

D-C Pressure Case Directional
PCG-K Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	01-Dec-14	30-Nov-14			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,049.00	7,803.00			
Log End Depth (MD, ft)	7,803.00	16,755.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	27-Nov-14 22:11	30-Nov-14 22:00			
Drill/Wipe End Date and Time	27-Nov-14 22:11	30-Nov-14 22:00			
Min Inc (deg) @ Depth (MD, ft)	0.25 @ 3,983.00	86.85 @ 8,387.00			
Max Inc (deg) @ Depth (MD, ft)	86.39 @ 7,757.00	91.70 @ 15,906.00			
Bit TFA(in2) / Bit Type	1.74 / PDC	1.532 / PDC			
Flow Rate (gpm)	566.60	290.00			
Max AV (fpm) / CV (fpm) @ MWD	500.0 / 500.0	503.0 / 503.0			
Fluid Type	Native/Spud Mud	Mineral Oil Bas			
Density (ppg) / Viscosity (spqt)	9.10 / 47.00	8.90 / 52.00			
Filtrate CL (ppm)	500.00	32.47			
pH / Fluid Loss (mptm)	N/A / N/A	N/A / N/A			
PV (cP) / YP (lbf2)	21 / 10.00	21 / 14.00			
% Solids / % Sand	7.3 / 0.1	2.3 / 0.1			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (deg F) / S	170.00 / 20M	210.00 / 20M			

Max Tool Temp (degF) / Source	170.37 / PCM	242.28 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	James Ramsay	James Ramsay			
Customer Representative	Jeremy Wilde	Jeremy Wilde			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11341333	12334774			
Insert Serial Number	11619996	11619996			
Date and Time Initialized	28-Nov-14 14:05	02-Dec-14 05:42			
Date and Time Read	01-Dec-14 03:33	06-Dec-14 16:28			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	46.00	48.00			
Software Version	6.33	6.21			
Sub Serial Number	11341333	12334774			
Sonde Serial Number	11638628	11297574			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	259.70	150.90			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.95	51.02			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11341333	12334774			
Insert/Sonde Serial Number	11293322	11579829			

REMARKS

1. Depths are Measured Depths, referenced to Driller's pipe tally, and measured from the rig floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the Power Law model for water based fluids and the Bingham Plastic model for oil based fluids.
4. All data presented is recorded unless otherwise specified.
5. Gap in Gamma data due to gamma tool in casing.
6. 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

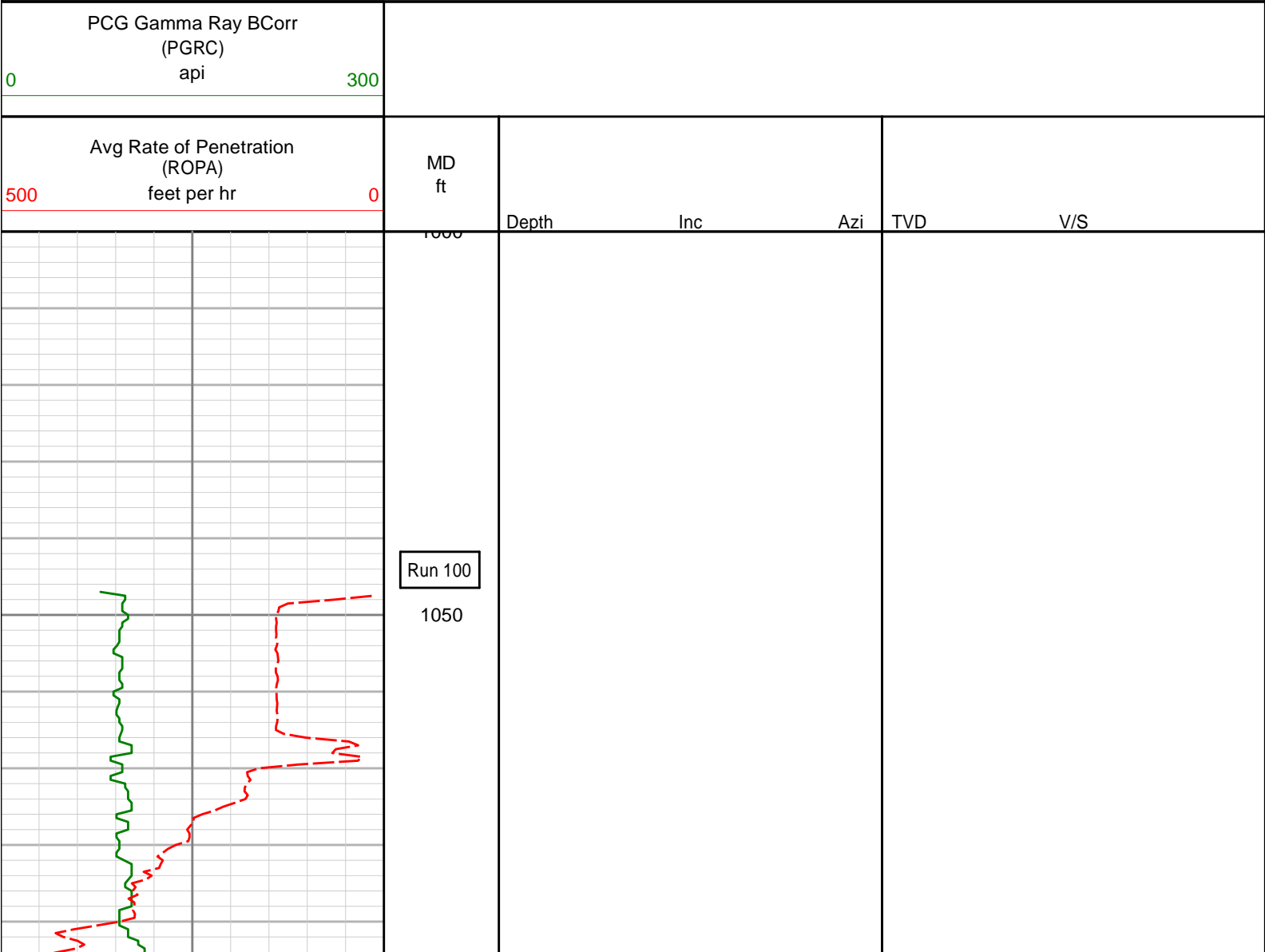
Insite Version 8.0.2

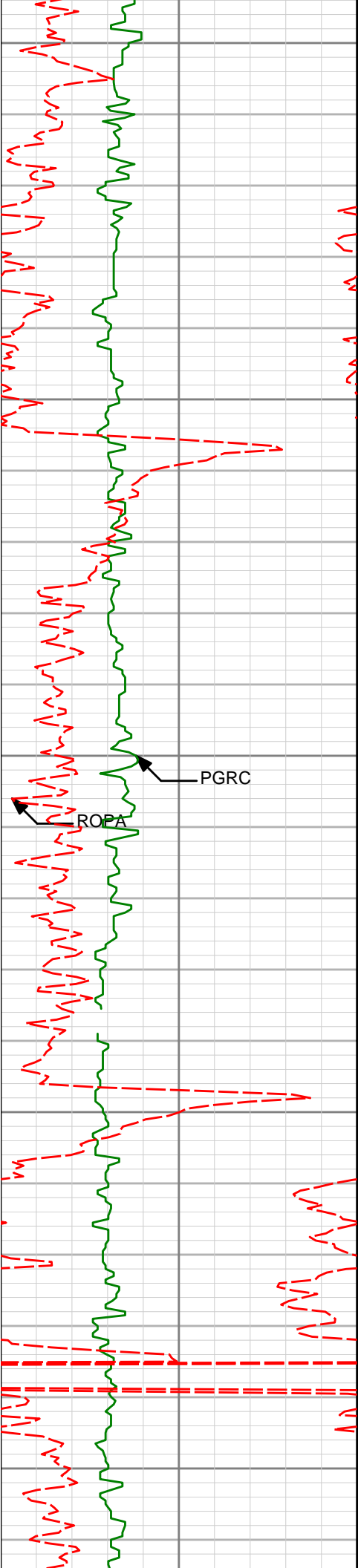
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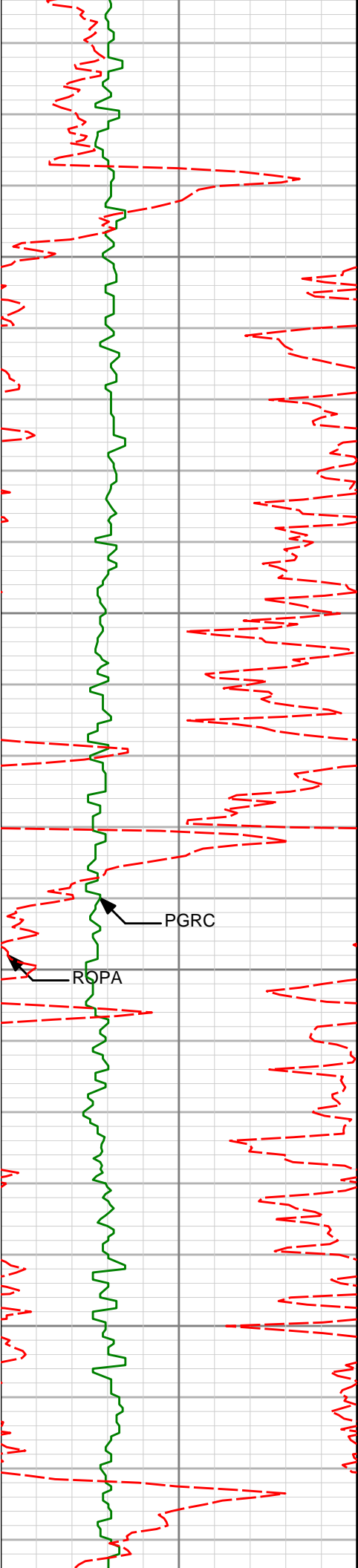
HALLIBURTON

APC
Gee 16C-25HZ
Wattenberg
Weld Colorado
USA
1:240 MD Detail Log





1100	1101'	0.80°	319.23°	1100.93'	-11.31'
1150					
1200	1196'	1.06°	322.56°	1195.92'	-12.51'
1250					
1300	1291'	0.95°	328.83°	1290.91'	-13.88'



1350

1386'

1.03°

327.92°

1385.89'

-15.28'

1400

1450

1480'

1.59°

284.99°

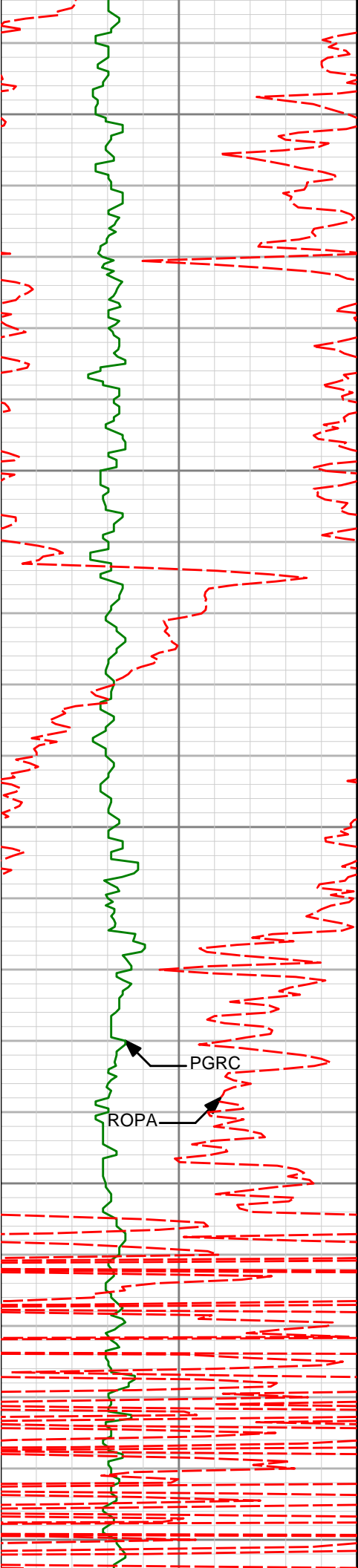
1479.87'

-16.33'

1500

PGRC

ROPA



1550

1575'

1.18°

318.91°

1574.84'

-17.41'

1600

1650

1681'

1.43°

315.93°

1680.81'

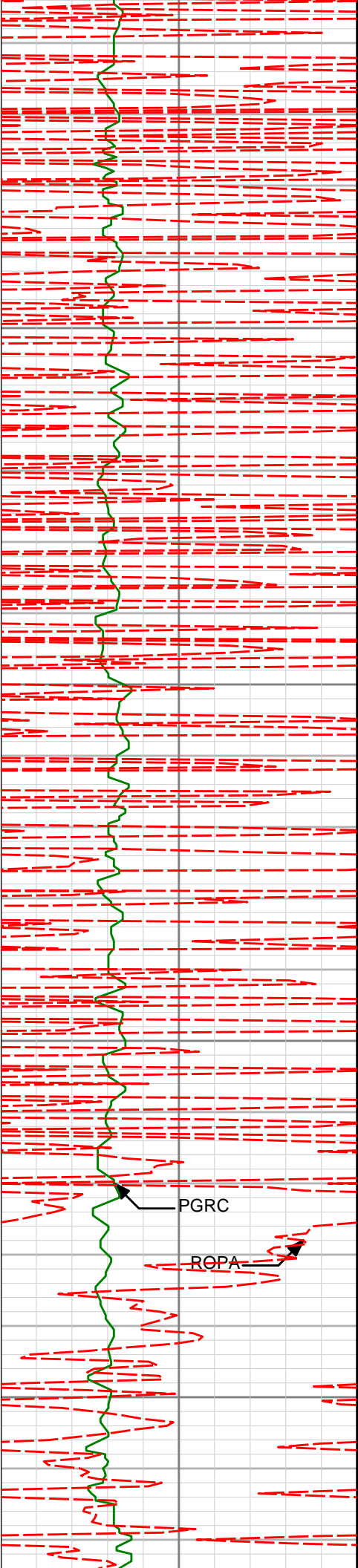
-19.19'

1700

1750

PGRC

ROPA



1773'

1.42°

312.64°

1772.79'

-20.78'

1800

1850

1864'

1.32°

315.00°

1863.76'

-22.29'

1900

PGRC

ROPA

1950

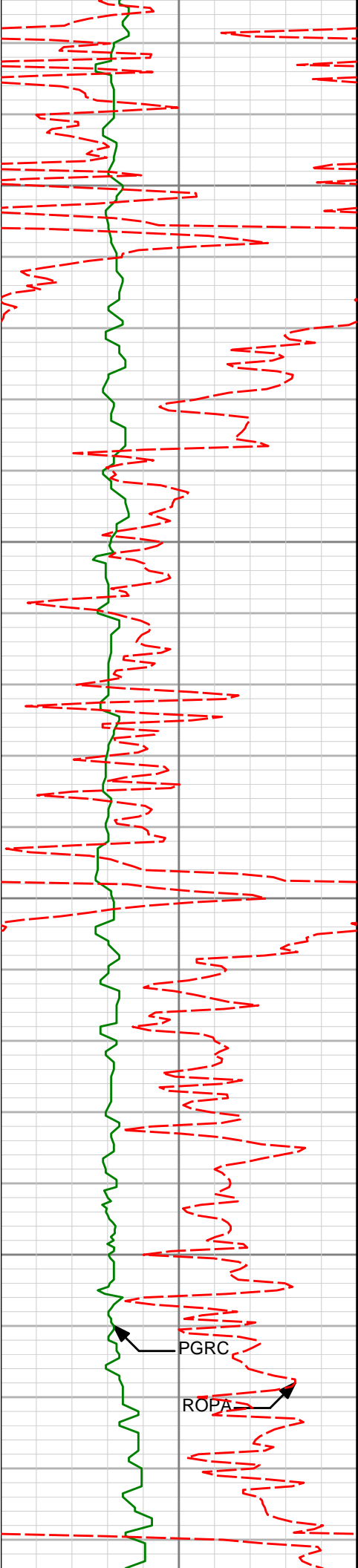
1957'

1.30°

310.72°

1956.74'

-23.73'



2000

2050

2100

2150

2049'

1.43°

321.96°

2048.71'

-25.32'

2142'

1.55°

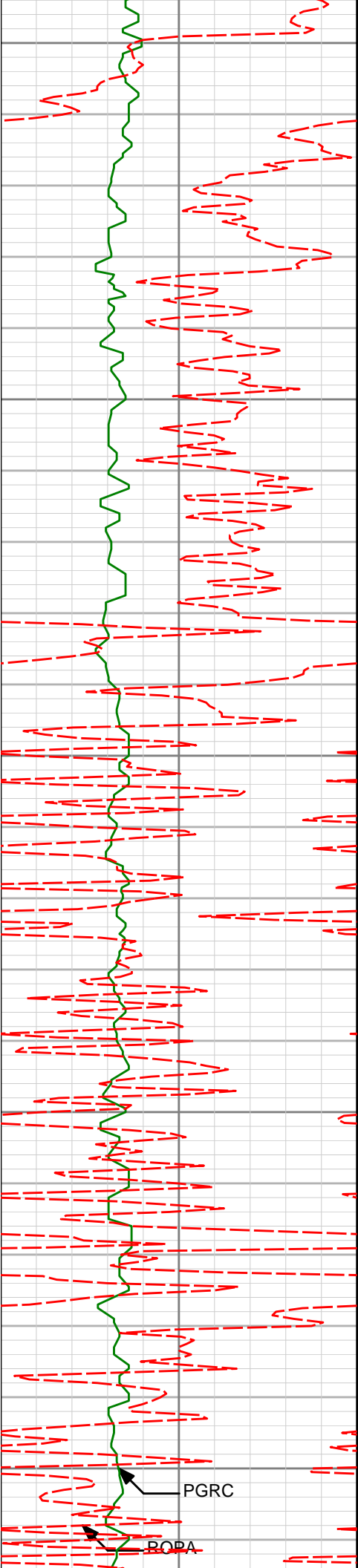
316.62°

2141.68'

-27.15'

PGRC

ROPA



2200

2234'

1.59°

275.29°

2233.65'

-28.17'

2250

2300

2326'

1.45°

270.20°

2325.61'

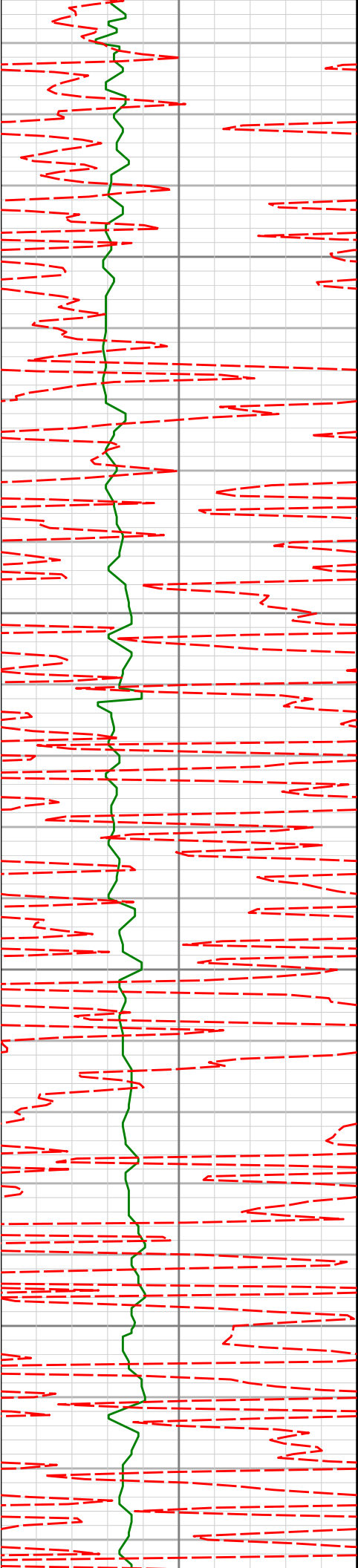
-28.29'

2350

2400

PGRC

BOPA



2419'

1.35°

269.67°

2418.59'

-28.29'

2450

2500

2511'

1.31°

267.59°

2510.56'

-28.24'

2550

2600

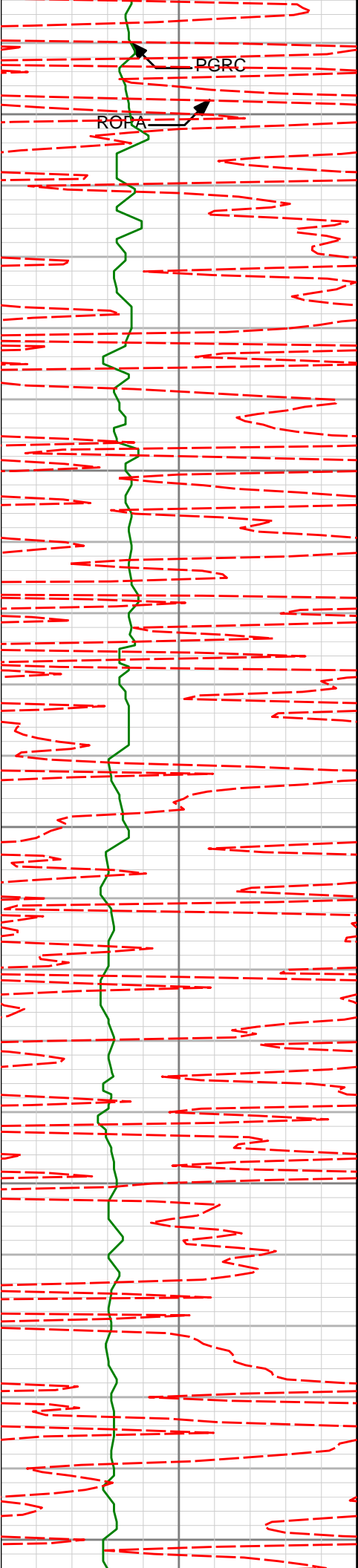
2602'

1.16°

261.30°

2601.54'

-28.05'



2650

2700

2750

2800

2850

2695'

1.16°

248.29°

2694.52'

-27.56'

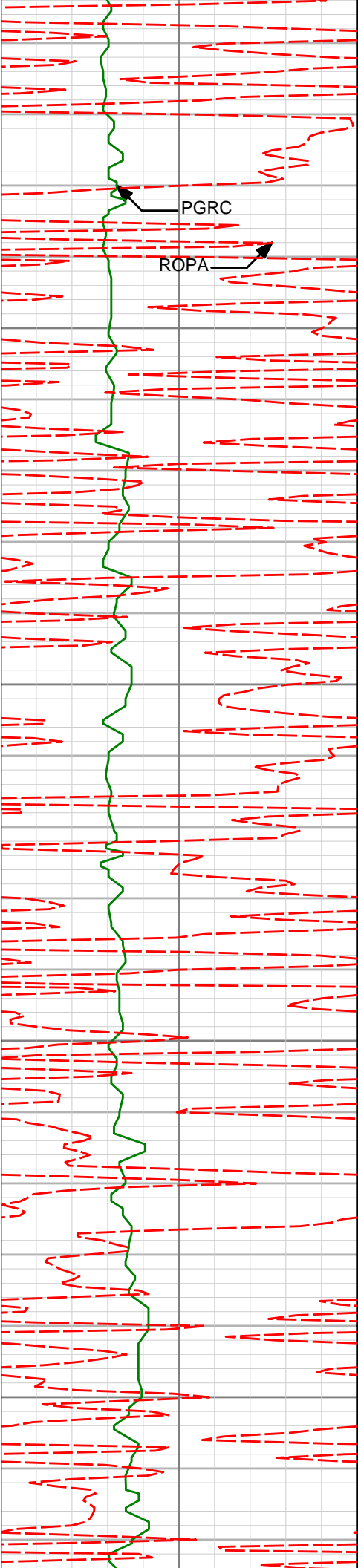
2787'

