

**1 : 600 / 1 : 240**

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	27-Apr-14	28-Apr-14			
Rig Bit Number	2	3			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.880	6.750			
Log Start Depth (MD, ft)	633.00	5,962.00			
Log End Depth (MD, ft)	5,962.00	6,983.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	26-Apr-14 17:25	27-Apr-14 21:51			
Drill/Wipe End Date and Time	27-Apr-14 14:21	28-Apr-14 10:15			
Min Inc (deg) @ Depth (MD, ft)	0.25 @ 2,305.00	6.90 @ 5,999.00			
Max Inc (deg) @ Depth (MD, ft)	10.77 @ 3,631.00	89.01 @ 6,929.00			
Bit TFA(in2) / Bit Type	1.04 / PDC	1.74 / PDC			
Flow Rate (gpm)	597.00	600.00			
Max AV (fpm) / CV (fpm) @ MWD	0.0 / 0.0	NA / 0.0			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.60 / 42.00	10.70 / 43.00			
Filtrate CL (ppm)	NA	NA			
pH / Fluid Loss (mptm)	9.50 / 8	9.50 / 7			
PV (cP) / YP (lbf2)	10 / 12.00	14 / 10.00			
% Solids / % Sand	6.20 / 0.15	11.40 / 0.15			
% Oil / Oil:Water Ratio	NA / NA	NA / NA			
Rm @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmf @ Measured Temp (degF)	NA @ NA	NA @ NA			
Rmc @ Measured Temp (degF)	NA @ NA	NA @ NA			
Max Tool Temp (in F) / C	151.45 / 61.36	151.45 / 61.36			

Max Tool Temp (degF) / Source	151.47 / PCM	151.47 / PCM			
Rm @ Max Tool Temp (degF)	NA @ 151.47	NA @ 151.47			
Lead MWD Engineer	Robert Barnes	Robert Barnes			
Customer Representative	Stetson Nielson	Stetson Nielson			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404294	11404294			
Insert Serial Number	11400991	11400991			
Date and Time Initialized	26-Apr-14 00:21	26-Apr-14 00:21			
Date and Time Read	28-Apr-14 17:16	28-Apr-14 17:23			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	57.00	54.00			
Software Version	6.21	6.21			
Sub Serial Number	11404294	11404294			
Sonde Serial Number	11833237	11833237			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	142.50	330.18			

### Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	49.42	47.28			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404294	11404294			
Insert/Sonde Serial Number	11293318	11293318			

## REMARKS

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

Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft

6. Insite Version V8.0.10

## WARRANTY

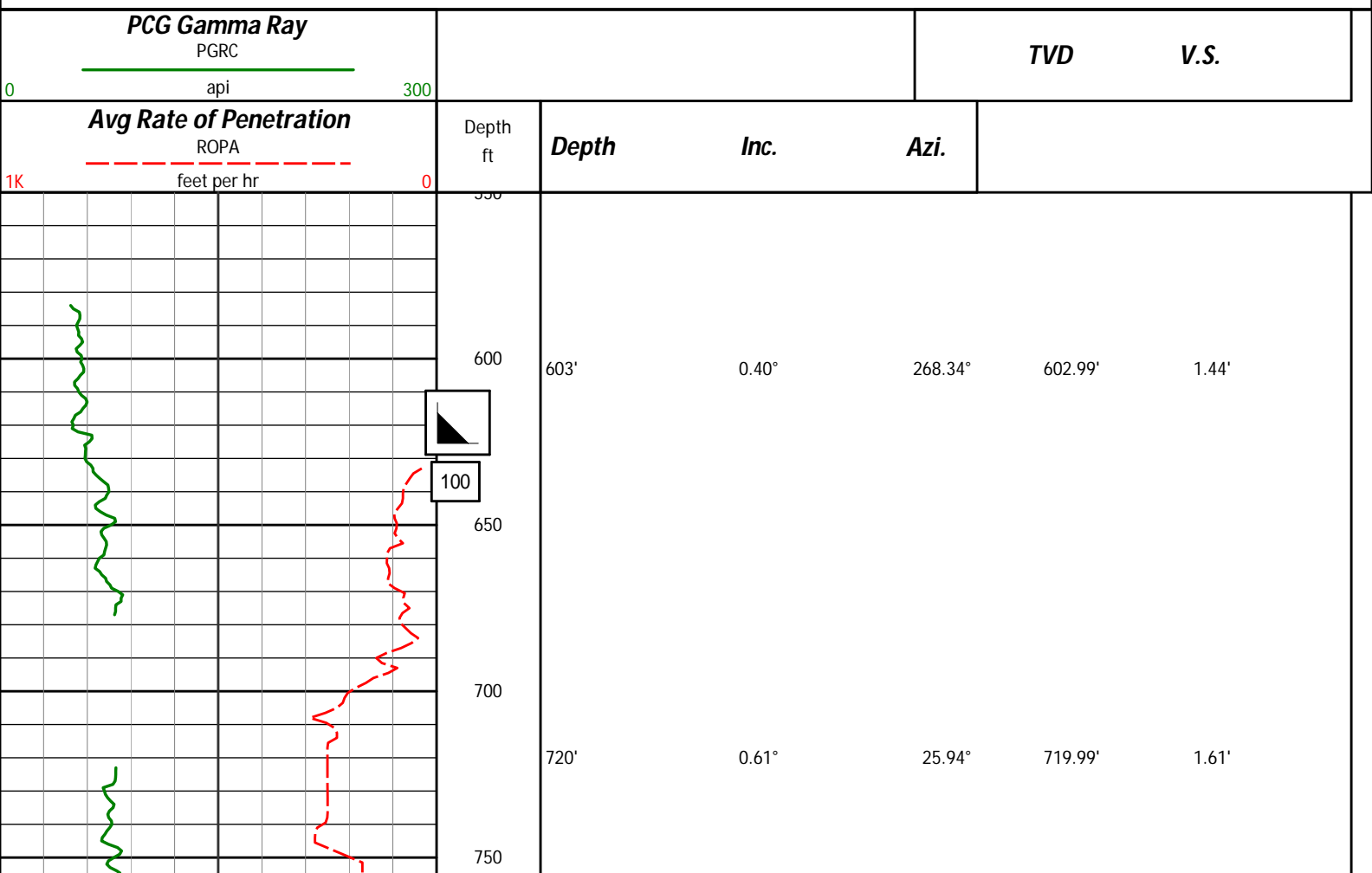
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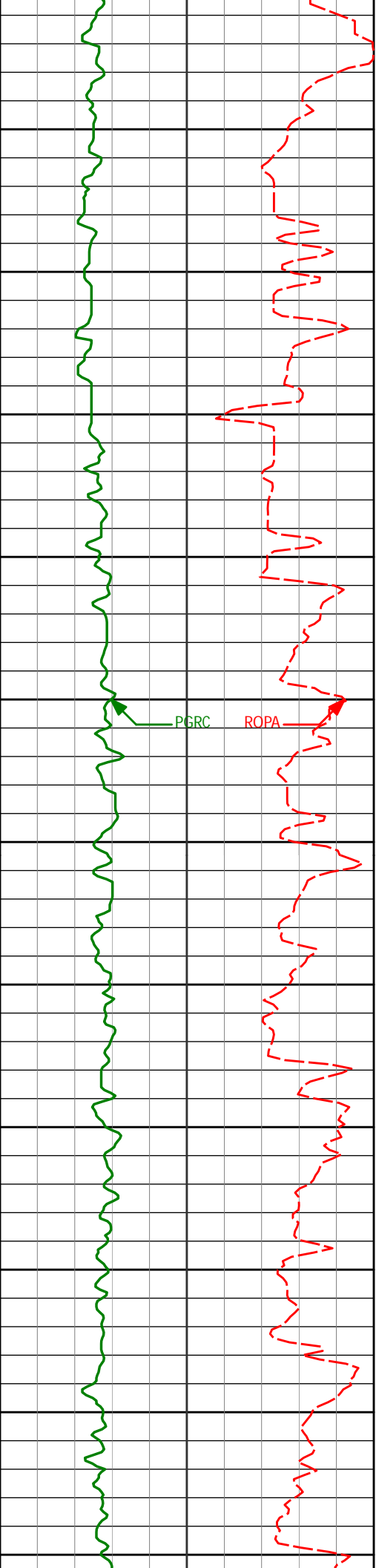
# HALLIBURTON

## Sperry Drilling Services

### TVD Correlation Log 1:600

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





800

812'

0.76°

30.20°

811.98'

1.17'

850

900

903'

0.57°

21.71°

902.98'

0.77'

950

1000

996'

0.81°

43.97°

995.97'

0.21'

1050

1100

1087'

0.71°

42.11°

1086.96'

-0.54'

1150

1200

1180'

0.65°

56.29°

1179.96'

-1.31'

1250

1300

1273'

0.73°

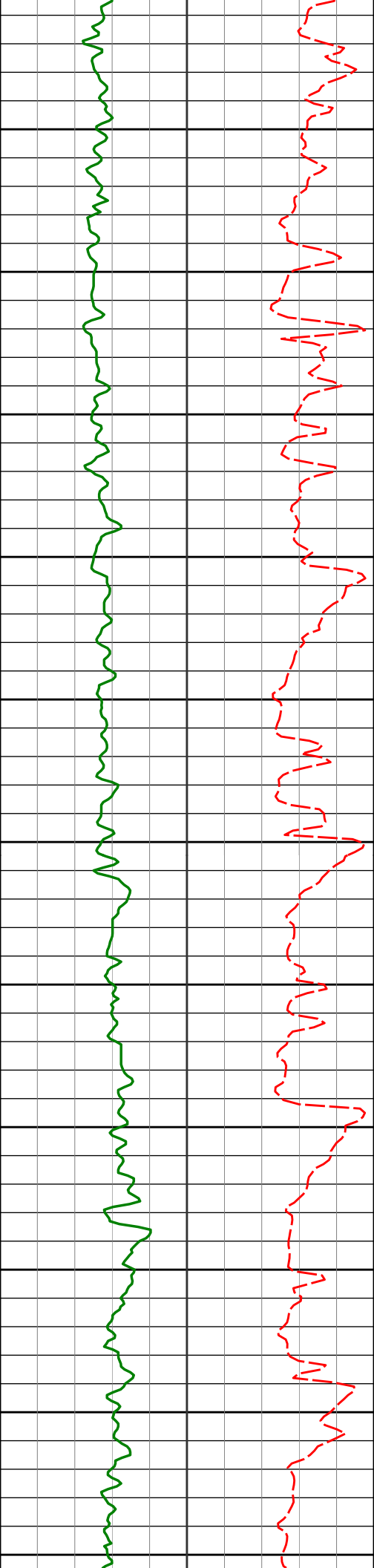
19.29°

1272.95'

-1.88'

PGRC

ROPA



1350

1366'

0.57°

357.43°

1365.94'

-1.98'

1400

1457'

0.49°

324.06°

1456.94'

-1.67'

1450

1500

1549'

0.55°

309.21°

1548.94'

-1.05'

1550

1600

1641'

0.69°

312.09°

1640.93'

-0.25'

1650

1700

1736'

0.43°

289.49°

1735.93'

0.54'

1750

1800

1831'

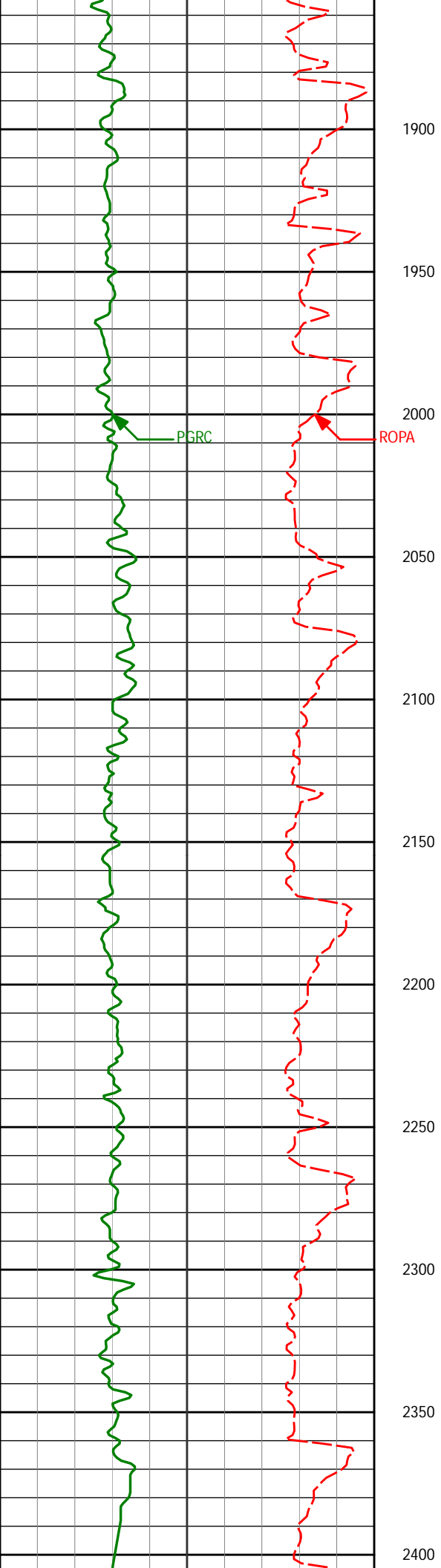
0.36°

297.45°

1830.92'

