

PCGK - Pressure Case Gamma



1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	20-Apr-14	21-Apr-14	24-Apr-14		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.880	6.750	4.780		
Log Start Depth (MD, ft)	638.00	5,857.00	6,912.00		
Log End Depth (MD, ft)	5,857.00	6,912.00	11,945.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	19-Apr-14 02:34	20-Apr-14 05:19	22-Apr-14 01:57		
Drill/Wipe End Date and Time	19-Apr-14 20:37	20-Apr-14 18:17	23-Apr-14 16:59		
Min Inc (deg) @ Depth (MD, ft)	0.07 @ 1,926.00	1.26 @ 5,863.00	87.22 @ 7,549.00		
Max Inc (deg) @ Depth (MD, ft)	18.08 @ 3,819.00	85.62 @ 6,858.00	92.41 @ 7,086.00		
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC	0.65 / PDC		
Flow Rate (gpm)	598.06	600.00	315.00		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud		
Density (ppg) / Viscosity (spqt)	8.90 / 32.00	10.50 / 40.00	9.40 / 37.00		
Filtrate CL (ppm)	1,200.00	2,400.00	2,600.00		
pH / Fluid Loss (mptm)	10.00 / 19	9.50 / 8	9.50 / 7		
PV (cP) / YP (lbf2)	4 / 4.00	14 / 11.00	9 / 10.00		
% Solids / % Sand	3.60 / 0.20	10.20 / 0.20	6.00 / 0.03		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
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 (deg F) @ Depth (MD, ft)	144.75 @ 100.00	150.00 @ 100.00	222.44 @ 100.00		

Max Tool Temp (degF) / Source	141.70 / PCM	158.60 / PCM	223.41 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 141.70	N/A @ 158.60	N/A @ 223.41		
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass		
Customer Representative	Jim Turner	Jim Turner	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	11404294	11404294	12310740		
Insert Serial Number	11400991	11400991	11400991		
Date and Time Initialized	18-Apr-14 01:27	18-Apr-14 01:27	21-Apr-14 05:57		
Date and Time Read	21-Apr-14 01:15	21-Apr-14 01:18	24-Apr-14 03:03		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	54.00	64.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404294	11404294	12310740		
Sonde Serial Number	11833237	11833237	11833237		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	191.43	38.82	37.89		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.16	47.18	66.79		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404294	11404294	12310740		
Insert/Sonde Serial Number	11293318	11293318	11293318		

REMARKS

1. All depths are calibrated to driller's pipe tally and are Measured depth's from the Drill 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 "Brigham 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:
 - 1:600 Log
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)
Interval Resolution: 1.0 ft
Interval Distance: 3.0 ft
 - 1:240 Log
PGRC (Gamma CG):
Interval Resolution: 0.5 ft
Interval Distance: 0.6 ft
 - ROPA (Average Rate Of Penetration):
Interval Resolution: 0.5 ft

Interval Resolution: 1.2 ft

6. Insite Version v8.0.10

WARRANTY

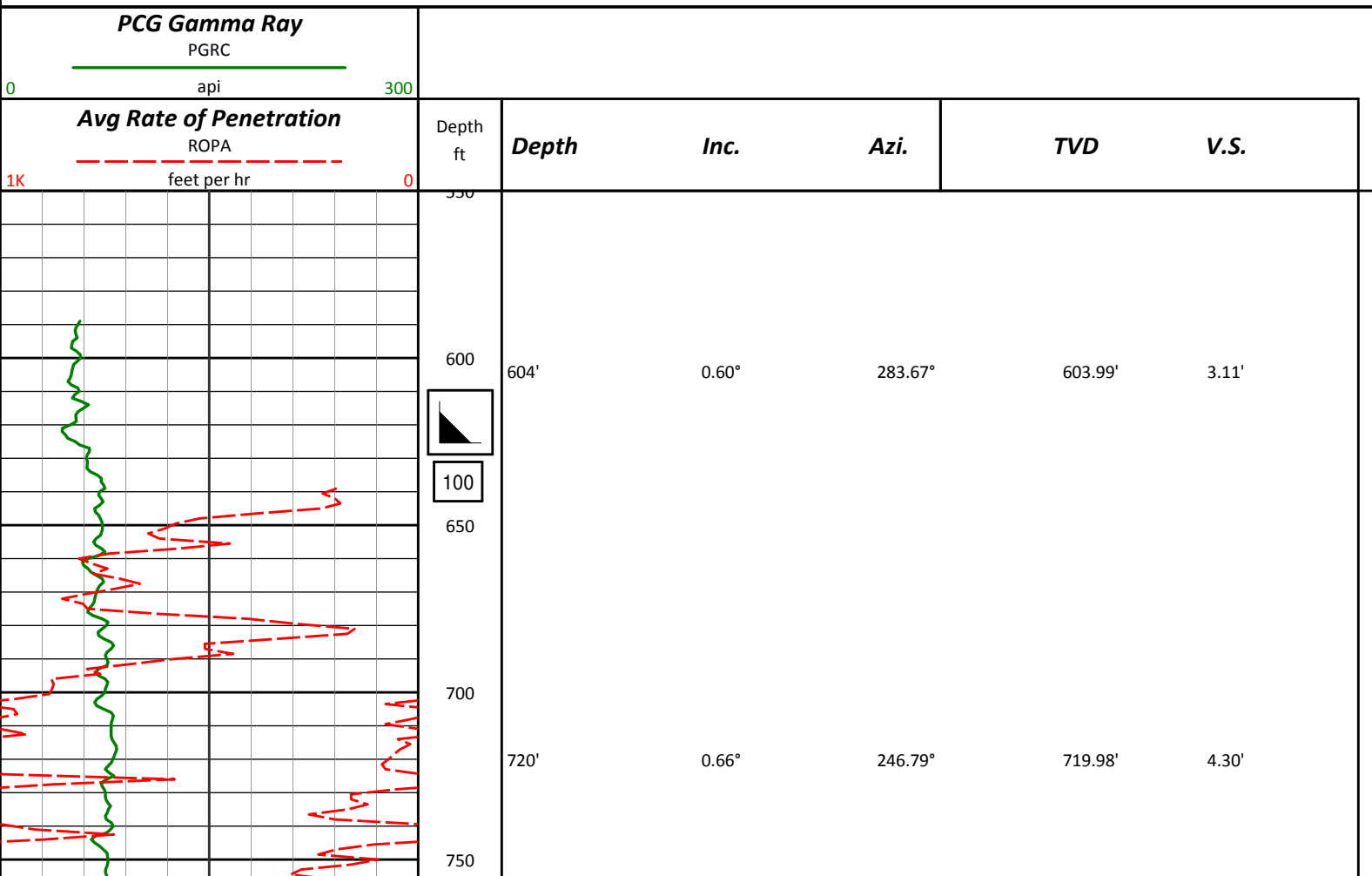
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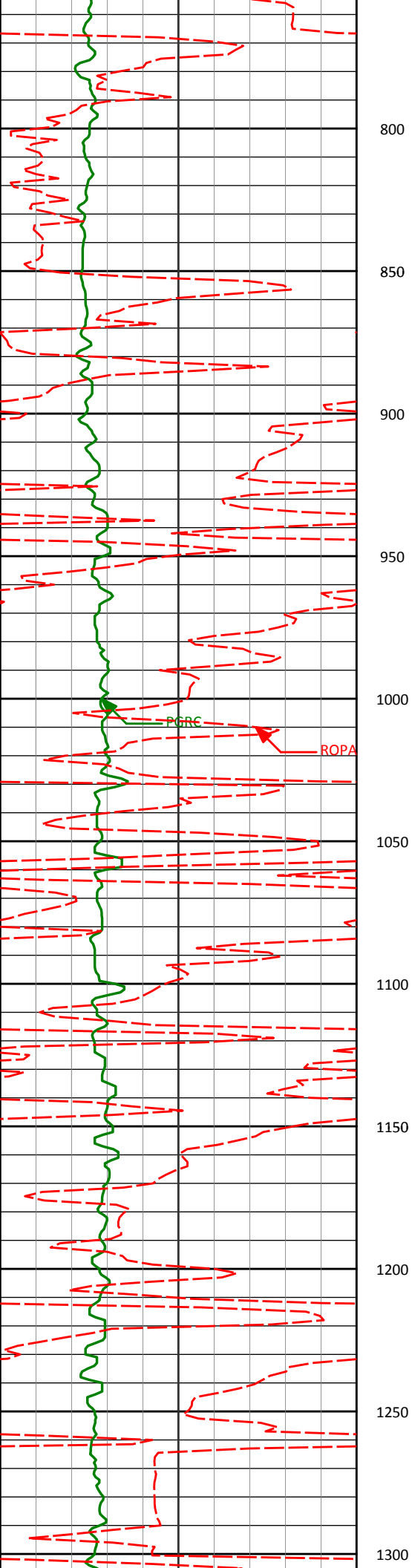
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Sperry Drilling Services

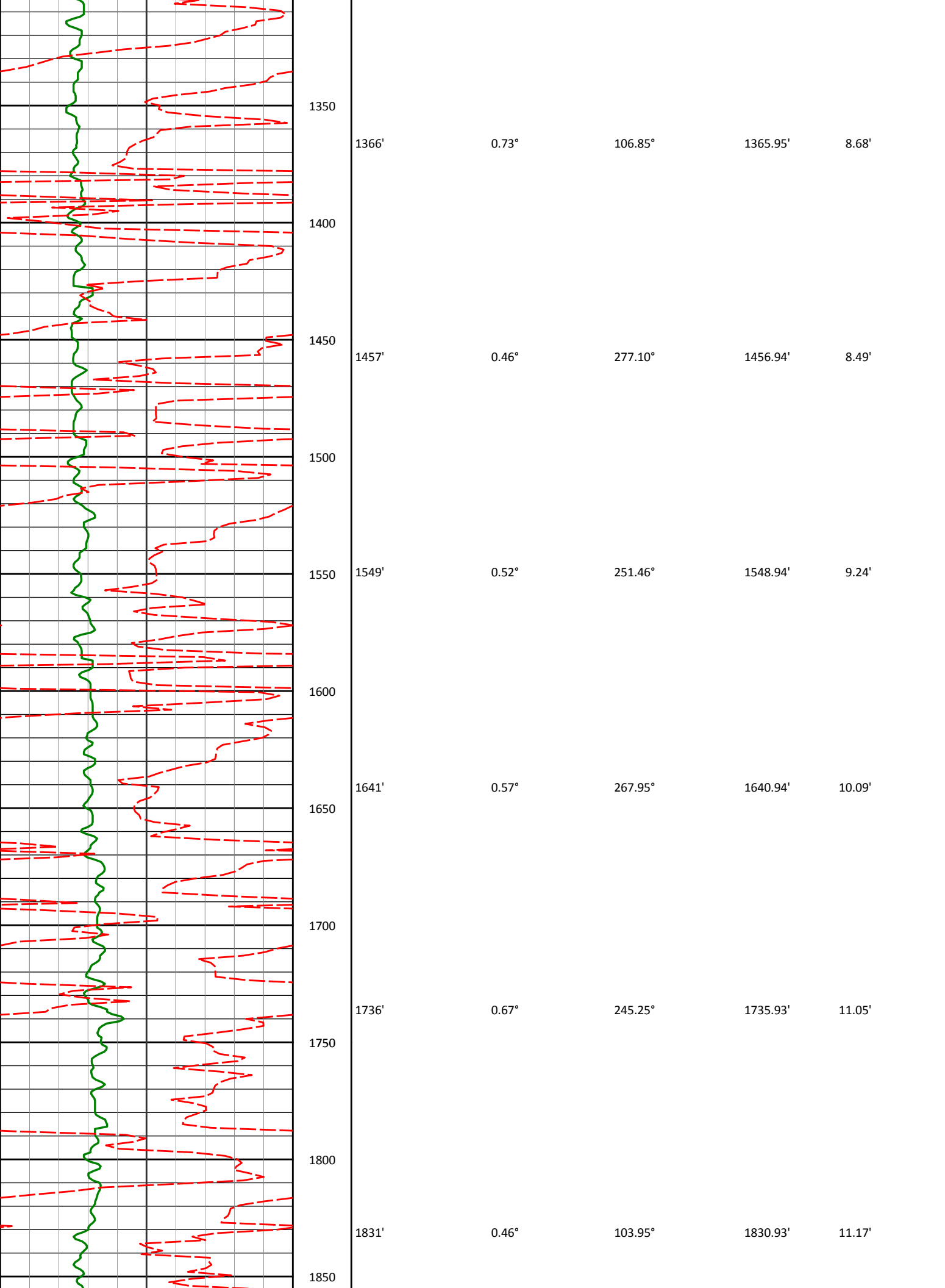
TVD Correlation Log 1:600

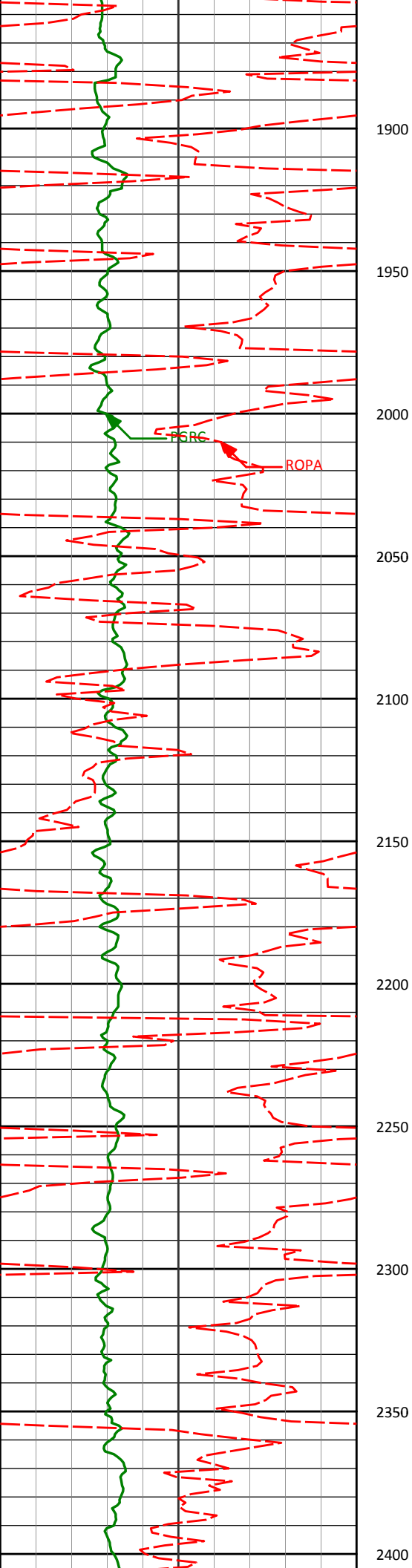
Noble Energy
Wells Ranch AE30-65-1AHNB
H&P 321
Sec. 29-T6N-R62W



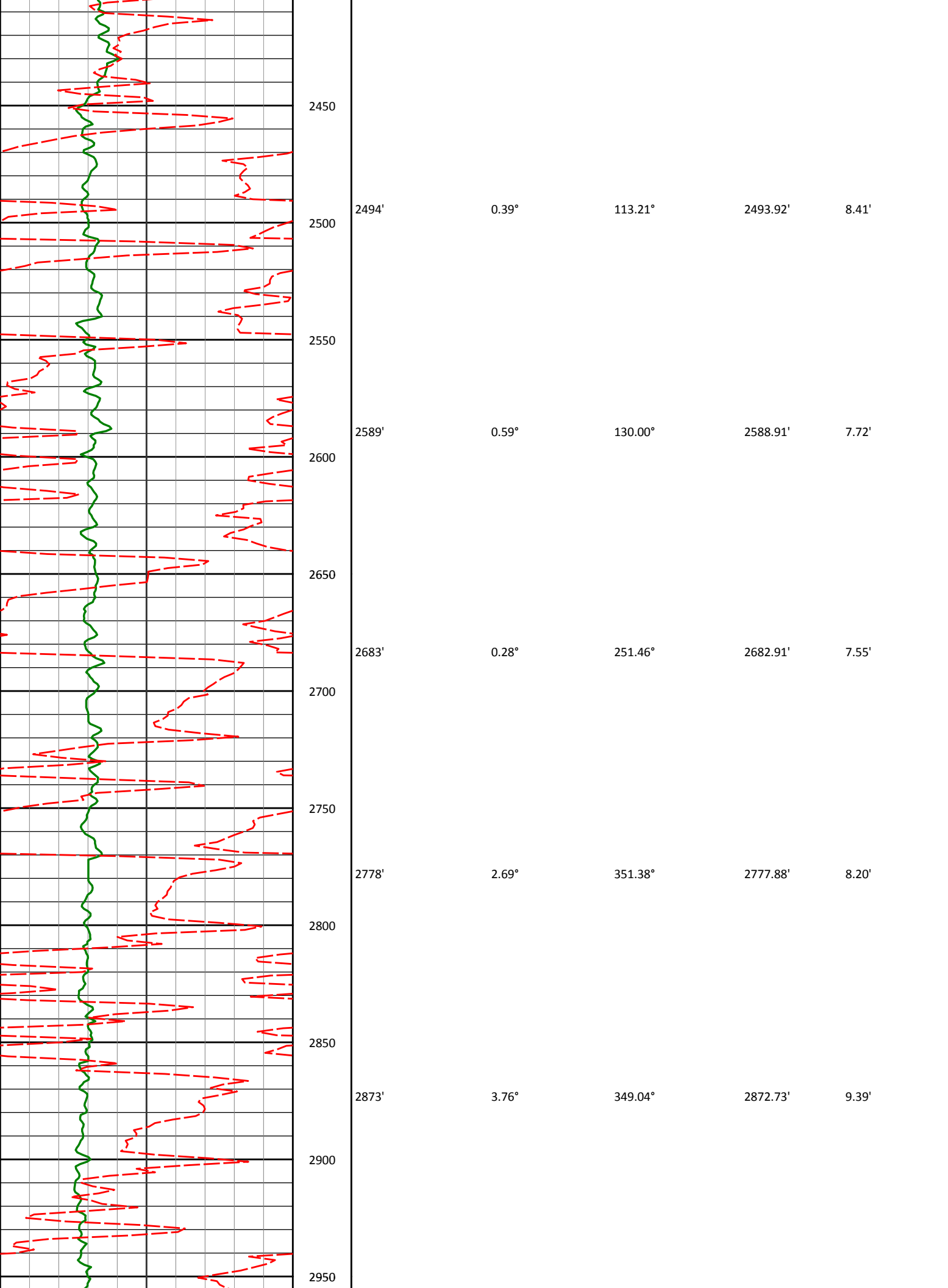


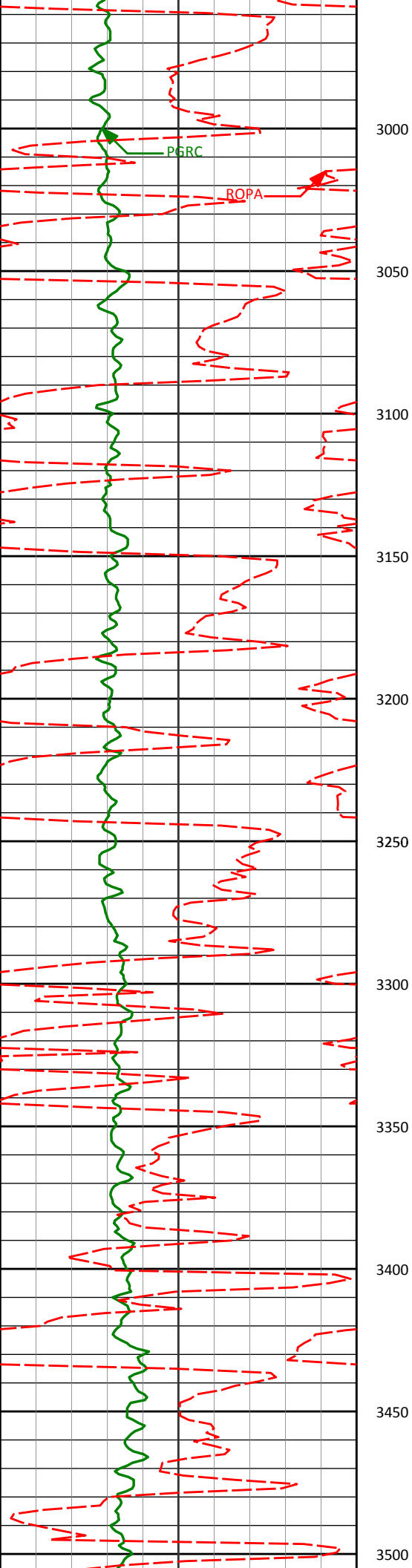
812'	0.56°	255.96°	811.98'	5.21'
903'	0.74°	232.94°	902.97'	6.09'
996'	0.73°	219.29°	995.96'	6.90'
1087'	0.58°	231.60°	1086.96'	7.59'
1180'	0.59°	228.60°	1179.95'	8.29'
1273'	0.50°	233.57°	1272.95'	8.94'



