

PCG-K Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	18-Mar-14	18-Mar-14	20-Mar-14	09-Apr-14	
Rig Bit Number	0100	0200	0300	400	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.750	6.750	6.750	4.750	
Log Start Depth (MD, ft)	991.00	7,445.00	7,633.00	7,980.00	
Log End Depth (MD, ft)	7,445.00	7,633.00	7,980.00	17,420.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	16-Mar-14 06:00	18-Mar-14 11:30	19-Mar-14 06:00	03-Apr-14 09:55	
Drill/Wipe End Date and Time	17-Mar-14 20:00	18-Mar-14 11:30	20-Mar-14 00:30	03-Apr-14 09:55	
Min Inc (deg) @ Depth (MD, ft)	0.03 @ 7,019.00	12.89 @ 7,443.00	32.87 @ 7,632.00	88.06 @ 15,229.00	
Max Inc (deg) @ Depth (MD, ft)	11.55 @ 7,396.00	27.34 @ 7,585.00	89.25 @ 7,980.00	92.84 @ 17,307.00	
Bit TFA(in2) / Bit Type	1.18 / PDC	0.97 / PDC	0.92 / PDC	1.53 / PDC	
Flow Rate (gpm)	624.90	420.00	436.00	278.96	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Fluid Type	Polymer	Polymer	Polymer	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	10.00 / 47.00	10.00 / 47.00	10.00 / 47.00	9.70 / 12.00	
Filtrate CL (ppm)	1,800.00	1,800.00	1,800.00	12,000.00	
pH / Fluid Loss (mptm)	8.40 / 6	8.40 / 6	8.40 / 6	N/A / N/A	
PV (cP) / YP (lbf2)	15 / 16.00	15 / 16.00	15 / 16.00	20 / 18.00	
% Solids / % Sand	12 / .89	12 / .8	12 / .8	2 / .2	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Max Tool Temp (in F) / S	175.04 / PDM	175.04 / PDM	175.04 / PDM	275.00 / PDM	

Max Tool Temp (degF) / Source	175.21 / PCM	175.21 / PCM	175.21 / PCM	258.96 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ 175.21	N/A @ 175.21	N/A @ 175.21	N/A @ 258.96	
Lead MWD Engineer	Patrick Megee	Patrick Megee	Patrick Megee	Patrick Megee	
Customer Representative	Travis Kruckenberg	Travis Kruckenberg	Travis Kruckenberg	Travis Kruckenberg	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	11303511	11303511	11303511	12177826	
Insert Serial Number	10744813	12001075	12001075	11227514	
Date and Time Initialized	15-Mar-14 14:19	17-Mar-14 22:01	01-Jan-70 00:00	30-Mar-14 20:35	
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00	01-Jan-70 00:00	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	53.00	48.00	48.00	50.59	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11303511	11303511	11303511	12177826	
Sonde Serial Number	11145627	11478044	11478044	11638625	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	349.29	313.21	332.35	227.41	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	54.69	51.41	51.48	54.82	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11303511	11303511	11303511	12177826	
Insert/Sonde Serial Number	11293409	12037414	12037414	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

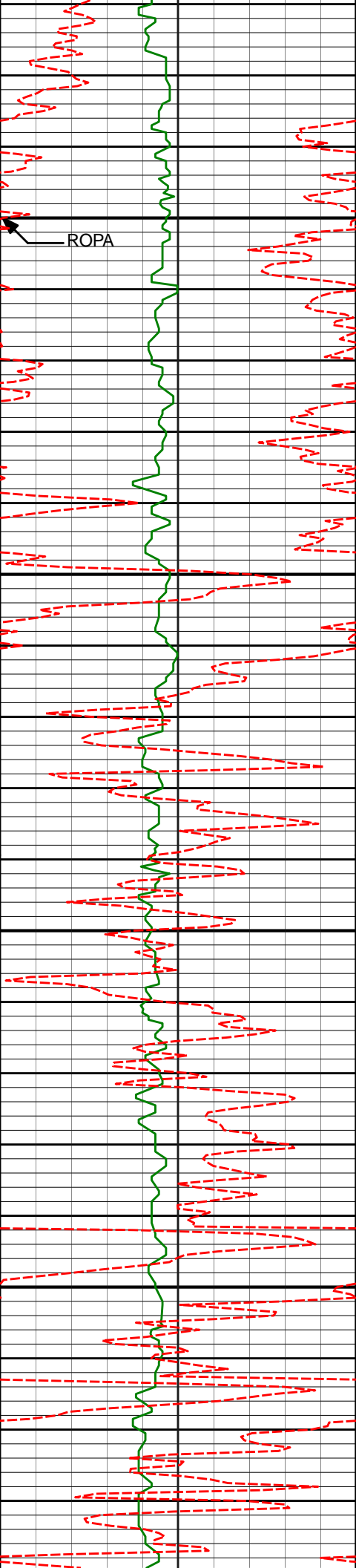
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES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

PCG Gamma Ray BCorr (PGRC)						
0250						
Avg Rate of Penetration (ROPA)		Depth ft	DEPTH	INC	AZI	TVD
5000feet per hr		1 : 240				VS
		1100	1105'	0.13°	207.81°	1104.97'
		1150				



1200

1250

1300

1350

1197'

0.19°

26.11°

1196.97'

5.73'

1289'

0.21°

52.47°

1288.97'

5.97'

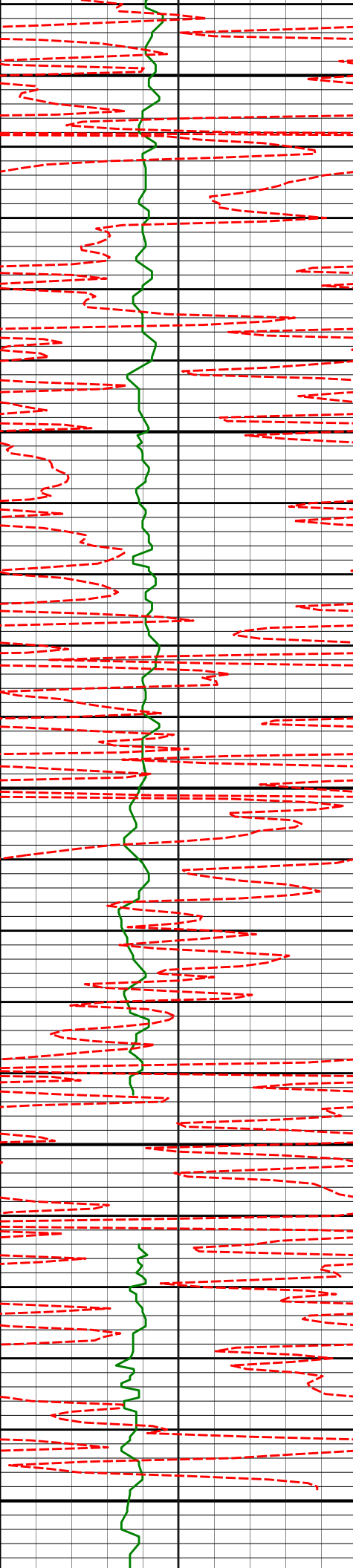
1382'

0.29°

167.25°

1381.97'

5.84'



1400

1450

1500

1550

1600

1475'

0.43°

217.97°

1474.97'

5.34'

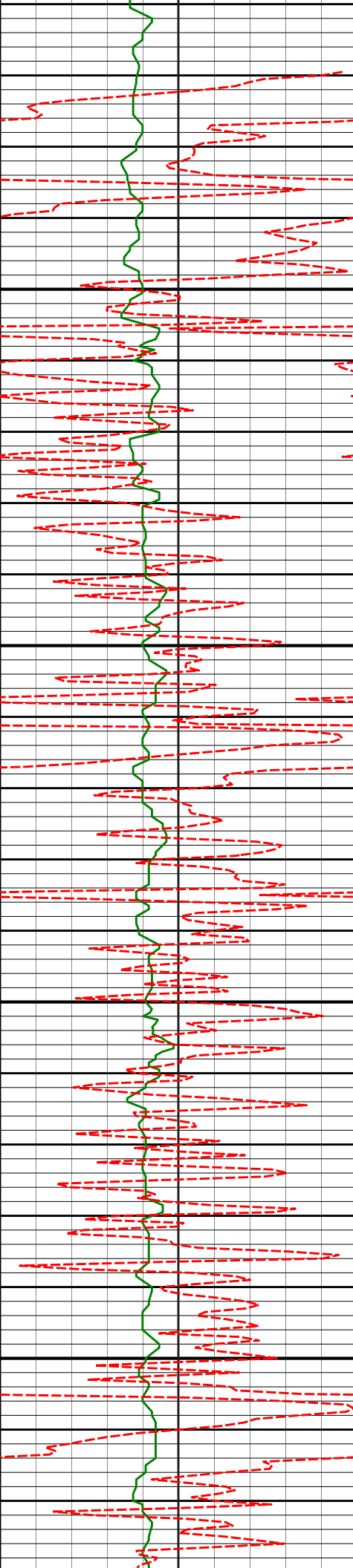
1568'

0.61°

261.11°

1567.96'

4.99'



1650

1700

1750

1800

1660'

0.64°

249.19°

1659.96'

4.73'

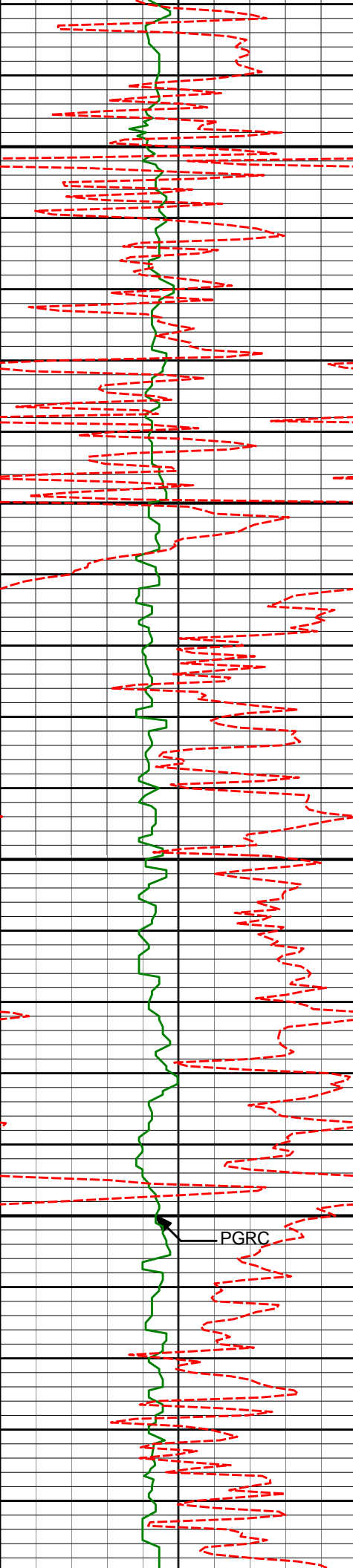
1752'

0.77°

255.04°

1751.95'

4.39'



1850

1900

1950

2000

PGRC

1845'

0.45°

273.24°

1844.95'

4.25'

1938'

0.87°

295.19°

1937.94'

4.57'

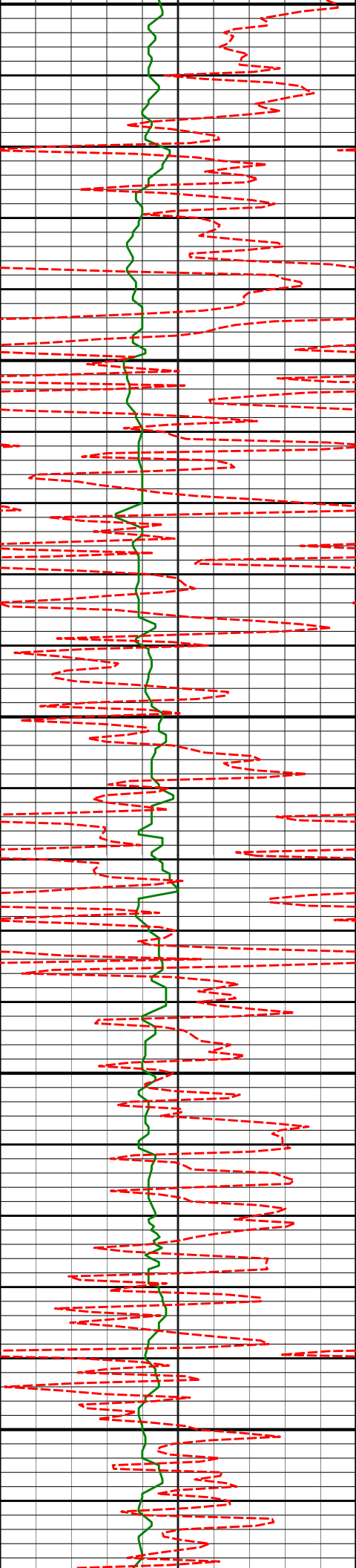
2031'

1.20°

273.00°

2030.92'

4.92'



2050

2100

2150

2200

2250

2124'

1.03°

289.65°

2123.91'

5.25'

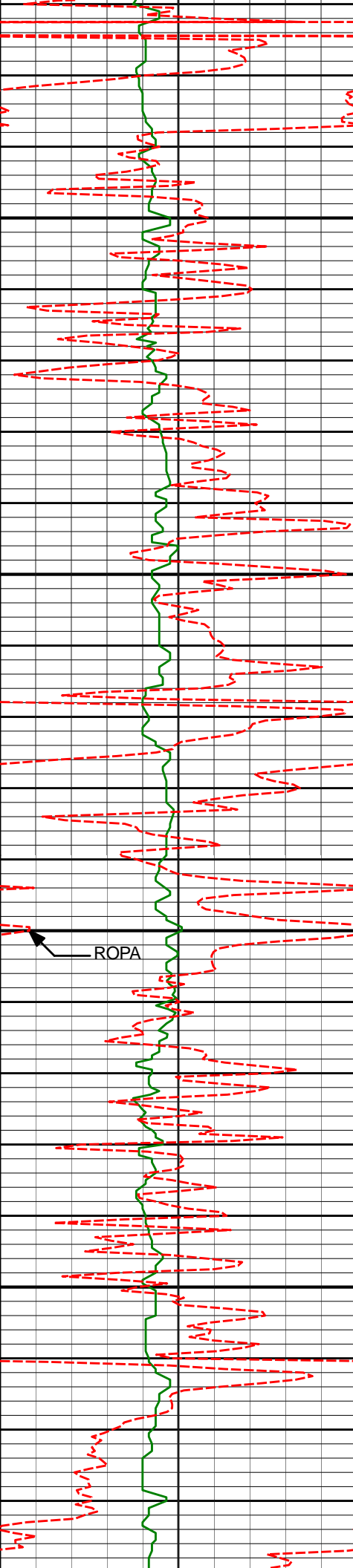
2217'

0.88°

288.87°

2216.89'

5.77'



2300

2309'

1.03°

303.96°

2308.88'

6.46'

2350

2400

2402'

1.68°

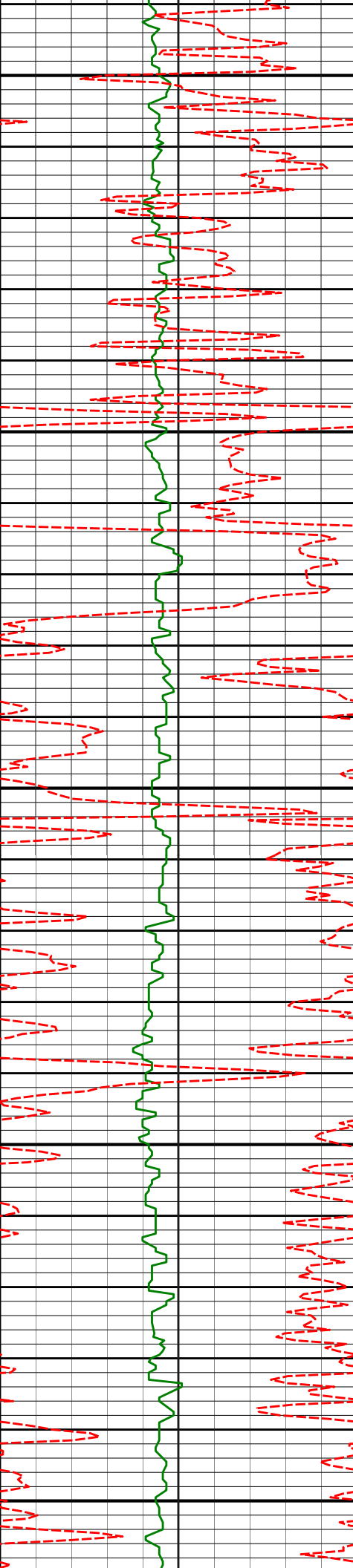
326.52°

2401.86'

8.06'

2450

ROPA



2500

2550

2600

2650

2700

2493'

1.61°

320.77°

2492.82'

10.17'

2586'

0.98°

279.66°

2585.80'

11.31'

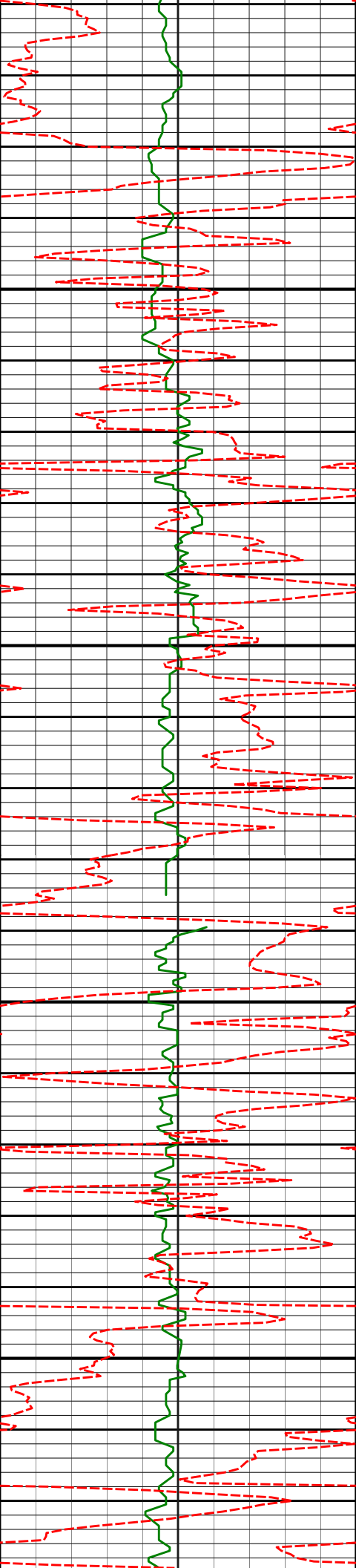
2679'

1.02°

294.21°

2678.78'

11.79'



2750

2772'

1.11°

280.88°

2771.77'

12.30'

2800

2850

2867'

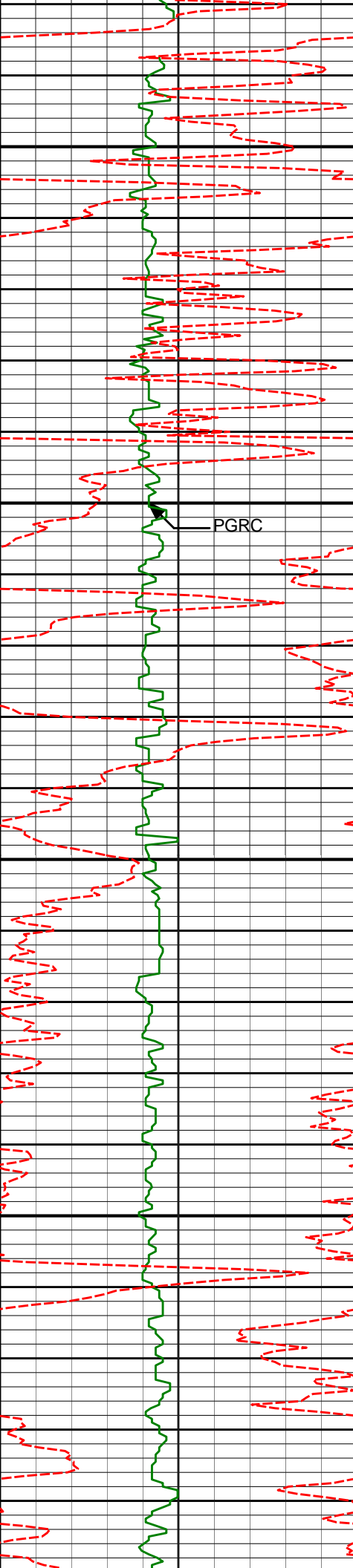
1.23°

231.47°

2866.75'

11.84'

2900



2950

2961'

1.50°

218.65°

2960.72'

10.25'

3000

PGRC

3050

3056'