1.16'

1850



1900

1926'

0.36°

289.17°

1925.92'

1.73'

1950

2000

2020'

0.26°

289.33°

2019.92'

2.22'

2050

2100

2115'

0.47°

253.93°

2114.92'

2.79'

2150

2200

2210'

0.31°

261.61°

2209.92'

3.41'

2250

2300

2305'

0.25°

243.23°

2304.92'

3.83'

2350

2400

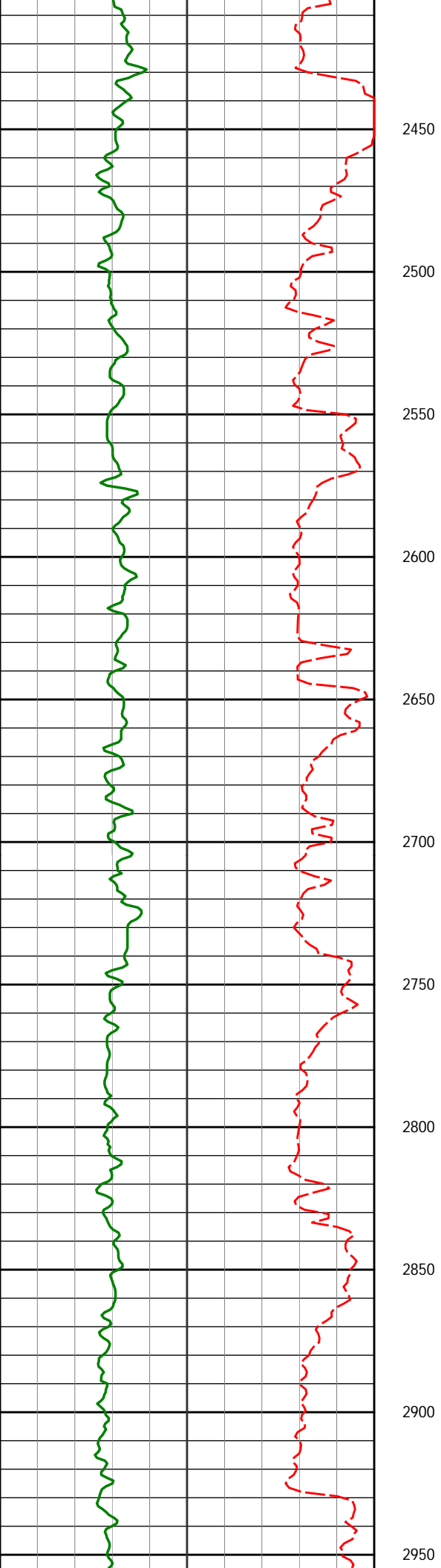
2399'

0.45°

244.54°

2398.91'

4.33'



2450

2500

2550

2600

2650

2700

2750

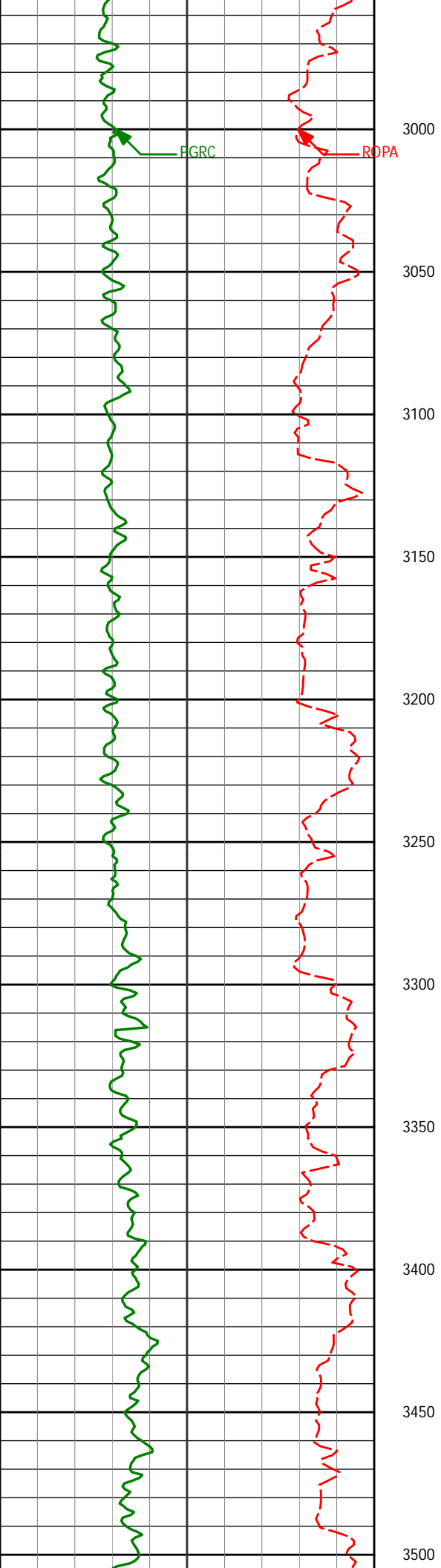
2800

2850

2900

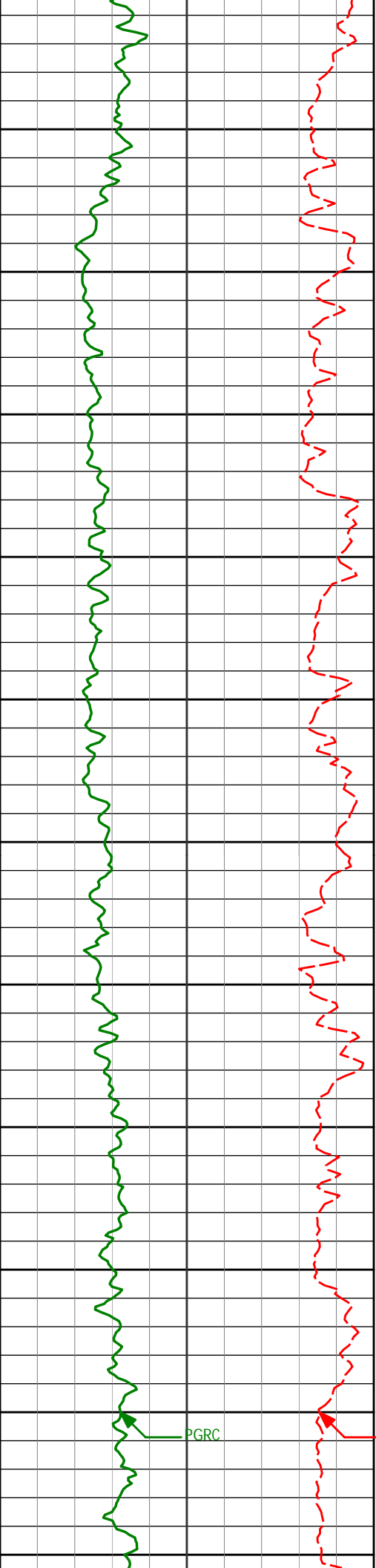
2950

2494'	0.38°	225.36°	2493.91'	4.86'
2588'	2.42°	8.86°	2587.89'	4.91'
2683'	4.09°	355.80°	2682.73'	5.26'
2778'	4.09°	351.17°	2777.49'	6.53'
2873'	5.56°	347.68°	2872.15'	8.63'



2968'	7.74°	346.75°	2966.51'	11.88'
3062'	9.03°	351.01°	3059.50'	15.50'
3157'	8.08°	351.20°	3153.44'	18.74'
3252'	8.51°	349.02°	3247.45'	22.12'
3347'	8.75°	355.43°	3341.37'	25.11'
3441'	8.88°	356.63°	3434.26'	27.19'

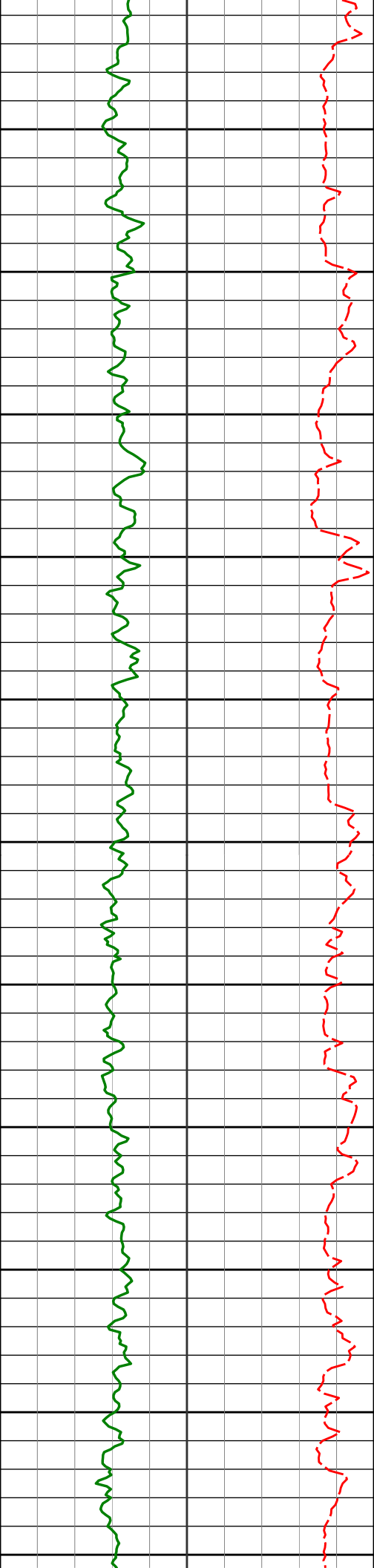




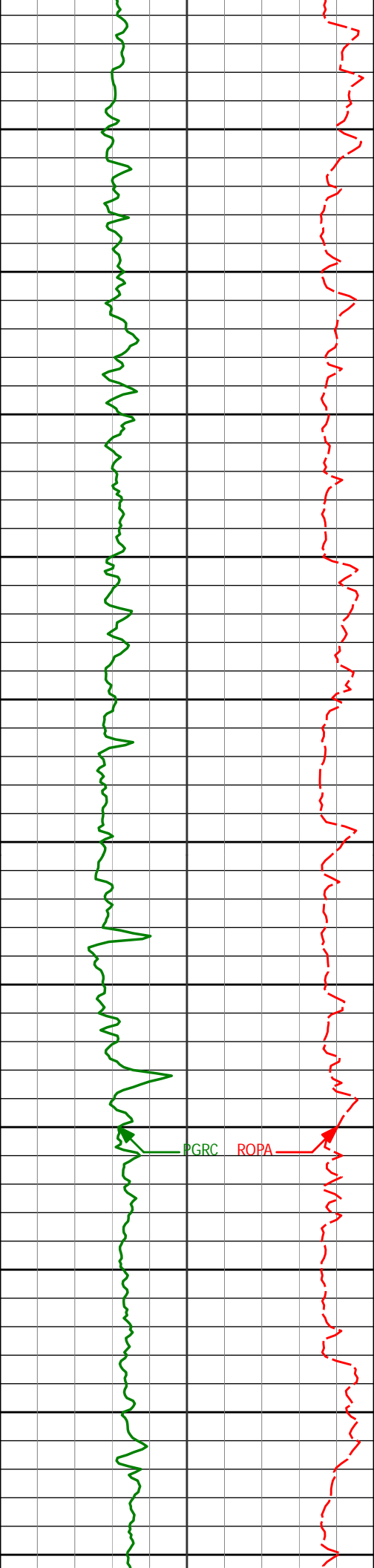
3536'	9.81°	346.73°	3528.01'	30.63'
3550				
3600				
3631'	10.77°	344.44°	3621.48'	36.10'
3650				
3700				
3726'	9.42°	343.29°	3715.01'	41.92'
3750				
3800				
3819'	7.30°	349.89°	3807.02'	46.14'
3850				
3900				
3914'	7.00°	349.23°	3901.28'	49.16'
3950				
4000	8.38°	346.65°	3995.42'	52.77'
4050				

