

PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 600 / 1 : 240

Country		: USA		<div>Company : Noble Energy</div> <div>Rig : H&P 321</div> <div>Well : Wells Ranch AE19-689</div> <div>Field : Wattenburg</div> <div>Country : USA</div> <div>API Number : 05-123-39895</div>			
Field		: Wattenburg					
Location		: Lat: 40° 28' 41.30" North Long: 104° 21' 20.48" West					
Well		: Wells Ranch AE19-689					
Company		: Noble Energy					
Rig		: H&P 321		<div>Other Services</div> <div>Directional Drilling</div>			
LOCATION							
Latitude : 40° 28' 41.30" North Longitude : 104° 21' 20.48" West		UTM Easting = 3,318,326.000 ft UTM Northing = 1,419,080.740 ft					
Permanent Datum		: Ground Level		Elevation : 4842.00 ft		Elev.	
Log Measured From		: Drill Floor		30.00 ft Above Permanent Datum		KB N/A DF 4872.00 ft GL 4842.00 ft WD N/A	
Drilling Measured From		: Drill Floor		MD LOG			
Depth Logged		: 759.00 ft To 17,296.00 ft		Unit No. : 11210424		Job No. : CA-XX-0901853575	
Date Logged		: 12-Dec-14 To 15-Dec-14		Plot Type : Final			
Total Depth MD		: 17,296.00 ft TVD : 6,709.28 ft		Plot Date : 22-Dec-14			
Spud Date		: 12-Dec-14					
Run No.		Borehole Record (MD)		Run No.		Borehole Record (MD)	
	Size	From	To		Size	From	To
100	8.750 in	759.00 ft	1,250.00 ft				
200	8.750 in	1,250.00 ft	7,090.00 ft				
300	6.125 in	7,090.00 ft	17,296.00 ft				

Max Tool Temp (degF) / Source	74.20 / PCM	160.83 / PCM	238.70 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 74.20	N/A @ 160.83	N/A @ 238.70		
Lead MWD Engineer	Robert Barnes	Robert Barnes	Robert Barnes		
Customer Representative	Stetson Nielsen	Stetson Nielsen	Jim Turner		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11341320	11341320	12463929		
Insert Serial Number	11400994	11400994	11400994		
Date and Time Initialized	12-Dec-14 17:04	01-Jan-70 00:00	15-Dec-14 10:36		
Date and Time Read	15-Dec-14 04:10	15-Dec-14 04:15	21-Dec-14 21:17		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	60.00	60.00	66.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11341320	11341320	12463929		
Sonde Serial Number	11833222	11833222	11638576		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	62.98	59.01	204.75		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	53.18	53.18	69.03		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11341320	11341320	12463929		
Insert/Sonde Serial Number	11579773	11579773	11120594		

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

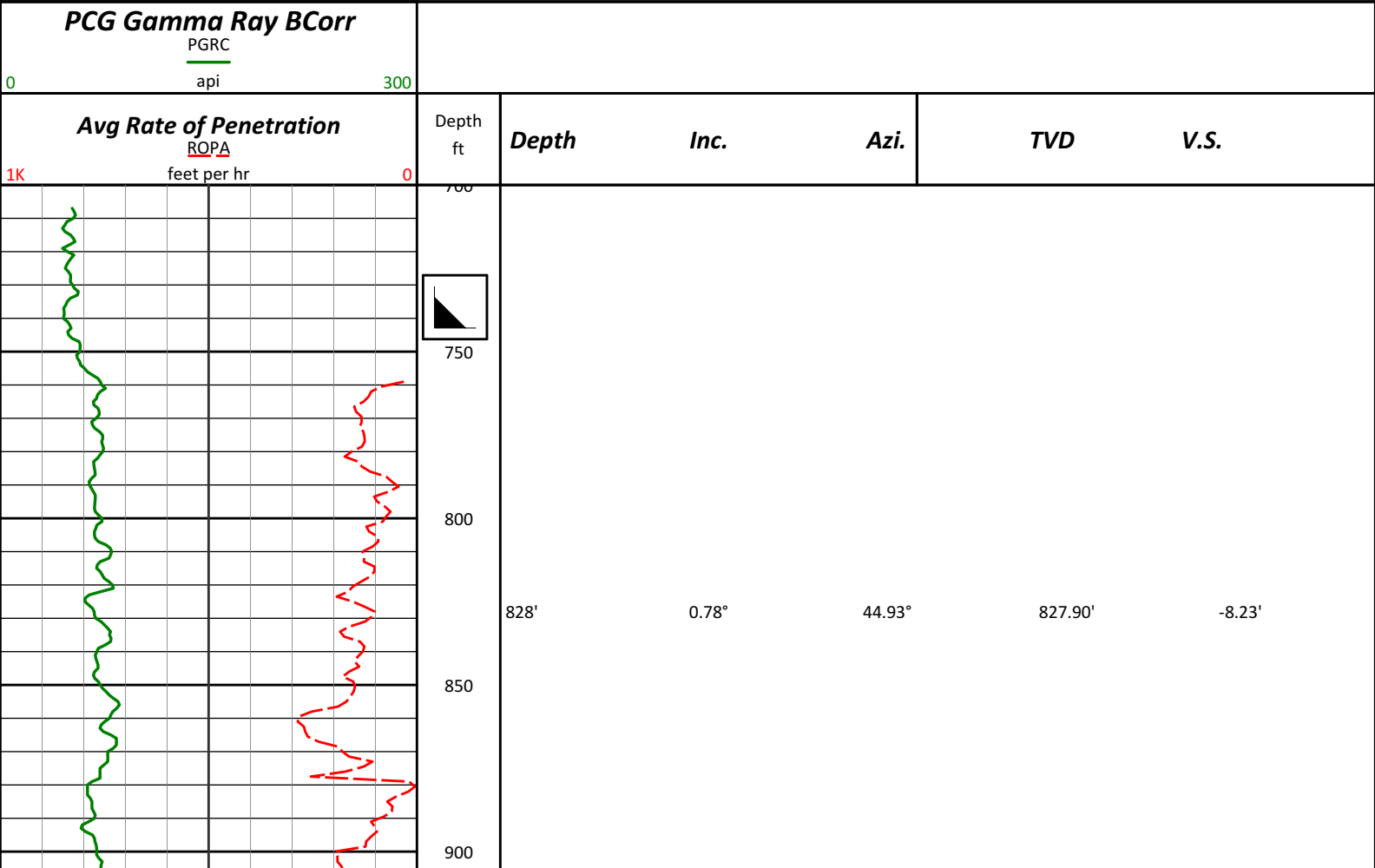
6. Insite Version v8.0.20

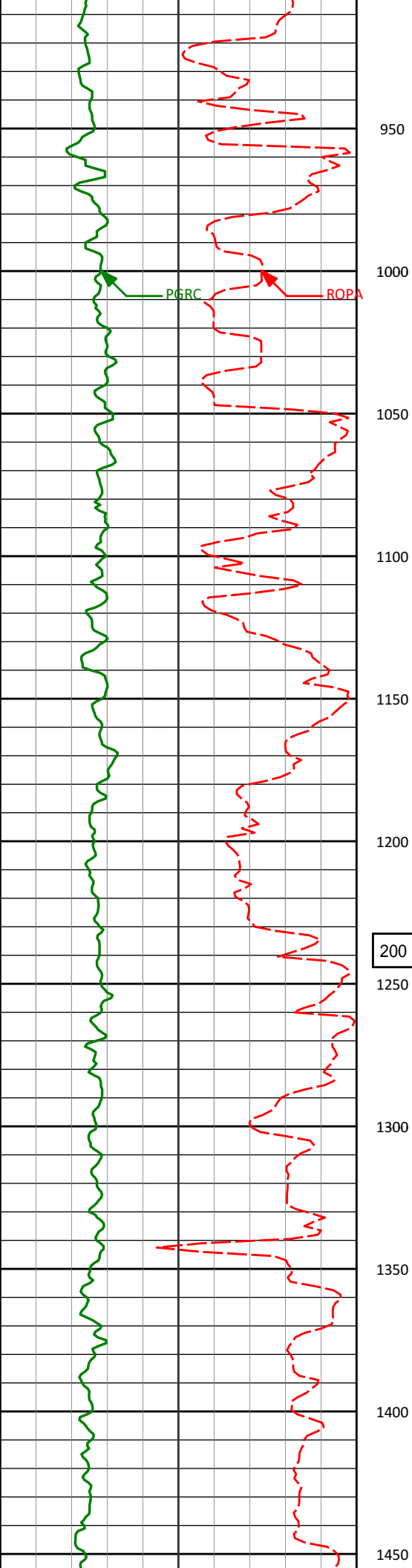
WARRANTY

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HALLIBURTON
Sperry Drilling Services
MD Correlation Log 1:600

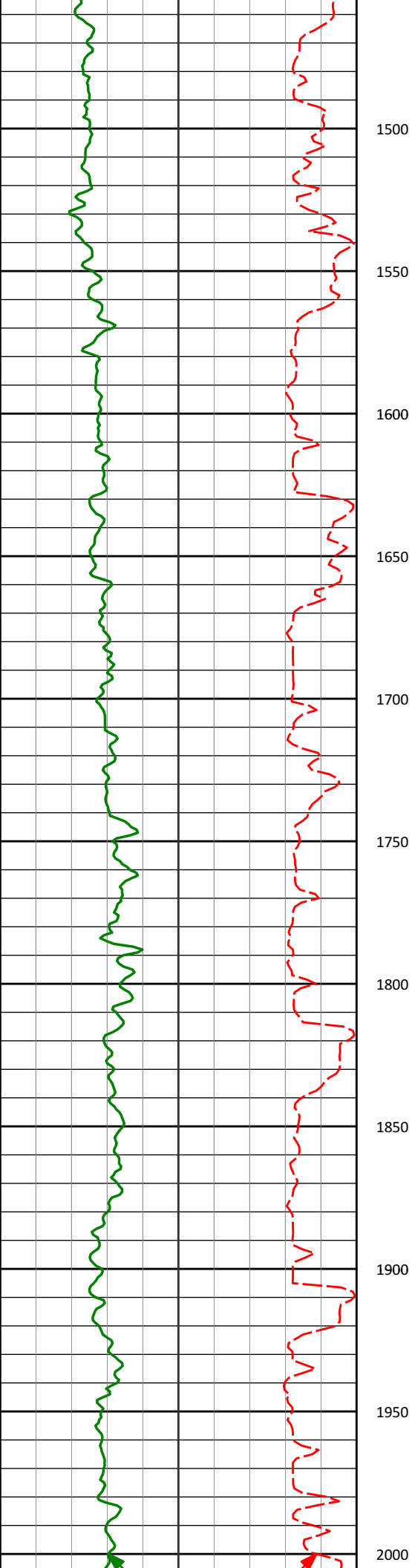
Noble Energy
Wells Ranch AE19-689
H&P 321
Sec.20-T6N-R62W



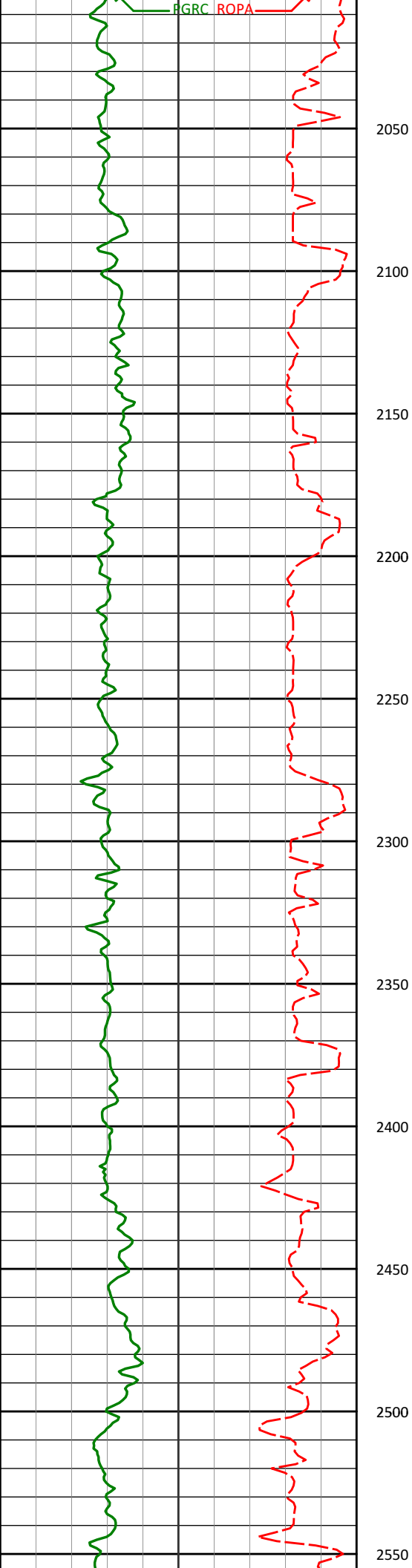


920'	0.66°	43.17°	919.89'	-9.01'
950				
1000				
1012'	0.78°	33.73°	1011.88'	-9.70'
1050				
1100				
1104'	0.73°	37.69°	1103.87'	-10.38'
1150				
1195'	0.85°	62.41°	1194.87'	-11.31'
1200				
1250				
1300				
1301'	0.51°	270.35°	1300.86'	-11.53'
1350				
1394'	0.58°	321.53°	1393.86'	-10.81'
1400				
1450				

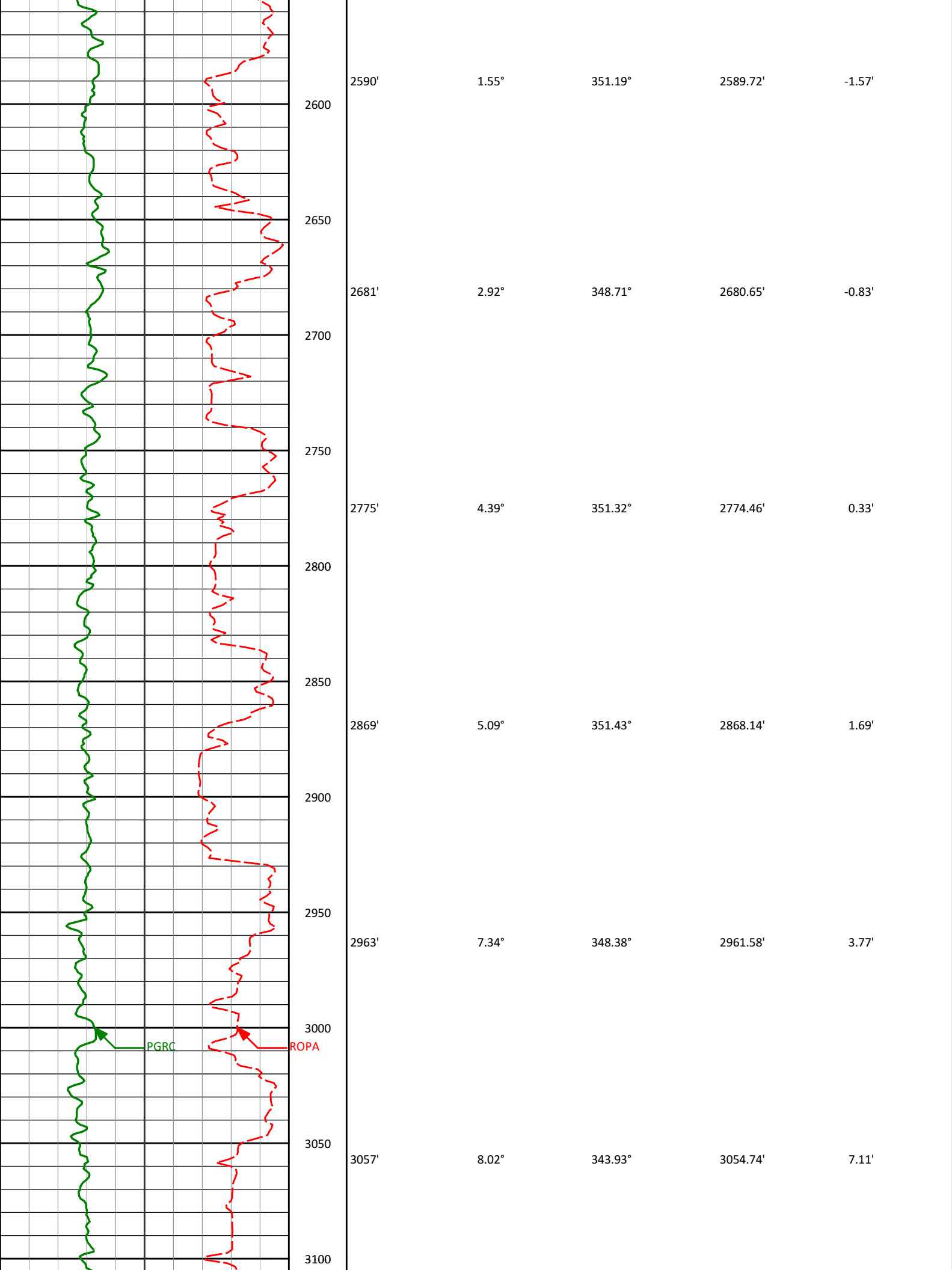
200

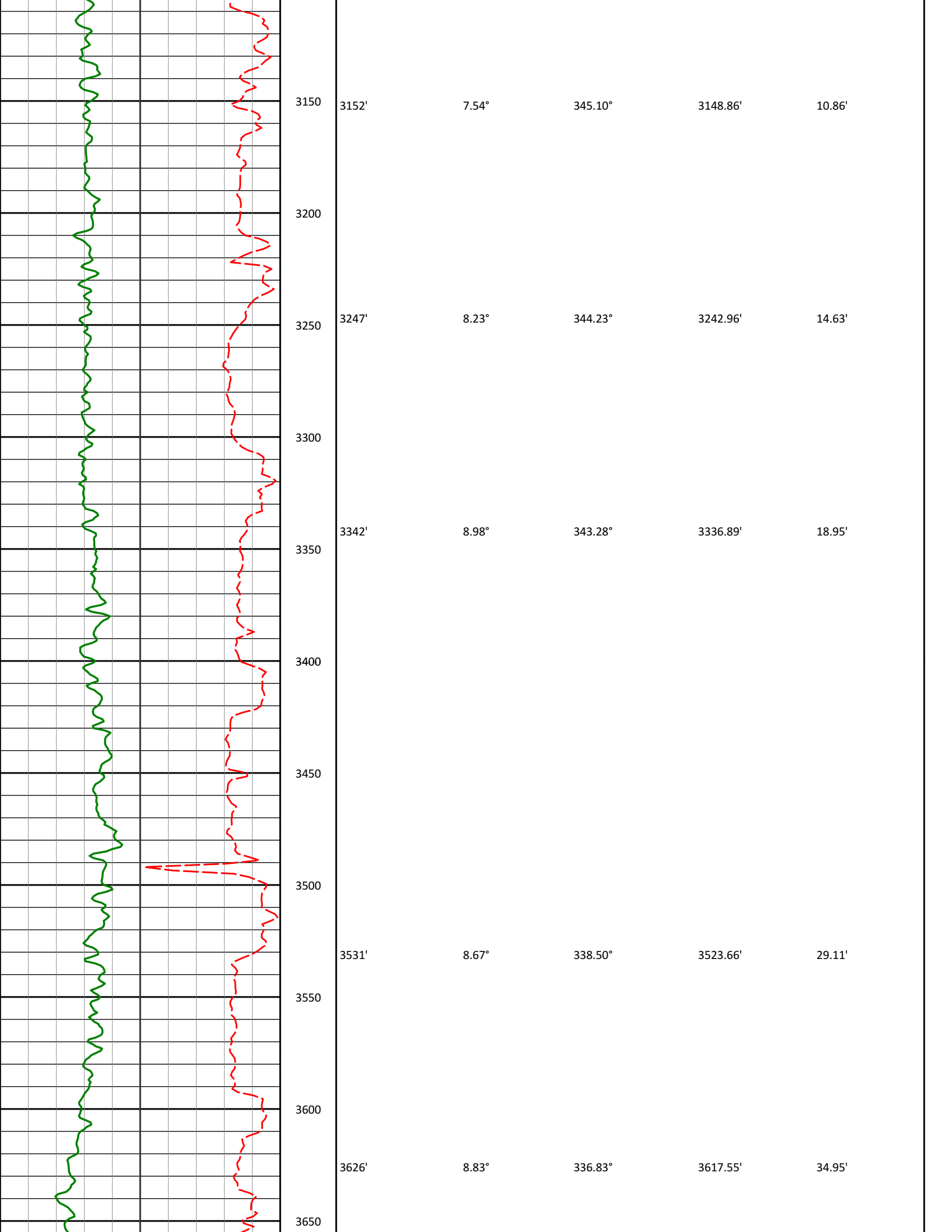


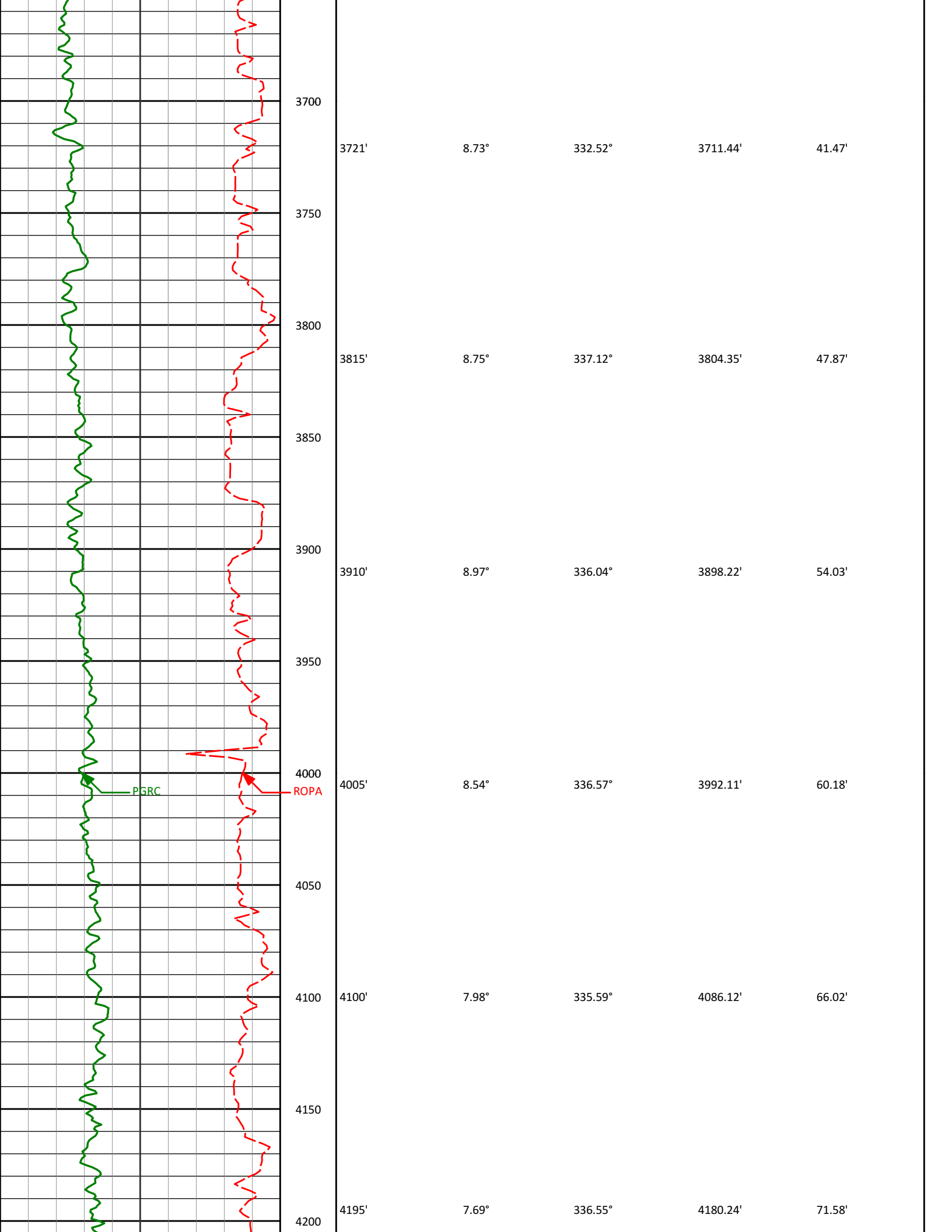
1485'	1.26°	302.17°	1484.85'	-9.66'
1500				
1550				
1577'	1.57°	256.77°	1576.82'	-7.57'
1600				
1650				
1700				
1750				
1760'	1.12°	275.65°	1759.77'	-3.36'
1800				
1850				
1852'	0.85°	285.63°	1851.76'	-1.80'
1900				
1943'	0.88°	303.81°	1942.75'	-0.55'
1950				
2000				

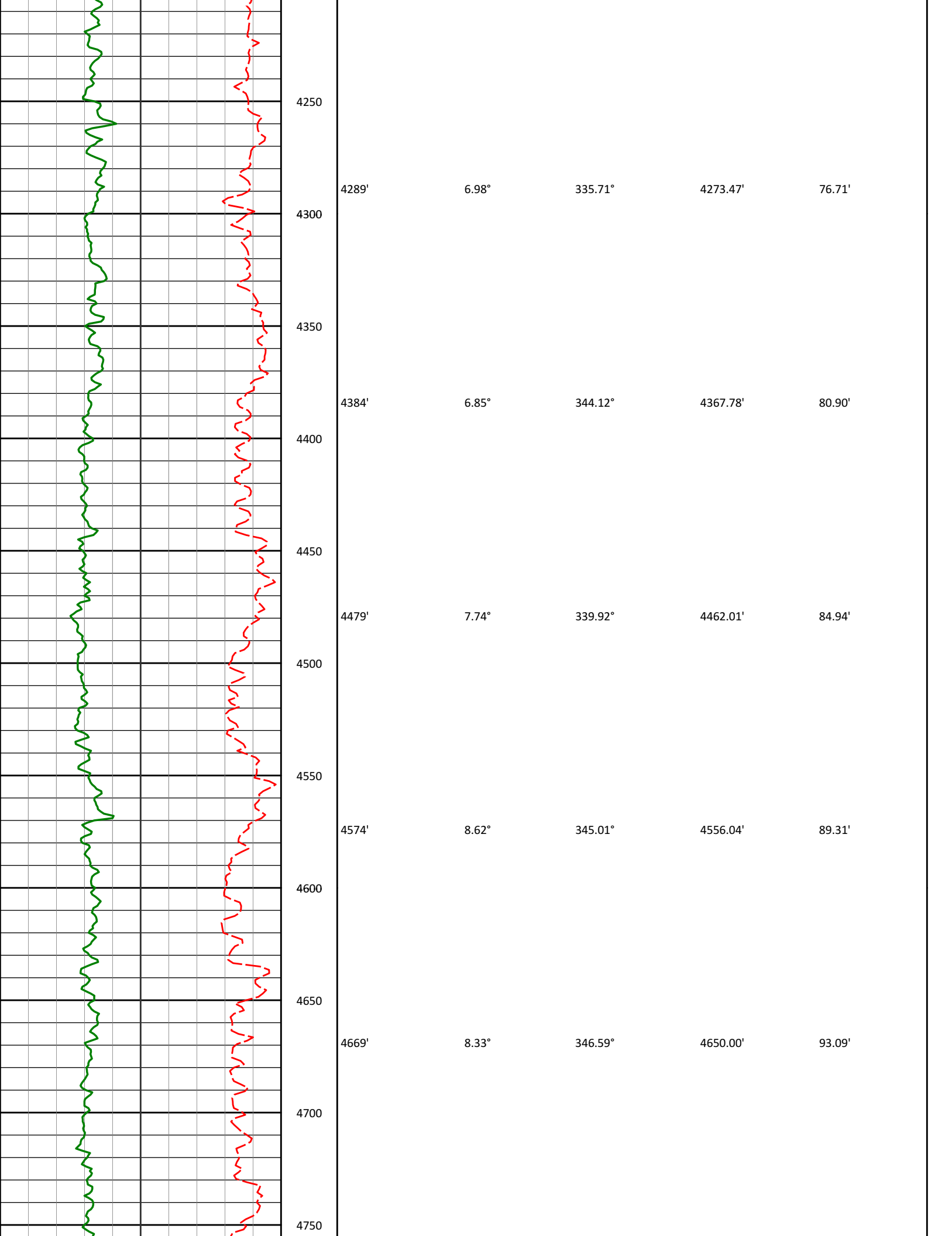


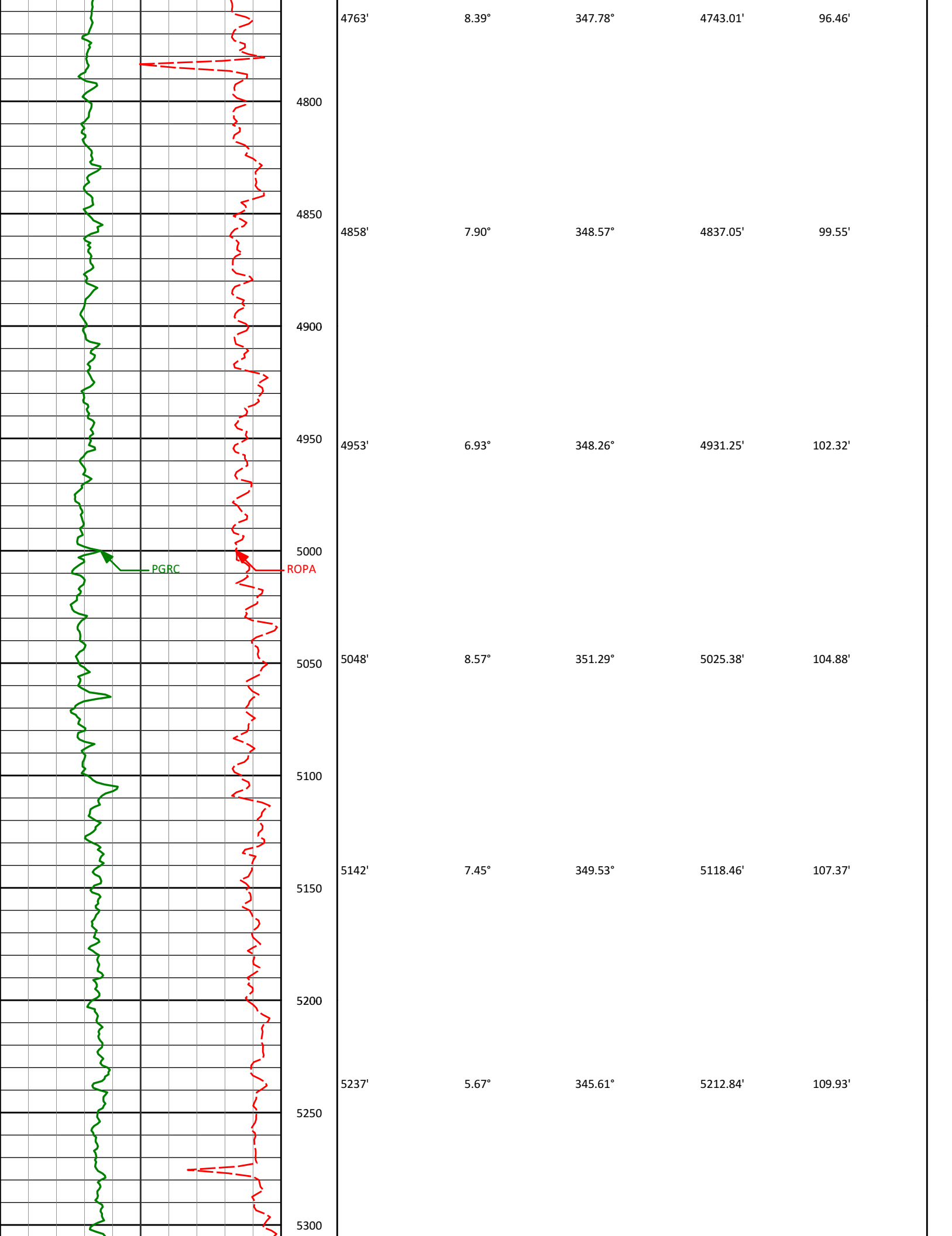
2035'	0.22°	103.17°	2034.75'	-0.13'
2050				
2100				
2150				
2200				
2221'	0.29°	100.59°	2220.74'	-0.95'
2250				
2300				
2313'	0.22°	69.68°	2312.74'	-1.34'
2350				
2400				
2405'	0.24°	36.81°	2404.74'	-1.61'
2450				
2500				
2497'	0.50°	6.03°	2496.74'	-1.76'
2550				