1.12°

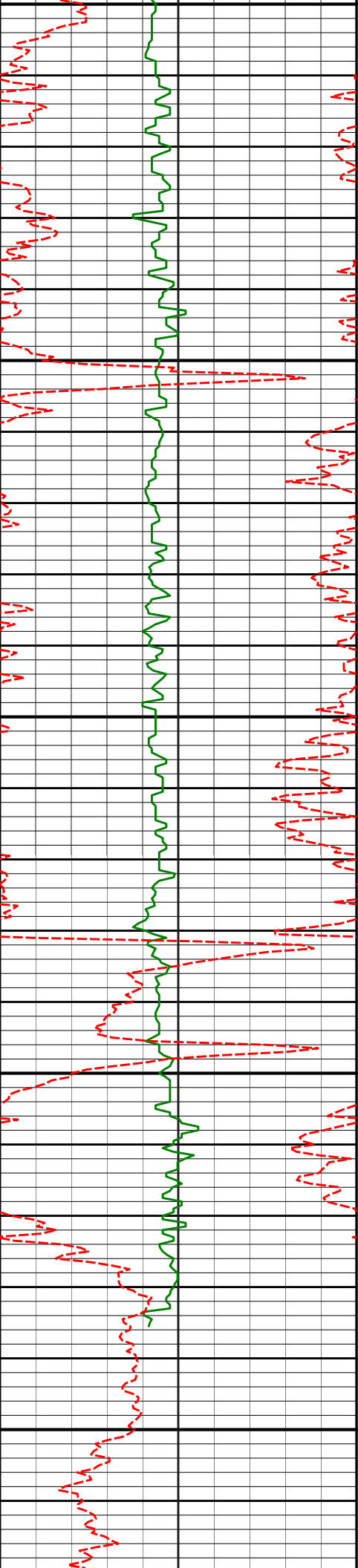
224.51°

3055.70'

8.62'

3100

3150



3150

3200

3250

3300

3350

3150'

3244'

3338'

1.77°

1.55°

1.20°

224.42°

212.60°

214.62°

3149.67'

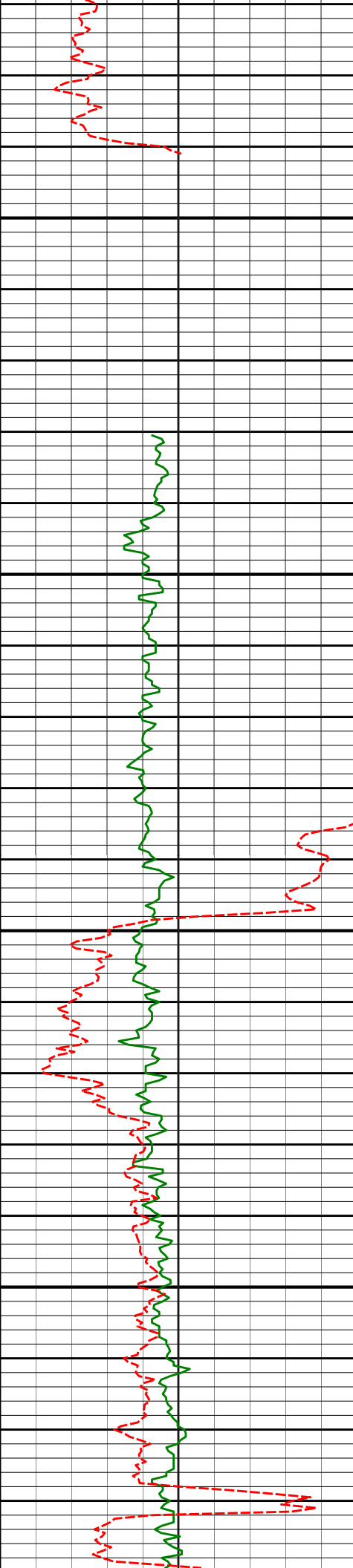
3243.63'

3337.60'

6.92'

4.82'

2.94'



3400

3450

3500

3550

3433'

1.33°

230.76°

3432.58'

1.42'

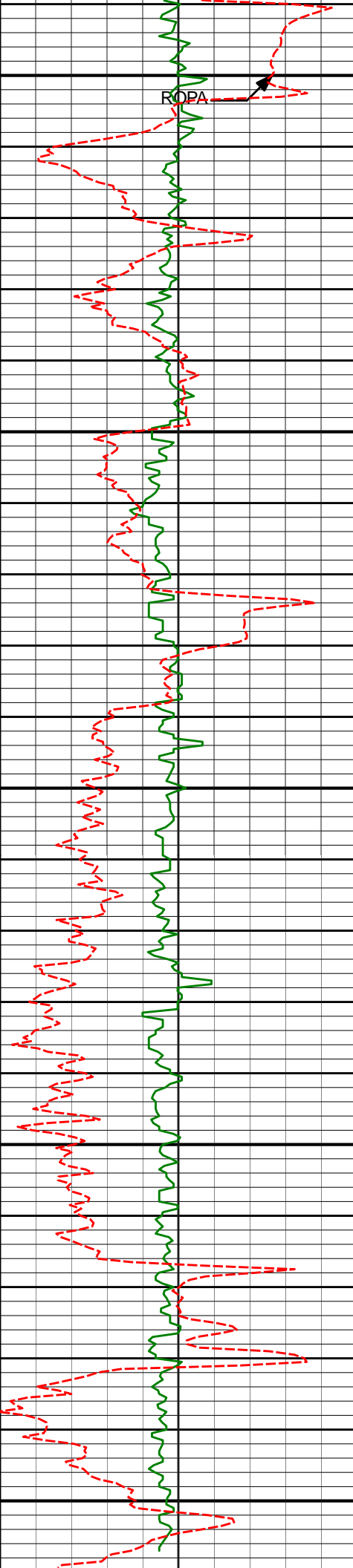
3527'

1.44°

249.85°

3526.55'

0.33'



3600

3621'

2.56°

274.44°

3620.49'

0.08'

3650

3700

3715'

2.80°

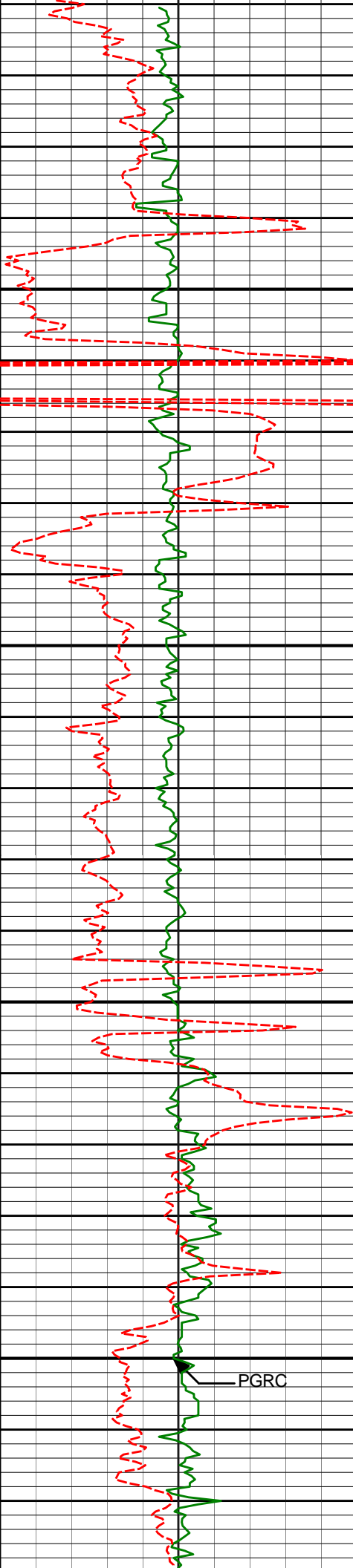
270.98°

3714.39'

0.29'

3750

3800



3850

3900

3950

4000

PGRC

3810'

2.68°

281.99°

3809.28'

0.79

3904'

2.86°

268.72°

3903.17'

1.20'

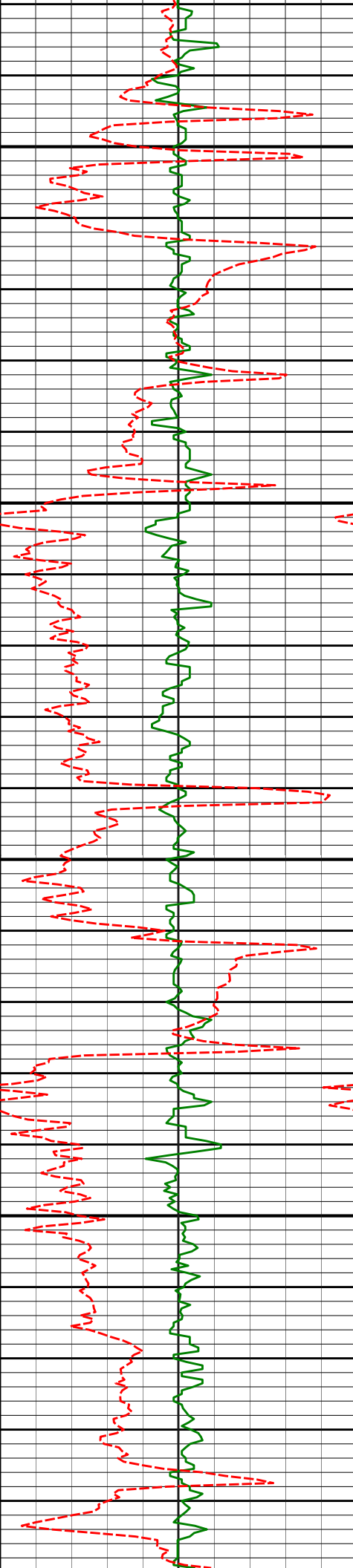
3998'

1.71°

272.36°

3997.10'

1.20'



4050

4093'

3.27°

284.79°

4092.00'

1.96'

4100

4150

4187'

4.57°

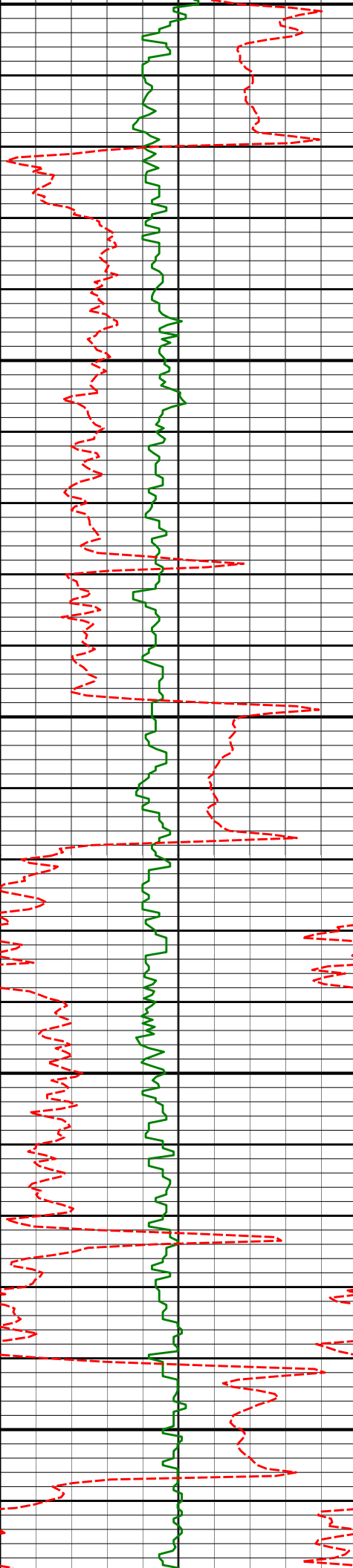
259.97°

4185.79'

1.99'

4200

4250



4250

4300

4350

4400

4450

4281'

6.14°

262.91°

4279.38'

0.72'

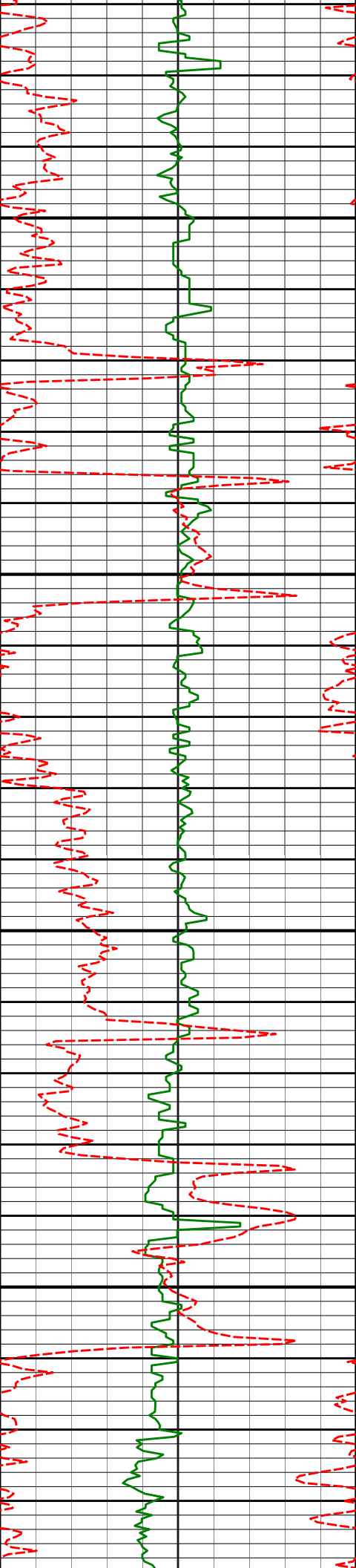
4376'

7.10°

280.99°

4373.75'

1.22'



4500

4550

4600

4650

4470'

7.53°

276.25°

4466.99'

3.01'

4565'

9.11°

277.71°

4560.98'

4.70'

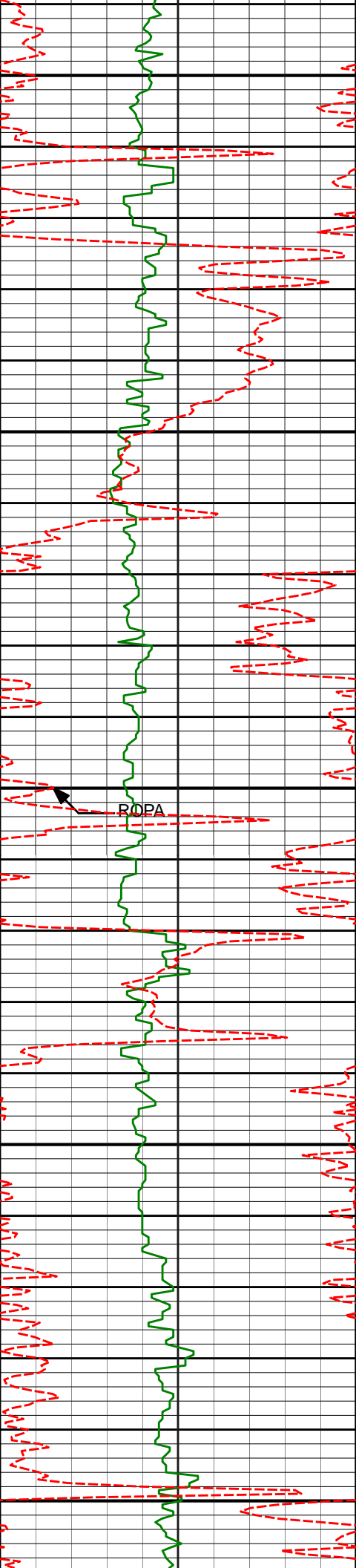
4659'

9.47°

272.98°

4653.75'

6.11'



4700

4750

4800

4850

4900

4753'

9.02°

271.51°

4746.53'

6.71'

4848'

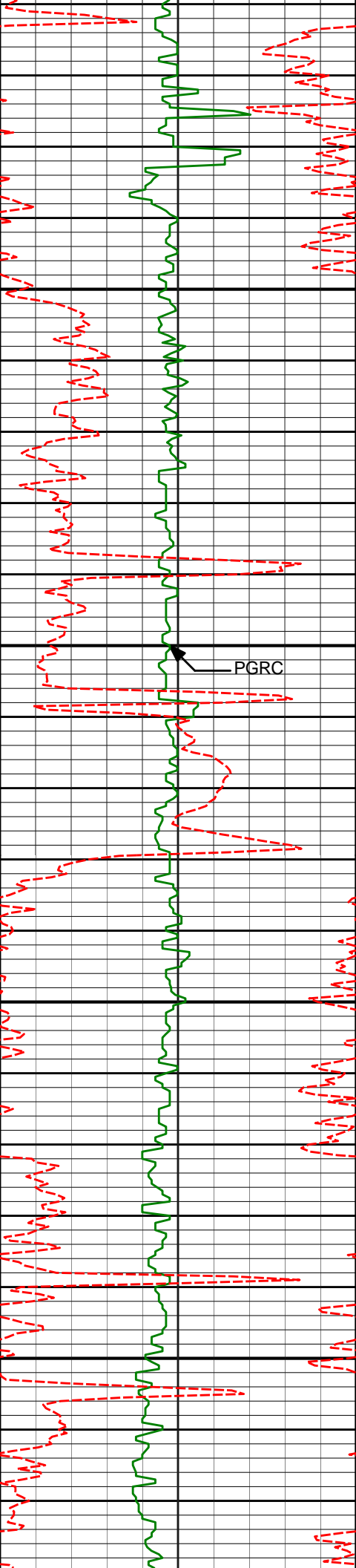
10.80°

280.23°

4840.12'

8.50'

ROPA



4950

5000

5050

5100

4942'

10.94°

278.29°

4932.43'

11.36'

5036'

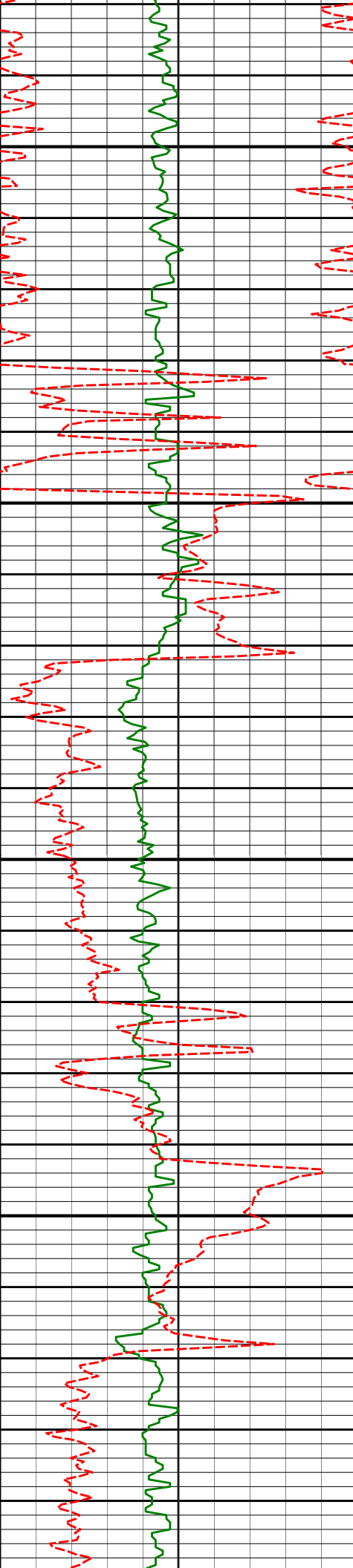
11.04°

271.37°

5024.71'

12.87'

PGRC



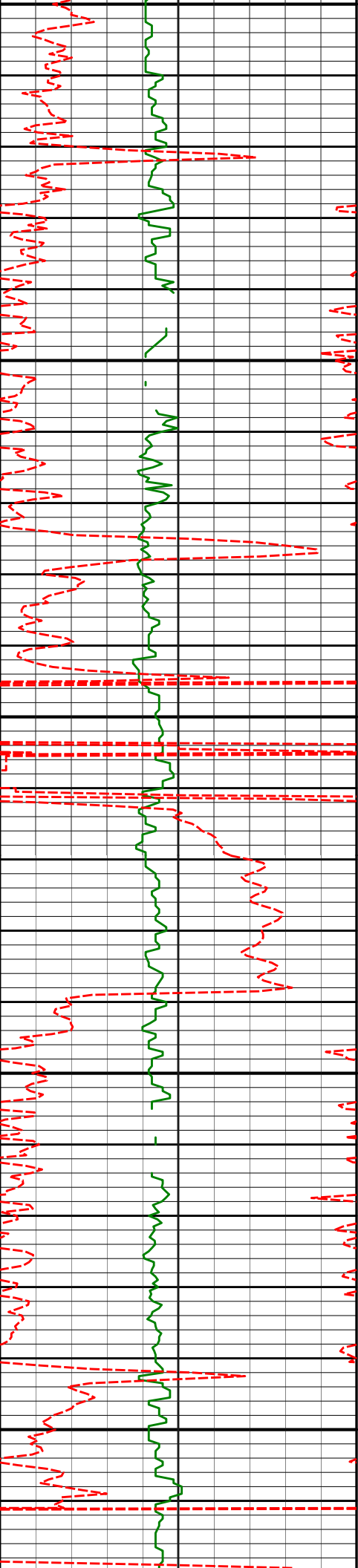
5150

5200

5250

5300

5131'	10.13°	270.94°	5118.09'	13.23'
5225'	8.85°	260.58°	5210.81'	12.19'
5319'	9.09°	267.12°	5303.66'	10.64'
5350'				



5350

5400

5450

5500

5550

5414'

10.85°

265.72°

5397.23'

9.61'

