

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

**1 : 600 / 1 : 240**

Country : <b>USA</b>			
Field : <b>Wattenburg</b>			
Location : <b>Lat: 40° 17' 21.41" North</b> <b>Long: 104° 44' 2.65" West</b>			
Well : <b>Burton K25-69-1HNL</b>			
Company : <b>Noble Energy</b>			
Rig : <b>H&amp;P 321</b>			
LOCATION			
Latitude : <b>40° 17' 21.41" North</b> Longitude : <b>104° 44' 2.65" West</b>			
UTM Easting = <b>3,213,665,170 ft</b> UTM Northing = <b>1,349,148,680 ft</b>			
Other Services <b>Directional Drilling</b>			
Company : <b>Noble Energy</b>			
Rig : <b>H&amp;P 321</b>			
Well : <b>Burton K25-69-1HNL</b>			
Field : <b>Wattenburg</b>			
Country : <b>USA</b>			
API Number : <b>05-123-38365</b>			
Permanent Datum : <b>Ground Level</b>			
Elevation : <b>4752.00 ft</b>			
Log Measured From : <b>Drill Floor</b>			
30.00 ft Above Permanent Datum			
Drilling Measured From : <b>Drill Floor</b>			
<b>MD LOG</b>			
Depth Logged : <b>709.00 ft</b> To <b>7,484.00 ft</b>			
Date Logged : <b>27-Oct-14</b> To <b>01-Nov-14</b>			
Total Depth MD : <b>7,484.00 ft</b> TVD : <b>7,126.20 ft</b>			
Spud Date : <b>28-Oct-14</b>			
Unit No. : <b>11210424</b>			
Job No. : <b>CA-XX-0901764742</b>			
Plot Type : <b>Final</b>			
Plot Date : <b>01-Nov-14</b>			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			
Size			
From			
To			
Run No.			

Max Tool Temp (degF) / Source	154.30 / PCM	154.30 / PCM	162.80 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 154.30	N/A @ 154.30	N/A @ 162.80		
Lead MWD Engineer	Albert Willimas	Albert Willimas	Albert Willimas		
Customer Representative	Jim Turner	Jim Turner	Jim Turner		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11342274	11342274	11342274		
Insert Serial Number	11680790	11680790	11680785		
Date and Time Initialized	27-Oct-14 22:16	01-Jan-70 00:00	31-Oct-14 12:30		
Date and Time Read	31-Oct-14 15:13	31-Oct-14 15:19	01-Jan-70 00:00		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	54.00	54.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11342274	11342274	11342274		
Sonde Serial Number	11181577	11181577	11297590		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	17.41	332.27	88.53		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	48.50	46.20	46.41		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11342274	11342274	11342274		
Insert/Sonde Serial Number	11120594	11120594	11681002		

## REMARKS

1. All depths are calibrated to driller's pipe tally and are measured depth's from the Drill Floor.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Brigham Plastic" model for oil and synthetic based fluids.
4. All data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:
  - 1:600 Log  
PGRC (Gamma CG) and ROPA (Average Rate of Penetration)  
Interval Resolution: 1.0 ft  
Interval Distance: 3.0 ft
  - 1:240 Log  
PGRC (Gamma CG):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft
  - ROPA (Average Rate of Penetration):  
Interval Resolution: 0.5 ft

Interval Resolution: 1.2 ft

6. Insite Version v8.0.10

## WARRANTY

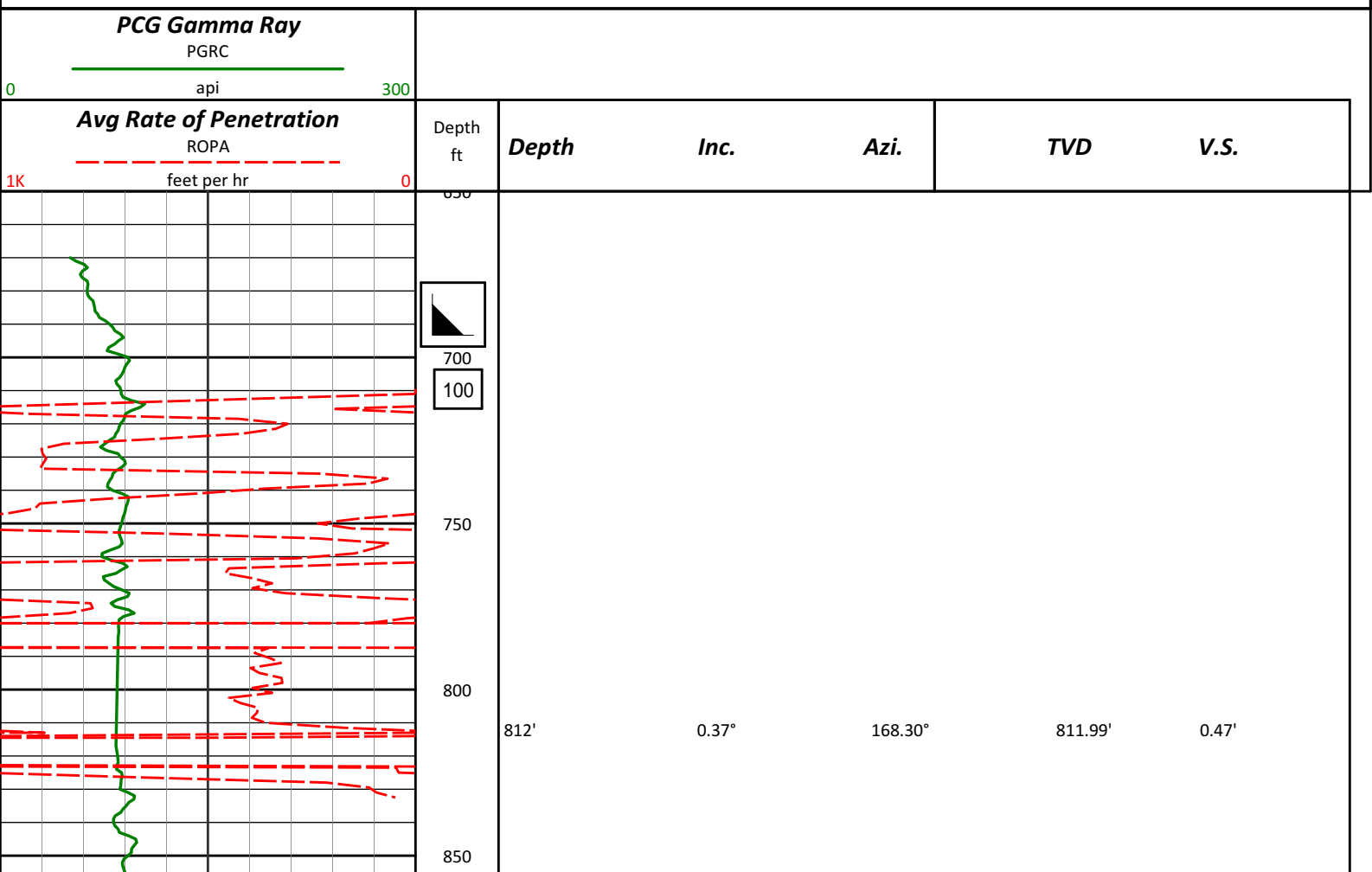
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

