



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	20-Dec-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	4.750				
Log Start Depth (MD, ft)	641.00				
Log End Depth (MD, ft)	6,284.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	18-Dec-15 15:30				
Drill/Wipe End Date and Time	20-Dec-15 04:45				
Min Inc (deg) @ Depth (MD, ft)	0.06 @ 1,682.00				
Max Inc (deg) @ Depth (MD, ft)	90.00 @ 6,284.00				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	578.37				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	9.80 / 42.00				
Filtrate CL (ppm)	1,400.00				
pH / Fluid Loss (mptm)	9.10 / 6				
PV (cP) / YP (lhf2)	13 / 13.00				
% Solids / % Sand	5.7 / 0.15				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Max Tool Temp (degF) / S	150.45 / PDC				

Max Tool Temp (degF) / Source	158.47 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Matt Busche				
Customer Representative	Johnny Sanchez				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404299				
Insert Serial Number	11145577				
Date and Time Initialized	18-Dec-15 01:52				
Date and Time Read	20-Dec-15 09:44				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	56.00				
Software Version	6.33				
Sub Serial Number	11404299				
Sonde Serial Number	11902176				
Sensor ID Number	N/A				
Toolface Offset (deg)	238.40				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	49.13				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404299				
Insert/Sonde Serial Number	11681003				

REMARKS

1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.

2. No depth corrections have been made for pipe stretch or compression.

3. All data presented is recorded (memory data) unless otherwise stated.

4. Environmental parameters used in gamma and resistance processing:

Hole Size: 8.75"

Mud Density: 8.75-10.7ppg

5. The following smoothing parameters have been applied to the data:

1:600 (2"):

Interval: 1.0 ft

Coercion Distance: 3.0 ft (ROPA)

Interval: 1.0 ft

Coercion Distance: 3.0 ft (Gamma Ray)

1:240 (5")

Interval: 0.5 ft

Coercion Distance: 1.2 ft (ROPA)

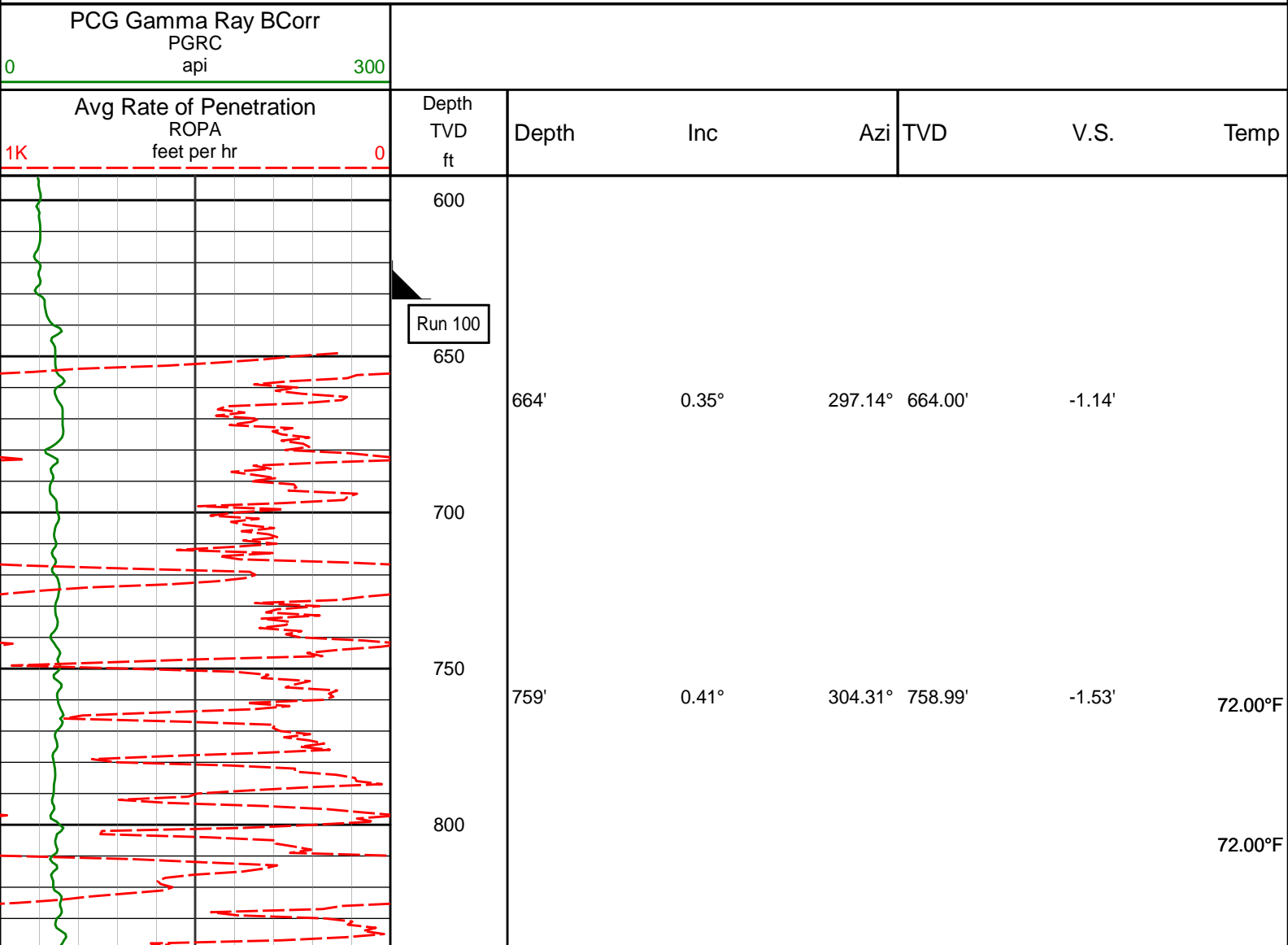
Interval: 0.5 ft

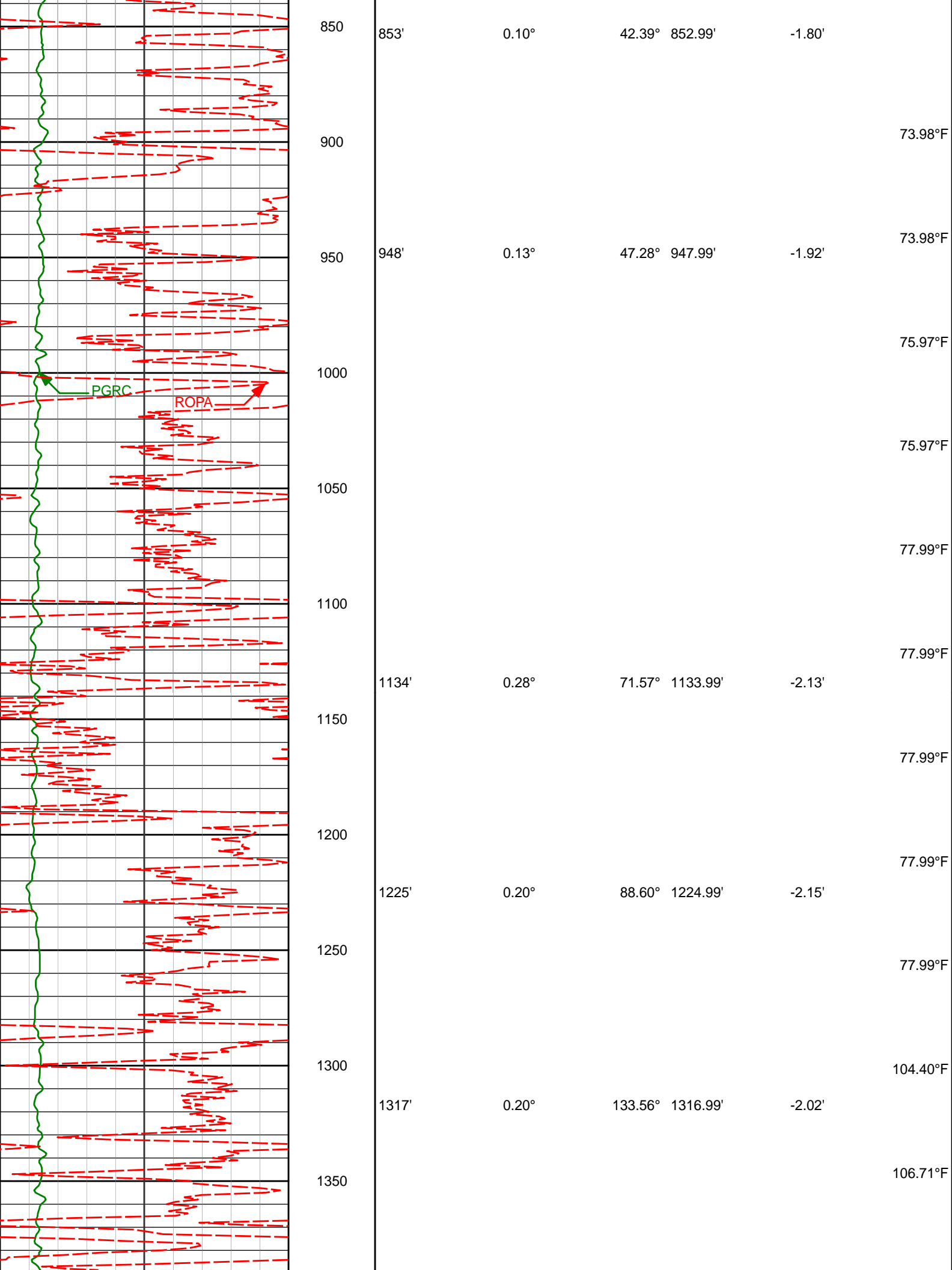
Coercion Distance: 0.6 ft (Gamma Ray)

