

PCG-K Pressure Case Gamma



1 : 240

[illegible]

WELL INFORMATION

| | | | | | |
|---|------------------|-------------------|--|--|--|
| MWD Run Number | 100 | 200 | | | |
| Date run completed | 26-Nov-14 | 16-Dec-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) | 1,045.00 | 7,671.00 | | | |
| Log End Depth (MD, ft) | 7,671.00 | 16,568.00 | | | |
| Drill or Wipe | Drill | Drill | | | |
| Drill/Wipe Start Date and Time | 23-Nov-14 20:00 | 09-Dec-14 00:00 | | | |
| Drill/Wipe End Date and Time | 26-Nov-14 07:30 | 14-Dec-14 14:30 | | | |
| Min Inc (deg) @ Depth (MD, ft) | 0.58 @ 4,259.00 | 87.13 @ 11,661.00 | | | |
| Max Inc (deg) @ Depth (MD, ft) | 90.20 @ 7,671.00 | 92.90 @ 11,095.00 | | | |
| Bit TFA(in2) / Bit Type | 1.74 / PDC | 1.534 / PDC | | | |
| Flow Rate (gpm) | 575.00 | 285.00 | | | |
| Max AV (fpm) / CV (fpm) @ MWD | 520.0 / 400.0 | 314.0 / 314.0 | | | |
| Fluid Type | Polymer | Mineral Oil Bas | | | |
| Density (ppg) / Viscosity (spqt) | 9.60 / 48.00 | 9.30 / 54.00 | | | |
| Filtrate CL (ppm) | 600.00 | 27.62 | | | |
| pH / Fluid Loss (mptm) | N/A / N/A | N/A / N/A | | | |
| PV (cP) / YP (lbf2) | 20 / 13.00 | 22 / 11.00 | | | |
| % Solids / % Sand | 4.6 / 0.1 | 7 / 0.1 | | | |
| % Oil / Oil:Water Ratio | N/A / N/A | 93 / 56:33 | | | |
| 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 Temp (degF) / RPM | 175.16 / RPM | 210.00 / RPM | | | |

| | | | | | |
|-------------------------------|--------------|--------------|--|--|--|
| Max Tool Temp (degF) / Source | 175.40 / PCM | 242.28 / PCM | | | |
| Rm @ Max Tool Temp (degF) | N/A @ N/A | N/A @ N/A | | | |
| Lead MWD Engineer | Adam Sampson | 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 | 11145513 | 11145513 | | | |
| Date and Time Initialized | 21-Nov-14 19:20 | 08-Dec-14 14:12 | | | |
| Date and Time Read | 01-Jan-70 00:00 | 16-Dec-14 16:13 | | | |
| ECMB SW Version | N/A | N/A | | | |

Directional Sensor Information

| | | | | | |
|------------------------|----------|----------|--|--|--|
| Tool Type | PCDC | PCDC | | | |
| Distance From Bit (ft) | 46.00 | 48.00 | | | |
| Software Version | 6.21 | 6.33 | | | |
| Sub Serial Number | 11341333 | 12334774 | | | |
| Sonde Serial Number | 11297574 | 11638628 | | | |
| Sensor ID Number | N/A | N/A | | | |
| Toolface Offset (deg) | 42.20 | 148.71 | | | |

Gamma Ray Sensor Information

| | | | | | |
|------------------------------|----------|----------|--|--|--|
| Tool Type | PCG | PCG | | | |
| Distance From Bit (ft) | 48.91 | 51.02 | | | |
| Recorded Sample Period (sec) | 10 | 10 | | | |
| Software Version | 8.15 | 8.15 | | | |
| Sub Serial Number | 11341333 | 12334774 | | | |
| Insert/Sonde Serial Number | 11579829 | 11293322 | | | |

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. All data presented is recorded data unless otherwise specified
4. 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

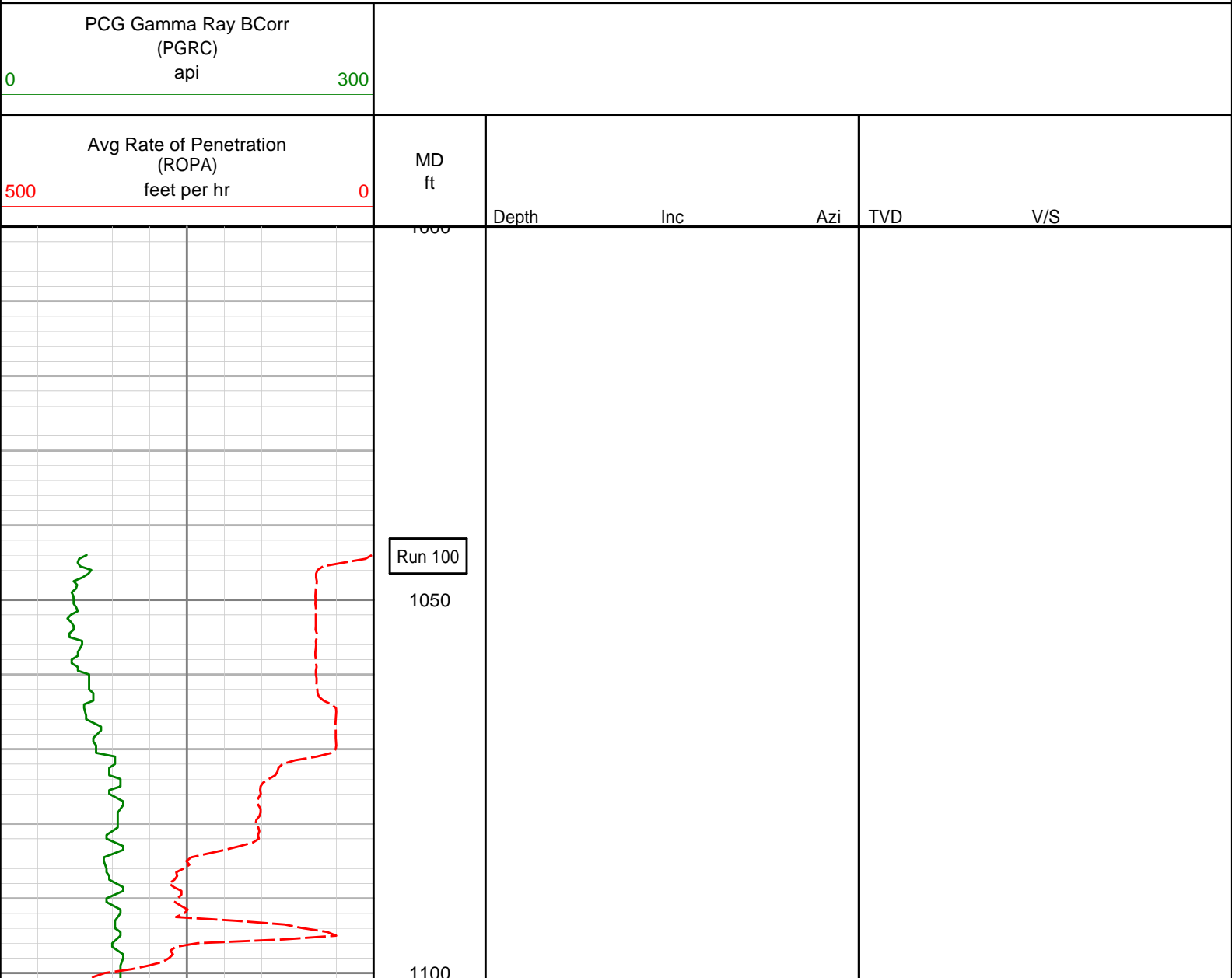
ROPA (Average Rate of Penetration):
Interval Resolution: 0.5 ft
Interval Distance: 1.2 ft
Gap Fill : 3.0 ft
5. INSITE version 8.0.20
6. Gap in data due to restarting the computers.

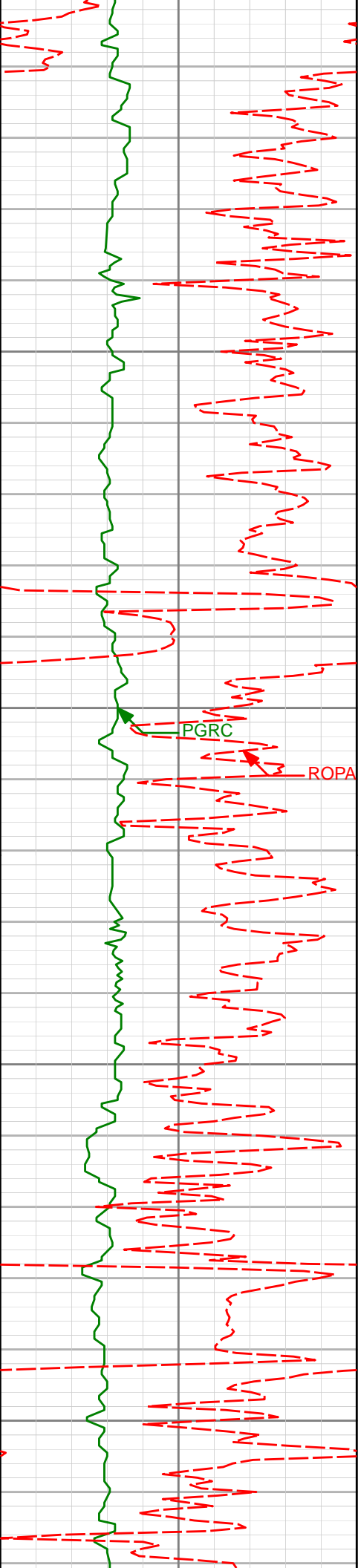
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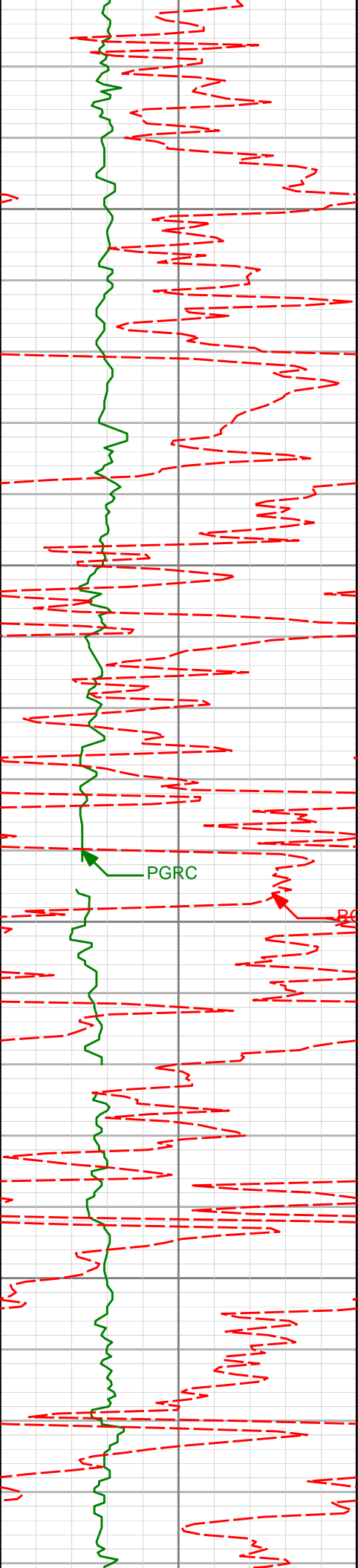
HALLIBURTON

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





| | | | | | |
|-------|-------|---------|----------|----------|---------|
| 1109' | 0.94° | 354.98° | 1108.92' | -11.95' | |
| 1150 | | | | | |
| 1200 | 1201' | 0.94° | 3.38° | 1200.91' | -13.46' |
| 1250 | | | | | |
| 1294' | 2.73° | 91.83° | 1293.87' | -14.15' | |
| 1300 | | | | | |



1350

1386'

3.91°

104.01°

1385.71'

-13.32'

1400

PGRC

BOPA

1450

1478'

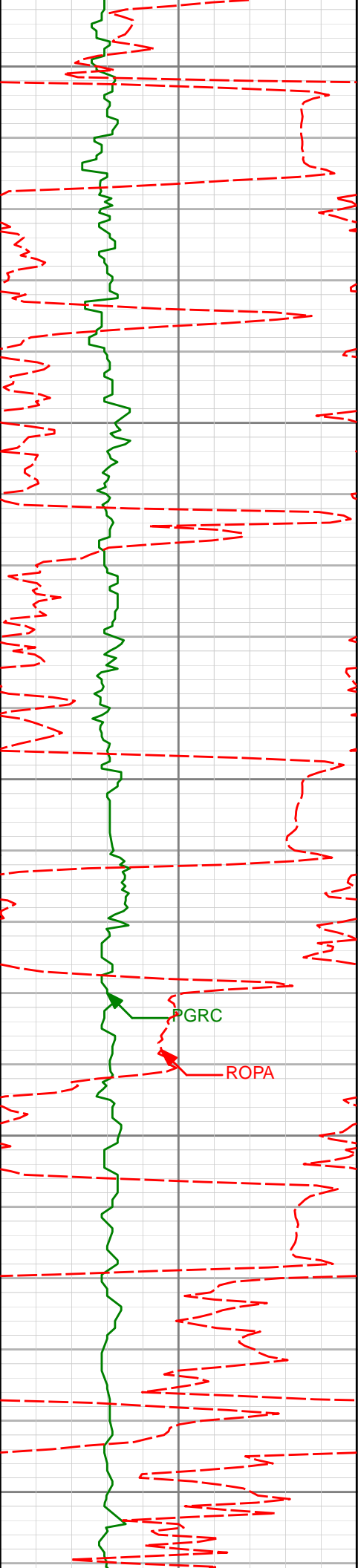
3.39°

114.19°

1477.53'

-11.45'

1500



1550

1570'

2.97°

133.41°

1569.39'

-8.69'

1600

1650

1663'

5.01°

134.98°

1662.16'

-4.17'

PGRC

ROPA

1700

1750

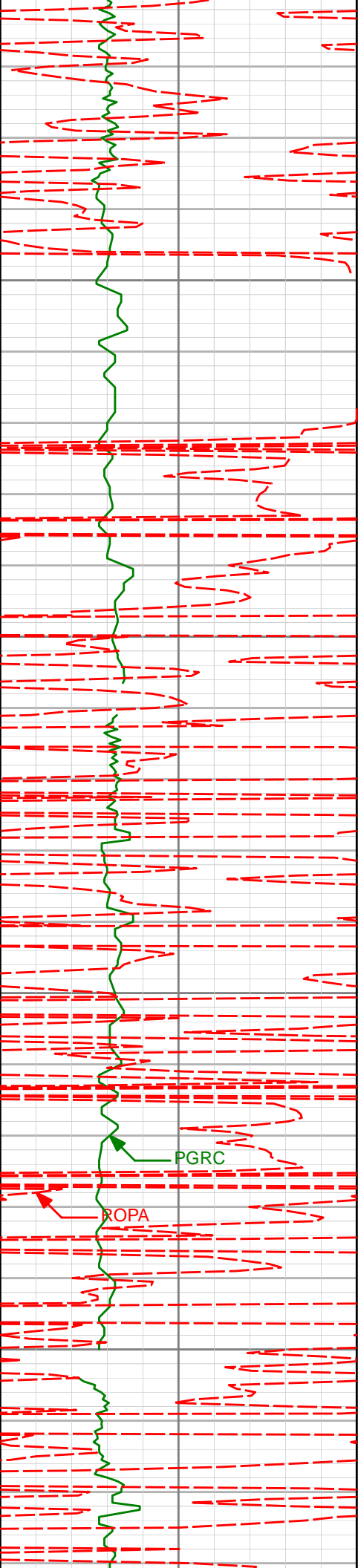
1756'

7.15°

126.34°

1754.63'

2.14'



1800

1850

1900

1950

1864'

8.39°

123.84°

1861.64'

10.51'

PGRC

ROPA

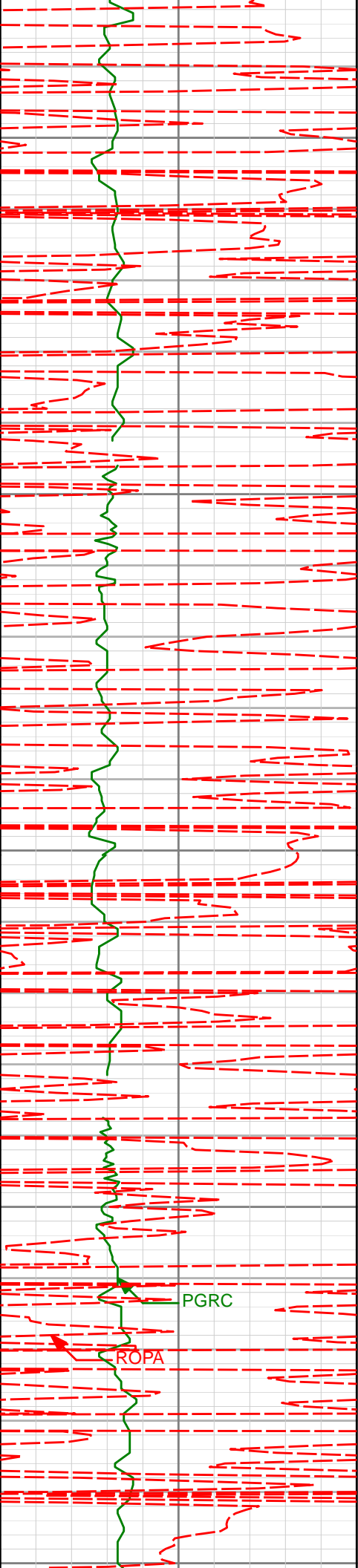
1957'

10.08°

121.05°

1953.43'

18.48'



2000

2050

2100

2150

2200

2049'

12.28°

114.60°

2043.68'

26.71'

2142'

14.24°

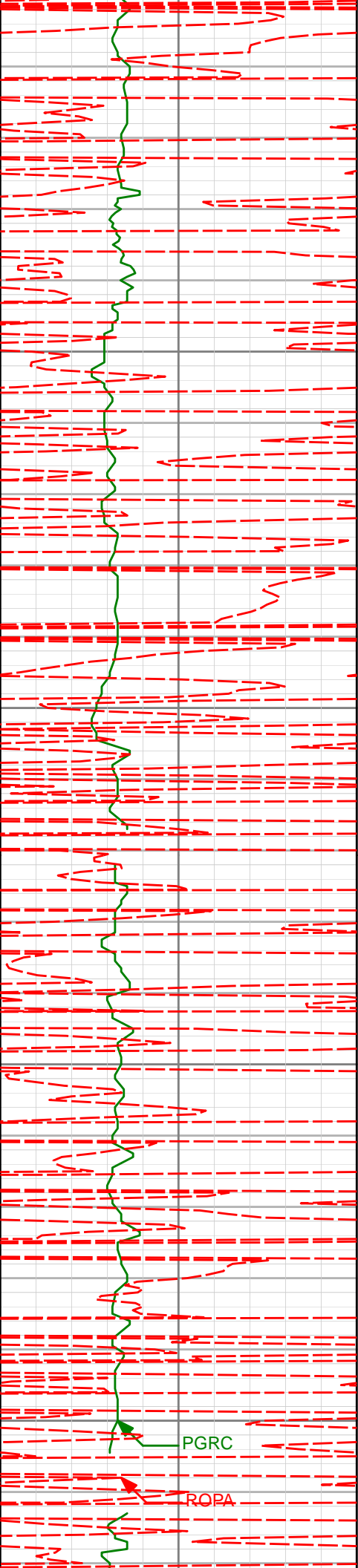
113.16°

2134.20'

35.33'

PGRC

ROPA



2200

2234'

16.43°

106.96°

2222.92'

43.57'

2250

2300

2326'

17.97°

106.76°

2310.80'

51.46'

2350

2400

PGRC

ROPA

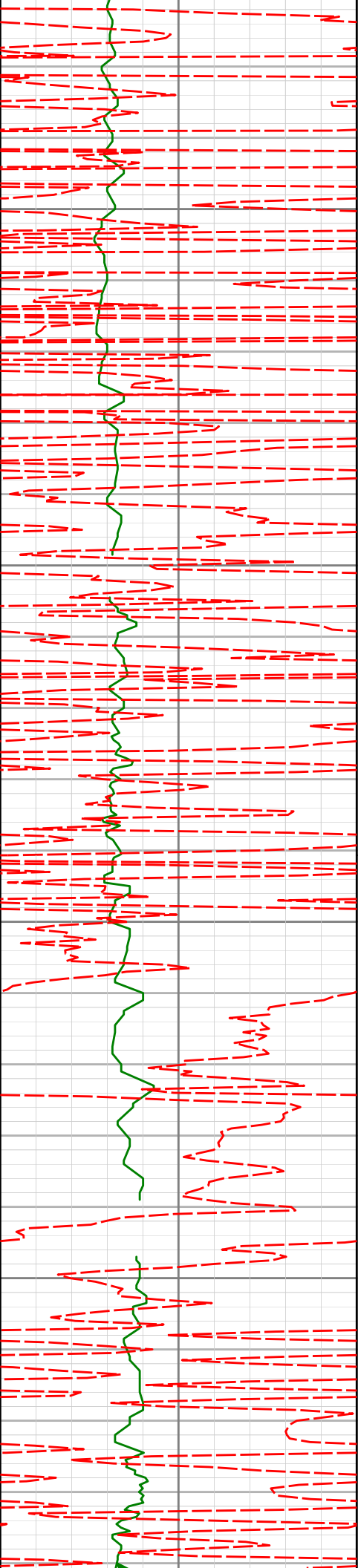
2419'

16.86°

104.90°

2399.54'

59.07'



2450

2500

2550

2600

2511'

15.69°

102.70°

2487.85'

65.23'

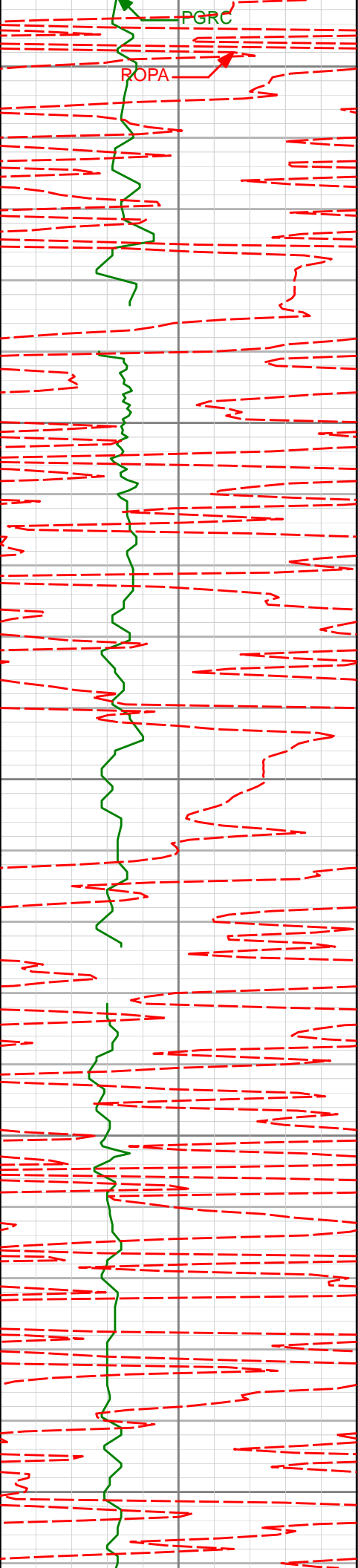
2602'