1.11°

243.96°

2786.50'

-26.83'



2880'	0.87°	231.67°	2879.49'	-26.00'
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2900

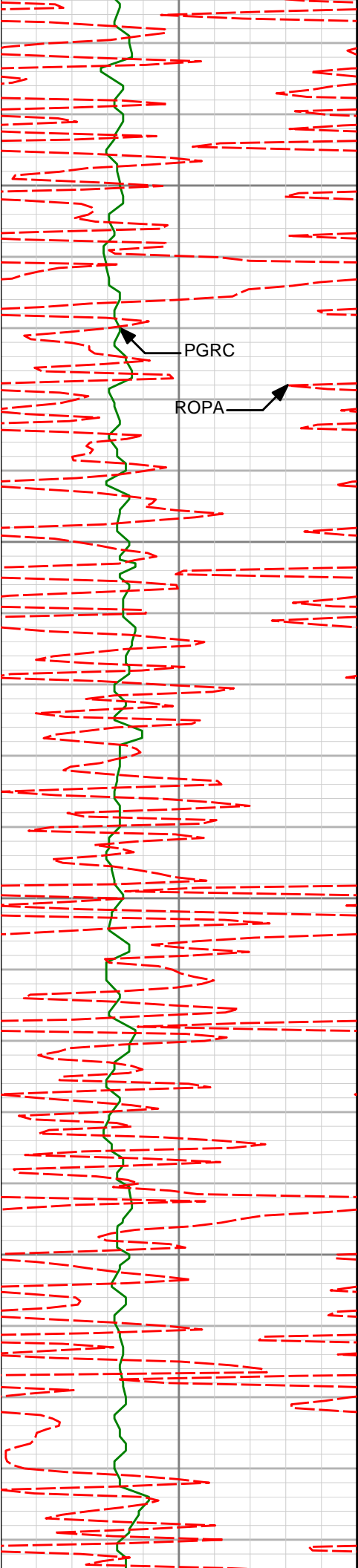
2950

2972'	0.58°	211.79°	2971.48'	-25.17'
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3000

3050

3065'	0.59°	140.74°	3064.48'	-24.40'
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3100

PGRC

ROPA

3150

3156'

0.48°

139.05°

3155.48'

-23.74'

3200

3250

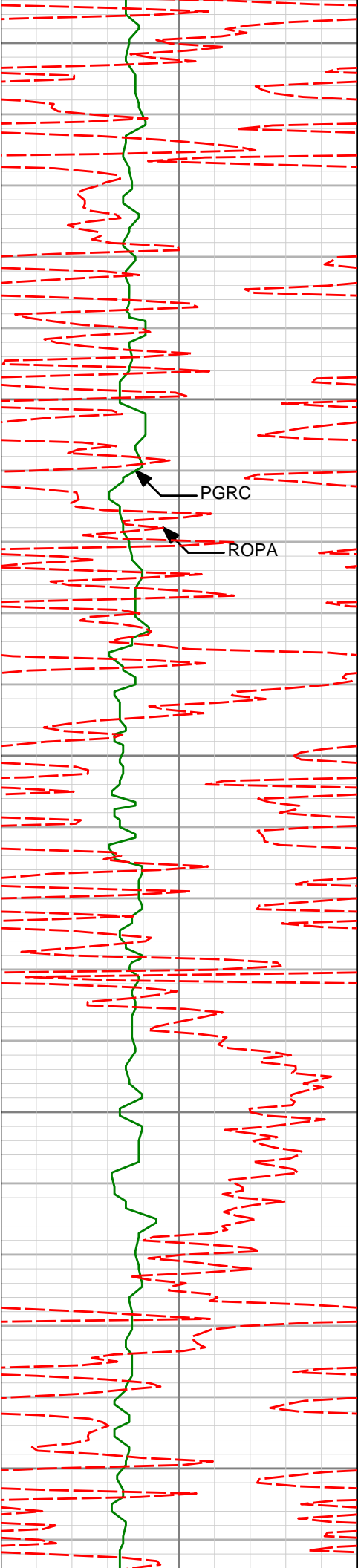
3248'

0.60°

141.22°

3247.47'

-23.08'



3300

3340'

0.44°

126.84°

3339.47'

-22.49'

3350

PGRC

ROPA

3400

3432'

0.61°

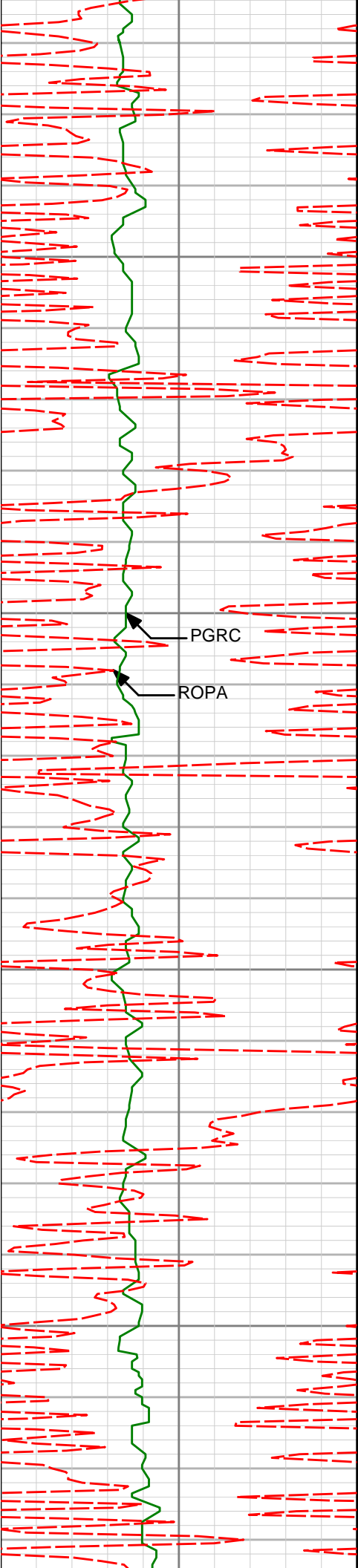
156.90°

3431.46'

-21.83'

3450

3500



3524'

0.32°

133.10°

3523.46'

-21.20'

3550

3600

PGRC

ROPA

3616'

0.65°

148.83°

3615.46'

-20.58'

3650

3700

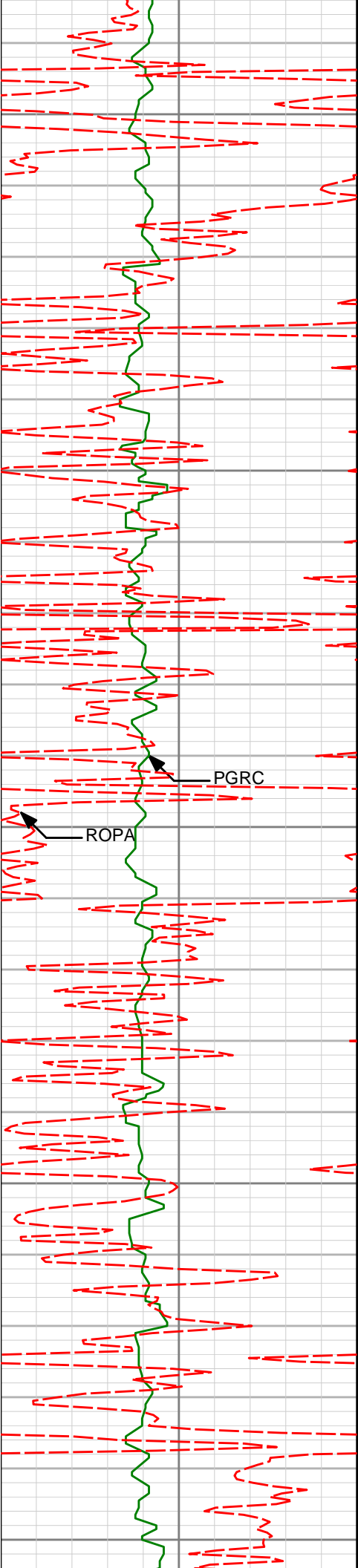
3708'

1.05°

168.07°

3707.45'

-19.31'



3750

3800

3850

3900

3950

3799'

0.86°

174.69°

3798.43'

-17.81'

3891'

0.50°

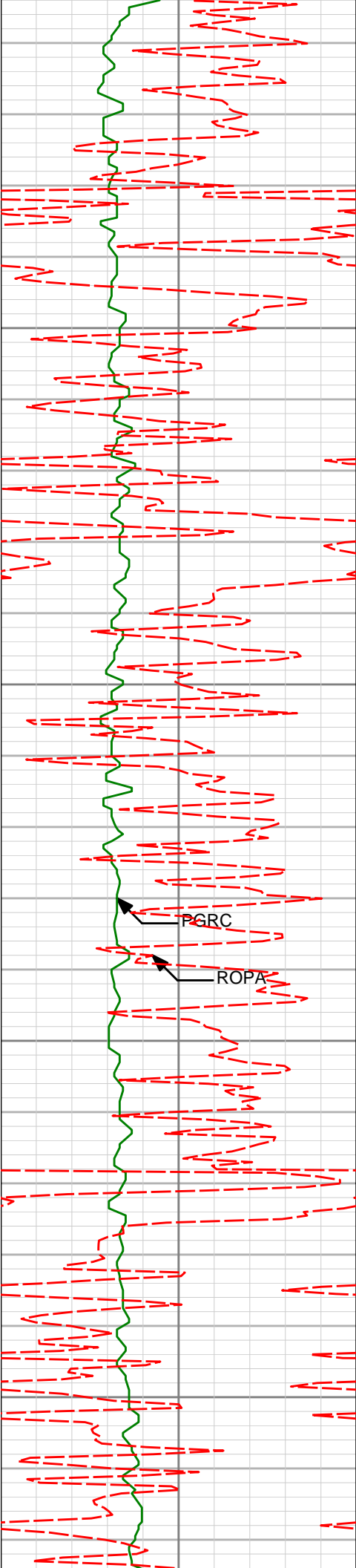
242.46°

3890.43'

-16.94'

PGRC

ROPA



3983'

0.25°

102.52°

3982.43'

-16.71'

4000

4050

4075'

0.46°

112.42°

4074.43'

-16.53'

PGRC

ROPA

4100

4150

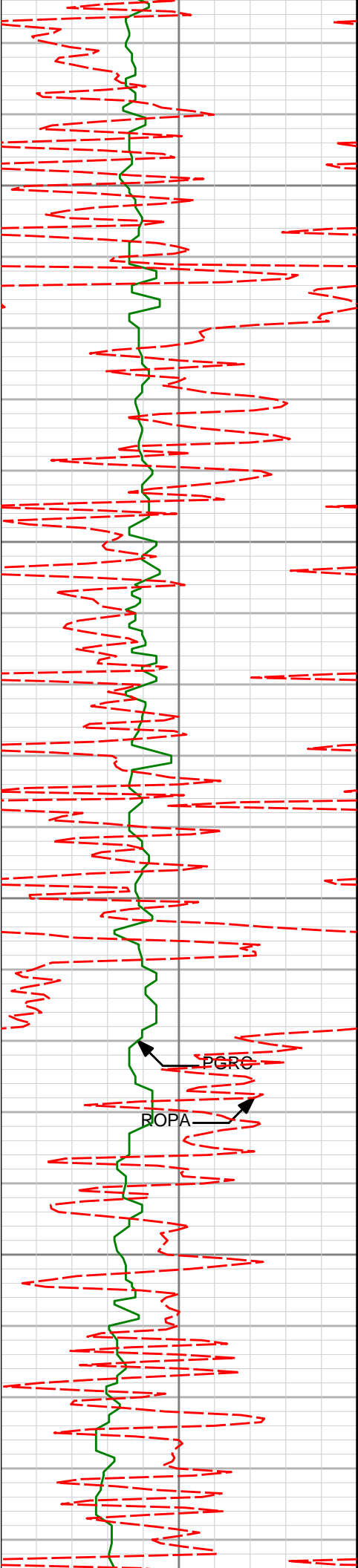
4167'

0.51°

115.07°

4166.42'

-16.21'



4200

4250

4300

4350

4259'

0.38°

86.43°

4258.42'

-16.06'

PGRE

BOPA

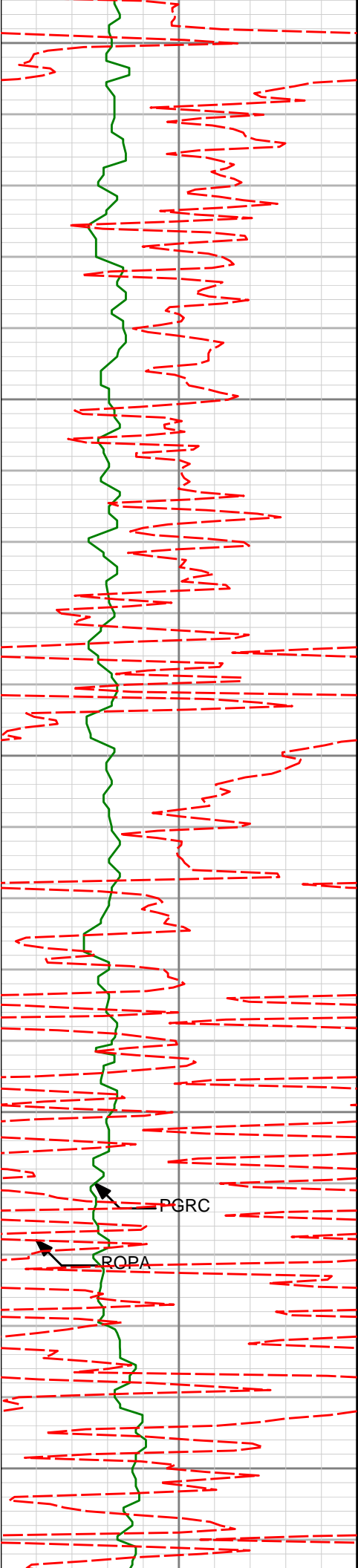
4353'

0.60°

129.48°

4352.42'

-15.76'



4400

4450

4500

4550

4600

4448'

0.75°

142.13°

4447.41'

-14.96'

4541'

0.42°

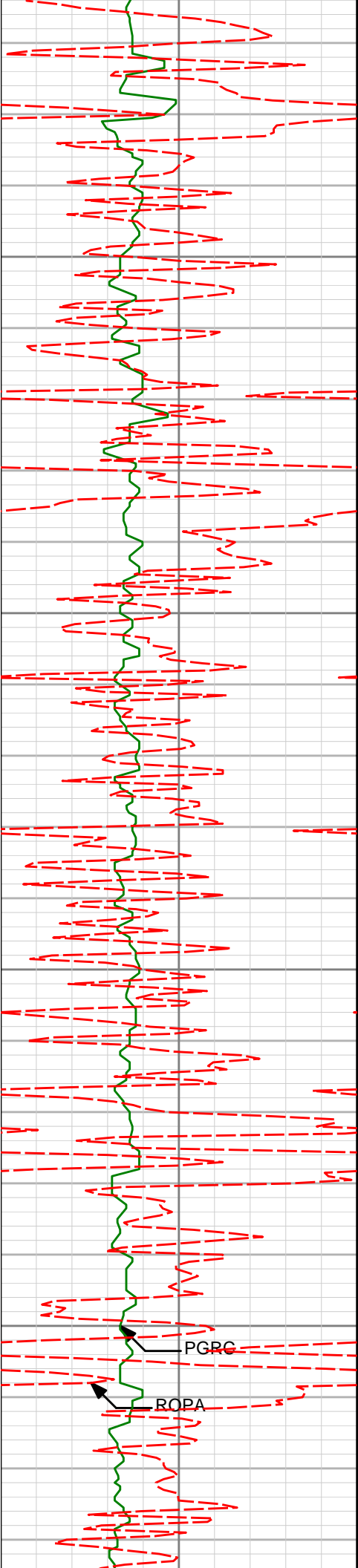
151.00°

4540.41'

-14.18'

PGRC

ROPA



4650

4700

4750

4800

4635'

0.56°

167.94°

4634.40'

-13.43'

4730'

0.41°

208.03°

4729.40'

-12.67'

4825'

0.66°

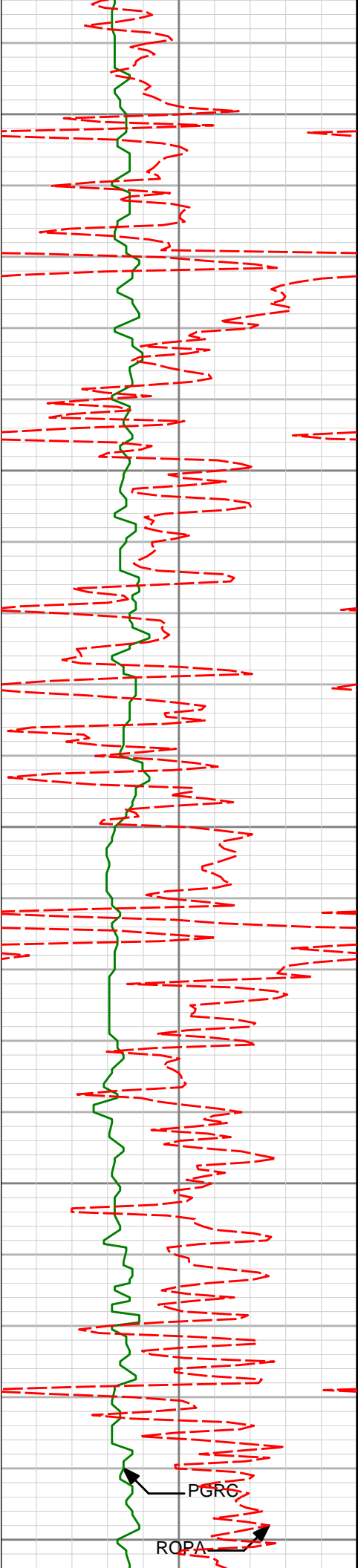
172.08°

4824.40'

-11.83'

PGRC

ROPA



4850

4900

4950

5000

5050

4919'

1.03°

172.06°

4918.38'

-10.46'

5014'

1.17°

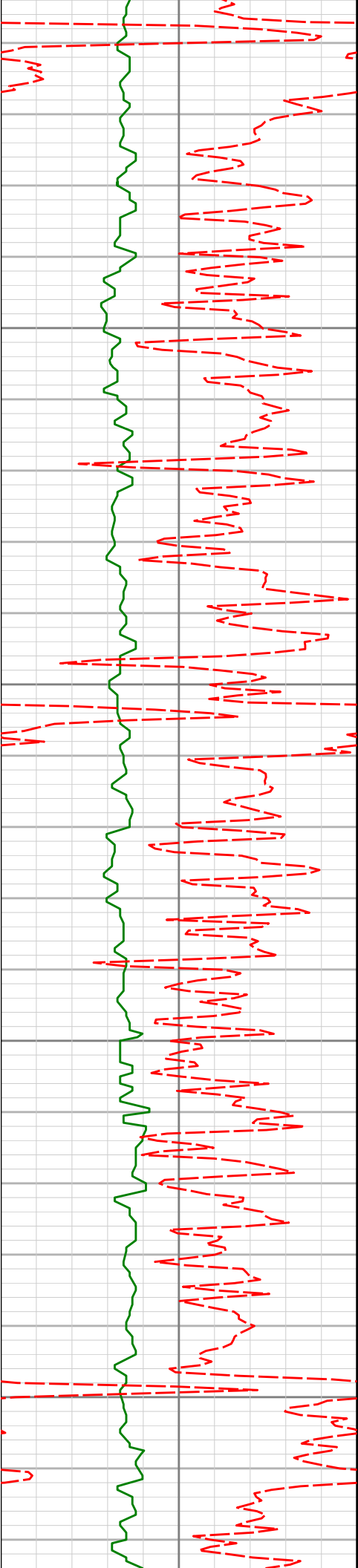
173.14°

5013.37'

-8.65'

PGRC

RQPA



5100

5150

5200

5250

5108'

1.02°

181.43°

5107.35'

-6.86'

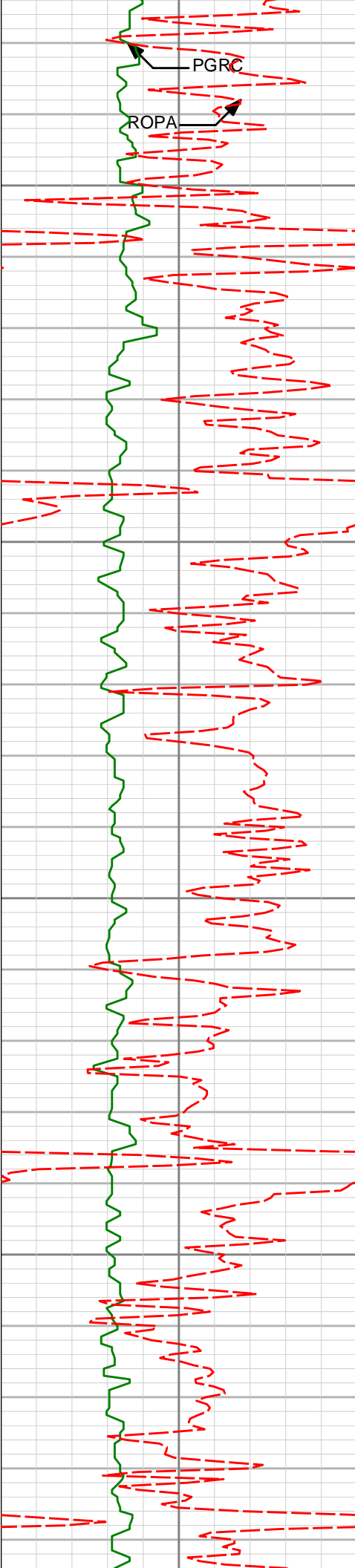
5203'

0.76°

197.99°

5202.34'

-5.42'



5300

5350

5400

5450

5297'

5391'

5485'

0.80°

1.03°

0.91°

235.88°

245.97°

258.76°

5296.33'

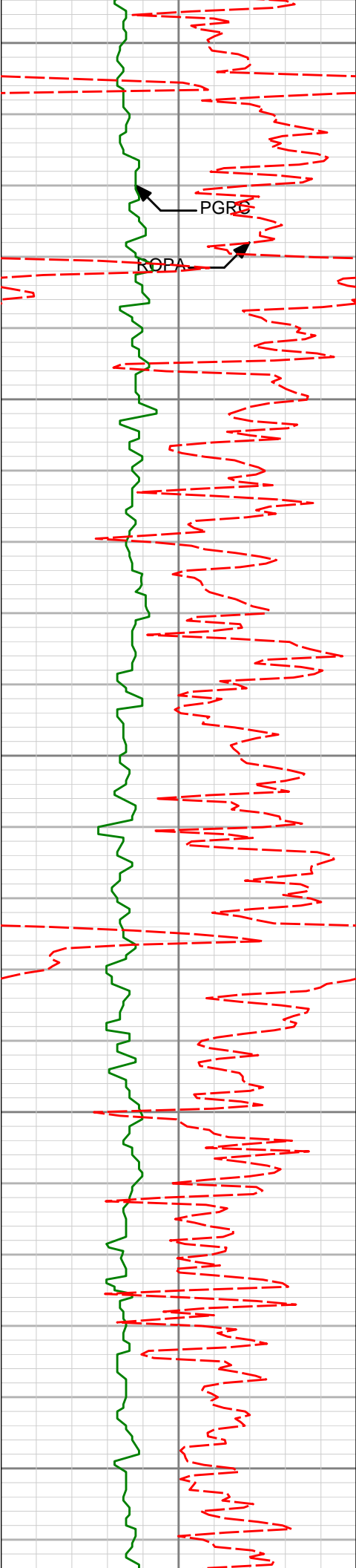
5390.32'

