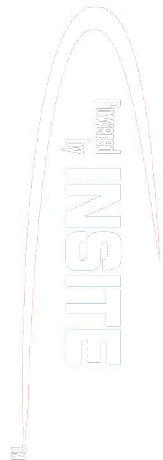


**PCDC - Pressure Case Directional**  
**PCGK - Pressure Case Gamma**

**1 : 600 / 1 : 240**

Country : <b>USA</b>			
Field : <b>Wattenburg</b>			
Location : <b>Lat: 40° 27' 21.02" North</b> <b>Long: 104° 21' 22.21" West</b>			
Well : <b>Wells Ranch AE30-65-1HNC</b>			
Company : <b>Noble Energy</b>			
Rig : <b>H&amp;P 321</b>			
LOCATION			
Latitude : <b>40° 27' 21.02" North</b> Longitude : <b>104° 21' 22.21" West</b>			
UTM Easting = <b>3,318,297.270 ft</b> UTM Northing = <b>1,410,955.760 ft</b>			
Other Services <b>Directional Drilling</b>			
Company : <b>Noble Energy</b>			
Rig : <b>H&amp;P 321</b>			
Well : <b>Wells Ranch AE30-65-1HNC</b>			
Field : <b>Wattenburg</b>			
Country : <b>USA</b>			
API Number : <b>05-123-38646</b>			
Permanent Datum : <b>Ground Level</b>			
Log Measured From : <b>Drill Floor</b>			
Drilling Measured From : <b>Drill Floor</b>			
Elevation : <b>4757.00 ft</b>			
30.00 ft Above Permanent Datum			
<b>MD LOG</b>			
Depth Logged : <b>668.00 ft To 11,987.00 ft</b>			
Date Logged : <b>10-Apr-14 To 17-Apr-14</b>			
Total Depth MD : <b>11,987.00 ft</b> TVD : <b>6,599.67 ft</b>			
Spud Date : <b>09-Apr-14</b>			
Unit No. : <b>11210424</b>			
Job No. : <b>CA-XX-0901176449</b>			
Plot Type : <b>Final</b>			
Plot Date : <b>08-May-14</b>			
Run No.			
Size			
From			
To			
0100			
8.750 in			
668.00 ft			
5,914.00 ft			
0200			
8.750 in			
5,914.00 ft			
6,100.00 ft			
0300			
8.750 in			
6,100.00 ft			
6,966.00 ft			
0400			
6.125 in			
11,987.00 ft			
Size			
Weight			
From			
To			
9.625 in			
34.90 lbf			
7.000 in			
26.00 lbf			
SURFACE			
SURFACE			
6,956.00 ft			

**WELL INFORMATION**

MWD Run Number	100	200	300	400	
Date run completed	11-Apr-14	12-Apr-14	12-Apr-14	15-Apr-14	
Rig Bit Number	2	3	4	5	
Bit Size (in)	8.750	8.750	8.750	6.125	
Tool Nominal OD (in)	6.800	6.800	4.750	4.810	
Log Start Depth (MD, ft)	668.00	5,914.00	6,100.00	6,966.00	
Log End Depth (MD, ft)	5,914.00	6,100.00	6,966.00	11,987.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	10-Apr-14 08:28	11-Apr-14 11:29	12-Apr-14 04:11	11-Apr-14 22:21	
Drill/Wipe End Date and Time	11-Apr-14 04:55	11-Apr-14 19:09	12-Apr-14 14:50	11-Apr-14 22:21	
Min Inc (deg) @ Depth (MD, ft)	0.17 @ 1,924.00	0.65 @ 5,919.00	11.75 @ 6,091.00	86.11 @ 9,916.00	
Max Inc (deg) @ Depth (MD, ft)	14.06 @ 3,818.00	11.75 @ 6,091.00	86.86 @ 6,911.00	93.51 @ 11,243.00	
Bit TFA(in2) / Bit Type	1.05 / PDC	1.74 / PDC	1.74 / PDC	0.65 / PDC	
Flow Rate (gpm)	592.00	585.71	559.85	310.39	
Max AV (fpm) / CV (fpm) @ MWD	NA / V	NA / NA	NA / NA	NA / NA	
Fluid Type	Native/Spud Mud	Fresh Water Gel	Native/Spud Mud	Polymer	
Density (ppg) / Viscosity (spqt)	8.60 / 30.00	10.00 / 38.00	10.30 / 38.00	9.27 / 38.00	
Filtrate CL (ppm)	1,800.00	2,100.00	2,100.00	2,100.00	
pH / Fluid Loss (mptm)	9.90 / 23	NA / NA	NA / NA	9.90 / 7	
PV (cP) / YP (Ihf2)	4 / 5.00	10 / 11.00	9 / 11.00	11 / 12.00	
% Solids / % Sand	2.10 / 0.40	8.50 / 0.15	8.1 / 0.10	5.70 / 0.35	
% Oil / Oil:Water Ratio	NA / NA	NA / NA	NA / NA	NA / NA	
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA	NA @ NA	NA @ NA	

Max Tool Temp (degF) / Source	145.90 / PCM	151.50 / PCM	158.47 / PCM	221.80 / PCM	
Rm @ Max Tool Temp (degF)	NA @ 145.90	NA @ 151.50	NA @ 158.47	NA @ 221.80	
Lead MWD Engineer	Kyle Wass	Kyle Wass	Kyle Wass	Kyle Wass	
Customer Representative	Jim Turner	Jim Turner	Jim Turner	Jim Turner	

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	245494	245494	245494	245494	
Insert Serial Number	11400842	11400842	11400880	11400880	
Date and Time Initialized	10-Apr-14 01:56	10-Apr-14 01:56	11-Apr-14 23:56	13-Apr-14 06:11	
Date and Time Read	12-Apr-14 23:26	12-Apr-14 17:04	12-Apr-14 20:47	15-Apr-14 19:10	
ECMB SW Version	N/A	N/A	N/A	N/A	

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	57.00	55.00	55.00	64.00	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	245494	245494	245494	245494	
Sonde Serial Number	11478014	11478014	11477956	11477956	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	279.47	228.99	228.99	100.04	

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	
Distance From Bit (ft)	50.28	47.75	47.75	66.71	
Recorded Sample Period (sec)	10	10	10	10	
Software Version	8.15	8.15	8.15	8.15	
Sub Serial Number	245494	245494	245494	245494	
Insert/Sonde Serial Number	11681051	11681051	11680921	11680921	

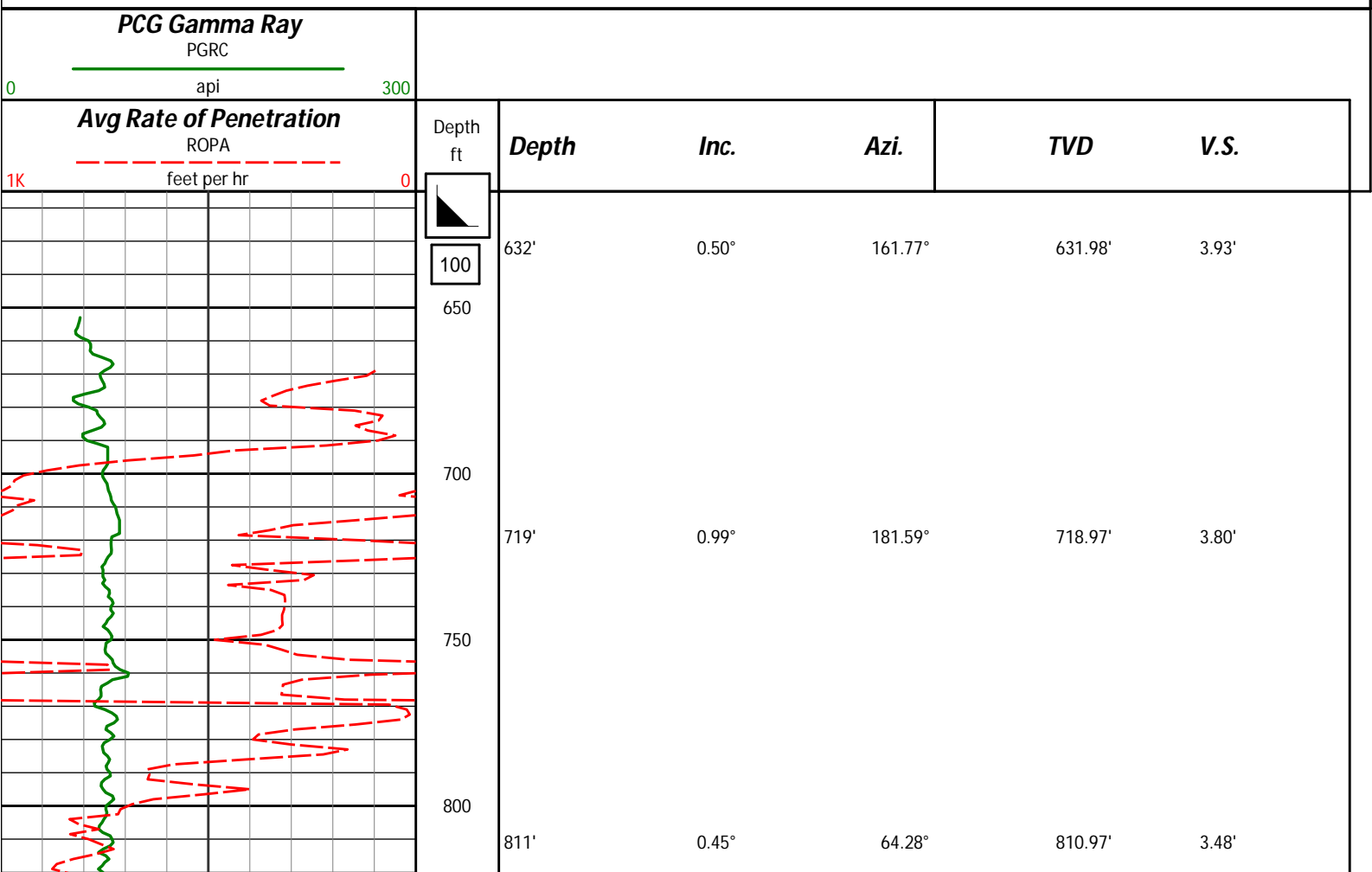
## REMARKS

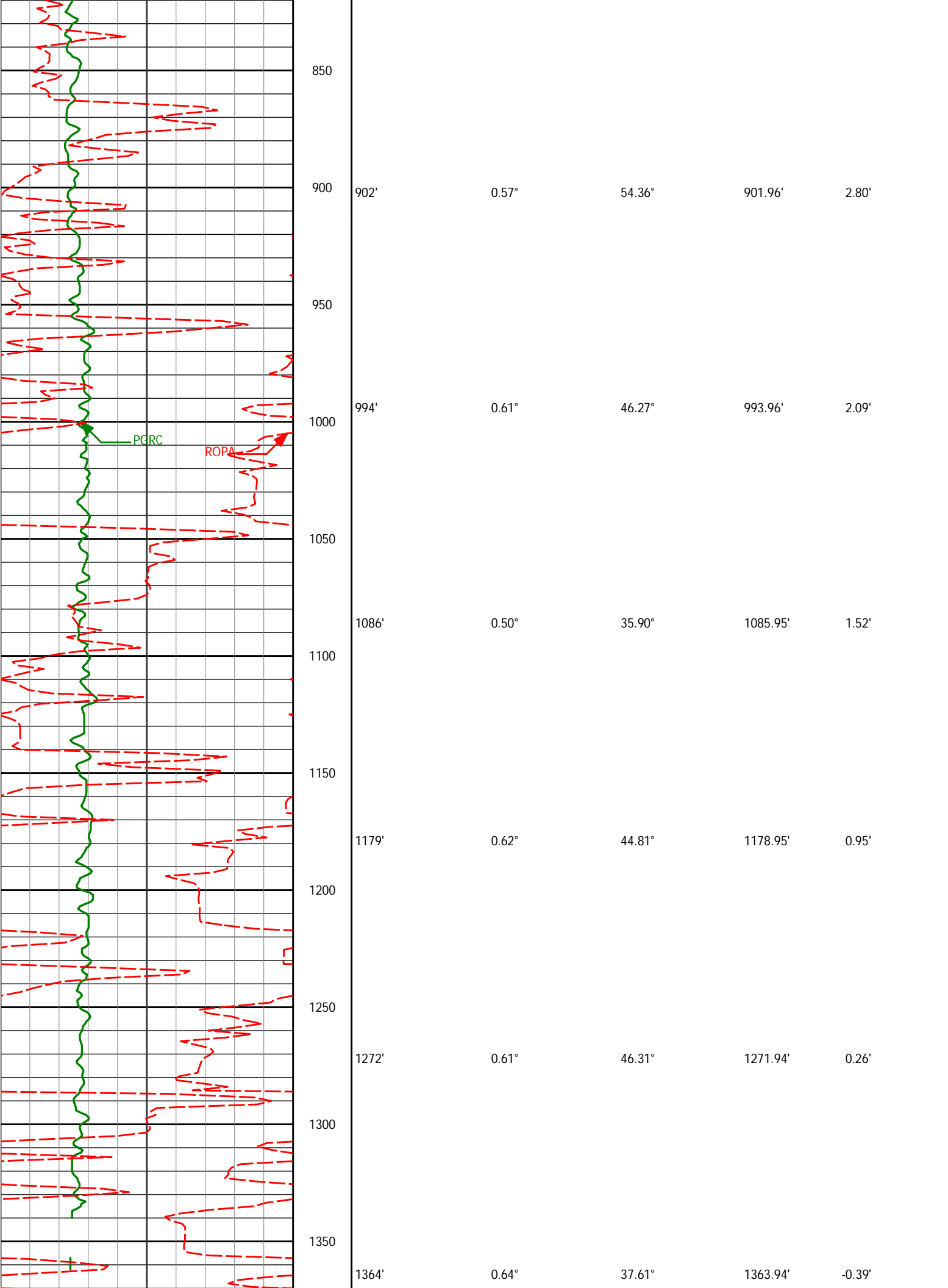
1. All depths are calibrated to driller's pipe tally and are Measured from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil 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

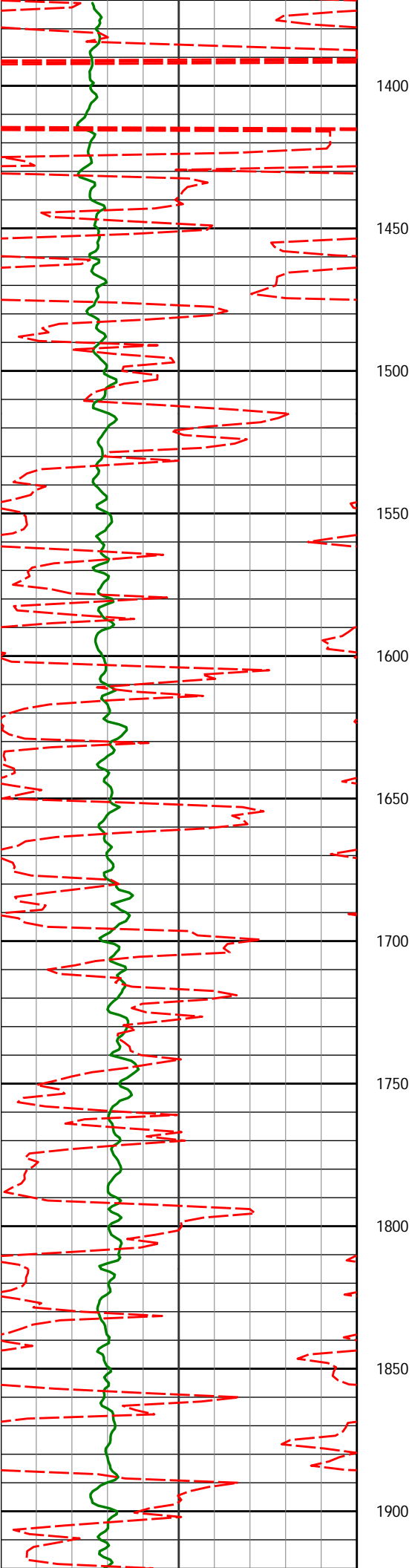
## 6. Insite Version V8.0.10

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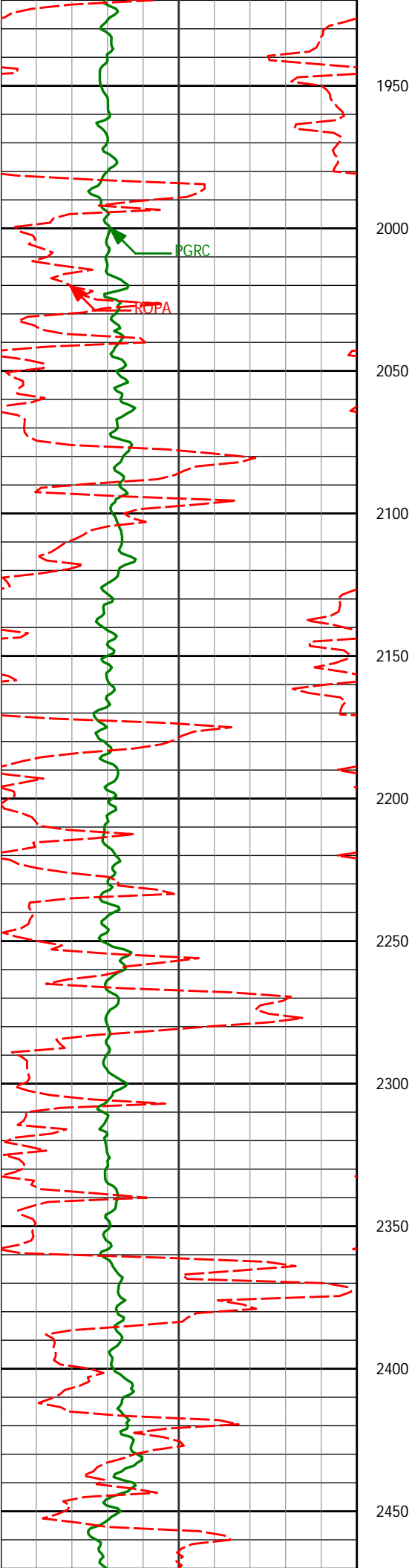
Noble Energy  
Wells Ranch AE30-65-1HNC  
H&P 321  
Sec. 29-T6N-R62W



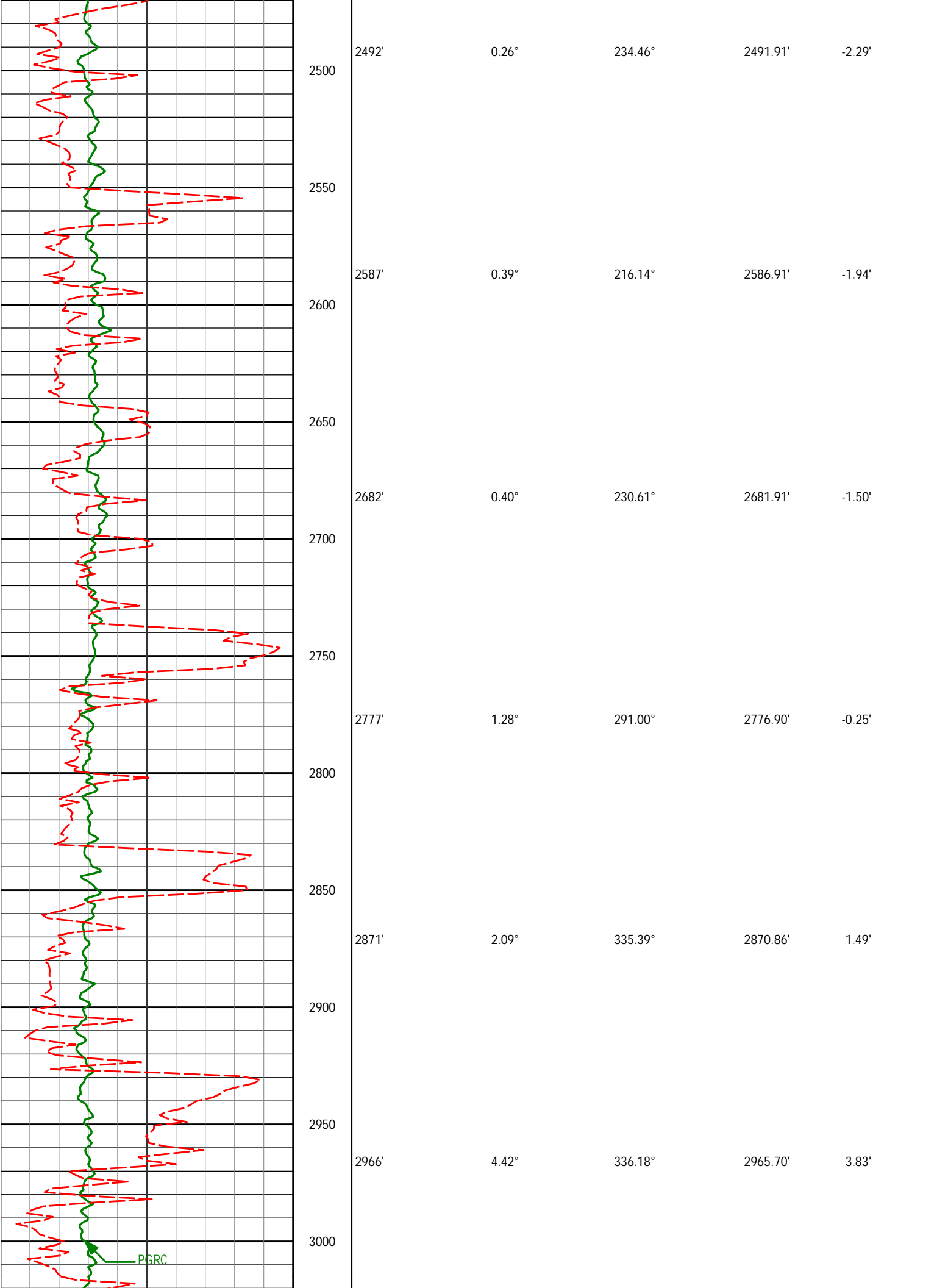


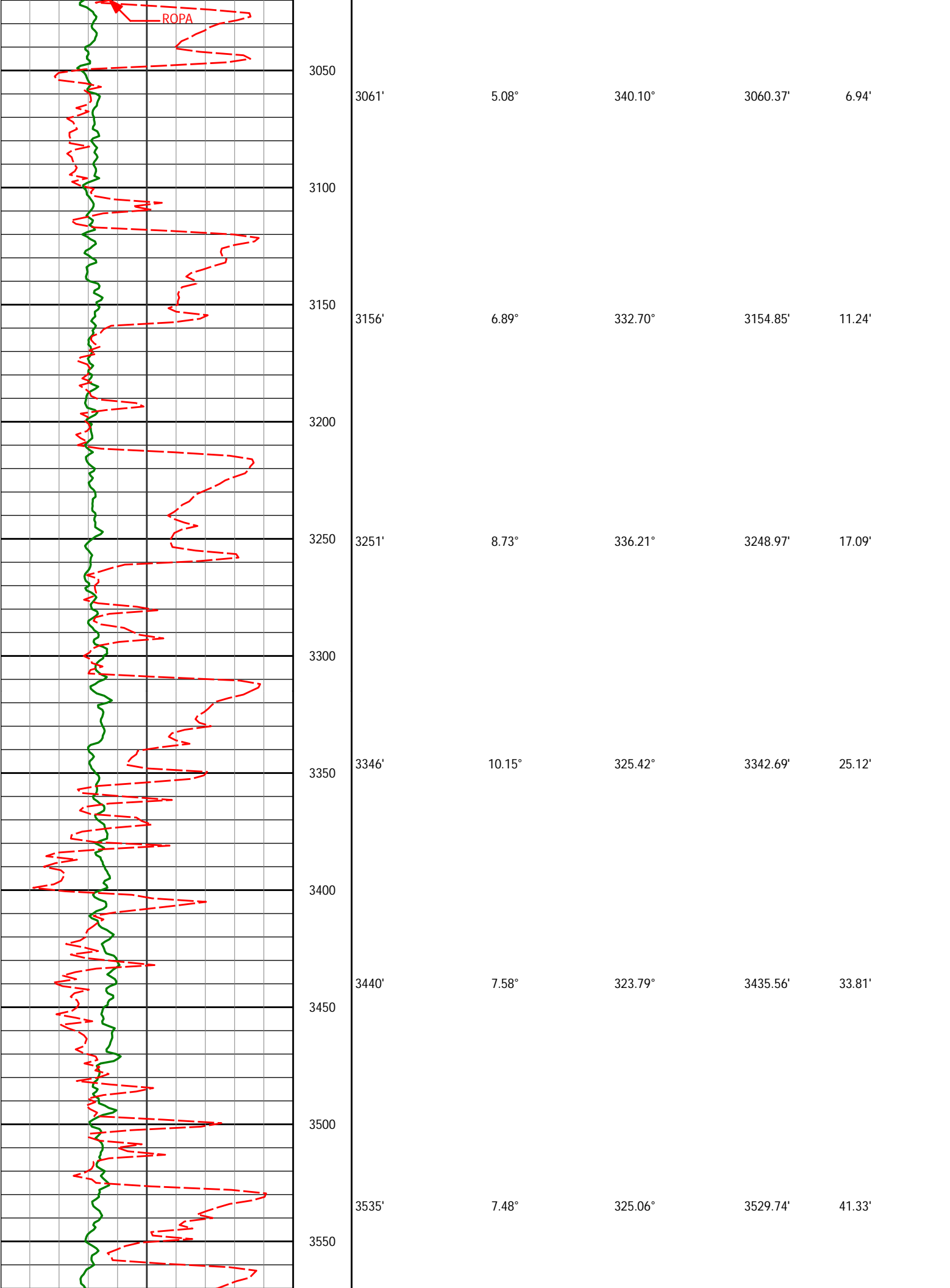


1400				
1450				
1456'	0.92°	46.30°	1455.93'	-1.21'
1500				
1550				
1548'	0.41°	187.23°	1547.93'	-1.70'
1600				
1650				
1640'	0.28°	163.01°	1639.93'	-1.74'
1700				
1750				
1735'	0.37°	154.48°	1734.92'	-1.95'
1800				
1850				
1830'	0.34°	165.54°	1829.92'	-2.17'
1900				

