

DC - Pressure Case Directional
PCGK - Pressure Case Gamma



1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	14-Jun-14	06-Jul-14	11-Jul-14		
Rig Bit Number	0100	0200	0300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.830	4.730	4.750		
Log Start Depth (MD, ft)	1,241.00	7,942.00	14,492.00		
Log End Depth (MD, ft)	7,942.00	14,492.00	18,542.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	11-Jun-14 14:00	01-Jul-14 13:15	06-Jul-14 12:50		
Drill/Wipe End Date and Time	14-Jun-14 00:45	05-Jul-14 13:30	10-Jul-14 06:00		
Min Inc (deg) @ Depth (MD, ft)	0.18 @ 6,777.00	87.93 @ 11,980.00	88.64 @ 15,115.00		
Max Inc (deg) @ Depth (MD, ft)	86.71 @ 7,895.00	92.28 @ 13,588.00	92.40 @ 18,363.00		
Bit TFA(in2) / Bit Type	1.84 / PDC	1.53 / PDC	1.48 / N/A		
Flow Rate (gpm)	606.54	274.97	276.43		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	307.1 / 0.0	0.0 / 0.0		
Fluid Type	Native/Spud Mud	Mineral Oil Bas	Diesel Mud Base		
Density (ppg) / Viscosity (spqt)	10.30 / 50.00	9.40 / 61.00	9.60 / 58.00		
Filtrate CL (ppm)	250,000.00	289,036.00	51,000.00		
pH / Fluid Loss (mptm)	9.50 / 4	N/A / N/A	N/A / N/A		
PV (cP) / YP (lbf2)	16 / 18.00	20 / 14.00	18 / 11.00		
% Solids / % Sand	10.10 / 0.30	9.2 / 0.02	12.50 / 0.01		
% Oil / Oil:Water Ratio	2.30 / N/A	61 / 69:31	63.50 / 73:27		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Max Temp (degF) / RPM	122.00 / RPM	224.10 / RPM	250.50 / RPM		

Max Tool Temp (degF) / Source	180.00 / PCM	234.12 / PCM	250.56 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 180.00	N/A @ 234.12	N/A @ 250.56		
Lead MWD Engineer	Caleb Jones	Caleb Jones	Clay Wass		
Customer Representative	Butch Beddingfield	Butch Beddingfield	Scott Hancock		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.93	5.93		
Sub Serial Number	11341319	11768600	11768600		
Insert Serial Number	11227520	11680745	11400845		
Date and Time Initialized	11-Jun-14 08:37	28-Jun-14 13:02	05-Jul-14 19:34		
Date and Time Read	16-Jun-14 11:24	01-Jan-70 00:00	11-Jul-14 07:09		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	44.75	48.96	49.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341319	11768600	11768600		
Sonde Serial Number	11297564	11638501	11638625		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	259.82	142.28	56.84		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.26	51.76	51.76		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341319	11768600	11768600		
Insert/Sonde Serial Number	11681022	11681022	11579845		

REMARKS

1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.

2. No depth corrections have been made for pipe stretch or compression.

3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.

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

5. The following smoothing parameters have been applied to the data:

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

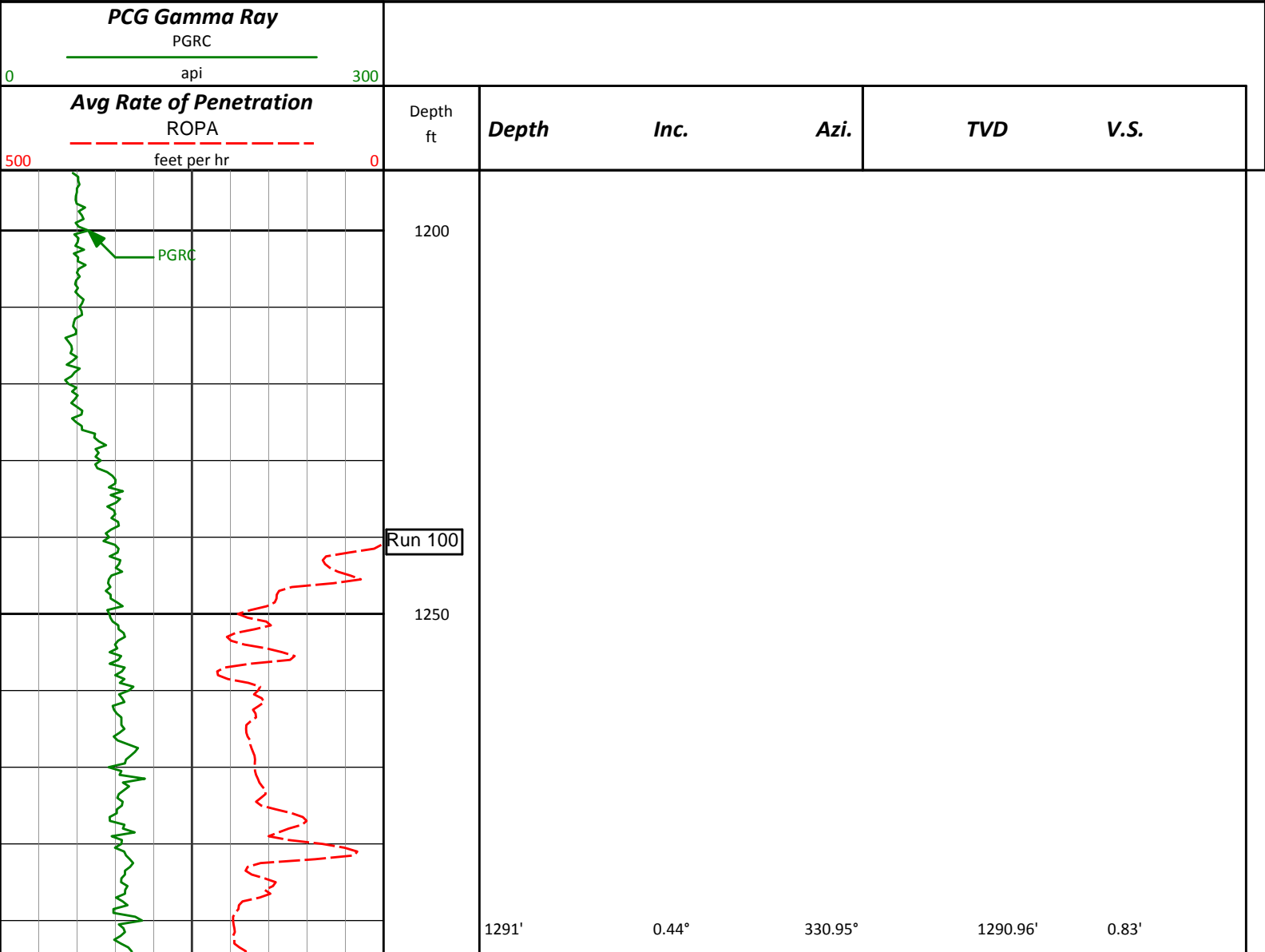
Insite version: 8.0

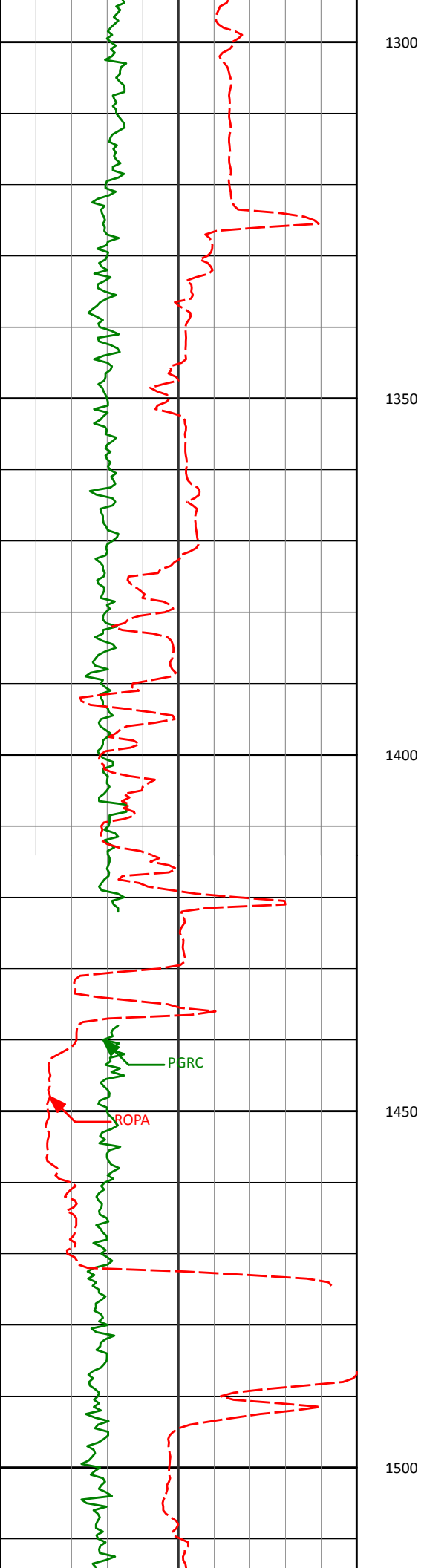
WARRANTY

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HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

Anadarko Petroleum Corp.
NRC 4N-32HZ
Xtreme 22
Sec. 8-T1N-R67W





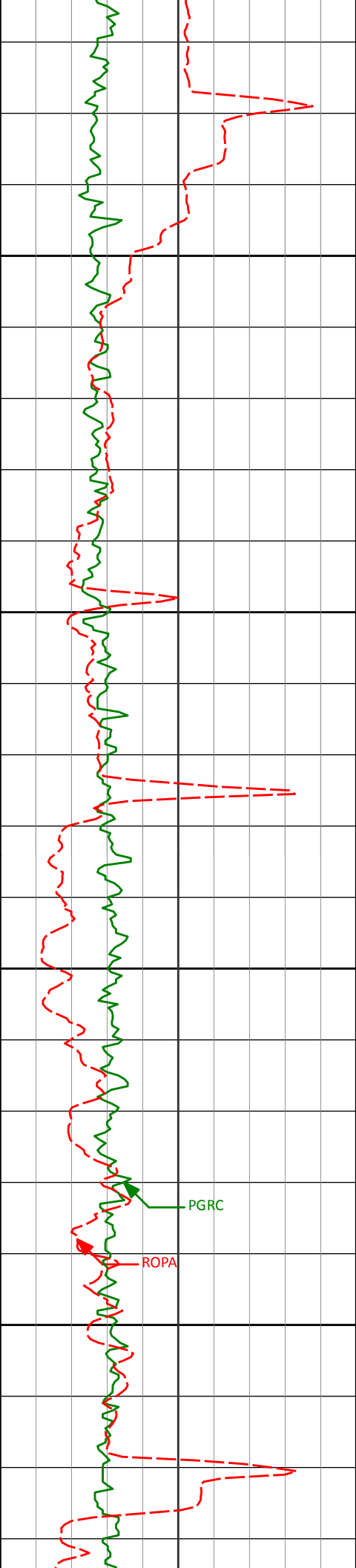
1481'

0.67°

284.42°

1480.95'

1.74'



1550

1600

1650

1700

1671'

0.33°

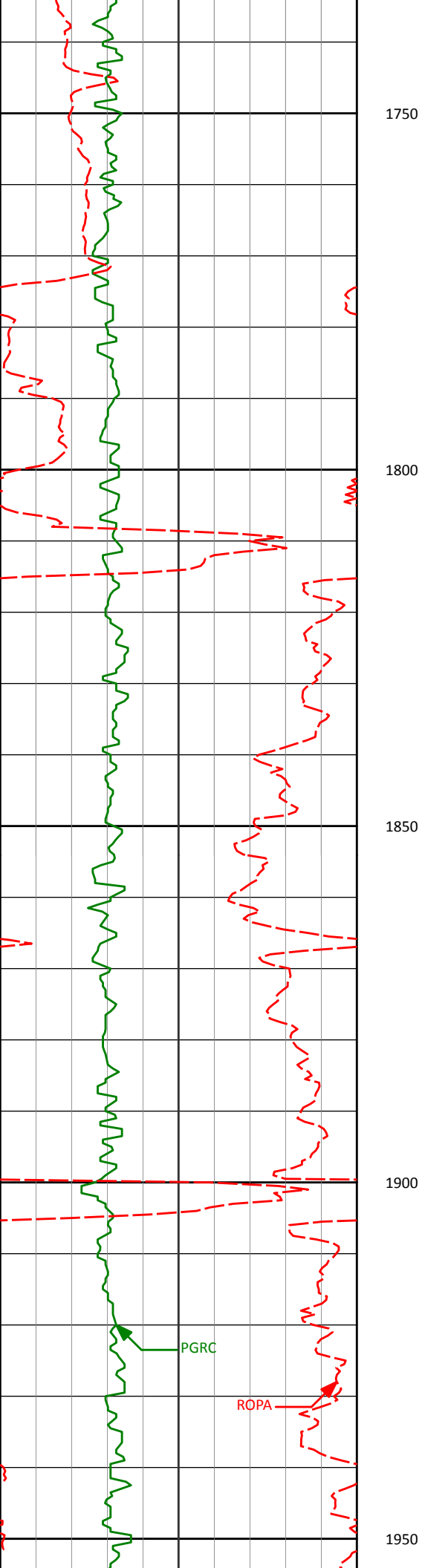
329.40°

1670.95'

2.49'

PGRC

ROPA



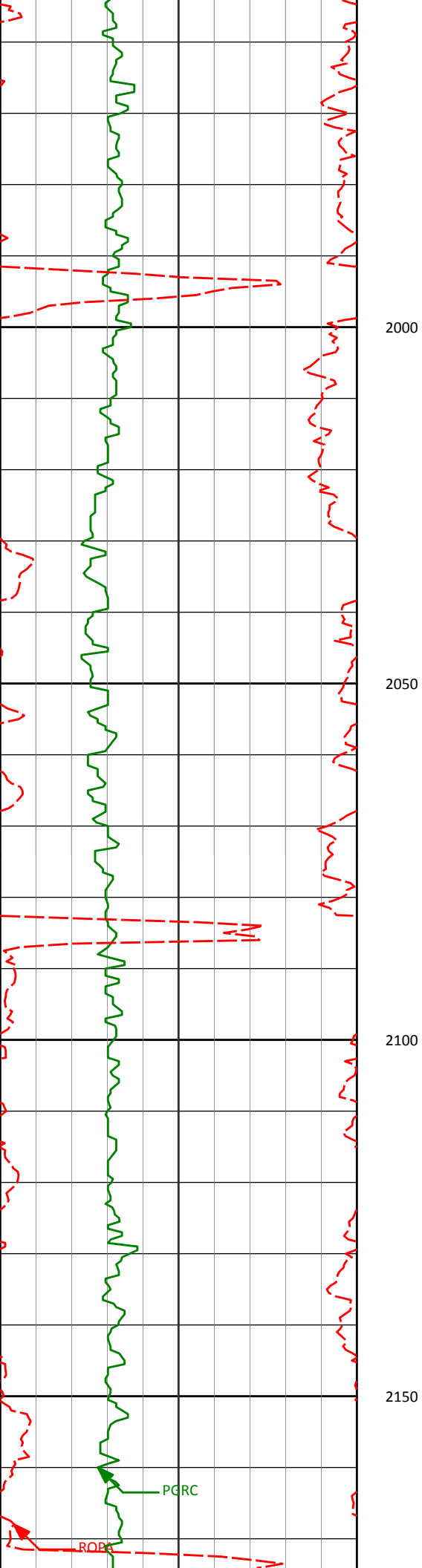
1854'

0.35°

342.01°

1853.94'

3.47'



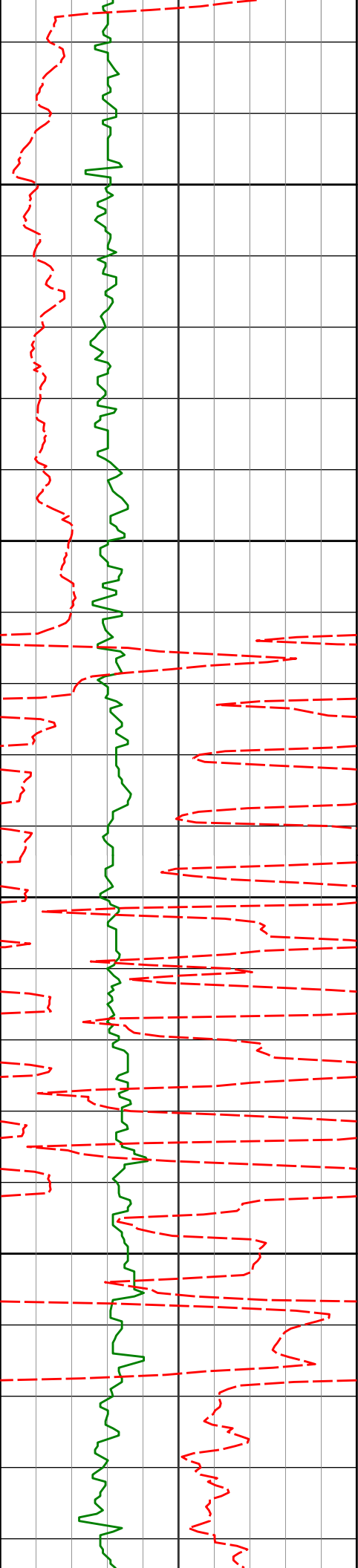
2036'

0.39°

261.95°

2035.94'

3.92'



2200

2218'

0.79°

306.65°

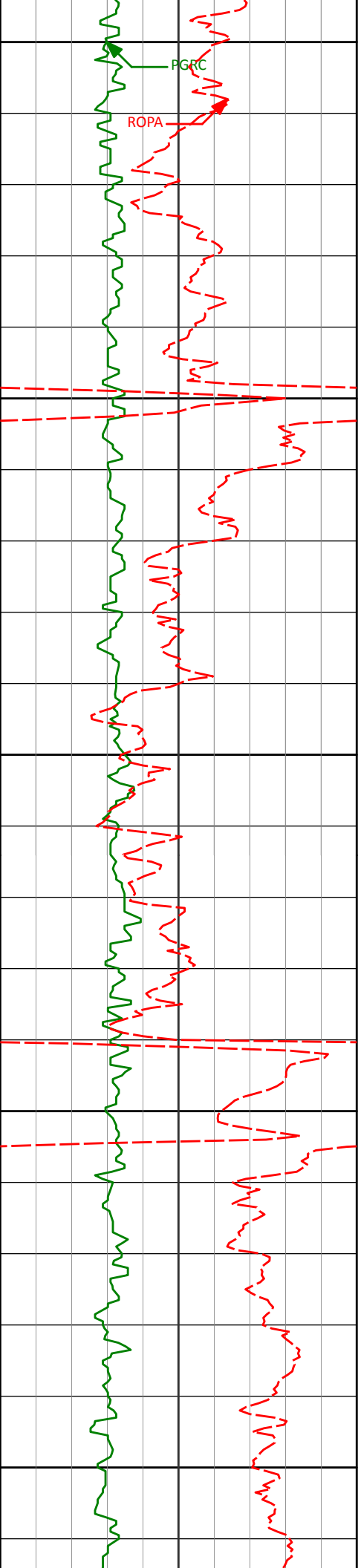
2217.93'

4.58'

2250

2300

2350



2400

2400'

1.23°

215.69°

2399.91'

3.74'

2450

2500

2550

2583'

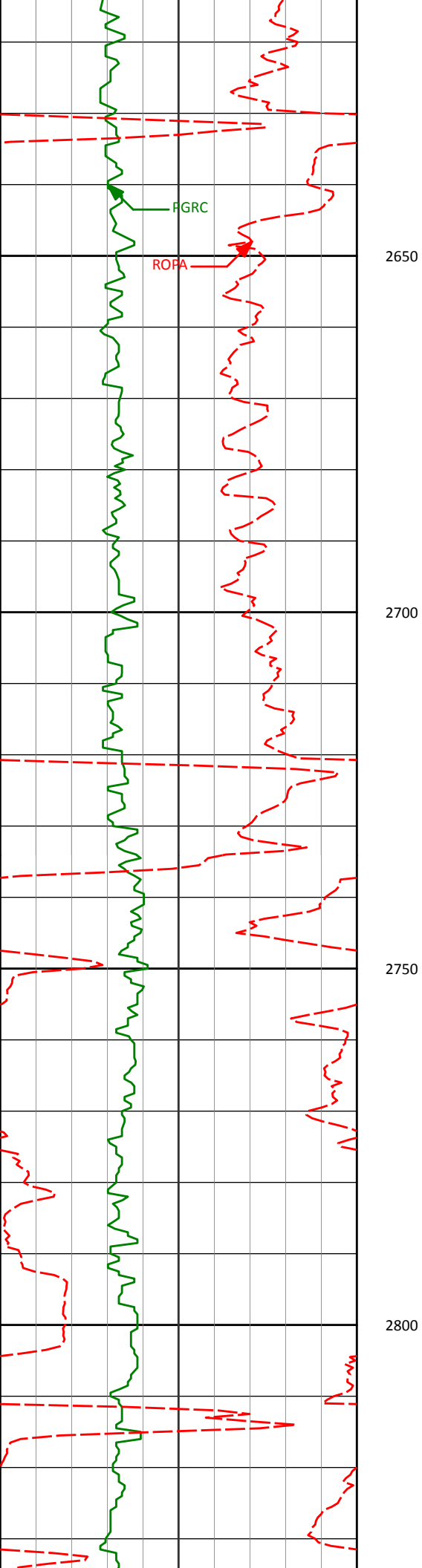
0.44°

359.31°

2582.90'

2.85'

2600



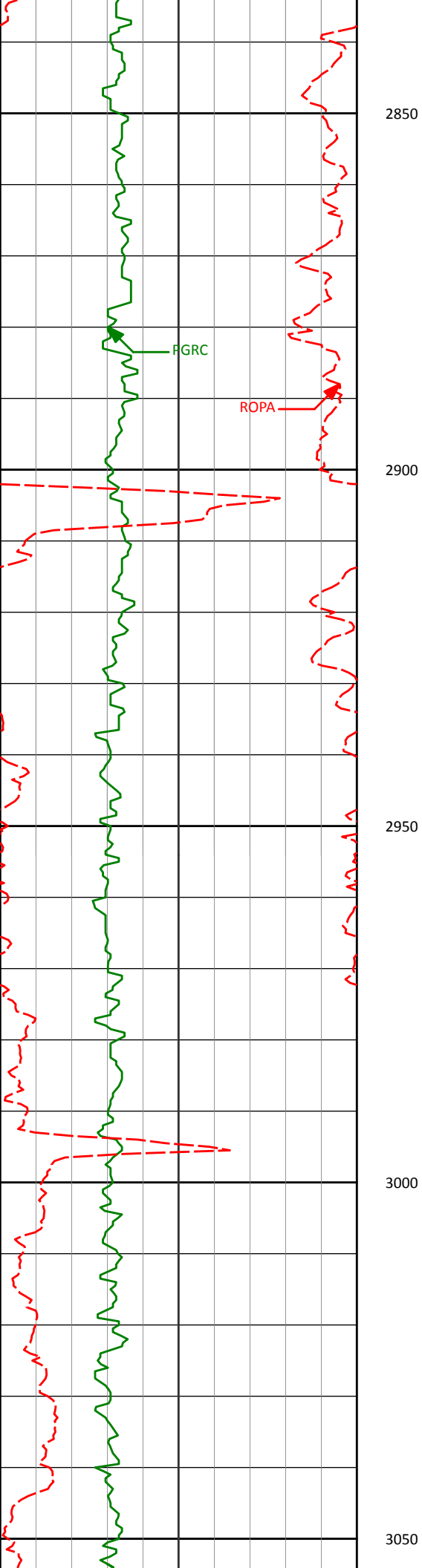
2765'

