



1 : 240

[illegible]

## WELL INFORMATION

MWD Run Number	100	200			
Date run completed	06-Aug-13	09-Aug-13			
Rig Bit Number	0100	0200			
Bit Size (in)	13.500	8.750			
Tool Nominal OD (in)	8.000	6.750			
Log Start Depth (TVD, ft)	13.00	983.95			
Log End Depth (TVD, ft)	983.95	7,258.25			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	06-Aug-13 01:45	07-Aug-13 23:54			
Drill/Wipe End Date and Time	06-Aug-13 16:55	09-Aug-13 12:45			
Min Inc (deg) @ Depth (TVD, ft)	.35 @ 359.99	.46 @ 1,249.94			
Max Inc (deg) @ Depth (TVD, ft)	.90 @ 824.97	88.67 @ 7,258.25			
Bit TFA(in2) / Bit Type	1.49 / PDC	1.49 / PDC			
Flow Rate (gpm)	400.07	573.36			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	8.40 / 35.00	9.60 / 36.00			
Filtrate CL (ppm)	1,200.00	900.00			
pH / Fluid Loss (mptm)	9.80 / 0	9.00 / 7			
PV (cP) / YP (lbf2)	12 / 8.00	11 / 12.00			
% Solids / % Sand	3.00 / 0.40	6.7 / 1			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (deg F) / S	168.00 / PGM	175.01 / PGM			

Max Tool Temp (degF) / Source	100.62 / PCM	175.21 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Evan LeBlanc	Matt Busche			
Customer Representative	Sam Taylor	Sam Taylor			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11847568	11341324			
Insert Serial Number	11680751	11227549			
Date and Time Initialized	02-Aug-13 21:49	06-Aug-13 12:06			
Date and Time Read	06-Aug-13 21:48	09-Aug-13 20:48			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.98	45.58			
Software Version	6.21	6.21			
Sub Serial Number	11847568	11341324			
Sonde Serial Number	11145708	11478090			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	346.10	356.93			

### Gamma Ray Sensor Information

Tool Type		PCG			
Distance From Bit (ft)		50.53			
Recorded Sample Period (sec)		10			
Software Version		8.15			
Sub Serial Number		11341324			
Insert/Sonde Serial Number		11293285			

## REMARKS

1. All depths are true vertical 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 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

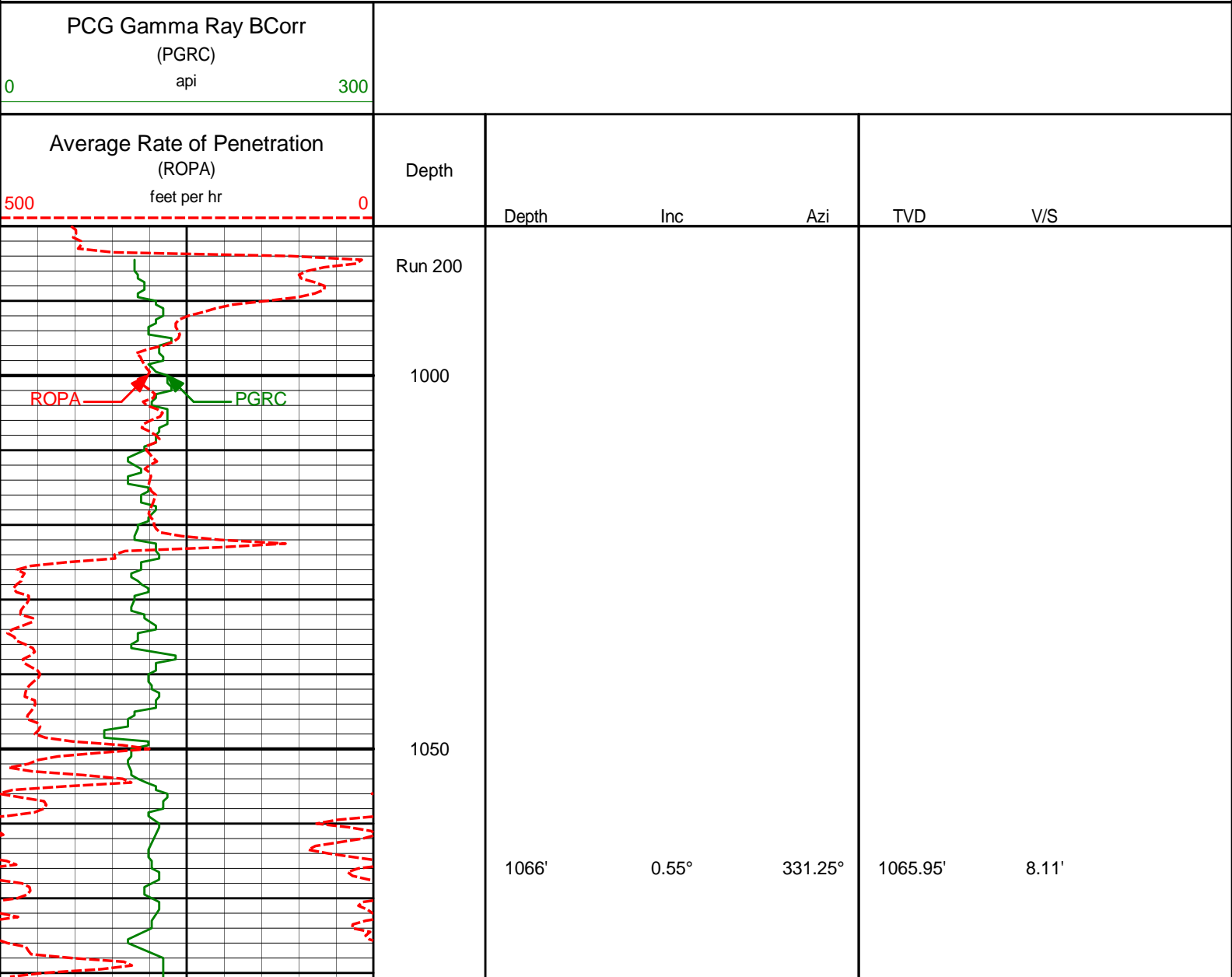
Insite version: 7.4.10

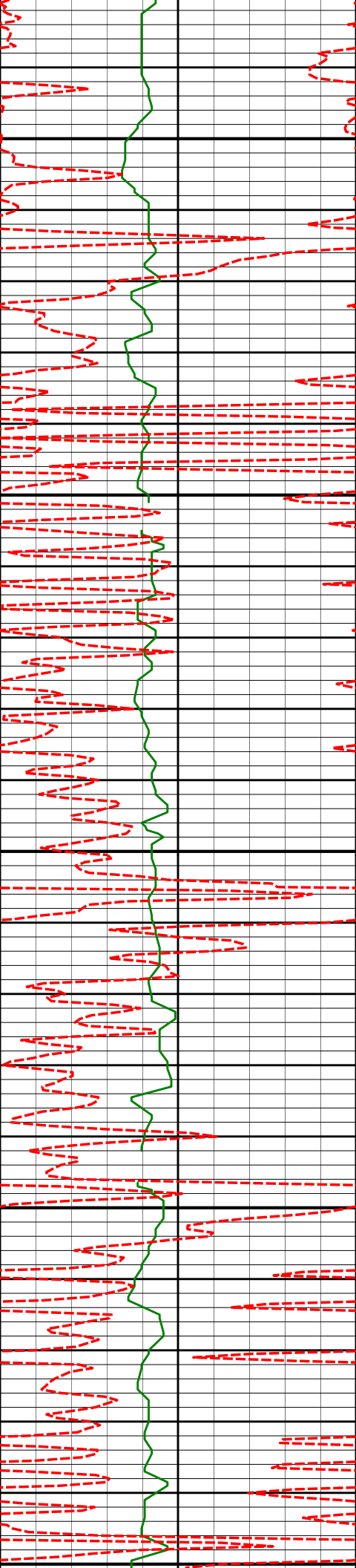
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HALLIBURTON

TVD Main Log 1:240





1100

1150

1200

1250

1300

1158'

0.56°

357.05°

1157.94'

8.95'

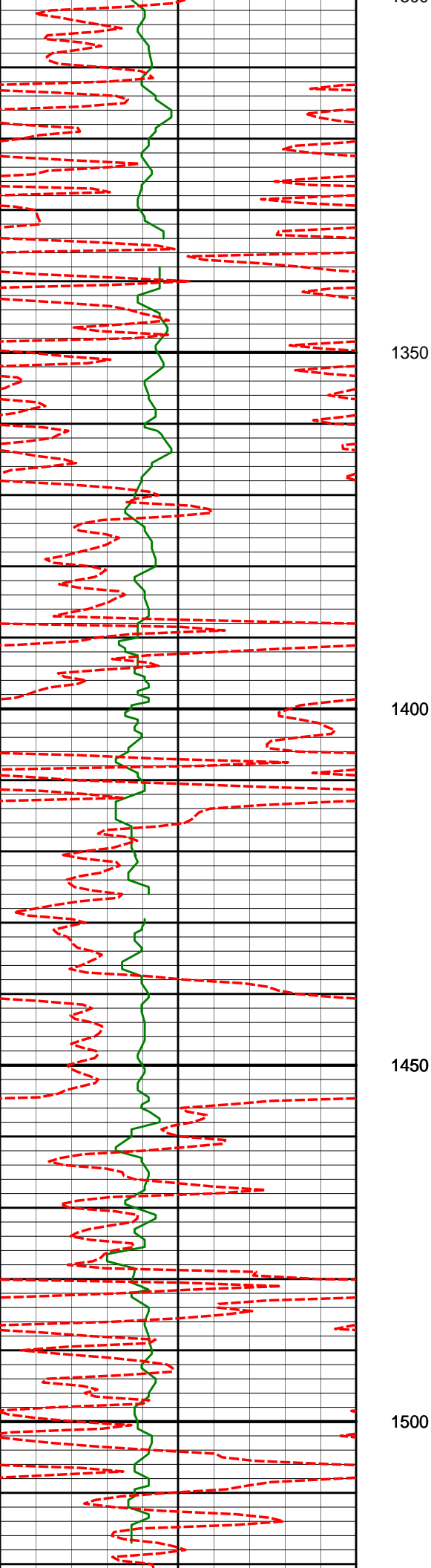
1250'