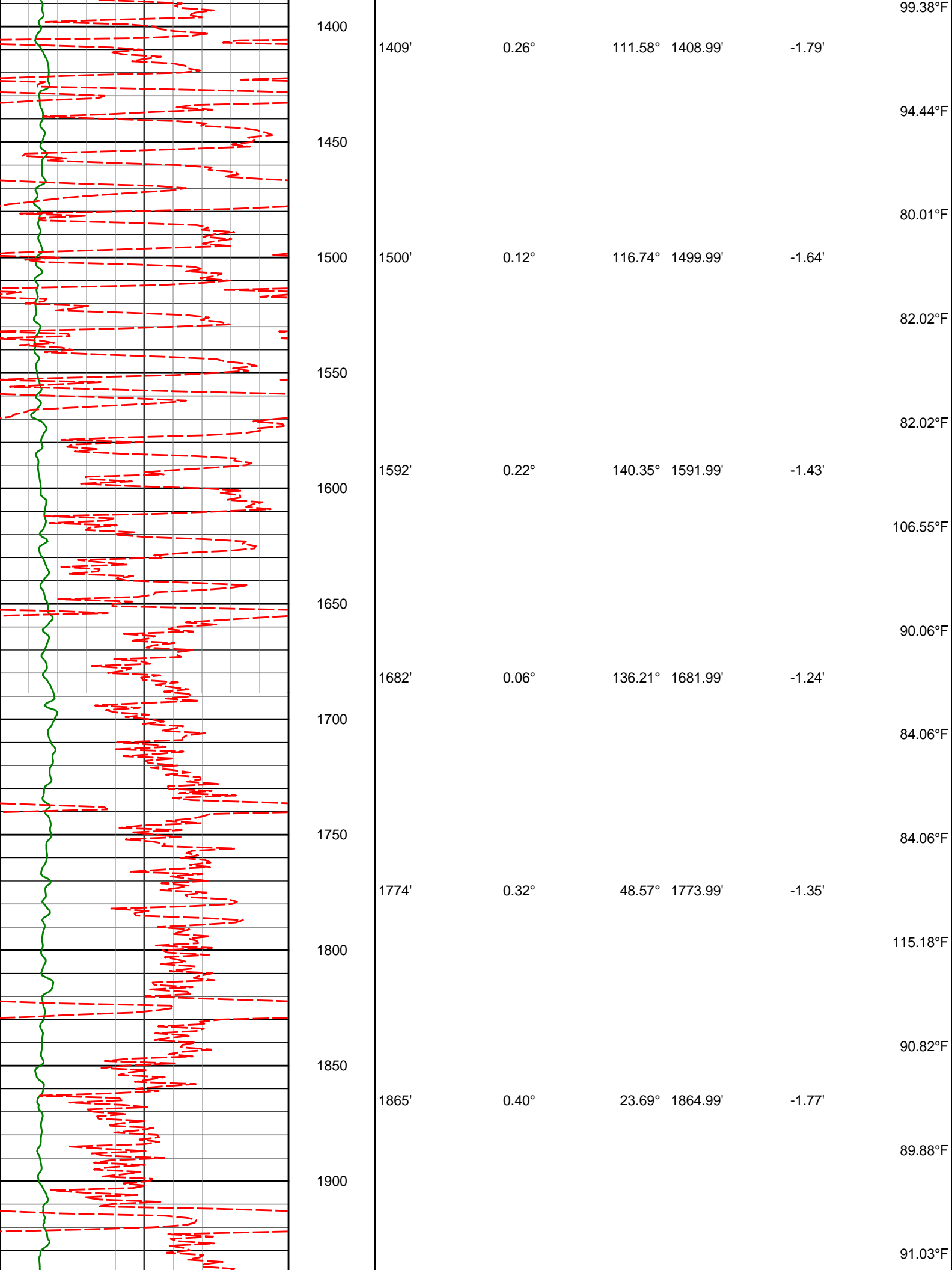
WARRANTY

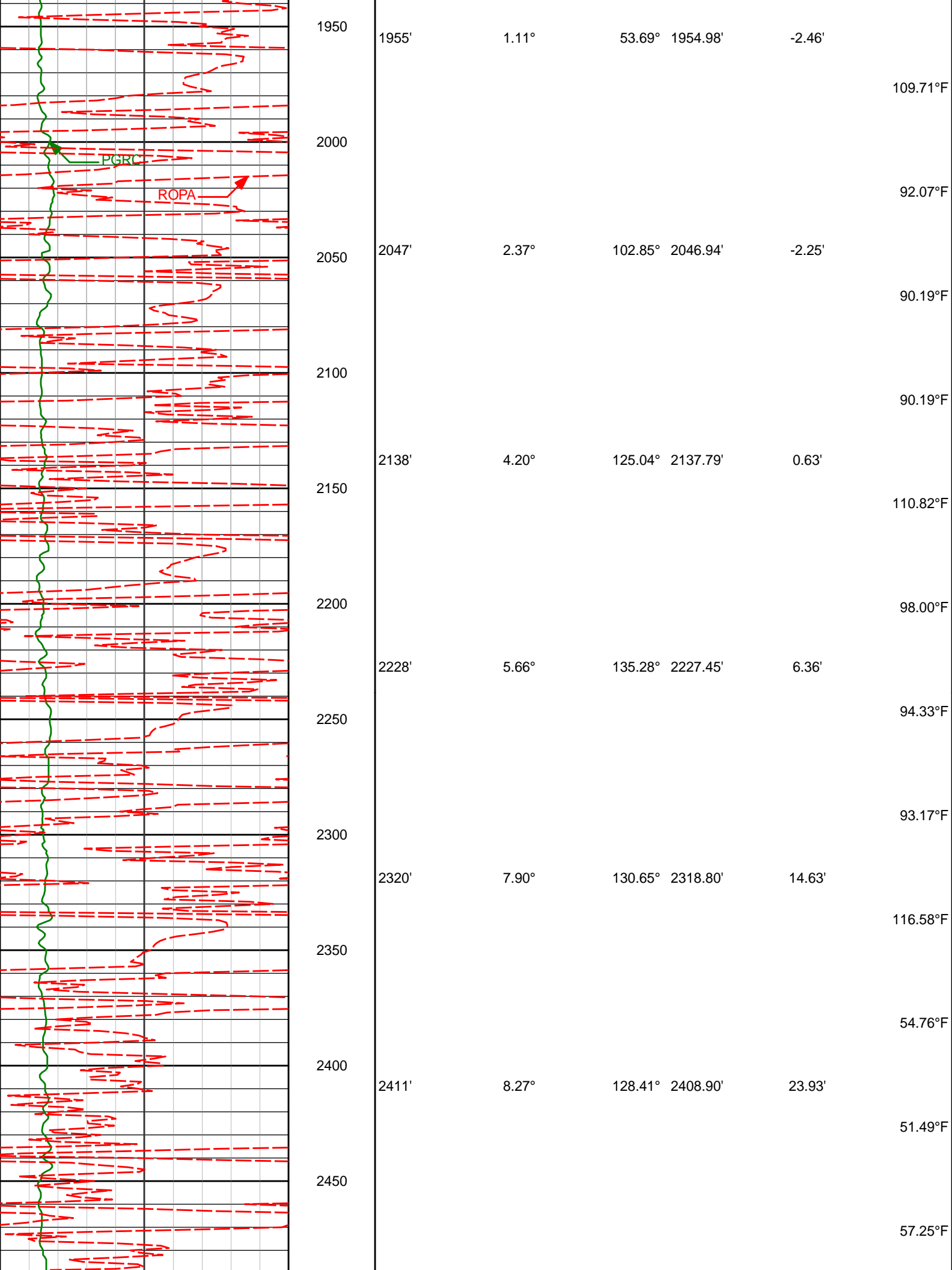
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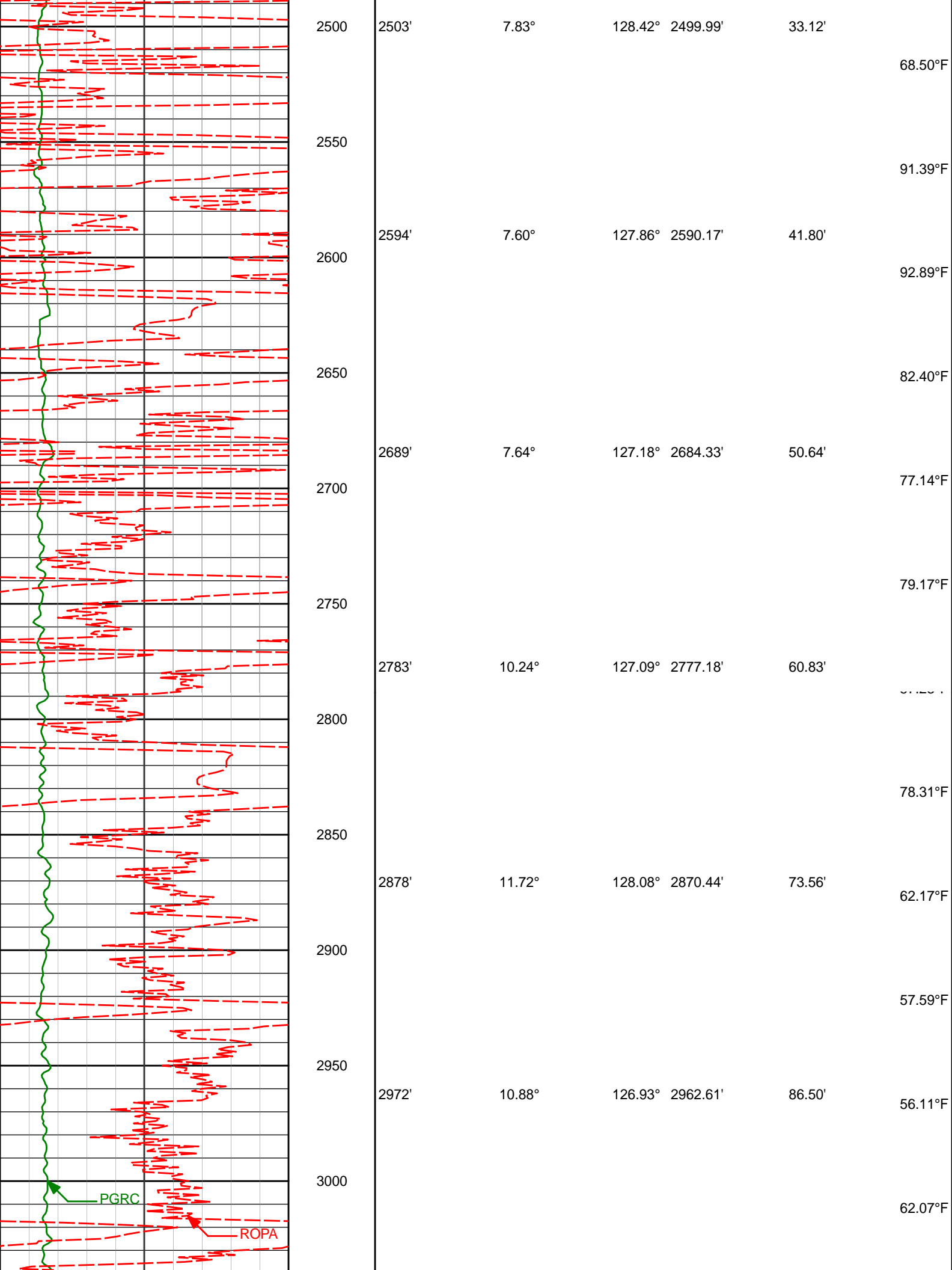
TVD Detail 1:600 Scale