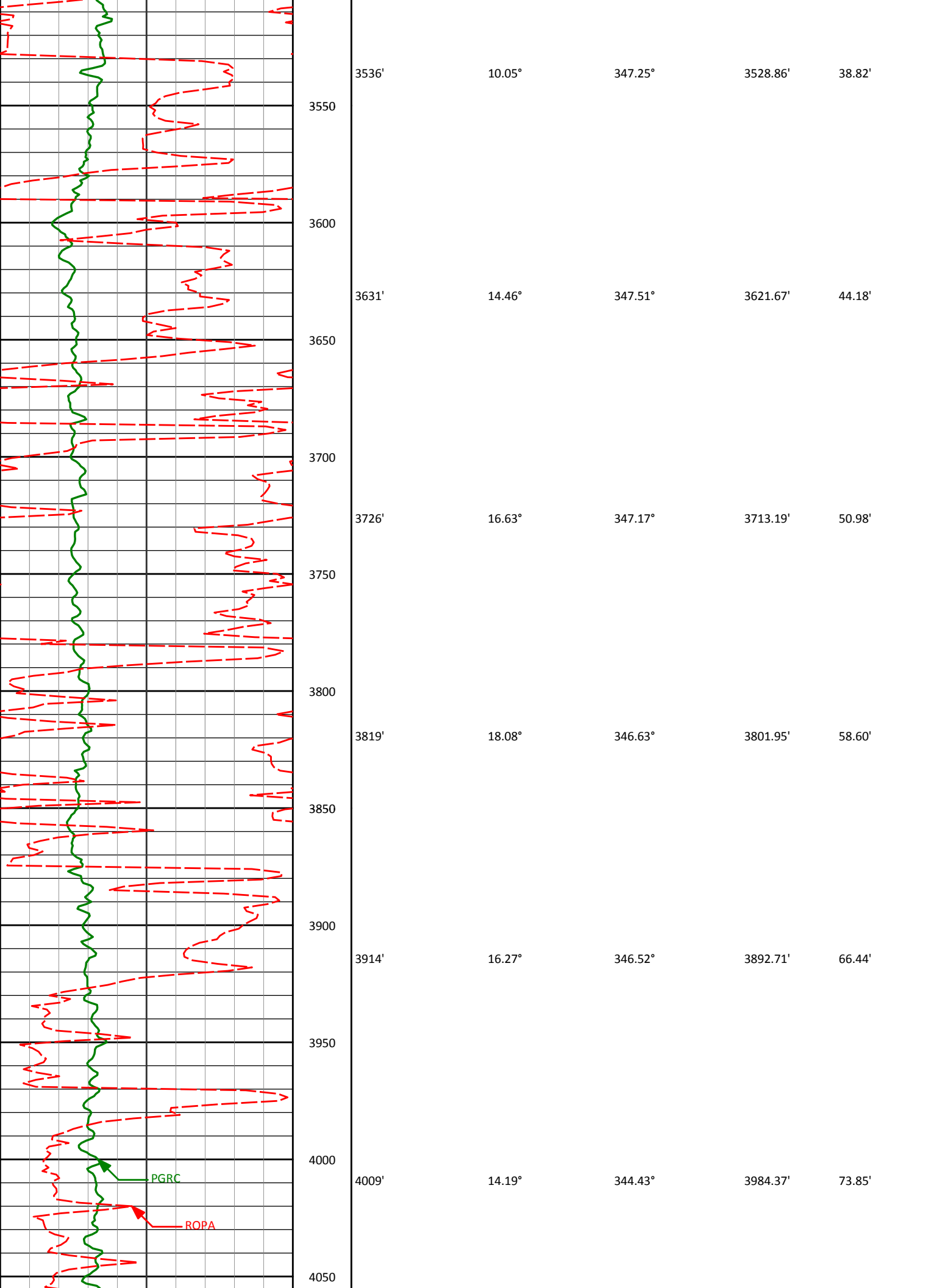


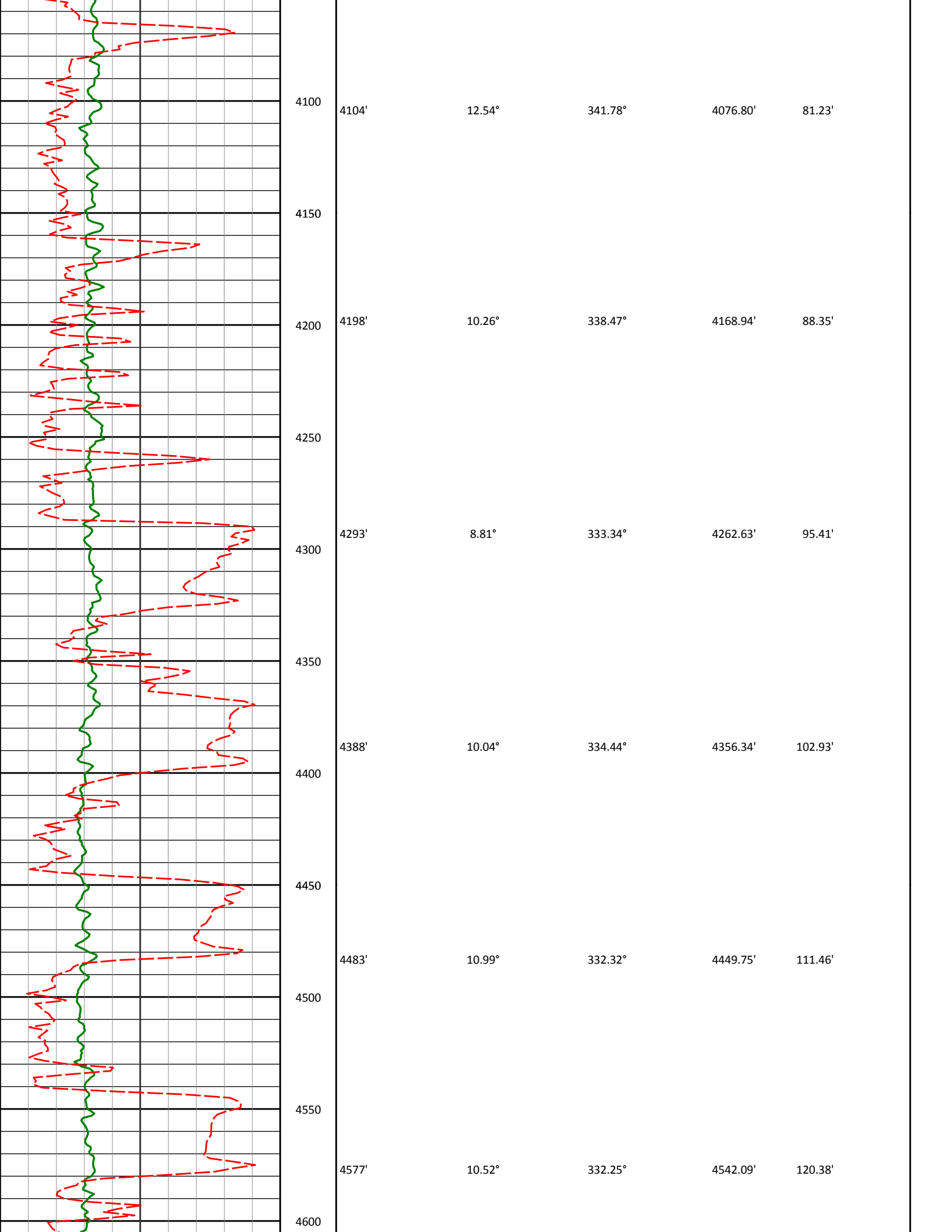
1900				
1926'	0.07°	355.94°	1925.93'	10.80'
1950				
2000				
2020'	0.29°	300.73°	2019.93'	11.02'
2050				
2100				
2115'	0.63°	67.22°	2114.93'	10.76'
2150				
2200				
2210'	0.41°	65.37°	2209.92'	9.99'
2250				
2300				
2350				
2400				
2399'	0.30°	67.99°	2398.92'	8.94'

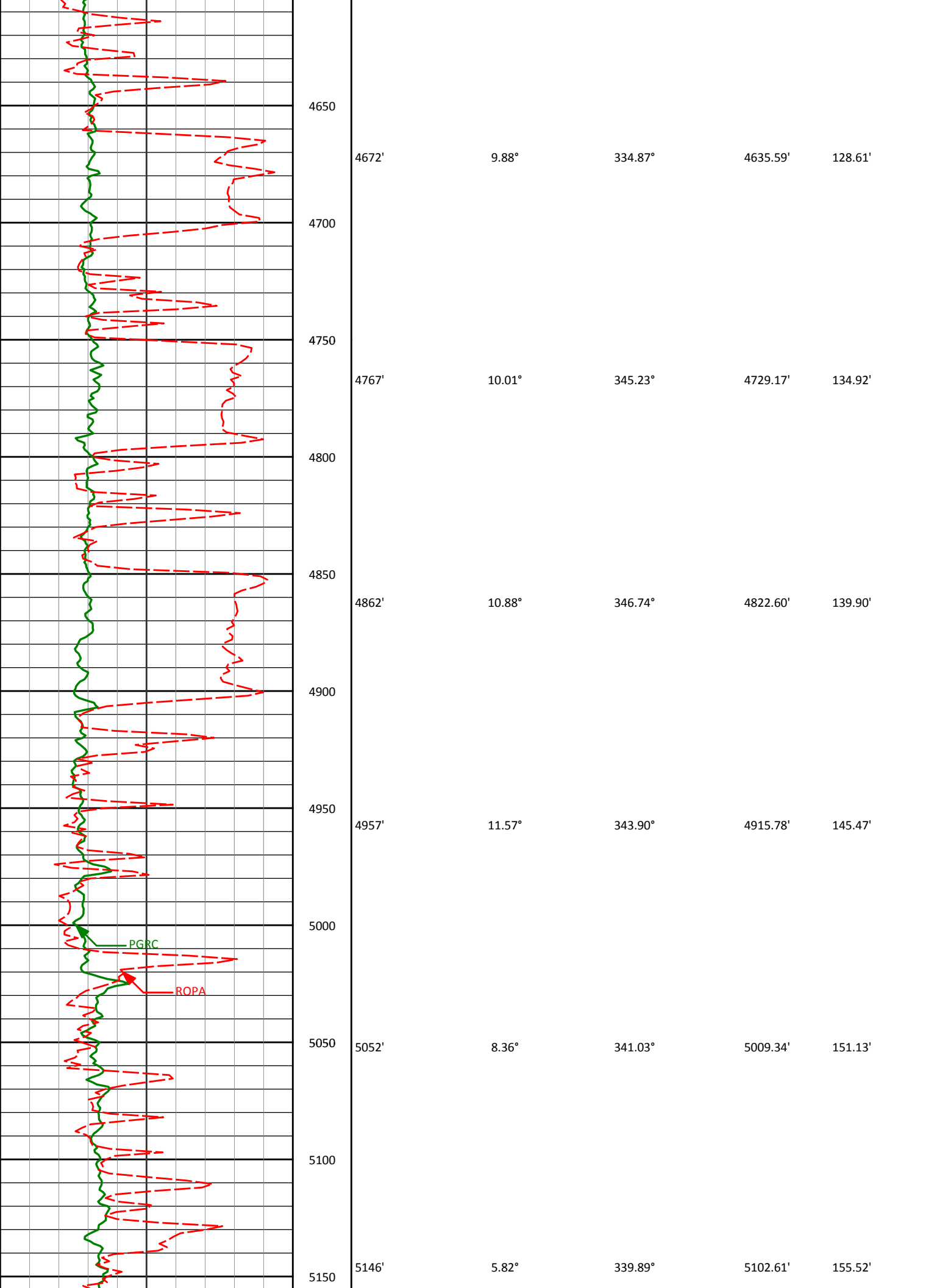


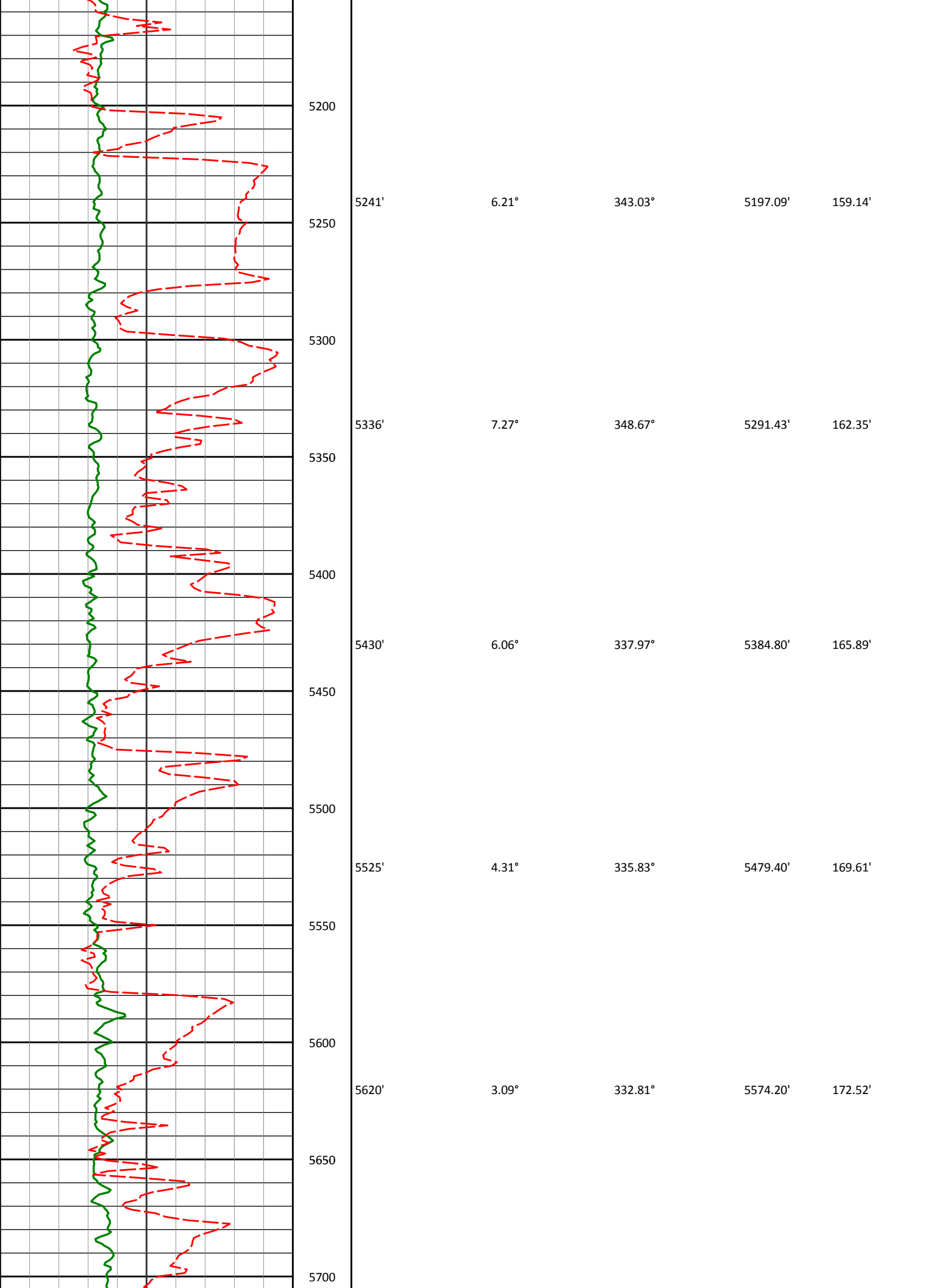


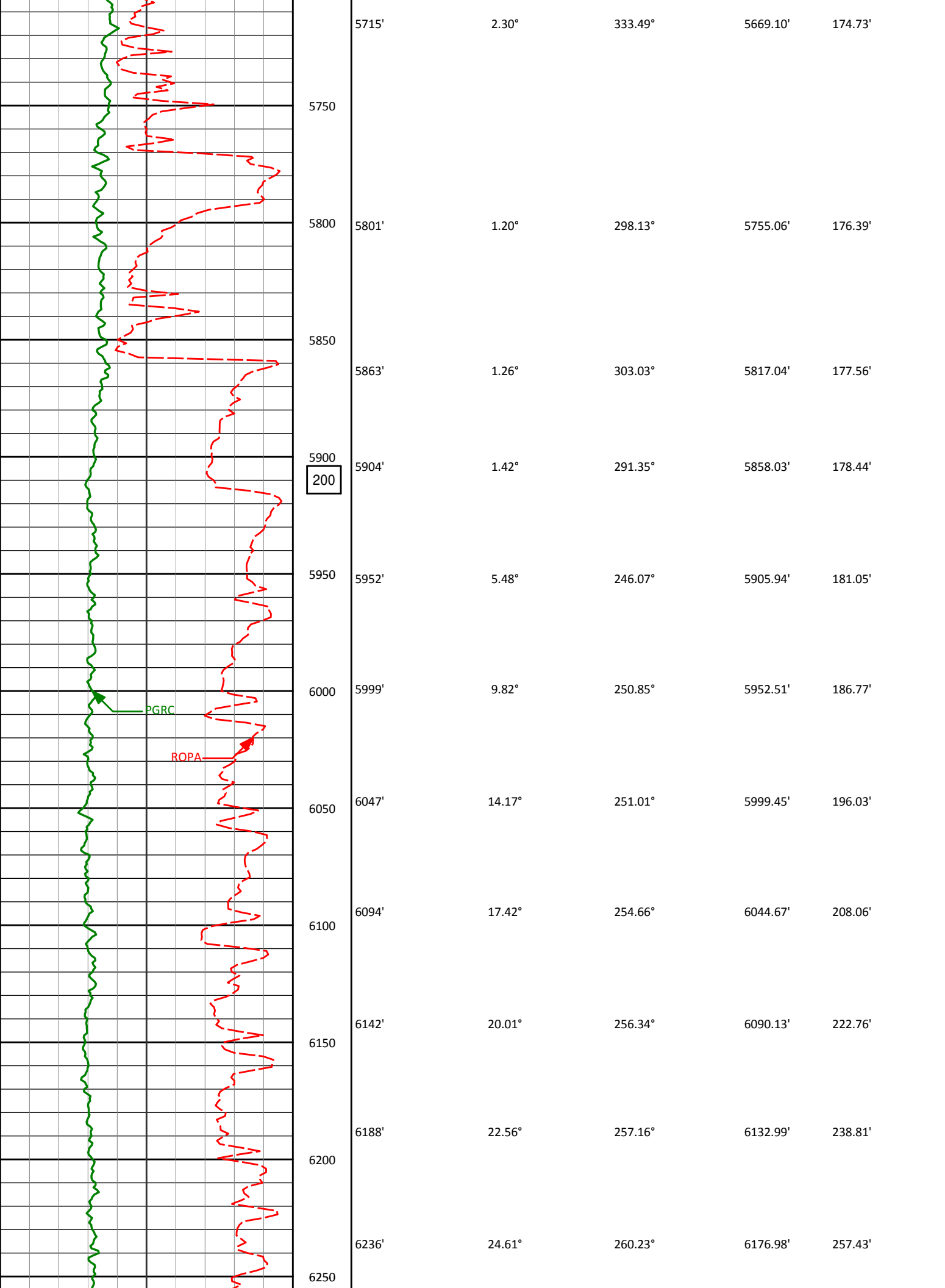
2968'	6.05°	334.65°	2967.37'	12.49'
3000				
3062'	8.20°	331.12°	3060.64'	18.36'
3100				
3157'	8.19°	342.12°	3154.68'	24.31'
3200				
3252'	8.76°	349.31°	3248.64'	28.39'
3300				
3347'	8.88°	350.54°	3342.52'	31.64'
3400				
3441'	9.78°	350.53°	3435.28'	34.88'
3450				
3500				

