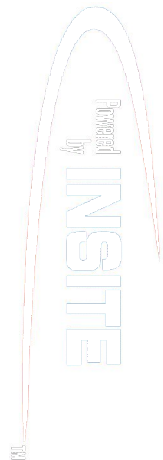


**PCD-C Pressure Case Directional
PCG-K Pressure Case Gamma**

1 : 240

Country : USA			
Field : Wattenberg			
Location : Lat: 40° 49' 7.90" North Long: 103° 47' 38.77" West			
Well : Horsetail 19N-1924M-R			
Company : Whiting			
Rig : Pioneer 54			
LOCATION			
Latitude : 40° 49' 7.90" North Longitude : 103° 47' 38.77" West			
UTM Easting = 11,391,552.789 ft UTM Northing = 5,071,194.751 ft			
Other Services None			
Company : Whiting			
Rig : Pioneer 54			
Well : Horsetail 19N-1924M-R			
Field : Wattenberg			
Country : USA			
API Number : 05-123-40630-00			
Permanent Datum : Ground Level			
Log Measured From : Drill Floor			
Drilling Measured From : Drill Floor			
Elevation : 4748.50 ft			
Elev. : N/A			
KB : 4767.00 ft			
DF : 4748.50 ft			
GL : 4748.50 ft			
WD : N/A			
Depth Logged : 0 ft			
To : 8,348.00 ft			
Date Logged : 05-Dec-14			
To : 12-Dec-14			
Total Depth MD : 8,348.00 ft			
TVD : 8,329.73 ft			
Spud Date : 05-Dec-14			
Plot Type : Final			
Plot Date : 15-Jan-15			
Unit No. : 1180			
Job No. : CA-XX-0901903909			
Borehole Record (MD)			
Run No.			
Size			
From			
To			
0100			
13,500 in			
0200			
8,750 in			
0300			
8,750 in			
6,415.00 ft			
8348.00 ft			
Casing Record (MD)			
Run No.			
Size			
Weight			
From			
To			
9,000 in			
45.00 lbpf			
SURFACE			
1,575.00 ft			

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	06-Dec-14	09-Dec-14	11-Dec-14		
Rig Bit Number	0100	0200	300		
Bit Size (in)	13.500	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750	6.750		
Log Start Depth (MD, ft)	0.00	1,610.00	6,415.00		
Log End Depth (MD, ft)	1,610.00	6,415.00	8,500.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	06-Dec-14 02:00	07-Dec-14 14:00	09-Dec-14 11:00		
Drill/Wipe End Date and Time	06-Dec-14 10:45	09-Dec-14 01:30	11-Dec-14 03:16		
Min Inc (deg) @ Depth (MD, ft)	0.31 @ 421.00	0.04 @ 4,763.00	0.15 @ 7092		
Max Inc (deg) @ Depth (MD, ft)	1.29 @ 1,554.00	8.00 @ 3,468.00	0.61 @ 7839		
Bit TFA(in2) / Bit Type	0.90 / PDC	0.90 / PDC	1.20 / PDC		
Flow Rate (gpm)	333.00	575.00	475.00		
Max AV (fpm) / CV (fpm) @ MWD	550.0 / 450.0	475.0 / 550.0	450.0 / 500.0		
Fluid Type	Polymer	Polymer	Polymer		
Density (ppg) / Viscosity (spqt)	8.60 / 20.00	8.70 / 44.00	8.80 / 47.00		
Filtrate CL (ppm)	1,100.00	900.00	1,100.00		
pH / Fluid Loss (mptm)	7.00 / 0	6.80 / 0	9.10 / 0		
PV (cP) / YP (Ihf2)	10 / 10.00	4 / 2.00	18 / 23.00		
% Solids / % Sand	3 / 0.02	1 / 0.02	4 / 0.02		
% Oil / Oil:Water Ratio	97 / 97:0	N/A / 0:99	N/A / 0:96		
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) / Source	77.99 / PCM	175.21 / PCM	185 / 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	David	David	David		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11404294	11404294	11404294		
Insert Serial Number	11227514	11227514	11227560		
Date and Time Initialized	05-Dec-14 15:57	06-Dec-14 21:23	09-Dec-14 04:23		
Date and Time Read	06-Dec-14 12:51	09-Dec-14 08:31	01-Jan-70 00:00		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	56.00	56.00		
Software Version	6.21	6.21	6.33		
Sub Serial Number	11404294	11404294	11404294		
Sonde Serial Number	11833233	11833233	11478078		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	291.60	318.70	281.12		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	58.47	58.92	59.11		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404294	11404294	11404294		
Insert/Sonde Serial Number	11680942	11680942	11579792		

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

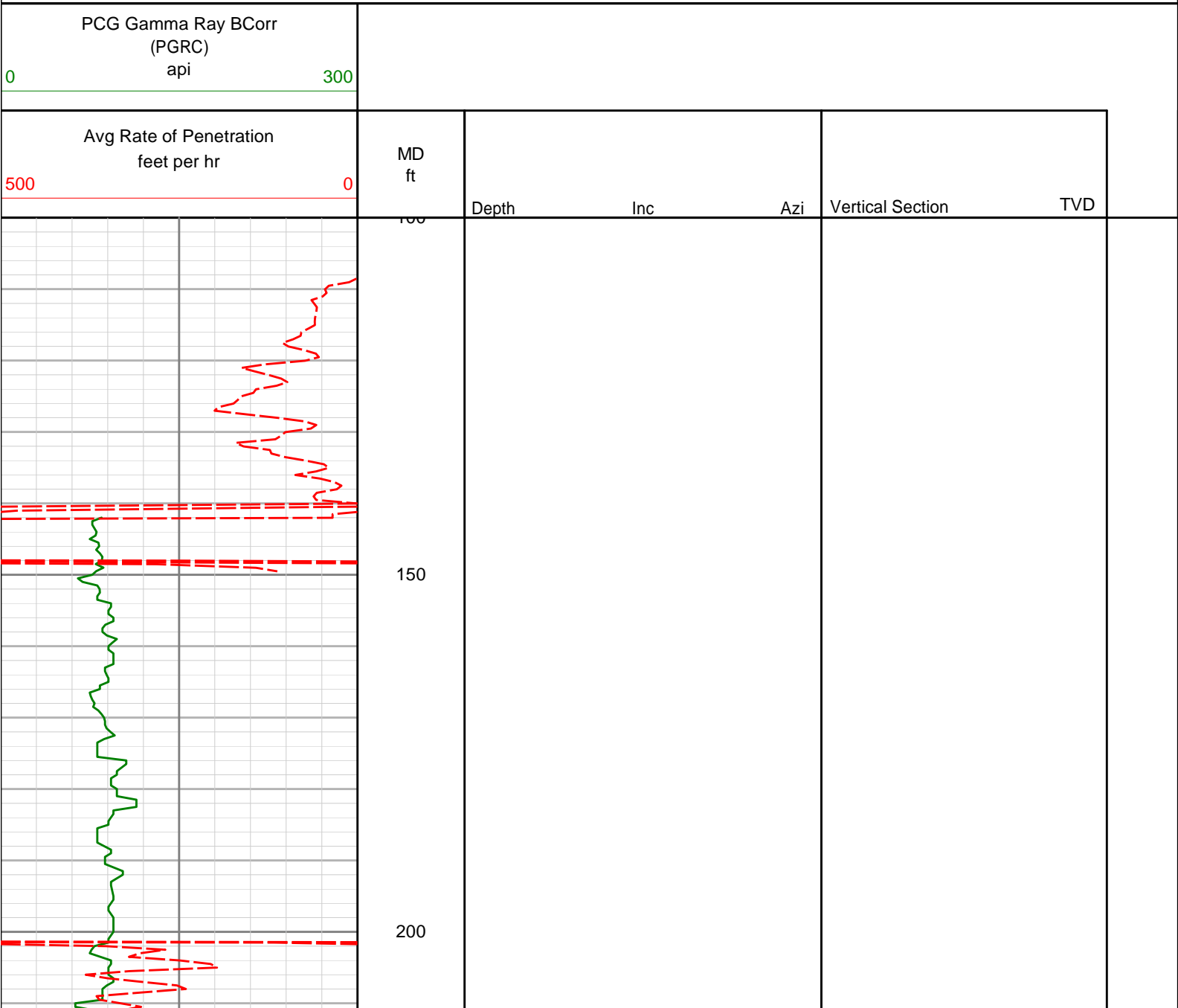
5. INSITE version 8.0.20

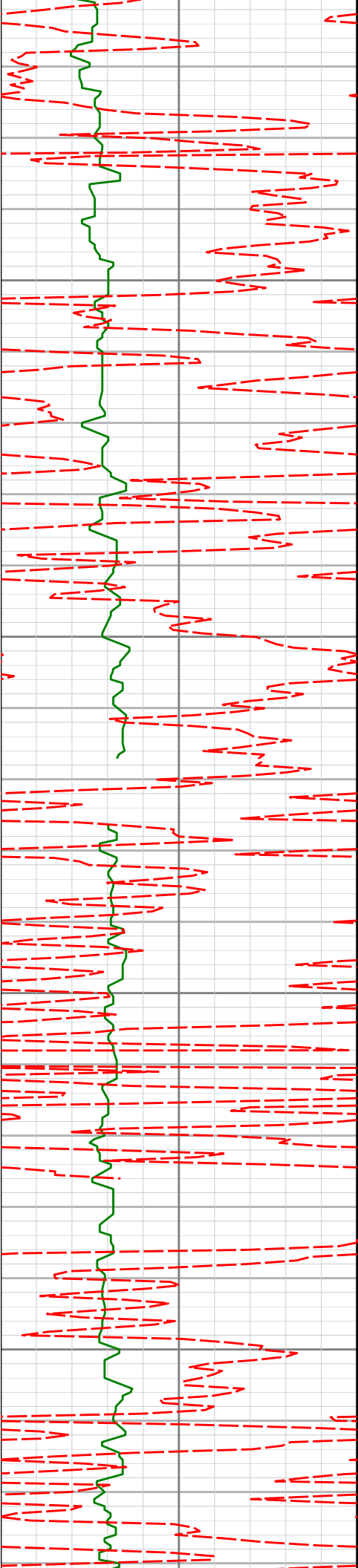
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HALLIBURTON

1:240 MD Log





237'

0.46°

301.54°

-0.51'

237.00'

250

300

328'

0.41°

291.72°

-0.83'

327.99'

350

400

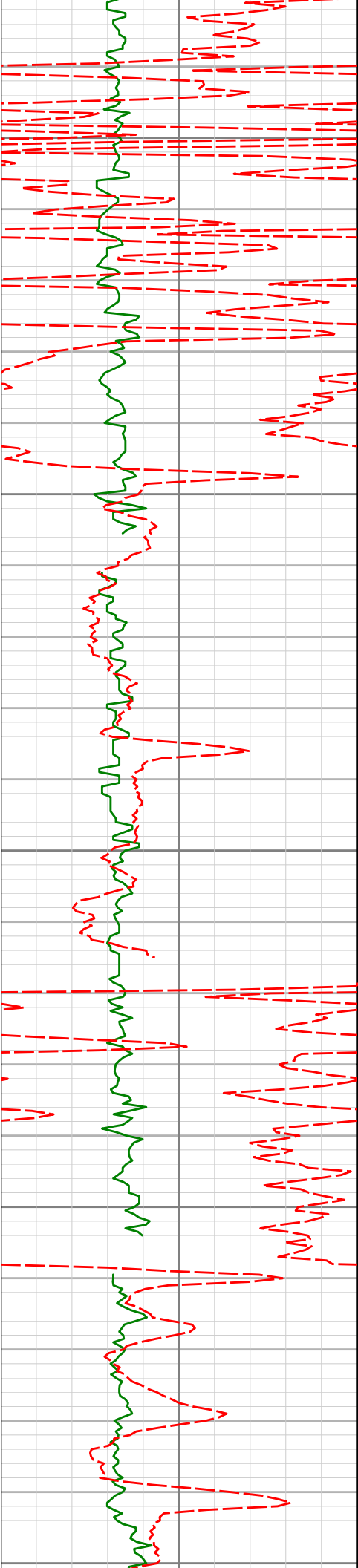
421'

0.31°

336.72°

-1.19'

420.99'



450

500

550

600

650

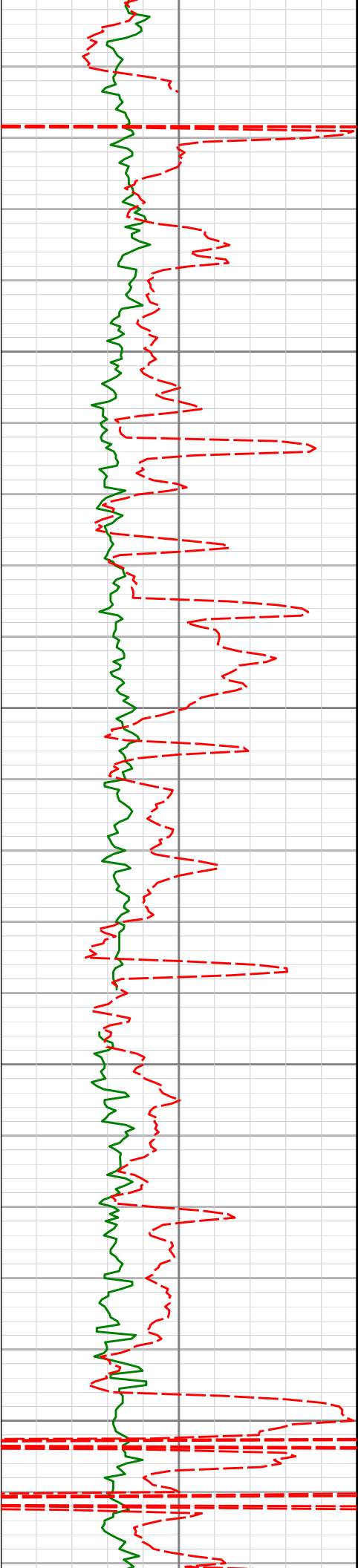
513'