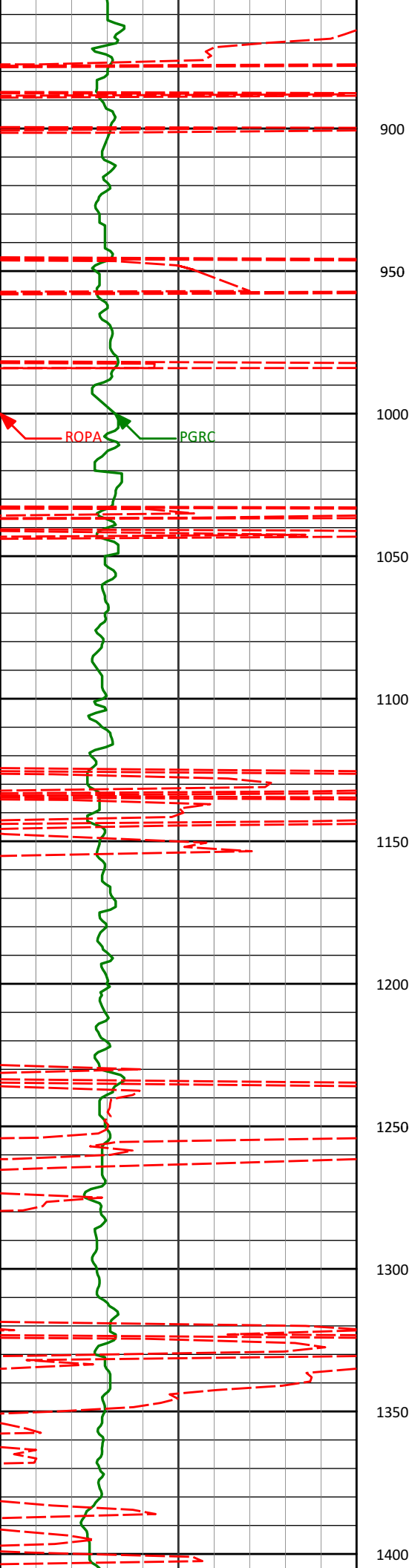
# HALLIBURTON

## Sperry Drilling Services

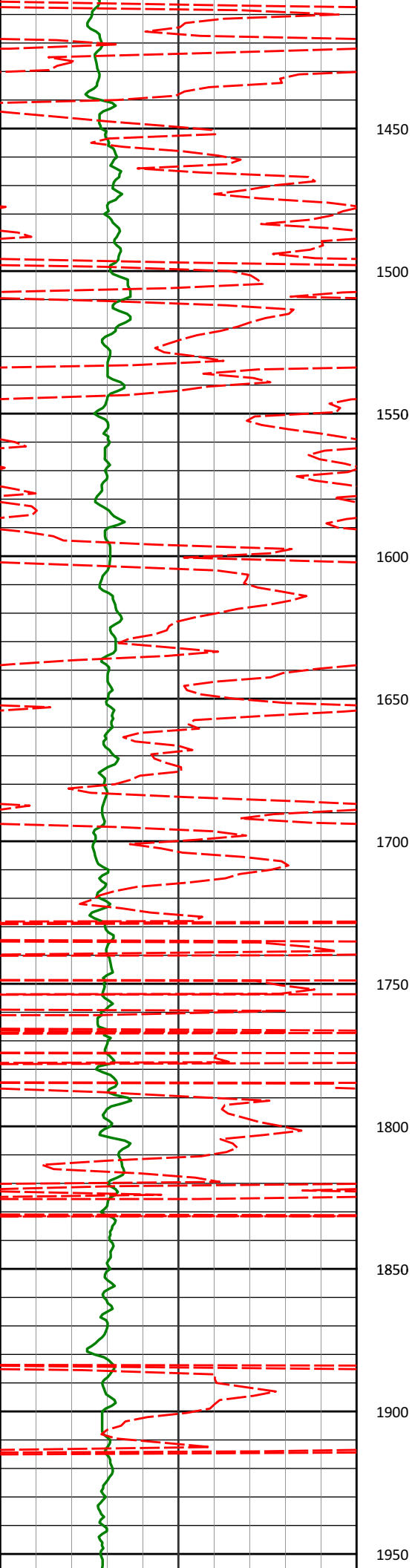
### MD Correlation Log 1:600

Noble Energy  
Burton K25-69-1HNL-A1  
H&P 321  
Sec.25-T4N-R66W

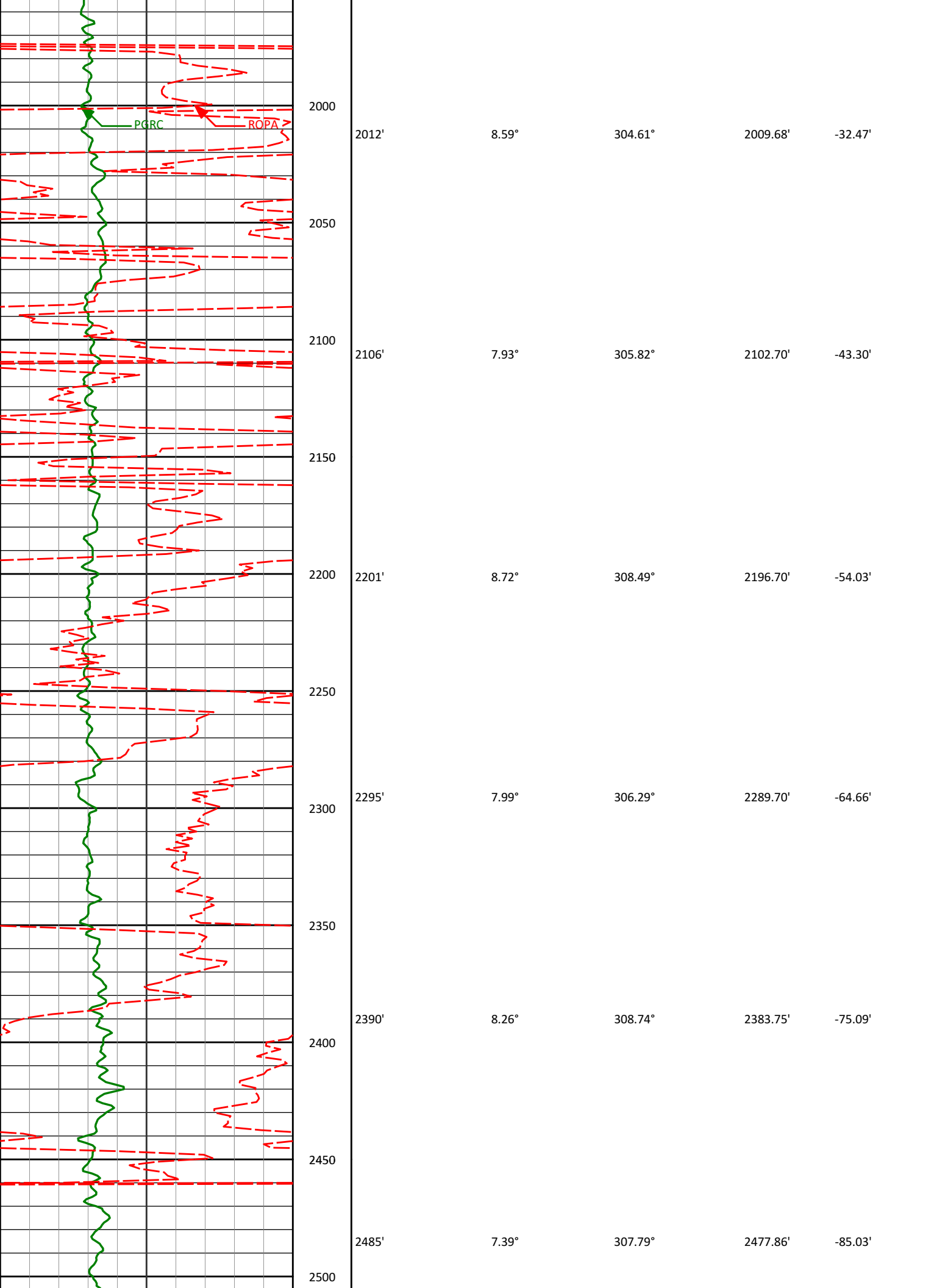


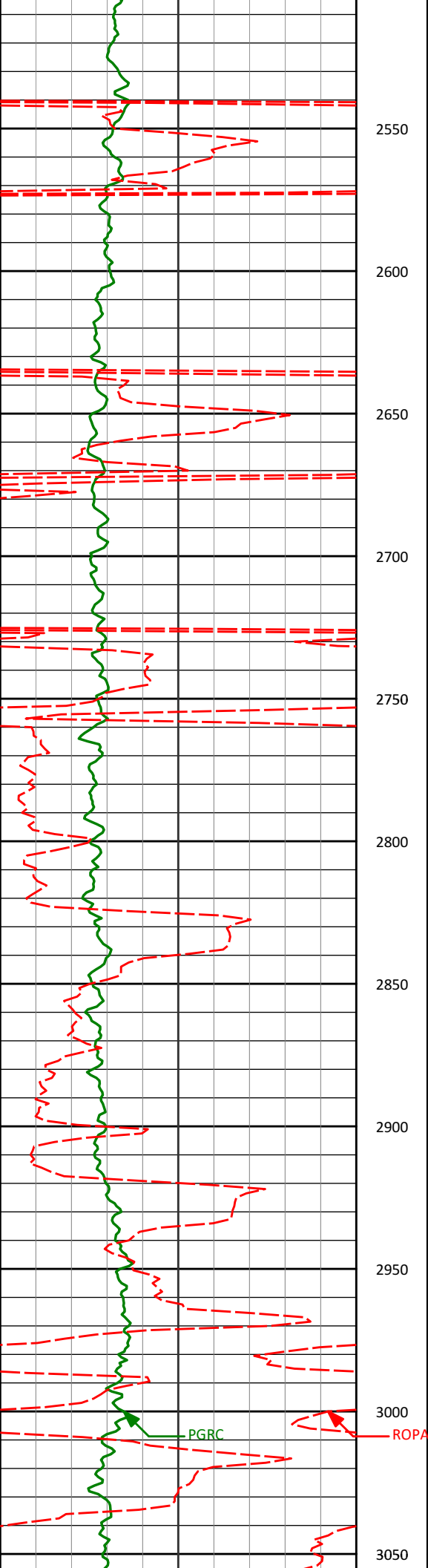


904'	0.48°	177.49°	903.99'	0.53'
950				
997'	0.79°	196.95°	996.99'	0.33'
1050				
1100				
1150				
1182'	0.68°	180.64°	1181.97'	-0.11'
1200				
1250				
1272'	0.68°	181.60°	1271.96'	-0.16'
1300				
1350				
1400				

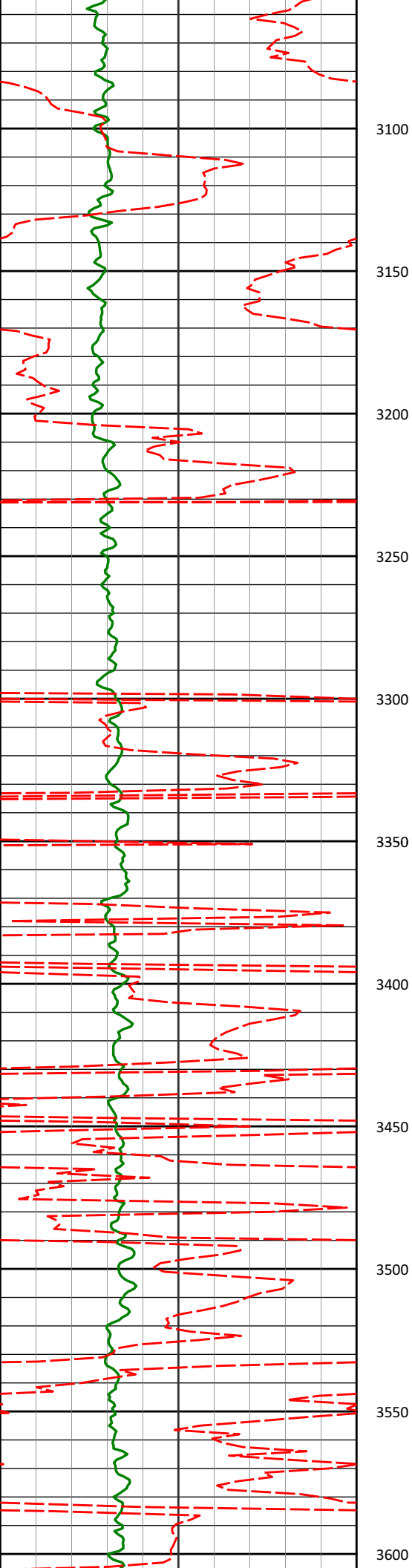


1450	1456'	0.59°	183.28°	1455.95'	-0.30'
1500					
1550	1547'	1.08°	324.26°	1546.95'	-0.82'
1600					
1650	1639'	2.77°	323.97°	1638.89'	-2.57'
1700					
1750	1732'	4.37°	312.70°	1731.71'	-6.39'
1800					
1850	1827'	6.37°	308.03°	1826.29'	-13.05'
1900					
1950	1918'	7.59°	304.82°	1916.61'	-21.79'



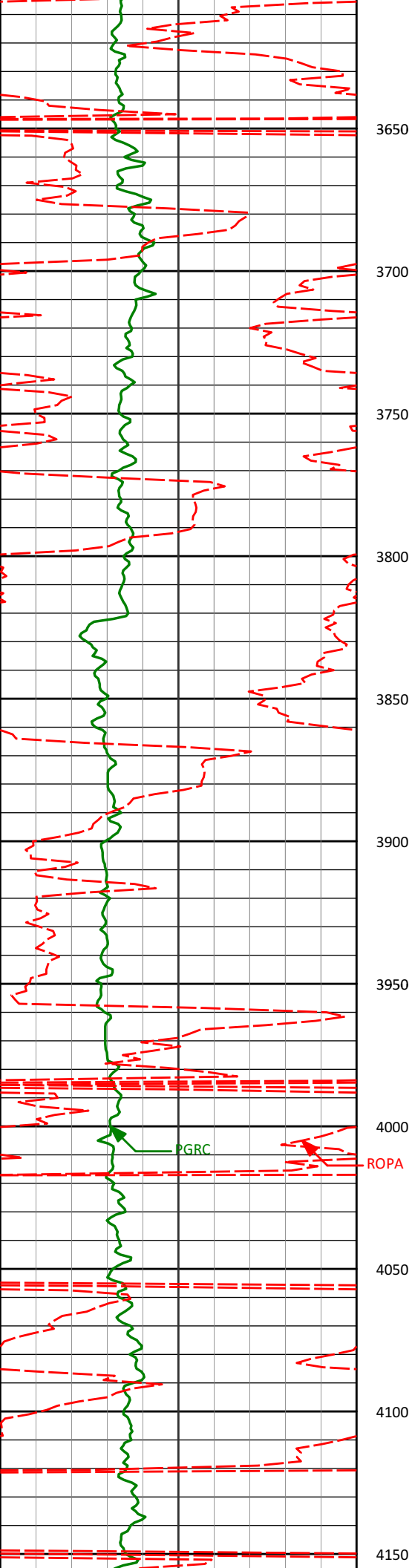


2550				
2580'	7.32°	313.56°	2572.08'	-94.04'
2600				
2650				
2675'	8.87°	314.46°	2666.13'	-103.41'
2700				
2750				
2769'	9.17°	314.18°	2758.97'	-113.69'
2800				
2850				
2864'	9.41°	314.87°	2852.73'	-124.34'
2900				
2950				
2959'	8.63°	313.84°	2946.55'	-134.72'
3000				
3050				
3054'	7.85°	314.09°	3040.57'	-144.27'

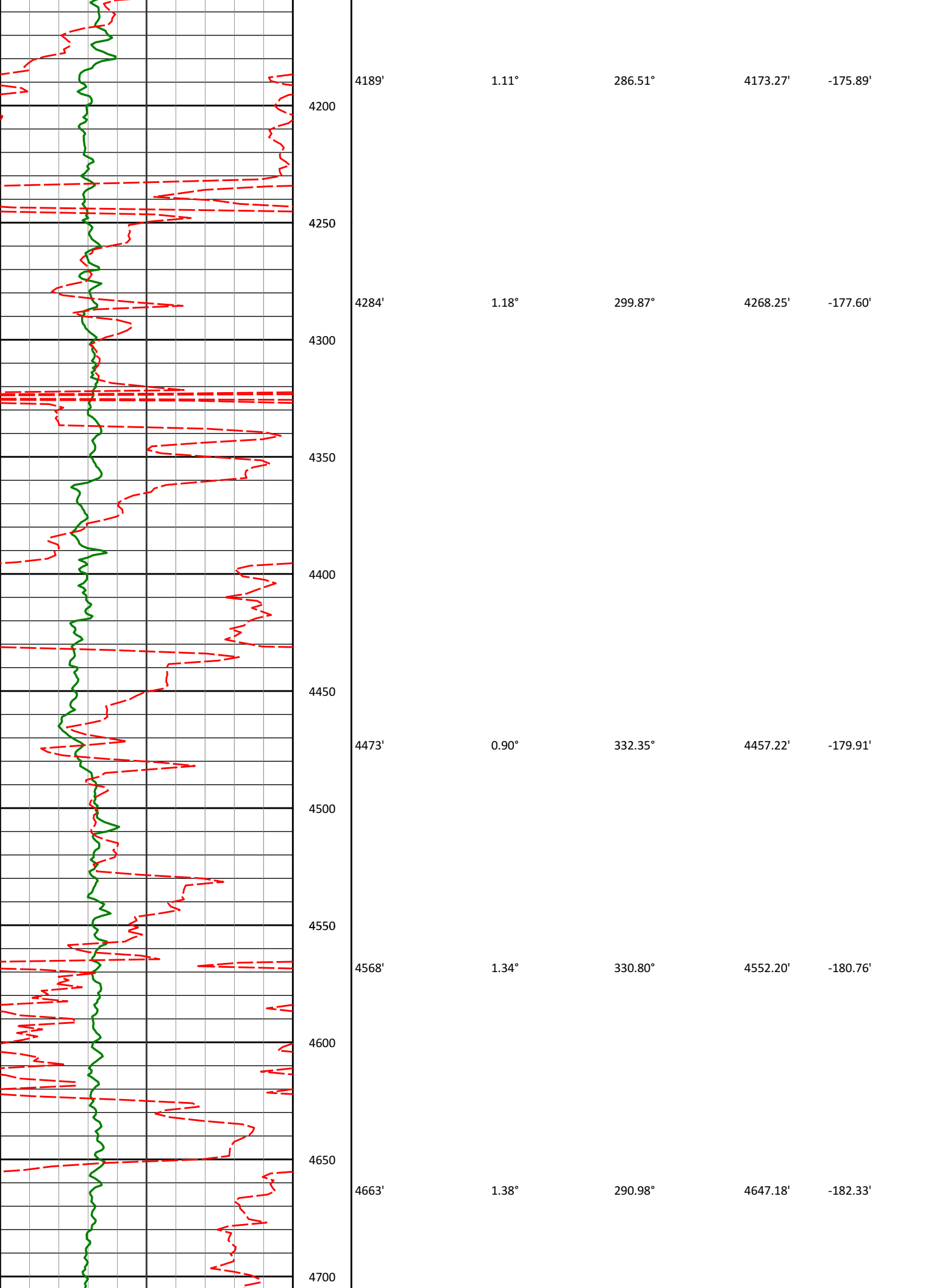


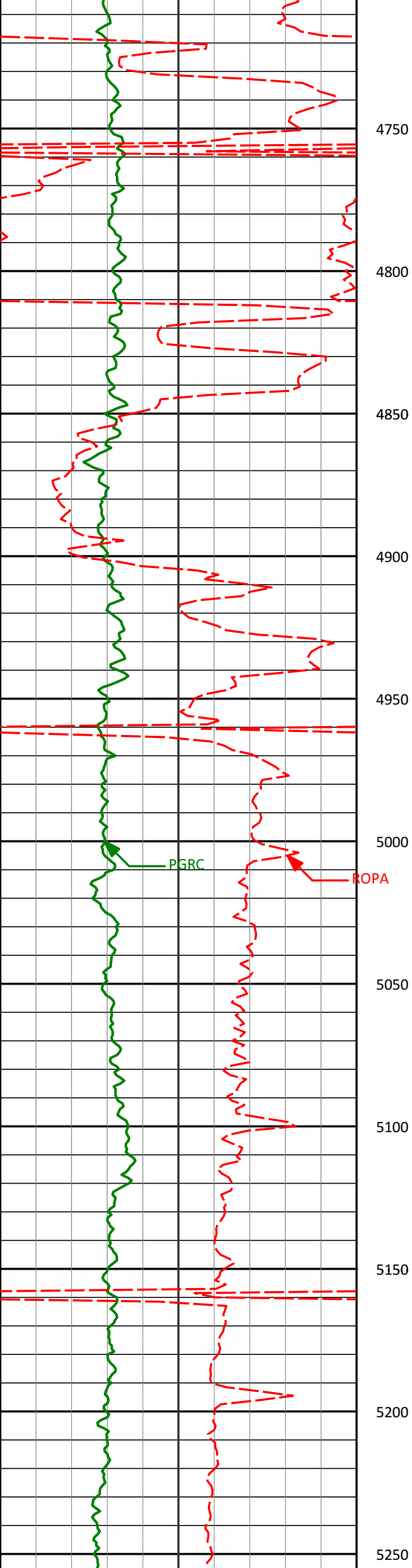
3054'	7.65°	314.65°	3046.57'	-144.27'
3100				
3149'	7.50°	312.43°	3134.72'	-153.28'
3150				
3200				
3243'	6.06°	311.66°	3228.06'	-161.32'
3250				
3300				
3338'	4.81°	315.35°	3322.63'	-167.71'
3350				
3400				
3433'	2.96°	317.50°	3417.41'	-172.05'
3450				
3500				
3550				
3600				