PGRC

ROPA



4100	4103'	7.89°	342.14°	4088.48'	57.30'
4150					
4200	4198'	8.60°	353.75°	4182.50'	61.07'
4250					
4300	4293'	7.17°	346.54°	4276.60'	64.19'
4350					
4400	4388'	8.42°	344.84°	4370.72'	68.33'
4450					
4500	4483'	10.14°	346.27°	4464.47'	73.25'
4550					
4600	4577'	8.85°	339.79°	4557.19'	78.83'



4650

4700

4750

4800

4850

4900

4950

5000

5050

5100

5150

4672'

4767'

4862'

4957'

5051'

5146'

9.22°

8.07°

10.17°

10.20°

7.92°

7.92°

353.61°

355.67°

357.97°

356.63°

355.65°

0.46°

4651.02'

4744.94'

4838.73'

4932.24'

5025.06'

5119.15'

83.29'

85.71'

87.66'

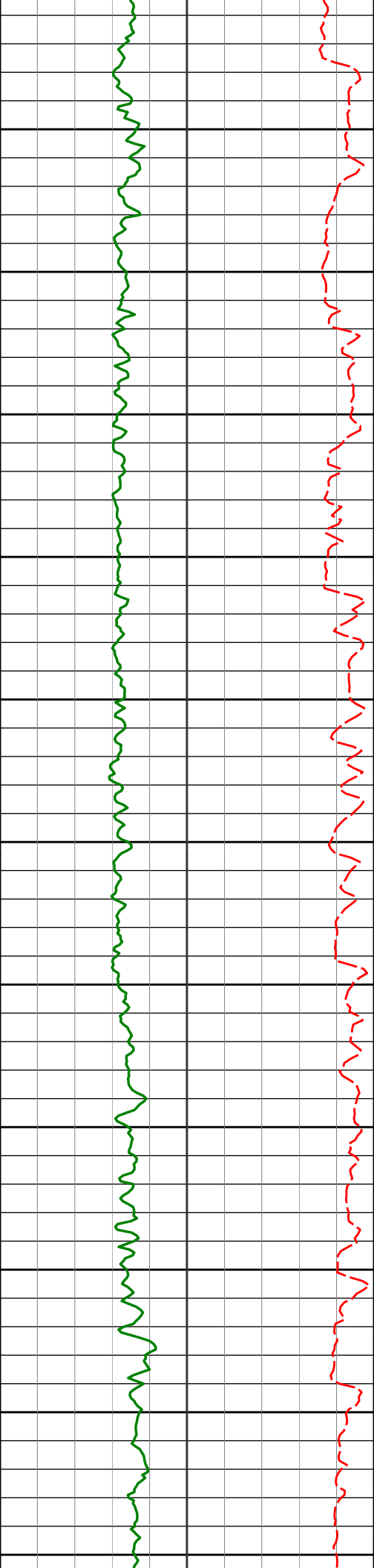
89.72'

91.82'

93.26'

PGRC

ROPA



5200  
5250  
5300  
5350  
5400  
5450  
5500  
5550  
5600  
5650  
5700

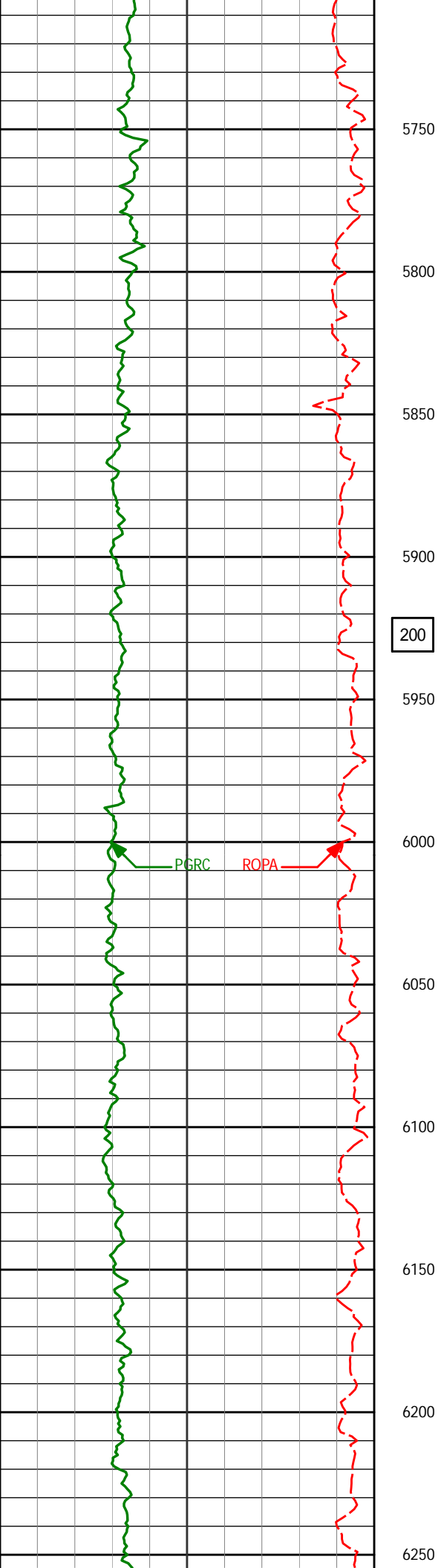
5241'  
5336'  
5430'  
5525'  
5620'  
5715'

8.94°  
9.95°  
10.57°  
9.54°  
10.57°  
8.52°

345.04°  
349.98°  
352.93°  
352.25°  
353.65°  
351.30°

5213.14'  
5306.85'  
5399.35'  
5492.89'  
5586.43'  
5680.11'

96.14'  
100.63'  
104.35'  
107.73'  
111.00'  
114.21'



5810'	10.07°	341.83°	5773.86'	118.98'
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5800

5850

5905'	8.43°	337.04°	5867.62'	125.36'
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5900

200

5950

5999'	6.90°	332.05°	5960.78'	131.54'
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6000

6047'	10.90°	314.86°	6008.20'	136.54'
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6050

6094'	14.79°	309.26°	6054.02'	144.84'
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6100

6142'	19.45°	299.16°	6099.89'	157.13'
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6150

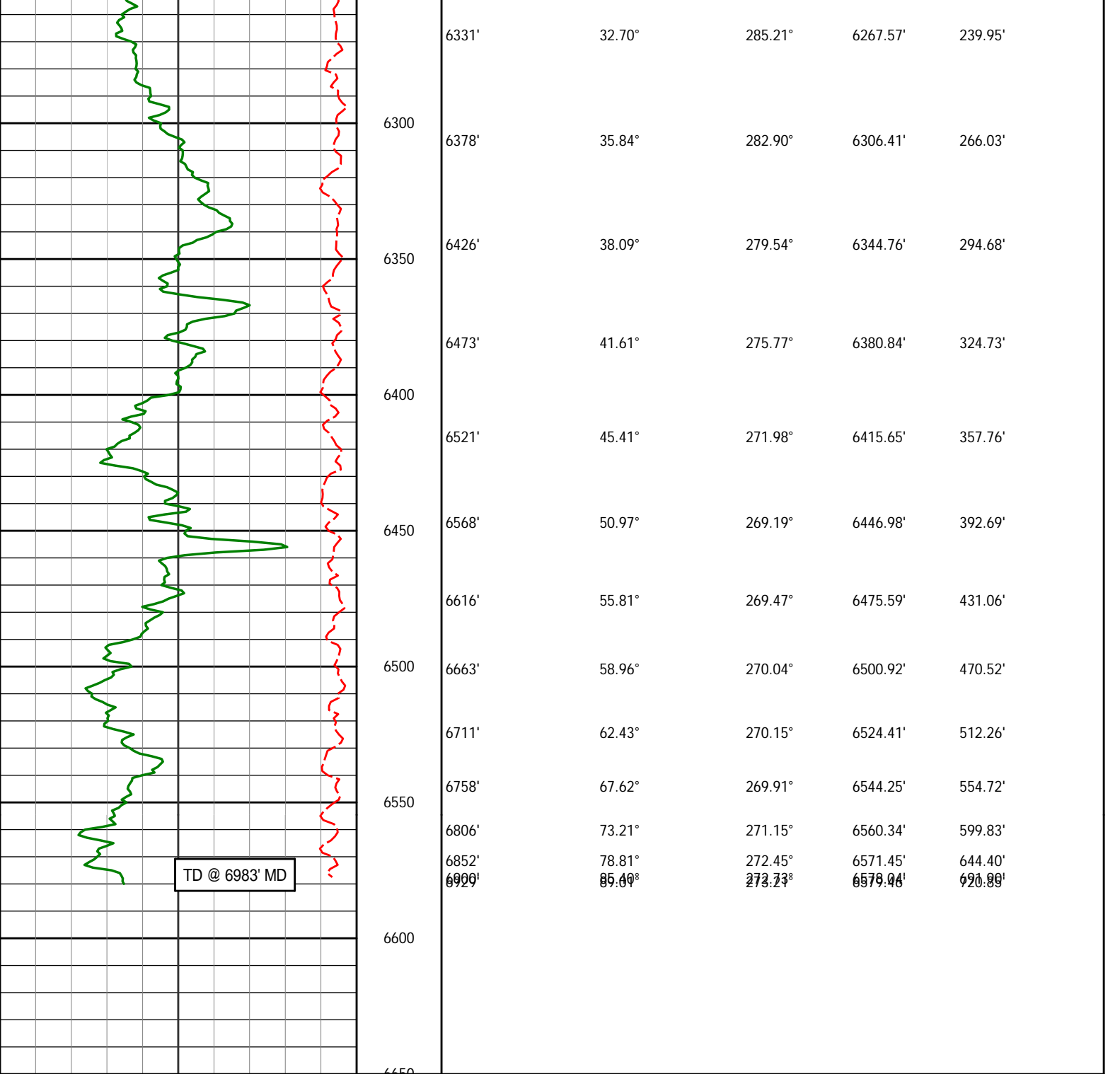
6188'	24.74°	292.53°	6142.50'	173.24'
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6200

6236'	27.84°	291.05°	6185.53'	193.53'
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6250

6283'	30.23°	288.72°	6226.63'	215.50'
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<div><div>Avg Rate of Penetration</div><div>ROPA</div><div>feet per hr</div></div>		Depth ft	Depth	Inc.	Azi.		
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>						TVD	V.S.

