

PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	27-Mar-14	28-Mar-14	31-Mar-14		
Rig Bit Number	2	3	4		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.800	6.800	4.750		
Log Start Depth (MD, ft)	645.00	5,883.00	6,923.00		
Log End Depth (MD, ft)	5,883.00	6,923.00	12,099.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	26-Mar-14 09:11	17-Mar-14 16:38	28-Mar-14 13:19		
Drill/Wipe End Date and Time	27-Mar-14 03:56	28-Mar-14 05:58	28-Mar-14 14:03		
Min Inc (deg) @ Depth (MD, ft)	0.15 @ 718.00	1.06 @ 5,888.00	87.04 @ 12,036.00		
Max Inc (deg) @ Depth (MD, ft)	1.84 @ 4,396.00	86.61 @ 6,868.00	91.76 @ 11,055.00		
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC	0.65 / PDC		
Flow Rate (gpm)	593.97	586.68	314.13		
Max AV (fpm) / CV (fpm) @ MWD	NA / NA	NA / NA	0.0 / 0.0		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.70 / 33.00	10.15 / 37.00	9.38 / 36.00		
Filtrate CL (ppm)	1,400.00	2,100.00	2,700.00		
pH / Fluid Loss (mptm)	11.40 / 31	9.10 / 8	9.70 / 8		
PV (cP) / YP (lbf2)	4 / 7.00	9 / 8.00	9 / 13.00		
% Solids / % Sand	2.60 / 1.50	12.00 / 0.15	5.60 / 0.25		
% Oil / Oil:Water Ratio	NA / NA	NA / NA	0.20 / NA		
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA		
Max Tool Temp (in F) / S	111.78 / PCM	151.88 / PCM	212.12 / PCM		

Max Tool Temp (degF) / Source	141.70 / PCM	154.30 / PCM	213.40 / PCM		
Rm @ Max Tool Temp (degF)	NA @ 141.70	NA @ 154.30	NA @ 213.40		
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass		
Customer Representative	Jim Turner	Stetson Nielsen	Stetson Nielsen		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.84	5.84	5.84		
Sub Serial Number	245494	245494	11675316		
Insert Serial Number	11400842	11400842	11400842		
Date and Time Initialized	25-Mar-14 19:03	25-Mar-14 19:03	28-Mar-14 23:36		
Date and Time Read	28-Mar-14 14:11	28-Mar-14 14:11	01-Apr-14 00:50		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	57.00	55.00	63.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	245494	245494	11675316		
Sonde Serial Number	11478014	11478014	11478014		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	76.70	323.25	353.94		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.70	47.99	66.37		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	245494	245494	11675316		
Insert/Sonde Serial Number	11681051	11681051	11681051		

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: 0.5 ft
Interval Distance: 1.2 ft

6. Insite Version V8.0.10

WARRANTY

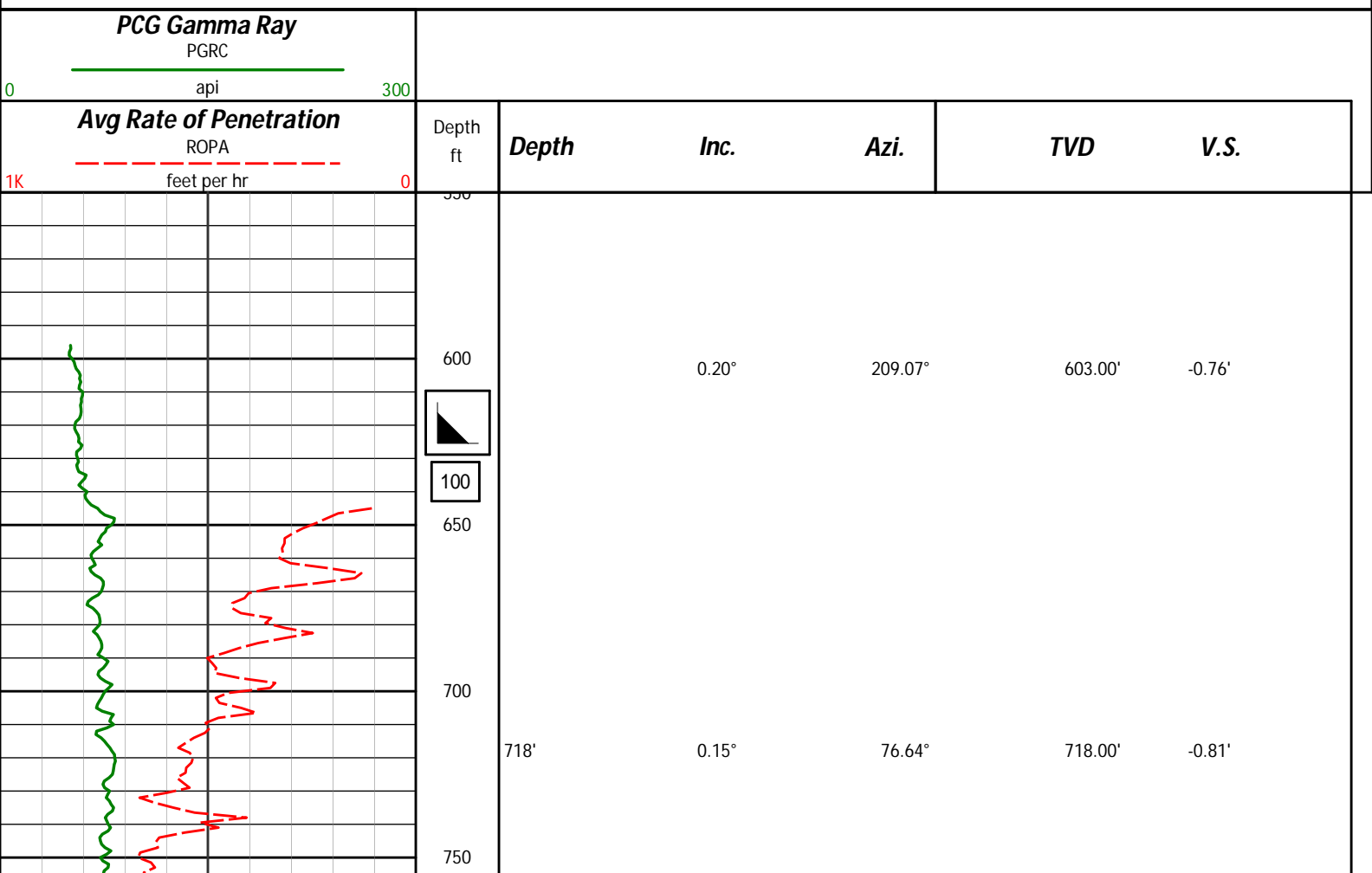
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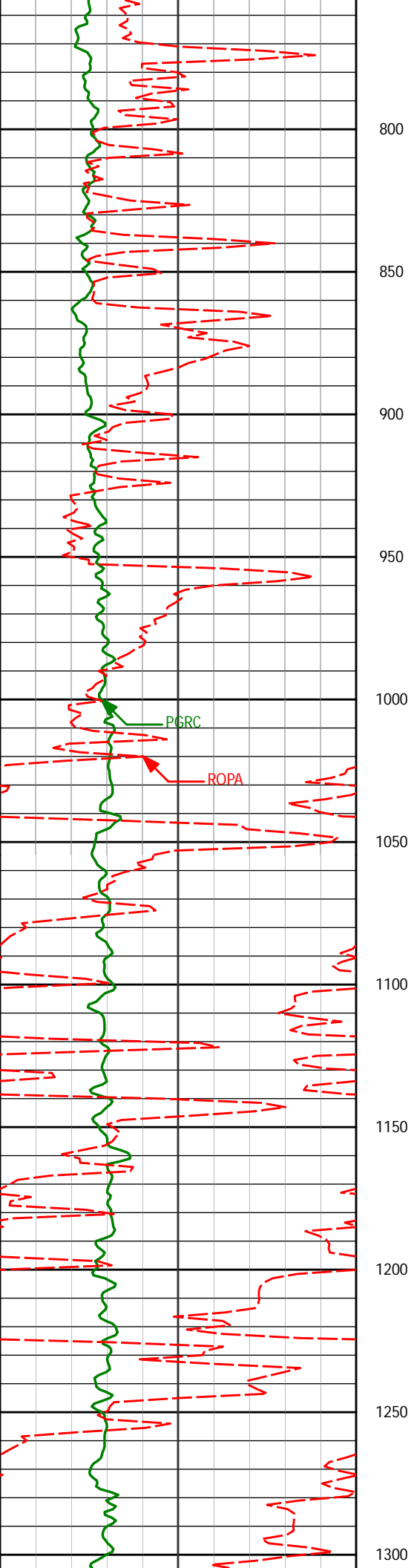
HALLIBURTON

Sperry Drilling Services

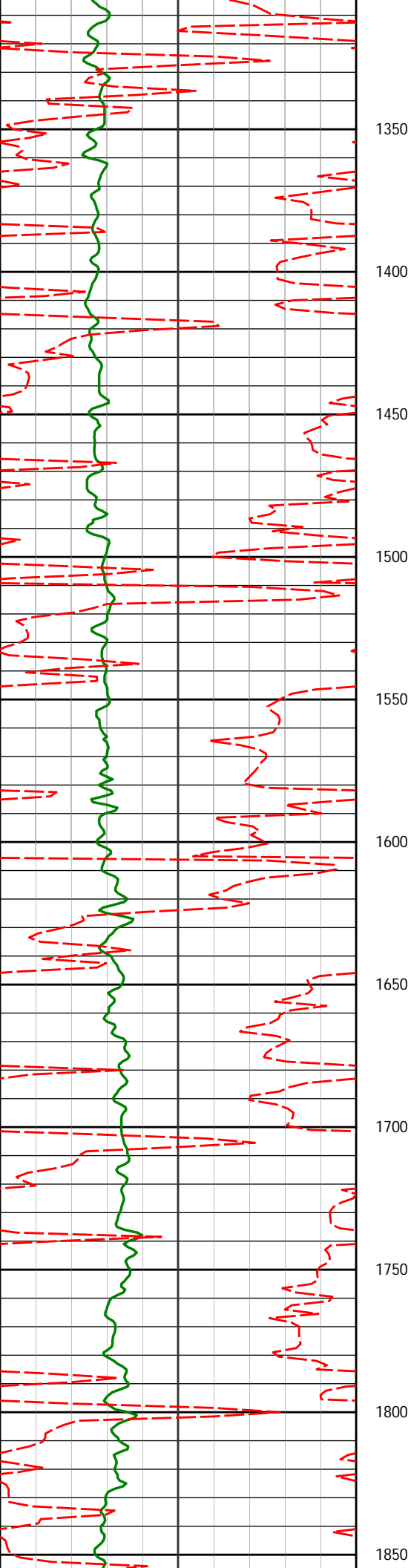
MD Correlation Log 1:600

Noble Energy
Wells Ranch AE30-64HNC
H&P 321
Sec. 29-T6N-R62W

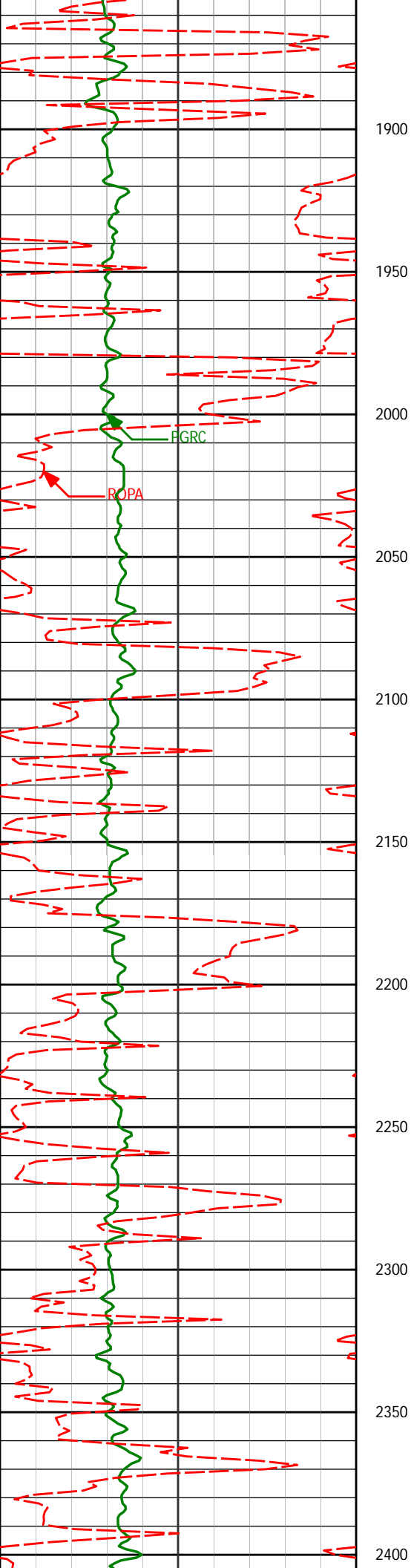




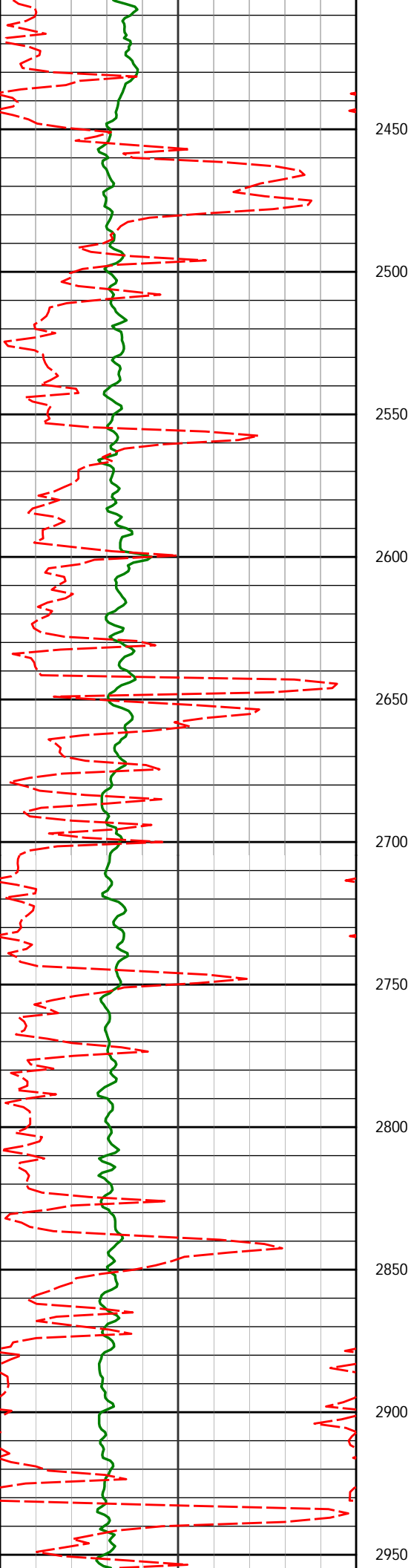
810'	0.31°	124.68°	810.00'	-1.13'
902'	0.41°	112.74°	901.99'	-1.63'
994'	0.55°	125.96°	993.99'	-2.29'
1085'	0.79°	134.79°	1084.99'	-3.07'
1178'	0.96°	135.49°	1177.97'	-4.06'
1271'	0.52°	67.68°	1270.97'	-4.99'



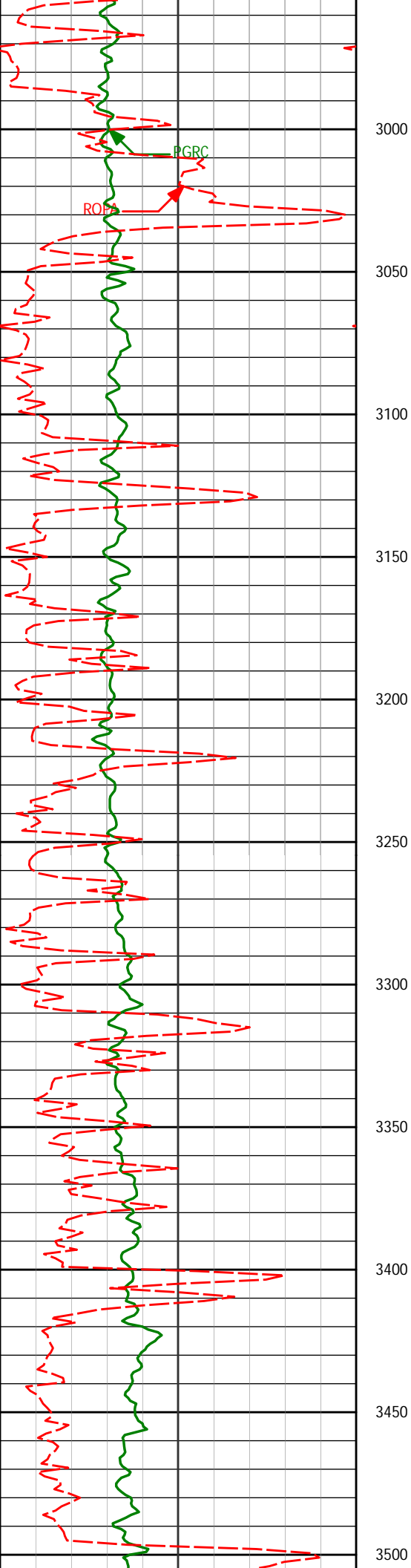
1364'	0.70°	70.48°	1363.96'	-5.92'
1458'	0.79°	69.61°	1457.95'	-7.08'
1553'	0.82°	68.97°	1552.95'	-8.33'
1648'	0.56°	305.89°	1647.94'	-8.60'
1742'	0.62°	313.25°	1741.94'	-7.87'
1837'	0.92°	277.78°	1836.93'	-6.74'



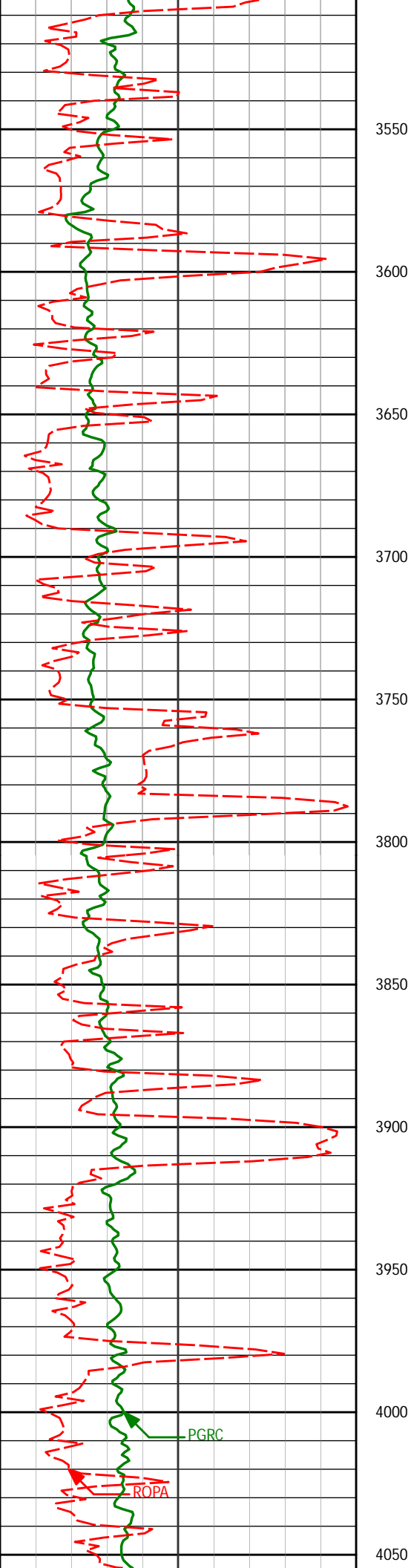
1932'	1.27°	293.44°	1931.91'	-5.03'
2026'	1.24°	255.60°	2025.89'	-3.09'
2120'	1.48°	240.09°	2119.86'	-1.04'
2215'	0.99°	141.28°	2214.85'	-0.47'
2310'	1.05°	148.64°	2309.83'	-1.41'



2403	1.26	166.02	2404.62	-2.09
2450				
2499'	0.57°	341.64°	2498.81'	-2.19'
2500				
2550				
2594'	0.92°	1.21°	2593.80'	-2.07'
2600				
2650				
2689'	0.85°	345.84°	2688.79'	-1.94'
2700				
2750				
2784'	0.94°	352.24°	2783.78'	-1.68'
2800				
2850				
2879'	0.99°	3.70°	2878.77'	-1.66'
2900				
2950				



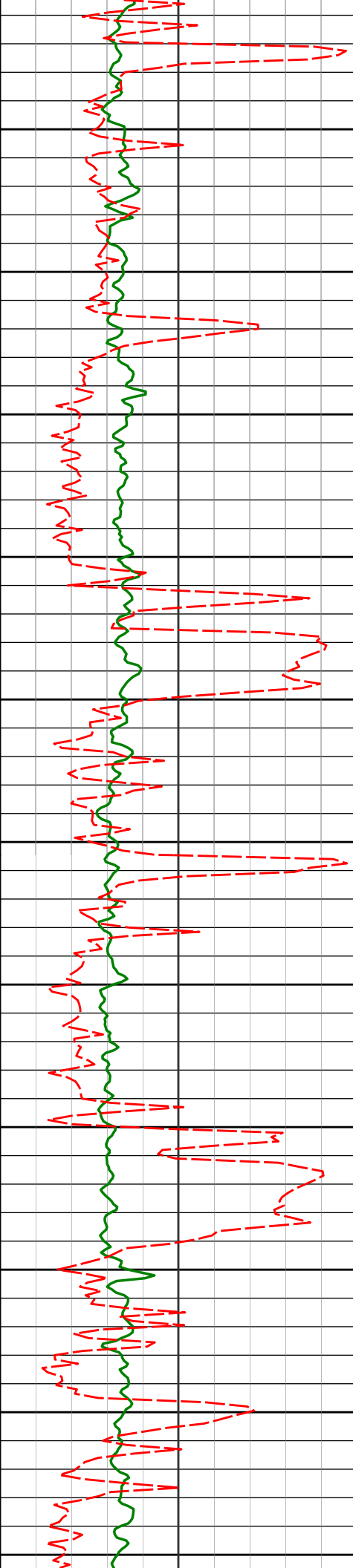
2974'	1.05°	8.94°	2973.75'	-1.87'
3000				
3068'	0.75°	2.98°	3067.74'	-2.06'
3100				
3163'	0.62°	9.54°	3162.73'	-2.20'
3200				
3258'	0.51°	24.01°	3257.73'	-2.47'
3300				
3352'	0.22°	244.98°	3351.73'	-2.48'
3400				
3447'	0.65°	322.13°	3446.72'	-1.99'
3500				