0.48°

359.44°

-1.80'

512.99'

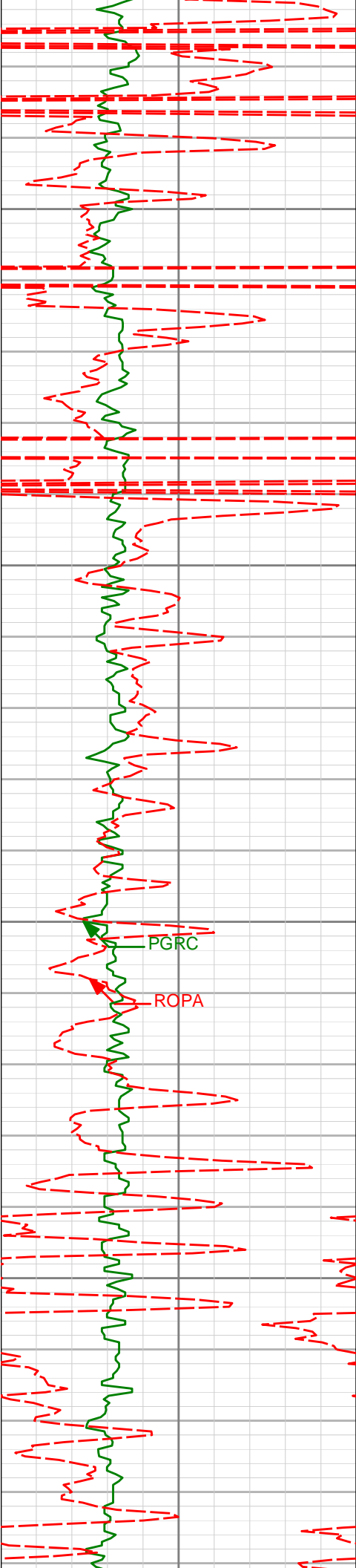


700

750

800

850



900

950

1000

1050

976'

0.66°

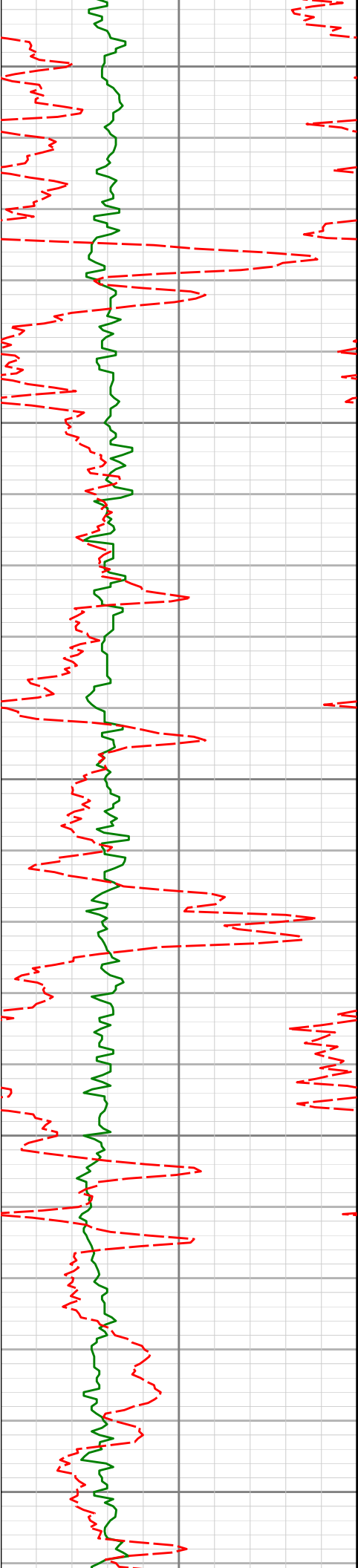
296.39°

-4.96'

975.97'

PGRC

ROPA



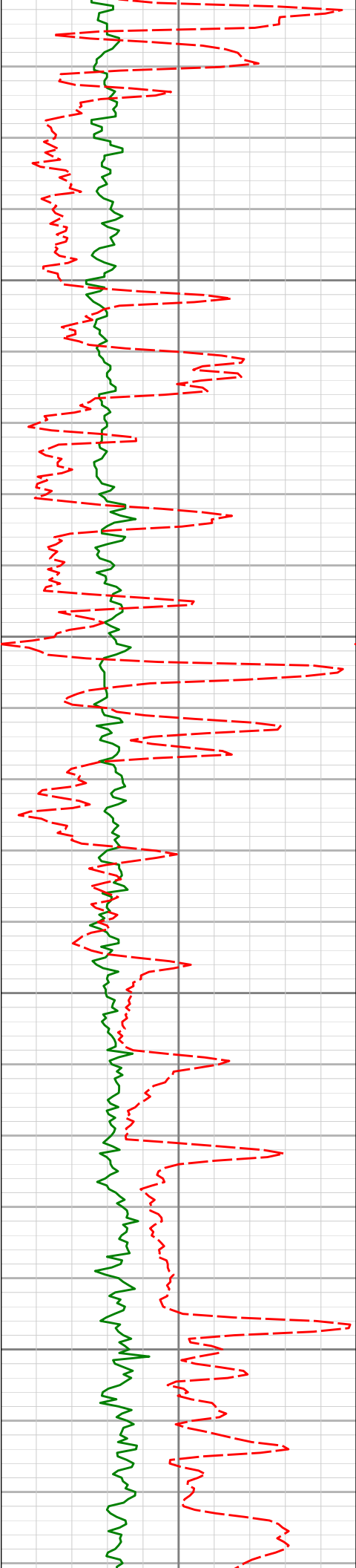
1100

1150

1200

1250

1300



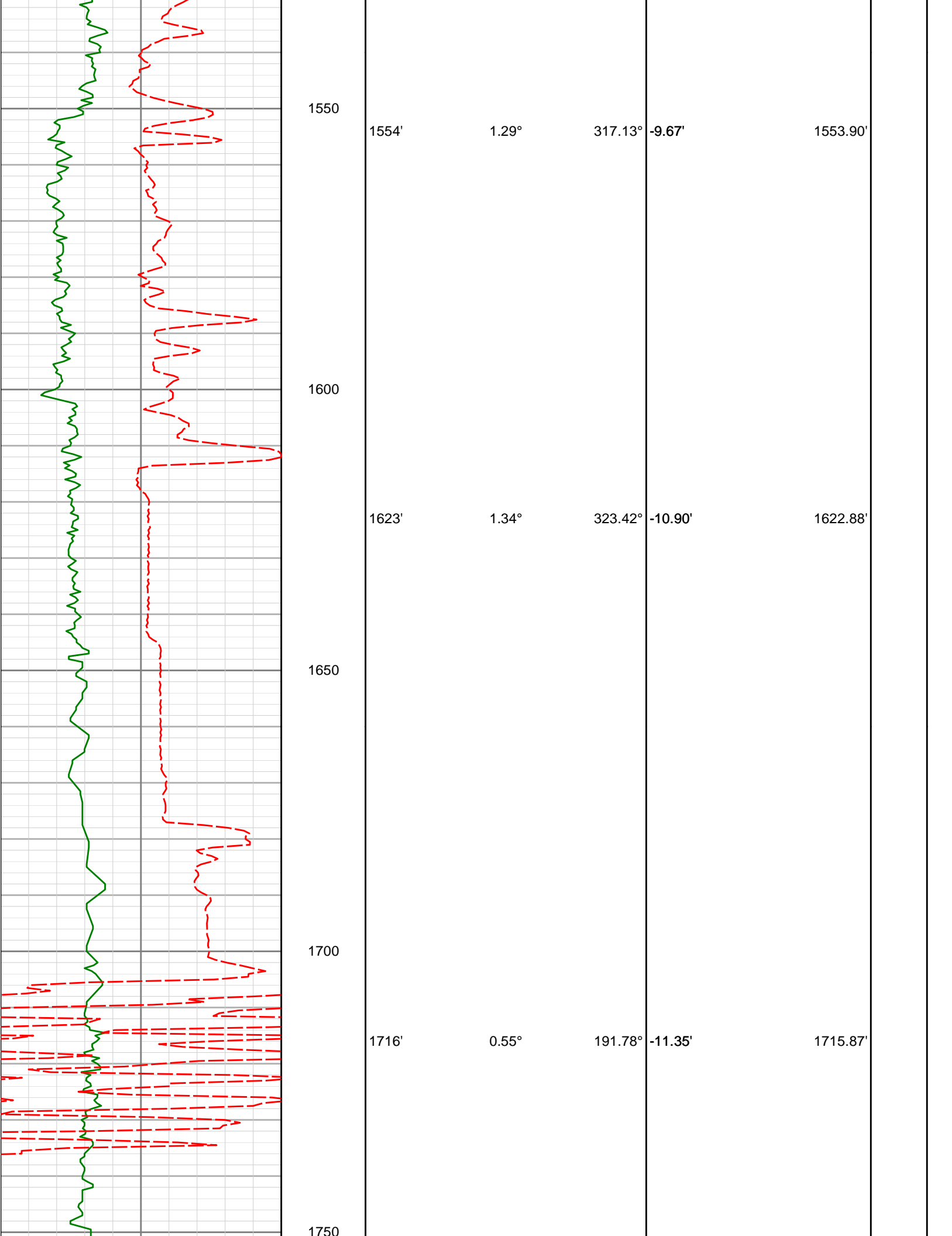
1346' 0.90° 295.55° -7.21' 1345.94'

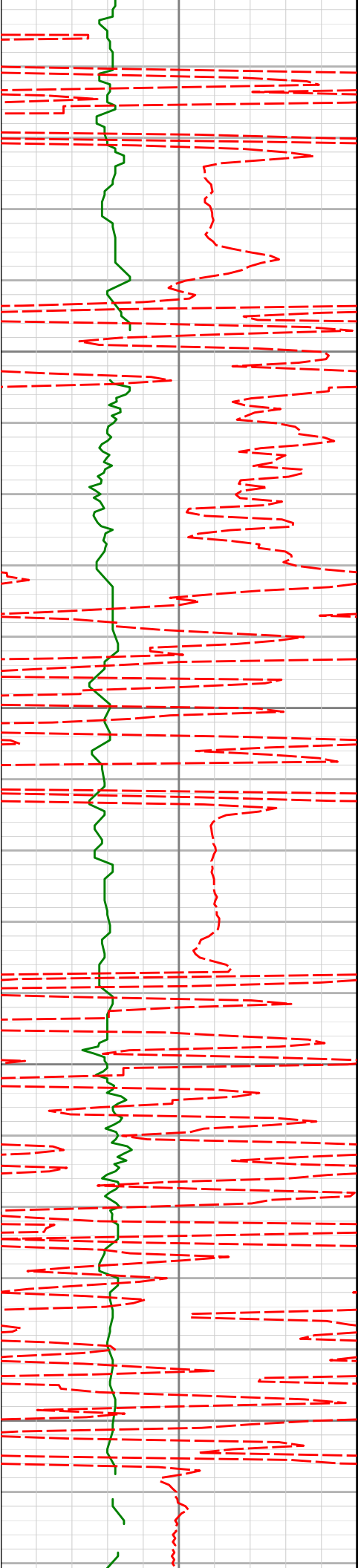
1350

1400

1450

1500





1800

1850

1900

1950

1808'

1.73°

159.56°

-9.61'

1807.85'

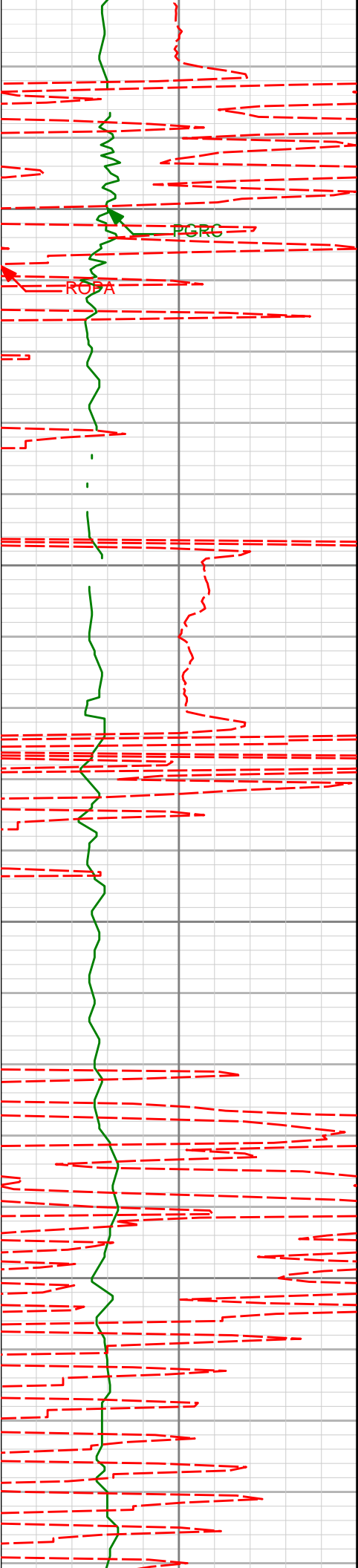
1899'

3.52°

167.01°

-5.59'

1898.76'



2000

2050

2100

2150

1990'

5.18°

174.24°

1.23'