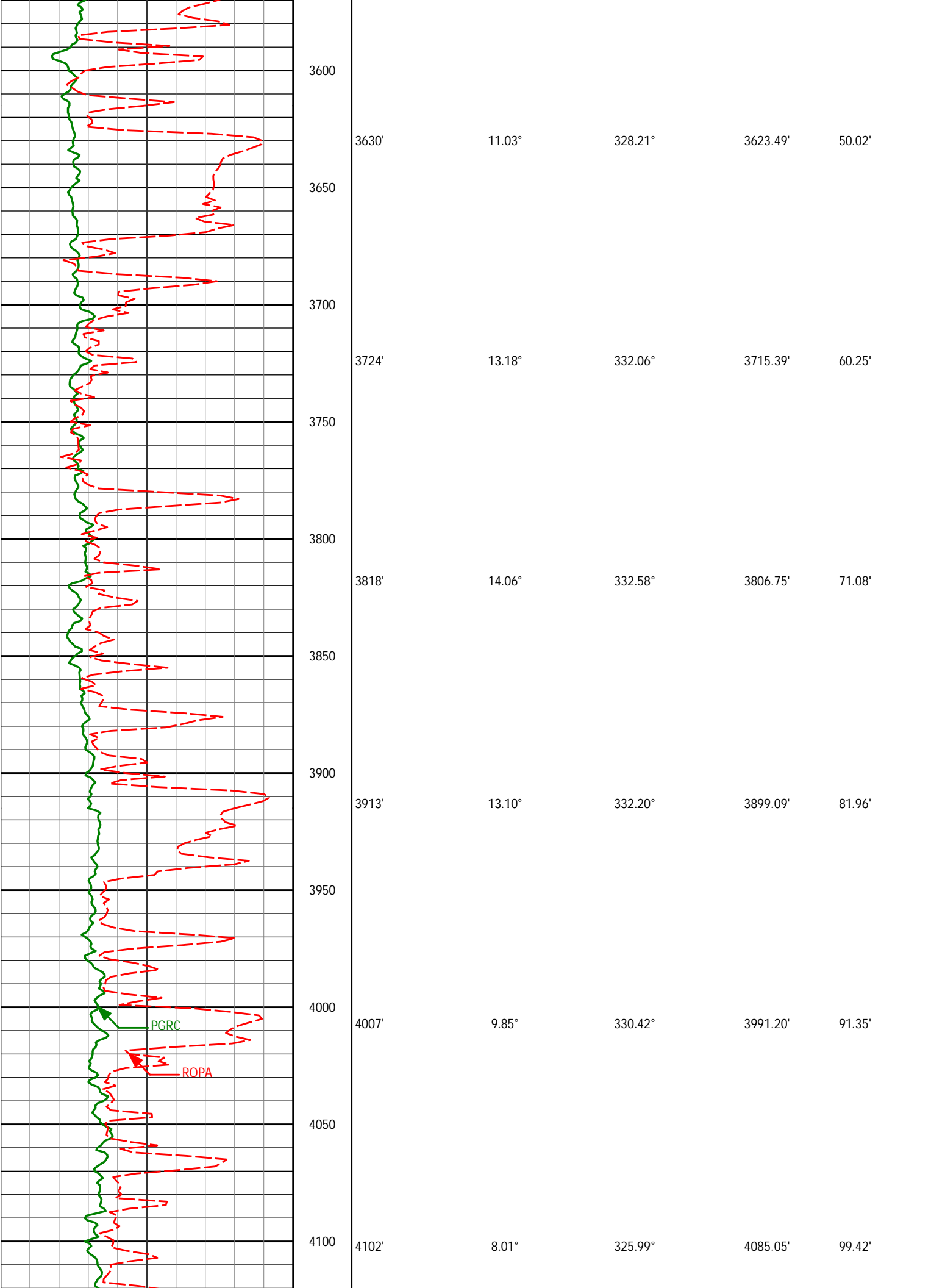


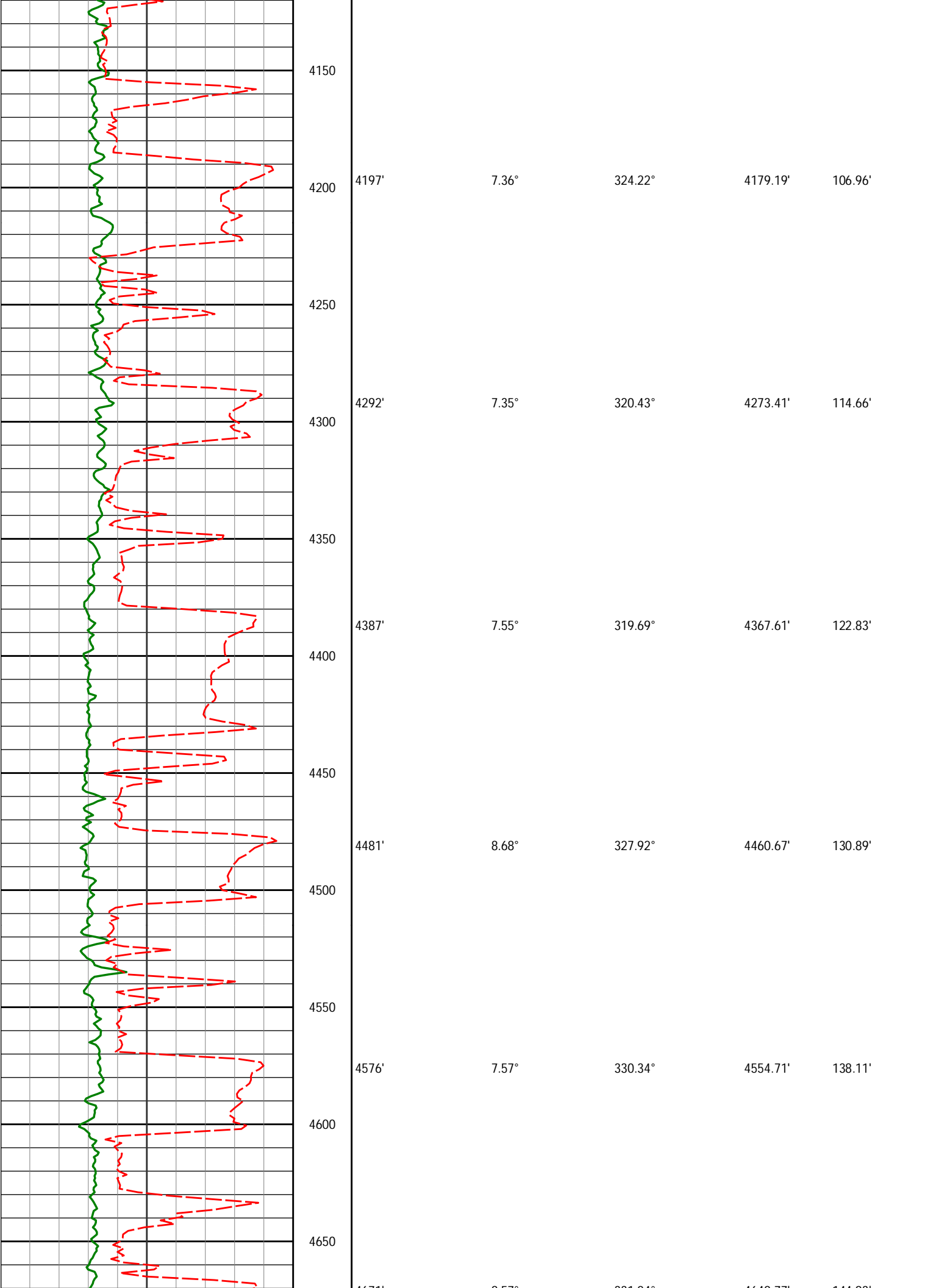
1924'	0.17°	191.15°	1923.92'	-2.22'
1950				
2000				
2019'	0.19°	100.65°	2018.92'	-2.35'
2050				
2100				
2114'	0.34°	100.57°	2113.92'	-2.79'
2150				
2200				
2209'	0.50°	130.71°	2208.92'	-3.39'
2250				
2300				
2303'	0.59°	249.19°	2302.92'	-3.26'
2350				
2400	0.33°	220.81°	2397.91'	-2.63'
2450				

