

PCGK - Pressure Case Gamma

1:240 / 1:600

Country		: USA																	
Field		: Wattenburg																	
Location		: Lat: 40° 20' 26.66" North Long: 104° 40' 36.05" West																	
Well		: Knaub PC G04-67-1HN - A1																	
Company		: Noble Energy																	
Rig		: H&P 321																	
LOCATION																			
				Latitude : 40° 20' 26.66" North Longitude : 104° 40' 36.05" West								Other Services Directional Drilling							
				UTM Easting = 3,229,500.13 ft UTM Northing = 1,368,037.31 ft															
Permanent Datum				: Ground Level		Elevation : 4678.00 ft		Elev.		KB NA									
Log Measured From				: Drill Floor		30.00 ft		Above Permanent Datum		DF 4708.00 ft GL 4678.00 ft WD NA									
Drilling Measured From				: Drill Floor		MD LOG													
Depth Logged				: 648.00 ft		To 11,321.00 ft		Unit No. : 11210424		Job No. :CA-XX-0900145810									
Date Logged				: 08-Feb-13		To 16-Mar-13		Plot Type : Final											
Total Depth MD				: 11,321.00 ft		TVD : 6,911.04 ft		Plot Date : 16-Mar-13											
Spud Date				: 09-Feb-13															
Run No.		Borehole Record (MD)						Run No.		Borehole Record (MD)									
		Size		From		To				Size		From		To					
0100		8.750 in		648.00 ft		3692.00 ft													
0200		8.750 in		SURFACE		5891.00 ft													
0300		8.750 in		SURFACE		7508.00 ft													
0400		6.125 in		7508.00 ft		11321.00 ft													
										Size		Casing Record (MD) Weight		From To					
										9.625 in		34.90 lbpf		SURFACE 638.00 ft					
										7.000 in		26.00 lbpf		7,501.00 ft					

## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300	400	
<b>Date run completed</b>	11-Feb-13	12-Feb-13	14-Feb-13	15-Mar-13	
<b>Rig Bit Number</b>	2	3	4	5	
<b>Bit Size (in)</b>	8.750	8.750	8.750	6.125	
<b>Tool Nominal OD (in)</b>	6.750	6.750	6.750	4.750	
<b>Log Start Depth (MD, ft)</b>	648.00	3,692.00	5,891.00	7,508.00	
<b>Log End Depth (MD, ft)</b>	3,692.00	5,891.00	7,508.00	11,321.00	
<b>Drill or Wipe</b>	Drill	Drill	Drill	Drill	
<b>Drill/Wipe Start Date and Time</b>	09-Feb-13 11:16	09-Feb-13 12:45	12-Feb-13 00:38	13-Mar-13 11:29	
<b>Drill/Wipe End Date and Time</b>	09-Feb-13 11:16	09-Feb-13 12:45	13-Feb-13 20:17	15-Mar-13 11:30	
<b>Min Inc (deg) @ Depth (MD, ft)</b>	.29 @ 1,739.00	10.36 @ 4,109.00	13.32 @ 5,910.00	86.27 @ 7,531.00	
<b>Max Inc (deg) @ Depth (MD, ft)</b>	14.89 @ 3,636.00	15.74 @ 3,919.00	86.95 @ 7,508.00	92.81 @ 9,211.00	
<b>Bit TFA(in2) / Bit Type</b>	.75 / PDC	.75 / PDC	.86 / PDC	.46 / NA	
<b>Flow Rate (gpm)</b>	595.35	570.96	570.69	270.00	
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A	449.4 / N/A	423.6 / 0	
<b>Fluid Type</b>	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
<b>Density (ppg) / Viscosity (spqt)</b>	8.60 / 28.00	8.80 / 28.00	10.80 / 40.00	9.20 / 33.00	
<b>Filtrate CL (ppm)</b>	1,800.00	2,500.00	2,900.00	1,600.00	
<b>pH / Fluid Loss (mptm)</b>	9.10 / 30	9.70 / 42	9.30 / 8	10.60 / 9	
<b>PV (cP) / YP (lbf2)</b>	1 / 4.00	1 / 4.00	15 / 15.00	6 / 5.00	
<b>% Solids / % Sand</b>	2.00 / 0.10	2.70 / 0.20	11.60 / 0.15	5.00 / 0.04	
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / N/A	N/A / N/A	NA / NA	
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A	NA @ NA	
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A	NA @ NA	
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A	NA @ NA	
<b>Max Tool Temp (degF) / Source</b>	124.80 / PCM	145.90 / PCM	171.20 / PCM	238.70 / PCM	
<b>Rm @ Max Tool Temp (degF)</b>	N/A @ 124.80	N/A @ 145.90	N/A @ 171.20	NA @ 238.70	
<b>Lead MWD Engineer</b>	Robbie Barnes	Robbie Barnes	Robbie Barnes	Robbie Barnes	
<b>Customer Representative</b>	Roger Foster	Roger Foster	Jim Turner	Mike Pino	

SENSOR INFORMATION

Downhole Processor Information					
Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.76	5.76	5.76	5.76	
Sub Serial Number	11024568	11024568	11025568	12134689	
Insert Serial Number	11400838	11400838	11400958	11400838	
Date and Time Initialized	09-Feb-13 14:26	09-Feb-13 14:26	12-Feb-13 11:13	13-Mar-13 10:48	
Date and Time Read	12-Feb-13 16:55	15-Jan-13 09:45	14-Feb-13 02:16	16-Mar-13 00:33	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information					
Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	56.00	58.00	54.00	63.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11024568	11024568	11024568	12134689	
Sonde Serial Number	11833225	11833225	11477984	11833225	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	198.26	337.67	274.79	200.24	

Gamma Ray Sensor Information					
Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	49.28	50.41	47.34	66.25	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	11024568	11024568	11024568	12134689	
Insert/Sonde Serial Number	11293307	11293307	11579788	11293307	

REMARKS
<p>1. All depths are calibrated to driller's pipe tally and are measured depth from the Drill Floor.</p> <p>2. No depth corrections have been made for pipe stretch or compression.</p> <p>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.</p> <p>4. All data presented is recorded data unless otherwise specified.</p> <p>5. The following smoothing parameters have been applied to the data:</p> <p>PGRC (Gamma CG): Interval Resolution: 0.5 ft Interval Distance: 0.6 ft</p> <p>ROPA (Average Rate Of Penetration): Interval Resolution: 0.5 ft Interval Distance: 1.2 ft</p> <p>6. Insite Version 7.4.1</p>

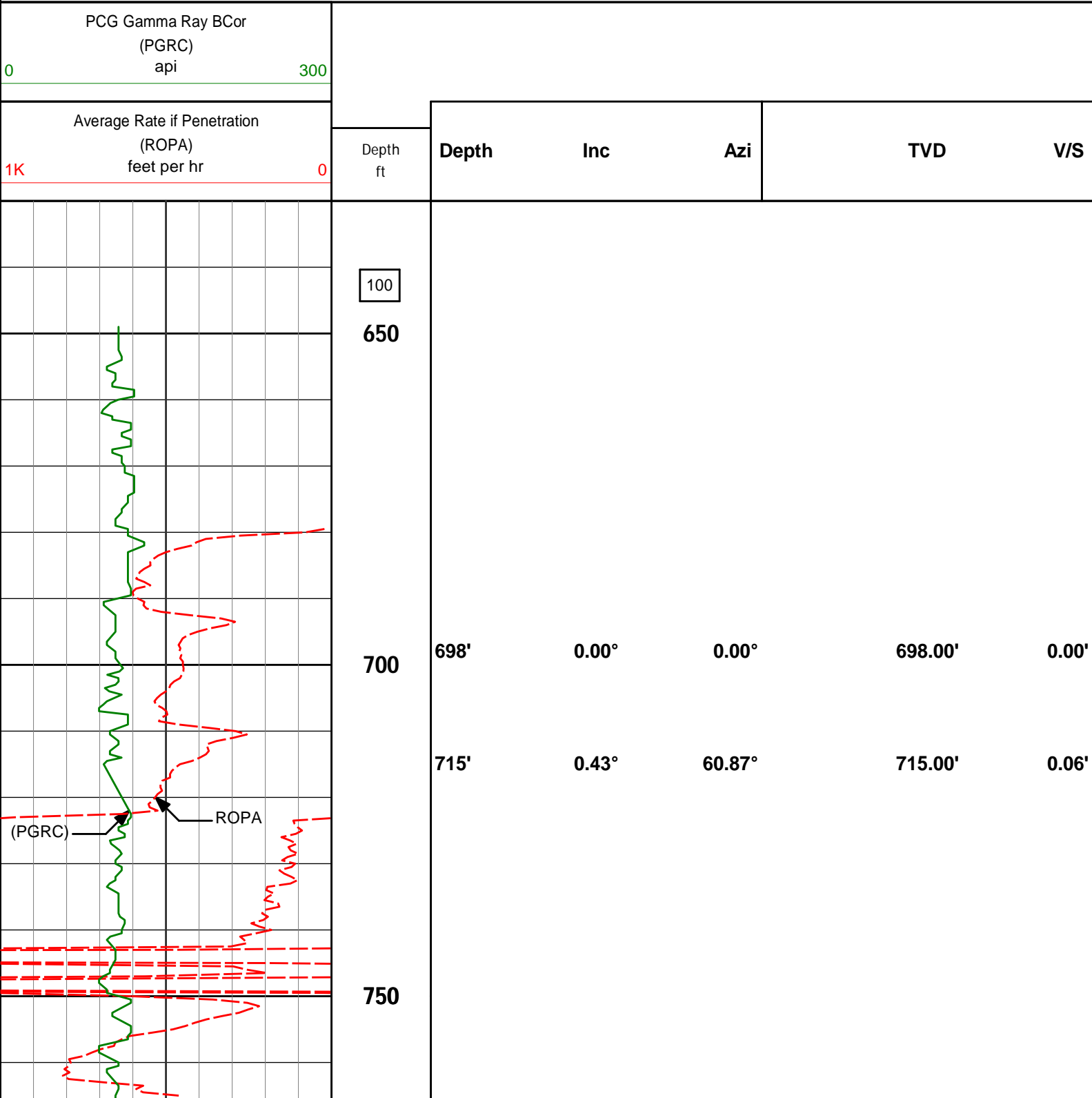
WARRANTY

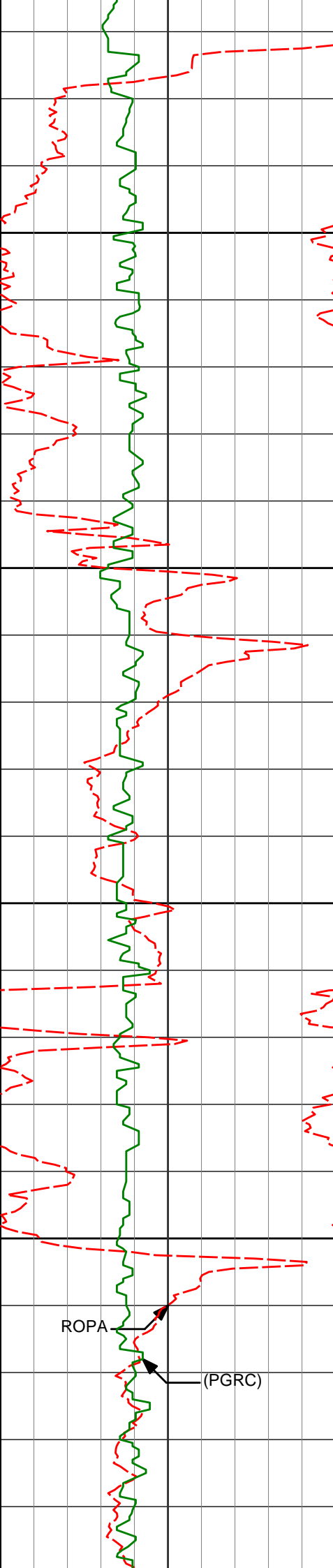
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**HALLIBURTON**  
**Sperry Drilling Services**  
**MD Detail Log 1:240**

Noble Energy  
Knaub PC G04-67-A1  
HP 321  
T4N R65W





800

850

900

950

ROPA

(PGRC)

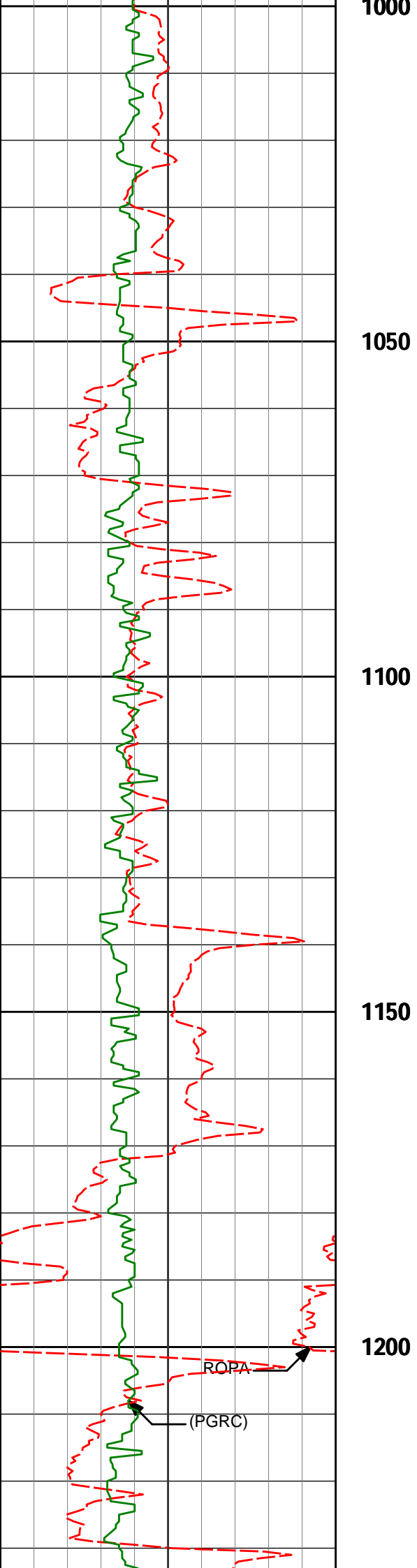
992'

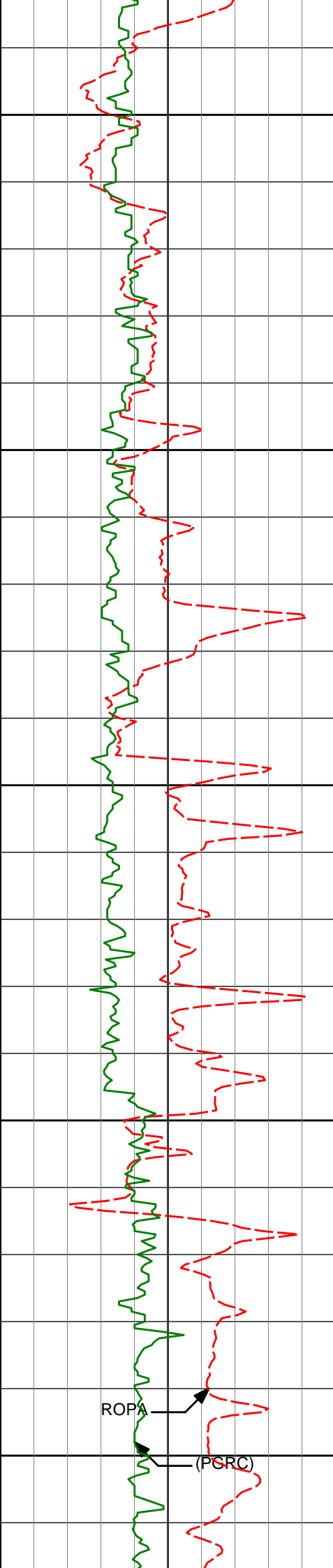
0.40°

82.83°

991.99'

