

PCG-K Pressure Case Gamma

1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	04-Nov-14	06-Nov-14	11-Nov-14		
Rig Bit Number	1	0200	300		
Bit Size (in)	8.750	6.125	6.125		
Tool Nominal OD (in)	6.750	4.750	4.750		
Log Start Depth (MD, ft)	1,099.00	7,517.00	9,181.00		
Log End Depth (MD, ft)	7,537.00	9,181.00	17,525.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	02-Nov-14 09:00	05-Nov-14 23:00	07-Nov-14 04:30		
Drill/Wipe End Date and Time	04-Nov-14 05:00	06-Nov-14 13:30	10-Nov-14 21:00		
Min Inc (deg) @ Depth (MD, ft)	0.19 @ 4,724.00	83.33 @ 7,534.00	87.44 @ 16,709.00		
Max Inc (deg) @ Depth (MD, ft)	82.75 @ 7,517.00	91.26 @ 8,668.00	92.59 @ 11,096.00		
Bit TFA(in2) / Bit Type	1.11 / PDC	1.73 / PDC	1.73 / PDC		
Flow Rate (gpm)	561.53	304.89	280.00		
Max AV (fpm) / CV (fpm) @ MWD	550.0 / 450.0	550.0 / 400.0	530.0 / 375.0		
Fluid Type	Fresh Water Gel	Diesel Mud Base	Diesel Mud Base		
Density (ppg) / Viscosity (spqt)	10.00 / 42.00	9.50 / 57.00	9.50 / 51.00		
Filtrate CL (ppm)	300.00	1,100.00	1,100.00		
pH / Fluid Loss (mptm)	7.00 / 33	N/A / N/A	N/A / N/A		
PV (cP) / YP (lbf2)	12 / 10.00	21 / 11.00	21 / 11.00		
% Solids / % Sand	0.6 / 0.1	1.2 / 0.1	3 / 0.1		
% Oil / Oil:Water Ratio	N/A / N/A	5 / 0:0	30 / 30:70		
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 Tool Temp (degF) / S	469.85 / 469.85	399.89 / 399.89	399.85 / 399.85		

Max Tool Temp (degF) / Source	169.65 / HCIM	202.60 / PCM	62.17 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Adam Sampson	Adam Sampson	Adam Sampson		
Customer Representative	Jeremy Wilde	Jeremy Wilde	Jeremy Wilde		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	HCIM	PCM	PCM		
Software Version	88.58	5.93	5.93		
Sub Serial Number	11753694	11768597	123		
Insert Serial Number	12241491	12001066	11145513		
Date and Time Initialized	02-Nov-14 06:10	05-Nov-14 00:27	06-Nov-14 18:56		
Date and Time Read	04-Nov-14 10:58	07-Nov-14 00:05	06-Nov-14 18:15		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	58.00	48.00	48.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11633681	11768597	11768577		
Sonde Serial Number	12177531	11062085	11297574		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	353.55	56.16	347.21		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	64.65	50.60	50.76		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11112533	11768597	123		
Insert/Sonde Serial Number	11579845	11293391	11579829		

Resistivity Sensor Information

Tool Type	EWR-P4	N/A	N/A		
Distance From Bit (ft)	38.00	N/A	N/A		
Recorded Sample Period (sec)	4	N/A	N/A		
Software Version	1.50	N/A	N/A		
Sub Serial Number	999999	N/A	N/A		
Receiver Insert Serial Number	11300636	N/A	N/A		
Transmitter Insert Serial Number	999999	N/A	N/A		
Receiver Orientation	Down	N/A	N/A		

DDSr-HCIM Sensor Information

Tool Type	DDSr-HCIM	N/A	N/A		
Distance From Bit (ft)	42.00	N/A	N/A		
Recorded Sample Period (sec)	12	N/A	N/A		
Software Version	20.88	N/A	N/A		
Sub Serial Number	123	N/A	N/A		
Insert Serial Number	12328441	N/A	N/A		
Sensor ID Number	10945	N/A	N/A		

REMARKS

1. Depths are measured Depths referenced to Driller's pipe tally and measure

1. Depths are measured depths, referenced to Driller's pipe tally, and measure from the rig floor.

2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the Power Law model for water based fluids and the Bingham Plastic model for oil based fluids.
4. All data presented is recorded unless otherwise specified.
5. 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

Insi te Versi on 8.0.2

WARRANTY

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HALLIBURTON

1:240 MD Detail Log

PCG Gamma Ray BCorr (PGRC) api					
0	300				
Avg Rate of Penetration (ROPA) feet per hr		MD ft			
500	0		Depth	Inc	Azi
					TVD
					V/S



Run 100

1100

1150

1200

1250

PGRC

ROPA

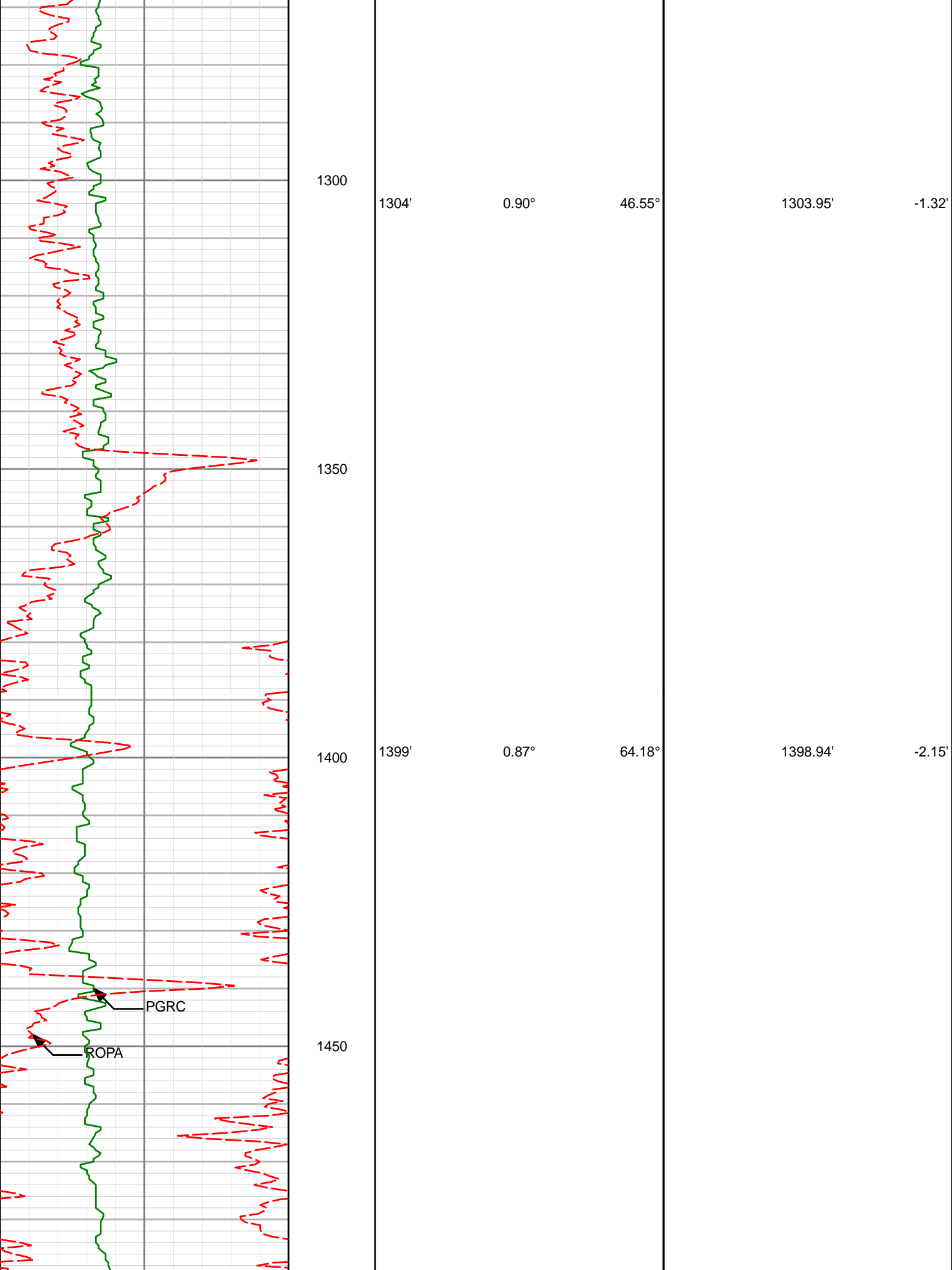
1209'

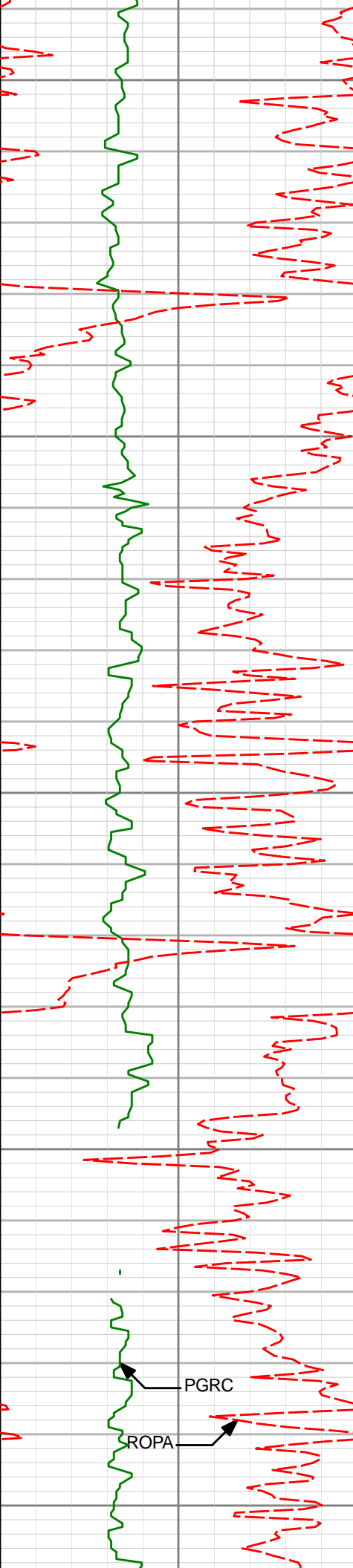
0.76°

55.59°

1208.96'

-0.45'





1500

1550

1600

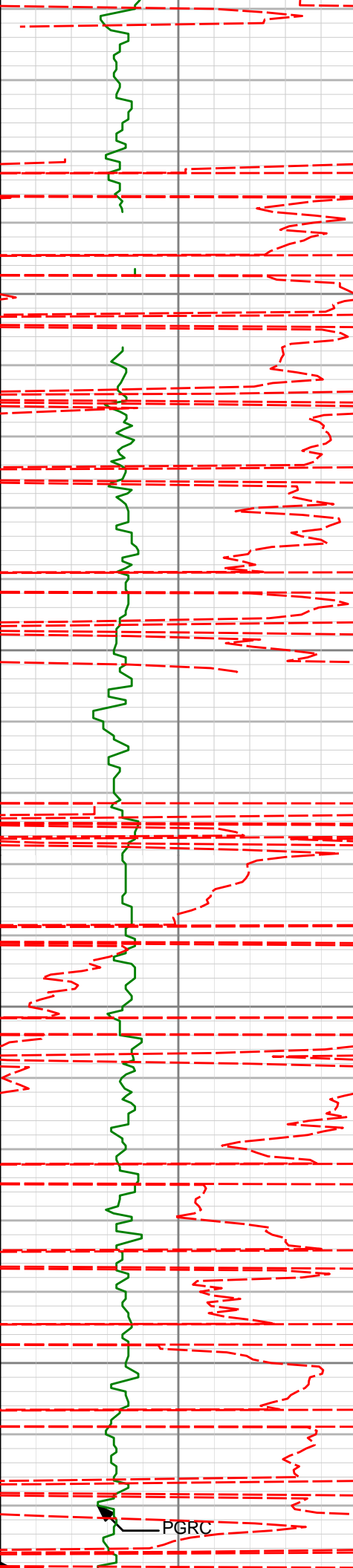
1650

1700

1493'	0.86°	53.13°	1492.93'	-2.90'
1587'	0.56°	28.37°	1586.92'	-3.73'
1679'	0.52°	33.65°	1678.92'	-4.47'

PGRC

ROPA



1750

1800

1850

1900

1770'

0.57°

14.53°

1769.91'

-5.26'

1862'

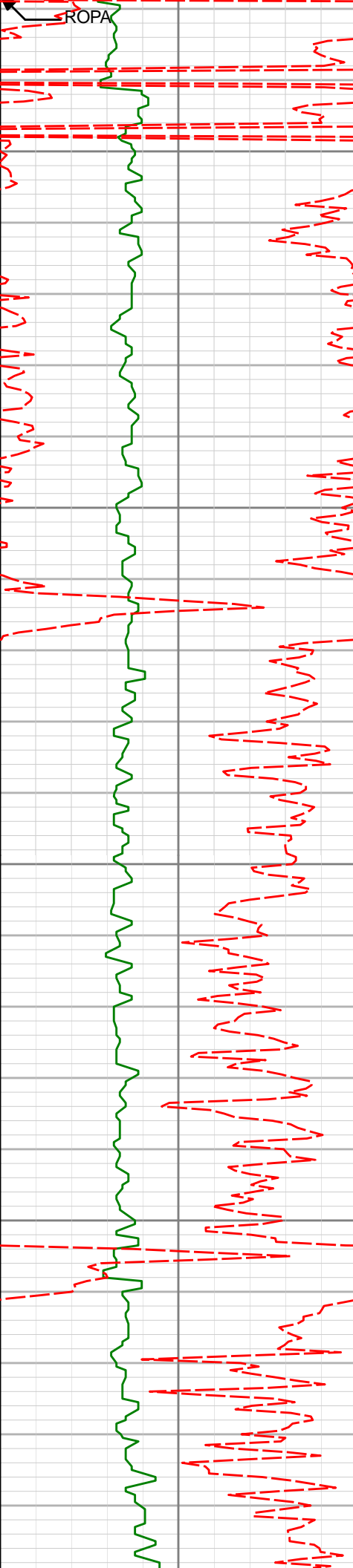
0.72°

1.85°

1861.91'

-6.28'

PGRC



1950

1953'

0.66°

347.17°

1952.90'

-7.36'

2000

2050

2100

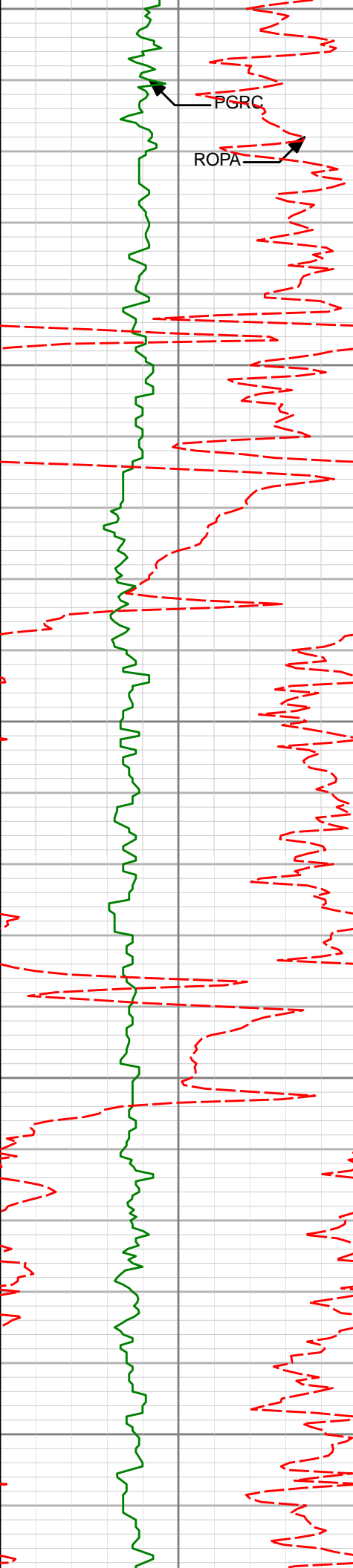
2045'

0.90°

325.98°

2044.89'

-8.47'



2150

PGRC

ROPA

2200

2228'

2.40°

272.96°

2227.82'

-9.84'

2250

2300

2319'

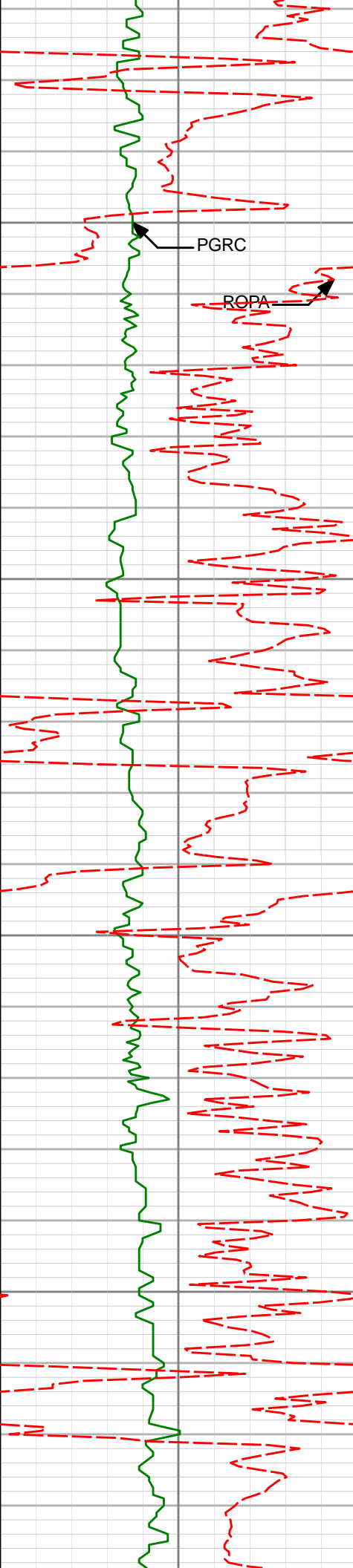
4.16°

230.07°

2318.68'

-7.79'

2350



2400

PGRC

ROPA

2450

2500

2550

2411'

6.15°

225.21°

2410.30'

-2.14'

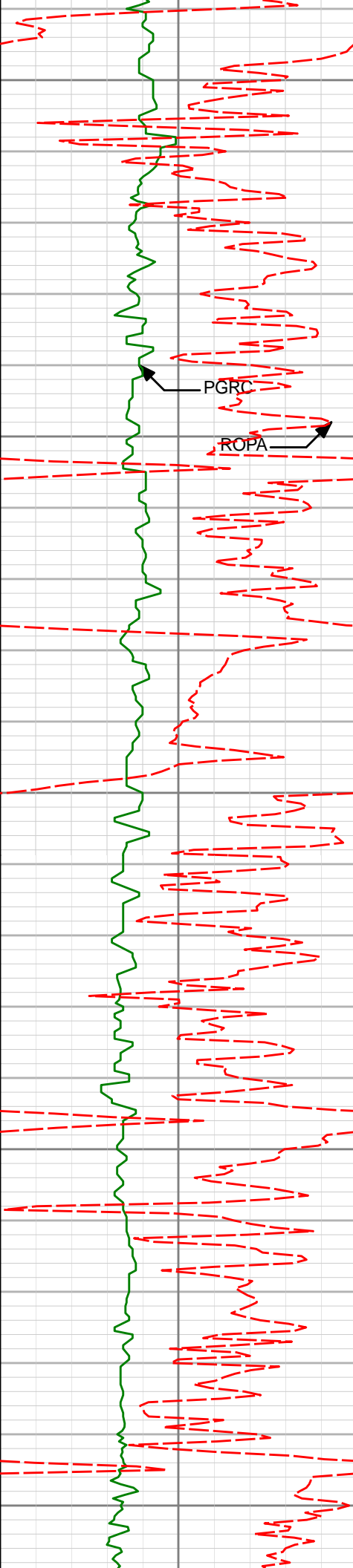
2502'

7.50°

218.08°

2500.66'

6.01'



2600

2650

2700

2750

2800

PGRC

ROPA

2593'

7.93°

207.66°

2590.84'

16.28'

2686'

8.79°

199.66°

2682.85'

28.69'

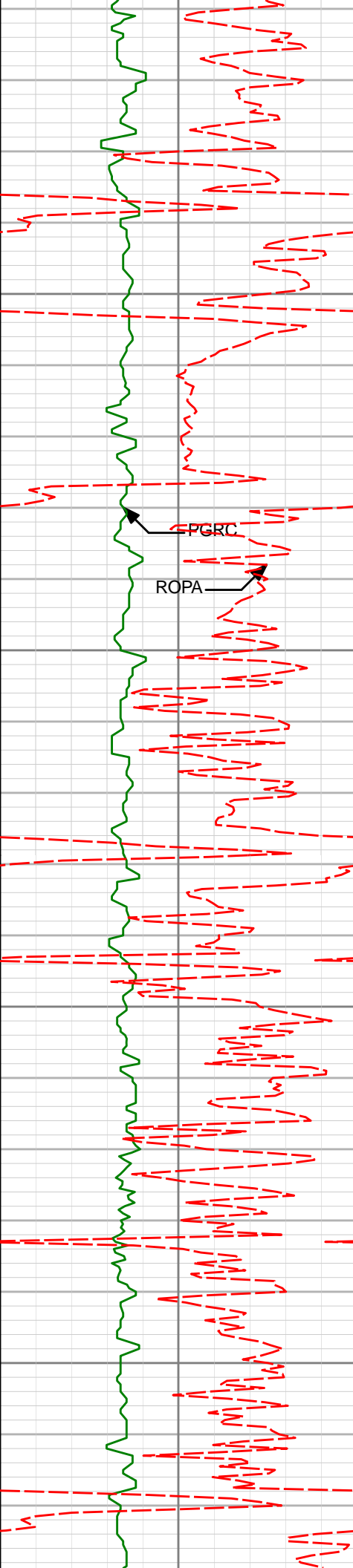
2778'

8.95°

195.41°

2773.75'

42.23'



2850

2870'

10.35°

179.65°

2864.46'

57.41'

PGRC

ROPA

2900

2950

2963'

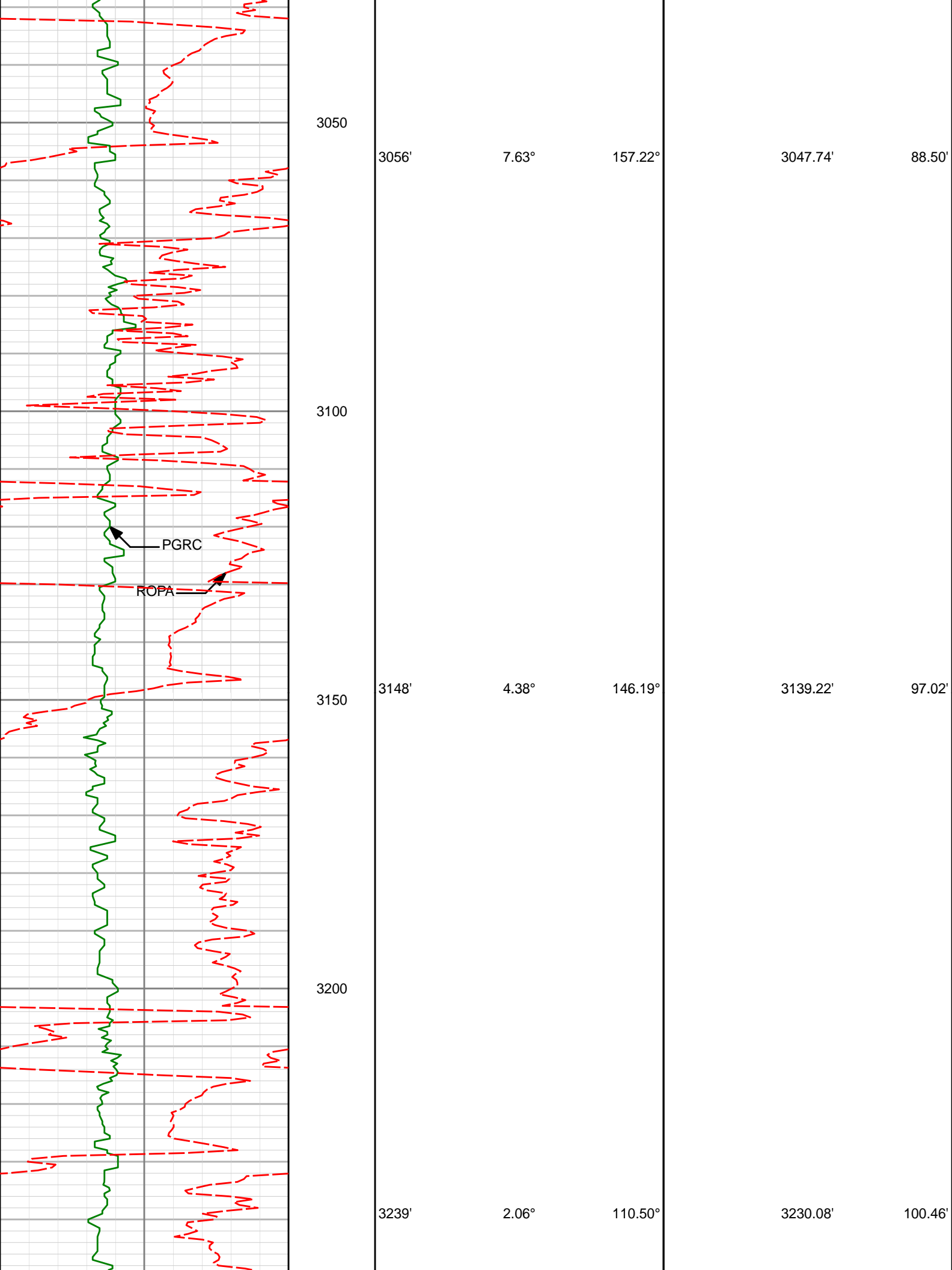
10.64°

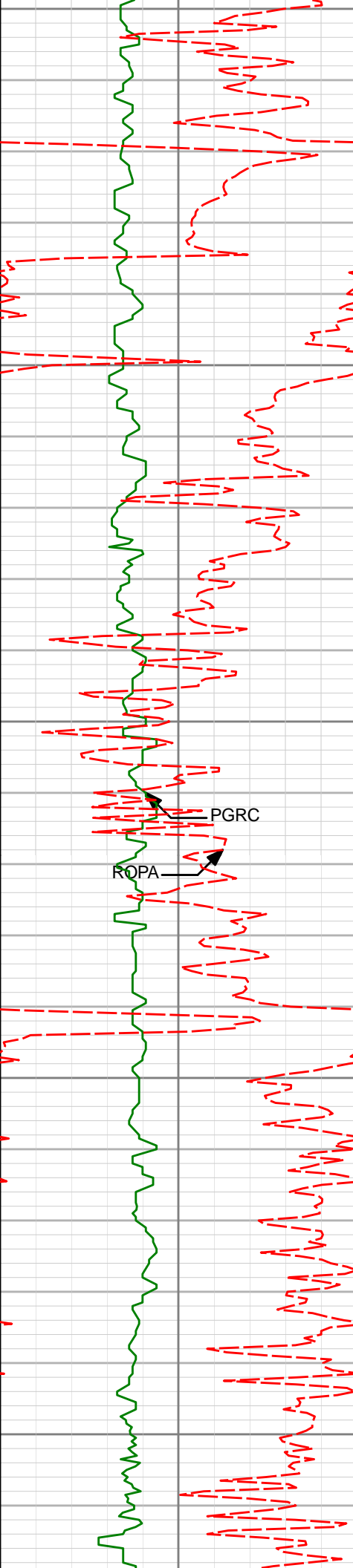
173.47°

2955.91'

74.29'

3000





3250

3300

3350

3400

3450

3332'

2.94°

0.84°

3323.03'

98.65'

PGRC

ROPA

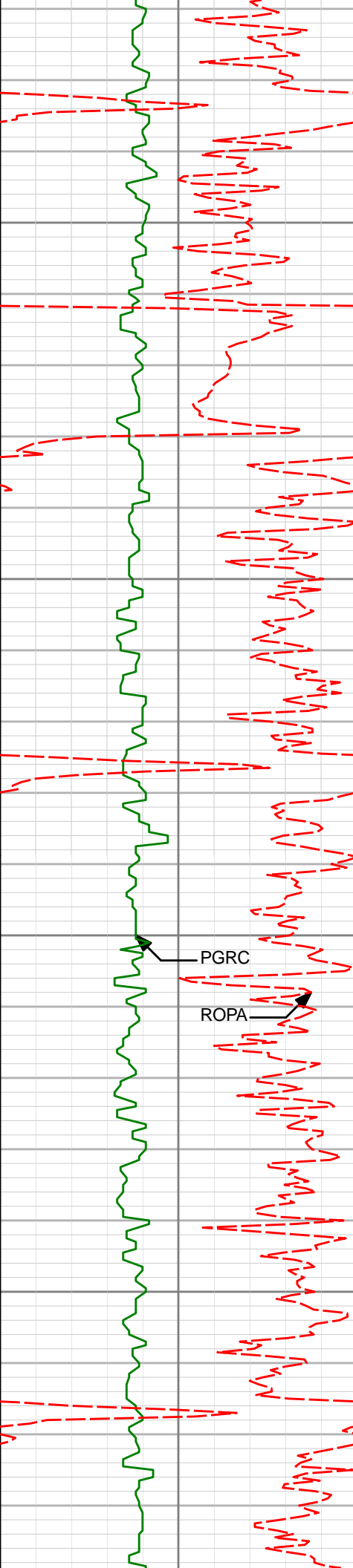
3424'

2.61°

345.08°

3414.92'

94.27'



3500

3517'

0.88°

6.03°

3507.88'

91.52'

3550

3600

PGRC

ROPA

3608'