16.76°

100.71°

2575.23'

70.38'



2650

2695'

16.35°

101.97°

2664.37'

75.58'

2700

2750

2787'

17.31°

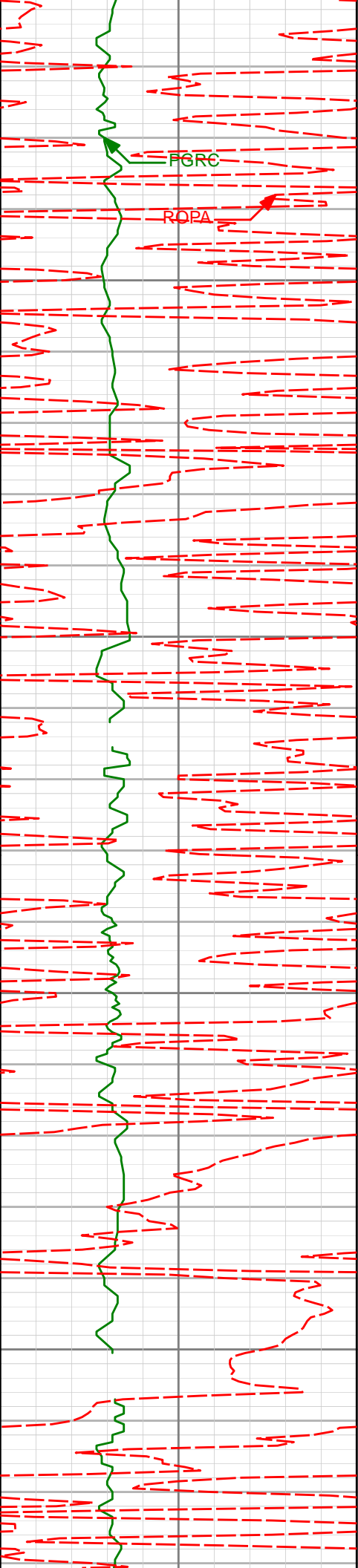
107.28°

2752.44'

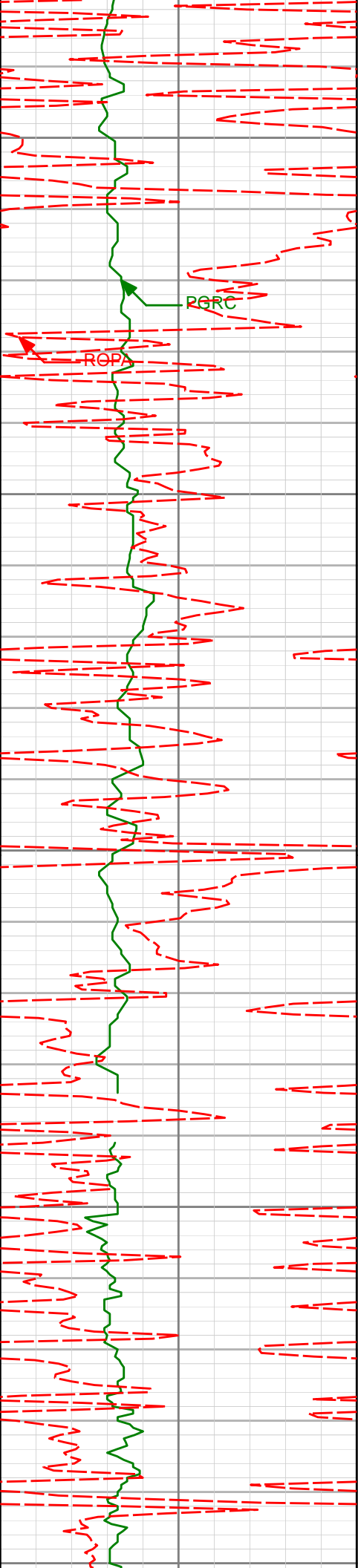
82.33'

2800

2850



| | | | | |
|-------|--------|---------|----------|---------|
| 2880' | 16.68° | 107.19° | 2841.38' | 90.39' |
| 2900 | | | | |
| 2950 | | | | |
| 2972' | 15.49° | 106.46° | 2929.77' | 97.77' |
| 3000 | | | | |
| 3050 | | | | |
| 3065' | 16.89° | 108.17° | 3019.08' | 105.50' |



3100

RGR

ROP

3150

3156'

15.44°

108.19°

3106.48'

113.41'

3200

3250

3248'

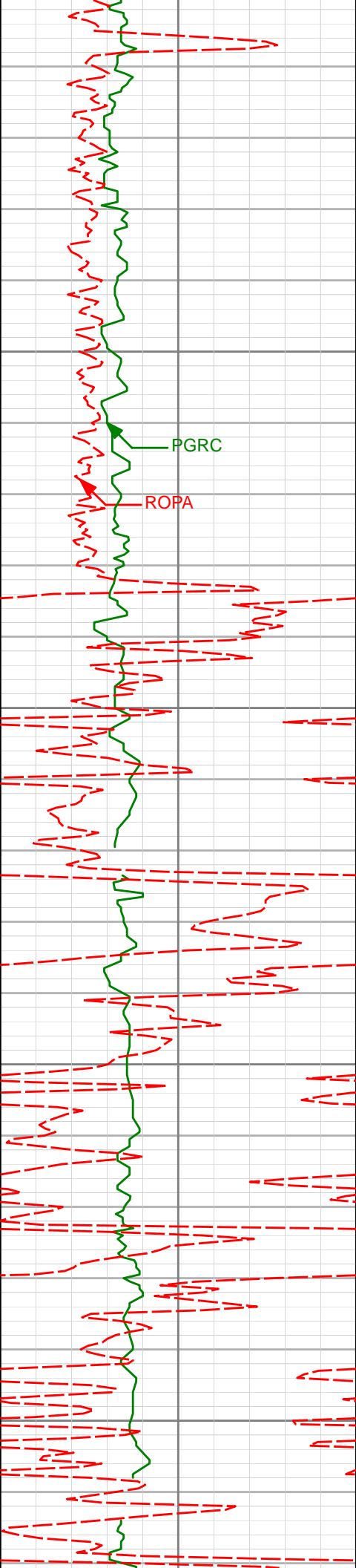
14.54°

106.89°

3195.35'

120.59'

3300



3340'

3350

3400

3432'

3450

3500

13.70°

105.22°

3284.57'

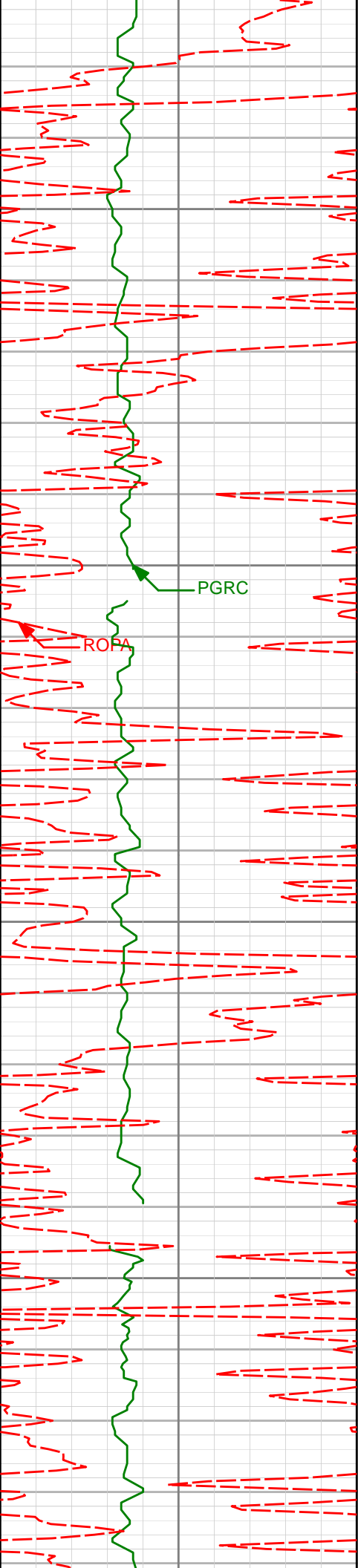
126.80'

11.49°

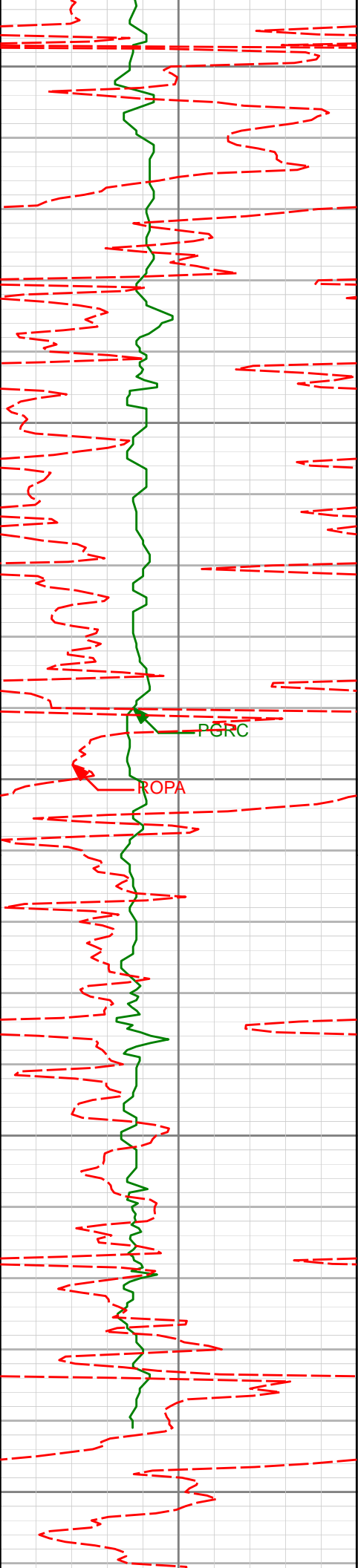
104.13°

3374.35'

131.90'



| | | | | |
|-------|-------|---------|----------|---------|
| 3524' | 9.04° | 101.03° | 3464.87' | 135.52' |
| 3550 | | | | |
| 3600 | | | | |
| 3616' | 7.65° | 101.48° | 3555.90' | 138.12' |
| 3650 | | | | |
| 3700 | | | | |
| 3708' | 7.19° | 101.78° | 3647.13' | 140.52' |



3750

3800

3850

3900

3950

3799'

5.57°

111.83°

3737.56'

143.32'

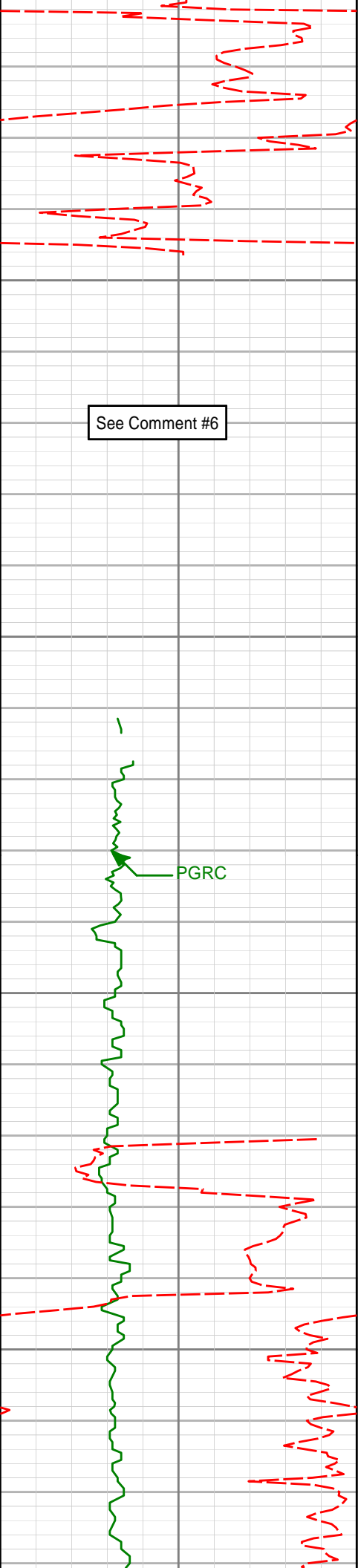
3891'

5.01°

110.03°

3829.17'

146.36'



4000

4050

4100

4150

3983'

3.24°

115.07°

3920.93'

148.84'

4075'

2.96°

105.08°

4012.79'

150.55'

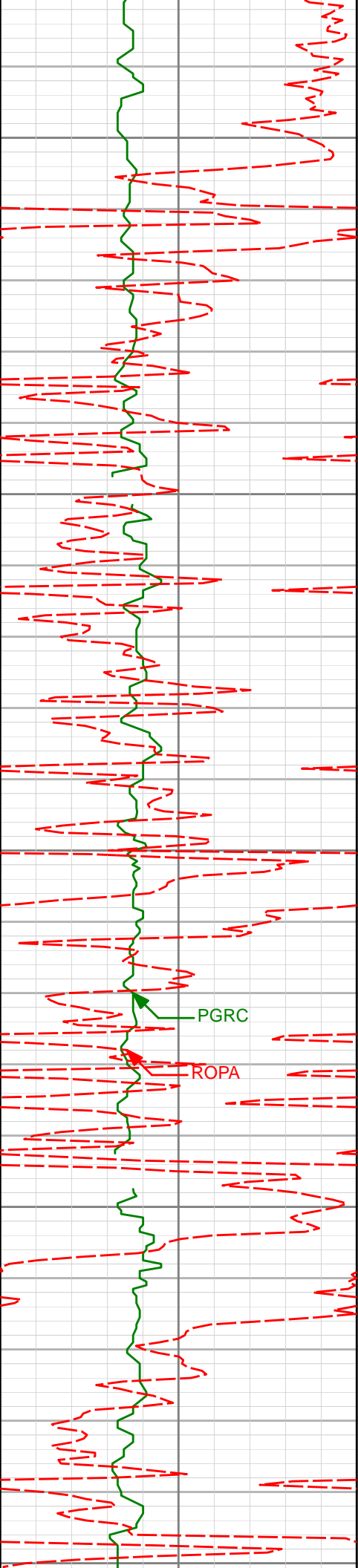
4167'

0.72°

109.50°

4104.74'

151.37'



4200

4250

4300

4350

4400

4259'

0.58°

93.61°

4196.73'

151.59'

PGRC

ROPA

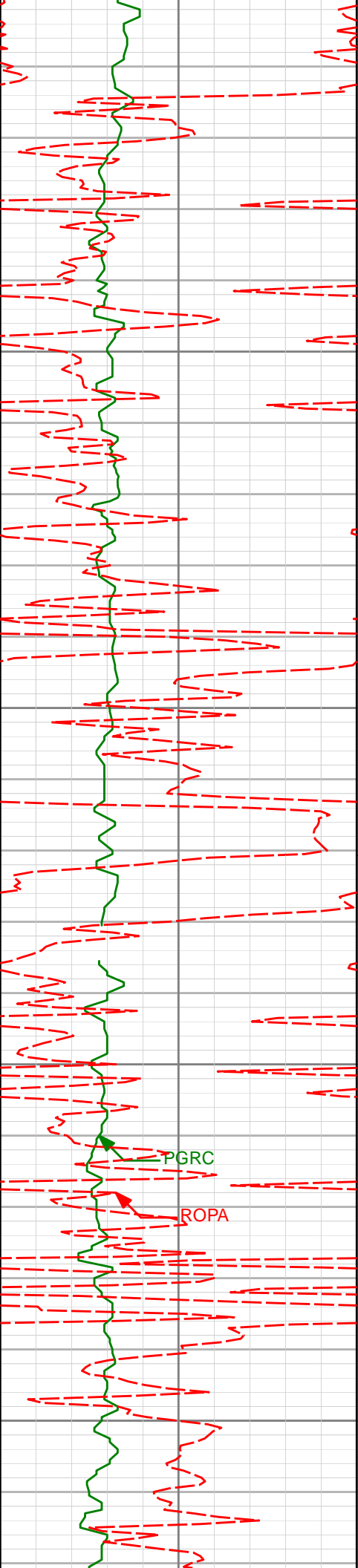
4353'

0.65°

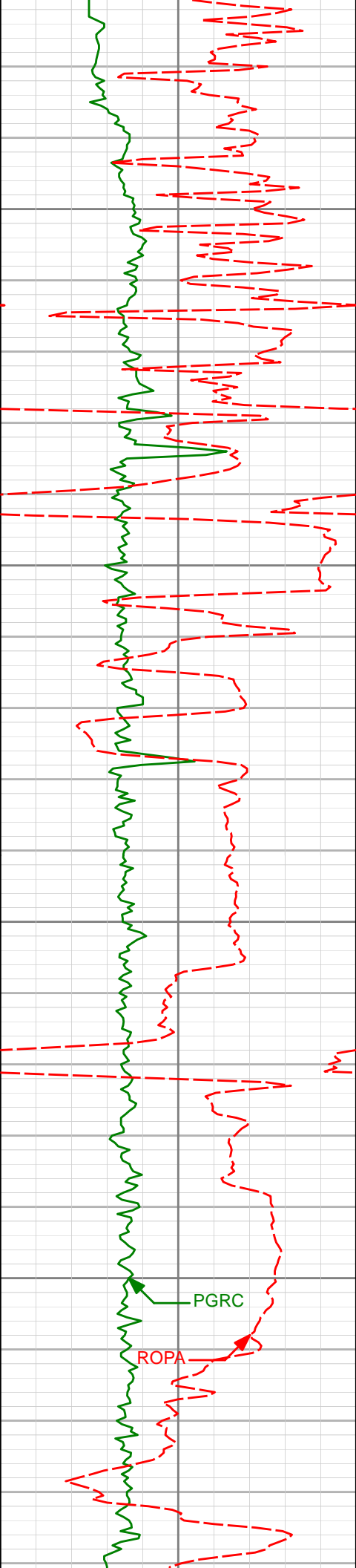
29.58°

4290.73'

151.15'



| | | | | | |
|------|-------|-------|---------|----------|---------|
| 4450 | 4447' | 1.06° | 21.28° | 4384.72' | 149.88' |
| 4500 | | | | | |
| 4550 | 4541' | 1.23° | 346.86° | 4478.70' | 148.09' |
| 4600 | | | | | |



4635'

1.38°

354.64°

4572.68'

145.98'

4650

4700

4730'

1.18°

335.47°

4667.65'

143.95'

4750

4800

PGRC

ROPA

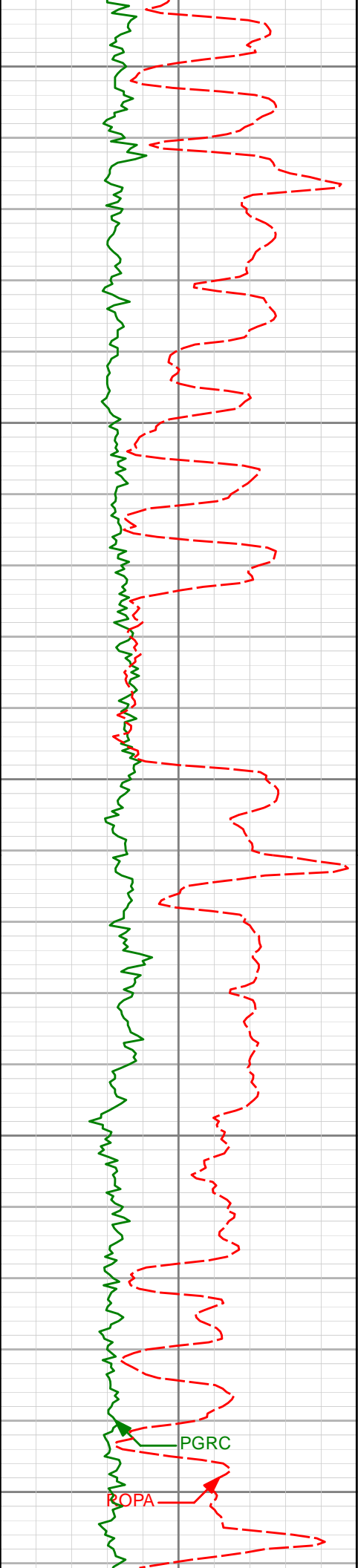
4825'

1.17°

312.68°

4762.63'

142.40'



4850

4900

4950

5000

5050

4919'

2.20°

303.48°

4856.59'

140.76'

5014'

2.35°

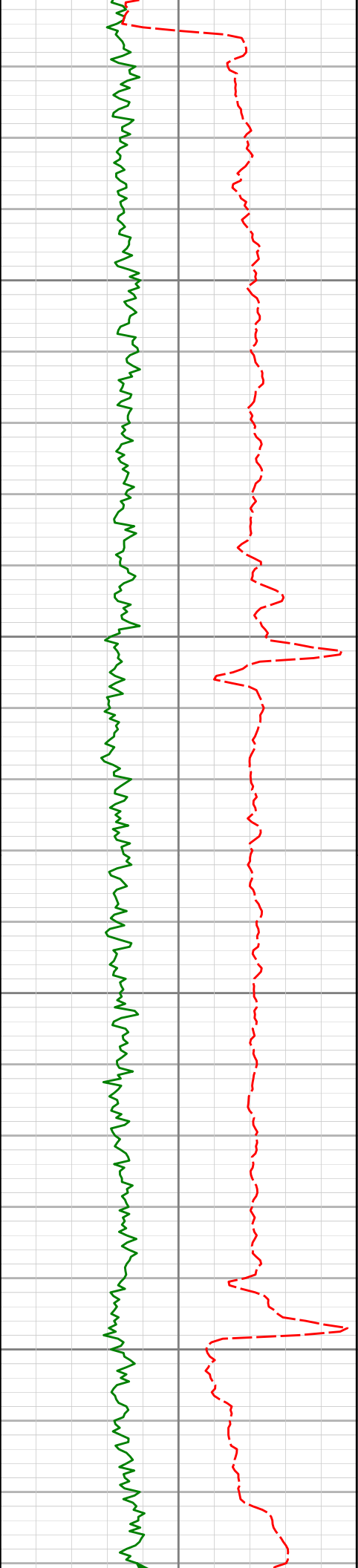
311.00°

4951.52'

138.47'

PGRC

ROPA



5100

5150

5200

5250

5108'

2.38°

312.51°

5045.44'

135.89'

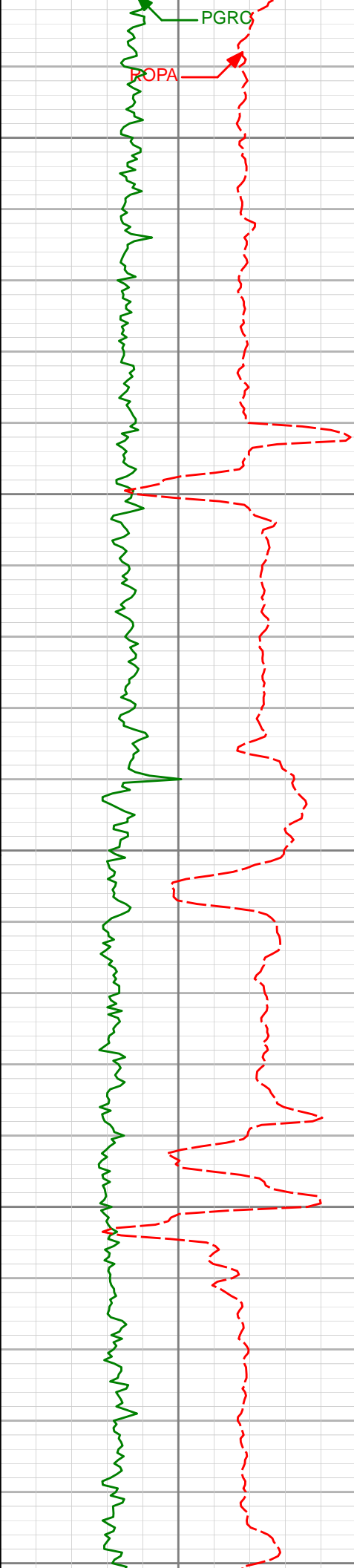
5203'

