

PCGK - Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	27-Aug-14	02-Sep-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)	1,317.00	7,975.00			
Log End Depth (MD, ft)	7,975.00	17,960.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	24-Aug-14 23:00	29-Aug-14 03:00			
Drill/Wipe End Date and Time	26-Aug-14 21:00	01-Sep-14 16:30			
Min Inc (deg) @ Depth (MD, ft)	0.10 @ 6,088.00	87.29 @ 10,095.00			
Max Inc (deg) @ Depth (MD, ft)	85.71 @ 7,924.00	92.68 @ 16,908.00			
Bit TFA(in2) / Bit Type	1.53 / PDC	1.78 / PDC			
Flow Rate (gpm)	594.73	304.00			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Water Based	Mineral Oil Bas			
Density (ppg) / Viscosity (spqt)	8.60 / 45.00	8.95 / 43.00			
Filtrate CL (ppm)	500	1,500.00			
pH / Fluid Loss (mptm)	N/A / 3	N/A / 2			
PV (cP) / YP (lbf2)	21 / 14.00	11 / 13.00			
% Solids / % Sand	8.7 / 0.1	1.70 / 0.10			
% 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 (in F) / S	475.75 / PDM	350.50 / PDM			

Max Tool Temp (degF) / Source	172.78 / PCM	250.56 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ 172.78	N/A @ 250.56			
Lead MWD Engineer	Caleb Jones	Caleb Jones			
Customer Representative	Tim Bundy	Rick Oman			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	SD50511	12177823			
Insert Serial Number	11400840	11680794			
Date and Time Initialized	23-Aug-14 14:24	26-Aug-14 23:07			
Date and Time Read	27-Aug-14 04:27	02-Sep-14 10:15			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	49.10	52.00			
Software Version	6.21	6.21			
Sub Serial Number	SD50511	12177823			
Sonde Serial Number	12177531	11902194			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	130.30	113.53			

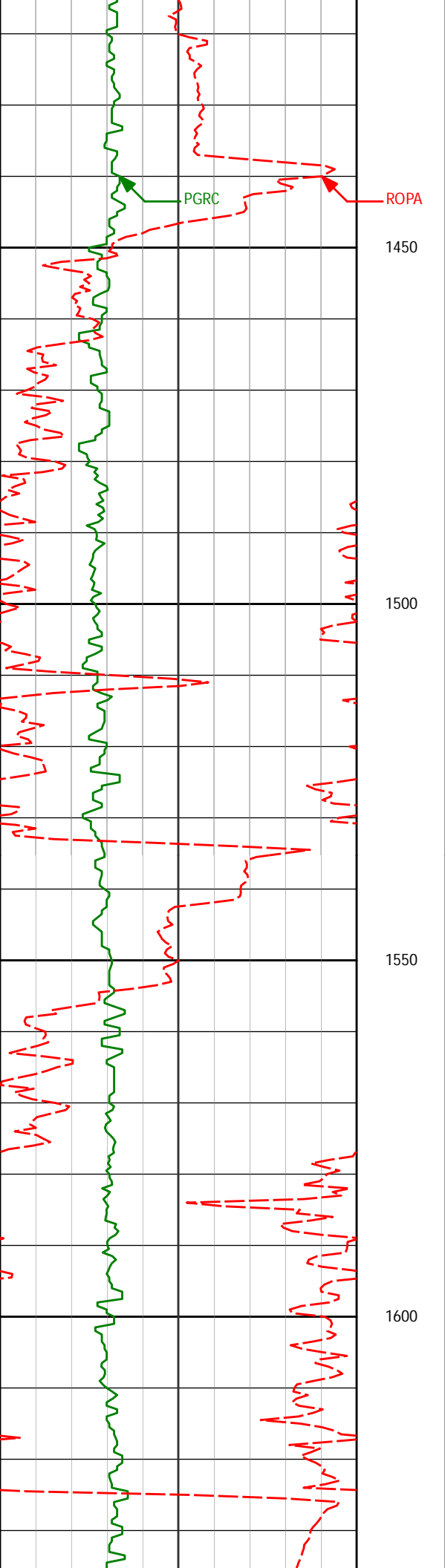
Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	54.05	55.14			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	SD50511	12177823			
Insert/Sonde Serial Number	12071277	11681029			

REMARKS

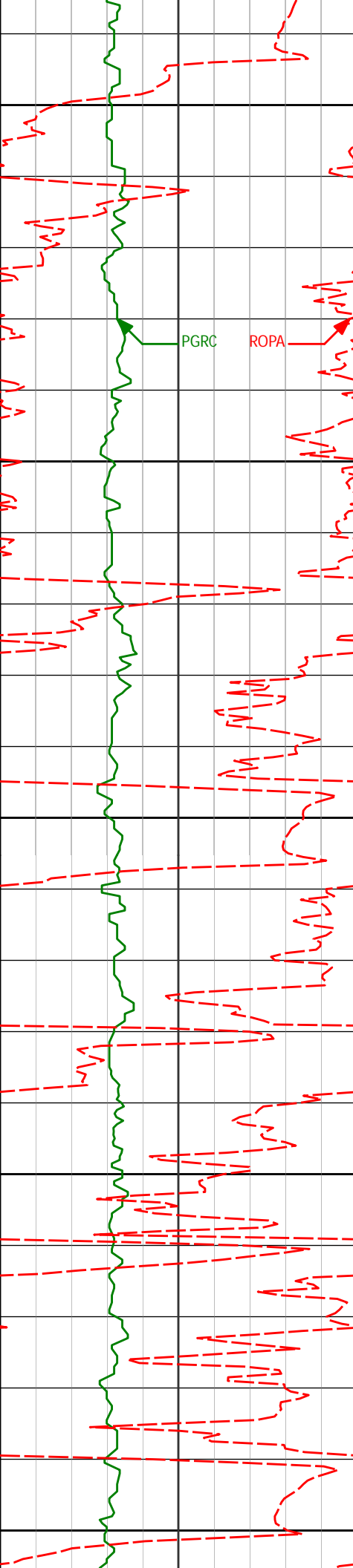
1. All depths are measured depths referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded data unless otherwise specified
4. The following smoothing 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

WARRANTY



1482'	0.66°	287.18°	1481.96'	-2.89'
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1574'	0.86°	283.86°	1573.95'	-3.21'
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1650

1667'

1.57°

122.76°

1666.94'

-2.69'

PGRC

ROPA

1700

1750

1759'

2.70°

124.42°

1758.87'

-0.78'

1800

1850

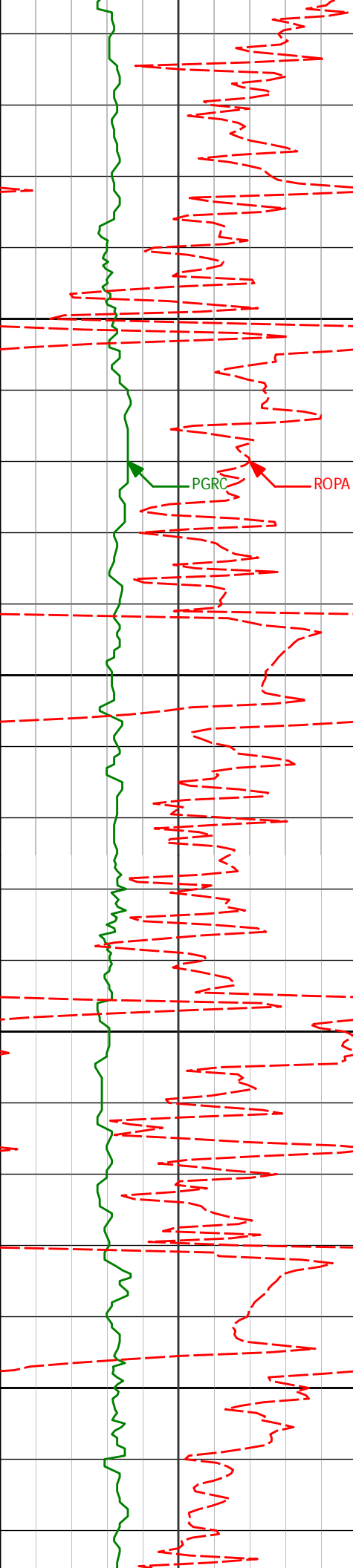
1851'

4.10°

114.96°

1850.71'

1.83'



1900

1950

2000

2050

PGR

ROPA

1944'

5.25°

106.17°

1943.40'

4.42'

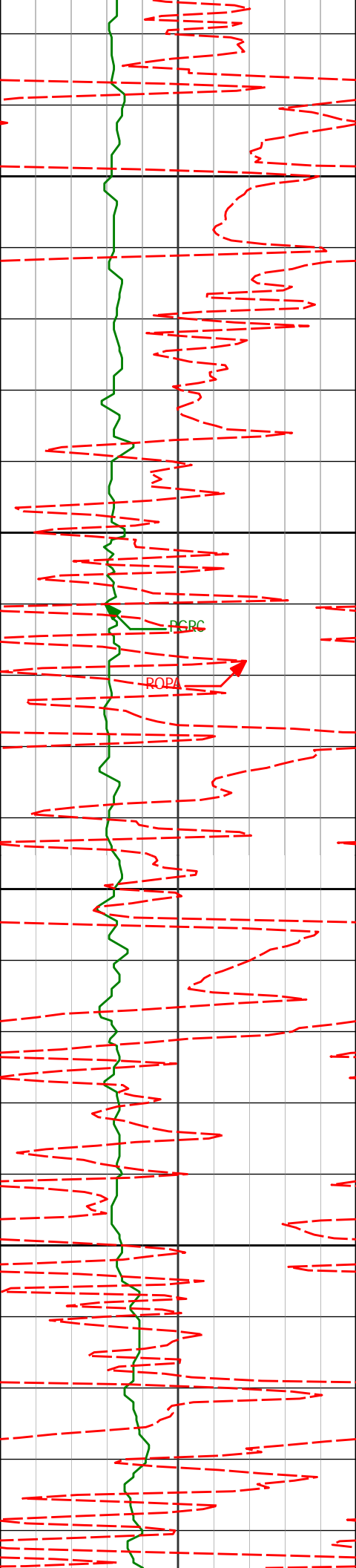
2036'

6.98°

102.98°

2034.87'

6.85'



2100

2129'

9.64°

101.50°

2126.89'

9.67'

2150

PCRC

ROPA

2200

2221'

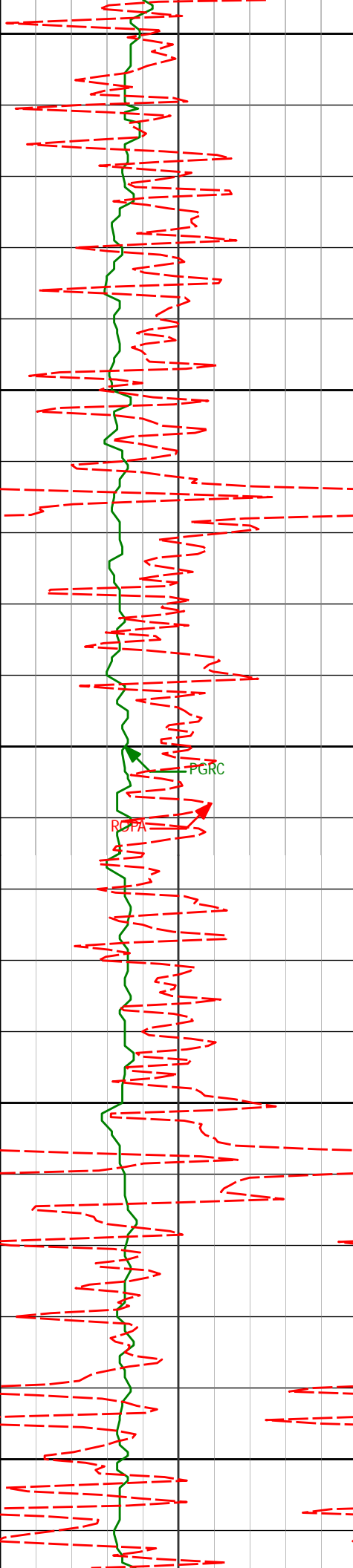
10.74°

92.56°

2217.44'

11.59'

2250



2300

2314'

2350

2400

2405'

2450

2497'

2500

2314'

2405'

2497'

10.42°

10.19°

9.58°

86.65°

82.26°

76.61°

2308.86'

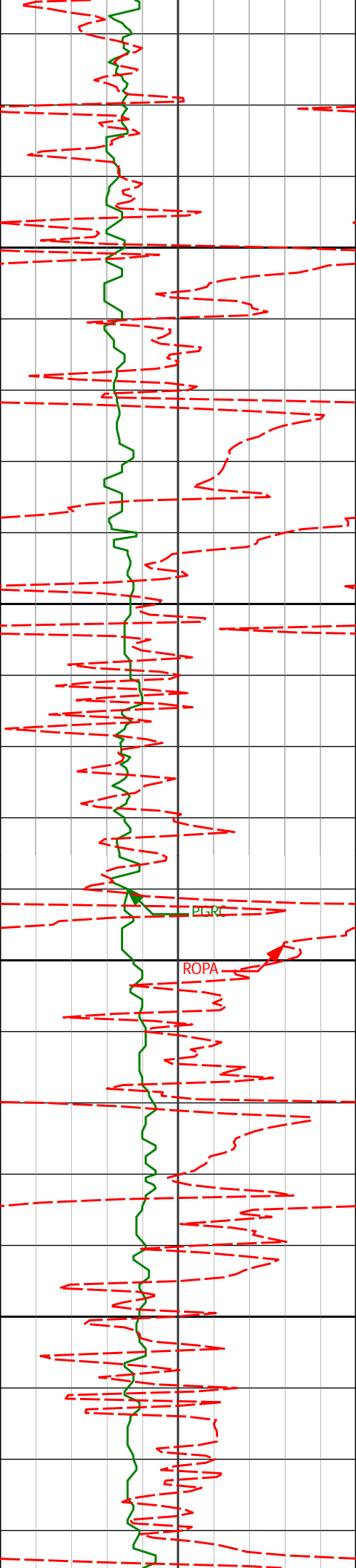
2398.40'

2489.03'

11.48'

9.92'

7.05'



2550

2590'

9.61°

85.33°

2580.74'

4.63'

2600

2650

PGRC

ROPA

2682'

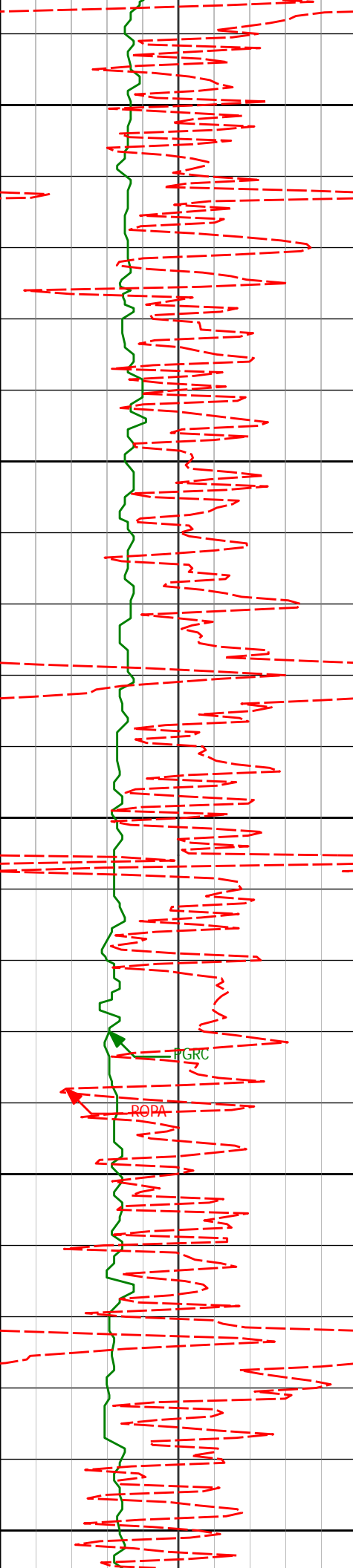
10.65°

84.83°

2671.30'

3.23'

2700



2750

2776'

10.33°

81.71°

2763.73'

1.24'

2800

2850

2871'

10.15°

80.22°

2857.22'

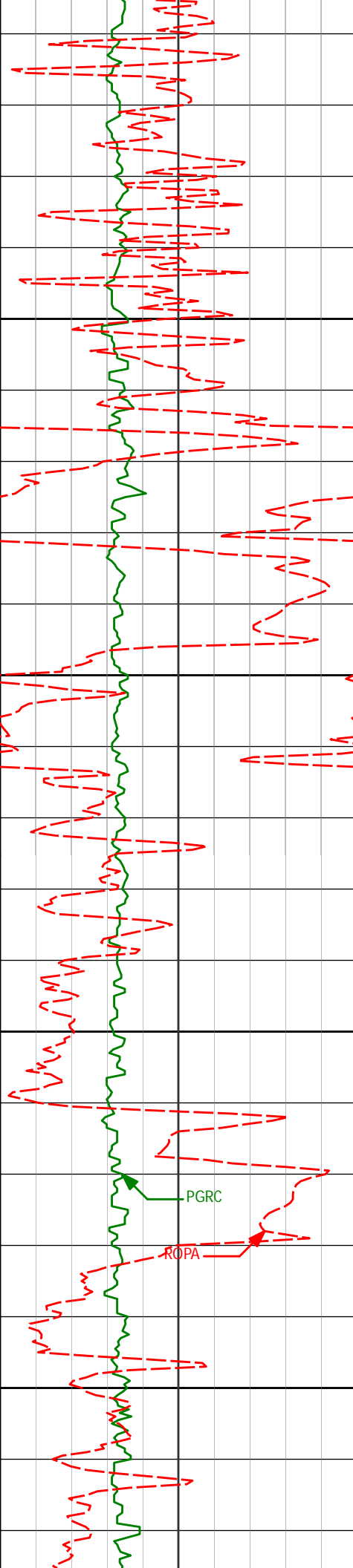
-1.41'

2900

2950

PGRC

ROPA



2965'

9.63°

77.43°

2949.82'

-4.53'

3000

3050

3060'

9.97°

86.99°

3043.44'

-6.69'

3100

3150

3155'

10.00°

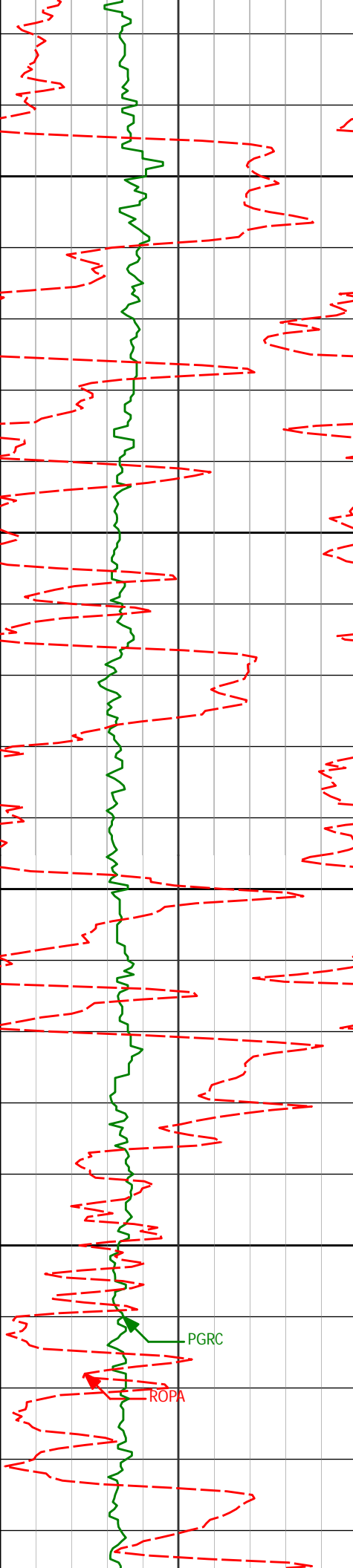
93.34°

3137.01'

-6.64'

PGRC

ROPA



3200

3250

3300

3350

3249'

9.61°

92.98°

3229.63'

-5.76'

3344'

9.78°

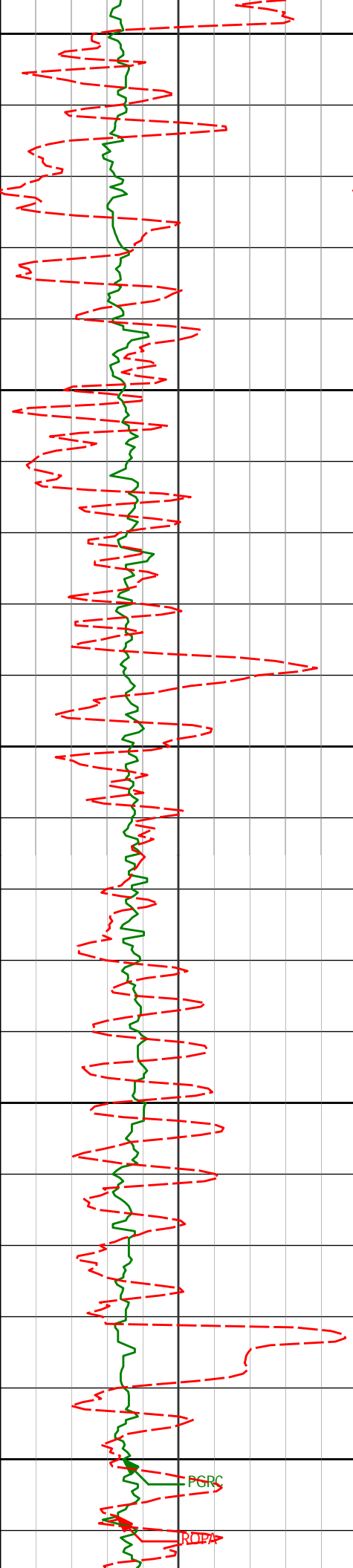
92.82°

3323.28'

-4.95'

PGRC

ROPA



3400

3438'

8.35°

95.11°

3416.10'

-3.95'

3450

3500

3533'

6.83°

95.06°

3510.27'