1989.49'

2083'

7.49°

175.66°

11.47'

2081.92'

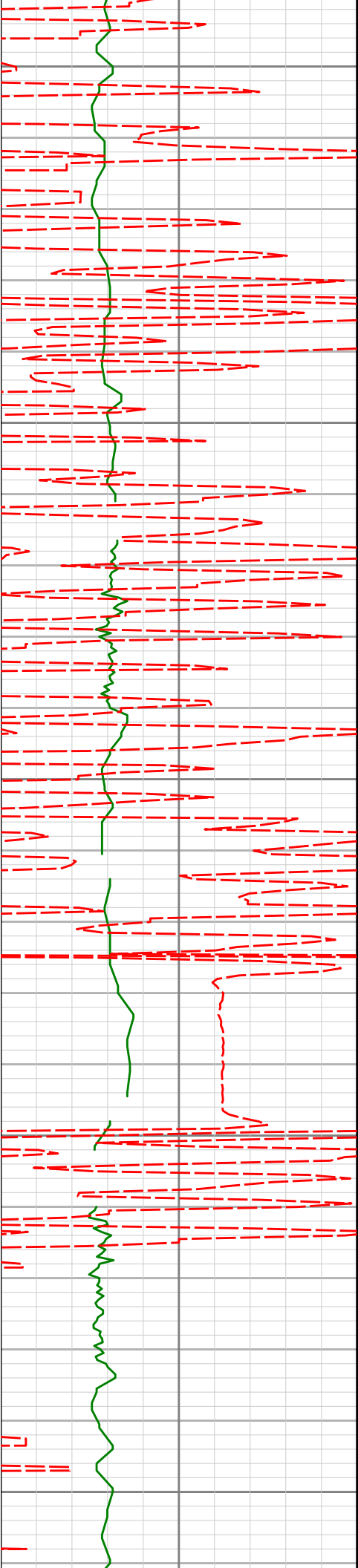
2176'

6.69°

174.89°

22.92'

2174.21'



2200

2250

2300

2350

2400

2267'

5.75°

172.75°

32.73'

2264.67'

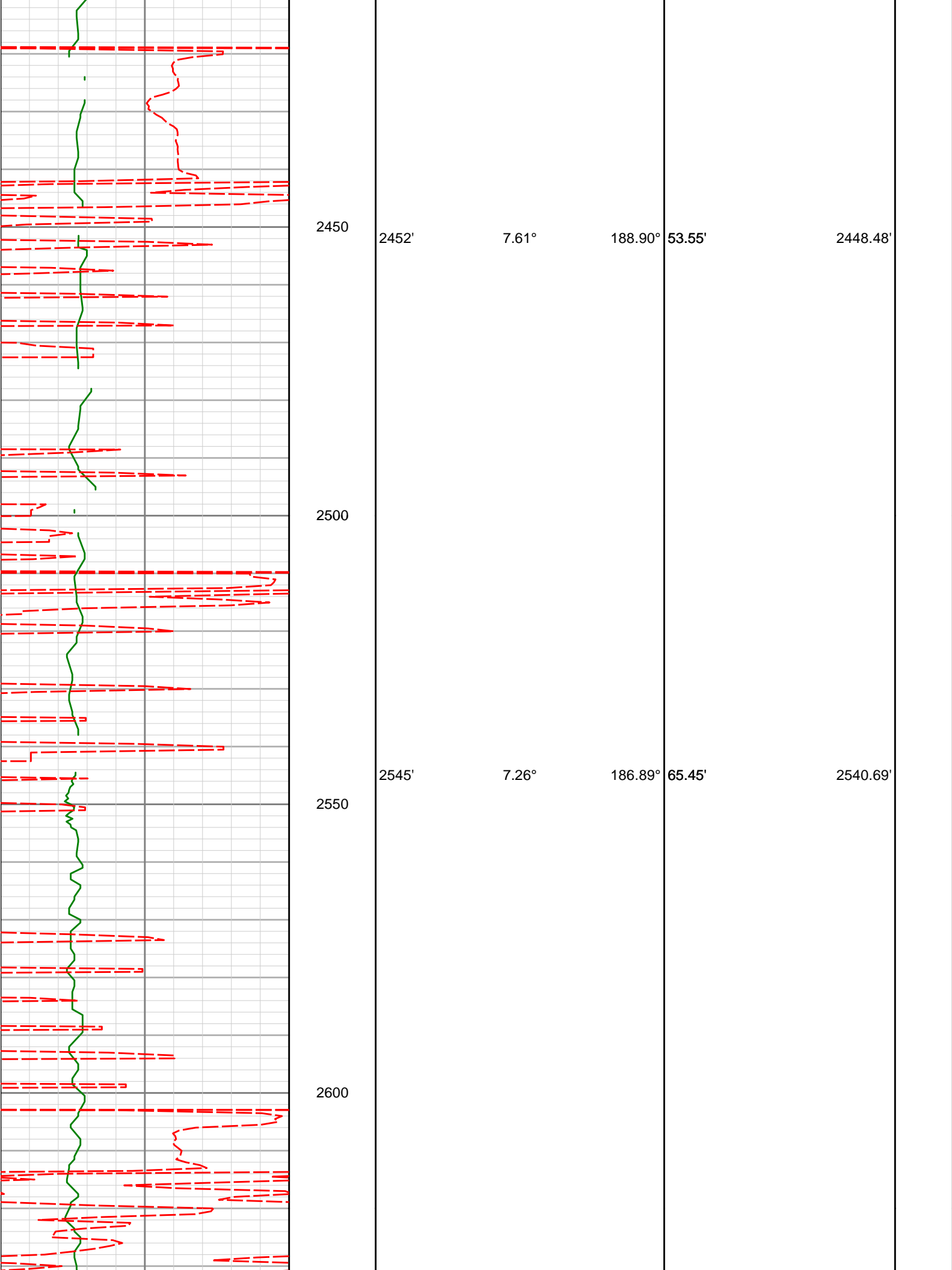
2360'

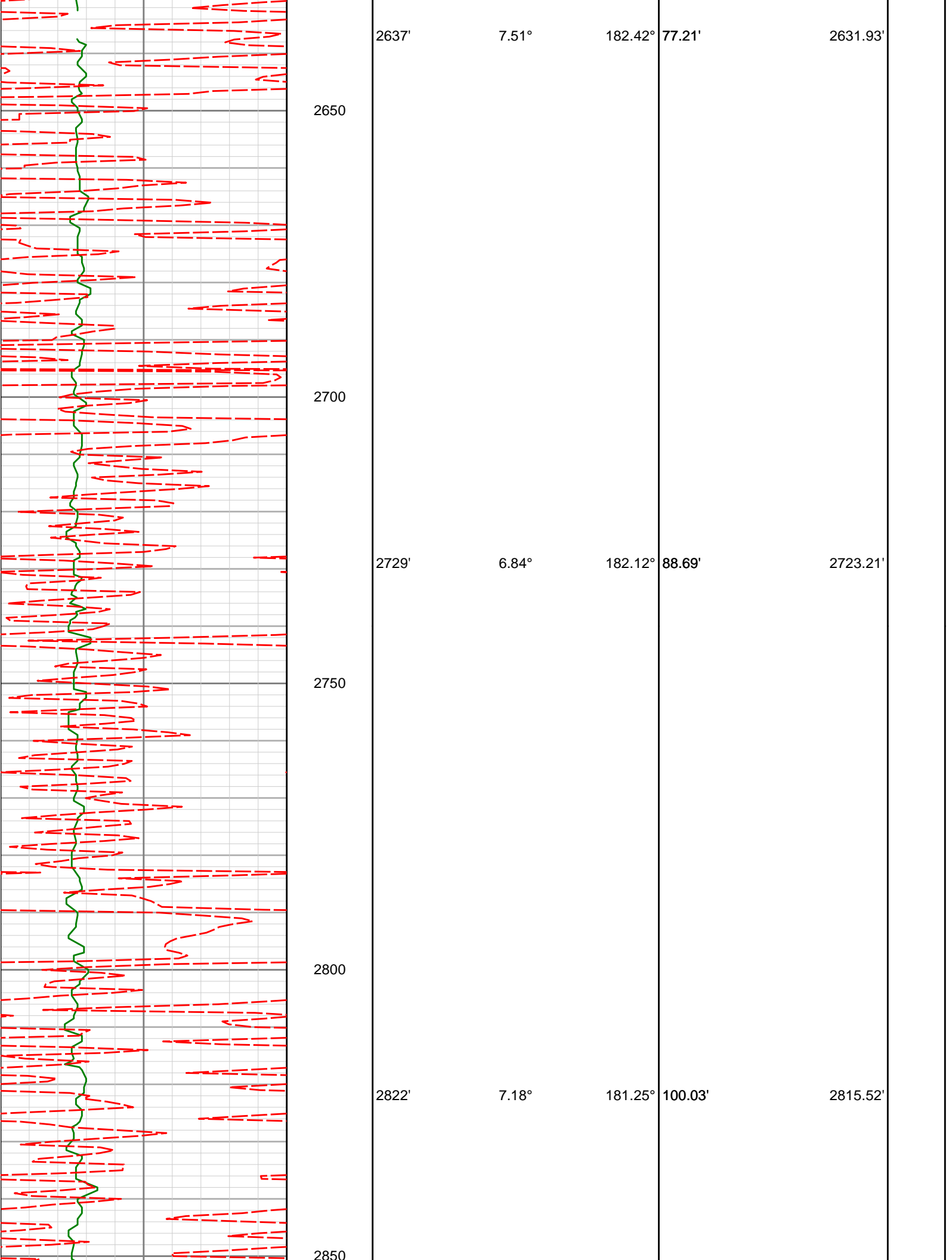
6.32°

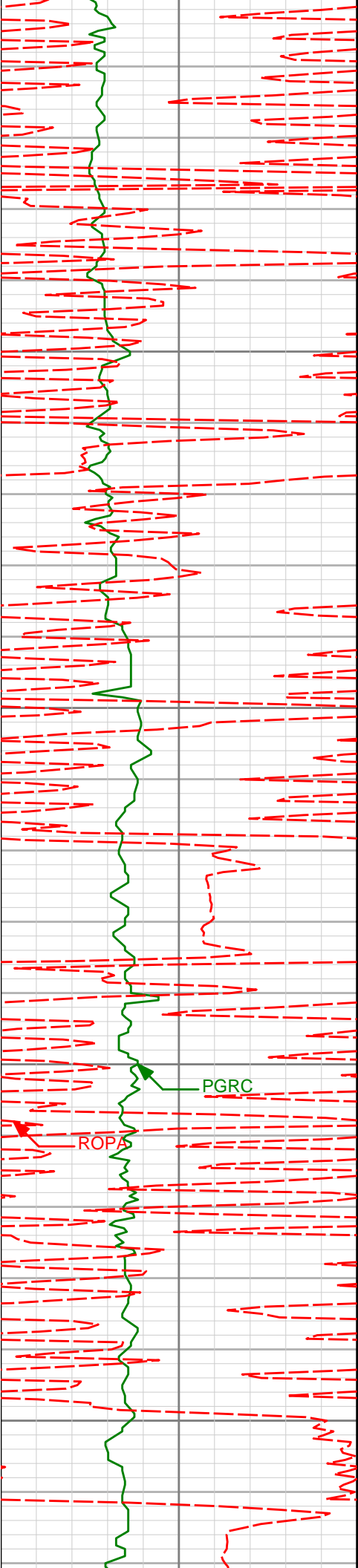
178.92°

42.48'

2357.15'







2900

2950

3000

3050

2914'

6.48°

180.70°

110.96'

2906.86'

3007'