0.46°

345.90°

1249.94'

9.75'



1341'

0.50°

347.90°

1340.93'

10.50'

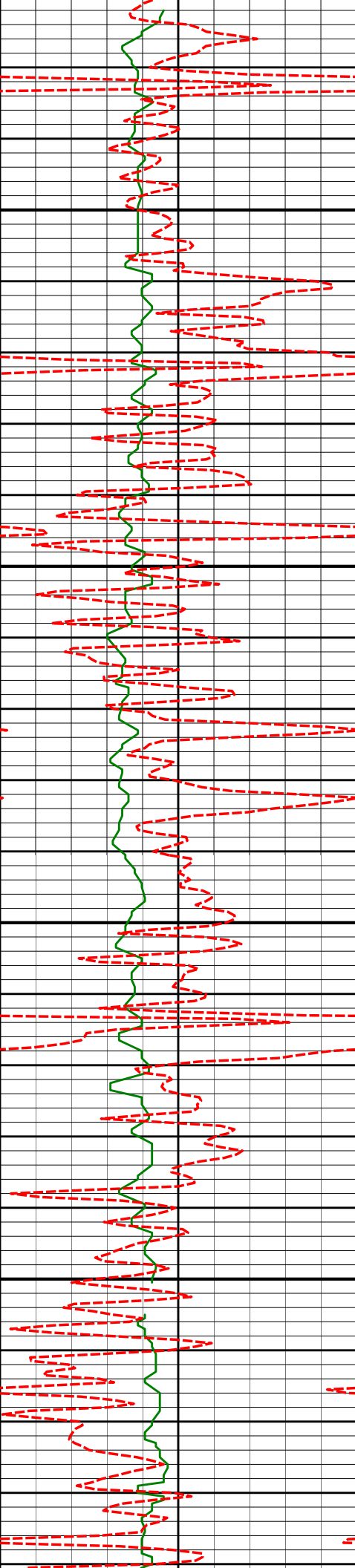
1433'

0.62°

346.00°

1432.93'

11.37'



1550

1600

1650

1700

1617'

0.65°

342.14°

1616.92'

13.33'

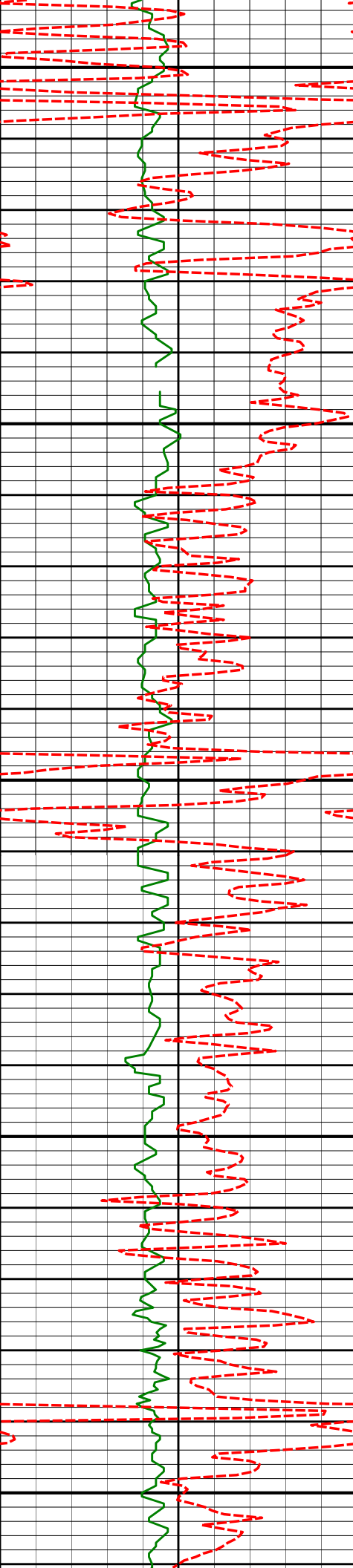
1708'

0.77°

346.30°

1707.91'

14.41'



1750

1800

1850

1900

1950

1800'

0.91°

335.43°

1799.90'

15.68'

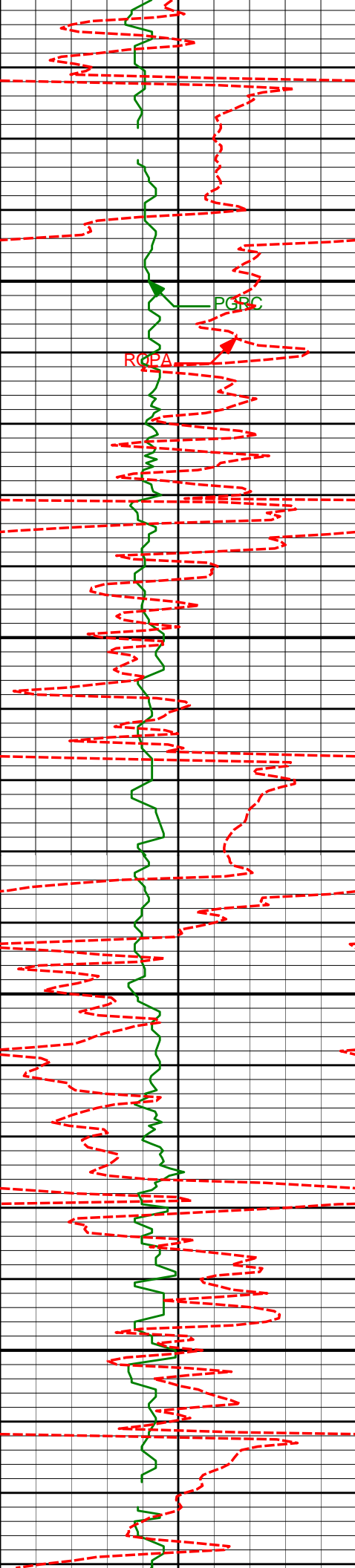
1891'

0.90°

326.65°

1890.89'

16.93'



2000

2050

2100

2150

1986'

1.19°

152.29°

1985.89'

16.68'

2081'

3.59°

138.98°

2080.80'

13.57'

2176'

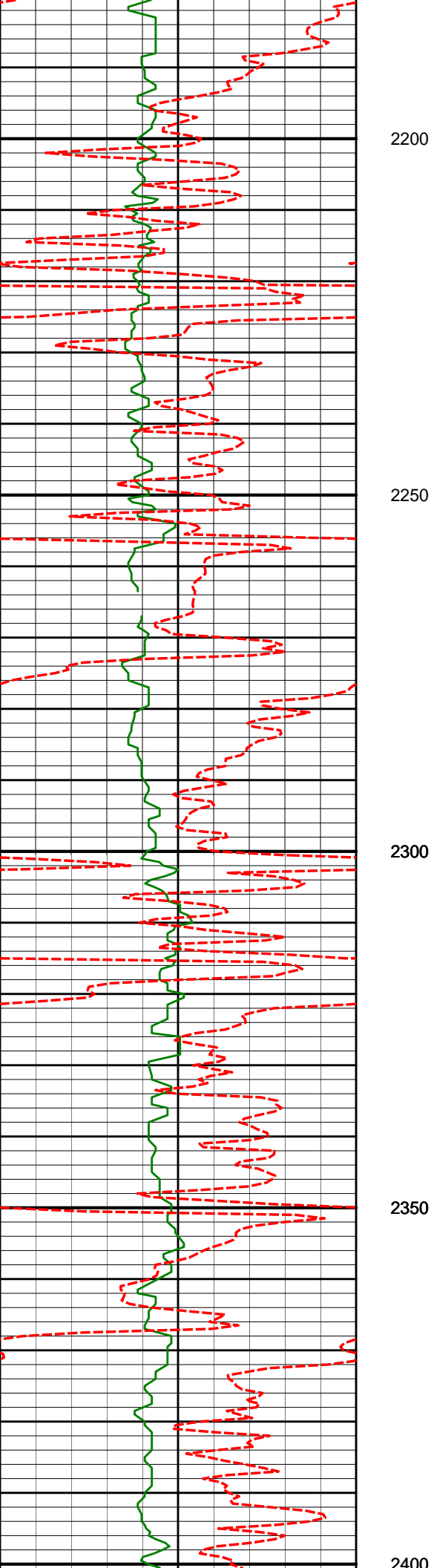
5.65°

145.37°

2175.48'

7.48'





2200

2250

2300

2350

2400

2272'

7.53°

141.68°

2270.84'

-1.34'

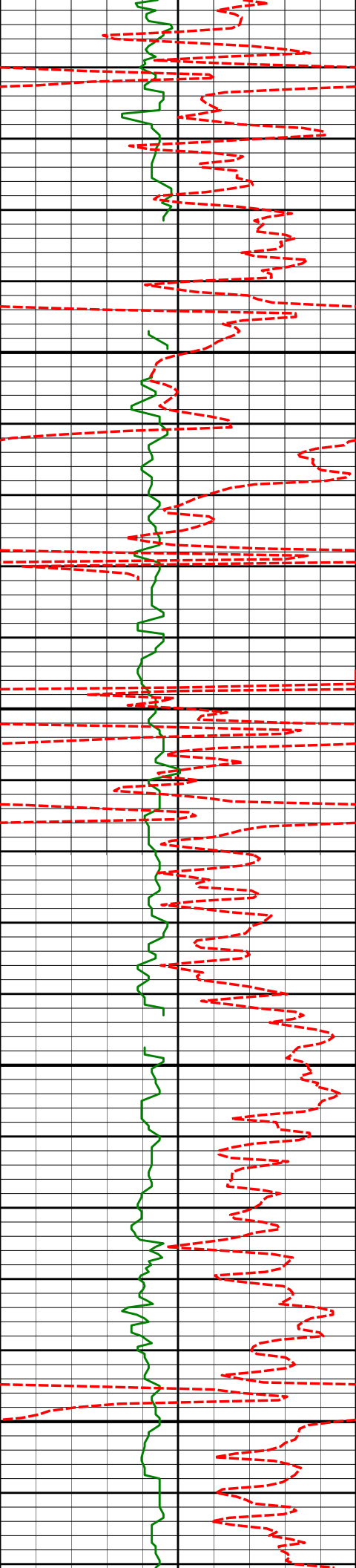
2367'

