

**PCGC - Pressure Case Gamma**  
**PCDC - Pressure Case Directional**

1 : 240

Company : Anadarko Petroleum Corporation									
Rig : Ensign 132									
Well : Highway 160 15C-2HZ									
Field : Wattenberg									
Country : USA									
API Number : 05-123-38026-00									
LOCATION					Other Services Directional Drilling				
Latitude : 40° 5' 7.62" North Longitude : 104° 44' 25.12" West					UTM Easting = 3,212,560.298 ft UTM Northing = 1,274,884.694 ft				
Country : USA									
Field : Wattenberg									
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## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300		
<b>Date run completed</b>	24-Dec-13	25-Dec-13	29-Dec-13		
<b>Rig Bit Number</b>	0100	0200	0300		
<b>Bit Size (in)</b>	8.750	8.750	6.125		
<b>Tool Nominal OD (in)</b>	6.750	6.750	4.750		
<b>Log Start Depth (TVD, ft)</b>	1,258.98	7,359.18	7,547.70		
<b>Log End Depth (TVD, ft)</b>	7,359.18	7,547.70	7,556.78		
<b>Drill or Wipe</b>	Drill	Drill	Drill		
<b>Drill/Wipe Start Date and Time</b>	22-Dec-13 11:45	23-Dec-13 15:06	24-Dec-13 18:00		
<b>Drill/Wipe End Date and Time</b>	24-Dec-13 03:30	23-Dec-13 15:06	25-Dec-13 09:00		
<b>Min Inc (deg) @ Depth (TVD, ft)</b>	0.13 @ 1,475.98	39.57 @ 7,376.45	88.12 @ 7,560.14		
<b>Max Inc (deg) @ Depth (TVD, ft)</b>	34.13 @ 7,338.85	88.00 @ 7,546.83	92.53 @ 7,558.99		
<b>Bit TFA(in2) / Bit Type</b>	0.98 / PDC	0.97 / PDC	0.98 / PDC		
<b>Flow Rate (gpm)</b>	596.50	529.69	295.07		
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Fluid Type</b>	Fresh Water Gel	Fresh Water Gel	Native/Spud Mud		
<b>Density (ppg) / Viscosity (spqt)</b>	9.10 / 38.00	10.10 / 38.00	9.50 / 41.00		
<b>Filtrate CL (ppm)</b>	700.00	1,000.00	1,400.00		
<b>pH / Fluid Loss (mptm)</b>	9.50 / 5	9.50 / 5	9.00 / 7		
<b>PV (cP) / YP (lbf2)</b>	14 / 14.00	14 / 14.00	8 / 7.00		
<b>% Solids / % Sand</b>	0.6 / 0.25	7.5 / 0.25	6.2 / 0.75		
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	N/A / N/A	N/A / N/A		
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Max Tool Temp (in F) / S</b>	105.58 / PGM	200.05 / PGM	234.12 / PGM		

Max Tool Temp (degF) / Source	165.58 / PCM	200.05 / PCM	231.42 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Matthew Busche	Matthew Henderson	Matthew Busche		
Customer Representative	Mike Bradshaw	Mike Bradshaw	Sam Taylor		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.84		
Sub Serial Number	11342277	11342277	12187590		
Insert Serial Number	11400908	11400838	11579809		
Date and Time Initialized	21-Dec-13 19:25	24-Dec-13 08:10	26-Dec-13 15:48		
Date and Time Read	24-Dec-13 15:04	25-Dec-13 18:55	29-Dec-13 16:01		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	46.19	46.20	39.20		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11342277	12187590	12187590		
Sonde Serial Number	11477984	11297493	11477984		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	270.40	239.66	245.64		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	51.14	51.15	44.15		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11342277	11342277	12187590		
Insert/Sonde Serial Number	11579809	12071277	11579809		

## REMARKS

1. All depths are measured depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded data unless otherwise specified.
4. The final survey is a straight line projection to the bit.
5. The following smoothing parameters have been applied to the data:

PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):  
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill: 3.0 ft

Insite version: 8.0

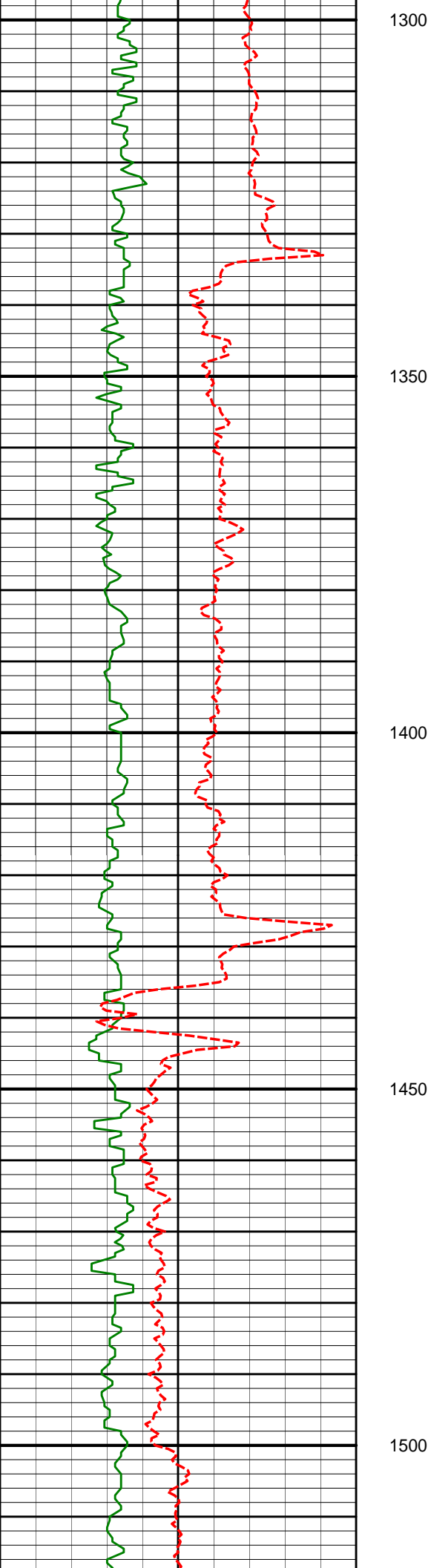
## WARRANTY

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

# TVD Main Log 1:240

PCG Gamma Ray BCorr (PGRC) api		Remark/Depth Remark	
0	300		
Average Rate of Penetration (ROPA) feet per hr	Depth	Inc	TVD
1K	0	Depth	V/S
		<div style="border: 1px solid black; padding: 5px;">9.625" Casing Shoe @ 1236' MD / 1235.98' TVD</div>	
	1250		
	Run 100		



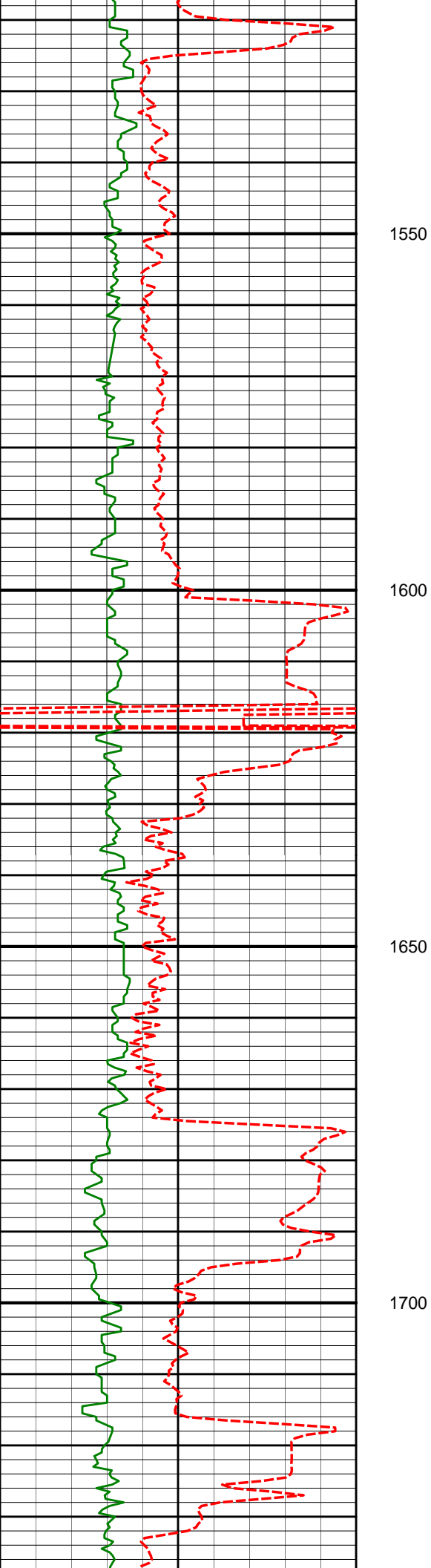
1476'

0.13°

22.48°

1475.98'

-5.05'



1572'

0.19°

136.94°

1571.98'

-5.04'

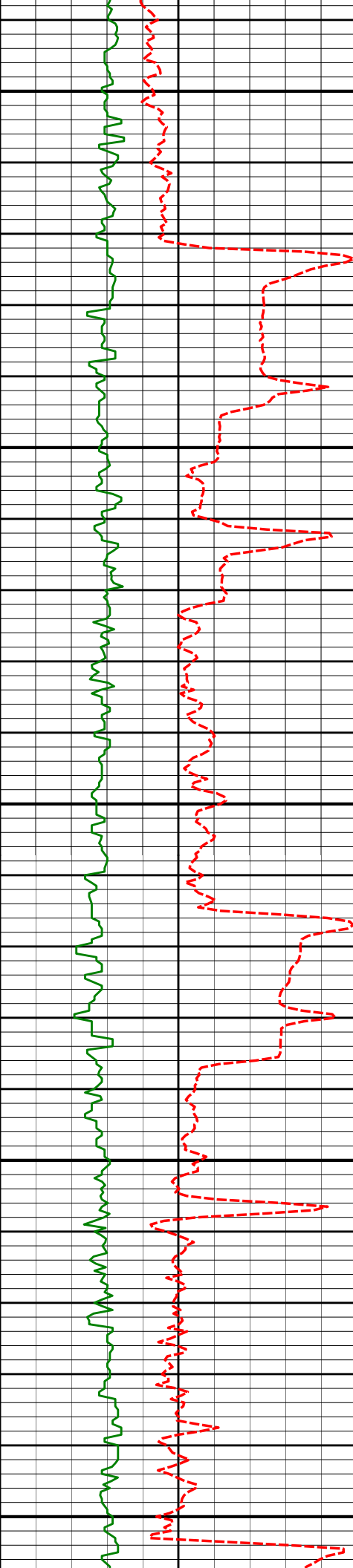
1666'

2.33°

319.37°

1665.95'

-6.34'



1750

1760'

3.71°

319.39°

1759.82'

-9.98'

1800

1850

1855'

7.01°

324.18°

1854.39'

-16.83'

1900

1950

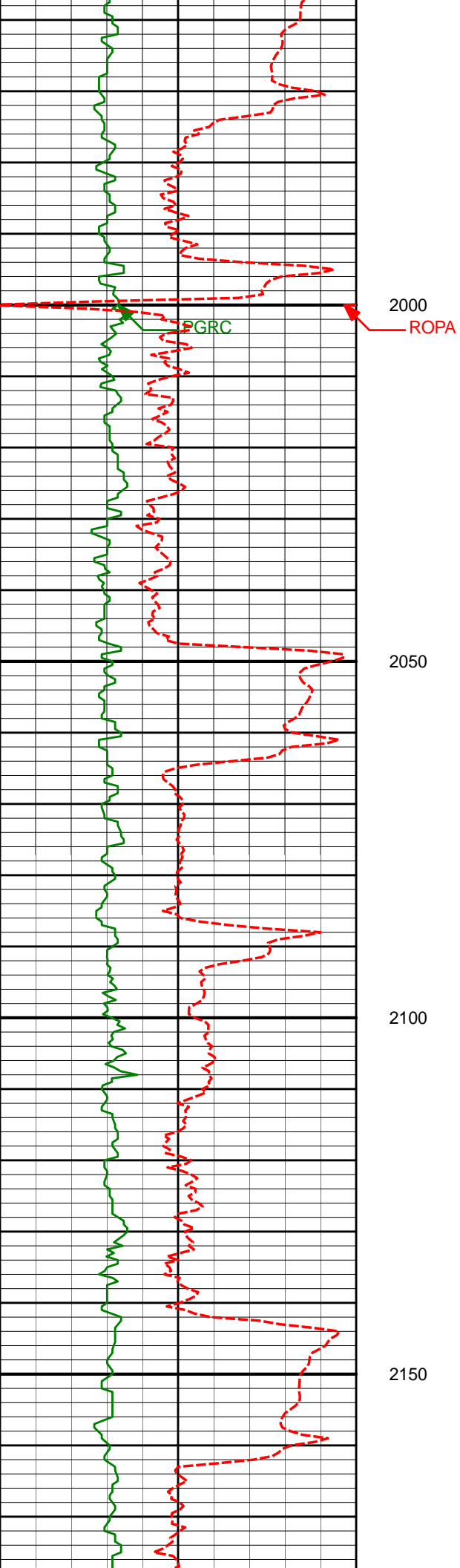
1949'

8.97°

327.57°

1947.48'

-27.40'



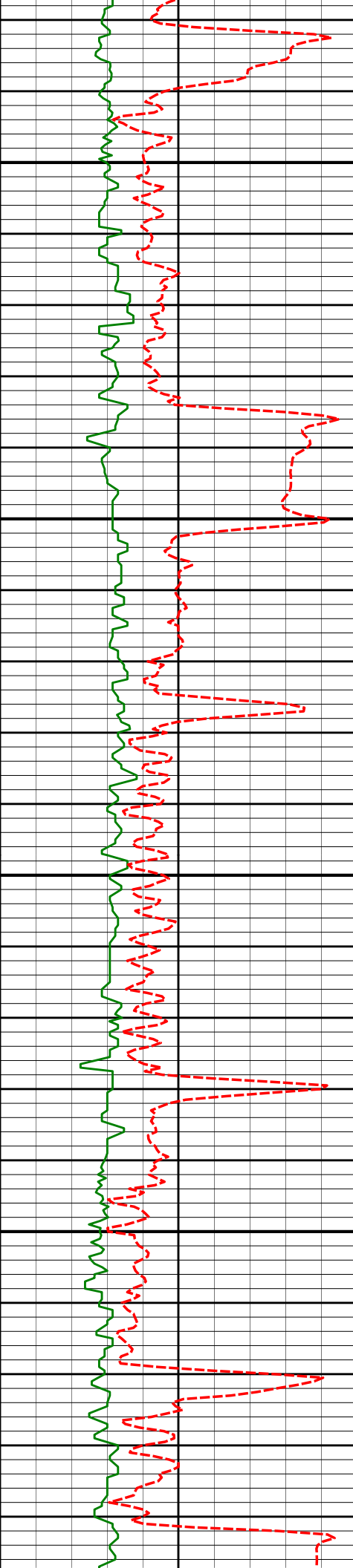
2043'	11.33°	325.84°	2040.00'	-40.91'
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2050

2100

2135'	12.81°	321.33°	2129.97'	-55.94'
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2150



2200

2230'

14.24°

313.78°

2222.34'

-71.71'

2250

2300

2324'