6.40°

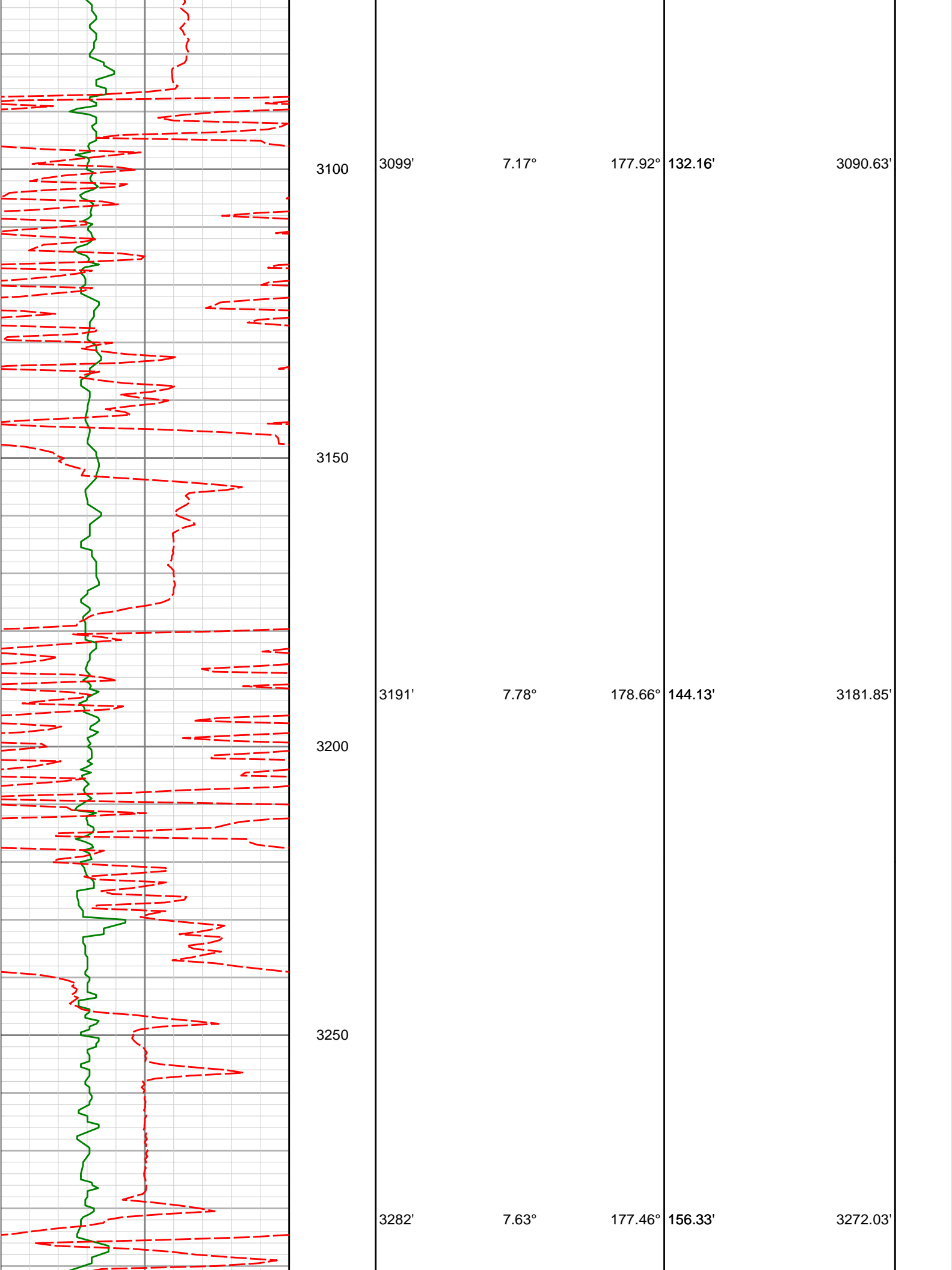
171.46°

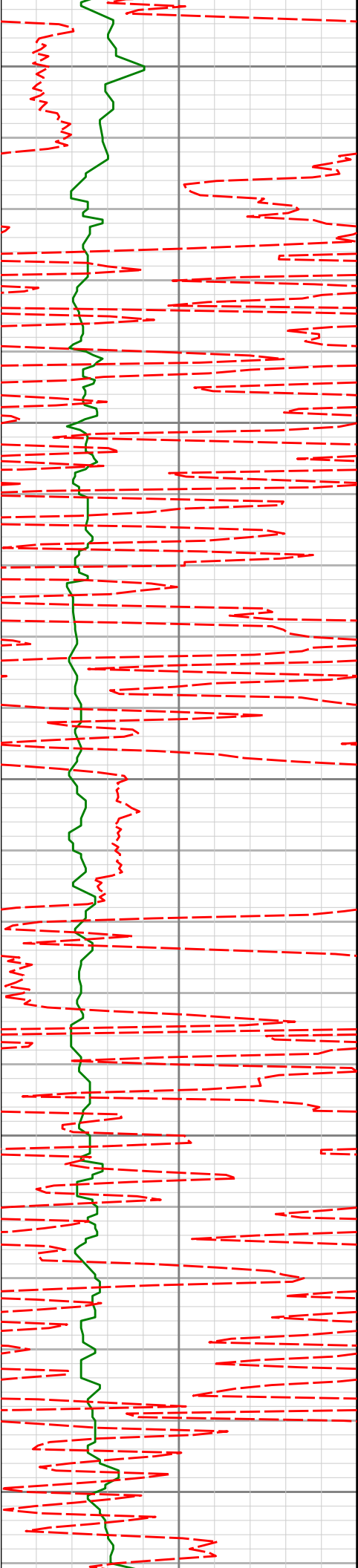
121.34'

2999.28'

PGRC

ROPA





3300

3350

3400

3450

3500

3375'

7.64°

177.62°

168.68'

3364.21'

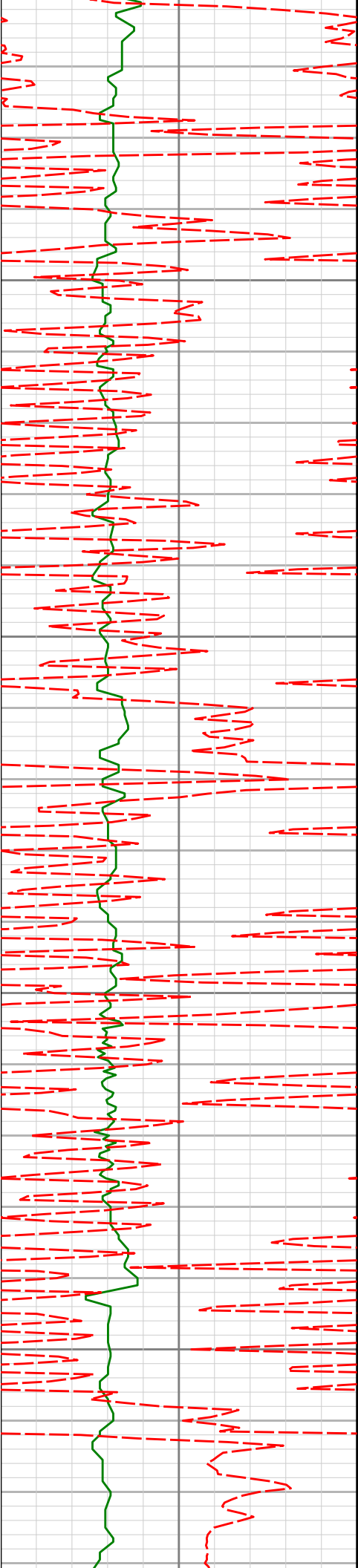
3468'

8.00°

177.76°

181.33'

3456.34'



3550

3560'

7.37°

177.94°

193.63'

3547.51'

3600

3650

3653'

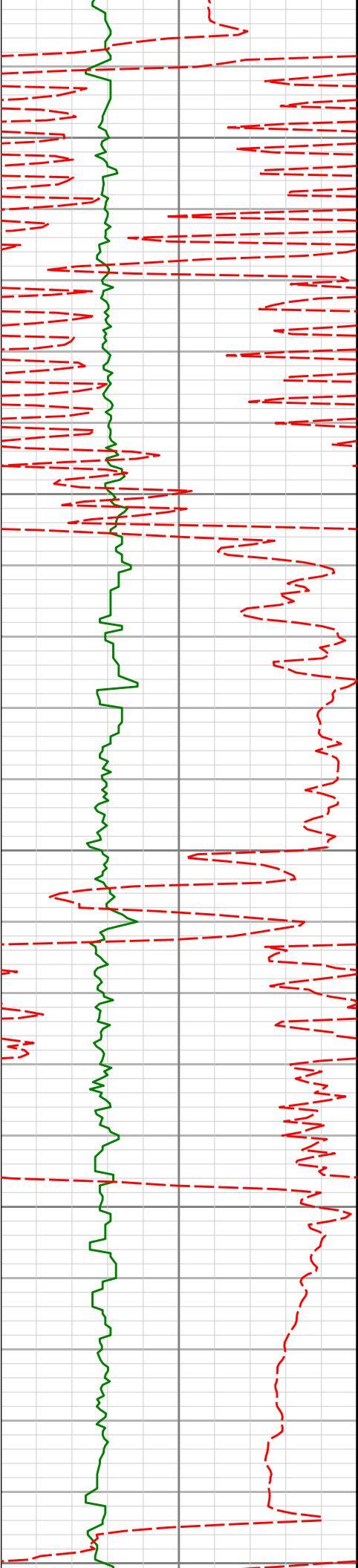
6.19°

179.67°

204.60'

3639.86'

3700



3750

3800

3850

3900

3950

3746'

5.23°

170.38°

213.81'

3732.40'

3837'

5.12°

168.35°

221.89'

3823.03'

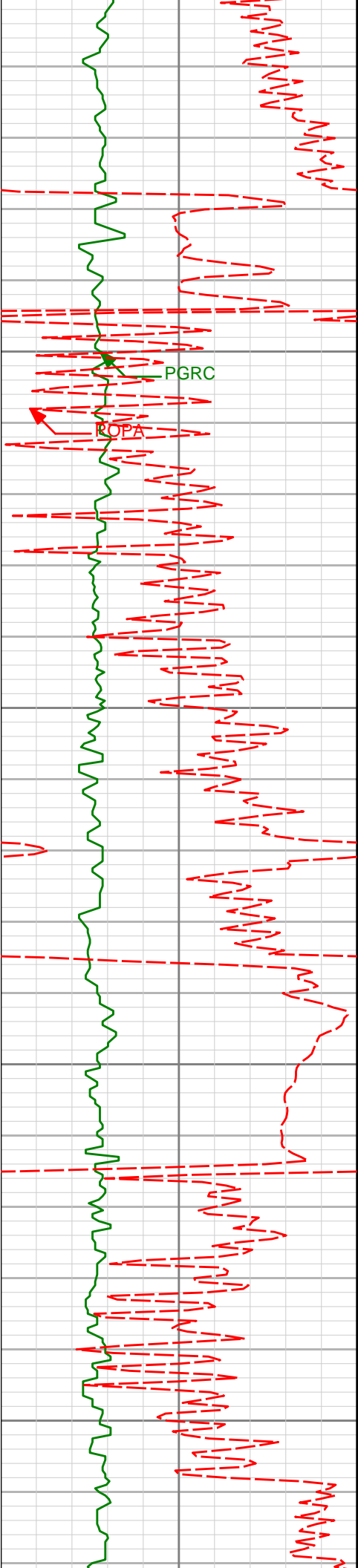
3930'

7.63°

172.49°

232.10'

3915.45'



4000

4050

4100

4150

4023'

7.44°

172.76°

244.21'

4007.65'

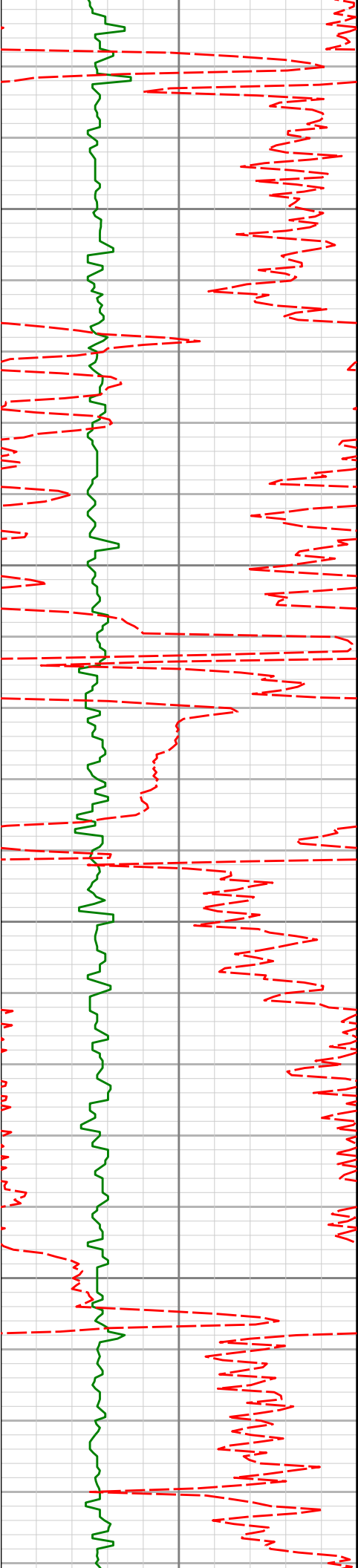
4115'

7.42°

180.89°

256.07'

4098.88'



4200

4207'

6.61°

182.26°

267.29'

4190.19'

4250

4300

4299'

5.83°

184.08°

277.24'

4281.64'

4350

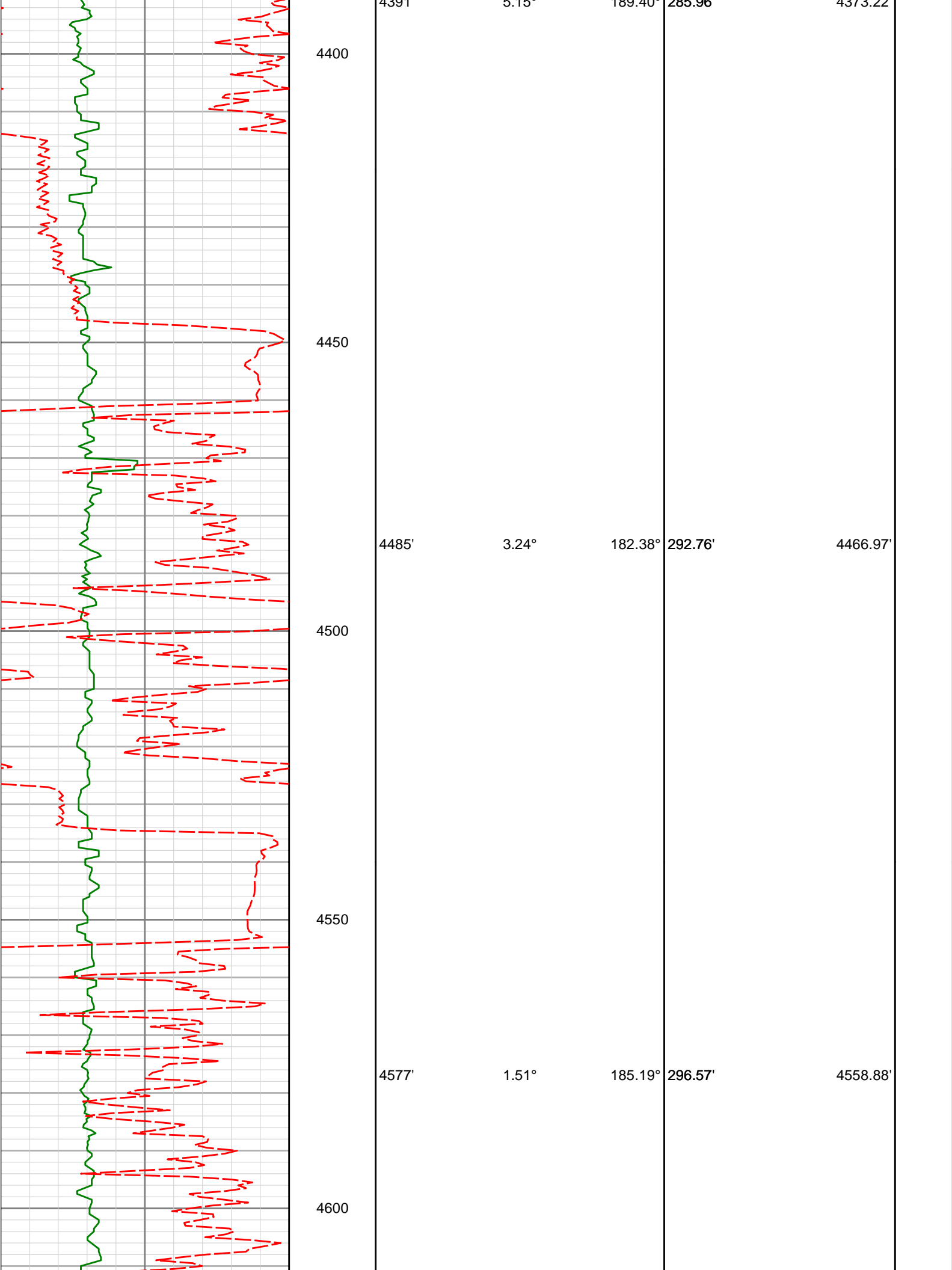
4304'

