

**PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma**



1 : 600 / 1 : 240

Country	: USA
Field	: Wattenberg
Location	: Lat: 40° 28' 23.45" North Long: 104° 23' 39.05" West
Well	: Wells Ranch USX AA23-65-1HN-A1
Company	: Noble Energy
Rig	: H&P 321
LOCATION	Company : Noble Energy
	Rig : H&P 321
Other Services Directional Drilling	Well : Wells Ranch USX AA23-65-1HN-A1
	Field : Wattenberg
	Country : USA
	API Number : 05-123-37023
	Latitude : 40° 28' 23.45" North Longitude : 104° 23' 39.05" West
	UTM Easting = 3,307,641.734 ft UTM Northing = 1,417,138.307 ft

Permanent Datum	: Ground Level	Elevation	: 4810.00 ft
Log Measured From	: Drill Floor		30.00 ft Above Permanent Datum
Drilling Measured From	: Drill Floor		MD LOG

Depth Logged	: 0 ft	To	11,100.00 ft
Date Logged	: 29-Jun-13	To	05-Jul-13
Total Depth MD	: 11,100.00 ft	TVD	: 6,664.18 ft
Spud Date	: 29-Jun-13	Plot Type	: Final
		Plot Date	: 08-Jul-13
		Unit No.	: 11210424
		Job No.	: CA-XX-0900544021

Run No.	Borehole Record (MD)		Run No.		Borehole Record (MD)	
	Size	From	To	Size	From	To
100	8.750 in	678.00 ft	6,040.00 ft			
200	8.750 in	6,040.00 ft	7,080.00 ft			
300	6.125 in	7,080.00 ft	11,100.00 ft			

Run No.	Casing Record (MD)		Run No.		Borehole Record (MD)	
	Size	Weight	From	To	From	To
	9.625 in	34.90 lbpf	SURFACE	668.00 ft		
	7.000 in	24.00 lbpf	SURFACE	7,070.00 ft		

WELL INFORMATION

MWD Run Number	100	200	300
Date run completed	01-Jul-13	02-Jul-13	05-Jul-13
Rig Bit Number	2	3	4
Bit Size (in)	8.750	8.750	6.125
Tool Nominal OD (in)	6.750	6.750	4.750
Log Start Depth (MD, ft)	678.00	6,040.00	7,080.00
Log End Depth (MD, ft)	6,040.00	7,080.00	11,100.00
Drill or Wipe	Drill	Drill	Drill
Drill/Wipe Start Date and Time	29-Jun-13 00:00	01-Jul-13 08:53	03-Jul-13 18:45
Drill/Wipe End Date and Time	29-Jun-13 00:00	02-Jul-13 10:16	05-Jul-13 01:03
Min Inc (deg) @ Depth (MD, ft)	.13 @ 1,003.00	10.02 @ 6,046.00	87.16 @ 7,184.00
Max Inc (deg) @ Depth (MD, ft)	13.69 @ 3,833.00	83.71 @ 7,026.00	91.64 @ 10,879.00
Bit TFA(in2) / Bit Type	.75 / PDC	.90 / N/A	.55 / PDC
Flow Rate (gpm)	595.88	596.95	291.85
Max AV (fpm) / CV (fpm) @ MWD	474.0 / N/A	477.0 / N/A	491.0 / N/A
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	8.60 / 28.00	9.50 / 36.00	9.10 / 33.00
Filtrate CL (ppm)	2,000.00	2,000.00	2,100.00
pH / Fluid Loss (mptm)	8.80 / 35	7.90 / 8	8.60 / 15
PV (cP) / YP (Ihf2)	1 / 2.00	10 / 12.00	5 / 5.00
% Solids / % Sand	2.20 / 0.75	6.00 / 0.25	5.40 / 0.10
% Oil / Oil:Water Ratio	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
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A

Max Tool Temp (degF) / Source	167.97 / PCM	167.97 / PCM	226.10 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 167.97	N/A @ 167.97	N/A @ 226.10		
Lead MWD Engineer	Robert Barnes	Chris Befort	Chris Befort		
Customer Representative	Stetson Neilson	Stetson Neilson	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404299	11404299	12177825		
Insert Serial Number	11227549	11227549	11227549		
Date and Time Initialized	29-Jun-13 09:26	29-Jun-13 09:26	03-Jul-13 09:14		
Date and Time Read	02-Jul-13 16:34	02-Jul-13 16:54	05-Jul-13 12:29		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	54.00	67.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404299	11404299	12177825		
Sonde Serial Number	11638498	11638498	11638498		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	199.38	259.35	126.47		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.67	47.61	69.49		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404299	11404299	12177825		
Insert/Sonde Serial Number	11293344	11293344	11293344		

REMARKS

1. All depths are calibrated to driller's pipe tally and are true vertical depth from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:

1: 600 Log
 PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
 Interval Resolution: 1.0 ft
 Interval Distance: 3.0 ft

1: 240 Log
 PGRC (Gamma CG):
 Interval Resolution: 0.5 ft
 Interval Distance: 0.6 ft

ROPA (Average Rate Of Penetration):
 Interval Resolution: 0.5 ft

Interval Resolution: 0.5 ft
 Interval Distance: 1.2 ft
 Interval Distance: 1.2 ft

6. Insite Version 7.4.2

WARRANTY


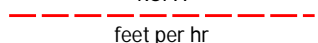
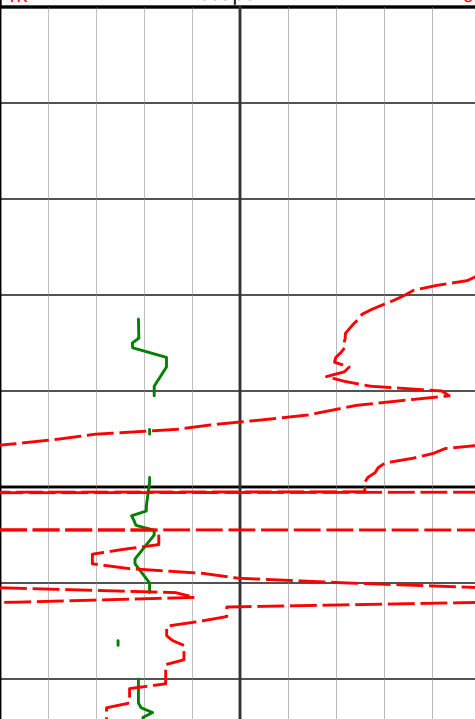
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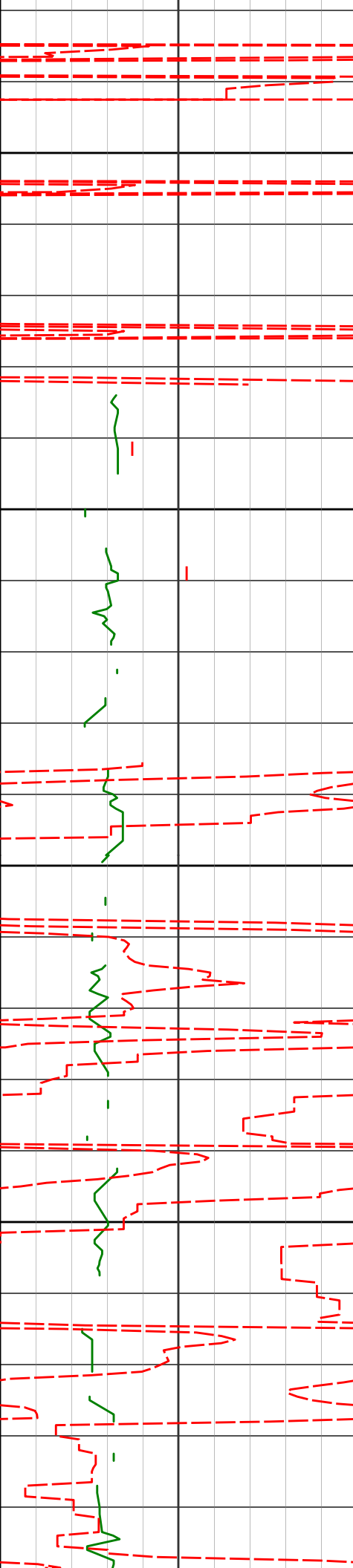
HALLIBURTON

Sperry Drilling Services

MD Detail Log 1:240

Noble Energy
 Wells Ranch USXAA23-65-1HN
 H&P 321
 Sec. 24-T6N-R63W

PCG Gamma Ray PGRC api	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
0  300						
1K  0						
	100					
	700					
		726'	0.33°	247.71°	725.97'	2.46'



750

800

850

900

818'

0.13°

252.74°

817.97'

2.82'

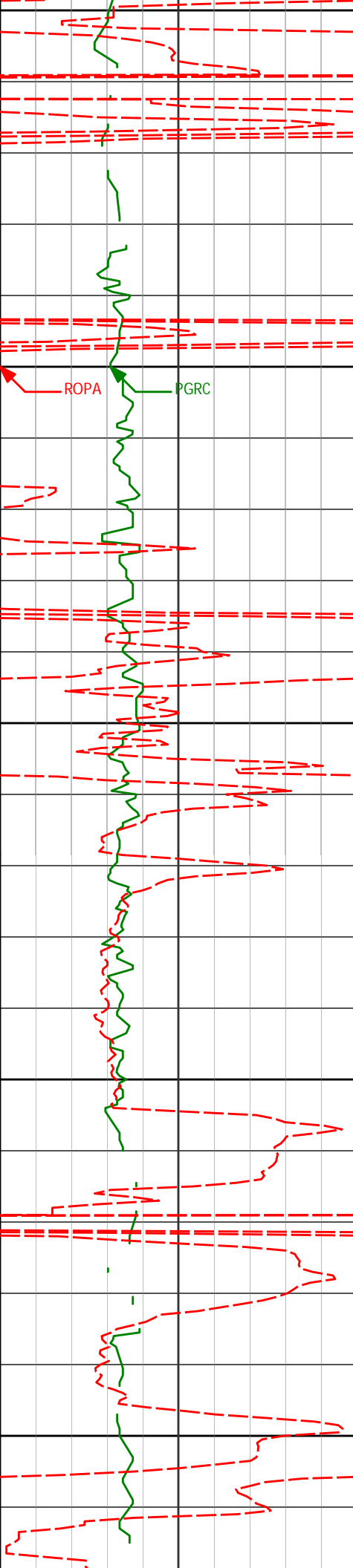
910'

0.21°

38.93°

909.97'

2.80'



950

1000

1050

1100

1150

1003'

0.13°

108.90°

1002.97'

2.58'

1095'

0.18°

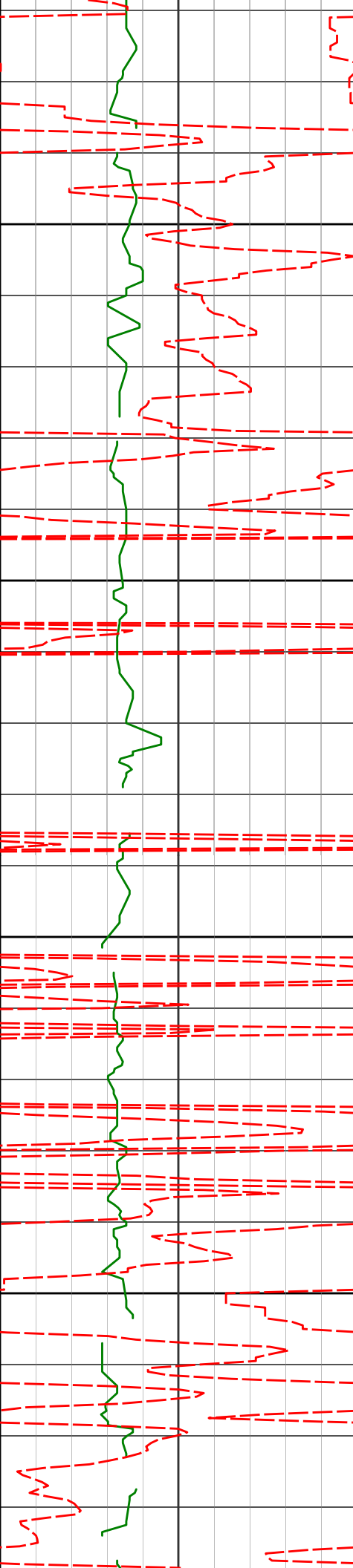
107.35°

1094.97'

2.36'

ROPA

PGRC



1187' 0.21° 60.28° 1186.97' 2.08'

1200

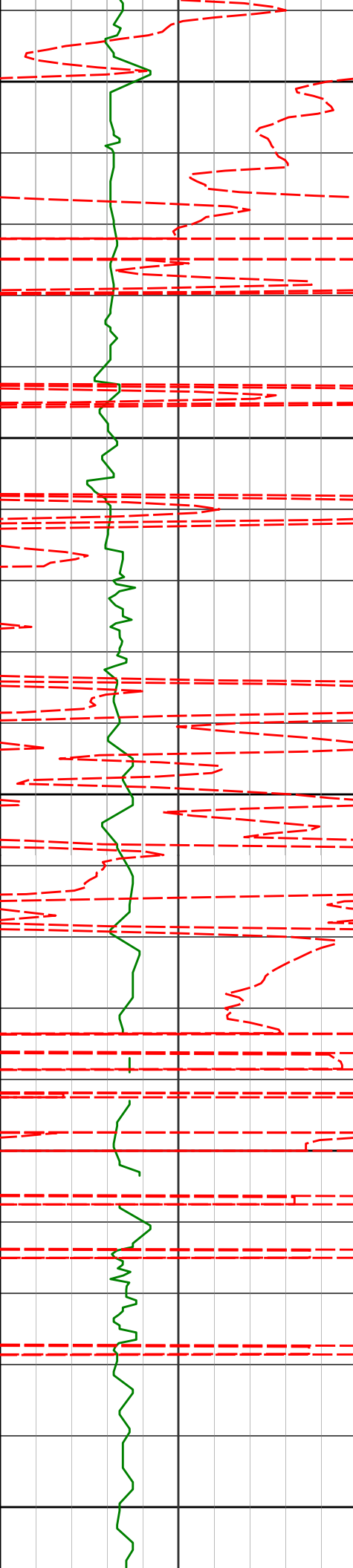
1250

1279' 0.73° 86.14° 1278.97' 1.34'

1300

1350

1371' 0.75° 57.11° 1370.96' 0.20'



1400

1450

1500

1550

1600

1463'

1.10°

52.10°

1462.95'

-1.13'

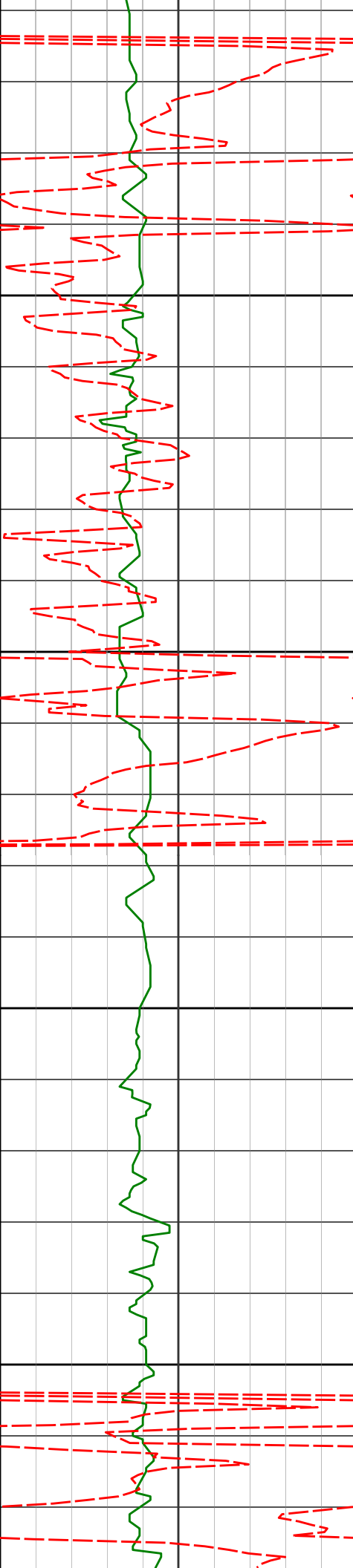
1557'

0.82°

294.39°

1556.94'

-1.36'



1650

1652'

2.43°

257.17°

1651.90'

1.21'

1700

1750

1747'

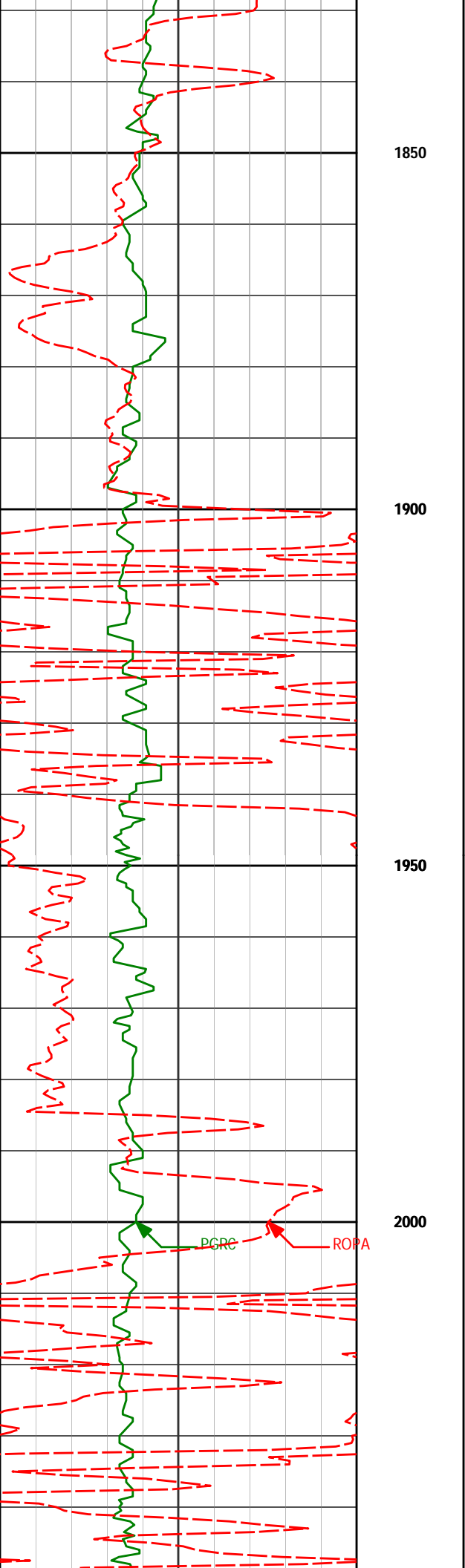
0.66°

265.36°

1746.87'

3.76'

1800



1842'

0.92°

244.42°

1841.86'

5.04'

1850

1900

1950

2000

1936'

0.65°

233.47°

1935.85'

6.24'

2031'