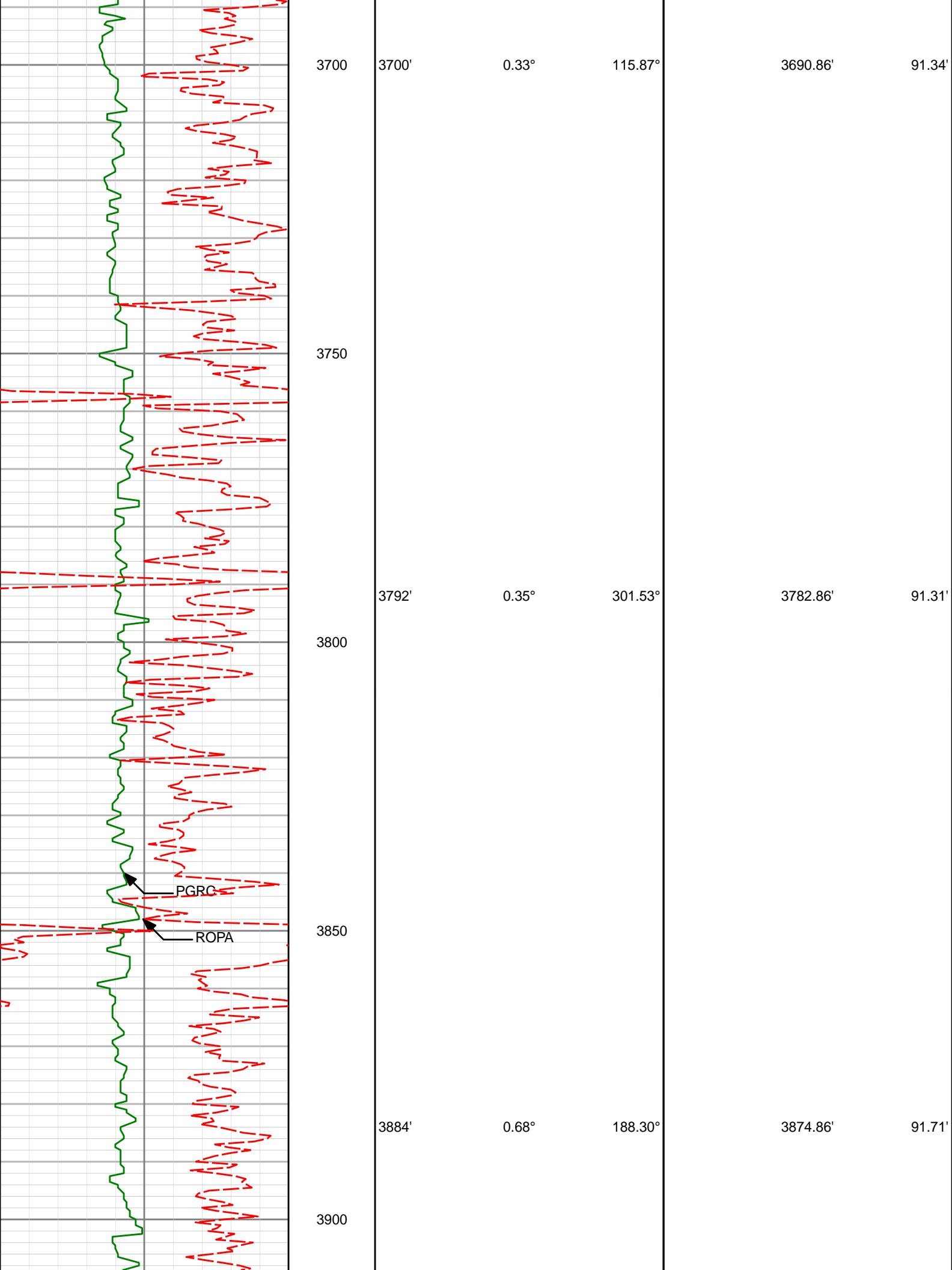
0.81°

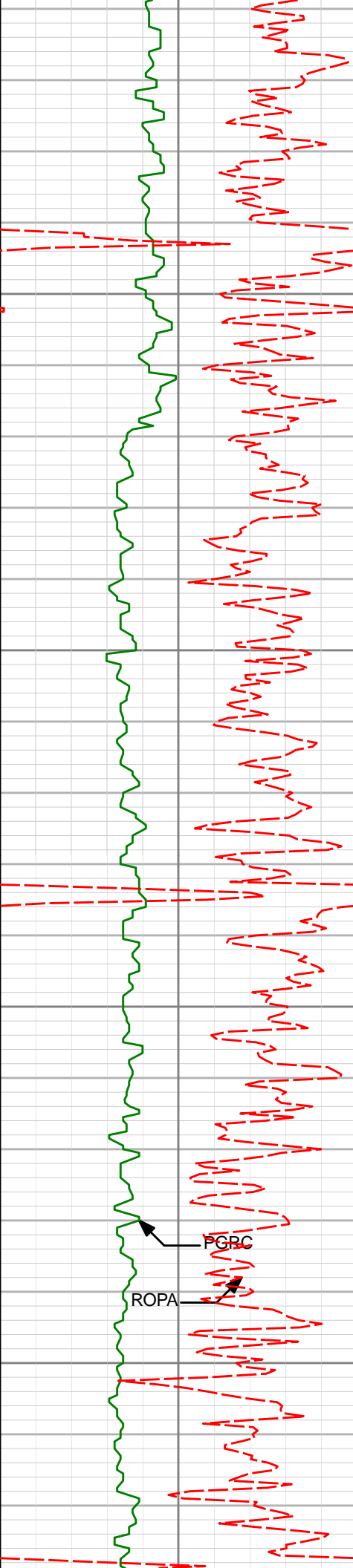
108.44°

3598.87'

91.03'

3650





3950

4000

4050

4100

3977'

0.86°

133.66°

3967.85'

92.73'

4069'

1.23°

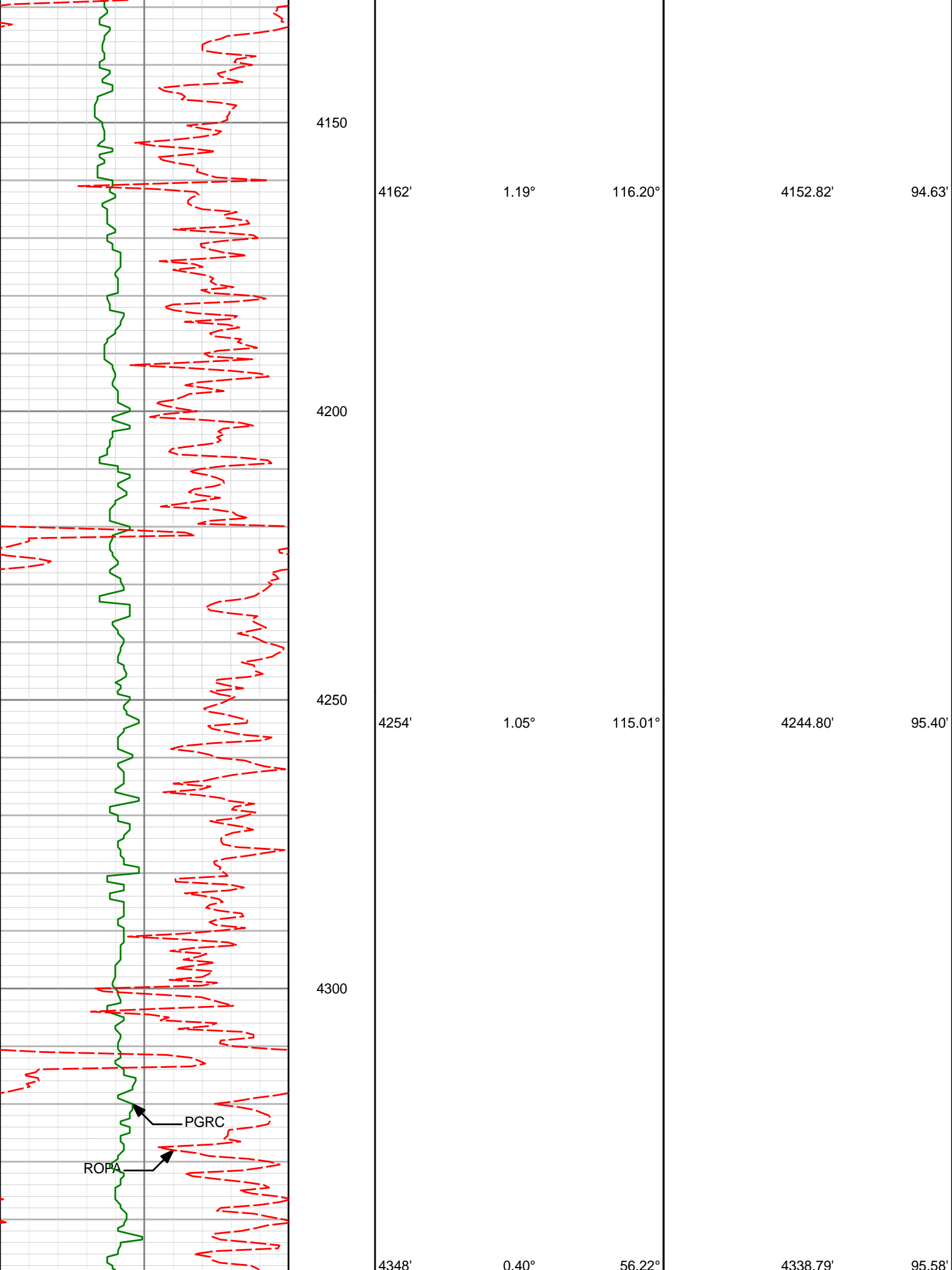
120.77°

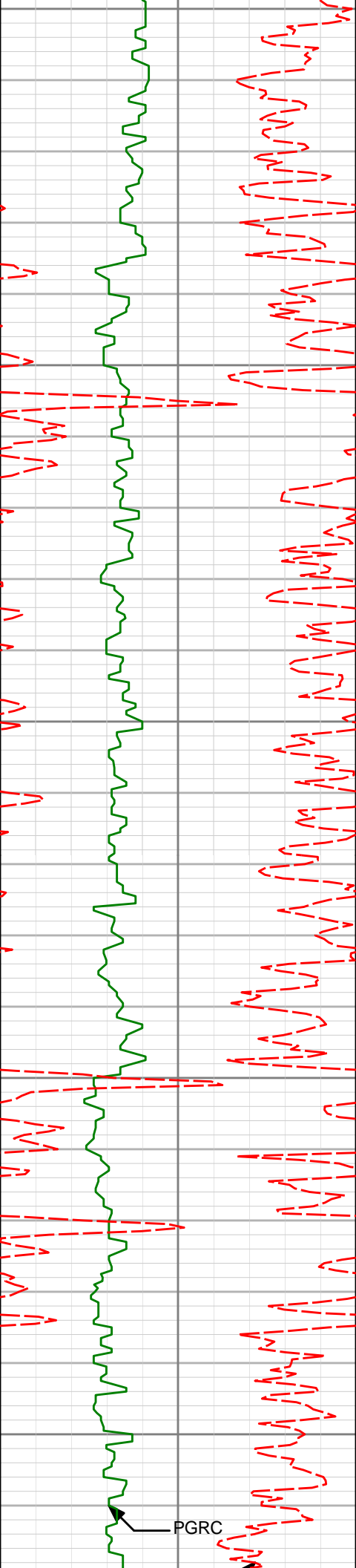
4059.84'

93.70'

PGRC

ROPA





4350

4400

4450

4500

4550

4442'

0.26°

13.75°

4432.79'

95.18'

4536'

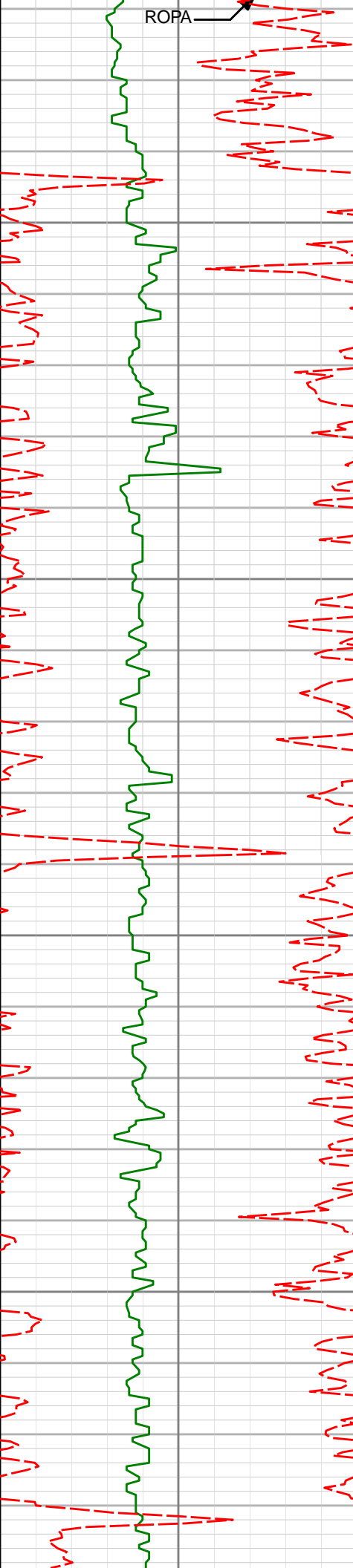
0.25°

40.97°

4526.79'

94.82'

PGRC



4600

4630'

0.45°

42.20°

4620.79'

94.39'

4650

4700

4724'

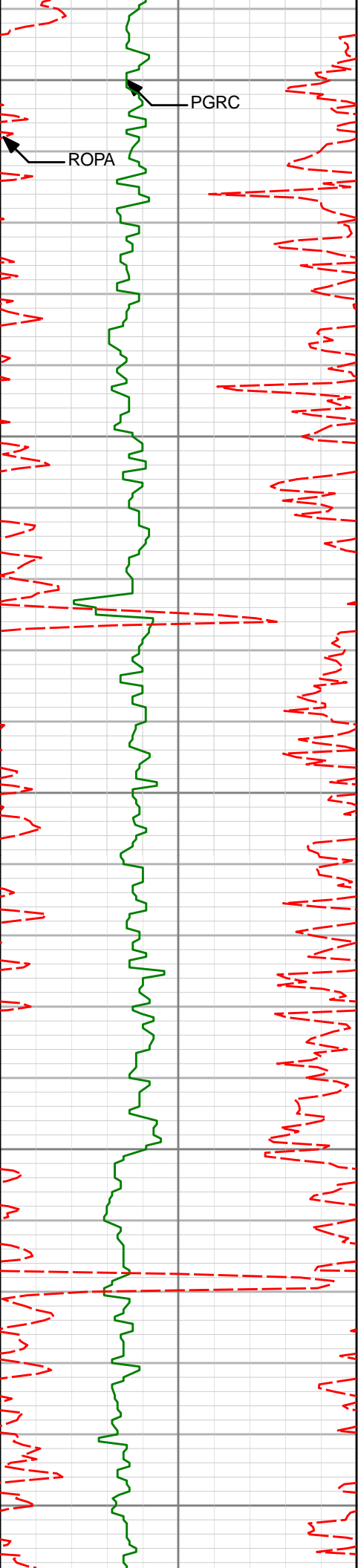
0.19°

64.42°

4714.79'

94.05'

4750



4800

4850

4900

4950

5000

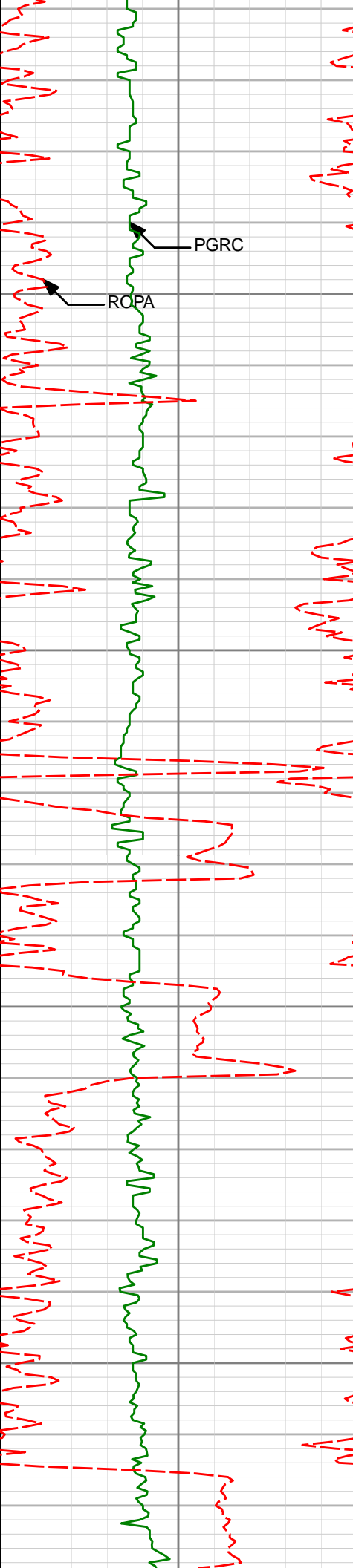
4912'

0.61°

58.88°

4902.78'

93.39'



5050

5100

5150

5200

5100'

5194'

0.68°

0.20°

112.22°

115.47°

5090.77'

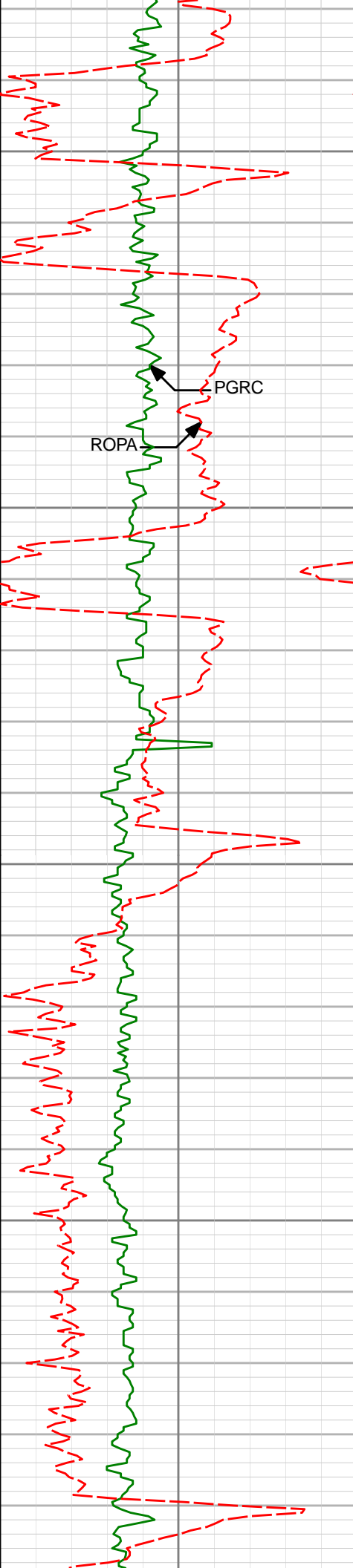
5184.77'

93.28'

93.56'

ROPAC

PGRC



5250

5300

5350

5400

PGRC

ROPA

5288'

0.57°

90.41°

5278.77'

93.63'

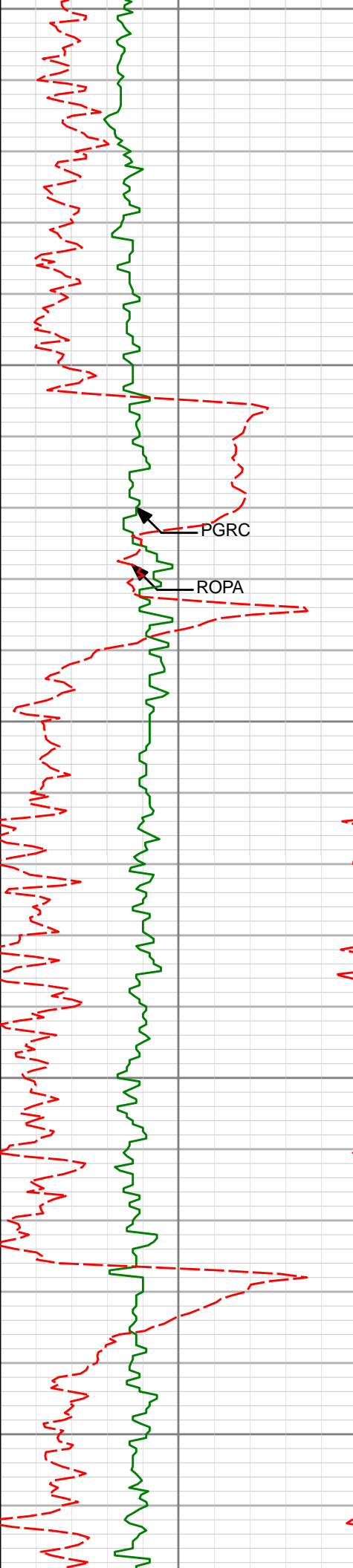
5382'

0.45°

63.86°

5372.76'

93.47'



5450

5476'

0.22°

23.55°

5466.76'

93.14'

5500

PGRC

ROPA

5550

5570'

0.25°

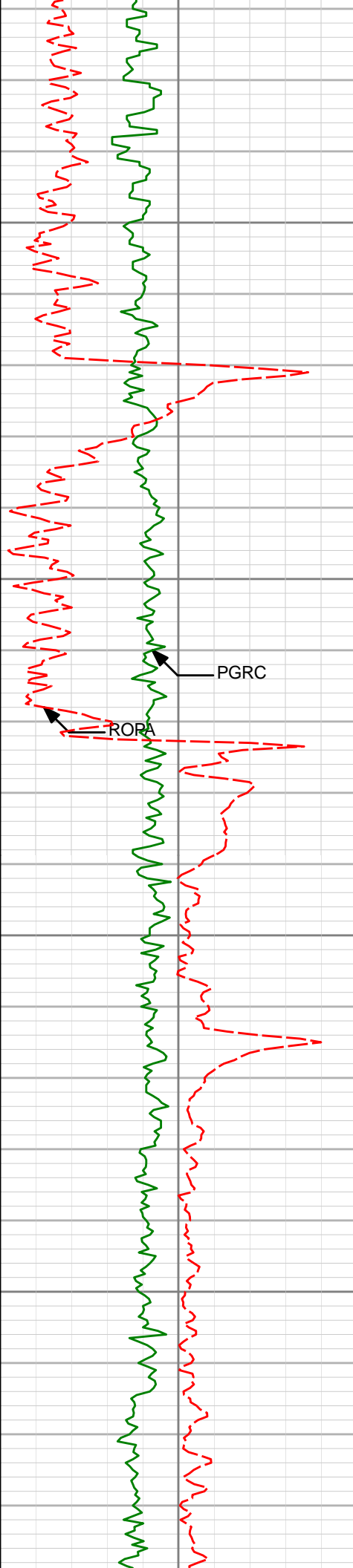
69.77°

5560.76'

92.90'

5600

5650



5700

5750

PGRC

RORA

5800

5850

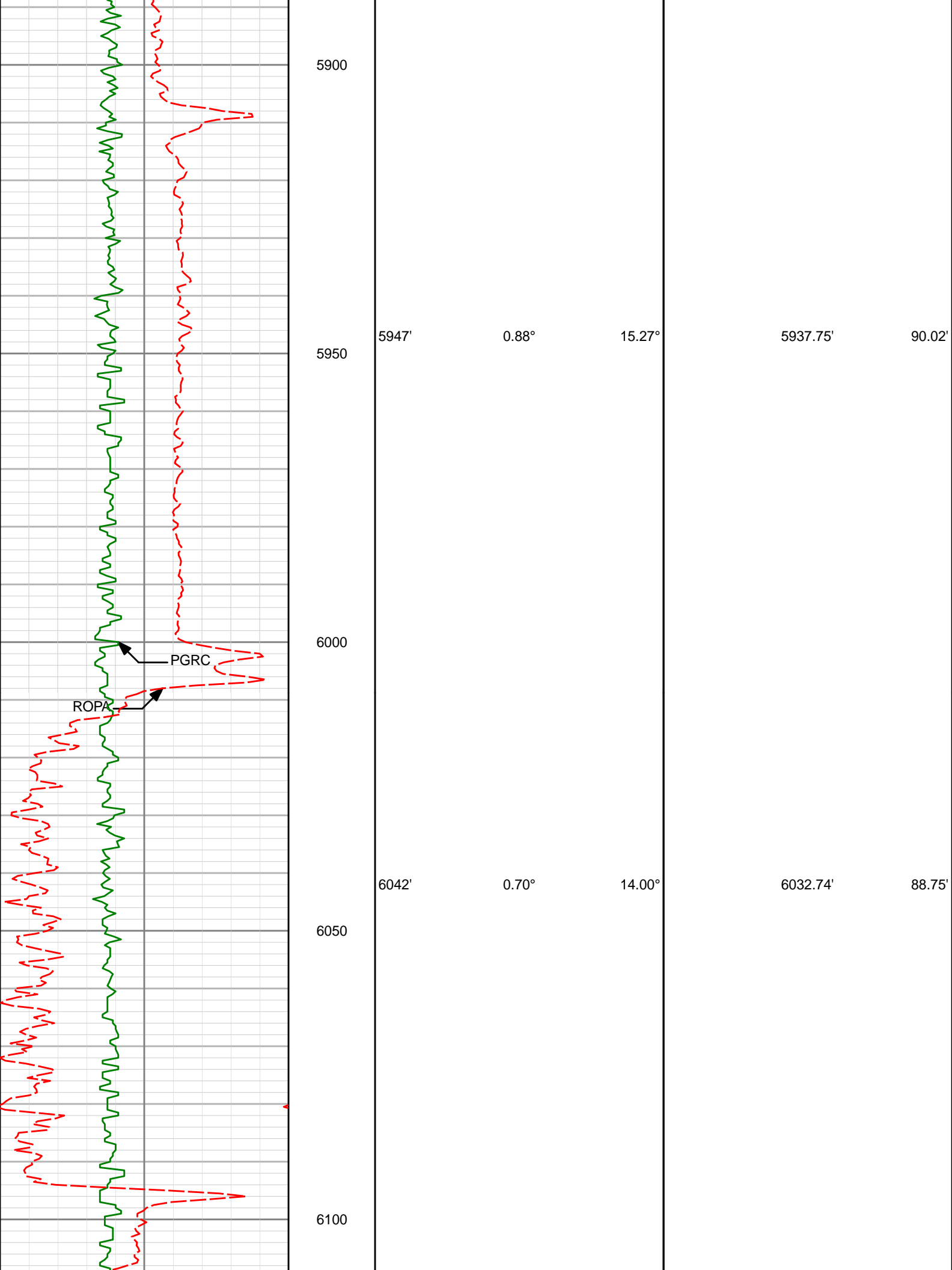
5853'

