

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

1 : 240

[illegible]

## WELL INFORMATION

<b>MWD Run Number</b>	100	200	300	400	
<b>Date run completed</b>	08-Feb-14	10-Feb-14	15-Feb-14	18-Feb-14	
<b>Rig Bit Number</b>	0100	0200	0300	0400	
<b>Bit Size (in)</b>	8.750	8.750	6.125	6.125	
<b>Tool Nominal OD (in)</b>	6.750	6.750	4.750	4.750	
<b>Log Start Depth (MD, ft)</b>	1,268.00	5,883.00	7,908.00	11,409.00	
<b>Log End Depth (MD, ft)</b>	5,883.00	7,908.00	11,409.00	11,854.00	
<b>Drill or Wipe</b>	Drill	Drill	Drill	Drill	
<b>Drill/Wipe Start Date and Time</b>	06-Feb-14 10:30	09-Feb-14 05:30	12-Feb-14 10:00	17-Feb-14 12:30	
<b>Drill/Wipe End Date and Time</b>	07-Feb-14 20:30	10-Feb-14 05:21	15-Feb-14 04:30	17-Feb-14 23:00	
<b>Min Inc (deg) @ Depth (MD, ft)</b>	0.28 @ 1,287.00	1.58 @ 6,884.00	87.96 @ 10,142.00	88.21 @ 11,752.00	
<b>Max Inc (deg) @ Depth (MD, ft)</b>	12.09 @ 4,504.00	88.10 @ 7,908.00	92.72 @ 8,619.00	90.92 @ 11,467.00	
<b>Bit TFA(in2) / Bit Type</b>	1.18 / PDC	1.18 / PDC	1.24 / PDC	0.92 / PDC	
<b>Flow Rate (gpm)</b>	586.37	579.29	294.87	250.00	
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
<b>Fluid Type</b>	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud	
<b>Density (ppg) / Viscosity (spqt)</b>	8.40 / 29.00	9.30 / 39.00	10.40 / 41.00	10.57 / 41.00	
<b>Filtrate CL (ppm)</b>	2,200.00	1,350.00	1,300.00	1,400.00	
<b>pH / Fluid Loss (mptm)</b>	8.40 / 17	8.70 / 5	8.70 / 5	9.60 / 1	
<b>PV (cP) / YP (lbf2)</b>	1 / 3.00	11 / 14.00	9 / 40.00	16 / 17.00	
<b>% Solids / % Sand</b>	0.4 / 0.05	5.70 / 0.70	4.30 / 1.10	13.3 / 0.75	
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A	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	N/A @ N/A	
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	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	N/A @ N/A	
<b>Max Tool Temp (degF) / S</b>	148.04 / PGM	170.70 / PGM	200.40 / N/A	200.74 / PGM	

Max Tool Temp (degF) / Source	146.84 / PCM	172.78 / PCM	226.12 / HCIM	228.74 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Matt Busche	Matt Busche	Matt Busche	Matt Busche	
Customer Representative	Sam Taylor	Sam Taylor	Sam Taylor	Sam Taylor	

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	HCIM	PCM	
Software Version	5.84	5.84	88.56	5.76	
Sub Serial Number	11341340	11341340	90390682	1231075	
Insert Serial Number	11227573	11227573	11902877	11227573	
Date and Time Initialized	02-Feb-14 12:48	08-Feb-14 12:45	11-Feb-14 16:55	15-Feb-14 19:20	
Date and Time Read	08-Feb-14 09:36	10-Feb-14 18:21	15-Feb-14 17:18	18-Feb-14 13:10	
ECMB SW Version	N/A	N/A	N/A	N/A	

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	45.08	45.08	41.64	42.58	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11341340	11341340	12310811	1231075	
Sonde Serial Number	11638623	11638623	11833224	11638623	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	40.18	35.95	307.82	71.70	

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	DGR	PCG	
Distance From Bit (ft)	50.03	50.03	63.64	47.49	
Recorded Sample Period (sec)	10	10	8	10	
Software Version	8.15	8.15	N/A	8.15	
Sub Serial Number	11341340	11341340	90390682	1231075	
Insert/Sonde Serial Number	12035849	11293312	262793	11293312	

## REMARKS

1. All depths are measured, 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. Lost depth tracking during this gap.
6. 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

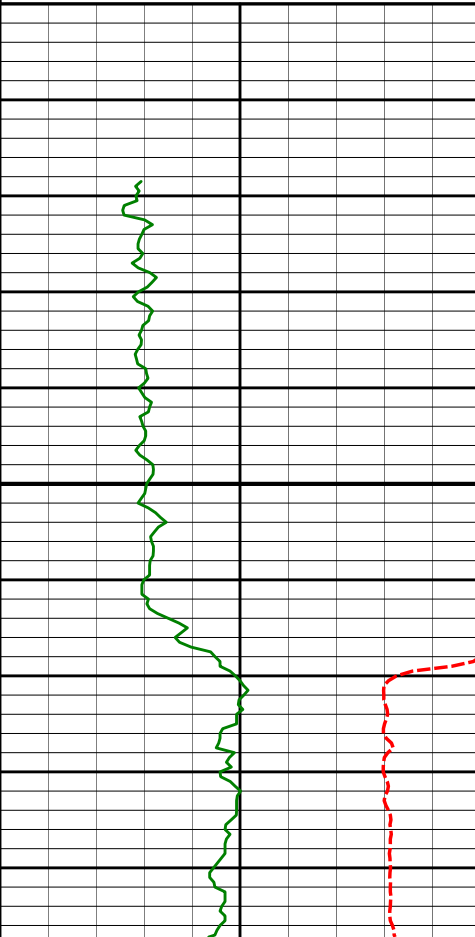
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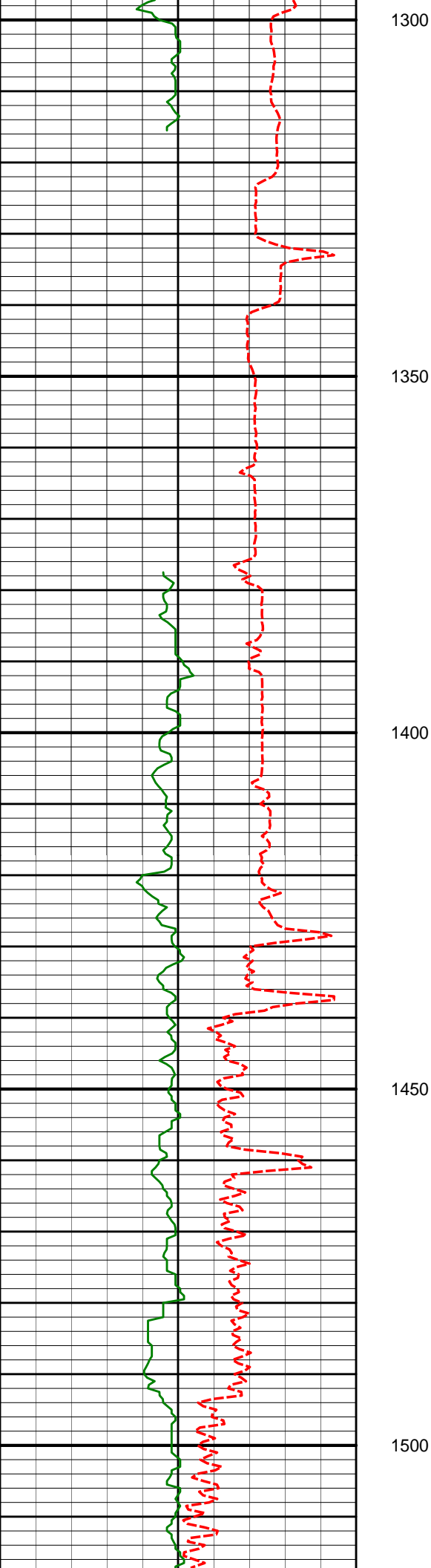
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# HALLIBURTON

# TVD Main Log 1:240

PCG Gamma Ray BCorr (PGRC) api								
0	300							
Average Rate of Penetration (ROPA) feet per hr		Depth						
1K	0	Depth	Inc	Azi	TVD	V/S		
		1200						
		<div>9.625" Casing Shoe @ 1236' MD / 1235.98' TVD</div>						
		1250						
		Run 100						
		1287'	0.28°	16.58°	1286.98'	-2.60'		



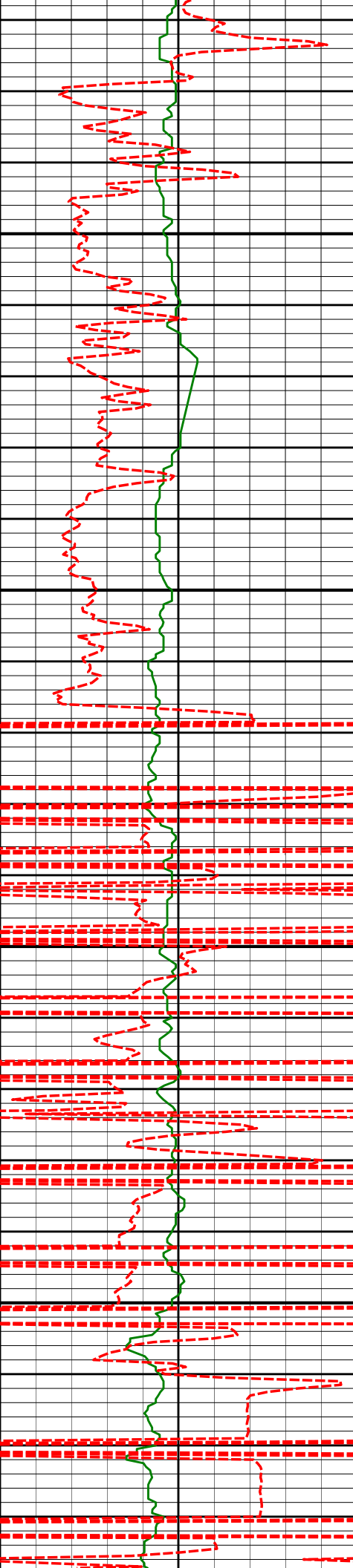
1476'

0.44°

352.89°

1475.98'

-1.44'



1550

1573'

0.52°

349.63°

1572.97'

-0.64'

1600

1650

1669'

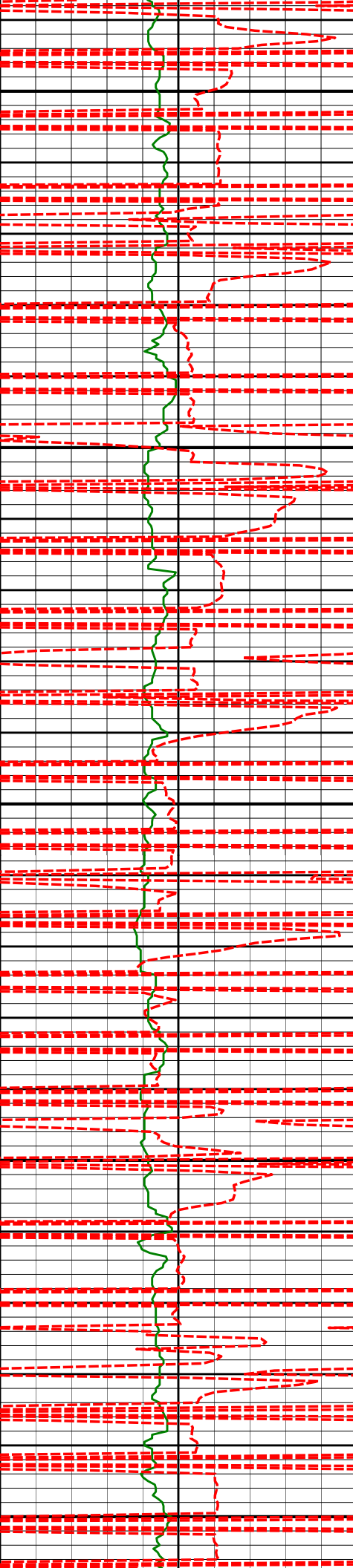
0.59°

354.53°

1668.97'

0.28'

1700



1750

1764'

0.54°

350.33°

1763.96'

1.21'

1800

1850

1859'

0.54°

347.97°

1858.96'

2.09'

1900

1950

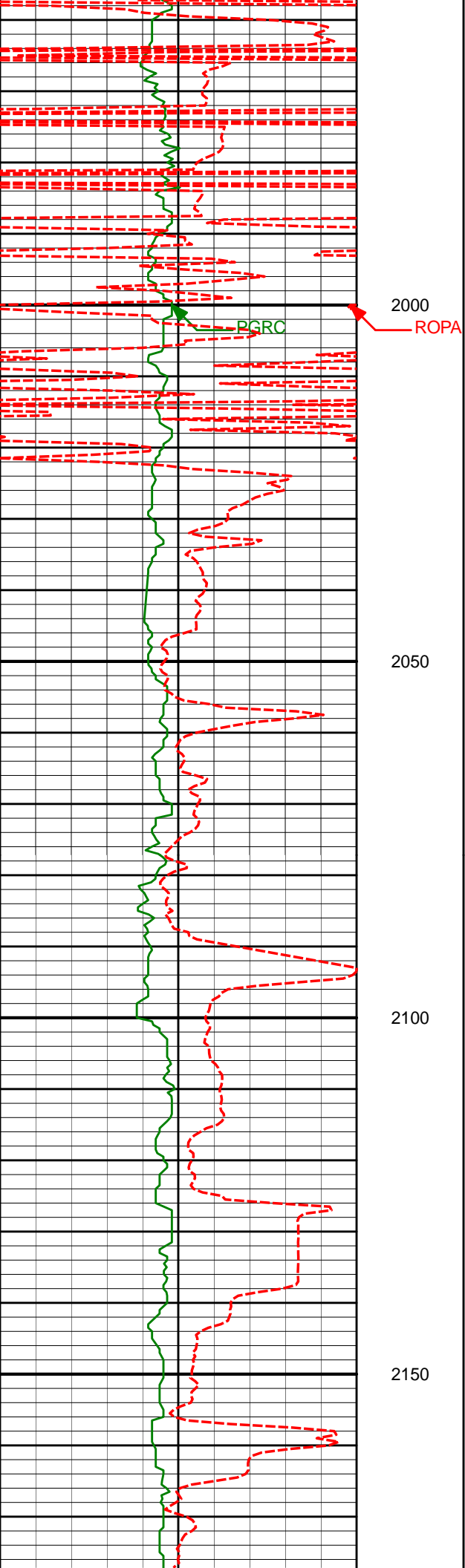
1954'