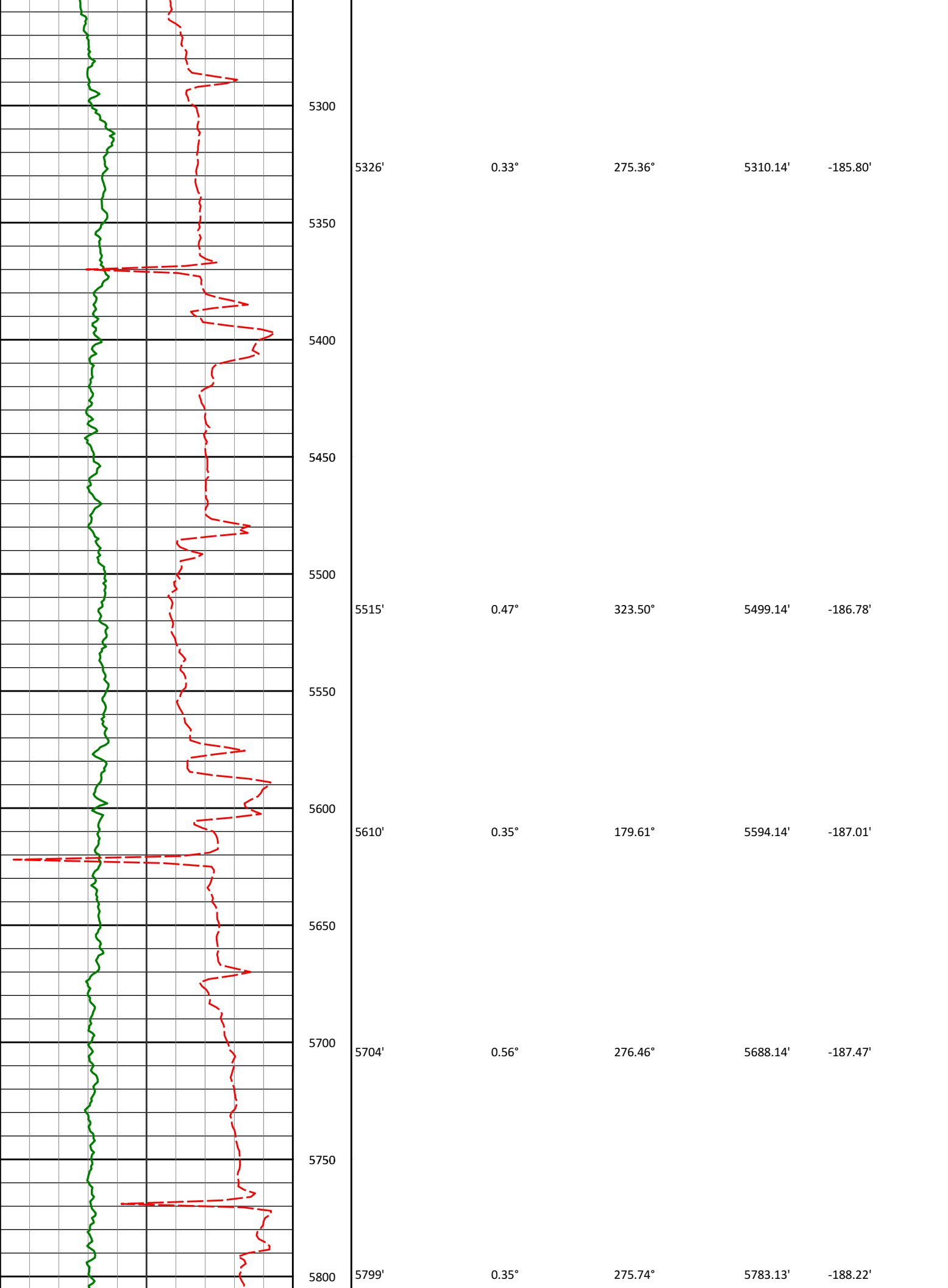


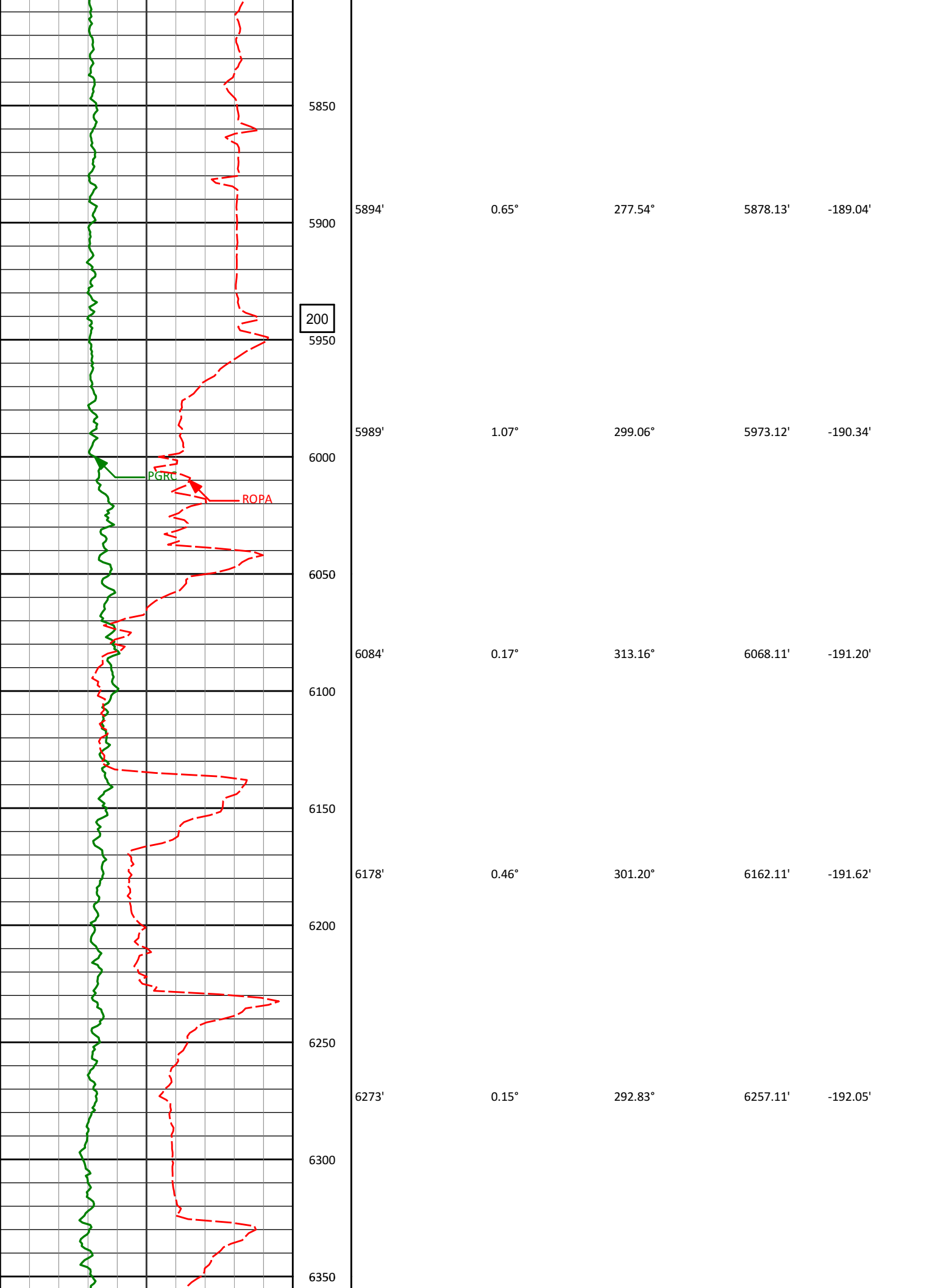
3622'	0.51°	331.32°	3606.31'	-175.63'
3650				
3700				
3717'	0.16°	129.97°	3701.30'	-175.73'
3750				
3800				
3811'	0.97°	163.57°	3795.30'	-175.42'
3850				
3900				
3905'	0.90°	167.58°	3889.29'	-175.08'
3950				
4000'	0.65°	169.27°	3984.28'	-174.85'
4050				
4094'	0.15°	271.54°	4078.28'	-174.89'
4100				
4150				

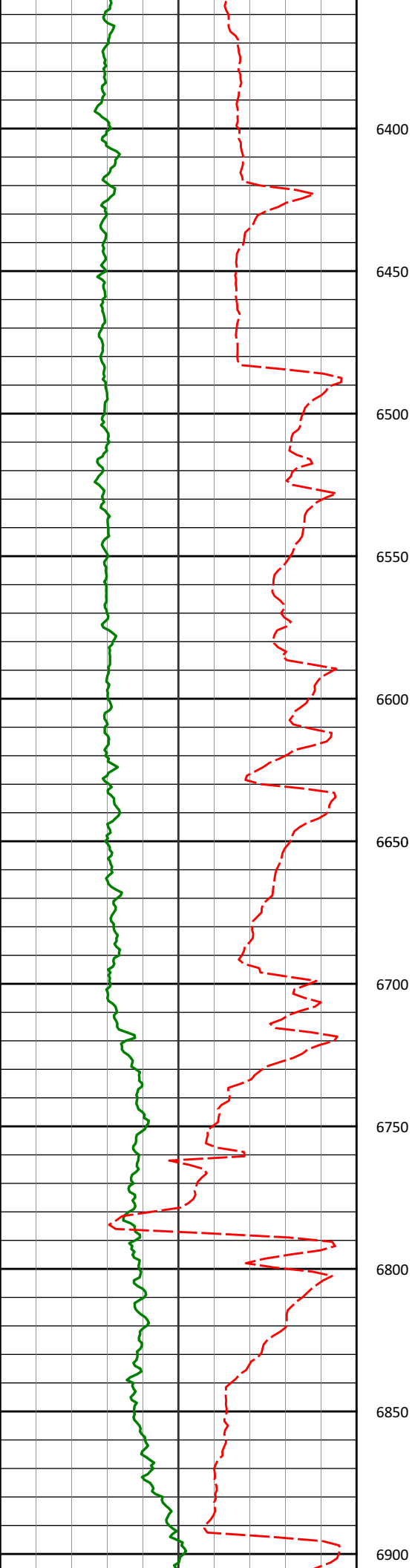




4757'	1.09°	273.74°	4741.16'	-184.27'
4947'	0.34°	122.71°	4931.15'	-185.60'
5042'	0.25°	132.17°	5026.15'	-185.22'
5136'	0.22°	185.86°	5120.14'	-185.10'
5231'	0.26°	249.99°	5215.14'	-185.32'







6462'

0.18°

240.44°

6446.11'

-192.54'

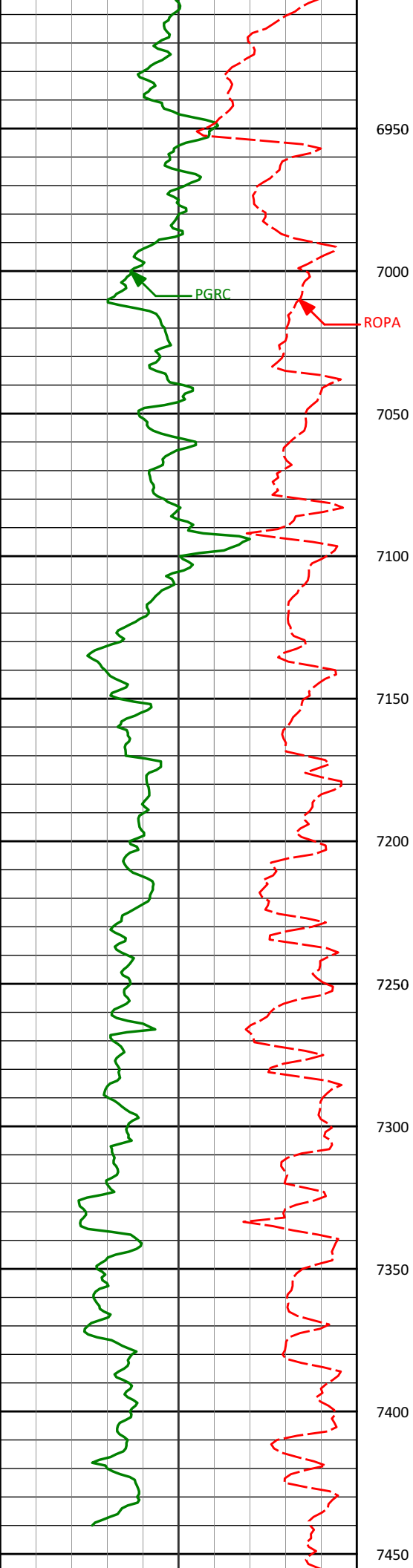
6557'