2.32°

308.62°

5140.36'

133.36'



5300

5350

5400

5450

5500

5297'

5391'

2.31°

2.01°

304.60°

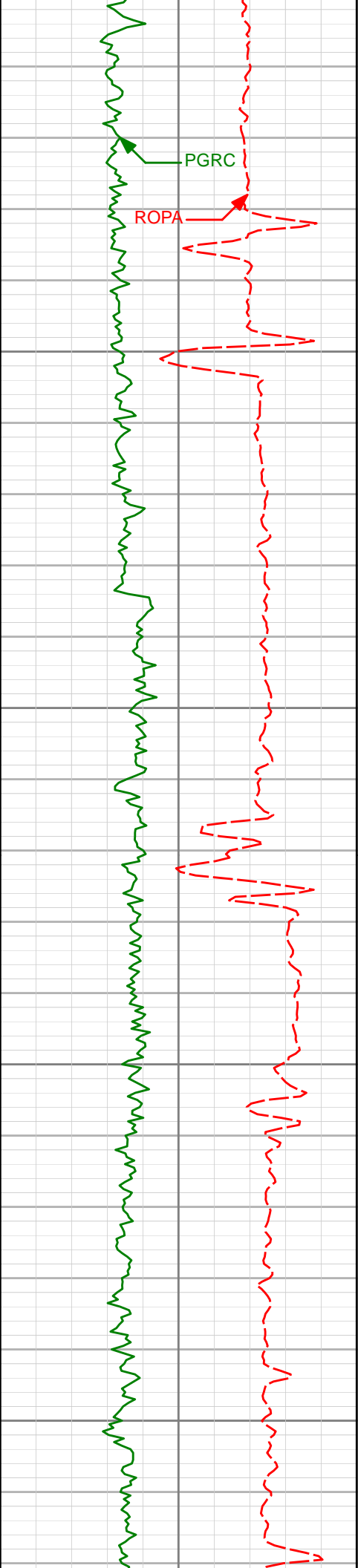
316.84°

5234.28'

5328.22'

131.09'

128.81'



5550

5550

5600

5650

5700

5580'

5674'

1.50°

1.94°

292.57°

301.62°

5517.13'

5611.09'

125.45'

124.14'



5750

5800

5850

5900

5769'

2.11°

303.56°

5706.03'

122.33'

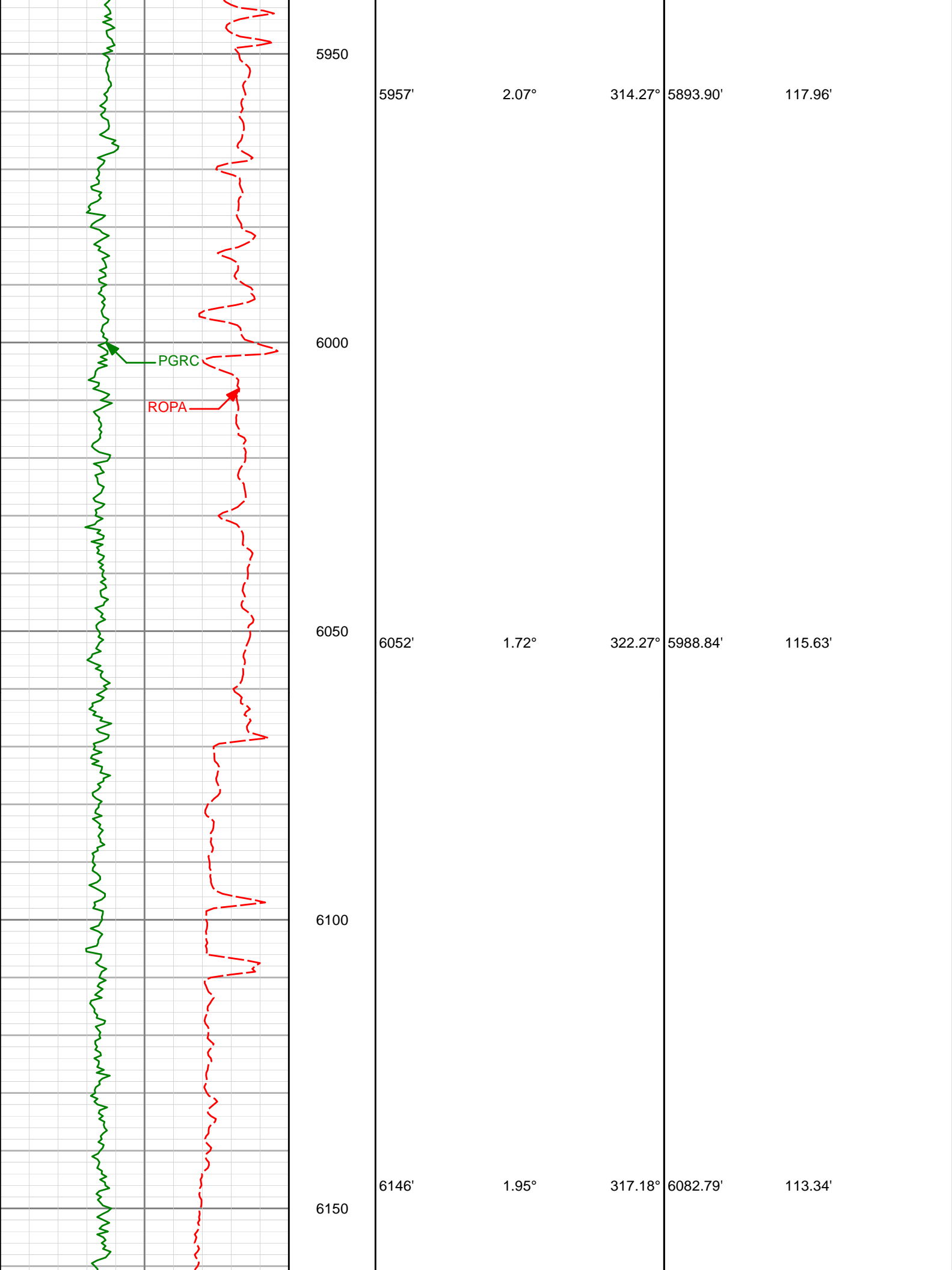
5863'

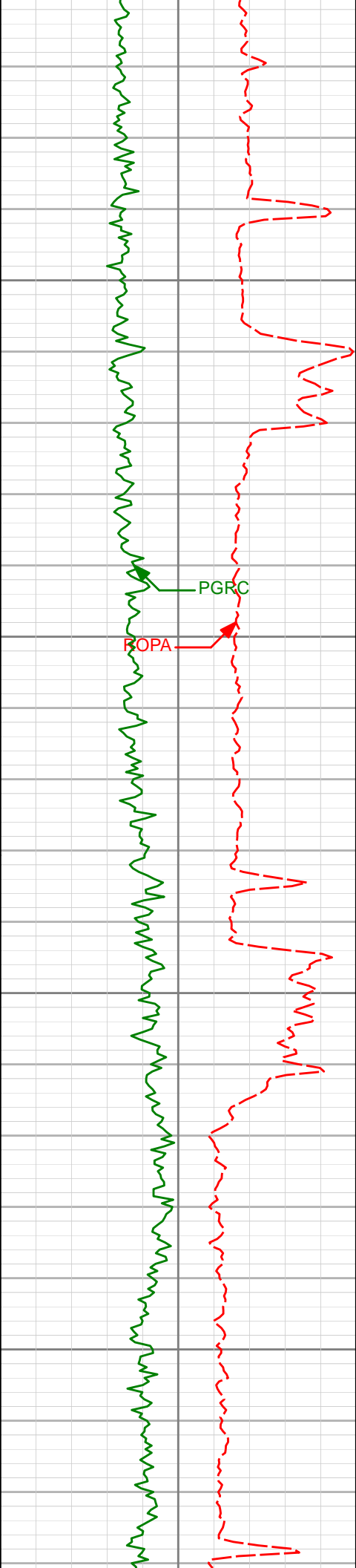
2.21°

308.02°

5799.96'

120.26'





6200

6241'

1.61°

289.59°

6177.75'

111.71'

6250

6300

6335'

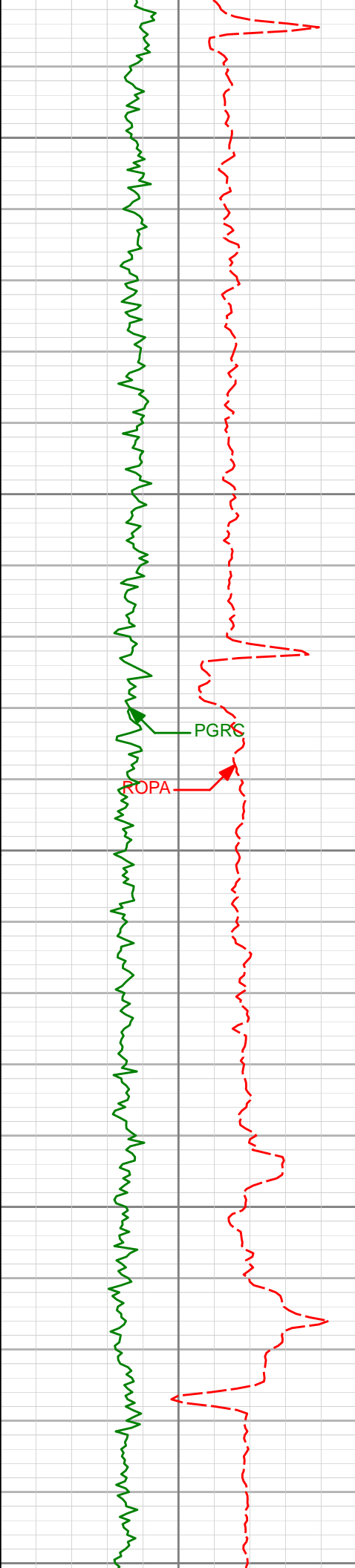
1.67°

202.51°

6271.72'

112.53'

6350



6400

6429'

1.62°

196.83°

6365.69'

115.07'

6450

6500

6523'

1.97°

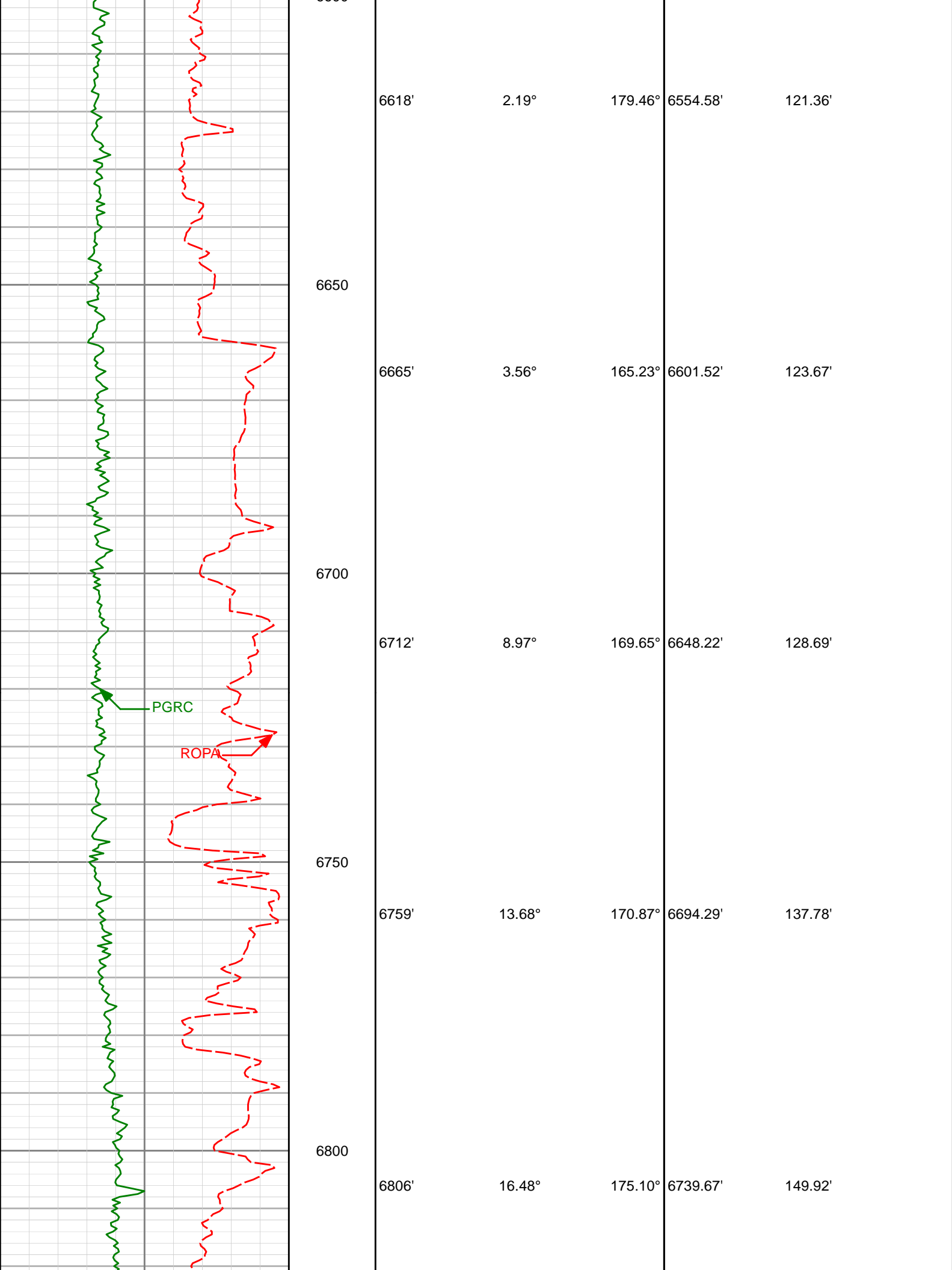
189.64°

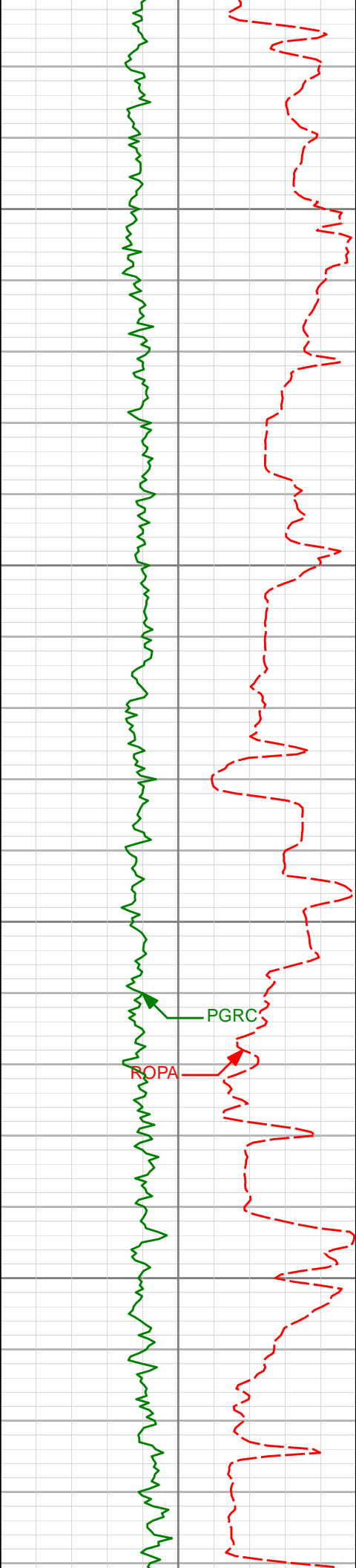
6459.64'

117.93'

6550

6600





6850

6853'

19.65°

175.91°

6784.35'

164.44'

6900

6901'

21.90°

177.56°

6829.22'

181.44'

6950

6948'

25.64°

180.20°

6872.23'

200.37'

7000

6995'

29.95°

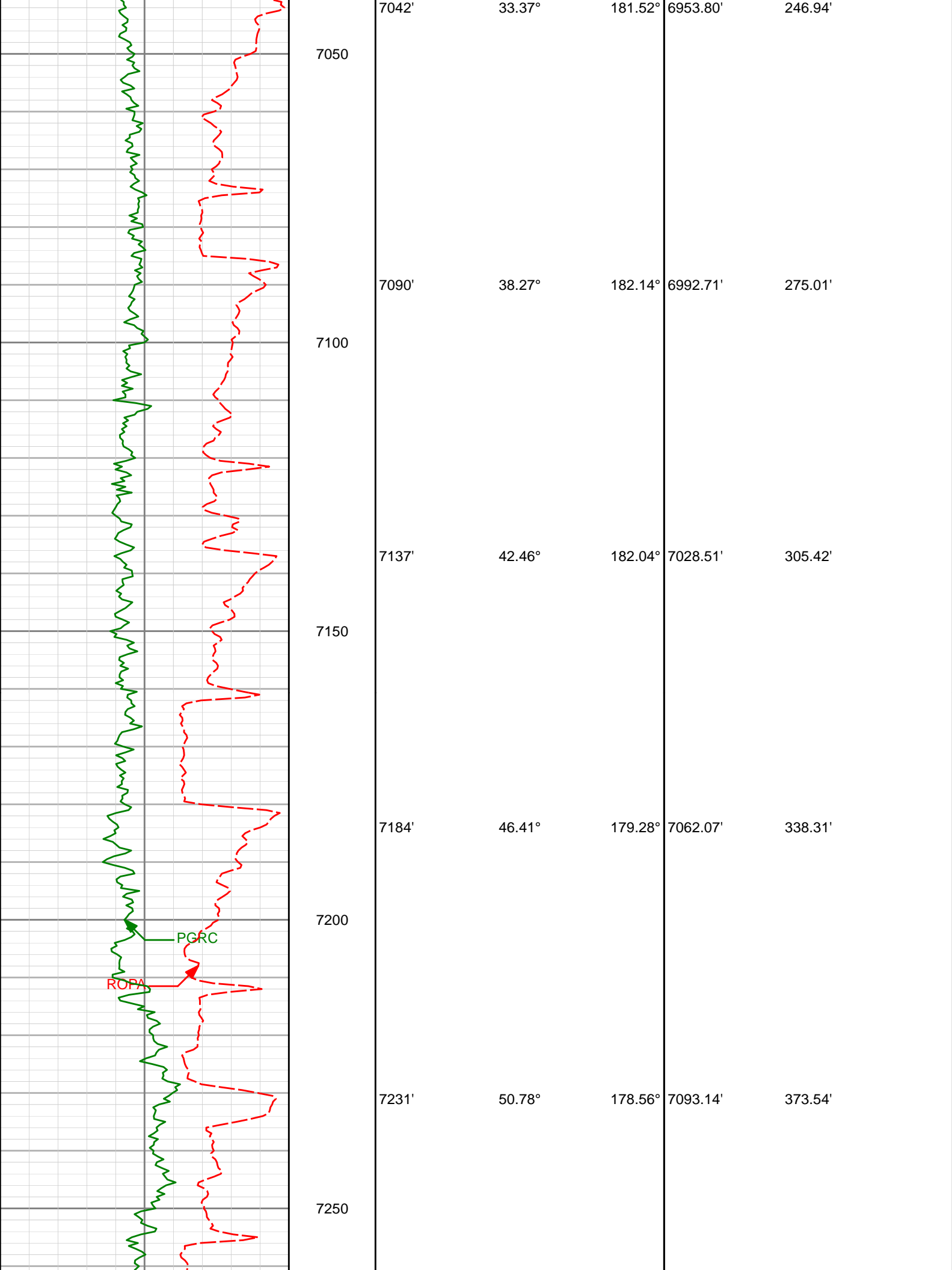
181.65°

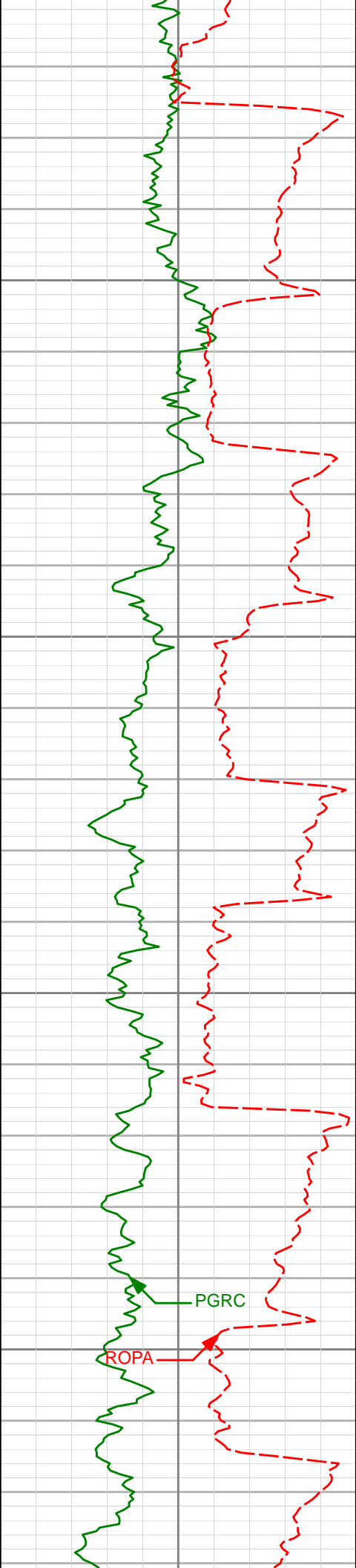
6913.80'

222.28'

PGRC

ROPA





7300

7350

7400

7450

7279'

56.02°

180.31°

7121.75'

412.06'

7326'

60.32°

180.87°

7146.54'

451.98'

7373'

63.24°

180.67°

7168.76'

493.39'

7420'

65.53°

180.38°

7189.08'

535.76'