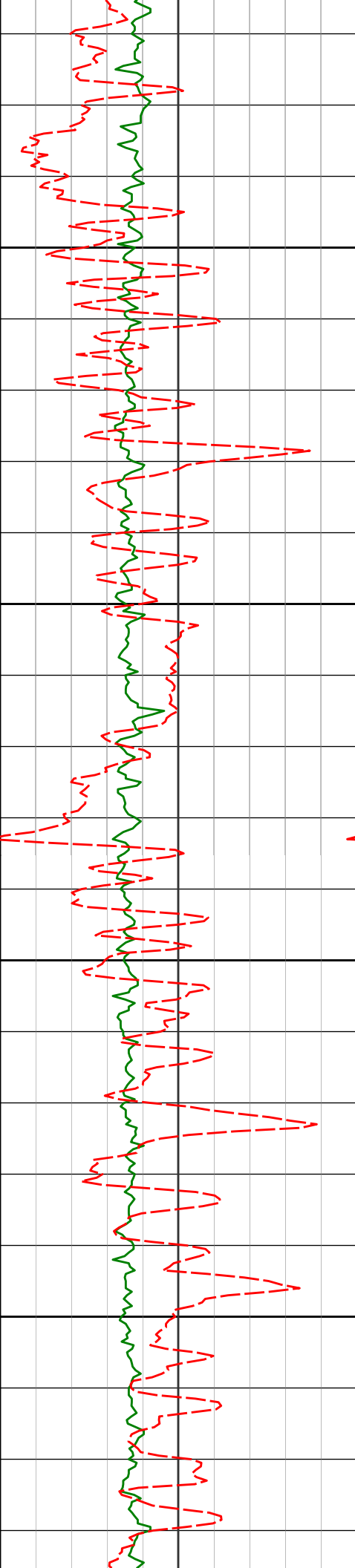
-2.84'

3550

3600

PGRC

JROPA



3628'

5.99°

91.92°

3604.67'

-2.17'

3650

3700

3723'

5.28°

83.31°

3699.21'

-2.52'

3750

3800

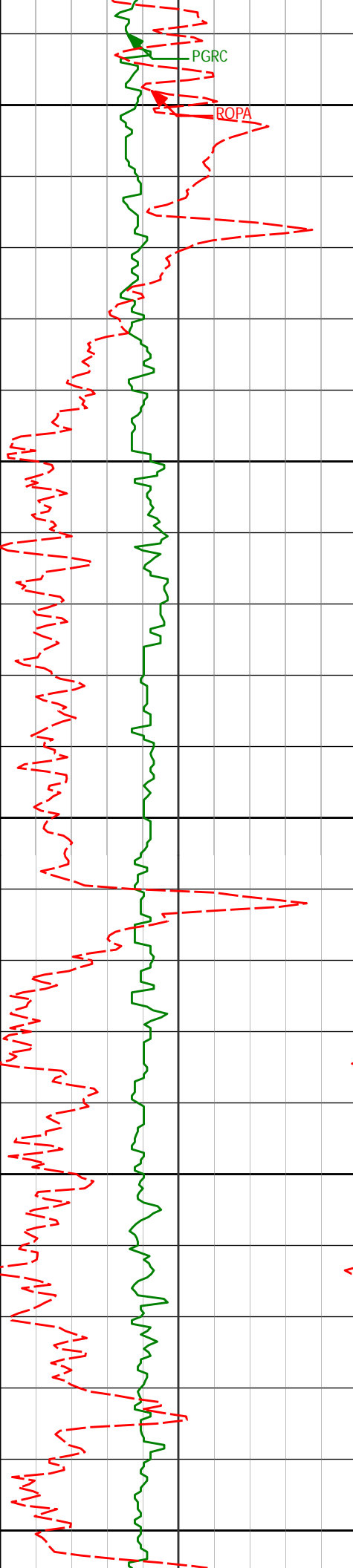
3817'

4.74°

84.47°

3792.85'

-3.40'



PGRC

ROPA

3850

3900

3950

4000

4050

3912'

4.31°

82.31°

3887.56'

-4.25'

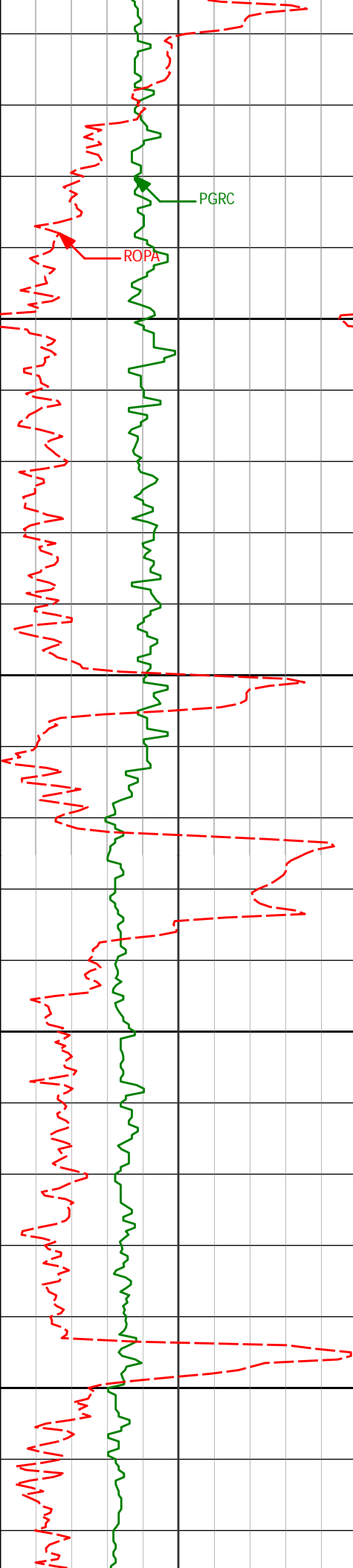
4006'

3.71°

84.03°

3981.33'

-5.04'



4100

4101'

3.13°

81.60°

4076.16'

-5.74'

4150

4200

4196'

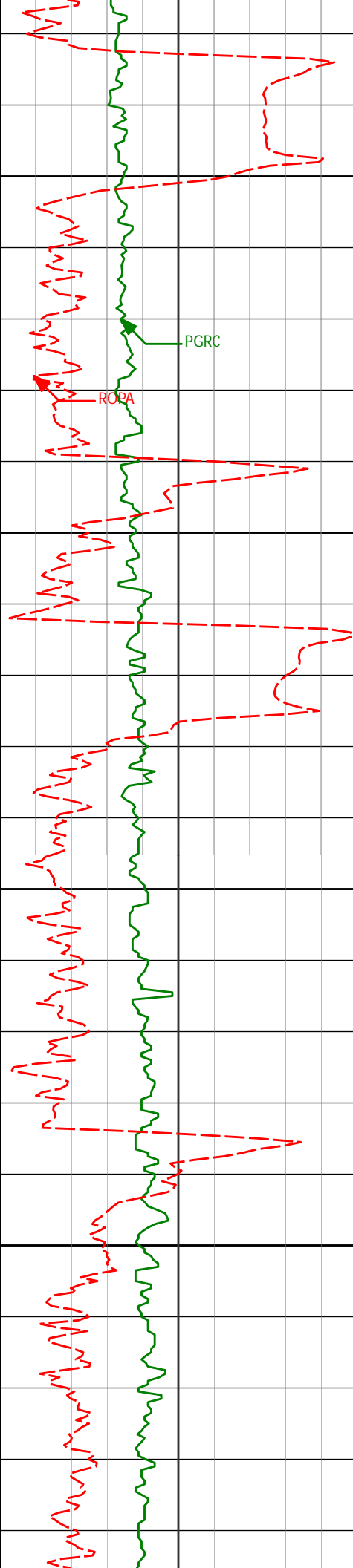
2.40°

62.71°

4171.05'

-7.03'

4250



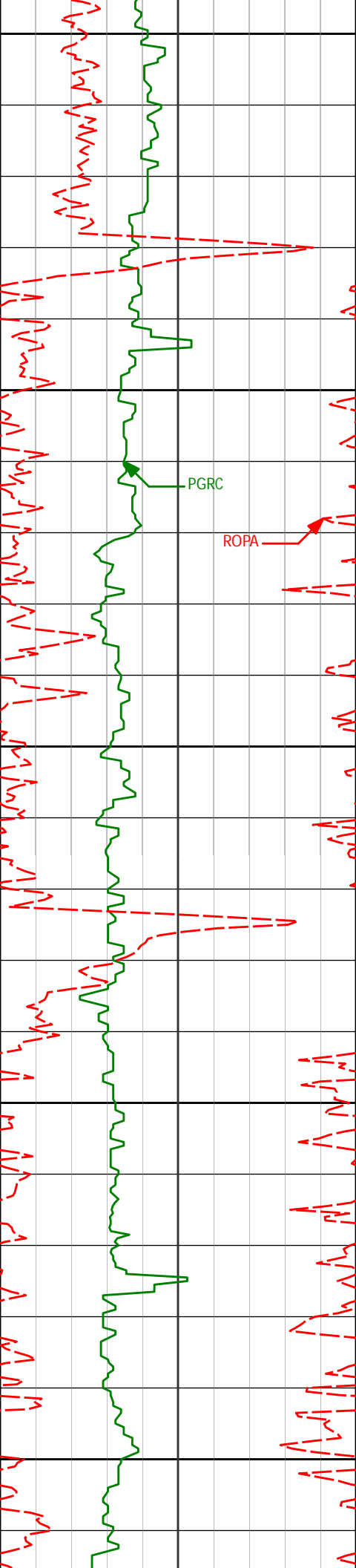
4300

4350

4400

4450

4290'	1.67°	38.38°	4264.99'	-9.01'
4385'	1.01°	318.49°	4359.97'	-10.72'
4479'	0.67°	300.12°	4453.96'	-11.61'



4500

4550

PGRC

ROPA

4574'

0.68°

253.52°

4548.95'

-11.73'

4600

4650

4668'

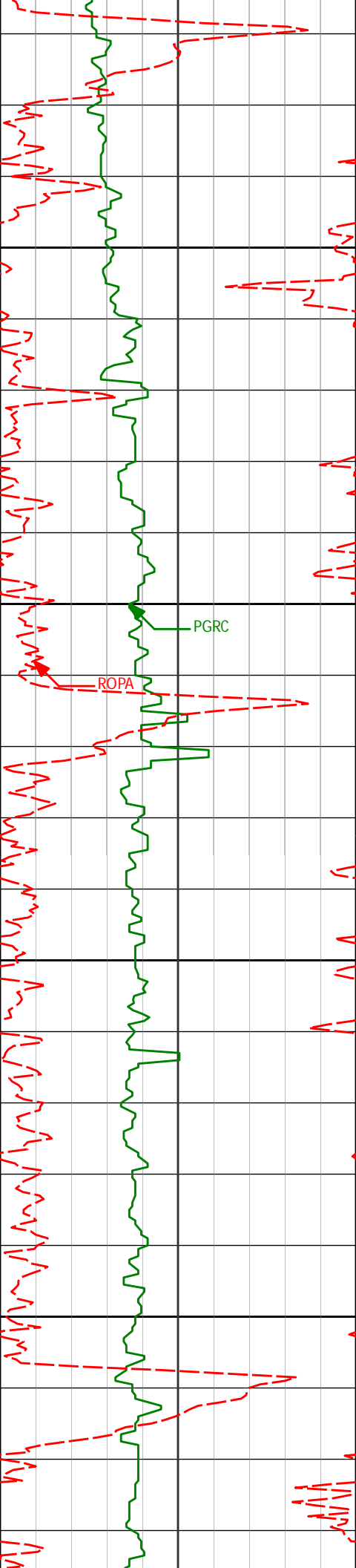
0.74°

251.66°

4642.95'

-11.38'

4700



4750

4763'

0.70°

266.02°

4737.94'

-11.15'

4800

PGRC

ROPA

4850

4857'

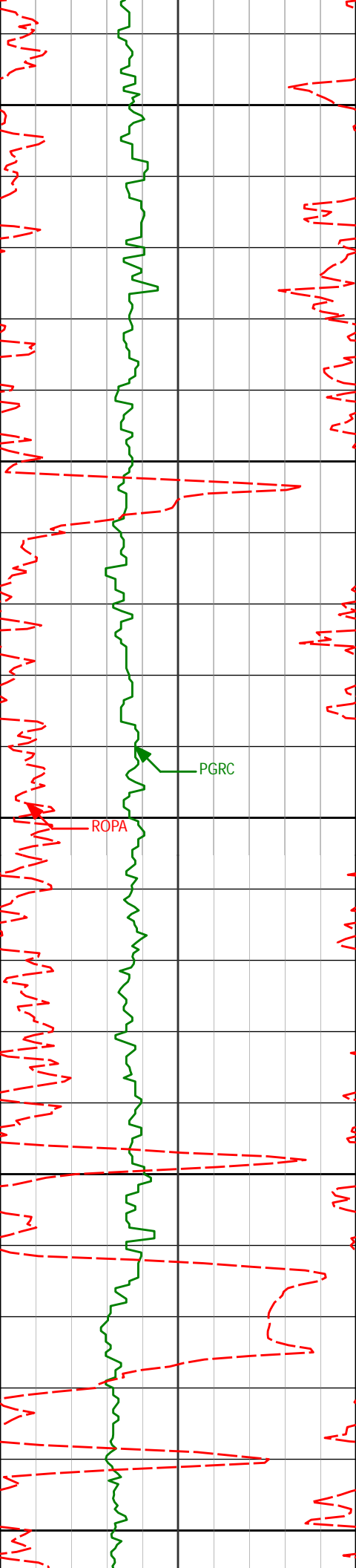
0.60°

271.96°

4831.93'

-11.13'

4900



4950

4952'

0.80°

268.07°

4926.93'

-11.12'

5000

5050

5100

5150

PGRC

ROPA

5047'

1.18°

254.35°

5021.91'

-10.84'

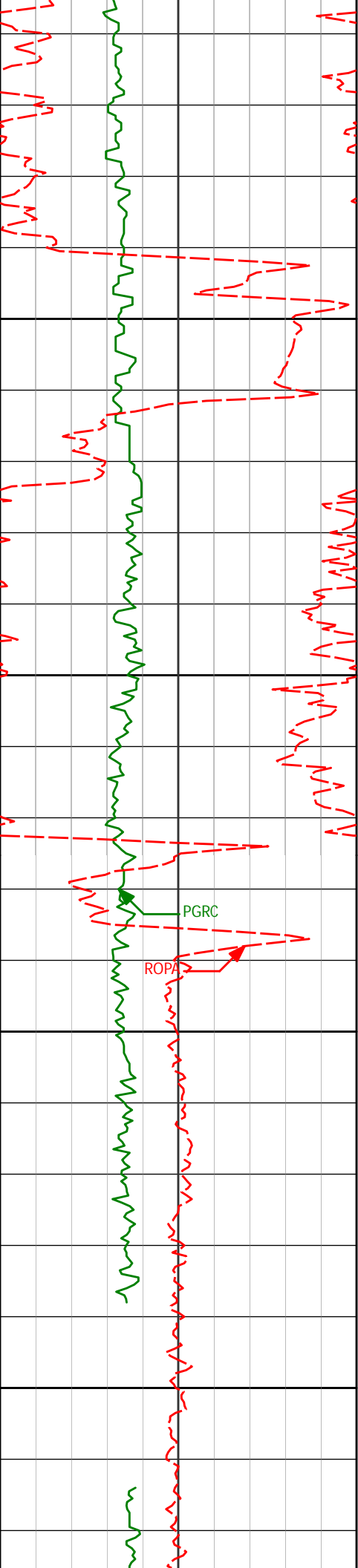
5141'

1.85°

192.84°

5115.88'

-9.10'



5200

5250

5300

5350

5236'

0.76°

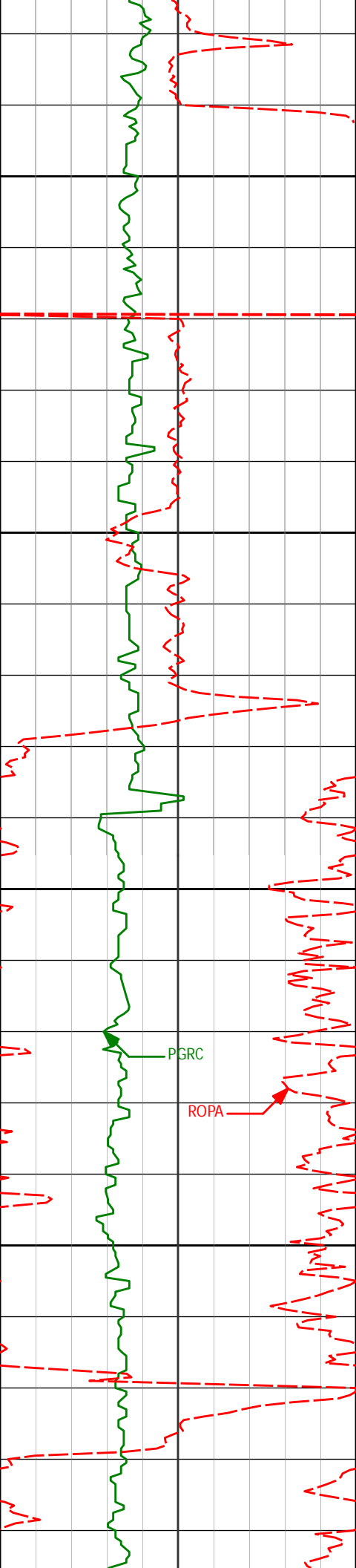
169.68°

5210.86'

-6.98'

PGRC

ROPA



5400

5425'

0.82°

133.31°

5399.84'

-4.82'

5450

5500

5520'

0.88°

121.10°

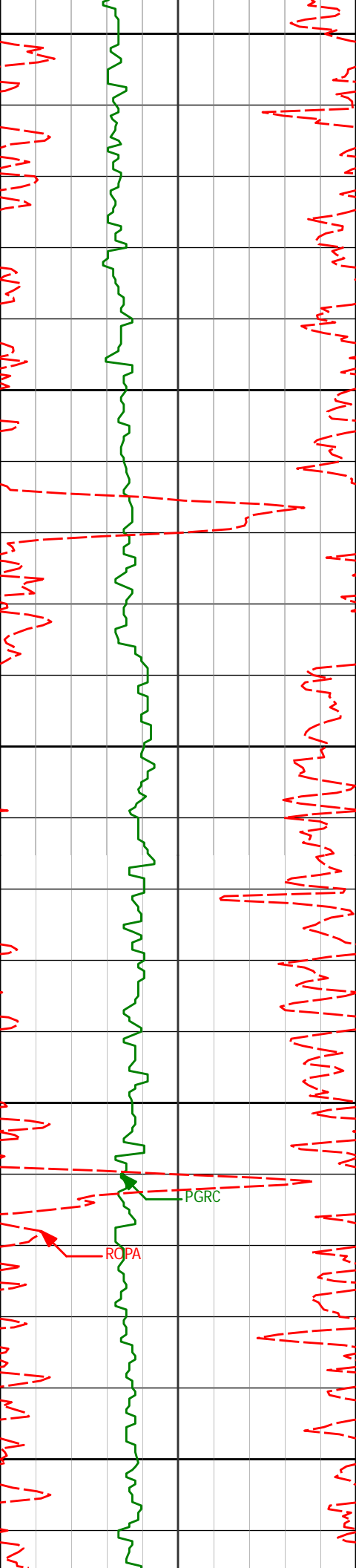
5494.83'

-3.98'

5550

PGRC

ROPA



5600

5614'

0.86°

124.69°

5588.82'

-3.20'

5650

5700

5709'

0.62°

124.47°

5683.81'

-2.51'

5750

5800

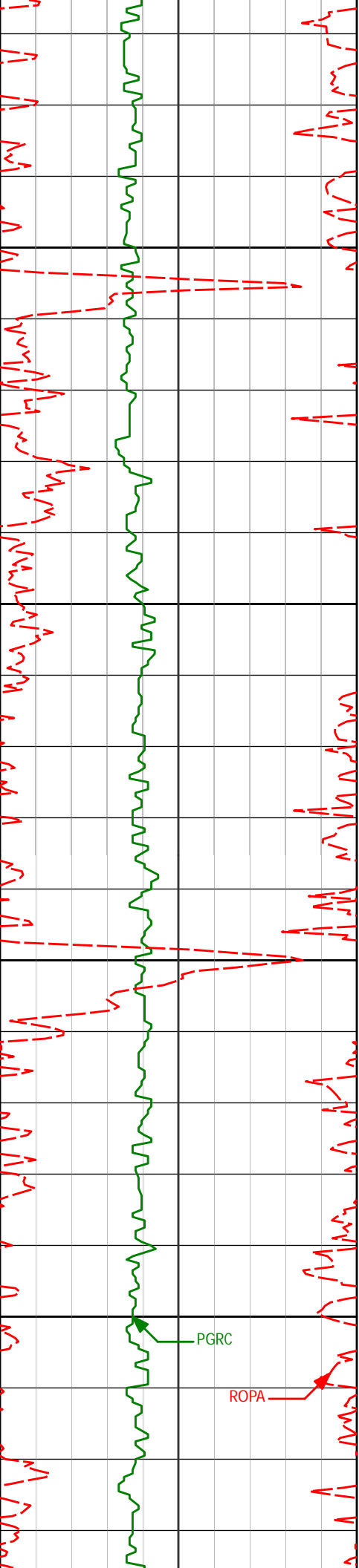
5803'

0.83°

128.15°

5777.80'

-1.80'



5850

5900

5950

6000

5898'

0.59°

120.15°

5872.80'

-1.13'

5993'