9.21°

143.56°

2364.83'

-12.33'



2450

2462'

11.00°

141.60°

2458.35'

-25.54'

2500

2550

2557'

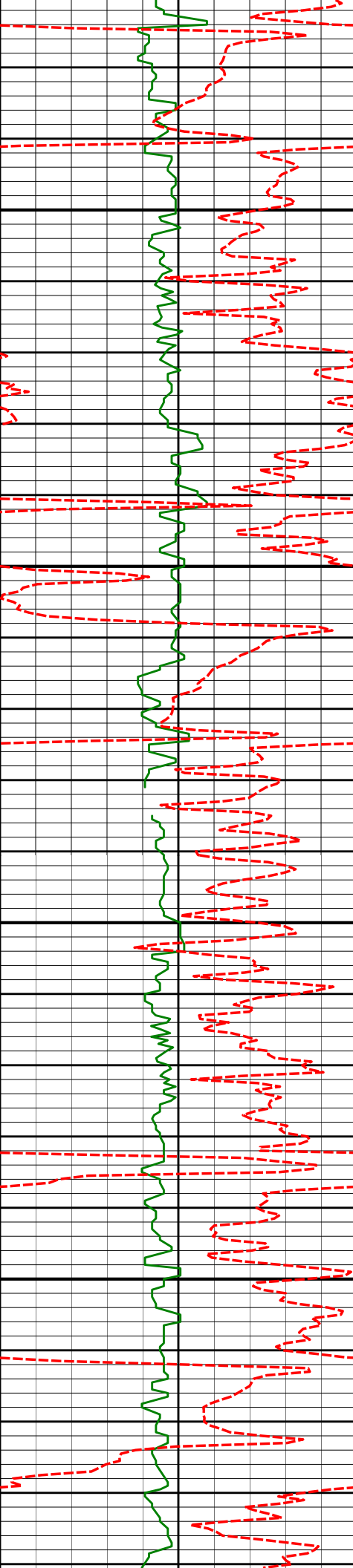
9.37°

139.94°

2551.85'

-38.56'

2600



2650

2700

2750

2800

2652'

10.37°

144.64°

2645.45'

-51.44'

2747'

11.31°

145.99°

2738.75'

-66.13'

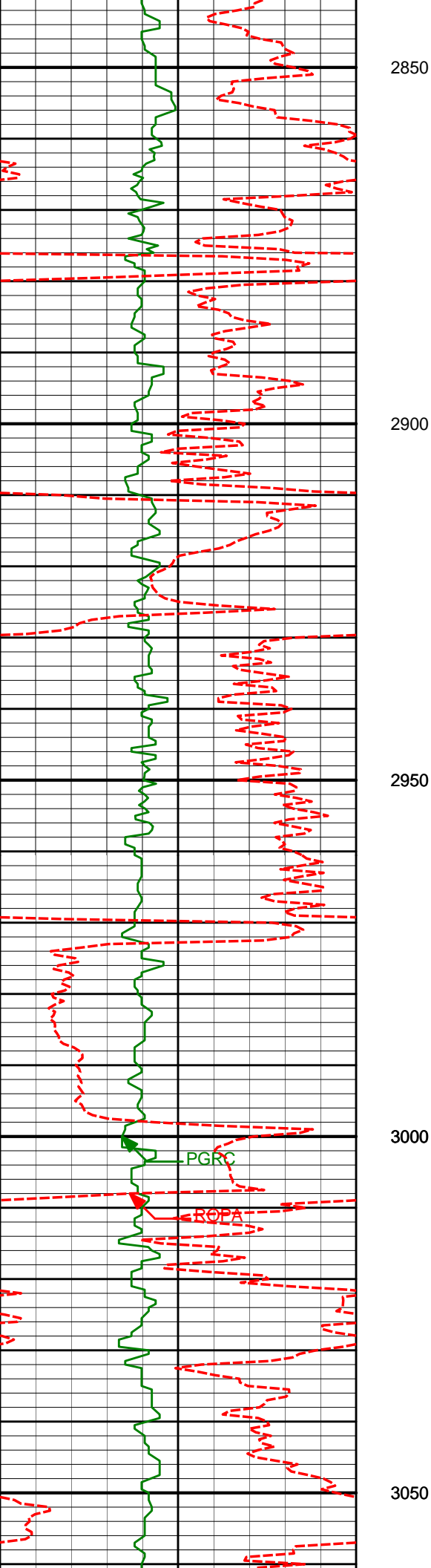
2842'

10.80°

145.92°

2831.99'

-81.21'



2850

2900

2950

3000

3050

2937'

11.85°

141.67°

2925.14'

-96.23'

PGRC

ROPA

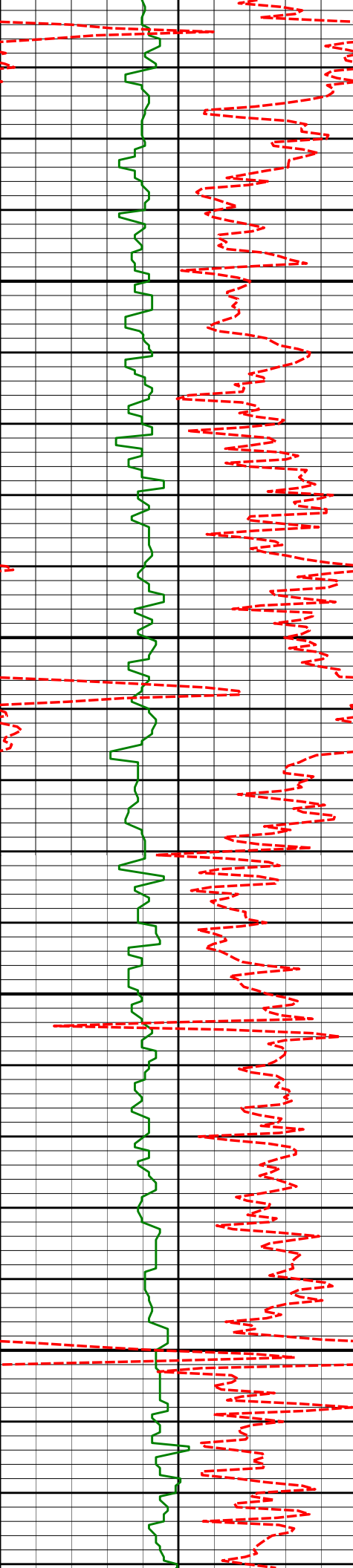
3032'

13.28°

139.45°

3017.86'

-112.16'



3100

3127'

13.05°

139.27°

3110.36'

-128.57'

3150

3200

3223'

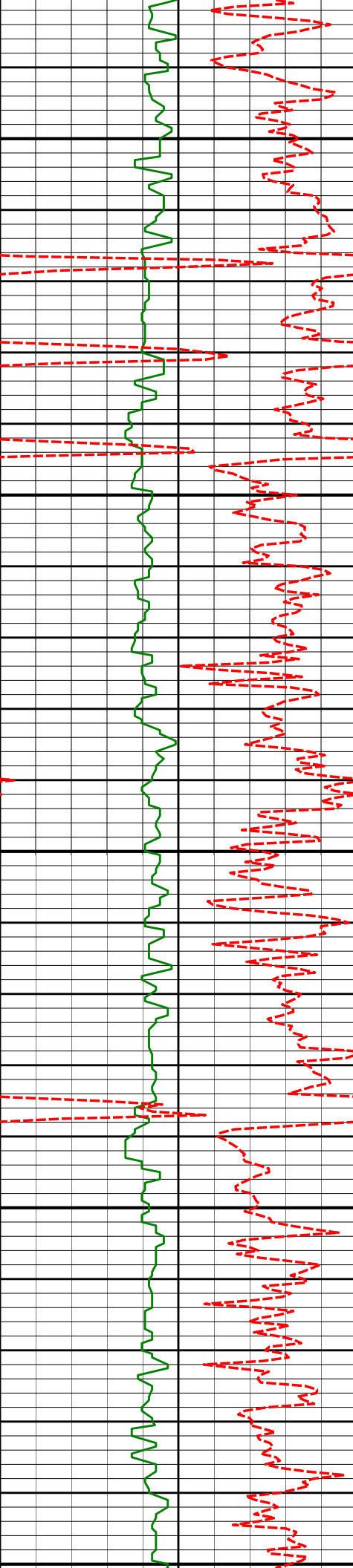
12.76°

138.73°

3203.94'

-144.74'

3250



3300

3318'

11.62°

138.89°

3296.80'

-159.82'

3350

3413'

11.15°

140.09°

3389.93'

-174.06'

3400

3450

3508'