0.48°

340.39°

1953.96'

2.90'



2050

2049'

0.49°

337.72°

2048.95'

3.65'

2100

2138'

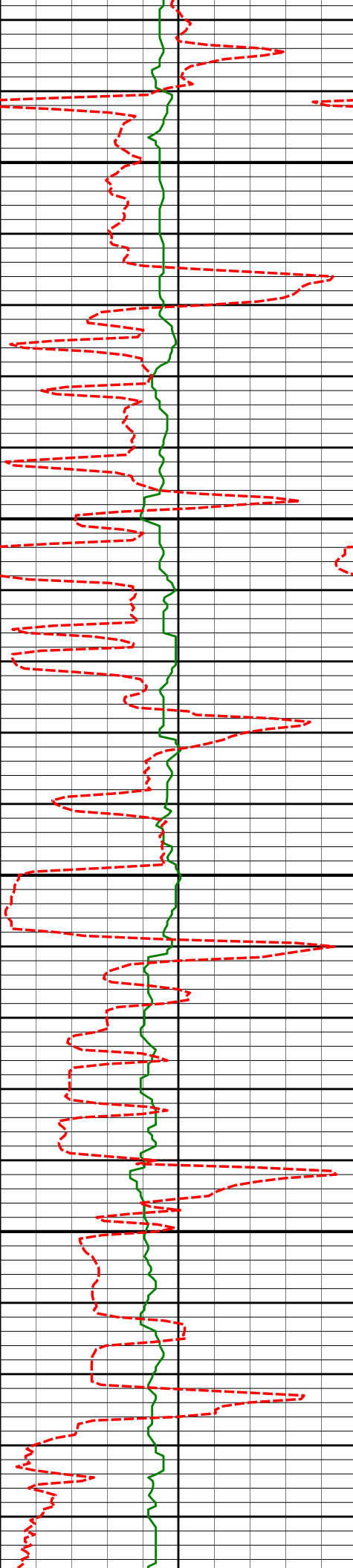
0.58°

335.43°

2137.95'

4.42'

2150



2200

2250

2300

2350

2233'

0.63°

332.23°

2232.94'

5.31'

2327'

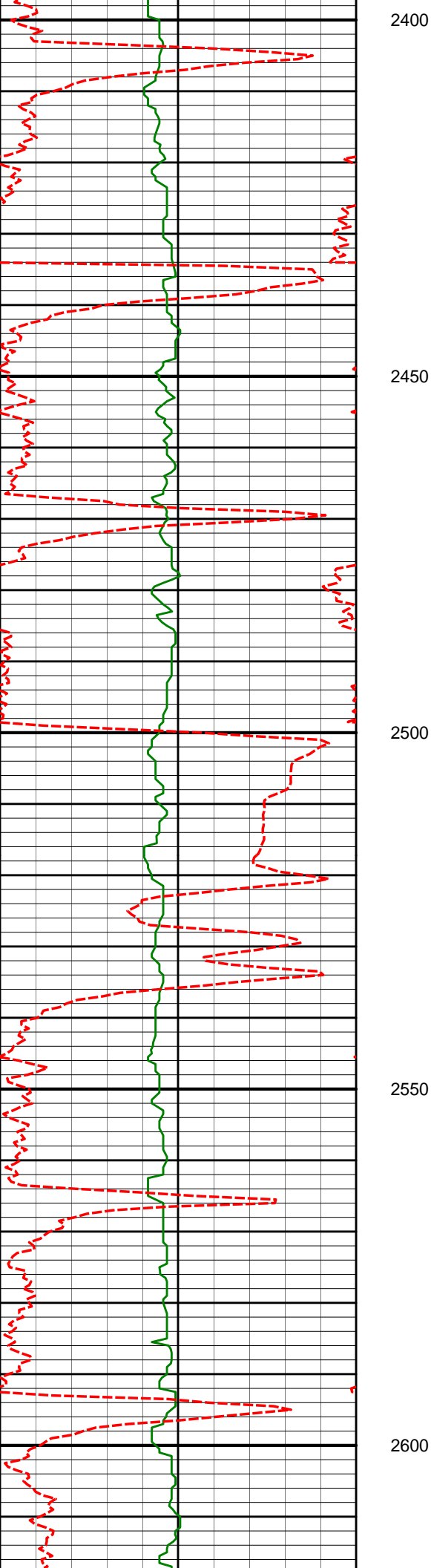
0.64°

345.01°

2326.94'

6.28'





2421'

0.62°

350.77°

2420.93'

7.29'

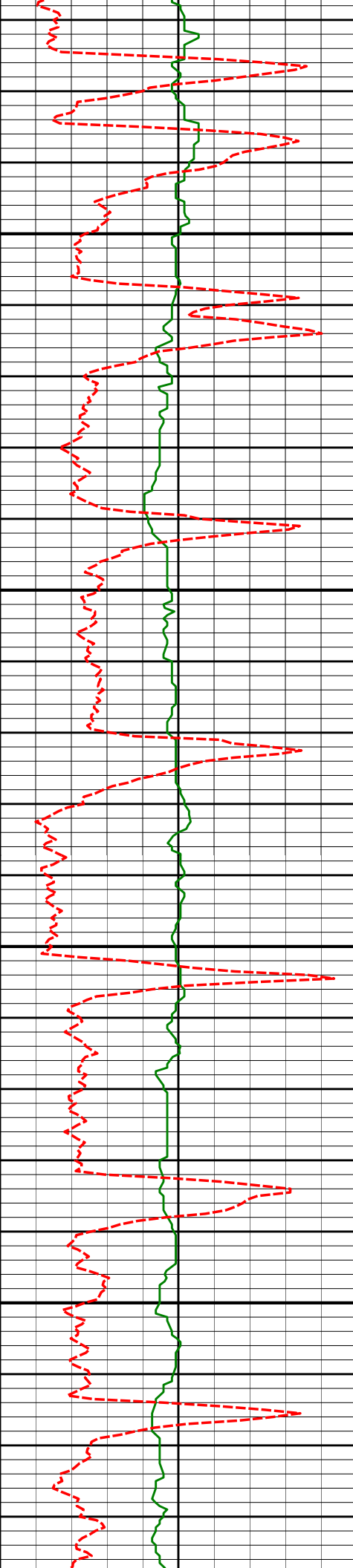
2610'

1.68°

176.00°

2609.91'

5.53'



2650

2700

2750

2800

2704'

1.50°

170.73°

2703.87'

2.94'

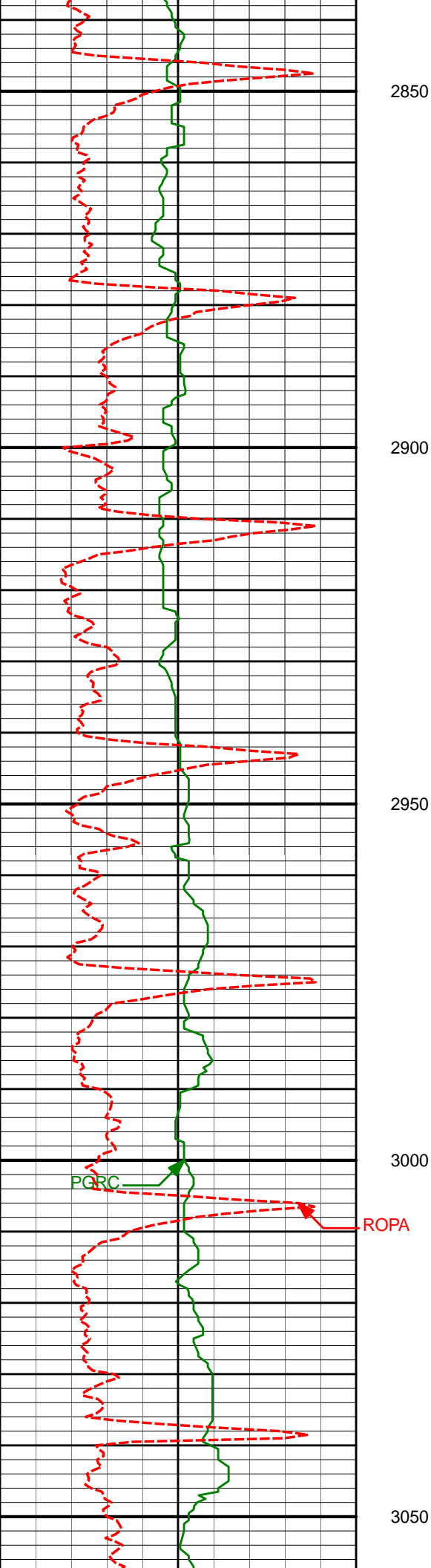
2798'

1.22°

173.24°

2797.85'

0.74'



2891'

1.02°

161.96°

2890.83'

-1.03'

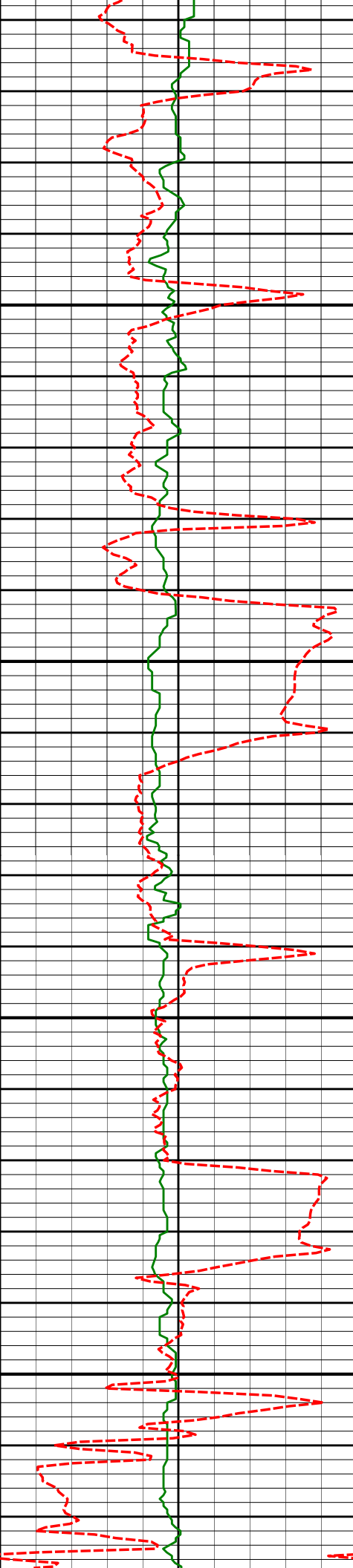
2986'

0.93°

152.24°

2985.82'

-2.52'



3100

3150

3200

3250

3080'

0.83°

149.57°

3079.81'

-3.78'

3174'

2.66°

197.37°

3173.76'

-6.45'

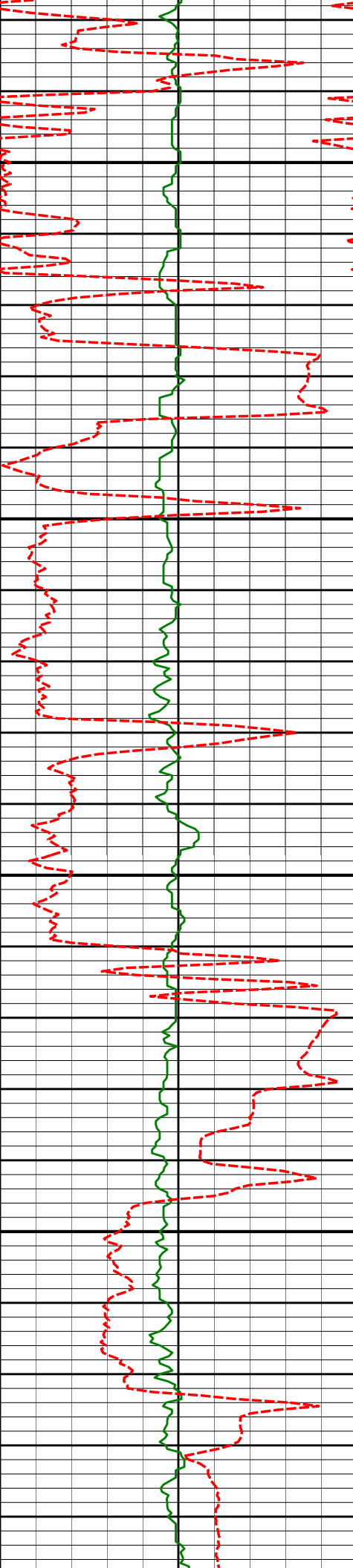
3268'

4.17°

206.96°

3267.59'

-11.58'



3300

3350

3400

3450

3362'

5.07°

206.95°

3361.29'

-18.33'

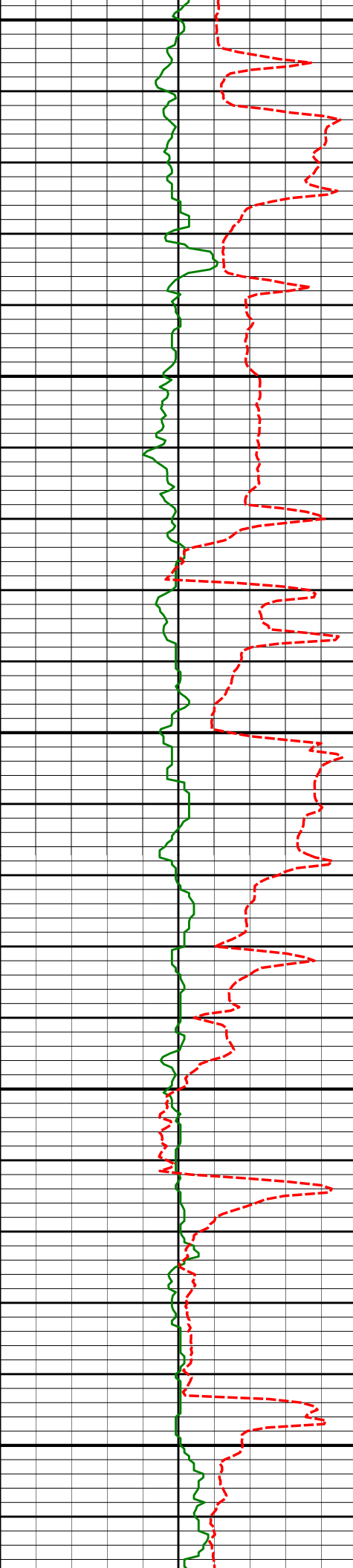
3457'