3542'	1.03°	307.40°	3541.71'	-1.00'
3550				
3637'	0.94°	305.56°	3636.70'	0.30'
3650				
3732'	1.05°	294.48°	3731.69'	1.71'
3750				
3827'	1.23°	298.08°	3826.67'	3.39'
3850				
3921'	0.50°	301.62°	3920.66'	4.62'
3950				
4016'	0.84°	225.90°	4015.65'	5.48'
4050				

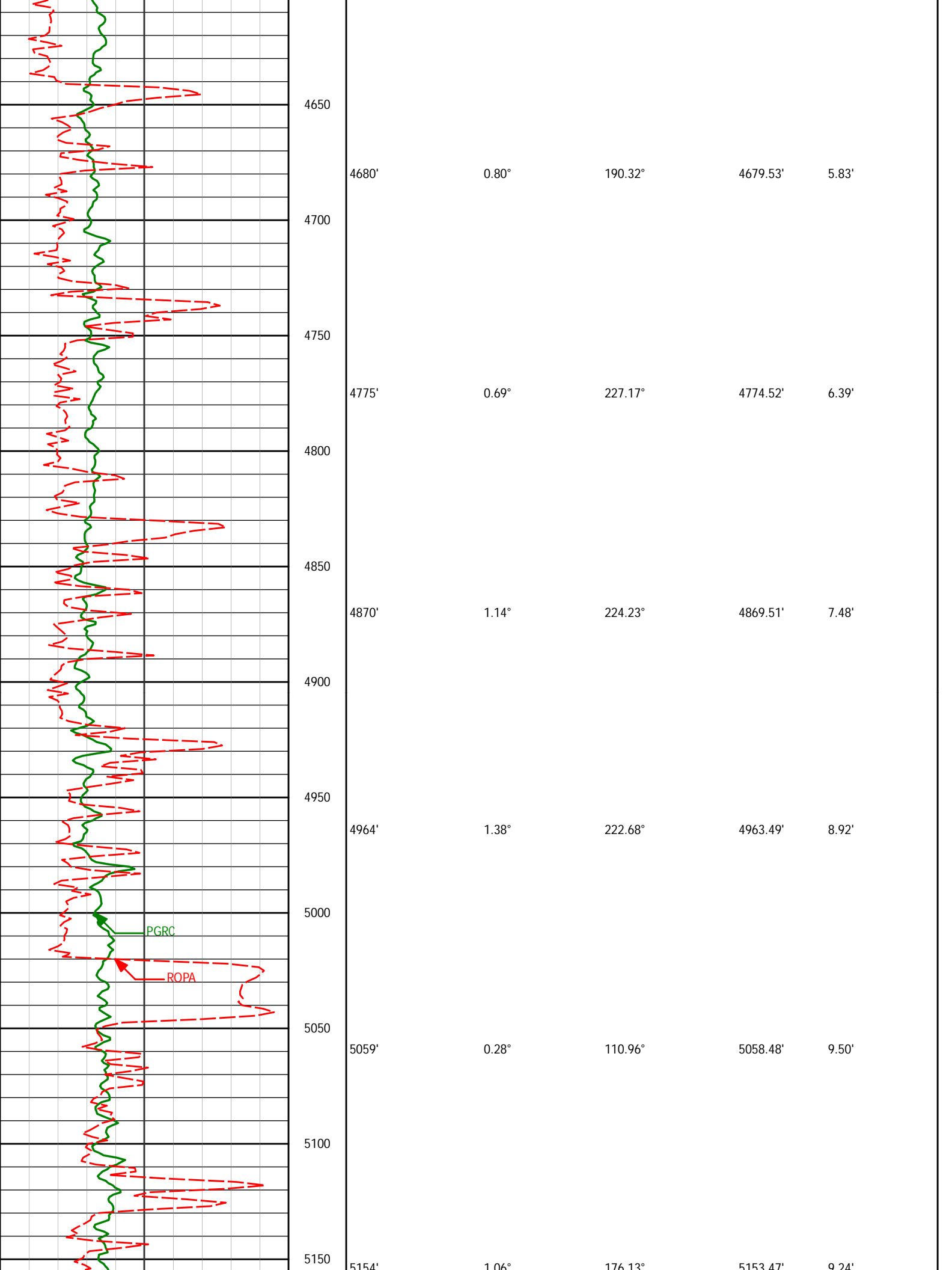
PGRC

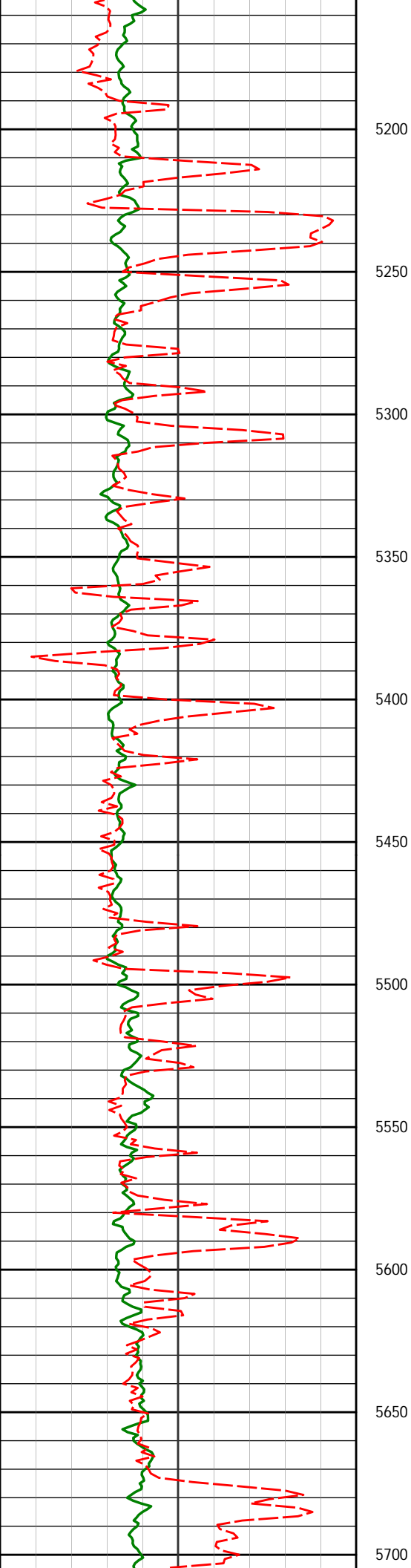
ROPA



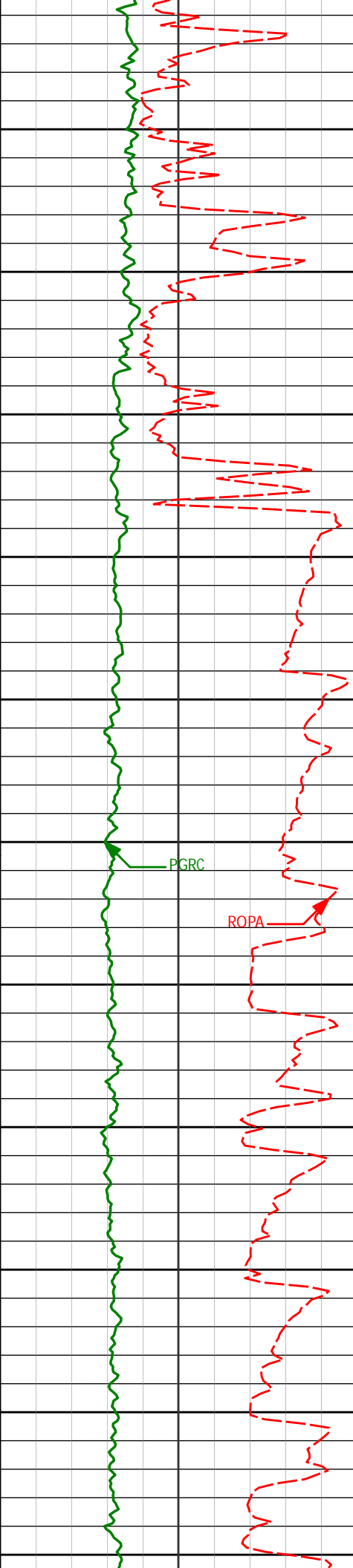
4100
4150
4200
4250
4300
4350
4400
4450
4500
4550
4600

4111'	1.07°	199.71°	4110.64'	6.30'
4206'	1.34°	193.74°	4205.62'	6.89'
4301'	0.33°	174.42°	4300.61'	7.15'
4396'	1.84°	167.80°	4395.59'	6.83'
4490'	1.00°	172.49°	4489.56'	6.44'
4585'	1.03°	156.99°	4584.54'	6.02'

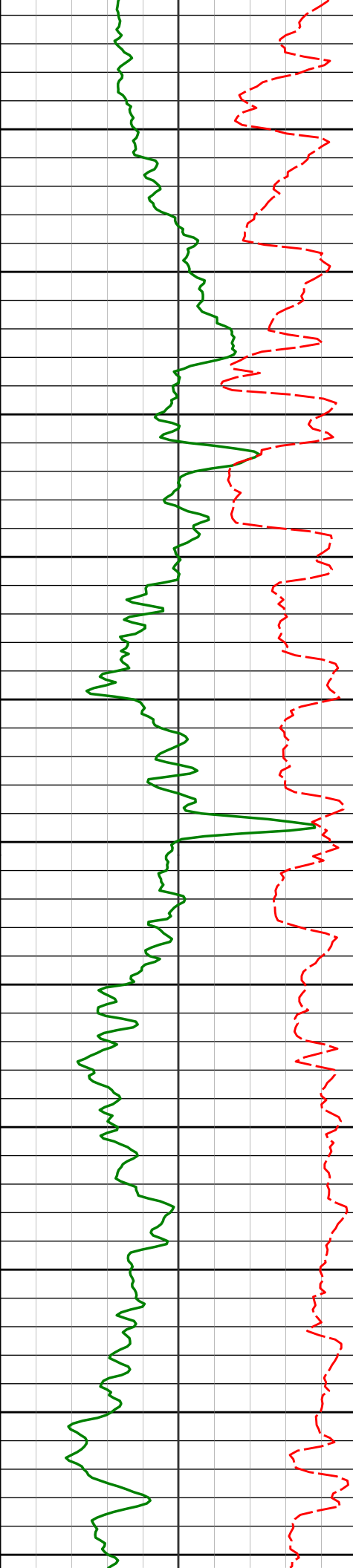




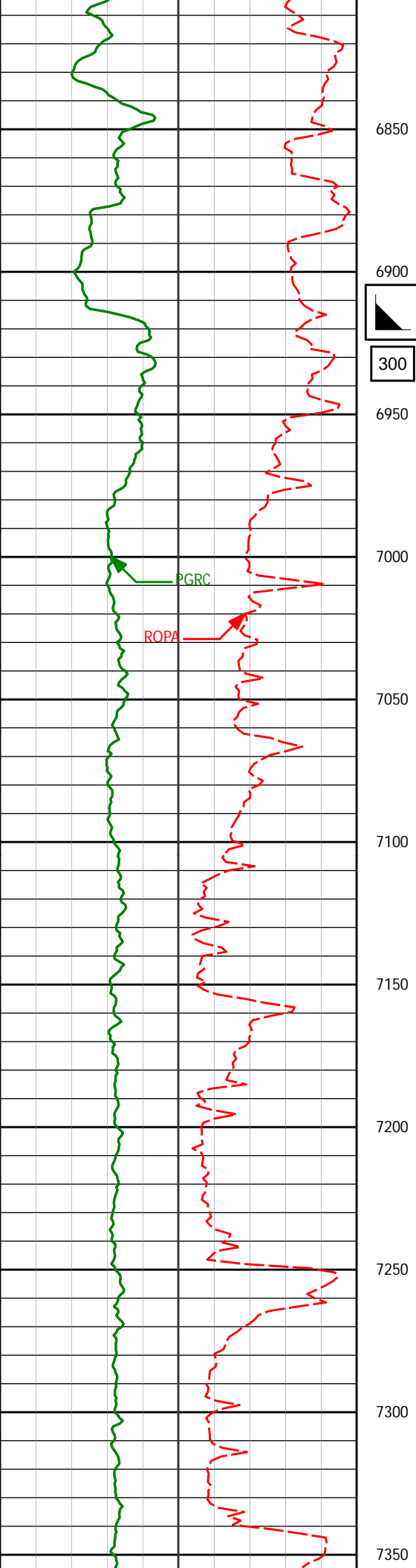
5194'	1.00°	170.13°	5193.47'	9.24'
5200				
5210				
5220				
5230				
5240				
5248'	0.29°	21.30°	5247.47'	9.10'
5250				
5260				
5270				
5280				
5290				
5300				
5310				
5320				
5330				
5340				
5343'	0.60°	301.82°	5342.46'	9.43'
5350				
5360				
5370				
5380				
5390				
5400				
5410				
5420				
5430				
5438'	0.28°	24.07°	5437.46'	9.75'
5450				
5460				
5470				
5480				
5490				
5500				
5510				
5520				
5530				
5533'	0.66°	219.98°	5532.46'	10.01'
5550				
5560				
5570				
5580				
5590				
5600				
5610				
5620				
5628'	0.76°	217.25°	5627.45'	10.76'
5650				
5660				
5670				
5680				
5690				
5700				



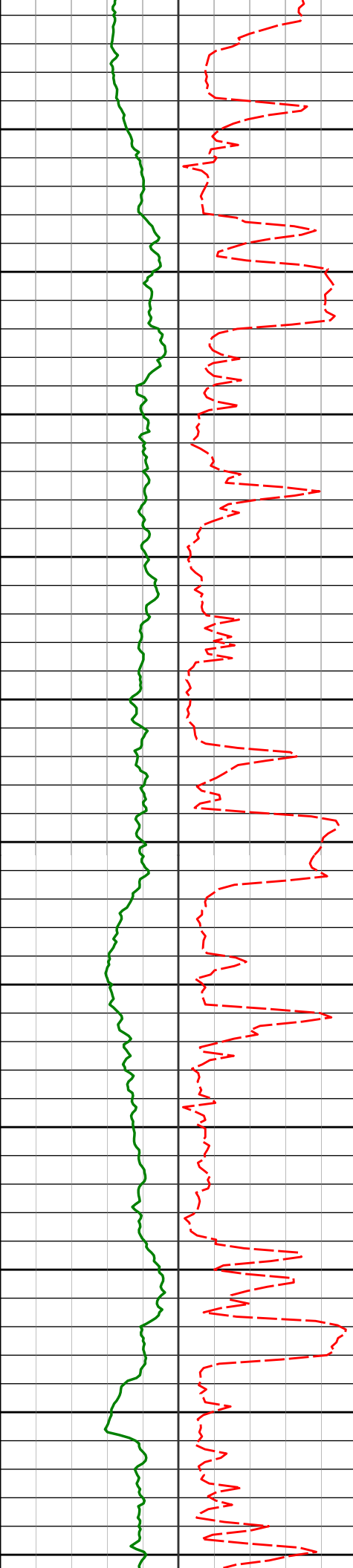
5723'	1.02°	219.82°	5722.44'	11.70'
5750				
5800				
5826'	1.10°	222.11°	5825.42'	12.97'
5850				
200				
5888'	1.06°	226.09°	5887.41'	13.80'
5900				
5950				
5959'	3.65°	258.98°	5958.35'	16.50'
6000				
6006'	9.62°	267.62°	6005.02'	21.91'
6050				
6054'	10.85°	271.16°	6052.25'	30.43'
6100				
6101'	13.71°	273.80°	6098.17'	40.40'
6150				
6149'	20.06°	274.21°	6144.08'	54.29'
6200				
6196'	26.23°	271.35°	6187.28'	72.71'
6250				
6244'	28.28°	271.03°	6229.94'	94.68'



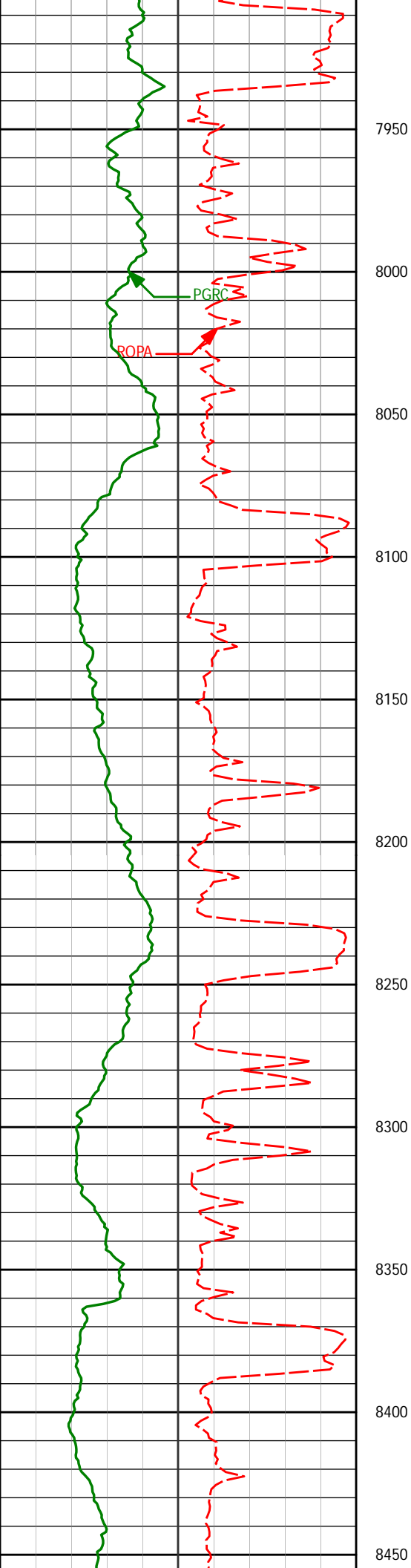
6290'	31.26°	269.96°	6269.87'	117.51'
6300				
6338'	37.29°	268.87°	6309.52'	144.53'
6350				
6385'	42.51°	270.03°	6345.56'	174.66'
6400				
6433'	45.28°	270.79°	6380.15'	207.93'
6450				
6480'	47.78°	271.71°	6412.48'	242.01'
6500				
6528'	49.18°	272.50°	6444.30'	277.90'
6550				
6575'	49.55°	272.22°	6474.91'	313.51'
6600				
6623'	54.81°	269.59°	6504.33'	351.39'
6650				
6670'	61.58°	268.01°	6529.09'	391.30'
6700				
6718'	70.88°	268.28°	6548.41'	435.18'
6750				
6765'	77.64°	269.61°	6561.16'	480.39'
6800				



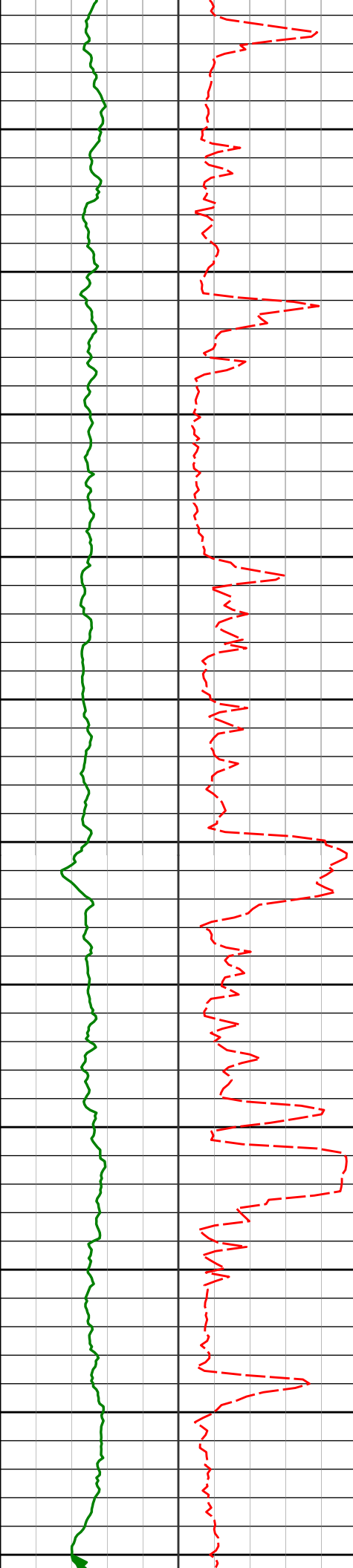
6813'	80.49°	269.94°	6570.26'	527.51'
6850				
6868'	86.61°	268.38°	6576.44'	582.13'
6900				
6943'	88.64°	268.46°	6579.55'	657.06'
6950				
7000				
7001'	89.94°	269.57°	6580.26'	715.05'
7050				
7093'	89.91°	270.65°	6580.38'	807.04'
7100				
7150				
7185'	89.78°	271.19°	6580.63'	898.99'
7200				
7250				
7278'	90.18°	271.71°	6580.67'	991.91'
7300				
7350				