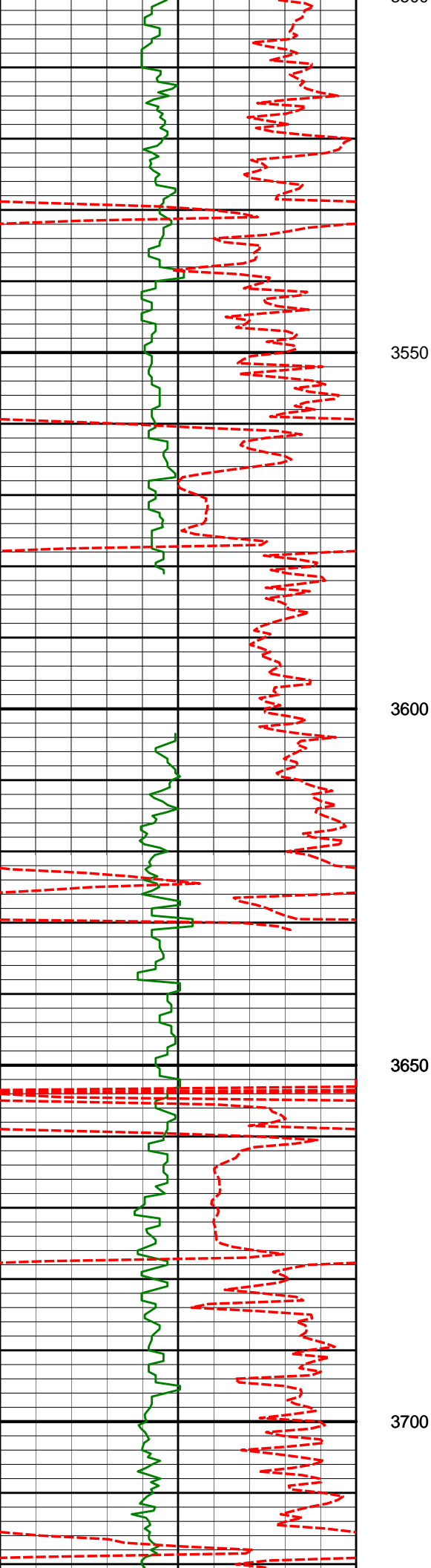
9.73°

141.86°

3483.35'

-187.41'

3500



3603'

9.09°

137.52°

3577.07'

-199.25'

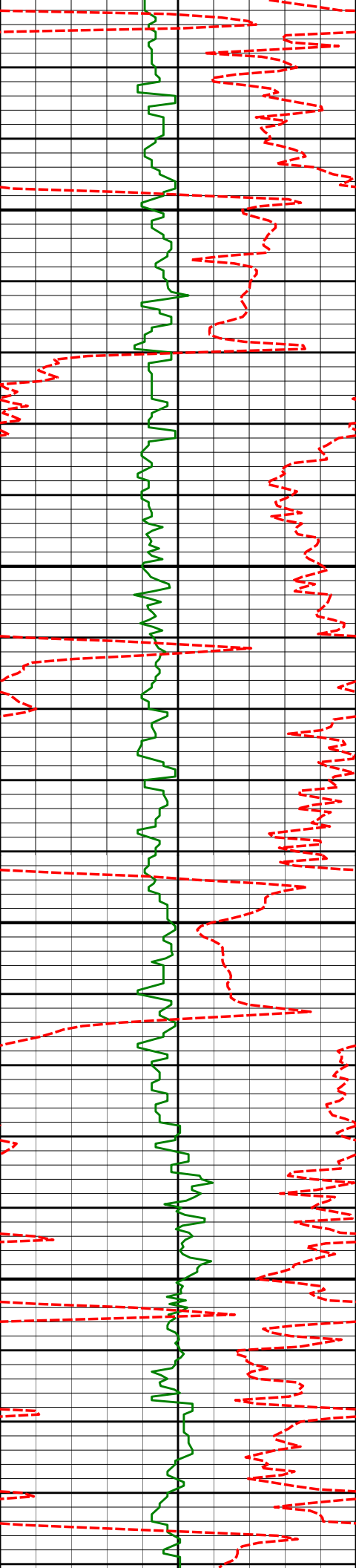
3698'

9.12°

141.85°

3670.88'

-210.70'



3750

3793'

10.80°

145.51°

3764.44'

-223.95'

3800

3850

3888'

10.31°

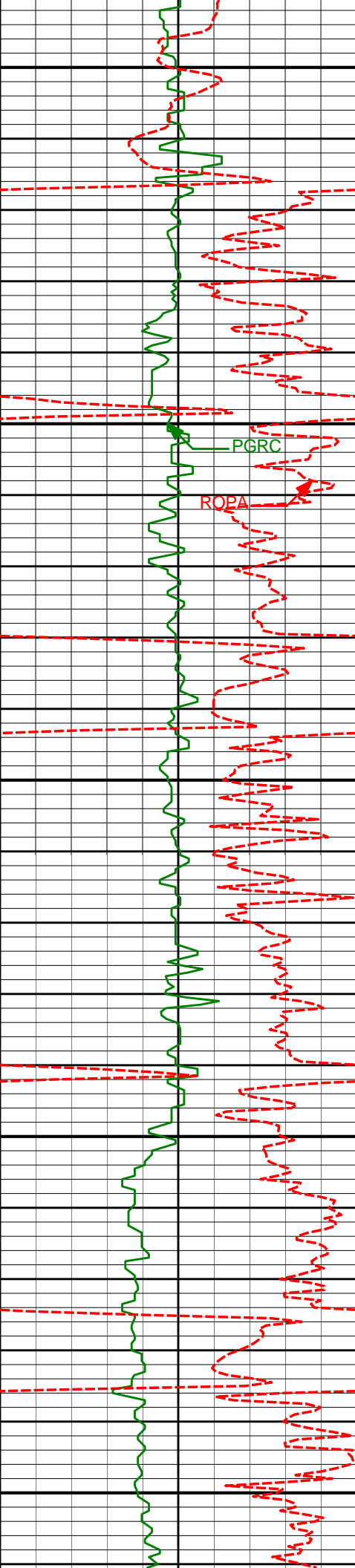
145.20°

3857.84'

-238.26'

3900





3950

3984'

10.98°

154.73°

3952.19'

-253.57'

4000

PGR

ROPA

4050

4079'

11.46°

150.81°

4045.38'

-269.99'

4100

4174'

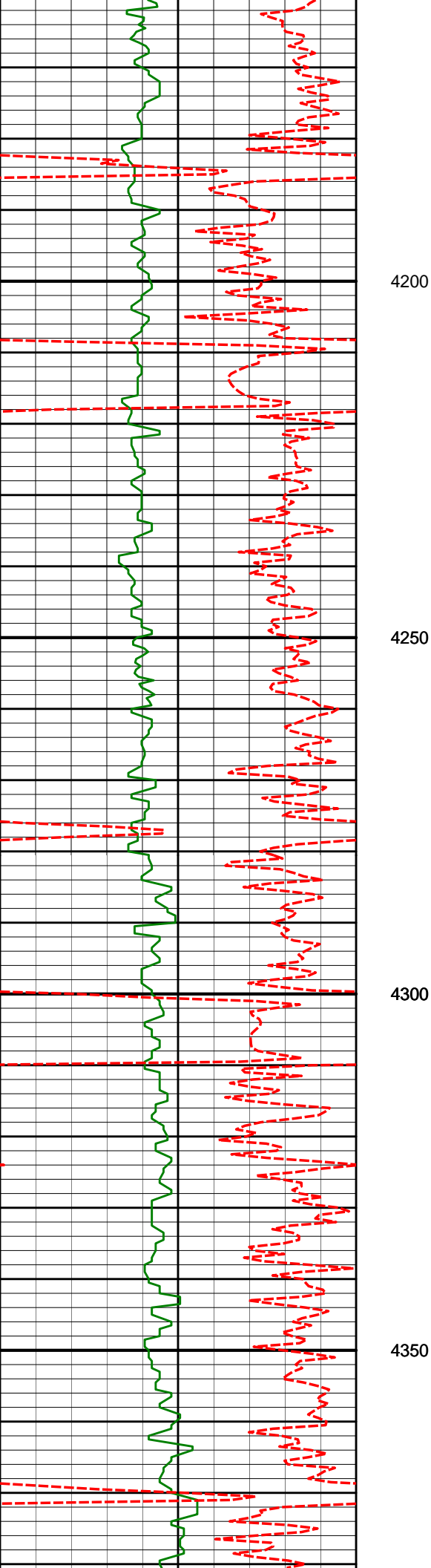
11.72°

150.73°

4138.44'

-286.63'

4150



4269'

12.70°

145.22°

4231.29'

-303.62'

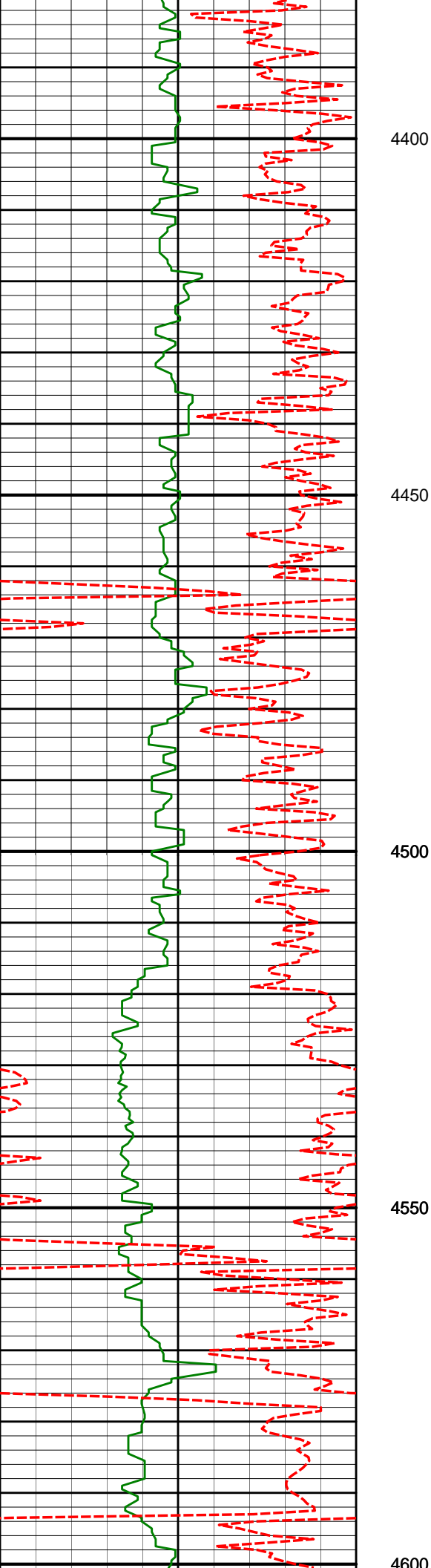
4364'