0.50°

221.93°

2764.90'

2.96'



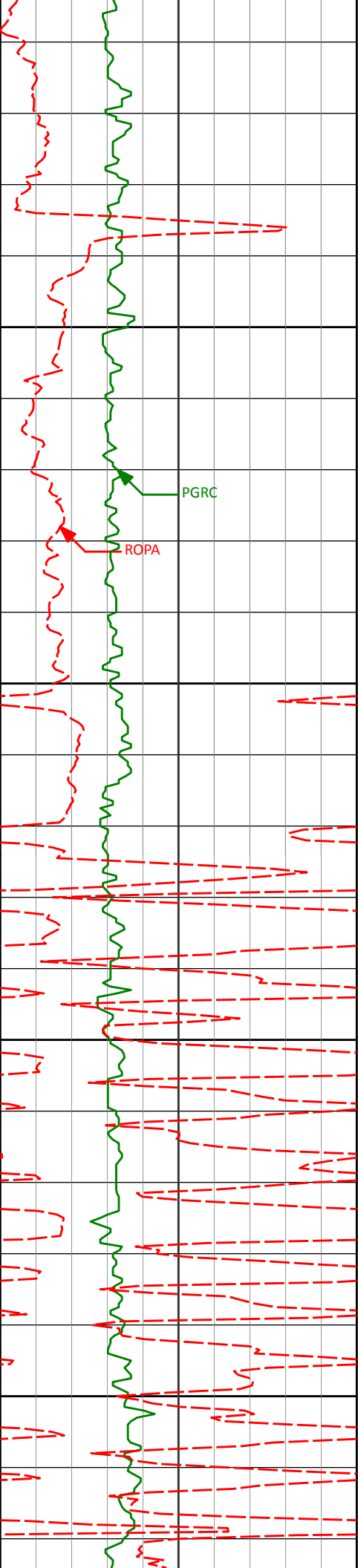
2946'

0.71°

200.31°

2945.89'

1.32'



3100

3128'

0.43°

266.23°

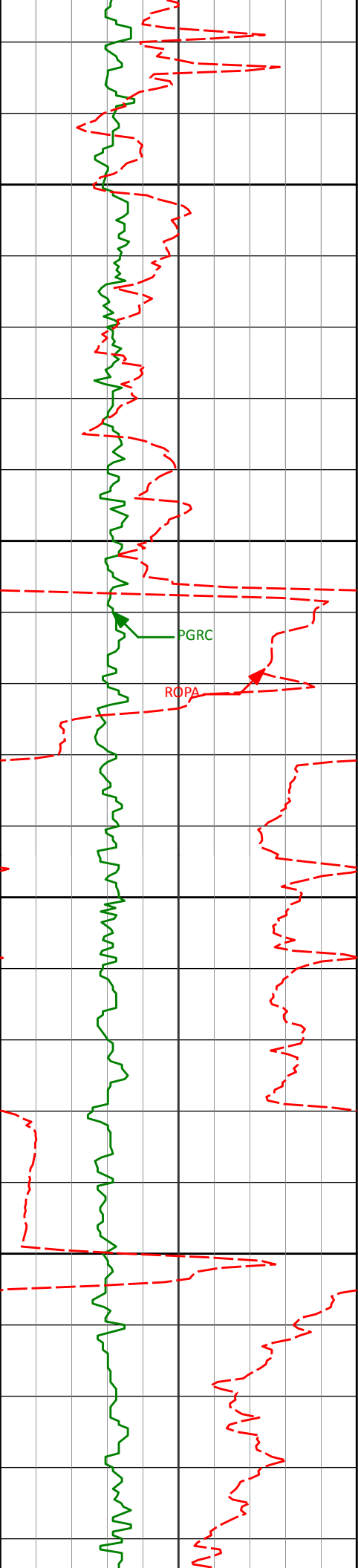
3127.88'

0.21'

3150

3200

3250



3300

3310'

0.81°

255.65°

3309.87'

-0.15'

3350

PGRC

ROPA

3400

3450

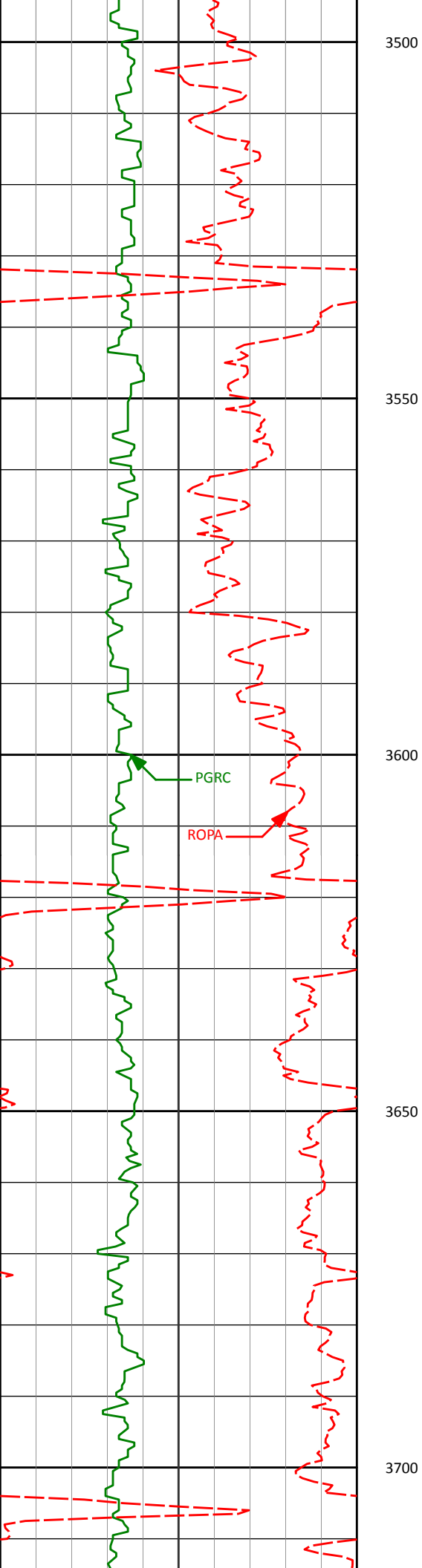
3486'

0.80°

109.84°

3485.86'

-0.88'



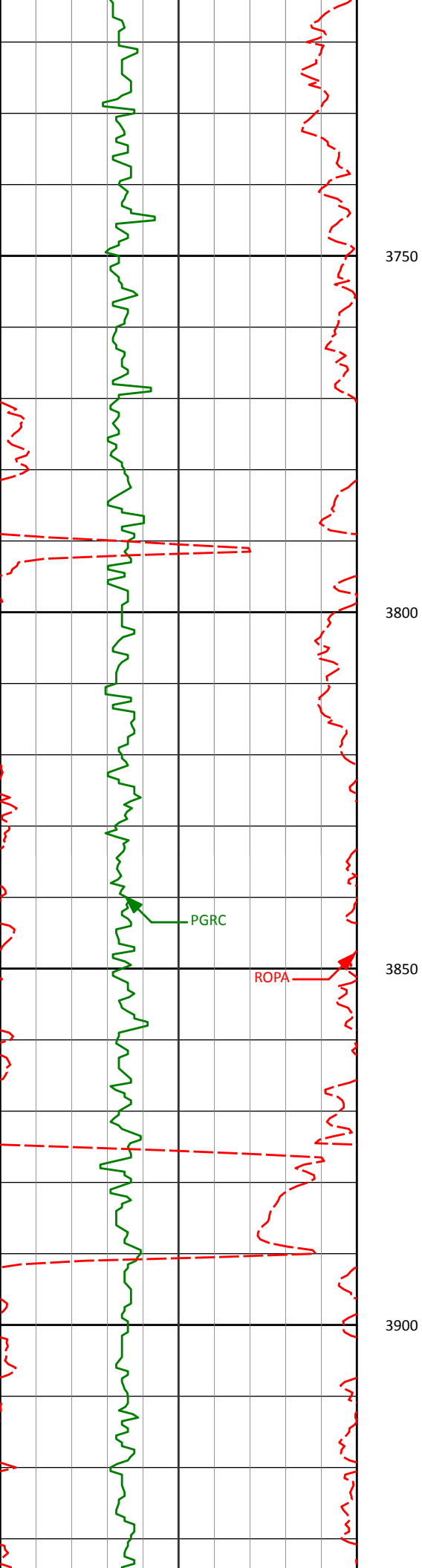
3657'

0.58°

170.93°

3656.85'

-2.13'



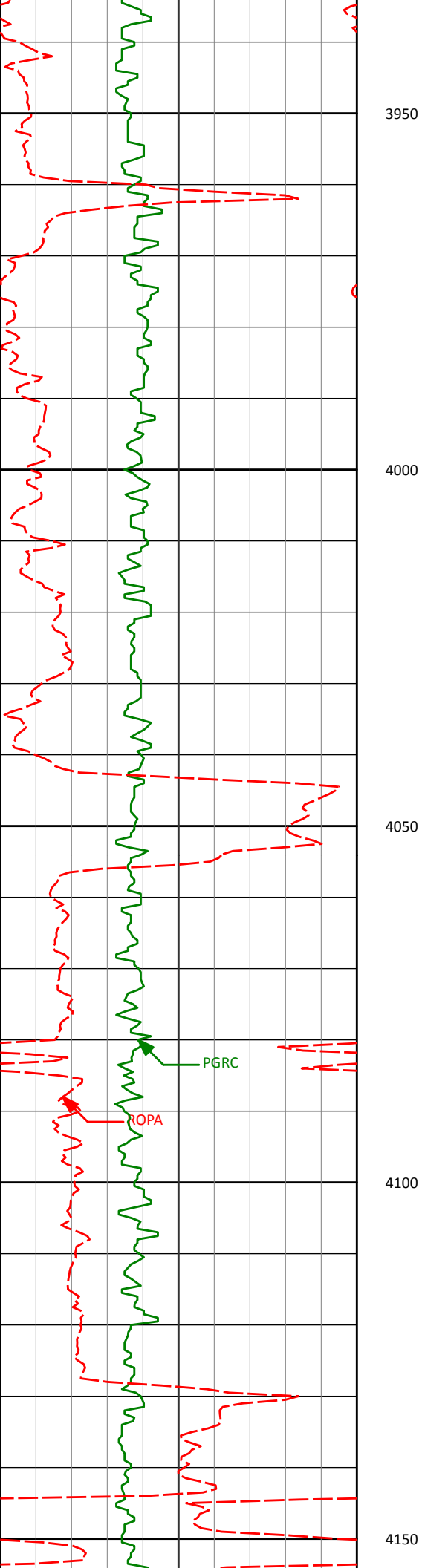
3828'

0.83°

185.78°

3827.84'

-4.22'



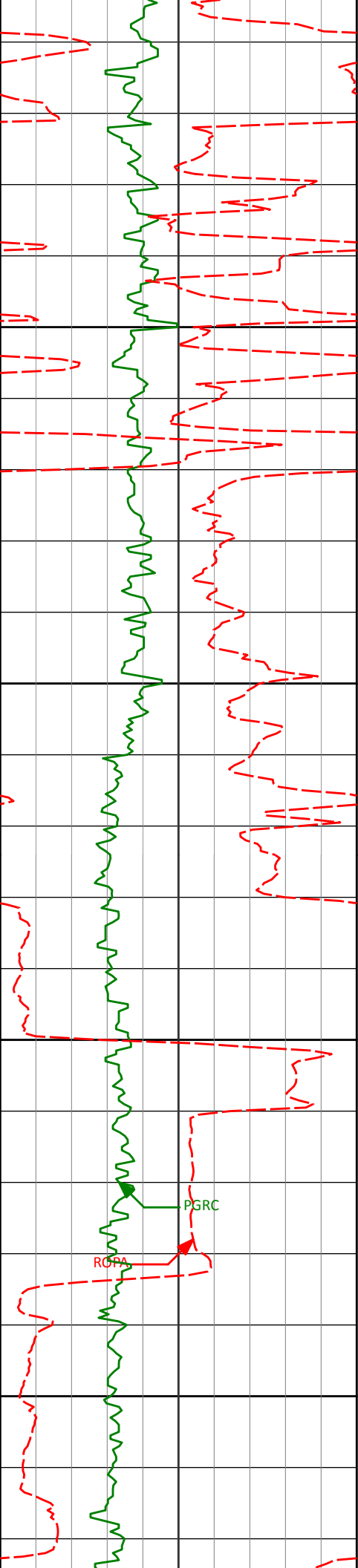
3997'

0.85°

30.49°

3996.83'

-4.36'



4168'

0.52°

199.95°

4167.83'

-4.00'

4200

4250

4300

PGRC

ROPA

4339'

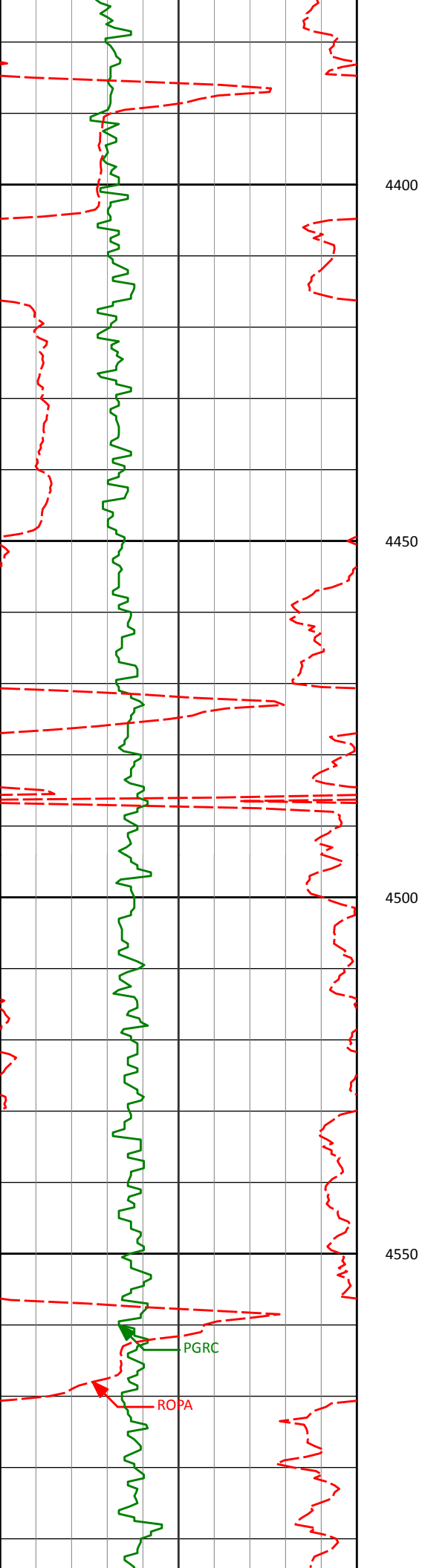
0.55°

70.81°

4338.83'

-4.46'

4350



4510'

0.66°

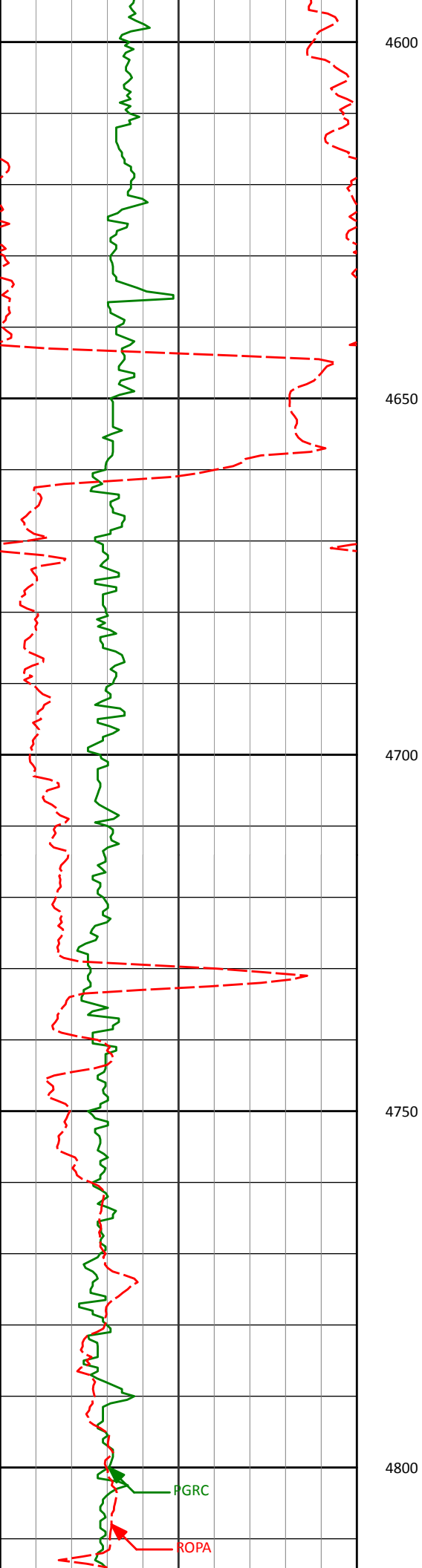
292.23°

4509.82'

-3.81'

PGRC

ROPA



4681'

0.65°

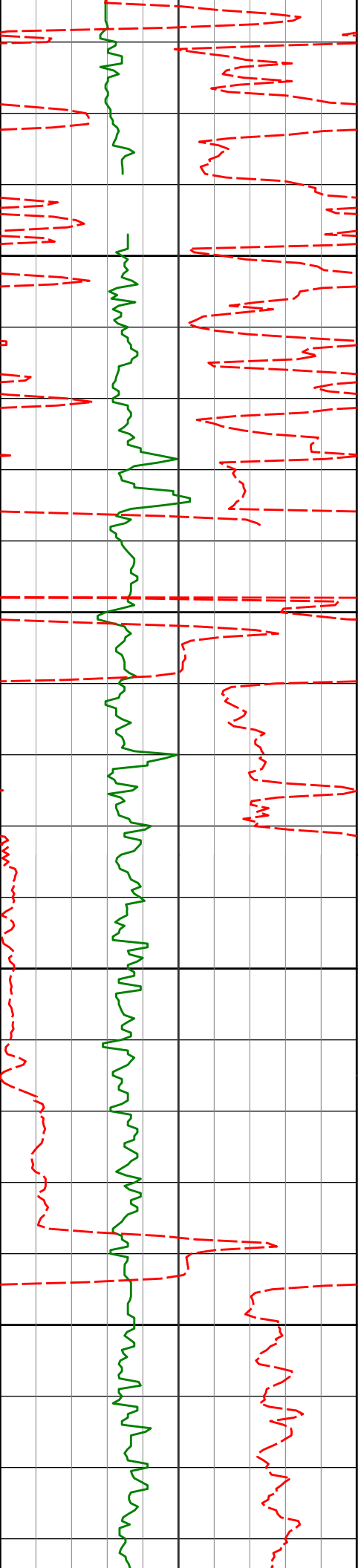
101.41°

4680.82'

-3.63'

GRGRC

ROPA



4850

4852'

0.19°

8.17°

4851.81'

-3.54'

4900

4950

5000

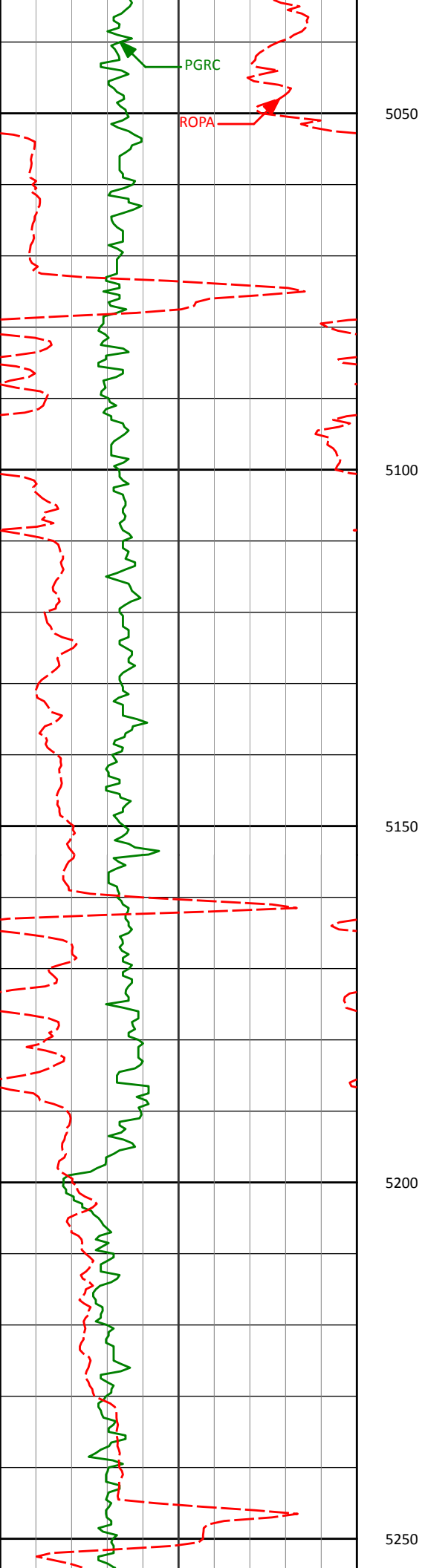
5024'

0.37°

26.96°

5023.81'

-2.77'



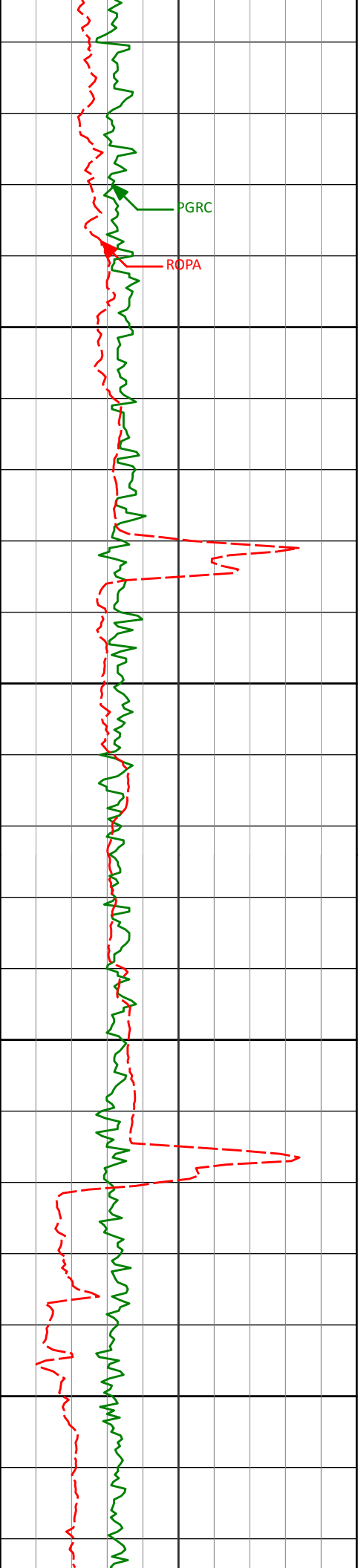
5195'