2.04'





1250

1268'

0.41°

27.91°

1267.99'

3.68'

1300

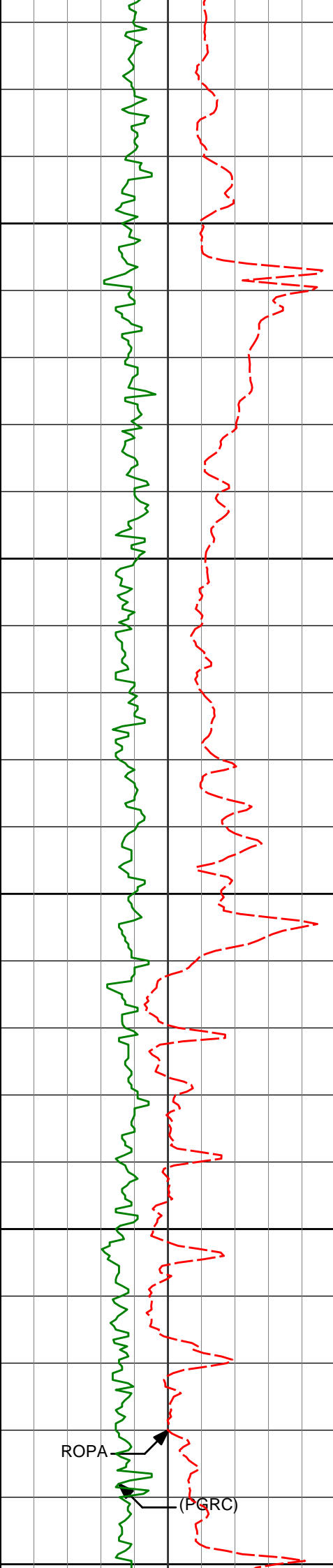
1350

1400

1450

ROPA

(PCRC)



1500

1550

1600

1650

1700

1549'

0.48°

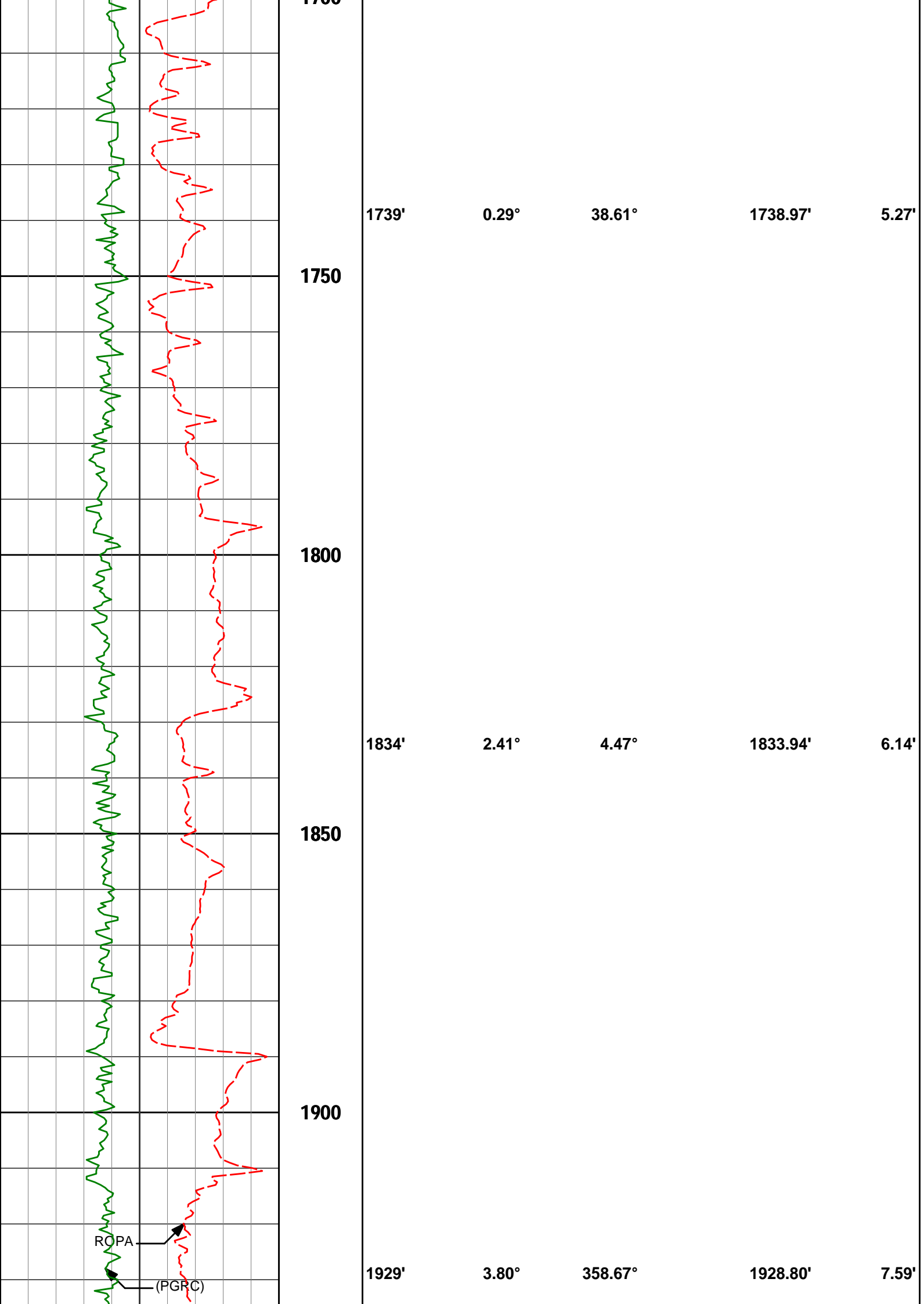
359.46°

1548.98'

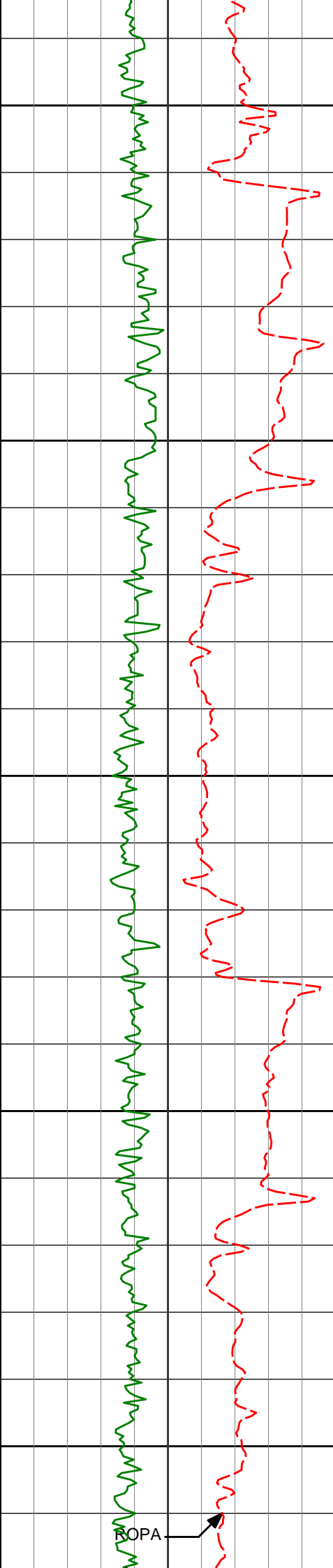
4.67'

ROPA

(PGRC)







1950

2000

2050

2100

2150

2023'

4.39°

352.88°

2022.56'

8.86'

2118'

5.79°

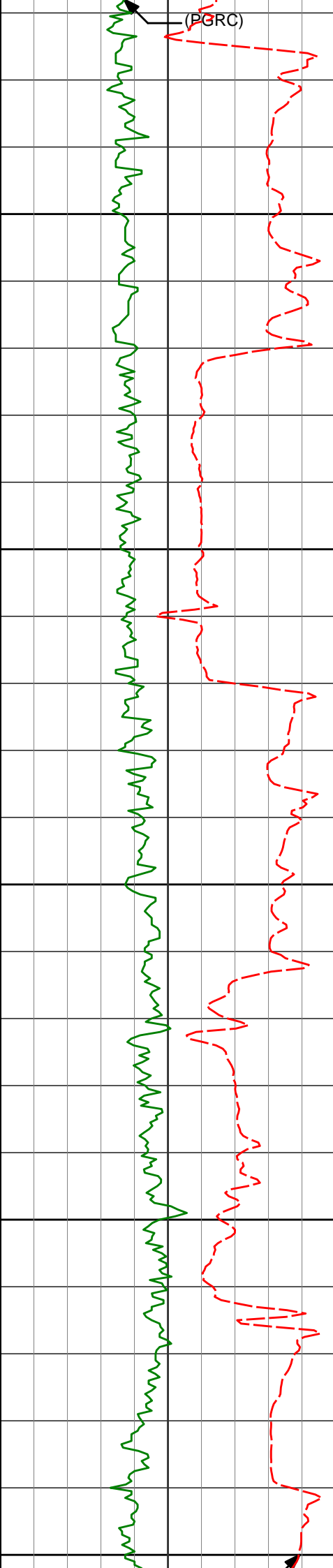
4.08°

2117.19'

10.98'

300PA





2200

2250

2300

2350

2400

2213'

7.15°

3.56°

2211.58'

14.49'

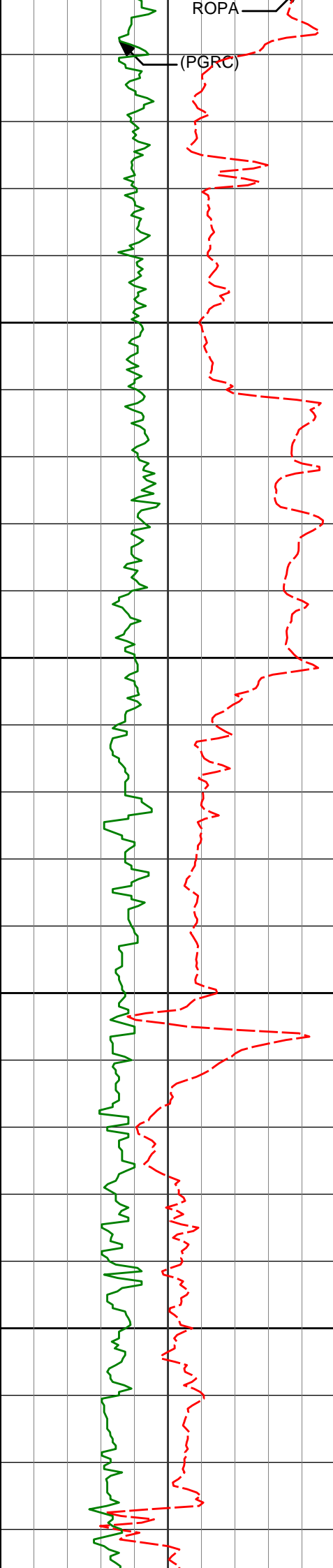
2308'

9.77°

355.84°

2305.54'

17.98'



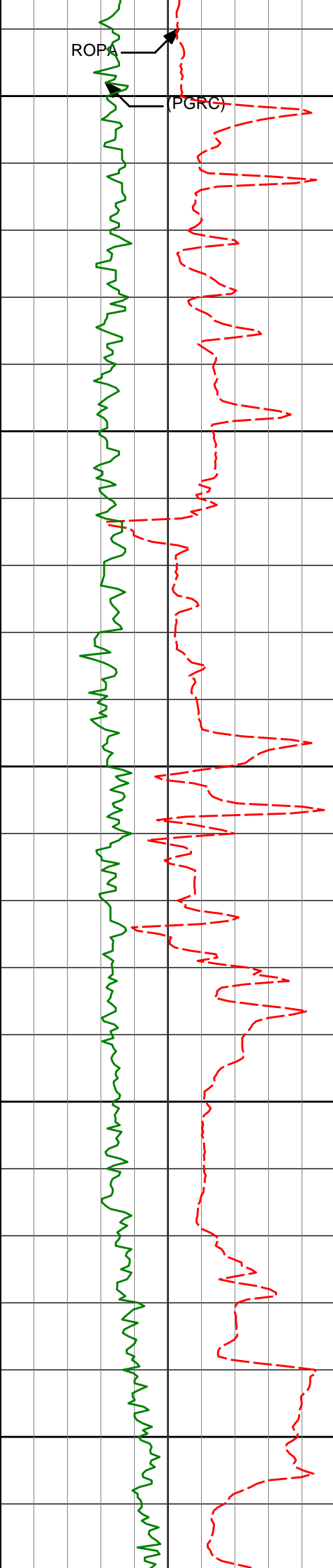
2450

2500

2550

2600

2403'	11.71°	355.43°	2398.87'	21.36'
2498'	14.02°	359.87°	2491.48'	26.19'
2593'	13.65°	0.51°	2583.73'	32.29'



2650

2700

2750

2800

2850

2688'

14.25°

0.75°

2675.92'

38.61'

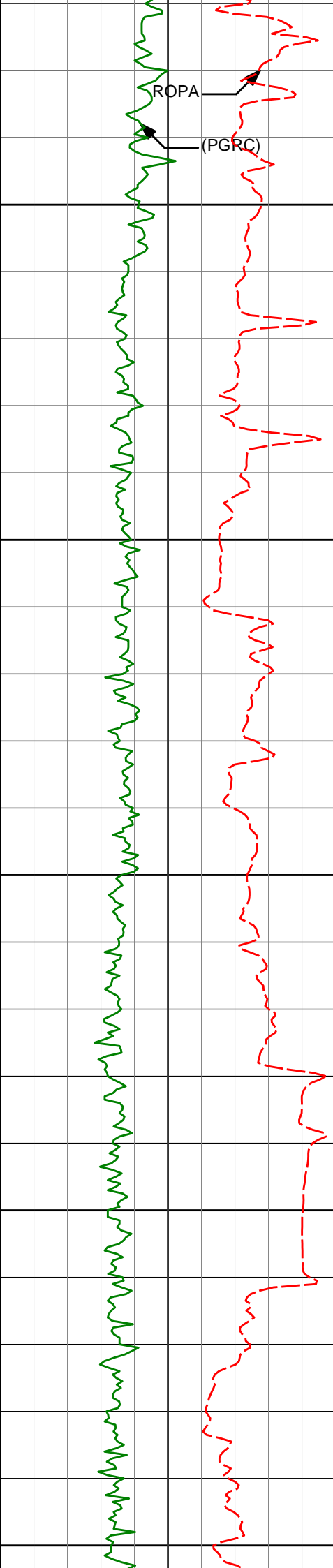
2783'

14.33°

1.09°

2767.98'

45.19'



2900

2950

3000

3050

3100

2878'

13.02°

354.99°

2860.30'

50.45'

2972'

11.91°

354.66°

2952.08'

54.04'