12.30°

139.69°

4324.04'

-319.90'



4459'

11.57°

141.80°

4416.99'

-335.10'

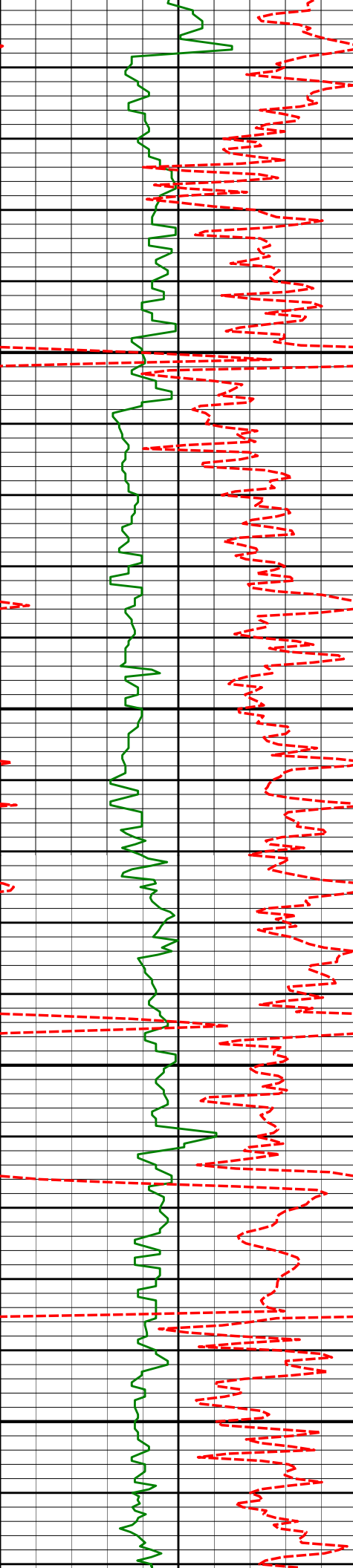
4554'

9.81°

141.63°

4510.34'

-348.92'



4650

4650

4700

4750

4800

4650'

10.42°

137.81°

4604.85'

-361.75'

4745'

9.38°

137.35°

4698.43'

-373.80'

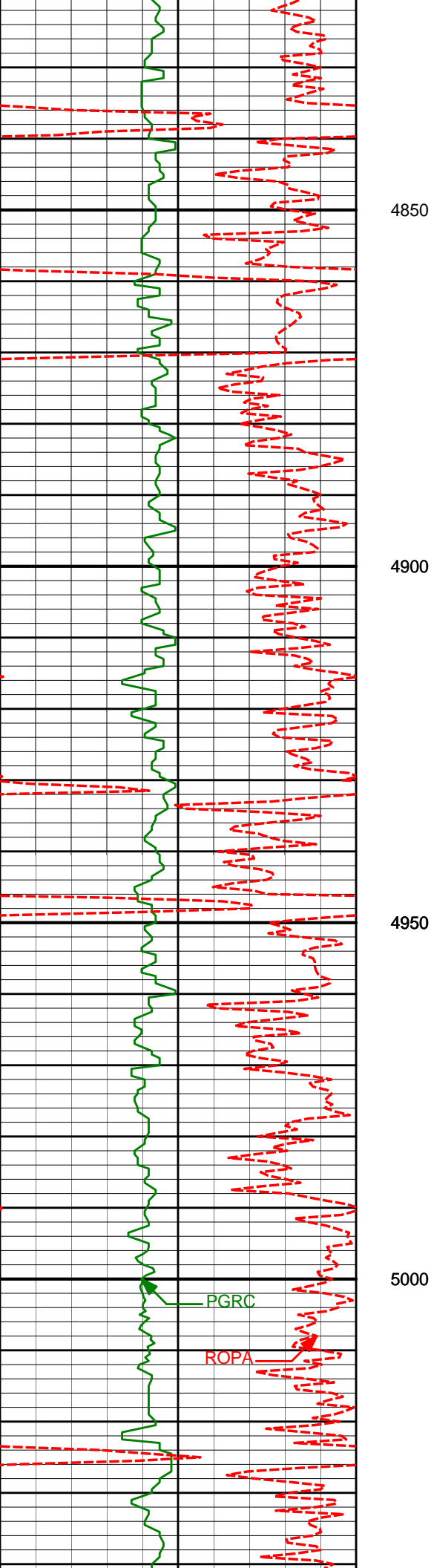
4840'

10.74°

137.28°

4791.97'

-385.99'



4935'

11.66°

138.31°

4885.16'

-399.65'

4850

4900

4950

5000

PGRC

ROPA

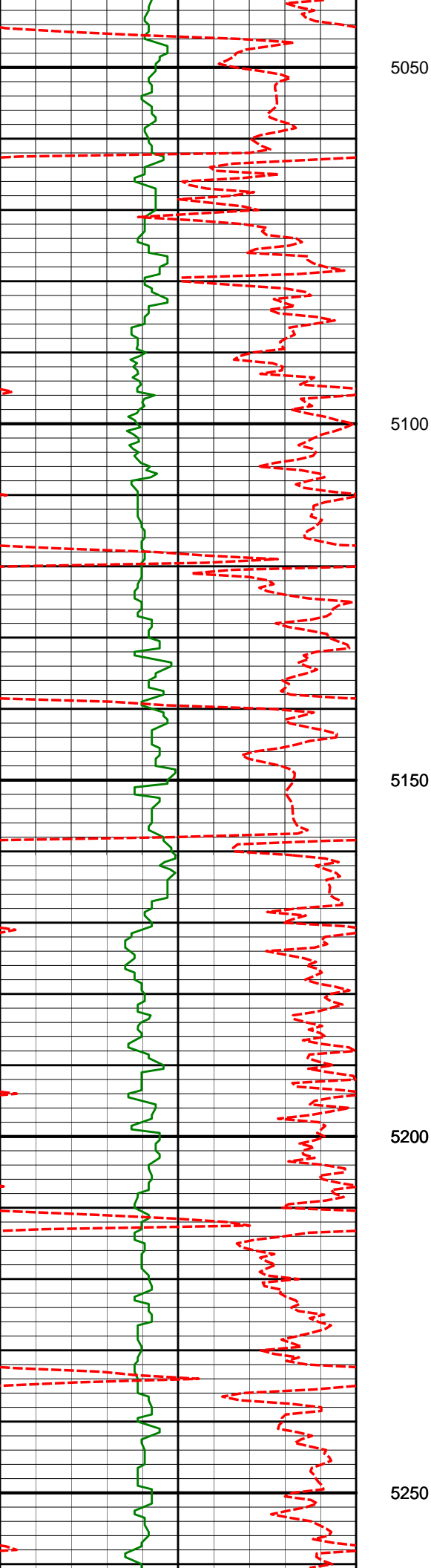
5030'

9.87°

135.93°

4978.48'

-412.66'



5125'

10.15°

136.82°

5072.04'

-424.61'

5220'

10.96°

139.69°

5165.43'

-437.59'

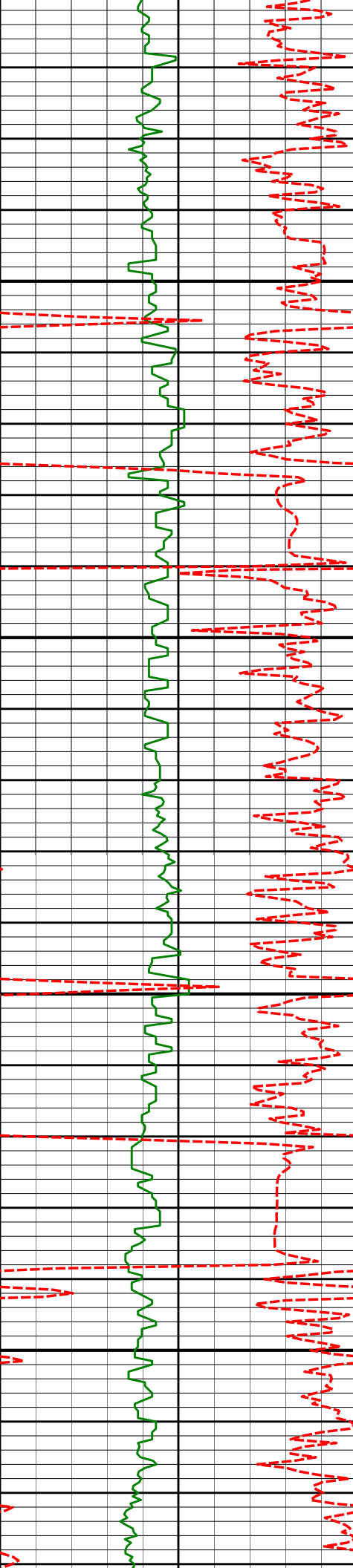
5315'

10.61°

141.28°

5258.75'

-451.29'



5300

5350

5400

5450

5411'

10.13°

135.33°

5353.18'

-464.18'