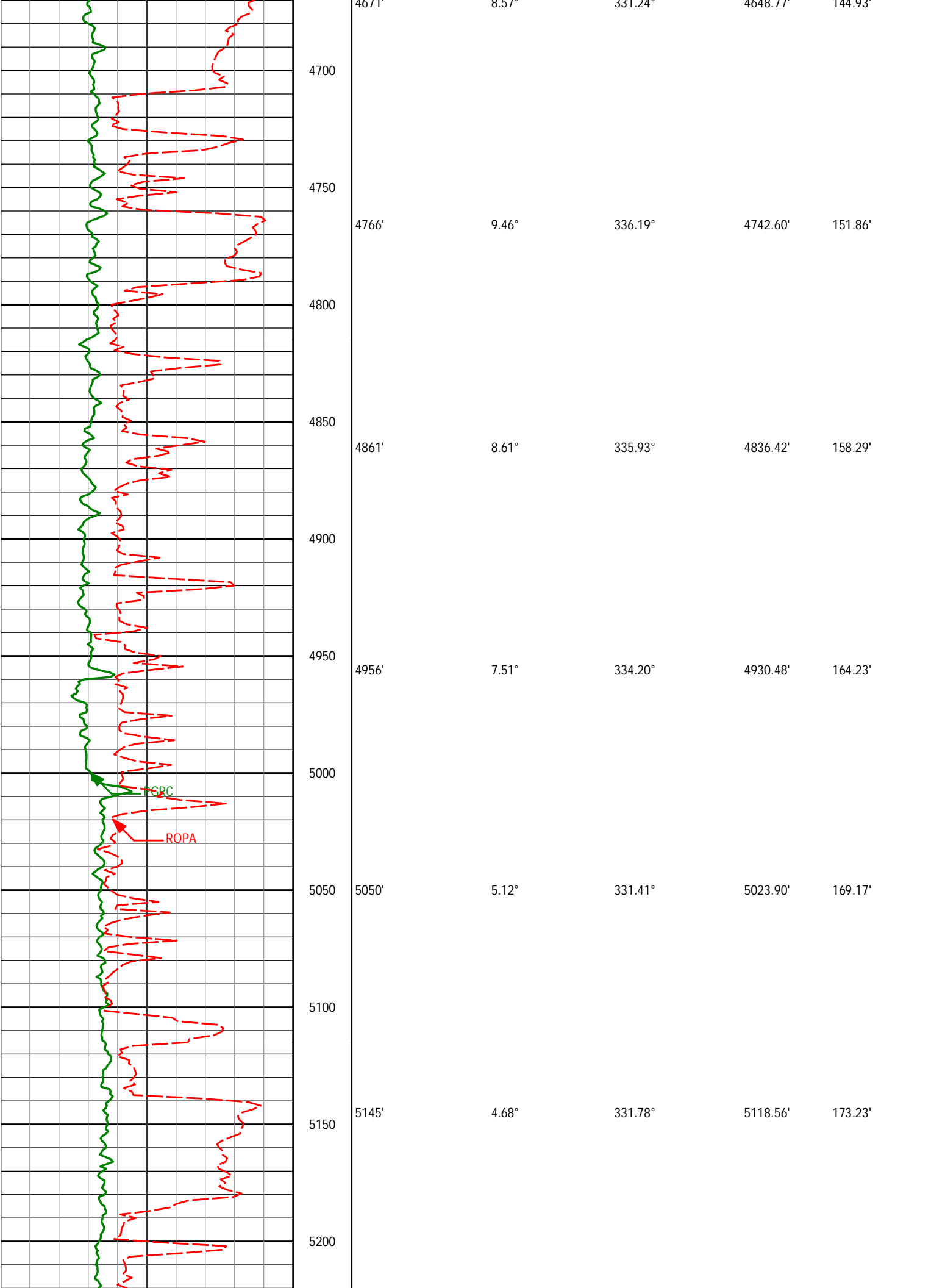


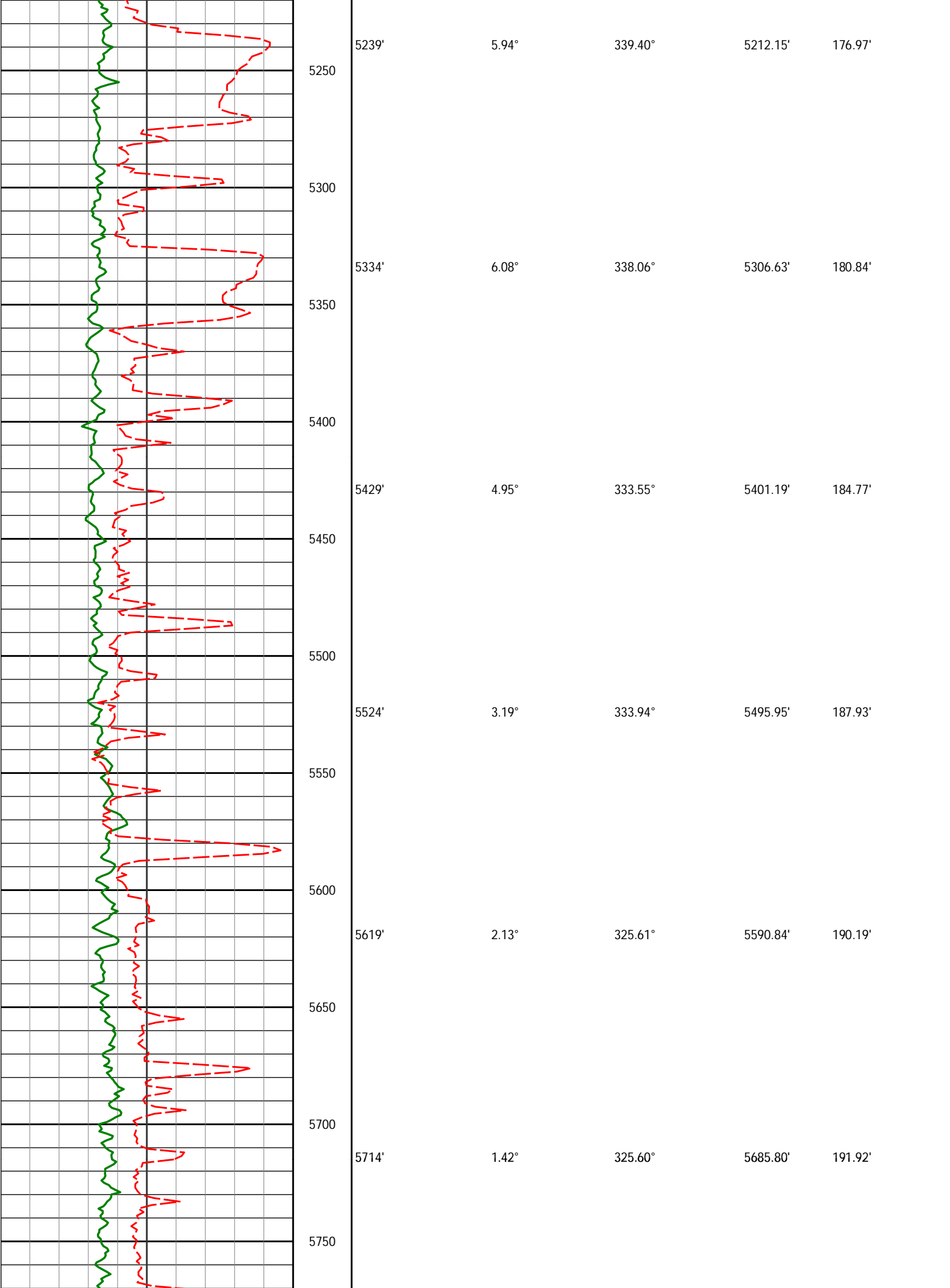


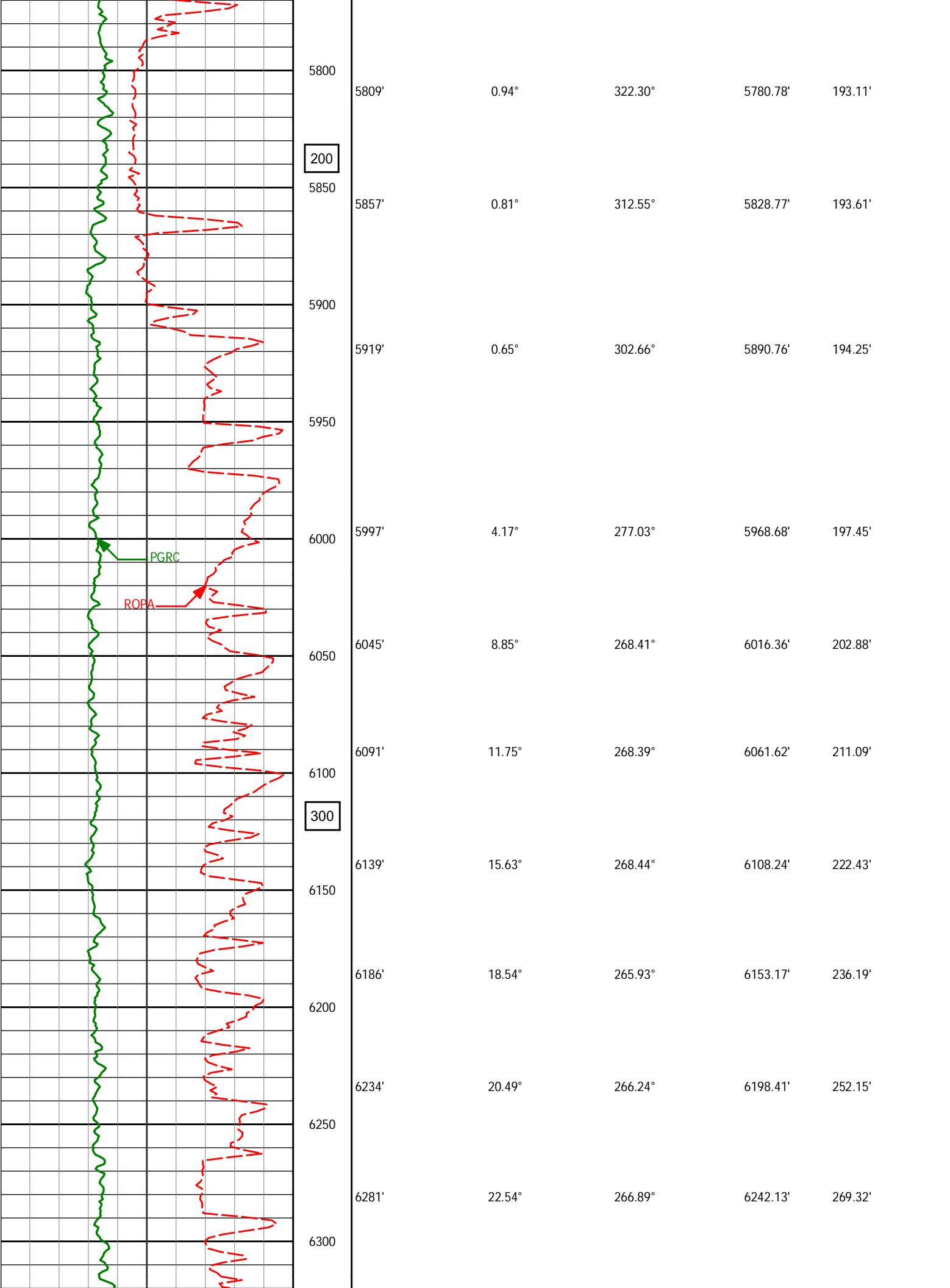


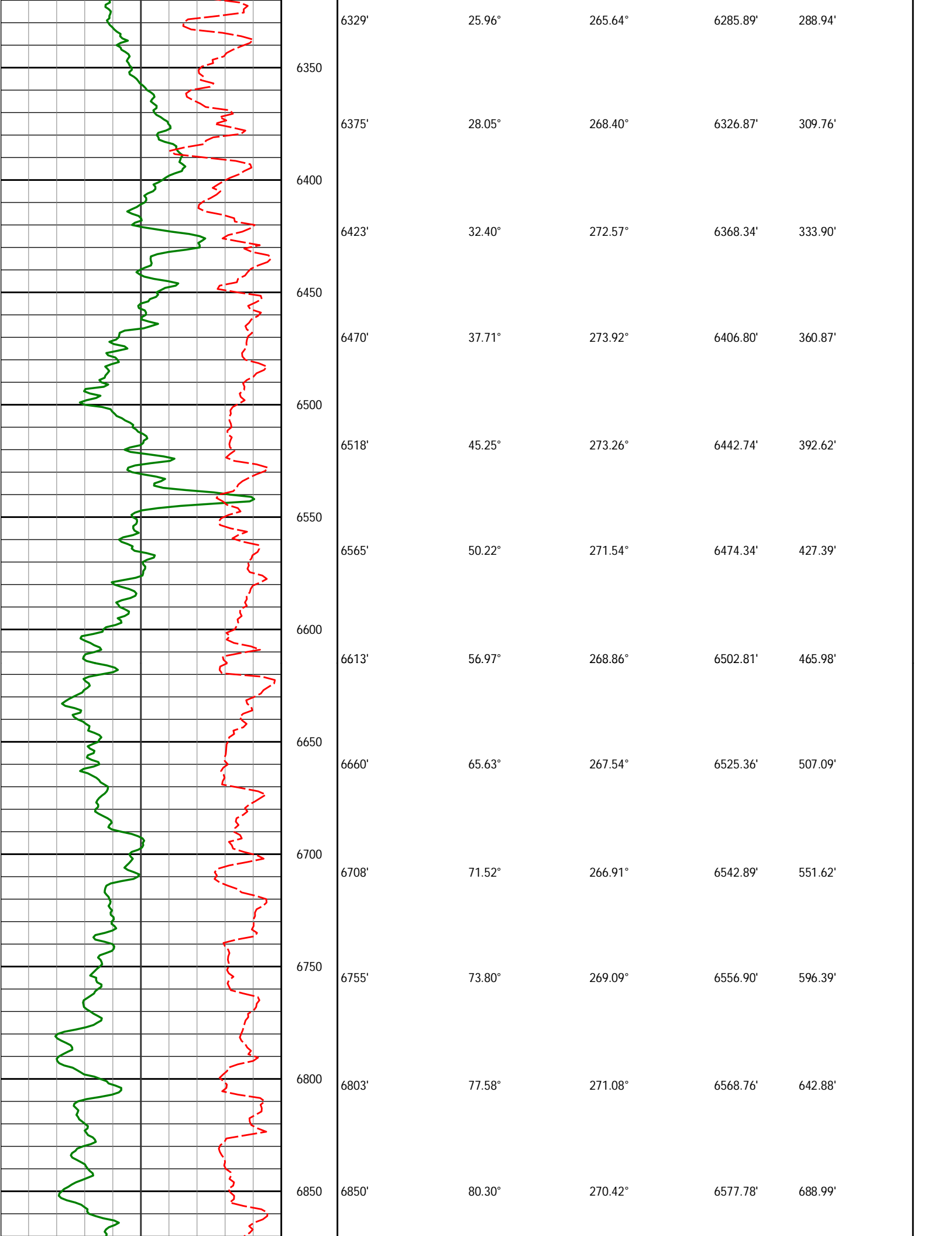


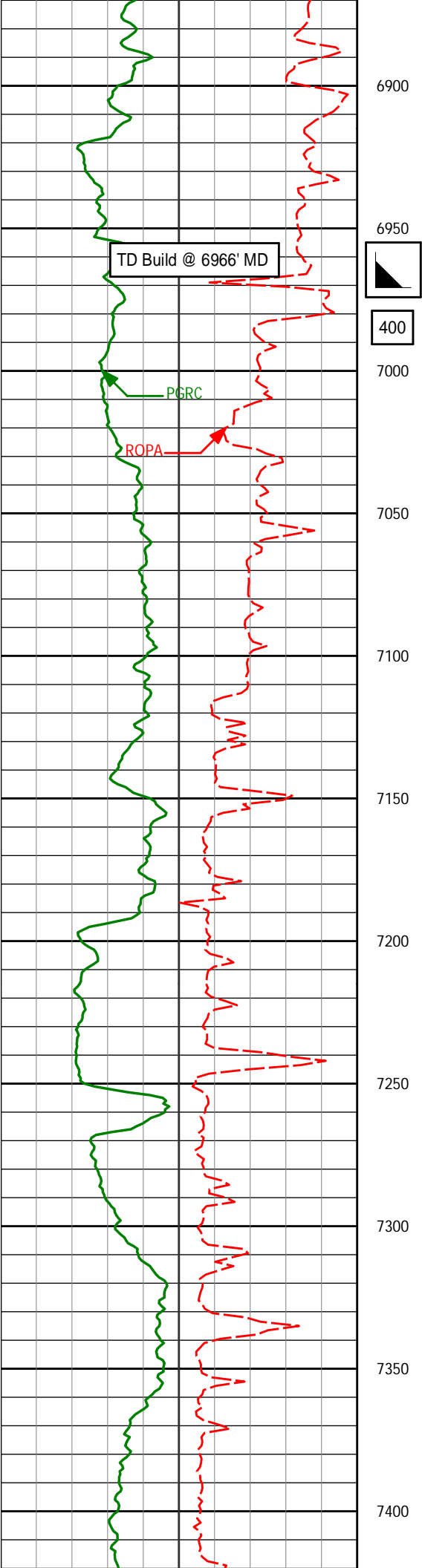




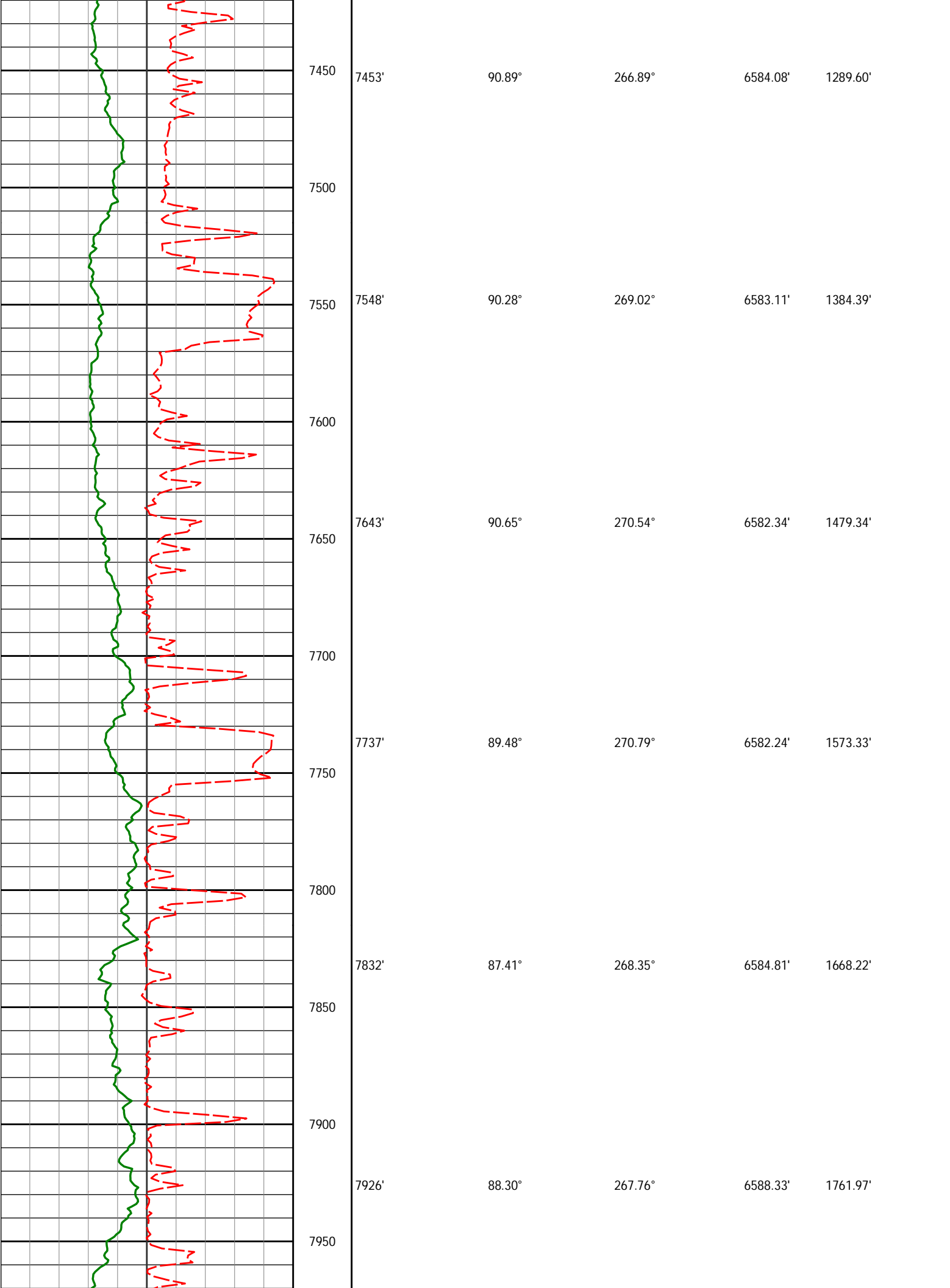




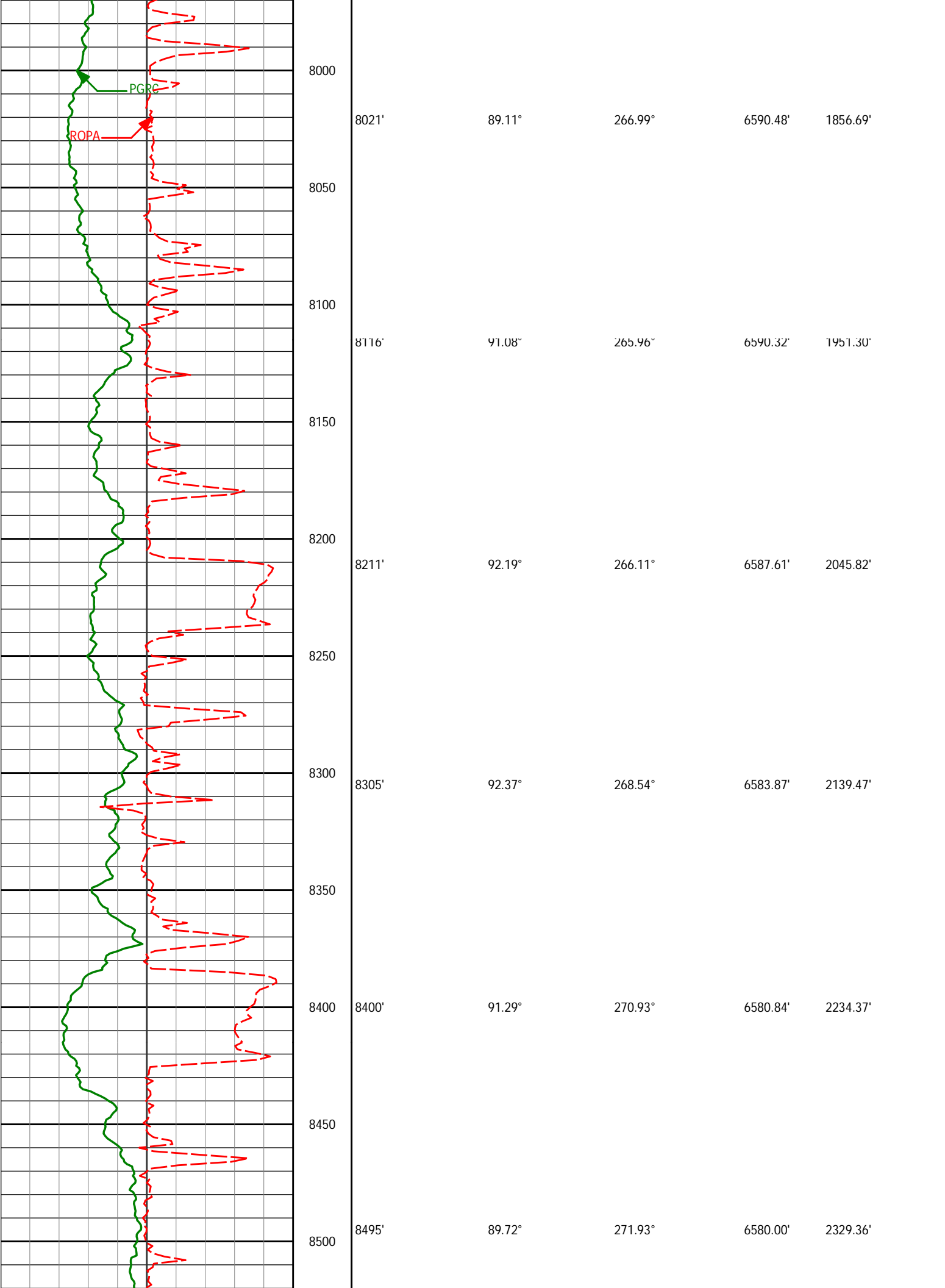


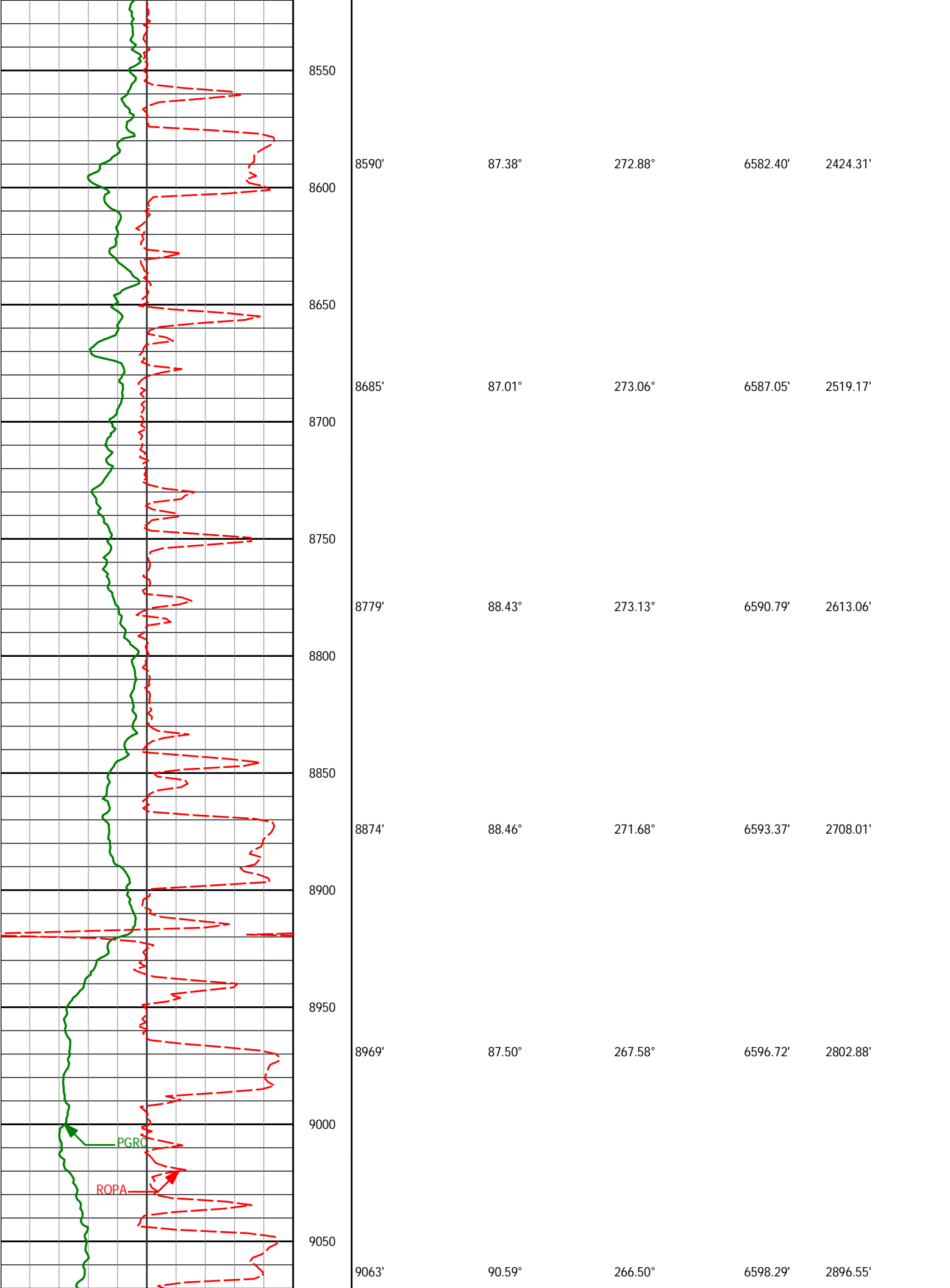


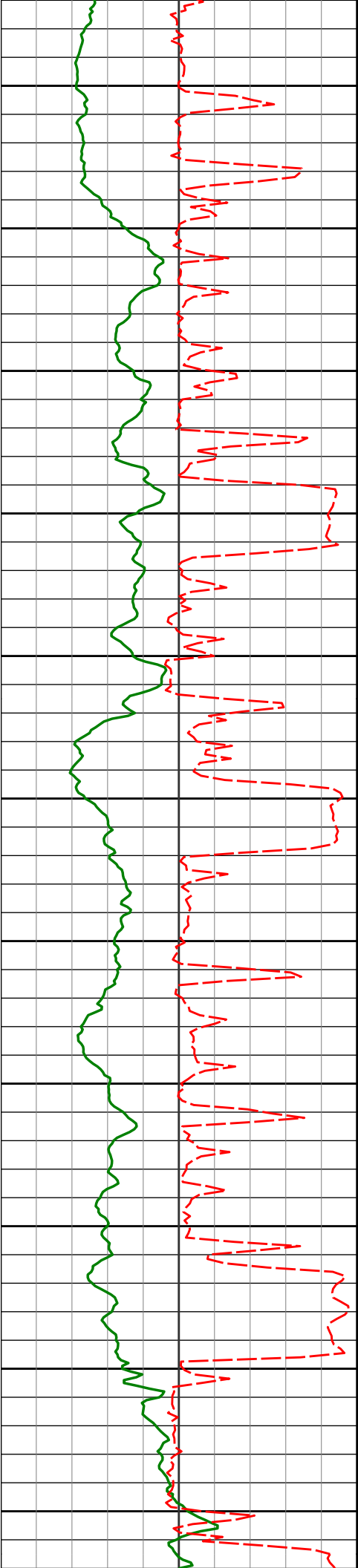
6911'	86.86°	267.18°	6584.59'	749.50'
6992'	90.31°	267.10°	6586.59'	830.21'
7085'	90.40°	266.41°	6586.02'	922.88'
7177'	90.28°	266.84°	6585.47'	1014.53'
7269'	89.97°	267.01°	6585.27'	1106.22'
7361'	90.31°	266.83°	6585.05'	1197.92'











9100

9150

9200

9250

9300

9350

9400

9450

9500

9550

9600

9158'

92.25°

266.05°

6595.93'

2991.11'

9253'

92.34°

267.56°

6592.13'

3085.70'

9347'

92.25°

267.42°

6588.36'

3179.38'

9442'

91.82°

268.22°

6584.99'

3274.11'

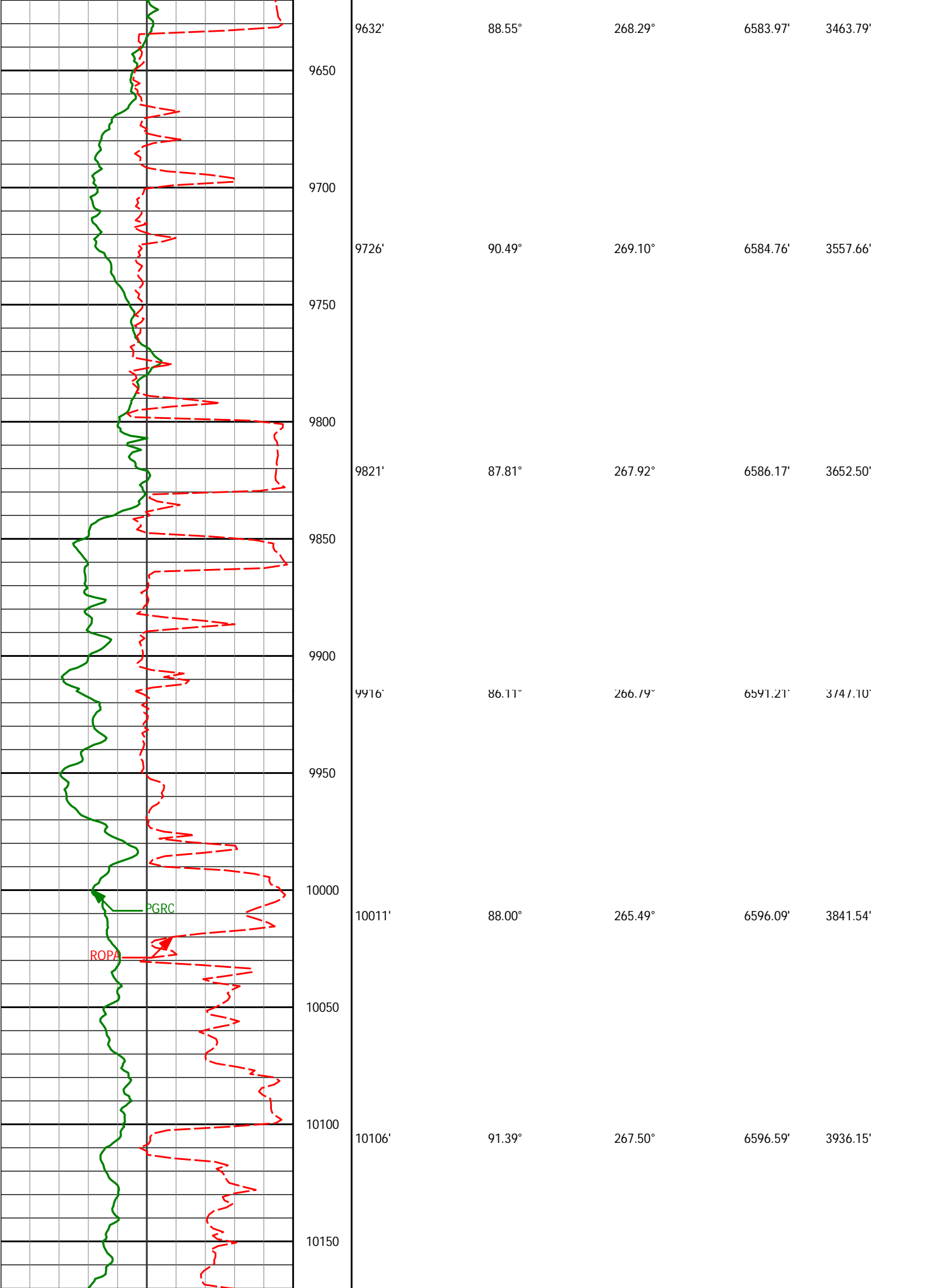
9537'

