

PCG Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	26-Jun-14	27-Jun-14	01-Jul-14	03-Jul-14	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	6.125	6.125	
Tool Nominal OD (in)	6.750	6.750	4.750	4.750	
Log Start Depth (MD, ft)	830.00	6,042.00	7,028.00	13,274.00	
Log End Depth (MD, ft)	6,042.00	7,028.00	13,274.00	16,445.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	25-Jun-14 17:00	27-Jun-14 02:45	28-Jun-14 17:15	01-Jul-14 19:30	
Drill/Wipe End Date and Time	26-Jun-14 09:15	27-Jun-14 12:15	01-Jul-14 06:15	03-Jul-14 08:15	
Min Inc (deg) @ Depth (MD, ft)	0.03 @ 4,946.00	0.13 @ 6,083.00	85.90 @ 7,124.00	86.85 @ 15,615.00	
Max Inc (deg) @ Depth (MD, ft)	6.24 @ 2,865.00	82.90 @ 6,977.00	92.34 @ 9,395.00	91.94 @ 15,805.00	
Bit TFA(in2) / Bit Type	1.14 / PDC	1.24 / PDC	1.24 / PDC	1.24 / PDC	
Flow Rate (gpm)	595.07	550.00	299.66	280.00	
Max AV (fpm) / CV (fpm) @ MWD	487.0 / NA	464.0 / NA	448.2 / NA	414.8 / NA	
Fluid Type	Native/Spud Mud	Fresh Water Gel	Native/Spud Mud	Native/Spud Mud	
Density (ppg) / Viscosity (spqt)	9.35 / 51.00	10.40 / 42.00	9.42 / 37.00	9.42 / 34.00	
Filtrate CL (ppm)	2,200.00	2,200.00	2,600.00	2,700.00	
pH / Fluid Loss (mptm)	9.20 / 7	9.00 / 7	10.10 / 5	9.20 / 6	
PV (cP) / YP (lbf2)	15 / 16.00	15 / 13.00	11 / 15.00	9 / 13.00	
% Solids / % Sand	3.3 / 0.15	9.7 / .25	7.2 / 0.10	5.7 / 0.10	
% Oil / Oil:Water Ratio	N/A / N/A	NA / NA	NA / NA	NA / NA	
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA	NA @ NA	
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA	NA @ NA	
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA	NA @ NA	
Max Tool Temp (in F) / S	128.66 / (DOM)	127.87 / (DOM)	222.71 / (DOM)	218.88 / (DOM)	

Max Tool Temp (degF) / Source	162.80 / PCM	167.97 / PCM	228.74 / PCM	242.28 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA	NA @ NA	NA @ NA	
Lead MWD Engineer	Brett Vandergon	Brett Vandergon	Brett Vandergon	Brett Vandergon	
Customer Representative	Matt Settles	Matt Settles	Matt Settles	Matt Settles	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.93	5.93	5.93	5.93	
Sub Serial Number	11341339	11341339	12334774	12334774	
Insert Serial Number	11400994	11400994	11680736	11400994	
Date and Time Initialized	24-Jun-14 14:48	01-Jan-70 00:00	27-Jun-14 23:21	01-Jul-14 10:40	
Date and Time Read	27-Jun-14 19:39	27-Jun-14 19:44	01-Jul-14 15:19	03-Jul-14 21:25	
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	51.00	65.00	65.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11341339	11341339	12334774	12334774	
Sonde Serial Number	11062120	11062120	11638497	11062120	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	94.94	129.22	353.18	90.76	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	46.39	44.37	58.02	58.03	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11341339	11341339	12334774	12334774	
Insert/Sonde Serial Number	11579775	11579775	11293301	11579775	

REMARKS

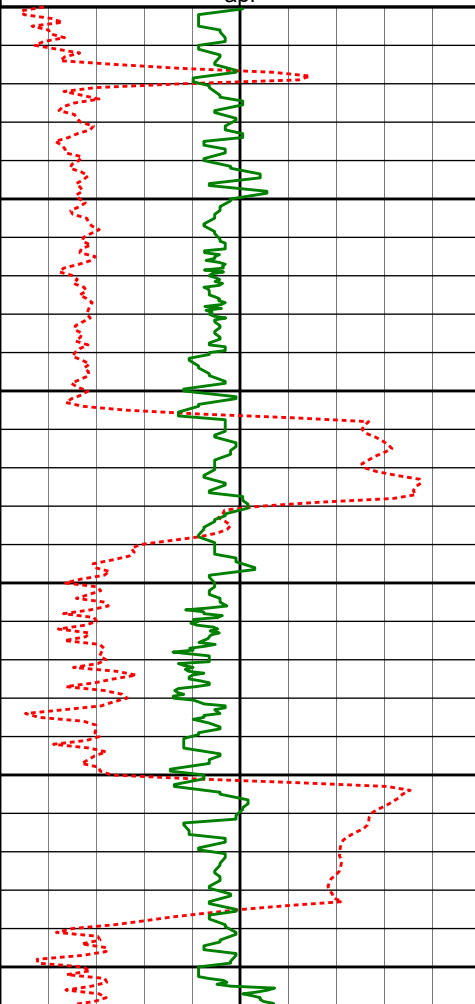
1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annual velocities are calculated using the "Power Law" model for water based 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

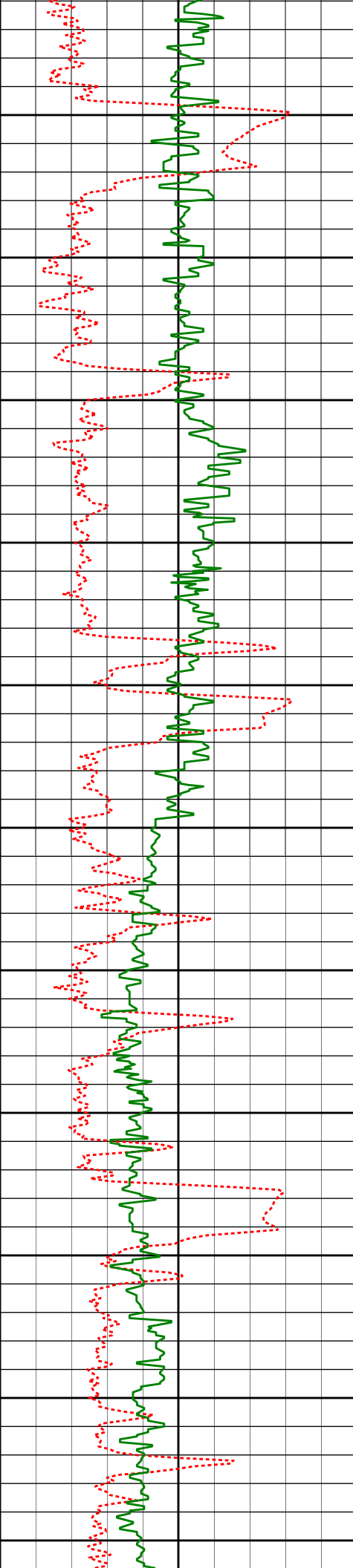
WARRANTY

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HALLIBURTON

MD Main Log 1:600

Average Rate of Penetration ROPA						
1K0						
feet per hr						
PCG Gamma Ray BCorr PGRC		Measured Depth (ft) 1:600	Depth	Inc	Azi.	TVDV.S.
0200						
api						
		3000'				
		3050'	3054'	5.94°	222.34°	3051.75'44.33'
		3100'				
		3150'	3149'	4.55°	229.33°	3146.36'50.66'
		3200'				
		3250'	3244'	2.16°	240.59°	3241.19'55.16'



3300'

3339'

0.44°

15.56°

3336.17'

56.64'

3350'

3400'

3434'

1.55°

39.41°

3431.15'

55.69'

3450'

3500'

3528'

1.21°

53.03°

3525.12'

54.05'

3550'

3600'

3623'

1.19°

23.10°

3620.10'

52.82'

3650'

3700'

3717'

0.50°

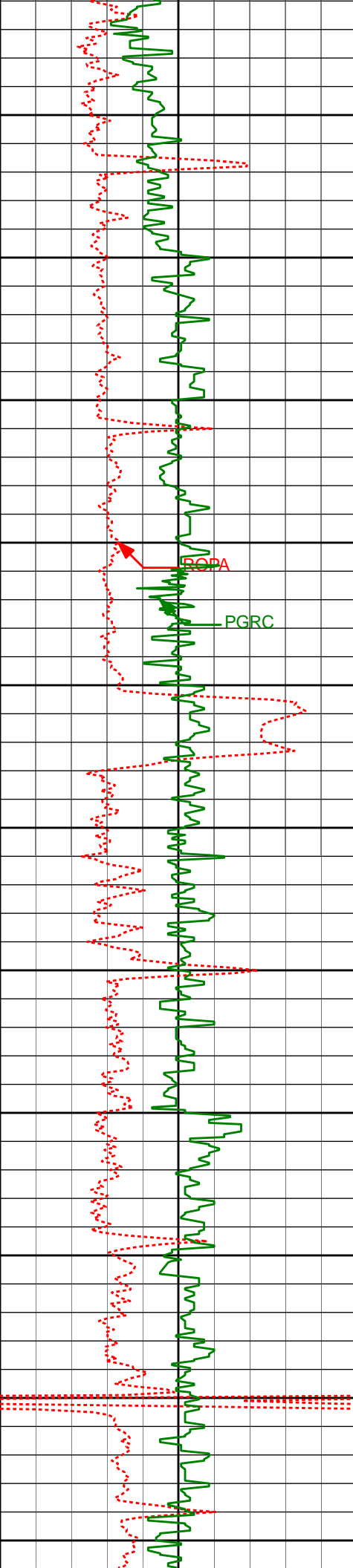
48.41°

3714.09'

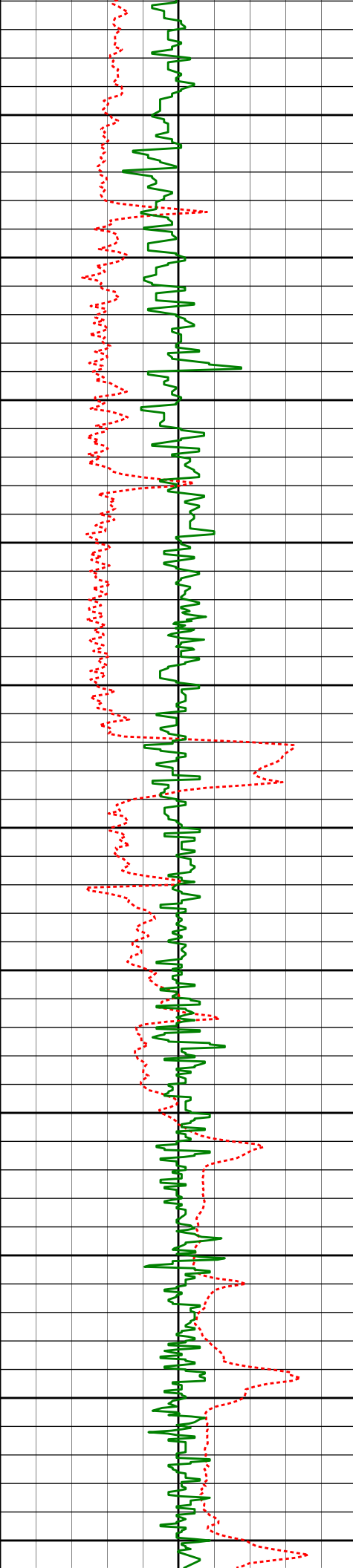
52.10'

3750'

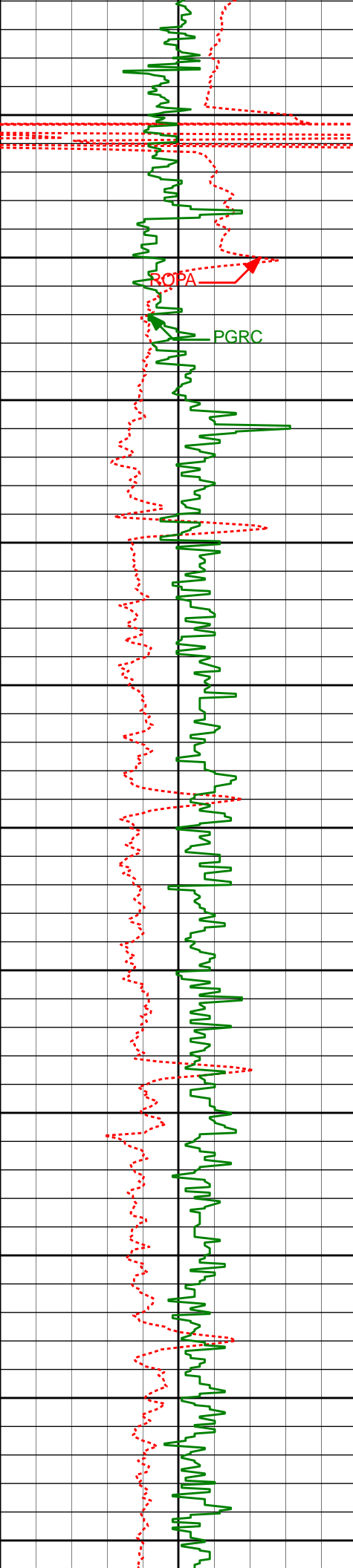
3800'



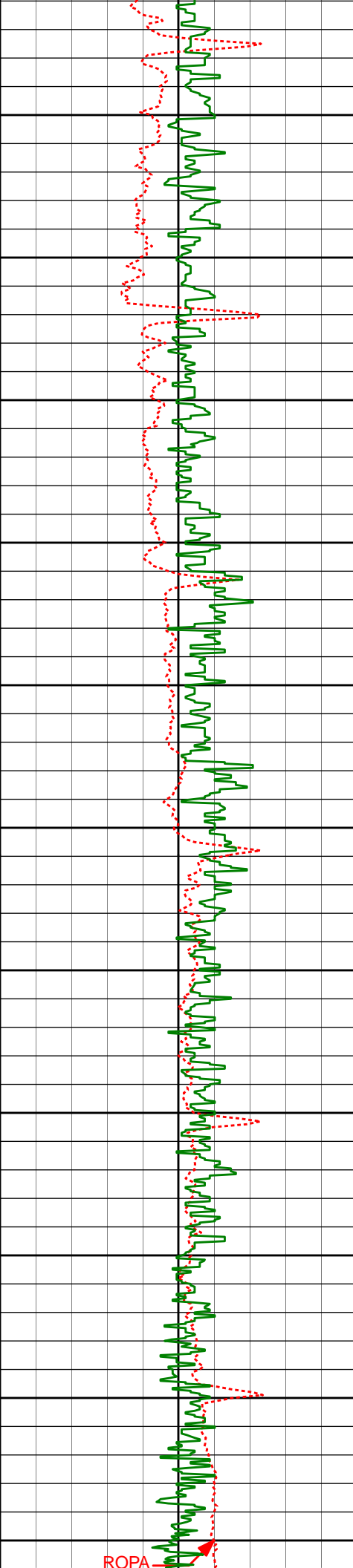
3850'	3812'	0.80°	48.45°	3809.09'	51.28'
3900'	3907'	0.98°	41.76°	3904.08'	50.21'
3950'					
4000'	4002'	0.96°	54.44°	3999.06'	49.00'
4050'					
4100'	4096'	0.31°	69.12°	4093.06'	48.10'
4150'					
4200'	4191'	0.07°	3.61°	4188.06'	47.86'
4250'					
4300'	4285'	0.57°	224.45°	4282.05'	48.19'
4350'					



4379'	0.58°	305.22°	4376.05'	48.90'
4400'				
4450'				
4473'	0.57°	341.69°	4470.05'	49.42'
4500'				
4550'				
4568'	0.54°	357.66°	4565.04'	49.57'
4600'				
4650'				
4662'	0.41°	223.83°	4659.04'	49.81'
4700'				
4750'				
4757'	0.22°	209.73°	4754.04'	50.15'
4800'				
4850'				
4852'	0.13°	132.66°	4849.04'	50.16'
4900'				



4950'	4946'	0.03°	122.19°	4943.04'	50.07'
5000'					
5050'	5041'	0.14°	74.47°	5038.04'	49.93'
5100'					
5150'	5136'	0.47°	307.33°	5133.04'	50.12'
5200'					
5250'	5231'	0.57°	273.44°	5228.03'	50.90'
5300'					
5350'	5326'	0.33°	289.30°	5323.03'	51.63'
5400'					
5450'	5421'	0.41°	238.25°	5418.03'	52.18'



5500'

5515'	0.41°	110.85°	5512.03'	52.15'
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5550'

5600'

5610'	0.98°	88.41°	5607.02'	51.03'
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5650'

5700'

5705'	0.86°	89.95°	5702.01'	49.50'
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5750'

5800'

5799'	0.68°	90.74°	5796.00'	48.24'
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5850'

5900'

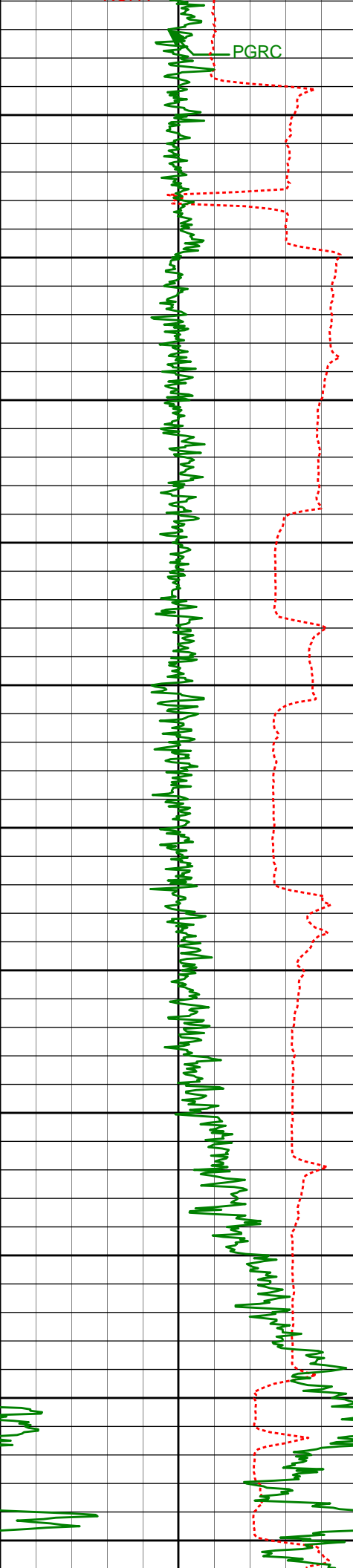
5894'	0.26°	111.28°	5891.00'	47.48'
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5950'

6000'

5989'	0.17°	45.15°	5986.00'	47.18'
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ROPA



Run200

6050'

6083'

0.13°

175.67°

6080.00'

47.07'

6100'

6150'

6178'

9.76°

256.13°

6174.54'

54.95'

6200'

6250'

6273'

12.28°

265.61°

6267.78'

72.91'

6300'

6350'

6368'

15.20°

260.76°

6360.06'

95.34'

6400'

6450'

6463'

32.79°

266.30°

6446.52'

133.69'

6500'

6550'

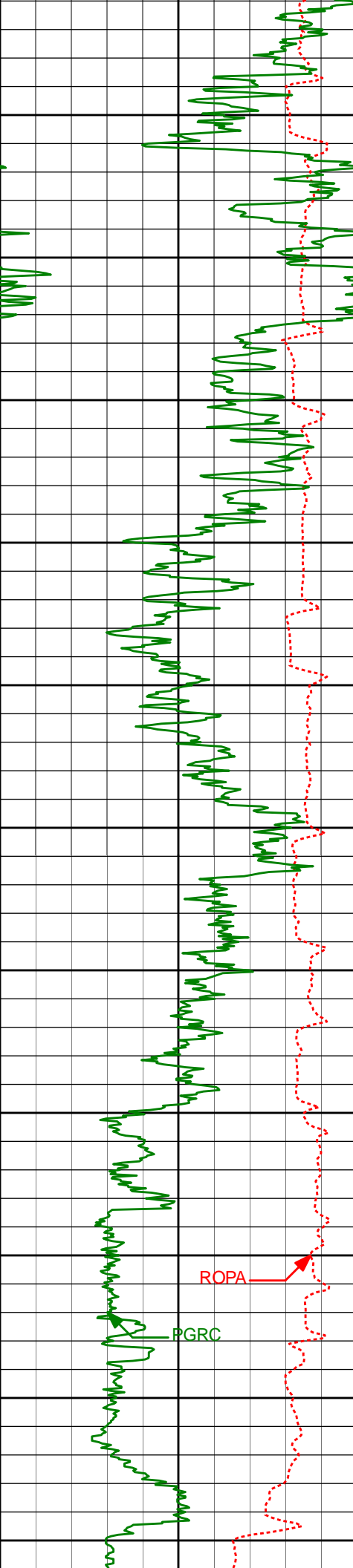
6557'

38.45°

267.78°

6522.90'

188.40'



6600'

6650'

6700'

6750'

6800'

6850'

6900'

6950'

7000'

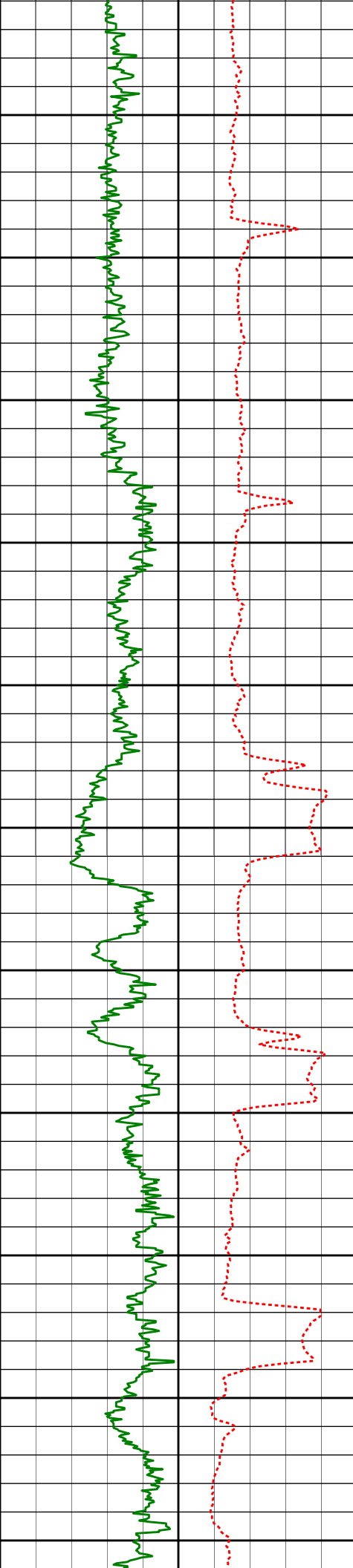
7050'

7100'

6652'	48.66°	269.96°	6591.66'	253.76'
6746'	59.80°	269.25°	6646.52'	329.89'
6841'	72.02°	270.07°	6685.23'	416.44'
6936'	77.73°	269.91°	6710.00'	508.08'
6977'	82.90°	268.43°	6716.90'	548.48'

Casing Shoe @ 7018'

Run 300



7150'

7200'

7250'

7300'

7350'

7400'

7450'

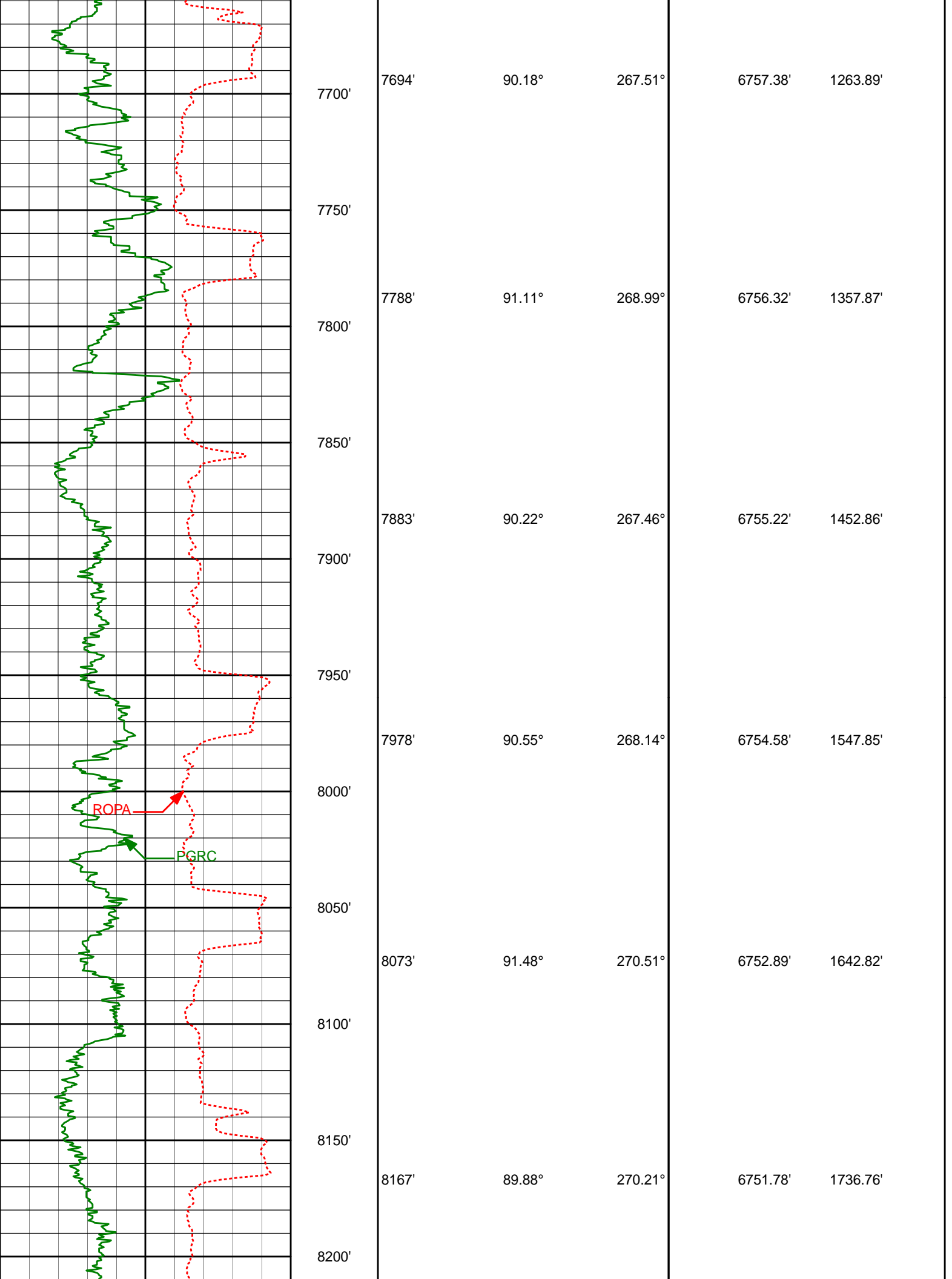
7500'