0.71°

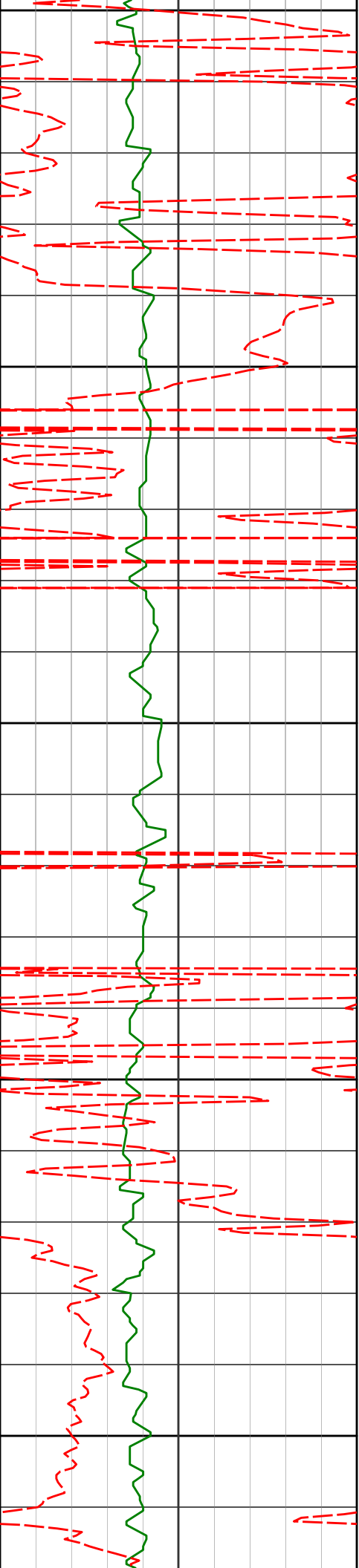
252.23°

2030.84'

7.30'

PGRC

ROPA



2050

2100

2150

2200

2250

2126'

0.46°

106.59°

2125.84'

7.54'

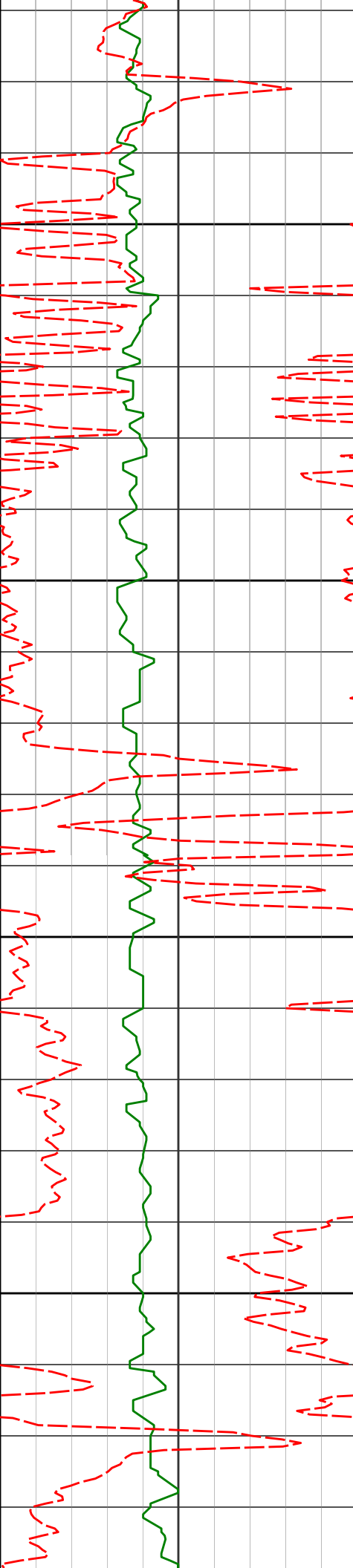
2221'

0.40°

115.10°

2220.84'

6.92'



2300

2350

2400

2450

2316'

0.65°

119.35°

2315.83'

6.22'

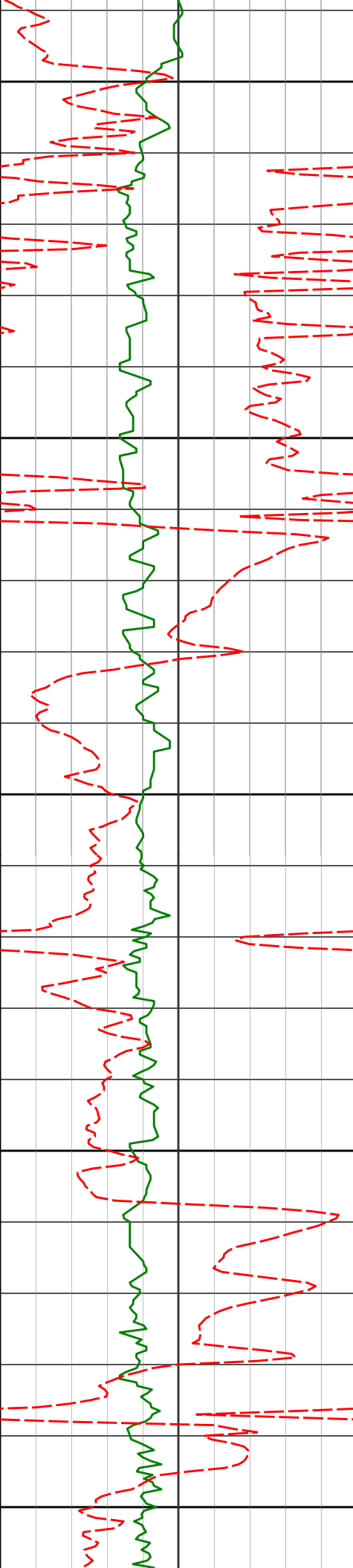
2411'

0.62°

106.46°

2410.83'

5.33'



2500

2506'

0.64°

115.42°

2505.82'

4.43'

2550

2600

2600'

1.45°

193.91°

2599.81'

4.47'

2650

2700

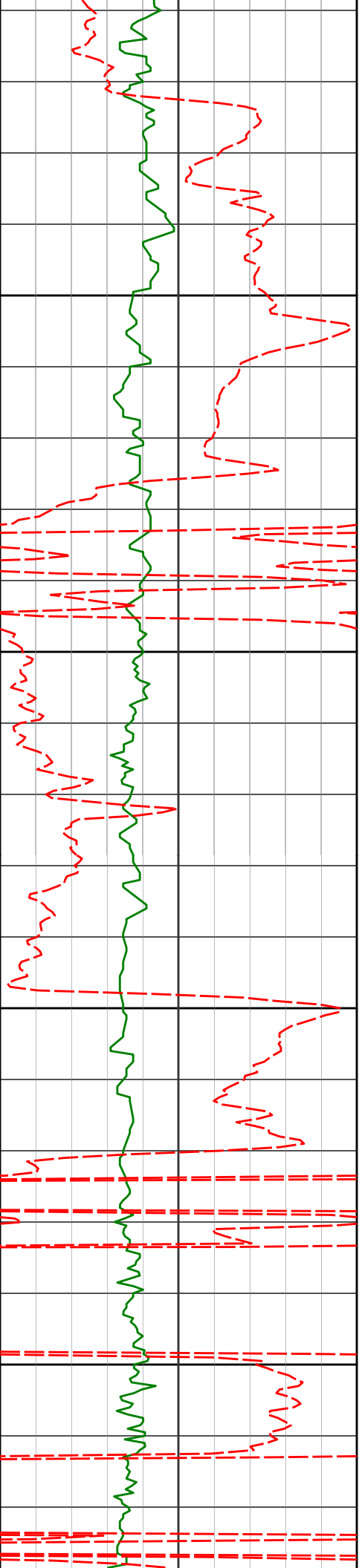
2695'

3.74°

195.98°

2694.70'

6.27'



2750

2790'

5.72°

190.25°

2789.38'

9.19'

2800

2850

2885'

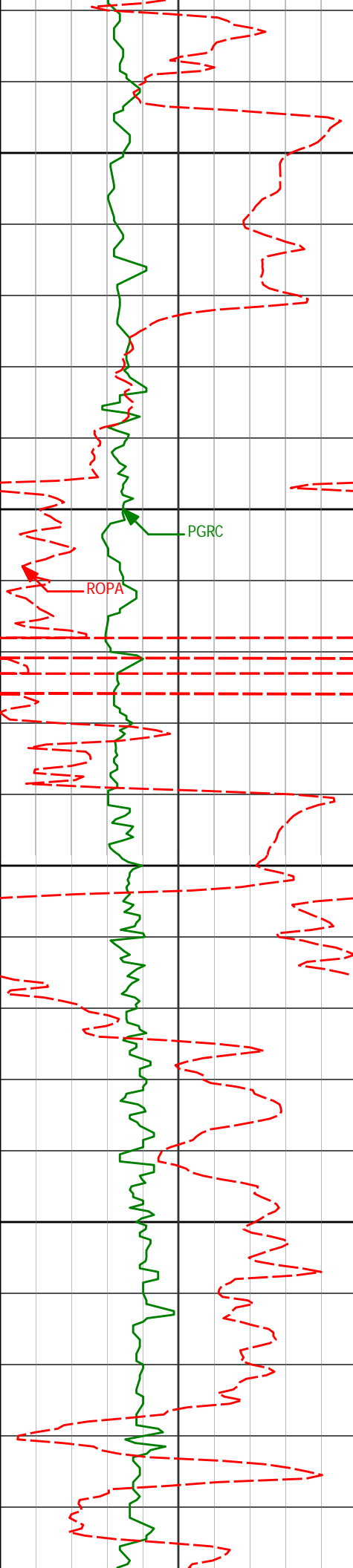
7.33°

194.45°

2883.76'

13.22'

2900



2950

2980'

9.43°

196.71°

2977.74'

19.09'

3000

PGRC

ROPA

3050

3075'

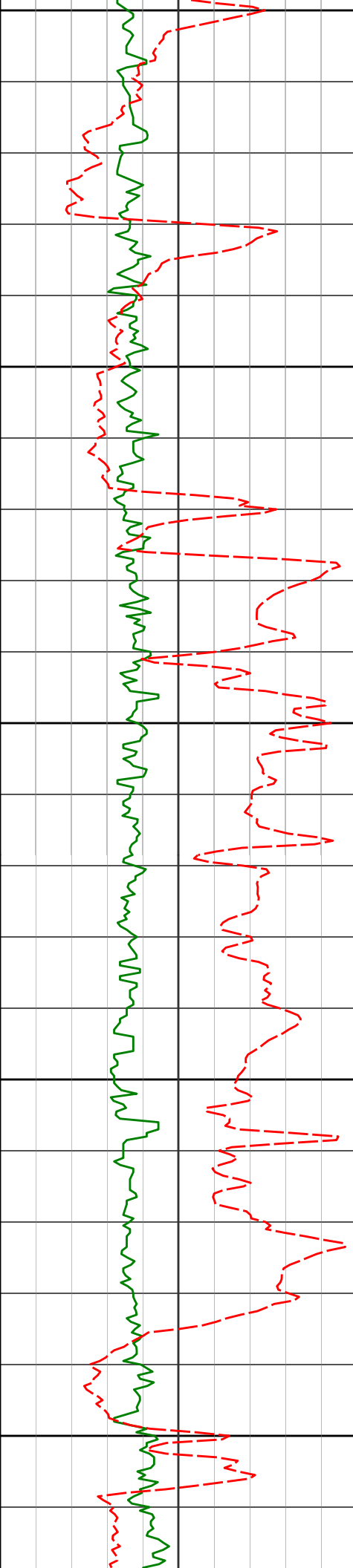
10.13°

201.04°

3071.36'

26.74'

3100



3150

3169'

9.38°

198.86°

3164.00'

34.55'

3200

3250

3264'

10.19°

198.88°

3257.62'

42.19'

3300

3350

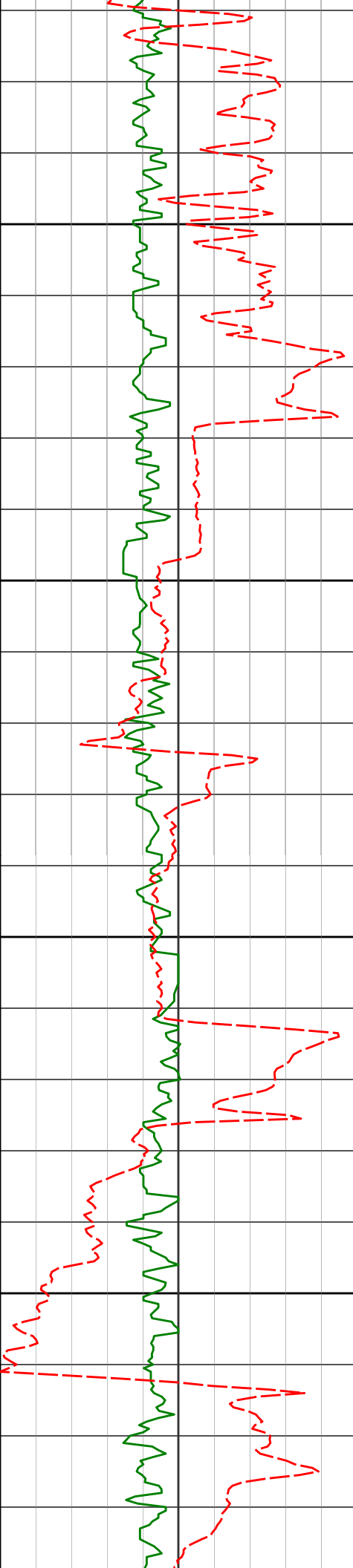
3359'

9.55°

203.15°

3351.21'

50.40'



3400

3450

3500

3550

3454'

9.43°

206.49°

3444.91'

59.20'

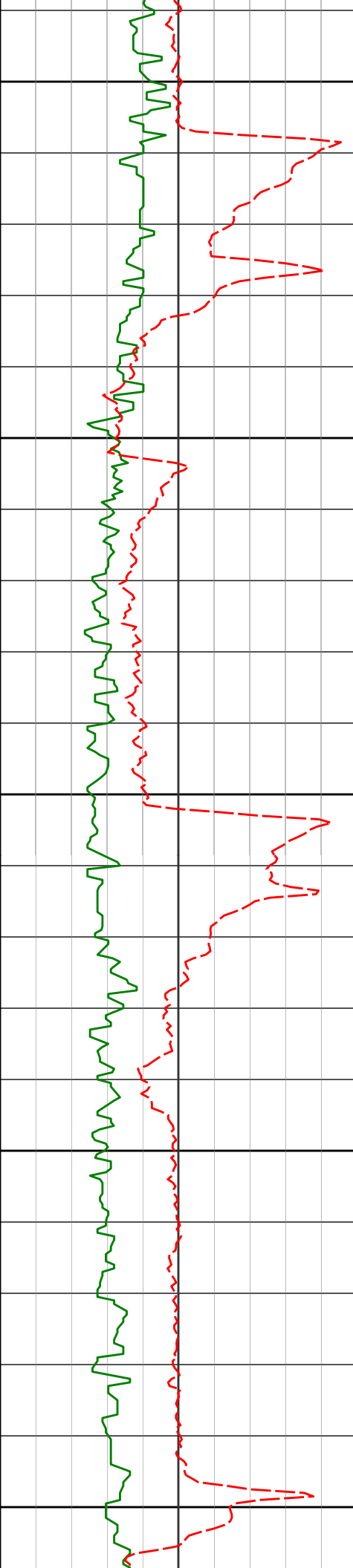
3549'

9.50°

201.38°

3538.62'

67.76'



3600

3643'

10.38°

197.59°

3631.21'

75.57'

3650

3700

3738'

12.48°

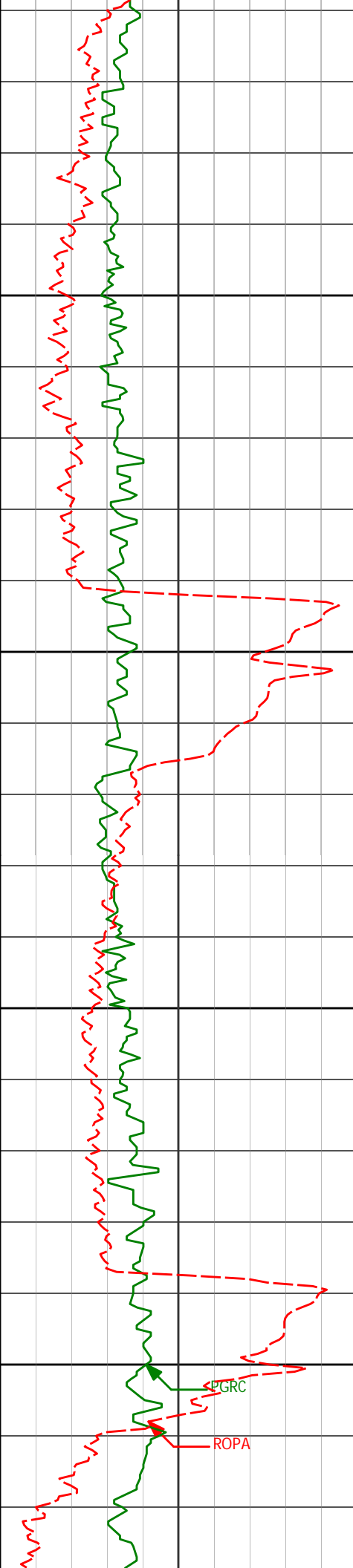
201.87°

3724.32'

84.78'

3750

3800



3833' 13.69° 200.95° 3816.85' 95.78'

3850

3900

3928' 13.10° 200.01° 3909.27' 106.73'

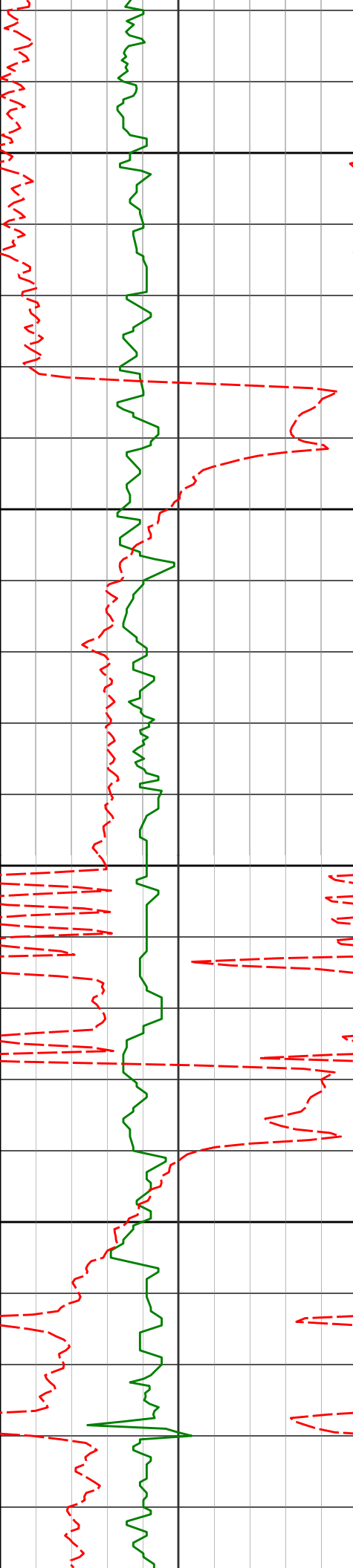
3950

4000

PGRC

ROPA

4023' 11.59° 197.83° 4002.07' 116.38'



4050

4100

4150

4200

4118'

10.62°

197.14°

4095.29'

124.65'