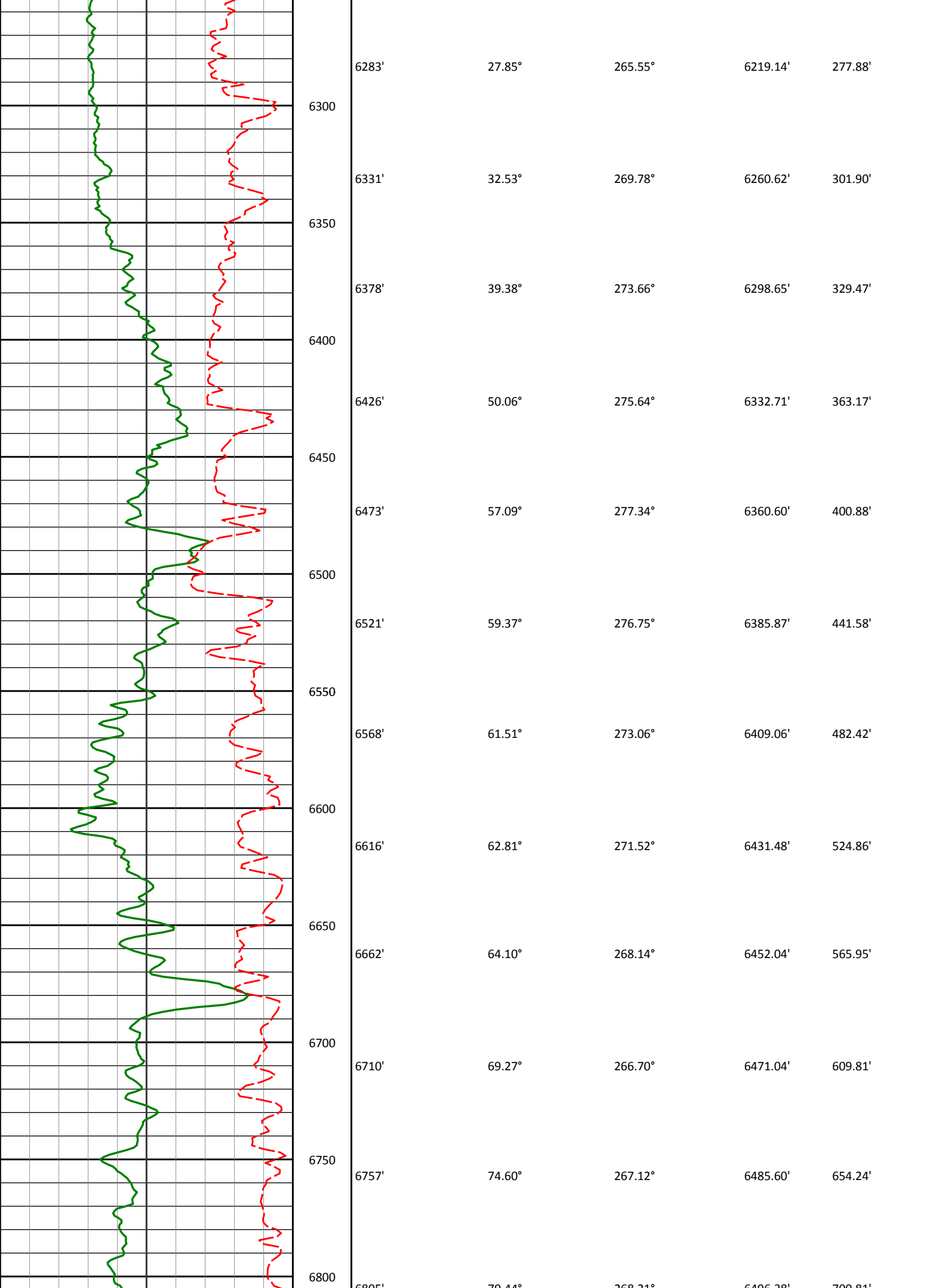


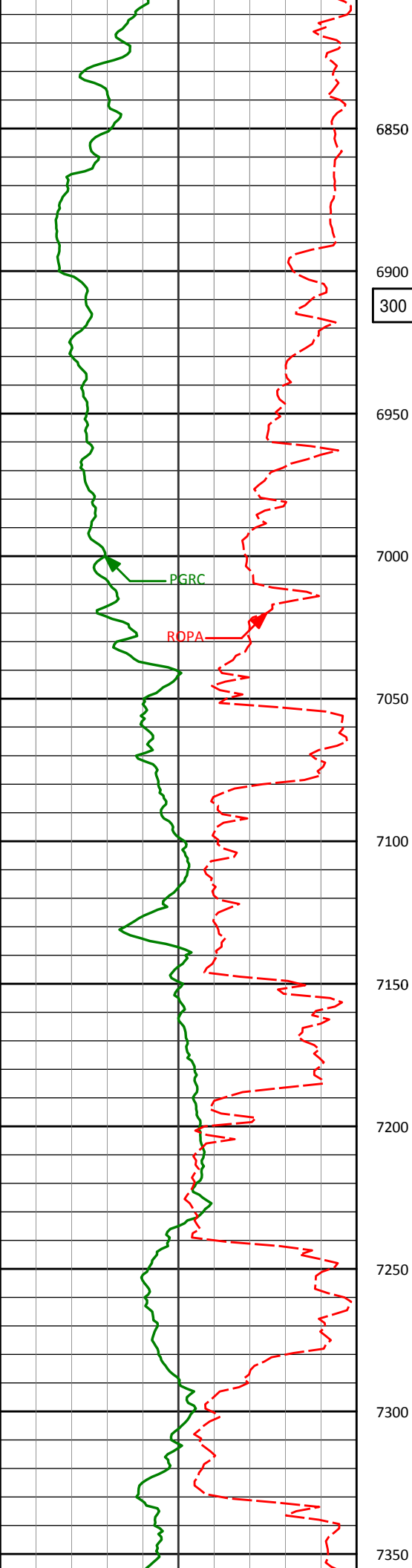




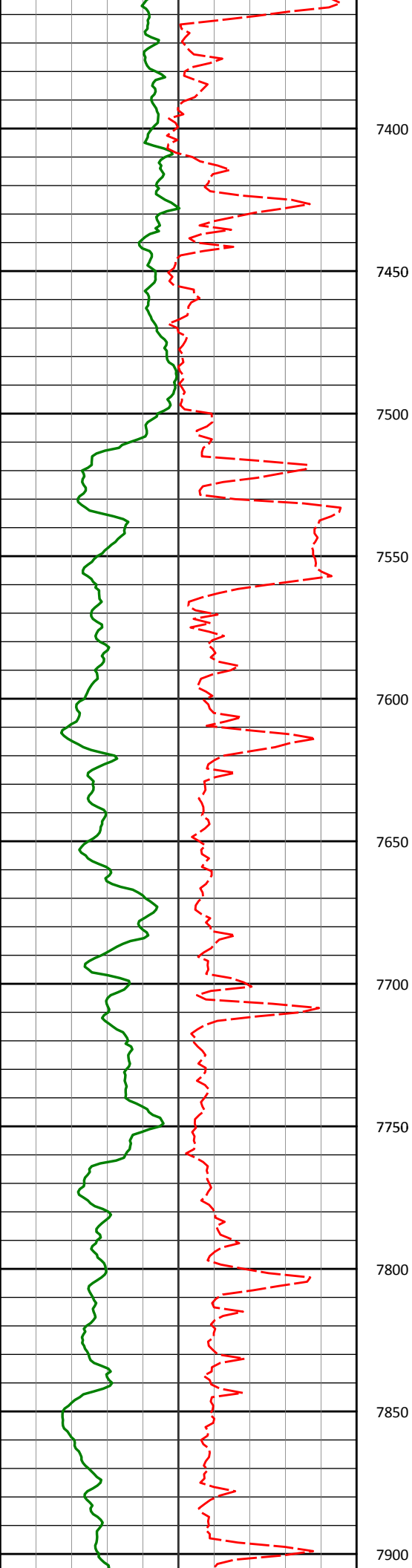




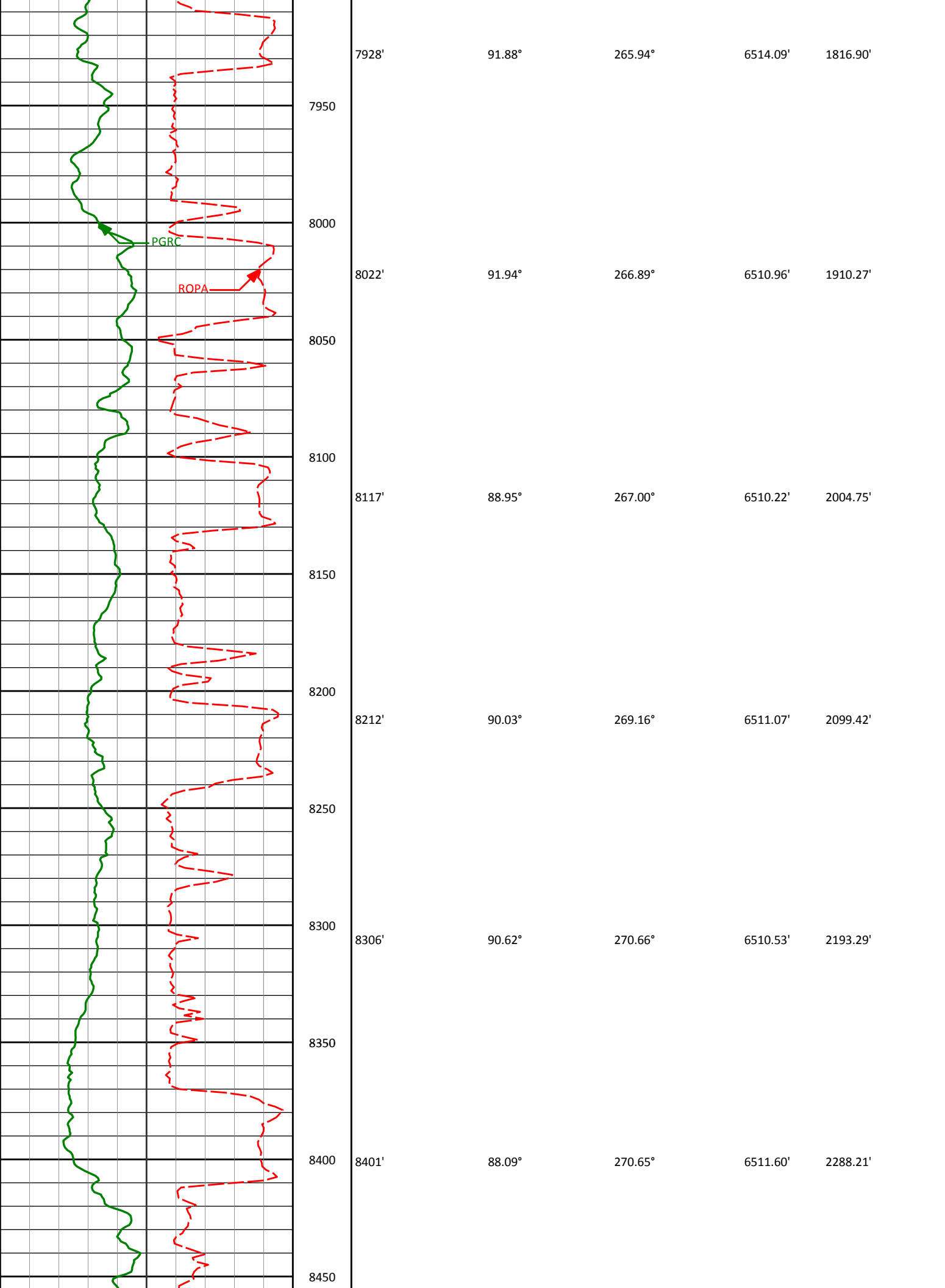


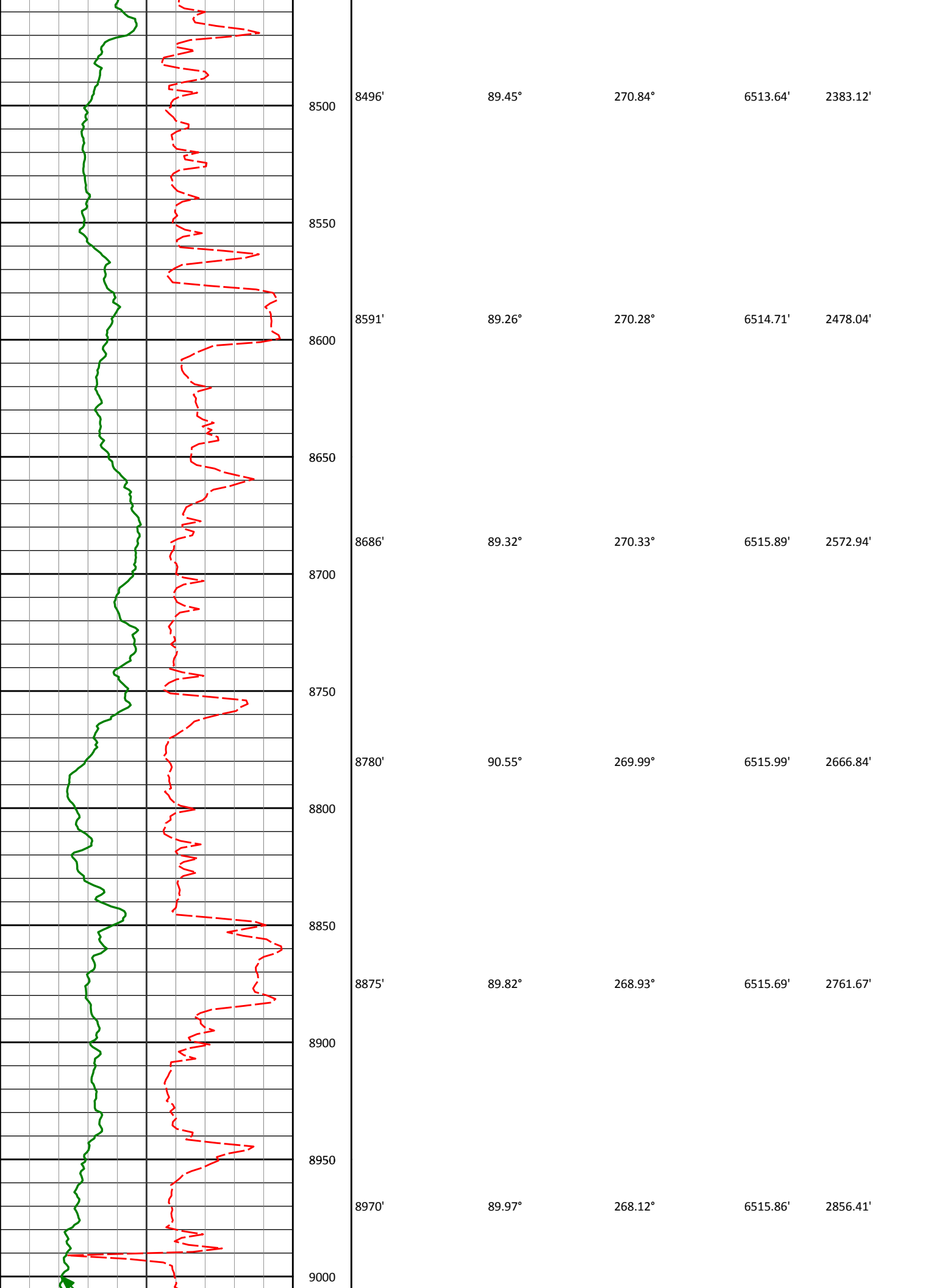


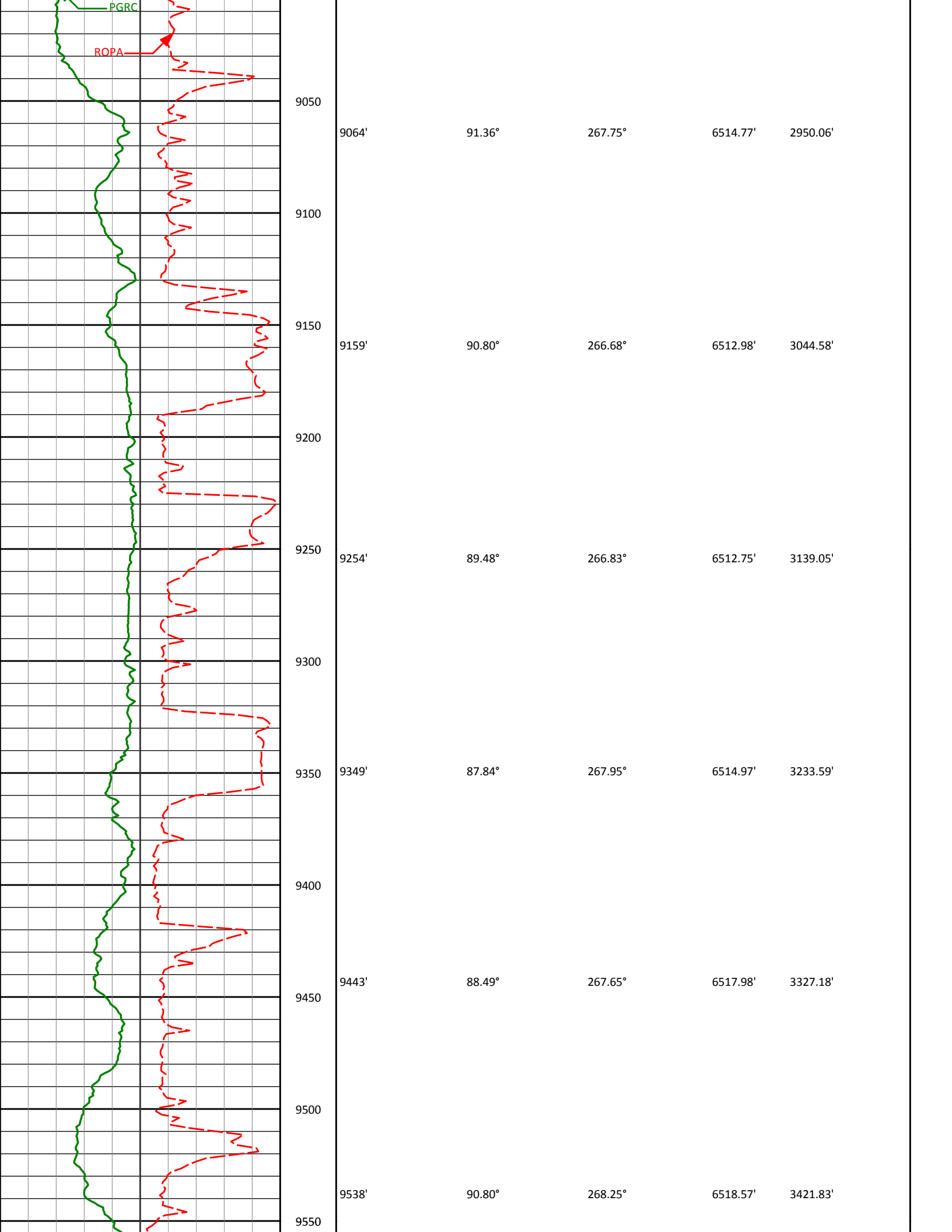
6805	79.44°	268.21°	6496.38'	700.81'
6850	85.62°	268.63°	6503.27'	753.18'
6858'				
6900				
6900				
6950				
6993'	91.29°	270.53°	6506.91'	887.86'
7000				
7050				
7086'	92.41°	268.88°	6503.91'	980.67'
7100				
7150				
7178'	91.36°	266.47°	6500.88'	1072.24'
7200				
7250				
7270'	89.48°	265.82°	6500.21'	1163.61'
7300				
7350				

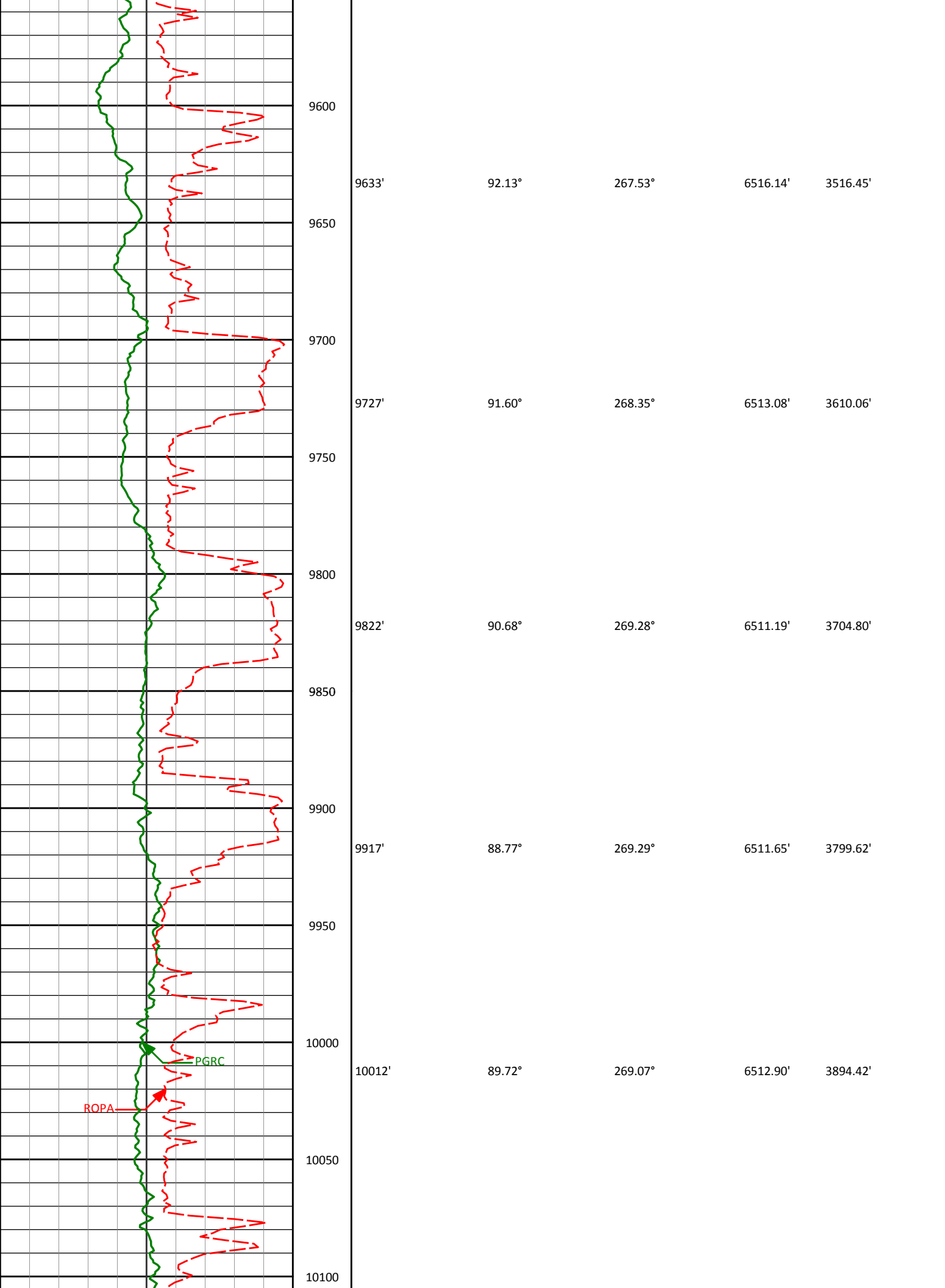


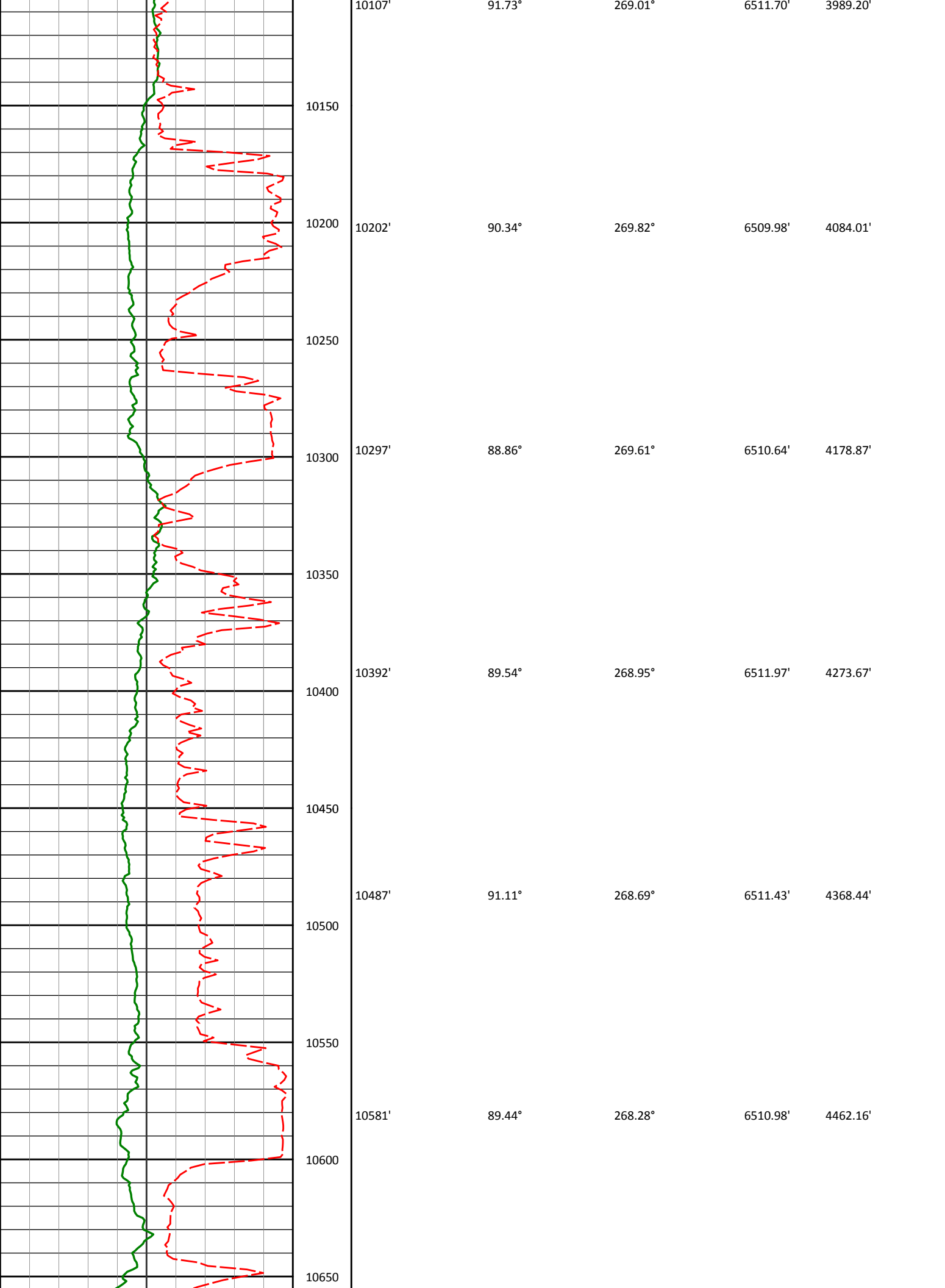
7362'	87.94°	266.63°	6502.28'	1254.97'
7400'	87.94°	266.63°	6502.28'	1254.97'
7454'	89.41°	268.47°	6504.40'	1346.55'
7500'	89.41°	268.47°	6504.40'	1346.55'
7549'	87.22°	267.19°	6507.20'	1441.15'
7600'	87.22°	267.19°	6507.20'	1441.15'
7644'	87.47°	265.95°	6511.60'	1535.48'
7700'	87.47°	265.95°	6511.60'	1535.48'
7738'	88.49°	265.22°	6514.91'	1628.67'
7800'	88.49°	265.22°	6514.91'	1628.67'
7833'	90.31°	264.58°	6515.91'	1722.75'
7900'	90.31°	264.58°	6515.91'	1722.75'