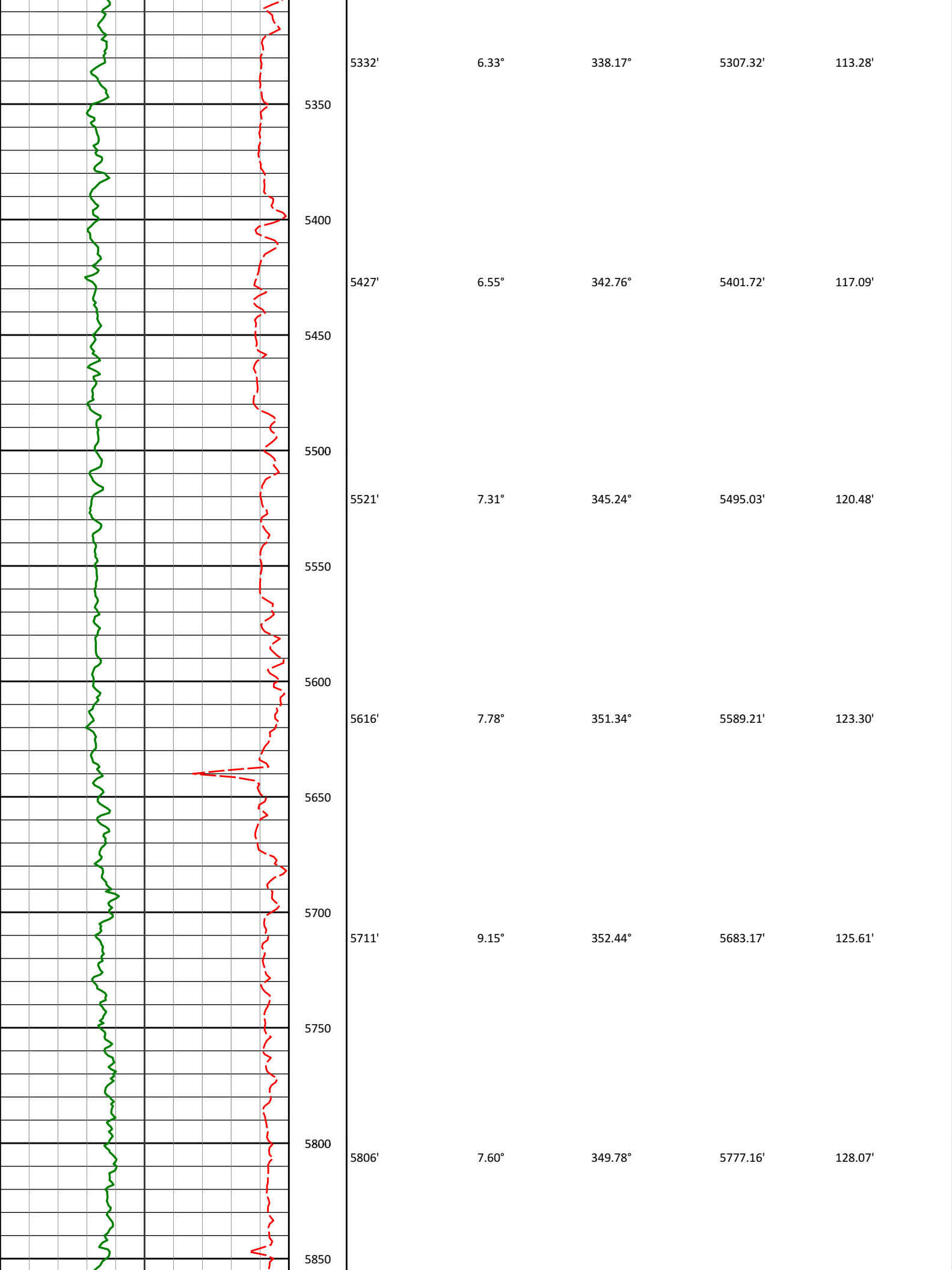


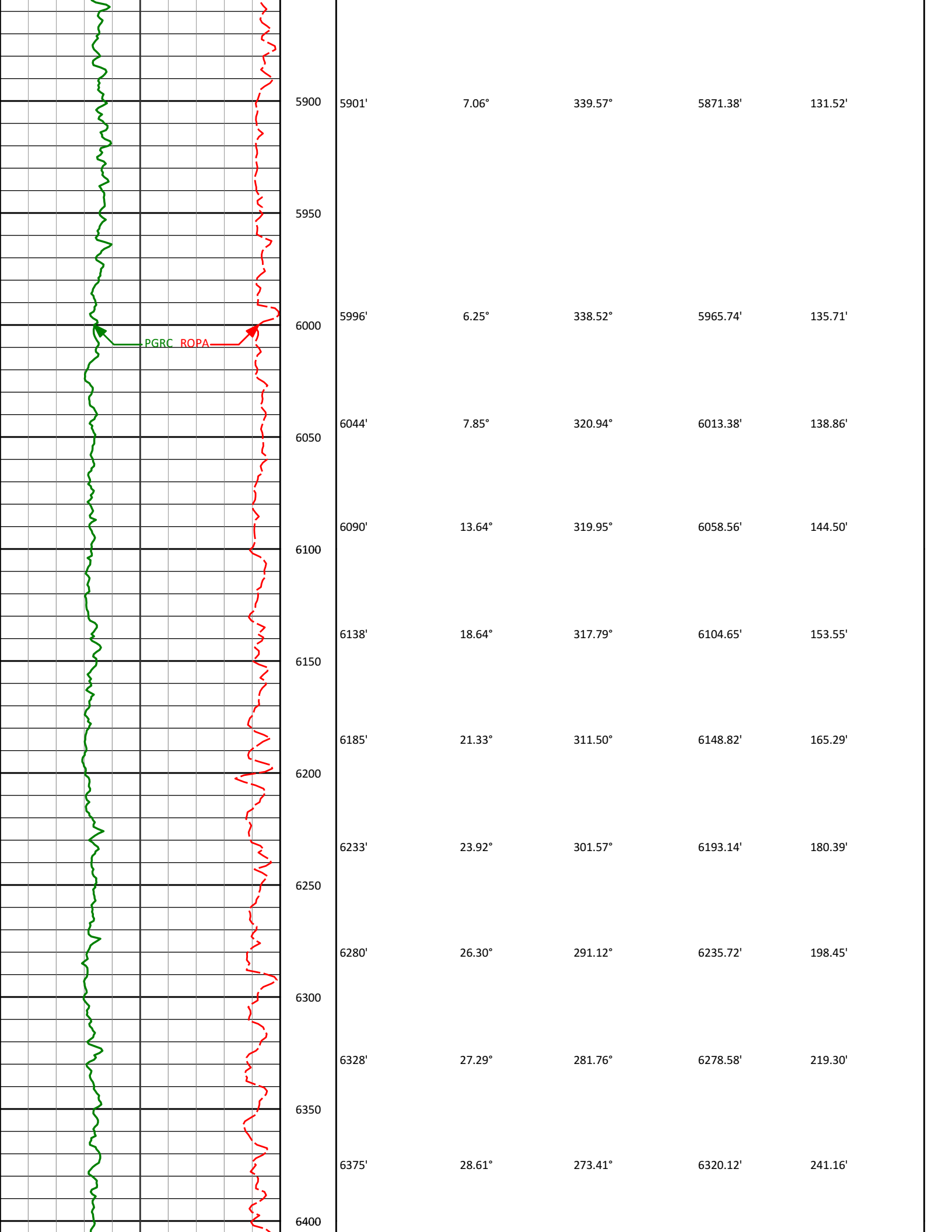


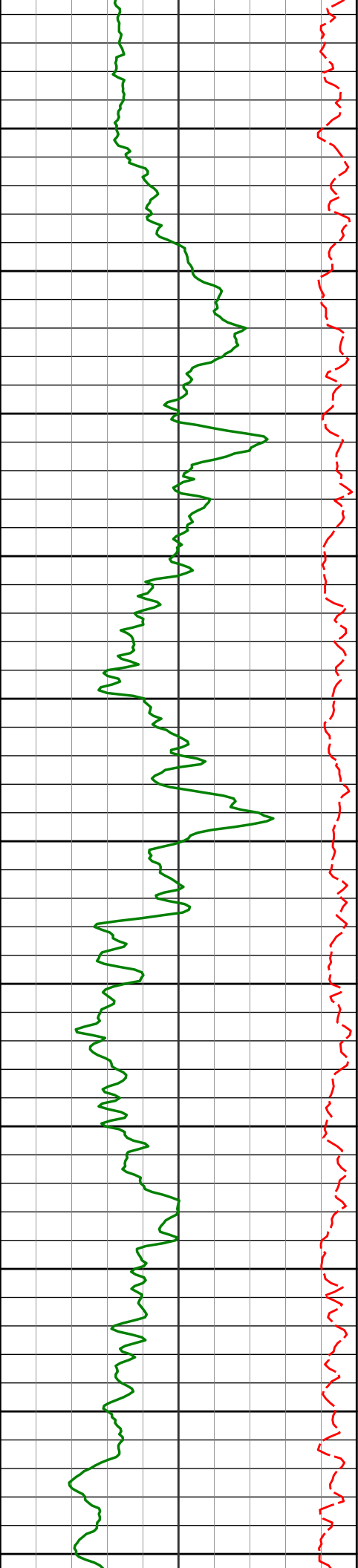




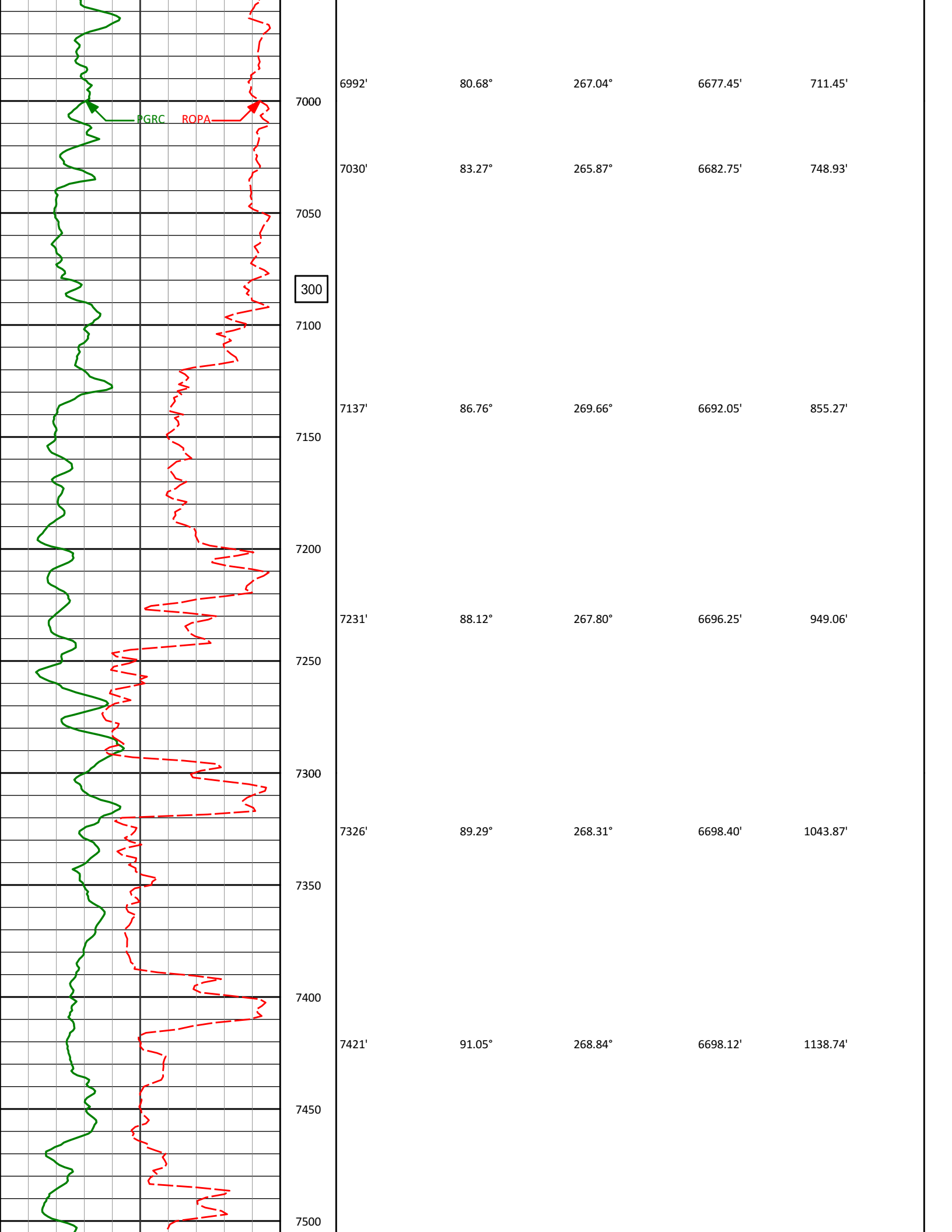


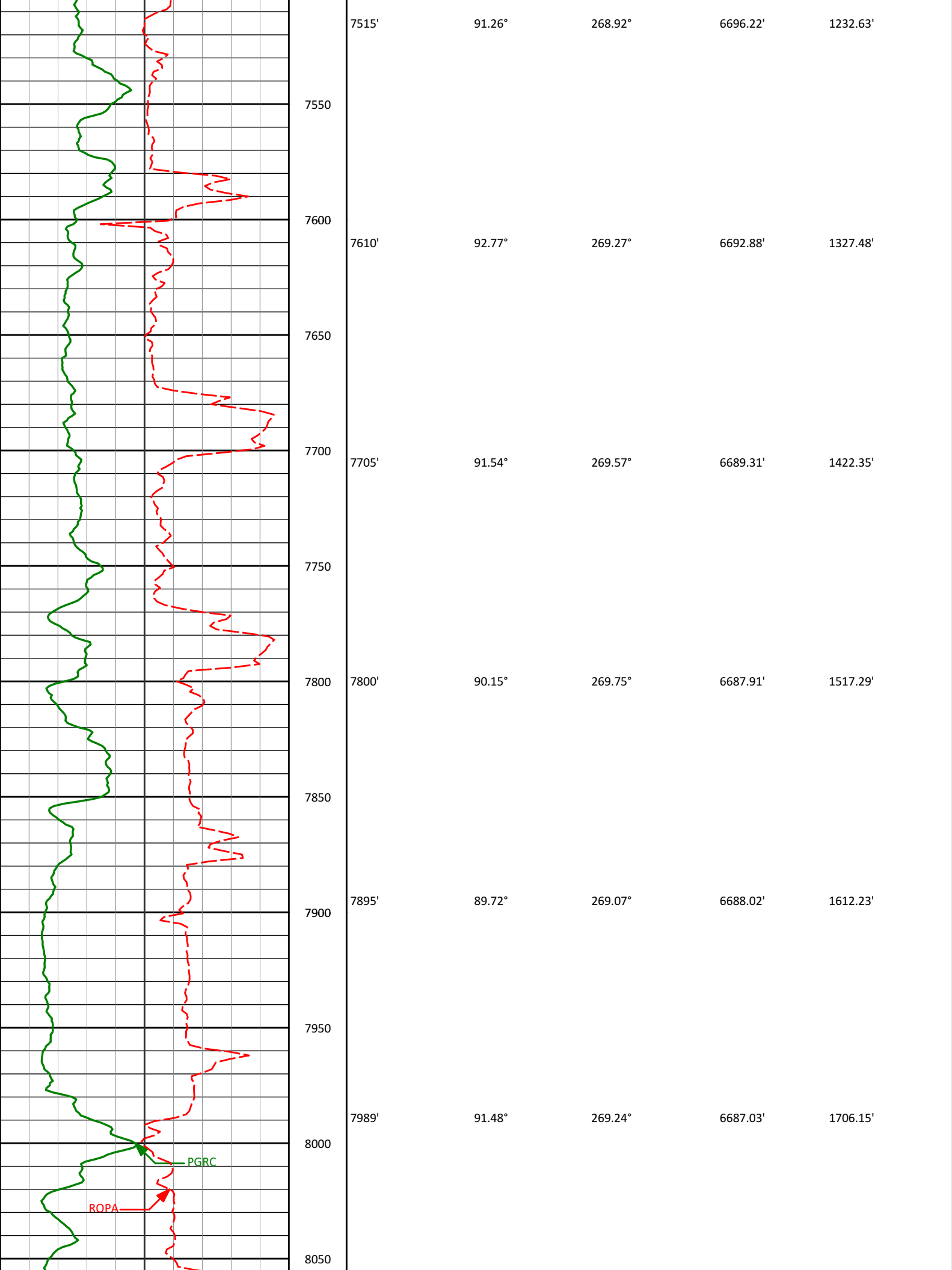


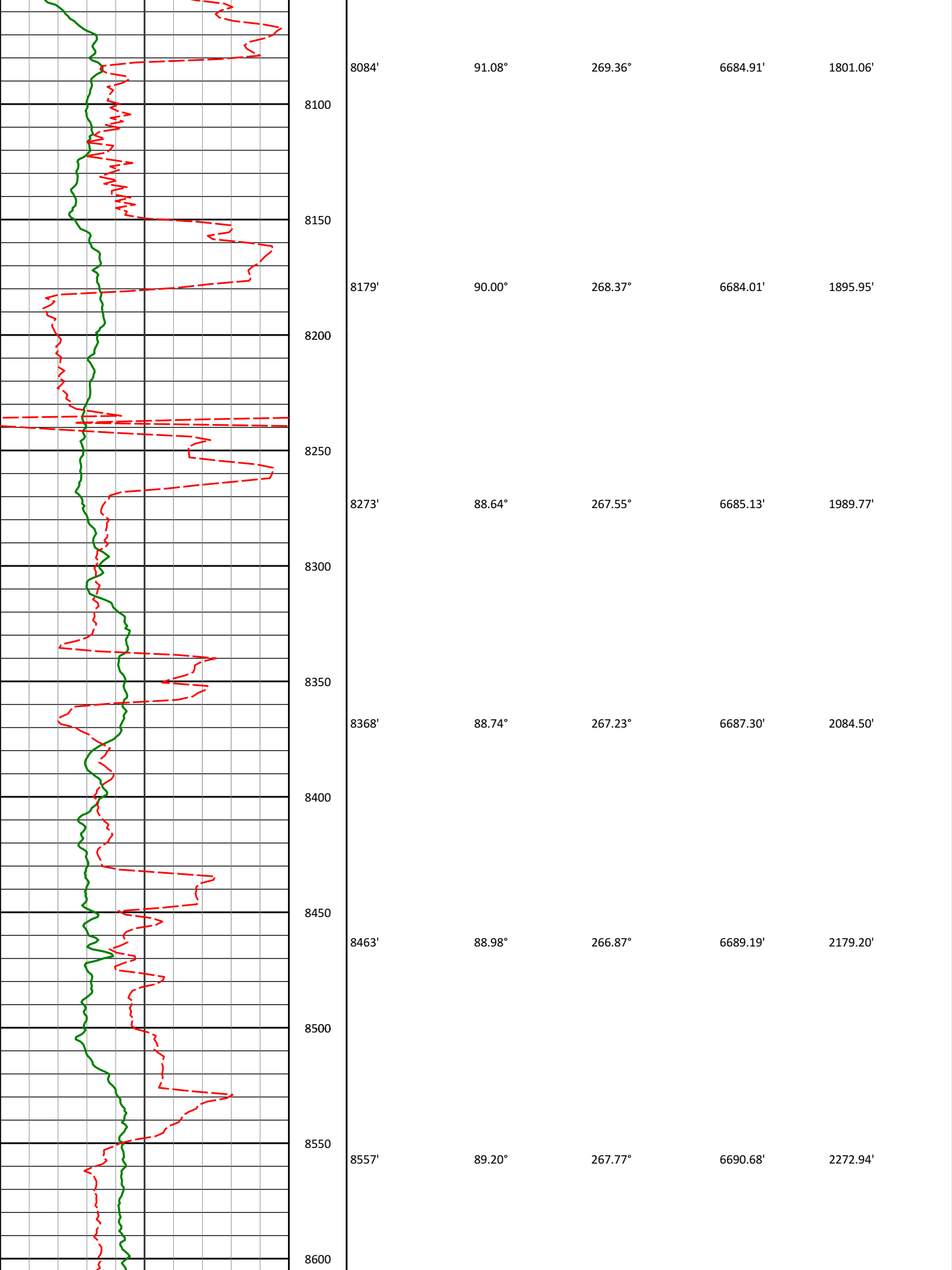


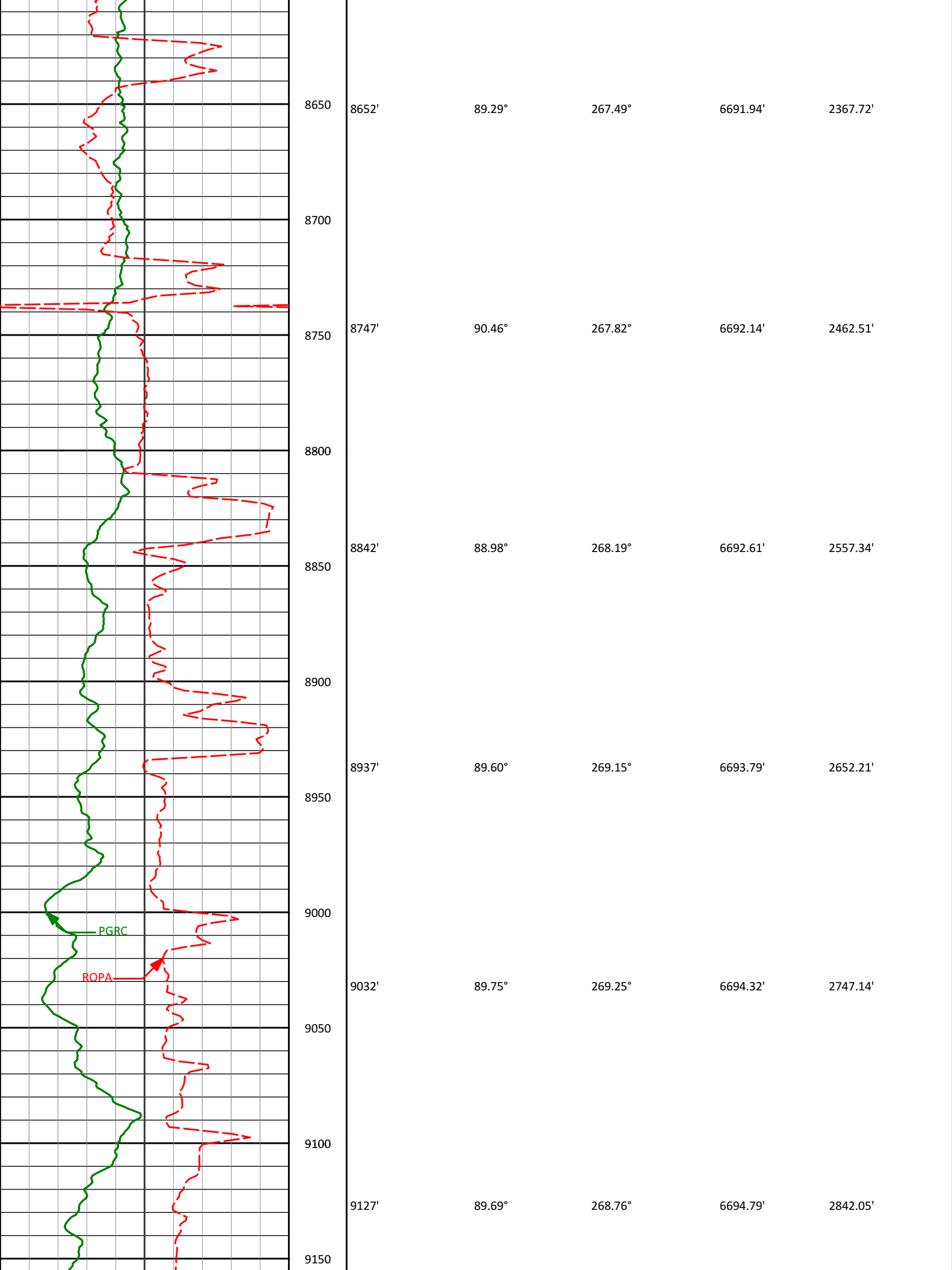


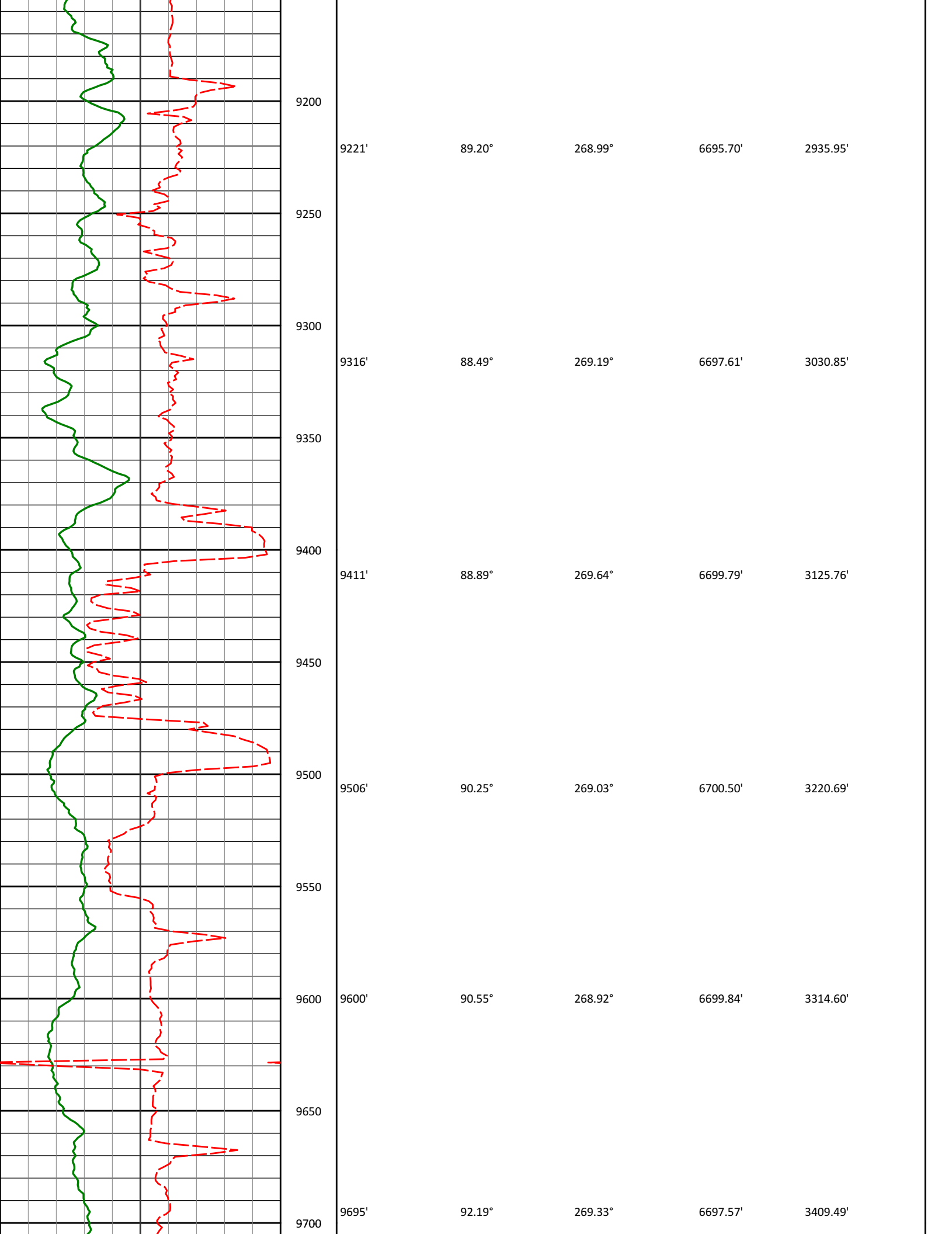
6423'	28.83°	275.05°	6362.21'	264.20'
6450				
6470'	31.10°	273.90°	6402.93'	287.64'
6500				
6518'	36.17°	271.66°	6442.88'	314.21'
6550				
6565'	41.27°	270.09°	6479.54'	343.59'
6600				
6613'	45.82°	267.16°	6514.33'	376.60'
6650				
6659'	50.39°	265.31°	6545.04'	410.69'
6700				
6707'	55.71°	264.99°	6573.88'	448.80'
6750				
6754'	59.97°	266.42°	6598.89'	488.38'
6800				
6802'	64.64°	268.02°	6621.20'	530.75'
6850				
6849'	69.45°	268.94°	6639.52'	573.96'
6900				
6897'	72.77°	269.64°	6655.06'	619.33'
6950				
6944'	75.95°	268.69°	6667.73'	664.55'