0.22°

355.40°

5194.81'

-1.95'



5300

5350

5400

5450

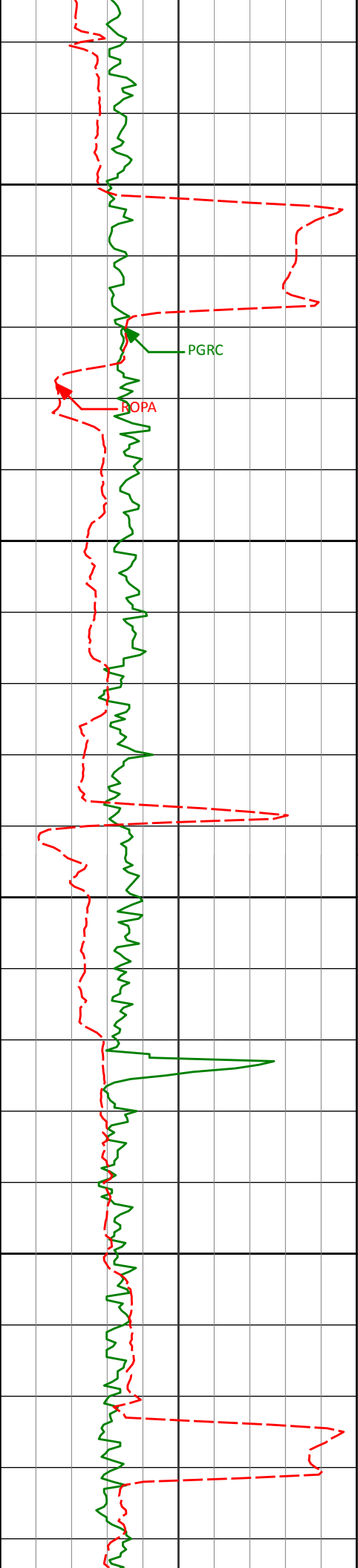
5365'

0.78°

351.25°

5364.80'

-0.48'



5500

5550

5600

5650

PGRC

ROPA

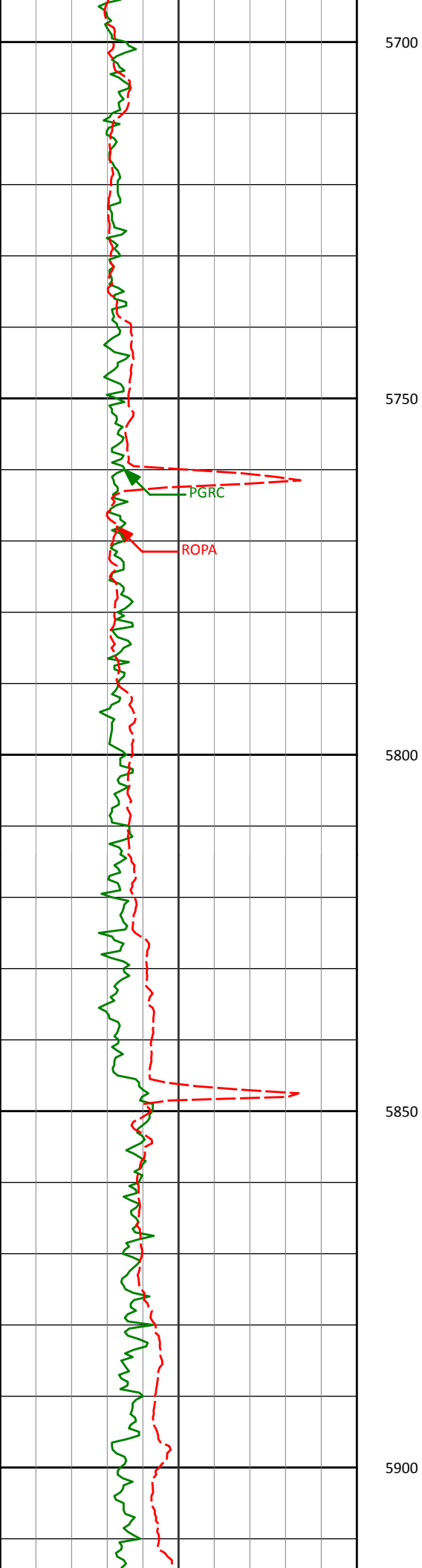
5536'

1.43°

208.24°

5535.79'

-1.21'



5708'

0.47°

219.23°

5707.76'

-3.64'

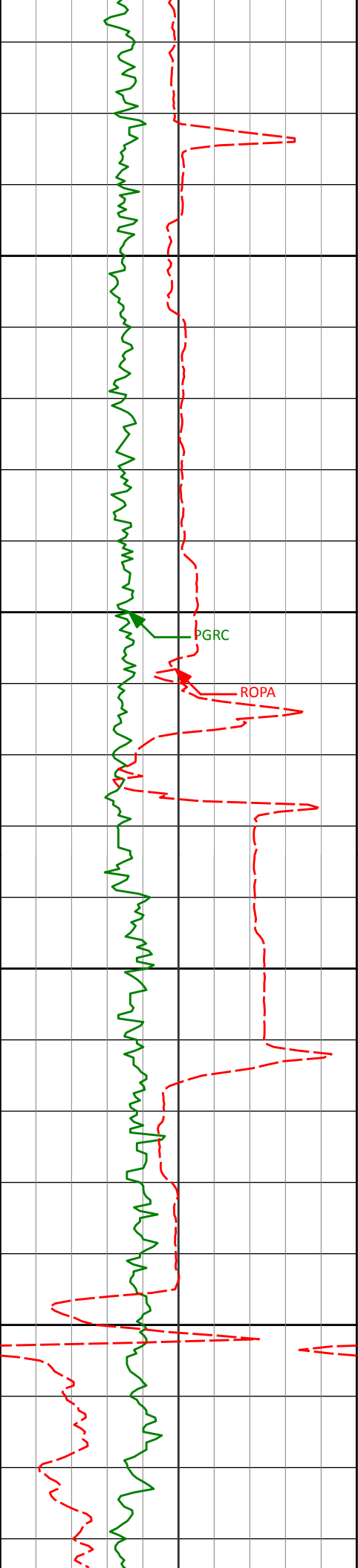
5879'

0.43°

140.08°

5878.76'

-4.68'



5950

6000

6050

6100

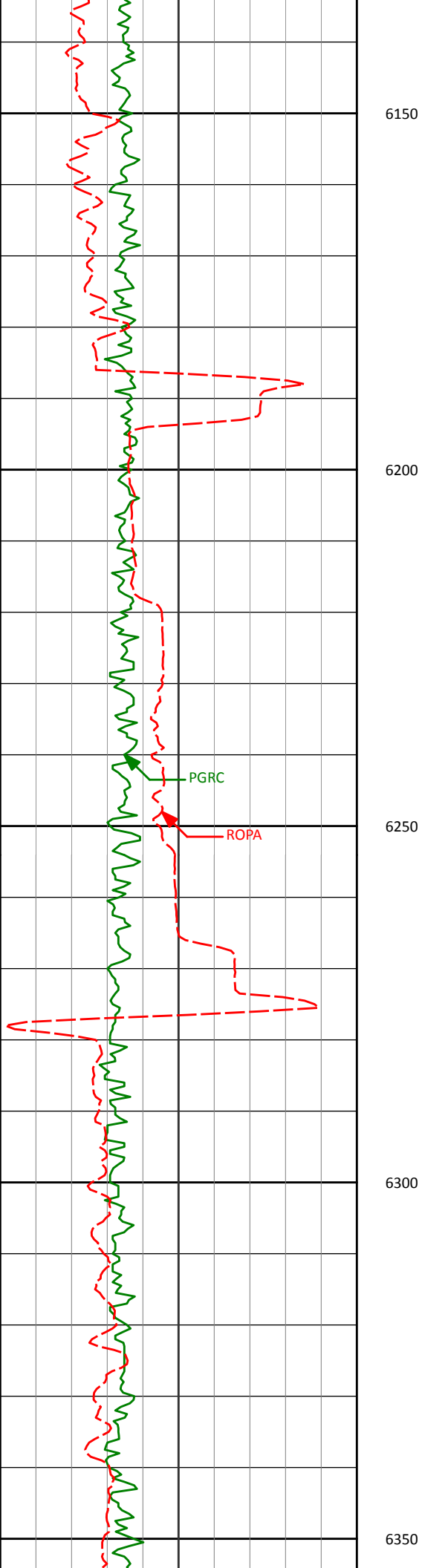
6051'

0.22°

187.64°

6050.75'

-5.50'



6222'

0.65°

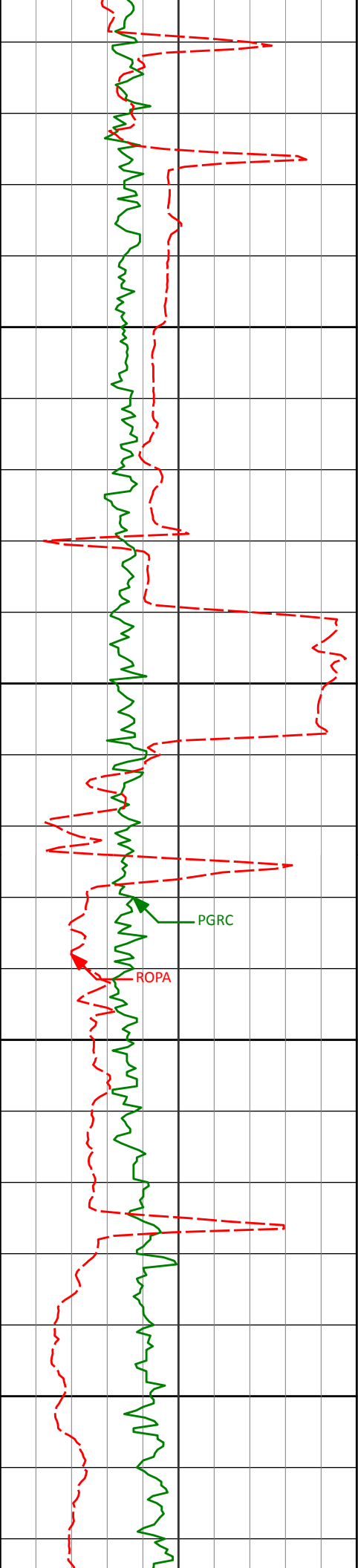
234.28°

6221.75'

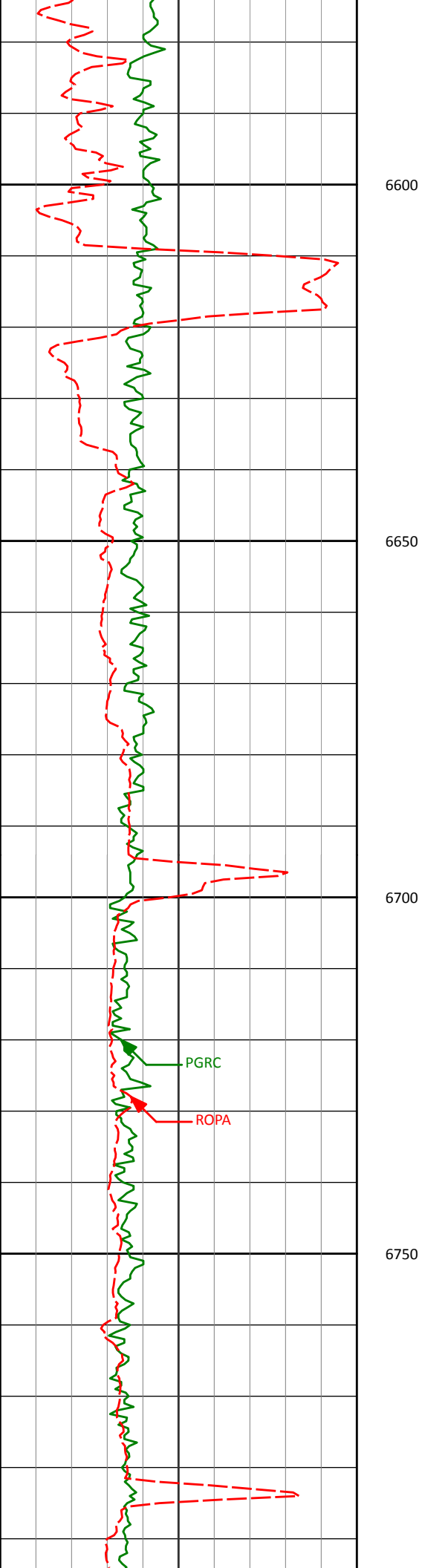
-6.39'

PGRC

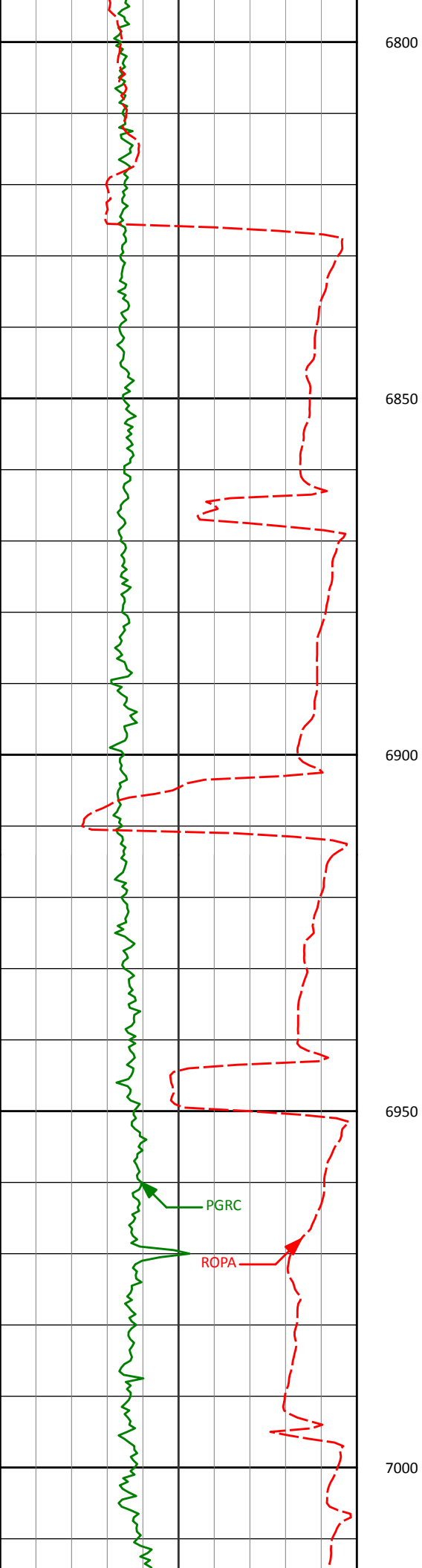
ROPA



6394'	1.27°	168.56°	6393.73'	-8.83'
6400				
6450				
6500				
6550				
6563'	0.85°	356.50°	6562.72'	-9.42'



6734'	0.26°	340.09°	6733.71'	-7.79'
6777'	0.18°	219.47°	6776.71'	-7.75'



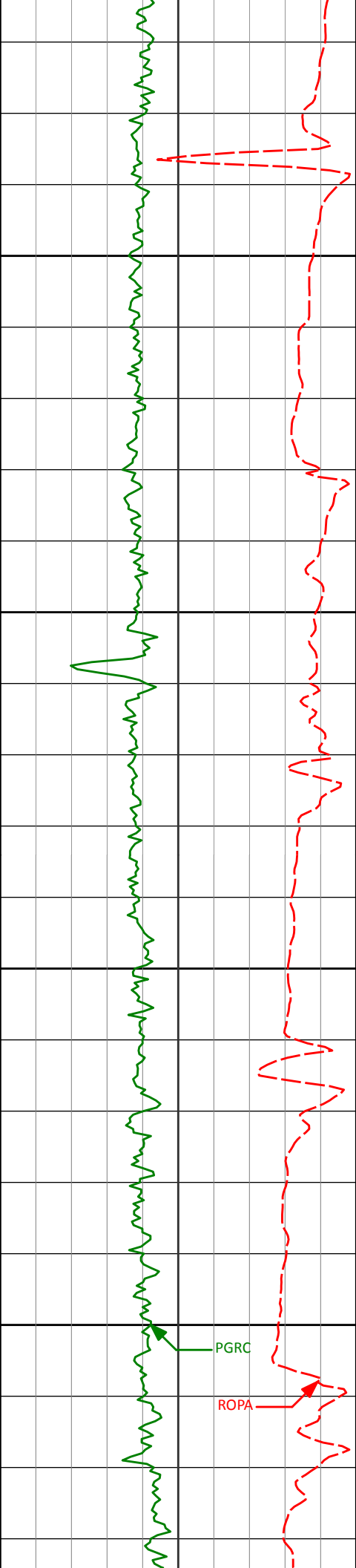
6820'	0.77°	13.53°	6819.71'	-7.52'
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6862'	4.34°	16.09°	6861.66'	-5.72'
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6904'	7.64°	19.86°	6903.42'	-1.56'
-------	-------	--------	----------	--------

6947'	10.38°	24.33°	6945.89'	4.66'
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6990'	13.13°	26.80°	6987.99'	12.55'
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7050

7100

7150

7200

7033'

16.73°

22.19°

7029.53'

22.64'

7075'

20.33°

17.53°

7069.35'

35.20'

7118'

23.23°

13.60°

7109.27'

50.57'

7161'

26.67°

11.52°

7148.26'

68.27'

7204'

30.36°

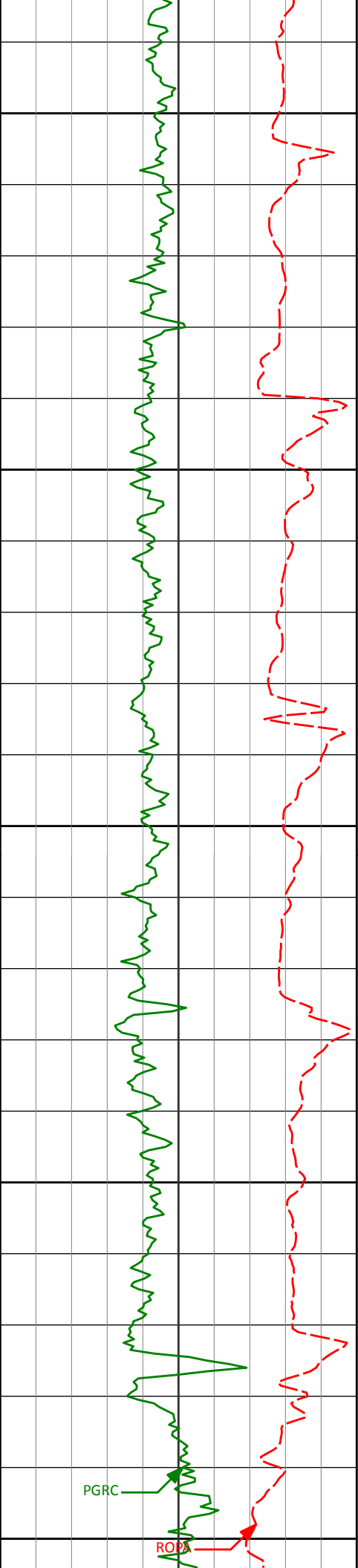
9.46°

7186.04'

88.46'

PGRC

ROPA



7250

7247'

34.11°

7.61°

7222.40'

111.14'

7300

7290'

37.52°

4.00°

7257.27'

136.16'

7350

7332'

41.02°

2.03°

7289.78'

162.70'

7400

7374'

44.94°

1.62°

7320.50'

191.31'

7450

7416'

49.06°

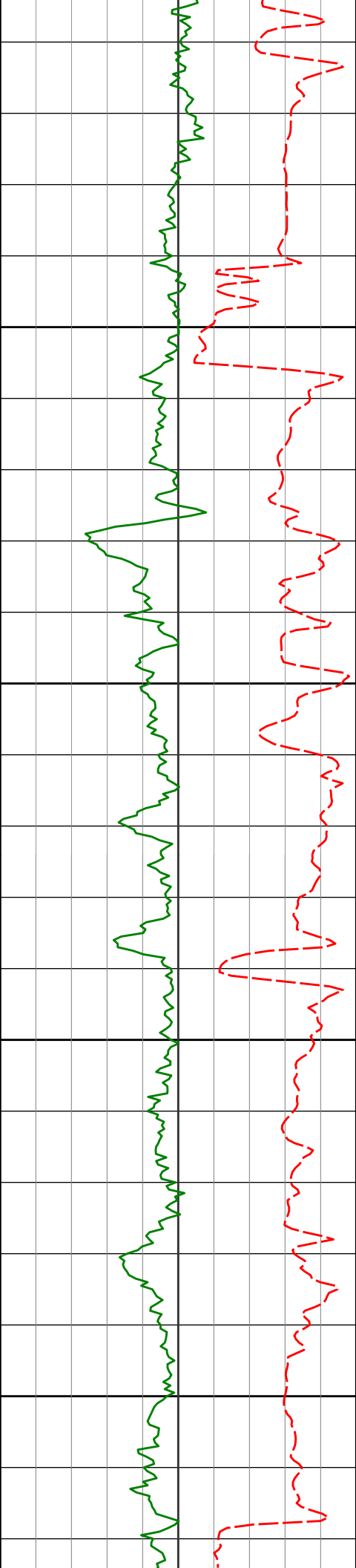
0.30°

7349.14'

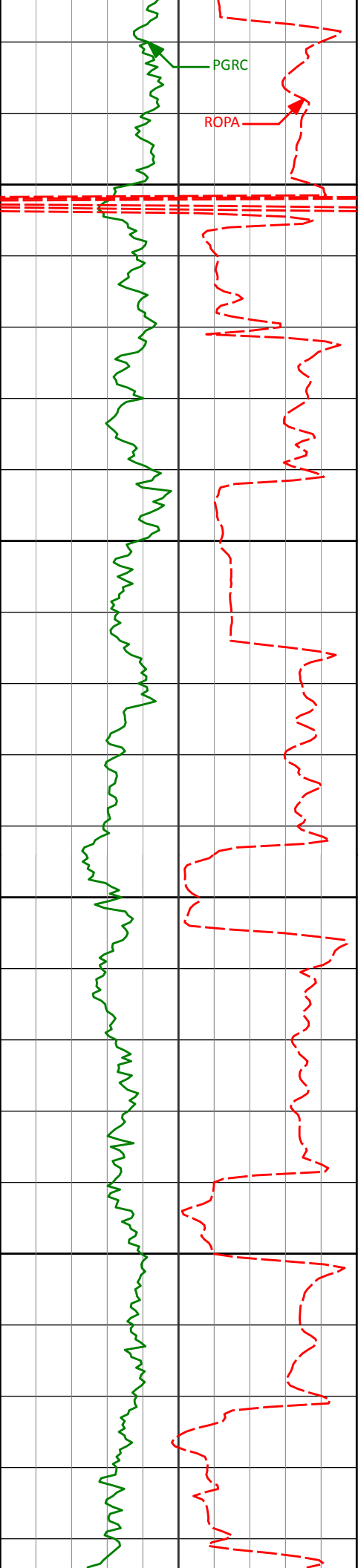
222.02'

