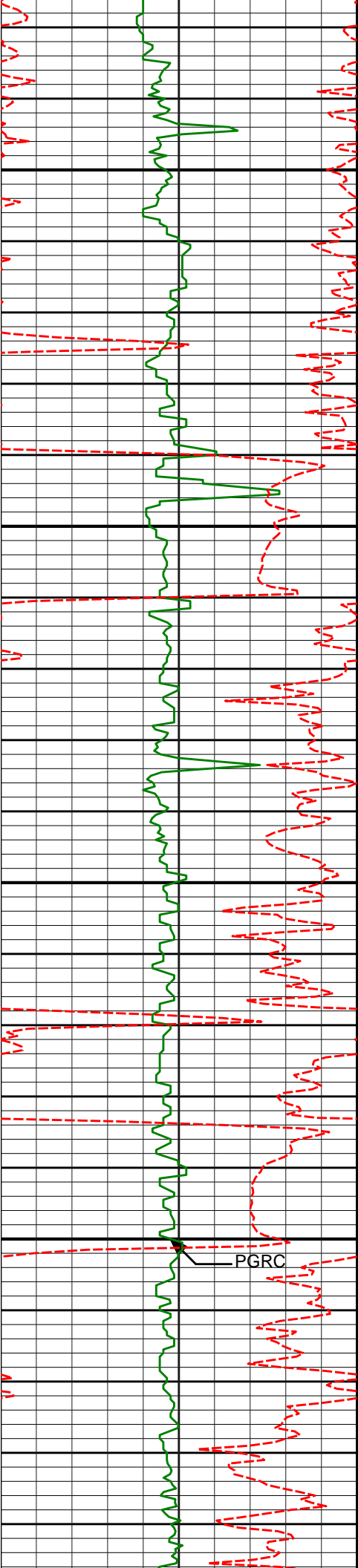
4824'

6.55°

84.84°

4822.48'

-2.14'



4850

4900

4950

5000

PGRC

4918'

8.09°

86.89°

4915.71'

-1.48'

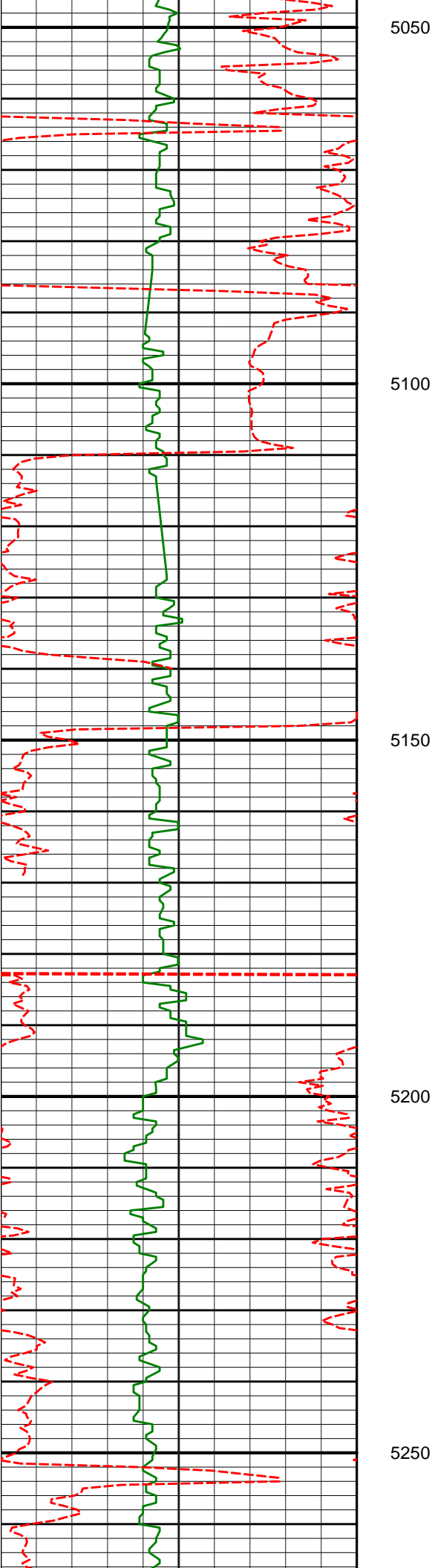
5012'

9.29°

88.61°

5008.63'

-1.15'



5107'

10.13°

86.99°

5102.27'

-0.77'

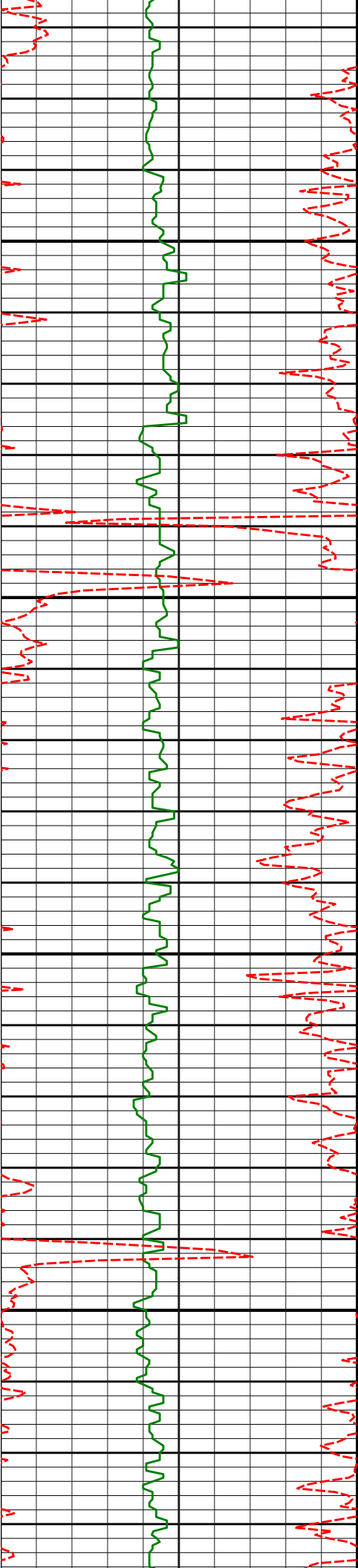
5202'

9.95°

90.10°

5195.81'

-0.59'



5300

5350

5400

5450

5296'

9.44°

88.32°

5288.47'

-0.61'

5390'

8.19°

86.34°

5381.36'

-0.18'

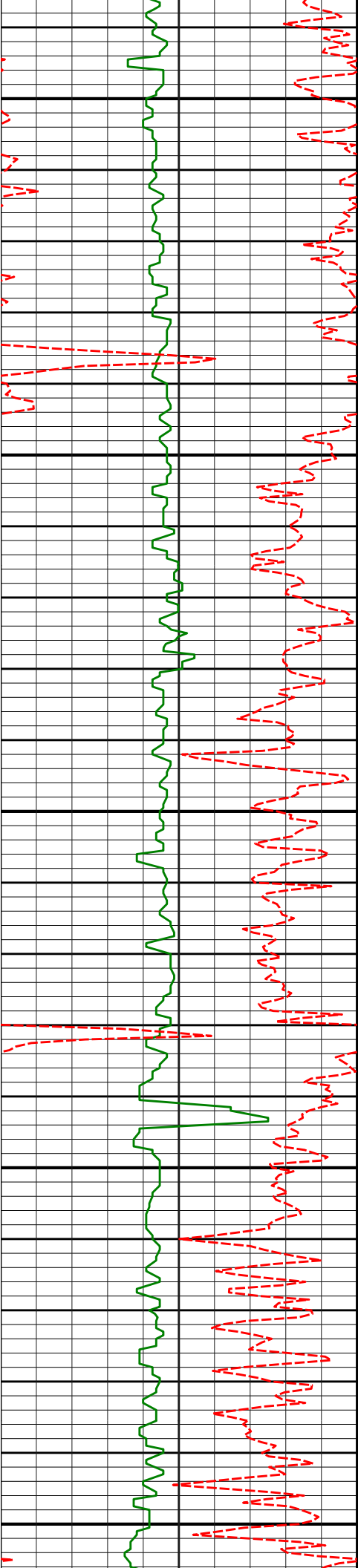
5485'

7.24°

88.04°

5475.50'

0.27'



5500

5550

5579'

6.18°

84.32°

5568.85'

0.80'

5600

5650

5674'

4.91°

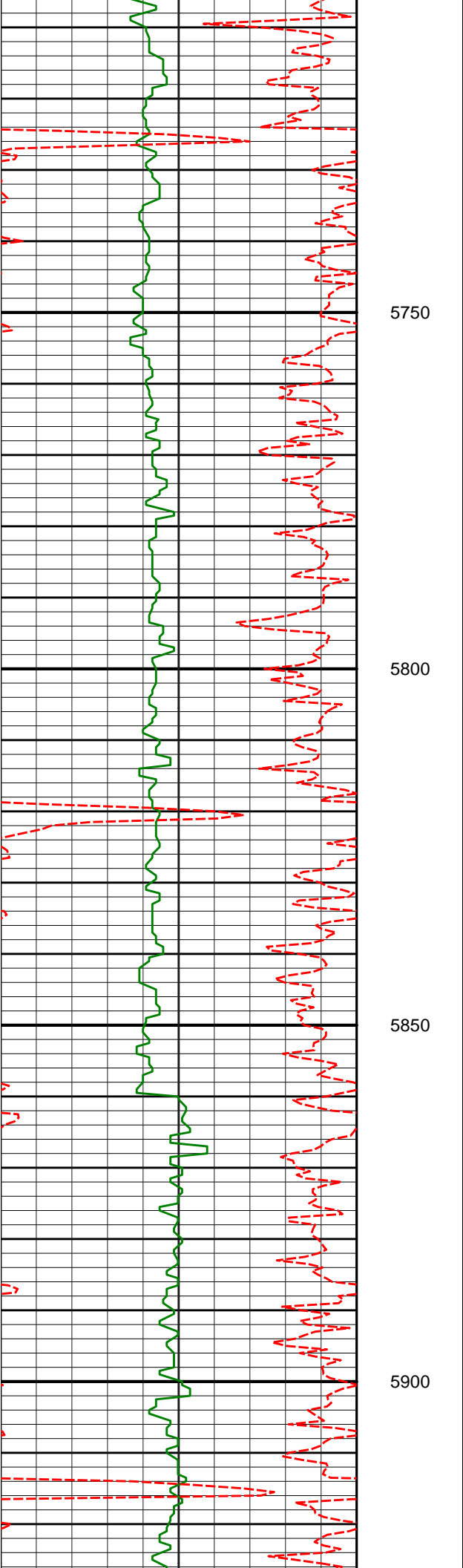
84.51°

5663.40'

1.56'

5700





5750

5800

5850

5900

5768'

4.31°

85.73°

5757.10'

2.09'

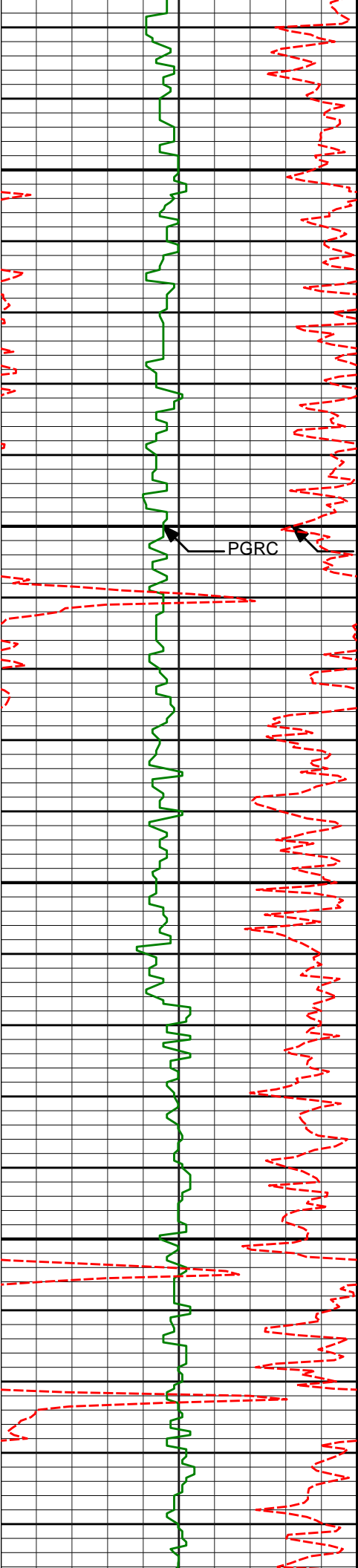
5862'

3.41°

90.71°

5850.89'

2.21'



5950

5957'

2.81°

89.04°

5945.75'

2.14'

6000

PGRC

ROPA

6050

6051'

1.70°

95.59°

6039.67'

1.98'

6100

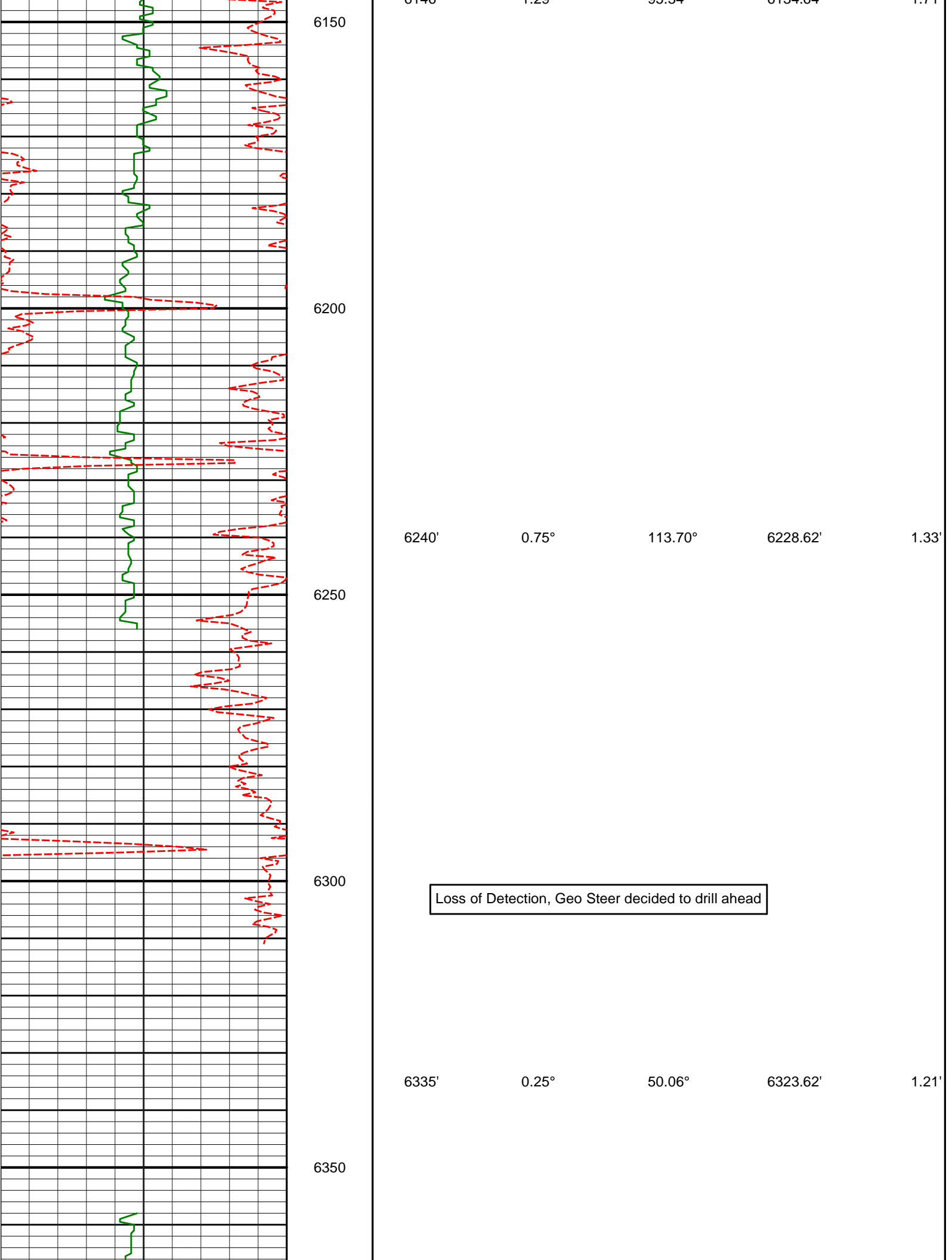
6146'

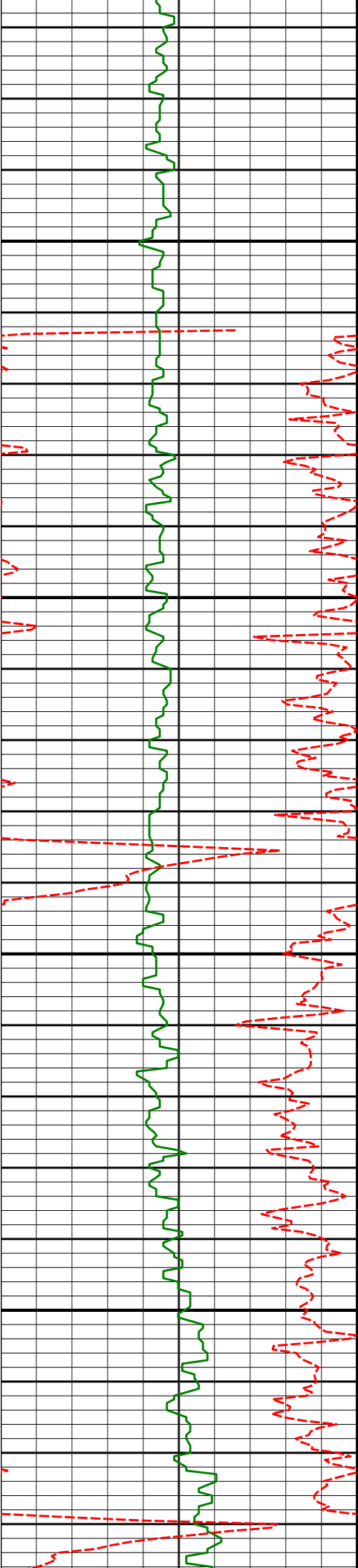
1.29°

95.34°

6134.64'