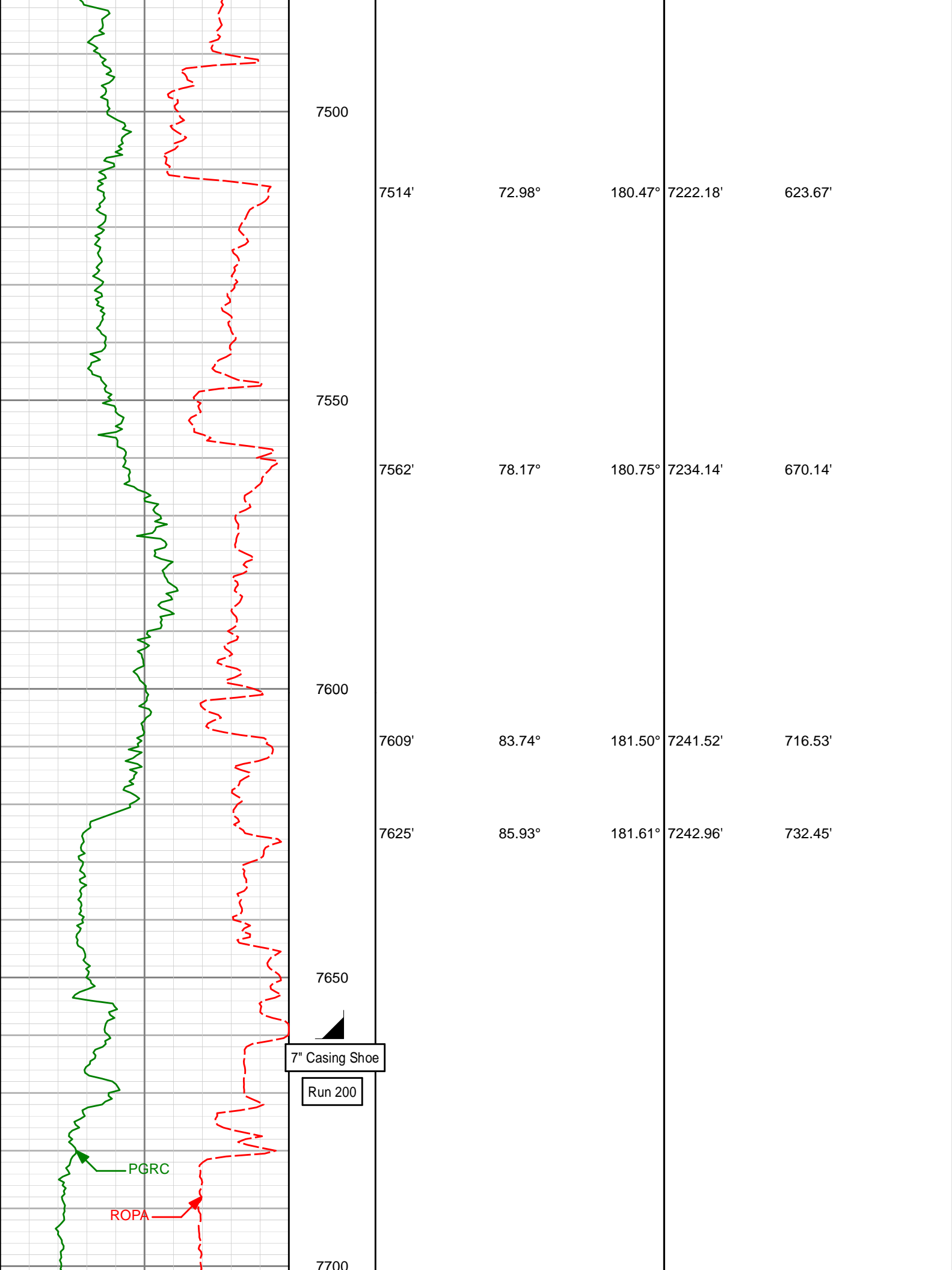
7467'

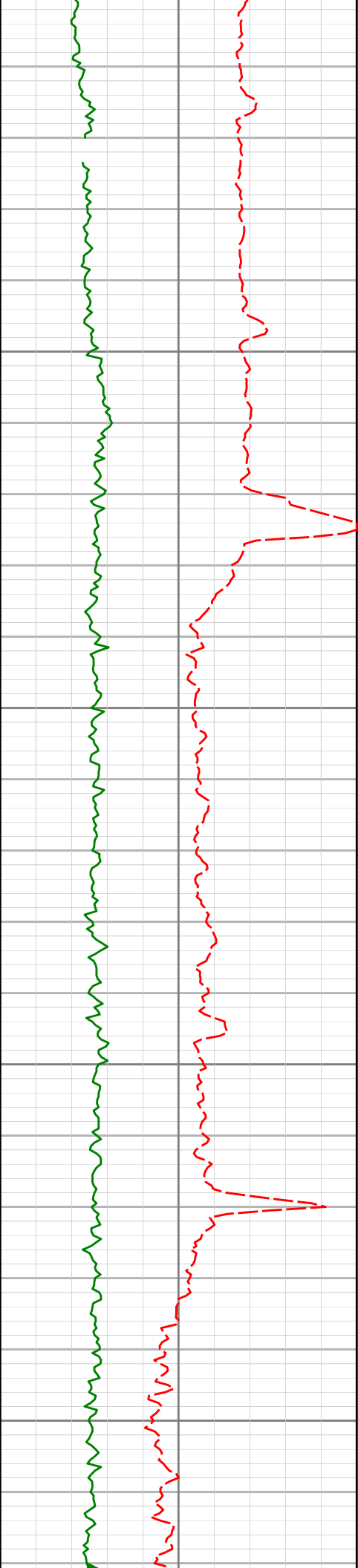
69.47°

180.06°

7207.06'

579.18'





7750
7800
7850
7900

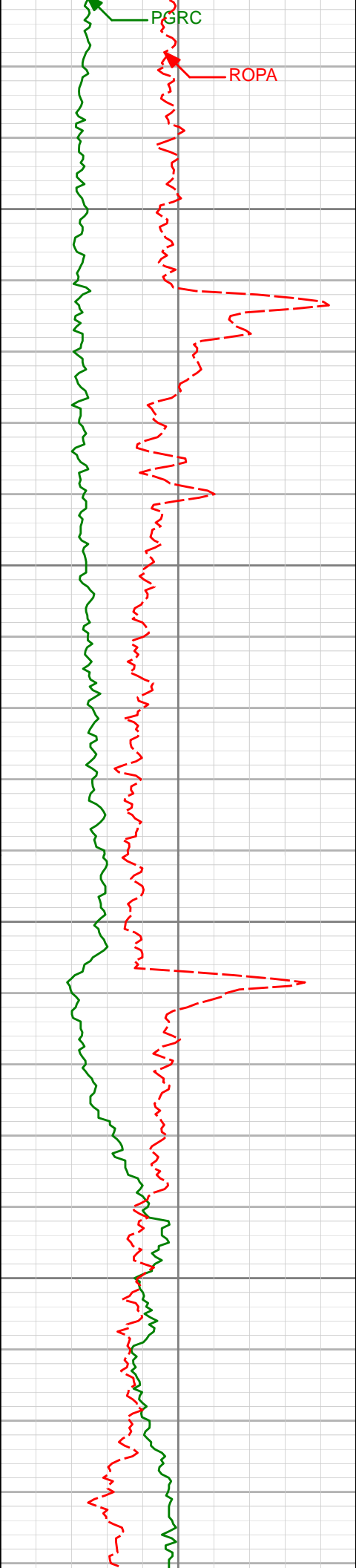
7727'
7822'
7916'

89.91°
89.63°
89.85°

181.31°
181.07°
180.57°

7246.67'
7247.05'
7247.47'

834.33'
929.31'
1023.30'



7950

8000

8050

8100

8010'

90.77°

180.52°

7246.96'

1117.29'

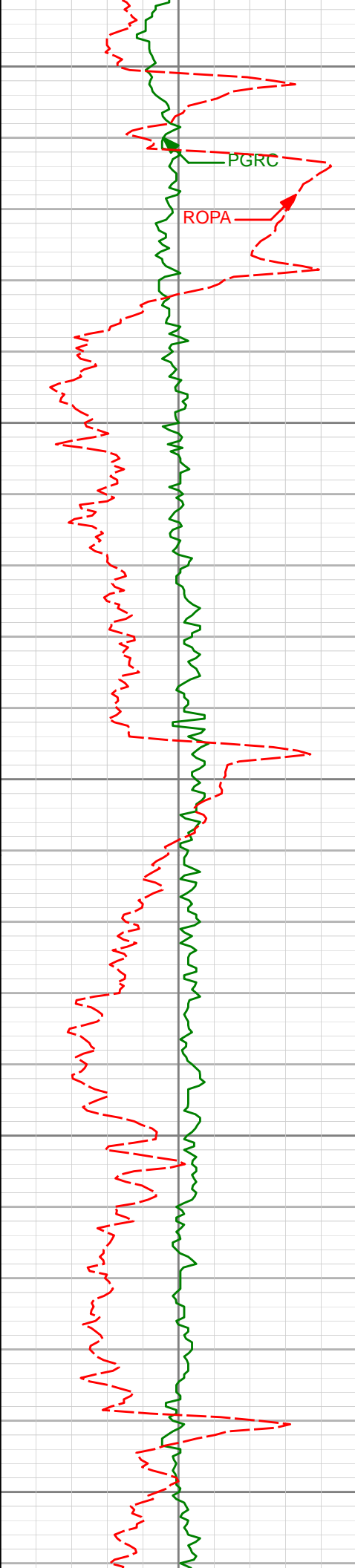
8104'

91.60°

180.39°

7245.02'

1211.27'



8150

PGRC

ROPA

8200

8250

8300

8350

8198'

90.12°

179.31°

7243.61'

1305.25'

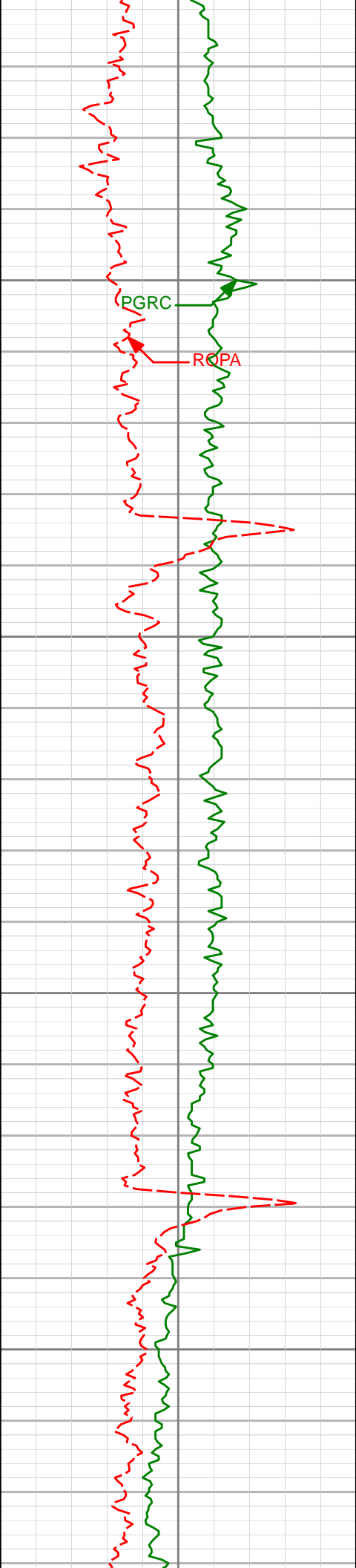
8293'

90.46°

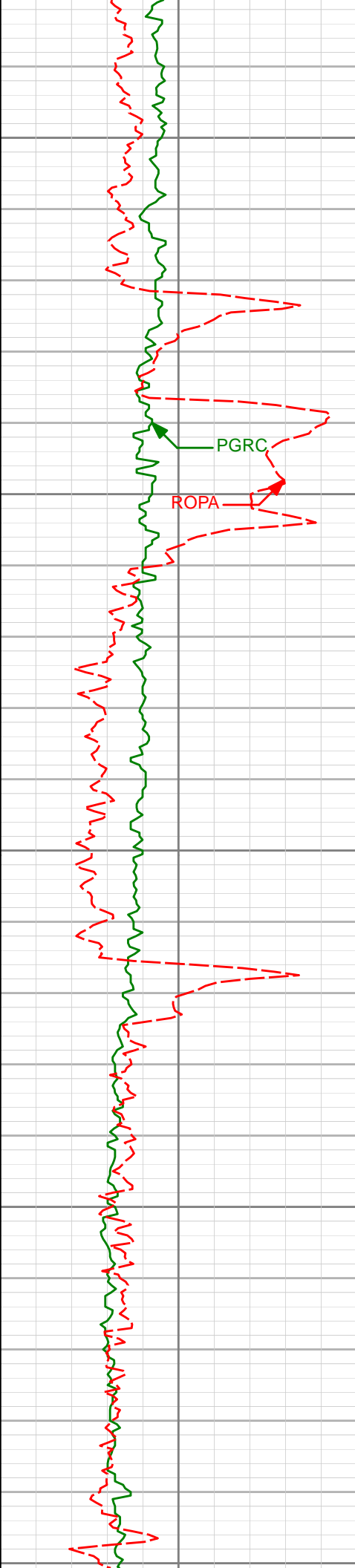
179.42°

7243.13'

1400.25'



| | | | | |
|-------|--------|---------|----------|----------|
| 8386' | 90.62° | 179.14° | 7242.25' | 1493.24' |
| 8400 | | | | |
| 8450 | | | | |
| 8480' | 90.34° | 178.50° | 7241.46' | 1587.21' |
| 8500 | | | | |
| 8550 | | | | |
| 8575' | 90.43° | 177.94° | 7240.83' | 1682.16' |



8600

8650

8700

8750

8800

8669'

90.12°

179.63°

7240.38'

1776.14'

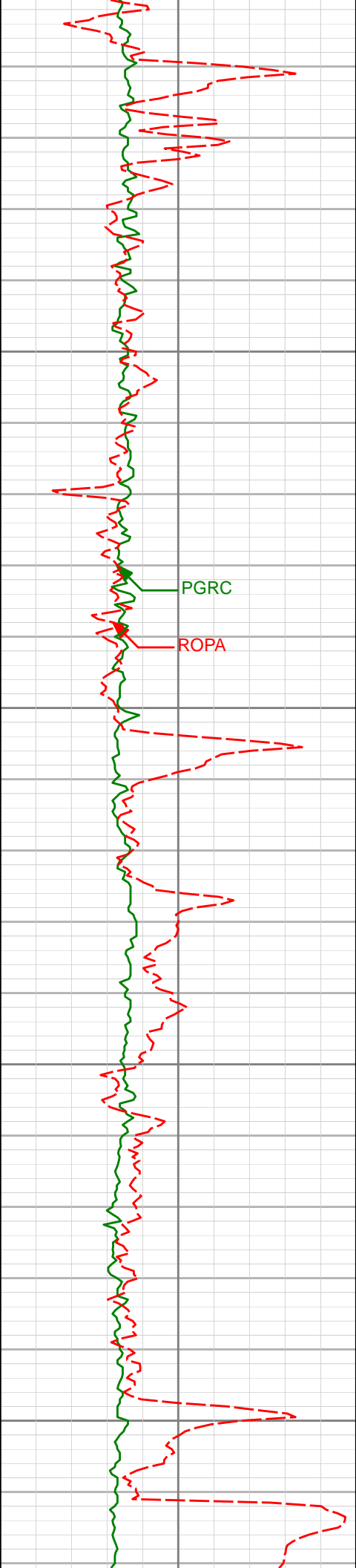
8763'

89.97°

179.42°

7240.30'

1870.13'



8850

8858'

90.34°

179.53°

7240.04'

1965.13'

8900

8950

8951'

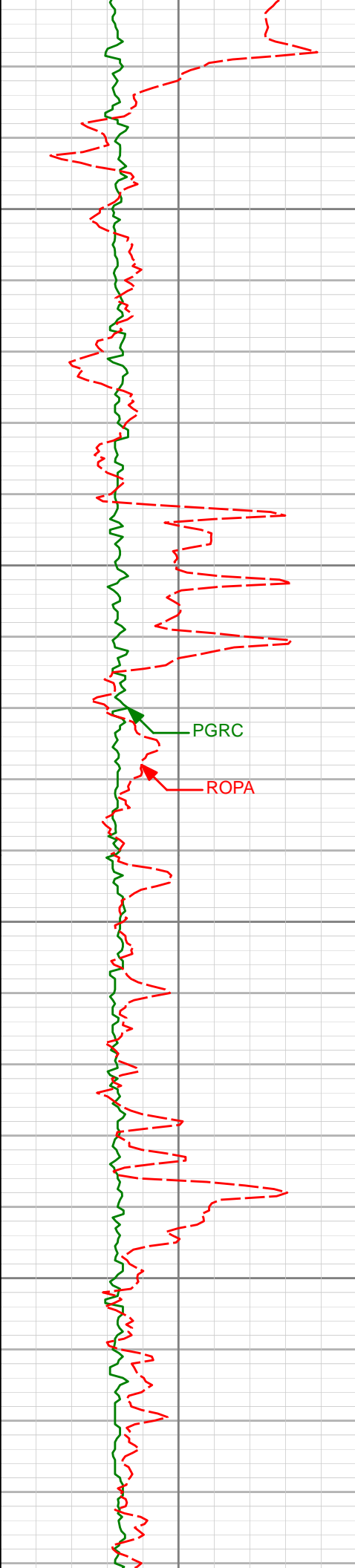
90.18°

178.95°

7239.62'

2058.12'

9000



9050

9100

9150

9200

9046'

89.51°

180.32°

7239.88'

2153.12'

9140'

89.08°

179.90°

7241.04'

2247.11'

9234'

88.86°

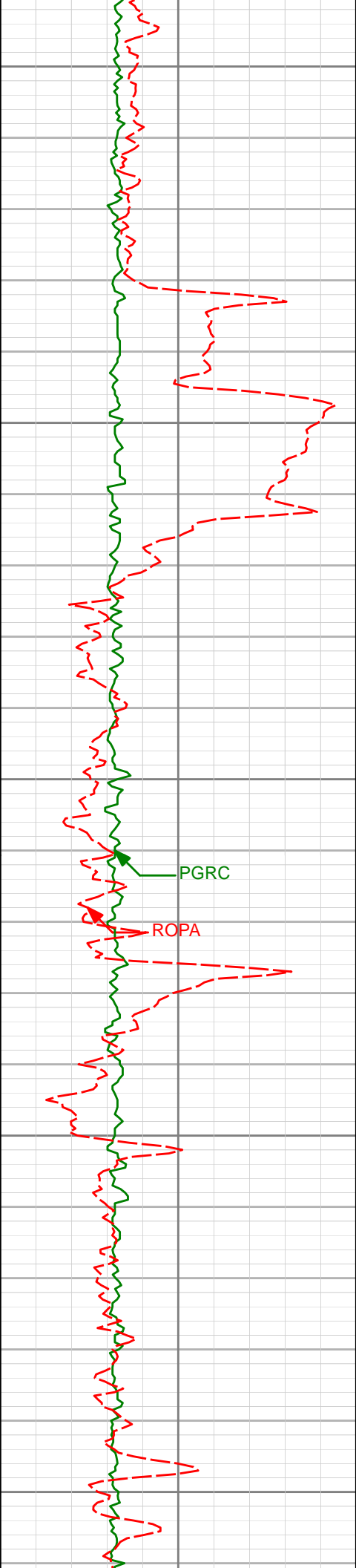
179.03°

7242.73'

2341.09'

PGRC

ROPA



9250

9300

9350

9400

9450

9328'

89.01°

180.41°

7244.47'

2435.07'

PGRC

ROPA

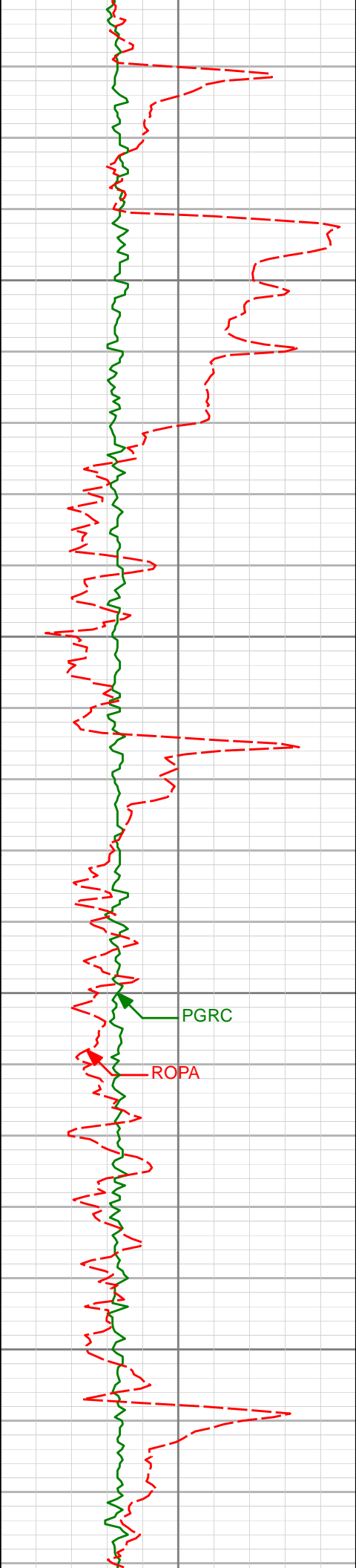
9422'

88.80°

178.96°

7246.27'

2529.05'



9500

9550

9600

9650

9516'

89.54°

181.73°

7247.63'

2623.03'

9611'

89.35°

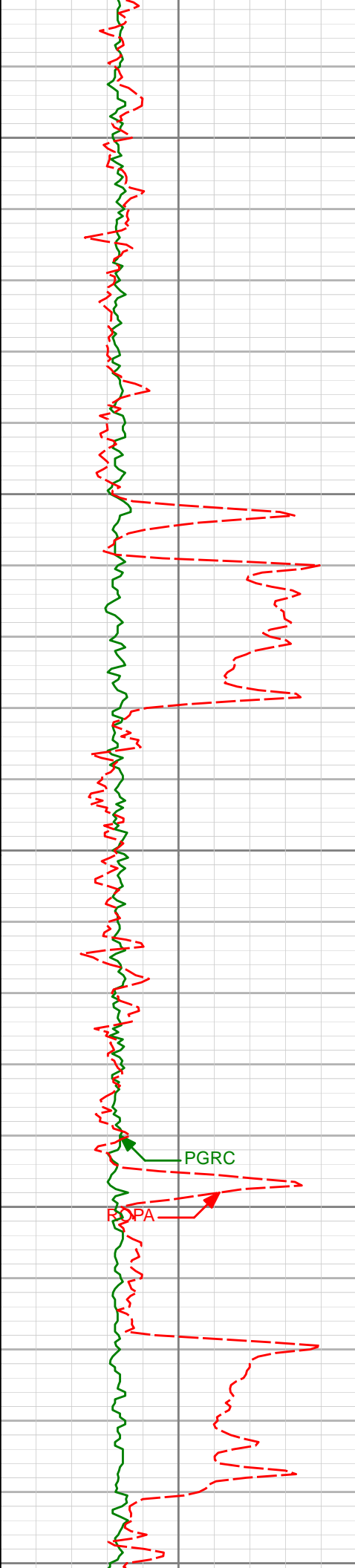
181.97°

7248.55'

2717.97'

PGRC

ROPA



9700

9705'

88.92°

181.55°

7249.97'

2811.92'

9750

9800

9800'

89.48°

180.55°

7251.30'

2906.89'

9850

9900

9893'

90.52°

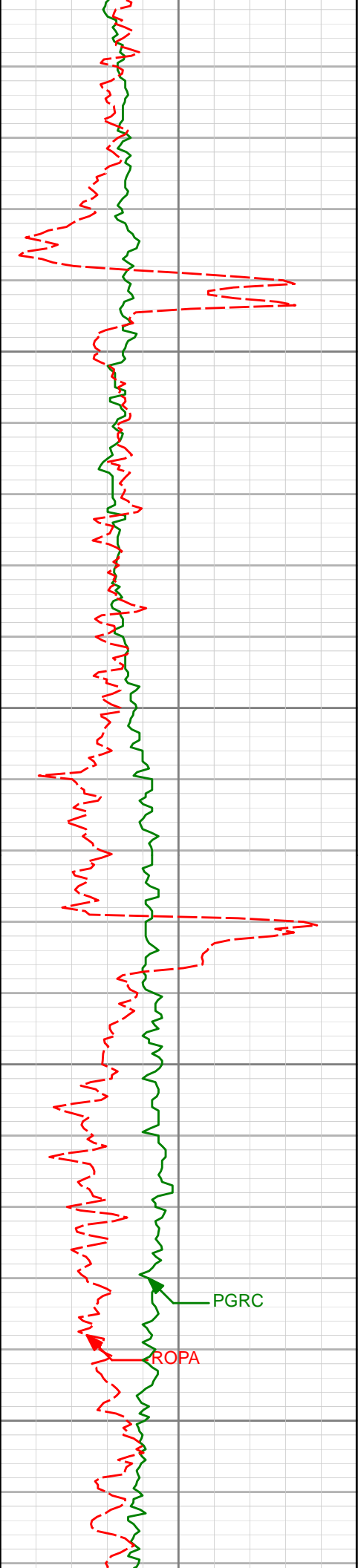
181.64°

7251.30'