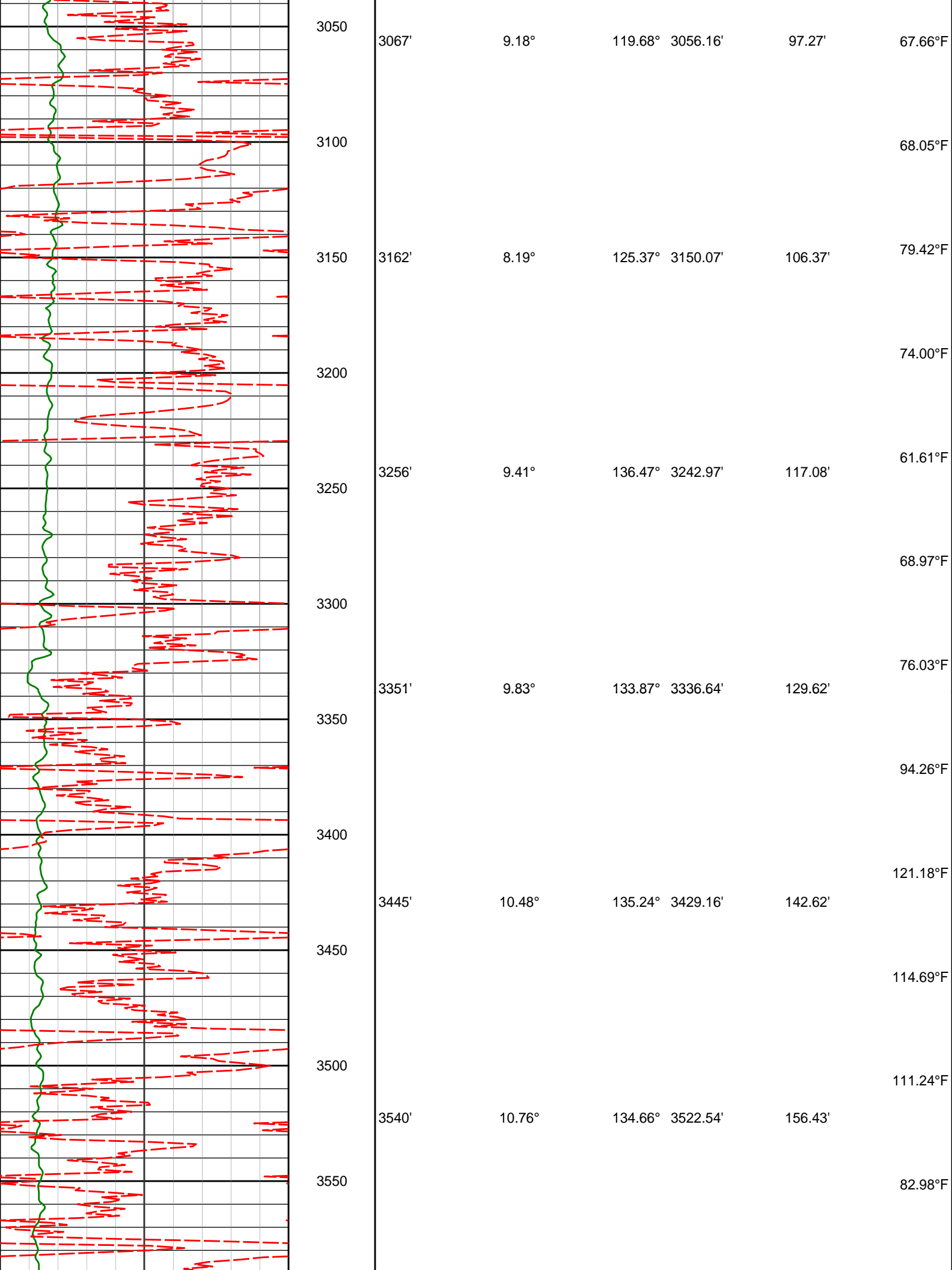


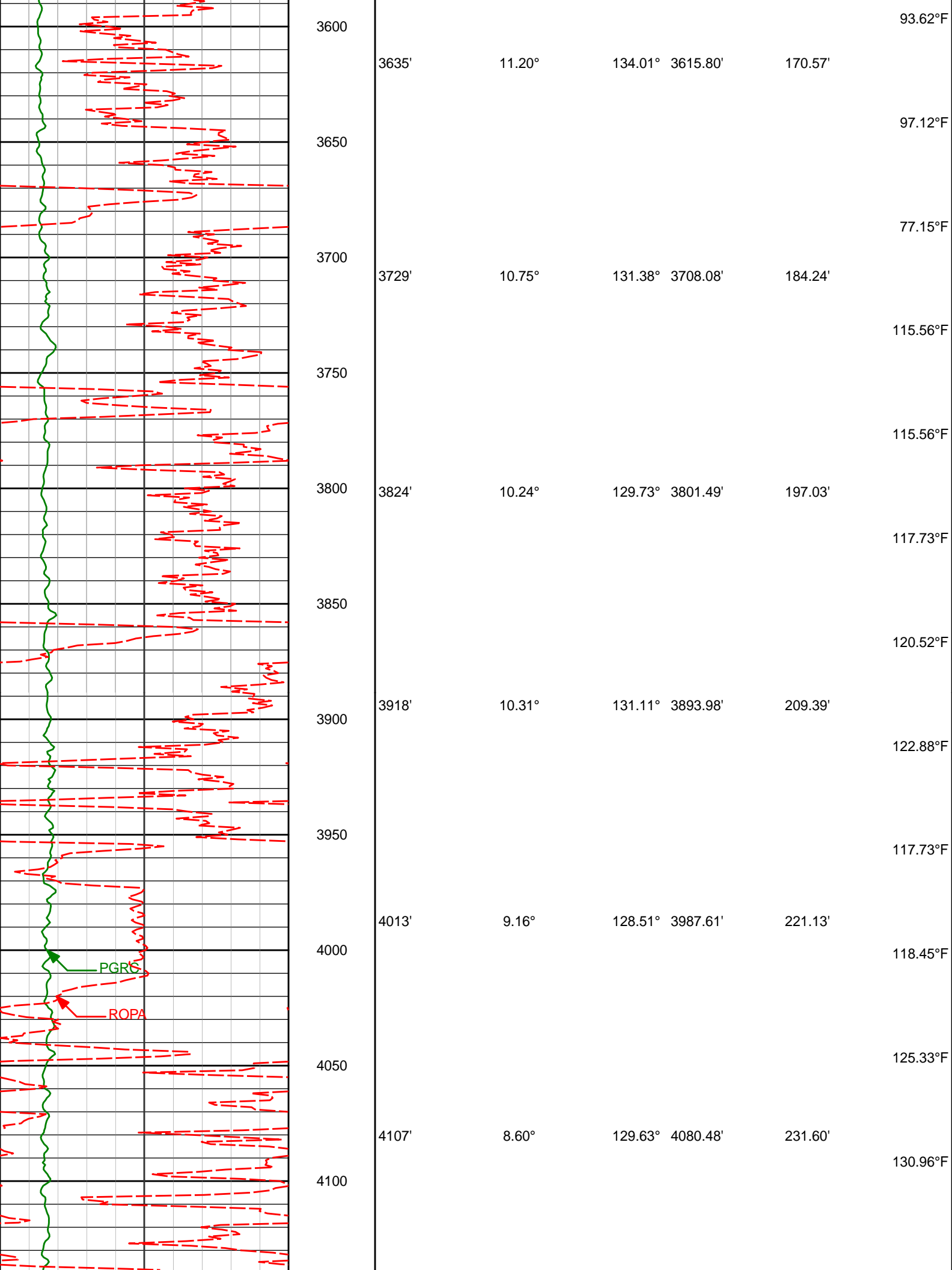


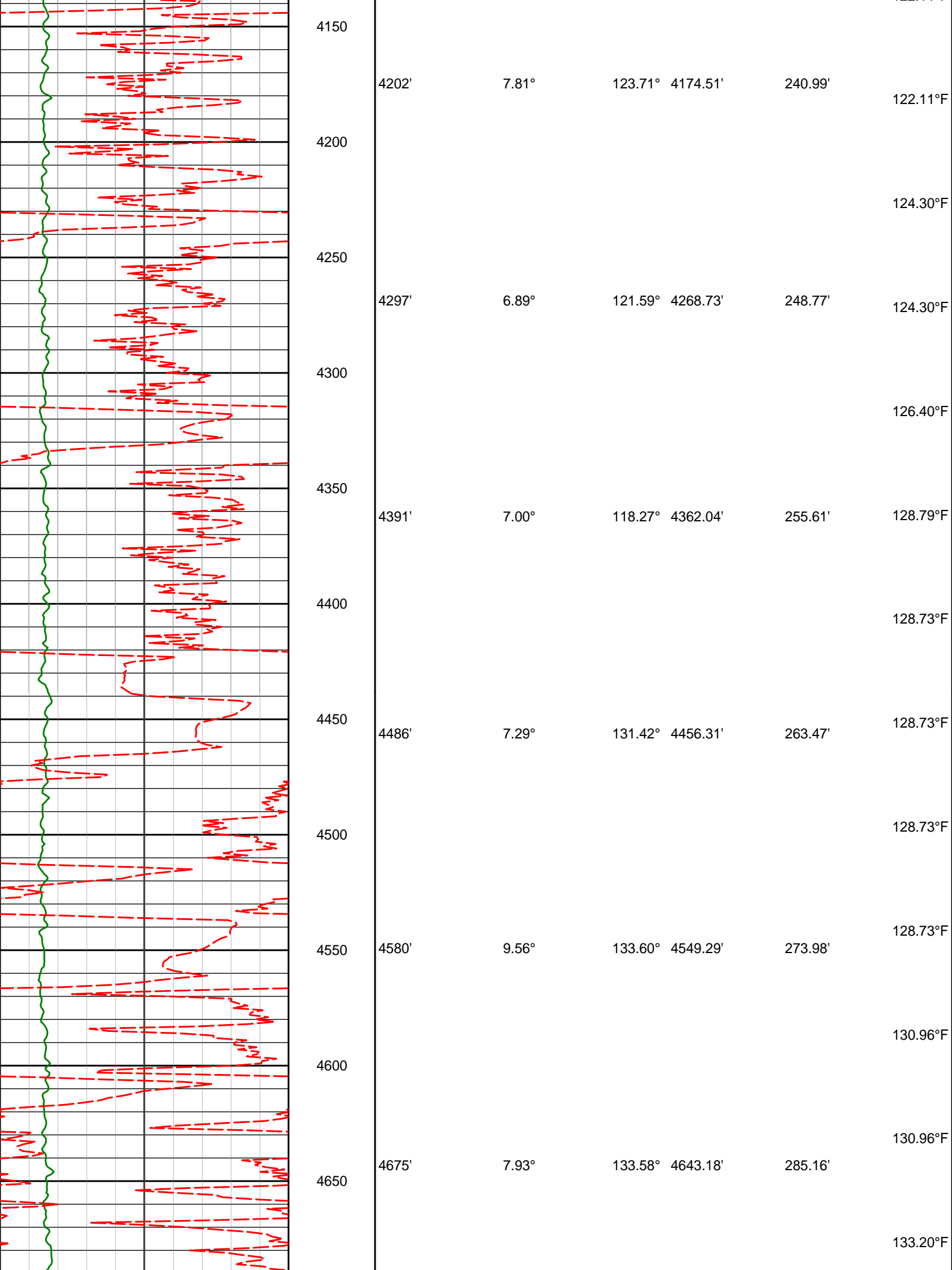


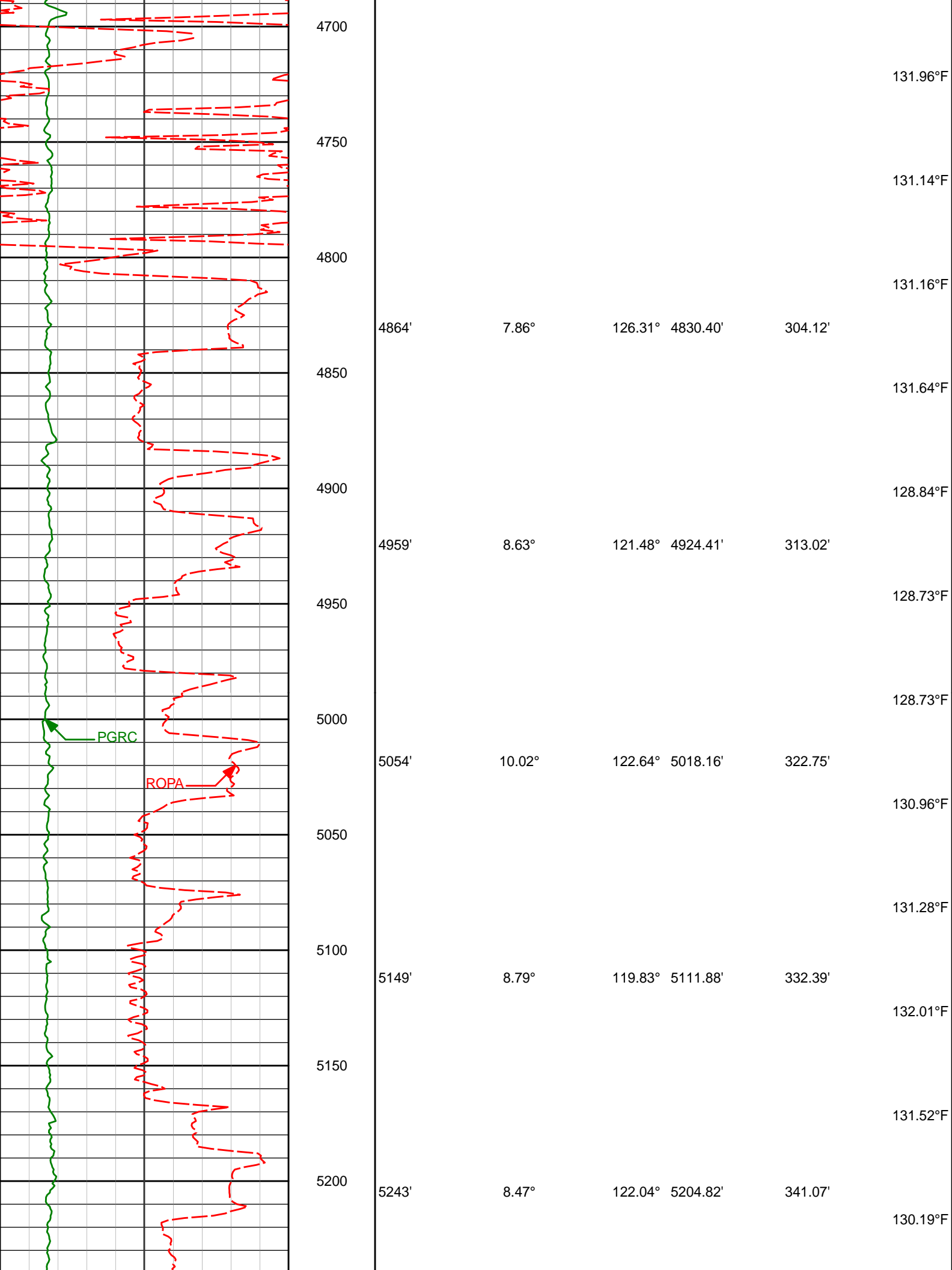


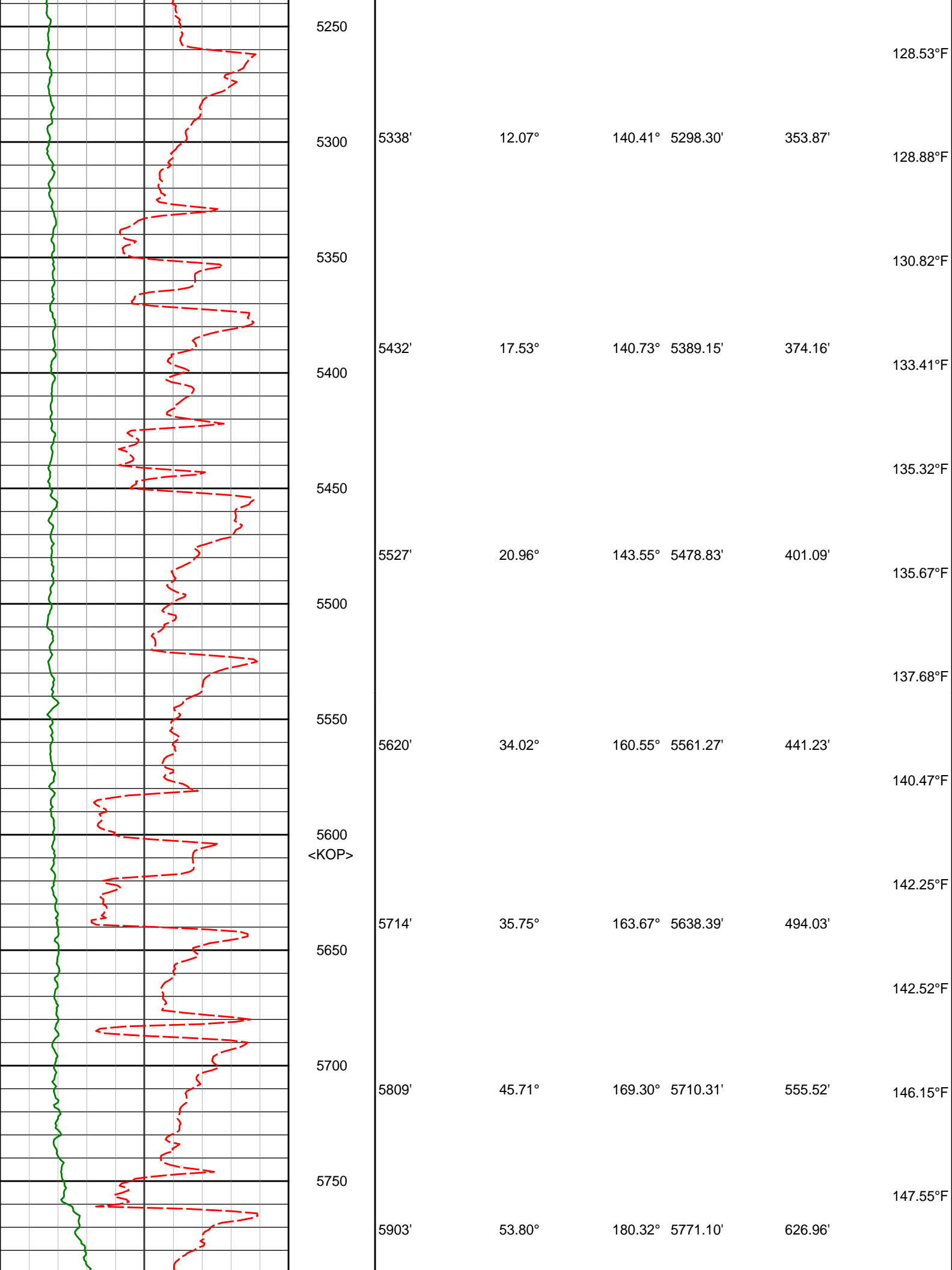


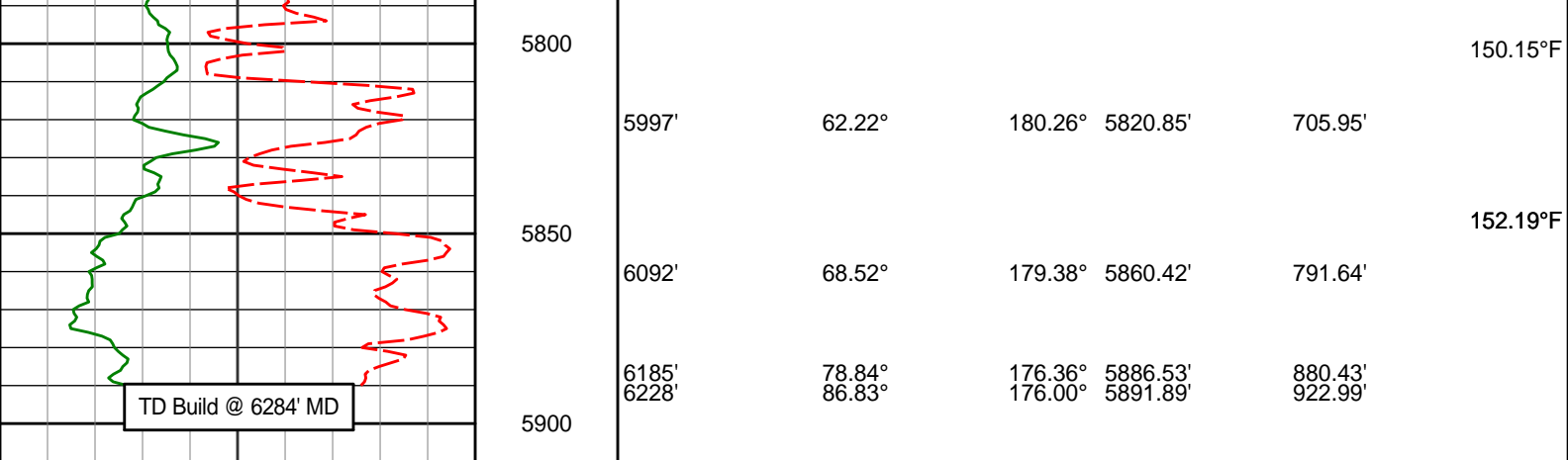






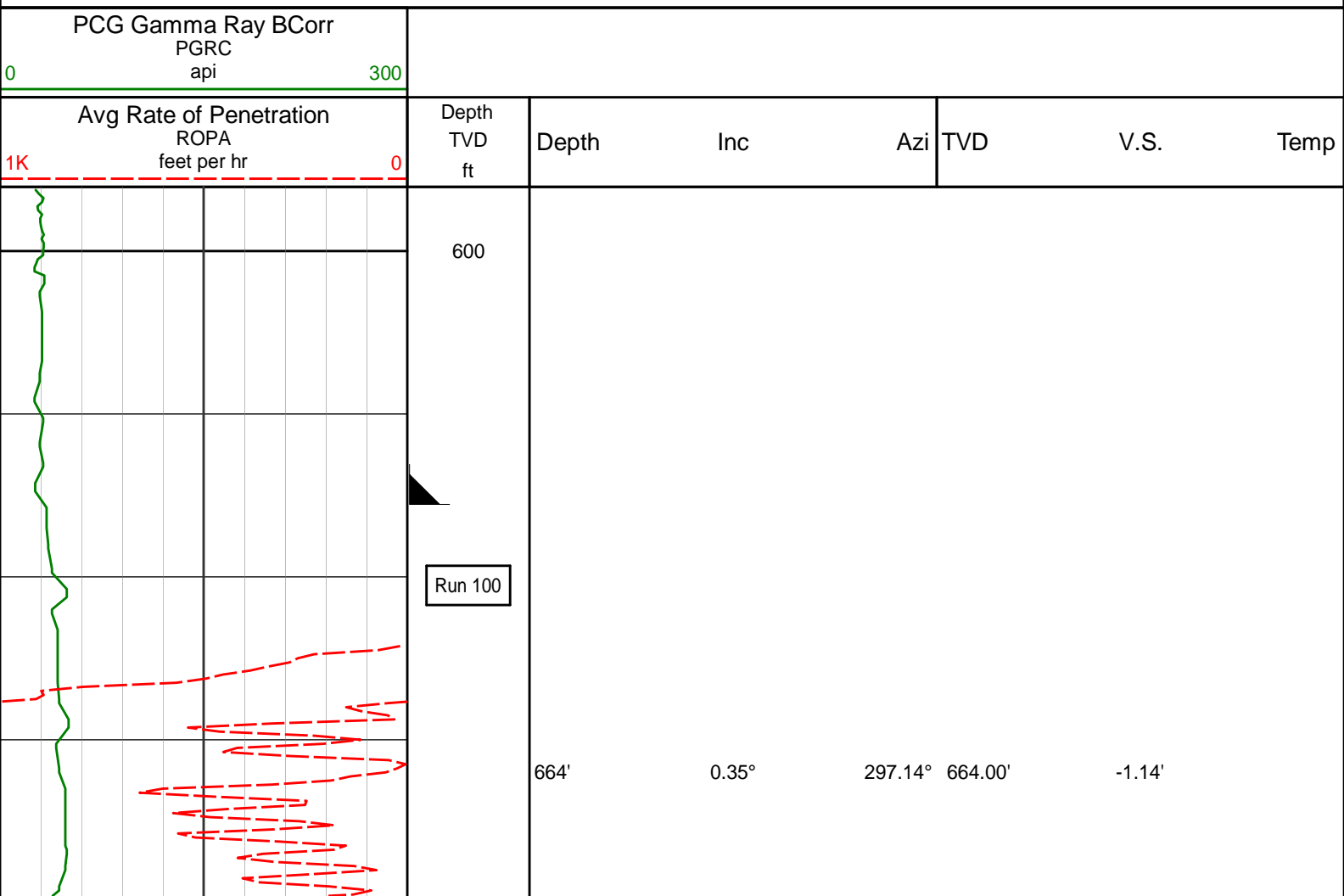


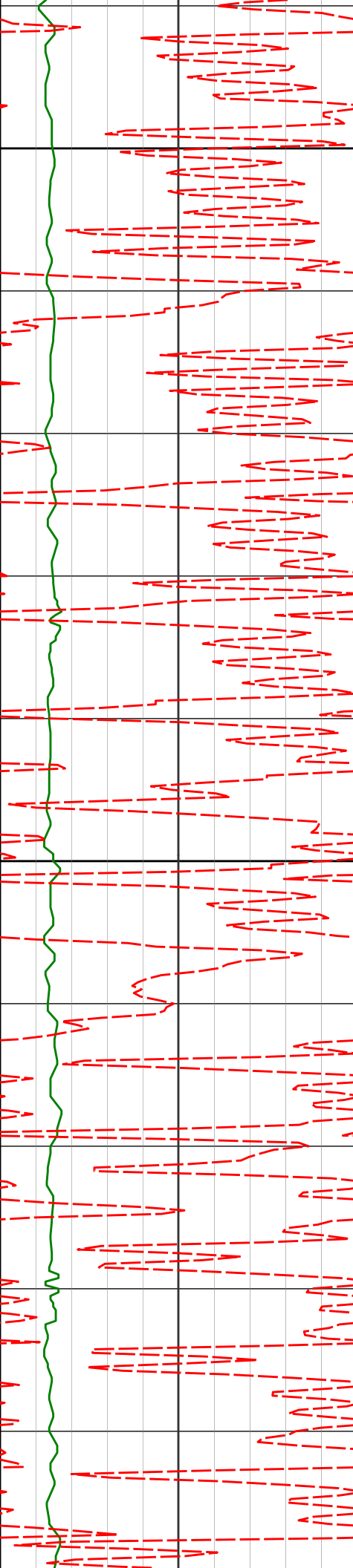