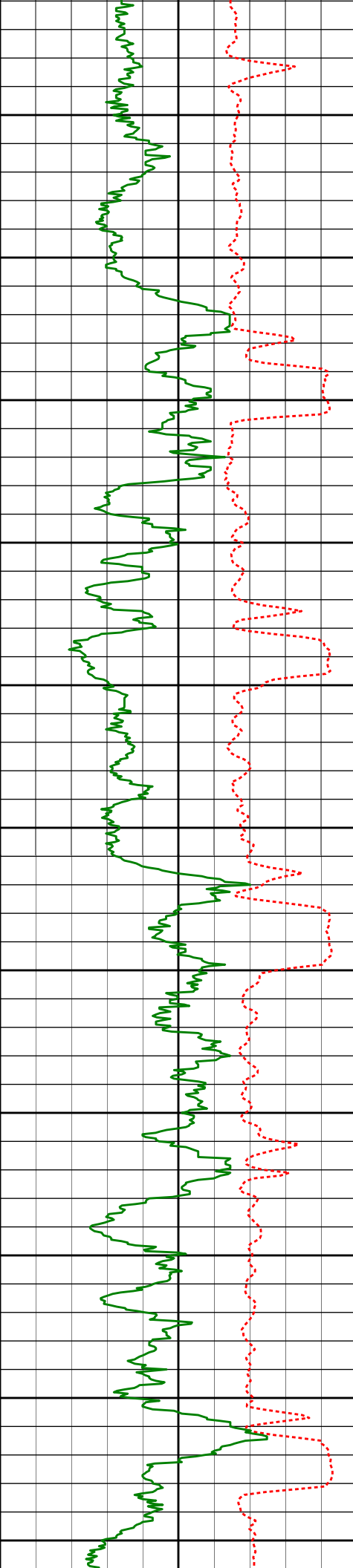
7550'

7600'

7650'

7124'	85.90°	267.11°	6731.24'	694.74'
7219'	86.73°	267.46°	6737.35'	789.52'
7314'	86.24°	266.42°	6743.17'	884.31'
7409'	86.64°	267.88°	6749.07'	979.09'
7504'	87.81°	268.44°	6753.67'	1073.98'
7599'	88.77°	266.77°	6756.51'	1168.92'





8250'

8262'

90.00°

269.12°

6751.88'

1831.74'

8300'

8350'

8356'

91.08°

270.00°

6750.99'

1925.72'

8400'

8450'

8451'

91.63°

270.28°

6748.75'

2020.65'

8500'

8550'

8545'

89.91°

270.08°

6747.48'

2114.60'

8600'

8650'

8639'

90.34°

269.47°

6747.28'

2208.58'

8700'

8750'

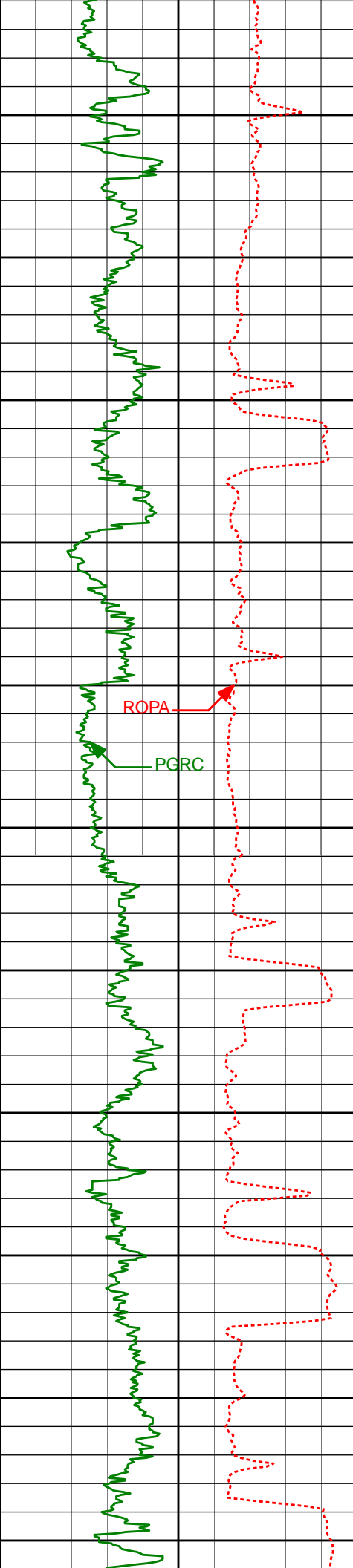
8734'

89.23°

269.61°

6747.63'

2303.56'



8800'

8829'

90.37°

268.46°

6747.97'

2398.56'

8850'

8900'

8923'

88.80°

269.40°

6748.65'

2492.55'

8950'

9000'

ROPA

PGRC

9018'

89.11°

267.86°

6750.38'

2587.53'

9050'

9100'

9112'

87.38°

266.77°

6753.26'

2681.46'

9150'

9200'

9207'

87.94°

267.05°

6757.14'

2776.34'

9250'

9300'

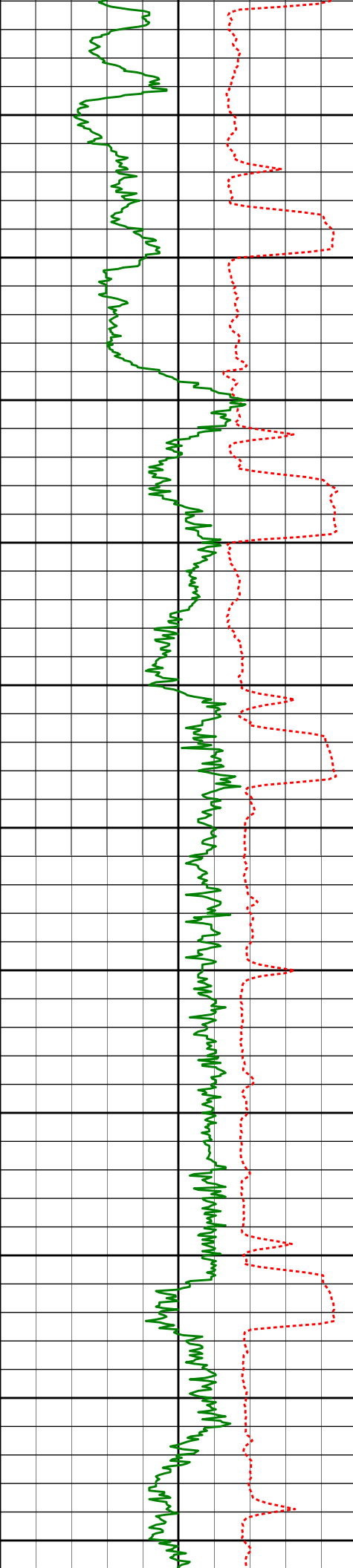
9301'

91.26°

269.18°

6757.79'

2870.32'



9350'

9400'

9450'

9500'

9550'

9600'

9650'

9700'

9750'

9800'

9850'

9395'

92.34°

270.32°

6754.84'

2964.25'

9490'

92.10°

271.11°

6751.16'

3059.10'

9584'

89.66°

270.02°

6749.72'

3153.02'

9679'

90.86°

271.04°

6749.29'

3247.96'

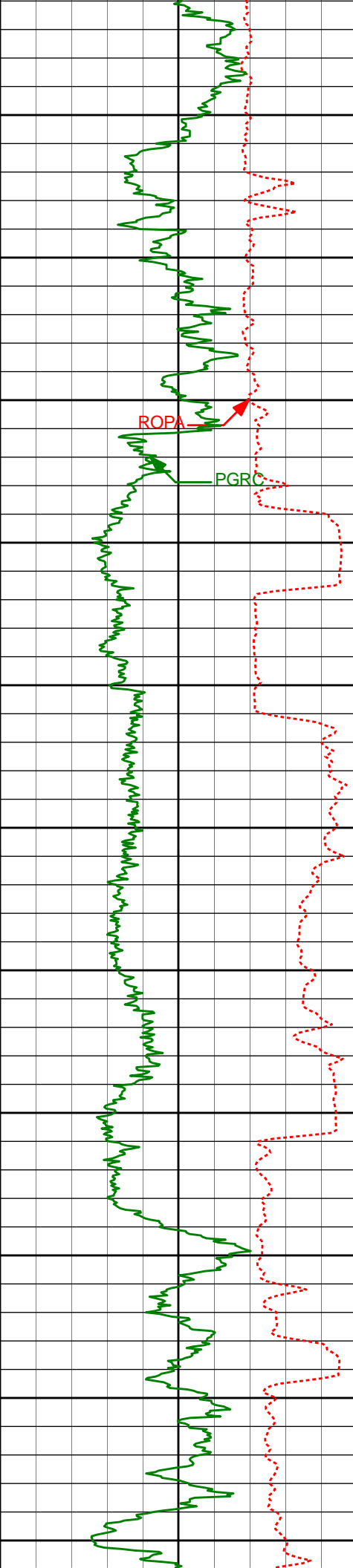
9774'

88.06°

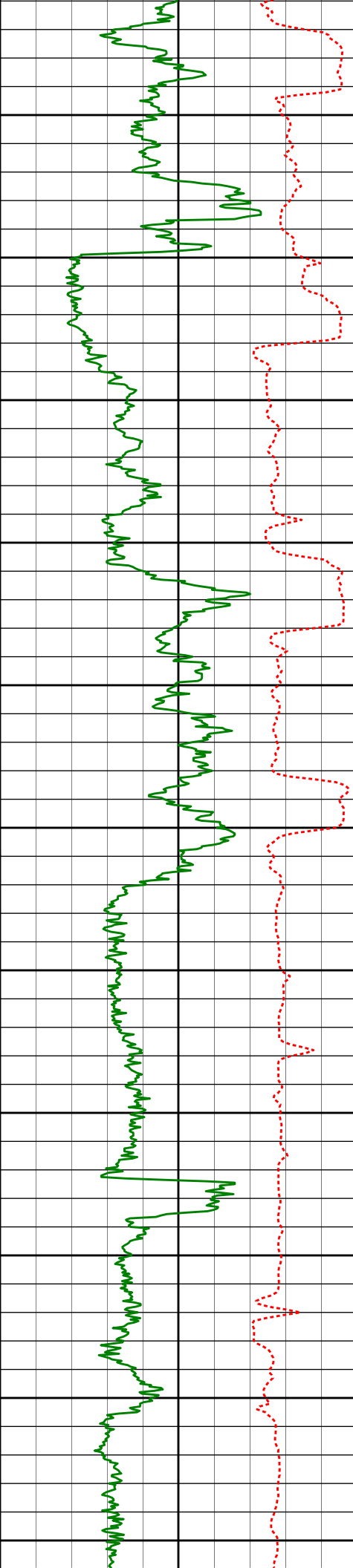
269.23°

6750.18'

3342.91'



9868'	87.23°	267.97°	6754.04'	3436.82'
9900'				
9950'				
9963'	86.67°	266.32°	6759.10'	3531.66'
10000'				
10050'				
10058'	87.38°	266.30°	6764.03'	3626.46'
10100'				
10150'				
10152'	89.41°	266.71°	6766.66'	3720.36'
10200'				
10250'				
10247'	90.15°	268.44°	6767.03'	3815.34'
10300'				
10350'				
10341'	91.08°	269.00°	6766.02'	3909.33'
10400'				



10433'

10450'

10500'

10525'

10550'

10600'

10650'

10700'

10750'

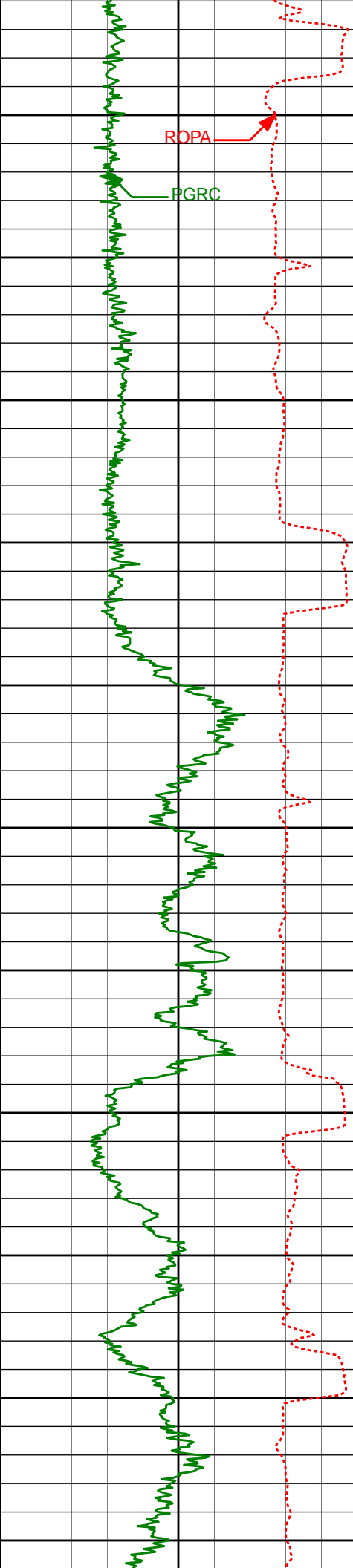
10800'

10850'

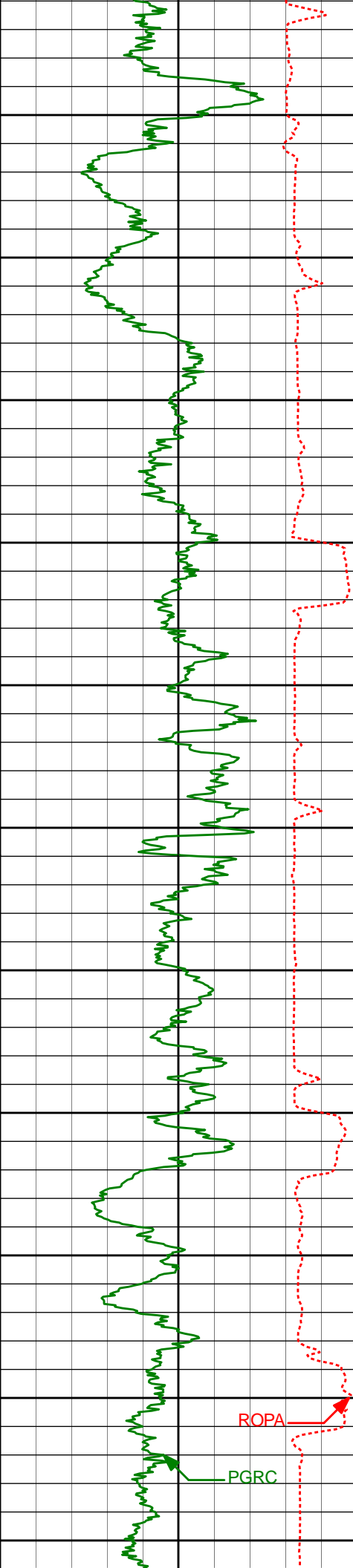
10900'

10950'

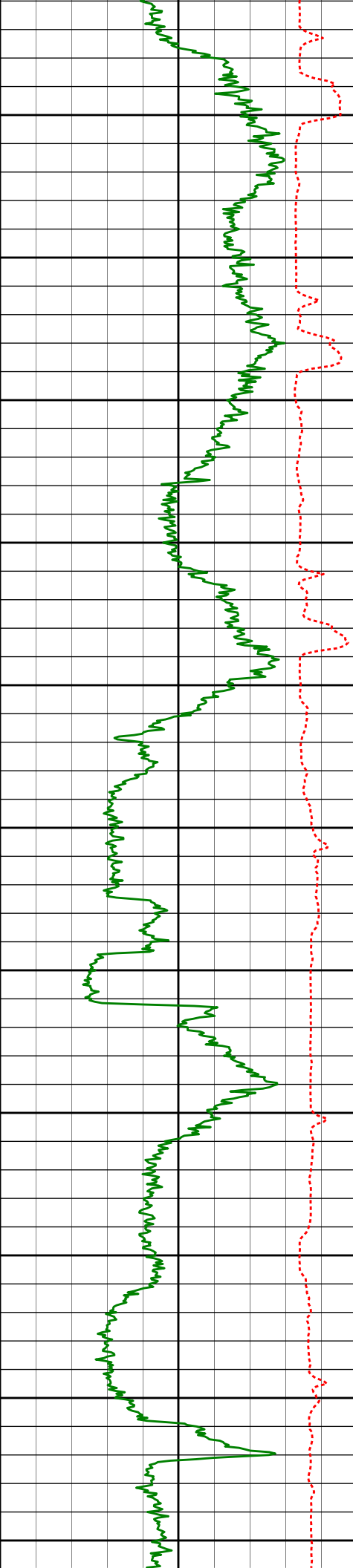
10433'	91.36°	270.32°	6764.06'	4001.29'
10525'	91.76°	271.00°	6761.55'	4093.19'
10618'	90.28°	271.42°	6759.90'	4186.07'
10711'	89.38°	270.89°	6760.18'	4278.97'
10804'	88.98°	269.92°	6761.51'	4371.91'
10896'	88.27°	268.02°	6763.71'	4463.88'



10989'	89.72°	268.11°	6765.35'	4556.86'
11000'				
11050'				
11081'	89.23°	266.33°	6766.19'	4648.83'
11100'				
11150'				
11173'	90.68°	269.22°	6766.26'	4740.81'
11200'				
11250'				
11266'	91.79°	268.34°	6764.26'	4833.78'
11300'				
11350'				
11359'	90.71°	268.93°	6762.23'	4926.76'
11400'				
11450'				
11453'	90.25°	269.83°	6761.44'	5020.74'
11500'				



11550'	11544'	90.49°	268.77°	6760.85'	5111.73'
11600'					
11650'	11638'	91.36°	268.31°	6759.33'	5205.72'
11700'					
11750'	11732'	89.78°	268.86°	6758.40'	5299.71'
11800'					
11850'	11825'	90.37°	267.63°	6758.28'	5392.71'
11900'					
11950'	11917'	91.08°	268.88°	6757.11'	5484.70'
12000'	12009'	90.03°	269.47°	6756.22'	5576.68'
12050'					



12100'

12150'

12200'

12250'

12300'

12350'

12400'

12450'

12500'

12550'

12600'

12101'

12196'

12291'

12385'

12480'

12575'

89.57°

87.97°

89.41°

88.80°

89.51°

89.14°

269.89°

270.19°

269.49°

268.25°

268.01°

267.33°

6756.54'

6758.58'

6760.76'

6762.22'

6763.62'

6764.74'

5668.67'

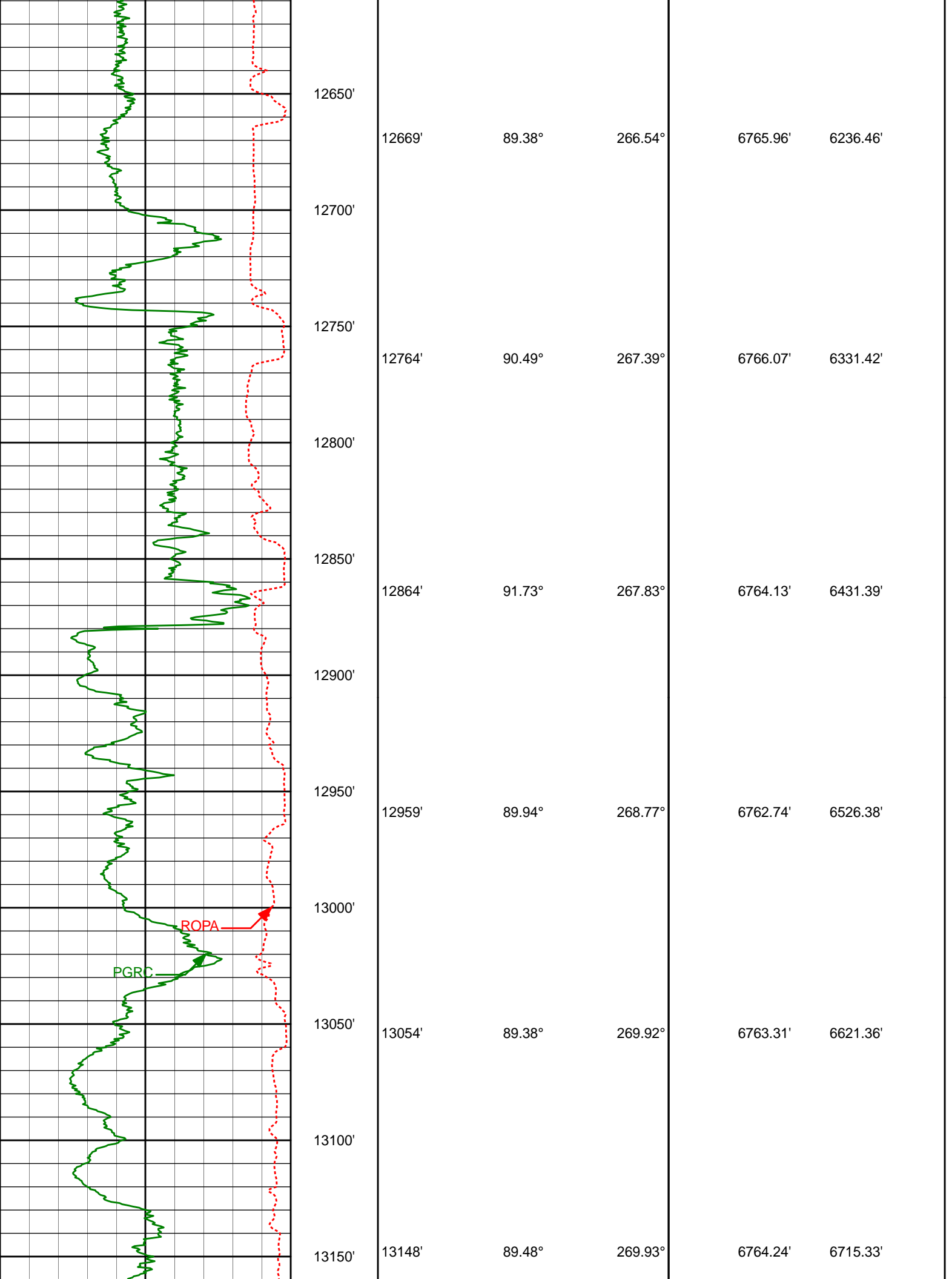
5763.61'

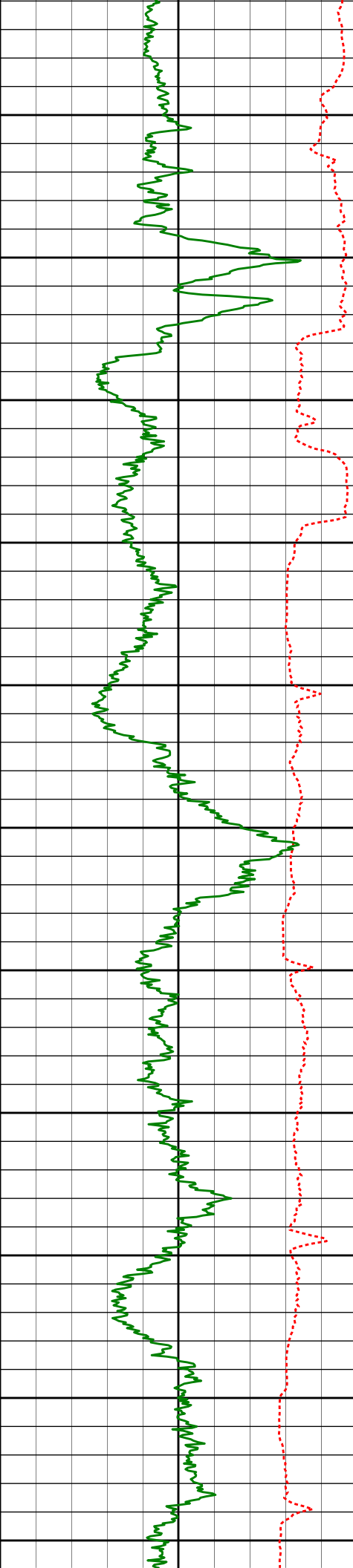
5858.55'

5952.54'

6047.52'

6142.51'





Run 300

13200'

13250'

13300'

13338'

88.67°

270.25°

6764.30'

6905.23'

13350'

13400'

13433'

88.27°

269.68°

6766.84'

7000.17'

13450'

13500'

13528'

88.15°

269.08°

6769.81'

7095.11'

13550'

13600'

13623'

88.34°

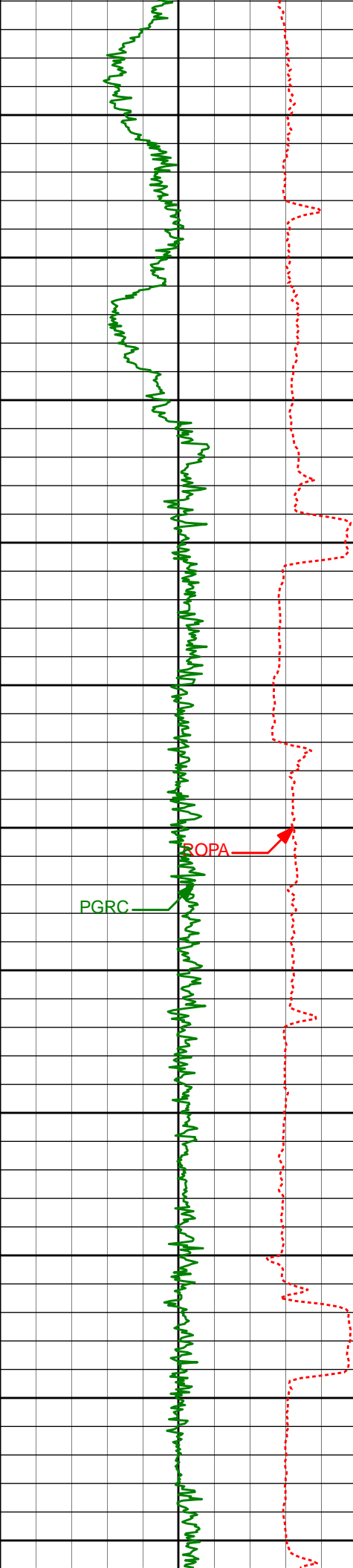
268.91°

6772.71'