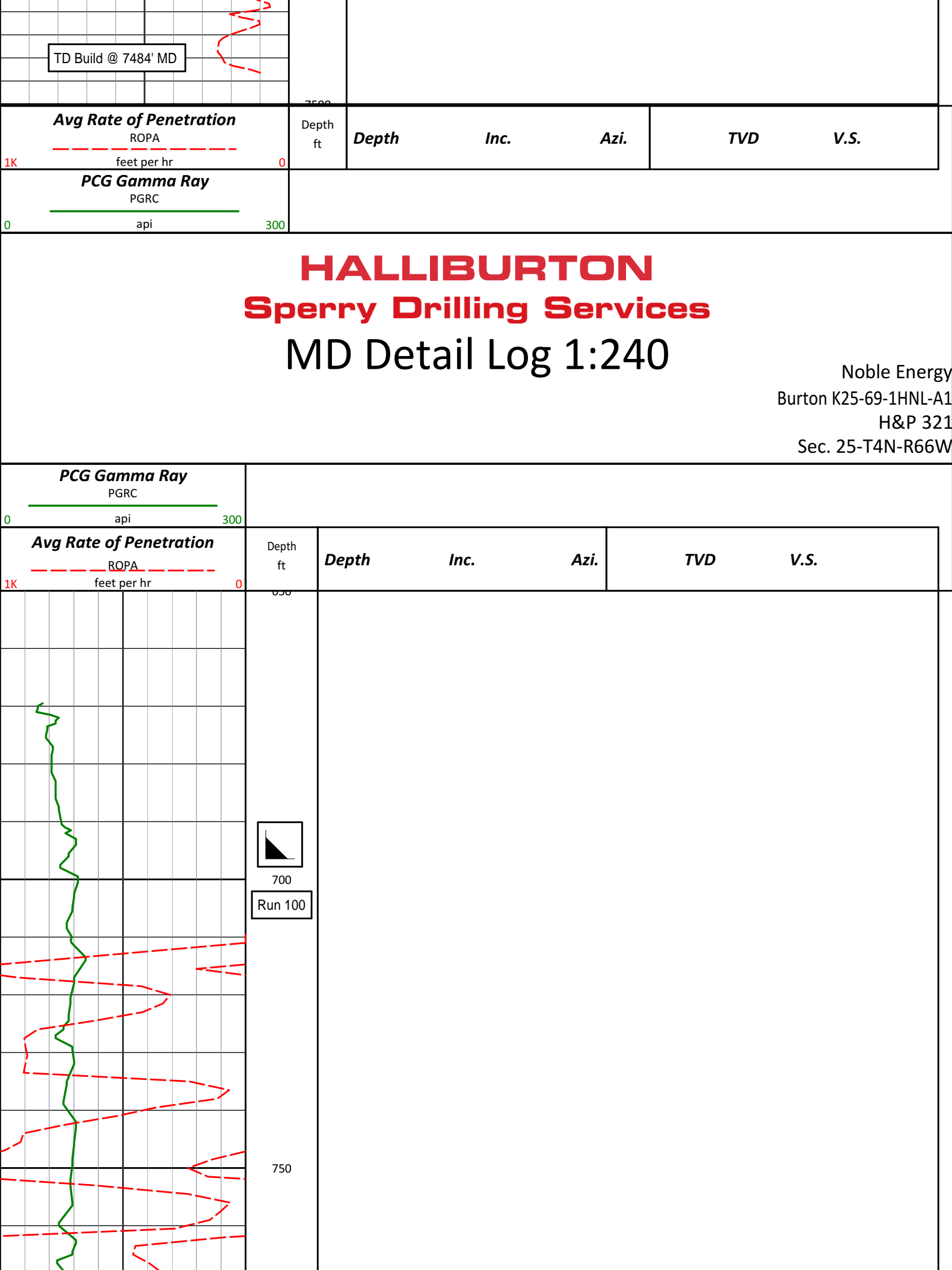
7.19°

84.56°

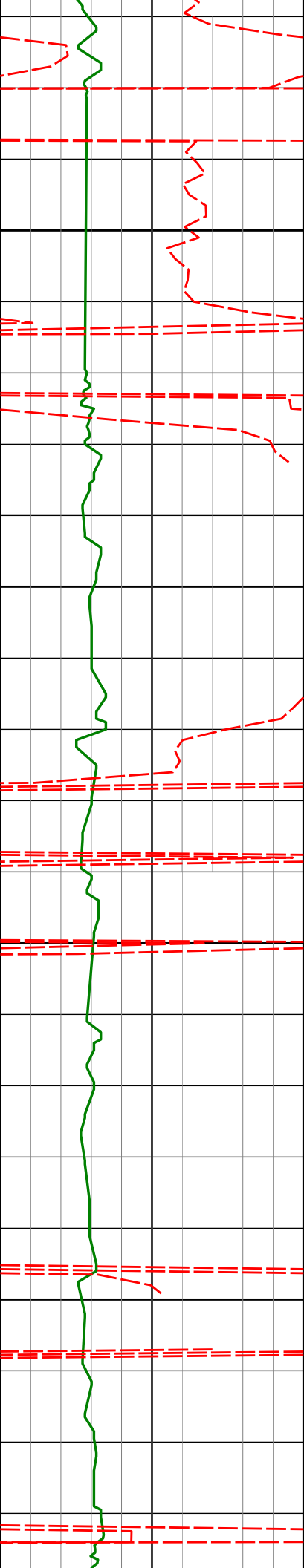
6540.86'

-186.73'









800

812'

0.37°

168.30°

811.99'

0.47'

850

900

904'

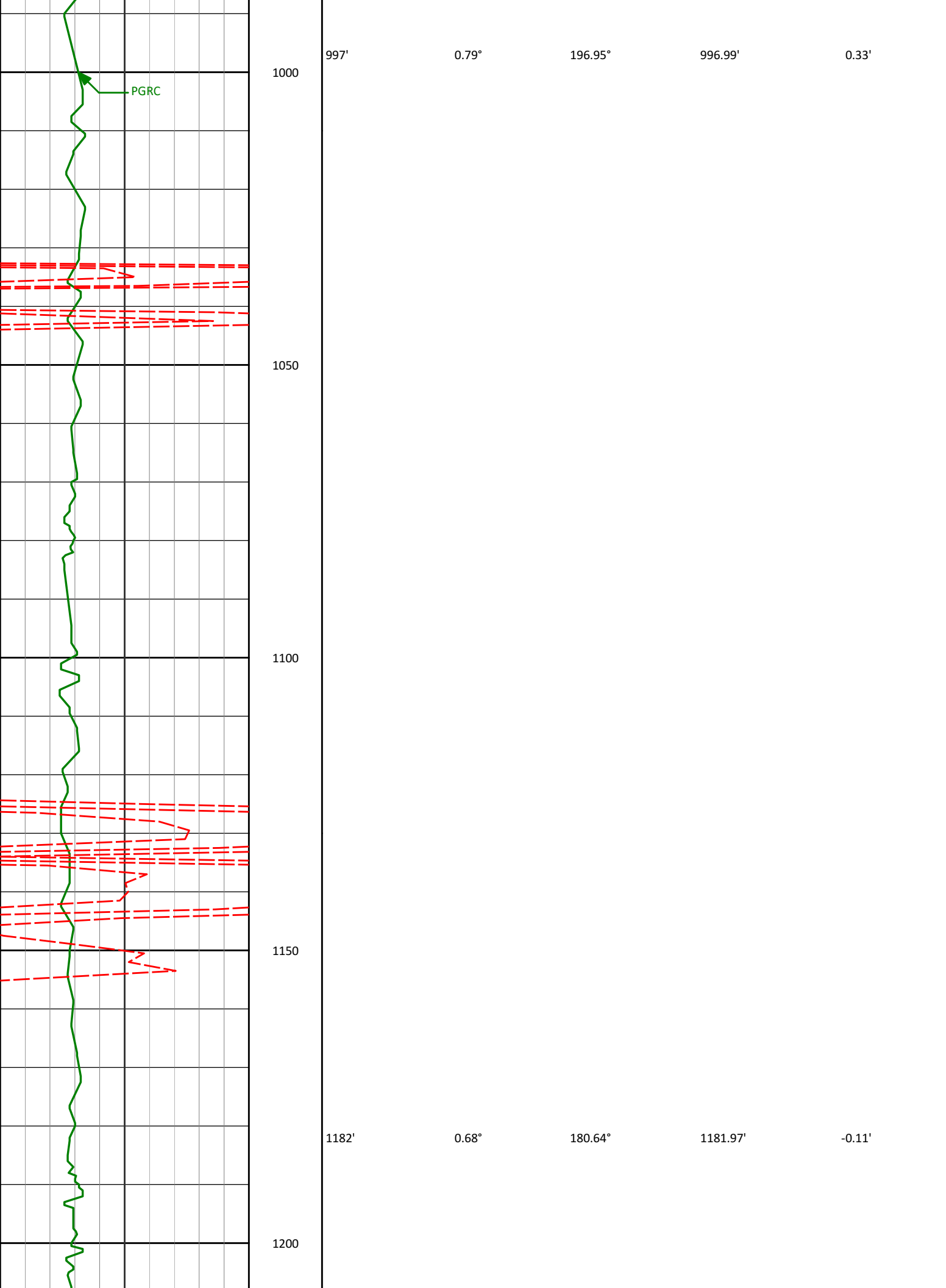
0.48°

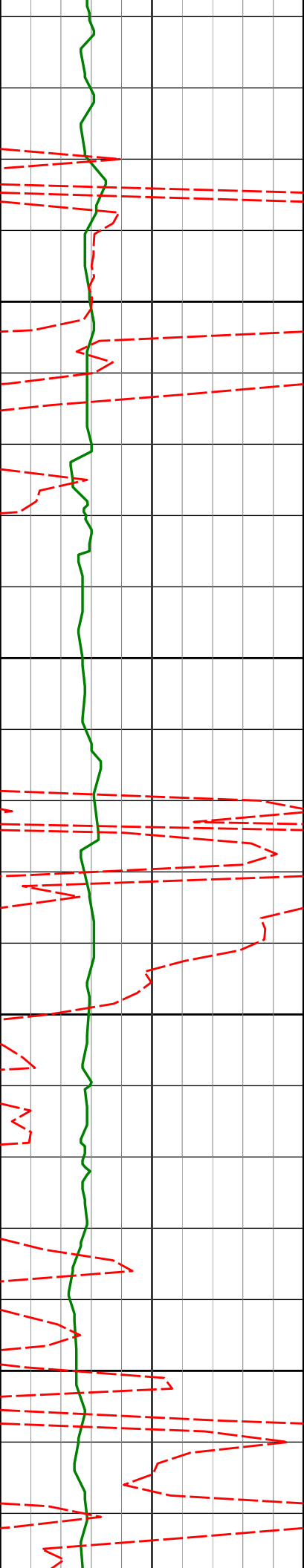
177.49°

903.99'

0.53'

950





1250

1272'

0.68°

181.60°

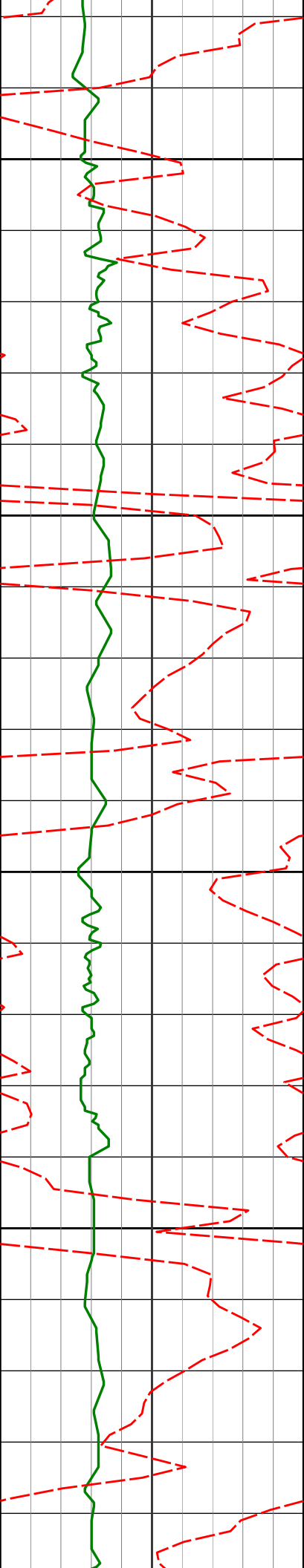
1271.96'

-0.16'

1300

1350

1400



1450

1456'

0.59°

183.28°

1455.95'

-0.30'

1500

1550

1547'

1.08°

324.26°

1546.95'

-0.82'

1600

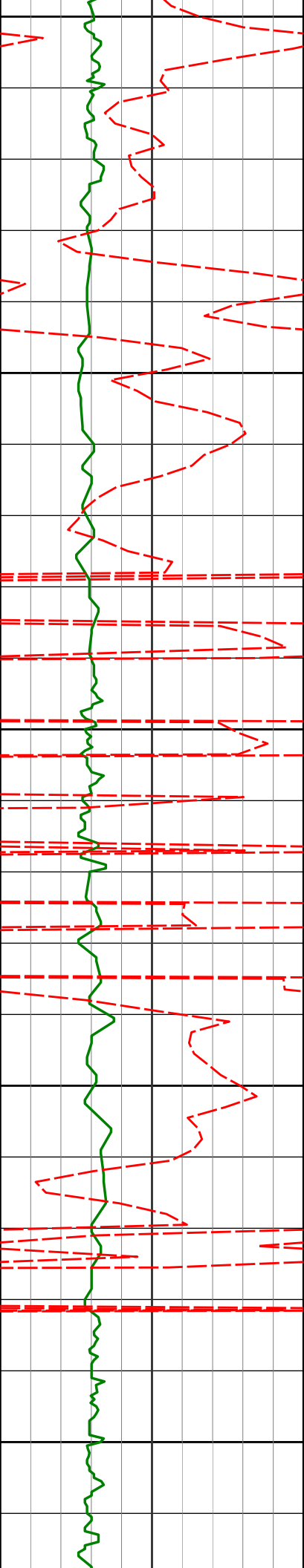
1639'