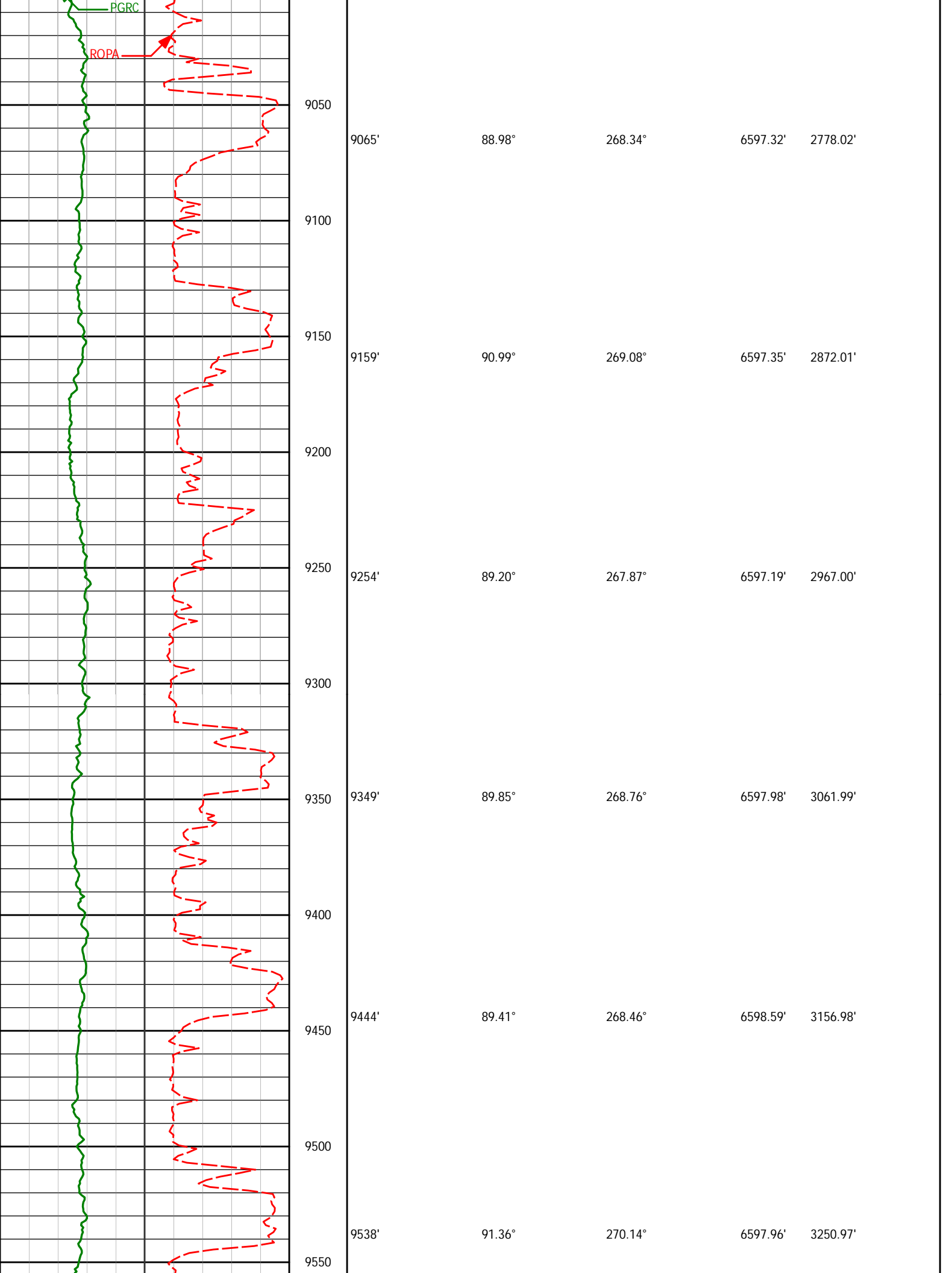
7371'	90.37°	270.61°	6580.22'	1084.85'
7400				
7463'	89.91°	269.21°	6580.00'	1176.83'
7500				
7555'	90.37°	270.52°	6579.77'	1268.82'
7600				
7647'	89.17°	268.42°	6580.14'	1360.81'
7700				
7739'	90.25°	268.08°	6580.60'	1452.80'
7800				
7833'	90.74°	271.82°	6579.79'	1546.77'
7850				
7900				

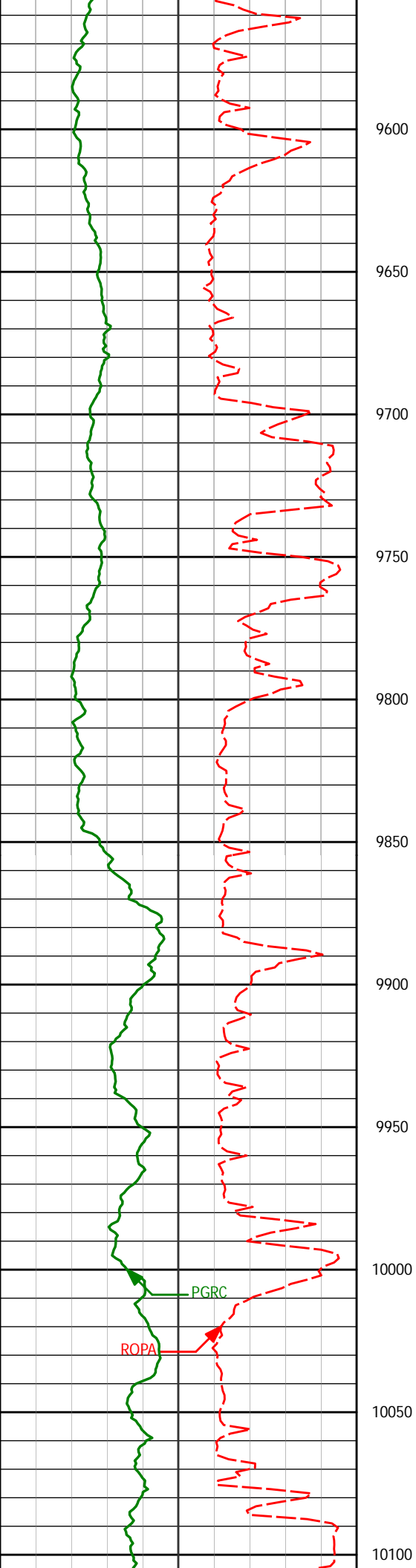


7928'	87.47°	268.55°	6581.28'	1641.72'
7950				
8000				
8023'	87.23°	268.64°	6585.67'	1736.61'
8050				
8100				
8117'	88.67°	265.25°	6589.03'	1830.47'
8150				
8200				
8212'	90.86°	267.84°	6589.42'	1925.36'
8250				
8300				
8307'	90.03°	266.82°	6588.68'	2020.31'
8350				
8400				
8402'	88.95°	268.31°	6589.53'	2115.27'
8450				

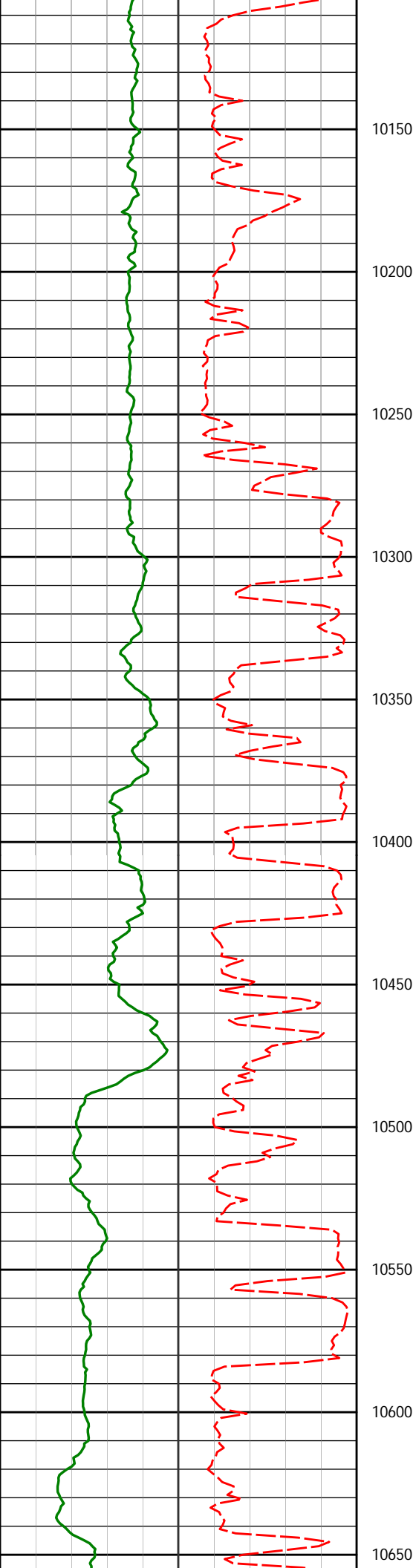


8500	8496'	89.63°	268.80°	6590.70'	2209.26'
8550					
8600	8591'	89.81°	268.67°	6591.16'	2304.25'
8650					
8700	8686'	88.37°	266.40°	6592.67'	2399.20'
8750					
8800	8781'	90.12°	267.64°	6593.92'	2494.12'
8850					
8900	8876'	89.75°	268.40°	6594.03'	2589.10'
8950					
9000	8970'	88.64°	267.24°	6595.35'	2683.07'

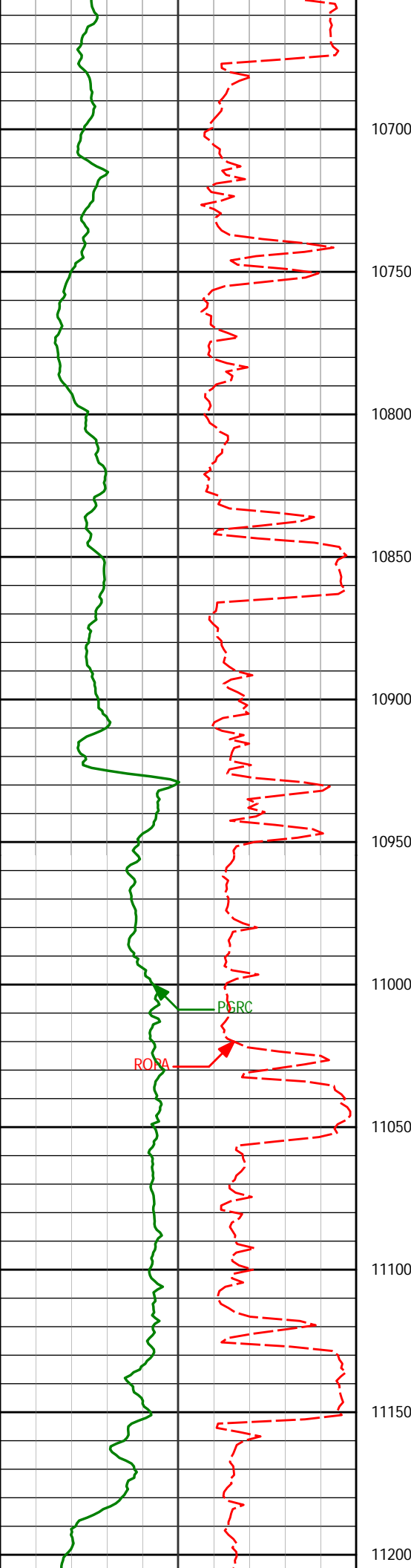




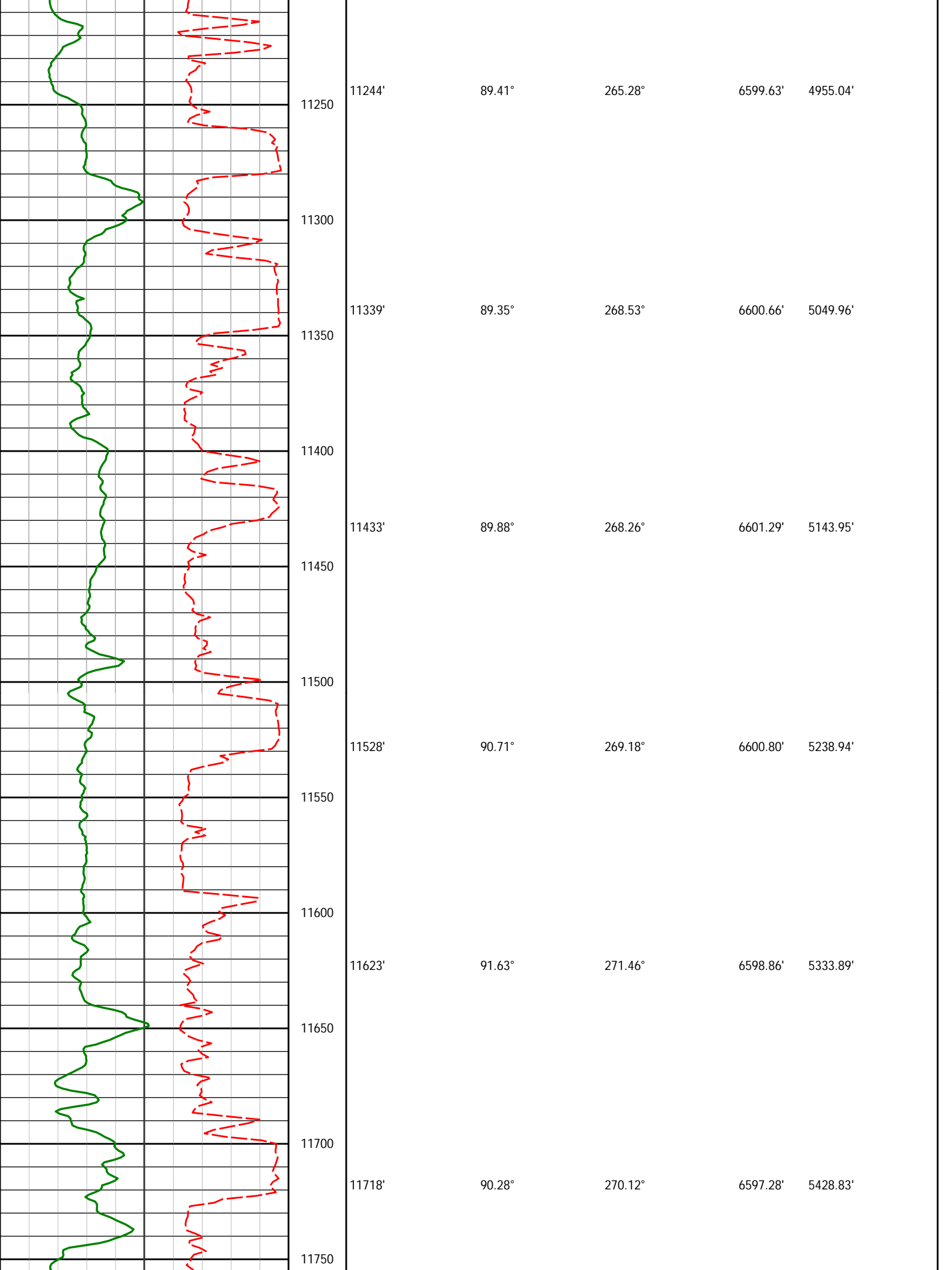
9600				
9633'	88.89°	268.79°	6597.75'	3345.96'
9650				
9700				
9728'	90.31°	270.63°	6598.41'	3440.95'
9750				
9800				
9822'	90.74°	270.79°	6597.55'	3534.91'
9850				
9900				
9917'	91.70°	270.22°	6595.53'	3629.85'
9950				
10000				
10012'	91.54°	269.52°	6592.84'	3724.81'
10050				
10100				

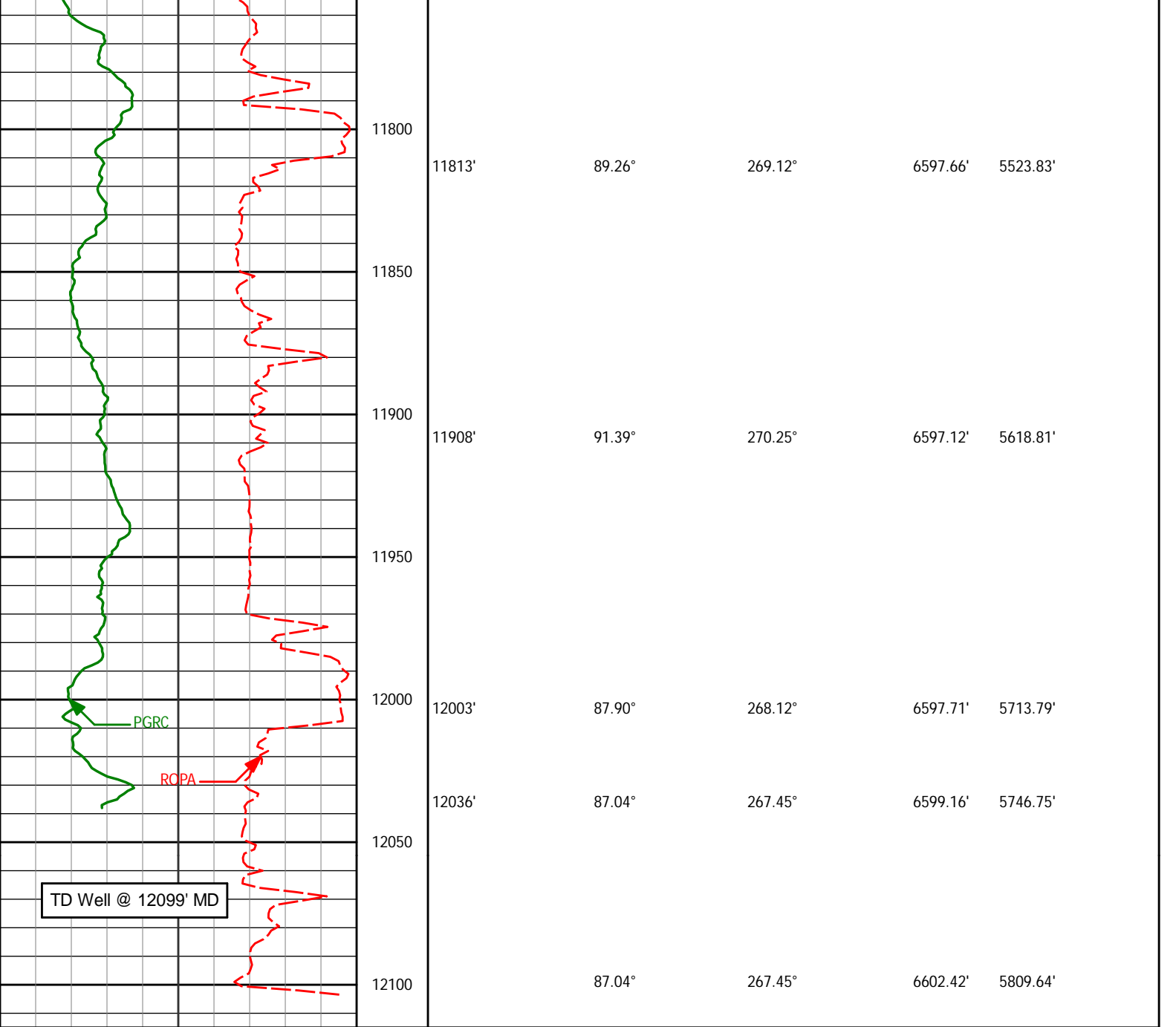


10107'	90.06°	270.19°	6591.52'	3819.79'
10202'	90.43°	273.80°	6591.11'	3914.65'
10297'	89.82°	275.66°	6590.90'	4009.18'
10392'	88.40°	271.48°	6592.38'	4103.86'
10487'	87.87°	271.45°	6595.47'	4198.72'
10582'	87.44°	267.96°	6599.36'	4293.62'



10676'	89.11°	268.09°	6602.19'	4387.56'
10700				
10750				
10771'	89.01°	268.03°	6603.75'	4482.53'
10800				
10850				
10866'	89.82°	266.90°	6604.72'	4577.49'
10900				
10950				
10960'	91.70°	267.42°	6603.47'	4671.42'
11000				
11050				
11055'	91.76°	268.58°	6600.60'	4766.36'
11100				
11150	90.00°	265.16°	6599.15'	4861.26'
11200				