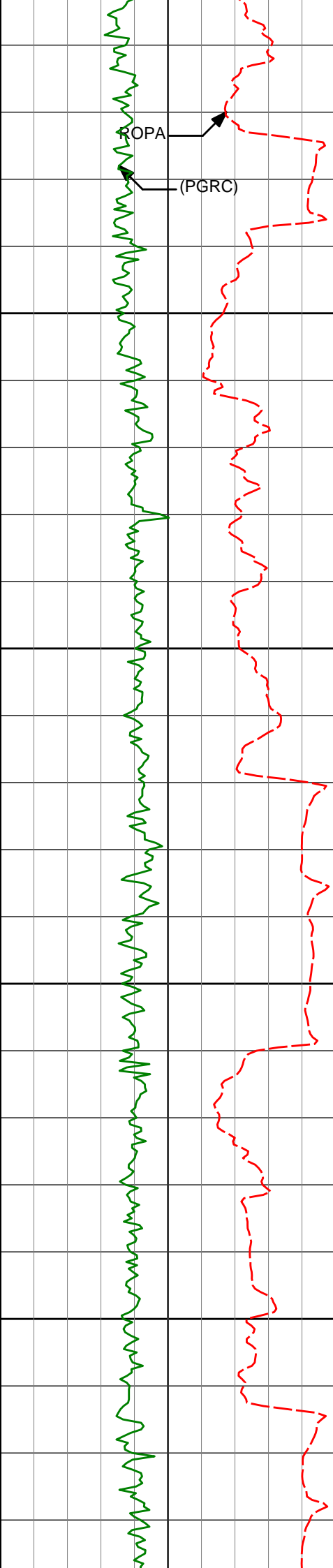
3067'

13.36°

354.54°

3044.77'

57.65'



3150

3162'

11.85°

356.35°

3137.48'

61.52'

3200

3250

3257'

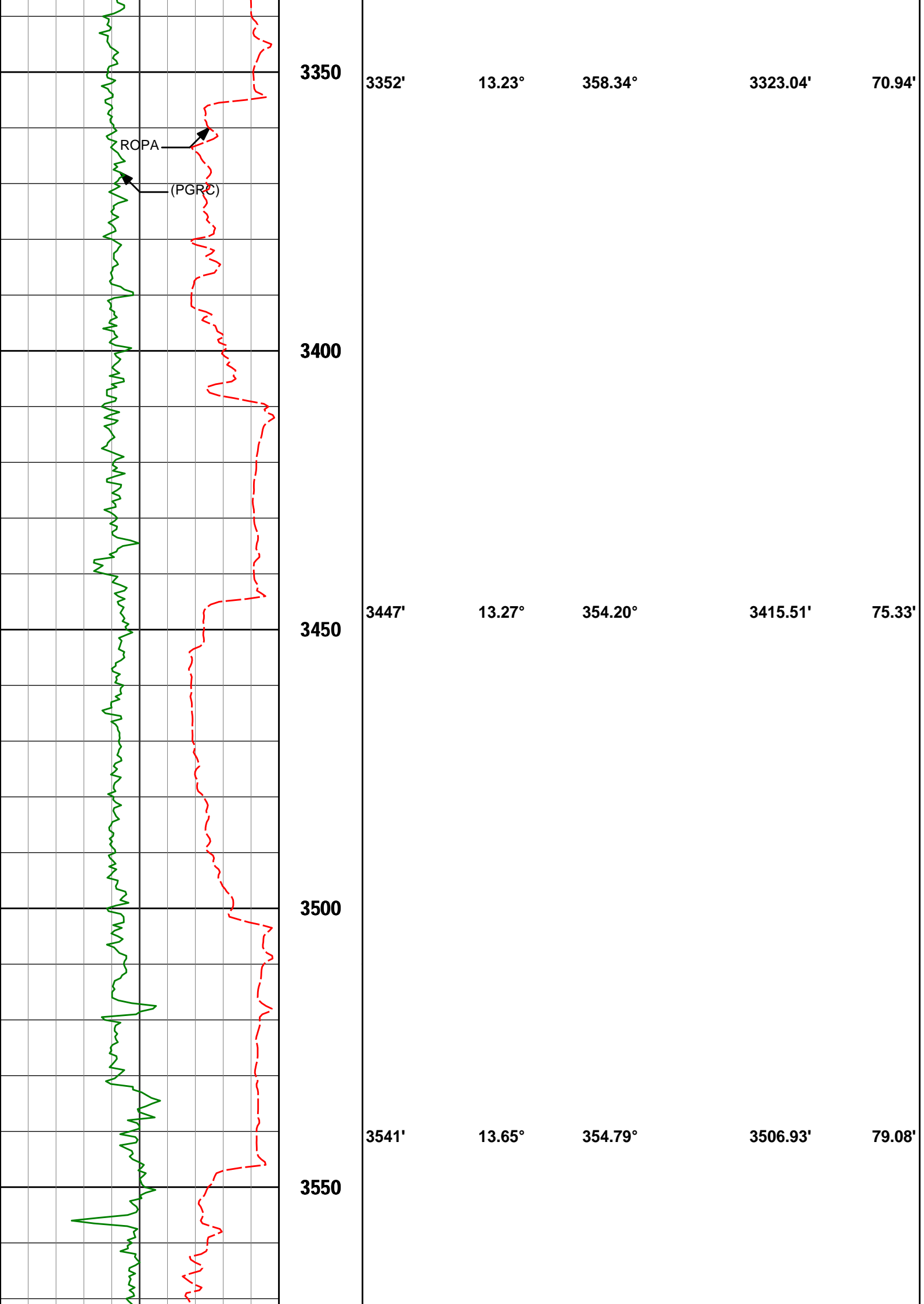
12.28°

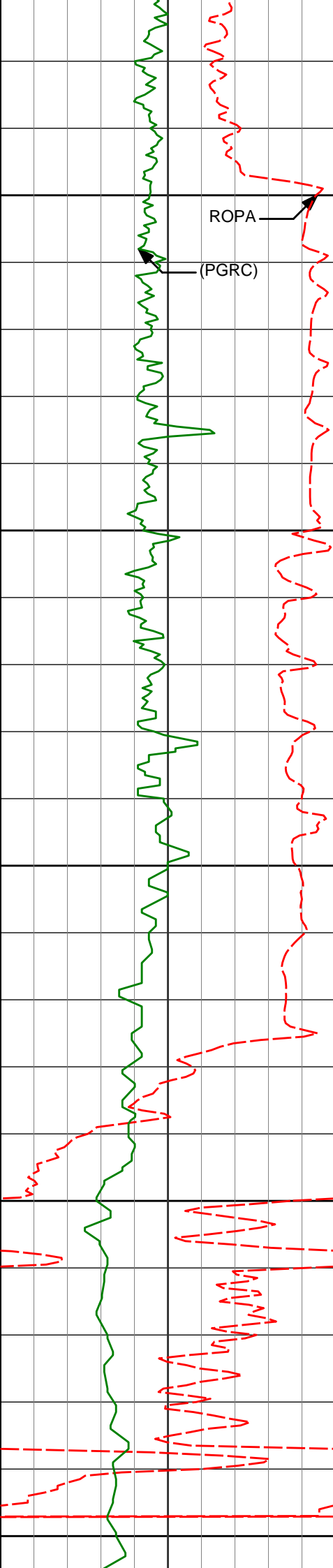
358.53°

3230.38'

65.93'

3300





3600

3650

3700

3750

3800

3636'

14.89°

357.96°

3599.00'

83.88'

3730'

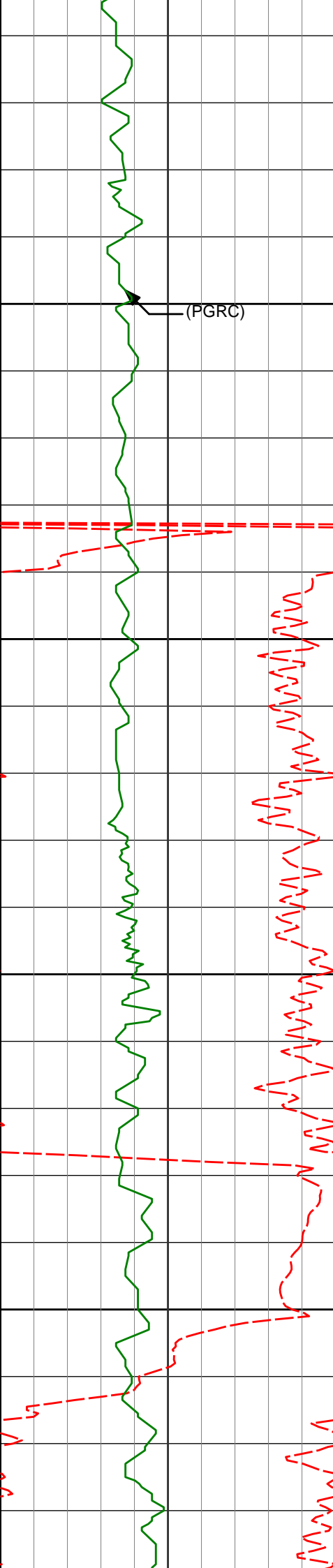
15.00°

357.62°

3689.82'

89.40'





3850

3900

3950

4000

3825'

15.53°

353.97°

3781.47'

94.23'

3919'

15.74°

350.89°

3872.00'

97.67'

4014'

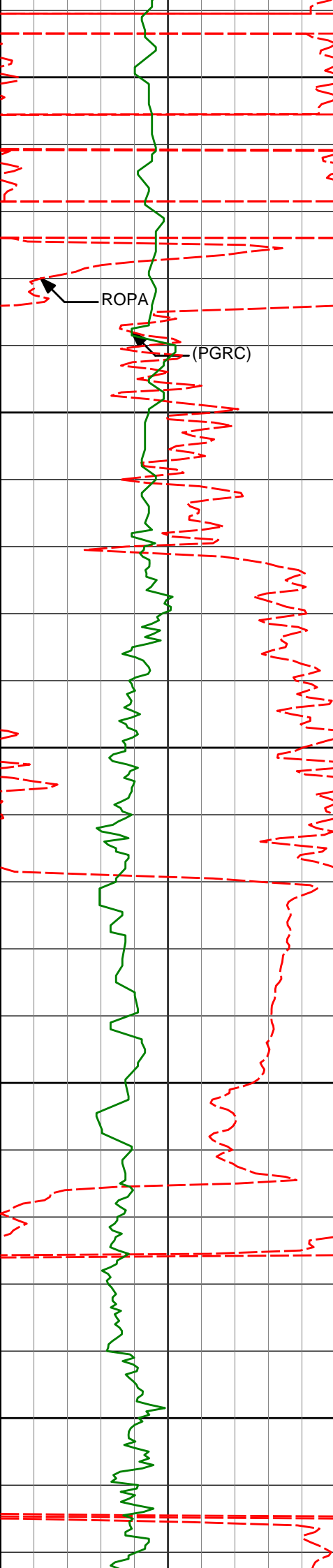
14.01°

357.40°

3963.81'

101.62'

(PGRC)



4050

4100

4150

4200

4250

4109'

10.36°

359.21°

4056.66'

106.32'

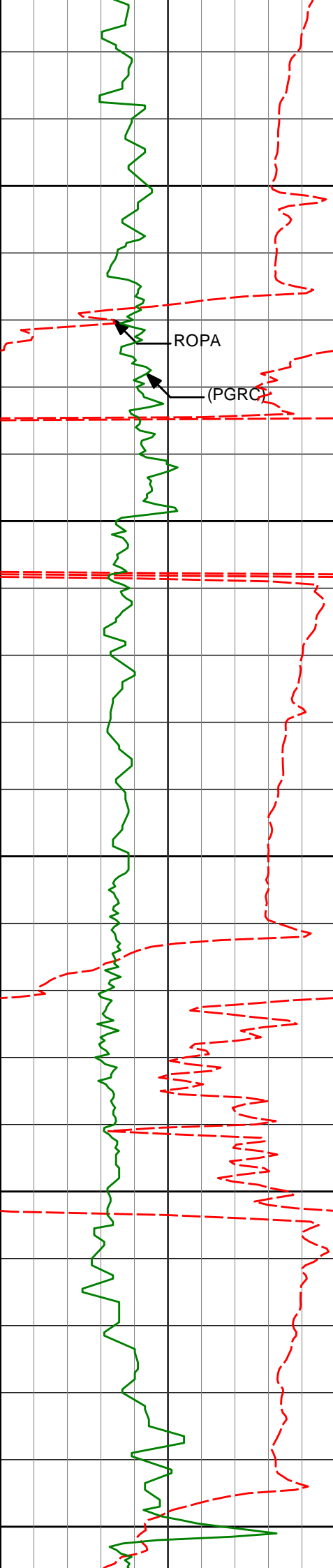
4204'

11.45°

359.23°

4149.94'

110.85'



4300

4299'

12.23°

358.97°

4242.92'

115.72'

ROPA

(PGRC)

4350

4400

4394'

13.79°

358.58°

4335.48'

120.95'

4450

4500

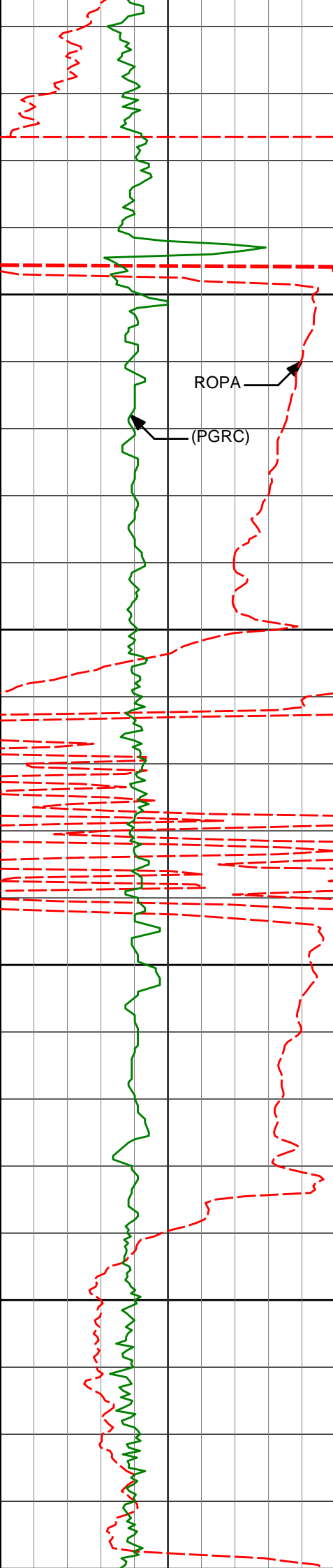
4488'

14.37°

357.21°

4426.65'

126.19'



4550

ROP

(PGRC)

4583'

15.18°

359.95°

4518.51'

132.05'

4600

4650

4678'

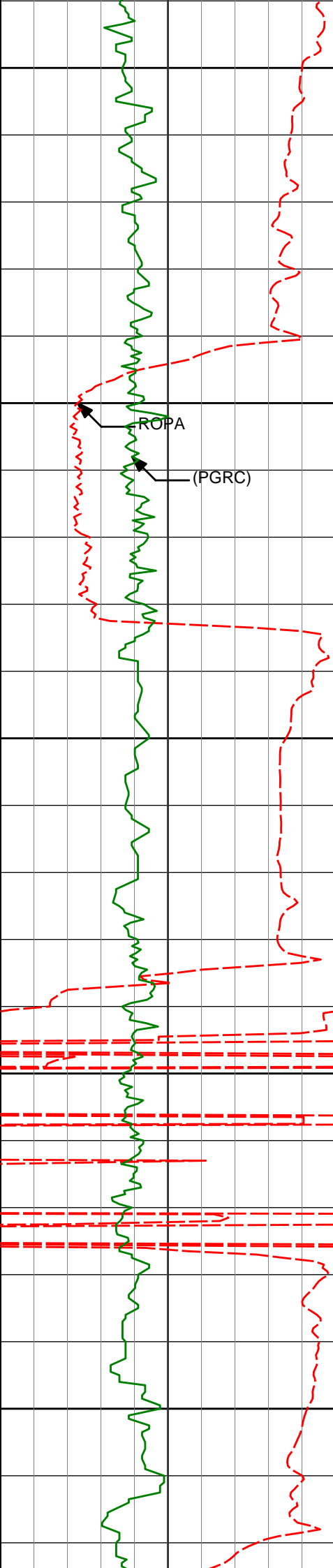
14.60°

0.63°

4610.32'

138.64'

4700



4750

4773'

