

PCG Pressure Case Gamma PCD Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	04-Jan-15	07-Jan-15			
Rig Bit Number	2	3			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,231.00	5,964.00			
Log End Depth (MD, ft)	5,964.00	10,448.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	03-Jan-15 05:45	05-Jan-15 22:15			
Drill/Wipe End Date and Time	04-Jan-15 08:45	07-Jan-15 00:30			
Min Inc (deg) @ Depth (MD, ft)	0.29 @ 1,390.00	84.57 @ 5,999.00			
Max Inc (deg) @ Depth (MD, ft)	81.74 @ 5,907.00	91.73 @ 9,680.00			
Bit TFA(in2) / Bit Type	1.21 / PDC	0.98 / PDC			
Flow Rate (gpm)	637.27	300.00			
Max AV (fpm) / CV (fpm) @ MWD	423.7 / NA	442.1 / NA			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	8.95 / 28.00	10.10 / 37.00			
Filtrate CL (ppm)	1,900.00	1,700.00			
pH / Fluid Loss (mptm)	9.80 / 36	9.90 / 7			
PV (cP) / YP (lbf2)	4 / 3.00	11 / 14.00			
% Solids / % Sand	10.5 / 0.25	9.5 / 0.20			
% Oil / Oil:Water Ratio	N/A / N/A	NA / NA			
Rm @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmf @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Rmc @ Measured Temp (degF)	N/A @ N/A	NA @ NA			
Max Tool Temp (in F) / C	105.50 / 40.83	200.00 / 76.67			

Max Tool Temp (degF) / Source	165.58 / PCM	200.80 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	NA @ NA			
Lead MWD Engineer	Brett Vandergon	Brett Vandergon			
Customer Representative	Jim Boyd	Jim Boyd			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	10789247	11768602			
Insert Serial Number	11400880	11619985			
Date and Time Initialized	01-Jan-15 10:30	04-Jan-15 19:32			
Date and Time Read	04-Jan-15 17:26	07-Jan-15 11:34			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	57.00	55.00			
Software Version	6.33	6.21			
Sub Serial Number	10789247	11768602			
Sonde Serial Number	10993517	11478016			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	66.43	69.70			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	50.27	47.87			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	10789247	11768602			
Insert/Sonde Serial Number	11293261	12037419			

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:
1: 600
PGRC (Corrected Gamma Ray):
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
Gap Fill: 5.0 ft
ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
Gap Fill: 5.0 ft
1: 240
PGRC (Corrected Gamma Ray):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
Gap Fill: 3.0 ft

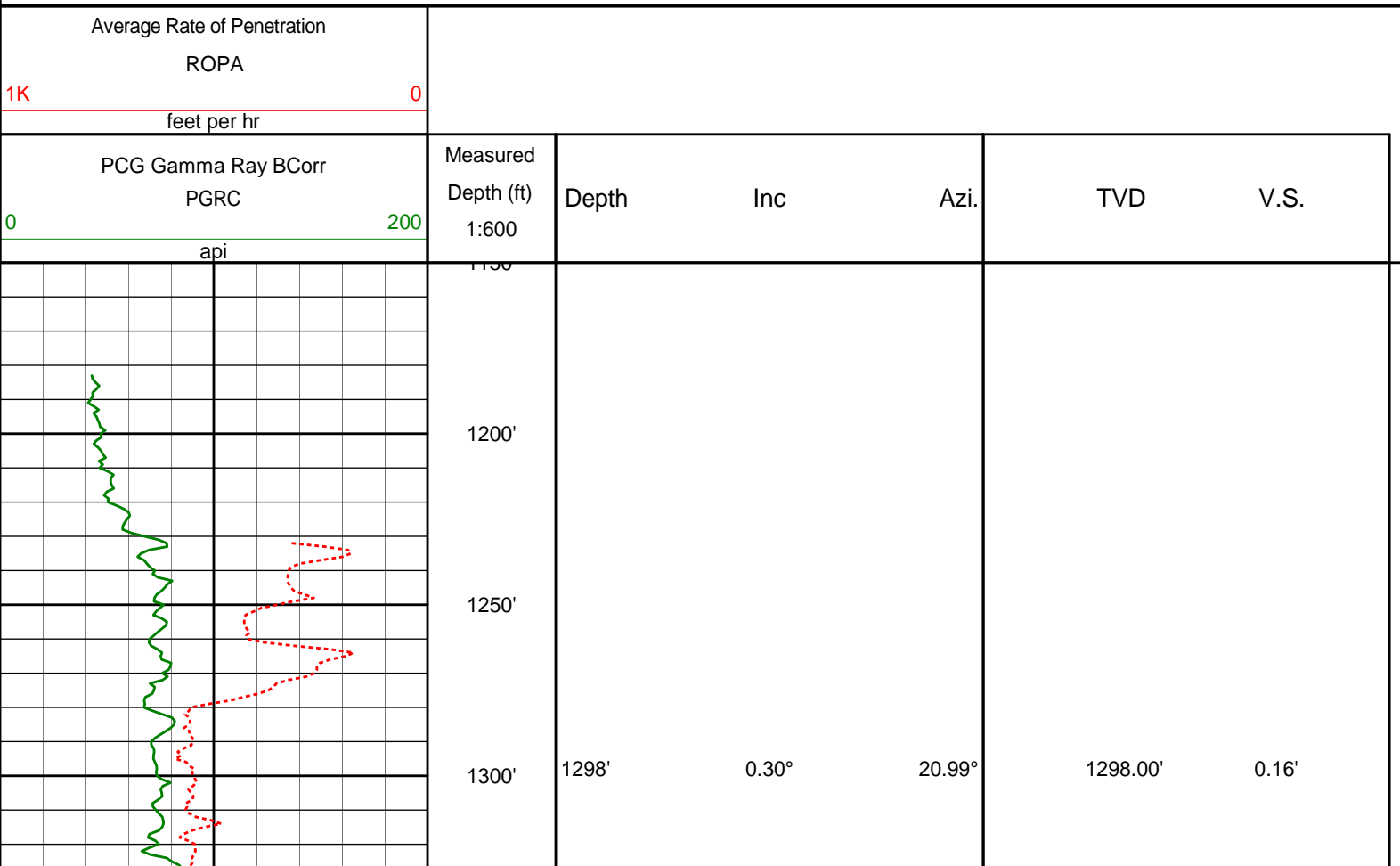
Gap Fill: 3.0 ft
ROPA (Average Rate of Penetration)
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill: 3.0 ft
6. INSITE version 8.0.2

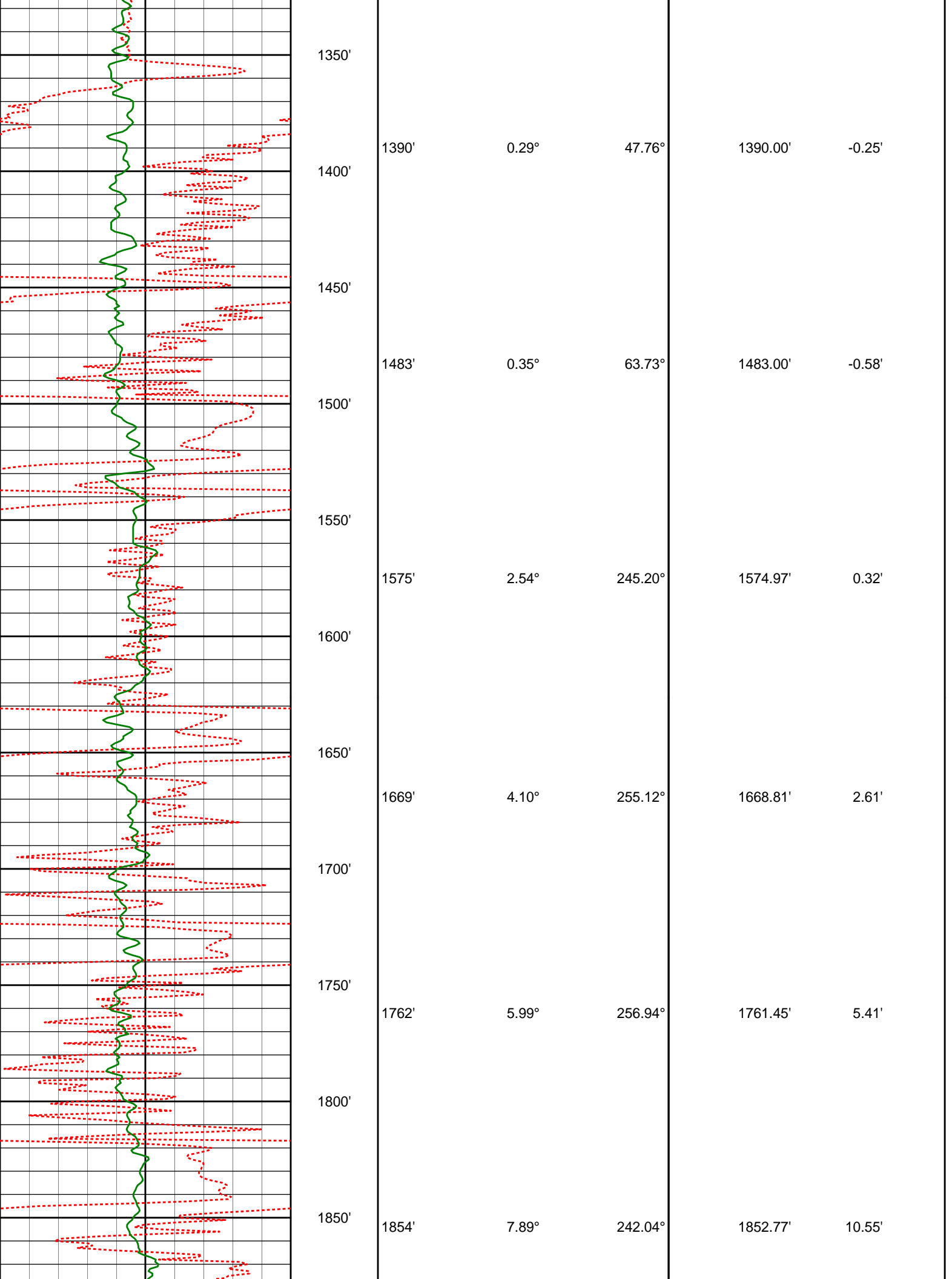
WARRANTY

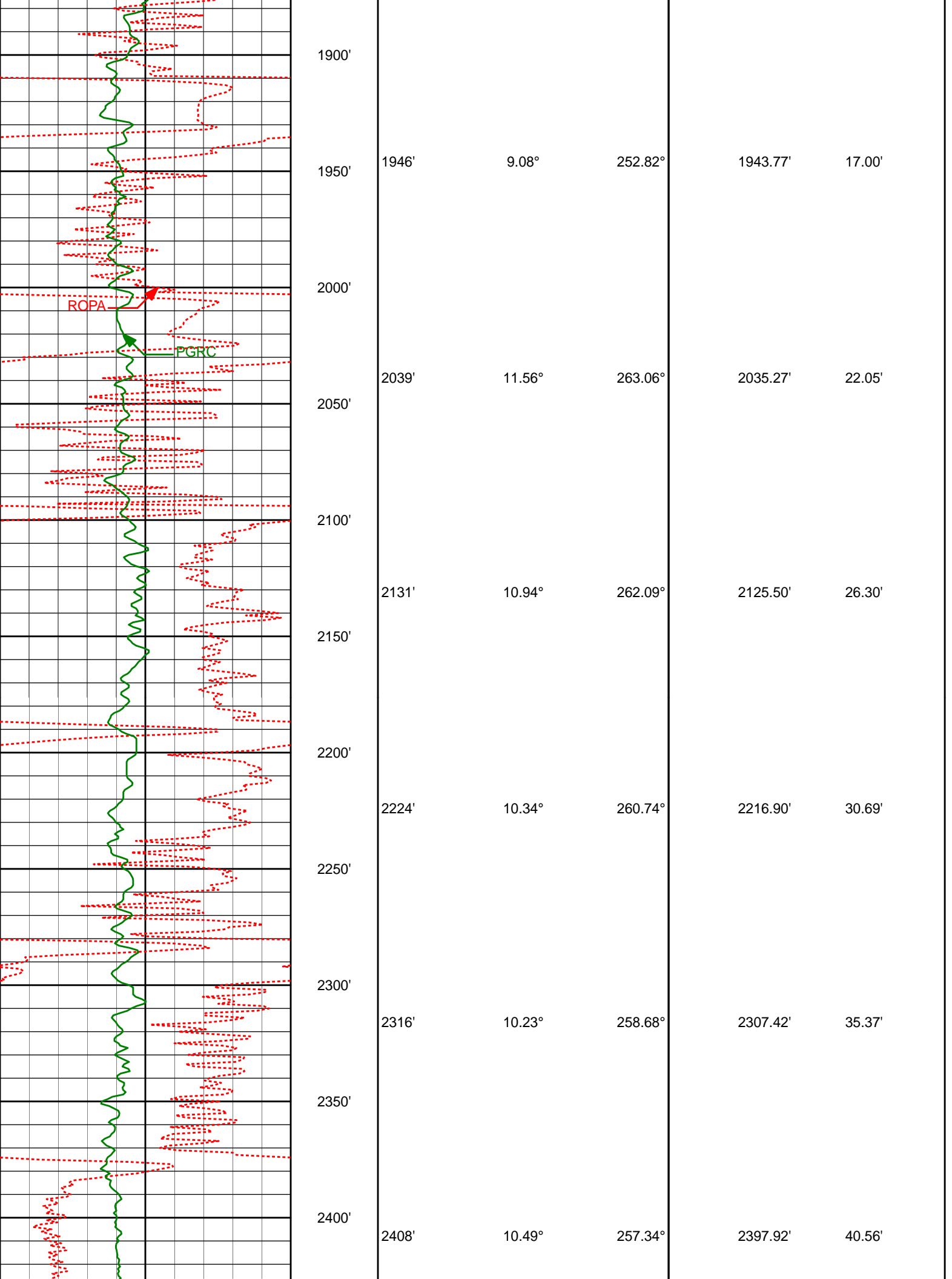
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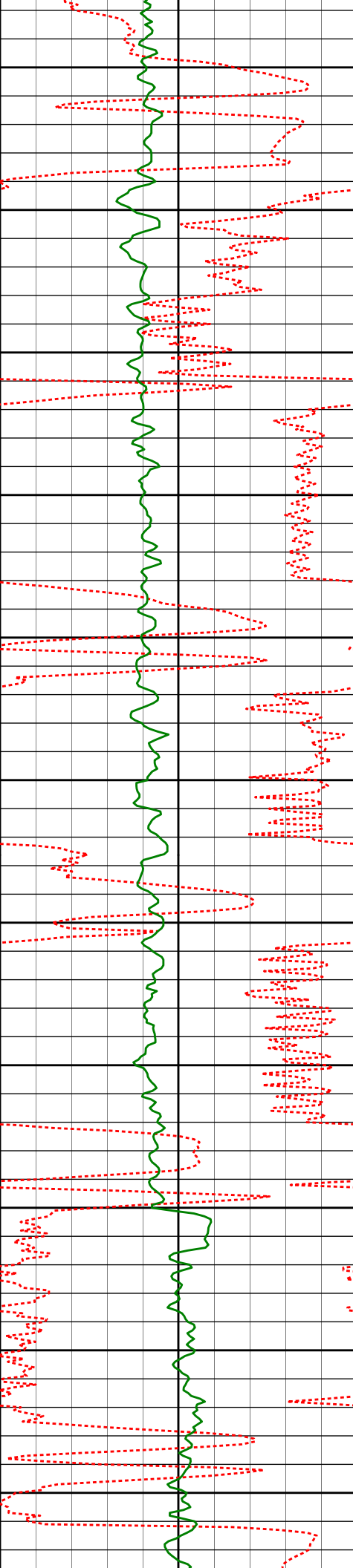
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MD Main Log 1:600









2450'

2500'

2550'

2600'

2650'

2700'

2750'

2800'

2850'

2900'

2950'

2504'

11.34°

265.09°

2492.19'

45.22'

2599'

11.37°

265.18°

2585.33'

48.84'

2694'

11.18°

265.21°

2678.49'

52.40'

2788'

10.85°

265.26°

2770.76'

55.84'

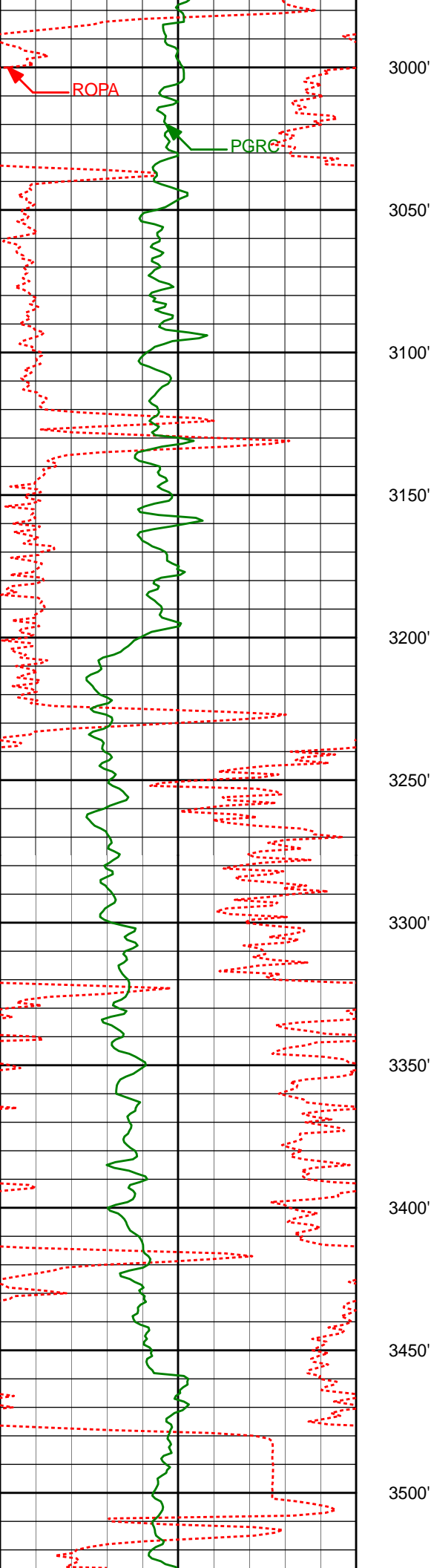
2884'