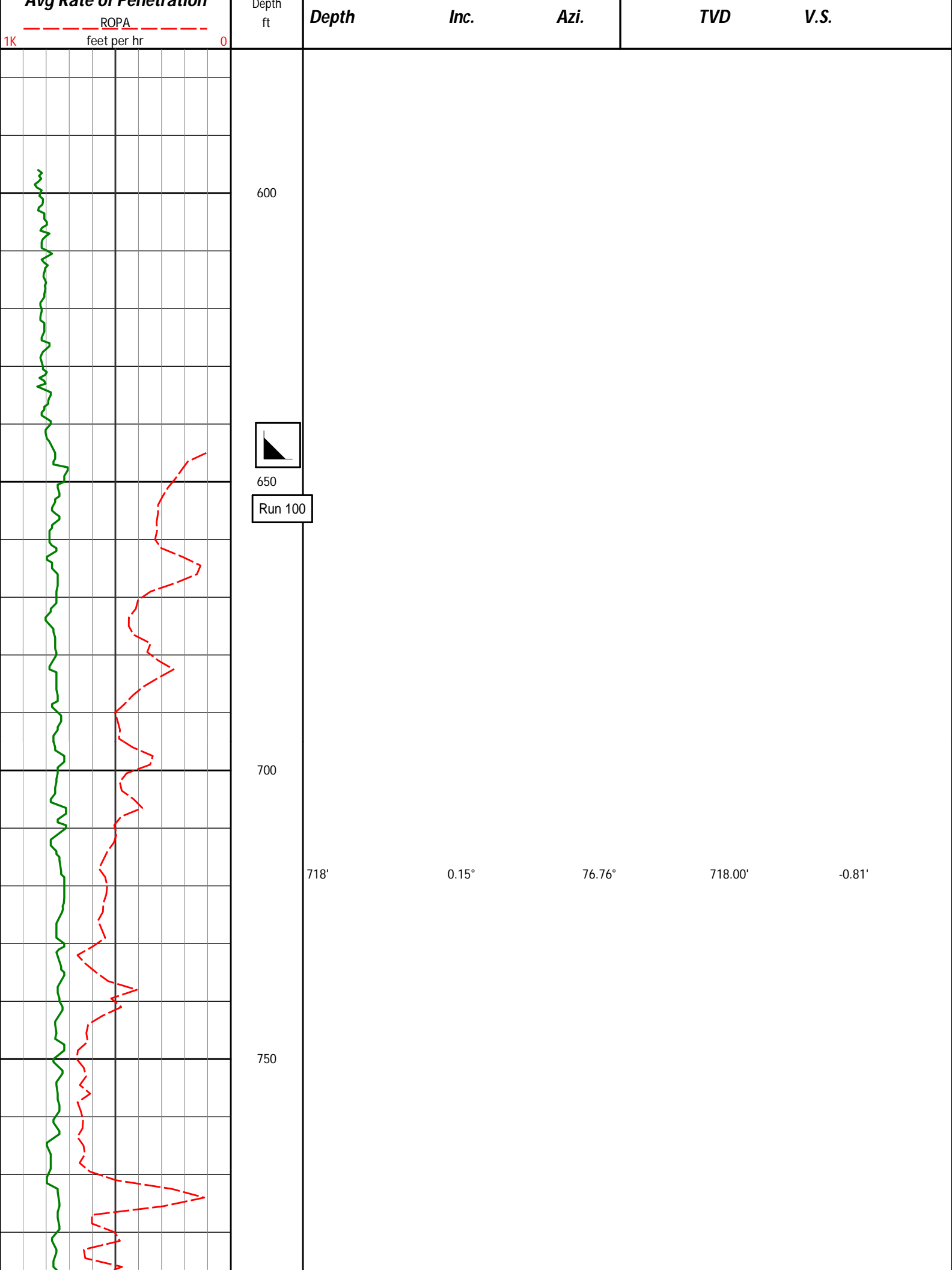


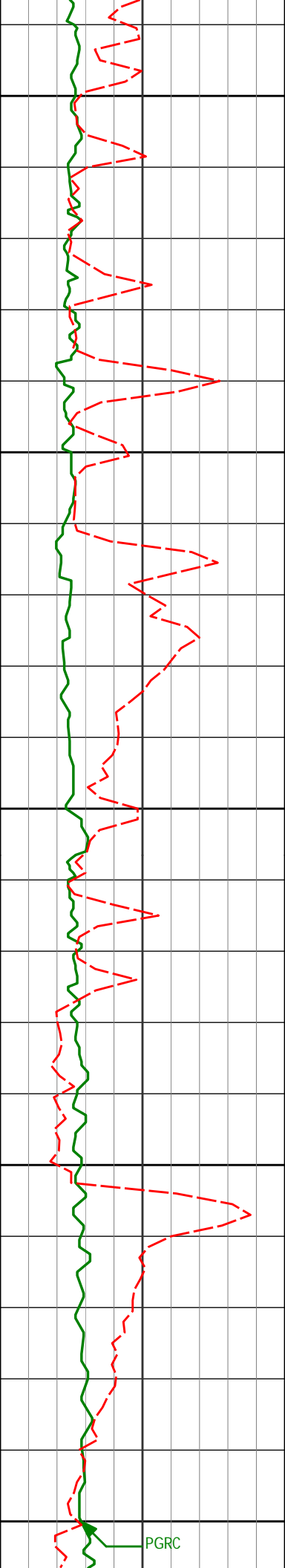
<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth ft	Depth		Inc.	Azi.	TVD		V.S.
1K	0								
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>									
0	300								

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy
Wells Ranch AE30--64AHN
H&P 321
Sec. 29-T6N-R62W

<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>								
<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth	Inc.		Azi.	TVD		V.S.





800

810'

0.31°

124.80°

810.00'

-1.13'

850

900

902'

0.41°

112.86°

901.99'

-1.63'

950

994'

0.55°

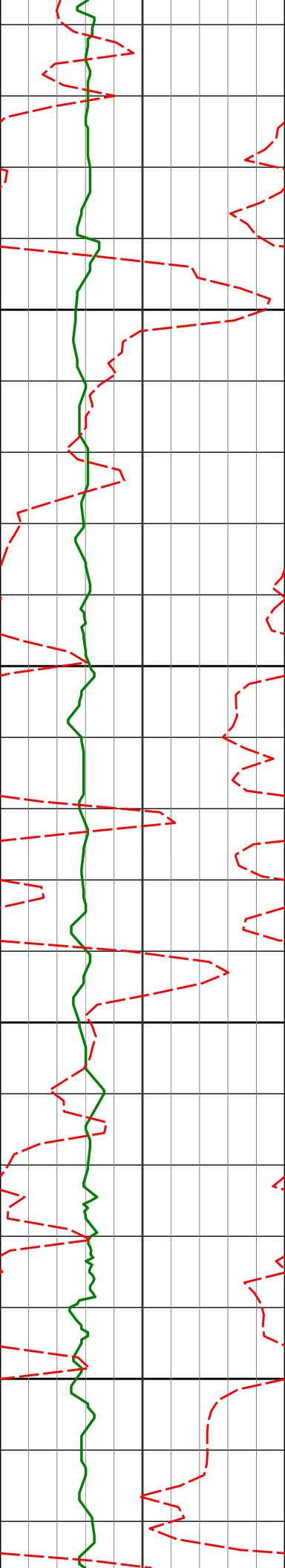
126.08°

993.99'

-2.29'

1000

PGRC



1050

1100

1150

1200

1085'

0.79°

134.91°

1084.99'

-3.07'

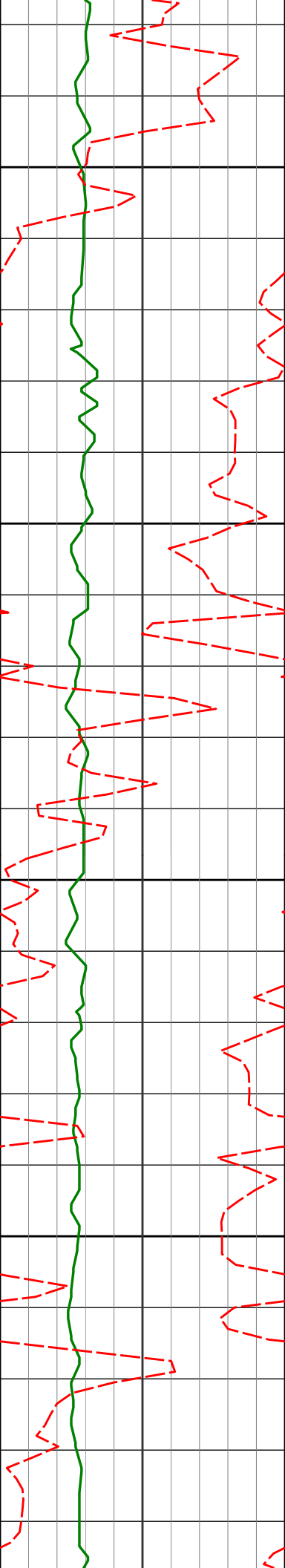
1178'

0.96°

135.60°

1177.97'

-4.06'



1250

1271'

0.52°

67.79°

1270.97'

-4.99'

1300

1350

1364'

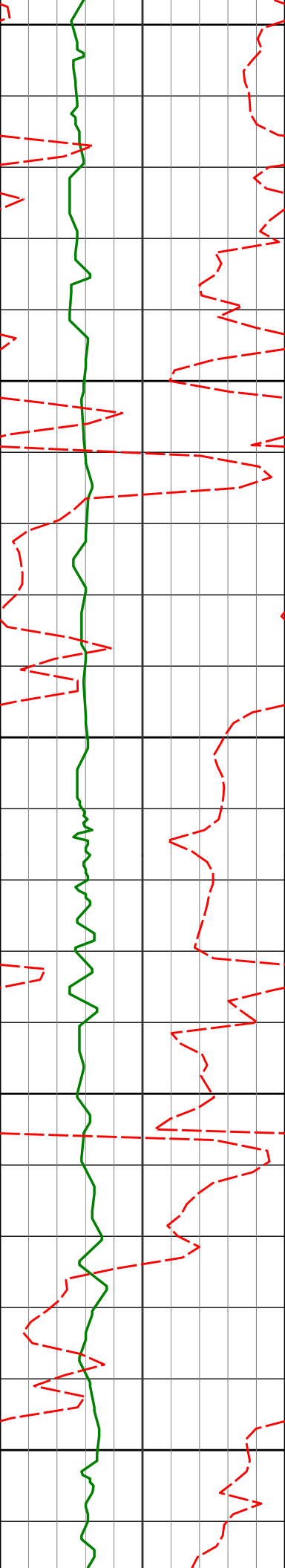
0.70°

70.59°

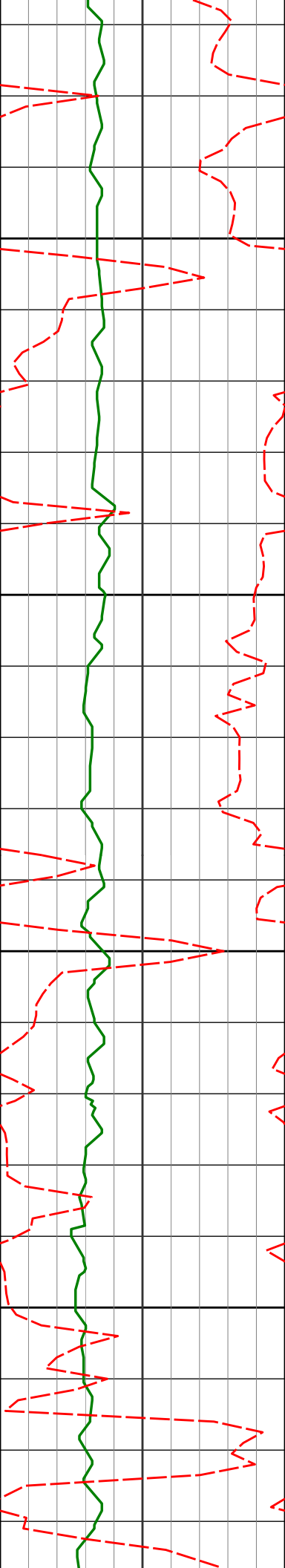
1363.96'

-5.92'

1400



1450				
1458'	0.79°	69.73°	1457.95'	-7.08'
1500				
1550				
1553'	0.82°	69.09°	1552.95'	-8.33'
1600				
1650				
1648'	0.56°	306.01°	1647.94'	-8.60'



1700

1750

1800

1850

1742'

0.62°

313.37°

1741.94'

-7.87'

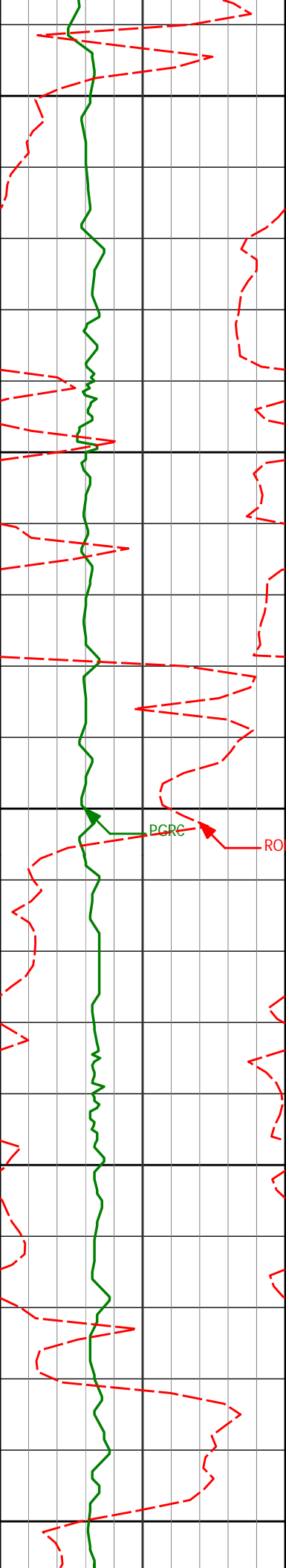
1837'

0.92°

277.90°

1836.93'

-6.74'



1900

1950

2000

2050

2100

1932'

1.27°

293.57°

1931.91'

-5.03'

2026'

1.24°

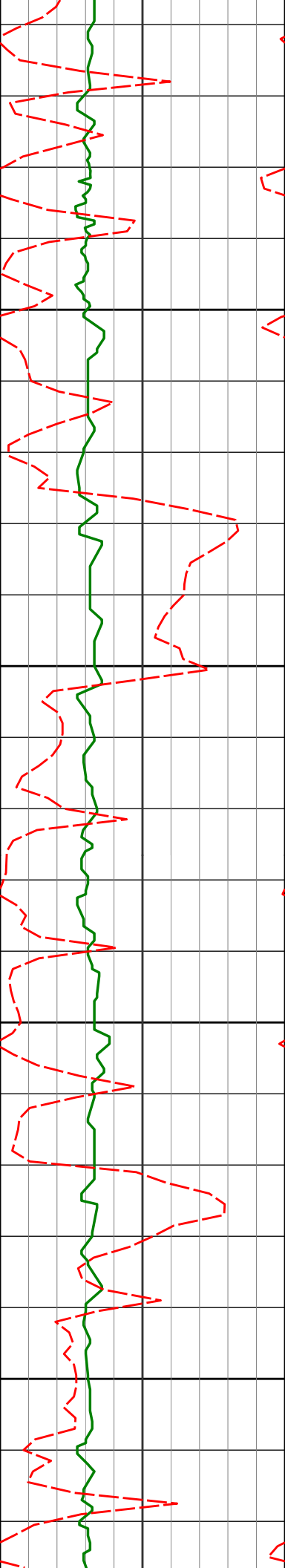
255.73°

2025.89'

-3.09'

PGRC

ROPA



2120'

1.48°

240.21°

2119.86'

-1.04'

2150

2200

2215'

0.99°

141.39°

2214.85'

-0.47'

2250

2300

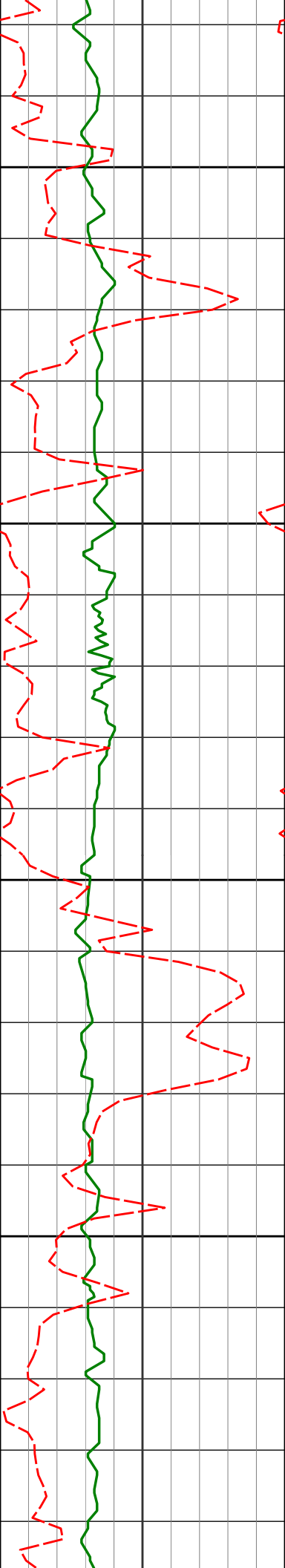
2310'

1.05°

148.75°

2309.83'

-1.41'



2350

2400

2450

2500

2405'

1.26°

166.14°

2404.82'

-2.09'

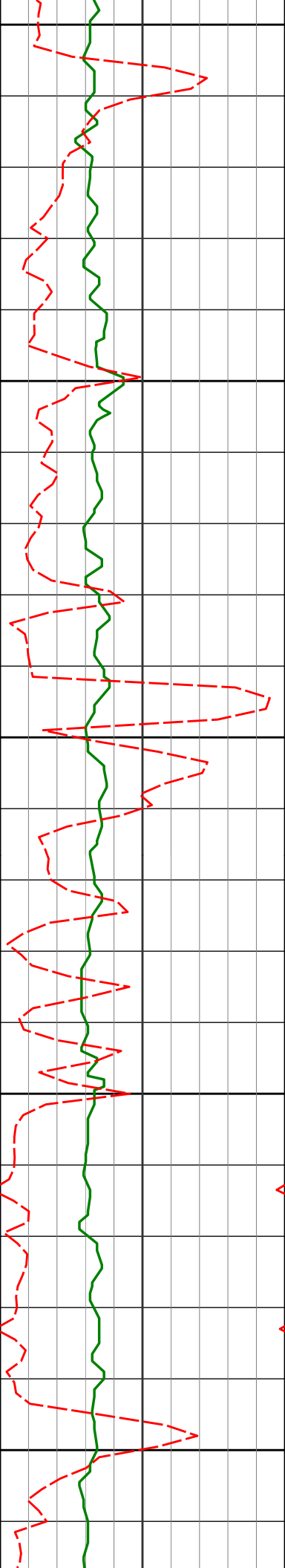
2499'

0.57°

341.76°

2498.81'

-2.19'



2550

2594'

0.92°

1.33°

2593.80'

-2.07'

2600

2650

2689'

0.85°

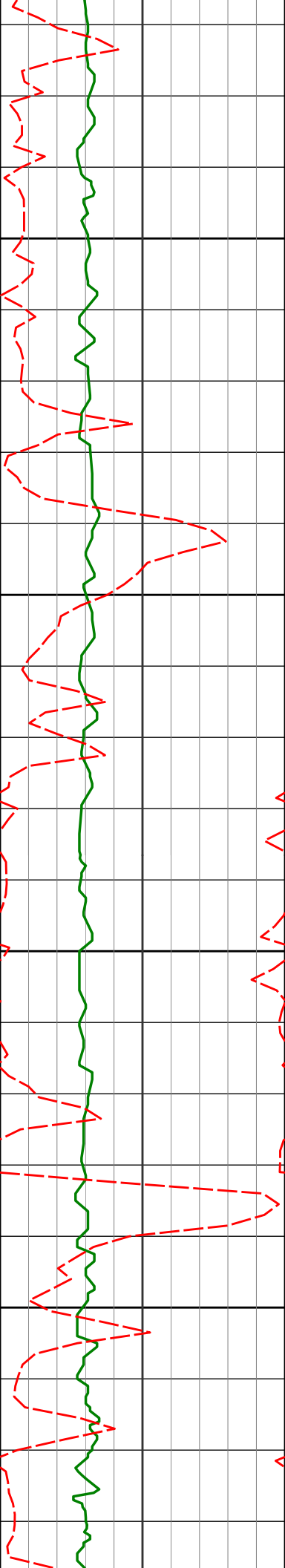
345.96°

2688.79'

-1.94'

2700

2750



2784'

0.94°

352.36°

2783.78'

-1.68'

2800

2850

2879'

0.99°

3.82°

2878.77'

-1.66'

2900

2950

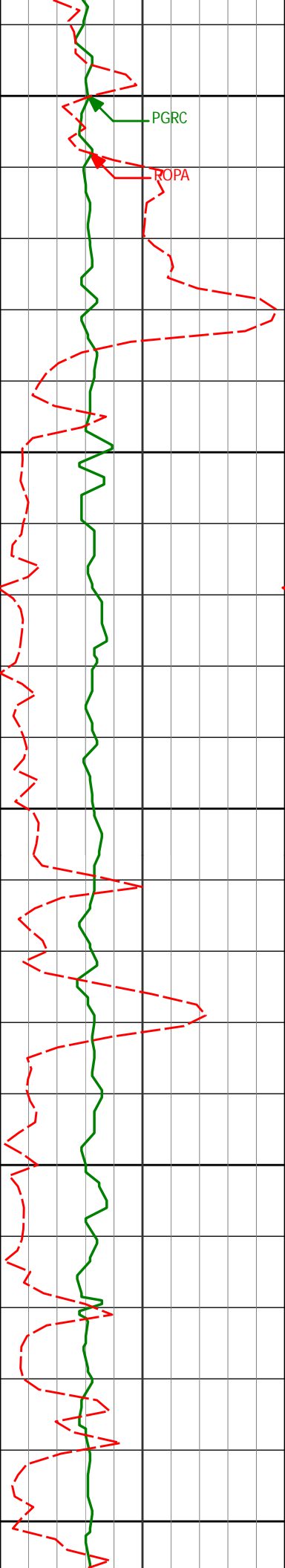
2974'

1.05°

9.06°

2973.75'

-1.87'



3000

PGRC

ROPA

3050

3068'

0.75°

3.09°

3067.74'

-2.06'

3100

3150

3163'