6.32°

208.22°

3455.82'

-26.68'



3500

3550

3600

3650

3700

3552'

7.37°

206.71°

3550.14'

-36.73'

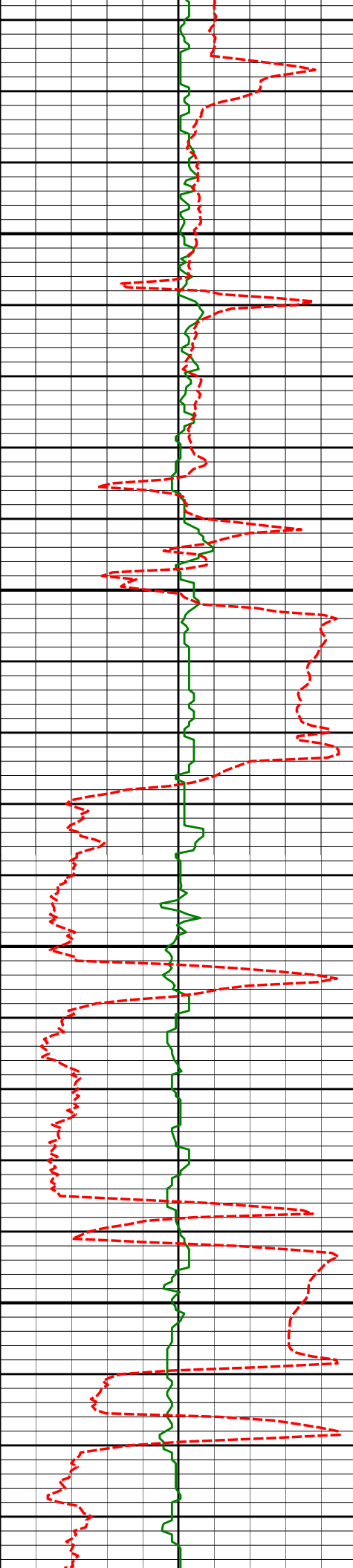
3647'

9.78°

205.43°

3644.07'

-49.46'



3743'

8.88°

200.95°

3738.80'

-63.74'

3838'

9.95°

201.78°

3832.52'

-78.21'

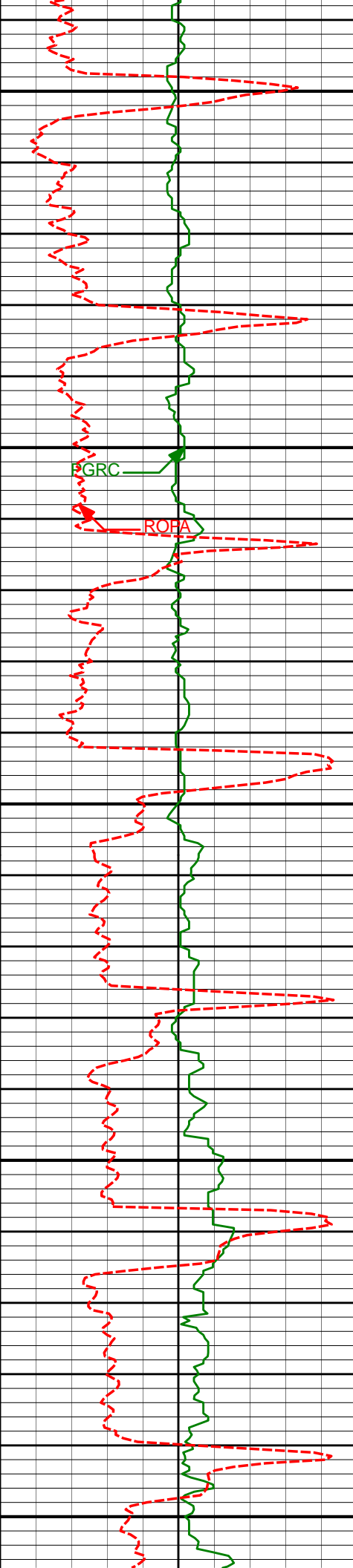
3933'

11.20°

 $204.65^{\circ}$ 

3925.90'

-94.22'



3950

4000

4050

4100

4150

RGRC

ROFA

4028'

10.47°

203.62°

4019.21'

-110.52'

4123'

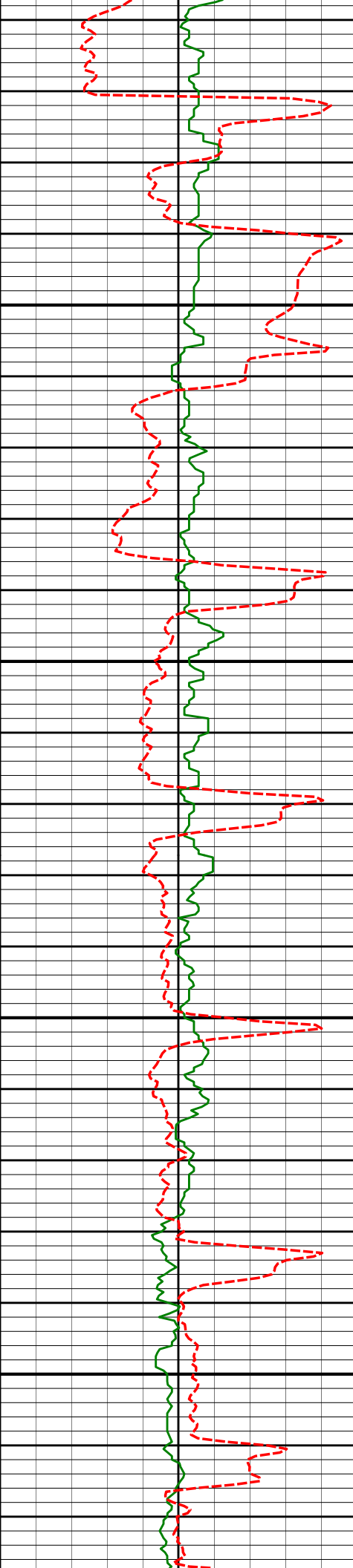
9.08°

201.04°

4112.83'

-125.42'





4200

4250

4300

4350

4219'

10.21°

209.56°

4207.47'

-139.89'

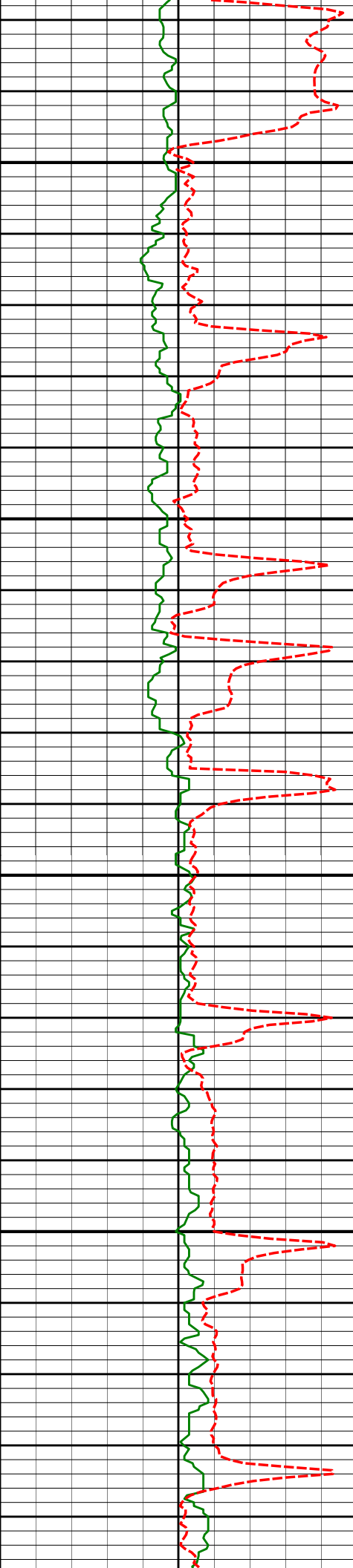
4314'

9.74°

209.29°

4301.04'

-154.23'



4400

4409'

11.99°

202.56°

4394.33'

-170.35'

4450

4500

4504'

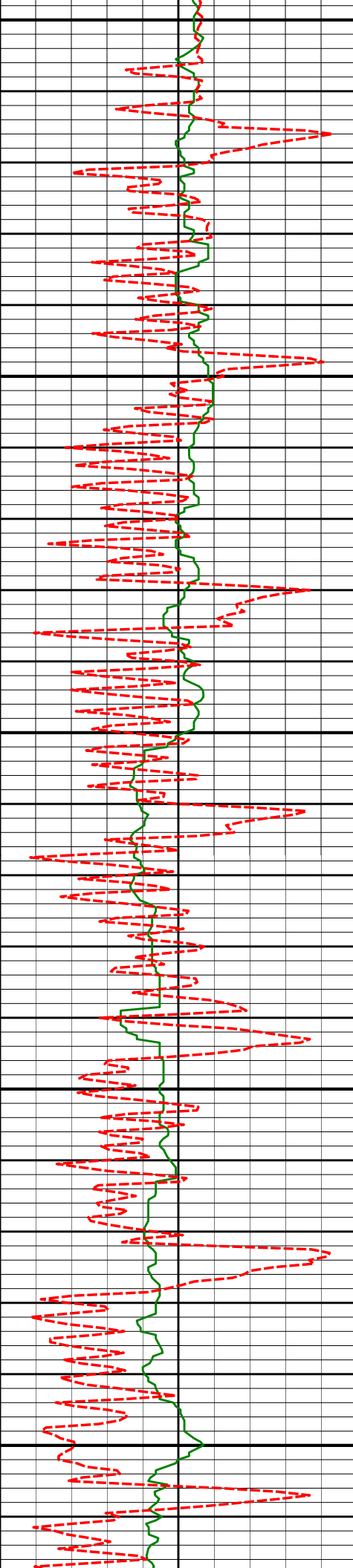
12.09°

201.34°

4487.24'

-188.73'

4550



4600

4650

4700

4750

4800

4599'

4694'

4790'

10.65°

9.41°

8.68°

201.75°

200.60°

199.01°

4580.38'

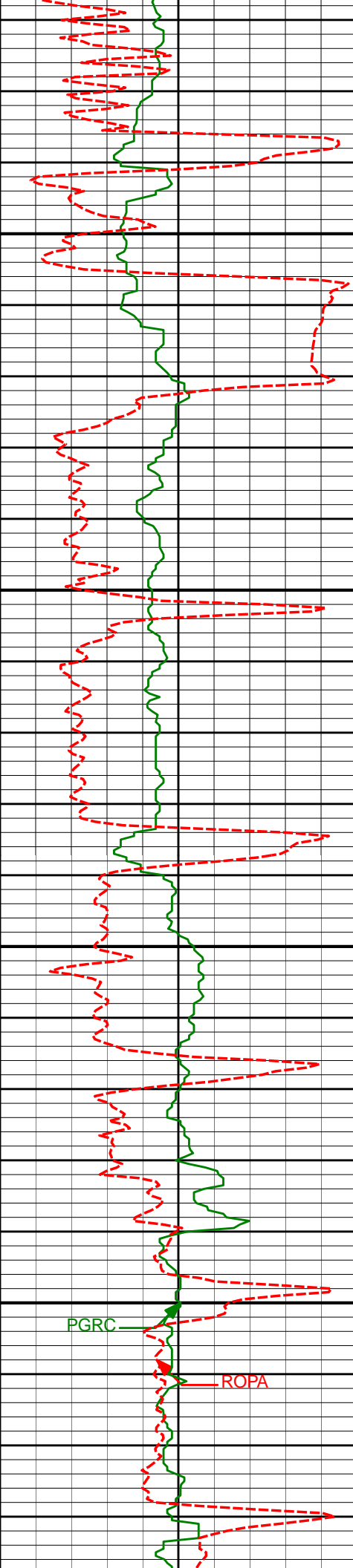
4673.92'

4768.73'

-206.15'

-221.57'

-235.77'



4850

4885'

10.32°

207.38°

4862.43'

-250.10'

4900

4950

4980'

9.50°

205.74°

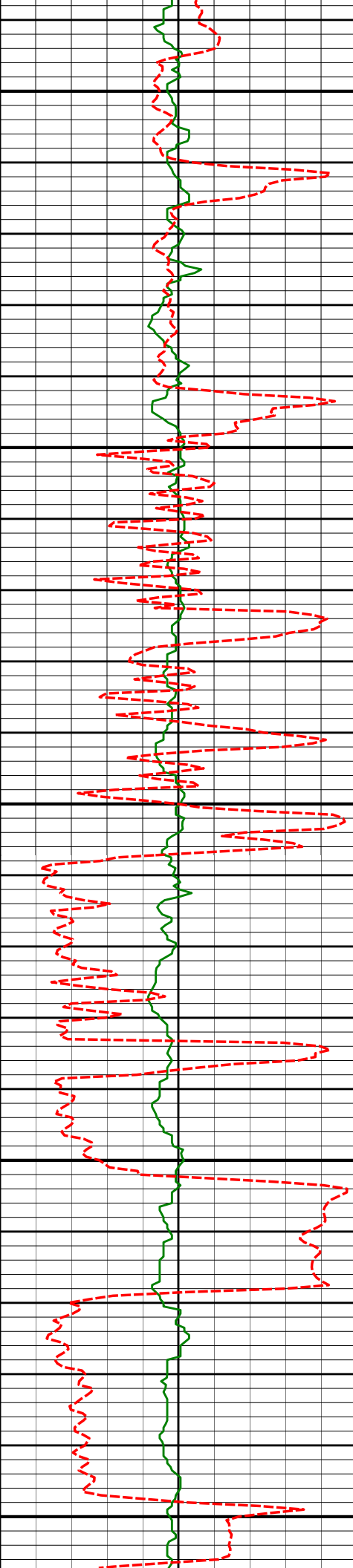
4956.01'

-264.72'

5000

PGRC

ROPA



5050

5075'

9.37°

205.79°

5049.72'

-278.75'

5100

5150

5170'