0.28°

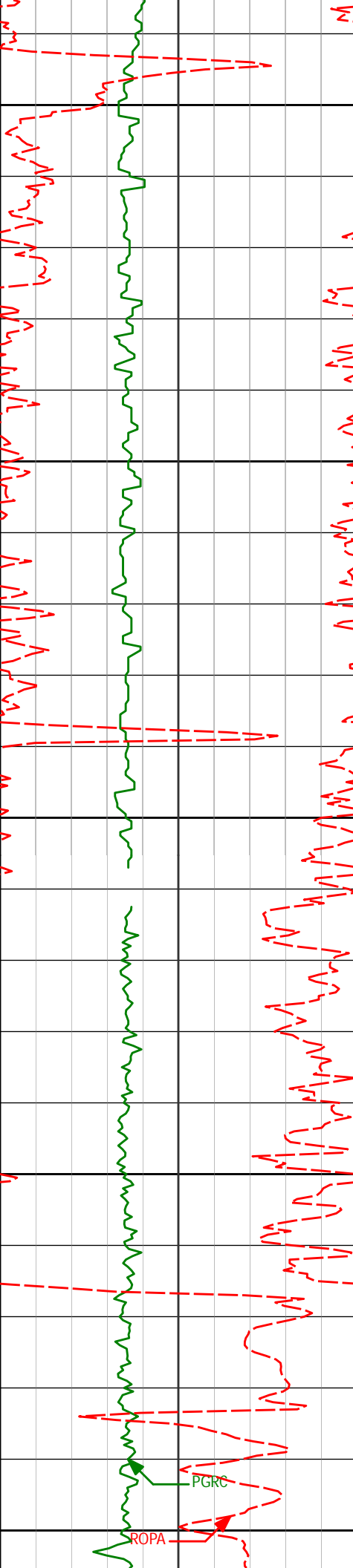
65.82°

5967.79'

-0.98'

PGRC

ROPA



6050

6088'

0.10°

181.03°

6062.79'

-0.99'

6100

6150

6182'

0.46°

296.66°

6156.79'

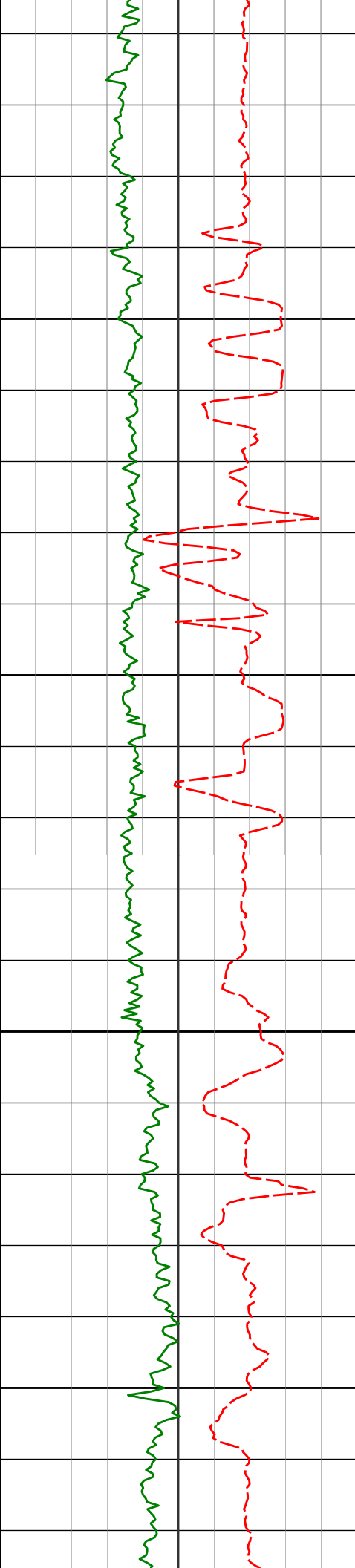
-1.08'

6200

6250

PGRC

ROPA



6300

6350

6400

6450

6276'

0.44°

319.78°

6250.79'

-1.52'

6371'

0.80°

0.45°

6345.79'

-2.46'

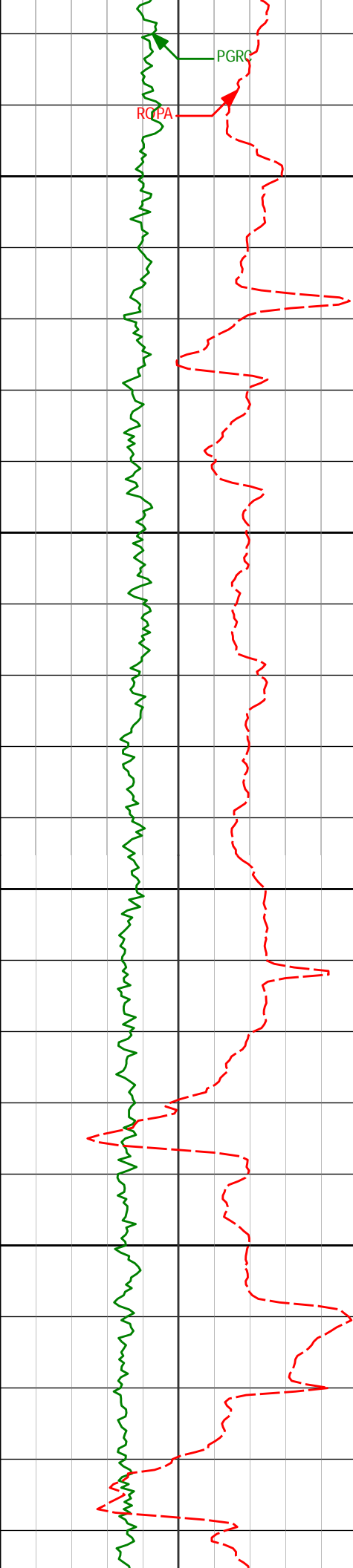
6465'

1.16°

294.88°

6439.77'

-3.52'



6500

6550

6600

6650

6560'

1.76°

305.82°

6534.74'

-4.78'

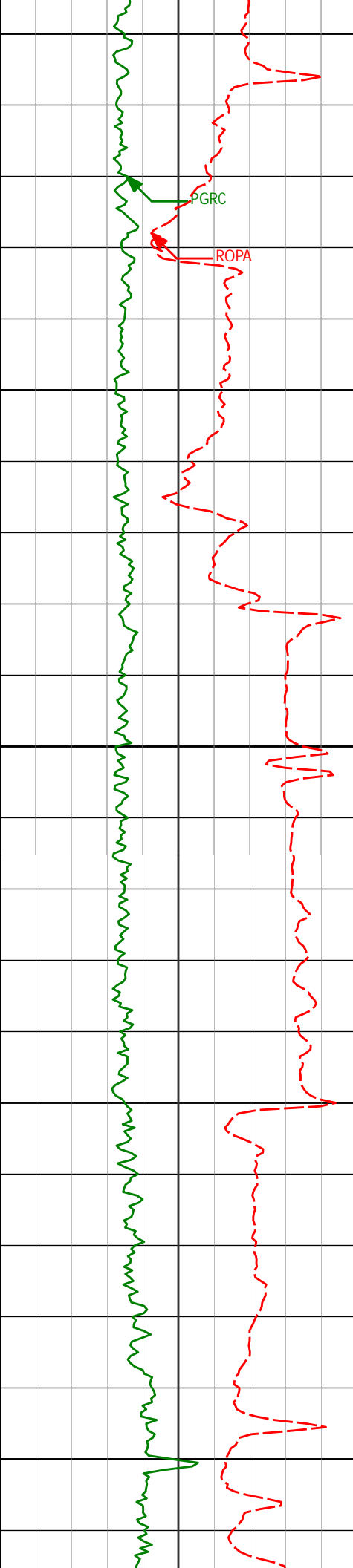
6655'

1.04°

324.82°

6629.71'

-6.34'



6700

PGRC

ROPA

6750

6749'

0.35°

28.90°

6723.71'

-7.28'

6800

6850

6900

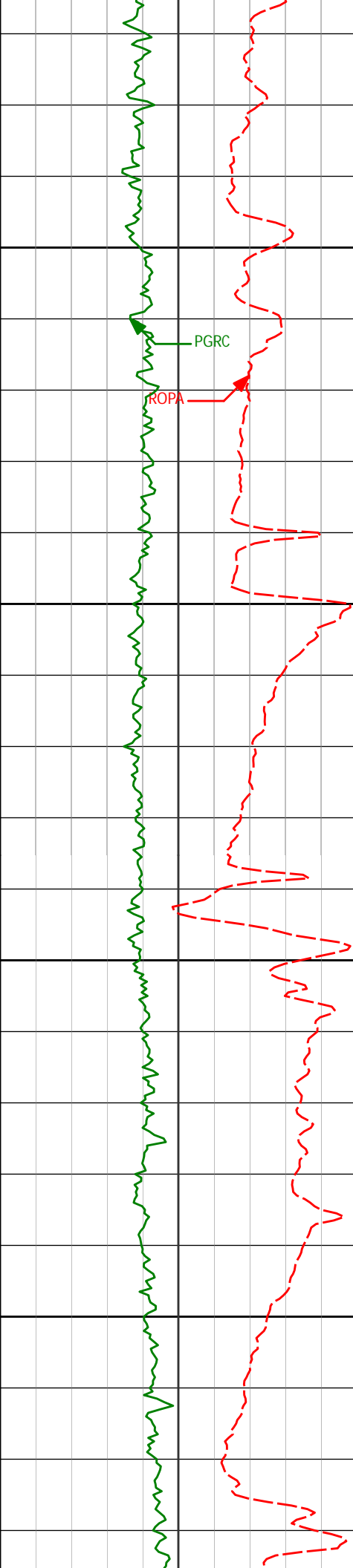
6844'

0.52°

336.00°

6818.71'

-7.93'



6950

7000

7050

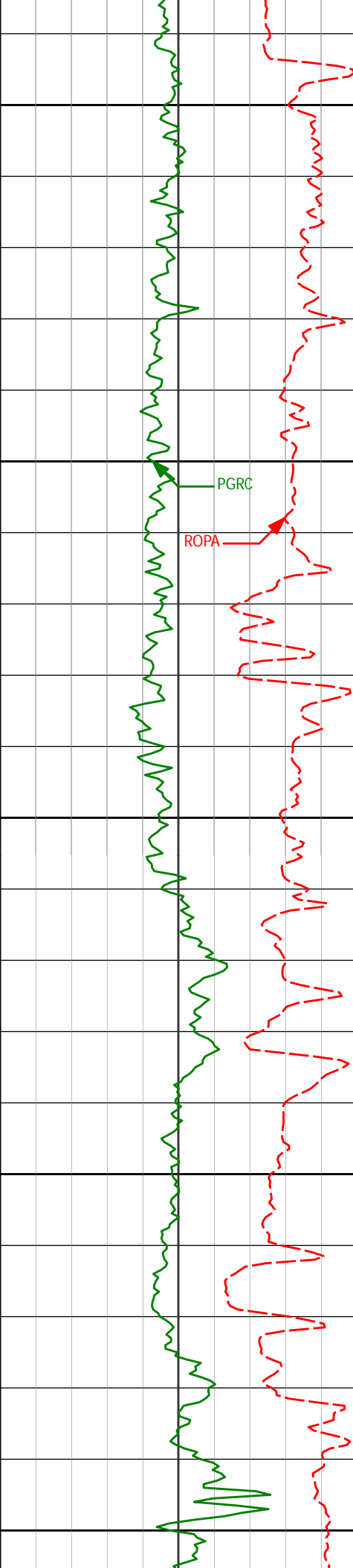
7100

6939'	0.65°	274.08°	6913.70'	-8.36'
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7033'	4.25°	180.11°	7007.61'	-4.92'
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7080'	9.43°	177.82°	7054.26'	0.68'
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7128'	14.91°	180.79°	7101.17'	10.79'
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7150

7175'

20.26°

178.22°

7145.96'

24.98'

7200

PGRC

ROPA

7222'

25.53°

178.91°

7189.24'

43.25'

7250

7269'

28.57°

182.45°

7231.09'

64.61'

7300

7317'

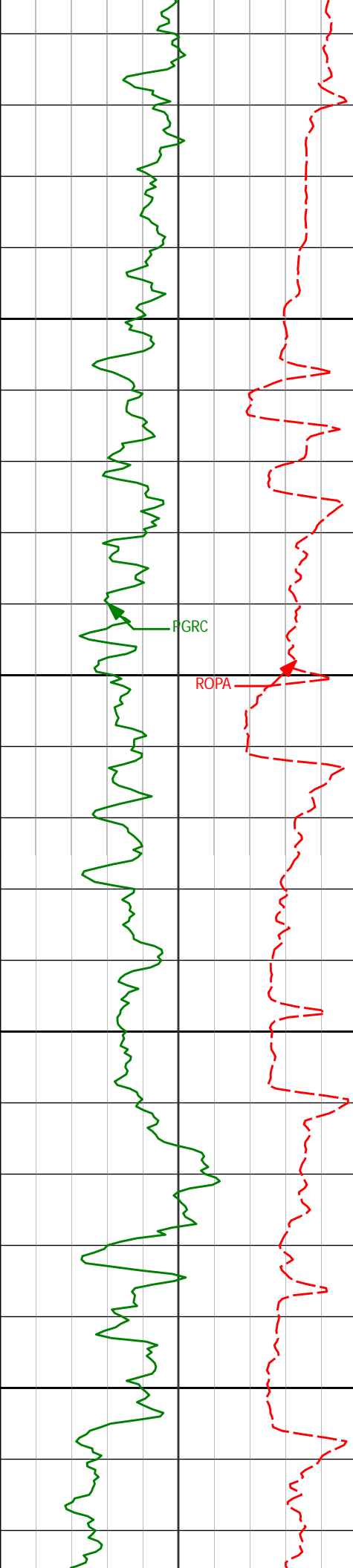
31.18°

186.14°

7272.72'

88.44'

7350



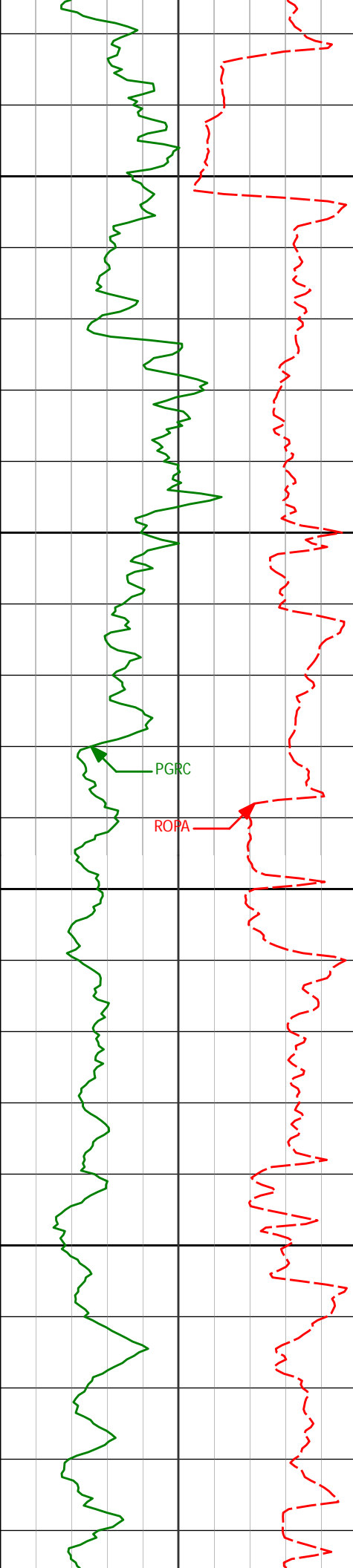
7400

7450

7500

7550

7364'	35.88°	182.05°	7311.89'	114.32'
7411'	40.67°	179.46°	7348.78'	143.42'
7458'	44.18°	178.69°	7383.47'	175.11'
7506'	49.13°	182.32°	7416.41'	210.00'
7553'	51.81°	182.51°	7446.32'	246.21'



7600

7601'

55.22°

181.54°

7474.86'

284.77'

7650

7648'

60.97°

181.38°

7499.69'

324.64'

7700

7695'

64.62°

179.39°

7521.17'

366.43'

7750

7742'

68.64°

178.75°

7539.81'

409.56'

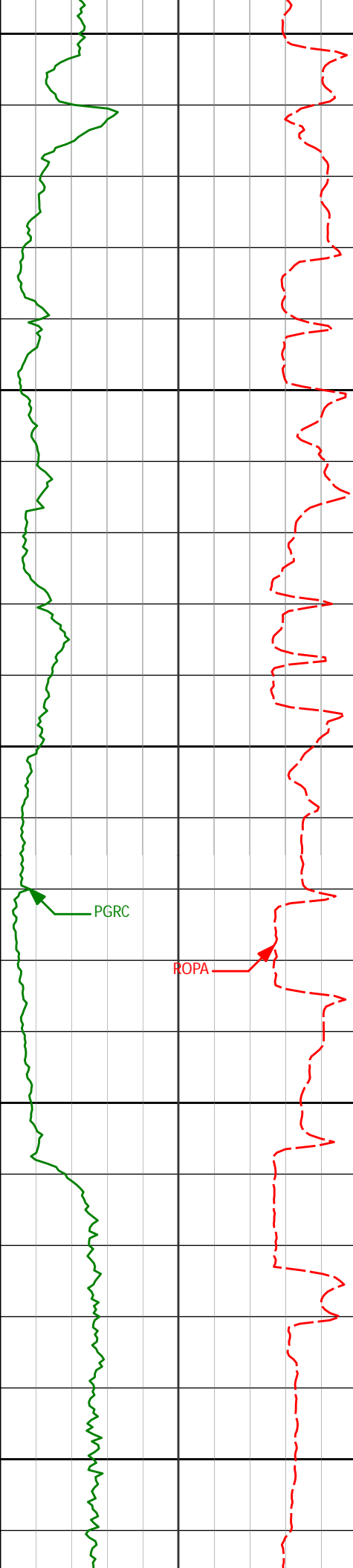
7790'

72.84°

178.95°

7555.64'

454.86'



7800

7837'

76.89°

178.52°

7567.91'

500.21'

7850

7884'

81.45°

178.04°

7576.74'

546.34'

7900

7924'

85.71°

177.94°

7581.21'

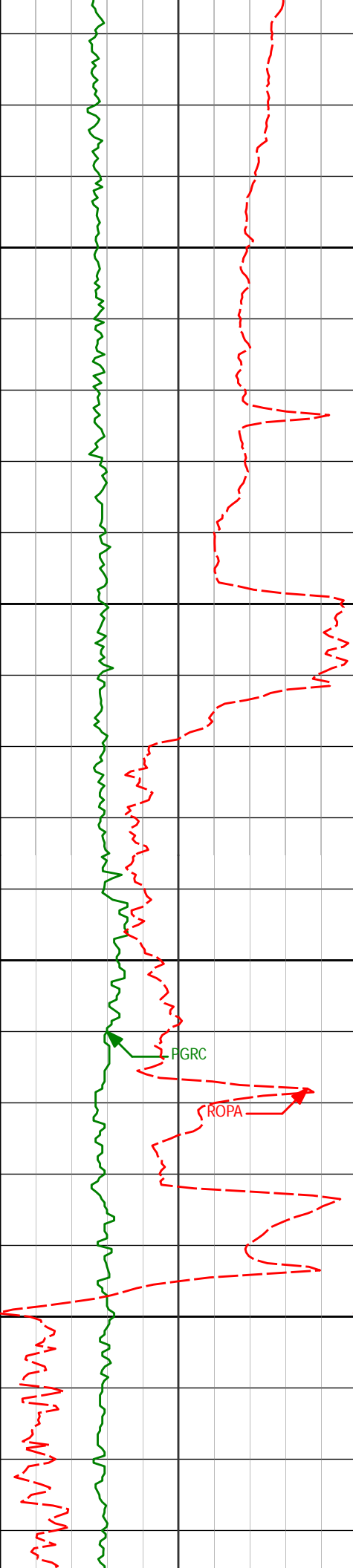
586.05'

7950

7" Shoe

Run 200

8000



8050

8100

8150

8200

8020'

87.69°

178.21°

7586.74'

681.83'

8115'

87.57°

179.08°

7590.67'

776.72'

FGRC

ROPA

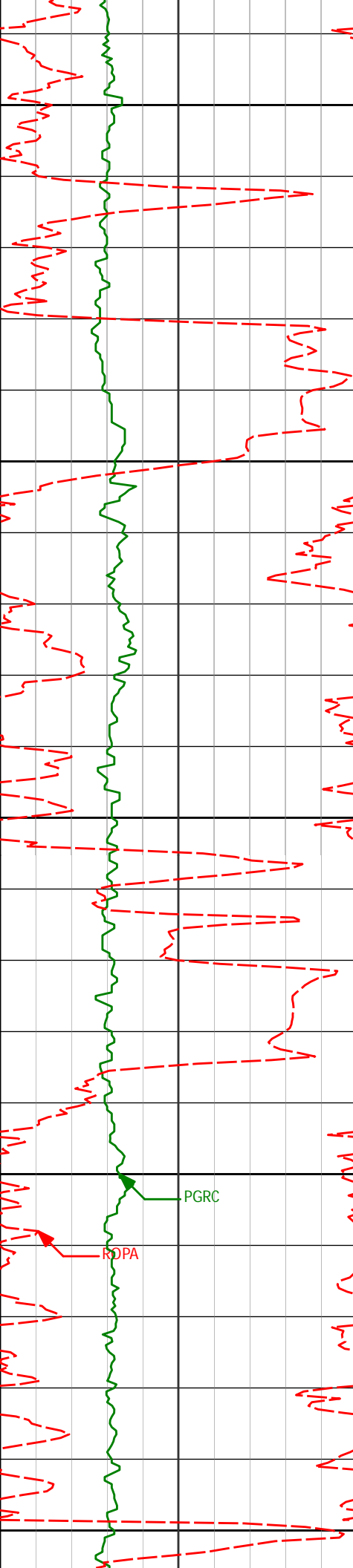
8209'

89.38°

178.37°

7593.17'

870.66'



8250

8300

8350

8400

8450

8303'

90.49°

178.75°

7593.27'

964.63'

8398'