PGRC

ROPA



	7459'	52.91°	0.21°	7376.21'	255.42'
7500	7502'	55.82°	359.41°	7401.26'	290.37'
7550	7545'	59.12°	359.56°	7424.38'	326.61'
7600	7588'	62.76°	359.44°	7445.26'	364.19'
7650	7631'	66.69°	359.35°	7463.61'	403.07'
	7674'	70.69°	357.08°	7479.24'	442.11'



7700

7716'

74.16°

357.45°

7491.92'

483.11'

7750

7759'

76.10°

357.71°

7502.95'

524.63'

7800

7802'

79.56°

358.33°

7512.02'

566.63'

7850

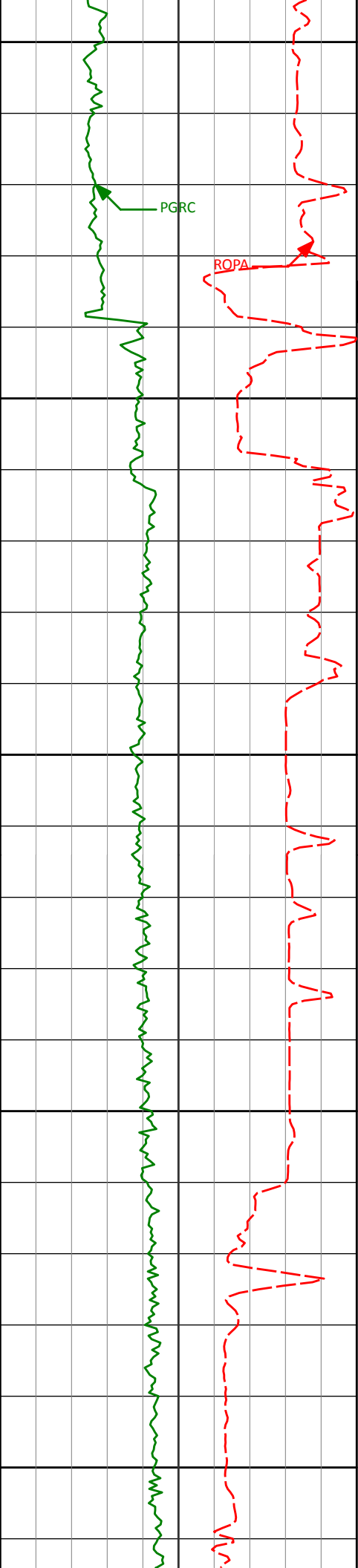
7845'

83.08°

358.12°

7518.50'

609.11'



7900

7950

8000

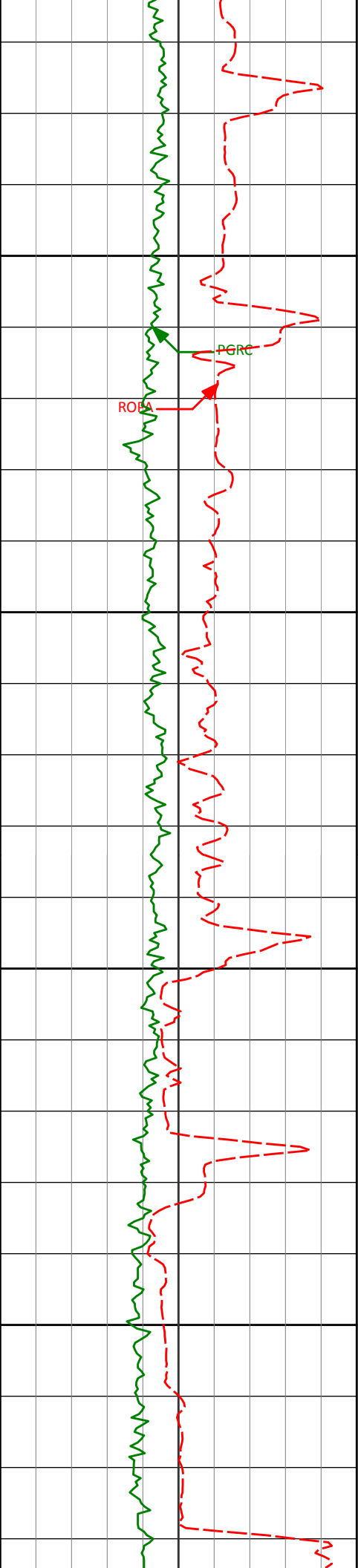
8050

8100

Casing @ 7937' MD

Run 200

7895'	86.71°	357.70°	7522.95	658.87'
7980'	90.34°	358.35°	7525.14'	743.78'



8150

8192'

90.22°

358.39°

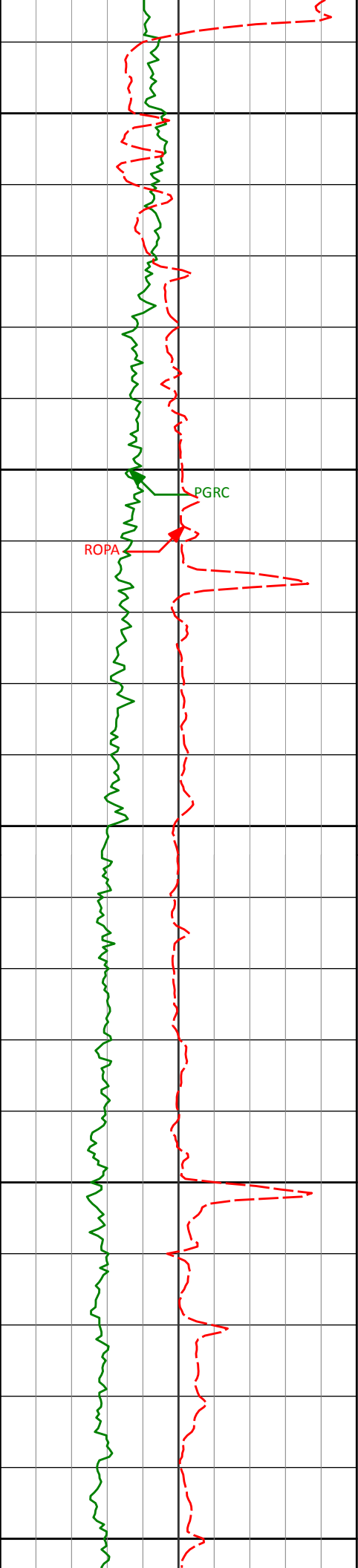
7524.10'

955.69'

8200

8250

8300



8350

8364'

89.14°

357.66°

7525.06'

1127.58'

8400

ROPA

PGRC

8450

8500

8535'

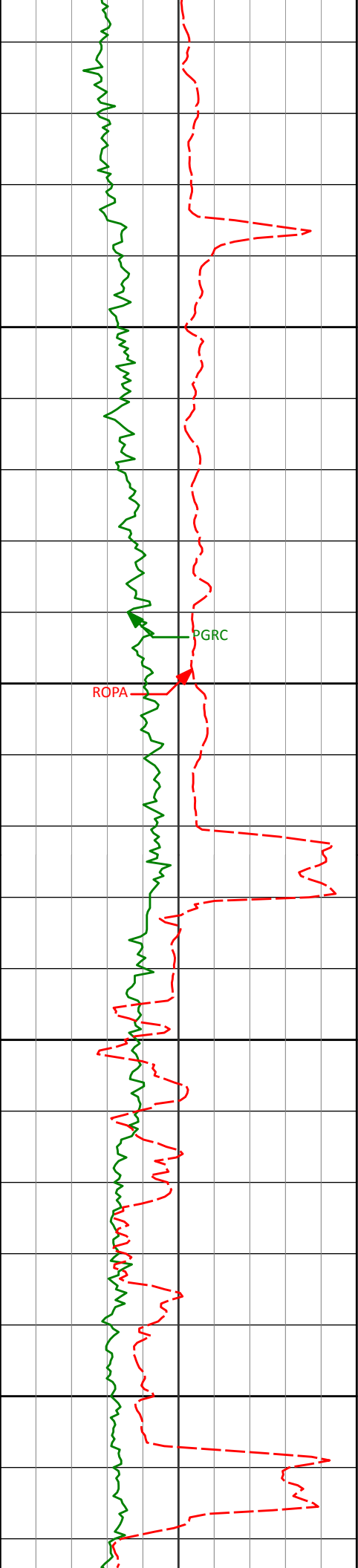
90.15°

357.49°

7526.12'

1298.42'

8550



8600

8650

8700

8750

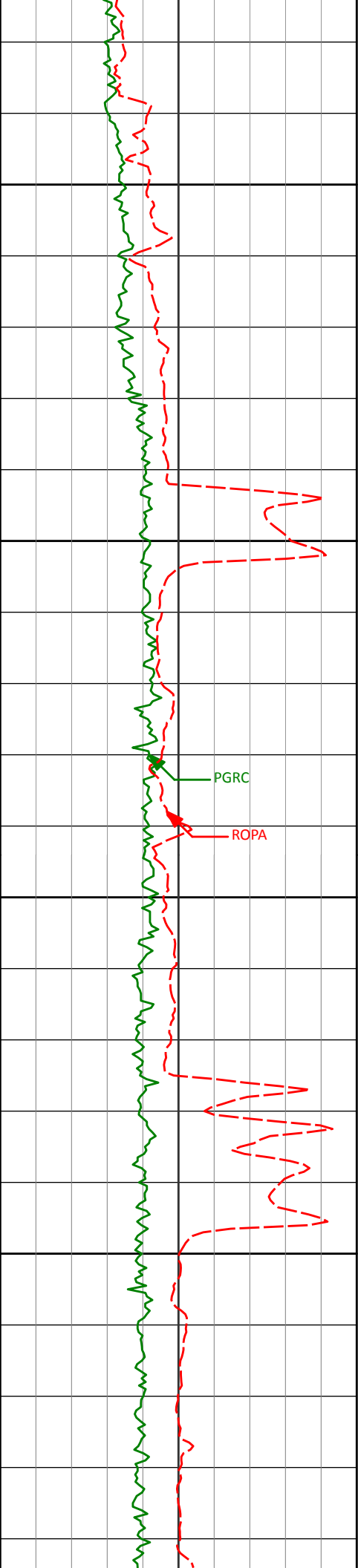
8706'

91.02°

359.11°

7524.38'

1469.33'



8800

8850

8876'

90.59°

0.69°

7521.99'

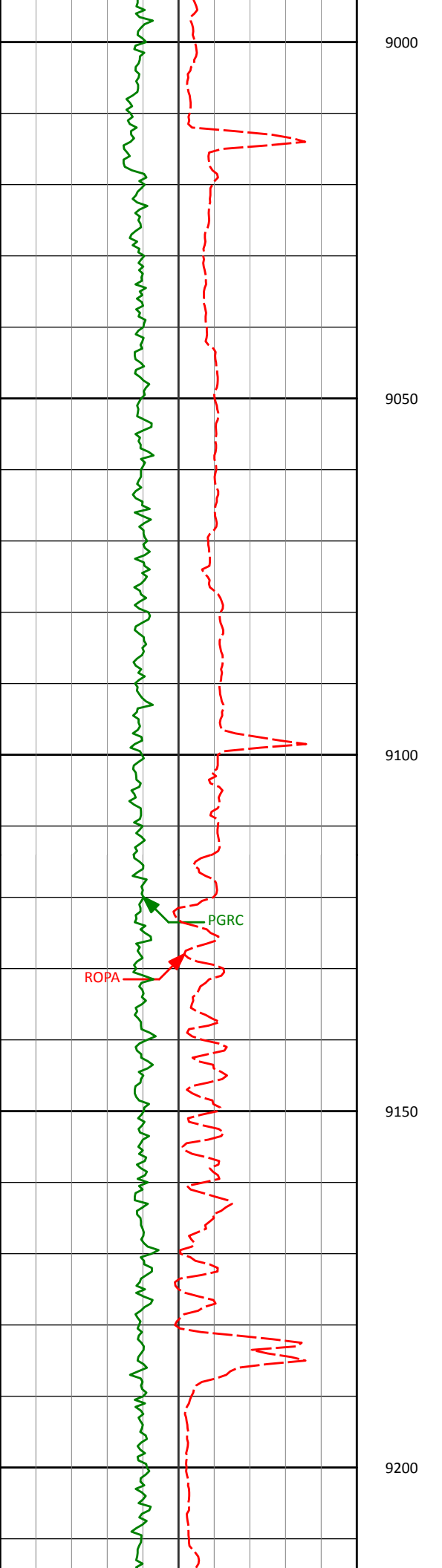
1639.31'

PGRC

ROPA

8900

8950



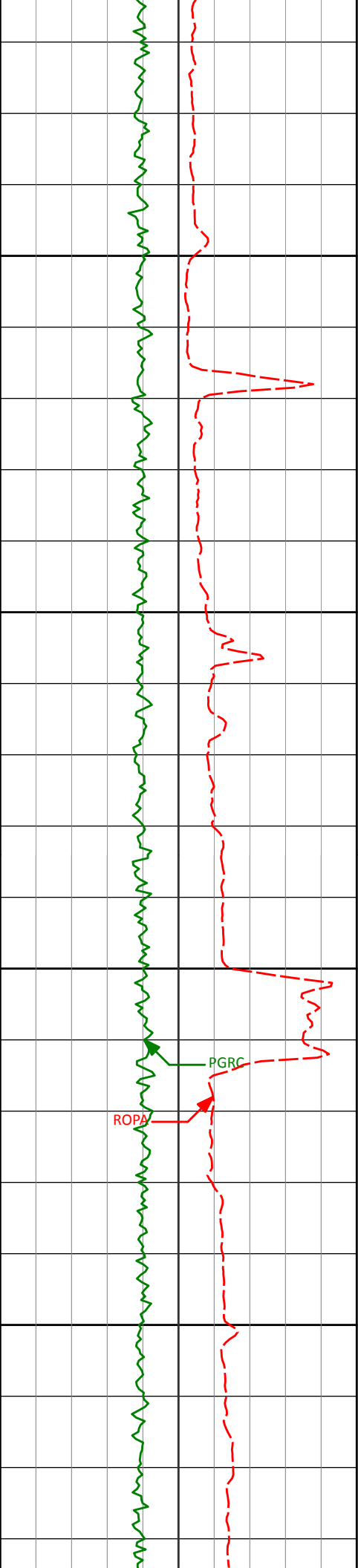
9045'

89.94°

359.78°

7521.21'

1808.30'



9250

9300

9350

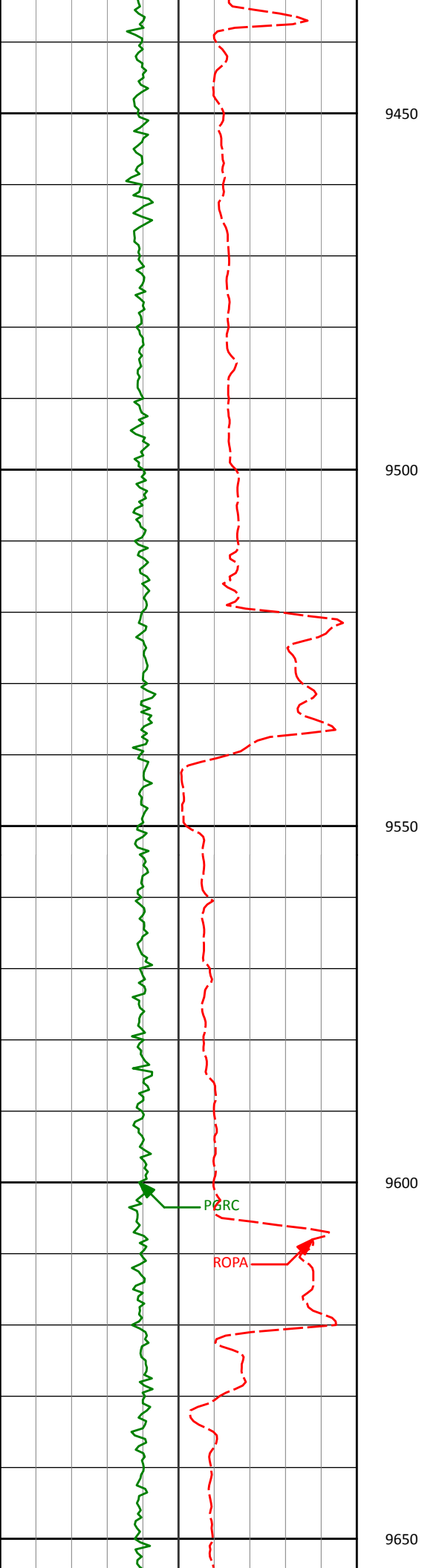
9216' 89.82° 358.40° 7521.57' 1979.27'

9383' 89.97° 358.43° 7521.87' 2146.21'

9400

PGRC

ROPA



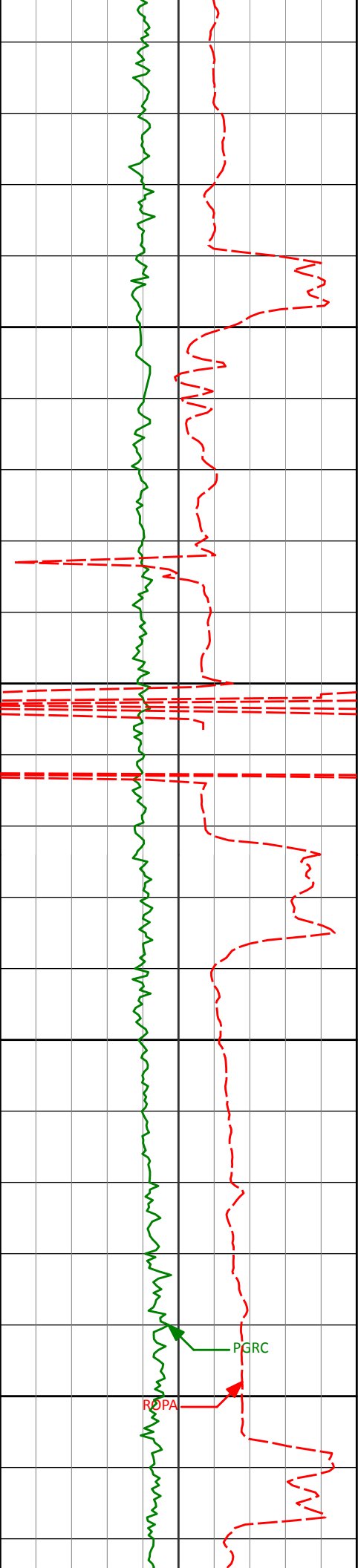
9551'

90.31°

358.83°

7521.46'

2314.16'



9700

9719'

89.82°

359.83°

7521.27'

2482.15'

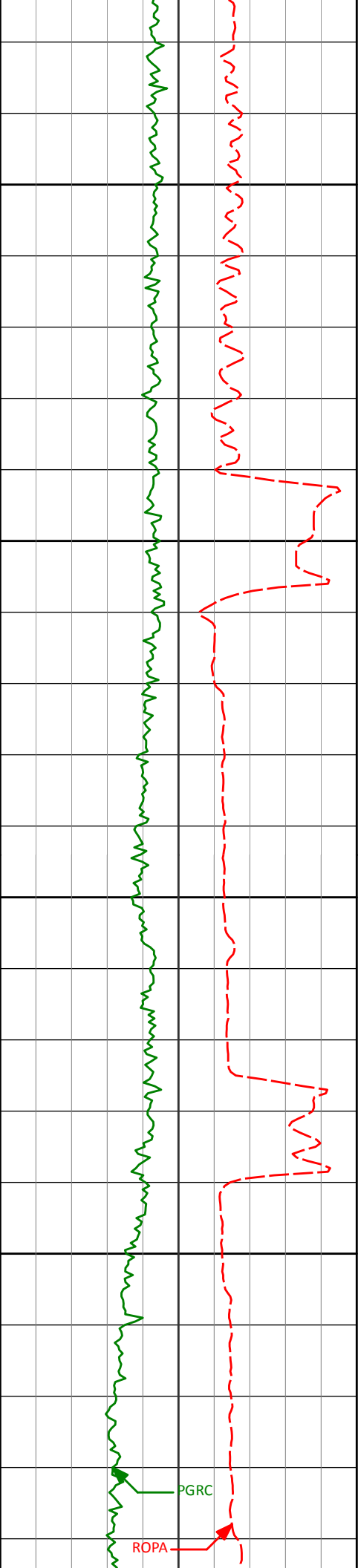
9750

9800

9850

PGRC

ROPA



9900

9950

10000

10050

9889'

90.65°

2.46°

7520.57'

2652.10'

10060'

88.71°

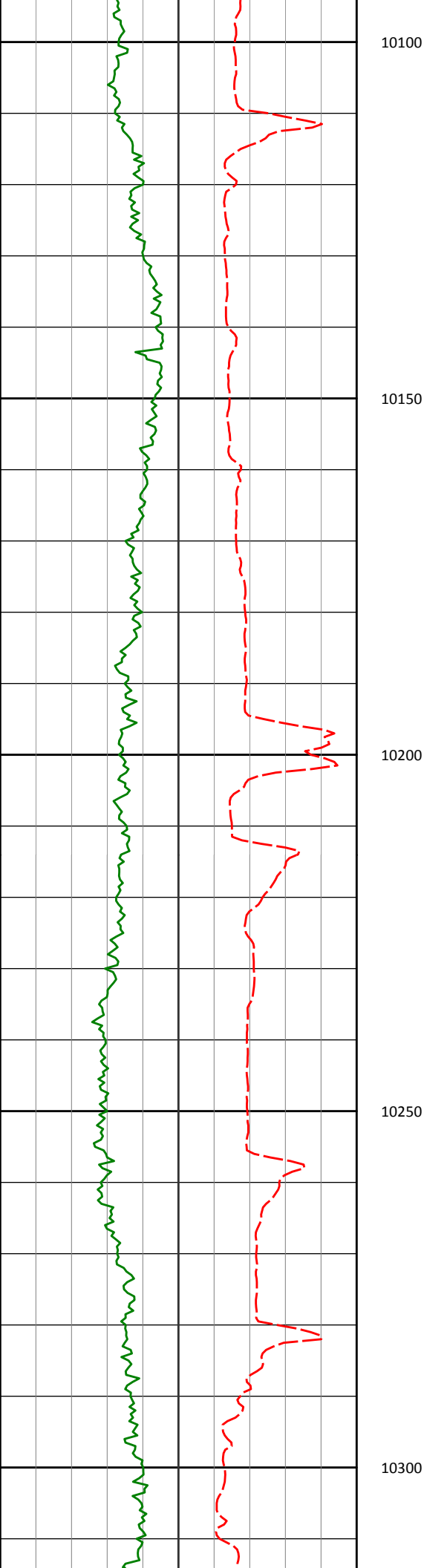
1.71°

7521.53'

2822.97'