15.02°

357.46°

4702.17'

144.68'

4800

ROPA

(PGRC)

4850

4867'

15.36°

357.24°

4792.88'

150.10'

4900

4950

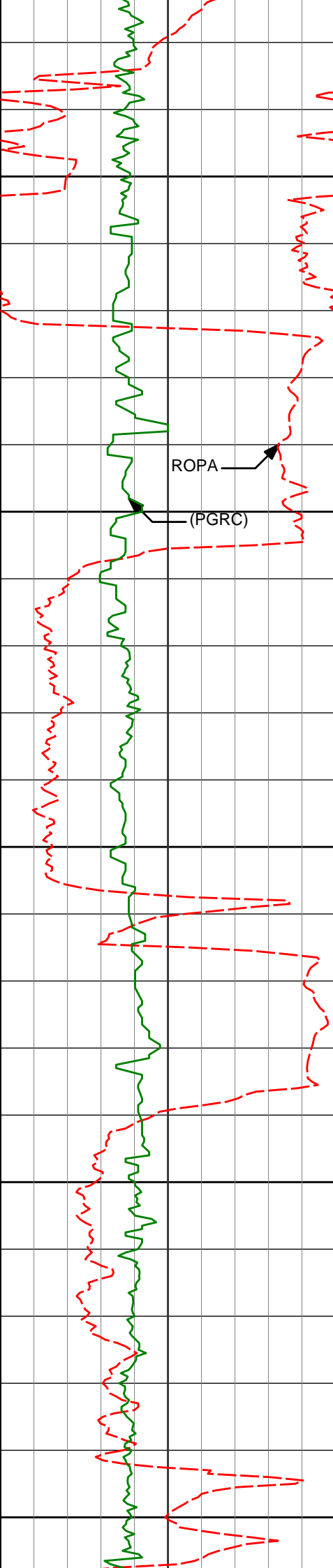
4962'

15.36°

356.92°

4884.49'

155.53'



5000

5050

5100

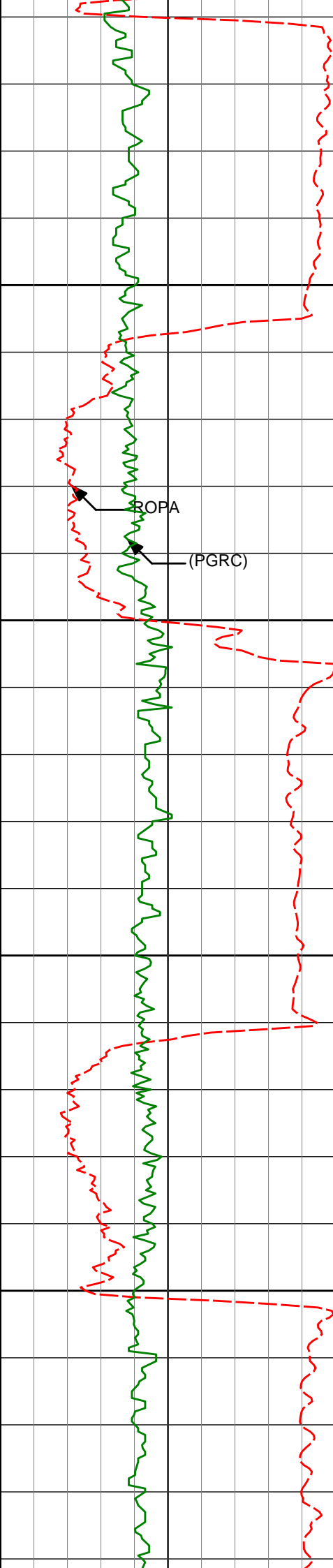
5150

5200

ROPA  
(PGRC)

5057'	15.72°	356.45°	4976.02'	160.85'
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5152'	13.29°	0.72°	5067.99'	166.52'
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5250

5300

5350

5400

5246'

12.80°

0.95°

5159.56'

172.44'

5341'

13.24°

359.13°

5252.12'

178.12'

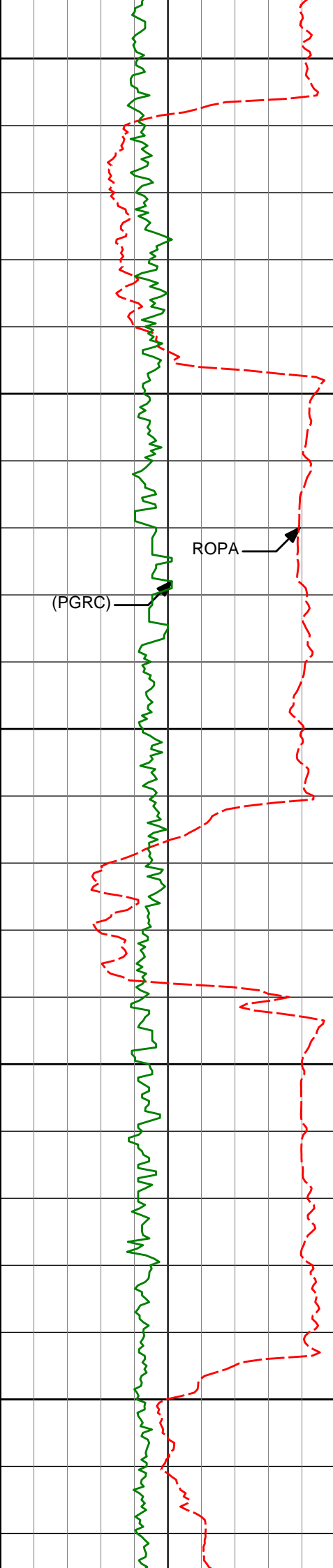
5436'

13.32°

357.94°

5344.58'

183.37'



5450

5500

5550

5600

5650

(PGRC)

ROPA

5531'

13.99°

355.92°

5436.90'

188.14'

5626'

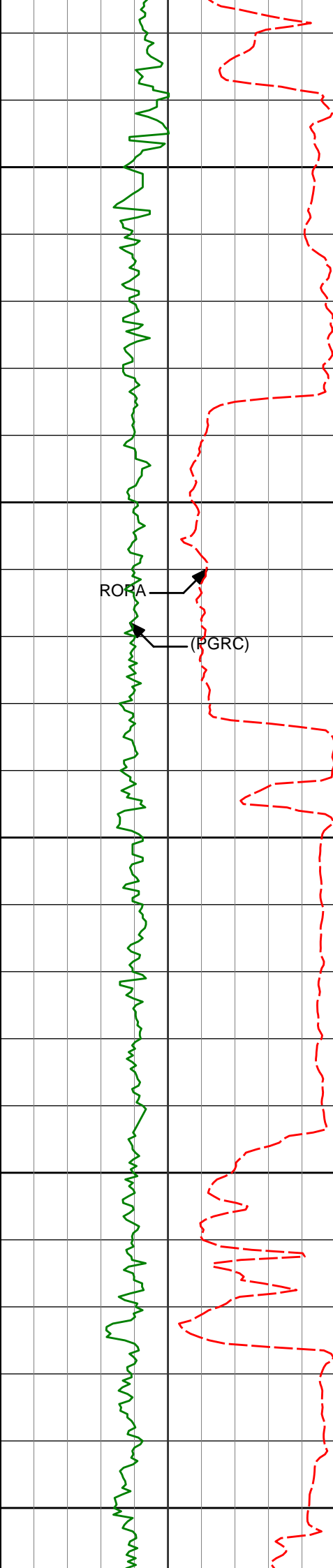
14.43°

356.33°

5528.99'

192.79'





5700

5721'

13.93°

355.62°

5621.09'

197.38'

5750

ROFA

(PGRC)

5800

5816'

12.67°

358.12°

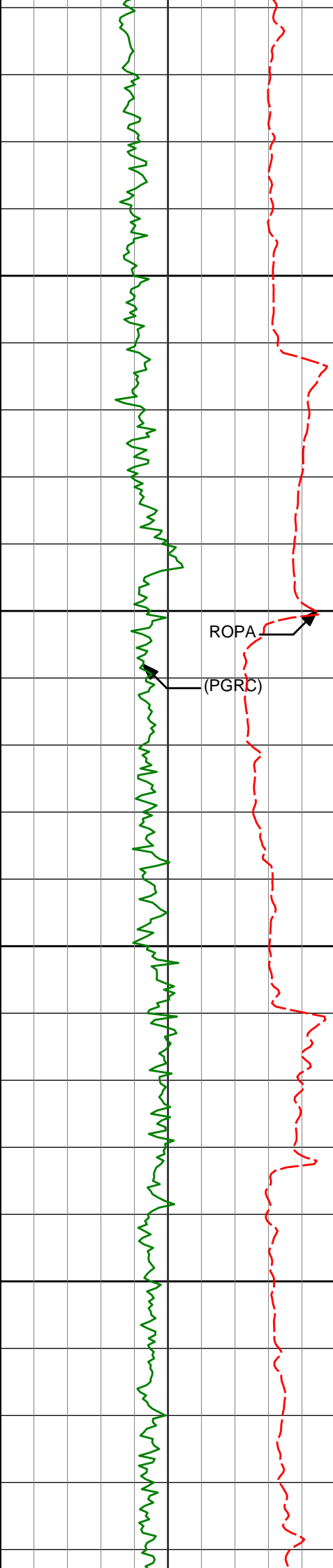
5713.54'

201.99'

5850

Run 300

5900



5950

6000

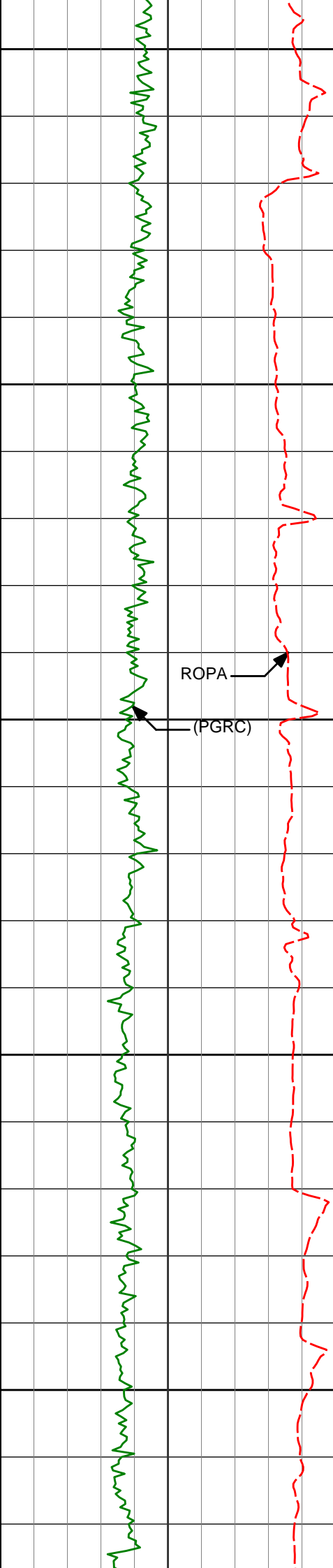
6050

6100

ROPA

(PGRC)

5910'	13.32°	2.89°	5805.14'	207.80'
6005'	15.34°	2.45°	5897.18'	215.08'
6100'	15.58°	357.11°	5988.74'	221.68'



6150

6200

6250

6300

6350

6195'

16.17°

353.37°

6080.12'

226.45'

6289'

14.41°

351.89°

6170.79'

229.92'

6337'

15.77°

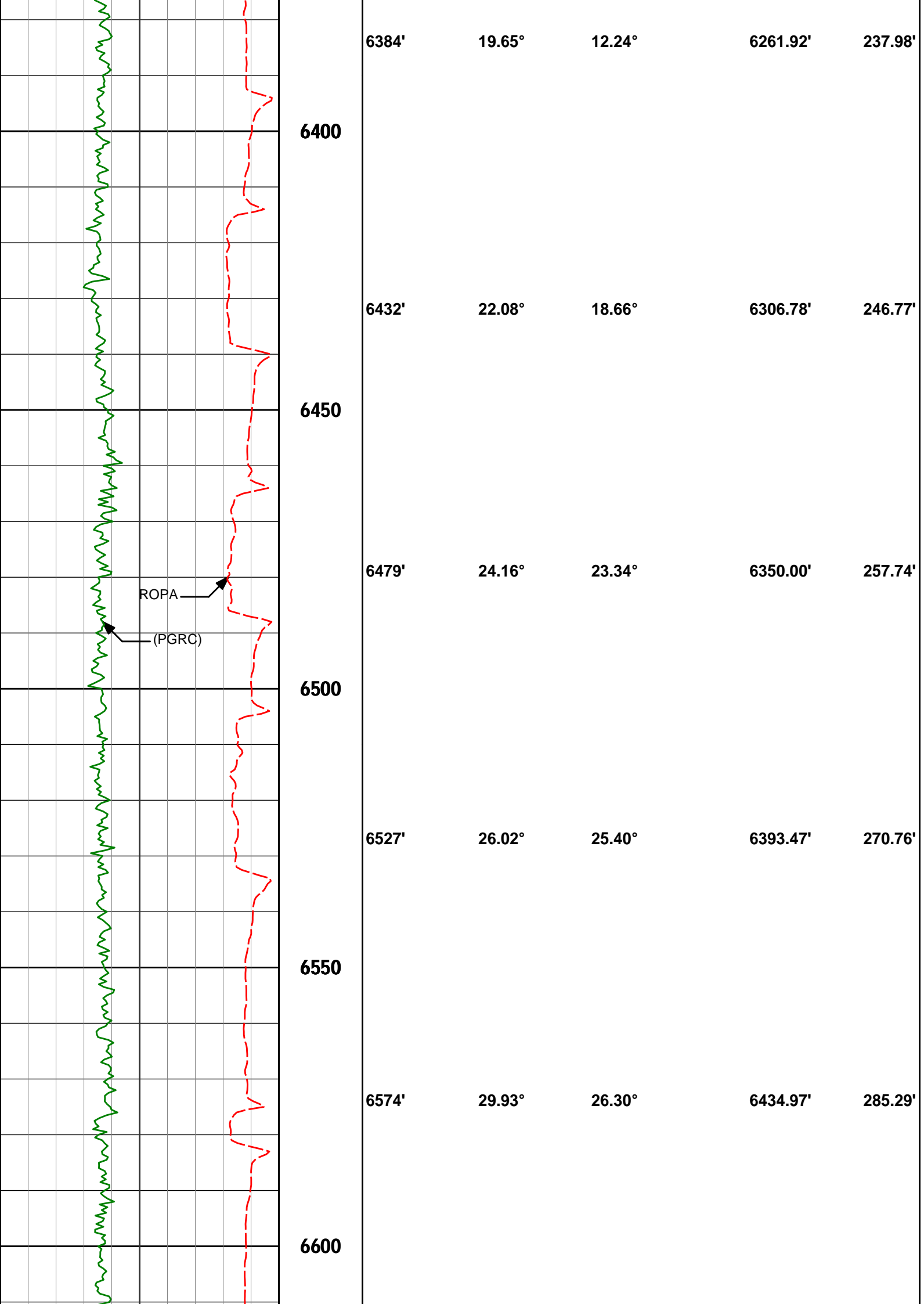
0.94°

6217.14'

232.51'

ROPA

(PGRC)



6384'

19.65°

12.24°

6261.92'

237.98'

6400

6432'

22.08°

18.66°

6306.78'

246.77'

6450

6479'

24.16°

23.34°

6350.00'

257.74'

ROPA

(PGRC)

6500

6527'

26.02°

25.40°

6393.47'

270.76'

6550

6574'