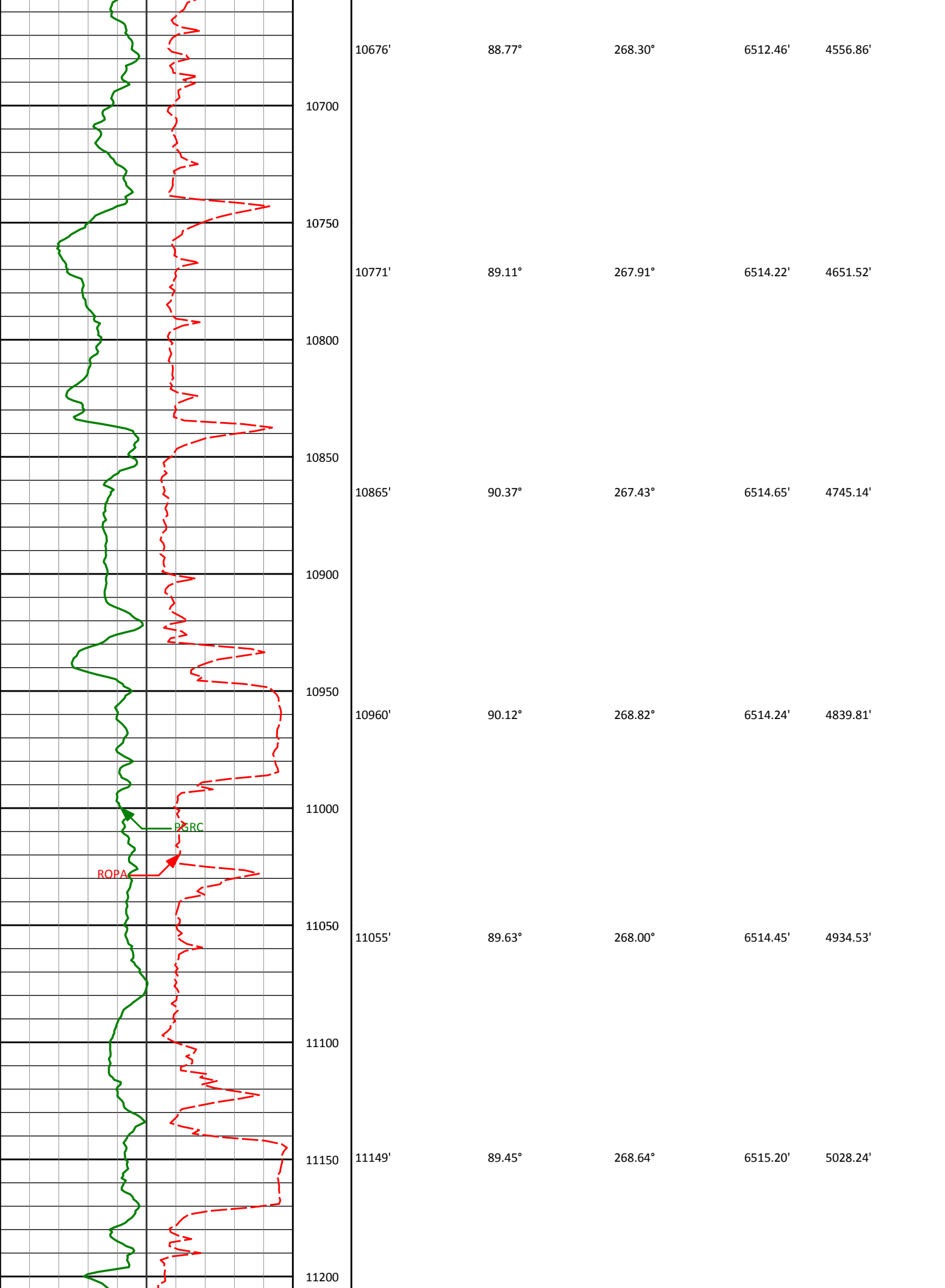


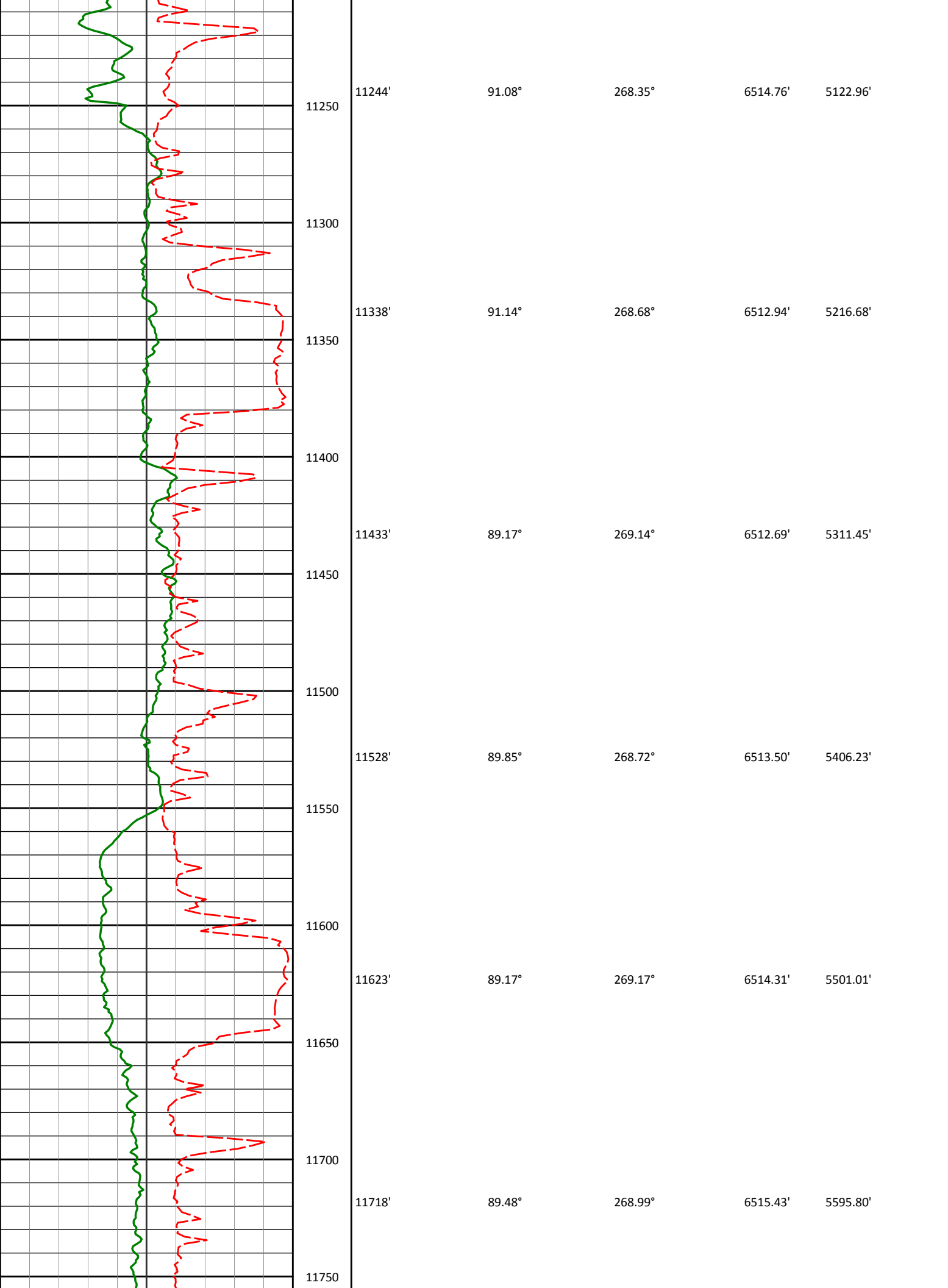


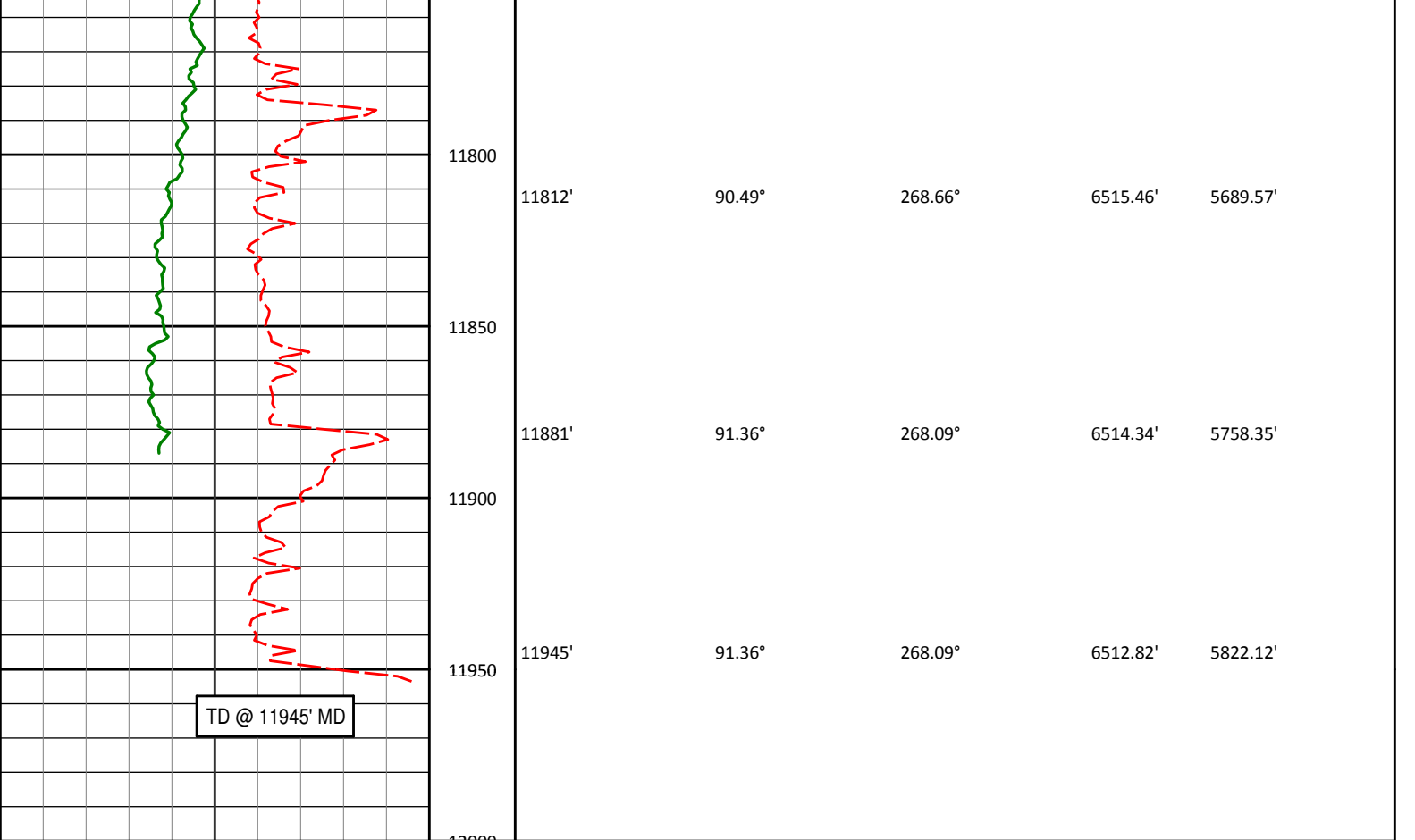










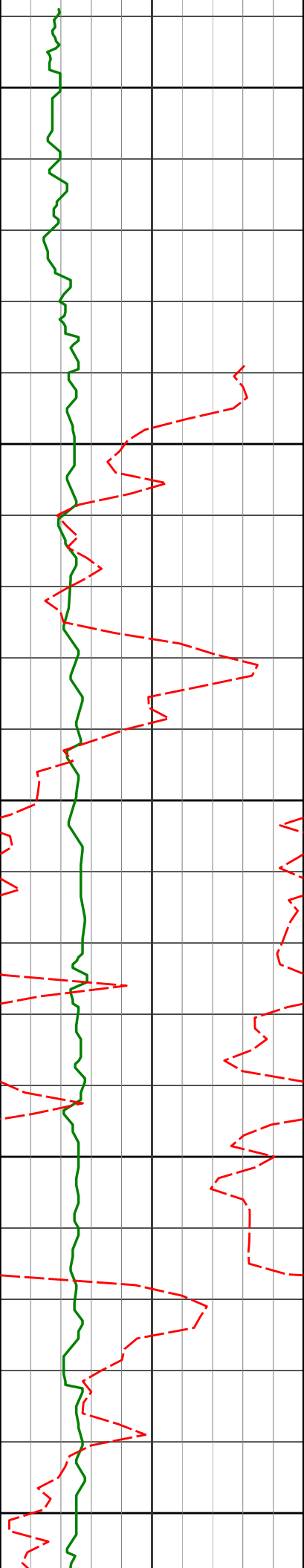


Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
1K	0						
PCG Gamma Ray PGRC api							
0	300						

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Sperry Drilling Services
TVD Detail Log 1:240

Noble Energy
Ranch AE30-65-1AHNB
H&P 321
Sec. 29-T6N-R62W

PCG Gamma Ray PGRC api							
0	300						
Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
1K	0	550					



600

650

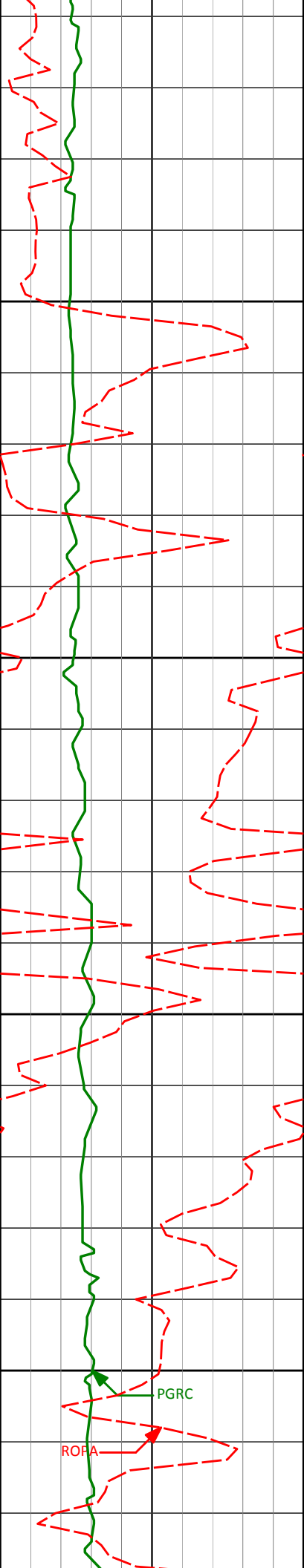
700

750

800



604'	0.60°	283.67°	603.99'	3.11'
720'	0.66°	246.79°	719.98'	4.30'



850

900

950

1000

812'

0.56°

255.96°

811.98'

5.21'

903'

0.74°

232.94°

902.97'

6.09'

996'

0.73°

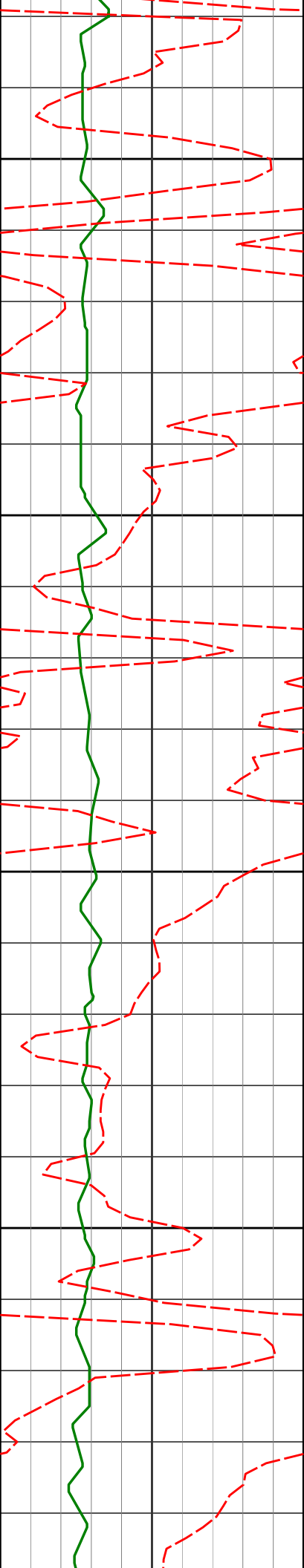
219.29°

995.96'

6.90'

PGRC

ROPA



1050

1100

1150

1200

1087'

0.58°

231.60°

1086.96'

7.59'

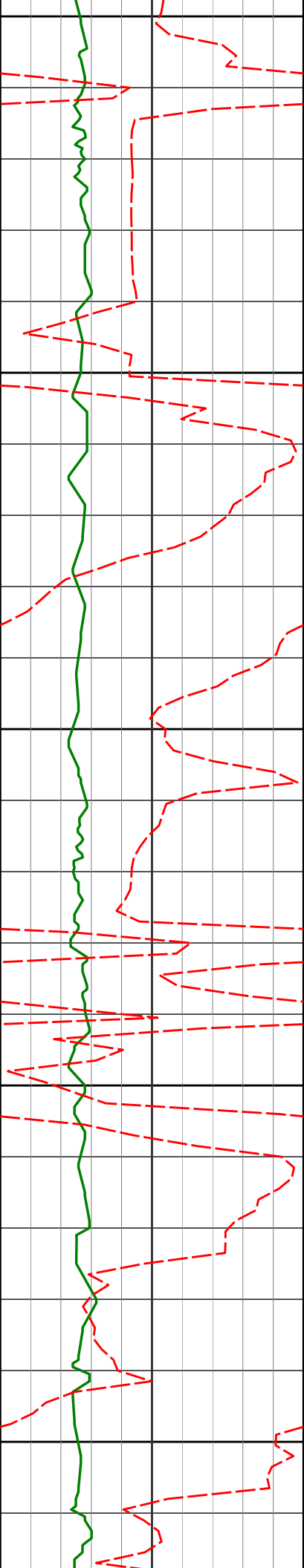
1180'

0.59°

228.60°

1179.95'

8.29'



1250

1273'

0.50°

233.57°

1272.95'

8.94'

1300

1350

1366'

0.73°

106.85°

1365.95'

8.68'

1400

1450

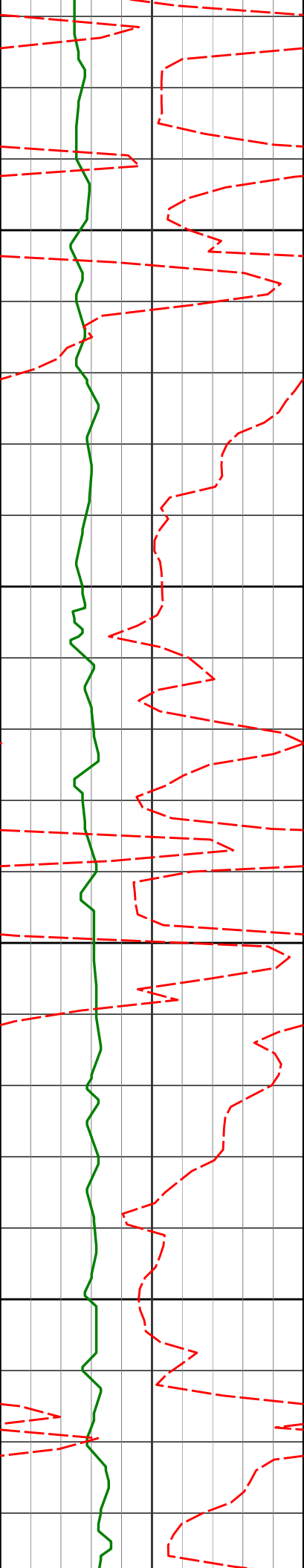
1457'

0.46°

277.10°

1456.94'

8.49'



1500

1550

1600

1650

1549'

0.52°

251.46°

1548.94'

9.24'

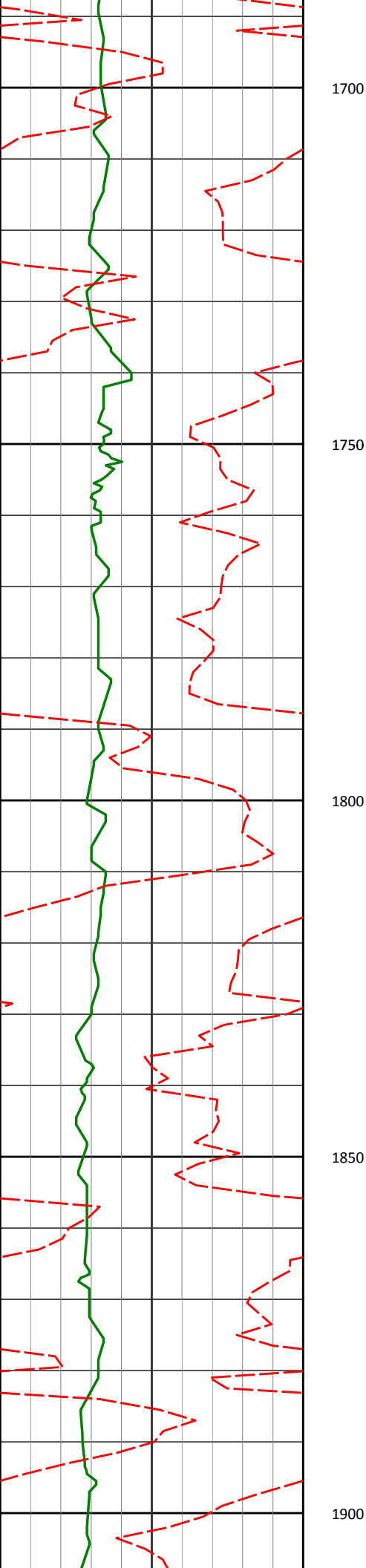
1641'

0.57°

267.95°

1640.94'

10.09'



1700

1750

1800

1850

1900

1736'

0.67°

245.25°

1735.93'

11.05'

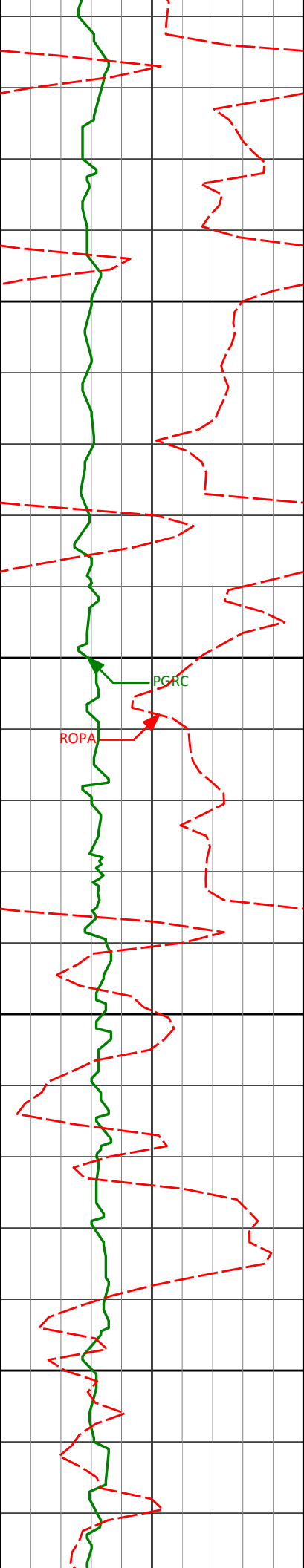
1831'