1.71'





6400

6429'

0.31°

311.95°

6417.62'

1.51'

6450

6500

6523'

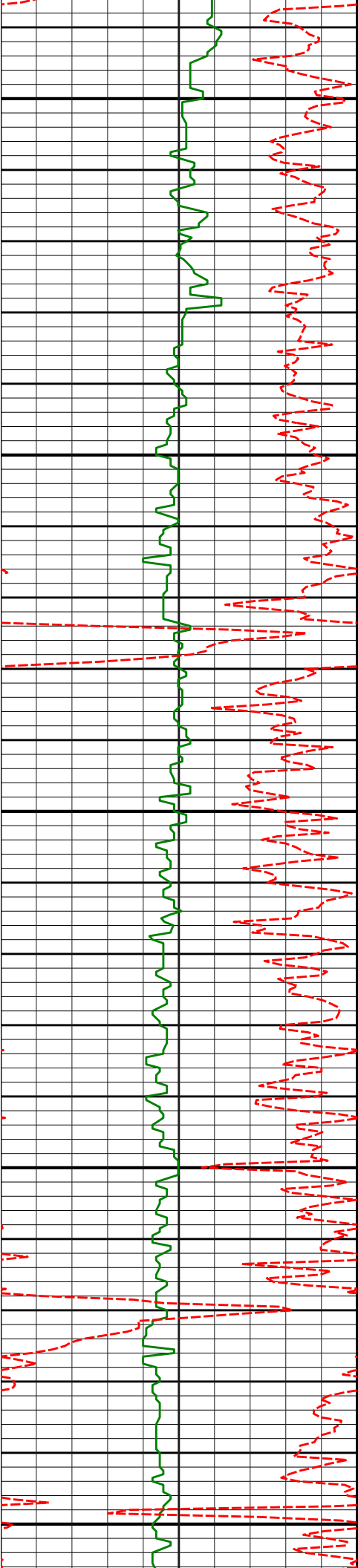
0.31°

294.04°

6511.62'

1.79'

6550



6600

6650

6700

6750

6800

6618'

0.31°

240.55°

6606.62'

1.77'

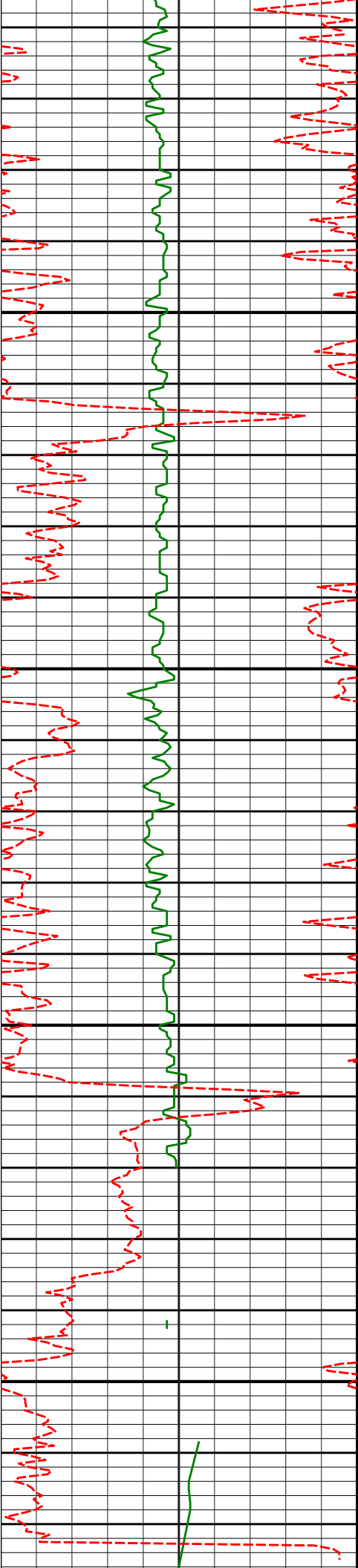
6712'

0.15°

158.82°

6700.62'

1.54'



6850

6900

6950

7000

6807'

0.43°

161.72°

6795.62'

1.08'

6901'

0.25°

202.62°

6889.61'

0.56'

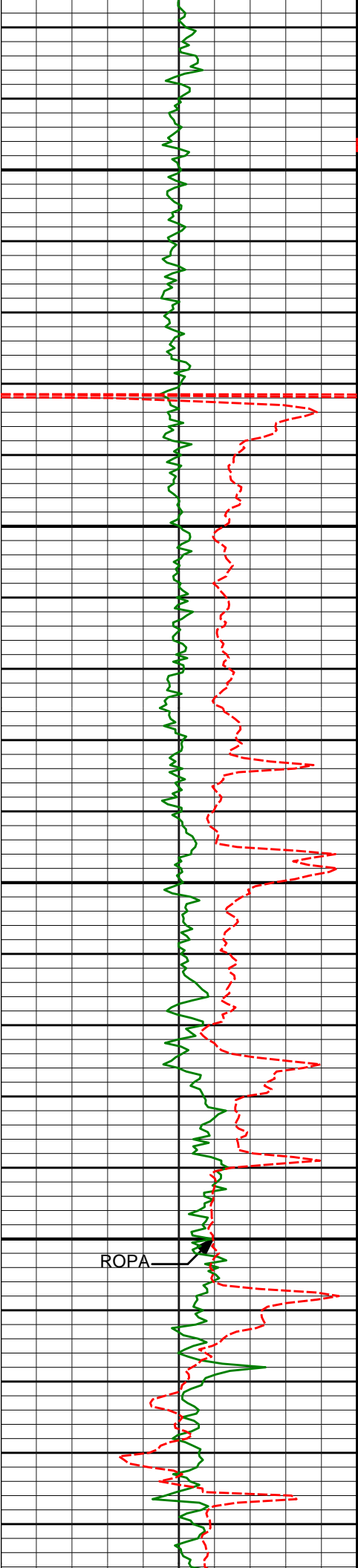
6996'

0.44°

215.66°

6984.61'

0.07'



7050

7090'

1.82°

299.52°

7078.60'

0.54'

7100

7137'

6.32°

353.74°

7125.48'

3.50'

7150

7185'

10.13°

3.61°

7172.98'

10.34'

7200

ROPA

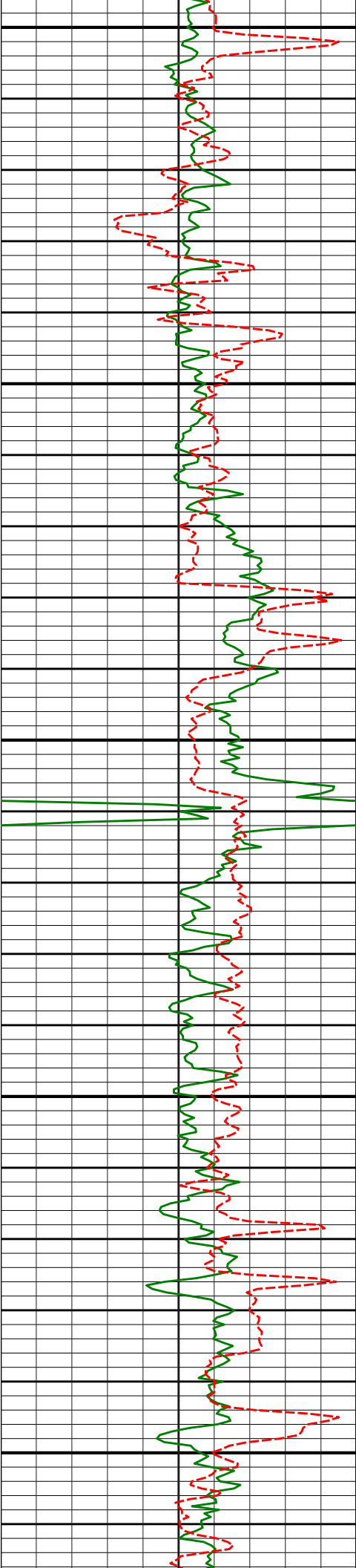
7232'

11.77°

3.96°

7219.12'

19.23'



7250

7279'

14.75°

359.45°

7264.86'

30.00'

7300

7326'

19.82°

1.52°

7309.72'

43.95'

7350

7374'

25.79°

355.81°

7353.96'

62.52'

7400

7421'

32.06°

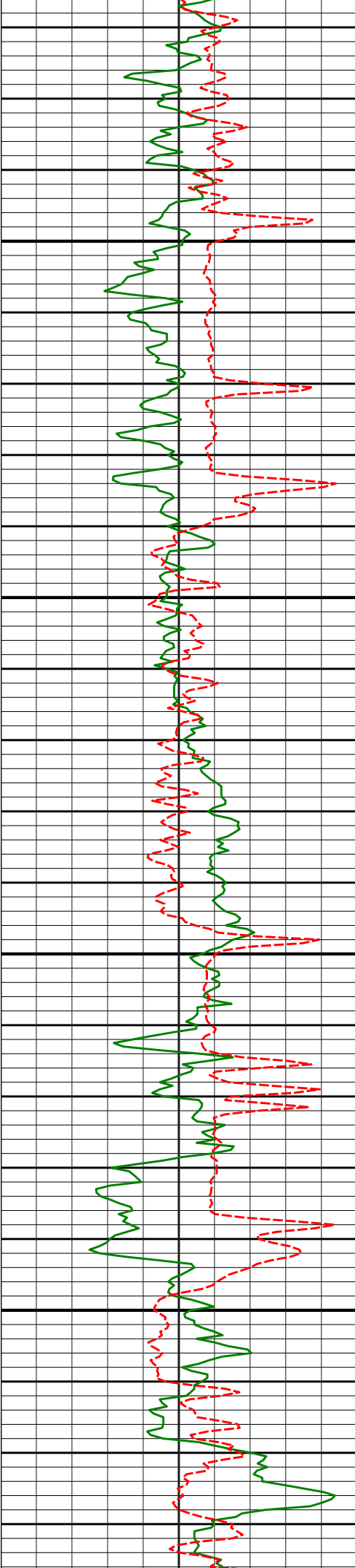
357.14°

7395.07'

85.22'

7450





7500

7550

7600

7650

7468'

35.65°

355.42°

7434.10'

111.37'

7515'

39.63°

355.28°

7471.31'

140.01'

7563'

44.90°

356.18°

7506.82'

172.23'

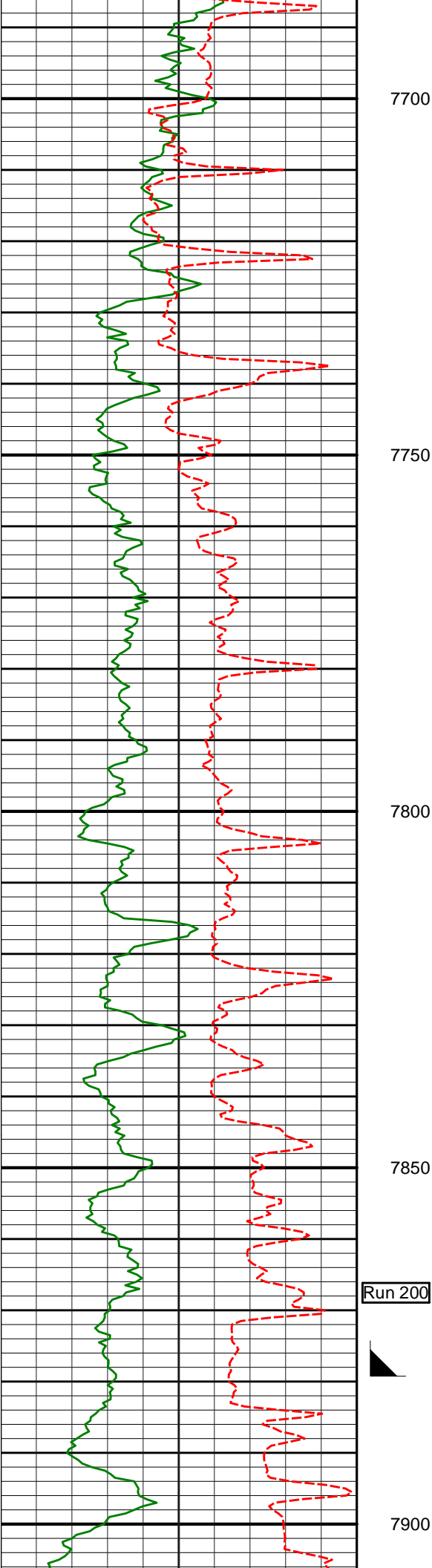
7657'

53.81°

356.86°

7567.42'

243.90'



Run 200



7" casing at 7,875' MD

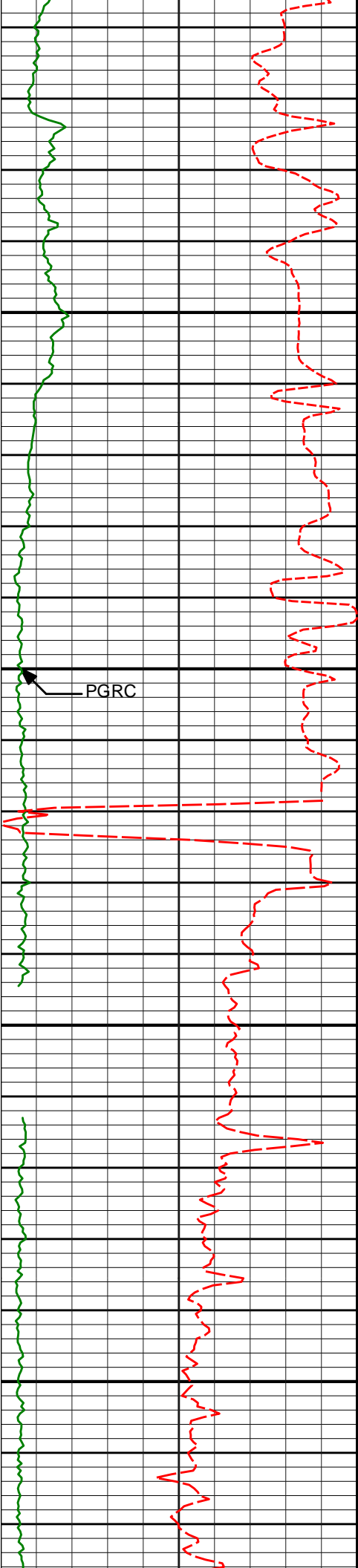
7894'

74.58°

358.70°

7667.39'

457.21'



7950

8000

8050

8100

7941'

79.64°

359.59°

7677.87'

503.01'

7966'

82.86°

0.93°

7681.67'

527.71'

8112'

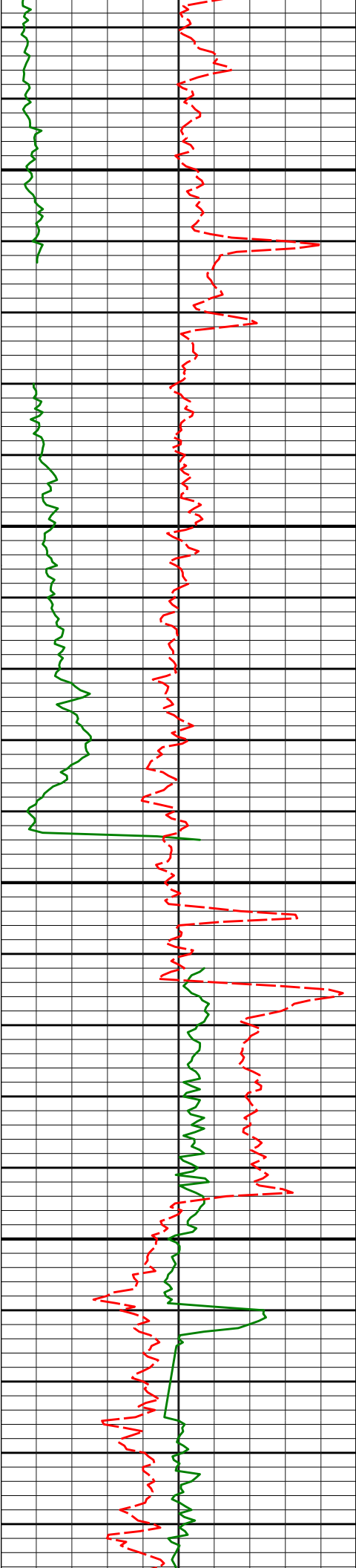
87.19°

1.98°

7694.33'

672.99'

PGRC



8150

8200

8250

8300

8207'

87.29°

2.62°

7698.91'

767.72'