Avg Rate of Penetration ROPA feet per hr		Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0								
PCG Gamma Ray BCorr PGRC api								
0 300								

TVD Detail 1:240 Scale





700

759'

0.41°

304.31° 758.99'

-1.53'

72.00°F

800

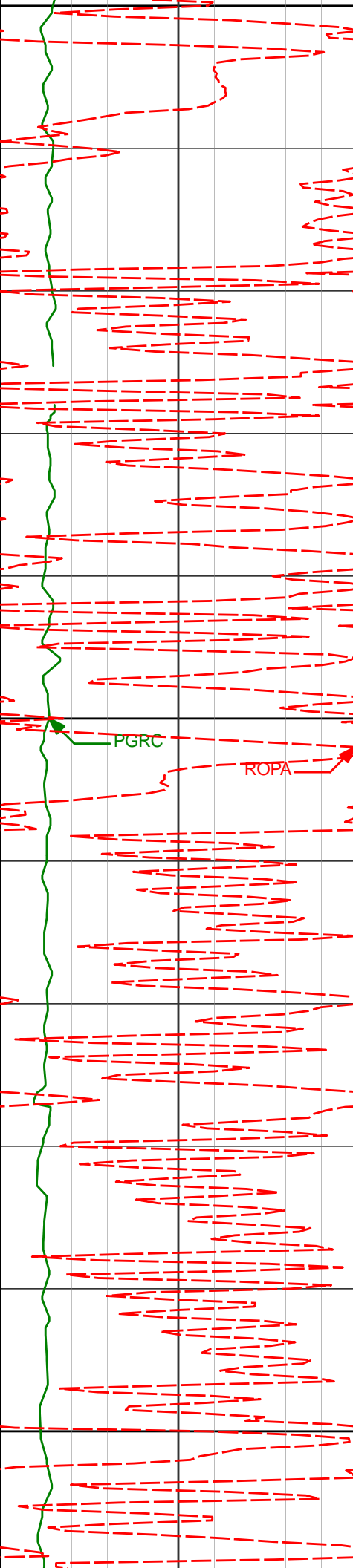
72.00°F

853'

0.10°

42.39° 852.99'

-1.80'



900

948'

0.13°

47.28°

947.99'

-1.92'