2.77°

323.97°

1638.89'

-2.57'



1650

1700

1750

1800

1850

1732'

4.37°

312.70°

1731.71'

-6.39'

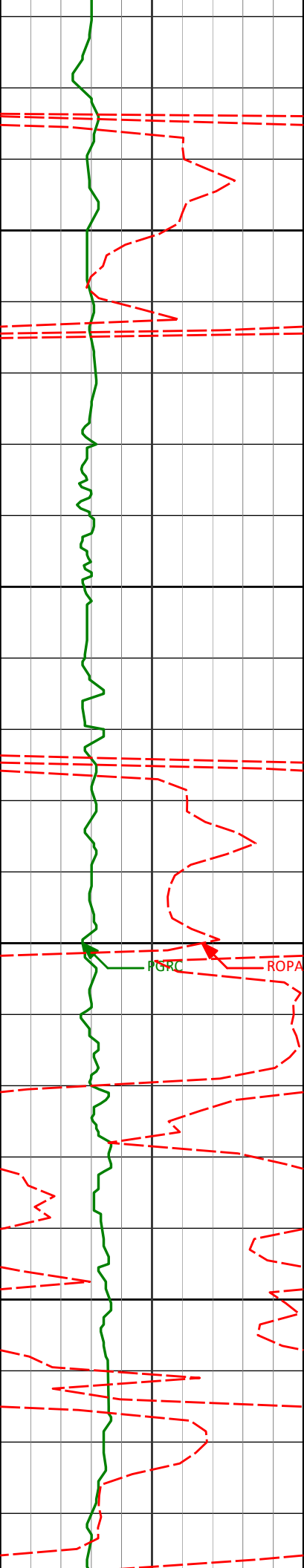
1827'

6.37°

308.03°

1826.29'

-13.05'



1900

1950

2000

2050

1918'

7.59°

304.82°

1916.61'

-21.79'

2012'

8.59°

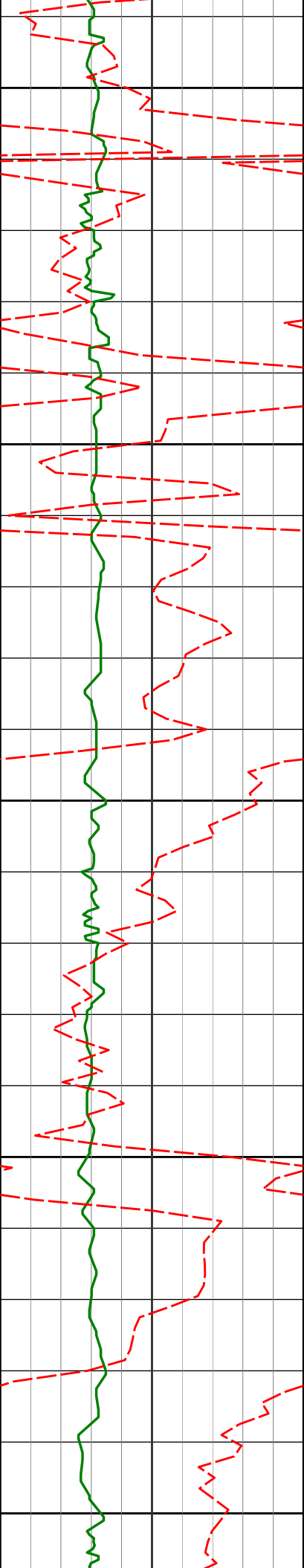
304.61°

2009.68'

-32.47'

PGRC

ROPA



2100

2106'

7.93°

305.82°

2102.70'

-43.30'

2150

2200

2201'

8.72°

308.49°

2196.70'

-54.03'

2250

2300

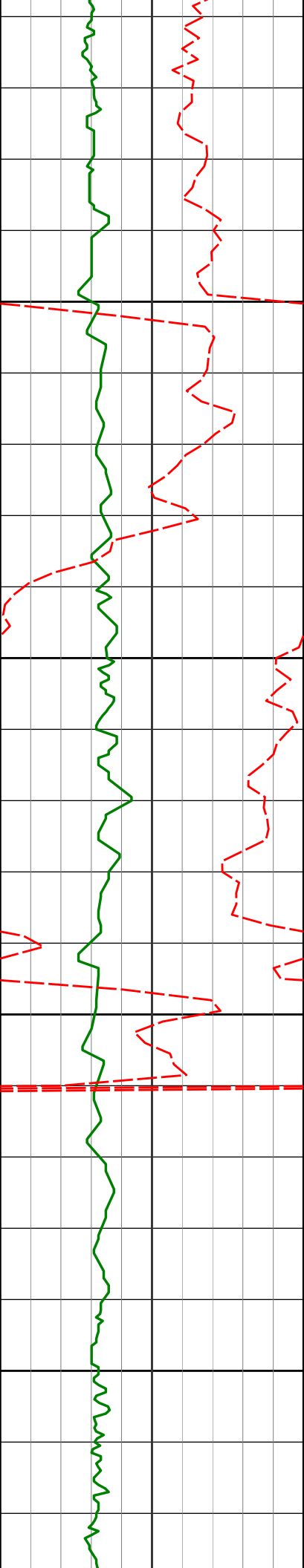
2295'

7.99°

306.29°

2289.70'

-64.66'



2350

2400

2450

2500

2390'

8.26°

308.74°

2383.75'

-75.09'

2485'

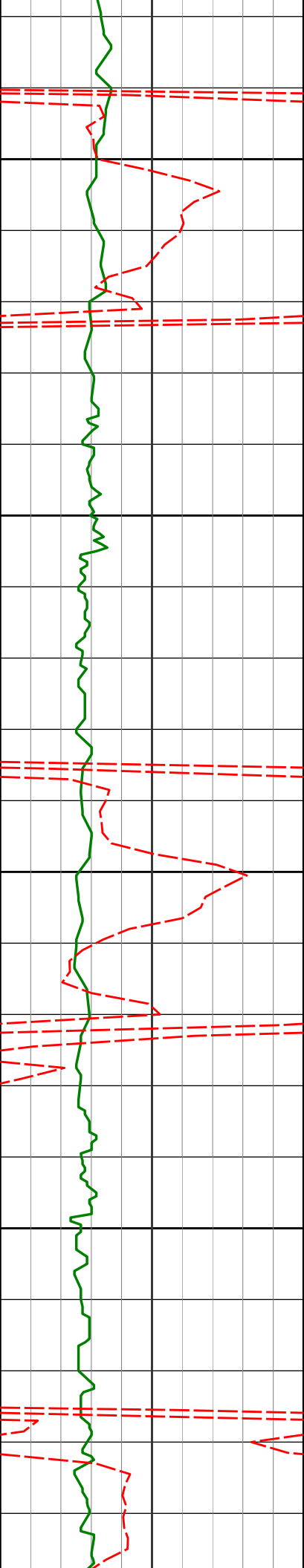
7.39°

307.79°

2477.86'

-85.03'





2550

2580'

7.32°

313.56°

2572.08'

-94.04'

2600

2650

2675'

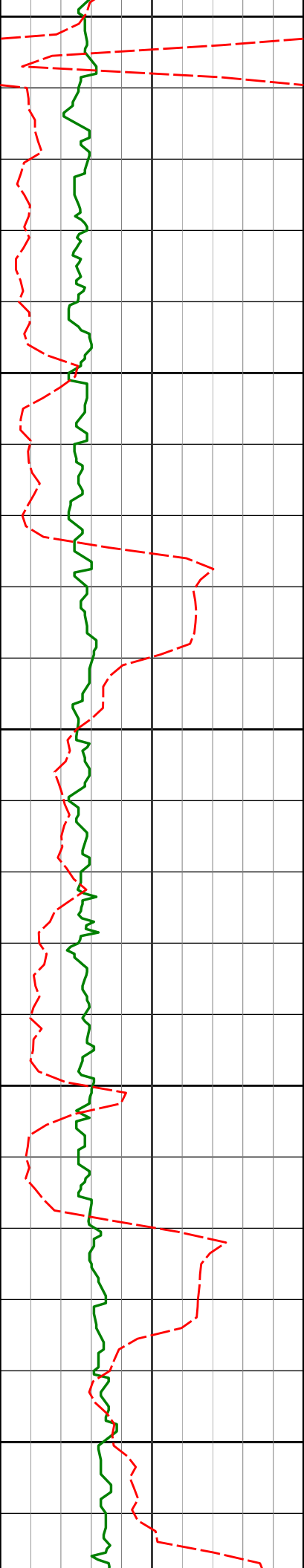
8.87°

314.46°

2666.13'

-103.41'

2700



2750

2769'

9.17°

314.18°

2758.97'

-113.69'

2800

2850

2864'

9.41°

314.87°

2852.73'

-124.34'

2900

2950

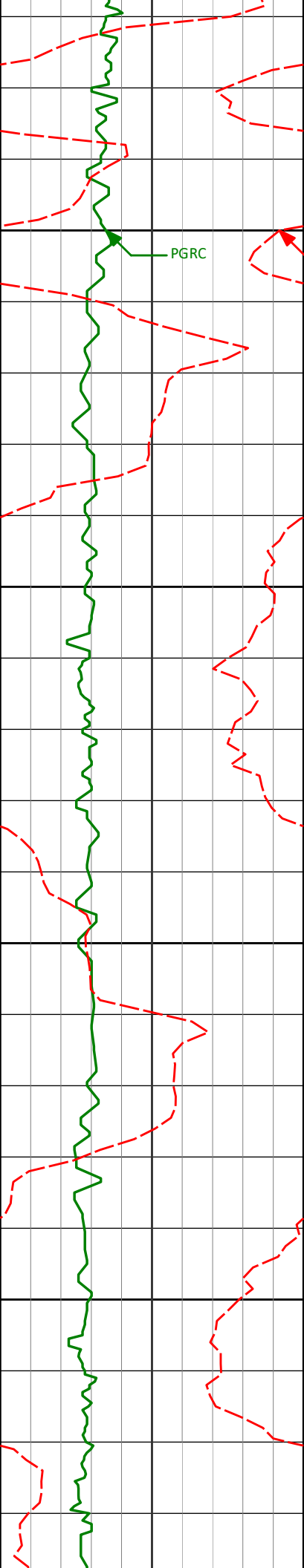
2959'

8.63°

313.84°

2946.55'

-134.72'



3000  
ROPA

PGRC

3050

3054'

7.85°

314.09°

3040.57'

-144.27'

3100

3150

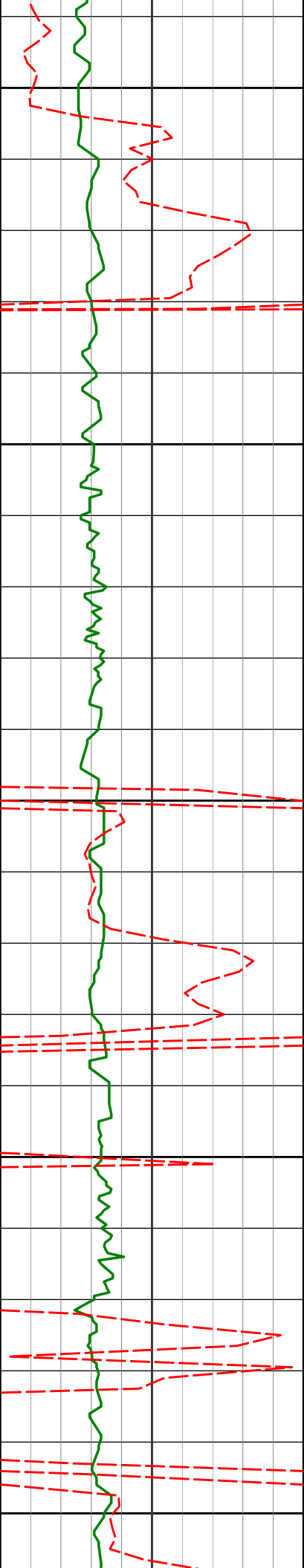
3149'

7.50°

312.43°

3134.72'

-153.28'



3200

3243'

6.06°

311.66°

3228.06'

-161.32'

3250

3300

3338'

4.81°

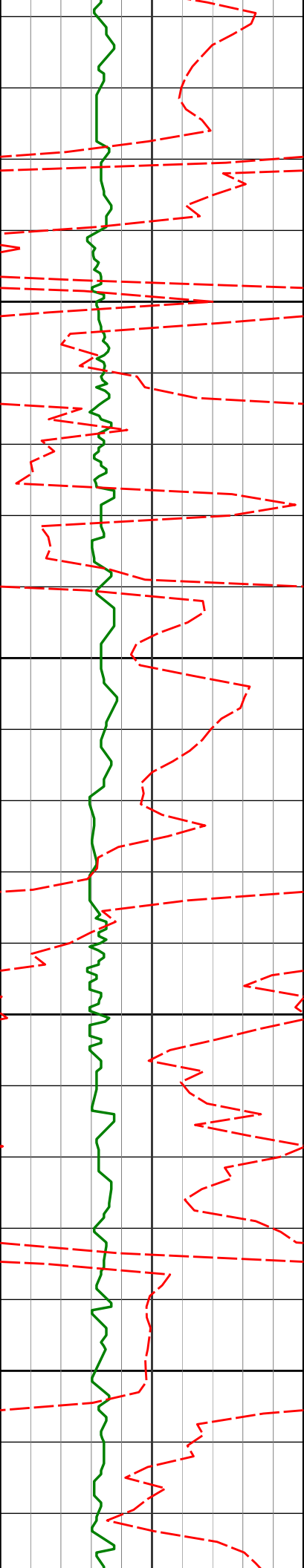
315.35°

3322.63'