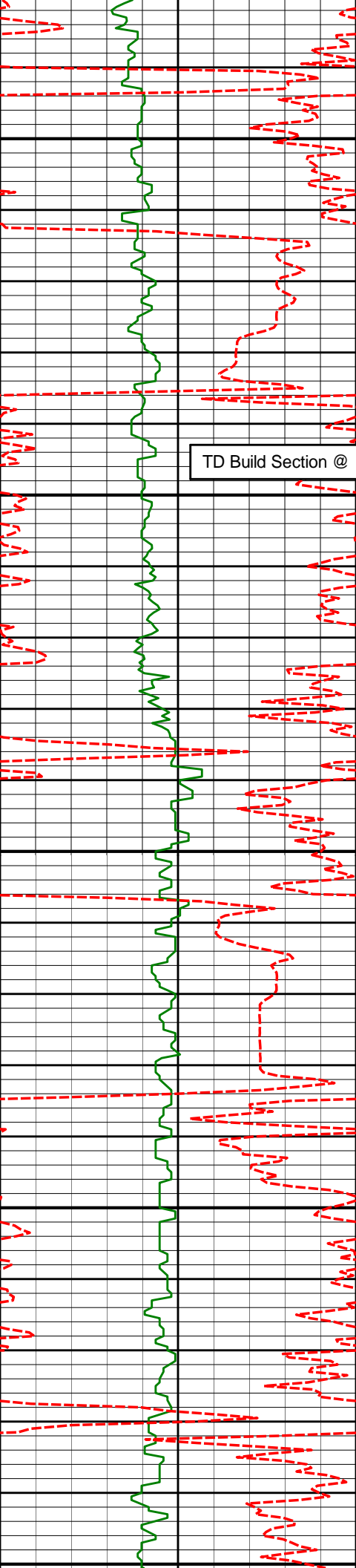
5506'

10.17°

142.54°

5446.70'

-476.77'



5500

5601'

10.66°

132.77°

5540.14'

-489.38'

TD Build Section @ 7813.50' MD / ' TVD

5550

5600

5696'

10.98°

132.84°

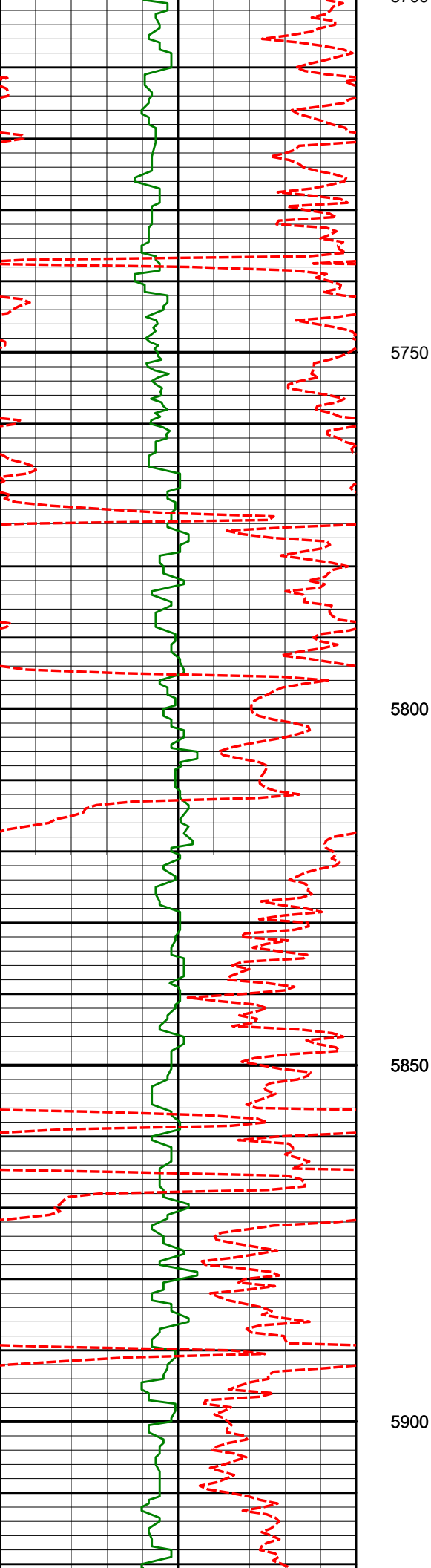
5633.45'

-501.49'

5650

5700





5791'

9.41°

133.78°

5726.95'

-513.00'

5750

5800

5886'

8.36°

142.06°

5820.81'

-523.82'

5850

5900

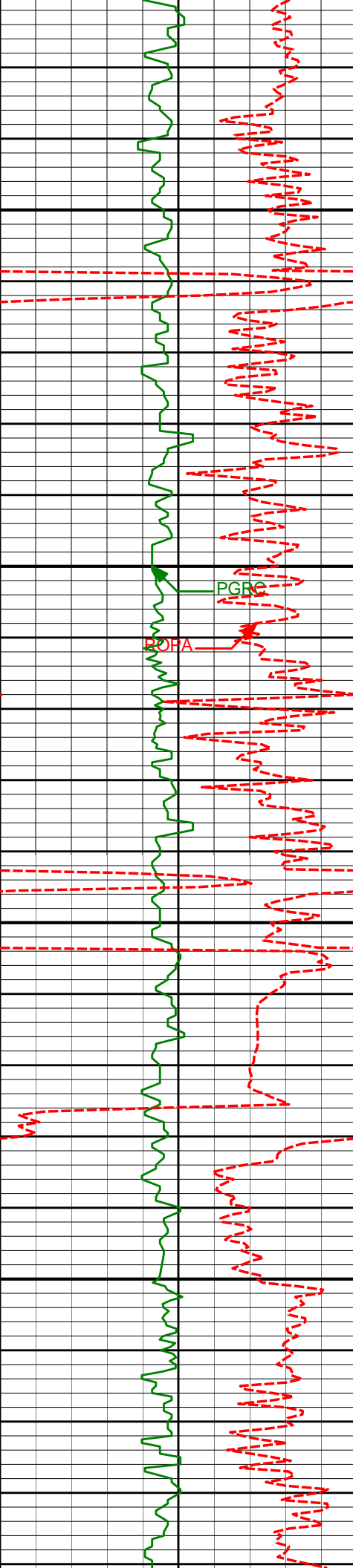
5981'

7.37°

143.24°

5914.92'

-534.14'



5950

6000

PGRC

POFA

6050

6100

6076'

6.33°

138.33°

6009.24'

-542.93'

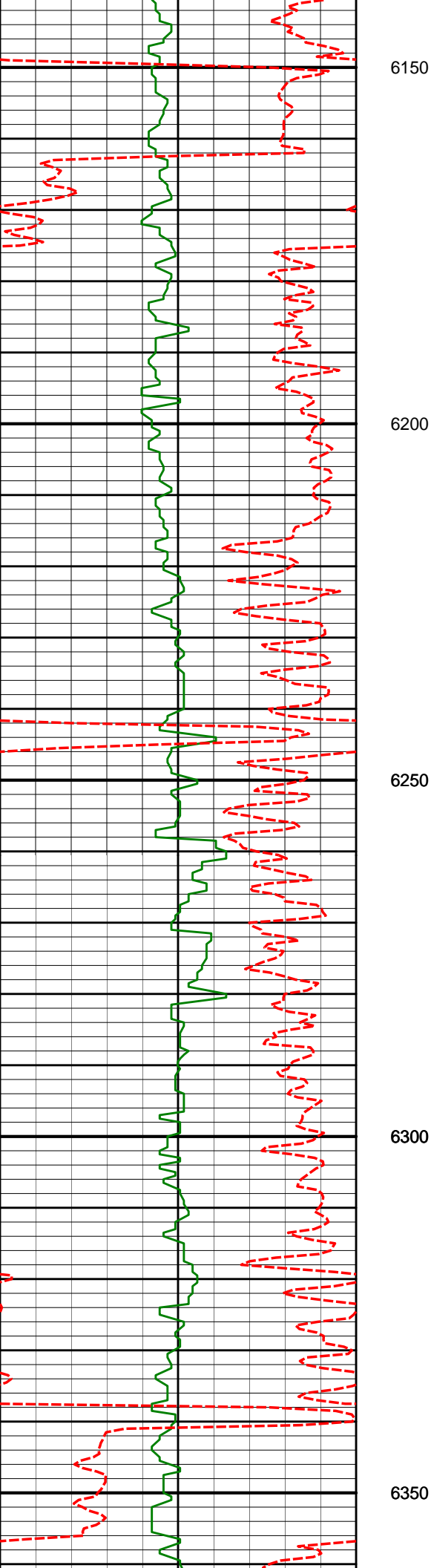
6171'

7.23°

144.57°

6103.58'

-551.70'



6266'

6.78°

135.33°

6197.87'

-560.56'

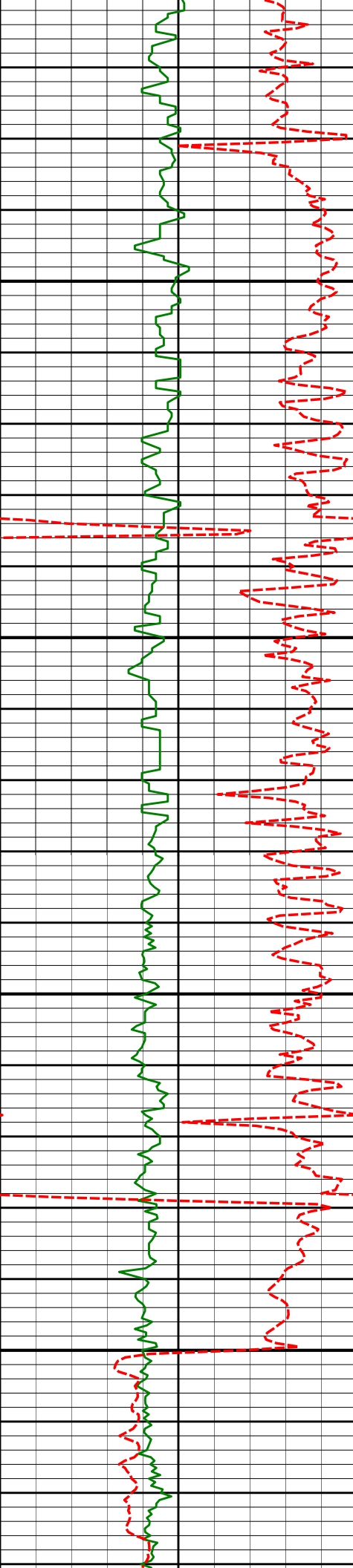
6362'

4.97°

133.76°

6293.36'

-567.46'



6400

6450

6500

6550

6457'

4.35°

133.34°

6388.05'

-572.77'

6552'

3.52°

133.06°

6482.82'