**HALLIBURTON**  
**Sperry Drilling Services**  
**TVD Detail Log 1:240**

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

### ***Avg Rate of Penetration***

## ROPA

feet per hr

1K

0

**PCG Gamma Ray**

PGRC

api

300

Depth  
ft

## Depth

***Inc.***

***Azi.***

***TVD***

**V.S.**



Run 100

600

603'

 $0.40^\circ$ 

268.34°

602.99'

1.44'

650

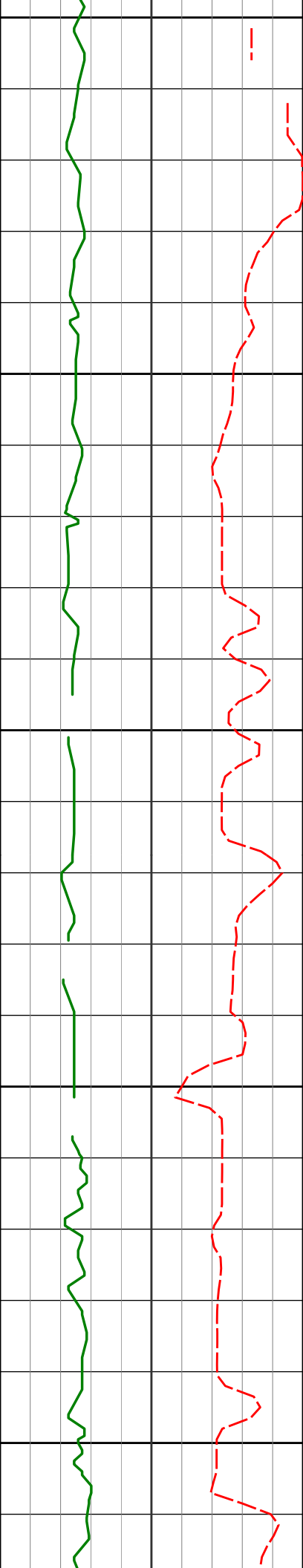
700

720'

 $0.61^\circ$  $25.94^\circ$ 

719.99'

1.61'



750

800

850

900

950

812'

0.76°

30.20°

811.98'

1.17'

903'

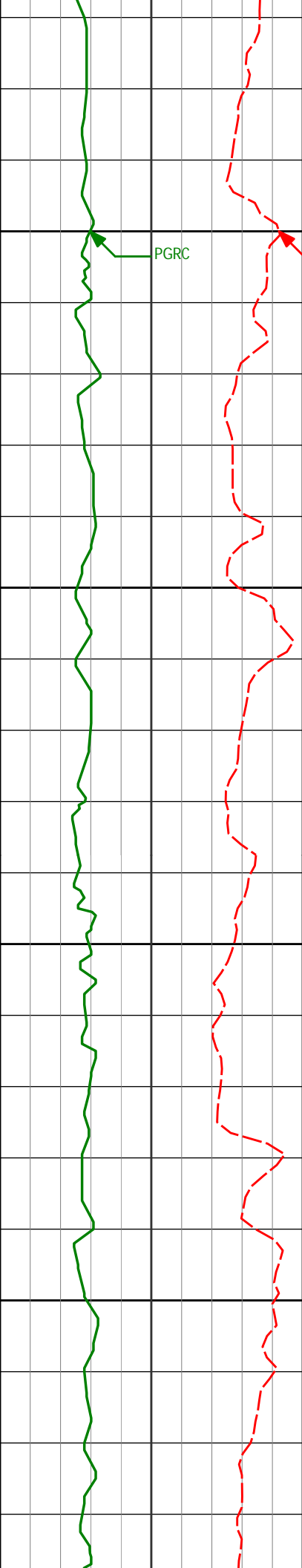
0.57°

21.71°

902.98'

0.77'





1000

1050

1100

1150

996'

0.81°

43.97°

995.97'

0.21'

1087'

0.71°

42.11°

1086.96'

-0.54'

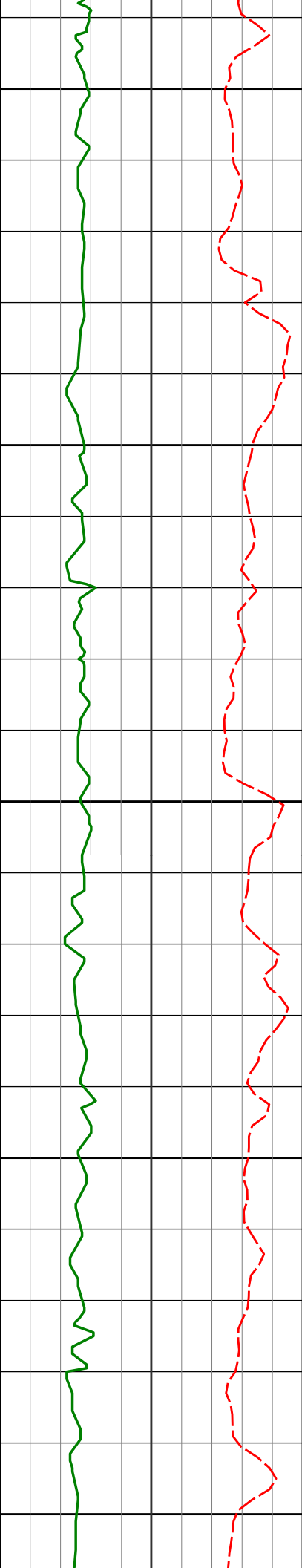
1180'

0.65°

56.29°

1179.96'

-1.31'



1200

1250

1300

1350

1400

1273'

0.73°

19.29°

1272.95'

-1.88'

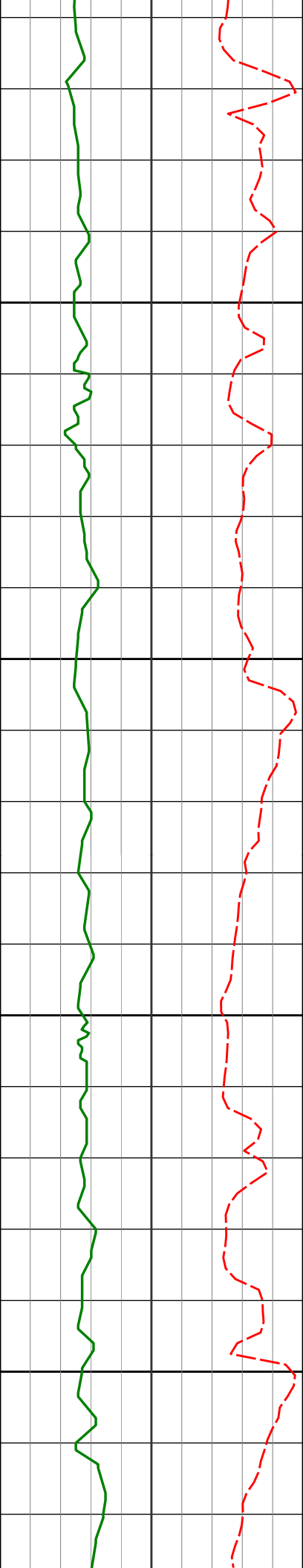
1366'

0.57°

357.43°

1365.94'

-1.98'



1450

1457'

0.49°

324.06°

1456.94'

-1.67'

1500

1550

1549'

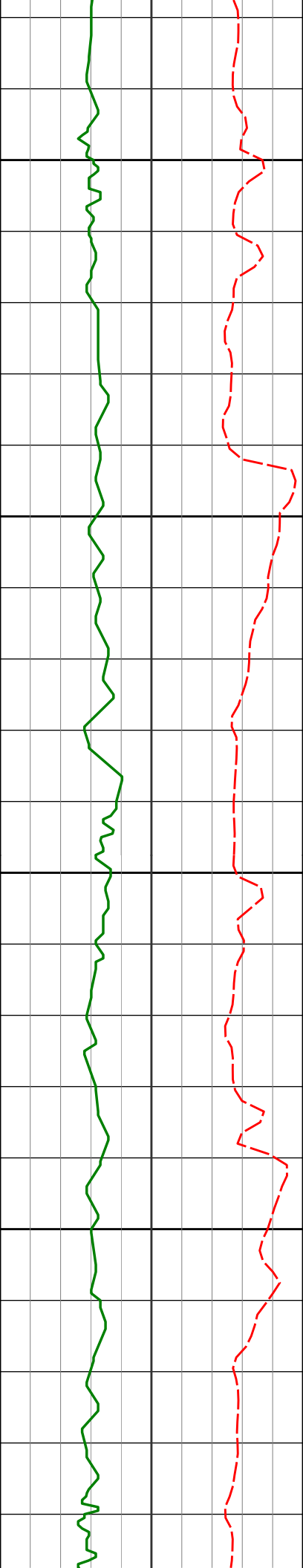
0.55°

309.21°

1548.94'

-1.05'

1600



1650

1700

1750

1800

1641'

0.69°

312.09°

1640.93'

-0.25'

1736'

0.43°

289.49°

1735.93'

0.54'

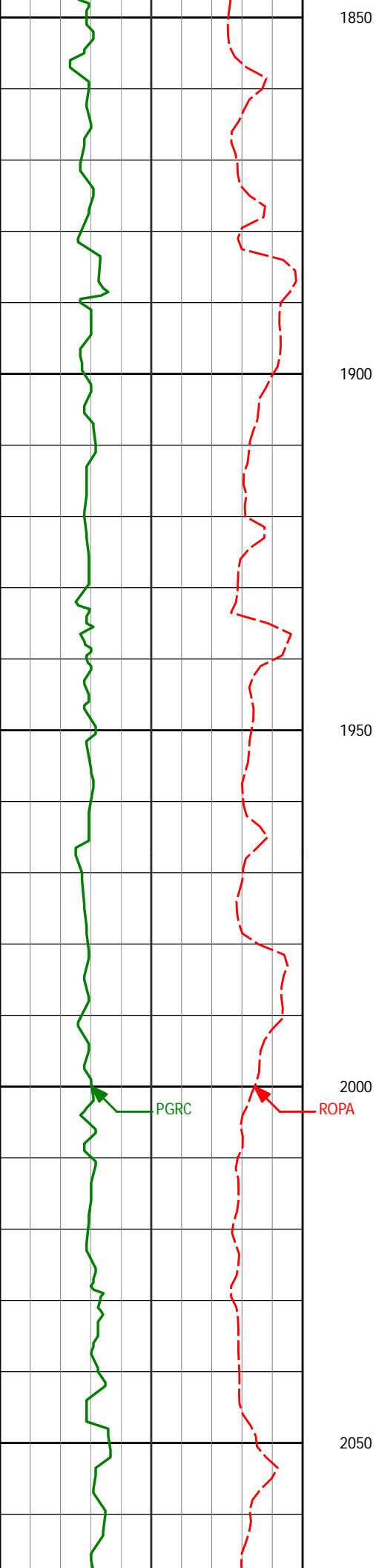
1831'

0.36°

297.45°

1830.92'

1.16'



1926'

0.36°

289.17°

1925.92'

1.73'

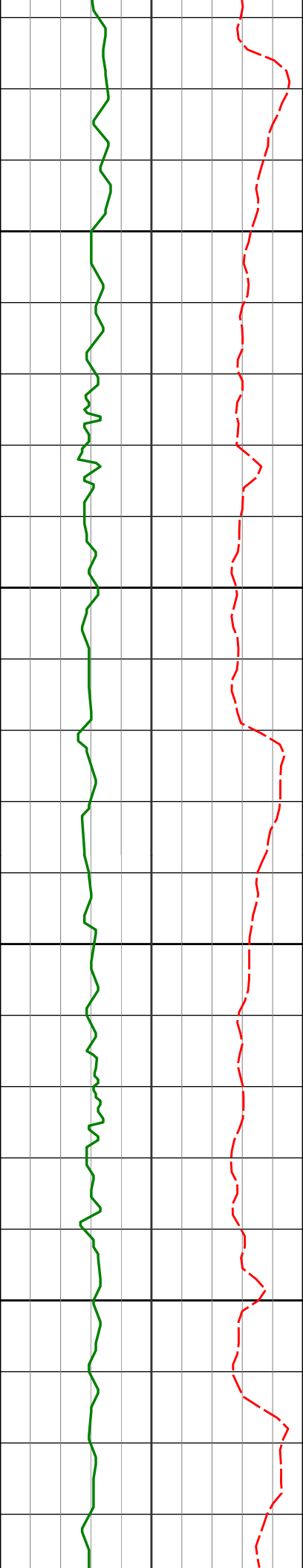
2020'

0.26°

289.33°

2019.92'

2.22'



2100

2115'

0.47°

253.93°

2114.92'

2.79'

2150

2200

2210'

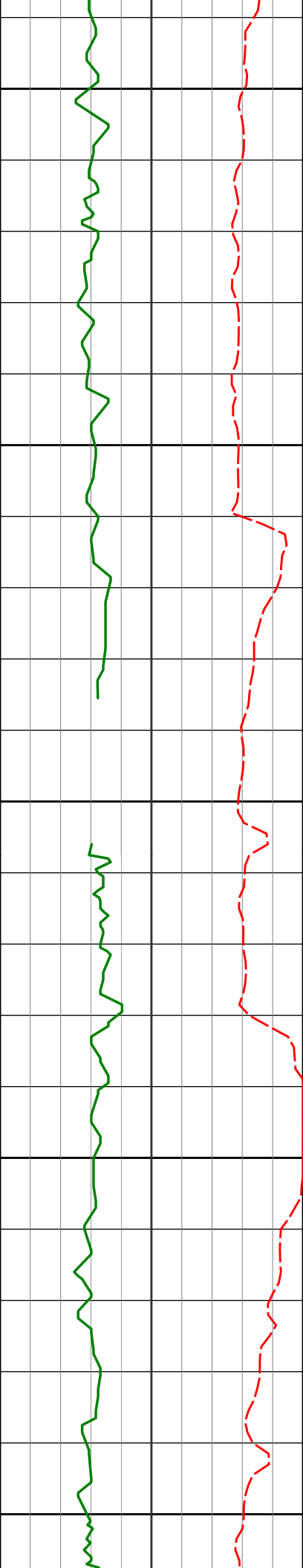
0.31°

261.61°

2209.92'