PGRC

ROPA



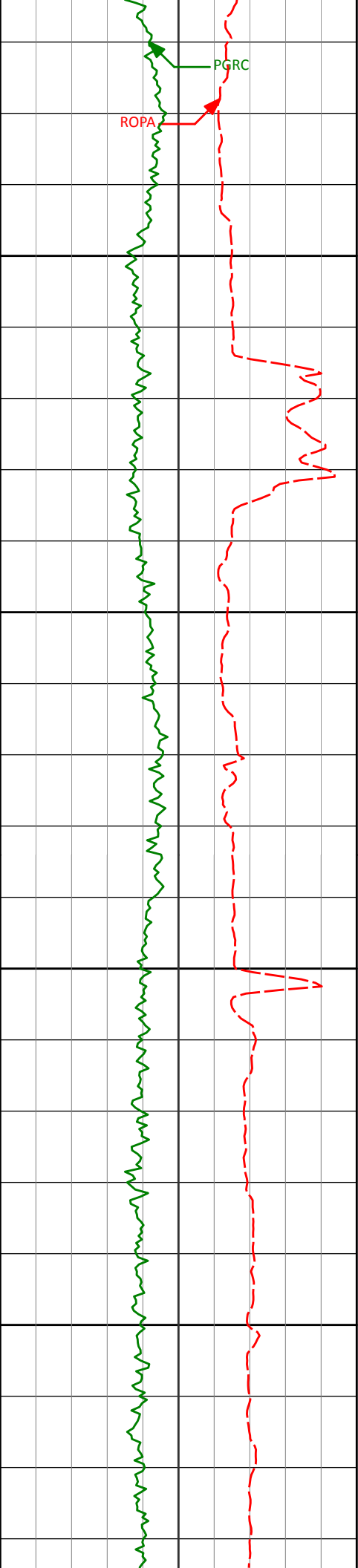
10232'

89.63°

2.30°

7524.02'

2994.84'



10350

10400

10450

10500

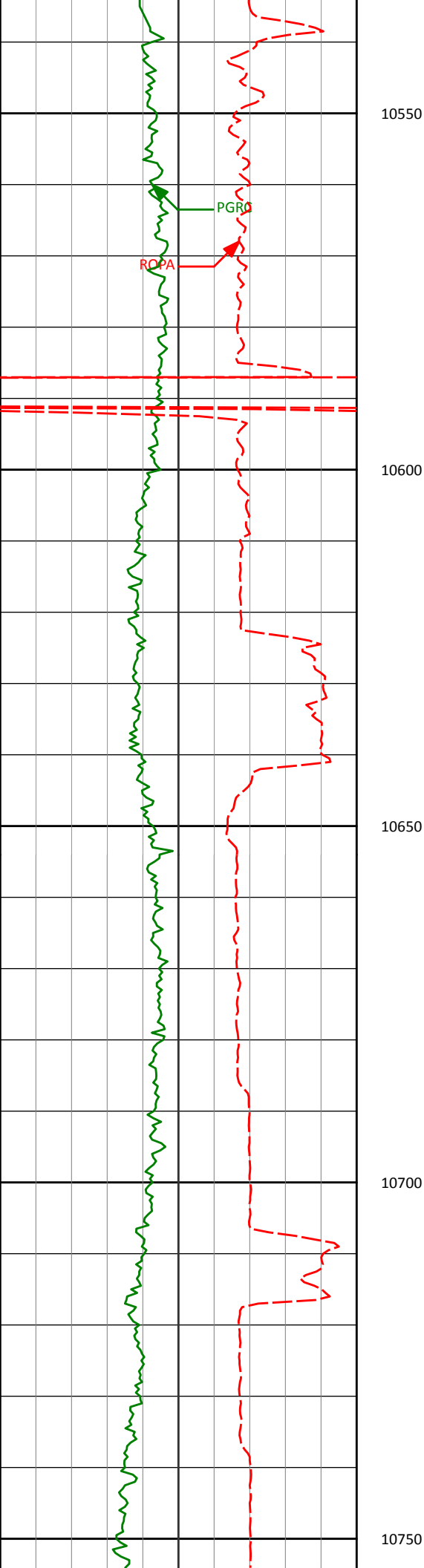
10402'

89.23°

0.71°

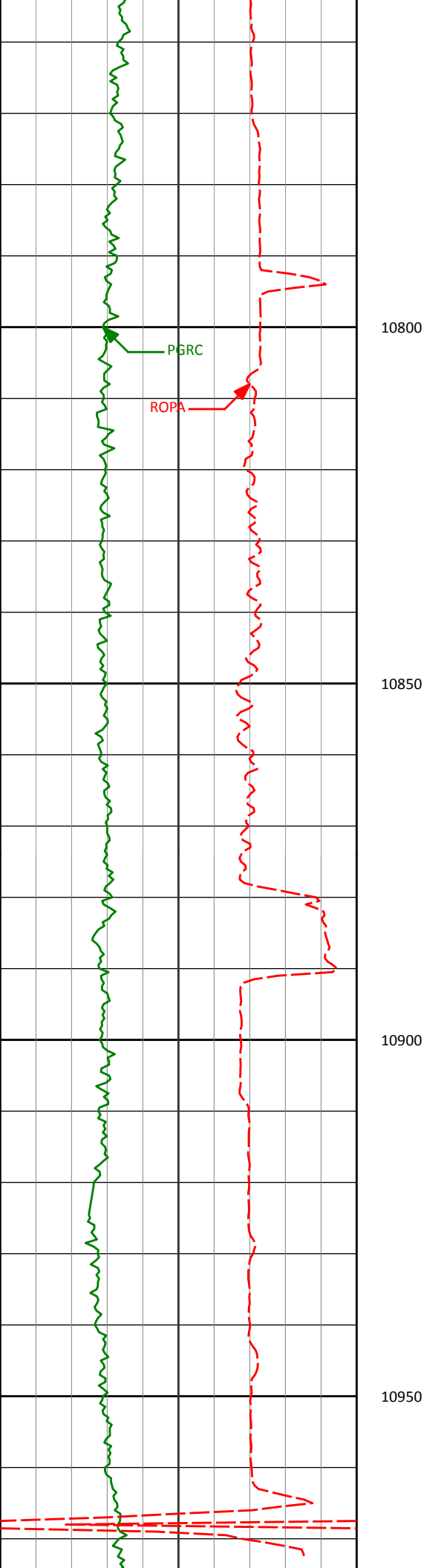
7525.71'

3164.77'



10573'	90.77°	2.13°	7525.71'	3335.71'
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10742'	89.63°	1.05°	7525.12'	3504.64'
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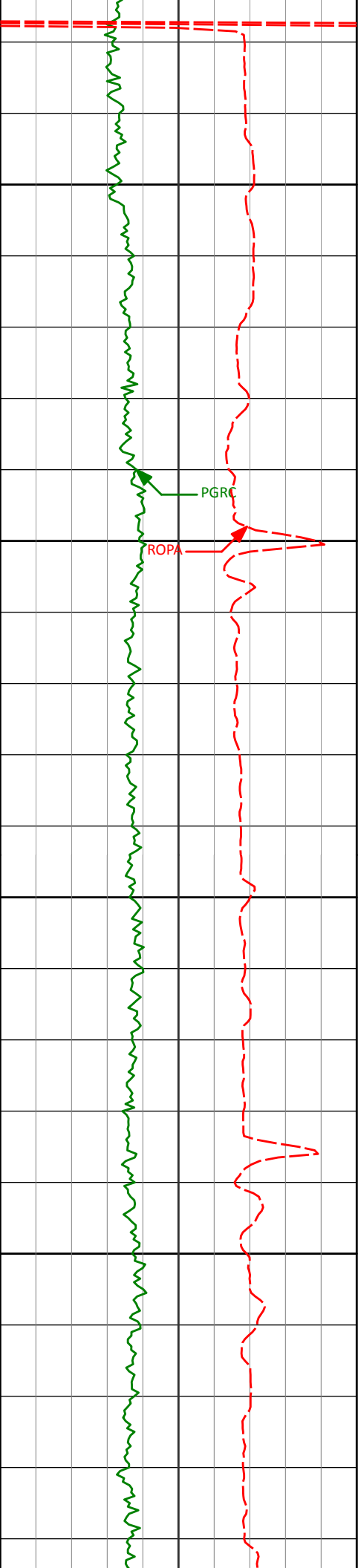
10913'

89.54°

359.76°

7526.36'

3675.63'



11000

11050

11100

11150

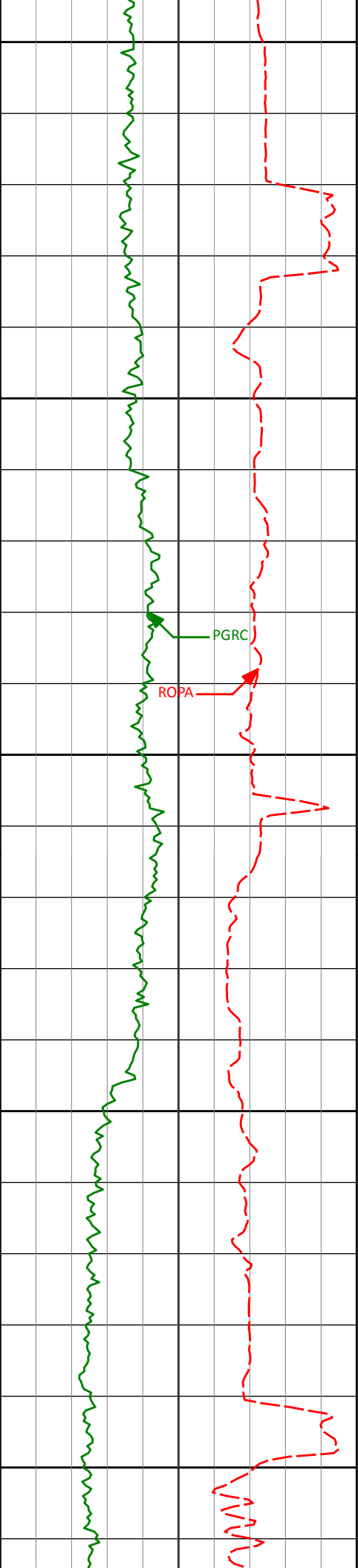
11084'

89.91°

359.37°

7527.18'

3846.62'



11200

11250

11300

11350

11400

11255'

89.41°

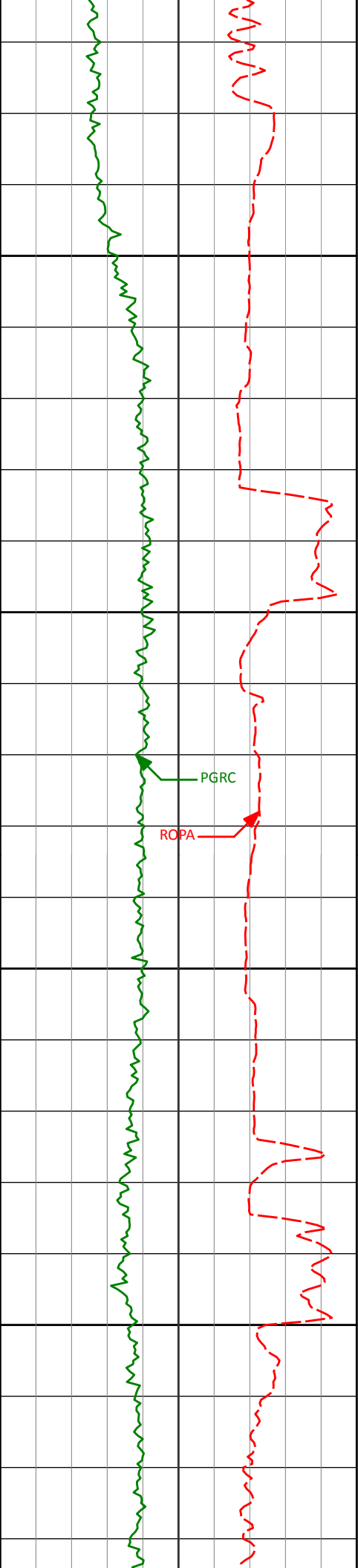
358.91°

7528.20'

4017.59'

PGRC

ROPA



11432'

90.86°

358.09°

7527.78'

4194.53'

11450

11500

PGRC

ROPA

11550

11600

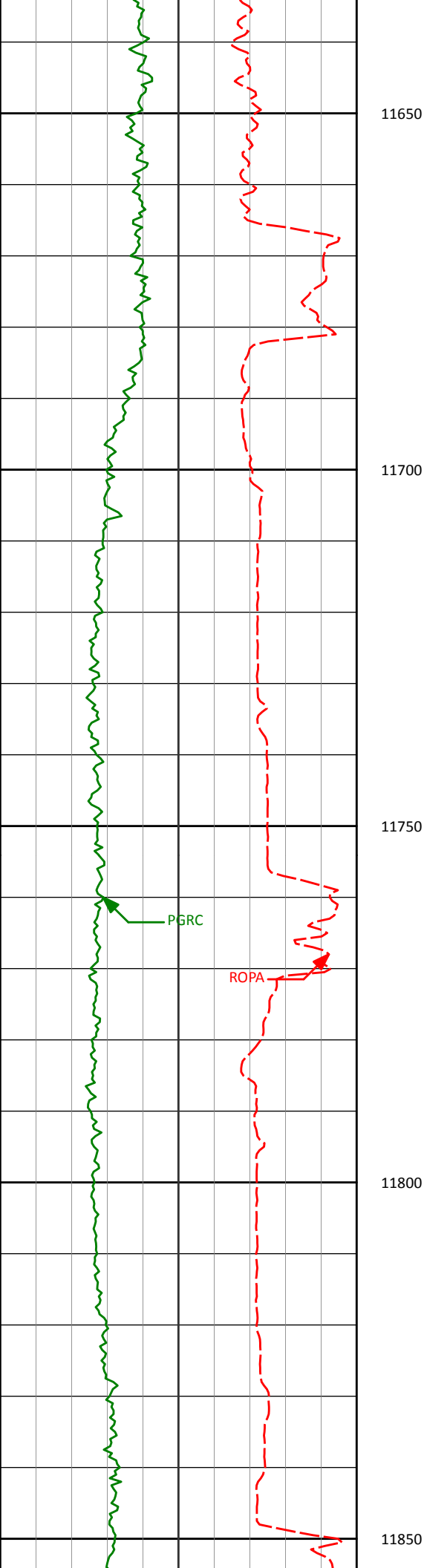
11615'

91.02°

0.57°

7524.78'

4377.48'



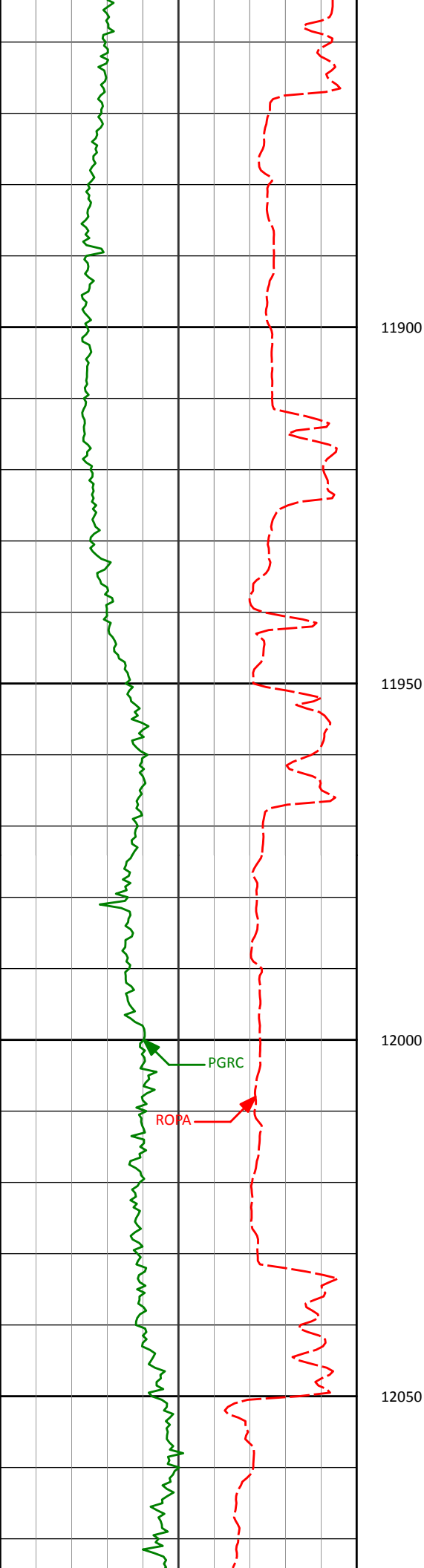
11798'

90.52°

3.18°

7522.32'

4560.35'



11980'

87.93°

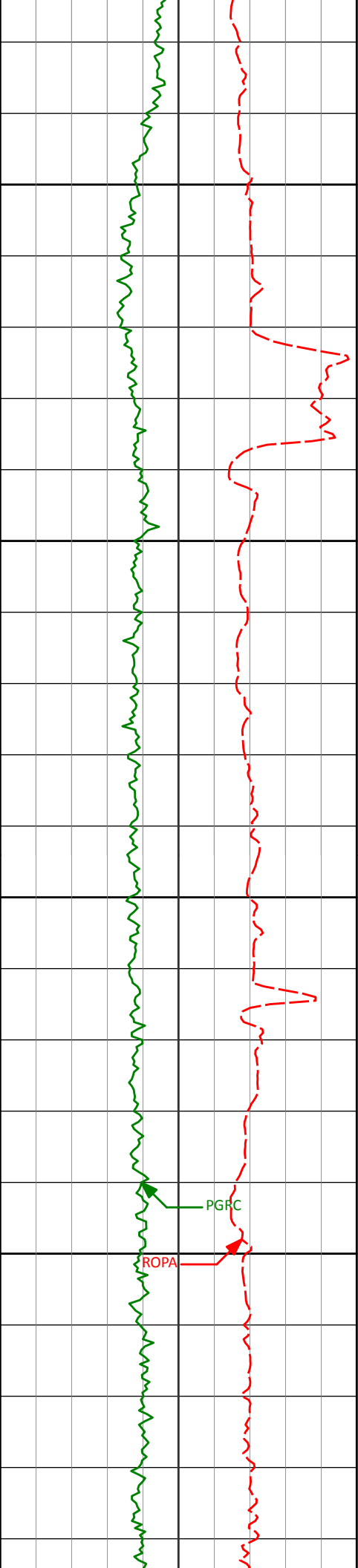
1.32°

7524.78'

4742.16'

PGRC

ROPA



12100

12150

12162'

88.95°

358.01°

7529.74'

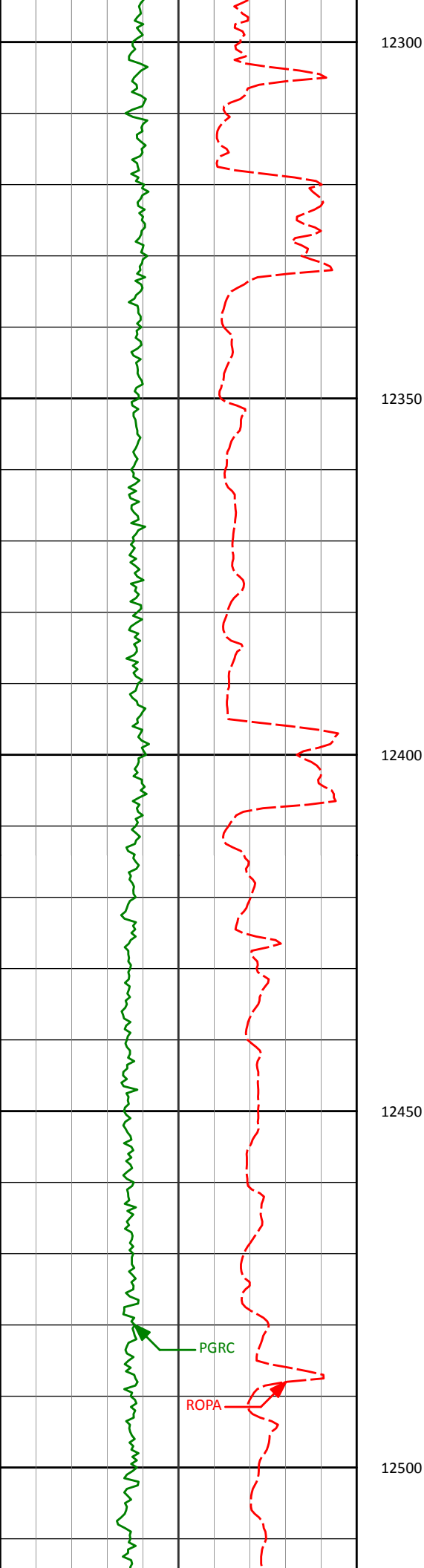
4924.07'

12200

12250

PGRC

ROPA



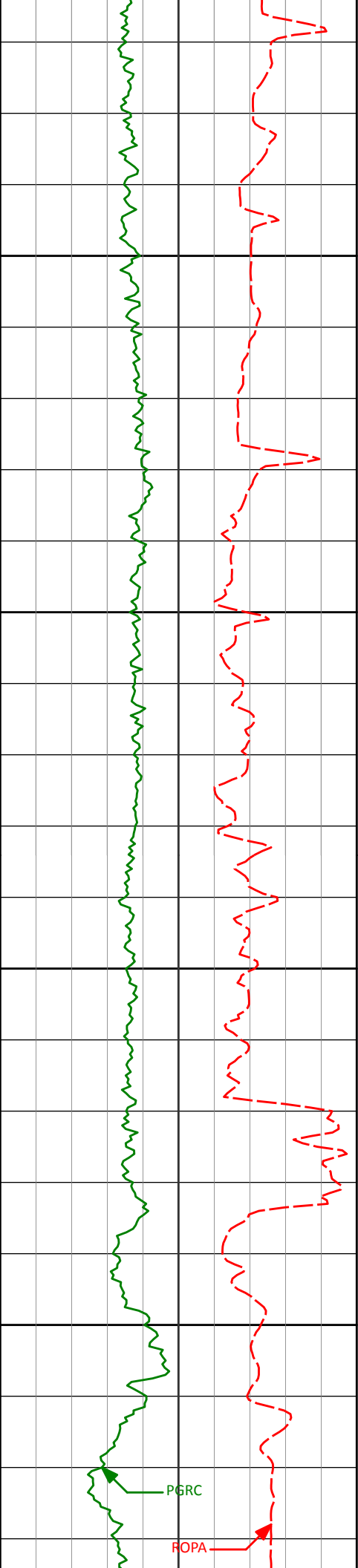
12344'

89.48°

357.64°

7532.23'

5105.92'



12526'

91.02°

359.53°

7531.43'

5287.85'

12550

12600

12650

12700

12708'