9.63°

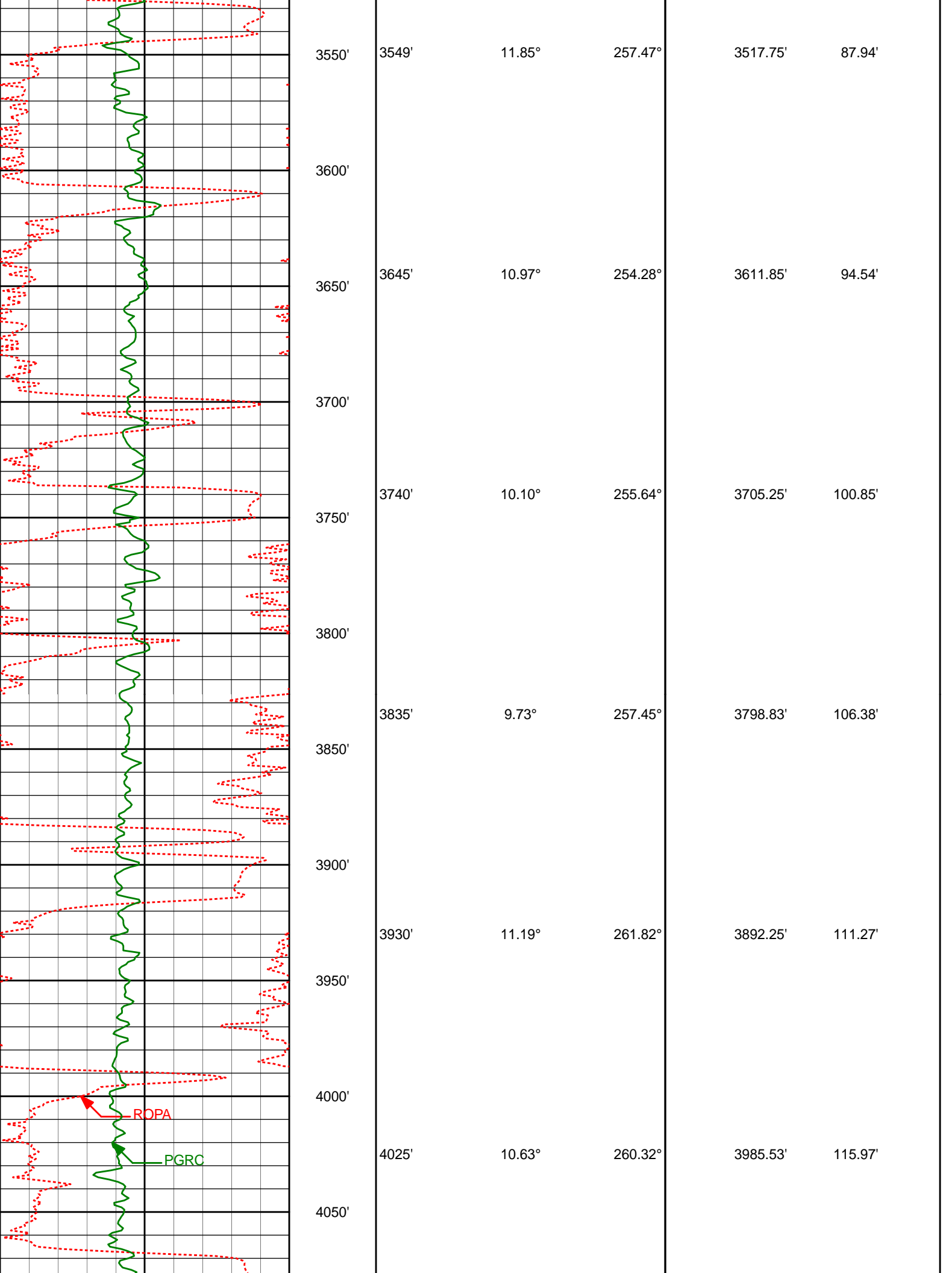
264.49°

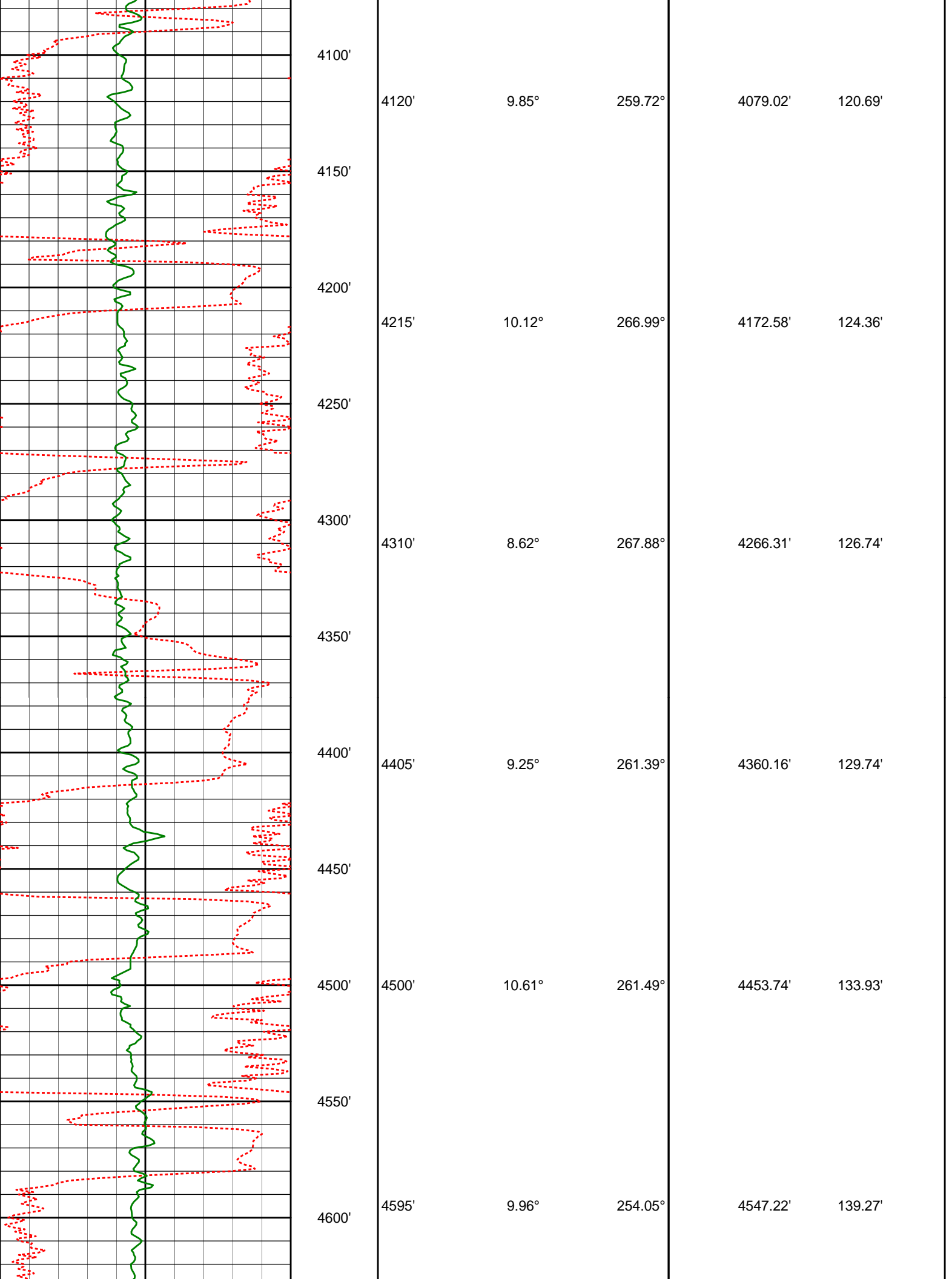
2865.23'

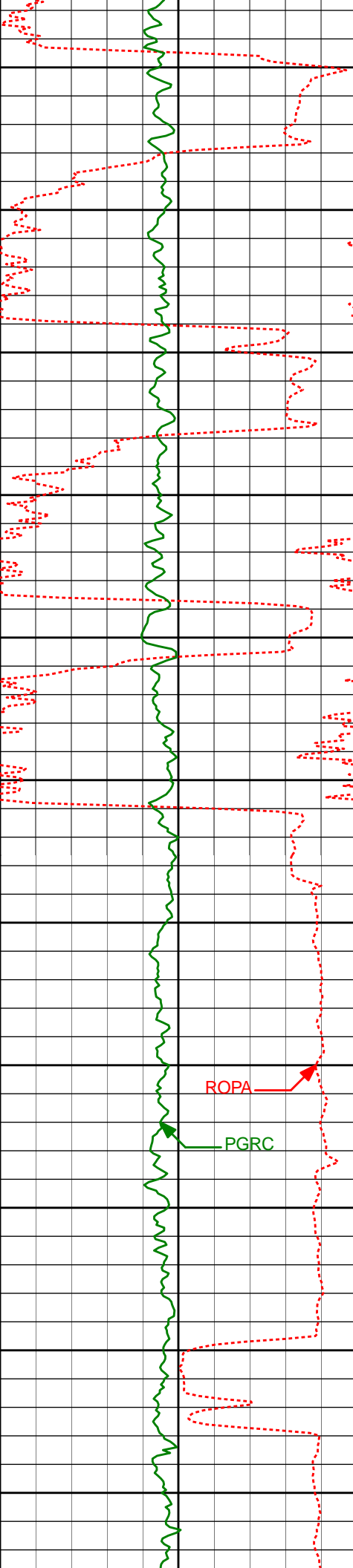
59.21'



2979'	10.36°	264.28°	2958.79'	62.60'
3074'	10.54°	263.85°	3052.21'	66.25'
3169'	10.71°	263.56°	3145.58'	70.06'
3264'	11.23°	263.48°	3238.85'	74.04'
3359'	11.78°	263.62°	3331.94'	78.21'
3454'	12.32°	263.57°	3424.85'	82.57'







4650'

4691'	11.64°	257.65°	4641.51'	145.51'
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4700'

4750'

4786'	12.47°	251.40°	4734.42'	152.88'
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4800'

4850'

4881'	11.53°	247.90°	4827.34'	161.70'
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4900'

4950'

4976'	15.37°	218.14°	4919.83'	176.93'
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5000'

ROPA

PGRC

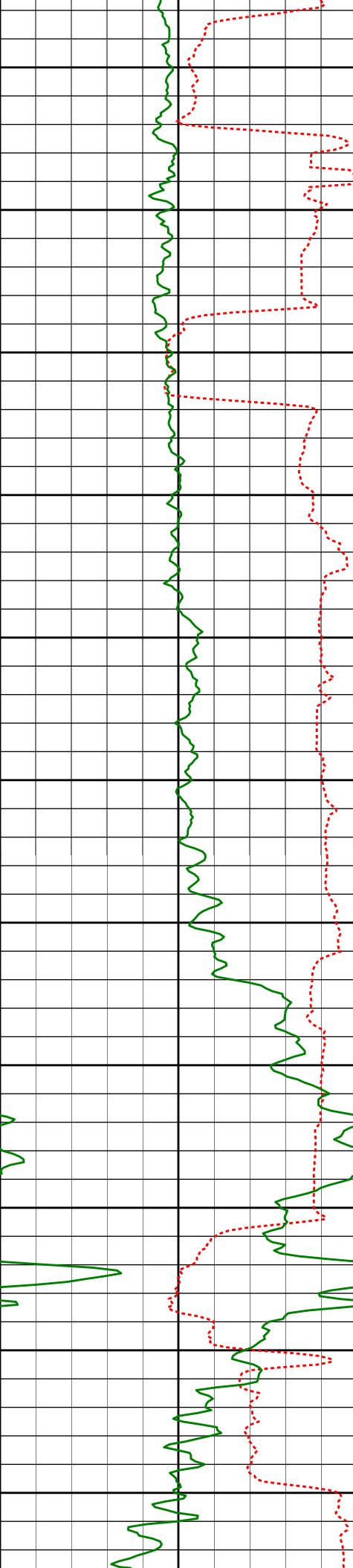
5050'

5071'	26.43°	209.05°	5008.46'	207.22'
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5100'

5150'

5166'	28.61°	195.22°	5092.79'	249.23'
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5200'

5250'

5300'

5350'

5400'

5450'

5500'

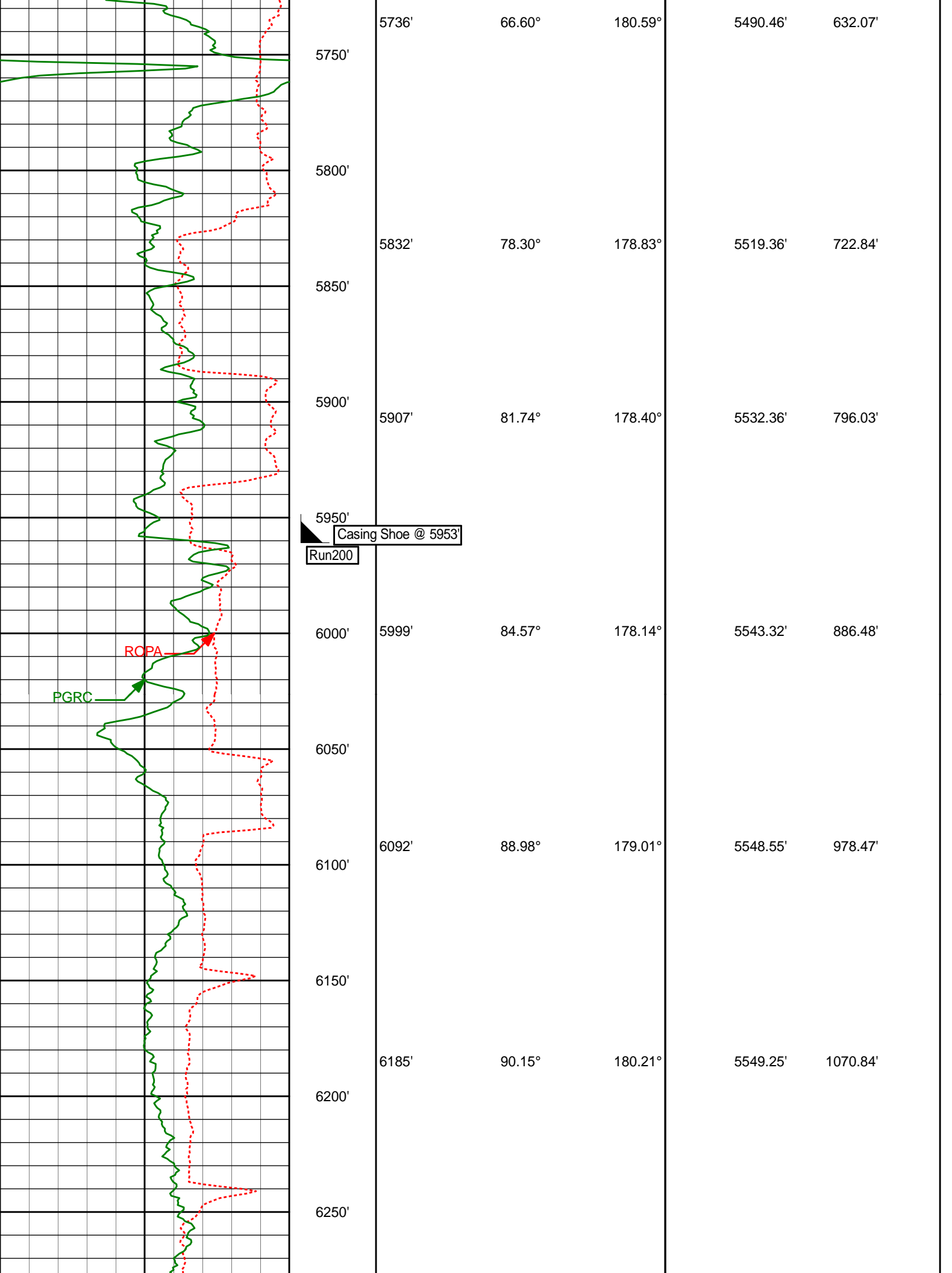
5550'

5600'

5650'

5700'

5261'	27.54°	187.32°	5176.64'	293.67'
5357'	32.95°	184.05°	5259.55'	341.99'
5405'	37.09°	179.36°	5298.86'	369.41'
5451'	40.90°	175.85°	5334.61'	398.01'
5546'	52.80°	179.69°	5399.48'	466.44'
5594'	60.50°	180.86°	5425.85'	506.29'
5642'	61.30°	180.91°	5449.19'	548.04'





6300'

6350'

6400'

6450'

6500'

6550'

6600'

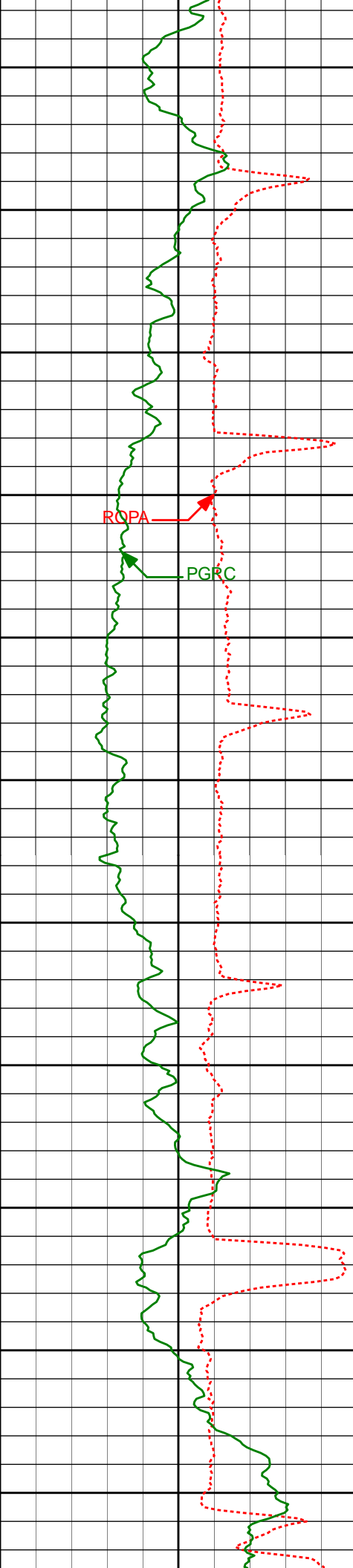
6650'

6700'