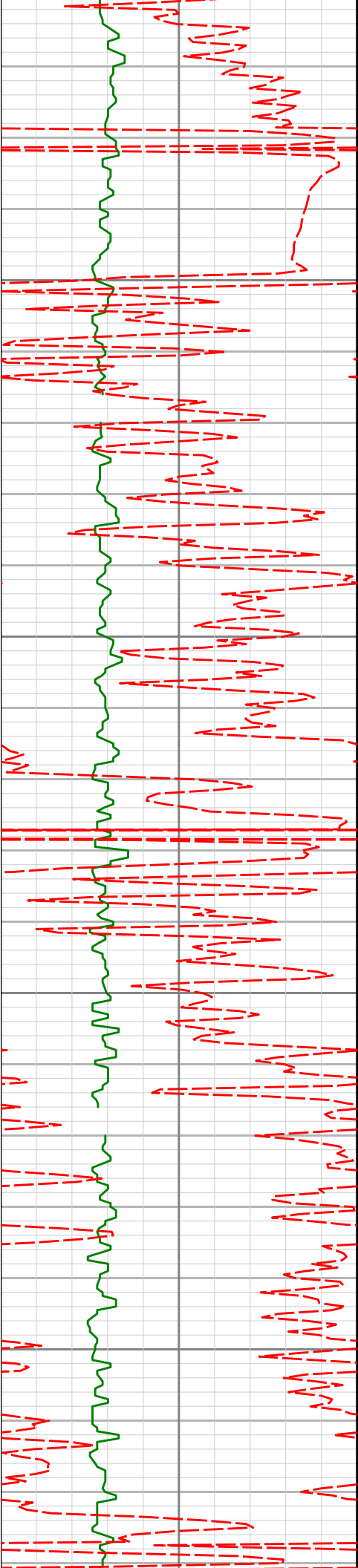
5.15°

180.40°

285.06'

4272.22'





4650

4700

4750

4800

4669'

0.10°

158.39°

297.85'

4650.87'

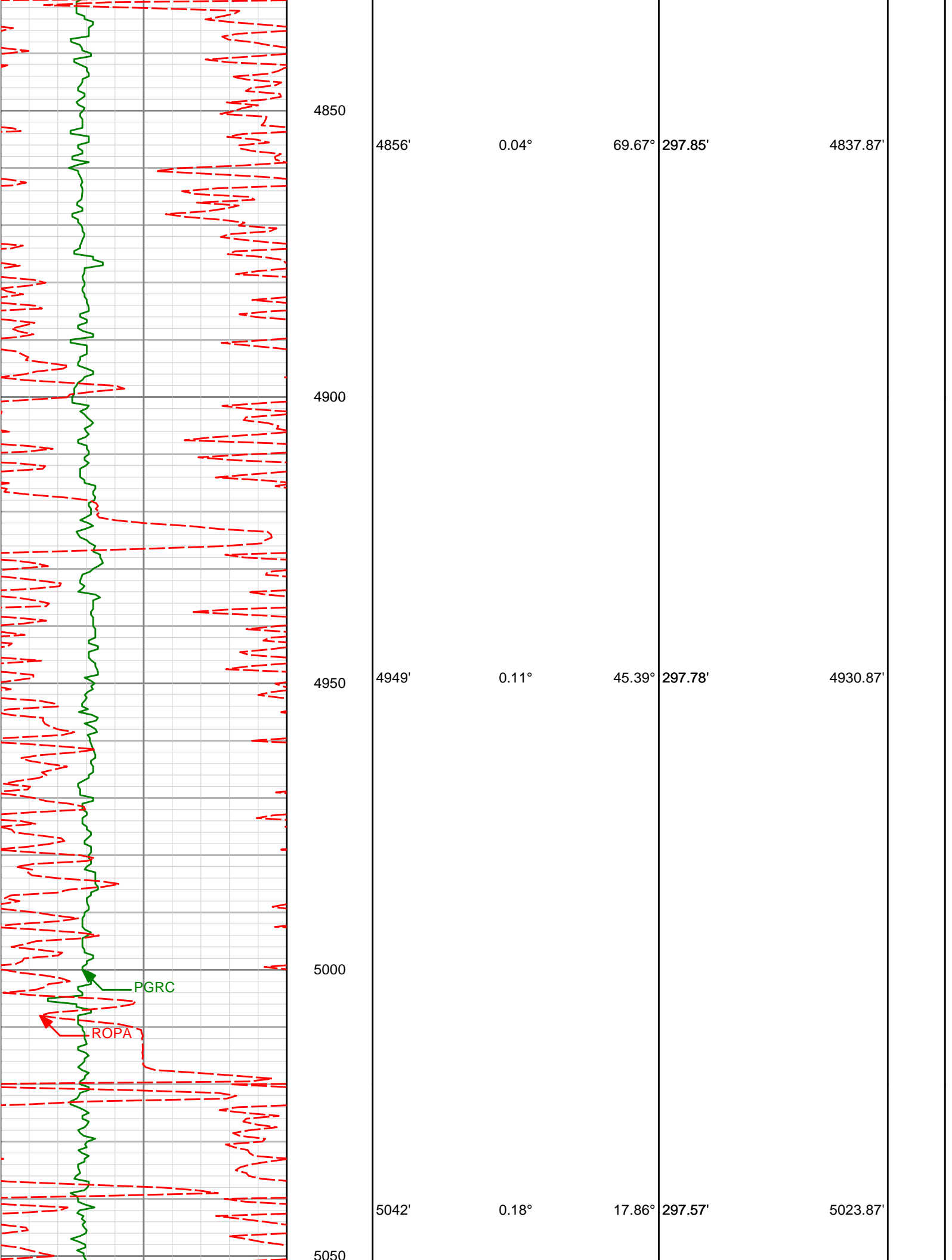
4763'

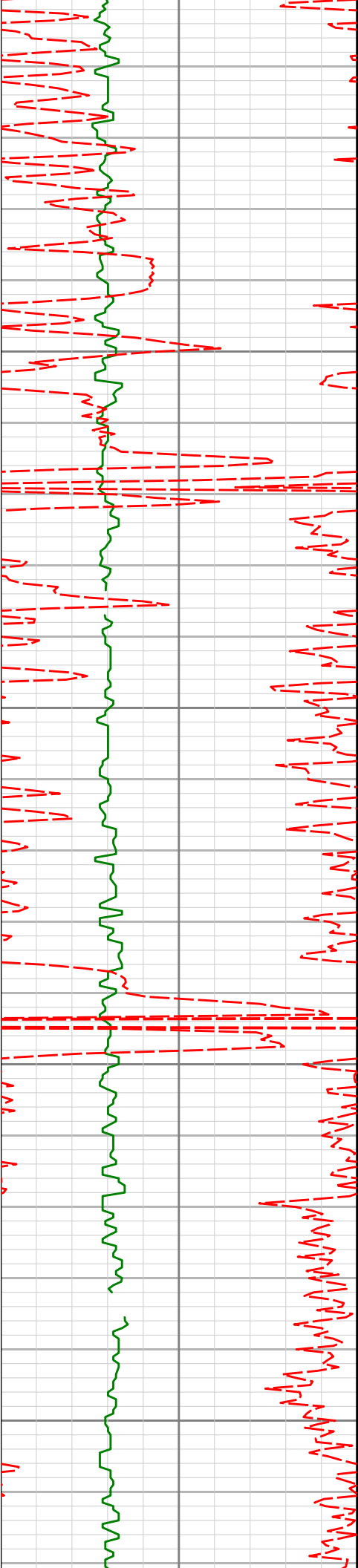
0.04°

352.31°

297.89'

4744.87'





5100

5150

5200

5250

5135'

0.13°

356.43°

297.33'

5116.87'

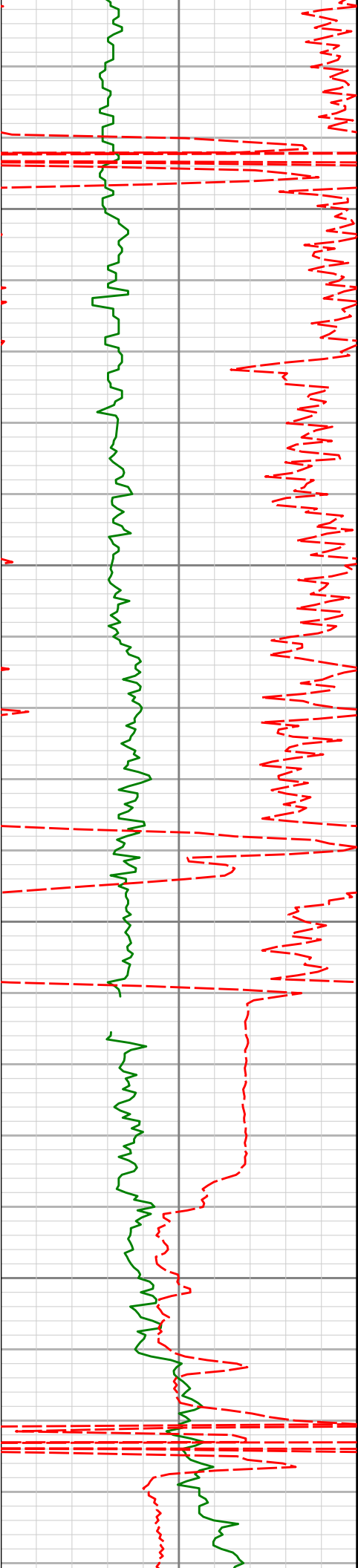
5228'

0.42°

308.13°

297.01'

5209.87'



5300

5350

5400

5450

5322'

0.71°

301.18°

296.49'

5303.87'

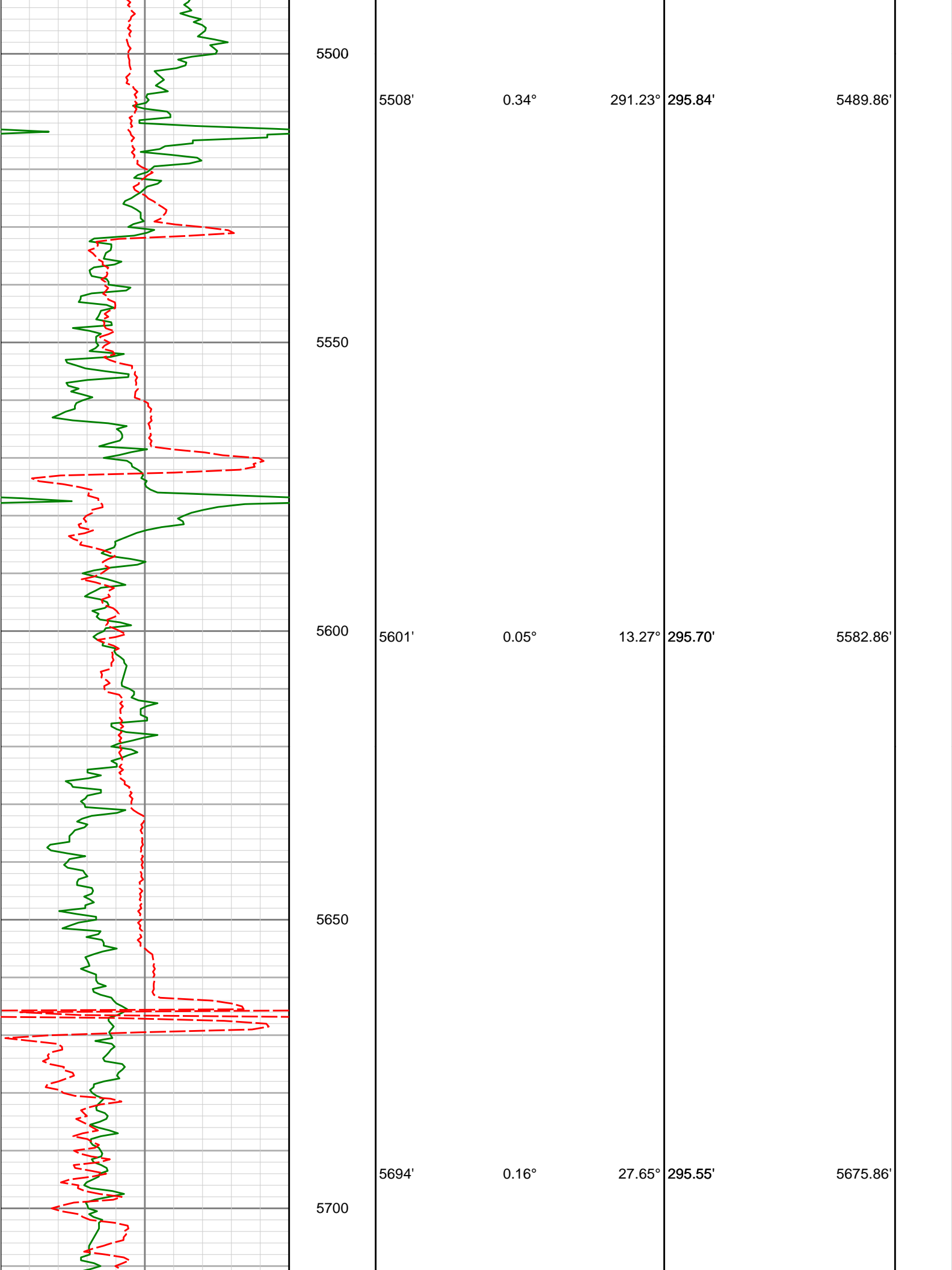
5415'