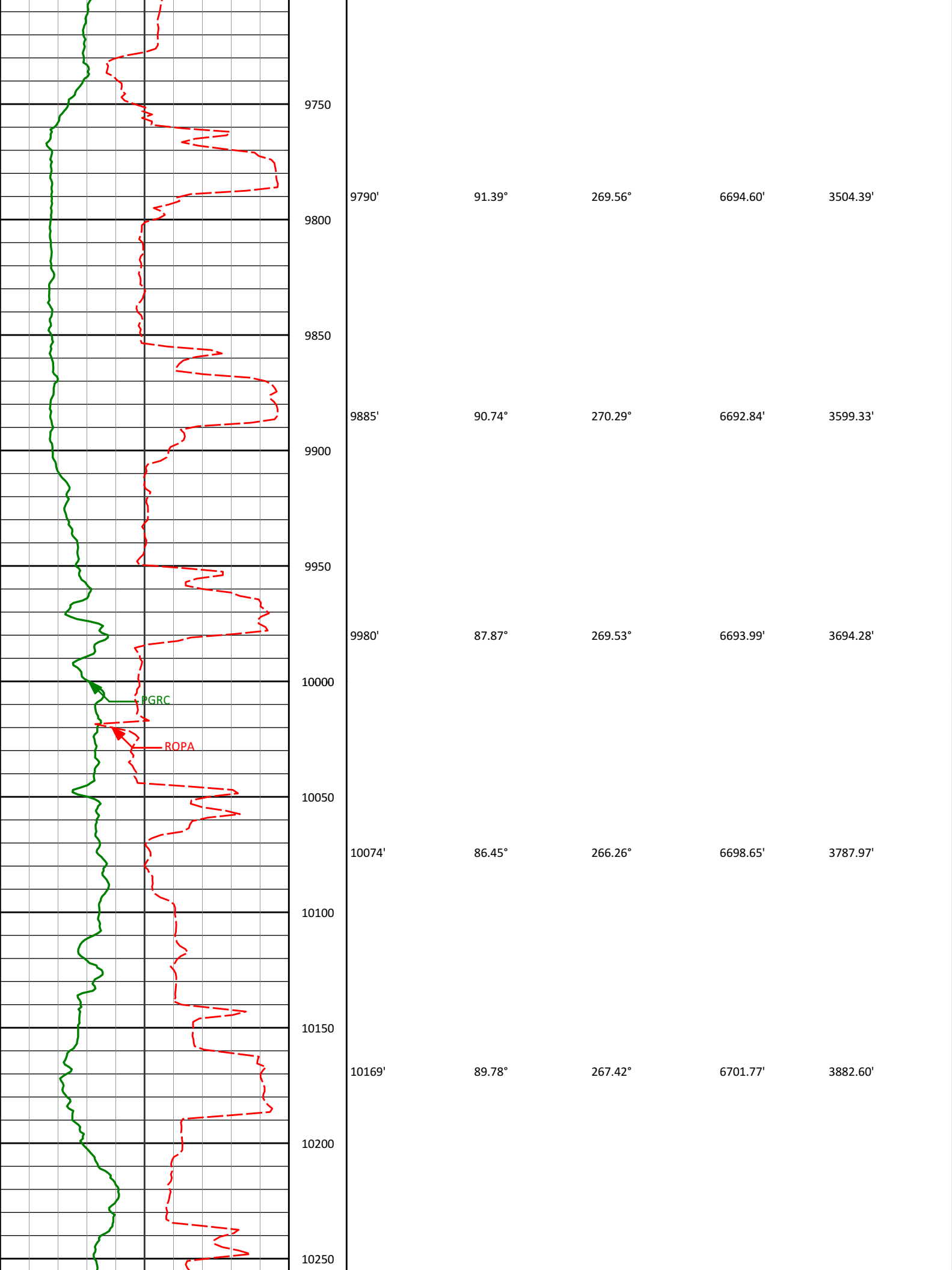


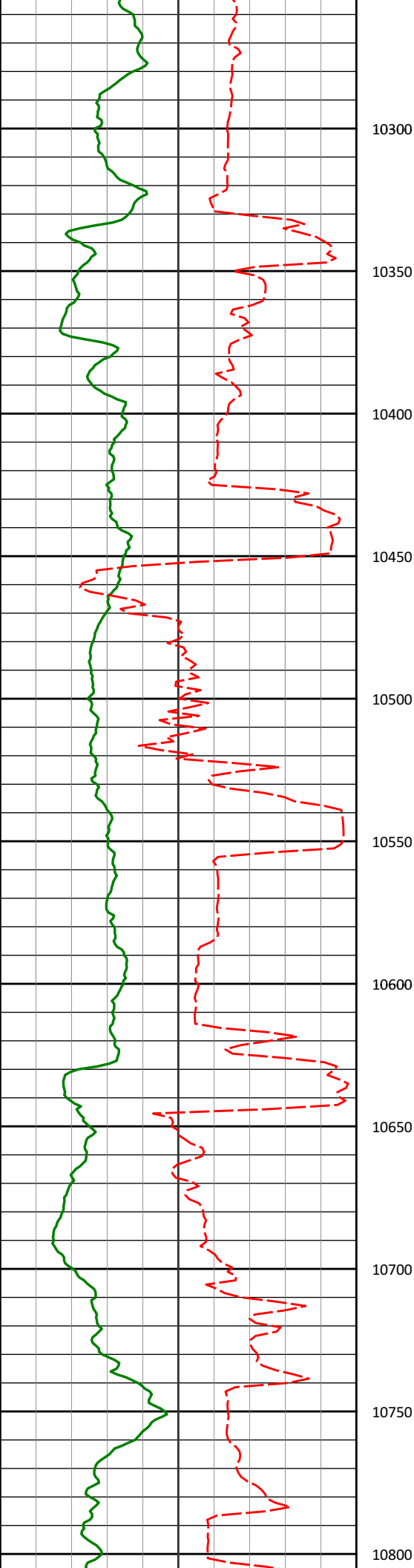




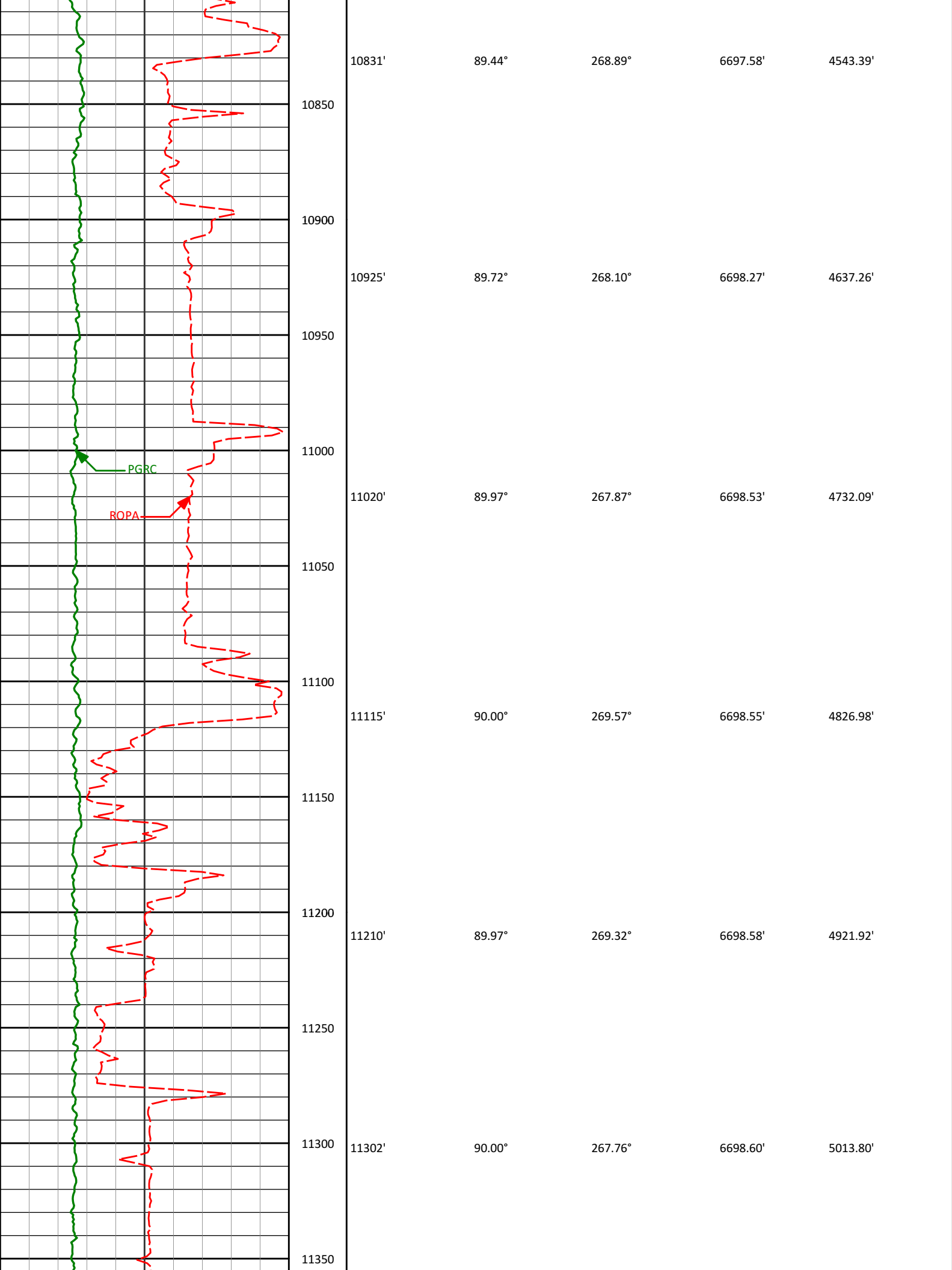


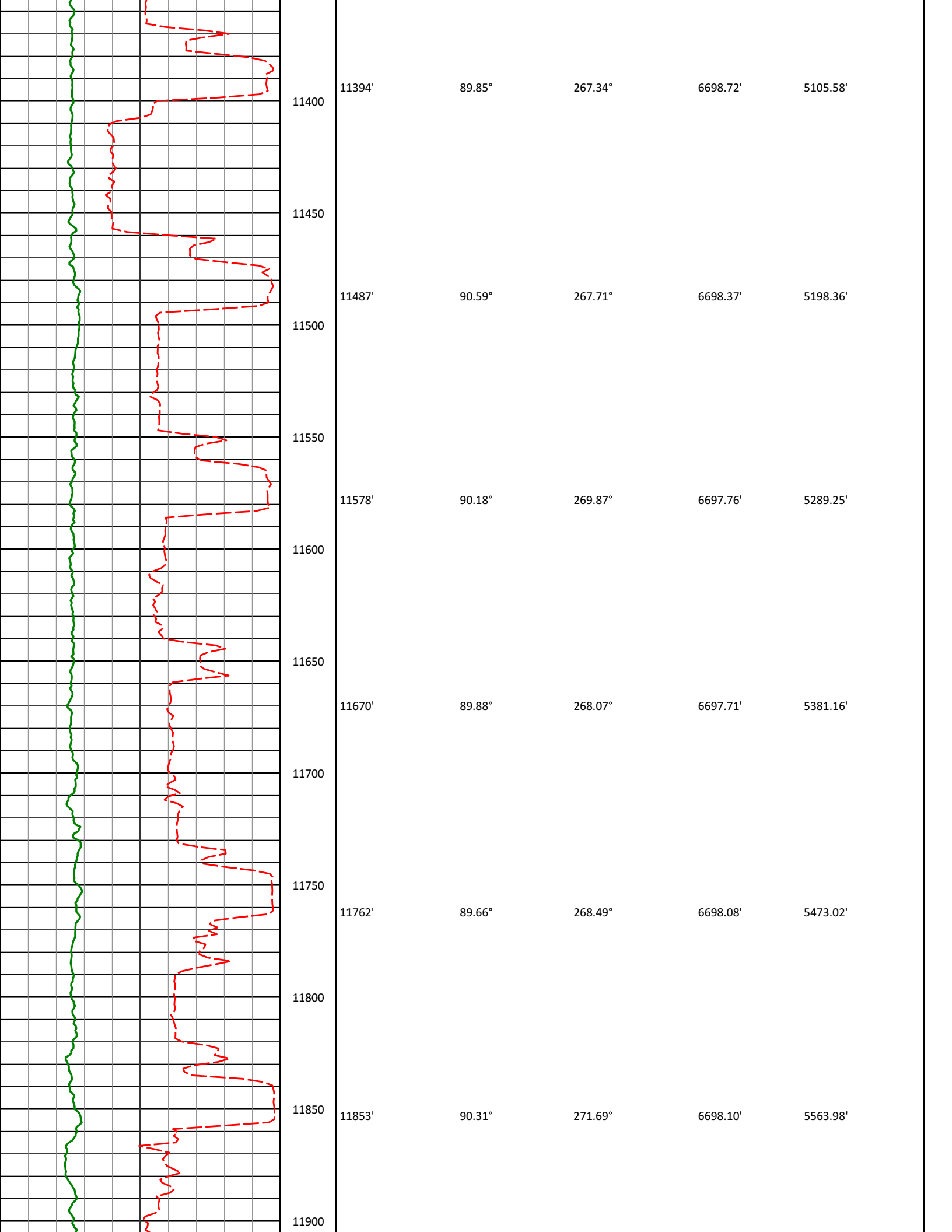


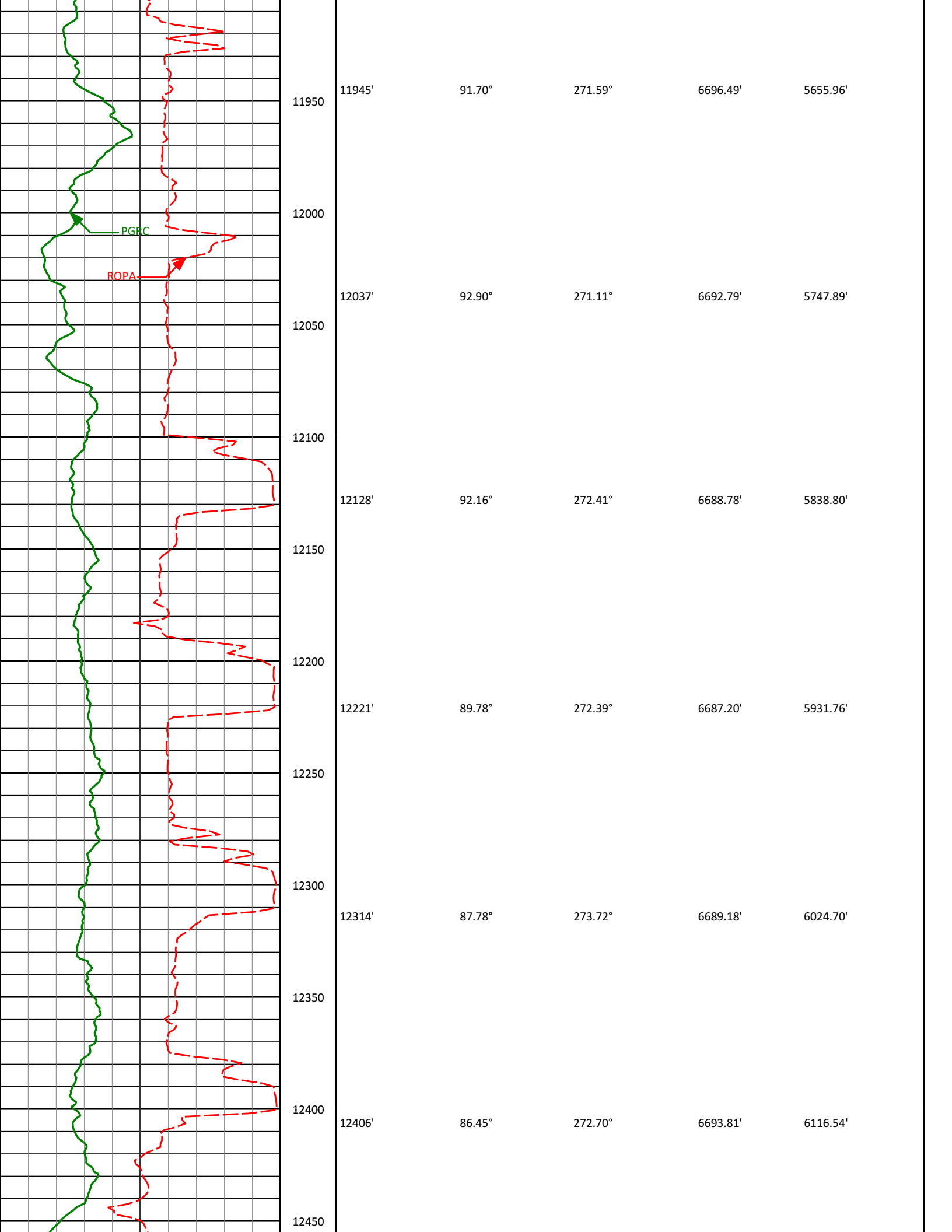


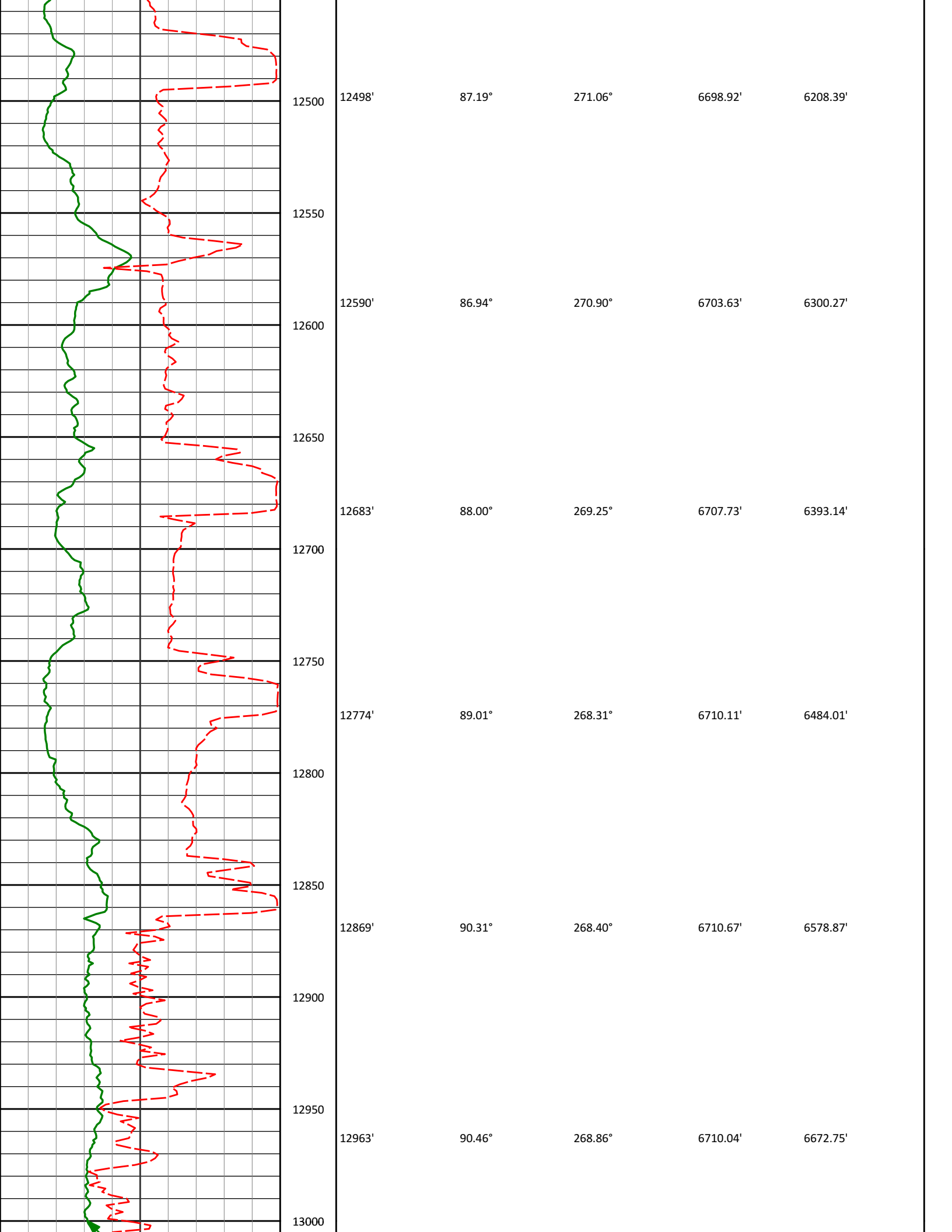


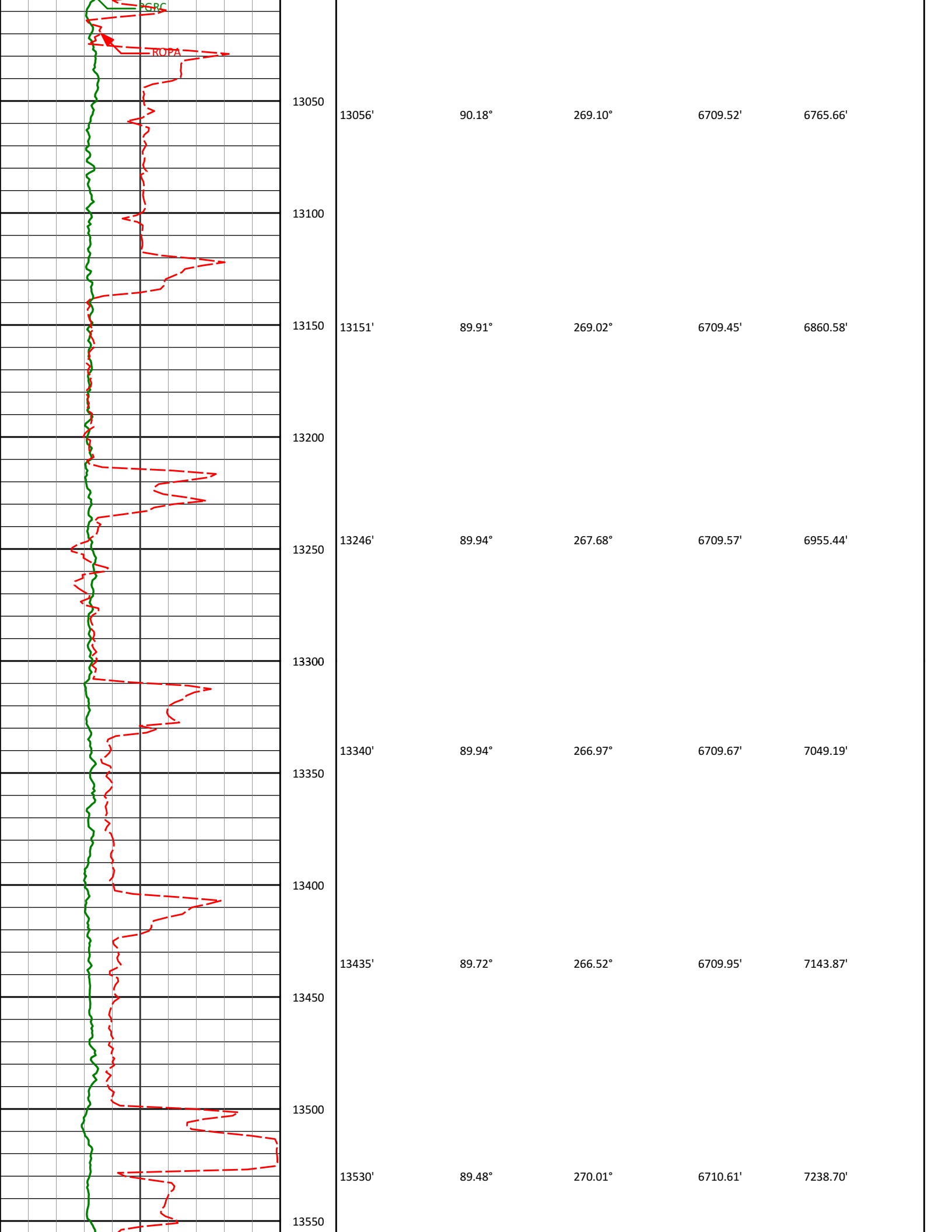
10263'	92.00°	267.61°	6700.31'	3976.36'
10358'	92.28°	267.83°	6696.77'	4071.09'
10453'	91.76°	268.25°	6693.42'	4165.86'
10547'	90.83°	269.80°	6691.29'	4259.75'
10642'	88.24°	269.14°	6692.06'	4354.68'
10736'	87.81°	268.68°	6695.30'	4448.53'

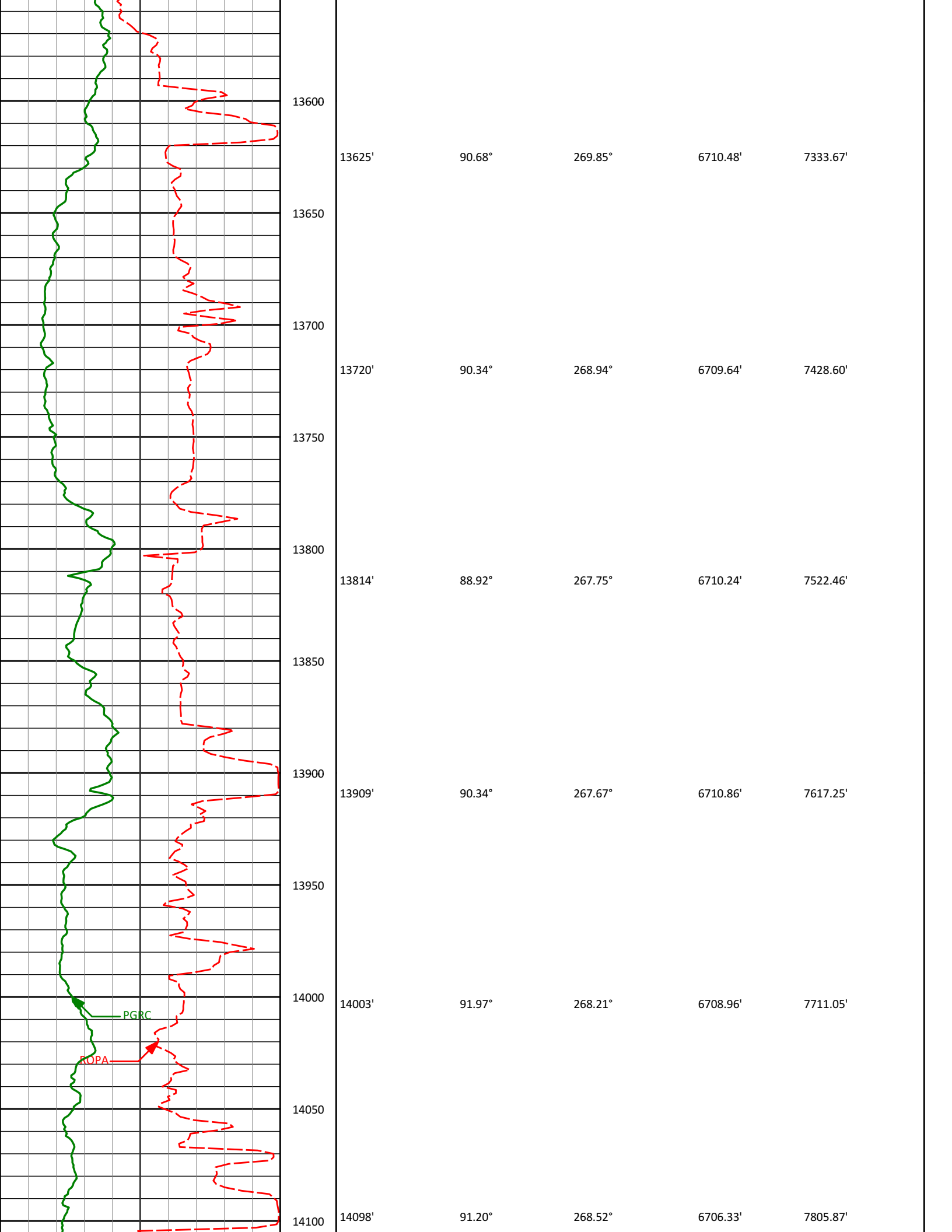


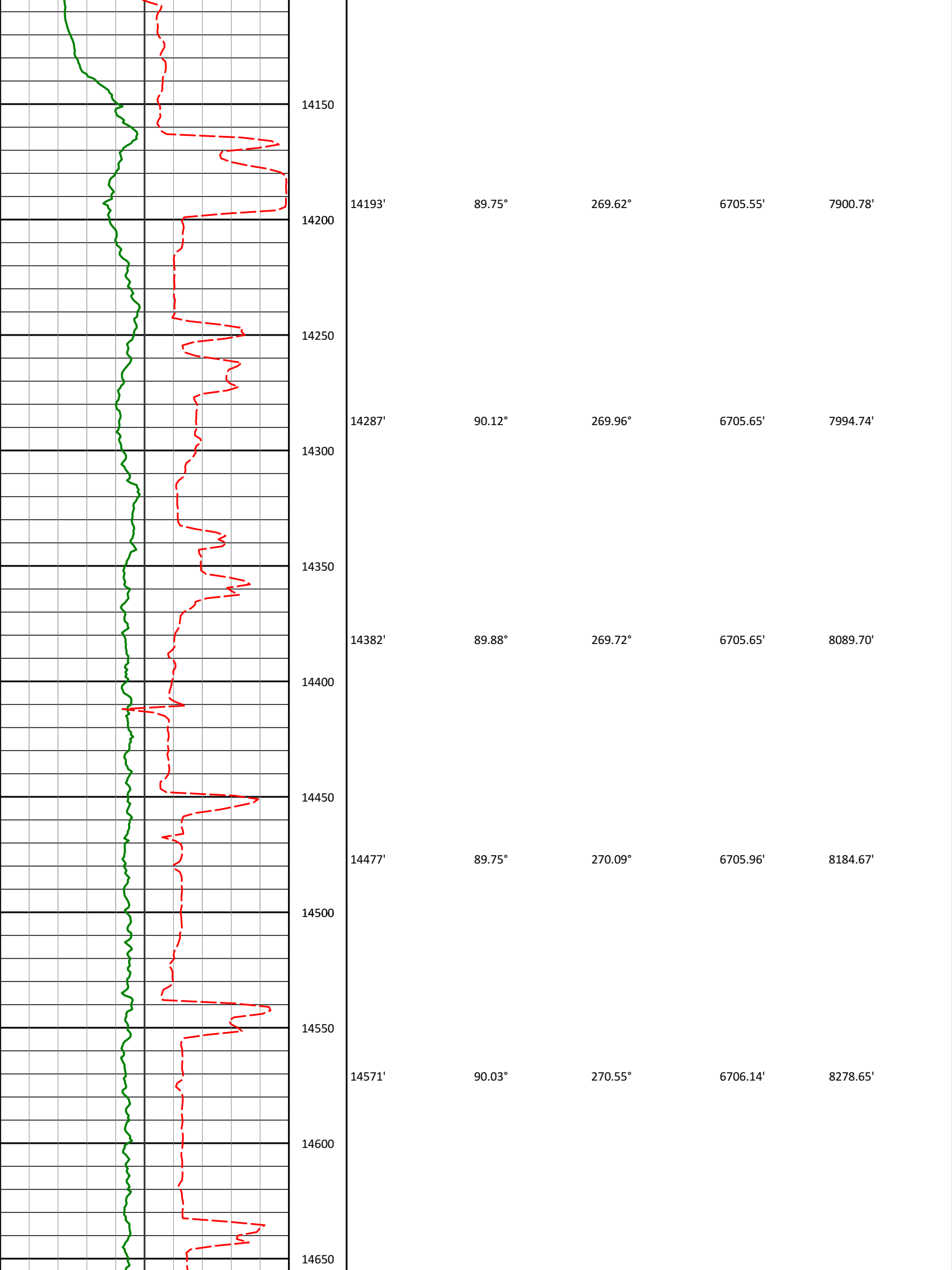


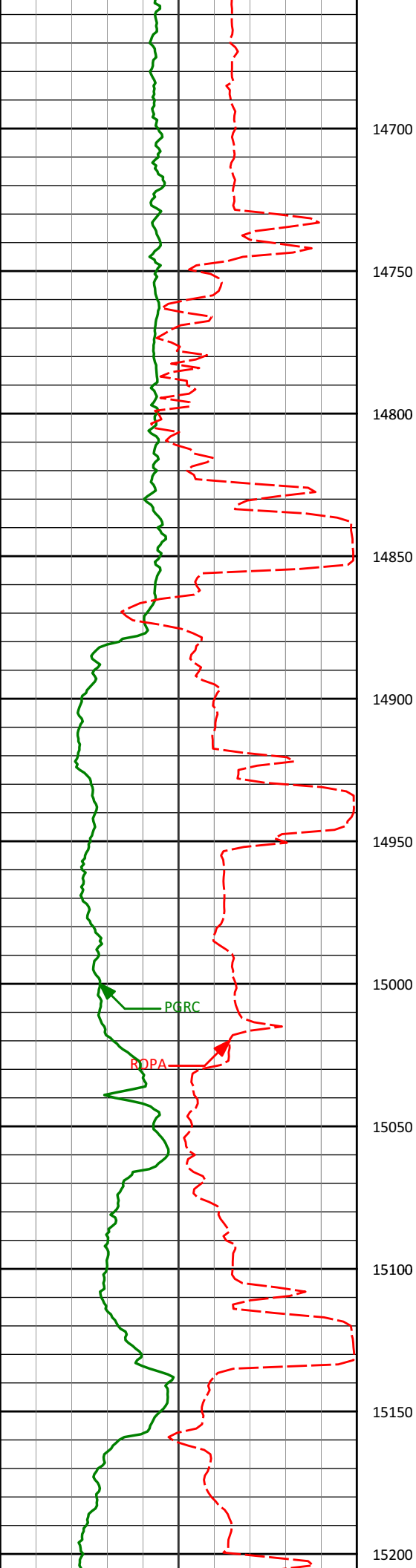












14665'	89.97°	270.85°	6706.14'	8372.64'
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14700

14750

14760'	89.75°	271.18°	6706.37'	8467.64'
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14800

14850

14855'	88.55°	269.11°	6707.78'	8562.60'
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14900

14950

14949'	90.22°	268.48°	6708.79'	8656.48'
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15000