8.29°

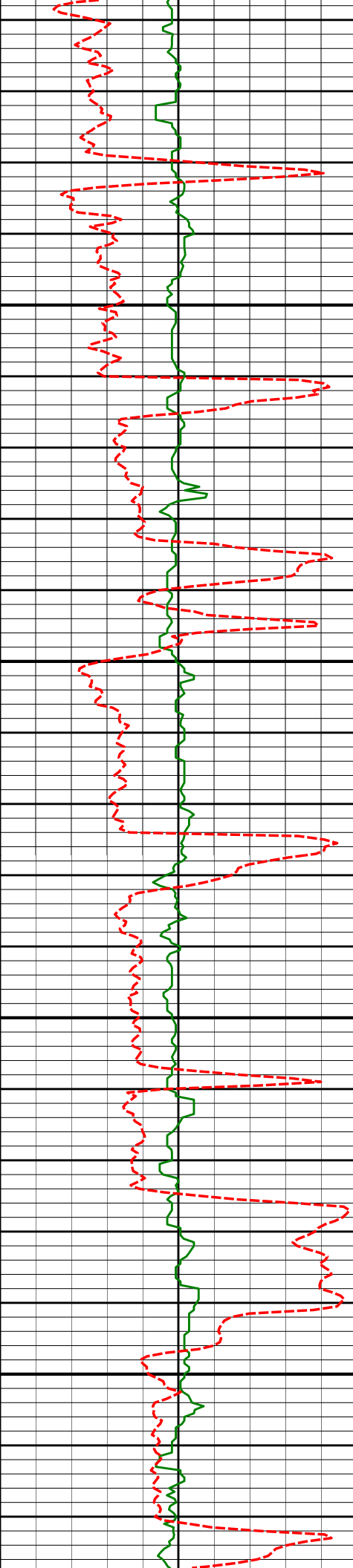
205.67°

5143.60'

-291.88'

5200

5250



5300

5350

5400

5450

5265'

10.03°

207.15°

5237.38'

-305.42'

5360'

9.05°

207.38°

5331.07'

-319.41'

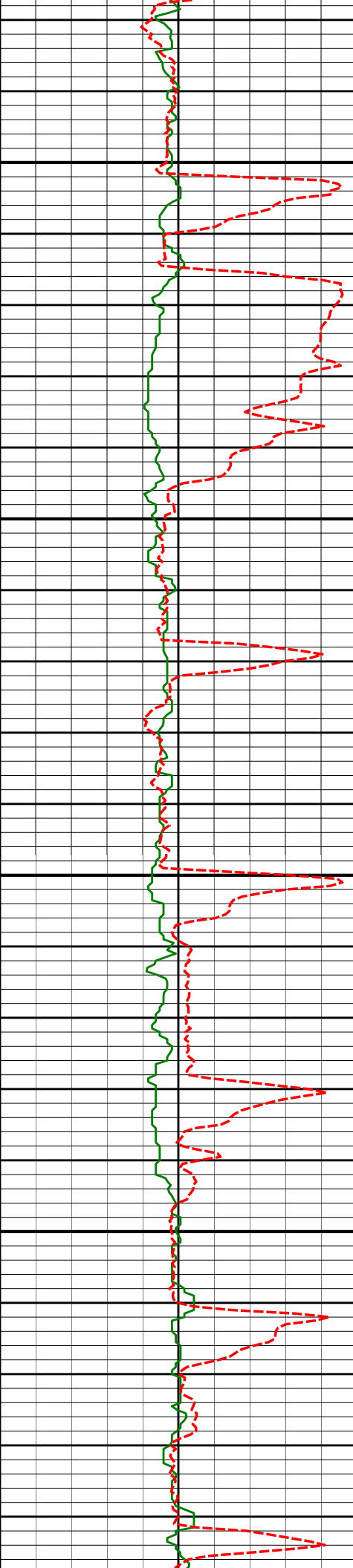
5456'

9.67°

201.95°

5425.79'

-333.60'



5500

5550

5600

5650

5551'

10.82°

205.76°

5519.27'

-349.03'

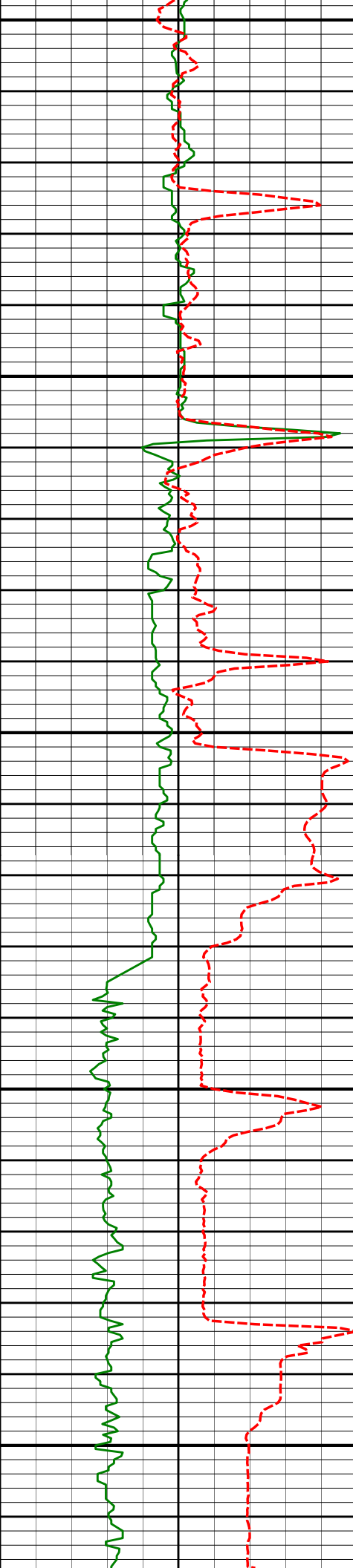
5646'

10.58°

206.09°

5612.62'

-364.89'



5700

5741'

8.77°

203.82°

5706.27'

-379.35'

5750

5800

5836'

10.76°

206.49°

5799.89'

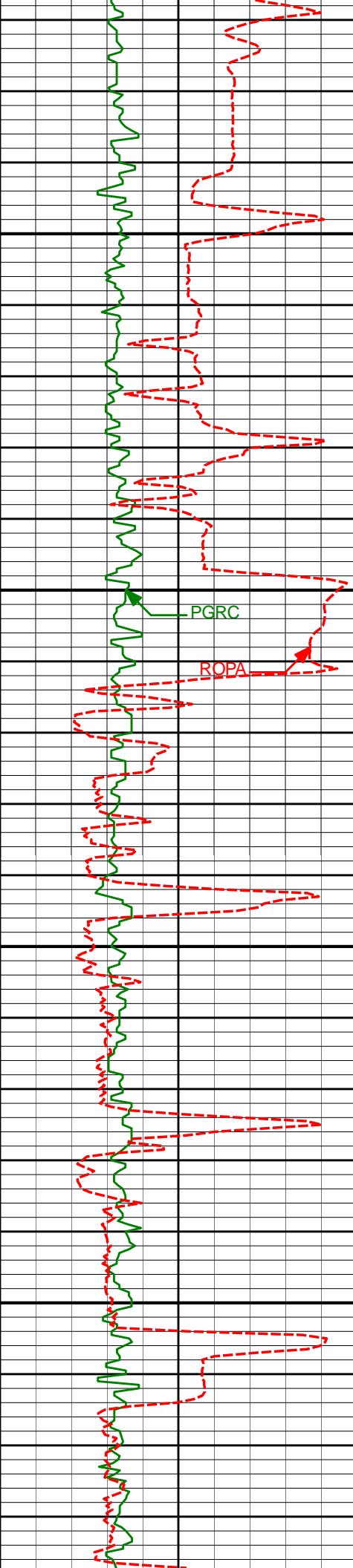
-393.92'

5850

Run 200

5900





5950

6000

6050

6100

5931'

9.76°

208.25°

5893.37'

-408.95'

6027'

10.94°

207.71°

5987.80'

-424.18'

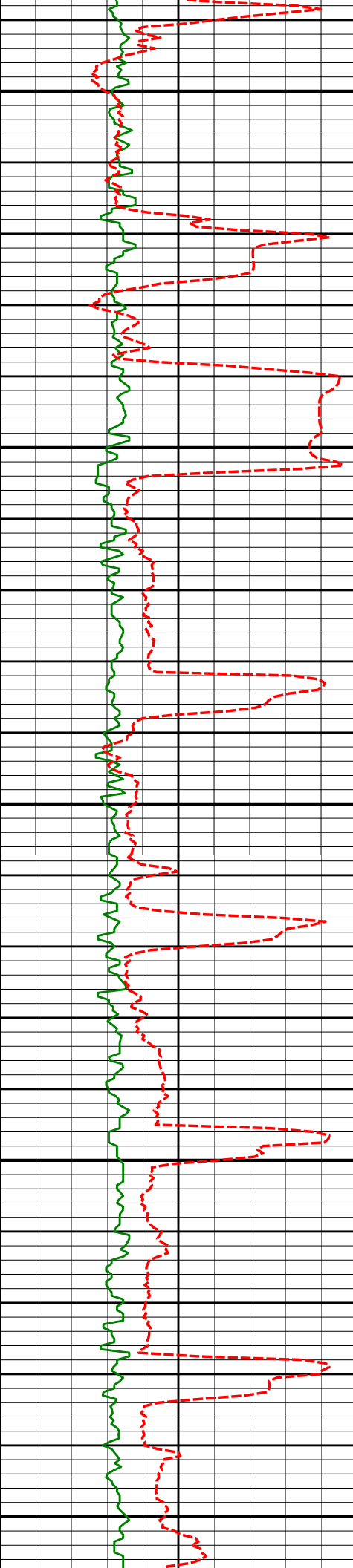
6122'

9.54°

204.82°

6081.29'

-439.31'



6150

6200

6250

6300

6350

6217'

10.46°

202.94°

6174.84'

-454.39'

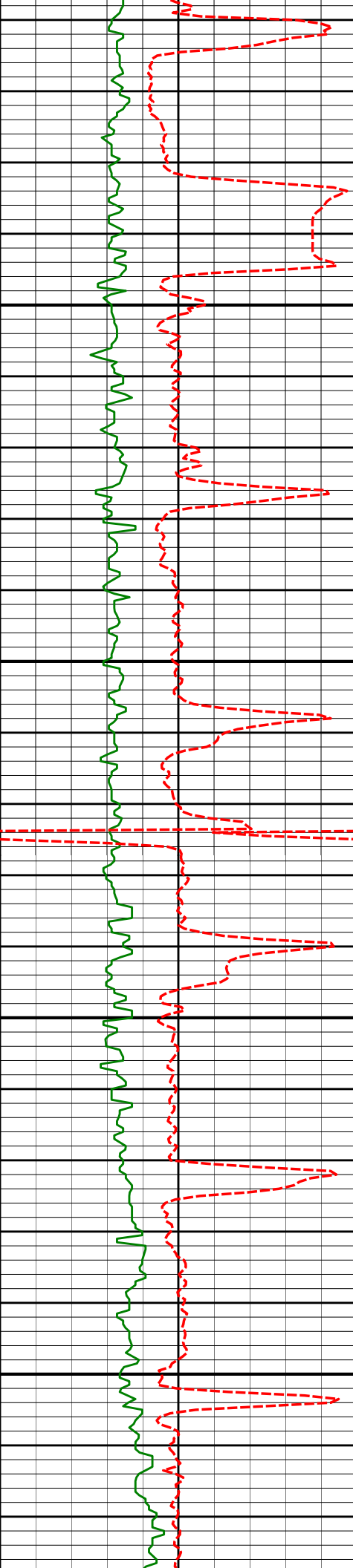
6312'

9.06°

205.52°

6268.47'

-469.09'



6400

6407'

9.28°

195.95°

6362.26'

-483.20'

6450

6500

6503'

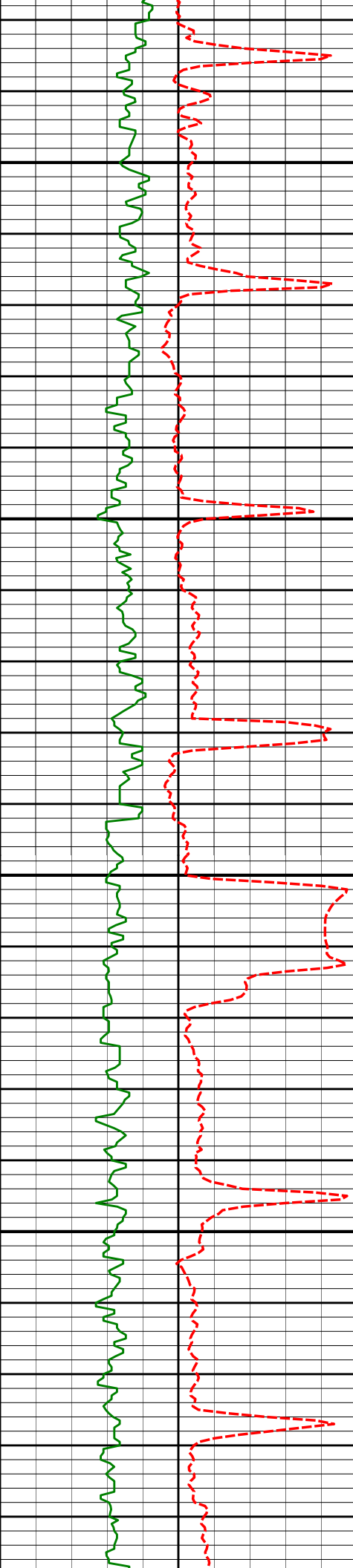
7.62°

190.24°

6457.21'

-496.91'

6550



6600

6650

6700

6750

6598'

5.19°

187.88°

6551.61'

-507.37'

6725'

2.14°

205.23°

6678.34'

-515.20'