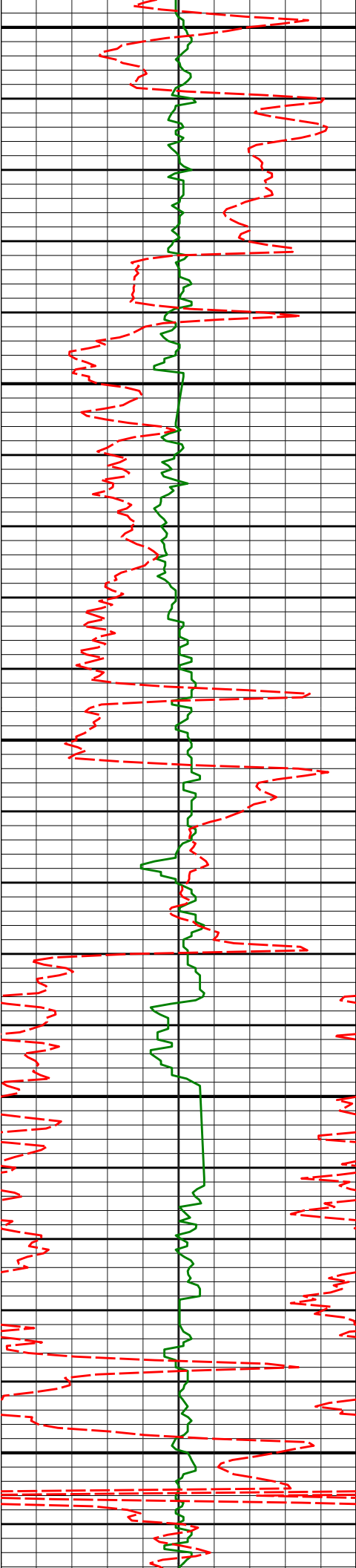
8301'

88.80°

0.96°

7702.11'

861.55'



8350

8396'

89.63°

0.51°

7703.42'

956.50'

8400

8450

8490'

90.22°

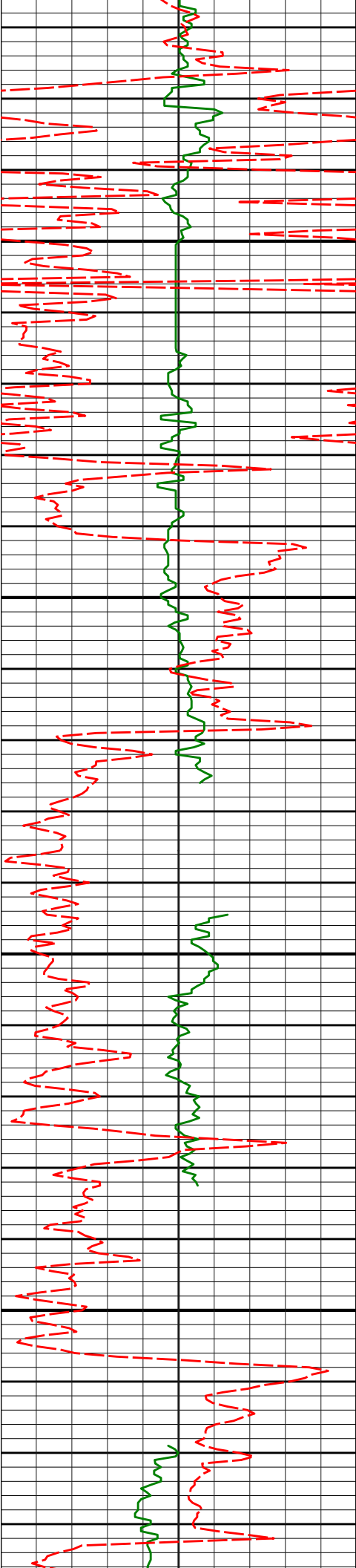
359.59°

7703.54'

1050.48'

8500

8550



8585'

90.34°

357.98°

7703.07'

1145.47'

8600

8650

8700

8750

8679'

89.72°

356.25°

7703.02'

1239.42'

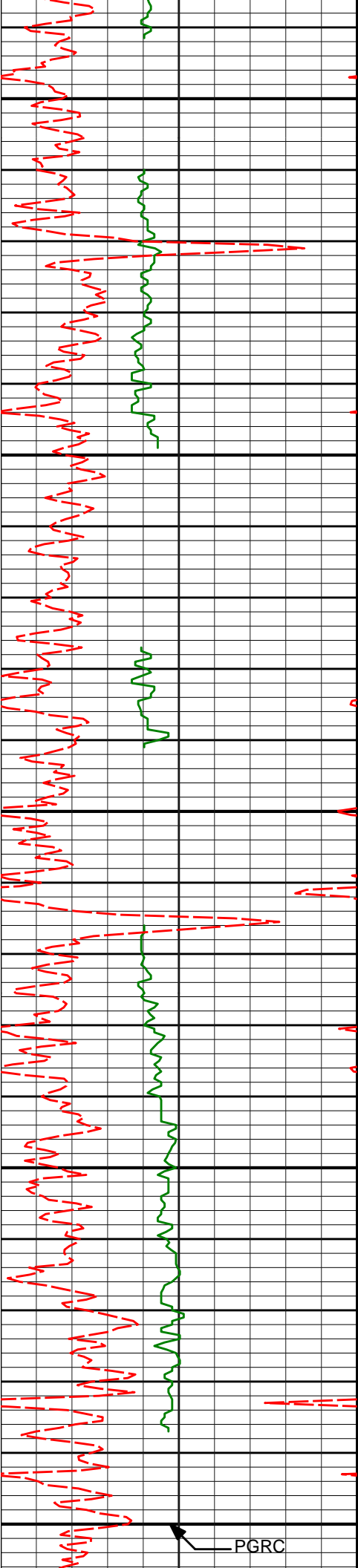
8774'

89.88°

355.79°

7703.36'

1334.30'



8800

8850

8900

8950

9000

8869'

90.83°

355.80°

7702.77'

1429.15'

8963'

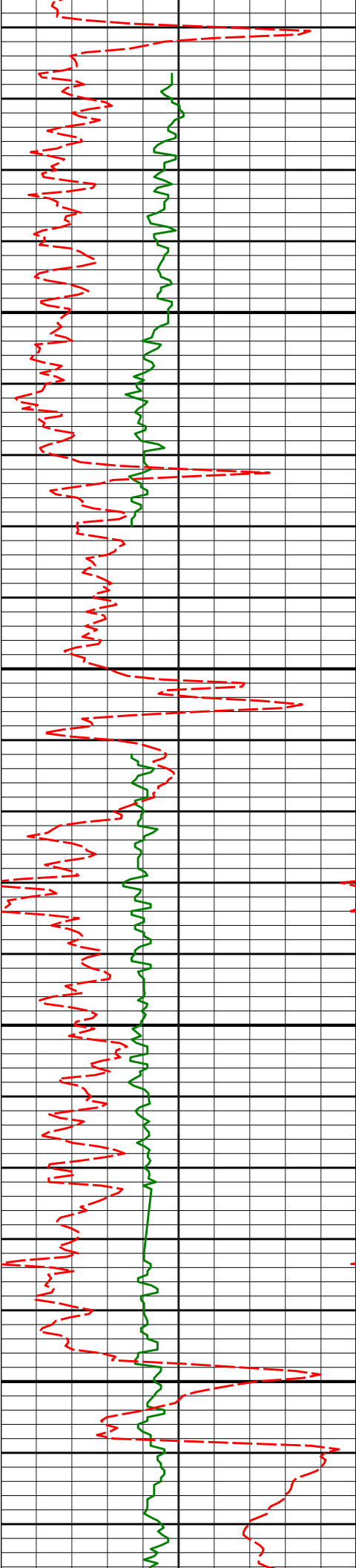
90.59°

355.31°

7701.60'

1522.98'

PGRC



9050

9057'

90.77°

355.05°

7700.49'

1616.77'

9100

9150

9152'

90.43°

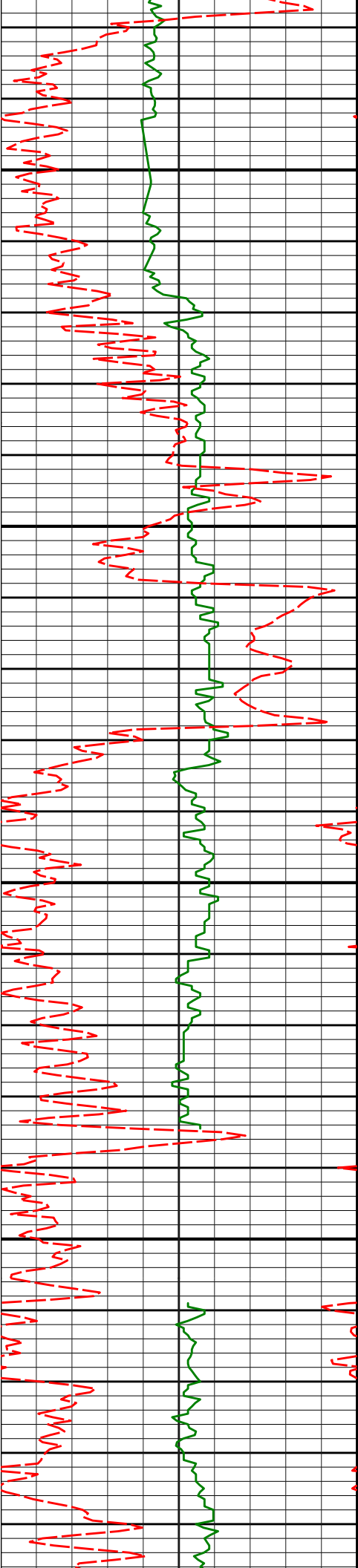
354.32°

7699.49'

1711.51'

9200





9250

9300

9350

9400

9246'

91.11°

355.53°

7698.23'

1805.27'

9339'

89.35°

356.00°

7697.86'

1898.12'

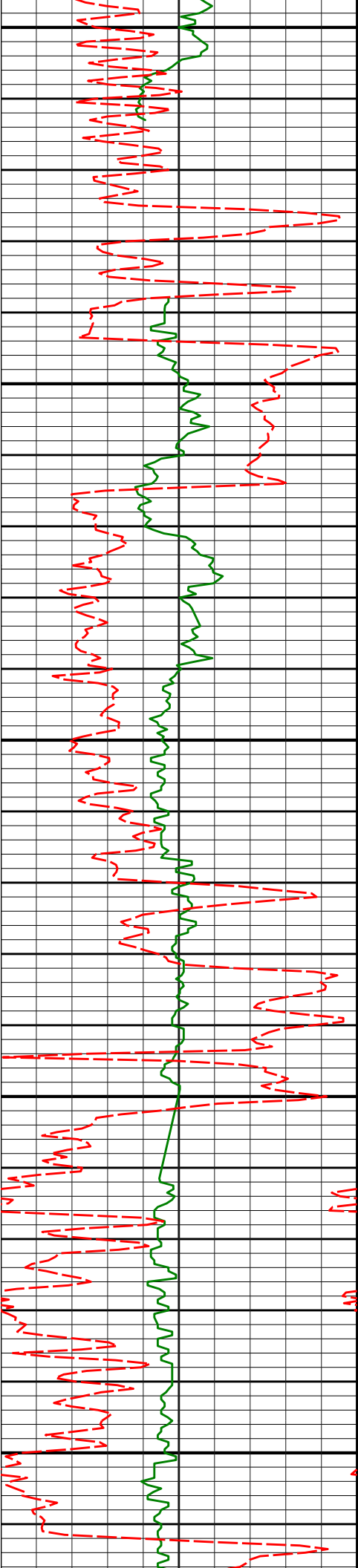
9431'

89.26°

356.04°

7698.97'

1989.99'



9450

9500

9550

9600

9650

9524'

89.69°

357.37°

7699.82'

2082.92'

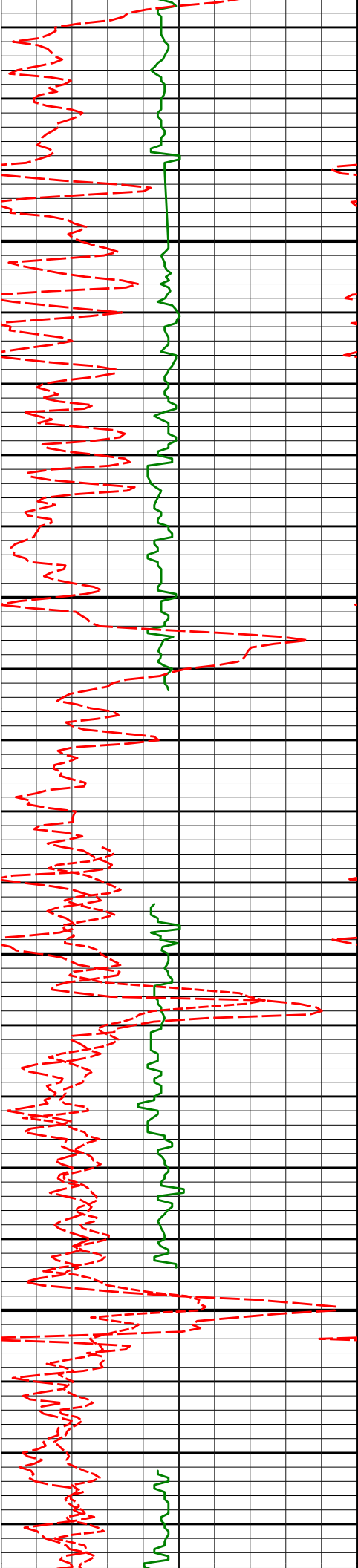
9615'

90.37°

357.00°

7699.78'

2173.87'



9700

9708'

90.62°

357.24°

7698.97'

2266.82'

9750

9800

9801'

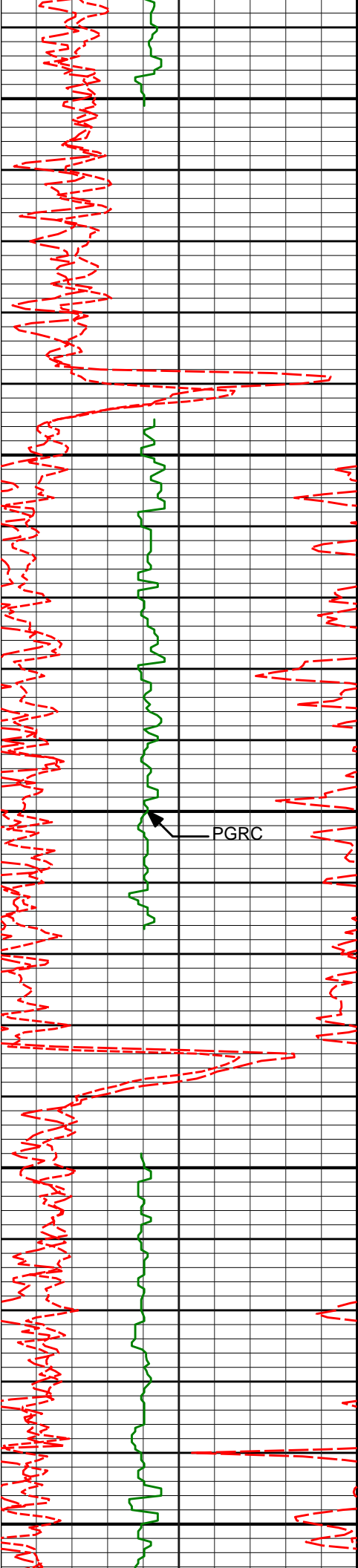
90.46°

357.15°

7698.10'

2359.77'

9850



9900

9950

10000

10050

10100

PGRC

9893'

90.15°

356.39°

7697.61'

2451.71'

9985'

90.40°

356.64°

7697.17'

2543.62'

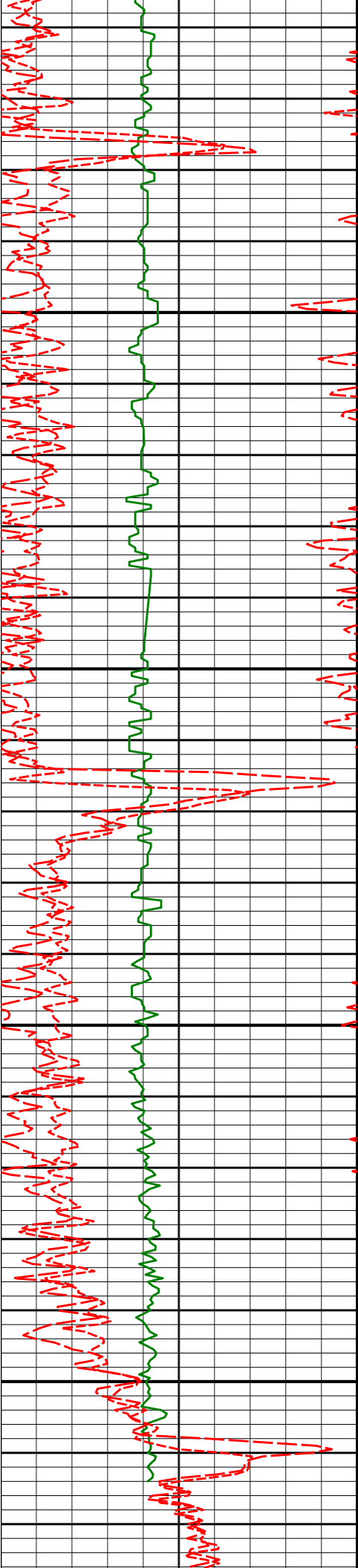
10077'

90.65°

356.66°

7696.32'

2635.54'