5484.31'

-4.46'

-3.74'

-3.25'



5500

PGRG

ROPA

5550

5580'

1.07°

257.67°

5579.29'

-2.92'

5600

5650

5675'

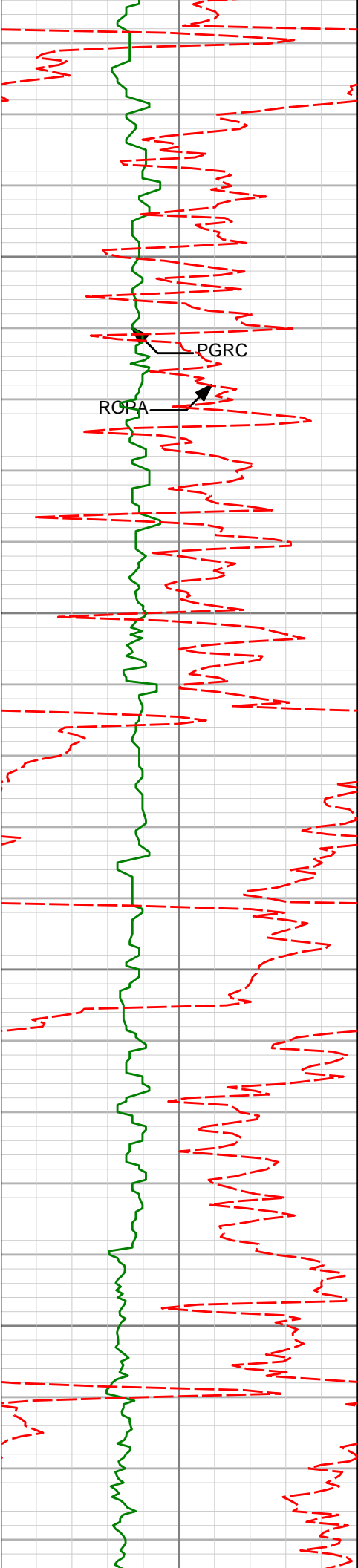
0.96°

270.32°

5674.28'

-2.73'

5700



5750

5769'

0.80°

271.56°

5768.26'

-2.75'

5800

5850

5863'

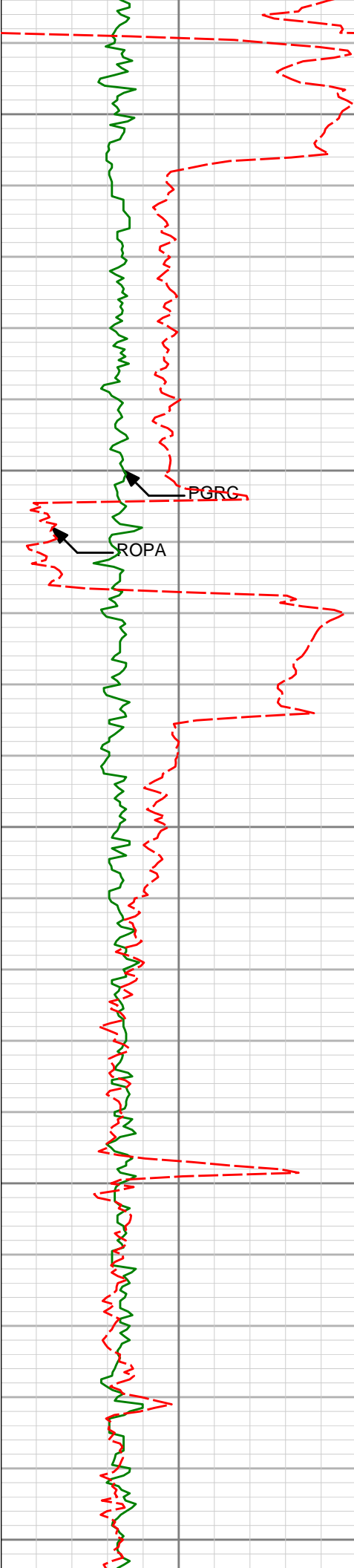
1.79°

279.55°

5862.24'

-3.02'

5900



5950

5957'

2.44°

269.33°

5956.18'

-3.24'

6000

PGRC

ROPA

6050

6052'

5.22°

270.57°

6050.95'

-3.26'

6100

6150

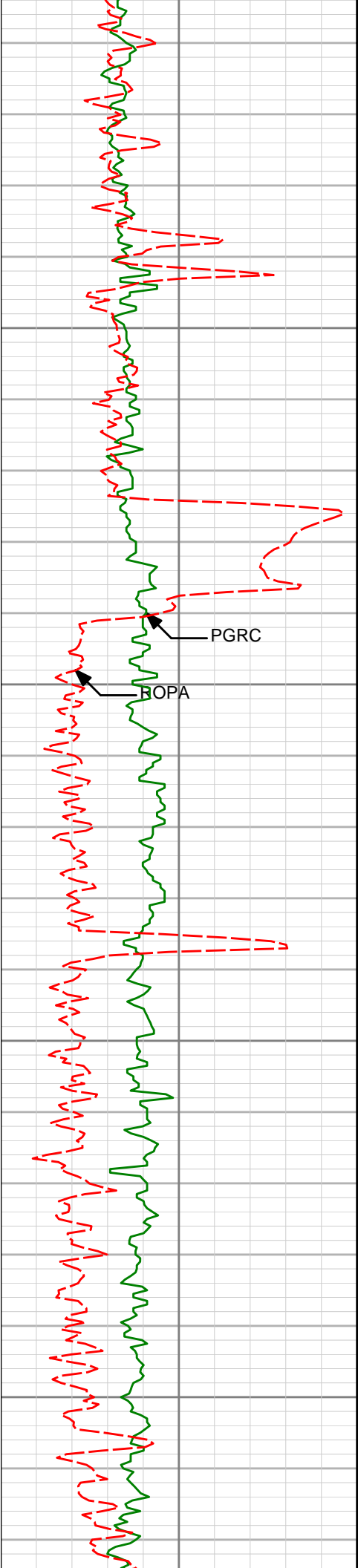
6146'

4.36°

270.49°

6144.63'

-3.33'



6200

6250

6300

6350

6241'

5.21°

274.74°

6239.29'

-3.72'

6335'

4.94°

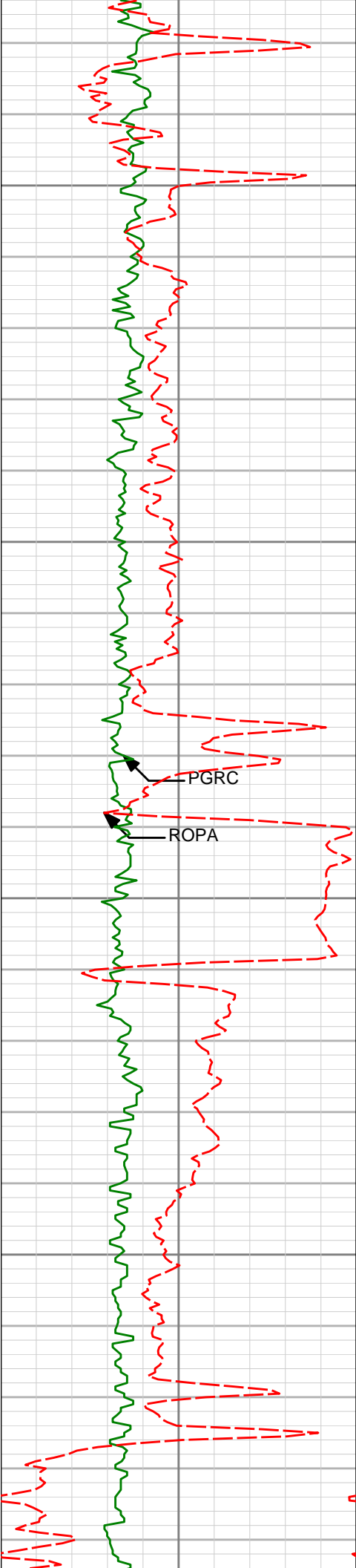
273.20°

6332.92'

-4.29'

PGRC

HOPA



6400

6429'

3.93°

270.00°

6426.64'

-4.52'

6450

PGRC

ROPA

6500

6523'

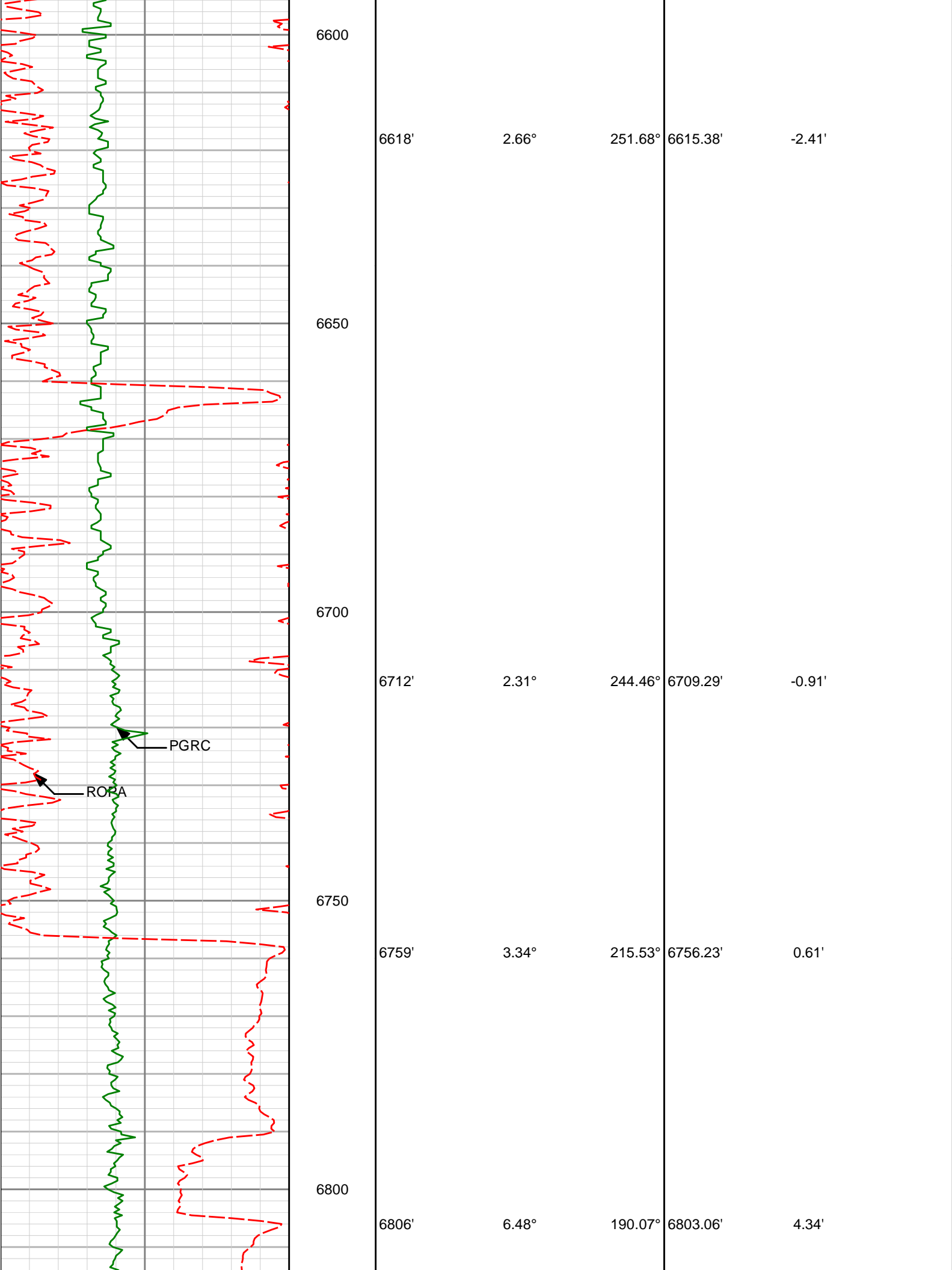
2.74°

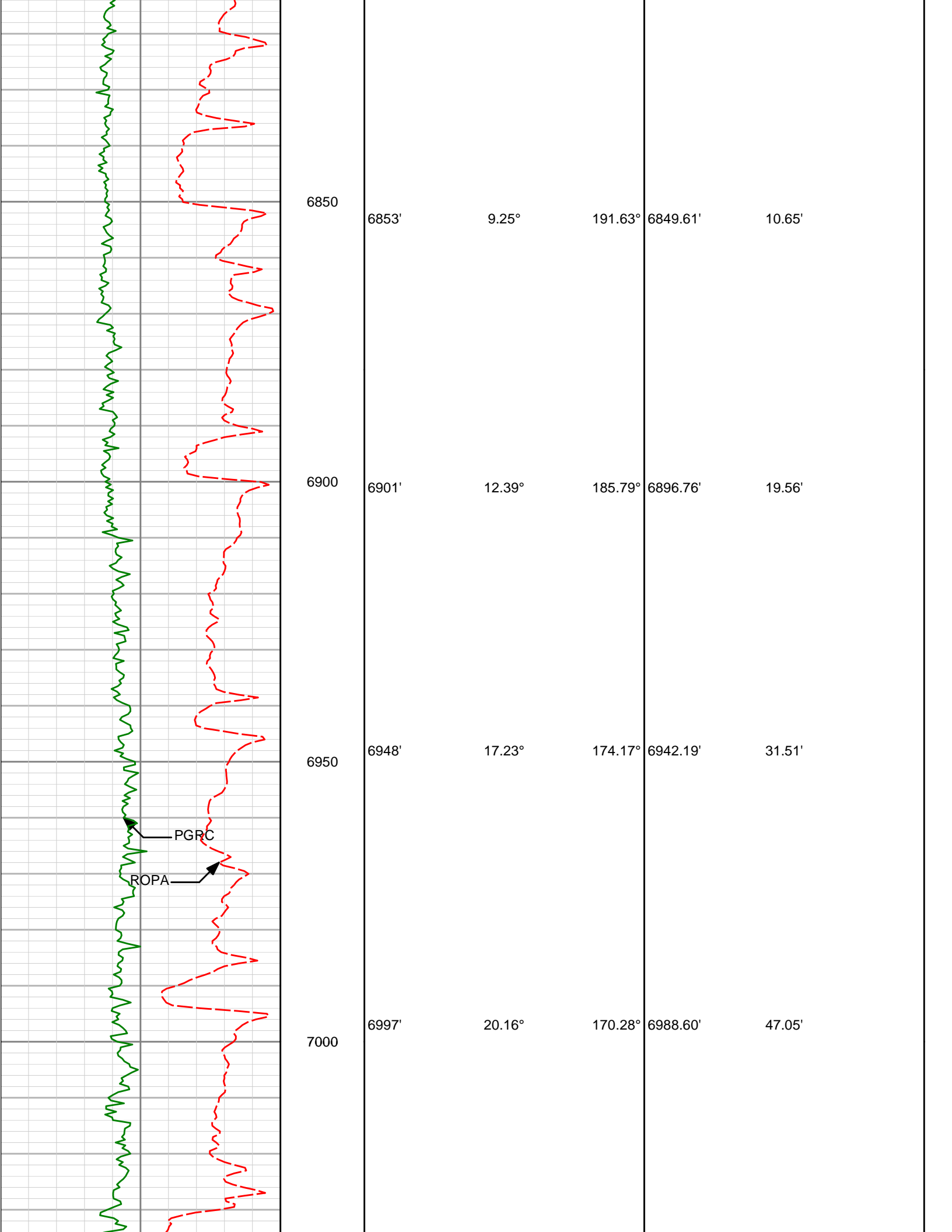
251.75°

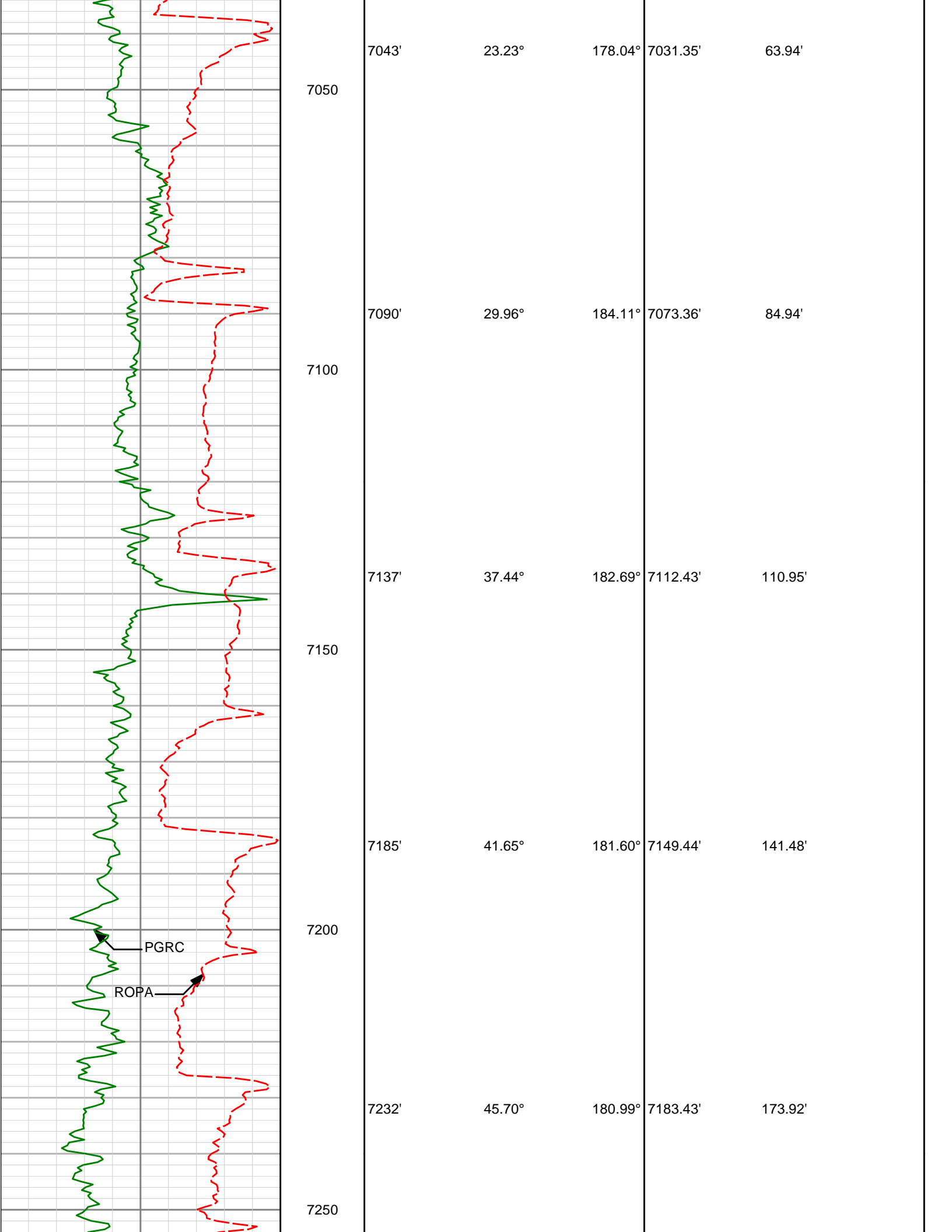
6520.48'

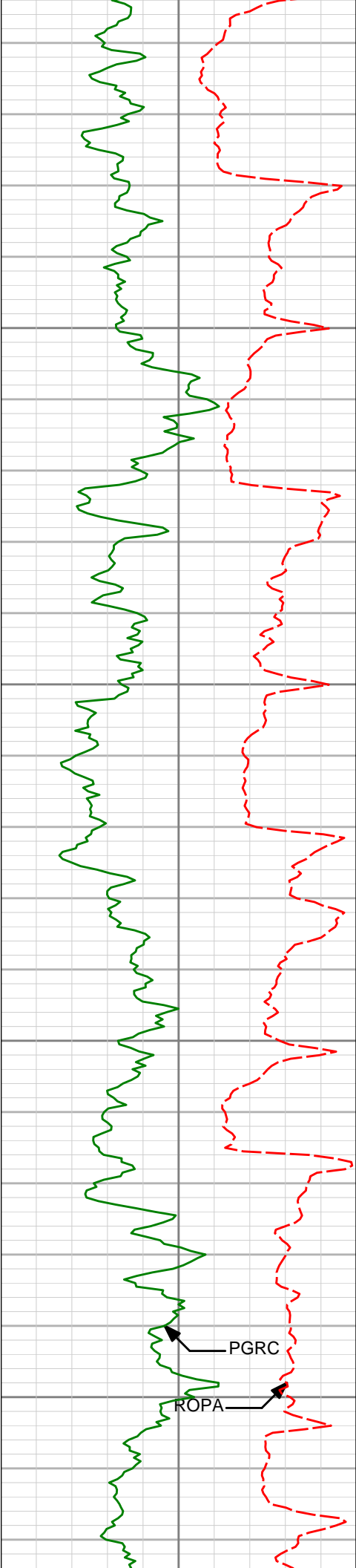
-3.82'

6550

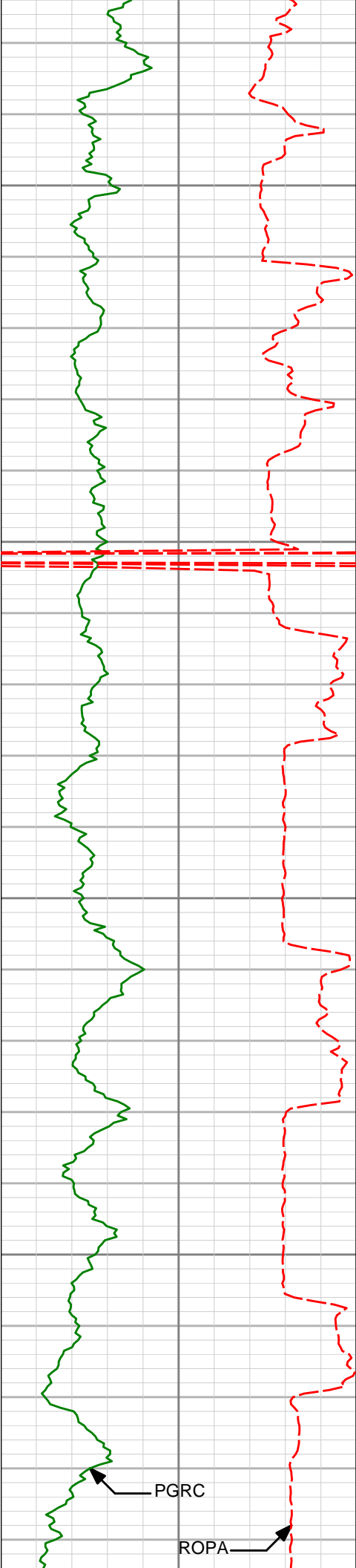








	7279'	48.14°	180.47°	7215.53'
7300				208.25'
	7326'	50.46°	179.50°	7246.17'
				243.88'
7350				
	7373'	53.44°	179.01°	7275.14'
				280.88'
7400				
	7420'	59.22°	179.05°	7301.18'
				319.97'
7450				
	7468'	66.87°	178.80°	7322.93'
				362.72'