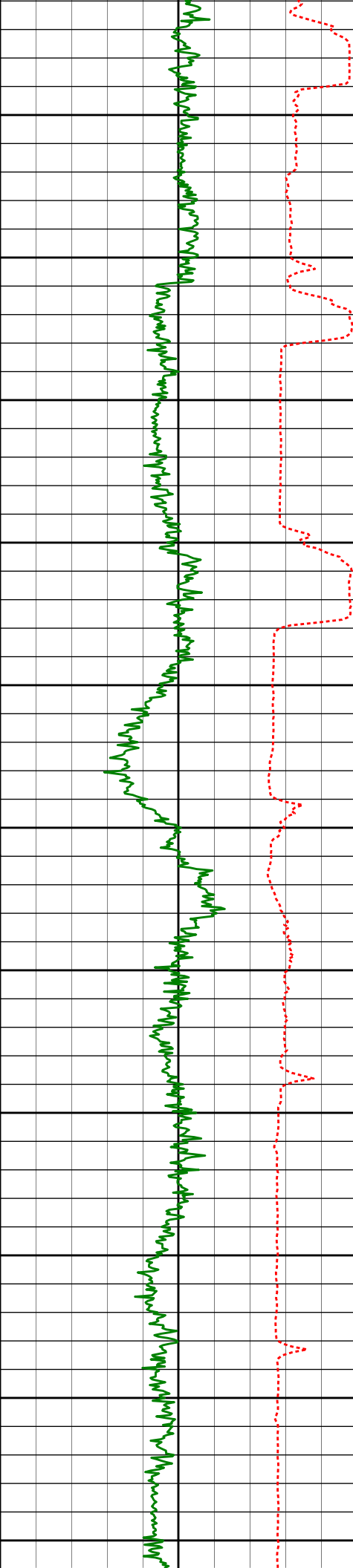
7190.06'

13650'

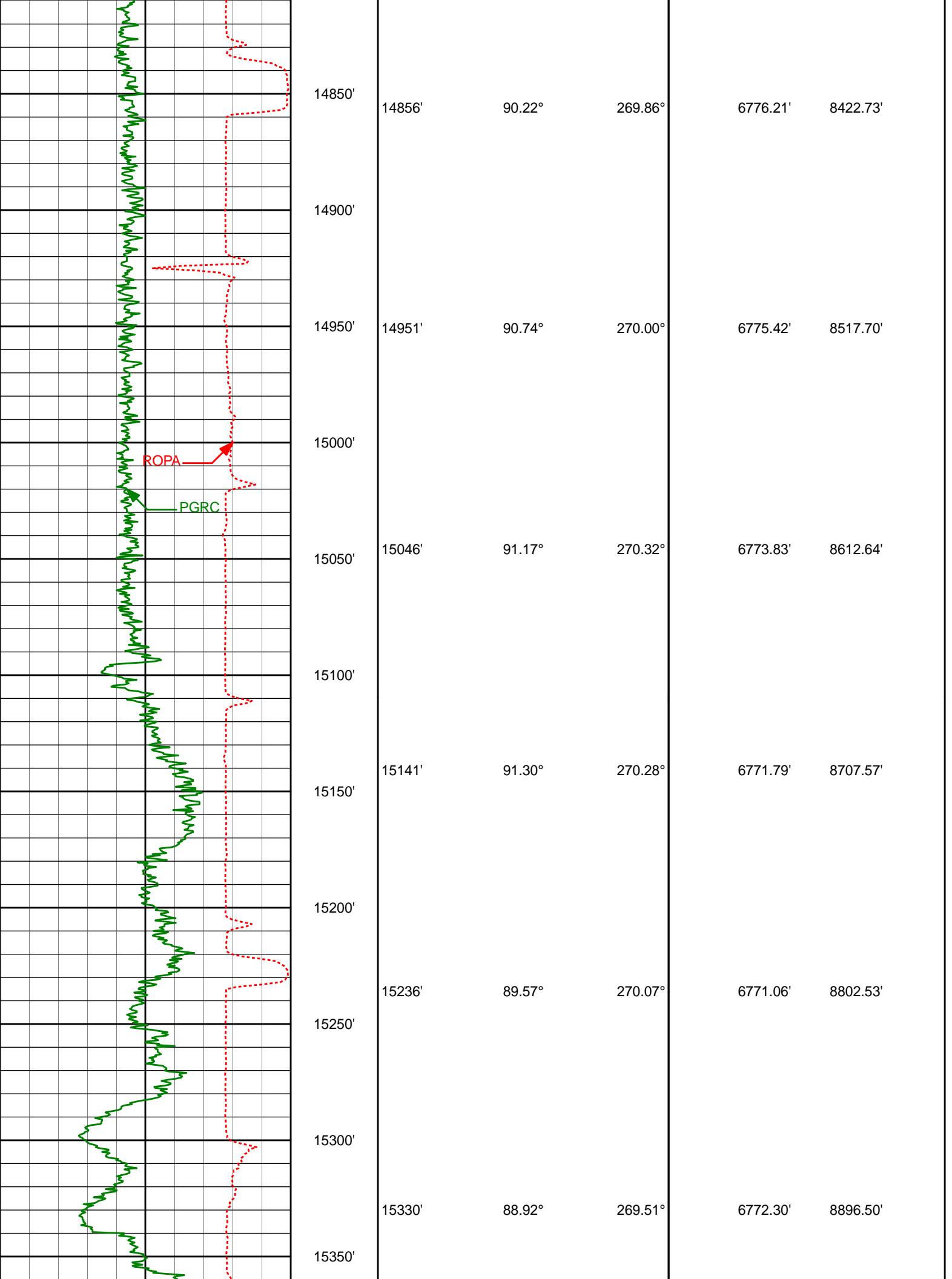
13700'

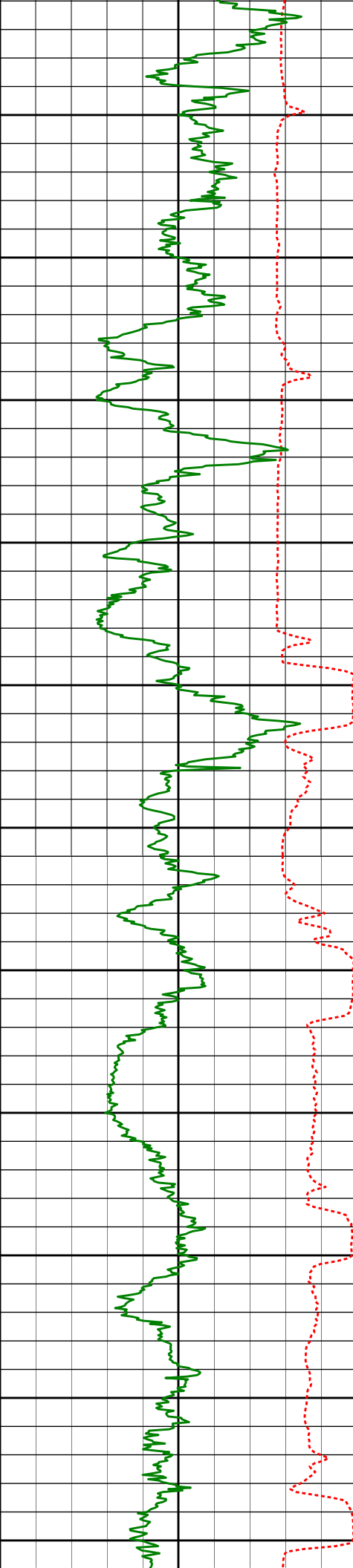


13750'	13717'	88.98°	268.42°	6774.91'	7284.03'
13800'	13812'	90.18°	268.13°	6775.61'	7379.03'
13850'					
13900'	13907'	90.25°	268.62°	6775.25'	7474.03'
13950'					
14000'	14002'	90.06°	267.02°	6775.00'	7569.02'
14050'					
14100'	14097'	89.75°	265.62°	6775.15'	7663.94'
14150'					
14200'	14192'	89.38°	266.77°	6775.87'	7758.86'
14250'					



14287'	89.20°	267.81°	6777.05'	7853.83'
14300'				
14350'				
14382'	89.35°	267.83°	6778.25'	7948.82'
14400'				
14450'				
14477'	91.11°	270.62°	6777.87'	8043.79'
14500'				
14550'				
14572'	90.56°	269.67°	6776.49'	8138.75'
14600'				
14650'				
14666'	89.78°	268.54°	6776.21'	8232.74'
14700'				
14750'				
14762'	90.00°	267.73°	6776.39'	8328.73'
14800'				





15400'

15425'

87.97°

268.92°

6774.88'

8991.45'

15450'

15500'

15520'

86.98°

268.12°

6779.07'

9086.36'

15550'

15600'

15615'

86.85°

268.56°

6784.18'

9181.22'

15650'

15700'

15710'

88.46°

268.23°

6788.07'

9276.14'

15750'

15800'

15805'

91.94°

269.03°

6787.74'

9371.12'

15850'

15900'

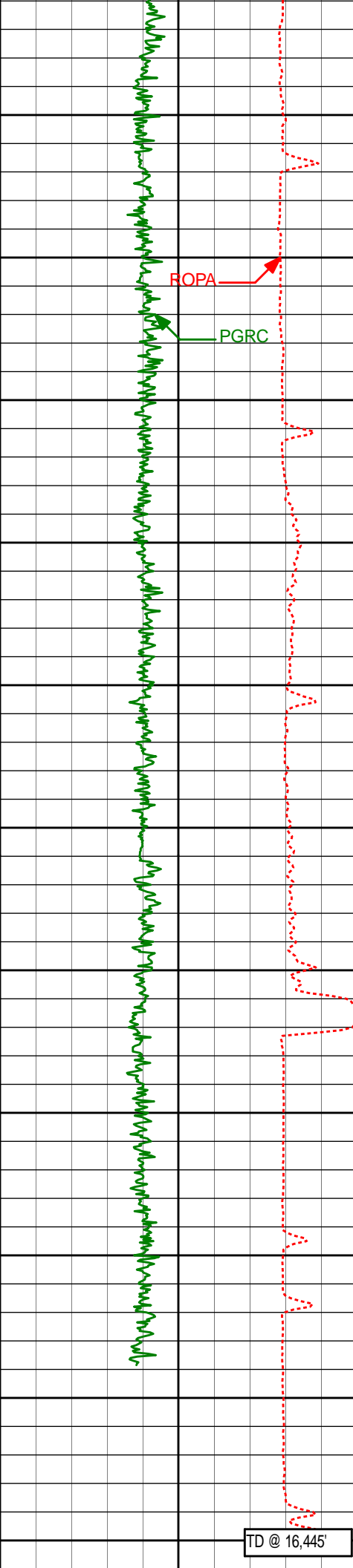
15900'

90.31°

268.15°

6785.87'

9466.10'



15950'

16000'

16050'

16100'

16150'

16200'

16250'

16300'

16350'

16400'

16450'

15995'

16089'

16184'

16279'

16380'

16445'

90.31°

89.91°

89.91°

89.32°

89.32°

89.32°

268.23°

266.94°

265.83°

265.97°

264.73°

264.73°

6785.36'

6785.18'

6785.32'

6785.96'

6787.16'

6787.93'

9561.10'

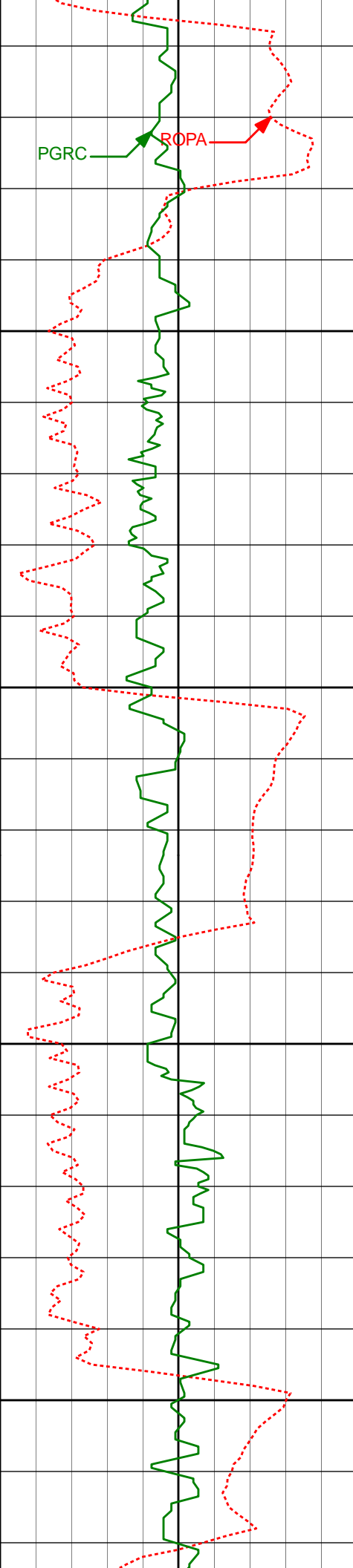
9655.08'

9750.01'

9844.91'

9945.75'

10010.60'



3150'

3200'

3250'

3300'

3149'

3244'

4.55°

2.16°

229.33°

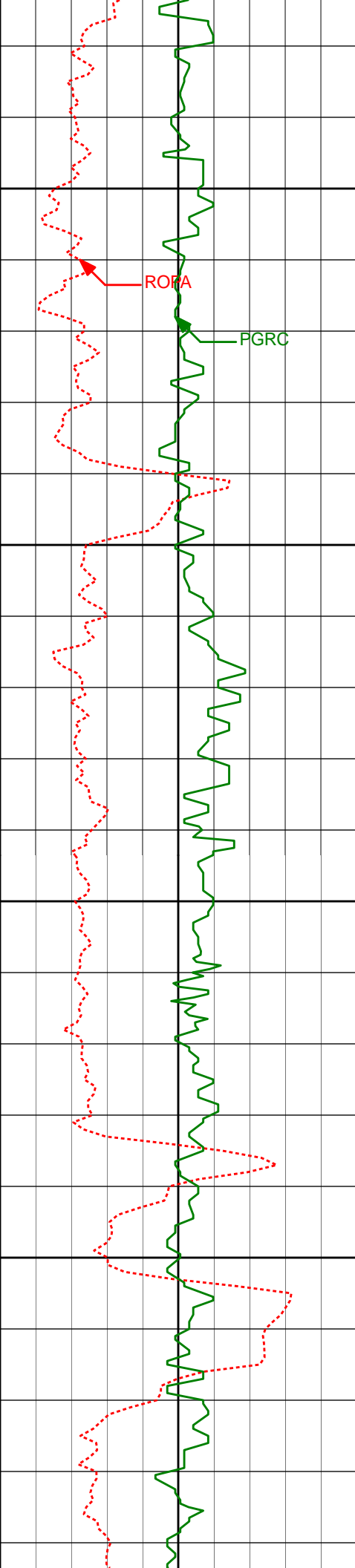
240.59°

3146.36'

3241.19'

50.66'

55.16'



3350'

3400'

3450'

3500'

3339'

0.44°

15.56°

3336.17'

56.64'

3434'

1.55°

39.41°

3431.15'

55.69'

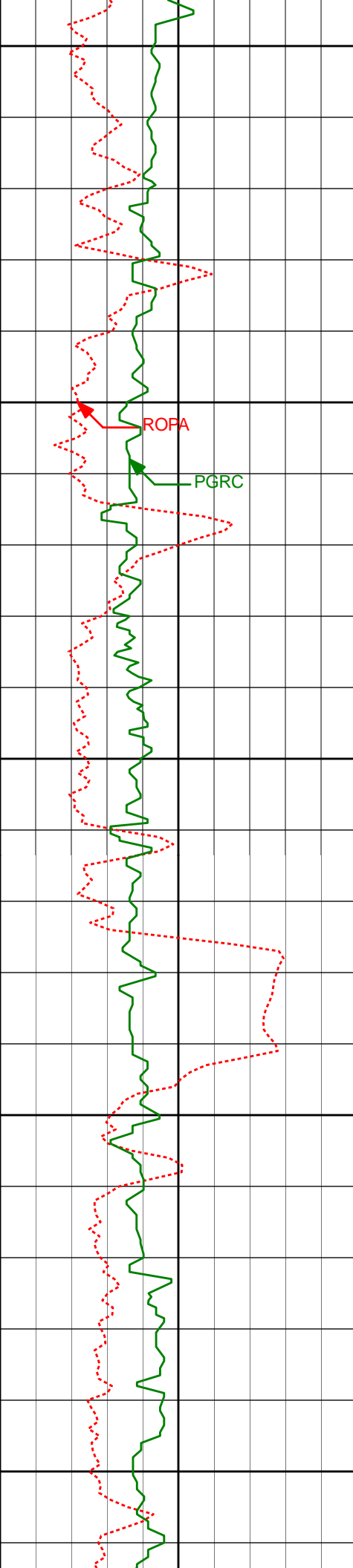
3528'

1.21°

53.03°

3525.12'

54.05'



3550'

3600'

3650'

3700'

3750'

ROPA

PGRC

3623'

1.19°

23.10°

3620.10'

52.82'

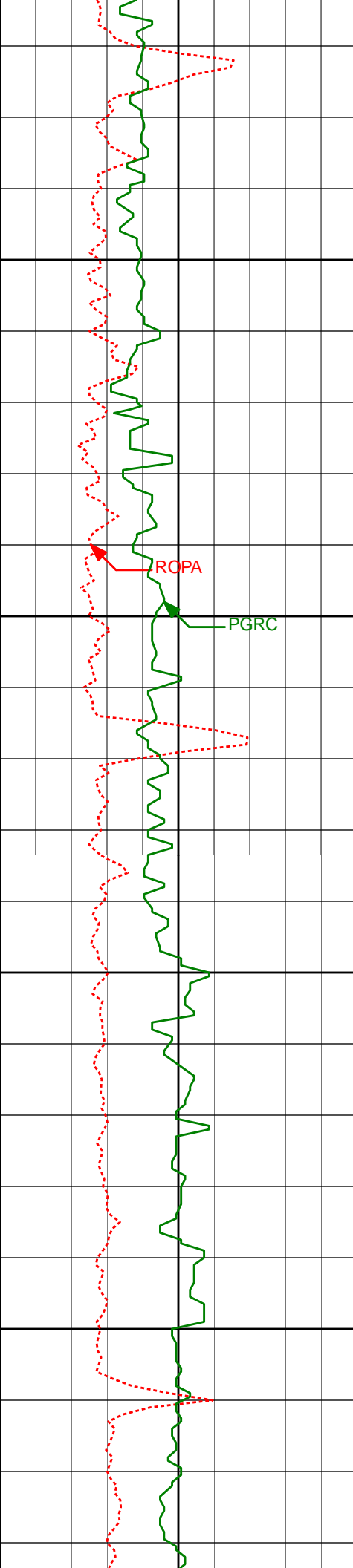
3717'

0.50°

48.41°

3714.09'

52.10'



3800'

3812'

0.80°

48.45°

3809.09'

51.28'

ROPA

PGRC

3850'

3900'

3907'

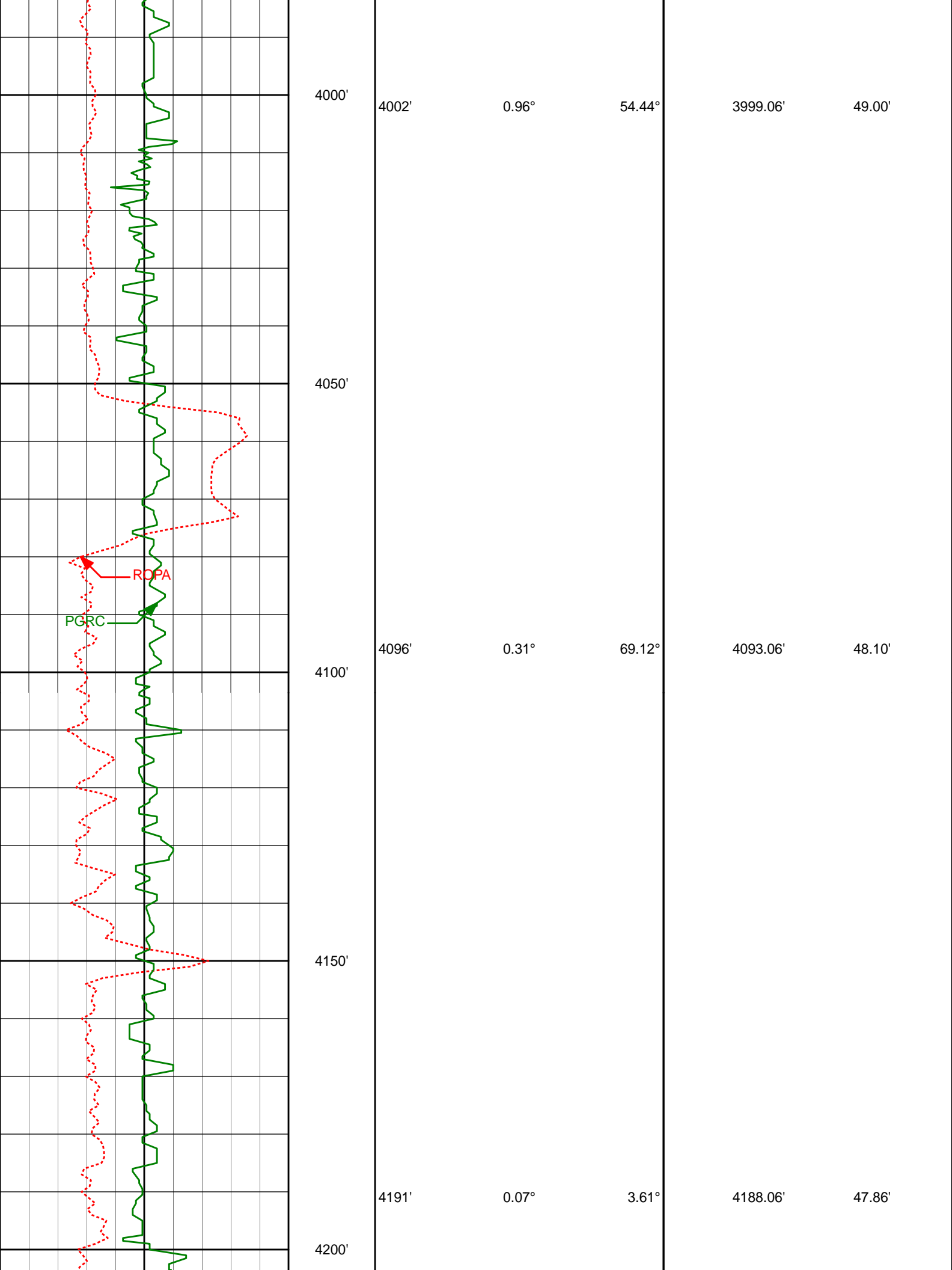
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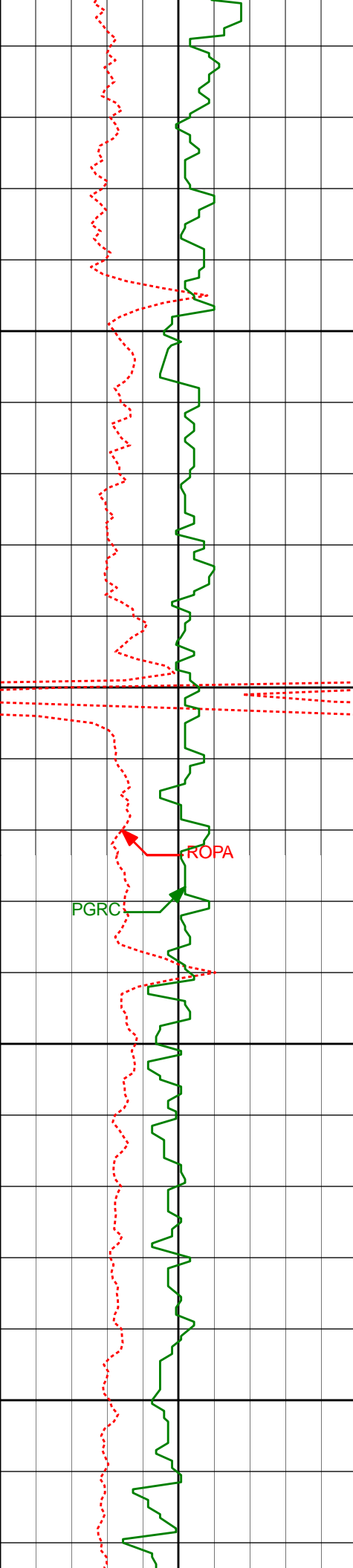
41.76°

3904.08'

50.21'

3950'





4250'

4285'

0.57°

224.45°

4282.05'

48.19'

4300'

PGRC

ROPA

4350'

4379'

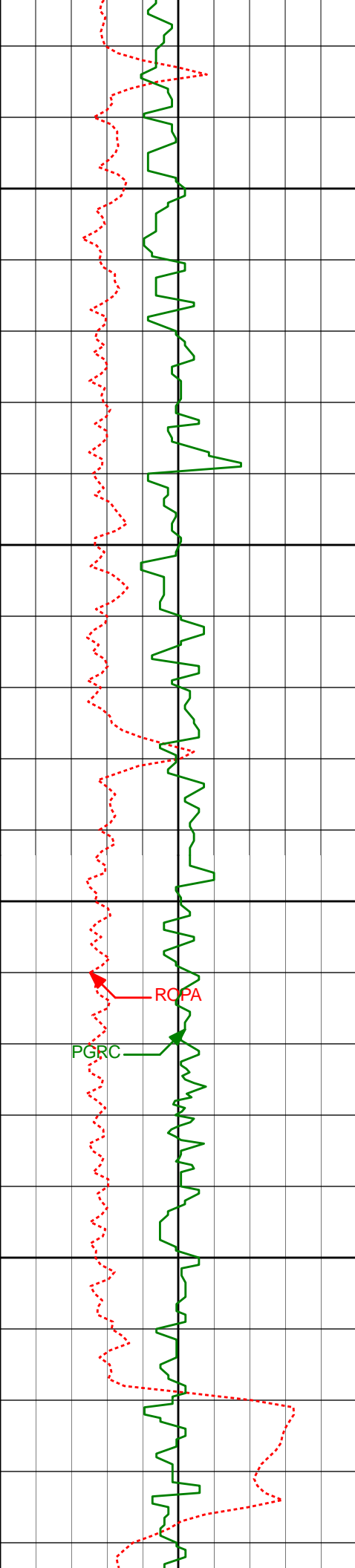
0.58°

305.22°

4376.05'