PGRC

BDPA

15050

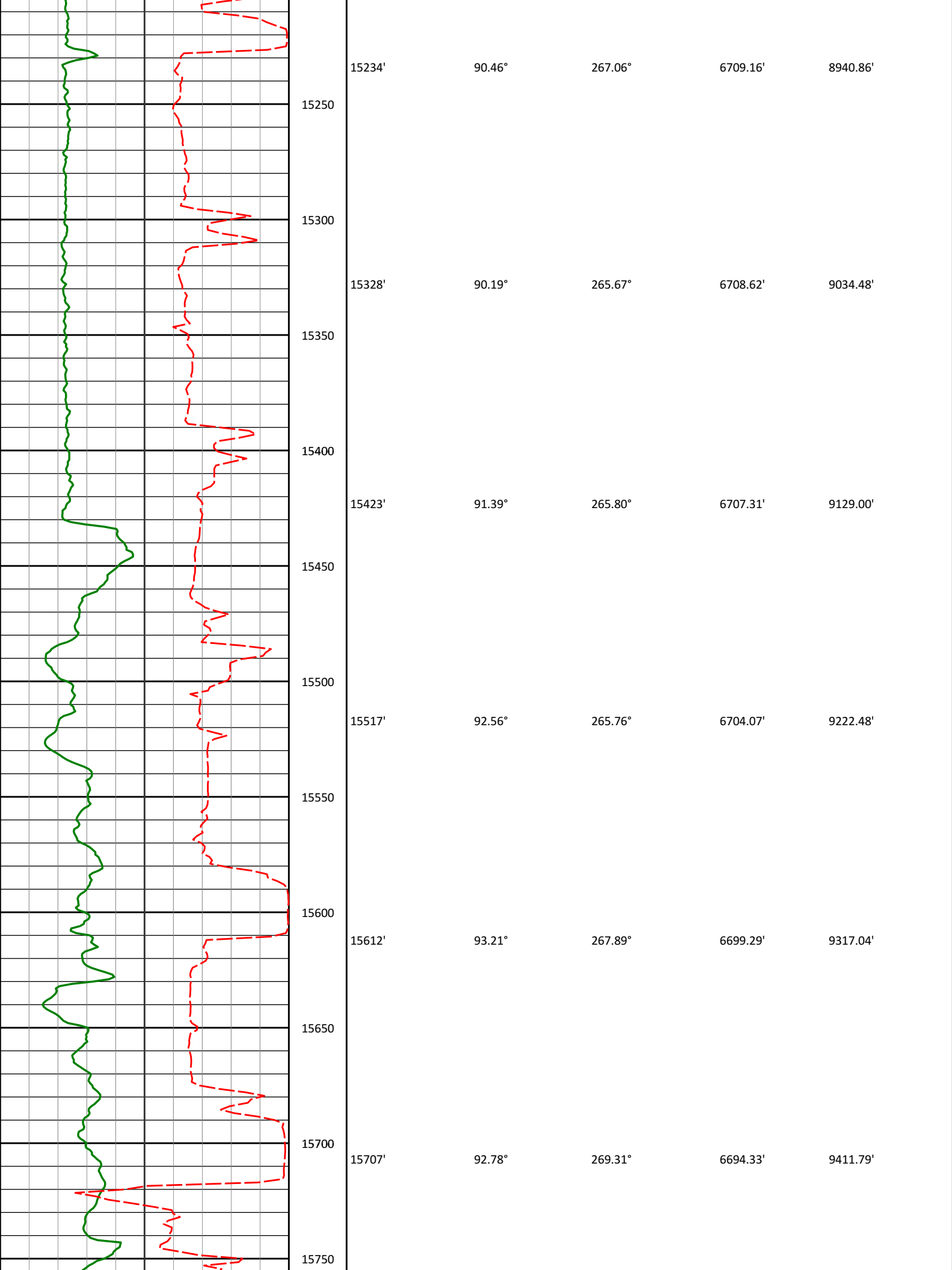
15044'	91.48°	268.79°	6707.38'	8751.36'
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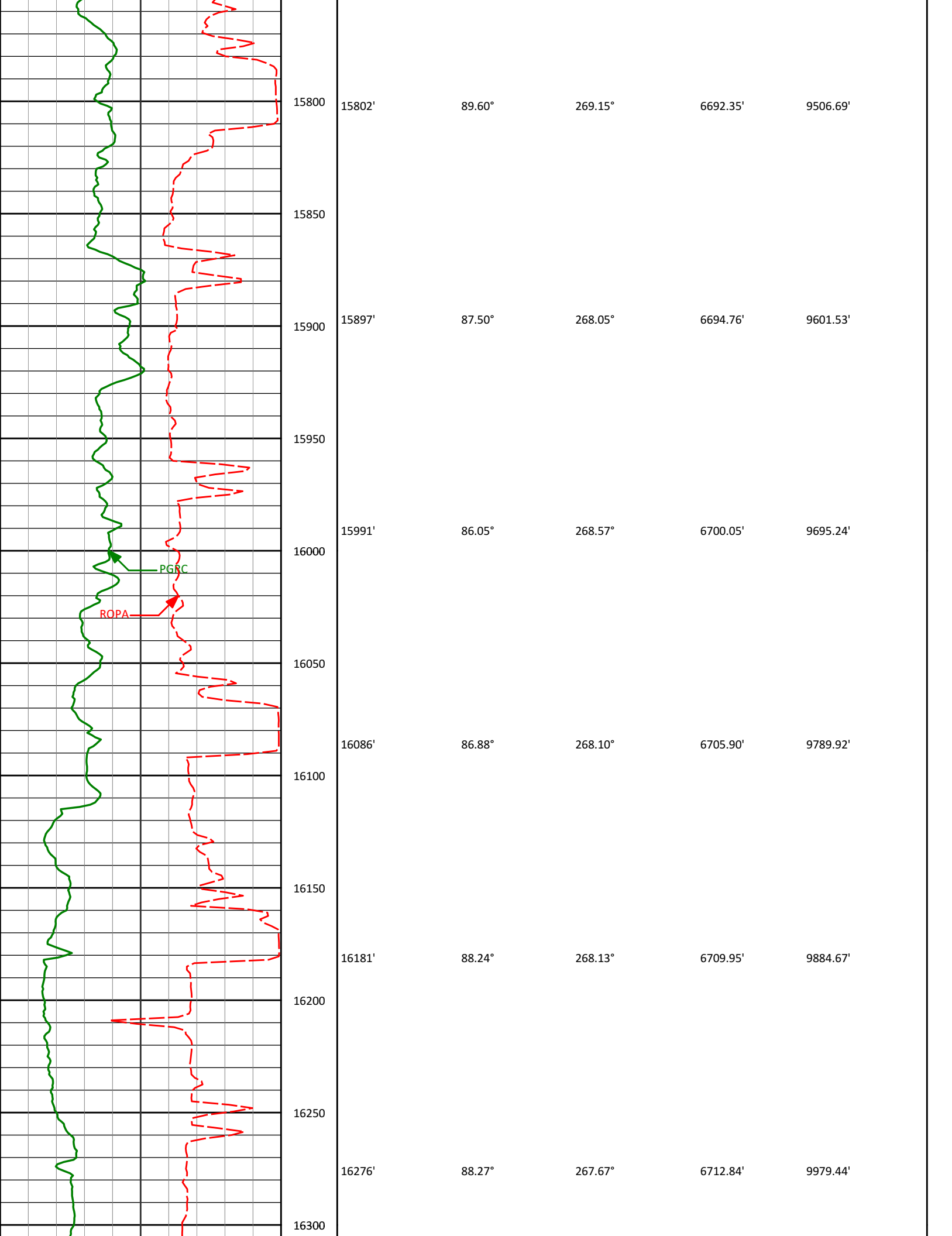
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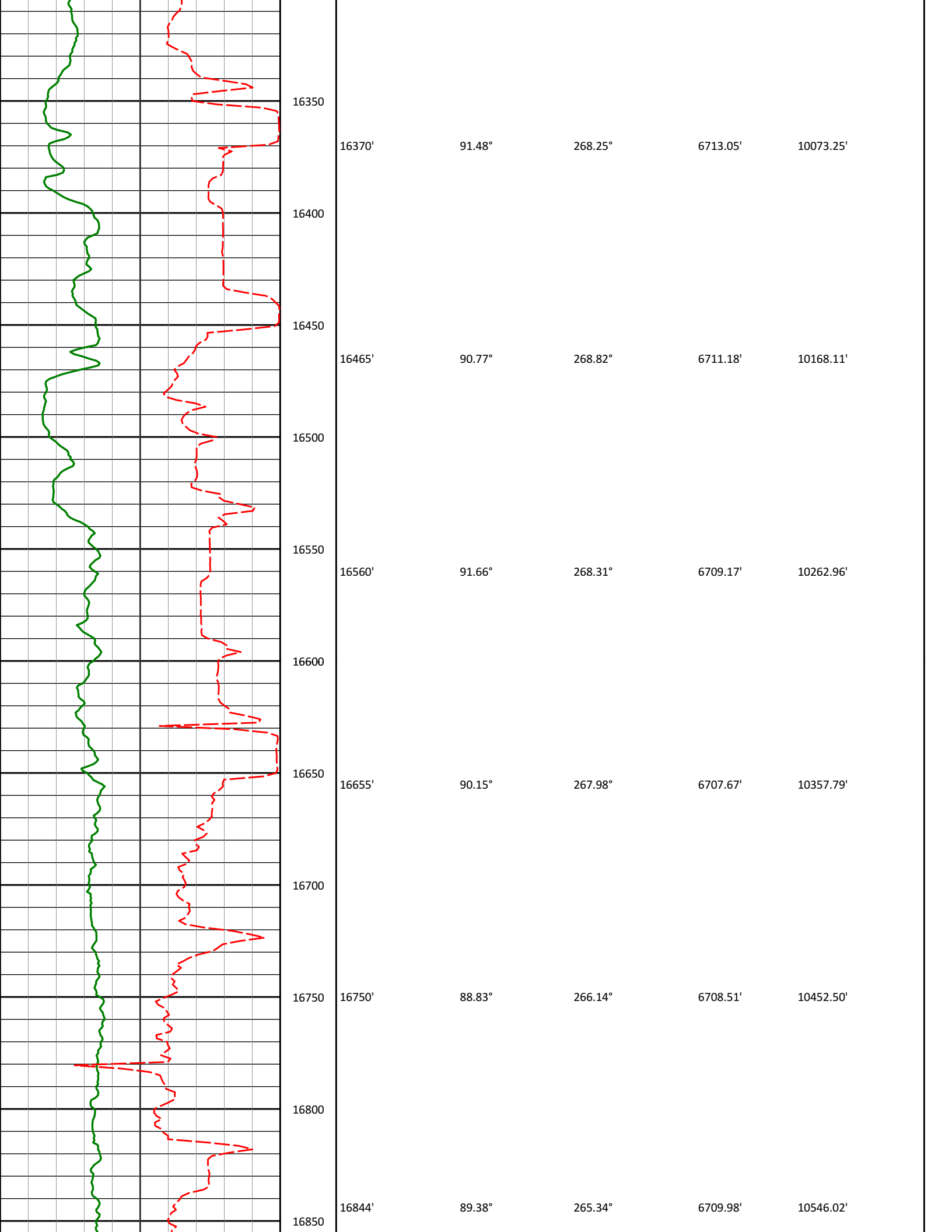
15150

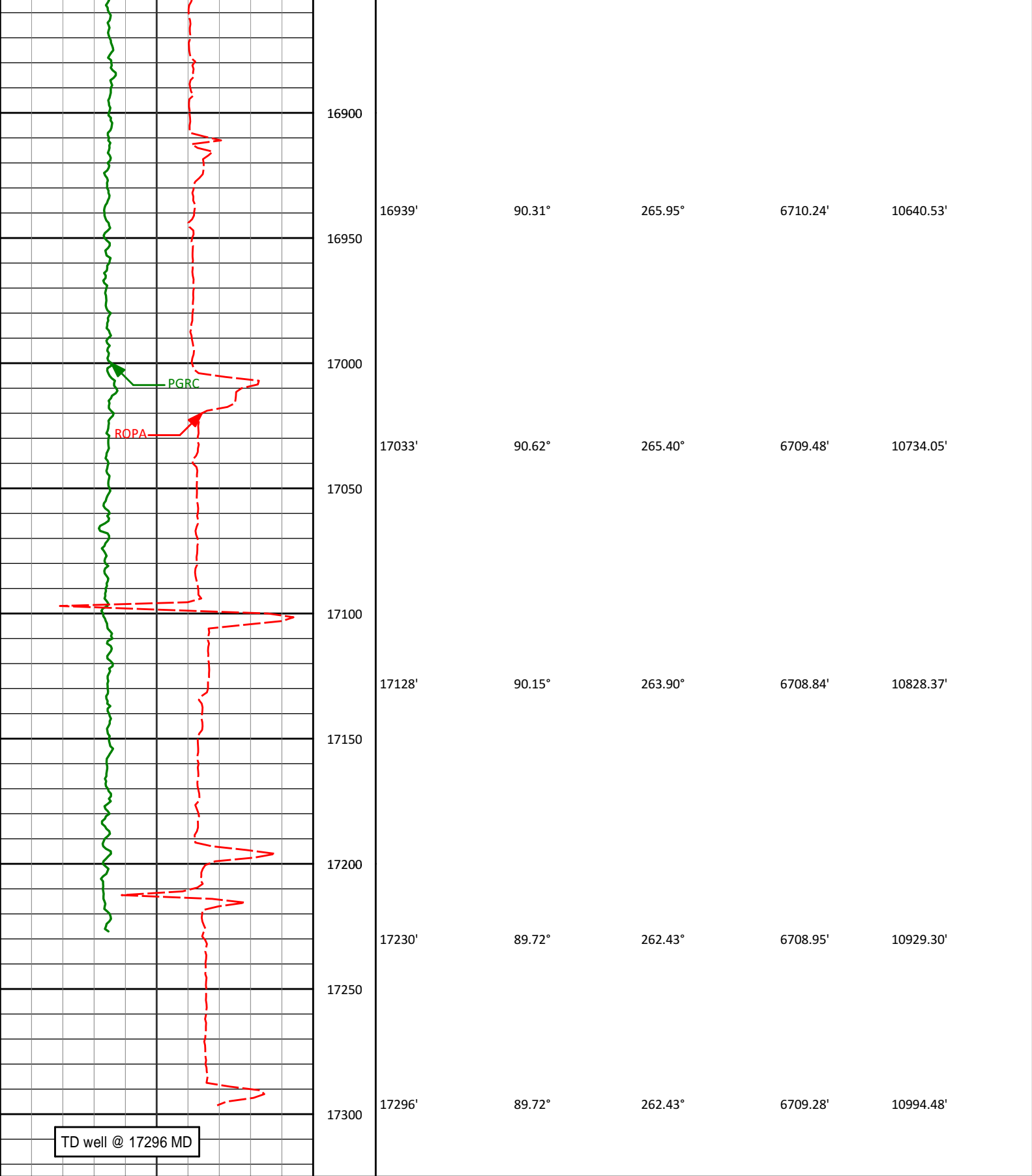
15139'	87.96°	267.06°	6707.85'	8846.16'
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15200





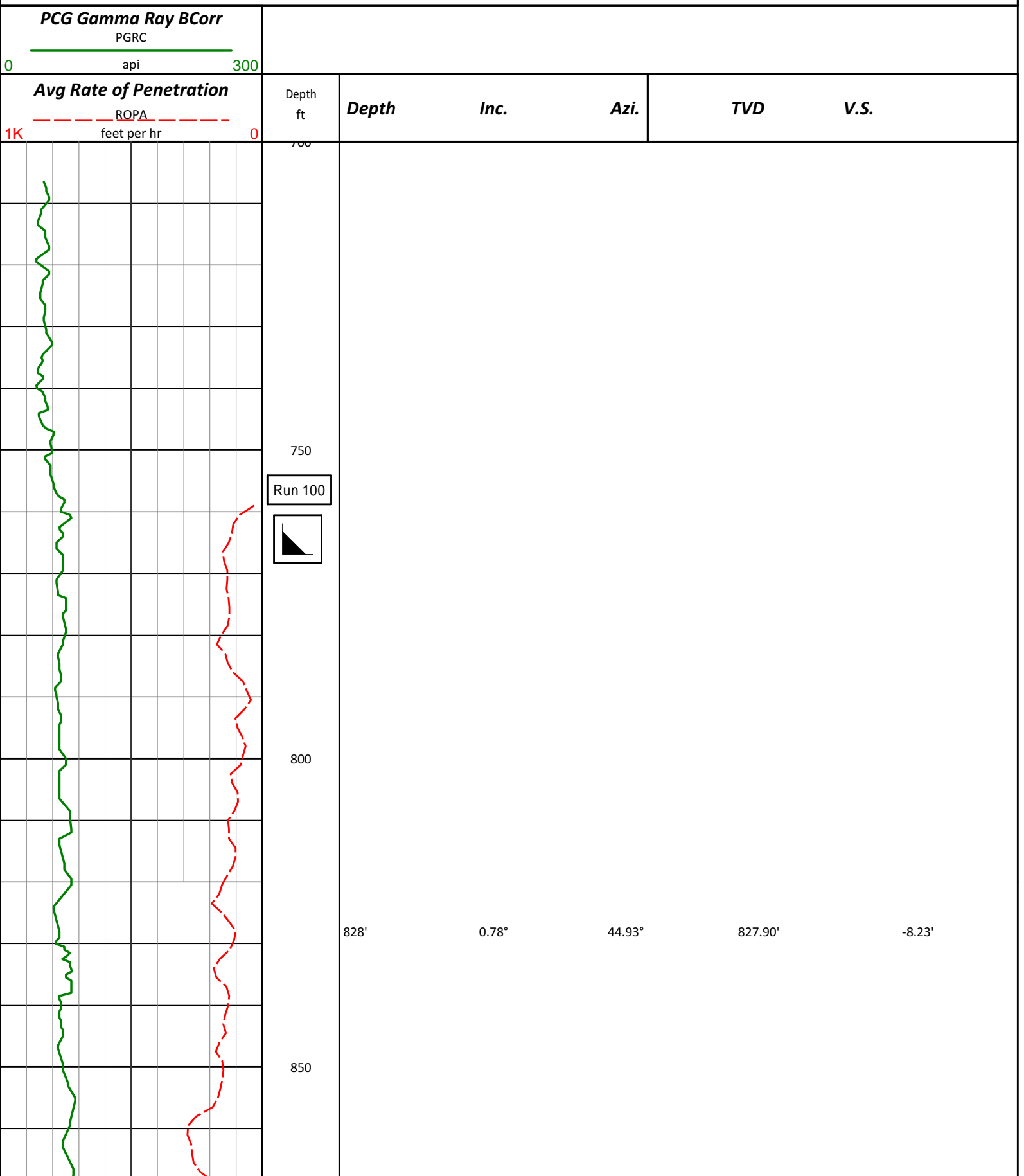


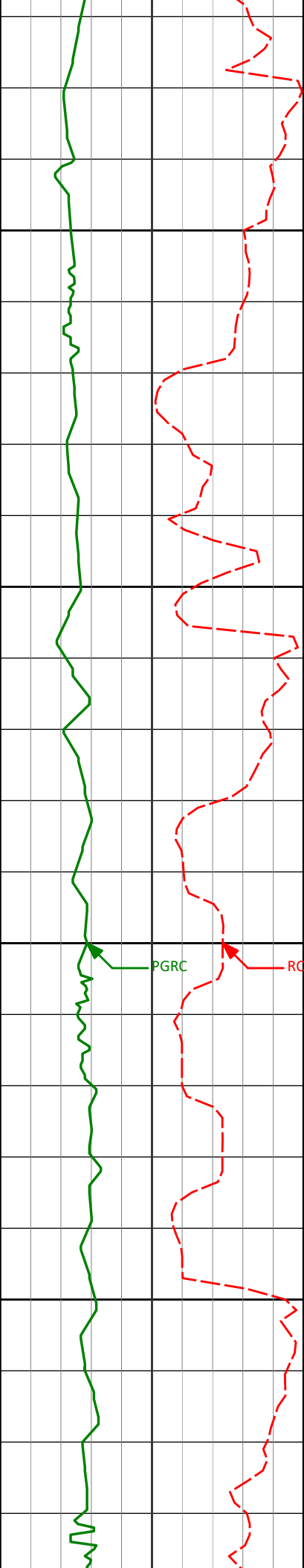


Avg Rate of Penetration ROPA feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
PCG Gamma Ray BCorr PGRC api							

MD Detail Log 1:240

Sec. 20-T6N-R62W





900

950

1000

1050

920'

1012'

0.66°

0.78°

43.17°

33.73°

919.89'

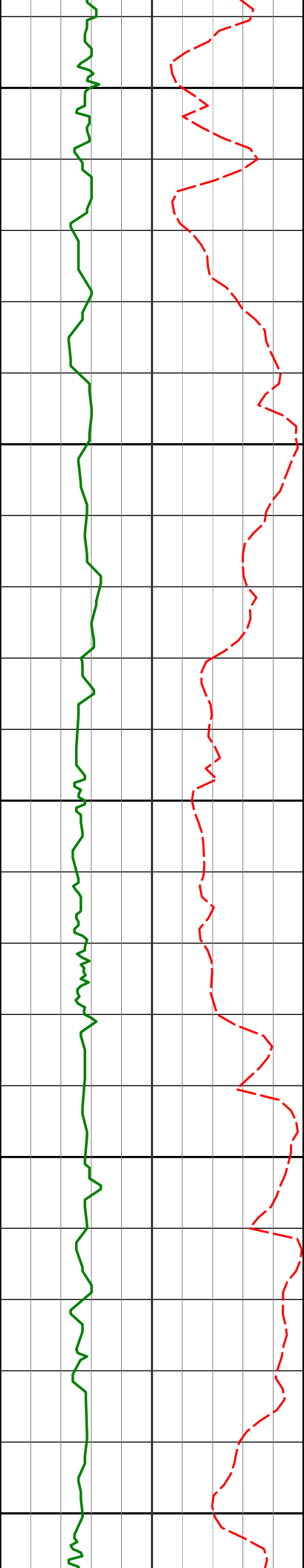
1011.88'

-9.01'

-9.70'

PGRC

ROPA



1100

1104'

0.73°

37.69°

1103.87'

-10.38'

1150

1200

1195'

0.85°

62.41°

1194.87'

-11.31'

200

1250

1300

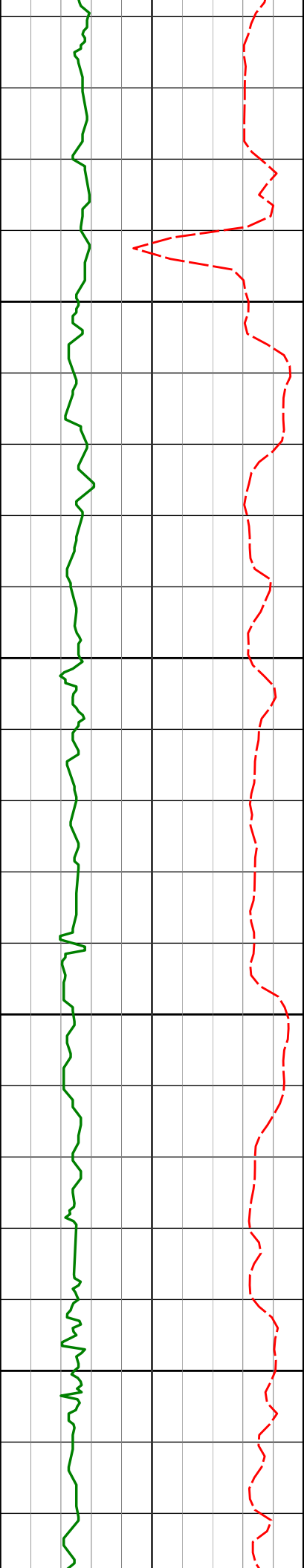
1301'

0.51°

270.35°

1300.86'

-11.53'



1350

1394'

0.58°

321.53°

1393.86'

-10.81'

1400

1450

1485'

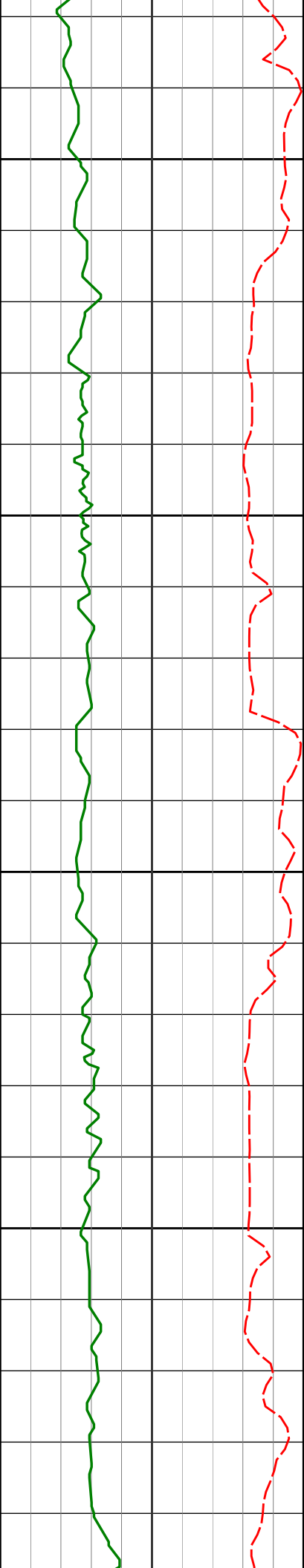
1.26°

302.17°

1484.85'

-9.66'

1500



1550

1577'

1.57°

256.77°

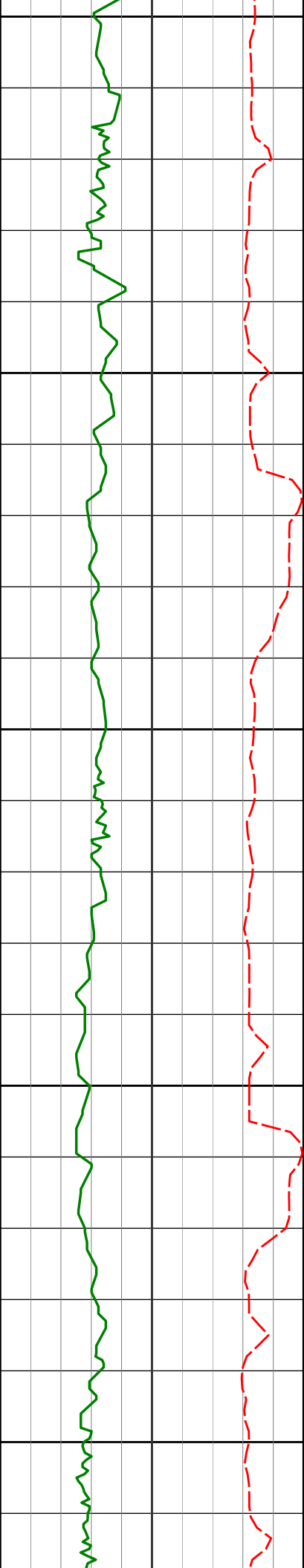
1576.82'

-7.57'

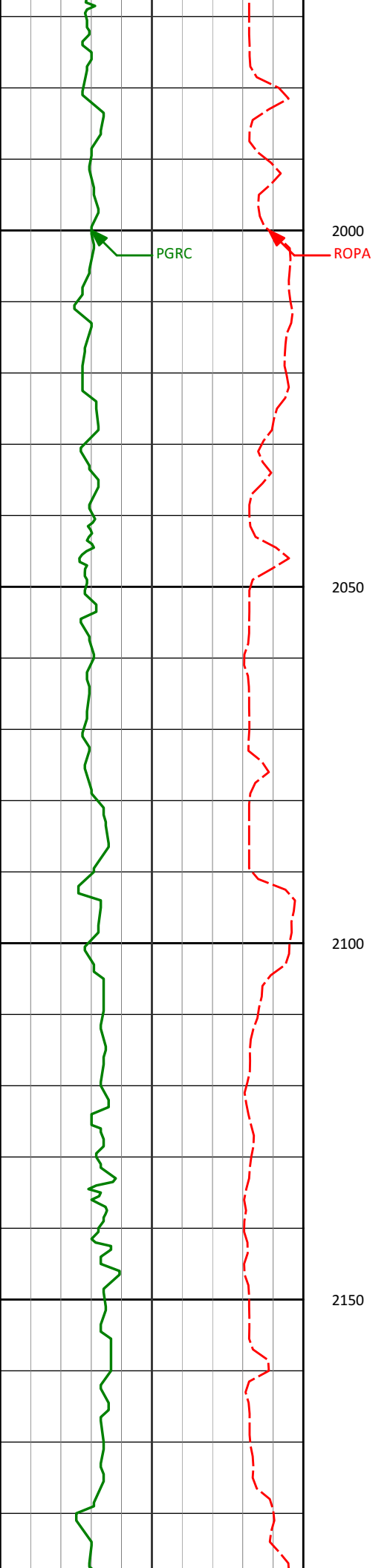
1600

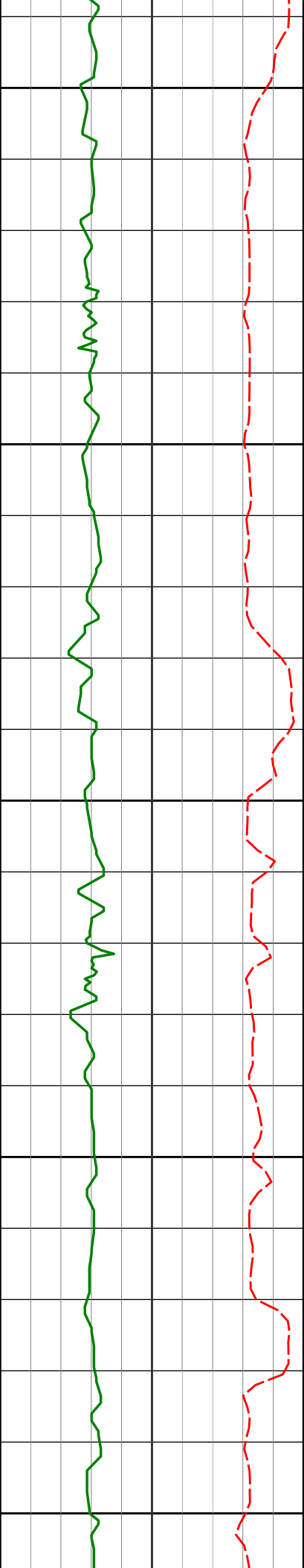
1650

1700



1750				
1760'	1.12°	275.65°	1759.77'	-3.36'
1800				
1850				
1852'	0.85°	285.63°	1851.76'	-1.80'
1900				
1943'	0.88°	303.81°	1942.75'	-0.55'
1950				





2200

2221'

0.29°

100.59°

2220.74'

-0.95'

2250

2300

2313'

0.22°

69.68°

2312.74'

-1.34'

2350

2400

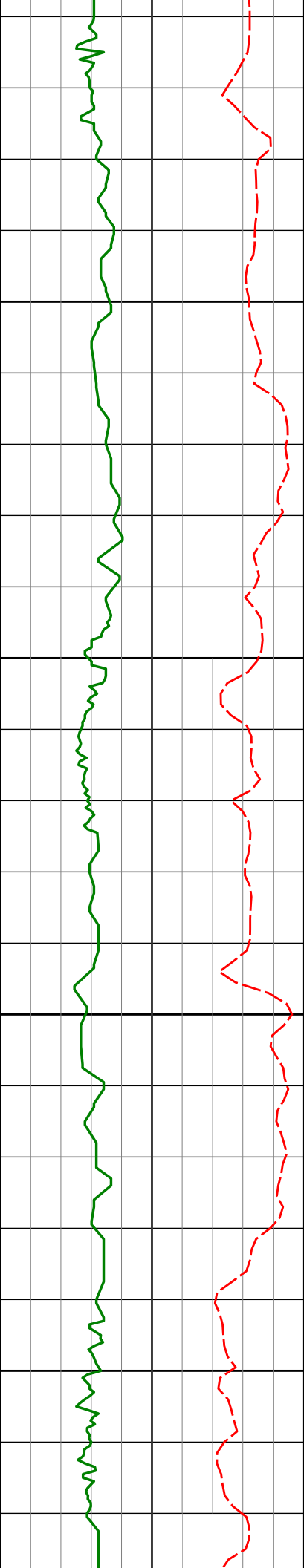
2405'

0.24°

36.81°

2404.74'

-1.61'



2450

2500

2550

2600

2497'

0.50°

6.03°

2496.74'

-1.76'

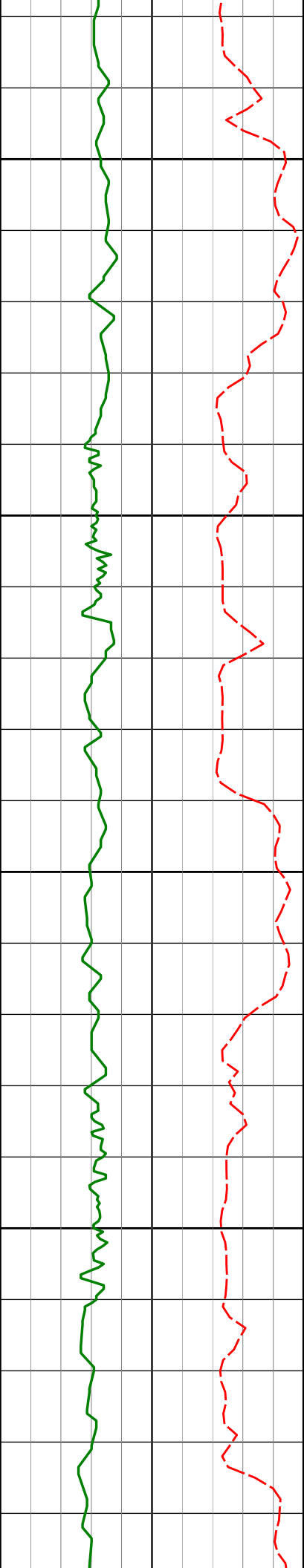
2590'

1.55°

351.19°

2589.72'

-1.57'



2650

2681'

2.92°

348.71°

2680.65'

-0.83'

2700

2750

2775'

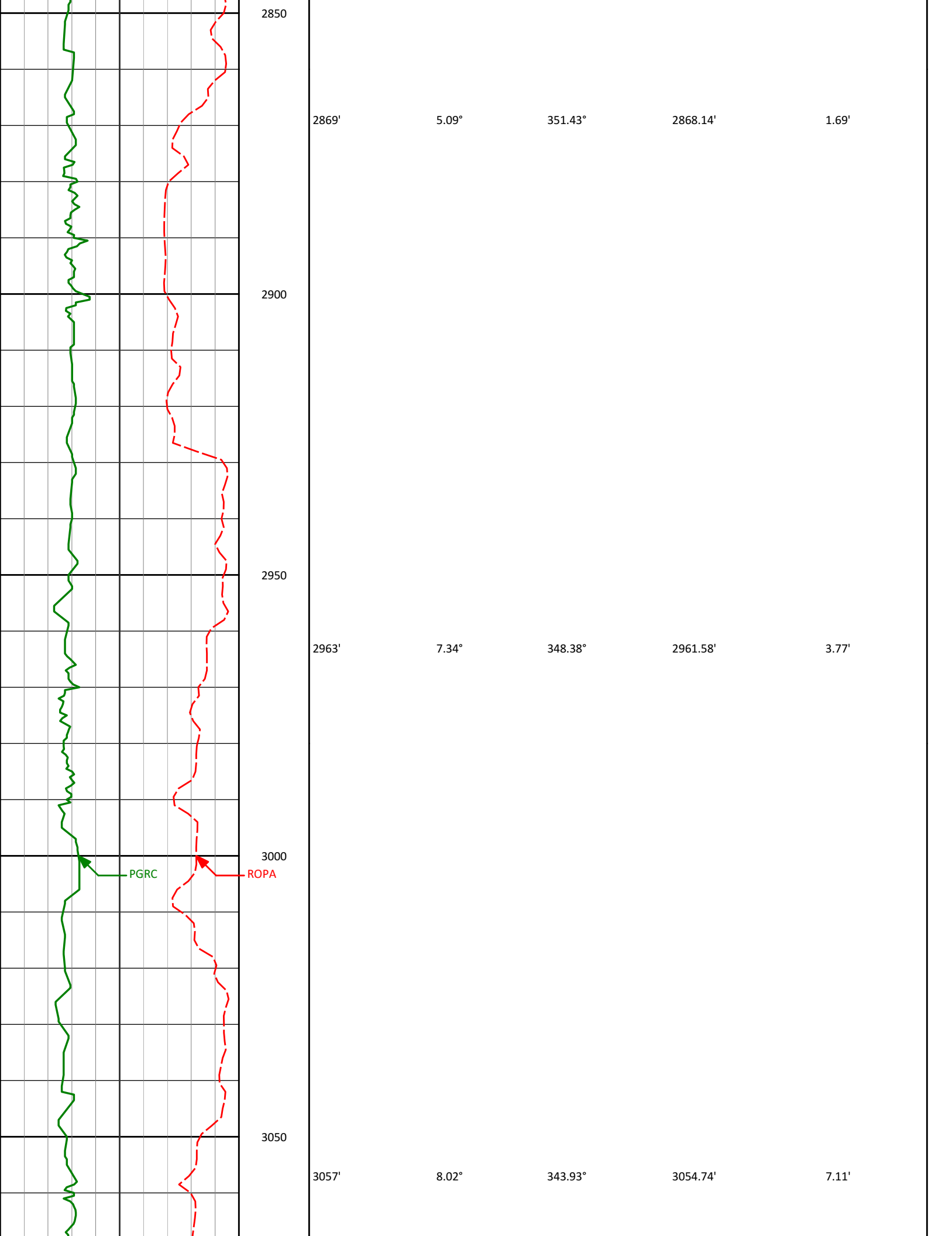
4.39°

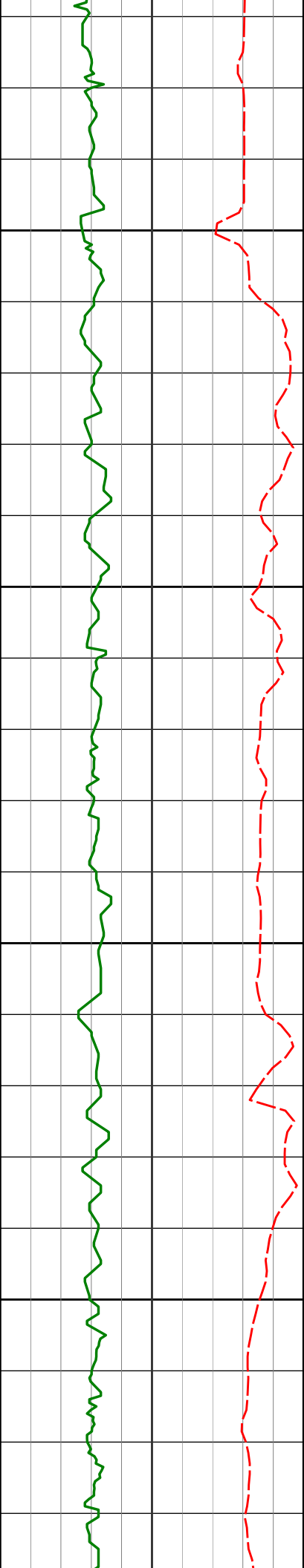
351.32°

2774.46'