14.99°

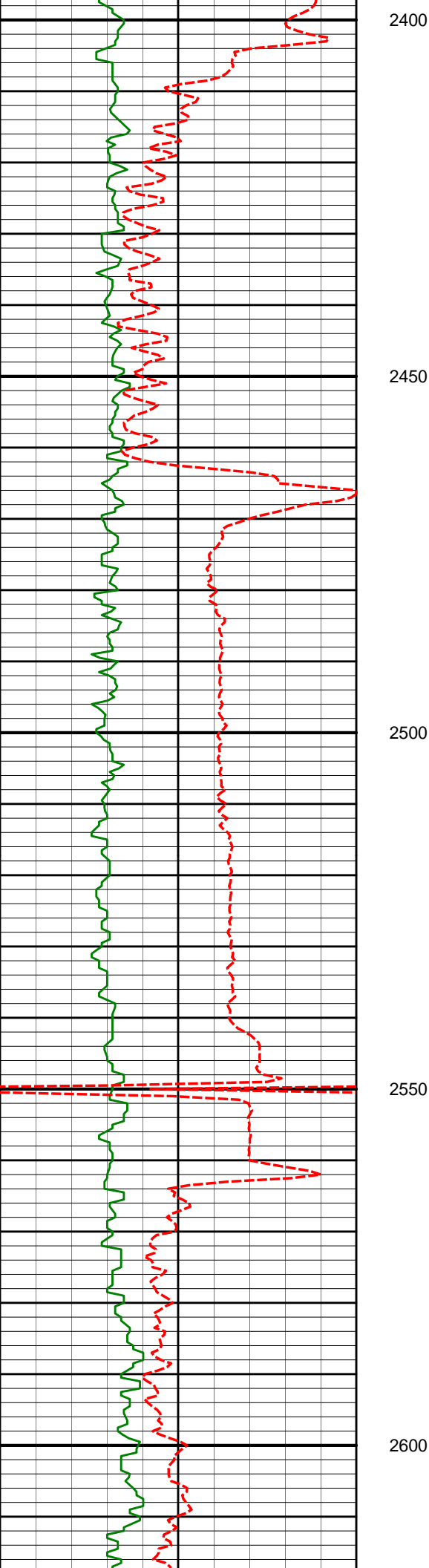
310.91°

2313.29'

-87.05'

2350





2418'

13.16°

310.80°

2404.47'

-101.39'

2512'

12.58°

311.22°

2496.11'

-114.57'

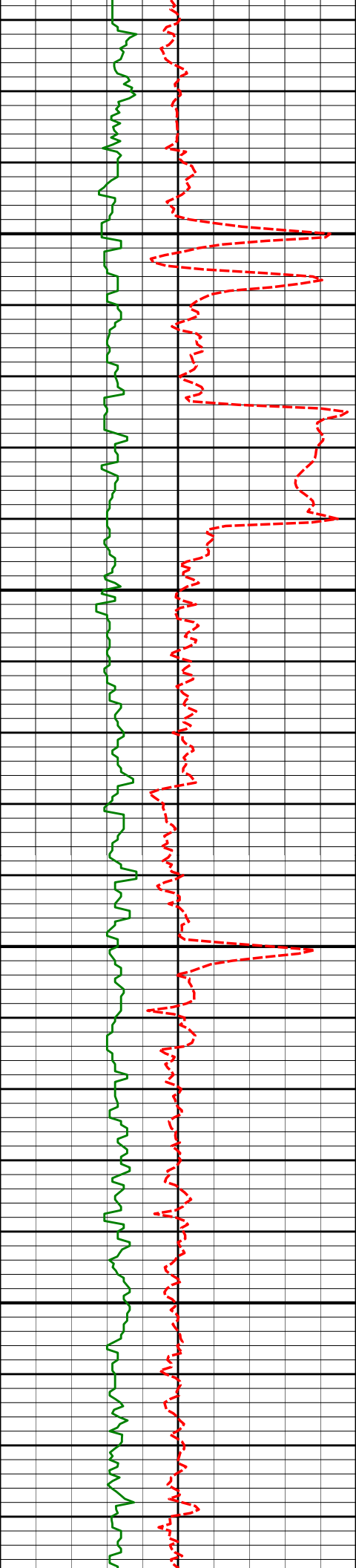
2606'

11.84°

311.27°

2587.98'

-127.15'



2650

2700

2750

2800

2700'

13.76°

311.85°

2679.64'

-140.42'

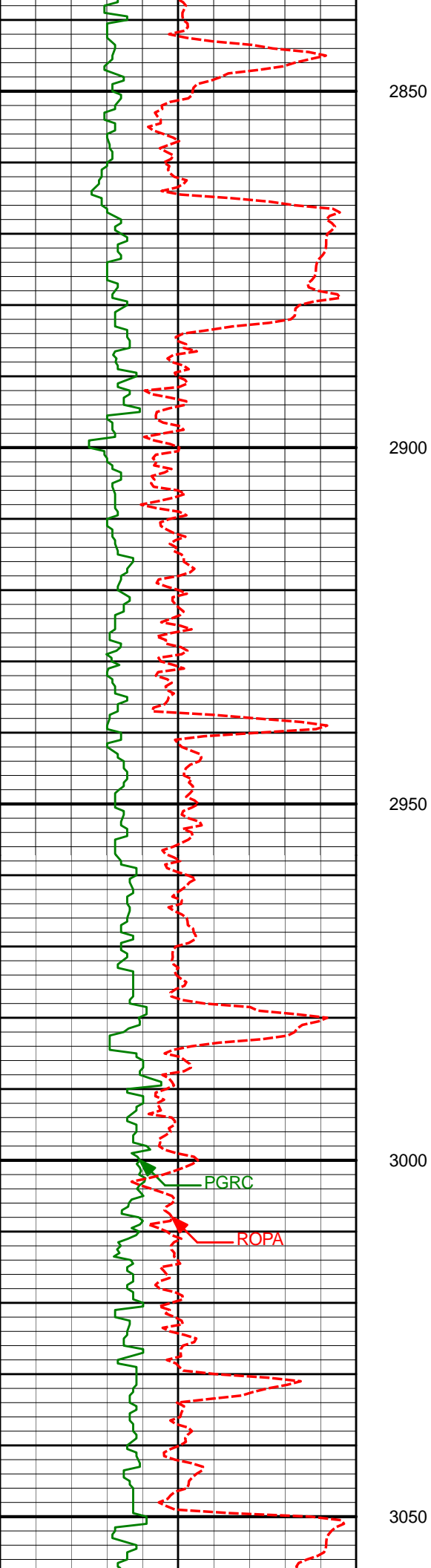
2794'

13.05°

310.35°

2771.08'

-154.17'



2850

2888'

14.01°

310.86°

2862.47'

-167.89'

2900

2950

2982'

13.15°

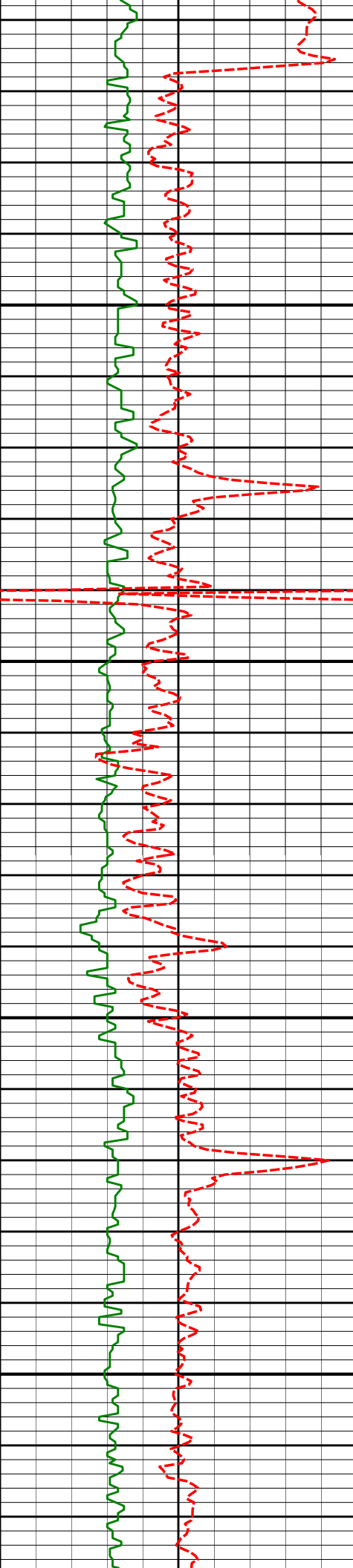
308.96°

2953.84'

-181.46'

3000

3050



3100

3150

3200

3250

3076'

14.56°

309.55°

3045.10'

-195.09'

3171'

14.32°

308.98°

3137.10'

-209.43'

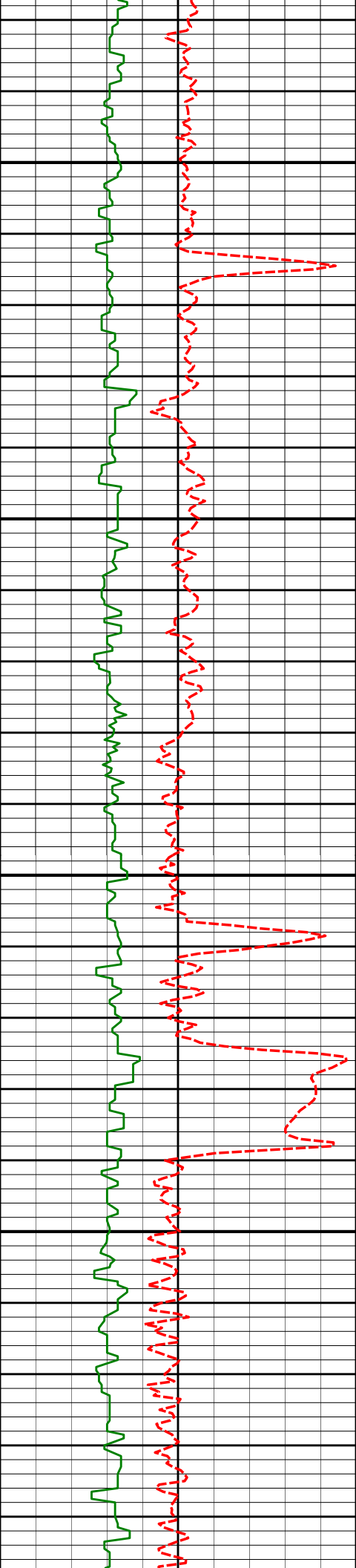
3265'

14.16°

308.69°

3228.21'

-223.30'



3300

3350

3400

3450

3359'

13.83°

307.49°

3319.42'

-236.69'

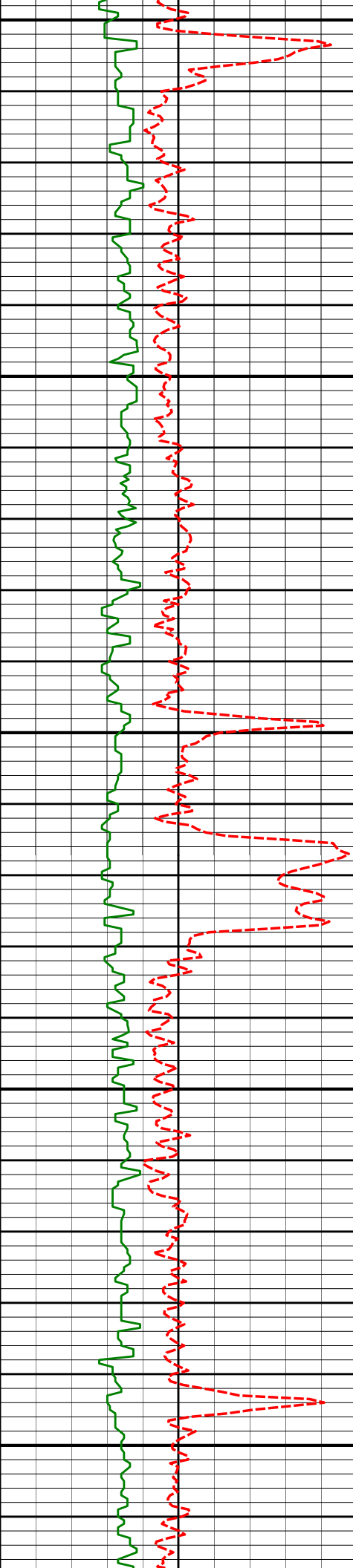
3454'

14.21°

314.12°

3411.60'

-251.10'



3500

3550

3600

3650

3700

3549'

13.54°

313.33°

3503.83'

-266.27'

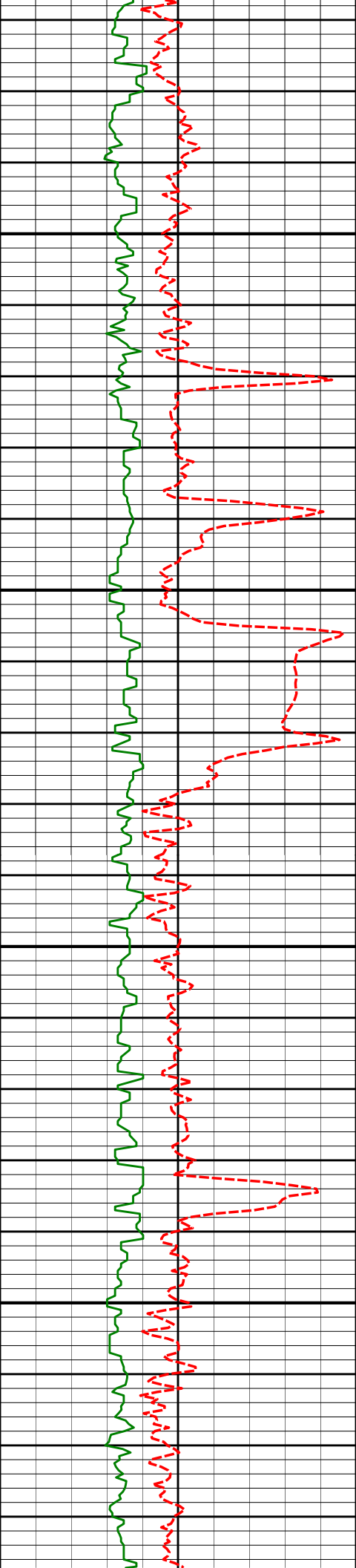
3644'

14.27°

312.63°

3596.04'

-281.23'



3739'

13.35°

310.13°

3688.30'

-295.63'

3750

3800

3835'

13.82°

317.44°

3781.62'

-310.65'

3850

3900

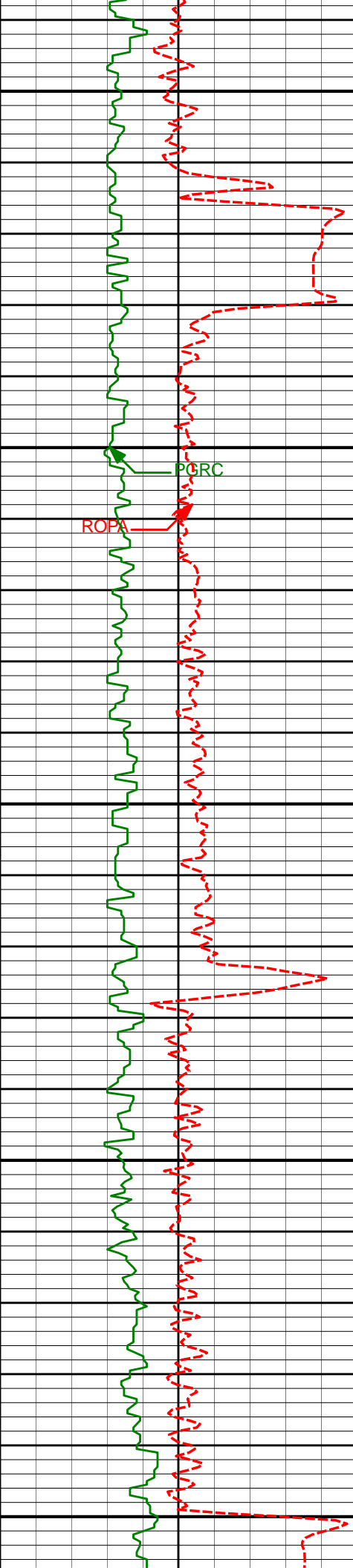
3930'