10150

10170'

90.89°

356.60°

7695.07'

2728.46'

10200

10250

10263'

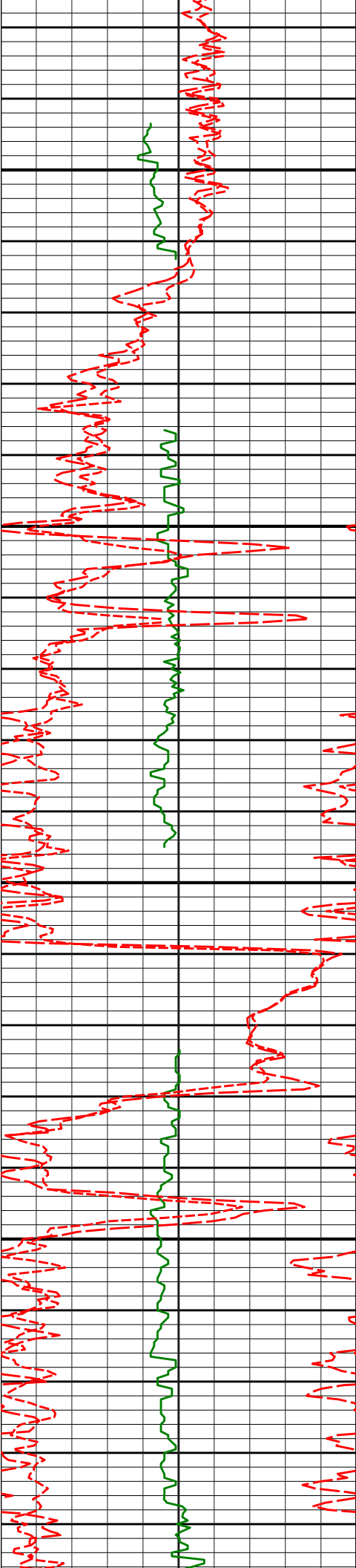
90.86°

356.13°

7693.65'

2821.35'

10300



10350

10355'

89.04°

354.48°

7693.73'

2913.16'

10400

10450

10447'

88.15°

353.70°

7695.99'

3004.81'

10500

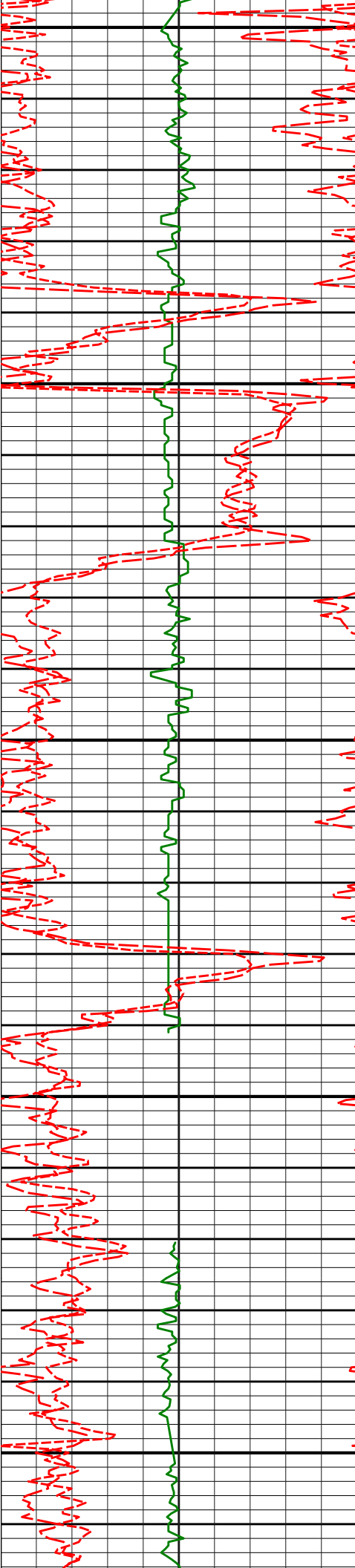
10539'

89.66°

353.83°

7697.75'

3096.42'



10550

10600

10650

10700

10750

10631'

89.05°

355.09°

7698.78'

3188.13'

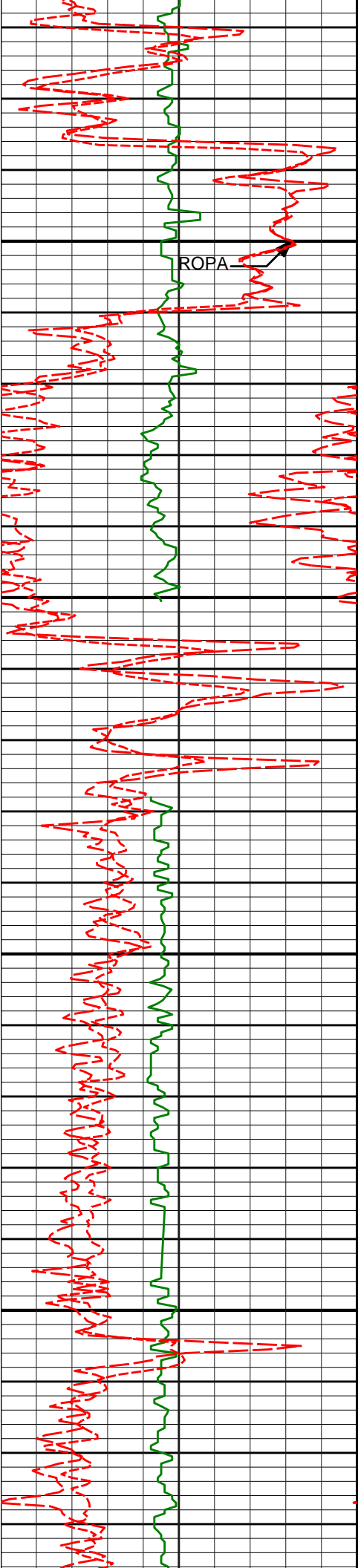
10723'

89.41°

354.77°

7700.02'

3279.90'



10800

10815'

90.03°

356.29°

7700.47'

3371.73'

10850

10900

10906'

89.94°

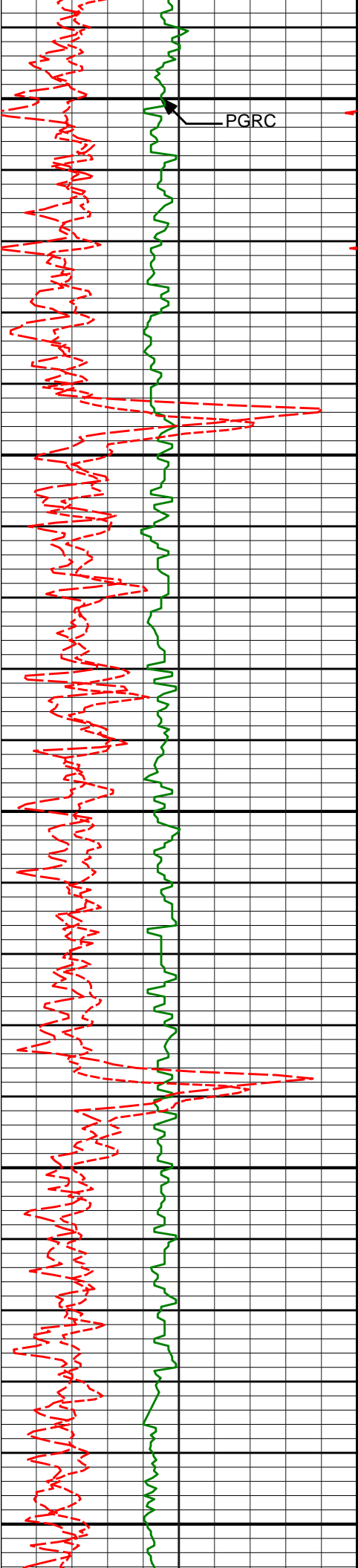
356.48°

7700.49'

3462.64'

10950





11000

10999'

89.72°

356.09°

7700.77'

3555.54'

PGRC

11050

11093'

89.91°

356.00°

7701.07'

3649.42'

11100

11150

11184'

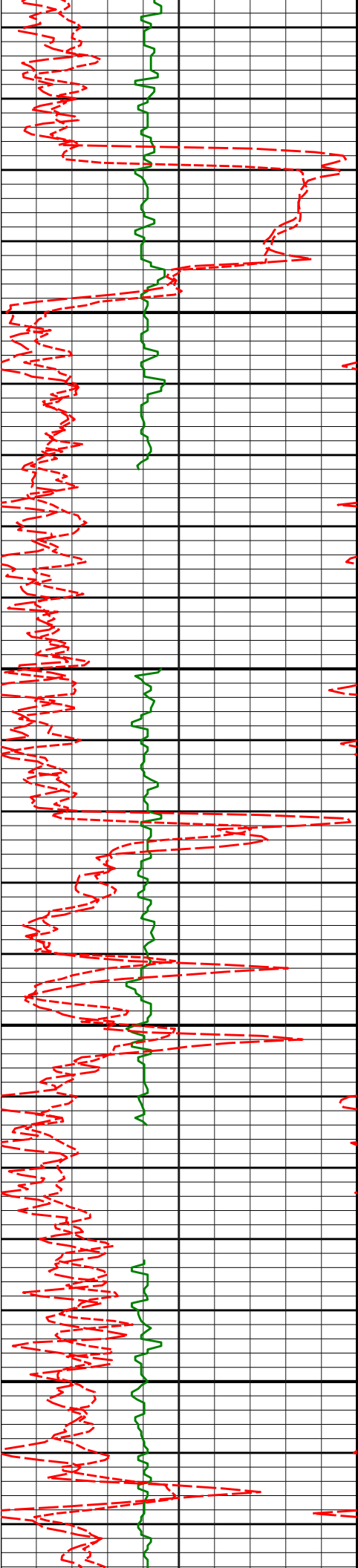
90.46°

356.30°

7700.78'

3740.31'

11200



11250

11276'

90.62°

357.27°

7699.91'

3832.24'

11300

11350

11368'

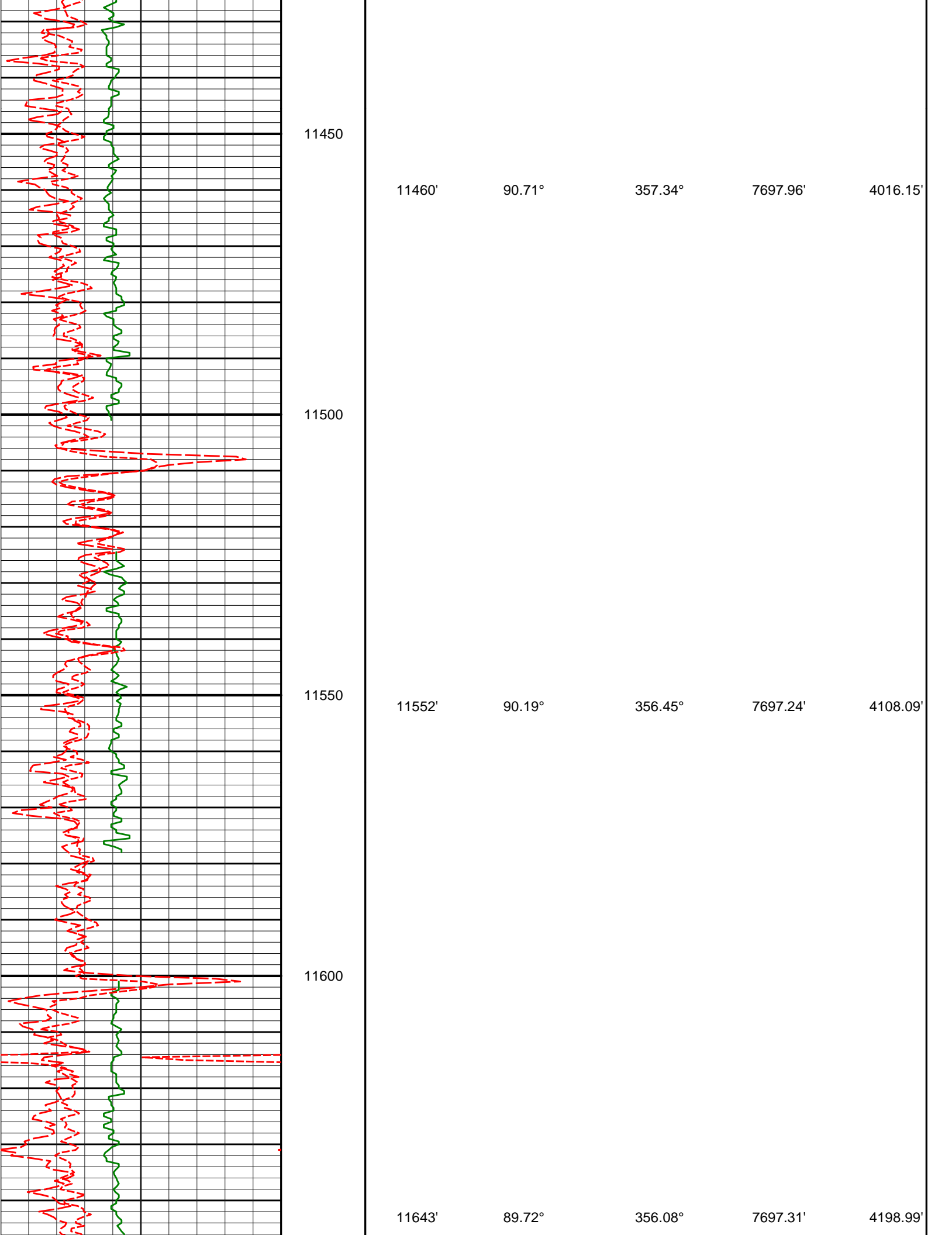
90.55°

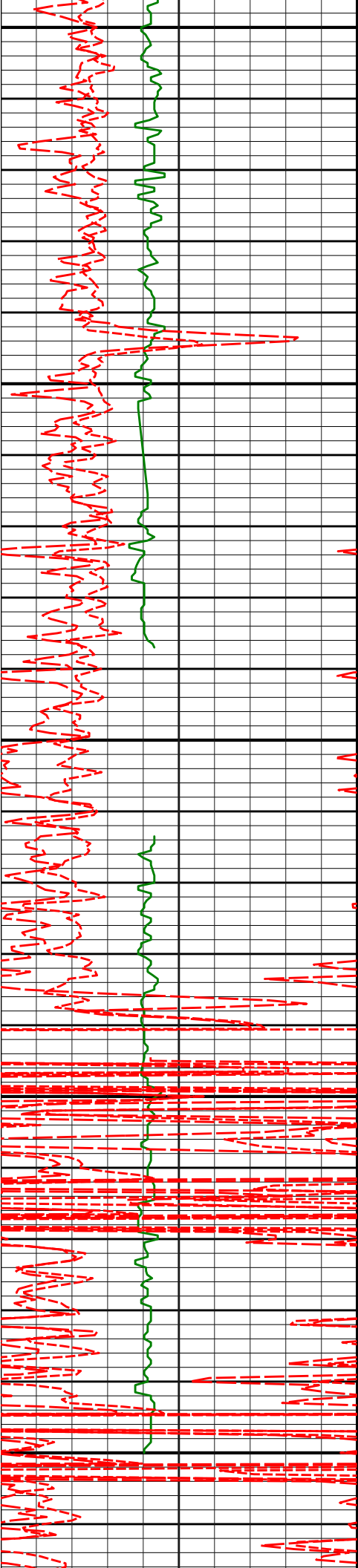
357.29°

7698.97'

3924.20'

11400





11650

11700

11750

11800

11850

11735'

89.38°

355.48°

7698.03'

4290.85'

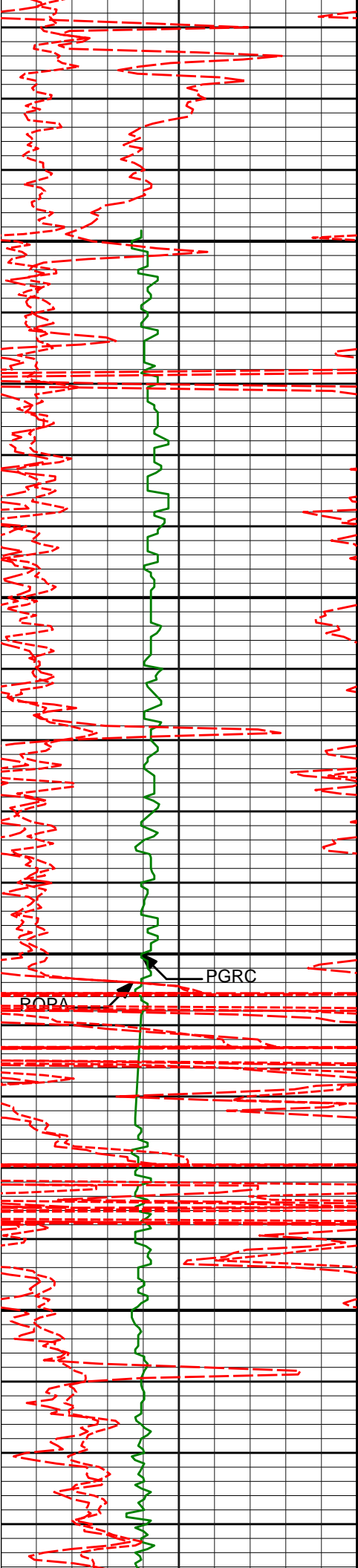
11827'

89.14°

355.34°

7699.22'