2999.87'

PGRC

BOPA



9950

10000

10050

10100

9985'

90.40°

181.31°

7250.56'

3091.84'

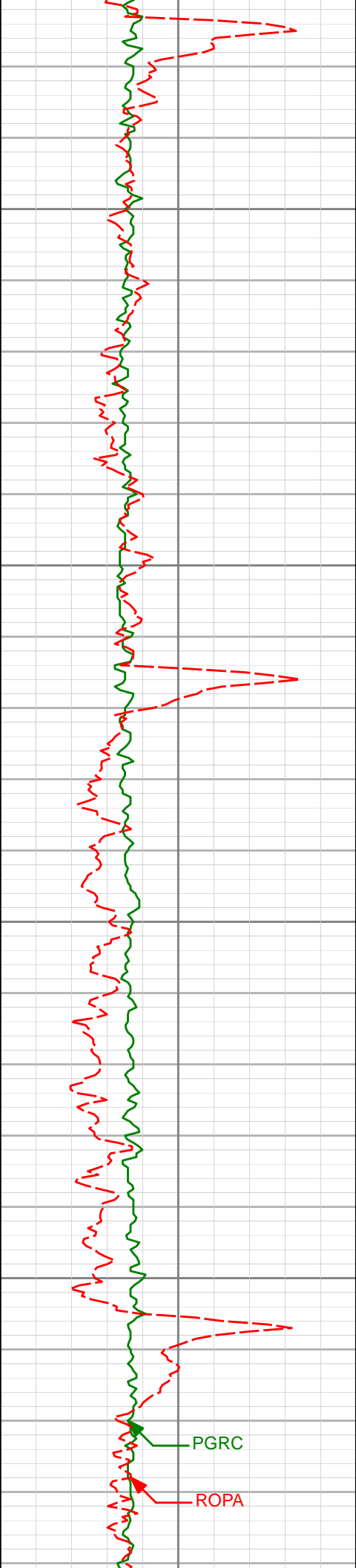
10077'

90.37°

181.18°

7249.94'

3183.81'



10150

10169'

89.97°

180.35°

7249.67'

3275.80'

10200

10250

10260'

89.38°

180.19°

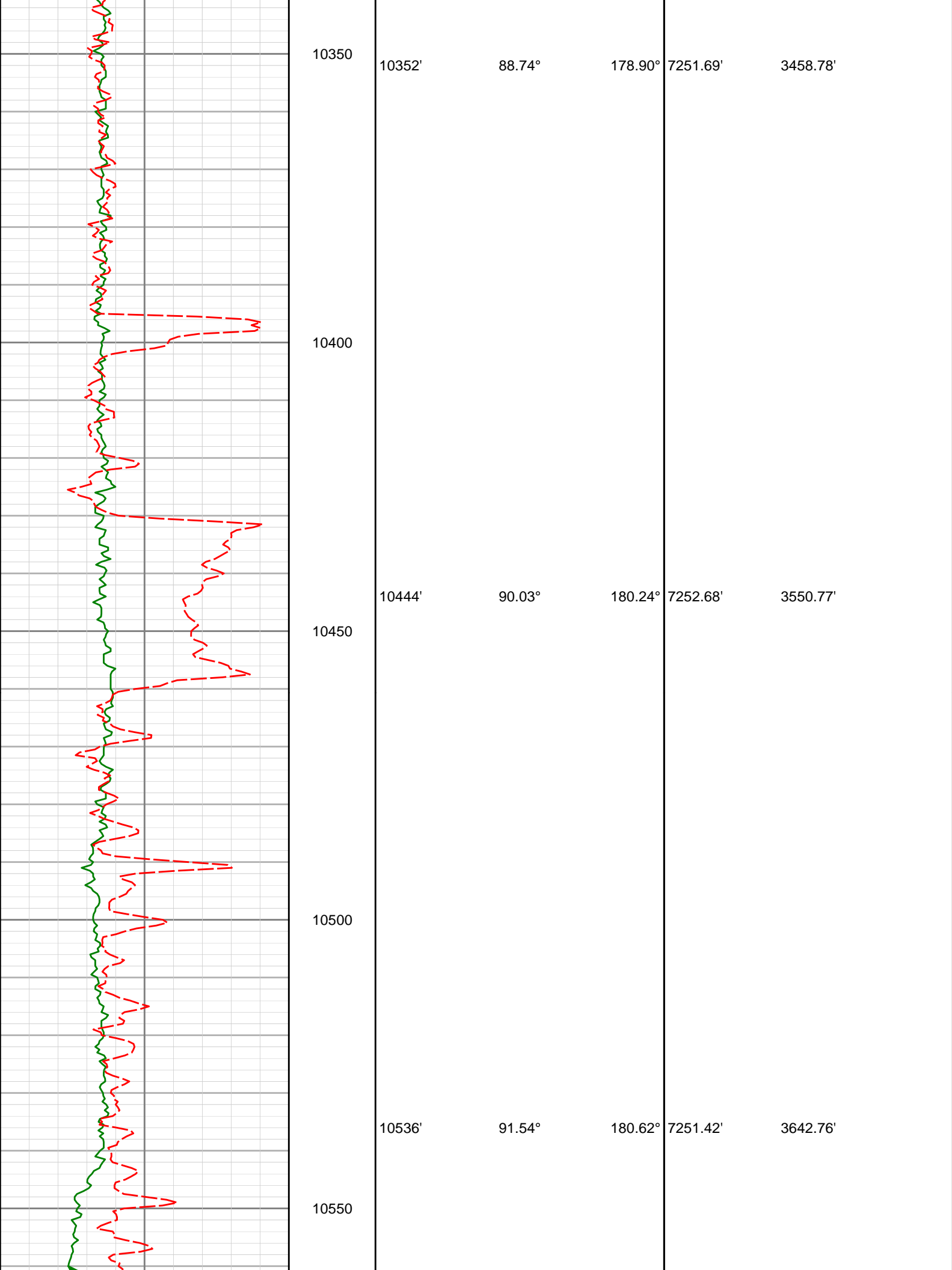
7250.18'

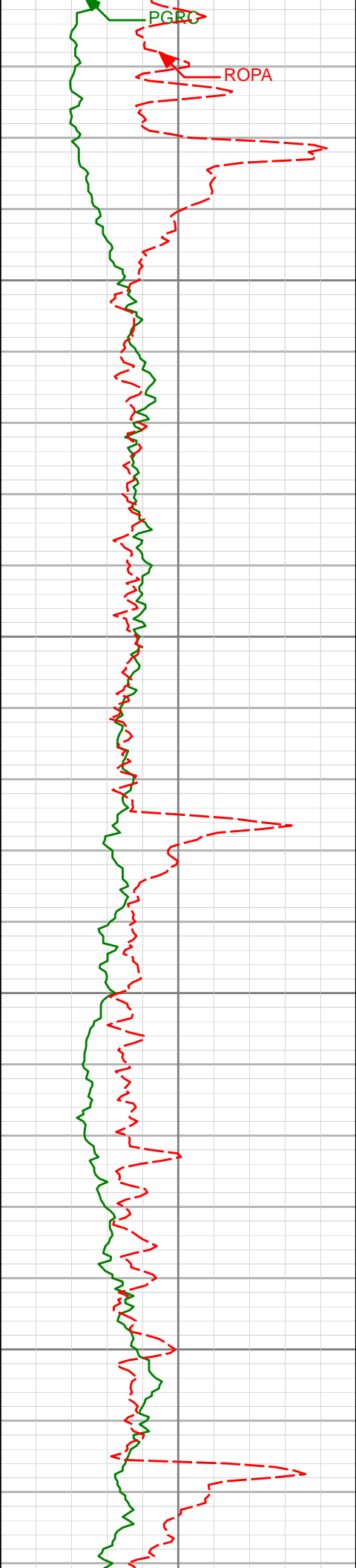
3366.80'

10300

PGRC

ROPA





10600

10650

10700

10750

10628'

91.32°

180.49°

7249.12'

3734.72'

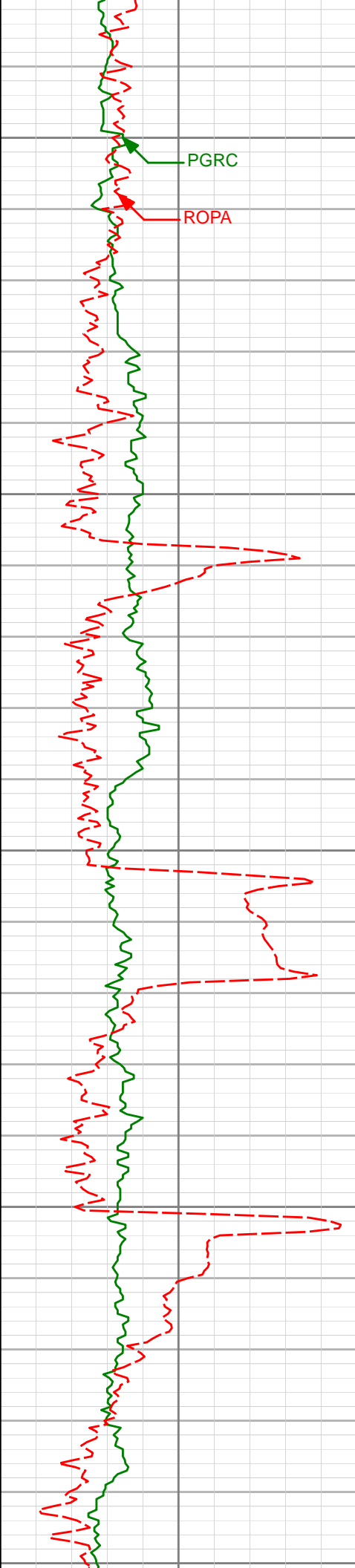
10720'

91.48°

180.15°

7246.88'

3826.69'



10800

10812'

91.88°

179.47°

7244.18'

3918.65'

10850

10900

10906'

92.28°

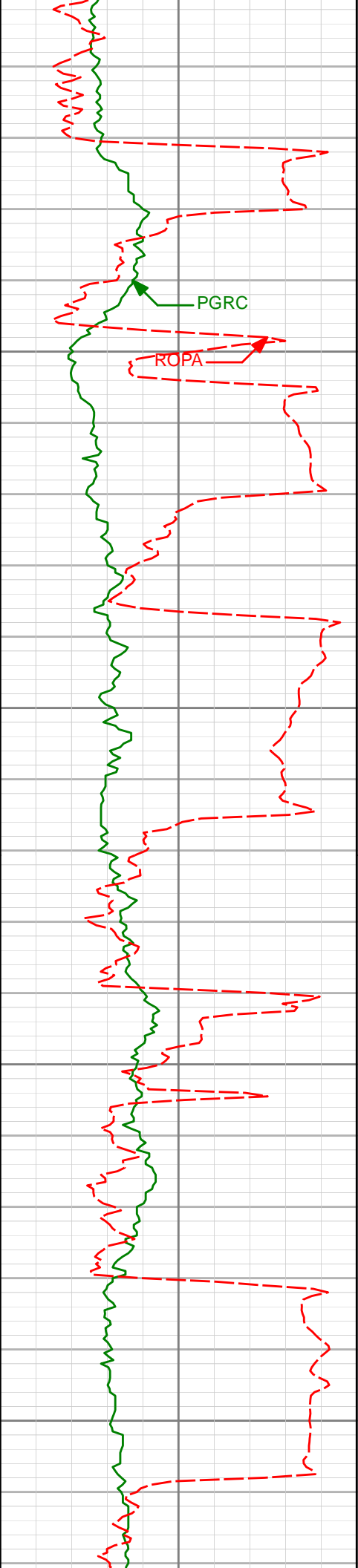
178.54°

7240.77'

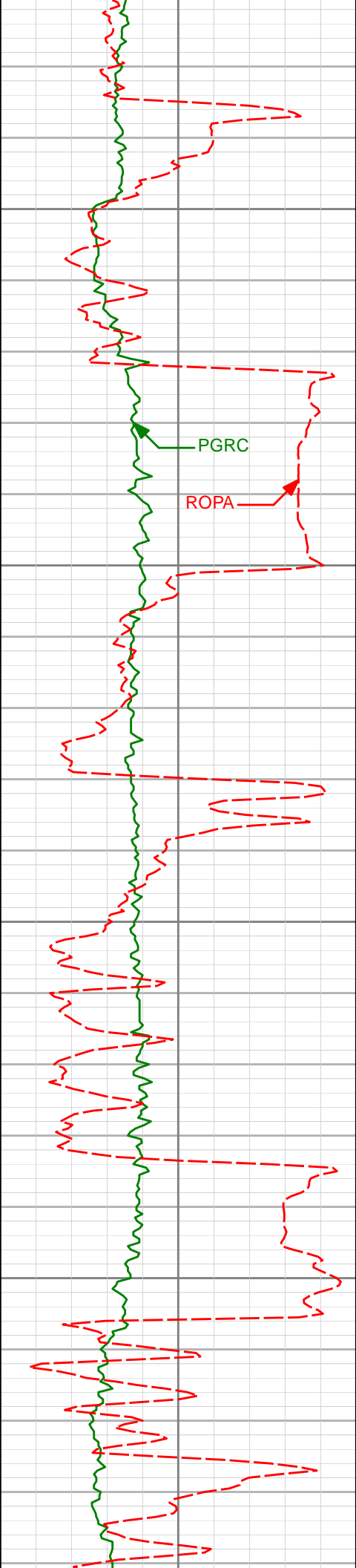
4012.58'

10950

11000



| | | | | | |
|-------|--------|--------|---------|----------|----------|
| 11000 | 11001 | 92.71° | 177.45° | 7236.63 | 4107.43 |
| 11050 | | | | | |
| 11100 | 11095' | 92.90° | 179.02° | 7232.03' | 4201.27' |
| 11150 | | | | | |
| 11200 | 11190' | 91.82° | 179.23° | 7228.12' | 4296.17' |



11250

11284'

90.25°

179.94°

7226.42'

4390.15'

11300

11350

11378'

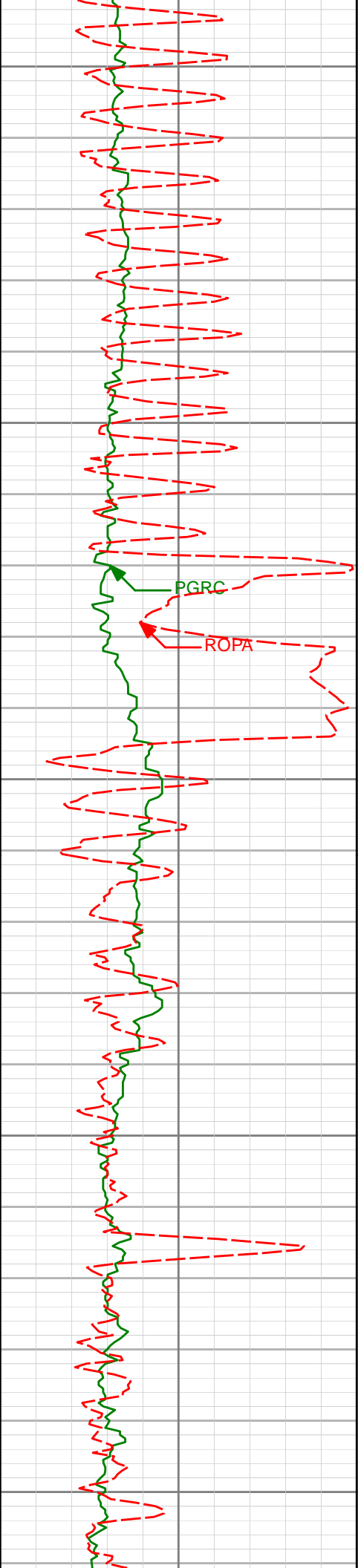
90.03°

180.59°

7226.19'

4484.15'

11400



11450

11473'

88.92°

180.61°

7227.06'

4579.14'

11500

PGRC

ROPA

11550

11567'

87.69°

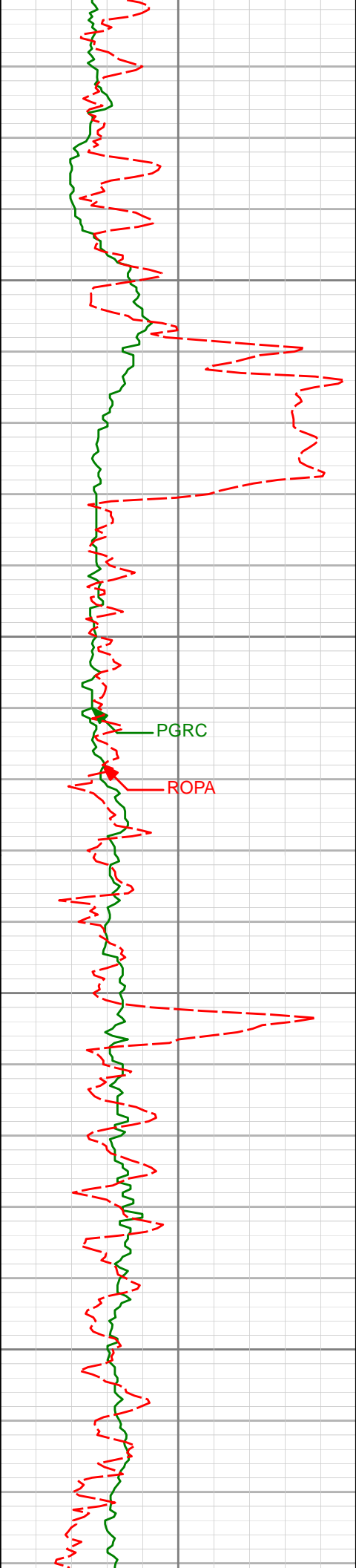
181.10°

7229.84'

4673.08'

11600

11650



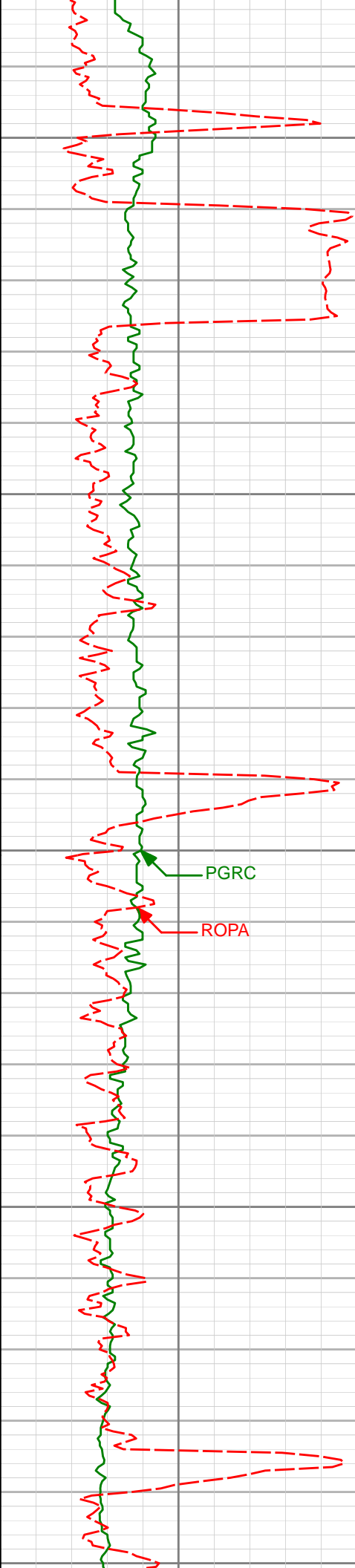
11700

11750

11800

11850

| | | | | |
|--------|--------|---------|----------|----------|
| 11661' | 87.13° | 180.32° | 7234.09' | 4766.98' |
| 11756' | 88.21° | 180.00° | 7237.95' | 4861.90' |
| 11850' | 87.94° | 179.89° | 7241.11' | 4955.85' |



11900

11950

12000

12050

12100

11944'

89.01°

179.64°

7243.61'

5049.81'

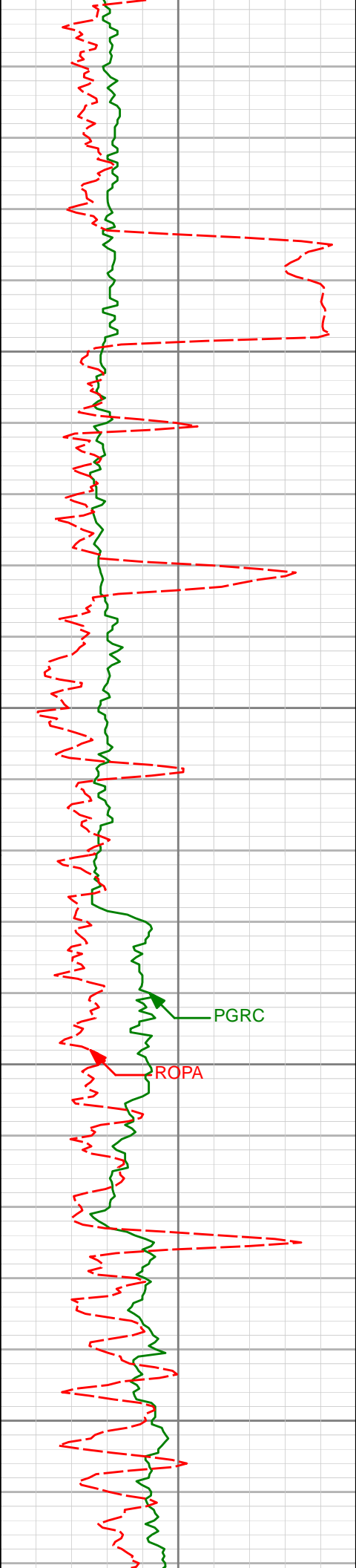
12039'

88.92°

179.35°

7245.33'

5144.79'