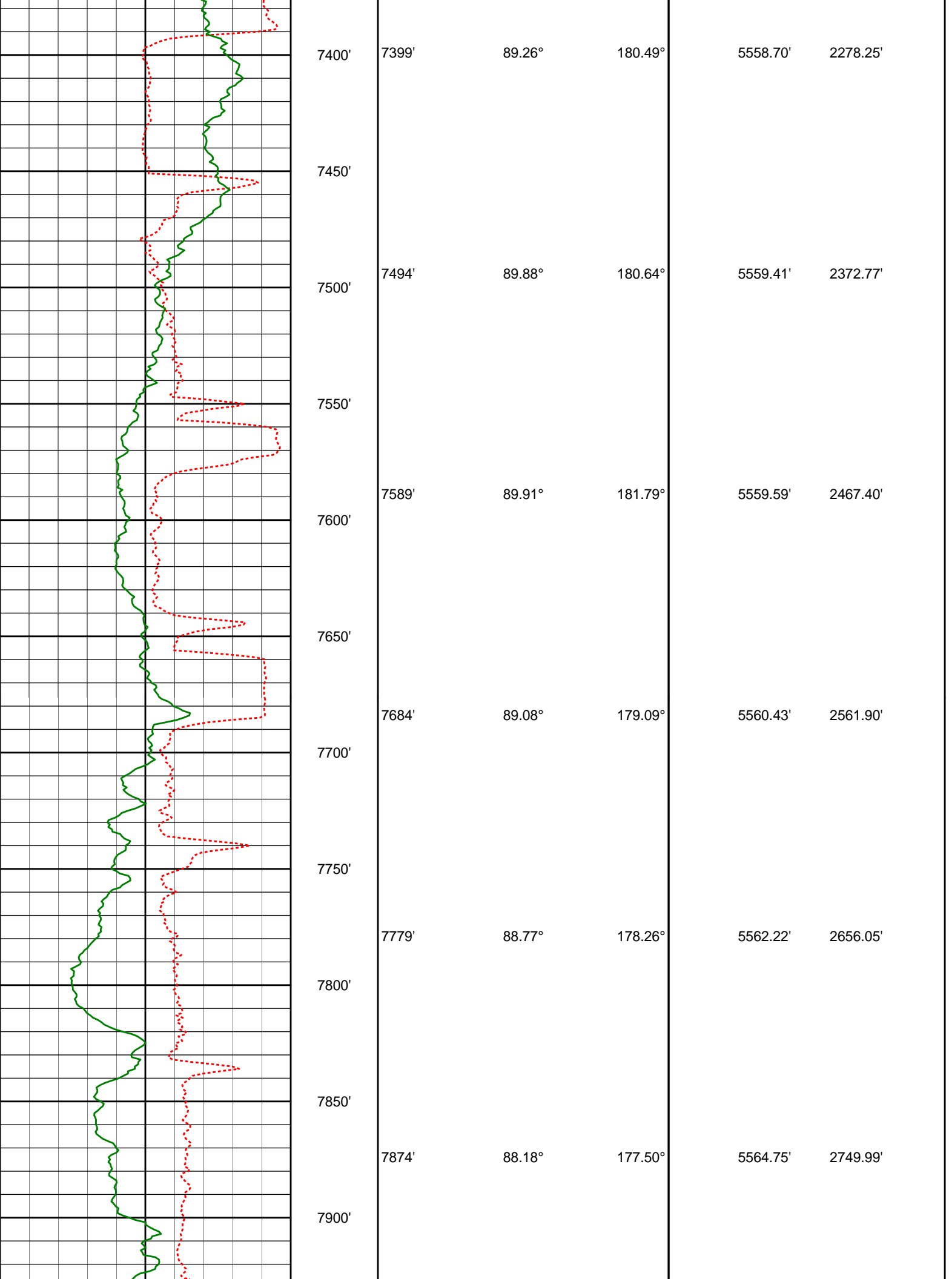
6750'

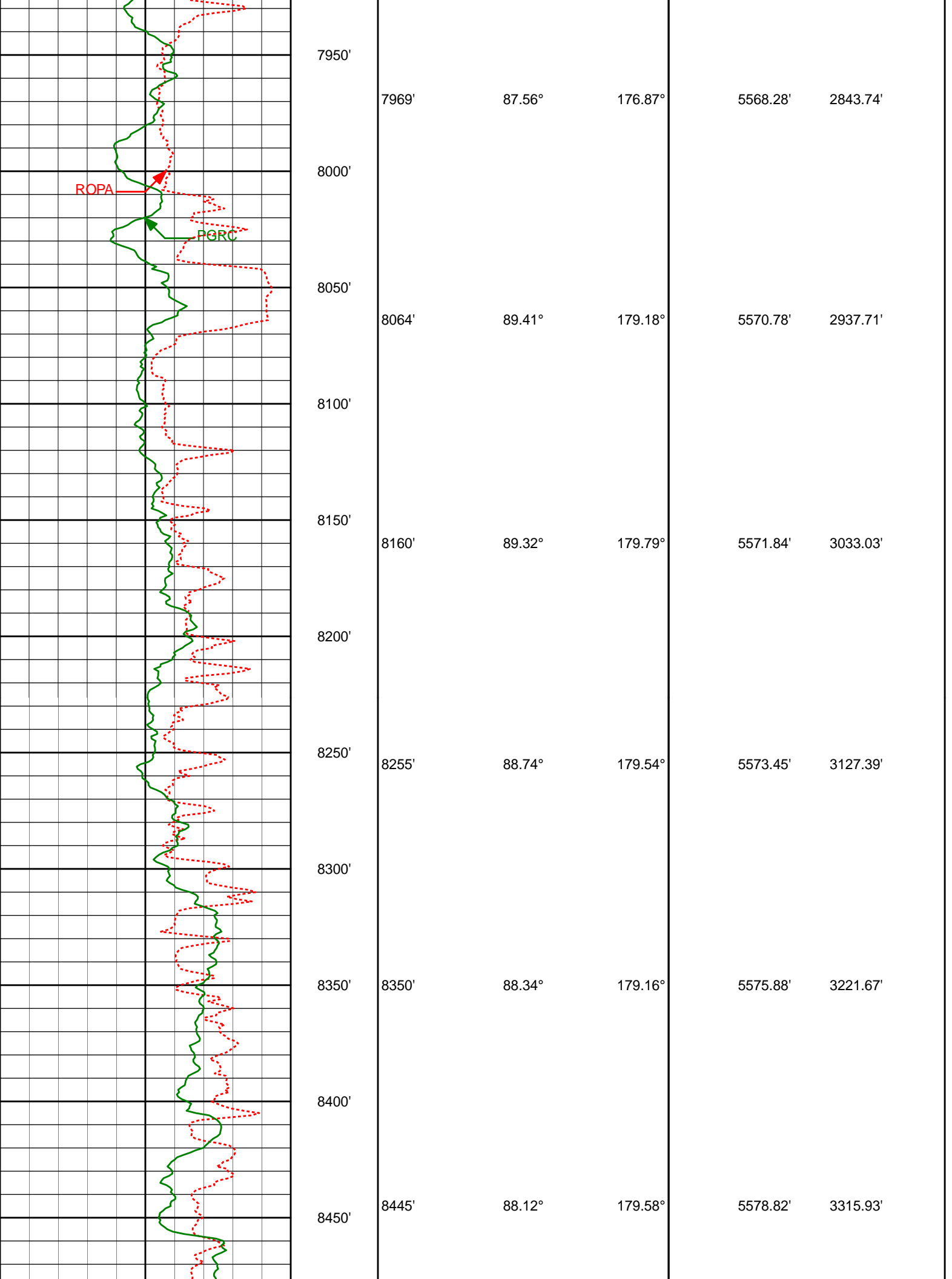
6800'

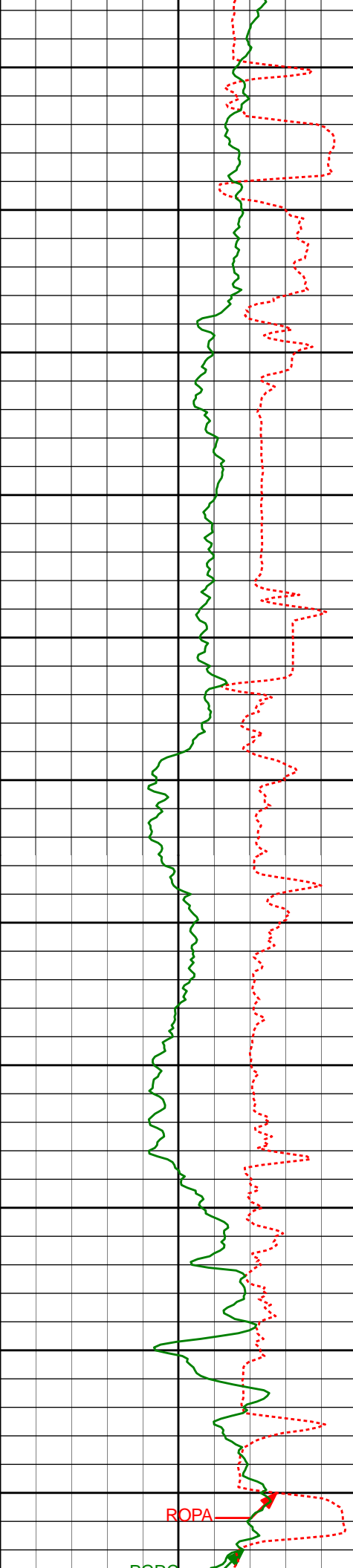
6278'	90.18°	179.47°	5548.97'	1163.25'
6370'	89.51°	178.45°	5549.22'	1254.50'
6463'	90.92°	181.29°	5548.87'	1346.91'
6555'	88.77°	181.53°	5549.12'	1438.57'
6648'	88.80°	180.90°	5551.10'	1531.19'
6740'	88.64°	180.85°	5553.15'	1622.76'



6833'	88.67°	180.27°	5555.33'	1715.27'
6850'				
6900'				
6925'	88.86°	179.88°	5557.31'	1806.71'
6950'				
7000'				
7020'	88.95°	180.07°	5559.12'	1901.12'
7050'				
7100'				
7114'	89.85°	180.63°	5560.10'	1994.62'
7150'				
7200'				
7209'	90.56°	180.73°	5559.77'	2089.16'
7250'				
7300'				
7304'	90.74°	180.74°	5558.70'	2183.71'
7350'				







8500'

8540'	89.17°	178.79°	5581.07'	3410.18'
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8550'

8600'

8635'	89.08°	178.77°	5582.53'	3504.36'
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8650'

8700'

8730'	89.20°	178.56°	5583.96'	3598.51'
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8750'

8800'

8825'	88.83°	178.32°	5585.60'	3692.61'
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8850'

8900'

8920'	88.40°	178.00°	5587.90'	3786.63'
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8950'

9000'

9015'	89.82°	178.94°	5589.38'	3880.74'
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9050'

9100'

9150'

9200'

9250'

9300'

9350'

9400'

9450'

9500'

9550'

9110'

89.97°

178.97°

5589.56'

3974.97'

9205'

89.78°

178.35°

5589.76'

4069.13'

9300'

89.97°

178.24°

5589.97'

4163.21'

9395'

90.55°

177.96°

5589.53'

4257.24'

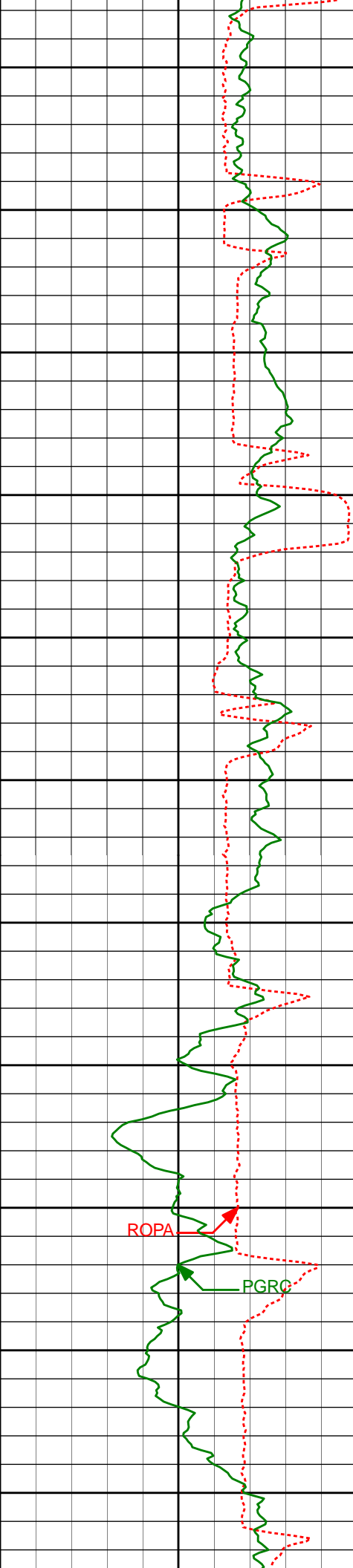
9490'

90.09°

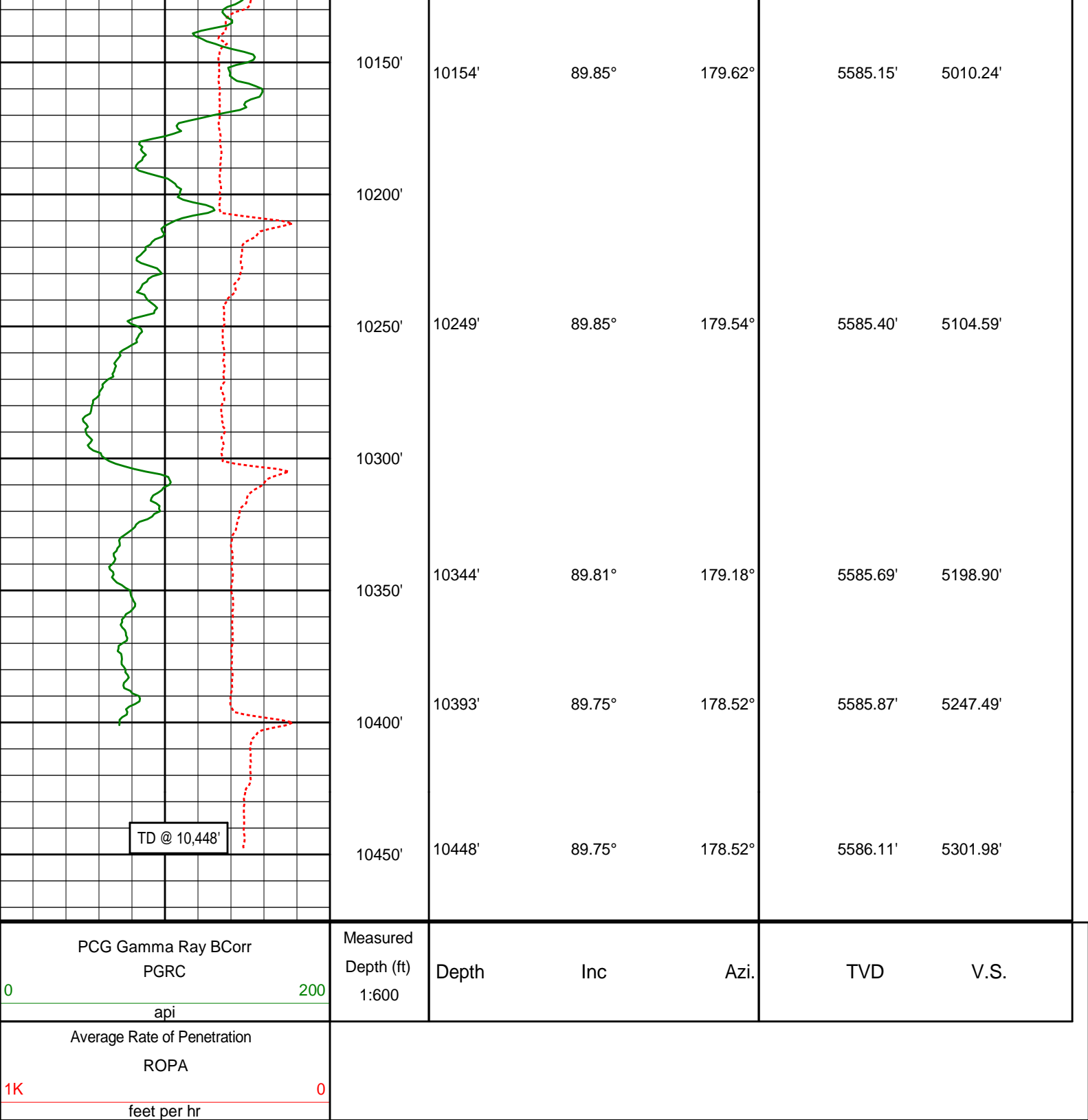
176.70°

5589.00'

4351.09'



9585'	91.51°	178.82°	5587.67'	4445.02'
9600'				
9650'				
9680'	91.73°	179.37°	5584.98'	4539.24'
9700'				
9750'				
9775'	90.15°	180.26°	5583.42'	4633.62'
9800'				
9850'				
9870'	89.97°	180.24°	5583.31'	4728.10'
9900'				
9950'				
9965'	89.54°	179.97°	5583.72'	4822.55'
10000'				
10050'				
10060'	89.45°	179.27°	5584.57'	4916.90'
10100'				

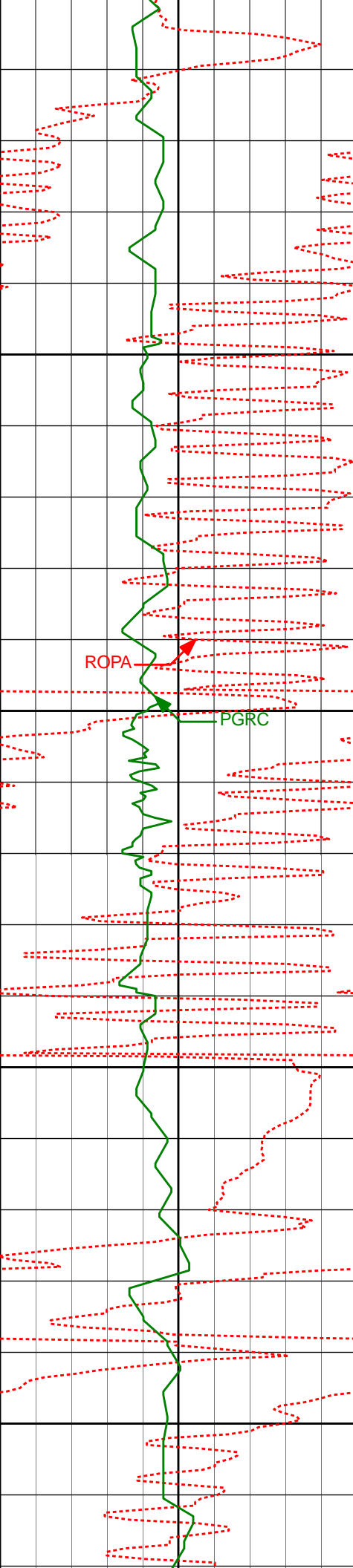


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MD Main Log 1:240



PCG Gamma Ray BCorr PGRC										Measured Depth (ft) 1:240	Depth	Inc	Azi.	TVD	V.S.
<div>0</div> <div>200</div> <div>api</div> <div>PGRC</div>															
										1150'					
										1200'					
										1250'					
										1300'	1298'	0.30°	20.99°	1298.00'	0.16'
										1350'					