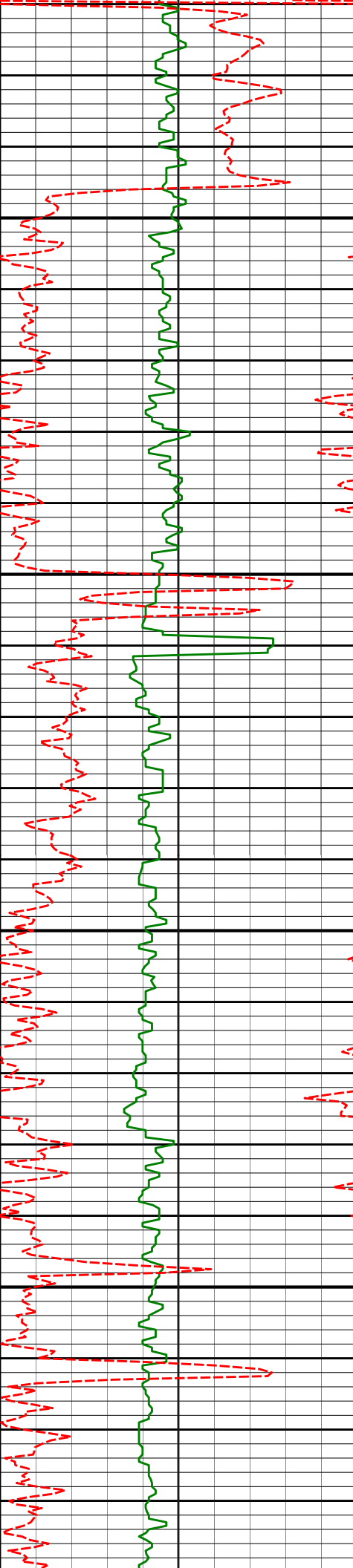
5508'

10.80°

263.20°

5489.55'

7.91'



5600

5603'

11.14°

266.79°

5582.82'

6.35'

5650

5700

5697'

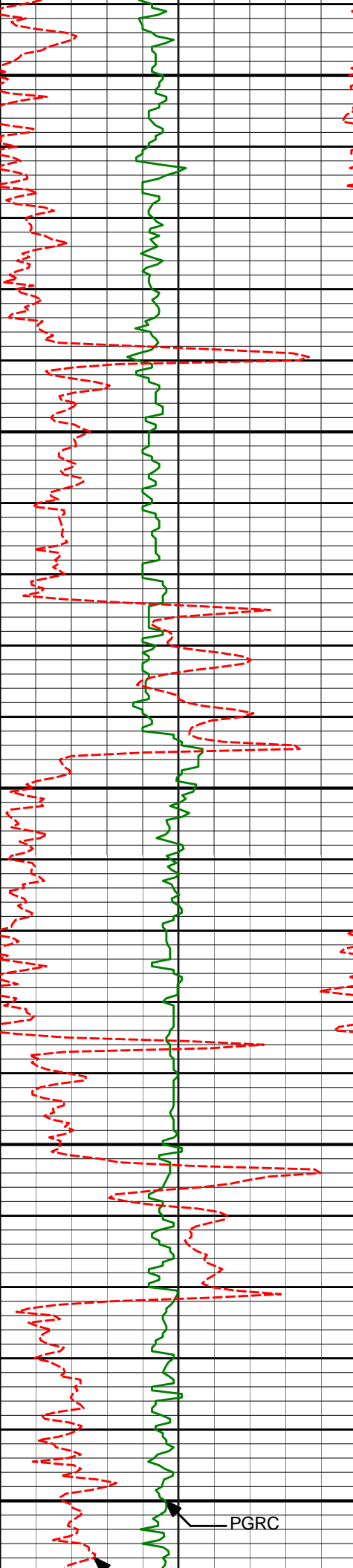
10.09°

265.08°

5675.21'

5.15'

5750



5800

5850

5900

5950

6000

PGRC

5791'

9.96°

266.38°

5767.77'

3.94'

5886'

7.85°

267.38°

5861.62'

3.13'

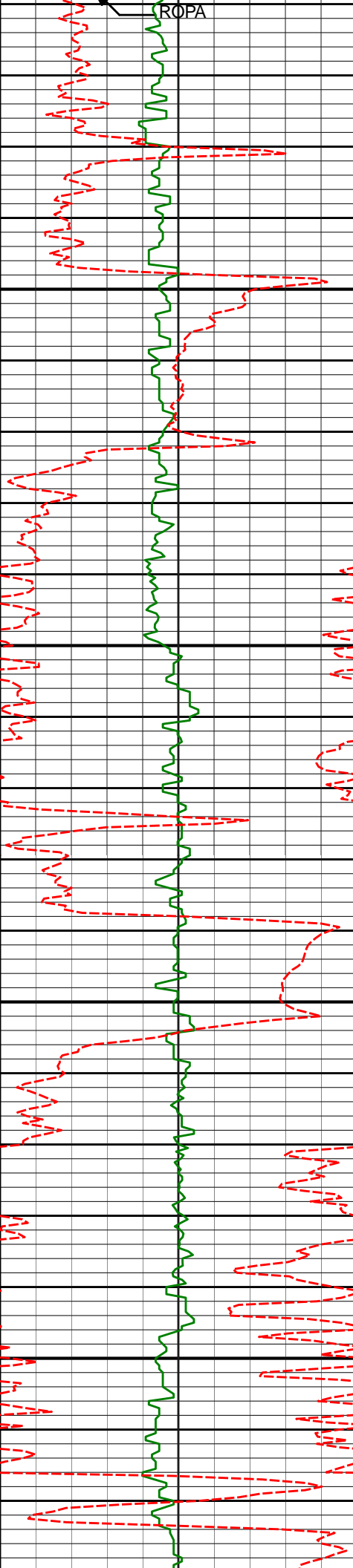
5980'

6.31°

271.23°

5954.90'

2.95'



6050

6100

6150

6200

6074'

4.19°

267.94°

6048.50'

2.95'

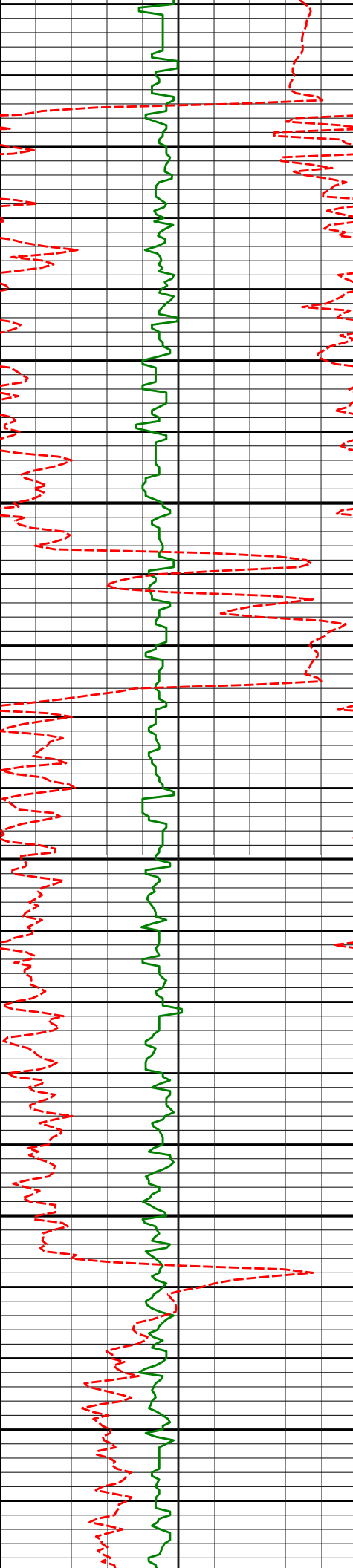
6169'

2.50°

264.72°

6143.34'

2.63'



6250

6300

6350

6400

6450

6263'

0.62°

241.50°

6237.30'

2.20'

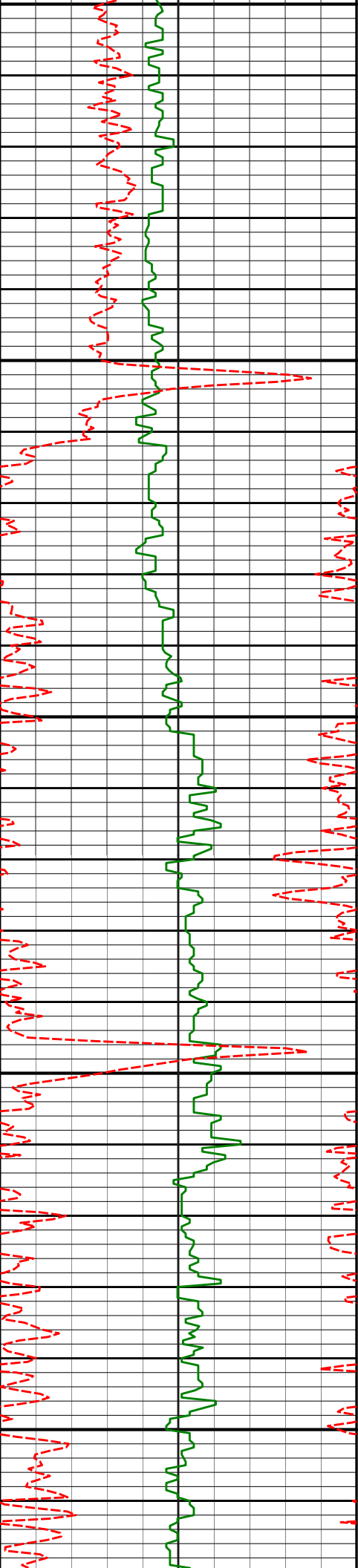
6358'

0.33°

172.52°

6332.30'

1.69'



6450

6500

6550

6600

6650

6452'

0.29°

62.03°

6426.30'

1.53'

6547'

0.07°

43.21°

6521.30'

1.69'

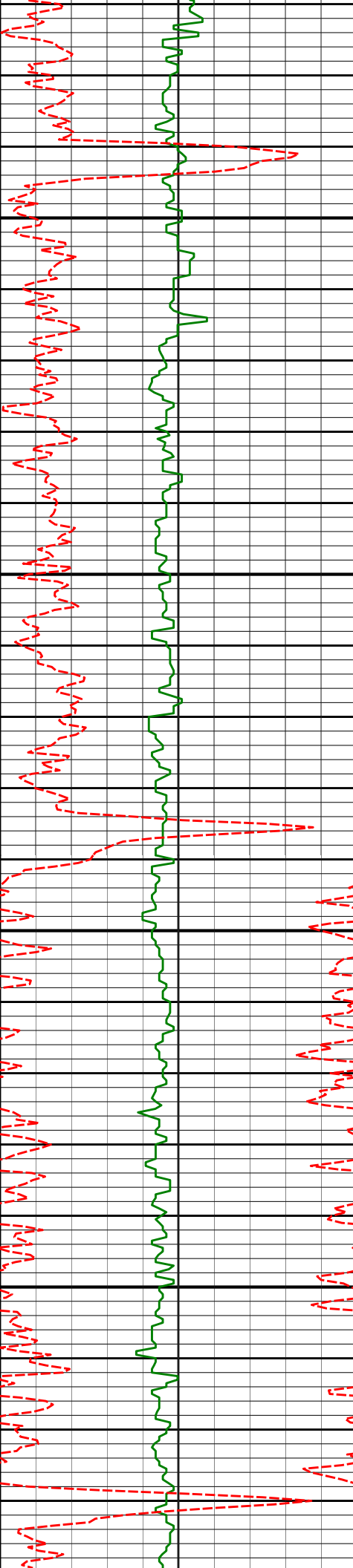
6641'

0.22°

130.46°

6615.30'

1.61'



6700

6735'

0.32°

123.65°

6709.30'

1.35'

6750

6800

6830'

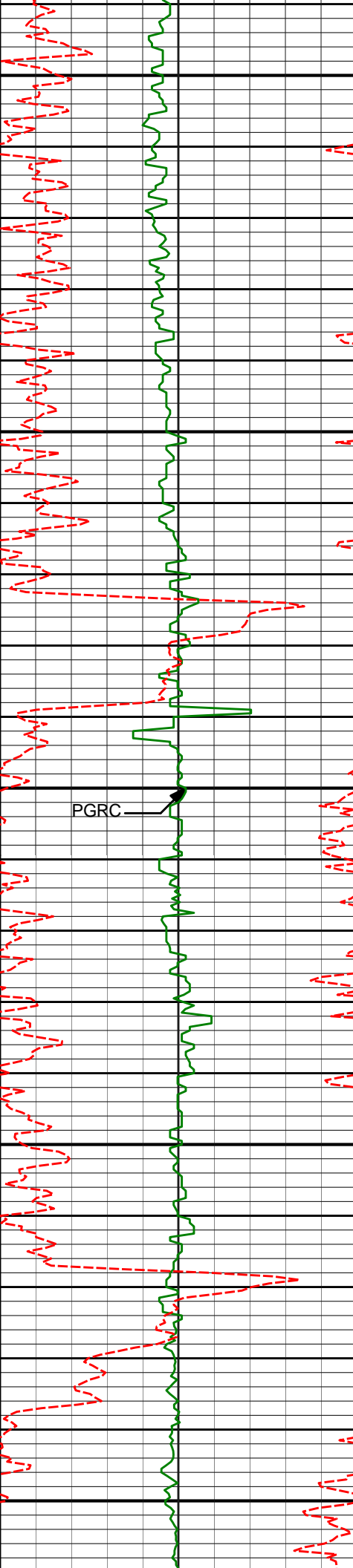
0.32°

105.40°

6804.29'

1.13'

6850



6900

6924'

0.25°

86.89°

6898.29'

1.07'

6950

7000

PGRC

7019'

0.03°

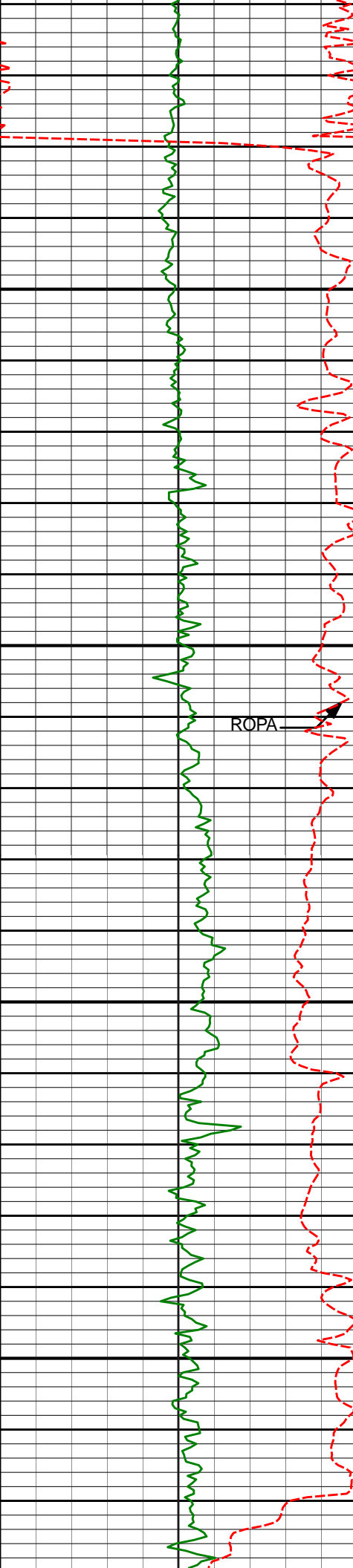
126.54°

6993.29'

1.07'

7050

7100



7150

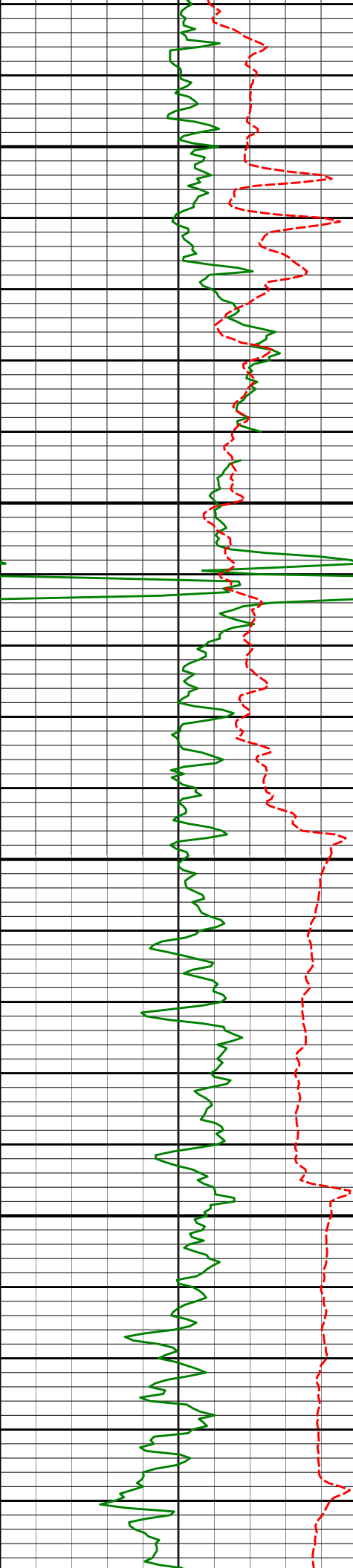
7200

7250

7300

ROPA

7113'	0.33°	354.76°	7087.29'	1.32'
7160'	2.16°	351.94°	7134.28'	2.33'
7207'	4.36°	355.30°	7181.20'	4.99'
7254'	6.70°	357.71°	7227.98'	9.51'
7302'	9.47°	357.33°	7275.50'	16.26'



Run 200

7350

7349'

10.86°

354.29°

7321.76'

24.53'

7400

7396'

11.55°

352.40°

7367.86'

33.60'

7450

7443'

12.89°

350.75°

7413.80'

43.43'

7500

7491'

17.80°

355.61°

7460.07'

56.04'

7550

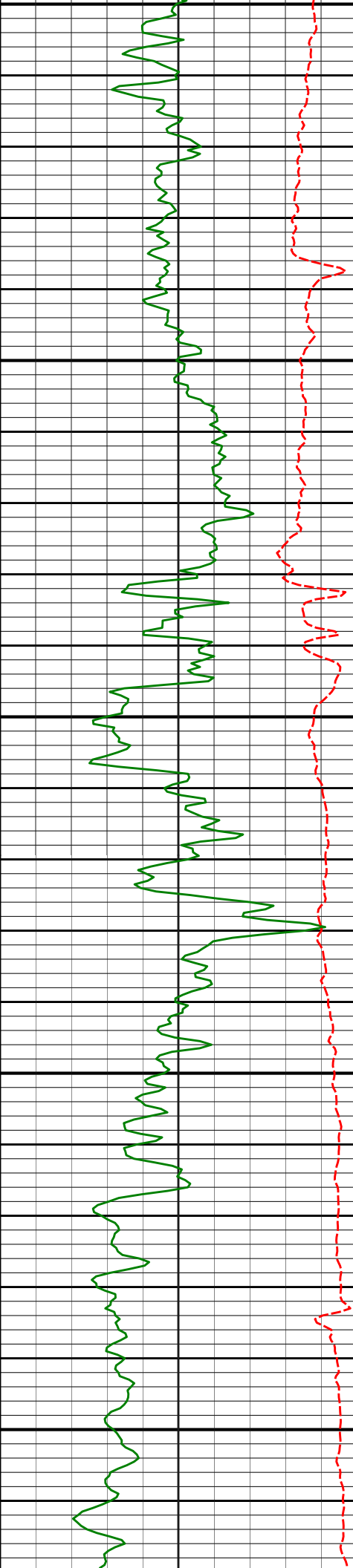
7538'

22.40°

359.88°

7504.20'

72.17'



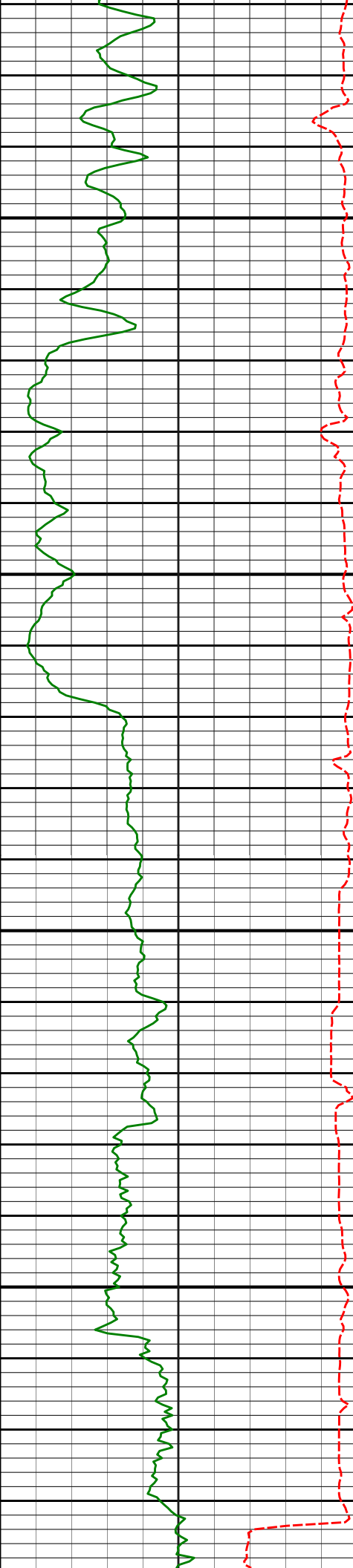
Run 300

7585'	27.34°	2.57°	7546.83'	91.92'
-------	--------	-------	----------	--------

7632'	32.87°	2.14°	7587.47'	115.47'
-------	--------	-------	----------	---------

7680'	39.75°	2.09°	7626.13'	143.85'
-------	--------	-------	----------	---------