12.96°

315.31°

3874.03'

-326.04'



3950

4000

4050

4100

4150

PCRC

ROPA

4025'

13.82°

317.46°

3966.45'

-341.43'

4120'

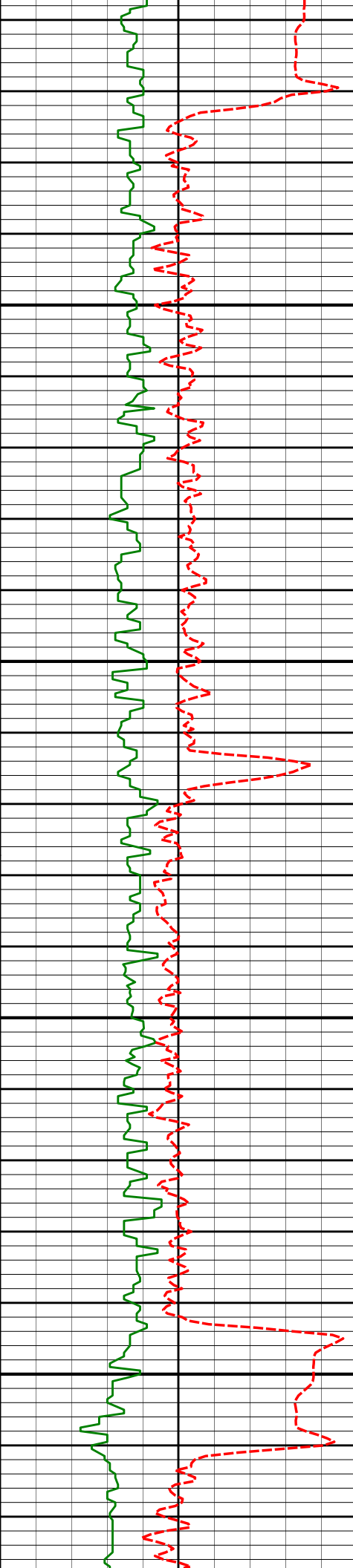
12.83°

317.54°

4058.89'

-357.05'





4200

4215'

14.48°

317.34°

4151.20'

-373.03'

4250

4300

4311'

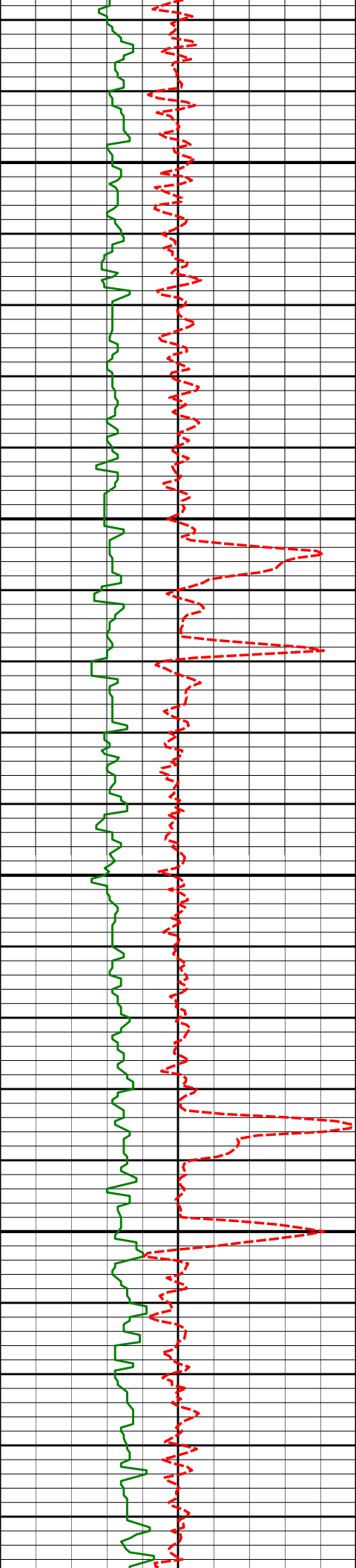
13.34°

317.68°

4244.39'

-389.49'

4350



4400

4419'

14.66°

313.02°

4349.18'

-407.37'

4450

4500

4501'

14.71°

313.24°

4428.50'

-421.05'

4550

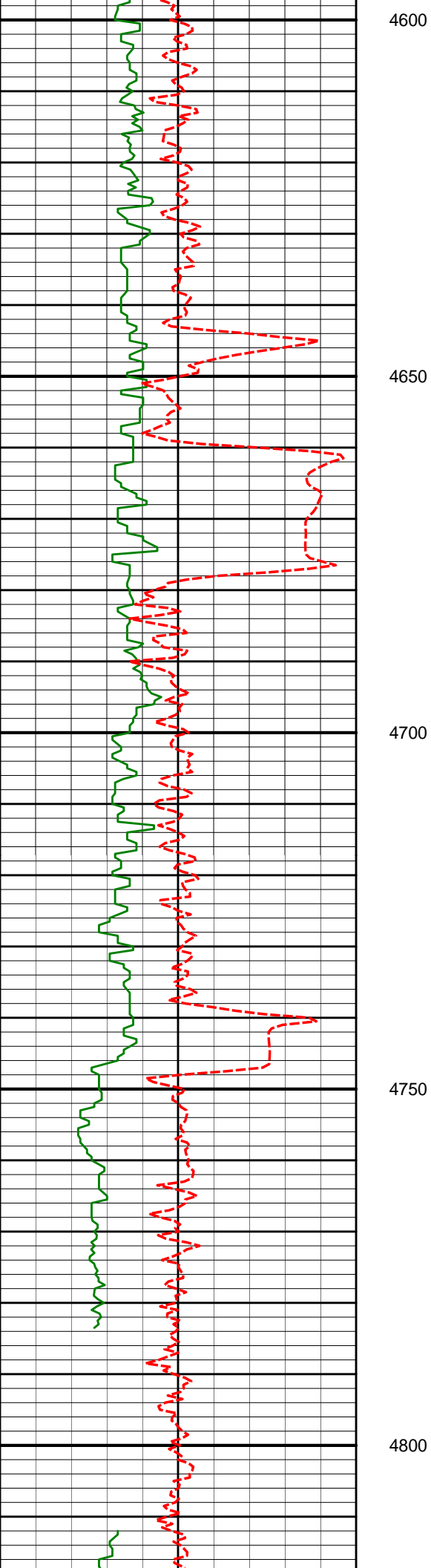
4596'

13.55°

312.68°

4520.63'

-436.25'



4691'

14.24°

309.51°

4612.85'

-450.62'

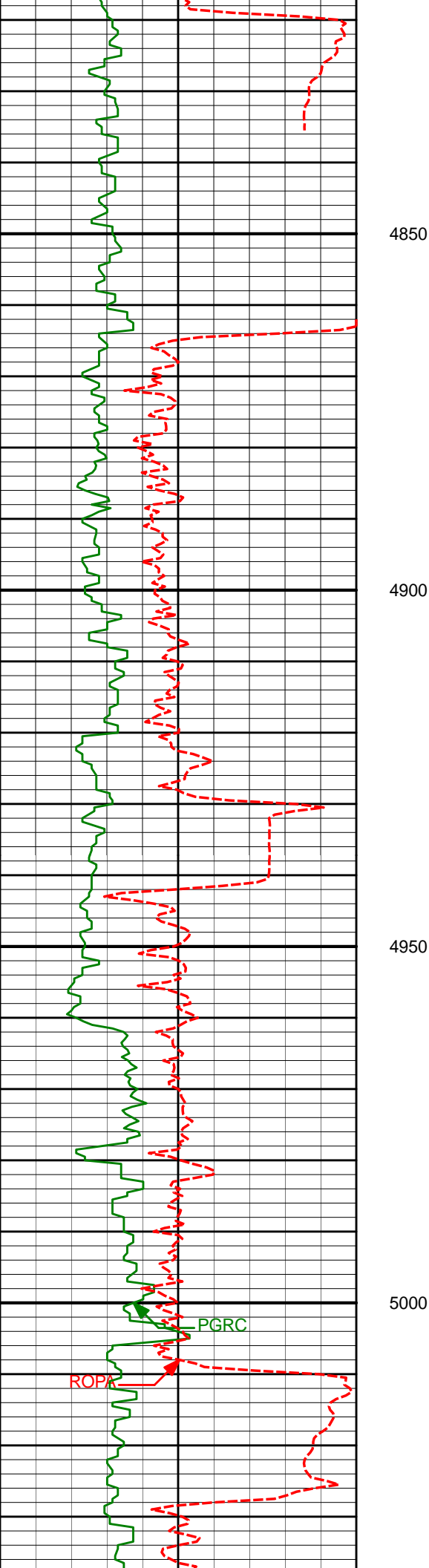
4786'

13.69°

309.16°

4705.04'

-464.53'



4850

4900

4950

5000

4881'

14.59°

309.66°

4797.16'

-478.63'

4976'

13.16°

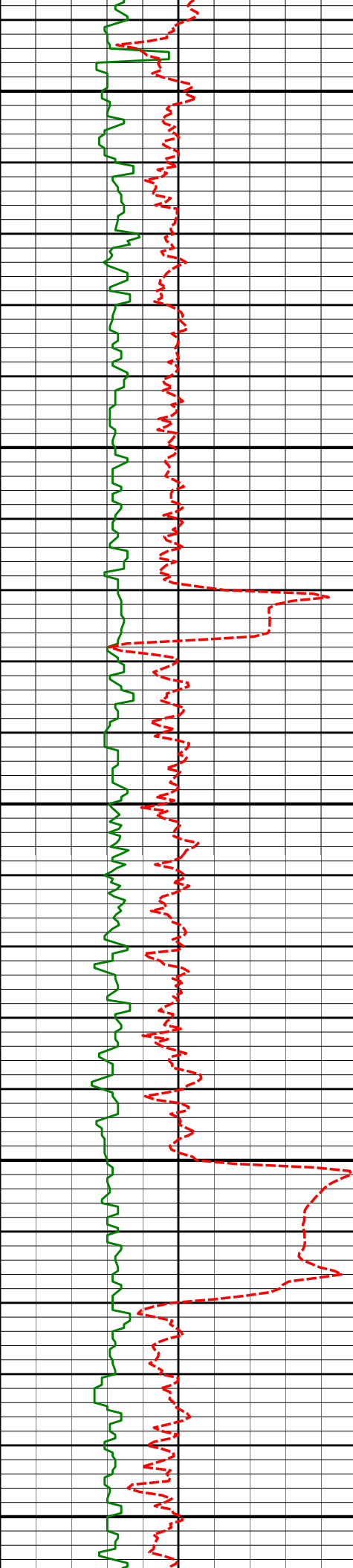
311.75°

4889.39'

-492.85'

PGRC

ROPK



5050

5071'

14.65°

310.80°

4981.60'

-507.30'

5100

5150

5167'

13.32°

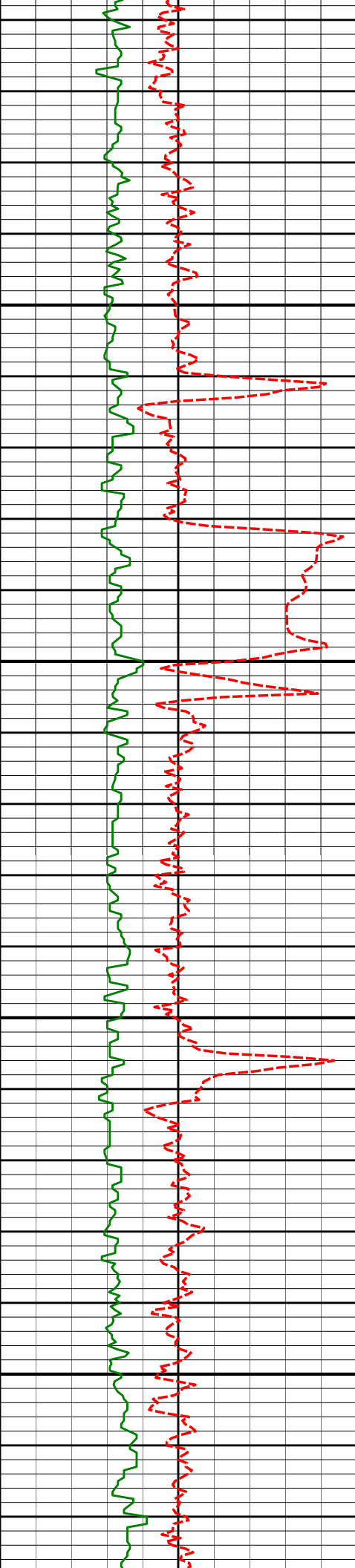
309.26°

5074.75'

-521.60'

5200

5250



5262'

13.74°

308.40°

5167.12'

-534.92'

5300

5350

5357'

14.23°

309.16°

5259.30'

-548.67'

5400

5450

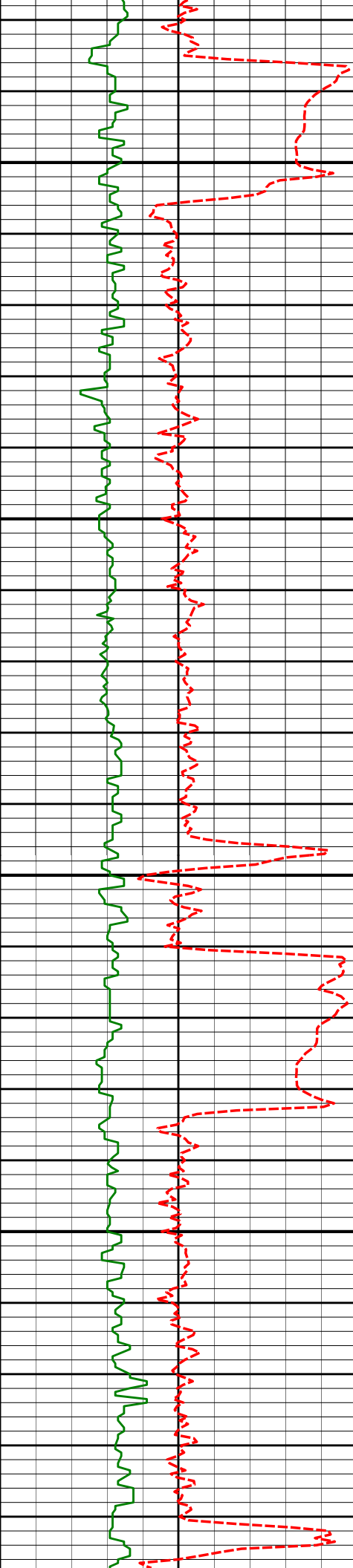
5452'

12.93°

308.08°

5351.64'

-561.98'



5500

5550

5600

5650

5547'

13.98°

308.35°

5444.03'

-575.04'