-167.71'

3350

3400



3433'

2.96°

317.50°

3417.41'

-172.05'

3450

3500

3550

3600

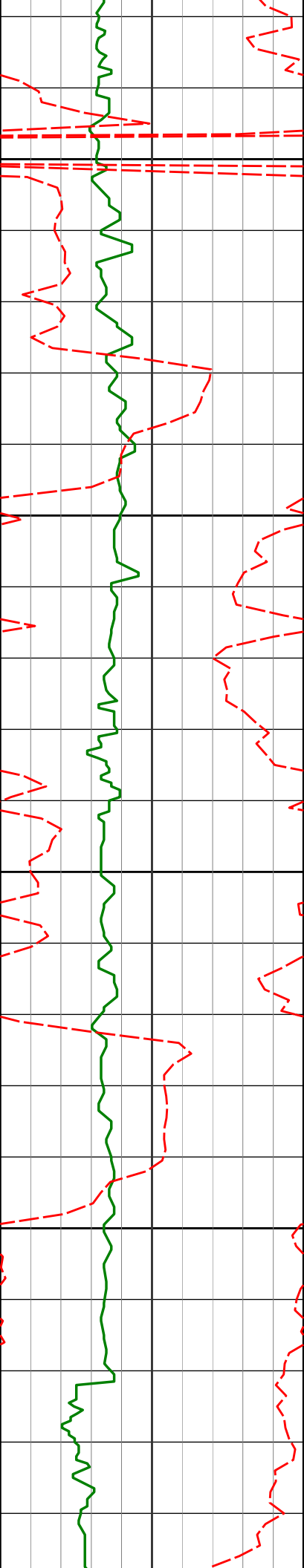
3622'

0.51°

331.32°

3606.31'

-175.63'



3650

3700

3750

3800

3717'

0.16°

129.97°

3701.30'

-175.73'

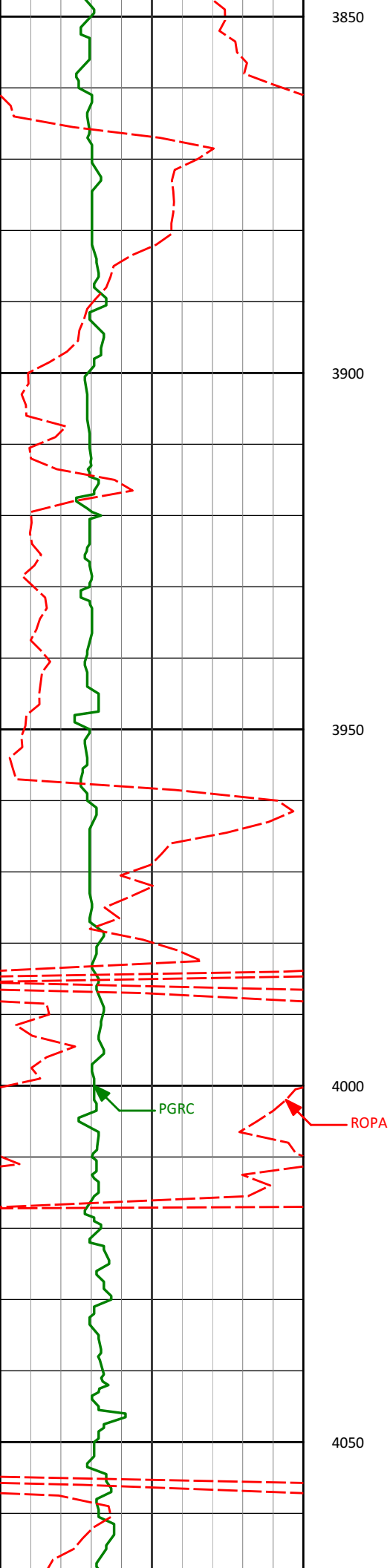
3811'

0.97°

163.57°

3795.30'

-175.42'



3905'

0.90°

167.58°

3889.29'

-175.08'

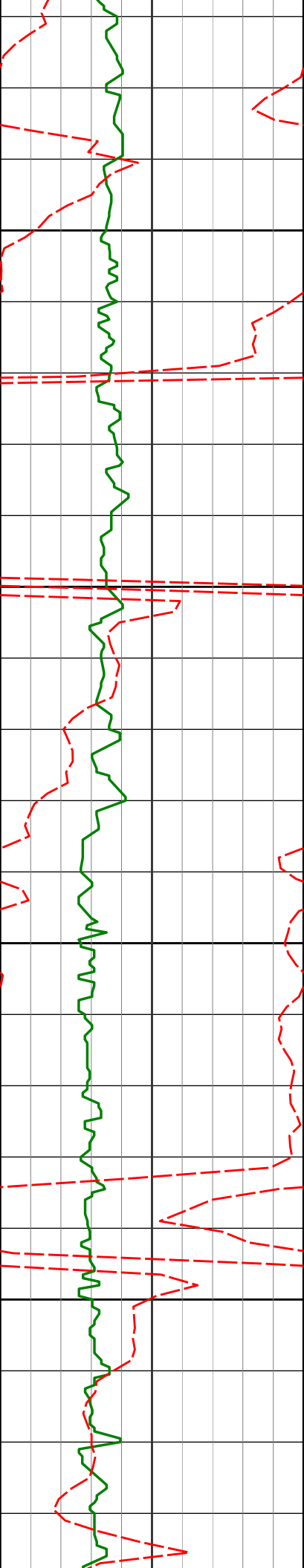
4000'

0.65°

169.27°

3984.28'

-174.85'



4094'	0.15°	271.54°	4078.28'	-174.89'
-------	-------	---------	----------	----------

4100

4150

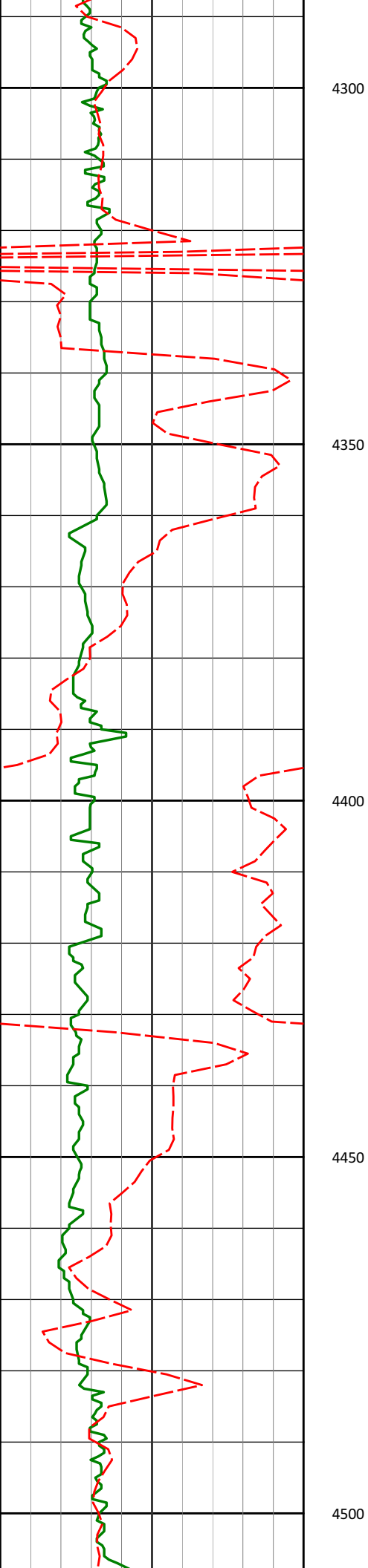
4189'	1.11°	286.51°	4173.27'	-175.89'
-------	-------	---------	----------	----------

4200

4250

4284'	1.18°	299.87°	4268.25'	-177.60'
-------	-------	---------	----------	----------





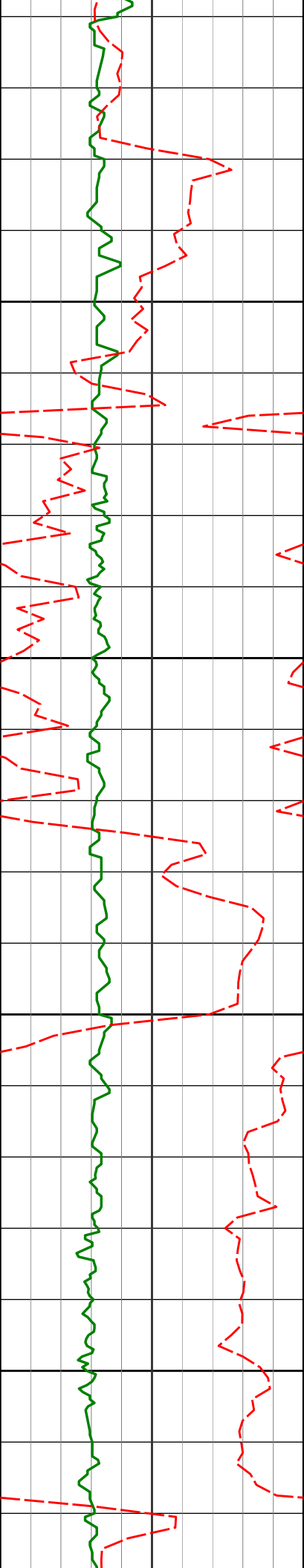
4473'

0.90°

332.35°

4457.22'

-179.91'



4550

4568'

1.34°

330.80°

4552.20'

-180.76'

4600

4650

4663'

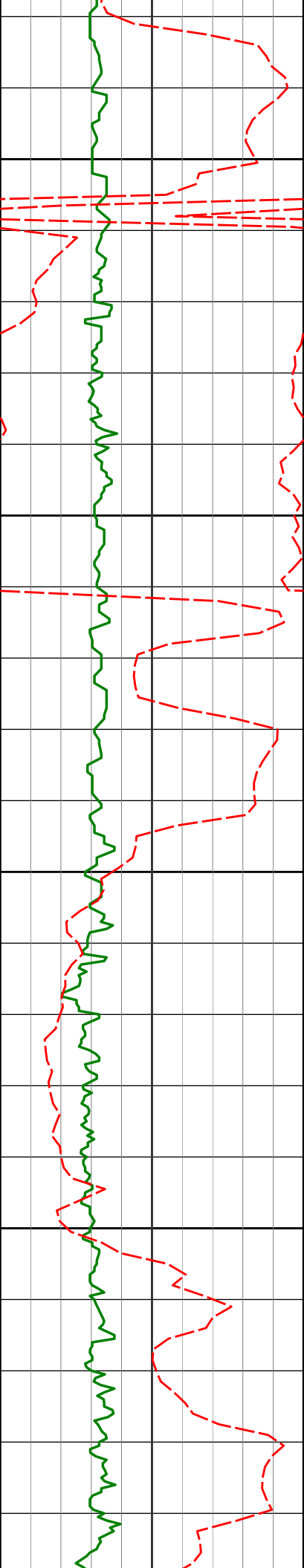
1.38°

290.98°

4647.18'

-182.33'

4700



4750

4757'

1.09°

273.74°

4741.16'

-184.27'

4800

4850

4900

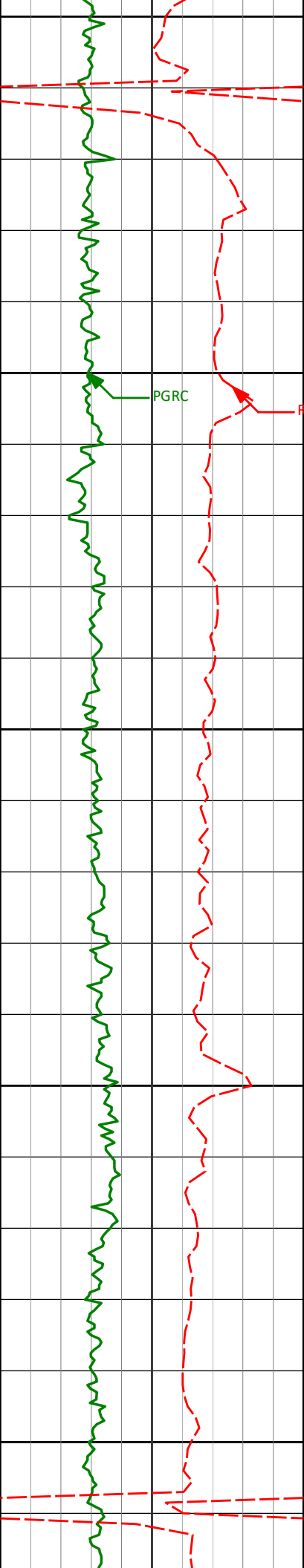
4947'

0.34°

122.71°

4931.15'

-185.60'



4950

5000

5050

5100

5150

PGRC

ROPA

5042'

0.25°

132.17°

5026.15'

-185.22'

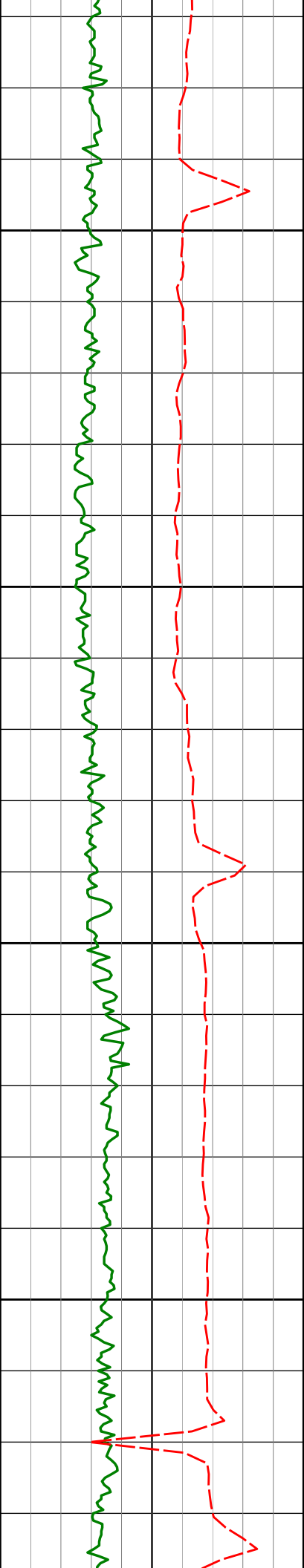
5136'