48.90'

4400'



4450'

4473'

0.57°

341.69°

4470.05'

49.42'

4500'

4550'

4568'

0.54°

357.66°

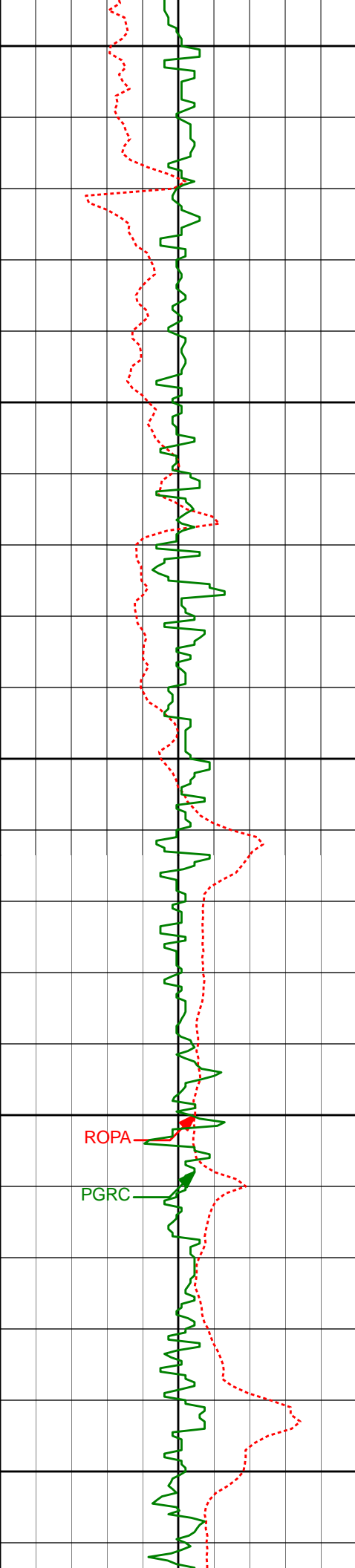
4565.04'

49.57'

4600'

RCPA

PGRC



4650'

4662'

0.41°

223.83°

4659.04'

49.81'

4700'

4750'

4757'

0.22°

209.73°

4754.04'

50.15'

4800'

ROPA

PGRC

4850'

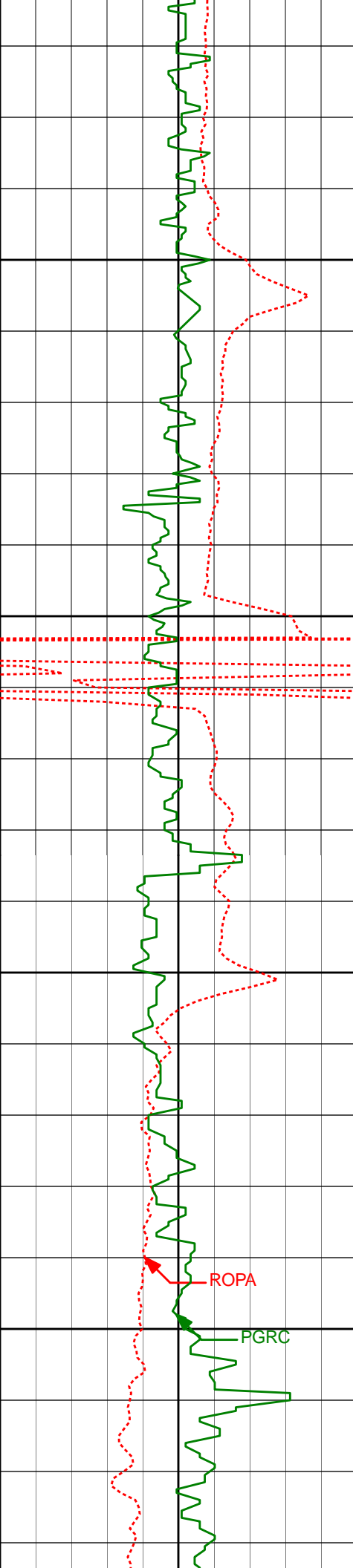
4852'

0.13°

132.66°

4849.04'

50.16'



4900'

4950'

5000'

5050'

4946'

0.03°

122.19°

4943.04'

50.07'

5041'

0.14°

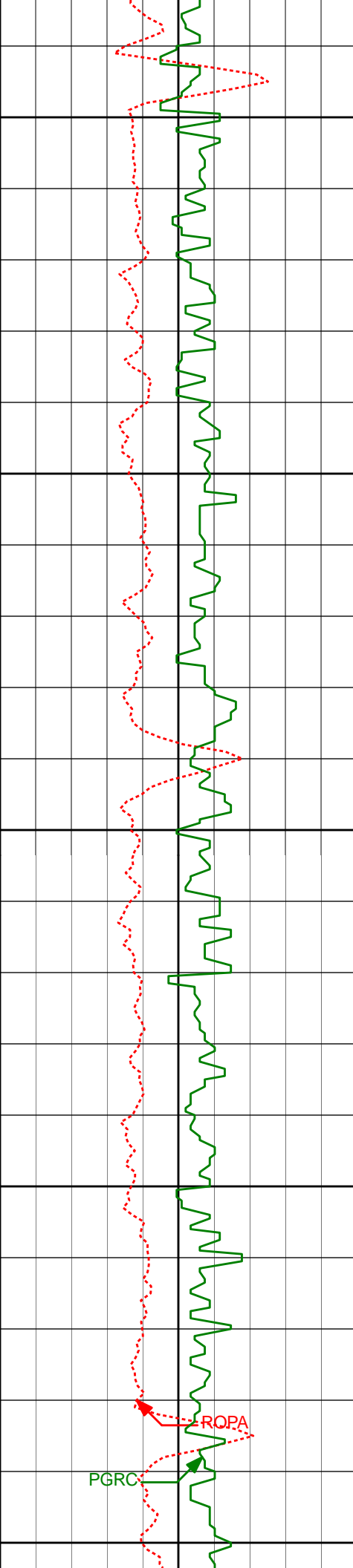
74.47°

5038.04'

49.93'

ROPA

PGRC



5100'

5136'

0.47°

307.33°

5133.04'

50.12'

5150'

5200'

5231'

0.57°

273.44°

5228.03'

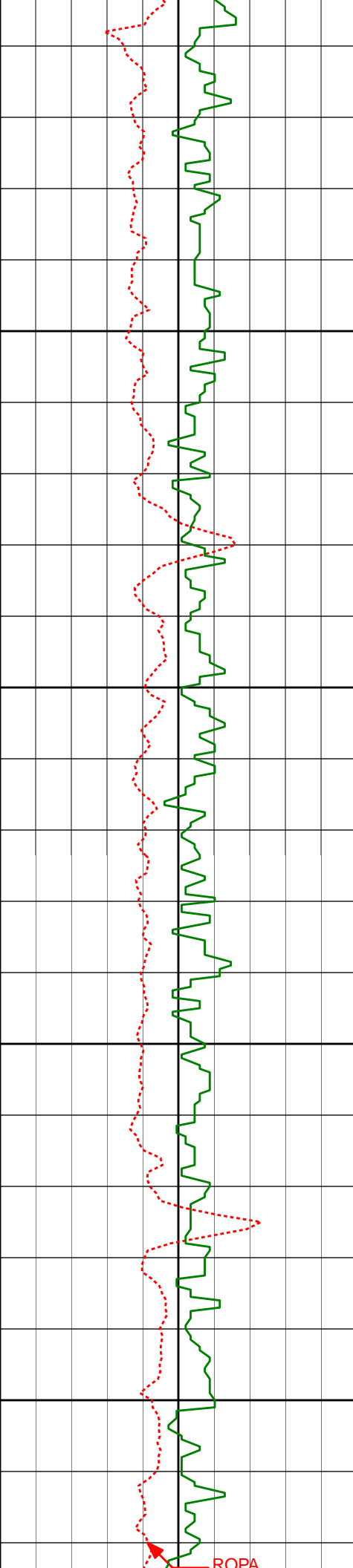
50.90'

5250'

5300'

PGRC

ROPA



5350'

5400'

5450'

5500'

5326'

0.33°

289.30°

5323.03'

51.63'

5421'

0.41°

238.25°

5418.03'

52.18'

5515'

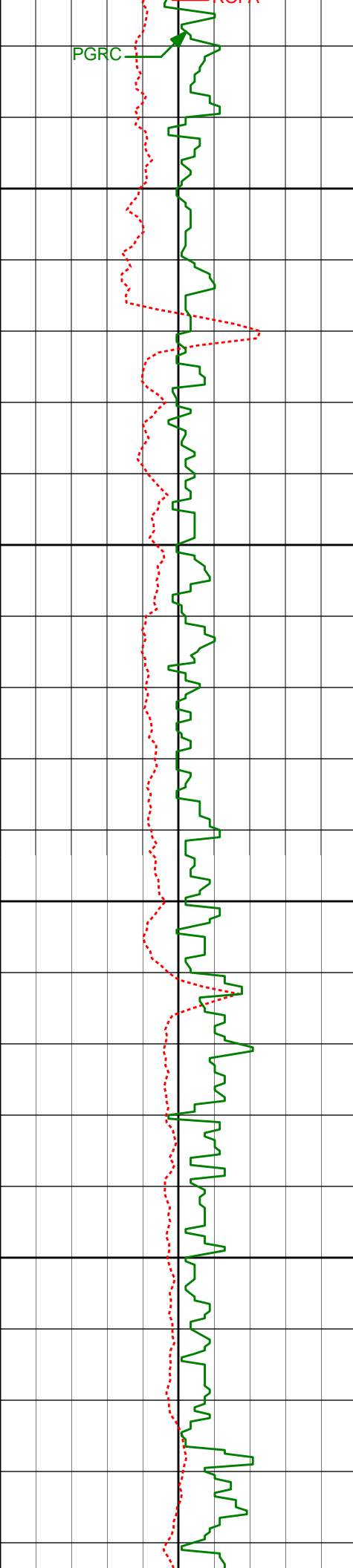
0.41°

110.85°

5512.03'

52.15'

ROPA



5550'

5600'

5650'

5700'

5610'

0.98°

88.41°

5607.02'

51.03'

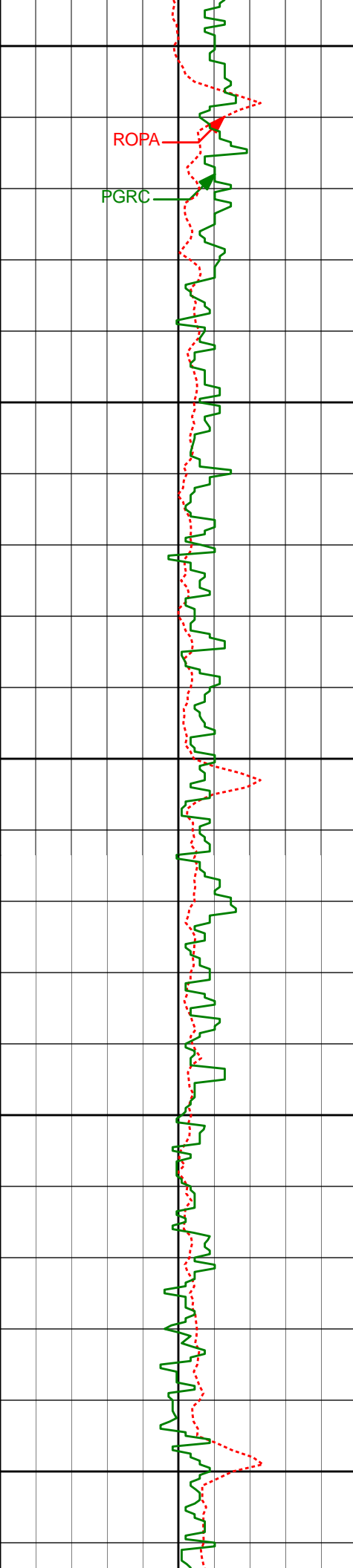
5705'

0.86°

89.95°

5702.01'

49.50'



ROPA

PGRC

5750'

5800'

5850'

5900'

5950'

5799'

0.68°

90.74°

5796.00'

48.24'

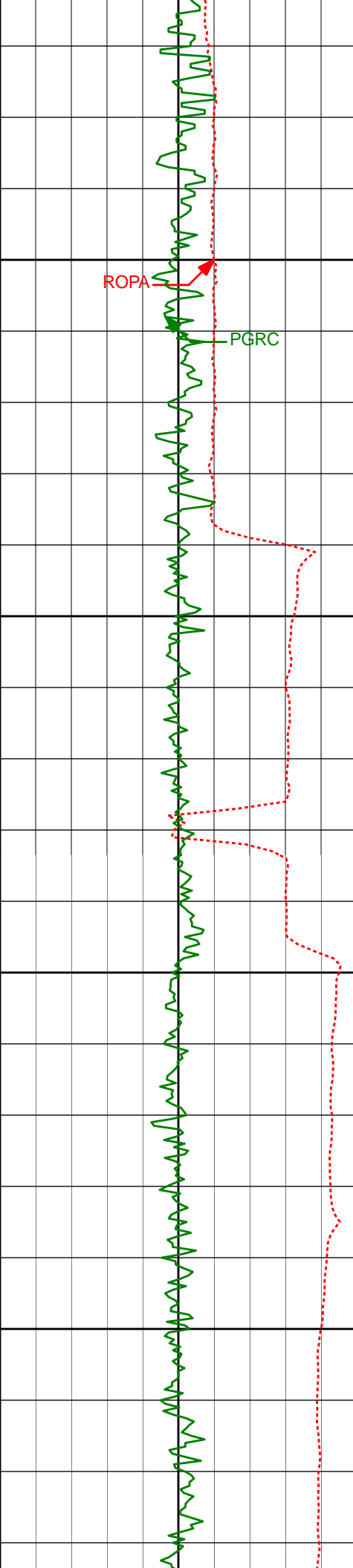
5894'

0.26°

111.28°

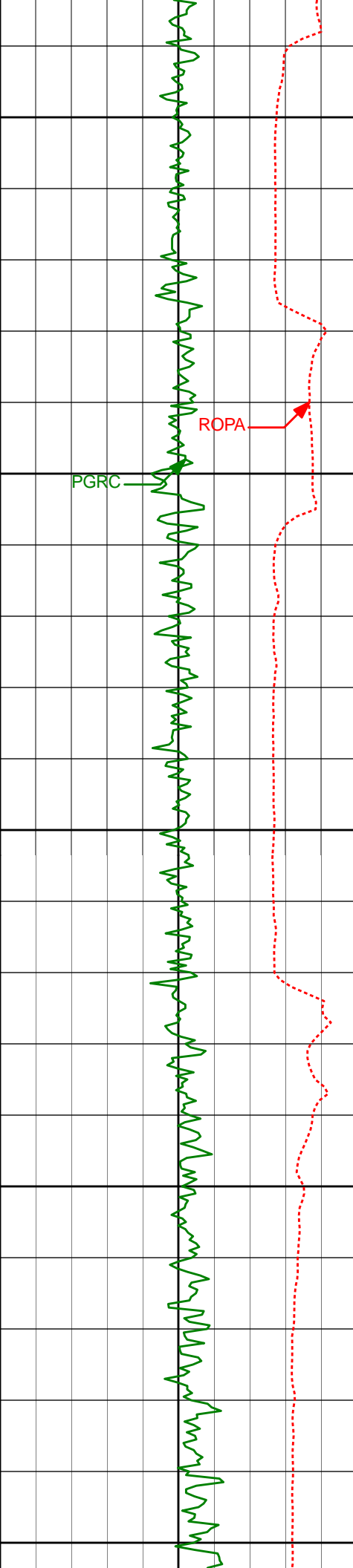
5891.00'

47.48'



Run200

5989'	0.17°	45.15°	5986.00'	47.18'
6000'				
6050'				
6083'	0.13°	175.67°	6080.00'	47.07'
6100'				
6150'				
6178'	9.76°	256.13°	6174.54'	54.95'



6200'

6250'

6300'

6350'

6400'

ROPA

PGRC

6273'

12.28°

265.61°

6267.78'

72.91'

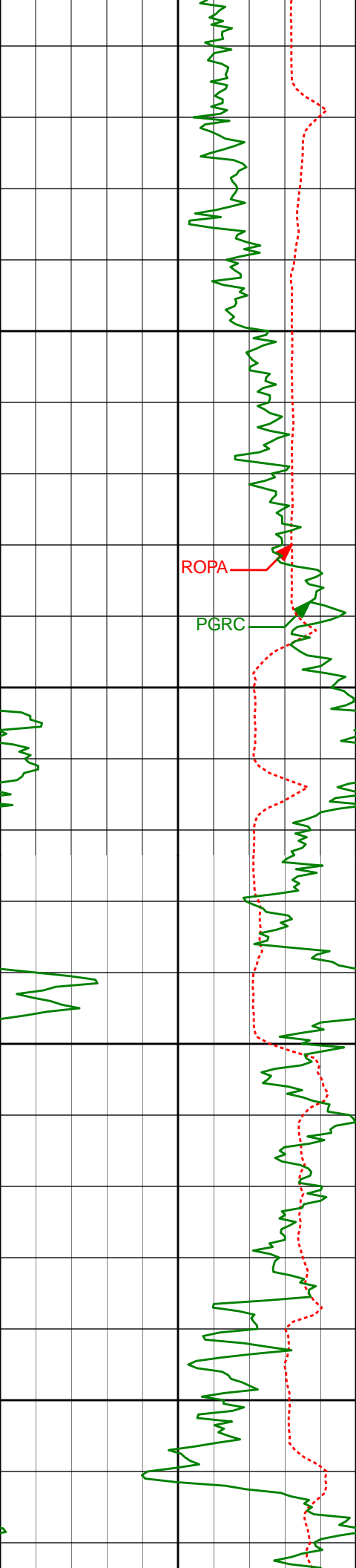
6368'

15.20°

260.76°

6360.06'

95.34'



6450'

6463'

32.79°

266.30°

6446.52'

133.69'

6500'

6550'

6557'

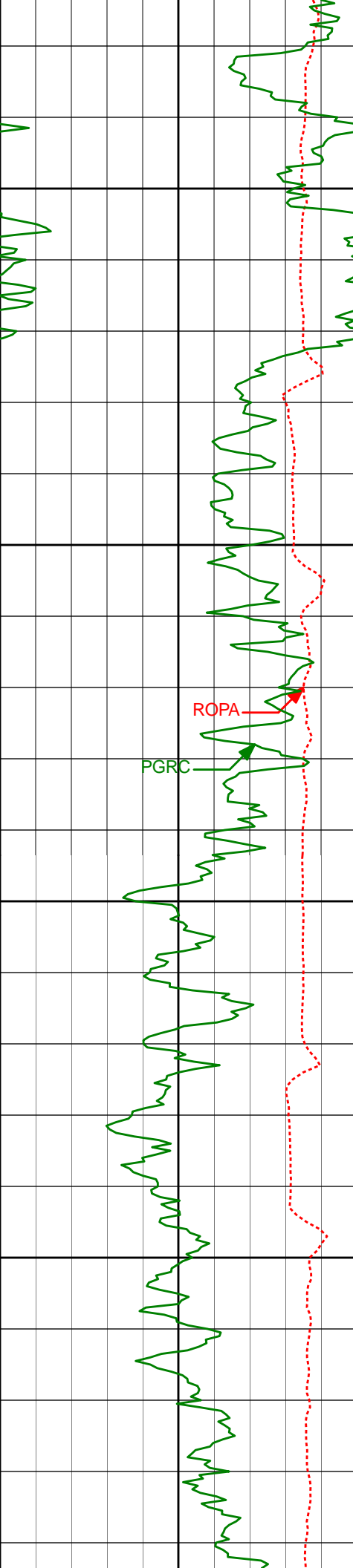
38.45°

267.78°

6522.90'

188.40'

6600'



6650'

6700'

6750'

6800'

PGRC

ROPA

6652'

48.66°

269.96°

6591.66'

253.76'

6746'

59.80°

269.25°

6646.52'

329.89'

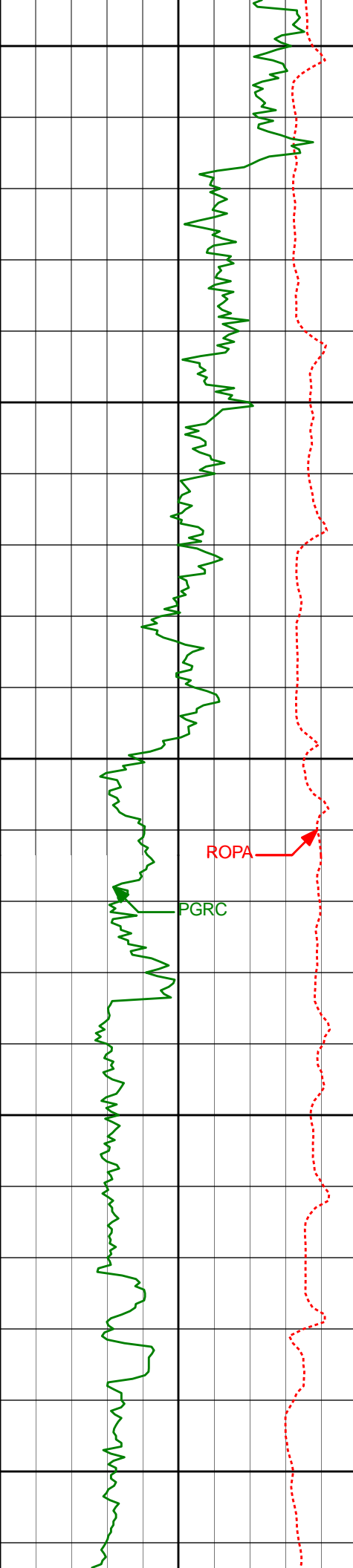
6841'

72.02°

270.07°

6685.23'

416.44'



6850'

6900'

6936'

77.73°

269.91°

6710.00'

508.08'

6950'

ROPA

PGRC

6977'

82.90°

268.43°

6716.90'

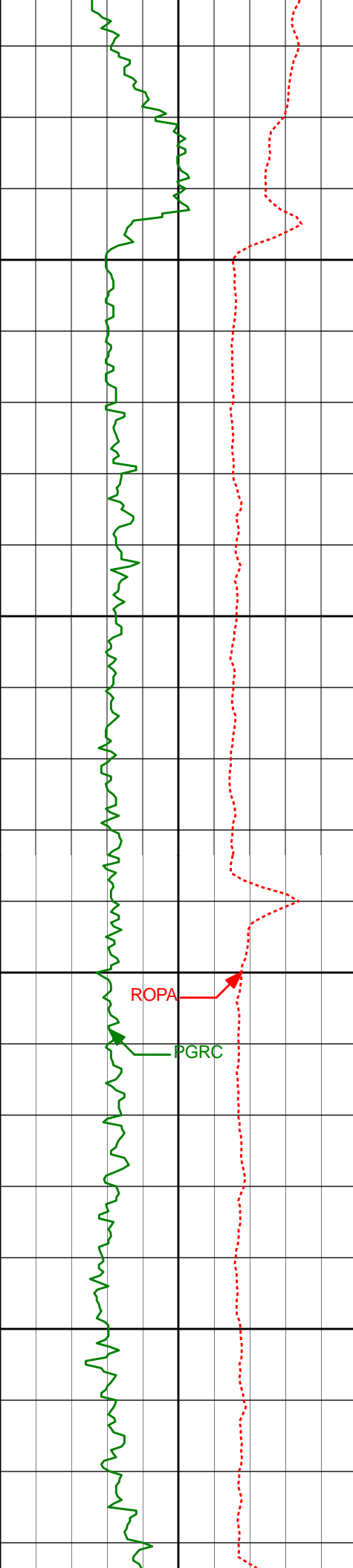
548.48'

7000'

Casing Shoe @ 7018'

Run 300

7050'



7100'

7124'

85.90°

267.11°

6731.24'

694.74'

7150'

7200'

ROPA

PGRC

7219'

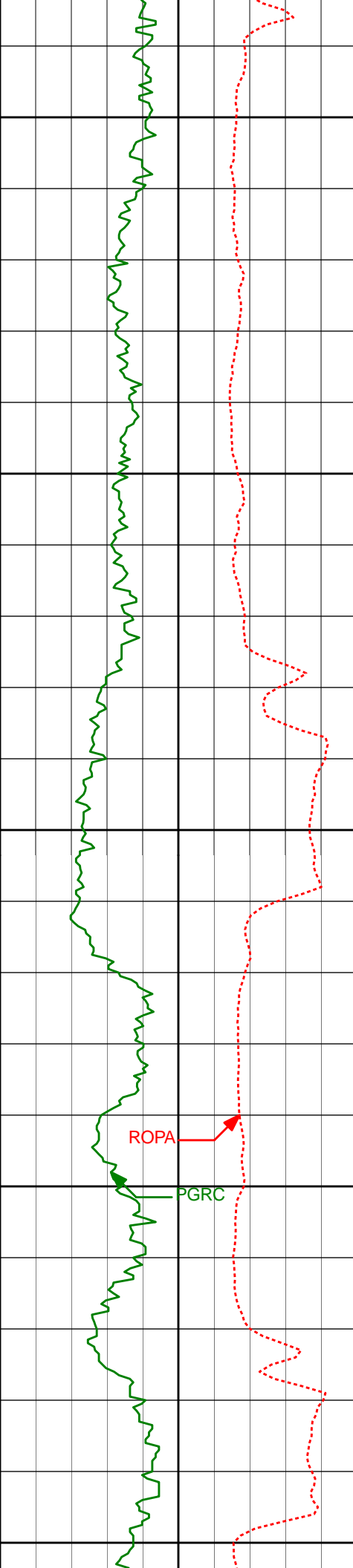
86.73°

267.46°

6737.35'

789.52'

7250'



7300'

7314'

86.24°

266.42°

6743.17'

884.31'

7350'

7400'

7409'

86.64°

267.88°

6749.07'