1350'

1390'

1400'

1450'

1483'

1500'

1550'

1390'

0.29°

47.76°

1390.00'

-0.25'

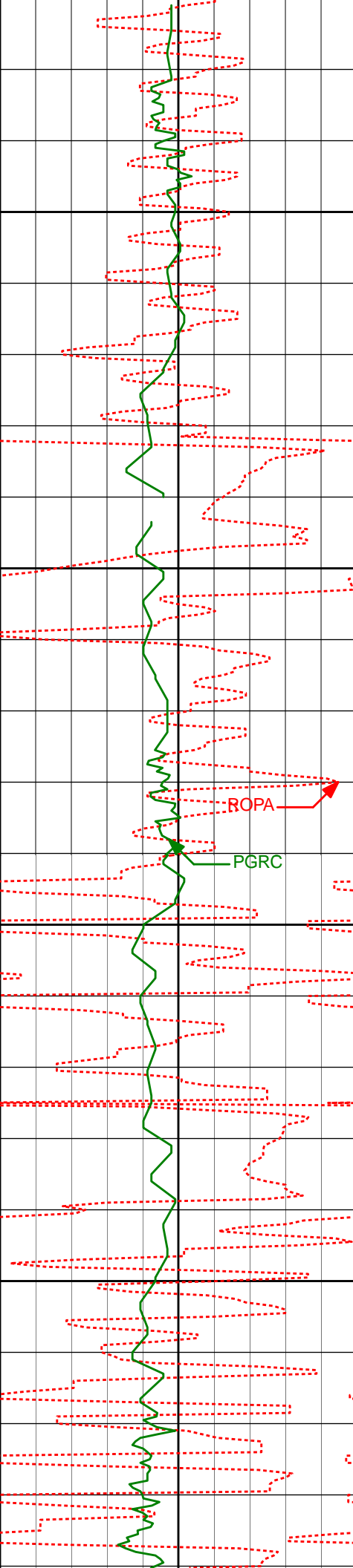
1483'

0.35°

63.73°

1483.00'

-0.58'



1600'

1650'

1700'

1750'

1575'

2.54°

245.20°

1574.97'

0.32'

1669'

4.10°

255.12°

1668.81'

2.61'

1762'

5.99°

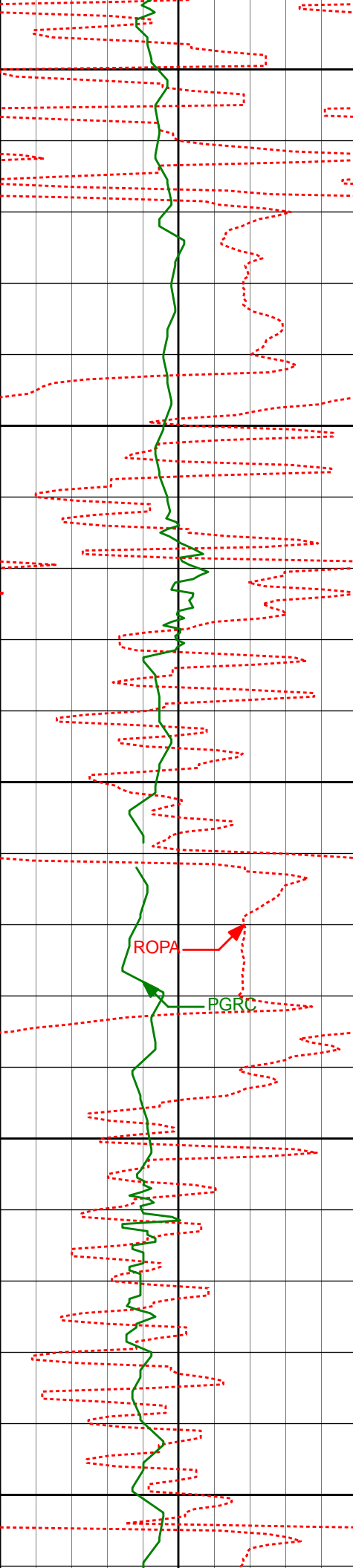
256.94°

1761.45'

5.41'

ROPA

PGRC



1800'

1850'

1900'

1950'

2000'

1854'

7.89°

242.04°

1852.77'

10.55'

ROPA

PGRC

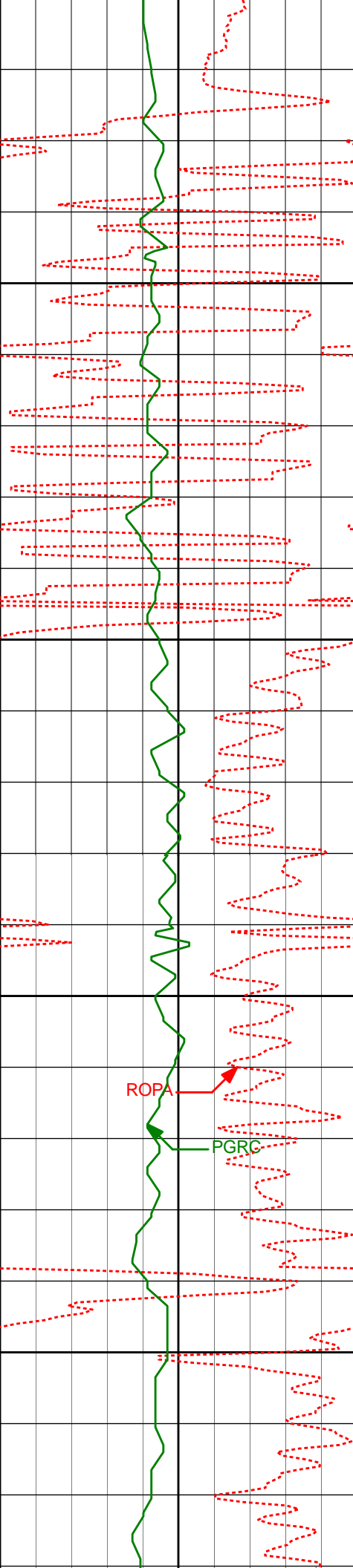
1946'

9.08°

252.82°

1943.77'

17.00'



2050'

2100'

2150'

2200'

2039'

11.56°

263.06°

2035.27'

22.05'

2131'

10.94°

262.09°

2125.50'

26.30'

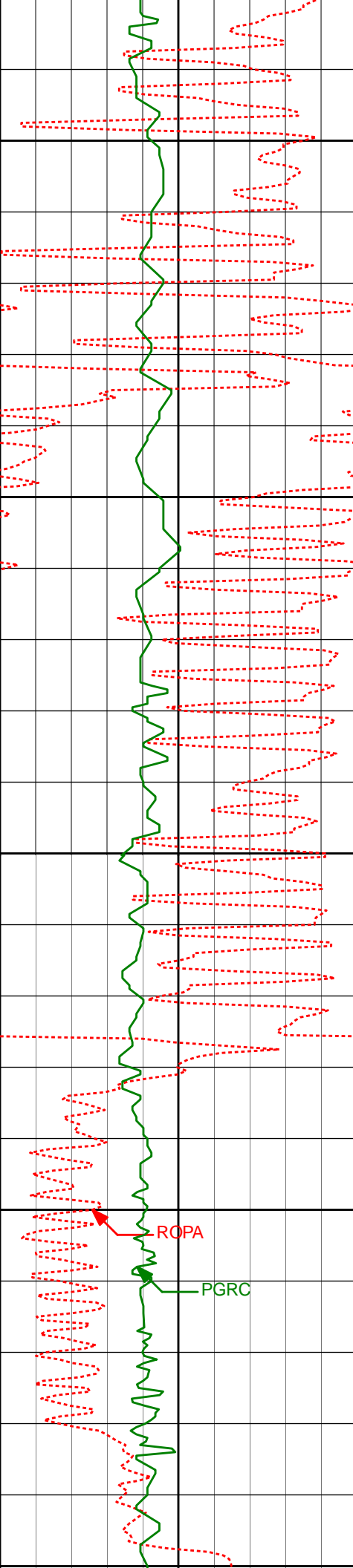
2224'

10.34°

260.74°

2216.90'

30.69'



2250'

2300'

2350'

2400'

2450'

2316'

10.23°

258.68°

2307.42'

35.37'

2408'

10.49°

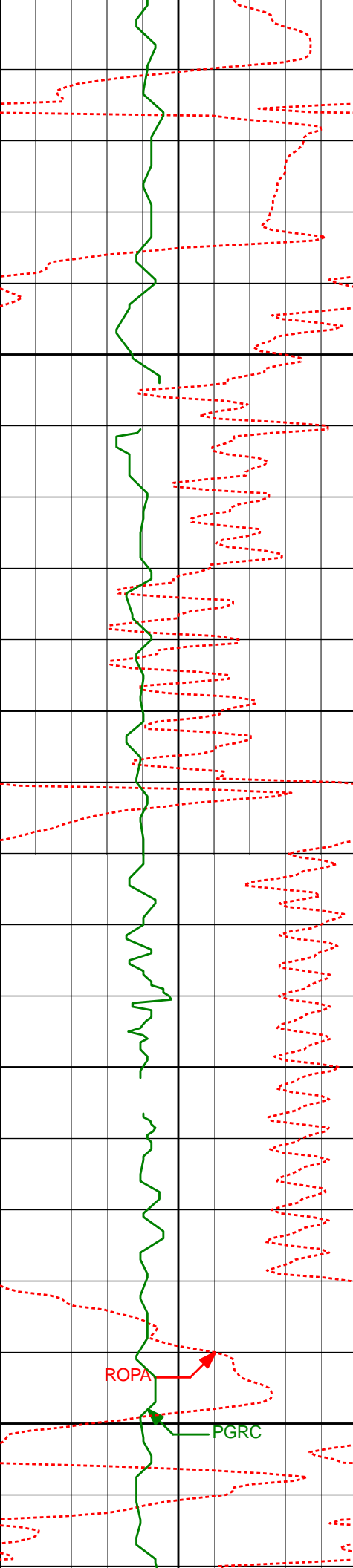
257.34°

2397.92'

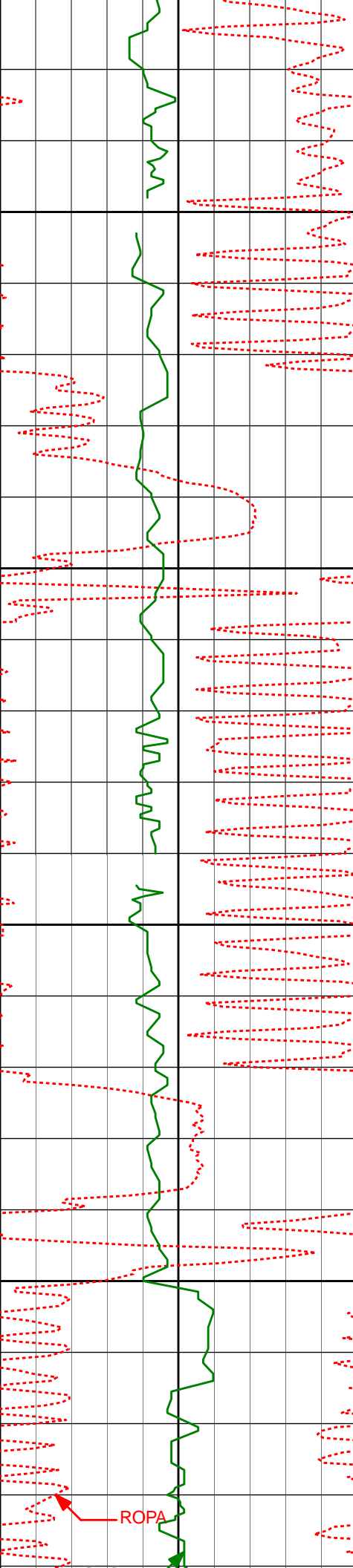
40.56'

ROPA

PGRC



2400'					
2500'	2504'	11.34°	265.09°	2492.19'	45.22'
2550'					
2600'	2599'	11.37°	265.18°	2585.33'	48.84'
2650'					



2700'

2750'

2800'

2850'

2694'

11.18°

265.21°

2678.49'

52.40'

2788'

10.85°

265.26°

2770.76'

55.84'

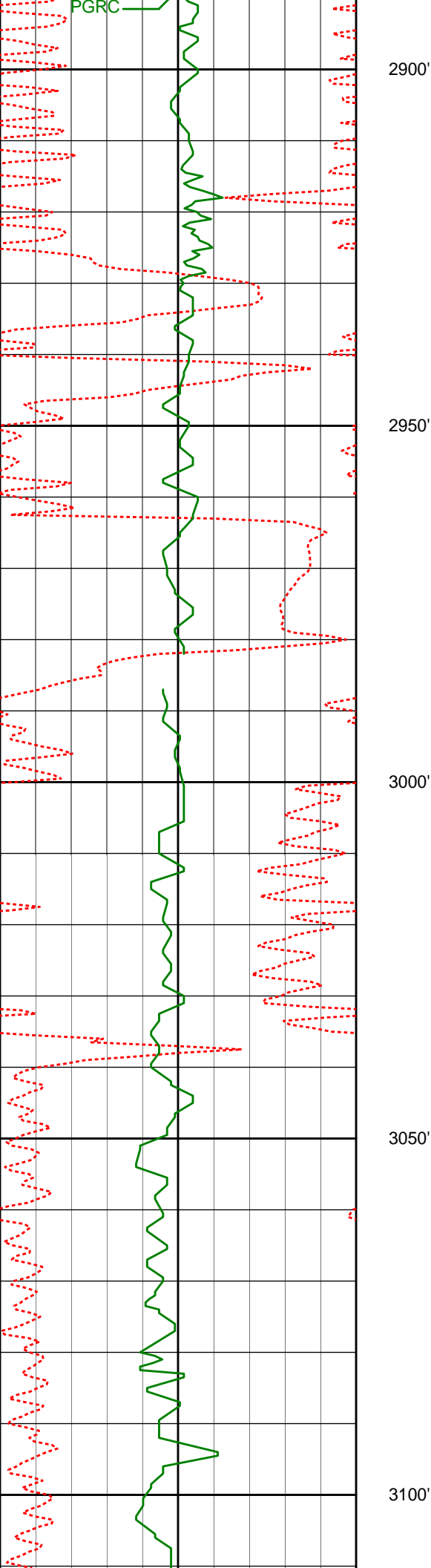
2884'

9.63°

264.49°

2865.23'

59.21'



2979'

10.36°

264.28°

2958.79'

62.60'

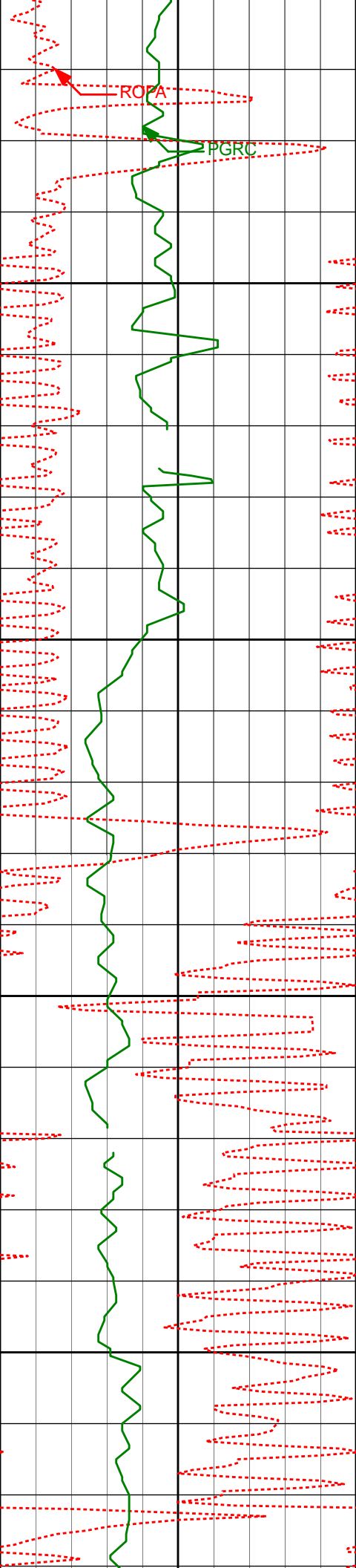
3074'

10.54°

263.85°

3052.21'

66.25'



3150'

3169'

10.71°

263.56°

3145.58'

70.06'

3200'

3250'

3264'

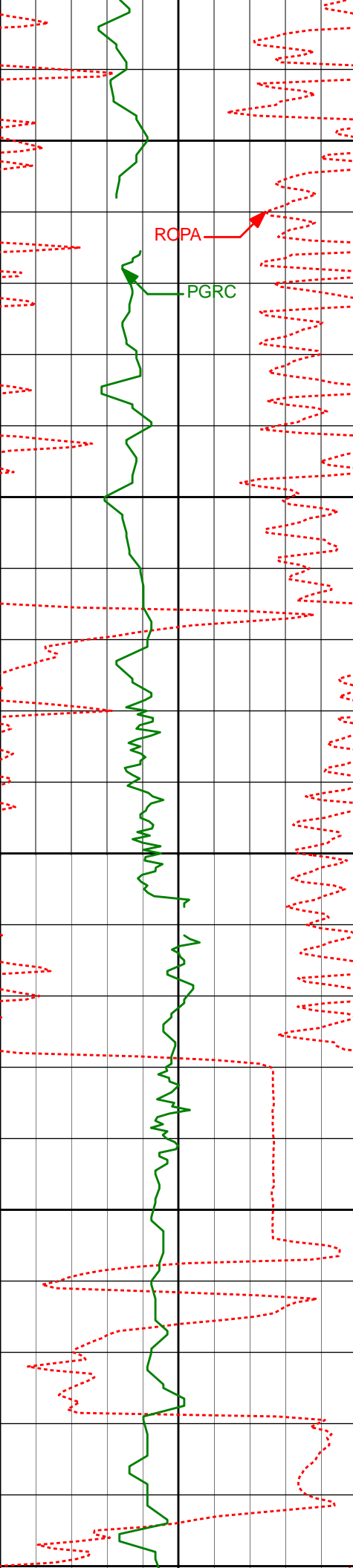
11.23°

263.48°

3238.85'