7500

7515'

72.32°

177.73°

7339.31'

406.73'

7550

7562'

74.66°

177.19°

7352.66'

451.75'

7600

7609'

77.17°

177.44°

7364.10'

497.28'

7650

7656'

79.59°

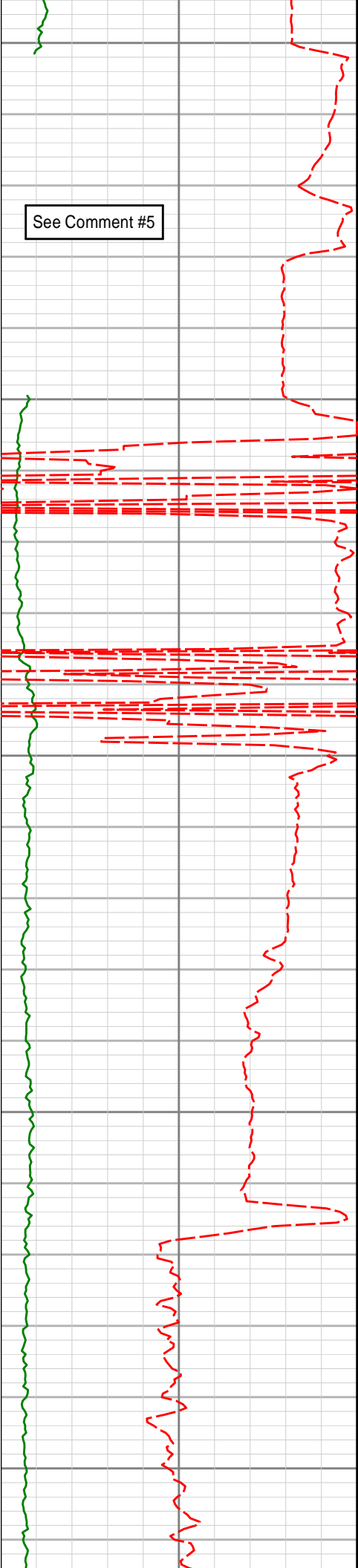
177.75°

7373.57'

543.27'

PGRC

ROPA



7700

7703'

82.80°

177.93°

7380.76'

589.68'

See Comment #5

7750

7757'

86.39°

178.91°

7385.85'

643.41'

7" Casing Shoe

7800

Run 200

7822'

89.45°

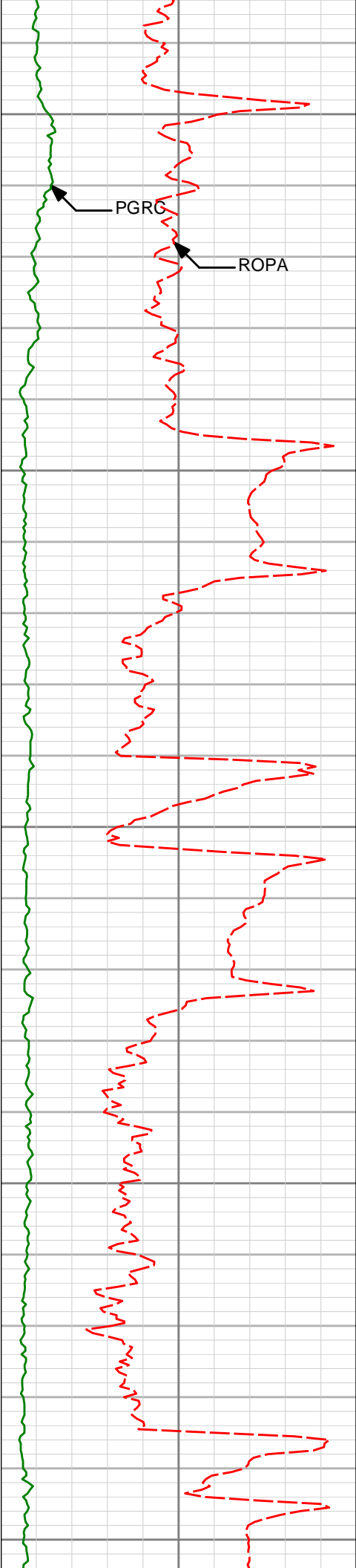
178.89°

7388.20'

708.35'

7850

7900



8150

8200

8250

8300

8350

8199'

90.65°

181.49°

7391.28'

1085.23'

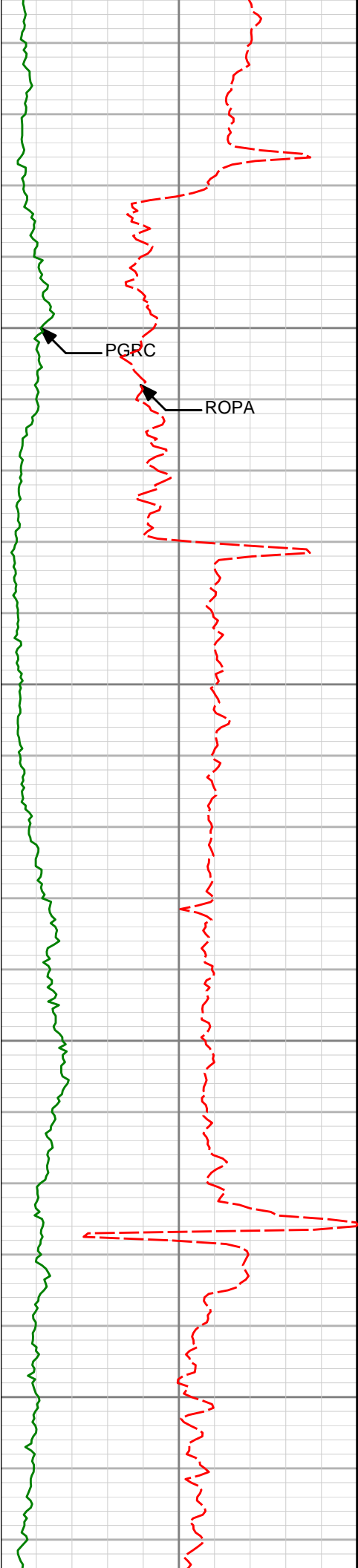
8293'

89.57°

182.63°

7391.10'

1179.16'



8387'

86.85°

181.38°

7394.03'

1273.05'

8400

PGRC

ROPA

8450

8481'

87.57°

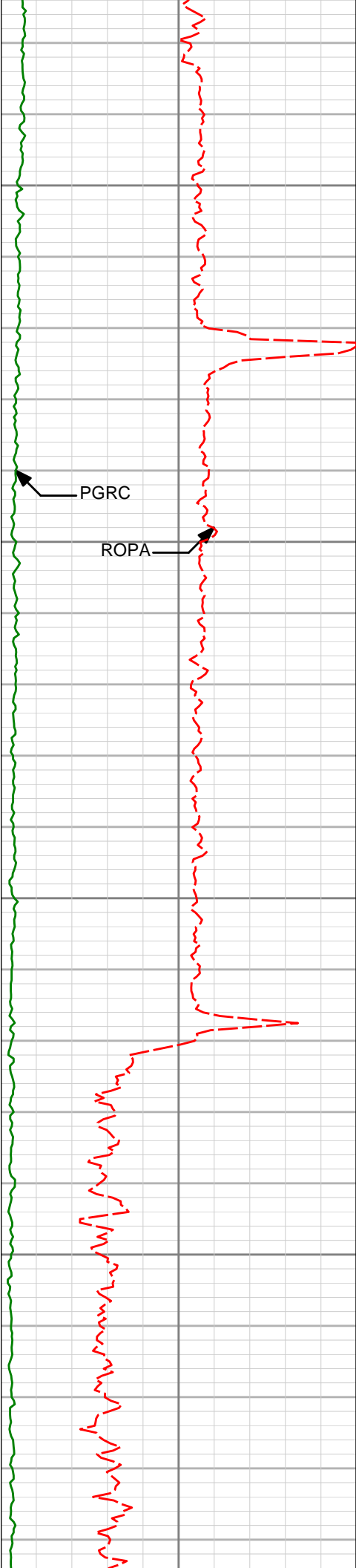
181.34°

7398.61'

1366.91'

8500

8550



8600

8650

8700

8750

8575'

88.06°

181.33°

7402.19'

1460.82'

8669'

88.86°

180.91°

7404.72'

1554.76'

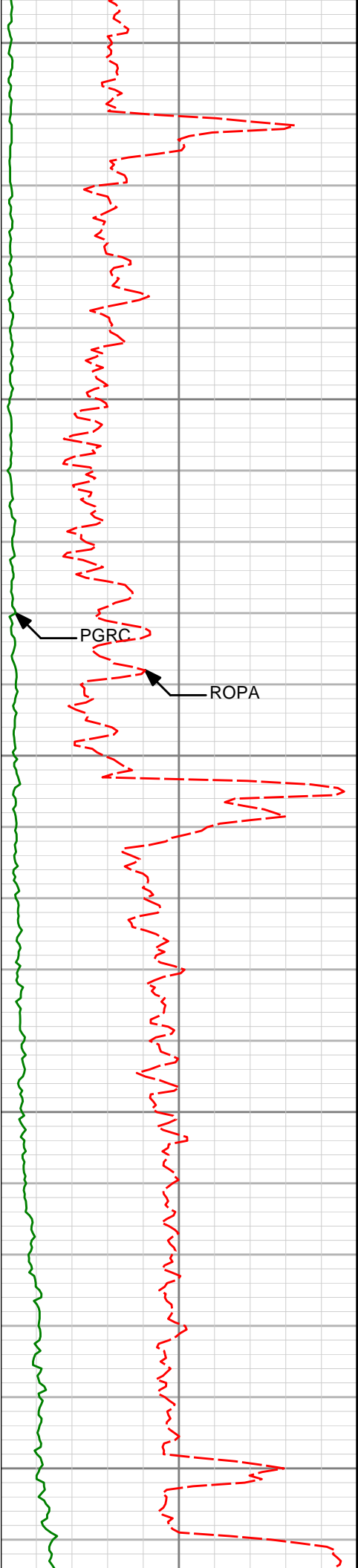
8764'

89.32°

180.34°

7406.23'

1649.75'



8800

8850

8900

8950

9000

8858'

89.85°

179.44°

7406.91'

1743.74'

PGRC

ROPA

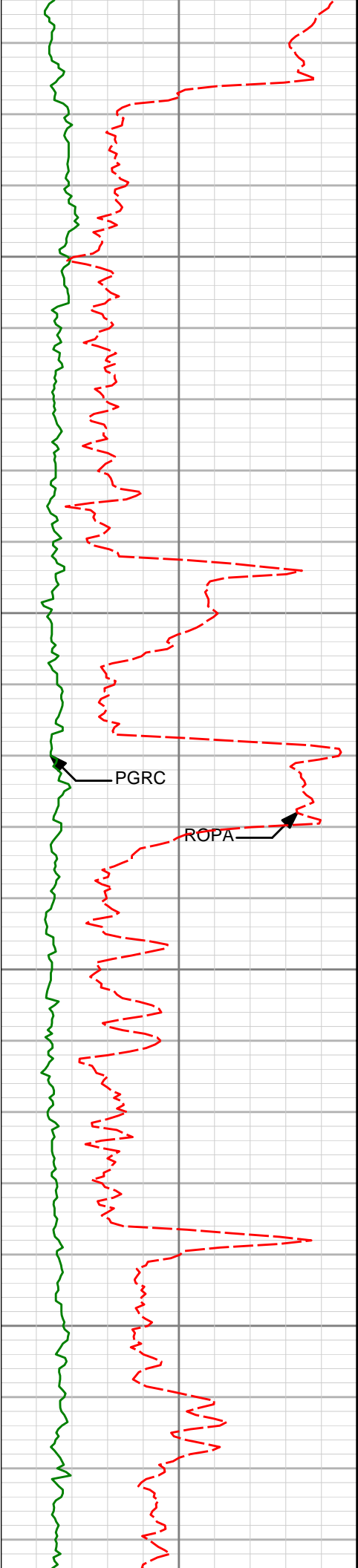
8952'

90.55°

179.03°

7406.58'

1837.73'



9050

9100

9150

9200

9046'

88.92°

179.21°

7407.01'

1931.72'

9140'

88.80°

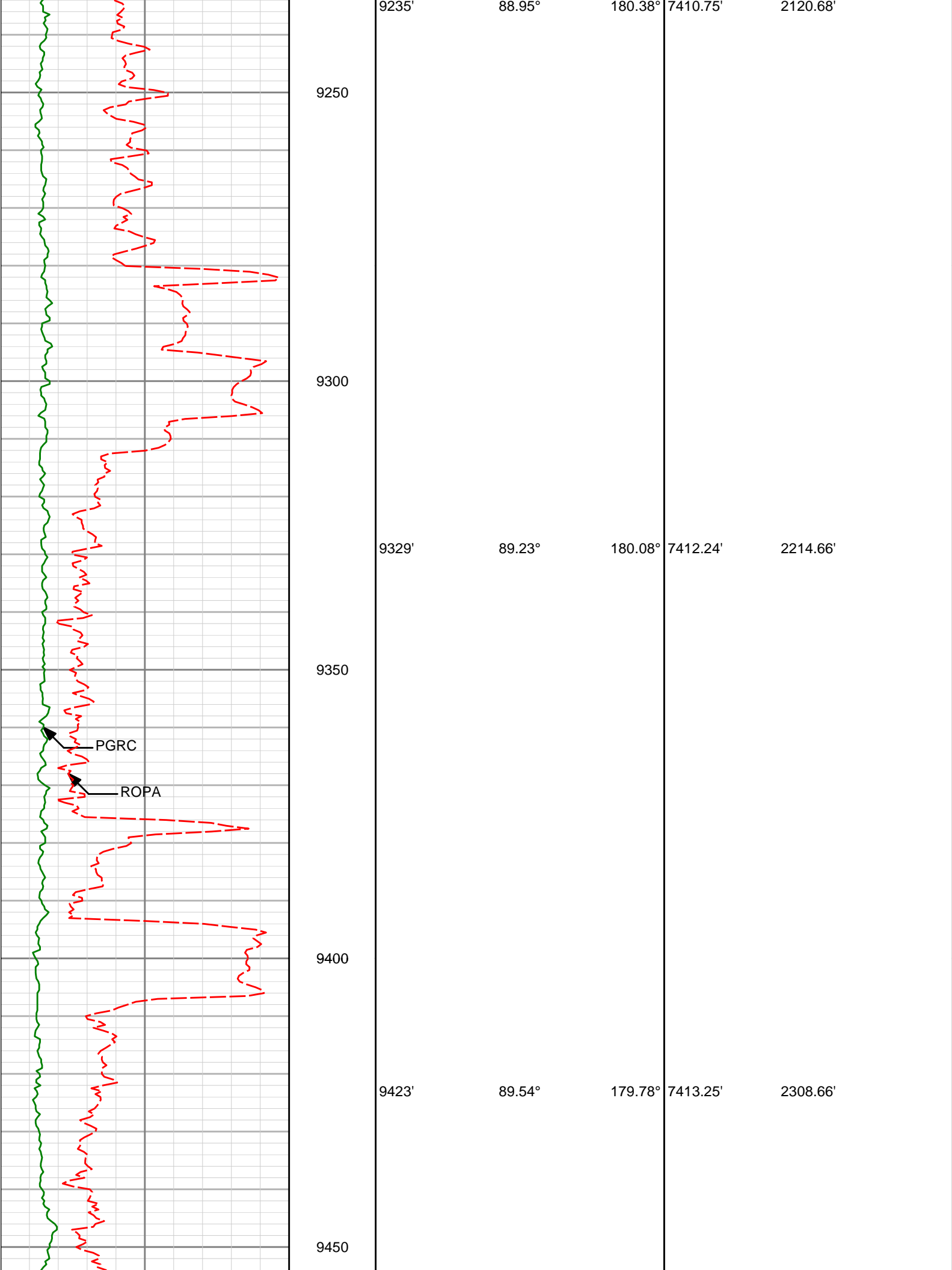
179.88°

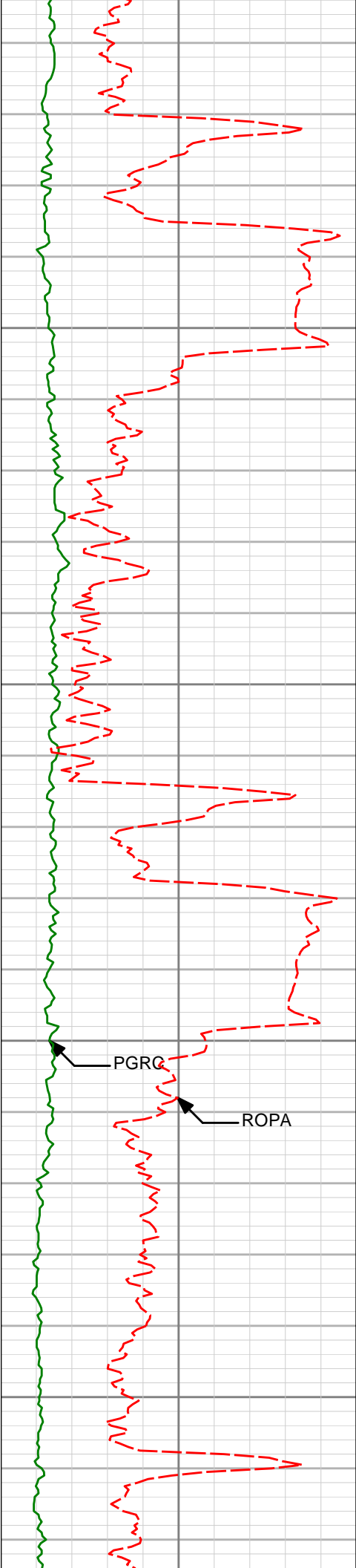
7408.88'

2025.69'

PGRC

ROPA





9500

9550

9600

9650

9517'

90.22°

180.76°

7413.45'

2402.65'

9611'

88.43°

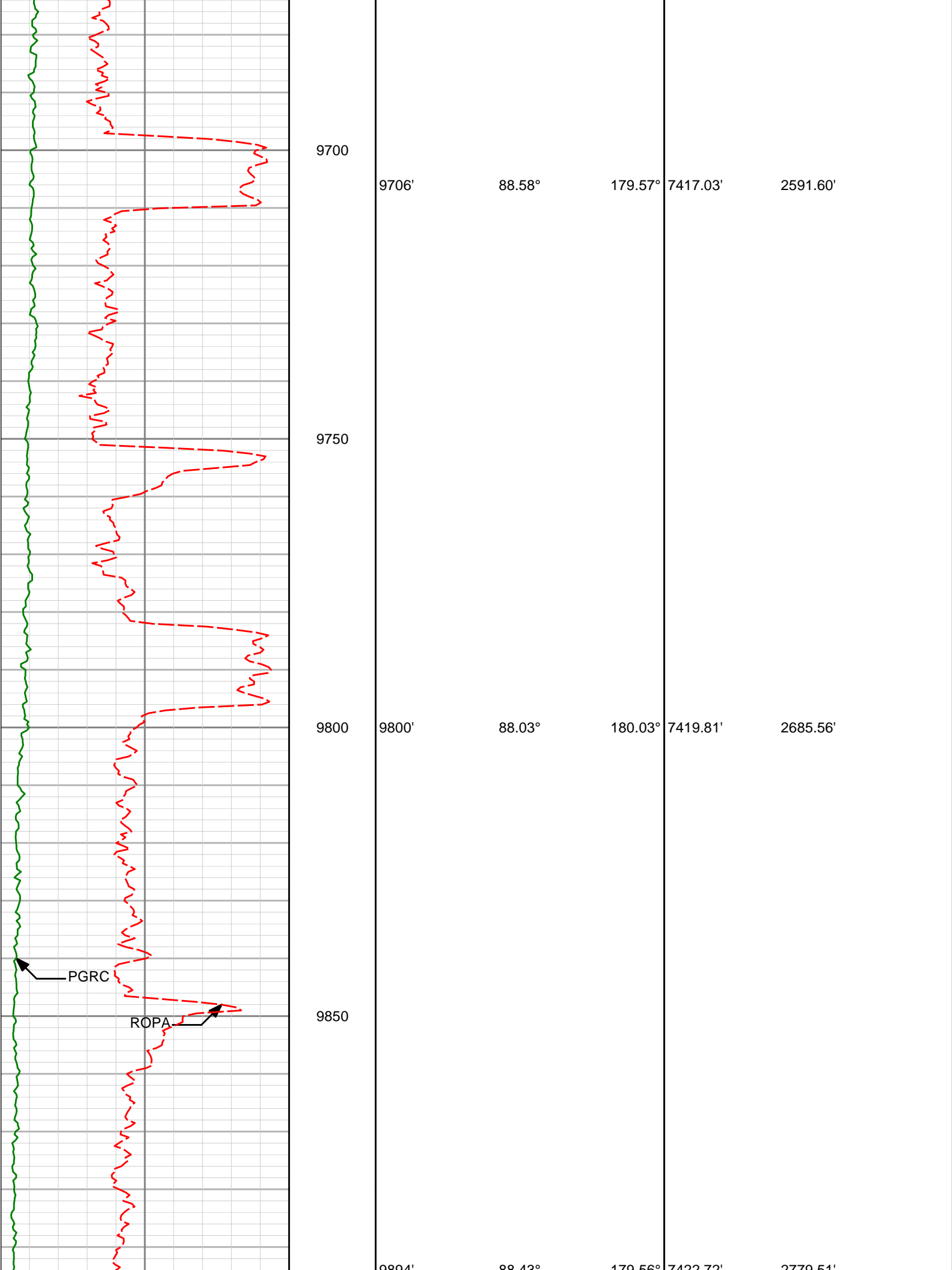
179.11°

7414.56'

2496.64'

PGRC

ROPA



9700

9750

9800

9850

9706'

88.58°

179.57°

7417.03'

2591.60'

9800'

88.03°

180.03°

7419.81'

2685.56'

9894'