0.22°

185.86°

5120.14'

-185.10'



5200

5231'

0.26°

249.99°

5215.14'

-185.32'

5250

5300

5326'

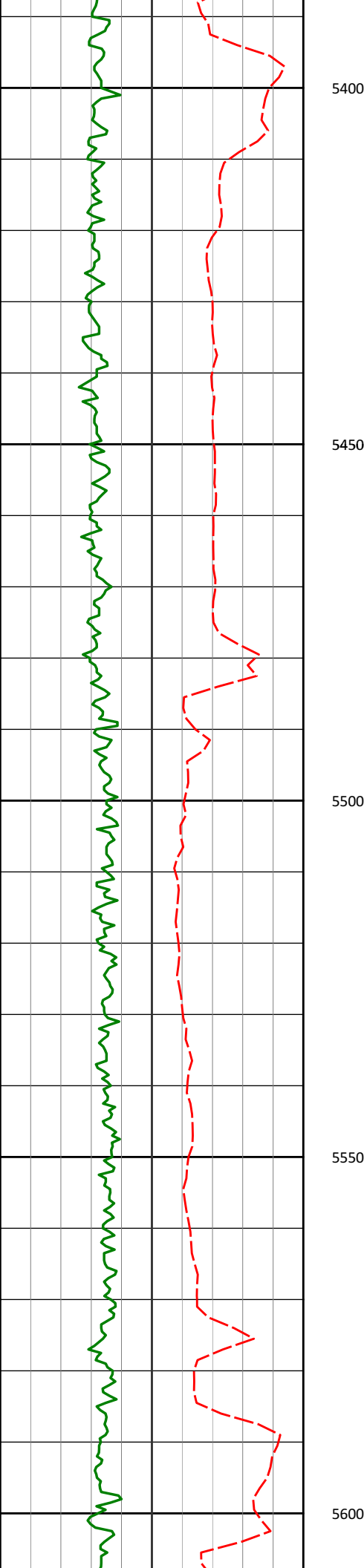
0.33°

275.36°

5310.14'

-185.80'

5350



5400

5450

5500

5550

5600

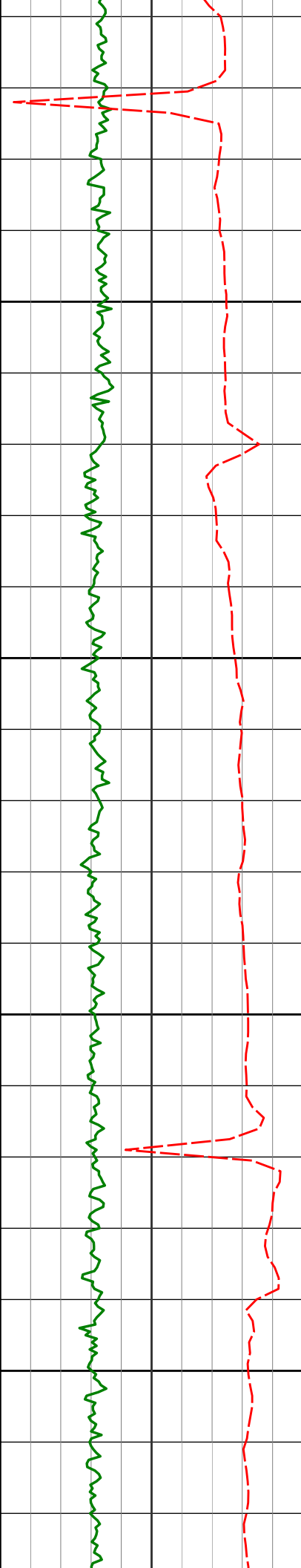
5515'

0.47°

323.50°

5499.14'

-186.78'



5610'

0.35°

179.61°

5594.14'

-187.01'

5650

5700

5704'

0.56°

276.46°

5688.14'

-187.47'

5750

5800

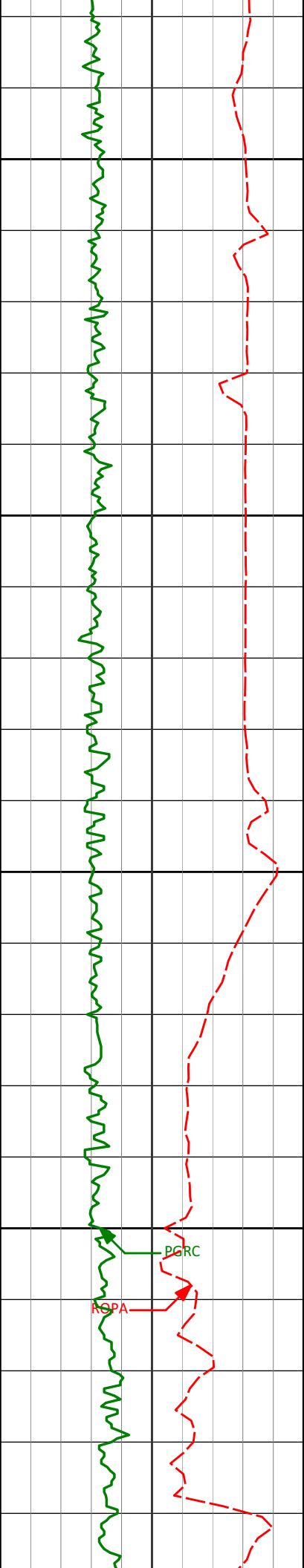
5799'

0.35°

275.74°

5783.13'

-188.22'



5850

5900

200  
5950

6000

5894'

0.65°

277.54°

5878.13'

-189.04'

5989'

1.07°

299.06°

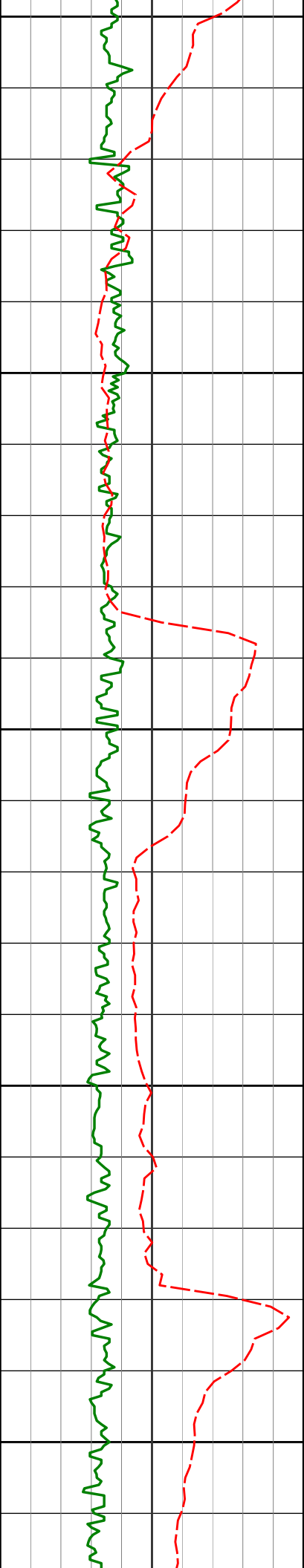
5973.12'

-190.34'

PGRC

KOPA





6050

6084'

0.17°

313.16°

6068.11'

-191.20'

6100

6150

6178'

0.46°

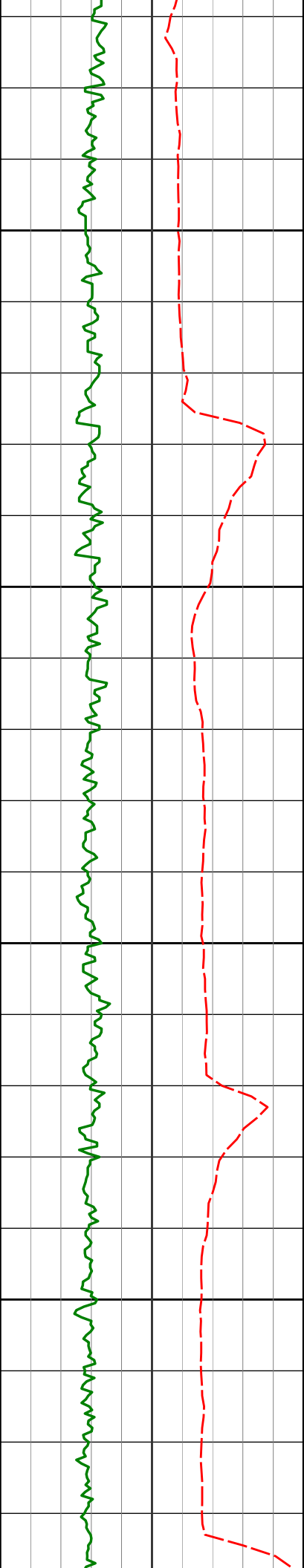
301.20°

6162.11'

-191.62'