0.33'

2800





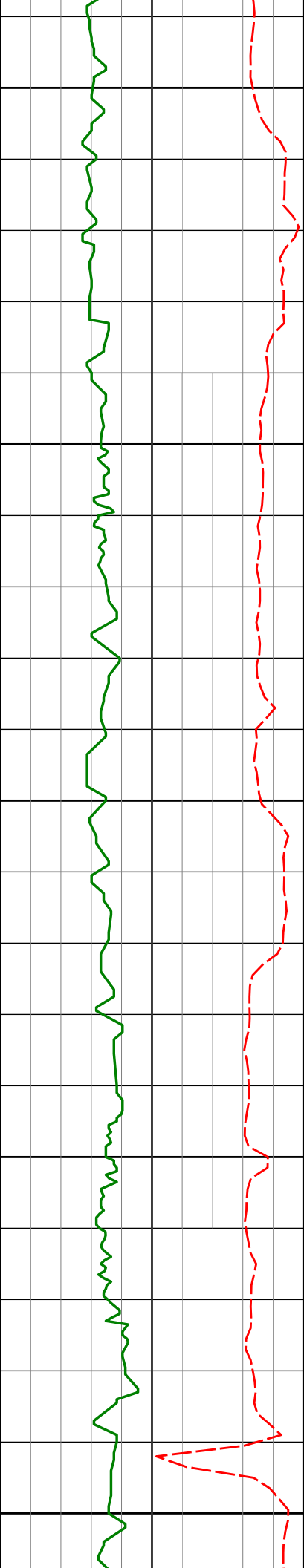
3100

3150

3200

3250

3152'	7.54°	345.10°	3148.86'	10.86'
3247'	8.23°	344.23°	3242.96'	14.63'



3300

3350

3400

3450

3500

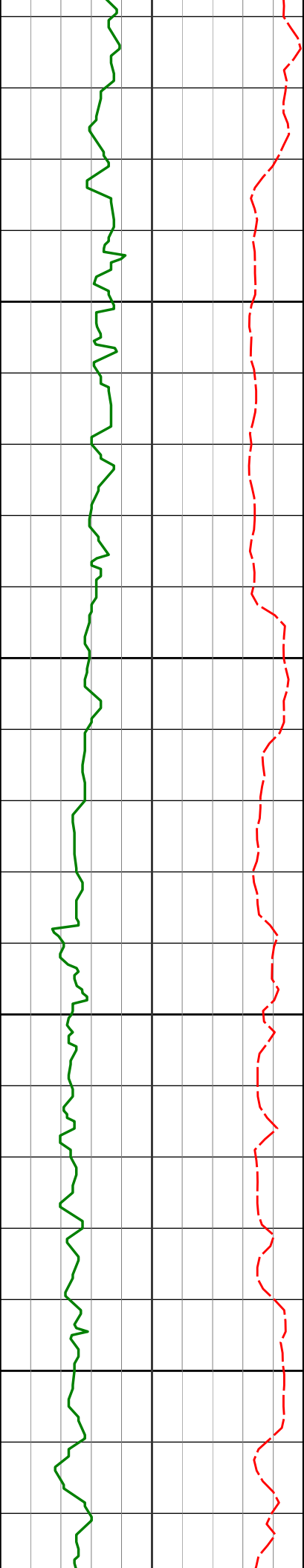
3342'

8.98°

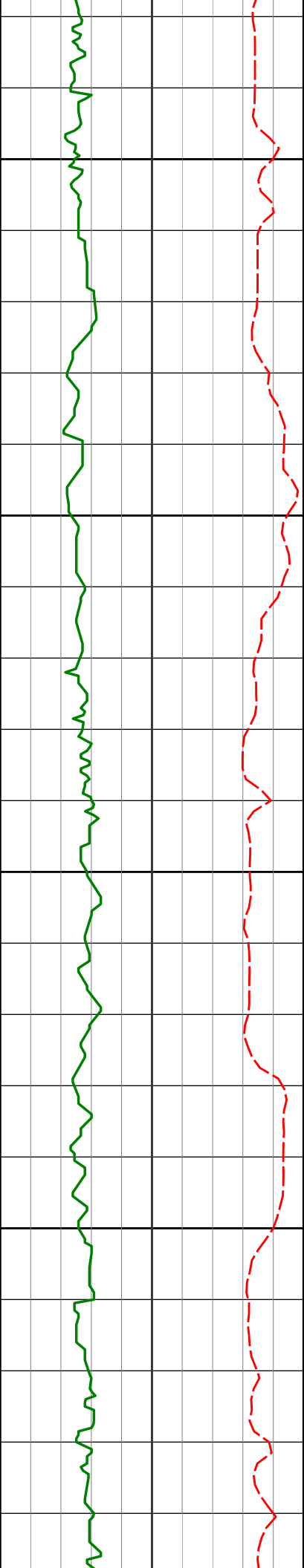
343.28°

3336.89'

18.95'



3531'	8.67°	338.50°	3523.66'	29.11'
3550				
3600				
3626'	8.83°	336.83°	3617.55'	34.95'
3650				
3700				
3721'	8.73°	332.52°	3711.44'	41.47'



3750

3800

3850

3900

3815'

8.75°

337.12°

3804.35'

47.87'

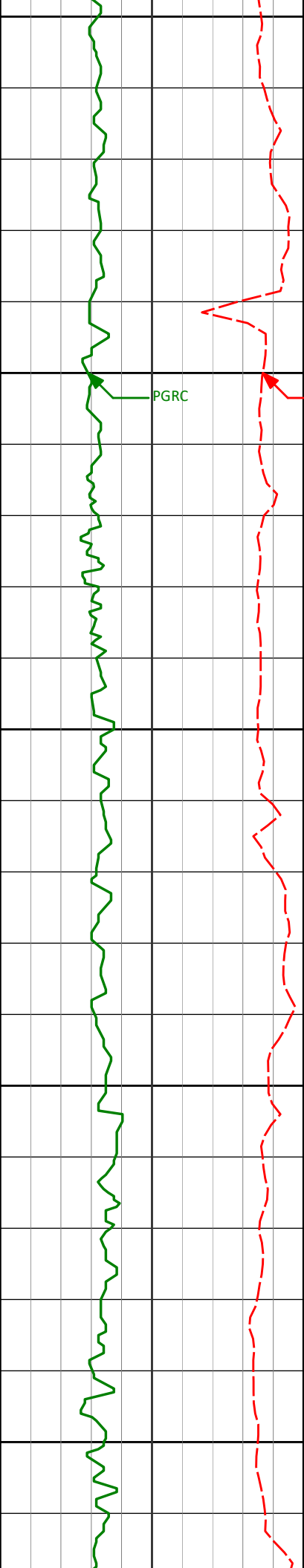
3910'

8.97°

336.04°

3898.22'

54.03'



3950

4000

4050

4100

4150

PGRC

ROPA

4005'

8.54°

336.57°

3992.11'

60.18'

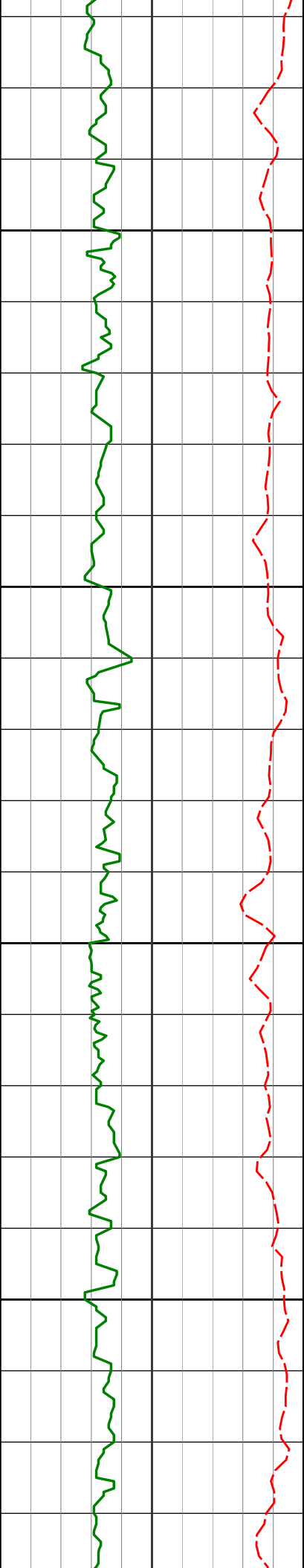
4100'

7.98°

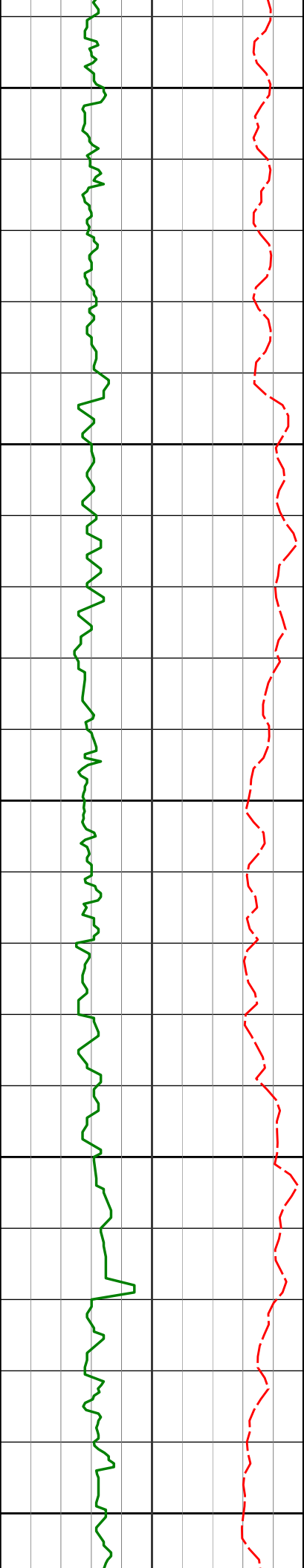
335.59°

4086.12'

66.02'



4195'	7.69°	336.55°	4180.24'	71.58'
4200				
4250				
4289'	6.98°	335.71°	4273.47'	76.71'
4300				
4350				
4384'	6.85°	344.12°	4367.78'	80.90'



4400

4450

4500

4550

4600

4479'

7.74°

339.92°

4462.01'

84.94'

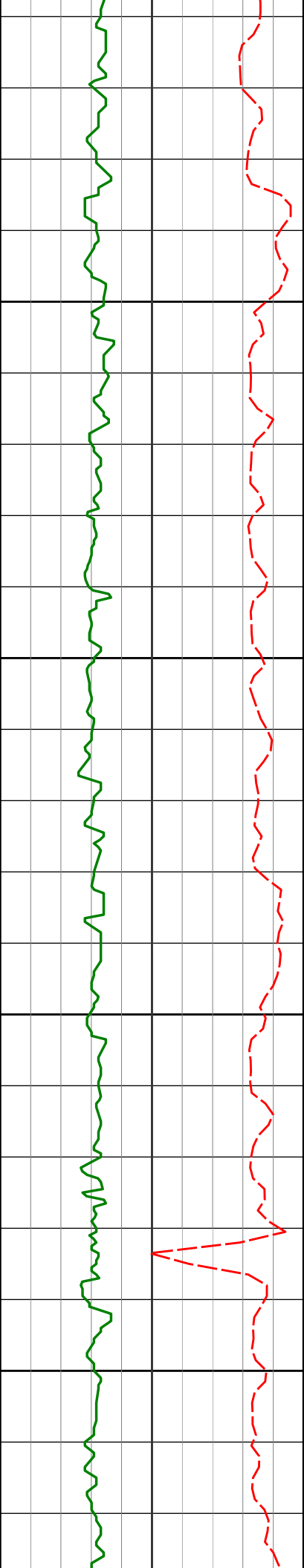
4574'

8.62°

345.01°

4556.04'

89.31'



4650

4669'

8.33°

346.59°

4650.00'

93.09'

4700

4750

4763'

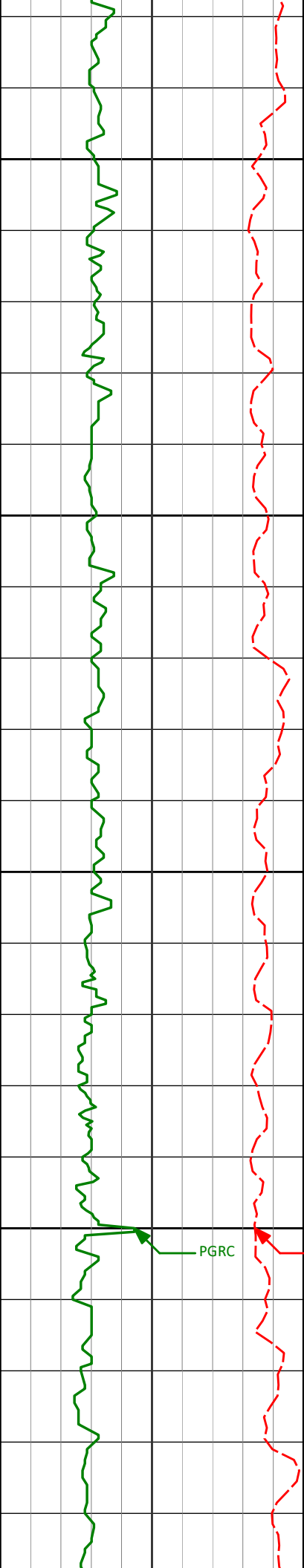
8.39°

347.78°

4743.01'

96.46'

4800



4850

4858'

7.90°

348.57°

4837.05'

99.55'

4900

4950

4953'

6.93°

348.26°

4931.25'

102.32'

5000

PGRC

ROPA

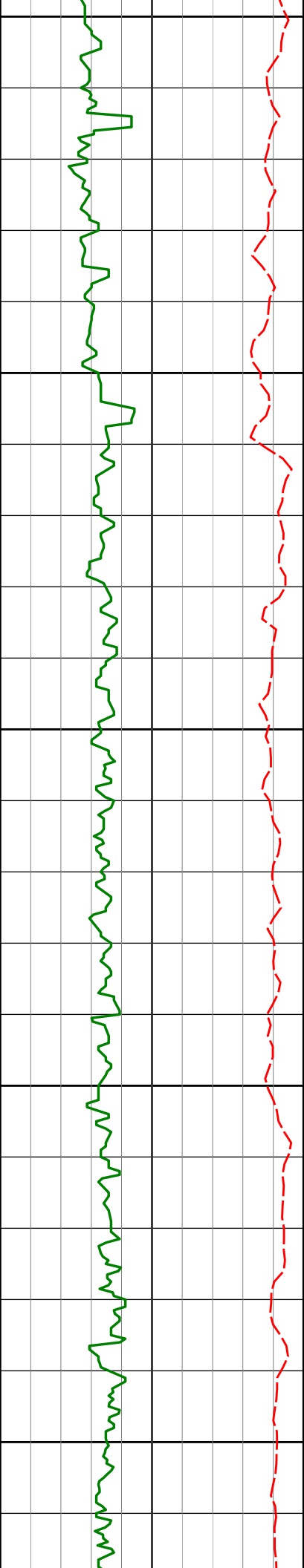
5010'

9.57°

351.30°

5025.30'

104.60'



5050

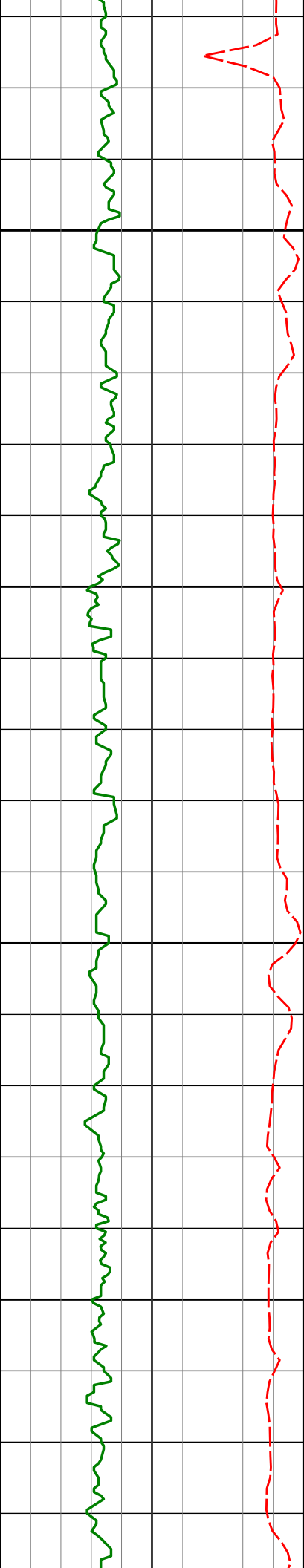
5100

5150

5200

5250

5048'	8.57°	351.29°	5025.38'	104.88'
5142'	7.45°	349.53°	5118.46'	107.37'
5237'	5.67°	345.61°	5212.84'	109.93'



5300

5332'

6.33°

338.17°

5307.32'

113.28'

5350

5400

5427'

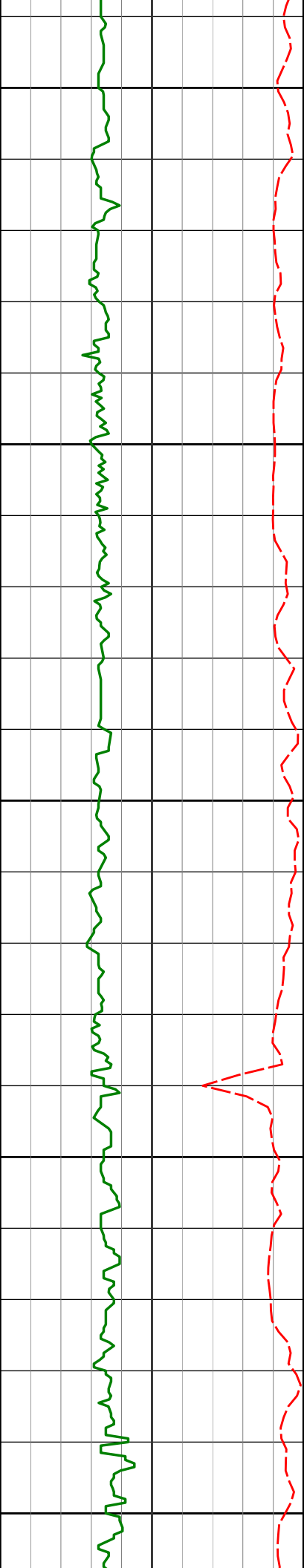
6.55°

342.76°

5401.72'

117.09'

5450



5500

5521'

7.31°

345.24°

5495.03'

120.48'

5550

5600

5616'

7.78°

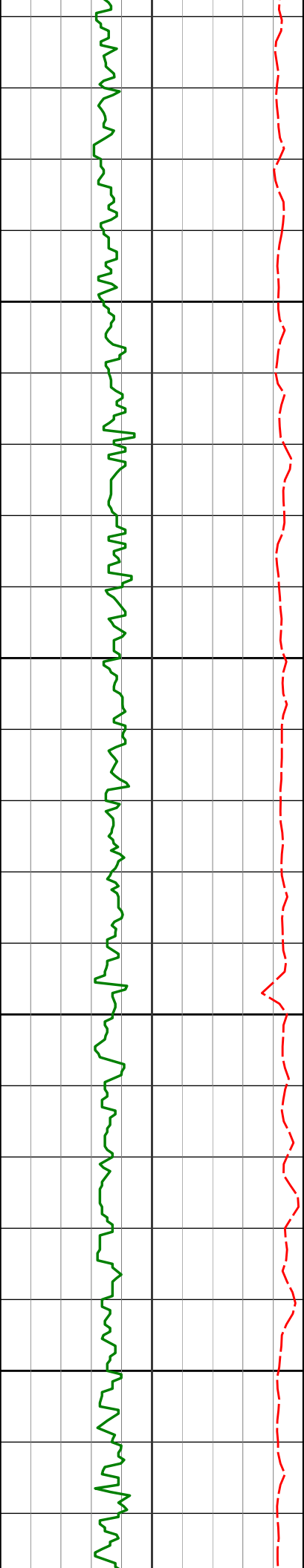
351.34°

5589.21'

123.30'

5650

5700



5711'

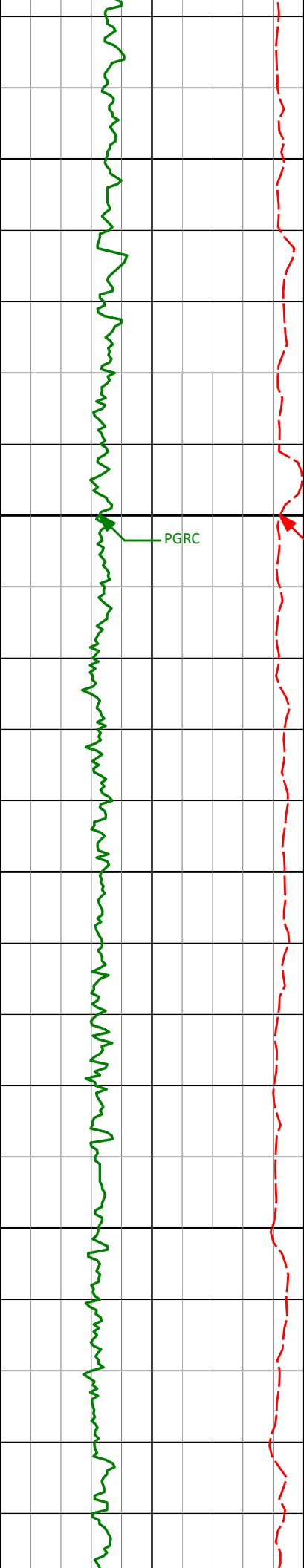
5750

5800

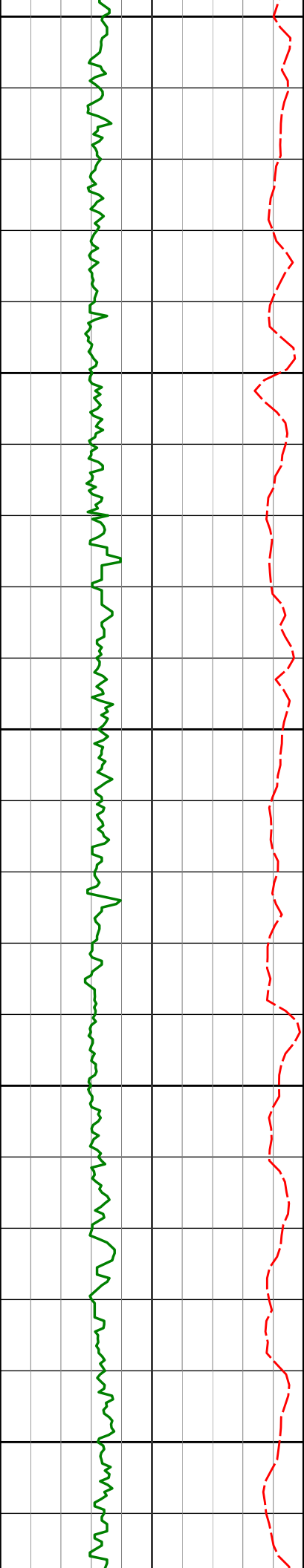
5850

5900

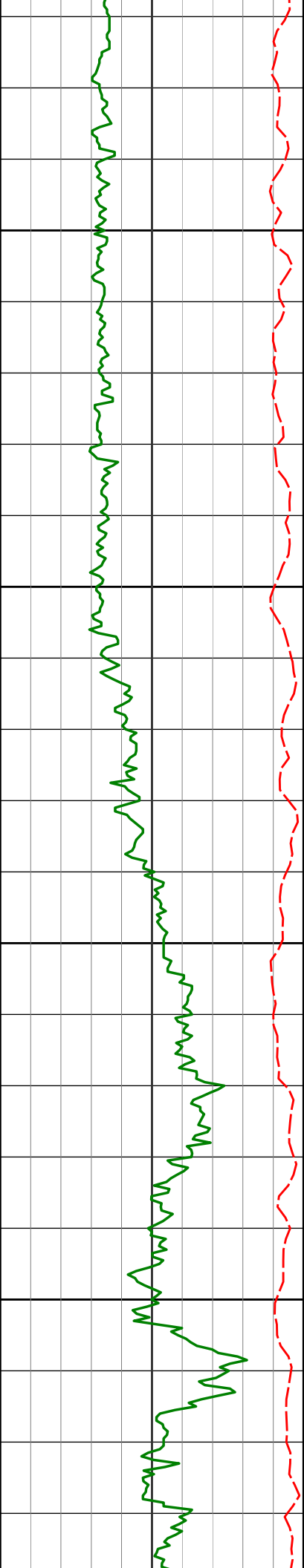
5711'	9.15°	352.44°	5683.17'	125.61'
5806'	7.60°	349.78°	5777.16'	128.07'
5901'	7.06°	339.57°	5871.38'	131.52'



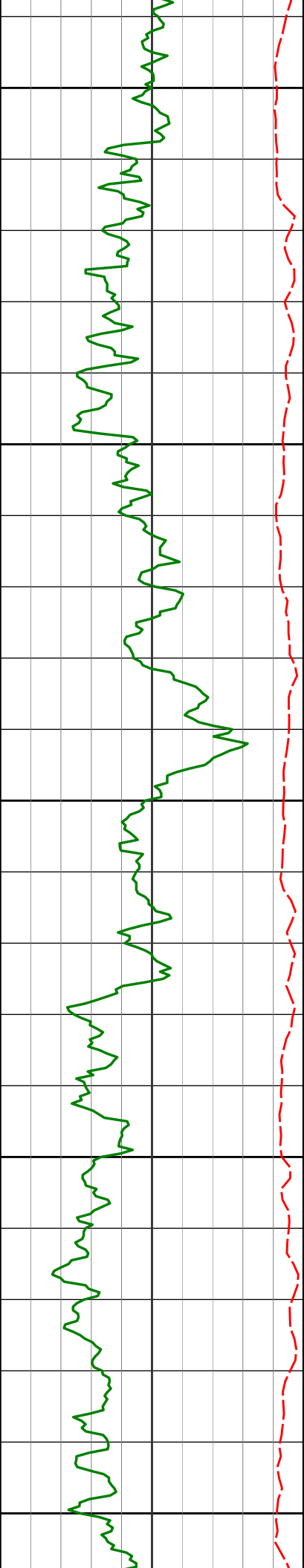
5950				
5996'	6.25°	338.52°	5965.74'	135.71'
6000				
6044'	7.85°	320.94°	6013.38'	138.86'
6050				
6090'	13.64°	319.95°	6058.56'	144.50'
6100				
6138'	18.64°	317.79°	6104.65'	153.55'



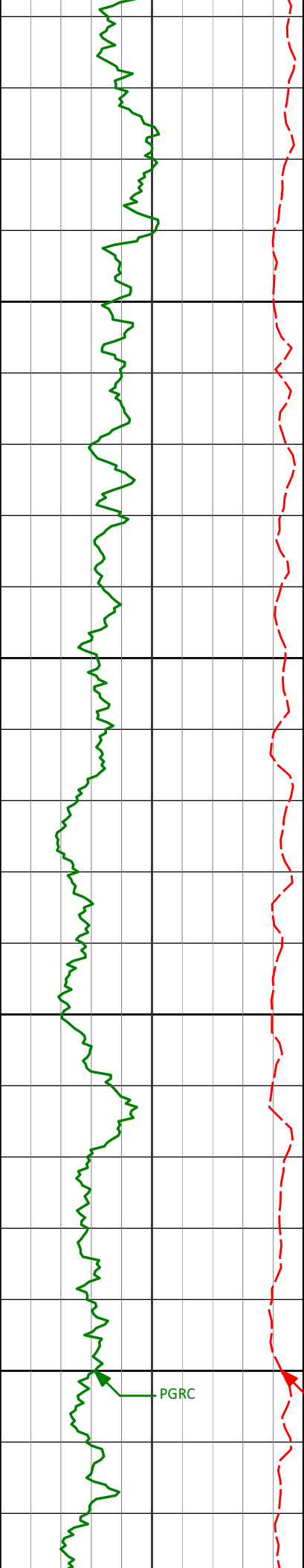
6150				
6185'	21.33°	311.50°	6148.82'	165.29'
6200				
6233'	23.92°	301.57°	6193.14'	180.39'
6250				
6280'	26.30°	291.12°	6235.72'	198.45'
6300				
6328'	27.29°	281.76°	6278.58'	219.30'
6350				



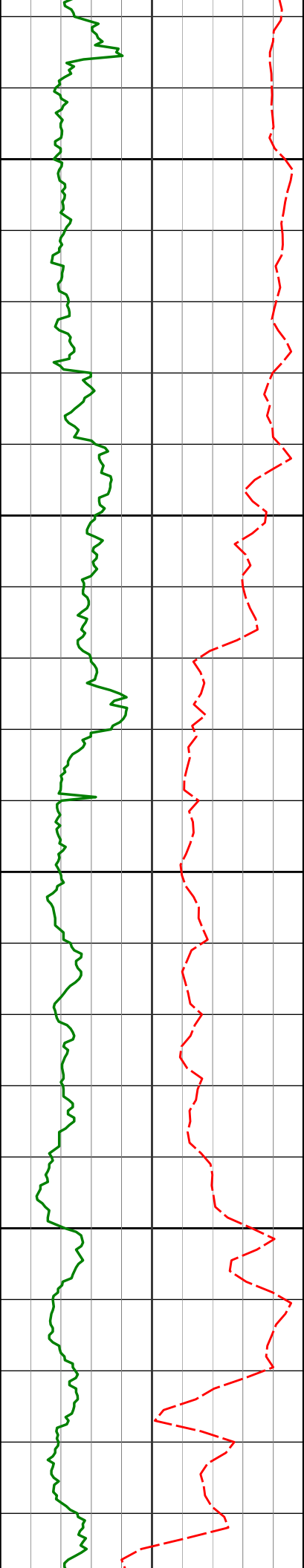
6400	6375'	28.61°	273.41°	6320.12'	241.16'
6450	6423'	28.83°	275.05°	6362.21'	264.20'
6500	6470'	31.10°	273.90°	6402.93'	287.64'
6550	6518'	36.17°	271.66°	6442.88'	314.21'
	6565'	41.27°	270.09°	6479.54'	343.59'



6600					
6613'	45.82°	267.16°	6514.33'	376.60'	
6650					
6659'	50.39°	265.31°	6545.04'	410.69'	
6700					
6707'	55.71°	264.99°	6573.88'	448.80'	
6750					
6754'	59.97°	266.42°	6598.89'	488.38'	
6800					
6802'	64.64°	268.02°	6621.20'	530.75'	



6850	6849'	69.45°	268.94°	6639.52'	573.96'
6900	6897'	72.77°	269.64°	6655.06'	619.33'
6950	6944'	75.95°	268.69°	6667.73'	664.55'
7000	6992'	80.68°	267.04°	6677.45'	711.45'



7030'

7050

7100

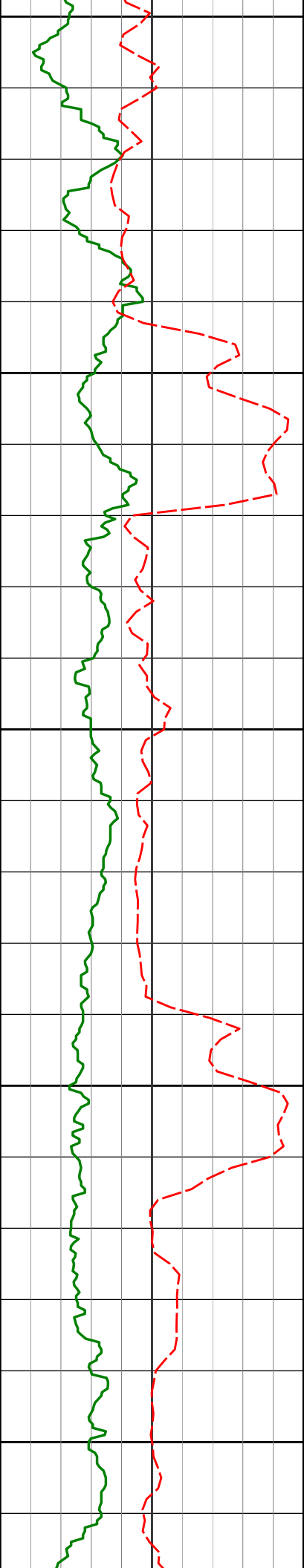
7137'

7150

7200

7231'

7030'	83.27°	265.87°	6682.75'	748.93'
7137'	86.76°	269.66°	6692.05'	855.27'
7231'	88.12°	267.80°	6696.25'	949.06'



7250

7300

7350

7400

7450

7326'

89.29°

268.31°

6698.40'

1043.87'