90.15°

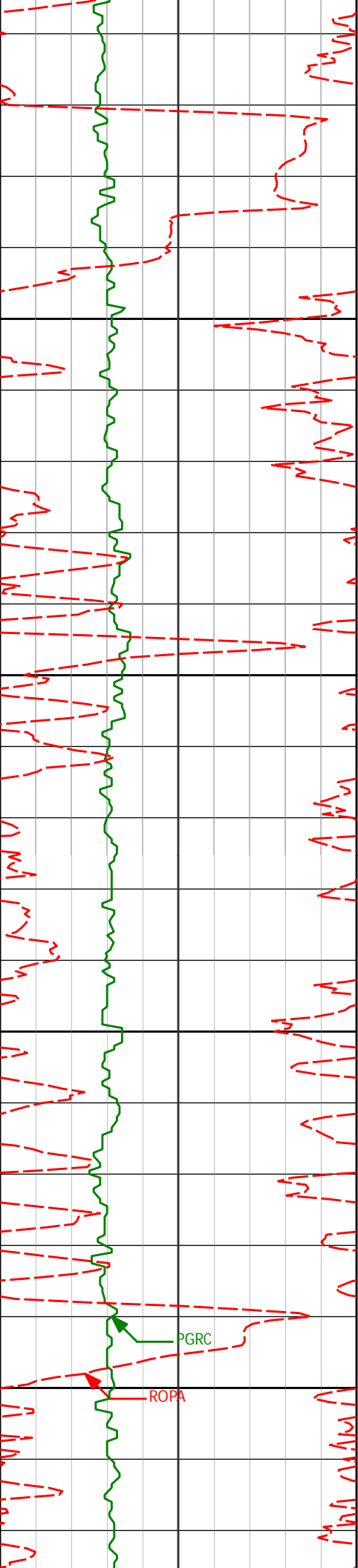
179.97°

7592.74'

1059.62'

PGRC

RDPA



8492'

90.68°

181.54°

7592.06'

1153.61'

8500

8550

8587'

90.09°

180.47°

7591.42'

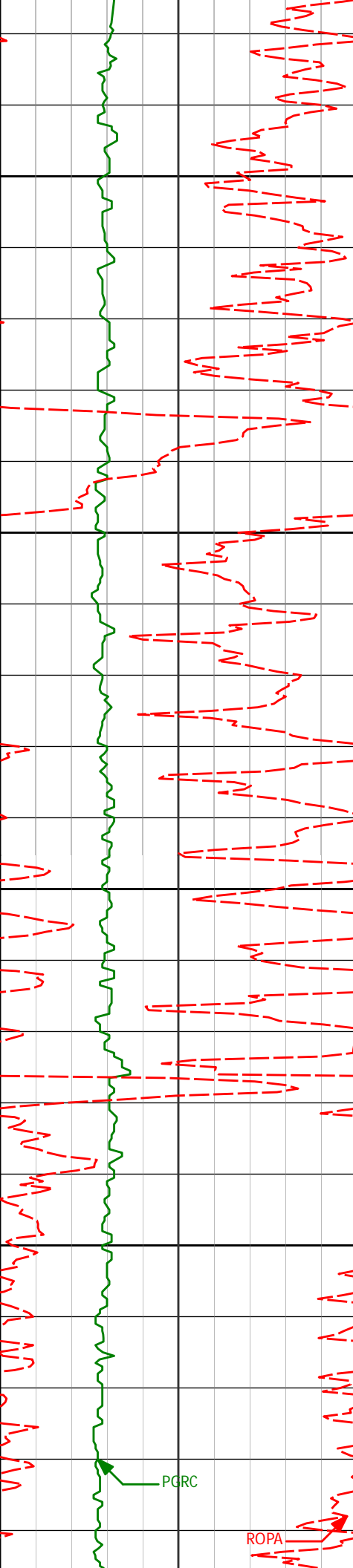
1248.59'

8600

8650

PGRC

ROPA



8682'	90.12°	180.30°	7591.25'	1343.59'
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8700

8750

8776'	90.89°	180.11°	7590.42'	1437.58'
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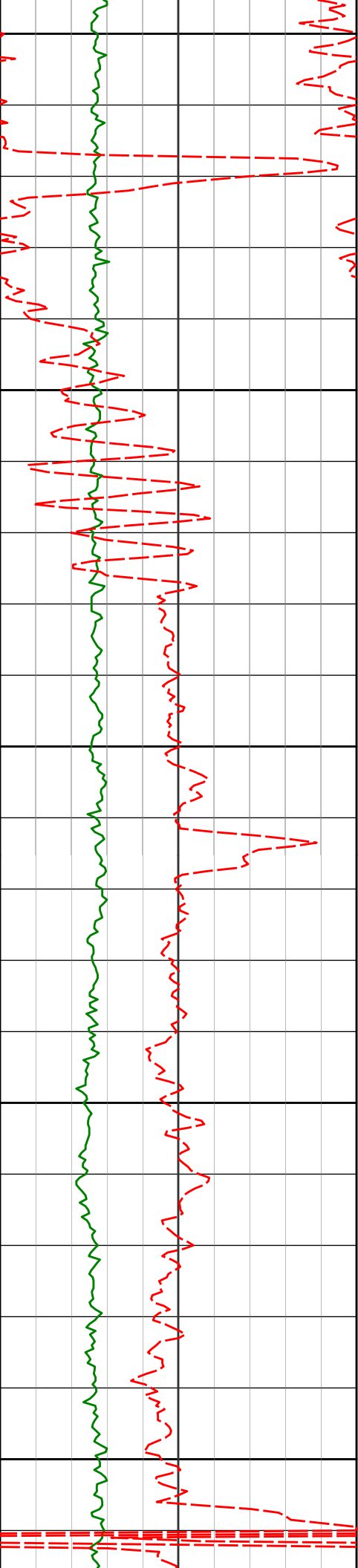
8800

8850

8870'	91.14°	180.08°	7588.76'	1531.57'
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PGRC

ROPA



8900

8950

9000

9050

9100

8964'

90.92°

179.80°

7587.07'

1625.55'

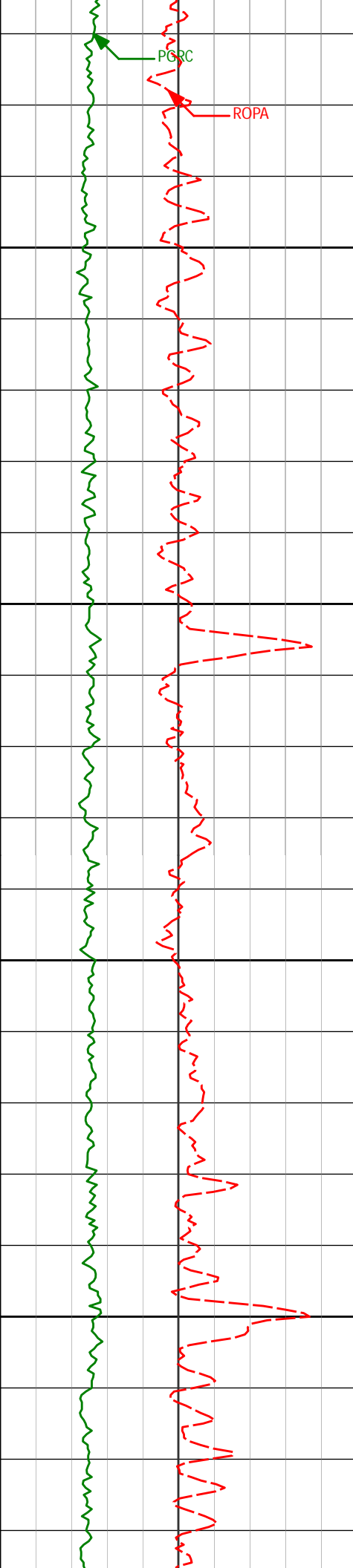
9059'

90.00°

179.61°

7586.30'

1720.55'



PGRC

ROPA

9150

9153'

90.34°

180.48°

7586.03'

1814.55'

9200

9250

9247'

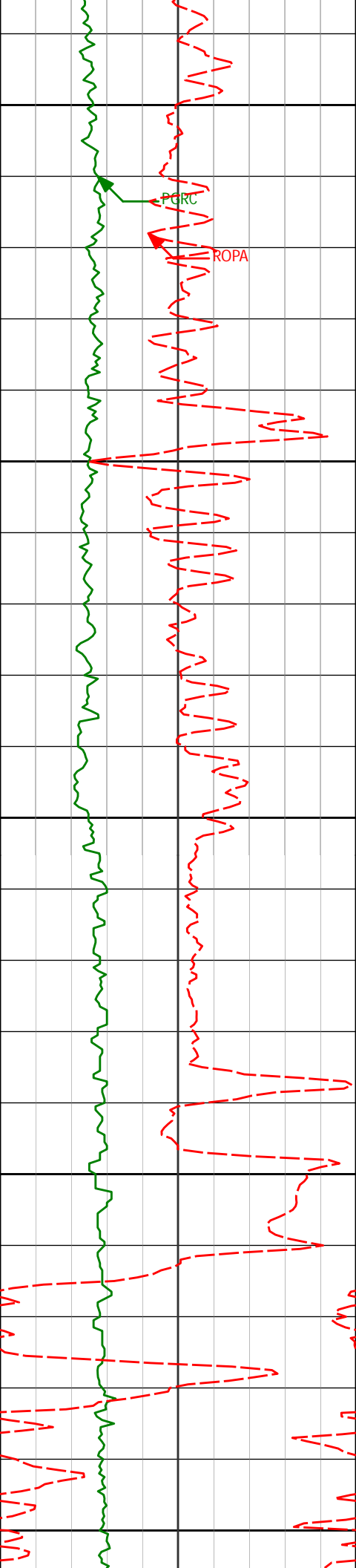
90.03°

180.45°

7585.72'

1908.54'

9300



9350

9400

9450

9500

9550

9341'

89.05°

181.10°

7586.48'

2002.53'

9435'

88.24°

181.10°

7588.70'

2096.48'

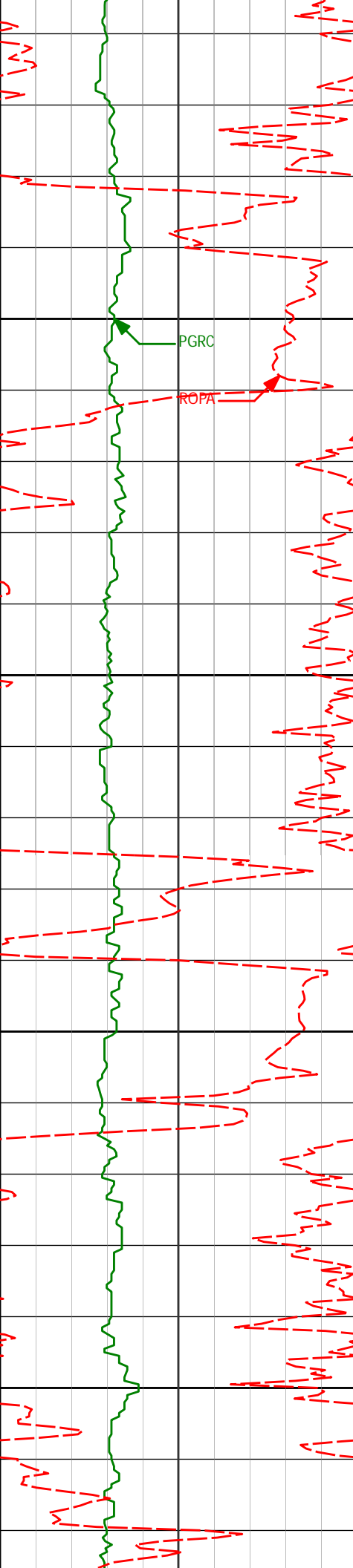
9530'

87.57°

180.93°

7592.17'

2191.40'



9600

9650

9700

9750

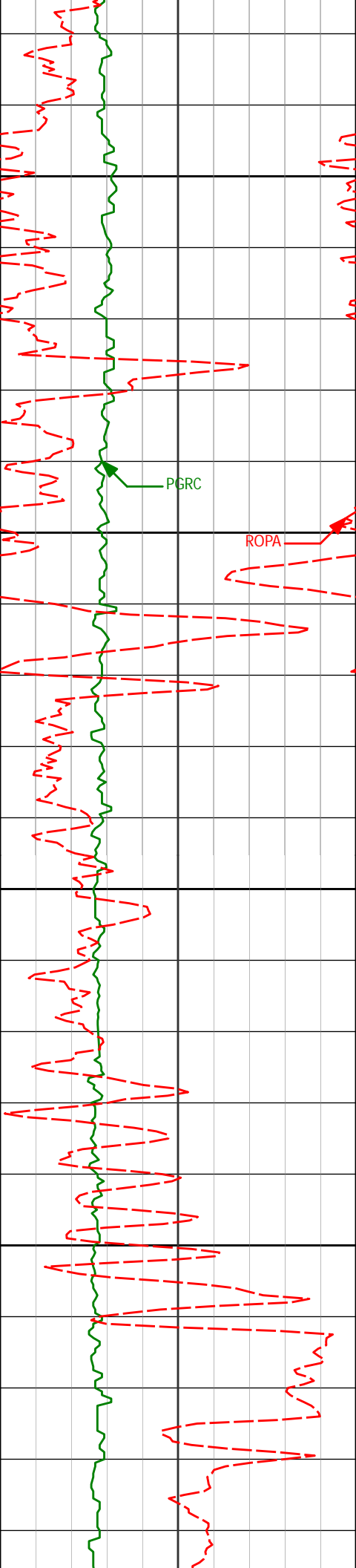
9718'

91.17°

181.08°

7594.24'

2379.33'



9800

9812'

91.33°

180.71°

7592.19'

2473.30'

9850

9900

9906'

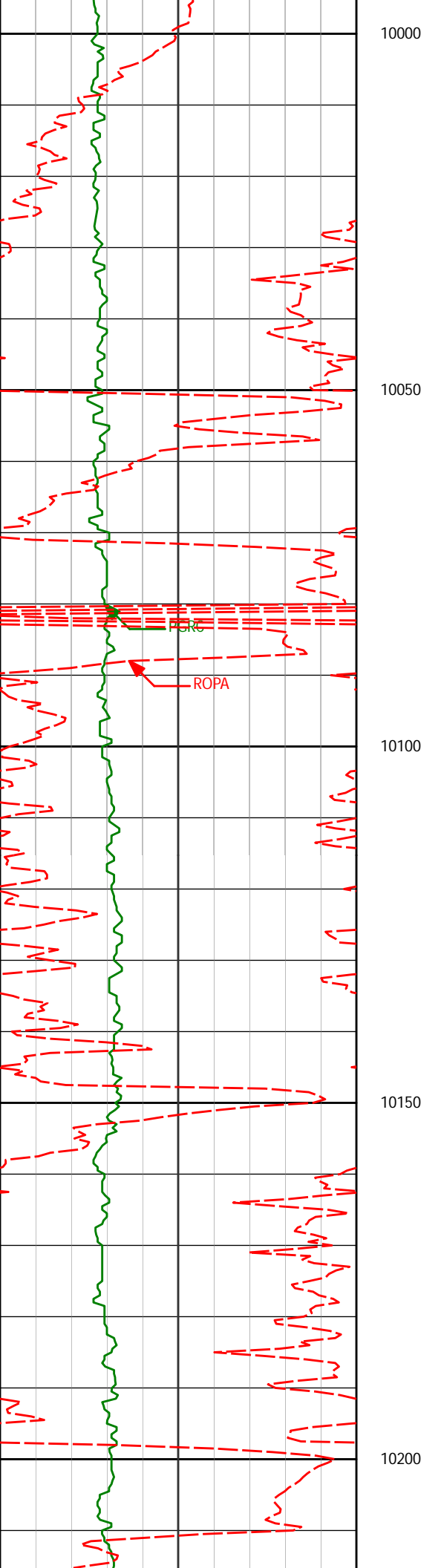
91.60°

180.86°

7589.79'

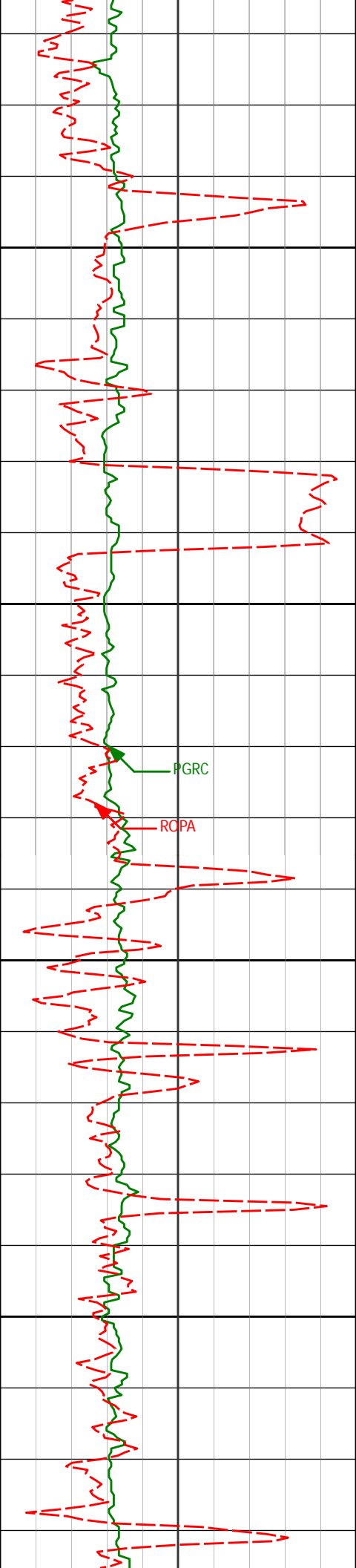
2567.26'

9950



10095'	87.29°	179.03°	7591.62'	2756.20'
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10189'	87.32°	178.29°	7596.04'	2850.07'
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10250

10283'

89.01°

178.43°

7599.05'

2943.98'

10300

PGRC

ROPA

10350

10377'

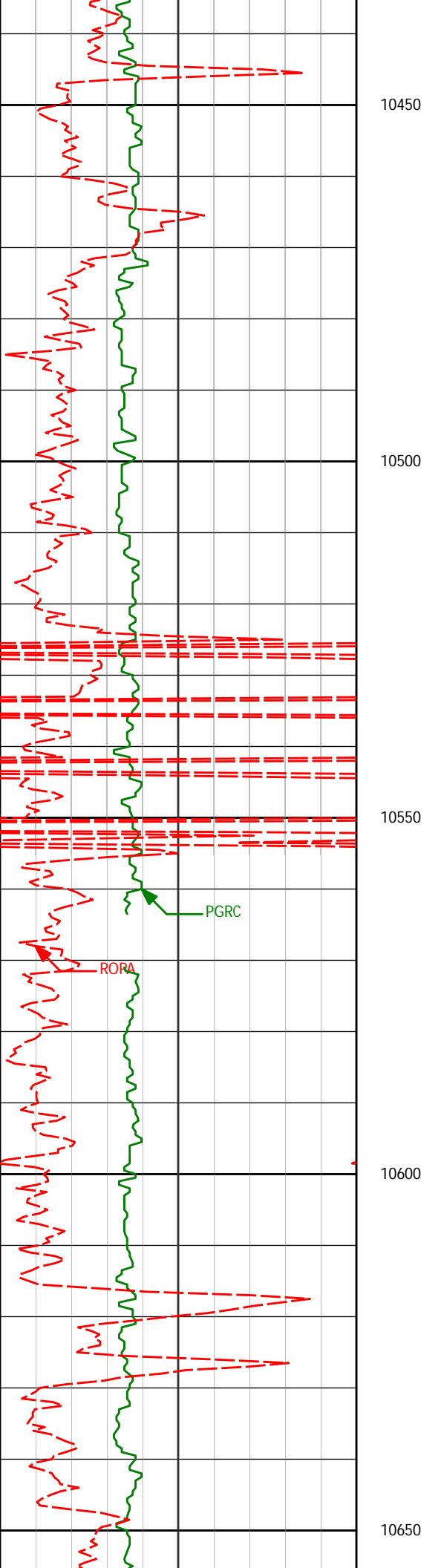
90.43°

179.05°

7599.51'

3037.95'

10400



10471'

90.22°

178.48°

7598.97'

3131.93'

10450

10500

10550

10600

10650

10566'

90.15°

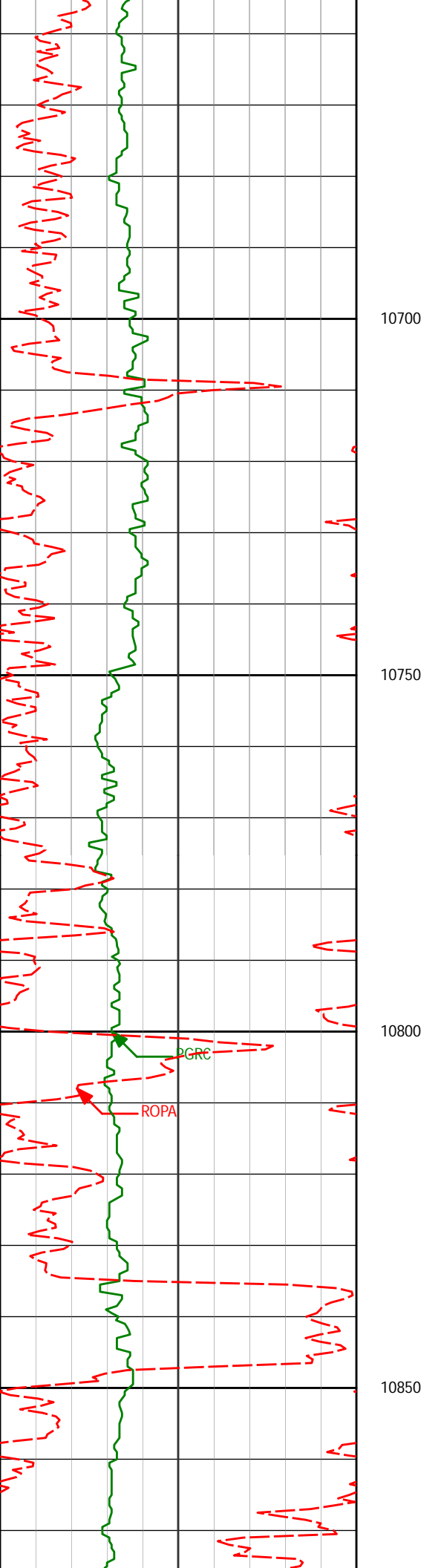
178.55°

7598.67'

3226.90'

PGRC

RORA



10657'	91.14°	178.60°	7597.64'	3317.86'
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10700