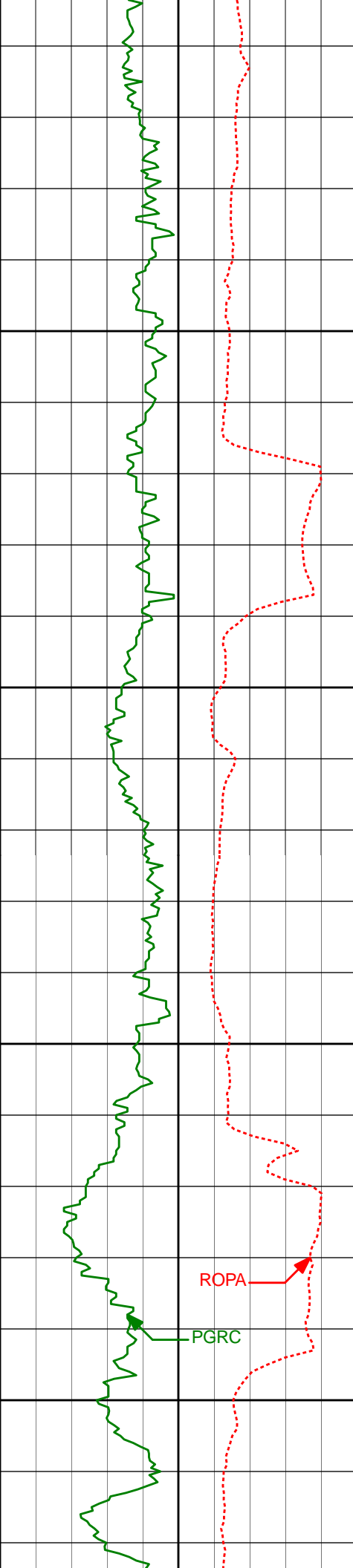
979.09'

7450'

7500'

ROPA

PGRC



7550'

7600'

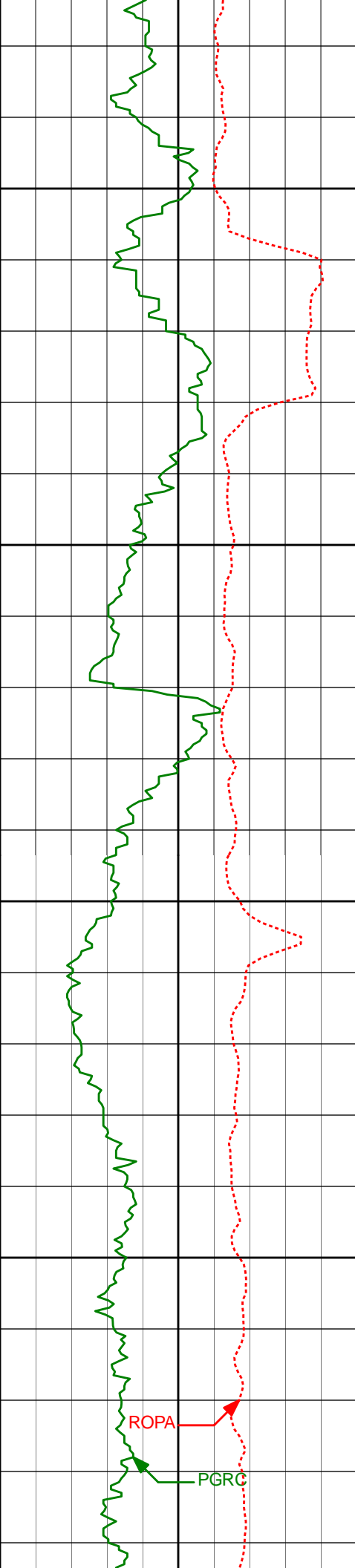
7650'

7700'

ROPA

PGRC

7504'	87.81°	268.44°	6753.67'	1073.98'
7599'	88.77°	266.77°	6756.51'	1168.92'
7694'	90.18°	267.51°	6757.38'	1263.89'



7750'

7788'

91.11°

268.99°

6756.32'

1357.87'

7800'

7850'

7883'

90.22°

267.46°

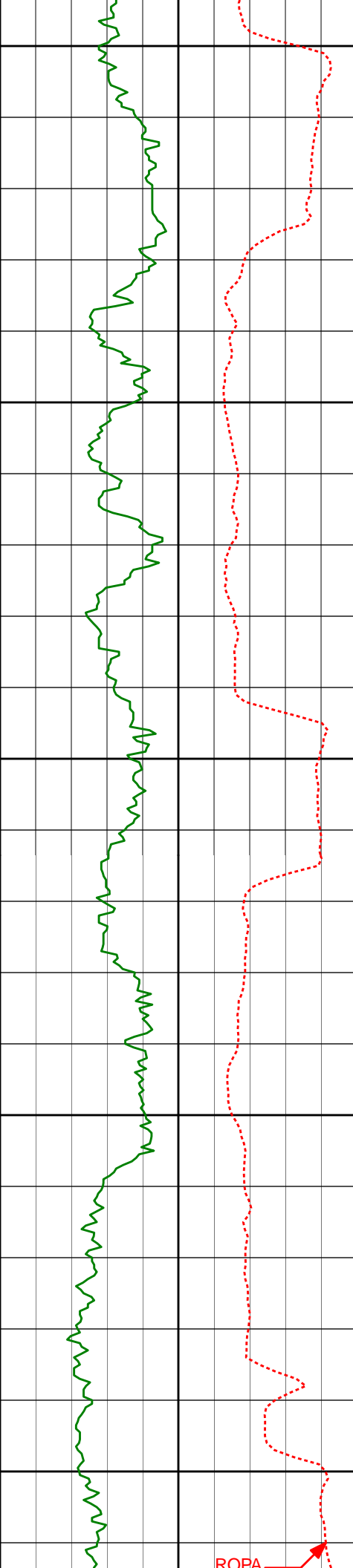
6755.22'

1452.86'

7900'

ROPA

PGRC



7950'

7978'

90.55°

268.14°

6754.58'

1547.85'

8000'

8050'

8073'

91.48°

270.51°

6752.89'

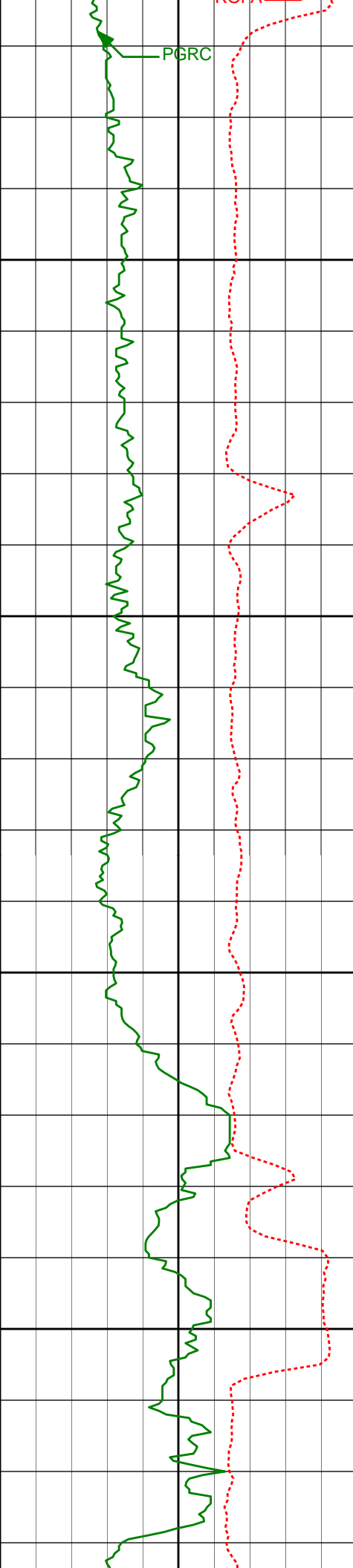
1642.82'

8100'

8150'

ROPA





8200'

8250'

8300'

8350'

8167'

89.88°

270.21°

6751.78'

1736.76'

8262'

90.00°

269.12°

6751.88'

1831.74'

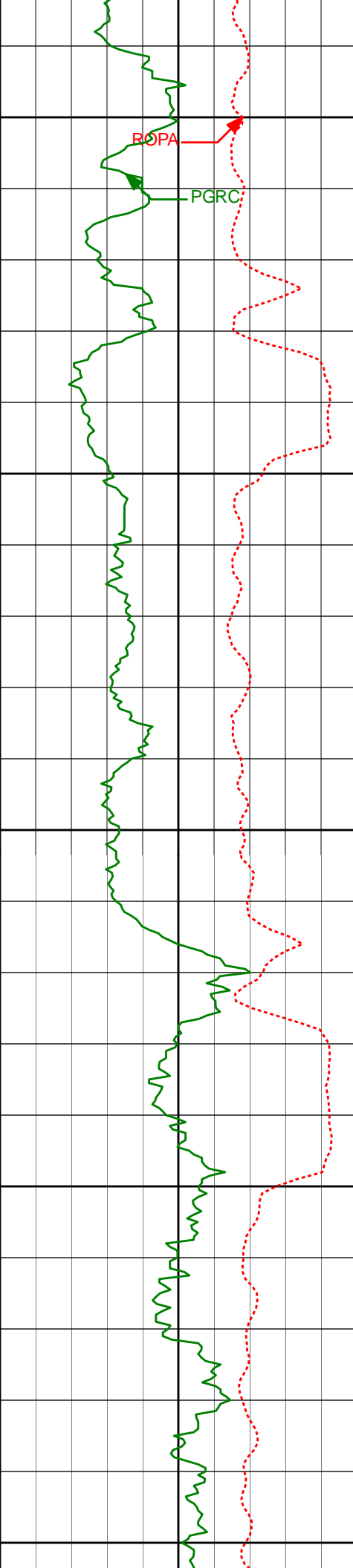
8356'

91.08°

270.00°

6750.99'

1925.72'



8400'

ROPA

PGRC

8450'

8451'

91.63°

270.28°

6748.75'

2020.65'

8500'

8550'

8545'

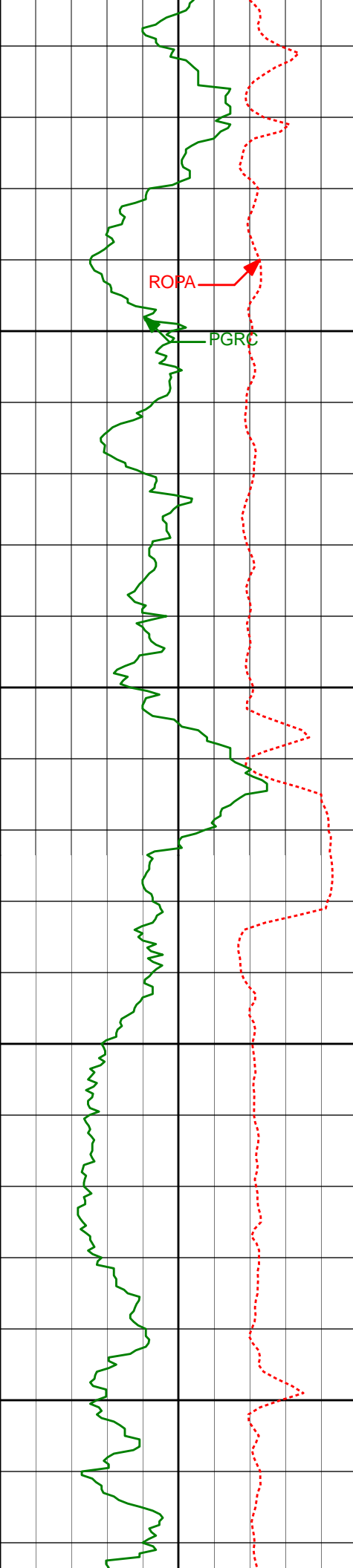
89.91°

270.08°

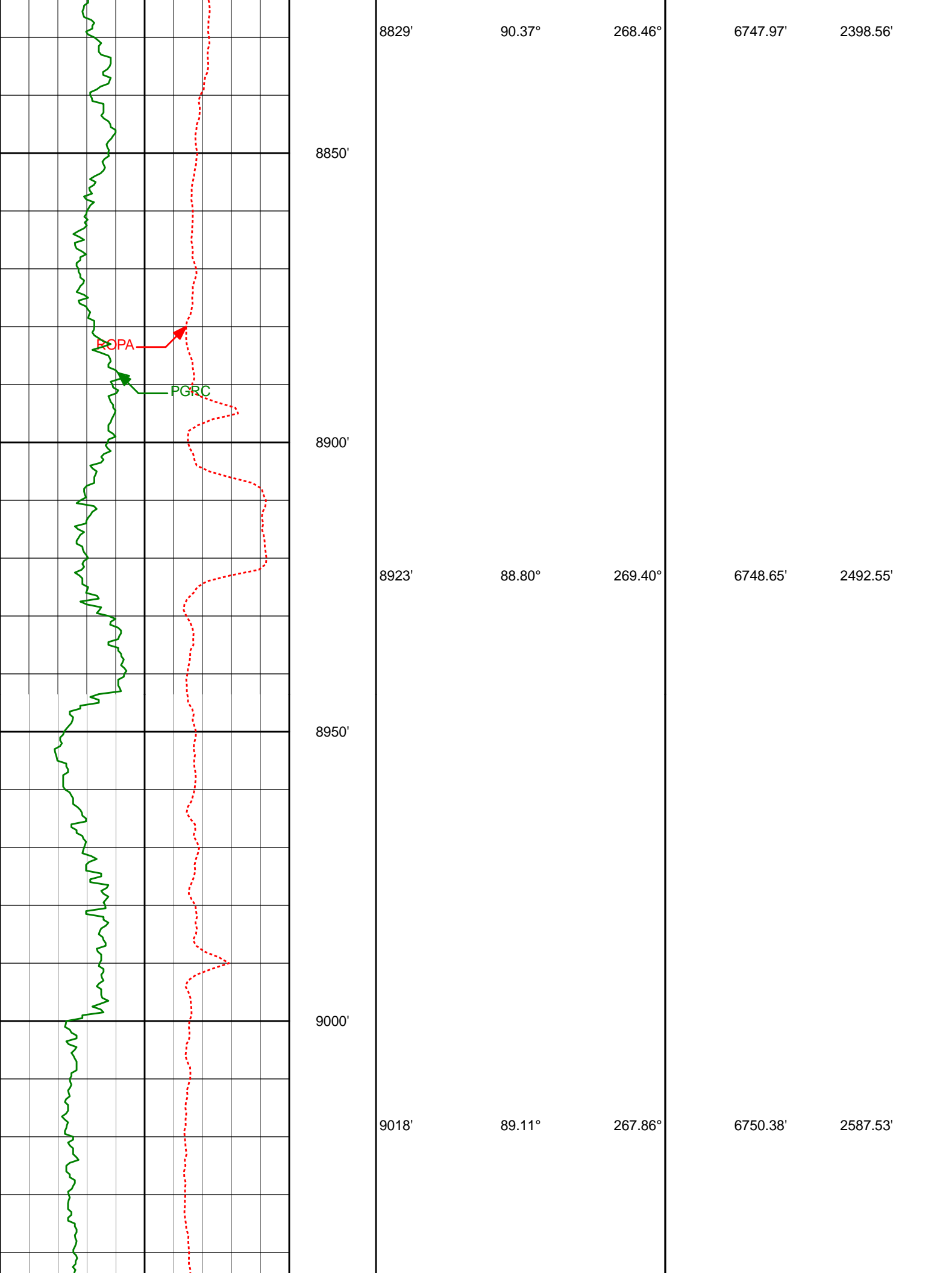
6747.48'

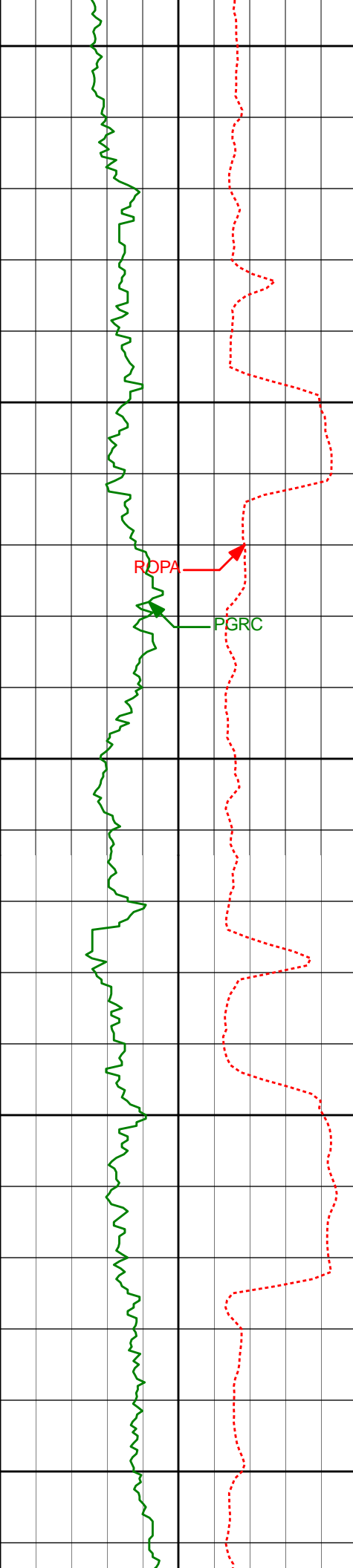
2114.60'

8600'



8639'	90.34°	269.47°	6747.28'	2208.58'
8650'				
8700'				
8734'	89.23°	269.61°	6747.63'	2303.56'
8750'				
8800'				





9050'

9100'

9150'

9200'

9250'

9112'

87.38°

266.77°

6753.26'

2681.46'

RDPA

PGRC

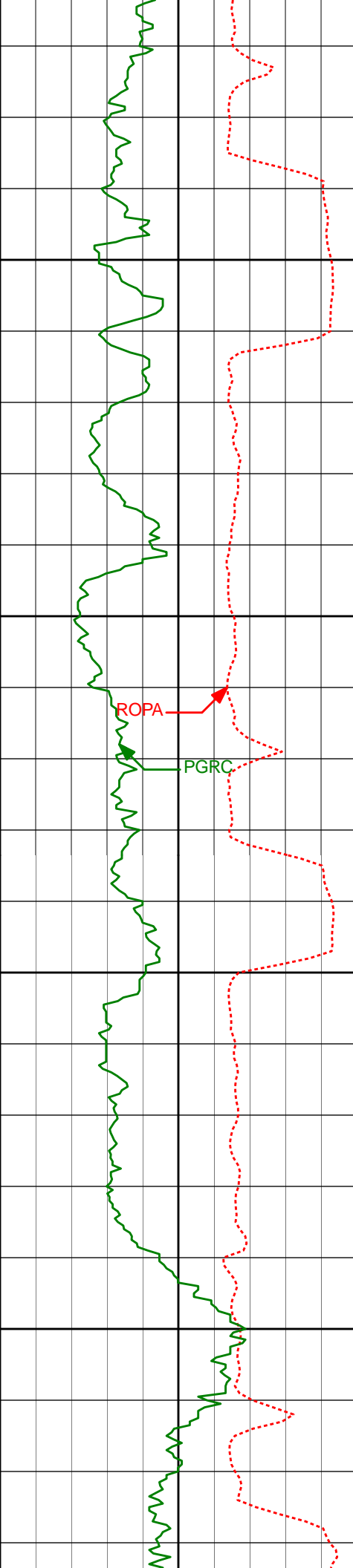
9207'

87.94°

267.05°

6757.14'

2776.34'



9300'

9301'

91.26°

269.18°

6757.79'

2870.32'

9350'

ROPA

PGRC

9400'

9395'

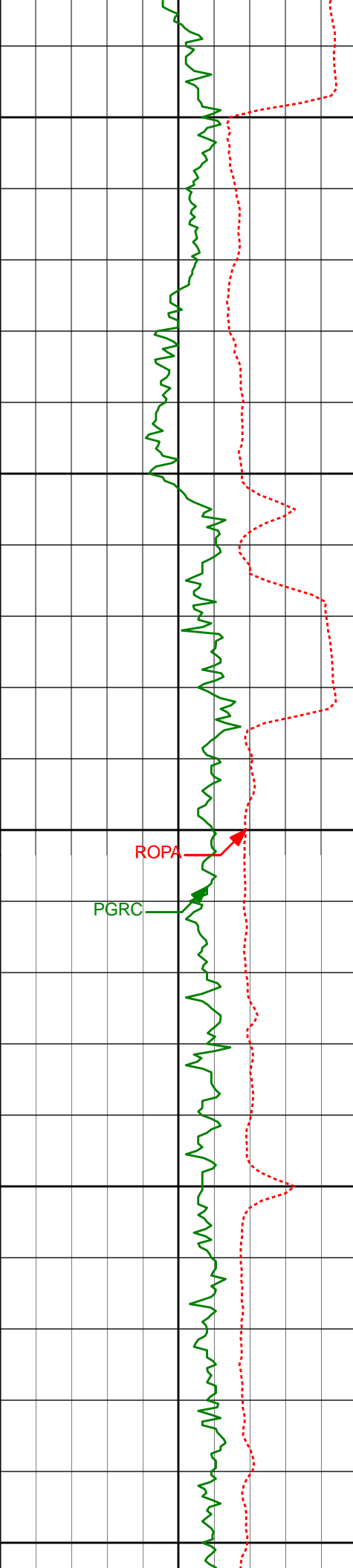
92.34°

270.32°

6754.84'

2964.25'

9450'



9500'

9550'

9600'

9650'

9700'

9490'

9584'

9679'

92.10°

89.66°

90.86°

271.11°

270.02°

271.04°

6751.16'

6749.72'

6749.29'

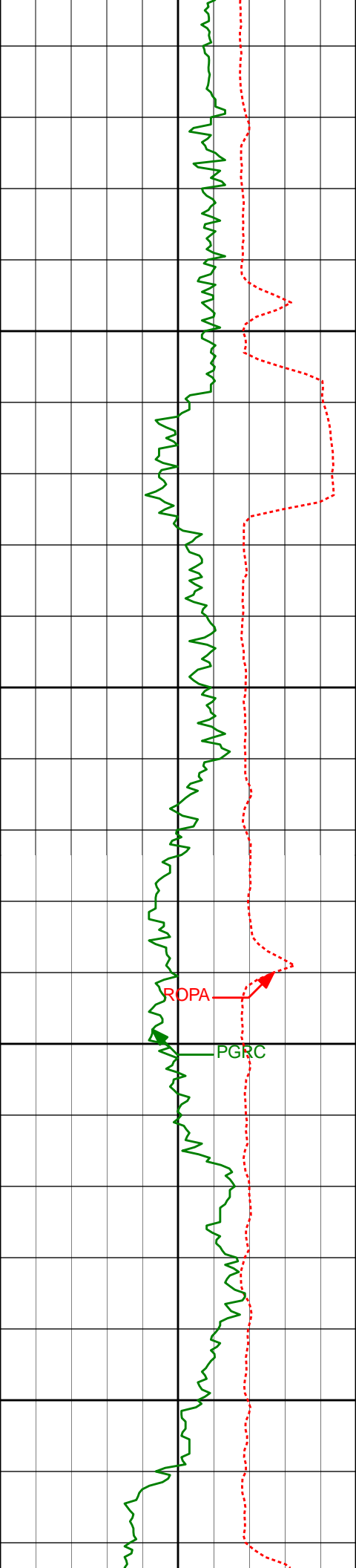
3059.10'

3153.02'

3247.96'

ROPA

PGRC



9750'

9774'

88.06°

269.23°

6750.18'

3342.91'

9800'

9850'

9868'

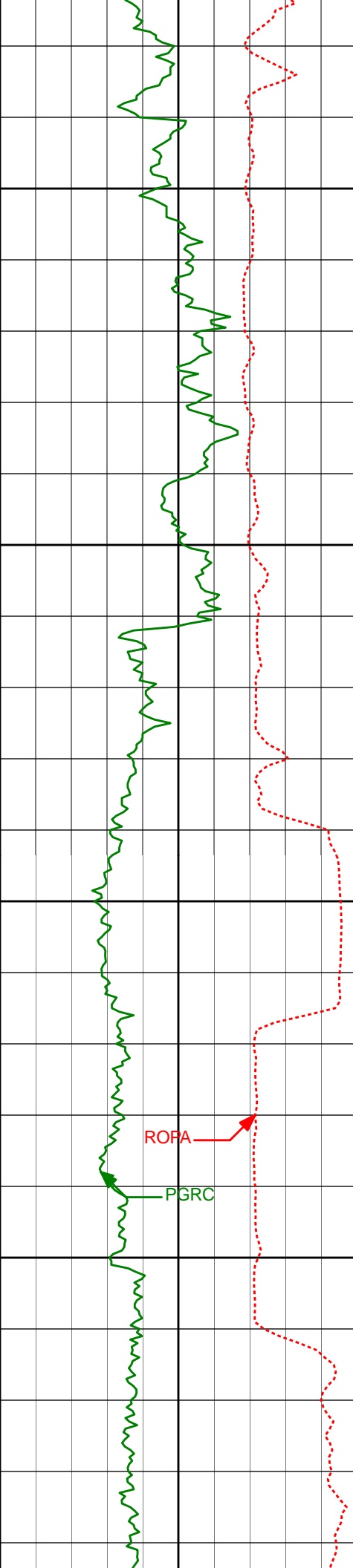
87.23°

267.97°

6754.04'

3436.82'

9900'



9950'

9963'

86.67°

266.32°

6759.10'

3531.66'

10000'

10050'

10058'