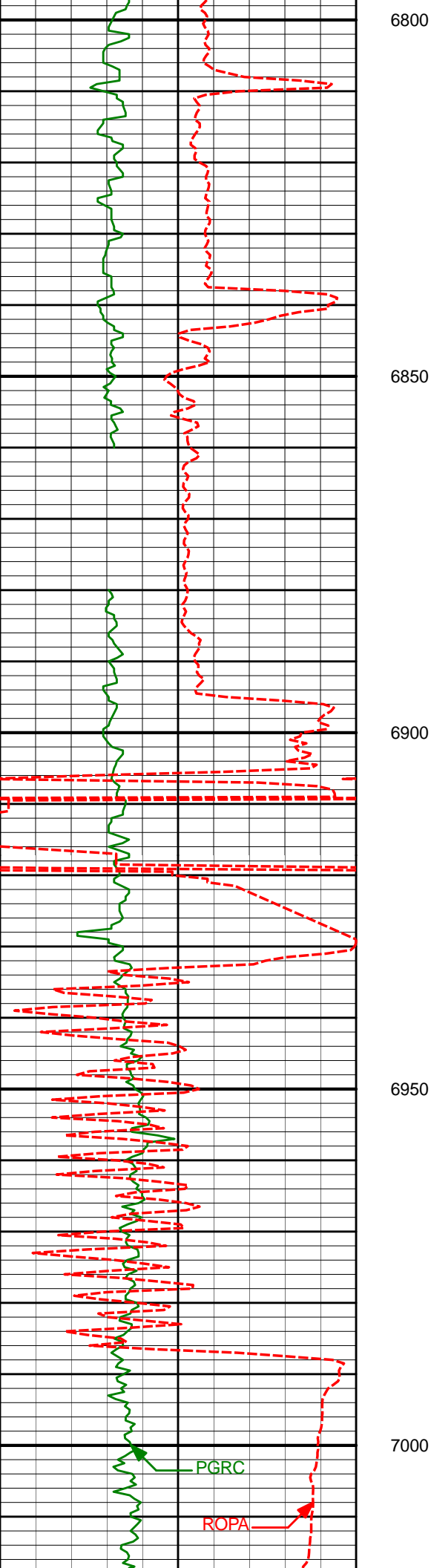
6788'

1.61°

224.81°

6741.31'

-516.89'



6884'

1.58°

267.17°

6837.28'

-517.92'

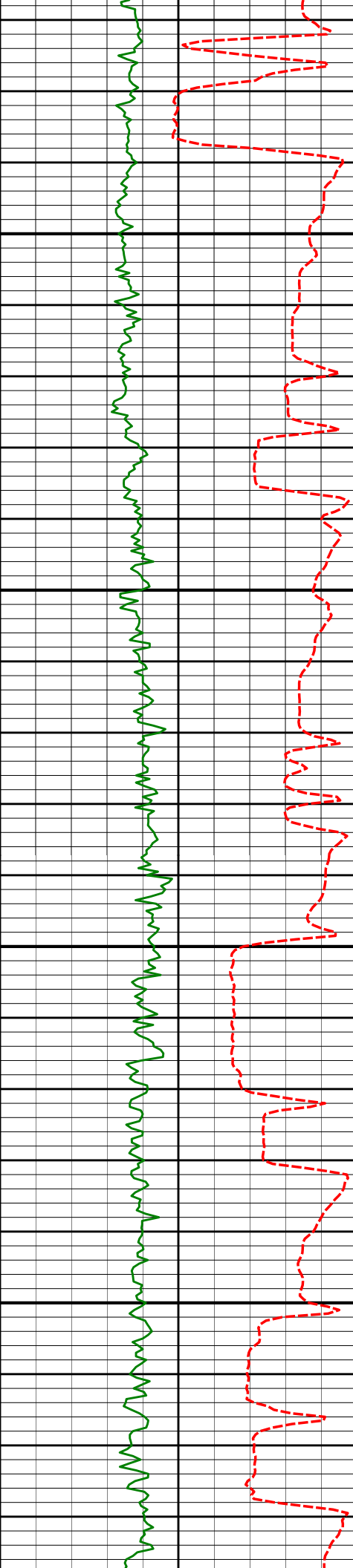
6979'

1.92°

302.78°

6932.23'

-517.12'



7050

7100

7150

7200

7027'

6.66°

357.46°

6980.10'

-513.90'

7074'

12.52°

359.39°

7026.42'

-506.08'

7122'

18.52°

0.12°

7072.65'

-493.24'

7169'

20.76°

0.96°

7116.91'

-477.45'

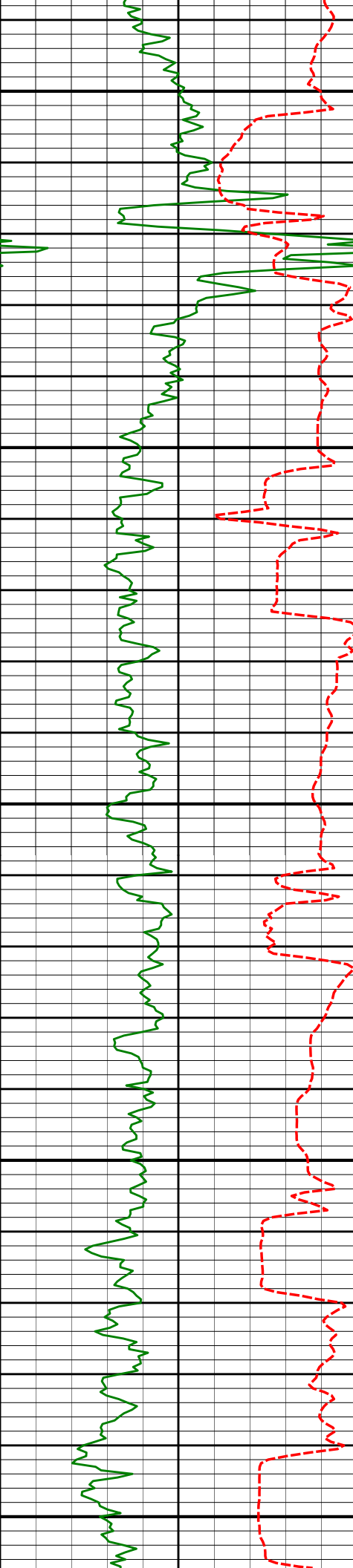
7217'

23.89°

359.02°

7161.31'

-459.22'



7250

7264'

26.89°

0.11°

7203.77'

-439.07'

7300

7312'

30.74°

0.22°

7245.82'

-415.94'

7350

7359'

36.23°

358.73°

7285.00'

-390.02'

7400

7407'

41.87°

357.72°

7322.26'

-359.81'

7450

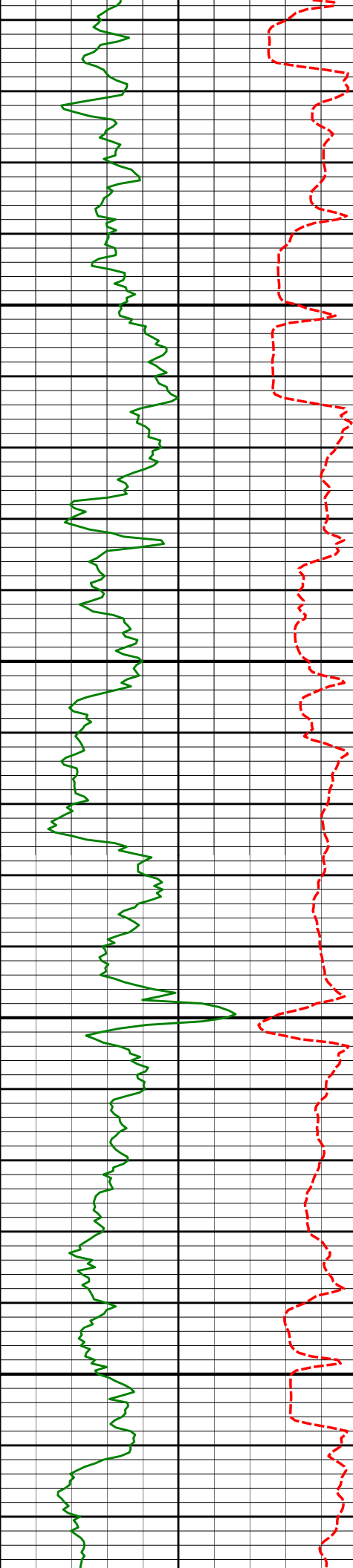
7454'

46.19°

356.36°

7356.05'

-327.19'



7500

7502'

49.26°

354.50°

7388.33'

-291.80'

7550

7549'

51.79°

353.98°

7418.21'

-255.71'

7600

7597'

59.38°

353.45°

7445.32'

-216.38'

7650

7644'

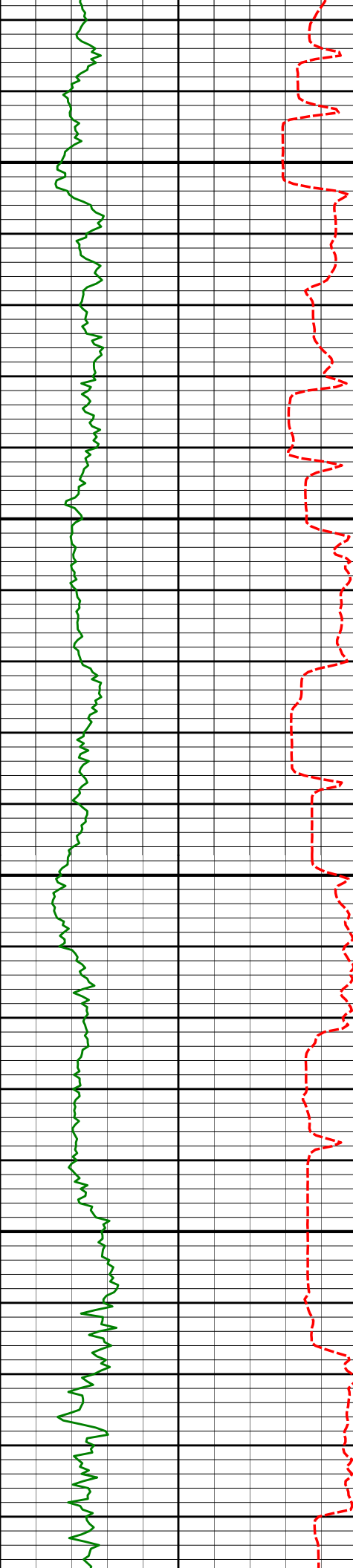
66.42°

354.02°

7466.72'

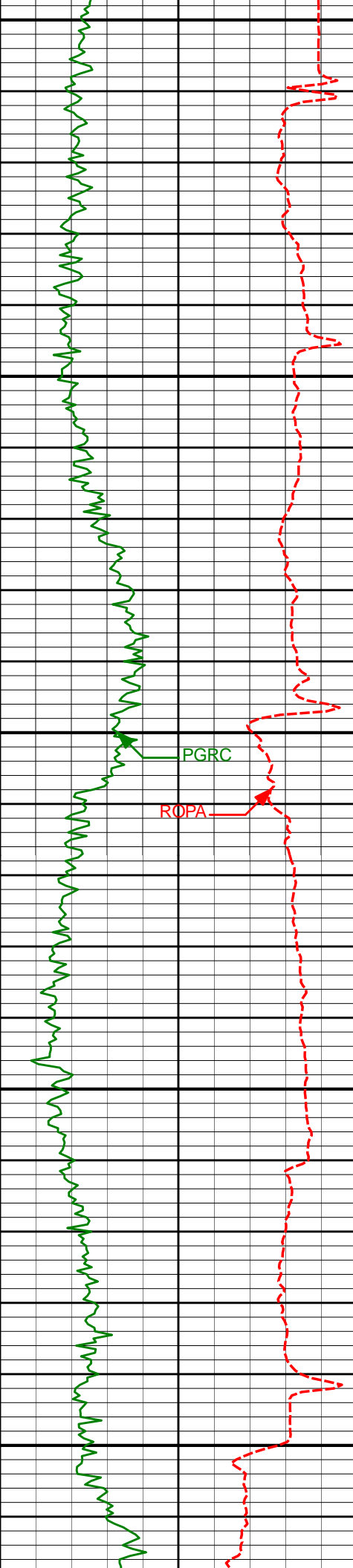
-174.81'





7692'	71.40°	357.51°	7483.99'	-130.17'
7700				
7739'	76.69°	359.43°	7496.91'	-85.01'
7750				
7787'	80.99°	359.80°	7506.19'	-37.93'
7800				
7834'	84.29°	0.34°	7512.21'	8.67'
7850				
7861'	85.50°	0.13°	7514.62'	35.56'

7" Casing Shoe @ 7898' MD / 7516.67' TVD



7900  
Run 300

7950

8000

8050

8100

PGRC

ROPA

7900'

7953'

8048'

88.27°

88.46°

88.39°

0.28°

0.44°

0.37°

7516.74'

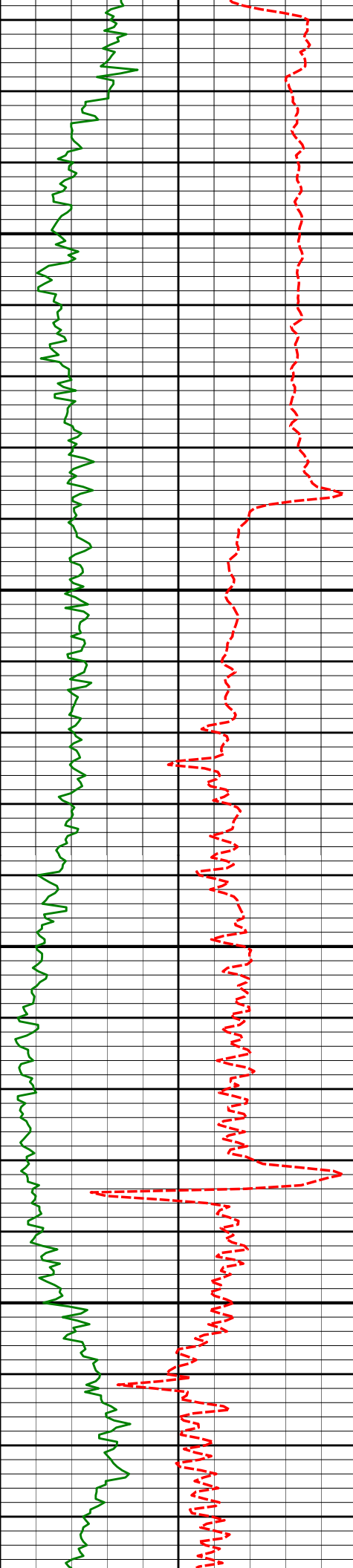
7518.25'

7520.86'

74.50'

127.48'

222.44'



8150

8200

8250

8300

8238'

88.27°

358.93°

7526.40'

412.35'