12100

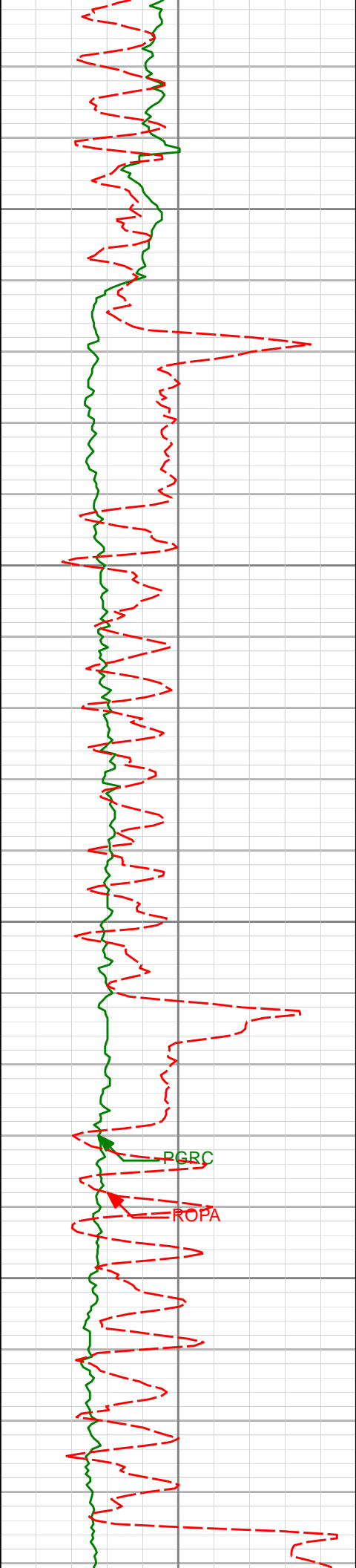
12150

12200

12250

12300

| | | | | |
|--------|--------|---------|----------|----------|
| 12133' | 89.72° | 179.59° | 7246.44' | 5238.78' |
| 12227' | 90.68° | 179.90° | 7246.12' | 5332.78' |



12350

12400

12450

12500

12415'

12510'

90.74°

91.85°

179.13°

179.95°

7244.34'

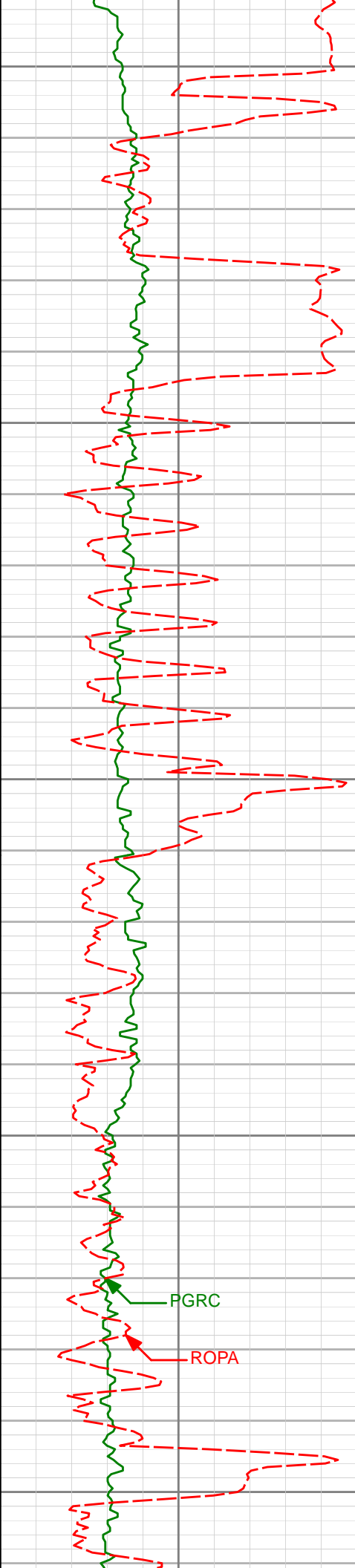
7242.20'

5520.76'

5615.73'

PGRC

ROPA



12550

12600

12650

12700

12750

12604'

88.61°

179.90°

7241.82'

5709.72'

12698'

88.80°

178.84°

7243.94'

5803.69'

PGRC

ROPA



12800

12850

12900

12950

12793'

90.06°

178.50°

7244.89'

5898.65'

12887'

90.80°

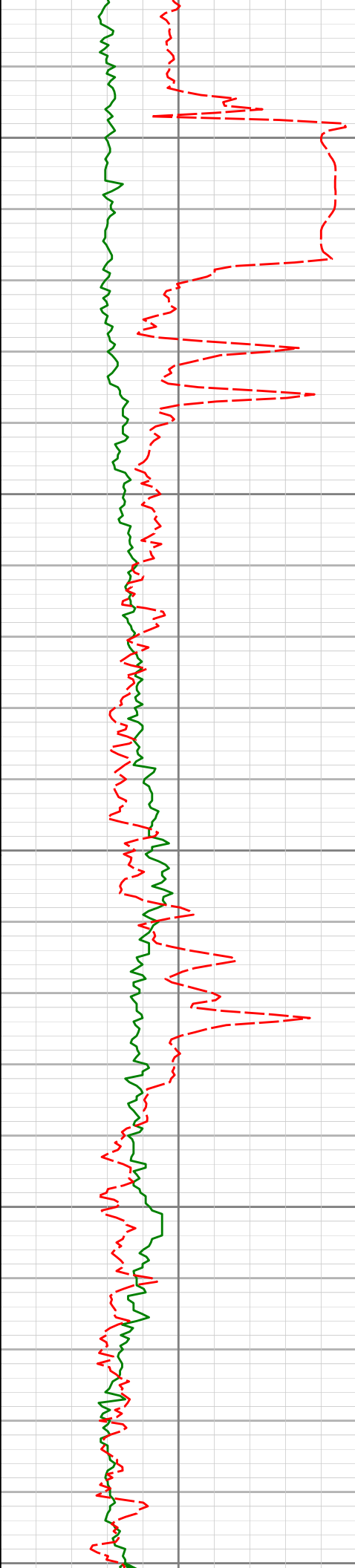
178.09°

7244.18'

5992.61'

PGRC

ROPA



13000

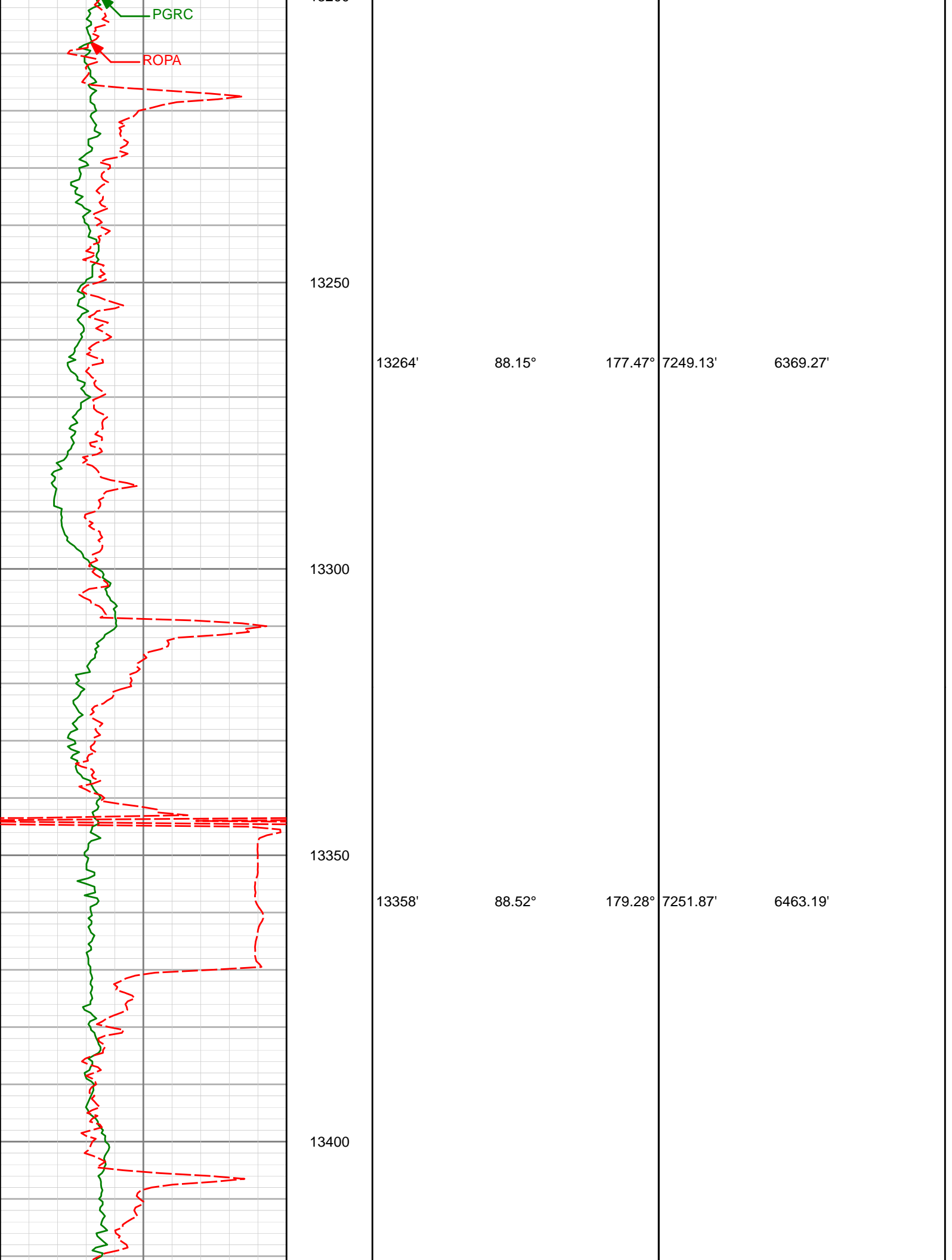
13050

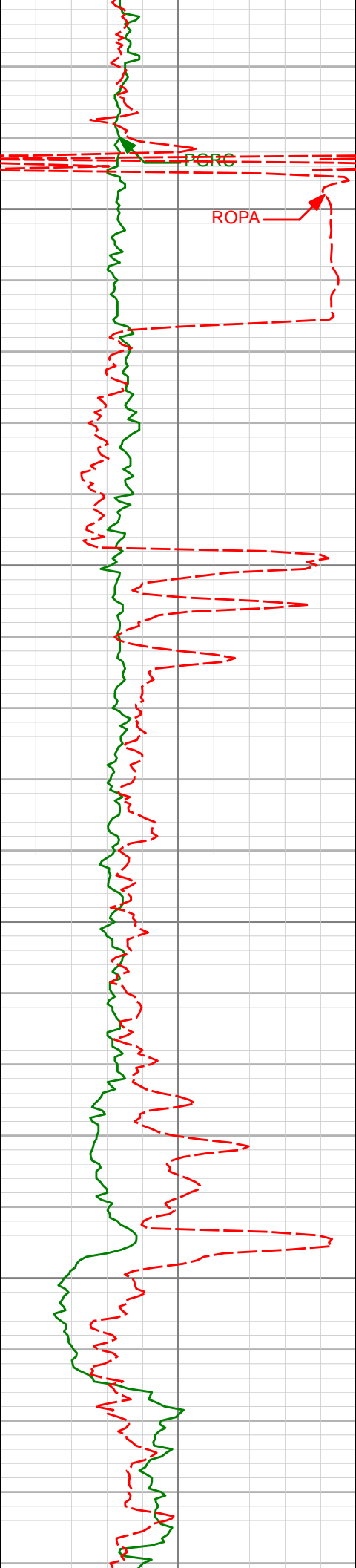
13100

13150

13200

| | | | | |
|--------|--------|---------|----------|----------|
| 12982' | 90.52° | 177.50° | 7243.09' | 6087.53' |
| 13076' | 88.55° | 178.32° | 7243.85' | 6181.46' |
| 13170' | 88.43° | 178.19° | 7246.33' | 6275.38' |





13450

13453'

90.00°

180.90°

7253.09'

6558.18'

13500

13550

13548'

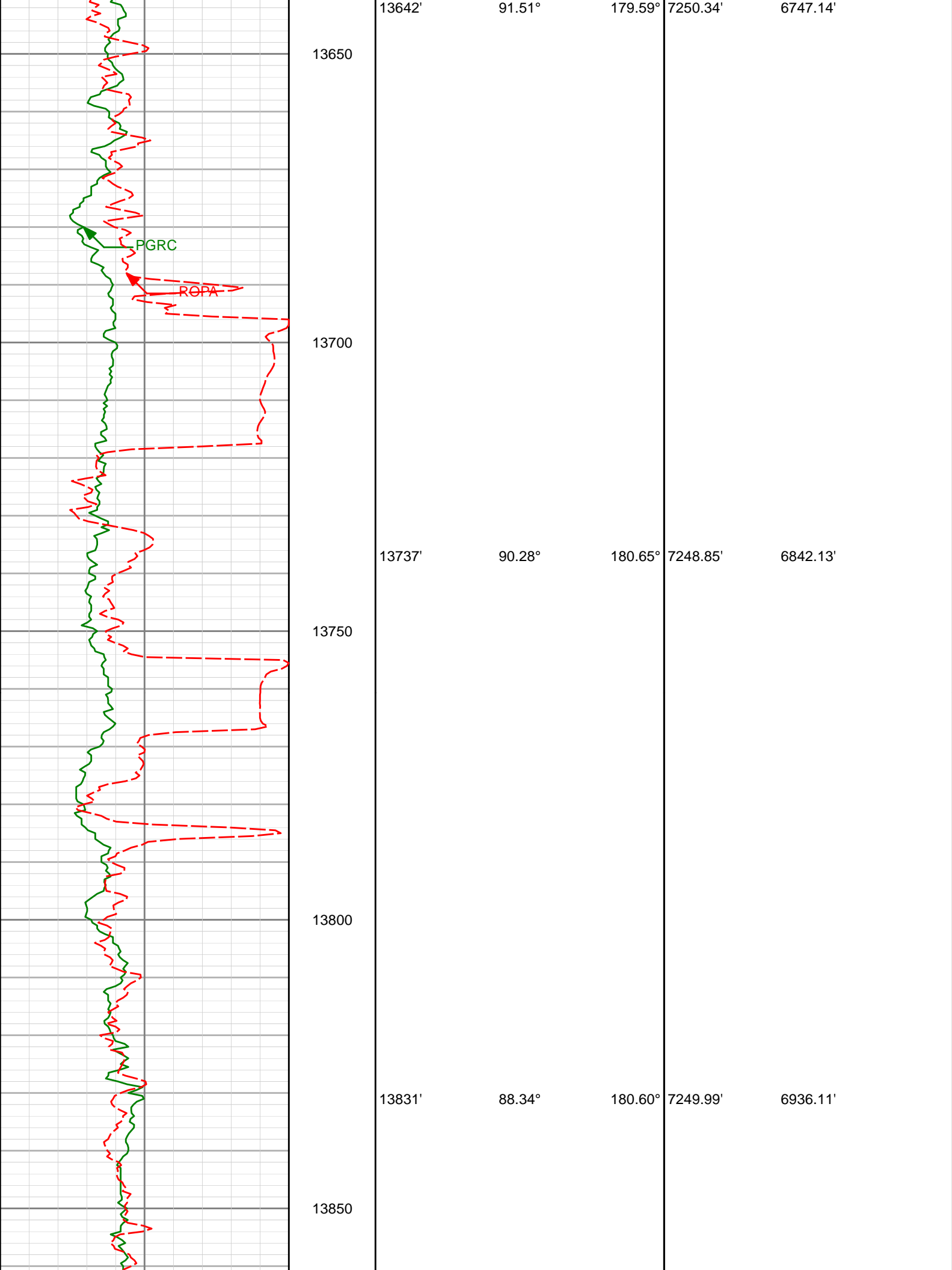
90.92°

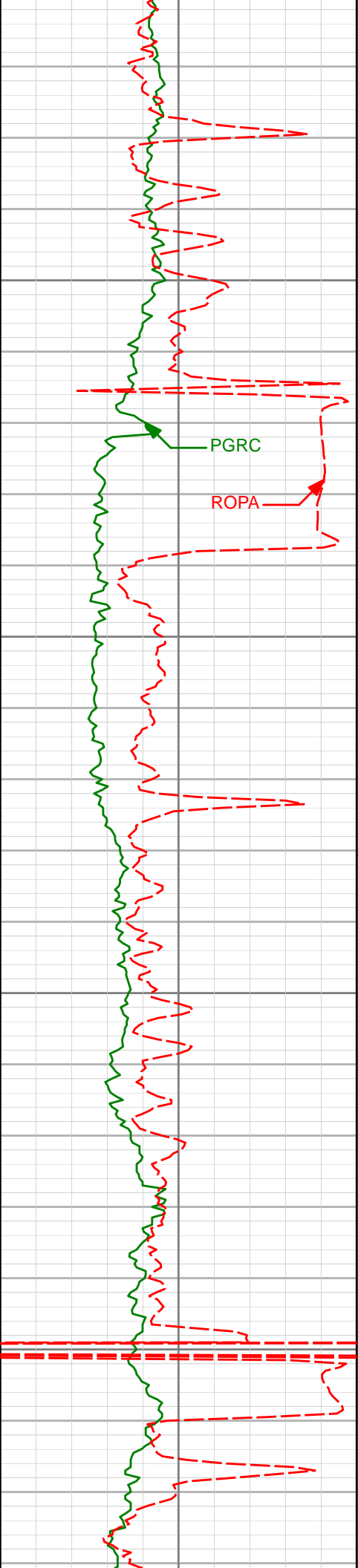
180.51°

7252.33'

6653.17'

13600





13900

13950

14000

14050

13925'

14019'

89.01°

89.45°

182.02°

181.89°

7252.16'

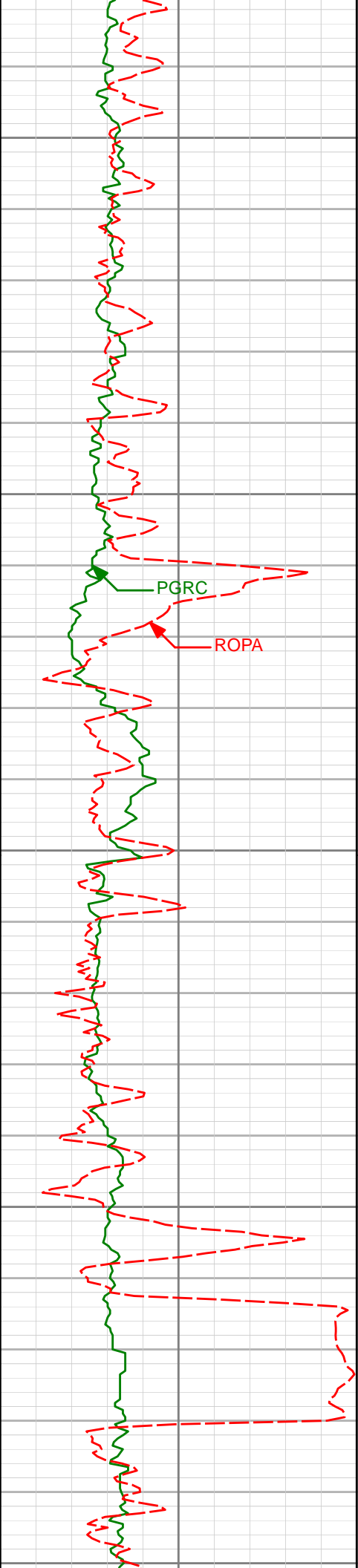
7253.42'

7030.06'

7124.00'

PGRC

ROPA



14100

14113'

89.72°

181.71°

7254.10'

7217.95'

14150

PGRC

ROPA

14200

14208'

89.45°

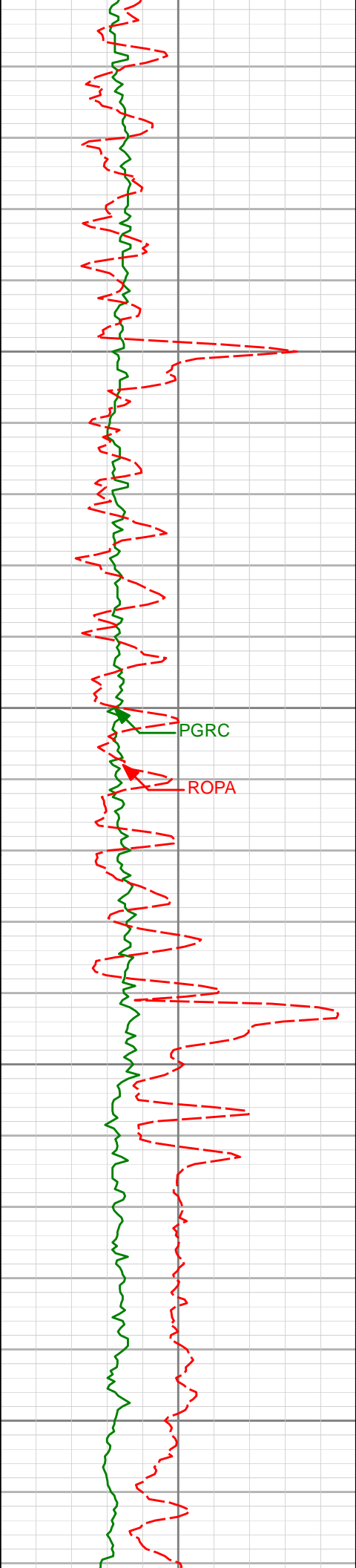
180.44°

7254.79'

7312.93'

14250

14300



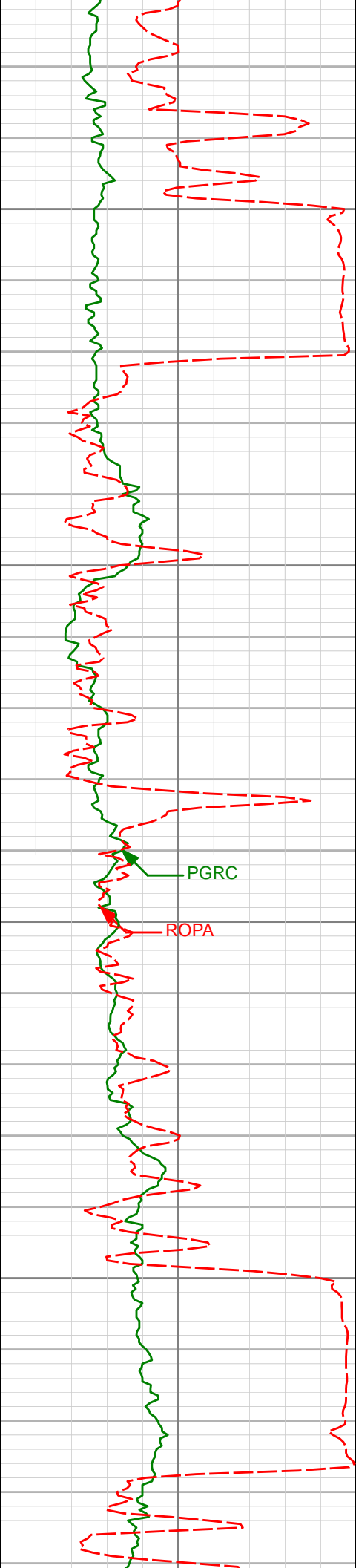
14350

14400

14450

14500

| | | | | |
|--------|--------|---------|----------|----------|
| 14302' | 90.58° | 179.55° | 7254.77' | 7406.92' |
| 14396' | 91.48° | 179.27° | 7253.08' | 7500.90' |
| 14491' | 92.40° | 178.66° | 7249.86' | 7595.83' |



14550

14585'

91.08°

178.56°

7247.01'

7689.76'

14600

14650

PGRC

ROPA

14679'