7727'	48.35°	4.29°	7659.88'	176.44'
-------	--------	-------	----------	---------



7800

7850

7900

7950

Run 400

7774' 56.17° 5.63° 7688.63' 213.44'

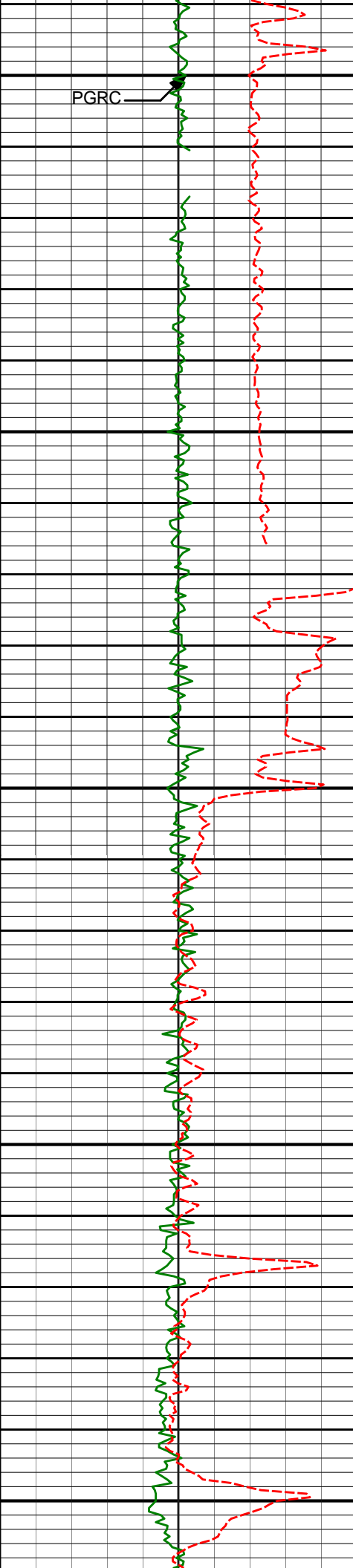
7821' 64.52° 4.95° 7711.86' 254.07'

7868' 74.28° 5.33° 7728.38' 297.83'

7915' 78.33° 358.44° 7739.52' 343.43'

7932' 80.65° 355.98° 7742.62' 360.12'

7" casing at 7,970' MD



8000

8050

8100

8150

8200

8113'

91.39°

357.95°

7750.66'

540.43'

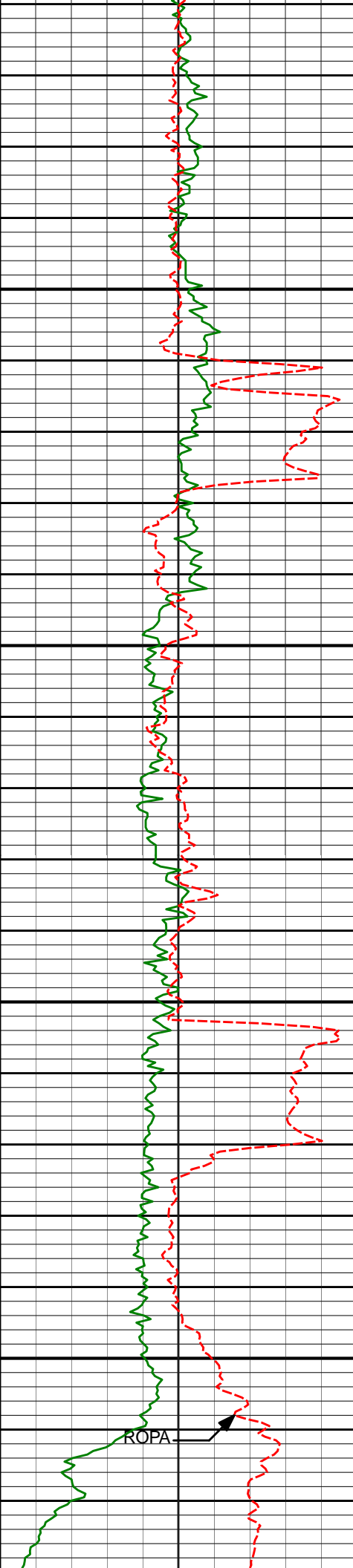
8208'

91.70°

357.77°

7748.10'

635.33'



8250

8300

8350

8400

8303'

92.59°

358.47°

7744.54'

730.21'

8397'

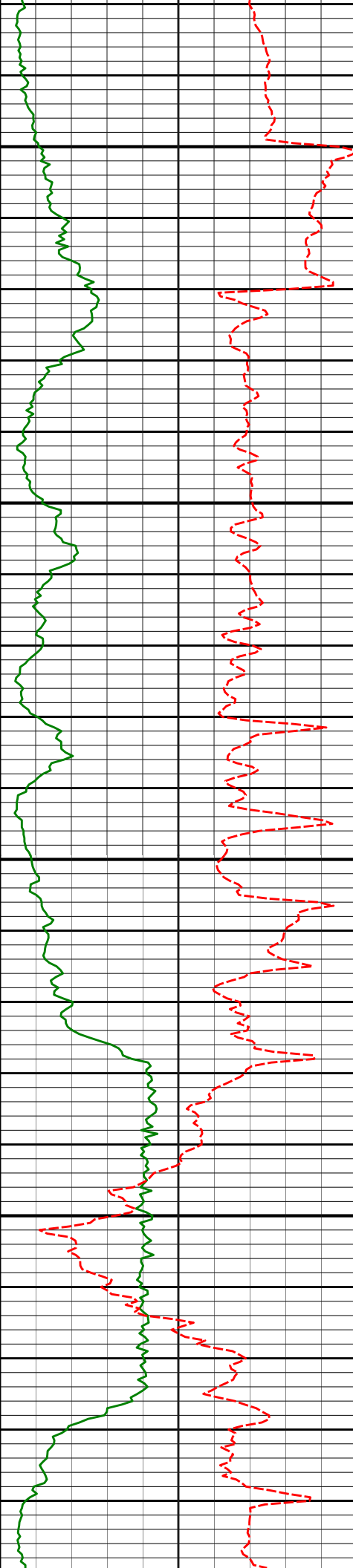
92.10°

359.09°

7740.70'

824.11'

ROPA



8450

8492'

91.23°

0.33°

7737.94'

919.07'

8500

8550

8586'

91.60°

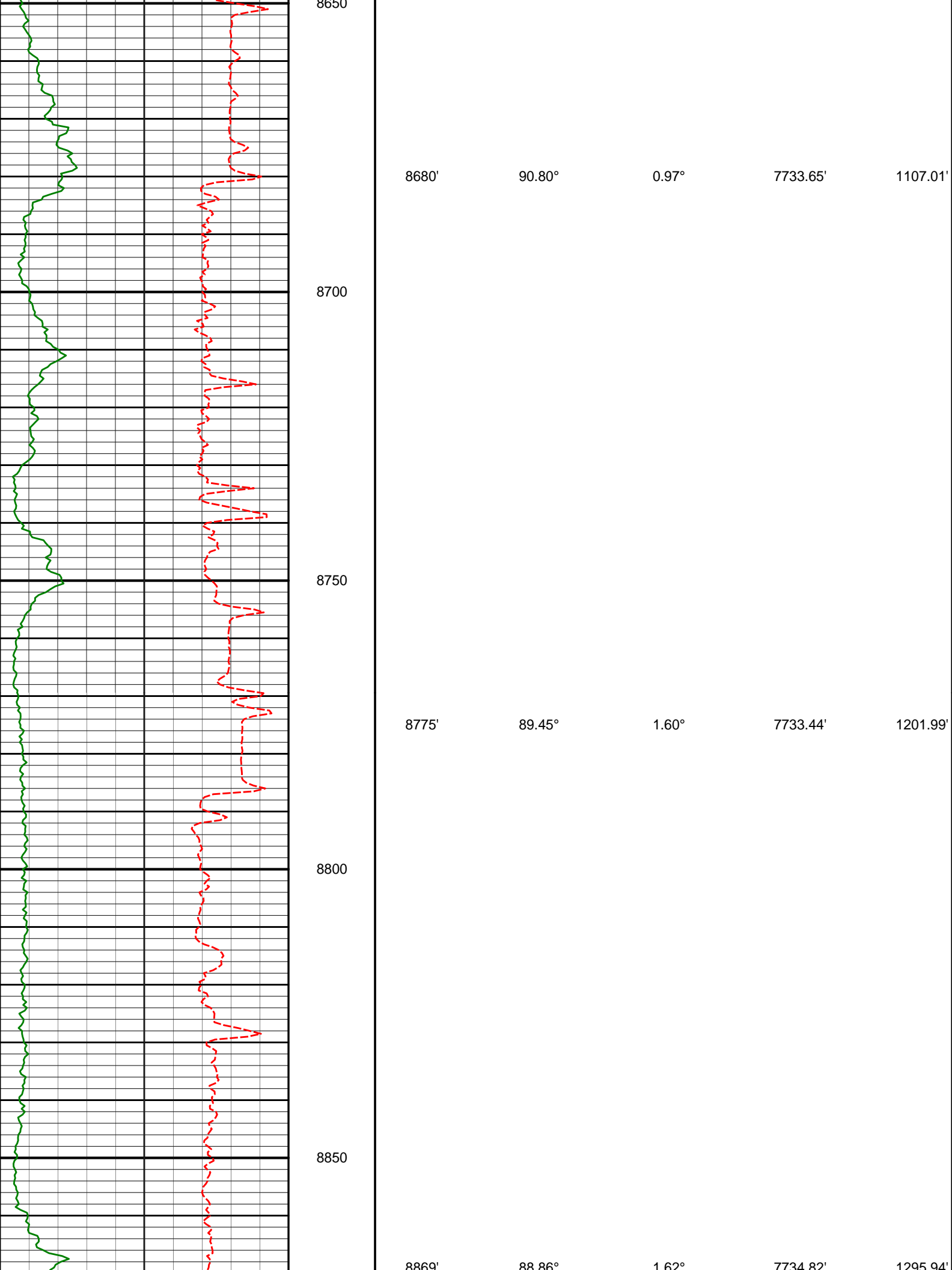
0.12°

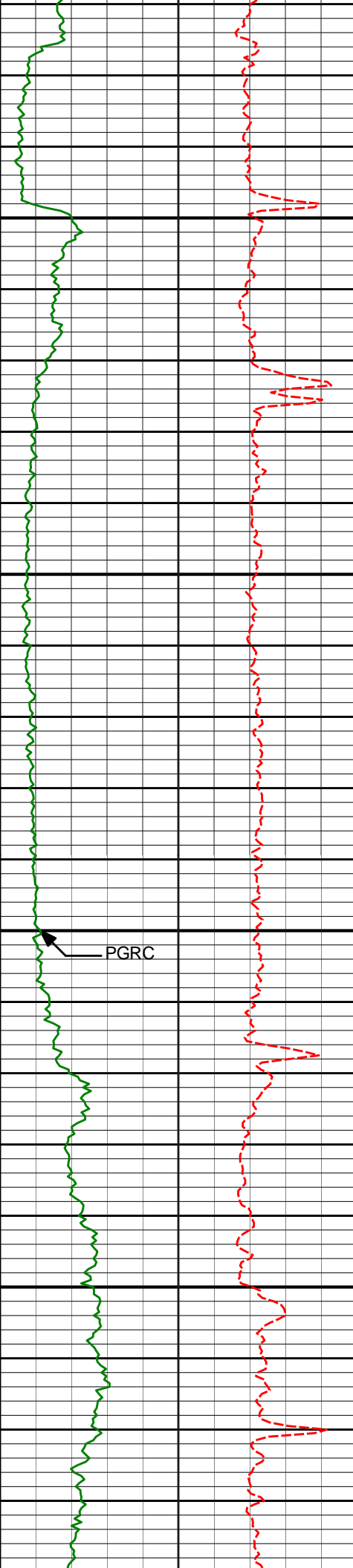
7735.61'

1013.04'

8600

8650





8900

8950

9000

9050

PGRC

8963'

89.54°

1.55°

7736.14'

1389.89'

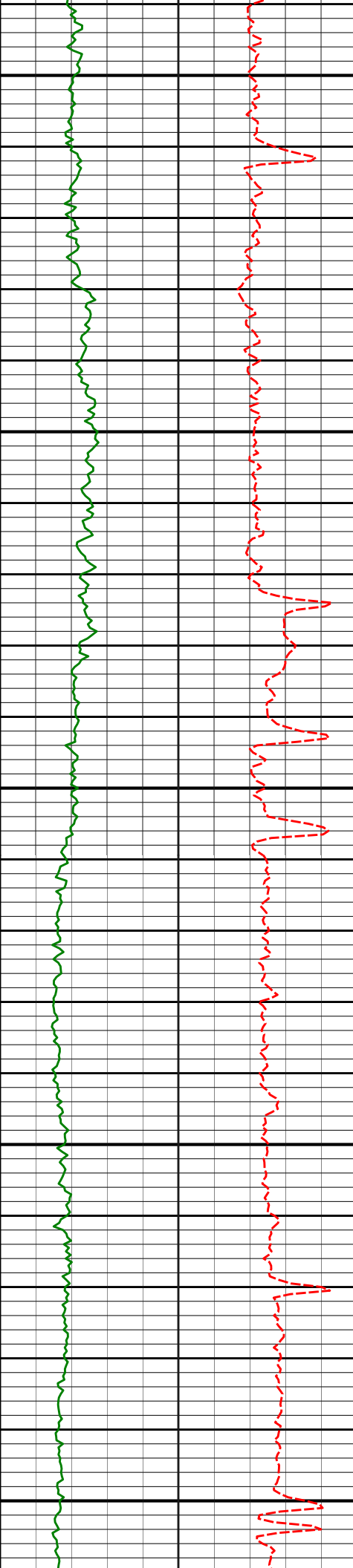
9058'

90.00°

1.36°

7736.52'

1484.86'



9100

9150

9200

9250

9300

9152'

91.11°

1.22°

7735.61'

1578.83'

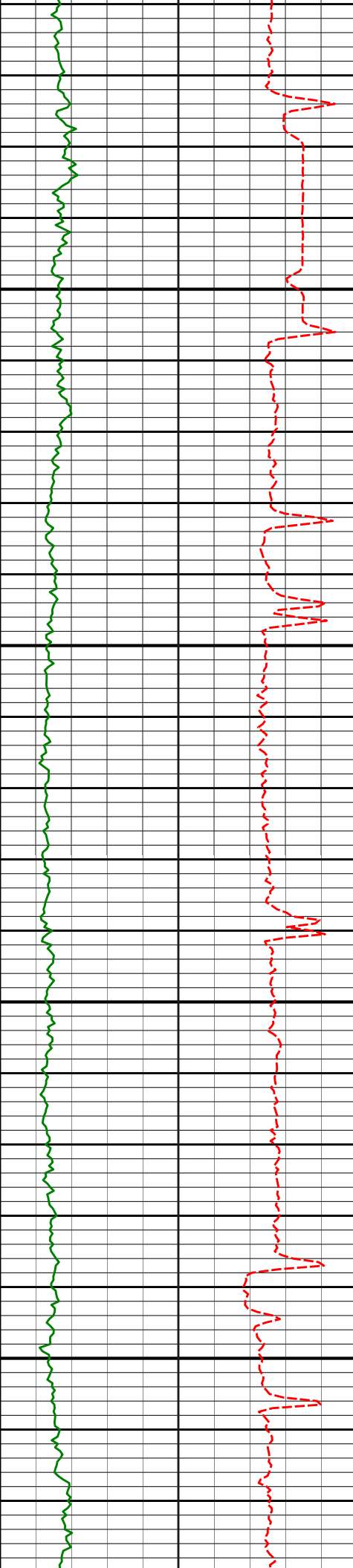
9247'

90.62°

1.73°

7734.17'

1673.78'



9350

9400

9450

9500

9337'

89.66°

1.51°

7733.95'

1763.74'

9431'

89.82°

1.40°

7734.38'

1857.71'

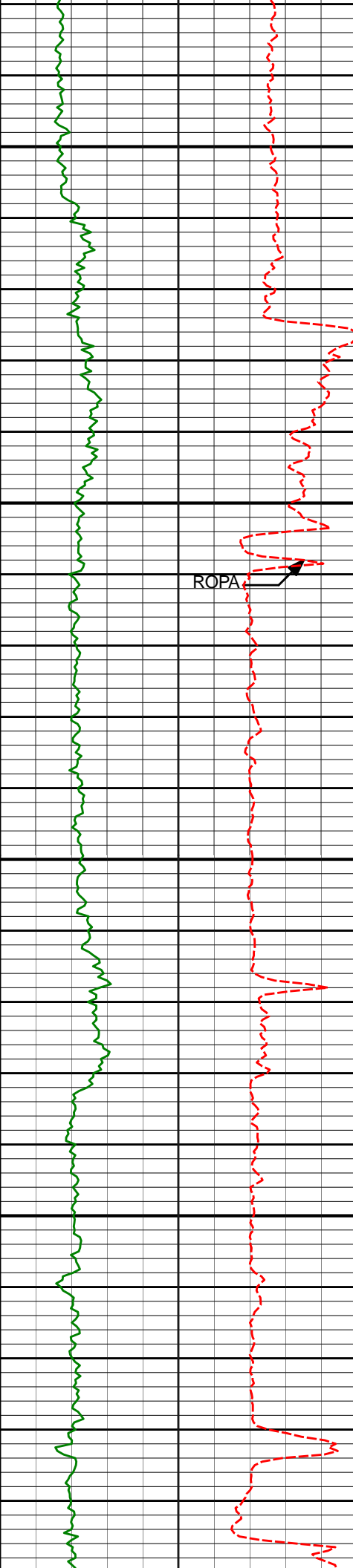
9523'

90.80°

1.15°

7733.88'

1949.68'



9550

9600

9650

9700

9750

ROPA

9615'

89.20°

2.50°

7733.88'

2041.63'

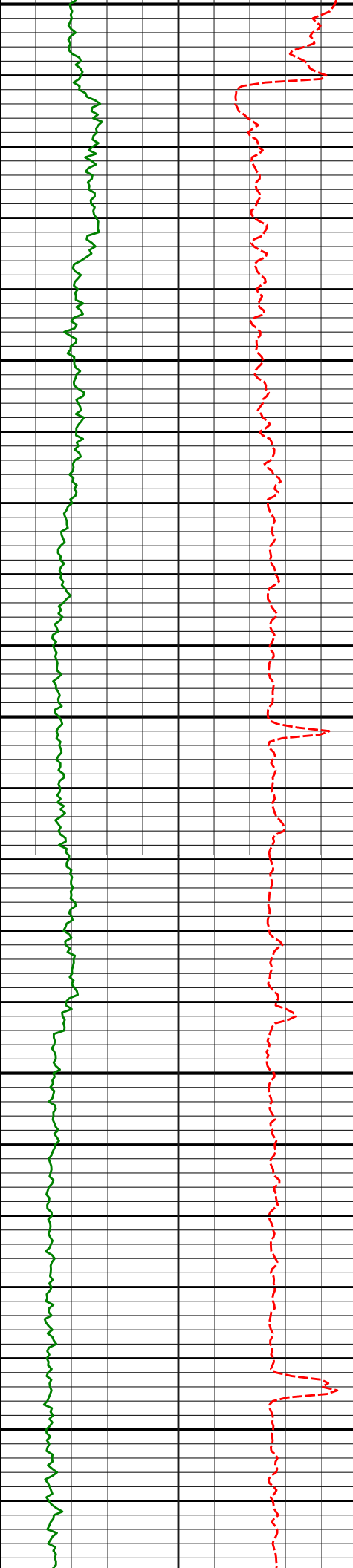
9707'

90.40°

2.46°

7734.20'

2133.54'



9750

9800

9850

9900

9950

9800'

9894'

89.01°

89.51°

2.58°

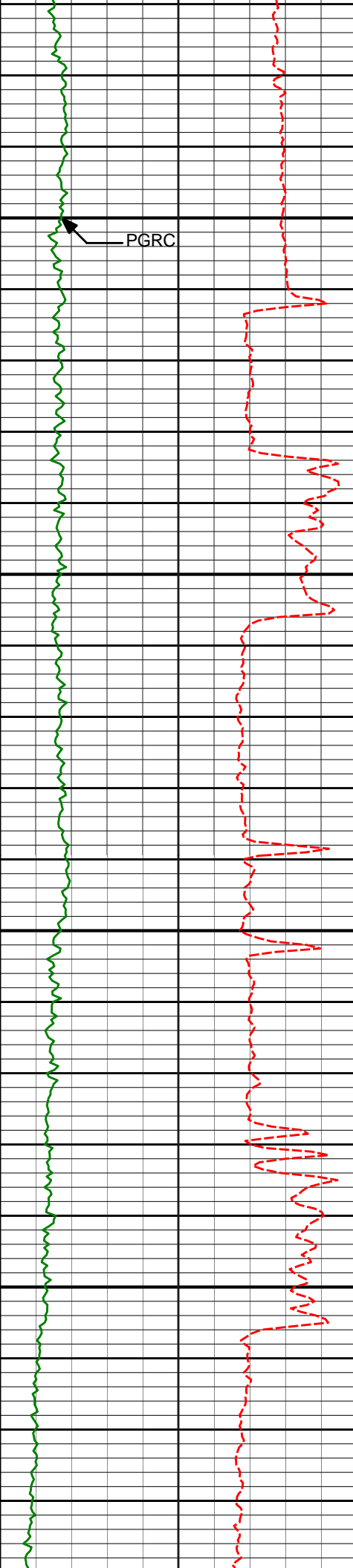
2.63°

7734.68'