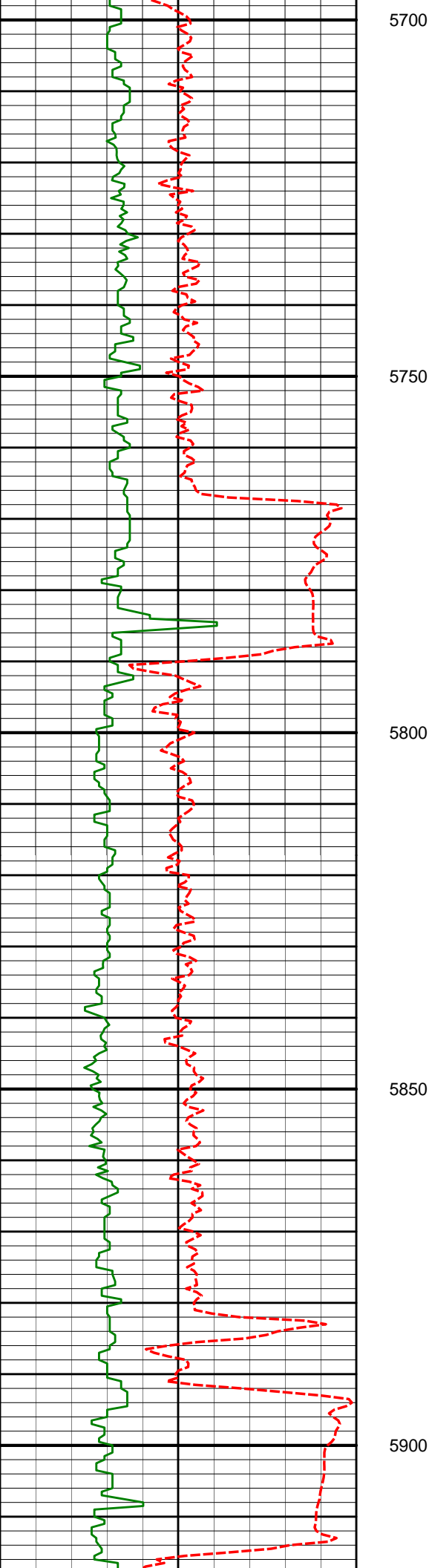
5642'

14.65°

309.79°

5536.08'

-589.21'



5738'

12.22°

308.10°

5629.45'

-602.63'

5833'

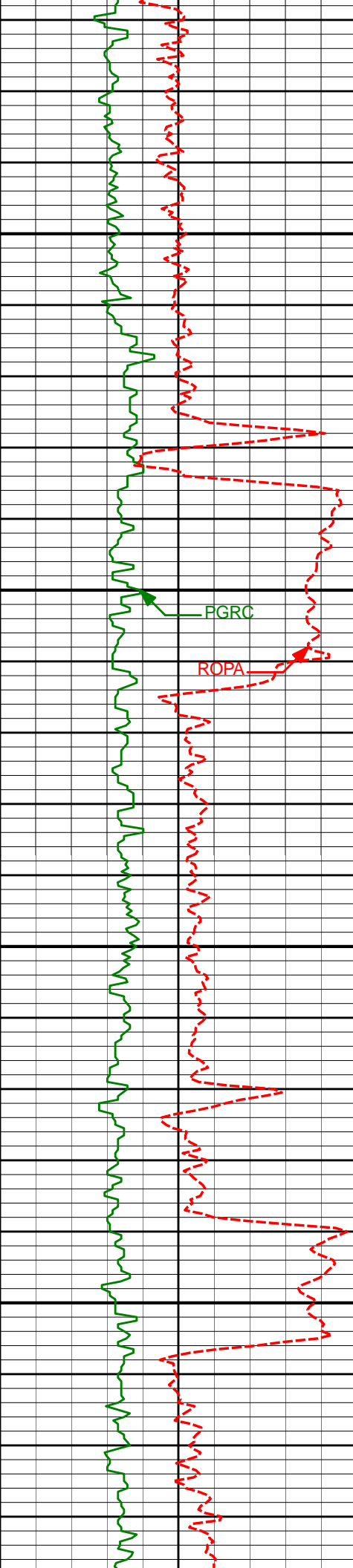
13.29°

305.44°

5722.10'

-614.57'





5928'	13.19°	311.21°	5814.58'	-627.44'
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5950

6000

FGRC

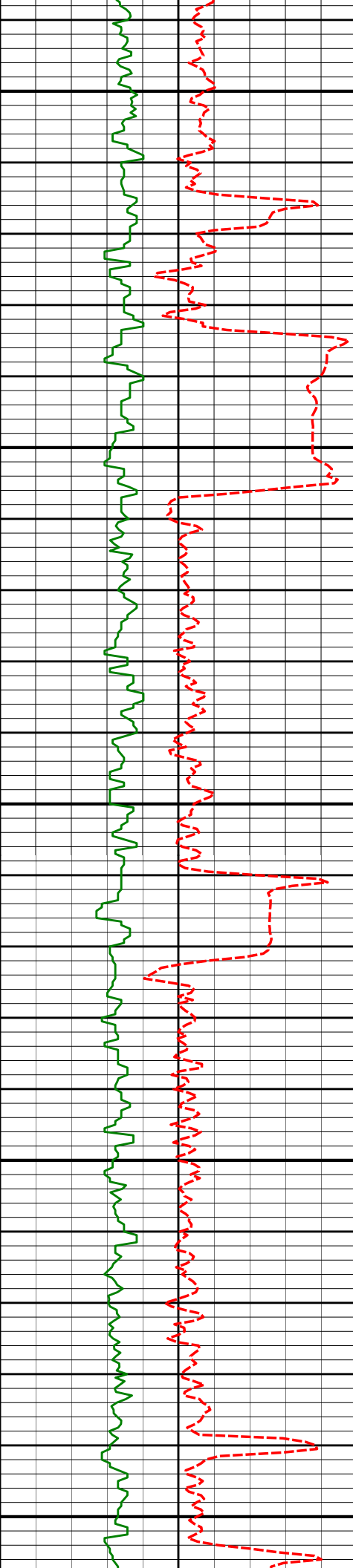
ROPA

6022'	13.53°	312.78°	5906.04'	-641.41'
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6050

6100

6117'	13.27°	312.65°	5998.45'	-655.77'
-------	--------	---------	----------	----------



6150

6200

6250

6300

6350

6212'

14.04°

314.21°

6090.77'

-670.61'

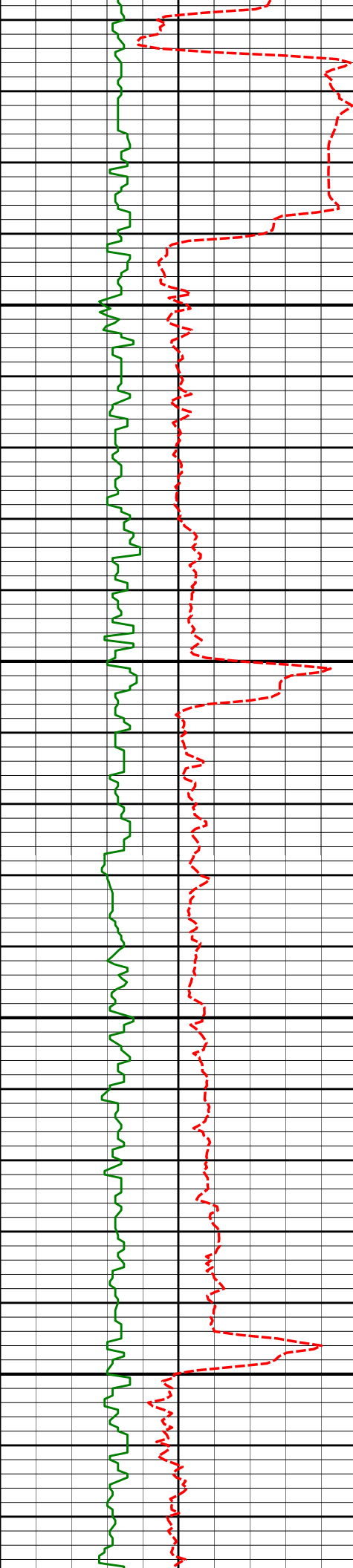
6307'

12.16°

311.57°

6183.29'

-684.73'



6400

6402'

12.40°

316.53°

6276.12'

-698.26'

6450

6500

6497'

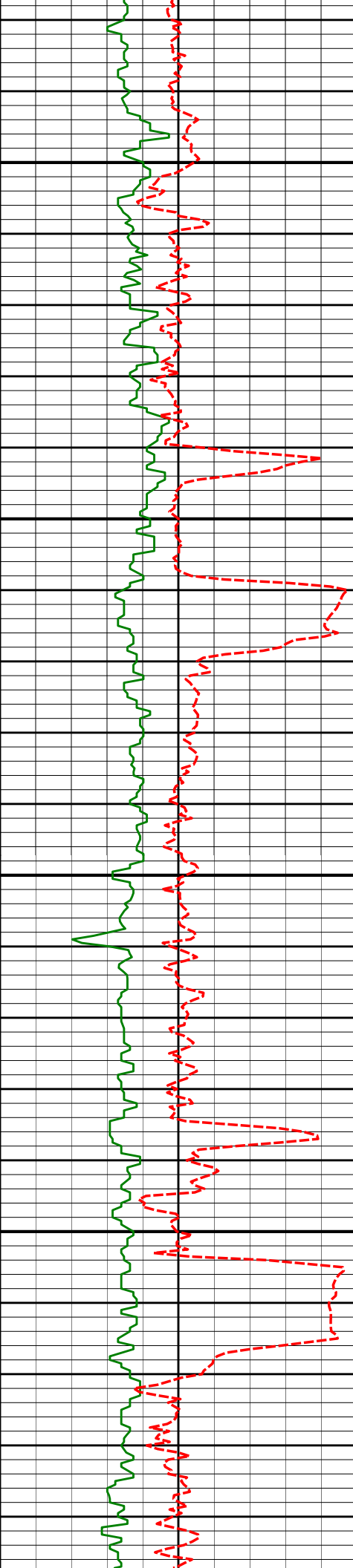
10.32°

315.60°

6369.26'

-711.28'

6550



6600

6650

6700

6750

6592'

8.70°

315.55°

6462.95'

-722.10'

6687'

6.63°

316.57°

6557.09'

-730.90'

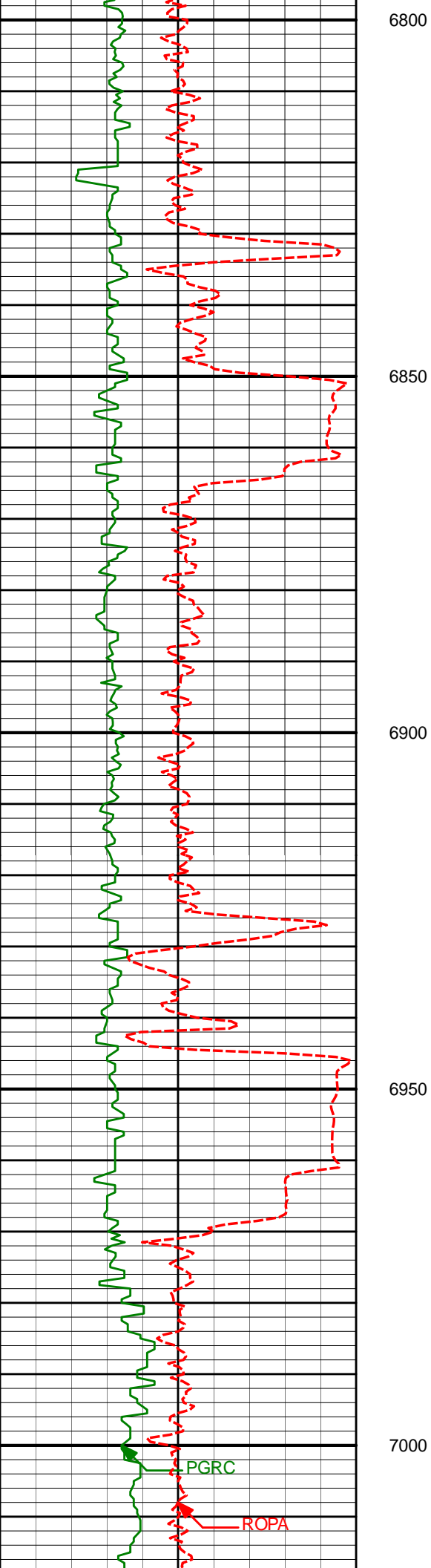
6782'

4.25°

325.59°

6651.66'

-737.58'



6878'

2.22°

342.74°

6747.50'

-742.20'

6973'

0.59°

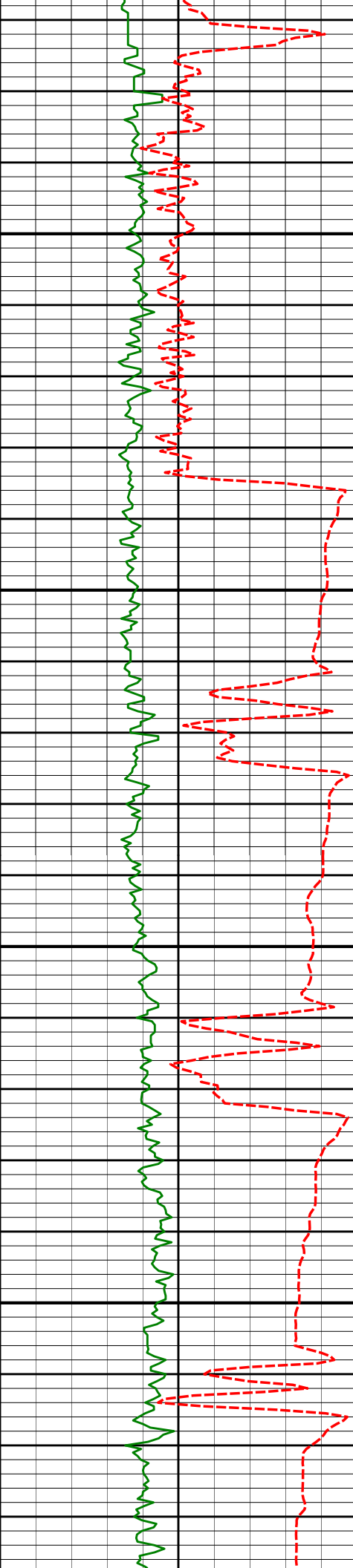
51.94°

6842.48'

-744.25'

PGRC

ROPA



7050

7068'

0.37°

15.71°

6937.47'

-744.86'

7100

7116'

3.00°

195.80°

6985.45'

-743.79'

7150

7163'

6.94°

185.90°

7032.27'

-739.77'

7200

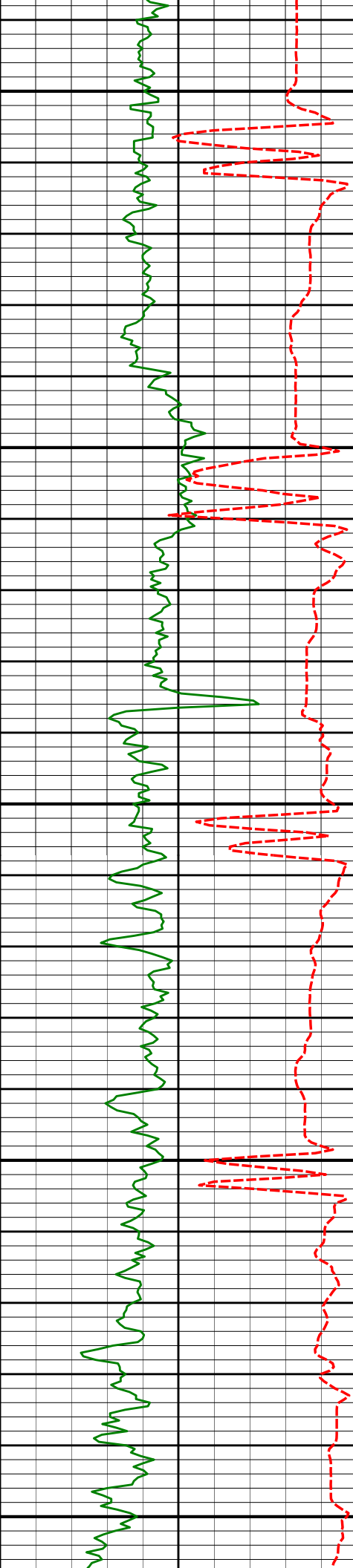
7211'