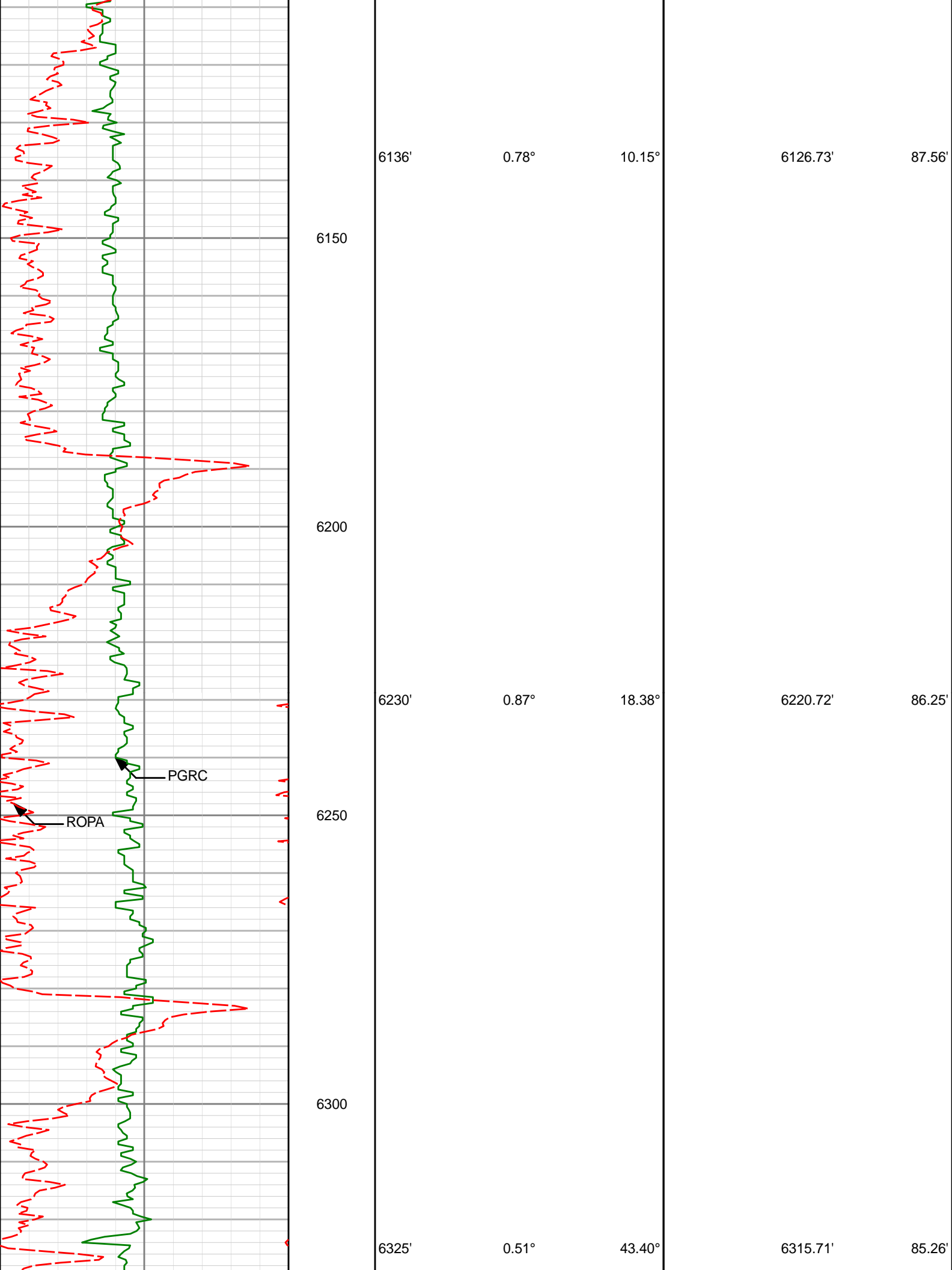
0.62°

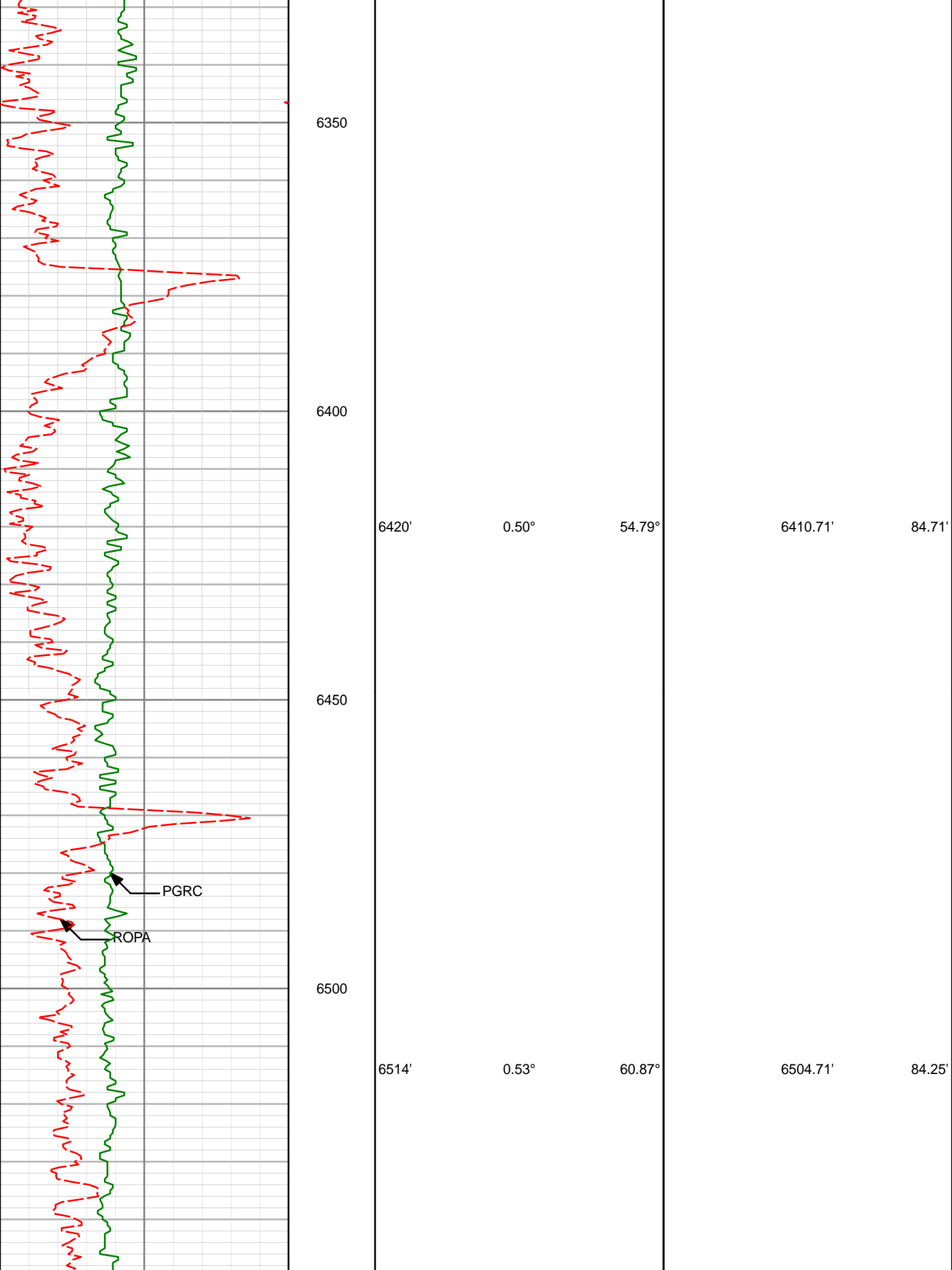
15.61°

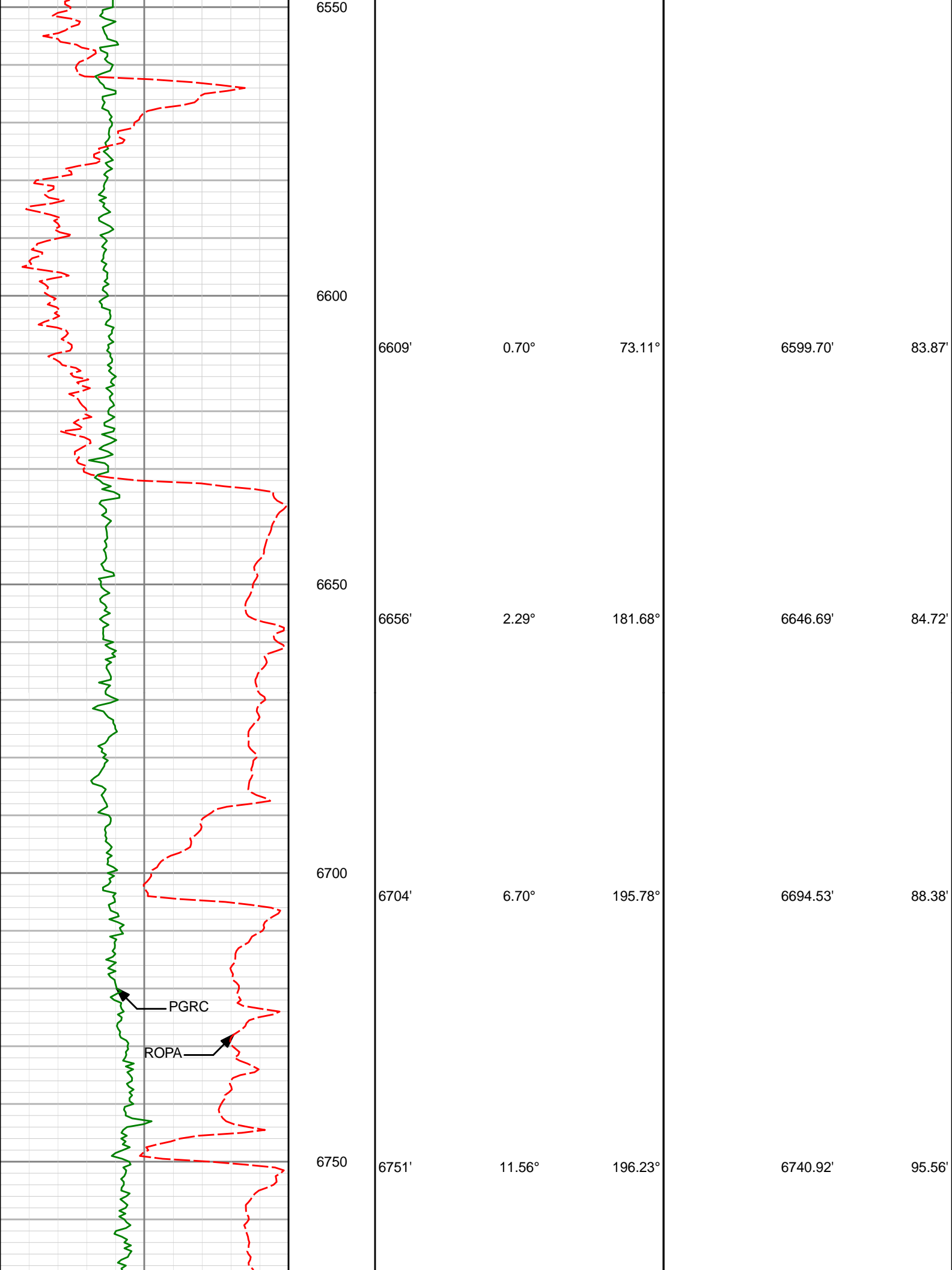
5843.75'

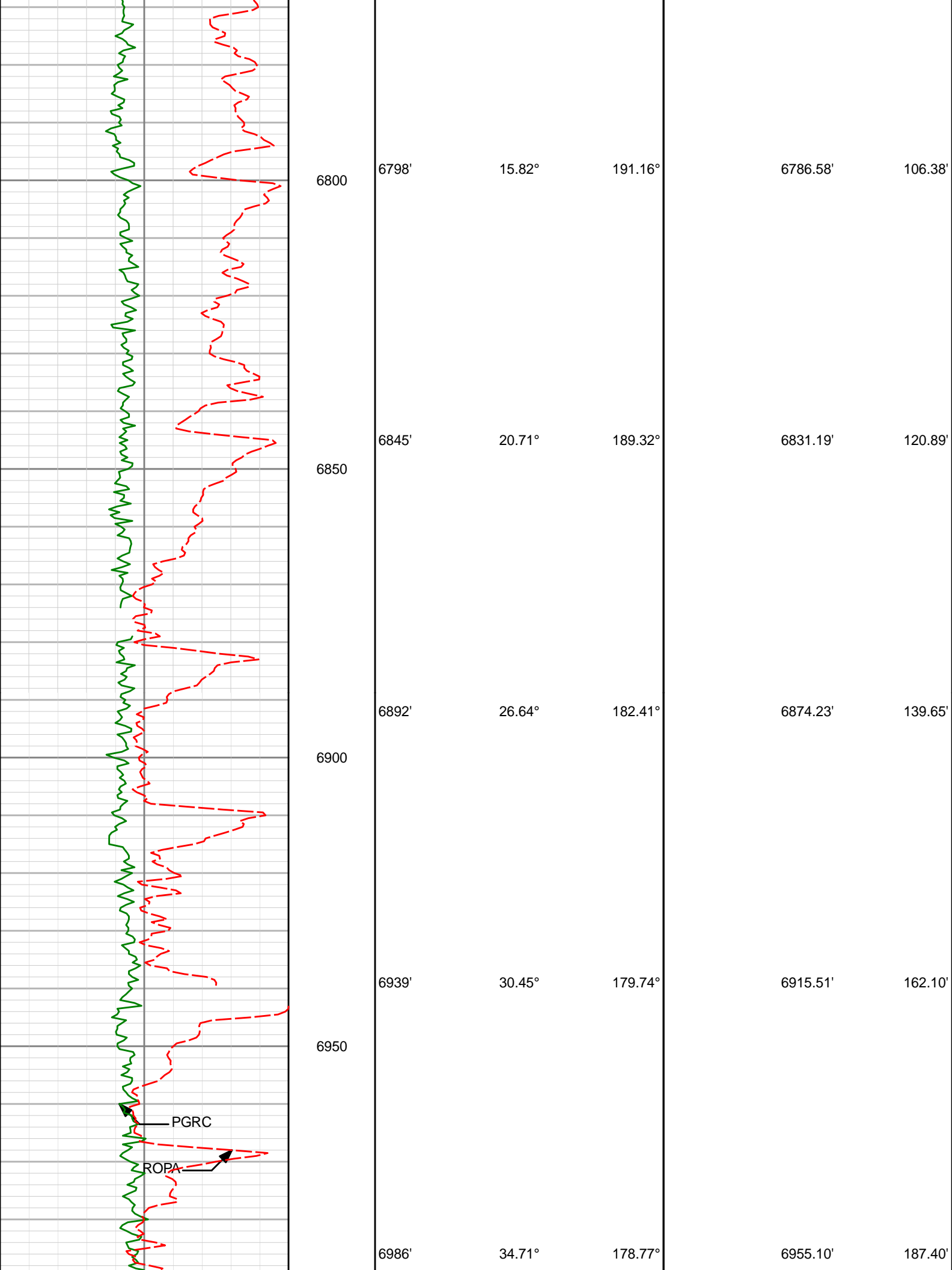
91.21'

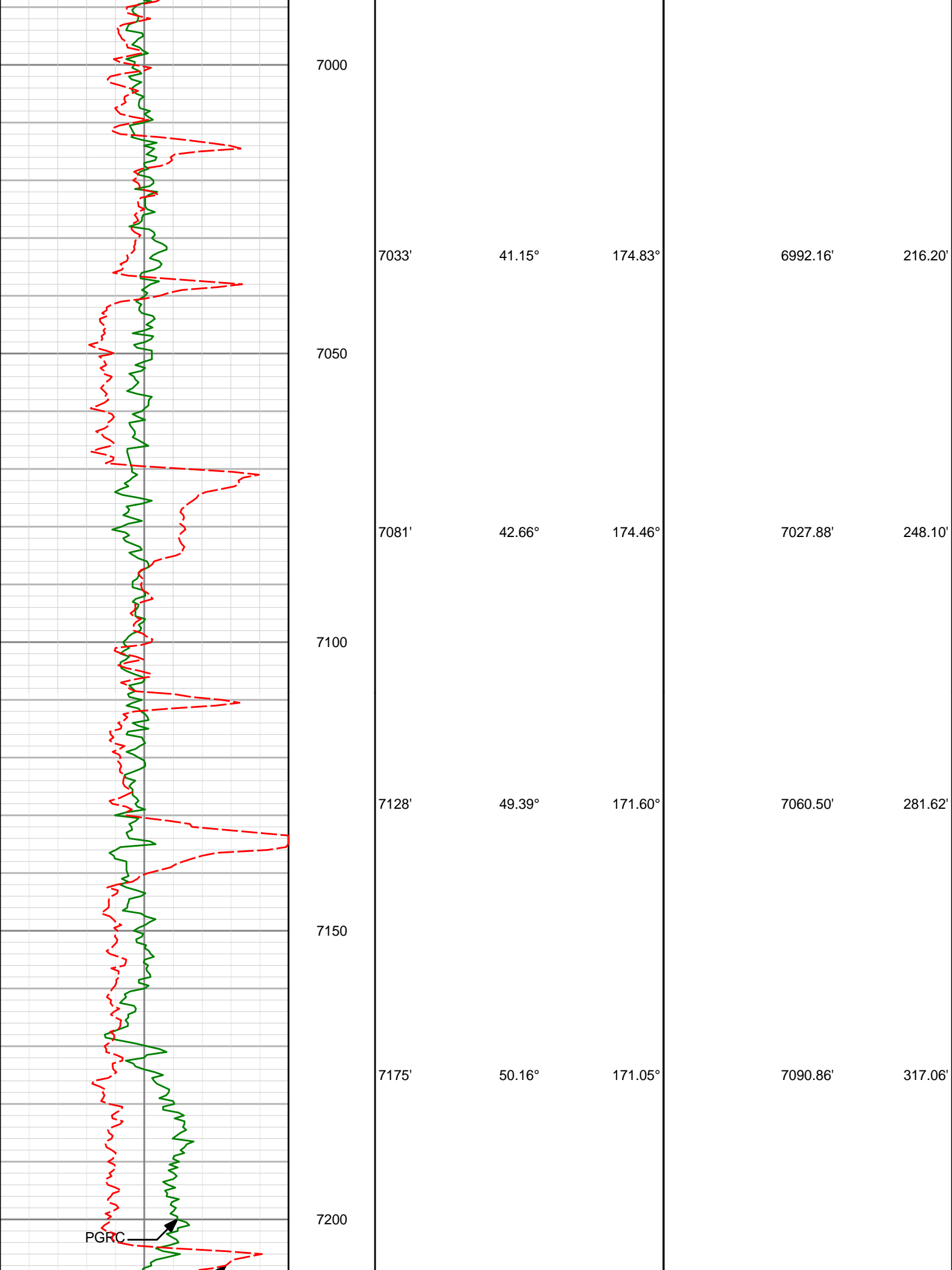


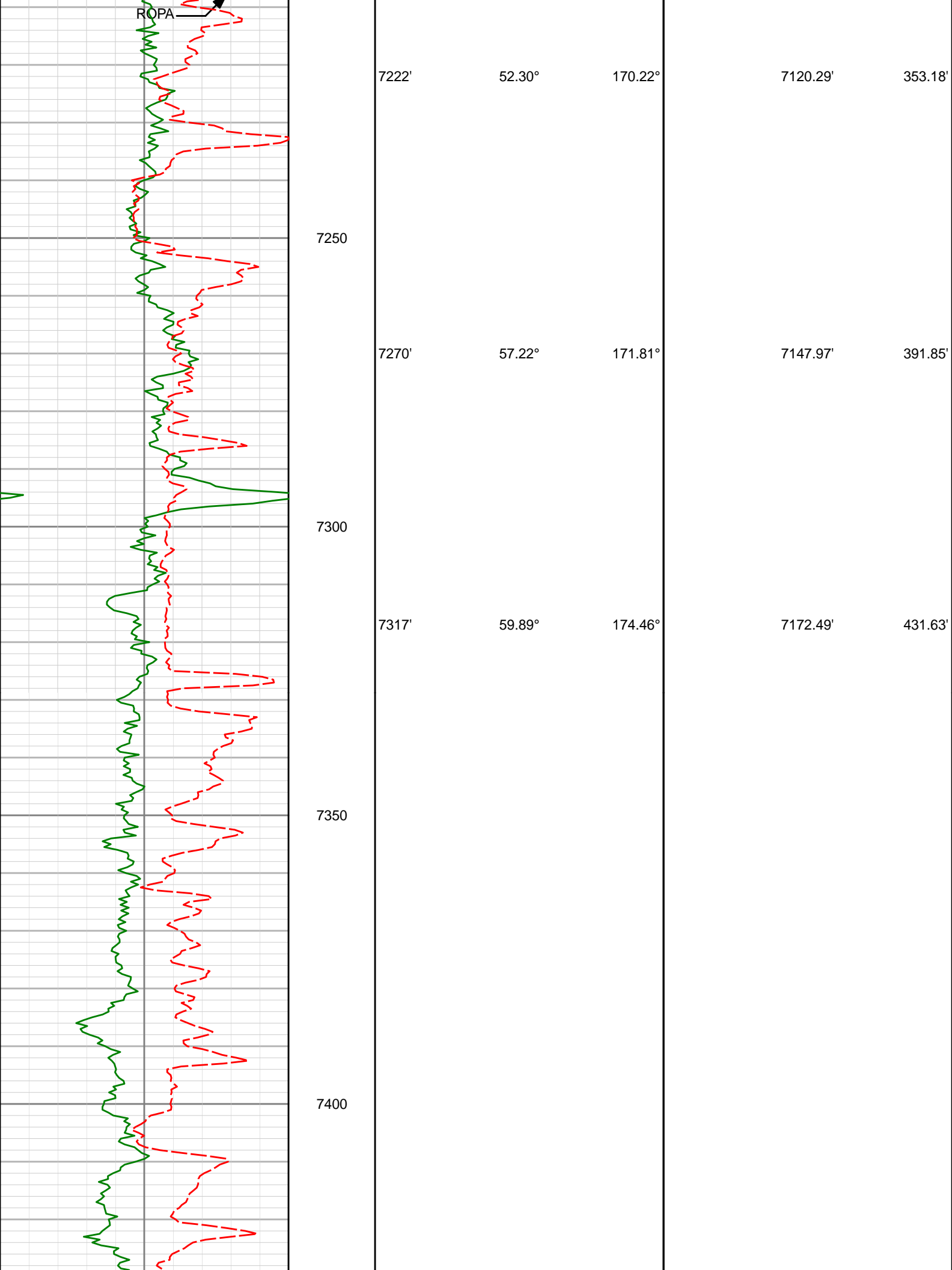


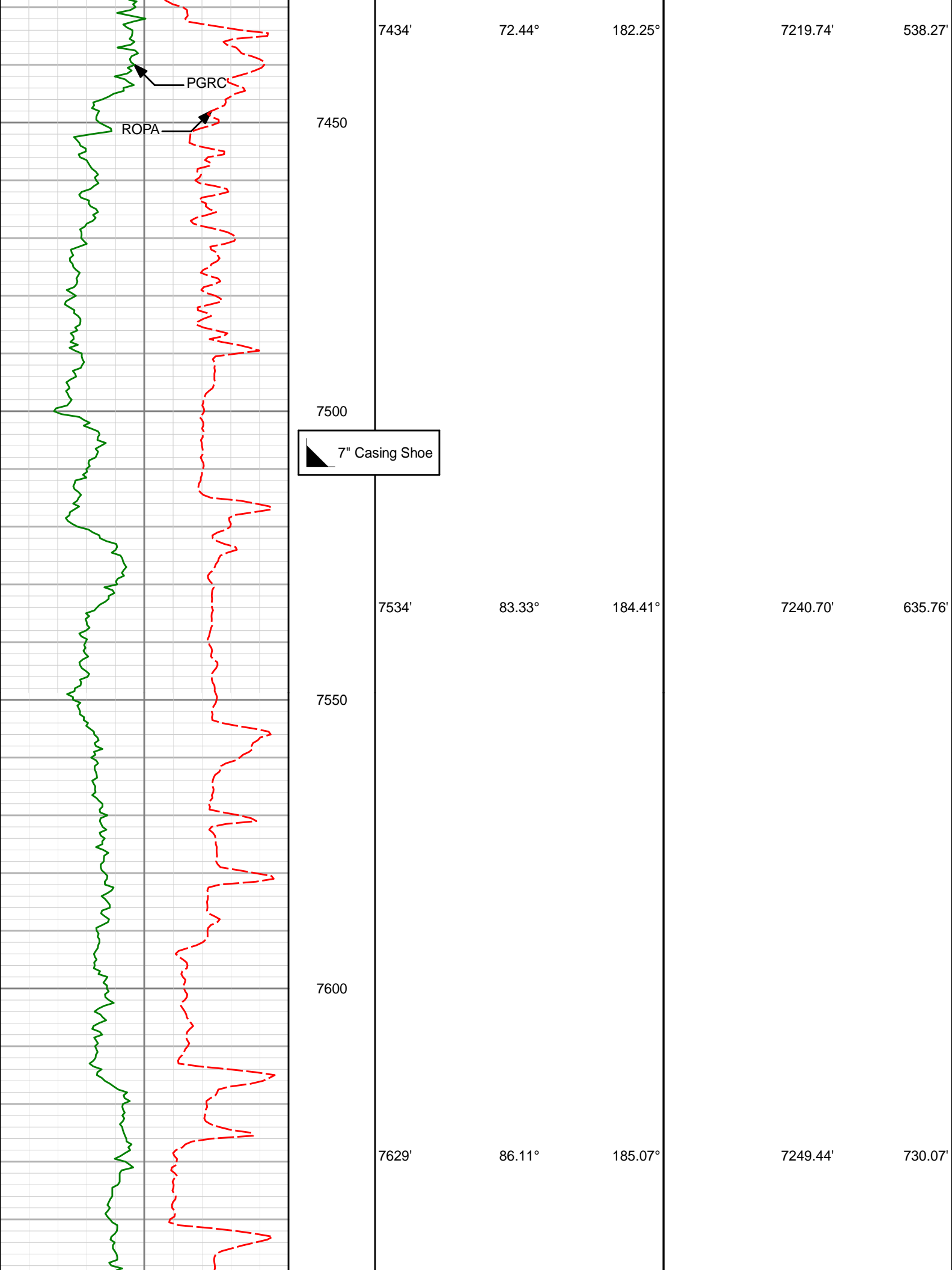


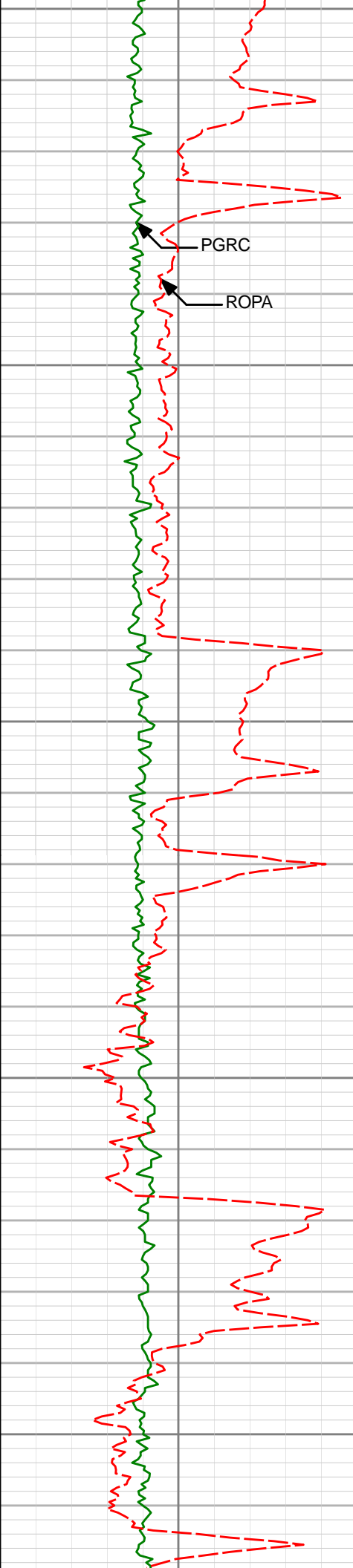












7650

7700

7750

7800

7850

PGRC

ROPA

7723'

89.94°

185.08°

7252.68'

823.67'

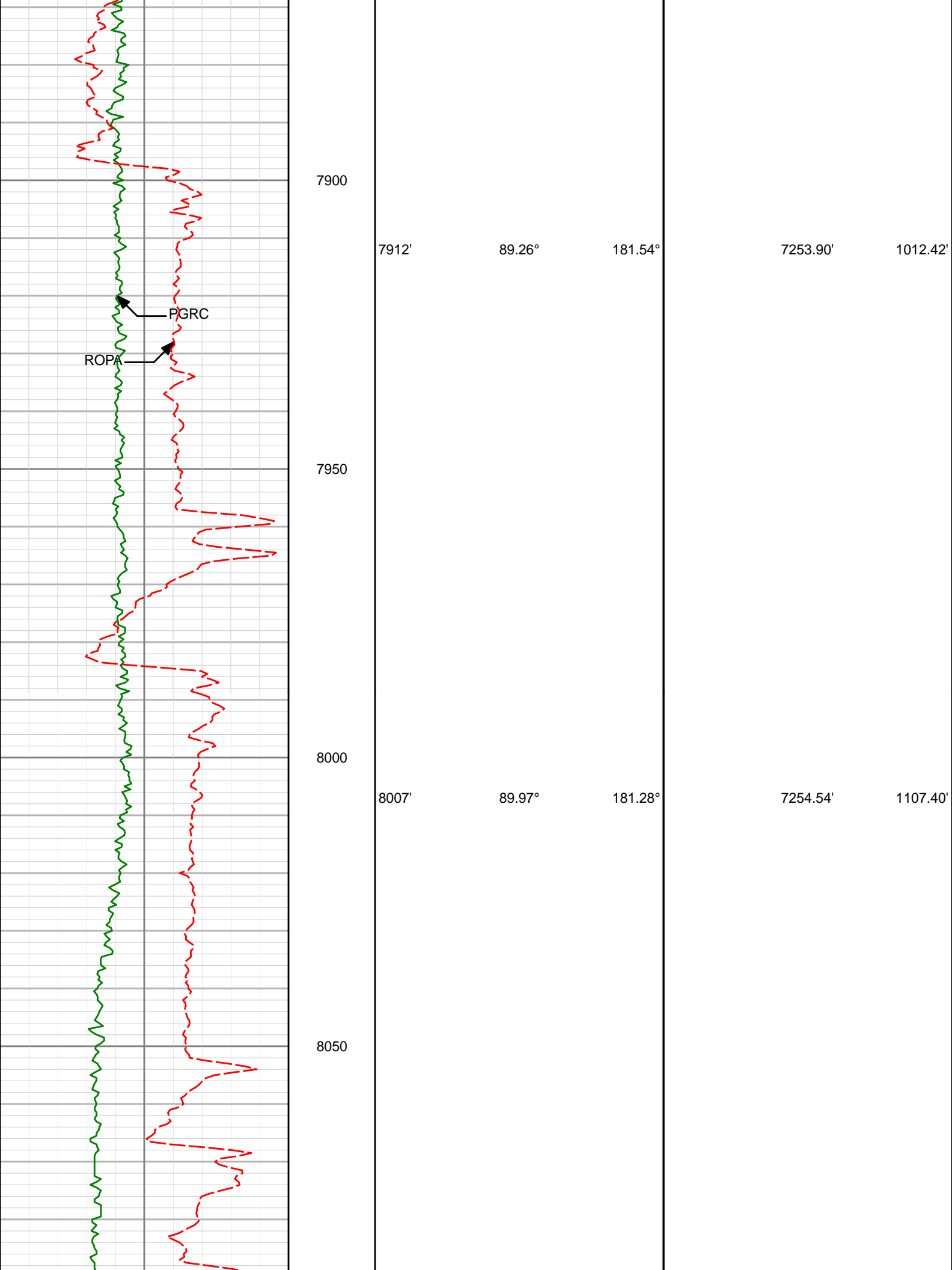
7818'