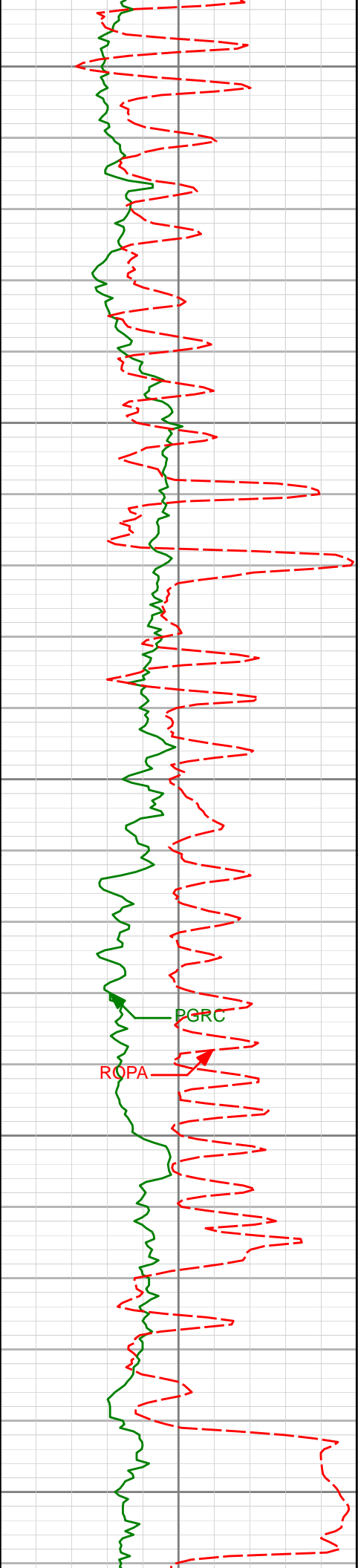
92.31°

178.30°

7244.23'

7783.68'

14700



14750

14773'

90.55°

179.60°

7241.88'

7877.63'

14800

14850

14867'

90.92°

179.15°

7240.68'

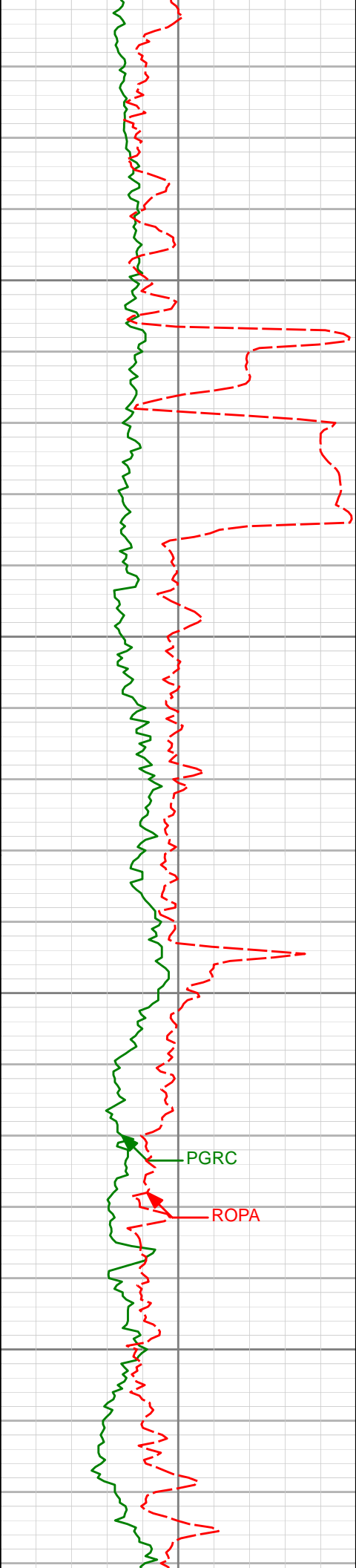
7971.62'

14900

14950

PGRC

ROPA



15000

15050

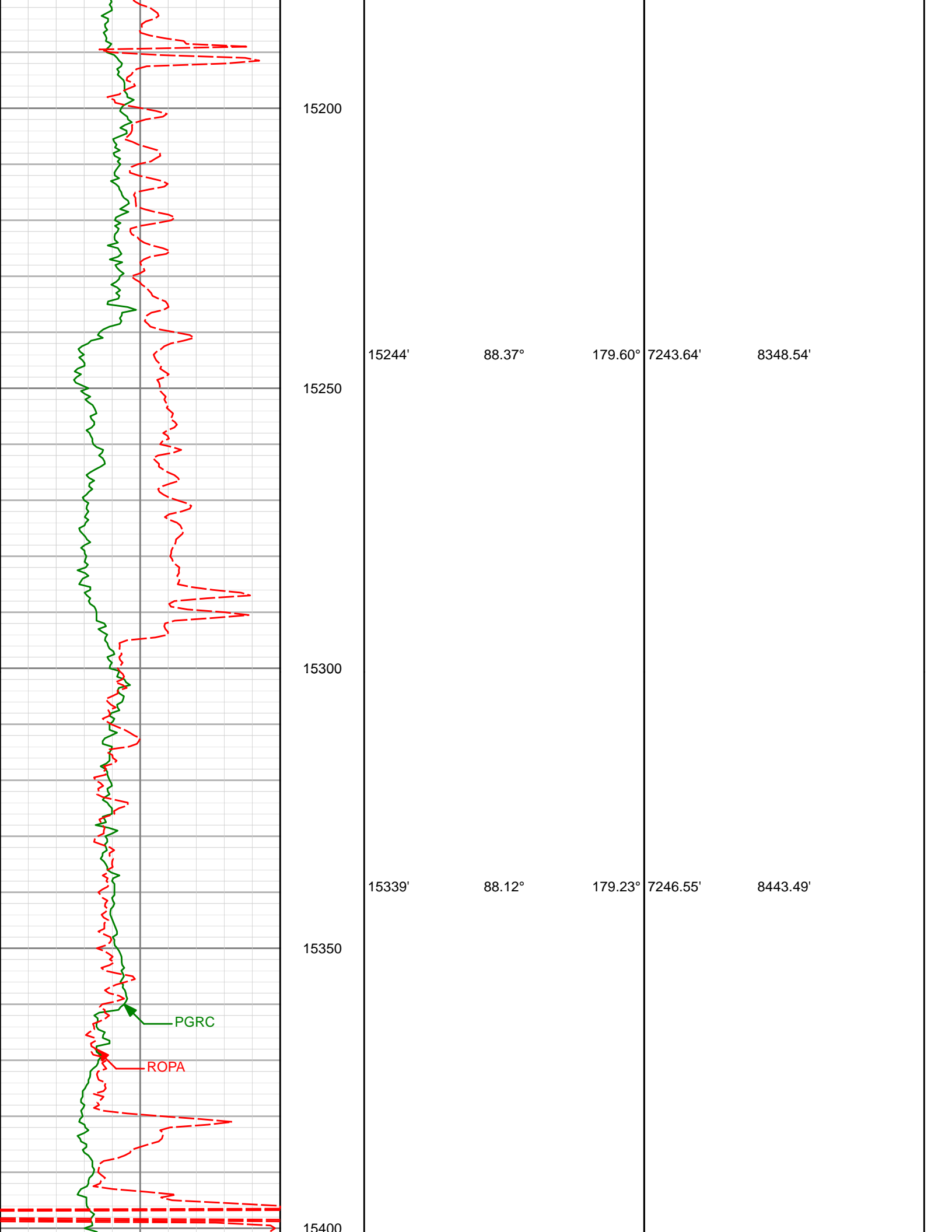
15100

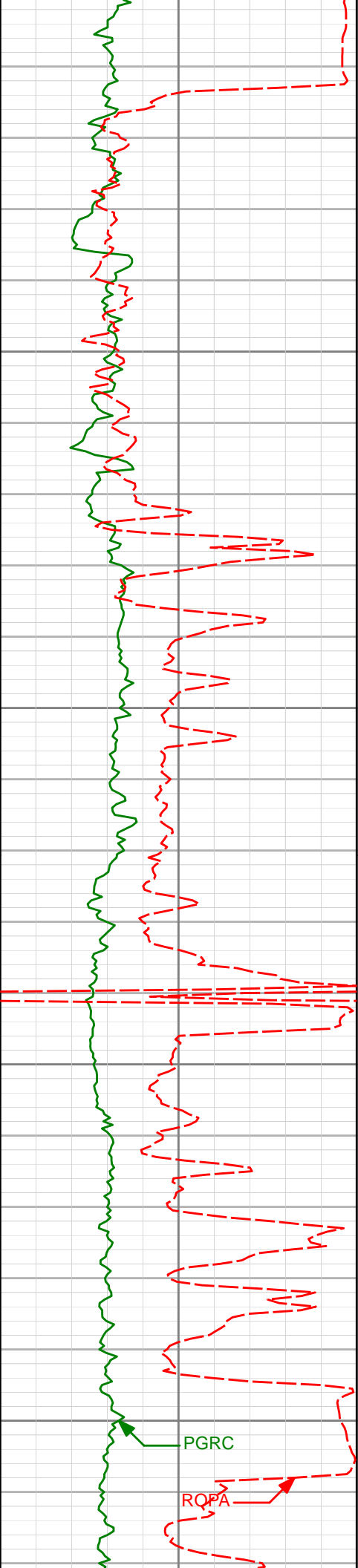
15150

PGRC

ROPA

| | | | | |
|--------|--------|---------|----------|----------|
| 14961 | 90.86° | 179.57° | 7239.21' | 8065.60' |
| 15056' | 88.95° | 179.95° | 7239.37' | 8160.59' |
| 15150' | 88.74° | 179.89° | 7241.27' | 8254.57' |





15400

15450

15500

15550

15600

15433'

88.89°

178.95°

7249.00'

8537.45'

15527'

87.63°

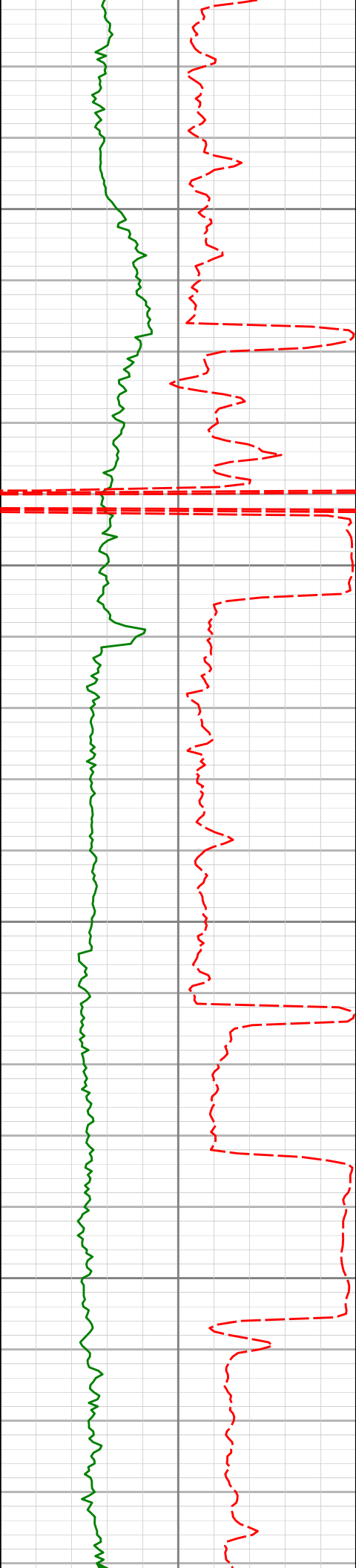
178.52°

7251.85'

8631.38'

PGRC

RQPA



15650

15700

15750

15800

15622'

88.49°

179.17°

7255.07'

8726.30'

15716'

89.45°

178.76°

7256.76'

8820.27'

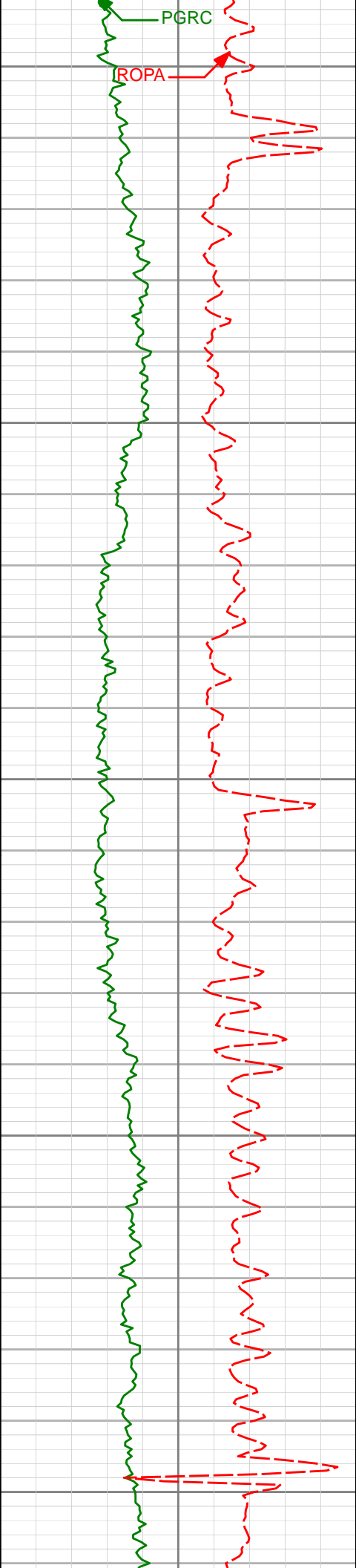
15811'

91.14°

179.60°

7256.27'

8915.26'



15850

15900

15950

16000

16050

15905'

91.76°

179.20°

7253.89'

9009.22'

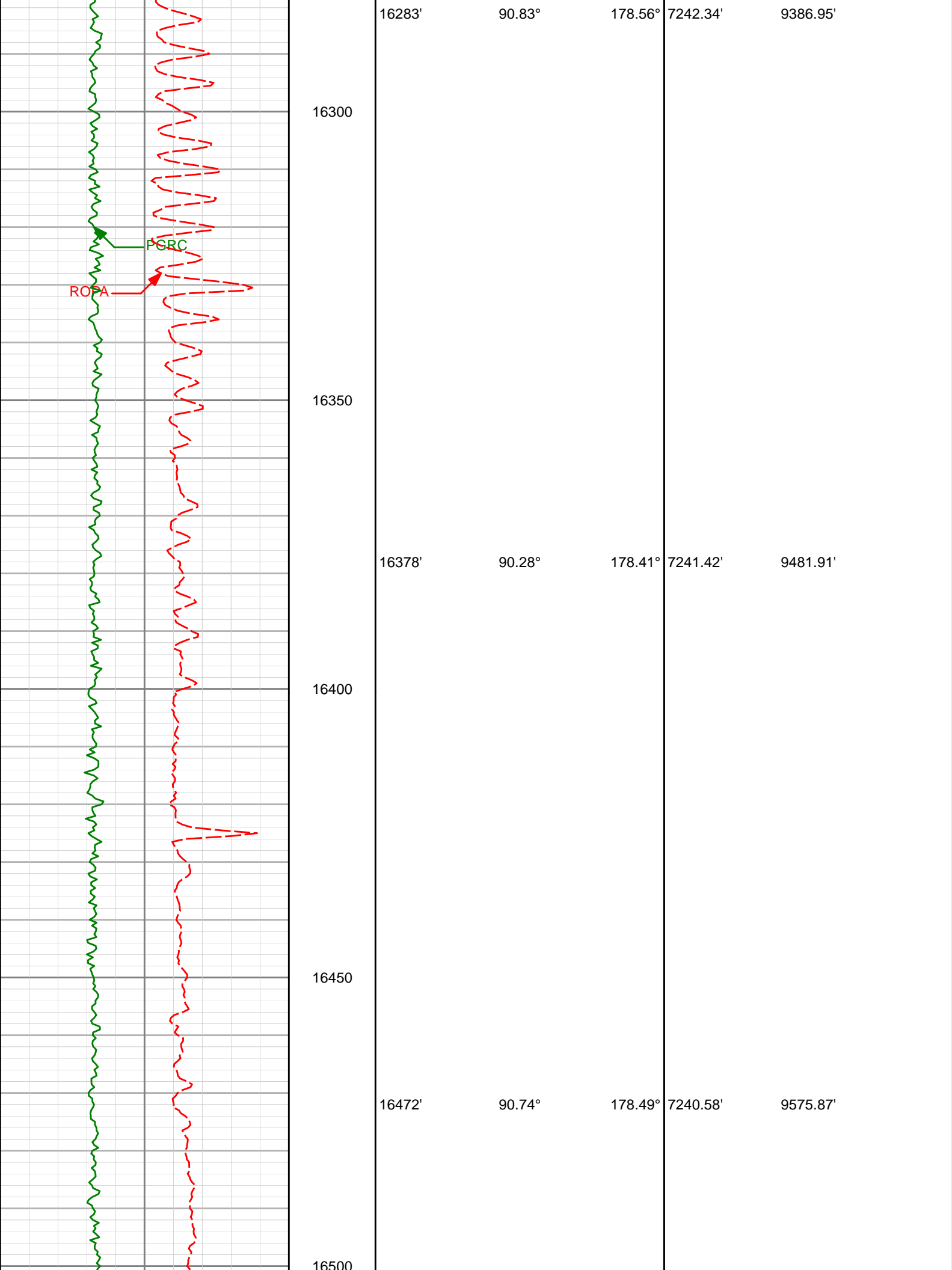
16000'

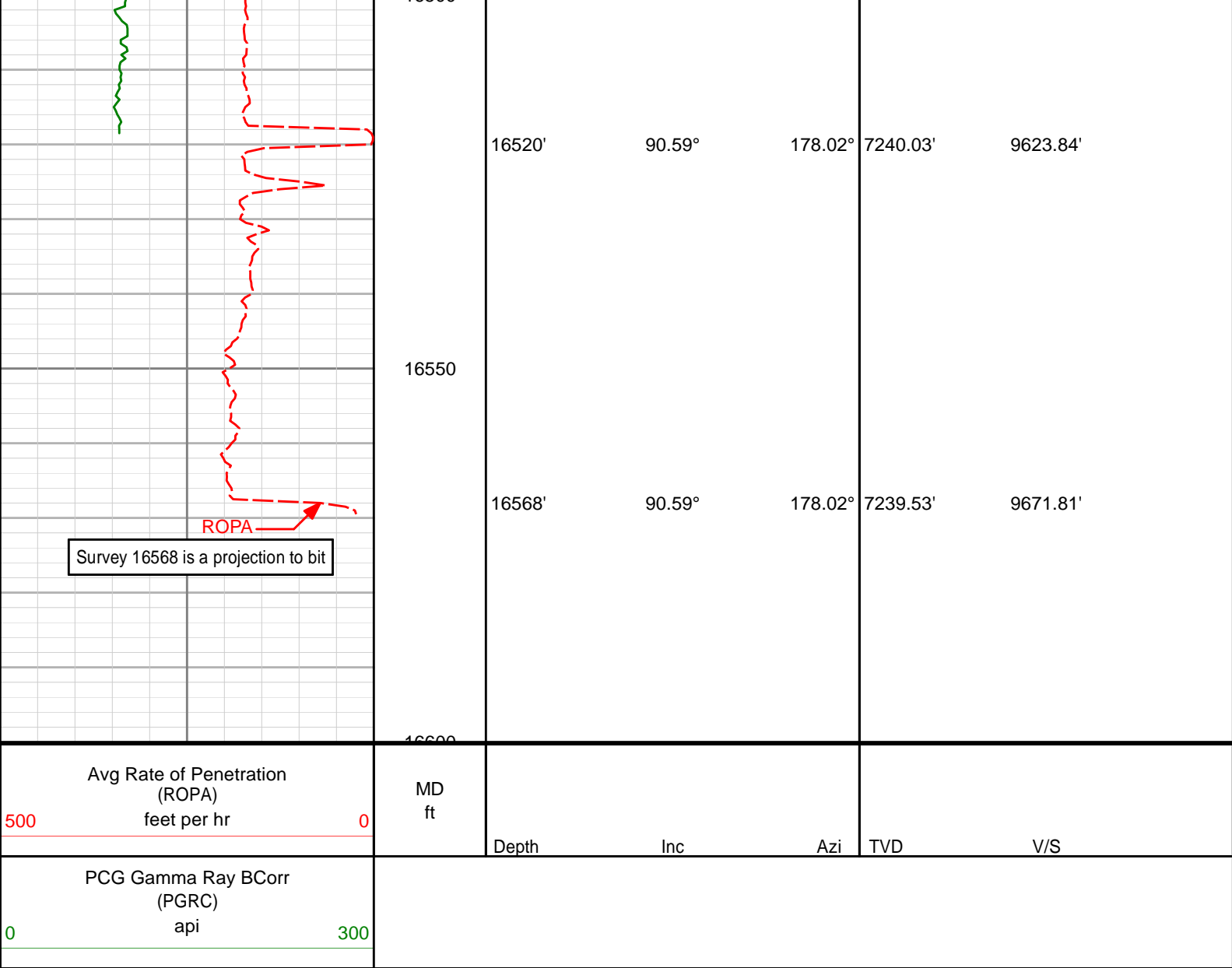
92.25°

179.11°

7250.57'

9104.15'