90.77°

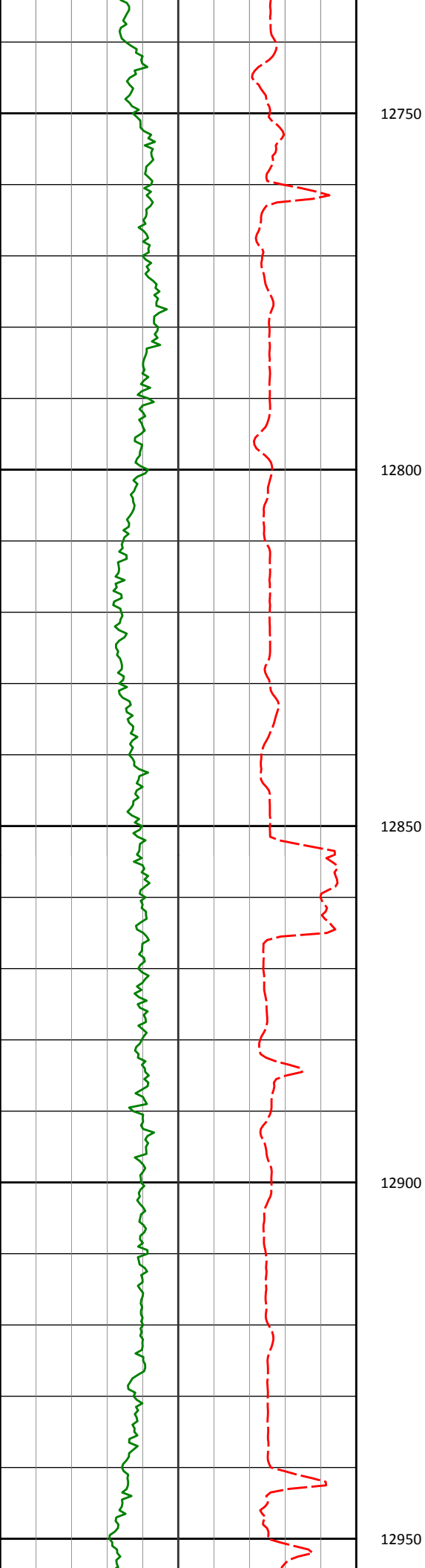
1.09°

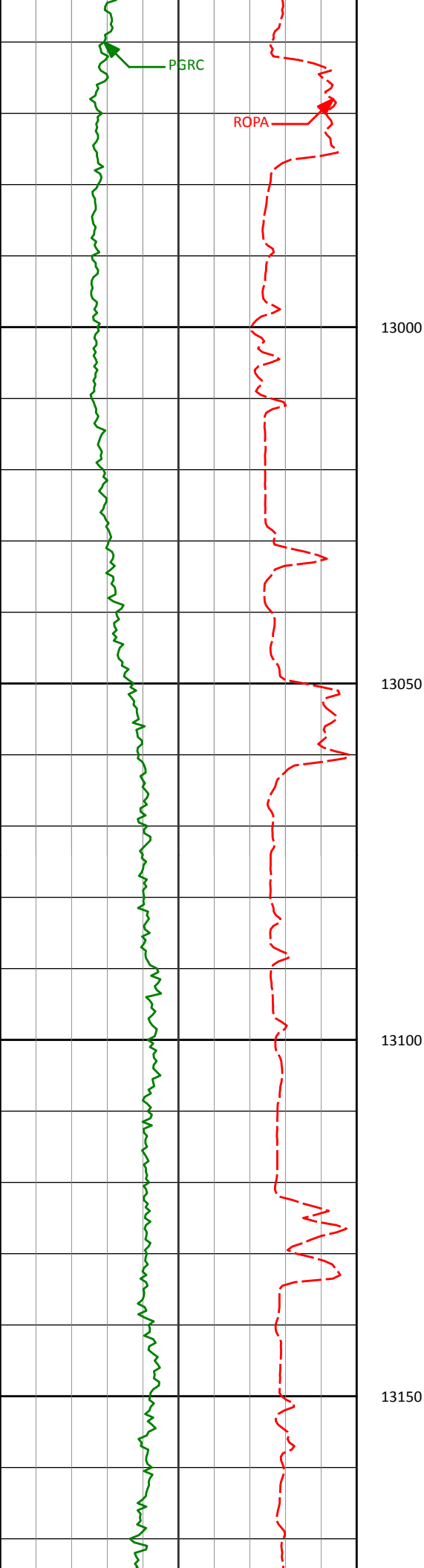
7528.59'

5469.82'

PGRC

ROPA





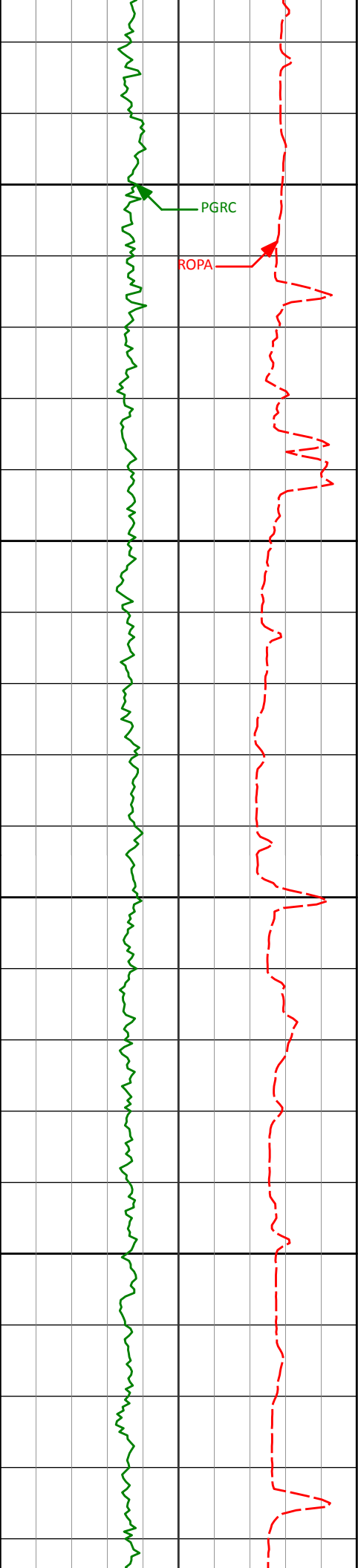
13072'

91.30°

359.64°

7525.69'

5833.77'



13200

PGRC

ROPA

13250

13248'

89.63°

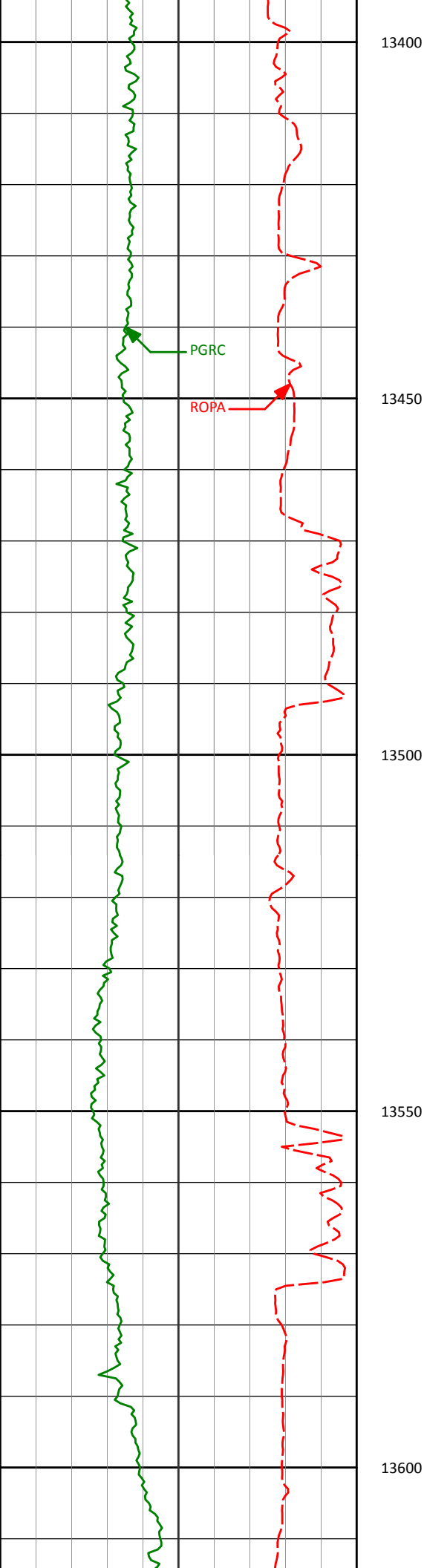
358.00°

7524.26'

6009.72'

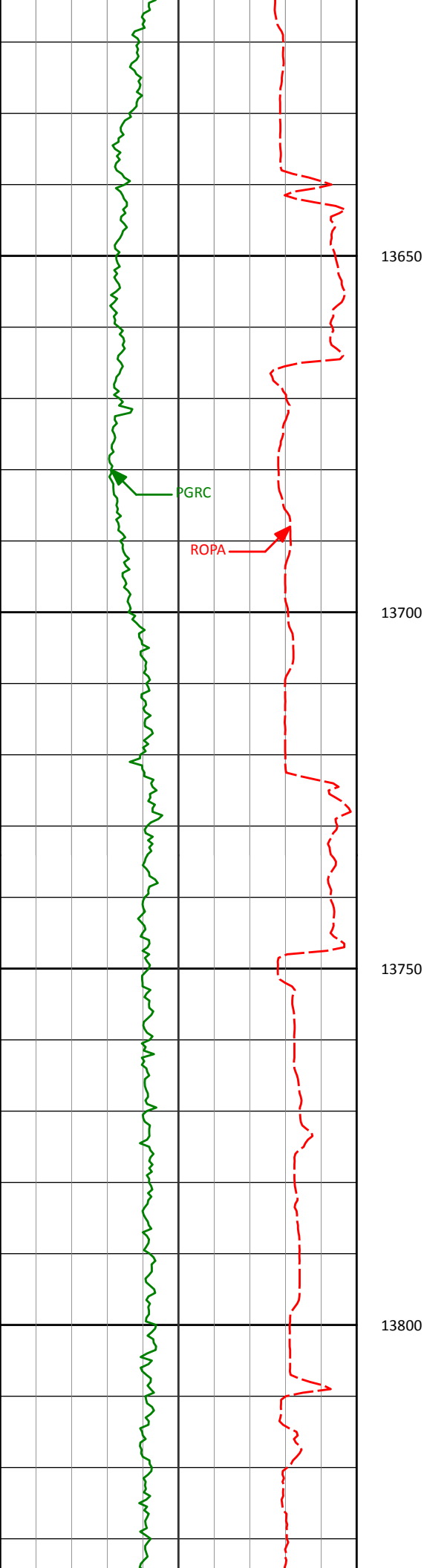
13300

13350



13418' 90.25° 356.77° 7524.44' 6179.54'

13588' 92.28° 357.75° 7520.68' 6349.29'



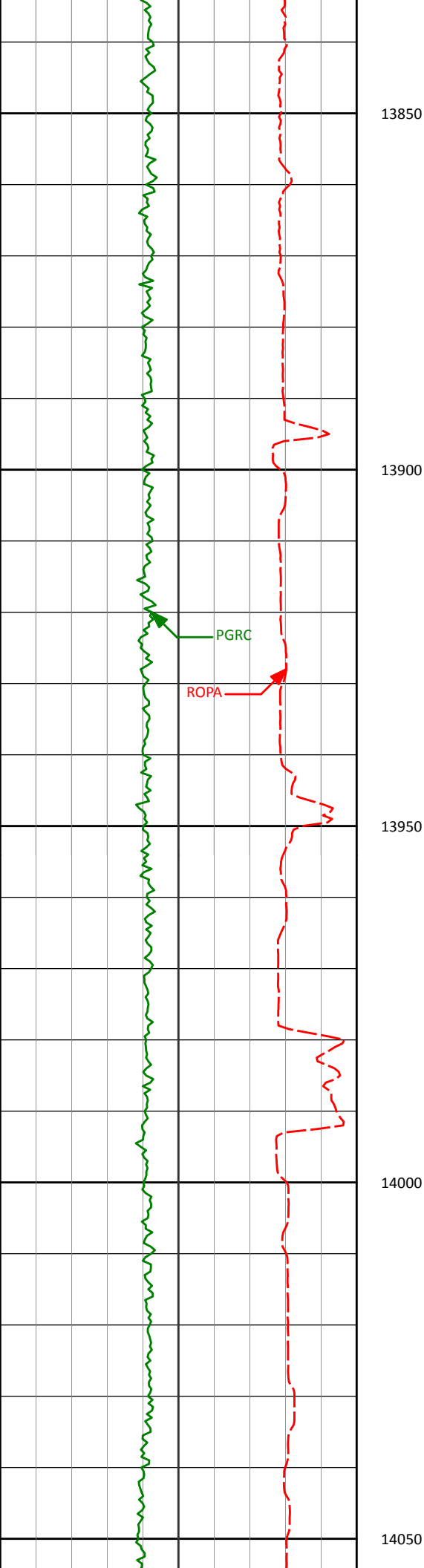
13757'

90.43°

0.87°

7516.69'

6518.20'



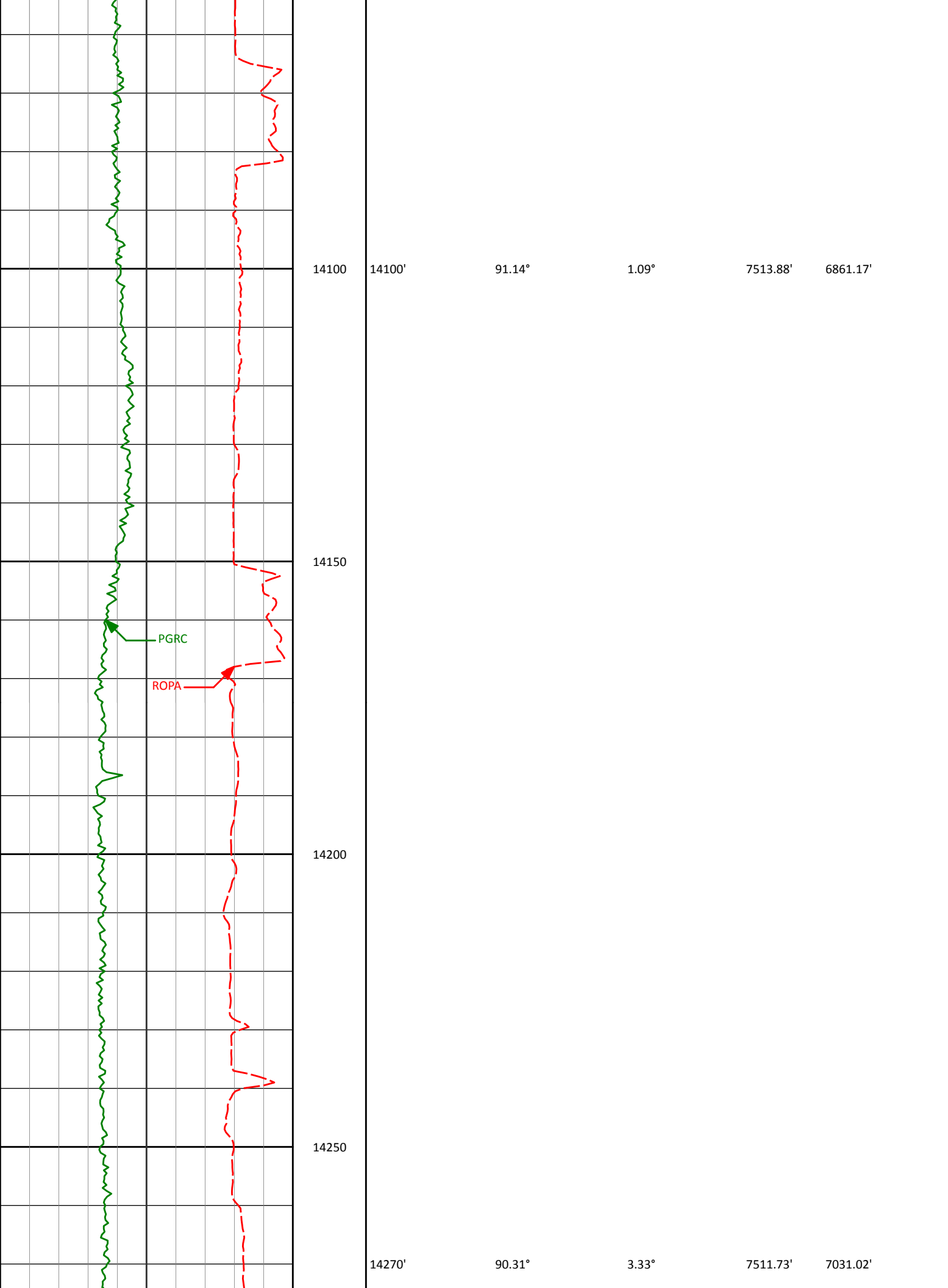
13928'

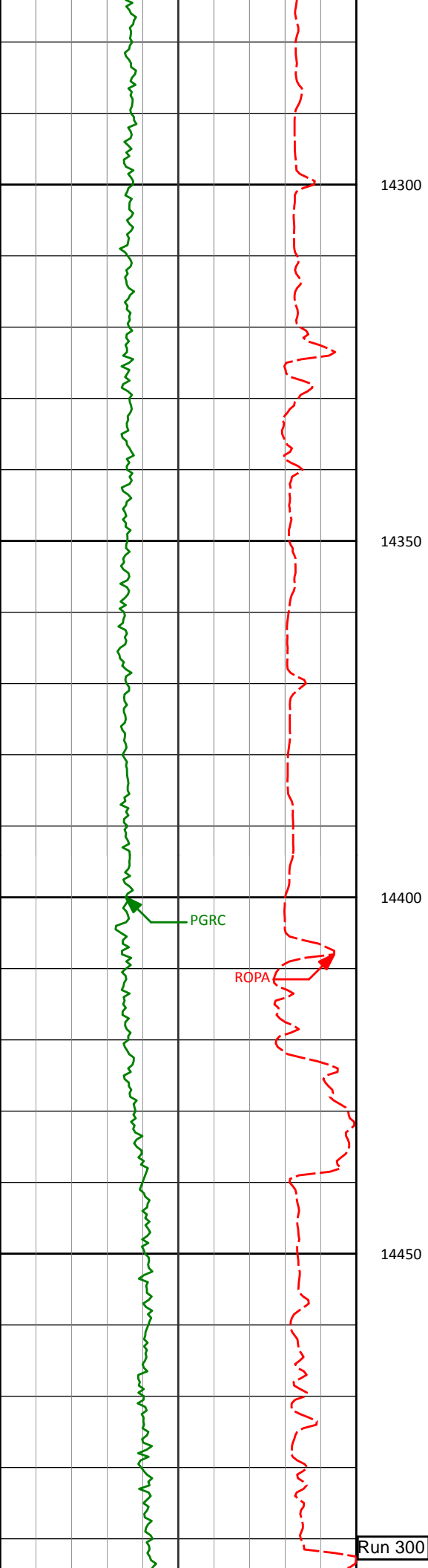
90.15°

359.22°

7515.82'

6689.19'





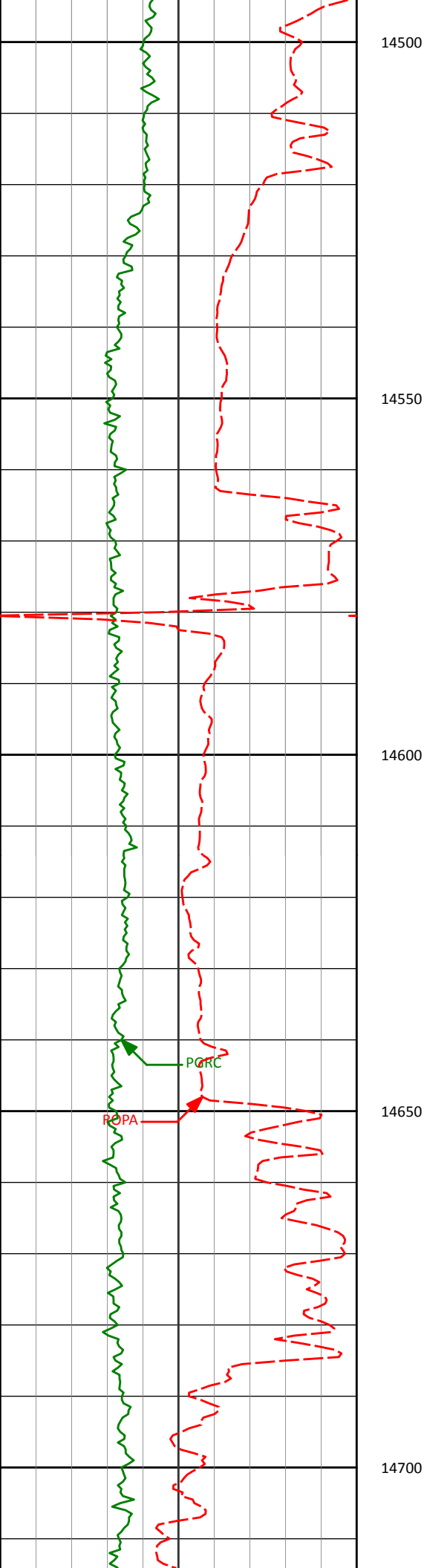
14441'

89.66°

5.55°

7511.78'

7201.50'



14602'

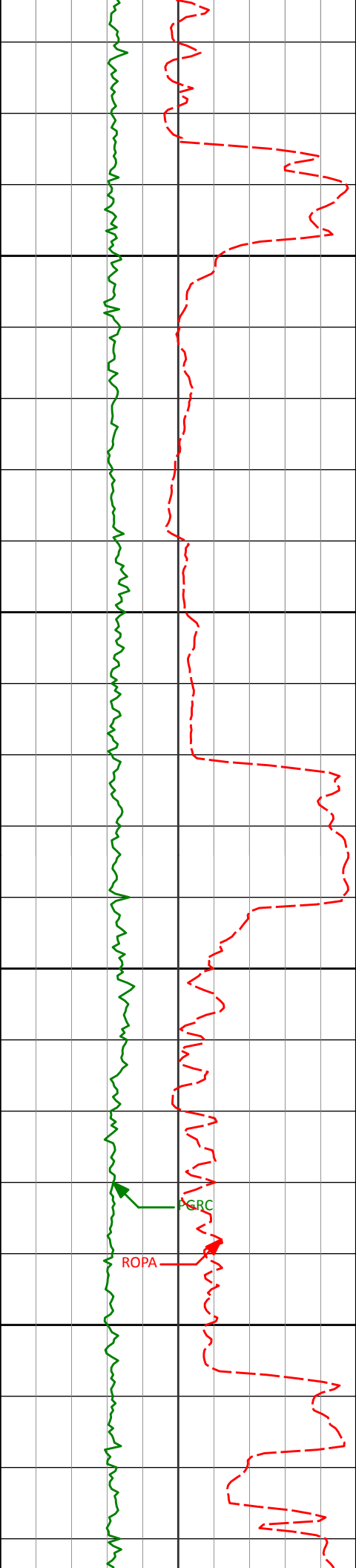
90.80°

3.82°

7511.13'

7361.95'

14700



14750

14774'

91.11°

0.77°

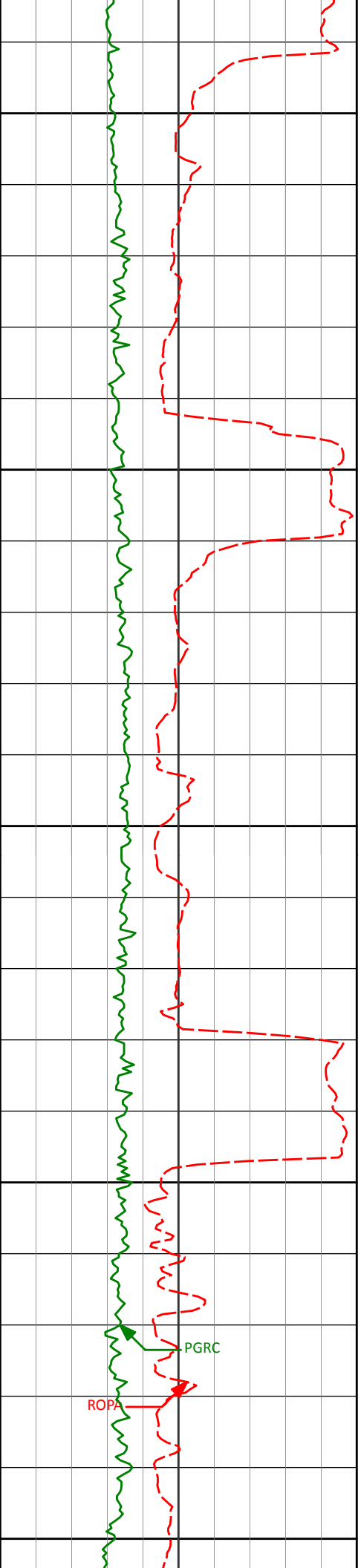
7508.26'