88.42°

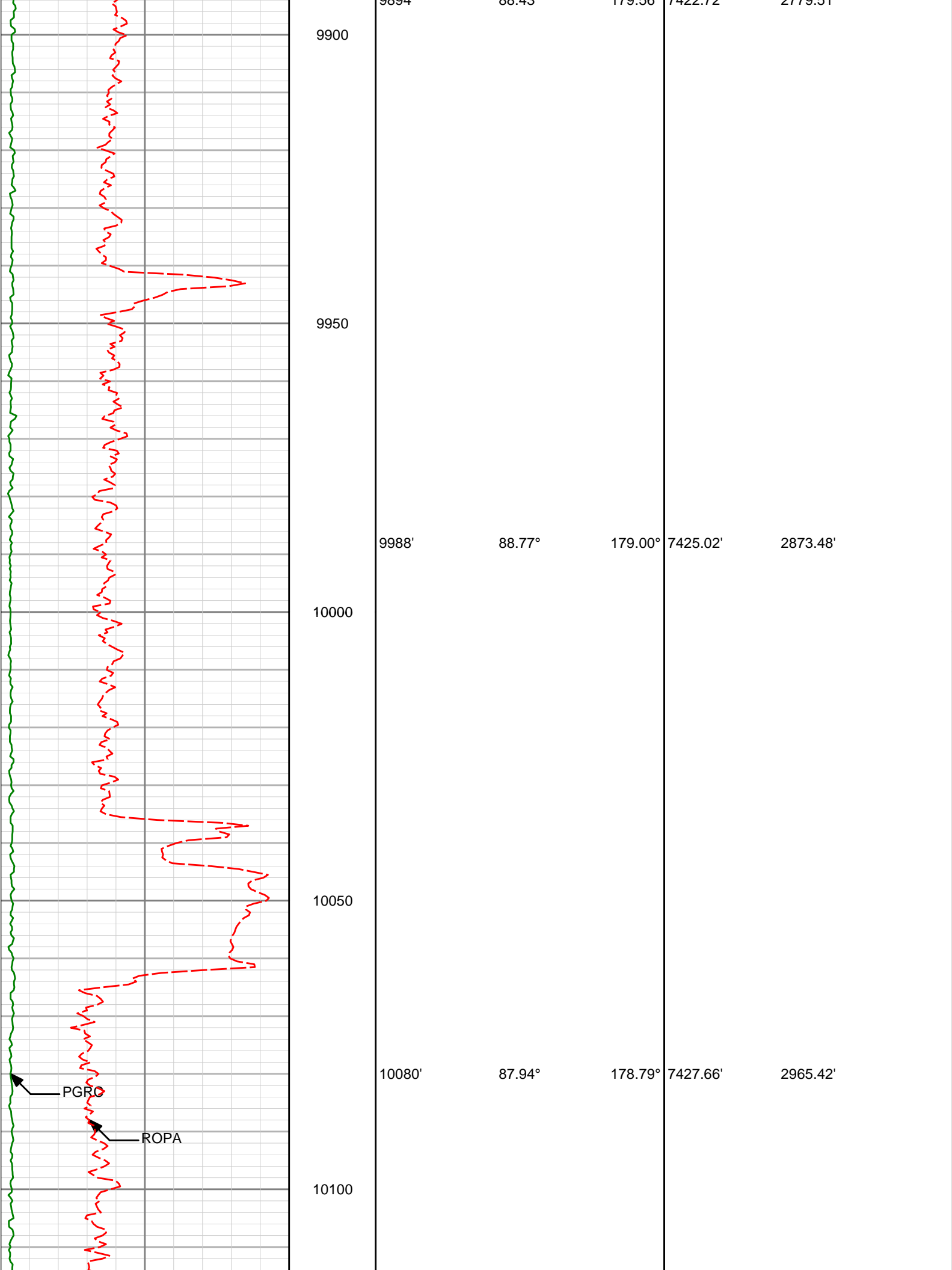
179.56°

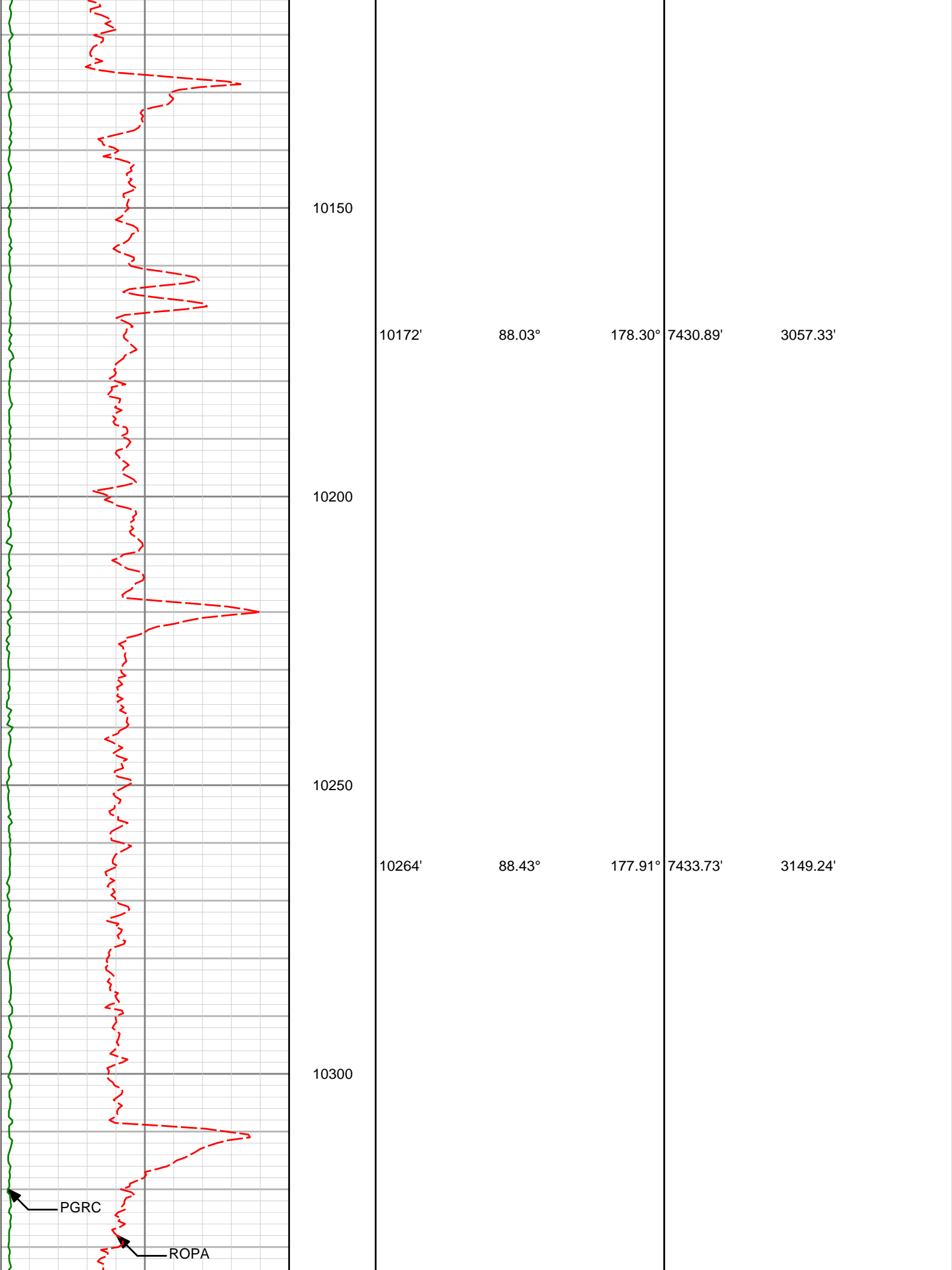
7422.72'

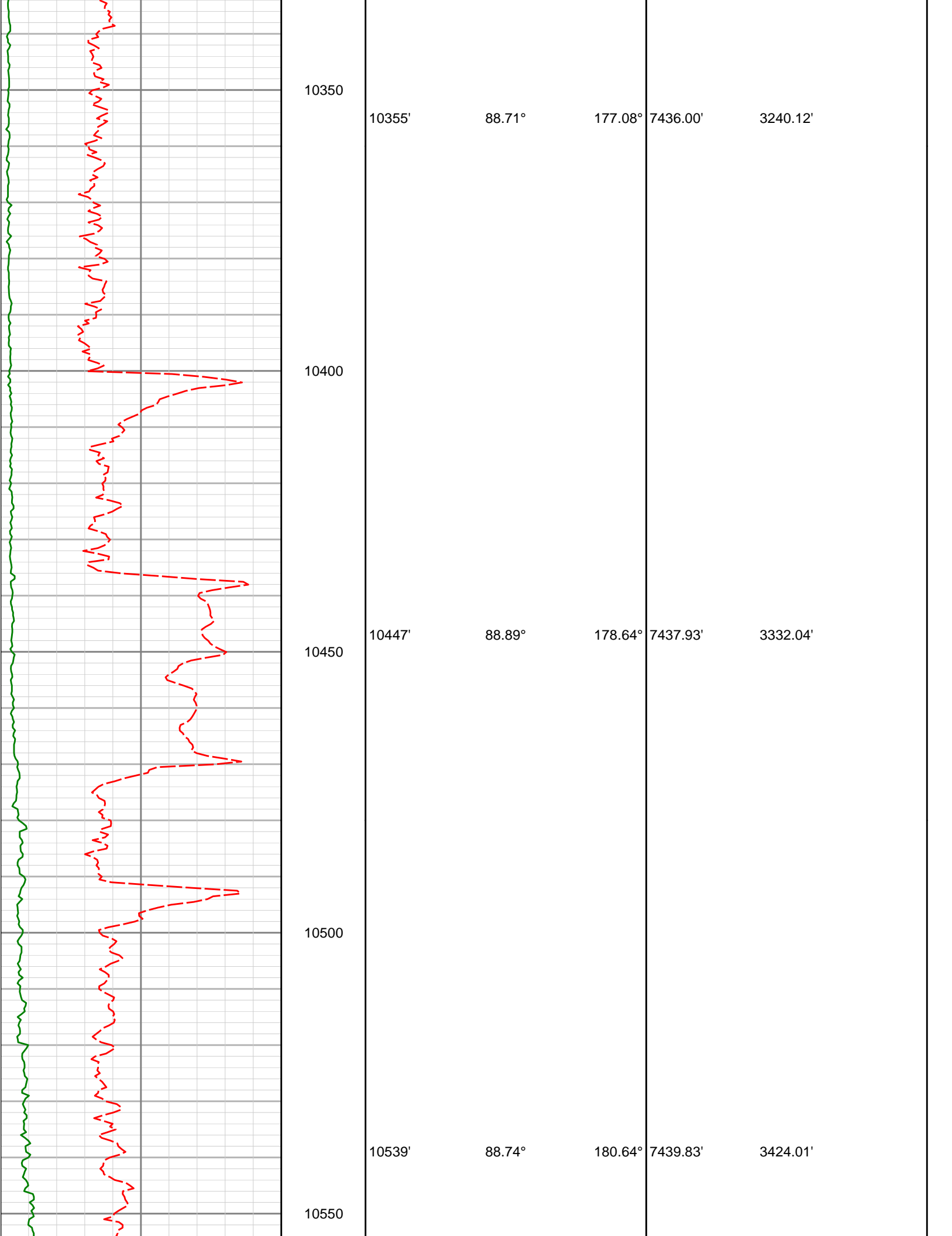
2779.51'

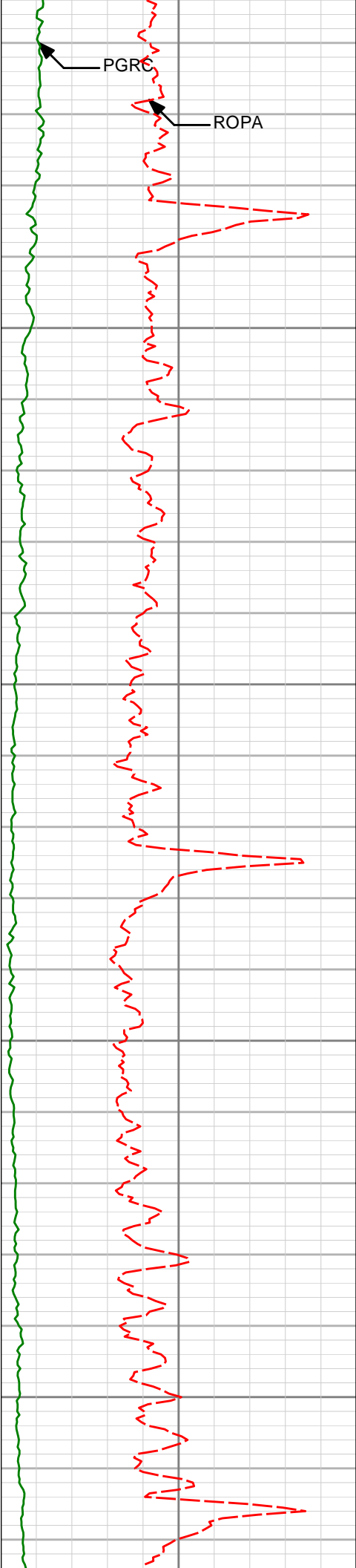
PGRC

ROPA









PGRS

ROPA

10600

10631'

89.85°

180.48°

7440.97'

3516.00'

10650

10700

10723'

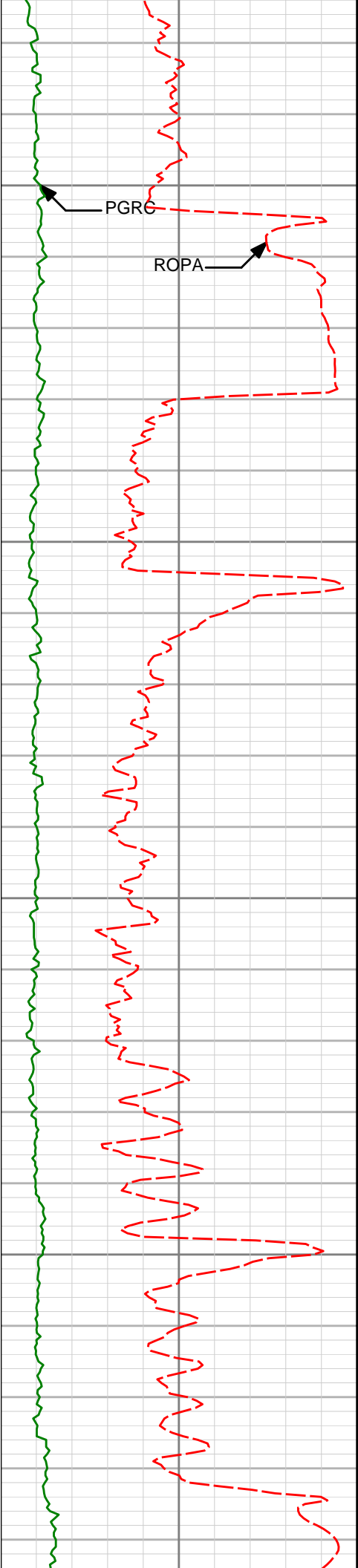
90.59°

180.20°

7440.61'

3607.99'

10750



10800

10814'

90.03°

180.02°

7440.12'

3698.99'

10850

10900

10907'

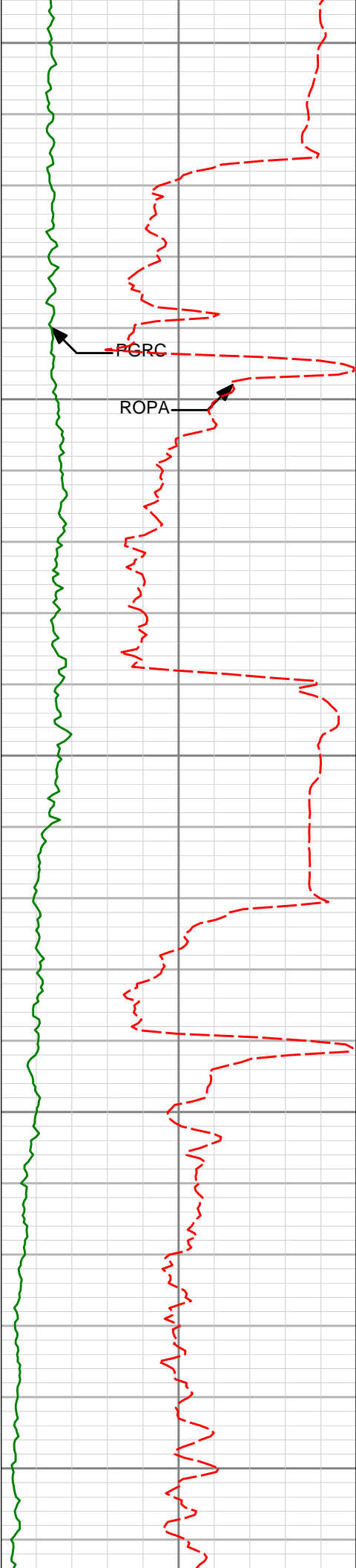
89.88°

180.51°

7440.19'

3791.99'

10950



11000

11001'

89.88°

180.64°

7440.39'

3885.99'

11050

PGRC

ROPA

11100

11095'

88.67°

180.52°

7441.58'

3979.97'

11150

11200

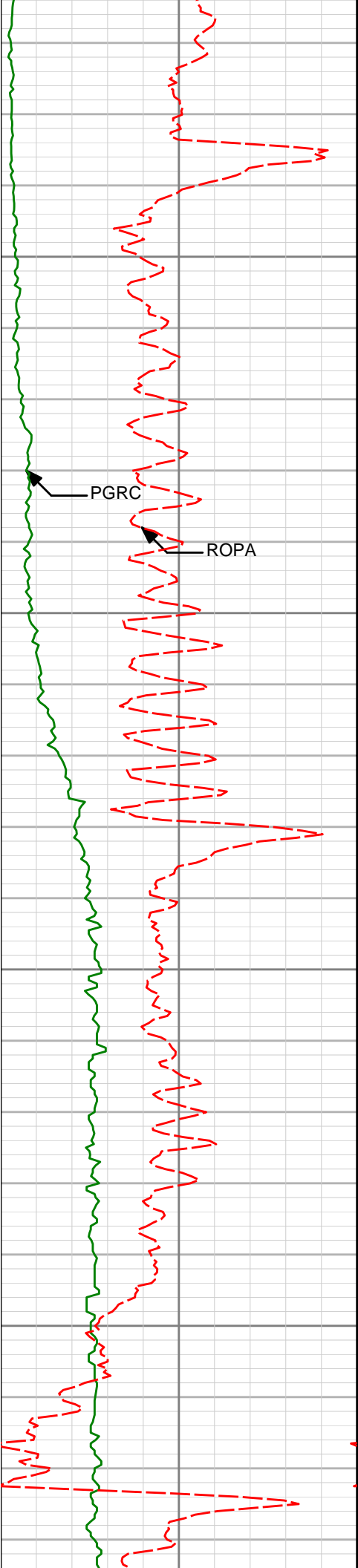
11190'

87.63°

181.85°

7444.65'

4074.90'



11250

11284'

88.18°

181.61°

7448.08'

4168.79'

11300

11350

11378'

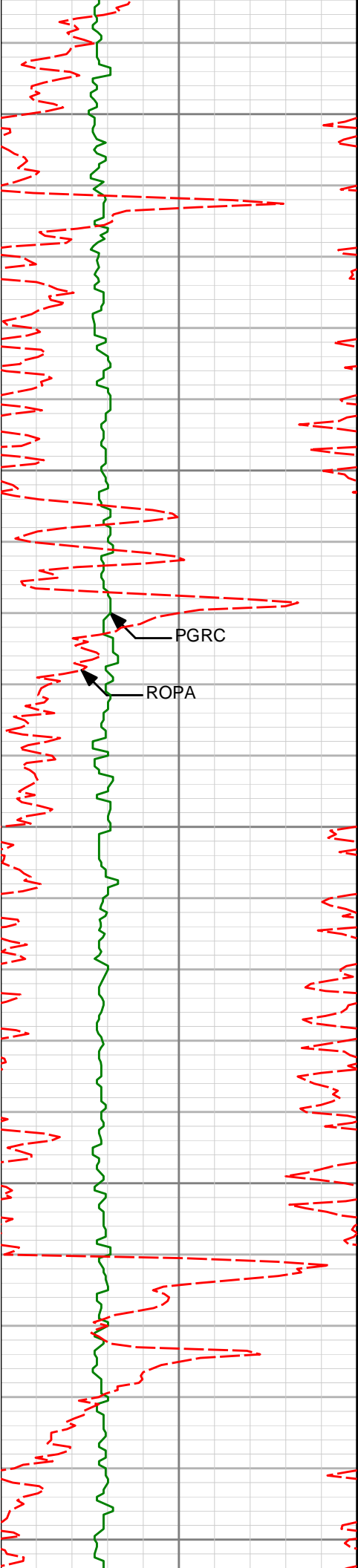
88.12°

181.69°

7451.12'

4262.70'

11400



11450

11473'

88.30°

180.76°

7454.08'

4357.64'

11500

11550

11567'

89.14°

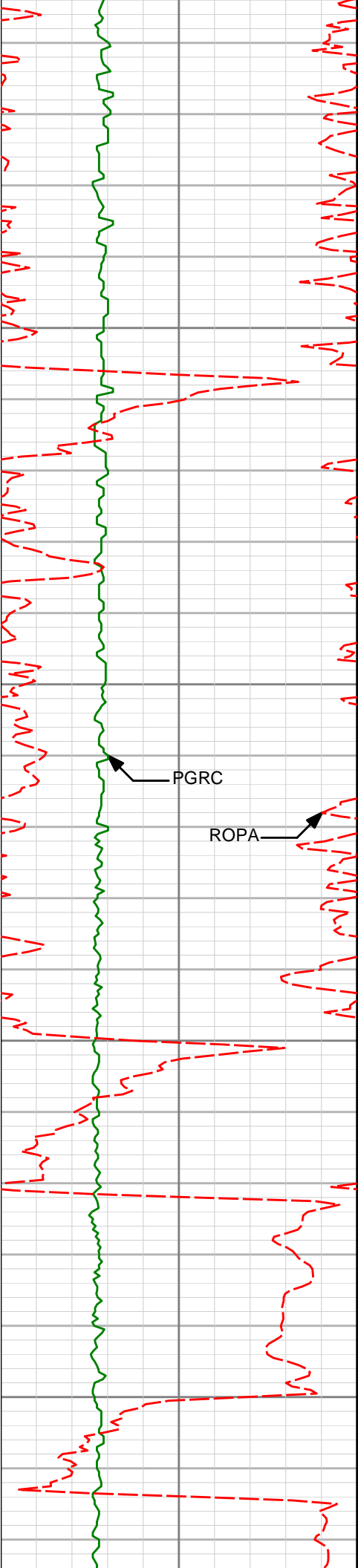
180.03°

7456.18'

4451.61'

11600

11650



11700

11750

11800

11850

11661'

89.97°

179.75°

7456.91'

4545.60'

11756'

90.65°

179.25°

7456.40'

4640.60'

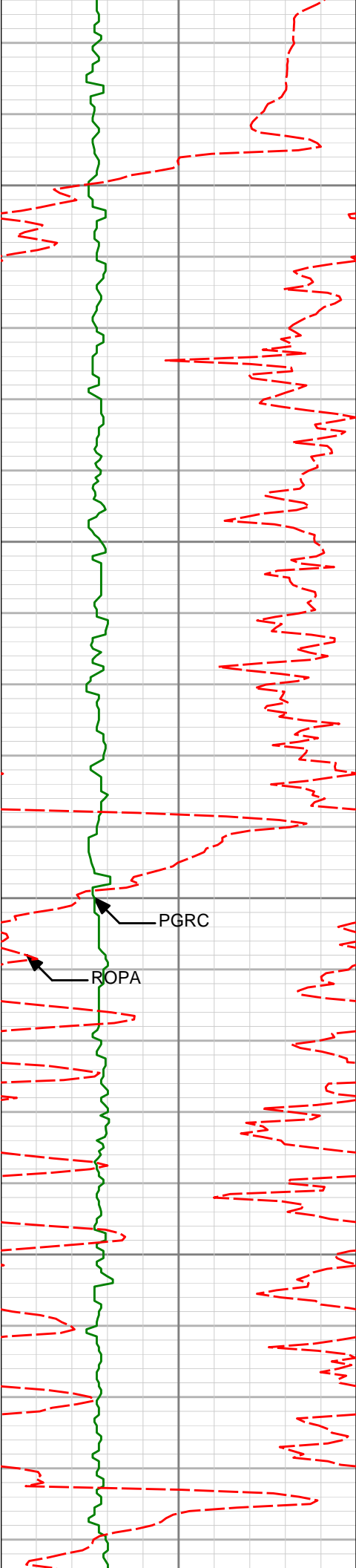
11850'