-577.23'

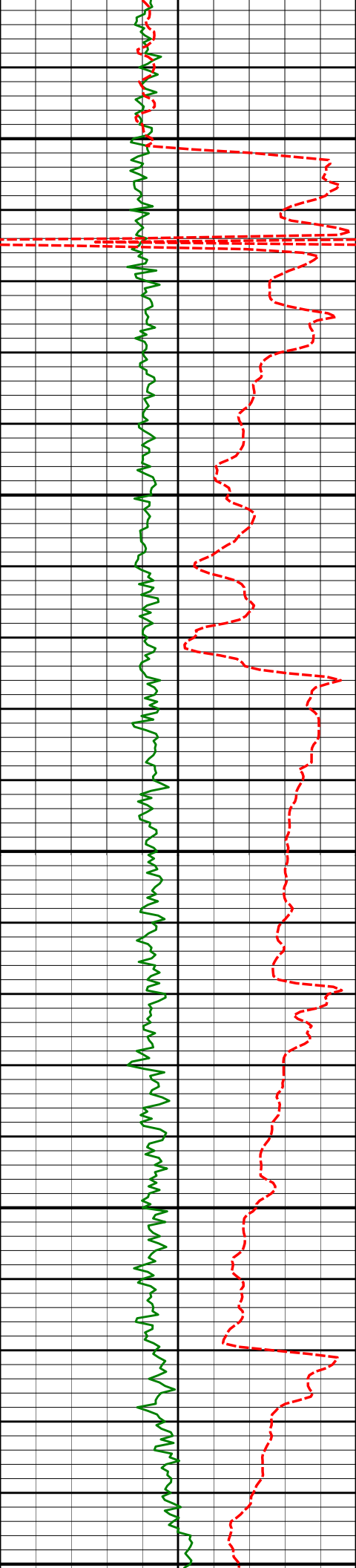
6647'

1.90°

111.04°

6577.72'

-579.78'



6600

6695'

1.09°

56.85°

6625.70'

-579.82'

6650

6742'

5.25°

4.48°

6672.62'

-577.43'

6700

6790'

10.89°

2.46°

6720.13'

-570.70'

6750

6837'

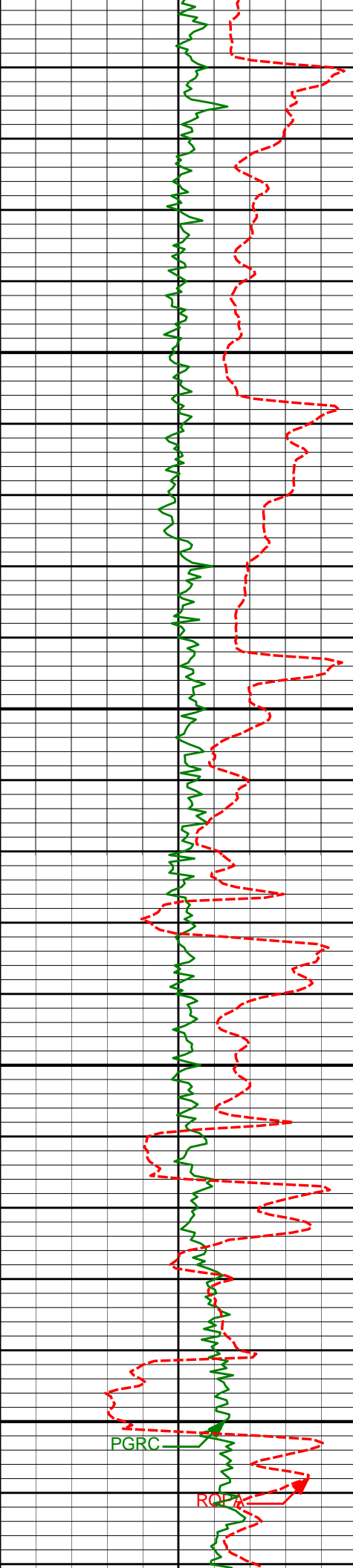
16.34°

359.54°

6765.79'

-559.65'

6800



6850  
6850  
6900  
6900  
6950  
6950  
7000  
7000

6885'  
6932'  
6980'  
7027'  
7075'  
7122'

23.03°  
28.46°  
34.76°  
39.54°  
43.00°  
46.31°

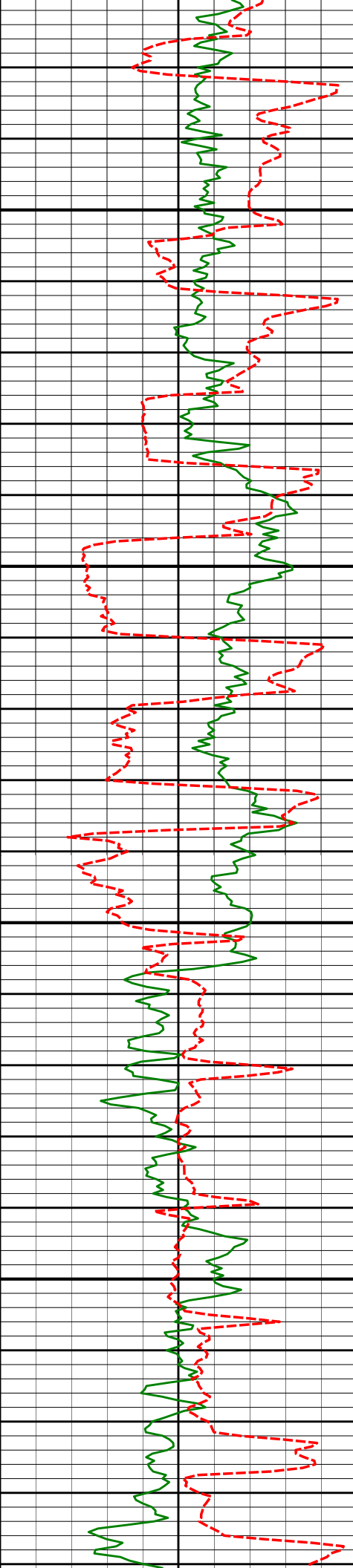
357.90°  
359.34°  
1.30°  
0.12°  
0.16°  
358.70°

6810.96'  
6853.28'  
6894.14'  
6931.59'  
6967.66'  
7001.09'

-543.50'  
-523.10'  
-497.95'  
-469.58'  
-437.92'  
-404.90'

PGRC

RO



7050

7100

7150

7200

7170'

50.78°

358.81°

7032.86'

-368.94'

7217'

55.66°

359.99°

7061.00'

-331.31'

7265'

59.32°

1.99°

7086.79'

-290.85'

7312'

61.53°

3.46°

7109.99'

-250.02'

7360'

64.33°

4.51°

7131.83'

-207.39'

7407'

65.91°

5.01°

7151.60'

-164.90'

7455'

66.97°

5.02°

7170.79'

-121.06'

7502'

68.08°

5.45°

7188.76'

-77.81'

7550'

69.31°

5.63°

7206.20'

-33.30'

7597'

70.45°

5.59°

7222.36'

10.63'

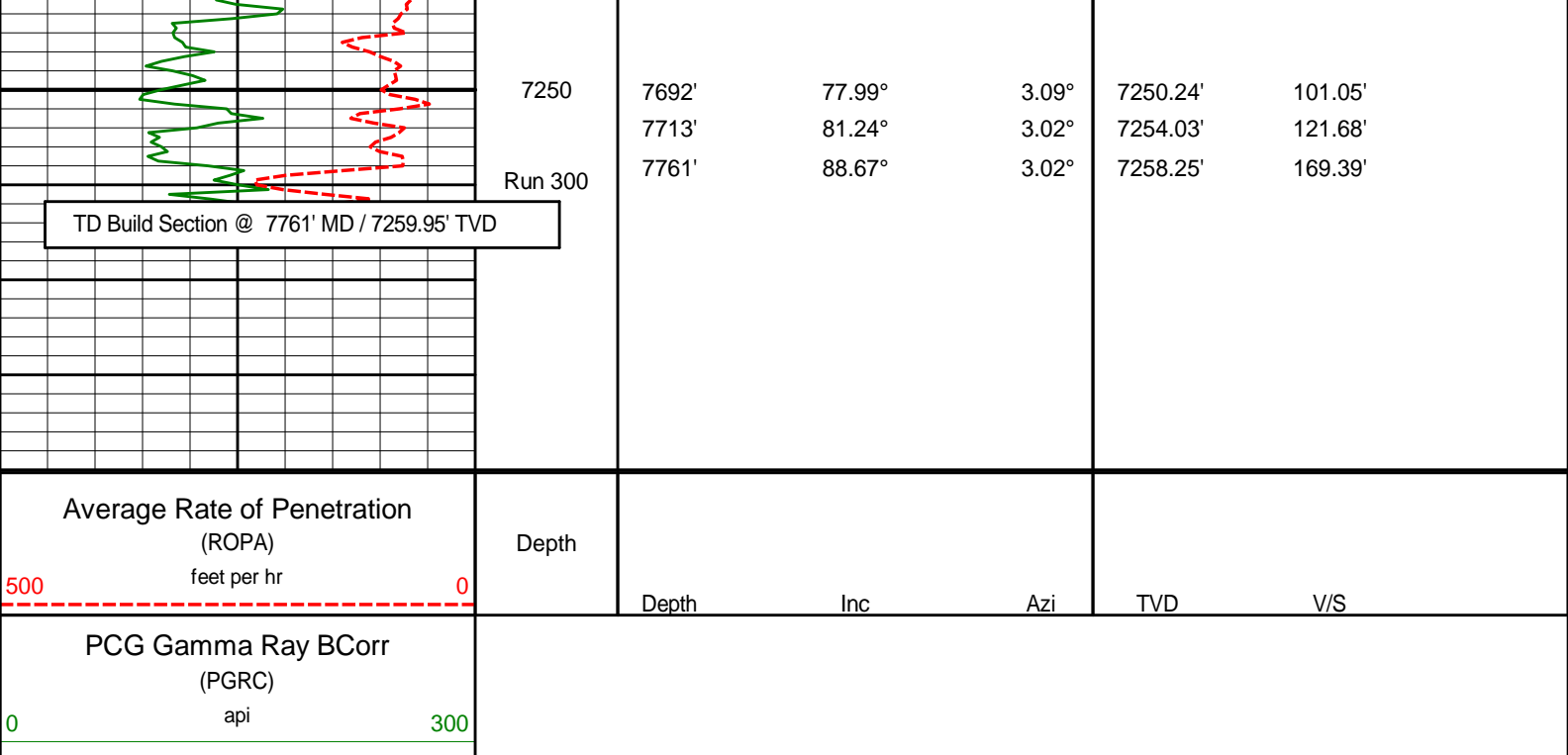
7645'