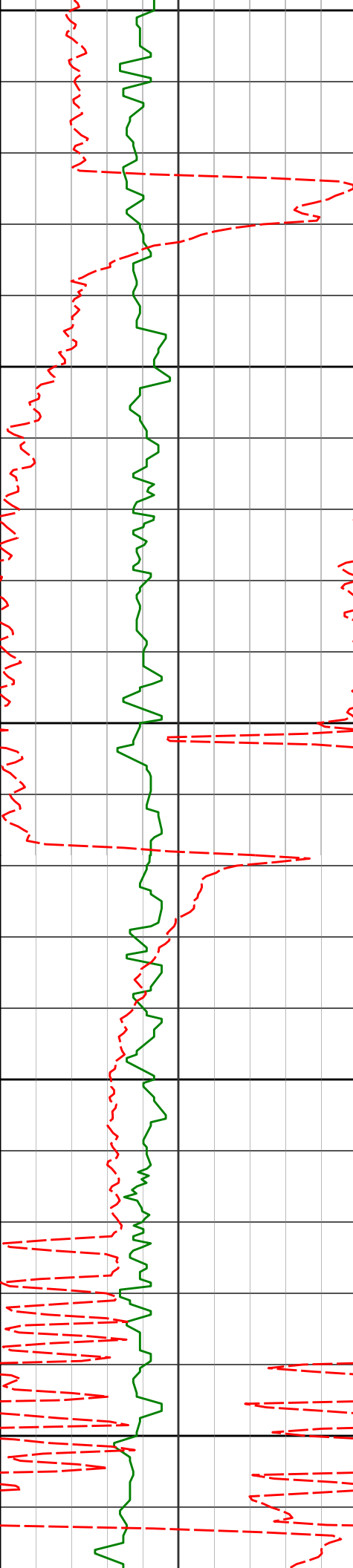
4212'

9.99°

198.78°

4187.78'

132.36'



4250

4300

4350

4400

4450

4307'

9.15°

200.42°

4281.45'

140.00'

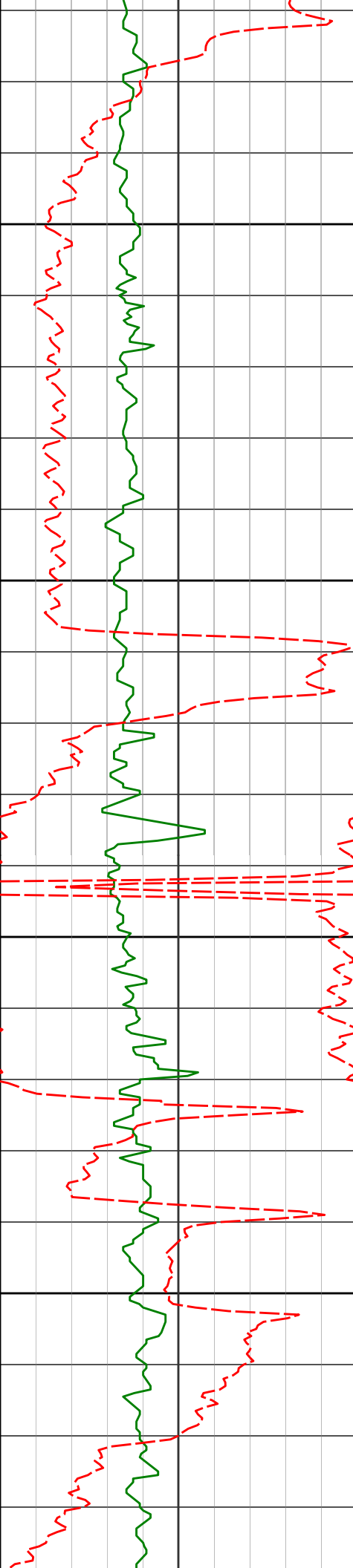
4402'

8.67°

201.41°

4375.31'

147.41'



4500

4550

4600

4650

4497'

8.99°

201.83°

4469.18'

154.92'

4591'

9.21°

199.30°

4562.00'

162.34'

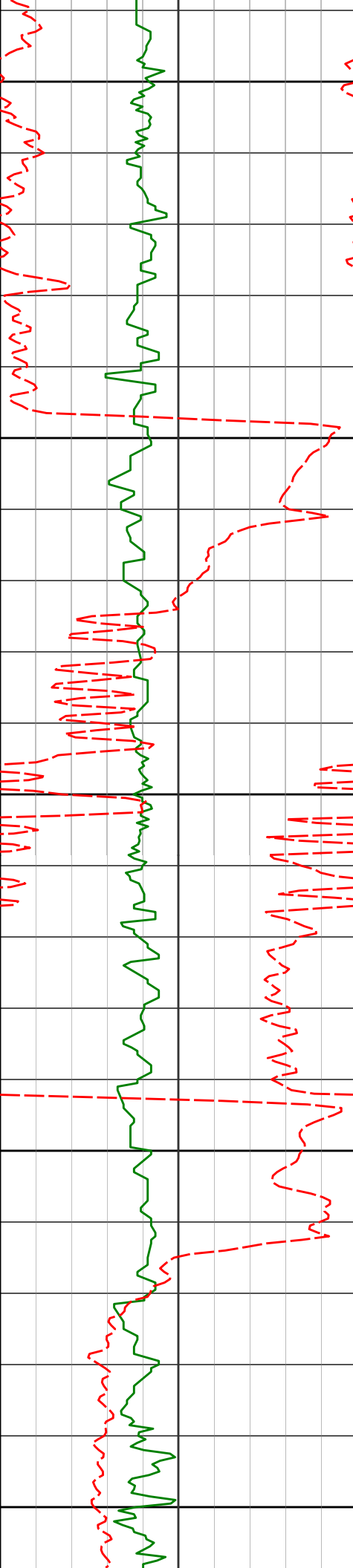
4686'

8.00°

200.30°

4655.93'

169.26'



4700

4750

4800

4850

4900

4781'

8.05°

201.69°

4750.00'

175.96'

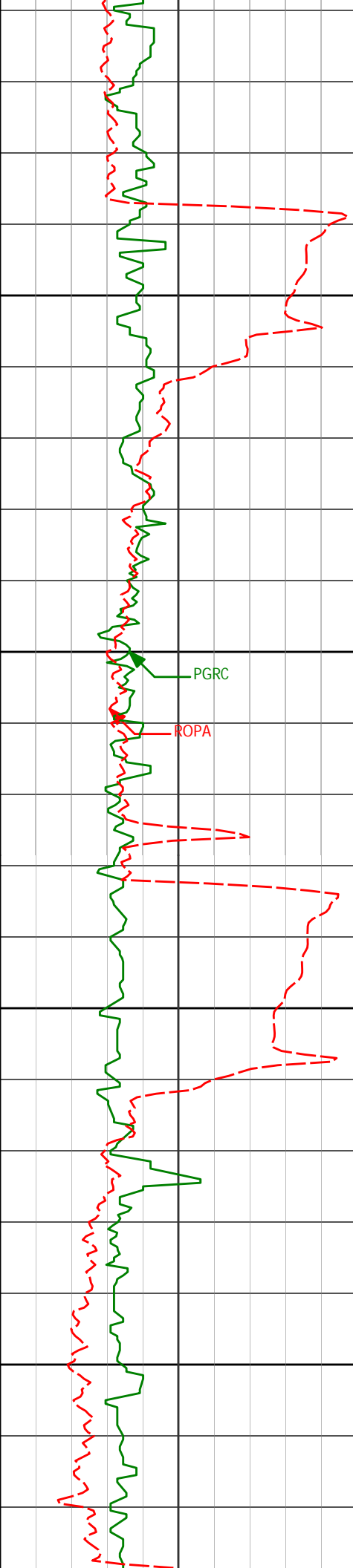
4876'

8.56°

196.45°

4844.00'

182.47'



4950

4970'

8.67°

197.99°

4936.94'

188.78'

5000

PGRC

ROPA

5050

5065'

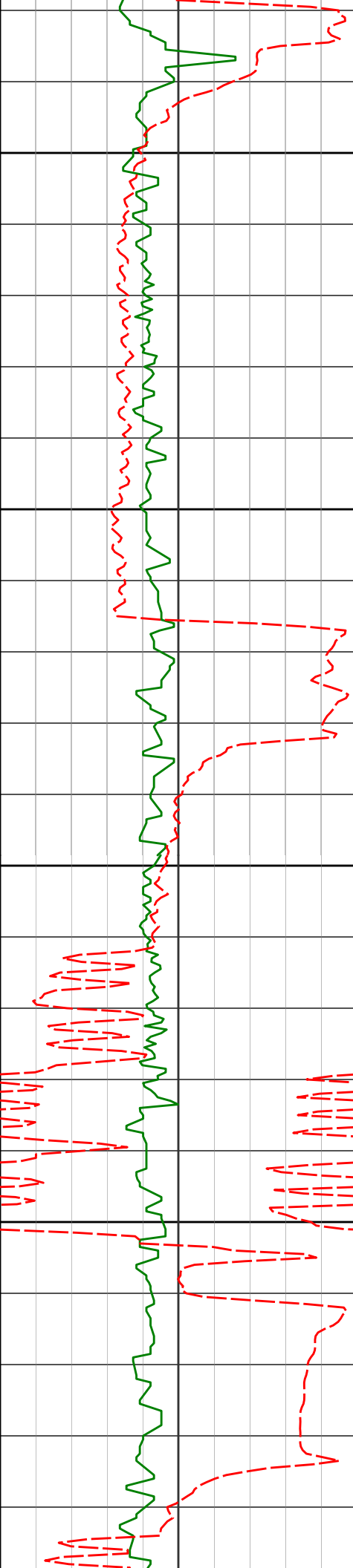
10.48°

193.88°

5030.62'

195.48'

5100



5150

5160'

9.73°

192.72°

5124.14'

201.90'

5200

5250

5255'

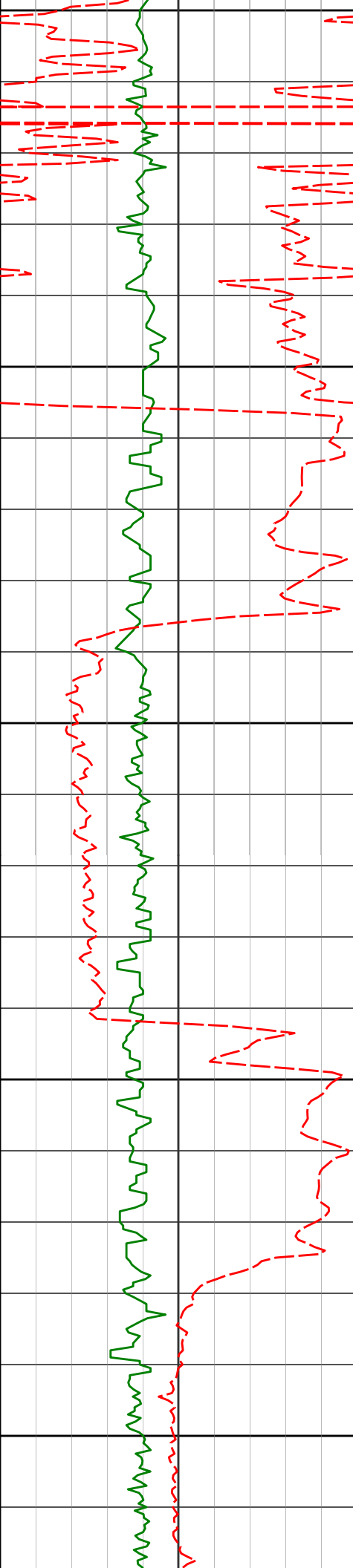
8.13°

200.07°

5217.99'

208.23'

5300



5350

5400

5450

5500

5550

5350'

5444'

5539'

8.59°

8.69°

8.93°

193.18°

199.34°

202.46°

5311.98'

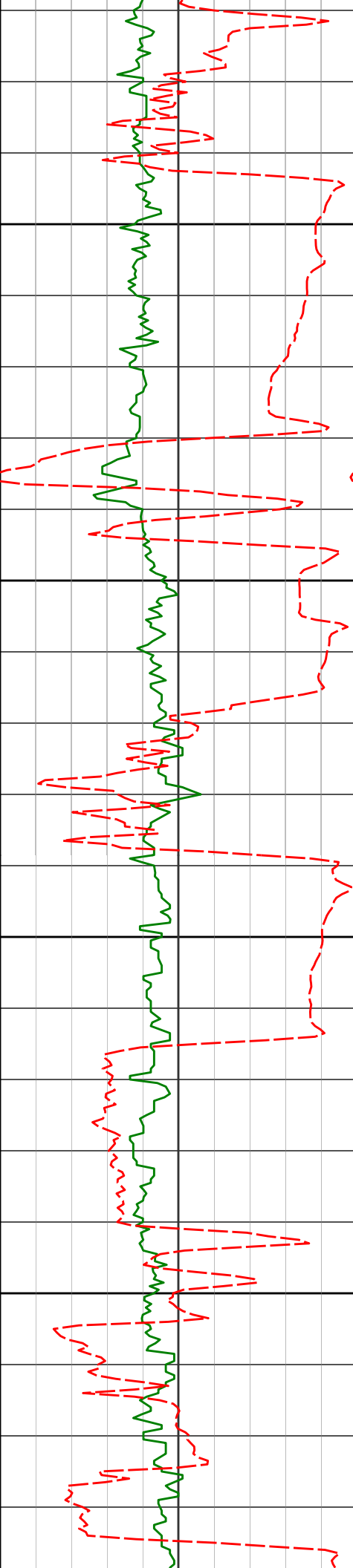
5404.92'

5498.80'

214.25'

220.35'

227.69'



5600

5650

5700

5750

5634'

9.98°

200.94°

5592.51'

235.73'

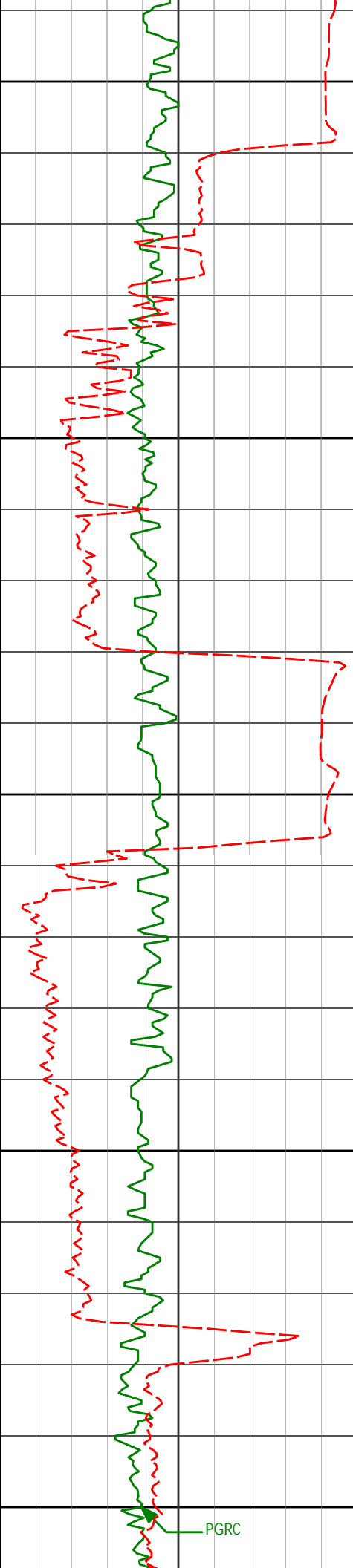
5728'

12.24°

201.05°

5684.74'

244.89'



5800

5823' 12.08° 204.41° 5777.61' 255.52'

5850

5900

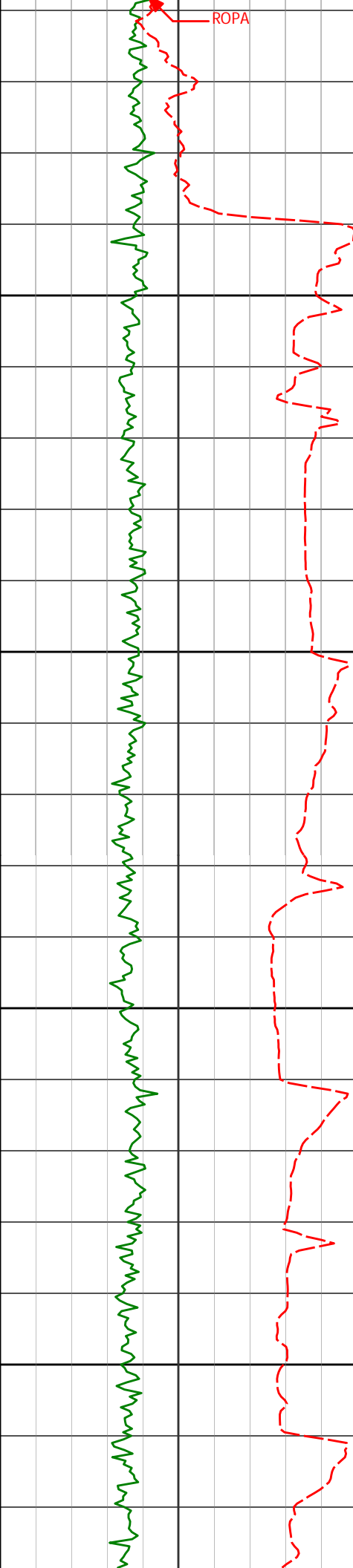
5918' 12.02° 203.89° 5870.52' 266.47'

5950

5983' 9.69° 206.51° 5934.35' 273.39'

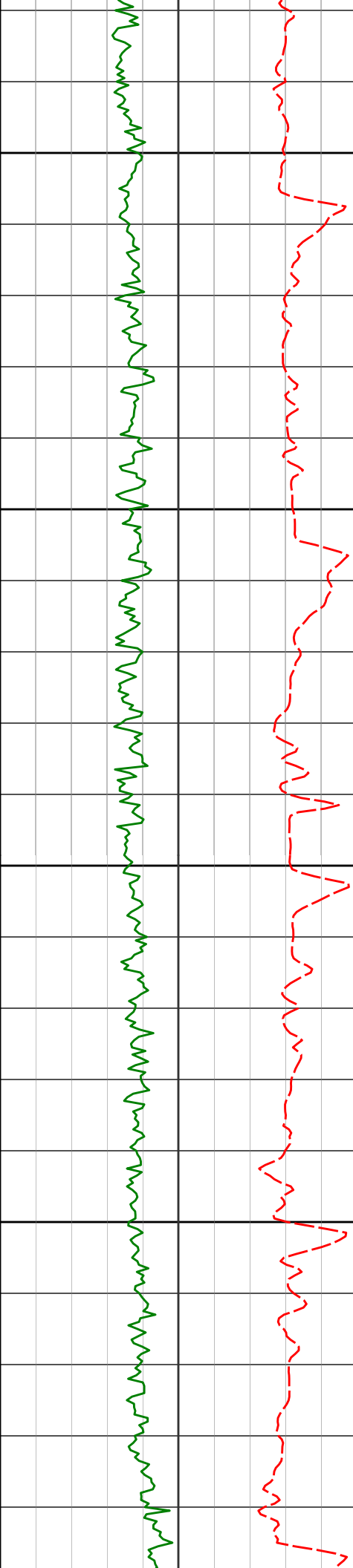
6000

PGRC



200

6046'	10.02°	202.04°	5996.42'	279.35'
6050				
6107'	12.46°	205.46°	6056.25'	285.88'
6155'	14.74°	209.26°	6102.90'	292.65'
6202'	16.49°	211.32°	6148.16'	300.73'