89.23°

179.48°

7456.50'

4734.59'



11900

11944'

89.17°

181.38°

7457.81'

4828.57'

11950

12000

PGRC

ROP

12039'

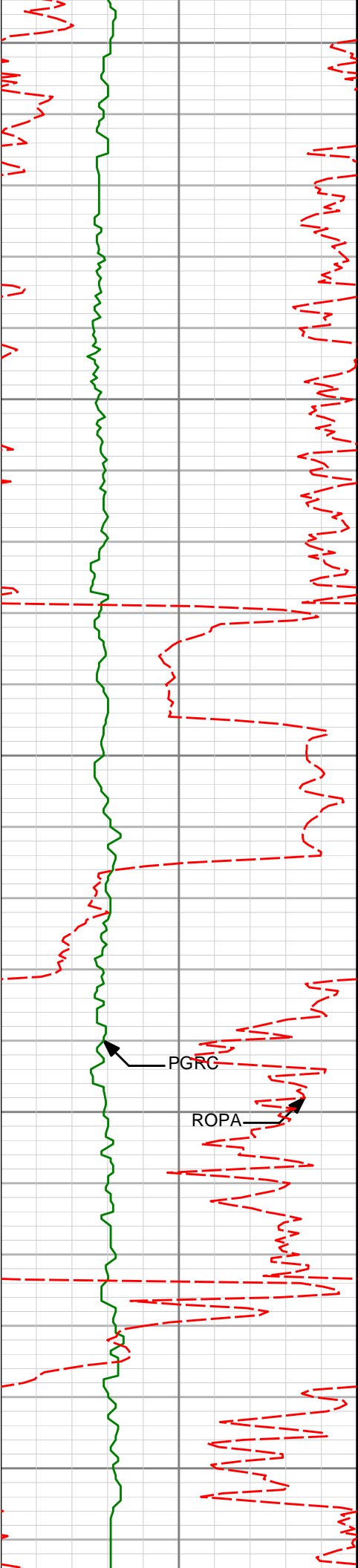
89.63°

180.65°

7458.81'

4923.55'

12050



12100

12133'

90.09°

179.41°

7459.04'

5017.55'

12150

12200

12228'

89.01°

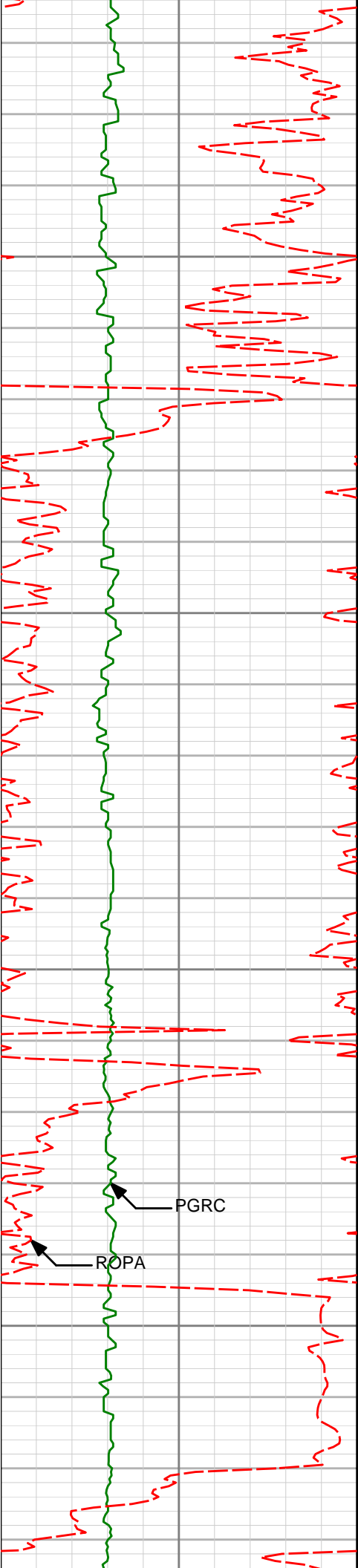
179.28°

7459.78'

5112.54'

12250

12300



12322'

89.78°

179.08°

7460.77'

5206.52'

12350

12400

12415'

90.31°

178.06°

7460.70'

5299.49'

12450

PGRC

ROPA

12500

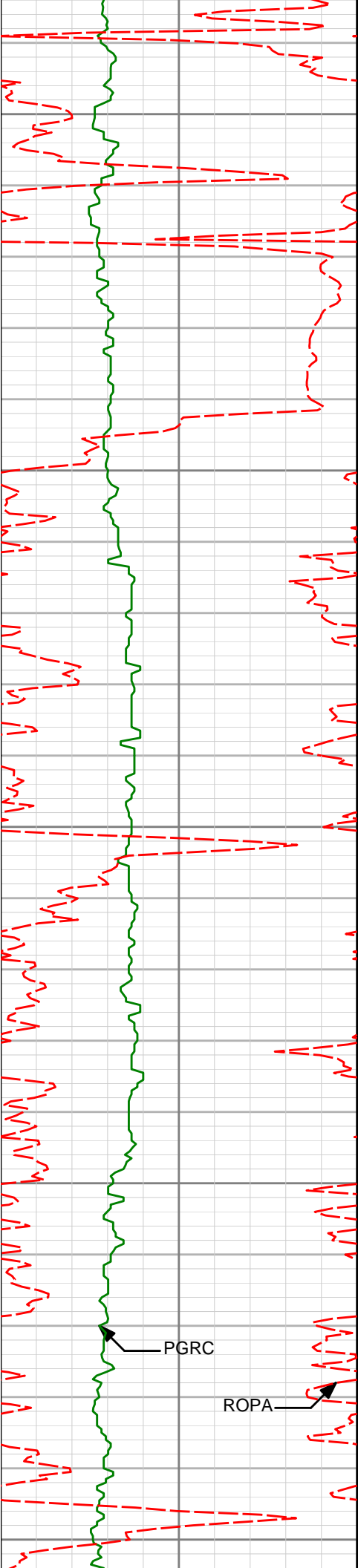
12510'

89.51°

178.72°

7460.85'

5394.46'



12550

12600

12650

12700

12750

12604'

88.74°

180.46°

7462.29'

5488.44'

12698'

89.82°

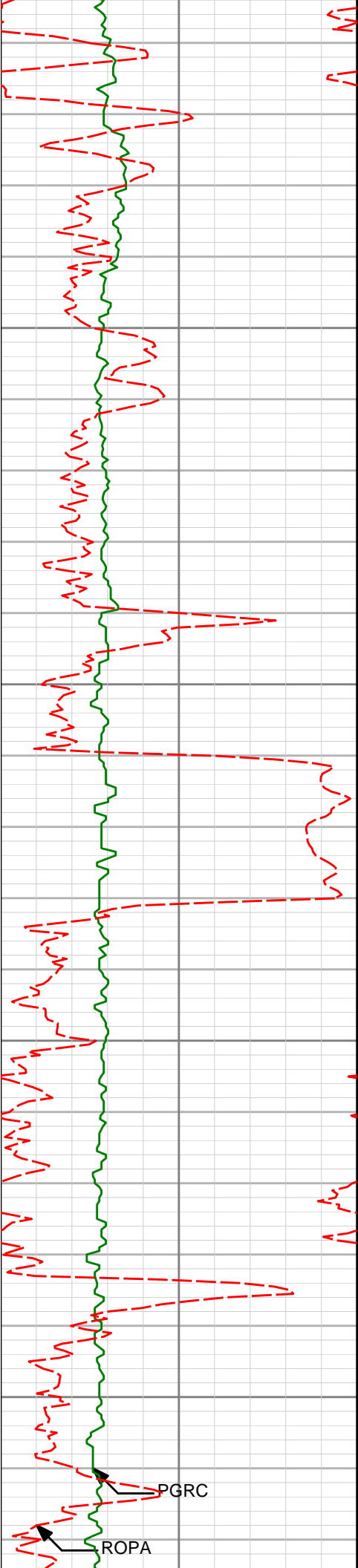
180.84°

7463.47'

5582.42'

PGRC

ROPA



12793'	91.08°	181.33°	7462.72'	5677.40'
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12800

12850

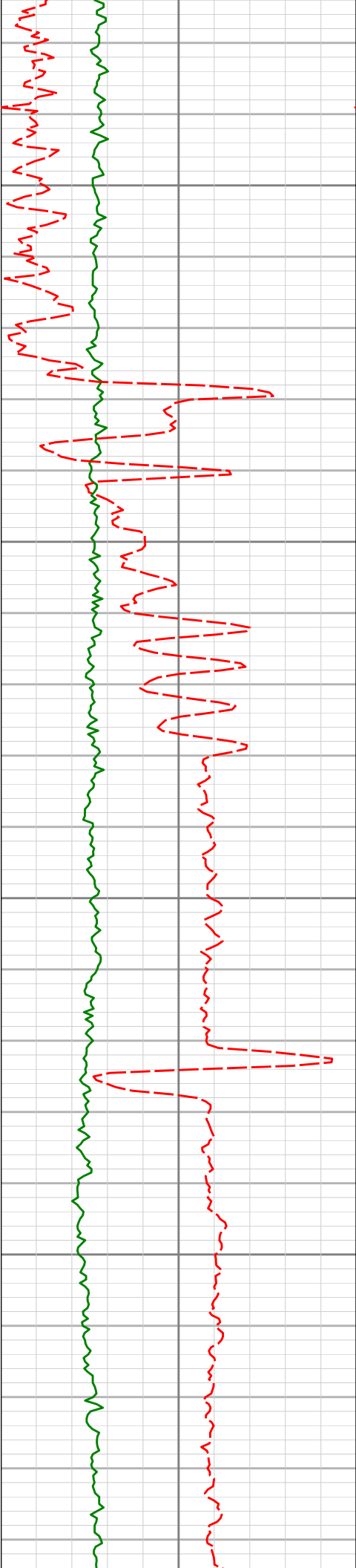
12887'	89.75°	180.38°	7462.04'	5771.38'
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12900

12950

PGRC

ROPA



13000

13050

13100

13150

12982'

90.55°

180.24°

7461.79'

5866.38'

13076'

90.19°

178.91°

7461.19'

5960.37'

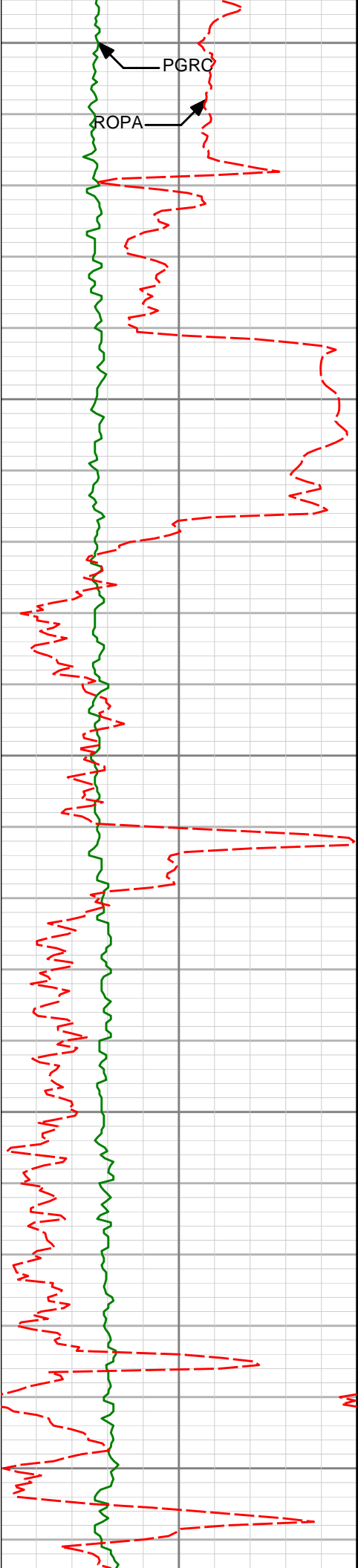
13170'

88.80°

177.77°

7462.01'

6054.33'



13200

PGRC

ROPA

13250

13264'

87.87°

179.17°

7464.75'

6148.25'

13300

13350

13359'

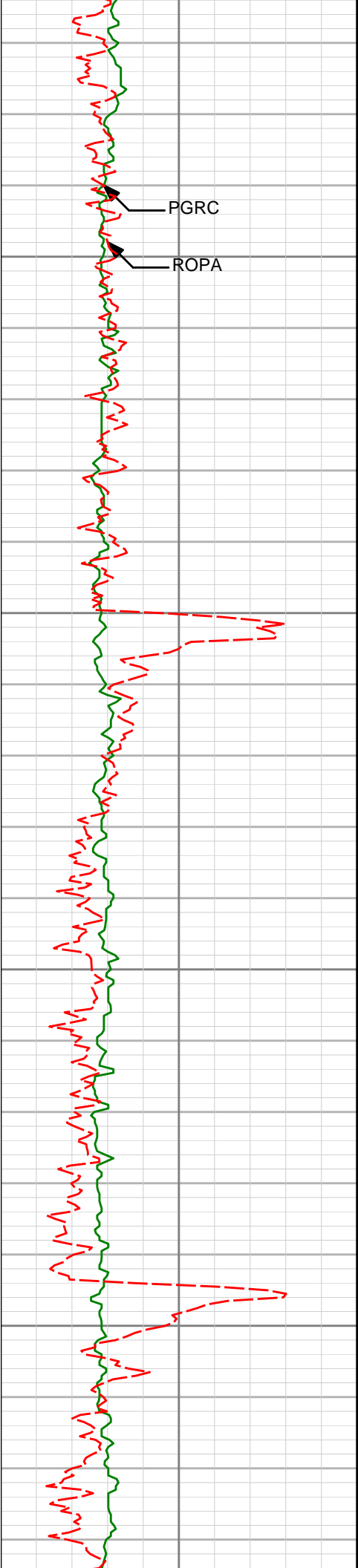
88.49°

178.93°

7467.76'

6243.19'

13400



13450

13453'

89.45°

178.56°

7469.45'

6337.15'

13500

13550

13548'

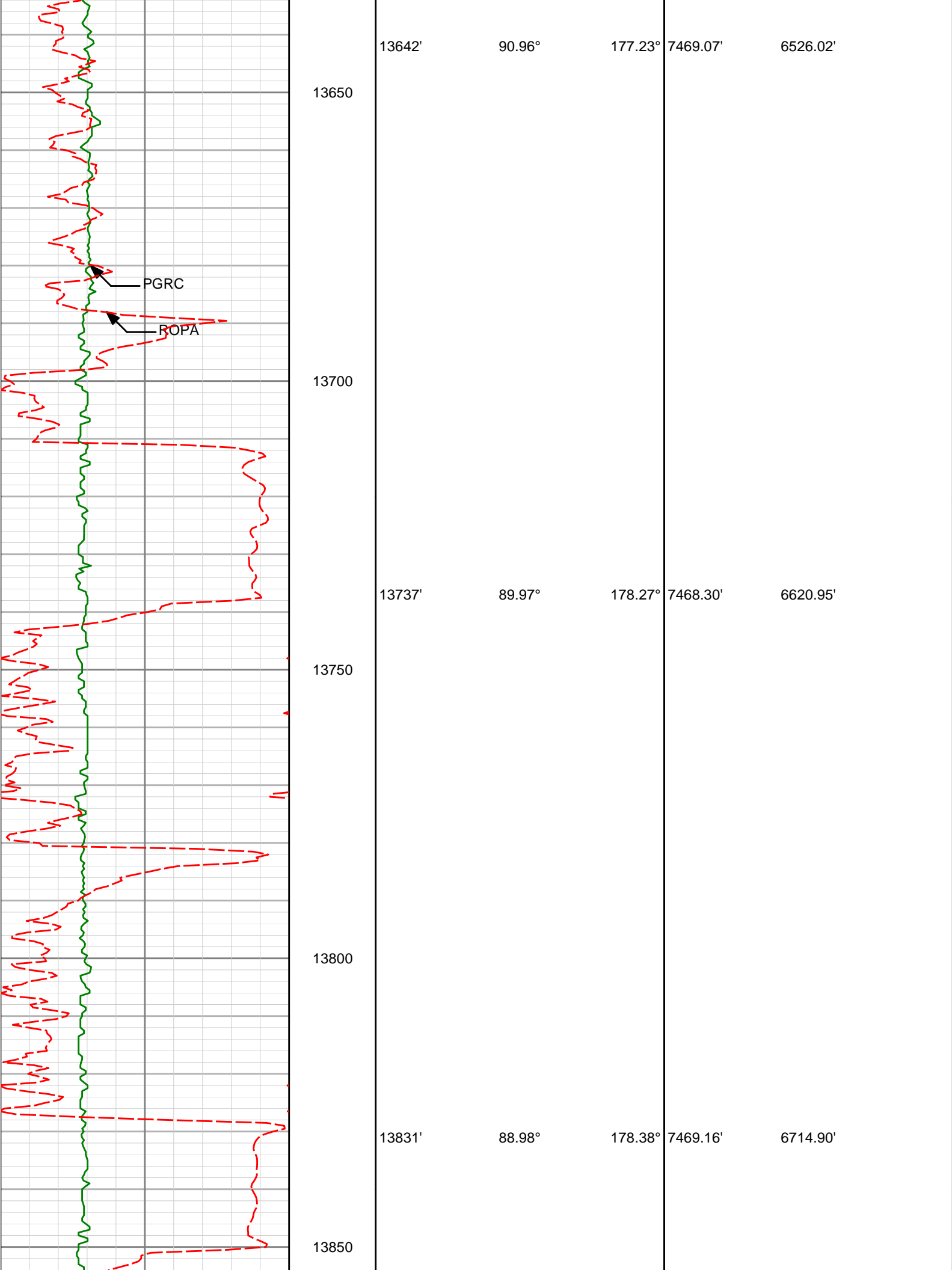
90.03°

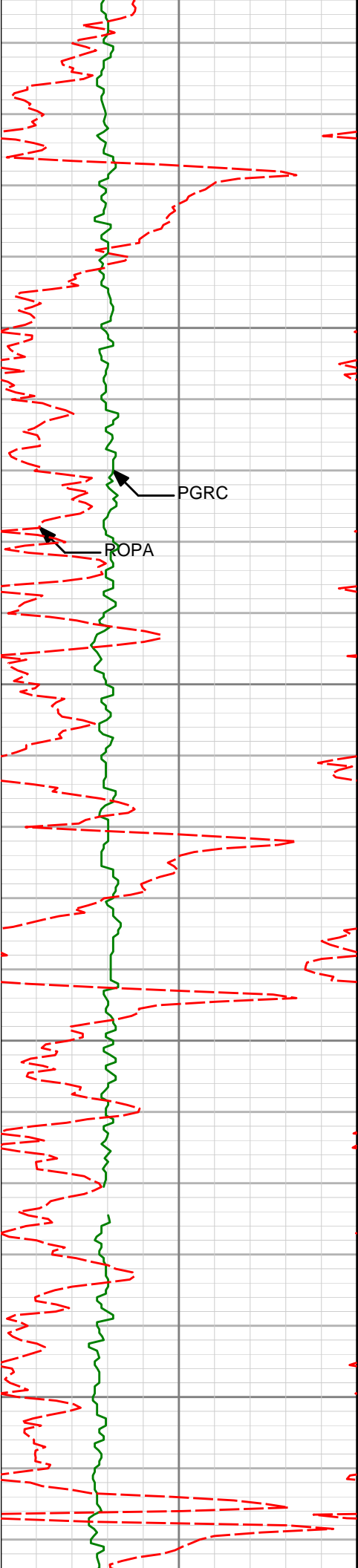
178.09°

7469.88'

6432.11'

13600





13900

13925'

PGRC

90.00°

179.90°

7470.00'

6808.88'

13950

14000

14019'

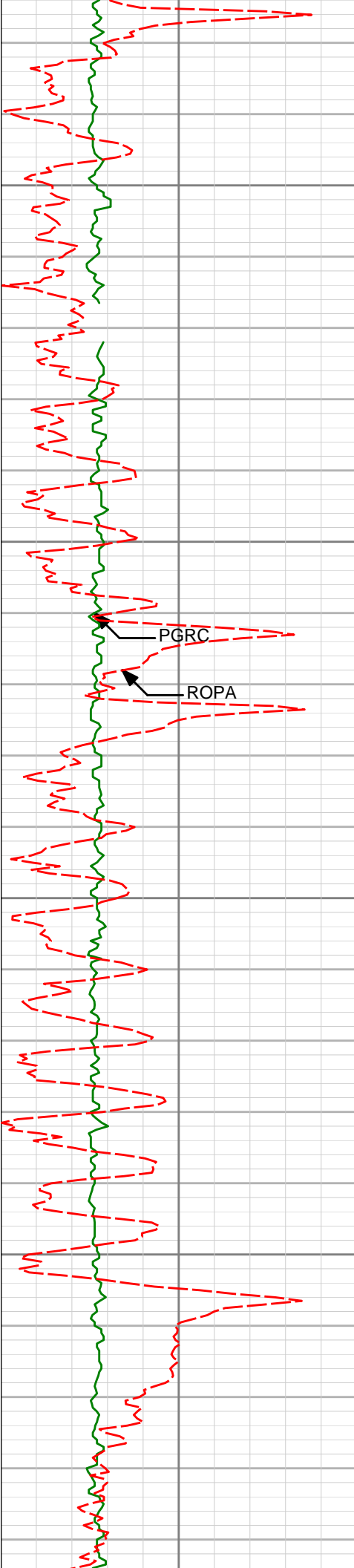
91.02°

180.19°

7469.16'

6902.88'

14050



14100

14114'

91.05°

180.36°

7467.45'

6997.86'

14150

PGRC

ROPA

14200

14208'

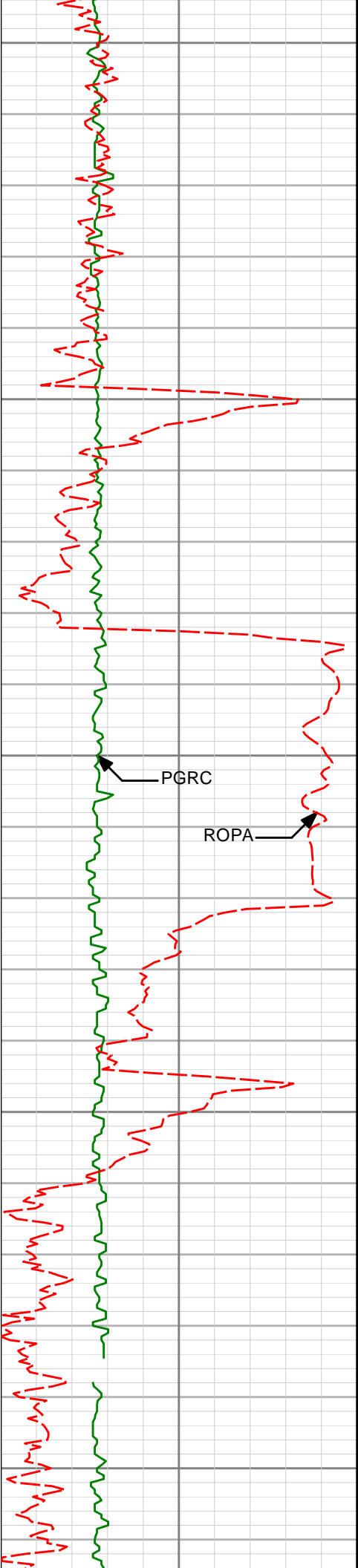
90.62°

179.30°

7466.08'