1000

PGRC

ROPA

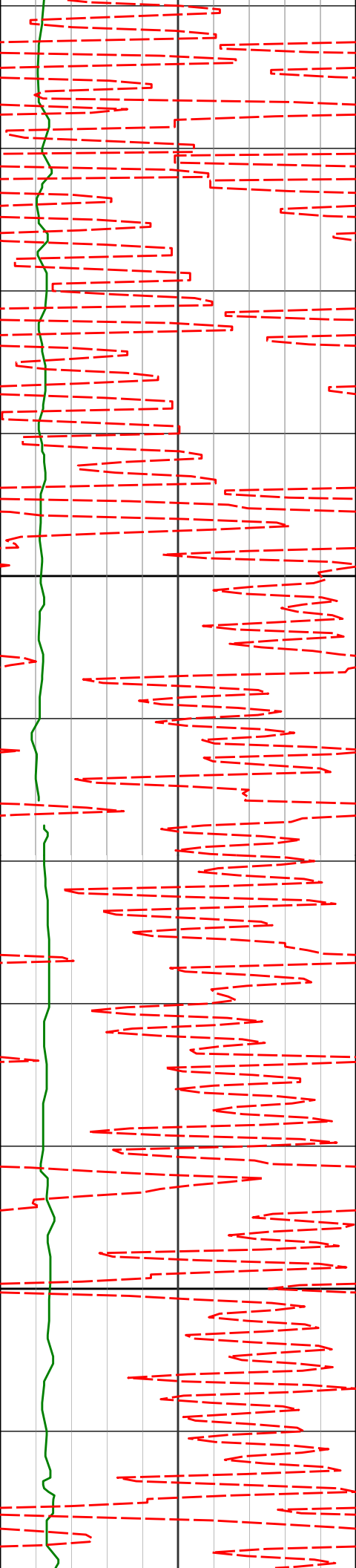
1100

73.98°F

75.97°F

75.97°F

77.99°F



1200

1300

1134'

0.28°

71.57°

1133.99'

-2.13'

1225'

0.20°

88.60°

1224.99'

-2.15'

1317'

0.20°

133.56°

1316.99'

-2.02'

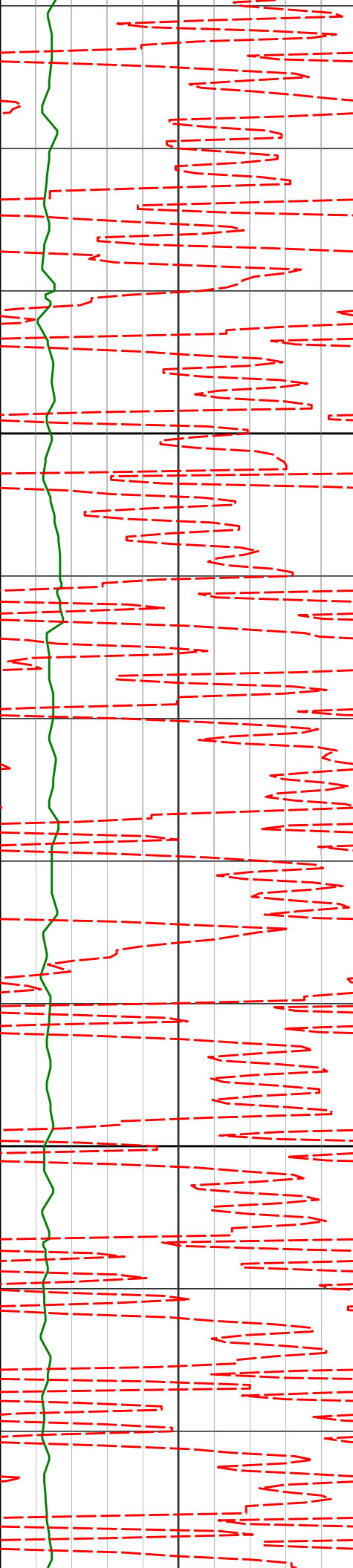
77.99°F

77.99°F

77.99°F

77.99°F

104.40°F



1400

1500

1409'

1500'

0.26°

0.12°

111.58°

116.74°

1408.99'

1499.99'

-1.79'

-1.64'

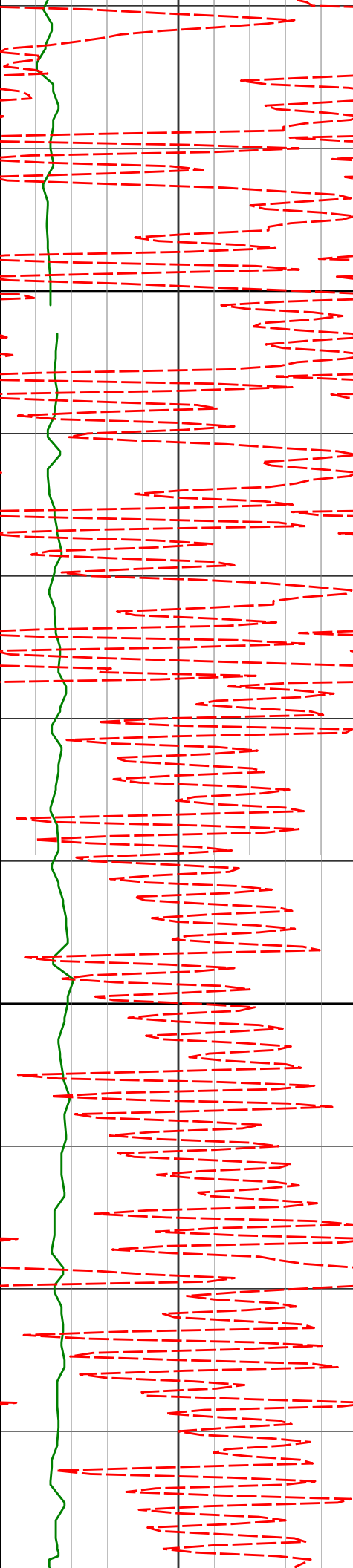
106.71°F

99.38°F

94.44°F

80.01°F

82.02°F



1600

1700

1592'

1682'

1774'

0.22°

0.06°

0.32°

140.35°

136.21°

48.57°

1591.99'

1681.99'

1773.99'

-1.43'

-1.24'

-1.35'

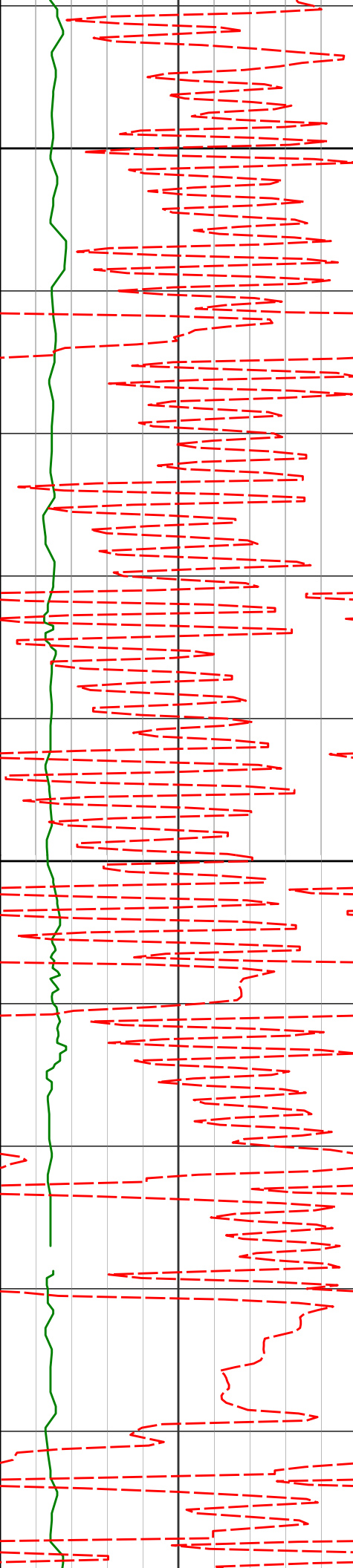
82.02°F

106.55°F

90.06°F

84.06°F

84.06°F



1800

115.18°F

90.82°F

1865'

0.40°

23.69°

1864.99'

-1.77'

89.88°F

1900

91.03°F

1955'

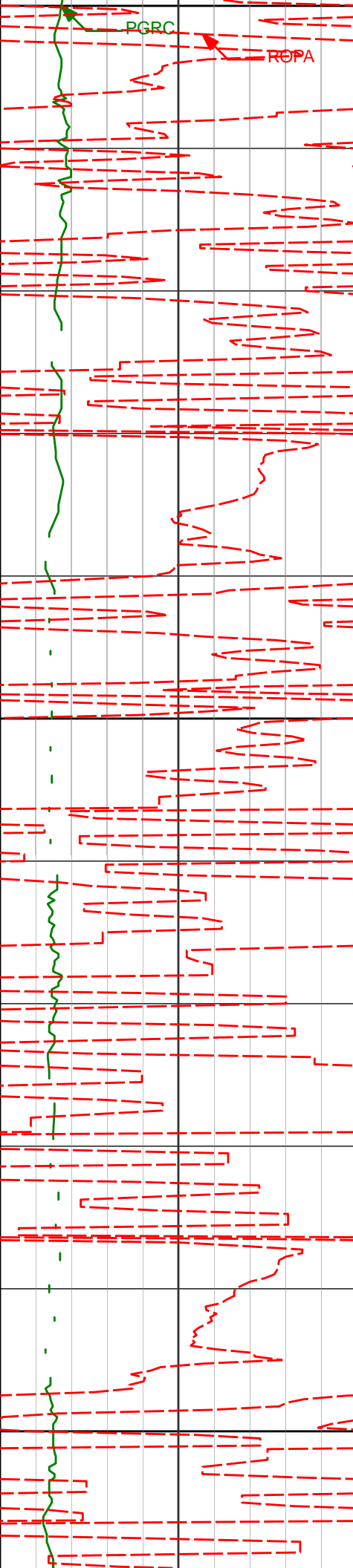
1.11°

53.69°

1954.98'

-2.46'

109.71°F



2000

PGRC

ROPA

92.07°F

2047'

2.37°

102.85°

2046.94'

-2.25'

90.19°F

2100

90.19°F

2138'

4.20°

125.04°

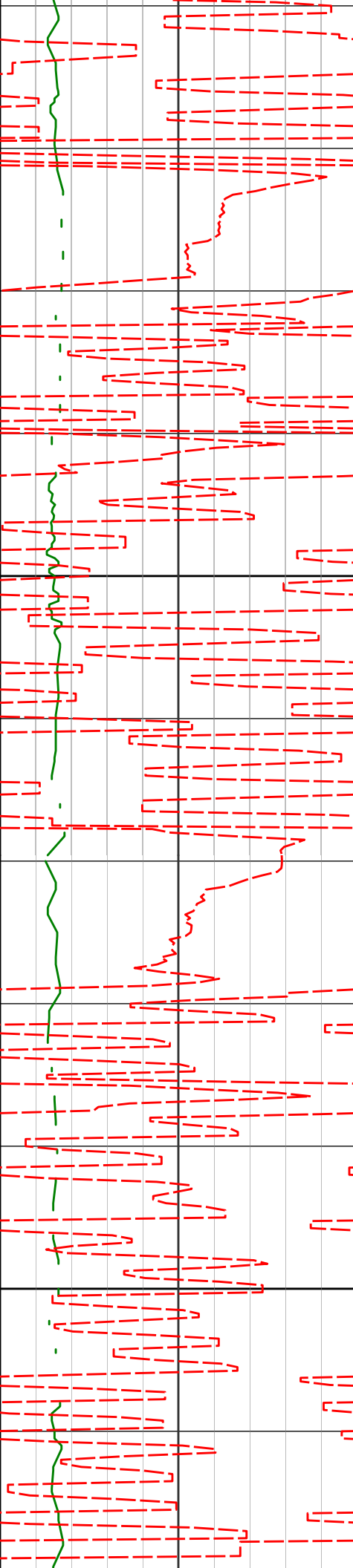
2137.79'

0.63'

110.82°F

2200

98.00°F



2228'

5.66°

135.28° 2227.45'

6.36'

94.33°F

93.17°F

2300

2320'

7.90°

130.65° 2318.80'

14.63'