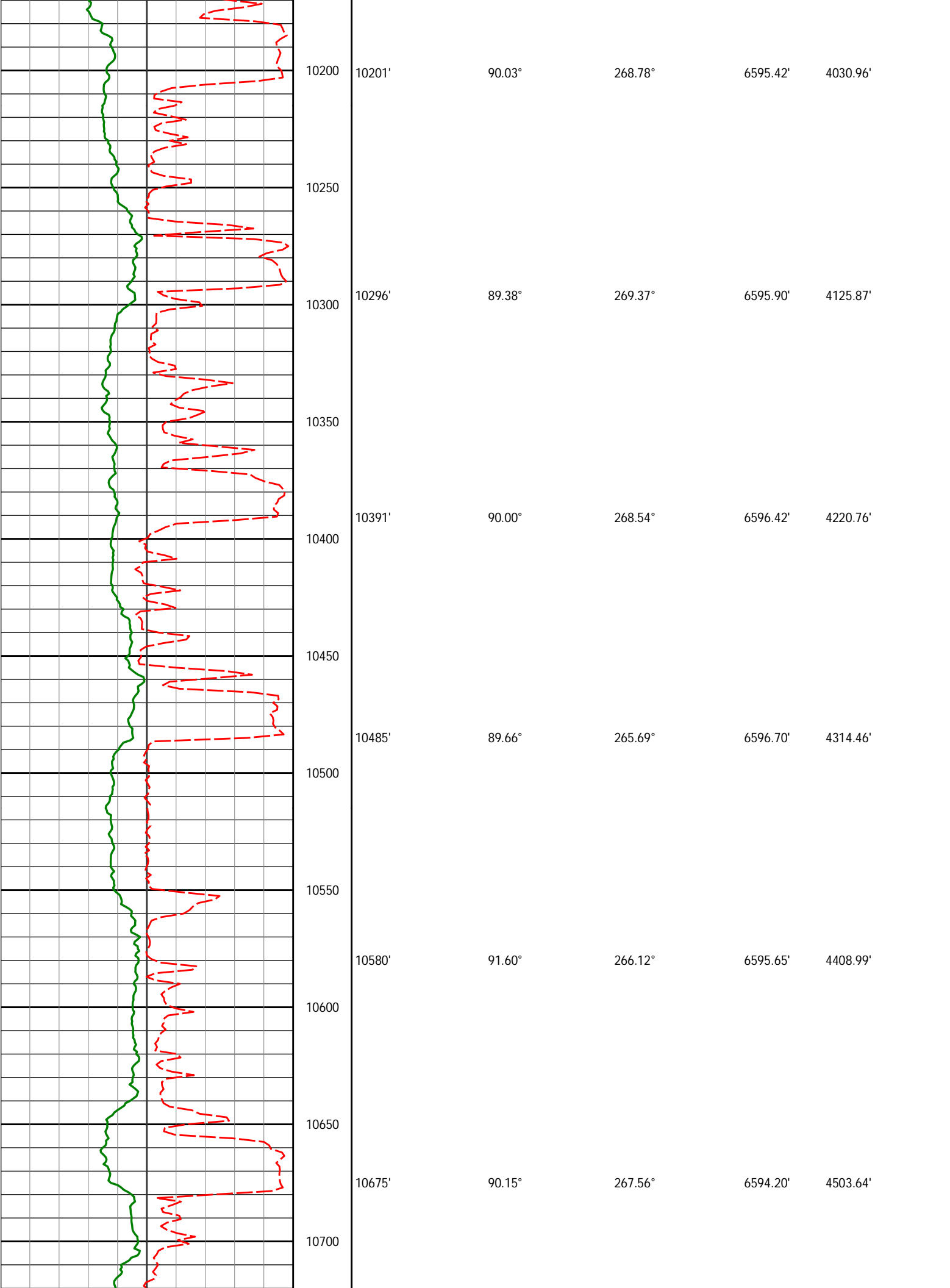
90.43°

268.57°

6583.13'

3368.95'





10200

10201'

90.03°

268.78°

6595.42'

4030.96'

10250

10300

10296'

89.38°

269.37°

6595.90'

4125.87'

10350

10400

10391'

90.00°

268.54°

6596.42'

4220.76'

10450

10500

10485'

89.66°

265.69°

6596.70'

4314.46'

10550

10600

10580'

91.60°

266.12°

6595.65'

4408.99'

10650

10700

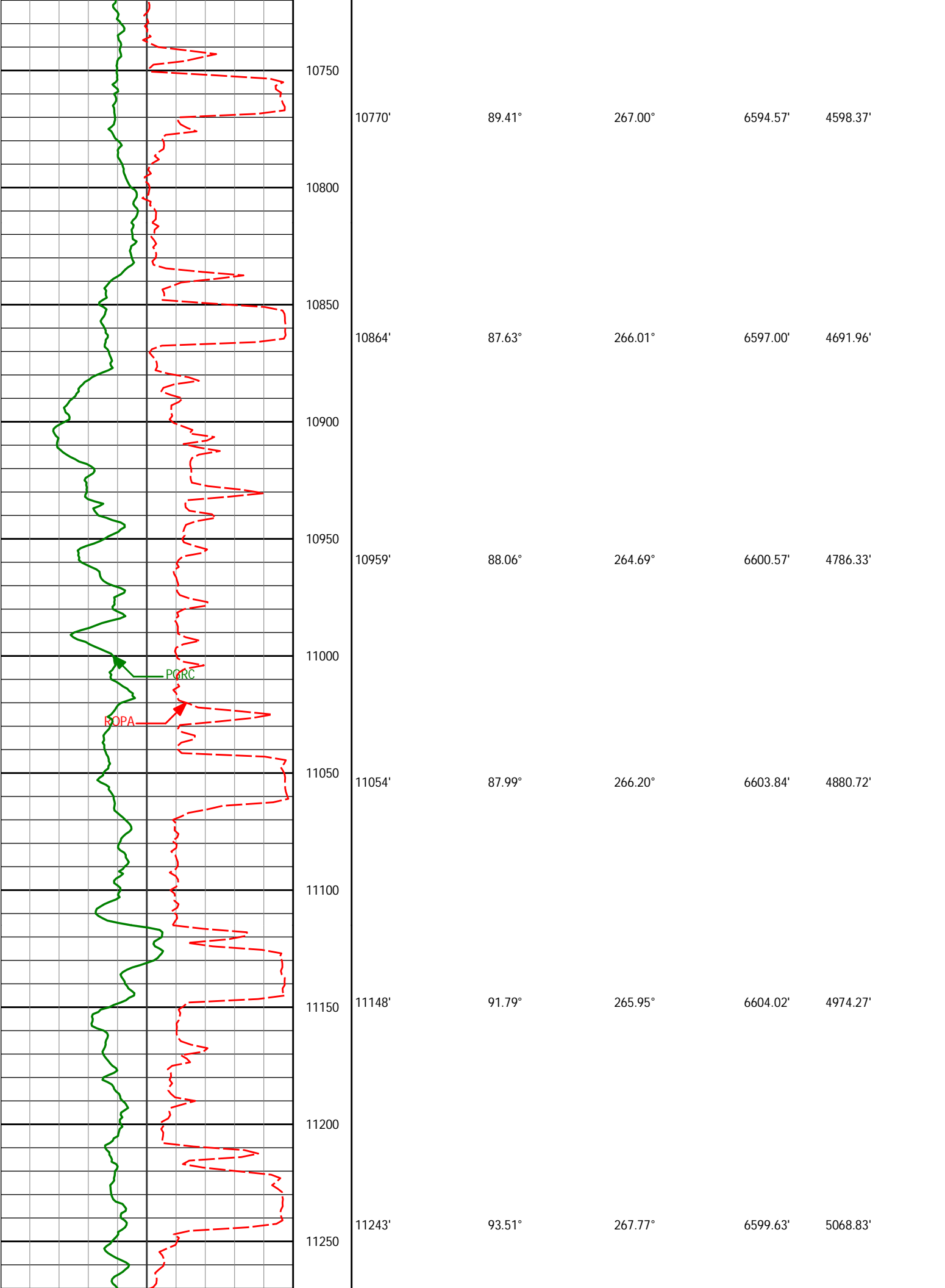
10675'

90.15°

267.56°

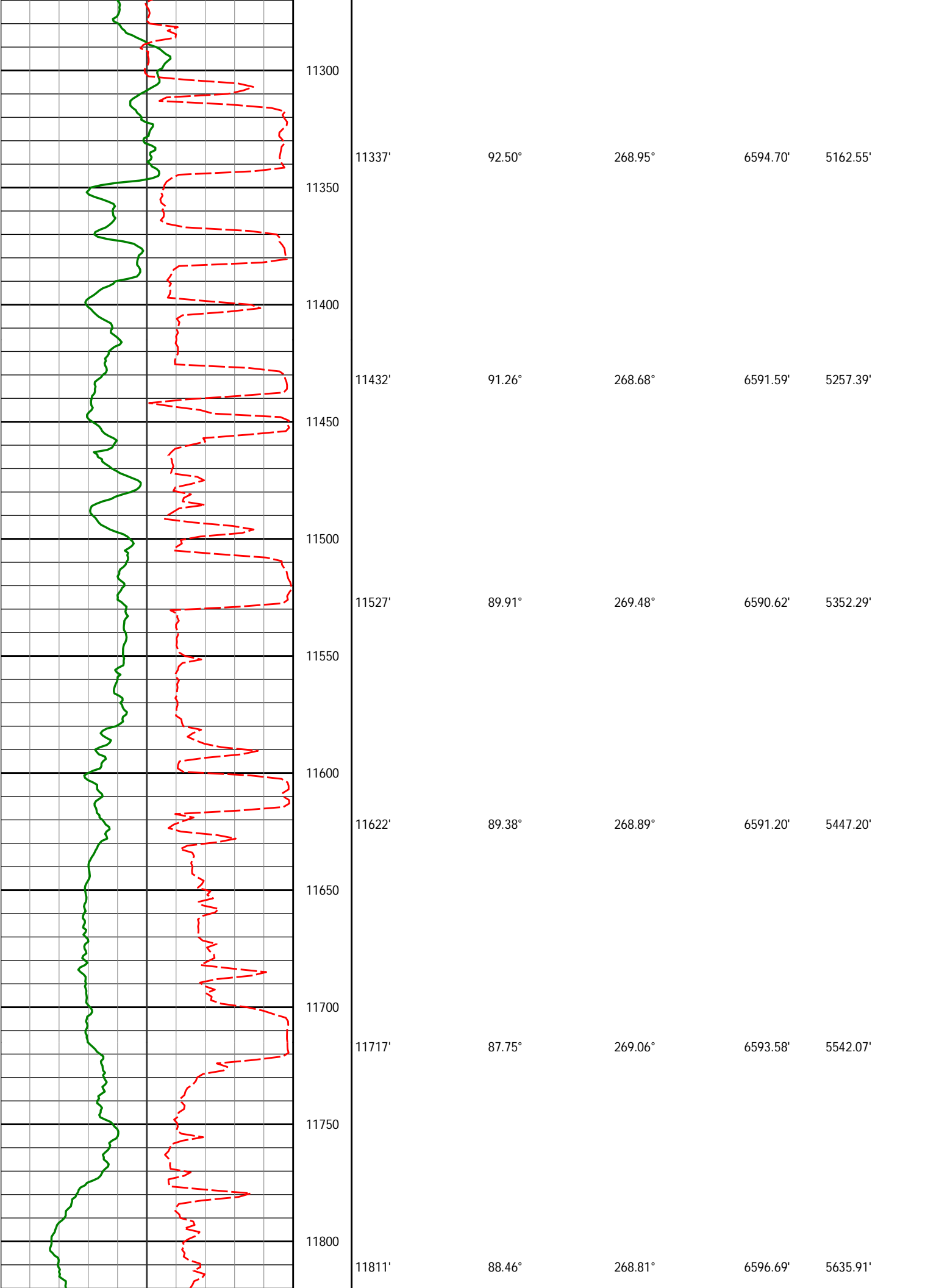
6594.20'

4503.64'



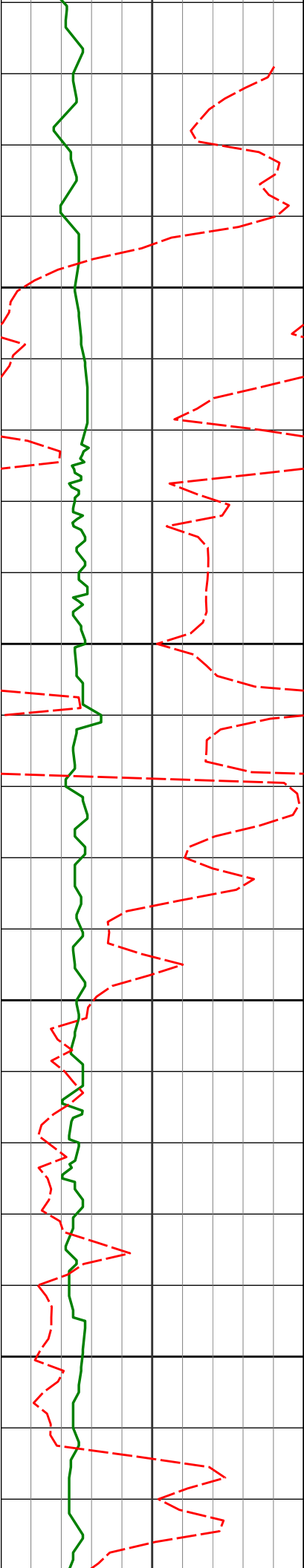
PGRC

ROPA









700

750

800

850

719'

0.99°

181.59°

718.97'

3.80'

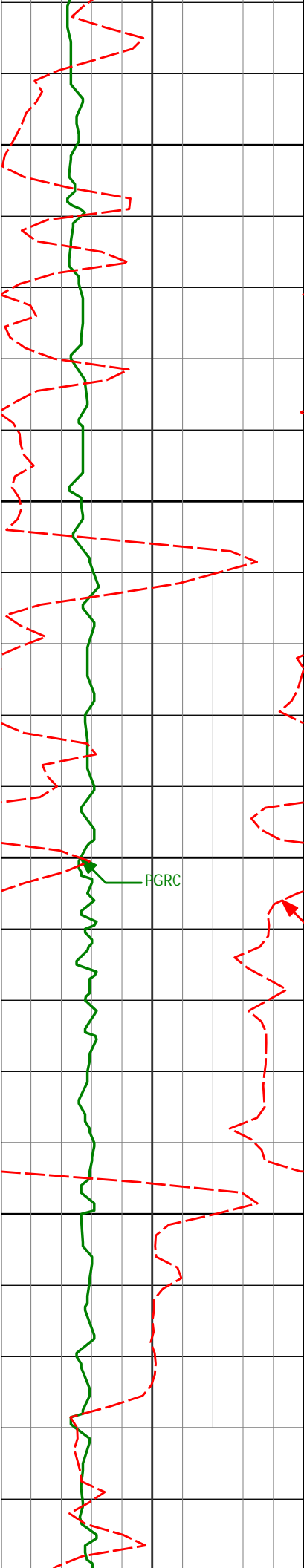
811'

0.45°

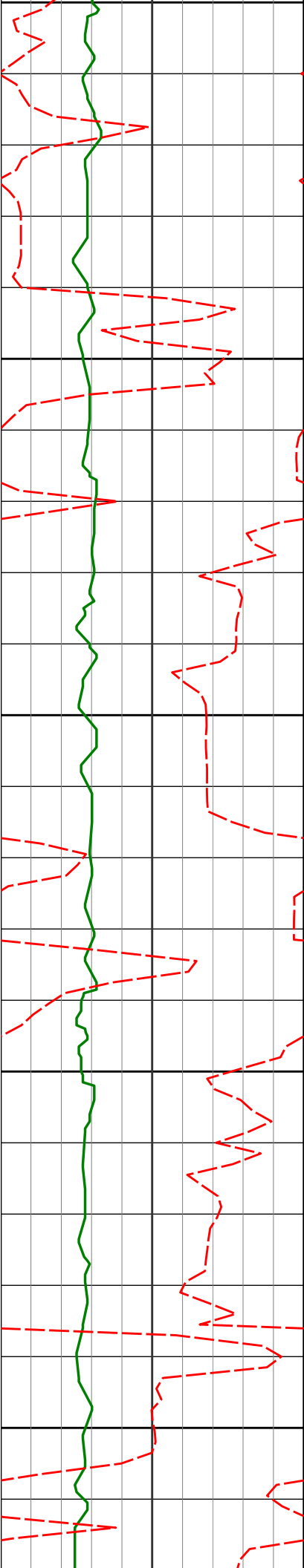
64.28°

810.97'

3.48'



900	902'	0.57°	54.36°	901.96'	2.80'
950					
994'	0.61°	46.27°	993.96'	2.09'	
1000					
1050					
1086'	0.50°	35.90°	1085.95'	1.52'	
1100					



1150

1300

1179'

0.62°

44.81°

1178.95'

0.95'

1250

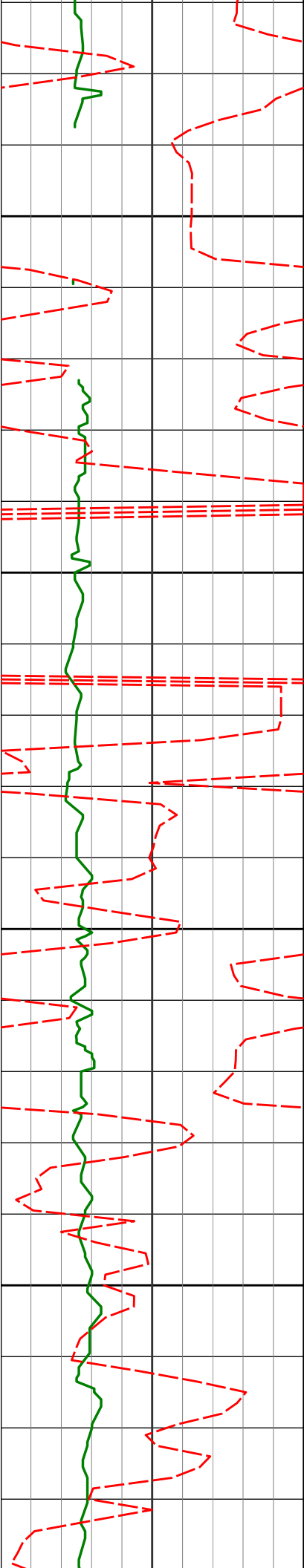
1272'

0.61°

46.31°

1271.94'

0.26'



1350

1364'

0.64°

37.61°

1363.94'

-0.39'

1400

1450

1456'

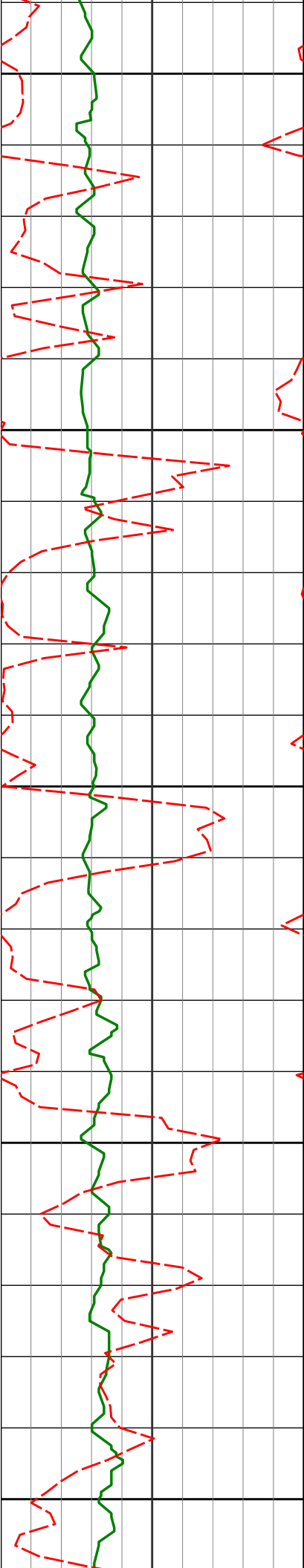
0.92°

46.30°

1455.93'

-1.21'

1500



1550

1600

1650

1700

1750

1548'

1640'

1735'

0.41°

0.28°

0.37°

187.23°

163.01°

154.48°

1547.93'

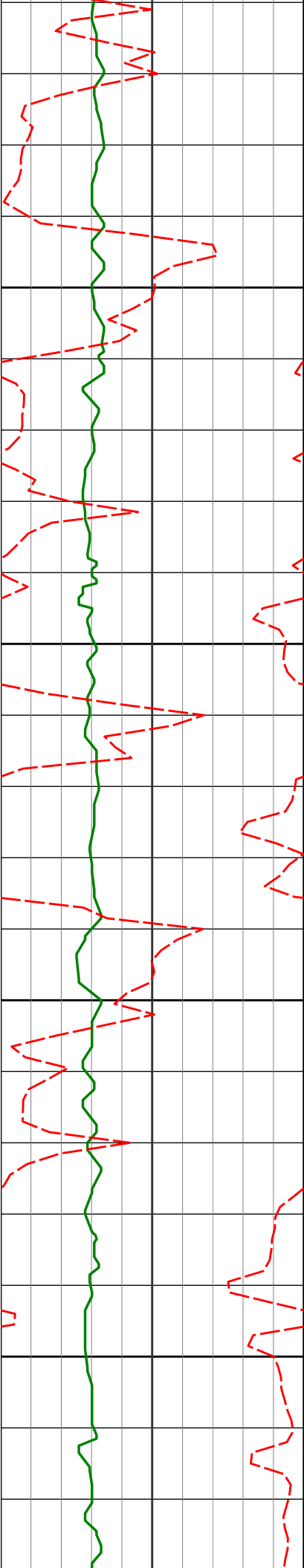
1639.93'

1734.92'

-1.70'

-1.74'

-1.95'



1800

1850

1900

1950

1830'

1924'

1950'

0.34°

0.17°

165.54°

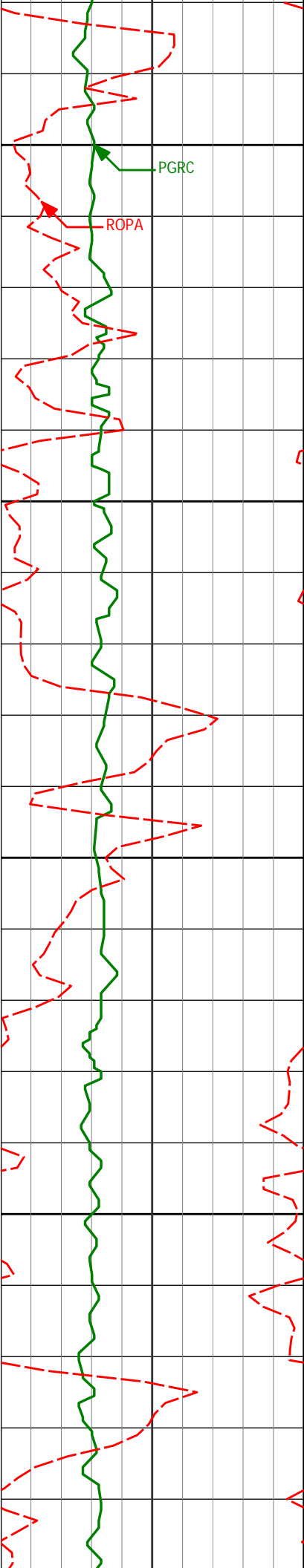
191.15°

1829.92'

1923.92'

-2.17'

-2.22'



2000

PGRC

ROPA

2019'

0.19°

100.65°

2018.92'

-2.35'

2050

2100

2114'

0.34°

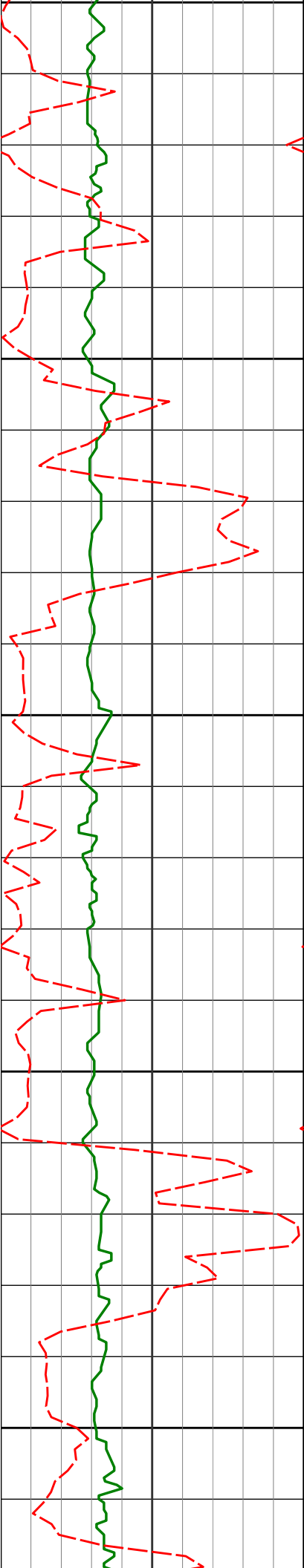
100.57°

2113.92'

-2.79'

2150

2200



2200  
2209'  
2250  
2300  
2303'  
2350  
2400  
2398'

0.50°

130.71°

2208.92'

-3.39'

0.59°

249.19°

2302.92'

-3.26'