7735.90'

2226.44'

2320.34'



10000

10050

10100

10150

9986'

90.37°

3.18°

7735.99'

2412.22'

PGRC

10078'

89.75°

2.10°

7735.90'

2504.11'

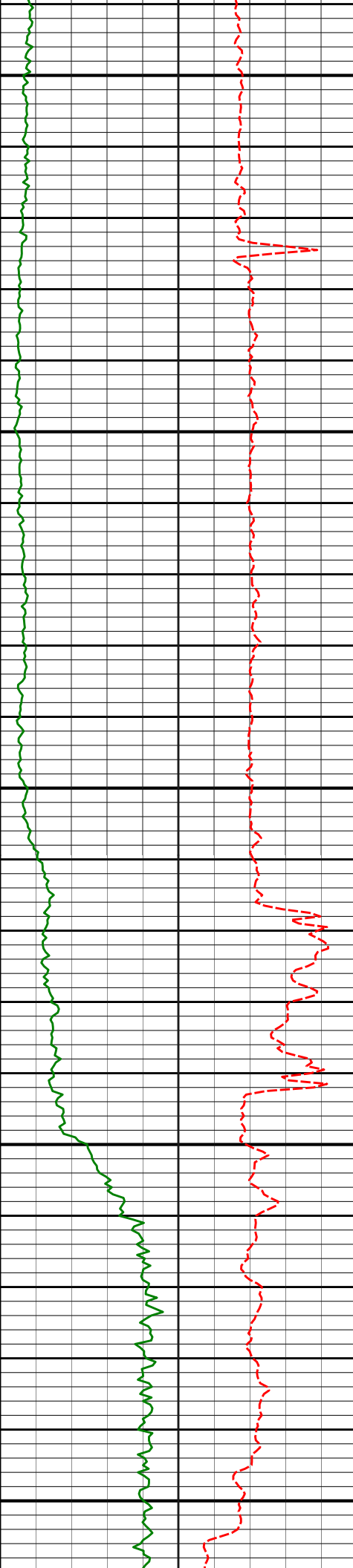
10170'

88.43°

1.52°

7737.36'

2596.05'



10200

10250

10300

10350

10400

10263'

89.41°

1.29°

7739.11'

2689.00'

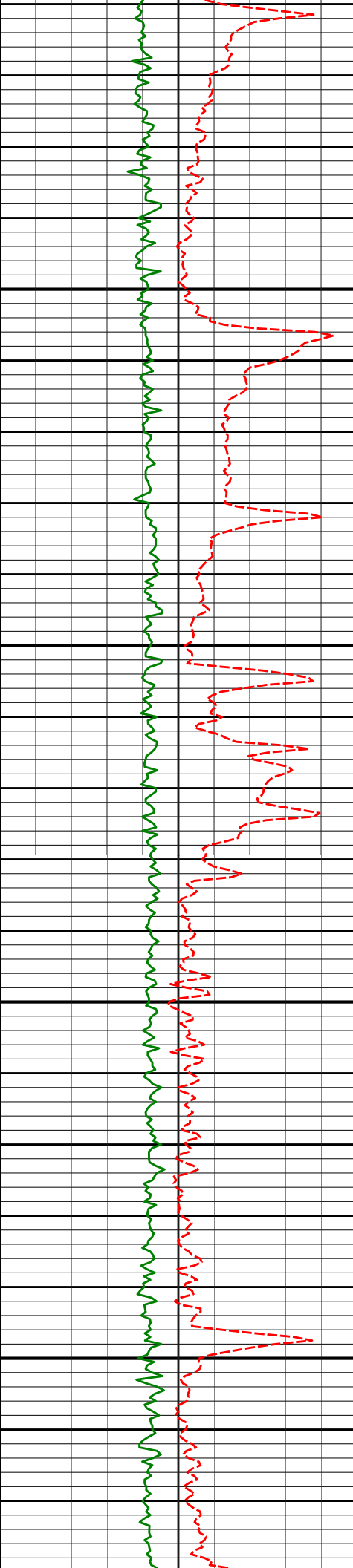
10356'

88.15°

1.31°

7741.09'

2781.96'



10450

10500

10550

10600

10449'

10543'

88.30°

90.43°

0.78°

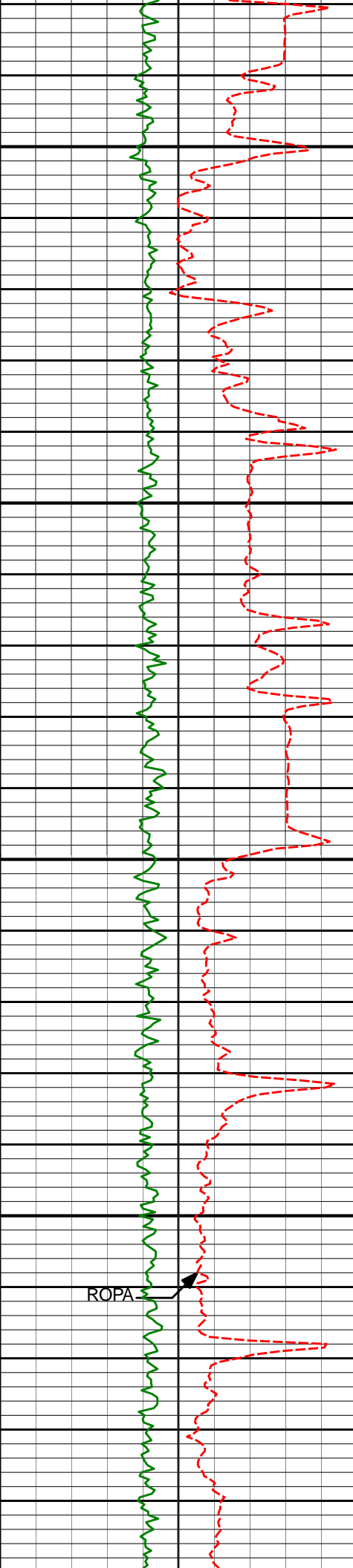
1.71°

7743.97'

7745.01'

2874.90'

2968.86'



10650

10700

10750

10800

ROPA

10634'

90.80°

1.71°

7744.04'

3059.81'

10727'

90.25°

0.69°

7743.18'

3152.79'

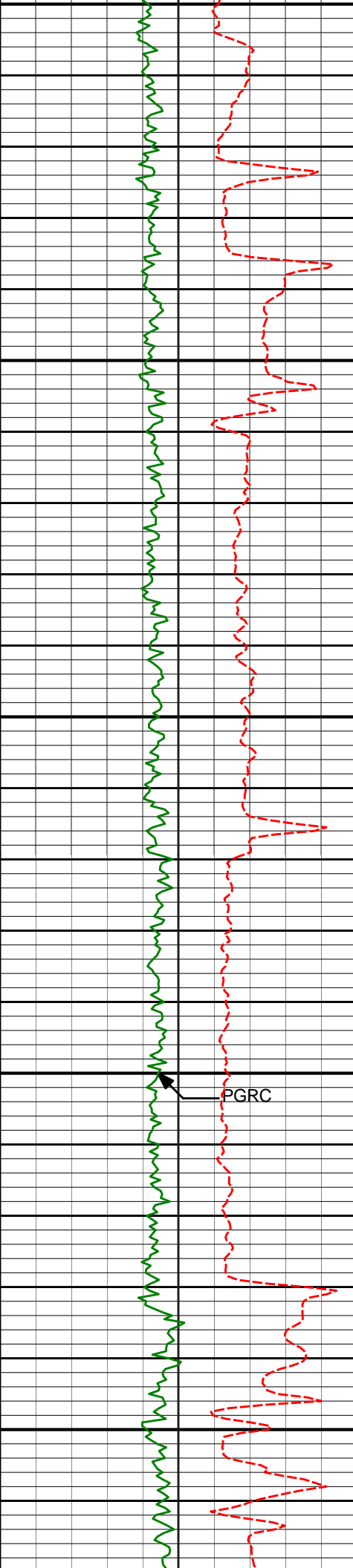
10818'

89.63°

359.11°

7743.28'

3243.78'



10850

10900

10950

11000

11050

10912'

89.14°

359.07°

7744.29'

3337.77'

11004'

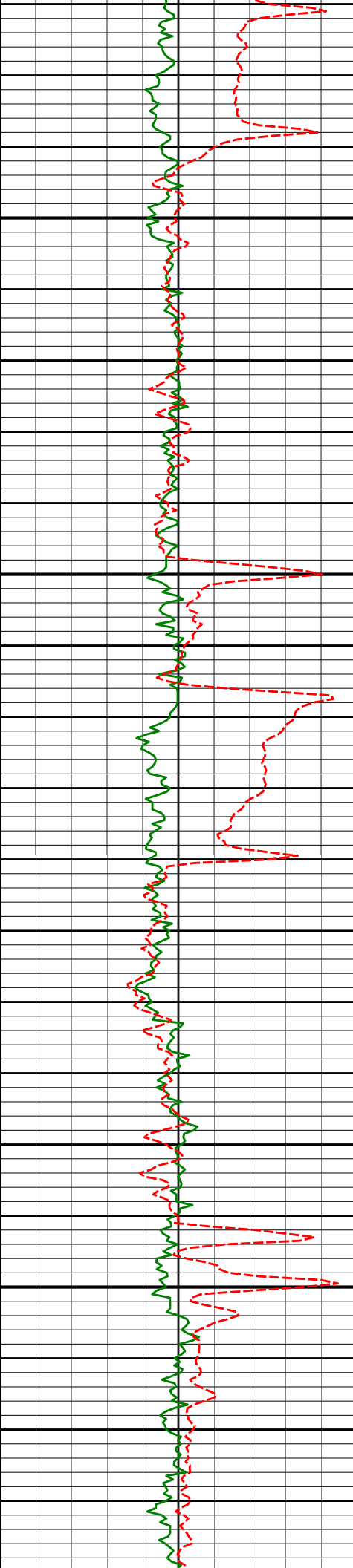
89.81°

359.17°

7745.13'

3429.75'

PGRC



11100

11150

11200

11250

11098'

89.63°

359.38°

7745.59'

3523.74'

11191'

88.52°

358.65°

7747.09'

3616.72'

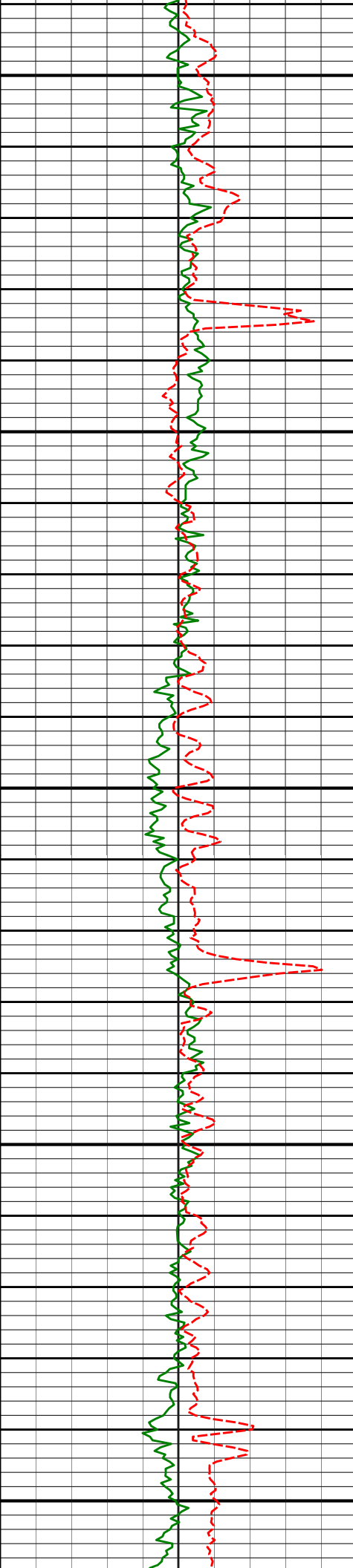
11283'

88.77°

358.31°

7749.27'

3708.66'



11300

11350

11400

11450

11500

11376'

89.82°

358.33°

7750.41'

3801.61'

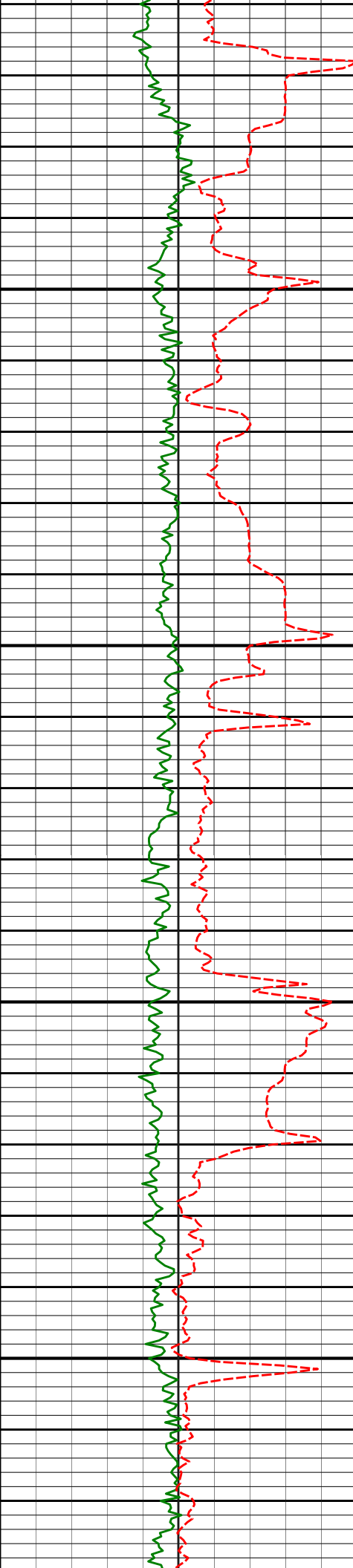
11469'

90.55°

358.50°

7750.11'

3894.58'



11550

11561'

90.65°

358.35°

7749.15'

3986.54'

11600

11650

11652'

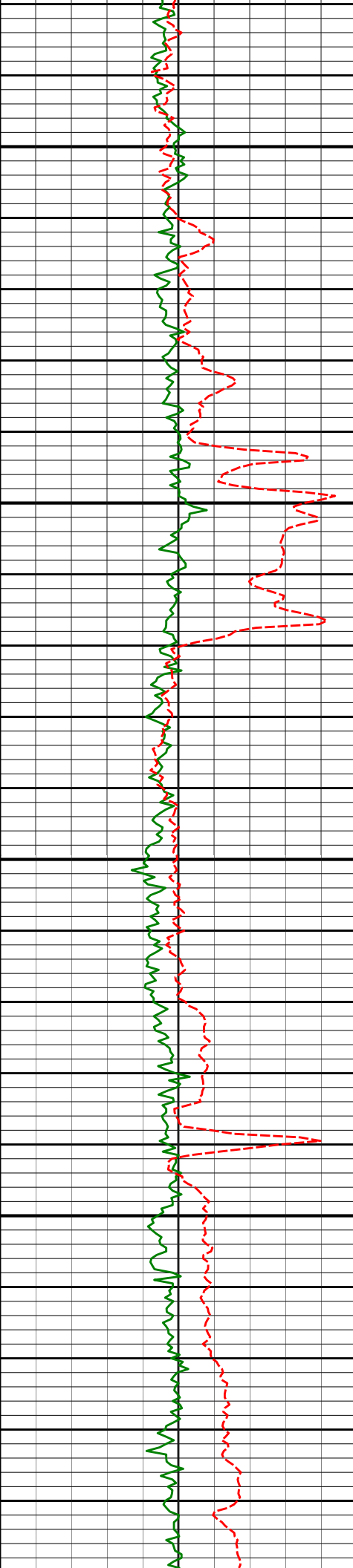
91.39°

358.75°

7747.53'

4077.49'

11700



11750

11800

11850

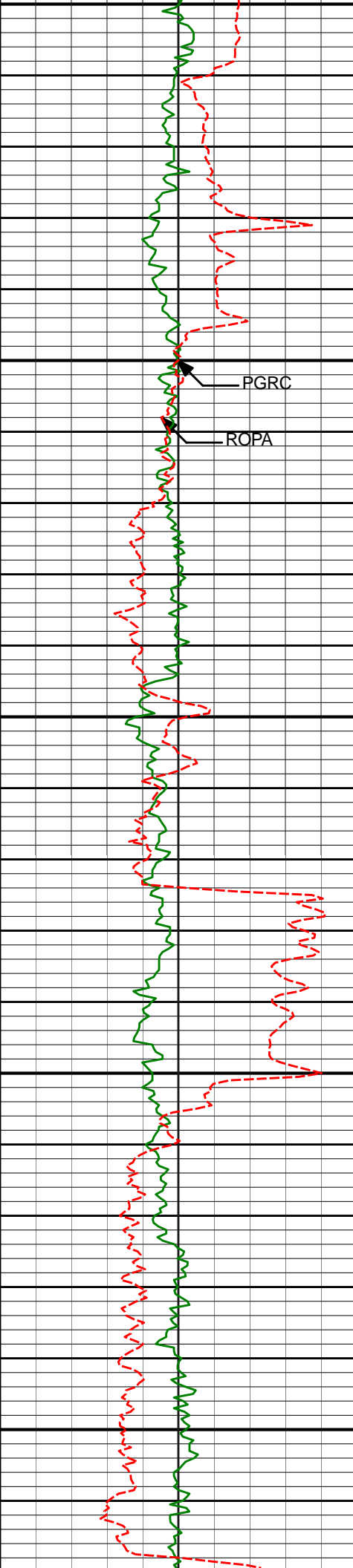
11900

11743'	90.00°	358.27°	7746.43'	4168.46'
--------	--------	---------	----------	----------

11836'	88.71°	358.78°	7747.47'	4261.42'
--------	--------	---------	----------	----------

11926'	89.69°	358.93°	7748.73'	4351.39'
--------	--------	---------	----------	----------

11950



11950

12000

12050

12100

12150

PGRC

ROPA

12021'

90.71°

358.81°

7748.40'

4446.37'

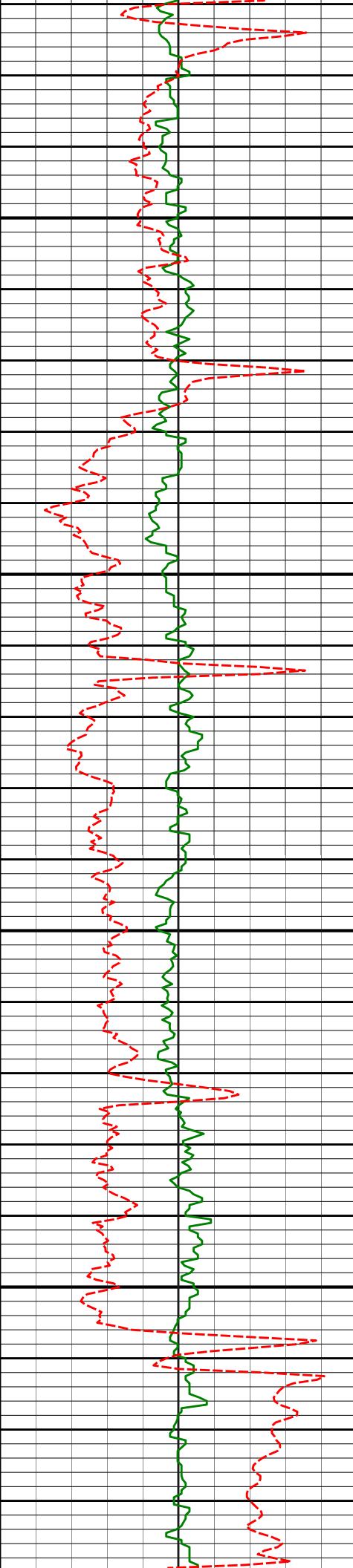
12115'

89.14°

0.12°

7748.52'

4540.36'



12200

12250

12300

12350

12210'

89.85°

0.07°

7749.36'

4635.36'