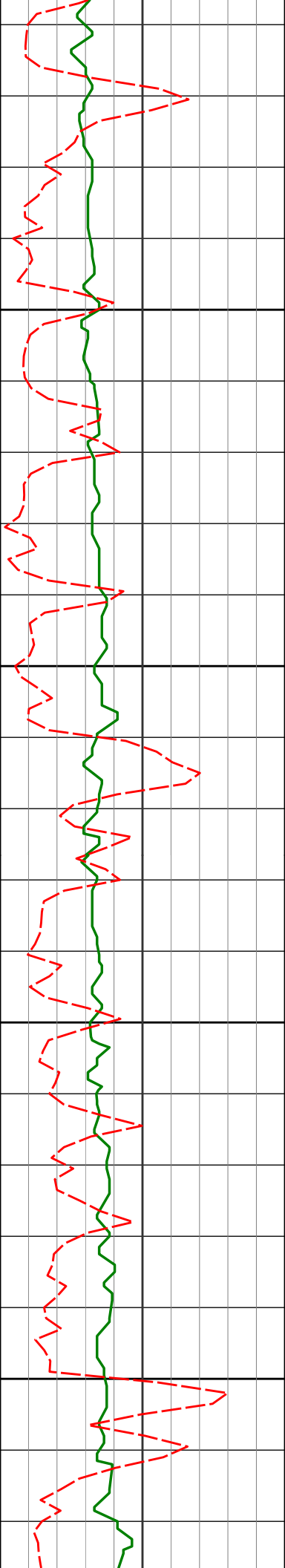
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9.66°

3162.73'

-2.20'

3200



3250

3258'

0.51°

24.13°

3257.73'

-2.47'

3300

3350

3352'

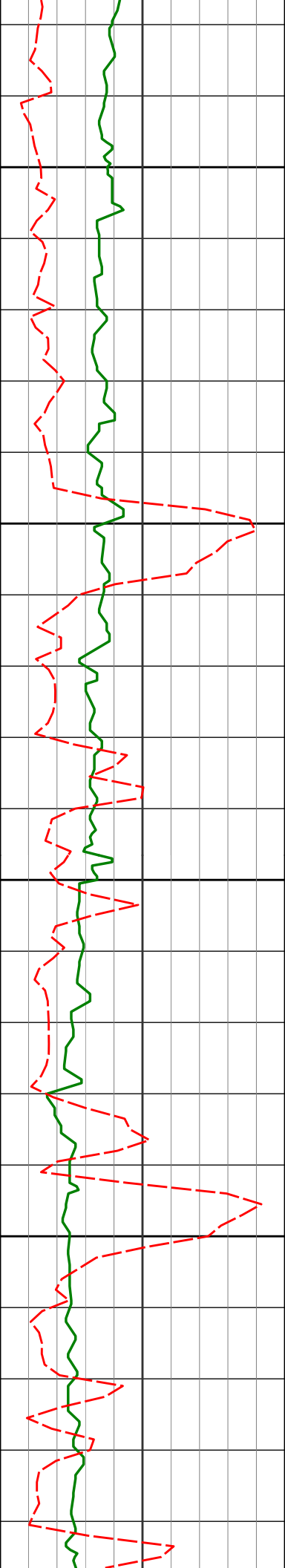
0.22°

245.10°

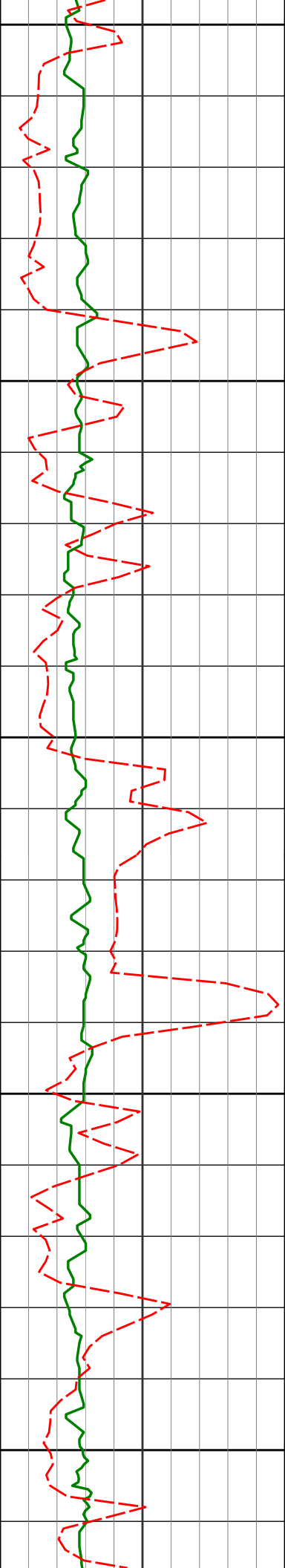
3351.73'

-2.48'

3400



3450	3447'	0.65°	322.25°	3446.72'	-1.99'
3500					
3550	3542'	1.03°	307.52°	3541.71'	-1.00'
3600					
	3637'	0.94°	305.68°	3636.70'	0.30'



3650

3700

3750

3800

3850

3732'

1.05°

294.60°

3731.69'

1.71'

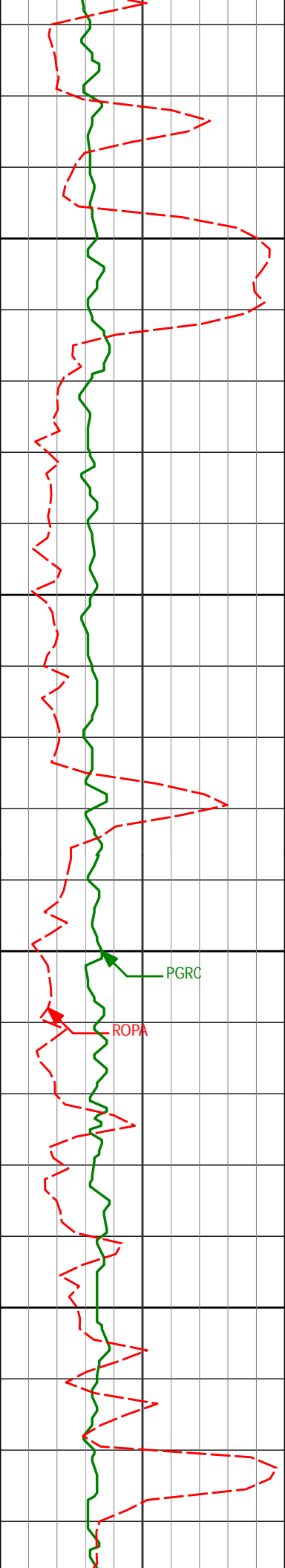
3827'

1.23°

298.21°

3826.67'

3.39'



3900

3921'

0.50°

301.74°

3920.66'

4.62'

3950

4000

PGRC

ROPA

4016'

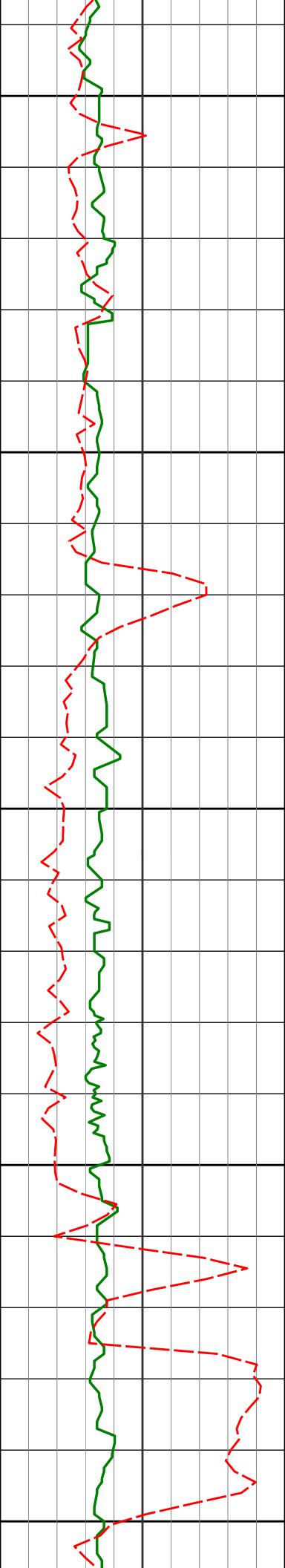
0.84°

226.02°

4015.65'

5.48'

4050



4100

4111'

1.07°

199.83°

4110.64'

6.30'

4150

4200

4206'

1.34°

193.86°

4205.62'

6.89'

4250

4300

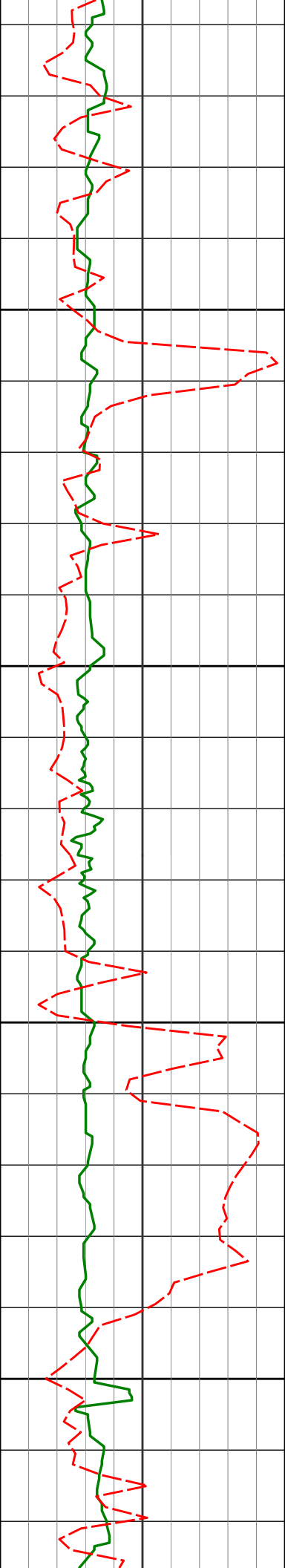
4301'

0.33°

174.54°

4300.61'

7.15'



4350

4400

4450

4500

4396'

1.84°

167.91°

4395.59'

6.83'

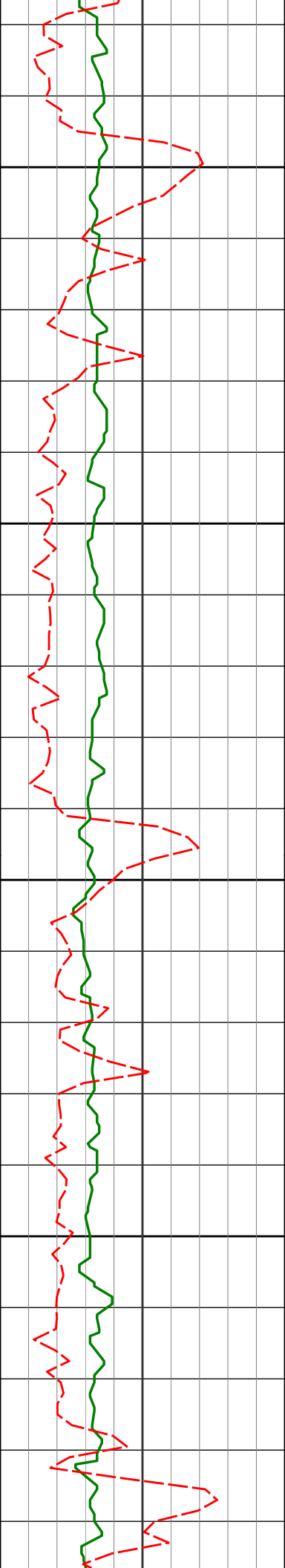
4490'

1.00°

172.61°

4489.56'

6.44'



4550

4585'

1.03°

157.11°

4584.54'

6.02'

4600

4650

4680'

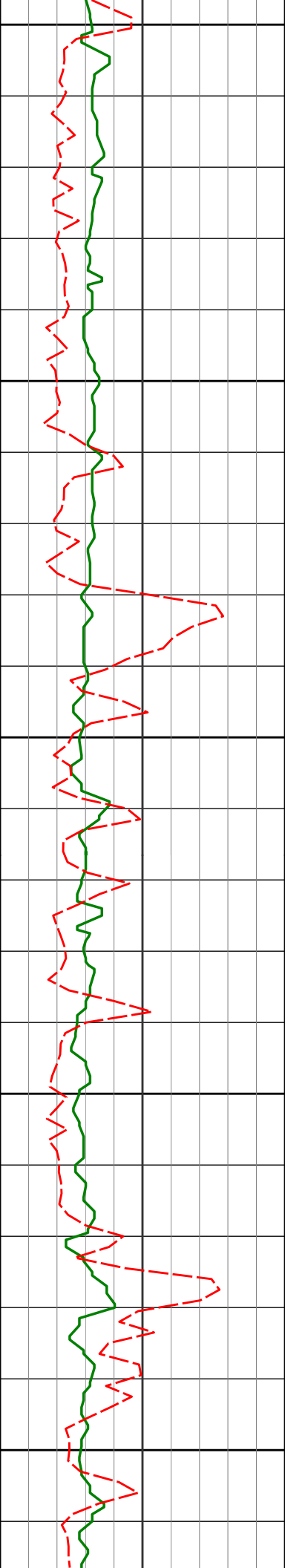
0.80°

190.44°

4679.53'

5.83'

4700



4750

4775'

0.69°

227.30°

4774.52'

6.39'

4800

4850

4870'

1.14°

224.36°

4869.51'

7.48'

4900

4950

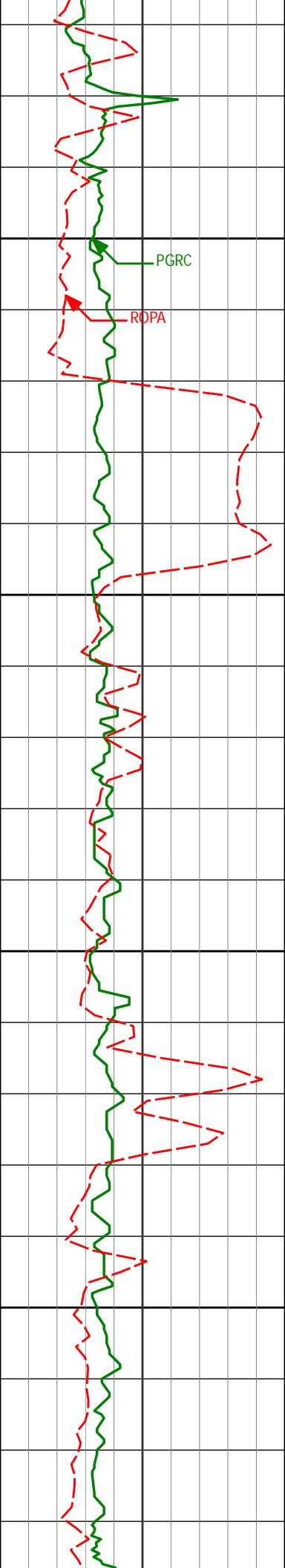
4964'

1.38°

222.81°

4963.49'

8.92'



5000

5050

5100

5150

5059'

0.28°

111.08°

5058.48'

9.50'

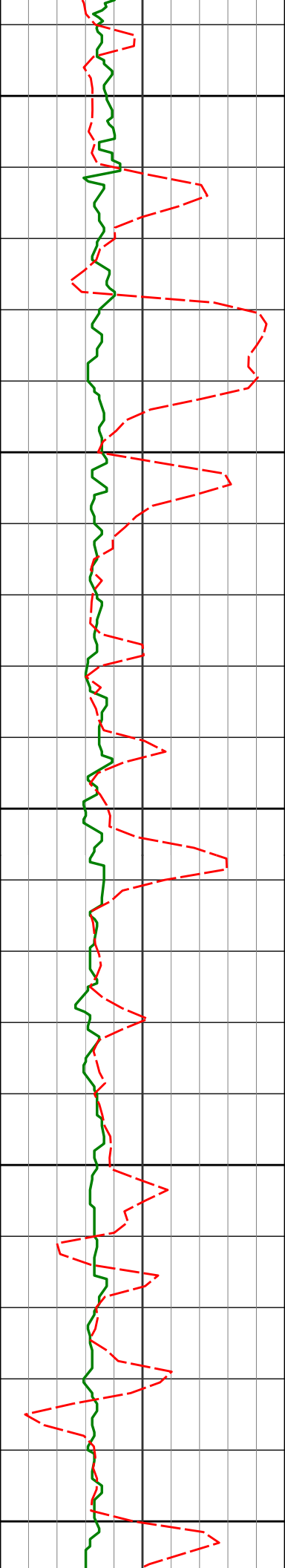
5154'

1.06°

176.25°

5153.47'

9.24'



5200

5250

5300

5350

5400

5248'

0.29°

21.42°

5247.47'

9.10'

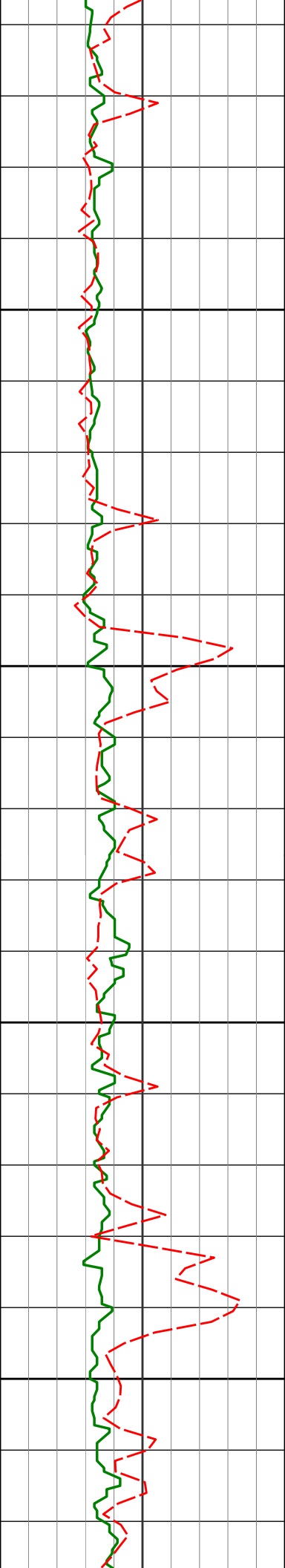
5343'

0.60°

301.95°

5342.46'

9.43'



5438'

0.28°

24.19°

5437.46'

9.75'

5450

5500

5533'

0.66°

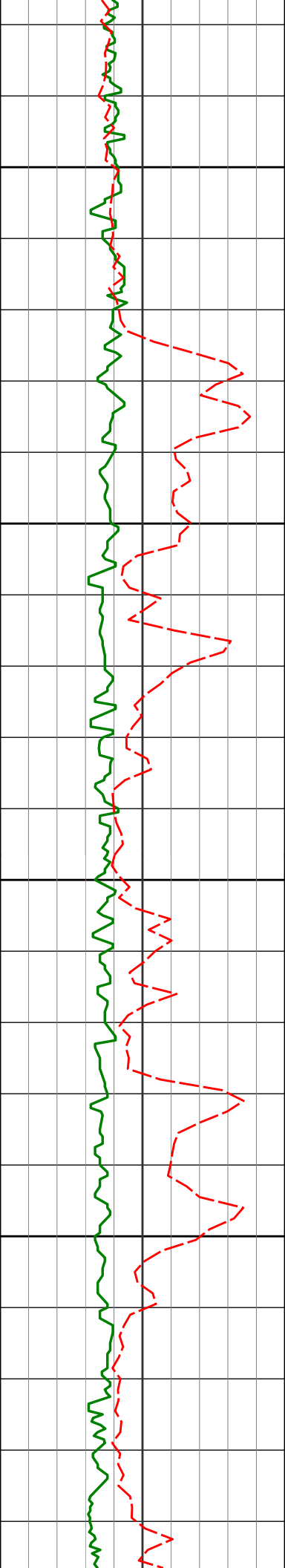
220.10°

5532.46'

10.01'

5550

5600



5650

5700

5750

5800

5628'

5723'

5826'

0.76°

1.02°

1.10°

217.37°

219.94°

222.23°

5627.45'

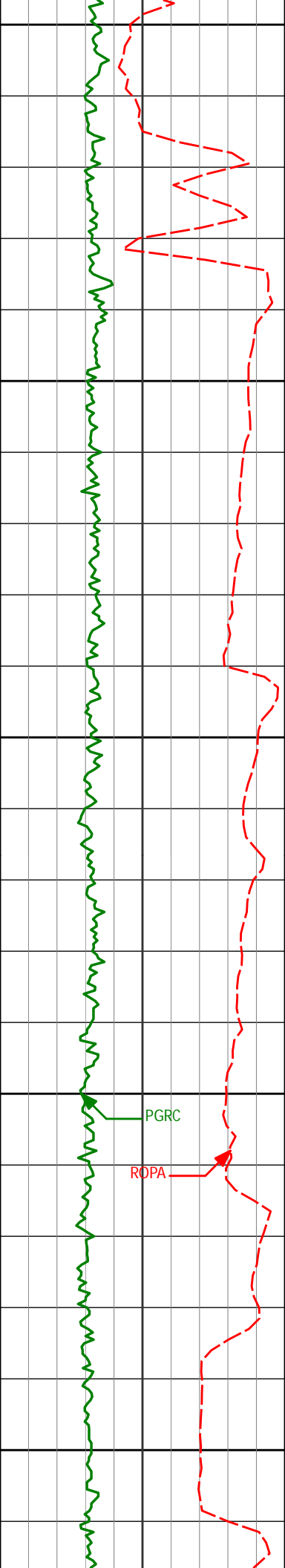
5722.44'

5825.42'

10.76'

11.70'

12.97'



5850

200

5888'

5900

5950

6000

6050

1.06°

226.22°

5887.41'

13.80'

5959'

3.65°

259.12°

5958.35'

16.50'

6006'

9.62°

267.81°

6005.02'

21.91'