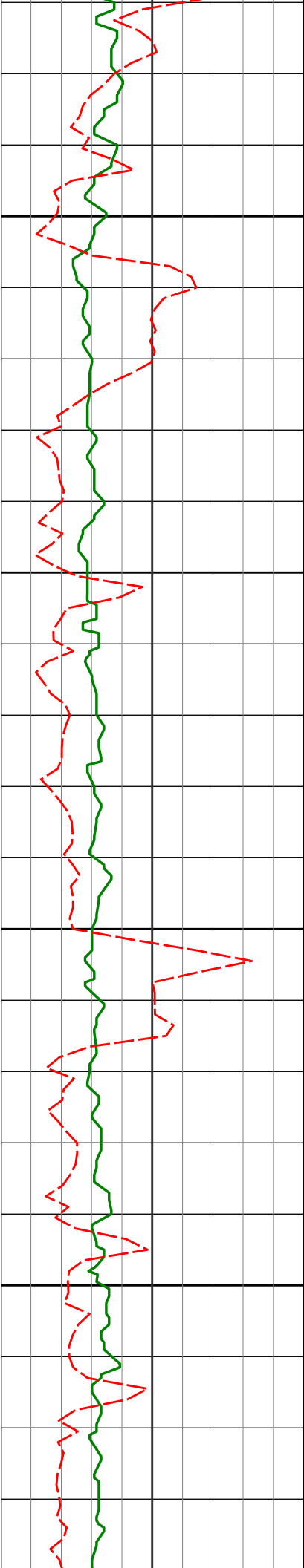
0.33°

220.81°

2397.91'

-2.63'





2450

2492'

0.26°

234.46°

2491.91'

-2.29'

2500

2550

2587'

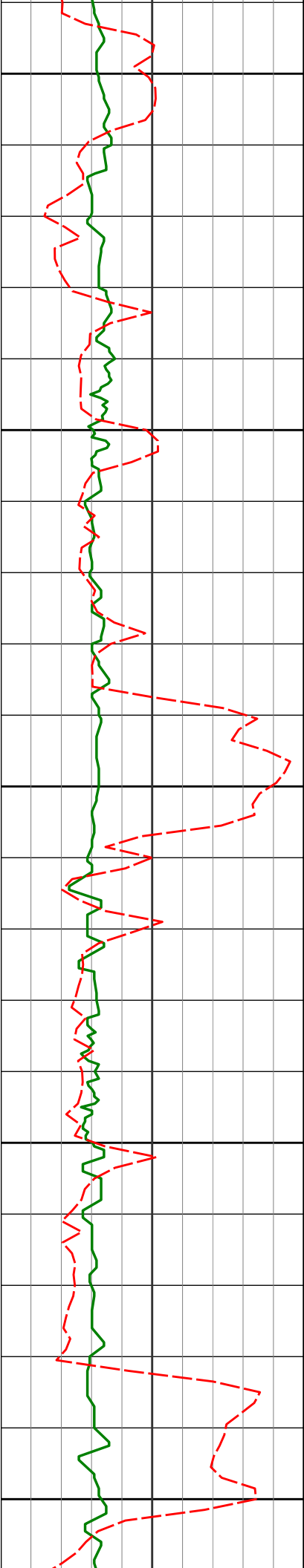
0.39°

216.14°

2586.91'

-1.94'

2600



2650

2682'

0.40°

230.61°

2681.91'

-1.50'

2700

2750

2777'

1.28°

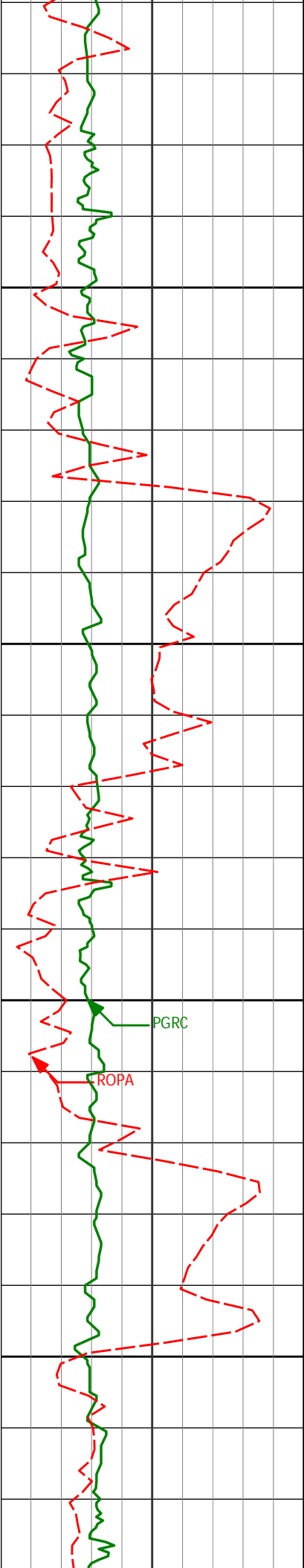
291.00°

2776.90'

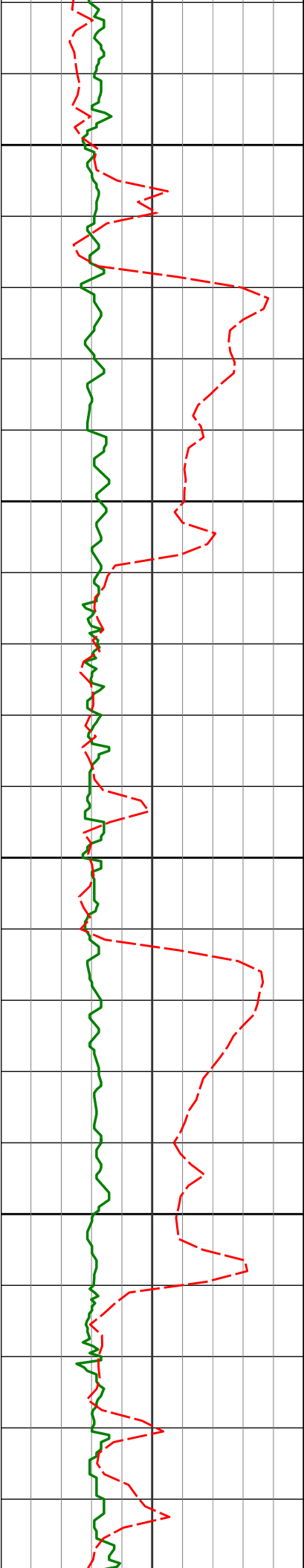
-0.25'

2800

2850



	2871'	2.09°	335.39°	2870.86'	1.49'
2900					
2950					
2966'	4.42°	336.18°	2965.70'	3.83'	
3000					
3050					
3061'	5.08°	340.10°	3060.37'	6.94'	



3100

3150

3200

3250

3300

3156'

6.89°

332.70°

3154.85'

11.24'

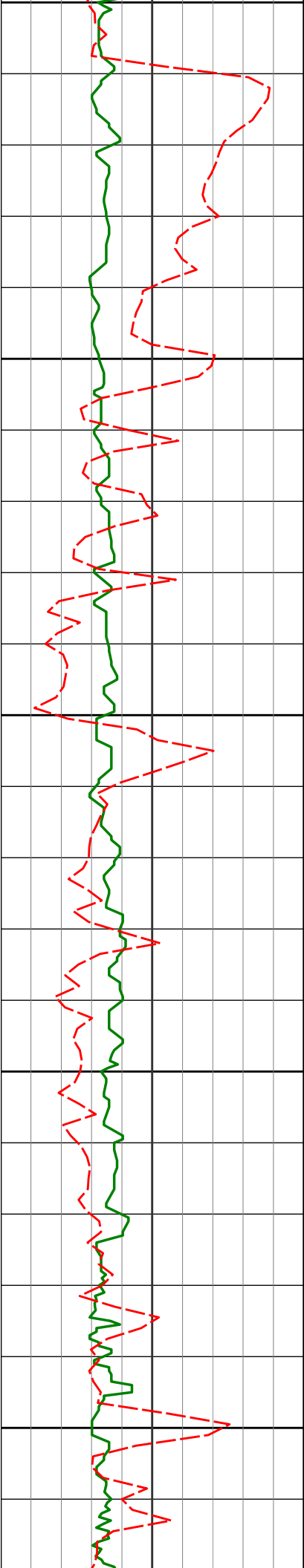
3251'

8.73°

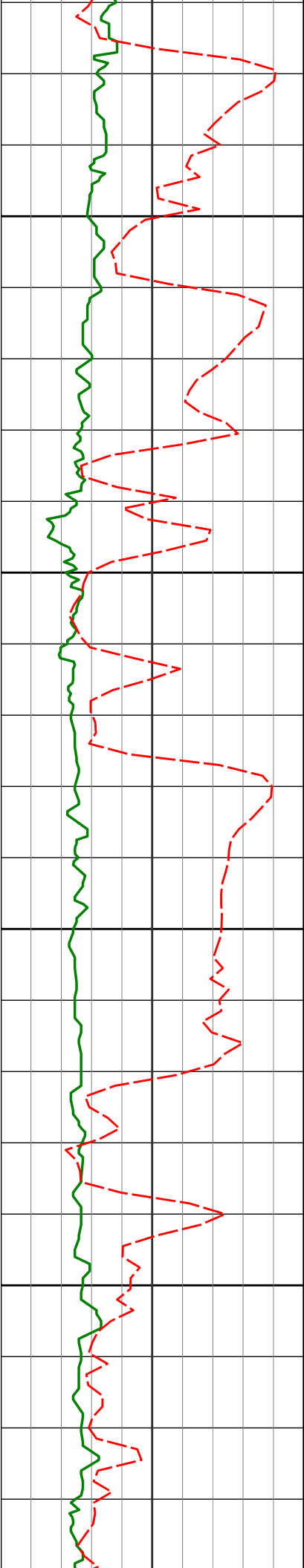
336.21°

3248.97'

17.09'



3300				
3346'	10.15°	325.42°	3342.69'	25.12'
3350				
3400				
3440'	7.58°	323.79°	3435.56'	33.81'
3450				
3500				



3535'

7.48°

325.06°

3529.74'

41.33'

3550

3600

3630'

11.03°

328.21°

3623.49'

50.02'

3650

3700

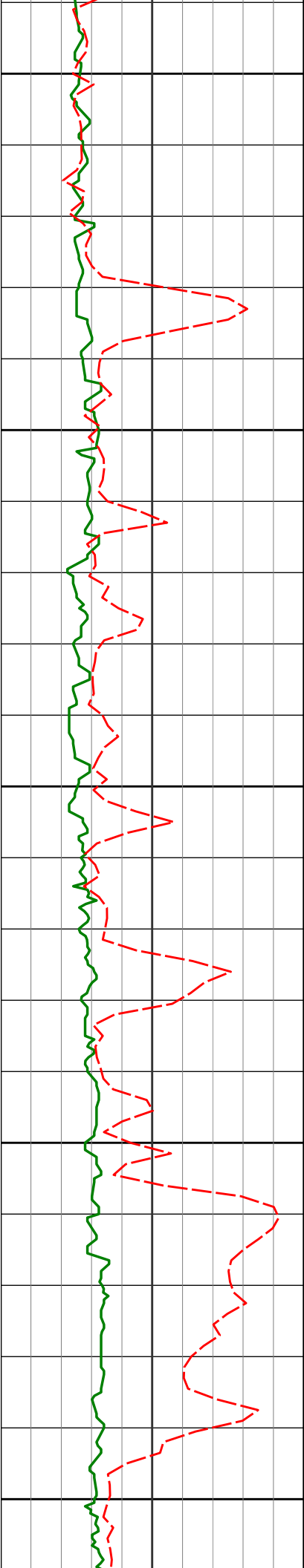
3724'

13.18°

332.06°

3715.39'

60.25'



3750

3800

3850

3900

3950

3818'

14.06°

332.58°

3806.75'

71.08'

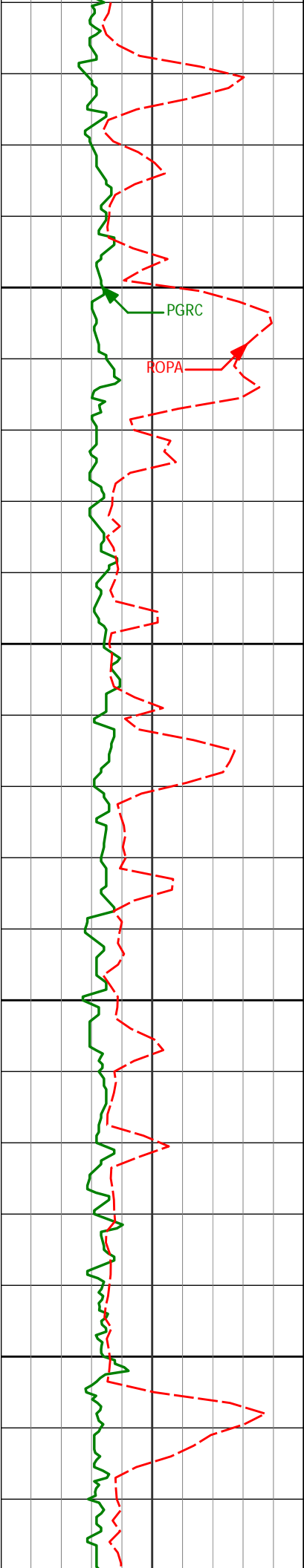
3913'

13.10°

332.20°

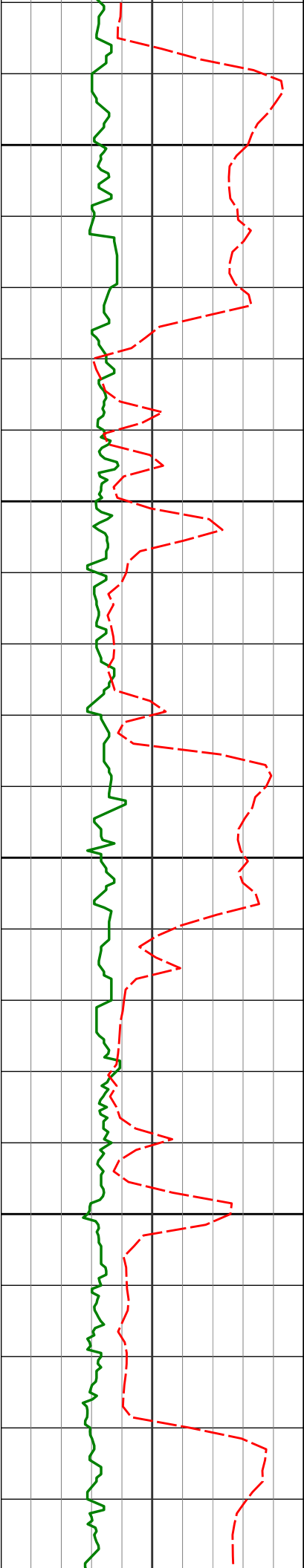
3899.09'

81.96'

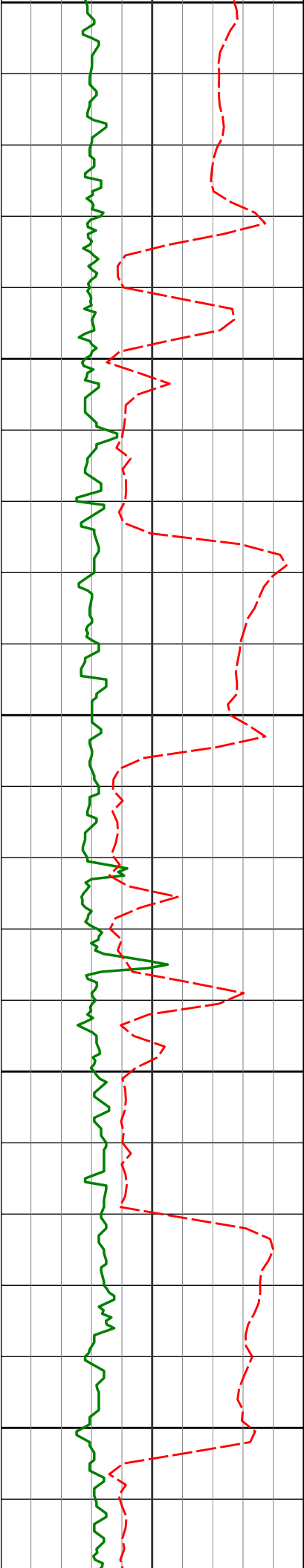


4000					
4007'	9.85°	330.42°	3991.20'	91.35'	
4050					
4100					
4102'	8.01°	325.99°	4085.05'	99.42'	
4150					

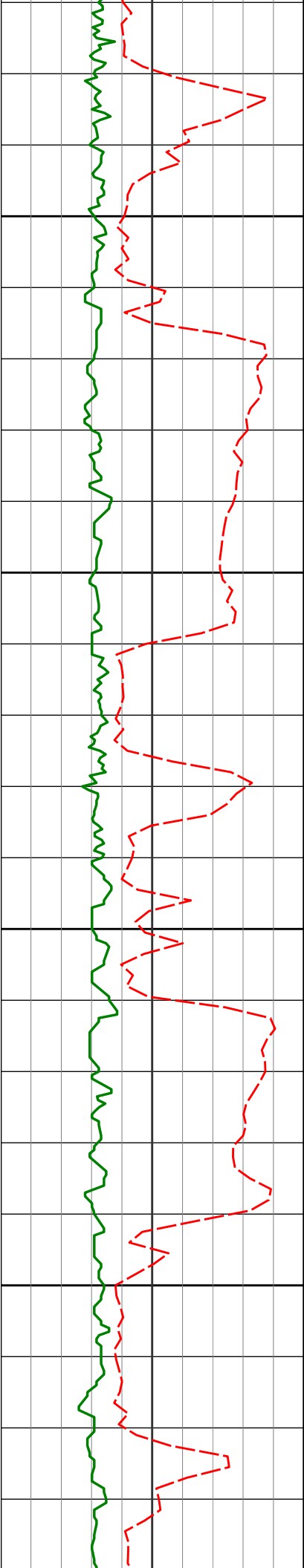




	4197'	7.36°	324.22°	4179.19'	106.96'
4200					
4250					
	4292'	7.35°	320.43°	4273.41'	114.66'
4300					
4350					
	4387'	7.55°	319.69°	4367.61'	122.83'
4400					



4400				
4450				
4481'	8.68°	327.92°	4460.67'	130.89'
4500				
4550				
4576'	7.57°	330.34°	4554.71'	138.11'
4600				



4650

4671'

8.57°

331.24°

4648.77'

144.93'

4700

4750

4766'

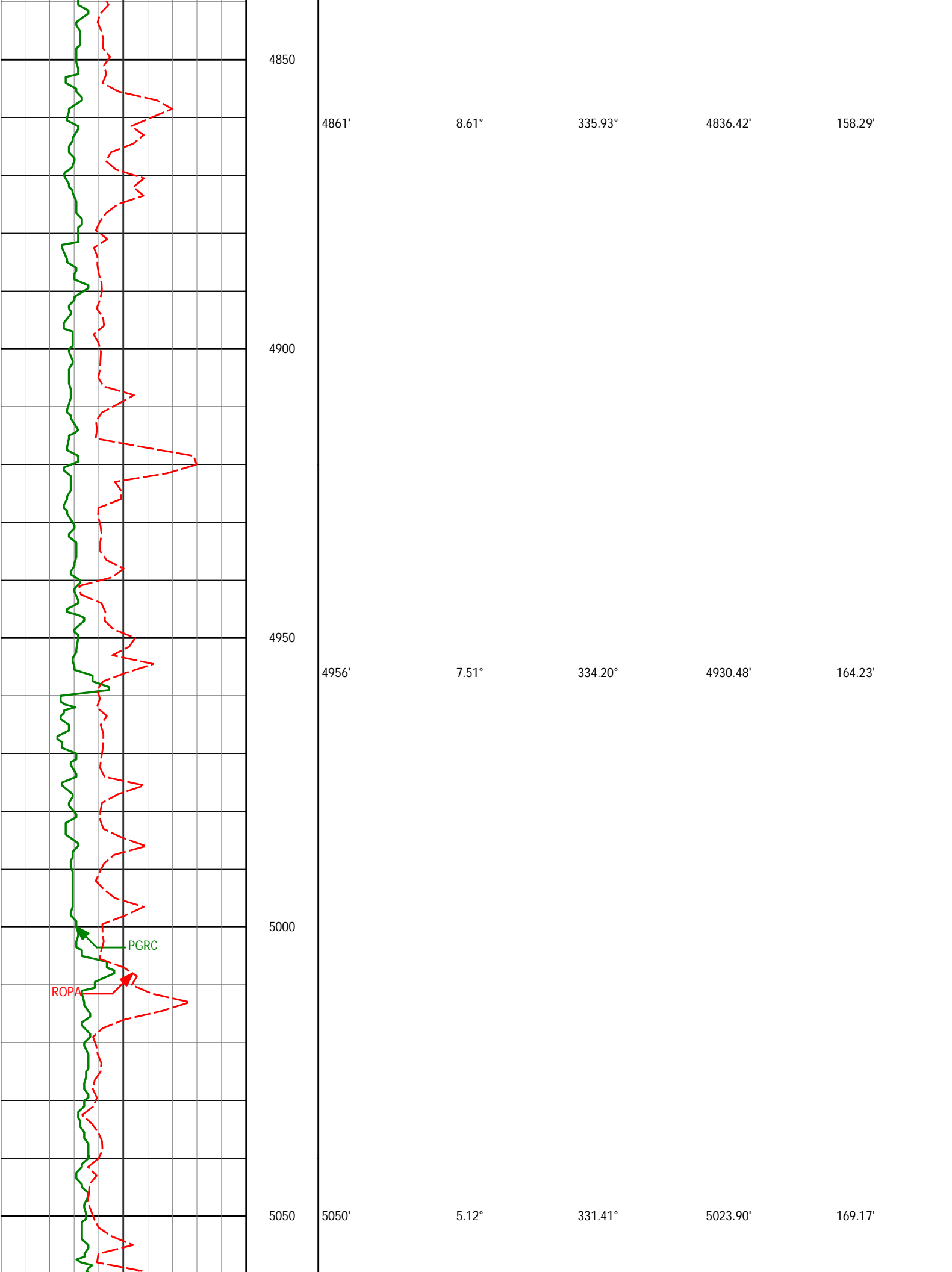
9.46°

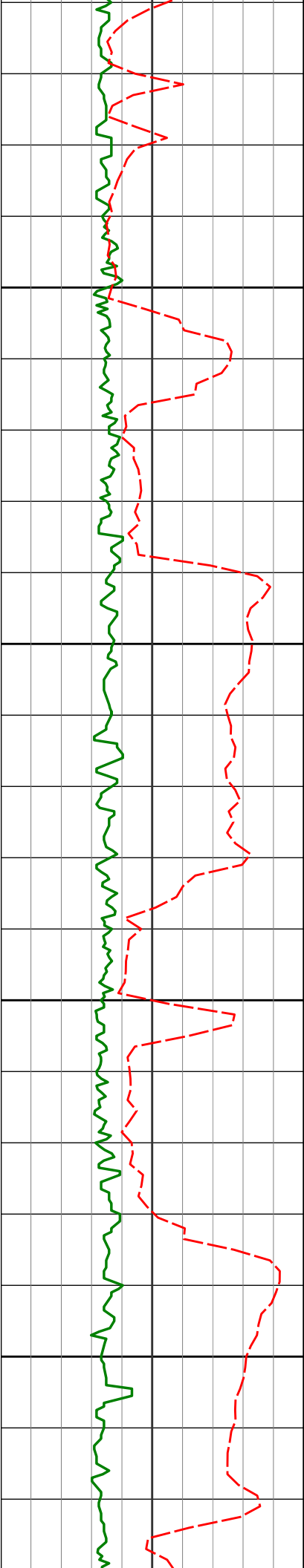
336.19°

4742.60'

