



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	03-Sep-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	628.99				
Log End Depth (TVD, ft)	6,450.55				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	31-Aug-15 20:50				
Drill/Wipe End Date and Time	31-Aug-15 20:50				
Min Inc (deg) @ Depth (TVD, ft)	0.09 @ 5,396.56				
Max Inc (deg) @ Depth (TVD, ft)	82.28 @ 6,442.83				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	558.19				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	8.90 / 27.00				
Filtrate CL (ppm)	6.00				
pH / Fluid Loss (mptm)	8.90 / 56				
PV (cP) / YP (lhf2)	3 / 2.00				
% Solids / % Sand	4.30 / 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) @ Depth (ft)	475.01 / PDC				

Max Tool Temp (degF) / Source	175.21 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 175.21				
Lead MWD Engineer	Brian Neu				
Customer Representative	JW Irwin				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404299				
Insert Serial Number	11619985				
Date and Time Initialized	01-Sep-15 09:32				
Date and Time Read	03-Sep-15 04:11				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	64.00				
Software Version	6.33				
Sub Serial Number	11404299				
Sonde Serial Number	10859920				
Sensor ID Number	N/A				
Toolface Offset (deg)	185.30				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	57.84				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404299				
Insert/Sonde Serial Number	11680918				

REMARKS

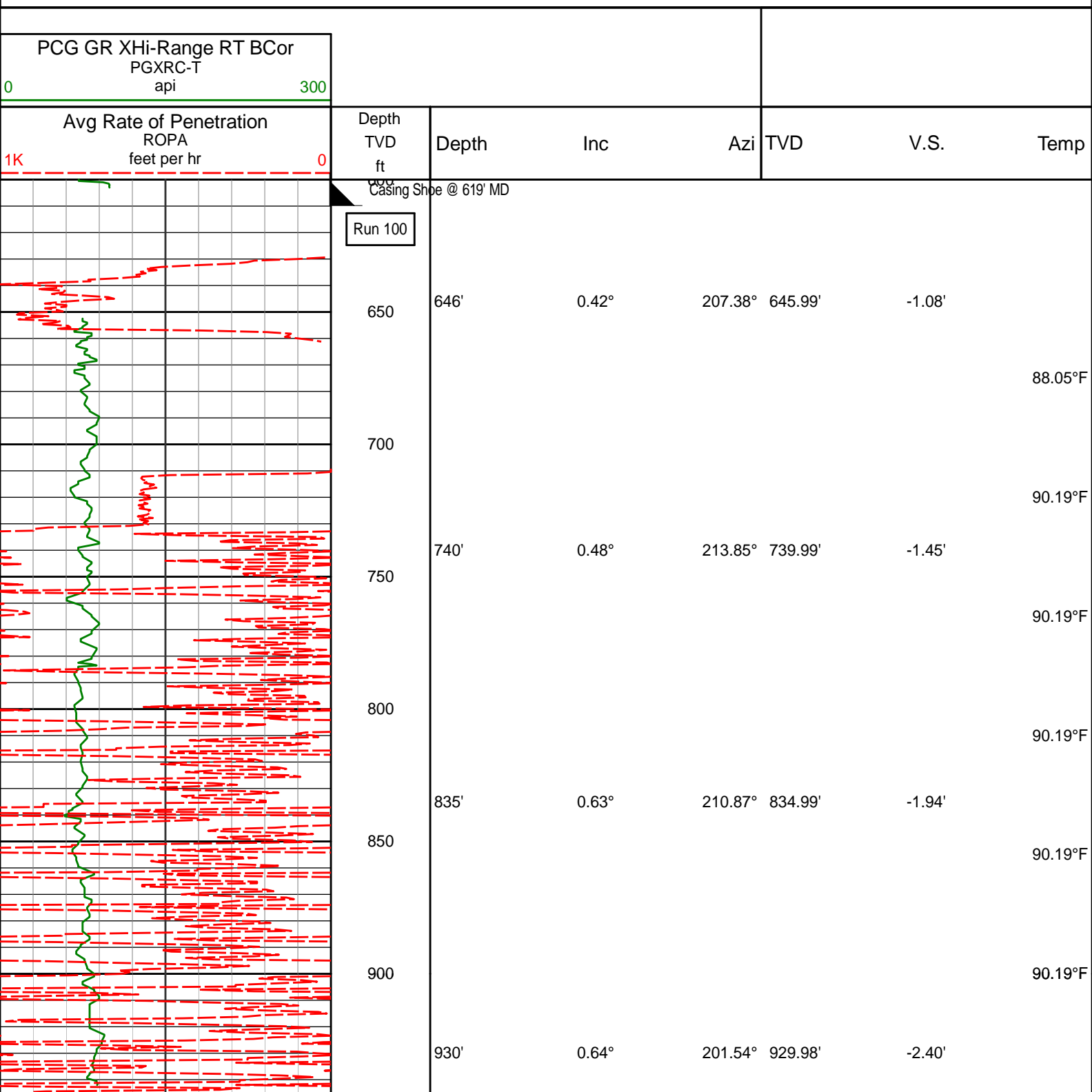
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:
Hole Size: 8.75"
Mud Density: 9.9-11.0
5. The following smoothing parameters have been applied to the data:
Interval: 0.5 ft