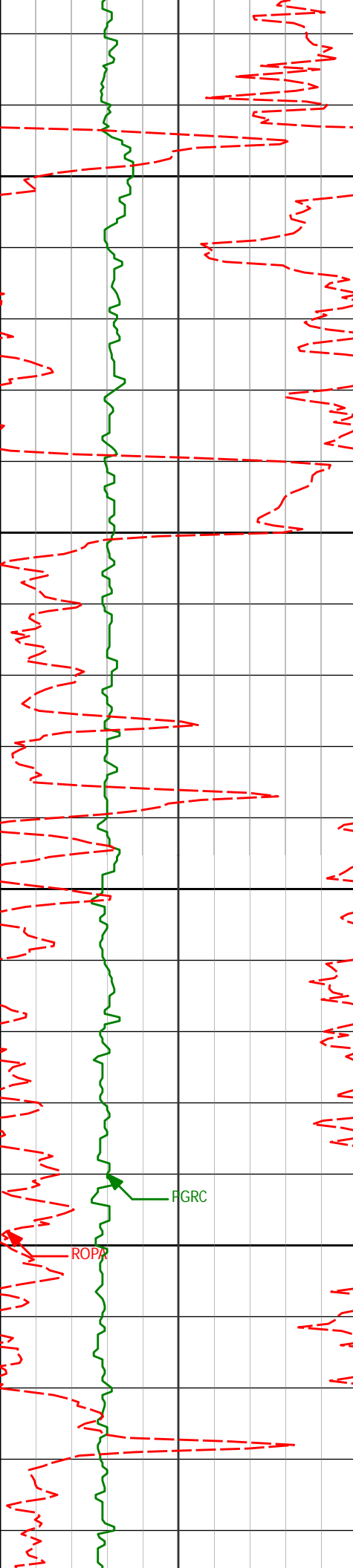
10750

10800

10850

10749'	91.94°	178.93°	7595.17'	3409.80'
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10841'	91.29°	179.07°	7592.58'	3501.75'
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10900

10933'

91.32°

179.97°

7590.48'

3593.73'

10950

11000

11024'

91.05°

179.81°

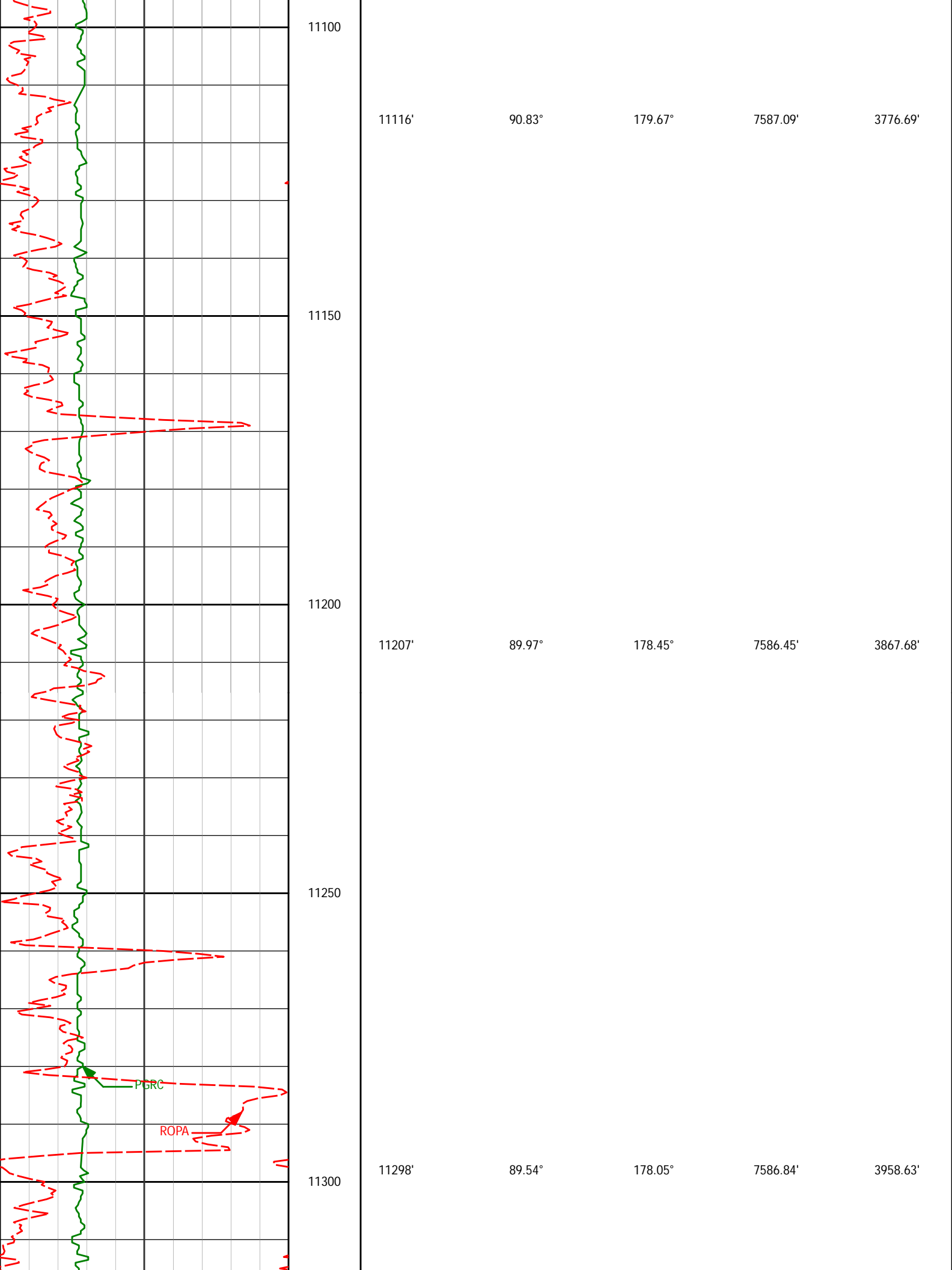
7588.60'

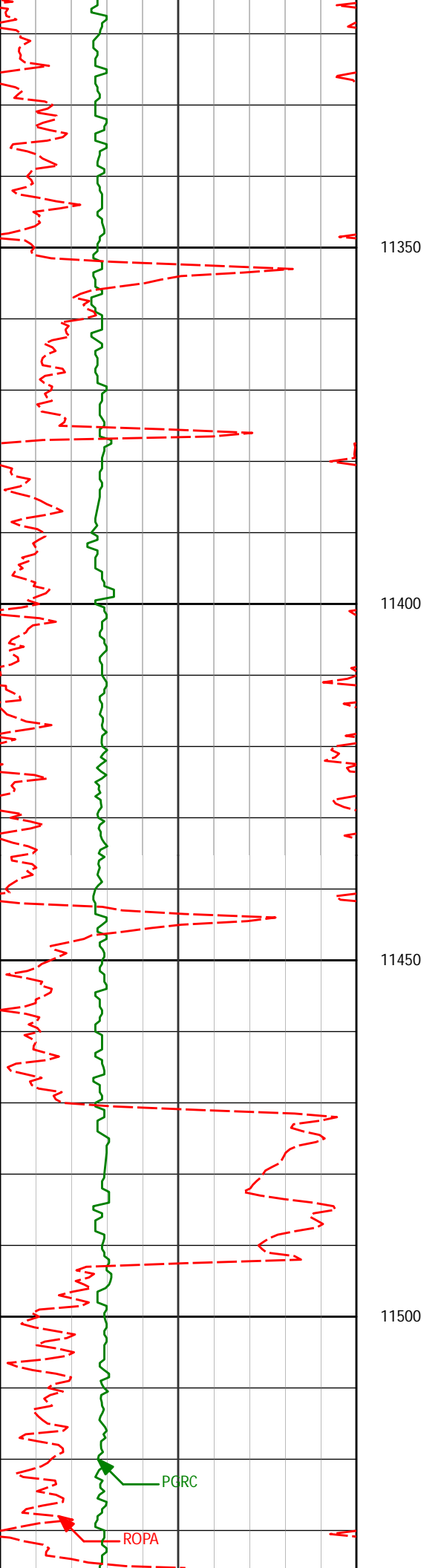
3684.71'

11050

FGRC

ROPA





11391'

88.52°

176.26°

7588.42'

4051.50'

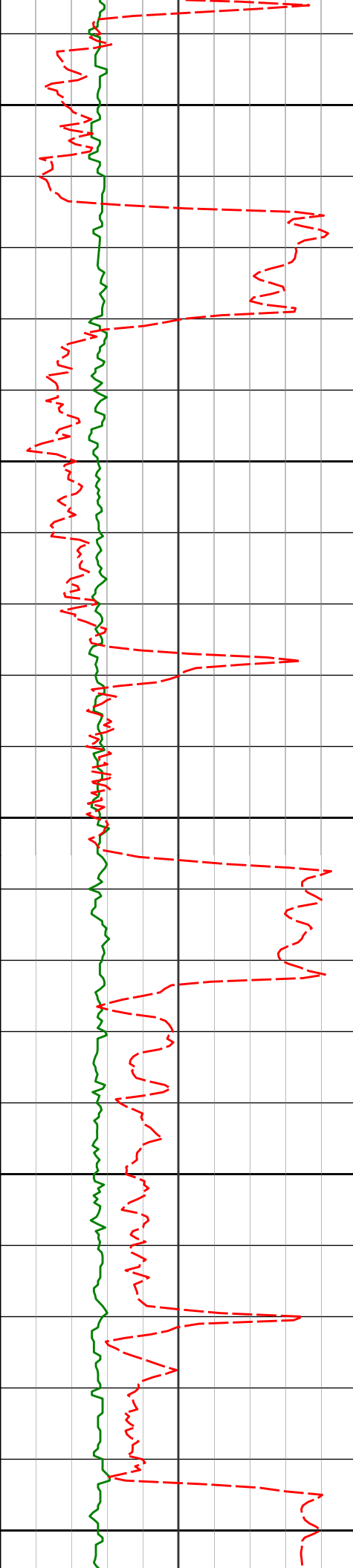
11482'

89.75°

176.44°

7589.79'

4142.30'



11550

11575'

90.92°

177.46°

7589.25'

4235.17'

11600

11650

11667'

90.71°

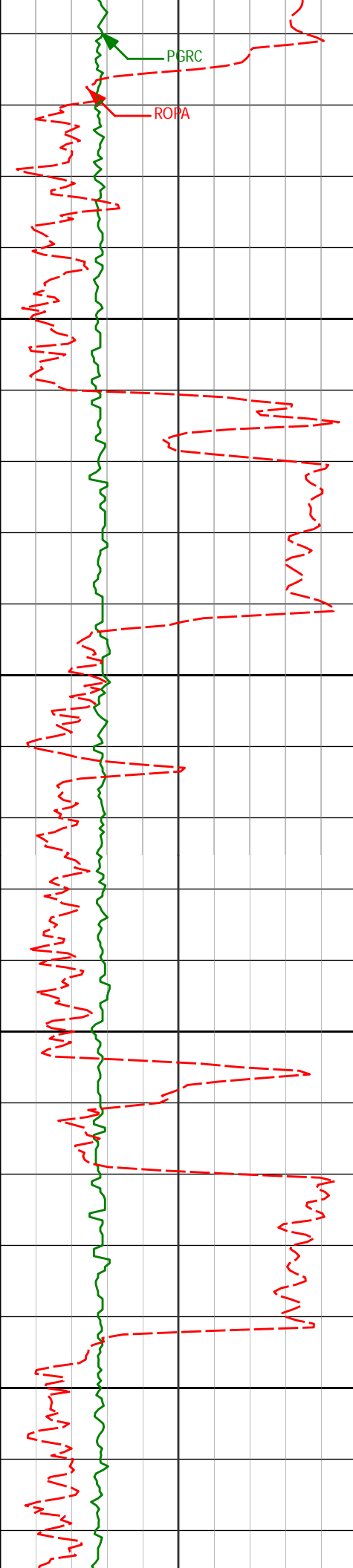
177.86°

7587.94'

4327.08'

11700

11750



11759'

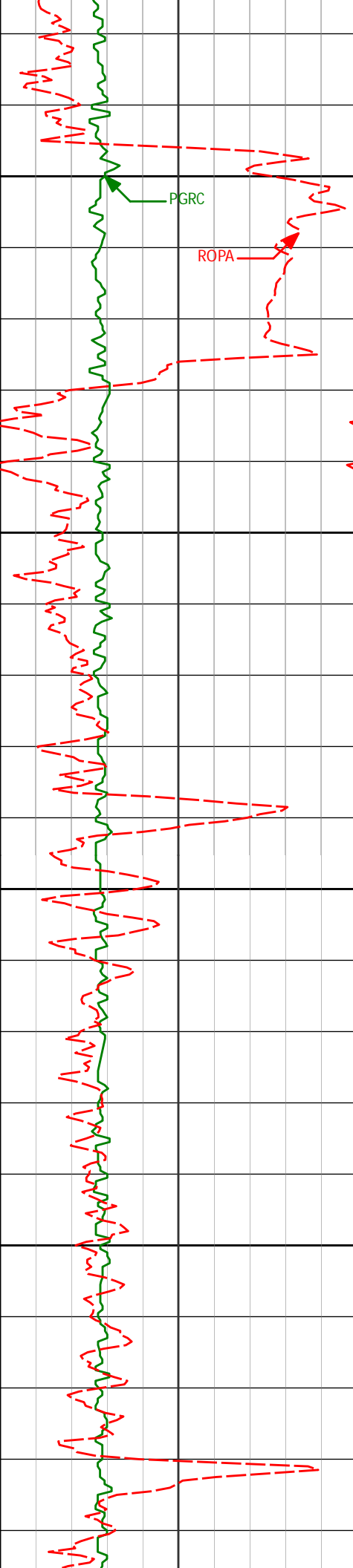
11800

11850

11900

11950

11759'	89.17°	178.10°	7588.04'	4419.02'
11853'	89.35°	179.18°	7589.25'	4512.98'
11945'	89.72°	179.96°	7590.00'	4604.98'



12000

PGRC

ROPA

12037'

90.71°

181.89°

7589.65'

4696.96'

12050

12100

12129'

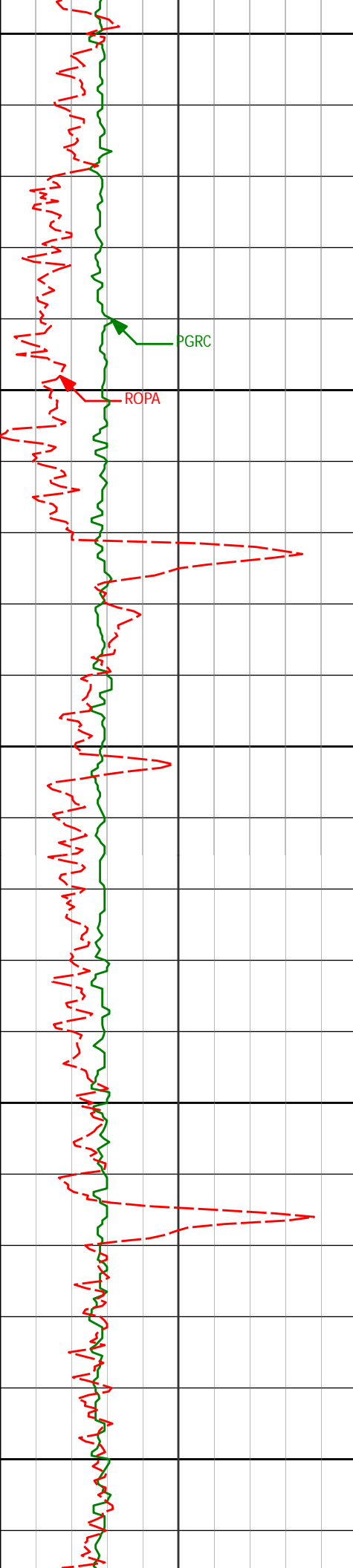
90.06°

180.81°

7589.03'

4788.93'

12150



12200

12222'

89.45°

180.30°

7589.43'

4881.92'

12250

12300

12313'

89.75°

180.87°

7590.07'

4972.92'

12350

12400

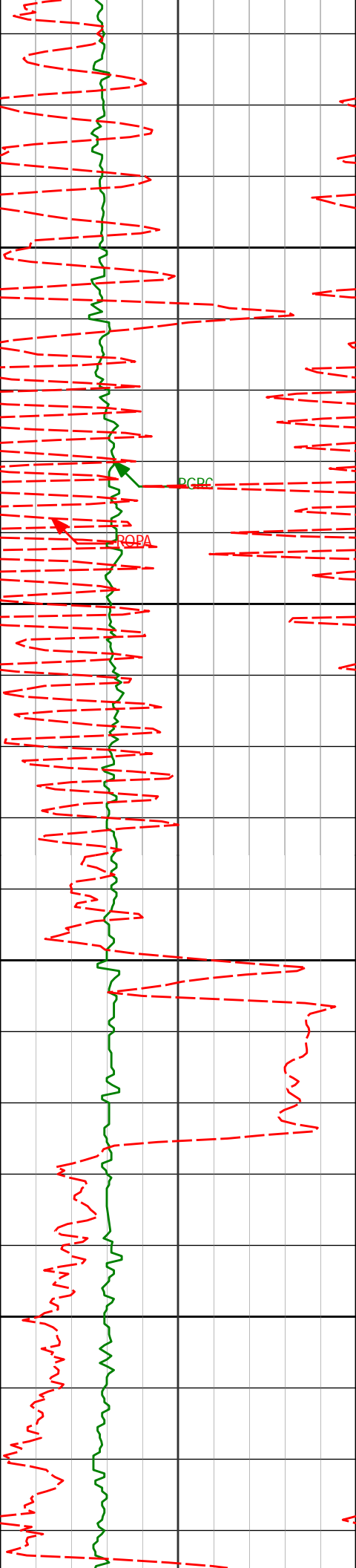
12405'

89.45°

179.93°

7590.71'

5064.91'



PGRC

ROPA

12450

12500

12550

12600

12498'

89.41°

179.55°

7591.63'

5157.90'

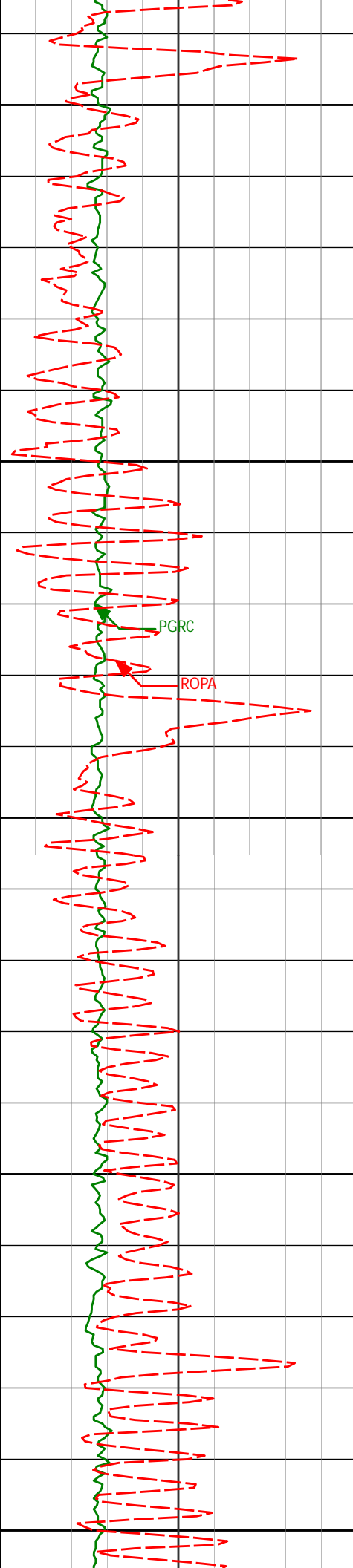
12590'

90.62°

181.87°

7591.61'

5249.89'



12650

12680'

91.08°

181.77°

7590.27'

5339.83'

12700

PGRC

ROPA

12750

12772'

90.71°

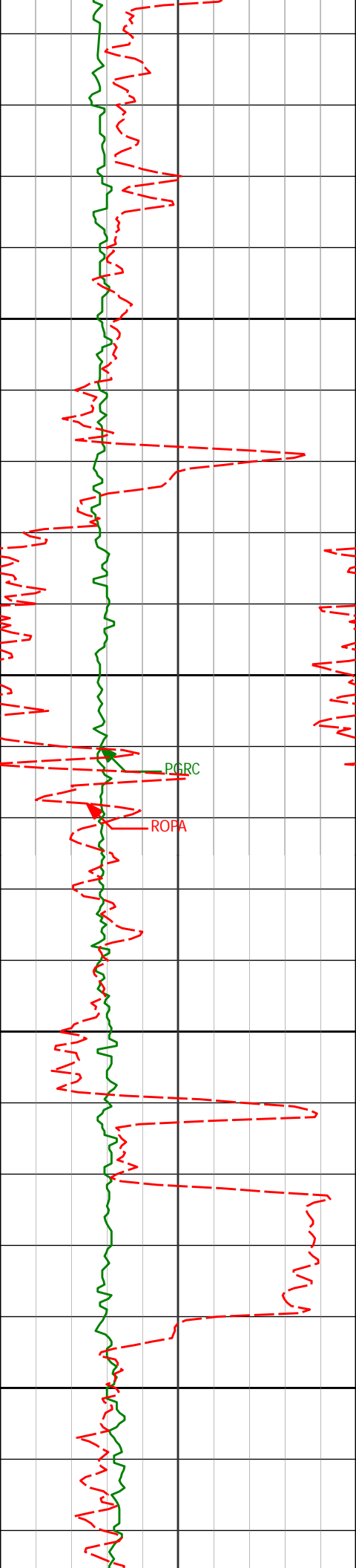
180.98°

7588.84'

5431.80'

12800

12850



12900

12950

13000

13050

12865'

88.58°

179.98°

7589.41'

5524.78'

12956'

88.40°

179.50°

7591.81'

5615.75'

13048'