0.46°

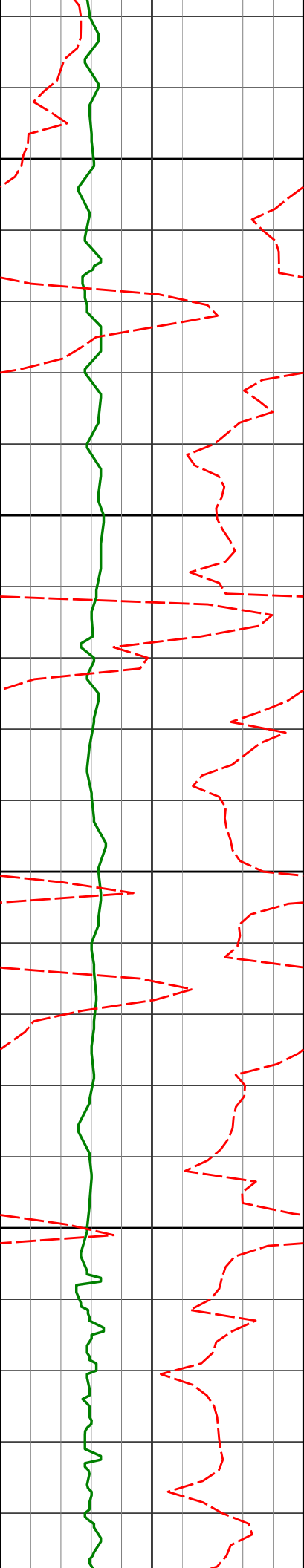
103.95°

1830.93'

11.17'



1926'	0.07°	355.94°	1925.93'	10.80'
1950				
2000				
2020'	0.29°	300.73°	2019.93'	11.02'
2050				
2100				
2115'	0.63°	67.22°	2114.93'	10.76'



2150

2200

2250

2300

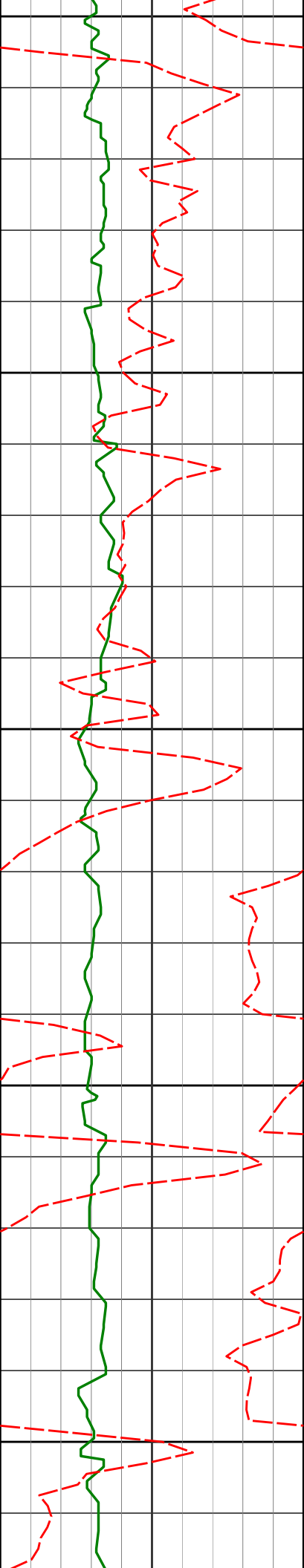
2210'

0.41°

65.37°

2209.92'

9.99'



2350

2400

2450

2500

2550

2399'

0.30°

67.99°

2398.92'

8.94'

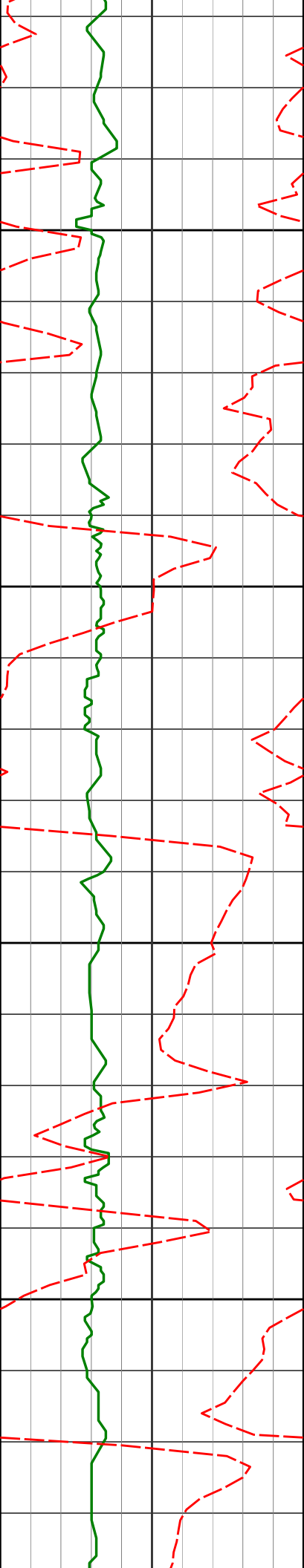
2494'

0.39°

113.21°

2493.92'

8.41'



2600

2650

2700

2750

2589'

0.59°

130.00°

2588.91'

7.72'

2683'

0.28°

251.46°

2682.91'

7.55'

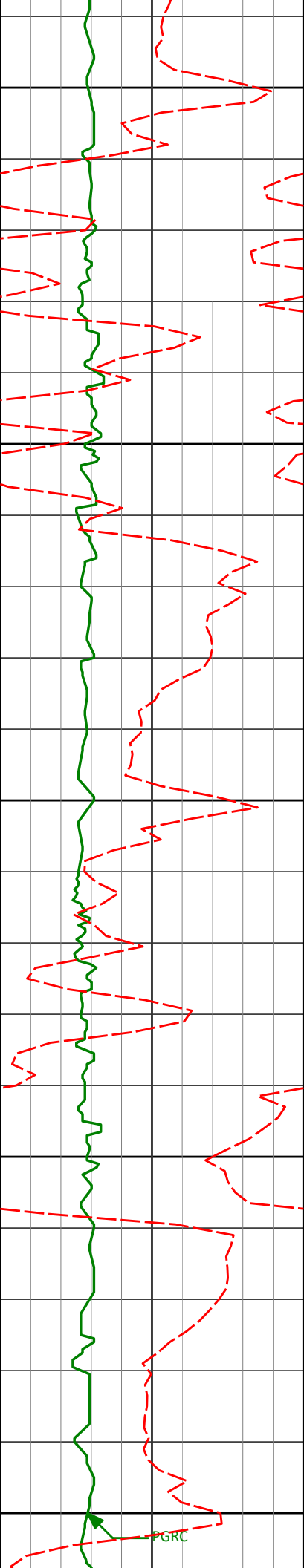
2778'

2.69°

351.38°

2777.88'

8.20'



2800

2850

2900

2950

3000

2873'

3.76°

349.04°

2872.73'

9.39'

2968'

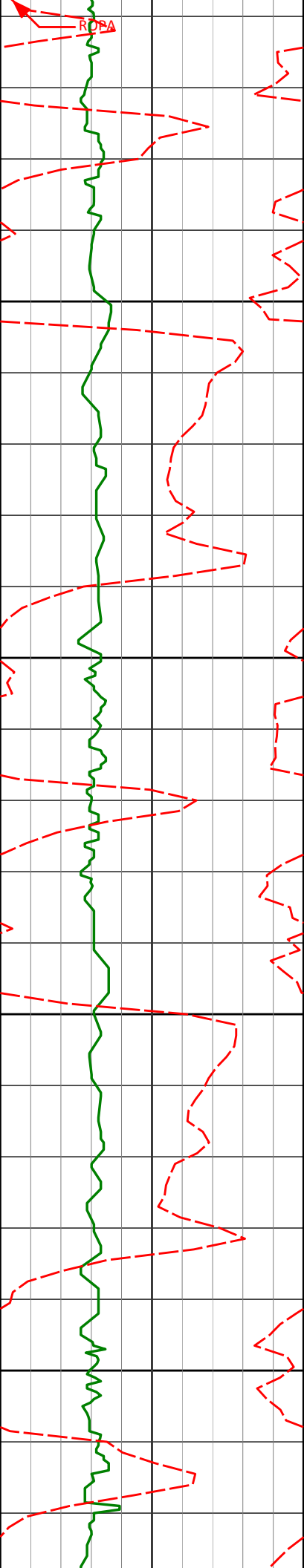
6.05°

334.65°

2967.37'

12.49'

PGRC



3050

3062'

8.20°

331.12°

3060.64'

18.36'

3100

3150

3157'

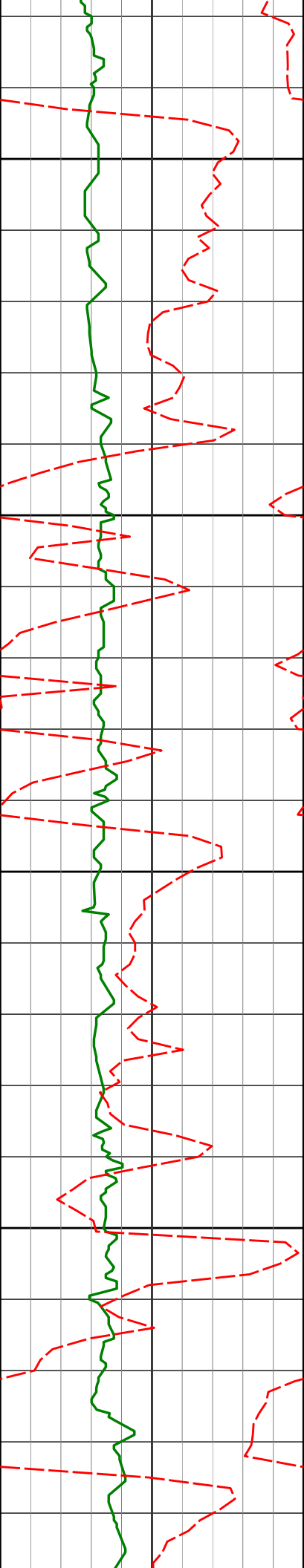
8.19°

342.12°

3154.68'

24.31'

3200



3250

3252'

8.76°

349.31°

3248.64'

28.39'

3300

3350

3347'

8.88°

350.54°

3342.52'

31.64'

3400

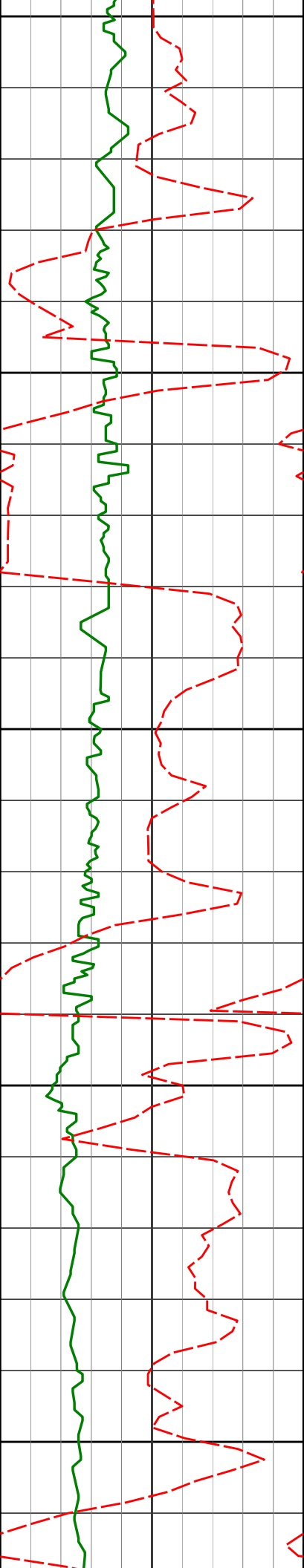
3441'

9.78°

350.53°

3435.28'

34.88'



3450

3500

3550

3600

3650

3536'

10.05°

347.25°

3528.86'

38.82'

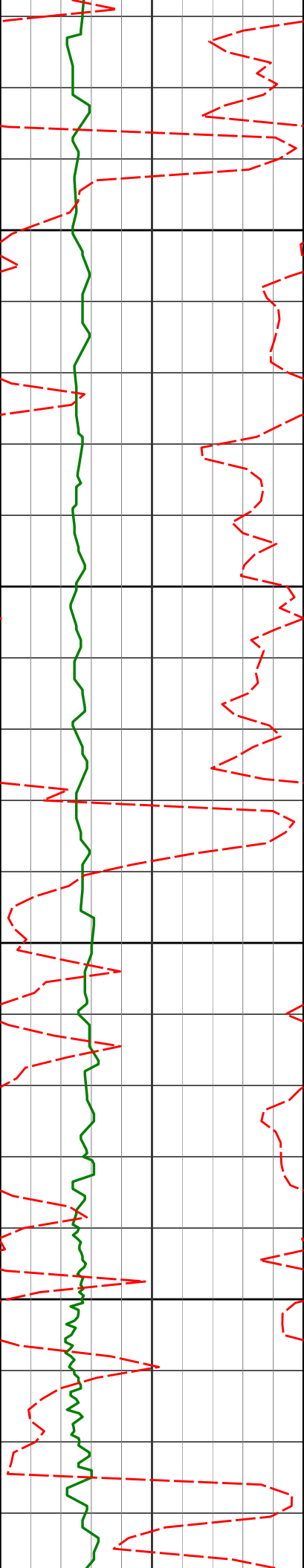
3631'

14.46°

347.51°

3621.67'

44.18'



3700

3726'

16.63°

347.17°

3713.19'

50.98'

3750

3800

3819'

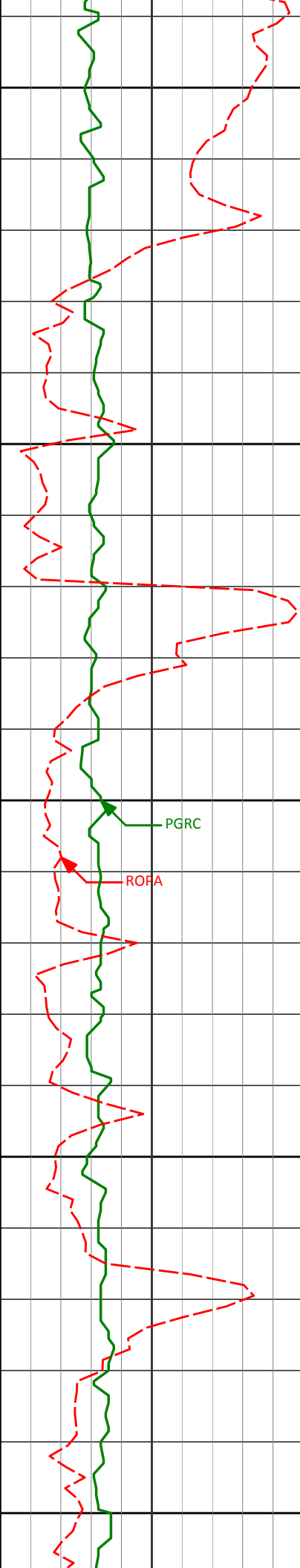
18.08°

346.63°

3801.95'

58.60'

3850



3900

3914'

16.27°

346.52°

3892.71'

66.44'

3950

4000

4009'

14.19°

344.43°

3984.37'

73.85'

4050

4100

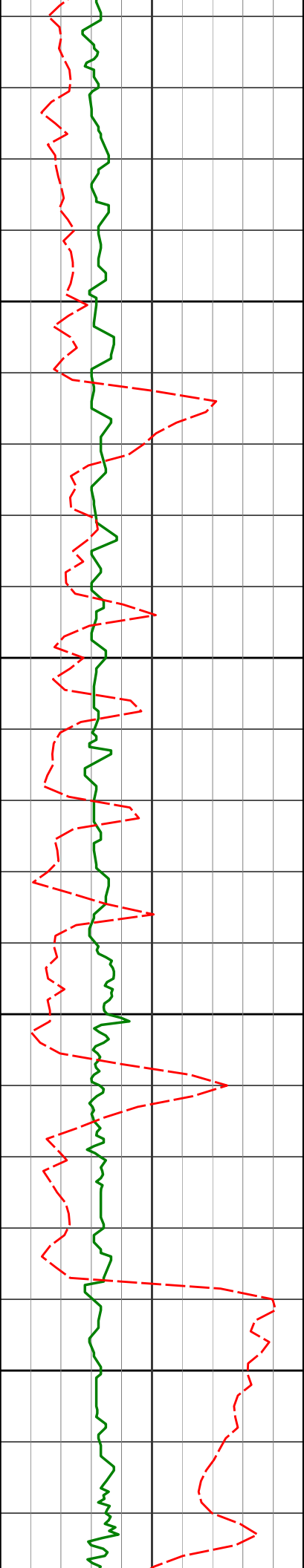
4104'

12.54°

341.78°

4076.80'

81.23'



4150

4200

4250

4300

4198'

10.26°

338.47°

4168.94'

88.35'

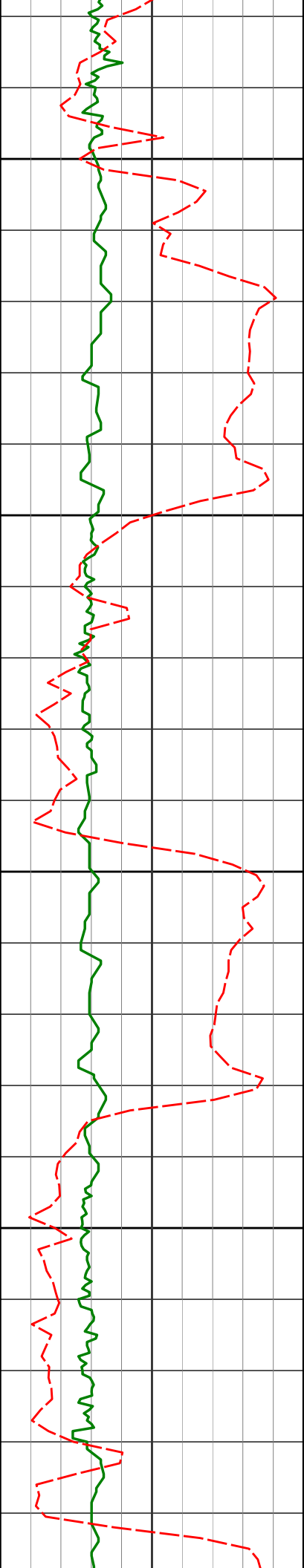
4293'

8.81°

333.34°

4262.63'

95.41'



4350

4388'

10.04°

334.44°

4356.34'

102.93'

4400

4450

4483'

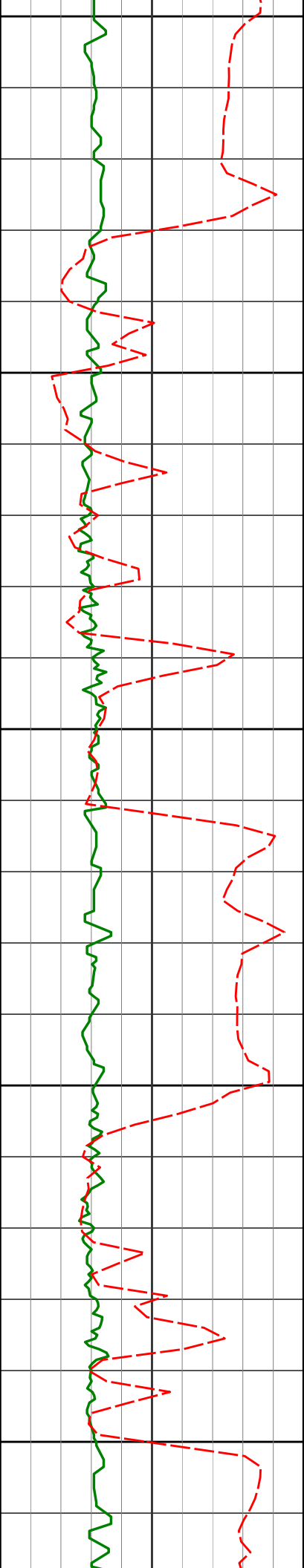
10.99°

332.32°

4449.75'

111.46'

4500



4550

4577'

10.52°

332.25°

4542.09'

120.38'

4600

4650

4672'

9.88°

334.87°

4635.59'

128.61'

4700

4750

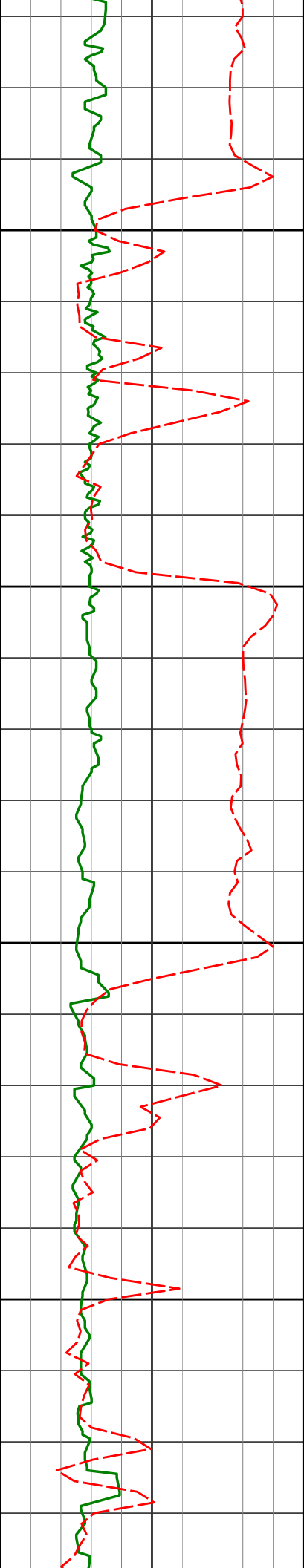
4767'

10.01°

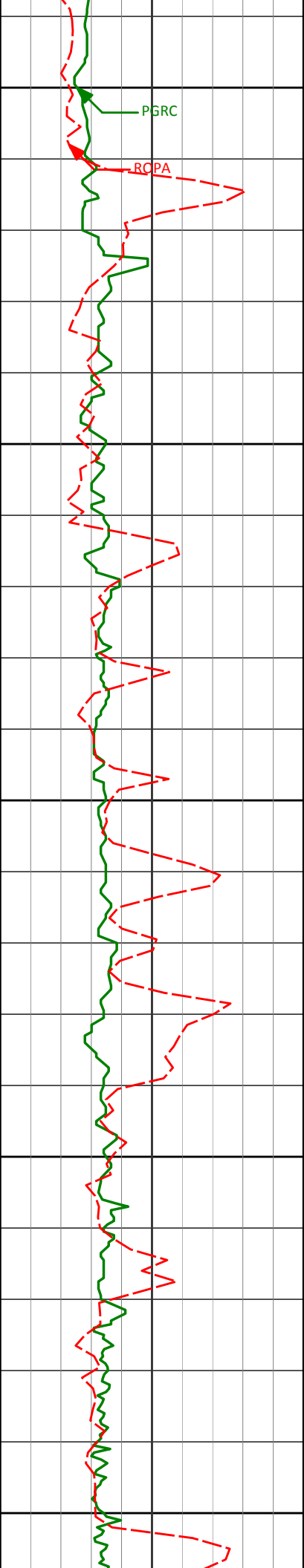
345.23°

4729.17'