4382.67'



11900

11918'

90.68°

357.01°

7699.36'

4473.55'

11950

12000

POPA

PGRC

12010'

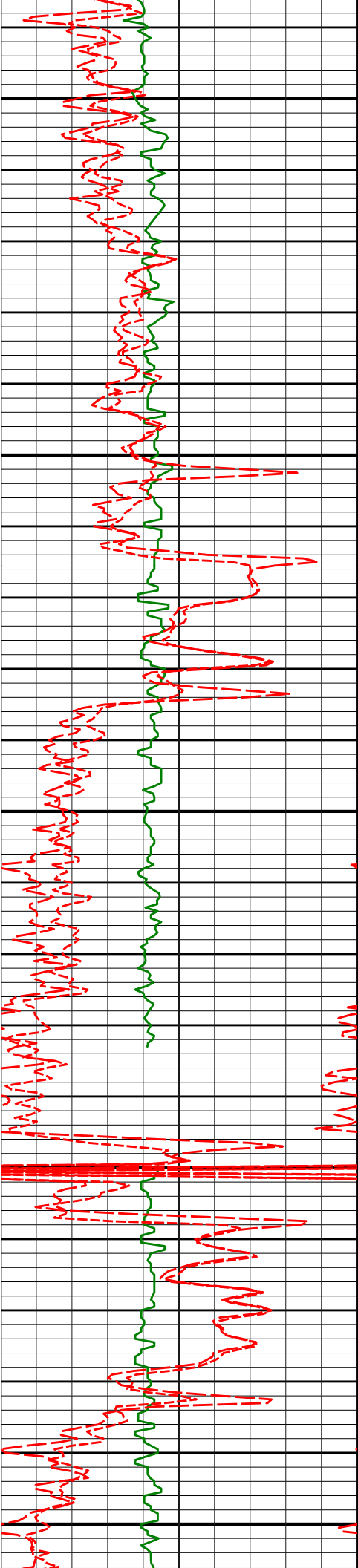
91.60°

358.22°

7697.53'

4565.51'

12050



12100

12105'

90.86°

357.06°

7695.49'

4660.46'

12150

12200

12199'

89.17°

357.14°

7695.47'

4754.41'

12250

12300

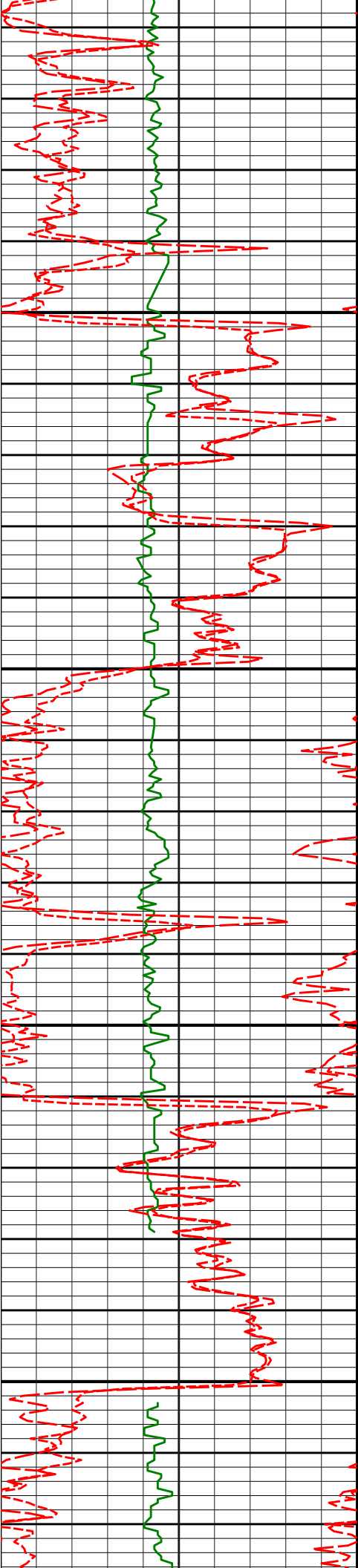
12294'

90.62°

357.05°

7695.64'

4849.35'



12350

12388'

89.57°

358.38°

7695.49'

4943.33'

12400

12450

12500

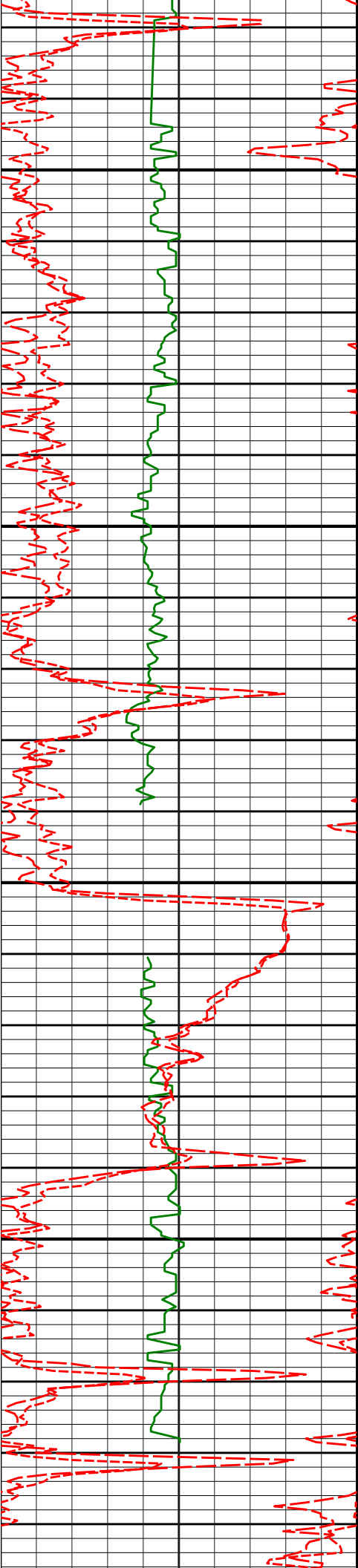
12483'

90.40°

358.82°

7695.51'

5038.32'



12550

12600

12650

12700

12578'

90.77°

359.20°

7694.54'

5133.32'

12672'

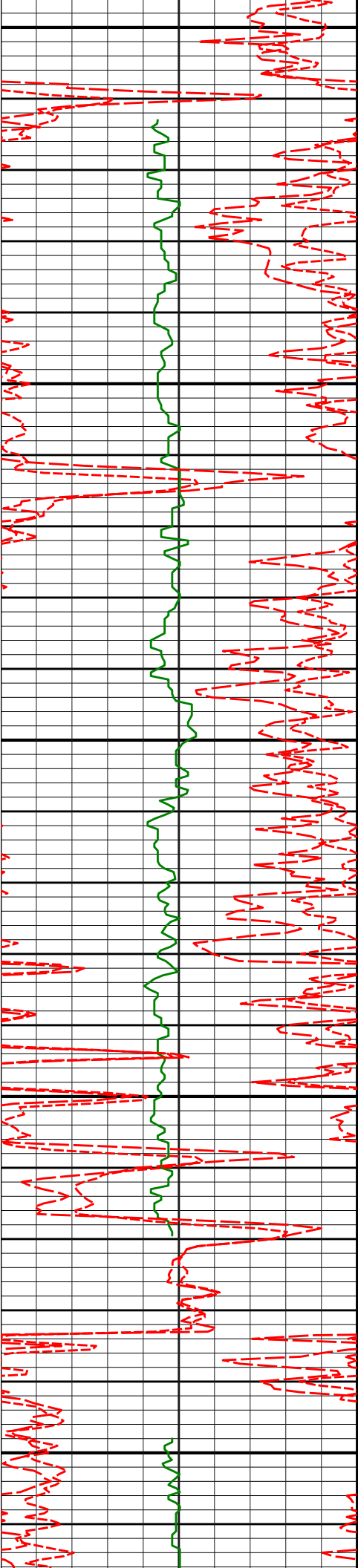
90.43°

0.66°

7693.56'

5227.30'





12750

12767'

89.60°

0.79°

7693.53'

5322.25'

12800

12850

12862'

90.18°

0.79°

7693.71'

5417.21'

12900

12950

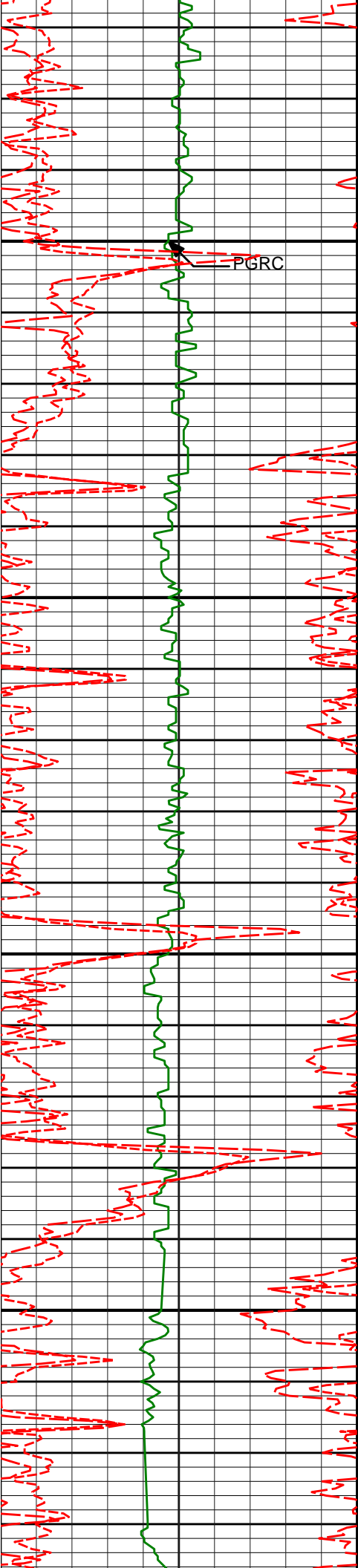
12957'

89.23°

0.78°

7694.20'

5512.16'



13000

PGRC

13050

13052'

89.38°

0.59°

7695.36'

5607.11'

13100

13150

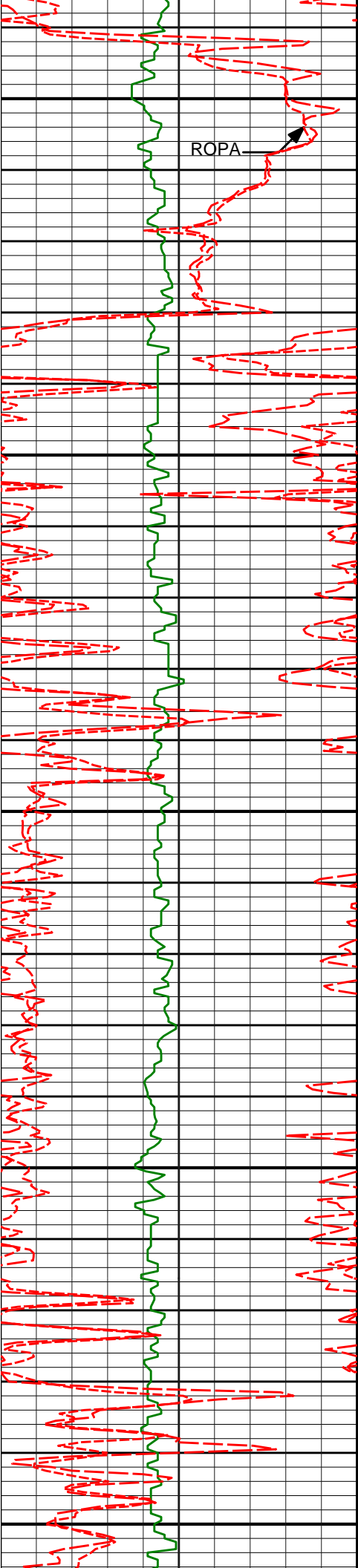
13146'

89.97°

0.40°

7695.89'

5701.07'



13200

ROPA

13241'

88.03°

0.97°

7697.55'

5796.01'

13250

13300

13336'

88.46°

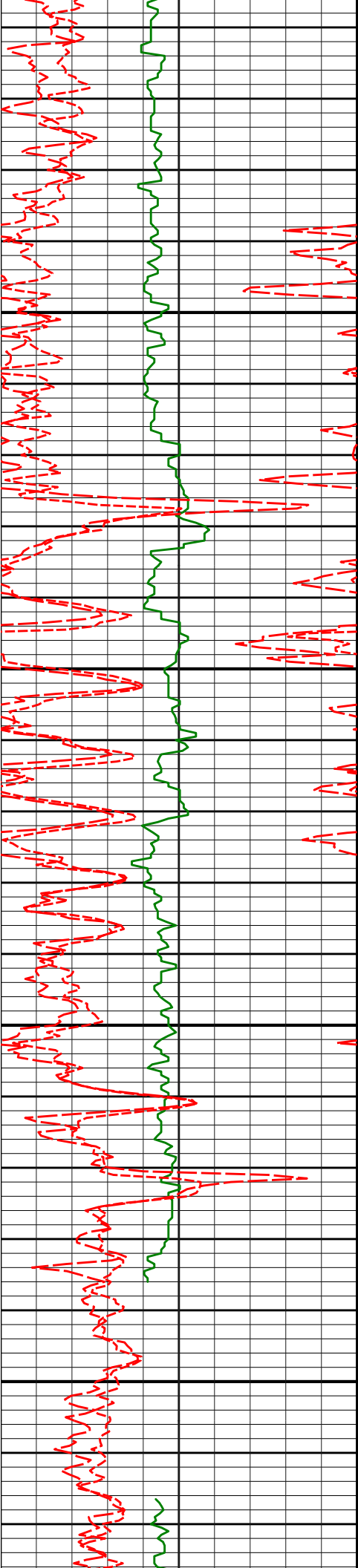
0.49°

7700.46'

5890.92'

13350

13400



13431'

90.25°

0.95°

7701.53'

5985.87'

13450

13500

13526'

90.06°

0.15°

7701.27'

6080.83'

13550

13600

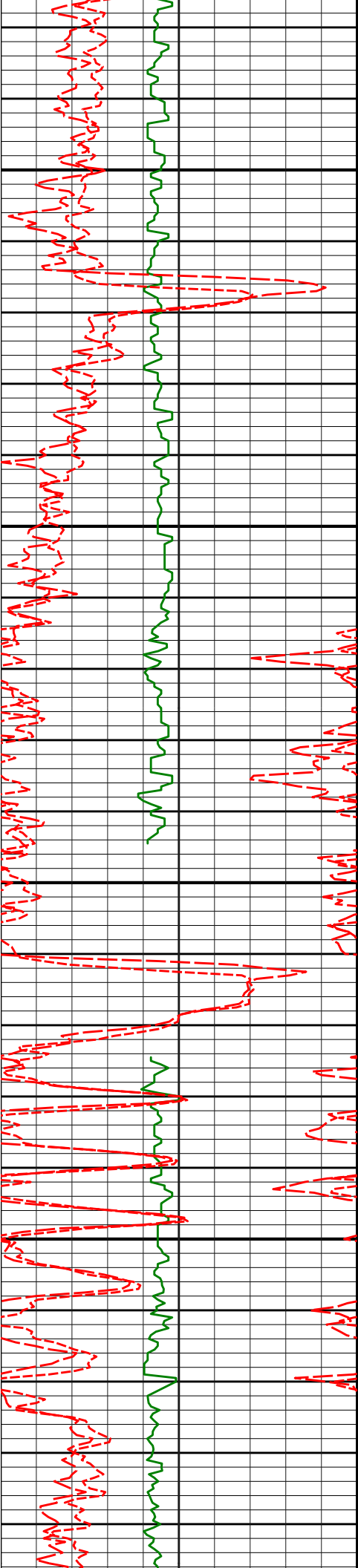
13621'

91.17°

0.18°

7700.25'

6175.80'



13650

13700

13750

13800

13715'

91.39°

359.95°

7698.15'

6269.76'

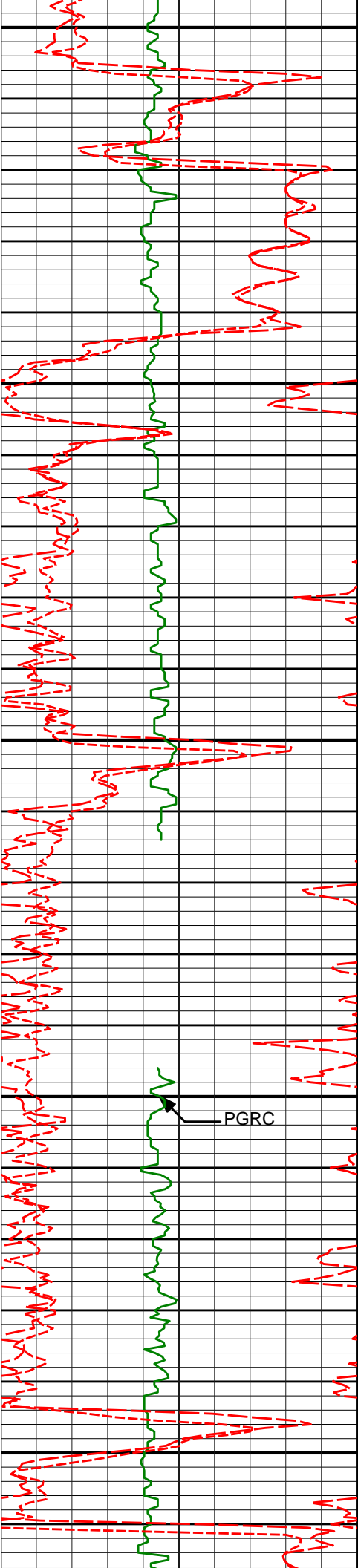
13810'