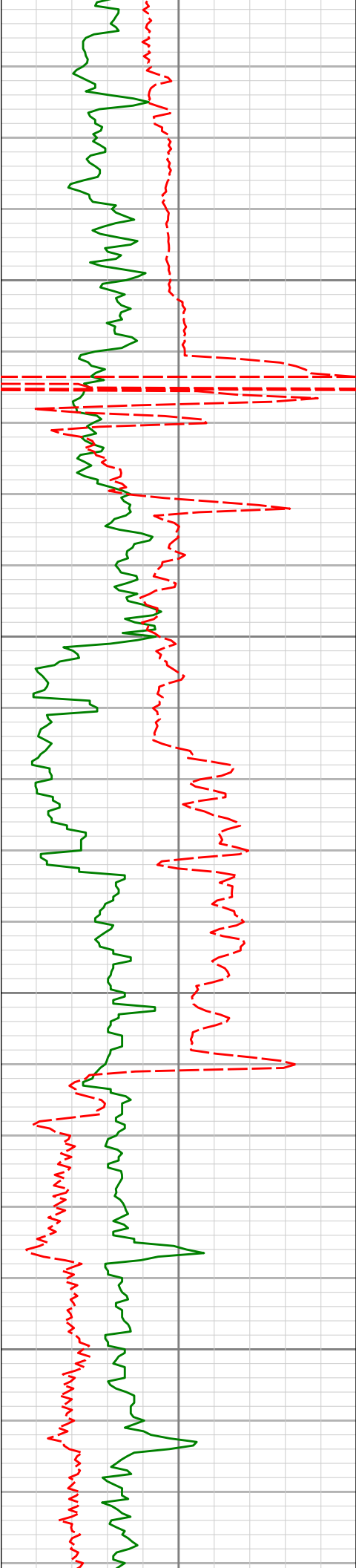
0.54°

285.04°

296.06'

5396.86'





5750

5787'

0.14°

122.76°

295.49'

5768.86'

5800

5850

5880'

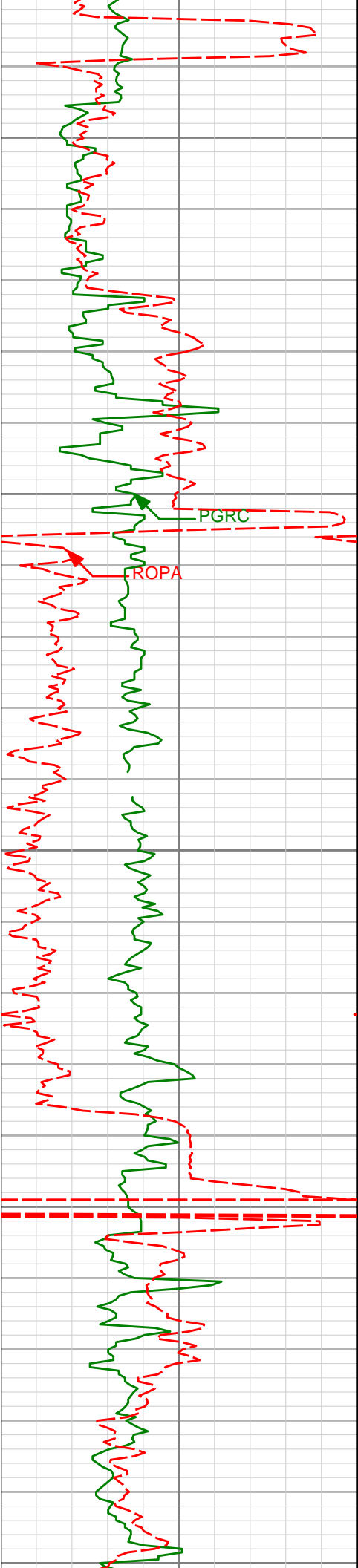
0.26°

131.68°

295.70'

5861.86'

5900



5950

5973'

0.28°

114.07°

295.94'

5954.86'

6000

PGRC

FROPA

6050

6067'

0.39°

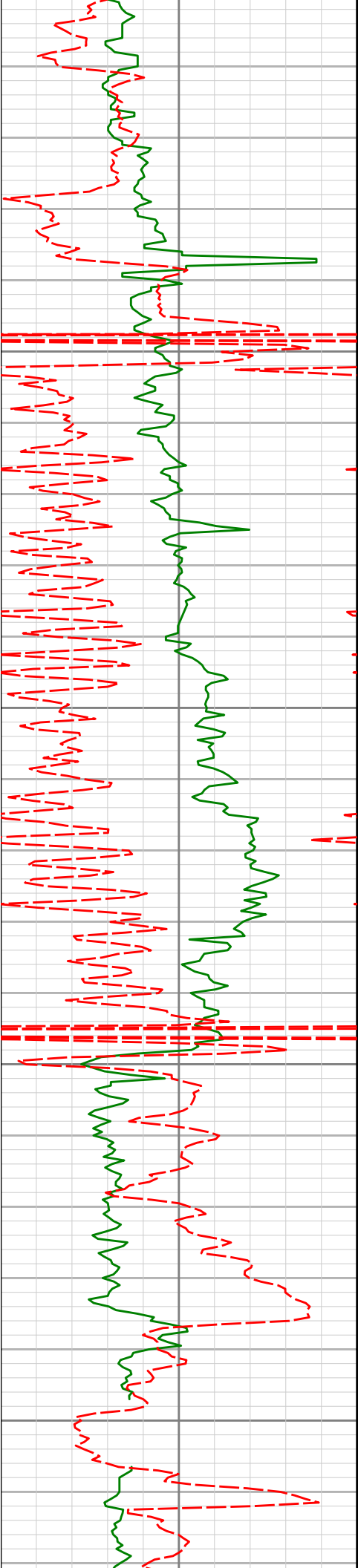
114.00°

296.17'

6048.85'

6100

6150



6160'	0.50°	93.51°	296.33'	6141.85'	
6200					
6250	6253'	0.49°	120.73°	296.57'	6234.85'
6300					
6350	6347'	0.74°	132.27°	297.19'	6328.84'



6400

6440'

0.59°

150.12°

298.02'

6421.84'

6450

6500

6533'