89.35°

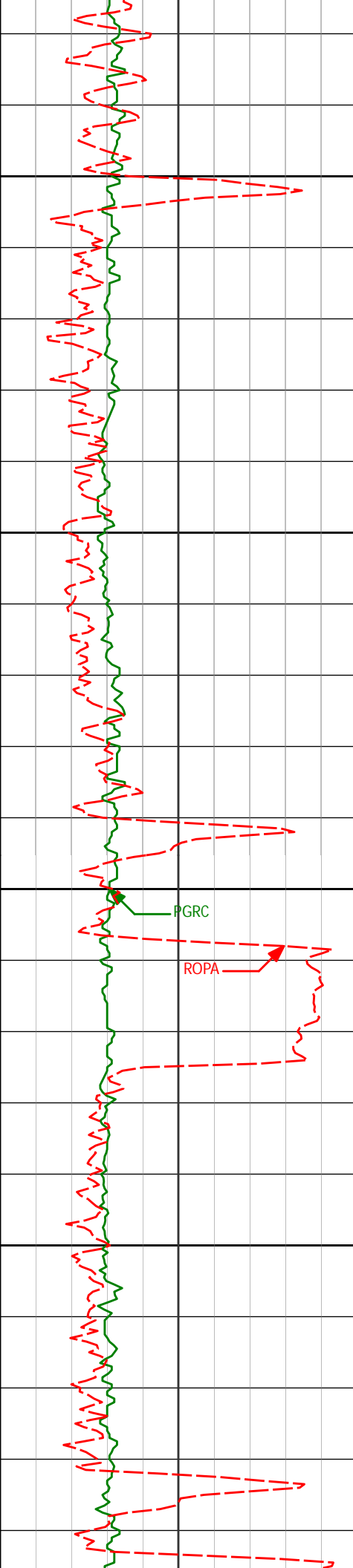
180.08°

7593.62'

5707.73'

PGRC

ROPA



13100

13139'

89.32°

179.38°

7594.67'

5798.72'

13150

13200

PGRC

ROPA

13231'

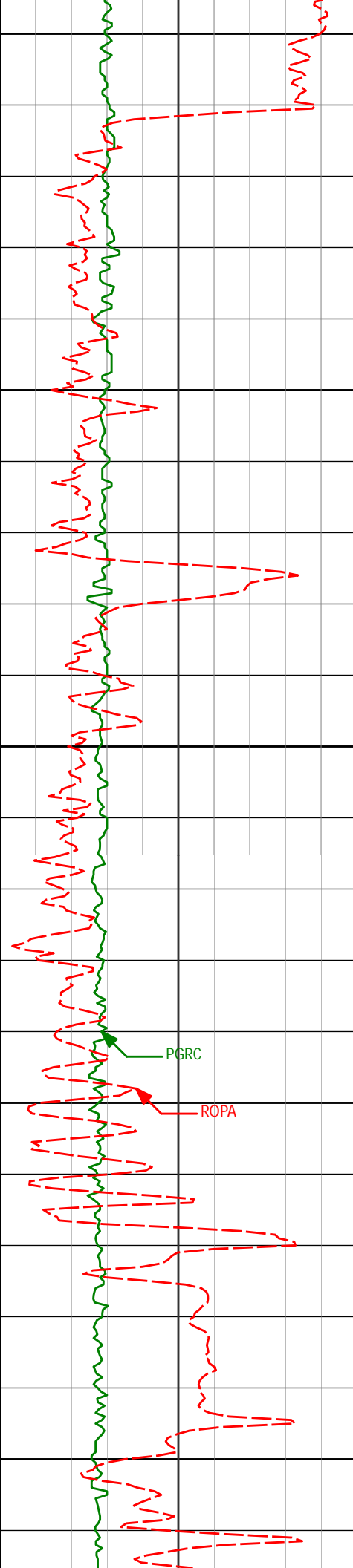
90.25°

180.09°

7595.02'

5890.72'

13250



13300

13323'

90.89°

180.83°

7594.10'

5982.71'

13350

13400

13417'

91.26°

180.71°

7592.34'

6076.69'

13450

13500

13511'

89.69°

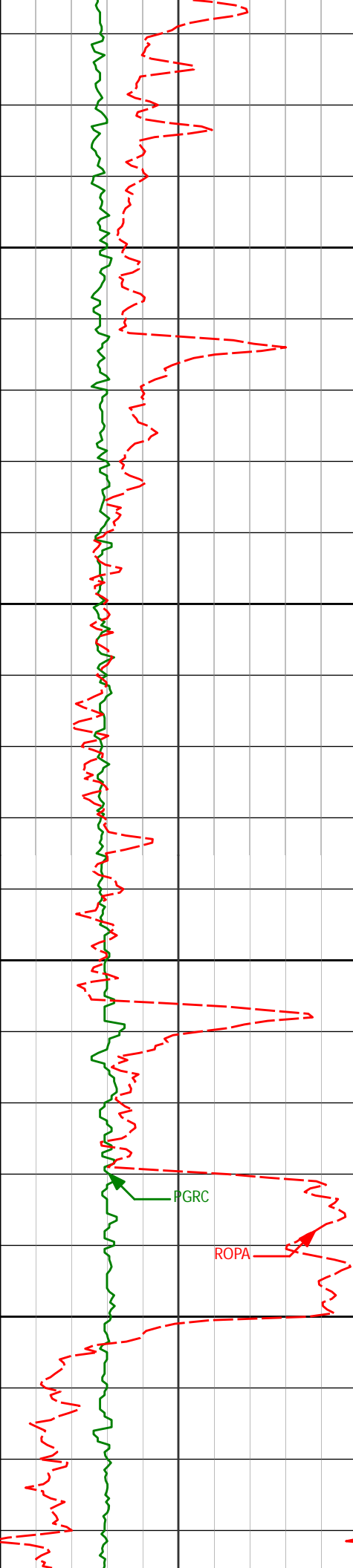
179.89°

7591.56'

6170.68'

PGRC

ROPA



13550

13600

13650

13700

13605'

88.21°

178.73°

7593.28'

6264.65'

PGRC

ROPA

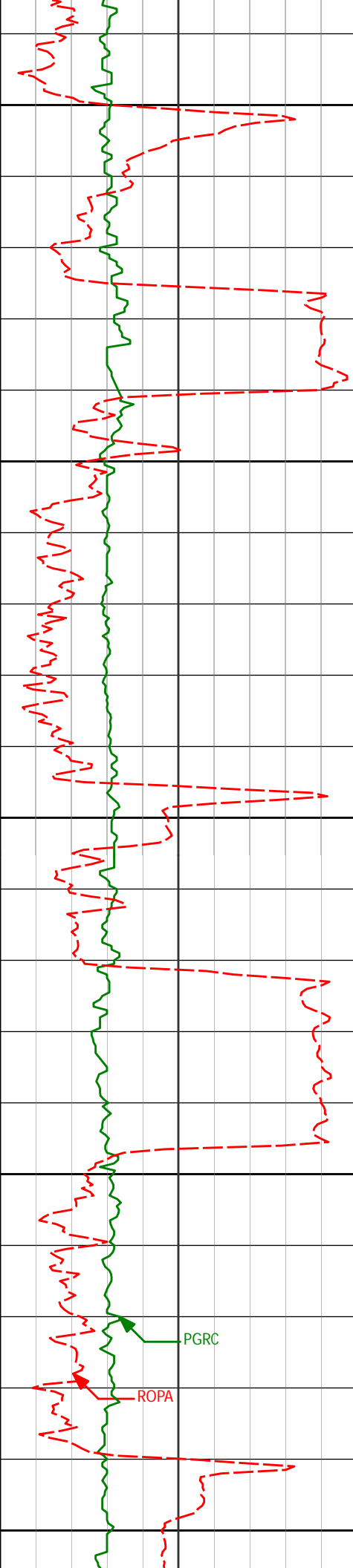
13700'

89.57°

179.11°

7595.12'

6359.61'



13750

13794'

89.82°

179.29°

7595.62'

6453.60'

13800

13850

13888'

90.74°

180.52°

7595.17'

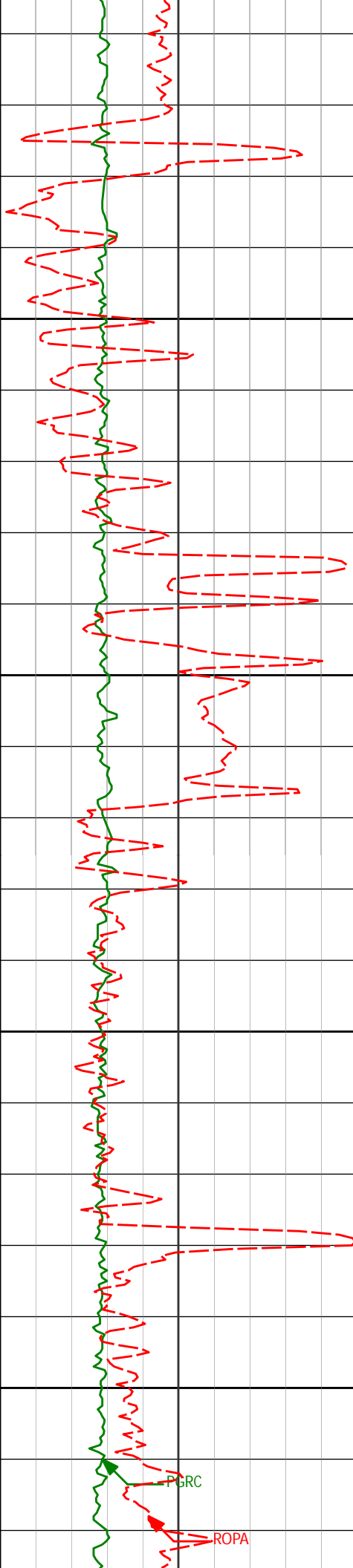
6547.60'

13900

13950

PGRC

ROPA



14000

14050

14100

14150

13982'

91.17°

181.11°

7593.60'

6641.58'

14077'

91.14°

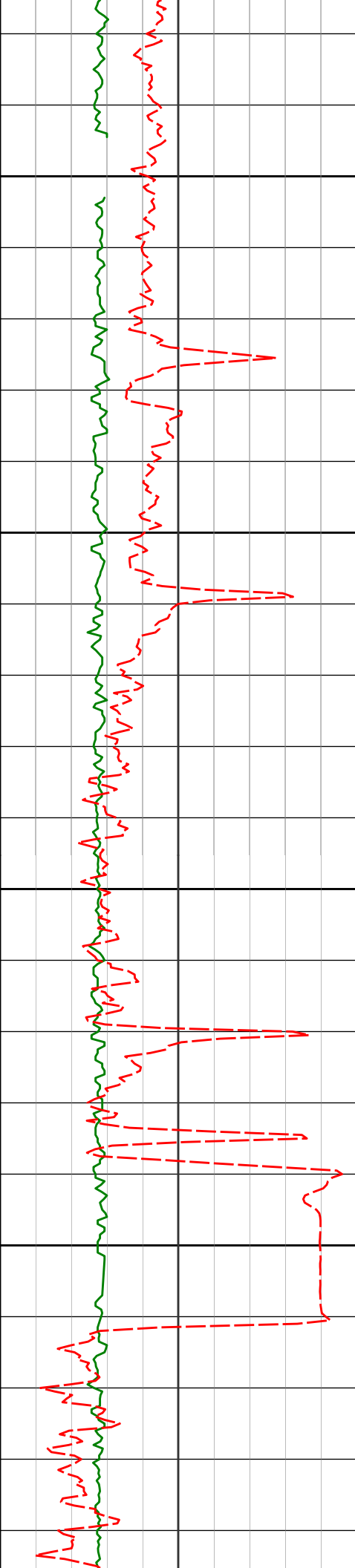
180.74°

7591.68'

6736.54'

PGRC

ROPA



14200

14204'

90.55°

180.02°

7589.81'

6863.53'

14250

14266'

89.94°

179.18°

7589.55'

6925.52'

14300

14350

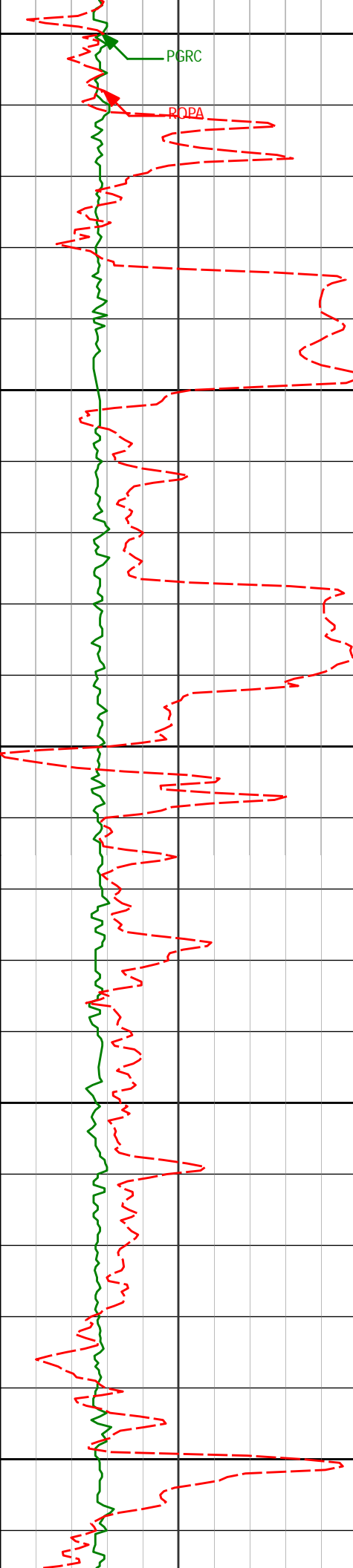
14360'

90.71°

179.31°

7589.01'

7019.51'



14400

PGRC

ROPA

14450

14455'

90.34°

178.97°

7588.14'

7114.50'

14500

14550

14550'

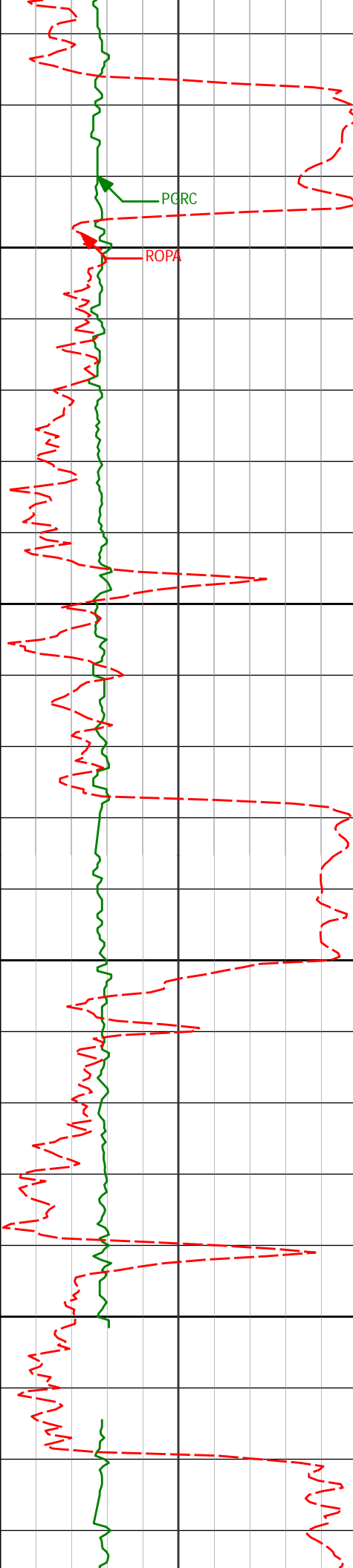
89.69°

178.37°

7588.12'

7209.47'

14600



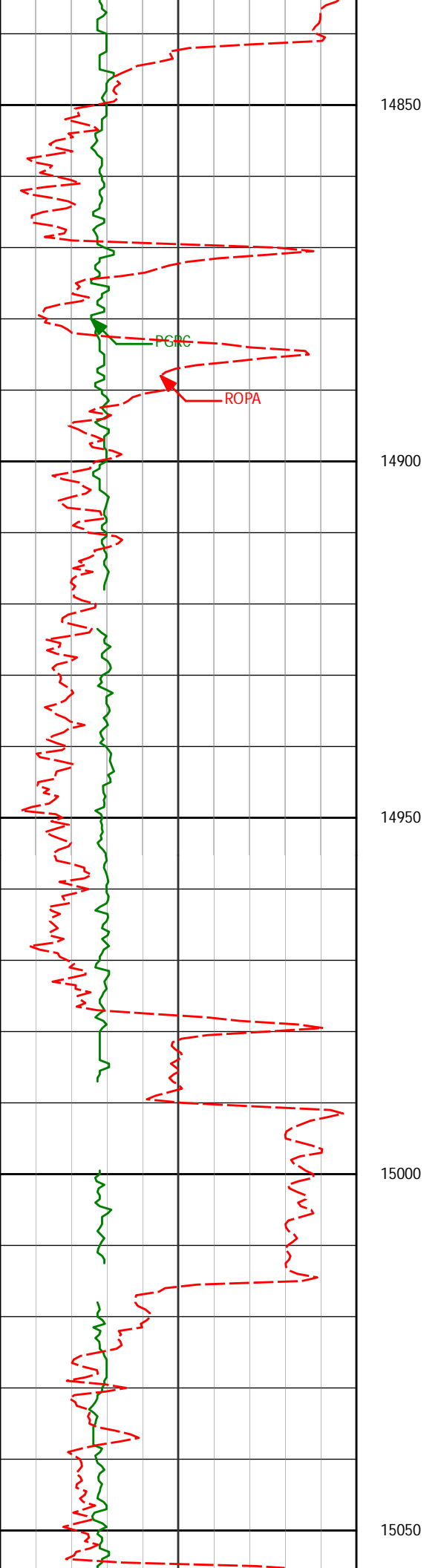
14650

14700

14750

14800

14644'	89.29°	178.68°	7588.95'	7303.44'
14739'	89.82°	179.24°	7589.69'	7398.42'
14833'	90.18°	180.71°	7589.69'	7492.41'



14927'

89.54°

179.15°

7589.92'

7586.41'

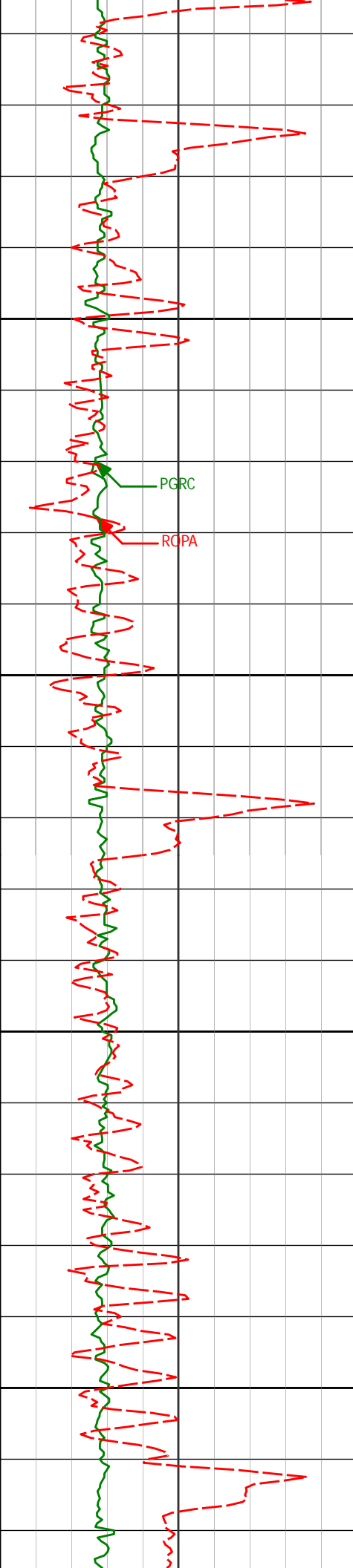
15021'

89.45°

181.37°

7590.75'

7680.40'



15100

15115'

89.35°

180.81°

7591.73'

7774.38'

PGRC

RCPA

15150

15200

15208'

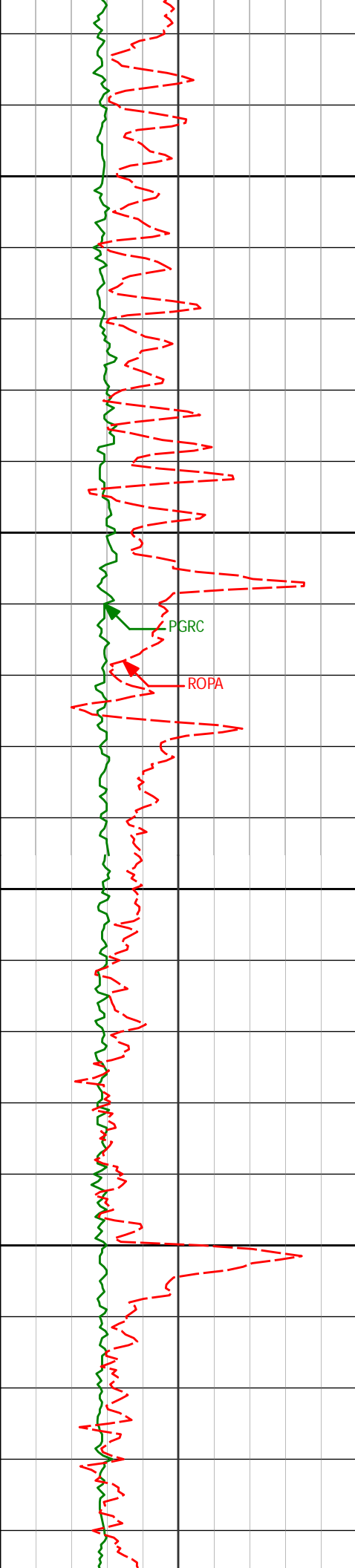
89.60°

180.43°

7592.59'

7867.37'

15250



15300

15303'

89.48°

180.25°

7593.35'

7962.36'

15350

PGRC

ROPA

15400

15398'

90.59°

180.63°

7593.29'

8057.36'