74.04'

3300'



RCPA

PGRC

3350'

3400'

3450'

3500'

3550'

3359'

11.78°

263.62°

3331.94'

78.21'

3454'

12.32°

263.57°

3424.85'

82.57'

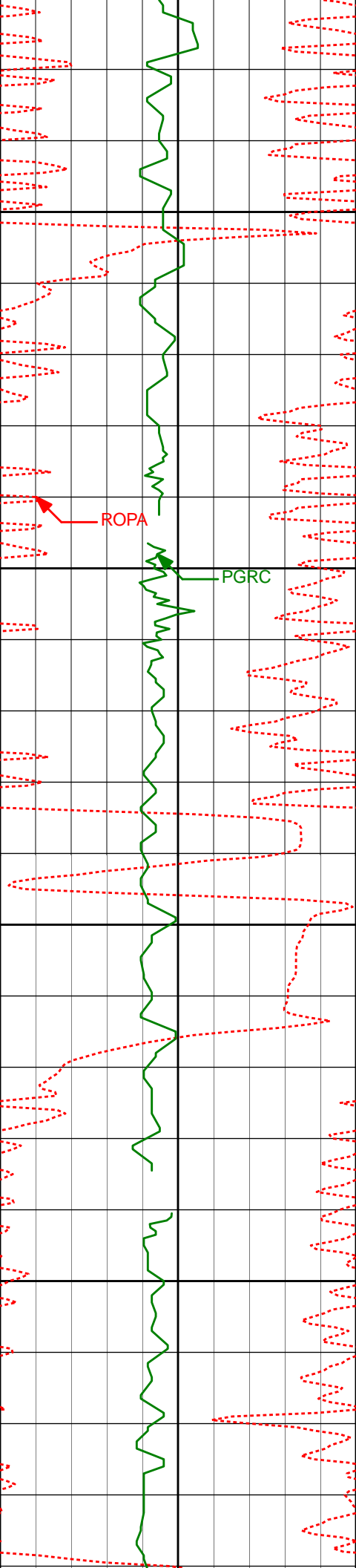
3549'

11.85°

257.47°

3517.75'

87.94'



3800'

3835'

9.73°

257.45°

3798.83'

106.38'

3850'

3900'

3930'

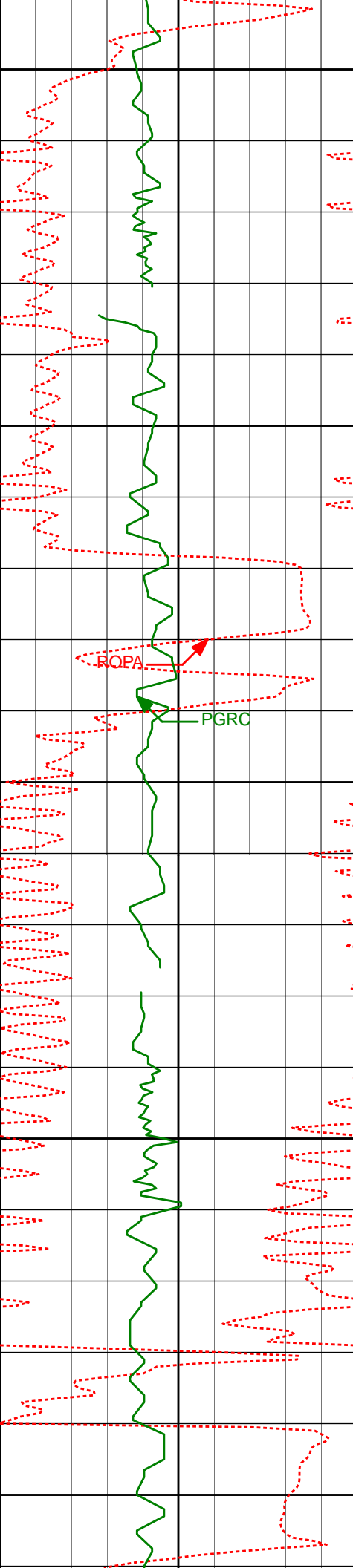
11.19°

261.82°

3892.25'

111.27'

3950'



4000'

4025'

10.63°

260.32°

3985.53'

115.97'

4050'

4100'

4120'

9.85°

259.72°

4079.02'

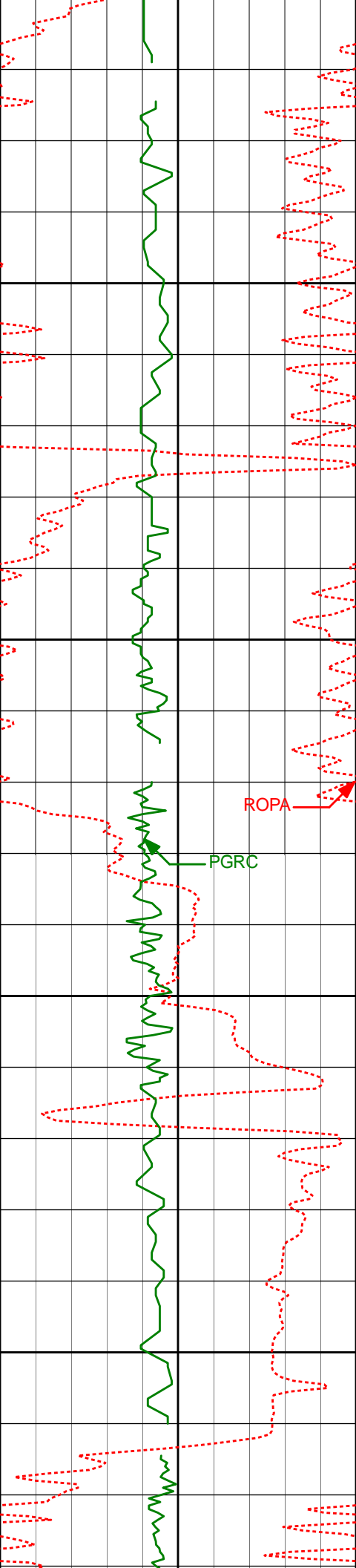
120.69'

4150'

4200'

ROPA

PGRC



4215'

10.12°

266.99°

4172.58'

124.36'

4250'

4300'

4310'

8.62°

267.88°

4266.31'

126.74'

ROPA

PGRC

4350'

4400'

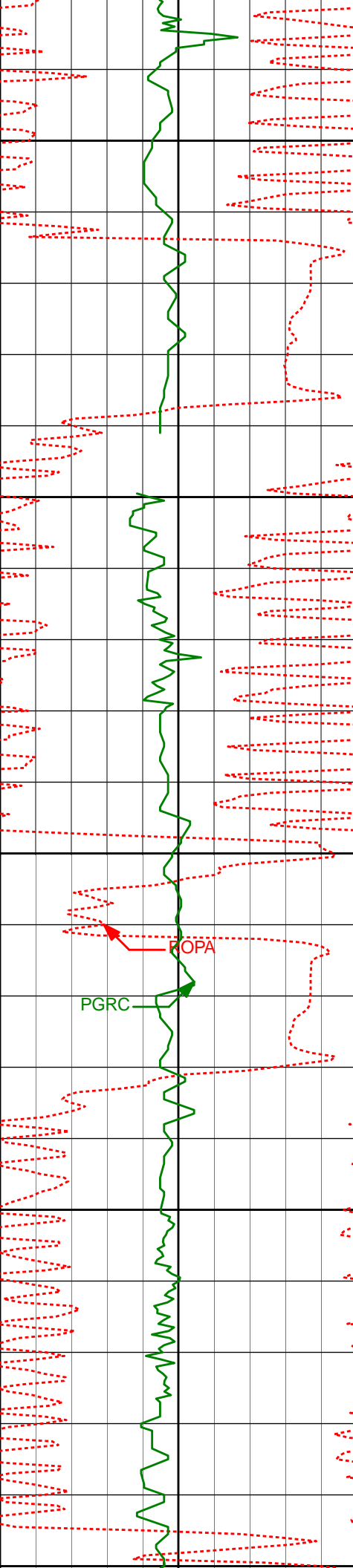
4405'

9.25°

261.39°

4360.16'

129.74'



4450'

4500'

4550'

4600'

4650'

4500'

10.61°

261.49°

4453.74'

133.93'

ROPA

PGRC

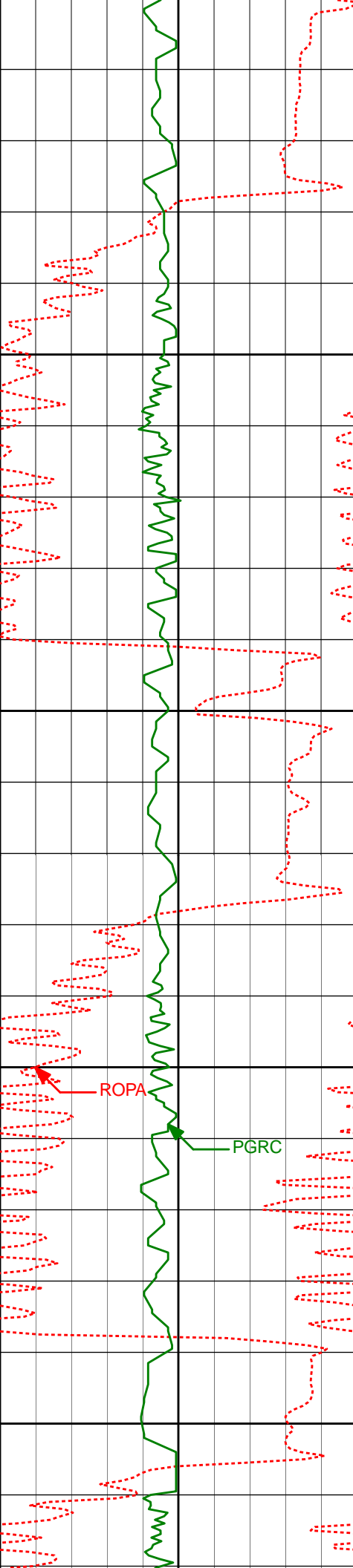
4595'

9.96°

254.05°

4547.22'

139.27'



4650'

4691'

4700'

4750'

4786'

4800'

4850'

4691'

11.64°

257.65°

4641.51'

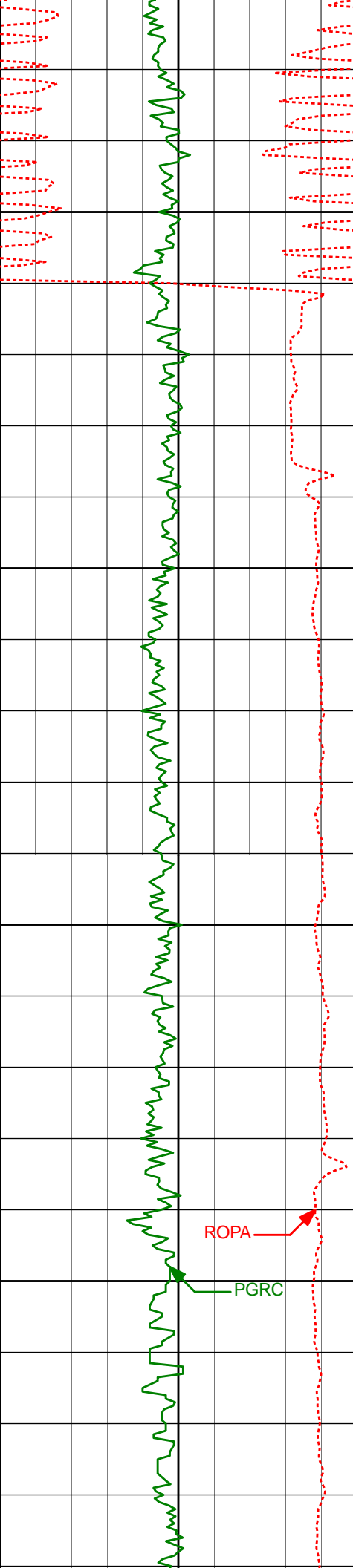
145.51'

12.47°

251.40°

4734.42'

152.88'



4900'

4950'

5000'

5050'

ROPA
PGRC

4881'

11.53°

247.90°

4827.34'

161.70'

4976'

15.37°

218.14°

4919.83'

176.93'

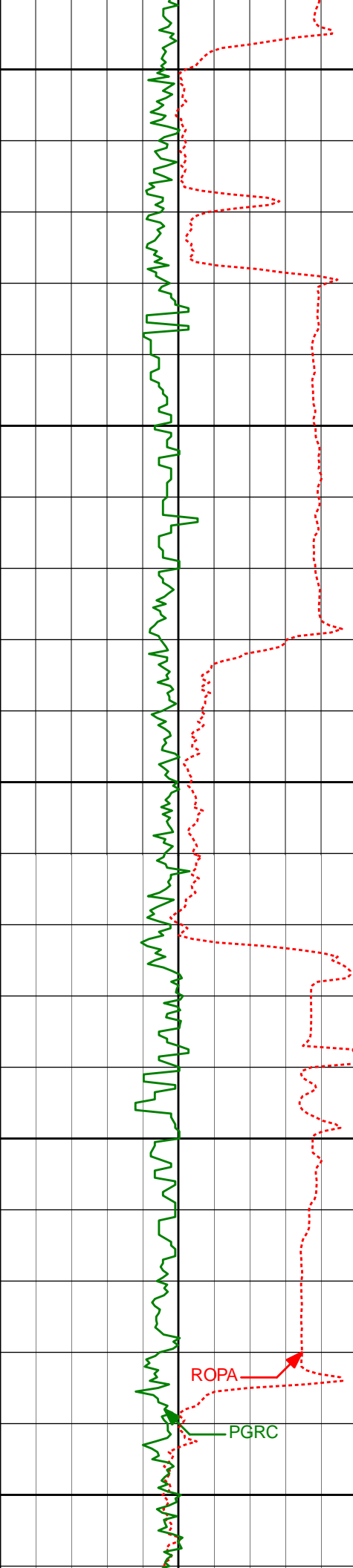
5071'

26.43°

209.05°

5008.46'

207.22'



5100'

5150'

5200'

5250'

5300'

5166'

28.61°

195.22°

5092.79'

249.23'

5261'

27.54°

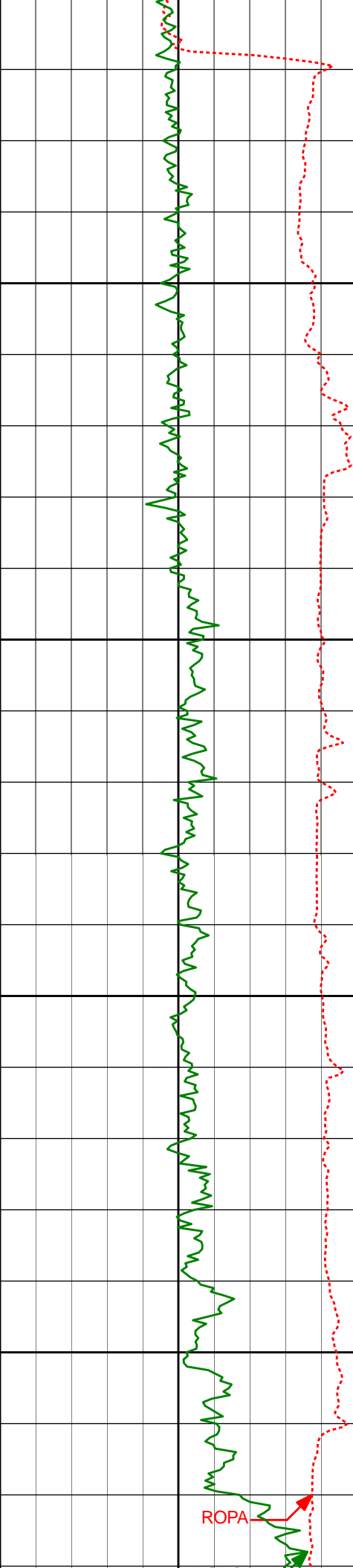
187.32°

5176.64'

293.67'

ROPA

PGRC



5350'

5357'

32.95°

184.05°

5259.55'

341.99'

5400'

5405'

37.09°

179.36°

5298.86'

369.41'

5450'

5451'

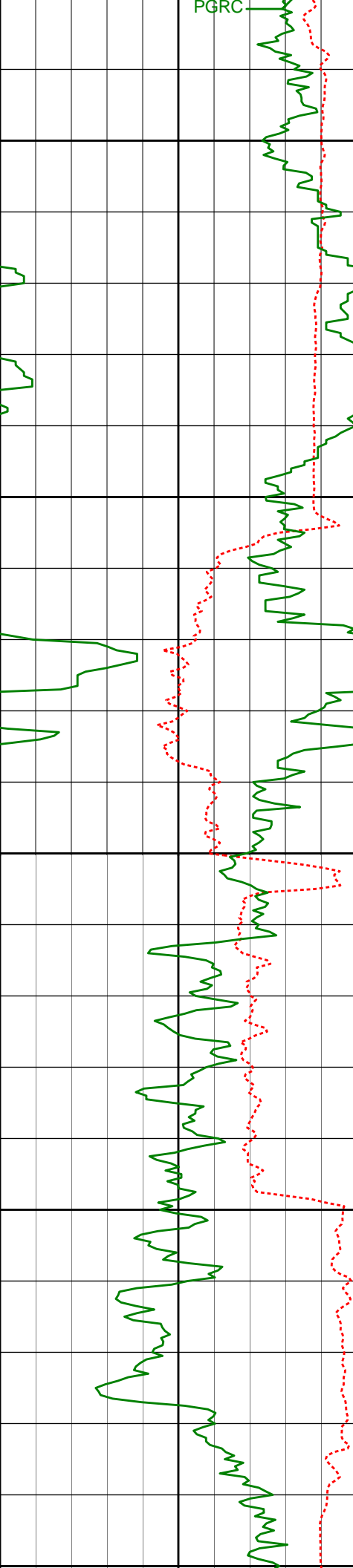
40.90°

175.85°

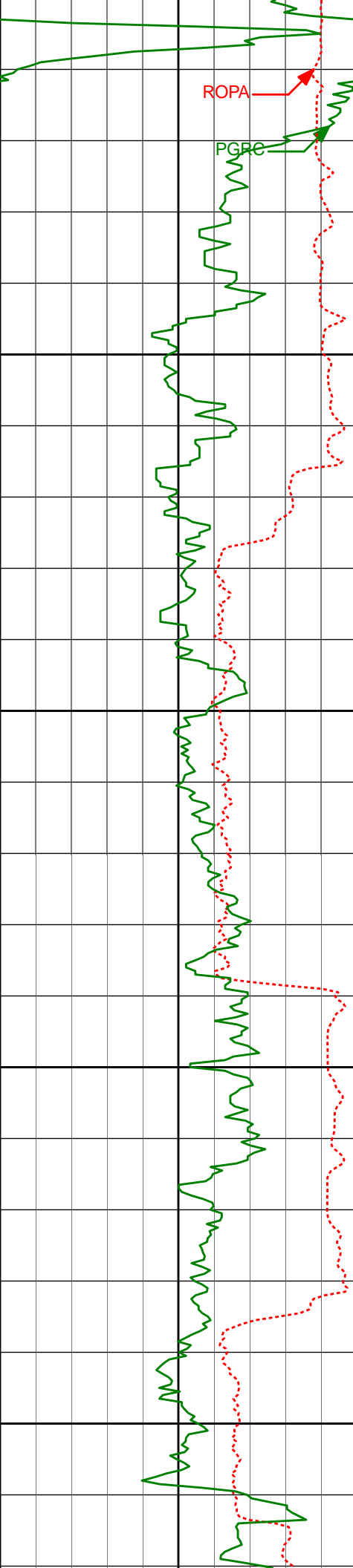
5334.61'