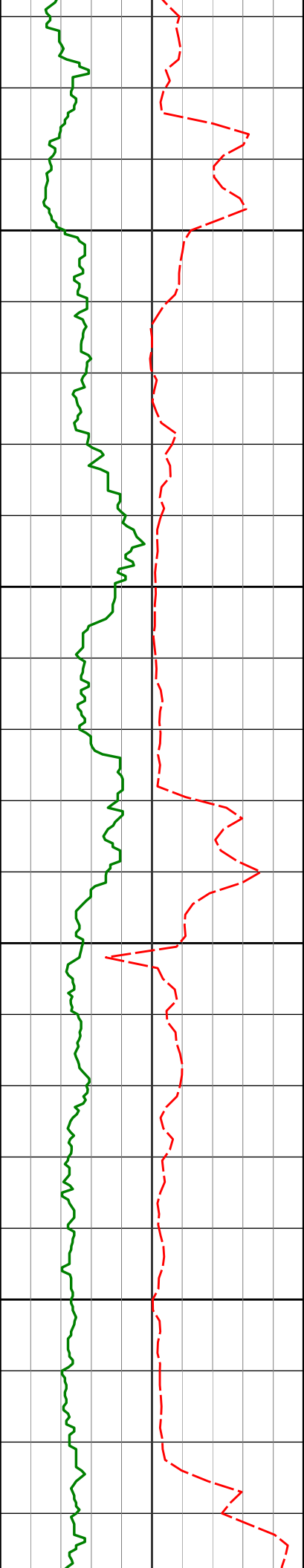
7421'

91.05°

268.84°

6698.12'

1138.74'



7500

7515'

91.26°

268.92°

6696.22'

1232.63'

7550

7600

7610'

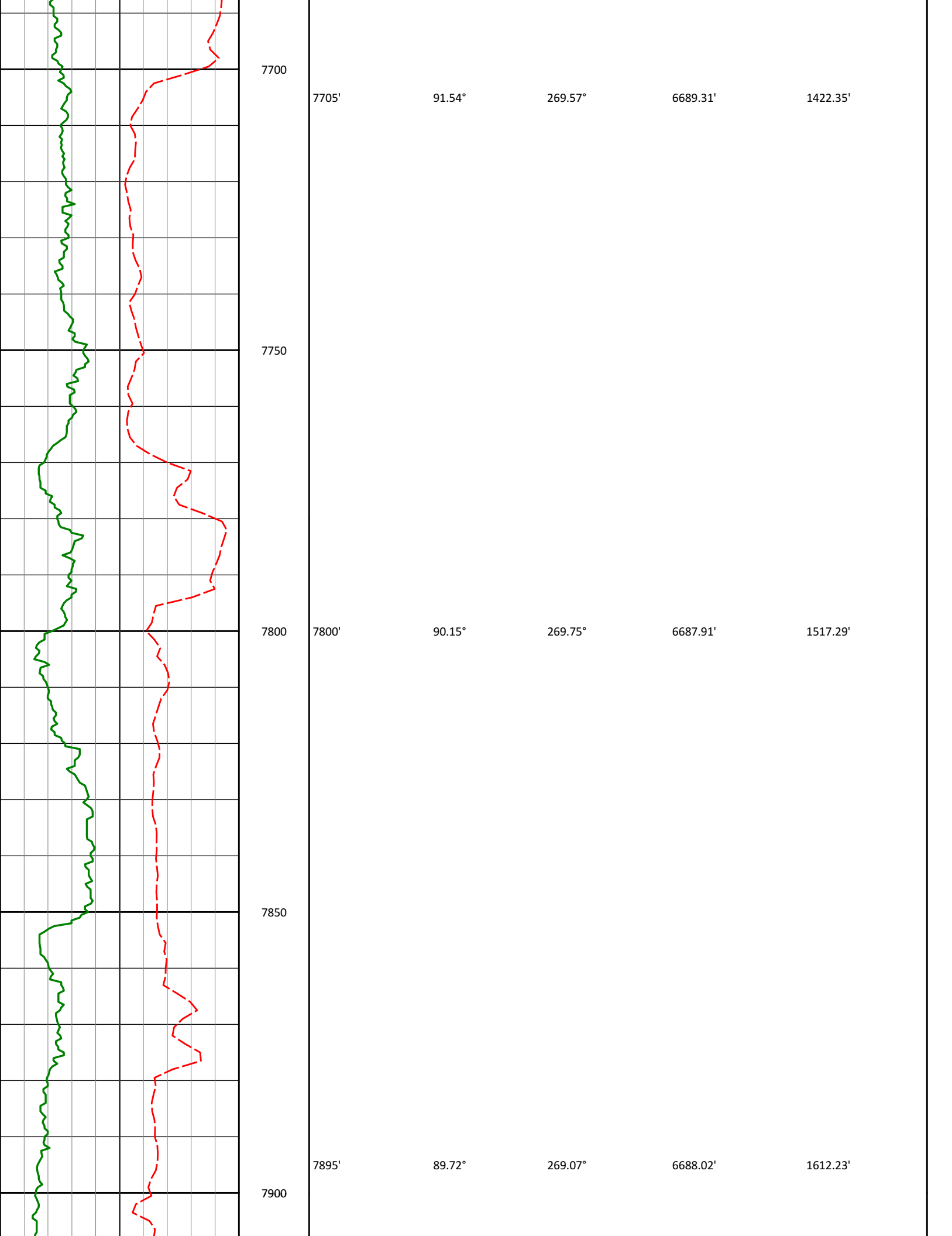
92.77°

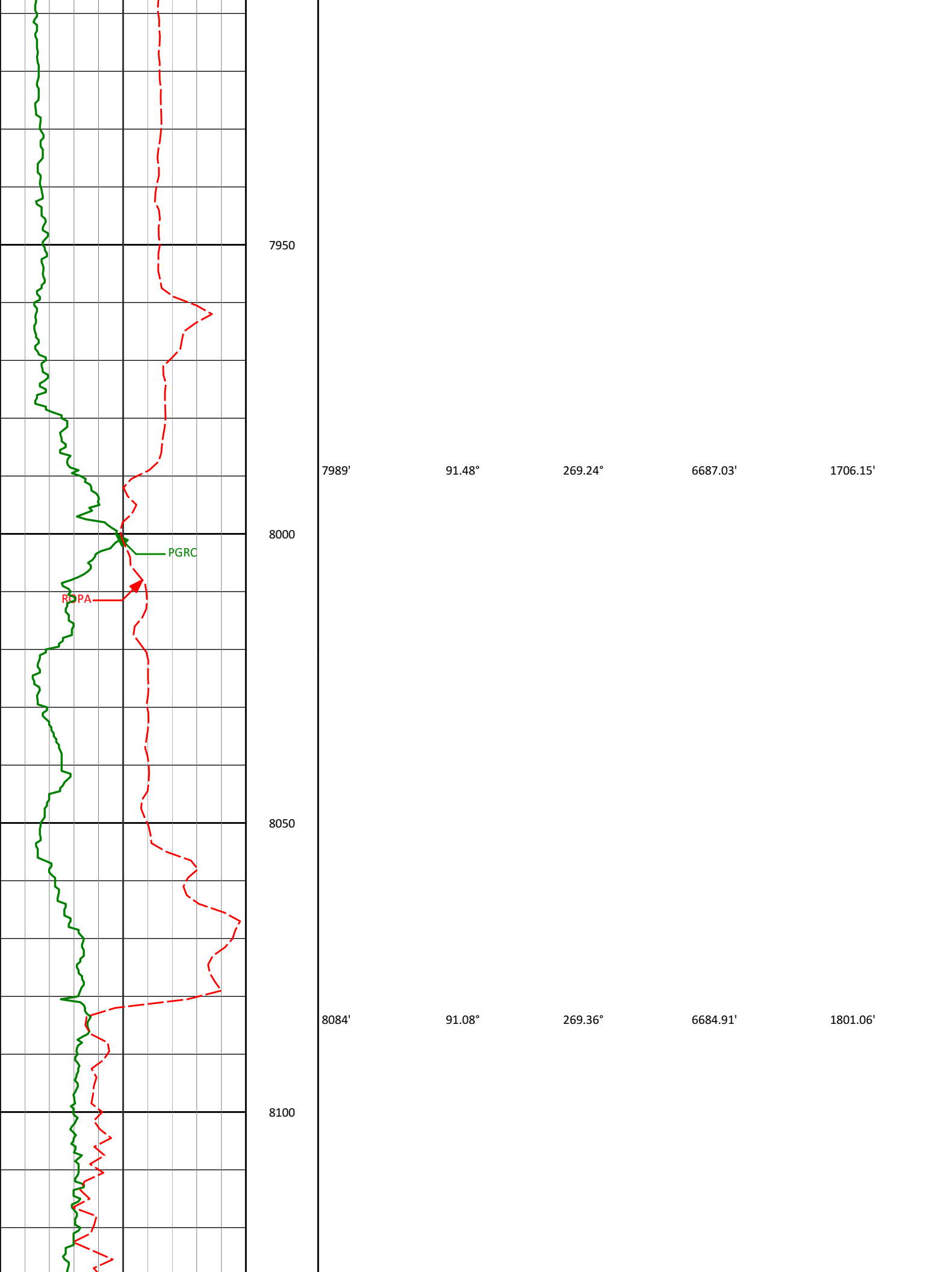
269.27°

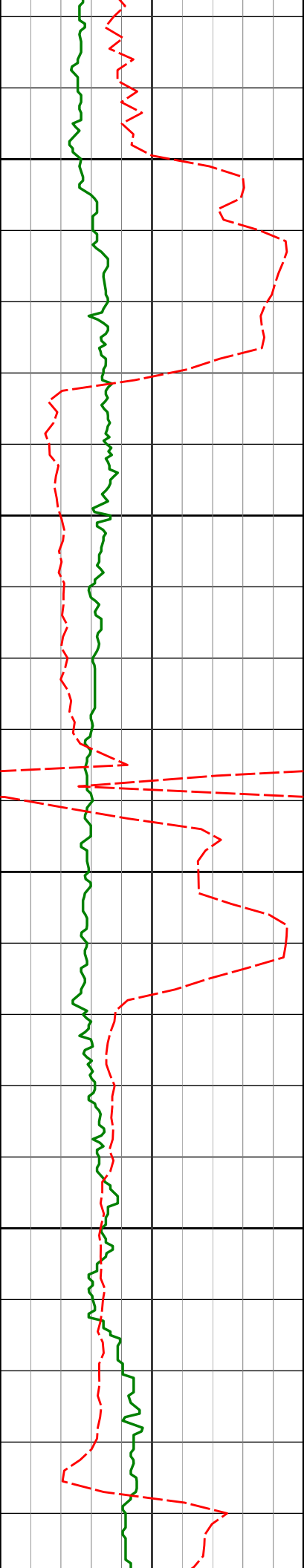
6692.88'

1327.48'

7650







8150

8179'

90.00°

268.37°

6684.01'

1895.95'

8200

8250

8273'

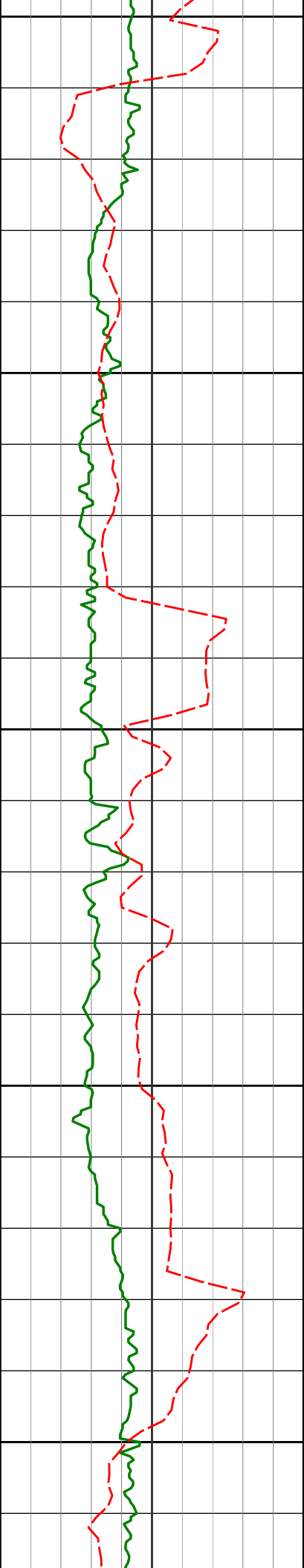
88.64°

267.55°

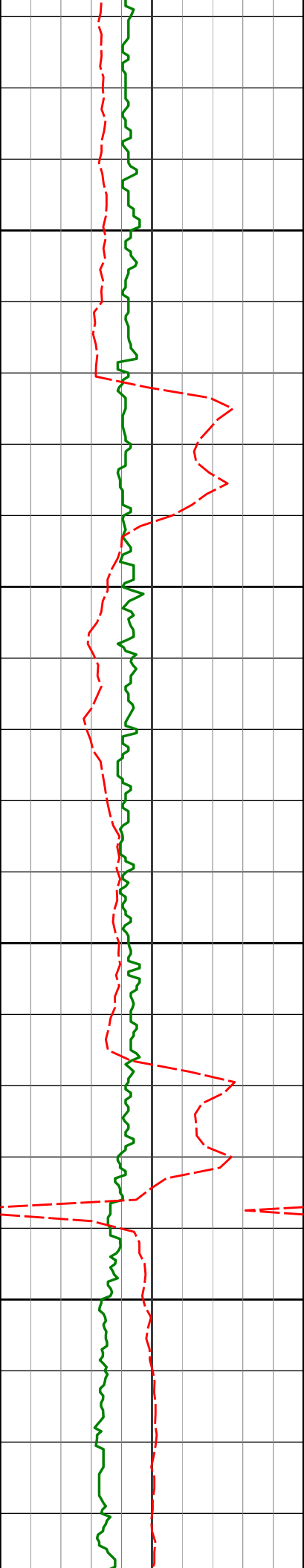
6685.13'

1989.77'

8300



8350					
8368'	88.74°	267.23°	6687.30'	2084.50'	
8400					
8450					
8463'	88.98°	266.87°	6689.19'	2179.20'	
8500					
8550					
8557'	89.20°	267.77°	6690.68'	2272.94'	



8600

8650

8700

8750

8652'

89.29°

267.49°

6691.94'

2367.72'

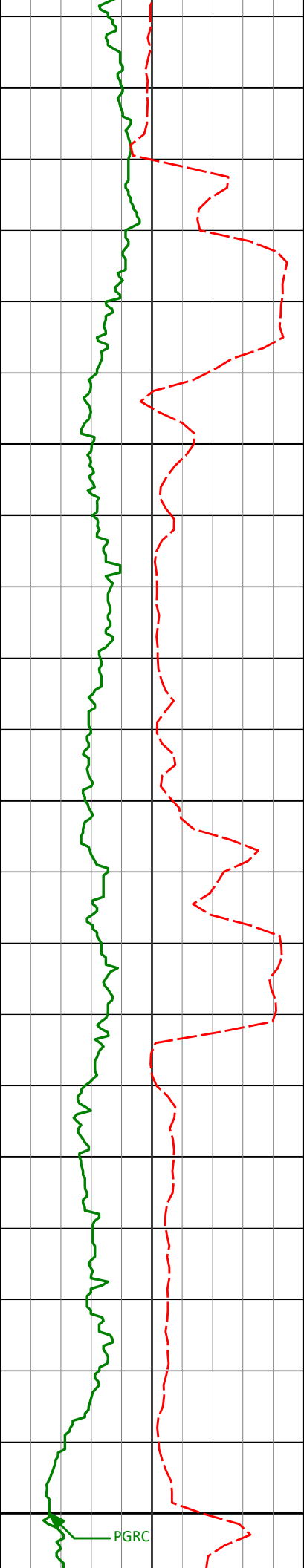
8747'

90.46°

267.82°

6692.14'

2462.51'



8800

8842'

88.98°

268.19°

6692.61'

2557.34'

8850

8900

8950

8937'

89.60°

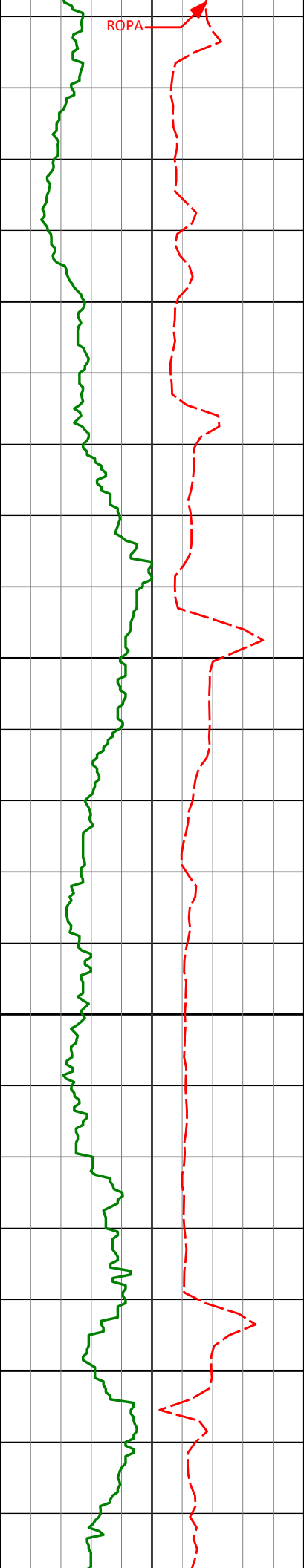
269.15°

6693.79'

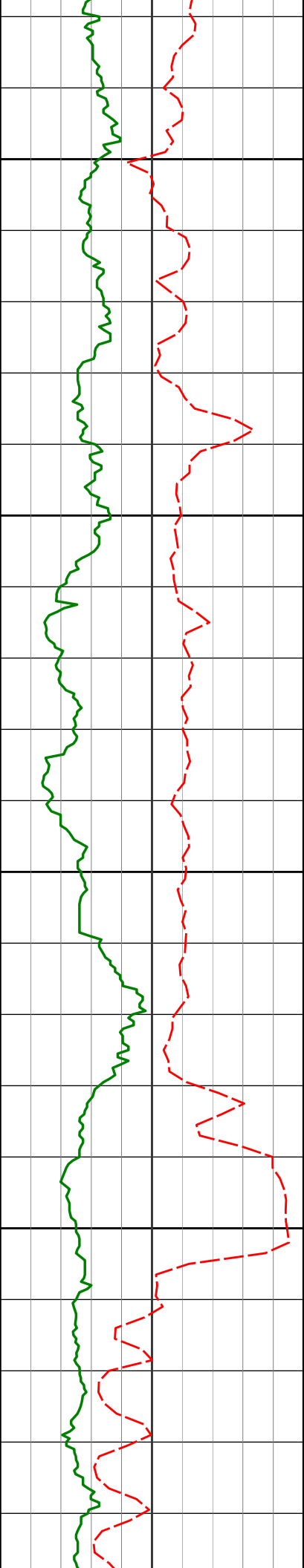
2652.21'

9000

PGRC



	9032'	89.75°	269.25°	6694.32'	2747.14'
9050					
9100					
	9127'	89.69°	268.76°	6694.79'	2842.05'
9150					
9200					
	9221'	89.20°	268.99°	6695.70'	2935.95'



9250

9300

9350

9400

9316'

88.49°

269.19°

6697.61'

3030.85'

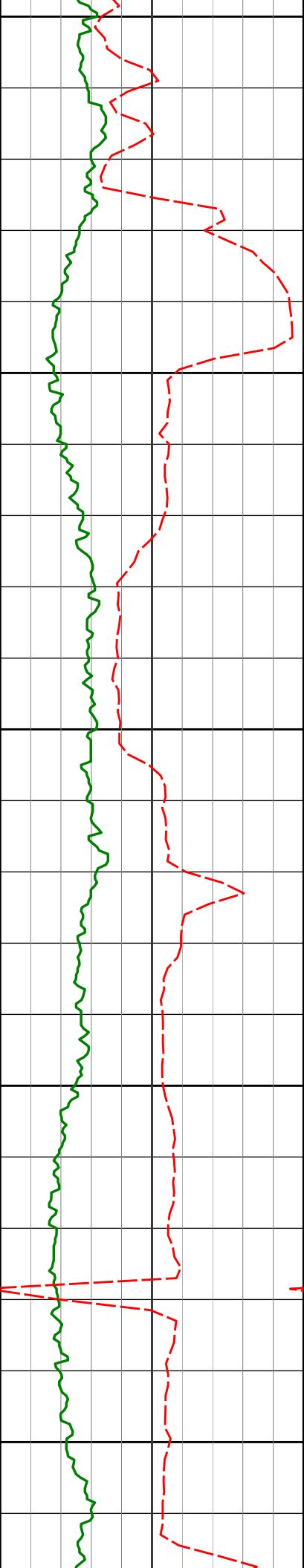
9411'

88.89°

269.64°

6699.79'

3125.76'



9450

9500

9550

9600

9650

9506'

90.25°

269.03°

6700.50'

3220.69'

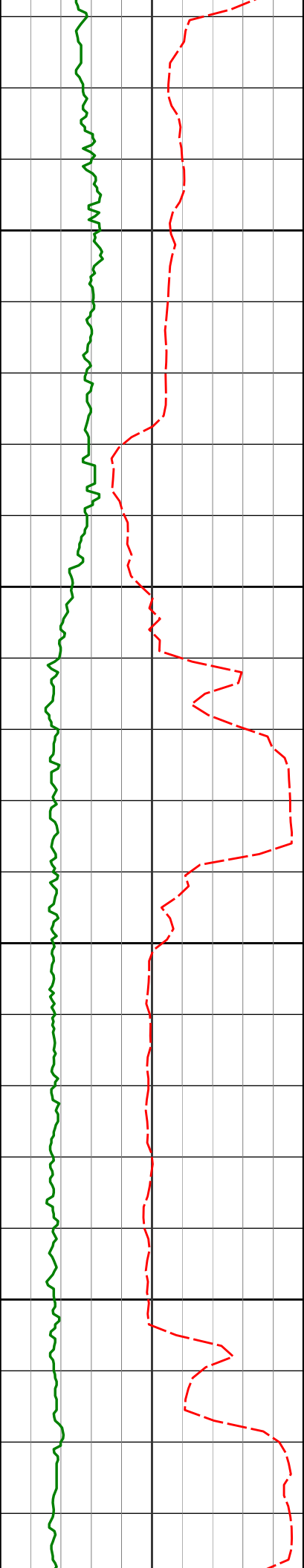
9600'

90.55°

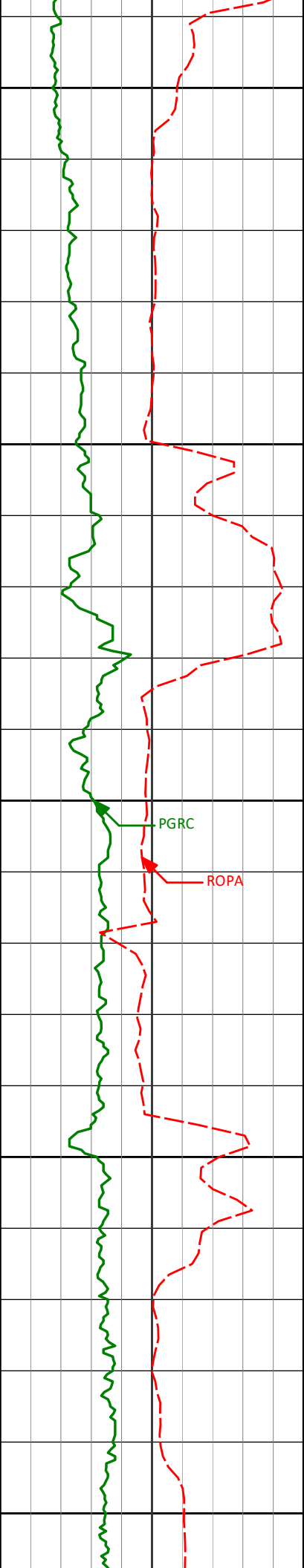
268.92°

6699.84'

3314.60'



9695'	92.19°	269.33°	6697.57'	3409.49'
9700				
9750				
9790'	91.39°	269.56°	6694.60'	3504.39'
9800				
9850				
9885'	90.74°	270.29°	6692.84'	3599.33'



9900

9950

10000

10050

10100

PGRC

ROPA

9980'

87.87°

269.53°

6693.99'

3694.28'

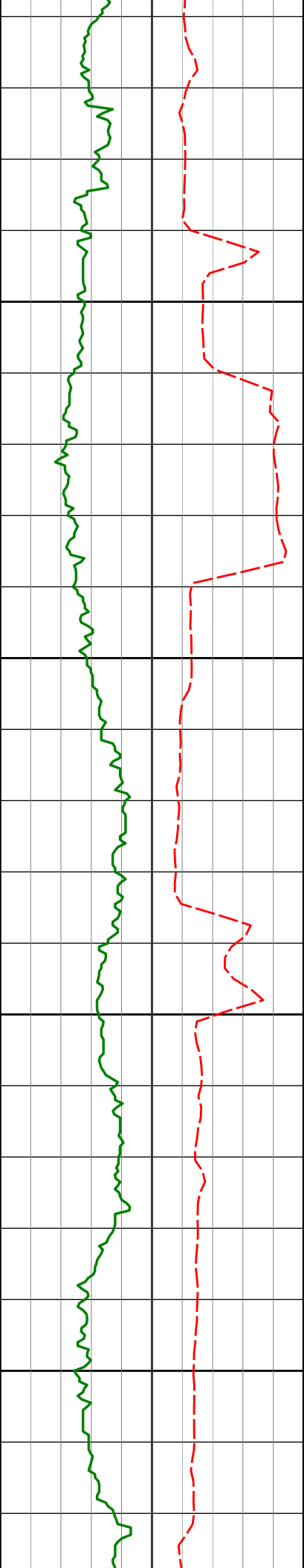
10074'

86.45°

266.26°

6698.65'

3787.97'



10150

10169'

89.78°

267.42°

6701.77'

3882.60'

10200

10250

10263'

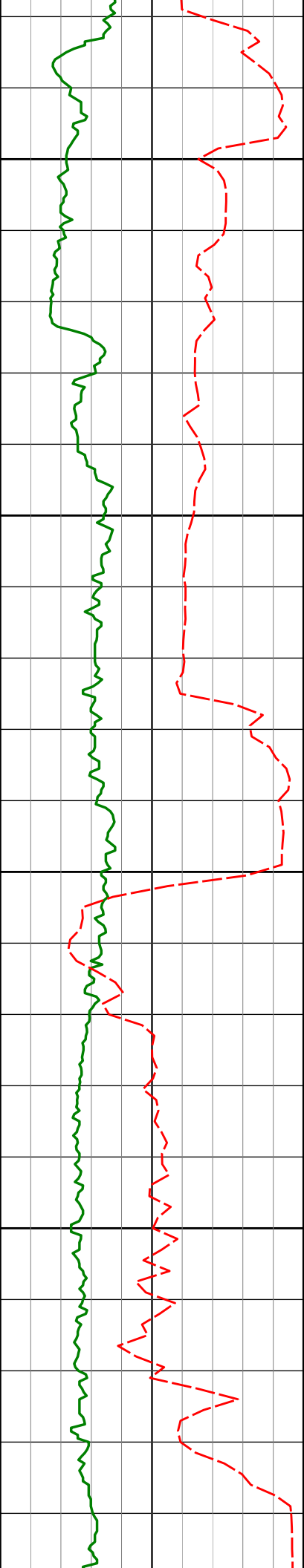
92.00°

267.61°

6700.31'

3976.36'

10300



10350

10400

10450

10500

10358'

92.28°

267.83°

6696.77'

4071.09'

10453'

91.76°

268.25°

6693.42'

4165.86'

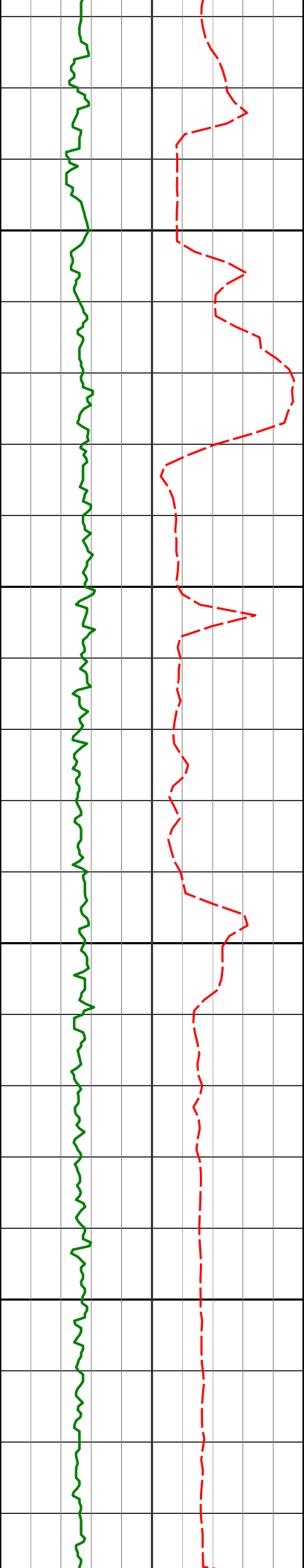
10547'

90.83°

269.80°

6691.29'

4259.75'



10800

10831'

89.44°

268.89°

6697.58'

4543.39'

10850

10900

10925'

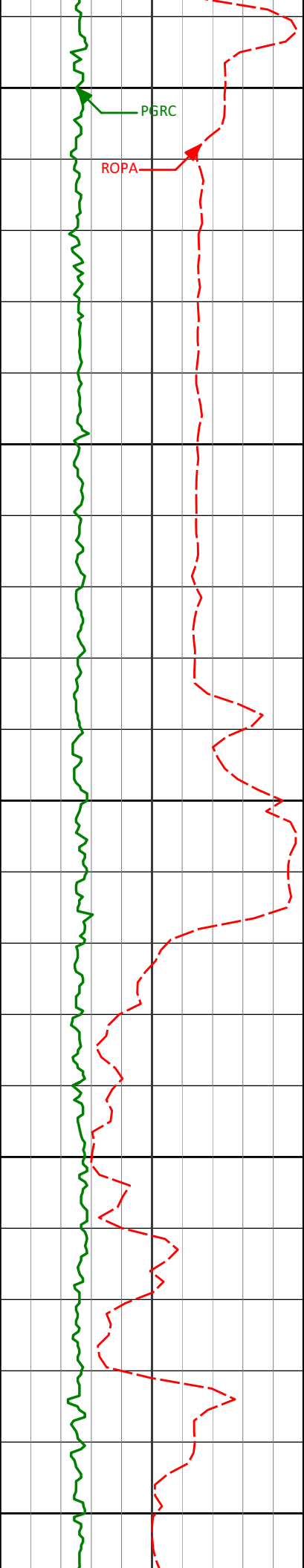
89.72°

268.10°

6698.27'

4637.26'

10950



11000

11050

11100

11150

11200

PGRC

ROPA

11020'

89.97°

267.87°

6698.53'

4732.09'

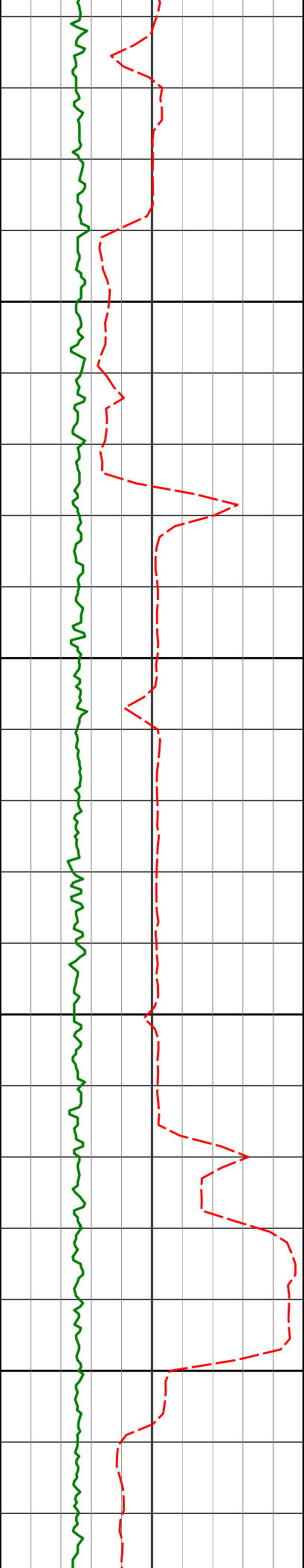
11115'

90.00°

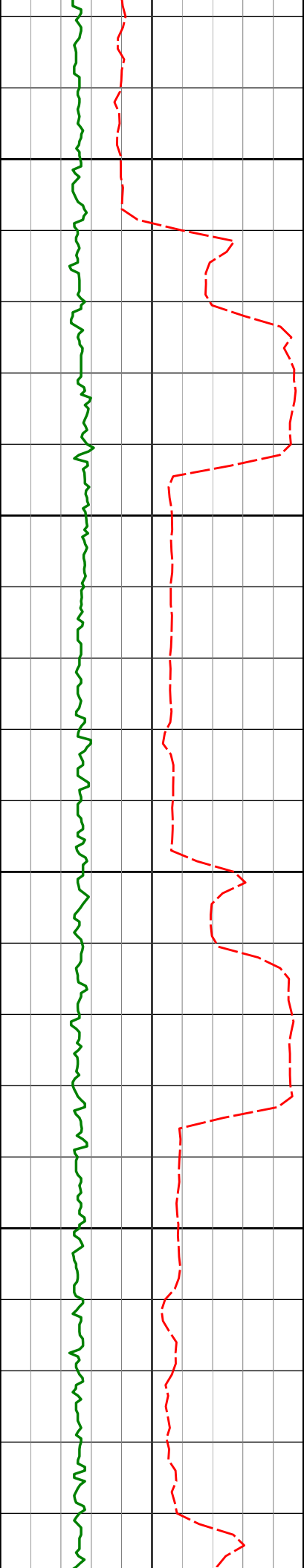
269.57°

6698.55'