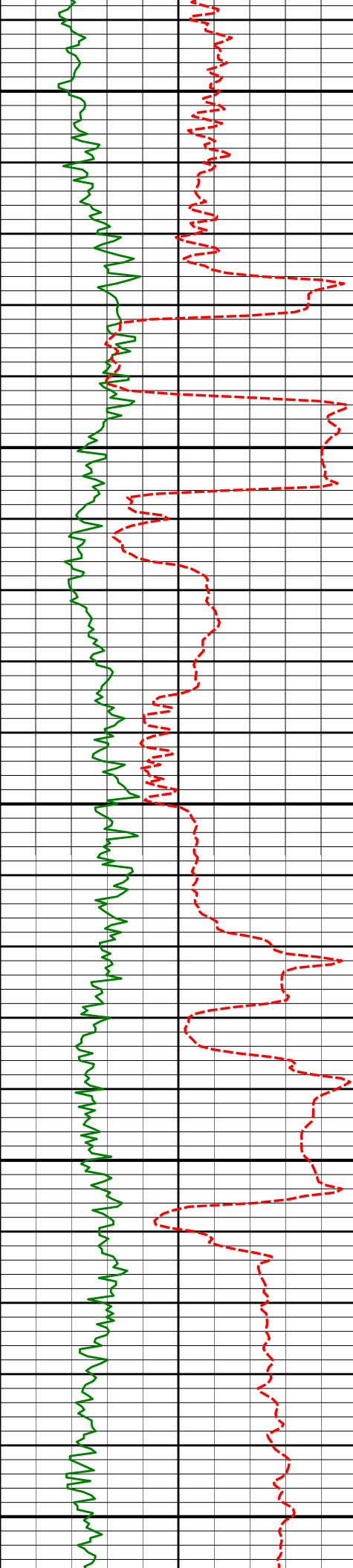
8334'

88.83°

358.31°

7528.83'

508.29'



8350

8400

8450

8500

8550

8429'

89.20°

359.05°

7530.46'

603.25'

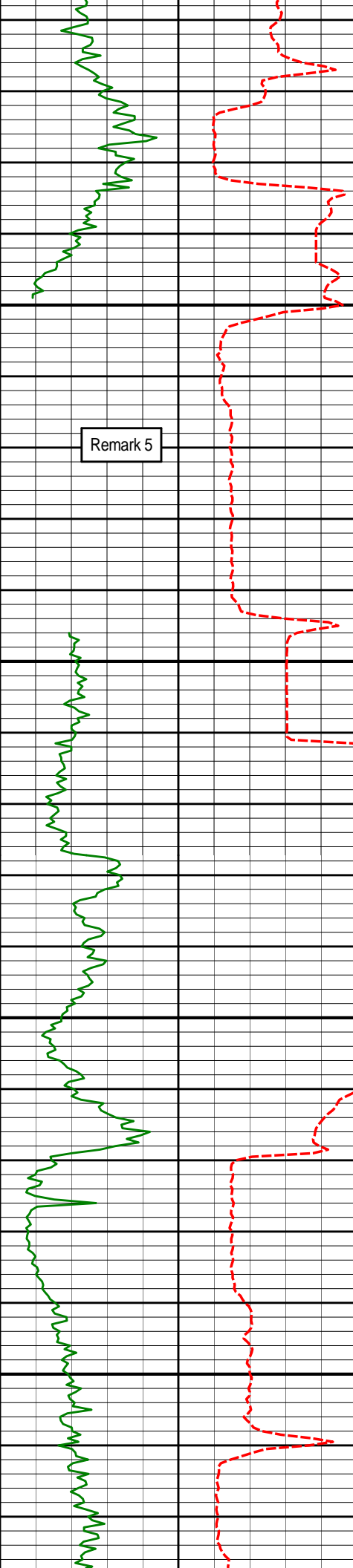
8524'

90.37°

359.18°

7530.82'

698.24'



8600

8650

8700

8750

Remark 5

8619'

92.72°

1.18°

7528.25'

793.19'

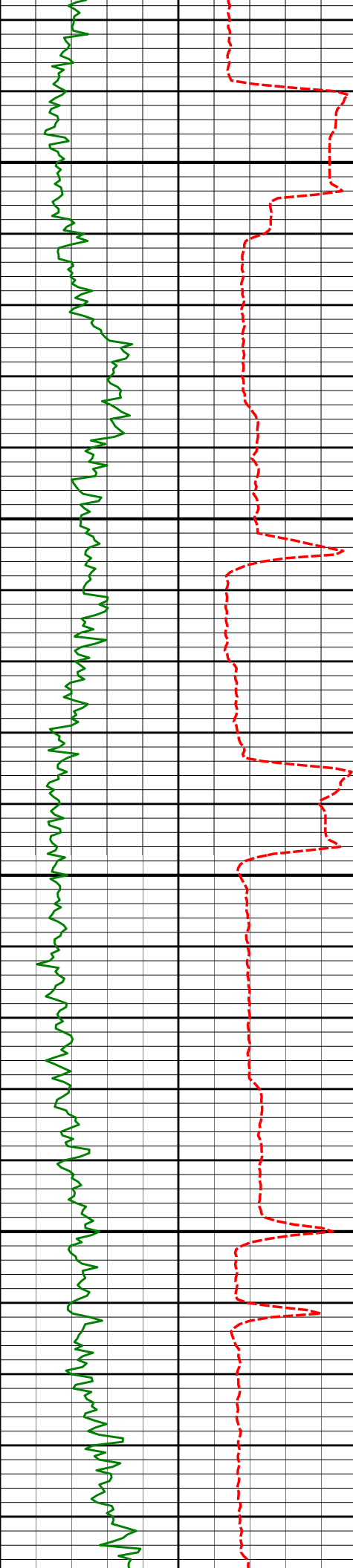
8714'

90.62°

0.80°

7525.49'

888.13'



8800

8810'

90.68°

3.17°

7524.40'

984.06'

8850

8900

8905'

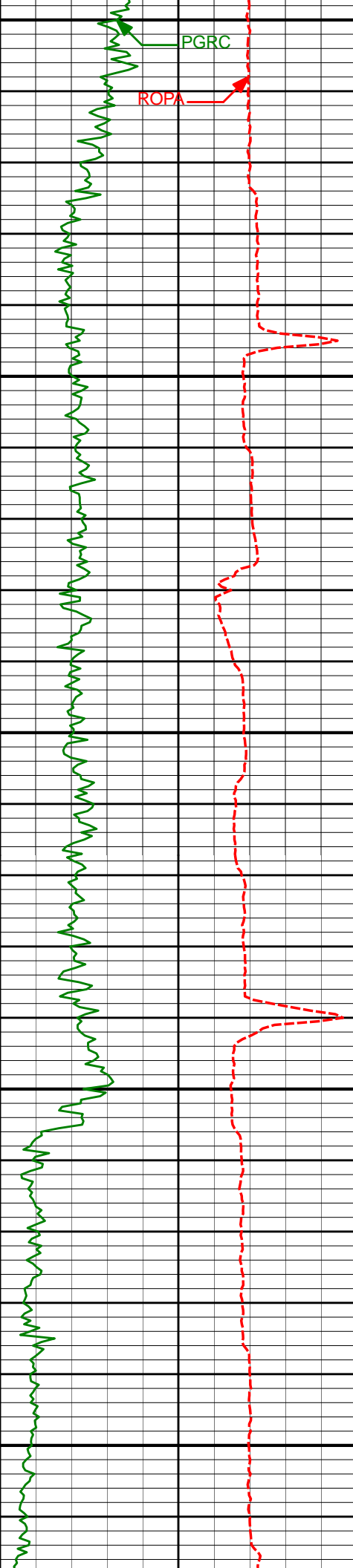
89.51°

2.71°

7524.24'

1078.93'

8950



9000	9000'	89.81°	2.31°	7524.80'	1173.84'
9050					
9100	9095'	89.63°	1.40°	7525.27'	1268.79'
9150					
9200	9190'	90.00°	359.53°	7525.57'	1363.78'



9250

9285'

90.12°

1.98°

7525.47'

1458.77'

9300

9350

9381'

89.07°

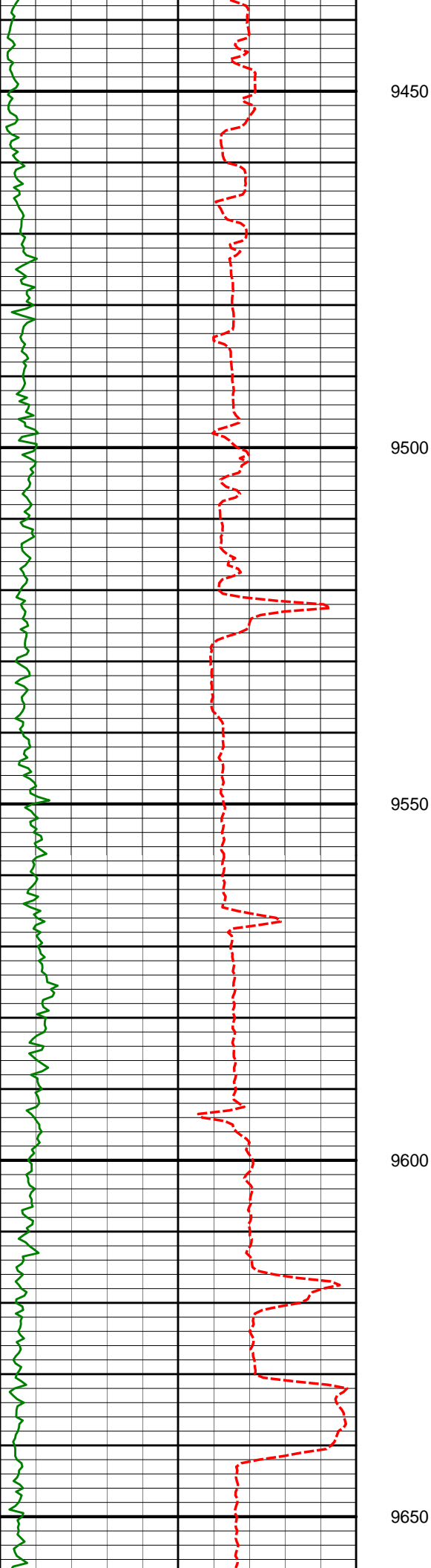
1.98°

7526.15'

1554.70'

9400





9476'

89.20°

1.41°

7527.59'

1649.65'

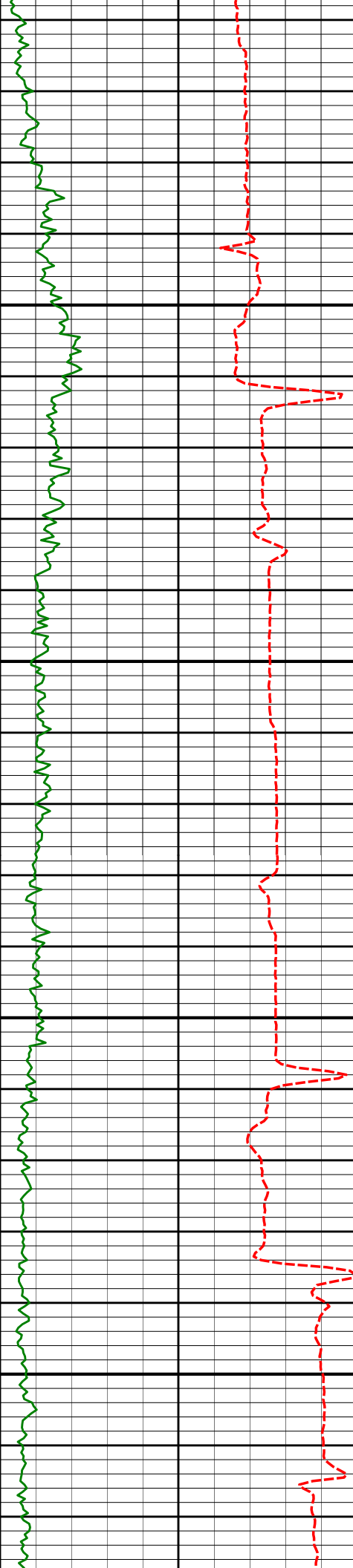
9571'

89.63°

0.93°

7528.56'

1744.63'



9700

9750

9800

9850

9666'

89.13°

1.60°

7529.58'

1839.60'

9761'

89.32°

1.35°

7530.87'

1934.56'

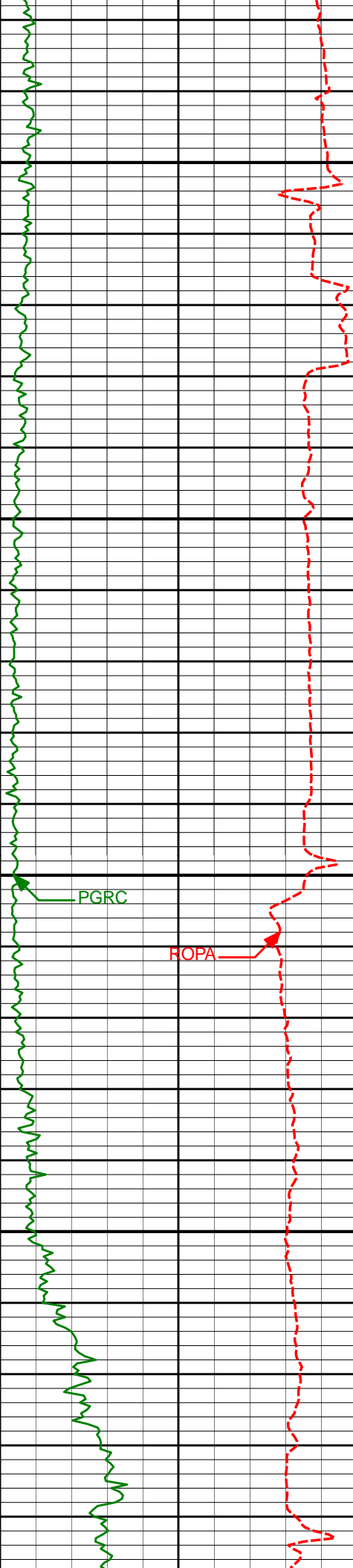
9856'

89.69°

0.37°

7531.69'

2029.54'



9900

9950

10000

10050

PGRC

ROPA

9952'

88.64°

1.57°

7533.09'

2125.51'