398.01'

5500'



5546'	52.80°	179.69°	5399.48'	466.44'
5550'				
5594'	60.50°	180.86°	5425.85'	506.29'
5600'				
5642'	61.30°	180.91°	5449.19'	548.04'
5650'				
5700'				
5736'	66.60°	180.59°	5490.46'	632.07'
5750'				



ROPA

PGRC

5800'

5850'

5900'

5950'

5832'

78.30°

178.83°

5519.36'

722.84'

5907'

81.74°

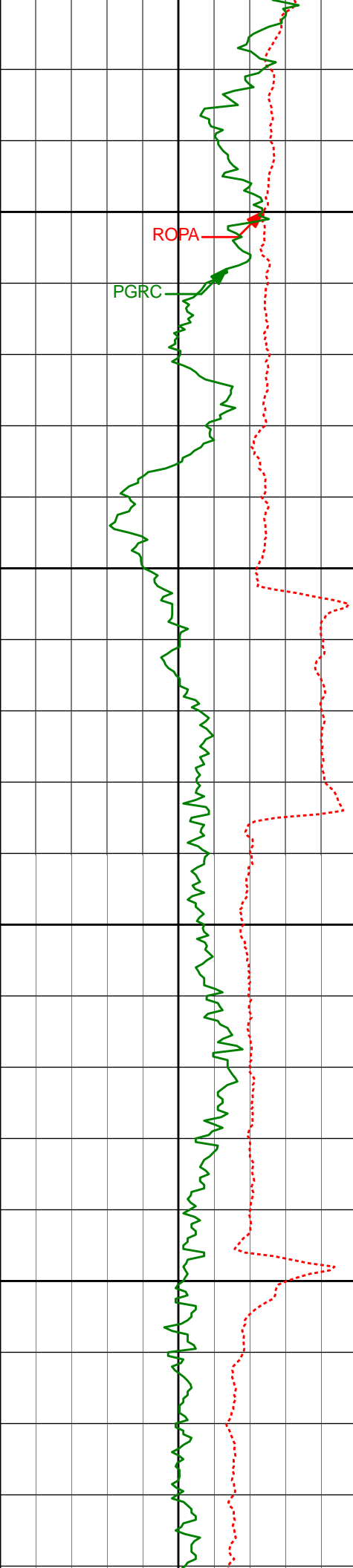
178.40°

5532.36'

796.03'

Casing Shoe @ 5953'

Run200



6000'

5999'

84.57°

178.14°

5543.32'

886.48'

6050'

6100'

6150'

6092'

88.98°

179.01°

5548.55'

978.47'

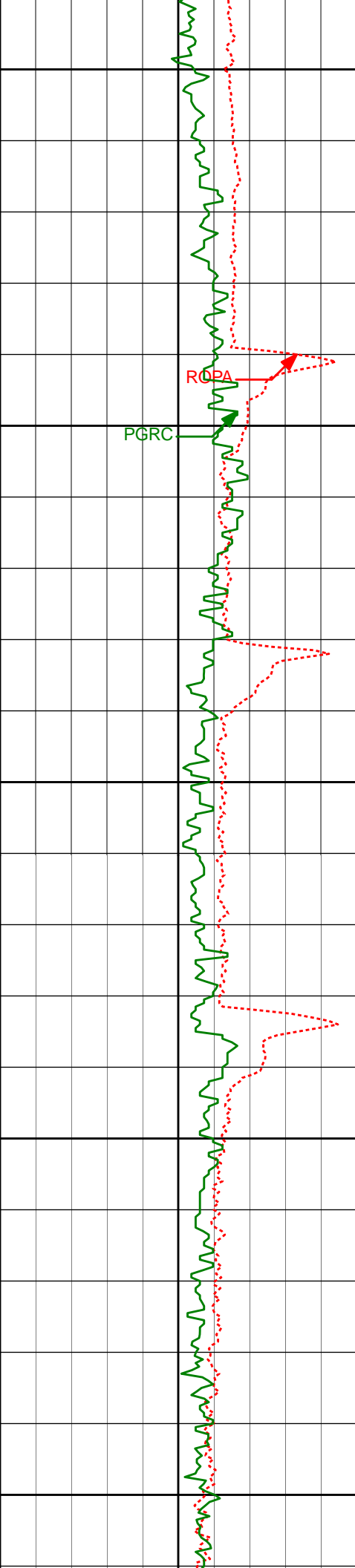
6185'

90.15°

180.21°

5549.25'

1070.84'



6200'

ROPA

PGRC

6250'

6278'

90.18°

179.47°

5548.97'

1163.25'

6300'

6350'

6370'

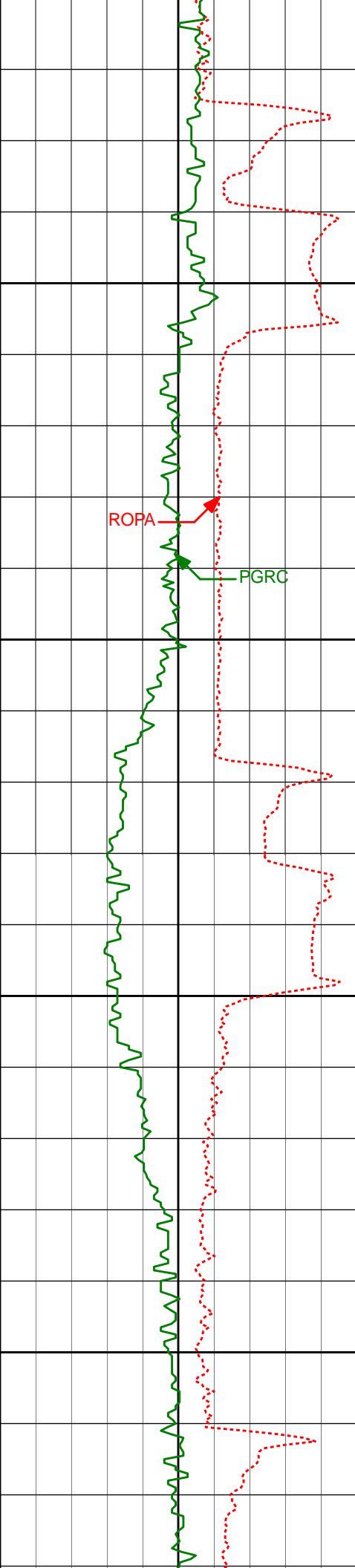
89.51°

178.45°

5549.22'

1254.50'

6400'



6450'

6463'

90.92°

181.29°

5548.87'

1346.91'

6500'

6550'

6555'

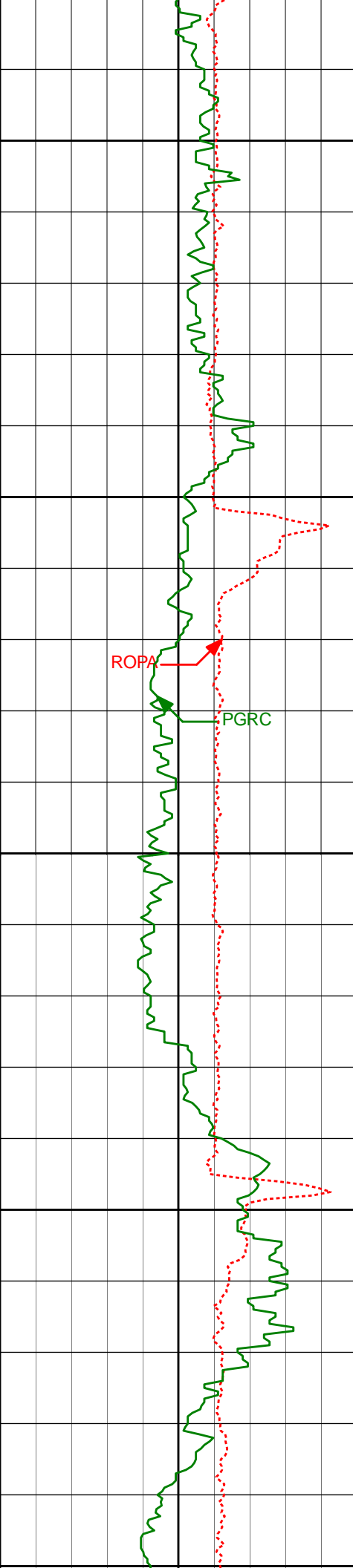
88.77°

181.53°

5549.12'

1438.57'

6600'



6650'

6648'

88.80°

180.90°

5551.10'

1531.19'

6700'

6740'

88.64°

180.85°

5553.15'

1622.76'

6750'

6800'

6833'

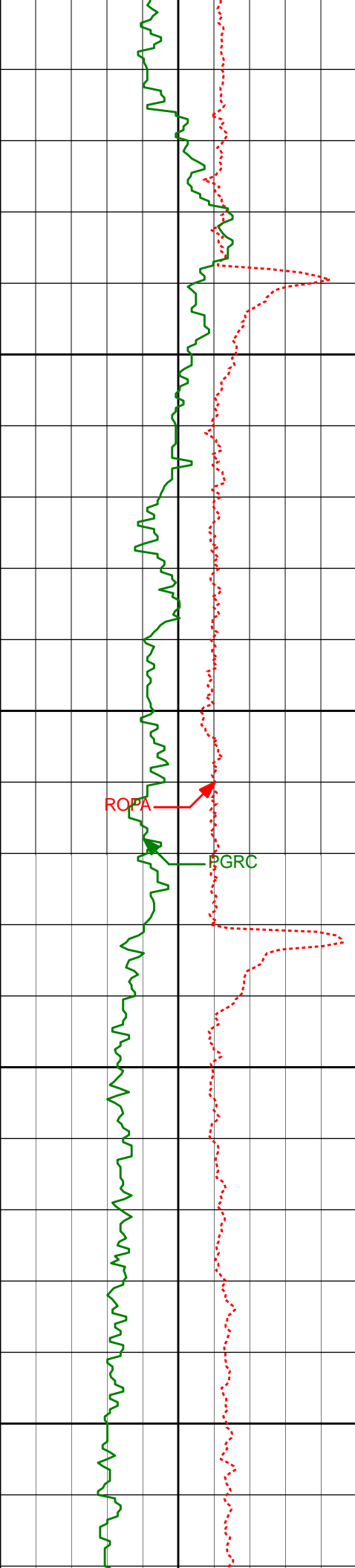
88.67°

180.27°

5555.33'

1715.27'

6850'



6900'

6950'

7000'

7050'

6925'

88.86°

179.88°

5557.31'

1806.71'

ROPA

PGRC

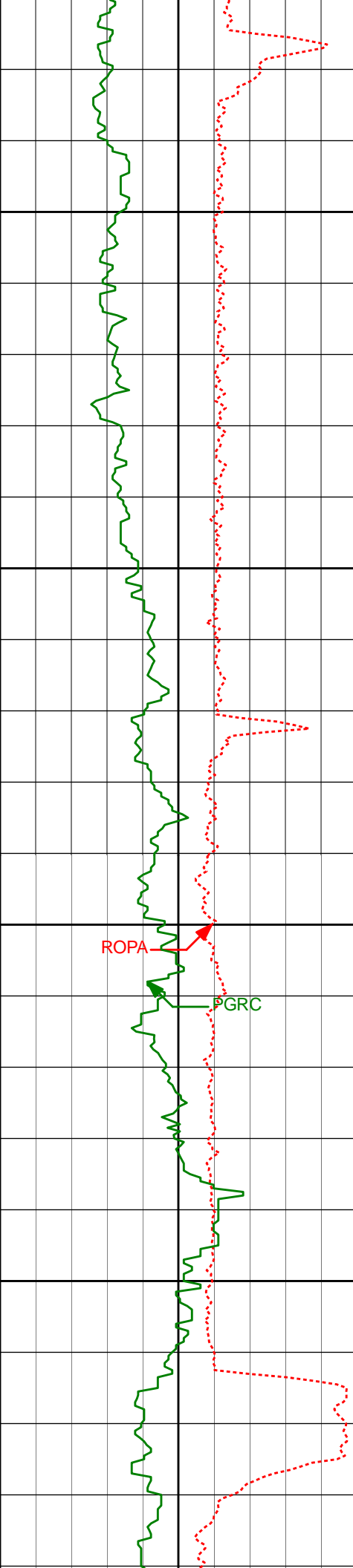
7020'

88.95°

180.07°

5559.12'

1901.12'



7100'

7114'

89.85°

180.63°

5560.10'

1994.62'

7150'

7200'

ROPA

PGRC

7209'

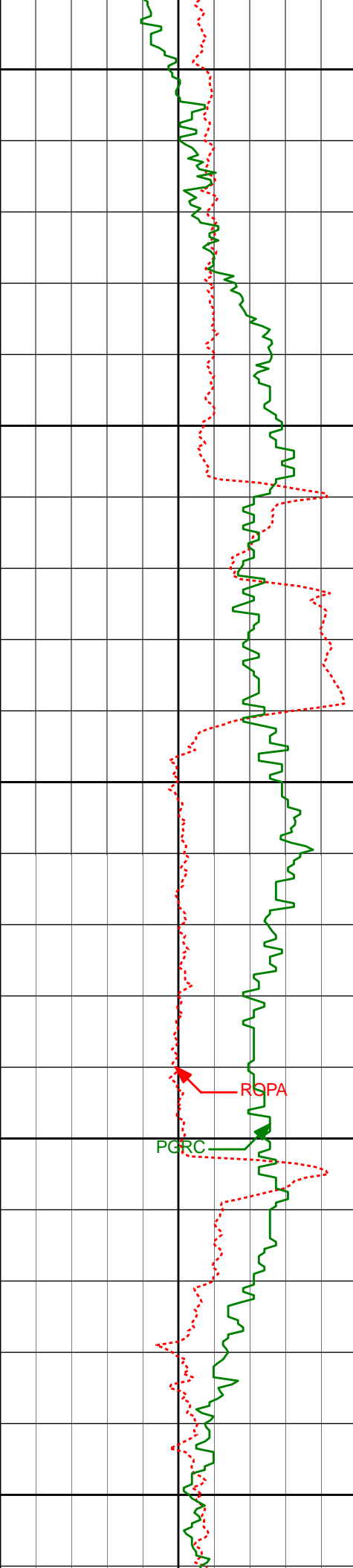
90.56°

180.73°

5559.77'

2089.16'

7250'



7300'

7304'

90.74°

180.74°

5558.70'

2183.71'

7350'

7400'

7399'

89.26°

180.49°

5558.70'

2278.25'

7450'

7500'

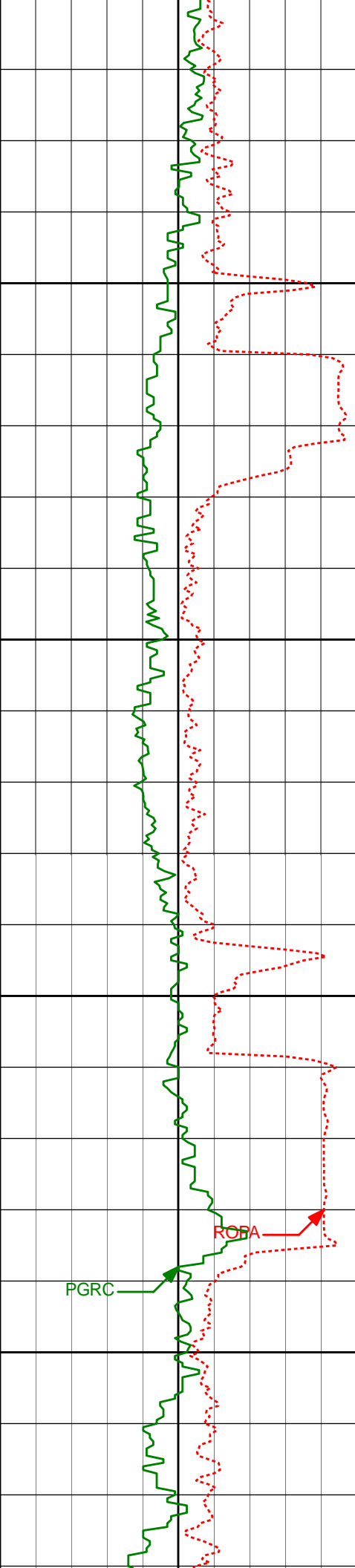
7494'

89.88°

180.64°

5559.41'

2372.77'



7550'

7589'

89.91°

181.79°

5559.59'

2467.40'

7600'

7650'

7684'

89.08°

179.09°

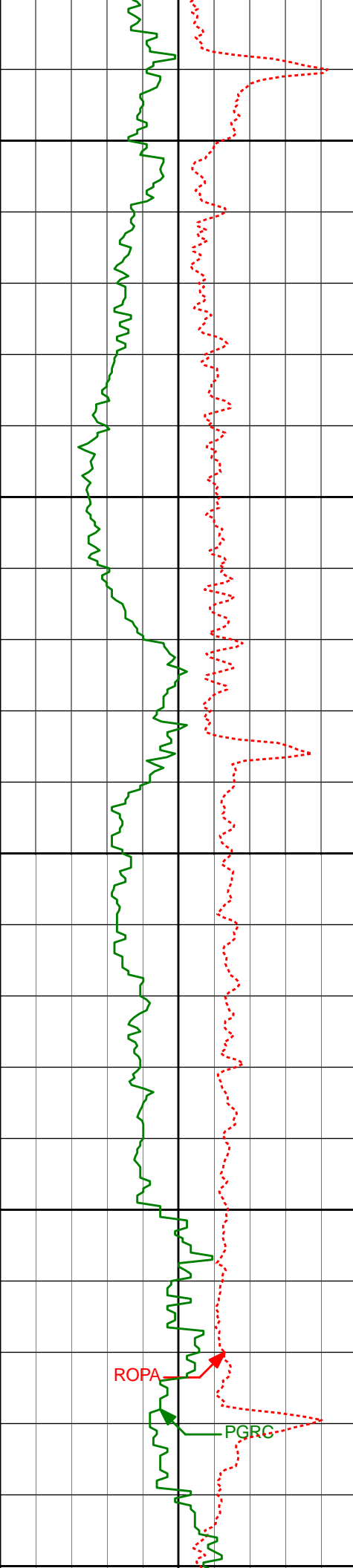
5560.43'