HALLIBURTON

DIRECTIONAL SURVEY REPORT
APC
Gee 16N-25HZ
Wattenberg
Weld Colorado
USA

| <i>Measured Depth (feet)</i> | <i>Inclination (degrees)</i> | <i>Direction (degrees)</i> | <i>Vertical Depth (feet)</i> | <i>Latitude (feet)</i> | <i>Departure (feet)</i> | <i>Vertical Section (feet)</i> | <i>Dogleg (deg/100ft)</i> |
|--------------------------------------|----------------------------------|--------------------------------|--------------------------------------|----------------------------|-----------------------------|--|-------------------------------|
| 948.00 | 0.96 | 338.74 | 947.94 | 9.38 N | 0.84 E | -9.38 | TIE-IN |
| 1109.00 | 0.94 | 354.98 | 1108.92 | 11.95 N | 0.24 E | -11.95 | 0.17 |
| 1201.00 | 0.94 | 3.38 | 1200.91 | 13.46 N | 0.21 E | -13.46 | 0.15 |
| 1294.00 | 2.73 | 91.83 | 1293.87 | 14.15 N | 2.47 E | -14.15 | 3.08 |
| 1386.00 | 3.91 | 104.01 | 1385.71 | 13.32 N | 7.71 E | -13.32 | 1.49 |
| 1478.00 | 3.39 | 114.19 | 1477.53 | 11.45 N | 13.23 E | -11.45 | 0.90 |
| 1570.00 | 2.97 | 133.41 | 1569.39 | 8.69 N | 17.44 E | -8.69 | 1.24 |
| 1663.00 | 5.01 | 134.98 | 1662.16 | 4.17 N | 22.07 E | -4.17 | 2.20 |
| 1756.00 | 7.15 | 126.34 | 1754.63 | 2.14 S | 29.60 E | 2.14 | 2.50 |
| 1864.00 | 8.39 | 123.84 | 1861.64 | 10.51 S | 41.56 E | 10.51 | 1.19 |
| 1957.00 | 10.08 | 121.05 | 1953.43 | 18.48 S | 54.17 E | 18.48 | 1.88 |
| 2049.00 | 12.28 | 114.60 | 2043.68 | 26.71 S | 69.97 E | 26.71 | 2.75 |
| 2142.00 | 14.24 | 113.16 | 2134.20 | 35.33 S | 89.48 E | 35.33 | 2.14 |
| 2234.00 | 16.43 | 106.96 | 2222.92 | 43.57 S | 112.33 E | 43.57 | 2.97 |
| 2326.00 | 17.97 | 106.76 | 2310.80 | 51.46 S | 138.37 E | 51.46 | 1.68 |
| 2419.00 | 16.86 | 104.90 | 2399.54 | 59.07 S | 165.14 E | 59.07 | 1.34 |
| 2511.00 | 15.69 | 102.70 | 2487.85 | 65.23 S | 190.17 E | 65.23 | 1.44 |
| 2602.00 | 16.76 | 100.71 | 2575.23 | 70.38 S | 215.06 E | 70.38 | 1.32 |
| 2695.00 | 16.35 | 101.97 | 2664.37 | 75.58 S | 241.04 E | 75.58 | 0.59 |
| 2787.00 | 17.31 | 107.28 | 2752.44 | 82.33 S | 266.78 E | 82.33 | 1.97 |
| 2880.00 | 16.68 | 107.19 | 2841.38 | 90.39 S | 292.74 E | 90.39 | 0.68 |
| 2972.00 | 15.49 | 106.46 | 2929.77 | 97.77 S | 317.14 E | 97.77 | 1.31 |
| 3065.00 | 16.89 | 108.17 | 3019.08 | 105.50 S | 341.89 E | 105.50 | 1.59 |
| 3156.00 | 15.44 | 108.19 | 3106.48 | 113.41 S | 365.96 E | 113.41 | 1.59 |
| 3248.00 | 14.54 | 106.89 | 3195.35 | 120.59 S | 388.64 E | 120.59 | 1.04 |
| 3340.00 | 13.70 | 105.22 | 3284.57 | 126.80 S | 410.21 E | 126.80 | 1.01 |
| 3432.00 | 11.49 | 104.13 | 3374.35 | 131.90 S | 429.61 E | 131.90 | 2.42 |
| 3524.00 | 9.04 | 101.03 | 3464.87 | 135.52 S | 445.59 E | 135.52 | 2.73 |
| 3616.00 | 7.65 | 101.48 | 3555.90 | 138.12 S | 458.69 E | 138.12 | 1.51 |
| 3708.00 | 7.19 | 101.78 | 3647.13 | 140.52 S | 470.32 E | 140.52 | 0.50 |
| 3799.00 | 5.57 | 111.83 | 3737.56 | 143.32 S | 480.00 E | 143.32 | 2.16 |
| 3891.00 | 5.01 | 110.03 | 3829.17 | 146.36 S | 487.92 E | 146.36 | 0.63 |
| 3983.00 | 3.24 | 115.07 | 3920.93 | 148.83 S | 494.05 E | 148.84 | 1.96 |
| 4075.00 | 2.96 | 105.08 | 4012.79 | 150.55 S | 498.69 E | 150.55 | 0.66 |
| 4167.00 | 0.72 | 109.50 | 4104.74 | 151.37 S | 501.53 E | 151.37 | 2.44 |
| 4259.00 | 0.58 | 93.61 | 4196.73 | 151.59 S | 502.54 E | 151.59 | 0.25 |
| 4353.00 | 0.65 | 29.58 | 4290.73 | 151.15 S | 503.28 E | 151.15 | 0.70 |
| 4447.00 | 1.06 | 21.28 | 4384.72 | 149.88 S | 503.86 E | 149.88 | 0.45 |
| 4541.00 | 1.23 | 346.86 | 4478.70 | 148.09 S | 503.95 E | 148.09 | 0.74 |
| 4635.00 | 1.38 | 354.64 | 4572.68 | 145.98 S | 503.61 E | 145.98 | 0.25 |
| 4730.00 | 1.18 | 335.47 | 4667.65 | 143.95 S | 503.10 E | 143.95 | 0.49 |
| 4825.00 | 1.17 | 312.68 | 4762.63 | 142.40 S | 501.98 E | 142.40 | 0.49 |
| 4919.00 | 2.20 | 303.48 | 4856.59 | 140.76 S | 499.77 E | 140.76 | 1.13 |
| 5014.00 | 2.35 | 311.00 | 4951.52 | 138.47 S | 496.78 E | 138.47 | 0.35 |
| 5108.00 | 2.38 | 312.51 | 5045.44 | 135.89 S | 493.88 E | 135.89 | 0.07 |
| 5203.00 | 2.32 | 308.62 | 5140.36 | 133.36 S | 490.93 E | 133.36 | 0.18 |
| 5297.00 | 2.31 | 304.60 | 5234.28 | 131.09 S | 487.88 E | 131.09 | 0.17 |
| 5391.00 | 2.01 | 316.84 | 5328.22 | 128.81 S | 485.20 E | 128.81 | 0.58 |
| 5580.00 | 1.50 | 292.57 | 5517.13 | 125.45 S | 480.64 E | 125.45 | 0.47 |
| 5674.00 | 1.94 | 301.62 | 5611.09 | 124.14 S | 478.15 E | 124.14 | 0.55 |

HALLIBURTON

Gee 16N-25HZ

| <i>Measured Depth (feet)</i> | <i>Inclination (degrees)</i> | <i>Direction (degrees)</i> | <i>Vertical Depth (feet)</i> | <i>Latitude (feet)</i> | <i>Departure (feet)</i> | <i>Vertical Section (feet)</i> | <i>Dogleg (deg/100ft)</i> |
|--------------------------------------|----------------------------------|--------------------------------|--------------------------------------|----------------------------|-----------------------------|--|-------------------------------|
| 5769.00 | 2.11 | 303.56 | 5706.03 | 122.33 S | 475.33 E | 122.33 | 0.19 |
| 5863.00 | 2.21 | 308.02 | 5799.96 | 120.26 S | 472.46 E | 120.26 | 0.21 |
| 5957.00 | 2.07 | 314.27 | 5893.90 | 117.96 S | 469.81 E | 117.96 | 0.29 |
| 6052.00 | 1.72 | 322.27 | 5988.84 | 115.63 S | 467.71 E | 115.63 | 0.46 |
| 6146.00 | 1.95 | 317.18 | 6082.79 | 113.34 S | 465.76 E | 113.34 | 0.30 |
| 6241.00 | 1.61 | 289.59 | 6177.75 | 111.71 S | 463.41 E | 111.71 | 0.96 |
| 6335.00 | 1.67 | 202.51 | 6271.72 | 112.53 S | 461.64 E | 112.53 | 2.40 |
| 6429.00 | 1.62 | 196.83 | 6365.69 | 115.07 S | 460.73 E | 115.07 | 0.18 |
| 6523.00 | 1.97 | 189.64 | 6459.64 | 117.93 S | 460.07 E | 117.93 | 0.44 |
| 6618.00 | 2.19 | 179.46 | 6554.58 | 121.36 S | 459.82 E | 121.36 | 0.45 |
| 6665.00 | 3.56 | 165.23 | 6601.52 | 123.67 S | 460.20 E | 123.67 | 3.27 |
| 6712.00 | 8.97 | 169.65 | 6648.22 | 128.69 S | 461.23 E | 128.69 | 11.55 |
| 6759.00 | 13.68 | 170.87 | 6694.29 | 137.78 S | 462.77 E | 137.78 | 10.03 |
| 6806.00 | 16.48 | 175.10 | 6739.67 | 149.92 S | 464.22 E | 149.92 | 6.40 |
| 6853.00 | 19.65 | 175.91 | 6784.35 | 164.44 S | 465.35 E | 164.44 | 6.77 |
| 6901.00 | 21.90 | 177.56 | 6829.22 | 181.44 S | 466.31 E | 181.44 | 4.84 |
| 6948.00 | 25.64 | 180.20 | 6872.23 | 200.37 S | 466.65 E | 200.37 | 8.27 |
| 6995.00 | 29.95 | 181.65 | 6913.80 | 222.28 S | 466.27 E | 222.28 | 9.28 |
| 7042.00 | 33.37 | 181.52 | 6953.80 | 246.94 S | 465.59 E | 246.94 | 7.28 |
| 7090.00 | 38.27 | 182.14 | 6992.71 | 275.00 S | 464.69 E | 275.01 | 10.24 |
| 7137.00 | 42.46 | 182.04 | 7028.51 | 305.42 S | 463.58 E | 305.42 | 8.92 |
| 7184.00 | 46.41 | 179.28 | 7062.07 | 338.31 S | 463.23 E | 338.31 | 9.35 |
| 7231.00 | 50.78 | 178.56 | 7093.14 | 373.54 S | 463.90 E | 373.54 | 9.37 |
| 7279.00 | 56.02 | 180.31 | 7121.75 | 412.06 S | 464.26 E | 412.06 | 11.30 |
| 7326.00 | 60.32 | 180.87 | 7146.54 | 451.98 S | 463.84 E | 451.98 | 9.20 |
| 7373.00 | 63.24 | 180.67 | 7168.76 | 493.39 S | 463.29 E | 493.39 | 6.22 |
| 7420.00 | 65.53 | 180.38 | 7189.08 | 535.76 S | 462.90 E | 535.76 | 4.90 |
| 7467.00 | 69.47 | 180.06 | 7207.06 | 579.18 S | 462.74 E | 579.18 | 8.41 |
| 7514.00 | 72.98 | 180.47 | 7222.18 | 623.67 S | 462.53 E | 623.67 | 7.51 |
| 7562.00 | 78.17 | 180.75 | 7234.14 | 670.14 S | 462.03 E | 670.14 | 10.83 |
| 7609.00 | 83.74 | 181.50 | 7241.52 | 716.52 S | 461.12 E | 716.53 | 11.96 |
| 7625.00 | 85.93 | 181.61 | 7242.96 | 732.45 S | 460.69 E | 732.45 | 13.70 |
| 7727.00 | 89.91 | 181.31 | 7246.67 | 834.33 S | 458.09 E | 834.33 | 3.91 |
| 7822.00 | 89.63 | 181.07 | 7247.05 | 929.31 S | 456.12 E | 929.31 | 0.39 |
| 7916.00 | 89.85 | 180.57 | 7247.47 | 1023.30 S | 454.77 E | 1023.30 | 0.58 |
| 8010.00 | 90.77 | 180.52 | 7246.96 | 1117.29 S | 453.88 E | 1117.29 | 0.98 |
| 8104.00 | 91.60 | 180.39 | 7245.02 | 1211.27 S | 453.13 E | 1211.27 | 0.89 |
| 8198.00 | 90.12 | 179.31 | 7243.61 | 1305.25 S | 453.38 E | 1305.25 | 1.95 |
| 8293.00 | 90.46 | 179.42 | 7243.13 | 1400.25 S | 454.43 E | 1400.25 | 0.38 |
| 8386.00 | 90.62 | 179.14 | 7242.25 | 1493.24 S | 455.60 E | 1493.24 | 0.35 |
| 8480.00 | 90.34 | 178.50 | 7241.46 | 1587.21 S | 457.54 E | 1587.21 | 0.74 |
| 8575.00 | 90.43 | 177.94 | 7240.83 | 1682.16 S | 460.49 E | 1682.16 | 0.60 |
| 8669.00 | 90.12 | 179.63 | 7240.38 | 1776.14 S | 462.48 E | 1776.14 | 1.83 |
| 8763.00 | 89.97 | 179.42 | 7240.30 | 1870.13 S | 463.26 E | 1870.13 | 0.27 |
| 8858.00 | 90.34 | 179.53 | 7240.04 | 1965.13 S | 464.13 E | 1965.13 | 0.41 |

HALLIBURTON

Gee 16N-25HZ

| <i>Measured Depth (feet)</i> | <i>Inclination (degrees)</i> | <i>Direction (degrees)</i> | <i>Vertical Depth (feet)</i> | <i>Latitude (feet)</i> | <i>Departure (feet)</i> | <i>Vertical Section (feet)</i> | <i>Dogleg (deg/100ft)</i> |
|--------------------------------------|----------------------------------|--------------------------------|--------------------------------------|----------------------------|-----------------------------|--|-------------------------------|
| 8951.00 | 90.18 | 178.95 | 7239.62 | 2058.12 S | 465.36 E | 2058.12 | 0.65 |
| 9046.00 | 89.51 | 180.32 | 7239.88 | 2153.12 S | 465.97 E | 2153.12 | 1.61 |
| 9140.00 | 89.08 | 179.90 | 7241.04 | 2247.11 S | 465.79 E | 2247.11 | 0.64 |
| 9234.00 | 88.86 | 179.03 | 7242.73 | 2341.09 S | 466.67 E | 2341.09 | 0.95 |
| 9328.00 | 89.01 | 180.41 | 7244.47 | 2435.07 S | 467.13 E | 2435.07 | 1.48 |
| 9422.00 | 88.80 | 178.96 | 7246.27 | 2529.05 S | 467.64 E | 2529.05 | 1.56 |
| 9516.00 | 89.54 | 181.73 | 7247.63 | 2623.02 S | 467.08 E | 2623.03 | 3.05 |
| 9611.00 | 89.35 | 181.97 | 7248.55 | 2717.97 S | 464.01 E | 2717.97 | 0.32 |
| 9705.00 | 88.92 | 181.55 | 7249.97 | 2811.92 S | 461.12 E | 2811.92 | 0.64 |
| 9800.00 | 89.48 | 180.55 | 7251.30 | 2906.89 S | 459.38 E | 2906.89 | 1.21 |
| 9893.00 | 90.52 | 181.64 | 7251.30 | 2999.87 S | 457.61 E | 2999.87 | 1.62 |
| 9985.00 | 90.40 | 181.31 | 7250.56 | 3091.84 S | 455.24 E | 3091.84 | 0.38 |
| 10077.00 | 90.37 | 181.18 | 7249.94 | 3183.81 S | 453.24 E | 3183.81 | 0.15 |
| 10169.00 | 89.97 | 180.35 | 7249.67 | 3275.80 S | 452.01 E | 3275.80 | 1.00 |
| 10260.00 | 89.38 | 180.19 | 7250.18 | 3366.80 S | 451.58 E | 3366.80 | 0.67 |
| 10352.00 | 88.74 | 178.90 | 7251.69 | 3458.78 S | 452.31 E | 3458.78 | 1.57 |
| 10444.00 | 90.03 | 180.24 | 7252.68 | 3550.77 S | 453.00 E | 3550.77 | 2.02 |
| 10536.00 | 91.54 | 180.62 | 7251.42 | 3642.76 S | 452.31 E | 3642.76 | 1.69 |
| 10628.00 | 91.32 | 180.49 | 7249.12 | 3734.72 S | 451.42 E | 3734.72 | 0.28 |
| 10720.00 | 91.48 | 180.15 | 7246.88 | 3826.69 S | 450.91 E | 3826.69 | 0.41 |
| 10812.00 | 91.88 | 179.47 | 7244.18 | 3918.65 S | 451.21 E | 3918.65 | 0.86 |
| 10906.00 | 92.28 | 178.54 | 7240.77 | 4012.58 S | 452.84 E | 4012.58 | 1.08 |
| 11001.00 | 92.71 | 177.45 | 7236.63 | 4107.43 S | 456.16 E | 4107.43 | 1.23 |
| 11095.00 | 92.90 | 179.02 | 7232.03 | 4201.27 S | 459.06 E | 4201.27 | 1.68 |
| 11190.00 | 91.82 | 179.23 | 7228.12 | 4296.17 S | 460.51 E | 4296.17 | 1.16 |
| 11284.00 | 90.25 | 179.94 | 7226.42 | 4390.15 S | 461.19 E | 4390.15 | 1.83 |
| 11378.00 | 90.03 | 180.59 | 7226.19 | 4484.15 S | 460.75 E | 4484.15 | 0.73 |
| 11473.00 | 88.92 | 180.61 | 7227.06 | 4579.14 S | 459.76 E | 4579.14 | 1.17 |
| 11567.00 | 87.69 | 181.10 | 7229.84 | 4673.08 S | 458.35 E | 4673.08 | 1.41 |
| 11661.00 | 87.13 | 180.32 | 7234.09 | 4766.98 S | 457.19 E | 4766.98 | 1.02 |
| 11756.00 | 88.21 | 180.00 | 7237.95 | 4861.90 S | 456.93 E | 4861.90 | 1.19 |
| 11850.00 | 87.94 | 179.89 | 7241.11 | 4955.85 S | 457.02 E | 4955.85 | 0.31 |
| 11944.00 | 89.01 | 179.64 | 7243.61 | 5049.81 S | 457.40 E | 5049.81 | 1.17 |
| 12039.00 | 88.92 | 179.35 | 7245.33 | 5144.79 S | 458.24 E | 5144.79 | 0.32 |
| 12133.00 | 89.72 | 179.59 | 7246.44 | 5238.78 S | 459.11 E | 5238.78 | 0.89 |
| 12227.00 | 90.68 | 179.90 | 7246.12 | 5332.78 S | 459.53 E | 5332.78 | 1.07 |
| 12321.00 | 90.37 | 179.44 | 7245.25 | 5426.77 S | 460.07 E | 5426.77 | 0.59 |
| 12415.00 | 90.74 | 179.13 | 7244.34 | 5520.76 S | 461.24 E | 5520.76 | 0.51 |
| 12510.00 | 91.85 | 179.95 | 7242.20 | 5615.73 S | 462.00 E | 5615.73 | 1.45 |
| 12604.00 | 88.61 | 179.90 | 7241.82 | 5709.72 S | 462.13 E | 5709.72 | 3.45 |
| 12698.00 | 88.80 | 178.84 | 7243.94 | 5803.69 S | 463.16 E | 5803.69 | 1.15 |
| 12793.00 | 90.06 | 178.50 | 7244.89 | 5898.65 S | 465.37 E | 5898.65 | 1.37 |
| 12887.00 | 90.80 | 178.09 | 7244.18 | 5992.61 S | 468.16 E | 5992.61 | 0.90 |
| 12982.00 | 90.52 | 177.50 | 7243.09 | 6087.53 S | 471.82 E | 6087.53 | 0.69 |
| 13076.00 | 88.55 | 178.32 | 7243.85 | 6181.46 S | 475.24 E | 6181.46 | 2.27 |

HALLIBURTON

Gee 16N-25HZ

| <i>Measured Depth (feet)</i> | <i>Inclination (degrees)</i> | <i>Direction (degrees)</i> | <i>Vertical Depth (feet)</i> | <i>Latitude (feet)</i> | <i>Departure (feet)</i> | <i>Vertical Section (feet)</i> | <i>Dogleg (deg/100ft)</i> |
|--------------------------------------|----------------------------------|--------------------------------|--------------------------------------|----------------------------|-----------------------------|--|-------------------------------|
| 13170.00 | 88.43 | 178.19 | 7246.33 | 6275.38 S | 478.11 E | 6275.38 | 0.19 |
| 13264.00 | 88.15 | 177.47 | 7249.13 | 6369.27 S | 481.66 E | 6369.27 | 0.82 |
| 13358.00 | 88.52 | 179.28 | 7251.87 | 6463.19 S | 484.33 E | 6463.19 | 1.96 |
| 13453.00 | 90.00 | 180.90 | 7253.09 | 6558.18 S | 484.18 E | 6558.18 | 2.31 |
| 13548.00 | 90.92 | 180.51 | 7252.33 | 6653.17 S | 483.01 E | 6653.17 | 1.05 |
| 13642.00 | 91.51 | 179.59 | 7250.34 | 6747.14 S | 482.93 E | 6747.14 | 1.16 |
| 13737.00 | 90.28 | 180.65 | 7248.85 | 6842.13 S | 482.73 E | 6842.13 | 1.71 |
| 13831.00 | 88.34 | 180.60 | 7249.99 | 6936.11 S | 481.70 E | 6936.11 | 2.06 |
| 13925.00 | 89.01 | 182.02 | 7252.16 | 7030.06 S | 479.56 E | 7030.06 | 1.67 |
| 14019.00 | 89.45 | 181.89 | 7253.42 | 7124.00 S | 476.35 E | 7124.00 | 0.49 |
| 14113.00 | 89.72 | 181.71 | 7254.10 | 7217.95 S | 473.40 E | 7217.95 | 0.35 |
| 14208.00 | 89.45 | 180.44 | 7254.79 | 7312.93 S | 471.61 E | 7312.93 | 1.37 |
| 14302.00 | 90.58 | 179.55 | 7254.77 | 7406.92 S | 471.62 E | 7406.92 | 1.53 |
| 14396.00 | 91.48 | 179.27 | 7253.08 | 7500.90 S | 472.59 E | 7500.90 | 1.00 |
| 14491.00 | 92.40 | 178.66 | 7249.86 | 7595.83 S | 474.30 E | 7595.83 | 1.16 |
| 14585.00 | 91.08 | 178.56 | 7247.01 | 7689.76 S | 476.58 E | 7689.76 | 1.41 |
| 14679.00 | 92.31 | 178.30 | 7244.23 | 7783.68 S | 479.16 E | 7783.68 | 1.34 |
| 14773.00 | 90.55 | 179.60 | 7241.88 | 7877.63 S | 480.88 E | 7877.63 | 2.33 |
| 14867.00 | 90.92 | 179.15 | 7240.68 | 7971.62 S | 481.91 E | 7971.62 | 0.62 |
| 14961.00 | 90.86 | 179.57 | 7239.21 | 8065.60 S | 482.95 E | 8065.60 | 0.45 |
| 15056.00 | 88.95 | 179.95 | 7239.37 | 8160.59 S | 483.35 E | 8160.59 | 2.05 |
| 15150.00 | 88.74 | 179.89 | 7241.27 | 8254.57 S | 483.48 E | 8254.57 | 0.23 |
| 15244.00 | 88.37 | 179.60 | 7243.64 | 8348.54 S | 483.90 E | 8348.54 | 0.50 |
| 15339.00 | 88.12 | 179.23 | 7246.55 | 8443.49 S | 484.87 E | 8443.49 | 0.47 |
| 15433.00 | 88.89 | 178.95 | 7249.00 | 8537.45 S | 486.36 E | 8537.45 | 0.87 |
| 15527.00 | 87.63 | 178.52 | 7251.85 | 8631.38 S | 488.44 E | 8631.38 | 1.42 |
| 15622.00 | 88.49 | 179.17 | 7255.07 | 8726.30 S | 490.35 E | 8726.30 | 1.13 |
| 15716.00 | 89.45 | 178.76 | 7256.76 | 8820.27 S | 492.05 E | 8820.27 | 1.11 |
| 15811.00 | 91.14 | 179.60 | 7256.27 | 8915.26 S | 493.41 E | 8915.26 | 1.99 |
| 15905.00 | 91.76 | 179.20 | 7253.89 | 9009.22 S | 494.39 E | 9009.22 | 0.78 |
| 16000.00 | 92.25 | 179.11 | 7250.57 | 9104.15 S | 495.79 E | 9104.15 | 0.52 |
| 16095.00 | 92.77 | 178.84 | 7246.41 | 9199.05 S | 497.49 E | 9199.05 | 0.62 |
| 16189.00 | 90.68 | 178.81 | 7243.58 | 9292.98 S | 499.42 E | 9292.98 | 2.22 |
| 16283.00 | 90.83 | 178.56 | 7242.34 | 9386.94 S | 501.58 E | 9386.95 | 0.31 |
| 16378.00 | 90.28 | 178.41 | 7241.42 | 9481.91 S | 504.09 E | 9481.91 | 0.60 |
| 16472.00 | 90.74 | 178.49 | 7240.58 | 9575.87 S | 506.63 E | 9575.87 | 0.50 |
| 16520.00 | 90.59 | 178.02 | 7240.03 | 9623.84 S | 508.09 E | 9623.84 | 1.03 |
| 16568.00 | 90.59 | 178.02 | 7239.53 | 9671.81 S | 509.75 E | 9671.81 | 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 16568.00 FEET
IS 9685.24 FEET ALONG 176.98 DEGREES (TRUE)**

Survey Data is tied onto Gyro Data

Final survey is a projection to bit

Surveys have been IFR Corrected