3.41'

2250



2300

2305'

0.25°

243.23°

2304.92'

3.83'

2350

2400

2399'

0.45°

244.54°

2398.91'

4.33'

2450

2500

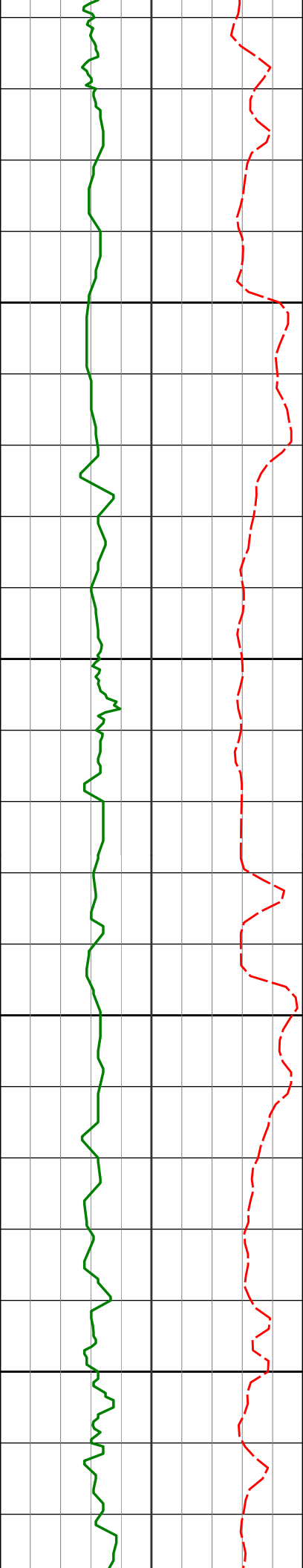
2494'

0.38°

225.36°

2493.91'

4.86'



2550

2588'

2.42°

8.86°

2587.89'

4.91'

2600

2650

2683'

4.09°

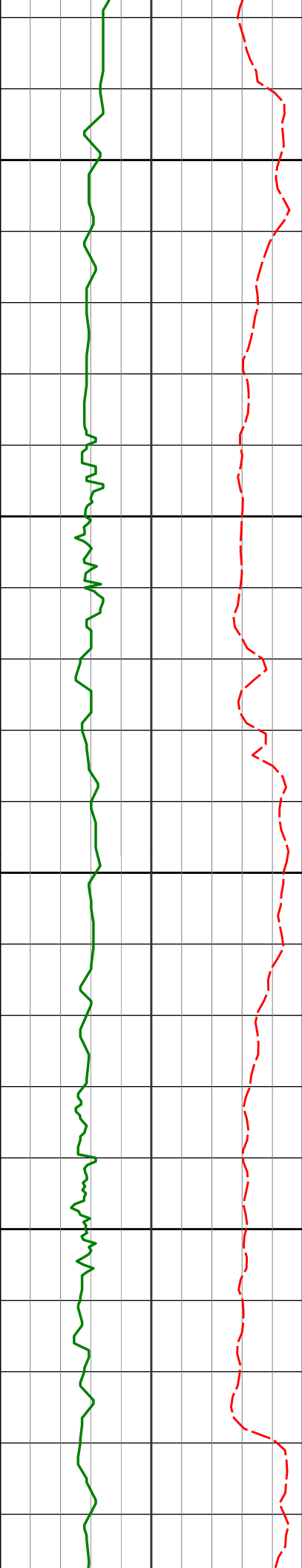
355.80°

2682.73'

5.26'

2700





2750

2778'

4.09°

351.17°

2777.49'

6.53'

2800

2850

2873'

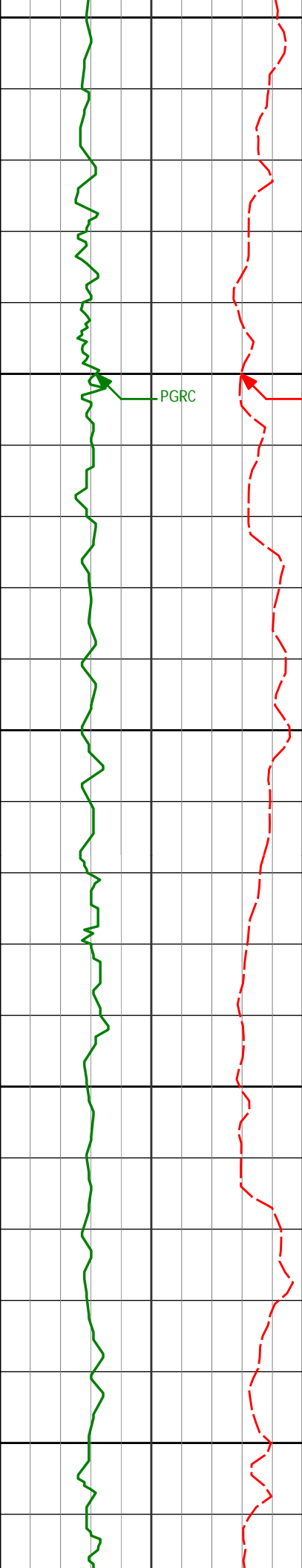
5.56°

347.68°

2872.15'

8.63'

2900



2950

2968'

7.74°

346.75°

2966.51'

11.88'

3000

PGRC

ROPA

3050

3062'

9.03°

351.01°

3059.50'

15.50'

3100

3150

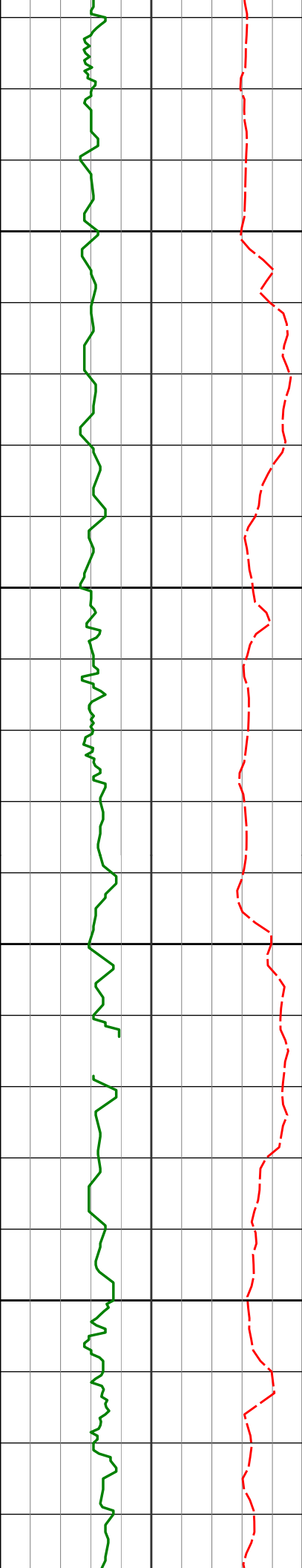
3157'

8.08°

351.20°

3153.44'

18.74'



3200

3250

3300

3350

3252'

8.51°

349.02°

3247.45'

22.12'

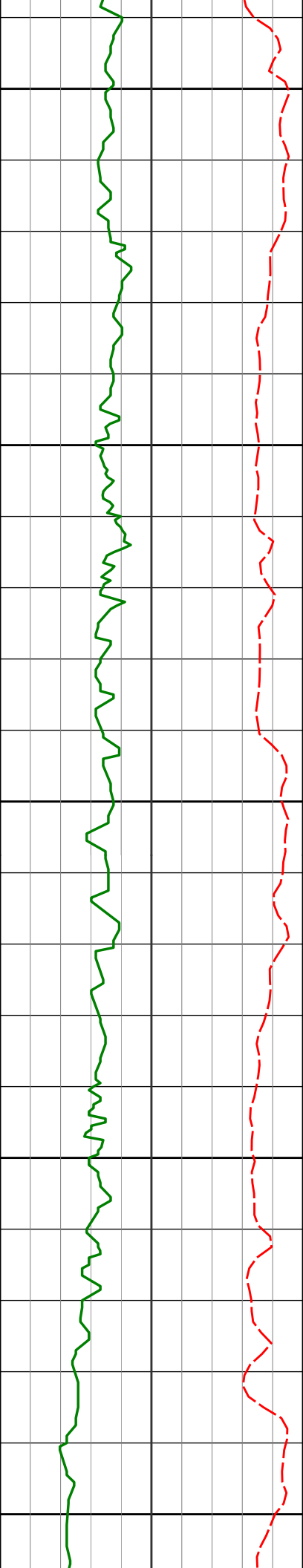
3347'

8.75°

355.43°

3341.37'

25.11'



3400

3441'

8.88°

356.63°

3434.26'

27.19'

3450

3500

3536'

9.81°

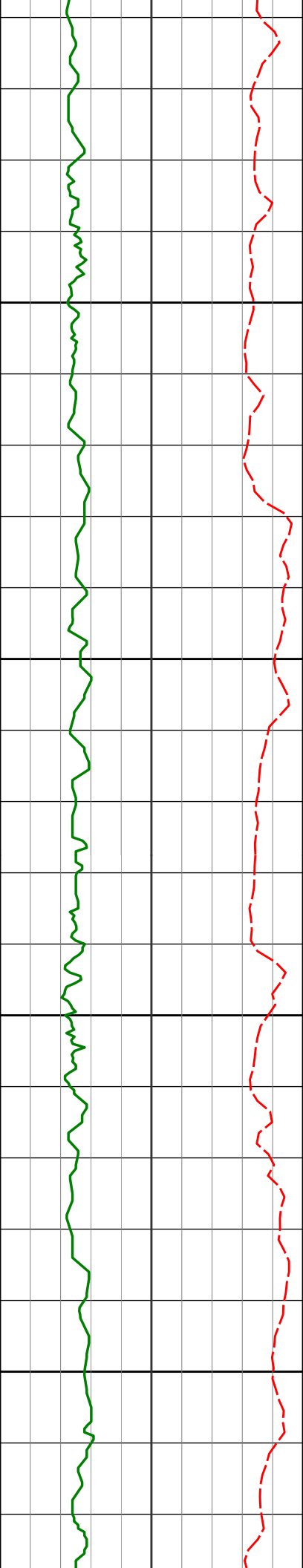
346.73°

3528.01'

30.63'

3550

3600



3650

3700

3750

3800

3631'

10.77°

344.44°

3621.48'

36.10'

3726'

9.42°

343.29°

3715.01'

41.92'

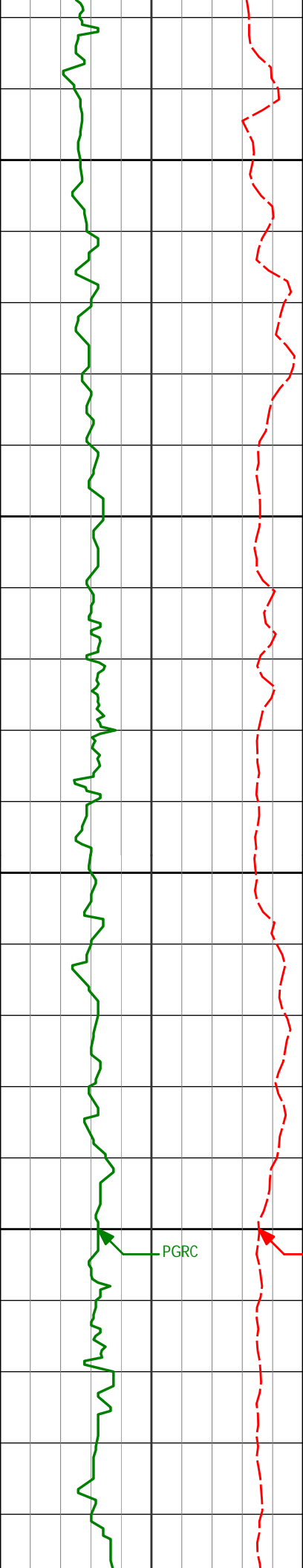
3819'

7.30°

349.89°

3807.02'