134.92'



4800					
4850					
	4862'	10.88°	346.74°	4822.60'	139.90'
4900					
4950					
	4957'	11.57°	343.90°	4915.78'	145.47'



5000

PGRC

ROPA

5050

5052'

8.36°

341.03°

5009.34'

151.13'

5100

5150

5146'

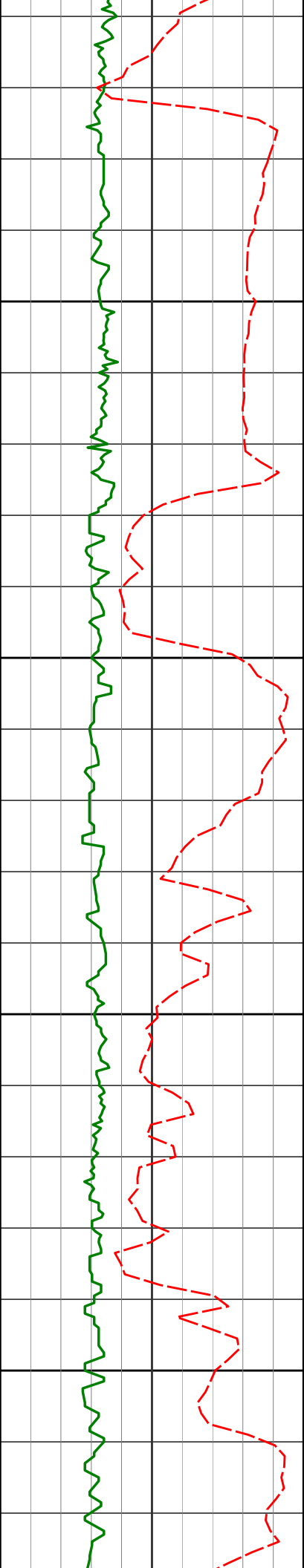
5.82°

339.89°

5102.61'

155.52'

5200



5250

5300

5350

5400

5241'

6.21°

343.03°

5197.09'

159.14'

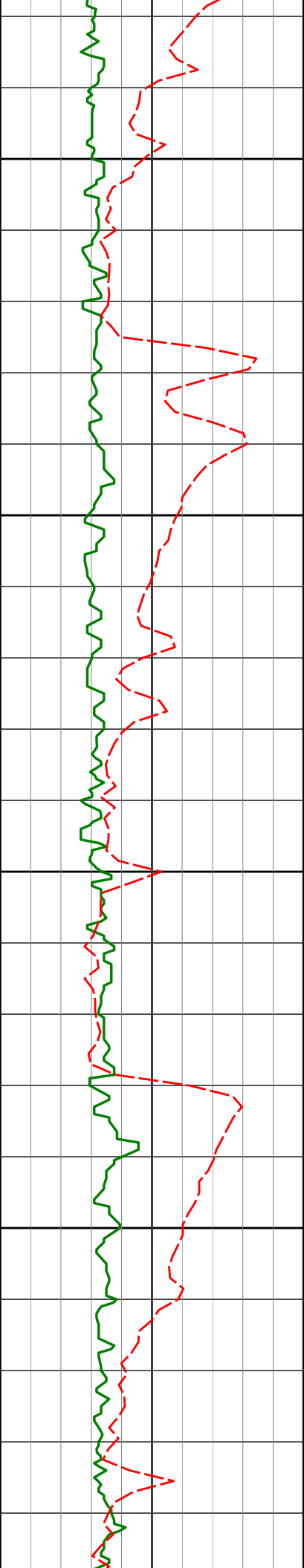
5336'

7.27°

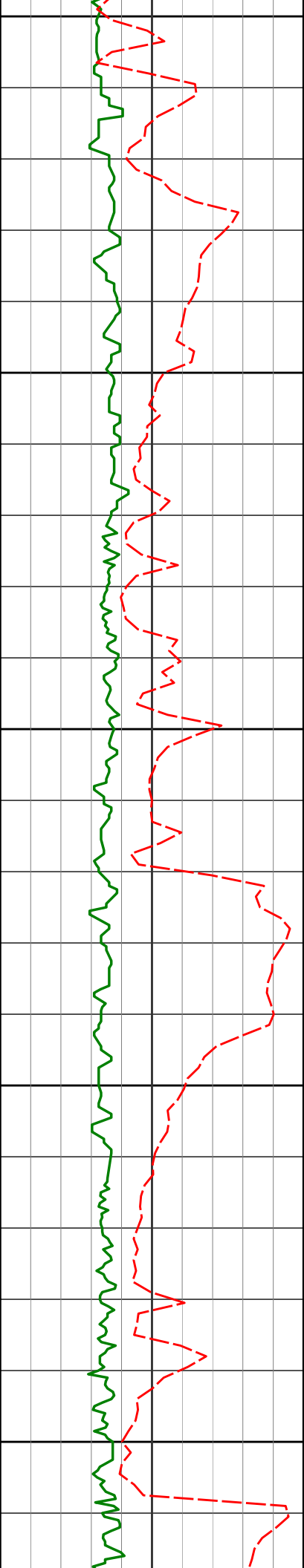
348.67°

5291.43'

162.35'



	5430'	6.06°	337.97°	5384.80'	165.89'
5450					
5500					
5525'	5525'	4.31°	335.83°	5479.40'	169.61'
5550					
5600					
5620'	5620'	3.09°	332.81°	5574.20'	172.52'



5650

5700

5750

5800

5850

5715'

2.30°

333.49°

5669.10'

174.73'

5801'

1.20°

298.13°

5755.06'

176.39'

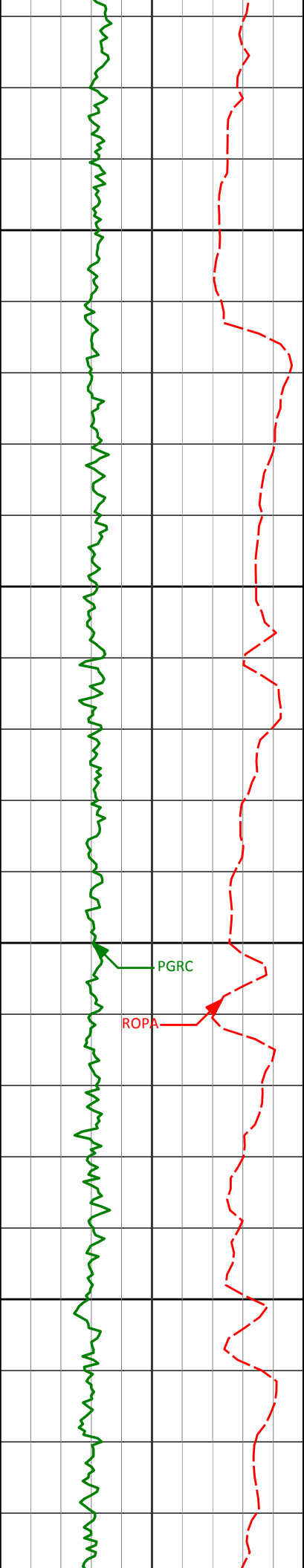
5863'

1.26°

303.03°

5817.04'

177.56'



5900

200

5904'

1.42°

291.35°

5858.03'

178.44'

5950

5952'

5.48°

246.07°

5905.94'

181.05'

6000

5999'

9.82°

250.85°

5952.51'

186.77'

PGRC

ROPA

6050

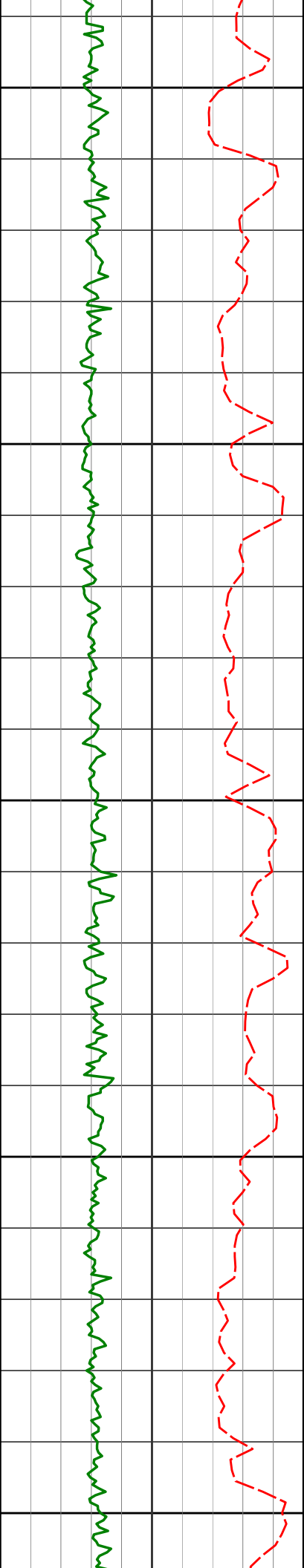
6047'

14.17°

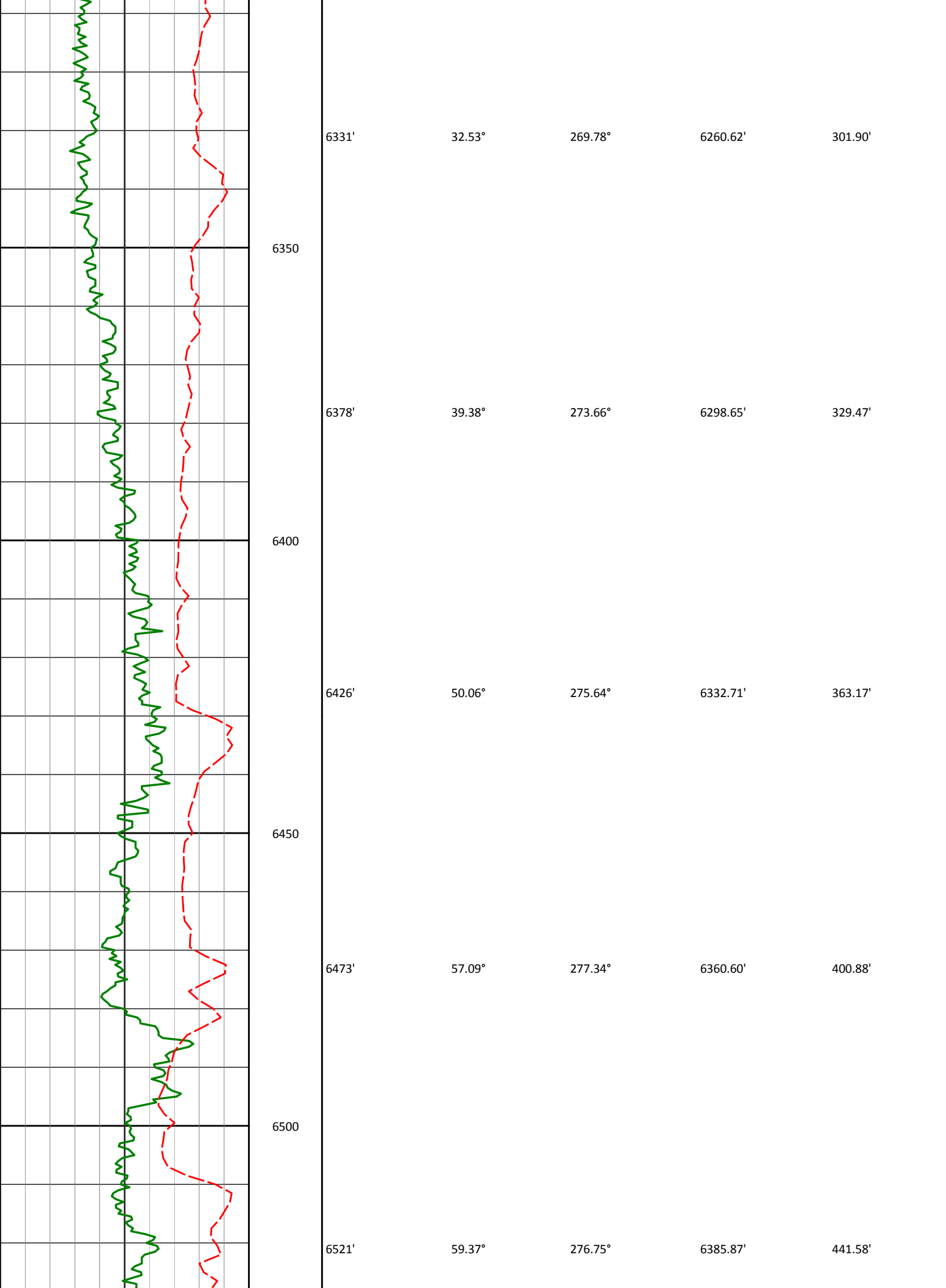
251.01°

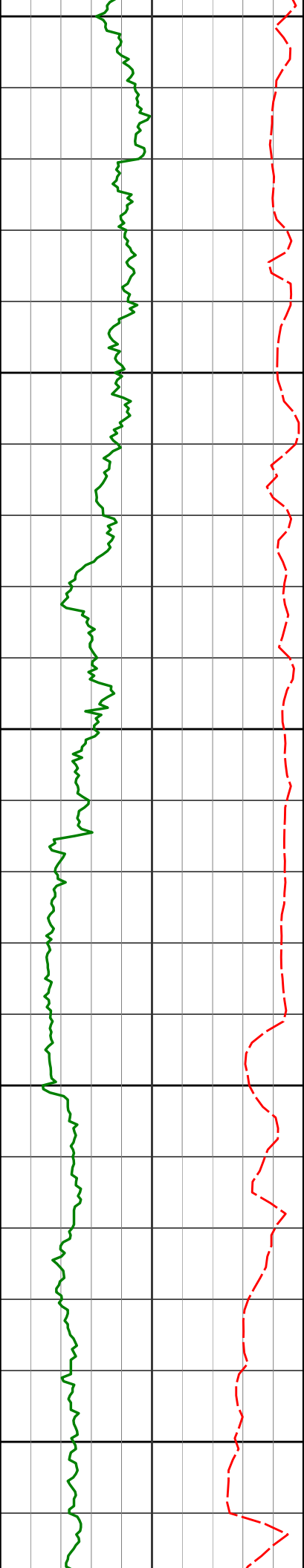
5999.45'

196.03'



6100	6094'	17.42°	254.66°	6044.67'	208.06'
6150	6142'	20.01°	256.34°	6090.13'	222.76'
6200	6188'	22.56°	257.16°	6132.99'	238.81'
6250	6236'	24.61°	260.23°	6176.98'	257.43'
6300	6283'	27.85°	265.55°	6219.14'	277.88'





6750

6757'

74.60°

267.12°

6485.60'

654.24'

6800

6805'

79.44°

268.21°

6496.38'

700.81'

6850

6858'

85.62°

268.63°

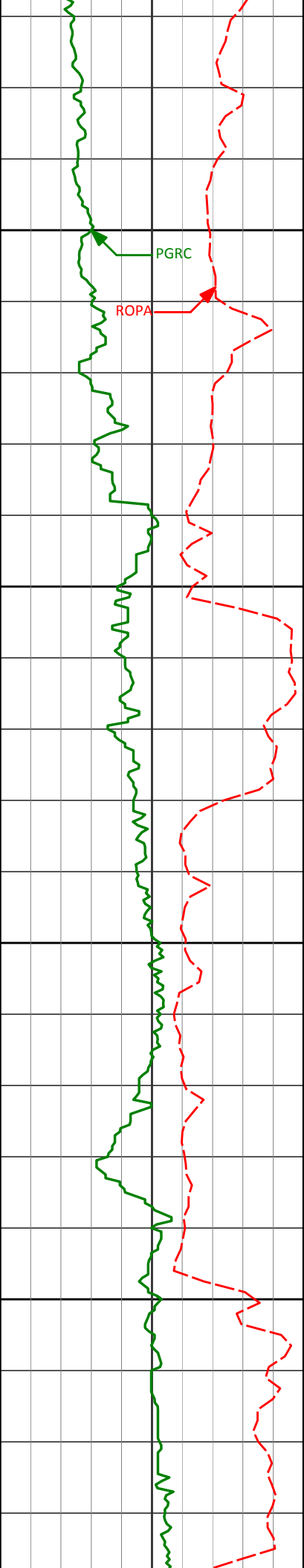
6503.27'

753.18'

6900

300

6950



6993'

91.29°

270.53°

6506.91'

887.86'

7000

7050

7100

7150

7086'

92.41°

268.88°

6503.91'

980.67'

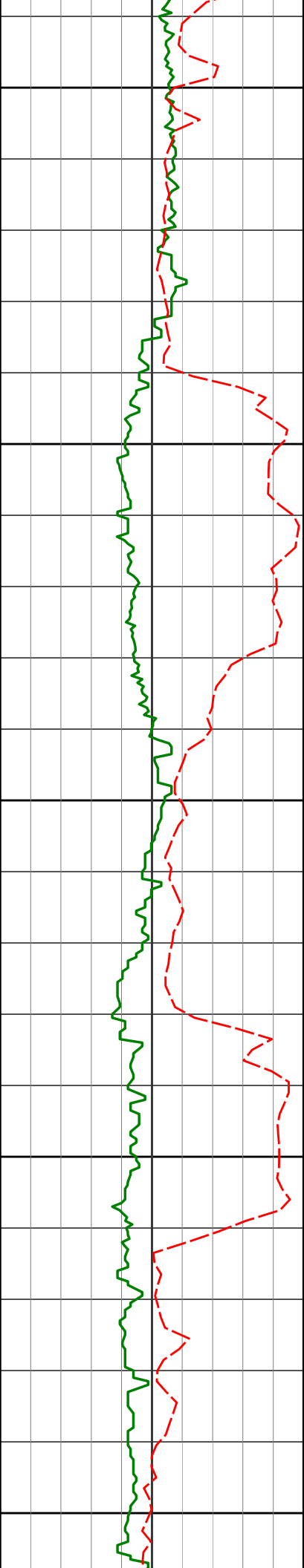
7178'

91.36°

266.47°

6500.88'

1072.24'



7200

7250

7300

7350

7400

7270'

89.48°

265.82°

6500.21'

1163.61'

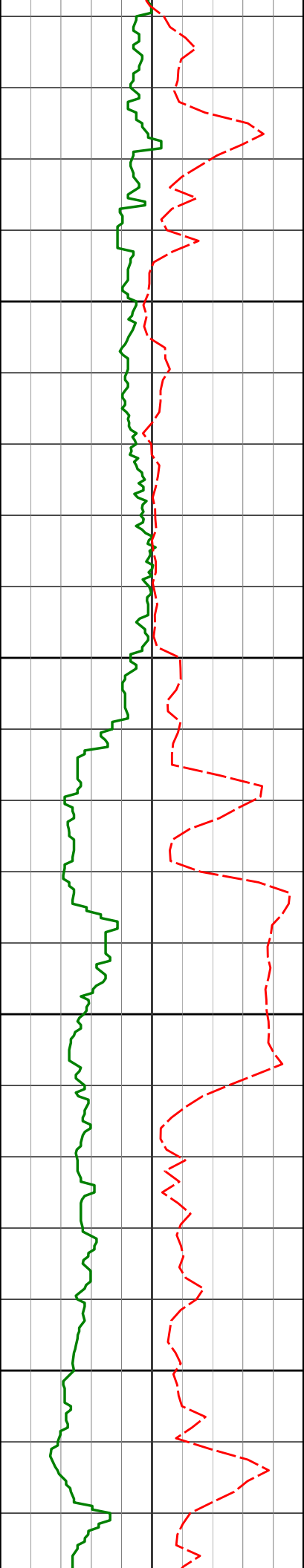
7362'

87.94°

266.63°

6502.28'

1254.97'



7450

7454'

89.41°

268.47°

6504.40'

1346.55'

7500

7550

7549'

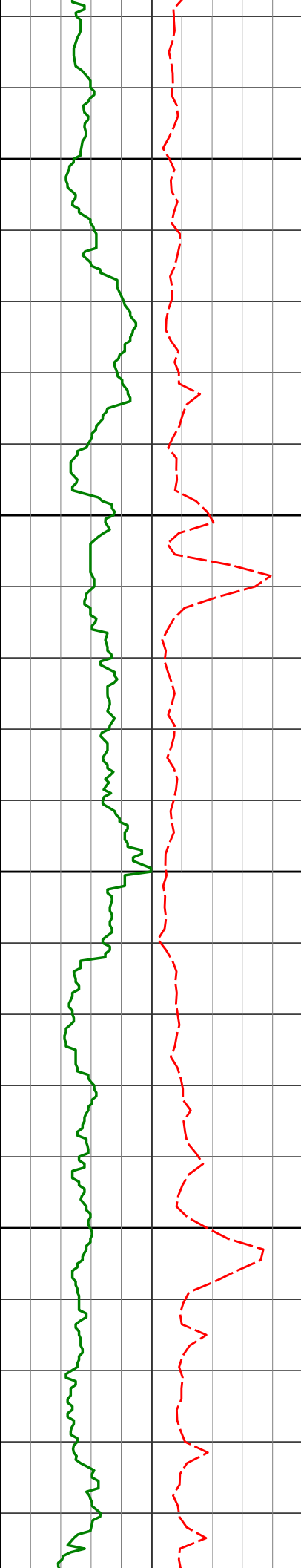
87.22°

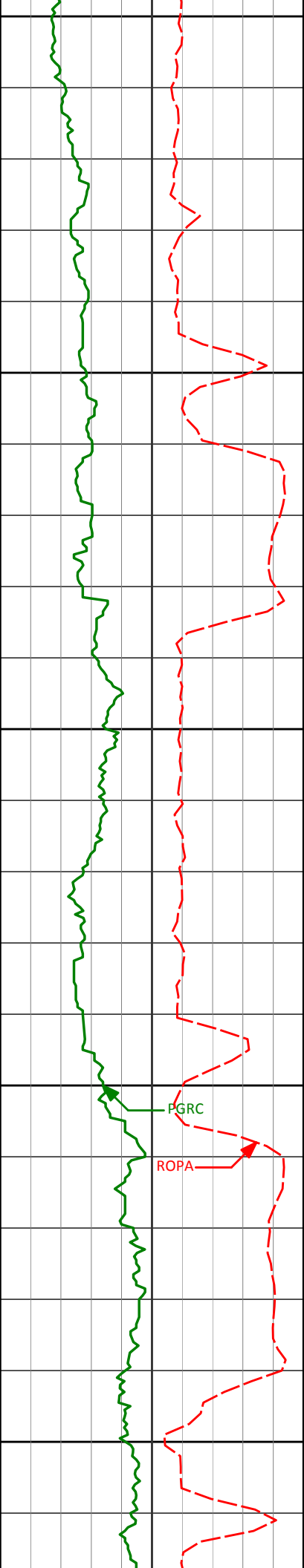
267.19°

6507.20'