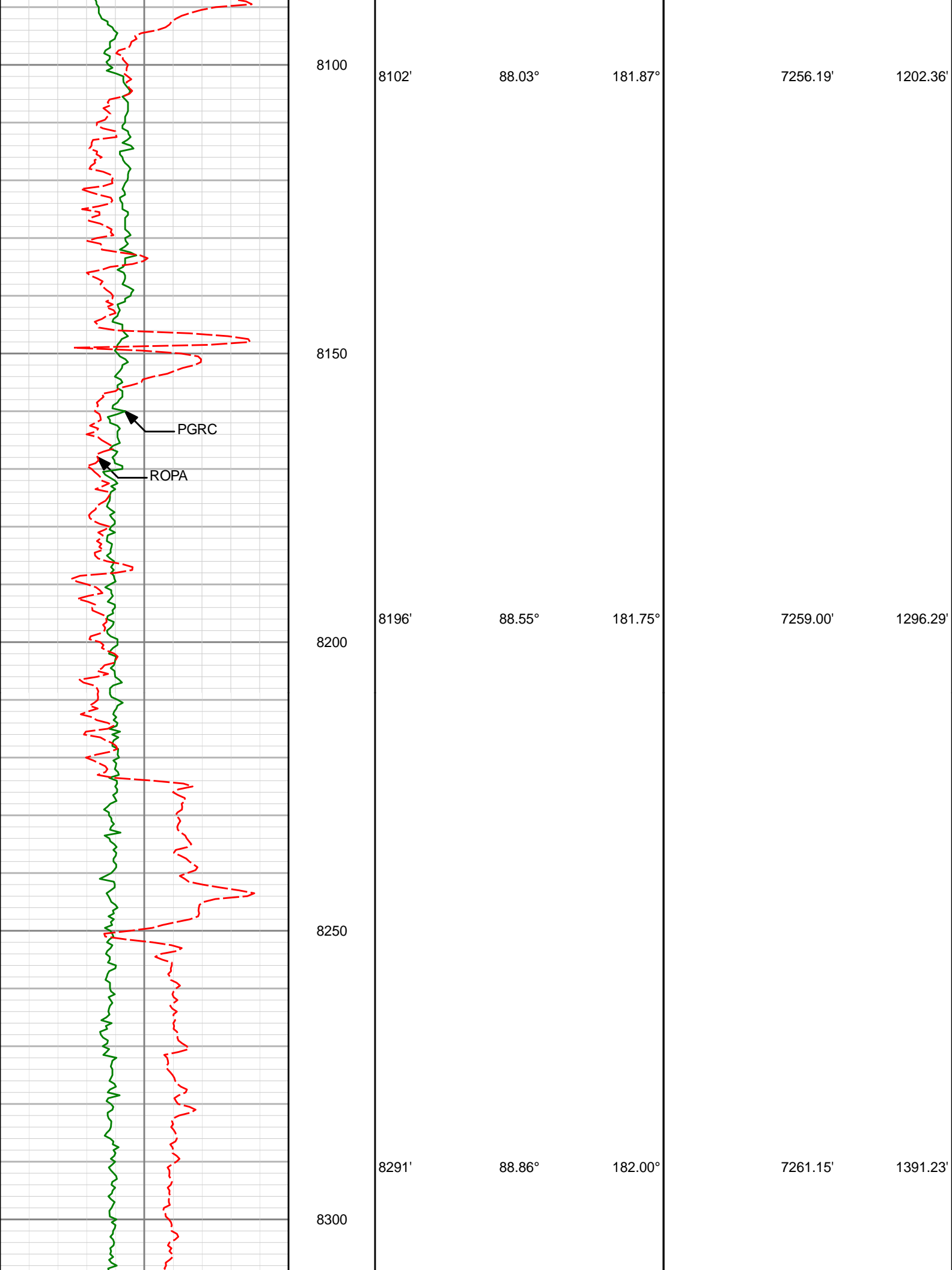
89.66°

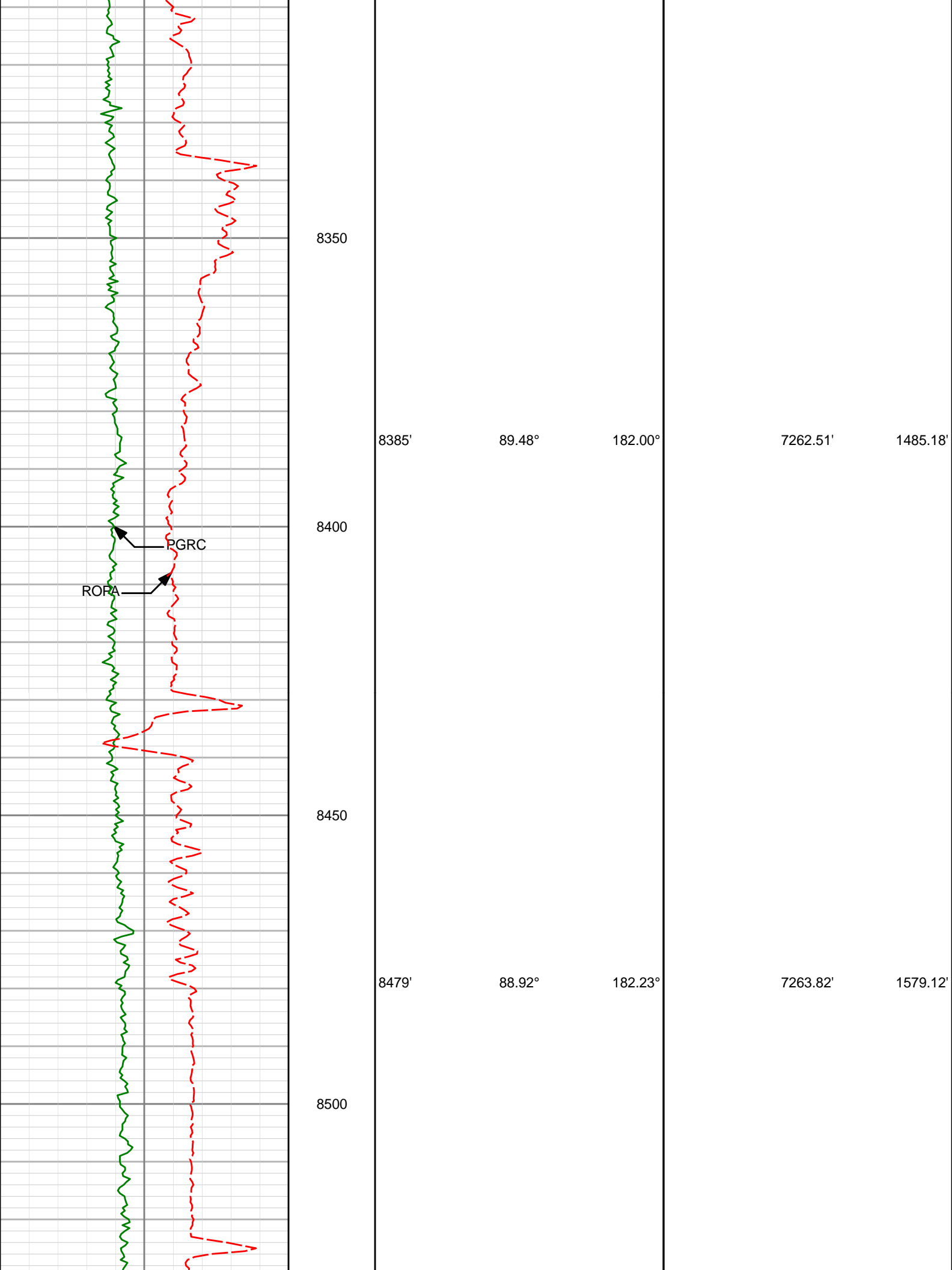
182.76°

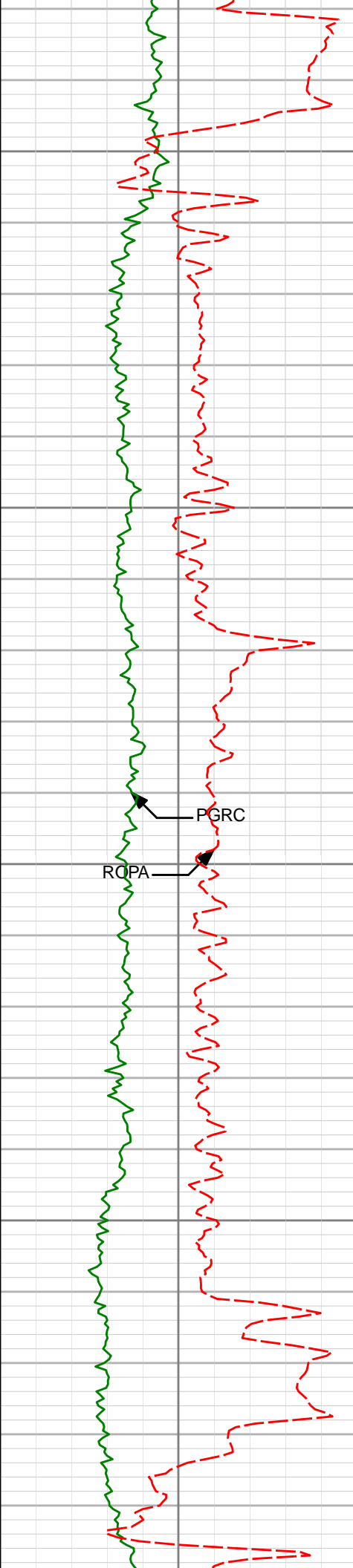
7253.01'

918.48'









8550

8574'

90.55°

180.10°

7264.26'

1674.10'

8600

PGRC

RQPA

8650

8668'

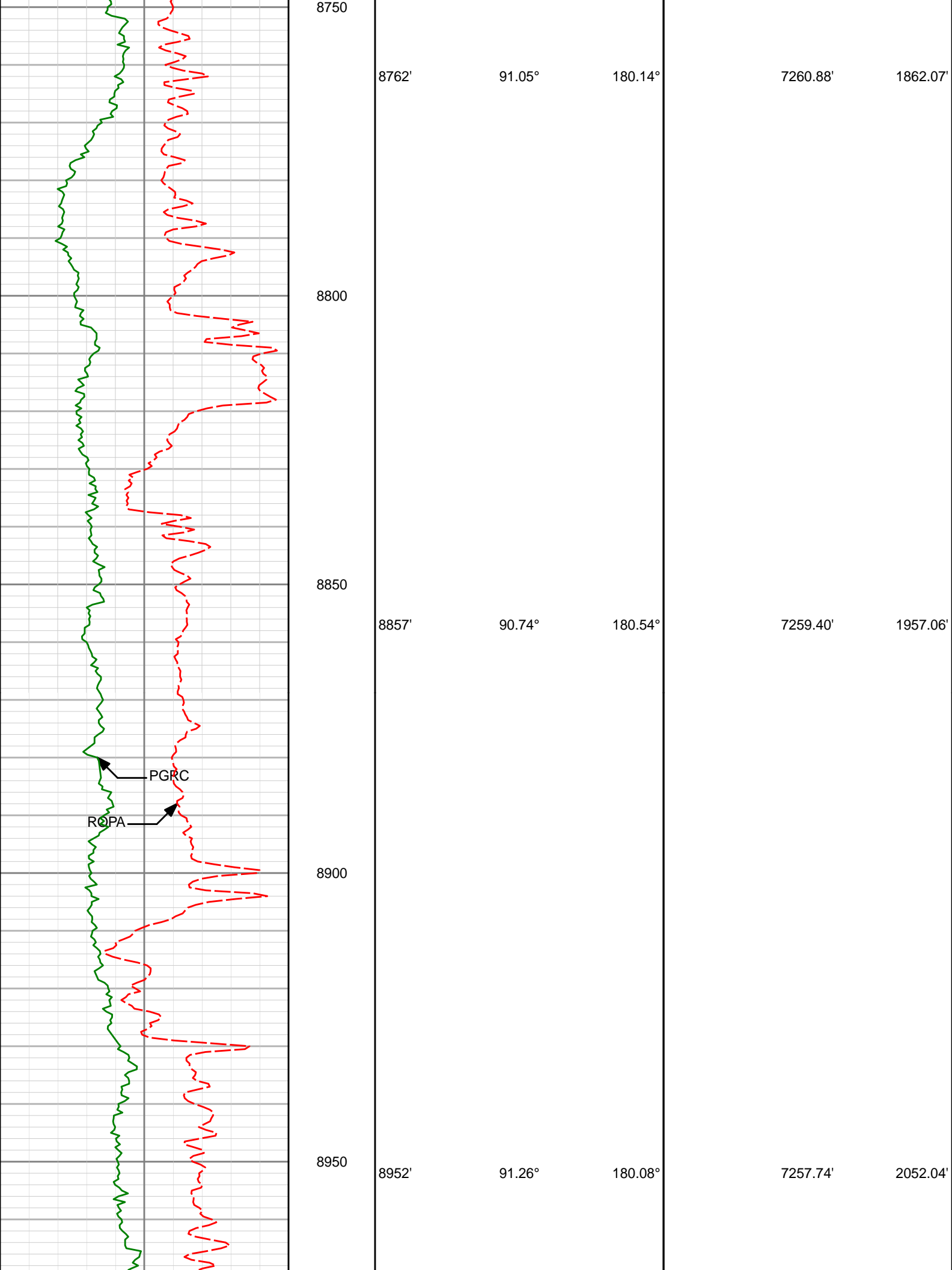
91.26°

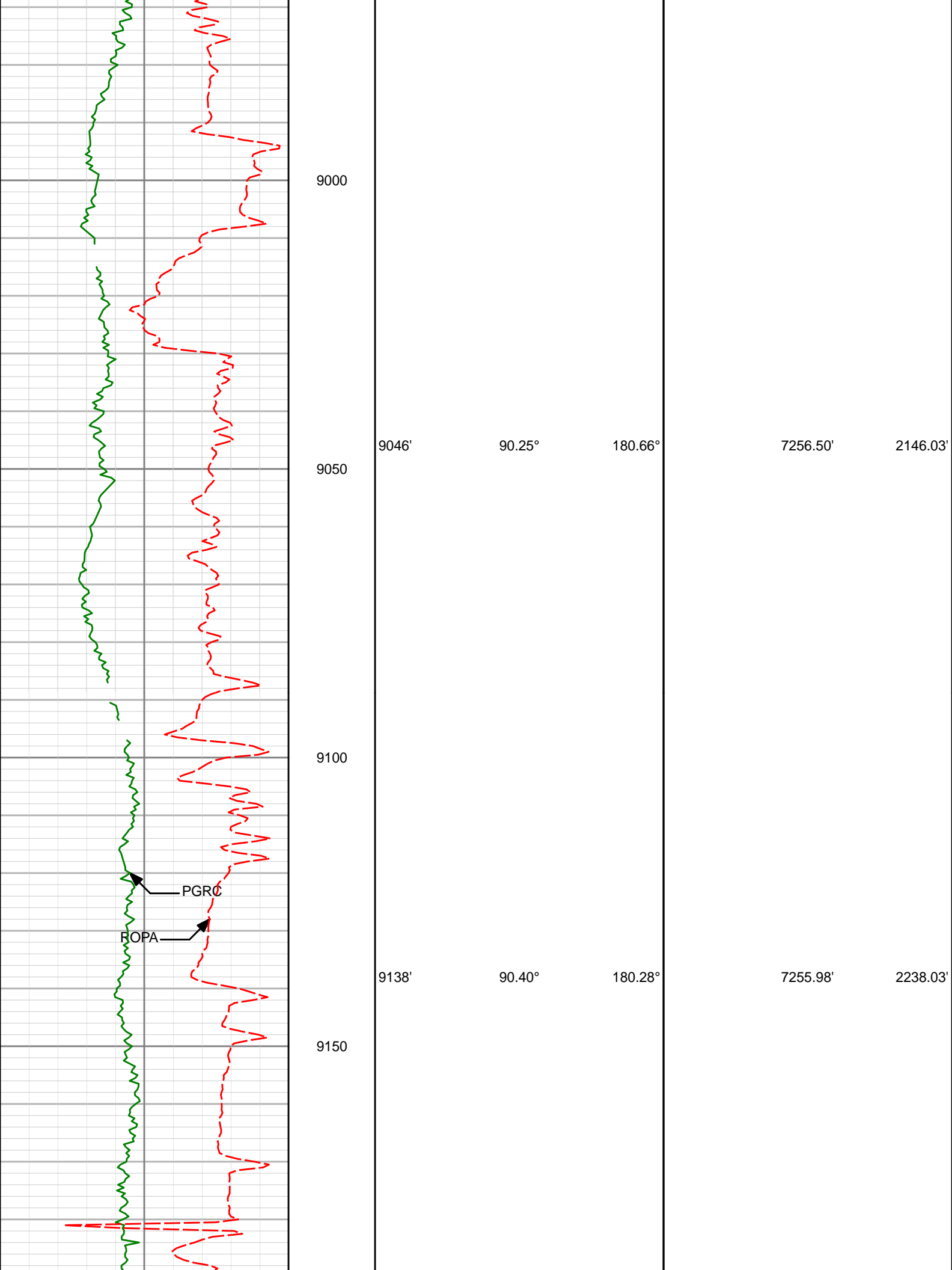
180.03°

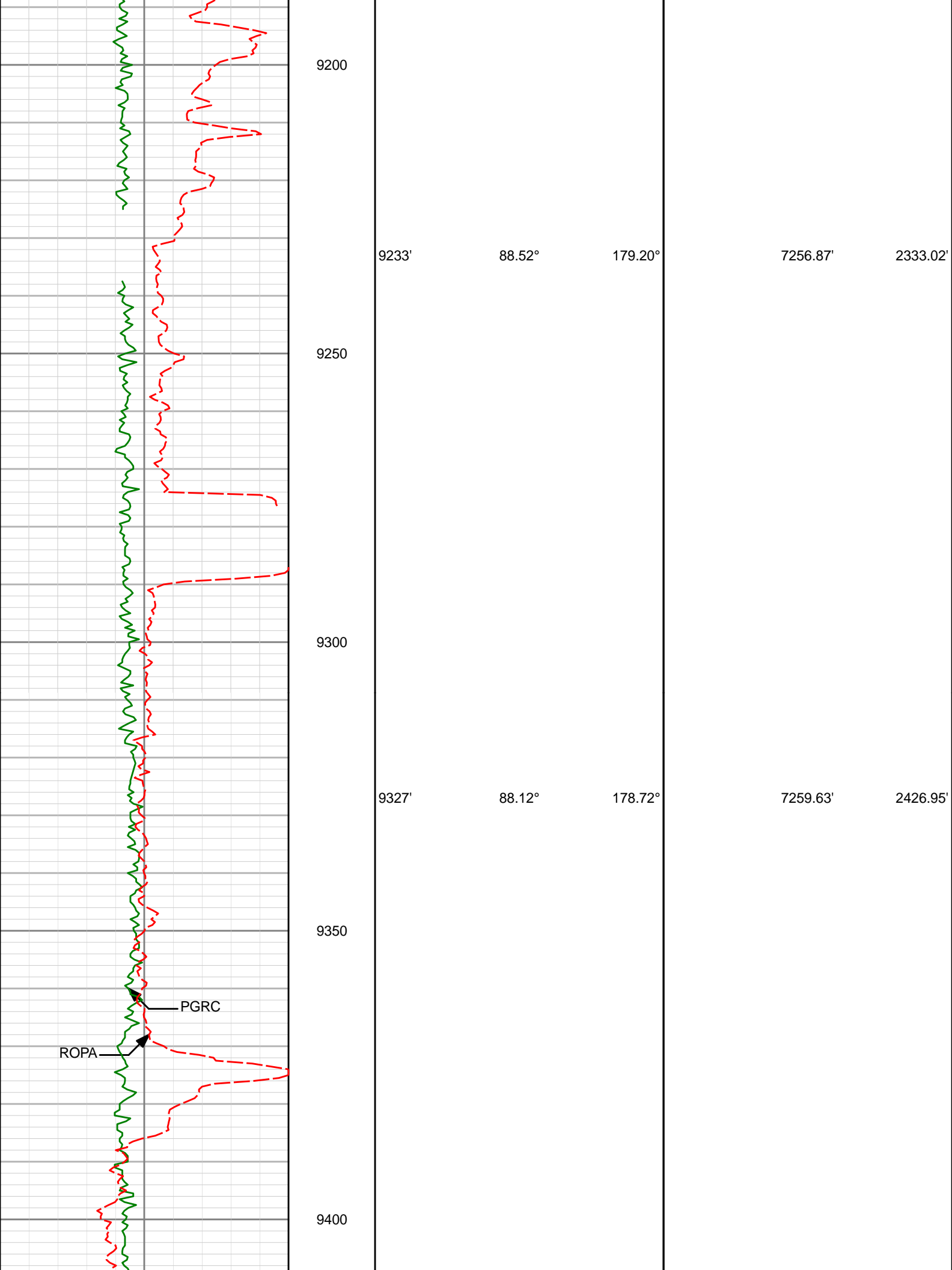
7262.77'

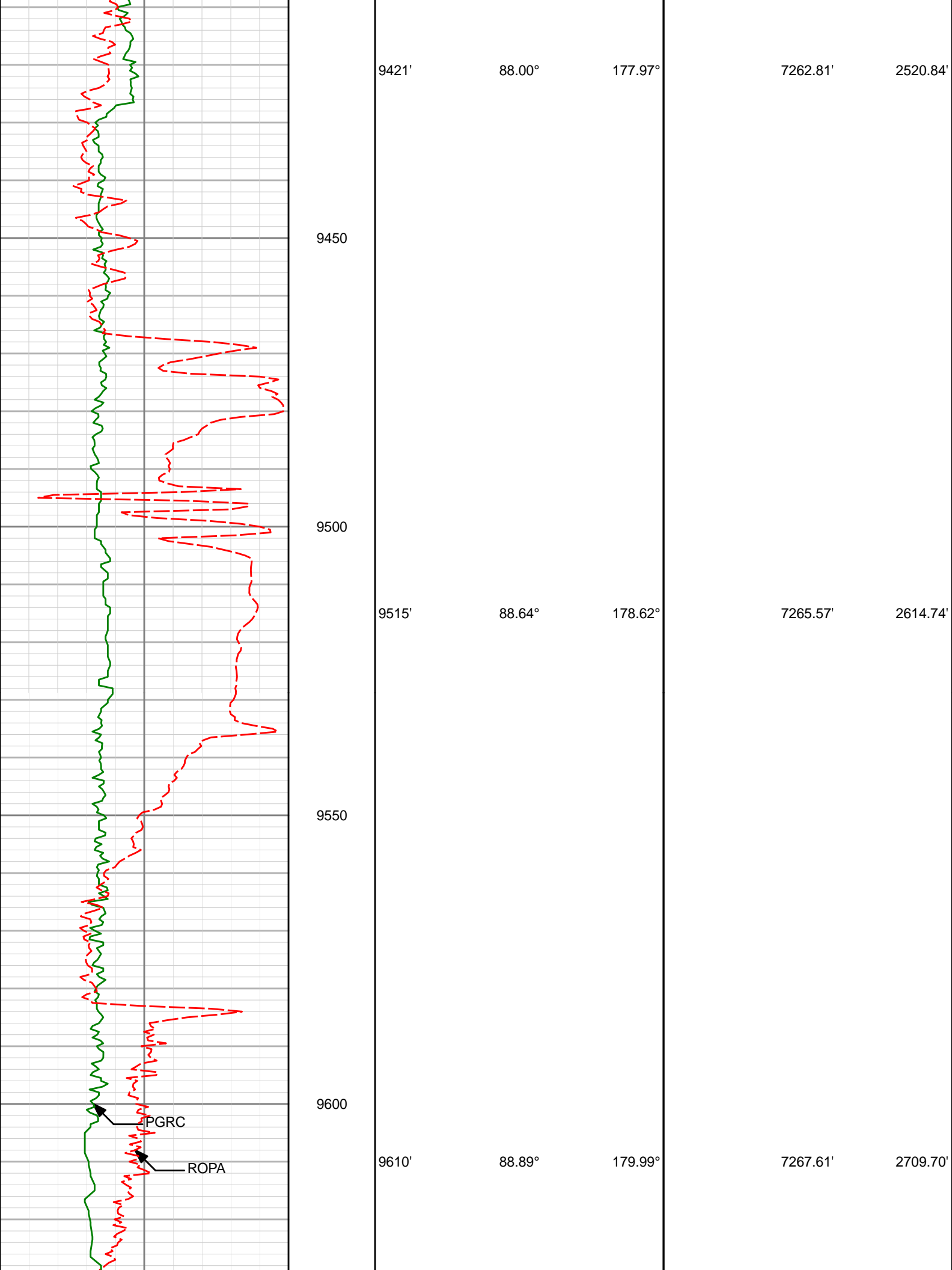
1768.09'