4826.98'



	11210'	89.97°	269.32°	6698.58'	4921.92'
11250					
11300	11302'	90.00°	267.76°	6698.60'	5013.80'
11350					
11400	11394'	89.85°	267.34°	6698.72'	5105.58'



11450

11487'

90.59°

267.71°

6698.37'

5198.36'

11500

11550

11578'

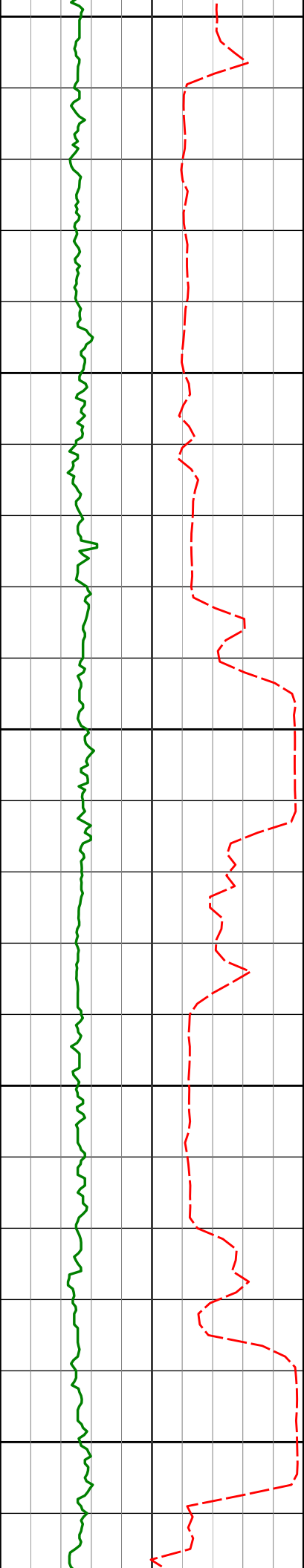
90.18°

269.87°

6697.76'

5289.25'

11600



11650

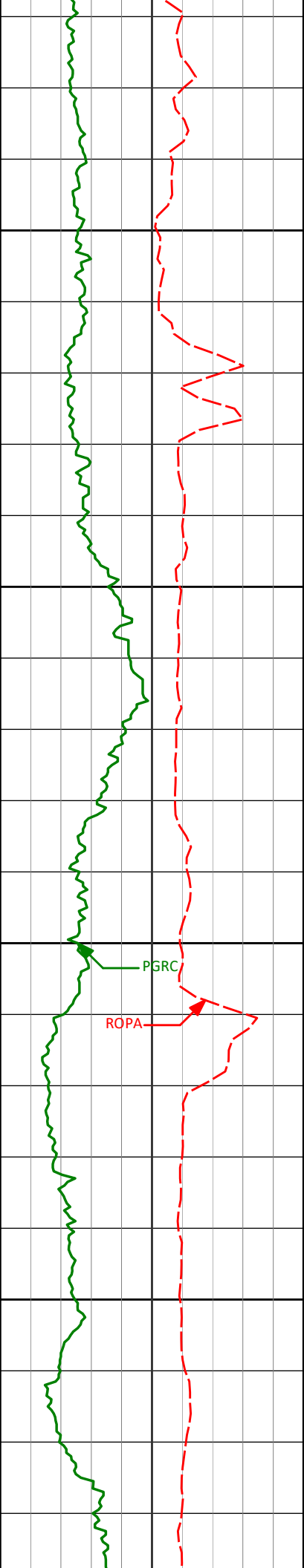
11700

11750

11800

11850

11670'	89.88°	268.07°	6697.71'	5381.16'
11762'	89.66°	268.49°	6698.08'	5473.02'
11853'	90.31°	271.69°	6698.10'	5563.98'



11900

11950

12000

12050

11945'

91.70°

271.59°

6696.49'

5655.96'

12037'

92.90°

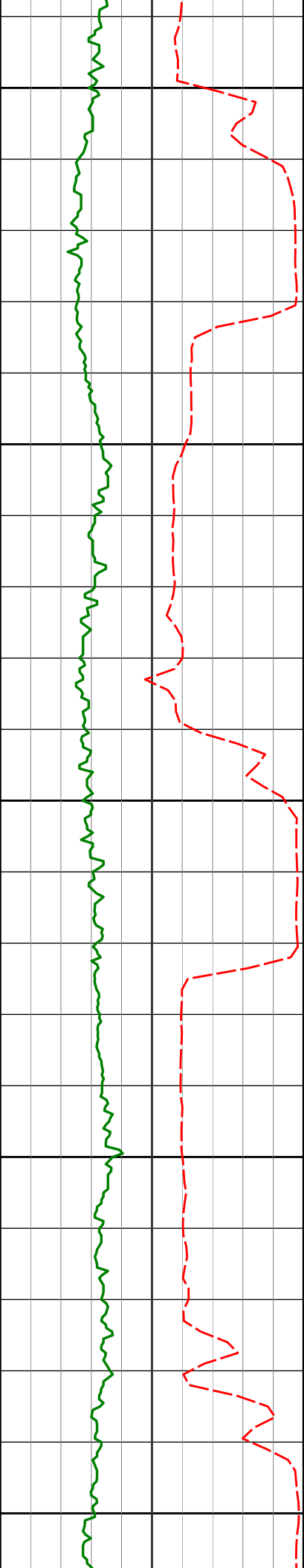
271.11°

6692.79'

5747.89'

PGRC

ROPA



12100

12128'

92.16°

272.41°

6688.78'

5838.80'

12150

12200

12221'

89.78°

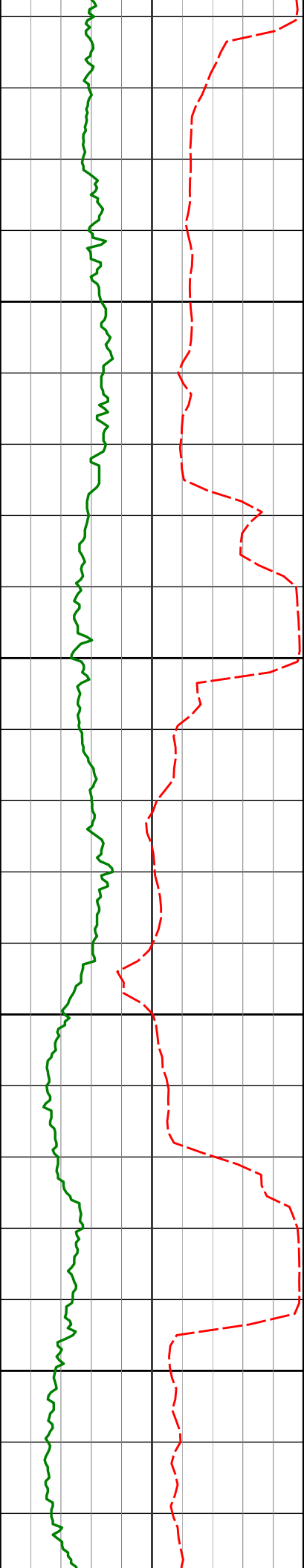
272.39°

6687.20'

5931.76'

12250

12300



12350

12400

12450

12500

12314'

12406'

12498'

87.78°

86.45°

87.19°

273.72°

272.70°

271.06°

6689.18'

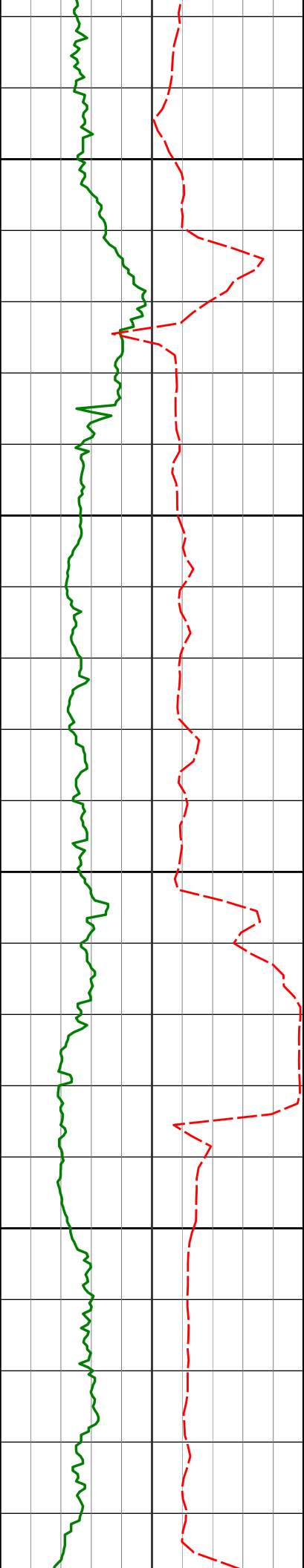
6693.81'

6698.92'

6024.70'

6116.54'

6208.39'



12550

12590'

86.94°

270.90°

6703.63'

6300.27'

12600

12650

12683'

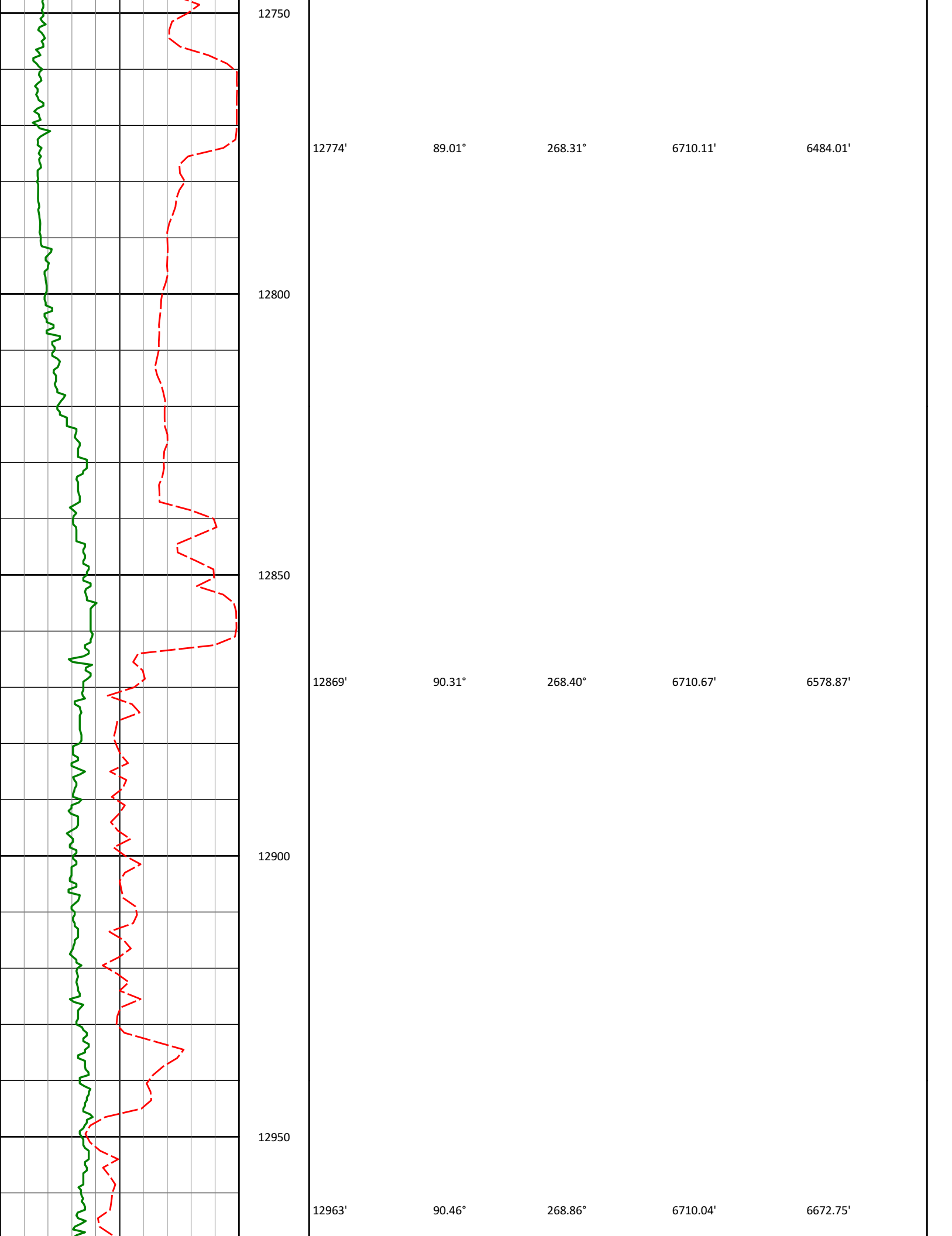
88.00°

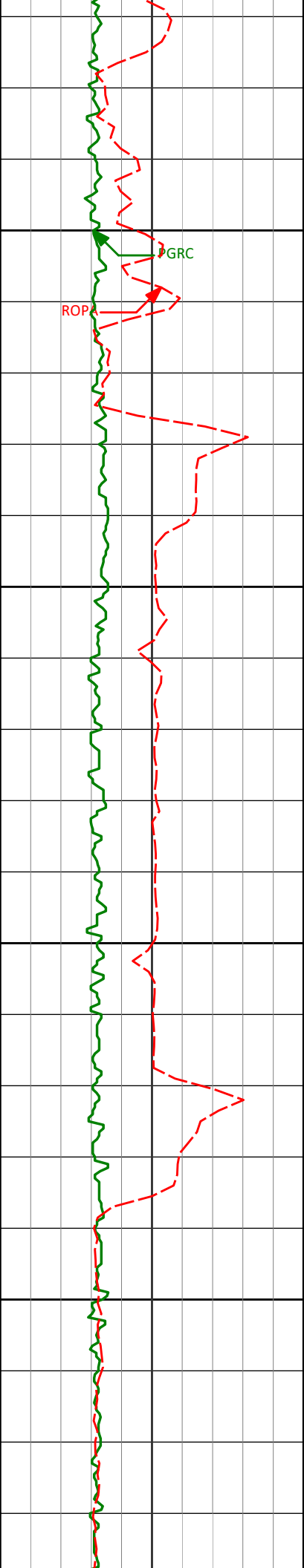
269.25°

6707.73'

6393.14'

12700





13000

13050

13100

13150

13056'

90.18°

269.10°

6709.52'

6765.66'

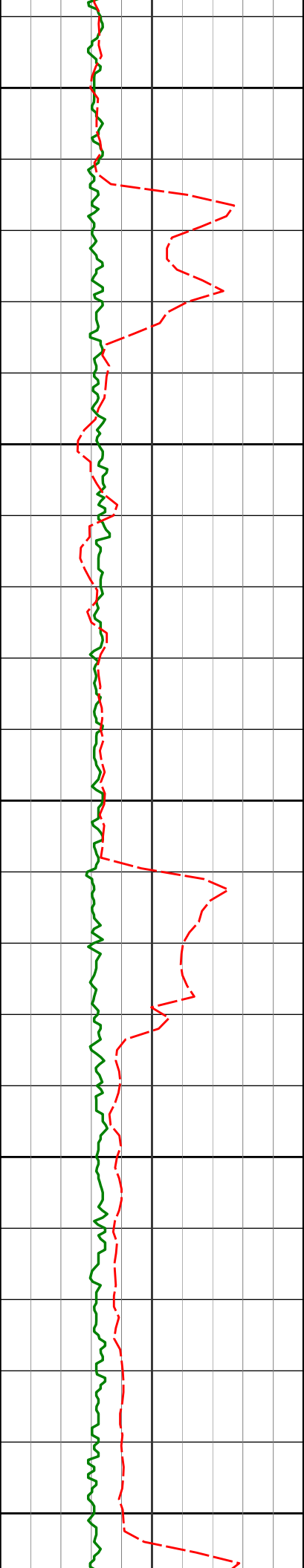
13151'

89.91°

269.02°

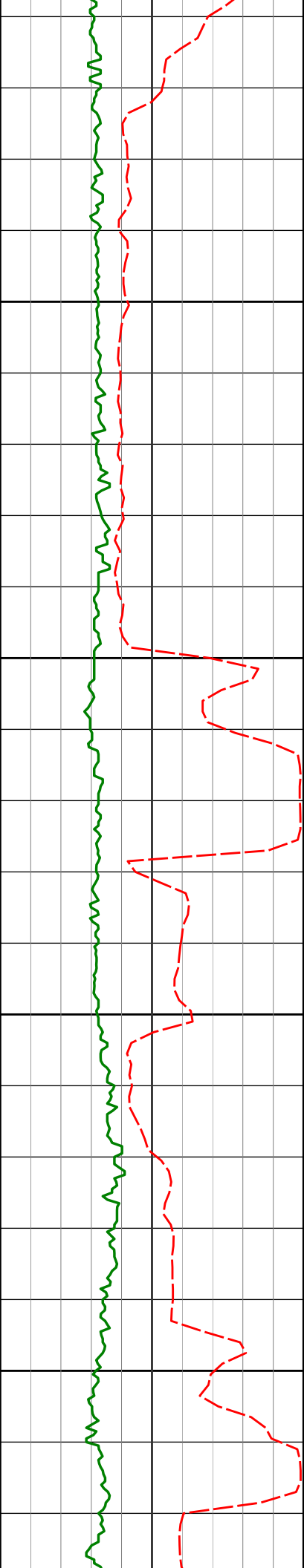
6709.45'

6860.58'

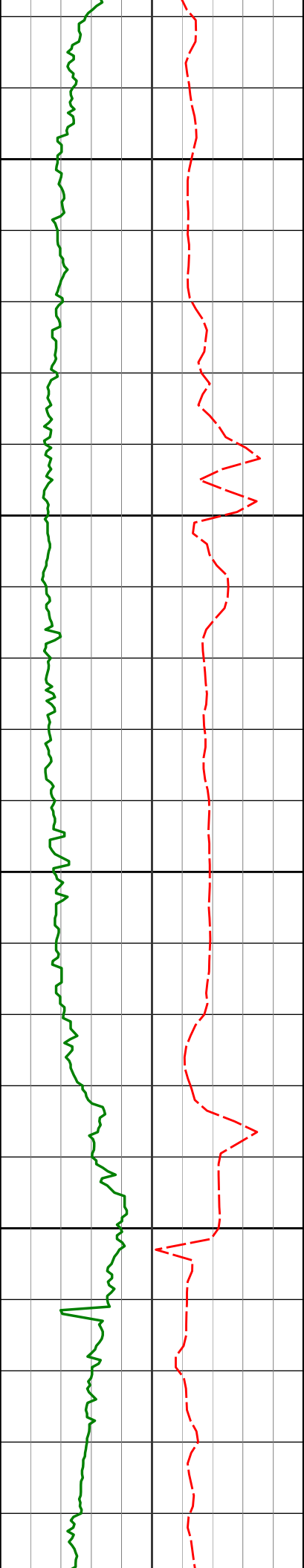


13200
13250
13300
13350
13400

13246'	89.94°	267.68°	6709.57'	6955.44'
13340'	89.94°	266.97°	6709.67'	7049.19'



13435'	89.72°	266.52°	6709.95'	7143.87'
13450				
13500				
13530'	89.48°	270.01°	6710.61'	7238.70'
13550				
13600				
13625'	90.68°	269.85°	6710.48'	7333.67'



13650

13700

13750

13800

13720'

90.34°

268.94°

6709.64'

7428.60'

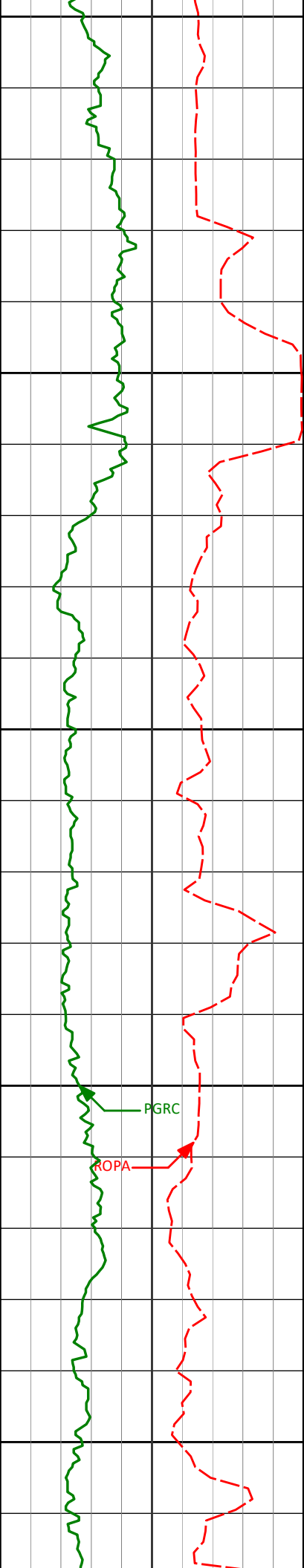
13814'

88.92°

267.75°

6710.24'

7522.46'



13850

13900

13950

14000

14050

13909'

90.34°

267.67°

6710.86'

7617.25'

14003'

91.97°

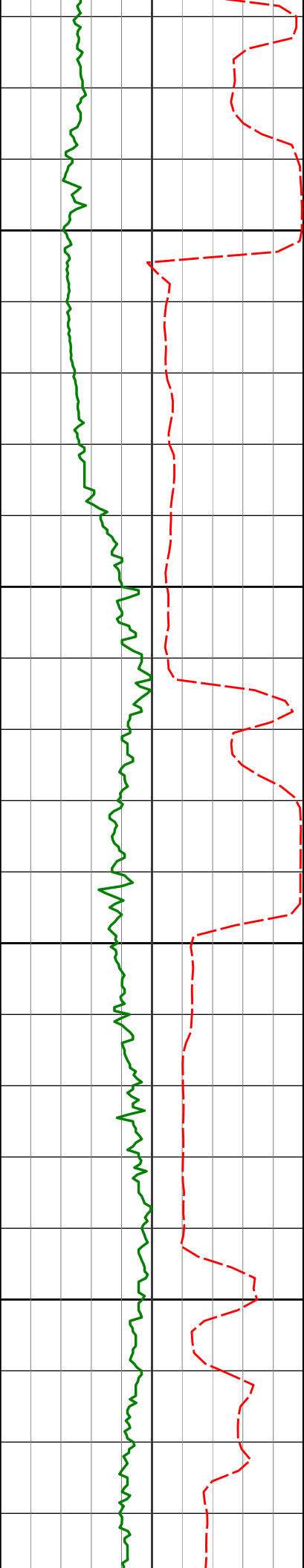
268.21°

6708.96'

7711.05'

PGRC

ROPA



14100

14150

14200

14250

14098'

91.20°

268.52°

6706.33'

7805.87'

14193'

89.75°

269.62°

6705.55'

7900.78'

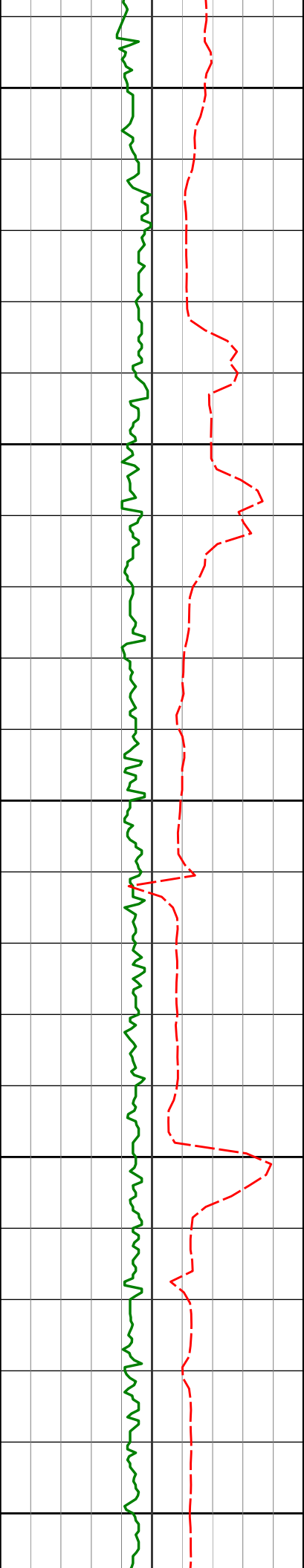
14287'

90.12°

269.96°

6705.65'

7994.74'



14300

14350

14400

14450

14500

14382'

89.88°

269.72°

6705.65'

8089.70'

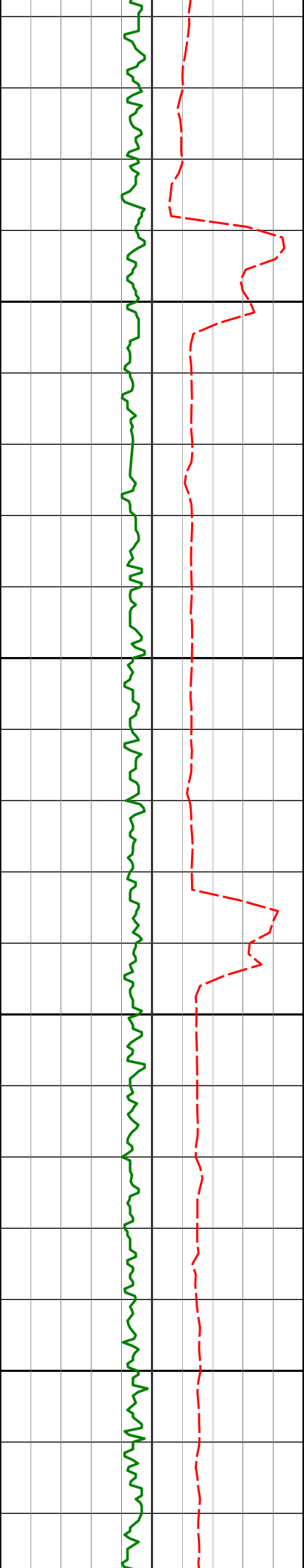
14477'

89.75°

270.09°

6705.96'

8184.67'



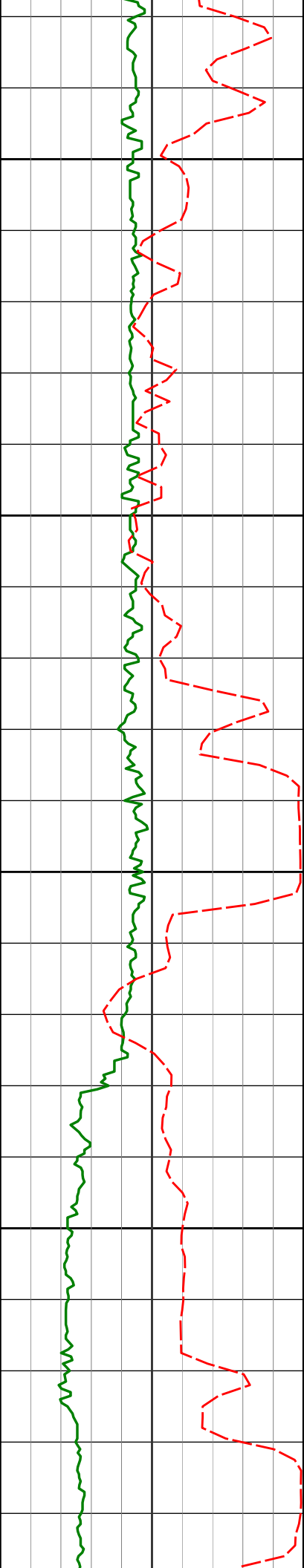
14550

14600

14650

14700

14571'	90.03°	270.55°	6706.14'	8278.65'
14665'	89.97°	270.85°	6706.14'	8372.64'



14750

14760'

89.75°

271.18°

6706.37'

8467.64'

14800

14850

14855'

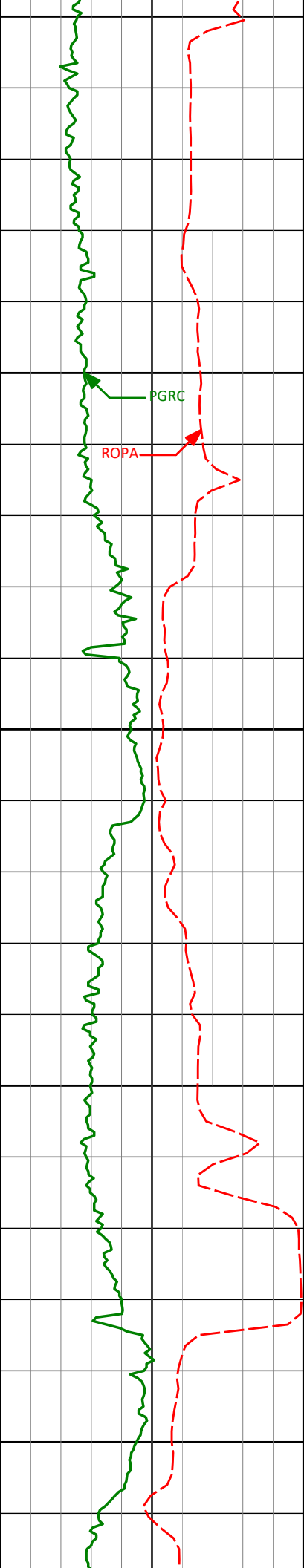
88.55°

269.11°

6707.78'

8562.60'

14900



14950

15000

15044'

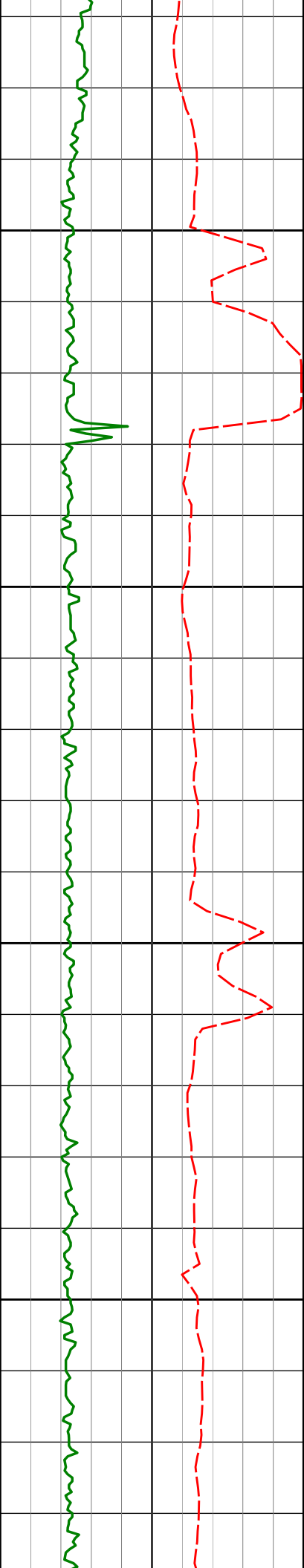
15050

15100

15139'

15150

14949'	90.22°	268.48°	6708.79'	8656.48'
15044'	91.48°	268.79°	6707.38'	8751.36'
15139'	87.96°	267.06°	6707.85'	8846.16'



15200

15234'

90.46°

267.06°

6709.16'

8940.86'

15250

15300

15328'

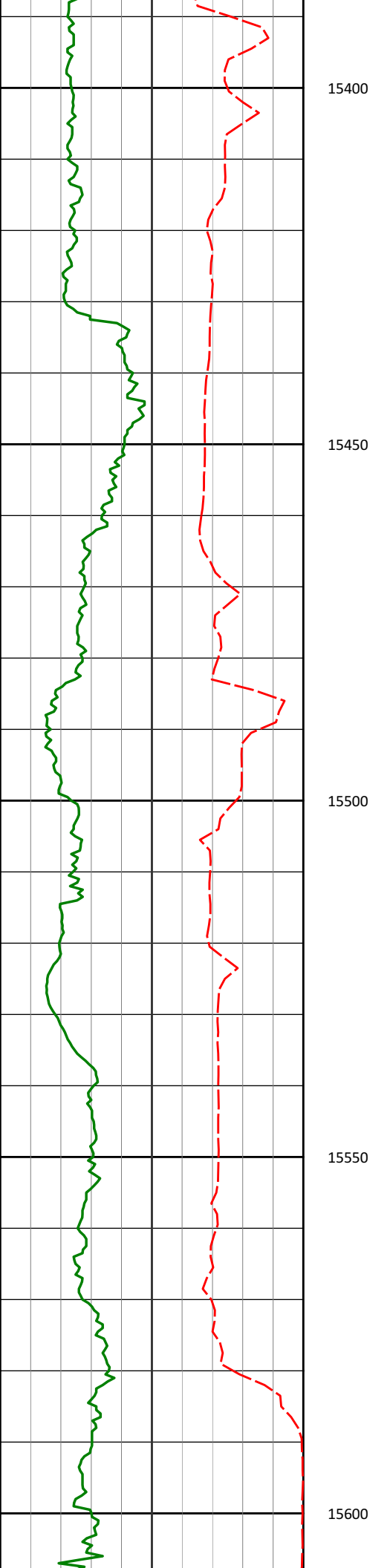
90.19°

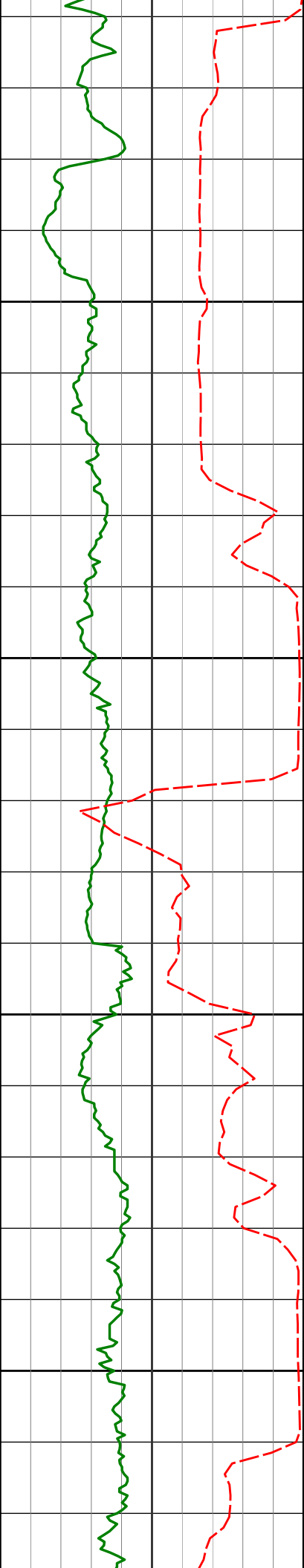
265.67°

6708.62'