15450

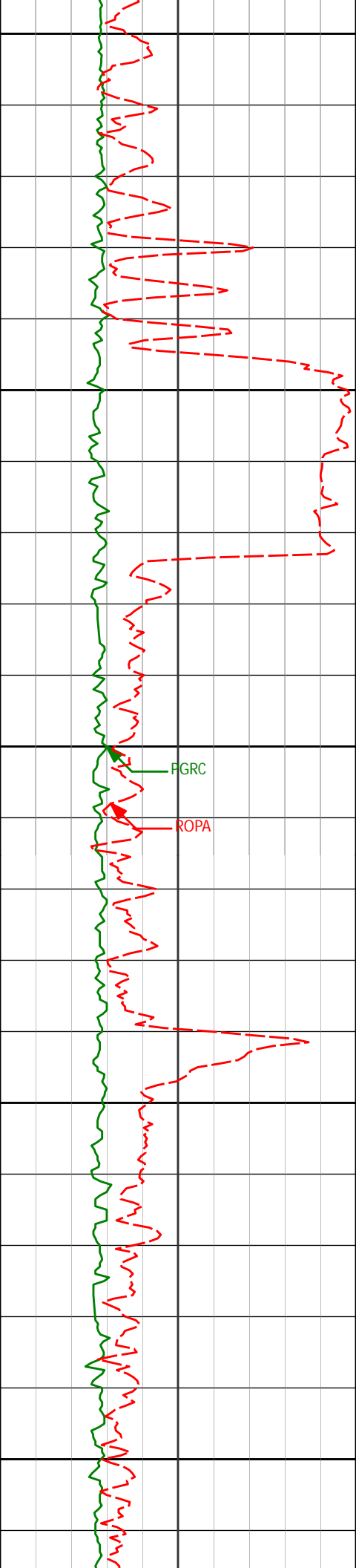
15492'

91.02°

180.86°

7591.97'

8151.34'



15500

15550

15600

15650

15700

15587'

89.32°

181.22°

7591.69'

8246.32'

FGRC

ROPA

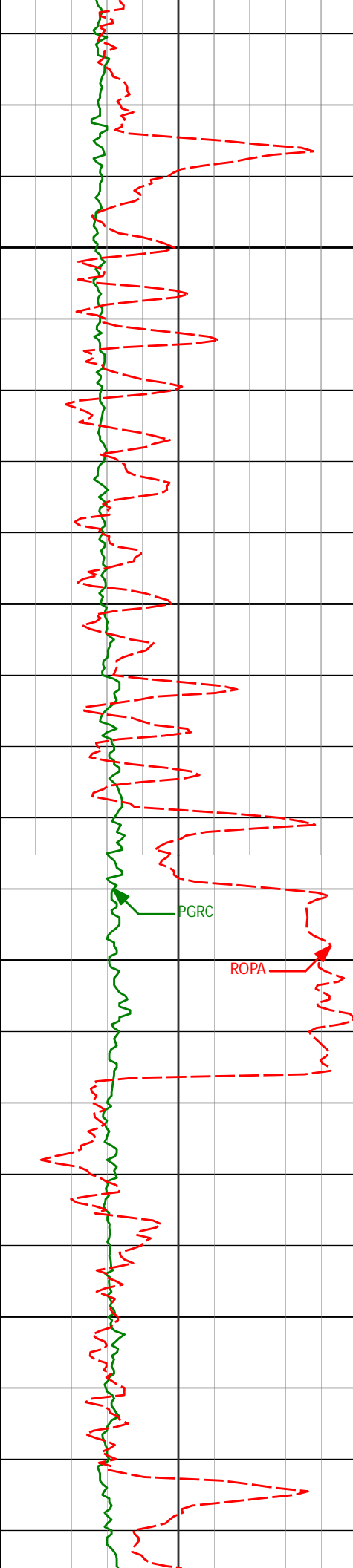
15681'

88.74°

180.39°

7593.28'

8340.30'



15750

15776'

88.71°

180.40°

7595.39'

8435.27'

15800

15850

15870'

89.35°

179.97°

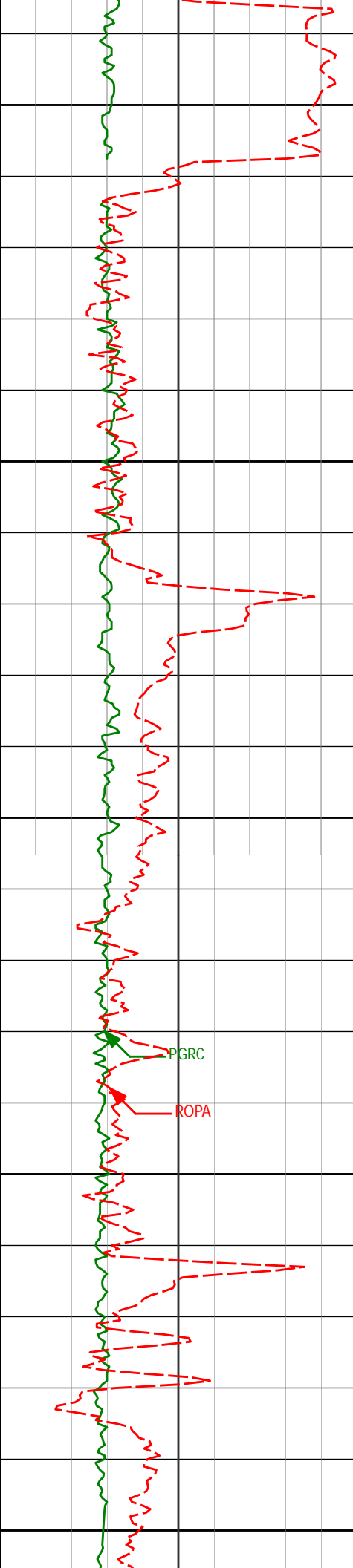
7596.99'

8529.26'

15900

PGRC

ROPA



15950

15964'

90.46°

180.80°

7597.14'

8623.25'

16000

16050

16058'

90.49°

180.80°

7596.36'

8717.24'

16100

16150

16152'

90.80°

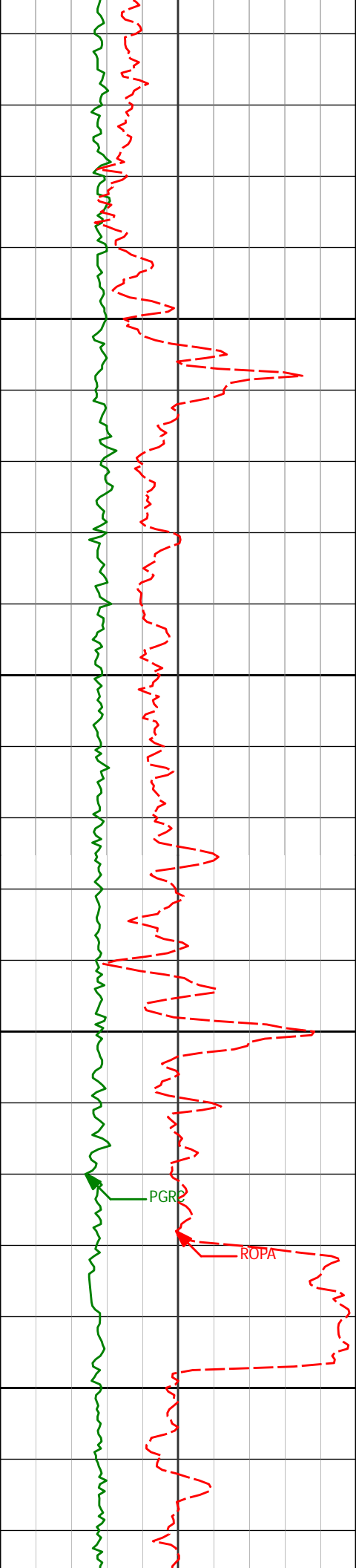
180.47°

7595.30'

8811.23'

PGRC

ROPA



16200

16250

16300

16350

16246'

90.52°

179.92°

7594.22'

8905.22'

PGR

ROPA

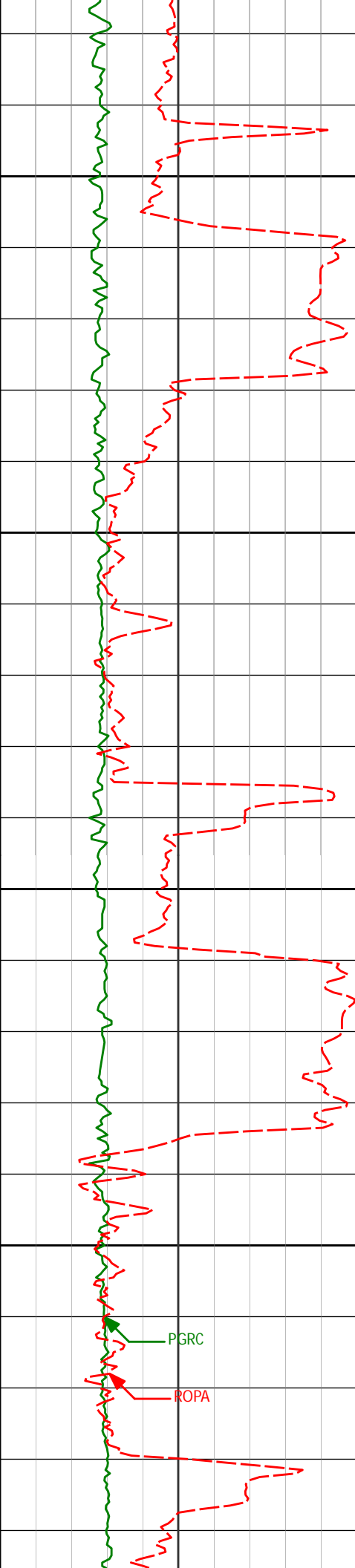
16340'

90.25°

178.55°

7593.59'

8999.21'



16400

16450

16500

16550

16434'

88.31°

178.51°

7594.77'

9093.17'

16529'

88.89°

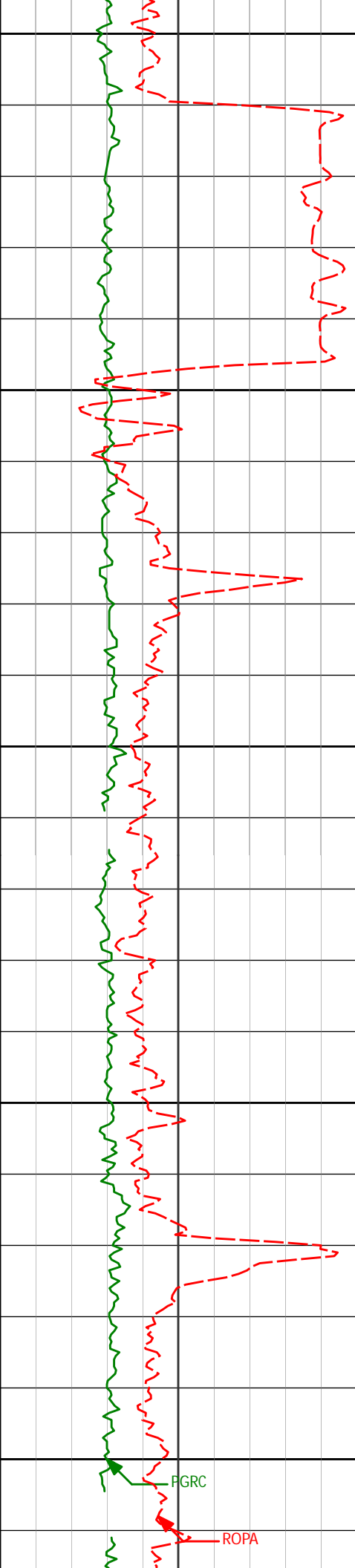
178.51°

7597.09'

9188.10'

PGRC

ROPA



16600

16624'

89.17°

179.45°

7598.70'

9283.08'

16650

16700

16718'

89.69°

179.53°

7599.64'

9377.07'

16750

16800

FGRC

ROPA

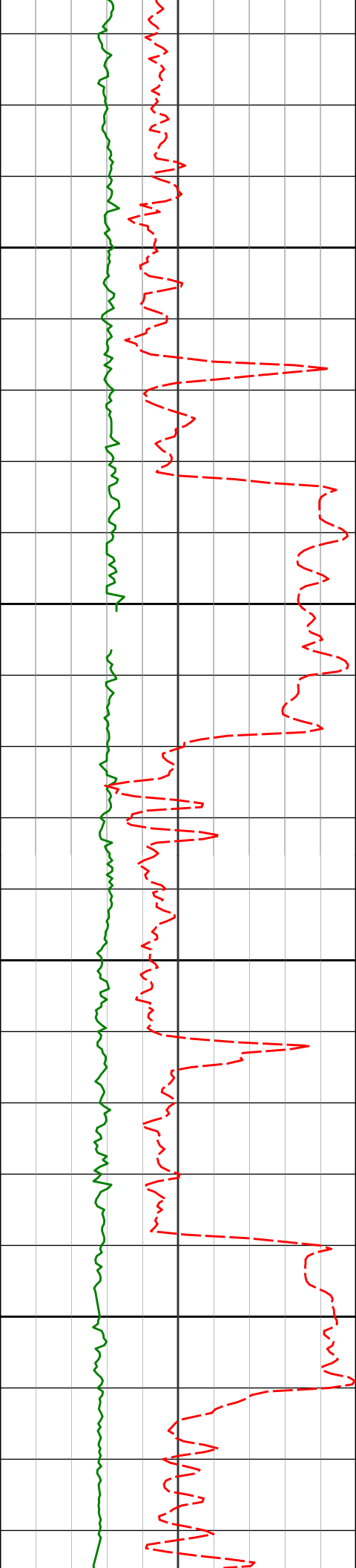
16813'

90.46°

179.42°

7599.51'

9472.06'



16850

16900

16950

17000

16908'

92.68°

179.99°

7596.91'

9567.02'

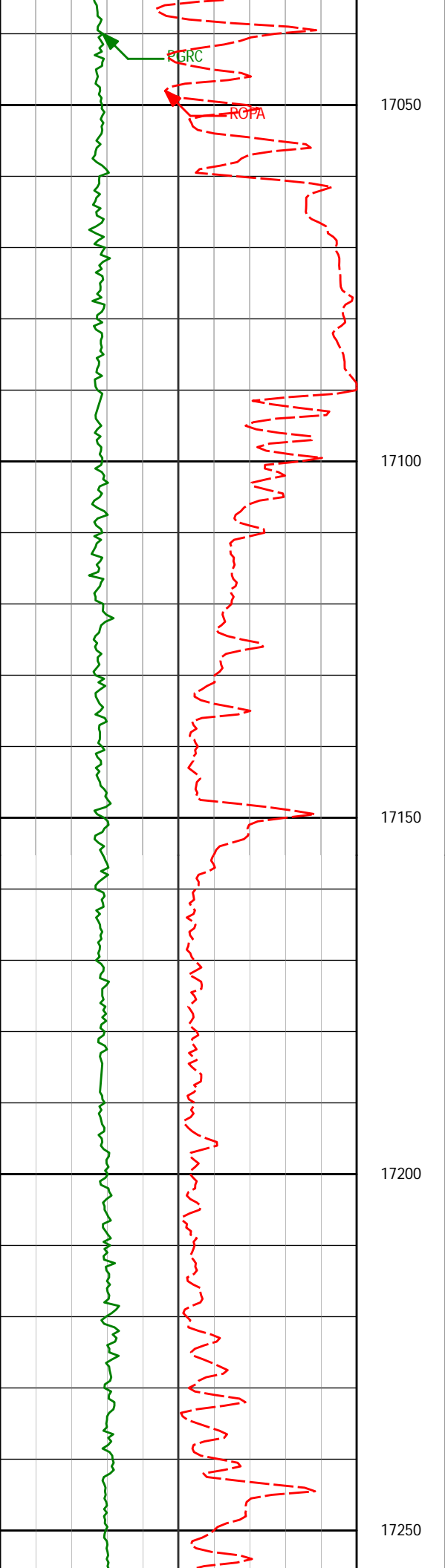
17003'

92.59°

180.99°

7592.54'

9661.91'



17098'

88.83°

181.83°

7591.36'

9756.86'

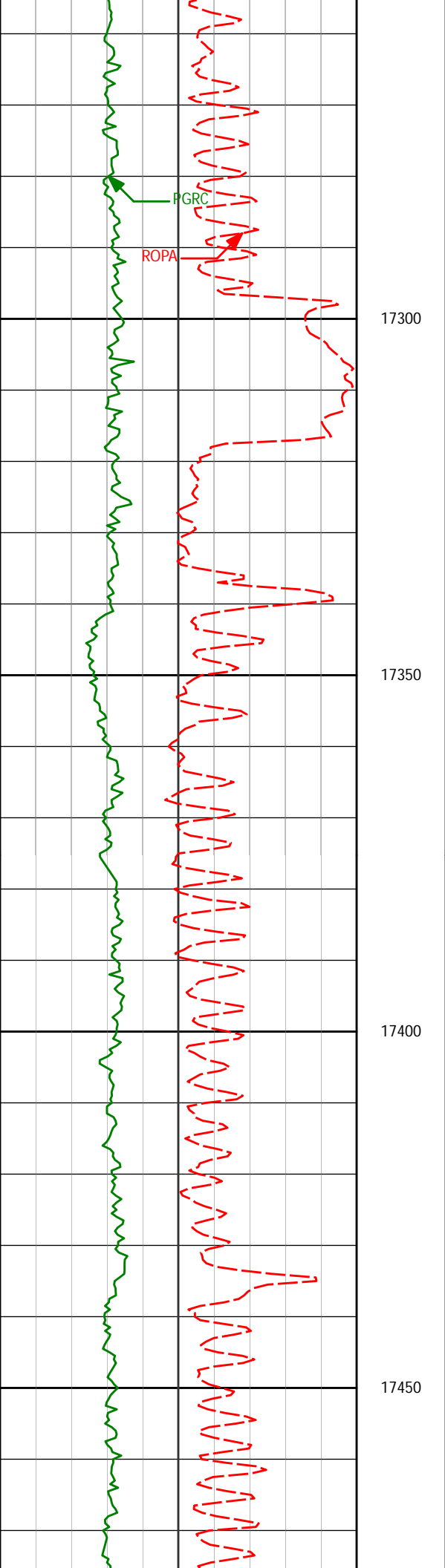
17193'

87.90°

180.63°

7594.07'

9851.80'



17288'

88.46°

180.78°

7597.09'

9946.74'

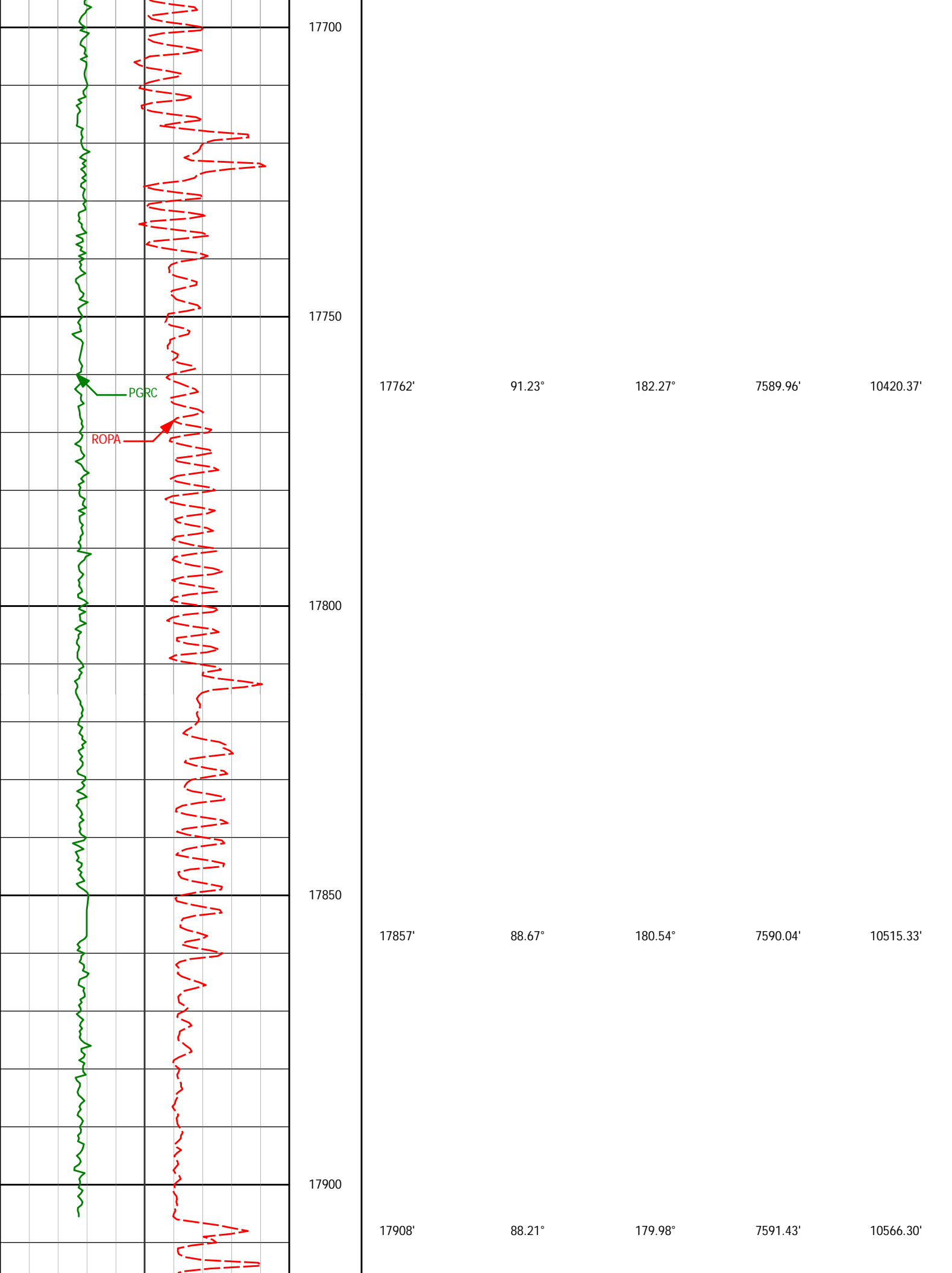
17383'