1441.15'

7600





7850

7900

7950

8000

8050

7928'

91.88°

265.94°

6514.09'

1816.90'

8022'

91.94°

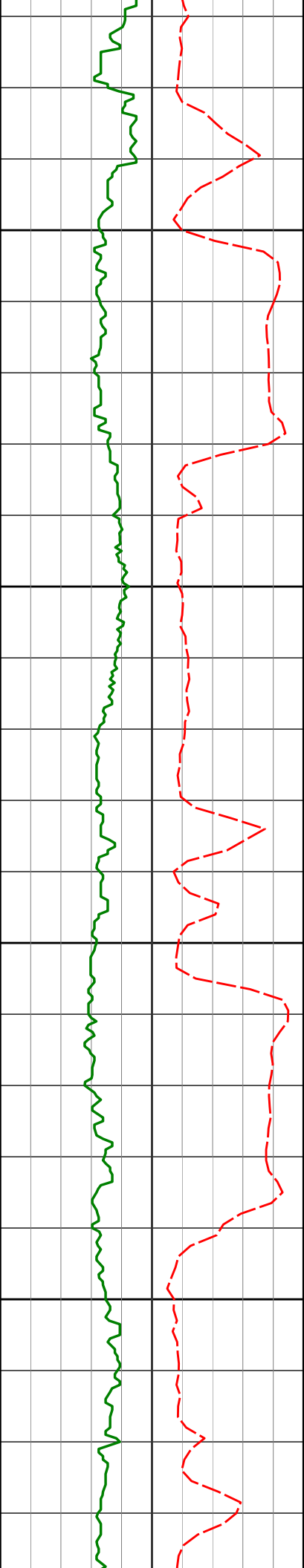
266.89°

6510.96'

1910.27'

PGRC

ROPA



8100

8117'

88.95°

267.00°

6510.22'

2004.75'

8150

8200

8212'

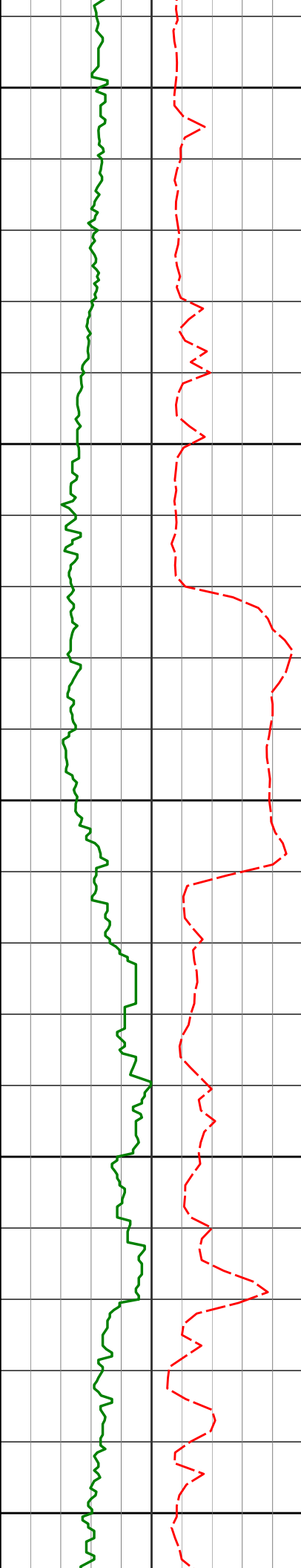
90.03°

269.16°

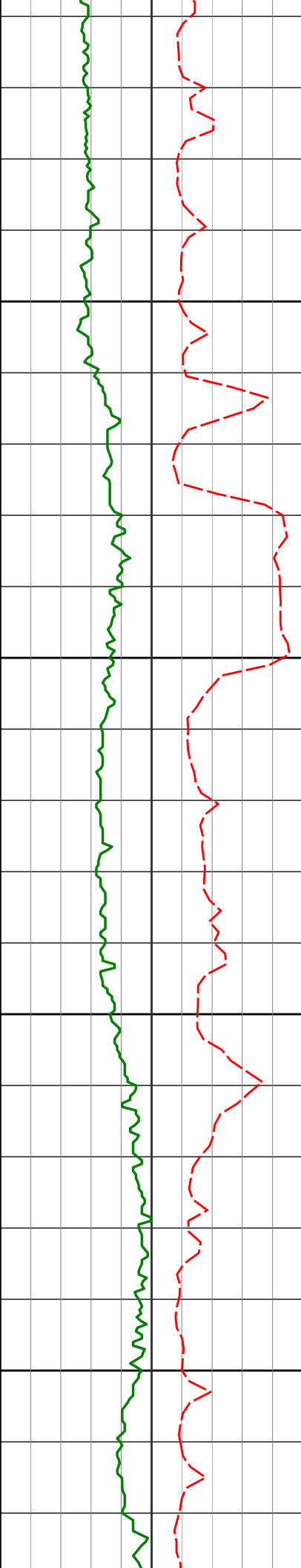
6511.07'

2099.42'

8250



Station	Latitude	Longitude	Distance (m)	Angle (°)
8300	8306'	90.62°	270.66°	6510.53'
8350				
8400	8401'	88.09°	270.65°	6511.60'
8450				
8500	8496'	89.45°	270.84°	6513.64'



8550

8600

8650

8700

8591'

89.26°

270.28°

6514.71'

2478.04'

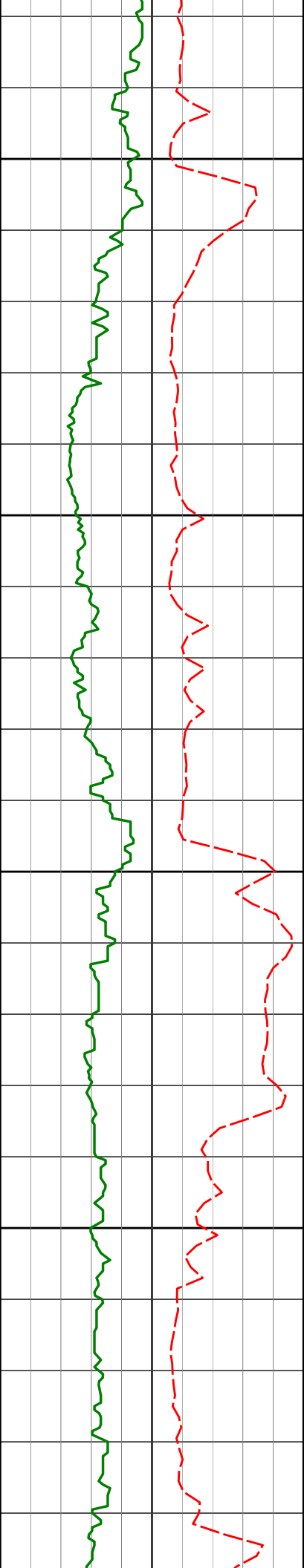
8686'

89.32°

 270.33°

6515.89'

2572.94'



8750

8780'

90.55°

269.99°

6515.99'

2666.84'

8800

8850

8875'

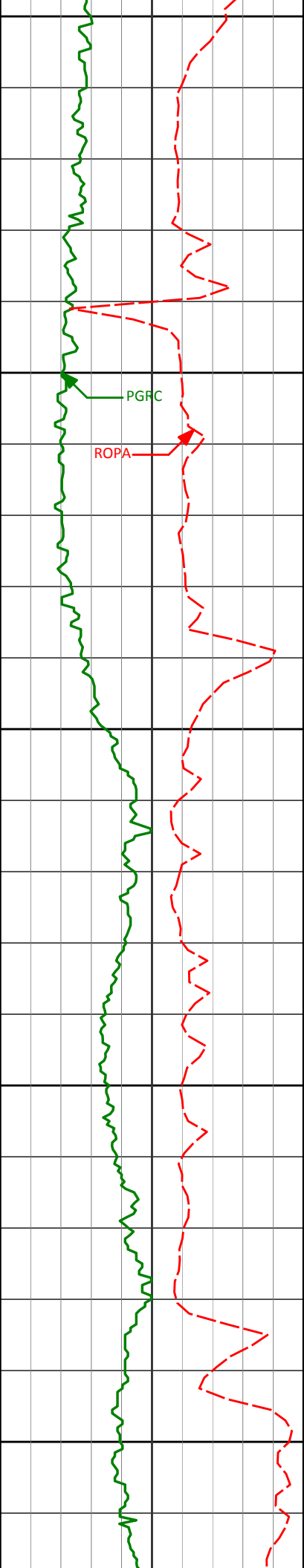
89.82°

268.93°

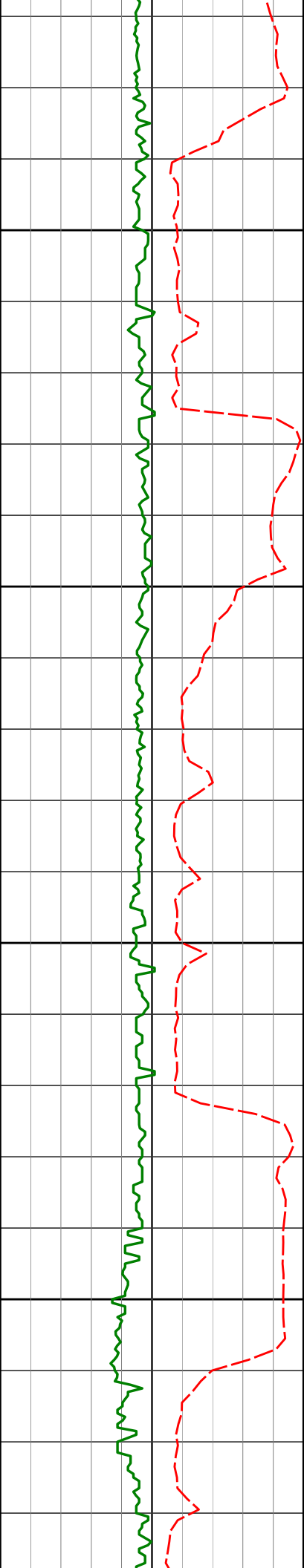
6515.69'

2761.67'

8900



8950				
8970'	89.97°	268.12°	6515.86'	2856.41'
9000				
9050				
9064'	91.36°	267.75°	6514.77'	2950.06'
9100				
9150				
9159'	90.80°	266.68°	6512.98'	3044.58'



9200

9250

9300

9350

9254'

89.48°

266.83°

6512.75'

3139.05'

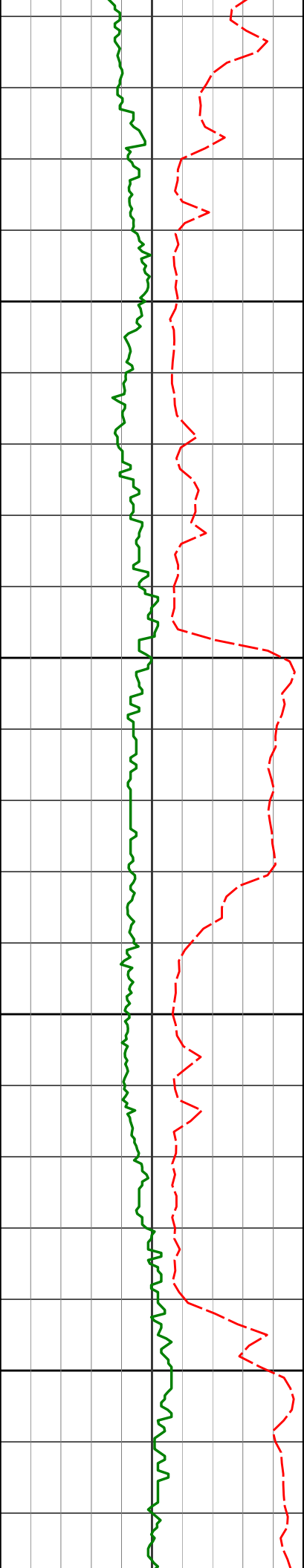
9349'

87.84°

267.95°

6514.97'

3233.59'



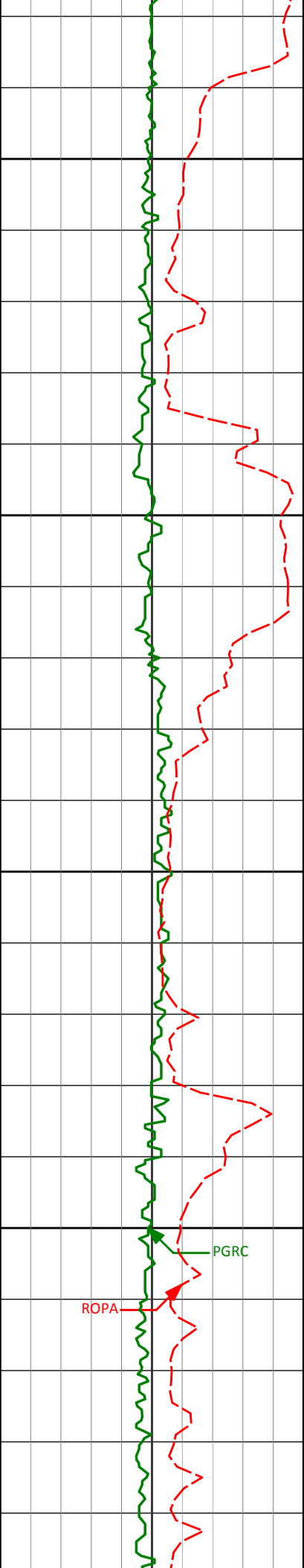
9650

9700

9750

9800

9633'	92.13°	267.53°	6516.14'	3516.45'
9727'	91.60°	268.35°	6513.08'	3610.06'
9822'	90.68°	269.28°	6511.19'	3704.80'



9850

9900

9950

10000

9917'

88.77°

269.29°

6511.65'

3799.62'

ROPA

PGRC

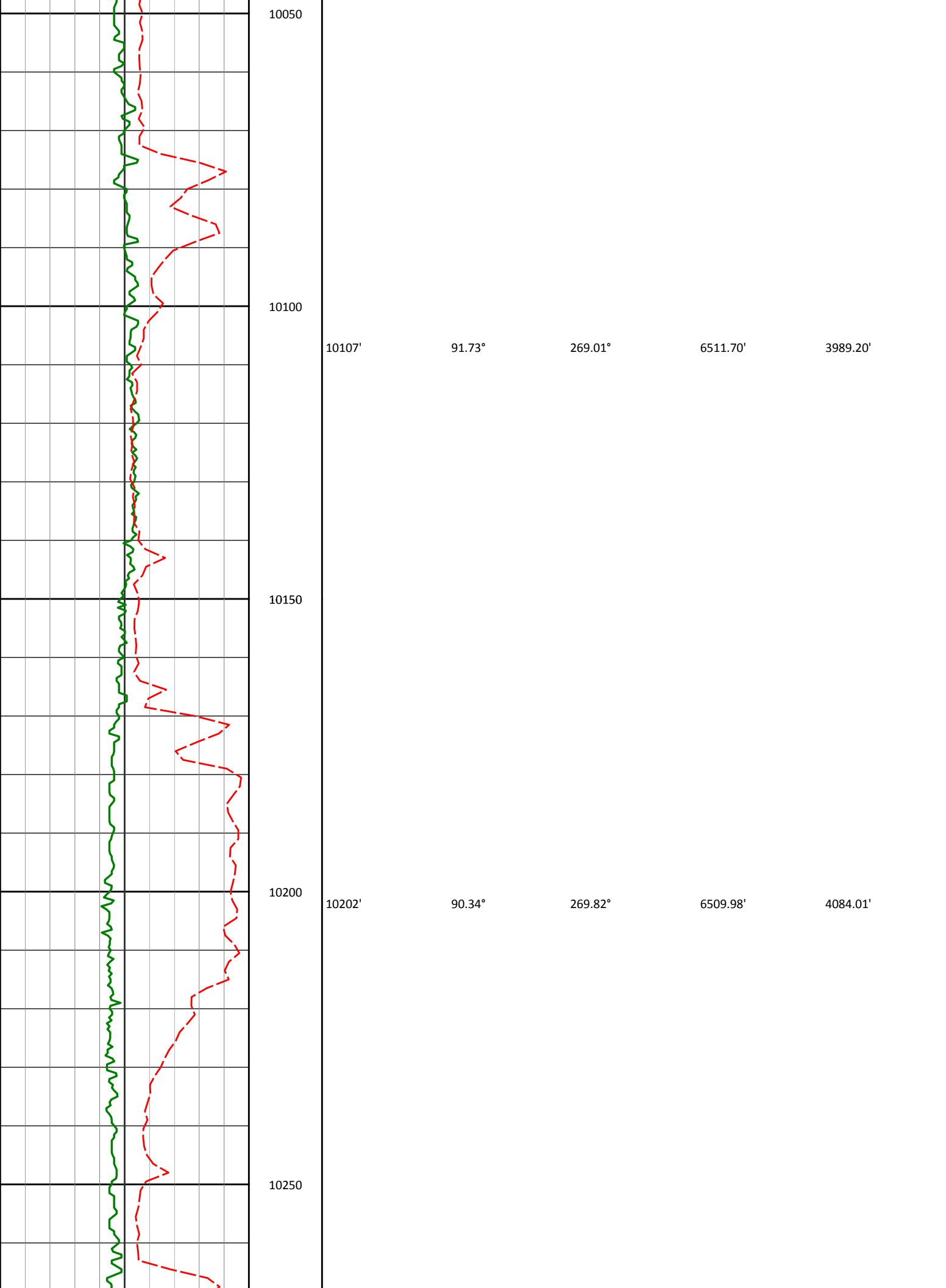
10012'

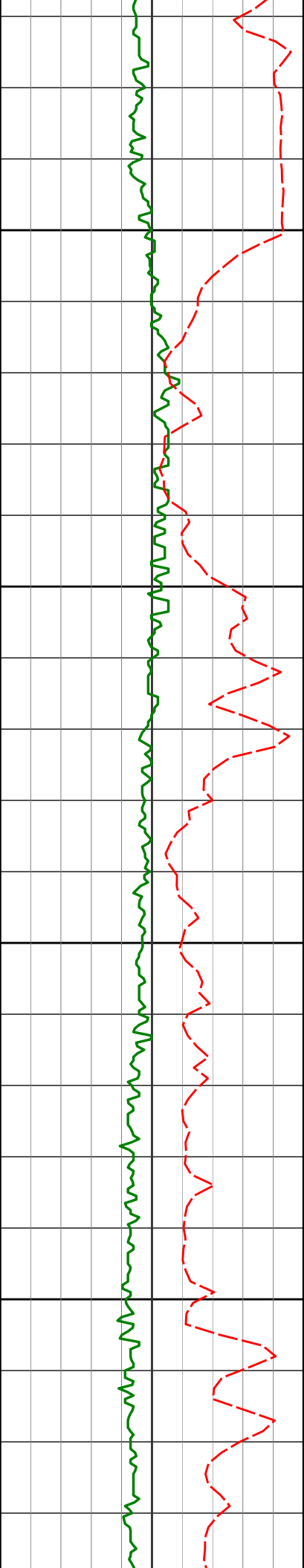
89.72°

269.07°

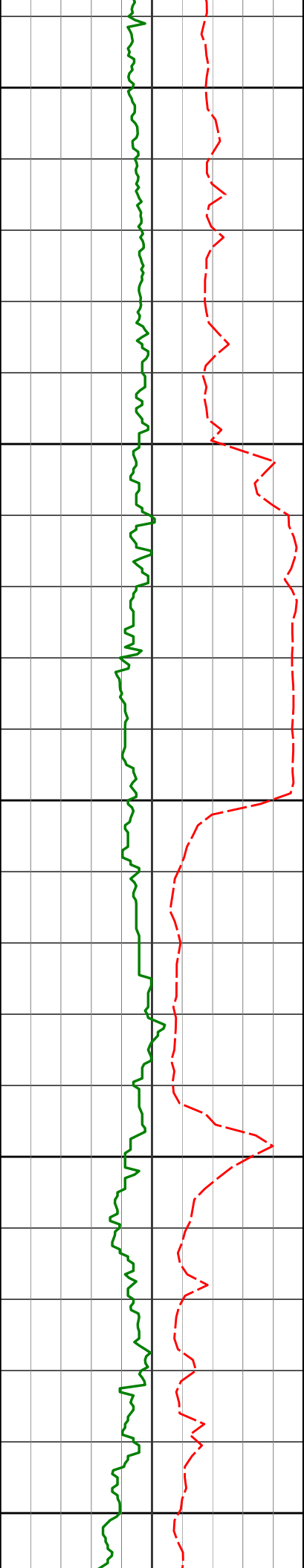
6512.90'

3894.42'





10297'	88.86°	269.61°	6510.64'	4178.87'	
10300					
10350					
10392'	89.54°	268.95°	6511.97'	4273.67'	
10400					
10450					
10487'	91.11°	268.69°	6511.43'	4368.44'	



10500

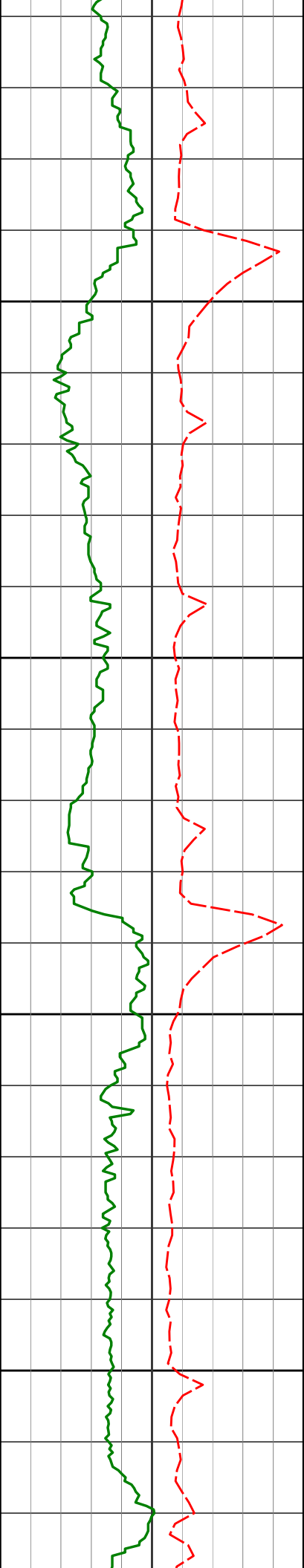
10550

10600

10650

10700

10581'	89.44°	268.28°	6510.98'	4462.16'
10676'	88.77°	268.30°	6512.46'	4556.86'



10750

10771'

89.11°

267.91°

6514.22'

4651.52'

10800

10850

10865'