11.30°

183.62°

7079.65'

-732.17'



7250

7258'

16.34°

179.37°

7125.28'

-720.95'

7300

7306'

20.68°

181.53°

7170.78'

-705.73'

7350

7353'

24.45°

181.41°

7214.18'

-687.69'

7400

7401'

27.52°

180.78°

7257.32'

-666.67'

7450

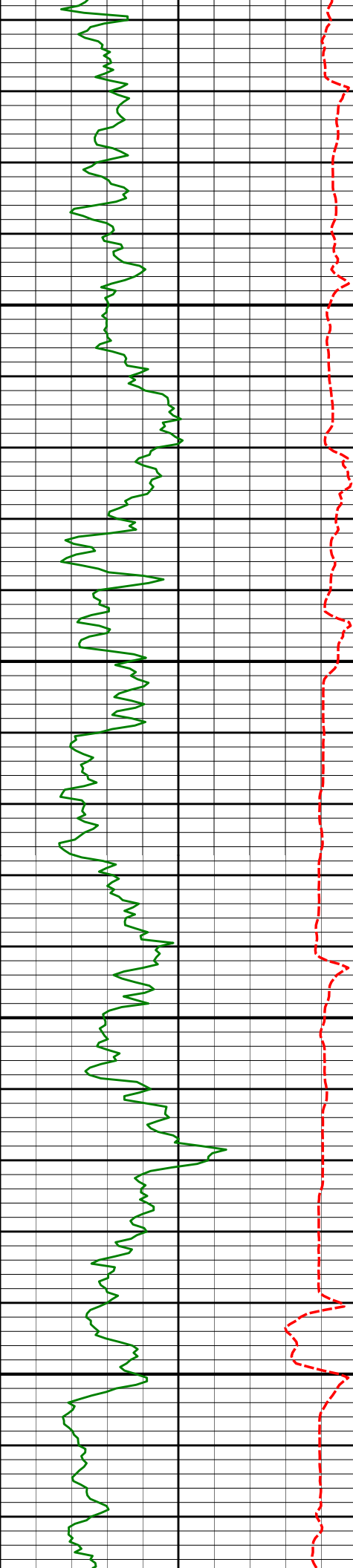
7448'

30.79°

179.39°

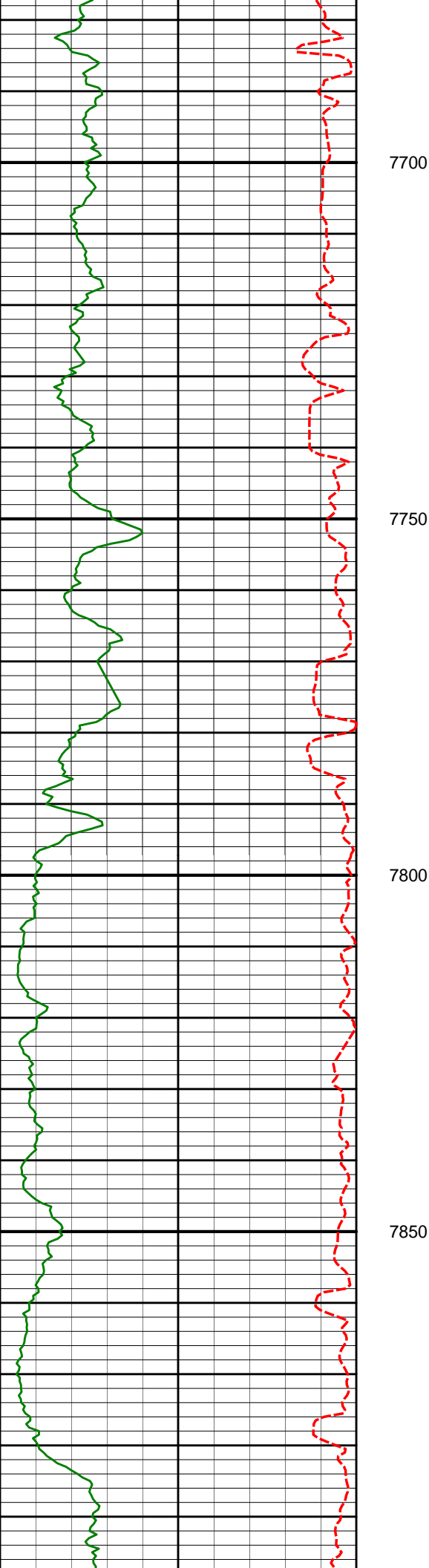
7298.36'

-643.79'



	7496'	34.13°	179.30°	7338.85'	-618.06'
7500					
Run 200					
	7543'	39.57°	178.82°	7376.45'	-589.92'
7550					
	7591'	46.94°	180.73°	7411.39'	-557.08'
7600					
	7638'	53.77°	182.56°	7441.36'	-520.91'
7650					





7686'

59.75°

182.49°

7467.66'

-480.79'

7700

7733'

65.35°

181.44°

7489.31'

-439.09'

7750

7781'

69.14°

183.53°

7507.88'

-394.84'

7800

7829'

73.76°

184.62°

7523.15'

-349.38'

7850

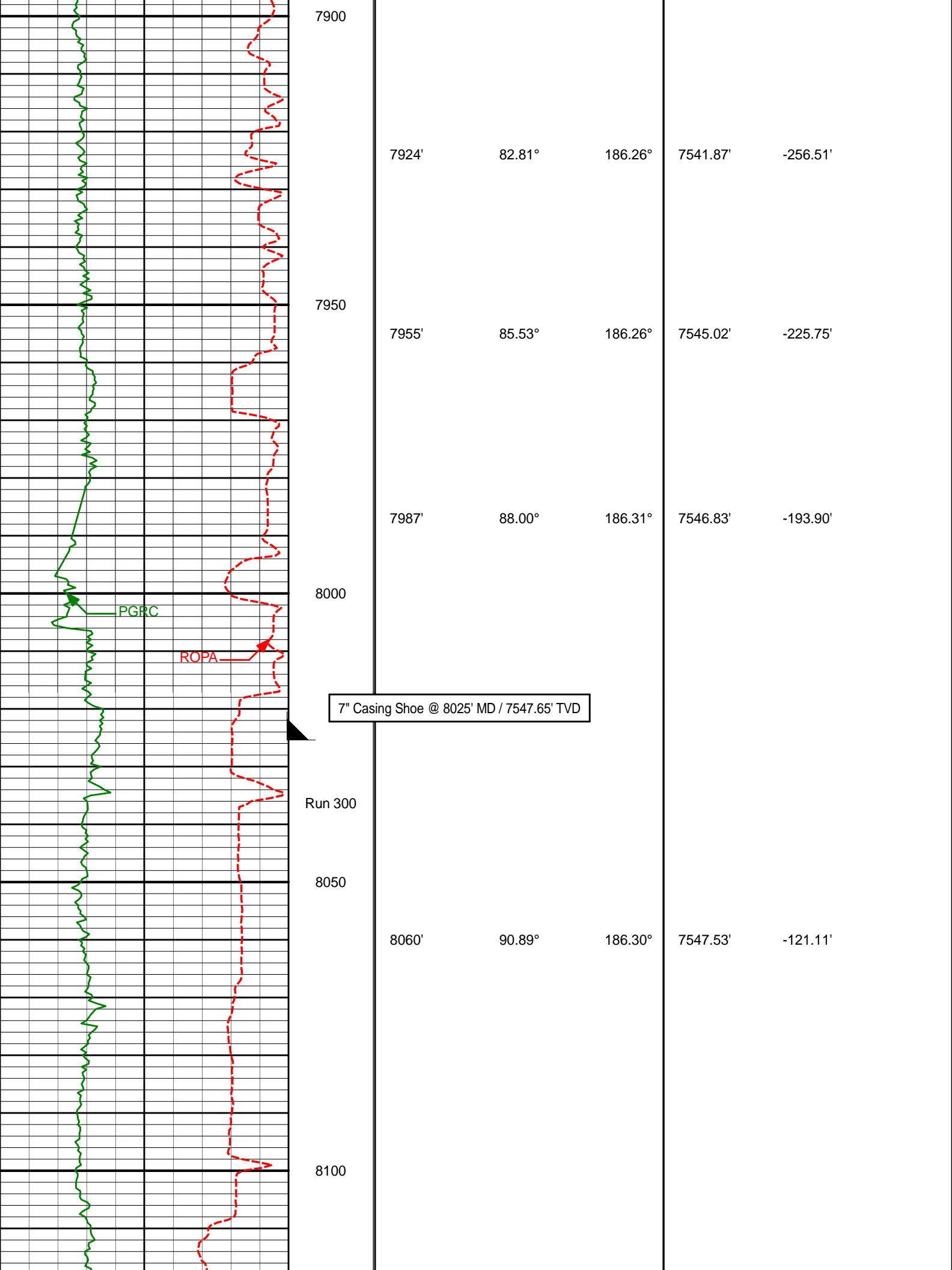
7877'

79.00°

185.21°

7534.44'

-302.81'





8150

8155'

90.49°

186.17°

7546.39'

-26.38'

8200

8250

8250'

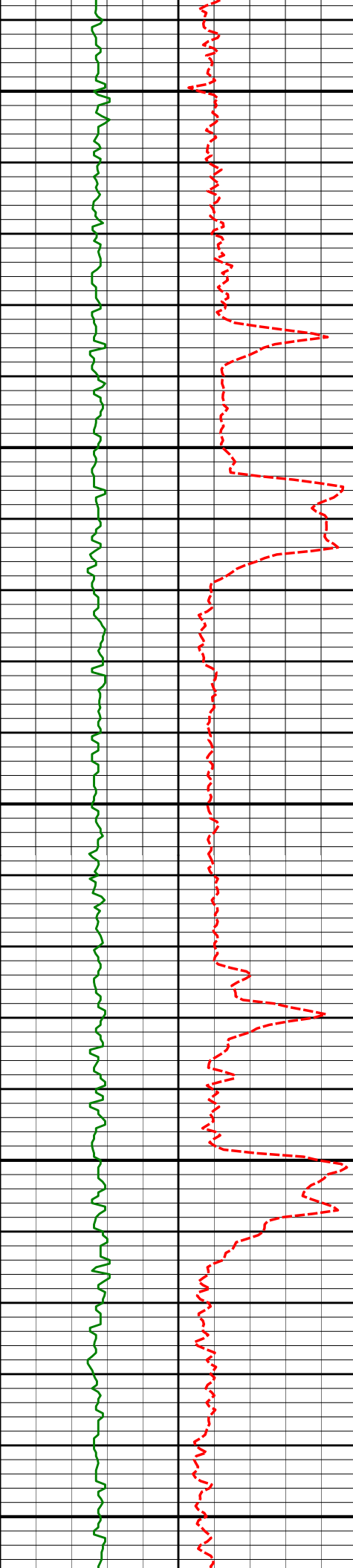
90.34°

185.65°

7545.70'

68.40'

8300



8350

8400

8450

8500

8550

8345'

90.00°

184.86°

7545.42'

163.24'

8440'

88.74°

182.67°

7546.46'

258.18'

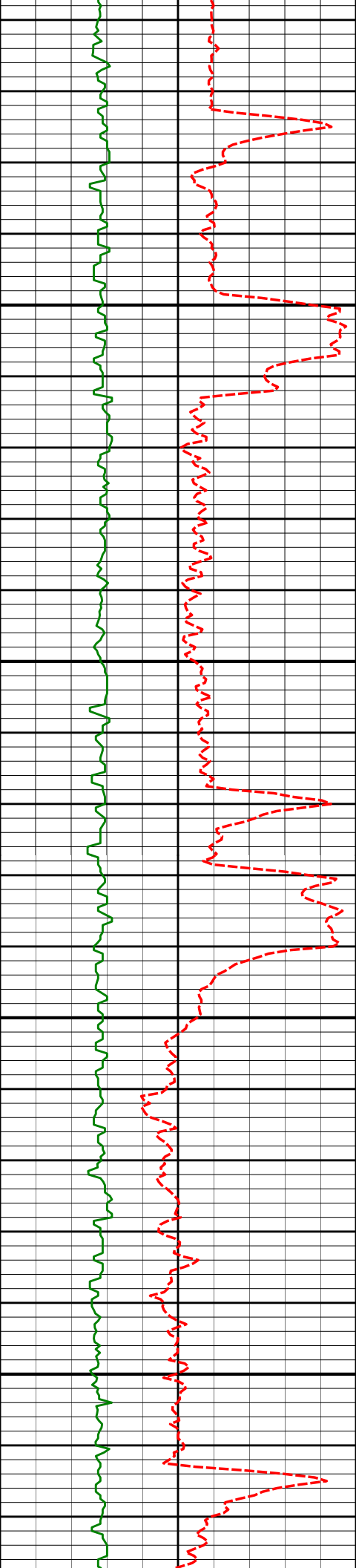
8536'

88.86°

181.94°

7548.48'

354.16'



8600

8650

8700

8750

8631'

89.17°

181.59°

7550.11'

449.14'

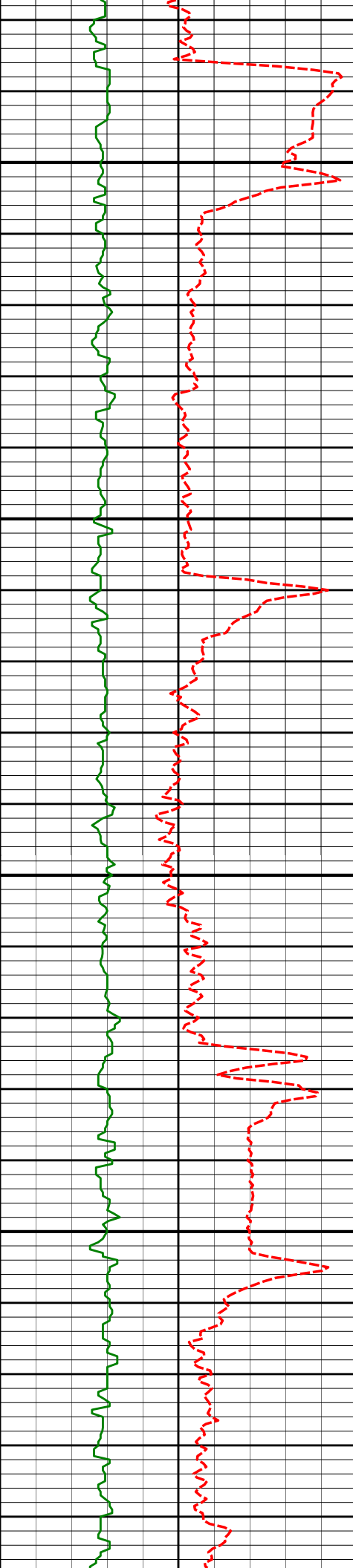
8726'

89.32°

180.85°

7551.36'

544.13'



8800

8821'

90.18°

181.60°

7551.77'

639.12'

8850

8900

8916'