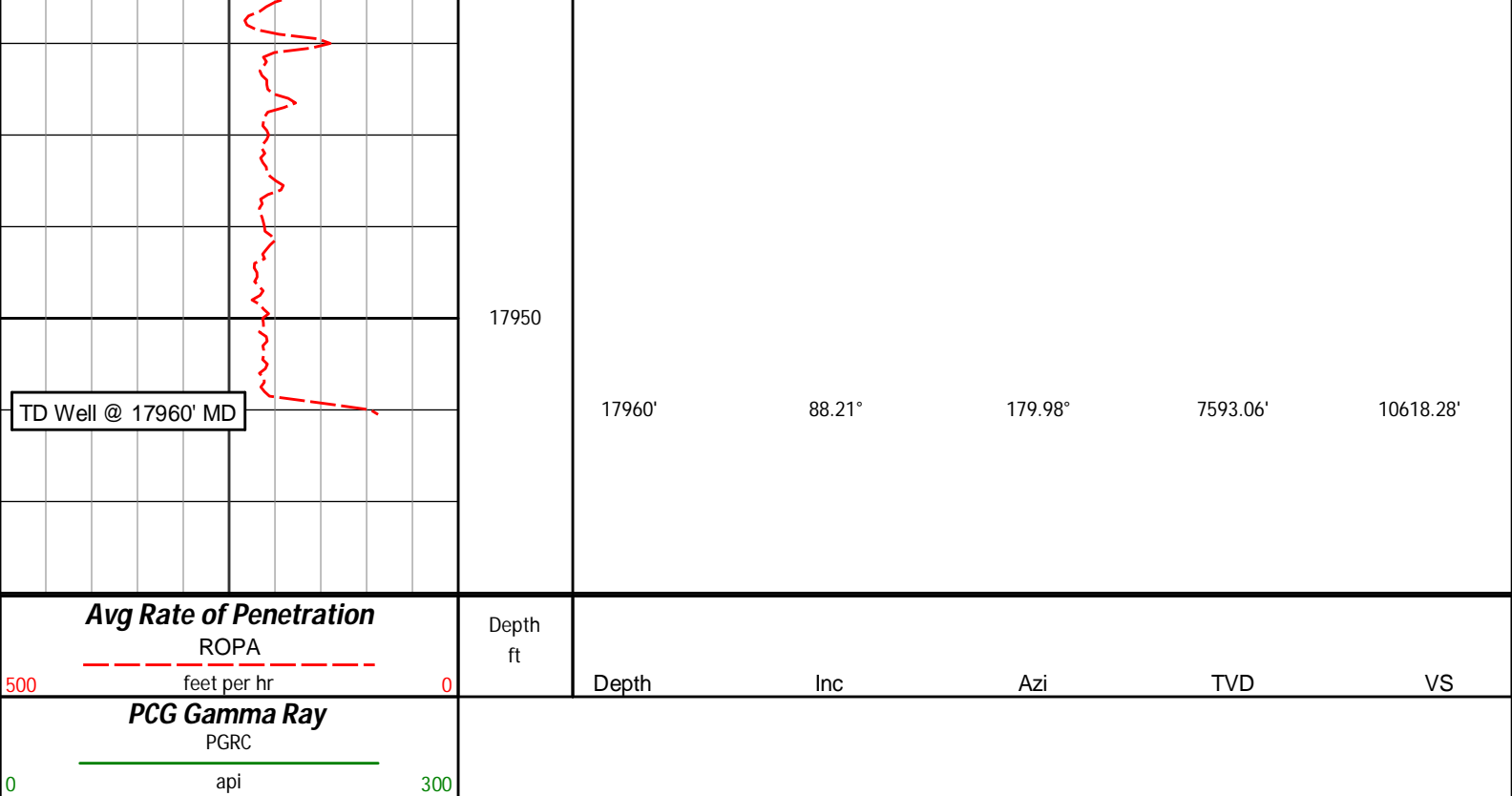
90.28°

181.08°

7598.14'

10041.72'





HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anardarko Petroleum Corp.
Small Eyed 14C-35HZ
Wattenburg
Weld County Colorado
USA
CA-XX-0901443400

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1223.00	0.46	282.91	1222.97	2.27 N	3.21 W	-2.27	TIE-IN
1390.00	0.59	283.58	1389.96	2.62 N	4.70 W	-2.62	0.08
1482.00	0.66	287.18	1481.96	2.89 N	5.67 W	-2.89	0.09
1574.00	0.86	283.86	1573.95	3.21 N	6.84 W	-3.21	0.22
1667.00	1.57	122.76	1666.94	2.69 N	6.45 W	-2.69	2.58
1759.00	2.70	124.42	1758.87	0.78 N	3.60 W	-0.78	1.23
1851.00	4.10	114.96	1850.71	1.83 S	1.17 E	1.83	1.63
1944.00	5.25	106.17	1943.40	4.42 S	8.27 E	4.42	1.45
2036.00	6.98	102.98	2034.87	6.85 S	17.76 E	6.85	1.92
2129.00	9.64	101.50	2126.89	9.67 S	30.90 E	9.67	2.87
2221.00	10.74	92.56	2217.44	11.59 S	47.01 E	11.59	2.09
2314.00	10.42	86.65	2308.86	11.48 S	64.07 E	11.48	1.22
2405.00	10.19	82.26	2398.40	9.92 S	80.26 E	9.92	0.90
2497.00	9.58	76.61	2489.03	7.05 S	95.77 E	7.05	1.24
2590.00	9.61	85.33	2580.74	4.63 S	111.04 E	4.63	1.56
2682.00	10.65	84.83	2671.30	3.23 S	127.16 E	3.23	1.13
2776.00	10.33	81.71	2763.73	1.24 S	144.15 E	1.24	0.69
2871.00	10.15	80.22	2857.22	1.41 N	160.82 E	-1.41	0.34
2965.00	9.63	77.43	2949.82	4.53 N	176.66 E	-4.53	0.75
3060.00	9.97	86.99	3043.44	6.69 N	192.63 E	-6.69	1.75
3155.00	10.00	93.34	3137.01	6.64 N	209.08 E	-6.64	1.16
3249.00	9.61	92.98	3229.63	5.76 N	225.06 E	-5.76	0.42
3344.00	9.78	92.82	3323.28	4.95 N	241.04 E	-4.95	0.18
3438.00	8.35	95.11	3416.10	3.95 N	255.81 E	-3.95	1.57
3533.00	6.83	95.06	3510.27	2.84 N	268.31 E	-2.84	1.60
3628.00	5.99	91.92	3604.67	2.17 N	278.89 E	-2.17	0.96
3723.00	5.28	83.34	3688.34	2.52 N	288.40 E	-2.52	1.16

3723.00	5.28	83.31	3899.21	2.32 N	288.19 E	-2.32	1.16
3817.00	4.74	84.47	3792.85	3.40 N	296.35 E	-3.40	0.58
3912.00	4.31	82.31	3887.56	4.25 N	303.79 E	-4.25	0.49
4006.00	3.71	84.03	3981.33	5.04 N	310.32 E	-5.04	0.65
4101.00	3.13	81.60	4076.16	5.74 N	315.94 E	-5.74	0.63
4196.00	2.40	62.71	4171.05	7.03 N	320.27 E	-7.03	1.22
4290.00	1.67	38.38	4264.99	9.01 N	322.87 E	-9.01	1.19
4385.00	1.01	318.49	4359.97	10.72 N	323.18 E	-10.72	1.89
4479.00	0.67	300.12	4453.96	11.61 N	322.15 E	-11.61	0.46
4574.00	0.68	253.52	4548.95	11.73 N	321.13 E	-11.73	0.56
4668.00	0.74	251.66	4642.95	11.38 N	320.02 E	-11.38	0.07
4763.00	0.70	266.02	4737.94	11.15 N	318.86 E	-11.15	0.19
4857.00	0.60	271.96	4831.93	11.13 N	317.80 E	-11.13	0.13
4952.00	0.80	268.07	4926.93	11.12 N	316.64 E	-11.12	0.22
5047.00	1.18	254.35	5021.91	10.84 N	315.03 E	-10.84	0.47
5141.00	1.85	192.84	5115.88	9.10 N	313.76 E	-9.10	1.76
5236.00	0.76	169.68	5210.86	6.98 N	313.53 E	-6.98	1.25
5425.00	0.82	133.31	5399.84	4.82 N	314.74 E	-4.82	0.26
5520.00	0.88	121.10	5494.83	3.98 N	315.86 E	-3.98	0.20
5614.00	0.86	124.69	5588.82	3.20 N	317.06 E	-3.20	0.06
5709.00	0.62	124.47	5683.81	2.51 N	318.07 E	-2.51	0.25
5803.00	0.83	128.15	5777.80	1.80 N	319.02 E	-1.80	0.23
5898.00	0.59	120.15	5872.80	1.13 N	319.99 E	-1.13	0.27
5993.00	0.28	65.82	5967.79	0.98 N	320.62 E	-0.98	0.51
6088.00	0.10	181.03	6062.79	0.99 N	320.83 E	-0.99	0.35
6182.00	0.46	296.66	6156.79	1.08 N	320.49 E	-1.08	0.54
6276.00	0.44	319.78	6250.79	1.52 N	319.92 E	-1.52	0.19
6371.00	0.80	0.45	6345.79	2.46 N	319.69 E	-2.46	0.58
6465.00	1.16	294.88	6439.77	3.52 N	318.84 E	-3.52	1.17
6560.00	1.76	305.82	6534.74	4.78 N	316.78 E	-4.78	0.69
6655.00	1.04	324.82	6629.71	6.34 N	315.10 E	-6.34	0.89
6749.00	0.35	28.90	6723.71	7.28 N	314.75 E	-7.28	1.00
6844.00	0.52	336.00	6818.71	7.93 N	314.71 E	-7.93	0.44
6939.00	0.65	274.08	6913.70	8.36 N	314.00 E	-8.36	0.64
7033.00	4.25	180.11	7007.61	4.92 N	313.46 E	-4.92	4.62
7080.00	9.43	177.82	7054.26	0.68 S	313.60 E	0.68	11.03
7128.00	14.91	180.79	7101.17	10.79 S	313.67 E	10.79	11.49
7175.00	20.26	178.22	7145.96	24.98 S	313.84 E	24.98	11.50
7222.00	25.53	178.91	7189.24	43.25 S	314.28 E	43.25	11.23
7269.00	28.57	182.45	7231.09	64.61 S	314.00 E	64.61	7.32
7317.00	31.18	186.14	7272.72	88.44 S	312.18 E	88.44	6.65
7364.00	35.88	182.05	7311.89	114.32 S	310.38 E	114.32	11.09
7411.00	40.67	179.46	7348.78	143.41 S	310.03 E	143.42	10.75
7458.00	44.18	178.69	7383.47	175.11 S	310.55 E	175.11	7.55
7506.00	49.13	182.32	7416.41	210.00 S	310.20 E	210.00	11.68
7553.00	51.81	182.51	7446.32	246.21 S	308.67 E	246.21	5.71
7601.00	55.22	181.54	7474.86	284.77 S	307.31 E	284.77	7.29
7648.00	60.97	181.38	7499.69	324.64 S	306.30 E	324.64	12.24
7695.00	64.62	179.39	7521.17	366.43 S	306.03 E	366.43	8.63
7742.00	68.64	178.75	7539.81	409.56 S	306.73 E	409.56	8.64
7790.00	72.84	178.95	7555.64	454.86 S	307.64 E	454.86	8.76
7837.00	76.89	178.52	7567.91	500.21 S	308.65 E	500.21	8.66
7884.00	81.45	178.04	7576.74	546.34 S	310.03 E	546.34	9.75
7924.00	85.71	177.94	7581.21	586.05 S	311.43 E	586.05	10.65
8020.00	87.69	178.21	7586.74	681.83 S	314.65 E	681.83	2.08
8115.00	87.57	179.08	7590.67	776.72 S	316.89 E	776.72	0.92
8209.00	89.38	178.37	7593.17	870.66 S	318.98 E	870.66	2.07
8303.00	90.49	178.75	7593.27	964.63 S	321.34 E	964.63	1.25
8398.00	90.15	179.97	7592.74	1059.62 S	322.40 E	1059.62	1.33
8492.00	90.68	181.54	7592.06	1153.61 S	321.17 E	1153.61	1.76
8587.00	90.09	180.47	7591.42	1248.59 S	319.50 E	1248.59	1.29
8682.00	90.12	180.30	7591.25	1343.59 S	318.86 E	1343.59	0.18
8776.00	90.89	180.11	7590.42	1437.58 S	318.53 E	1437.58	0.84
8870.00	91.14	180.08	7588.76	1531.57 S	318.37 E	1531.57	0.27
8964.00	90.92	179.80	7587.07	1625.55 S	318.47 E	1625.55	0.38
9059.00	90.00	179.61	7586.30	1720.55 S	318.96 E	1720.55	0.99
9153.00	90.34	180.48	7586.03	1814.55 S	318.88 E	1814.55	0.99
9247.00	90.03	180.45	7585.72	1908.54 S	318.12 E	1908.54	0.33
9341.00	89.05	181.10	7586.48	2002.53 S	316.85 E	2002.53	1.25
9435.00	88.24	181.10	7588.70	2096.48 S	315.05 E	2096.48	0.86
9530.00	87.57	180.93	7592.17	2191.40 S	313.36 E	2191.40	0.73
9718.00	91.17	181.08	7594.24	2379.33 S	310.07 E	2379.33	1.92
9812.00	91.33	180.71	7592.19	2473.30 S	308.60 E	2473.30	0.43
9906.00	91.60	180.86	7589.79	2567.26 S	307.31 E	2567.26	0.33
10095.00	87.29	179.03	7591.62	2756.20 S	307.49 E	2756.20	2.48

10189.00	87.32	178.29	7596.04	2850.07 S	309.69 E	2850.07	0.79
10283.00	89.01	178.43	7599.05	2943.98 S	312.38 E	2943.98	1.80
10377.00	90.43	179.05	7599.51	3037.95 S	314.44 E	3037.95	1.65
10471.00	90.22	178.48	7598.97	3131.93 S	316.47 E	3131.93	0.65
10566.00	90.15	178.55	7598.67	3226.89 S	318.93 E	3226.90	0.10
10657.00	91.14	178.60	7597.64	3317.86 S	321.19 E	3317.86	1.09
10749.00	91.94	178.93	7595.17	3409.80 S	323.18 E	3409.80	0.94
10841.00	91.29	179.07	7592.58	3501.75 S	324.78 E	3501.75	0.72
10933.00	91.32	179.97	7590.48	3593.73 S	325.55 E	3593.73	0.98
11024.00	91.05	179.81	7588.60	3684.71 S	325.73 E	3684.71	0.34
11116.00	90.83	179.67	7587.09	3776.69 S	326.14 E	3776.69	0.28
11207.00	89.97	178.45	7586.45	3867.68 S	327.64 E	3867.68	1.64
11298.00	89.54	178.05	7586.84	3958.63 S	330.42 E	3958.63	0.65
11391.00	88.52	176.26	7588.42	4051.50 S	335.03 E	4051.50	2.22
11482.00	89.75	176.44	7589.79	4142.30 S	340.82 E	4142.30	1.37
11575.00	90.92	177.46	7589.25	4235.17 S	345.77 E	4235.17	1.67
11667.00	90.71	177.86	7587.94	4327.08 S	349.53 E	4327.08	0.49
11759.00	89.17	178.10	7588.04	4419.02 S	352.77 E	4419.02	1.69
11853.00	89.35	179.18	7589.25	4512.98 S	355.00 E	4512.98	1.16
11945.00	89.72	179.96	7590.00	4604.98 S	355.69 E	4604.98	0.94
12037.00	90.71	181.89	7589.65	4696.96 S	354.21 E	4696.96	2.36
12129.00	90.06	180.81	7589.03	4788.93 S	352.04 E	4788.93	1.37
12222.00	89.45	180.30	7589.43	4881.92 S	351.14 E	4881.92	0.85
12313.00	89.75	180.87	7590.07	4972.92 S	350.21 E	4972.92	0.71
12405.00	89.45	179.93	7590.71	5064.91 S	349.57 E	5064.91	1.07
12498.00	89.41	179.55	7591.63	5157.90 S	349.99 E	5157.90	0.41
12590.00	90.62	181.87	7591.61	5249.89 S	348.85 E	5249.89	2.84
12680.00	91.08	181.77	7590.27	5339.83 S	345.99 E	5339.83	0.52
12772.00	90.71	180.98	7588.84	5431.80 S	343.78 E	5431.80	0.95
12865.00	88.58	179.98	7589.41	5524.78 S	343.01 E	5524.78	2.53
12956.00	88.40	179.50	7591.81	5615.75 S	343.42 E	5615.75	0.56
13048.00	89.35	180.08	7593.62	5707.73 S	343.76 E	5707.73	1.21
13139.00	89.32	179.38	7594.67	5798.72 S	344.18 E	5798.72	0.77
13231.00	90.25	180.09	7595.02	5890.72 S	344.61 E	5890.72	1.27
13323.00	90.89	180.83	7594.10	5982.71 S	343.87 E	5982.71	1.06
13417.00	91.26	180.71	7592.34	6076.69 S	342.61 E	6076.69	0.41
13511.00	89.69	179.89	7591.56	6170.68 S	342.12 E	6170.68	1.88
13605.00	88.21	178.73	7593.28	6264.65 S	343.25 E	6264.65	2.00
13700.00	89.57	179.11	7595.12	6359.61 S	345.04 E	6359.61	1.49
13794.00	89.82	179.29	7595.62	6453.60 S	346.35 E	6453.60	0.33
13888.00	90.74	180.52	7595.17	6547.60 S	346.51 E	6547.60	1.63
13982.00	91.17	181.11	7593.60	6641.58 S	345.17 E	6641.58	0.78
14077.00	91.14	180.74	7591.68	6736.54 S	343.64 E	6736.54	0.39
14204.00	90.55	180.02	7589.81	6863.53 S	342.79 E	6863.53	0.73
14266.00	89.94	179.18	7589.55	6925.52 S	343.23 E	6925.52	1.67
14360.00	90.71	179.31	7589.01	7019.51 S	344.47 E	7019.51	0.83
14455.00	90.34	178.97	7588.14	7114.50 S	345.89 E	7114.50	0.53
14550.00	89.69	178.37	7588.12	7209.47 S	348.10 E	7209.47	0.93
14644.00	89.29	178.68	7588.95	7303.44 S	350.52 E	7303.44	0.54
14739.00	89.82	179.24	7589.69	7398.42 S	352.24 E	7398.42	0.81
14833.00	90.18	180.71	7589.69	7492.41 S	352.28 E	7492.41	1.61
14927.00	89.54	179.15	7589.92	7586.41 S	352.40 E	7586.41	1.79
15021.00	89.45	181.37	7590.75	7680.40 S	351.97 E	7680.40	2.36
15115.00	89.35	180.81	7591.73	7774.38 S	350.18 E	7774.38	0.61
15208.00	89.60	180.43	7592.59	7867.37 S	349.18 E	7867.37	0.49
15303.00	89.48	180.25	7593.35	7962.36 S	348.61 E	7962.36	0.23
15398.00	90.59	180.63	7593.29	8057.36 S	347.88 E	8057.36	1.23
15492.00	91.02	180.86	7591.97	8151.34 S	346.66 E	8151.34	0.52
15587.00	89.32	181.22	7591.69	8246.32 S	344.94 E	8246.32	1.83
15681.00	88.74	180.39	7593.28	8340.30 S	343.62 E	8340.30	1.08
15776.00	88.71	180.40	7595.39	8435.27 S	342.96 E	8435.27	0.03
15870.00	89.35	179.97	7596.99	8529.26 S	342.66 E	8529.26	0.82
15964.00	90.46	180.80	7597.14	8623.25 S	342.03 E	8623.25	1.47
16058.00	90.49	180.80	7596.36	8717.24 S	340.71 E	8717.24	0.03
16152.00	90.80	180.47	7595.30	8811.23 S	339.67 E	8811.23	0.48
16246.00	90.52	179.92	7594.22	8905.22 S	339.35 E	8905.22	0.66
16340.00	90.25	178.55	7593.59	8999.21 S	340.61 E	8999.21	1.49
16434.00	88.31	178.51	7594.77	9093.17 S	343.02 E	9093.17	2.06
16529.00	88.89	178.51	7597.09	9188.10 S	345.49 E	9188.10	0.61
16624.00	89.17	179.45	7598.70	9283.07 S	347.18 E	9283.08	1.03
16718.00	89.69	179.53	7599.64	9377.07 S	348.02 E	9377.07	0.56
16813.00	90.46	179.42	7599.51	9472.06 S	348.89 E	9472.06	0.82
16908.00	92.68	179.99	7596.91	9567.02 S	349.38 E	9567.02	2.41
17003.00	92.59	180.99	7592.54	9661.91 S	348.56 E	9661.91	1.06
17098.00	89.22	181.22	7594.22	9756.82 S	349.22 E	9756.82	1.22

17098.00	88.83	181.83	7591.36	9756.86 S	346.23 E	9756.86	4.06
17193.00	87.90	180.63	7594.07	9851.80 S	344.19 E	9851.80	1.60
17288.00	88.46	180.78	7597.09	9946.74 S	343.02 E	9946.74	0.61
17383.00	90.28	181.08	7598.14	10041.72 S	341.48 E	10041.72	1.94
17478.00	91.29	181.06	7596.83	10136.69 S	339.70 E	10136.69	1.06
17572.00	91.54	182.69	7594.51	10230.61 S	336.63 E	10230.61	1.75
17667.00	91.36	182.63	7592.11	10325.48 S	332.22 E	10325.48	0.20
17762.00	91.23	182.27	7589.96	10420.36 S	328.16 E	10420.37	0.40
17857.00	88.67	180.54	7590.04	10515.32 S	325.83 E	10515.33	3.25
17908.00	88.21	179.98	7591.43	10566.30 S	325.60 E	10566.30	1.42
17960.00	88.21	179.98	7593.06	10618.28 S	325.62 E	10618.28	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 8.58 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17960.00 FEET
IS 10623.27 FEET ALONG 178.24 DEGREES (TRUE)**

Directional surveys tied onto Gyro's @ 1223' MD. Final Survey is a straightline projection to bit.