91.60°

0.08°

7695.67'

6364.72'



13850

13900

13950

14000

14050

13905'

90.06°

0.11°

7694.30'

6459.68'

13999'

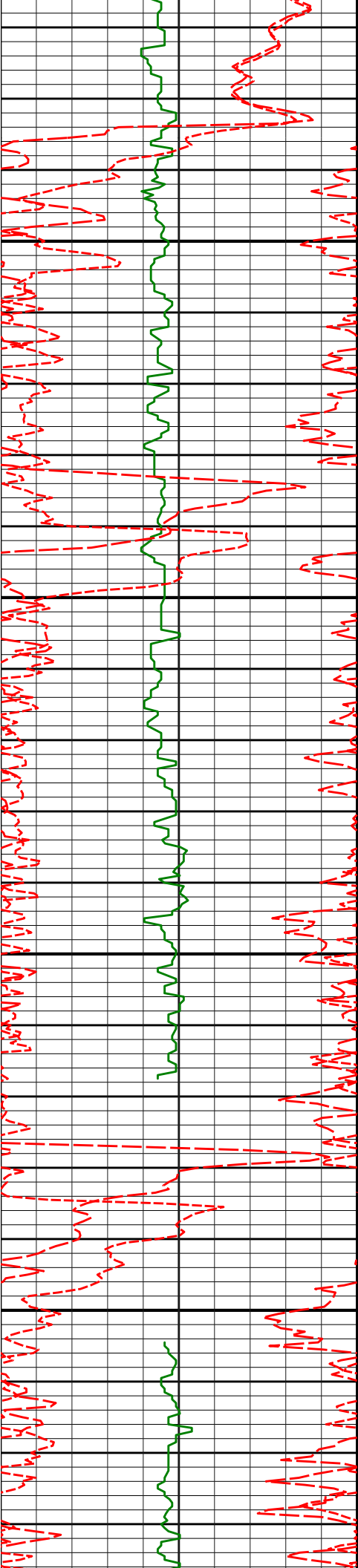
90.59°

0.13°

7693.76'

6553.66'

PGRC



14100

14150

14200

14250

14094'

89.14°

0.54°

7693.99'

6648.63'

14188'

89.23°

0.20°

7695.32'

6742.60'

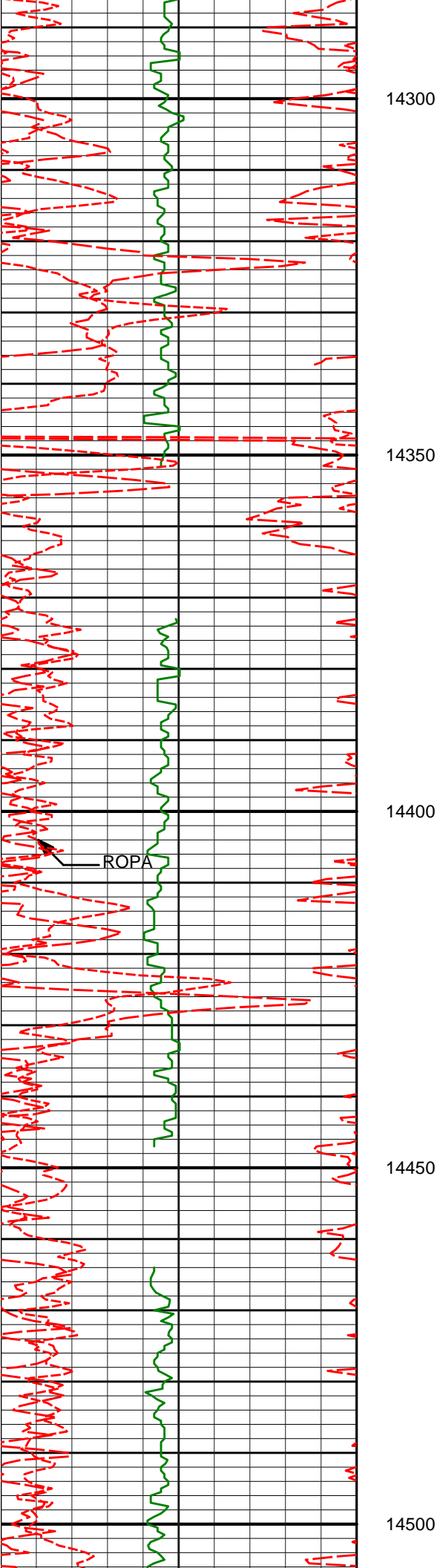
14283'

89.45°

0.19°

7696.42'

6837.57'



14378'

89.94°

0.21°

7696.92'

6932.55'

14473'

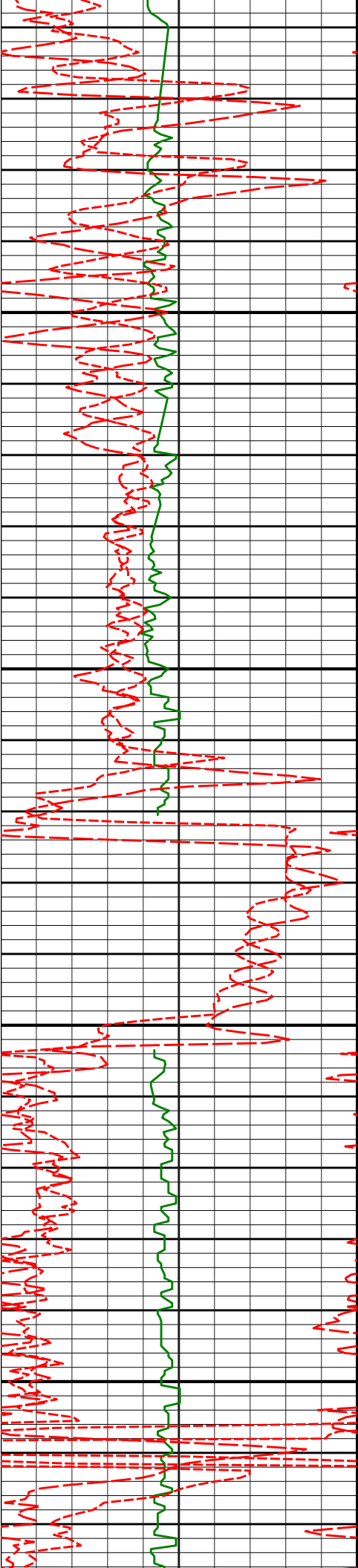
89.72°

359.93°

7697.21'

7027.53'





14550

14568'

90.15°

0.27°

7697.31'

7122.51'

14600

14650

14663'

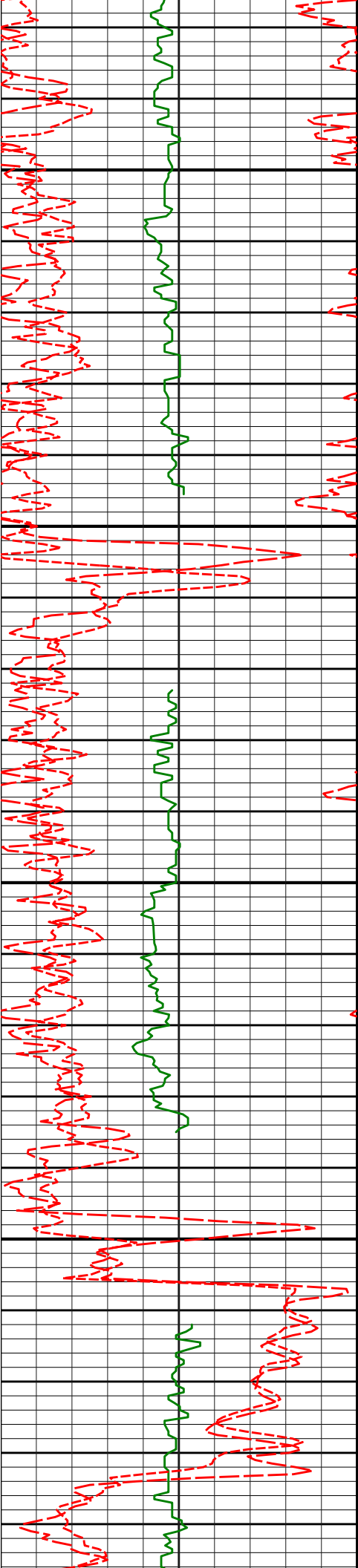
89.41°

358.90°

7697.68'

7217.50'

14700



14750

14758'

90.09°

358.82°

7698.09'

7312.50'

14800

14850

14852'

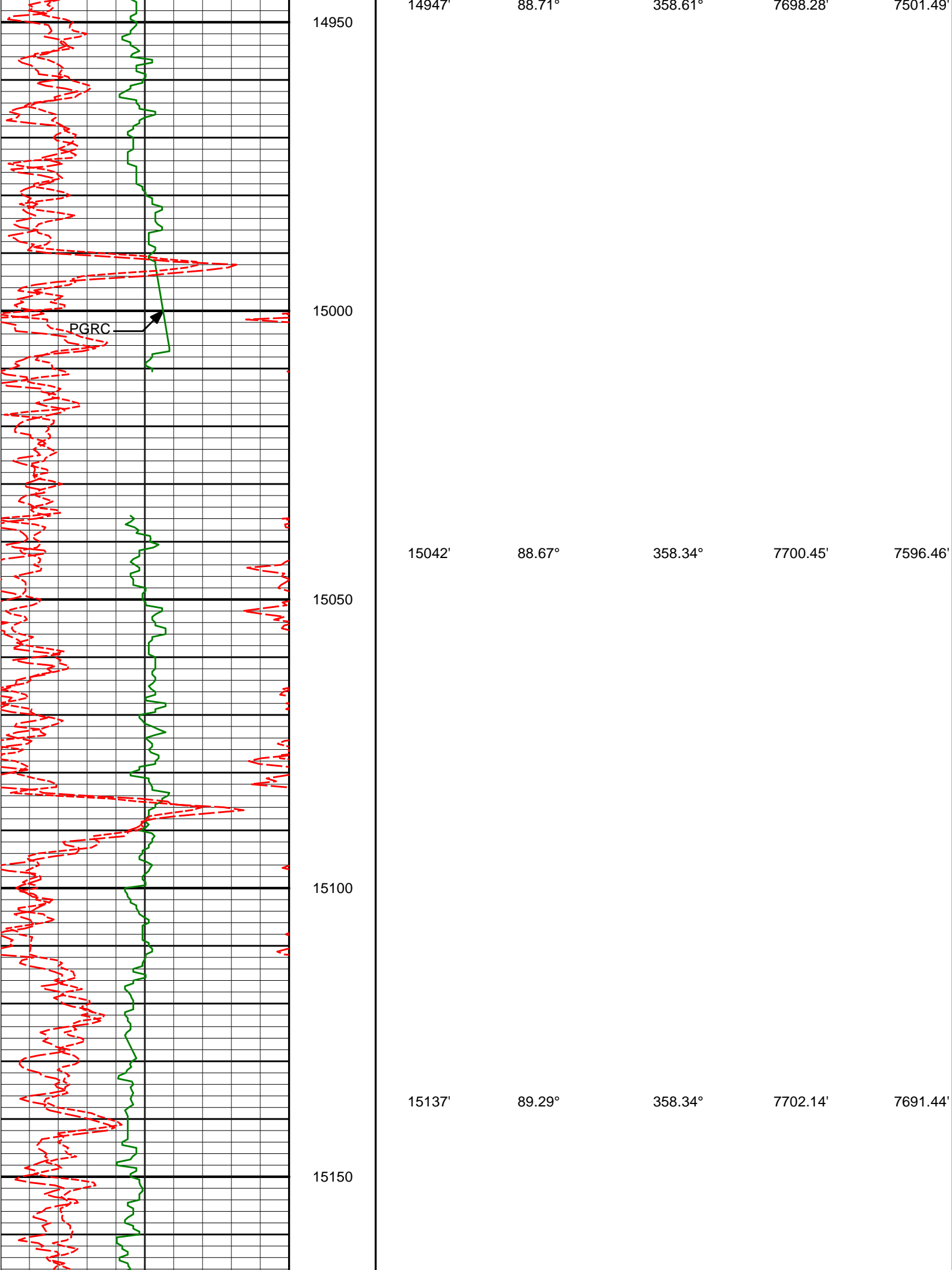
90.49°

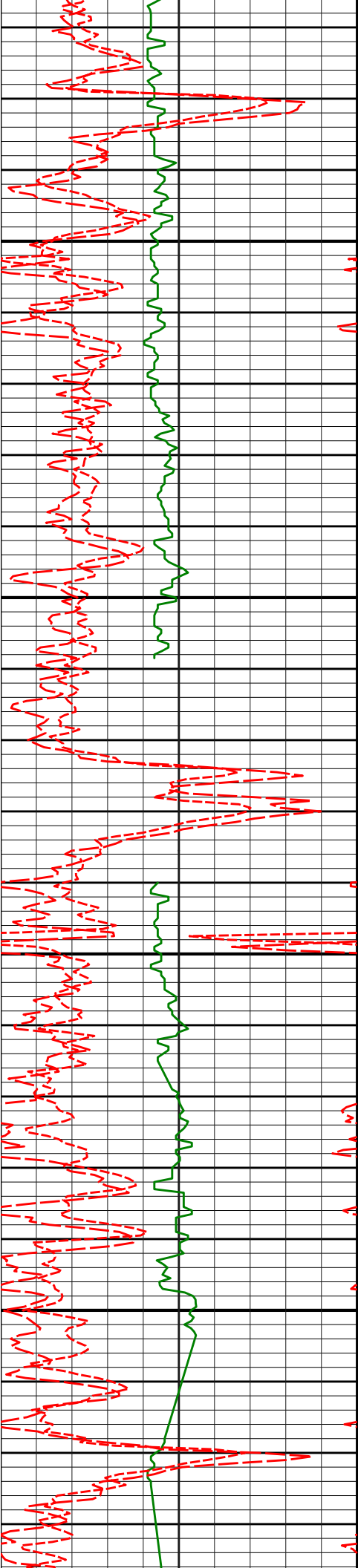
359.25°

7697.62'

7406.50'

14900





15200

15250

15300

15350

15231'

89.72°

358.03°

7702.96'

7785.43'

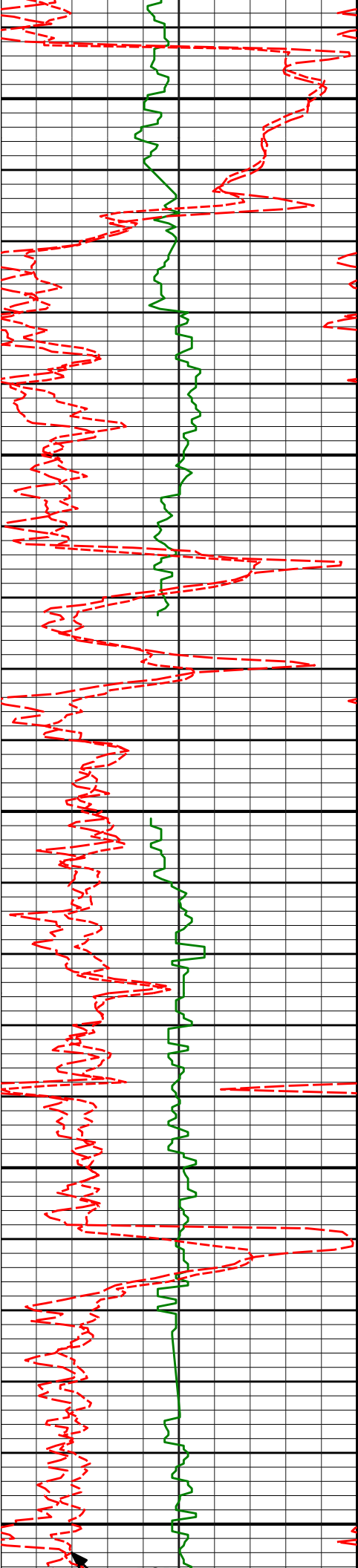
15326'

90.62°

358.38°

7702.67'

7880.42'



15400

15421'

88.58°

357.70°

7703.34'

7975.40'

15450

15500

15516'

89.14°

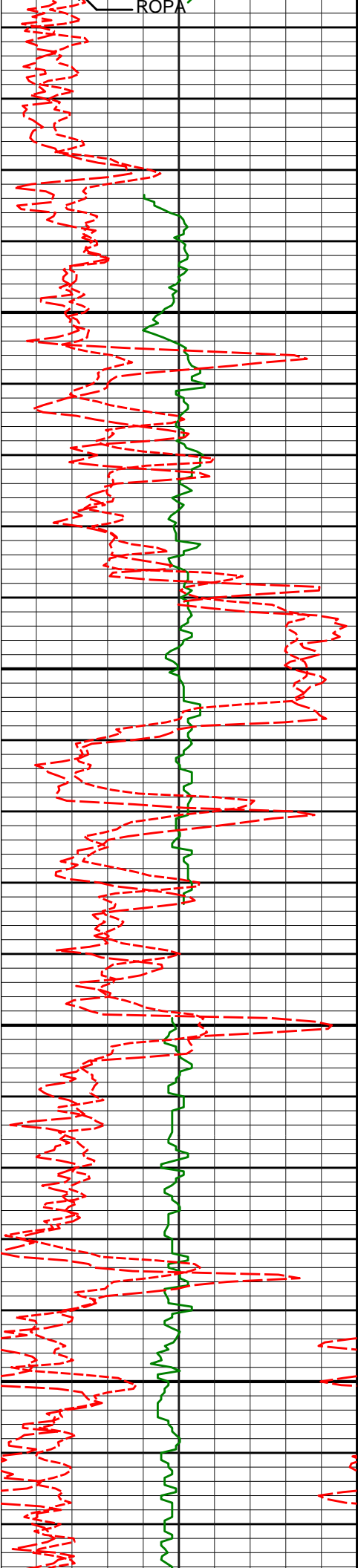
357.81°

7705.23'