46.14'



3850

3900

3950

4000

PGRC

ROPA

3914'

7.00°

349.23°

3901.28'

49.16'

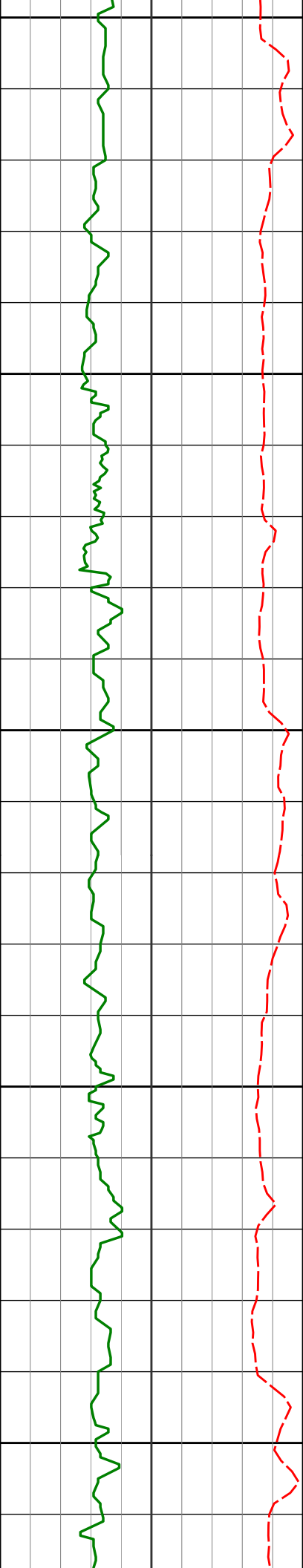
4009'

8.38°

346.65°

3995.42'

52.77'



4050

4103'

7.89°

342.14°

4088.48'

57.30'

4100

4150

4198'

8.60°

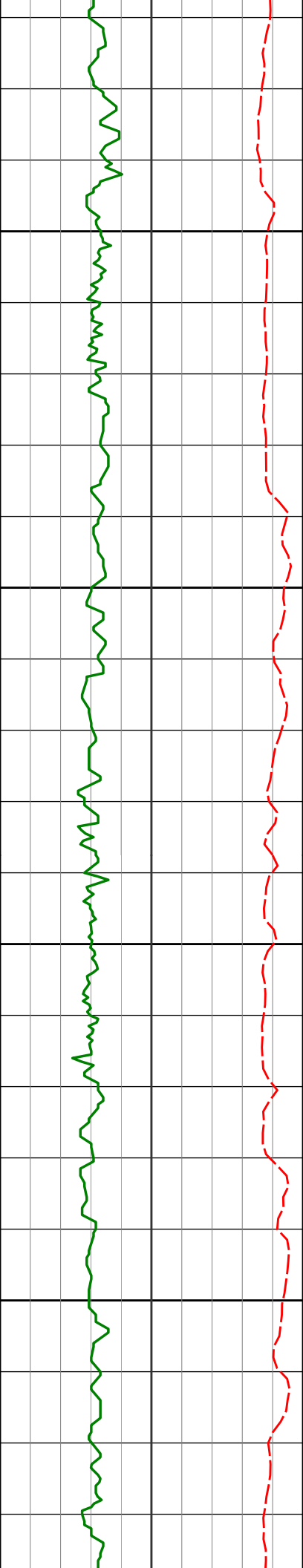
353.75°

4182.50'

61.07'

4200

4250



4300

4350

4400

4450

4293'

7.17°

346.54°

4276.60'

64.19'

4388'

8.42°

344.84°

4370.72'

68.33'

4483'

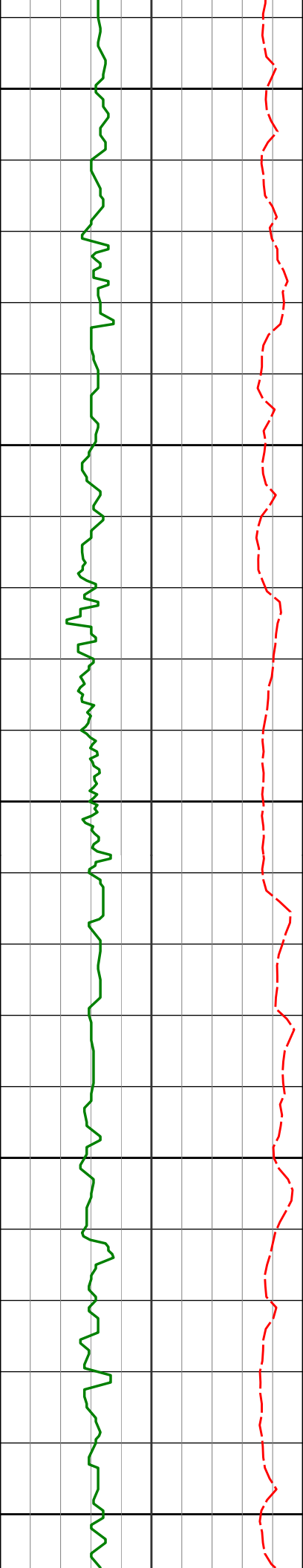
10.14°

346.27°

4464.47'

73.25'





4500

4550

4600

4650

4700

4577'

8.85°

339.79°

4557.19'

78.83'

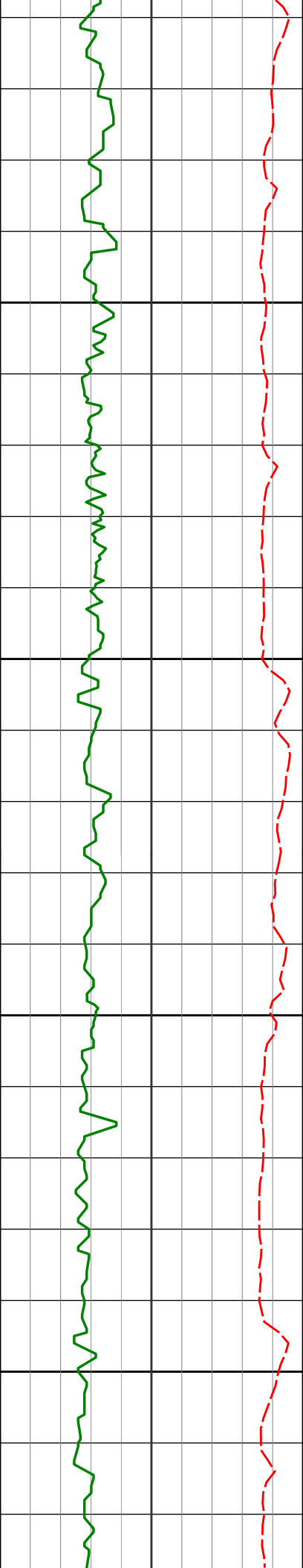
4672'

9.22°

353.61°

4651.02'

83.29'



4750

4800

4850

4900

4767'

8.07°

355.67°

4744.94'

85.71'

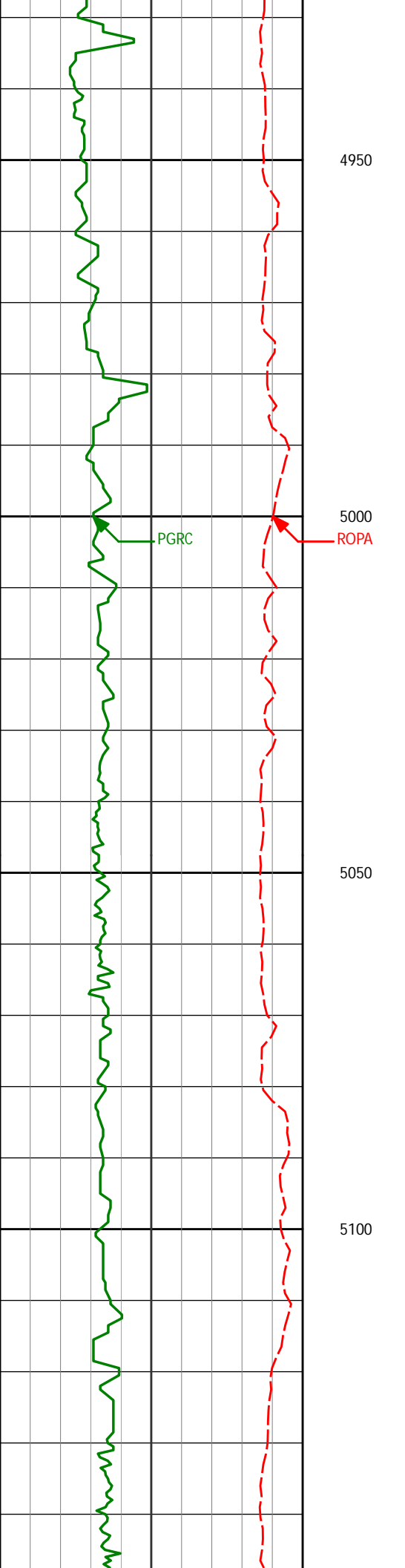
4862'

10.17°

357.97°

4838.73'

87.66'



4957'

10.20°

356.63°

4932.24'

89.72'

4950

5000

PGRC

ROPA

5051'

7.92°

355.65°

5025.06'

91.82'

5050

5100

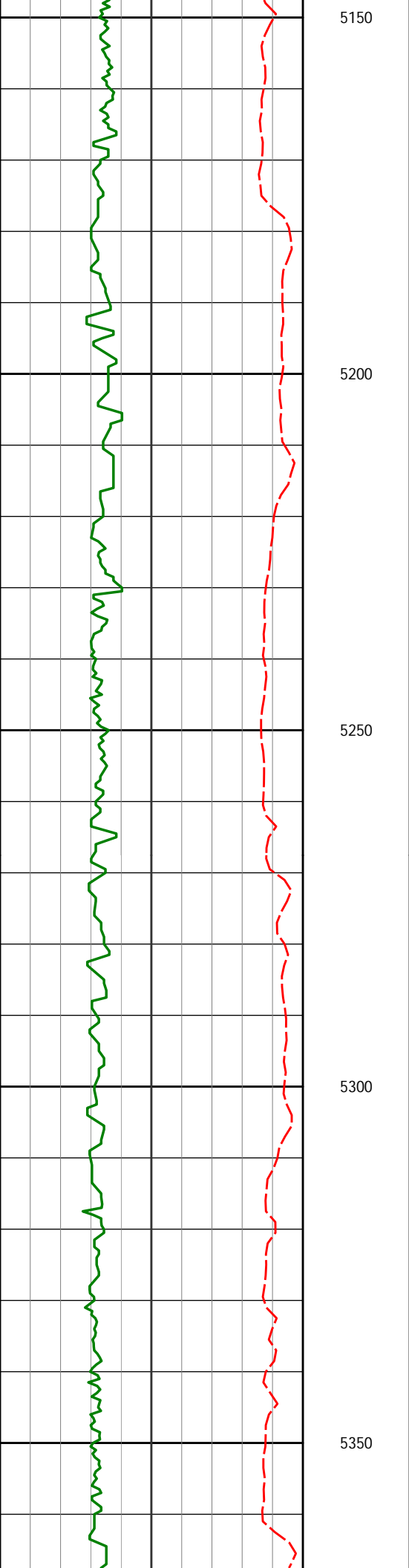
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0.46°

5119.15'

93.26'



5241'

8.94°

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5213.14'

96.14'

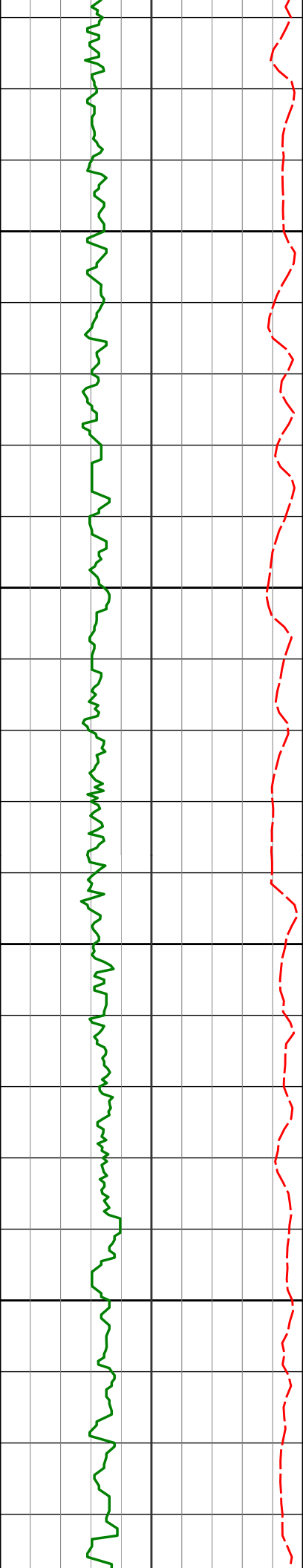
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9.95°