91.33°F

54.76°F

2400

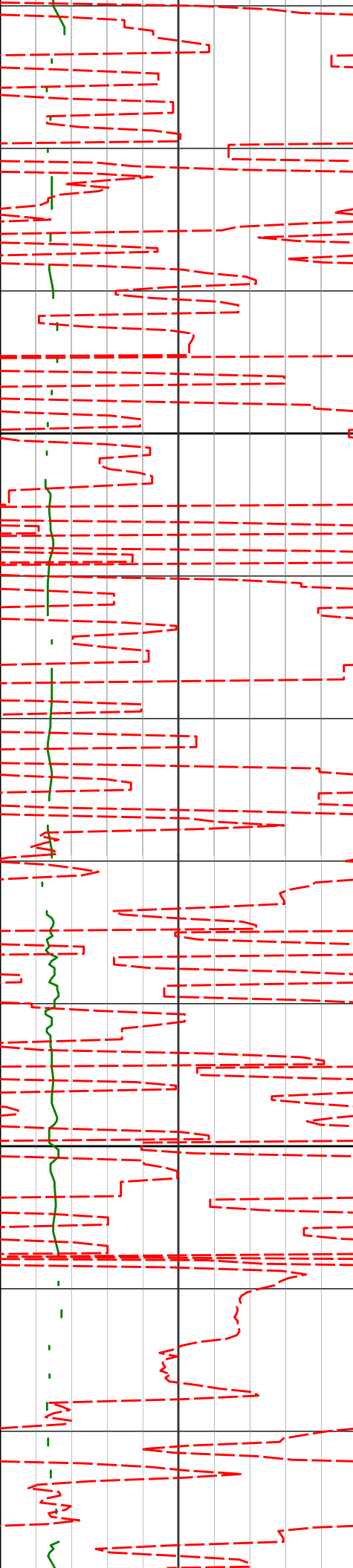
2411'

8.27°

128.41° 2408.90'

23.93'

51.49°F



57.25°F

2500

2503'

7.83°

128.42° 2499.99'

33.12'

68.50°F

91.39°F

2594'

7.60°

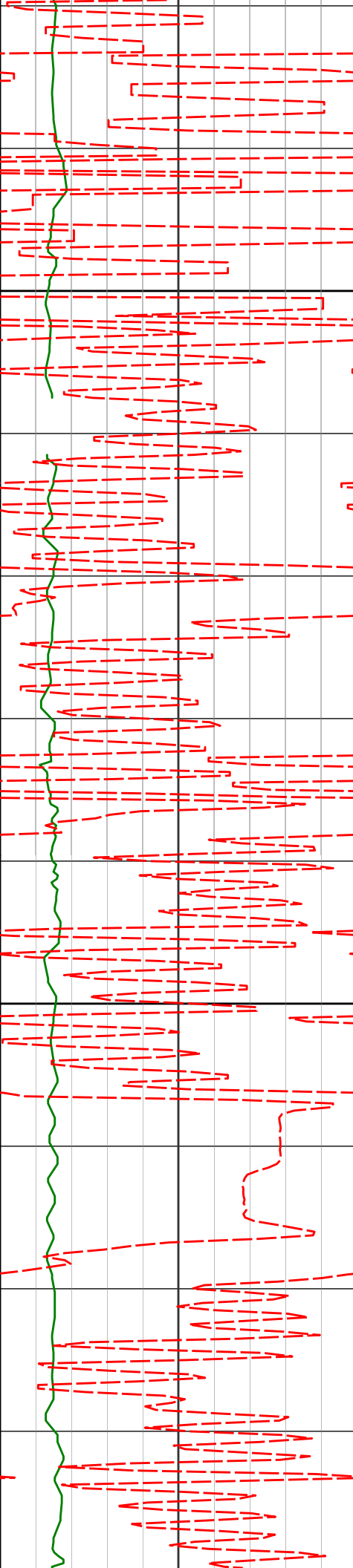
127.86° 2590.17'

41.80'

2600

92.89°F

82.40°F



2689'

7.64°

127.18° 2684.33'

50.64'

2700

77.14°F

2783'

10.24°

127.09° 2777.18'

60.83'

2800

57.23°F

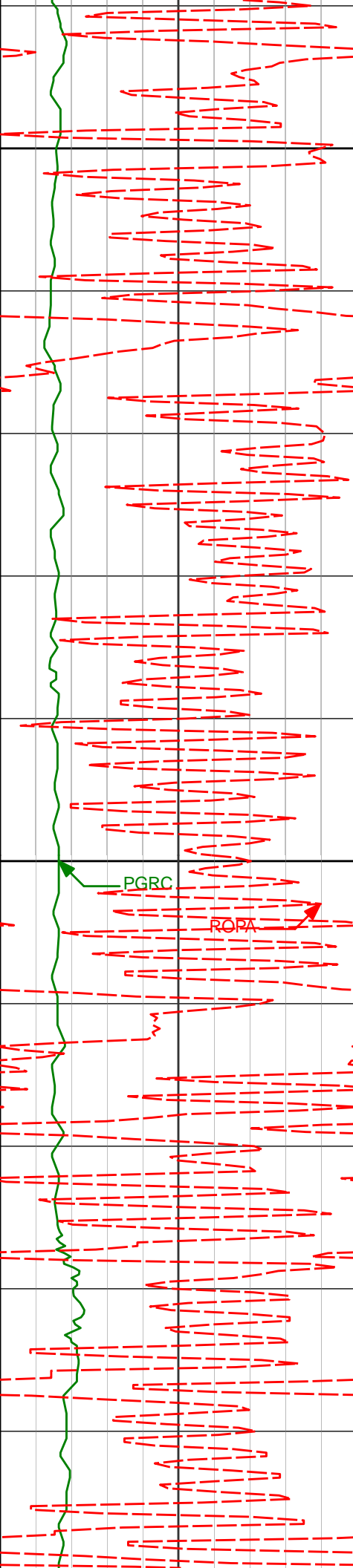
78.31°F

2878'

11.72°

128.08° 2870.44'

73.56'



2900

57.59°F

2972'

10.88°

126.93°

2962.61'

86.50'

56.11°F

3000

PGRC

ROPA

62.07°F

3067'

9.18°

119.68°

3056.16'

97.27'

67.66°F



3100

68.05°F

3162'

8.19°

125.37°

3150.07'

106.37'

79.42°F

3200

74.00°F

3256'

9.41°

136.47°

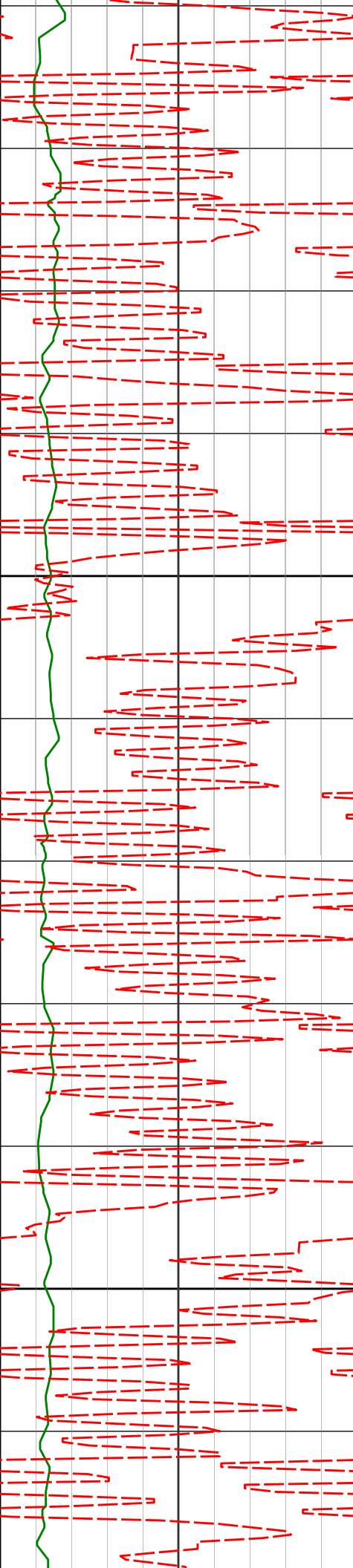
3242.97'

117.08'

61.61°F

3300

68.97°F



3400

3500

3351'

9.83°

133.87°

3336.64'

129.62'

76.03°F

3445'

10.48°

135.24°

3429.16'

142.62'

121.18°F

114.69°F

3540'

10.76°

134.66°

3522.54'

156.43'

111.24°F



3600

3700

3635'

3729'

11.20°

10.75°

134.01°

131.38°

3615.80'

3708.08'

170.57'

184.24'

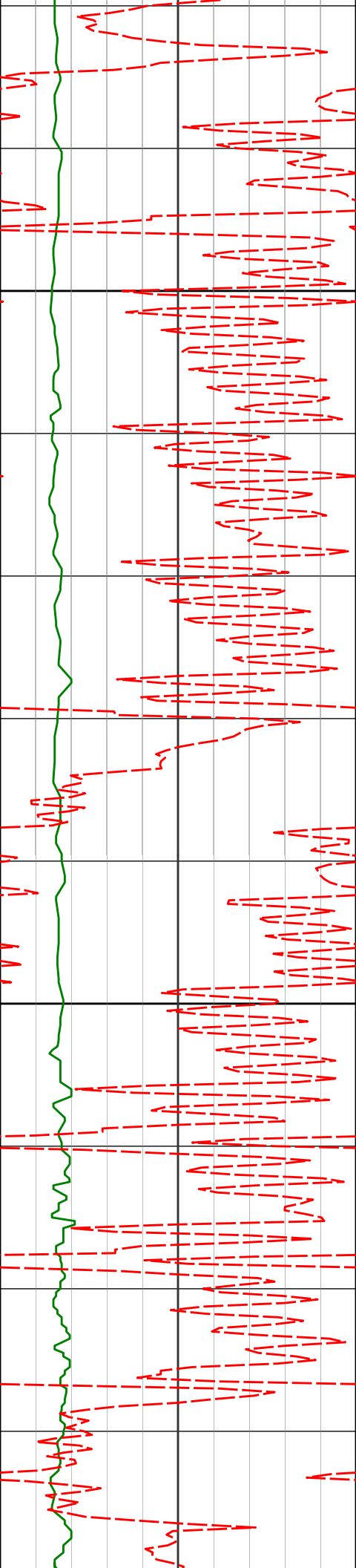
82.98°F

93.62°F

97.12°F

77.15°F

115.56°F



3800

3824'

10.24°

129.73°

3801.49'

197.03'

115.56°F

117.73°F

120.52°F

3900

3918'

10.31°

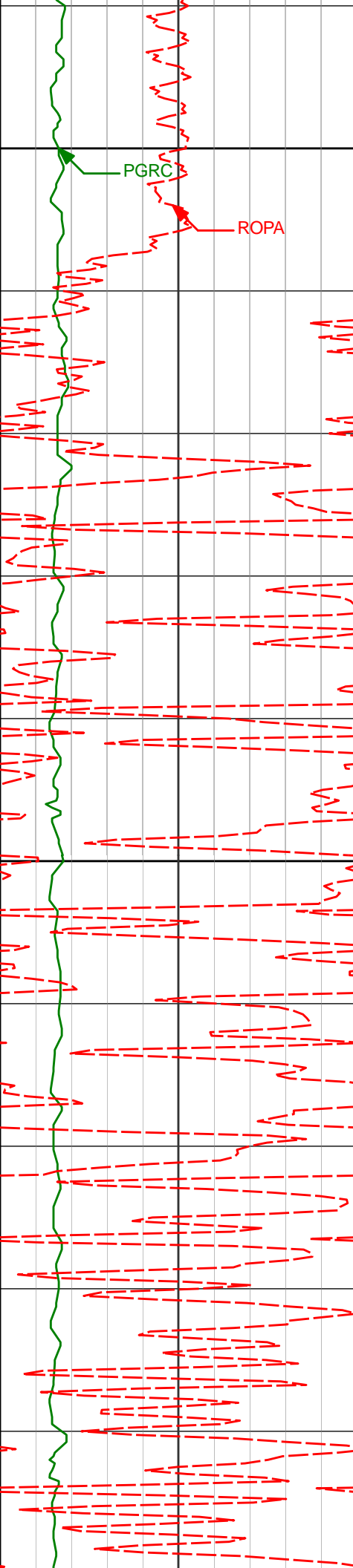
131.11°

3893.98'

209.39'

122.88°F

117.73°F



4000

4100

4013'

9.16°

128.51° 3987.61'

221.13'

118.45°F

125.33°F

4107'

8.60°

129.63° 4080.48'

231.60'