7091.85'

14250



14300

14302'

89.48°

177.91°

7465.99'

7185.82'

14350

14400

14396'

89.69°

179.44°

7466.67'

7279.79'

PGRC

ROPA

14450

14500

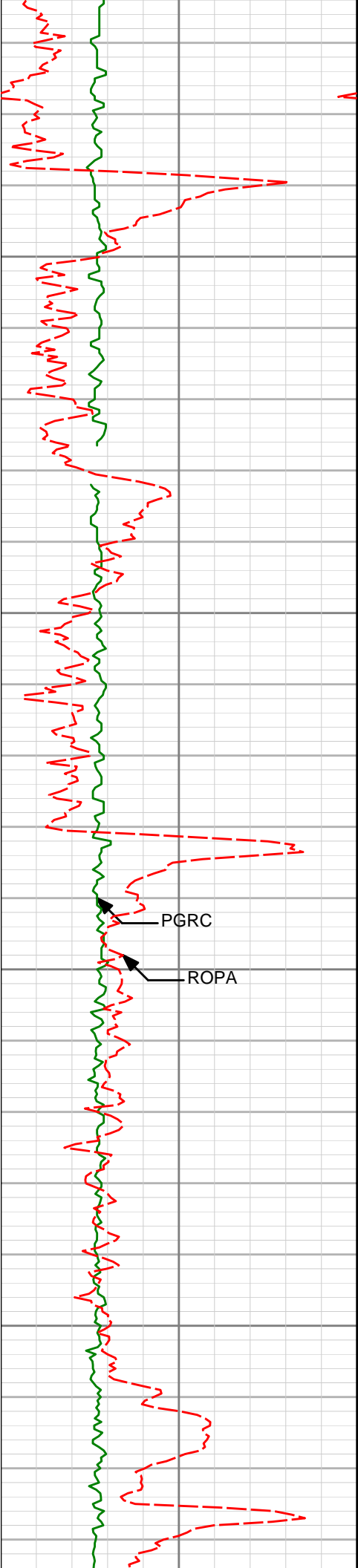
14491'

89.85°

180.77°

7467.06'

7374.78'



14550

14585'

90.15°

180.94°

7467.06'

7468.77'

14600

14650

PGRC

ROPA

14679'

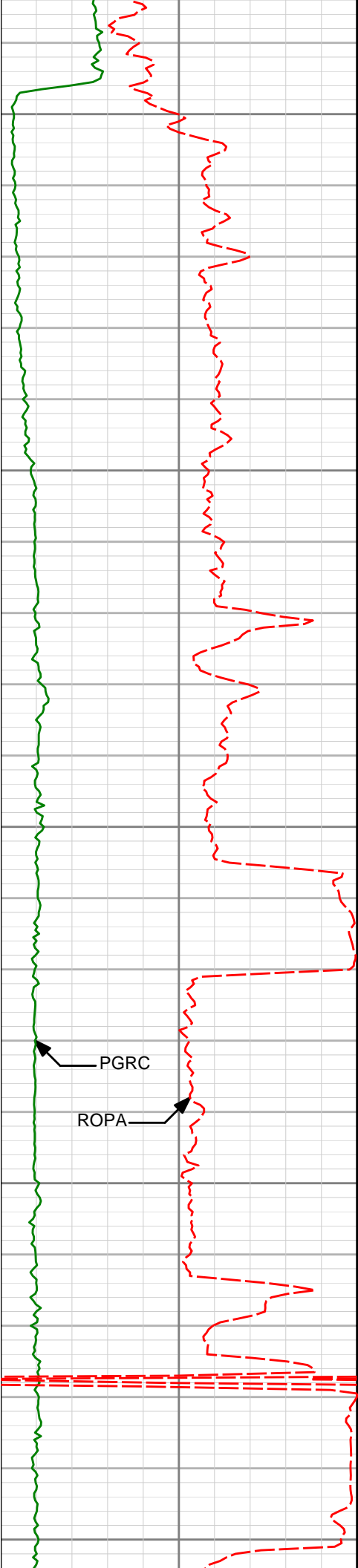
90.15°

180.45°

7466.81'

7562.77'

14700



14750

14800

14850

14900

14950

14773'

90.00°

179.75°

7466.69'

7656.76'

14867'

89.88°

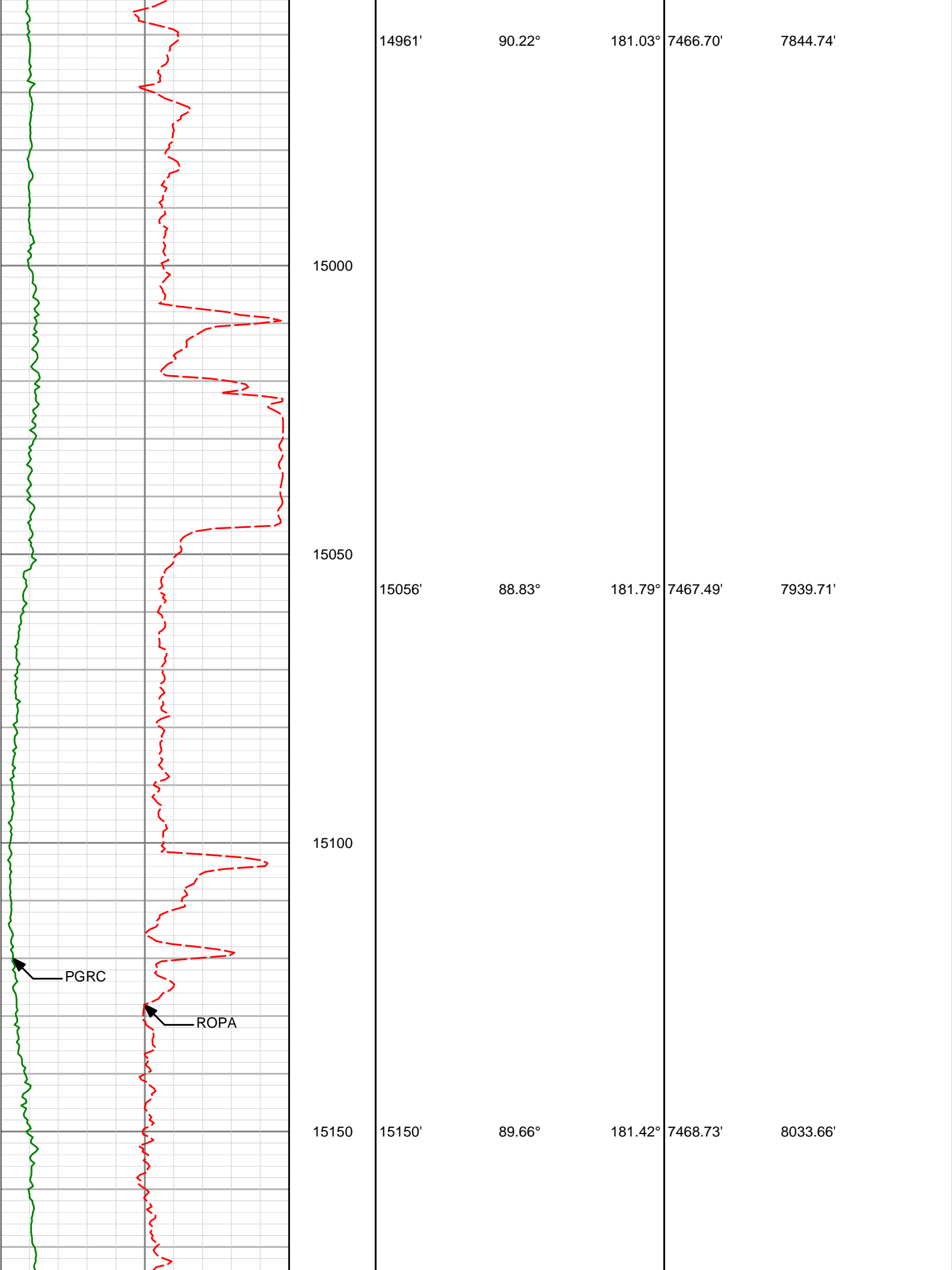
178.52°

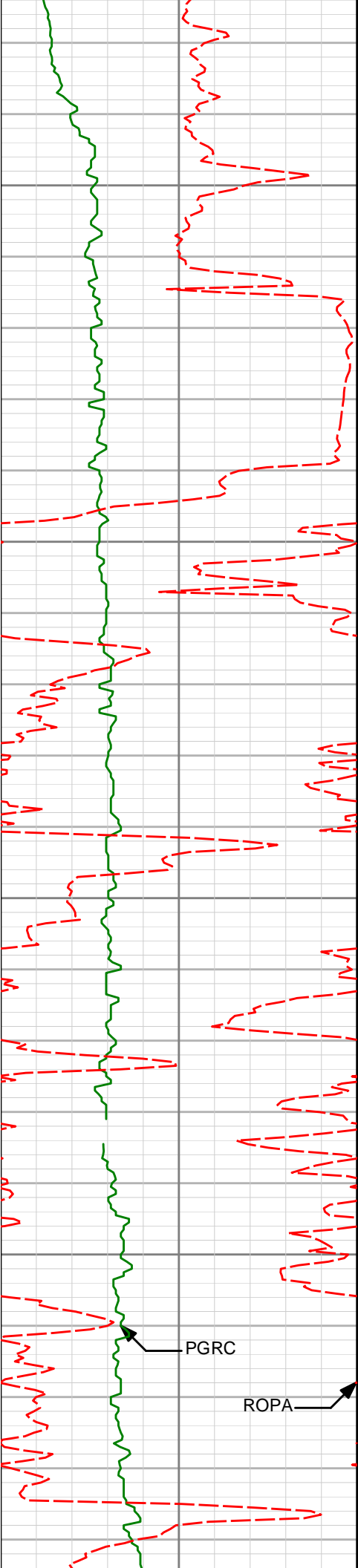
7466.79'

7750.75'

PGRC

ROPA





15200

15250

15300

15350

15245'

15339'

87.35°

88.06°

182.00°

181.51°

7471.21'

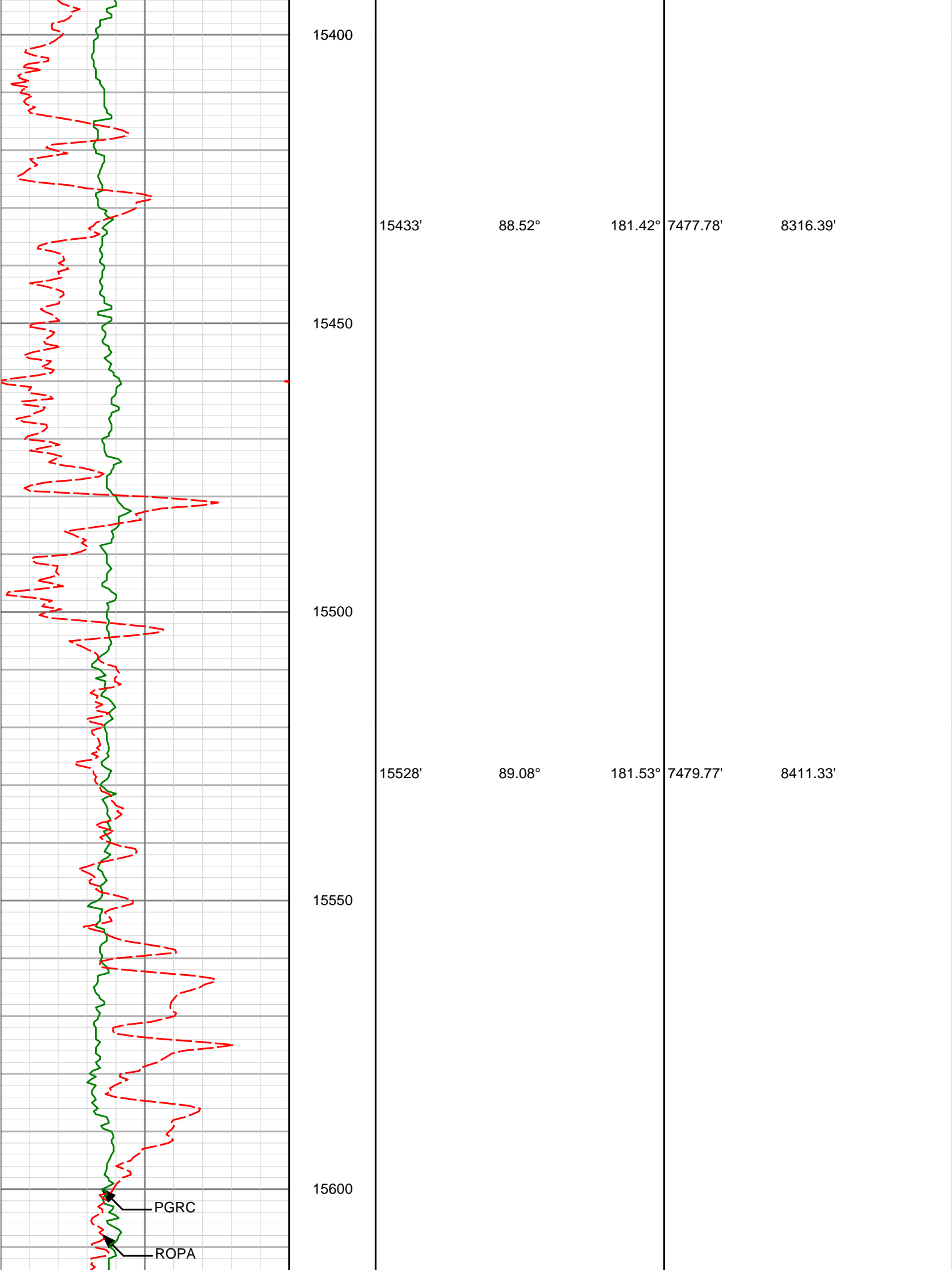
7474.97'

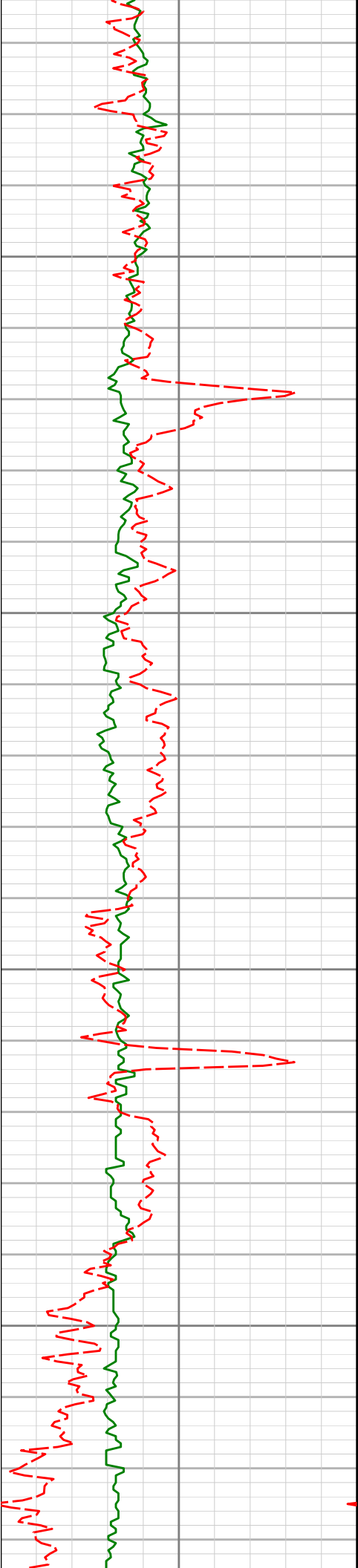
8128.58'

8222.46'

PGRC

ROPA





15622'

89.75°

181.45°

7480.73'

8505.30'

15650

15700

15717'

90.43°

181.03°

7480.58'

8600.27'

15750

15800

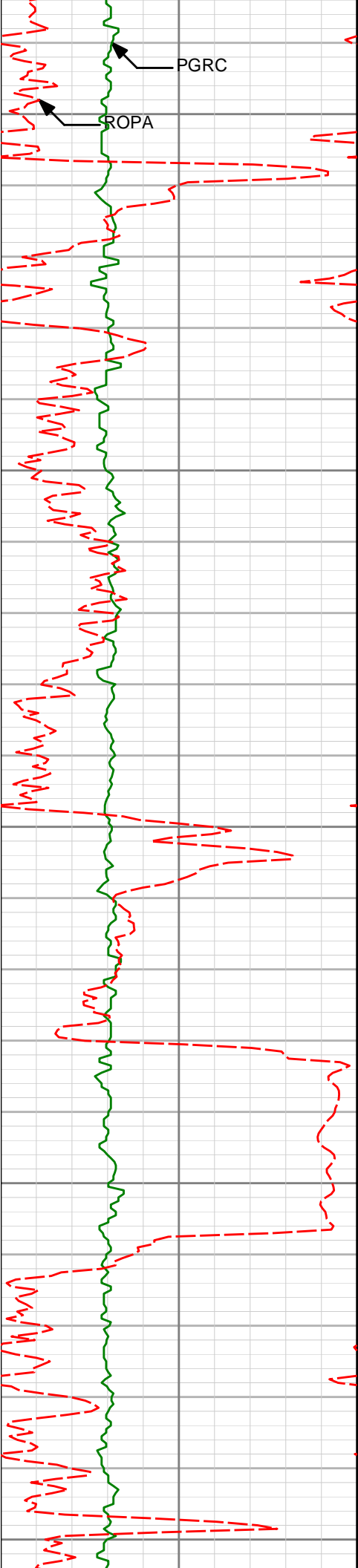
15811'

91.26°

180.60°

7479.19'

8694.25'



15850

15900

15950

16000

16050

15906'

91.70°

179.64°

7476.74'

8789.22'

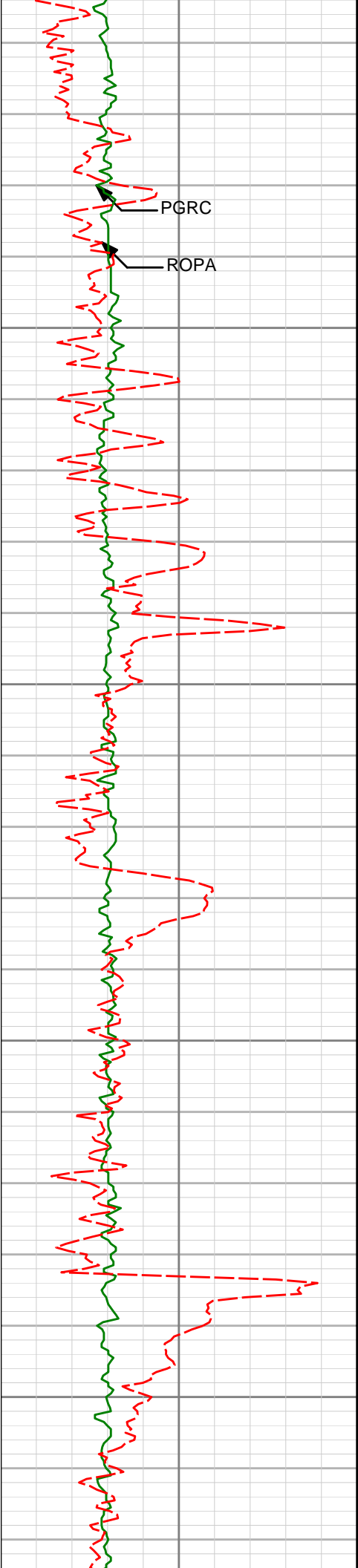
16000'

90.77°

180.38°

7474.71'

8883.20'



16100

16150

16200

16250

16095'

90.31°

180.01°

7473.82'

8978.19'

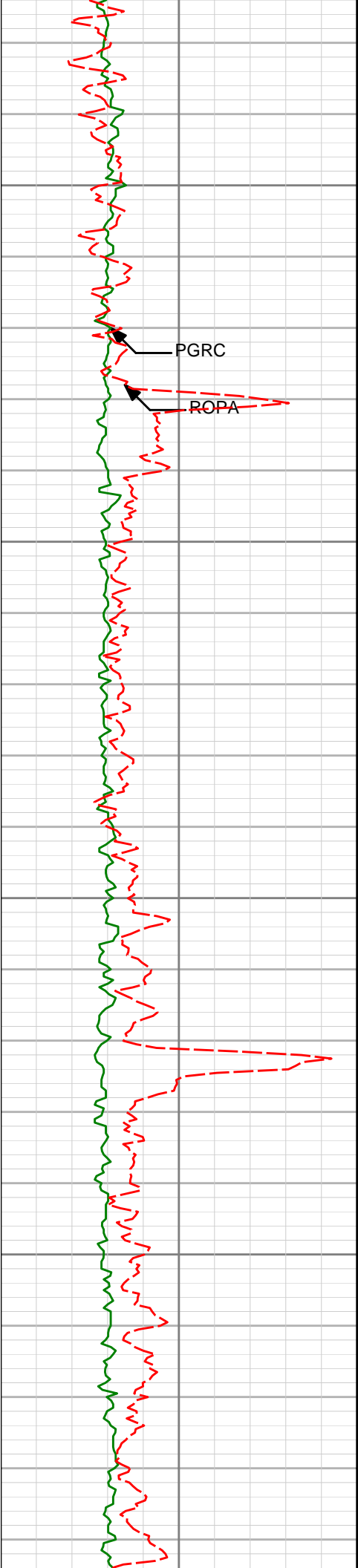
16189'

90.25°

179.63°

7473.36'

9072.19'



16300

16350

16400

16450

16284'

90.59°

178.91°

7472.66'

9167.18'

PGRC

ROPA

16378'

90.74°

178.21°

7471.57'

9261.14'