349.98°

5306.85'

100.63'



5400

5430'

10.57°

352.93°

5399.35'

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5450

5525'

9.54°

352.25°

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107.73'

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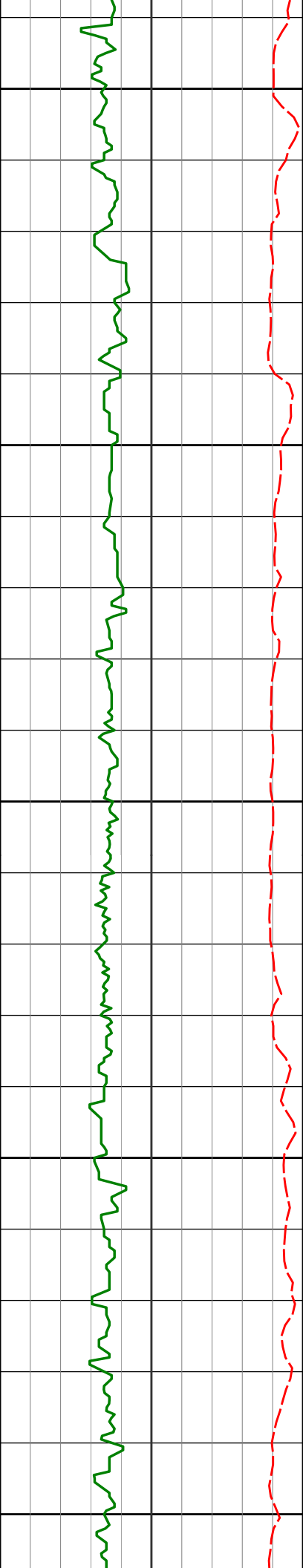
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353.65°

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111.00'



5600

5650

5715'

5700

5750

5810'

5800

8.52°

351.30°

5680.11'

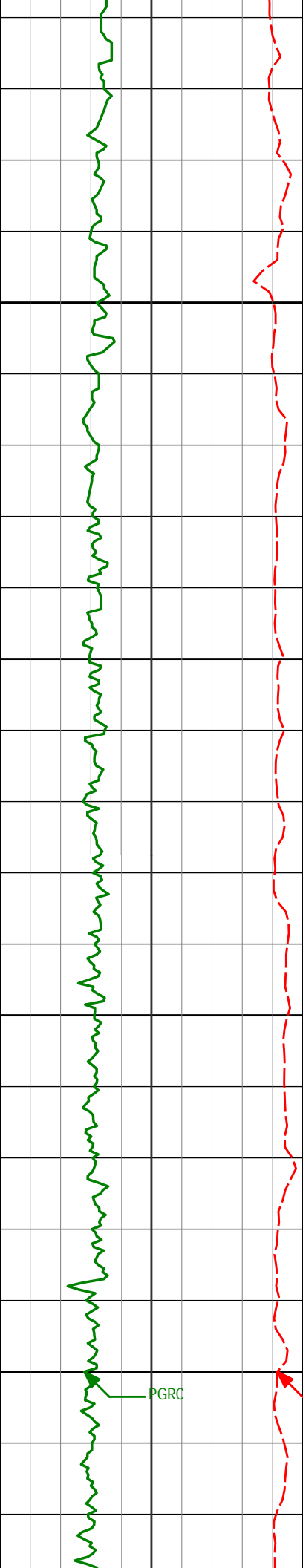
114.21'

10.07°

341.83°

5773.86'

118.98'



5850

5905'

8.43°

337.04°

5867.62'

125.36'

5900

5950

200

5999'

6.90°

332.05°

5960.78'

131.54'

6000

PGRC

ROPA

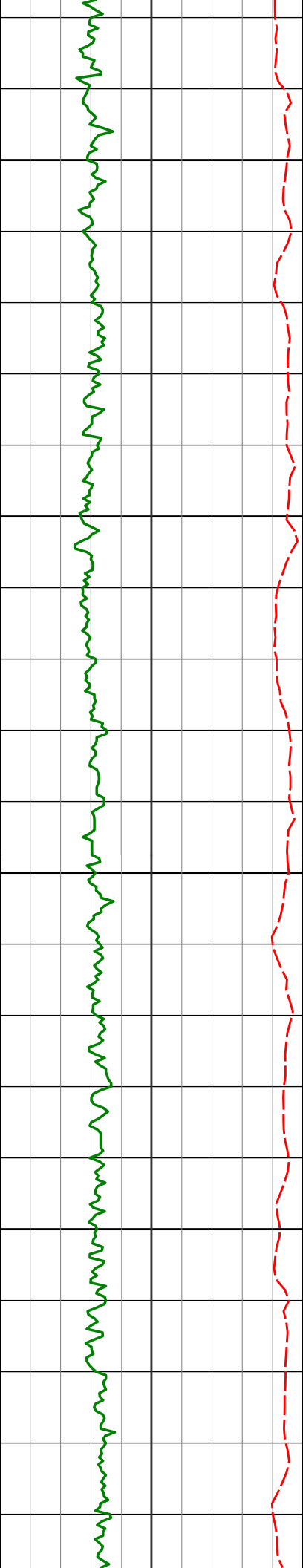
6047'

10.90°

314.86°

6008.20'

136.54'



6050

6094'	14.79°	309.26°	6054.02'	144.84'
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6100

6142'	19.45°	299.16°	6099.89'	157.13'
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6150

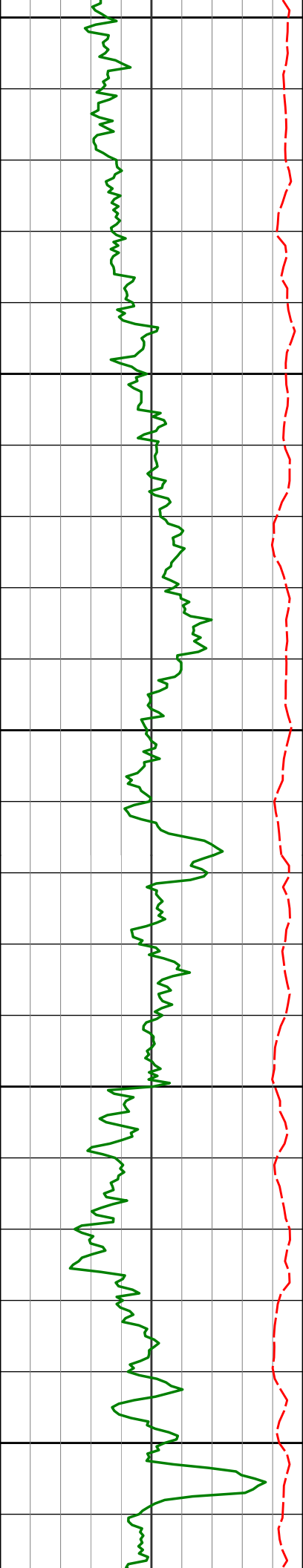
6188'	24.74°	292.53°	6142.50'	173.24'
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6200

6236'	27.84°	291.05°	6185.53'	193.53'
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6283'	30.23°	288.72°	6226.63'	215.50'
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6250

6331'

32.70°

285.21°

6267.57'

239.95'

6300

6378'

35.84°

282.90°

6306.41'

266.03'

6350

6426'

38.09°

279.54°

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294.68'

6400

6473'

41.61°

275.77°

6380.84'

324.73'

6450

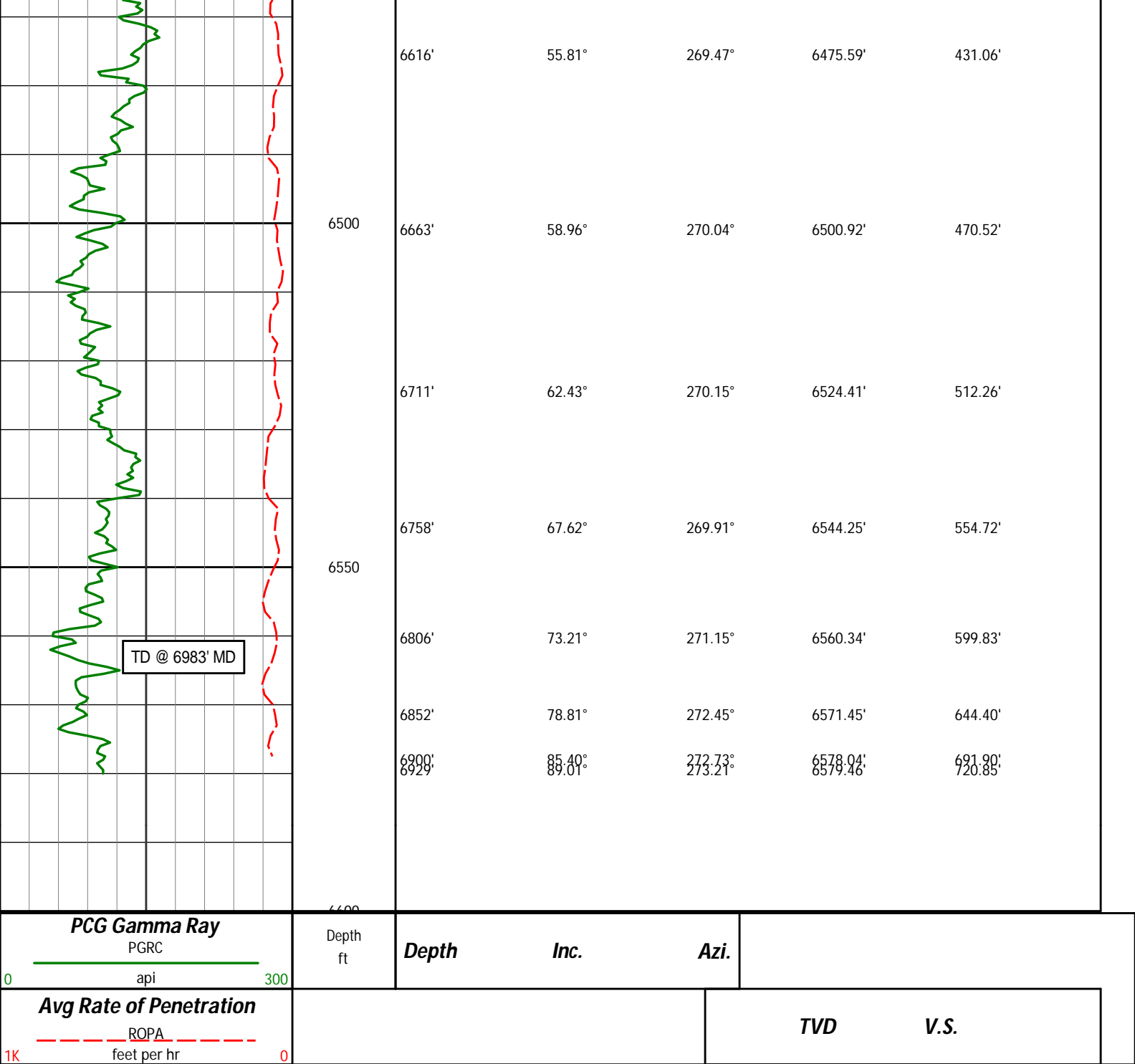
6568'

50.97°

269.19°

6446.98'

392.69'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

Noble Energy  
WRAE30-65HNC  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901176461

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
299.00	0.40	353.94	299.00	1.04 N	0.11 W	0.19	0.13
603.00	0.40	268.34	602.99	2.06 N	1.28 W	1.44	0.18
720.00	0.61	25.94	719.99	2.61 N	1.42 W	1.61	0.74