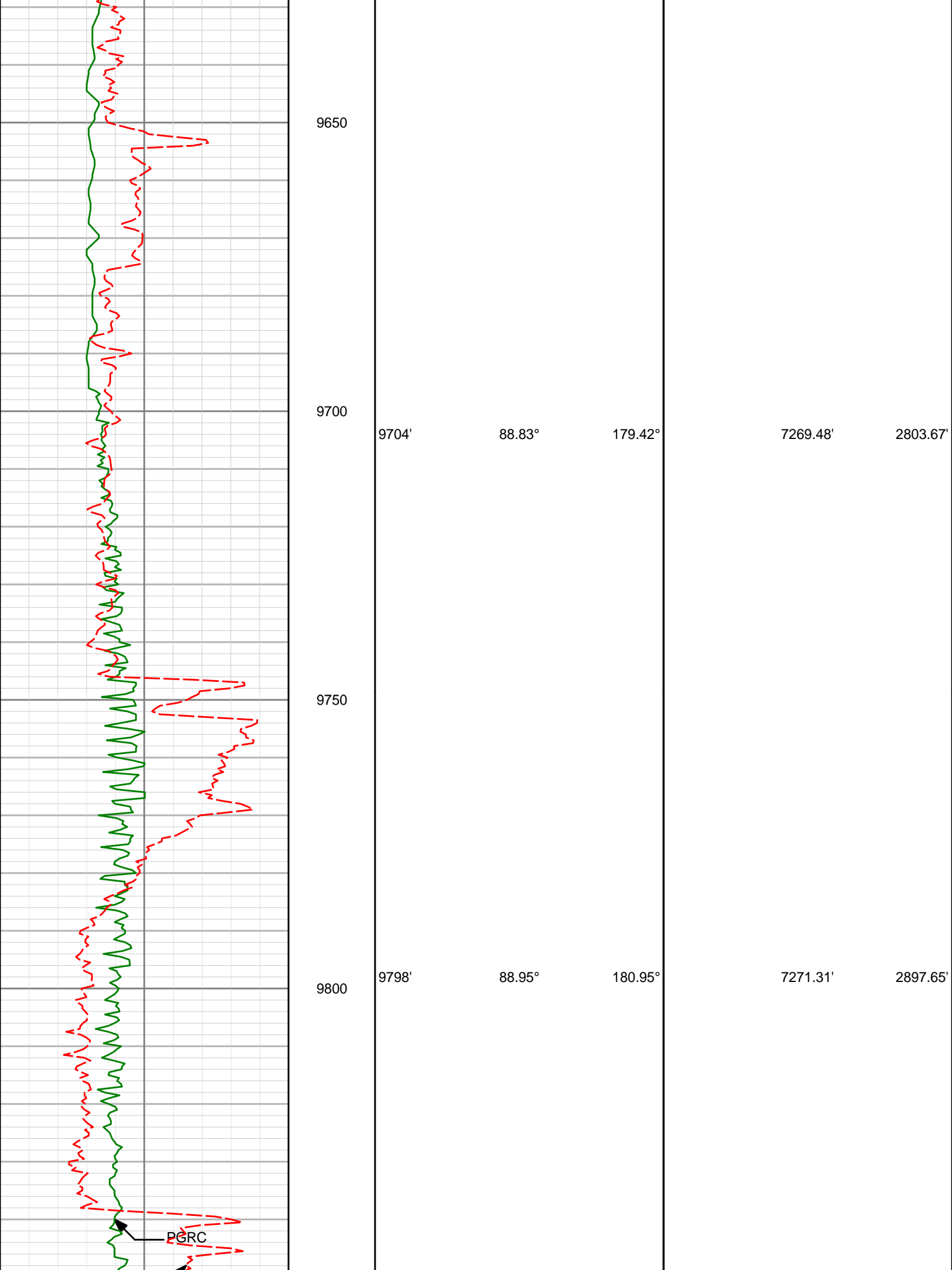
8700

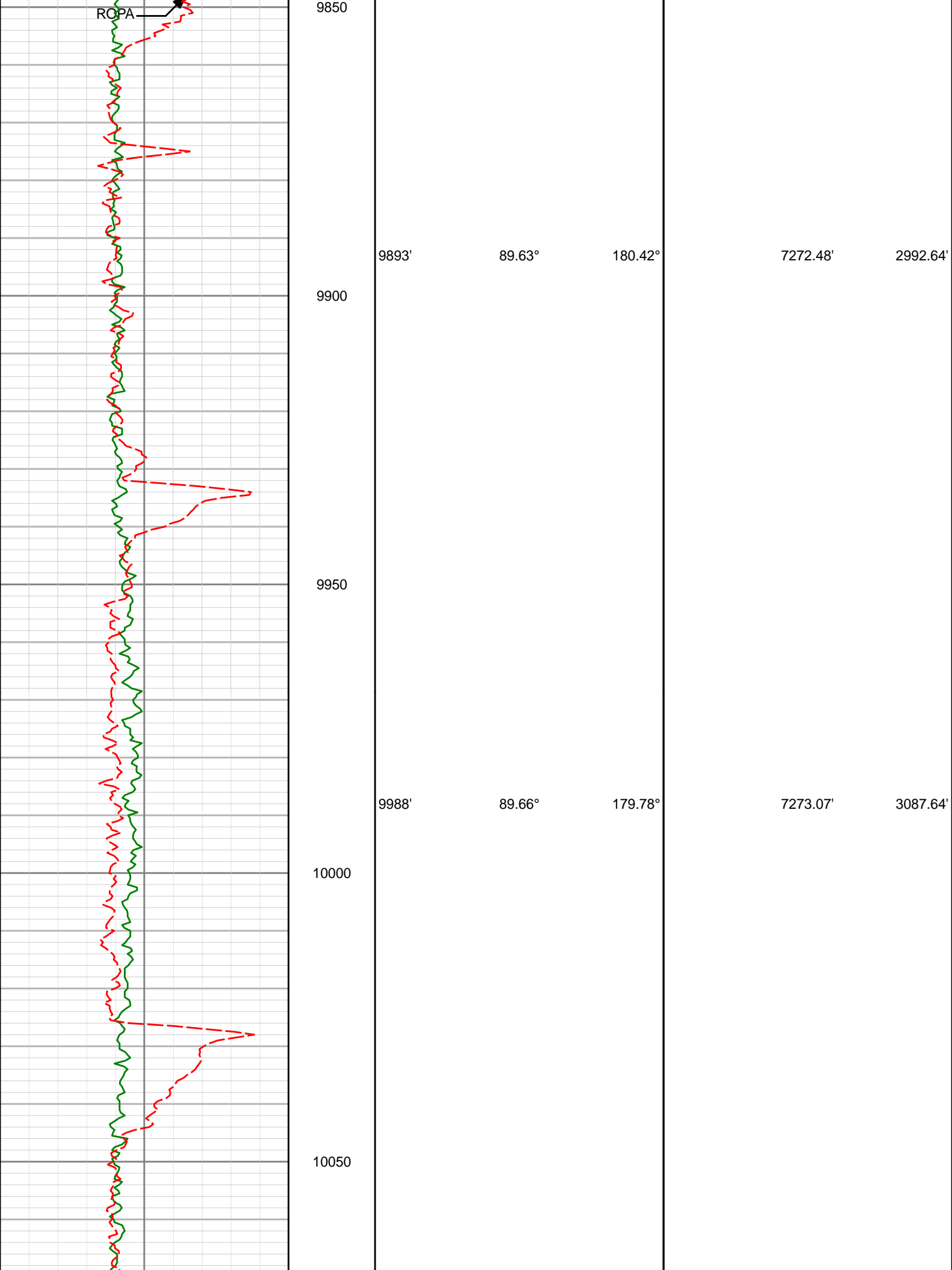


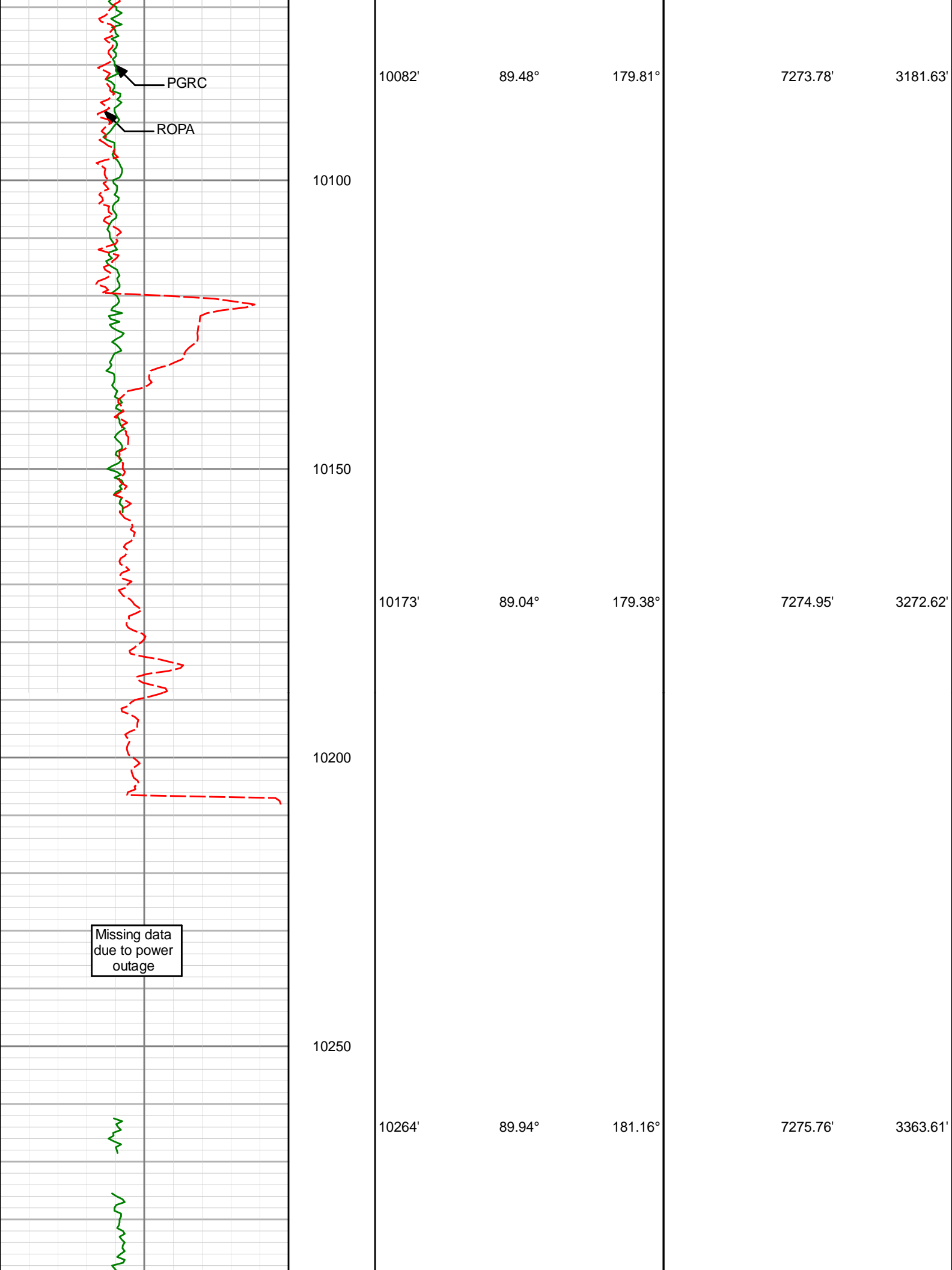


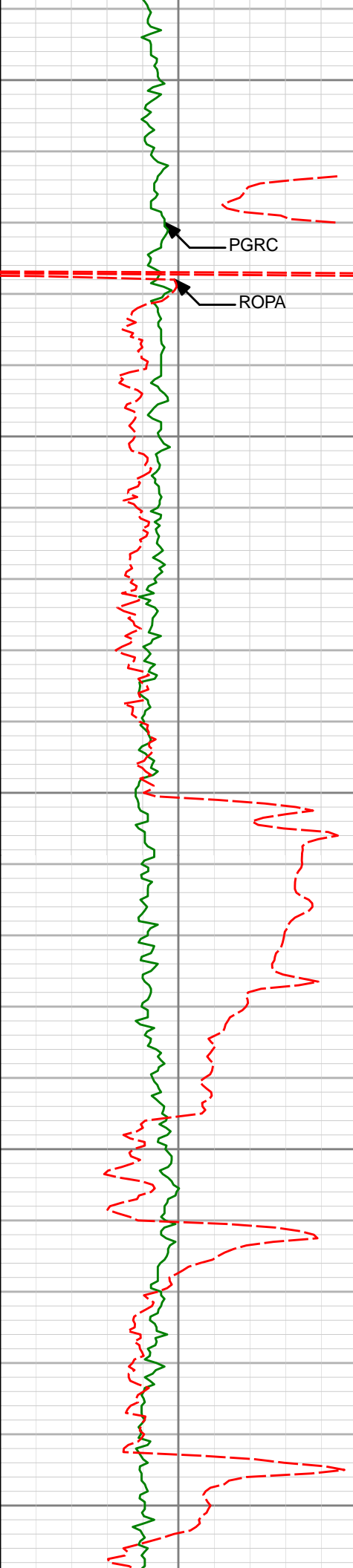












10300

PGRC

ROPA

10350

10357'

89.35°

180.16°

7276.34'

3456.60'

10400

10450

10449'

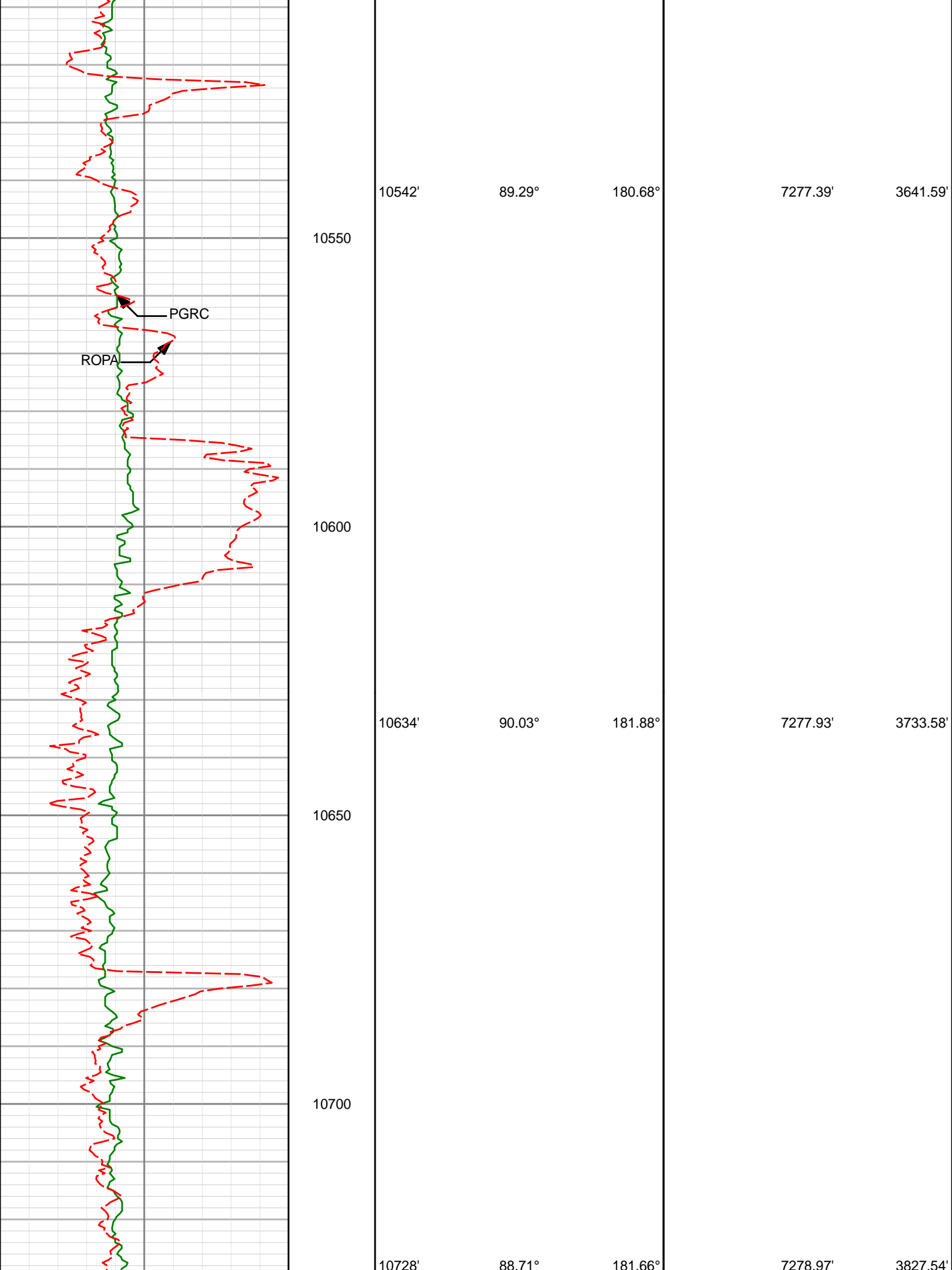
90.03°

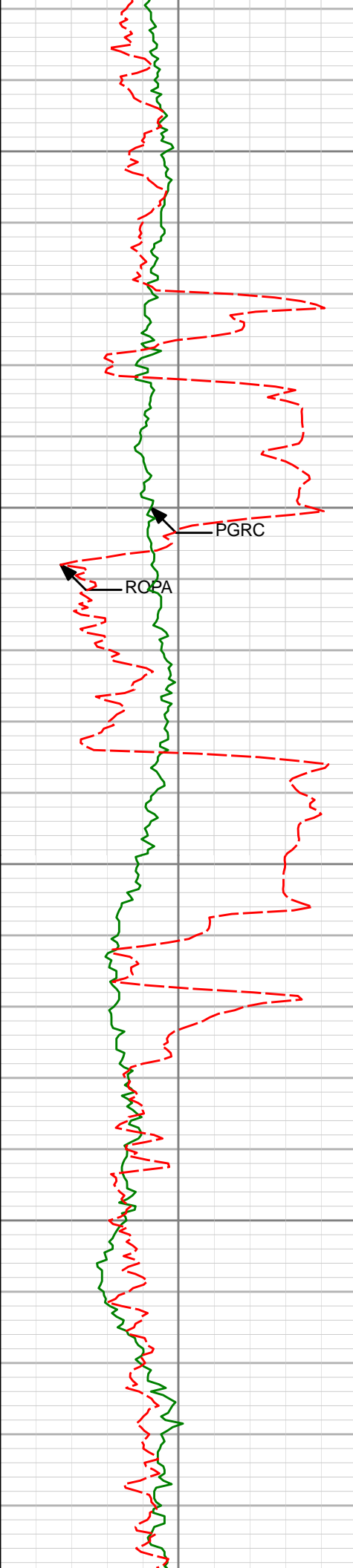
181.12°

7276.84'

3548.60'

10500





10750

10800

PGRC

ROPA

10850

10900

10819'

90.03°

181.75°

7279.97'

3918.50'

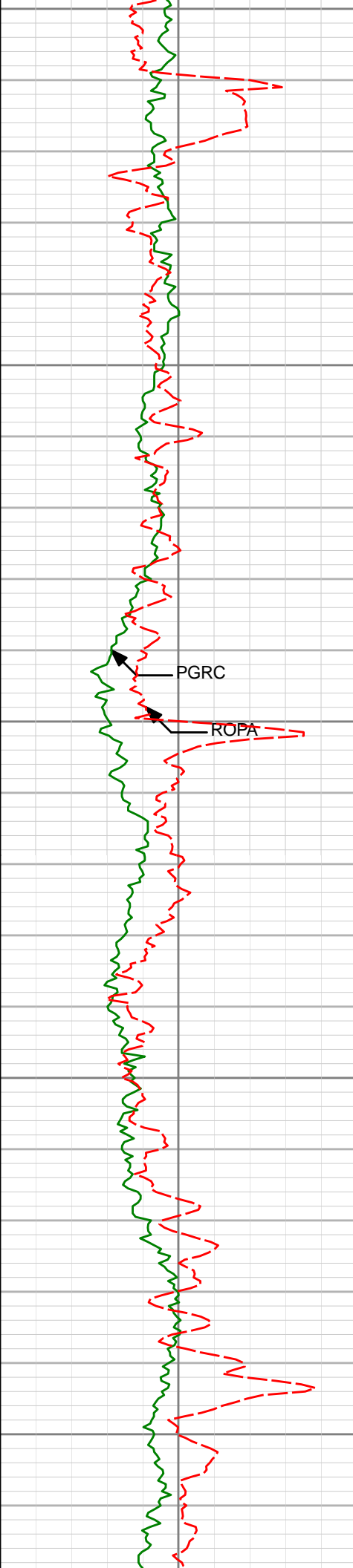
10910'

92.31°

180.64°

7278.11'

4009.47'



10950

11000

11050

11100

11150

11003'

92.31°

180.79°

7274.36'

4102.39'

PGRC

ROPA

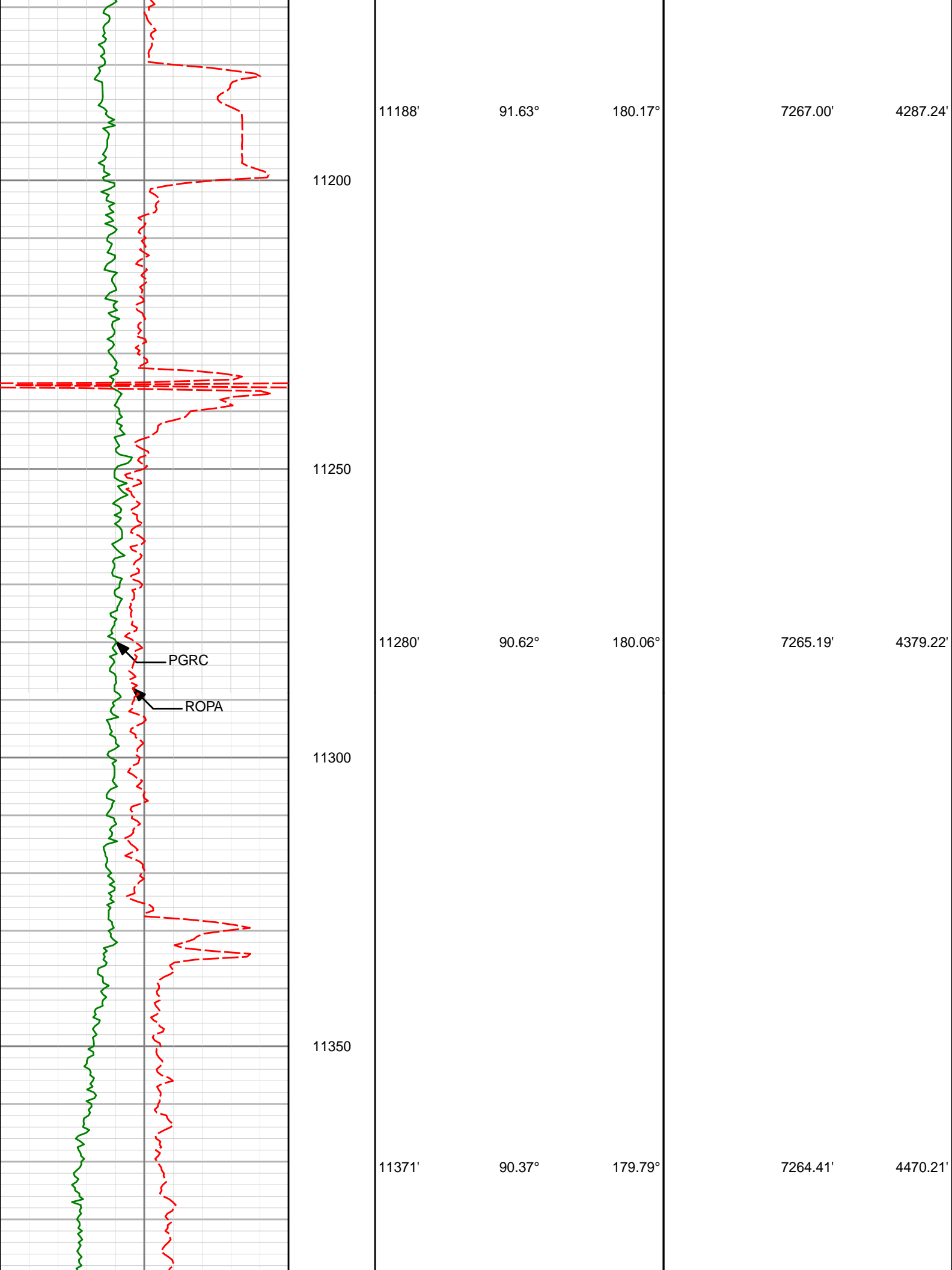
11096'

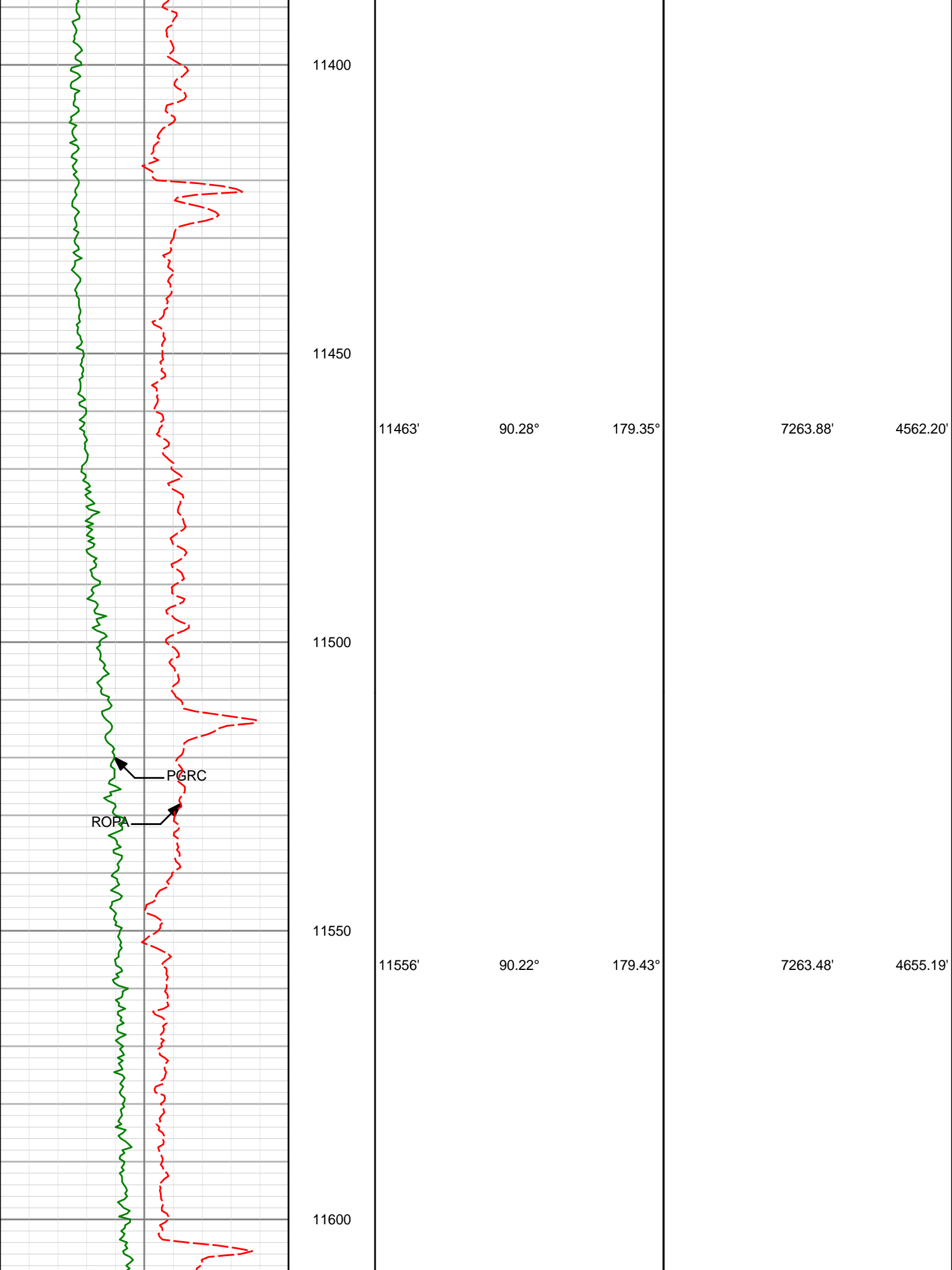
92.59°

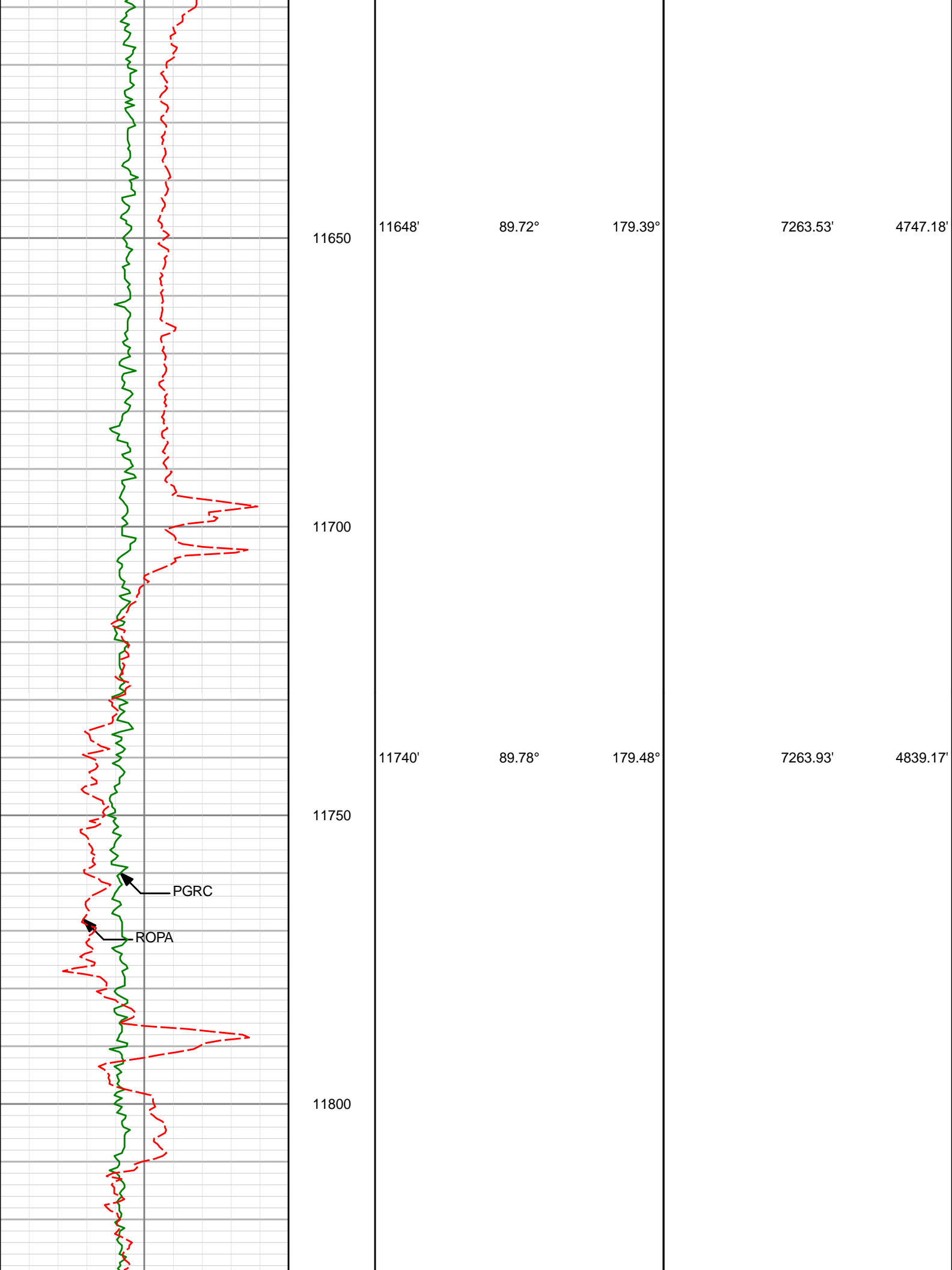
180.48°

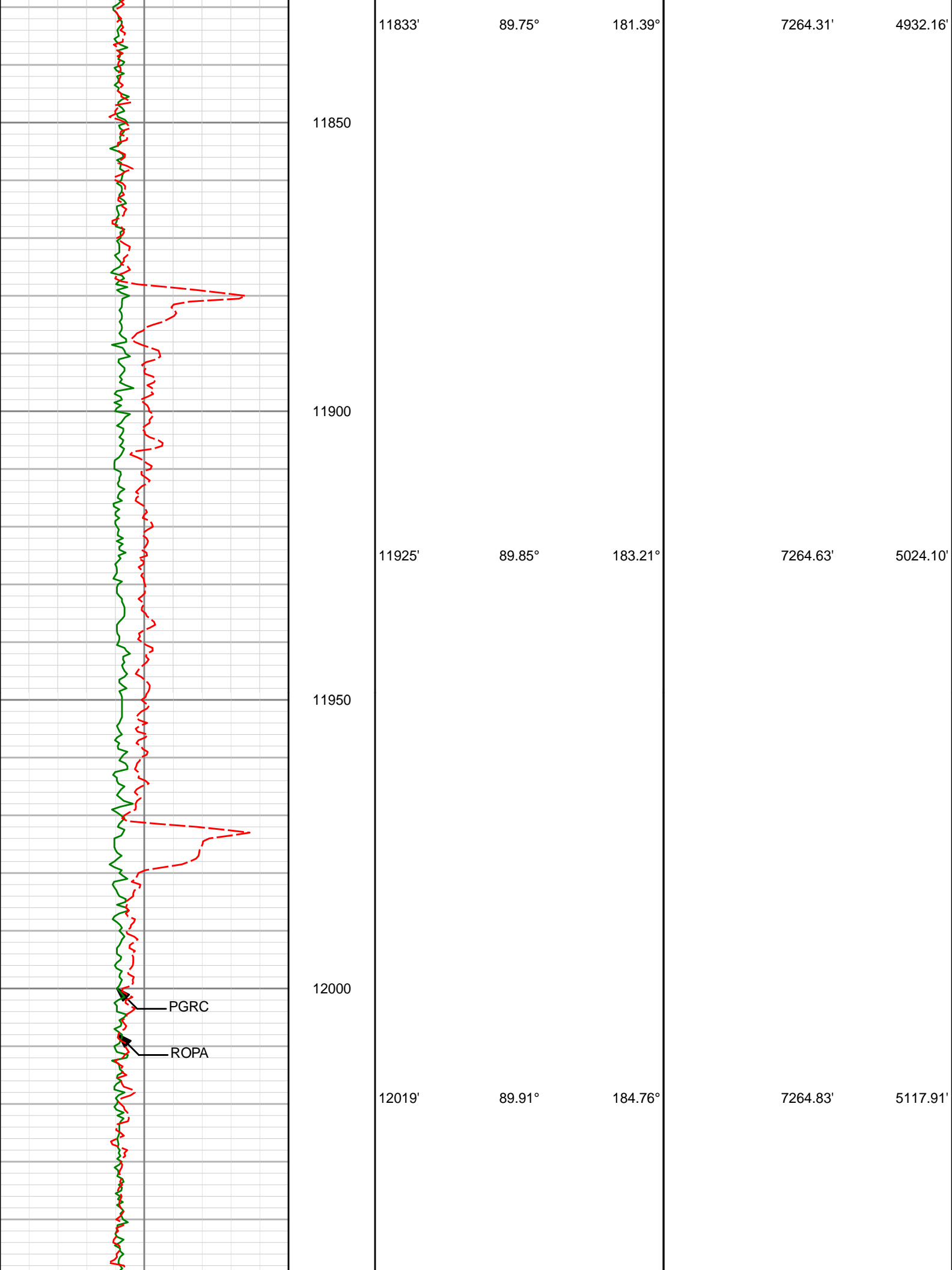
7270.39'