71.66°

5.16°

7237.95'

55.83'



**HALLIBURTON**

### DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation  
 USA Fed 28N-36HZ  
 Wattenberg  
 Weld Colorado  
 USA  
 CA-XX-0900512978

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
236.00	0.44	351.96	236.00	0.90 N	0.13 W	0.90	0.19
360.00	0.35	356.32	359.99	1.75 N	0.22 W	1.75	0.08
451.00	0.49	339.56	450.99	2.39 N	0.37 W	2.39	0.20
545.00	0.52	348.96	544.99	3.18 N	0.59 W	3.18	0.09
638.00	0.83	341.51	637.98	4.24 N	0.89 W	4.24	0.35
731.00	0.58	329.53	730.98	5.28 N	1.34 W	5.28	0.31
825.00	0.90	305.50	824.97	6.12 N	2.18 W	6.12	0.47
917.00	0.85	301.99	916.96	6.90 N	3.35 W	6.90	0.08
1066.00	0.55	331.25	1065.95	8.11 N	4.63 W	8.11	0.31
1158.00	0.56	357.05	1157.94	8.95 N	4.87 W	8.95	0.27
1250.00	0.46	345.90	1249.94	9.76 N	4.98 W	9.75	0.15
1341.00	0.50	347.90	1340.93	10.50 N	5.15 W	10.50	0.05
1433.00	0.62	346.00	1432.93	11.38 N	5.36 W	11.37	0.13
1617.00	0.65	342.14	1616.92	13.33 N	5.92 W	13.33	0.03
1708.00	0.77	346.30	1707.91	14.42 N	6.22 W	14.41	0.14
1800.00	0.91	335.43	1799.90	15.68 N	6.67 W	15.68	0.23
1891.00	0.90	326.65	1890.89	16.94 N	7.36 W	16.93	0.15
1986.00	1.19	152.29	1985.89	16.69 N	7.32 W	16.68	2.20
2081.00	3.59	138.98	2080.80	13.57 N	4.90 W	13.57	2.58
2176.00	5.65	145.37	2175.48	7.48 N	0.29 W	7.48	2.23
2272.00	7.53	141.68	2270.84	1.35 S	6.29 E	-1.34	2.01
2367.00	9.21	143.56	2364.83	12.35 S	14.67 E	-12.33	1.79
2462.00	11.00	141.60	2458.35	25.57 S	24.81 E	-25.54	1.92
2557.00	9.37	139.94	2551.85	38.59 S	35.42 E	-38.56	1.74
2652.00	10.37	144.64	2645.45	51.48 S	45.35 E	-51.44	1.35
2747.00	11.31	145.99	2738.75	66.18 S	55.51 E	-66.13	1.02
2842.00	10.80	145.92	2831.99	81.27 S	65.70 E	-81.21	0.54
2937.00	11.85	141.67	2925.14	96.30 S	76.74 E	-96.23	1.41
3032.00	12.88	138.45	3017.86	112.34 S	88.82 E	-112.46	1.59



3032.00	13.28	139.45	3017.86	112.24 S	89.89 E	-112.16	1.59
3127.00	13.05	139.27	3110.36	128.66 S	103.98 E	-128.57	0.25
3223.00	12.76	138.73	3203.94	144.84 S	118.04 E	-144.74	0.33
3318.00	11.62	138.89	3296.80	159.93 S	131.25 E	-159.82	1.20
3413.00	11.15	140.09	3389.93	174.19 S	143.44 E	-174.06	0.55
3508.00	9.73	141.86	3483.35	187.55 S	154.29 E	-187.41	1.53
3603.00	9.09	137.52	3577.07	199.40 S	164.32 E	-199.25	1.01
3698.00	9.12	141.85	3670.88	210.85 S	174.03 E	-210.70	0.72
3793.00	10.80	145.51	3764.44	224.11 S	183.73 E	-223.95	1.89
3888.00	10.31	145.20	3857.84	238.43 S	193.62 E	-238.26	0.52
3984.00	10.98	154.73	3952.19	253.75 S	202.42 E	-253.57	1.96
4079.00	11.46	150.81	4045.38	270.17 S	210.89 E	-269.99	0.95
4174.00	11.72	150.73	4138.44	286.83 S	220.21 E	-286.63	0.27
4269.00	12.70	145.22	4231.29	303.82 S	230.88 E	-303.62	1.60
4364.00	12.30	139.69	4324.04	320.12 S	243.39 E	-319.90	1.33
4459.00	11.57	141.80	4416.99	335.32 S	255.83 E	-335.10	0.90
4554.00	9.81	141.63	4510.34	349.15 S	266.74 E	-348.92	1.85
4650.00	10.42	137.81	4604.85	362.00 S	277.65 E	-361.75	0.94
4745.00	9.38	137.35	4698.43	374.06 S	288.66 E	-373.80	1.10
4840.00	10.74	137.28	4791.97	386.25 S	299.92 E	-385.99	1.43
4935.00	11.66	138.31	4885.16	399.93 S	312.31 E	-399.65	0.99
5030.00	9.87	135.93	4978.48	412.95 S	324.35 E	-412.66	1.94
5125.00	10.15	136.82	5072.04	424.90 S	335.75 E	-424.61	0.34
5220.00	10.96	139.69	5165.43	437.89 S	347.32 E	-437.59	1.02
5315.00	10.61	141.28	5258.75	451.60 S	358.63 E	-451.29	0.48
5411.00	10.13	135.33	5353.18	464.50 S	370.09 E	-464.18	1.22
5506.00	10.17	142.54	5446.70	477.10 S	381.07 E	-476.77	1.34
5601.00	10.66	132.77	5540.14	489.73 S	392.62 E	-489.38	1.93
5696.00	10.98	132.84	5633.45	501.84 S	405.70 E	-501.49	0.34
5791.00	9.41	133.78	5726.95	513.37 S	417.95 E	-513.00	1.66
5886.00	8.36	142.06	5820.81	524.19 S	427.80 E	-523.82	1.74
5981.00	7.37	143.24	5914.92	534.52 S	435.69 E	-534.14	1.06
6076.00	6.33	138.33	6009.24	543.31 S	442.82 E	-542.93	1.26
6171.00	7.23	144.57	6103.58	552.10 S	449.77 E	-551.70	1.22
6266.00	6.78	135.33	6197.87	560.95 S	457.18 E	-560.56	1.28
6362.00	4.97	133.76	6293.36	567.86 S	464.16 E	-567.46	1.89
6457.00	4.35	133.34	6388.05	573.18 S	469.76 E	-572.77	0.65
6552.00	3.52	133.06	6482.82	577.64 S	474.51 E	-577.23	0.87
6647.00	1.90	111.04	6577.72	580.20 S	478.11 E	-579.78	2.00
6695.00	1.09	56.85	6625.70	580.24 S	479.23 E	-579.82	3.21
6742.00	5.25	4.48	6672.62	577.85 S	479.78 E	-577.43	9.93
6790.00	10.89	2.46	6720.13	571.12 S	480.14 E	-570.70	11.76
6837.00	16.34	359.54	6765.79	560.07 S	480.28 E	-559.65	11.68
6885.00	23.03	357.90	6810.96	543.91 S	479.88 E	-543.50	13.98
6932.00	28.46	359.34	6853.28	523.51 S	479.42 E	-523.10	11.63
6980.00	34.76	1.30	6894.14	498.37 S	479.60 E	-497.95	13.30
7027.00	39.54	0.12	6931.59	470.00 S	479.93 E	-469.58	10.28
7075.00	43.00	0.16	6967.66	438.34 S	480.01 E	-437.92	7.21
7122.00	46.31	358.70	7001.09	405.32 S	479.67 E	-404.90	7.37
7170.00	50.78	358.81	7032.86	369.36 S	478.89 E	-368.94	9.31
7217.00	55.66	359.99	7061.00	331.73 S	478.51 E	-331.31	10.58
7265.00	59.32	1.99	7086.79	291.27 S	479.22 E	-290.85	8.40
7312.00	61.53	3.46	7109.99	250.44 S	481.17 E	-250.02	5.43
7360.00	64.33	4.51	7131.83	207.81 S	484.14 E	-207.39	6.15
7407.00	65.91	5.01	7151.60	165.32 S	487.68 E	-164.90	3.50
7455.00	66.97	5.02	7170.79	121.49 S	491.53 E	-121.06	2.21
7502.00	68.08	5.45	7188.76	78.24 S	495.49 E	-77.81	2.51
7550.00	69.31	5.63	7206.20	33.73 S	499.81 E	-33.30	2.59
7597.00	70.45	5.59	7222.36	10.19 N	504.12 E	10.63	2.43
7645.00	71.66	5.16	7237.95	55.39 N	508.37 E	55.83	2.66
7692.00	77.99	3.09	7250.24	100.60 N	511.62 E	101.05	14.12
7713.00	81.24	3.02	7254.03	121.23 N	512.72 E	121.68	15.48
7761.00	88.67	3.02	7258.25	168.94 N	515.24 E	169.39	15.48

**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 0.05 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7761.00 FEET  
IS 542.23 FEET ALONG 71.85 DEGREES (TRUE)

All directional surveys tied onto surface. Final survey is a straight-line projection to the bit.

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