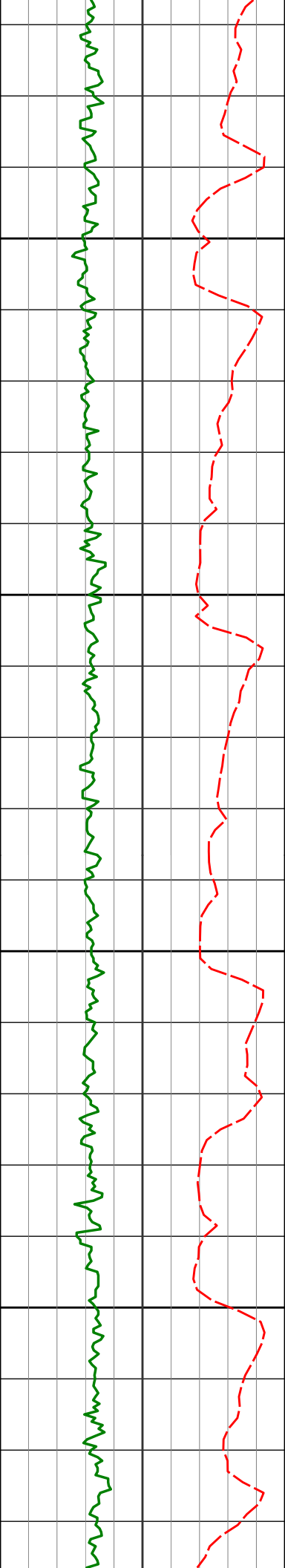
6054'

10.85°

271.35°

6052.25'

30.43'



6100

6101'

13.71°

274.02°

6098.17'

40.40'

6150

6149'

20.06°

274.48°

6144.08'

54.29'

6200

6196'

26.23°

271.66°

6187.28'

72.71'

6250

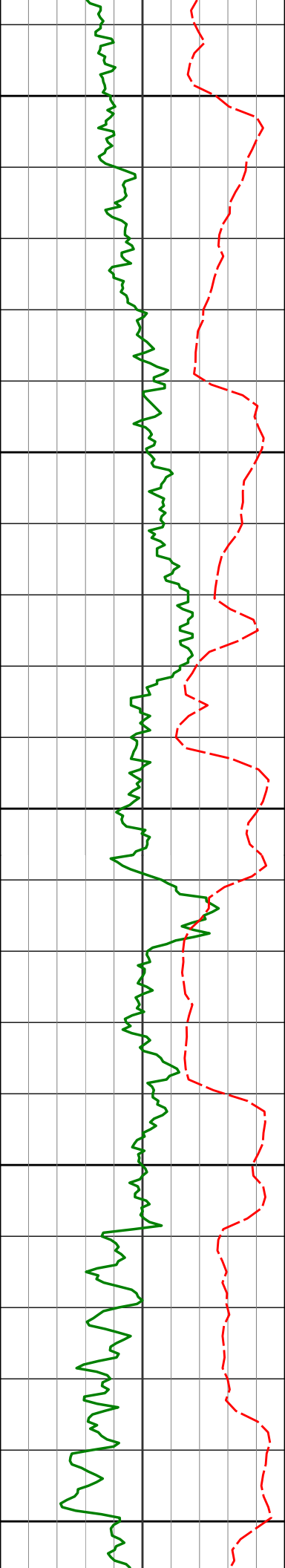
6244'

28.28°

271.36°

6229.94'

94.68'



6300

6350

6400

6450

6500

6290'

31.26°

270.30°

6269.87'

117.51'

6338'

37.29°

269.25°

6309.52'

144.53'

6385'

42.51°

270.46°

6345.56'

174.66'

6433'

45.28°

271.47°

6380.15'

207.93'

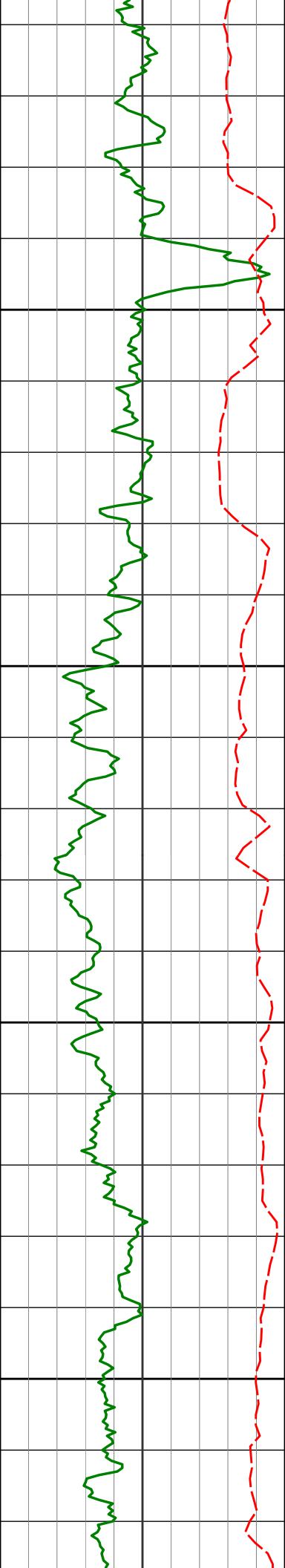
6480'

47.78°

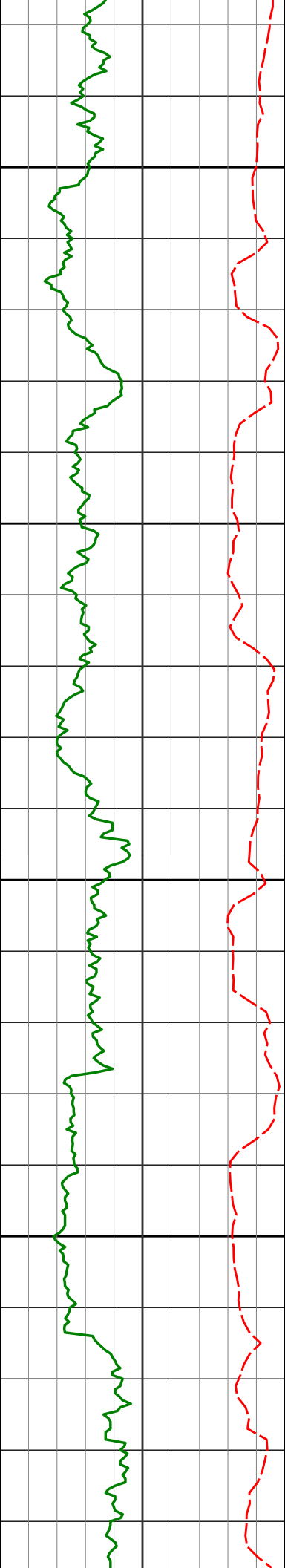
272.50°

6412.48'

242.01'



6528'	49.18°	273.23°	6444.30'	277.90'
6550				
6575'	49.55°	272.74°	6474.91'	313.51'
6600				
6623'	54.81°	270.11°	6504.33'	351.39'
6650				
6670'	61.58°	268.47°	6529.09'	391.30'
6700				
6718'	70.88°	268.61°	6548.41'	435.18'



6750

6765'

77.64°

269.44°

6561.16'

480.39'

6800

6813'

80.49°

272.12°

6570.26'

527.51'

6850

6868'

86.61°

267.81°

6576.44'

582.13'

6900



Run 300

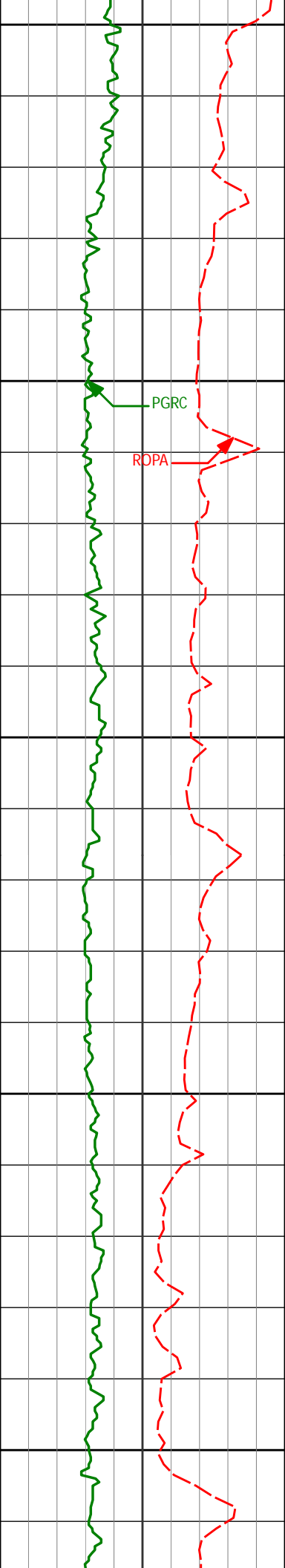
6943'

88.64°

268.59°

6579.55'

657.06'



6950

7000

7050

7100

7150

7001'

89.94°

269.71°

6580.26'

715.05'

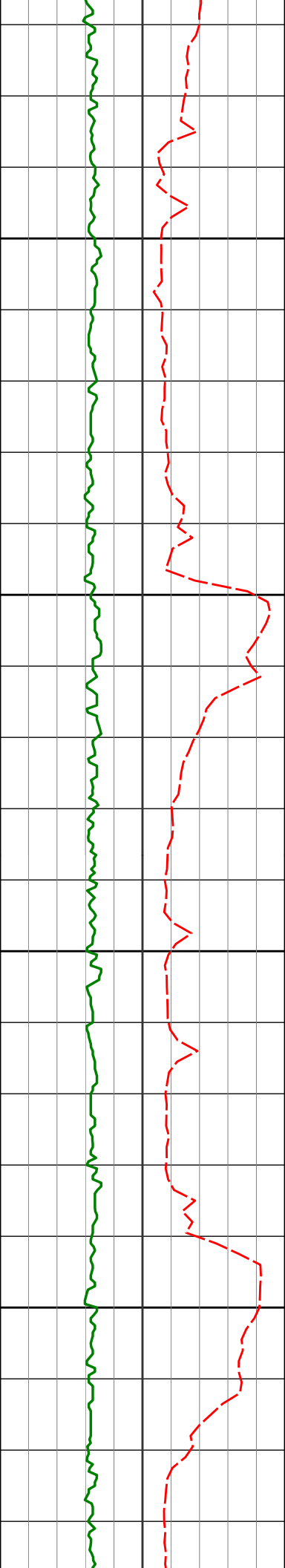
7093'

89.91°

270.78°

6580.38'

807.04'



7200

7250

7300

7350

7185'

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271.33°

6580.63'

898.99'

7278'

90.18°

271.85°

6580.67'

991.91'

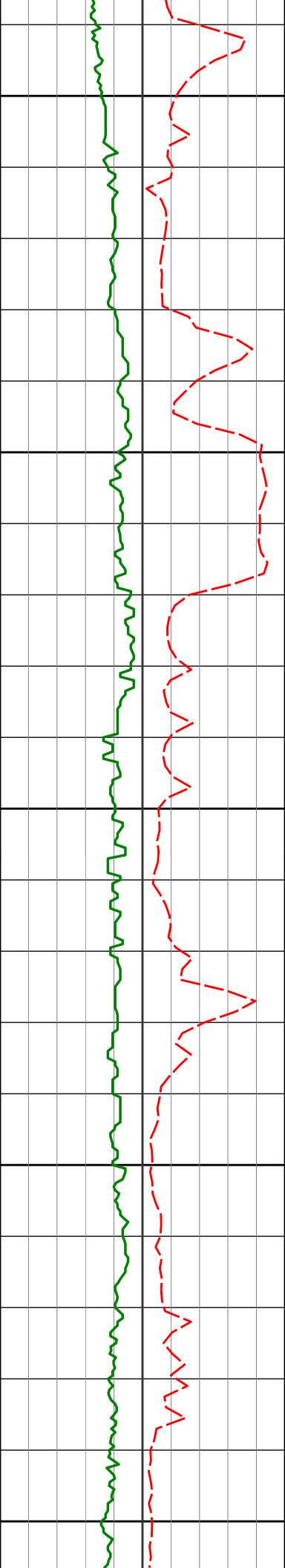
7371'

90.37°

270.75°

6580.22'

1084.85'



7400

7450

7500

7550

7600

7463'

89.91°

269.34°

6580.00'

1176.83'

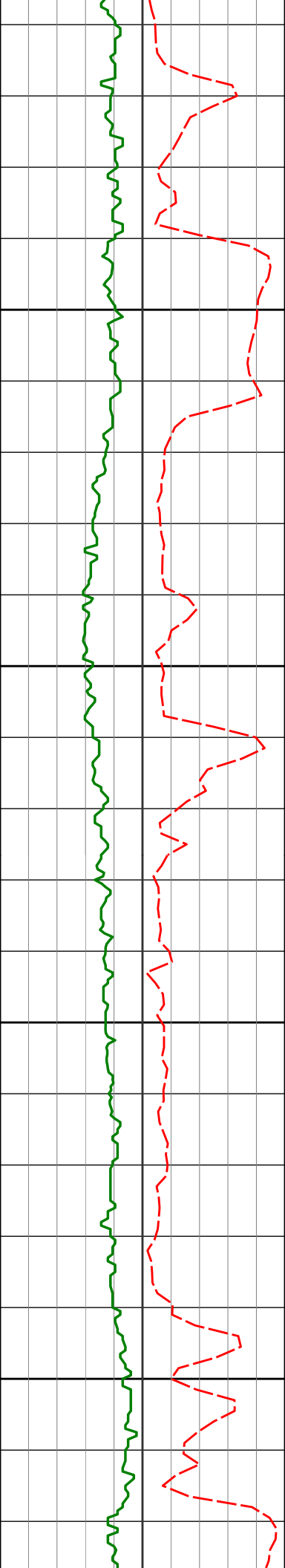
7555'

90.37°

270.66°

6579.77'

1268.82'



7650

7700

7750

7800

7647'

7739'

89.17°

90.25°

268.56°

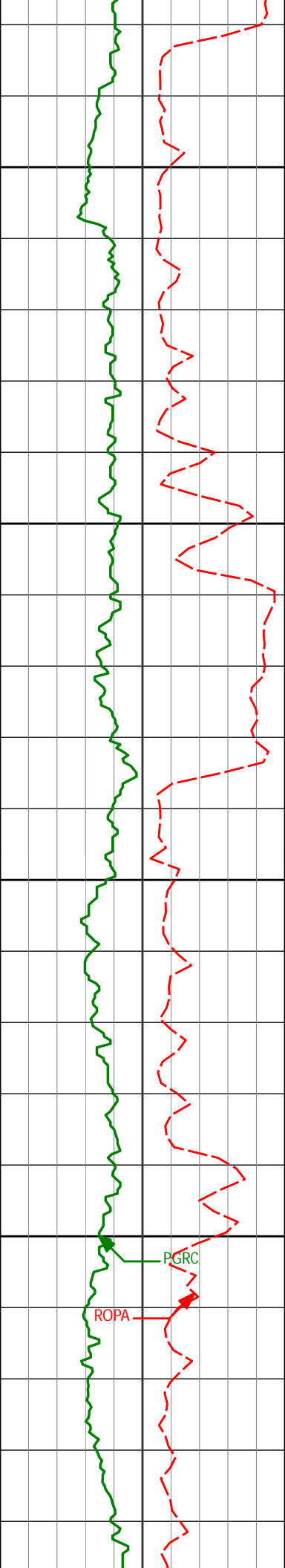
268.21°

6580.14'

6580.60'

1360.81'

1452.80'



7833'

90.74°

271.95°

6579.79'

1546.77'

7850

7900

7928'

87.47°

268.69°

6581.28'

1641.72'

7950

8000

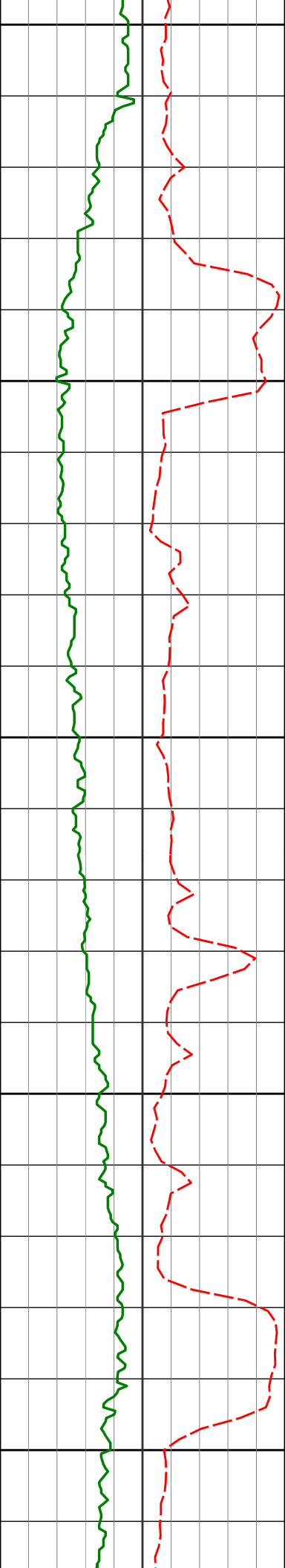
8023'

87.23°

268.77°

6585.67'

1736.61'



8050

8100

8150

8200

8250

8117'

88.67°

265.39°

6589.03'

1830.47'

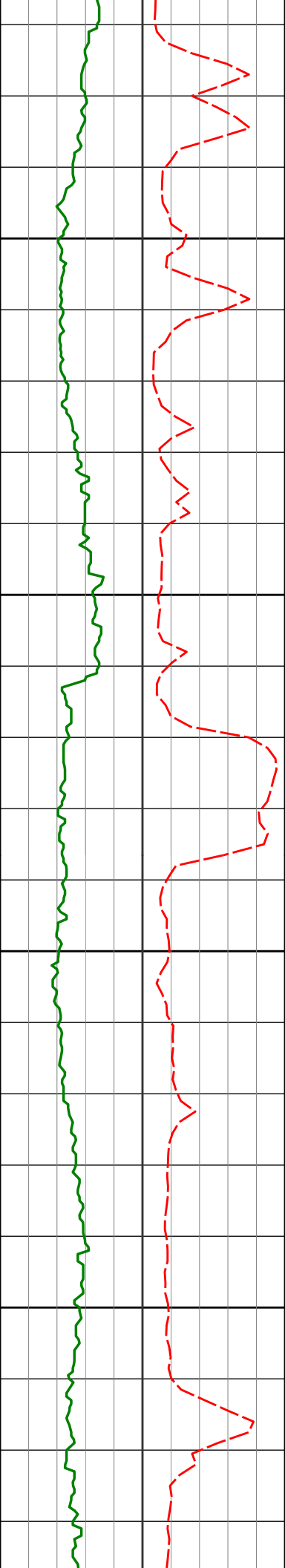
8212'

90.86°

267.97°

6589.42'

1925.36'



8300

8307'

90.03°

266.96°

6588.68'

2020.31'

8350

8400

8402'

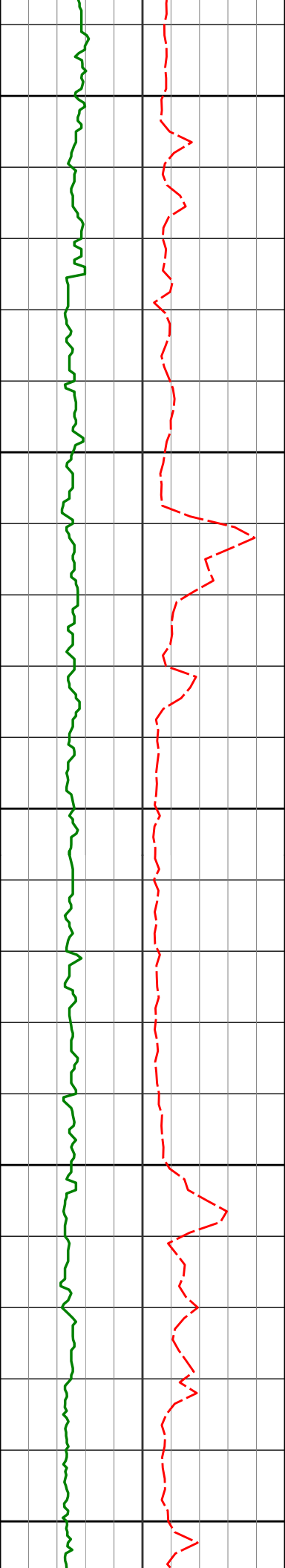
88.95°

268.45°

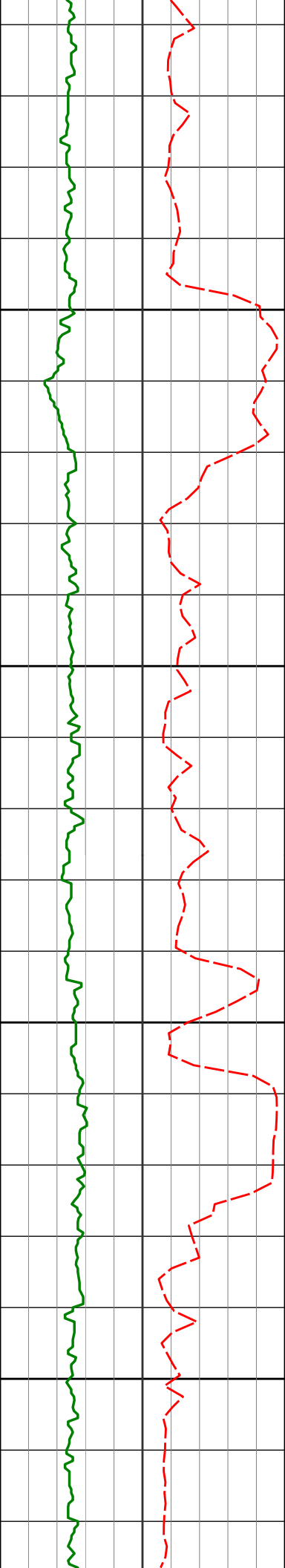
6589.53'