4195.30'











12050

12100

12150

12200

12250

12114'

89.72°

185.17°

7265.14'

5212.60'

12200'

88.92°

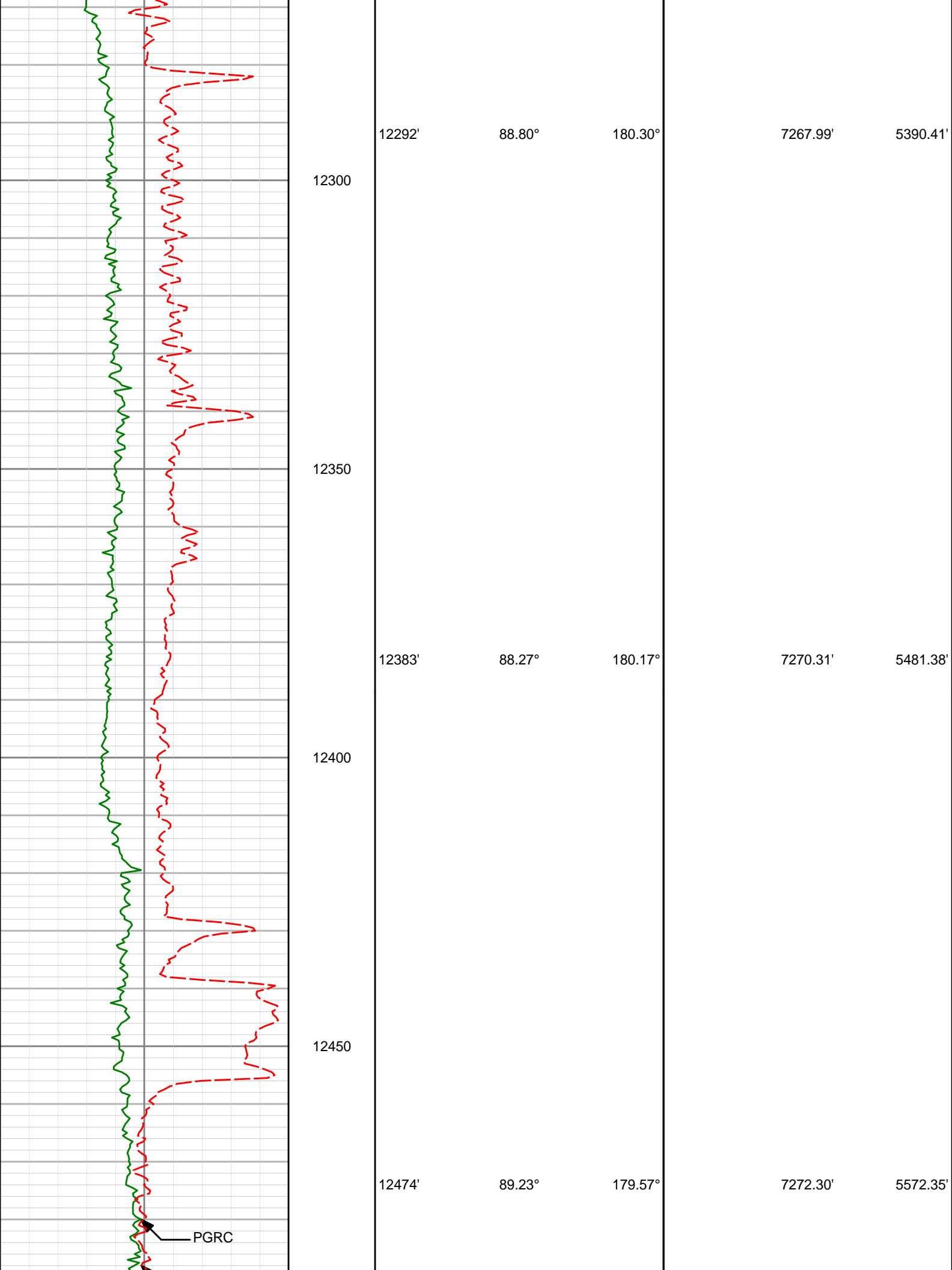
182.01°

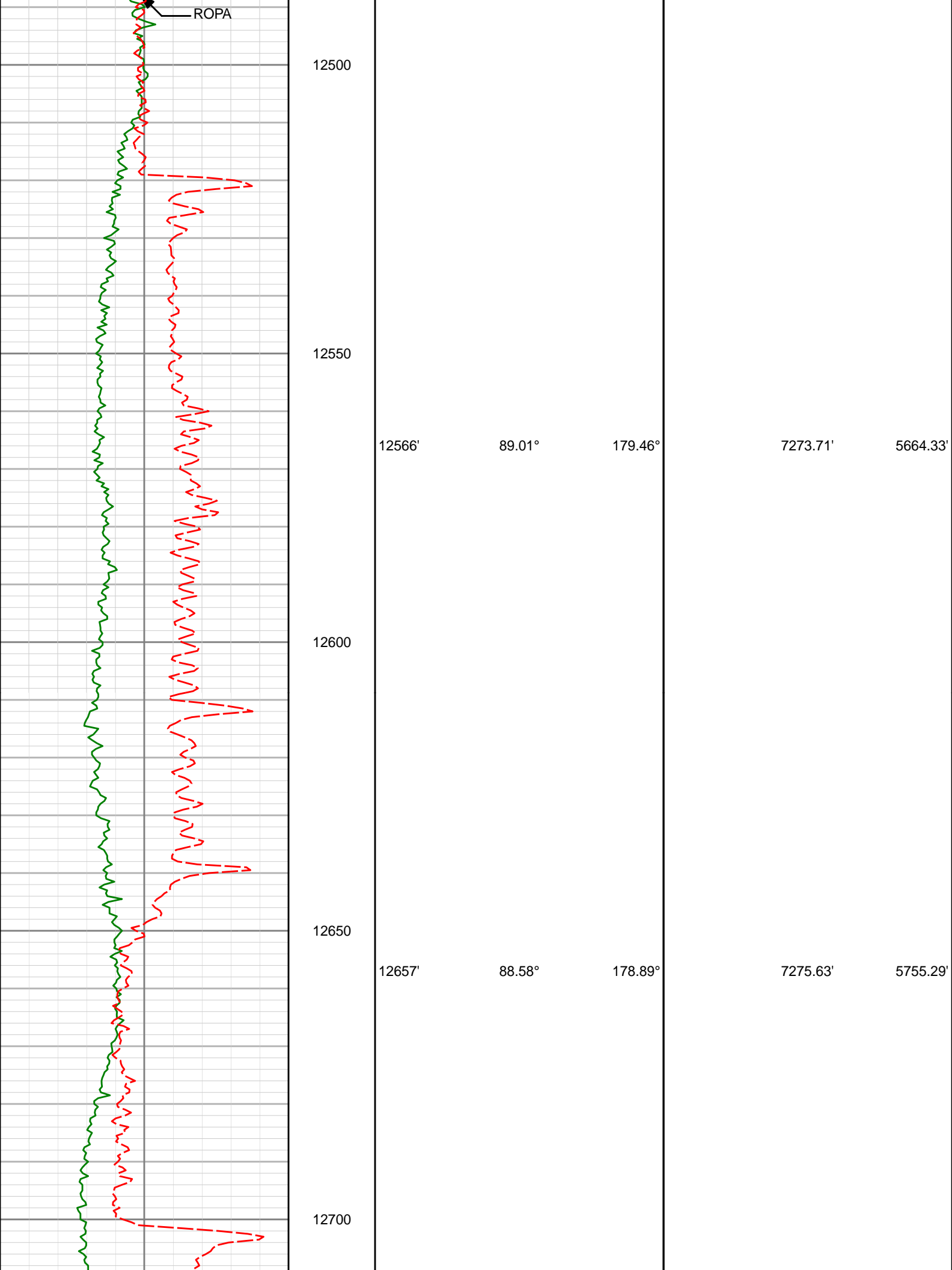
7266.16'

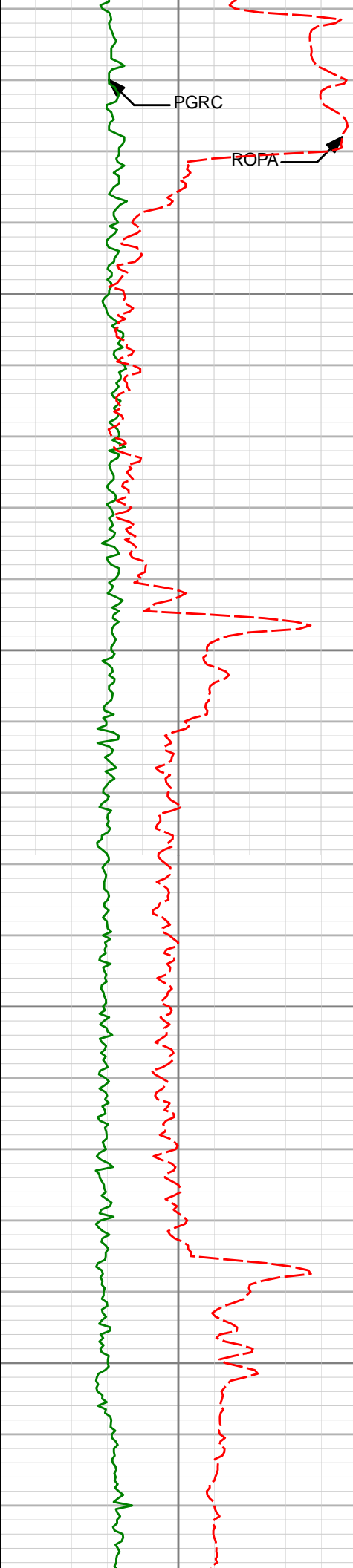
5298.44'

PGRC

ROPA







12750

12749'

90.03°

179.11°

7276.74'

5847.26'

12800

12841'

90.12°

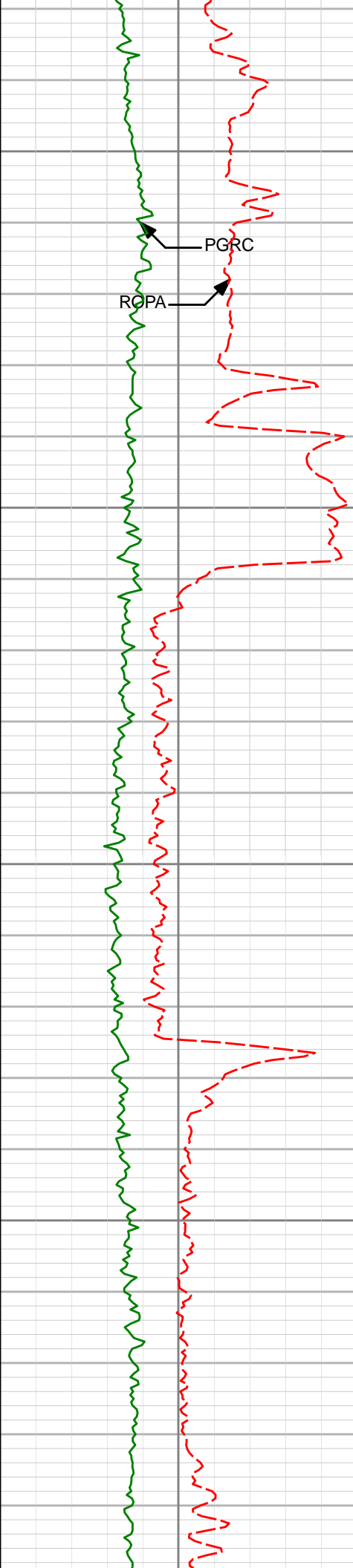
178.76°

7276.62'

5939.23'

12850

12900



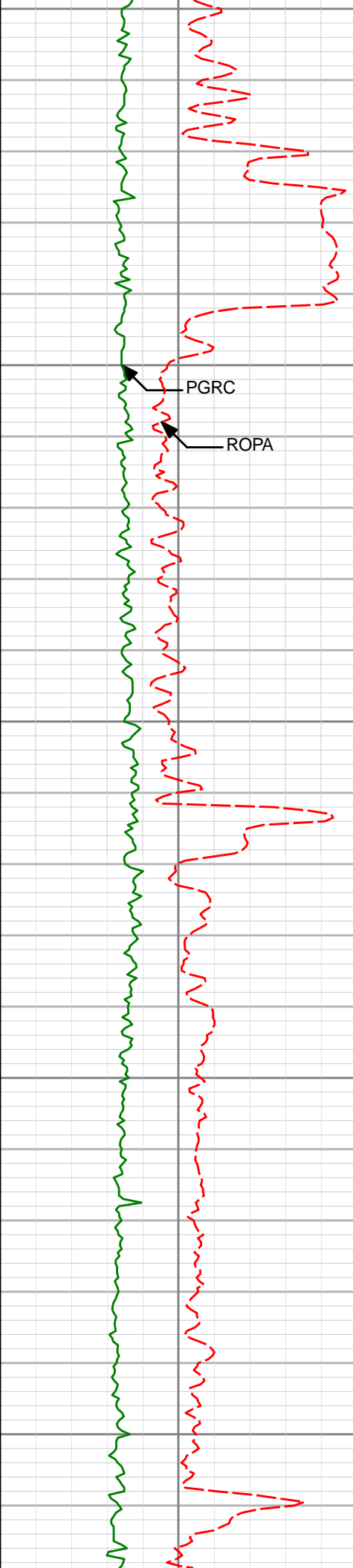
12950

13000

13050

13100

12935'	90.71°	178.38°	7275.94'	6033.18'
13029'	90.03°	179.23°	7275.33'	6127.15'
13123'	90.18°	178.70°	7275.16'	6221.12'



13150

13200

13250

13300

13350

PGRC

ROPA

13218'

89.51°

179.08°

7275.42'

6316.09'

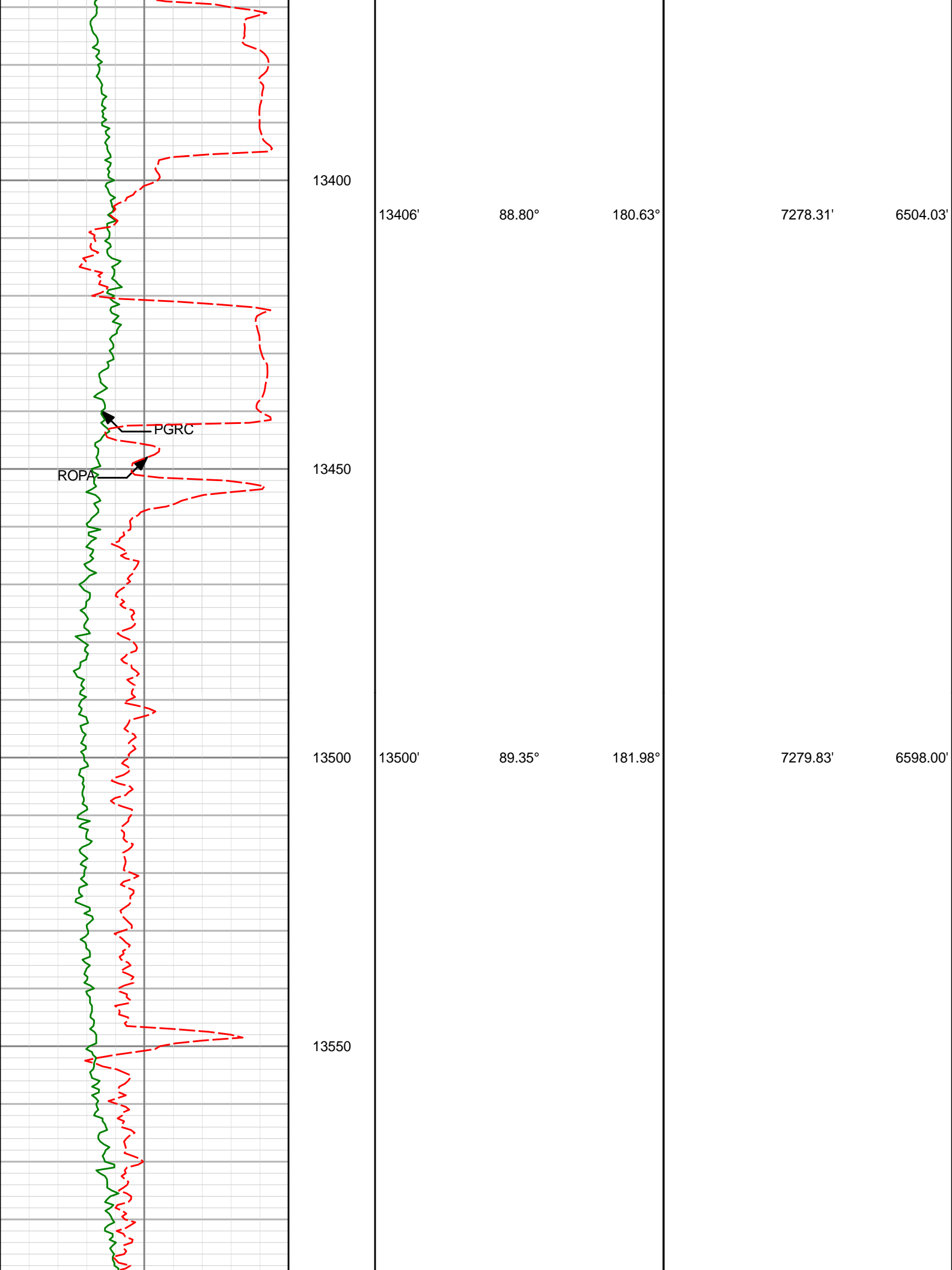
13312'

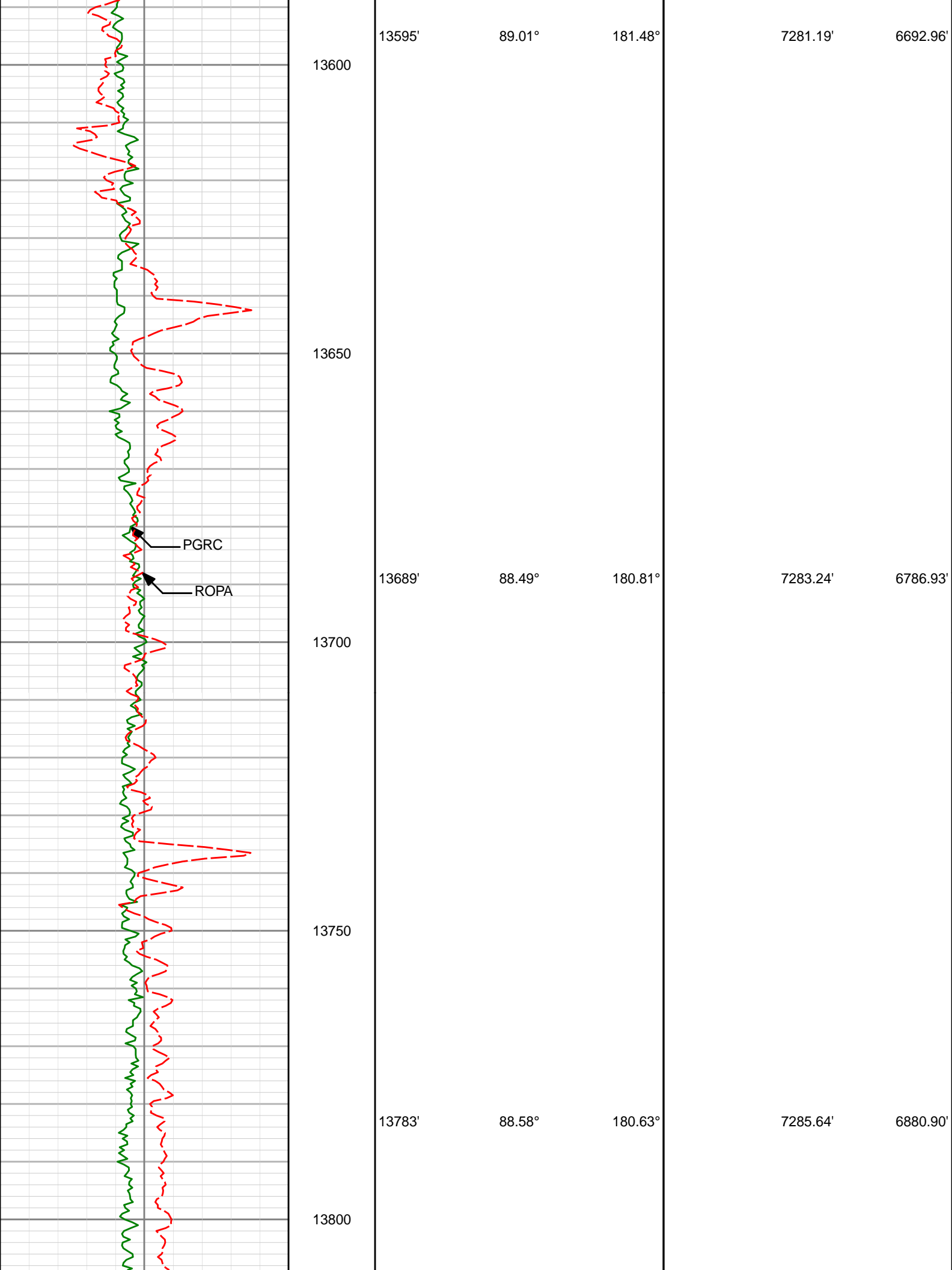
89.08°

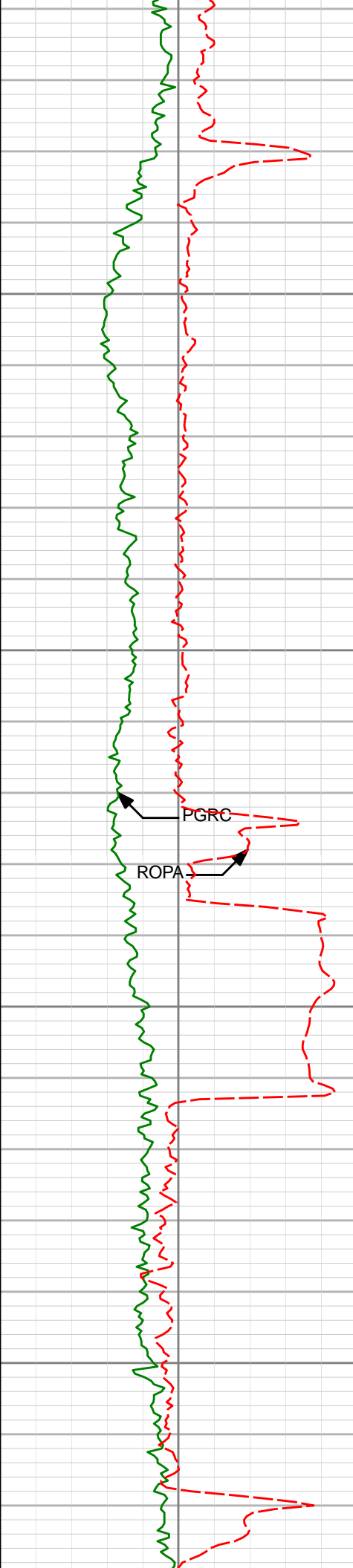
178.85°

7276.57'

6410.06'







13850

13877'

88.28°

180.24°

7288.22'

6974.86'

13900

PGRC

ROPA

13950

13972'

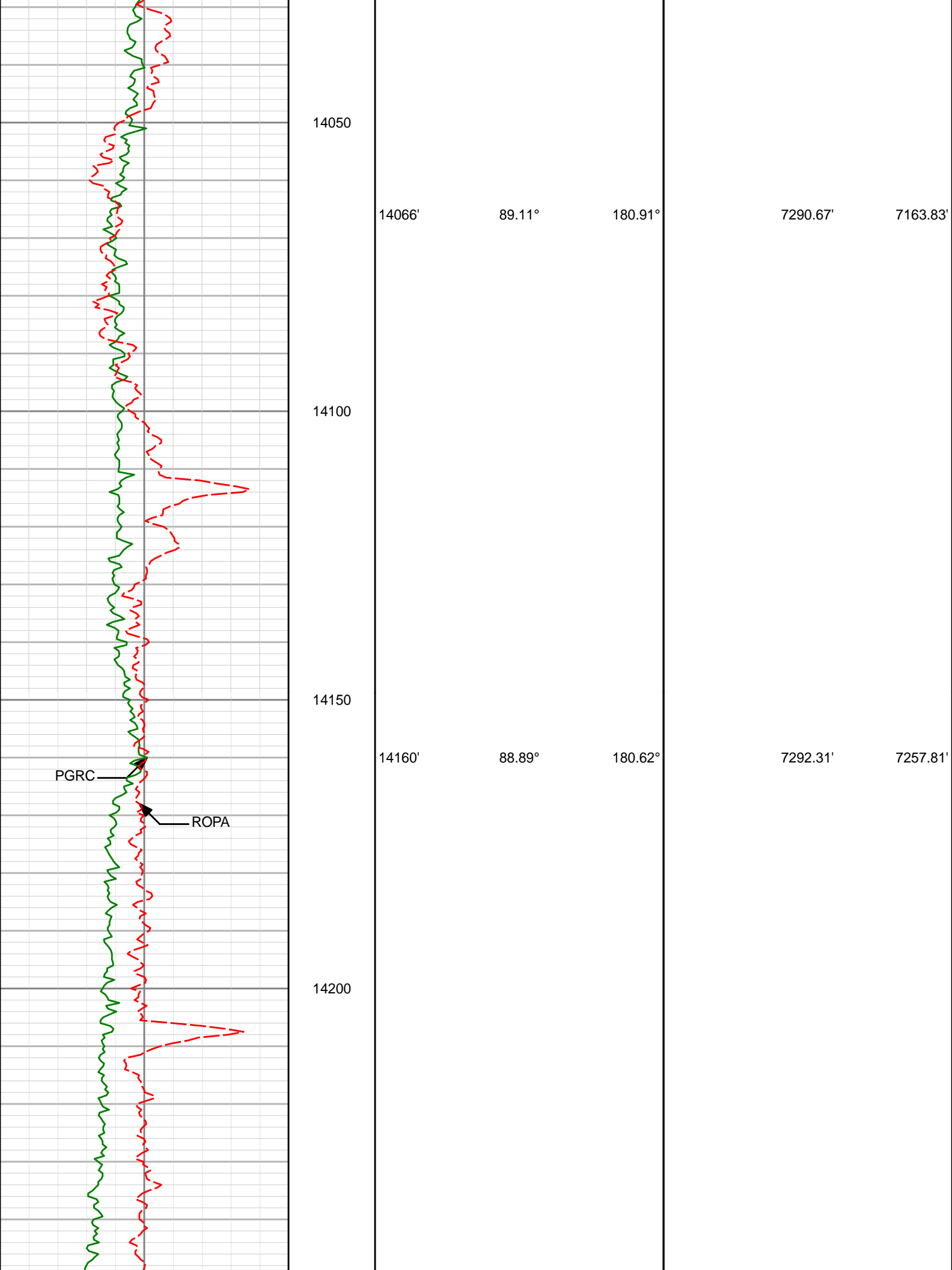
89.82°

181.45°

7289.79'

7069.84'