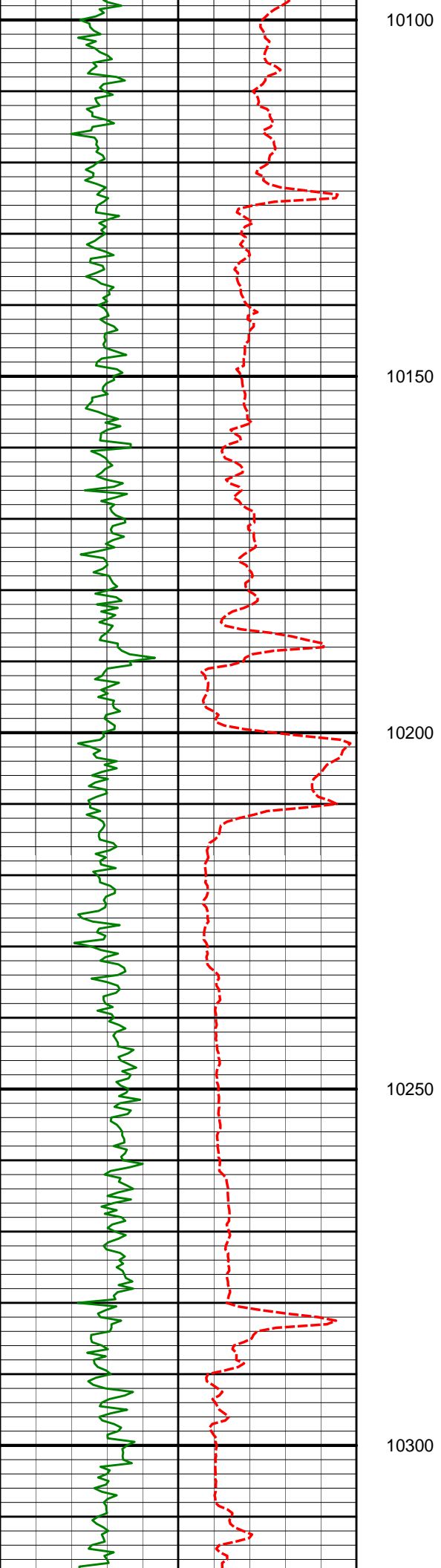
10078'

88.27°

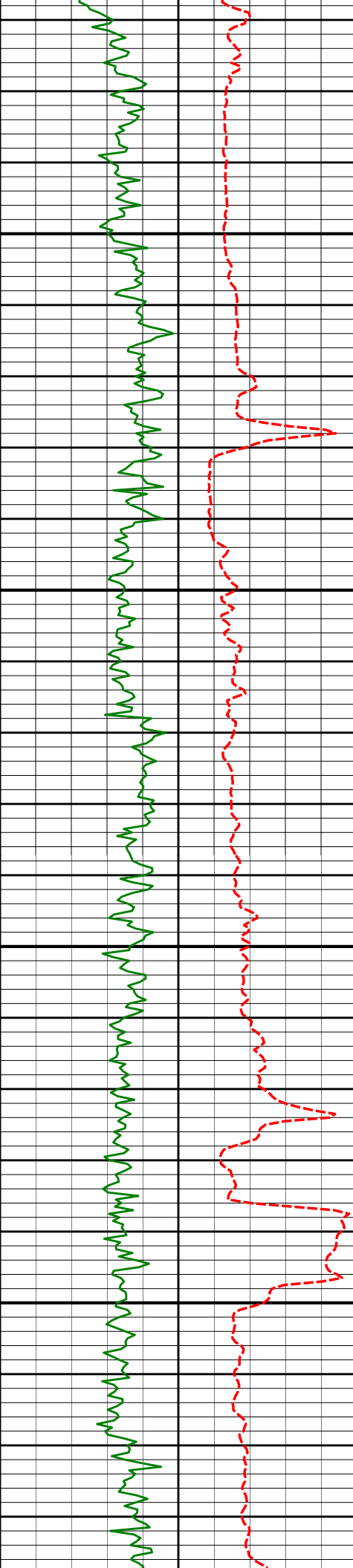
1.29°

7536.49'

2251.43'



10142'	87.96°	1.02°	7538.59'	2315.38'
10237'	89.38°	359.85°	7540.80'	2410.35'



10332'

89.94°

0.26°

7541.36'

2505.35'

10350

10400

10427'

90.31°

359.08°

7541.15'

2600.34'

10450

10500

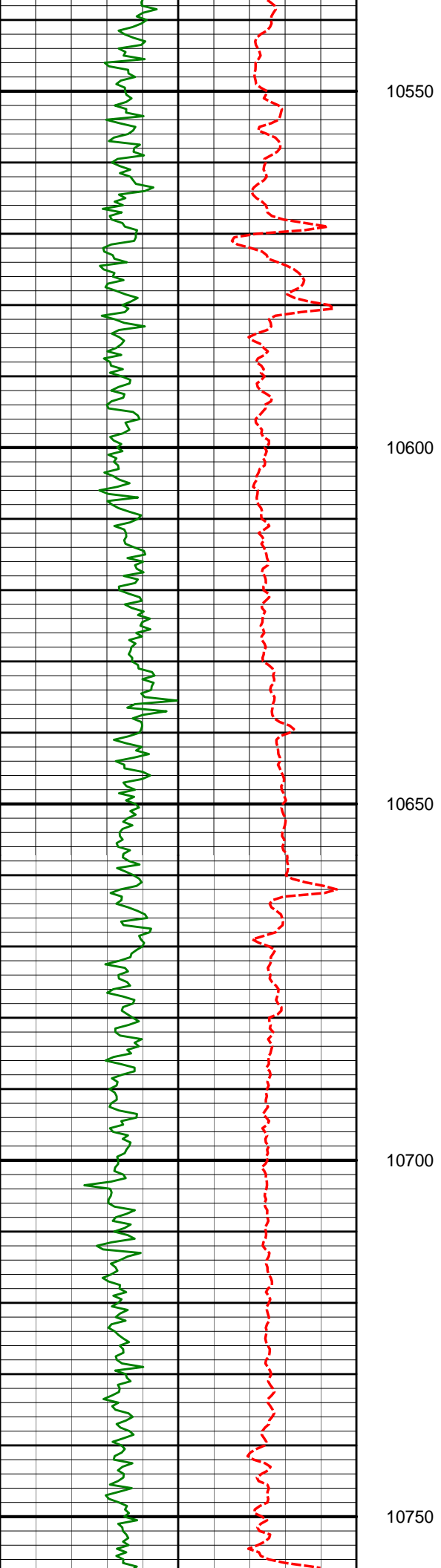
10522'

89.88°

0.27°

7541.00'

2695.34'



10550

10600

10650

10700

10750

10618'

89.69°

359.09°

7541.36'

2791.34'

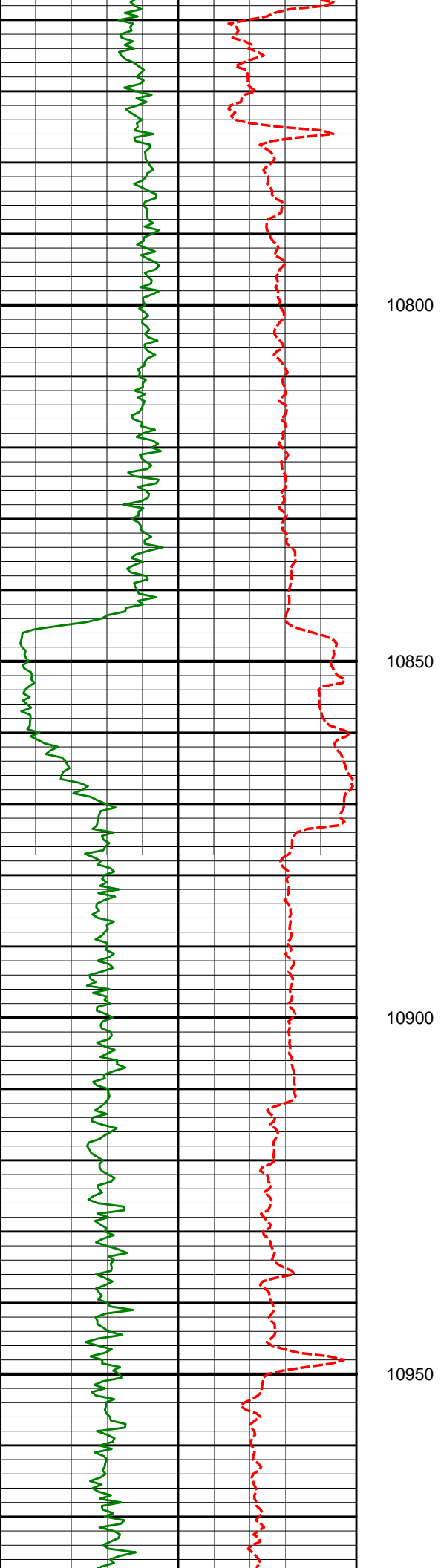
10713'

90.25°

359.27°

7541.41'

2886.32'



10800

10808'

90.68°

359.25°

7540.64'

2981.31'

10850

10900

10903'

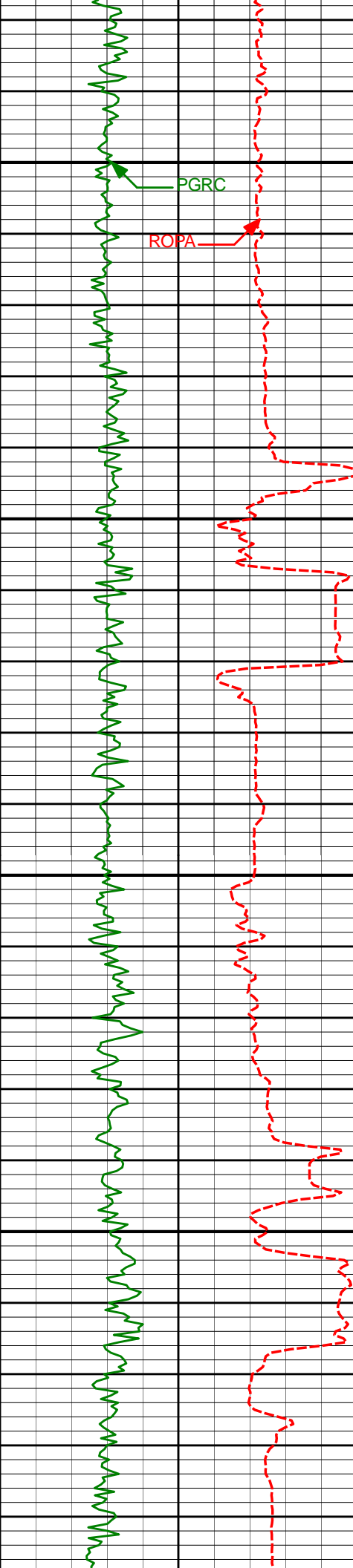
89.07°

359.25°

7540.84'

3076.30'

10950



11000

11050

11100

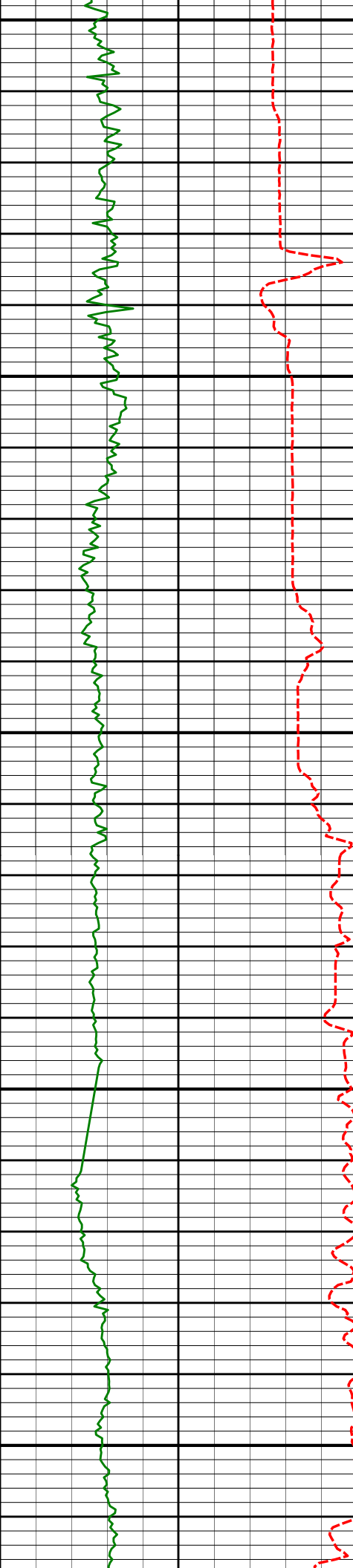
11150

10998'	89.94°	358.74°	7541.66'	3171.28'
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11094'	89.51°	0.09°	7542.12'	3267.27'
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11189'	88.58°	0.48°	7543.71'	3362.26'
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11200

11250

11300

11350

11400

Run 400

11284'

89.44°

0.15°

7545.35'

3457.24'

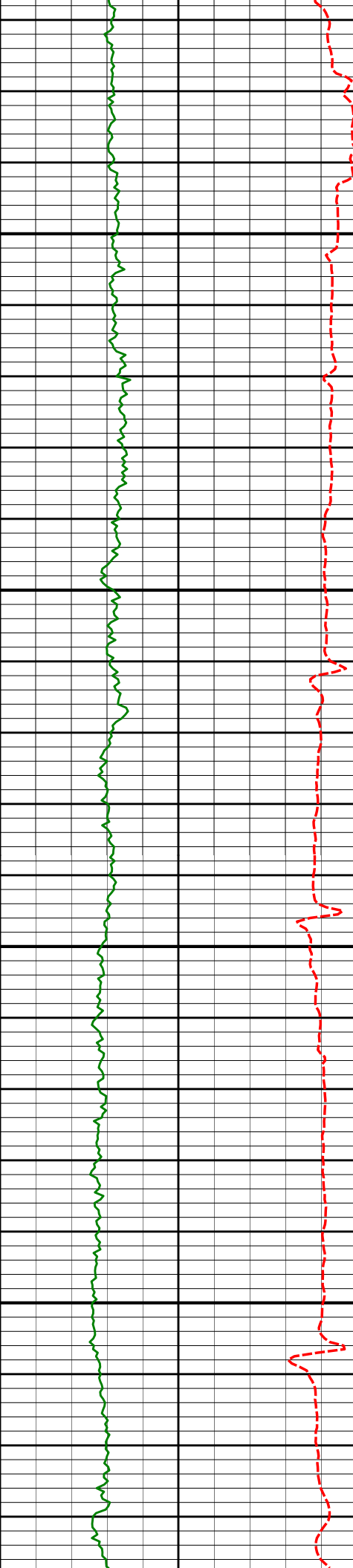
11372'