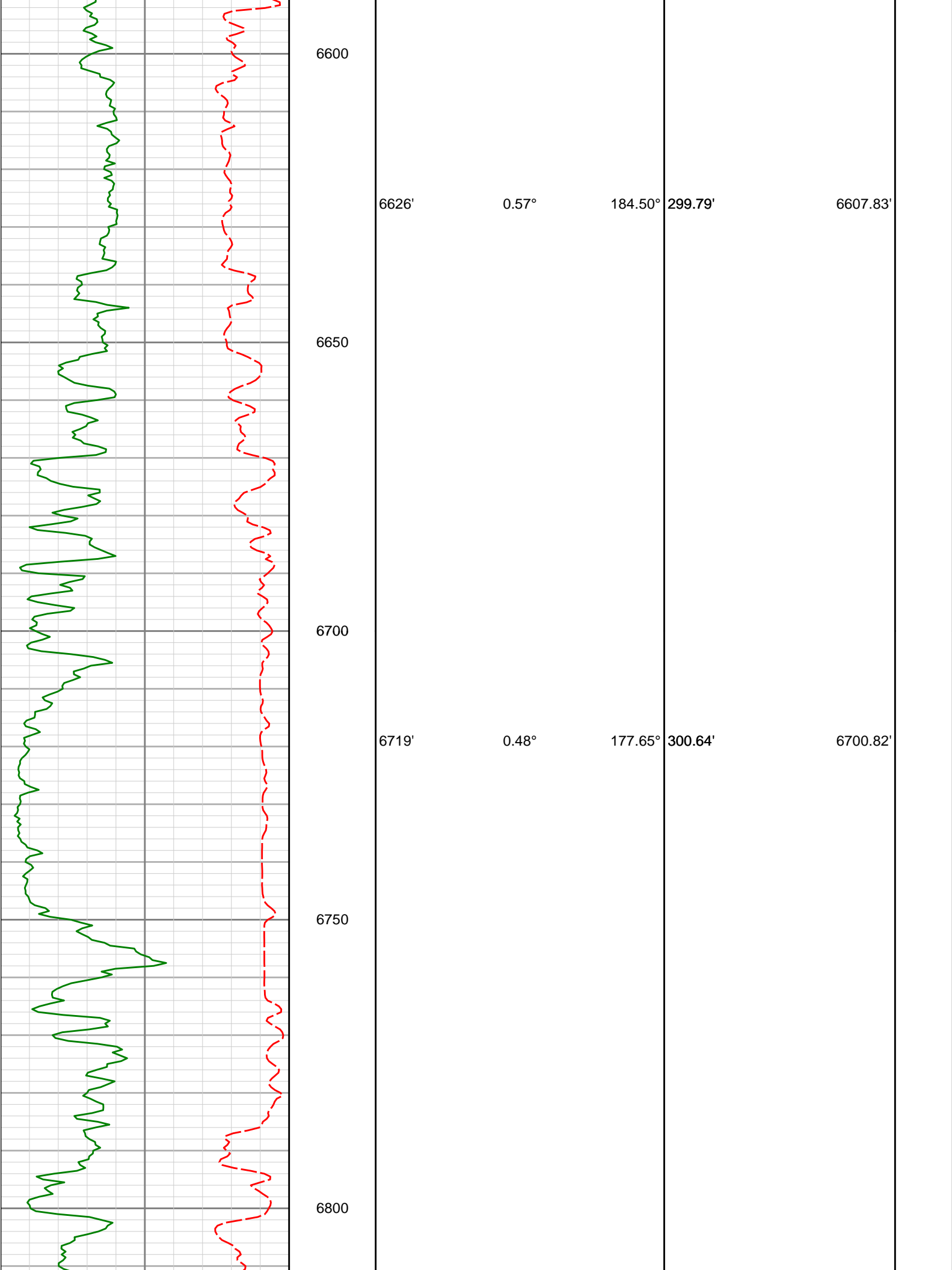
0.56°

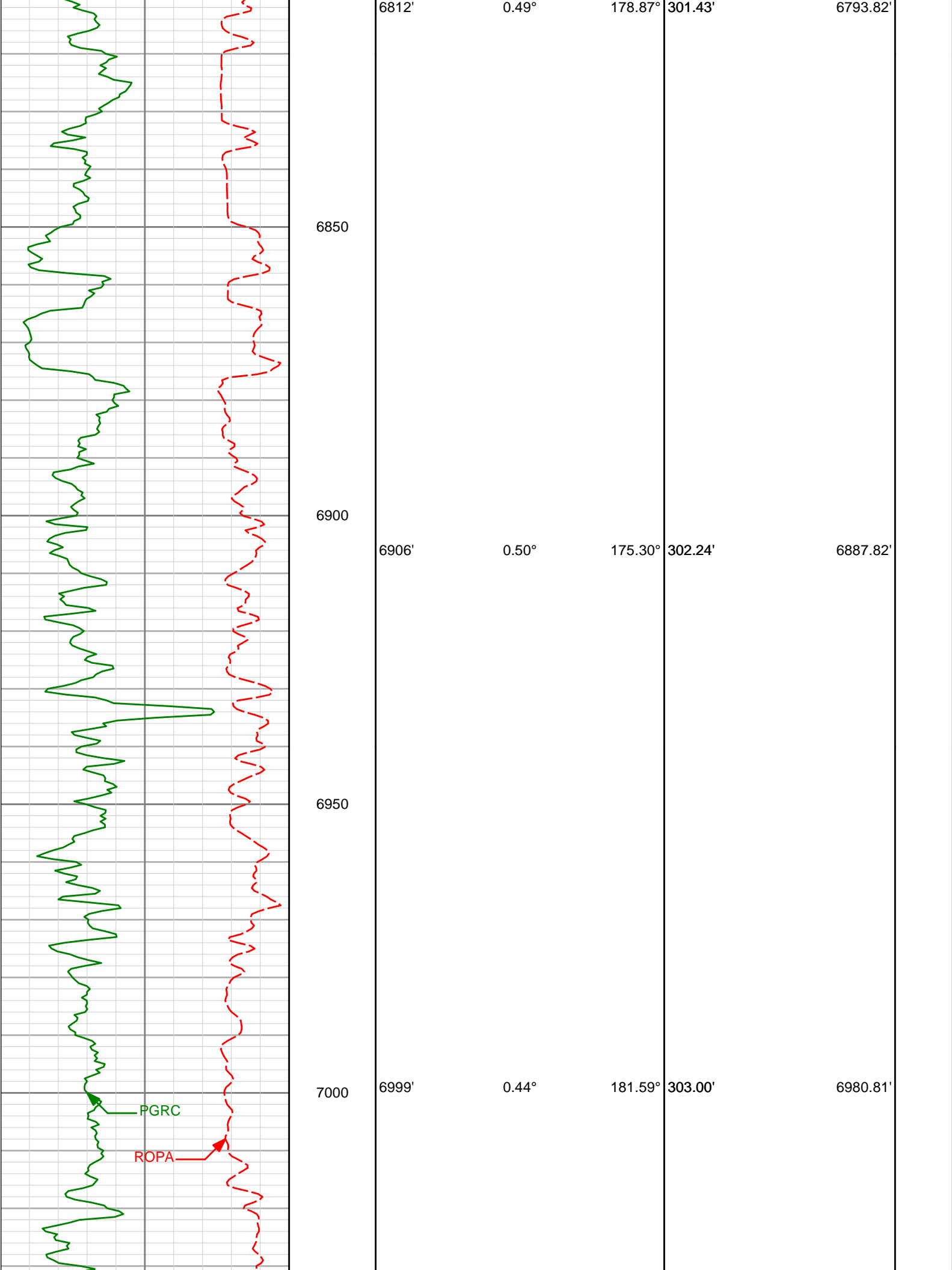
169.66°

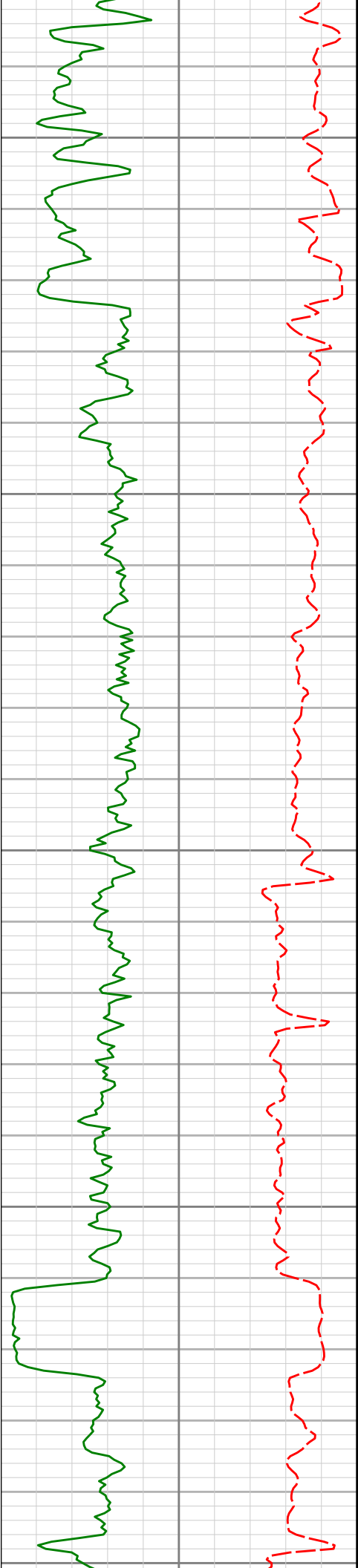
298.88'

6514.83'

6550







7050

7100

7150

7200

7250

7092'

0.15°

182.08°

303.48'

7073.81'

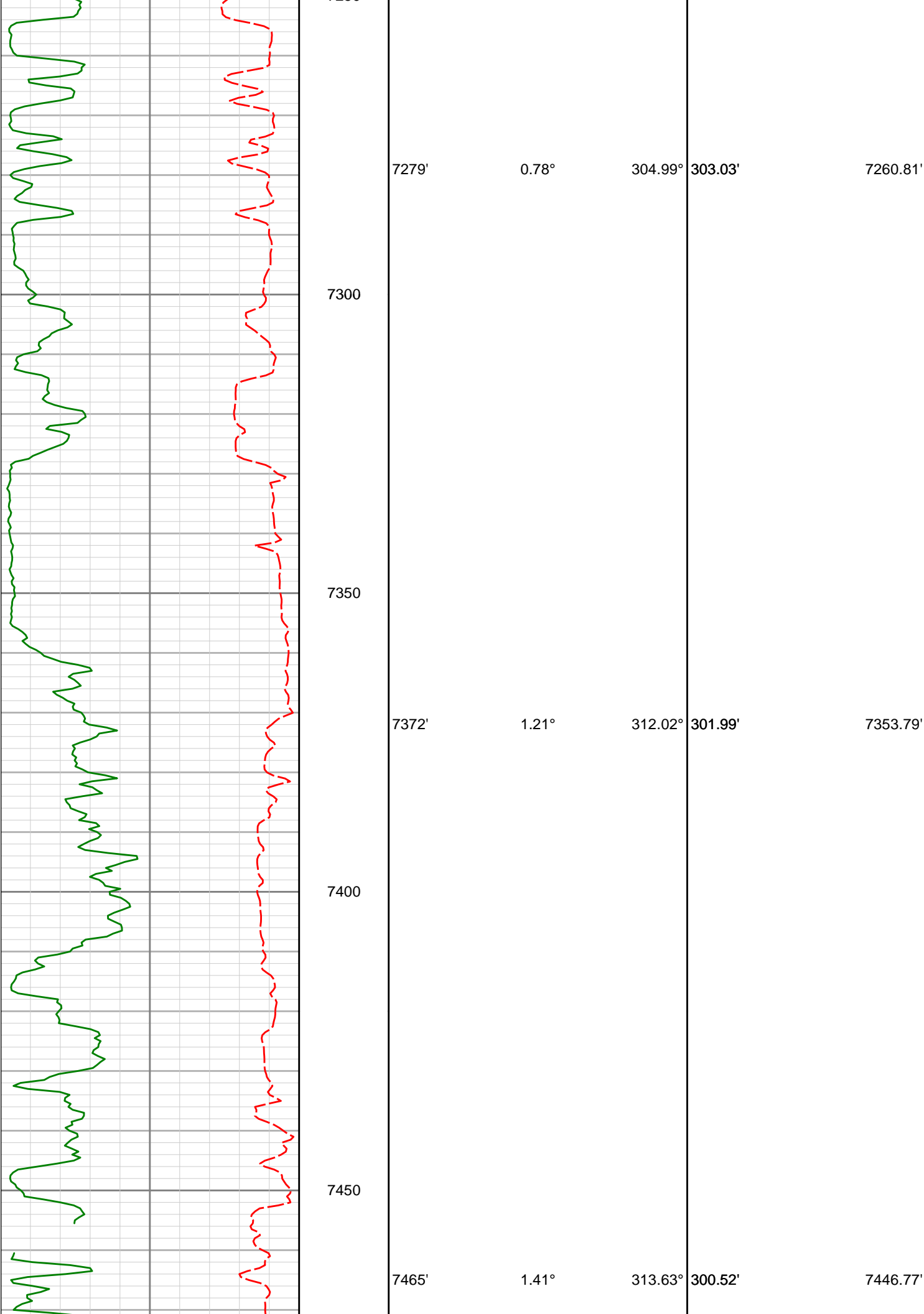
7185'

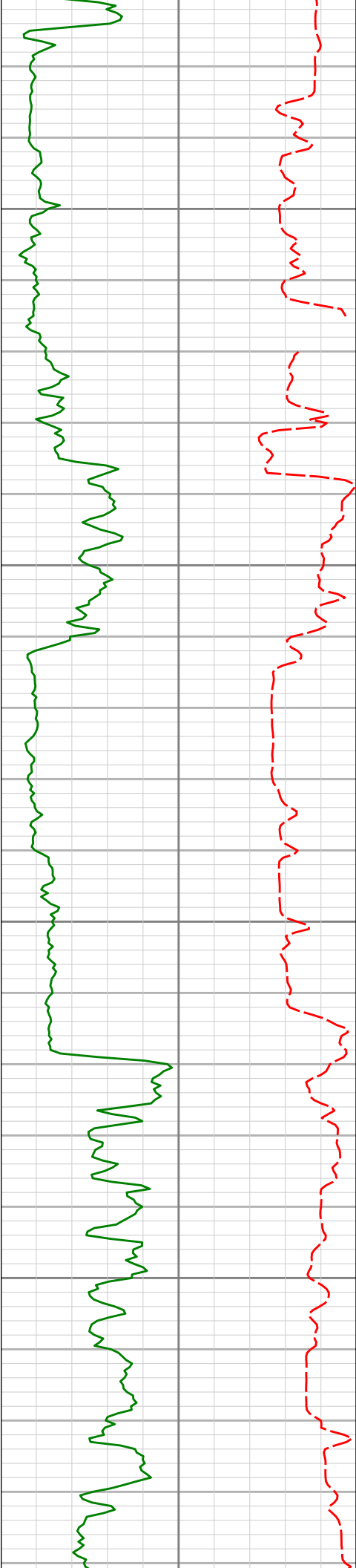
0.40°

287.36°

303.50'

7166.81'





7500

7550

7600

7650

7559'

0.31°

67.09°

299.62'

7540.76'

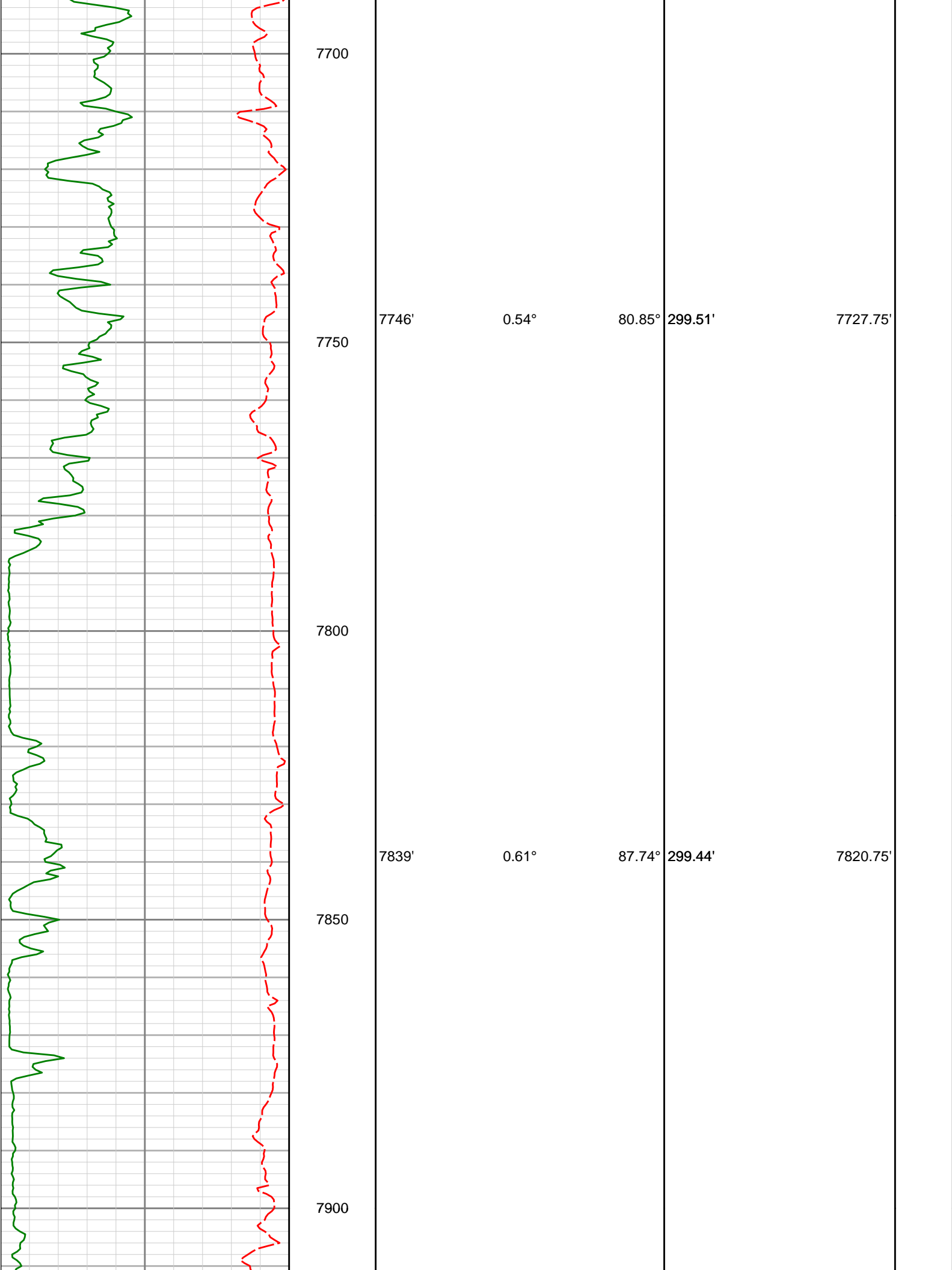
7652'