2561.90'

7700'

PGRC

ROFA



7750'

7779'

88.77°

178.26°

5562.22'

2656.05'

7800'

7850'

7874'

88.18°

177.50°

5564.75'

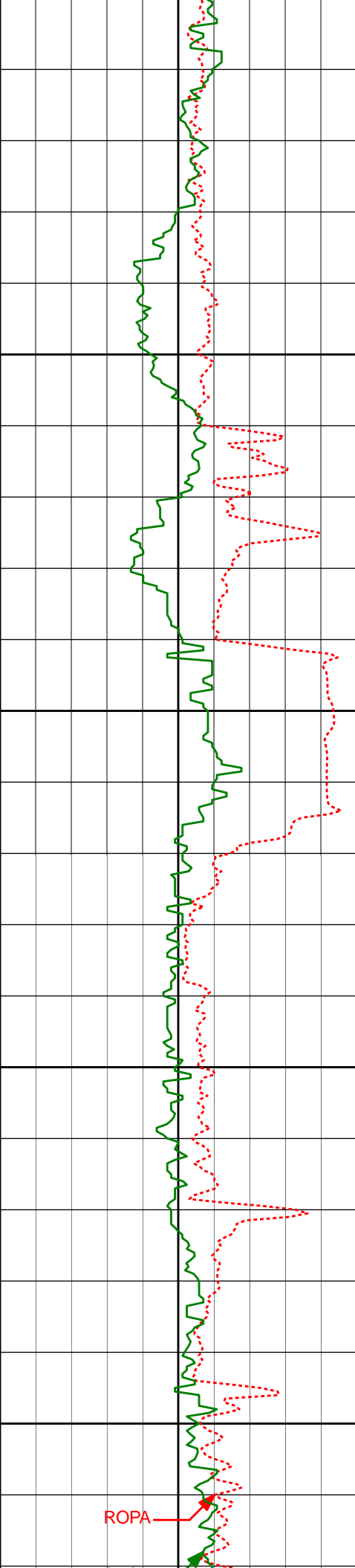
2749.99'

7900'

ROPA

PGRG

7950'



7950'

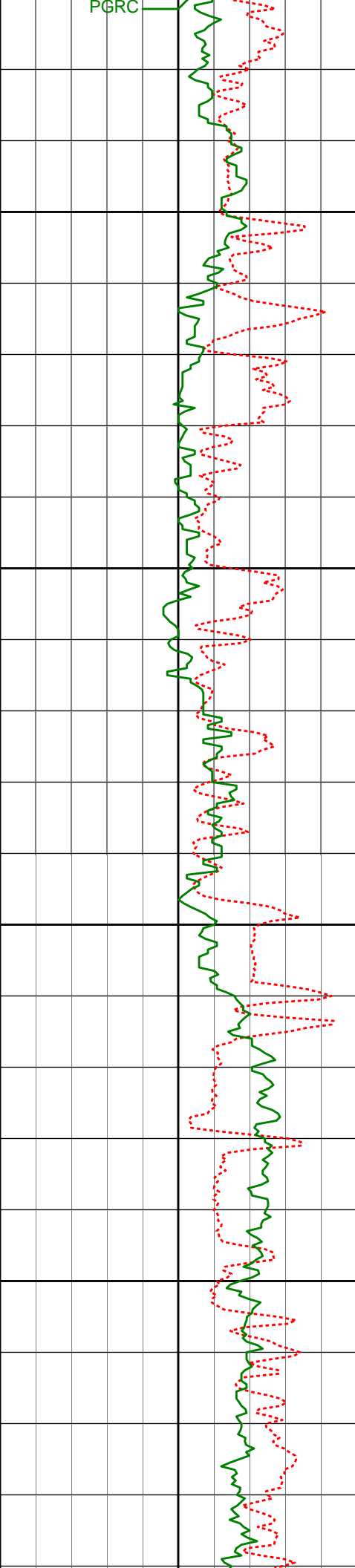
8000'

8050'

8100'

8150'

7969'	87.56°	176.87°	5568.28'	2843.74'
8064'	89.41°	179.18°	5570.78'	2937.71'
8160'	89.32°	179.79°	5571.84'	3033.03'



8200'

8250'

8300'

8350'

8255'

88.74°

179.54°

5573.45'

3127.39'

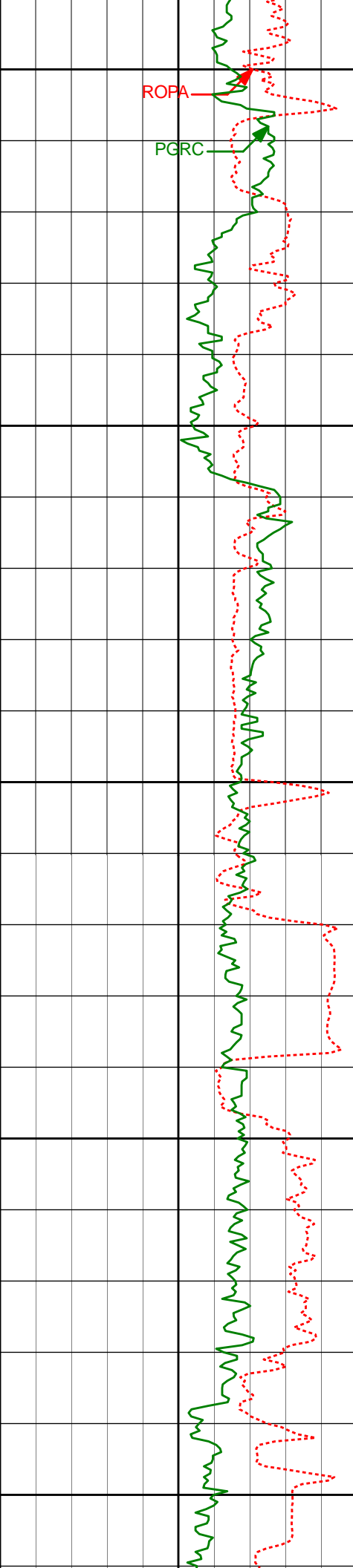
8350'

88.34°

179.16°

5575.88'

3221.67'



ROPA

PGRC

8400'

8450'

8500'

8550'

8600'

8445'

88.12°

179.58°

5578.82'

3315.93'

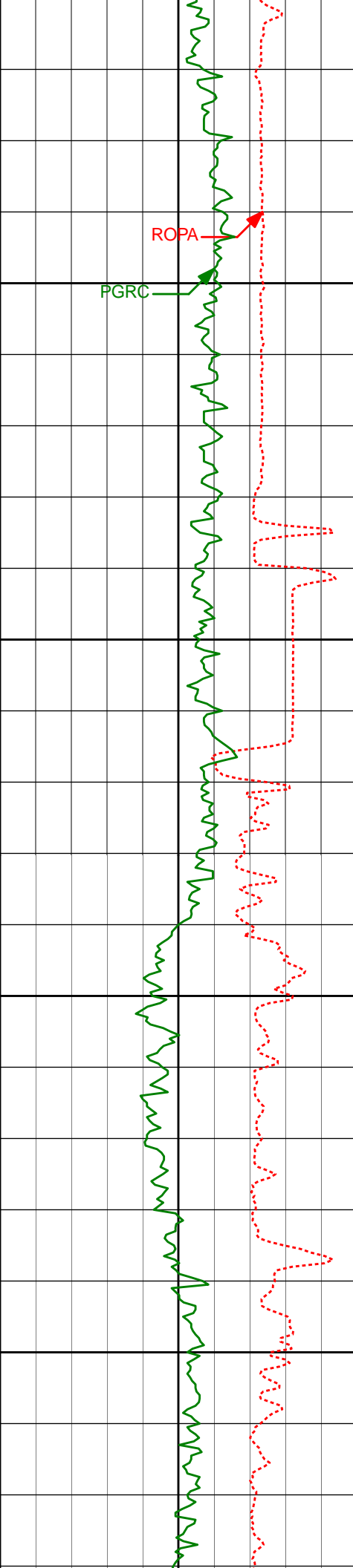
8540'

89.17°

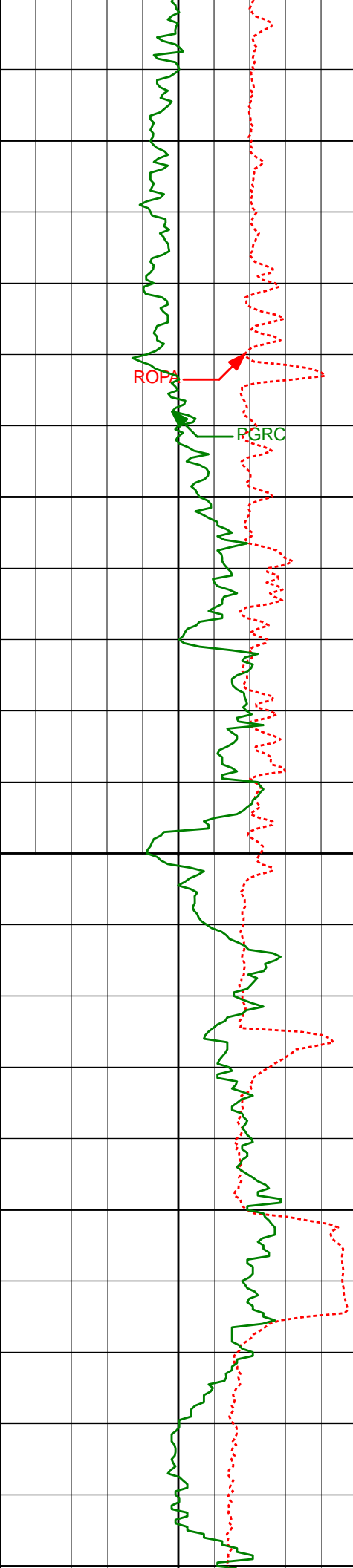
178.79°

5581.07'

3410.18'



8635'	89.08°	178.77°	5582.53'	3504.36'
8650'				
8700'				
8730'	89.20°	178.56°	5583.96'	3598.51'
8750'				
8800'				
8825'	88.83°	178.32°	5585.60'	3692.61'



8850'

8900'

8950'

9000'

9050'

8920'

88.40°

178.00°

5587.90'

3786.63'

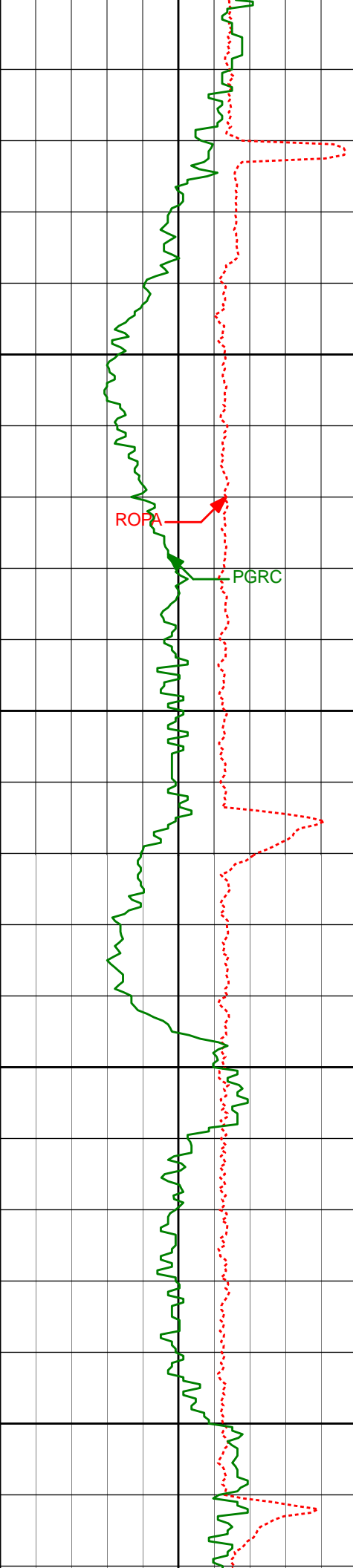
9015'

89.82°

178.94°

5589.38'

3880.74'



9100'

9150'

9200'

9250'

9110'

89.97°

178.97°

5589.56'

3974.97'

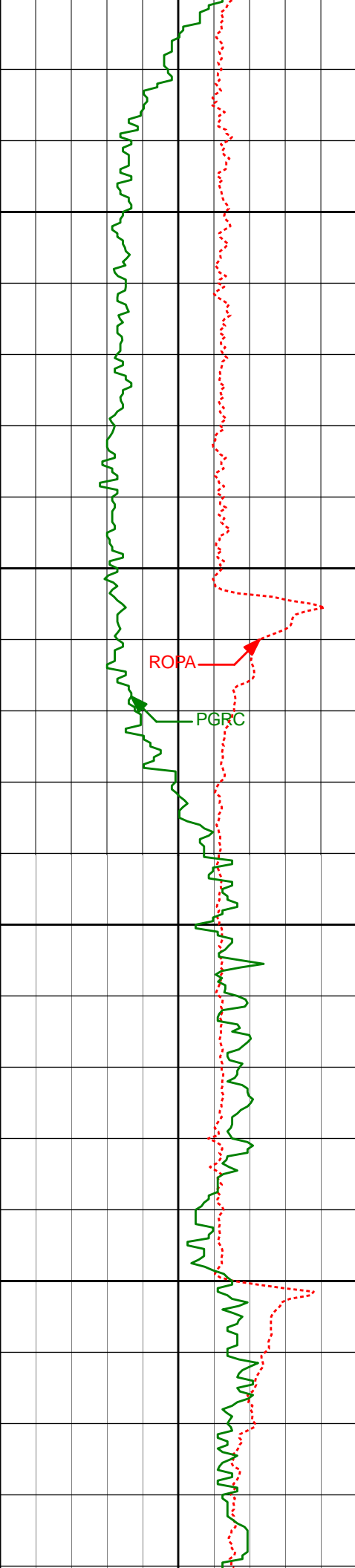
9205'

89.78°

178.35°

5589.76'

4069.13'



9300'

9350'

9400'

9450'

9300'

9395'

9490'

89.97°

90.55°

90.09°

178.24°

177.96°

176.70°

5589.97'

5589.53'

5589.00'

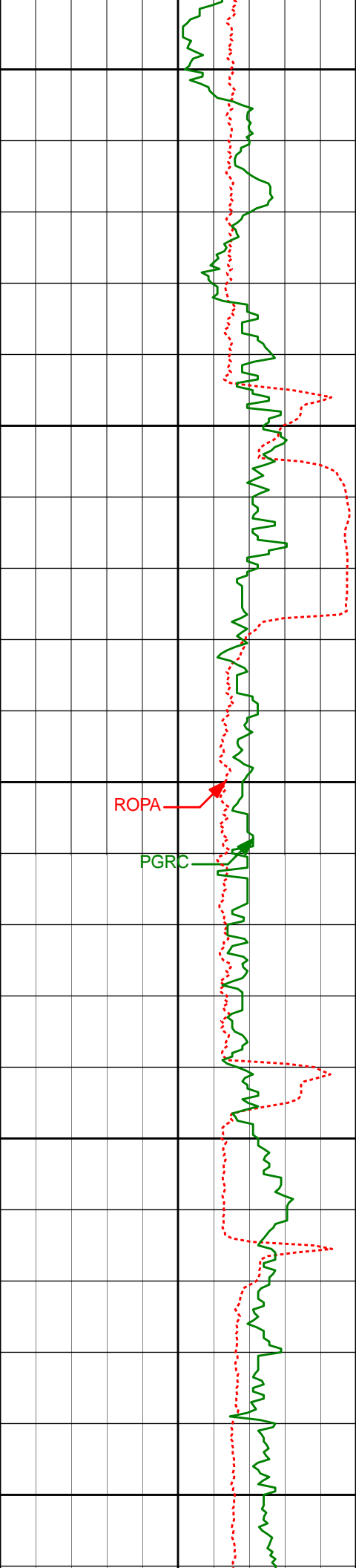
4163.21'

4257.24'

4351.09'

ROPA

PGRC



9500'

9550'

9600'

9650'

9700'

ROPA

PGRC

9585'

91.51°

178.82°

5587.67'

4445.02'

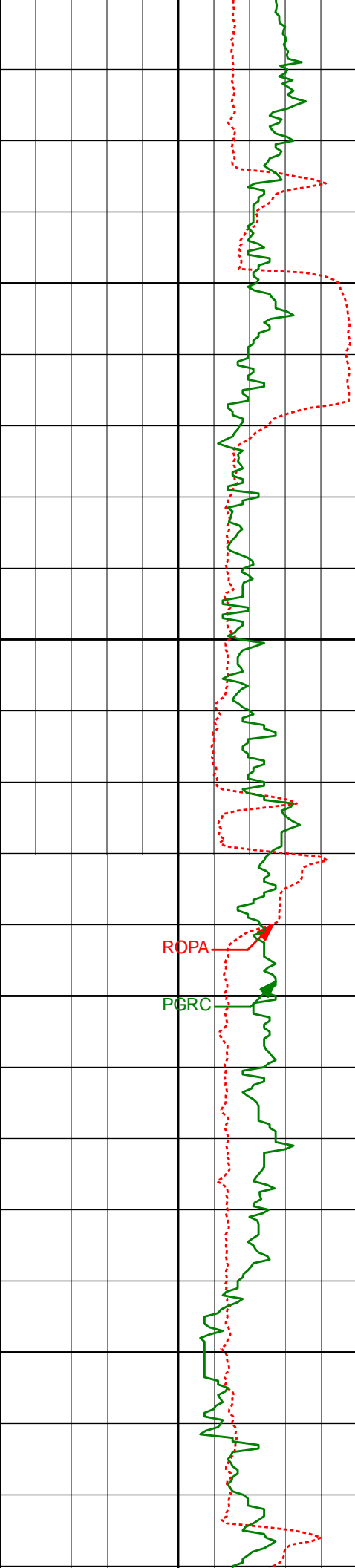
9680'