87.38°

266.30°

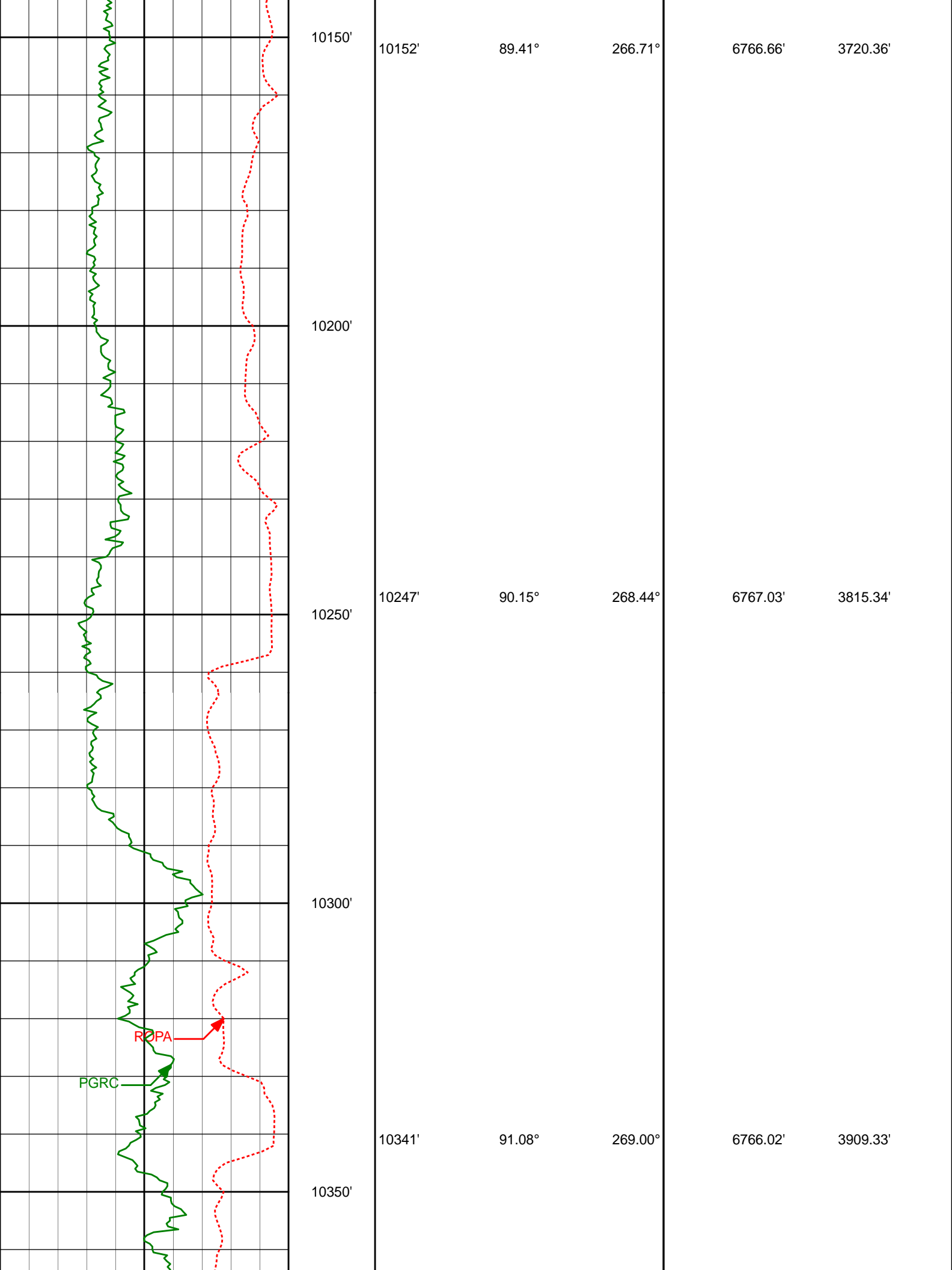
6764.03'

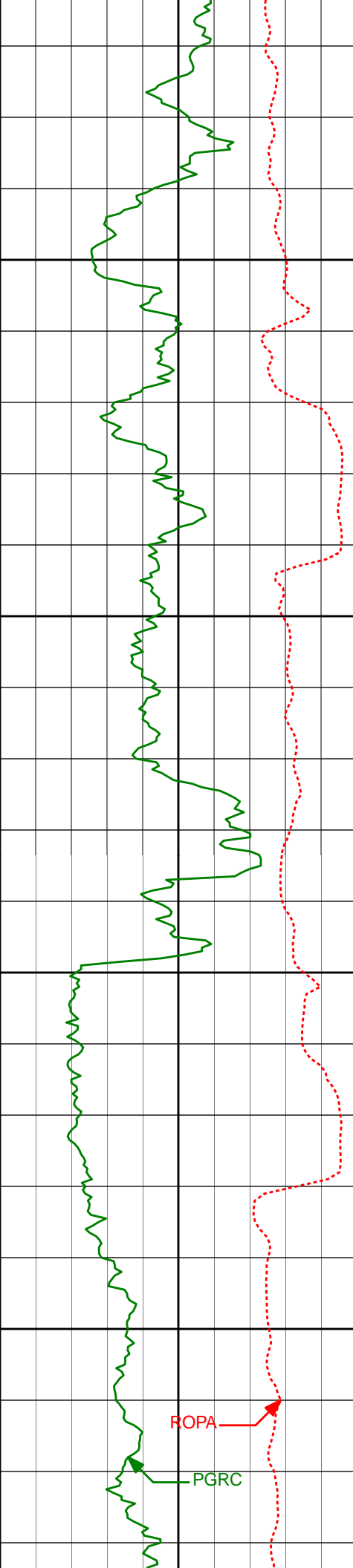
3626.46'

10100'

ROPA

PGRC





10400'

10450'

10500'

10550'

10433'

91.36°

270.32°

6764.06'

4001.29'

10525'

91.76°

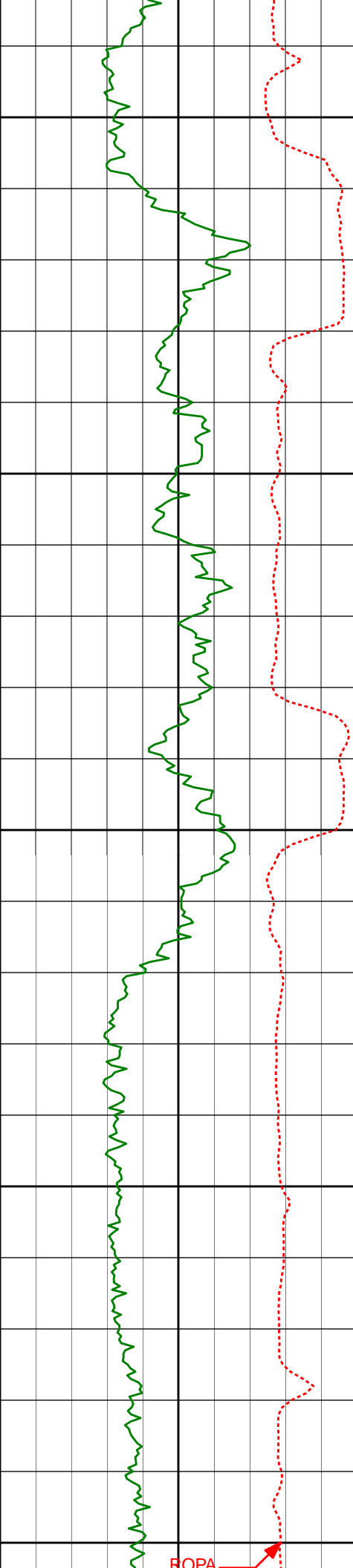
271.00°

6761.55'

4093.19'

ROPA

PGRC



10600'

10618'

90.28°

271.42°

6759.90'

4186.07'

10650'

10700'

10711'

89.38°

270.89°

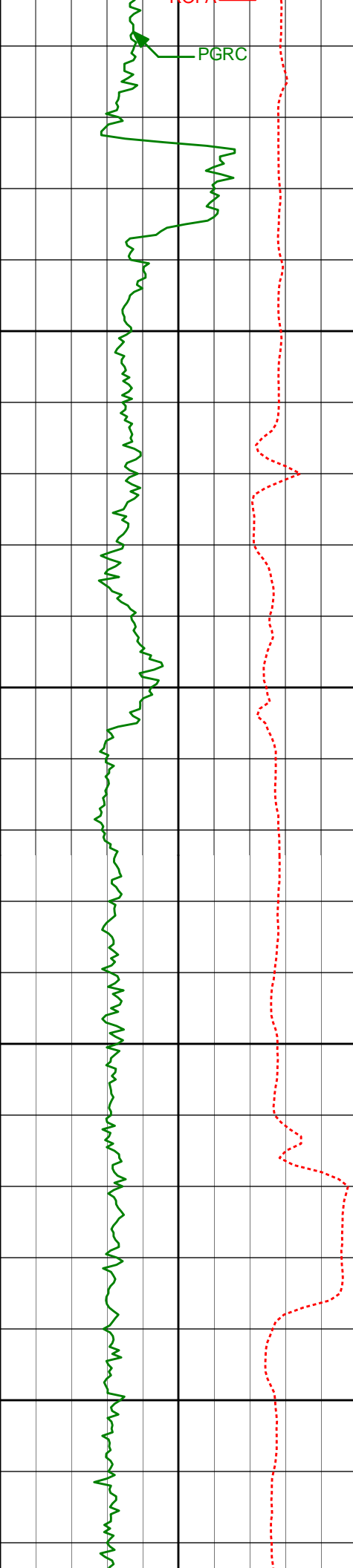
6760.18'

4278.97'

10750'

10800'

ROPA



PGRC

PGF

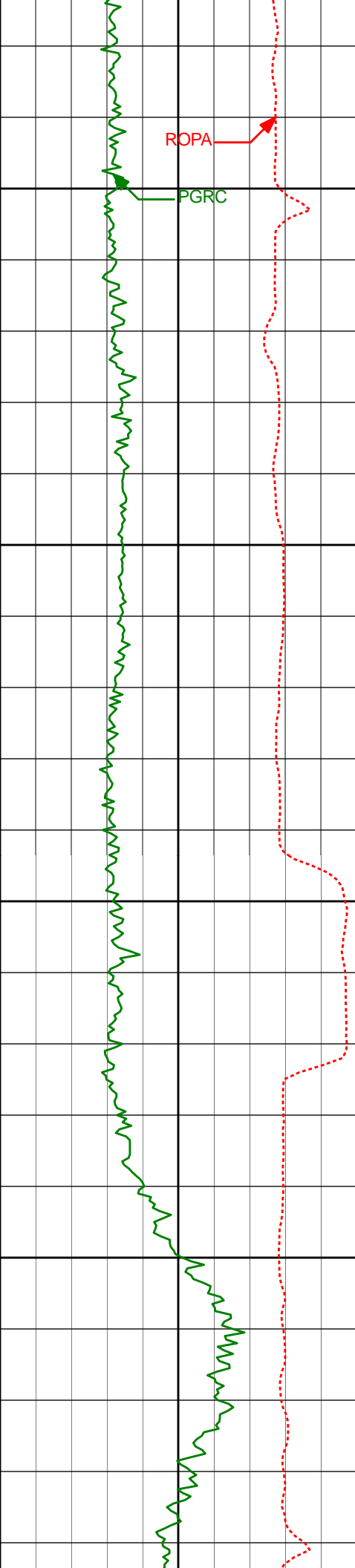
10850'

10900'

10950'

11000'

10804	88.98°	269.92°	6761.51'	4371.91'
10896'	88.27°	268.02°	6763.71'	4463.88'
10989'	89.72°	268.11°	6765.35'	4556.86'



11050'

11081'

89.23°

266.33°

6766.19'

4648.83'

11100'

11150'

11173'

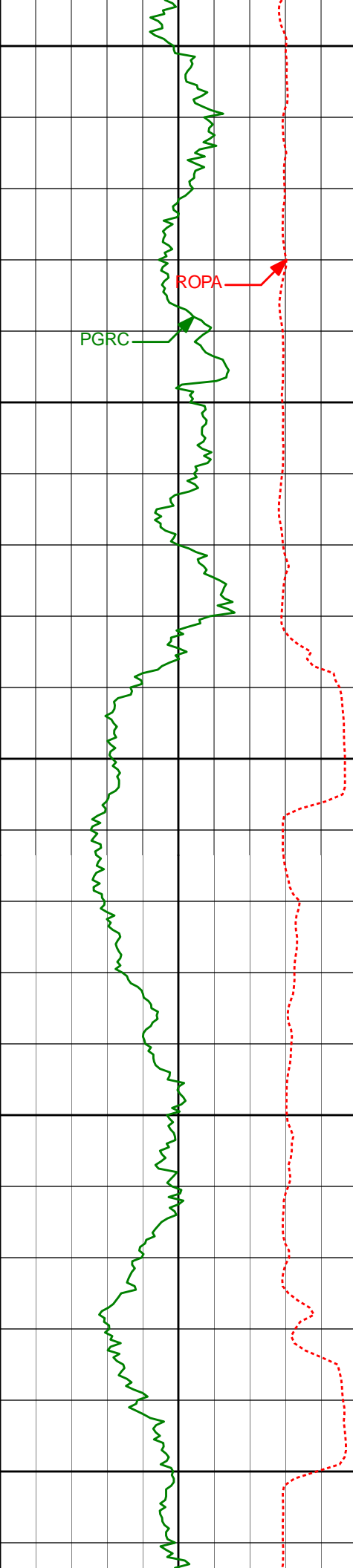
90.68°

269.22°

6766.26'

4740.81'

11200'



11250'

11266'

91.79°

268.34°

6764.26'

4833.78'

11300'

11350'

11359'

90.71°

268.93°

6762.23'

4926.76'

11400'

11450'

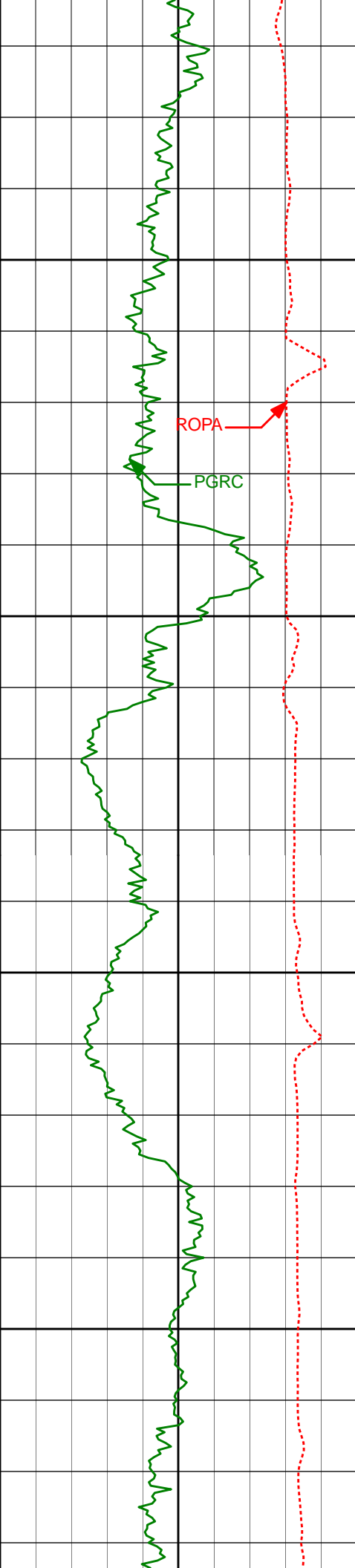
11453'

90.25°

269.83°

6761.44'

5020.74'



11500'

ROPA

PGRC

11544'

90.49°

268.77°

6760.85'

5111.73'

11550'

11600'

11638'

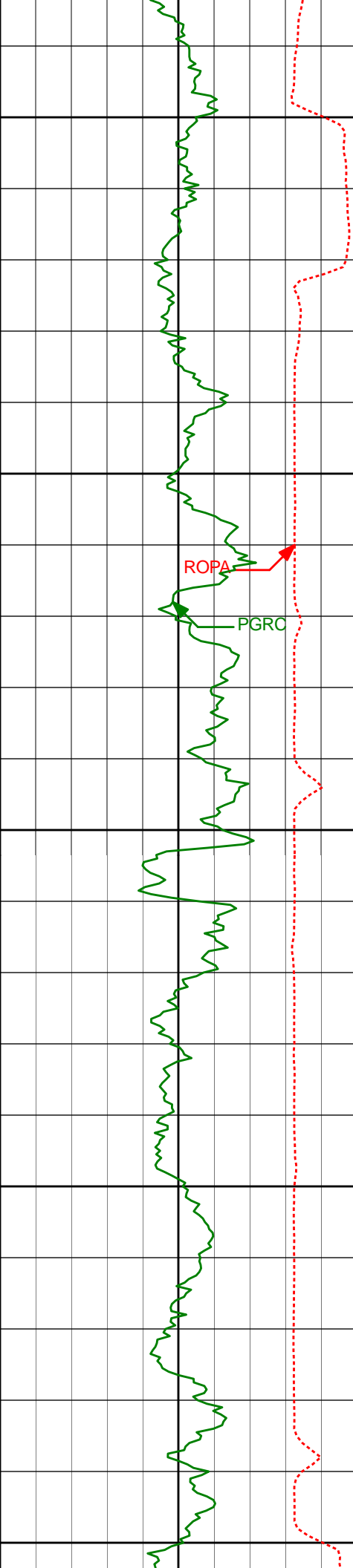
91.36°

268.31°

6759.33'

5205.72'

11650'



11700'

11732'

89.78°

268.86°

6758.40'

5299.71'

11750'

ROPA

PGRO

11800'

11825'

90.37°

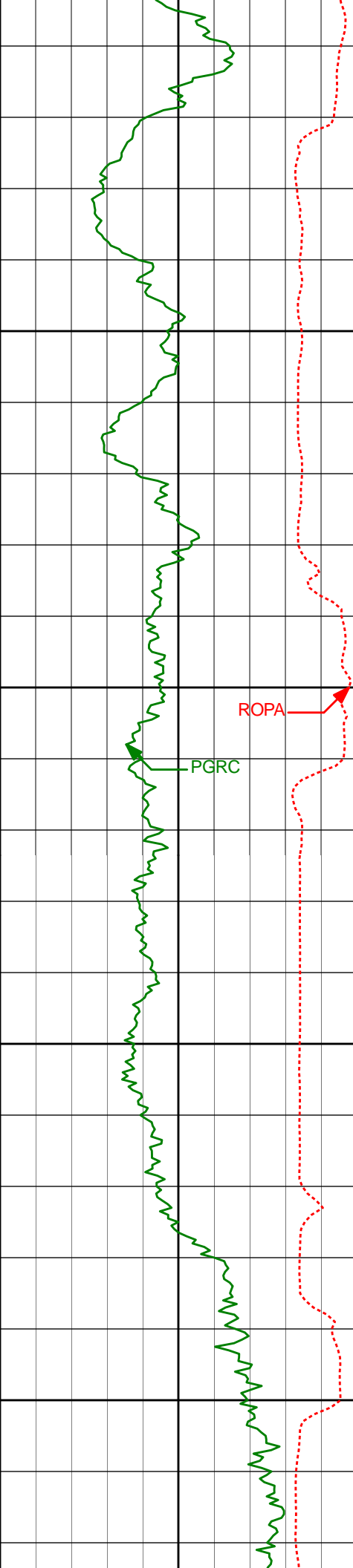
267.63°

6758.28'

5392.71'

11850'

11900'



11950'

12000'

12050'

12100'

11917'

12009'

12101'

91.08°

90.03°

89.57°

268.88°

269.47°

269.89°

6757.11'

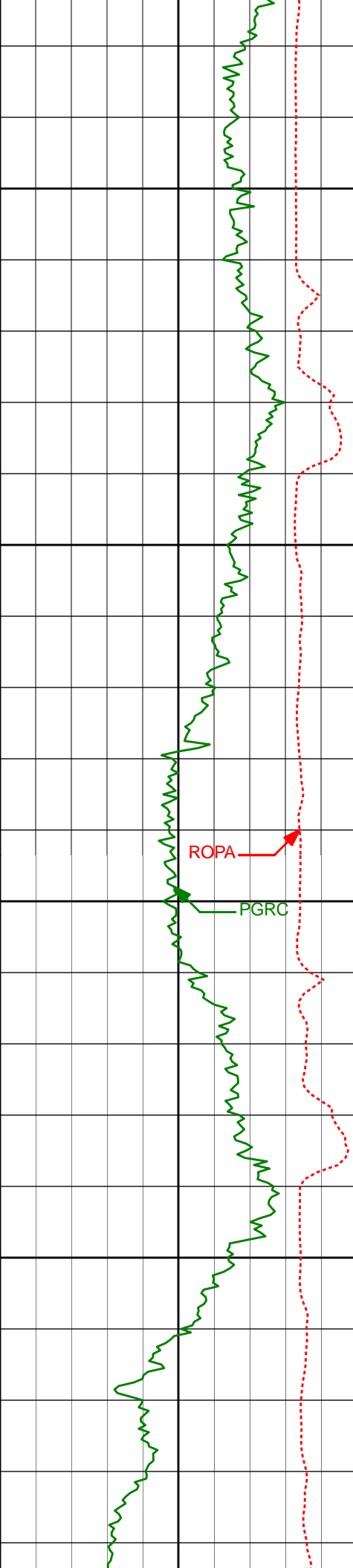
6756.22'

6756.54'

5484.70'

5576.68'

5668.67'



12150'

12200'

12250'

12300'

12196'

87.97°

270.19°

6758.58'

5763.61'

12291'

89.41°

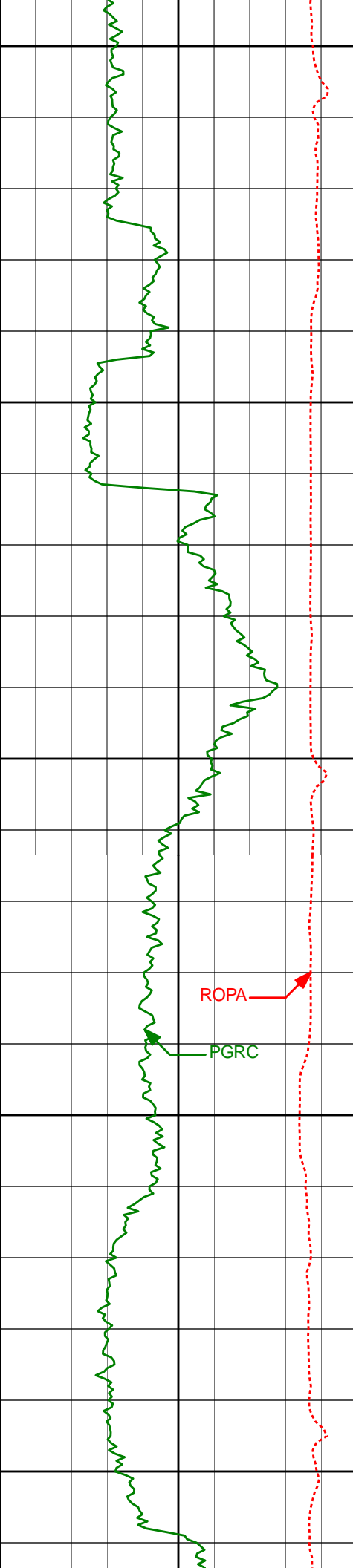
269.49°

6760.76'

5858.55'

ROPA

PGRC



12350'

12385'

88.80°

268.25°

6762.22'

5952.54'

12400'

12450'

12480'

89.51°

268.01°

6763.62'

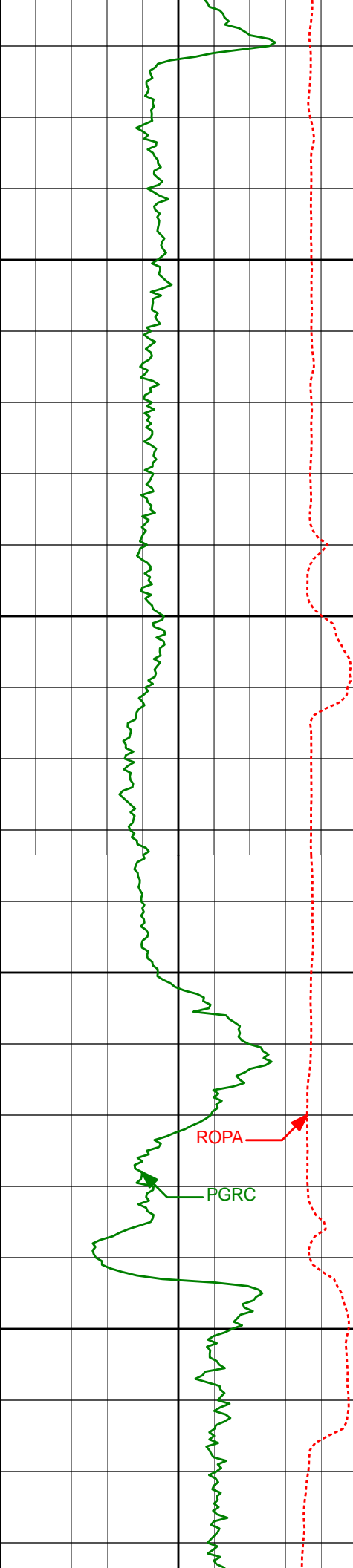
6047.52'

12500'

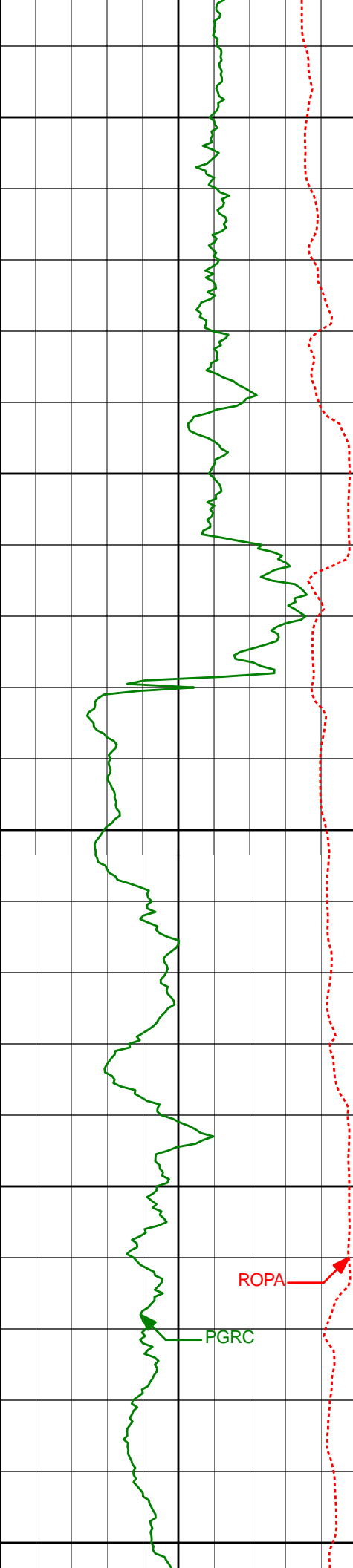
12550'

ROPA

PGRC



12575'	89.14°	267.33°	6764.74'	6142.51'
12600'				
12650'				
12669'	89.38°	266.54°	6765.96'	6236.46'
12700'				
12750'				
12764'	90.49°	267.39°	6766.07'	6331.42'



12800'

12850'

12900'

12950'

13000'

12864'

91.73°

267.83°

6764.13'

6431.39'

12959'