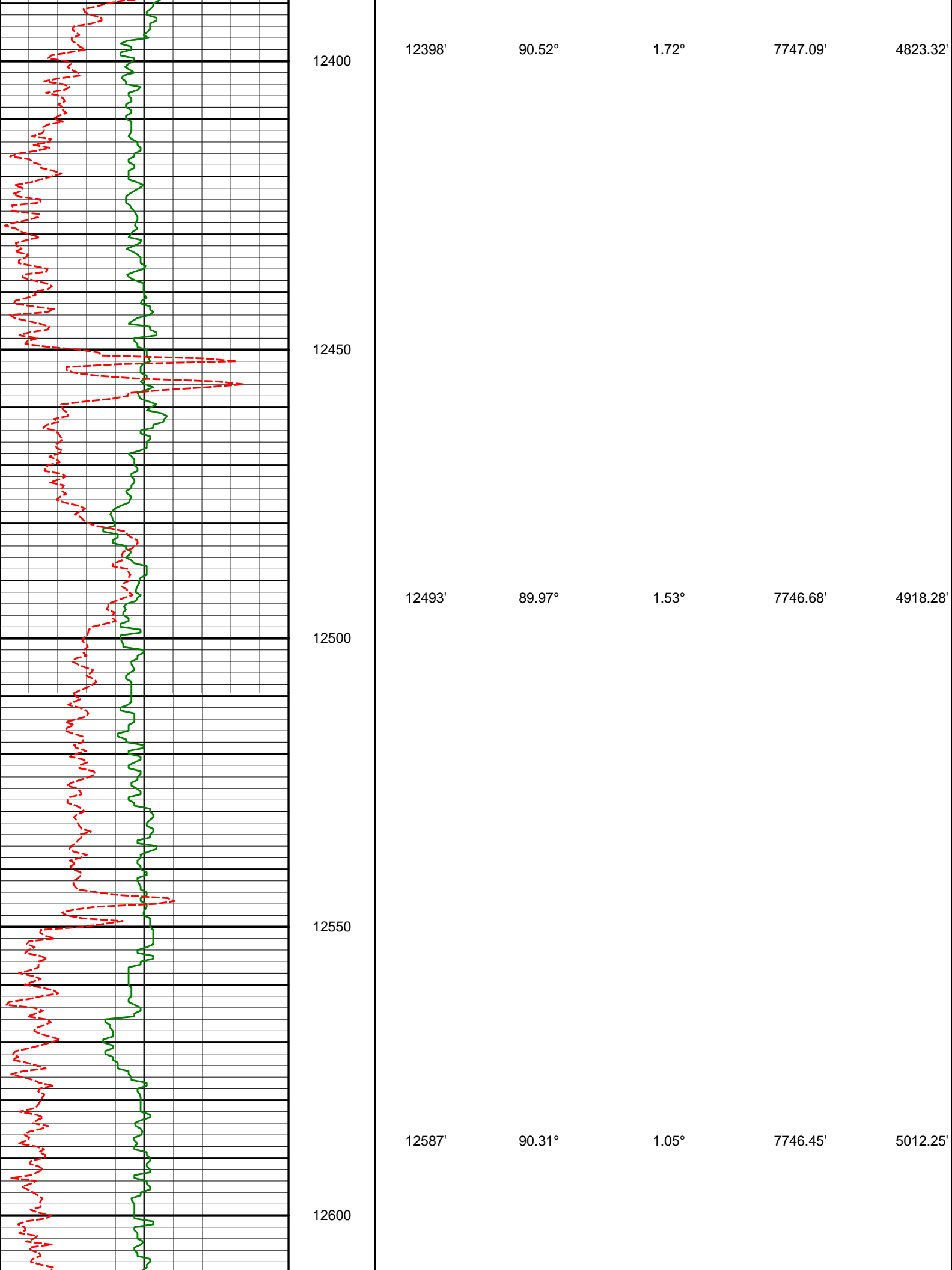
12304'

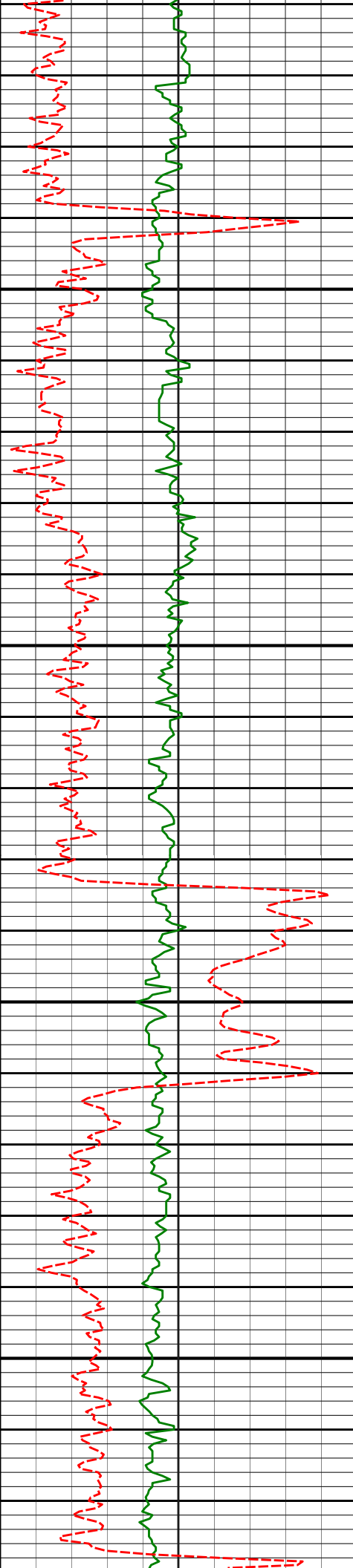
91.20°

0.49°

7748.50'

4729.35'





12650

12700

12750

12800

12681'

91.11°

0.94°

7745.28'

5106.23'

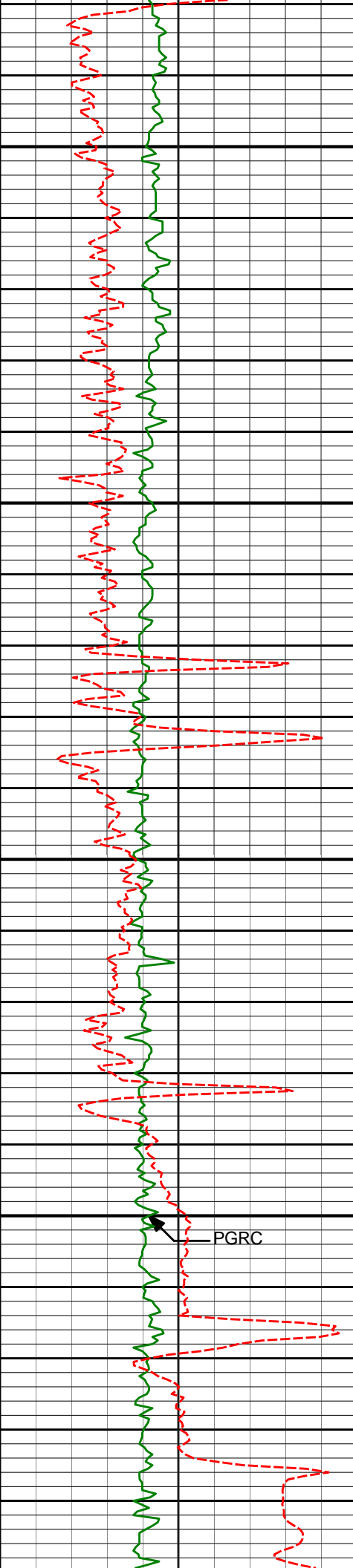
12776'

89.54°

0.71°

7744.75'

5201.21'



12850

12870'

90.25°

0.71°

7744.92'

5295.21'

12900

12950

12964'

90.99°

0.00°

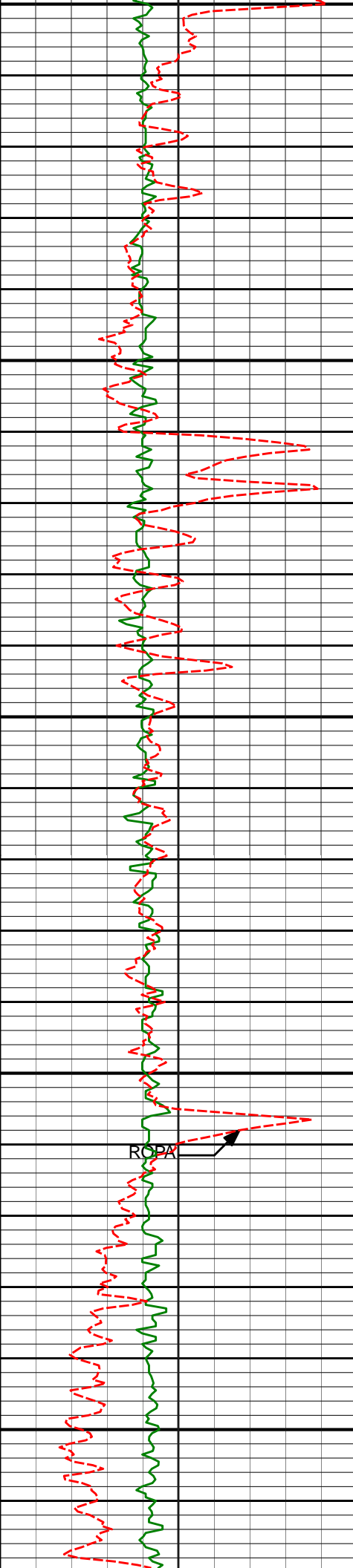
7743.90'

5389.20'

13000

PGRC

13050



13050

13100

13150

13200

13250

13059'

89.45°

359.34°

7743.54'

5484.19'

13153'

89.45°

358.67°

7744.44'

5578.17'

13247'

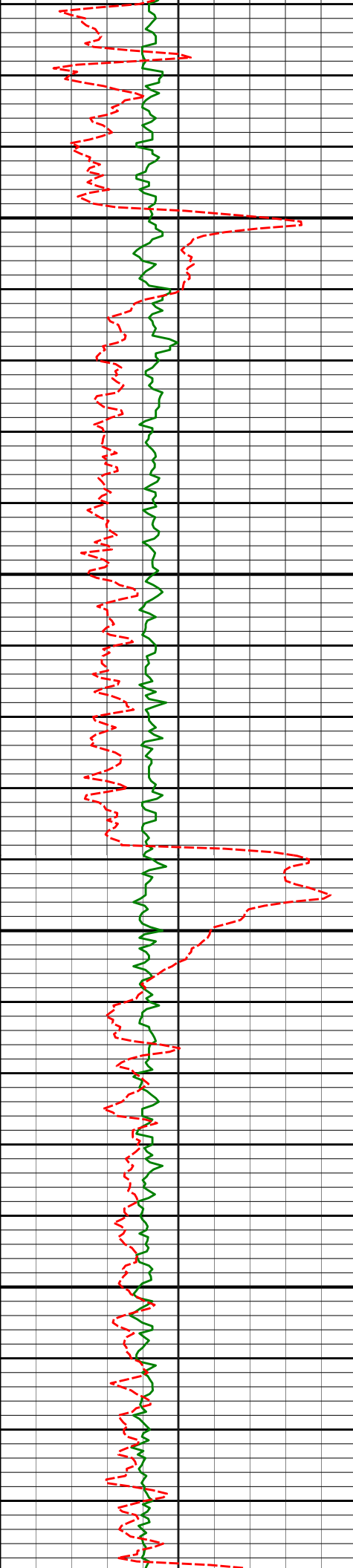
89.97°

357.94°

7744.91'

5672.13'

ROD



13300

13350

13400

13450

13342'

90.43°

357.69°

7744.58'

5767.06'

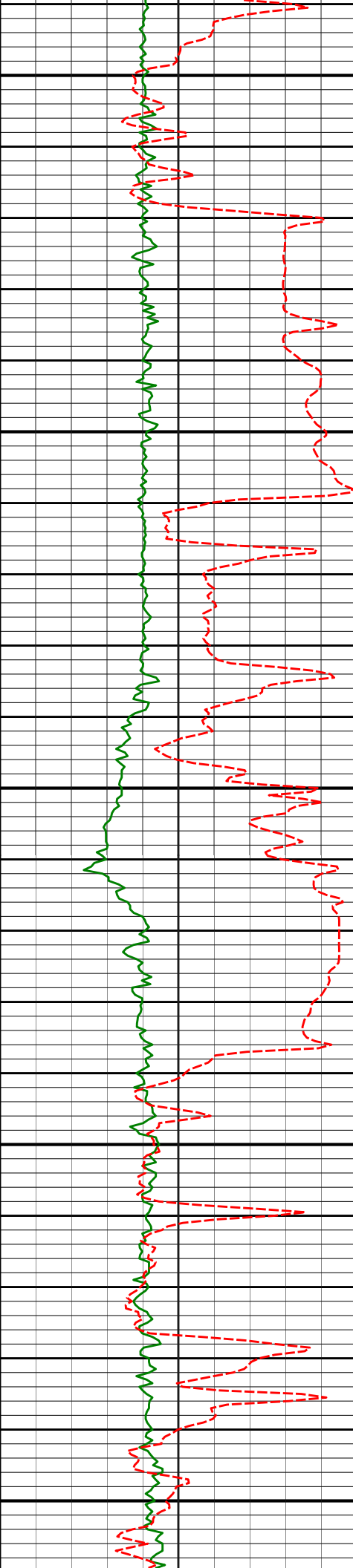
13436'

90.83°

356.56°

7743.55'

5860.94'



13500

13550

13600

13650

13700

13531'

91.39°

357.38°

7741.71'

5955.79'

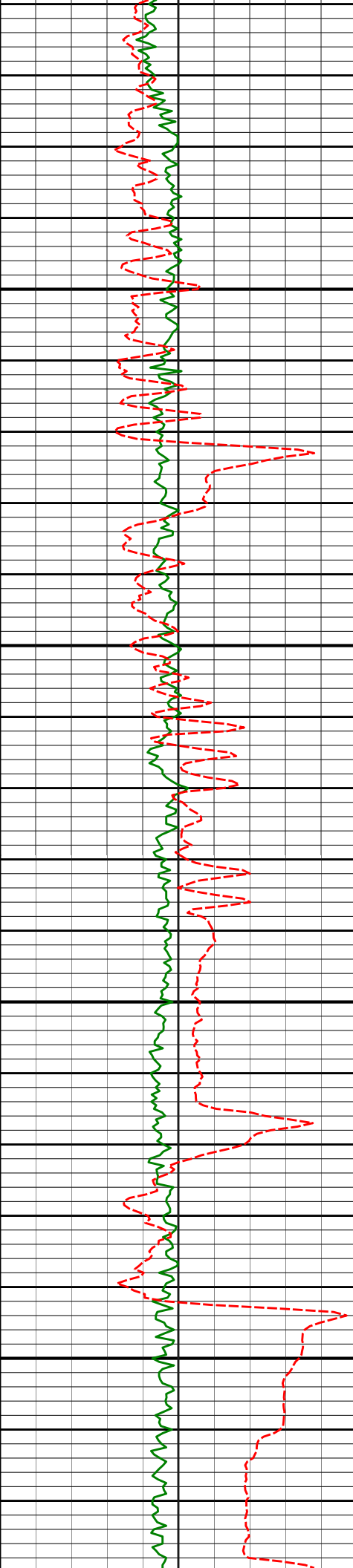
13625'

88.52°

356.96°

7741.78'

6049.67'



13750

13800

13850

13900

13720'

89.01°

357.17°

7743.83'

6144.52'

13814'

90.37°

357.05°

7744.34'

6238.40'

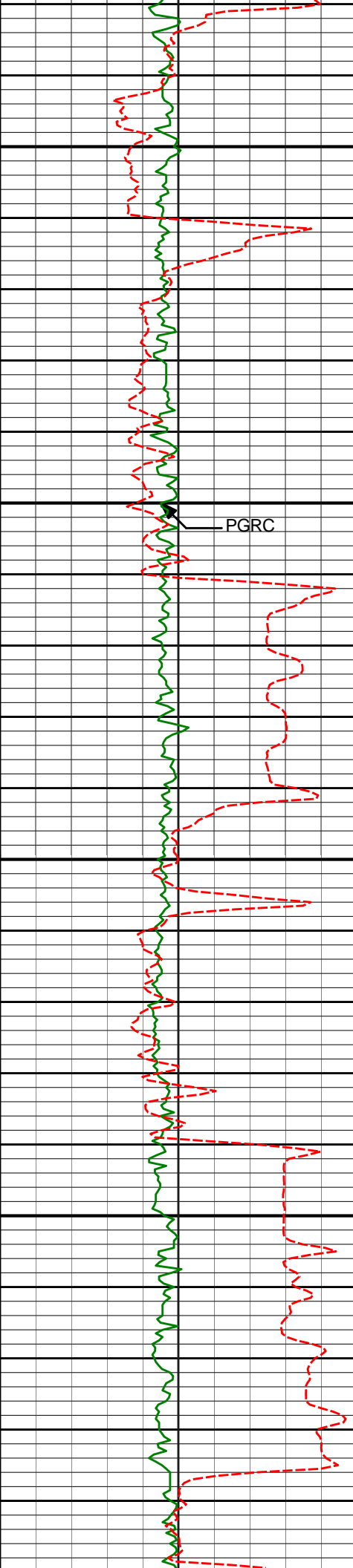
13908'

89.88°

358.03°

7744.13'

6332.32'



13950

14000

14050

14100

14150

14003'

90.99°

359.03°

7743.41'

6427.28'

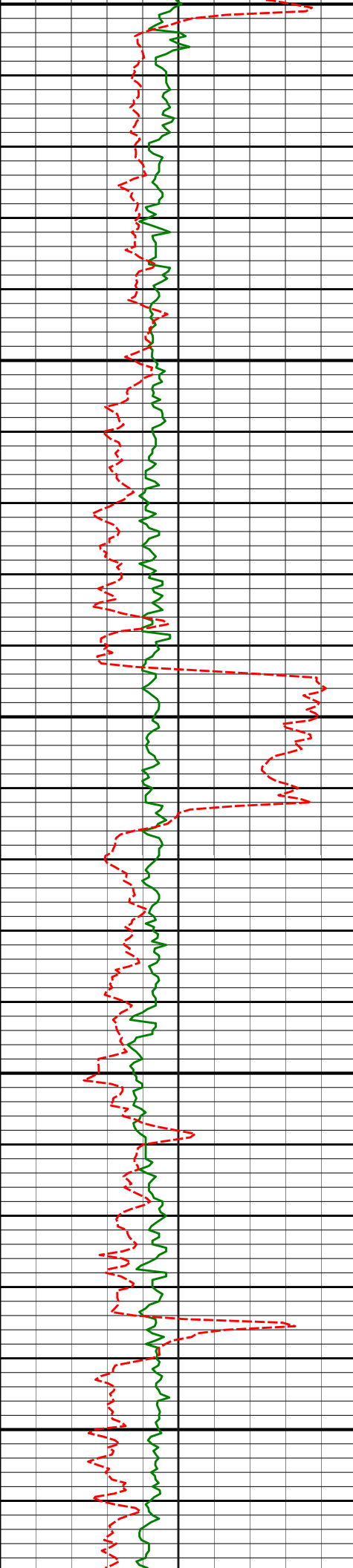
14097'

91.17°

0.61°

7741.64'

6521.26'



14150

14192'

91.14°

1.68°

7739.73'

6616.22'

14200

14250

14286'

89.51°

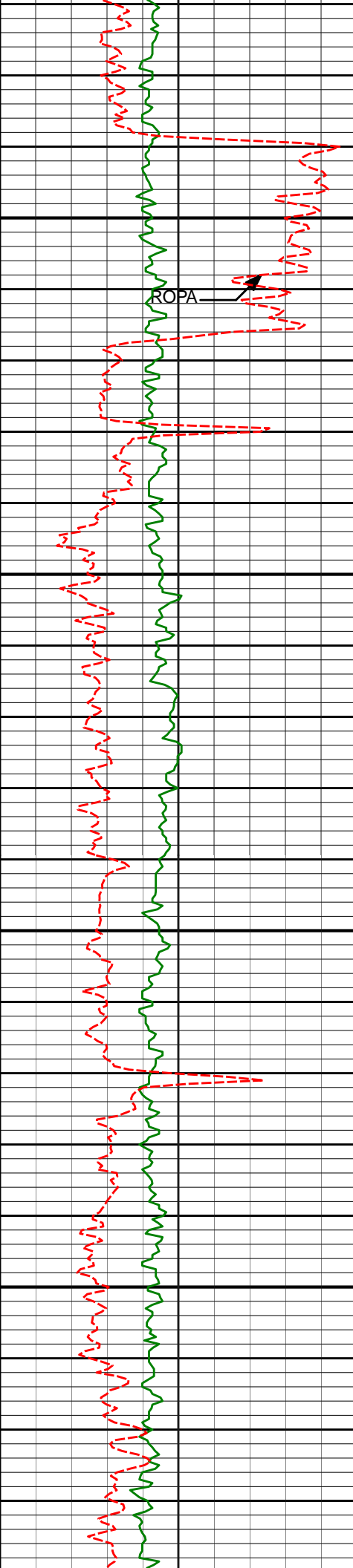
1.42°

7739.19'

6710.18'

14300

14350



14400

14450

14500

14550

14380'

91.23°

1.72°

7738.59'

6804.14'

14475'

89.82°

2.36°

7737.72'

6899.07'

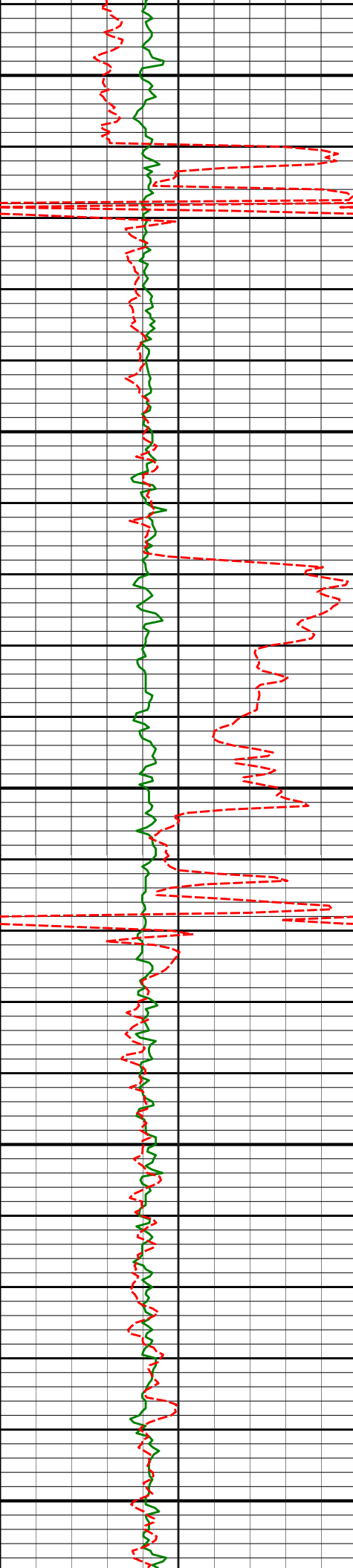
14569'