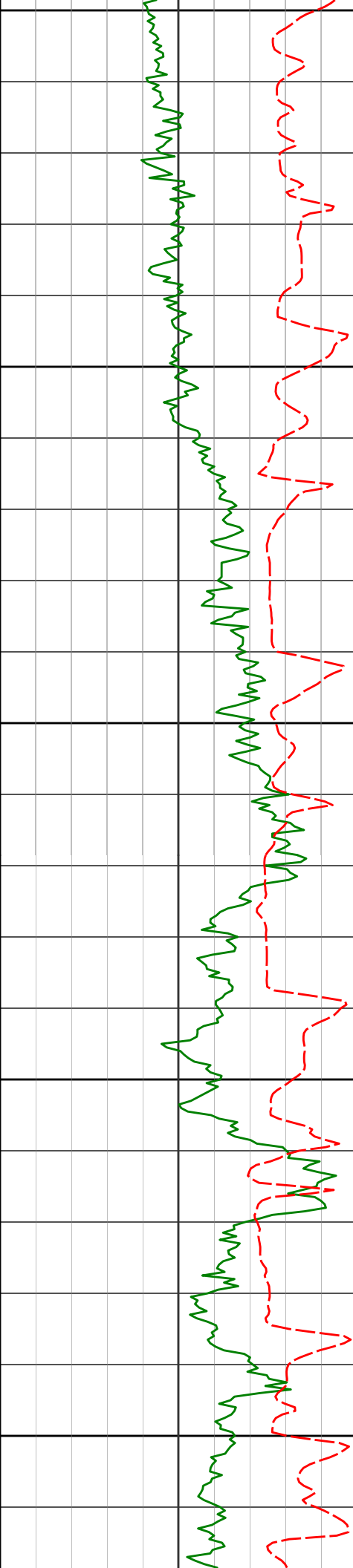
6250	6250'	20.49°	222.00°	6193.69'	311.74'
------	-------	--------	---------	----------	---------

6300	6297'	24.98°	228.46°	6237.03'	326.58'
------	-------	--------	---------	----------	---------

6350	6345'	29.99°	230.91°	6279.60'	345.59'
------	-------	--------	---------	----------	---------

6400	6392'	34.83°	232.94°	6319.27'	367.69'
------	-------	--------	---------	----------	---------

	6440'	40.13°	237.63°	6357.35'	394.09'
--	-------	--------	---------	----------	---------



6450

6486'

44.32°

241.10°

6391.42'

422.90'

6500

6534'

47.37°

242.62°

6424.85'

455.50'

6550

6581'

49.99°

245.74°

6455.88'

489.35'

6600

6629'

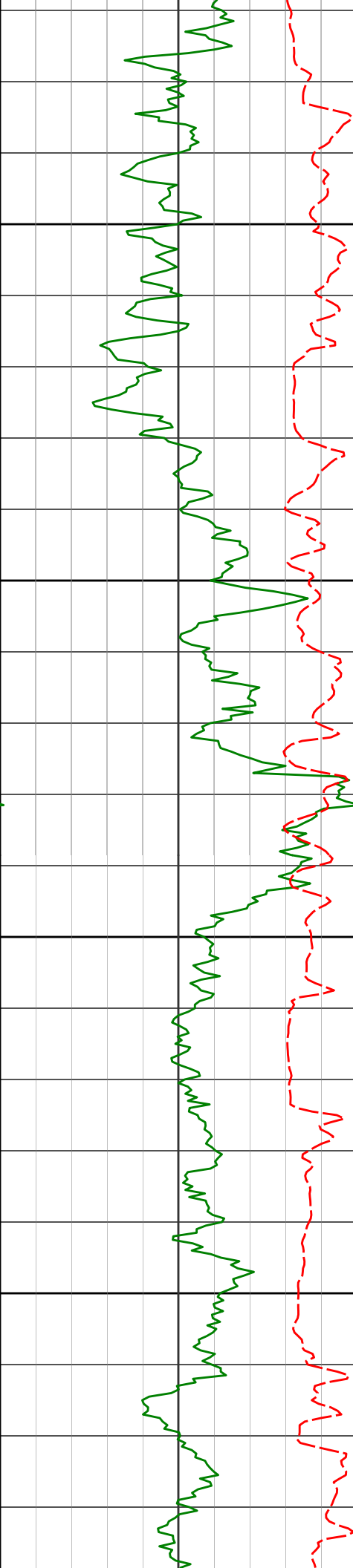
52.55°

249.08°

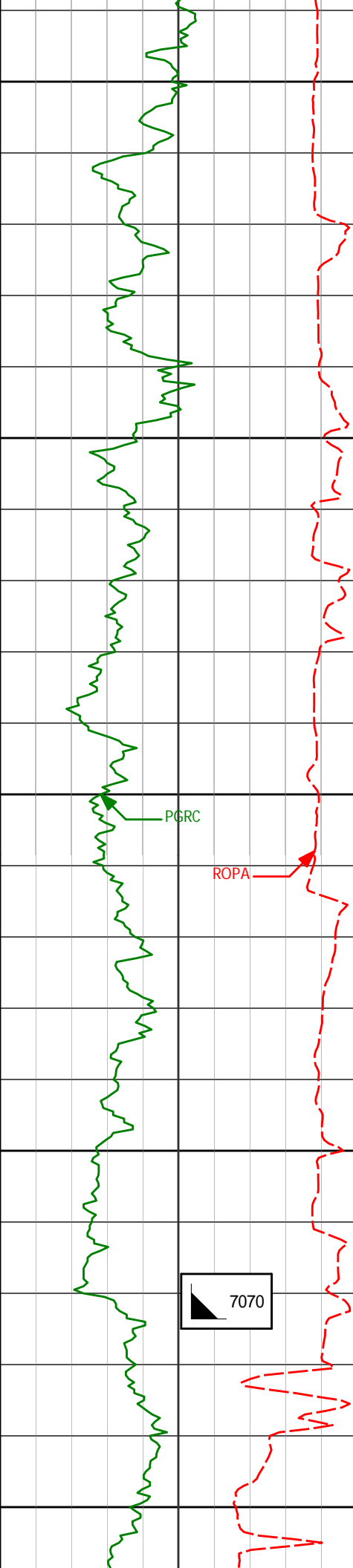
6485.92'

525.79'

6650



6675'	55.48°	252.33°	6512.95'	562.45'
6700				
6723'	58.12°	256.77°	6539.24'	602.37'
6750				
6770'	62.76°	259.01°	6562.42'	643.19'
6800				
6818'	67.71°	262.33°	6582.52'	686.76'
6850				
6865'	71.99°	264.93°	6598.71'	730.81'



6900

6913' 74.31° 265.43° 6612.62' 776.60'

6950

6960' 79.13° 267.30° 6623.42' 822.09'

7000

PGRC

ROPA

7008' 81.32° 267.59° 6631.56' 869.06'

7026' 83.71° 267.98° 6633.91' 886.77'

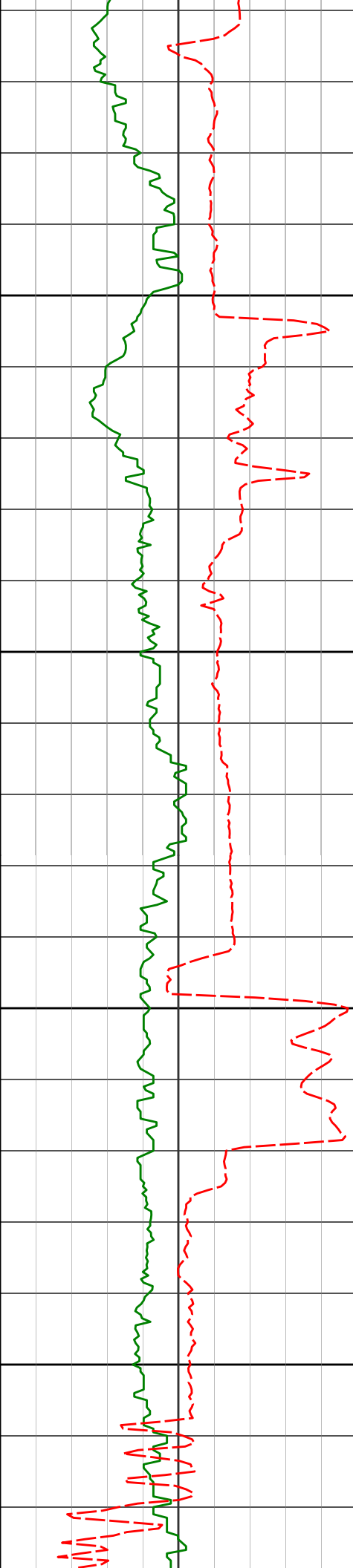
7050

7070

300

7100

7108' 87.47° 270.24° 6640.21' 967.61'



7150

7184'

87.16°

270.25°

6643.77'

1042.46'

7200

7250

7278'

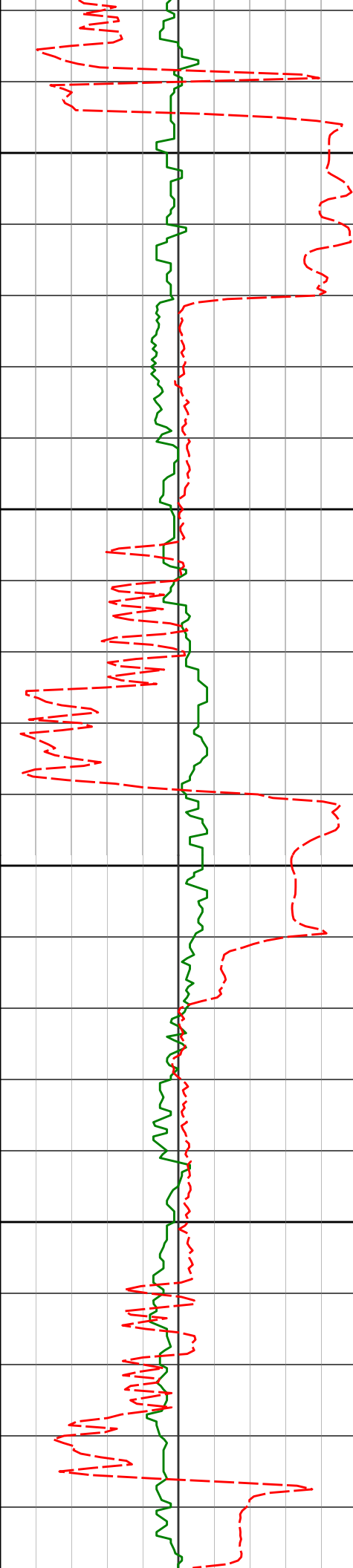
87.84°

269.69°

6647.87'

1135.13'

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7350

7373'

89.26°

269.37°

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1228.95'

7400

7450

7468'

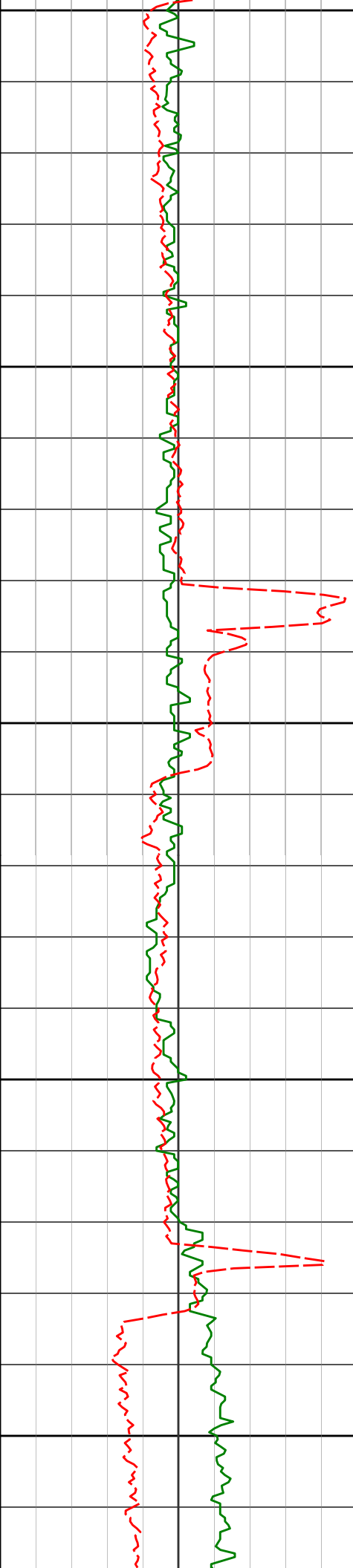
91.11°

268.88°

6649.97'

1322.90'

7500



7550

7562'

91.30°

268.63°

6648.00'

1415.94'

7600

7650

7657'

90.62°

268.74°

6646.41'

1509.99'

7700

7750

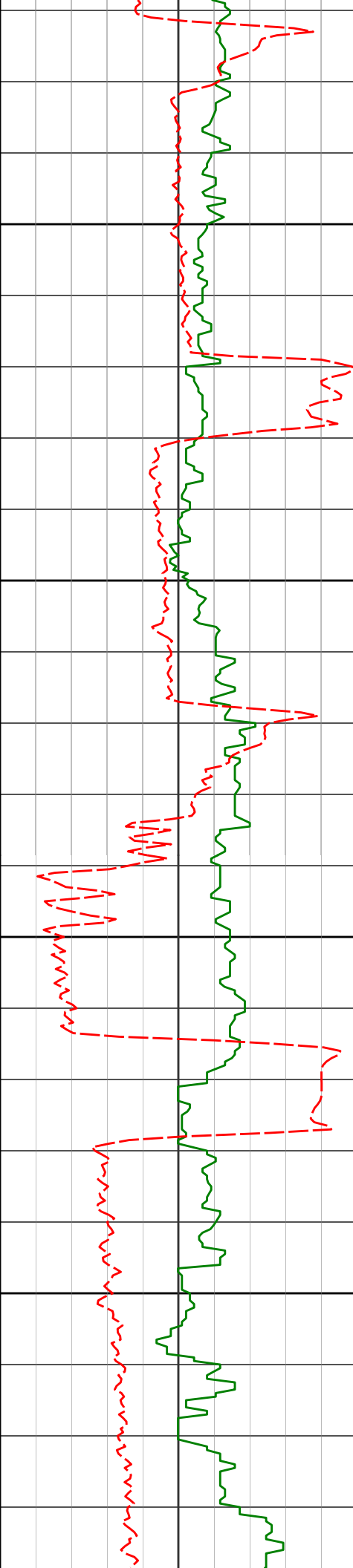
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89.94°

268.46°

6645.95'

1604.07'



7800

7850

7900

7950

7846'

89.11°

268.04°

6646.73'

1697.23'

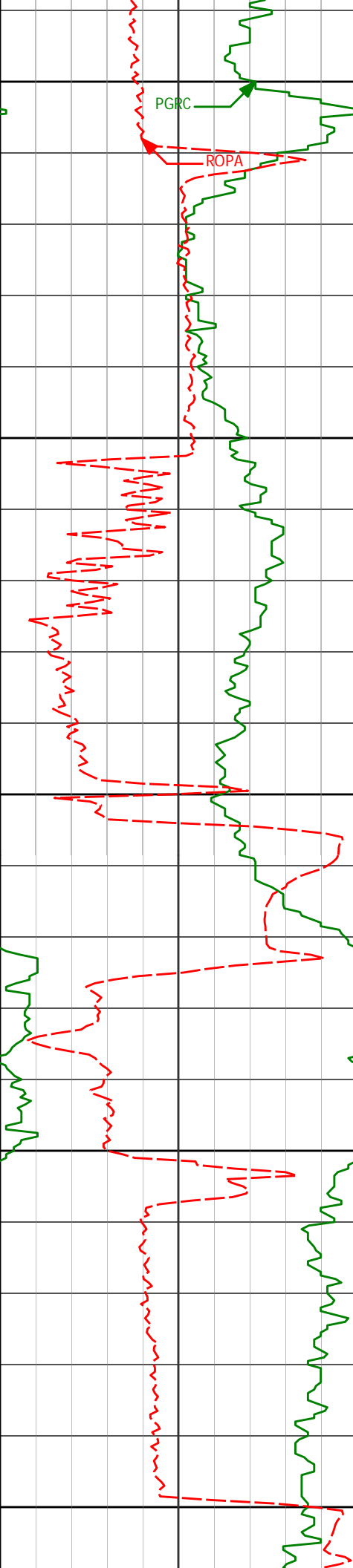
7941'

90.80°

270.05°

6646.81'

1791.20'



8000

PGRC

ROPA

8036'

88.12°

269.22°

6647.70'

1885.02'

8050

8100

8150

8130'

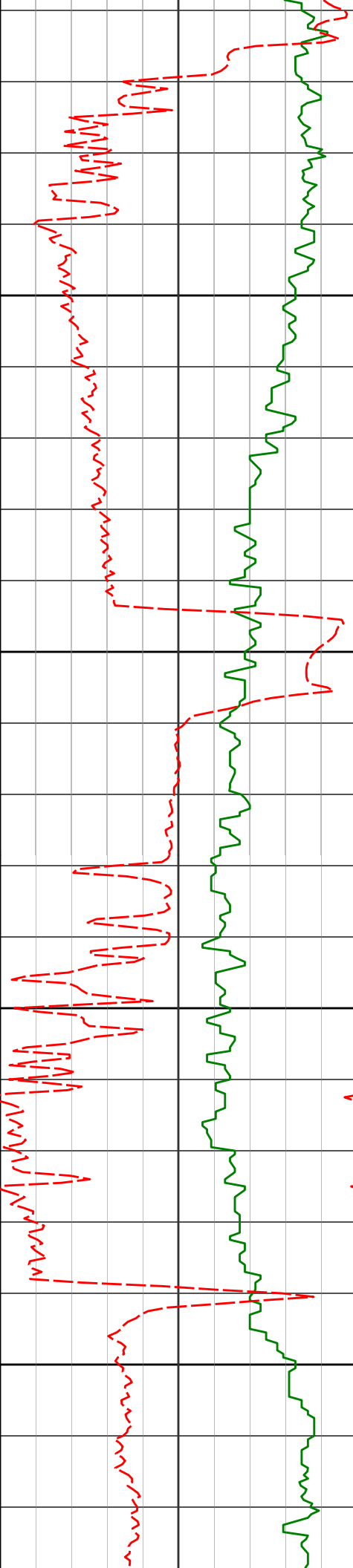
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269.11°

6650.56'

1977.93'

8200



8225'

88.83°

269.91°

6652.85'

2071.76'

8250

8300

8319'

90.09°

269.90°

6653.74'

2164.53'

8350

8400

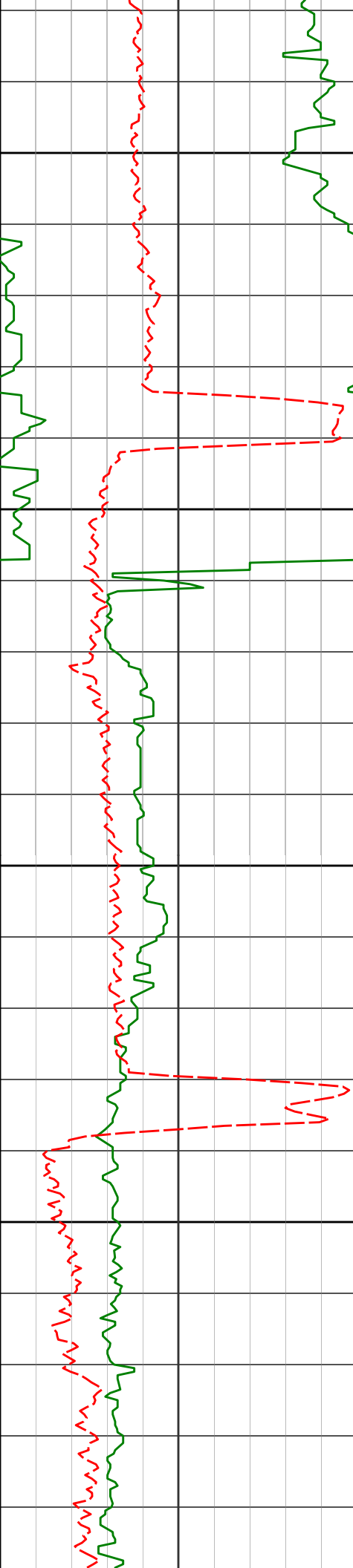
8414'

91.14°

271.14°

6652.72'

2258.11'



8450

8500

8550

8600

8509'