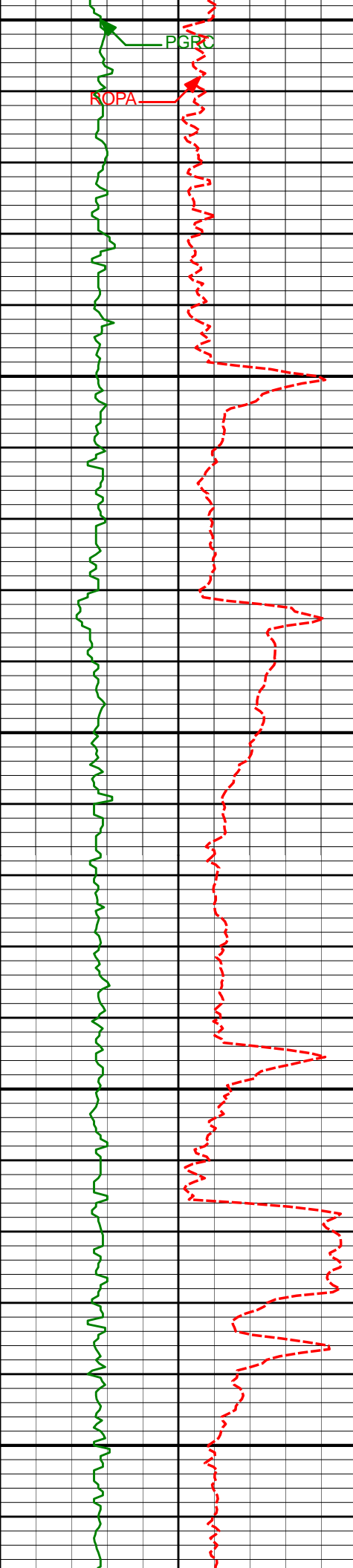
90.28°

181.00°

7551.39'

734.11'

8950



9000

PGRC

ROPA

9011'

90.25°

180.92°

7550.95'

829.09'

9050

9100

9106'

89.69°

180.09°

7551.00'

924.06'

9150

9200

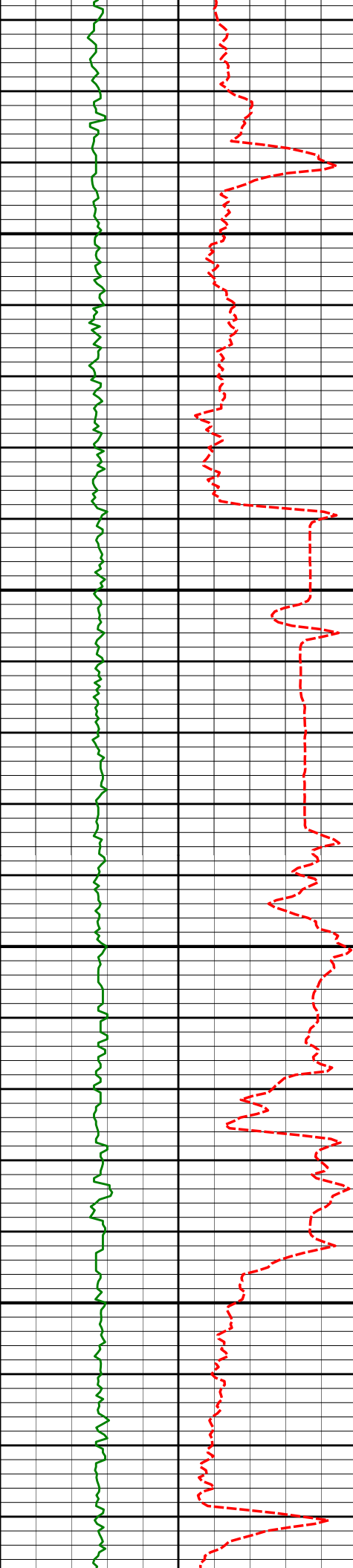
9202'

90.06°

179.42°

7551.21'

1019.98'



9250

9300

9350

9400

9297'

88.83°

177.89°

7552.13'

1114.81'

9392'

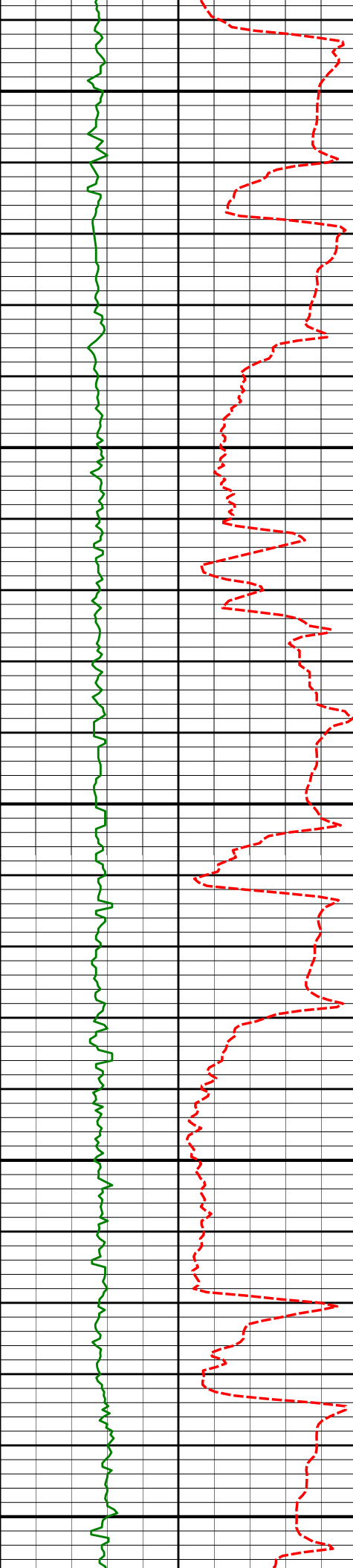
90.12°

178.86°

7553.00'

1209.61'





9450

9487'

88.71°

180.20°

7553.97'

1304.52'

9500

9550

9600

9650

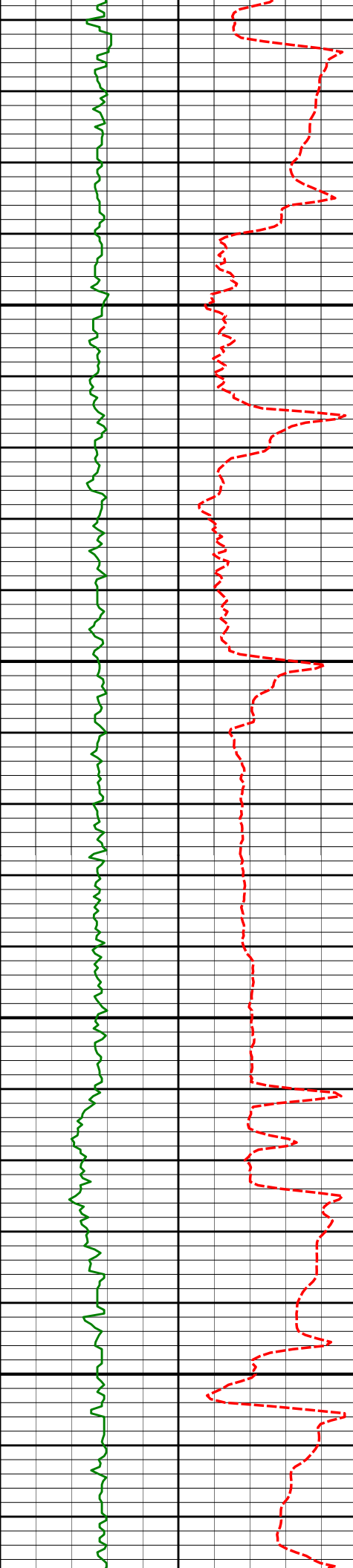
9583'

88.46°

180.63°

7556.34'

1400.45'



9700

9750

9800

9850

9678'

90.22°

181.98°

7557.44'

1495.43'

9773'

89.20°

180.41°

7557.92'

1590.42'

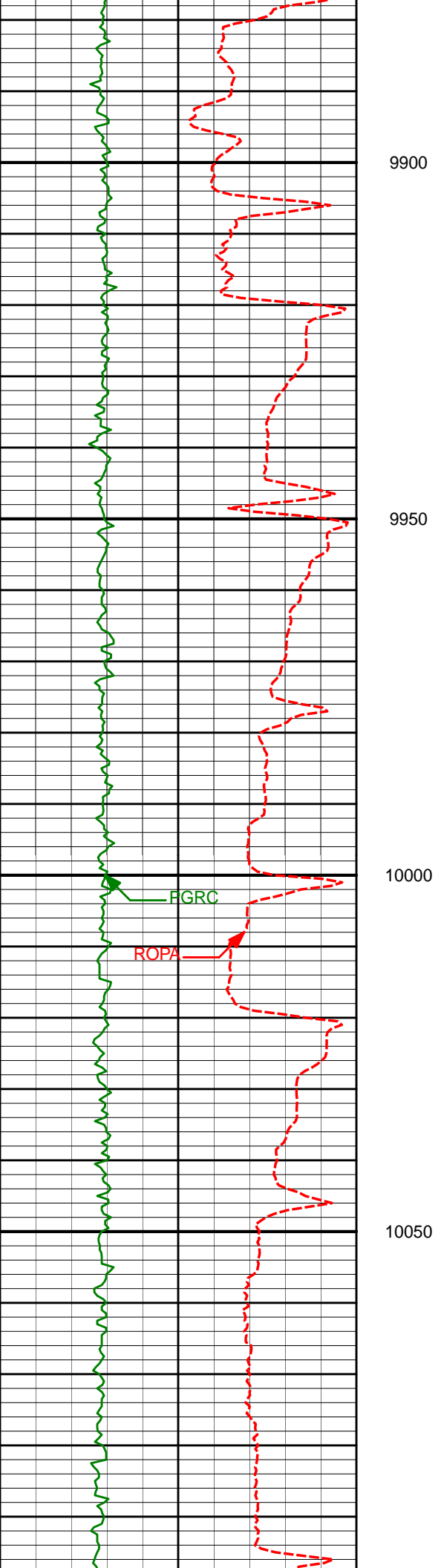
9868'

88.21°

180.11°

7560.07'

1685.35'



9963'

90.28°

182.11°

7561.32'

1780.32'

10000

FGRC

ROPA

10050

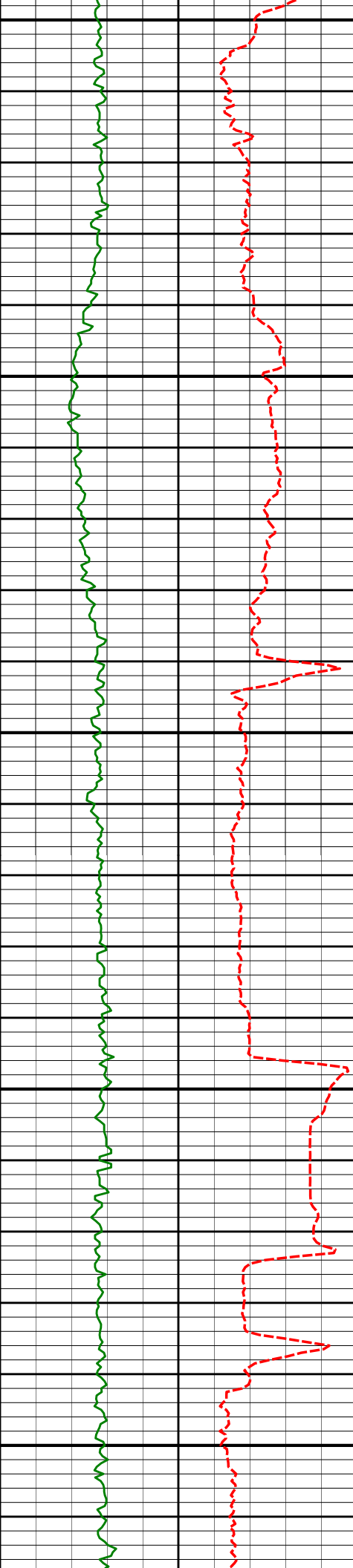
10058'

92.53°

182.77°

7558.99'

1875.28'



10100

10150

10200

10250

10300

10153'

90.89°

181.69°

7556.15'

1970.23'

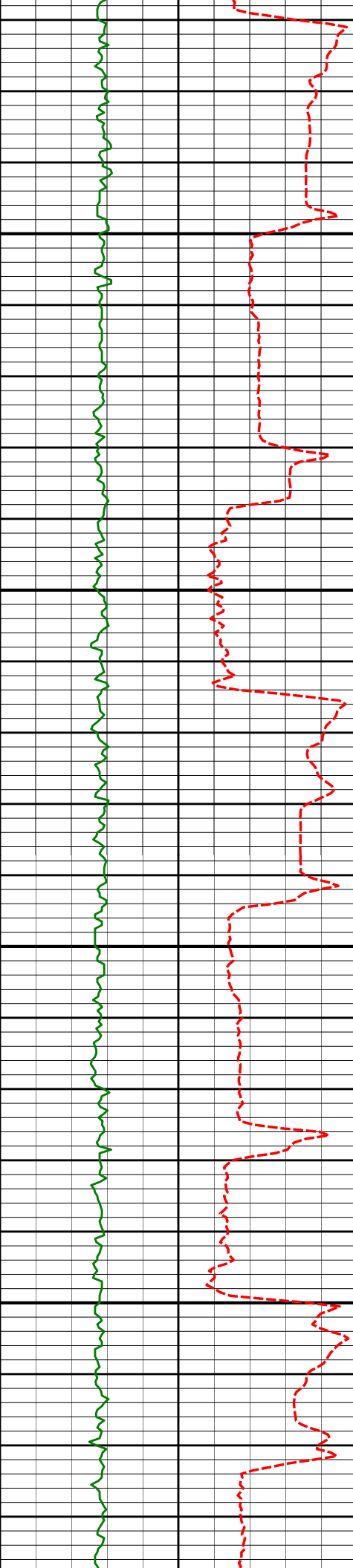
10280'

88.95°

180.54°

7556.33'

2097.21'



10350

10375'

90.65°

181.66°

7556.66'

2192.19'

10400

10439'

90.55°

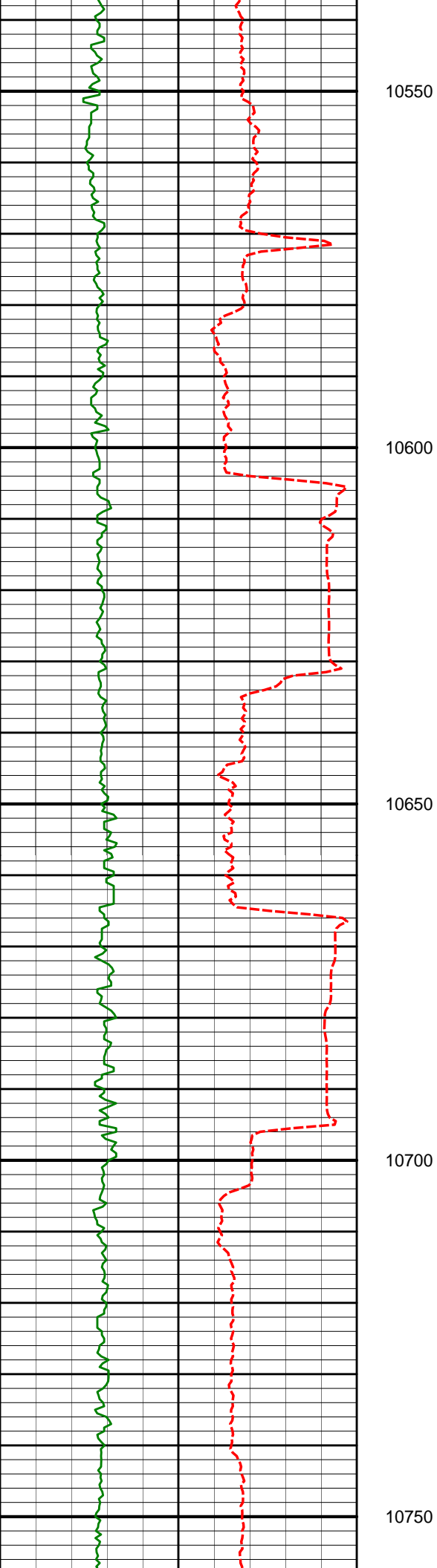
182.64°

7555.99'