7533.77'

14800

14850

14900



14950

15000

15050

15100

15150

14943'

91.30°

359.07°

7504.71'

7702.72'

15115'

88.64°

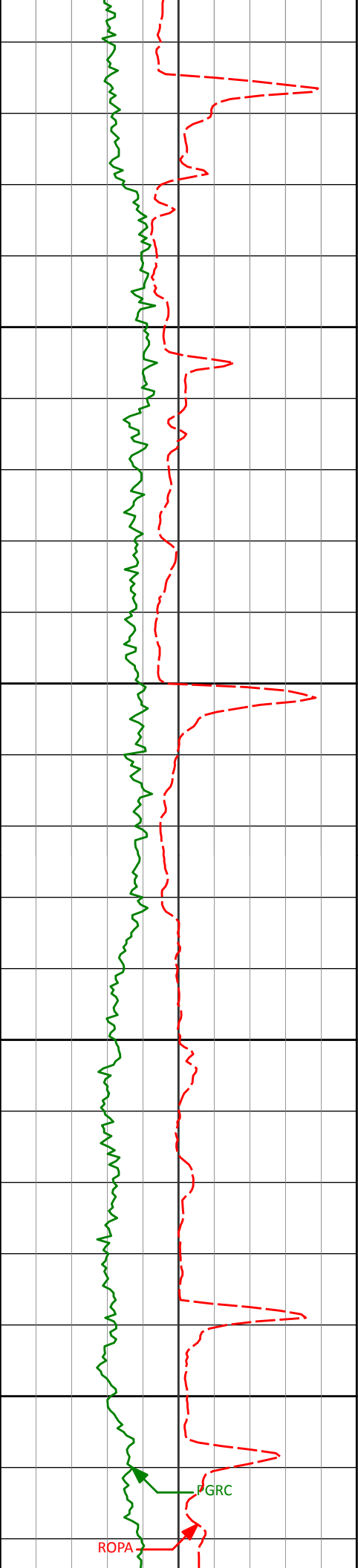
358.20°

7504.80'

7874.66'

PGRC

ROPA



15200

15250

15300

15350

15286'

88.64°

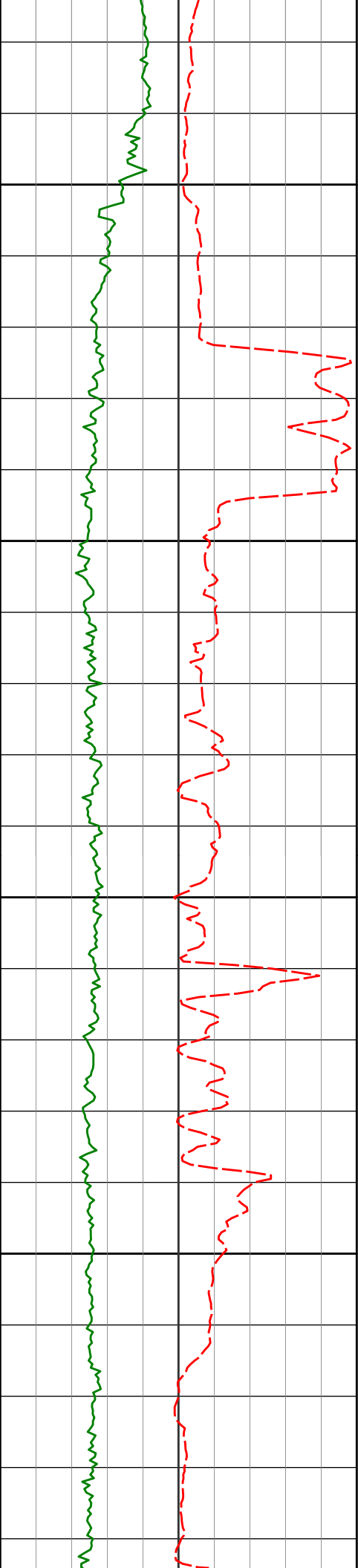
357.89°

7508.86'

8045.51'

ROPA

PGR



15400

15450

15500

15550

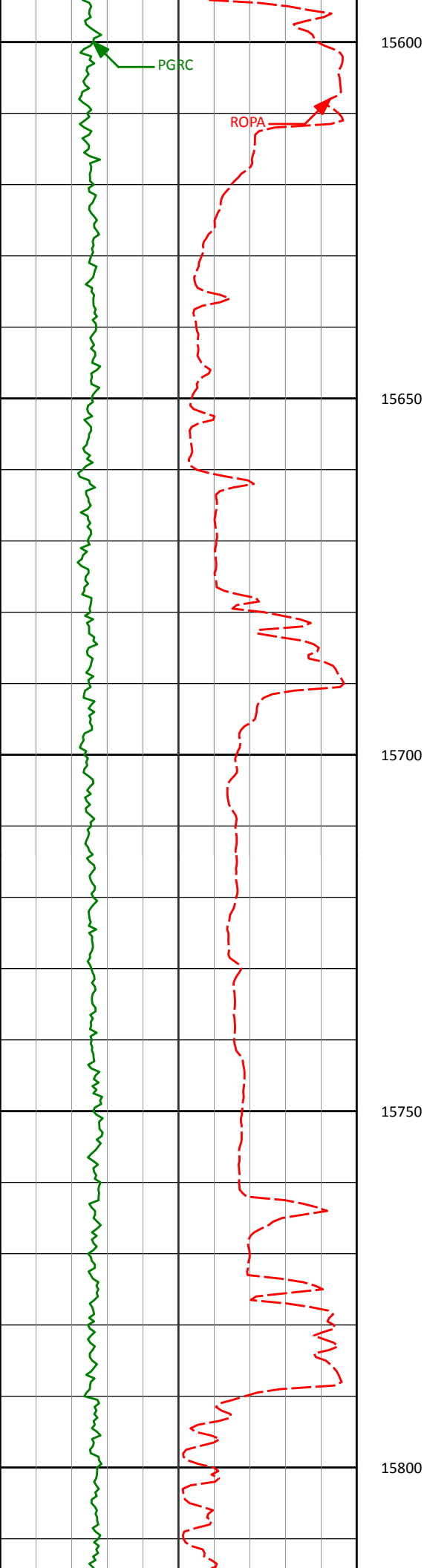
15457'

89.94°

358.60°

7510.98'

8216.41'



15627'

90.18°

359.06°

7510.80'

8386.37'

15650

15700

15750

15795'

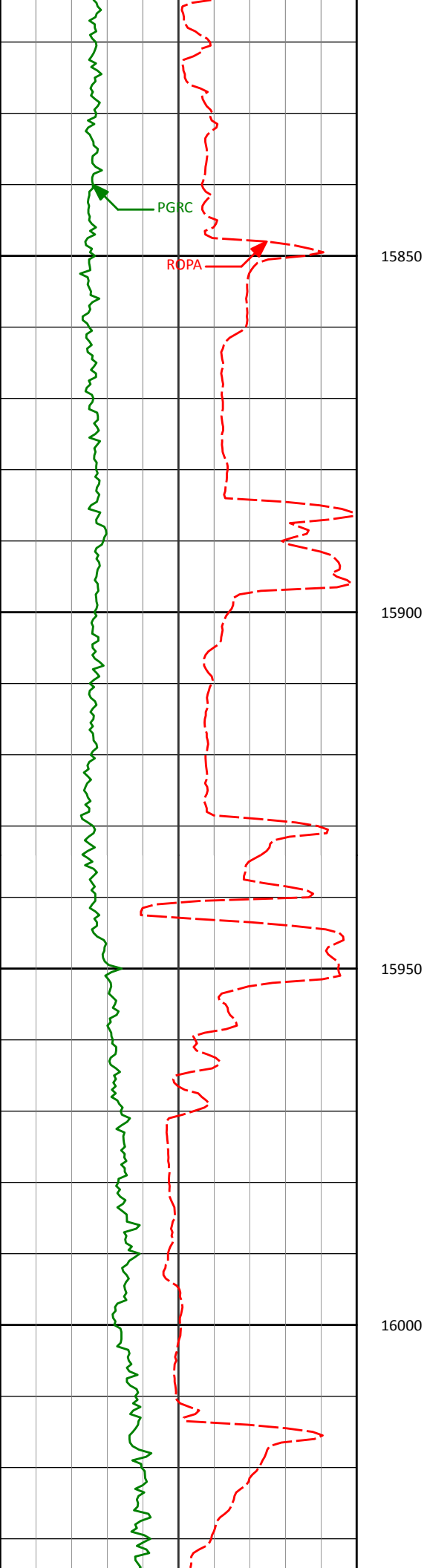
89.75°

359.00°

7510.90'

8554.35'

15800



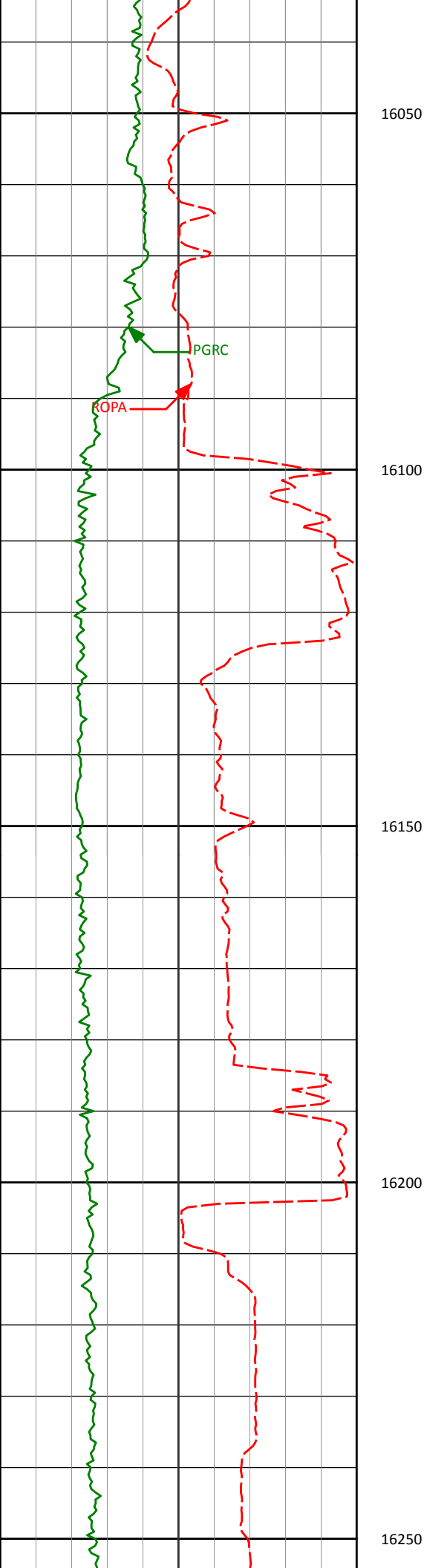
15966'

88.83°

359.28°

7513.02'

8725.32'



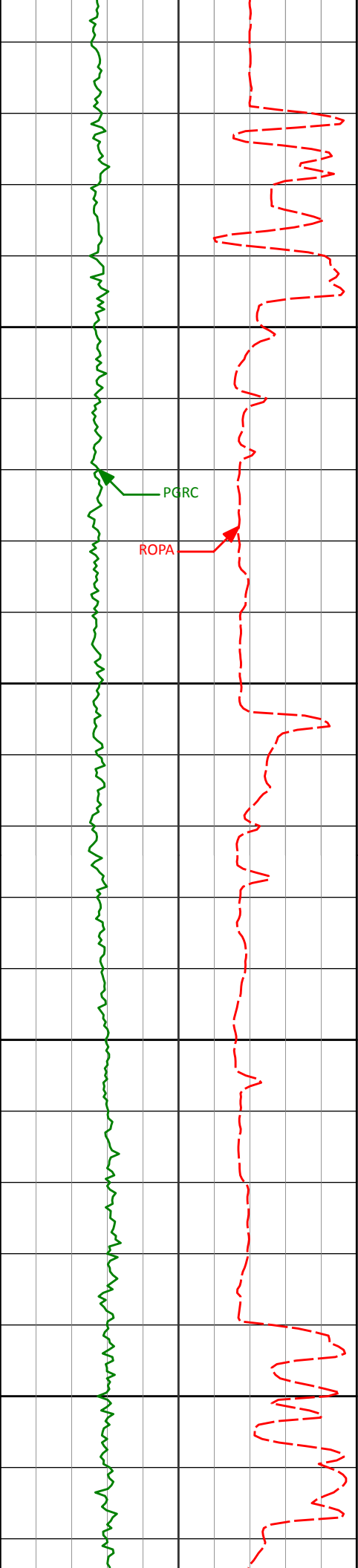
16137'

90.03°

359.49°

7514.72'

8896.29'



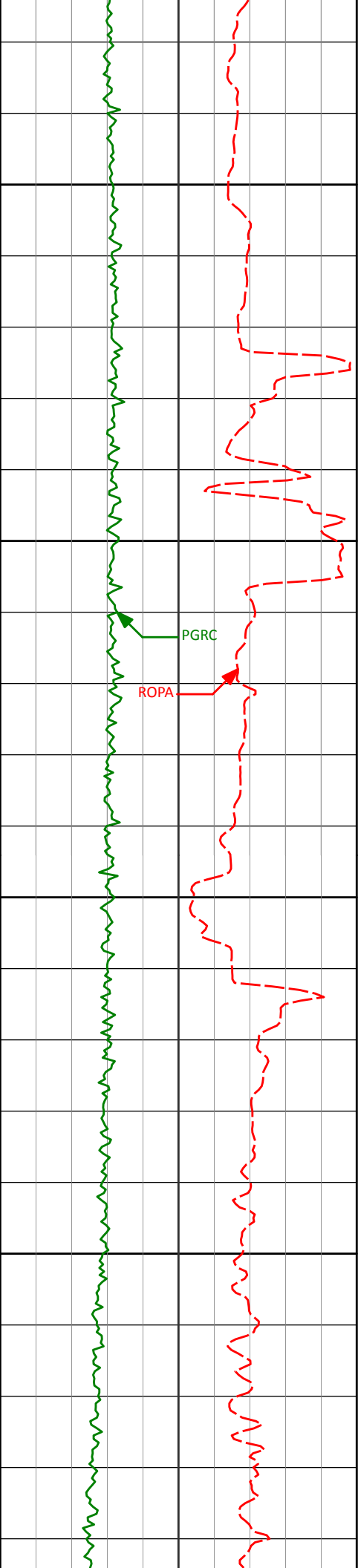
16308'

90.40°

0.42°

7514.08'

9067.29'



16500

16550

16600

16650

16480'

90.19°

0.61°

7513.19'

9239.28'

PGRC

ROPA

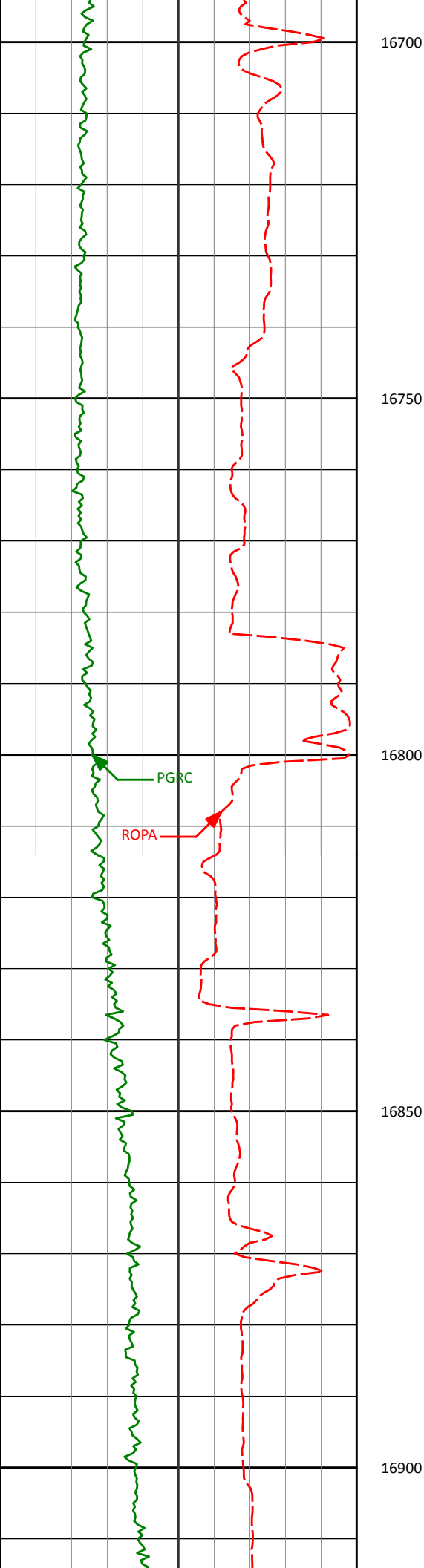
16651'

90.65°

0.50°

7511.94'

9410.27'



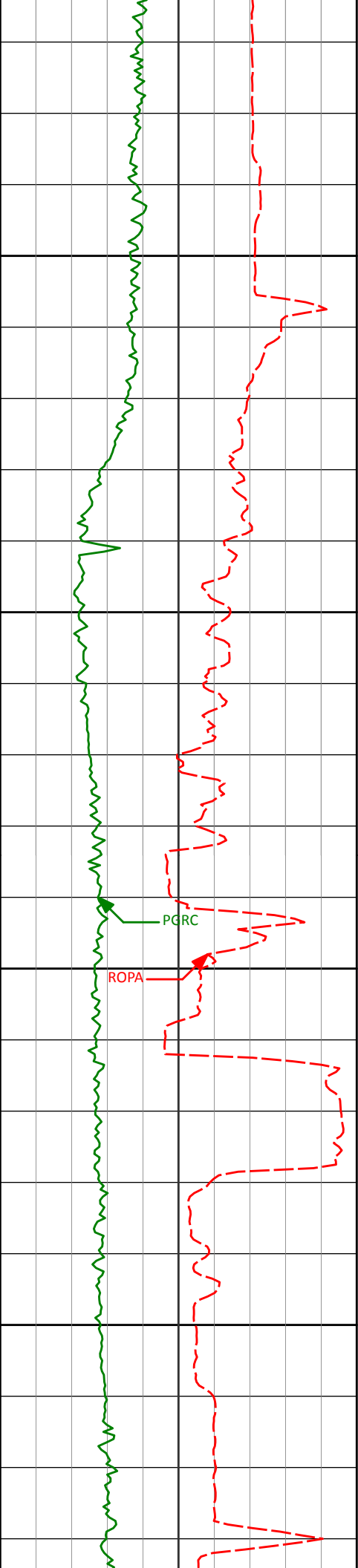
16823'

90.65°

1.03°

7509.99'

9582.24'



16950

16994'

90.40°

359.35°

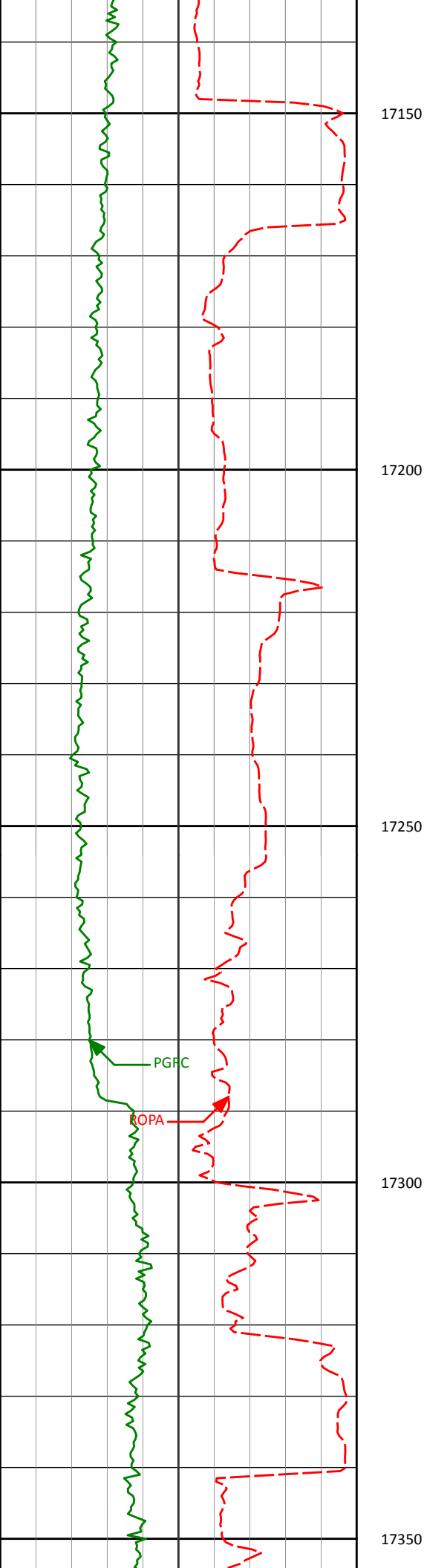
7508.42'

9753.23'

17000

17050

17100



17165'

91.26°

0.46°

7505.95'

9924.20'

17150

17200

17250

17300

17336'

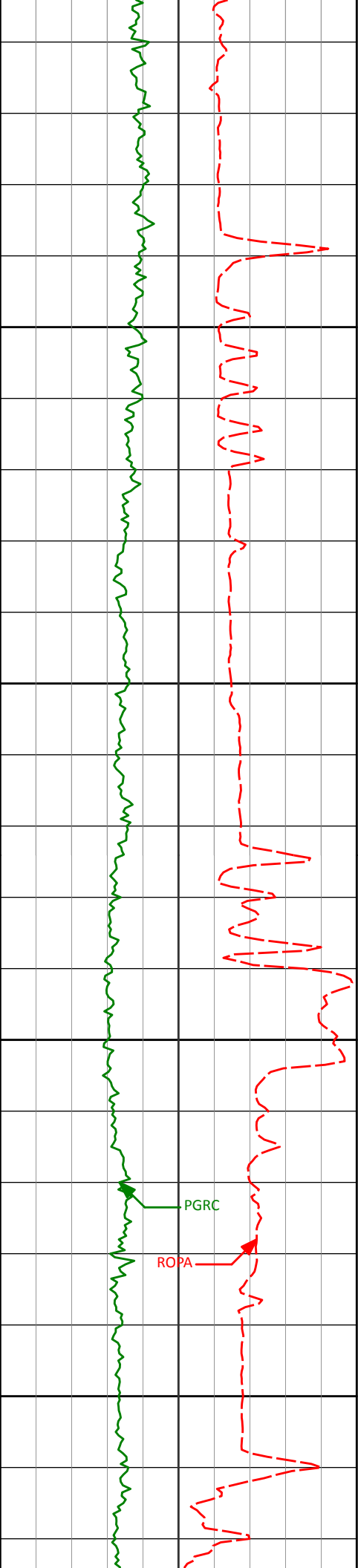
90.92°

1.01°

7502.69'