14000



14050

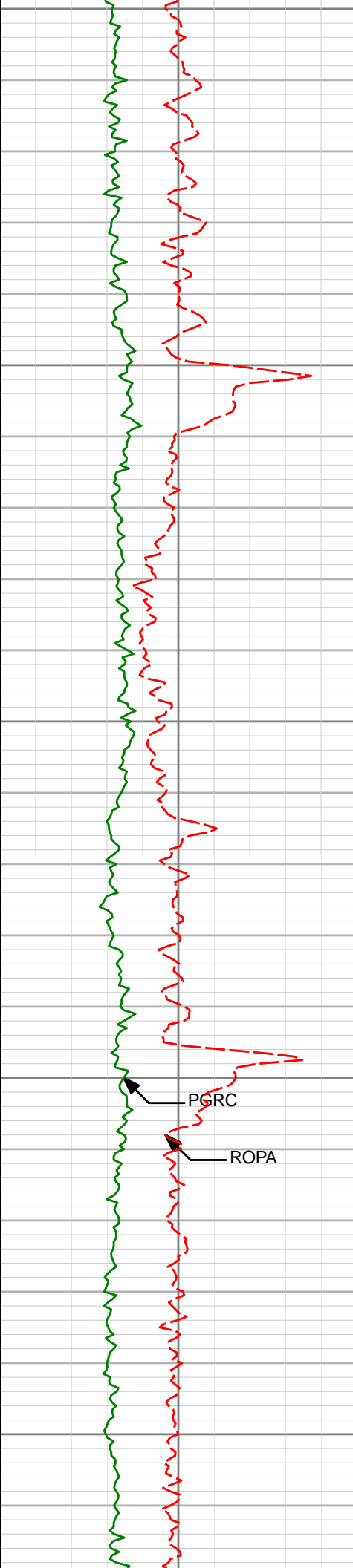
14100

14150

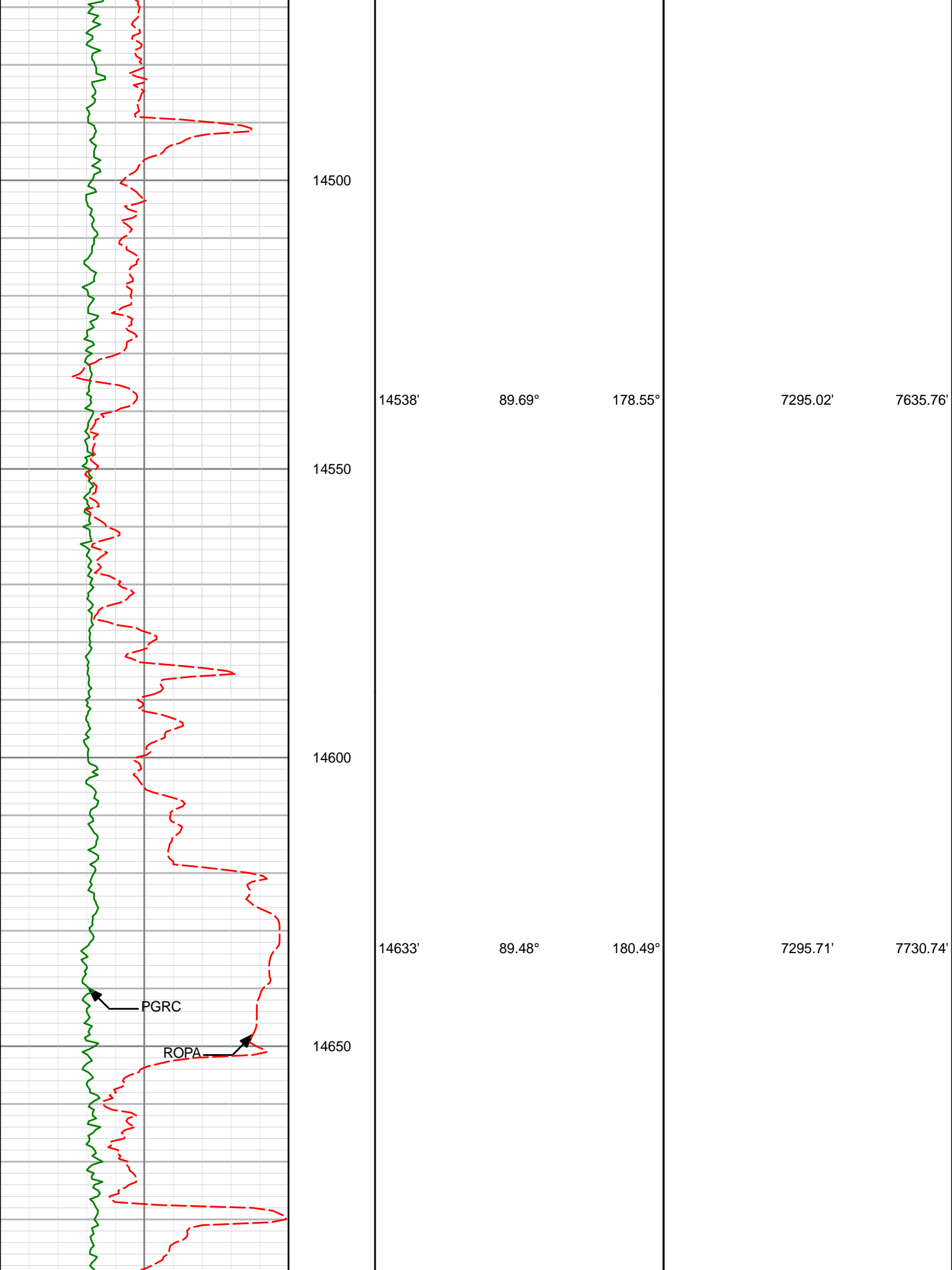
14200

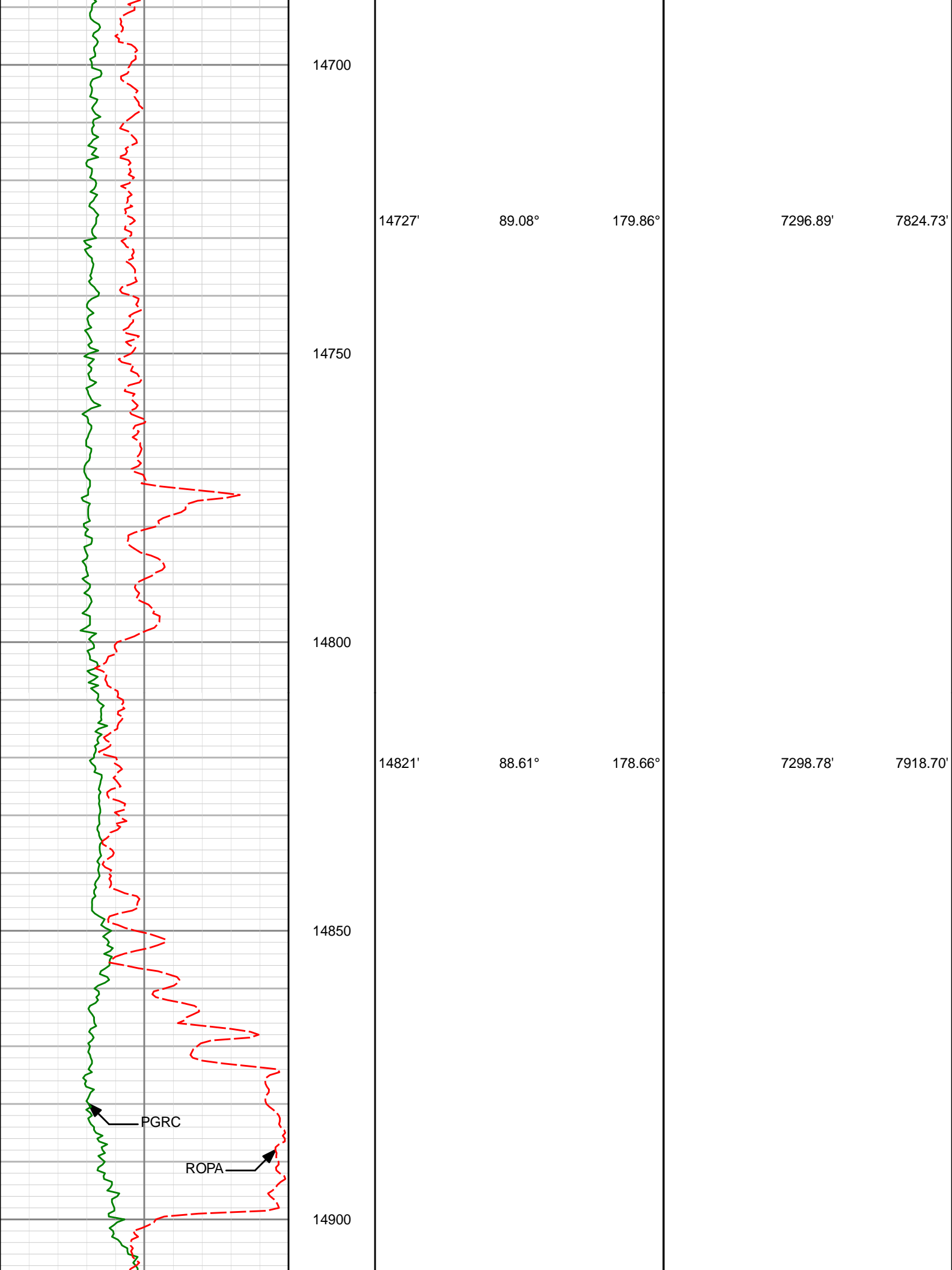
PGRC

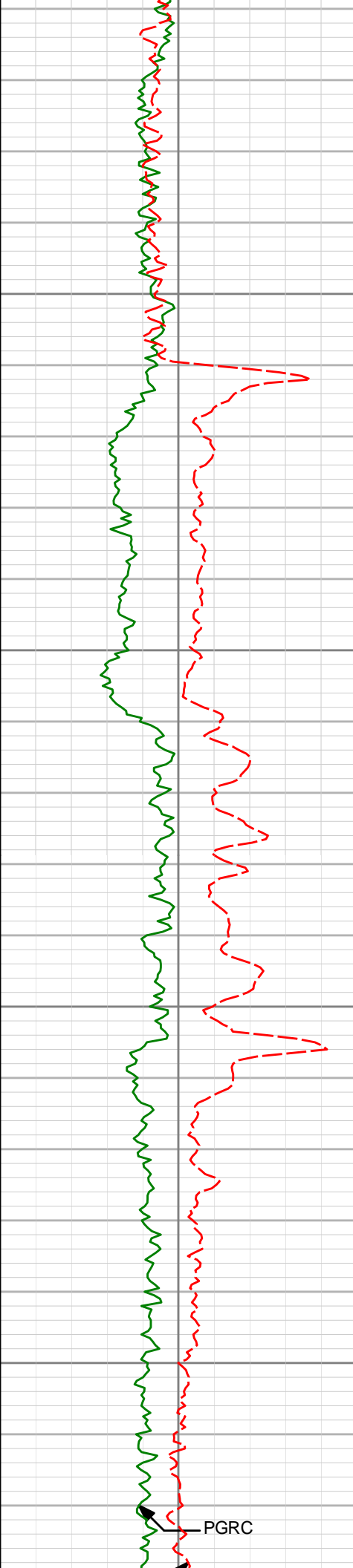
ROPA



14250	14255'	89.20°	180.26°	7293.90'	7352.79'
14300					
14350	14349'	89.32°	179.86°	7295.11'	7446.79'
14400					
14450	14443'	90.55°	179.82°	7295.22'	7540.78'







14950

15000

15050

15100

14916'

89.72°

180.08°

7300.17'

8013.67'

15011'

90.03°

179.72°

7300.37'

8108.67'

15105'

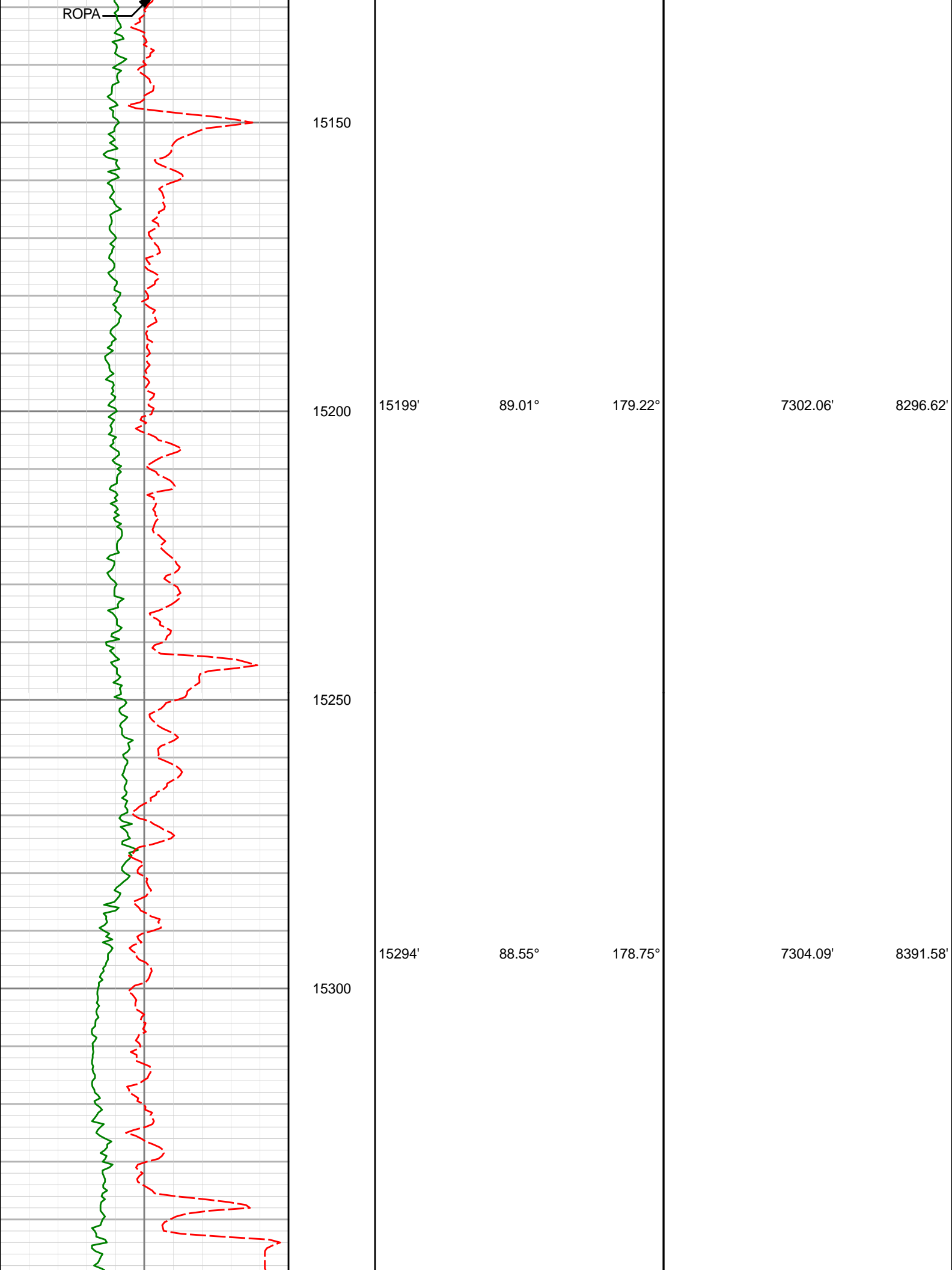
89.45°

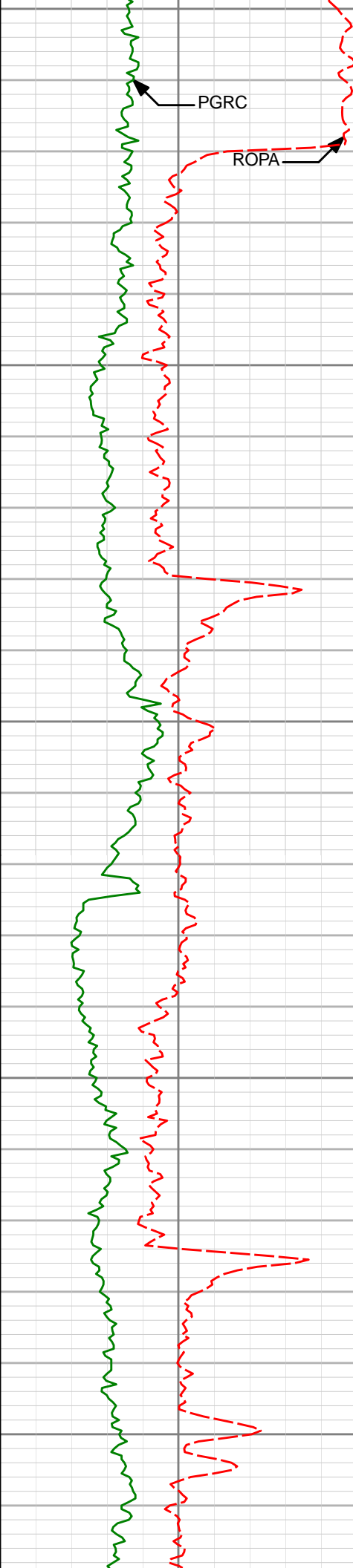
179.13°

7300.80'

8202.65'

PGRC





15350

PGRC

ROPA

15388'

90.83°

179.85°

7304.60'

8485.55'

15400

15450

15482'

91.02°

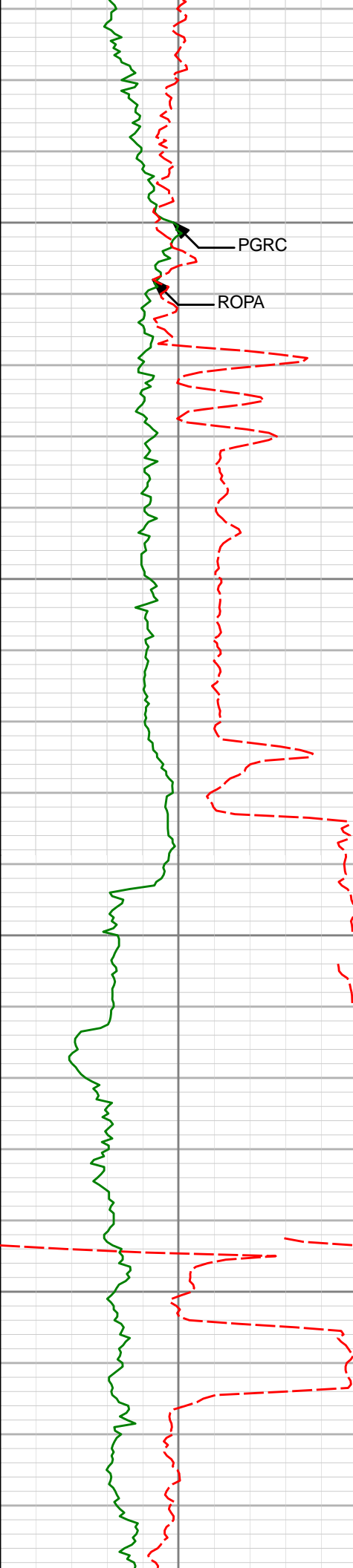
179.09°

7303.08'

8579.53'

15500

15550



15600

PGRC

ROPA

15650

15700

15750

15576'

91.73°

178.67°

7300.82'

8673.47'

15671'

91.60°

178.04°

7298.06'

8768.37'

15765'

92.06°

179.32°

7295.06'

8862.28'



15800

PGRC

ROPA

15850

15900

15950

16000

15859'

91.20°

180.72°

7292.39'

8956.24'

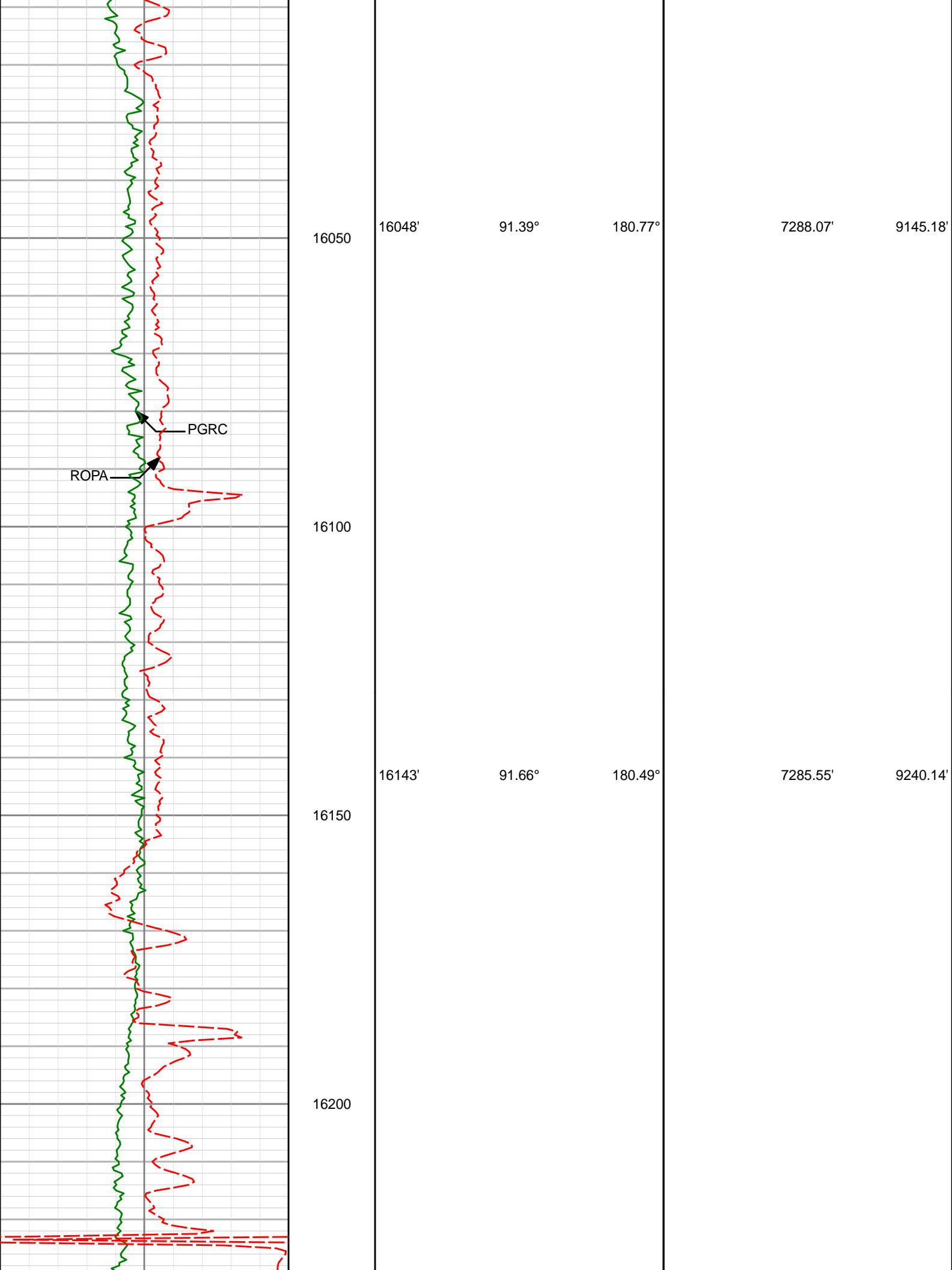
15954'

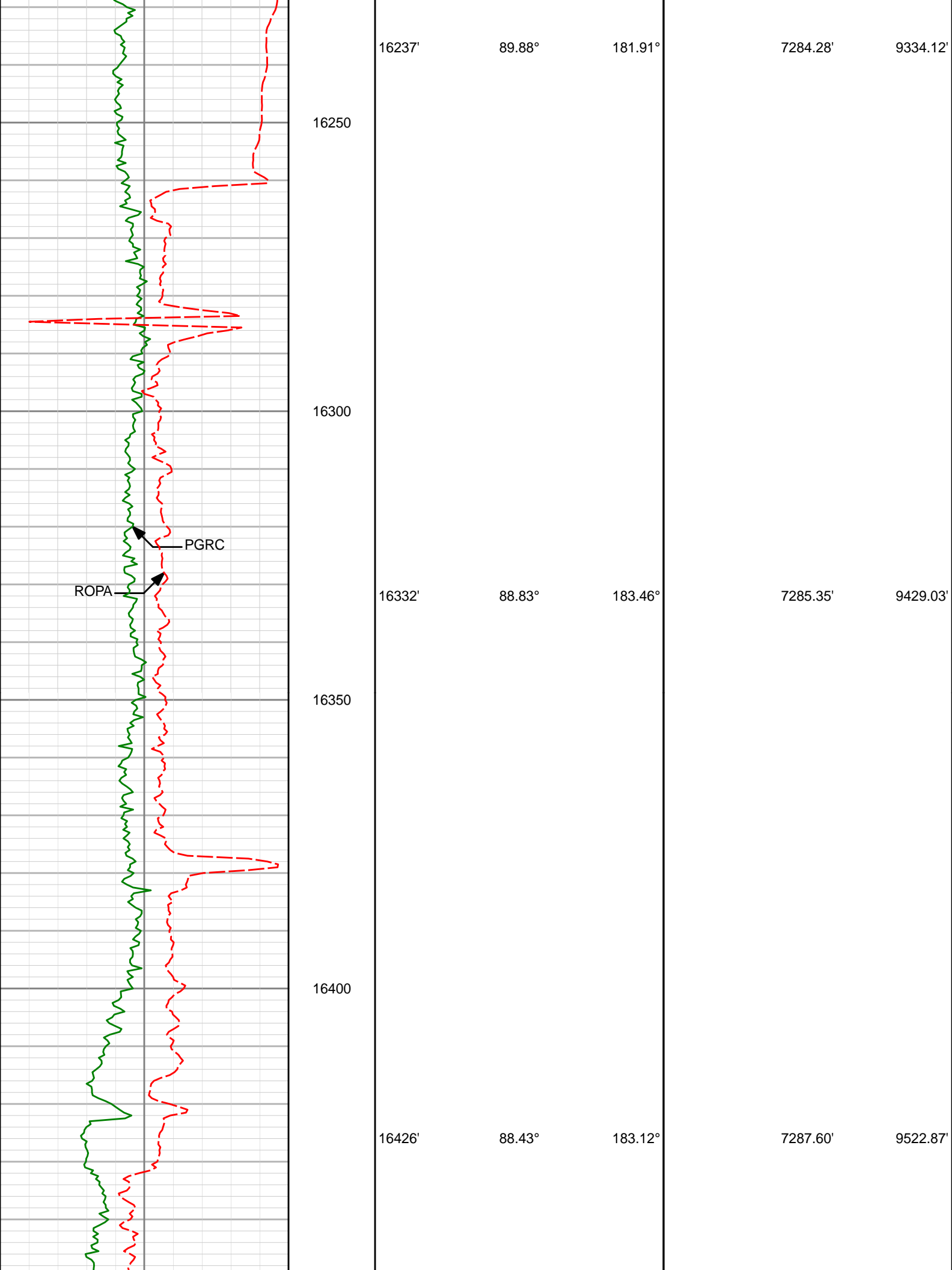
91.32°

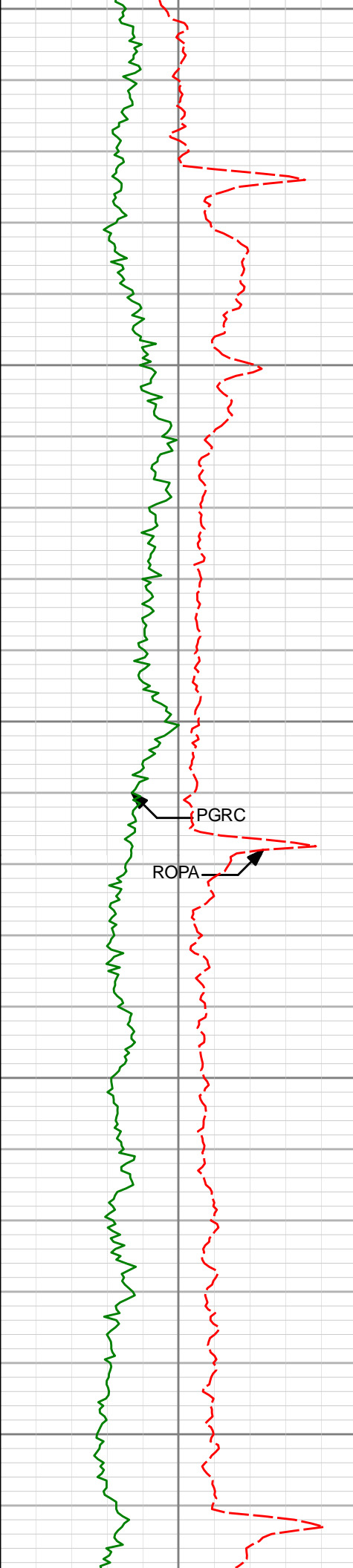
181.34°

7290.30'

9051.21'







16450

16500

16550

16600

16650

16521'

88.06°

182.78°

7290.51'

9617.73'

PGRC

ROPA

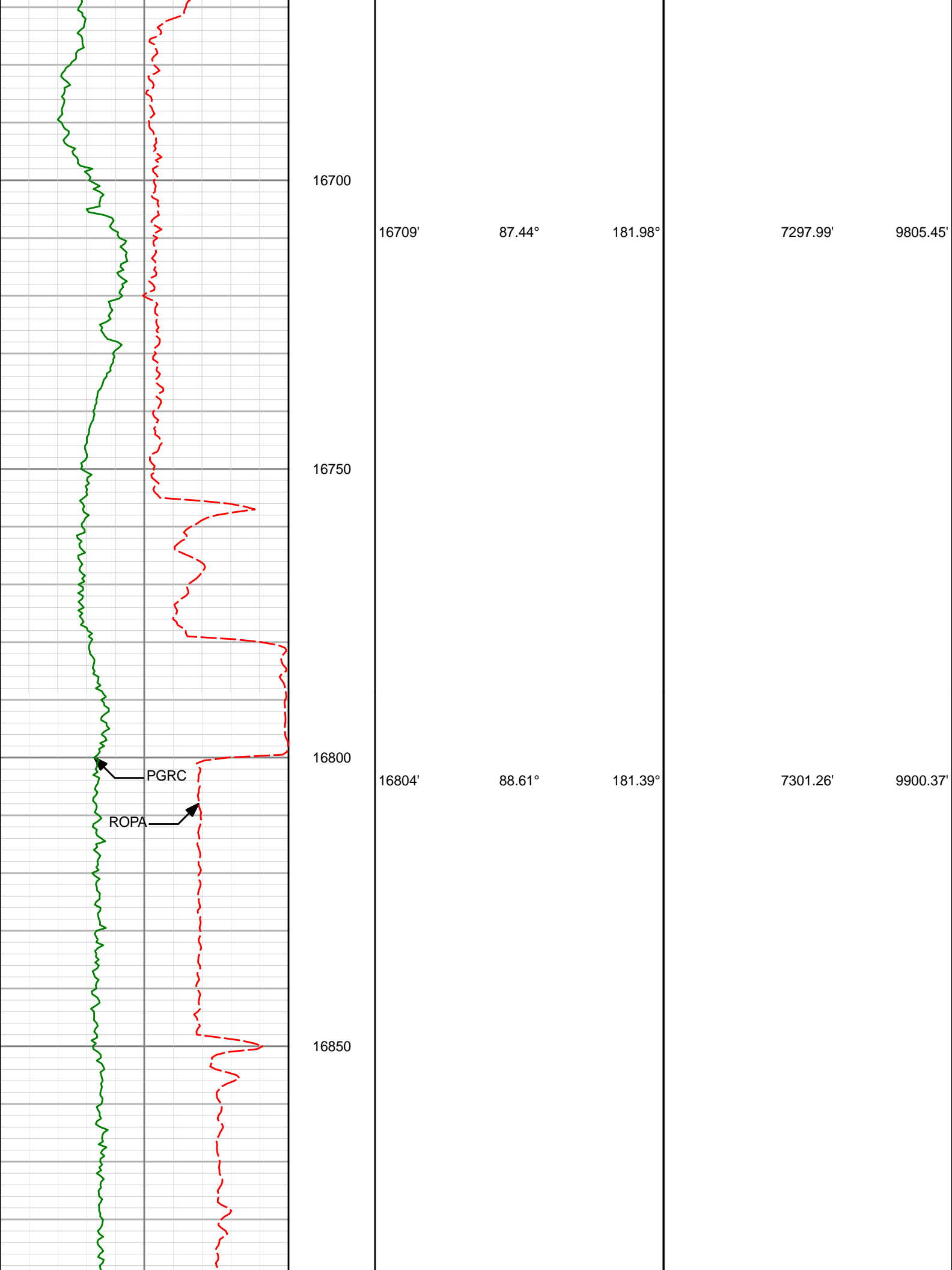
16615'