2256.19'

10450

10500



10566'

88.43°

180.55°

7557.12'

2383.16'

10629'

89.11°

181.03°

7558.48'

2446.13'

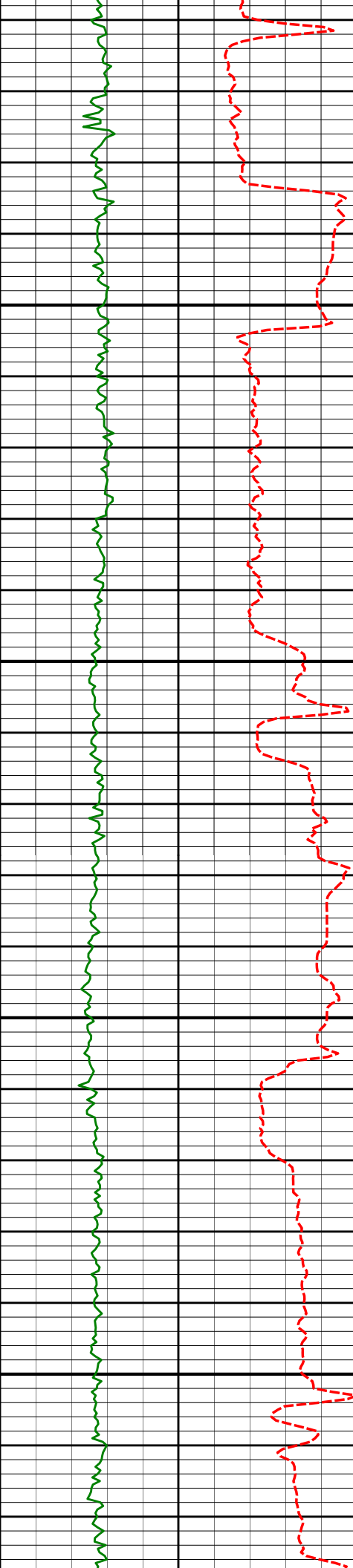
10724'

91.14°

182.10°

7558.27'

2541.12'



10800

10850

10900

10950

10819'

90.49°

181.72°

7556.92'

2636.11'

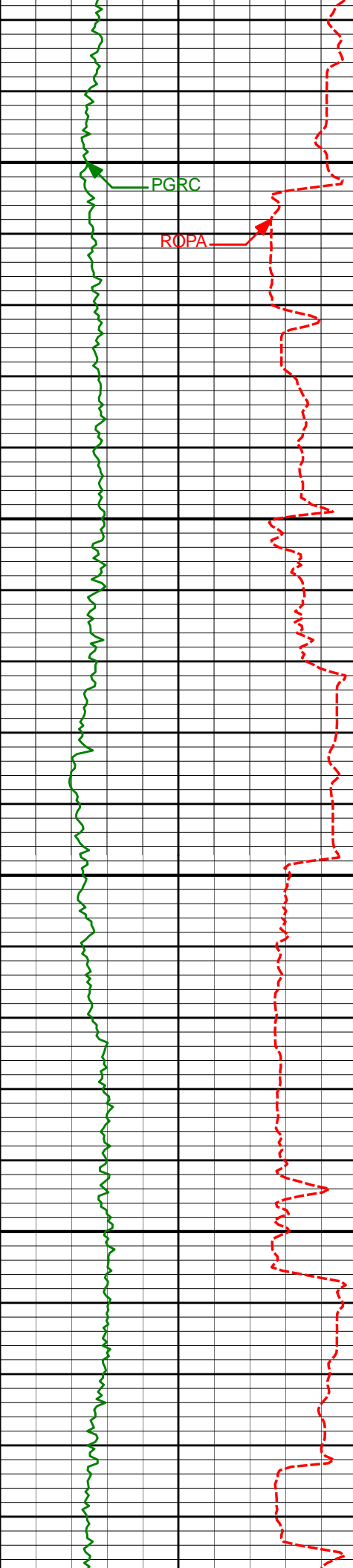
10915'

90.06°

182.27°

7556.46'

2732.11'



11000

PGRC

ROPA

11010'

89.54°

182.38°

7556.79'

2827.11'

11050

11100

11105'

88.98°

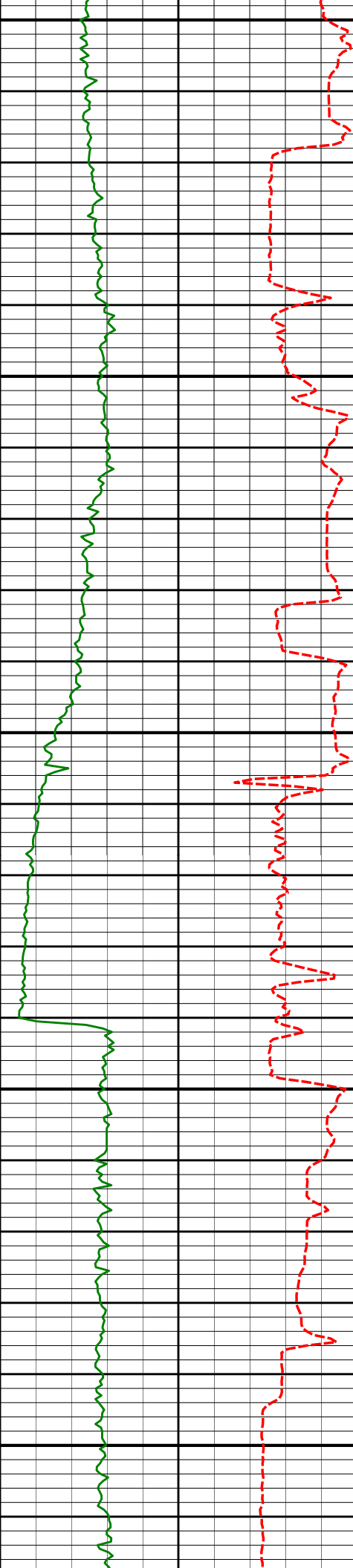
182.34°

7558.02'

2922.10'

11150





11200	11200'	89.78°	182.09°	7559.04'	3017.09'
11250					
11300	11295'	89.26°	181.02°	7559.84'	3112.08'
11350					
11400	11390'	91.02°	182.11°	7559.61'	3207.08'



11450

11500

11550

11600

11486'

91.05°

181.95°

7557.87'

3303.06'

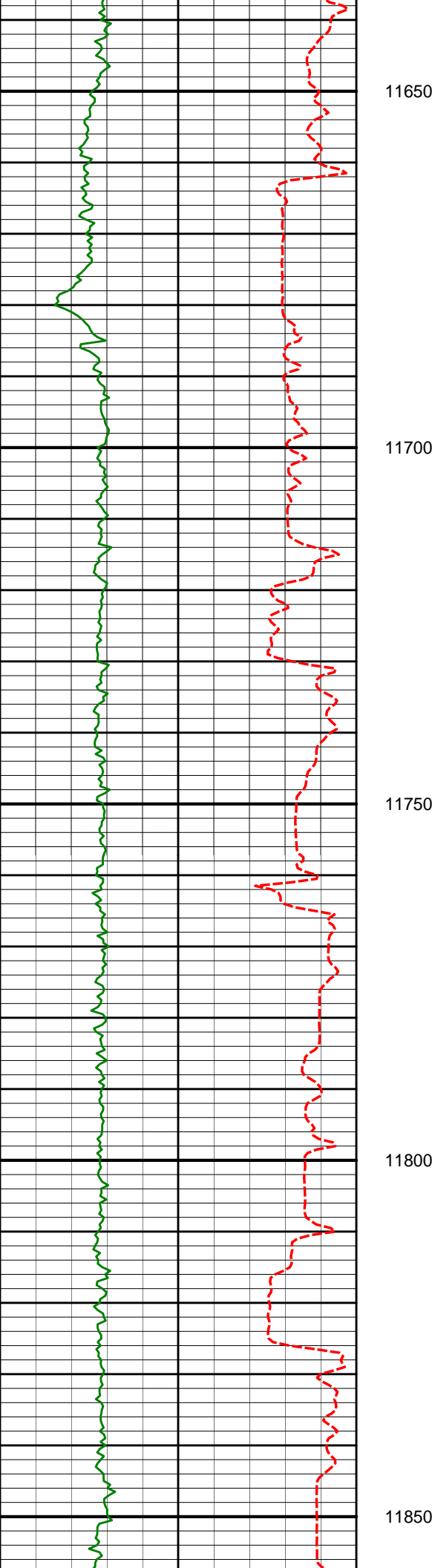
11581'

89.05°

180.50°

7557.79'

3398.05'



11650

11700

11750

11800

11850

11676'

88.12°

180.74°

7560.14'

3492.99'

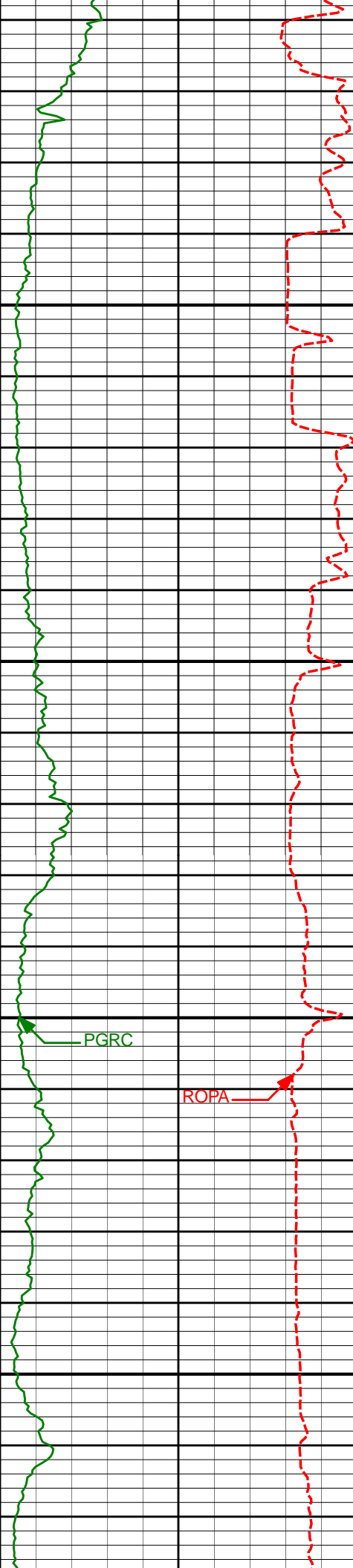
11771'

89.01°

180.34°

7562.52'

3587.93'



11900

11950

12000

12050

11866'

90.28°

181.70°

7563.10'

3682.91'

11961'

91.05°

183.36°

7562.00'

3777.89'

12056'

91.79°

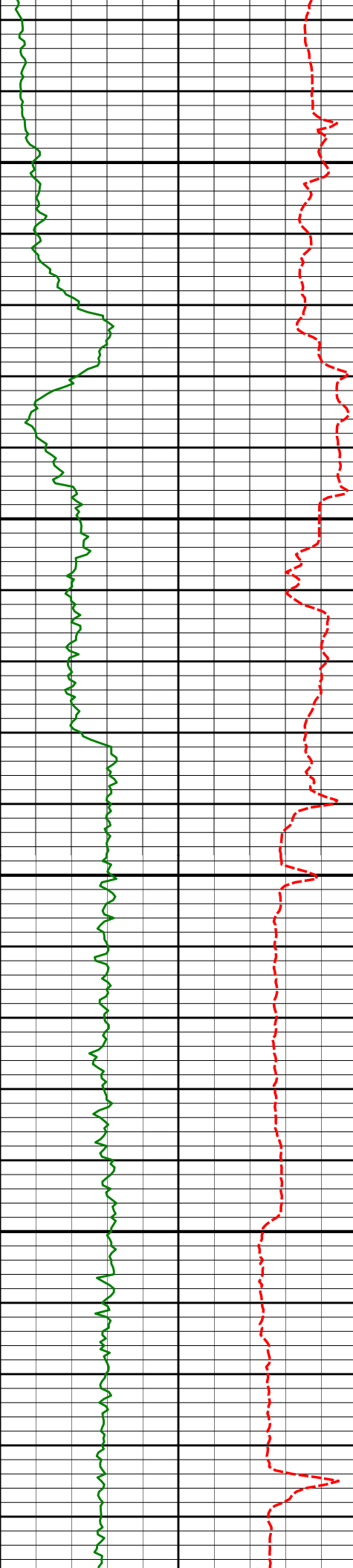
183.86°

7559.65'

3872.82'

PGRC

ROPA



12100

12150

12200

12250

12151'

91.42°

184.32°

7556.99'

3967.72'

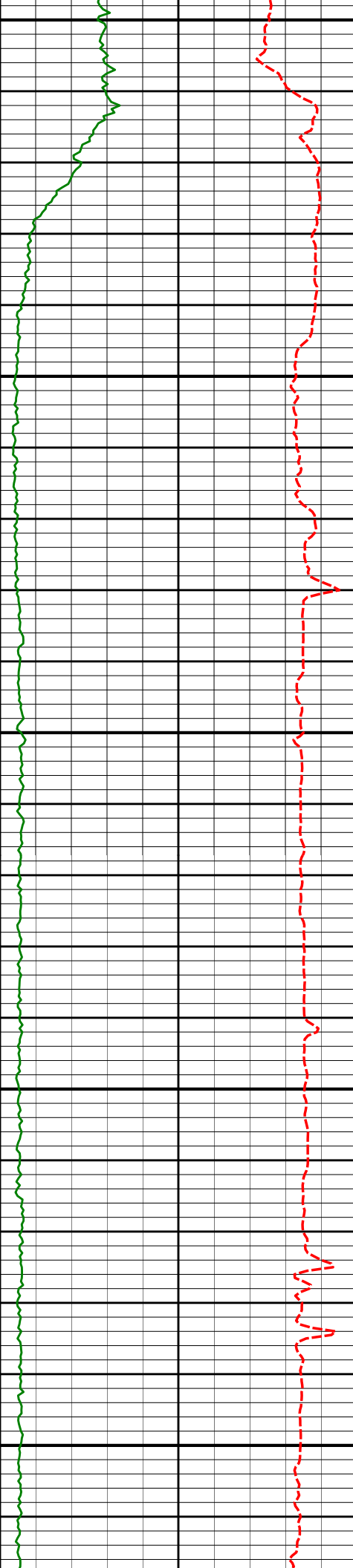
12246'

90.74°

183.80°

7555.20'

4062.64'