90.86°

1.95°

7737.16'

6993.00'



14600

14650

14700

14750

14800

14663'

91.73°

2.37°

7735.03'

7086.90'

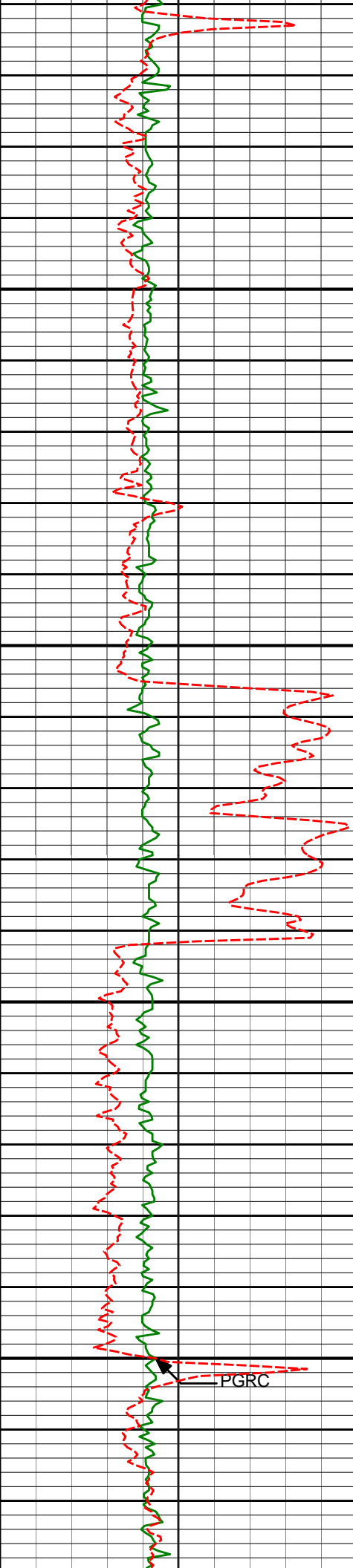
14758'

90.06°

2.74°

7733.55'

7181.79'



14850

14852'

90.83°

2.03°

7732.82'

7275.71'

14900

14950

14947'

89.14°

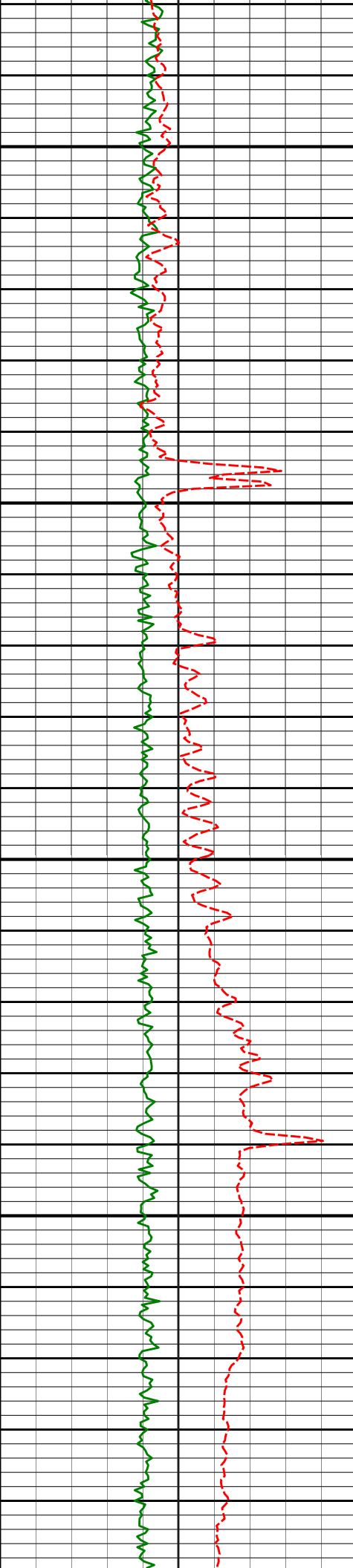
2.54°

7732.84'

7370.62'

15000

PGRC



15050

15100

15150

15200

15041'

89.78°

2.30°

7733.73'

7464.53'

15135'

90.00°

1.87°

7733.91'

7558.47'

15229'

88.06°

0.55°

7735.50'

7652.43'

15250



15250

15300

15350

15400

15450

15324'

88.37°

0.23°

7738.46'

7747.38'

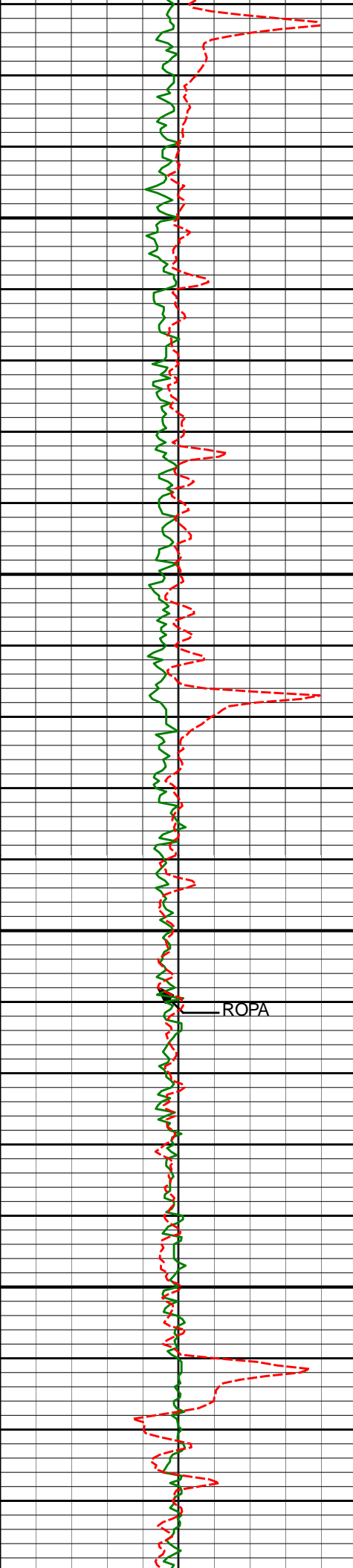
15418'

89.01°

359.93°

7740.61'

7841.35'



15500

15550

15600

15650

ROPA

15512'

89.51°

359.39°

7741.82'

7935.34'

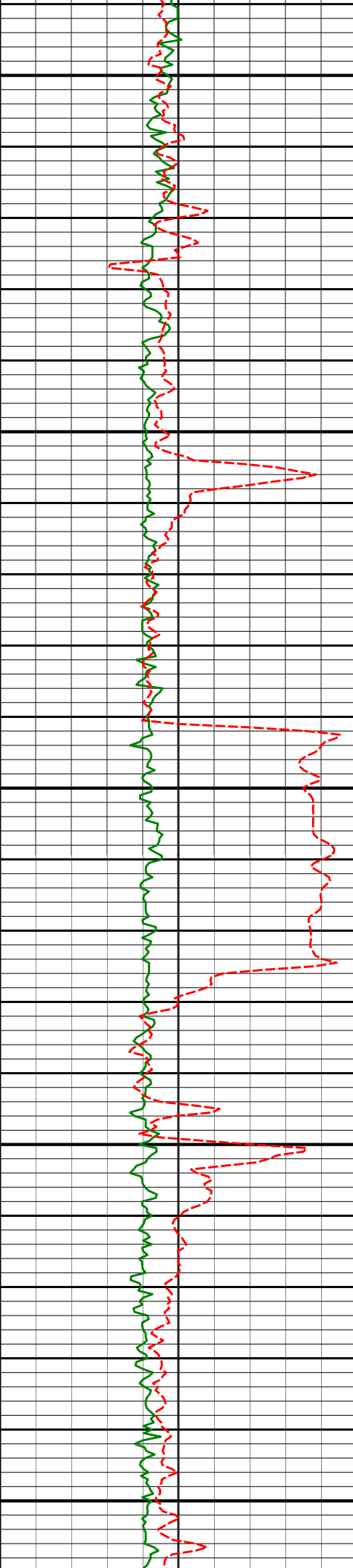
15607'

90.12°

359.54°

7742.13'

8030.34'



15700

15701'

91.02°

359.15°

7741.20'

8124.33'

15750

15800

15796'

91.66°

359.28°

7738.97'

8219.29'

15850

15900

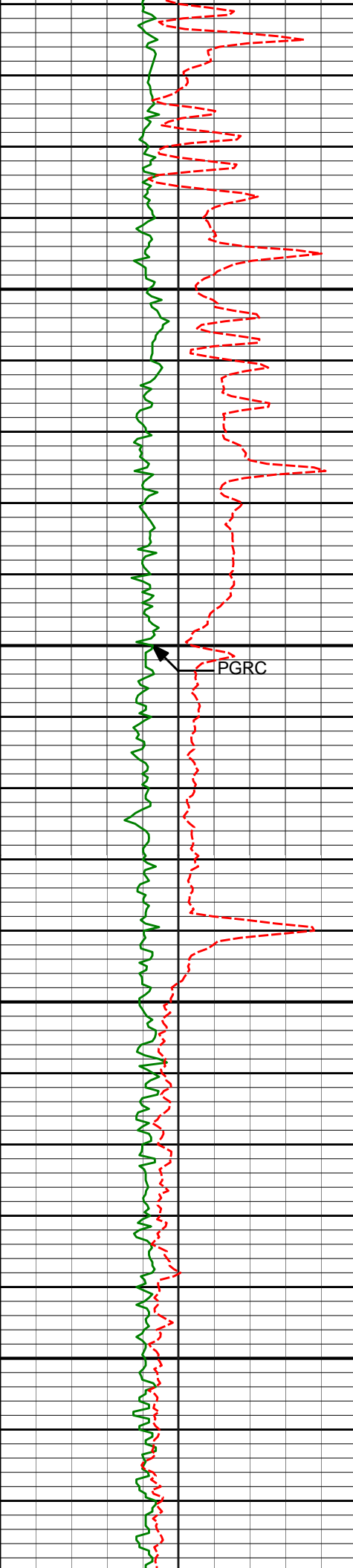
15890'

91.26°

359.48°

7736.58'

8313.26'



15950

15985'

88.52°

357.88°

7736.76'

8408.22'

16000

PGRC

16050

16079'

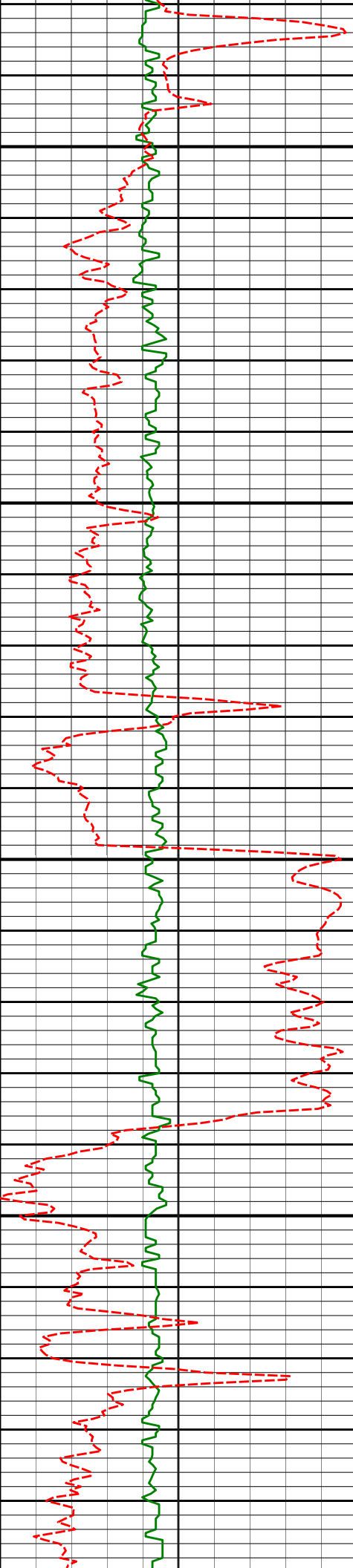
88.71°

357.26°

7739.03'

8502.11'

16100



16150

16200

16250

16300

16350

16174'

89.54°

356.98°

7740.48'

8596.98'

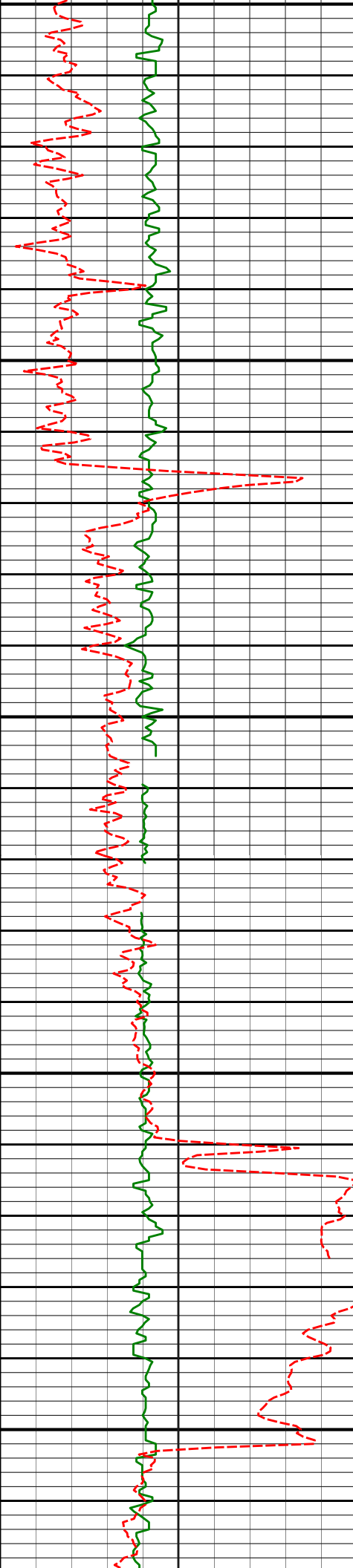
16268'

89.60°

358.54°

7741.19'

8690.90'



16350

16363'

90.68°

359.38°

7740.96'

8785.89'

16400

16450

16457'

91.20°

358.82°

7739.42'

8879.86'

16500

16550

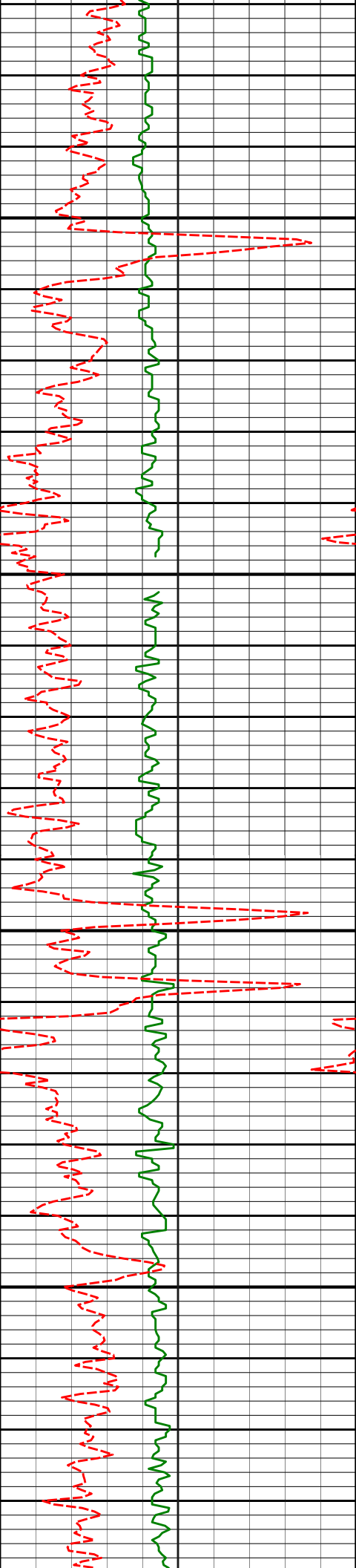
16552'

88.86°

0.23°

7739.37'

8974.85'



16600

16650

16700

16750

16646'

88.83°

359.87°

7741.26'

9068.83'

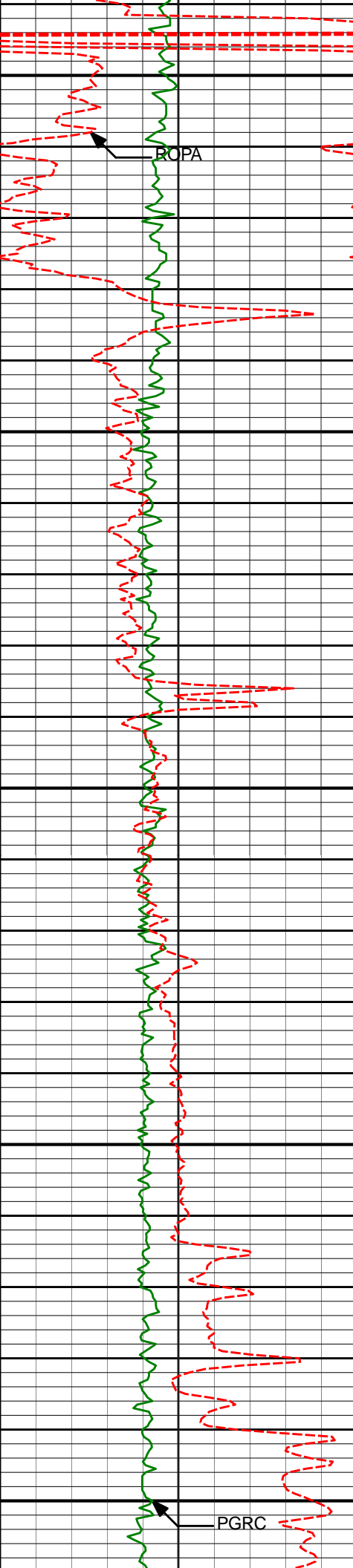
16741'

89.78°

359.44°

7742.41'

9163.82'



16800

BOPA

16850

16900

16950

17000

16835'

91.17°

359.99°

7741.63'

9257.82'

16929'

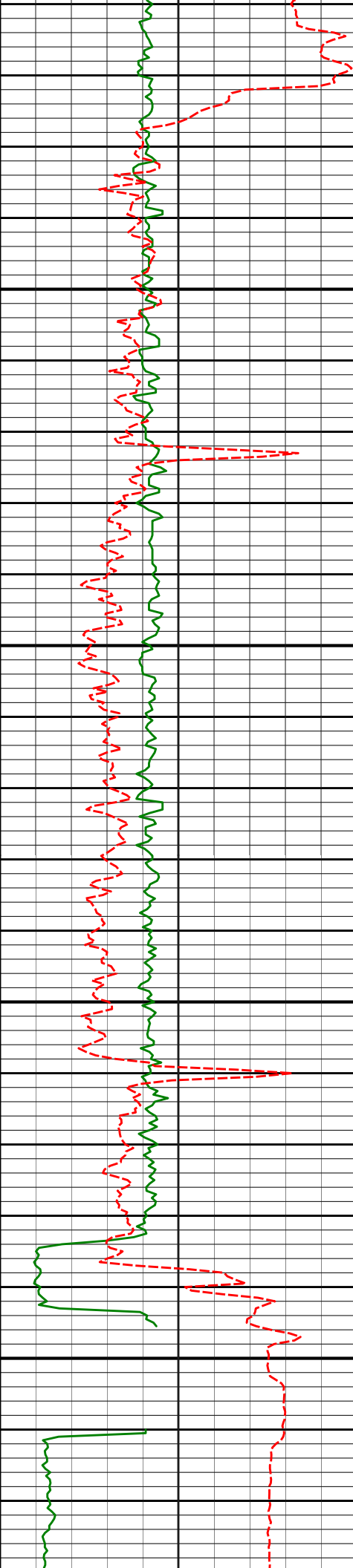
91.91°

359.77°

7739.11'

9351.78'

PGRC



17050

17100

17150

17200

17024'

90.74°

359.69°

7736.91'

9446.75'

17118'

91.11°

359.60°

7735.39'

9540.74'