8070.36'

15550

15600



15650

15700

15750

15800

15611'

89.26°

357.80°

7706.55'

8165.33'

15705'

90.12°

357.92°

7707.06'

8259.31'

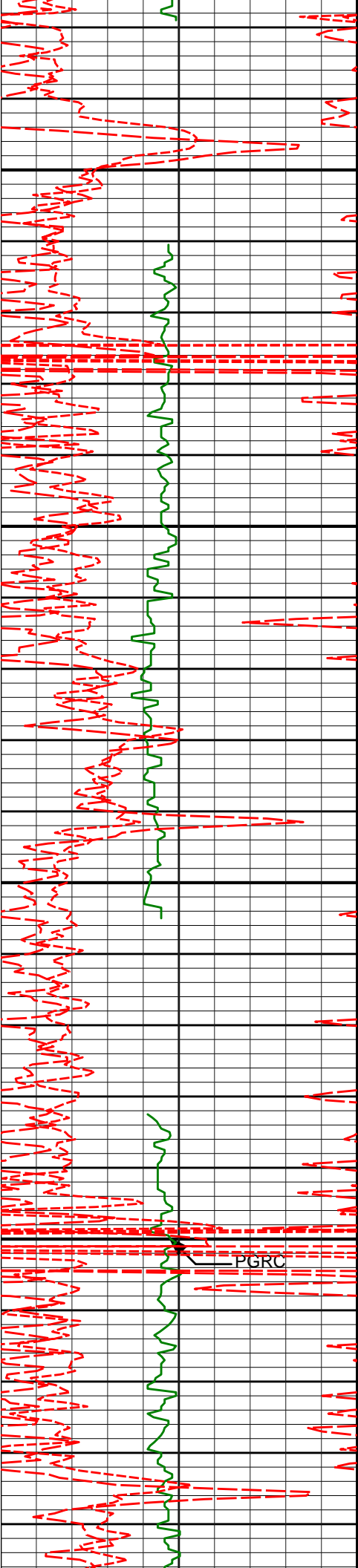
15800'

91.26°

358.96°

7705.92'

8354.30'



15850

15894'

91.23°

358.96°

7703.88'

8448.27'

15900

15950

15989'

91.54°

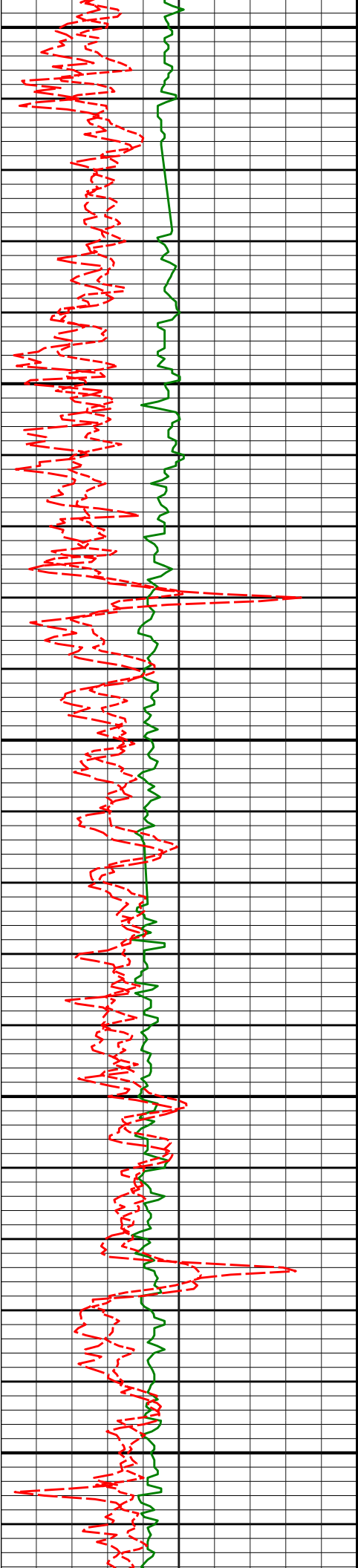
359.01°

7701.58'

8543.25'

16000

PGRC



16050

16100

16150

16200

16250

16178'

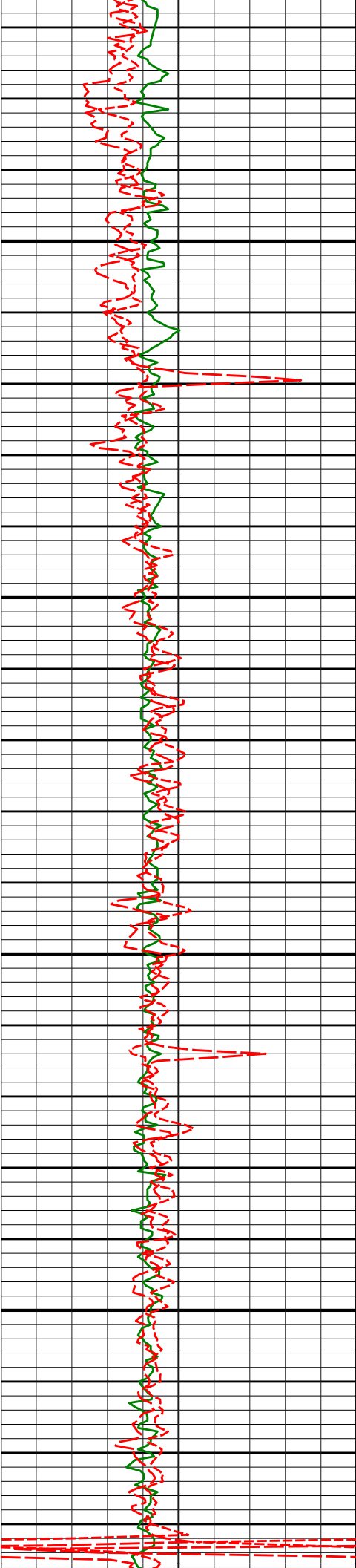
90.80°

357.94°

7698.07'

8732.20'





16300

16350

16400

16450

16272'

90.62°

357.42°

7696.90'

8826.17'

16367'

91.14°

357.85°

7695.45'

8921.14'

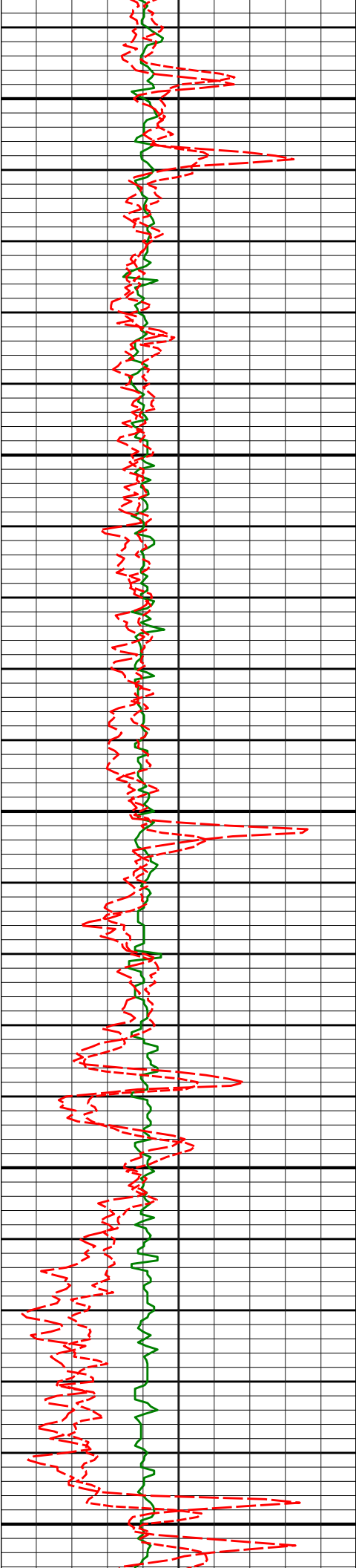
16461'

90.92°

357.51°

7693.76'

9015.10'



16500

16550

16600

16650

16700

16556'

90.83°

356.85°

7692.31'

9110.04'

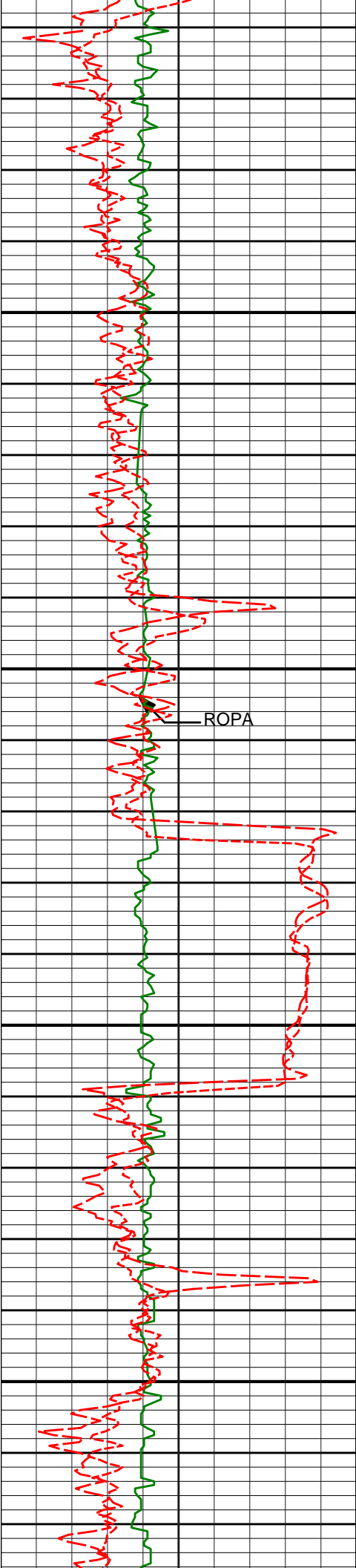
16650'

90.65°

356.54°

7691.09'

9203.96'



16750

16800

16850

16900

ROPA

16744'

90.68°

355.83°

7690.00'

9297.84'

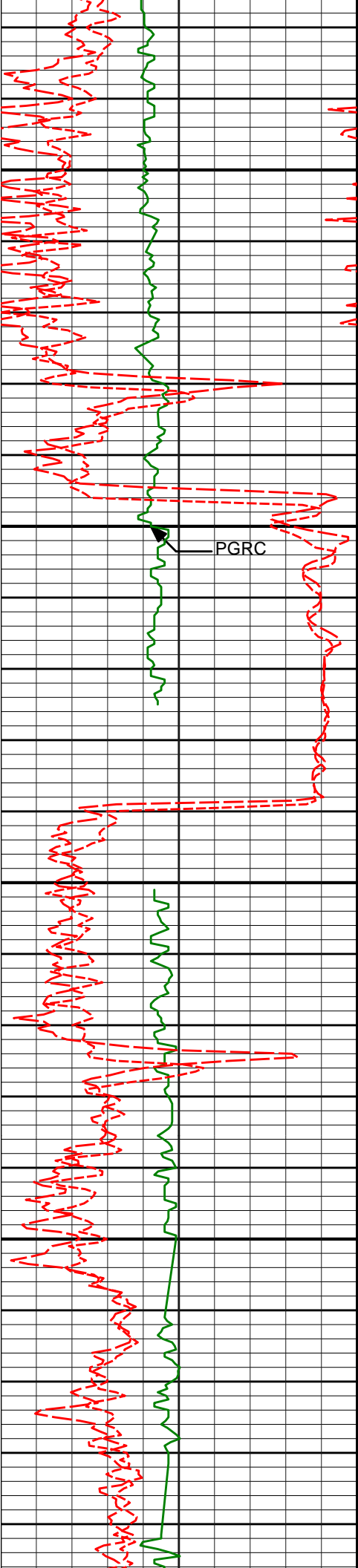
16838'

89.60°

355.66°

7689.77'

9391.70'



16950

17000

17050

17100

PGRC

16932'

88.52°

356.41°

7691.31'

9485.56'

17027'

88.58°

357.01°

7693.72'

9580.46'

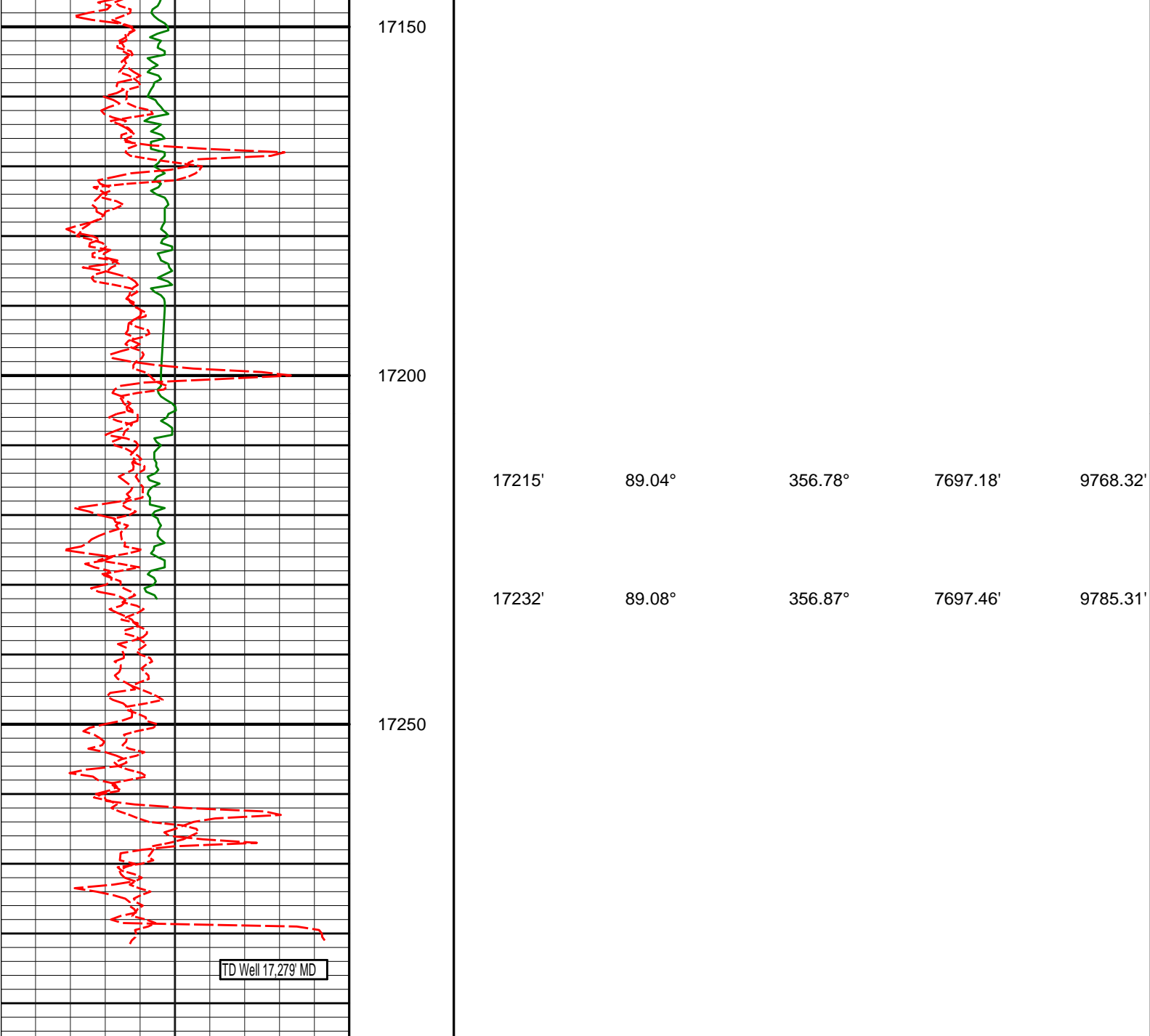
17121'

89.08°

357.19°

7695.64'

9674.39'



Avg Rate of Penetration (ROPA) feet per hr	Depth ft 1 : 240	DEPTH	INC	AZI	TVD	VS
500	0					
PCG Gamma Ray (PGRC)						
0	250					

# MD 1:240 Detail Log

**HALLIBURTON**

## DIRECTIONAL SURVEY REPORT

Anadarko  
NRC 2C-4HZ  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0901205069  
Survey's tied on to surface gyro's.