151.86'

4800





5100

5150

5200

5250

5145'

4.68°

331.78°

5118.56'

173.23'

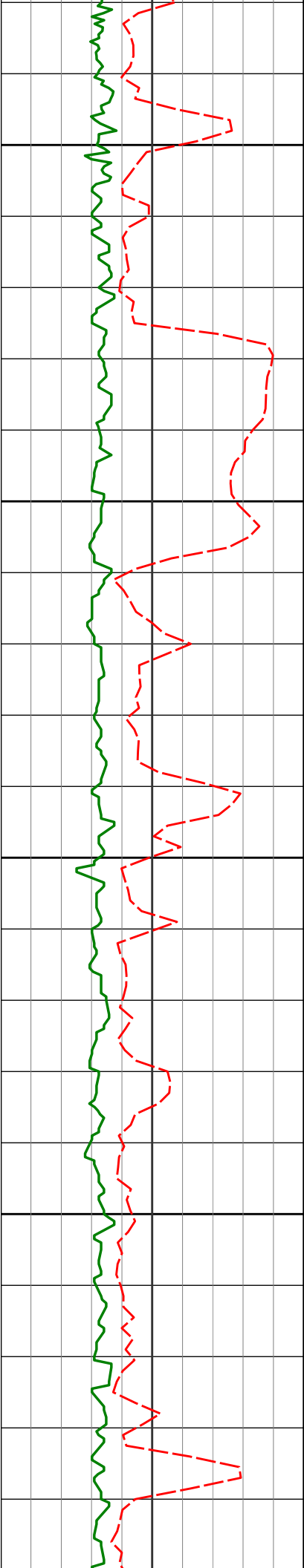
5239'

5.94°

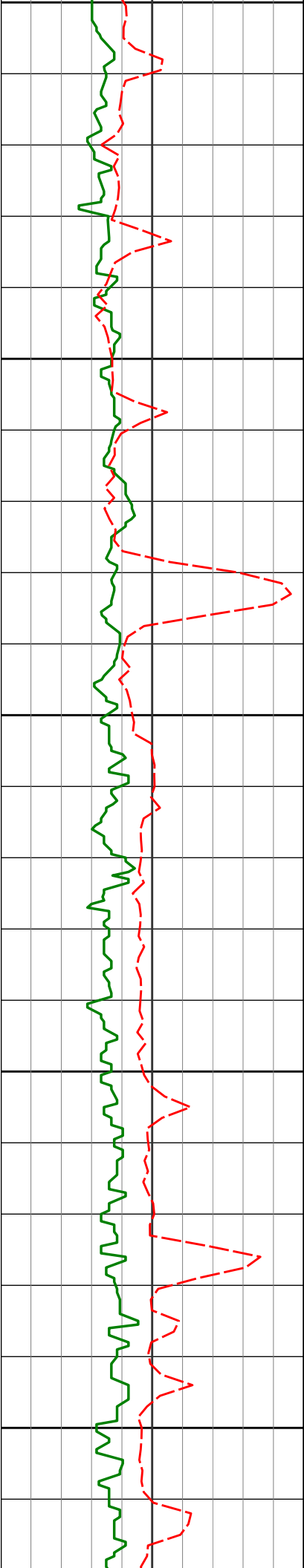
339.40°

5212.15'

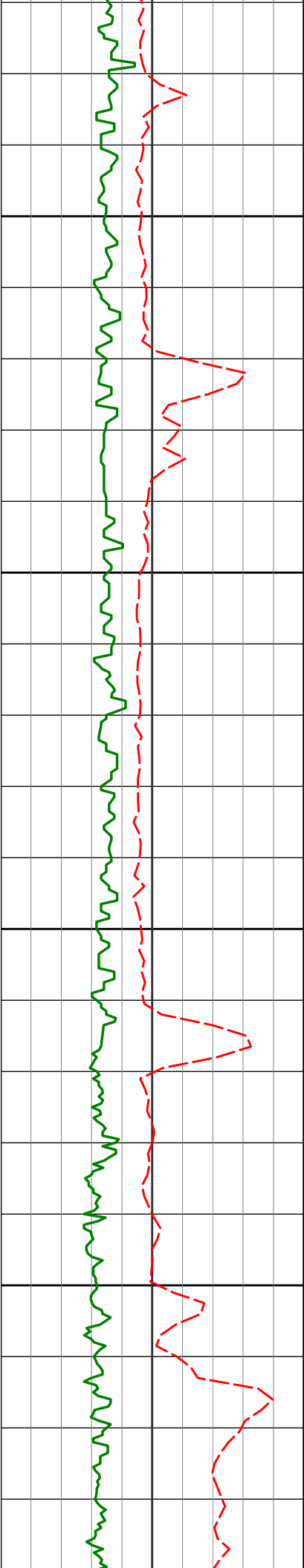
176.97'



5300					
	5334'	6.08°	338.06°	5306.63'	180.84'
5350					
5400					
	5429'	4.95°	333.55°	5401.19'	184.77'
5450					
5500					



5524'	3.19°	333.94°	5495.95'	187.93'
5550				
5600				
5619'	2.13°	325.61°	5590.84'	190.19'
5650				
5700				
5714'	1.42°	325.60°	5685.80'	191.92'



5750

5809'

0.94°

322.30°

5780.78'

193.11'

5800

200

5850

5857'

0.81°

312.55°

5828.77'

193.61'

5900

200

5919'

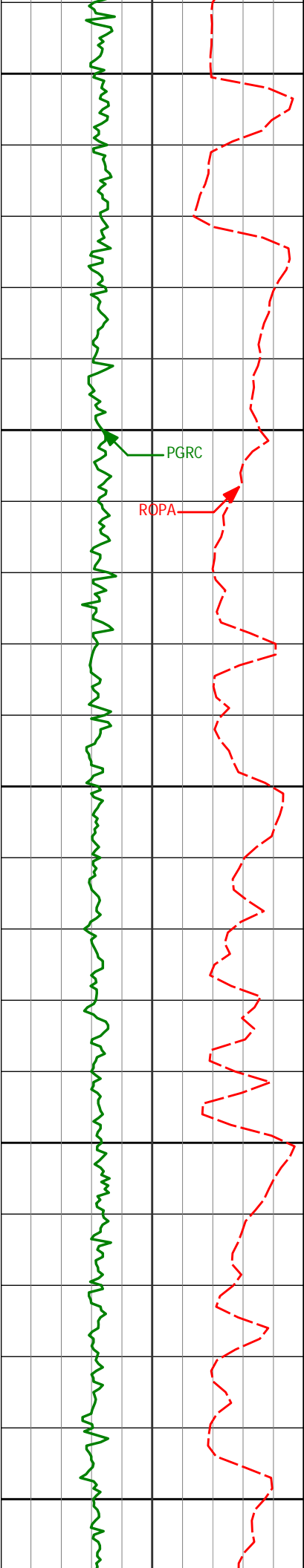
0.65°

302.66°

5890.76'

194.25'





5950

6000

6050

6100

6150

5997'

4.17°

277.03°

5968.68'

197.45'

6045'

8.85°

268.41°

6016.36'

202.88'

6091'

11.75°

268.39°

6061.62'

211.09'

300

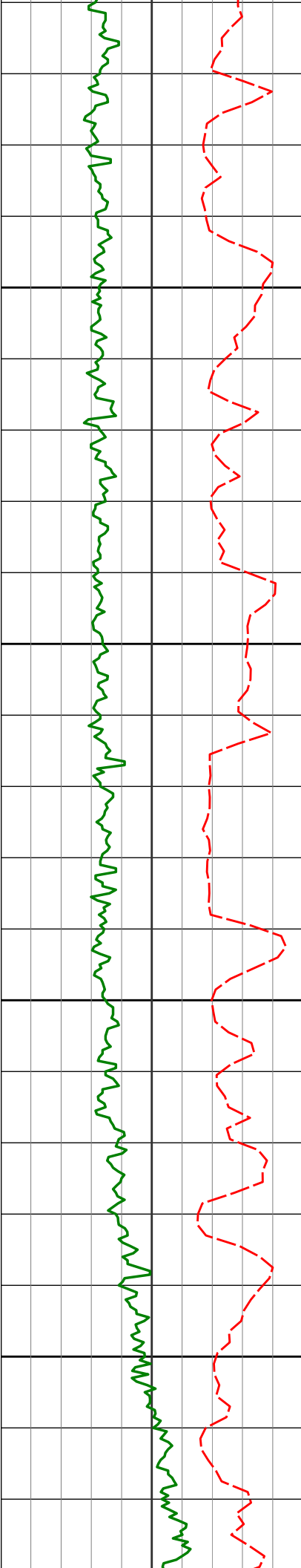
6139'

15.63°

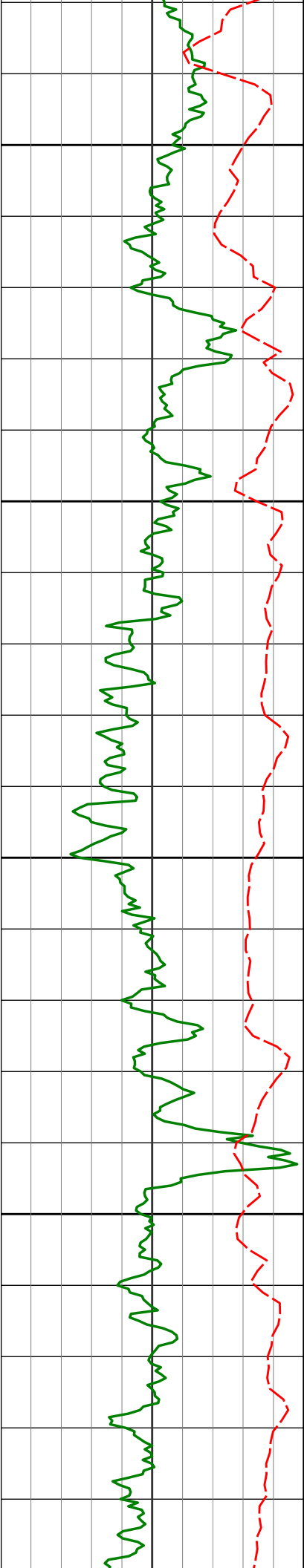
268.44°

6108.24'

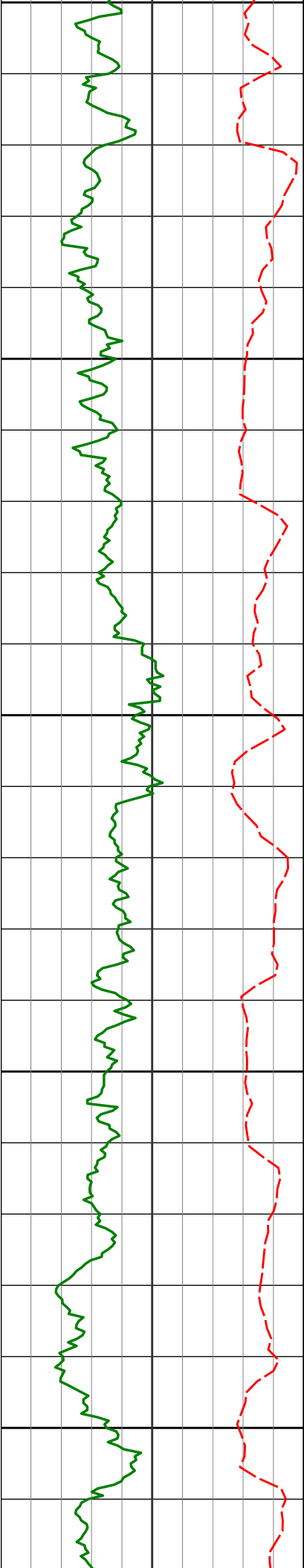
222.43'



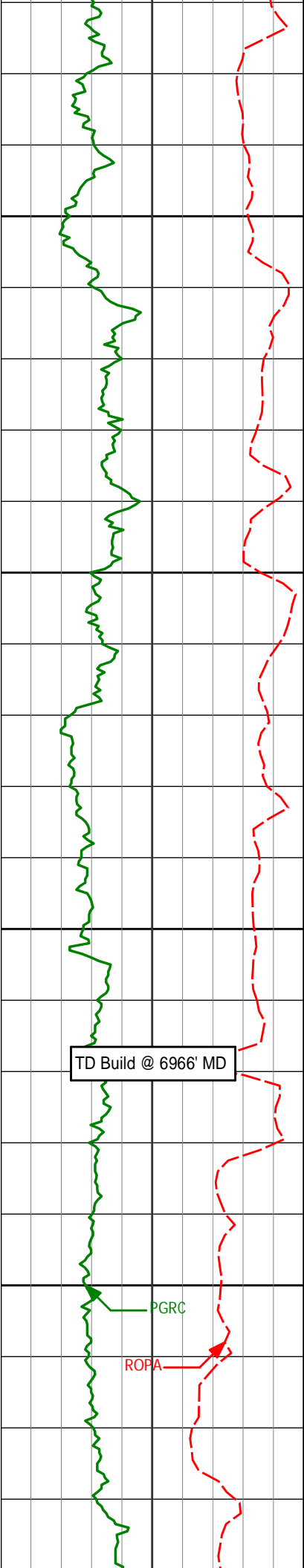
6186'	18.54°	265.93°	6153.17'	236.19'
6234'	20.49°	266.24°	6198.41'	252.15'
6281'	22.54°	266.89°	6242.13'	269.32'
6329'	25.96°	265.64°	6285.89'	288.94'
6375'	28.05°	268.40°	6326.87'	309.76'



6400				
6423'	32.40°	272.57°	6368.34'	333.90'
6450				
6470'	37.71°	273.92°	6406.80'	360.87'
6500				
6518'	45.25°	273.26°	6442.74'	392.62'
6550				
6565'	50.22°	271.54°	6474.34'	427.39'
6600				



6600				
6613'	56.97°	268.86°	6502.81'	465.98'
6650				
6660'	65.63°	267.54°	6525.36'	507.09'
6700				
6708'	71.52°	266.91°	6542.89'	551.62'
6750				
6755'	73.80°	269.09°	6556.90'	596.39'
6800				
6803'	77.58°	271.08°	6568.76'	642.88'



6850

6850'

80.30°

270.42°

6577.78'

688.99'

6900

6911'

86.86°

267.18°

6584.59'

749.50'

6950



400

TD Build @ 6966' MD

6992'

90.31°

267.10°

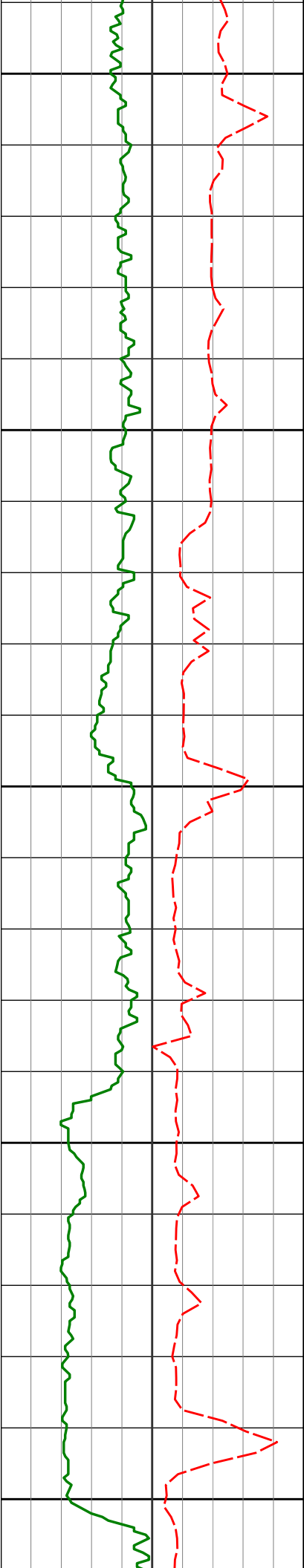
6586.59'

830.21'

7000

PGRC

ROPA



7050

7085'

90.40°

266.41°

6586.02'

922.88'

7100

7150

7177'

90.28°

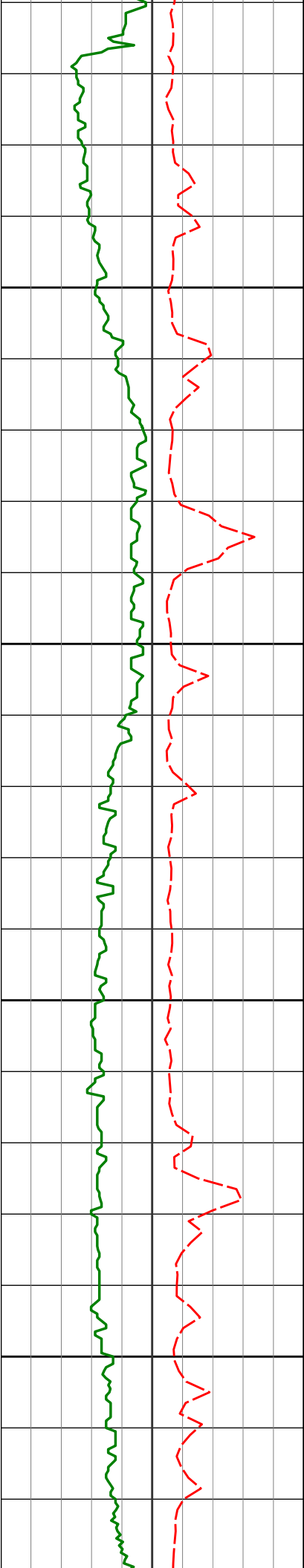
266.84°

6585.47'

1014.53'

7200

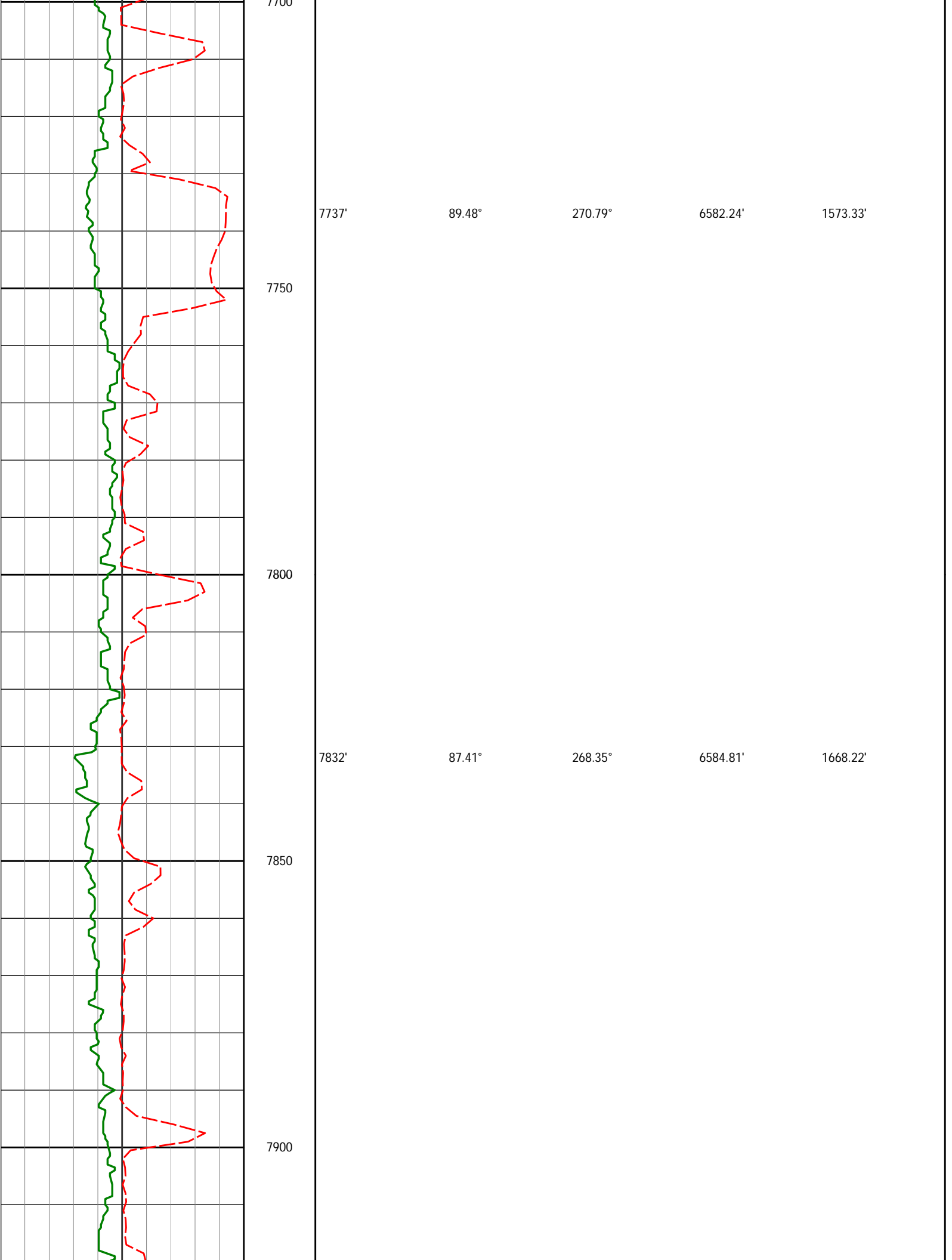
7250

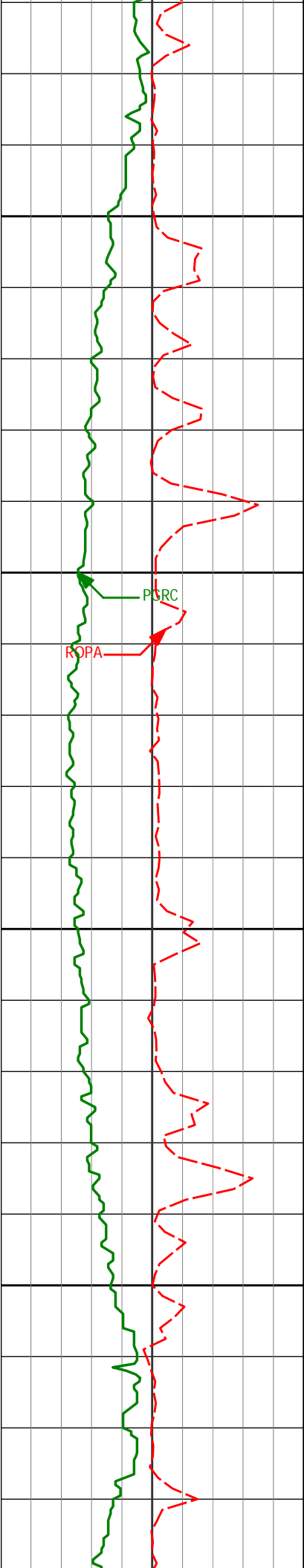


7269'	89.97°	267.01°	6585.27'	1106.22'
7300				
7350				
7361'	90.31°	266.83°	6585.05'	1197.92'
7400				
7450				
7453'	90.89°	266.89°	6584.08'	1289.60'