88.49°

0.43°

7546.94'

3545.23'



11450

11467'

90.92°

359.38°

7547.43'

3640.22'

11500

11550

11562'

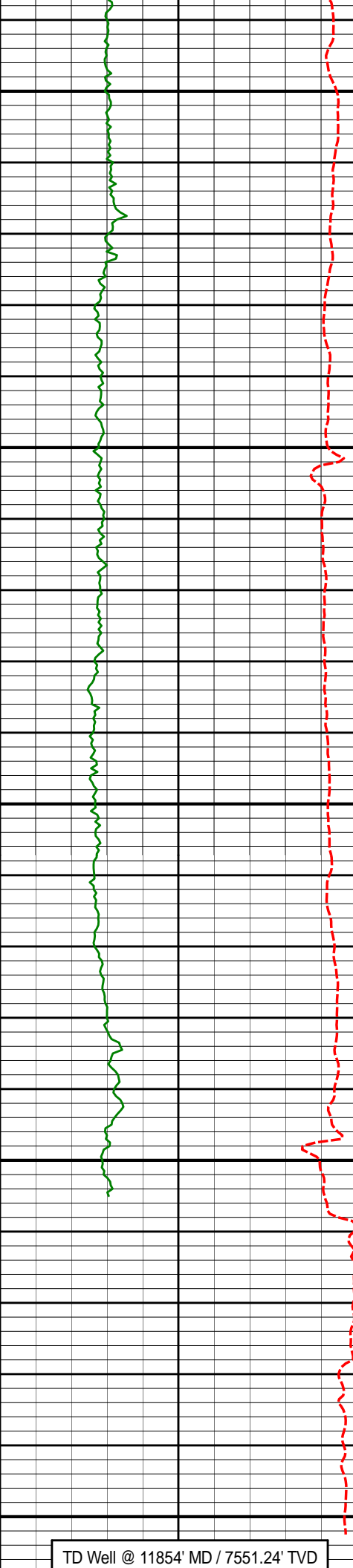
90.34°

359.03°

7546.38'

3735.20'

11600



11650

11657'

89.72°

357.12°

7546.33'

3830.14'

11700

11750

11752'

88.21°

355.31°

7548.05'

3924.91'

11800

11850

11854'

88.21°

355.31°

7551.24'

4026.52'

TD Well @ 11854' MD / 7551.24' TVD

Average Rate of Penetration (ROPA) feet per hr	Depth					
		Depth	Inc	Azi	TVD	V/S
PCG Gamma Ray BCorr (PGRC) api						

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation  
Lochbuie 30C-13HZ  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0901047725

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1188.00	0.08	199.76	1187.98	2.77 S	0.47 W	-2.77	TIE-IN
1287.00	0.28	16.58	1286.98	2.60 S	0.42 W	-2.60	0.36
1476.00	0.44	352.89	1475.98	1.44 S	0.38 W	-1.44	0.11
1573.00	0.52	349.63	1572.97	0.64 S	0.51 W	-0.64	0.09
1669.00	0.59	354.53	1668.97	0.28 N	0.63 W	0.28	0.09
1764.00	0.54	350.33	1763.96	1.21 N	0.76 W	1.21	0.07
1859.00	0.54	347.97	1858.96	2.09 N	0.92 W	2.09	0.02
1954.00	0.48	340.39	1953.96	2.90 N	1.15 W	2.90	0.09
2049.00	0.49	337.72	2048.95	3.65 N	1.44 W	3.65	0.03
2138.00	0.58	335.43	2137.95	4.42 N	1.77 W	4.42	0.10
2233.00	0.63	332.23	2232.94	5.31 N	2.21 W	5.31	0.06
2327.00	0.64	345.01	2326.94	6.28 N	2.59 W	6.28	0.15
2421.00	0.62	350.77	2420.93	7.29 N	2.81 W	7.29	0.07
2610.00	1.68	176.00	2609.91	5.53 N	2.78 W	5.53	1.22
2704.00	1.50	170.73	2703.87	2.94 N	2.48 W	2.94	0.25
2798.00	1.22	173.24	2797.85	0.74 N	2.17 W	0.74	0.30
2891.00	1.02	161.96	2890.83	1.03 S	1.79 W	-1.03	0.32
2986.00	0.93	152.24	2985.82	2.52 S	1.17 W	-2.52	0.20
3080.00	0.83	149.57	3079.81	3.78 S	0.47 W	-3.78	0.11
3174.00	2.66	197.37	3173.76	6.45 S	0.78 W	-6.45	2.33
3268.00	4.17	206.96	3267.59	11.58 S	2.98 W	-11.58	1.71
3362.00	5.07	206.95	3361.29	18.33 S	6.41 W	-18.33	0.96
3457.00	6.32	208.22	3455.82	26.68 S	10.79 W	-26.68	1.32
3552.00	7.37	206.71	3550.14	36.73 S	16.00 W	-36.73	1.12
3647.00	9.78	205.43	3644.07	49.46 S	22.20 W	-49.46	2.54
3743.00	8.88	200.95	3738.80	63.74 S	28.35 W	-63.74	1.20
3838.00	9.95	201.78	3832.52	78.21 S	34.02 W	-78.21	1.14
3933.00	11.20	204.65	3925.90	94.22 S	40.91 W	-94.22	1.43
4028.00	10.47	203.62	4019.21	110.52 S	48.22 W	-110.52	0.79
4123.00	9.08	201.04	4112.83	125.42 S	54.37 W	-125.42	1.53
4219.00	10.21	209.56	4207.47	139.89 S	61.29 W	-139.89	1.89
4314.00	9.74	209.29	4301.04	154.23 S	69.37 W	-154.23	0.50
4409.00	11.99	202.56	4394.33	170.35 S	77.09 W	-170.35	2.72
4504.00	12.09	201.34	4487.24	188.73 S	84.50 W	-188.73	0.29
4599.00	10.65	201.75	4580.38	206.15 S	91.37 W	-206.15	1.52
4694.00	9.41	200.60	4673.92	221.57 S	97.36 W	-221.57	1.32
4790.00	8.68	199.01	4768.73	235.77 S	102.48 W	-235.77	0.80
4885.00	10.32	207.38	4862.43	250.10 S	108.73 W	-250.10	2.25
4980.00	9.50	205.74	4956.01	264.72 S	116.05 W	-264.72	0.91
5075.00	9.37	205.79	5049.72	278.75 S	122.82 W	-278.75	0.14
5170.00	8.29	205.67	5143.60	291.88 S	129.15 W	-291.88	1.14
5265.00	10.03	207.15	5237.38	305.42 S	135.89 W	-305.42	1.85
5360.00	9.05	207.38	5331.07	319.41 S	143.10 W	-319.41	1.03
5456.00	9.67	201.95	5425.79	333.60 S	149.59 W	-333.60	1.12
5551.00	10.82	205.76	5519.27	349.03 S	156.45 W	-349.03	1.40

5646.00	10.58	206.09	5612.62	364.89 S	164.16 W	-364.89	0.26
5741.00	8.77	203.82	5706.27	379.35 S	170.92 W	-379.35	1.95
5836.00	10.76	206.49	5799.89	393.92 S	177.80 W	-393.92	2.15
5931.00	9.76	208.25	5893.37	408.95 S	185.57 W	-408.95	1.10
6027.00	10.94	207.71	5987.80	424.18 S	193.65 W	-424.18	1.23
6122.00	9.54	204.82	6081.29	439.31 S	201.15 W	-439.31	1.57
6217.00	10.46	202.94	6174.84	454.39 S	207.82 W	-454.39	1.03
6312.00	9.06	205.52	6268.47	469.09 S	214.40 W	-469.09	1.54
6407.00	9.28	195.95	6362.26	483.20 S	219.73 W	-483.20	1.62
6503.00	7.62	190.24	6457.21	496.91 S	222.99 W	-496.91	1.94
6598.00	5.19	187.88	6551.61	507.37 S	224.69 W	-507.37	2.57
6725.00	2.14	205.23	6678.34	515.20 S	226.49 W	-515.20	2.53
6788.00	1.61	224.81	6741.31	516.89 S	227.62 W	-516.89	1.31
6884.00	1.58	267.17	6837.28	517.92 S	229.89 W	-517.92	1.20
6979.00	1.92	302.78	6932.23	517.12 S	232.54 W	-517.12	1.18
7027.00	6.66	357.46	6980.10	513.90 S	233.34 W	-513.90	12.01
7074.00	12.52	359.39	7026.42	506.08 S	233.51 W	-506.08	12.49
7122.00	18.52	0.12	7072.65	493.24 S	233.55 W	-493.24	12.51
7169.00	20.76	0.96	7116.91	477.45 S	233.40 W	-477.45	4.80
7217.00	23.89	359.02	7161.31	459.22 S	233.42 W	-459.22	6.70
7264.00	26.89	0.11	7203.77	439.07 S	233.56 W	-439.07	6.46
7312.00	30.74	0.22	7245.82	415.94 S	233.50 W	-415.94	8.02
7359.00	36.23	358.73	7285.00	390.02 S	233.76 W	-390.02	11.81
7407.00	41.87	357.72	7322.26	359.81 S	234.71 W	-359.81	11.82
7454.00	46.19	356.36	7356.05	327.19 S	236.41 W	-327.19	9.41
7502.00	49.26	354.50	7388.33	291.80 S	239.25 W	-291.80	7.01
7549.00	51.79	353.98	7418.21	255.71 S	242.90 W	-255.71	5.45
7597.00	59.38	353.45	7445.32	216.38 S	247.24 W	-216.38	15.84
7644.00	66.42	354.02	7466.72	174.81 S	251.79 W	-174.81	15.02
7692.00	71.40	357.51	7483.99	130.17 S	255.08 W	-130.17	12.39
7739.00	76.69	359.43	7496.91	85.01 S	256.27 W	-85.01	11.92
7787.00	80.99	359.80	7506.19	37.93 S	256.59 W	-37.93	8.99
7834.00	84.29	0.34	7512.21	8.67 N	256.53 W	8.67	7.11
7861.00	85.50	0.13	7514.62	35.56 N	256.42 W	35.56	4.55
7900.00	88.27	0.28	7516.74	74.50 N	256.28 W	74.50	7.11
7953.00	88.46	0.44	7518.25	127.48 N	255.95 W	127.48	0.47
8048.00	88.39	0.37	7520.86	222.44 N	255.28 W	222.44	0.10
8238.00	88.27	358.93	7526.40	412.35 N	256.44 W	412.35	0.76
8334.00	88.83	358.31	7528.83	508.29 N	258.75 W	508.29	0.87
8429.00	89.20	359.05	7530.46	603.25 N	260.94 W	603.25	0.87
8524.00	90.37	359.18	7530.82	698.24 N	262.40 W	698.24	1.24
8619.00	92.72	1.18	7528.25	793.19 N	262.11 W	793.19	3.25
8714.00	90.62	0.80	7525.49	888.13 N	260.47 W	888.13	2.25
8810.00	90.68	3.17	7524.40	984.06 N	257.14 W	984.06	2.47
8905.00	89.51	2.71	7524.24	1078.93 N	252.27 W	1078.93	1.32
9000.00	89.81	2.31	7524.80	1173.84 N	248.11 W	1173.84	0.53
9095.00	89.63	1.40	7525.27	1268.79 N	245.03 W	1268.79	0.98
9190.00	90.00	359.53	7525.57	1363.78 N	244.26 W	1363.78	2.01
9285.00	90.12	1.98	7525.47	1458.77 N	243.01 W	1458.77	2.58
9381.00	89.07	1.98	7526.15	1554.70 N	239.69 W	1554.70	1.09
9476.00	89.20	1.41	7527.59	1649.65 N	236.89 W	1649.65	0.62
9571.00	89.63	0.93	7528.56	1744.63 N	234.95 W	1744.63	0.68
9666.00	89.13	1.60	7529.58	1839.60 N	232.85 W	1839.60	0.88
9761.00	89.32	1.35	7530.87	1934.56 N	230.40 W	1934.56	0.33
9856.00	89.69	0.37	7531.69	2029.54 N	228.98 W	2029.54	1.10
9952.00	88.64	1.57	7533.09	2125.51 N	227.35 W	2125.51	1.66
10078.00	88.27	1.29	7536.49	2251.43 N	224.21 W	2251.43	0.37
10142.00	87.96	1.02	7538.59	2315.38 N	222.92 W	2315.38	0.64
10237.00	89.38	359.85	7540.80	2410.35 N	222.20 W	2410.35	1.94
10332.00	89.94	0.26	7541.36	2505.35 N	222.11 W	2505.35	0.73
10427.00	90.31	359.08	7541.15	2600.34 N	222.66 W	2600.34	1.30
10522.00	89.88	0.27	7541.00	2695.34 N	223.19 W	2695.34	1.33
10618.00	89.69	359.09	7541.36	2791.34 N	223.73 W	2791.34	1.25
10713.00	90.25	359.27	7541.41	2886.32 N	225.09 W	2886.32	0.62
10808.00	90.68	359.25	7540.64	2981.31 N	226.32 W	2981.31	0.45
10903.00	89.07	359.25	7540.84	3076.30 N	227.56 W	3076.30	1.69
10998.00	89.94	358.74	7541.66	3171.28 N	229.23 W	3171.28	1.06
11094.00	89.51	0.09	7542.12	3267.27 N	230.21 W	3267.27	1.48
11189.00	88.58	0.48	7543.71	3362.26 N	229.73 W	3362.26	1.06
11284.00	89.44	0.15	7545.35	3457.24 N	229.21 W	3457.24	0.97
11372.00	88.49	0.43	7546.94	3545.23 N	228.77 W	3545.23	1.13
11467.00	90.92	359.38	7547.43	3640.22 N	228.92 W	3640.22	2.79
11562.00	90.34	359.03	7546.38	3735.20 N	230.24 W	3735.20	0.71
11657.00	89.72	357.12	7546.33	3830.14 N	233.43 W	3830.14	2.11
11752.00	88.21	355.31	7548.05	3924.91 N	239.70 W	3924.91	2.48

11854.00

88.21

355.31

7551.24

4026.52 N

248.04 W

4026.52

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 0.00 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.50 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11854.00 FEET  
IS 4034.15 FEET ALONG 356.47 DEGREES (TRUE)**

**All directional surveys tied on to the last gyro survey at 1188.00' MD. Final survey is a straight-line projection to the bit.**

**Date Printed:18 February 2014**