89.94°

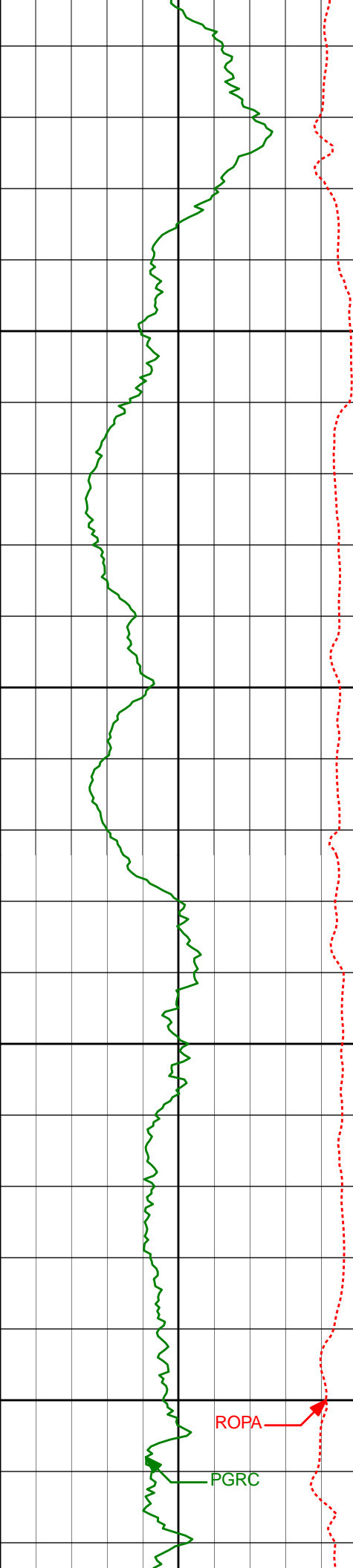
268.77°

6762.74'

6526.38'

ROPA

PGRC



13050'

13054'

89.38°

269.92°

6763.31'

6621.36'

13100'

13150'

13148'

89.48°

269.93°

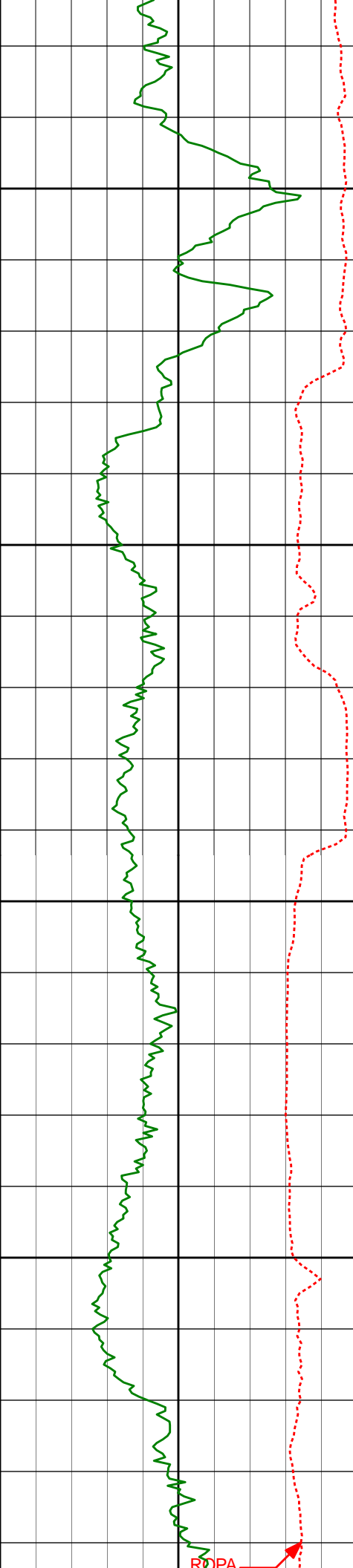
6764.24'

6715.33'

13200'

ROPA

PGRC



Run 300

13250'

13300'

13350'

13400'

13338'

88.67°

270.25°

6764.30'

6905.23'

13433'

88.27°

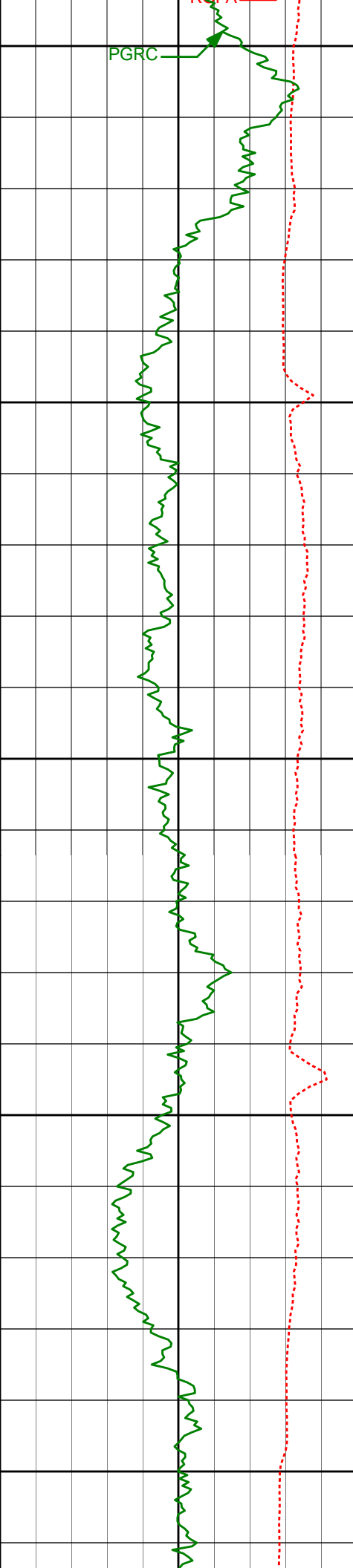
269.68°

6766.84'

7000.17'

ROPA





13450'

13500'

13528'

88.15°

269.08°

6769.81'

7095.11'

13550'

13600'

13623'

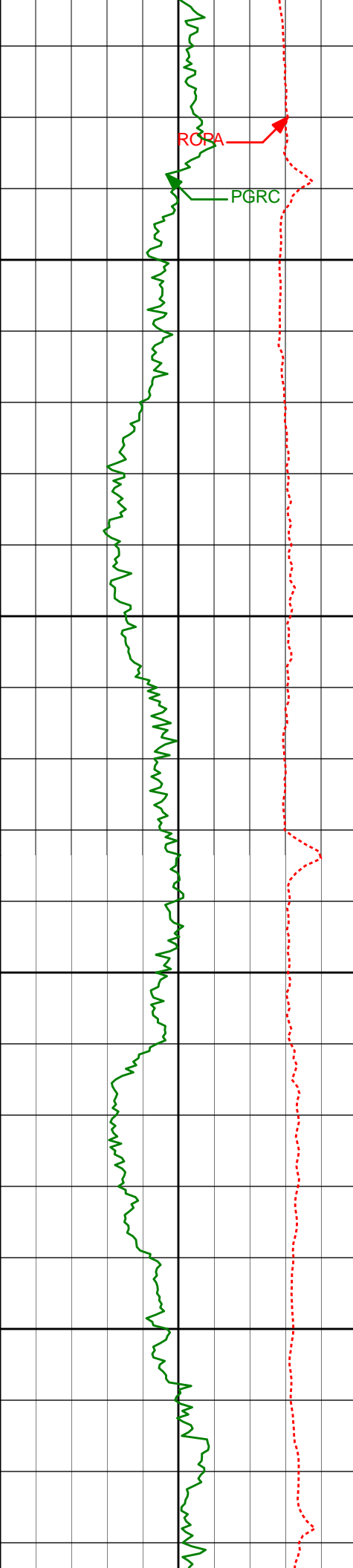
88.34°

268.91°

6772.71'

7190.06'

13650'



13700'

13717'

88.98°

268.42°

6774.91'

7284.03'

13750'

13800'

13812'

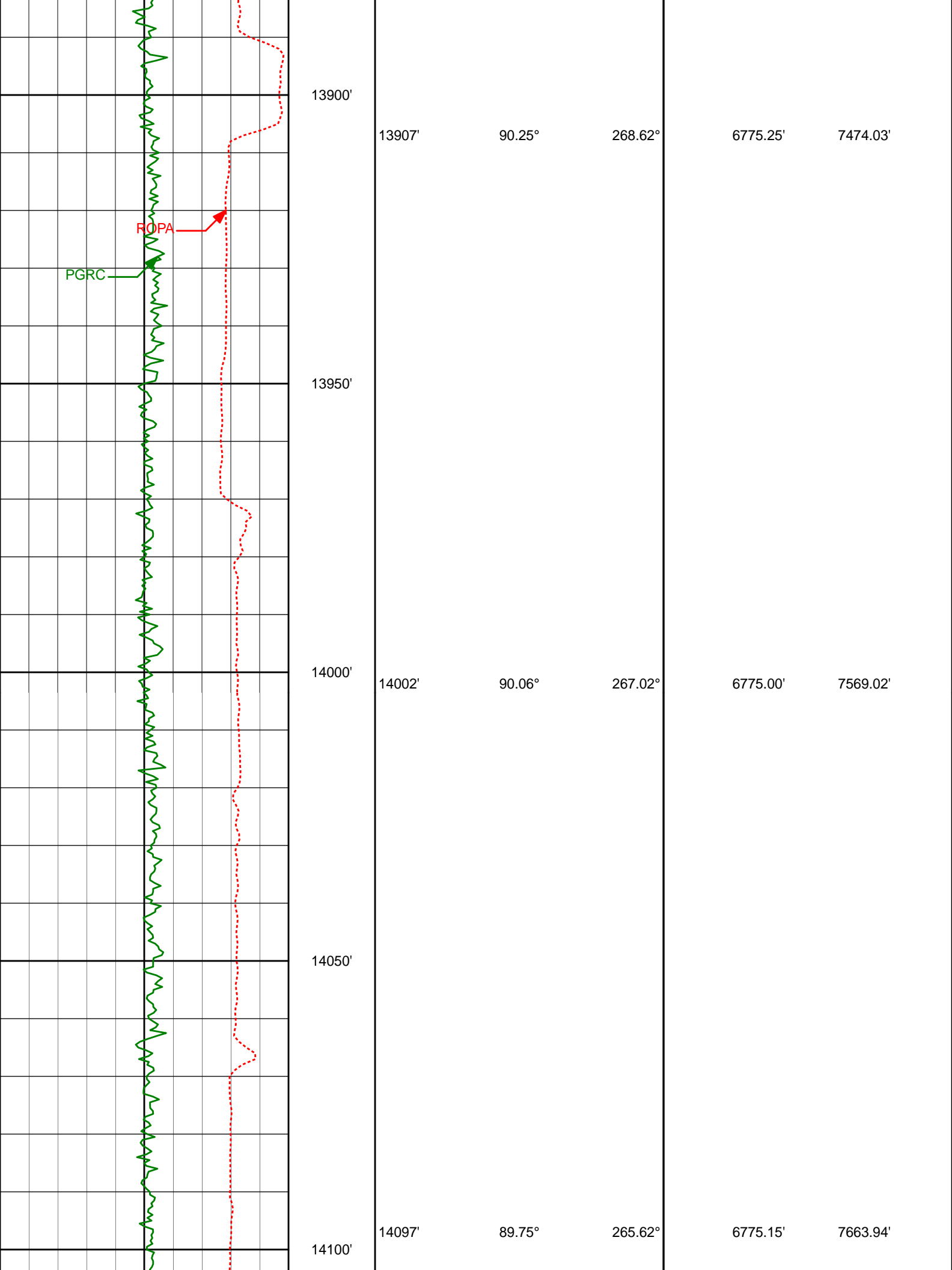
90.18°

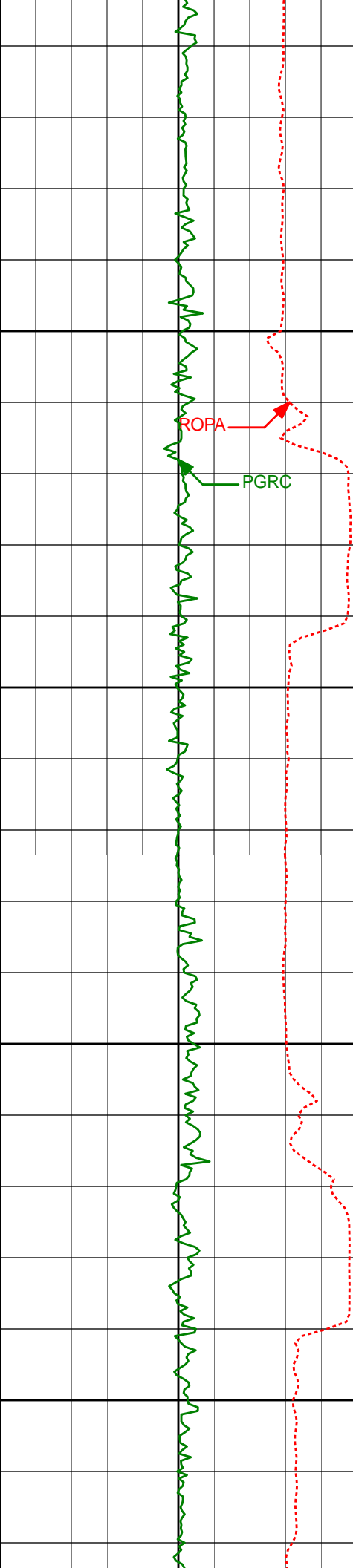
268.13°

6775.61'

7379.03'

13850'





14150'

ROPA

PGRC

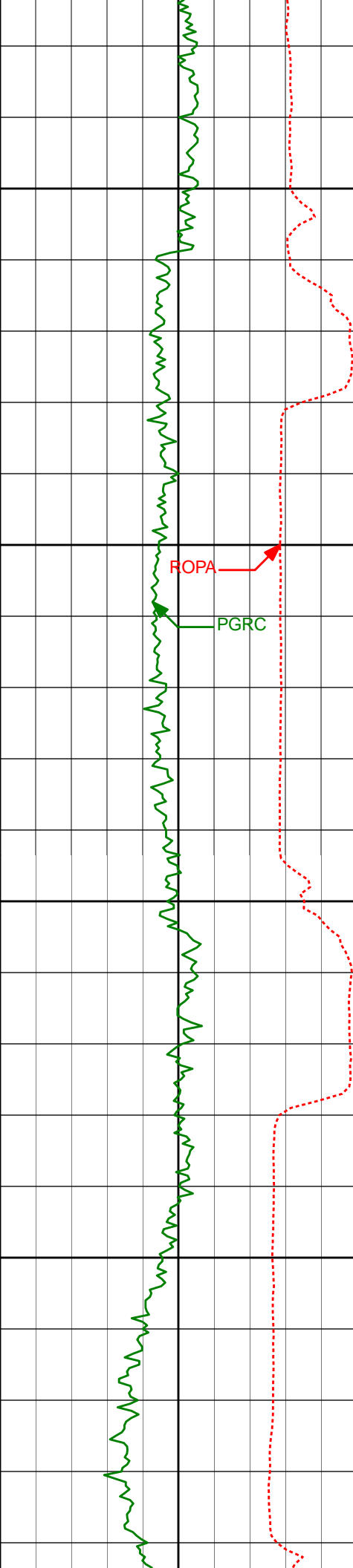
14200'

14250'

14300'

14192'	89.38°	266.77°	6775.87'	7758.86'
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14287'	89.20°	267.81°	6777.05'	7853.83'
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14350'

14382'

89.35°

267.83°

6778.25'

7948.82'

14400'

ROPA

PGRC

14450'

14477'

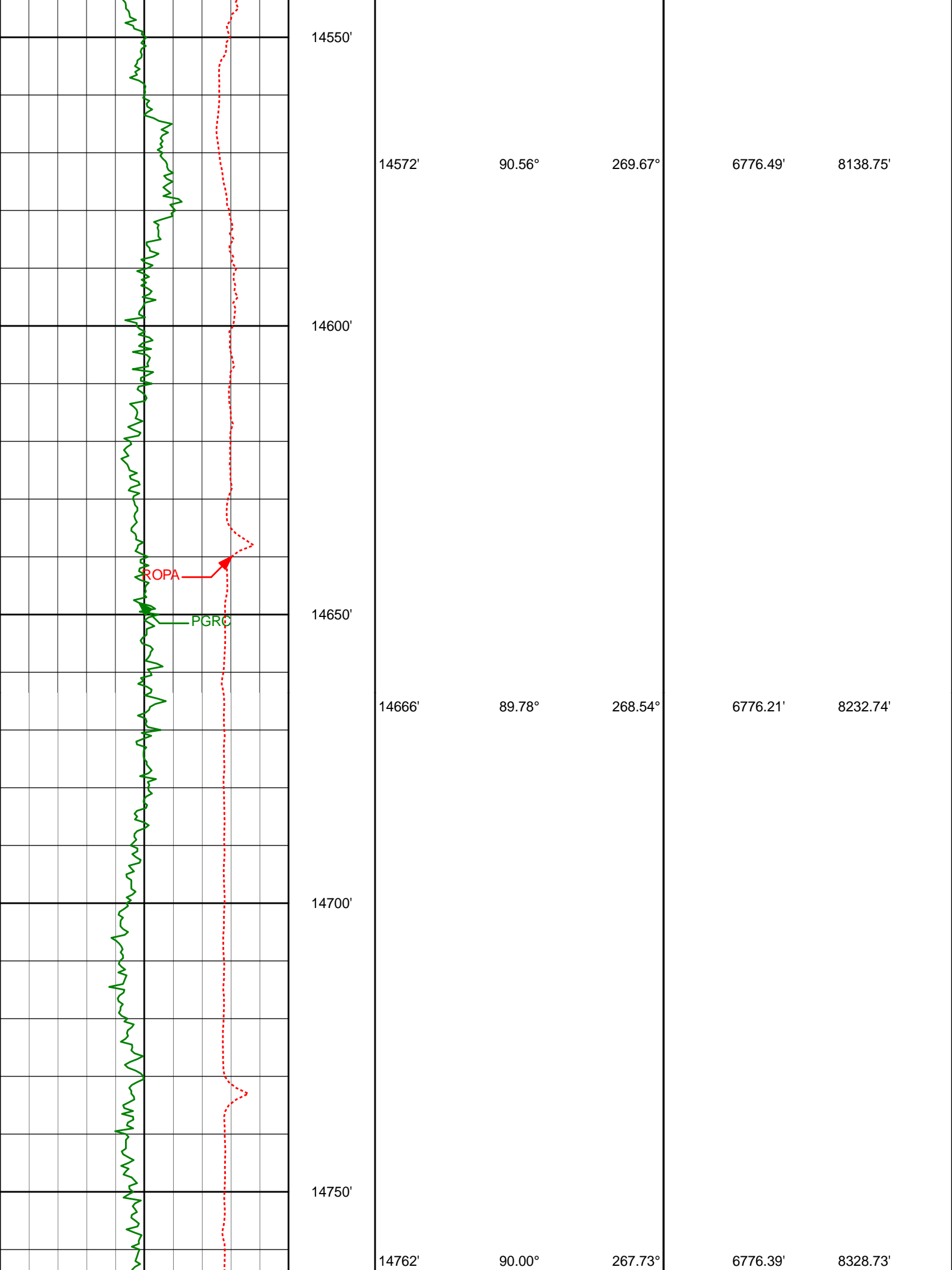
91.11°

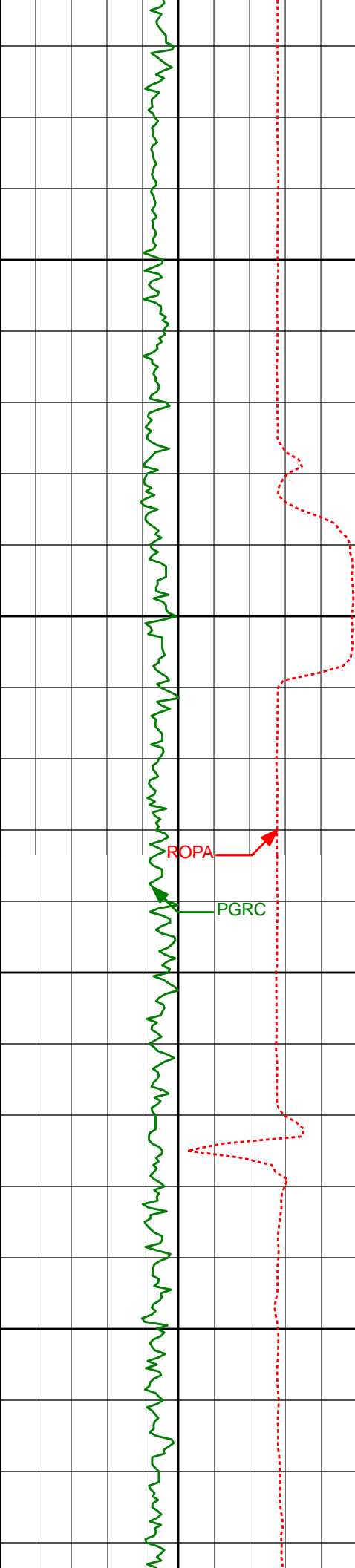
270.62°

6777.87'

8043.79'

14500'





14800'

14850'

14900'

14950'

14856'

90.22°

269.86°

6776.21'

8422.73'

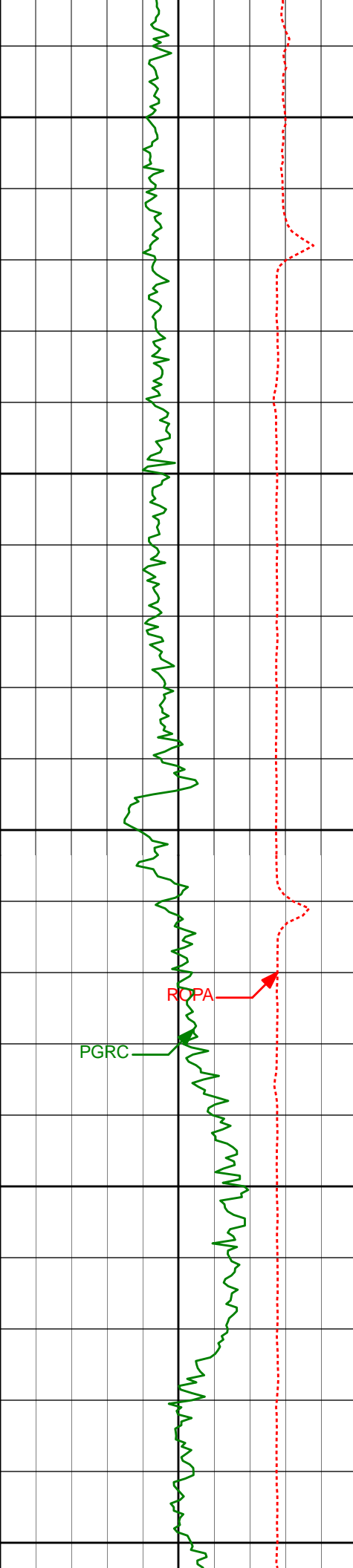
14951'

90.74°

270.00°

6775.42'

8517.70'



15000'

15050'

15100'

15150'

15200'

15046'

91.17°

270.32°

6773.83'

8612.64'

15141'

91.30°

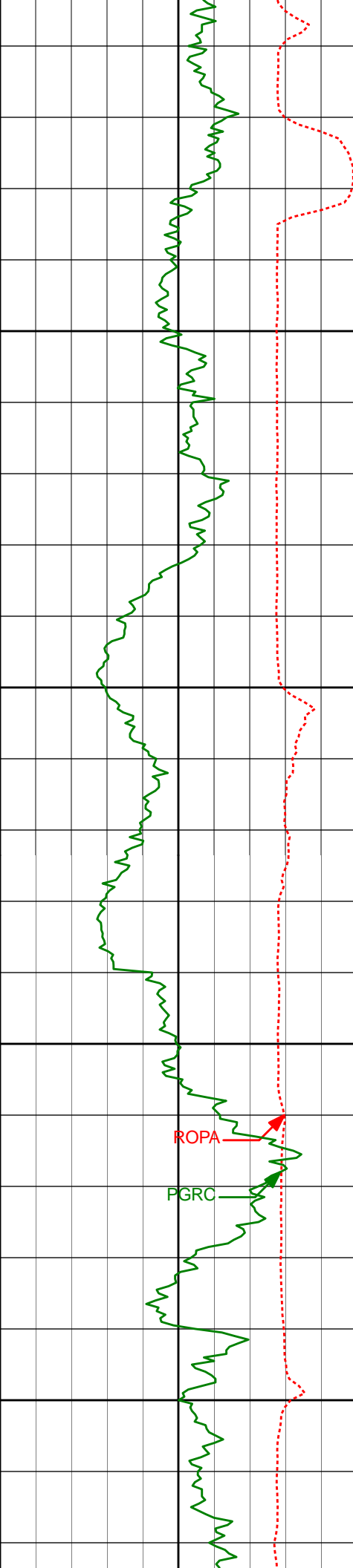
270.28°

6771.79'

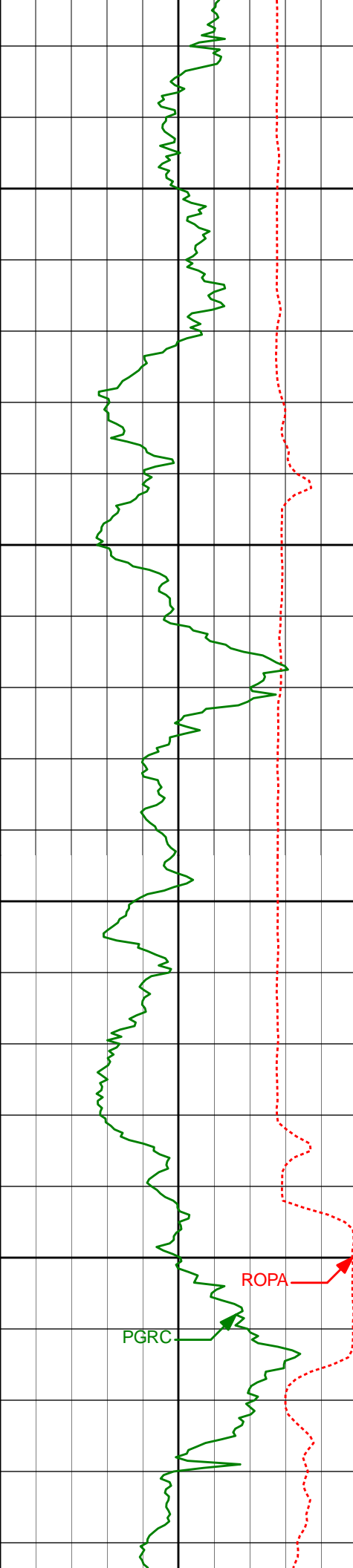
8707.57'

ROPA

PGRC



15236'	89.57°	270.07°	6771.06'	8802.53'
15250'				
15300'				
15330'	88.92°	269.51°	6772.30'	8896.50'
15350'				
15400'				



15450'

15500'