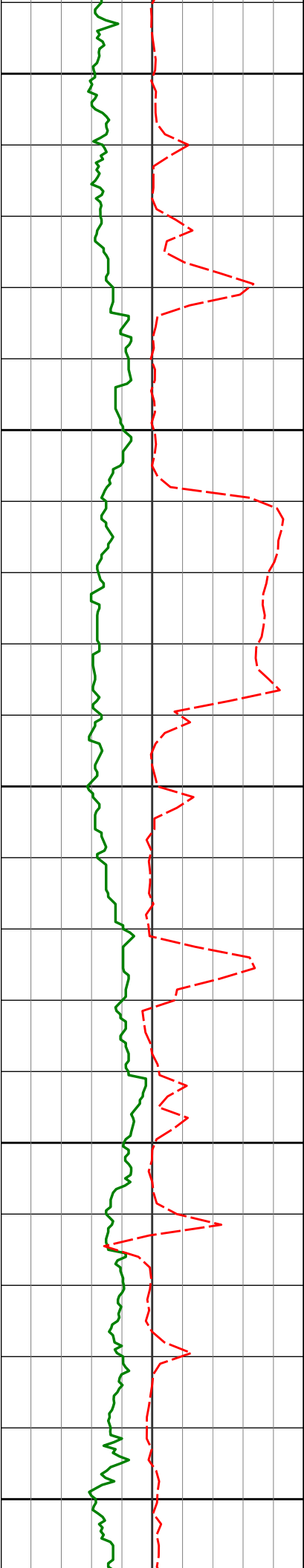








7926'	88.30°	267.76°	6588.33'	1761.97'
7950				
8000				
8021'	89.11°	266.99°	6590.48'	1856.69'
8050				
8100				
8116'	91.08°	265.96°	6590.32'	1951.30'



8150

8200

8250

8300

8350

8211'

92.19°

266.11°

6587.61'

2045.82'

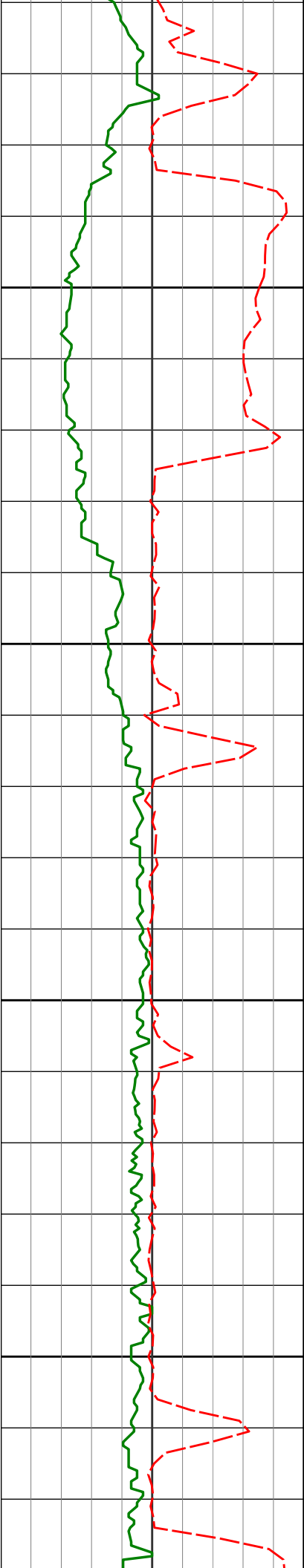
8305'

92.37°

268.54°

6583.87'

2139.47'



8400

8450

8500

8550

8400'

8495'

91.29°

89.72°

270.93°

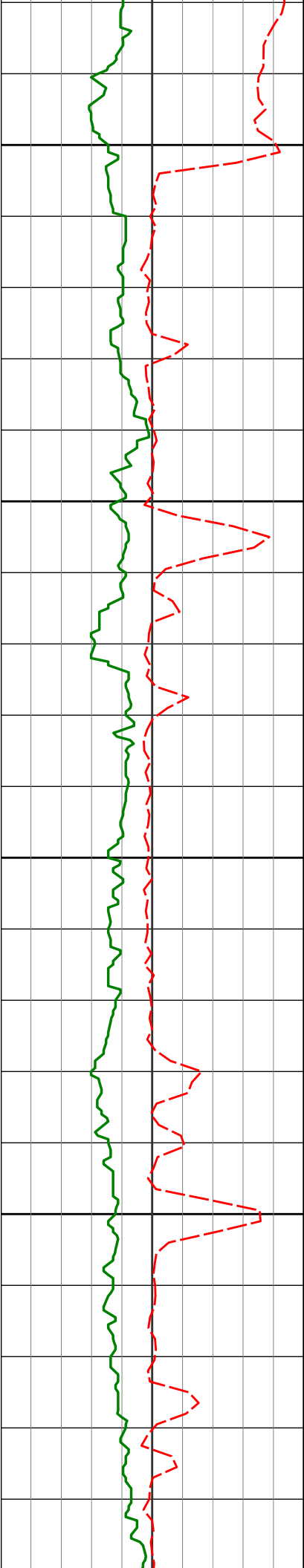
271.93°

6580.84'

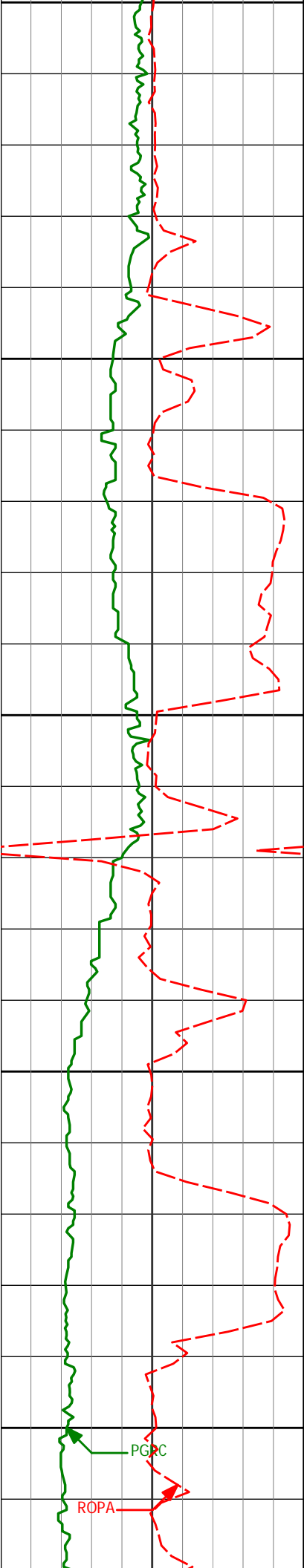
6580.00'

2234.37'

2329.36'



8590'	87.38°	272.88°	6582.40'	2424.31'
8600				
8650				
8685'	87.01°	273.06°	6587.05'	2519.17'
8700				
8750				
8779'	88.43°	273.13°	6590.79'	2613.06'
8800				



8800

8850

8874'

88.46°

271.68°

6593.37'

2708.01'

8900

8950

8969'

87.50°

267.58°

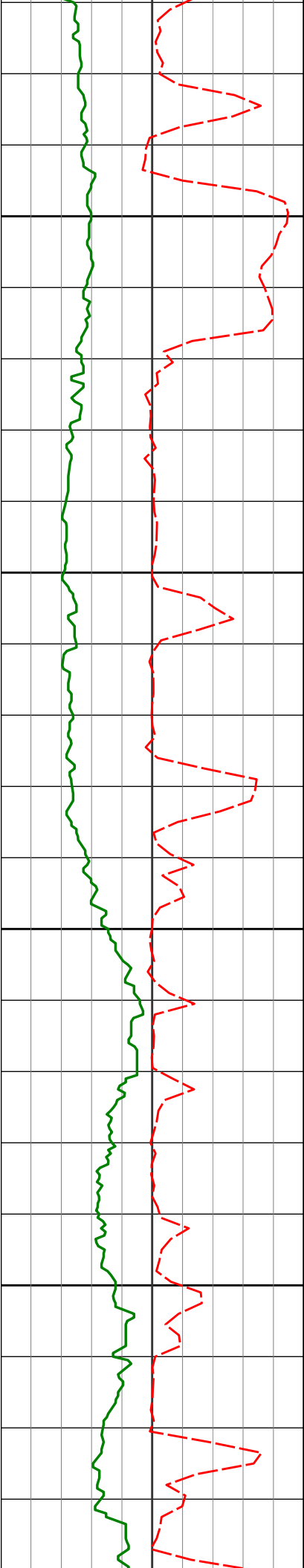
6596.72'

2802.88'

9000

PGRC

ROPA



9050

9063'

90.59°

266.50°

6598.29'

2896.55'

9100

9150

9158'

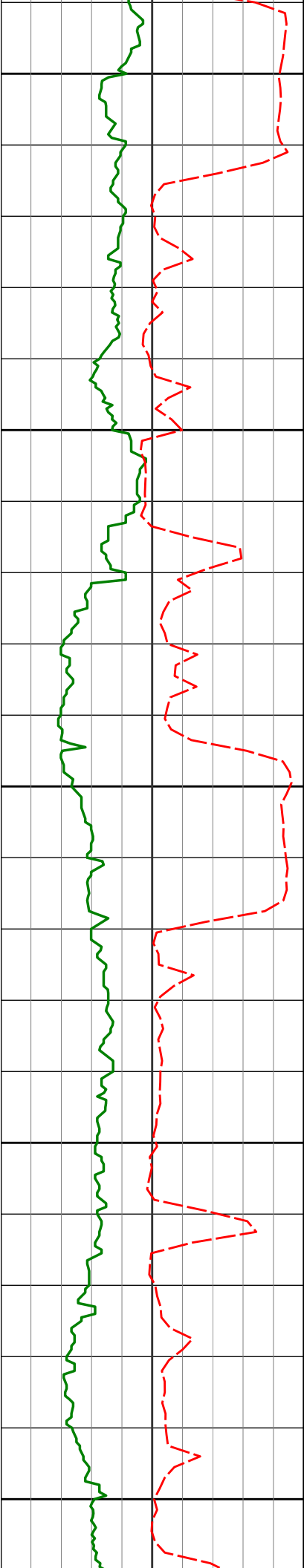
92.25°

266.05°

6595.93'

2991.11'

9200



9250

9253'

92.34°

267.56°

6592.13'

3085.70'

9300

9350

9347'

92.25°

267.42°

6588.36'

3179.38'

9400

9450

9442'

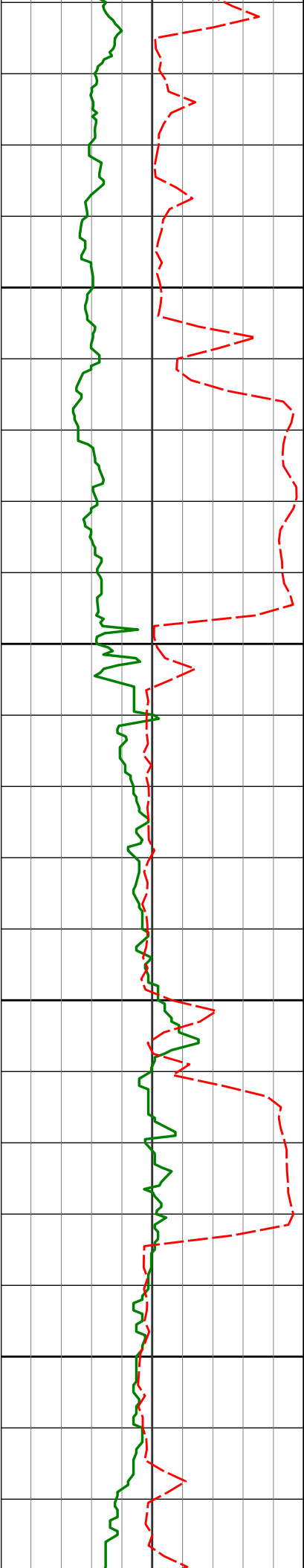
91.82°

268.22°

6584.99'

3274.11'





9500

9537'

90.43°

268.57°

6583.13'

3368.95'

9550

9600

9632'

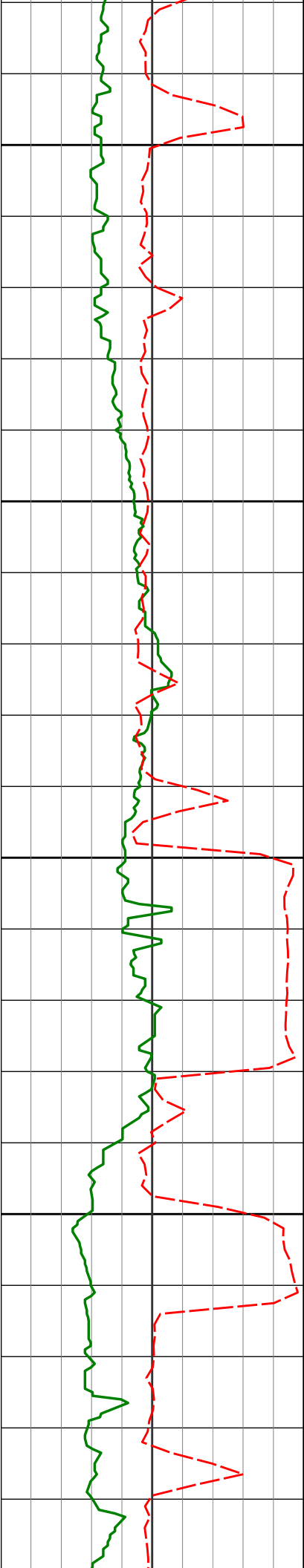
88.55°

268.29°

6583.97'

3463.79'

9650



9700

9726'

90.49°

269.10°

6584.76'

3557.66'

9750

9800

9821'

87.81°

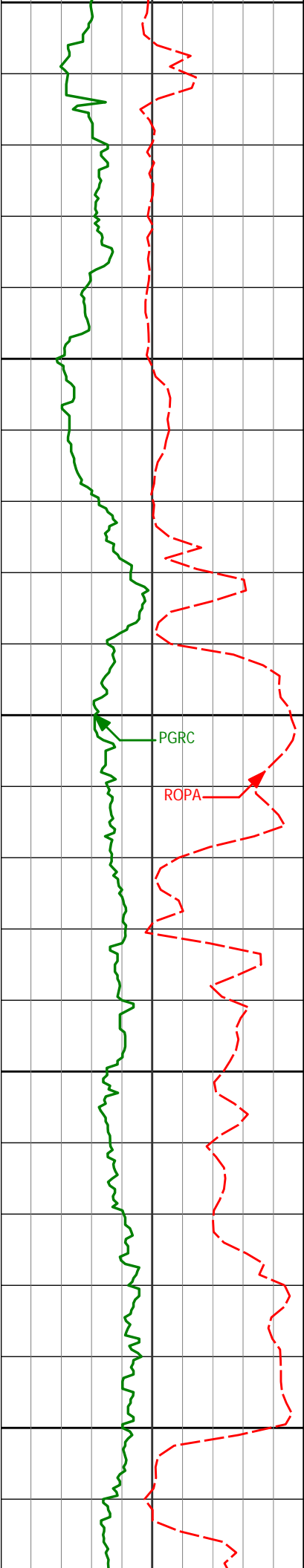
267.92°

6586.17'

3652.50'

9850

9900



9900

9916'

9950

10000

10011'

10050

10100

10106'

9916'

86.11°

266.79°

6591.21'

3747.10'

10011'

88.00°

265.49°

6596.09'

3841.54'

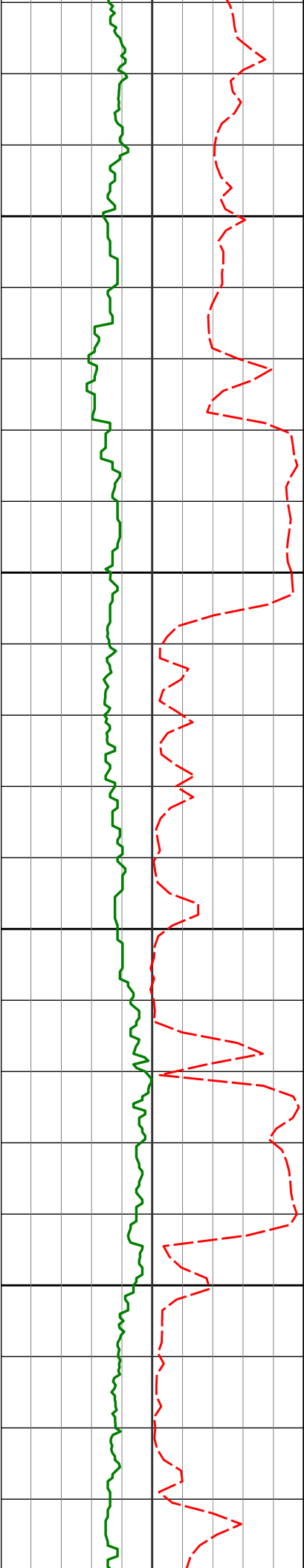
10106'

91.39°

267.50°

6596.59'

3936.15'



10150

10200

10250

10300

10201'

90.03°

268.78°

6595.42'

4030.96'

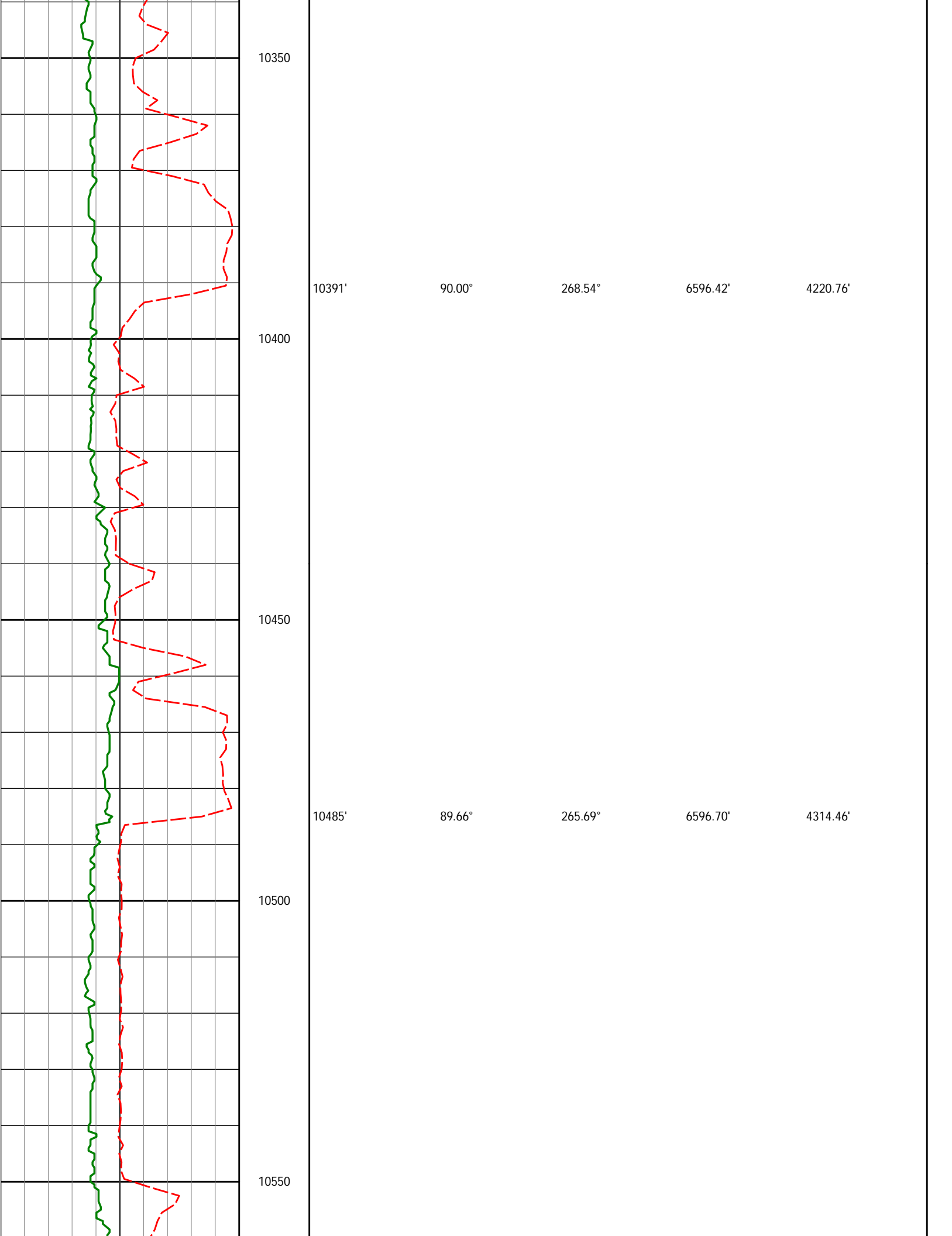
10296'

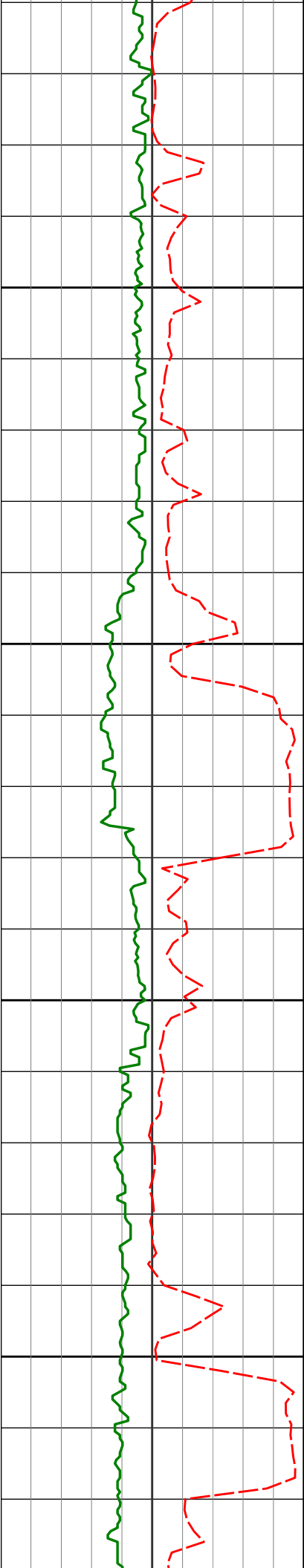
89.38°

269.37°

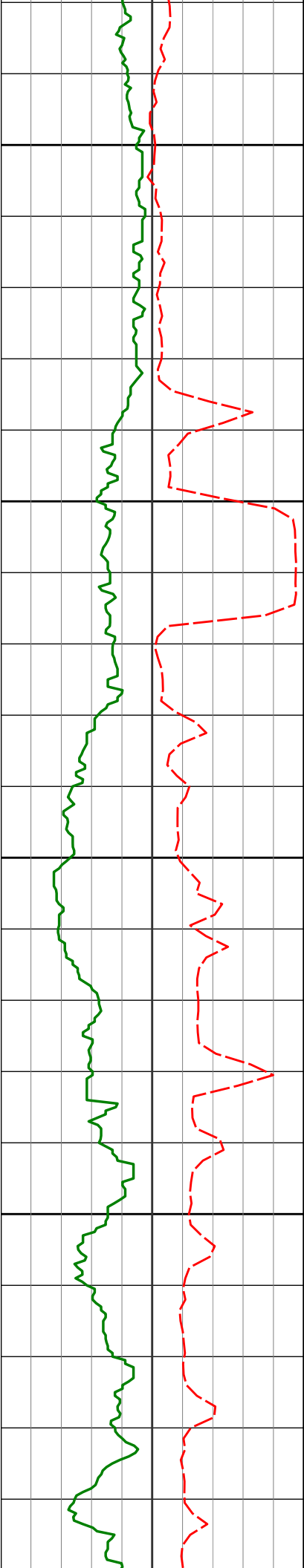
6595.90'

4125.87'





10580'	91.60°	266.12°	6595.65'	4408.99'
10600				
10650				
10675'	90.15°	267.56°	6594.20'	4503.64'
10700				
10750				
10770'	89.41°	267.00°	6594.57'	4598.37'



10800

10850

10900

10950

11000

10864'

87.63°

266.01°

6597.00'

4691.96'