6200

6250



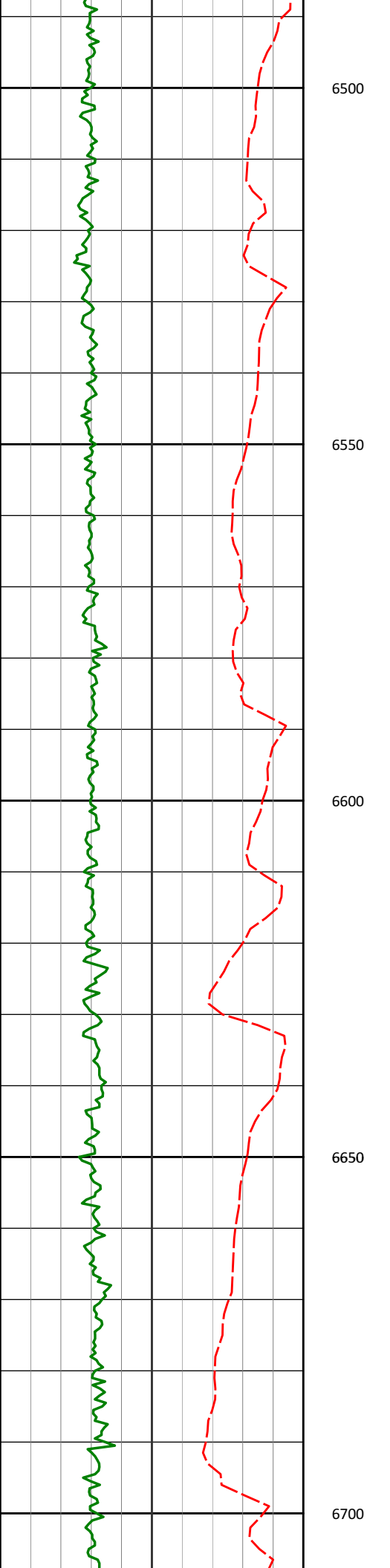
6300

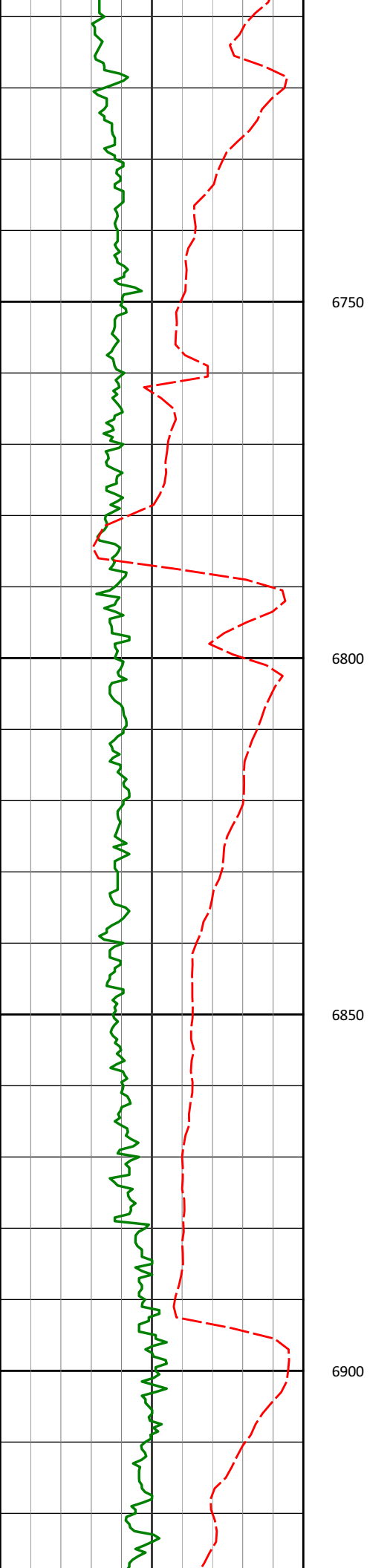
6350

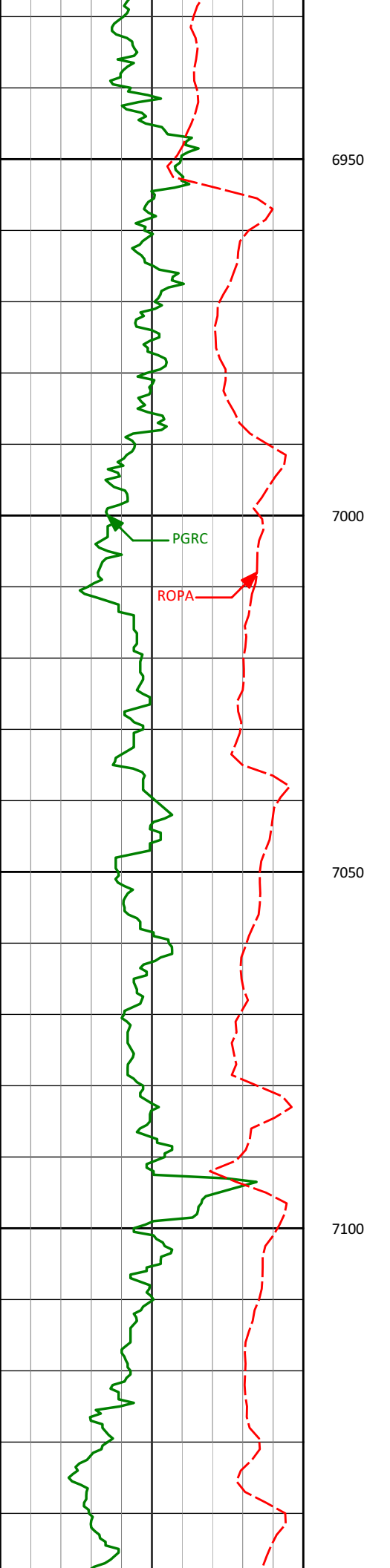
6400

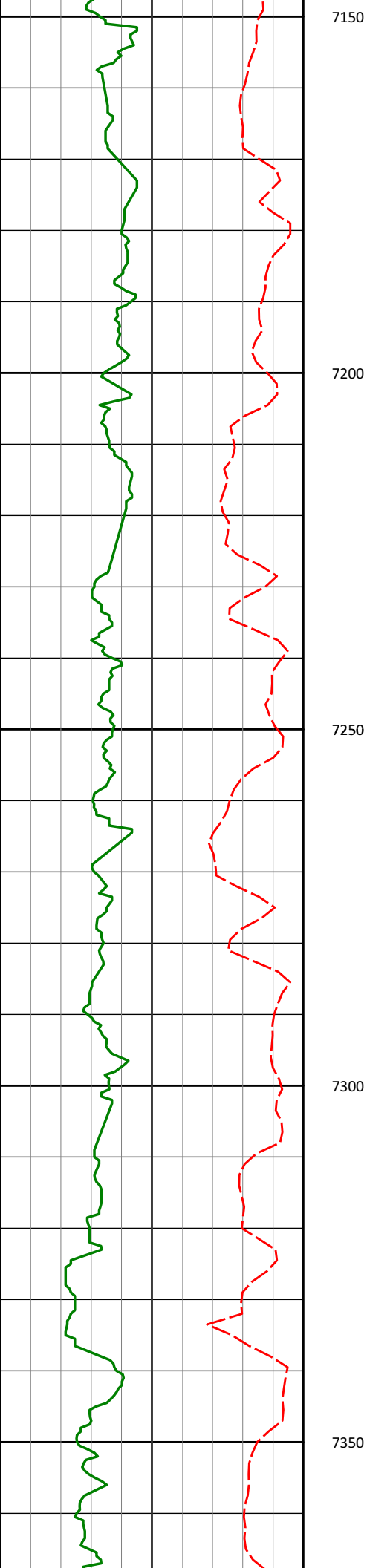
6450

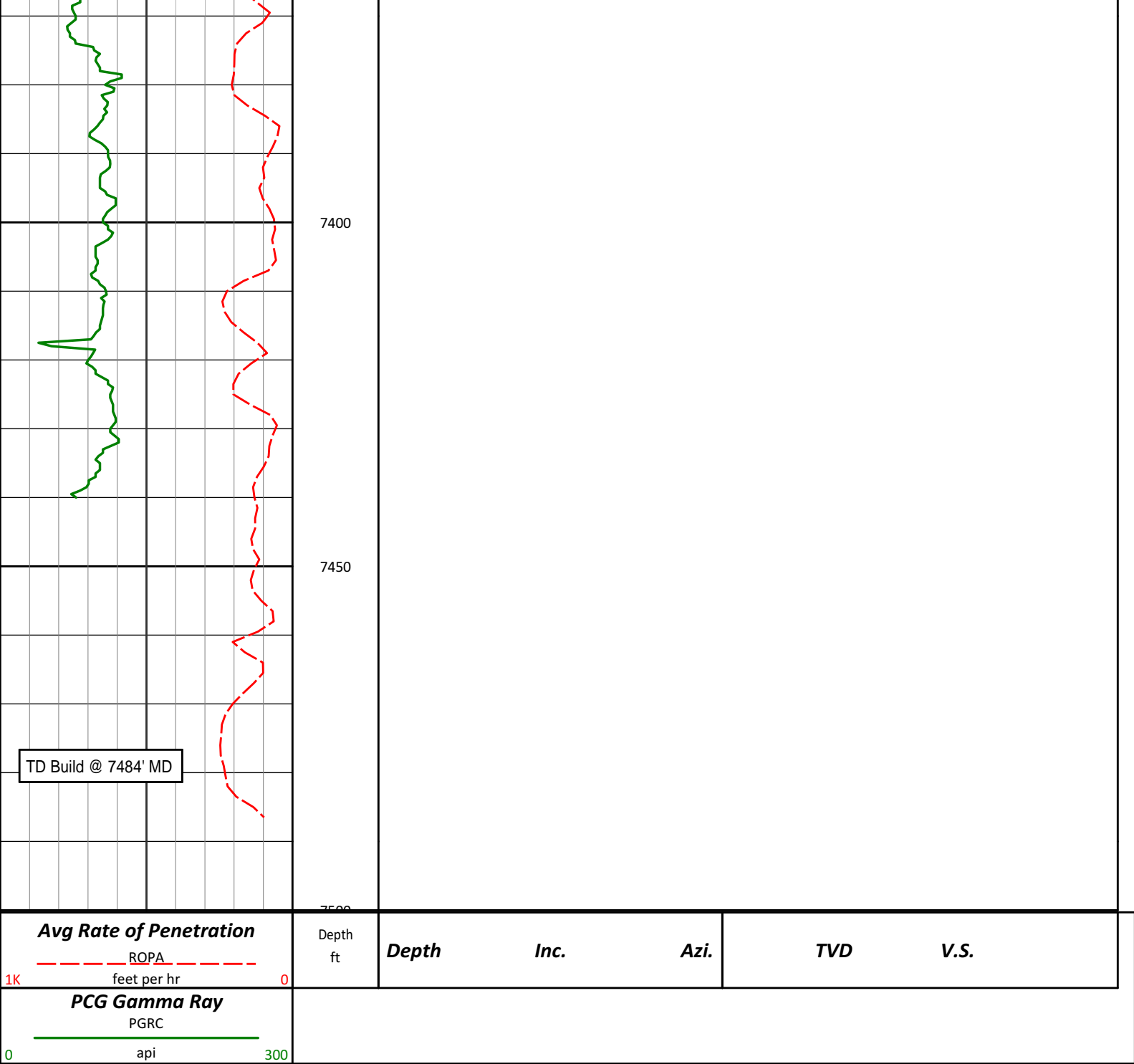
6273'	0.15°	292.83°	6257.11'	-192.05'
6462'	0.18°	240.44°	6446.11'	-192.54'











**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Noble Energy  
Burton K25-69-1HNL  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0901764742

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
812.00	0.37	168.30	811.99	2.57 S	0.53 E	0.47	0.05
904.00	0.48	177.49	903.99	3.24 S	0.61 E	0.53	0.14
997.00	0.79	196.95	996.99	4.25 S	0.44 E	0.33	0.40

1182.00	0.68	180.64	1181.97	6.56 S	0.05 E	-0.11	0.13
1272.00	0.68	181.60	1271.96	7.63 S	0.03 E	-0.16	0.01
1456.00	0.59	183.28	1455.95	9.67 S	0.05 W	-0.30	0.05
1547.00	1.08	324.26	1546.95	9.44 S	0.58 W	-0.82	1.74
1639.00	2.77	323.97	1638.89	6.94 S	2.39 W	-2.57	1.84
1732.00	4.37	312.70	1731.71	2.72 S	6.32 W	-6.39	1.87
1827.00	6.37	308.03	1826.29	2.98 N	13.13 W	-13.05	2.15
1918.00	7.59	304.82	1916.61	9.53 N	22.04 W	-21.79	1.41
2012.00	8.59	304.61	2009.68	17.06 N	32.92 W	-32.47	1.06
2106.00	7.93	305.82	2102.70	24.84 N	43.95 W	-43.30	0.73
2201.00	8.72	308.49	2196.70	33.16 N	54.90 W	-54.03	0.93
2295.00	7.99	306.29	2289.70	41.46 N	65.74 W	-64.66	0.85
2390.00	8.26	308.74	2383.75	49.64 N	76.39 W	-75.09	0.46
2485.00	7.39	307.79	2477.86	57.65 N	86.54 W	-85.03	0.93
2580.00	7.32	313.56	2572.08	65.57 N	95.75 W	-94.04	0.78
2675.00	8.87	314.46	2666.13	74.87 N	105.37 W	-103.41	1.64
2769.00	9.17	314.18	2758.97	85.16 N	115.91 W	-113.69	0.32
2864.00	9.41	314.87	2852.73	95.92 N	126.85 W	-124.34	0.28
2959.00	8.63	313.84	2946.55	106.33 N	137.49 W	-134.72	0.84
3054.00	7.85	314.09	3040.57	115.78 N	147.29 W	-144.27	0.82
3149.00	7.50	312.43	3134.72	124.48 N	156.53 W	-153.28	0.44
3243.00	6.06	311.66	3228.06	131.92 N	164.76 W	-161.32	1.53
3338.00	4.81	315.35	3322.63	138.09 N	171.31 W	-167.71	1.37
3433.00	2.96	317.50	3417.41	142.73 N	175.76 W	-172.05	1.95
3622.00	0.51	331.32	3606.31	147.07 N	179.47 W	-175.63	1.31
3717.00	0.16	129.97	3701.30	147.35 N	179.57 W	-175.73	0.70
3811.00	0.97	163.57	3795.30	146.50 N	179.24 W	-175.42	0.90
3905.00	0.90	167.58	3889.29	145.02 N	178.86 W	-175.08	0.10
4000.00	0.65	169.27	3984.28	143.76 N	178.60 W	-174.85	0.26
4094.00	0.15	271.54	4078.28	143.24 N	178.62 W	-174.89	0.74
4189.00	1.11	286.51	4173.27	143.51 N	179.63 W	-175.89	1.02
4284.00	1.18	299.87	4268.25	144.25 N	181.36 W	-177.60	0.29
4473.00	0.90	332.35	4457.22	146.54 N	183.73 W	-179.91	0.34
4568.00	1.34	330.80	4552.20	148.17 N	184.62 W	-180.76	0.46
4663.00	1.38	290.98	4647.18	149.55 N	186.23 W	-182.33	0.98
4757.00	1.09	273.74	4741.16	150.01 N	188.18 W	-184.27	0.50
4947.00	0.34	122.71	4931.15	149.82 N	189.51 W	-185.60	0.74
5042.00	0.25	132.17	5026.15	149.53 N	189.12 W	-185.22	0.11
5136.00	0.22	185.86	5120.14	149.22 N	188.99 W	-185.10	0.23
5231.00	0.26	249.99	5215.14	148.96 N	189.21 W	-185.32	0.27
5326.00	0.33	275.36	5310.14	148.91 N	189.68 W	-185.80	0.15
5515.00	0.47	323.50	5499.14	149.59 N	190.69 W	-186.78	0.19
5610.00	0.35	179.61	5594.14	149.61 N	190.91 W	-187.01	0.82
5704.00	0.56	276.46	5688.14	149.37 N	191.37 W	-187.47	0.74
5799.00	0.35	275.74	5783.13	149.46 N	192.12 W	-188.22	0.22
5894.00	0.65	277.54	5878.13	149.56 N	192.94 W	-189.04	0.32
5989.00	1.07	299.06	5973.12	150.06 N	194.25 W	-190.34	0.55
6084.00	0.17	313.16	6068.11	150.58 N	195.13 W	-191.20	0.95
6178.00	0.46	301.20	6162.11	150.87 N	195.55 W	-191.62	0.31
6273.00	0.15	292.83	6257.11	151.12 N	196.00 W	-192.05	0.33
6462.00	0.18	240.44	6446.11	151.07 N	196.48 W	-192.54	0.08
6557.00	7.19	84.56	6540.86	151.56 N	190.69 W	-186.73	7.74
6651.00	12.85	88.95	6633.39	152.31 N	174.36 W	-170.40	6.07
6746.00	19.79	91.18	6724.51	152.17 N	147.69 W	-143.74	7.33
6841.00	26.16	93.44	6811.93	150.58 N	110.67 W	-106.77	6.77
6935.00	33.32	91.91	6893.50	148.48 N	64.12 W	-60.29	7.66
6983.00	36.54	89.28	6932.85	148.22 N	36.65 W	-32.83	7.40
7030.00	42.61	89.22	6969.06	148.61 N	6.72 W	-2.91	12.92
7078.00	49.95	88.18	7002.21	149.42 N	27.94 E	31.76	15.37
7125.00	56.87	87.10	7030.21	150.98 N	65.62 E	69.47	14.84
7173.00	64.59	86.83	7053.66	153.20 N	107.40 E	111.29	16.09
7220.00	68.16	88.96	7072.50	154.77 N	150.42 E	154.34	8.66
7268.00	71.37	91.61	7089.10	154.54 N	195.45 E	199.35	8.46
7315.00	75.72	92.26	7102.41	153.01 N	240.48 E	244.33	9.35
7363.00	78.18	92.83	7113.25	150.94 N	287.19 E	290.97	5.25
7430.00	84.45	90.10	7123.36	149.26 N	353.37 E	357.08	10.19

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 88.53 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.97 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7430.00 FEET  
IS 383.59 FEET ALONG 67.10 DEGREES (GRID)

Tied in @ Surface

Date Printed:01 November 2014