12300

12350

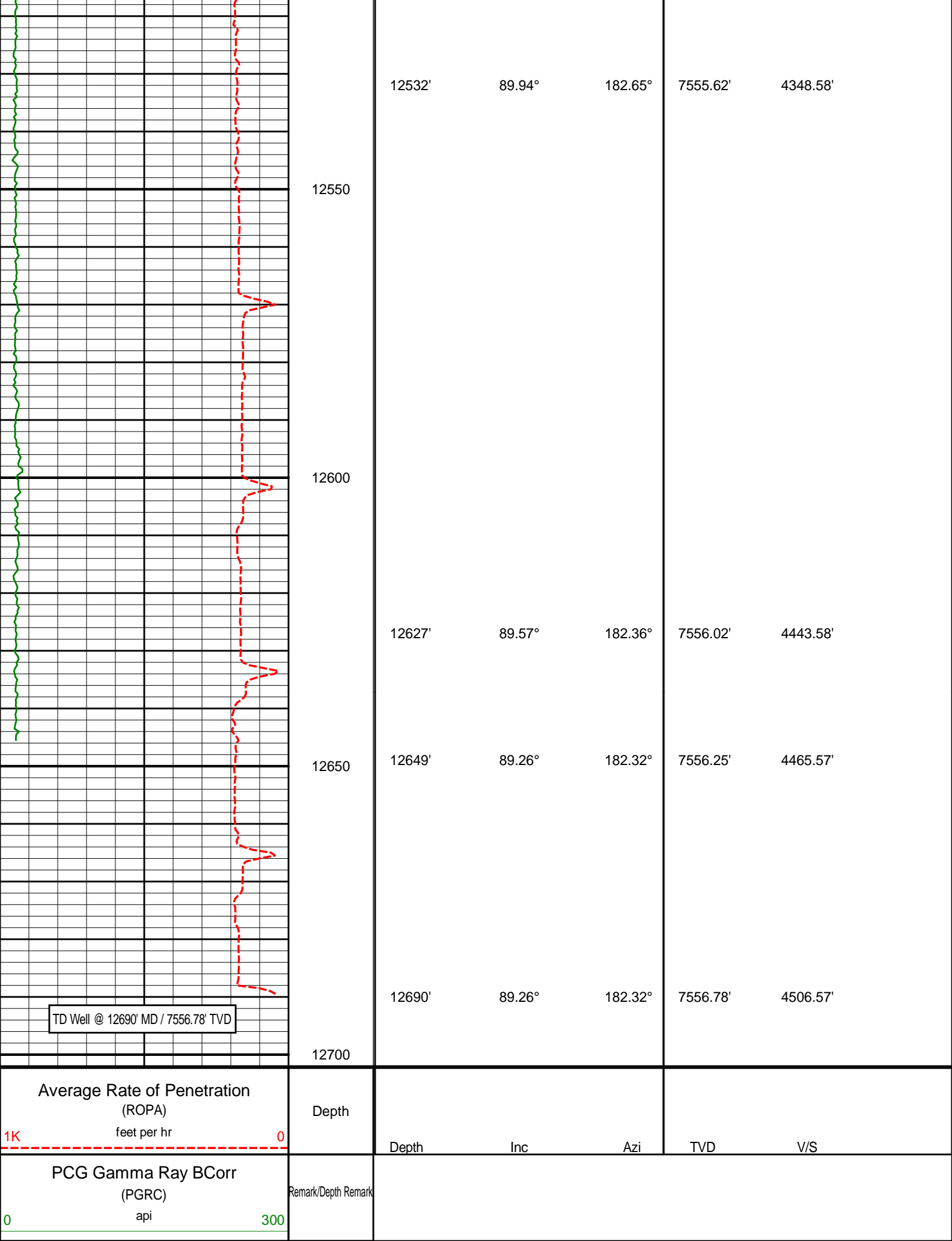
12400

12450

12500

12341'	89.78°	183.00°	7554.77'	4157.61'
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12437'	89.63°	183.17°	7555.26'	4253.59'
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# HALLIBURTON

## DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation  
Highway 160 15C-2HZ  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900754412

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
1148.00	0.25	267.43	1147.98	4.92 N	4.42 W	-4.76	TIE-IN
1476.00	0.13	22.48	1475.98	5.23 N	4.99 W	-5.05	0.10
1572.00	0.19	136.94	1571.98	5.22 N	4.84 W	-5.04	0.28
1666.00	2.33	319.37	1665.95	6.55 N	5.98 W	-6.34	2.68
1760.00	3.71	319.39	1759.82	10.31 N	9.20 W	-9.98	1.47
1855.00	7.01	324.18	1854.39	17.35 N	14.60 W	-16.83	3.50
1949.00	8.97	327.57	1947.48	28.18 N	21.89 W	-27.40	2.14
2043.00	11.33	325.84	2040.00	42.01 N	31.00 W	-40.91	2.53
2135.00	12.81	321.33	2129.97	57.45 N	42.45 W	-55.94	1.91
2230.00	14.24	313.78	2222.34	73.76 N	57.47 W	-71.71	2.39
2324.00	14.99	310.91	2313.29	89.72 N	75.00 W	-87.05	1.11
2418.00	13.16	310.80	2404.47	104.68 N	92.29 W	-101.39	1.95
2512.00	12.58	311.22	2496.11	118.42 N	108.09 W	-114.57	0.62
2606.00	11.84	311.27	2587.98	131.52 N	123.04 W	-127.15	0.79
2700.00	13.76	311.85	2679.64	145.34 N	138.62 W	-140.42	2.05
2794.00	13.05	310.35	2771.08	159.67 N	155.03 W	-154.17	0.84
2888.00	14.01	310.86	2862.47	173.99 N	171.73 W	-167.89	1.03
2982.00	13.15	308.96	2953.84	188.16 N	188.65 W	-181.46	1.03
3076.00	14.56	309.55	3045.10	202.40 N	206.07 W	-195.09	1.51
3171.00	14.32	308.98	3137.10	217.40 N	224.41 W	-209.43	0.29
3265.00	14.16	308.69	3228.21	231.90 N	242.43 W	-223.30	0.19
3359.00	13.83	307.49	3319.42	245.92 N	260.31 W	-236.69	0.47
3454.00	14.21	314.12	3411.60	260.95 N	277.70 W	-251.10	1.74
3549.00	13.54	313.33	3503.83	276.70 N	294.16 W	-266.27	0.73
3644.00	14.27	312.63	3596.04	292.26 N	310.86 W	-281.23	0.79
3739.00	13.35	310.13	3688.30	307.26 N	327.86 W	-295.63	1.15
3835.00	13.82	317.44	3781.62	322.85 N	344.09 W	-310.65	1.85
3930.00	12.96	315.31	3874.03	338.78 N	359.26 W	-326.04	1.04
4025.00	13.82	317.46	3966.45	354.72 N	374.42 W	-341.43	1.05
4120.00	12.83	317.54	4058.89	370.86 N	389.21 W	-357.05	1.04
4215.00	14.48	317.34	4151.20	387.37 N	404.38 W	-373.03	1.74
4311.00	13.34	317.68	4244.39	404.39 N	419.97 W	-389.49	1.19
4419.00	14.66	313.02	4349.18	422.93 N	438.36 W	-407.37	1.61
4501.00	14.71	313.24	4428.50	437.14 N	453.53 W	-421.05	0.09
4596.00	13.55	312.68	4520.63	452.95 N	470.49 W	-436.25	1.23
4691.00	14.24	309.51	4612.85	467.93 N	487.69 W	-450.62	1.08
4786.00	13.69	309.16	4705.04	482.46 N	505.42 W	-464.53	0.59
4881.00	14.59	309.66	4797.16	497.19 N	523.35 W	-478.63	0.96
4976.00	13.16	311.75	4889.39	512.03 N	540.63 W	-492.85	1.59
5071.00	14.65	310.80	4981.60	527.08 N	557.79 W	-507.30	1.59
5167.00	13.32	309.26	5074.75	542.02 N	575.55 W	-521.60	1.44
5262.00	13.74	308.40	5167.12	555.95 N	592.86 W	-534.92	0.49
5357.00	14.23	309.16	5259.30	570.33 N	610.76 W	-548.67	0.55
5452.00	12.93	308.08	5351.64	584.26 N	628.18 W	-561.98	1.39
5547.00	13.98	308.35	5444.03	597.94 N	645.55 W	-575.04	1.11
5642.00	14.65	309.79	5536.08	612.74 N	663.78 W	-589.21	0.80
5738.00	12.22	308.10	5629.45	626.78 N	681.10 W	-602.63	2.56
5833.00	13.29	305.44	5722.10	639.32 N	697.91 W	-614.57	1.28
5928.00	13.19	311.21	5814.58	652.79 N	714.96 W	-627.44	1.39
6022.00	13.53	312.78	5906.04	667.33 N	731.10 W	-641.41	0.53
6117.00	13.27	312.65	5998.45	682.26 N	747.28 W	-655.77	0.28
6212.00	14.04	314.21	6090.77	697.68 N	763.56 W	-670.61	0.90
6307.00	12.16	311.57	6183.29	712.36 N	779.30 W	-684.73	2.08
6402.00	12.40	316.53	6276.12	726.40 N	793.81 W	-698.26	1.14
6497.00	10.32	315.60	6369.26	739.89 N	806.78 W	-711.28	2.20



6592.00	8.70	315.55	6462.95	751.09 N	817.76 W	-722.10	1.71
6687.00	6.63	316.57	6557.09	760.21 N	826.57 W	-730.90	2.18
6782.00	4.25	325.59	6651.66	767.10 N	832.33 W	-737.58	2.65
6878.00	2.22	342.74	6747.50	771.81 N	834.89 W	-742.20	2.32
6973.00	0.59	51.94	6842.48	773.87 N	835.05 W	-744.25	2.19
7068.00	0.37	15.71	6937.47	774.46 N	834.58 W	-744.86	0.38
7116.00	3.00	195.80	6985.45	773.40 N	834.88 W	-743.79	7.02
7163.00	6.94	185.90	7032.27	769.39 N	835.51 W	-739.77	8.55
7211.00	11.30	183.62	7079.65	761.81 N	836.10 W	-732.17	9.11
7258.00	16.34	179.37	7125.28	750.60 N	836.32 W	-720.95	10.93
7306.00	20.68	181.53	7170.78	735.37 N	836.48 W	-705.73	9.15
7353.00	24.45	181.41	7214.18	717.34 N	836.94 W	-687.69	8.02
7401.00	27.52	180.78	7257.32	696.32 N	837.33 W	-666.67	6.42
7448.00	30.79	179.39	7298.36	673.42 N	837.35 W	-643.79	7.10
7496.00	34.13	179.30	7338.85	647.67 N	837.06 W	-618.06	6.96
7543.00	39.57	178.82	7376.45	619.49 N	836.59 W	-589.92	11.59
7591.00	46.94	180.73	7411.39	586.63 N	836.49 W	-557.08	15.59
7638.00	53.77	182.56	7441.36	550.48 N	837.56 W	-520.91	14.84
7686.00	59.75	182.49	7467.66	510.39 N	839.33 W	-480.79	12.46
7733.00	65.35	181.44	7489.31	468.72 N	840.75 W	-439.09	12.08
7781.00	69.14	183.53	7507.88	424.51 N	842.68 W	-394.84	8.86
7829.00	73.76	184.62	7523.15	379.13 N	845.92 W	-349.38	9.86
7877.00	79.00	185.21	7534.44	332.67 N	849.92 W	-302.81	10.98
7924.00	82.81	186.26	7541.87	286.50 N	854.55 W	-256.51	8.40
7955.00	85.53	186.26	7545.02	255.85 N	857.92 W	-225.75	8.77
7987.00	88.00	186.31	7546.83	224.10 N	861.41 W	-193.90	7.72
8060.00	90.89	186.30	7547.53	151.55 N	869.43 W	-121.11	3.96
8155.00	90.49	186.17	7546.39	57.12 N	879.75 W	-26.38	0.44
8250.00	90.34	185.65	7545.70	37.37 S	889.53 W	68.40	0.57
8345.00	90.00	184.86	7545.42	131.97 S	898.23 W	163.24	0.91
8440.00	88.74	182.67	7546.46	226.76 S	904.47 W	258.18	2.66
8536.00	88.86	181.94	7548.48	322.66 S	908.33 W	354.16	0.77
8631.00	89.17	181.59	7550.11	417.60 S	911.25 W	449.14	0.49
8726.00	89.32	180.85	7551.36	512.57 S	913.27 W	544.13	0.79
8821.00	90.18	181.60	7551.77	607.54 S	915.30 W	639.12	1.20
8916.00	90.28	181.00	7551.39	702.52 S	917.46 W	734.11	0.64
9011.00	90.25	180.92	7550.95	797.50 S	919.05 W	829.09	0.09
9106.00	89.69	180.09	7551.00	892.50 S	919.89 W	924.06	1.05
9202.00	90.06	179.42	7551.21	988.50 S	919.48 W	1019.98	0.80
9297.00	88.83	177.89	7552.13	1083.46 S	917.25 W	1114.81	2.07
9392.00	90.12	178.86	7553.00	1178.41 S	914.55 W	1209.61	1.70
9487.00	88.71	180.20	7553.97	1273.40 S	913.78 W	1304.52	2.05
9583.00	88.46	180.63	7556.34	1369.37 S	914.47 W	1400.45	0.52
9678.00	90.22	181.98	7557.44	1464.33 S	916.63 W	1495.43	2.33
9773.00	89.20	180.41	7557.92	1559.31 S	918.62 W	1590.42	1.97
9868.00	88.21	180.11	7560.07	1654.28 S	919.05 W	1685.35	1.09
9963.00	90.28	182.11	7561.32	1749.24 S	920.89 W	1780.32	3.03
10058.00	92.53	182.77	7558.99	1844.12 S	924.93 W	1875.28	2.47
10153.00	90.89	181.69	7556.15	1939.00 S	928.62 W	1970.23	2.07
10280.00	88.95	180.54	7556.33	2065.97 S	931.09 W	2097.21	1.78
10375.00	90.65	181.66	7556.66	2160.95 S	932.92 W	2192.19	2.14
10439.00	90.55	182.64	7555.99	2224.90 S	935.32 W	2256.19	1.54
10566.00	88.43	180.55	7557.12	2351.83 S	938.85 W	2383.16	2.34
10629.00	89.11	181.03	7558.48	2414.81 S	939.72 W	2446.13	1.32
10724.00	91.14	182.10	7558.27	2509.77 S	942.32 W	2541.12	2.42
10819.00	90.49	181.72	7556.92	2604.70 S	945.48 W	2636.11	0.79
10915.00	90.06	182.27	7556.46	2700.64 S	948.82 W	2732.11	0.73
11010.00	89.54	182.38	7556.79	2795.57 S	952.68 W	2827.11	0.56
11105.00	88.98	182.34	7558.02	2890.48 S	956.59 W	2922.10	0.59
11200.00	89.78	182.09	7559.04	2985.40 S	960.26 W	3017.09	0.88
11295.00	89.26	181.02	7559.84	3080.36 S	962.84 W	3112.08	1.25
11390.00	91.02	182.11	7559.61	3175.32 S	965.43 W	3207.08	2.18
11486.00	91.05	181.95	7557.87	3271.24 S	968.83 W	3303.06	0.17
11581.00	89.05	180.50	7557.79	3366.21 S	970.86 W	3398.05	2.60
11676.00	88.12	180.74	7560.14	3461.18 S	971.89 W	3492.99	1.01
11771.00	89.01	180.34	7562.52	3556.14 S	972.79 W	3587.93	1.03
11866.00	90.28	181.70	7563.10	3651.12 S	974.48 W	3682.91	1.96
11961.00	91.05	183.36	7562.00	3746.02 S	978.67 W	3777.89	1.93
12056.00	91.79	183.86	7559.65	3840.80 S	984.65 W	3872.82	0.94
12151.00	91.42	184.32	7556.99	3935.52 S	991.42 W	3967.72	0.62
12246.00	90.74	183.80	7555.20	4030.26 S	998.15 W	4062.64	0.90
12341.00	89.78	183.00	7554.77	4125.09 S	1003.78 W	4157.61	1.32
12437.00	89.63	183.17	7555.26	4220.95 S	1008.95 W	4253.59	0.24
12532.00	89.94	182.65	7555.62	4315.83 S	1013.77 W	4348.58	0.64
12627.00	89.57	182.36	7556.02	4410.74 S	1017.92 W	4443.58	0.49

12649.00	89.26	182.32	7556.25	4432.72 S	1018.82 W	4465.57	1.42
12690.00	89.26	182.32	7556.78	4473.68 S	1020.48 W	4506.57	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 182.00 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.53 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12690.00 FEET  
IS 4588.60 FEET ALONG 192.85 DEGREES (TRUE)**

**All directional surveys tied on to the last gyro survey at 1148.00' MD. Final survey is a straight-line projection to the bit.**

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