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
1010.00	0.52	215.70	1009.98	1.32 N	0.20 E	1.32	TIE-IN
1111.00	0.44	335.38	1110.98	1.30 N	0.23 W	1.30	0.82
1206.00	0.51	320.95	1205.97	1.96 N	0.65 W	1.97	0.15
1301.00	0.37	318.22	1300.97	2.52 N	1.12 W	2.54	0.15
1388.00	0.31	310.20	1387.97	2.88 N	1.49 W	2.90	0.09
1482.00	0.54	289.46	1481.97	3.19 N	2.10 W	3.23	0.29
1586.00	0.59	296.02	1585.96	3.59 N	3.04 W	3.64	0.08
1685.00	0.60	315.77	1684.96	4.18 N	3.86 W	4.25	0.21
1771.00	0.76	295.86	1770.95	4.76 N	4.69 W	4.84	0.33
1864.00	0.92	306.03	1863.94	5.46 N	5.85 W	5.56	0.23
1955.00	1.06	296.58	1954.93	6.27 N	7.19 W	6.39	0.24
2048.00	0.41	98.97	2047.92	6.60 N	7.63 W	6.73	1.57
2142.00	0.46	129.19	2141.92	6.31 N	7.01 W	6.43	0.25
2233.00	0.31	12.34	2232.92	6.32 N	6.67 W	6.44	0.73
2325.00	0.47	310.39	2324.92	6.81 N	6.90 W	6.93	0.46
2417.00	2.06	189.10	2416.90	5.42 N	7.45 W	5.55	2.54
2510.00	3.20	186.31	2509.80	1.19 N	8.00 W	1.33	1.23
2603.00	3.22	184.08	2602.65	4.00 S	8.47 W	-3.85	0.14
2695.00	1.31	140.01	2694.58	7.38 S	7.98 W	-7.24	2.67
2787.00	1.09	163.67	2786.56	9.02 S	7.06 W	-8.90	0.58
2879.00	0.74	216.39	2878.55	10.34 S	7.17 W	-10.22	0.95
2971.00	0.87	244.41	2970.55	11.12 S	8.15 W	-10.98	0.45
3063.00	0.65	226.97	3062.54	11.78 S	9.16 W	-11.62	0.34
3155.00	0.72	234.39	3154.53	12.47 S	10.01 W	-12.30	0.12
3246.00	1.21	353.42	3245.52	11.85 S	10.59 W	-11.66	1.85
3339.00	2.00	2.27	3338.49	9.25 S	10.63 W	-9.07	0.89
3431.00	2.11	349.33	3430.43	5.99 S	10.88 W	-5.79	0.52
3523.00	2.15	351.95	3522.36	2.61 S	11.44 W	-2.41	0.11
3615.00	1.35	343.54	3614.32	0.14 N	11.99 W	0.35	0.91
3706.00	1.48	336.27	3705.29	2.24 N	12.77 W	2.46	0.24
3798.00	1.62	76.63	3797.27	3.63 N	11.98 W	3.84	2.59
3890.00	1.67	86.28	3889.23	4.02 N	9.38 W	4.18	0.31
3982.00	1.51	93.07	3981.20	4.04 N	6.83 W	4.16	0.27
4073.00	1.24	115.71	4072.17	3.55 N	4.74 W	3.63	0.66
4165.00	1.42	111.12	4164.15	2.70 N	2.78 W	2.75	0.23
4257.00	1.01	125.36	4256.13	1.82 N	1.06 W	1.84	0.55
4352.00	1.09	138.41	4351.11	0.66 N	0.22 E	0.66	0.26
4446.00	1.02	141.46	4445.10	0.66 S	1.34 E	-0.68	0.10
4541.00	0.75	143.99	4540.08	1.82 S	2.23 E	-1.86	0.29
4635.00	2.70	92.32	4634.04	2.41 S	4.81 E	-2.49	2.46
4729.00	3.94	88.28	4727.88	2.40 S	10.25 E	-2.58	1.34
4824.00	6.55	84.72	4822.48	1.81 S	18.91 E	-2.14	2.77
4918.00	8.09	86.76	4915.71	0.94 S	30.85 E	-1.48	1.66
5012.00	9.29	88.47	5008.63	0.36 S	45.04 E	-1.15	1.31
5107.00	10.13	86.85	5102.27	0.30 N	61.05 E	-0.77	0.93
5202.00	9.95	89.95	5195.81	0.77 N	77.59 E	-0.59	0.60
5296.00	9.44	88.18	5288.47	1.02 N	93.42 E	-0.61	0.63
5390.00	8.19	86.21	5381.36	1.71 N	107.81 E	-0.18	1.37
5485.00	7.24	87.92	5475.50	2.37 N	120.54 E	0.27	1.03
5579.00	6.18	84.20	5568.85	3.10 N	131.49 E	0.80	1.22

5674.00	4.91	84.40	5663.40	4.01 N	140.63 E	1.56	1.34
5768.00	4.31	85.63	5757.10	4.67 N	148.15 E	2.09	0.65
5862.00	3.41	90.61	5850.89	4.91 N	154.47 E	2.21	1.02
5957.00	2.81	88.94	5945.75	4.92 N	159.62 E	2.14	0.64
6051.00	1.70	95.50	6039.67	4.83 N	163.32 E	1.98	1.21
6146.00	1.29	95.25	6134.64	4.60 N	165.78 E	1.71	0.43
6240.00	0.75	113.61	6228.62	4.26 N	167.40 E	1.33	0.66
6335.00	0.25	49.98	6323.62	4.14 N	168.13 E	1.21	0.71
6429.00	0.31	311.87	6417.62	4.44 N	168.10 E	1.51	0.45
6523.00	0.31	293.96	6511.62	4.72 N	167.68 E	1.79	0.10
6618.00	0.31	240.48	6606.62	4.69 N	167.22 E	1.77	0.29
6712.00	0.15	158.73	6700.62	4.45 N	167.04 E	1.54	0.35
6807.00	0.43	161.64	6795.62	4.00 N	167.20 E	1.08	0.30
6901.00	0.25	202.53	6889.61	3.48 N	167.23 E	0.56	0.31
6996.00	0.44	215.58	6984.61	2.99 N	166.94 E	0.07	0.22
7090.00	1.82	299.45	7078.60	3.43 N	165.43 E	0.54	1.94
7137.00	6.32	353.67	7125.48	6.37 N	164.49 E	3.50	11.61
7185.00	10.13	3.53	7172.98	13.21 N	164.46 E	10.34	8.44
7232.00	11.77	3.89	7219.12	22.12 N	165.04 E	19.23	3.49
7279.00	14.75	359.38	7264.86	32.89 N	165.30 E	30.00	6.71
7326.00	19.82	1.46	7309.72	46.84 N	165.44 E	43.95	10.87
7374.00	25.79	355.78	7353.96	65.41 N	164.88 E	62.52	13.24
7421.00	32.06	357.14	7395.07	88.09 N	163.50 E	85.22	13.41
7468.00	35.65	355.42	7434.10	114.21 N	161.79 E	111.37	7.91
7515.00	39.63	355.29	7471.31	142.81 N	159.46 E	140.01	8.47
7563.00	44.90	356.19	7506.82	175.00 N	157.08 E	172.23	11.05
7610.00	50.27	356.49	7538.51	209.61 N	154.87 E	206.88	11.44
7657.00	53.81	356.89	7567.42	246.60 N	152.73 E	243.90	7.56
7704.00	58.53	359.22	7593.58	285.61 N	151.43 E	282.92	10.85
7752.00	62.57	358.76	7617.17	327.39 N	150.69 E	324.71	8.46
7799.00	66.99	358.67	7637.19	369.89 N	149.73 E	367.22	9.41
7847.00	72.16	358.72	7653.94	414.84 N	148.71 E	412.18	10.77
7894.00	74.58	358.72	7667.39	459.86 N	147.70 E	457.21	5.15
7941.00	79.64	359.60	7677.87	505.66 N	147.04 E	503.01	10.92
7966.00	82.86	0.93	7681.67	530.36 N	147.15 E	527.71	13.91
8112.00	87.19	1.99	7694.33	675.73 N	150.86 E	672.99	3.05
8207.00	87.29	2.62	7698.91	770.54 N	154.68 E	767.72	0.67
8301.00	88.80	0.98	7702.11	864.43 N	157.63 E	861.55	2.37
8396.00	89.63	0.53	7703.42	959.41 N	158.88 E	956.50	0.99
8490.00	90.22	359.62	7703.54	1053.41 N	159.00 E	1050.48	1.15
8585.00	90.34	358.03	7703.07	1148.39 N	157.05 E	1145.47	1.68
8679.00	89.72	356.31	7703.02	1242.27 N	152.41 E	1239.42	1.95
8774.00	89.88	355.86	7703.36	1337.05 N	145.93 E	1334.30	0.50
8869.00	90.83	355.86	7702.77	1431.80 N	139.07 E	1429.15	1.00
8963.00	90.59	355.38	7701.60	1525.51 N	131.89 E	1522.98	0.57
9057.00	90.77	355.12	7700.49	1619.19 N	124.11 E	1616.77	0.34
9152.00	90.43	354.40	7699.49	1713.78 N	115.43 E	1711.51	0.84
9246.00	91.11	355.60	7698.23	1807.41 N	107.24 E	1805.27	1.47
9339.00	89.35	356.06	7697.86	1900.16 N	100.48 E	1898.12	1.96
9431.00	89.26	356.10	7698.97	1991.94 N	94.19 E	1989.99	0.11
9524.00	89.69	357.42	7699.82	2084.79 N	88.93 E	2082.92	1.49
9615.00	90.37	357.05	7699.78	2175.68 N	84.54 E	2173.87	0.85
9708.00	90.62	357.28	7698.97	2268.56 N	79.94 E	2266.82	0.37
9801.00	90.46	357.20	7698.10	2361.45 N	75.46 E	2359.77	0.19
9893.00	90.15	356.45	7697.61	2453.31 N	70.37 E	2451.71	0.88
9985.00	90.40	356.70	7697.17	2545.14 N	64.87 E	2543.62	0.38
10077.00	90.65	356.72	7696.32	2636.99 N	59.59 E	2635.54	0.27
10170.00	90.89	356.65	7695.07	2729.82 N	54.21 E	2728.46	0.27
10263.00	90.86	356.19	7693.65	2822.63 N	48.41 E	2821.35	0.50
10355.00	89.04	354.56	7693.73	2914.32 N	40.99 E	2913.16	2.66
10447.00	88.15	353.79	7695.99	3005.82 N	31.66 E	3004.81	1.28
10539.00	89.66	353.91	7697.75	3097.27 N	21.80 E	3096.42	1.65
10631.00	89.05	355.16	7698.78	3188.84 N	13.04 E	3188.13	1.51
10723.00	89.41	354.84	7700.02	3280.48 N	5.02 E	3279.90	0.52
10815.00	90.03	356.35	7700.47	3372.21 N	2.04 W	3371.73	1.77
10906.00	89.94	356.53	7700.49	3463.03 N	7.69 W	3462.64	0.22
10999.00	89.72	356.15	7700.77	3555.84 N	13.63 W	3555.54	0.47
11093.00	89.91	356.06	7701.07	3649.63 N	20.02 W	3649.42	0.22
11184.00	90.46	356.36	7700.78	3740.43 N	26.03 W	3740.31	0.69
11276.00	90.62	357.32	7699.91	3832.28 N	31.10 W	3832.24	1.06
11368.00	90.55	357.34	7698.97	3924.18 N	35.20 W	3924.20	0.98

11366.00	90.33	357.34	7698.97	3924.18 N	33.39 W	3924.20	0.08
11460.00	90.71	357.39	7697.96	4016.07 N	39.62 W	4016.15	0.18
11552.00	90.19	356.51	7697.24	4107.94 N	44.51 W	4108.09	1.11
11643.00	89.72	356.14	7697.31	4198.75 N	50.34 W	4198.99	0.66
11735.00	89.38	355.55	7698.03	4290.51 N	57.01 W	4290.85	0.74
11827.00	89.14	355.40	7699.22	4382.21 N	64.27 W	4382.67	0.31
11918.00	90.68	357.07	7699.36	4473.01 N	70.24 W	4473.55	2.50
12010.00	91.60	358.26	7697.53	4564.91 N	73.99 W	4565.51	1.63
12105.00	90.86	357.11	7695.49	4659.81 N	77.83 W	4660.46	1.44
12199.00	89.17	357.19	7695.47	4753.69 N	82.50 W	4754.41	1.80
12294.00	90.62	357.10	7695.64	4848.57 N	87.23 W	4849.35	1.53
12388.00	89.57	358.42	7695.49	4942.49 N	90.91 W	4943.33	1.79
12483.00	90.40	358.85	7695.51	5037.47 N	93.17 W	5038.32	0.98
12578.00	90.77	359.23	7694.54	5132.45 N	94.76 W	5133.32	0.56
12672.00	90.43	0.68	7693.56	5226.44 N	94.84 W	5227.30	1.58
12767.00	89.60	0.80	7693.53	5321.43 N	93.61 W	5322.25	0.88
12862.00	90.18	0.80	7693.71	5416.42 N	92.28 W	5417.21	0.61
12957.00	89.23	0.80	7694.20	5511.41 N	90.96 W	5512.16	1.00
13052.00	89.38	0.61	7695.36	5606.39 N	89.79 W	5607.11	0.25
13146.00	89.97	0.42	7695.89	5700.39 N	88.94 W	5701.07	0.66
13241.00	88.03	0.99	7697.55	5795.36 N	87.77 W	5796.01	2.13
13336.00	88.46	0.51	7700.46	5890.31 N	86.53 W	5890.92	0.68
13431.00	90.25	0.97	7701.53	5985.29 N	85.30 W	5985.87	1.95
13526.00	90.06	0.18	7701.27	6080.29 N	84.35 W	6080.83	0.86
13621.00	91.17	0.20	7700.25	6175.28 N	84.04 W	6175.80	1.17
13715.00	91.39	359.98	7698.15	6269.25 N	83.89 W	6269.76	0.33
13810.00	91.60	0.10	7695.67	6364.22 N	83.82 W	6364.72	0.25
13905.00	90.06	0.14	7694.30	6459.21 N	83.62 W	6459.68	1.62
13999.00	90.59	0.16	7693.76	6553.21 N	83.38 W	6553.66	0.56
14094.00	89.14	0.56	7693.99	6648.20 N	82.78 W	6648.63	1.58
14188.00	89.23	0.23	7695.32	6742.19 N	82.13 W	6742.60	0.36
14283.00	89.45	0.21	7696.42	6837.18 N	81.77 W	6837.57	0.23
14378.00	89.94	0.23	7696.92	6932.18 N	81.40 W	6932.55	0.52
14473.00	89.72	359.95	7697.21	7027.18 N	81.25 W	7027.53	0.37
14568.00	90.15	0.29	7697.31	7122.18 N	81.05 W	7122.51	0.58
14663.00	89.41	358.94	7697.68	7217.17 N	81.69 W	7217.50	1.62
14758.00	90.09	358.85	7698.09	7312.15 N	83.52 W	7312.50	0.72
14852.00	90.49	359.28	7697.62	7406.14 N	85.06 W	7406.50	0.62
14947.00	88.71	358.65	7698.28	7501.12 N	86.77 W	7501.49	1.99
15042.00	88.67	358.39	7700.45	7596.06 N	89.23 W	7596.46	0.28
15137.00	89.29	358.38	7702.14	7691.01 N	91.90 W	7691.44	0.65
15231.00	89.72	358.08	7702.96	7784.96 N	94.81 W	7785.43	0.56
15326.00	90.62	358.42	7702.67	7879.91 N	97.71 W	7880.42	1.01
15421.00	88.58	357.75	7703.34	7974.85 N	100.88 W	7975.40	2.26
15516.00	89.14	357.85	7705.23	8069.76 N	104.53 W	8070.36	0.60
15611.00	89.26	357.84	7706.55	8164.69 N	108.10 W	8165.33	0.13
15705.00	90.12	357.96	7707.06	8258.62 N	111.55 W	8259.31	0.92
15800.00	91.26	358.99	7705.92	8353.58 N	114.07 W	8354.30	1.62
15894.00	91.23	358.99	7703.88	8447.54 N	115.73 W	8448.27	0.03
15989.00	91.54	359.04	7701.58	8542.50 N	117.36 W	8543.25	0.33
16083.00	90.96	358.60	7699.53	8636.46 N	119.30 W	8637.22	0.77
16178.00	90.80	357.98	7698.07	8731.40 N	122.13 W	8732.20	0.67
16272.00	90.62	357.47	7696.90	8825.32 N	125.86 W	8826.17	0.58
16367.00	91.14	357.89	7695.45	8920.23 N	129.71 W	8921.14	0.70
16461.00	90.92	357.56	7693.76	9014.14 N	133.44 W	9015.10	0.42
16556.00	90.83	356.90	7692.31	9109.02 N	138.03 W	9110.04	0.70
16650.00	90.65	356.60	7691.09	9202.86 N	143.36 W	9203.96	0.37
16744.00	90.68	355.89	7690.00	9296.65 N	149.52 W	9297.84	0.76
16838.00	89.60	355.73	7689.77	9390.40 N	156.38 W	9391.70	1.16
16932.00	88.52	356.47	7691.31	9484.17 N	162.78 W	9485.56	1.39
17027.00	88.58	357.06	7693.72	9578.98 N	168.14 W	9580.46	0.62
17121.00	89.08	357.24	7695.64	9672.85 N	172.81 W	9674.39	0.57
17215.00	89.04	356.83	7697.18	9766.71 N	177.67 W	9768.32	0.44
17232.00	89.08	356.92	7697.46	9783.68 N	178.60 W	9785.31	0.58
17279.00	89.08	356.92	7698.21	9830.61 N	181.12 W	9832.27	0.00

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 359.00 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17279.00 FEET  
IS 9832.28 FEET ALONG 358.94 DEGREES (TRUE)

Final survey is a straight line projection to bit.

IFR Corrections have been applied to all surveys.

Date Printed:22 May 2014