2115.27'

8450



8500	8496'	89.63°	268.94°	6590.70'	2209.26'
8550					
8600	8591'	89.81°	268.81°	6591.16'	2304.25'
8650					
8700	8686'	88.37°	266.54°	6592.67'	2399.20'



8750

8781'

90.12°

267.77°

6593.92'

2494.12'

8800

8850

8876'

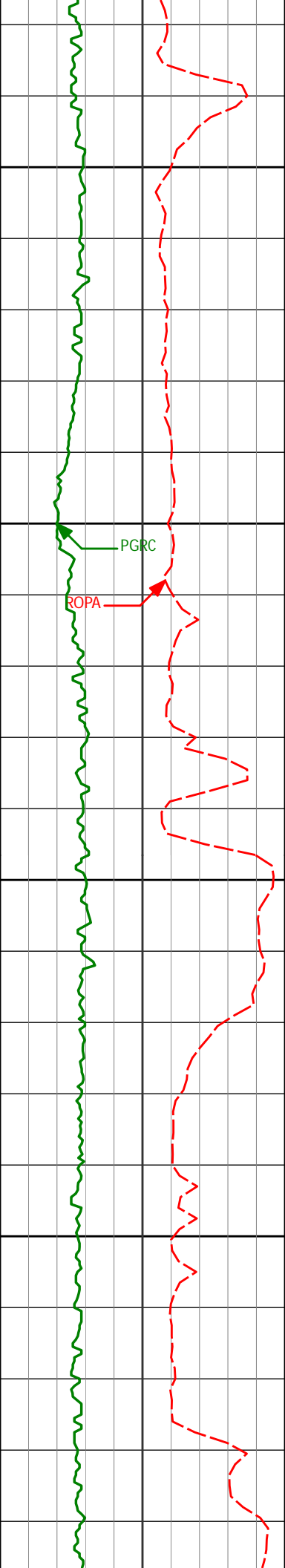
89.75°

268.53°

6594.03'

2589.10'

8900



8950

8970'

88.64°

267.37°

6595.35'

2683.07'

9000

PGRC

ROPA

9050

9065'

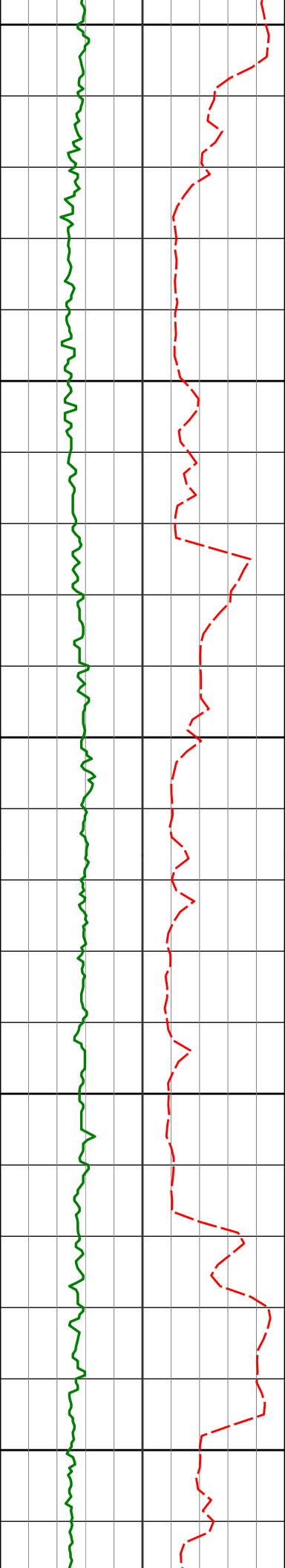
88.98°

268.48°

6597.32'

2778.02'

9100



9150

9159'

90.99°

269.22°

6597.35'

2872.01'

9200

9250

9254'

89.20°

268.00°

6597.19'

2967.00'

9300

9350

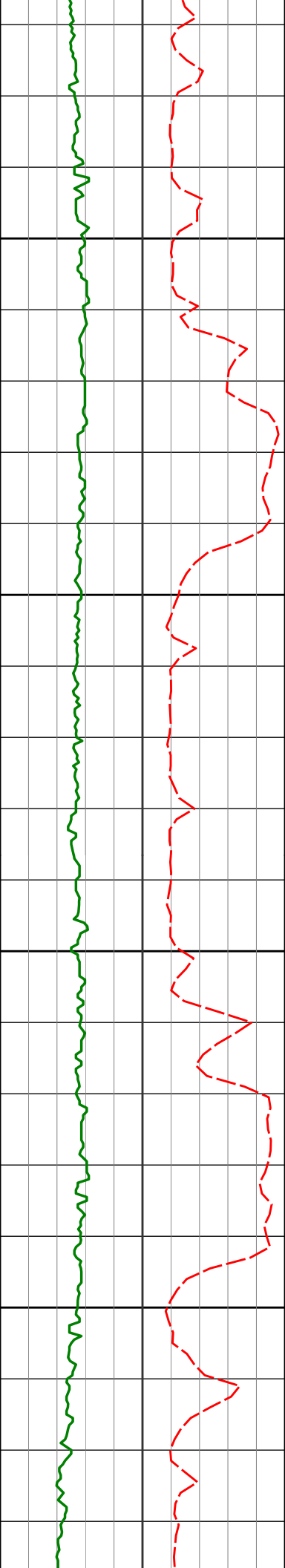
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268.89°

6597.98'

3061.99'



9400

9450

9500

9550

9444'

89.41°

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6598.59'

3156.98'

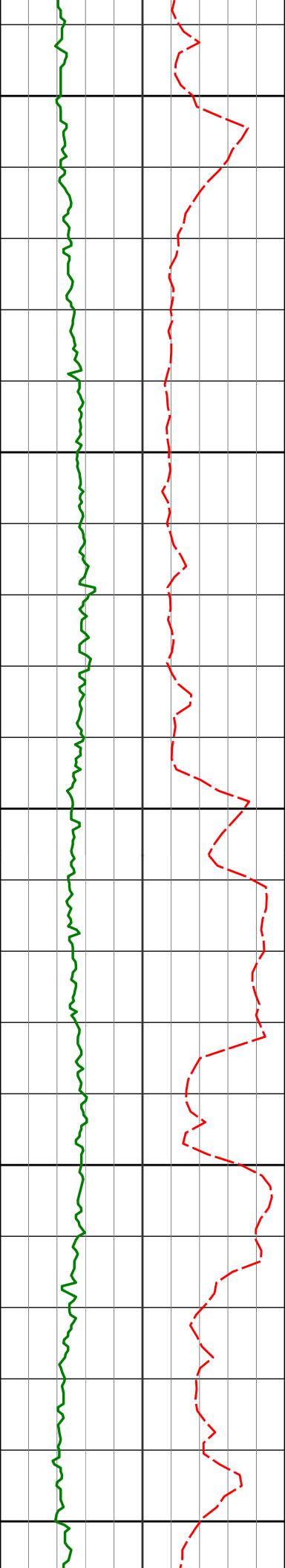
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91.36°

270.27°

6597.96'

3250.97'



9600

9650

9700

9750

9800

9633'

88.89°

268.92°

6597.75'

3345.96'

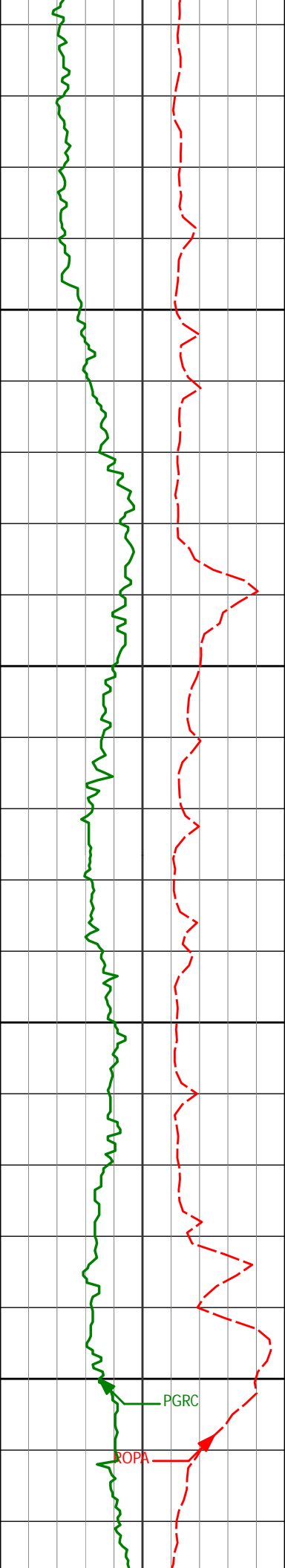
9728'

90.31°

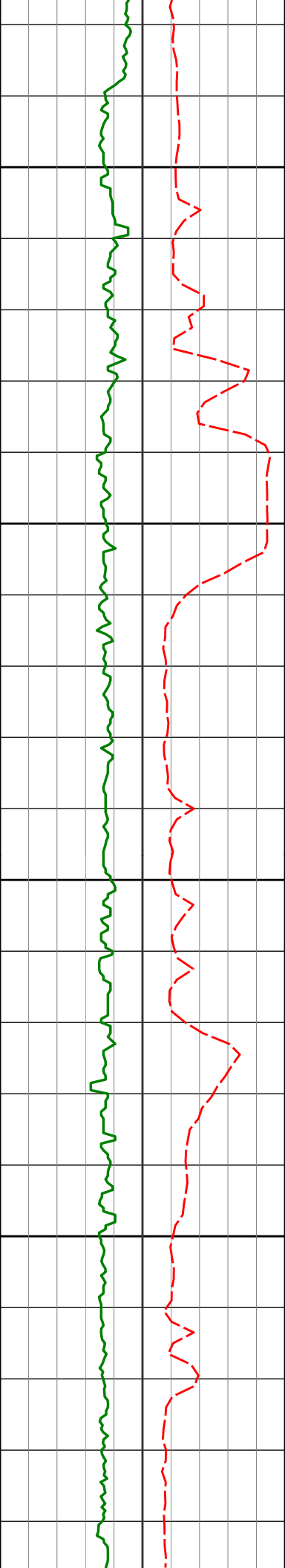
270.76°

6598.41'

3440.95'



9822'	90.74°	270.92°	6597.55'	3534.91'
9850				
9900				
9917'	91.70°	270.36°	6595.53'	3629.85'
9950				
10000				
10012'	91.54°	269.65°	6592.84'	3724.81'



10050

10100

10150

10200

10107'

10202'

90.06°

90.43°

270.33°

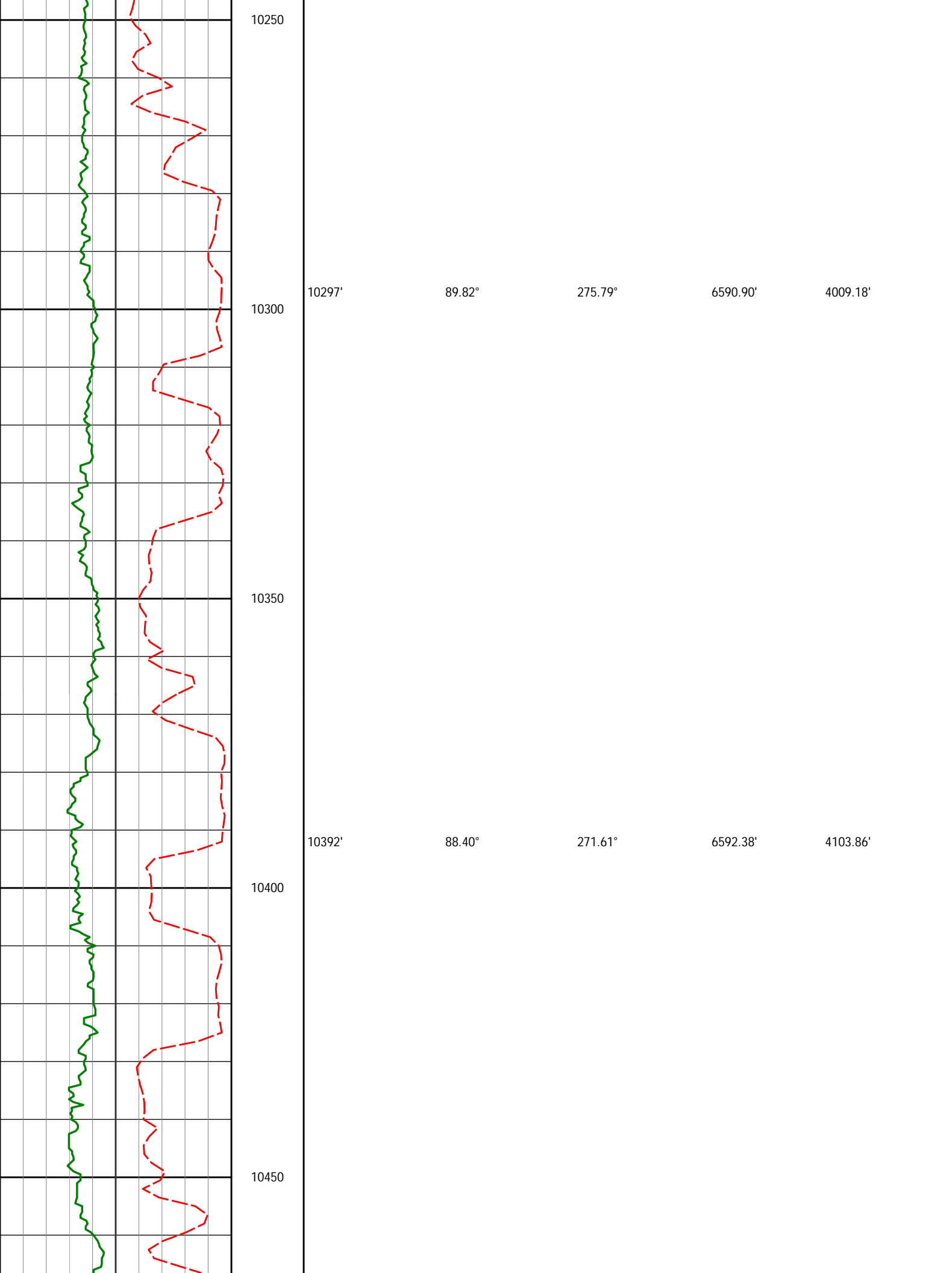
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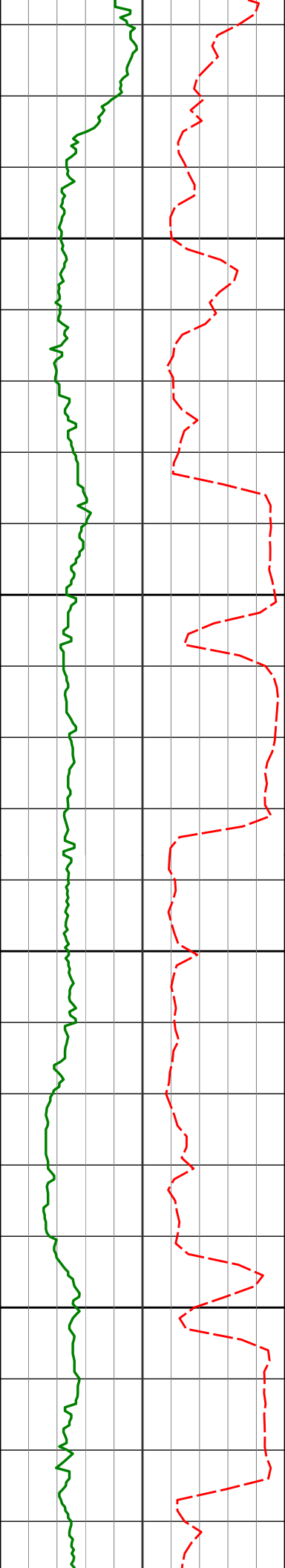
6591.52'

6591.11'

3819.79'

3914.65'





10487'	87.87°	271.59°	6595.47'	4198.72'
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10500

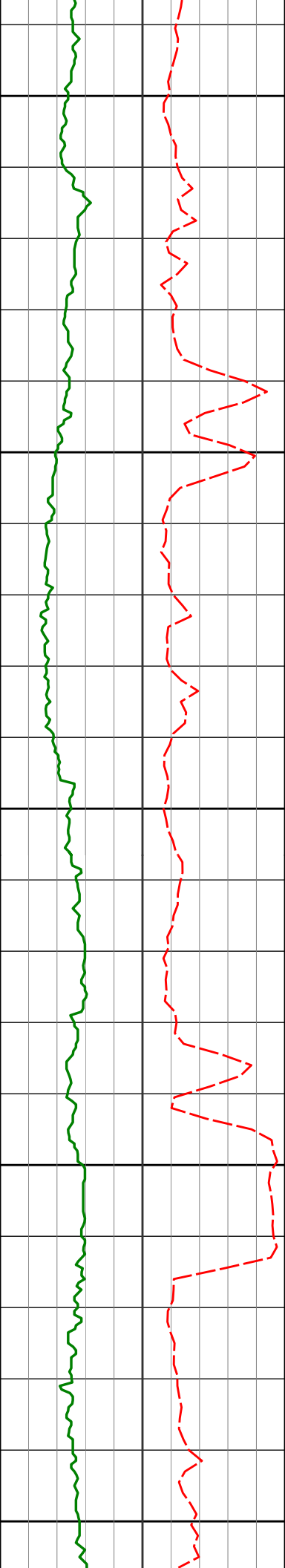
10550

10582'	87.44°	268.10°	6599.36'	4293.62'
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10600

10650

10676'	89.11°	268.23°	6602.19'	4387.56'
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10700

10750

10800

10850

10900

10771'

89.01°

268.16°

6603.75'

4482.53'

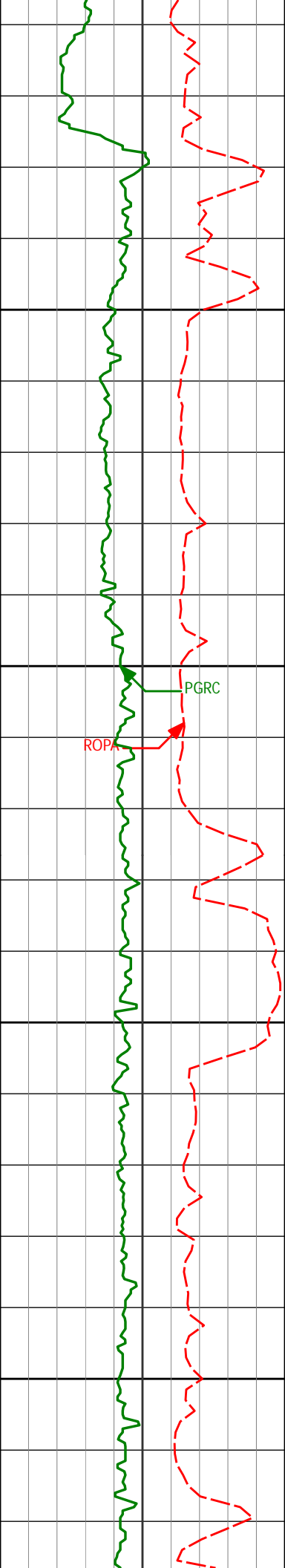
10866'

89.82°

267.03°

6604.72'

4577.49'



10950

10960'

91.70°

267.56°

6603.47'

4671.42'

11000

11050

11055'

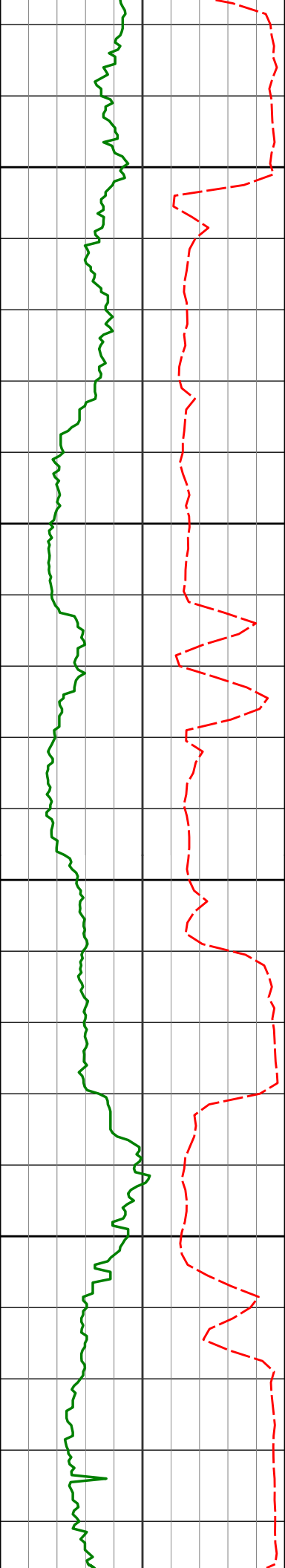
91.76°

268.71°

6600.60'

4766.36'

11100



11150

11200

11250

11300

11150'

11244'

11339'

90.00°

89.41°

89.35°

265.30°

265.42°

268.66°

6599.15'