Coercion Distance: 1.2 ft (ROPA)
Interval: 0.5 ft
Coercion Distance: 0.6 ft (Gamma Ray)

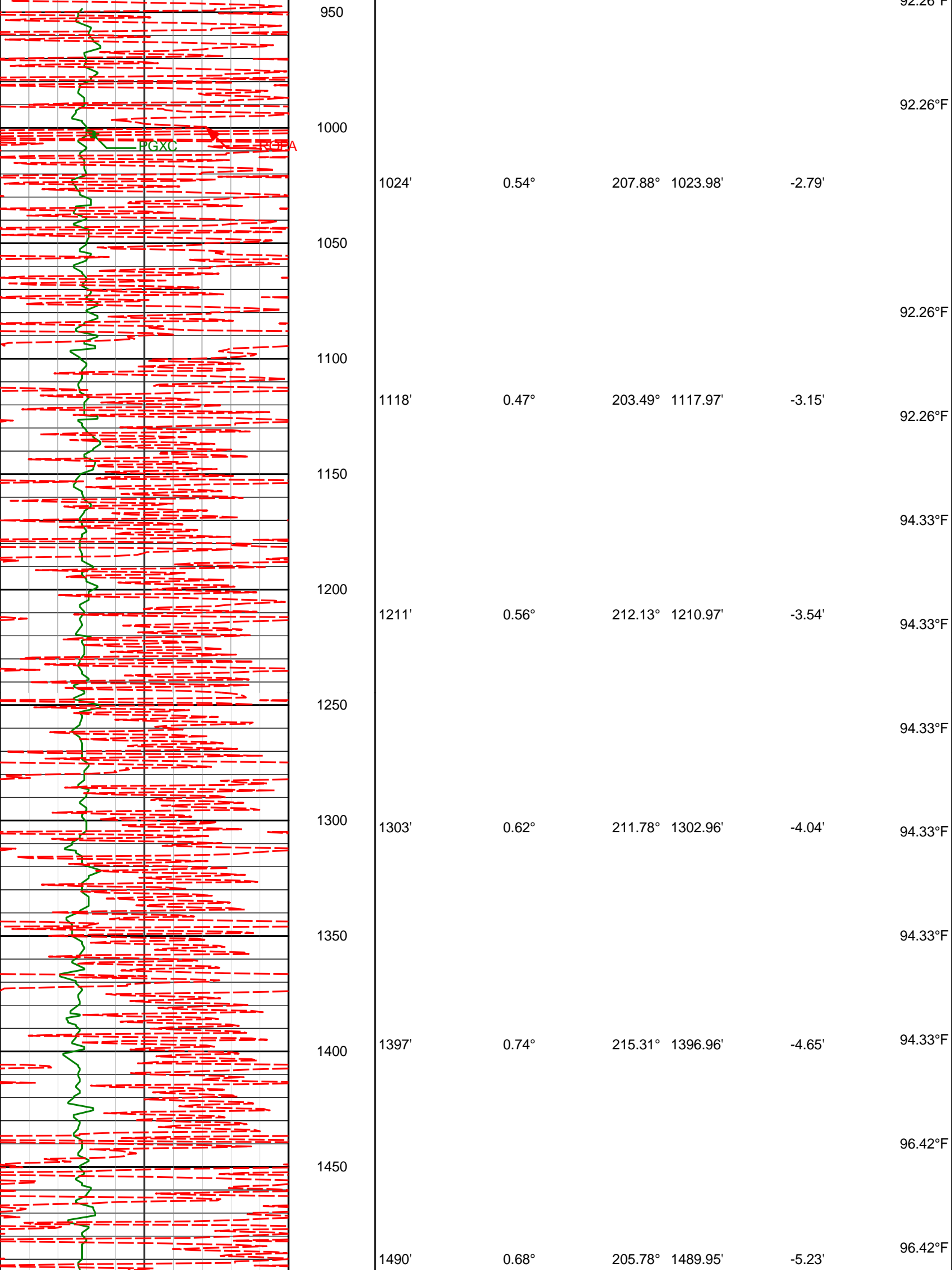
WARRANTY

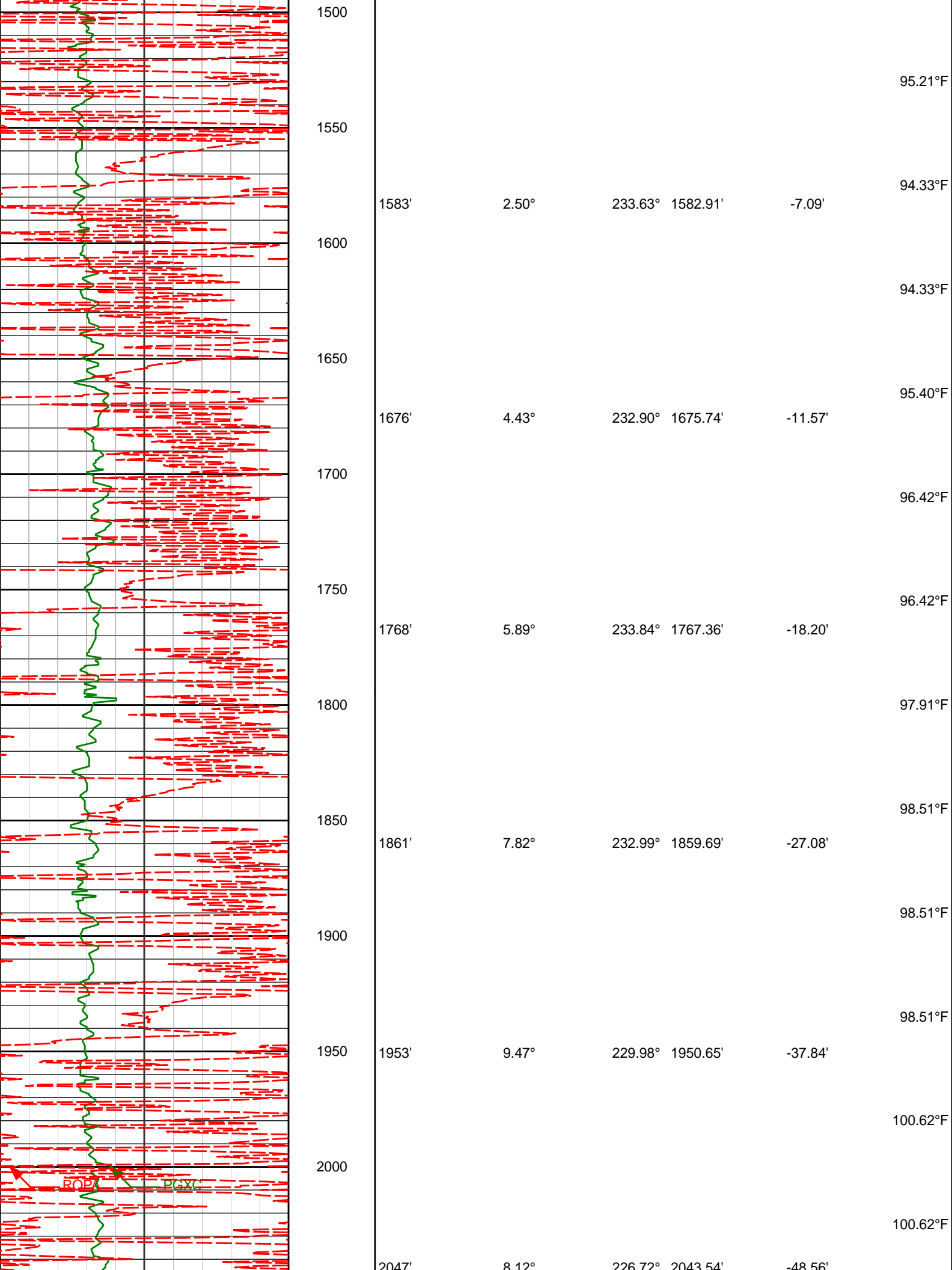
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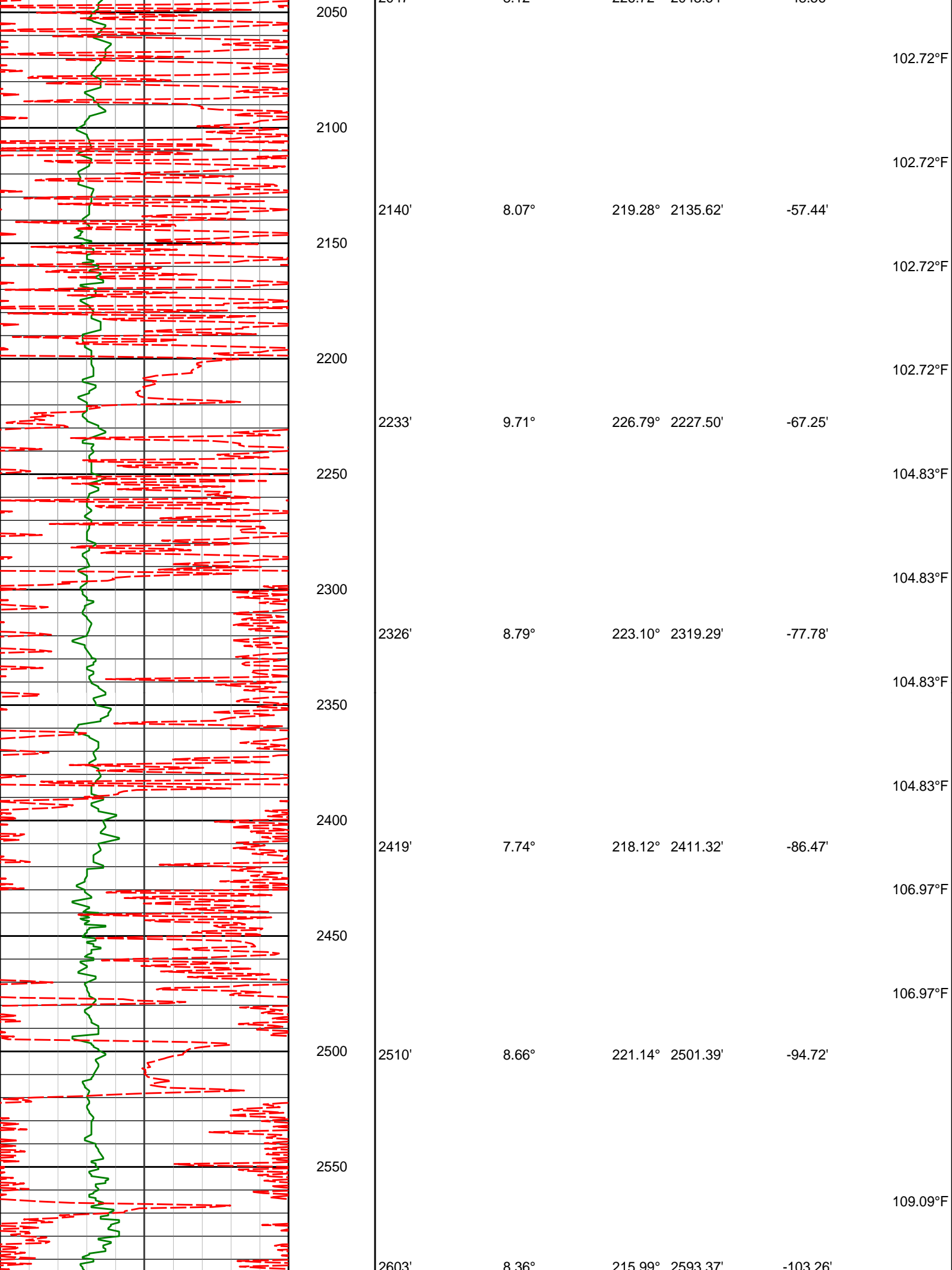
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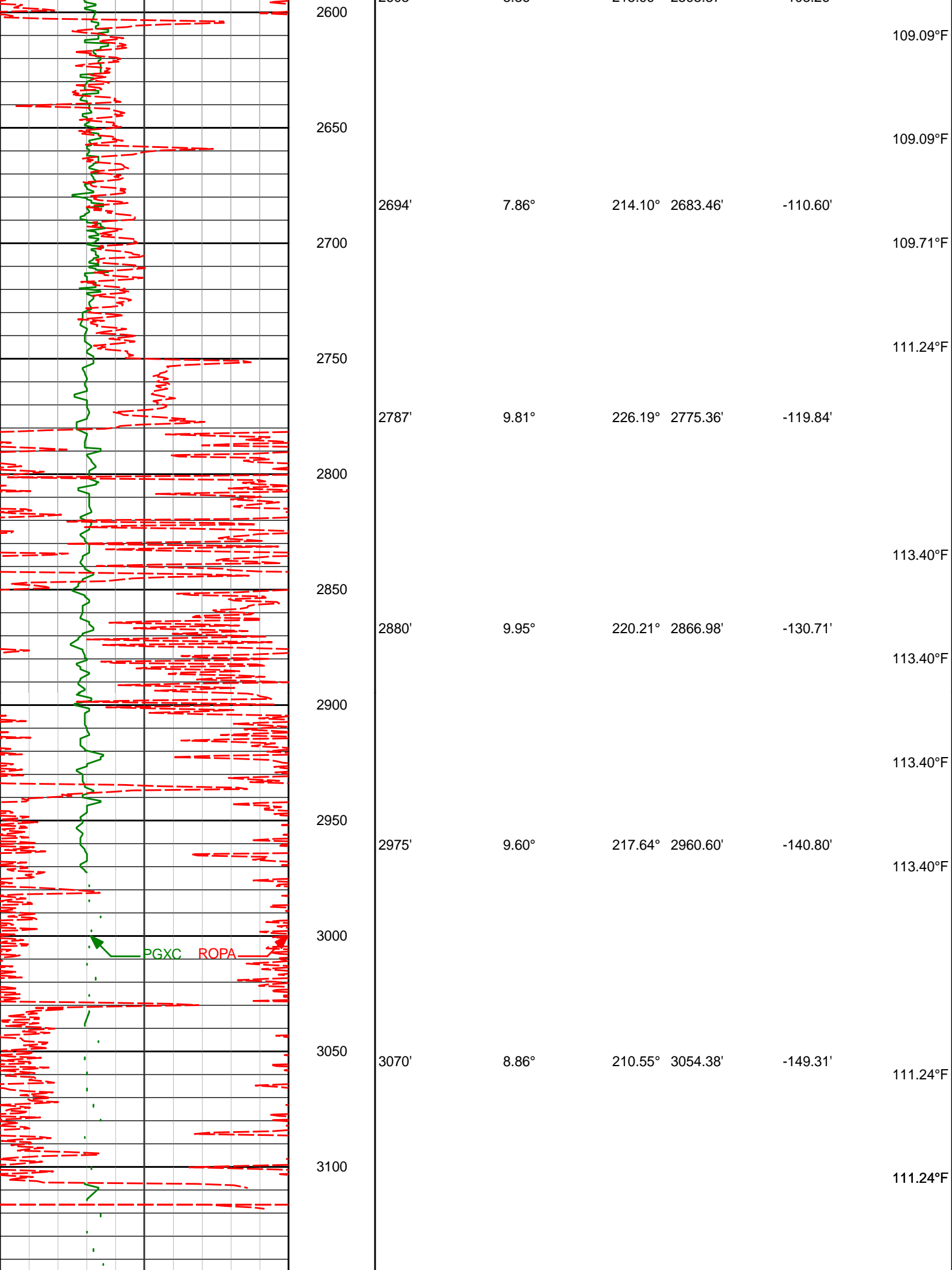