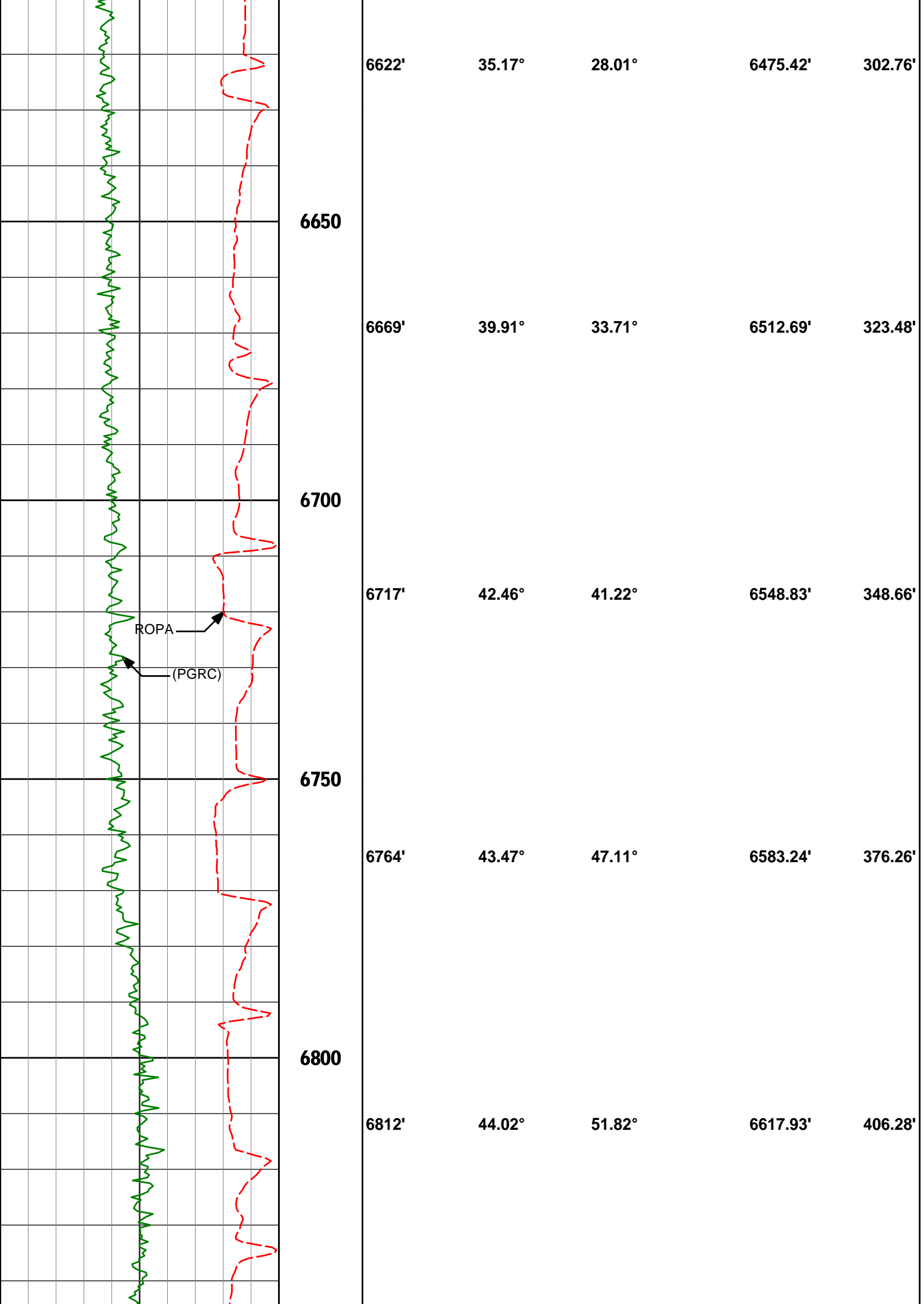
29.93°

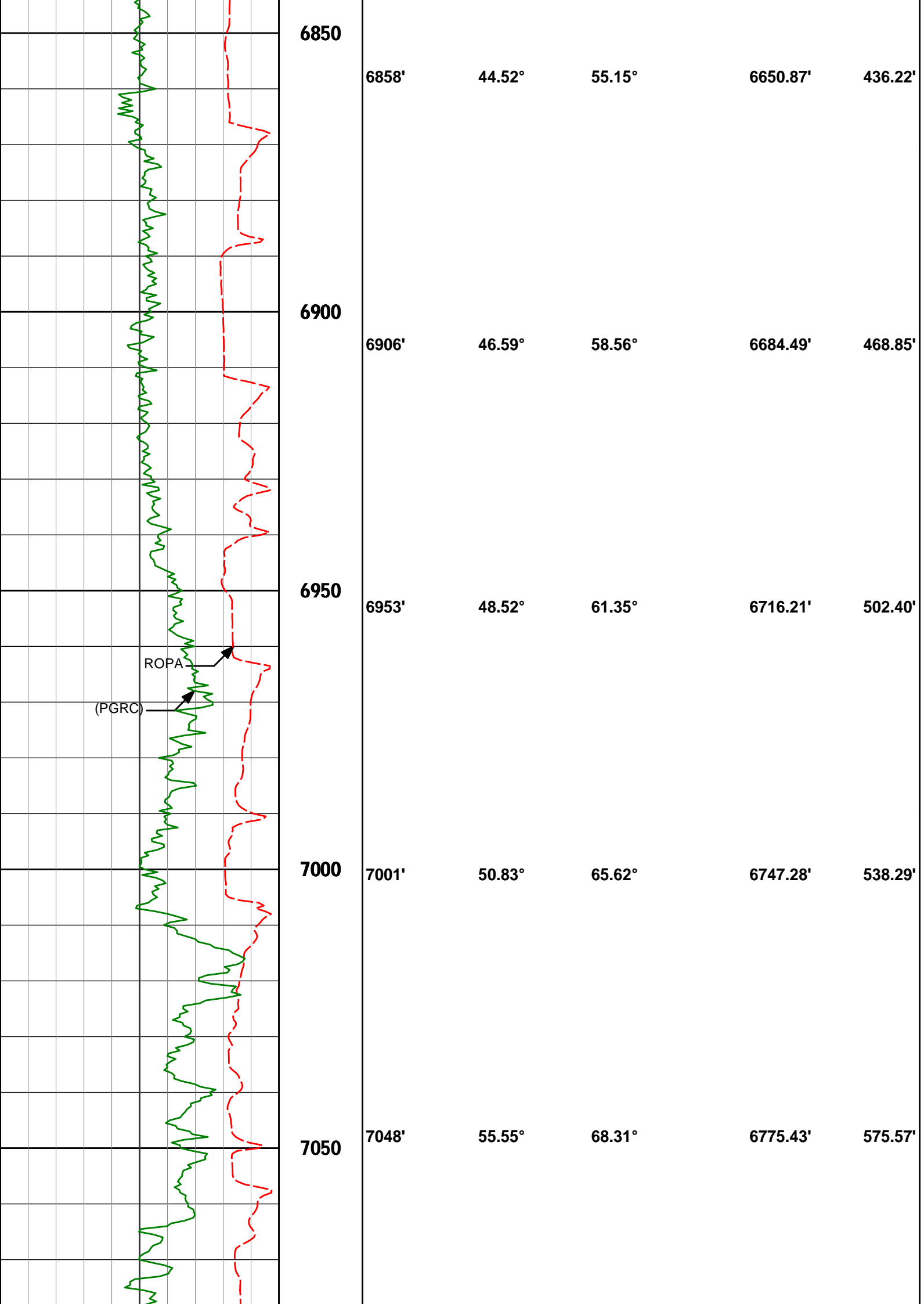
26.30°

6434.97'

285.29'

6600





6850

6858'

44.52°

55.15°

6650.87'

436.22'

6900

6906'

46.59°

58.56°

6684.49'

468.85'

6950

6953'

48.52°

61.35°

6716.21'

502.40'

ROPA

(PGRC)

7000

7001'

50.83°

65.62°

6747.28'

538.29'

7050

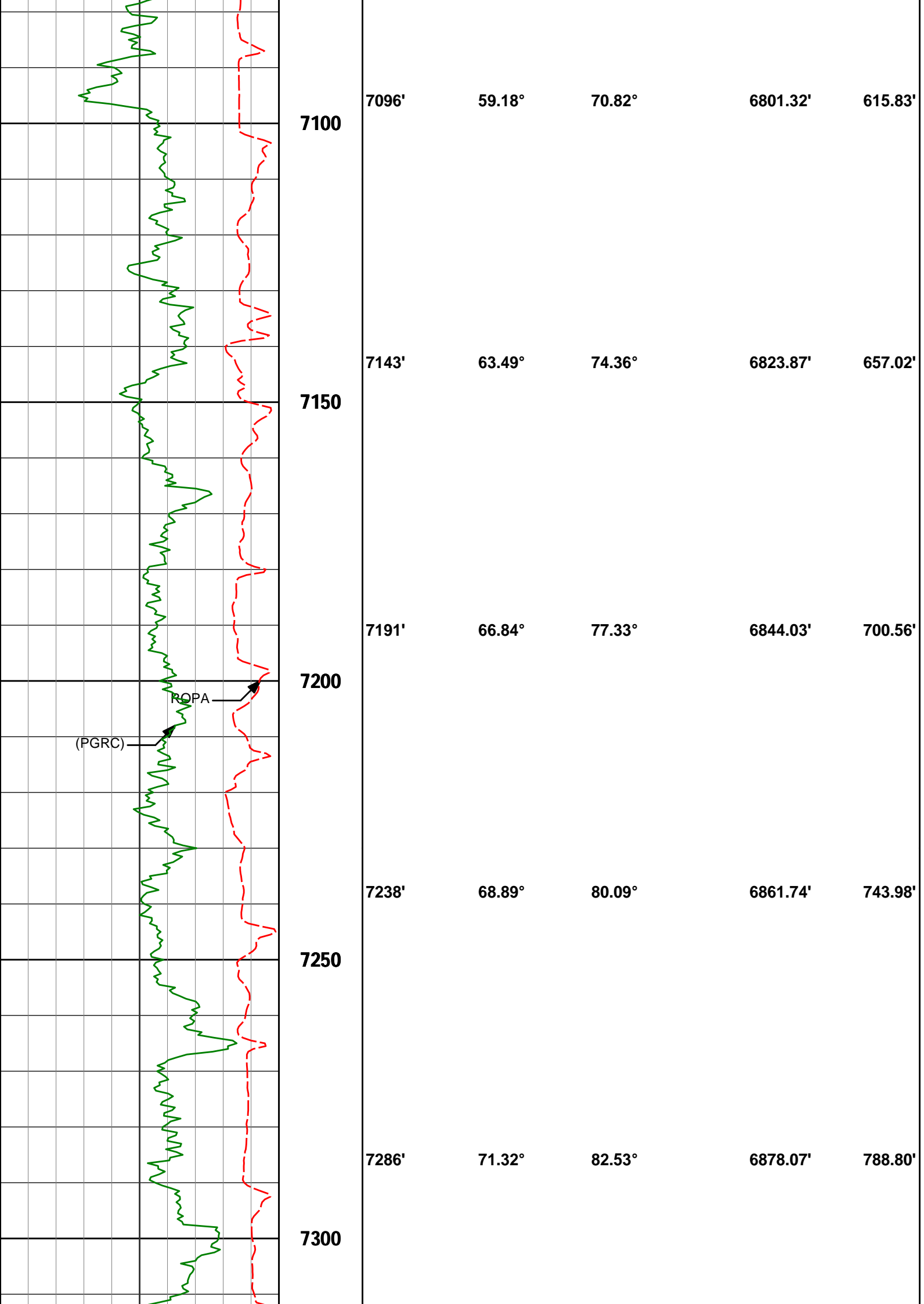
7048'

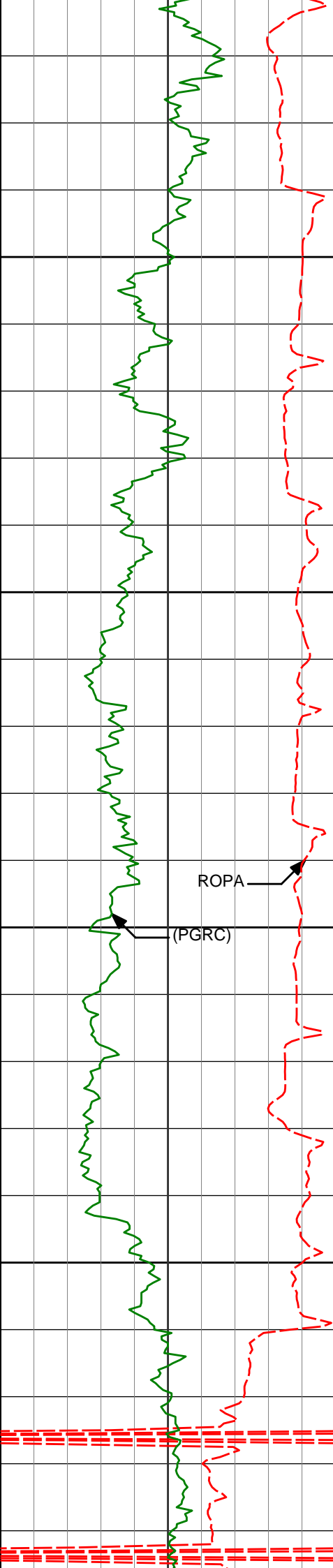
55.55°

68.31°

6775.43'

575.57'





**7350**

**7400**

**7450**

**7500**

Run 400



7333'

73.63°

84.54°

6892.22'

833.07'

7381'

76.81°

86.04°

6904.47'

878.67'

7428'

81.07°

88.35°

6913.48'

923.67'

7454'

83.83°

90.46°

6916.90'

948.59'

7531'

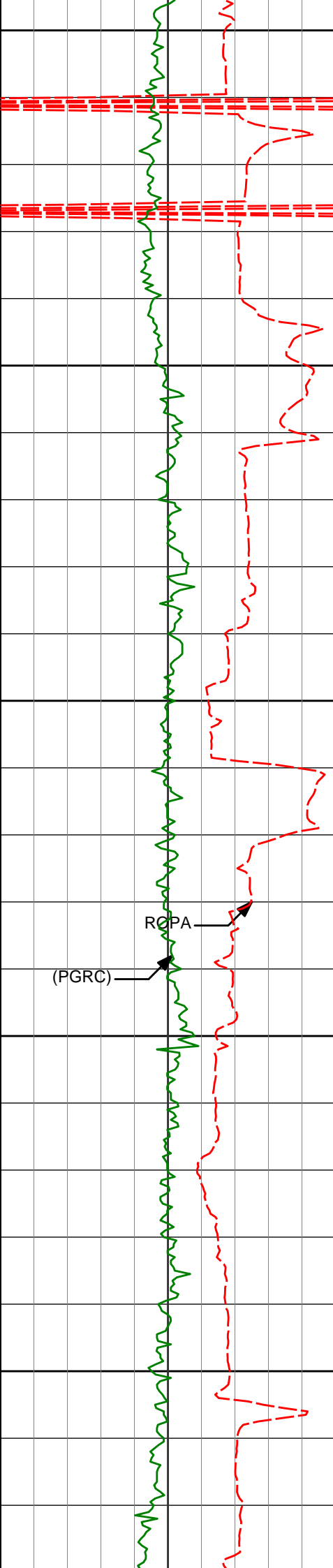
86.27°

92.96°

6923.54'

1021.90'





7550

7600

7650

7700

7750

7598'

87.53°

93.22°

6927.16'

1085.36'

7693'