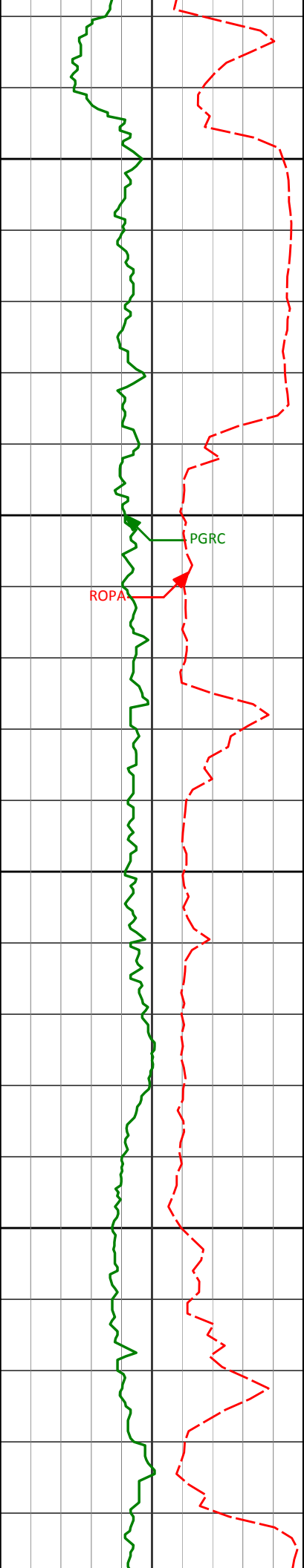
90.37°

267.43°

6514.65'

4745.14'

10900



10950

10960'

90.12°

268.82°

6514.24'

4839.81'

11000

PGRC

ROPA

11050

11055'

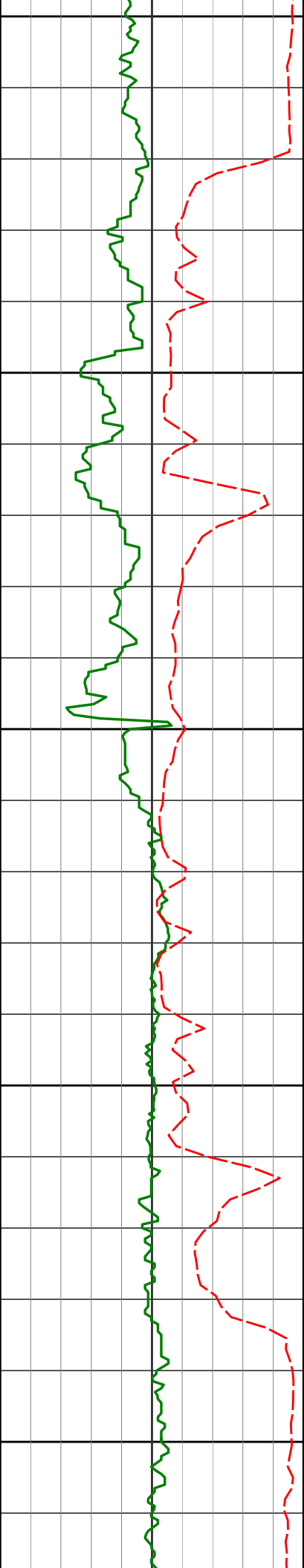
89.63°

268.00°

6514.45'

4934.53'

11100



11150

11200

11250

11300

11350

11149'

11244'

11338'

89.45°

91.08°

91.14°

268.64°

268.35°

268.68°

6515.20'

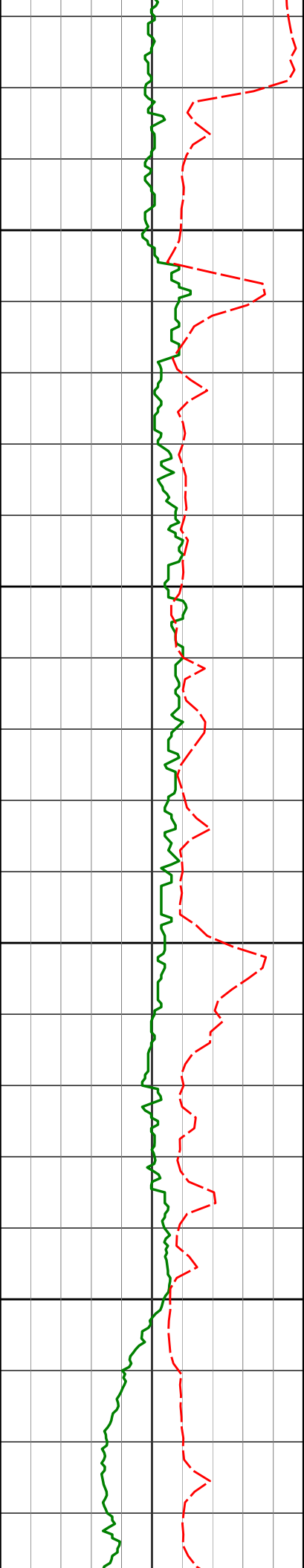
6514.76'

6512.94'

5028.24'

5122.96'

5216.68'



11400

11433'

89.17°

269.14°

6512.69'

5311.45'

11450

11500

11528'

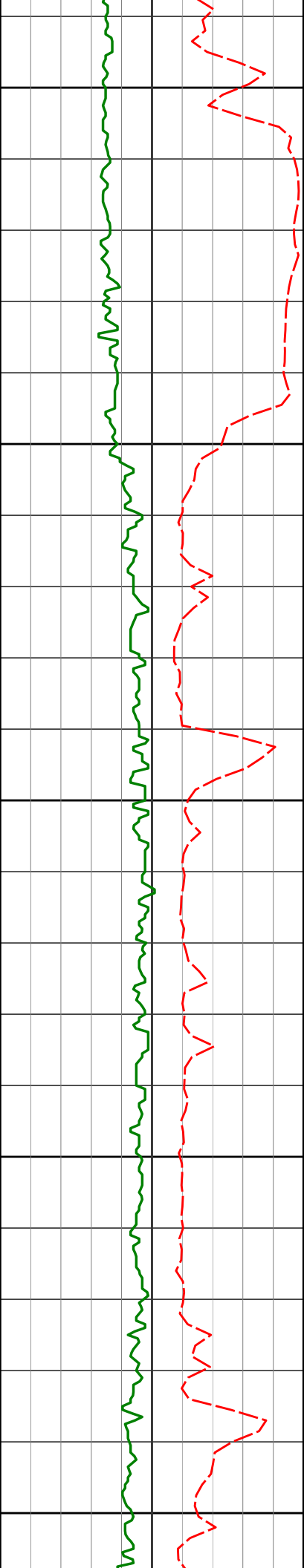
89.85°

268.72°

6513.50'

5406.23'

11550



11600

11623'

89.17°

269.17°

6514.31'

5501.01'

11650

11700

11718'

89.48°

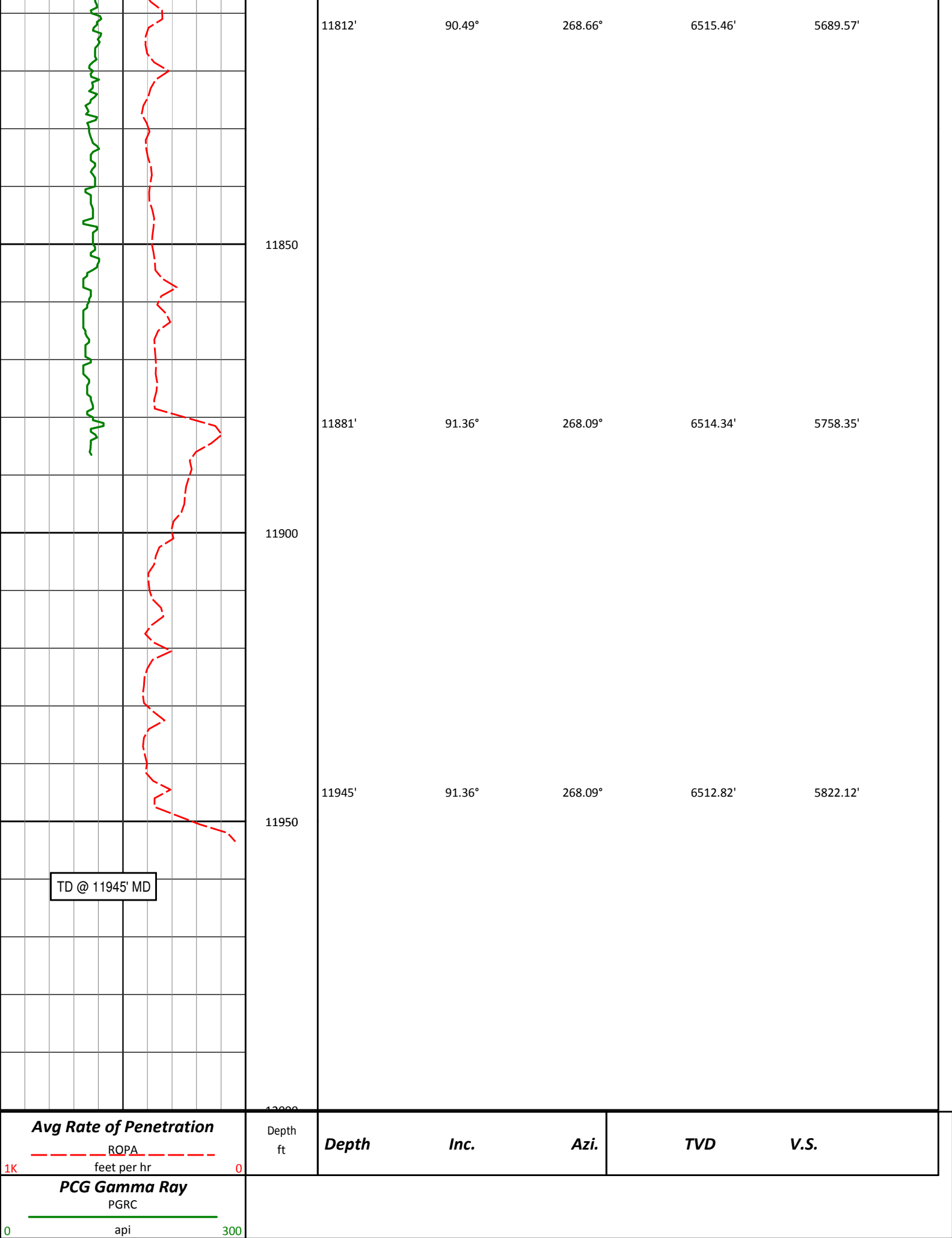
268.99°

6515.43'

5595.80'

11750

11800



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE30-65-1AHNB
Wattenburg
Weld Colorado
USA
CA-XX-0901176457

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
604.00	0.60	283.67	603.99	0.75 N	3.07 W	3.11	0.10
720.00	0.66	246.79	719.98	0.63 N	4.28 W	4.30	0.35
812.00	0.56	255.96	811.98	0.31 N	5.20 W	5.21	0.15
903.00	0.74	232.94	902.97	0.15 S	6.10 W	6.09	0.34
996.00	0.73	219.29	995.96	0.97 S	6.96 W	6.90	0.19
1087.00	0.58	231.60	1086.96	1.71 S	7.68 W	7.59	0.23
1180.00	0.59	228.60	1179.95	2.32 S	8.41 W	8.29	0.03
1273.00	0.50	233.57	1272.95	2.87 S	9.10 W	8.94	0.11
1366.00	0.73	106.85	1365.95	3.29 S	8.86 W	8.68	1.19
1457.00	0.46	277.10	1456.94	3.41 S	8.66 W	8.49	1.30
1549.00	0.52	251.46	1548.94	3.50 S	9.43 W	9.24	0.24
1641.00	0.57	267.95	1640.94	3.65 S	10.28 W	10.09	0.18
1736.00	0.67	245.25	1735.93	3.90 S	11.26 W	11.05	0.28
1831.00	0.46	103.95	1830.93	4.22 S	11.39 W	11.17	1.12
1926.00	0.07	355.94	1925.93	4.25 S	11.02 W	10.80	0.51
2020.00	0.29	300.73	2019.93	4.08 S	11.23 W	11.02	0.27
2115.00	0.63	67.22	2114.93	3.75 S	10.96 W	10.76	0.88
2210.00	0.41	65.37	2209.92	3.41 S	10.17 W	9.99	0.23
2399.00	0.30	67.99	2398.92	2.94 S	9.09 W	8.94	0.06
2494.00	0.39	113.21	2493.92	2.97 S	8.57 W	8.41	0.29
2589.00	0.59	130.00	2588.91	3.41 S	7.89 W	7.72	0.26
2683.00	0.28	251.46	2682.91	3.80 S	7.74 W	7.55	0.82
2778.00	2.69	351.38	2777.88	1.67 S	8.30 W	8.20	2.90
2873.00	3.76	349.04	2872.73	3.59 N	9.22 W	9.39	1.13
2968.00	6.05	334.65	2967.37	11.18 N	11.96 W	12.49	2.72
3062.00	8.20	331.12	3060.64	21.53 N	17.32 W	18.36	2.33
3157.00	8.19	342.12	3154.68	33.90 N	22.67 W	24.31	1.65
3252.00	8.76	349.31	3248.64	47.45 N	26.09 W	28.39	1.27
3347.00	8.88	350.54	3342.52	61.79 N	28.63 W	31.64	0.24
3441.00	9.78	350.53	3435.28	76.82 N	31.14 W	34.88	0.96
3536.00	10.05	347.25	3528.86	92.86 N	34.30 W	38.82	0.66
3631.00	14.46	347.51	3621.67	112.54 N	38.69 W	44.18	4.64
3726.00	16.63	347.17	3713.19	137.38 N	44.28 W	50.98	2.29
3819.00	18.08	346.63	3801.95	164.39 N	50.57 W	58.60	1.57
3914.00	16.27	346.52	3892.71	191.68 N	57.08 W	66.44	1.91
4009.00	14.19	344.43	3984.37	215.84 N	63.31 W	73.85	2.26
4104.00	12.54	341.78	4076.80	236.85 N	69.66 W	81.23	1.85
4198.00	10.26	338.47	4168.94	254.34 N	75.93 W	88.35	2.52
4293.00	8.81	333.34	4262.63	268.71 N	82.29 W	95.41	1.77
4388.00	10.04	334.44	4356.34	282.68 N	89.13 W	102.93	1.31
4483.00	10.99	332.32	4449.75	298.17 N	96.91 W	111.46	1.08
4577.00	10.52	332.25	4542.09	313.70 N	105.07 W	120.38	0.50
4672.00	9.88	334.87	4635.59	328.75 N	112.57 W	128.61	0.83
4767.00	10.01	345.23	4729.17	344.12 N	118.14 W	134.92	1.89
4862.00	10.88	346.74	4822.60	360.83 N	122.30 W	139.90	0.96
4957.00	11.57	343.90	4915.78	378.71 N	127.00 W	145.47	0.93
5052.00	8.36	341.03	5009.34	394.40 N	131.88 W	151.13	3.42
5146.00	5.82	339.89	5102.61	405.34 N	135.74 W	155.52	2.71
5241.00	6.21	343.03	5197.09	414.77 N	138.90 W	159.14	0.54
5336.00	7.27	348.67	5291.43	425.58 N	141.58 W	162.35	1.31
5430.00	6.06	337.97	5384.80	436.02 N	144.61 W	165.89	1.84
5525.00	4.31	335.83	5479.40	443.92 N	147.95 W	169.61	1.85
5620.00	3.09	332.81	5574.20	449.46 N	150.59 W	172.52	1.30
5715.00	2.30	333.49	5669.10	453.44 N	152.61 W	174.73	0.83

5801.00	1.20	298.13	5755.06	455.41 N	154.17 W	176.39	1.74
5863.00	1.26	303.03	5817.04	456.09 N	155.31 W	177.56	0.20
5904.00	1.42	291.35	5858.03	456.52 N	156.17 W	178.44	0.77
5952.00	5.48	246.07	5905.94	455.80 N	158.82 W	181.05	9.57
5999.00	9.82	250.85	5952.51	453.58 N	164.66 W	186.77	9.32
6047.00	14.17	251.01	5999.45	450.32 N	174.08 W	196.03	9.06
6094.00	17.42	254.66	6044.67	446.59 N	186.31 W	208.06	7.23
6142.00	20.01	256.34	6090.13	442.75 N	201.22 W	222.76	5.51
6188.00	22.56	257.16	6132.99	438.93 N	217.48 W	238.81	5.58
6236.00	24.61	260.23	6176.98	435.18 N	236.31 W	257.43	4.98
6283.00	27.85	265.55	6219.14	432.67 N	256.90 W	277.88	8.51
6331.00	32.53	269.78	6260.62	431.75 N	281.00 W	301.90	10.70
6378.00	39.38	273.66	6298.65	432.65 N	308.56 W	329.47	15.35
6426.00	50.06	275.64	6332.71	435.44 N	342.16 W	363.17	22.44
6473.00	57.09	277.34	6360.60	439.74 N	379.71 W	400.88	15.24
6521.00	59.37	276.75	6385.87	444.74 N	420.21 W	441.58	4.86
6568.00	61.51	273.06	6409.06	448.22 N	460.93 W	482.42	8.21
6616.00	62.81	271.52	6431.48	449.91 N	503.34 W	524.86	3.92
6662.00	64.10	268.14	6452.04	449.79 N	544.48 W	565.95	7.15
6710.00	69.27	266.70	6471.04	447.79 N	588.50 W	609.81	11.12
6757.00	74.60	267.12	6485.60	445.39 N	633.10 W	654.24	11.37
6805.00	79.44	268.21	6496.38	443.48 N	679.82 W	700.81	10.32
6858.00	85.62	268.63	6503.27	442.04 N	732.32 W	753.18	11.69
6993.00	91.29	270.53	6506.91	441.05 N	867.21 W	887.86	4.43
7086.00	92.41	268.88	6503.91	440.57 N	960.16 W	980.67	2.14
7178.00	91.36	266.47	6500.88	436.84 N	1052.02 W	1072.24	2.86
7270.00	89.48	265.82	6500.21	430.66 N	1143.81 W	1163.61	2.16
7362.00	87.94	266.63	6502.28	424.60 N	1235.58 W	1254.97	1.89
7454.00	89.41	268.47	6504.40	420.67 N	1327.47 W	1346.55	2.56
7549.00	87.22	267.19	6507.20	417.08 N	1422.35 W	1441.15	2.67
7644.00	87.47	265.95	6511.60	411.40 N	1517.07 W	1535.48	1.33
7738.00	88.49	265.22	6514.91	404.17 N	1610.74 W	1628.67	1.33
7833.00	90.31	264.58	6515.91	395.72 N	1705.35 W	1722.75	2.03
7928.00	91.88	265.94	6514.09	387.87 N	1800.00 W	1816.90	2.19
8022.00	91.94	266.89	6510.96	382.00 N	1893.76 W	1910.27	1.01
8117.00	88.95	267.00	6510.22	376.94 N	1988.62 W	2004.75	3.15
8212.00	90.03	269.16	6511.07	373.76 N	2083.55 W	2099.42	2.54
8306.00	90.62	270.66	6510.53	373.61 N	2177.55 W	2193.29	1.71
8401.00	88.09	270.65	6511.60	374.69 N	2272.53 W	2288.21	2.66
8496.00	89.45	270.84	6513.64	375.93 N	2367.50 W	2383.12	1.45
8591.00	89.26	270.28	6514.71	376.86 N	2462.48 W	2478.04	0.62
8686.00	89.32	270.33	6515.89	377.36 N	2557.48 W	2572.94	0.08
8780.00	90.55	269.99	6515.99	377.62 N	2651.47 W	2666.84	1.36
8875.00	89.82	268.93	6515.69	376.73 N	2746.47 W	2761.67	1.35
8970.00	89.97	268.12	6515.86	374.28 N	2841.43 W	2856.41	0.87
9064.00	91.36	267.75	6514.77	370.90 N	2935.36 W	2950.06	1.53
9159.00	90.80	266.68	6512.98	366.28 N	3030.23 W	3044.58	1.27
9254.00	89.48	266.83	6512.75	360.90 N	3125.08 W	3139.05	1.40
9349.00	87.84	267.95	6514.97	356.58 N	3219.95 W	3233.59	2.09
9443.00	88.49	267.65	6517.98	352.97 N	3313.83 W	3327.18	0.76
9538.00	90.80	268.25	6518.57	349.57 N	3408.76 W	3421.83	2.51
9633.00	92.13	267.53	6516.14	346.08 N	3503.66 W	3516.45	1.59
9727.00	91.60	268.35	6513.08	342.70 N	3597.55 W	3610.06	1.04
9822.00	90.68	269.28	6511.19	340.74 N	3692.51 W	3704.80	1.38
9917.00	88.77	269.29	6511.65	339.55 N	3787.50 W	3799.62	2.01
10012.00	89.72	269.07	6512.90	338.19 N	3882.48 W	3894.42	1.03
10107.00	91.73	269.01	6511.70	336.60 N	3977.45 W	3989.20	2.12
10202.00	90.34	269.82	6509.98	335.63 N	4072.43 W	4084.01	1.69
10297.00	88.86	269.61	6510.64	335.16 N	4167.42 W	4178.87	1.57
10392.00	89.54	268.95	6511.97	333.96 N	4262.41 W	4273.67	1.00
10487.00	91.11	268.69	6511.43	332.01 N	4357.38 W	4368.44	1.68
10581.00	89.44	268.28	6510.98	329.52 N	4451.34 W	4462.16	1.83
10676.00	88.77	268.30	6512.46	326.69 N	4546.29 W	4556.86	0.71
10771.00	89.11	267.91	6514.22	323.55 N	4641.22 W	4651.52	0.54
10865.00	90.37	267.43	6514.65	319.73 N	4735.14 W	4745.14	1.43
10960.00	90.12	268.82	6514.24	316.62 N	4830.09 W	4839.81	1.49
11055.00	89.63	268.00	6514.45	313.98 N	4925.05 W	4934.53	1.01
11149.00	89.45	268.64	6515.20	311.23 N	5019.00 W	5028.24	0.71
11244.00	91.08	268.35	6514.76	308.73 N	5113.97 W	5122.96	1.74
11338.00	91.14	268.68	6512.94	306.30 N	5207.92 W	5216.68	0.36
11433.00	89.17	269.14	6512.69	304.49 N	5302.89 W	5311.45	2.13

11528.00	89.85	268.72	6513.50	302.71 N	5397.87 W	5406.23	0.84
11623.00	89.17	269.17	6514.31	300.96 N	5492.85 W	5501.01	0.86
11718.00	89.48	268.99	6515.43	299.44 N	5587.83 W	5595.80	0.38
11812.00	90.49	268.66	6515.46	297.51 N	5681.81 W	5689.57	1.13
11881.00	91.36	268.09	6514.34	295.56 N	5750.78 W	5758.35	1.51
11945.00	91.36	268.09	6512.82	293.42 N	5814.72 W	5822.12	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 272.82 DEGREES (GRID)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11945.00 FEET
IS 5822.12 FEET ALONG 272.89 DEGREES (GRID)**

**First Survey from 3rd party source (Muulti Shot EMS) and provided by CO-man on location before drilling.
Survey Depth 604 Inc 0.6 Azi 283.67
Tied in @ Surface
Magnetic direction of 7.566 has been added to AZI for grid direction correction.**

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