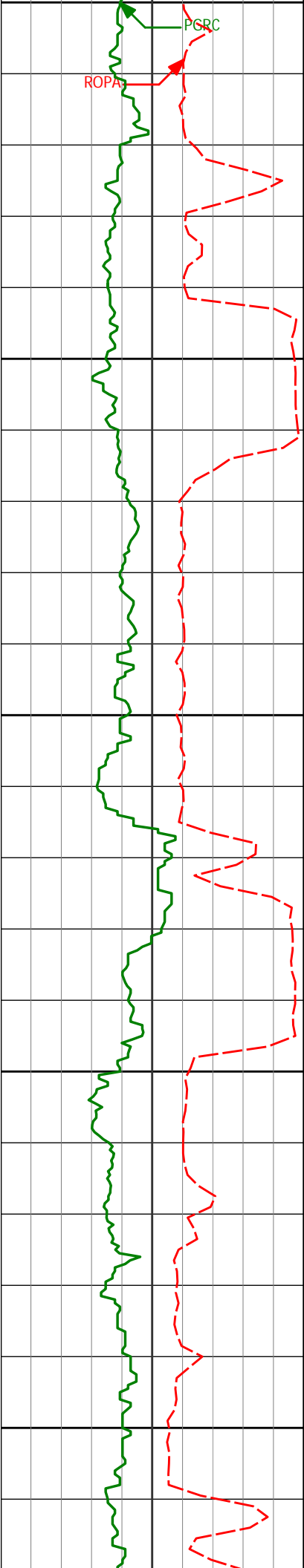
10959'

88.06°

264.69°

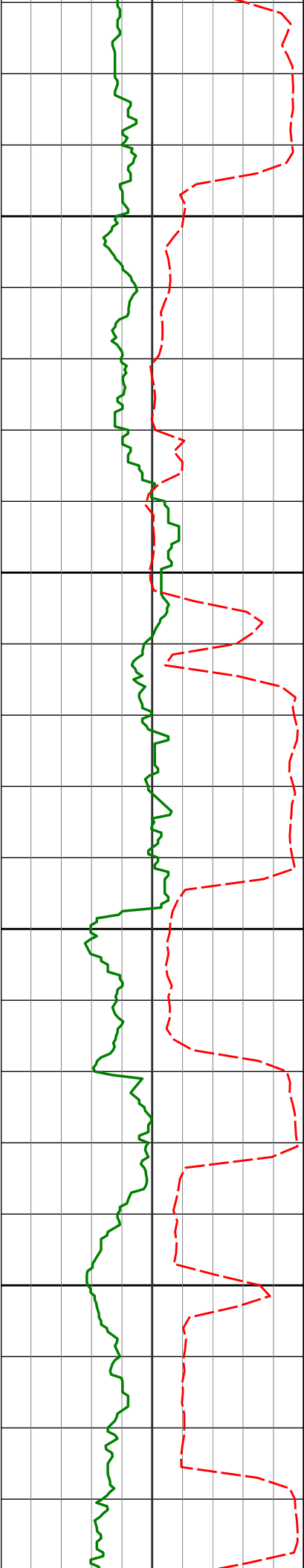
6600.57'

4786.33'

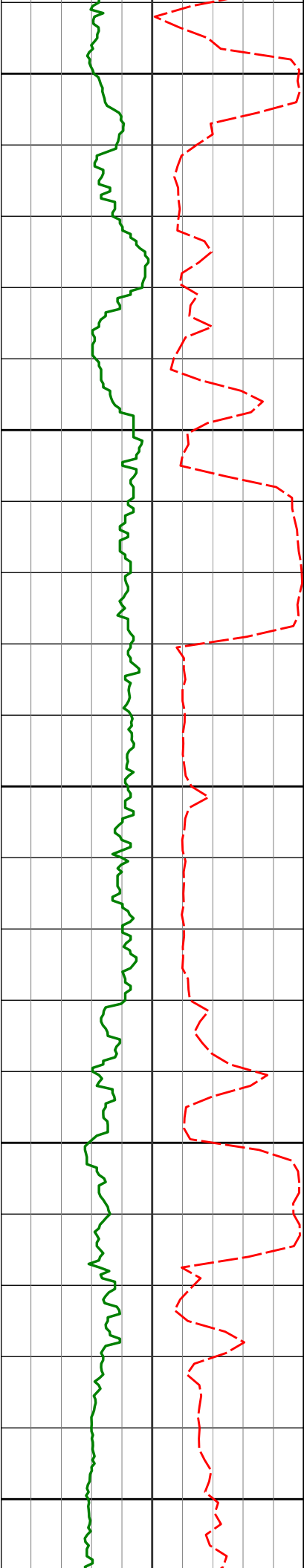


11050				
11054'	87.99°	266.20°	6603.84'	4880.72'
11100				
11150				
11148'	91.79°	265.95°	6604.02'	4974.27'
11200				





	11243'	93.51°	267.77°	6599.63'	5068.83'
11250					
11300					
	11337'	92.50°	268.95°	6594.70'	5162.55'
11350					
11400					
	11432'	91.26°	268.68°	6591.59'	5257.39'



11450

11500

11550

11600

11650

11527'

89.91°

269.48°

6590.62'

5352.29'

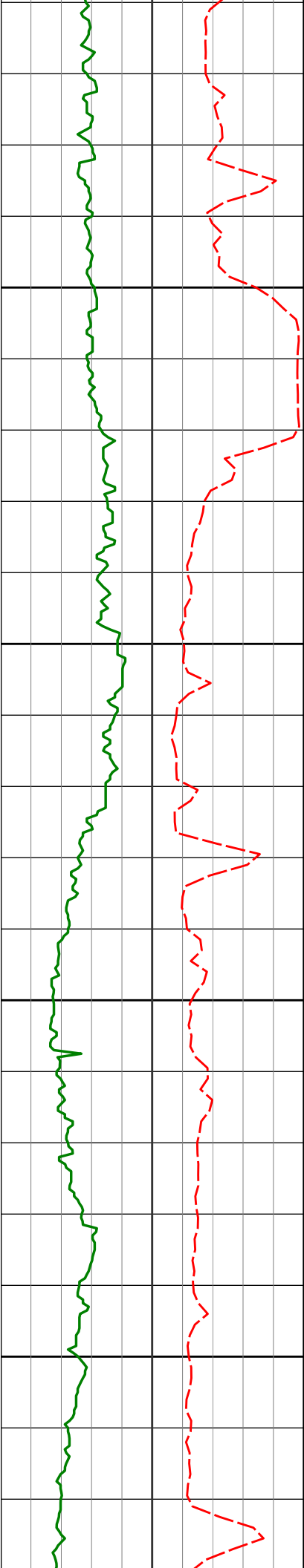
11622'

89.38°

268.89°

6591.20'

5447.20'



11700

11717'

87.75°

269.06°

6593.58'

5542.07'

11750

11800

11811'

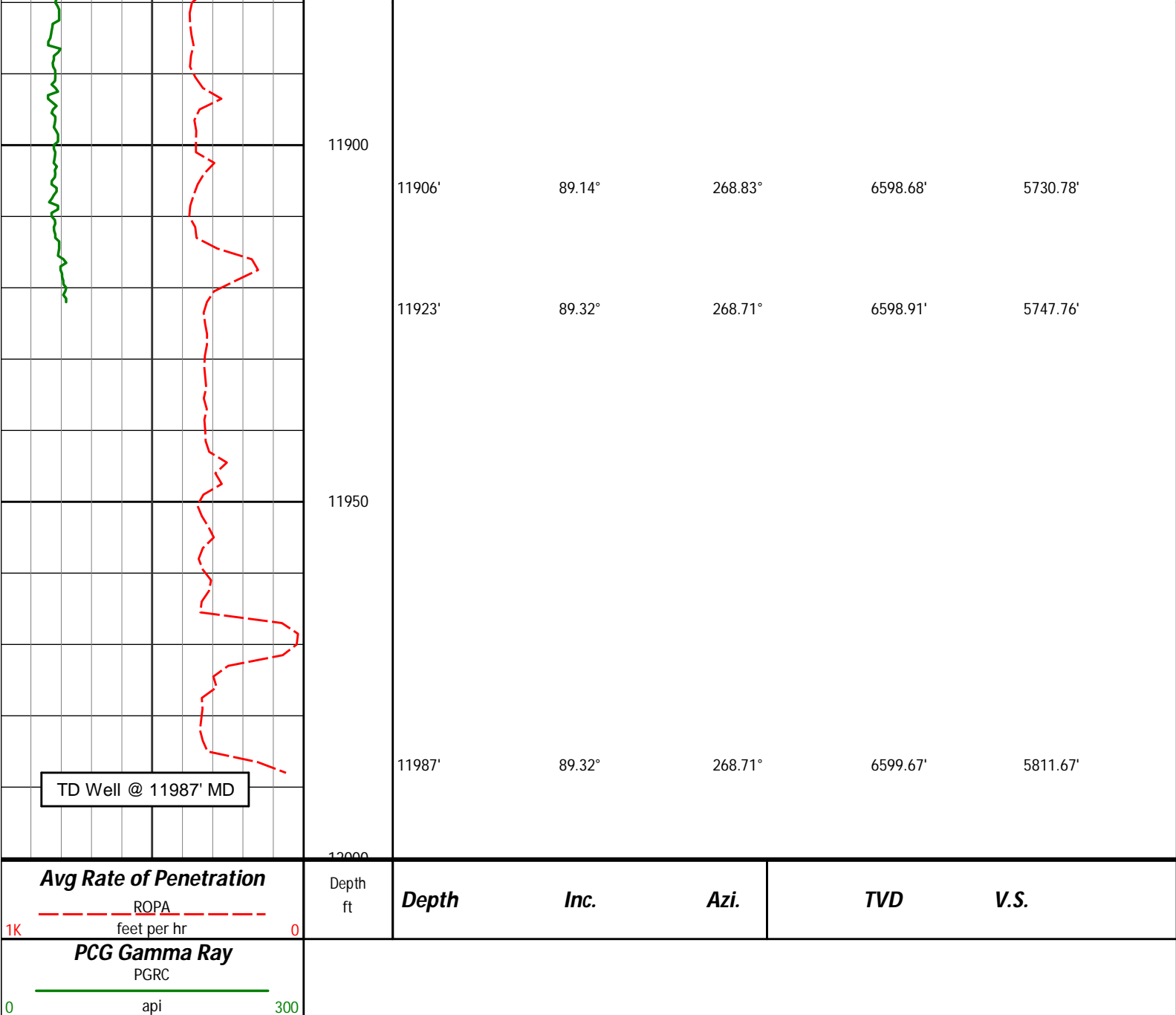
88.46°

268.81°

6596.69'

5635.91'

11850



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Noble Energy  
 Wells Ranch AE30-65-1HNC  
 Wattenburg  
 Weld Colorado  
 USA  
 CA-XX-0901176449

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
214.00	0.50	294.17	214.00	0.38 N	0.85 W	0.86	0.23
420.00	0.70	270.67	419.99	0.77 N	2.93 W	2.95	0.15
632.00	0.50	161.77	631.98	0.10 S	3.94 W	3.93	0.46
719.00	0.99	181.59	718.97	1.21 S	3.84 W	3.80	0.63
811.00	0.45	64.28	810.97	1.85 S	3.53 W	3.48	1.37
902.00	0.57	54.36	901.96	1.43 S	2.84 W	2.80	0.16
994.00	0.61	46.27	993.96	0.82 S	2.12 W	2.09	0.10

994.00	0.01	40.27	995.90	0.02 S	2.12 W	2.03	0.10
1086.00	0.50	35.90	1085.95	0.16 S	1.53 W	1.52	0.16
1179.00	0.62	44.81	1178.95	0.53 N	0.94 W	0.95	0.16
1272.00	0.61	46.31	1271.94	1.22 N	0.22 W	0.26	0.02
1364.00	0.64	37.61	1363.94	1.97 N	0.44 E	-0.39	0.11
1456.00	0.92	46.30	1455.93	2.89 N	1.29 E	-1.21	0.33
1548.00	0.41	187.23	1547.93	3.07 N	1.78 E	-1.70	1.37
1640.00	0.28	163.01	1639.93	2.53 N	1.81 E	-1.74	0.21
1735.00	0.37	154.48	1734.92	2.03 N	2.01 E	-1.95	0.11
1830.00	0.34	165.54	1829.92	1.48 N	2.21 E	-2.17	0.08
1924.00	0.17	191.15	1923.92	1.07 N	2.25 E	-2.22	0.21
2019.00	0.19	100.65	2018.92	0.91 N	2.38 E	-2.35	0.27
2114.00	0.34	100.57	2113.92	0.83 N	2.81 E	-2.79	0.16
2209.00	0.50	130.71	2208.92	0.50 N	3.40 E	-3.39	0.28
2303.00	0.59	249.19	2302.92	0.06 N	3.26 E	-3.26	1.00
2398.00	0.33	220.81	2397.91	0.32 S	2.63 E	-2.63	0.36
2492.00	0.26	234.46	2491.91	0.65 S	2.28 E	-2.29	0.11
2587.00	0.39	216.14	2586.91	1.03 S	1.91 E	-1.94	0.17
2682.00	0.40	230.61	2681.91	1.50 S	1.46 E	-1.50	0.11
2777.00	1.28	291.00	2776.90	1.33 S	0.22 E	-0.25	1.20
2871.00	2.09	335.39	2870.86	0.60 N	1.48 W	1.49	1.57
2966.00	4.42	336.18	2965.70	5.53 N	3.68 W	3.83	2.45
3061.00	5.08	340.10	3060.37	12.83 N	6.59 W	6.94	0.77
3156.00	6.89	332.70	3154.85	21.85 N	10.63 W	11.24	2.07
3251.00	8.73	336.21	3248.97	33.51 N	16.16 W	17.09	2.00
3346.00	10.15	325.42	3342.69	47.00 N	23.82 W	25.12	2.38
3440.00	7.58	323.79	3435.56	58.82 N	32.18 W	33.81	2.75
3535.00	7.48	325.06	3529.74	68.95 N	39.42 W	41.33	0.20
3630.00	11.03	328.21	3623.49	81.75 N	47.76 W	50.02	3.77
3724.00	13.18	332.06	3715.39	98.86 N	57.52 W	60.25	2.44
3818.00	14.06	332.58	3806.75	118.46 N	67.80 W	71.08	0.95
3913.00	13.10	332.20	3899.09	138.23 N	78.13 W	81.96	1.01
4007.00	9.85	330.42	3991.20	154.65 N	87.07 W	91.35	3.48
4102.00	8.01	325.99	4085.05	167.20 N	94.78 W	99.42	2.07
4197.00	7.36	324.22	4179.19	177.63 N	102.04 W	106.96	0.73
4292.00	7.35	320.43	4273.41	187.25 N	109.47 W	114.66	0.51
4387.00	7.55	319.69	4367.61	196.69 N	117.38 W	122.83	0.23
4481.00	8.68	327.92	4460.67	207.41 N	125.14 W	130.89	1.72
4576.00	7.57	330.34	4554.71	218.92 N	132.05 W	138.11	1.22
4671.00	8.57	331.24	4648.77	230.57 N	138.55 W	144.93	1.06
4766.00	9.46	336.19	4742.60	243.91 N	145.11 W	151.86	1.24
4861.00	8.61	335.93	4836.42	257.55 N	151.16 W	158.29	0.90
4956.00	7.51	334.20	4930.48	269.63 N	156.76 W	164.23	1.19
5050.00	5.12	331.41	5023.90	278.85 N	161.44 W	169.17	2.56
5145.00	4.68	331.78	5118.56	285.98 N	165.31 W	173.23	0.46
5239.00	5.94	339.40	5212.15	293.92 N	168.83 W	176.97	1.53
5334.00	6.08	338.06	5306.63	303.18 N	172.44 W	180.84	0.21
5429.00	4.95	333.55	5401.19	311.52 N	176.15 W	184.77	1.27
5524.00	3.19	333.94	5495.95	317.57 N	179.13 W	187.93	1.85
5619.00	2.13	325.61	5590.84	321.40 N	181.29 W	190.19	1.18
5714.00	1.42	325.60	5685.80	323.83 N	182.95 W	191.92	0.75
5809.00	0.94	322.30	5780.78	325.41 N	184.09 W	193.11	0.51
5857.00	0.81	312.55	5828.77	325.95 N	184.59 W	193.61	0.41
5919.00	0.65	302.66	5890.76	326.44 N	185.20 W	194.25	0.33
5997.00	4.17	277.03	5968.68	327.03 N	188.39 W	197.45	4.61
6045.00	8.85	268.41	6016.36	327.14 N	193.82 W	202.88	9.93
6091.00	11.75	268.39	6061.62	326.91 N	202.04 W	211.09	6.30
6139.00	15.63	268.44	6108.24	326.59 N	213.39 W	222.43	8.08
6186.00	18.54	265.93	6153.17	325.89 N	227.18 W	236.19	6.39
6234.00	20.49	266.24	6198.41	324.80 N	243.17 W	252.15	4.07
6281.00	22.54	266.89	6242.13	323.77 N	260.38 W	269.32	4.39
6329.00	25.96	265.64	6285.89	322.47 N	280.05 W	288.94	7.20
6375.00	28.05	268.40	6326.87	321.40 N	300.90 W	309.76	5.30
6423.00	32.40	272.57	6368.34	321.67 N	325.04 W	333.90	10.06
6470.00	37.71	273.92	6406.80	323.21 N	351.98 W	360.87	11.42
6518.00	45.25	273.26	6442.74	325.19 N	383.69 W	392.62	15.73
6565.00	50.22	271.54	6474.34	326.63 N	418.43 W	427.39	10.92
6613.00	56.97	268.86	6502.81	326.72 N	457.03 W	465.98	14.76
6660.00	65.63	267.54	6525.36	325.41 N	498.20 W	507.09	18.59
6708.00	71.52	266.91	6542.89	323.24 N	542.81 W	551.62	12.33
6755.00	73.80	269.09	6556.90	321.68 N	587.64 W	596.39	6.57
6803.00	77.58	271.08	6568.76	321.76 N	634.14 W	642.88	8.84

6850.00	80.30	270.42	6577.78	322.36 N	680.26 W	688.99	5.95
6911.00	86.86	267.18	6584.59	321.08 N	740.82 W	749.50	11.98
6992.00	90.31	267.10	6586.59	317.04 N	821.68 W	830.21	4.26
7085.00	90.40	266.41	6586.02	311.77 N	914.53 W	922.88	0.75
7177.00	90.28	266.84	6585.47	306.36 N	1006.37 W	1014.53	0.49
7269.00	89.97	267.01	6585.27	301.42 N	1098.24 W	1106.22	0.38
7361.00	90.31	266.83	6585.05	296.48 N	1190.10 W	1197.92	0.42
7453.00	90.89	266.89	6584.08	291.44 N	1281.96 W	1289.60	0.63
7548.00	90.28	269.02	6583.11	288.05 N	1376.89 W	1384.39	2.33
7643.00	90.65	270.54	6582.34	287.69 N	1471.88 W	1479.34	1.65
7737.00	89.48	270.79	6582.24	288.78 N	1565.87 W	1573.33	1.27
7832.00	87.41	268.35	6584.81	288.07 N	1660.82 W	1668.22	3.37
7926.00	88.30	267.76	6588.33	284.88 N	1754.70 W	1761.97	1.14
8021.00	89.11	266.99	6590.48	280.53 N	1849.58 W	1856.69	1.18
8116.00	91.08	265.96	6590.32	274.69 N	1944.39 W	1951.30	2.34
8211.00	92.19	266.11	6587.61	268.12 N	2039.12 W	2045.82	1.18
8305.00	92.37	268.54	6583.87	263.74 N	2132.94 W	2139.47	2.59
8400.00	91.29	270.93	6580.84	263.30 N	2227.88 W	2234.37	2.76
8495.00	89.72	271.93	6580.00	265.67 N	2322.84 W	2329.36	1.96
8590.00	87.38	272.88	6582.40	269.65 N	2417.72 W	2424.31	2.66
8685.00	87.01	273.06	6587.05	274.57 N	2512.48 W	2519.17	0.43
8779.00	88.43	273.13	6590.79	279.64 N	2606.27 W	2613.06	1.51
8874.00	88.46	271.68	6593.37	283.63 N	2701.15 W	2708.01	1.53
8969.00	87.50	267.58	6596.72	283.01 N	2796.06 W	2802.88	4.43
9063.00	90.59	266.50	6598.29	278.16 N	2889.91 W	2896.55	3.48
9158.00	92.25	266.05	6595.93	271.99 N	2984.68 W	2991.11	1.81
9253.00	92.34	267.56	6592.13	266.70 N	3079.45 W	3085.70	1.59
9347.00	92.25	267.42	6588.36	262.59 N	3173.29 W	3179.38	0.18
9442.00	91.82	268.22	6584.99	258.98 N	3268.16 W	3274.11	0.96
9537.00	90.43	268.57	6583.13	256.32 N	3363.10 W	3368.95	1.51
9632.00	88.55	268.29	6583.97	253.71 N	3458.06 W	3463.79	2.00
9726.00	90.49	269.10	6584.76	251.57 N	3552.02 W	3557.66	2.24
9821.00	87.81	267.92	6586.17	249.10 N	3646.97 W	3652.50	3.08
9916.00	86.11	266.79	6591.21	244.73 N	3741.73 W	3747.10	2.15
10011.00	88.00	265.49	6596.09	238.34 N	3836.38 W	3841.54	2.41
10106.00	91.39	267.50	6596.59	232.53 N	3931.19 W	3936.15	4.15
10201.00	90.03	268.78	6595.42	229.45 N	4026.12 W	4030.96	1.97
10296.00	89.38	269.37	6595.90	227.92 N	4121.11 W	4125.87	0.92
10391.00	90.00	268.54	6596.42	226.18 N	4216.09 W	4220.76	1.09
10485.00	89.66	265.69	6596.70	221.45 N	4309.96 W	4314.46	3.05
10580.00	91.60	266.12	6595.65	214.67 N	4404.71 W	4408.99	2.09
10675.00	90.15	267.56	6594.20	209.43 N	4499.55 W	4503.64	2.15
10770.00	89.41	267.00	6594.57	204.92 N	4594.44 W	4598.37	0.98
10864.00	87.63	266.01	6597.00	199.20 N	4688.23 W	4691.96	2.17
10959.00	88.06	264.69	6600.57	191.50 N	4782.85 W	4786.33	1.46
11054.00	87.99	266.20	6603.84	183.96 N	4877.49 W	4880.72	1.59
11148.00	91.79	265.95	6604.02	177.53 N	4971.25 W	4974.27	4.05
11243.00	93.51	267.77	6599.63	172.33 N	5066.00 W	5068.83	2.63
11337.00	92.50	268.95	6594.70	169.64 N	5159.83 W	5162.55	1.65
11432.00	91.26	268.68	6591.59	167.68 N	5254.75 W	5257.39	1.34
11527.00	89.91	269.48	6590.62	166.15 N	5349.73 W	5352.29	1.65
11622.00	89.38	268.89	6591.20	164.80 N	5444.72 W	5447.20	0.83
11717.00	87.75	269.06	6593.58	163.10 N	5539.67 W	5542.07	1.73
11811.00	88.46	268.81	6596.69	161.36 N	5633.60 W	5635.91	0.80
11906.00	89.14	268.83	6598.68	159.40 N	5728.56 W	5730.78	0.72
11923.00	89.32	268.71	6598.91	159.04 N	5745.56 W	5747.76	1.27
11987.00	89.32	268.71	6599.67	157.60 N	5809.54 W	5811.67	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 271.60 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 11987.00 FEET  
IS 5811.67 FEET ALONG 271.55 DEGREES (GRID)**

First Three survey's from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.

Survey Depth 214 Inc 0.50 Azi 294.17

Survey Depth 421 Inc 0.70 Azi 270.67

Survey Depth 619 Inc 0.50 Azi 161.67

Tied in @ Surface

Magnetic direction of 7.568 has been added to AZI for grid direction correction.

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