90.31°

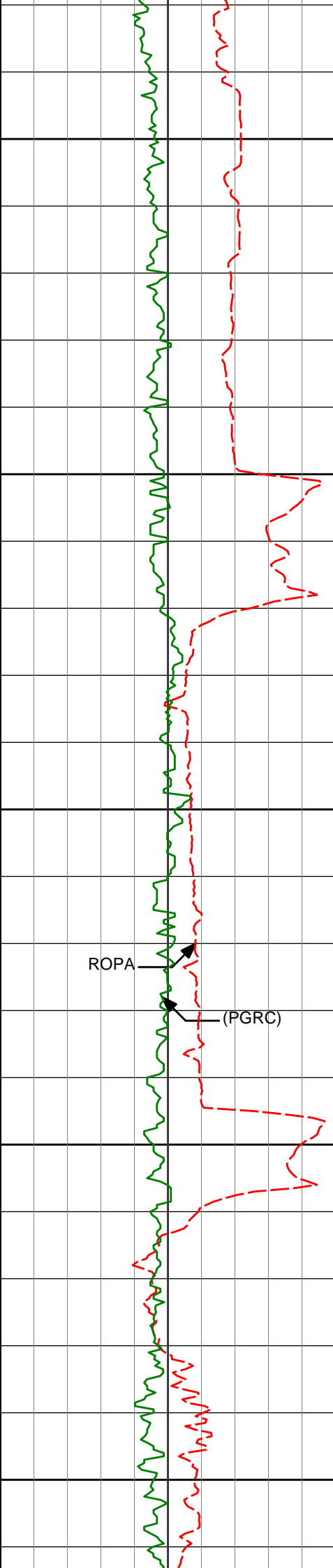
92.93°

6928.95'

1175.45'

ROPA

(PGRC)



7800

7850

7900

7950

8000

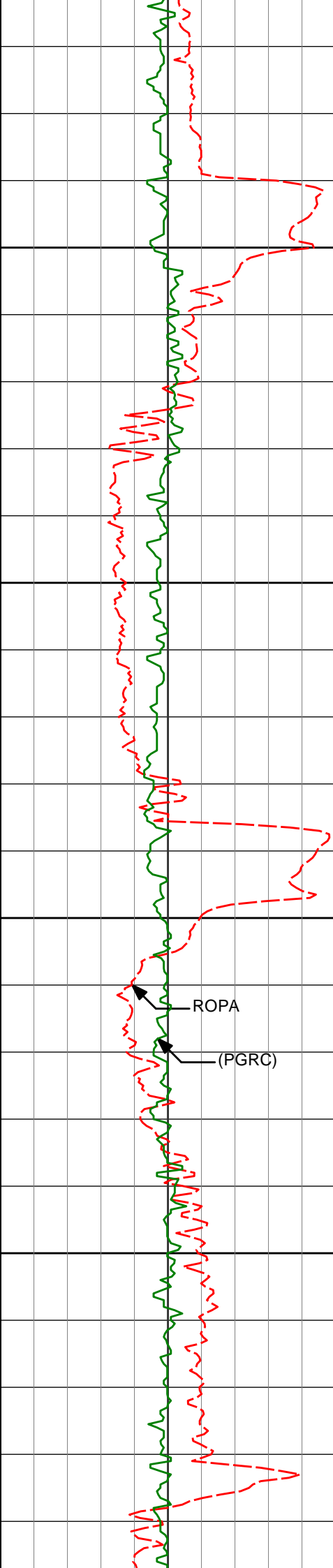
7788'      91.23°      91.66°      6927.68'      1265.95'

7883'      90.89°      92.18°      6925.91'      1356.63'

7978'      89.41°      93.52°      6925.66'      1446.86'

ROPA

(PGRC)



**8050**

**8100**

**8150**

**8200**

**8073'**

**90.89°**

**91.53°**

**6925.40'**

**1537.25'**

**8167'**

**89.13°**

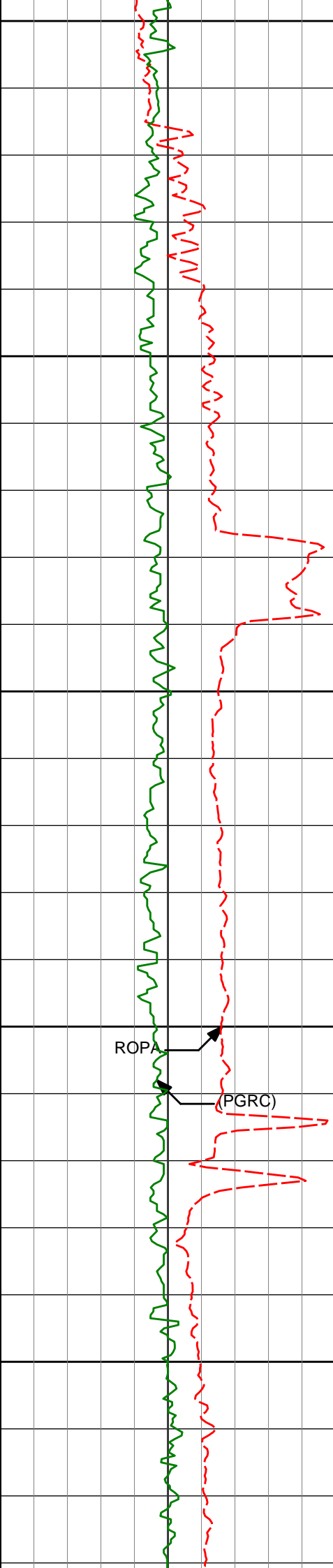
**91.70°**

**6925.38'**

**1627.14'**

ROPA

(PGRC)



8250

8262'

91.04°

92.16°

6925.23'

1717.84'

8300

8350

8357'

89.85°

90.83°

6924.49'

1808.74'

8400

ROPA

(PGRC)

8450

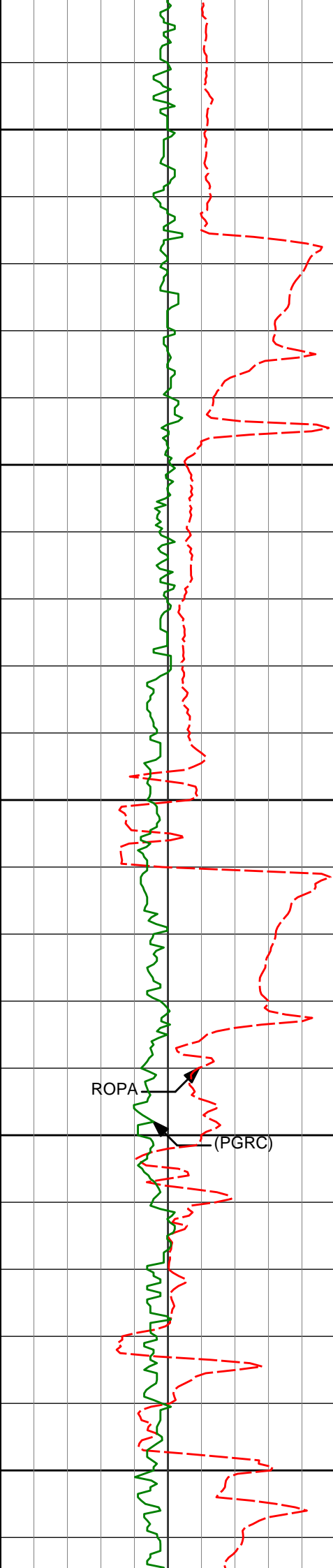
8452'

90.49°

89.66°

6924.21'

1900.23'



8500

8550

8600

8650

8700

8547'

91.45°

93.52°

6922.60'

1991.06'

8642'

89.26°

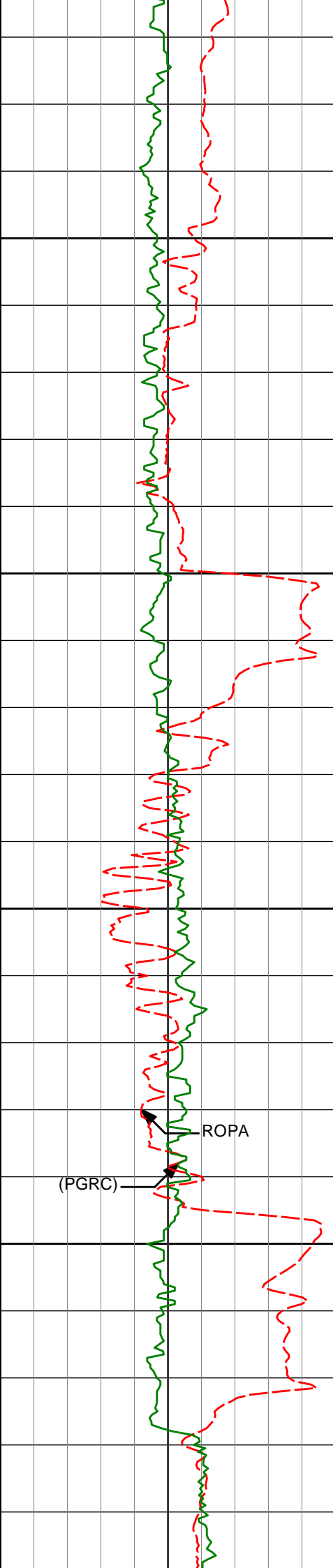
91.67°

6922.01'

2081.41'

ROPA

(PGRC)



8750

8800

8850

8900

8737'

88.77°

89.54°

6923.64'

2172.72'

8832'

89.01°

89.15°

6925.48'

2264.58'

8926'

89.38°

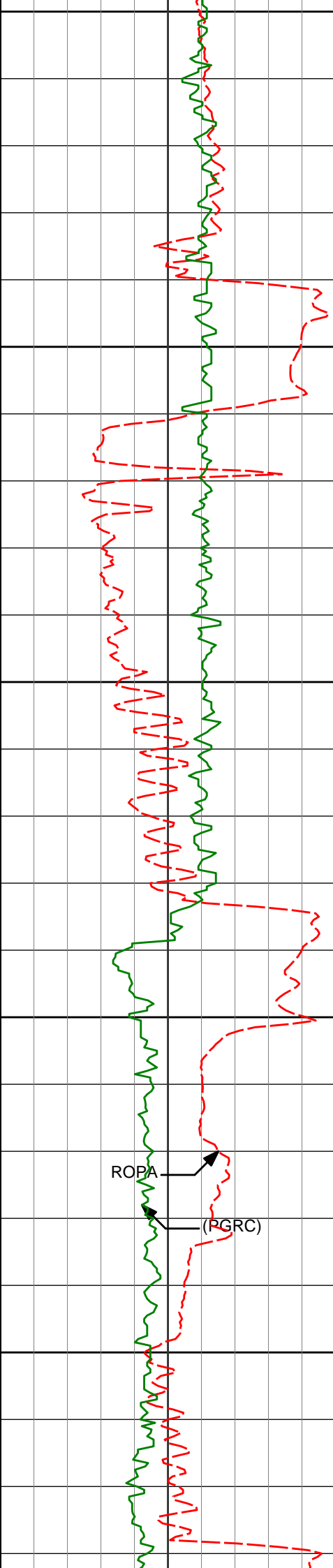
91.03°

6926.80'

2355.16'

ROPA

(PGRC)



8950

9000

9050

9100

9150

9021'

90.62°

91.19°

6926.80'

2446.25'

9116'

89.23°

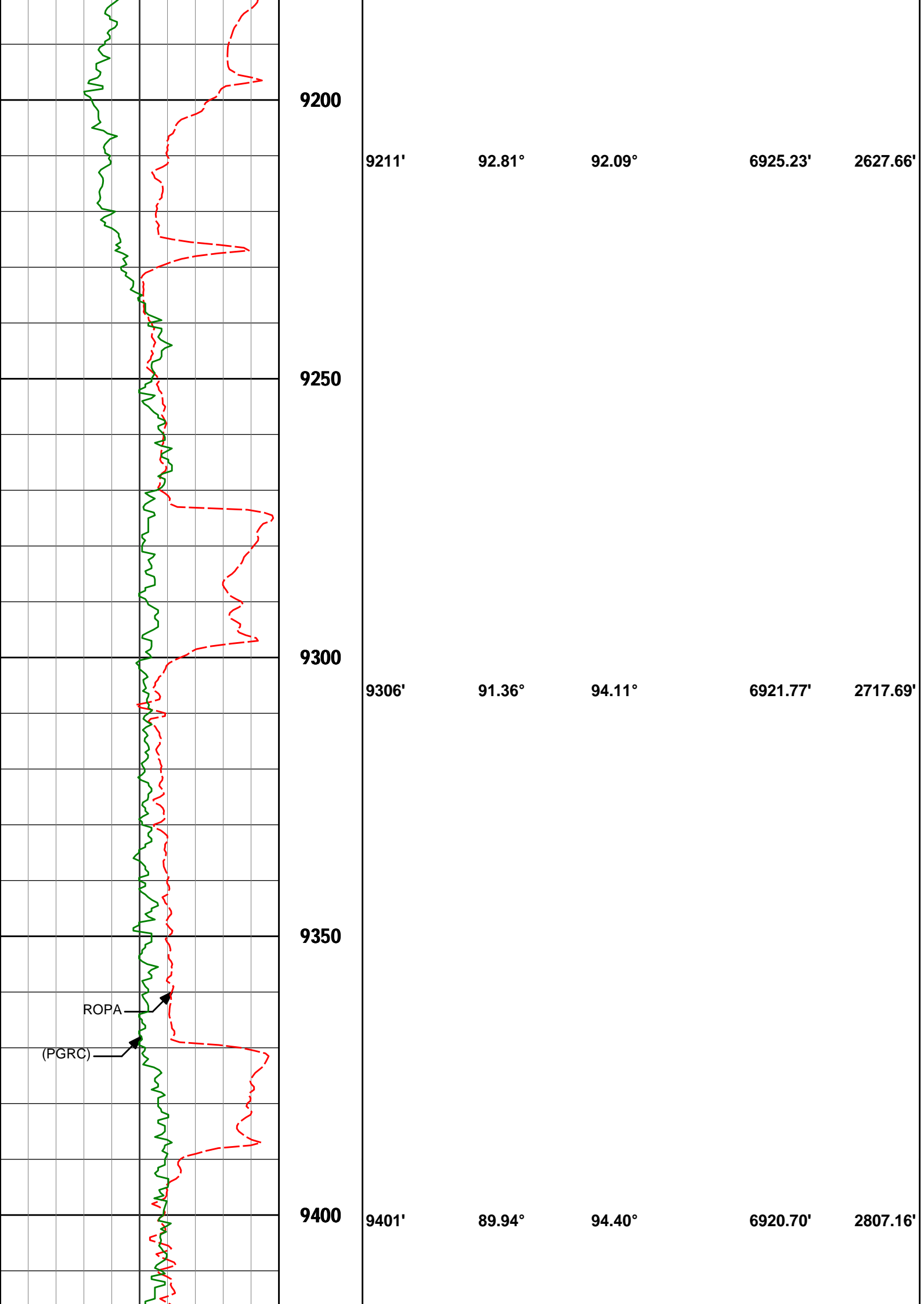
92.13°

6926.92'

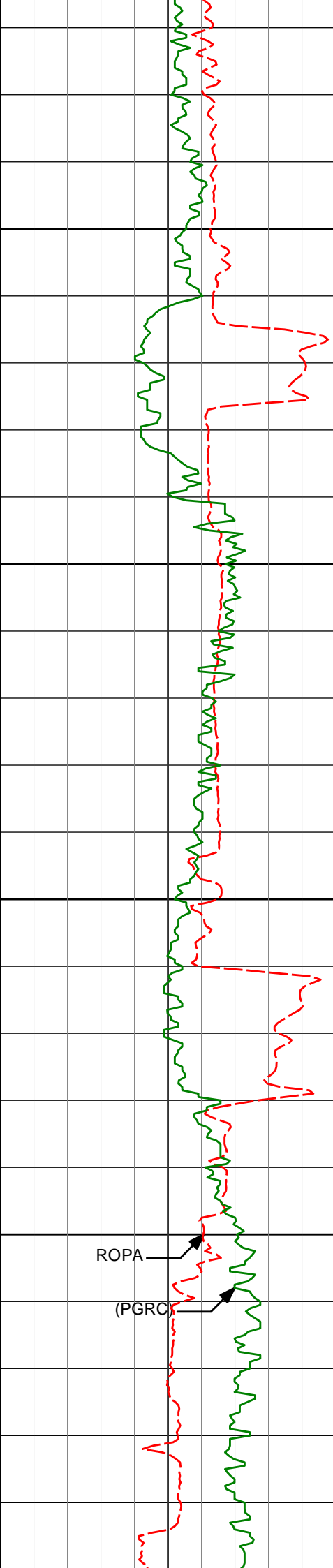
2537.08'