91.73°

179.37°

5584.98'

4539.24'



9750'

9775'

90.15°

180.26°

5583.42'

4633.62'

9800'

ROPA

PGRC

9850'

9870'

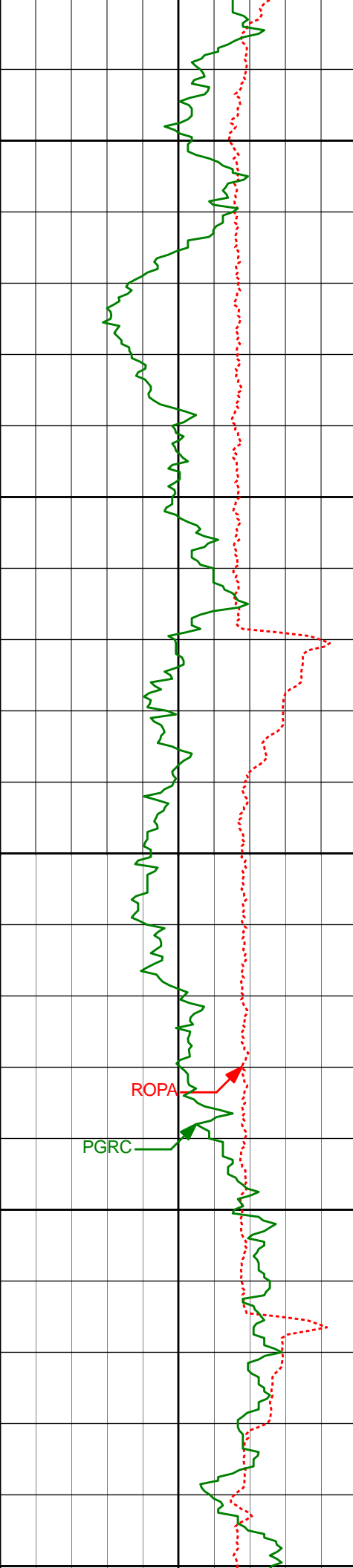
89.97°

180.24°

5583.31'

4728.10'

9900'



9950'

9965'

89.54°

179.97°

5583.72'

4822.55'

10000'

10050'

10060'

89.45°

179.27°

5584.57'

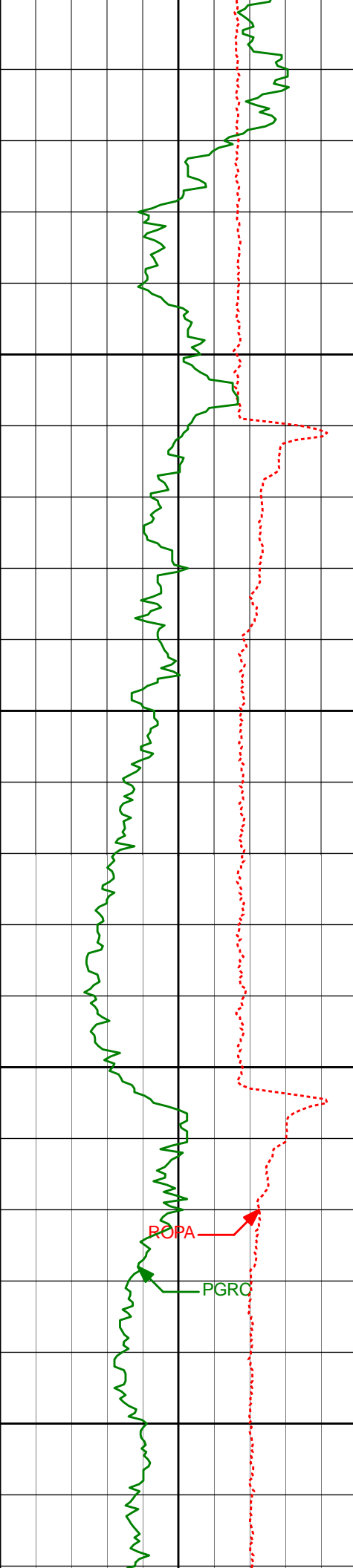
4916.90'

10100'

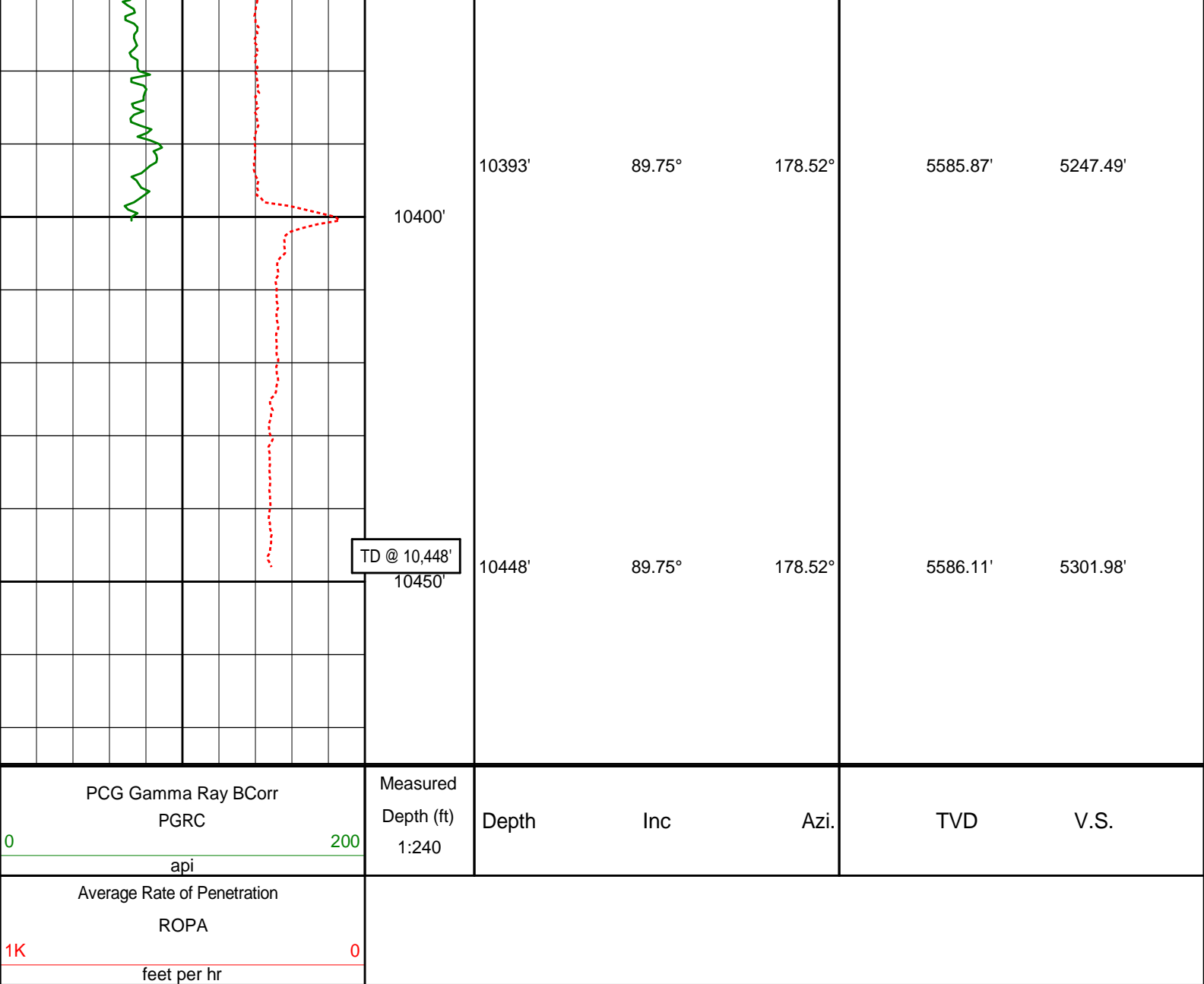
10150'

ROPA

PGRC



10150'	10154'	89.85°	179.62°	5585.15'	5010.24'
10200'					
10250'	10249'	89.85°	179.54°	5585.40'	5104.59'
10300'					
10350'	10344'	89.81°	179.18°	5585.69'	5198.90'



PCG Gamma Ray BCorr PGRC		Measured Depth (ft) 1:240	Depth	Inc	Azi.	TVD	V.S.
0	200						
api							
Average Rate of Penetration ROPA							
1K	0						
feet per hr							

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Gradishar State LD11-73-1AHN
Wattenberg
Weld Colorado
USA

CA-XX-0901945793

The first three surveys at 467', 742' and 1121' 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
467.00	0.00	209.11	467.00	0.00 N	0.00 E	0.00	0.00
742.00	0.10	314.71	742.00	0.17 N	0.17 W	-0.15	0.04
1121.00	0.20	182.91	1121.00	0.26 S	0.44 W	0.31	0.07
1298.00	0.30	20.99	1298.00	0.13 S	0.29 W	0.16	0.28
1390.00	0.29	47.76	1390.00	0.25 N	0.03 W	-0.25	0.15
1483.00	0.35	63.73	1483.00	0.54 N	0.40 E	-0.58	0.12
1575.00	2.54	245.20	1574.97	0.19 S	1.19 W	0.32	3.14
1669.00	4.10	255.12	1668.81	1.93 S	6.33 W	2.61	1.76
1762.00	5.99	256.94	1761.45	3.87 S	14.26 W	5.41	2.04

1854.00	7.89	242.04	1852.77	7.92 S	24.52 W	10.55	2.83
1946.00	9.08	252.82	1943.77	13.03 S	37.04 W	17.00	2.16
2039.00	11.56	263.06	2035.27	16.33 S	53.31 W	22.05	3.31
2131.00	10.94	262.09	2125.50	18.64 S	71.11 W	26.30	0.71
2224.00	10.34	260.74	2216.90	21.20 S	88.09 W	30.69	0.70
2316.00	10.23	258.68	2307.42	24.13 S	104.25 W	35.37	0.42
2408.00	10.49	257.34	2397.92	27.57 S	120.44 W	40.56	0.39
2504.00	11.34	265.09	2492.19	30.29 S	138.37 W	45.22	1.76
2599.00	11.37	265.18	2585.33	31.88 S	157.01 W	48.84	0.04
2694.00	11.18	265.21	2678.49	33.43 S	175.52 W	52.40	0.20
2788.00	10.85	265.26	2770.76	34.93 S	193.42 W	55.84	0.35
2884.00	9.63	264.49	2865.23	36.44 S	210.42 W	59.21	1.28
2979.00	10.36	264.28	2958.79	38.06 S	226.83 W	62.60	0.77
3074.00	10.54	263.85	3052.21	39.84 S	243.96 W	66.25	0.20
3169.00	10.71	263.56	3145.58	41.76 S	261.37 W	70.06	0.19
3264.00	11.23	263.48	3238.85	43.80 S	279.33 W	74.04	0.54
3359.00	11.78	263.62	3331.94	45.93 S	298.15 W	78.21	0.58
3454.00	12.32	263.57	3424.85	48.14 S	317.85 W	82.57	0.57
3549.00	11.85	257.47	3517.75	51.39 S	337.44 W	87.94	1.43
3645.00	10.97	254.28	3611.85	56.01 S	355.86 W	94.54	1.13
3740.00	10.10	255.64	3705.25	60.52 S	372.63 W	100.85	0.95
3835.00	9.73	257.45	3798.83	64.33 S	388.53 W	106.38	0.51
3930.00	11.19	261.82	3892.25	67.38 S	405.49 W	111.27	1.75
4025.00	10.63	260.32	3985.53	70.17 S	423.25 W	115.97	0.66
4120.00	9.85	259.72	4079.02	73.09 S	439.88 W	120.69	0.82
4215.00	10.12	266.99	4172.58	74.98 S	456.21 W	124.36	1.36
4310.00	8.62	267.88	4266.31	75.68 S	471.66 W	126.74	1.58
4405.00	9.25	261.39	4360.16	77.09 S	486.32 W	129.74	1.25
4500.00	10.61	261.49	4453.74	79.53 S	502.52 W	133.93	1.44
4595.00	9.96	254.05	4547.22	83.08 S	519.07 W	139.27	1.55
4691.00	11.64	257.65	4641.51	87.43 S	536.52 W	145.51	1.89
4786.00	12.47	251.40	4734.42	92.75 S	555.61 W	152.88	1.62
4881.00	11.53	247.90	4827.34	99.60 S	574.13 W	161.70	1.25
4976.00	15.37	218.14	4919.83	113.09 S	590.72 W	176.93	8.20
5071.00	26.43	209.05	5008.46	141.57 S	608.83 W	207.22	12.10
5166.00	28.61	195.22	5092.79	182.05 S	625.09 W	249.23	7.09
5261.00	27.54	187.32	5176.64	225.80 S	633.86 W	293.67	4.07
5357.00	32.95	184.05	5259.55	273.89 S	638.54 W	341.99	5.88
5405.00	37.09	179.36	5298.86	301.40 S	639.30 W	369.41	10.29
5451.00	40.90	175.85	5334.61	330.30 S	638.05 W	398.01	9.57
5546.00	52.80	179.69	5399.48	399.41 S	635.59 W	466.44	12.87
5594.00	60.50	180.86	5425.85	439.48 S	635.80 W	506.29	16.17
5642.00	61.30	180.91	5449.19	481.41 S	636.45 W	548.04	1.68
5736.00	66.60	180.59	5490.46	565.83 S	637.55 W	632.07	5.65
5832.00	78.30	178.83	5519.36	657.19 S	637.04 W	722.84	12.31
5907.00	81.74	178.40	5532.36	731.03 S	635.26 W	796.03	4.63
5999.00	84.57	178.14	5543.32	822.32 S	632.50 W	886.48	3.08
6092.00	88.98	179.01	5548.55	915.12 S	630.19 W	978.47	4.84
6185.00	90.15	180.21	5549.25	1008.11 S	629.55 W	1070.84	1.80
6278.00	90.18	179.47	5548.97	1101.11 S	629.29 W	1163.25	0.79
6370.00	89.51	178.45	5549.22	1193.09 S	627.62 W	1254.50	1.33
6463.00	90.92	181.29	5548.87	1286.08 S	627.41 W	1346.91	3.41
6555.00	88.77	181.53	5549.12	1378.05 S	629.68 W	1438.57	2.36
6648.00	88.80	180.90	5551.10	1471.00 S	631.65 W	1531.19	0.68
6740.00	88.64	180.85	5553.15	1562.97 S	633.05 W	1622.76	0.18
6833.00	88.67	180.27	5555.33	1655.94 S	633.96 W	1715.27	0.62
6925.00	88.86	179.88	5557.31	1747.92 S	634.09 W	1806.71	0.47
7020.00	88.95	180.07	5559.12	1842.90 S	634.05 W	1901.12	0.22
7114.00	89.85	180.63	5560.10	1936.89 S	634.62 W	1994.62	1.12
7209.00	90.56	180.73	5559.77	2031.88 S	635.74 W	2089.16	0.75
7304.00	90.74	180.74	5558.70	2126.87 S	636.96 W	2183.71	0.20
7399.00	89.26	180.49	5558.70	2221.86 S	637.98 W	2278.25	1.58
7494.00	89.88	180.64	5559.41	2316.86 S	638.91 W	2372.77	0.67
7589.00	89.91	181.79	5559.59	2411.83 S	640.92 W	2467.40	1.21
7684.00	89.08	179.09	5560.43	2506.82 S	641.65 W	2561.90	2.97
7779.00	88.77	178.26	5562.22	2601.77 S	639.45 W	2656.05	0.93
7874.00	88.18	177.50	5564.75	2696.67 S	635.93 W	2749.99	1.01
7969.00	87.56	176.87	5568.28	2791.49 S	631.27 W	2843.74	0.93
8064.00	89.41	179.18	5570.78	2886.39 S	628.00 W	2937.71	3.12
8160.00	89.32	179.79	5571.84	2982.38 S	627.13 W	3033.03	0.64
8255.00	88.74	179.54	5573.45	3077.37 S	626.58 W	3127.39	0.67
8350.00	88.34	179.16	5575.88	3172.33 S	625.50 W	3221.67	0.59
8445.00	88.12	179.58	5578.82	3267.28 S	624.45 W	3315.93	0.50
8540.00	89.17	178.79	5581.07	3362.24 S	623.10 W	3410.18	1.38

8635.00	89.08	178.77	5582.53	3457.21 S	621.09 W	3504.36	0.10
8730.00	89.20	178.56	5583.96	3552.17 S	618.87 W	3598.51	0.26
8825.00	88.83	178.32	5585.60	3647.12 S	616.29 W	3692.61	0.46
8920.00	88.40	178.00	5587.90	3742.04 S	613.24 W	3786.63	0.57
9015.00	89.82	178.94	5589.38	3836.99 S	610.70 W	3880.74	1.79
9110.00	89.97	178.97	5589.56	3931.98 S	608.97 W	3974.97	0.16
9205.00	89.78	178.35	5589.76	4026.95 S	606.75 W	4069.13	0.67
9300.00	89.97	178.24	5589.97	4121.91 S	603.93 W	4163.21	0.23
9395.00	90.55	177.96	5589.53	4216.85 S	600.77 W	4257.24	0.68
9490.00	90.09	176.70	5589.00	4311.75 S	596.34 W	4351.09	1.41
9585.00	91.51	178.82	5587.67	4406.66 S	592.63 W	4445.02	2.69
9680.00	91.73	179.37	5584.98	4501.61 S	591.14 W	4539.24	0.62
9775.00	90.15	180.26	5583.42	4596.59 S	590.83 W	4633.62	1.90
9870.00	89.97	180.24	5583.31	4691.59 S	591.25 W	4728.10	0.20
9965.00	89.54	179.97	5583.72	4786.59 S	591.42 W	4822.55	0.53
10060.00	89.45	179.27	5584.57	4881.58 S	590.79 W	4916.90	0.74
10154.00	89.85	179.62	5585.15	4975.58 S	589.89 W	5010.24	0.57
10249.00	89.85	179.54	5585.40	5070.57 S	589.19 W	5104.59	0.09
10344.00	89.81	179.18	5585.69	5165.57 S	588.13 W	5198.90	0.38
10393.00	89.75	178.52	5585.87	5214.56 S	587.15 W	5247.49	1.36
10448.00	89.75	178.52	5586.11	5269.54 S	585.73 W	5301.98	0.01

CALCULATION BASED ON MINIMUM CURVATURE METHOD

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 186.27 DEGREES (GRID)
A TOTAL CORRECTION OF 6.91 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10448.00 FEET
IS 5301.99 FEET ALONG 186.34 DEGREES (GRID)**

Final survey is a straight line projection to TD.