130.96°F

122.11°F

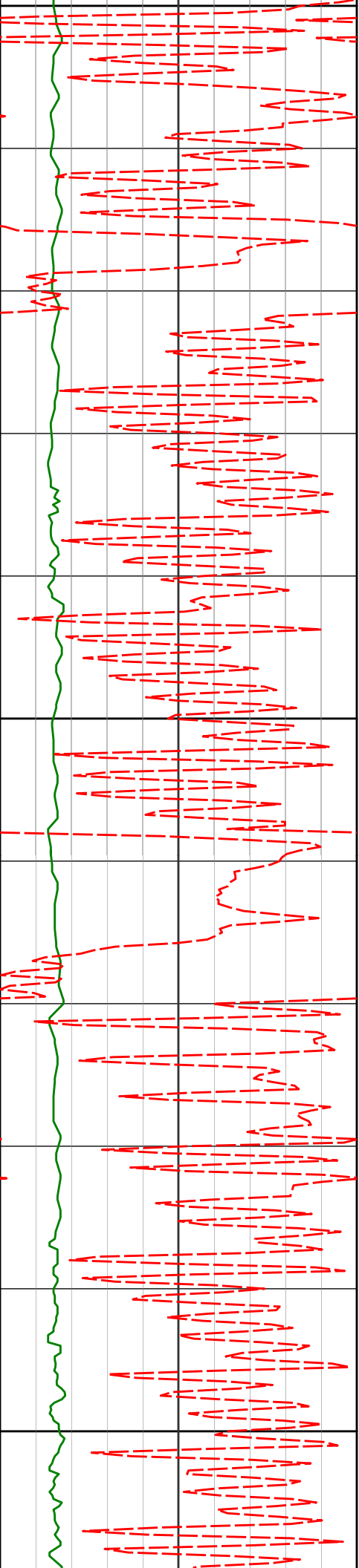
4202'

7.81°

123.71° 4174.51'

240.99'

122.11°F



4200

4297'

6.89°

121.59°

4268.73'

248.77'

4300

4391'

7.00°

118.27°

4362.04'

255.61'

4400

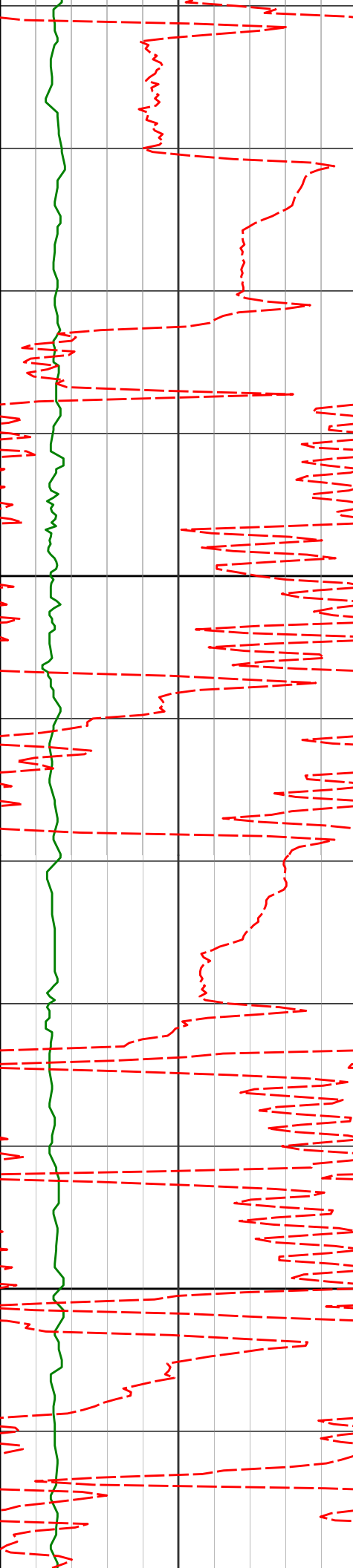
124.30°F

124.30°F

125.70°F

128.79°F

128.73°F



4486'

7.29°

131.42°

4456.31'

263.47'

128.73°F

4500

128.73°F

4580'

9.56°

133.60°

4549.29'

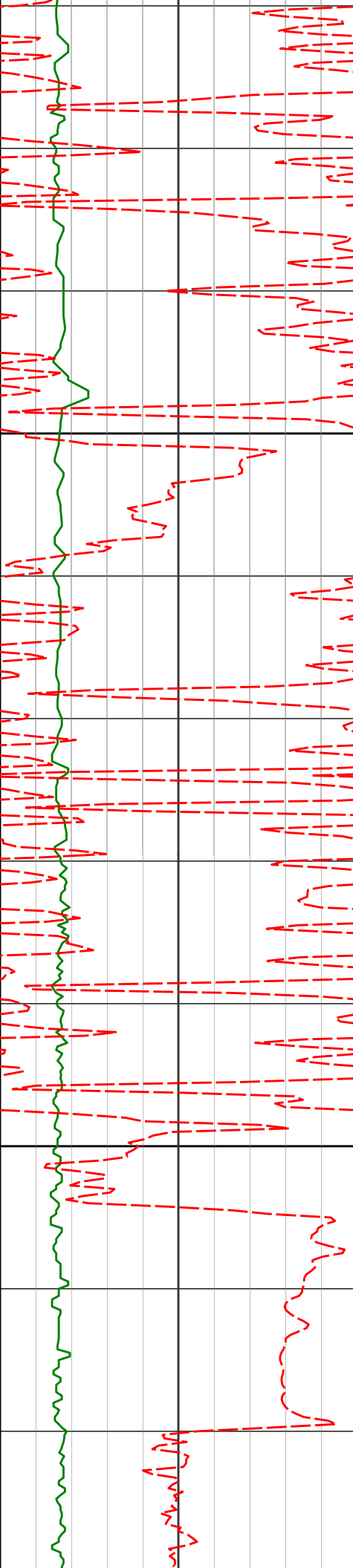
273.98'

128.73°F

4600

130.96°F

130.96°F



4675'

7.93°

133.58° 4643.18'

285.16'

4700

133.20°F

131.96°F

131.14°F

4800

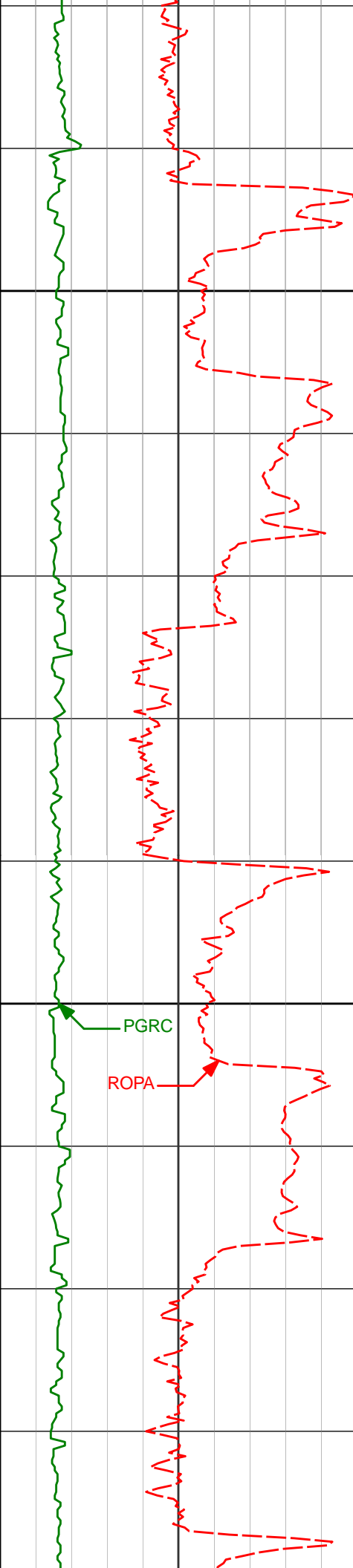
131.16°F

4864'

7.86°

126.31° 4830.40'

304.12'



4900

4959'

8.63°

121.48° 4924.41'

313.02'

128.84°F

128.73°F

128.73°F

5000

5054'

10.02°

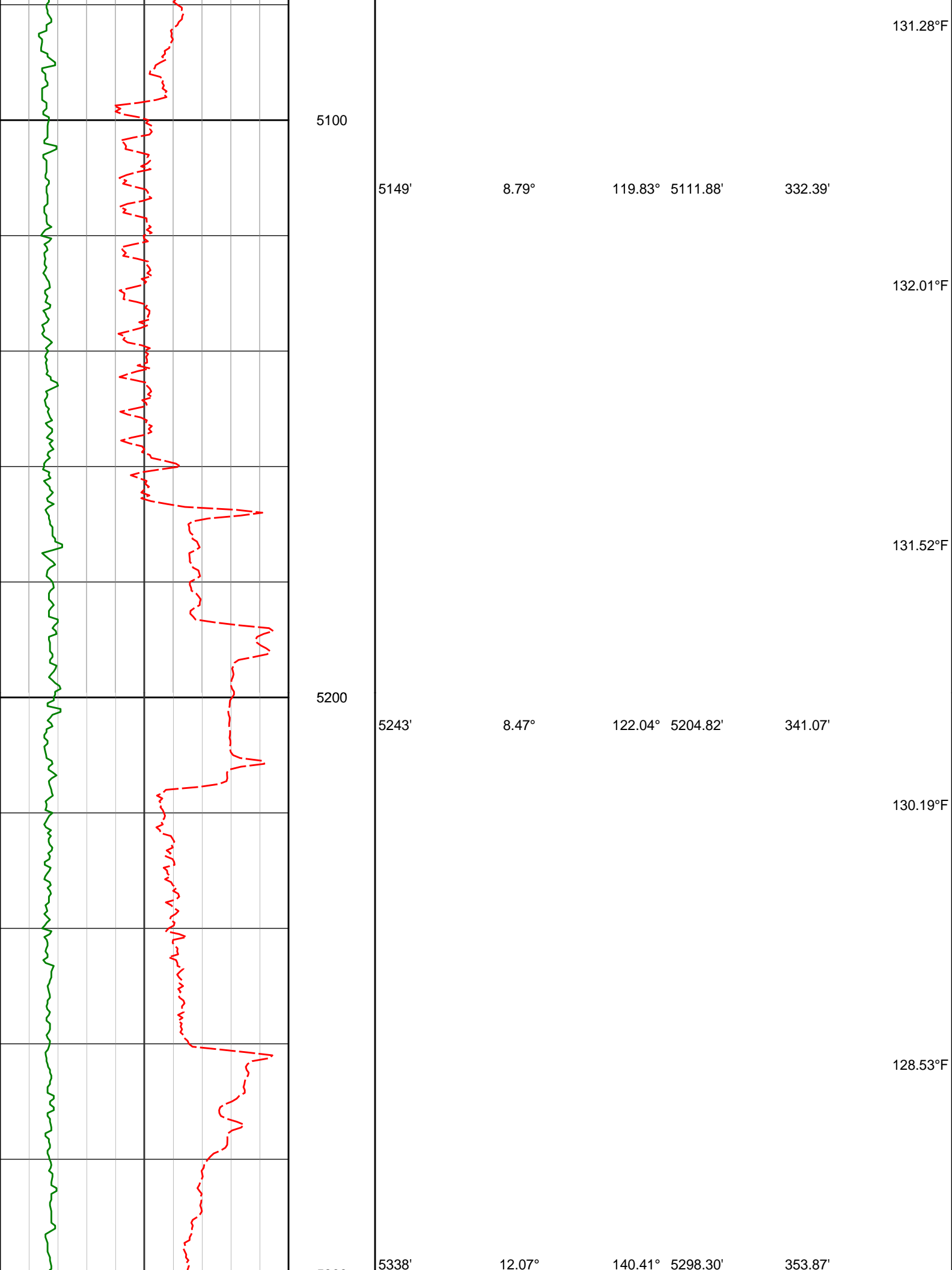
122.64° 5018.16'

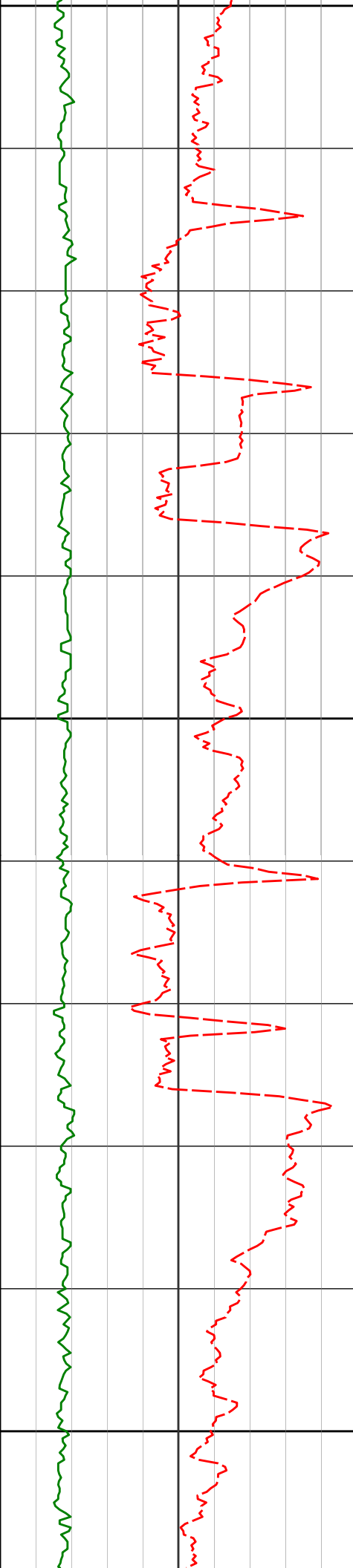
322.75'