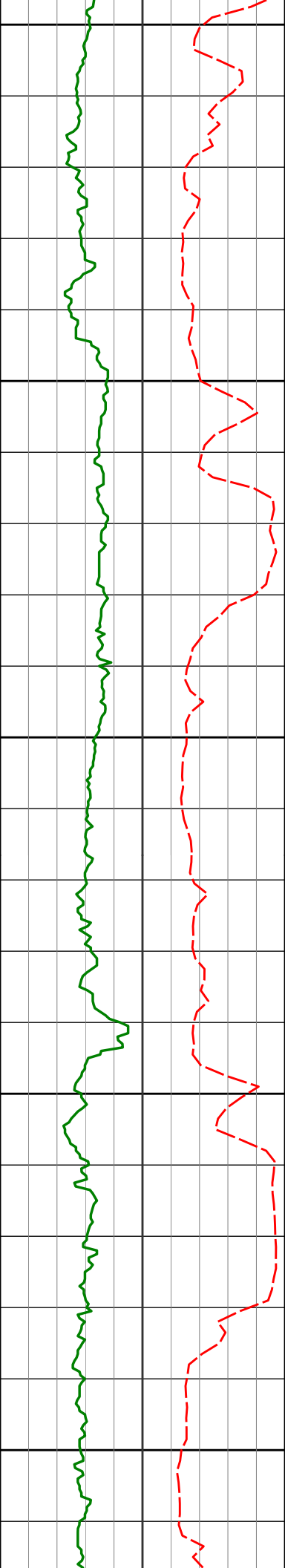
6599.63'

6600.66'

4861.26'

4955.04'

5049.96'



11350

11400

11433'

89.88°

268.39°

6601.29'

5143.95'

11450

11500

11528'

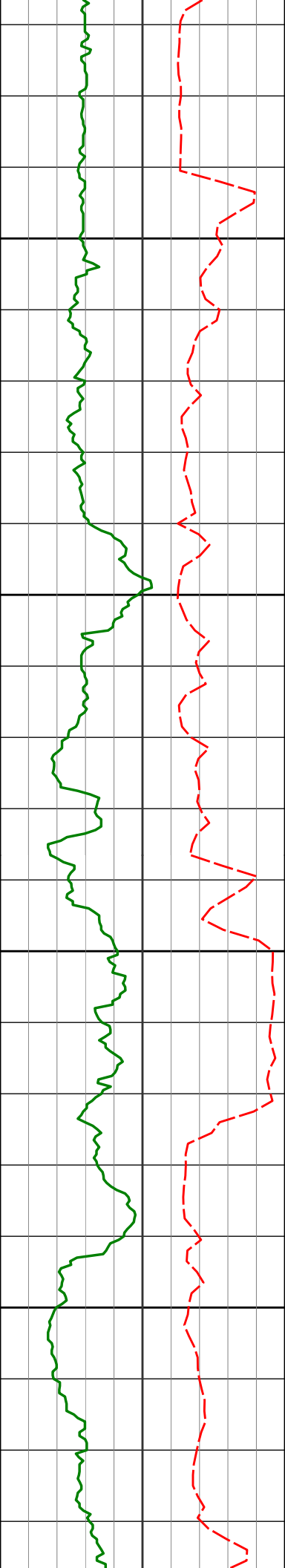
90.71°

269.31°

6600.80'

5238.94'

11550



11600

11623'

91.63°

271.60°

6598.86'

5333.89'

11650

11700

11718'

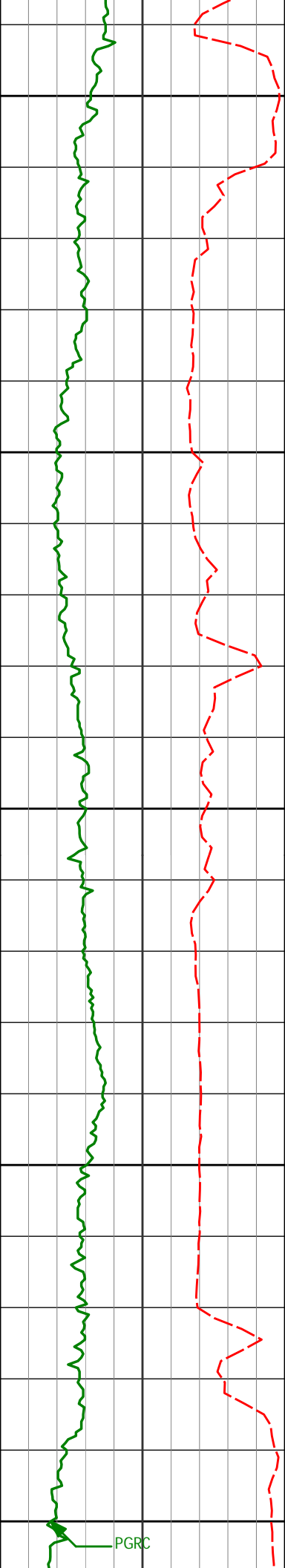
90.28°

270.26°

6597.28'

5428.83'

11750



11800

11813'

89.26°

269.25°

6597.66'

5523.83'

11850

11900

11908'

91.39°

270.39°

6597.12'

5618.81'

11950

12000

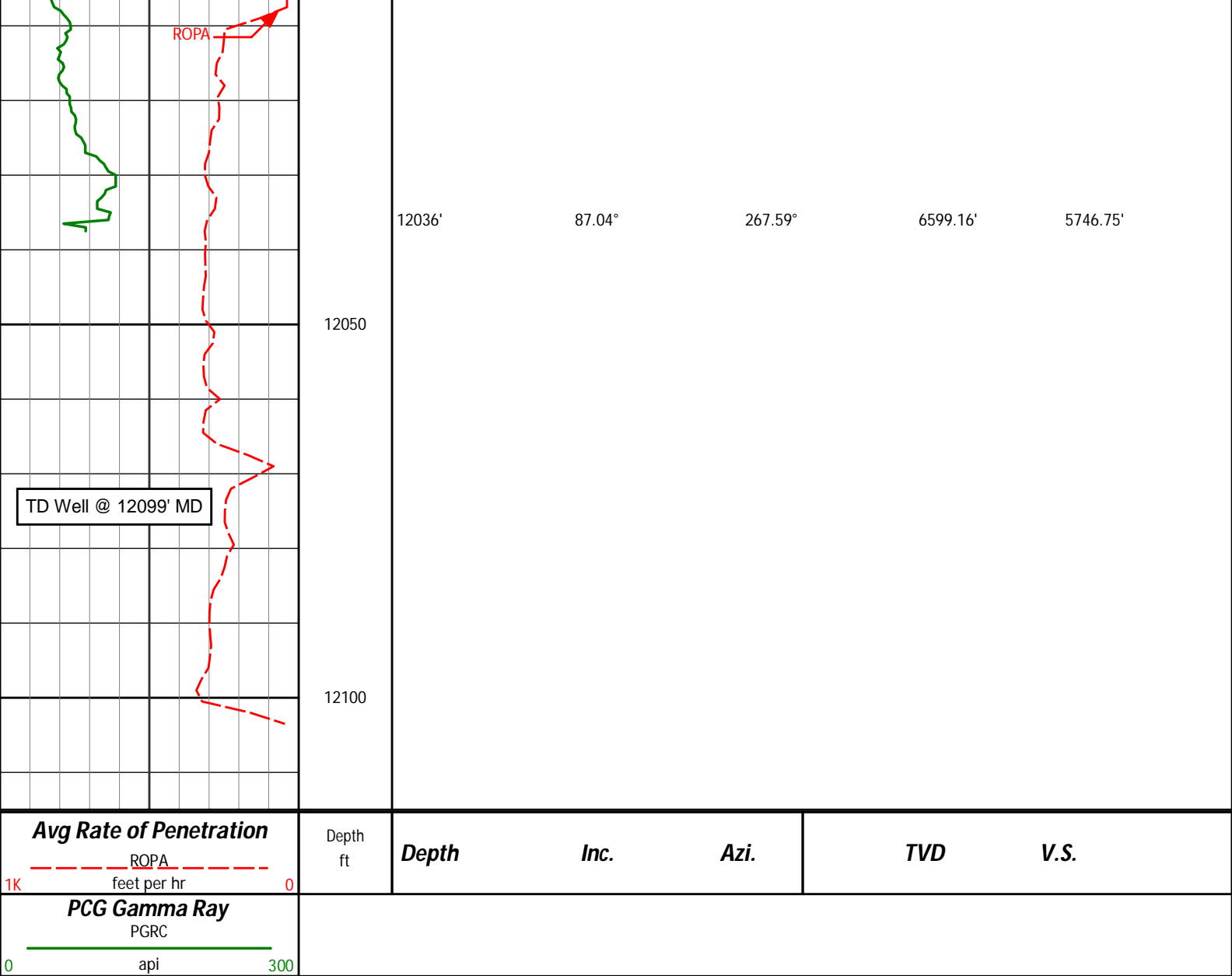
12003'

87.90°

268.25°

6597.71'

5713.79'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE30-64HNC
Wattenburg
Weld Colorado
USA
CA-XX-0901176441

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
298.00	0.30	39.67	298.00	0.60 N	0.50 E	-0.51	0.10
603.00	0.20	209.07	603.00	0.75 N	0.75 E	-0.76	0.16
718.00	0.15	76.64	718.00	0.61 N	0.80 E	-0.81	0.28
810.00	0.31	124.68	810.00	0.50 N	1.12 E	-1.13	0.26
902.00	0.41	112.74	901.99	0.23 N	1.63 E	-1.63	0.14
994.00	0.55	125.96	993.99	0.16 S	2.29 E	-2.29	0.19
1085.00	0.79	134.79	1084.99	0.86 S	3.09 E	-3.07	0.29
1178.00	0.96	135.49	1177.97	1.87 S	4.09 E	-4.06	0.18
1271.00	0.52	67.68	1270.97	2.26 S	5.03 E	-4.99	0.97
1364.00	0.70	70.48	1363.96	1.91 S	5.95 E	-5.92	0.20
1458.00	0.79	69.61	1457.95	1.49 S	7.10 E	-7.08	0.10

1553.00	0.82	68.97	1552.95	1.02 S	8.35 E	-8.33	0.03
1648.00	0.56	305.89	1647.94	0.50 S	8.61 E	-8.60	1.28
1742.00	0.62	313.25	1741.94	0.11 N	7.86 E	-7.87	0.10
1837.00	0.92	277.78	1836.93	0.57 N	6.73 E	-6.74	0.58
1932.00	1.27	293.44	1931.91	1.09 N	5.01 E	-5.03	0.48
2026.00	1.24	255.60	2025.89	1.25 N	3.07 E	-3.09	0.87
2120.00	1.48	240.09	2119.86	0.39 N	1.03 E	-1.04	0.47
2215.00	0.99	141.28	2214.85	0.86 S	0.48 E	-0.47	2.00
2310.00	1.05	148.64	2309.83	2.24 S	1.45 E	-1.41	0.15
2405.00	1.26	166.02	2404.82	4.00 S	2.16 E	-2.09	0.43
2499.00	0.57	341.64	2498.81	4.56 S	2.26 E	-2.19	1.95
2594.00	0.92	1.21	2593.80	3.35 S	2.13 E	-2.07	0.45
2689.00	0.85	345.84	2688.79	1.90 S	1.97 E	-1.94	0.26
2784.00	0.94	352.24	2783.78	0.45 S	1.69 E	-1.68	0.14
2879.00	0.99	3.70	2878.77	1.14 N	1.64 E	-1.66	0.21
2974.00	1.05	8.94	2973.75	2.82 N	1.83 E	-1.87	0.12
3068.00	0.75	2.98	3067.74	4.29 N	1.99 E	-2.06	0.33
3163.00	0.62	9.54	3162.73	5.42 N	2.11 E	-2.20	0.16
3258.00	0.51	24.01	3257.73	6.31 N	2.37 E	-2.47	0.19
3352.00	0.22	244.98	3351.73	6.62 N	2.37 E	-2.48	0.74
3447.00	0.65	322.13	3446.72	6.96 N	1.88 E	-1.99	0.67
3542.00	1.03	307.40	3541.71	7.91 N	0.87 E	-1.00	0.46
3637.00	0.94	305.56	3636.70	8.88 N	0.44 W	0.30	0.10
3732.00	1.05	294.48	3731.69	9.69 N	1.87 W	1.71	0.23
3827.00	1.23	298.08	3826.67	10.53 N	3.56 W	3.39	0.20
3921.00	0.50	301.62	3920.66	11.22 N	4.80 W	4.62	0.78
4016.00	0.84	225.90	4015.65	10.96 N	5.65 W	5.48	0.91
4111.00	1.07	199.71	4110.64	9.64 N	6.45 W	6.30	0.51
4206.00	1.34	193.74	4205.62	7.72 N	7.02 W	6.89	0.31
4301.00	0.33	174.42	4300.61	6.37 N	7.25 W	7.15	1.09
4396.00	1.84	167.80	4395.59	4.61 N	6.90 W	6.83	1.59
4490.00	1.00	172.49	4489.56	2.32 N	6.48 W	6.44	0.90
4585.00	1.03	156.99	4584.54	0.71 N	6.04 W	6.02	0.29
4680.00	0.80	190.32	4679.53	0.73 S	5.82 W	5.83	0.60
4775.00	0.69	227.17	4774.52	1.77 S	6.36 W	6.39	0.51
4870.00	1.14	224.23	4869.51	2.83 S	7.44 W	7.48	0.48
4964.00	1.38	222.68	4963.49	4.34 S	8.86 W	8.92	0.26
5059.00	0.28	110.96	5058.48	5.26 S	9.42 W	9.50	1.59
5154.00	1.06	176.13	5153.47	6.22 S	9.14 W	9.24	1.03
5248.00	0.29	21.30	5247.47	6.87 S	8.99 W	9.10	1.41
5343.00	0.60	301.82	5342.46	6.38 S	9.33 W	9.43	0.65
5438.00	0.28	24.07	5437.46	5.90 S	9.66 W	9.75	0.66
5533.00	0.66	219.98	5532.46	6.11 S	9.91 W	10.01	0.98
5628.00	0.76	217.25	5627.45	7.03 S	10.65 W	10.76	0.11
5723.00	1.02	219.82	5722.44	8.18 S	11.57 W	11.70	0.28
5826.00	1.10	222.11	5825.42	9.62 S	12.82 W	12.97	0.09
5888.00	1.06	226.09	5887.41	10.46 S	13.63 W	13.80	0.14
5959.00	3.65	258.98	5958.35	11.35 S	16.32 W	16.50	3.97
6006.00	9.62	267.62	6005.02	11.80 S	21.72 W	21.91	12.84
6054.00	10.85	271.16	6052.25	11.87 S	30.25 W	30.43	2.88
6101.00	13.71	273.80	6098.17	11.41 S	40.23 W	40.40	6.20
6149.00	20.06	274.21	6144.08	10.43 S	54.13 W	54.29	13.23
6196.00	26.23	271.35	6187.28	9.59 S	72.57 W	72.71	13.34
6244.00	28.28	271.03	6229.94	9.14 S	94.54 W	94.68	4.28
6290.00	31.26	269.96	6269.87	8.95 S	117.38 W	117.51	6.58
6338.00	37.29	268.87	6309.52	9.25 S	144.40 W	144.53	12.63
6385.00	42.51	270.03	6345.56	9.52 S	174.53 W	174.66	11.22
6433.00	45.28	270.79	6380.15	9.28 S	207.81 W	207.93	5.87
6480.00	47.78	271.71	6412.48	8.53 S	241.91 W	242.01	5.51
6528.00	49.18	272.50	6444.30	7.20 S	277.82 W	277.90	3.17
6575.00	49.55	272.22	6474.91	5.74 S	313.46 W	313.51	0.91
6623.00	54.81	269.59	6504.33	5.17 S	351.35 W	351.39	11.78
6670.00	61.58	268.01	6529.09	6.03 S	391.26 W	391.30	14.68
6718.00	70.88	268.28	6548.41	7.44 S	435.12 W	435.18	19.38
6765.00	77.64	269.61	6561.16	8.27 S	480.32 W	480.39	14.64
6813.00	80.49	269.94	6570.26	8.45 S	527.44 W	527.51	5.98
6868.00	86.61	268.38	6576.44	9.26 S	582.06 W	582.13	11.48
6943.00	88.64	268.46	6579.55	11.32 S	656.96 W	657.06	2.71
7001.00	89.94	269.57	6580.26	12.32 S	714.95 W	715.05	2.95
7093.00	89.91	270.65	6580.38	12.14 S	806.95 W	807.04	1.17
7185.00	89.78	271.19	6580.63	10.66 S	898.93 W	898.99	0.60
7278.00	90.18	271.71	6580.67	8.31 S	991.90 W	991.91	0.71
7371.00	90.37	270.61	6580.22	6.43 S	1084.88 W	1084.85	1.20
7463.00	89.91	269.21	6580.00	6.57 S	1176.88 W	1176.83	1.60

7555.00	90.37	270.52	6579.77	6.79 S	1268.88 W	1268.82	1.51
7647.00	89.17	268.42	6580.14	7.64 S	1360.86 W	1360.81	2.63
7739.00	90.25	268.08	6580.60	10.45 S	1452.82 W	1452.80	1.23
7833.00	90.74	271.82	6579.79	10.53 S	1546.80 W	1546.77	4.01
7928.00	87.47	268.55	6581.28	10.23 S	1641.76 W	1641.72	4.87
8023.00	87.23	268.64	6585.67	12.55 S	1736.63 W	1736.61	0.27
8117.00	88.67	265.25	6589.03	17.56 S	1830.42 W	1830.47	3.92
8212.00	90.86	267.84	6589.42	23.28 S	1925.23 W	1925.36	3.57
8307.00	90.03	266.82	6588.68	27.71 S	2020.12 W	2020.31	1.38
8402.00	88.95	268.31	6589.53	31.74 S	2115.03 W	2115.27	1.94
8496.00	89.63	268.80	6590.70	34.11 S	2208.99 W	2209.26	0.89
8591.00	89.81	268.67	6591.16	36.21 S	2303.97 W	2304.25	0.23
8686.00	88.37	266.40	6592.67	40.30 S	2398.86 W	2399.20	2.83
8781.00	90.12	267.64	6593.92	45.23 S	2493.72 W	2494.12	2.26
8876.00	89.75	268.40	6594.03	48.52 S	2588.66 W	2589.10	0.89
8970.00	88.64	267.24	6595.35	52.09 S	2682.58 W	2683.07	1.71
9065.00	88.98	268.34	6597.32	55.75 S	2777.49 W	2778.02	1.21
9159.00	90.99	269.08	6597.35	57.87 S	2871.46 W	2872.01	2.28
9254.00	89.20	267.87	6597.19	60.40 S	2966.42 W	2967.00	2.27
9349.00	89.85	268.76	6597.98	63.19 S	3061.37 W	3061.99	1.16
9444.00	89.41	268.46	6598.59	65.50 S	3156.34 W	3156.98	0.56
9538.00	91.36	270.14	6597.96	66.65 S	3250.33 W	3250.97	2.74
9633.00	88.89	268.79	6597.75	67.53 S	3345.31 W	3345.96	2.96
9728.00	90.31	270.63	6598.41	68.01 S	3440.30 W	3440.95	2.45
9822.00	90.74	270.79	6597.55	66.85 S	3534.29 W	3534.91	0.49
9917.00	91.70	270.22	6595.53	66.01 S	3629.26 W	3629.85	1.18
10012.00	91.54	269.52	6592.84	66.23 S	3724.22 W	3724.81	0.76
10107.00	90.06	270.19	6591.52	66.47 S	3819.21 W	3819.79	1.71
10202.00	90.43	273.80	6591.11	63.16 S	3914.14 W	3914.65	3.82
10297.00	89.82	275.66	6590.90	55.33 S	4008.81 W	4009.18	2.06
10392.00	88.40	271.48	6592.38	49.41 S	4103.59 W	4103.86	4.65
10487.00	87.87	271.45	6595.47	46.99 S	4198.51 W	4198.72	0.56
10582.00	87.44	267.96	6599.36	47.47 S	4293.41 W	4293.62	3.70
10676.00	89.11	268.09	6602.19	50.71 S	4387.31 W	4387.56	1.78
10771.00	89.01	268.03	6603.75	53.93 S	4482.24 W	4482.53	0.12
10866.00	89.82	266.90	6604.72	58.13 S	4577.14 W	4577.49	1.46
10960.00	91.70	267.42	6603.47	62.79 S	4671.01 W	4671.42	2.08
11055.00	91.76	268.58	6600.60	66.10 S	4765.91 W	4766.36	1.22
11150.00	90.00	265.16	6599.15	71.29 S	4860.74 W	4861.26	4.05
11244.00	89.41	265.28	6599.63	79.12 S	4954.41 W	4955.04	0.64
11339.00	89.35	268.53	6600.66	84.25 S	5049.26 W	5049.96	3.42
11433.00	89.88	268.26	6601.29	86.88 S	5143.22 W	5143.95	0.63
11528.00	90.71	269.18	6600.80	89.00 S	5238.19 W	5238.94	1.30
11623.00	91.63	271.46	6598.86	88.47 S	5333.16 W	5333.89	2.59
11718.00	90.28	270.12	6597.28	87.16 S	5428.13 W	5428.83	2.00
11813.00	89.26	269.12	6597.66	87.79 S	5523.13 W	5523.83	1.50
11908.00	91.39	270.25	6597.12	88.32 S	5618.12 W	5618.81	2.54
12003.00	87.90	268.12	6597.71	89.67 S	5713.09 W	5713.79	4.30
12036.00	87.04	267.45	6599.16	90.94 S	5746.03 W	5746.75	3.30
12099.00	87.04	267.45	6602.42	93.74 S	5808.88 W	5809.64	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 269.09 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 12099.00 FEET
IS 5809.64 FEET ALONG 269.08 DEGREES (GRID)**

**First survey from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.
Survey Depth 298 Inc 0.30 Azi 39.67
Survey Depth 603 Inc 0.20 Azi 209.07
Tied in @ Surface
Magnetic direction of 7.573 has been added to AZI for grid direction correction.**