9034.48'

15350





15612'

93.21°

267.89°

6699.29'

9317.04'

15650

15700

15707'

92.78°

269.31°

6694.33'

9411.79'

15750

15800

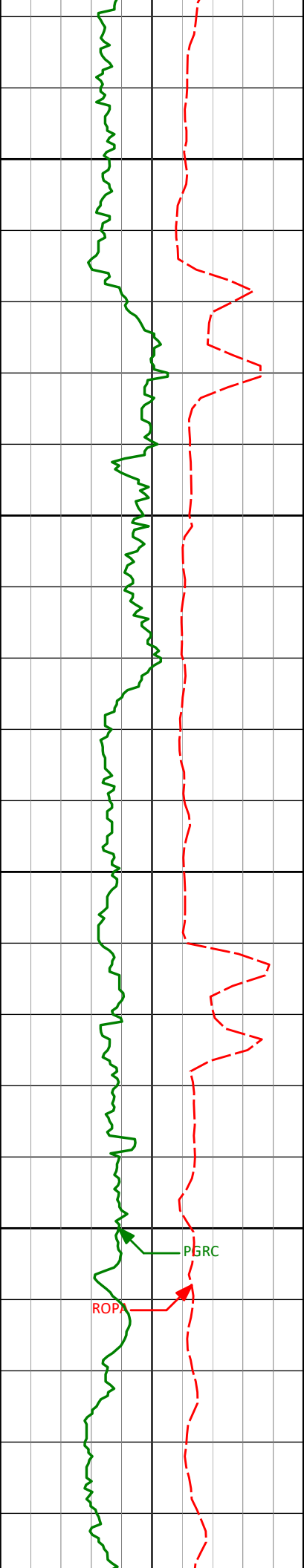
15802'

89.60°

269.15°

6692.35'

9506.69'



15850

15900

15950

16000

15897'

87.50°

268.05°

6694.76'

9601.53'

15991'

86.05°

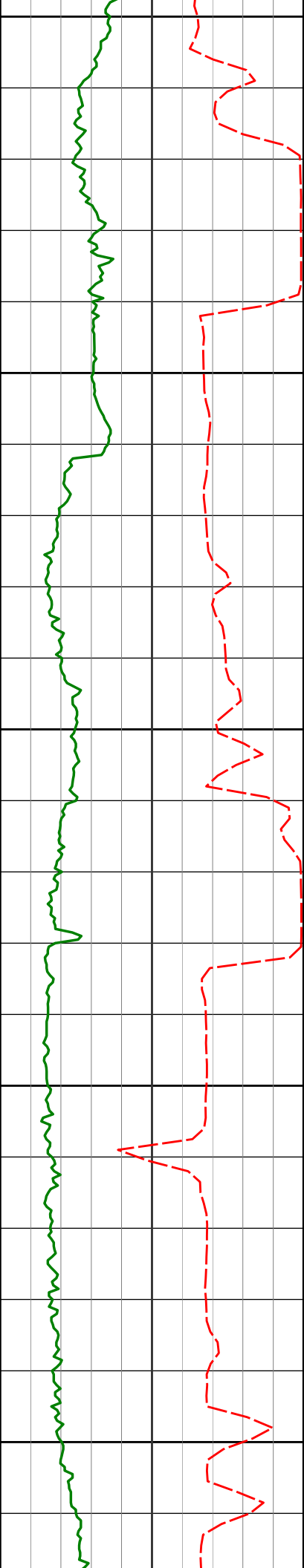
268.57°

6700.05'

9695.24'

ROP

PGRC



16050

16086'

86.88°

268.10°

6705.90'

9789.92'

16100

16150

16181'

88.24°

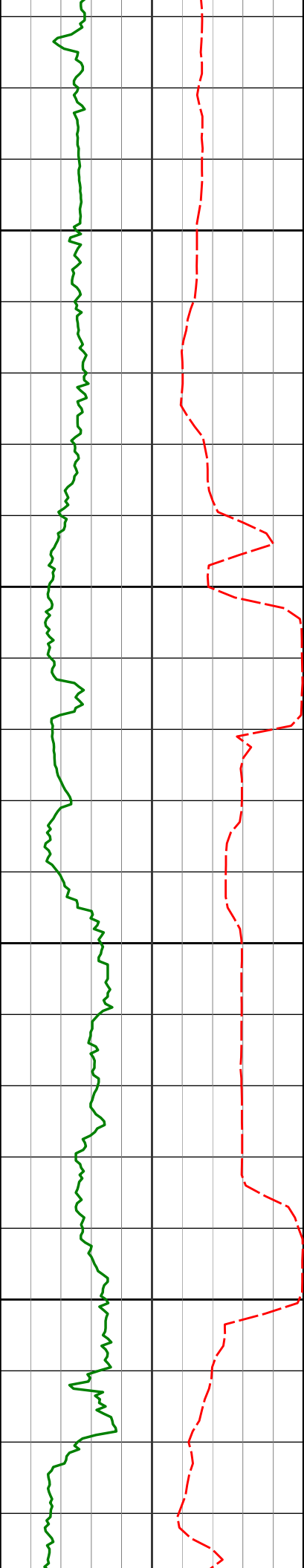
268.13°

6709.95'

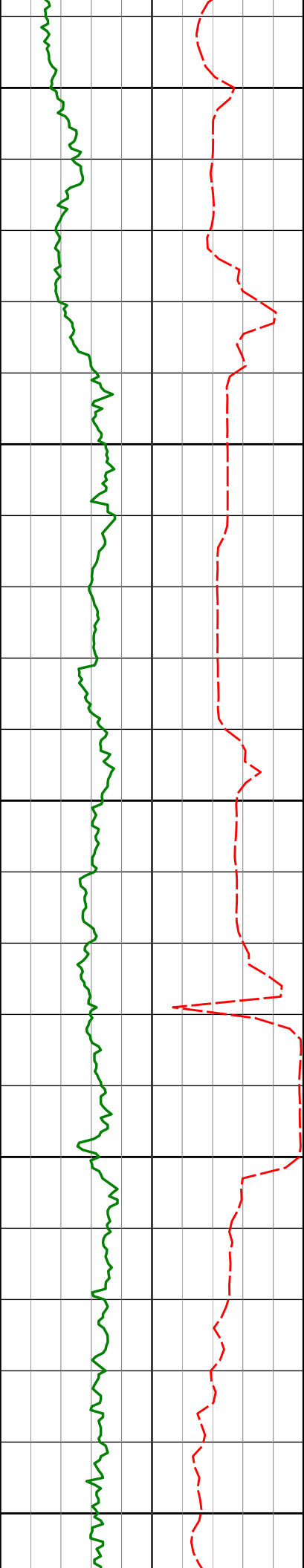
9884.67'

16200

16250



16276'	88.27°	267.67°	6712.84'	9979.44'
16300				
16350				
16370'	91.48°	268.25°	6713.05'	10073.25'
16400				
16450				
16465'	90.77°	268.82°	6711.18'	10168.11'



16500

16550

16600

16650

16700

16560'

91.66°

268.31°

6709.17'

10262.96'

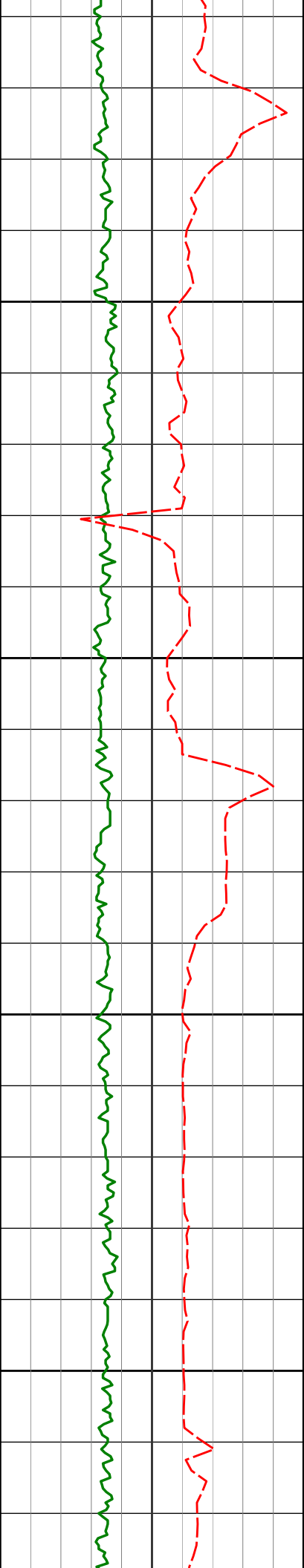
16655'

90.15°

267.98°

6707.67'

10357.79'



16750

16750'

88.83°

266.14°

6708.51'

10452.50'

16800

16844'

89.38°

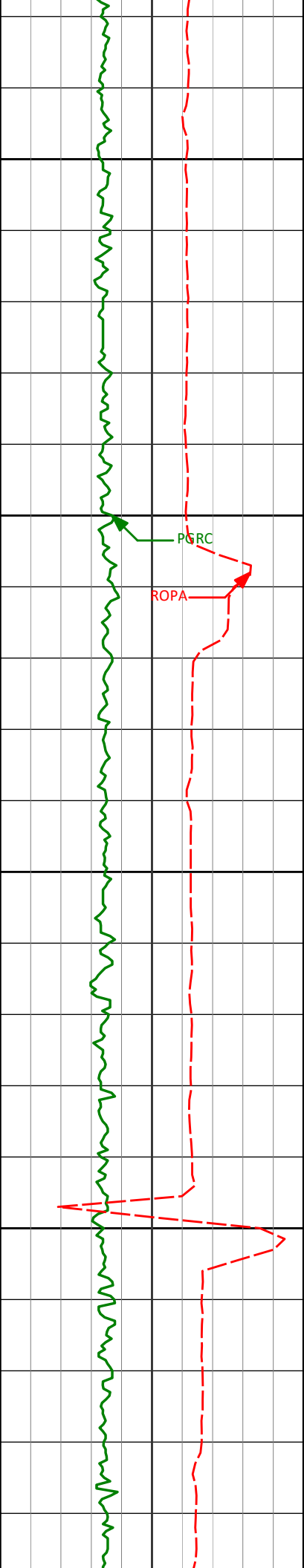
265.34°

6709.98'

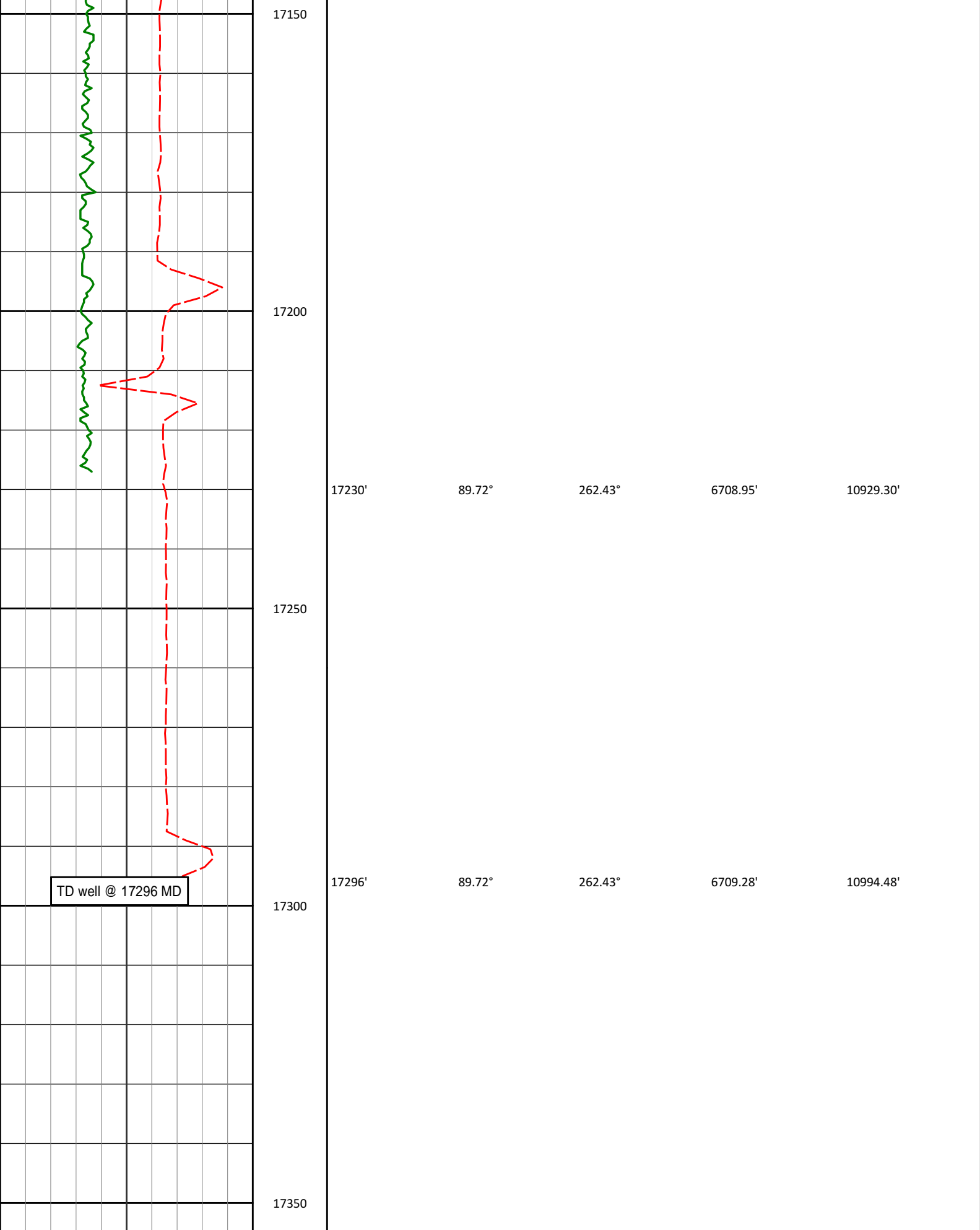
10546.02'

16850

16900



16939'	90.31°	265.95°	6710.24'	10640.53'
16950				
17000				
17033'	90.62°	265.40°	6709.48'	10734.05'
17050				
17100				
17128'	90.15°	263.90°	6708.84'	10828.37'



<div><div>Avg Rate of Penetration</div><div><div>1K</div><div>0</div><div>ROP</div><div>feet per hr</div></div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
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HALLIBURTON**DIRECTIONAL SURVEY REPORT**

**Noble Energy
Wells Ranch AE19-689
Wattenburg
Weld Colorado
USA
CA-XX-0901853575**

<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
238.00	0.50	228.60	238.00	0.69 S	0.78 W	0.76	0.21
481.00	1.60	82.70	480.97	0.96 S	1.79 E	-1.81	0.84
828.00	0.78	44.93	827.90	1.33 N	8.26 E	-8.23	0.32
920.00	0.66	43.17	919.89	2.16 N	9.07 E	-9.01	0.13
1012.00	0.78	33.73	1011.88	3.07 N	9.78 E	-9.70	0.18
1104.00	0.73	37.69	1103.87	4.05 N	10.49 E	-10.38	0.08
1195.00	0.85	62.41	1194.87	4.82 N	11.44 E	-11.31	0.39
1301.00	0.51	270.35	1300.86	5.19 N	11.66 E	-11.53	1.25
1394.00	0.58	321.53	1393.86	5.56 N	10.96 E	-10.81	0.51
1485.00	1.26	302.17	1484.85	6.46 N	9.82 E	-9.66	0.81
1577.00	1.57	256.77	1576.82	6.71 N	7.74 E	-7.57	1.23
1760.00	1.12	275.65	1759.77	6.31 N	3.52 E	-3.36	0.34
1852.00	0.85	285.63	1851.76	6.58 N	1.97 E	-1.80	0.35
1943.00	0.88	303.81	1942.75	7.15 N	0.74 E	-0.55	0.30
2035.00	0.22	103.17	2034.75	7.50 N	0.32 E	-0.13	1.18
2221.00	0.29	100.59	2220.74	7.34 N	1.13 E	-0.95	0.04
2313.00	0.22	69.68	2312.74	7.35 N	1.53 E	-1.34	0.16
2405.00	0.24	36.81	2404.74	7.57 N	1.81 E	-1.61	0.14
2497.00	0.50	6.03	2496.74	8.12 N	1.97 E	-1.76	0.35
2590.00	1.55	351.19	2589.72	9.77 N	1.82 E	-1.57	1.16
2681.00	2.92	348.71	2680.65	13.26 N	1.17 E	-0.83	1.51
2775.00	4.39	351.32	2774.46	19.16 N	0.16 E	0.33	1.57
2869.00	5.09	351.43	2868.14	26.84 N	1.00 W	1.69	0.74
2963.00	7.34	348.38	2961.58	36.85 N	2.83 W	3.77	2.42
3057.00	8.02	343.93	3054.74	49.03 N	5.86 W	7.11	0.96
3152.00	7.54	345.10	3148.86	61.42 N	9.30 W	10.86	0.53
3247.00	8.23	344.23	3242.96	73.99 N	12.75 W	14.63	0.74
3342.00	8.98	343.28	3336.89	87.64 N	16.73 W	18.95	0.80
3531.00	8.67	338.50	3523.66	115.02 N	26.19 W	29.11	0.42
3626.00	8.83	336.83	3617.55	128.38 N	31.69 W	34.95	0.32
3721.00	8.73	332.52	3711.44	141.48 N	37.88 W	41.47	0.70
3815.00	8.75	337.12	3804.35	154.40 N	43.95 W	47.87	0.74
3910.00	8.97	336.04	3898.22	167.82 N	49.77 W	54.03	0.29
4005.00	8.54	336.57	3992.11	181.06 N	55.58 W	60.18	0.46
4100.00	7.98	335.59	4086.12	193.54 N	61.11 W	66.02	0.61
4195.00	7.69	336.55	4180.24	205.38 N	66.37 W	71.58	0.33
4289.00	6.98	335.71	4273.47	216.35 N	71.22 W	76.71	0.76
4384.00	6.85	344.12	4367.78	227.06 N	75.14 W	80.90	1.07
4479.00	7.74	339.92	4462.01	238.52 N	78.89 W	84.94	1.09
4574.00	8.62	345.01	4556.04	251.41 N	82.93 W	89.31	1.20
4669.00	8.33	346.59	4650.00	264.98 N	86.37 W	93.09	0.39
4763.00	8.39	347.78	4743.01	278.30 N	89.40 W	96.46	0.19
4858.00	7.90	348.57	4837.05	291.48 N	92.16 W	99.55	0.53
4953.00	6.93	348.26	4931.25	303.49 N	94.62 W	102.32	1.02
5048.00	8.57	351.29	5025.38	316.10 N	96.86 W	104.88	1.78
5142.00	7.45	349.53	5118.46	329.01 N	99.02 W	107.37	1.22
5237.00	5.67	345.61	5212.84	339.62 N	101.31 W	109.93	1.93
5332.00	6.33	338.17	5307.32	349.02 N	104.42 W	113.28	1.07
5427.00	6.55	342.76	5401.72	359.06 N	107.98 W	117.09	0.59

5521.00	7.31	345.24	5495.03	369.96 N	111.09 W	120.48	0.87
5616.00	7.78	351.34	5589.21	382.16 N	113.60 W	123.30	0.98
5711.00	9.15	352.44	5683.17	396.01 N	115.56 W	125.61	1.45
5806.00	7.60	349.78	5777.16	409.68 N	117.67 W	128.07	1.68
5901.00	7.06	339.57	5871.38	421.33 N	120.82 W	131.52	1.48
5996.00	6.25	338.52	5965.74	431.62 N	124.75 W	135.71	0.86
6044.00	7.85	320.94	6013.38	436.60 N	127.77 W	138.86	5.56
6090.00	13.64	319.95	6058.56	443.19 N	133.25 W	144.50	12.59
6138.00	18.64	317.79	6104.65	453.21 N	142.05 W	153.55	10.49
6185.00	21.33	311.50	6148.82	464.44 N	153.50 W	165.29	7.32
6233.00	23.92	301.57	6193.14	475.33 N	168.34 W	180.39	9.60
6280.00	26.30	291.12	6235.72	484.07 N	186.18 W	198.45	10.69
6328.00	27.29	281.76	6278.58	490.15 N	206.88 W	219.30	9.02
6375.00	28.61	273.41	6320.12	493.02 N	228.67 W	241.16	8.78
6423.00	28.83	275.05	6362.21	494.72 N	251.67 W	264.20	1.70
6470.00	31.10	273.90	6402.93	496.54 N	275.08 W	287.64	4.98
6518.00	36.17	271.66	6442.88	497.80 N	301.62 W	314.21	10.87
6565.00	41.27	270.09	6479.54	498.22 N	331.01 W	343.59	11.05
6613.00	45.82	267.16	6514.33	497.40 N	364.05 W	376.60	10.37
6659.00	50.39	265.31	6545.04	495.13 N	398.20 W	410.69	10.38
6707.00	55.71	264.99	6573.88	491.88 N	436.41 W	448.80	11.10
6754.00	59.97	266.42	6598.89	488.91 N	476.08 W	488.38	9.42
6802.00	64.64	268.02	6621.20	486.87 N	518.51 W	530.75	10.17
6849.00	69.45	268.94	6639.52	485.73 N	561.76 W	573.96	10.39
6897.00	72.77	269.64	6655.06	485.17 N	607.17 W	619.33	7.05
6944.00	75.95	268.69	6667.73	484.50 N	652.42 W	664.55	7.04
6992.00	80.68	267.04	6677.45	482.75 N	699.37 W	711.45	10.41
7030.00	83.27	265.87	6682.75	480.42 N	736.93 W	748.93	7.47
7137.00	86.76	269.66	6692.05	476.27 N	843.40 W	855.27	4.80
7231.00	88.12	267.80	6696.25	474.19 N	937.28 W	949.06	2.45
7326.00	89.29	268.31	6698.40	470.97 N	1032.20 W	1043.87	1.34
7421.00	91.05	268.84	6698.12	468.60 N	1127.17 W	1138.74	1.93
7515.00	91.26	268.92	6696.22	466.77 N	1221.13 W	1232.63	0.24
7610.00	92.77	269.27	6692.88	465.27 N	1316.06 W	1327.48	1.63
7705.00	91.54	269.57	6689.31	464.31 N	1410.98 W	1422.35	1.33
7800.00	90.15	269.75	6687.91	463.74 N	1505.97 W	1517.29	1.48
7895.00	89.72	269.07	6688.02	462.77 N	1600.96 W	1612.23	0.85
7989.00	91.48	269.24	6687.03	461.38 N	1694.94 W	1706.15	1.88
8084.00	91.08	269.36	6684.91	460.22 N	1789.91 W	1801.06	0.44
8179.00	90.00	268.37	6684.01	458.34 N	1884.89 W	1895.95	1.54
8273.00	88.64	267.55	6685.13	454.99 N	1978.82 W	1989.77	1.69
8368.00	88.74	267.23	6687.30	450.67 N	2073.69 W	2084.50	0.35
8463.00	88.98	266.87	6689.19	445.78 N	2168.55 W	2179.20	0.46
8557.00	89.20	267.77	6690.68	441.38 N	2262.43 W	2272.94	0.99
8652.00	89.29	267.49	6691.94	437.45 N	2357.34 W	2367.72	0.31
8747.00	90.46	267.82	6692.14	433.57 N	2452.26 W	2462.51	1.28
8842.00	88.98	268.19	6692.61	430.26 N	2547.20 W	2557.34	1.61
8937.00	89.60	269.15	6693.79	428.06 N	2642.17 W	2652.21	1.20
9032.00	89.75	269.25	6694.32	426.73 N	2737.16 W	2747.14	0.19
9127.00	89.69	268.76	6694.79	425.08 N	2832.14 W	2842.05	0.52
9221.00	89.20	268.99	6695.70	423.23 N	2926.12 W	2935.95	0.58
9316.00	88.49	269.19	6697.61	421.73 N	3021.08 W	3030.85	0.78
9411.00	88.89	269.64	6699.79	420.76 N	3116.05 W	3125.76	0.63
9506.00	90.25	269.03	6700.50	419.65 N	3211.04 W	3220.69	1.57
9600.00	90.55	268.92	6699.84	417.97 N	3305.03 W	3314.60	0.34
9695.00	92.19	269.33	6697.57	416.52 N	3399.98 W	3409.49	1.78
9790.00	91.39	269.56	6694.60	415.60 N	3494.93 W	3504.39	0.88
9885.00	90.74	270.29	6692.84	415.48 N	3589.91 W	3599.33	1.03
9980.00	87.87	269.53	6693.99	415.33 N	3684.90 W	3694.28	3.13
10074.00	86.45	266.26	6698.65	411.88 N	3778.70 W	3787.97	3.79
10169.00	89.78	267.42	6701.77	406.65 N	3873.49 W	3882.60	3.71
10263.00	92.00	267.61	6700.31	402.57 N	3967.39 W	3976.36	2.37
10358.00	92.28	267.83	6696.77	398.80 N	4062.24 W	4071.09	0.37
10453.00	91.76	268.25	6693.42	395.55 N	4157.13 W	4165.86	0.70
10547.00	90.83	269.80	6691.29	393.95 N	4251.09 W	4259.75	1.92
10642.00	88.24	269.14	6692.06	393.07 N	4346.07 W	4354.68	2.81
10736.00	87.81	268.68	6695.30	391.29 N	4440.00 W	4448.53	0.67
10831.00	89.44	268.89	6697.58	389.27 N	4534.95 W	4543.39	1.73
10925.00	89.72	268.10	6698.27	386.80 N	4628.91 W	4637.26	0.89
11020.00	89.97	267.87	6698.53	383.46 N	4723.85 W	4732.09	0.36
11115.00	90.00	269.57	6698.55	381.34 N	4818.82 W	4826.98	1.79
11212.00	89.87	269.88	6698.58	382.42 N	4913.82 W	4921.82	2.87

11210.00	89.97	269.32	6698.58	380.42 N	4913.82 W	4921.92	0.27
11302.00	90.00	267.76	6698.60	378.08 N	5005.79 W	5013.80	1.70
11394.00	89.85	267.34	6698.72	374.14 N	5097.70 W	5105.58	0.48
11487.00	90.59	267.71	6698.37	370.13 N	5190.61 W	5198.36	0.89
11578.00	90.18	269.87	6697.76	368.21 N	5281.59 W	5289.25	2.42
11670.00	89.88	268.07	6697.71	366.55 N	5373.57 W	5381.16	1.98
11762.00	89.66	268.49	6698.08	363.79 N	5465.53 W	5473.02	0.52
11853.00	90.31	271.69	6698.10	363.93 N	5556.51 W	5563.98	3.59
11945.00	91.70	271.59	6696.49	366.57 N	5648.46 W	5655.96	1.51
12037.00	92.90	271.11	6692.79	368.73 N	5740.36 W	5747.89	1.40
12128.00	92.16	272.41	6688.78	371.52 N	5831.22 W	5838.80	1.64
12221.00	89.78	272.39	6687.20	375.42 N	5924.12 W	5931.76	2.56
12314.00	87.78	273.72	6689.18	380.37 N	6016.96 W	6024.70	2.58
12406.00	86.45	272.70	6693.81	385.52 N	6108.70 W	6116.54	1.82
12498.00	87.19	271.06	6698.92	388.53 N	6200.50 W	6208.39	1.95
12590.00	86.94	270.90	6703.63	390.10 N	6292.37 W	6300.27	0.32
12683.00	88.00	269.25	6707.73	390.22 N	6385.27 W	6393.14	2.11
12774.00	89.01	268.31	6710.11	388.29 N	6476.22 W	6484.01	1.52
12869.00	90.31	268.40	6710.67	385.56 N	6571.18 W	6578.87	1.37
12963.00	90.46	268.86	6710.04	383.31 N	6665.15 W	6672.75	0.51
13056.00	90.18	269.10	6709.52	381.66 N	6758.13 W	6765.66	0.40
13151.00	89.91	269.02	6709.45	380.10 N	6853.12 W	6860.58	0.30
13246.00	89.94	267.68	6709.57	377.36 N	6948.08 W	6955.44	1.41
13340.00	89.94	266.97	6709.67	372.97 N	7041.97 W	7049.19	0.76
13435.00	89.72	266.52	6709.95	367.58 N	7136.82 W	7143.87	0.53
13530.00	89.48	270.01	6710.61	364.70 N	7231.76 W	7238.70	3.68
13625.00	90.68	269.85	6710.48	364.59 N	7326.76 W	7333.67	1.27
13720.00	90.34	268.94	6709.64	363.59 N	7421.75 W	7428.60	1.02
13814.00	88.92	267.75	6710.24	360.87 N	7515.70 W	7522.46	1.97
13909.00	90.34	267.67	6710.86	357.07 N	7610.62 W	7617.25	1.50
14003.00	91.97	268.21	6708.96	353.70 N	7704.54 W	7711.05	1.83
14098.00	91.20	268.52	6706.33	350.99 N	7799.46 W	7805.87	0.87
14193.00	89.75	269.62	6705.55	349.45 N	7894.44 W	7900.78	1.92
14287.00	90.12	269.96	6705.65	349.10 N	7988.44 W	7994.74	0.53
14382.00	89.88	269.72	6705.65	348.84 N	8083.44 W	8089.70	0.36
14477.00	89.75	270.09	6705.96	348.68 N	8178.44 W	8184.67	0.41
14571.00	90.03	270.55	6706.14	349.20 N	8272.44 W	8278.65	0.57
14665.00	89.97	270.85	6706.14	350.35 N	8366.43 W	8372.64	0.33
14760.00	89.75	271.18	6706.37	352.03 N	8461.42 W	8467.64	0.42
14855.00	88.55	269.11	6707.78	352.27 N	8556.40 W	8562.60	2.52
14949.00	90.22	268.48	6708.79	350.30 N	8650.37 W	8656.48	1.90
15044.00	91.48	268.79	6707.38	348.03 N	8745.33 W	8751.36	1.37
15139.00	87.96	267.06	6707.85	344.60 N	8840.25 W	8846.16	4.13
15234.00	90.46	267.06	6709.16	339.72 N	8935.10 W	8940.86	2.63
15328.00	90.19	265.67	6708.62	333.76 N	9028.91 W	9034.48	1.51
15423.00	91.39	265.80	6707.31	326.70 N	9123.64 W	9129.00	1.27
15517.00	92.56	265.76	6704.07	319.79 N	9217.33 W	9222.48	1.25
15612.00	93.21	267.89	6699.29	314.53 N	9312.05 W	9317.04	2.34
15707.00	92.78	269.31	6694.33	312.21 N	9406.89 W	9411.79	1.56
15802.00	89.60	269.15	6692.35	310.94 N	9501.85 W	9506.69	3.35
15897.00	87.50	268.05	6694.76	308.62 N	9596.79 W	9601.53	2.50
15991.00	86.05	268.57	6700.05	305.85 N	9690.59 W	9695.24	1.64
16086.00	86.88	268.10	6705.90	303.09 N	9785.37 W	9789.92	1.00
16181.00	88.24	268.13	6709.95	299.97 N	9880.23 W	9884.67	1.43
16276.00	88.27	267.67	6712.84	296.49 N	9975.12 W	9979.44	0.49
16370.00	91.48	268.25	6713.05	293.15 N	10069.05 W	10073.25	3.47
16465.00	90.77	268.82	6711.18	290.72 N	10164.00 W	10168.11	0.96
16560.00	91.66	268.31	6709.17	288.34 N	10258.95 W	10262.96	1.08
16655.00	90.15	267.98	6707.67	285.27 N	10353.88 W	10357.79	1.63
16750.00	88.83	266.14	6708.51	280.39 N	10448.75 W	10452.50	2.38
16844.00	89.38	265.34	6709.98	273.41 N	10542.48 W	10546.02	1.03
16939.00	90.31	265.95	6710.24	266.20 N	10637.20 W	10640.53	1.17
17033.00	90.62	265.40	6709.48	259.11 N	10730.93 W	10734.05	0.67
17128.00	90.15	263.90	6708.84	250.25 N	10825.51 W	10828.37	1.65
17230.00	89.72	262.43	6708.95	238.11 N	10926.78 W	10929.30	1.50
17296.00	89.72	262.43	6709.28	229.42 N	10992.21 W	10994.48	0.00

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 271.46 DEGREES (GRID)
A TOTAL CORRECTION OF 7.40 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17296.00 FEET
IS 10994.60 FEET ALONG 271.20 DEGREES (GRID)

Tied in @ Surface
First two Survey's from 3rd party source (Muilti Shot EMS)

Final survey projected to bit.

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