90.92°

270.48°

6651.01'

2351.60'

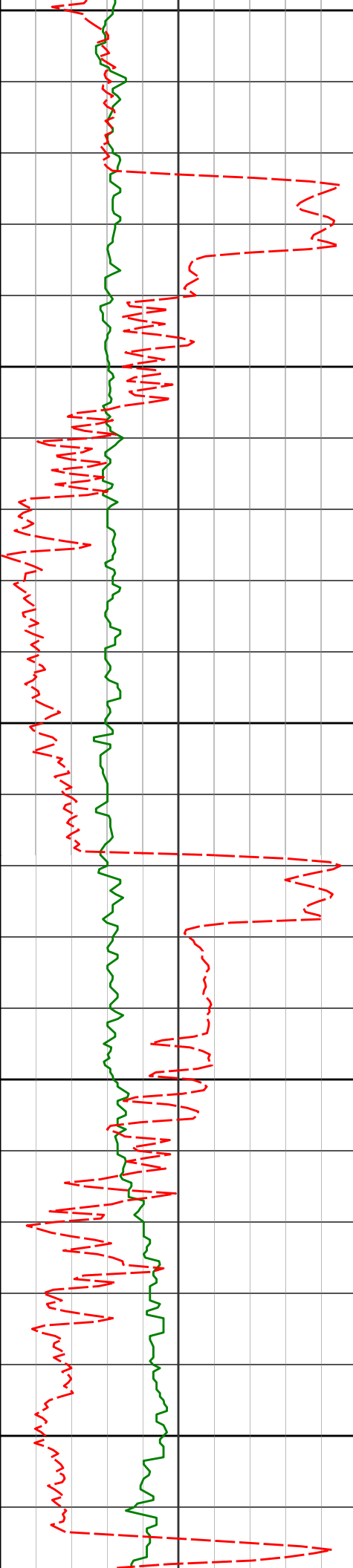
8604'

90.49°

270.54°

6649.83'

2445.18'



8650

8700

8750

8800

8850

8699'

89.91°

268.46°

6649.50'

2539.04'

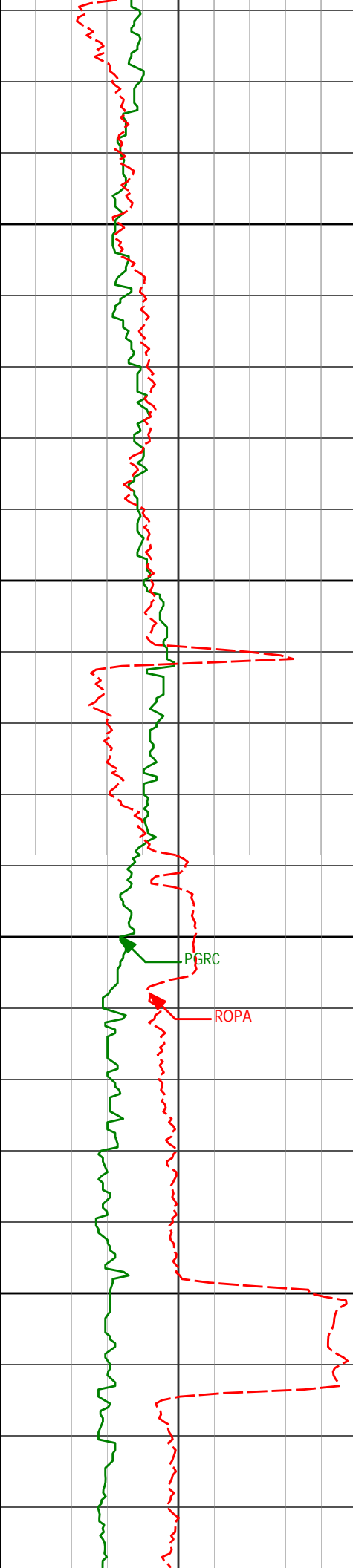
8793'

89.04°

267.00°

6650.36'

2632.31'



8888' 89.38° 267.55° 6651.67' 2726.66'

8900

8950

8983' 90.22° 267.48° 6652.00' 2820.97'

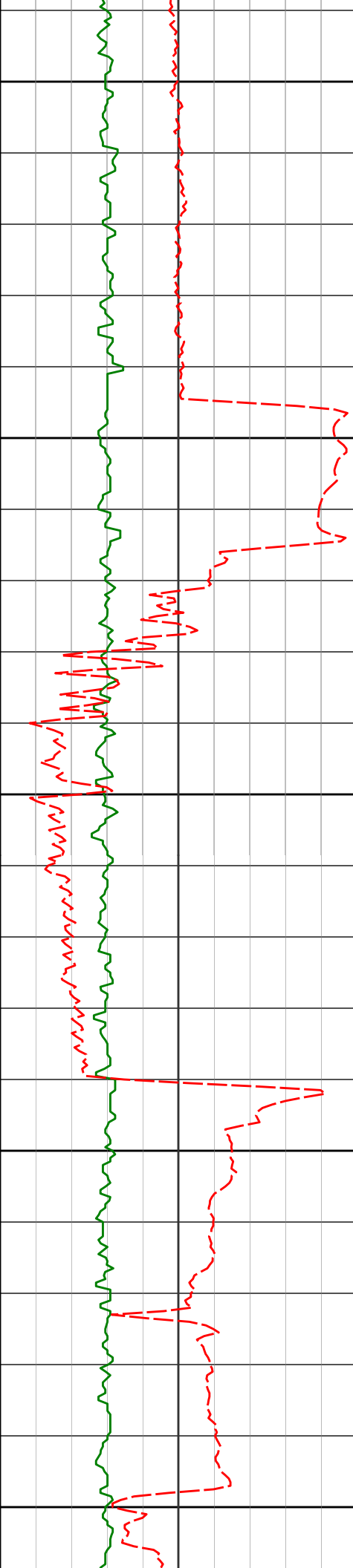
9000

PGRC

ROPA

9050

9078' 88.92° 268.12° 6652.71' 2915.23'



9100

9150

9200

9250

9300

9173'

89.41°

271.49°

6654.09'

3008.99'

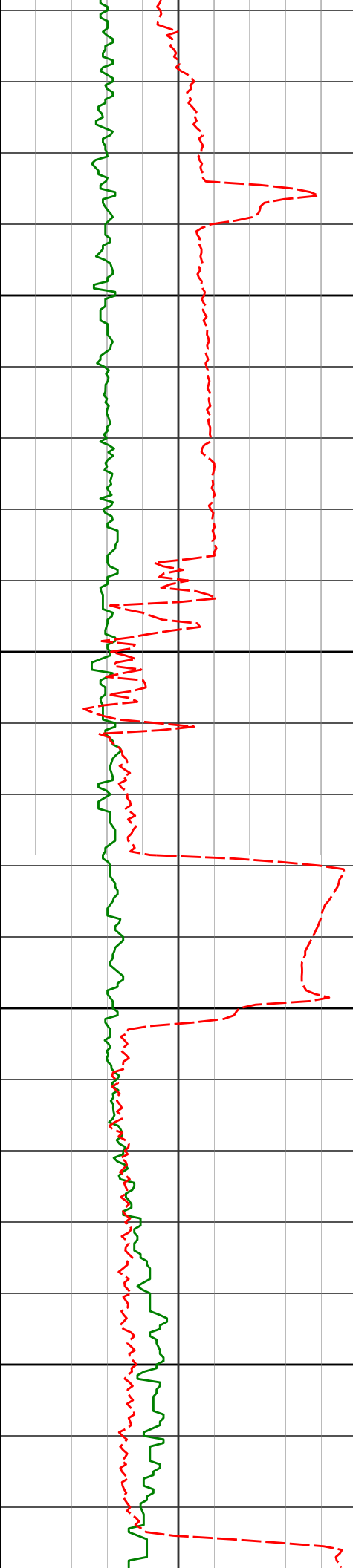
9268'

89.32°

271.66°

6655.14'

3102.25'



9350

9362'

89.60°

272.29°

6656.03'

3194.41'

9400

9450

9457'

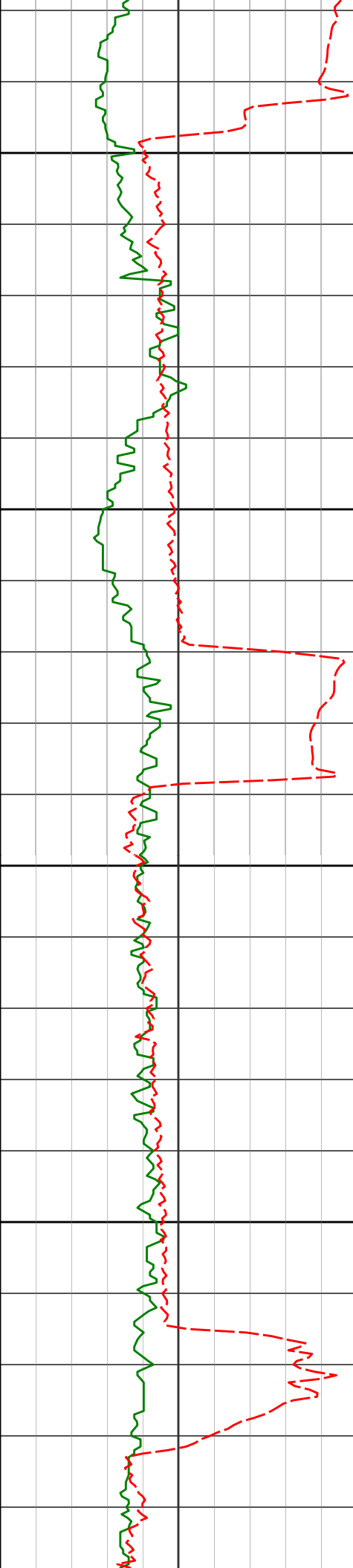
89.01°

270.50°

6657.18'

3287.73'

9500



9550

9552'

87.66°

268.71°

6659.94'

3381.52'

9600

9650

9647'

88.98°

268.25°

6662.73'

3475.59'

9700

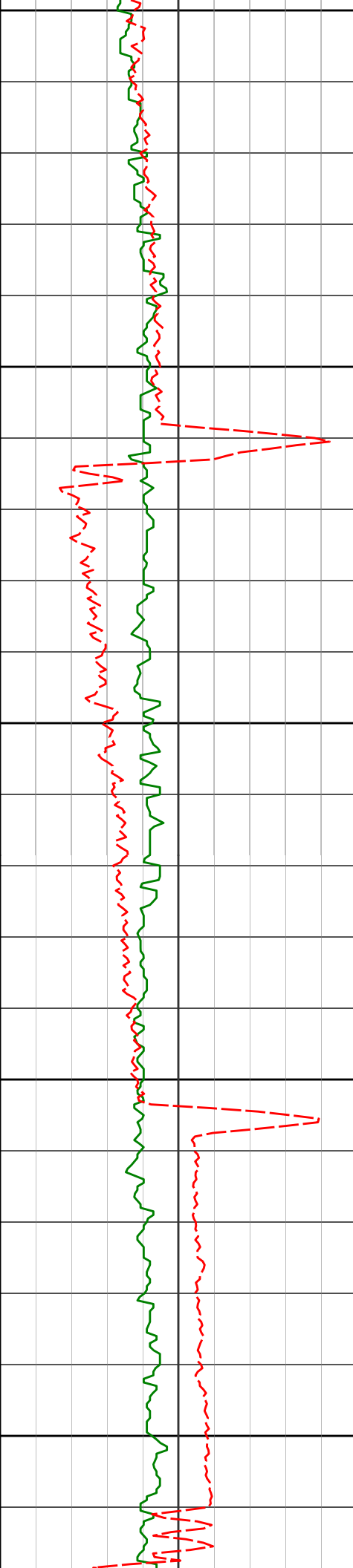
9742'

89.78°

269.20°

6663.75'

3569.63'



9750

9800

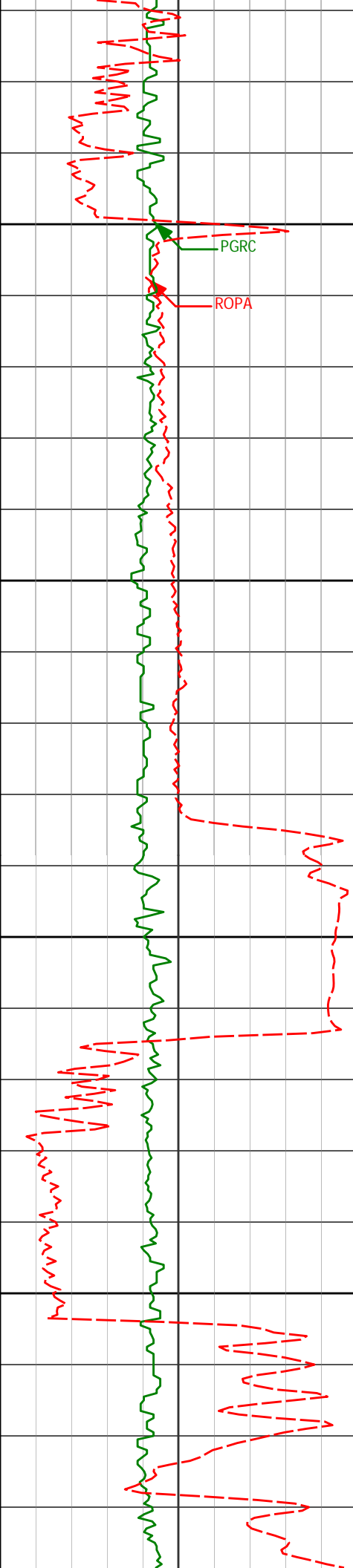
9850

9900

9950

9837' 90.12° 269.55° 6663.82' 3663.53'

9931' 89.29° 267.60° 6664.31' 3756.62'



10000

PGRC

ROPA

10026'

90.12°

266.89°

6664.79'

3850.98'

10050

10100

10120'

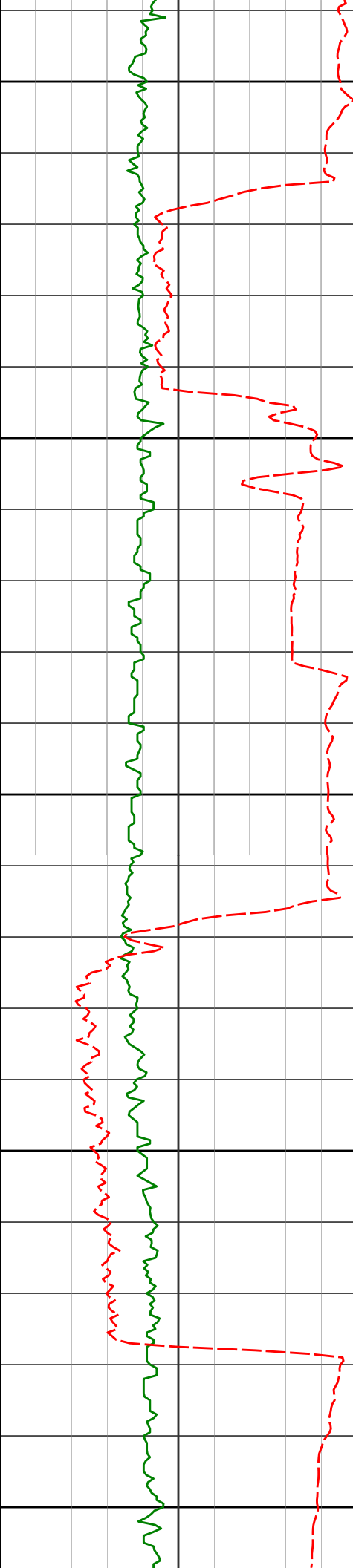
89.26°

267.47°

6665.30'

3944.37'

10150



10200

10215'

89.54°

267.55°

6666.29'

4038.68'

10250

10300

10310'

89.78°

268.52°

6666.86'

4132.89'

10350

10400

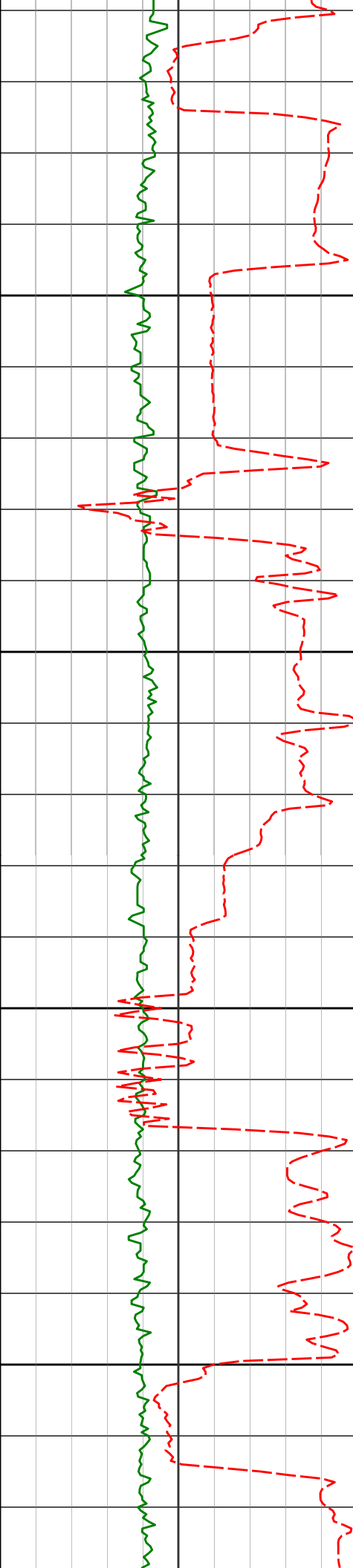
10405'

89.63°

269.28°

6667.34'

4226.90'



10450

10500

10550

10600

10500'

10595'

89.38°

89.35°

269.32°

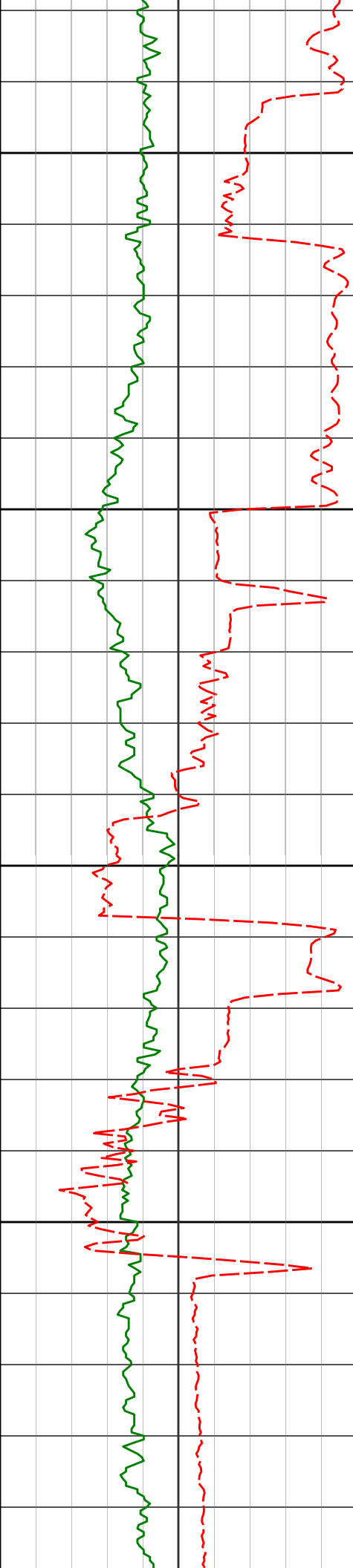
267.29°

6668.16'

6669.21'

4320.81'

4414.95'



10650

10689'

91.20°

271.31°

6668.76'