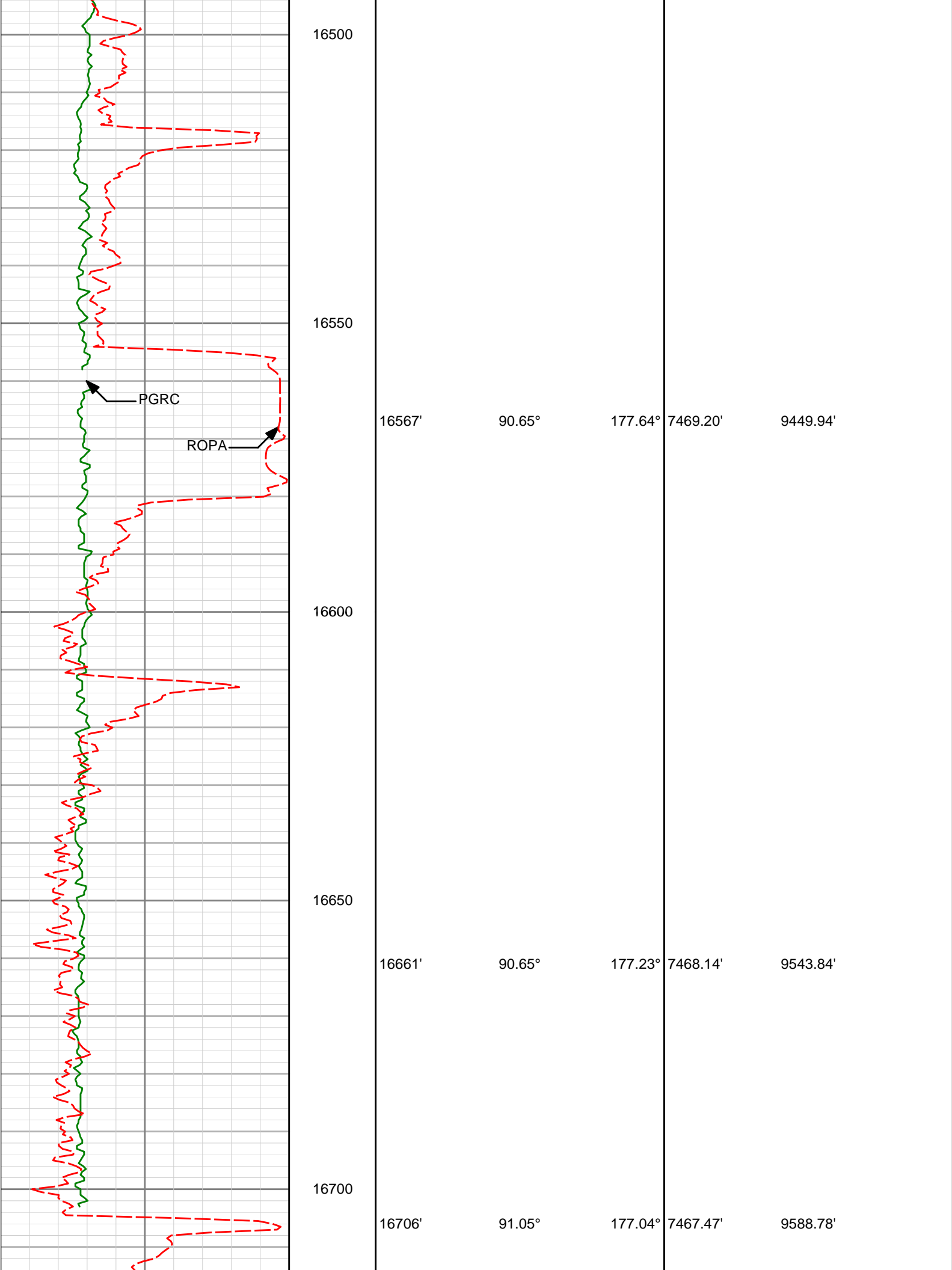
16473'

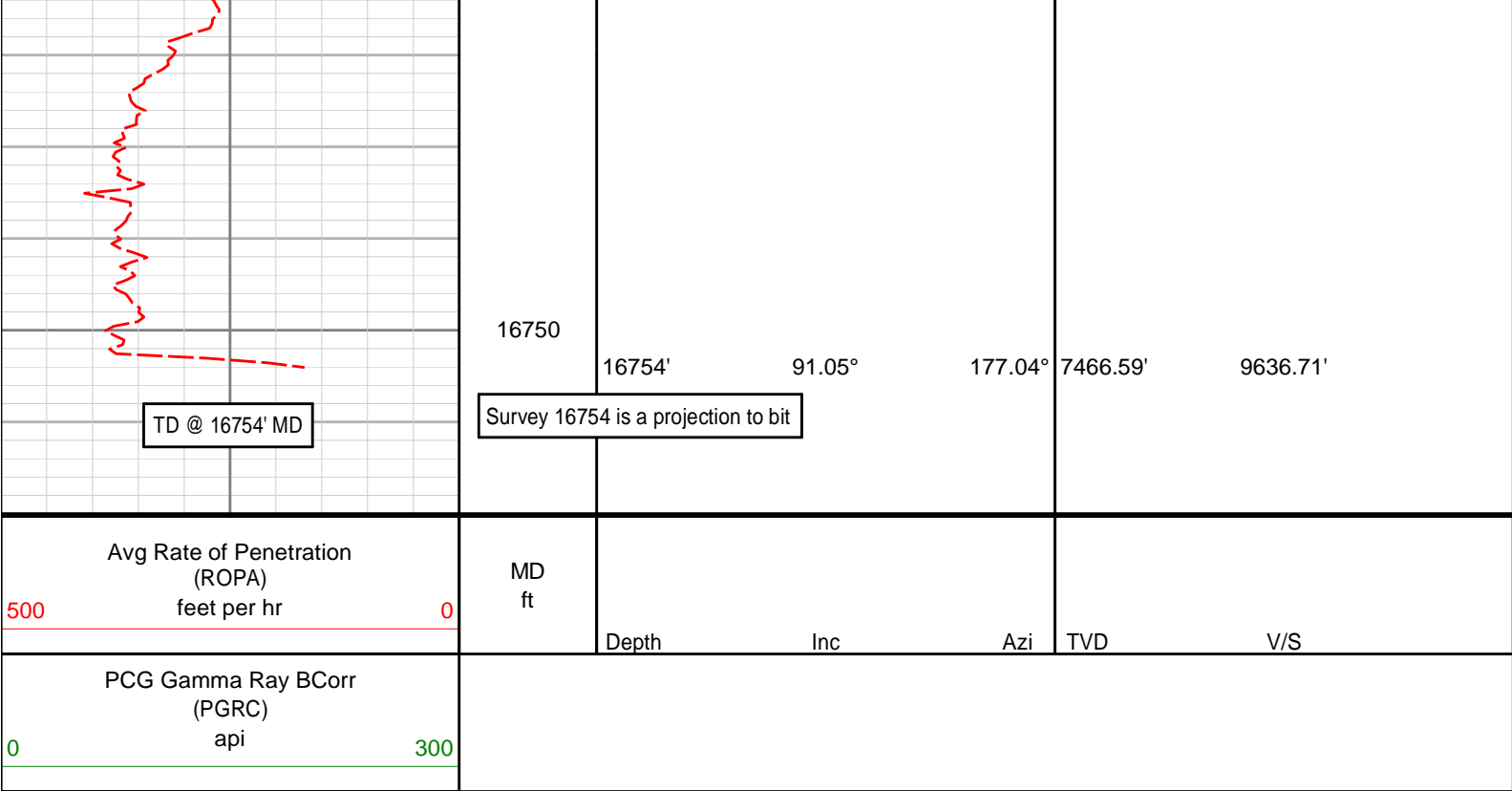
90.74°

176.99°

7470.34'

9356.05'





HALLIBURTON

DIRECTIONAL SURVEY REPORT

APC
Gee 16C-25HZ
Wattenberg
Weld Colorado
USA
CA-XX-0901807183

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
1101.00	0.80	319.23	1100.93	11.31 N	0.63 E	-11.31	0.19
1196.00	1.06	322.56	1195.92	12.51 N	0.33 W	-12.51	0.28
1291.00	0.95	328.83	1290.91	13.88 N	1.27 W	-13.88	0.16
1386.00	1.03	327.92	1385.89	15.28 N	2.14 W	-15.28	0.09
1480.00	1.59	284.99	1479.87	16.33 N	3.84 W	-16.33	1.16
1575.00	1.18	318.91	1574.84	17.41 N	5.76 W	-17.41	0.95
1681.00	1.43	315.93	1680.81	19.19 N	7.40 W	-19.19	0.24
1773.00	1.42	312.64	1772.79	20.78 N	9.03 W	-20.78	0.09
1864.00	1.32	315.00	1863.76	22.29 N	10.61 W	-22.29	0.13
1957.00	1.30	310.72	1956.74	23.73 N	12.16 W	-23.73	0.11
2049.00	1.43	321.96	2048.71	25.32 N	13.66 W	-25.32	0.32
2142.00	1.55	316.62	2141.68	27.15 N	15.24 W	-27.15	0.20
2234.00	1.59	275.29	2233.65	28.17 N	17.37 W	-28.17	1.21
2326.00	1.45	270.20	2325.61	28.29 N	19.80 W	-28.29	0.21
2419.00	1.35	269.67	2418.59	28.29 N	22.07 W	-28.29	0.11
2511.00	1.31	267.59	2510.56	28.24 N	24.21 W	-28.24	0.07
2602.00	1.16	261.30	2601.54	28.05 N	26.16 W	-28.05	0.22
2695.00	1.16	248.29	2694.52	27.56 N	27.96 W	-27.56	0.28
2787.00	1.11	243.96	2786.50	26.83 N	29.63 W	-26.83	0.11

2787.00	1.71	240.30	2780.30	20.00 N	20.00 W	20.00	0.17
2880.00	0.87	231.67	2879.49	25.99 N	30.99 W	-26.00	0.34
2972.00	0.58	211.79	2971.48	25.17 N	31.78 W	-25.17	0.41
3065.00	0.59	140.74	3064.48	24.40 N	31.73 W	-24.40	0.73
3156.00	0.48	139.05	3155.48	23.74 N	31.18 W	-23.74	0.12
3248.00	0.60	141.22	3247.47	23.08 N	30.63 W	-23.08	0.13
3340.00	0.44	126.84	3339.47	22.49 N	30.04 W	-22.49	0.22
3432.00	0.61	156.90	3431.46	21.83 N	29.57 W	-21.83	0.35
3524.00	0.32	133.10	3523.46	21.20 N	29.19 W	-21.20	0.37
3616.00	0.65	148.83	3615.46	20.58 N	28.73 W	-20.58	0.38
3708.00	1.05	168.07	3707.45	19.31 N	28.29 W	-19.31	0.53
3799.00	0.86	174.69	3798.43	17.81 N	28.05 W	-17.81	0.24
3891.00	0.50	242.46	3890.43	16.94 N	28.34 W	-16.94	0.89
3983.00	0.25	102.52	3982.43	16.71 N	28.50 W	-16.71	0.77
4075.00	0.46	112.42	4074.43	16.53 N	27.97 W	-16.53	0.24
4167.00	0.51	115.07	4166.42	16.21 N	27.25 W	-16.21	0.06
4259.00	0.38	86.43	4258.42	16.06 N	26.58 W	-16.06	0.28
4353.00	0.60	129.48	4352.42	15.76 N	25.89 W	-15.76	0.44
4448.00	0.75	142.13	4447.41	14.96 N	25.12 W	-14.96	0.22
4541.00	0.42	151.00	4540.41	14.18 N	24.58 W	-14.18	0.37
4635.00	0.56	167.94	4634.40	13.43 N	24.32 W	-13.43	0.21
4730.00	0.41	208.03	4729.40	12.67 N	24.38 W	-12.67	0.38
4825.00	0.66	172.08	4824.40	11.83 N	24.47 W	-11.83	0.43
4919.00	1.03	172.06	4918.38	10.46 N	24.28 W	-10.46	0.39
5014.00	1.17	173.14	5013.37	8.65 N	24.04 W	-8.65	0.15
5108.00	1.02	181.43	5107.35	6.86 N	23.95 W	-6.86	0.23
5203.00	0.76	197.99	5202.34	5.42 N	24.16 W	-5.42	0.38
5297.00	0.80	235.88	5296.33	4.46 N	24.90 W	-4.46	0.54
5391.00	1.03	245.97	5390.32	3.74 N	26.21 W	-3.74	0.30
5485.00	0.91	258.76	5484.31	3.25 N	27.72 W	-3.25	0.26
5580.00	1.07	257.67	5579.29	2.92 N	29.33 W	-2.92	0.17
5675.00	0.96	270.32	5674.28	2.73 N	30.99 W	-2.73	0.26
5769.00	0.80	271.56	5768.26	2.75 N	32.43 W	-2.75	0.17
5863.00	1.79	279.55	5862.24	3.02 N	34.53 W	-3.02	1.07
5957.00	2.44	269.33	5956.18	3.24 N	37.98 W	-3.24	0.80
6052.00	5.22	270.57	6050.95	3.26 N	44.33 W	-3.26	2.93
6146.00	4.36	270.49	6144.63	3.33 N	52.18 W	-3.33	0.91
6241.00	5.21	274.74	6239.29	3.72 N	60.09 W	-3.72	0.97
6335.00	4.94	273.20	6332.92	4.29 N	68.38 W	-4.29	0.32
6429.00	3.93	270.00	6426.64	4.52 N	75.64 W	-4.52	1.11
6523.00	2.74	251.75	6520.48	3.82 N	81.00 W	-3.82	1.68
6618.00	2.66	251.68	6615.38	2.41 N	85.25 W	-2.41	0.08
6712.00	2.31	244.46	6709.29	0.91 N	89.03 W	-0.91	0.50
6759.00	3.34	215.53	6756.23	0.61 S	90.68 W	0.61	3.68
6806.00	6.48	190.07	6803.06	4.34 S	91.94 W	4.34	7.98
6853.00	9.25	191.63	6849.61	10.65 S	93.16 W	10.65	5.91
6901.00	12.39	185.79	6896.76	19.56 S	94.46 W	19.56	6.92
6948.00	17.23	174.17	6942.19	31.51 S	94.26 W	31.51	12.03
6997.00	20.16	170.28	6988.60	47.05 S	92.10 W	47.05	6.50
7043.00	23.23	178.04	7031.35	63.94 S	90.45 W	63.94	9.12
7090.00	29.96	184.11	7073.36	84.94 S	90.97 W	84.94	15.43
7137.00	37.44	182.69	7112.43	110.95 S	92.49 W	110.95	16.00
7185.00	41.65	181.60	7149.44	141.48 S	93.62 W	141.48	8.89
7232.00	45.70	180.99	7183.43	173.92 S	94.35 W	173.92	8.66
7279.00	48.14	180.47	7215.53	208.25 S	94.78 W	208.25	5.25
7326.00	50.46	179.50	7246.17	243.88 S	94.77 W	243.88	5.18
7373.00	53.44	179.01	7275.14	280.88 S	94.28 W	280.88	6.39
7420.00	59.22	179.05	7301.18	319.97 S	93.62 W	319.97	12.30
7468.00	66.87	178.80	7322.93	362.72 S	92.81 W	362.72	15.94
7515.00	72.32	177.73	7339.31	406.73 S	91.47 W	406.73	11.79
7562.00	74.66	177.19	7352.66	451.75 S	89.48 W	451.75	5.10
7609.00	77.17	177.44	7364.10	497.28 S	87.34 W	497.28	5.37
7656.00	79.59	177.75	7373.57	543.27 S	85.41 W	543.27	5.19
7703.00	82.80	177.93	7380.76	589.68 S	83.66 W	589.68	6.84
7757.00	86.39	178.91	7385.85	643.41 S	82.18 W	643.41	6.89
7822.00	89.45	178.89	7388.20	708.35 S	80.93 W	708.35	4.71
7916.00	90.15	177.95	7388.53	802.31 S	78.34 W	802.31	1.25
8011.00	89.41	178.87	7388.90	897.27 S	75.70 W	897.27	1.24
8105.00	88.52	180.46	7390.60	991.25 S	75.15 W	991.25	1.94
8199.00	90.65	181.49	7391.28	1085.23 S	76.75 W	1085.23	2.52
8293.00	89.57	182.63	7391.10	1179.16 S	80.13 W	1179.16	1.67

8387.00	86.85	181.38	7394.03	1273.05 S	83.42 W	1273.05	3.18
8481.00	87.57	181.34	7398.61	1366.91 S	85.65 W	1366.91	0.77
8575.00	88.06	181.33	7402.19	1460.82 S	87.84 W	1460.82	0.52
8669.00	88.86	180.91	7404.72	1554.76 S	89.67 W	1554.76	0.96
8764.00	89.32	180.34	7406.23	1649.75 S	90.71 W	1649.75	0.77
8858.00	89.85	179.44	7406.91	1743.74 S	90.53 W	1743.74	1.11
8952.00	90.55	179.03	7406.58	1837.73 S	89.27 W	1837.73	0.86
9046.00	88.92	179.21	7407.01	1931.72 S	87.83 W	1931.72	1.74
9140.00	88.80	179.88	7408.88	2025.69 S	87.08 W	2025.69	0.72
9235.00	88.95	180.38	7410.75	2120.68 S	87.30 W	2120.68	0.55
9329.00	89.23	180.08	7412.24	2214.66 S	87.68 W	2214.66	0.44
9423.00	89.54	179.78	7413.25	2308.66 S	87.56 W	2308.66	0.46
9517.00	90.22	180.76	7413.45	2402.65 S	88.00 W	2402.65	1.27
9611.00	88.43	179.11	7414.56	2496.64 S	87.90 W	2496.64	2.59
9706.00	88.58	179.57	7417.03	2591.60 S	86.80 W	2591.60	0.51
9800.00	88.03	180.03	7419.81	2685.56 S	86.48 W	2685.56	0.76
9894.00	88.43	179.56	7422.72	2779.51 S	86.14 W	2779.51	0.66
9988.00	88.77	179.00	7425.02	2873.48 S	84.96 W	2873.48	0.70
10080.00	87.94	178.79	7427.66	2965.42 S	83.19 W	2965.42	0.93
10172.00	88.03	178.30	7430.89	3057.33 S	80.85 W	3057.33	0.54
10264.00	88.43	177.91	7433.73	3149.24 S	77.81 W	3149.24	0.61
10355.00	88.71	177.08	7436.00	3240.12 S	73.83 W	3240.12	0.96
10447.00	88.89	178.64	7437.93	3332.04 S	70.40 W	3332.04	1.71
10539.00	88.74	180.64	7439.83	3424.01 S	69.82 W	3424.01	2.18
10631.00	89.85	180.48	7440.97	3516.00 S	70.72 W	3516.00	1.22
10723.00	90.59	180.20	7440.61	3607.99 S	71.27 W	3607.99	0.86
10814.00	90.03	180.02	7440.12	3698.99 S	71.44 W	3698.99	0.65
10907.00	89.88	180.51	7440.19	3791.99 S	71.87 W	3791.99	0.55
11001.00	89.88	180.64	7440.39	3885.99 S	72.81 W	3885.99	0.14
11095.00	88.67	180.52	7441.58	3979.97 S	73.77 W	3979.97	1.29
11190.00	87.63	181.85	7444.65	4074.90 S	75.73 W	4074.90	1.78
11284.00	88.18	181.61	7448.08	4168.79 S	78.57 W	4168.79	0.64
11378.00	88.12	181.69	7451.12	4262.70 S	81.27 W	4262.70	0.11
11473.00	88.30	180.76	7454.08	4357.64 S	83.30 W	4357.64	1.00
11567.00	89.14	180.03	7456.18	4451.61 S	83.95 W	4451.61	1.18
11661.00	89.97	179.75	7456.91	4545.60 S	83.77 W	4545.60	0.93
11756.00	90.65	179.25	7456.40	4640.60 S	82.94 W	4640.60	0.89
11850.00	89.23	179.48	7456.50	4734.59 S	81.90 W	4734.59	1.53
11944.00	89.17	181.38	7457.81	4828.57 S	82.60 W	4828.57	2.02
12039.00	89.63	180.65	7458.81	4923.55 S	84.28 W	4923.55	0.91
12133.00	90.09	179.41	7459.04	5017.55 S	84.33 W	5017.55	1.41
12228.00	89.01	179.28	7459.78	5112.54 S	83.25 W	5112.54	1.15
12322.00	89.78	179.08	7460.77	5206.52 S	81.90 W	5206.52	0.85
12415.00	90.31	178.06	7460.70	5299.49 S	79.58 W	5299.49	1.24
12510.00	89.51	178.72	7460.85	5394.46 S	76.91 W	5394.46	1.09
12604.00	88.74	180.46	7462.29	5488.44 S	76.24 W	5488.44	2.02
12698.00	89.82	180.84	7463.47	5582.42 S	77.31 W	5582.42	1.22
12793.00	91.08	181.33	7462.72	5677.40 S	79.10 W	5677.40	1.42
12887.00	89.75	180.38	7462.04	5771.38 S	80.51 W	5771.38	1.74
12982.00	90.55	180.24	7461.79	5866.38 S	81.02 W	5866.38	0.85
13076.00	90.19	178.91	7461.19	5960.37 S	80.32 W	5960.37	1.47
13170.00	88.80	177.77	7462.01	6054.33 S	77.60 W	6054.33	1.91
13264.00	87.87	179.17	7464.75	6148.25 S	75.09 W	6148.25	1.79
13359.00	88.49	178.93	7467.76	6243.19 S	73.52 W	6243.19	0.70
13453.00	89.45	178.56	7469.45	6337.15 S	71.46 W	6337.15	1.09
13548.00	90.03	178.09	7469.88	6432.11 S	68.68 W	6432.11	0.79
13642.00	90.96	177.23	7469.07	6526.02 S	64.84 W	6526.02	1.35
13737.00	89.97	178.27	7468.30	6620.95 S	61.12 W	6620.95	1.51
13831.00	88.98	178.38	7469.16	6714.90 S	58.37 W	6714.90	1.06
13925.00	90.00	179.90	7470.00	6808.88 S	56.96 W	6808.88	1.95
14019.00	91.02	180.19	7469.16	6902.88 S	57.03 W	6902.88	1.13
14114.00	91.05	180.36	7467.45	6997.86 S	57.49 W	6997.86	0.18
14208.00	90.62	179.30	7466.08	7091.85 S	57.21 W	7091.85	1.22
14302.00	89.48	177.91	7465.99	7185.82 S	54.92 W	7185.82	1.91
14396.00	89.69	179.44	7466.67	7279.79 S	52.75 W	7279.79	1.64
14491.00	89.85	180.77	7467.06	7374.78 S	52.92 W	7374.78	1.41
14585.00	90.15	180.94	7467.06	7468.77 S	54.32 W	7468.77	0.37
14679.00	90.15	180.45	7466.81	7562.77 S	55.46 W	7562.77	0.52
14773.00	90.00	179.75	7466.69	7656.76 S	55.63 W	7656.76	0.76
14867.00	89.88	178.52	7466.79	7750.75 S	54.21 W	7750.75	1.31
14961.00	90.22	181.03	7466.70	7844.74 S	53.84 W	7844.74	2.69

15056.00	88.83	181.79	7467.49	7939.71 S	56.18 W	7939.71	1.67
15150.00	89.66	181.42	7468.73	8033.66 S	58.81 W	8033.66	0.97
15245.00	87.35	182.00	7471.21	8128.58 S	61.64 W	8128.58	2.51
15339.00	88.06	181.51	7474.97	8222.46 S	64.52 W	8222.46	0.92
15433.00	88.52	181.42	7477.78	8316.39 S	66.92 W	8316.39	0.50
15528.00	89.08	181.53	7479.77	8411.33 S	69.36 W	8411.33	0.60
15622.00	89.75	181.45	7480.73	8505.30 S	71.81 W	8505.30	0.72
15717.00	90.43	181.03	7480.58	8600.27 S	73.86 W	8600.27	0.84
15811.00	91.26	180.60	7479.19	8694.25 S	75.20 W	8694.25	0.99
15906.00	91.70	179.64	7476.74	8789.22 S	75.40 W	8789.22	1.11
16000.00	90.77	180.38	7474.71	8883.20 S	75.42 W	8883.20	1.26
16095.00	90.31	180.01	7473.82	8978.19 S	75.74 W	8978.19	0.62
16189.00	90.25	179.63	7473.36	9072.19 S	75.44 W	9072.19	0.41
16284.00	90.59	178.91	7472.66	9167.18 S	74.23 W	9167.18	0.84
16378.00	90.74	178.21	7471.57	9261.14 S	71.87 W	9261.14	0.76
16473.00	90.74	176.99	7470.34	9356.05 S	67.89 W	9356.05	1.28
16567.00	90.65	177.64	7469.20	9449.94 S	63.49 W	9449.94	0.70
16661.00	90.65	177.23	7468.14	9543.84 S	59.29 W	9543.84	0.44
16706.00	91.05	177.04	7467.47	9588.78 S	57.04 W	9588.78	0.98
16754.00	91.05	177.04	7466.59	9636.70 S	54.56 W	9636.71	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 180.00 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.51 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16754.00 FEET
IS 9636.86 FEET ALONG 180.32 DEGREES (TRUE)**

Survey Data is tied onto Gyro Data

Final survey is a projection to bit

Surveys have been IFR Corrected