	812.00	0.76	30.20	811.98	3.58 N	0.90 W	1.17	0.17
	903.00	0.57	21.71	902.98	4.52 N	0.43 W	0.77	0.23
	996.00	0.81	43.97	995.97	5.42 N	0.20 E	0.21	0.38
	1087.00	0.71	42.11	1086.96	6.30 N	1.03 E	-0.54	0.11
	1180.00	0.65	56.29	1179.96	7.02 N	1.85 E	-1.31	0.19
	1273.00	0.73	19.29	1272.95	7.88 N	2.49 E	-1.88	0.48
	1366.00	0.57	357.43	1365.94	8.90 N	2.66 E	-1.98	0.31
	1457.00	0.49	324.06	1456.94	9.67 N	2.41 E	-1.67	0.34
	1549.00	0.55	309.21	1548.94	10.26 N	1.84 E	-1.05	0.16
	1641.00	0.69	312.09	1640.93	10.91 N	1.09 E	-0.25	0.16
	1736.00	0.43	289.49	1735.93	11.42 N	0.32 E	0.54	0.35
	1831.00	0.36	297.45	1830.92	11.67 N	0.28 W	1.16	0.09
	1926.00	0.36	289.17	1925.92	11.91 N	0.82 W	1.73	0.05
	2020.00	0.26	289.33	2019.92	12.08 N	1.30 W	2.22	0.11
	2115.00	0.47	253.93	2114.92	12.04 N	1.88 W	2.79	0.31
	2210.00	0.31	261.61	2209.92	11.89 N	2.51 W	3.41	0.18
	2305.00	0.25	243.23	2304.92	11.76 N	2.95 W	3.83	0.11
	2399.00	0.45	244.54	2398.91	11.51 N	3.47 W	4.33	0.21
	2494.00	0.38	225.36	2493.91	11.13 N	4.03 W	4.86	0.16
	2588.00	2.42	8.86	2587.89	12.87 N	3.94 W	4.91	2.91
	2683.00	4.09	355.80	2682.73	18.23 N	3.88 W	5.26	1.91
	2778.00	4.09	351.17	2777.49	24.96 N	4.65 W	6.53	0.35
	2873.00	5.56	347.68	2872.15	32.80 N	6.15 W	8.63	1.58
	2968.00	7.74	346.75	2966.51	43.53 N	8.60 W	11.88	2.30
	3062.00	9.03	351.01	3059.50	56.98 N	11.20 W	15.50	1.52
	3157.00	8.08	351.20	3153.44	70.94 N	13.39 W	18.74	1.00
	3252.00	8.51	349.02	3247.45	84.44 N	15.75 W	22.12	0.56
	3347.00	8.75	355.43	3341.37	98.54 N	17.67 W	25.11	1.04
	3441.00	8.88	356.63	3434.26	112.91 N	18.66 W	27.19	0.24
	3536.00	9.81	346.73	3528.01	128.11 N	20.95 W	30.63	1.95
	3631.00	10.77	344.44	3621.48	144.54 N	25.19 W	36.10	1.10
	3726.00	9.42	343.29	3715.01	160.53 N	29.81 W	41.92	1.44
	3819.00	7.30	349.89	3807.02	173.64 N	33.03 W	46.14	2.50
	3914.00	7.00	349.23	3901.28	185.27 N	35.17 W	49.16	0.33
	4009.00	8.38	346.65	3995.42	197.69 N	37.85 W	52.77	1.50
	4103.00	7.89	342.14	4088.48	210.50 N	41.41 W	57.30	0.86
	4198.00	8.60	353.75	4182.50	223.77 N	44.19 W	61.07	1.90
	4293.00	7.17	346.54	4276.60	236.59 N	46.34 W	64.19	1.83
	4388.00	8.42	344.84	4370.72	249.07 N	49.54 W	68.33	1.34
	4483.00	10.14	346.27	4464.47	263.91 N	53.34 W	73.25	1.83
	4577.00	8.85	339.79	4557.19	278.74 N	57.81 W	78.83	1.78
	4672.00	9.22	353.61	4651.02	293.16 N	61.18 W	83.29	2.31
	4767.00	8.07	355.67	4744.94	307.37 N	62.53 W	85.71	1.25
	4862.00	10.17	357.97	4838.73	322.41 N	63.33 W	87.66	2.24
	4957.00	10.20	356.63	4932.24	339.18 N	64.12 W	89.72	0.25
	5051.00	7.92	355.65	5025.06	353.95 N	65.10 W	91.82	2.43
	5146.00	7.92	0.46	5119.15	367.02 N	65.54 W	93.26	0.70
	5241.00	8.94	345.04	5213.14	380.70 N	67.40 W	96.14	2.60
	5336.00	9.95	349.98	5306.85	395.92 N	70.73 W	100.63	1.36
	5430.00	10.57	352.93	5399.35	412.47 N	73.21 W	104.35	0.86
	5525.00	9.54	352.25	5492.89	428.92 N	75.34 W	107.73	1.09
	5620.00	10.57	353.65	5586.43	445.38 N	77.37 W	111.00	1.11
	5715.00	8.52	351.30	5680.11	461.00 N	79.39 W	114.21	2.20
	5810.00	10.07	341.83	5773.86	475.85 N	83.05 W	118.98	2.29
	5905.00	8.43	337.04	5867.62	490.15 N	88.36 W	125.36	1.91
	5999.00	6.90	332.05	5960.78	501.48 N	93.69 W	131.54	1.77
	6047.00	10.90	314.86	6008.20	507.23 N	98.26 W	136.54	9.92
	6094.00	14.79	309.26	6054.02	514.17 N	106.06 W	144.84	8.68
	6142.00	19.45	299.16	6099.89	521.95 N	117.79 W	157.13	11.48
	6188.00	24.74	292.53	6142.50	529.37 N	133.38 W	173.24	12.70
	6236.00	27.84	291.05	6185.53	537.25 N	153.13 W	193.53	6.60
	6283.00	30.23	288.72	6226.63	544.99 N	174.58 W	215.50	5.62
	6331.00	32.70	285.21	6267.57	552.27 N	198.54 W	239.95	6.41
	6378.00	35.84	282.90	6306.41	558.67 N	224.21 W	266.03	7.23
	6426.00	38.09	279.54	6344.76	564.27 N	252.52 W	294.68	6.30
	6473.00	41.61	275.77	6380.84	568.24 N	282.35 W	324.73	9.08
	6521.00	45.41	271.98	6415.65	570.43 N	315.31 W	357.76	9.60
	6568.00	50.97	269.19	6446.98	570.75 N	350.32 W	392.69	12.63
	6616.00	55.81	269.47	6475.59	570.31 N	388.83 W	431.06	10.09
	6663.00	58.96	270.04	6500.92	570.14 N	428.42 W	470.52	6.78
	6711.00	62.43	270.15	6524.41	570.21 N	470.27 W	512.26	7.23
	6758.00	67.62	269.91	6544.25	570.23 N	512.86 W	554.72	11.05
	6806.00	73.21	271.15	6560.34	570.66 N	558.06 W	599.83	11.90
	6852.00	78.81	272.45	6571.45	572.07 N	602.65 W	644.40	12.48
	6898.00	85.42	273.78	6578.24	573.81 N	652.42 W	691.22	12.74
	6944.00	92.03	275.11	6585.04	575.55 N	702.20 W	738.04	13.00
	6990.00	98.64	276.44	6591.84	577.29 N	751.98 W	784.86	13.26
	7036.00	105.25	277.77	6598.64	579.03 N	801.76 W	831.68	13.52
	7082.00	111.86	279.10	6605.44	580.77 N	851.54 W	878.50	13.78
	7128.00	118.47	280.43	6612.24	582.51 N	901.32 W	925.32	14.04
	7174.00	125.08	281.76	6619.04	584.25 N	951.10 W	972.14	14.30
	7220.00	131.69	283.09	6625.84	586.00 N	1000.88 W	1018.96	14.56
	7266.00	138.30	284.42	6632.64	587.74 N	1050.66 W	1065.78	14.82
	7312.00	144.91	285.75	6639.44	589.49 N	1100.44 W	1112.60	15.08
	7358.00	151.52	287.08	6646.24	591.23 N	1150.22 W	1159.42	15.34
	7404.00	158.13	288.41	6653.04	592.98 N	1200.00 W	1206.24	15.60
	7450.00	164.74	289.74	6659.84	594.72 N	1249.78 W	1253.06	15.86
	7496.00	171.35	291.07	6666.64	596.47 N	1299.56 W	1300.00	16.12
	7542.00	177.96	292.40	6673.44	598.21 N	1349.34 W	1346.82	16.38
	7588.00	184.57	293.73	6680.24	600.00 N	1399.12 W	1393.64	16.64
	7634.00	191.18	295.06	6687.04	601.74 N	1448.90 W	1440.46	16.90
	7680.00	197.79	296.39	6693.84	603.49 N	1498.68 W	1487.28	17.16
	7726.00	204.40	297.72	6700.64	605.23 N	1548.46 W	1534.10	17.42
	7772.00	211.01	299.05	6707.44	606.98 N	1598.24 W	1580.92	17.68
	7818.00	217.62	300.38	6714.24	608.72 N	1648.02 W	1627.74	17.94
	7864.00	224.23	301.71	6721.04	610.47 N	1697.80 W	1674.56	18.20
	7910.00	230.84	303.04	6727.84	612.21 N	1747.58 W	1721.38	18.46
	7956.00	237.45	304.37	6734.64	613.96 N	1797.36 W	1768.20	18.72
	8002.00	244.06	305.70	6741.44	615.70 N	1847.14 W	1815.02	18.98
	8048.00	250.67	307.03	6748.24	617.45 N	1896.92 W	1861.84	19.24
	8094.00	257.28	308.36	6755.04	619.19 N	1946.70 W	1908.66	19.50
	8140.00	263.89	309.69	6761.84	620.94 N	1996.48 W	1955.48	19.76
	8186.00	270.50	311.02	6768.64	622.68 N	2046.26 W	2002.30	20.02
	8232.00	277.11	312.35	6775.44	624.43 N	2096.04 W	2049.12	20.28
	8278.00	283.72	313.68	6782.24	626.17 N	2145.82 W	2095.94	20.54
	8324.00	290.33	315.01	6789.04	627.92 N	2195.60 W	2142.76	20.80
	8370.00	296.94	316.34	6795.84	629.66 N	2245.38 W	2189.58	21.06
	8416.00	303.55	317.67	6802.64	631.41 N	2295.16 W	2236.40	21.32
	8462.00	310.16	319.00	6809.44	633.15 N	2344.94 W	2283.22	21.58
	8508.00	316.77	320.33	6816.24	634.90 N	2394.72 W	2330.04	21.84
	8554.00	323.38	321.66	6823.04	636.64 N	2444.50 W	2376.86	22.10
	8600.00	330.00	322.99	6829.84	638.39 N	2494.28 W	2423.68	22.36
	8646.00	336.61	324.32	6836.64	640.13 N	2544.06 W	2470.50	22.62
	8692.00	343.22	325.65	6843.44	641.88 N	2593.84 W	2517.32	22.88
	8738.00	349.83	326.98	6850.24	643.62 N	2643.62 W	2564.14	23.14
	8784.00	356.44	328.31	6857.04	645.37 N	2693.40 W	2610.96	23.40
	8830.00	363.05	329.64	6863.84	647.11 N	2743.18 W	2657.78	23.66
	8876.00	369.66	330.97	6870.64	648.86 N	2792.96 W	2704.60	23.92
	8922.00	376.27	332.30	6877.44	650.60 N	2842.74 W	2751.42	24.18
	8968.00	382.88	333.63	6884.24	652.35 N	2892.52 W	2798.24	24.44
	9014.00	389.49	334.96	6891.04	654.09 N	2942.30 W	2845.06	24.70
	9060.00	396.10	336.29	6897.84	655.84 N	2992.08 W	2891.88	24.96
	9106.00	402.71	337					

6900.00	85.40	272.73	6578.04	574.21 N	650.13 W	691.90	13.74
6929.00	89.01	273.21	6579.46	575.72 N	679.05 W	720.85	12.56

**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 274.36 DEGREES (GRID)  
A TOTAL CORRECTION OF 7.44 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6929.00 FEET  
IS 890.25 FEET ALONG 310.29 DEGREES (GRID)**

**First Surveys from 3rd party source (Muilti Shot EMS) and provided by CO-man on location before drilling.**

**Survey Depth 299 Inc 0.4 Azi 353.94**

**Survey Depth 603 Inc 0.4 Azi 268.34**

**Tied in @ Surface**

**Magnetic direction of 7.44 has been added to AZI for grid direction correction.**

**Date Printed:28 April 2014**