ROPA

(PGRC)







9450

9500

9550

9600

9650

9496'

89.44°

94.07°

6921.21'

2896.65'

9590'

90.86°

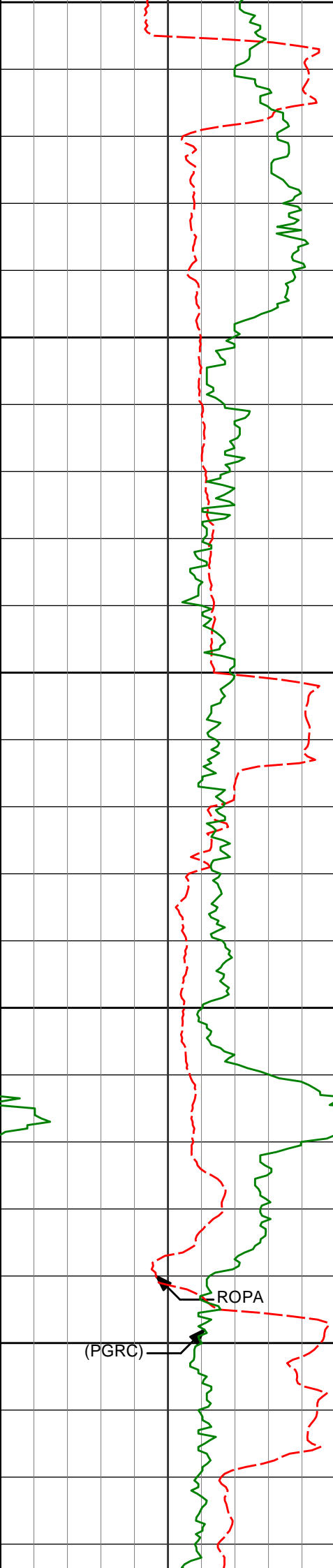
91.52°

6920.96'

2985.95'

ROPA

(PGRO)



9650

9685'

91.02°

92.00°

6919.40'

3076.71'

9700

9750

9780'

90.09°

91.02°

6918.48'

3167.61'

9800

9850

ROPA  
(PGRC)

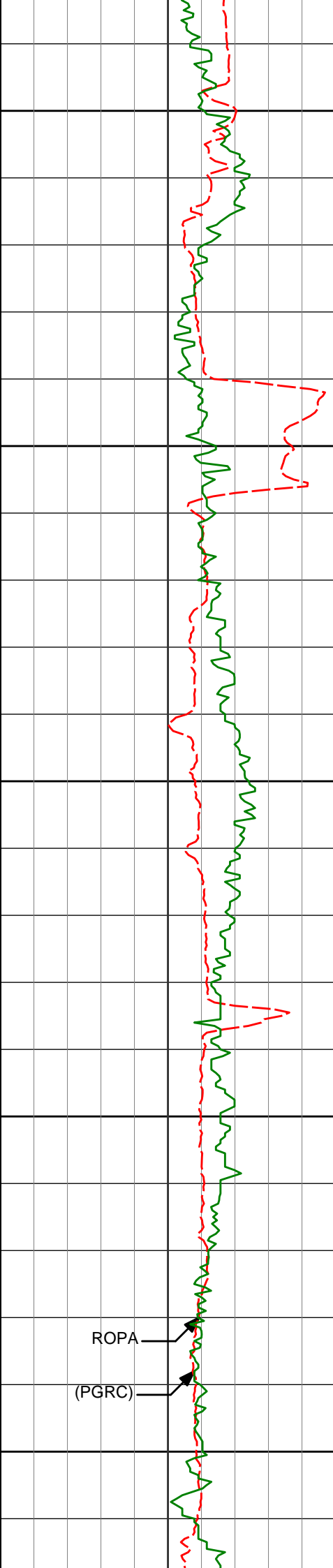
9875'

90.25°

91.80°

6918.20'

3258.56'



9900

9950

10000

10050

10100

9970'

89.57°

92.16°

6918.35'

3349.23'

10065'

89.78°

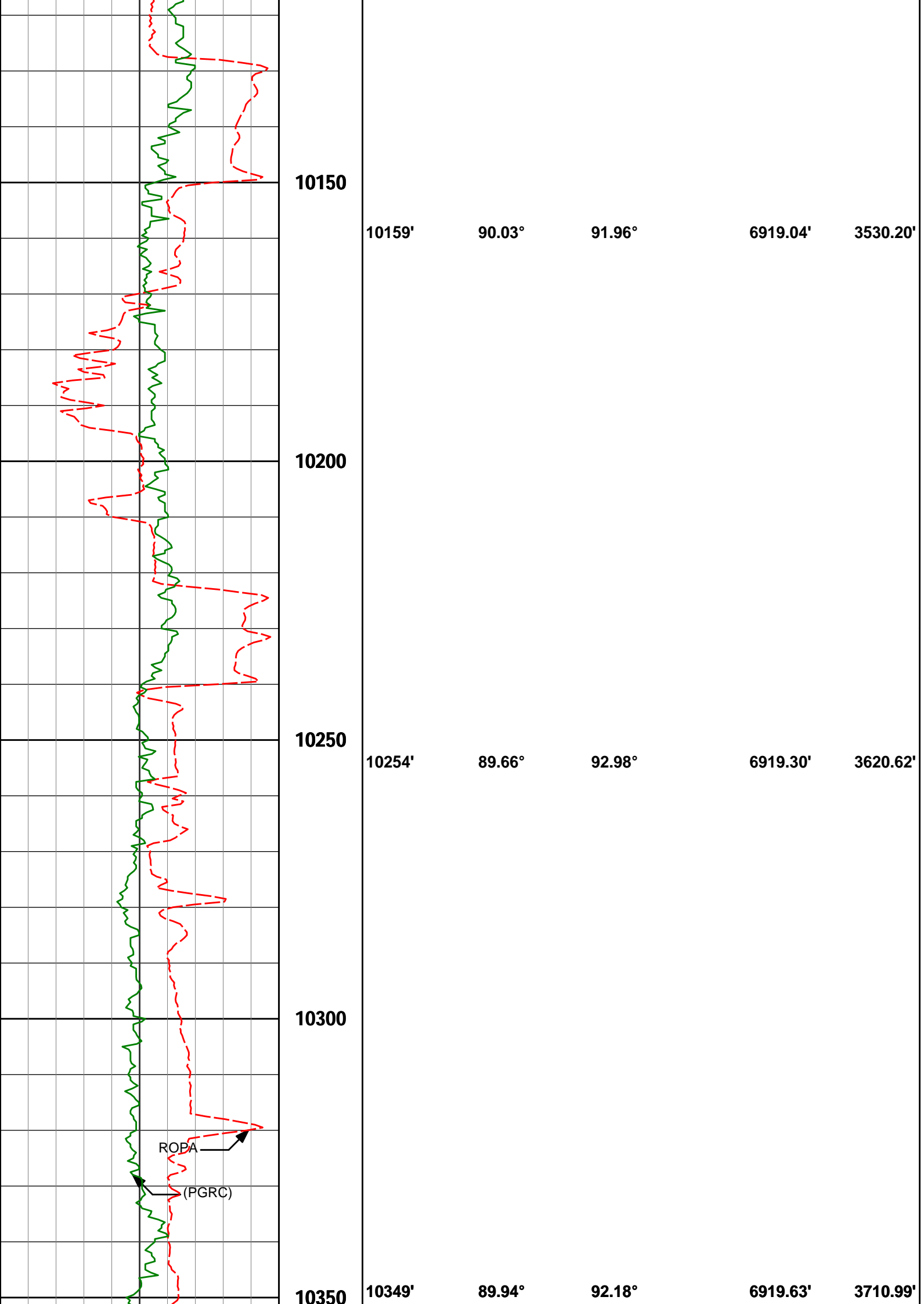
90.69°

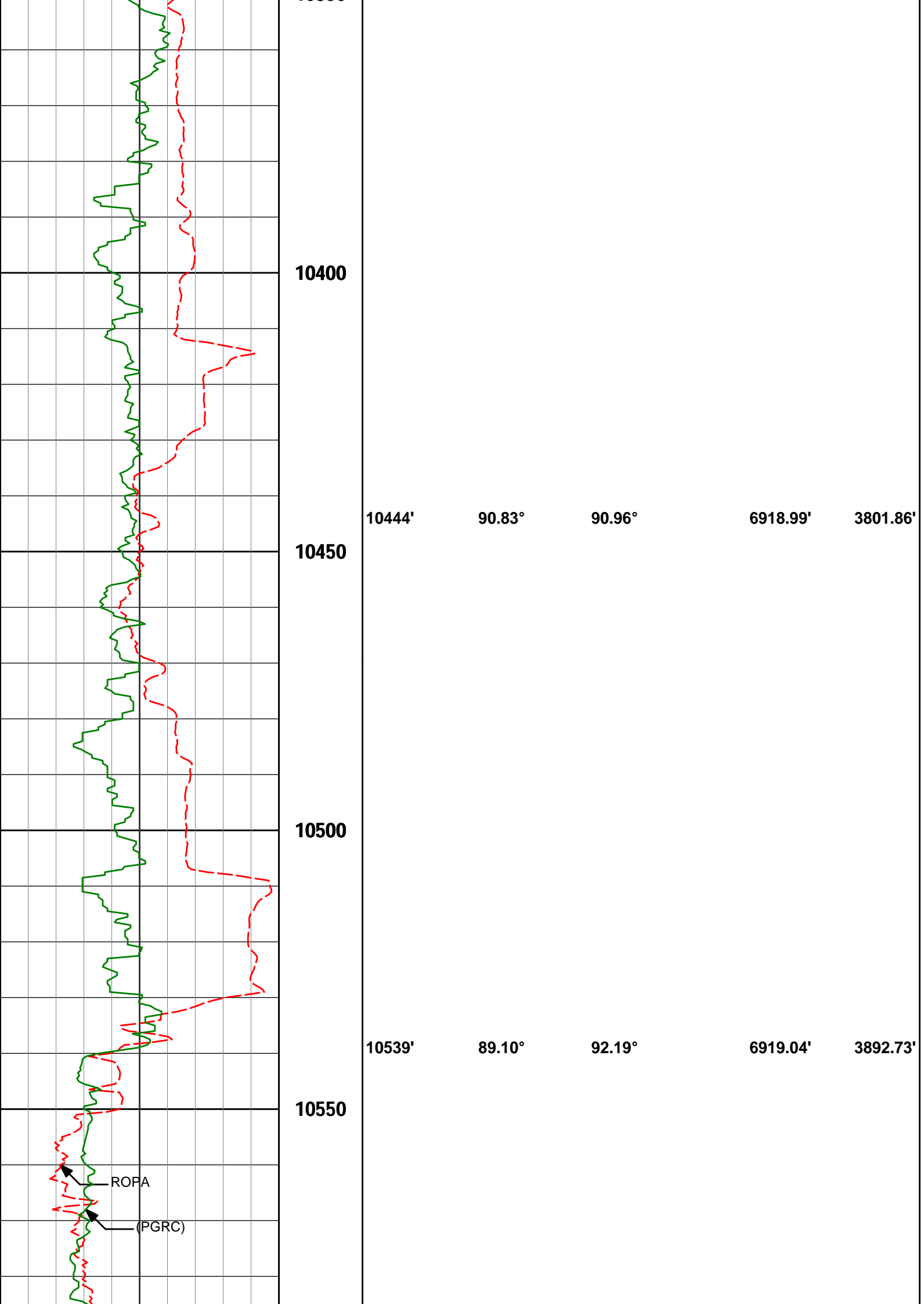
6918.89'

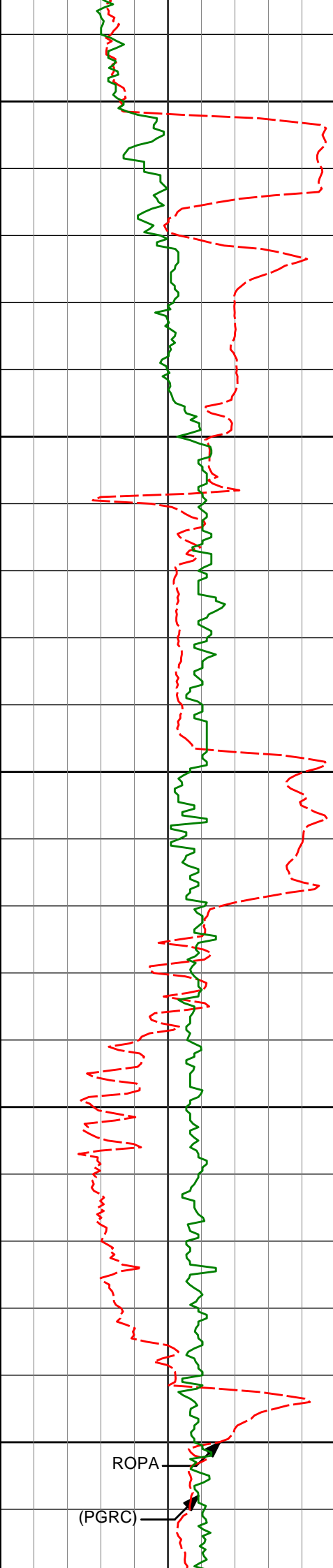
3440.17'

ROPA

(PGRC)







10600

10650

10700

10750

10800

10634'

89.81°

91.95°

6919.93'

3983.35'

10729'