10095.16'

17350



17400

17450

17500

17550

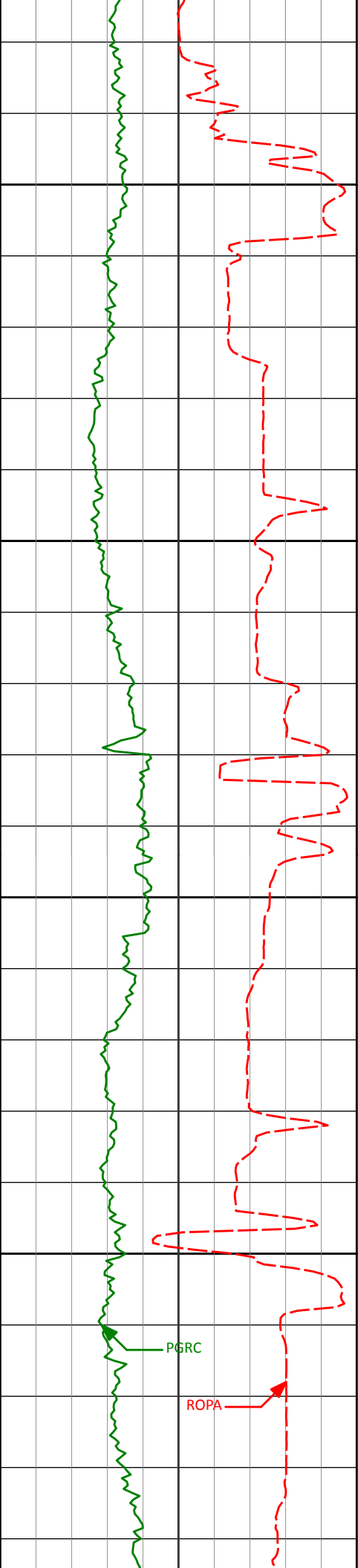
17508'

89.66°

1.04°

7501.82'

10267.13'



17600

17650

17679'

17700

17750

PGRC

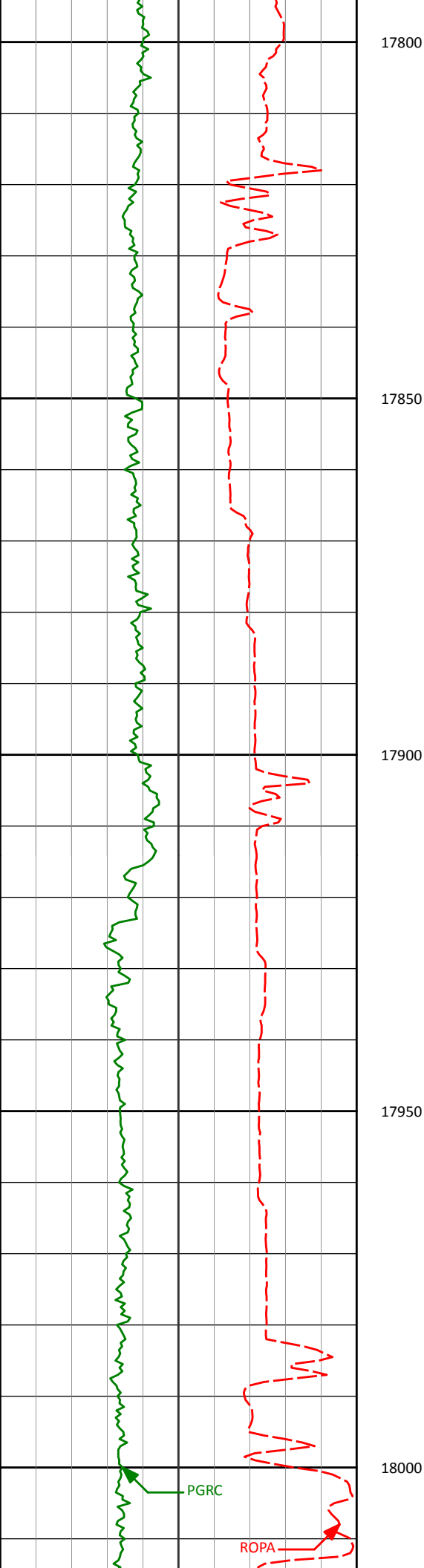
ROPA

91.60°

2.33°

7499.94'

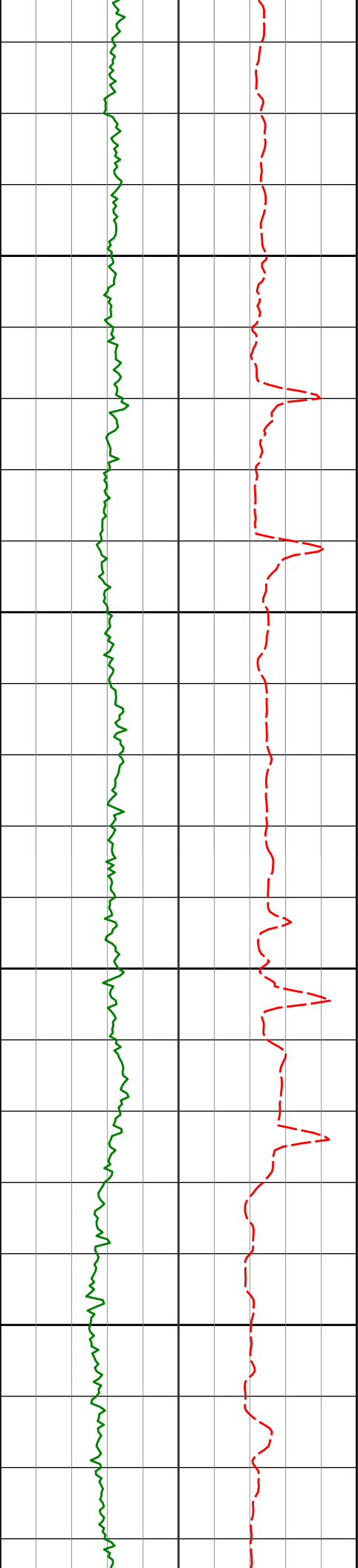
10438.03'



17850' 90.99° 0.67° 7496.08' 10608.92'

PGRC

ROPA



18021'

90.55°

0.05°

7493.78'

10779.90'

18050

18100

18150

18200

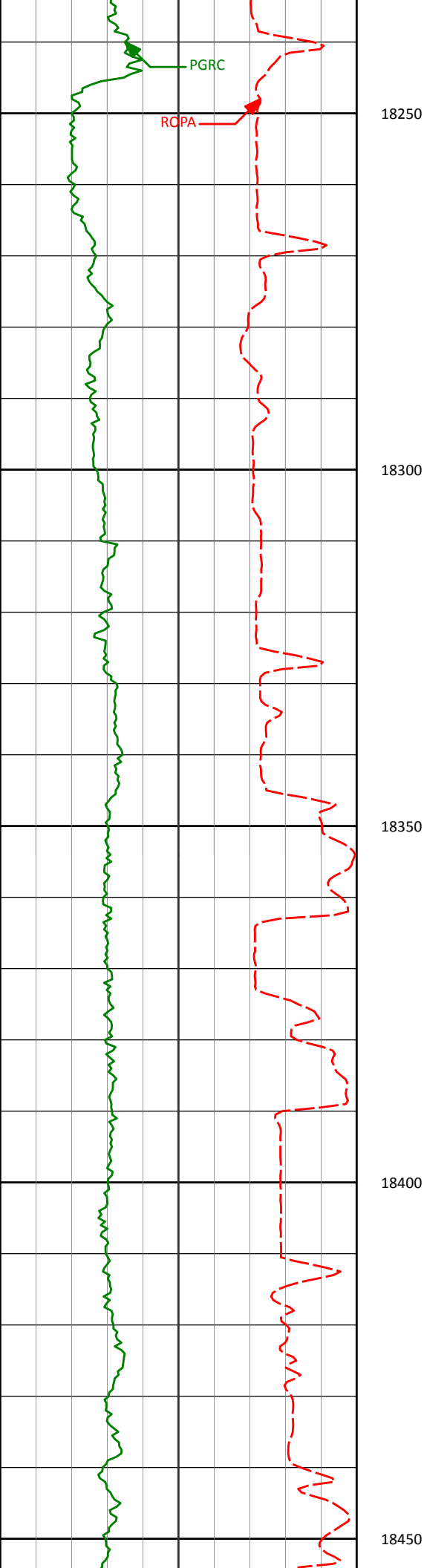
18192'

91.42°

359.94°

7490.84'

10950.87'



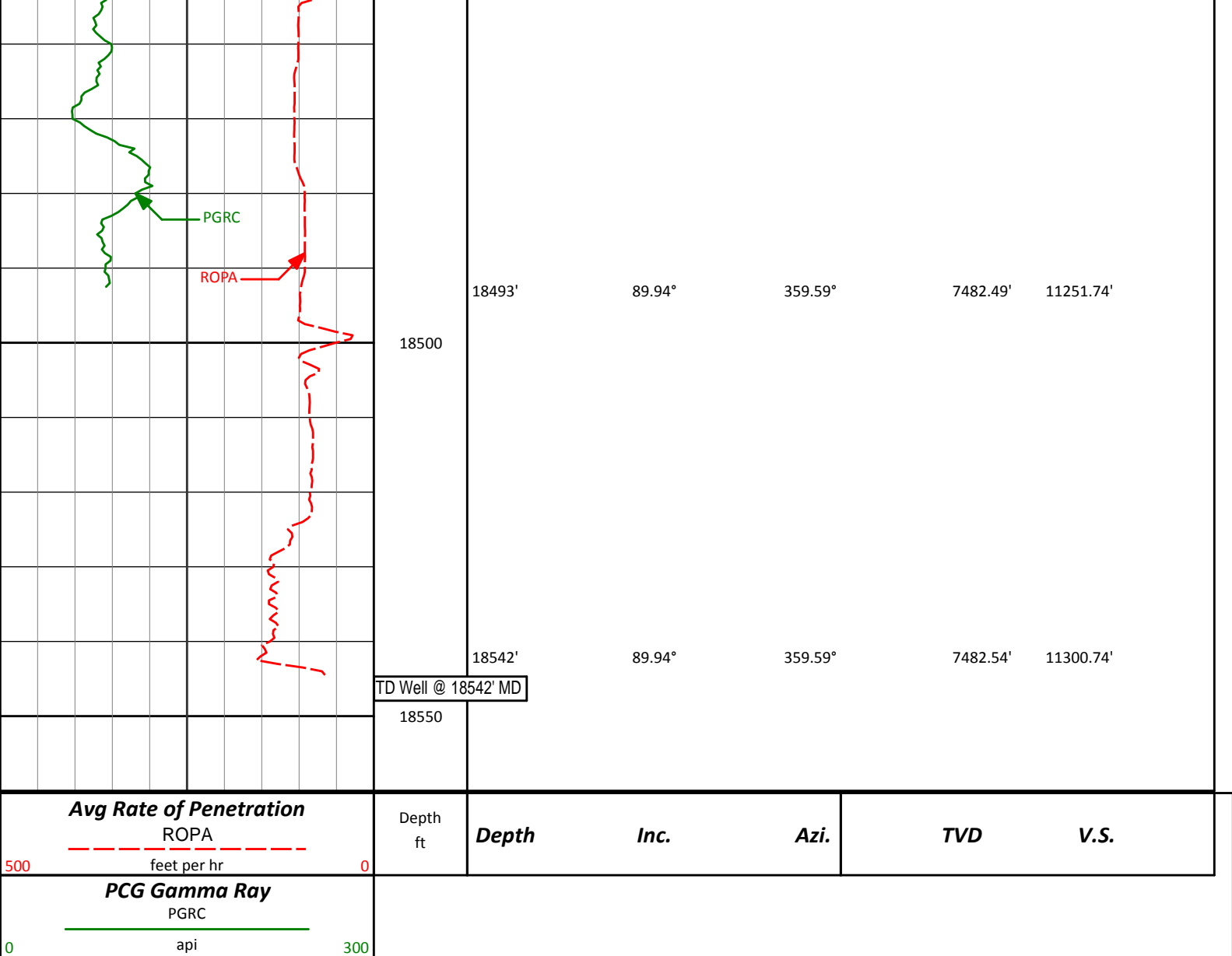
18363'

92.40°

0.26°

7485.14'

11121.77'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp
NRC 4N-32HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901338021

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1136.00	0.68	288.80	1135.97	0.01 N	6.57 W	0.01	TIE-IN
1291.00	0.44	330.95	1290.96	0.83 N	7.73 W	0.83	0.30
1481.00	0.67	284.42	1480.95	1.74 N	9.16 W	1.74	0.26
1671.00	0.33	329.40	1670.95	2.49 N	10.51 W	2.49	0.26
1854.00	0.35	342.01	1853.94	3.47 N	10.96 W	3.47	0.04
2036.00	0.39	261.95	2035.94	3.92 N	11.74 W	3.92	0.26
2218.00	0.79	306.65	2217.93	4.58 N	13.36 W	4.58	0.32
2400.00	1.23	215.69	2399.91	3.74 N	15.51 W	3.74	0.81
2583.00	0.44	359.31	2582.90	2.85 N	16.66 W	2.85	0.88
2765.00	0.50	221.93	2764.90	2.96 N	17.20 W	2.96	0.48
2946.00	0.71	200.31	2945.89	1.32 N	18.12 W	1.32	0.17
3128.00	0.43	266.23	3127.88	0.21 N	19.19 W	0.21	0.36

3310.00	0.81	255.65	3309.87	0.15 S	21.12 W	-0.15	0.22
3486.00	0.80	109.84	3485.86	0.88 S	21.17 W	-0.88	0.87
3657.00	0.58	170.93	3656.85	2.13 S	19.91 W	-2.13	0.42
3828.00	0.83	185.78	3827.84	4.22 S	19.90 W	-4.22	0.18
3997.00	0.85	30.49	3996.83	4.36 S	19.38 W	-4.36	0.97
4168.00	0.52	199.95	4167.83	4.00 S	19.00 W	-4.00	0.80
4339.00	0.55	70.81	4338.83	4.46 S	18.49 W	-4.46	0.57
4510.00	0.66	292.23	4509.82	3.81 S	18.63 W	-3.81	0.66
4681.00	0.65	101.41	4680.82	3.63 S	18.59 W	-3.63	0.76
4852.00	0.19	8.17	4851.81	3.54 S	17.60 W	-3.54	0.40
5024.00	0.37	26.96	5023.81	2.77 S	17.31 W	-2.77	0.12
5195.00	0.22	355.40	5194.81	1.95 S	17.08 W	-1.95	0.13
5365.00	0.78	351.25	5364.80	0.48 S	17.29 W	-0.48	0.33
5536.00	1.43	208.24	5535.79	1.21 S	18.47 W	-1.21	1.23
5708.00	0.47	219.23	5707.76	3.64 S	19.93 W	-3.64	0.57
5879.00	0.43	140.08	5878.76	4.68 S	19.97 W	-4.68	0.34
6051.00	0.22	187.64	6050.75	5.50 S	19.60 W	-5.50	0.19
6222.00	0.65	234.28	6221.75	6.39 S	20.43 W	-6.39	0.31
6394.00	1.27	168.56	6393.73	8.83 S	20.84 W	-8.83	0.68
6563.00	0.85	356.50	6562.72	9.42 S	20.55 W	-9.42	1.25
6734.00	0.26	340.09	6733.71	7.79 S	20.76 W	-7.79	0.35
6777.00	0.18	219.47	6776.71	7.75 S	20.83 W	-7.75	0.89
6820.00	0.77	13.53	6819.71	7.52 S	20.81 W	-7.52	2.17
6862.00	4.34	16.09	6861.66	5.72 S	20.30 W	-5.72	8.50
6904.00	7.64	19.86	6903.42	1.56 S	18.91 W	-1.56	7.91
6947.00	10.38	24.33	6945.89	4.66 N	16.34 W	4.66	6.57
6990.00	13.13	26.80	6987.99	12.55 N	12.55 W	12.55	6.50
7033.00	16.73	22.19	7029.53	22.64 N	8.00 W	22.64	8.81
7075.00	20.33	17.53	7069.35	35.20 N	3.52 W	35.20	9.26
7118.00	23.23	13.60	7109.27	50.57 N	0.72 E	50.57	7.55
7161.00	26.67	11.52	7148.26	68.27 N	4.65 E	68.27	8.25
7204.00	30.36	9.46	7186.04	88.46 N	8.36 E	88.46	8.88
7247.00	34.11	7.61	7222.40	111.14 N	11.74 E	111.14	9.02
7290.00	37.52	4.00	7257.27	136.16 N	14.26 E	136.16	9.33
7332.00	41.02	2.03	7289.78	162.70 N	15.64 E	162.70	8.85
7374.00	44.94	1.62	7320.50	191.31 N	16.54 E	191.31	9.36
7416.00	49.06	0.30	7349.14	222.02 N	17.05 E	222.02	10.07
7459.00	52.91	0.21	7376.21	255.42 N	17.20 E	255.42	8.95
7502.00	55.82	359.41	7401.26	290.37 N	17.07 E	290.37	6.93
7545.00	59.12	359.56	7424.38	326.61 N	16.75 E	326.61	7.68
7588.00	62.76	359.44	7445.26	364.19 N	16.42 E	364.19	8.47
7631.00	66.69	359.35	7463.61	403.07 N	16.01 E	403.07	9.14
7674.00	70.69	357.98	7479.24	443.11 N	15.07 E	443.11	9.76
7716.00	74.16	357.45	7491.92	483.11 N	13.47 E	483.11	8.35
7759.00	76.10	357.71	7502.95	524.63 N	11.72 E	524.63	4.55
7802.00	79.56	358.33	7512.02	566.63 N	10.27 E	566.63	8.17
7845.00	83.08	358.12	7518.50	609.11 N	8.95 E	609.11	8.20
7895.00	86.71	357.70	7522.95	658.87 N	7.13 E	658.87	7.31
7980.00	90.34	358.35	7525.14	743.78 N	4.21 E	743.78	4.34
8192.00	90.22	358.39	7524.10	955.69 N	1.82 W	955.69	0.06
8364.00	89.14	357.66	7525.06	1127.58 N	7.75 W	1127.58	0.76
8535.00	90.15	357.49	7526.12	1298.42 N	14.99 W	1298.42	0.60
8706.00	91.02	359.11	7524.38	1469.33 N	20.06 W	1469.33	1.08
8876.00	90.59	0.69	7521.99	1639.31 N	20.36 W	1639.31	0.96
9045.00	89.94	359.78	7521.21	1808.30 N	19.66 W	1808.30	0.66
9216.00	89.82	358.40	7521.57	1979.27 N	22.38 W	1979.27	0.81
9383.00	89.97	358.43	7521.87	2146.21 N	27.00 W	2146.21	0.09
9551.00	90.31	358.83	7521.46	2314.16 N	31.02 W	2314.16	0.31
9719.00	89.82	359.83	7521.27	2482.15 N	32.98 W	2482.15	0.66
9889.00	90.65	2.46	7520.57	2652.10 N	29.58 W	2652.10	1.62
10060.00	88.71	1.71	7521.53	2822.97 N	23.36 W	2822.97	1.22
10232.00	89.63	2.30	7524.02	2994.84 N	17.35 W	2994.84	0.64
10402.00	89.23	0.71	7525.71	3164.77 N	12.88 W	3164.77	0.96
10573.00	90.77	2.13	7525.71	3335.71 N	8.64 W	3335.71	1.22
10742.00	89.63	1.05	7525.12	3504.64 N	3.95 W	3504.64	0.93
10913.00	89.54	359.76	7526.36	3675.63 N	2.75 W	3675.63	0.76
11084.00	89.91	359.37	7527.18	3846.62 N	4.04 W	3846.62	0.31
11255.00	89.41	358.91	7528.20	4017.59 N	6.61 W	4017.59	0.40
11432.00	90.86	358.09	7527.78	4194.53 N	11.24 W	4194.53	0.94
11615.00	91.02	0.57	7524.78	4377.48 N	13.38 W	4377.48	1.36
11798.00	90.52	3.18	7522.32	4560.35 N	7.40 W	4560.35	1.45
11982.00	87.82	1.22	7524.72	4742.12 N	2.25 W	4742.12	1.75

11980.00	87.93	1.32	7524.78	4742.16 N	0.25 W	4742.16	1.75
12162.00	88.95	358.01	7529.74	4924.07 N	1.32 W	4924.07	1.90
12344.00	89.48	357.64	7532.23	5105.92 N	8.22 W	5105.92	0.36
12526.00	91.02	359.53	7531.43	5287.85 N	12.72 W	5287.85	1.34
12708.00	90.77	1.09	7528.59	5469.82 N	11.73 W	5469.82	0.87
12890.00	89.88	359.04	7527.56	5651.80 N	11.53 W	5651.80	1.23
13072.00	91.30	359.64	7525.69	5833.77 N	13.62 W	5833.77	0.85
13248.00	89.63	358.00	7524.26	6009.72 N	17.25 W	6009.72	1.33
13418.00	90.25	356.77	7524.44	6179.54 N	25.00 W	6179.54	0.81
13588.00	92.28	357.75	7520.68	6349.29 N	33.13 W	6349.29	1.33
13757.00	90.43	0.87	7516.69	6518.20 N	35.16 W	6518.20	2.15
13928.00	90.15	359.22	7515.82	6689.19 N	35.03 W	6689.19	0.98
14100.00	91.14	1.09	7513.88	6861.17 N	34.56 W	6861.17	1.23
14270.00	90.31	3.33	7511.73	7031.02 N	28.01 W	7031.02	1.41
14441.00	89.66	5.55	7511.78	7201.50 N	14.77 W	7201.50	1.35
14602.00	90.80	3.82	7511.13	7361.95 N	1.62 W	7361.95	1.29
14774.00	91.11	0.77	7508.26	7533.77 N	5.26 E	7533.77	1.78
14943.00	91.30	359.07	7504.71	7702.72 N	5.03 E	7702.72	1.01
15115.00	88.64	358.20	7504.80	7874.66 N	0.93 E	7874.66	1.63
15286.00	88.64	357.89	7508.86	8045.51 N	4.90 W	8045.51	0.18
15457.00	89.94	358.60	7510.98	8216.41 N	10.14 W	8216.41	0.87
15627.00	90.18	359.06	7510.80	8386.37 N	13.61 W	8386.37	0.31
15795.00	89.75	359.00	7510.90	8554.35 N	16.45 W	8554.35	0.26
15966.00	88.83	359.28	7513.02	8725.31 N	19.02 W	8725.32	0.56
16137.00	90.03	359.49	7514.72	8896.29 N	20.85 W	8896.29	0.71
16308.00	90.40	0.42	7514.08	9067.29 N	20.99 W	9067.29	0.59
16480.00	90.19	0.61	7513.19	9239.28 N	19.44 W	9239.28	0.16
16651.00	90.65	0.50	7511.94	9410.27 N	17.79 W	9410.27	0.28
16823.00	90.65	1.03	7509.99	9582.24 N	15.49 W	9582.24	0.31

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 0.00 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 16823.00 FEET
IS 9582.25 FEET ALONG 359.91 DEGREES (TRUE)**

Directional surveys tied onto Gyro's @ 1136' MD. Final Survey is a straightline projection to bit.