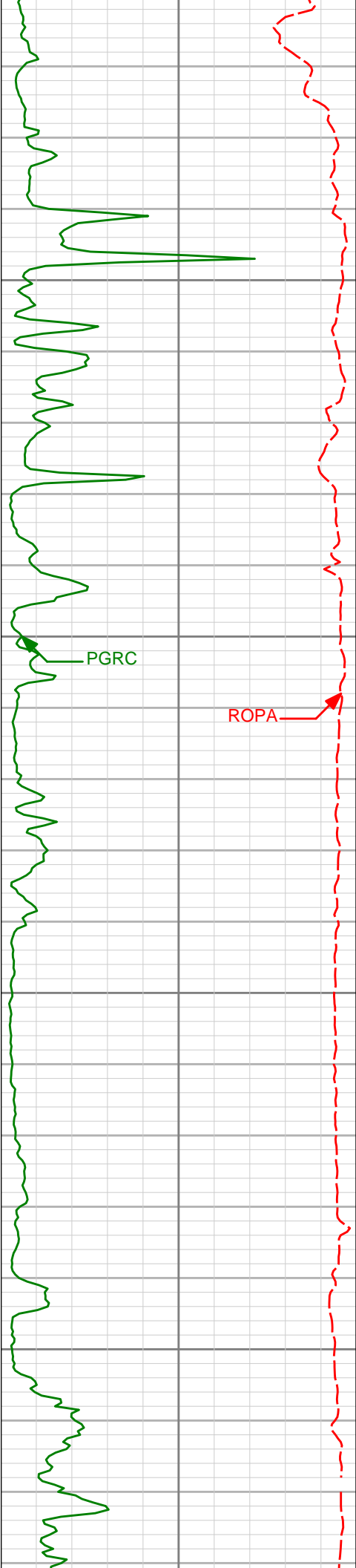
0.42°

93.88°

299.55'

7633.76'





7932'

0.37°

102.19°

299.49'

7913.75'

7950

8000

8050

8100

8025'

0.40°

110.17°

299.67'

8006.74'

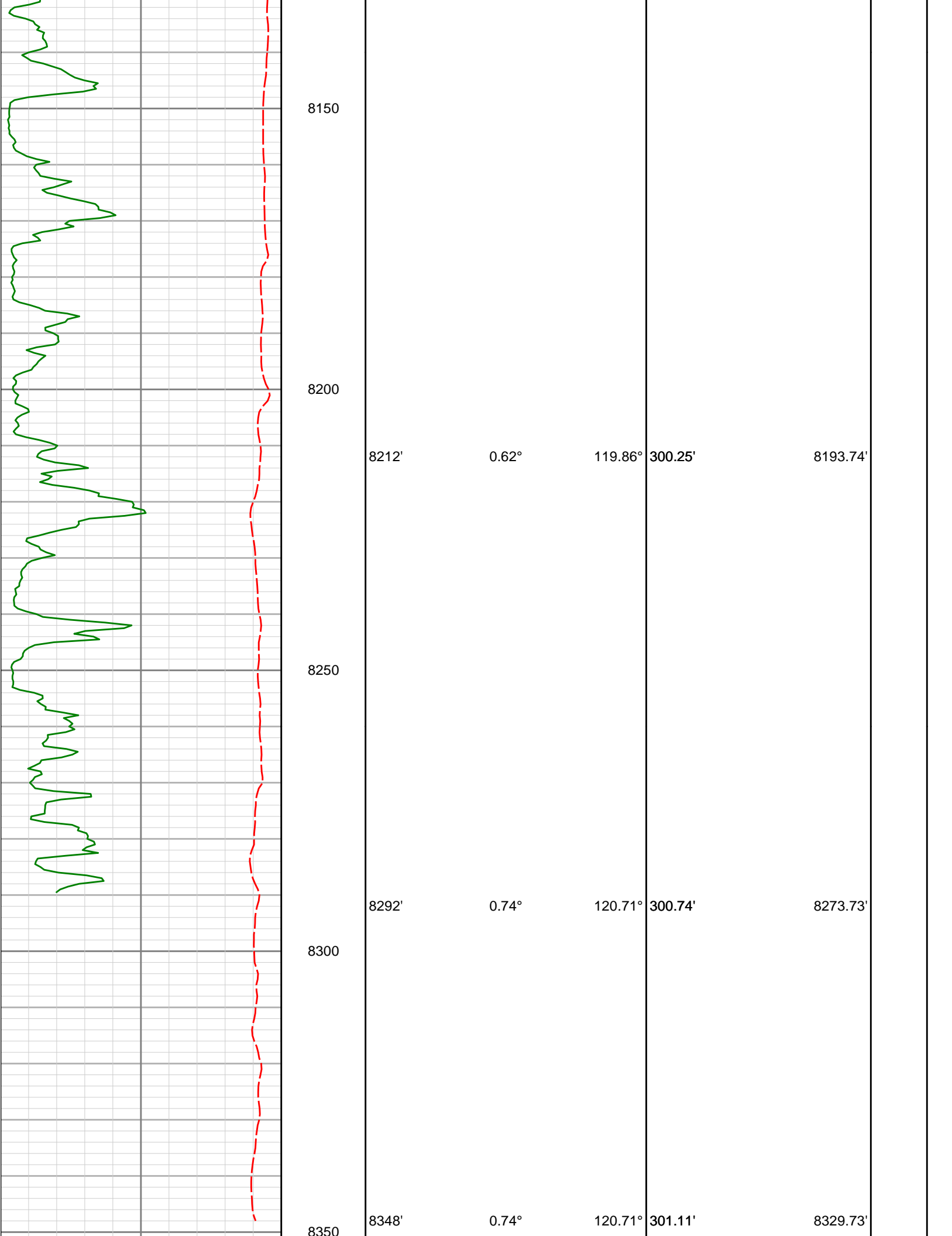
8119'

0.54°

102.28°

299.89'

8100.74'



<div> <div>TD Well @ 8348'</div> <div>8400</div> </div>					
<div> <div>Avg Rate of Penetration feet per hr</div> <div>5000</div> </div>		<div>MD ft</div>	Depth	Inc	Azi
<div> <div>PCG Gamma Ray BCorr (PGRC) api</div> <div>0300</div> </div>		<div>Vertical Section</div> <div>TVD</div>			

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
237.00	0.46	301.54	237.00	0.50 N	0.81 W	-0.51	0.19
328.00	0.41	291.72	327.99	0.81 N	1.42 W	-0.83	0.10
421.00	0.31	336.72	420.99	1.16 N	1.83 W	-1.19	0.31
513.00	0.48	359.44	512.99	1.78 N	1.94 W	-1.80	0.25
976.00	0.66	296.39	975.97	4.90 N	4.34 W	-4.96	0.13
1346.00	0.90	295.55	1345.94	7.10 N	8.87 W	-7.21	0.06
1554.00	1.29	317.13	1553.90	9.52 N	11.94 W	-9.67	0.27
1623.00	1.34	323.42	1622.88	10.74 N	12.95 W	-10.90	0.22
1716.00	0.55	191.78	1715.87	11.18 N	13.69 W	-11.35	1.89
1808.00	1.73	159.56	1807.85	9.44 N	13.29 W	-9.61	1.41
1899.00	3.52	167.01	1898.76	5.43 N	12.19 W	-5.59	2.00
1990.00	5.18	174.24	1989.49	1.38 S	11.15 W	1.23	1.92
2083.00	7.49	175.66	2081.92	11.60 S	10.27 W	11.47	2.49
2176.00	6.69	174.89	2174.21	23.04 S	9.32 W	22.92	0.87
2267.00	5.75	172.75	2264.67	32.84 S	8.28 W	32.73	1.06
2360.00	6.32	178.92	2357.15	42.58 S	7.59 W	42.48	0.93
2452.00	7.61	188.90	2448.48	53.66 S	8.44 W	53.55	1.92
2545.00	7.26	186.89	2540.69	65.58 S	10.10 W	65.45	0.47
2637.00	7.51	182.42	2631.93	77.36 S	11.05 W	77.21	0.68
2729.00	6.84	182.12	2723.21	88.84 S	11.51 W	88.69	0.73
2822.00	7.18	181.25	2815.52	100.18 S	11.84 W	100.03	0.38
2914.00	6.48	180.70	2906.86	111.12 S	12.03 W	110.96	0.76
3007.00	6.40	171.46	2999.28	121.50 S	11.32 W	121.34	1.12
3099.00	7.17	177.92	3090.63	132.31 S	10.35 W	132.16	1.18
3191.00	7.78	178.66	3181.85	144.27 S	10.00 W	144.13	0.67
3282.00	7.63	177.46	3272.03	156.46 S	9.58 W	156.33	0.24
3375.00	7.64	177.62	3364.21	168.81 S	9.05 W	168.68	0.03

3468.00	8.00	177.76	3456.34	181.45 S	8.54 W	181.33	0.39
3560.00	7.37	177.94	3547.51	193.74 S	8.08 W	193.63	0.69
3653.00	6.19	179.67	3639.86	204.72 S	7.84 W	204.60	1.29
3746.00	5.23	170.38	3732.40	213.91 S	7.10 W	213.81	1.43
3837.00	5.12	168.35	3823.03	221.98 S	5.59 W	221.89	0.23
3930.00	7.63	172.49	3915.45	232.17 S	3.94 W	232.10	2.74
4023.00	7.44	172.76	4007.65	244.26 S	2.38 W	244.21	0.21
4115.00	7.42	180.89	4098.88	256.11 S	1.72 W	256.07	1.14
4207.00	6.61	182.26	4190.19	267.34 S	2.02 W	267.29	0.90
4299.00	5.83	184.08	4281.64	277.29 S	2.56 W	277.24	0.87
4391.00	5.15	189.40	4373.22	286.03 S	3.57 W	285.96	0.92
4485.00	3.24	182.38	4466.97	292.84 S	4.37 W	292.76	2.10
4577.00	1.51	185.19	4558.88	296.65 S	4.59 W	296.57	1.88
4669.00	0.10	158.39	4650.87	297.93 S	4.67 W	297.85	1.55
4763.00	0.04	352.31	4744.87	297.97 S	4.64 W	297.89	0.15
4856.00	0.04	69.67	4837.87	297.93 S	4.61 W	297.85	0.05
4949.00	0.11	45.39	4930.87	297.86 S	4.52 W	297.78	0.08
5042.00	0.18	17.86	5023.87	297.66 S	4.41 W	297.57	0.10
5135.00	0.13	356.43	5116.87	297.41 S	4.37 W	297.33	0.08
5228.00	0.42	308.13	5209.87	297.10 S	4.65 W	297.01	0.37
5322.00	0.71	301.18	5303.87	296.58 S	5.42 W	296.49	0.32
5415.00	0.54	285.04	5396.86	296.17 S	6.33 W	296.06	0.26
5508.00	0.34	291.23	5489.86	295.96 S	7.01 W	295.84	0.22
5601.00	0.05	13.27	5582.86	295.82 S	7.26 W	295.70	0.36
5694.00	0.16	27.65	5675.86	295.66 S	7.19 W	295.55	0.12
5787.00	0.14	122.76	5768.86	295.61 S	7.04 W	295.49	0.24
5880.00	0.26	131.68	5861.86	295.81 S	6.78 W	295.70	0.13
5973.00	0.28	114.07	5954.86	296.04 S	6.42 W	295.94	0.09
6067.00	0.39	114.00	6048.85	296.27 S	5.92 W	296.17	0.12
6160.00	0.50	93.51	6141.85	296.42 S	5.22 W	296.33	0.21
6253.00	0.49	120.73	6234.85	296.65 S	4.47 W	296.57	0.25
6347.00	0.74	132.27	6328.84	297.26 S	3.68 W	297.19	0.30
6440.00	0.59	150.12	6421.84	298.08 S	3.00 W	298.02	0.27
6533.00	0.56	169.66	6514.83	298.94 S	2.68 W	298.88	0.21
6626.00	0.57	184.50	6607.83	299.85 S	2.63 W	299.79	0.16
6719.00	0.48	177.65	6700.82	300.70 S	2.65 W	300.64	0.12
6812.00	0.49	178.87	6793.82	301.49 S	2.63 W	301.43	0.02
6906.00	0.50	175.30	6887.82	302.30 S	2.59 W	302.24	0.03
6999.00	0.44	181.59	6980.81	303.06 S	2.56 W	303.00	0.08
7092.00	0.15	182.08	7073.81	303.54 S	2.58 W	303.48	0.31
7185.00	0.40	287.36	7166.81	303.56 S	2.89 W	303.50	0.50
7279.00	0.78	304.99	7260.81	303.10 S	3.73 W	303.03	0.44
7372.00	1.21	312.02	7353.79	302.08 S	4.98 W	301.99	0.48
7465.00	1.41	313.63	7446.77	300.63 S	6.54 W	300.52	0.22
7559.00	0.31	67.09	7540.76	299.73 S	7.14 W	299.62	1.66
7652.00	0.42	93.88	7633.76	299.66 S	6.57 W	299.55	0.22
7746.00	0.54	80.85	7727.75	299.61 S	5.79 W	299.51	0.17
7839.00	0.61	87.74	7820.75	299.52 S	4.86 W	299.44	0.11
7932.00	0.37	102.19	7913.75	299.57 S	4.07 W	299.49	0.29
8025.00	0.40	110.17	8006.74	299.74 S	3.47 W	299.67	0.07
8119.00	0.54	102.28	8100.74	299.95 S	2.73 W	299.89	0.16
8212.00	0.62	119.86	8193.74	300.29 S	1.87 W	300.25	0.21
8292.00	0.74	120.71	8273.73	300.77 S	1.05 W	300.74	0.15
8348.00	0.74	120.71	8329.73	301.14 S	0.42 W	301.11	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 179.27 DEGREES (TRUE)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 8348.00 FEET
IS 301.14 FEET ALONG 180.08 DEGREES (TRUE)

Surveys have been IFR Corrected
Final Survey is Projected to TD