90.15°

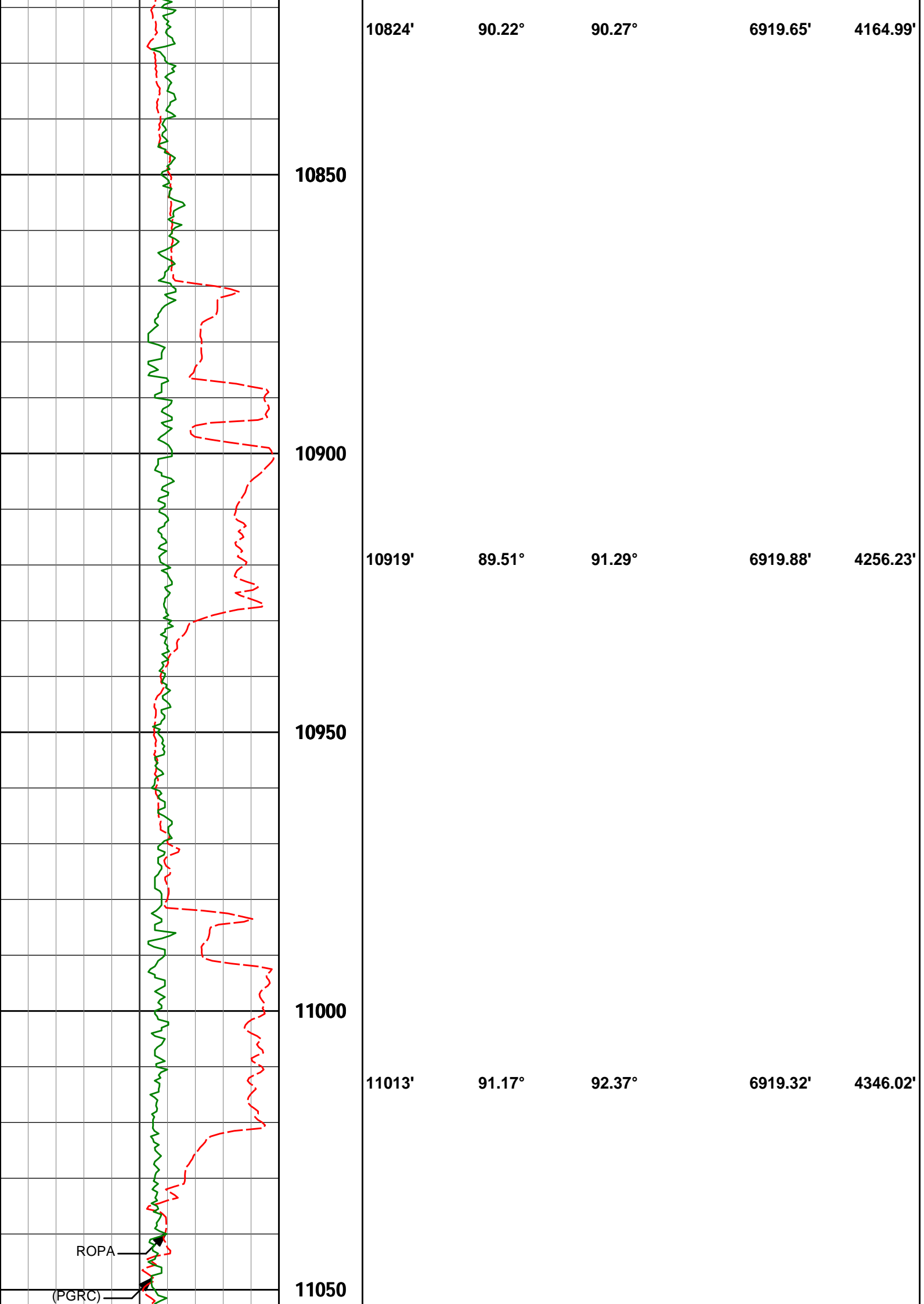
92.23°

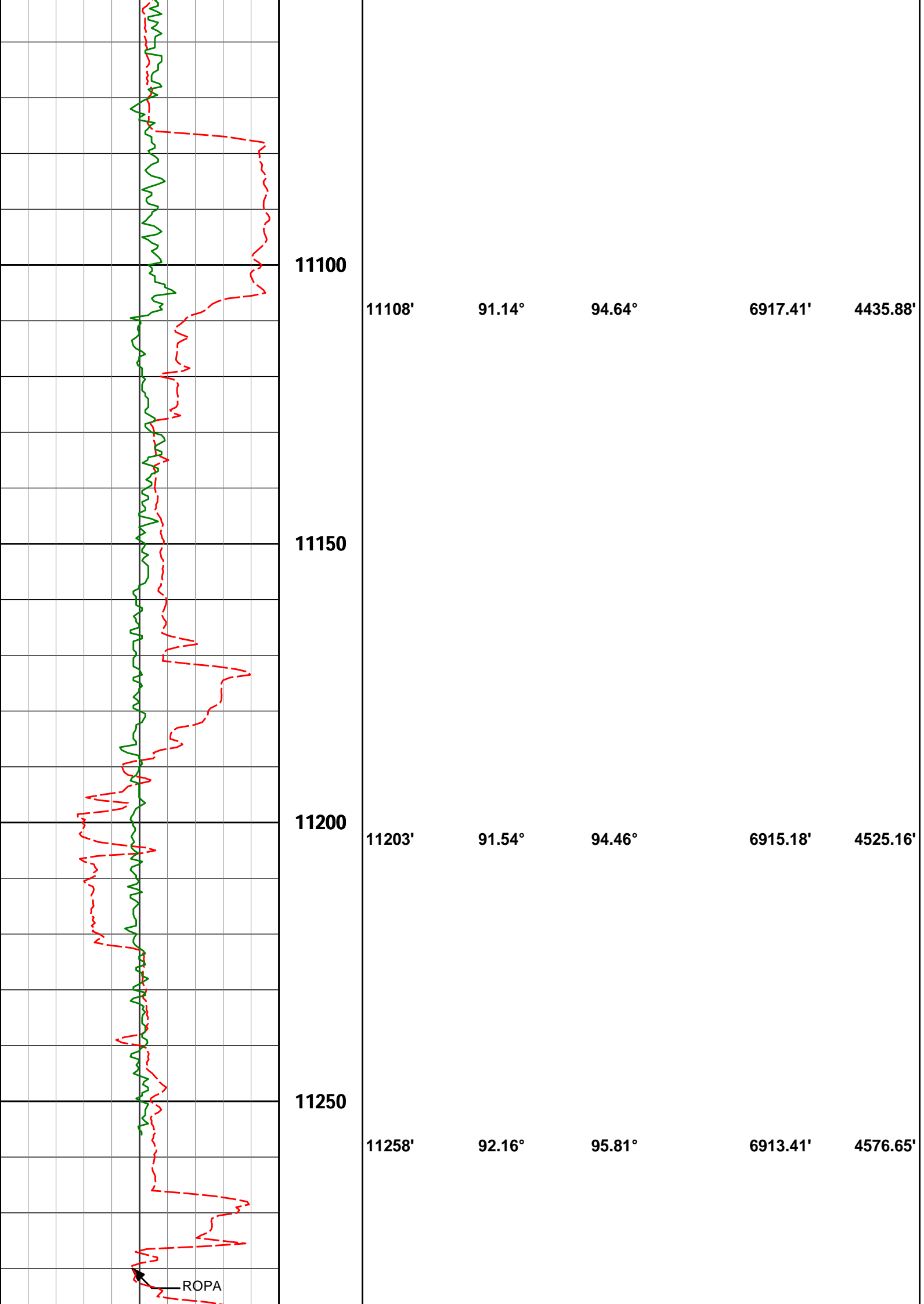
6919.96'

4073.97'

ROPA

(PGRC)









	3541.00	13.65	354.79	3506.93	328.03 N	8.21 W	79.08	0.43
	3636.00	14.89	357.96	3599.00	351.39 N	9.67 W	83.88	1.54
	3730.00	15.00	357.62	3689.82	375.61 N	10.60 W	89.40	0.15
	3825.00	15.53	353.97	3781.47	400.54 N	12.45 W	94.23	1.15
	3919.00	15.74	350.89	3872.00	425.65 N	15.79 W	97.67	0.91
	4014.00	14.01	357.40	3963.81	449.87 N	18.35 W	101.62	2.53
	4109.00	10.36	359.21	4056.66	469.91 N	18.99 W	106.32	3.86
	4204.00	11.45	359.23	4149.94	487.88 N	19.23 W	110.85	1.14
	4299.00	12.23	358.97	4242.92	507.36 N	19.54 W	115.72	0.83
	4394.00	13.79	358.58	4335.48	528.74 N	20.00 W	120.95	1.64
	4488.00	14.37	357.21	4426.65	551.59 N	20.85 W	126.19	0.71
	4583.00	15.18	359.95	4518.51	575.80 N	21.43 W	132.05	1.13
	4678.00	14.60	0.63	4610.32	600.22 N	21.31 W	138.64	0.64
	4773.00	15.02	357.46	4702.17	624.49 N	21.73 W	144.68	0.96
	4867.00	15.36	357.24	4792.88	649.09 N	22.87 W	150.10	0.37
	4962.00	15.36	356.92	4884.49	674.22 N	24.15 W	155.53	0.09
	5057.00	15.72	356.45	4976.02	699.63 N	25.62 W	160.85	0.40
	5152.00	13.29	0.72	5067.99	723.39 N	26.28 W	166.52	2.79
	5246.00	12.80	0.95	5159.56	744.60 N	25.97 W	172.44	0.52
	5341.00	13.24	359.13	5252.12	766.00 N	25.97 W	178.12	0.63
	5436.00	13.32	357.94	5344.58	787.81 N	26.52 W	183.37	0.30
	5531.00	13.99	355.92	5436.90	810.20 N	27.74 W	188.14	0.87
	5626.00	14.43	356.33	5528.99	833.47 N	29.31 W	192.79	0.48
	5721.00	13.93	355.62	5621.09	856.68 N	30.94 W	197.38	0.55
	5816.00	12.67	358.12	5713.54	878.50 N	32.16 W	201.99	1.46
	5910.00	13.32	2.89	5805.14	899.63 N	31.95 W	207.80	1.33
	6005.00	15.34	2.45	5897.18	923.11 N	30.86 W	215.08	2.13
	6100.00	15.58	357.11	5988.74	948.41 N	30.96 W	221.68	1.52
	6195.00	16.17	353.37	6080.12	974.29 N	33.13 W	226.45	1.24
	6289.00	14.41	351.89	6170.79	998.87 N	36.29 W	229.92	1.91
	6337.00	15.77	0.94	6217.14	1011.30 N	37.03 W	232.51	5.67
	6384.00	19.65	12.24	6261.92	1025.42 N	35.25 W	237.98	10.99
	6432.00	22.08	18.66	6306.78	1041.86 N	30.65 W	246.77	6.95
	6479.00	24.16	23.34	6350.00	1059.07 N	24.01 W	257.74	5.90
	6527.00	26.02	25.40	6393.47	1077.60 N	15.60 W	270.76	4.27
	6574.00	29.93	26.30	6434.97	1097.43 N	5.98 W	285.29	8.37
	6622.00	35.17	28.01	6475.42	1120.39 N	5.82 E	302.76	11.07
	6669.00	39.91	33.71	6512.69	1144.90 N	20.56 E	323.48	12.50
	6717.00	42.46	41.22	6548.83	1169.91 N	39.80 E	348.66	11.58
	6764.00	43.47	47.11	6583.24	1192.86 N	62.11 E	376.26	8.80
	6812.00	44.02	51.82	6617.93	1214.41 N	87.32 E	406.28	6.88
	6858.00	44.52	55.15	6650.87	1233.50 N	113.13 E	436.22	5.17
	6906.00	46.59	58.56	6684.49	1252.22 N	141.82 E	468.85	6.65
	6953.00	48.52	61.35	6716.21	1269.57 N	171.84 E	502.40	6.00
	7001.00	50.83	65.62	6747.28	1285.88 N	204.58 E	538.29	8.33
	7048.00	55.55	68.31	6775.43	1300.57 N	239.20 E	575.57	11.03
	7096.00	59.18	70.82	6801.32	1314.66 N	277.08 E	615.83	8.75
	7143.00	63.49	74.36	6823.87	1326.97 N	316.42 E	657.02	11.31
	7191.00	66.84	77.33	6844.03	1337.60 N	358.65 E	700.56	8.95
	7238.00	68.89	80.09	6861.74	1346.11 N	401.33 E	743.98	6.98
	7286.00	71.32	82.53	6878.07	1352.92 N	445.94 E	788.80	6.96
	7333.00	73.63	84.54	6892.22	1357.96 N	490.47 E	833.07	6.39
	7381.00	76.81	86.04	6904.47	1361.76 N	536.72 E	878.67	7.28
	7428.00	81.07	88.35	6913.48	1364.01 N	582.78 E	923.67	10.27
	7454.00	83.83	90.46	6916.90	1364.28 N	608.55 E	948.59	13.31
	7531.00	86.27	92.96	6923.54	1361.98 N	685.22 E	1021.90	4.53
	7598.00	87.53	93.22	6927.16	1358.37 N	752.02 E	1085.36	1.92
	7693.00	90.31	92.93	6928.95	1353.28 N	846.86 E	1175.45	2.94
	7788.00	91.23	91.66	6927.68	1349.47 N	941.77 E	1265.95	1.65
	7883.00	90.89	92.18	6925.91	1346.29 N	1036.70 E	1356.63	0.65
	7978.00	89.41	93.52	6925.66	1341.56 N	1131.58 E	1446.86	2.11
	8073.00	90.89	91.53	6925.40	1337.37 N	1226.48 E	1537.25	2.62
	8167.00	89.13	91.70	6925.38	1334.73 N	1320.43 E	1627.14	1.88
	8262.00	91.04	92.16	6925.23	1331.53 N	1415.38 E	1717.84	2.07
	8357.00	89.85	90.83	6924.49	1329.05 N	1510.34 E	1808.74	1.89
	8452.00	90.49	89.66	6924.21	1328.65 N	1605.33 E	1900.23	1.40
	8547.00	91.45	93.52	6922.60	1326.01 N	1700.26 E	1991.06	4.19
	8642.00	89.26	91.67	6922.01	1321.70 N	1795.16 E	2081.41	3.02
	8737.00	88.77	89.54	6923.64	1320.70 N	1890.13 E	2172.72	2.30
	8832.00	89.01	89.15	6925.48	1321.78 N	1985.11 E	2264.58	0.48
	8926.00	89.38	91.03	6926.80	1321.64 N	2079.09 E	2355.16	2.03
	9021.00	90.62	91.19	6926.80	1319.80 N	2174.07 E	2446.25	1.31
	9116.00	89.23	92.13	6926.92	1317.04 N	2269.03 E	2537.08	1.76
	9211.00	92.81	92.09	6925.23	1313.55 N	2363.93 E	2627.66	3.77
	9306.00	91.36	94.11	6921.77	1308.42 N	2458.73 E	2717.69	2.62

9401.00	89.94	94.40	6920.70	1301.37 N	2553.45 E	2807.16	1.52
9496.00	89.44	94.07	6921.21	1294.36 N	2648.19 E	2896.65	0.62
9590.00	90.86	91.52	6920.96	1289.77 N	2742.07 E	2985.95	3.10
9685.00	91.02	92.00	6919.40	1286.85 N	2837.01 E	3076.71	0.52
9780.00	90.09	91.02	6918.48	1284.35 N	2931.97 E	3167.61	1.41
9875.00	90.25	91.80	6918.20	1282.01 N	3026.94 E	3258.56	0.83
9970.00	89.57	92.16	6918.35	1278.73 N	3121.89 E	3349.23	0.81
10065.00	89.78	90.69	6918.89	1276.37 N	3216.85 E	3440.17	1.56
10159.00	90.03	91.96	6919.04	1274.19 N	3310.83 E	3530.20	1.38
10254.00	89.66	92.98	6919.30	1270.10 N	3405.74 E	3620.62	1.14
10349.00	89.94	92.18	6919.63	1265.82 N	3500.64 E	3710.99	0.89
10444.00	90.83	90.96	6918.99	1263.22 N	3595.60 E	3801.86	1.59
10539.00	89.10	92.19	6919.04	1260.60 N	3690.56 E	3892.73	2.23
10634.00	89.81	91.95	6919.93	1257.17 N	3785.49 E	3983.35	0.79
10729.00	90.15	92.23	6919.96	1253.70 N	3880.43 E	4073.97	0.46
10824.00	90.22	90.27	6919.65	1251.63 N	3975.40 E	4164.99	2.07
10919.00	89.51	91.29	6919.88	1250.34 N	4070.39 E	4256.23	1.31
11013.00	91.17	92.37	6919.32	1247.33 N	4164.33 E	4346.02	2.11
11108.00	91.14	94.64	6917.41	1241.52 N	4259.13 E	4435.88	2.39
11203.00	91.54	94.46	6915.18	1233.98 N	4353.80 E	4525.16	0.46
11258.00	92.16	95.81	6913.41	1229.06 N	4408.55 E	4576.65	2.68
11321.00	92.16	95.81	6911.04	1222.69 N	4471.18 E	4635.34	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 CLOSURE OF 74.71 DEGREES (GRID)  
A TOTAL CORRECTION OF 8.10 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11321.00 FEET  
IS 4635.35 FEET ALONG 74.71 DEGREES (GRID)**

**Tie In @ Surface Casing Shoe**