4507.85'

10700

10750

10784'

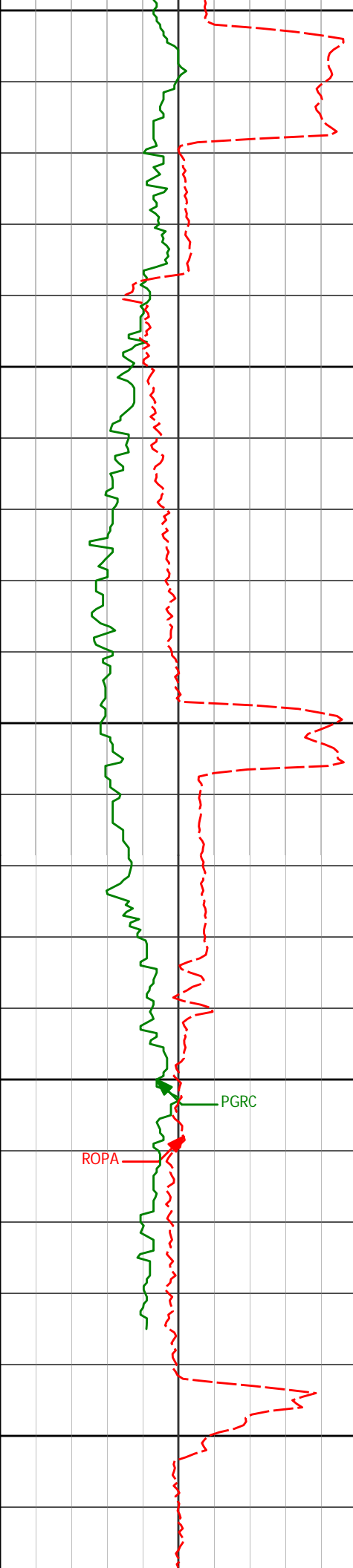
89.60°

271.31°

6668.09'

4601.20'

10800



10850

10879'

91.64°

273.19°

6667.07'

4694.24'

10900

10950

10973'

90.77°

272.53°

6665.09'

4786.08'

11000

ROPA

PGRC

11033'

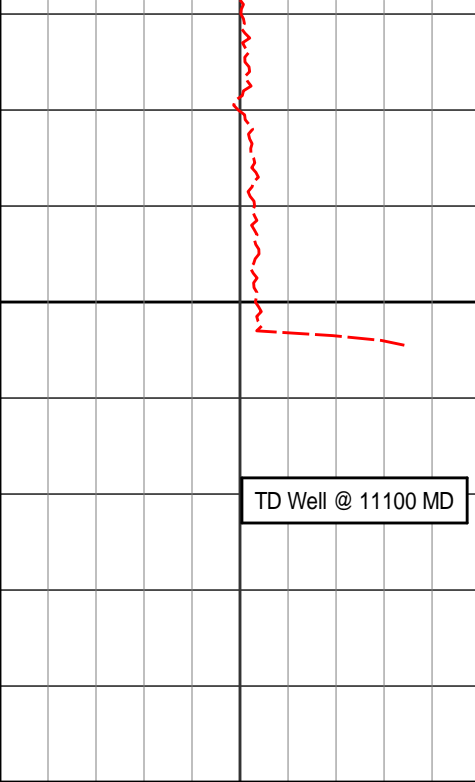
90.43°

272.21°

6664.46'

4844.82'

11050



11100

TD Well @ 11100 MD

11150

Avg Rate of Penetration ROPA feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.

PCG Gamma Ray PGRC api	0 300
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HALLIBURTON

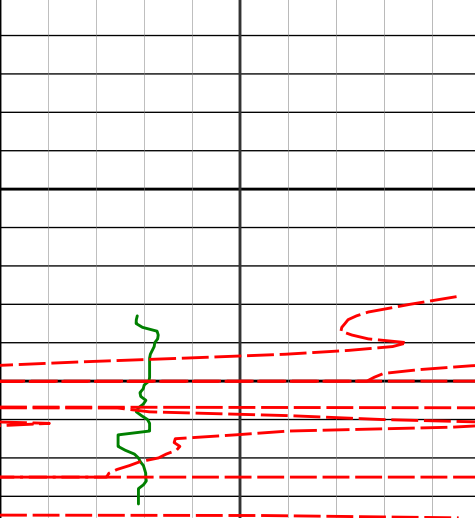
Sperry Drilling Services

MD Correlation Log 1:600

Noble Energy
 Wells Ranch USXAA23-65-1HN
 H&P 321
 Sec. 24-T6N-R63W

PCG Gamma Ray PGRC api	0 300
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Avg Rate of Penetration ROPA feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.



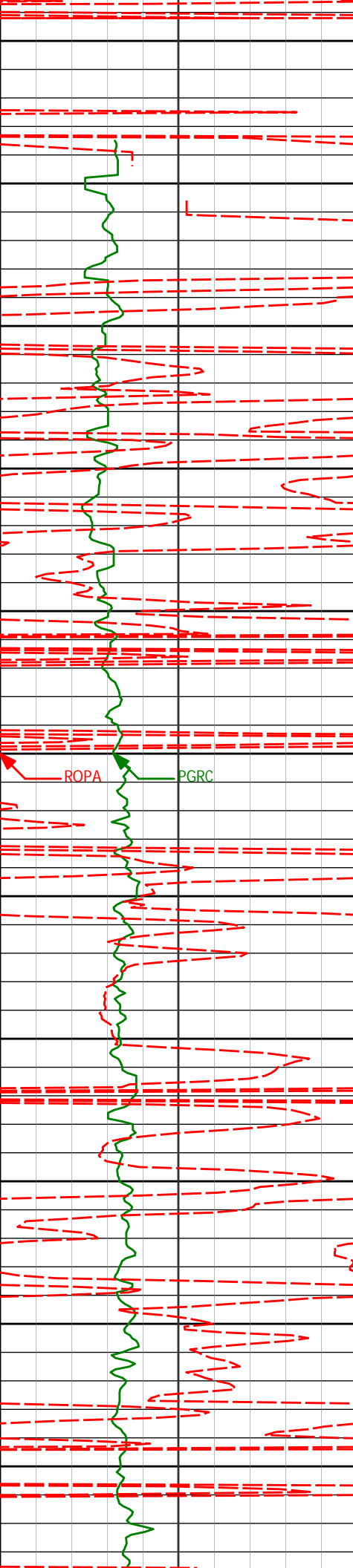
600

650

100

700

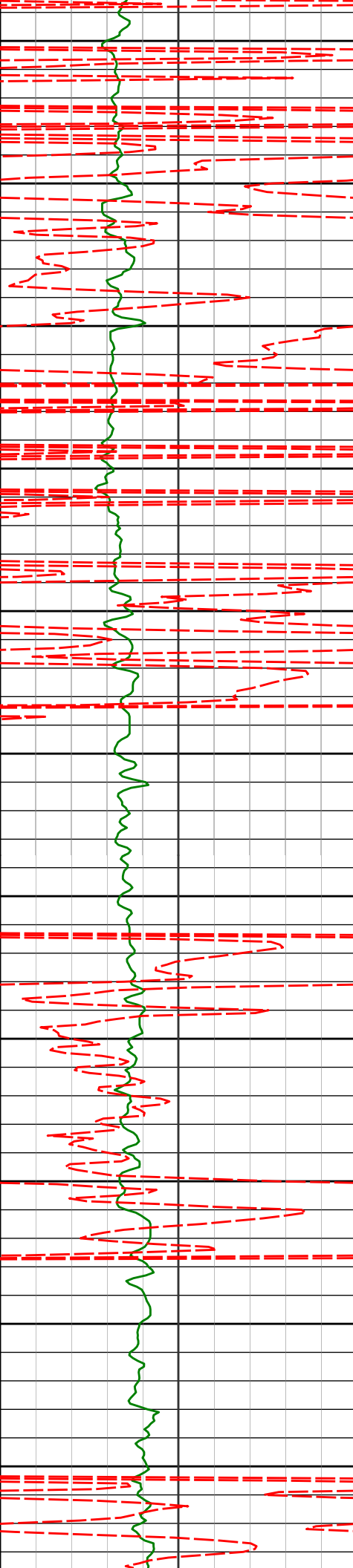
642'	0.70°	7.10°	641.98'	2.37'
726'	0.33°	247.71°	725.97'	2.46'



750
800
850
900
950
1000
1050
1100
1150
1200
1250

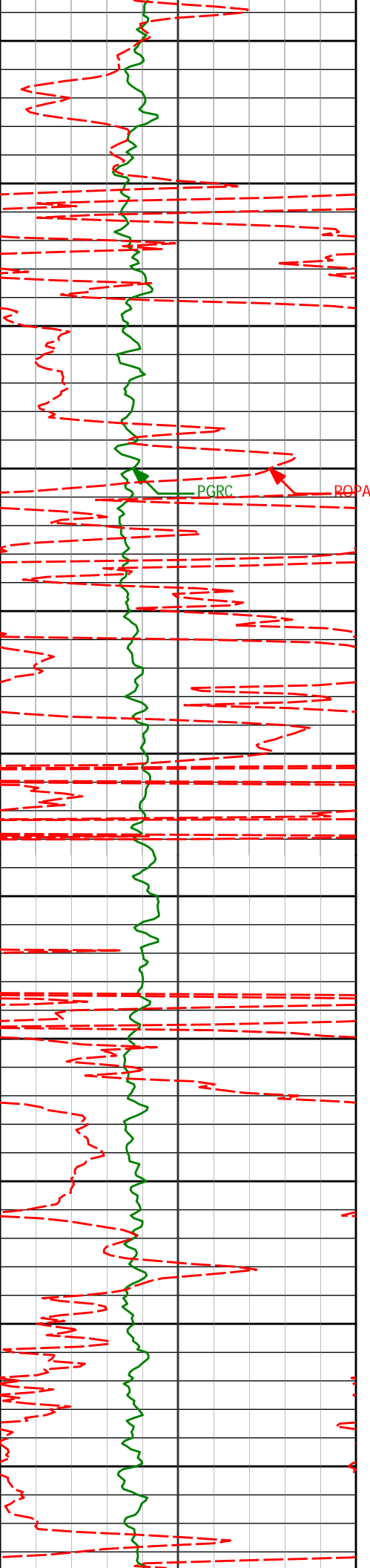
818'	0.13°	252.74°	817.97'	2.82'
910'	0.21°	38.93°	909.97'	2.80'
1003'	0.13°	108.90°	1002.97'	2.58'
1095'	0.18°	107.35°	1094.97'	2.36'
1187'	0.21°	60.28°	1186.97'	2.08'
1279'	0.73°	86.14°	1278.97'	1.34'

ROPA PGRC

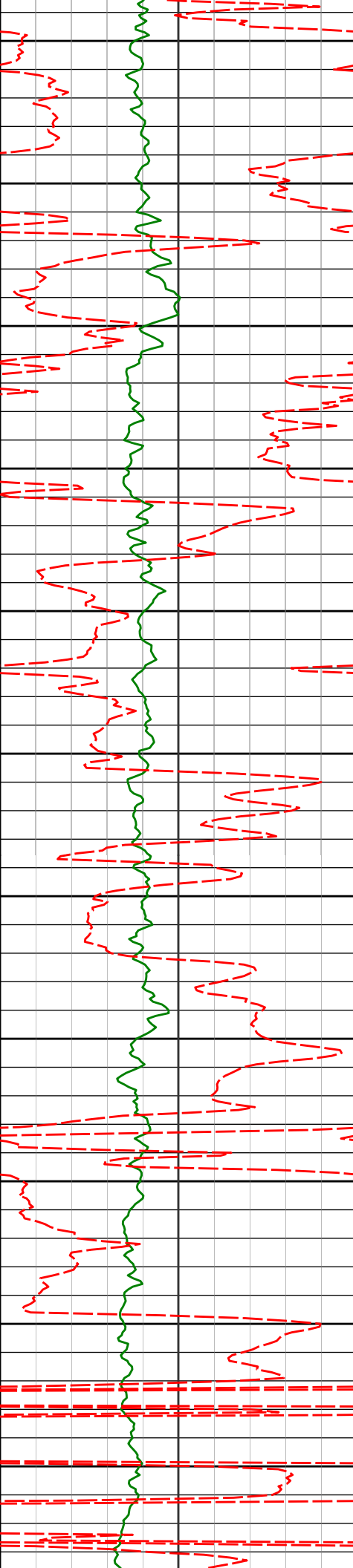


1300
1350
1400
1450
1500
1550
1600
1650
1700
1750
1800

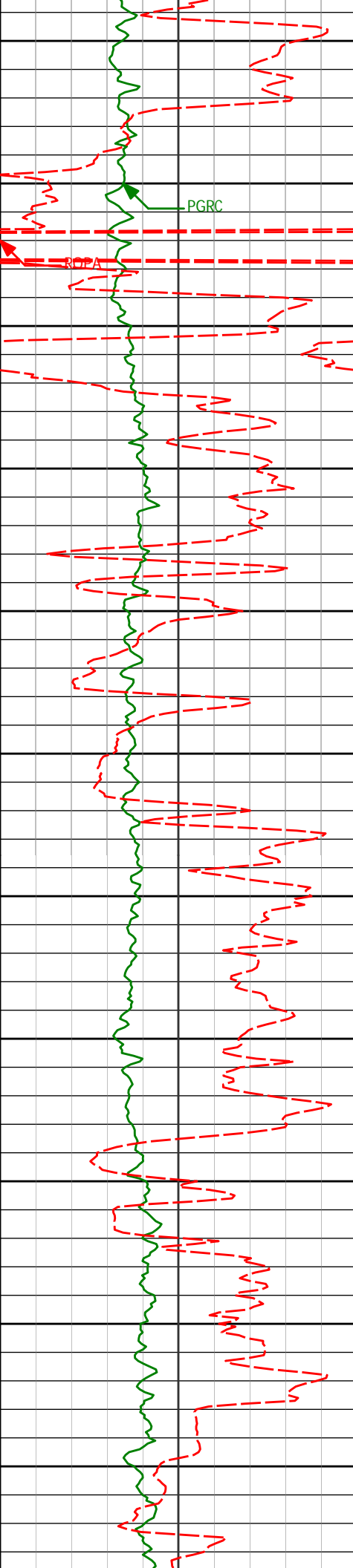
1371'	0.75°	57.11°	1370.96'	0.20'
1463'	1.10°	52.10°	1462.95'	-1.13'
1557'	0.82°	294.39°	1556.94'	-1.36'
1652'	2.43°	257.17°	1651.90'	1.21'
1747'	0.66°	265.36°	1746.87'	3.76'



1842'	0.92°	244.42°	1841.86'	5.04'
1936'	0.65°	233.47°	1935.85'	6.24'
2031'	0.71°	252.23°	2030.84'	7.30'
2126'	0.46°	106.59°	2125.84'	7.54'
2221'	0.40°	115.10°	2220.84'	6.92'
2316'	0.65°	119.35°	2315.83'	6.22'



2411'	0.62°	106.46°	2410.83'	5.33'
2506'	0.64°	115.42°	2505.82'	4.43'
2600'	1.45°	193.91°	2599.81'	4.47'
2695'	3.74°	195.98°	2694.70'	6.27'
2790'	5.72°	190.25°	2789.38'	9.19'
2885'	7.33°	194.45°	2883.76'	13.22'



2950

2980'

9.43°

196.71°

2977.74'

19.09'

3000

PGRC

ROPA

3050

3075'

10.13°

201.04°

3071.36'

26.74'

3100

3150

3169'

9.38°

198.86°

3164.00'

34.55'

3200

3250

3264'

10.19°

198.88°

3257.62'

42.19'

3300

3350

3359'

9.55°

203.15°

3351.21'

50.40'

3400

3450

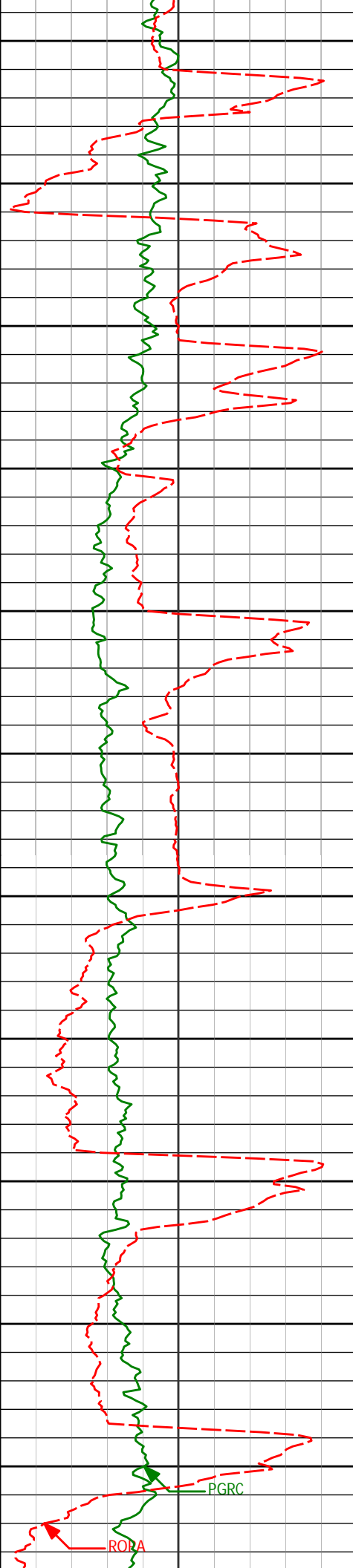
3454'

9.43°

206.49°

3444.91'

59.20'



3500

3550

3600

3650

3700

3750

3800

3850

3900

3950

4000

3549'

9.50°

201.38°

3538.62'

67.76'

3643'

10.38°

197.59°

3631.21'

75.57'

3738'

12.48°

201.87°

3724.32'

84.78'

3833'

13.69°

200.95°

3816.85'

95.78'

3928'

13.10°

200.01°

3909.27'

106.73'

4023'

11.59°

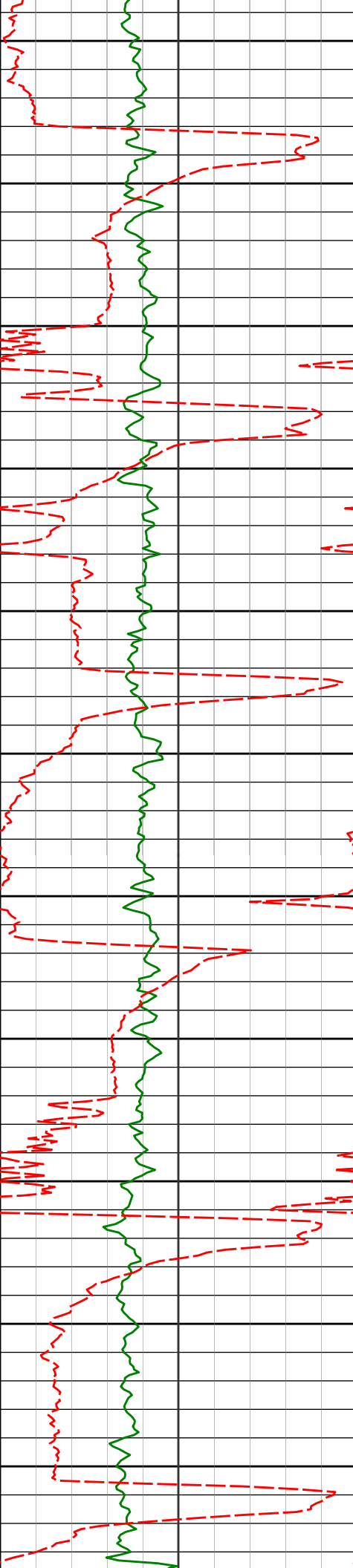
197.83°

4002.07'