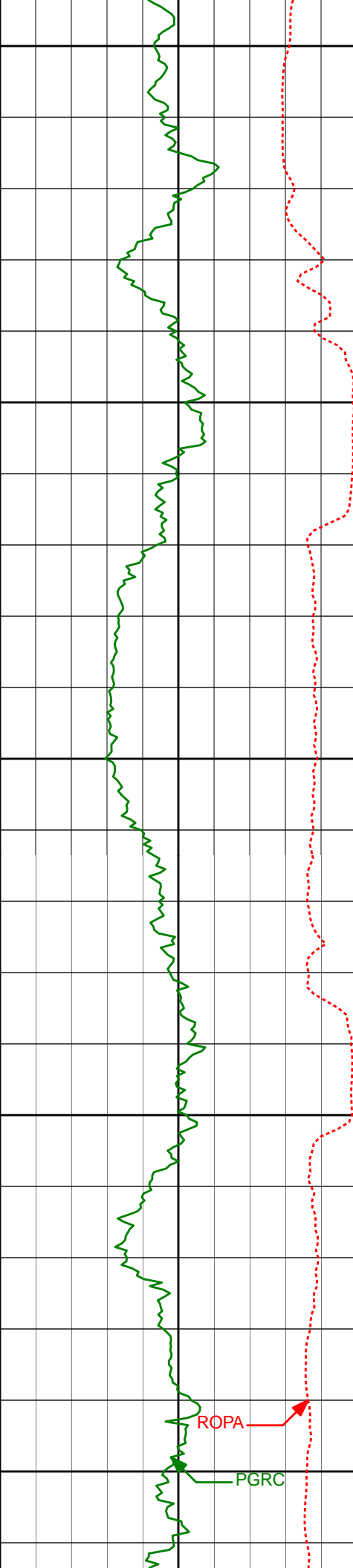
15550'

15600'

PGRC

ROPA

15425'	87.97°	268.92°	6774.88'	8991.45'
15520'	86.98°	268.12°	6779.07'	9086.36'
15615'	86.85°	268.56°	6784.18'	9181.22'



15650'

15700'

15750'

15800'

15850'

15710'

88.46°

268.23°

6788.07'

9276.14'

15805'

91.94°

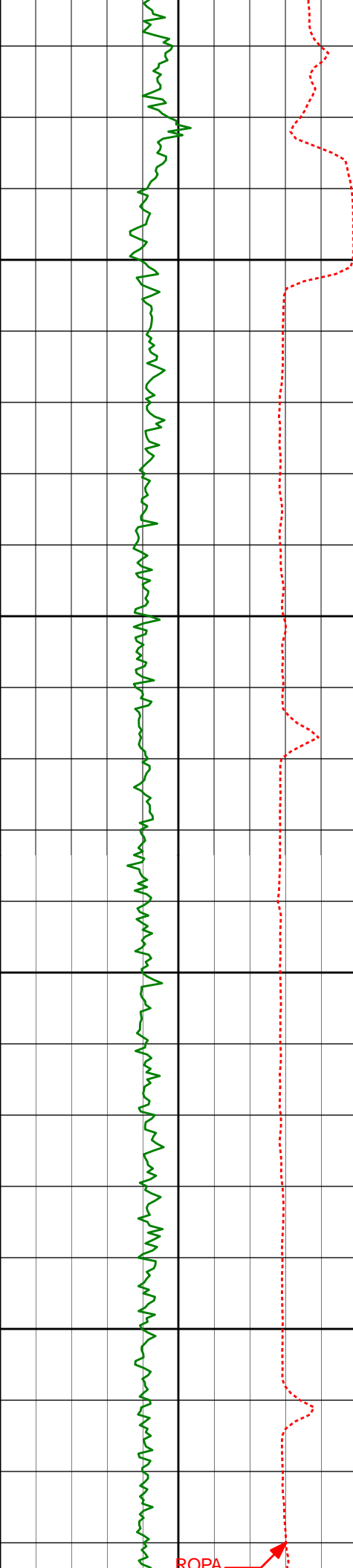
269.03°

6787.74'

9371.12'

ROPA

PGRC



15900'

15950'

16000'

16050'

15900'

15995'

90.31°

90.31°

268.15°

268.23°

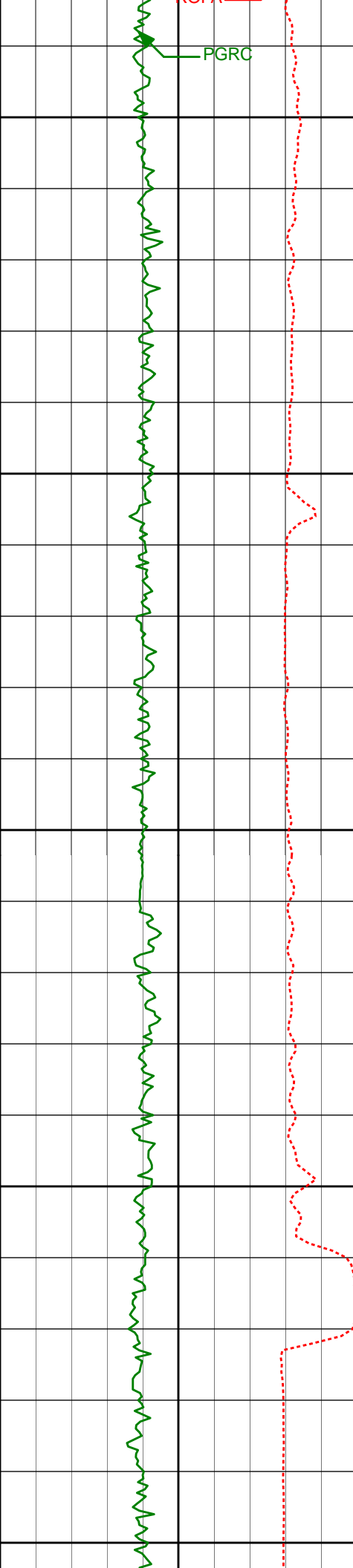
6785.87'

6785.36'

9466.10'

9561.10'

ROPA



PGRC

16100'

16150'

16200'

16250'

16300'

16089'

89.91°

266.94°

6785.18'

9655.08'

16184'

89.91°

265.83°

6785.32'

9750.01'

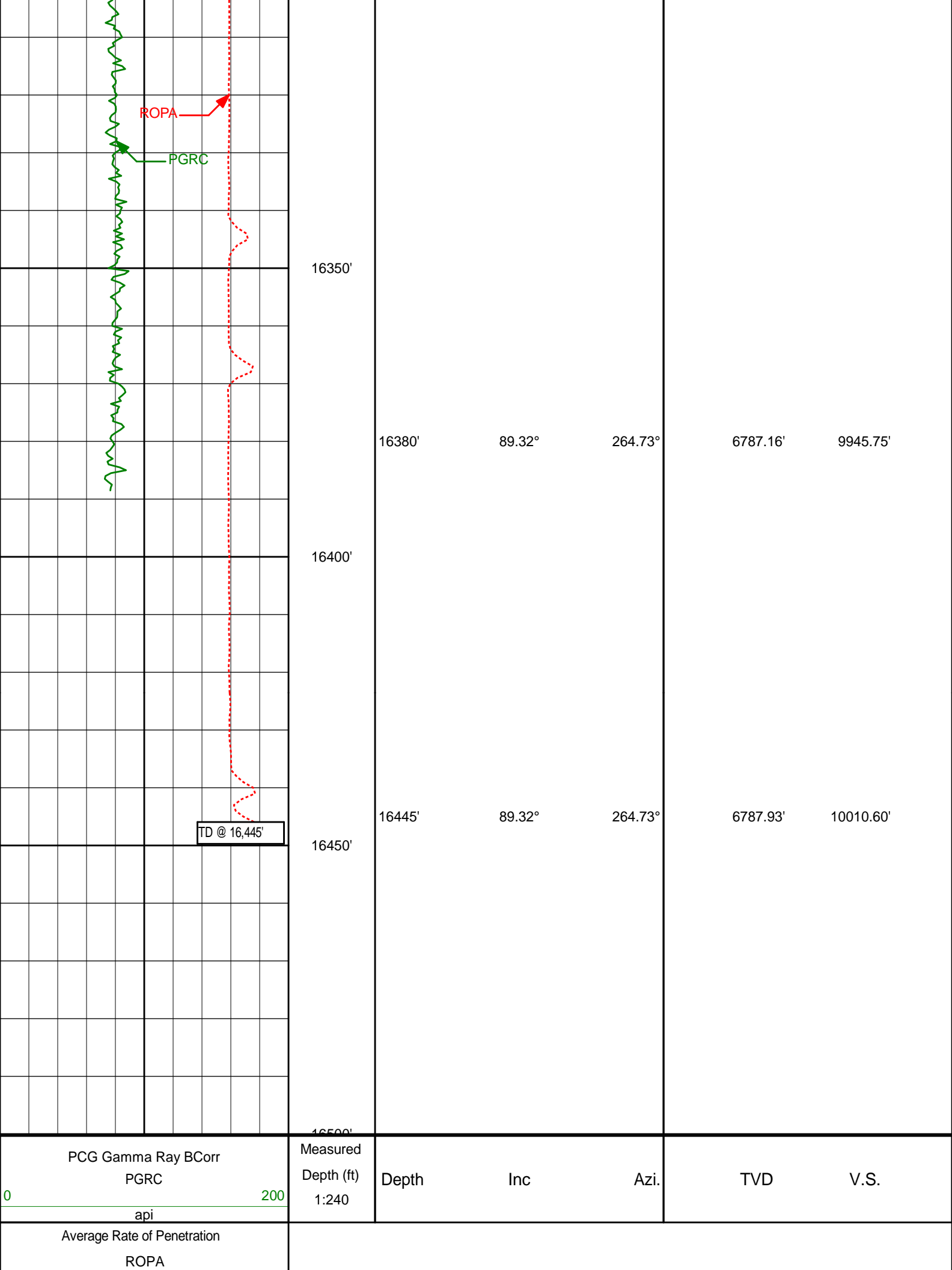
16279'

89.32°

265.97°

6785.96'

9844.91'



PCG Gamma Ray BCorr PGRC		Measured Depth (ft) 1:240	Depth		Inc	Azi.	TVD		V.S.
Average Rate of Penetration ROPA									

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble
NCLP AA06-66-1HNC
Wattenberg
Weld Colorado
USA
CA-XX-0901287463
The first three surveys at 365', 640', and 800' are provided by HP.

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
365.00	0.20	347.07	365.00	0.62 N	0.14 W	0.13	0.05
640.00	0.40	85.27	640.00	1.17 N	0.71 E	-0.74	0.17
800.00	0.20	34.17	799.99	1.44 N	1.42 E	-1.46	0.20
899.00	0.90	4.16	898.99	2.36 N	1.57 E	-1.63	0.74
991.00	1.07	17.47	990.98	3.90 N	1.88 E	-1.98	0.31
1085.00	1.31	4.60	1084.96	5.81 N	2.23 E	-2.38	0.38
1178.00	1.55	323.32	1177.93	7.88 N	1.57 E	-1.77	1.11
1270.00	0.37	292.78	1269.92	8.99 N	0.55 E	-0.78	1.35
1364.00	0.26	280.23	1363.91	9.15 N	0.06 E	-0.30	0.14
1457.00	0.26	302.38	1456.91	9.30 N	0.33 W	0.09	0.11
1551.00	0.31	265.29	1550.91	9.39 N	0.76 W	0.52	0.20
1643.00	0.61	236.23	1642.91	9.10 N	1.41 W	1.18	0.40
1734.00	0.53	231.31	1733.90	8.57 N	2.15 W	1.92	0.10
1826.00	0.64	227.48	1825.90	7.95 N	2.86 W	2.65	0.13
1921.00	0.54	257.33	1920.89	7.50 N	3.68 W	3.49	0.34
2015.00	0.41	250.39	2014.89	7.29 N	4.43 W	4.24	0.15
2109.00	0.48	282.41	2108.89	7.26 N	5.13 W	4.94	0.27
2204.00	0.37	315.65	2203.89	7.56 N	5.74 W	5.54	0.28
2299.00	1.03	315.01	2298.88	8.39 N	6.56 W	6.34	0.69
2393.00	2.18	230.26	2392.85	7.84 N	8.53 W	8.32	2.47
2487.00	2.53	226.70	2486.77	5.28 N	11.41 W	11.27	0.40
2581.00	2.33	222.82	2580.69	2.45 N	14.22 W	14.15	0.28
2676.00	3.88	231.91	2675.54	0.95 S	18.06 W	18.08	1.71
2770.00	4.69	227.07	2769.28	5.53 S	23.38 W	23.52	0.94
2865.00	6.24	223.99	2863.85	11.89 S	29.81 W	30.11	1.66
2959.00	6.23	222.96	2957.29	19.30 S	36.83 W	37.32	0.12
3054.00	5.94	222.34	3051.75	26.70 S	43.66 W	44.33	0.31
3149.00	4.55	229.33	3146.36	32.79 S	49.83 W	50.66	1.61
3244.00	2.16	240.59	3241.19	36.13 S	54.25 W	55.16	2.60
3339.00	0.44	15.56	3336.17	36.65 S	55.71 W	56.64	2.62
3434.00	1.55	39.41	3431.15	35.31 S	54.79 W	55.69	1.22
3528.00	1.21	53.03	3525.12	33.73 S	53.19 W	54.05	0.50
3623.00	1.19	23.10	3620.10	32.22 S	52.01 W	52.82	0.65
3717.00	0.50	48.41	3714.09	31.05 S	51.32 W	52.10	0.82
3812.00	0.80	48.45	3809.09	30.34 S	50.51 W	51.28	0.32
3907.00	0.98	41.76	3904.08	29.29 S	49.47 W	50.21	0.22
4002.00	0.96	54.44	3999.06	28.22 S	48.28 W	49.00	0.23
4096.00	0.31	69.12	4093.06	27.67 S	47.41 W	48.10	0.71
4191.00	0.07	3.61	4188.06	27.52 S	47.16 W	47.86	0.30
4285.00	0.57	224.45	4282.05	27.80 S	47.49 W	48.19	0.66
4379.00	0.58	305.22	4376.05	27.86 S	48.20 W	48.90	0.79
4473.00	0.57	341.69	4470.05	27.14 S	48.74 W	49.42	0.38
4568.00	0.54	357.66	4565.04	26.24 S	48.90 W	49.57	0.17
4662.00	0.41	223.83	4659.04	26.04 S	49.15 W	49.81	0.93
4757.00	0.22	209.73	4754.04	26.45 S	49.48 W	50.15	0.21
4852.00	0.13	132.66	4849.04	26.68 S	49.49 W	50.16	0.24
4946.00	0.03	122.19	4943.04	26.76 S	49.39 W	50.07	0.11
5041.00	0.14	74.47	5038.04	26.75 S	49.26 W	49.93	0.13
5136.00	0.47	307.33	5133.04	26.48 S	49.46 W	50.12	0.60
5231.00	0.57	273.44	5228.03	26.21 S	50.24 W	50.90	0.33
5326.00	0.33	289.30	5323.03	26.10 S	50.97 W	51.63	0.28
5421.00	0.41	238.25	5418.03	26.18 S	51.52 W	52.18	0.34

5515.00	0.41	110.85	5512.03	26.48 S	51.49 W	52.15	0.78
5610.00	0.98	88.41	5607.02	26.58 S	50.36 W	51.03	0.65
5705.00	0.86	89.95	5702.01	26.56 S	48.83 W	49.50	0.13
5799.00	0.68	90.74	5796.00	26.56 S	47.57 W	48.24	0.19
5894.00	0.26	111.28	5891.00	26.65 S	46.81 W	47.48	0.47
5989.00	0.17	45.15	5986.00	26.63 S	46.50 W	47.18	0.26
6083.00	0.13	175.67	6080.00	26.64 S	46.40 W	47.07	0.29
6178.00	9.76	256.13	6174.54	28.68 S	54.23 W	54.95	10.25
6273.00	12.28	265.61	6267.78	31.38 S	72.12 W	72.91	3.26
6368.00	15.20	260.76	6360.06	34.16 S	94.49 W	95.34	3.30
6463.00	32.79	266.30	6446.52	37.85 S	132.76 W	133.69	18.65
6557.00	38.45	267.78	6522.90	40.62 S	187.41 W	188.40	6.09
6652.00	48.66	269.96	6591.66	41.79 S	252.76 W	253.76	10.86
6746.00	59.80	269.25	6646.52	42.35 S	328.91 W	329.89	11.87
6841.00	72.02	270.07	6685.23	42.84 S	415.47 W	416.44	12.89
6936.00	77.73	269.91	6710.00	42.85 S	507.14 W	508.08	6.01
6977.00	82.90	268.43	6716.90	43.44 S	547.54 W	548.48	13.10
7124.00	85.90	267.11	6731.24	49.14 S	693.71 W	694.74	2.23
7219.00	86.73	267.46	6737.35	53.63 S	788.40 W	789.52	0.95
7314.00	86.24	266.42	6743.17	58.69 S	883.09 W	884.31	1.21
7409.00	86.64	267.88	6749.07	63.41 S	977.78 W	979.09	1.59
7504.00	87.81	268.44	6753.67	66.45 S	1072.62 W	1073.98	1.37
7599.00	88.77	266.77	6756.51	70.42 S	1167.49 W	1168.92	2.03
7694.00	90.18	267.51	6757.38	75.16 S	1262.36 W	1263.89	1.68
7788.00	91.11	268.99	6756.32	78.03 S	1356.31 W	1357.87	1.86
7883.00	90.22	267.46	6755.22	80.97 S	1451.26 W	1452.86	1.86
7978.00	90.55	268.14	6754.58	84.62 S	1546.18 W	1547.85	0.80
8073.00	91.48	270.51	6752.89	85.74 S	1641.15 W	1642.82	2.68
8167.00	89.88	270.21	6751.78	85.15 S	1735.14 W	1736.76	1.73
8262.00	90.00	269.12	6751.88	85.71 S	1830.14 W	1831.74	1.15
8356.00	91.08	270.00	6750.99	86.43 S	1924.13 W	1925.72	1.48
8451.00	91.63	270.28	6748.75	86.20 S	2019.10 W	2020.65	0.65
8545.00	89.91	270.08	6747.48	85.90 S	2113.09 W	2114.60	1.84
8639.00	90.34	269.47	6747.28	86.27 S	2207.09 W	2208.58	0.79
8734.00	89.23	269.61	6747.63	87.03 S	2302.08 W	2303.56	1.18
8829.00	90.37	268.46	6747.97	88.63 S	2397.07 W	2398.56	1.70
8923.00	88.80	269.40	6748.65	90.39 S	2491.04 W	2492.55	1.95
9018.00	89.11	267.86	6750.38	92.66 S	2586.00 W	2587.53	1.65
9112.00	87.38	266.77	6753.26	97.06 S	2679.84 W	2681.46	2.17
9207.00	87.94	267.05	6757.14	102.18 S	2774.63 W	2776.34	0.66
9301.00	91.26	269.18	6757.79	105.27 S	2868.56 W	2870.32	4.20
9395.00	92.34	270.32	6754.84	105.68 S	2962.51 W	2964.25	1.67
9490.00	92.10	271.11	6751.16	104.49 S	3057.43 W	3059.10	0.87
9584.00	89.66	270.02	6749.72	103.57 S	3151.40 W	3153.02	2.84
9679.00	90.86	271.04	6749.29	102.69 S	3246.39 W	3247.96	1.66
9774.00	88.06	269.23	6750.18	102.46 S	3341.38 W	3342.91	3.51
9868.00	87.23	267.97	6754.04	104.76 S	3435.27 W	3436.82	1.60
9963.00	86.67	266.32	6759.10	109.48 S	3530.01 W	3531.66	1.83
10058.00	87.38	266.30	6764.03	115.59 S	3624.68 W	3626.46	0.75
10152.00	89.41	266.71	6766.66	121.32 S	3718.47 W	3720.36	2.20
10247.00	90.15	268.44	6767.03	125.34 S	3813.38 W	3815.34	1.98
10341.00	91.08	269.00	6766.02	127.44 S	3907.35 W	3909.33	1.15
10433.00	91.36	270.32	6764.06	127.98 S	3999.32 W	4001.29	1.47
10525.00	91.76	271.00	6761.55	126.92 S	4091.28 W	4093.19	0.86
10618.00	90.28	271.42	6759.90	124.96 S	4184.24 W	4186.07	1.65
10711.00	89.38	270.89	6760.18	123.08 S	4277.22 W	4278.97	1.12
10804.00	88.98	269.92	6761.51	122.43 S	4370.21 W	4371.91	1.13
10896.00	88.27	268.02	6763.71	124.08 S	4462.16 W	4463.88	2.20
10989.00	89.72	268.11	6765.35	127.22 S	4555.09 W	4556.86	1.56
11081.00	89.23	266.33	6766.19	131.68 S	4646.98 W	4648.83	2.01
11173.00	90.68	269.22	6766.26	135.25 S	4738.90 W	4740.81	3.51
11266.00	91.79	268.34	6764.26	137.23 S	4831.85 W	4833.78	1.52
11359.00	90.71	268.93	6762.23	139.45 S	4924.80 W	4926.76	1.32
11453.00	90.25	269.83	6761.44	140.46 S	5018.79 W	5020.74	1.08
11544.00	90.49	268.77	6760.85	141.58 S	5109.78 W	5111.73	1.19
11638.00	91.36	268.31	6759.33	143.97 S	5203.74 W	5205.72	1.05
11732.00	89.78	268.86	6758.40	146.29 S	5297.70 W	5299.71	1.78
11825.00	90.37	267.63	6758.28	149.14 S	5390.65 W	5392.71	1.47
11917.00	91.08	268.88	6757.11	151.94 S	5482.60 W	5484.70	1.56
12009.00	90.03	269.47	6756.22	153.27 S	5574.59 W	5576.68	1.31
12101.00	89.57	269.89	6756.54	153.78 S	5666.58 W	5668.67	0.68
12196.00	87.97	270.19	6758.58	153.71 S	5761.56 W	5763.61	1.71
12291.00	89.41	269.49	6760.76	153.98 S	5856.53 W	5858.55	1.69
12385.00	88.80	268.25	6762.22	155.83 S	5950.50 W	5952.54	1.47
12480.00	88.54	268.64	6763.68	158.83 S	6045.44 W	6047.53	0.78

12480.00	89.51	268.01	6763.62	158.93 S	6045.44 W	6047.52	0.79
12575.00	89.14	267.33	6764.74	162.79 S	6140.35 W	6142.51	0.81
12669.00	89.38	266.54	6765.96	167.82 S	6234.21 W	6236.46	0.88
12764.00	90.49	267.39	6766.07	172.85 S	6329.07 W	6331.42	1.47
12864.00	91.73	267.83	6764.13	177.02 S	6428.96 W	6431.39	1.32
12959.00	89.94	268.77	6762.74	179.84 S	6523.91 W	6526.38	2.13
13054.00	89.38	269.92	6763.31	180.92 S	6618.90 W	6621.36	1.35
13148.00	89.48	269.93	6764.24	181.05 S	6712.89 W	6715.33	0.11
13243.00	90.89	270.45	6763.94	180.73 S	6807.89 W	6810.29	1.58
13338.00	88.67	270.25	6764.30	180.15 S	6902.88 W	6905.23	2.35
13433.00	88.27	269.68	6766.84	180.21 S	6997.85 W	7000.17	0.73
13528.00	88.15	269.08	6769.81	181.24 S	7092.79 W	7095.11	0.64
13623.00	88.34	268.91	6772.71	182.90 S	7187.73 W	7190.06	0.27
13717.00	88.98	268.42	6774.91	185.09 S	7281.68 W	7284.03	0.86
13812.00	90.18	268.13	6775.61	187.95 S	7376.63 W	7379.03	1.30
13907.00	90.25	268.62	6775.25	190.64 S	7471.60 W	7474.03	0.52
14002.00	90.06	267.02	6775.00	194.26 S	7566.52 W	7569.02	1.70
14097.00	89.75	265.62	6775.15	200.36 S	7661.32 W	7663.94	1.51
14192.00	89.38	266.77	6775.87	206.66 S	7756.11 W	7758.86	1.27
14287.00	89.20	267.81	6777.05	211.15 S	7851.00 W	7853.83	1.11
14382.00	89.35	267.83	6778.25	214.76 S	7945.92 W	7948.82	0.16
14477.00	91.11	270.62	6777.87	216.05 S	8040.90 W	8043.79	3.47
14572.00	90.56	269.67	6776.49	215.81 S	8135.89 W	8138.75	1.16
14666.00	89.78	268.54	6776.21	217.28 S	8229.87 W	8232.74	1.46
14762.00	90.00	267.73	6776.39	220.40 S	8325.82 W	8328.73	0.87
14856.00	90.22	269.86	6776.21	222.38 S	8419.79 W	8422.73	2.28
14951.00	90.74	270.00	6775.42	222.49 S	8514.79 W	8517.70	0.57
15046.00	91.17	270.32	6773.83	222.23 S	8609.78 W	8612.64	0.56
15141.00	91.30	270.28	6771.79	221.73 S	8704.75 W	8707.57	0.14
15236.00	89.57	270.07	6771.06	221.44 S	8799.74 W	8802.53	1.83
15330.00	88.92	269.51	6772.30	221.79 S	8893.74 W	8896.50	0.91
15425.00	87.97	268.92	6774.88	223.09 S	8988.69 W	8991.45	1.18
15520.00	86.98	268.12	6779.07	225.54 S	9083.56 W	9086.36	1.34
15615.00	86.85	268.56	6784.18	228.29 S	9178.39 W	9181.22	0.48
15710.00	88.46	268.23	6788.07	230.95 S	9273.27 W	9276.14	1.73
15805.00	91.94	269.03	6787.74	233.22 S	9368.22 W	9371.12	3.76
15900.00	90.31	268.15	6785.87	235.55 S	9463.17 W	9466.10	1.95
15995.00	90.31	268.23	6785.36	238.55 S	9558.12 W	9561.10	0.08
16089.00	89.91	266.94	6785.18	242.52 S	9652.04 W	9655.08	1.44
16184.00	89.91	265.83	6785.32	248.51 S	9746.85 W	9750.01	1.17
16279.00	89.32	265.97	6785.96	255.30 S	9841.60 W	9844.91	0.64
16380.00	89.32	264.73	6787.16	263.49 S	9942.26 W	9945.75	1.23
16445.00	89.32	264.73	6787.93	269.45 S	10006.98 W	10010.60	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 268.52 DEGREES (GRID)
A TOTAL CORRECTION OF 7.47 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16445.00 FEET
IS 10010.61 FEET ALONG 268.46 DEGREES (GRID)**

Final survey is a straight line projection to TD.