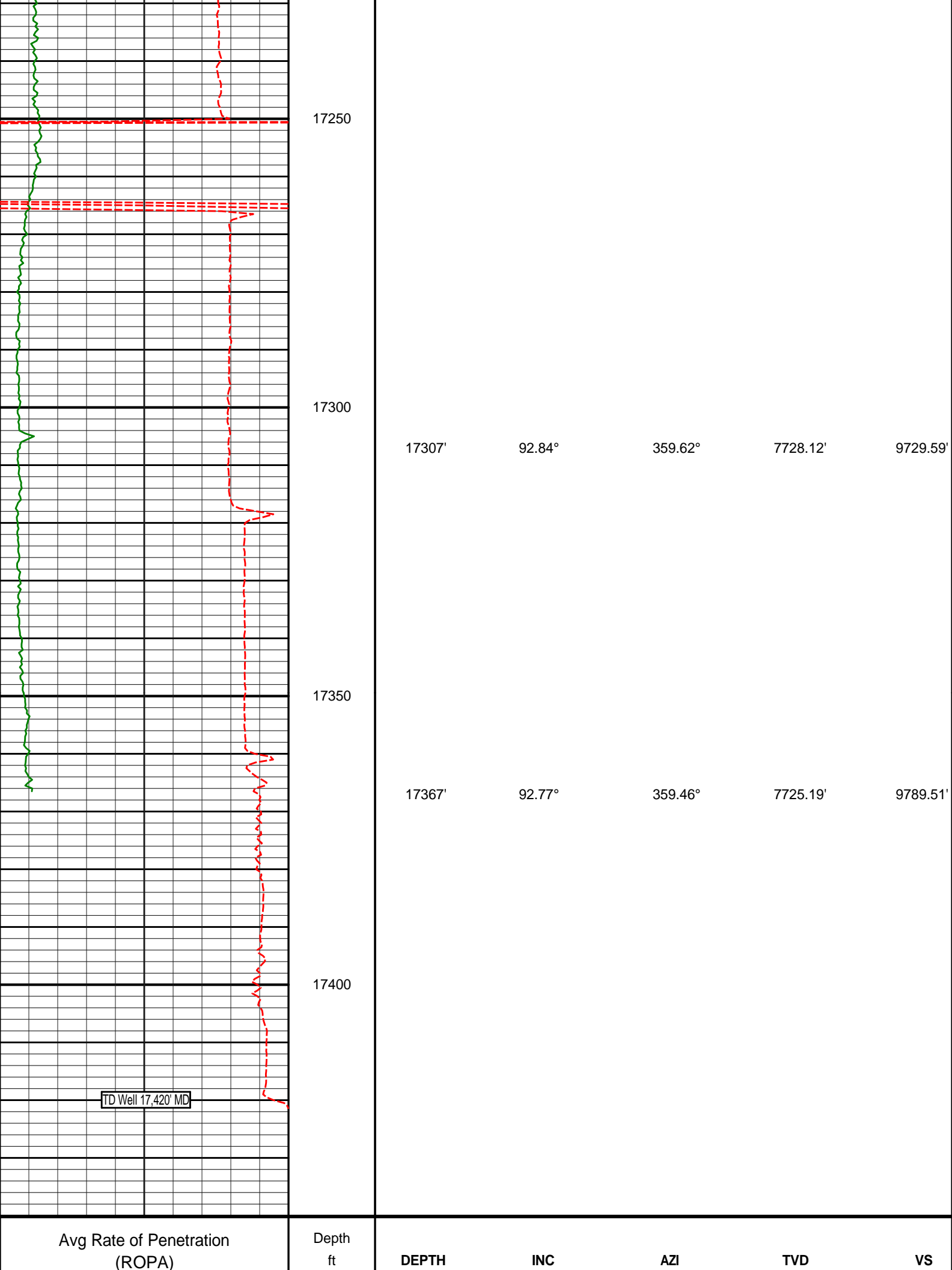
17213'

92.44°

359.63°

7732.45'

9635.69'



TD Well 17,420' MD

Avg Rate of Penetration
(ROPA)

Depth
ft

DEPTH

INC

AZI

TVD

VS

500

feet per hr

0

1 : 240

PCG Gamma Ray BCorr
(PGRC)

0

250

HALLIBURTON

Sperry Drilling

MD 1:240 Detail Log

HALLIBURTON							
DIRECTIONAL SURVEY REPORT							
Anadarko							
NRC 30C-4HZ							
Wattenberg							
Weld Colorado							
USA							
CA-XX-0901165851							
Survey's tied on to surface gyro's.							
Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
991.00	0.35	27.60	990.97	5.49 N	0.38 W	5.49	TIE-IN
1105.00	0.13	207.81	1104.97	5.68 N	0.28 W	5.68	0.42
1197.00	0.19	26.11	1196.97	5.73 N	0.26 W	5.73	0.35
1289.00	0.21	52.47	1288.97	5.97 N	0.06 W	5.97	0.10
1382.00	0.29	167.25	1381.97	5.84 N	0.13 E	5.84	0.46
1475.00	0.43	217.97	1474.97	5.34 N	0.04 W	5.34	0.36
1568.00	0.61	261.11	1567.96	4.99 N	0.74 W	4.99	0.45
1660.00	0.64	249.19	1659.96	4.73 N	1.70 W	4.73	0.14
1752.00	0.77	255.04	1751.95	4.39 N	2.78 W	4.39	0.16
1845.00	0.45	273.24	1844.95	4.25 N	3.75 W	4.25	0.40
1938.00	0.87	295.19	1937.94	4.57 N	4.75 W	4.57	0.52
2031.00	1.20	273.00	2030.92	4.92 N	6.36 W	4.92	0.55
2124.00	1.03	289.65	2123.91	5.25 N	8.12 W	5.25	0.39
2217.00	0.88	288.87	2216.89	5.76 N	9.59 W	5.77	0.16
2309.00	1.03	303.96	2308.88	6.45 N	10.94 W	6.46	0.32
2402.00	1.68	326.52	2401.86	8.06 N	12.39 W	8.06	0.89
2493.00	1.61	320.77	2492.82	10.16 N	13.93 W	10.17	0.20
2586.00	0.98	279.66	2585.80	11.30 N	15.54 W	11.31	1.17
2679.00	1.02	294.21	2678.78	11.78 N	17.08 W	11.79	0.28
2772.00	1.11	280.88	2771.77	12.29 N	18.72 W	12.30	0.28
2867.00	1.23	231.47	2866.75	11.83 N	20.42 W	11.84	1.04
2961.00	1.50	218.65	2960.72	10.24 N	21.98 W	10.25	0.43
3056.00	1.12	224.51	3055.70	8.60 N	23.41 W	8.62	0.42
3150.00	1.77	224.42	3149.67	6.91 N	25.07 W	6.92	0.69
3244.00	1.55	212.60	3243.63	4.80 N	26.77 W	4.82	0.43
3338.00	1.20	214.62	3337.60	2.92 N	28.01 W	2.94	0.38
3433.00	1.33	230.76	3432.58	1.41 N	29.43 W	1.42	0.40
3527.00	1.44	249.85	3526.55	0.31 N	31.38 W	0.33	0.50
3621.00	2.56	274.44	3620.49	0.07 N	34.59 W	0.08	1.48
3715.00	2.80	270.98	3714.39	0.27 N	38.97 W	0.29	0.31
3810.00	2.68	281.99	3809.28	0.77 N	43.47 W	0.79	0.57

3904.00	2.86	268.72	3903.17	1.17 N	47.96 W	1.20	0.71
3998.00	1.71	272.36	3997.10	1.18 N	51.71 W	1.20	1.23
4093.00	3.27	284.79	4092.00	1.93 N	55.74 W	1.96	1.73
4187.00	4.57	259.97	4185.79	1.96 N	62.02 W	1.99	2.24
4281.00	6.14	262.91	4279.38	0.69 N	70.70 W	0.72	1.69
4376.00	7.10	280.99	4373.75	1.18 N	81.51 W	1.22	2.40
4470.00	7.53	276.25	4466.99	2.96 N	93.33 W	3.01	0.79
4565.00	9.11	277.71	4560.98	4.64 N	106.97 W	4.70	1.68
4659.00	9.47	272.98	4653.75	6.04 N	122.07 W	6.11	0.90
4753.00	9.02	271.51	4746.53	6.64 N	137.16 W	6.71	0.54
4848.00	10.80	280.23	4840.12	8.42 N	153.37 W	8.50	2.45
4942.00	10.94	278.29	4932.43	11.27 N	170.86 W	11.36	0.42
5036.00	11.04	271.37	5024.71	12.77 N	188.68 W	12.87	1.41
5131.00	10.13	270.94	5118.09	13.12 N	206.13 W	13.23	0.96
5225.00	8.85	260.58	5210.81	12.08 N	221.53 W	12.19	2.27
5319.00	9.09	267.12	5303.66	10.52 N	236.08 W	10.64	1.11
5414.00	10.85	265.72	5397.23	9.47 N	252.49 W	9.61	1.87
5508.00	10.80	263.20	5489.55	7.77 N	270.06 W	7.91	0.51
5603.00	11.14	266.79	5582.82	6.20 N	288.06 W	6.35	0.80
5697.00	10.09	265.08	5675.21	4.99 N	305.33 W	5.15	1.17
5791.00	9.96	266.38	5767.77	3.77 N	321.65 W	3.94	0.28
5886.00	7.85	267.38	5861.62	2.95 N	336.33 W	3.13	2.23
5980.00	6.31	271.23	5954.90	2.77 N	347.91 W	2.95	1.71
6074.00	4.19	267.94	6048.50	2.76 N	356.51 W	2.95	2.28
6169.00	2.50	264.72	6143.34	2.44 N	362.04 W	2.63	1.79
6263.00	0.62	241.50	6237.30	2.01 N	364.53 W	2.20	2.07
6358.00	0.33	172.52	6332.30	1.50 N	364.94 W	1.69	0.62
6452.00	0.29	62.03	6426.30	1.34 N	364.70 W	1.53	0.54
6547.00	0.07	43.21	6521.30	1.49 N	364.45 W	1.69	0.24
6641.00	0.22	130.46	6615.30	1.42 N	364.27 W	1.61	0.24
6735.00	0.32	123.65	6709.30	1.16 N	363.91 W	1.35	0.11
6830.00	0.32	105.40	6804.29	0.94 N	363.44 W	1.13	0.11
6924.00	0.25	86.89	6898.29	0.88 N	362.98 W	1.07	0.12
7019.00	0.03	126.54	6993.29	0.88 N	362.75 W	1.07	0.24
7113.00	0.33	354.76	7087.29	1.13 N	362.76 W	1.32	0.37
7160.00	2.16	351.94	7134.28	2.14 N	362.89 W	2.33	3.89
7207.00	4.36	355.30	7181.20	4.80 N	363.16 W	4.99	4.70
7254.00	6.70	357.71	7227.98	9.32 N	363.42 W	9.51	5.00
7302.00	9.47	357.33	7275.50	16.07 N	363.72 W	16.26	5.77
7349.00	10.86	354.29	7321.76	24.33 N	364.34 W	24.53	3.17
7396.00	11.55	352.40	7367.86	33.40 N	365.40 W	33.60	1.66
7443.00	12.89	350.75	7413.80	43.24 N	366.86 W	43.43	2.95
7491.00	17.80	355.61	7460.07	55.85 N	368.29 W	56.04	10.57
7538.00	22.40	359.88	7504.20	71.98 N	368.86 W	72.17	10.27
7585.00	27.34	2.57	7546.83	91.73 N	368.39 W	91.92	10.78
7632.00	32.87	2.14	7587.47	115.27 N	367.43 W	115.47	11.77
7680.00	39.75	2.09	7626.13	143.66 N	366.38 W	143.85	14.33
7727.00	48.35	4.29	7659.88	176.25 N	364.52 W	176.44	18.58
7774.00	56.17	5.63	7688.63	213.25 N	361.28 W	213.44	16.79
7821.00	64.52	4.95	7711.86	253.88 N	357.53 W	254.07	17.81
7868.00	74.28	5.33	7728.38	297.65 N	353.59 W	297.83	20.78
7915.00	78.33	358.44	7739.52	343.25 N	352.11 W	343.43	16.64
7932.00	80.65	355.98	7742.62	359.94 N	352.93 W	360.12	19.71
8019.00	88.67	357.20	7750.71	446.33 N	358.07 W	446.52	9.32
8113.00	91.39	357.95	7750.66	540.24 N	362.05 W	540.43	3.00
8208.00	91.70	357.77	7748.10	635.14 N	365.59 W	635.33	0.38
8303.00	92.59	358.47	7744.54	730.02 N	368.71 W	730.21	1.19
8397.00	92.10	359.09	7740.70	823.92 N	370.71 W	824.11	0.84
8492.00	91.23	0.33	7737.94	918.88 N	371.19 W	919.07	1.59
8586.00	91.60	0.12	7735.61	1012.85 N	370.82 W	1013.04	0.45
8680.00	90.80	0.97	7733.65	1106.82 N	369.93 W	1107.01	1.24
8775.00	89.45	1.60	7733.44	1201.79 N	367.79 W	1201.99	1.57
8869.00	88.86	1.62	7734.82	1295.75 N	365.15 W	1295.94	0.63
8963.00	89.54	1.55	7736.14	1389.70 N	362.55 W	1389.89	0.73
9058.00	90.00	1.36	7736.52	1484.67 N	360.14 W	1484.86	0.52
9152.00	91.11	1.22	7735.61	1578.64 N	358.03 W	1578.83	1.19
9247.00	90.62	1.73	7734.17	1673.60 N	355.58 W	1673.78	0.74
9337.00	89.66	1.51	7733.95	1763.56 N	353.04 W	1763.74	1.09
9431.00	89.82	1.40	7734.38	1857.53 N	350.65 W	1857.71	0.21
9523.00	90.80	1.15	7733.88	1949.50 N	348.60 W	1949.68	1.10
9615.00	89.20	2.50	7733.88	2041.45 N	345.67 W	2041.63	2.28
9707.00	90.40	2.46	7734.20	2133.36 N	341.69 W	2133.54	1.31
9800.00	89.01	2.58	7734.68	2226.27 N	337.60 W	2226.44	1.50
9894.00	89.51	2.63	7735.90	2320.16 N	333.33 W	2320.34	0.53
9988.00	88.87	2.42	7737.33	2418.34 N	328.87 W	2418.53	1.14

9986.00	90.37	3.18	7735.99	2412.04 N	328.67 W	2412.22	1.11
10078.00	89.75	2.10	7735.90	2503.94 N	324.43 W	2504.11	1.35
10170.00	88.43	1.52	7737.36	2595.88 N	321.53 W	2596.05	1.57
10263.00	89.41	1.29	7739.11	2688.84 N	319.25 W	2689.00	1.08
10356.00	88.15	1.31	7741.09	2781.79 N	317.14 W	2781.96	1.36
10449.00	88.30	0.78	7743.97	2874.73 N	315.44 W	2874.90	0.59
10543.00	90.43	1.71	7745.01	2968.70 N	313.40 W	2968.86	2.47
10634.00	90.80	1.71	7744.04	3059.65 N	310.68 W	3059.81	0.41
10727.00	90.25	0.69	7743.18	3152.62 N	308.74 W	3152.79	1.25
10818.00	89.63	359.11	7743.28	3243.62 N	308.90 W	3243.78	1.87
10912.00	89.14	359.07	7744.29	3337.60 N	310.39 W	3337.77	0.52
11004.00	89.81	359.17	7745.13	3429.59 N	311.80 W	3429.75	0.74
11098.00	89.63	359.38	7745.59	3523.58 N	312.99 W	3523.74	0.29
11191.00	88.52	358.65	7747.09	3616.55 N	314.59 W	3616.72	1.43
11283.00	88.77	358.31	7749.27	3708.49 N	317.03 W	3708.66	0.46
11376.00	89.82	358.33	7750.41	3801.44 N	319.76 W	3801.61	1.13
11469.00	90.55	358.50	7750.11	3894.41 N	322.33 W	3894.58	0.81
11561.00	90.65	358.35	7749.15	3986.37 N	324.86 W	3986.54	0.20
11652.00	91.39	358.75	7747.53	4077.32 N	327.16 W	4077.49	0.92
11743.00	90.00	358.27	7746.43	4168.28 N	329.52 W	4168.46	1.62
11836.00	88.71	358.78	7747.47	4261.24 N	331.92 W	4261.42	1.49
11926.00	89.69	358.93	7748.73	4351.22 N	333.72 W	4351.39	1.10
12021.00	90.71	358.81	7748.40	4446.20 N	335.59 W	4446.37	1.08
12115.00	89.14	0.12	7748.52	4540.19 N	336.47 W	4540.36	2.18
12210.00	89.85	0.07	7749.36	4635.18 N	336.31 W	4635.36	0.75
12304.00	91.20	0.49	7748.50	4729.18 N	335.85 W	4729.35	1.50
12398.00	90.52	1.72	7747.09	4823.15 N	334.04 W	4823.32	1.50
12493.00	89.97	1.53	7746.68	4918.11 N	331.34 W	4918.28	0.61
12587.00	90.31	1.05	7746.45	5012.08 N	329.23 W	5012.25	0.63
12681.00	91.11	0.94	7745.28	5106.06 N	327.60 W	5106.23	0.86
12776.00	89.54	0.71	7744.75	5201.04 N	326.23 W	5201.21	1.67
12870.00	90.25	0.71	7744.92	5295.04 N	325.06 W	5295.21	0.76
12964.00	90.99	0.00	7743.90	5389.03 N	324.48 W	5389.20	1.09
13059.00	89.45	359.34	7743.54	5484.02 N	325.03 W	5484.19	1.76
13153.00	89.45	358.67	7744.44	5578.00 N	326.66 W	5578.17	0.71
13247.00	89.97	357.94	7744.91	5671.96 N	329.44 W	5672.13	0.95
13342.00	90.43	357.69	7744.58	5766.89 N	333.06 W	5767.06	0.55
13436.00	90.83	356.56	7743.55	5860.76 N	337.78 W	5860.94	1.28
13531.00	91.39	357.38	7741.71	5955.61 N	342.80 W	5955.79	1.05
13625.00	88.52	356.96	7741.78	6049.49 N	347.44 W	6049.67	3.09
13720.00	89.01	357.17	7743.83	6144.34 N	352.30 W	6144.52	0.56
13814.00	90.37	357.05	7744.34	6238.22 N	357.04 W	6238.40	1.45
13908.00	89.88	358.03	7744.13	6332.13 N	361.08 W	6332.32	1.17
14003.00	90.99	359.03	7743.41	6427.09 N	363.51 W	6427.28	1.57
14097.00	91.17	0.61	7741.64	6521.07 N	363.81 W	6521.26	1.69
14192.00	91.14	1.68	7739.73	6616.03 N	361.91 W	6616.22	1.13
14286.00	89.51	1.42	7739.19	6709.99 N	359.37 W	6710.18	1.76
14380.00	91.23	1.72	7738.59	6803.95 N	356.79 W	6804.14	1.86
14475.00	89.82	2.36	7737.72	6898.89 N	353.41 W	6899.07	1.63
14569.00	90.86	1.95	7737.16	6992.82 N	349.88 W	6993.00	1.19
14663.00	91.73	2.37	7735.03	7086.72 N	346.34 W	7086.90	1.03
14758.00	90.06	2.74	7733.55	7181.61 N	342.10 W	7181.79	1.80
14852.00	90.83	2.03	7732.82	7275.53 N	338.19 W	7275.71	1.11
14947.00	89.14	2.54	7732.84	7370.45 N	334.40 W	7370.62	1.86
15041.00	89.78	2.30	7733.73	7464.36 N	330.43 W	7464.53	0.73
15135.00	90.00	1.87	7733.91	7558.30 N	327.01 W	7558.47	0.51
15229.00	88.06	0.55	7735.50	7652.26 N	325.03 W	7652.43	2.50
15324.00	88.37	0.23	7738.46	7747.21 N	324.38 W	7747.38	0.47
15418.00	89.01	359.93	7740.61	7841.18 N	324.25 W	7841.35	0.75
15512.00	89.51	359.39	7741.82	7935.17 N	324.81 W	7935.34	0.78
15607.00	90.12	359.54	7742.13	8030.17 N	325.70 W	8030.34	0.66
15701.00	91.02	359.15	7741.20	8124.16 N	326.77 W	8124.33	1.04
15796.00	91.66	359.28	7738.97	8219.12 N	328.07 W	8219.29	0.69
15890.00	91.26	359.48	7736.58	8313.08 N	329.09 W	8313.26	0.48
15985.00	88.52	357.88	7736.76	8408.05 N	331.28 W	8408.22	3.34
16079.00	88.71	357.26	7739.03	8501.93 N	335.26 W	8502.11	0.69
16174.00	89.54	356.98	7740.48	8596.80 N	340.03 W	8596.98	0.92
16268.00	89.60	358.54	7741.19	8690.73 N	343.71 W	8690.90	1.66
16363.00	90.68	359.38	7740.96	8785.71 N	345.43 W	8785.89	1.44
16457.00	91.20	358.82	7739.42	8879.68 N	346.91 W	8879.86	0.81
16552.00	88.86	0.23	7739.37	8974.67 N	347.70 W	8974.85	2.88
16646.00	88.83	359.87	7741.26	9068.65 N	347.61 W	9068.83	0.38
16741.00	89.78	359.44	7742.41	9163.64 N	348.19 W	9163.82	1.10
16835.00	91.17	359.99	7741.63	9257.63 N	348.65 W	9257.82	1.59
16929.00	91.91	359.77	7739.11	9351.60 N	348.85 W	9351.78	0.82

17024.00	90.74	359.69	7736.91	9446.57 N	349.30 W	9446.75	1.23
17118.00	91.11	359.60	7735.39	9540.56 N	349.88 W	9540.74	0.41
17213.00	92.44	359.63	7732.45	9635.51 N	350.52 W	9635.69	1.40
17307.00	92.84	359.62	7728.12	9729.40 N	351.13 W	9729.59	0.43
17367.00	92.77	359.46	7725.19	9789.33 N	351.61 W	9789.51	0.29

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 359.97 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.58 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17367.00 FEET
IS 9795.64 FEET ALONG 357.94 DEGREES (TRUE)**

Final survey is a straight line projection to bit.

IFR Corrections have been applied to all surveys.

Date Printed:20 April 2014