116.38'

PGRC

ROBA



4050

4100

4150

4200

4250

4300

4350

4400

4450

4500

4550

4118'

10.62°

197.14°

4095.29'

124.65'

4212'

9.99°

198.78°

4187.78'

132.36'

4307'

9.15°

200.42°

4281.45'

140.00'

4402'

8.67°

201.41°

4375.31'

147.41'

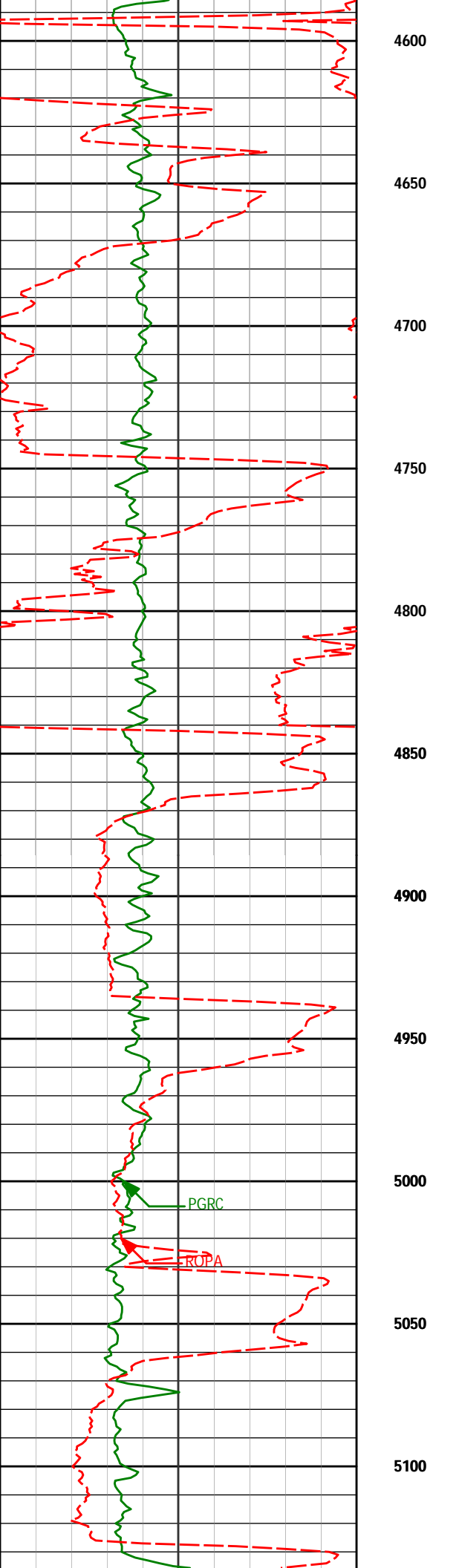
4497'

8.99°

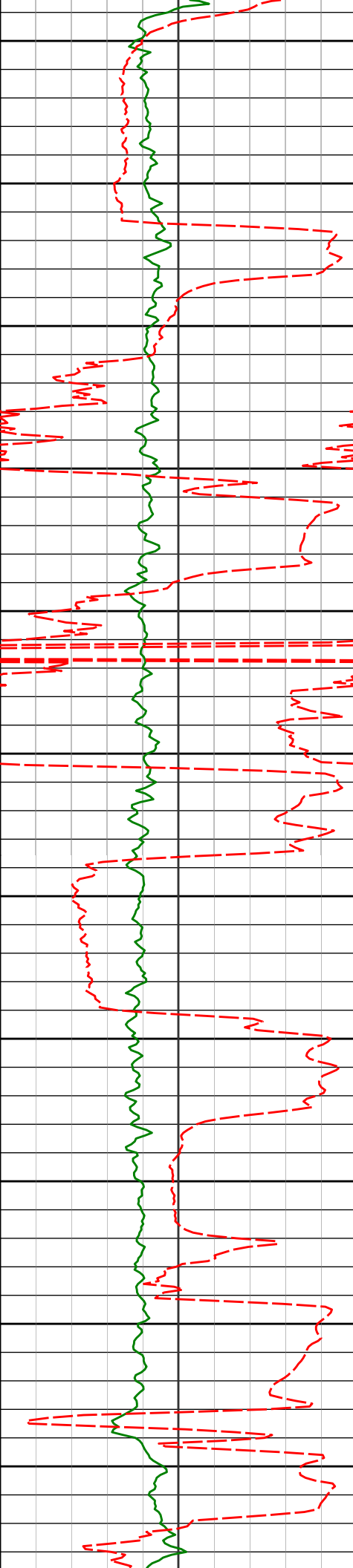
201.83°

4469.18'

154.92'



4591'	9.21°	199.30°	4562.00'	162.34'
4686'	8.00°	200.30°	4655.93'	169.26'
4781'	8.05°	201.69°	4750.00'	175.96'
4876'	8.56°	196.45°	4844.00'	182.47'
4970'	8.67°	197.99°	4936.94'	188.78'
5065'	10.48°	193.88°	5030.62'	195.48'



5150

5160'

9.73°

192.72°

5124.14'

201.90'

5200

5250

5255'

8.13°

200.07°

5217.99'

208.23'

5300

5350

5350'

8.59°

193.18°

5311.98'

214.25'

5400

5450

5444'

8.69°

199.34°

5404.92'

220.35'

5500

5550

5539'

8.93°

202.46°

5498.80'

227.69'

5600

5650

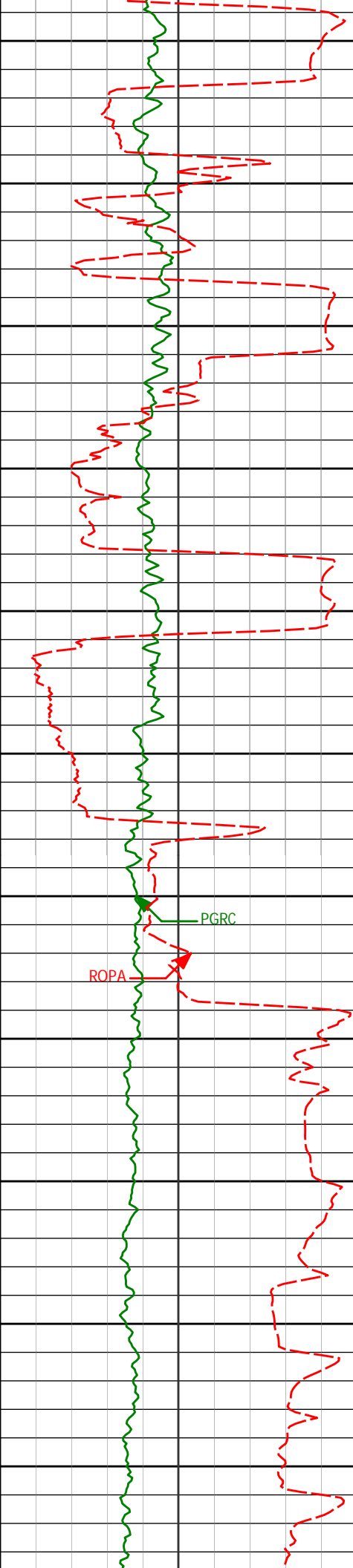
5634'

9.98°

200.94°

5592.51'

235.73'



5700

5728'

12.24°

201.05°

5684.74'

244.89'

5750

5800

5823'

12.08°

204.41°

5777.61'

255.52'

5850

5900

5918'

12.02°

203.89°

5870.52'

266.47'

5950

6000

5983'

9.69°

206.51°

5934.35'

273.39'

PGRC

ROPA

200

6050

6046'

10.02°

202.04°

5996.42'

279.35'

6100

6107'

12.46°

205.46°

6056.25'

285.88'

6150

6155'

14.74°

209.26°

6102.90'

292.65'

6200

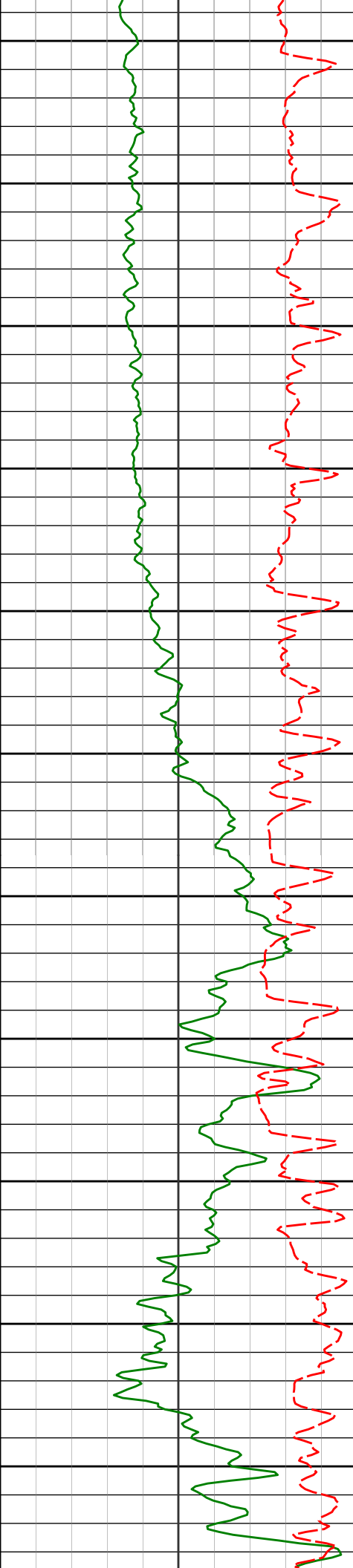
6202'

16.49°

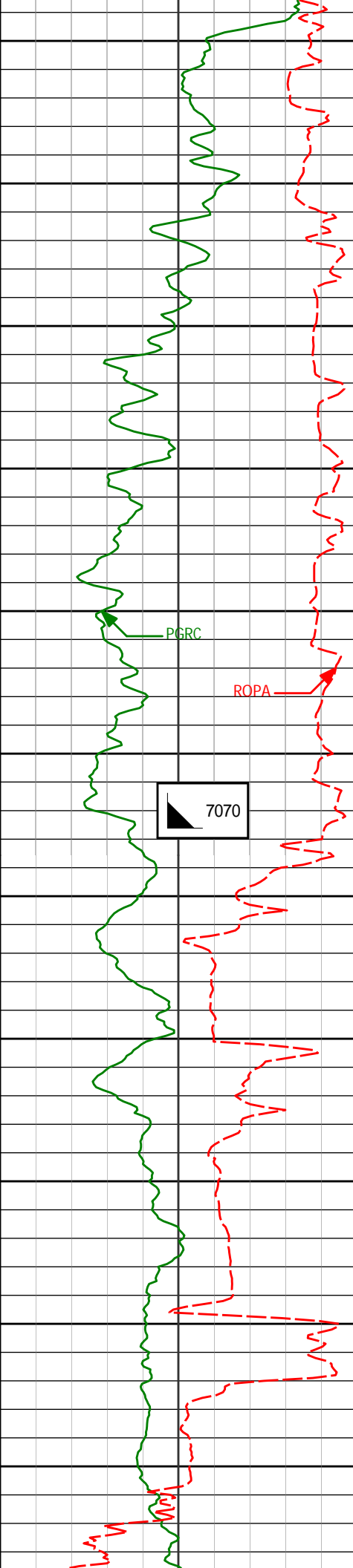
211.32°

6148.16'

300.73'



6250	6250'	20.49°	222.00°	6193.69'	311.74'
6300	6297'	24.98°	228.46°	6237.03'	326.58'
6350	6345'	29.99°	230.91°	6279.60'	345.59'
6400	6392'	34.83°	232.94°	6319.27'	367.69'
6450	6440'	40.13°	237.63°	6357.35'	394.09'
6500	6486'	44.32°	241.10°	6391.42'	422.90'
6550	6534'	47.37°	242.62°	6424.85'	455.50'
6600	6581'	49.99°	245.74°	6455.88'	489.35'
6650	6629'	52.55°	249.08°	6485.92'	525.79'
6700	6675'	55.48°	252.33°	6512.95'	562.45'
6750	6723'	58.12°	256.77°	6539.24'	602.37'
	6770'	62.76°	259.01°	6562.42'	643.19'



6800

6818' 67.71° 262.33° 6582.52' 686.76'

6850

6865' 71.99° 264.93° 6598.71' 730.81'

6900

6913' 74.31° 265.43° 6612.62' 776.60'

6950

6960' 79.13° 267.30° 6623.42' 822.09'

7000

7008' 81.32° 267.59° 6631.56' 869.06'

ROPA

7026' 83.71° 267.98° 6633.91' 886.77'

7050



300

7100

7108' 87.47° 270.24° 6640.21' 967.61'

7150

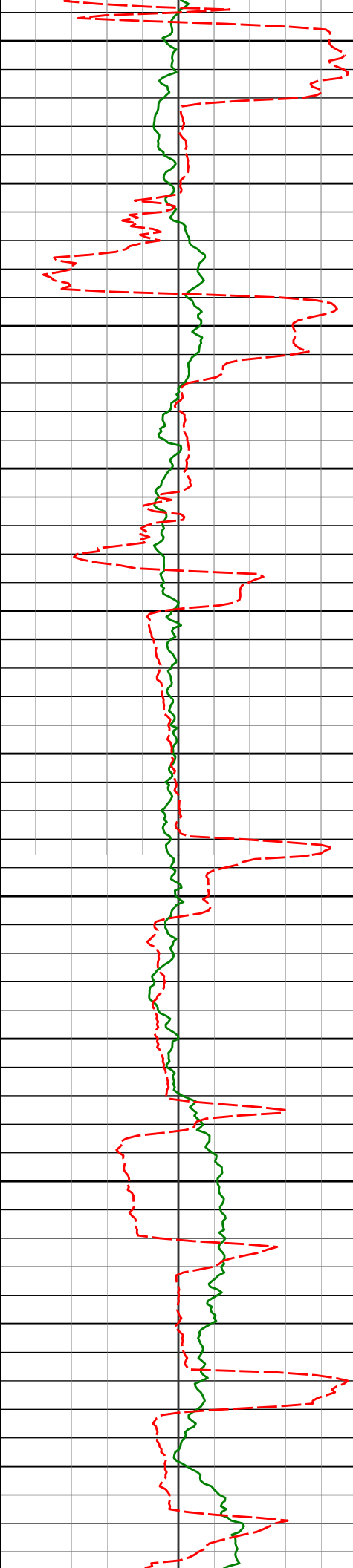
7184' 87.16° 270.25° 6643.77' 1042.46'

7200

7250

7278' 87.84° 269.69° 6647.87' 1135.13'

7300



7350

7373'

89.26°

269.37°

6650.28'

1228.95'

7400

7450

7468'

91.11°

268.88°

6649.97'

1322.90'

7500

7550

7562'

91.30°

268.63°

6648.00'

1415.94'

7600

7650

7657'

90.62°

268.74°

6646.41'

1509.99'

7700

7750

7752'

89.94°

268.46°

6645.95'

1604.07'

7800

7850

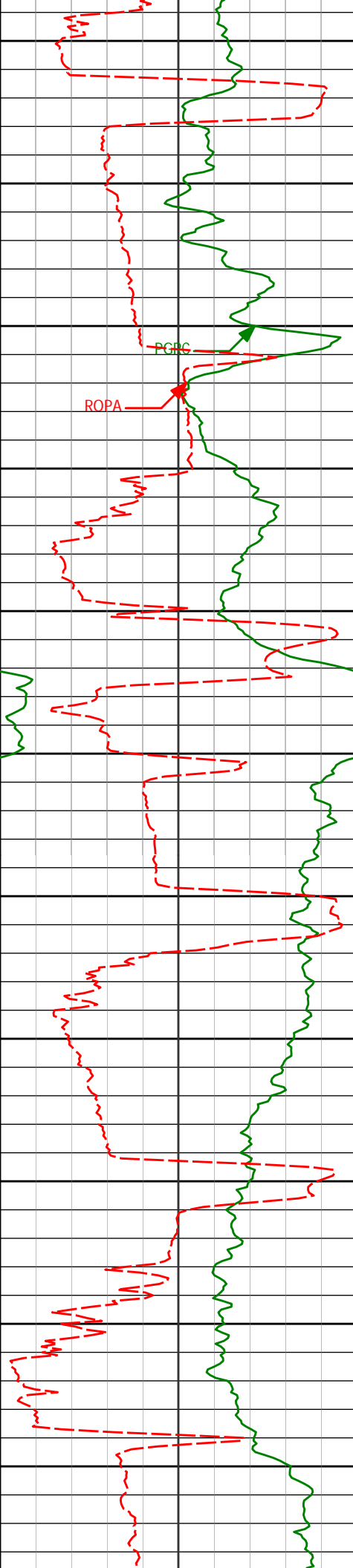
7846'

89.11°

268.04°

6646.73'

1697.23'



7900

7941'

90.80°

270.05°

6646.81'

1791.20'

7950

8000

PGRC

ROPA

8036'

88.12°

269.22°

6647.70'

1885.02'

8050

8100

8130'

88.40°

269.11°

6650.56'

1977.93'

8150

8200

8225'

88.83°

269.91°

6652.85'

2071.76'

8250

8300

8319'

90.09°

269.90°

6653.74'

2164.53'

8350

8400

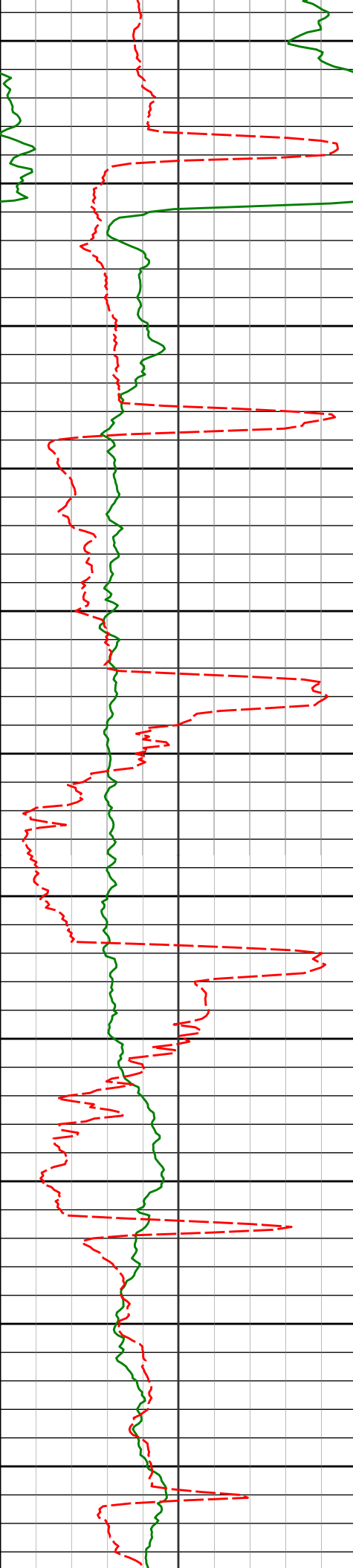
8414'

91.14°

271.14°

6652.72'

2258.11'



8450

8500

8550

8600

8650

8700

8750

8800

8850

8900

8950

8509' 90.92° 270.48° 6651.01' 2351.60'