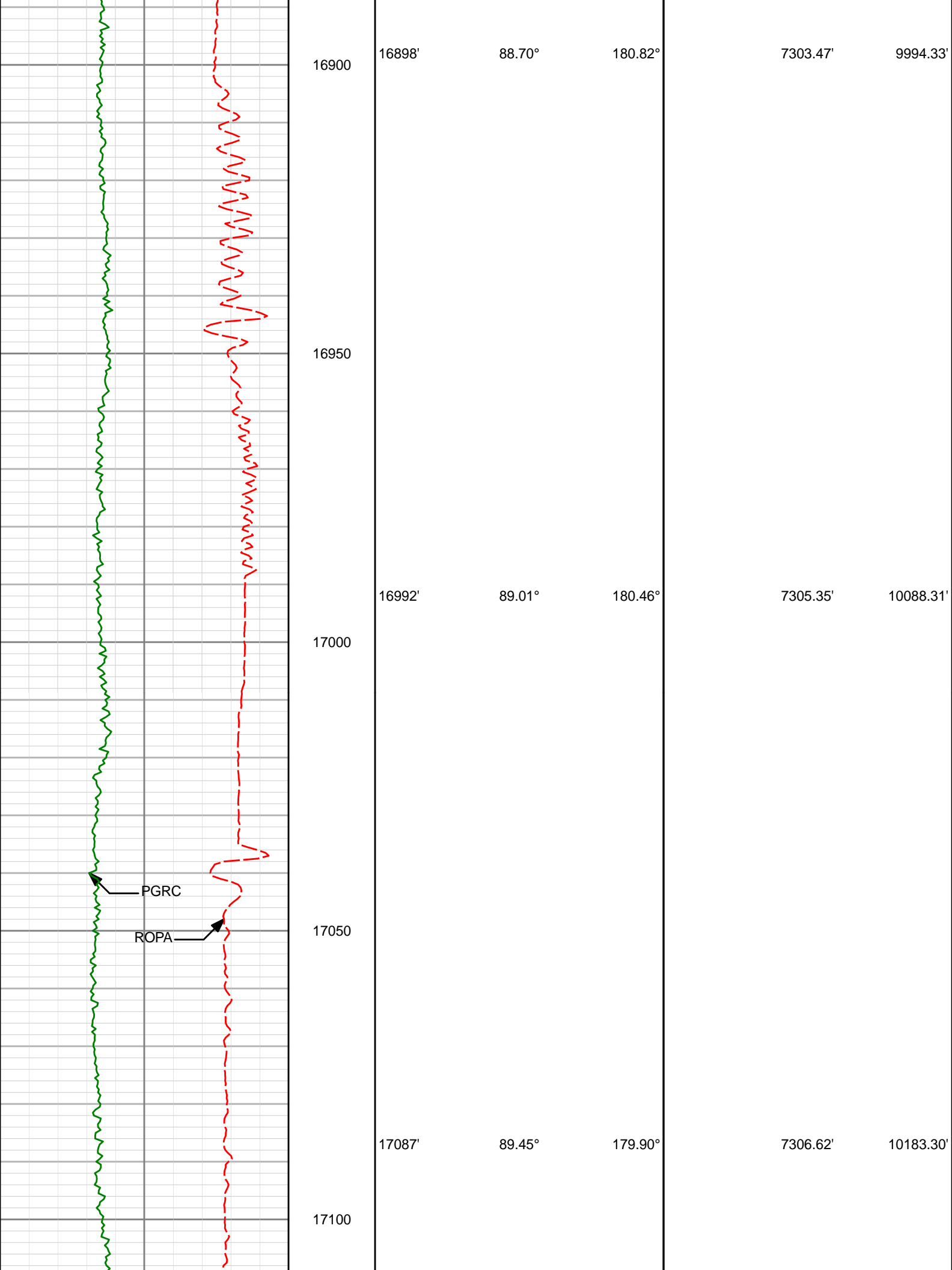
87.69°

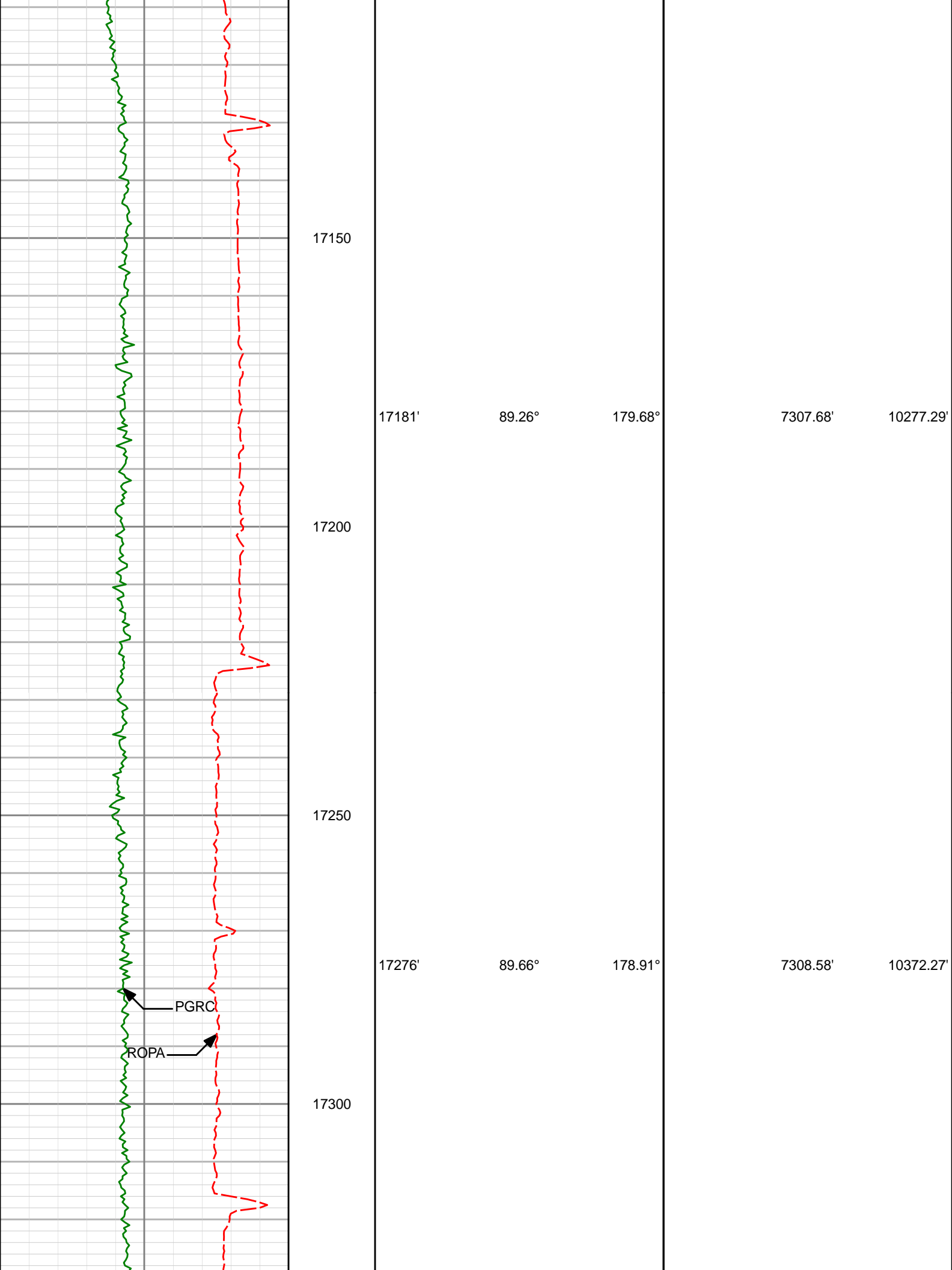
182.47°

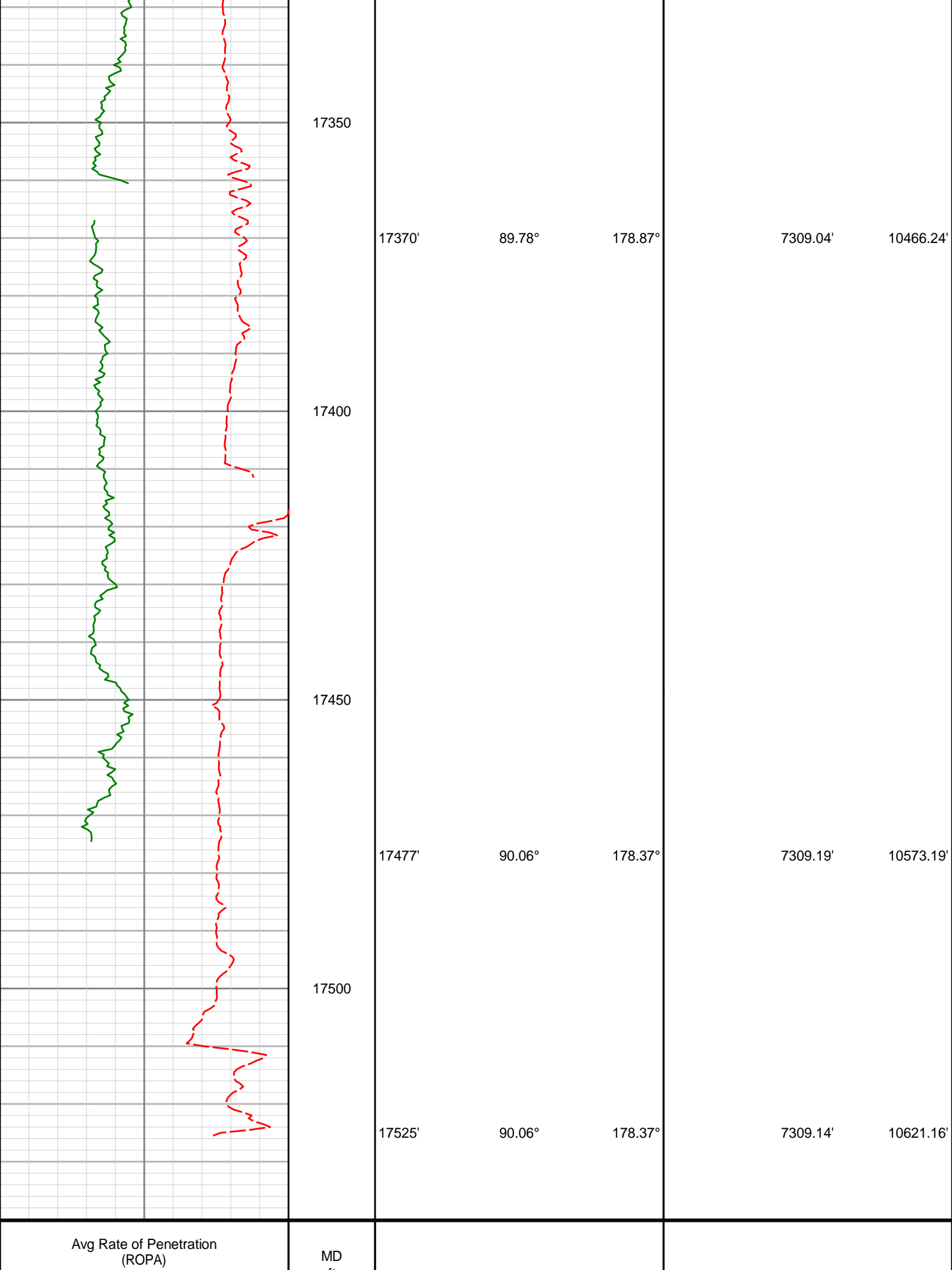
7294.00'

9711.59'









500	feet per hr	0	ft	Depth	Inc	Azi	TVD	V/S
PCG Gamma Ray BCorr (PGRC) api								
0		300						

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko
Kerr 13N-25HZ
Wattenburg
Weld Colorado
USA
CA-XX-0901640431

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1108.00	0.90	55.50	1107.97	0.39 S	0.07 E	0.39	TIE-IN
1209.00	0.76	55.59	1208.96	0.44 N	1.28 E	-0.45	0.14
1304.00	0.90	46.55	1303.95	1.31 N	2.34 E	-1.32	0.20
1399.00	0.87	64.18	1398.94	2.13 N	3.53 E	-2.15	0.29
1493.00	0.86	53.13	1492.93	2.87 N	4.74 E	-2.90	0.18
1587.00	0.56	28.37	1586.92	3.70 N	5.52 E	-3.73	0.45
1679.00	0.52	33.65	1678.92	4.44 N	5.96 E	-4.47	0.07
1770.00	0.57	14.53	1769.91	5.22 N	6.31 E	-5.26	0.21
1862.00	0.72	1.85	1861.91	6.24 N	6.44 E	-6.28	0.22
1953.00	0.66	347.17	1952.90	7.32 N	6.34 E	-7.36	0.20
2045.00	0.90	325.98	2044.89	8.44 N	5.82 E	-8.47	0.40
2228.00	2.40	272.96	2227.82	9.83 N	1.19 E	-9.84	1.09
2319.00	4.16	230.07	2318.68	7.81 N	3.25 W	-7.79	3.19
2411.00	6.15	225.21	2410.30	2.19 N	9.30 W	-2.14	2.21
2502.00	7.50	218.08	2500.66	5.92 S	16.43 W	6.01	1.75
2593.00	7.93	207.66	2590.84	16.15 S	23.00 W	16.28	1.61
2686.00	8.79	199.66	2682.85	28.53 S	28.37 W	28.69	1.55
2778.00	8.95	195.41	2773.75	42.04 S	32.64 W	42.23	0.73
2870.00	10.35	179.65	2864.46	57.21 S	34.49 W	57.41	3.24
2963.00	10.64	173.47	2955.91	74.10 S	33.46 W	74.29	1.25
3056.00	7.63	157.22	3047.74	88.32 S	30.10 W	88.50	4.23
3148.00	4.38	146.19	3139.22	96.88 S	25.77 W	97.02	3.73
3239.00	2.06	110.50	3230.08	100.34 S	22.31 W	100.46	3.25
3332.00	2.94	0.84	3323.03	98.54 S	20.71 W	98.65	4.43
3424.00	2.61	345.08	3414.92	94.15 S	21.21 W	94.27	0.90
3517.00	0.88	6.03	3507.88	91.40 S	21.68 W	91.52	1.95
3608.00	0.81	108.44	3598.87	90.91 S	21.00 W	91.03	1.45
3700.00	0.33	115.87	3690.86	91.23 S	20.14 W	91.34	0.53
3792.00	0.35	301.53	3782.86	91.20 S	20.14 W	91.31	0.74
3884.00	0.68	188.30	3874.86	91.59 S	20.46 W	91.71	0.96
3977.00	0.86	133.66	3967.85	92.62 S	20.04 W	92.73	0.78
4069.00	1.23	120.77	4059.84	93.60 S	18.69 W	93.70	0.47
4162.00	1.19	116.20	4152.82	94.54 S	16.96 W	94.63	0.11
4254.00	1.05	115.01	4244.80	95.31 S	15.34 W	95.40	0.15
4348.00	0.40	56.22	4338.79	95.50 S	14.29 W	95.58	0.97
4442.00	0.26	13.75	4432.79	95.11 S	13.97 W	95.18	0.29
4536.00	0.25	40.97	4526.79	94.74 S	13.78 W	94.82	0.13
4630.00	0.45	42.20	4620.79	94.32 S	13.40 W	94.39	0.21
4724.00	0.19	64.42	4714.79	93.97 S	13.01 W	94.05	0.30
4912.00	0.61	58.88	4902.78	93.32 S	11.87 W	93.39	0.22
5100.00	0.68	112.22	5090.77	93.23 S	9.98 W	93.28	0.31
5194.00	0.20	115.47	5184.77	93.51 S	9.32 W	93.56	0.51
5288.00	0.57	90.41	5278.77	93.58 S	8.70 W	93.63	0.42
5382.00	0.45	63.86	5372.76	93.42 S	7.90 W	93.47	0.28
5476.00	0.22	23.55	5466.76	93.10 S	7.50 W	93.14	0.34
5570.00	0.25	69.77	5560.76	92.86 S	7.24 W	92.90	0.20
5853.00	0.62	15.61	5843.75	91.17 S	6.25 W	91.21	0.18
5947.00	0.88	15.27	5937.75	89.98 S	5.92 W	90.02	0.28
6042.00	0.70	14.00	6032.74	88.72 S	5.59 W	88.75	0.19

6136.00	0.78	10.15	6126.73	87.53 S	5.33 W	87.56	0.10
6230.00	0.87	18.38	6220.72	86.22 S	5.00 W	86.25	0.16
6325.00	0.51	43.40	6315.71	85.23 S	4.48 W	85.26	0.49
6420.00	0.50	54.79	6410.71	84.69 S	3.85 W	84.71	0.11
6514.00	0.53	60.87	6504.71	84.24 S	3.13 W	84.25	0.07
6609.00	0.70	73.11	6599.70	83.86 S	2.20 W	83.87	0.23
6656.00	2.29	181.68	6646.69	84.71 S	1.95 W	84.72	5.53
6704.00	6.70	195.78	6694.53	88.37 S	2.74 W	88.38	9.40
6751.00	11.56	196.23	6740.92	95.53 S	4.80 W	95.56	10.34
6798.00	15.82	191.16	6786.58	106.34 S	7.36 W	106.38	9.41
6845.00	20.71	189.32	6831.19	120.84 S	9.95 W	120.89	10.48
6892.00	26.64	182.41	6874.23	139.59 S	11.74 W	139.65	13.91
6939.00	30.45	179.74	6915.51	162.03 S	12.13 W	162.10	8.55
6986.00	34.71	178.77	6955.10	187.33 S	11.78 W	187.40	9.13
7033.00	41.15	174.83	6992.16	216.15 S	10.10 W	216.20	14.63
7081.00	42.66	174.46	7027.88	248.06 S	7.11 W	248.10	3.19
7128.00	49.39	171.60	7060.50	281.61 S	2.96 W	281.62	14.97
7175.00	50.16	171.05	7090.86	317.08 S	2.45 E	317.06	1.87
7222.00	52.30	170.22	7120.29	353.23 S	8.42 E	353.18	4.76
7270.00	57.22	171.81	7147.97	391.94 S	14.52 E	391.85	10.60
7317.00	59.89	174.46	7172.49	431.75 S	19.30 E	431.63	7.44
7434.00	72.44	182.25	7219.74	538.41 S	22.01 E	538.27	12.32
7534.00	83.33	184.41	7240.70	635.86 S	16.31 E	635.76	11.09
7629.00	86.11	185.07	7249.44	730.13 S	8.49 E	730.07	3.01
7723.00	89.94	185.08	7252.68	823.68 S	0.18 E	823.67	4.07
7818.00	89.66	182.76	7253.01	918.46 S	6.31 W	918.48	2.46
7912.00	89.26	181.54	7253.90	1012.38 S	9.84 W	1012.42	1.37
8007.00	89.97	181.28	7254.54	1107.35 S	12.18 W	1107.40	0.80
8102.00	88.03	181.87	7256.19	1202.30 S	14.79 W	1202.36	2.13
8196.00	88.55	181.75	7259.00	1296.21 S	17.76 W	1296.29	0.57
8291.00	88.86	182.00	7261.15	1391.13 S	20.86 W	1391.23	0.42
8385.00	89.48	182.00	7262.51	1485.06 S	24.14 W	1485.18	0.66
8479.00	88.92	182.23	7263.82	1578.99 S	27.61 W	1579.12	0.64
8574.00	90.55	180.10	7264.26	1673.96 S	29.54 W	1674.10	2.82
8668.00	91.26	180.03	7262.77	1767.95 S	29.65 W	1768.09	0.76
8762.00	91.05	180.14	7260.88	1861.93 S	29.79 W	1862.07	0.25
8857.00	90.74	180.54	7259.40	1956.92 S	30.35 W	1957.06	0.53
8952.00	91.26	180.08	7257.74	2051.90 S	30.87 W	2052.04	0.73
9046.00	90.25	180.66	7256.50	2145.89 S	31.47 W	2146.03	1.24
9138.00	90.40	180.28	7255.98	2237.88 S	32.23 W	2238.03	0.44
9233.00	88.52	179.20	7256.87	2332.87 S	31.80 W	2333.02	2.28
9327.00	88.12	178.72	7259.63	2426.82 S	30.09 W	2426.95	0.66
9421.00	88.00	177.97	7262.81	2520.72 S	27.38 W	2520.84	0.81
9515.00	88.64	178.62	7265.57	2614.64 S	24.58 W	2614.74	0.97
9610.00	88.89	179.99	7267.61	2709.61 S	23.43 W	2709.70	1.47
9704.00	88.83	179.42	7269.48	2803.59 S	22.95 W	2803.67	0.61
9798.00	88.95	180.95	7271.31	2897.57 S	23.25 W	2897.65	1.63
9893.00	89.63	180.42	7272.48	2992.55 S	24.39 W	2992.64	0.91
9988.00	89.66	179.78	7273.07	3087.55 S	24.55 W	3087.64	0.67
10082.00	89.48	179.81	7273.78	3181.55 S	24.22 W	3181.63	0.19
10173.00	89.04	179.38	7274.95	3272.54 S	23.57 W	3272.62	0.68
10264.00	89.94	181.16	7275.76	3363.53 S	24.00 W	3363.61	2.19
10357.00	89.35	180.16	7276.34	3456.52 S	25.07 W	3456.60	1.25
10449.00	90.03	181.12	7276.84	3548.51 S	26.10 W	3548.60	1.28
10542.00	89.29	180.68	7277.39	3641.49 S	27.56 W	3641.59	0.93
10634.00	90.03	181.88	7277.93	3733.47 S	29.62 W	3733.58	1.53
10728.00	88.71	181.66	7278.97	3827.41 S	32.52 W	3827.54	1.42
10819.00	90.03	181.75	7279.97	3918.37 S	35.23 W	3918.50	1.45
10910.00	92.31	180.64	7278.11	4009.32 S	37.12 W	4009.47	2.79
11003.00	92.31	180.79	7274.36	4102.24 S	38.28 W	4102.39	0.16
11096.00	92.59	180.48	7270.39	4195.15 S	39.31 W	4195.30	0.45
11188.00	91.63	180.17	7267.00	4287.08 S	39.84 W	4287.24	1.10
11280.00	90.62	180.06	7265.19	4379.06 S	40.02 W	4379.22	1.10
11371.00	90.37	179.79	7264.41	4470.06 S	39.90 W	4470.21	0.40
11463.00	90.28	179.35	7263.88	4562.05 S	39.21 W	4562.20	0.49
11556.00	90.22	179.43	7263.48	4655.05 S	38.22 W	4655.19	0.11
11648.00	89.72	179.39	7263.53	4747.04 S	37.27 W	4747.18	0.55
11740.00	89.78	179.48	7263.93	4839.04 S	36.37 W	4839.17	0.12
11833.00	89.75	181.39	7264.31	4932.03 S	37.07 W	4932.16	2.05
11925.00	89.85	183.21	7264.63	5023.95 S	40.76 W	5024.10	1.98
12019.00	89.91	184.76	7264.83	5117.72 S	47.30 W	5117.91	1.65
12114.00	89.72	185.17	7265.14	5212.36 S	55.52 W	5212.60	0.48
12200.00	88.92	182.01	7266.16	5298.18 S	60.90 W	5298.44	3.79
12292.00	88.80	180.30	7267.99	5390.14 S	62.76 W	5390.41	1.86
12383.00	88.27	180.17	7270.21	5481.11 S	62.13 W	5481.28	0.60

12383.00	88.27	180.17	7270.31	5481.11 S	63.13 W	5481.38	0.60
12474.00	89.23	179.57	7272.30	5572.08 S	62.92 W	5572.35	1.24
12566.00	89.01	179.46	7273.71	5664.07 S	62.14 W	5664.33	0.27
12657.00	88.58	178.89	7275.63	5755.04 S	60.83 W	5755.29	0.78
12749.00	90.03	179.11	7276.74	5847.02 S	59.23 W	5847.26	1.59
12841.00	90.12	178.76	7276.62	5939.00 S	57.52 W	5939.23	0.39
12935.00	90.71	178.38	7275.94	6032.97 S	55.17 W	6033.18	0.75
13029.00	90.03	179.23	7275.33	6126.94 S	53.21 W	6127.15	1.16
13123.00	90.18	178.70	7275.16	6220.93 S	51.51 W	6221.12	0.59
13218.00	89.51	179.08	7275.42	6315.91 S	49.67 W	6316.09	0.81
13312.00	89.08	178.85	7276.57	6409.89 S	47.98 W	6410.06	0.52
13406.00	88.80	180.63	7278.31	6503.86 S	47.55 W	6504.03	1.92
13500.00	89.35	181.98	7279.83	6597.83 S	49.69 W	6598.00	1.55
13595.00	89.01	181.48	7281.19	6692.77 S	52.56 W	6692.96	0.64
13689.00	88.49	180.81	7283.24	6786.73 S	54.44 W	6786.93	0.90
13783.00	88.58	180.63	7285.64	6880.69 S	55.62 W	6880.90	0.21
13877.00	88.28	180.24	7288.22	6974.65 S	56.33 W	6974.86	0.52
13972.00	89.82	181.45	7289.79	7069.63 S	57.73 W	7069.84	2.06
14066.00	89.11	180.91	7290.67	7163.60 S	59.67 W	7163.83	0.95
14160.00	88.89	180.62	7292.31	7257.58 S	60.92 W	7257.81	0.39
14255.00	89.20	180.26	7293.90	7352.56 S	61.65 W	7352.79	0.50
14349.00	89.32	179.86	7295.11	7446.55 S	61.75 W	7446.79	0.44
14443.00	90.55	179.82	7295.22	7540.55 S	61.49 W	7540.78	1.31
14538.00	89.69	178.55	7295.02	7635.54 S	60.13 W	7635.76	1.61
14633.00	89.48	180.49	7295.71	7730.53 S	59.34 W	7730.74	2.05
14727.00	89.08	179.86	7296.89	7824.52 S	59.63 W	7824.73	0.79
14821.00	88.61	178.66	7298.78	7918.49 S	58.41 W	7918.70	1.37
14916.00	89.72	180.08	7300.17	8013.47 S	57.37 W	8013.67	1.90
15011.00	90.03	179.72	7300.37	8108.47 S	57.20 W	8108.67	0.50
15105.00	89.45	179.13	7300.80	8202.46 S	56.26 W	8202.65	0.88
15199.00	89.01	179.22	7302.06	8296.45 S	54.91 W	8296.62	0.48
15294.00	88.55	178.75	7304.09	8391.41 S	53.22 W	8391.58	0.69
15388.00	90.83	179.85	7304.60	8485.39 S	52.07 W	8485.55	2.69
15482.00	91.02	179.09	7303.08	8579.38 S	51.21 W	8579.53	0.83
15576.00	91.73	178.67	7300.82	8673.33 S	49.37 W	8673.47	0.88
15671.00	91.60	178.04	7298.06	8768.25 S	46.64 W	8768.37	0.68
15765.00	92.06	179.32	7295.06	8862.17 S	44.48 W	8862.28	1.45
15859.00	91.20	180.72	7292.39	8956.13 S	44.51 W	8956.24	1.75
15954.00	91.32	181.34	7290.30	9051.09 S	46.22 W	9051.21	0.66
16048.00	91.39	180.77	7288.07	9145.05 S	47.95 W	9145.18	0.61
16143.00	91.66	180.49	7285.55	9240.01 S	48.99 W	9240.14	0.41
16237.00	89.88	181.91	7284.28	9333.98 S	50.96 W	9334.12	2.42
16332.00	88.83	183.46	7285.35	9428.86 S	55.41 W	9429.03	1.97
16426.00	88.43	183.12	7287.60	9522.68 S	60.80 W	9522.87	0.56
16521.00	88.06	182.78	7290.51	9617.51 S	65.69 W	9617.73	0.53
16615.00	87.69	182.47	7294.00	9711.35 S	69.99 W	9711.59	0.51
16709.00	87.44	181.98	7297.99	9805.19 S	73.64 W	9805.45	0.58
16804.00	88.61	181.39	7301.26	9900.09 S	76.43 W	9900.37	1.38
16898.00	88.70	180.82	7303.47	9994.05 S	78.24 W	9994.33	0.61
16992.00	89.01	180.46	7305.35	10088.02 S	79.29 W	10088.31	0.51
17087.00	89.45	179.90	7306.62	10183.01 S	79.59 W	10183.30	0.75
17181.00	89.26	179.68	7307.68	10277.01 S	79.25 W	10277.29	0.31
17276.00	89.66	178.91	7308.58	10371.99 S	78.08 W	10372.27	0.91
17370.00	89.78	178.87	7309.04	10465.97 S	76.26 W	10466.24	0.13
17477.00	90.06	178.37	7309.19	10572.94 S	73.68 W	10573.19	0.54
17525.00	90.06	178.37	7309.14	10620.92 S	72.31 W	10621.16	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 180.33 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.55 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17525.00 FEET
IS 10621.17 FEET ALONG 180.39 DEGREES (TRUE)

Survey Data is tied on to Gyro Data.

Final survey is projected to bit.