130.96°F

PGRC

ROPA





5300

128.88°F

130.82°F

5432'

17.53°

140.73° 5389.15'

374.16'

5400

133.41°F

135.32°F

5527'

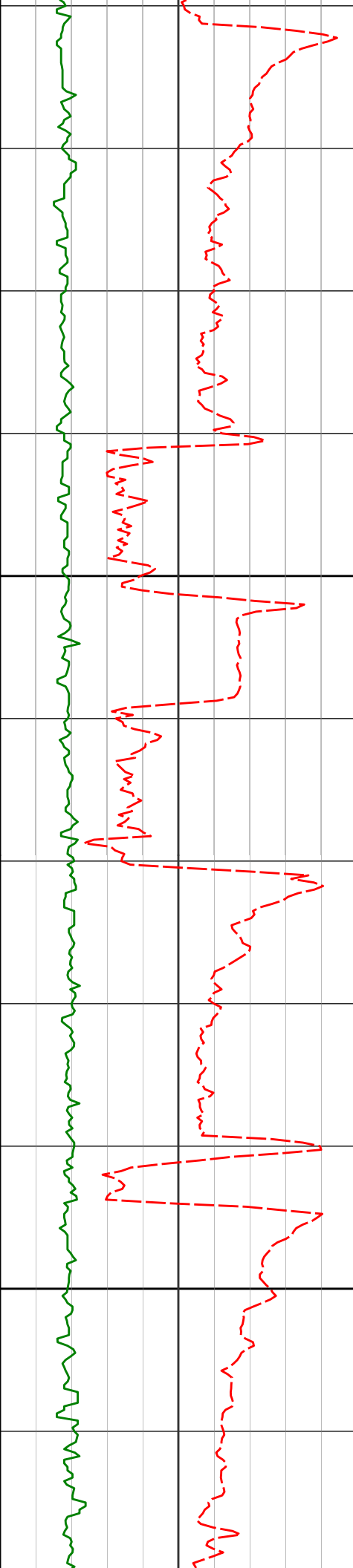
20.96°

143.55° 5478.83'

401.09'

5500

135.67°F



5600
<KOP>

5700

5620'

34.02°

160.55° 5561.27'

441.23'

5714'

35.75°

163.67° 5638.39'

494.03'

5809'

45.71°

169.30° 5710.31'

555.52'

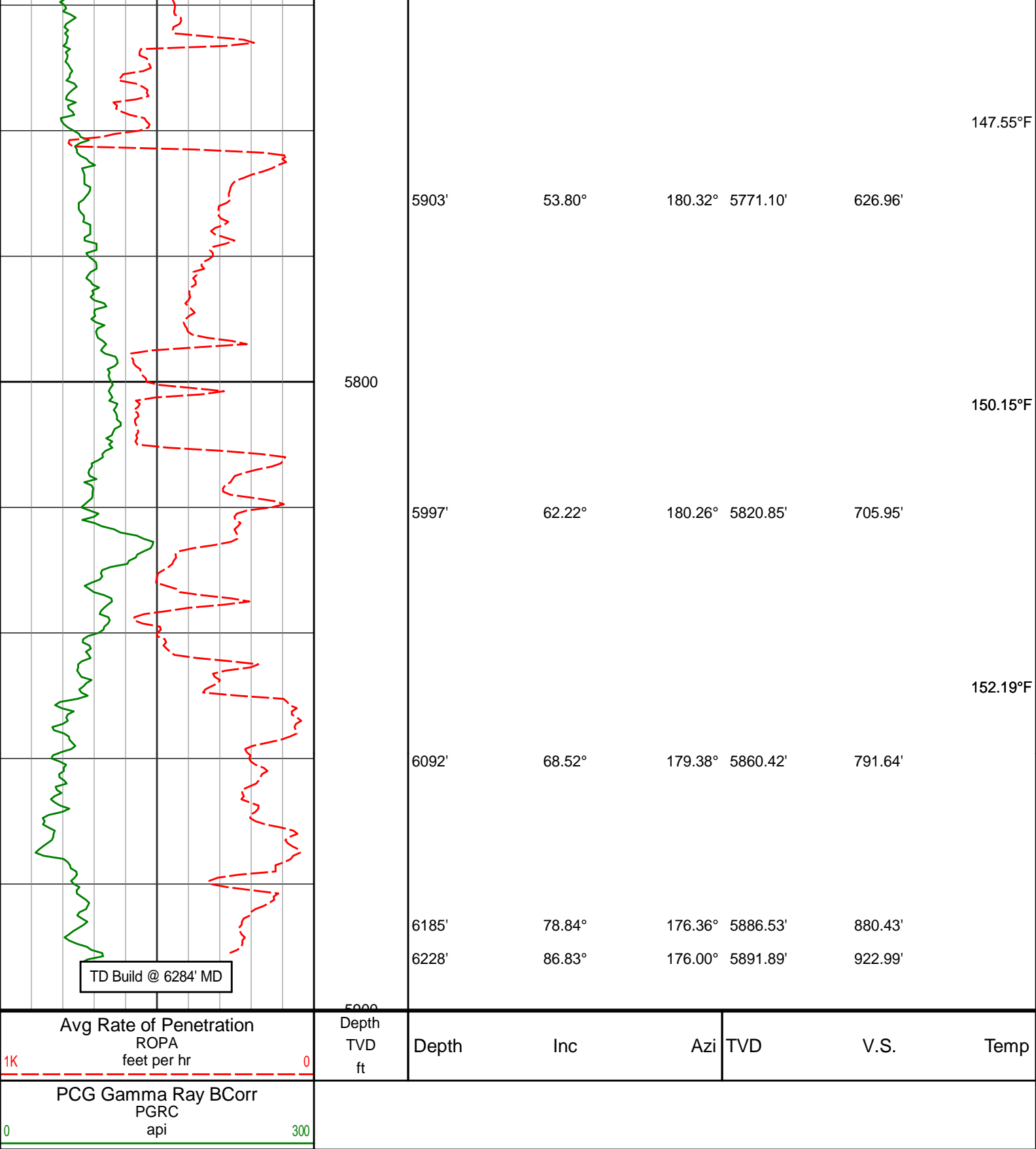
137.68°F

140.47°F

142.25°F

142.52°F

146.15°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Douglas LC35-770
Wattenberg
Weld Colorado
USA

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
664.00	0.35	297.14	664.00	0.92 N	1.80 W	-1.14	0.05
759.00	0.41	304.31	758.99	1.25 N	2.34 W	-1.53	0.09
853.00	0.10	42.39	852.99	1.50 N	2.56 W	-1.80	0.47
948.00	0.13	47.28	947.99	1.63 N	2.43 W	-1.92	0.03
1134.00	0.28	71.57	1133.99	1.91 N	1.85 W	-2.13	0.09
1225.00	0.20	88.60	1224.99	1.99 N	1.48 W	-2.15	0.12
1317.00	0.20	133.56	1316.99	1.88 N	1.21 W	-2.02	0.16
1409.00	0.26	111.58	1408.99	1.69 N	0.90 W	-1.79	0.12
1500.00	0.12	116.74	1499.99	1.57 N	0.61 W	-1.64	0.16
1592.00	0.22	140.35	1591.99	1.39 N	0.41 W	-1.43	0.13
1682.00	0.06	136.21	1681.99	1.22 N	0.27 W	-1.24	0.18
1774.00	0.32	48.57	1773.99	1.35 N	0.04 W	-1.35	0.35
1865.00	0.40	23.69	1864.99	1.81 N	0.28 E	-1.77	0.19
1955.00	1.11	53.69	1954.98	2.62 N	1.11 E	-2.46	0.88
2047.00	2.37	102.85	2046.94	2.73 N	3.69 E	-2.25	2.00
2138.00	4.20	125.04	2137.79	0.39 N	8.25 E	0.63	2.42
2228.00	5.66	135.28	2227.45	4.66 S	14.08 E	6.36	1.89
2320.00	7.90	130.65	2318.80	12.00 S	22.07 E	14.63	2.50
2411.00	8.27	128.41	2408.90	20.14 S	31.94 E	23.93	0.53
2503.00	7.83	128.42	2499.99	28.15 S	42.04 E	33.12	0.48
2594.00	7.60	127.86	2590.17	35.69 S	51.65 E	41.80	0.26
2689.00	7.64	127.18	2684.33	43.37 S	61.64 E	50.64	0.10
2783.00	10.24	127.09	2777.18	52.18 S	73.28 E	60.83	2.77
2878.00	11.72	128.08	2870.44	63.23 S	87.62 E	73.56	1.57
2972.00	10.88	126.93	2962.61	74.45 S	102.23 E	86.50	0.93
3067.00	9.18	119.68	3056.16	83.59 S	115.98 E	97.27	2.23
3162.00	8.19	125.37	3150.07	91.26 S	128.08 E	106.37	1.37
3256.00	9.41	136.47	3242.97	100.71 S	138.83 E	117.08	2.22
3351.00	9.83	133.87	3336.64	111.96 S	150.03 E	129.62	0.64
3445.00	10.48	135.24	3429.16	123.59 S	161.84 E	142.62	0.74
3540.00	10.76	134.66	3522.54	135.96 S	174.23 E	156.43	0.31
3635.00	11.20	134.01	3615.80	148.61 S	187.17 E	170.57	0.48
3729.00	10.75	131.38	3708.08	160.74 S	200.32 E	184.24	0.72
3824.00	10.24	129.73	3801.49	171.99 S	213.46 E	197.03	0.62
3918.00	10.31	131.11	3893.98	182.86 S	226.22 E	209.39	0.27
4013.00	9.16	128.51	3987.61	193.16 S	238.54 E	221.13	1.29
4107.00	8.60	129.63	4080.48	202.31 S	249.82 E	231.60	0.62
4202.00	7.81	123.71	4174.51	210.42 S	260.66 E	240.99	1.22
4297.00	6.89	121.59	4268.73	216.99 S	270.89 E	248.77	1.01
4391.00	7.00	118.27	4362.04	222.66 S	280.74 E	255.61	0.44
4486.00	7.29	131.42	4456.31	229.39 S	290.35 E	263.47	1.74
4580.00	9.56	133.60	4549.29	238.72 S	300.48 E	273.98	2.44
4675.00	7.93	133.58	4643.18	248.68 S	310.94 E	285.16	1.71
4864.00	7.86	126.31	4830.40	265.32 S	330.80 E	304.12	0.53
4959.00	8.63	121.48	4924.41	272.89 S	342.11 E	313.02	1.09
5054.00	10.02	122.64	5018.16	281.06 S	355.14 E	322.75	1.47
5149.00	8.79	119.83	5111.88	289.13 S	368.39 E	332.39	1.38
5243.00	8.47	122.04	5204.82	296.37 S	380.49 E	341.07	0.48
5338.00	12.07	140.41	5298.30	307.75 S	392.76 E	353.87	5.08
5432.00	17.53	140.73	5389.15	326.30 S	408.00 E	374.16	5.81
5527.00	20.96	143.55	5478.83	351.05 S	427.15 E	401.09	3.74
5620.00	34.02	160.55	5561.27	389.18 S	445.81 E	441.23	16.25
5714.00	35.75	163.67	5638.39	440.33 S	462.29 E	494.03	2.64
5809.00	45.71	169.30	5710.31	500.54 S	476.45 E	555.52	11.17
5903.00	53.80	180.32	5771.10	571.77 S	482.50 E	626.96	12.40
5997.00	62.22	180.26	5820.85	651.43 S	482.09 E	705.95	8.96
6092.00	68.52	179.38	5860.42	737.74 S	482.38 E	791.64	6.68
6185.00	78.84	176.36	5886.53	826.80 S	485.76 E	880.43	11.53
6228.00	86.83	176.00	5891.89	869.33 S	488.60 E	922.99	18.59

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 172.91 DEGREES (GRID)

A TOTAL CORRECTION OF 7.04 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

A TOTAL CORRECTION OF 7.04 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6228.00 FEET
IS 997.23 FEET ALONG 150.66 DEGREES (GRID)

Final survey is a projection to the bit at TD.

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