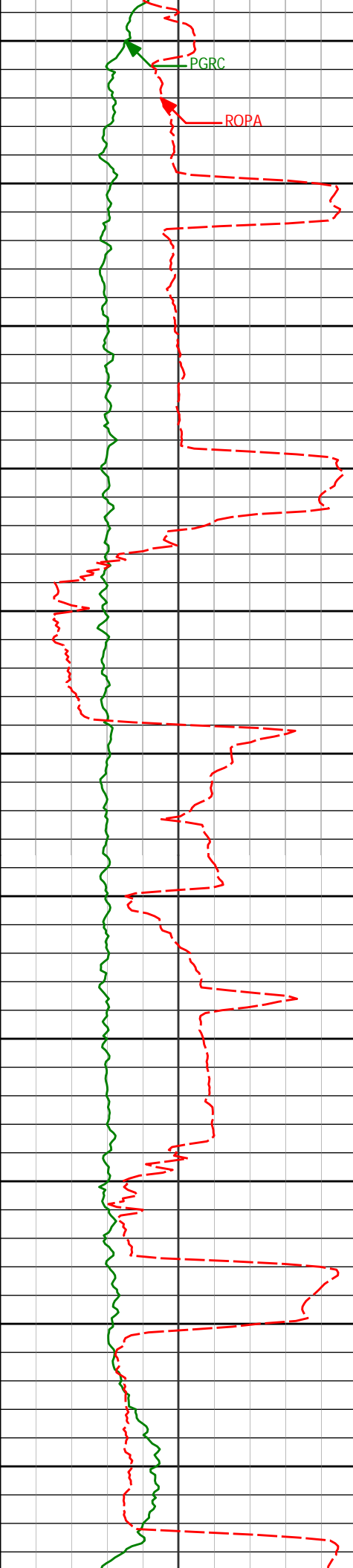
8604' 90.49° 270.54° 6649.83' 2445.18'

8699' 89.91° 268.46° 6649.50' 2539.04'

8793' 89.04° 267.00° 6650.36' 2632.31'

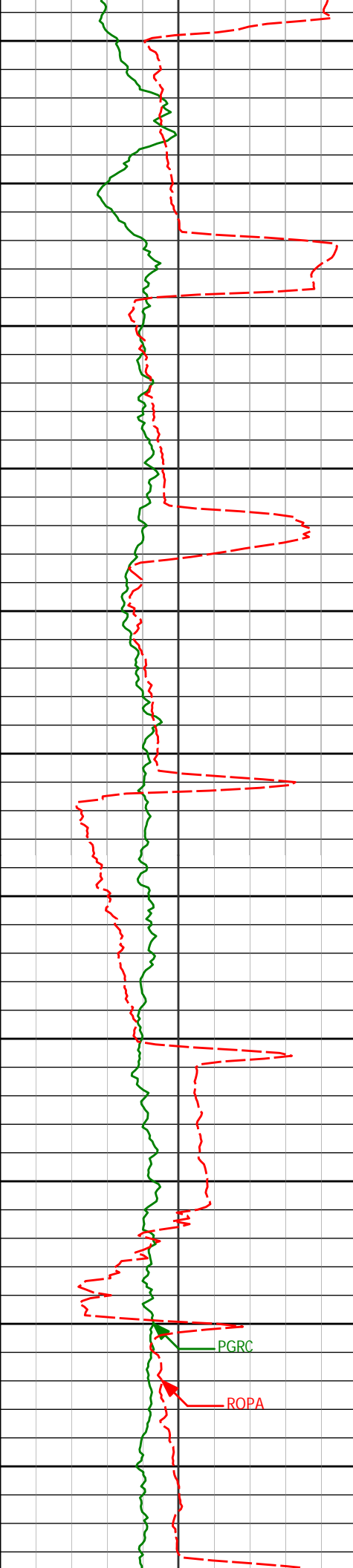
8888' 89.38° 267.55° 6651.67' 2726.66'

8983' 90.22° 267.48° 6652.00' 2820.97'



9000
9050
9100
9150
9200
9250
9300
9350
9400
9450
9500

9078'	88.92°	268.12°	6652.71'	2915.23'
9173'	89.41°	271.49°	6654.09'	3008.99'
9268'	89.32°	271.66°	6655.14'	3102.25'
9362'	89.60°	272.29°	6656.03'	3194.41'
9457'	89.01°	270.50°	6657.18'	3287.73'



9550	9552'	87.66°	268.71°	6659.94'	3381.52'
9600					
9650	9647'	88.98°	268.25°	6662.73'	3475.59'
9700					
9750	9742'	89.78°	269.20°	6663.75'	3569.63'
9800					
9850	9837'	90.12°	269.55°	6663.82'	3663.53'
9900					
9950	9931'	89.29°	267.60°	6664.31'	3756.62'
10000					
10050	10026'	90.12°	266.89°	6664.79'	3850.98'

PGRC

ROPA



10100

10120'

89.26°

267.47°

6665.30'

3944.37'

10150

10200

10215'

89.54°

267.55°

6666.29'

4038.68'

10250

10300

10310'

89.78°

268.52°

6666.86'

4132.89'

10350

10400

10405'

89.63°

269.28°

6667.34'

4226.90'

10450

10500

10500'

89.38°

269.32°

6668.16'

4320.81'

10550

10600

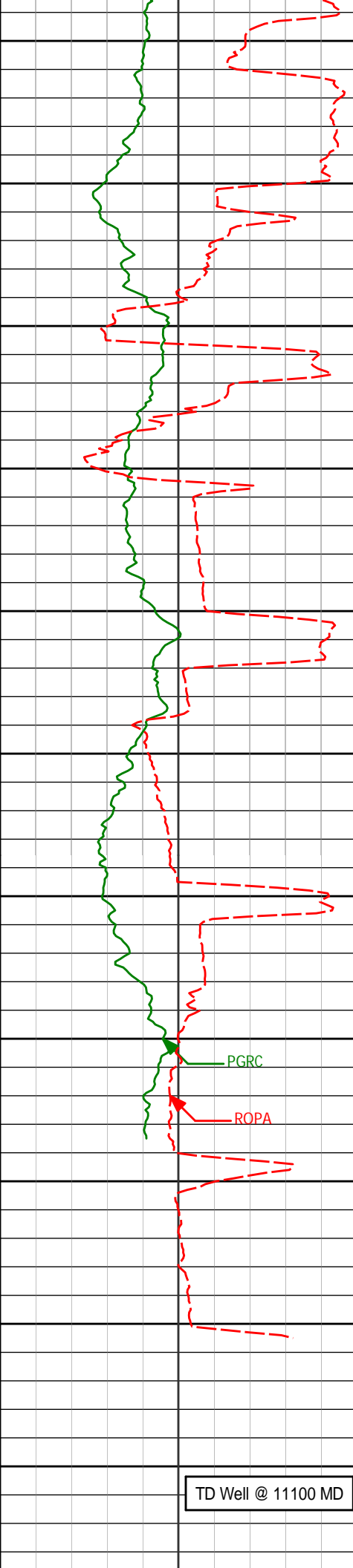
10595'

89.35°

267.29°

6669.21'

4414.95'



10650

10689' 91.20° 271.31° 6668.76' 4507.85'

10700

10750

10784' 89.60° 271.31° 6668.09' 4601.20'

10800

10850

10879' 91.64° 273.19° 6667.07' 4694.24'

10900

10950

10973' 90.77° 272.53° 6665.09' 4786.08'

11000

PGRC

ROPA

11033' 90.43° 272.21° 6664.46' 4844.82'

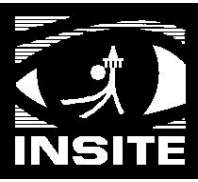
11050

11100

11150

TD Well @ 11100 MD

Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
1K	0						
PCG Gamma Ray PGRC api							
0	300						



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch USX AA23-65-1HN-A1
Wattenberg
Weld Colorado
USA
CA-XX-0900544021

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
235.00	0.60	284.50	235.00	0.31 N	1.19 W	1.13	0.26
642.00	0.70	7.10	641.98	3.31 N	2.95 W	2.37	0.21
726.00	0.33	247.71	725.97	3.73 N	3.11 W	2.46	1.08
818.00	0.13	252.74	817.97	3.59 N	3.45 W	2.82	0.22
910.00	0.21	38.93	909.97	3.69 N	3.45 W	2.80	0.35
1003.00	0.13	108.90	1002.97	3.79 N	3.24 W	2.58	0.22
1095.00	0.18	107.35	1094.97	3.71 N	3.01 W	2.36	0.06
1187.00	0.21	60.28	1186.97	3.75 N	2.73 W	2.08	0.17
1279.00	0.73	86.14	1278.97	3.88 N	2.00 W	1.34	0.60
1371.00	0.75	57.11	1370.96	4.24 N	0.90 W	0.20	0.40
1463.00	1.10	52.10	1462.95	5.11 N	0.30 E	-1.13	0.39
1557.00	0.82	294.39	1556.94	5.95 N	0.40 E	-1.36	1.76
1652.00	2.43	257.17	1651.90	5.78 N	2.18 W	1.21	1.94
1747.00	0.66	265.36	1746.87	5.29 N	4.69 W	3.76	1.87
1842.00	0.92	244.42	1841.86	4.92 N	5.92 W	5.04	0.40
1936.00	0.65	233.47	1935.85	4.28 N	7.03 W	6.24	0.33
2031.00	0.71	252.23	2030.84	3.78 N	8.02 W	7.30	0.24
2126.00	0.46	106.59	2125.84	3.49 N	8.21 W	7.54	1.18
2221.00	0.40	115.10	2220.84	3.24 N	7.55 W	6.92	0.09
2316.00	0.65	119.35	2315.83	2.83 N	6.77 W	6.22	0.27
2411.00	0.62	106.46	2410.83	2.42 N	5.81 W	5.33	0.15
2506.00	0.64	115.42	2505.82	2.04 N	4.83 W	4.43	0.11
2600.00	1.45	193.91	2599.81	0.67 N	4.64 W	4.47	1.56
2695.00	3.74	195.98	2694.70	3.48 S	5.78 W	6.27	2.41
2790.00	5.72	190.25	2789.38	11.11 S	7.48 W	9.19	2.15
2885.00	7.33	194.45	2883.76	21.64 S	9.83 W	13.22	1.76
2980.00	9.43	196.71	2977.74	34.97 S	13.58 W	19.09	2.24
3075.00	10.13	201.04	3071.36	50.22 S	18.82 W	26.74	1.07
3169.00	9.38	198.86	3164.00	65.18 S	24.26 W	34.55	0.89
3264.00	10.19	198.88	3257.62	80.46 S	29.48 W	42.19	0.85
3359.00	9.55	203.15	3351.21	95.66 S	35.30 W	50.40	1.03
3454.00	9.43	206.49	3444.91	109.86 S	41.87 W	59.20	0.59
3549.00	9.50	201.38	3538.62	124.13 S	48.20 W	67.76	0.89
3643.00	10.38	197.59	3631.21	139.42 S	53.59 W	75.57	1.17
3738.00	12.48	201.87	3724.32	157.11 S	60.00 W	84.78	2.38
3833.00	13.69	200.95	3816.85	177.14 S	67.84 W	95.78	1.29
3928.00	13.10	200.01	3909.27	197.75 S	75.54 W	106.73	0.66
4023.00	11.59	197.83	4002.07	216.95 S	82.15 W	116.38	1.66
4118.00	10.62	197.14	4095.29	234.40 S	87.65 W	124.65	1.03
4212.00	9.99	198.78	4187.78	250.40 S	92.83 W	132.36	0.74
4307.00	9.15	200.42	4281.45	265.28 S	98.12 W	140.00	0.93
4402.00	8.67	201.41	4375.31	279.02 S	103.37 W	147.41	0.53
4497.00	8.99	201.83	4469.18	292.58 S	108.74 W	154.92	0.35
4591.00	9.21	199.30	4562.00	306.50 S	113.96 W	162.34	0.48
4686.00	8.00	200.30	4655.93	319.87 S	118.76 W	169.26	1.28
4781.00	8.85	204.68	4749.88	333.88 S	123.53 W	175.86	0.84

4781.00	8.05	201.69	4750.00	332.26 S	123.52 W	175.96	0.21
4876.00	8.56	196.45	4844.00	345.22 S	127.98 W	182.47	0.96
4970.00	8.67	197.99	4936.94	358.67 S	132.14 W	188.78	0.27
5065.00	10.48	193.88	5030.62	373.86 S	136.43 W	195.48	2.04
5160.00	9.73	192.72	5124.14	390.07 S	140.27 W	201.90	0.82
5255.00	8.13	200.07	5217.99	404.22 S	144.34 W	208.23	2.06
5350.00	8.59	193.18	5311.98	417.43 S	148.27 W	214.25	1.16
5444.00	8.69	199.34	5404.92	430.97 S	152.22 W	220.35	0.99
5539.00	8.93	202.46	5498.80	444.56 S	157.41 W	227.69	0.56
5634.00	9.98	200.94	5592.51	459.06 S	163.17 W	235.73	1.13
5728.00	12.24	201.05	5684.74	475.97 S	169.66 W	244.89	2.41
5823.00	12.08	204.41	5777.61	494.42 S	177.39 W	255.52	0.76
5918.00	12.02	203.89	5870.52	512.51 S	185.50 W	266.47	0.13
5983.00	9.69	206.51	5934.35	523.60 S	190.69 W	273.39	3.66
6046.00	10.02	202.04	5996.42	533.42 S	195.11 W	279.35	1.32
6107.00	12.46	205.46	6056.25	544.28 S	199.93 W	285.88	4.15
6155.00	14.74	209.26	6102.90	554.28 S	205.14 W	292.65	5.09
6202.00	16.49	211.32	6148.16	565.20 S	211.53 W	300.73	3.92
6250.00	20.49	222.00	6193.69	577.27 S	220.70 W	311.74	10.88
6297.00	24.98	228.46	6237.03	589.98 S	233.64 W	326.58	10.92
6345.00	29.99	230.91	6279.60	604.27 S	250.55 W	345.59	10.71
6392.00	34.83	232.94	6319.27	619.78 S	270.39 W	367.69	10.54
6440.00	40.13	237.63	6357.35	636.33 S	294.42 W	394.09	12.54
6486.00	44.32	241.10	6391.42	652.05 S	321.02 W	422.90	10.42
6534.00	47.37	242.62	6424.85	668.28 S	351.39 W	455.50	6.75
6581.00	49.99	245.74	6455.88	683.63 S	383.16 W	489.35	7.47
6629.00	52.55	249.08	6485.92	697.99 S	417.73 W	525.79	7.62
6675.00	55.48	252.33	6512.95	710.27 S	452.85 W	562.45	8.55
6723.00	58.12	256.77	6539.24	720.94 S	491.55 W	602.37	9.49
6770.00	62.76	259.01	6562.42	729.49 S	531.51 W	643.19	10.72
6818.00	67.71	262.33	6582.52	736.53 S	574.51 W	686.76	12.07
6865.00	71.99	264.93	6598.71	741.41 S	618.35 W	730.81	10.49
6913.00	74.31	265.43	6612.62	745.27 S	664.12 W	776.60	4.92
6960.00	79.13	267.30	6623.42	748.16 S	709.76 W	822.09	10.96
7008.00	81.32	267.59	6631.56	750.27 S	757.01 W	869.06	4.60
7026.00	83.71	267.98	6633.91	750.96 S	774.84 W	886.77	13.45
7108.00	87.47	270.24	6640.21	752.22 S	856.57 W	967.61	5.35
7184.00	87.16	270.25	6643.77	751.90 S	932.49 W	1042.46	0.40
7278.00	87.84	269.69	6647.87	751.95 S	1026.39 W	1135.13	0.93
7373.00	89.26	269.37	6650.28	752.73 S	1121.36 W	1228.95	1.53
7468.00	91.11	268.88	6649.97	754.18 S	1216.34 W	1322.90	2.02
7562.00	91.30	268.63	6648.00	756.22 S	1310.30 W	1415.94	0.34
7657.00	90.62	268.74	6646.41	758.40 S	1405.26 W	1509.99	0.72
7752.00	89.94	268.46	6645.95	760.72 S	1500.23 W	1604.07	0.77
7846.00	89.11	268.04	6646.73	763.58 S	1594.18 W	1697.23	0.99
7941.00	90.80	270.05	6646.81	765.17 S	1689.16 W	1791.20	2.76
8036.00	88.12	269.22	6647.70	765.77 S	1784.15 W	1885.02	2.95
8130.00	88.40	269.11	6650.56	767.14 S	1878.09 W	1977.93	0.32
8225.00	88.83	269.91	6652.85	767.95 S	1973.06 W	2071.76	0.95
8319.00	90.09	269.90	6653.74	768.11 S	2067.05 W	2164.53	1.34
8414.00	91.14	271.14	6652.72	767.25 S	2162.04 W	2258.11	1.71
8509.00	90.92	270.48	6651.01	765.90 S	2257.02 W	2351.60	0.73
8604.00	90.49	270.54	6649.83	765.05 S	2352.00 W	2445.18	0.46
8699.00	89.91	268.46	6649.50	765.88 S	2446.99 W	2539.04	2.27
8793.00	89.04	267.00	6650.36	769.60 S	2540.91 W	2632.31	1.81
8888.00	89.38	267.55	6651.67	774.11 S	2635.80 W	2726.66	0.68
8983.00	90.22	267.48	6652.00	778.23 S	2730.71 W	2820.97	0.88
9078.00	88.92	268.12	6652.71	781.87 S	2825.63 W	2915.23	1.52
9173.00	89.41	271.49	6654.09	782.19 S	2920.61 W	3008.99	3.58
9268.00	89.32	271.66	6655.14	779.58 S	3015.56 W	3102.25	0.20
9362.00	89.60	272.29	6656.03	776.35 S	3109.50 W	3194.41	0.73
9457.00	89.01	270.50	6657.18	774.03 S	3204.46 W	3287.73	1.98
9552.00	87.66	268.71	6659.94	774.69 S	3299.42 W	3381.52	2.37
9647.00	88.98	268.25	6662.73	777.20 S	3394.34 W	3475.59	1.48
9742.00	89.78	269.20	6663.75	779.32 S	3489.31 W	3569.63	1.31
9837.00	90.12	269.55	6663.82	780.36 S	3584.30 W	3663.53	0.51
9931.00	89.29	267.60	6664.31	782.69 S	3678.27 W	3756.62	2.25
10026.00	90.12	266.89	6664.79	787.26 S	3773.15 W	3850.98	1.16
10120.00	89.26	267.47	6665.30	791.88 S	3867.04 W	3944.37	1.11
10215.00	89.54	267.55	6666.29	796.01 S	3961.94 W	4038.68	0.30
10310.00	89.78	268.52	6666.86	799.28 S	4056.88 W	4132.89	1.05
10405.00	89.63	269.28	6667.34	801.11 S	4151.86 W	4226.90	0.82
10500.00	89.38	269.32	6668.16	802.27 S	4246.85 W	4320.81	0.26
10595.00	89.35	267.29	6669.21	805.08 S	4341.80 W	4414.95	2.14
10689.00	91.20	271.31	6668.76	806.23 S	4435.77 W	4507.85	4.71

10784.00	89.60	271.31	6668.09	804.07 S	4530.74 W	4601.20	1.69
10879.00	91.64	273.19	6667.07	800.34 S	4625.65 W	4694.24	2.92
10973.00	90.77	272.53	6665.09	795.65 S	4719.51 W	4786.08	1.16
11033.00	90.43	272.21	6664.46	793.17 S	4779.46 W	4844.82	0.77

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 260.63 DEGREES (GRID)
A TOTAL CORRECTION OF 7.70 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11033.00 FEET
IS 4844.83 FEET ALONG 260.58 DEGREES (GRID)**

First two survey are from 3rd party source (Multi Shot EMS) and provided by CO-man on location before drilling.

Depth 235 Inc 0.60 Azi 284.50

Depth 642 Inc 0.70 Azi 367.10

Tied in @ Surface