TVD Detail 1:600 Scale

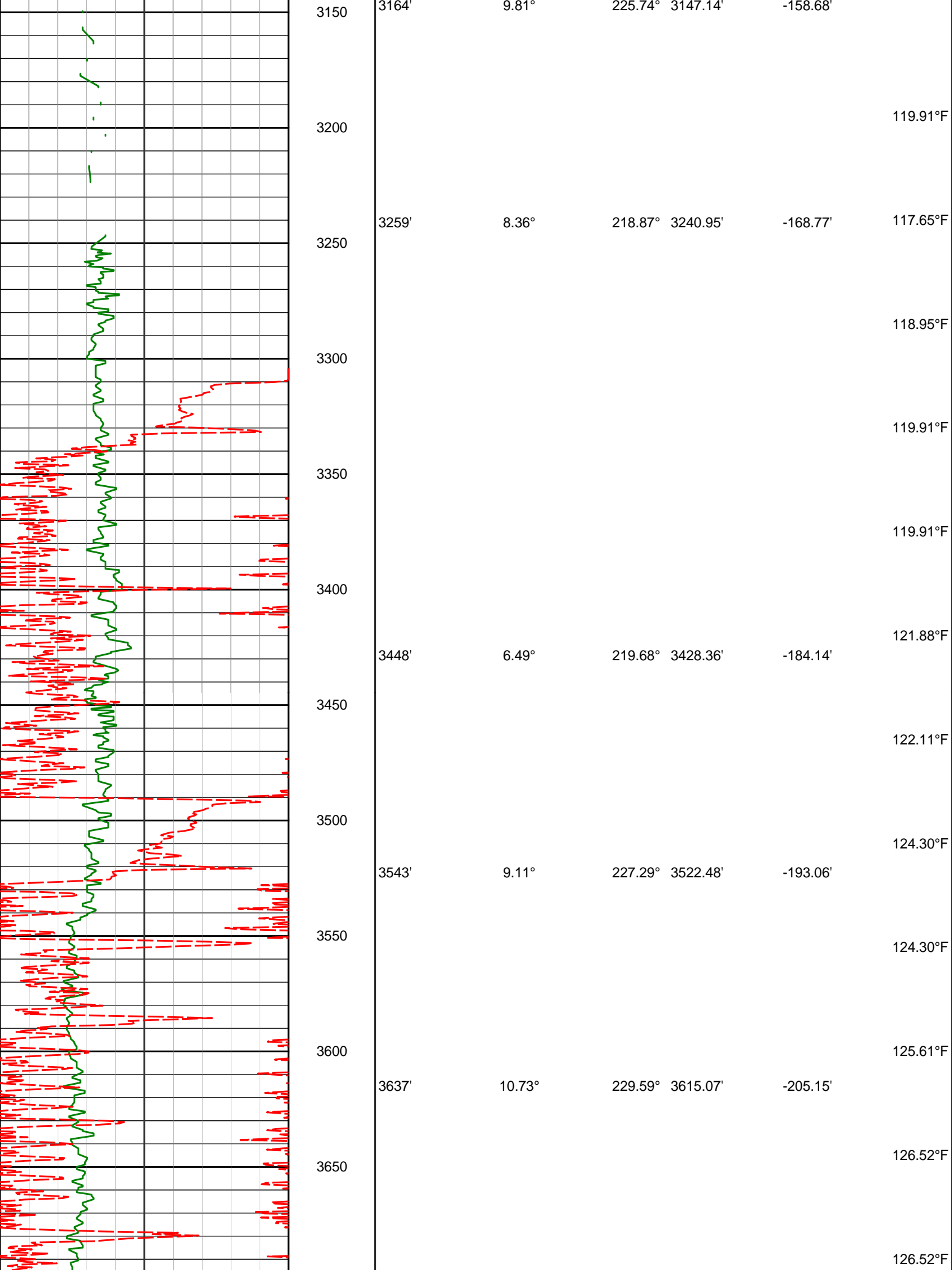


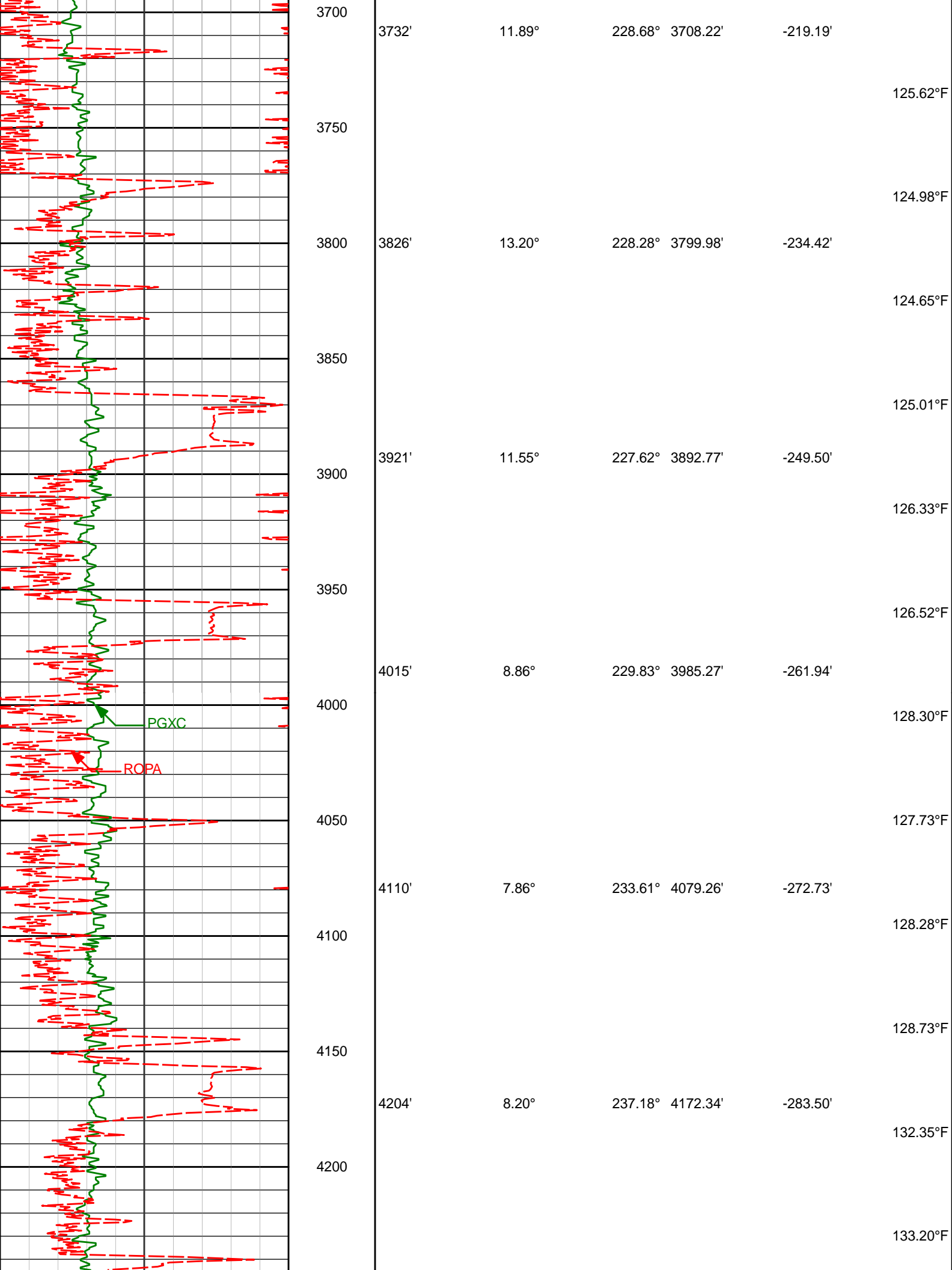


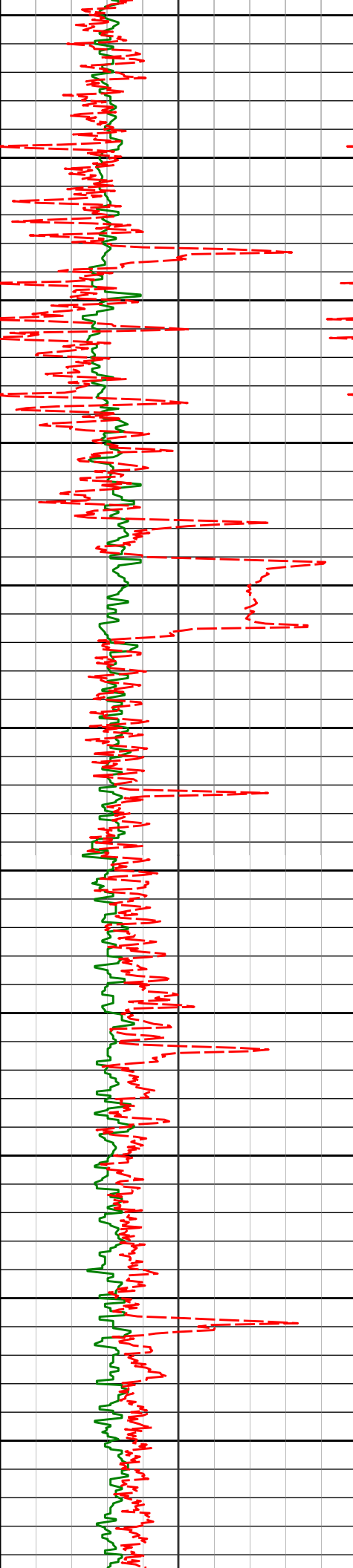






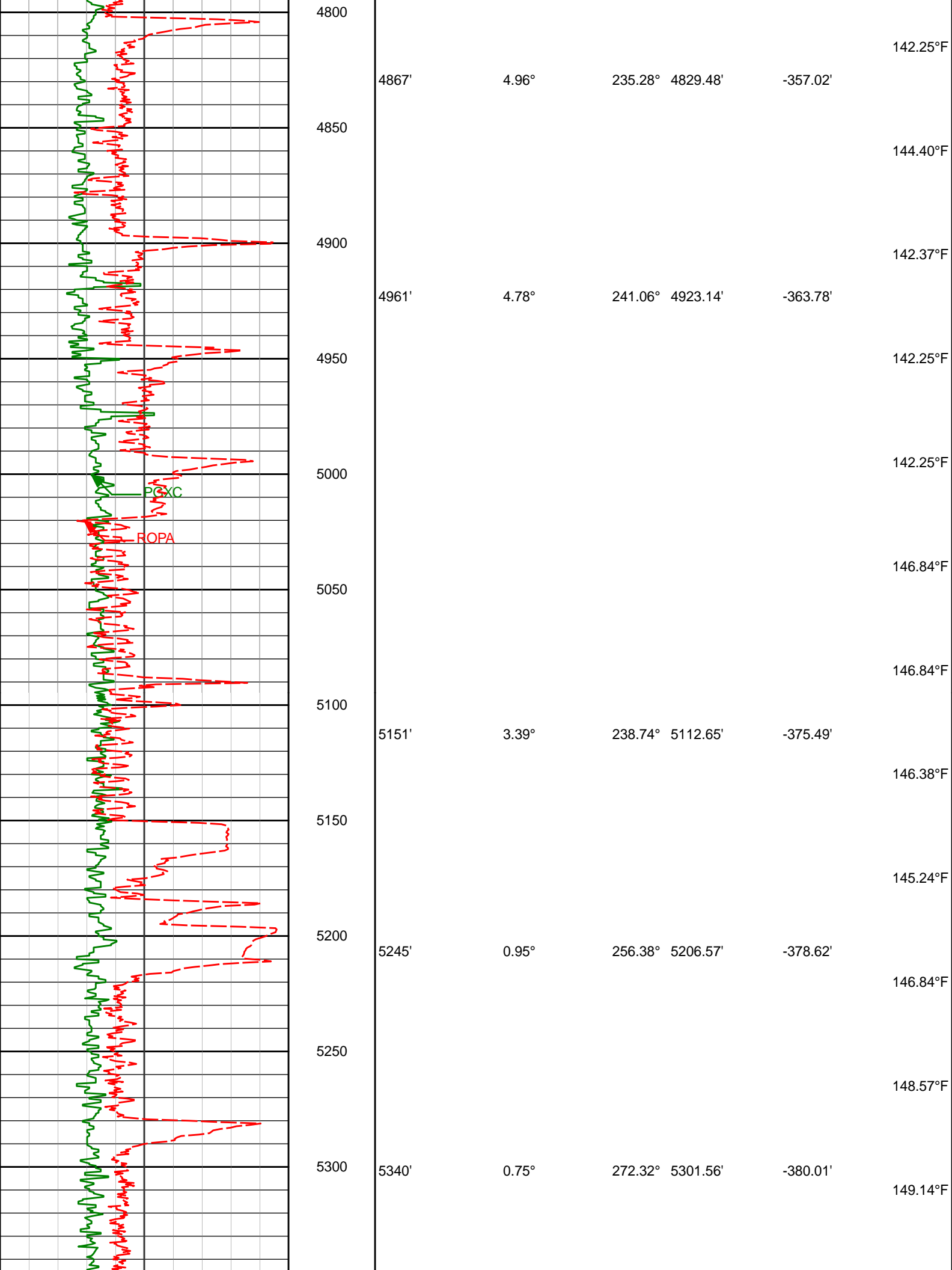


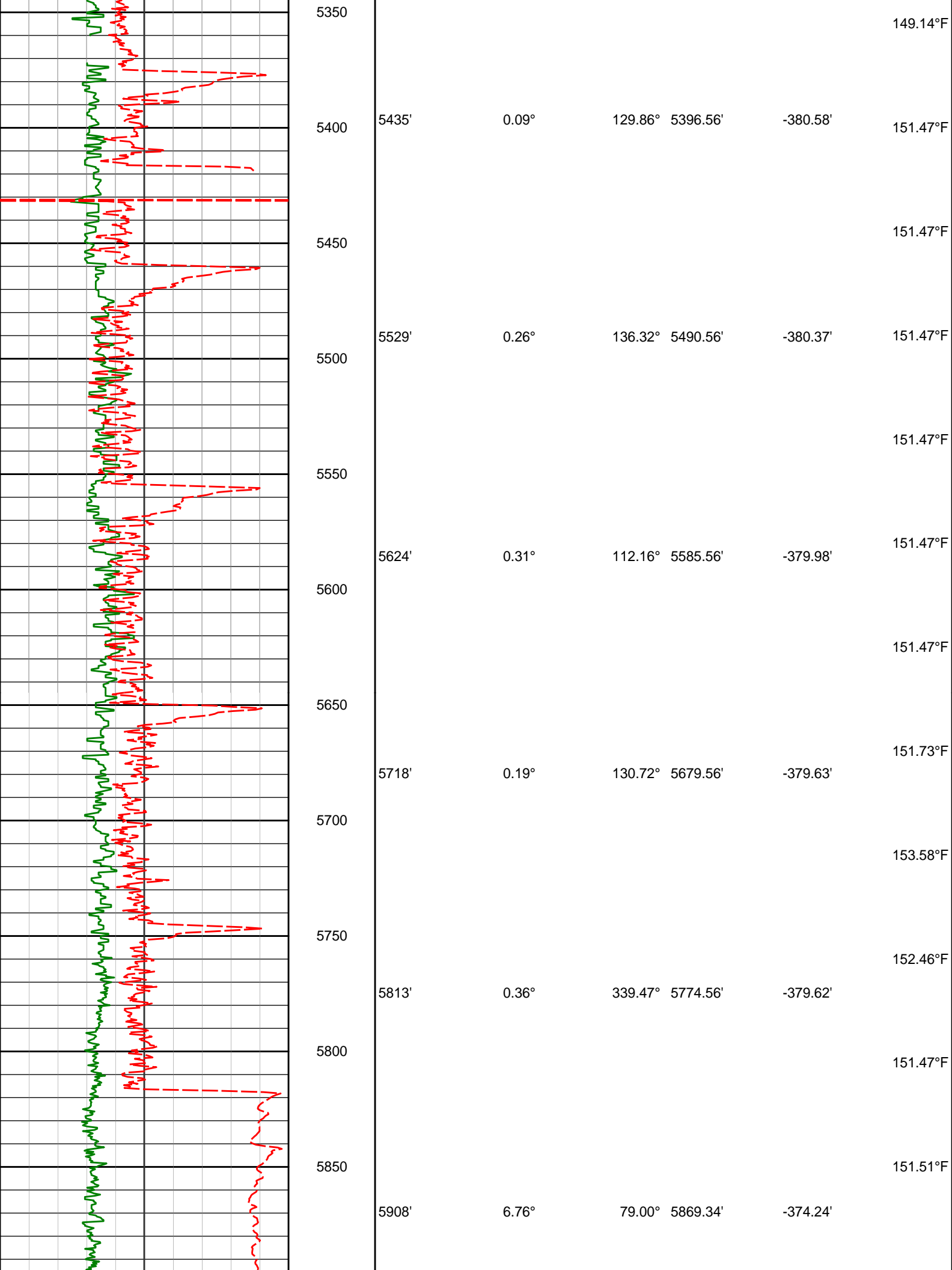


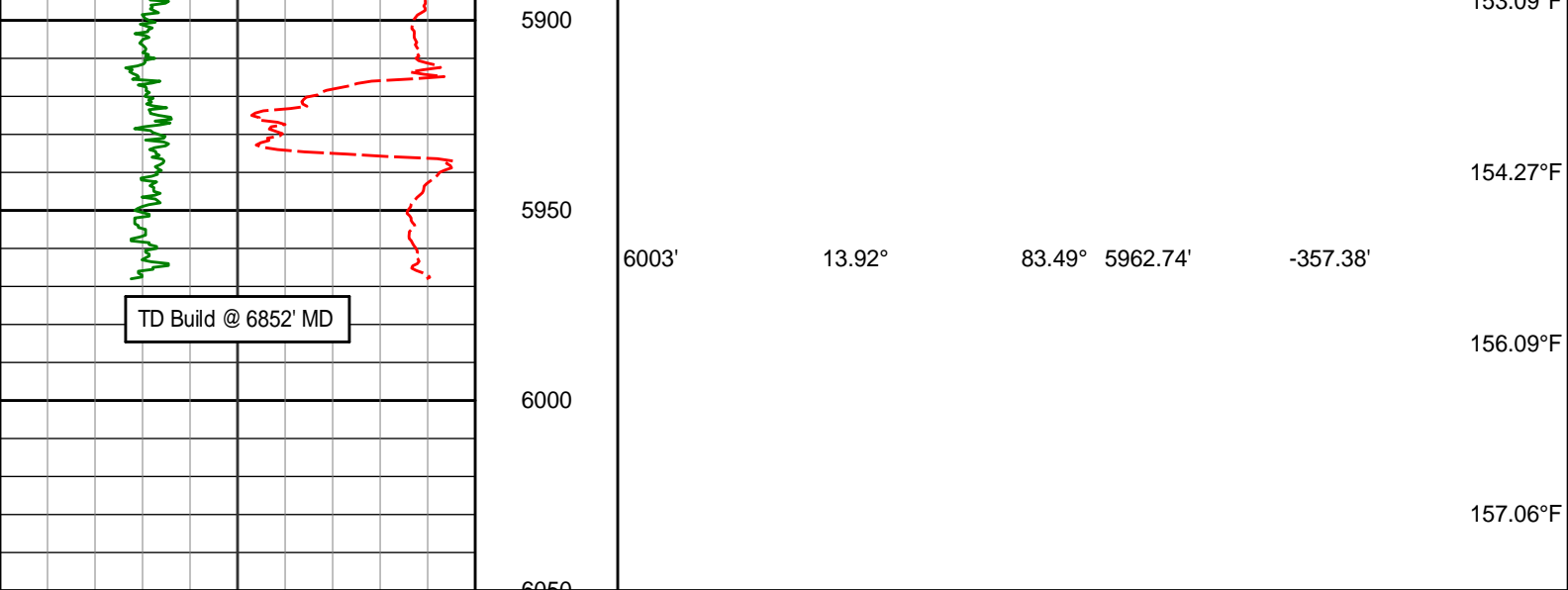


4250
4299'
4300
4350
4394'
4400
4450
4488'
4500
4550
4583'
4600
4650
4678'
4700
4772'
4750

4299'	8.17°	237.63°	4266.37'	-294.87'	133.20°F
4394'	7.47°	240.97°	4360.49'	-305.95'	135.45°F
4488'	8.79°	236.11°	4453.54'	-317.23'	136.04°F
4583'	8.21°	236.12°	4547.50'	-328.86'	137.70°F
4678'	7.56°	238.63°	4641.60'	-339.80'	139.96°F
4772'	6.17°	237.89°	4734.93'	-349.34'	142.25°F







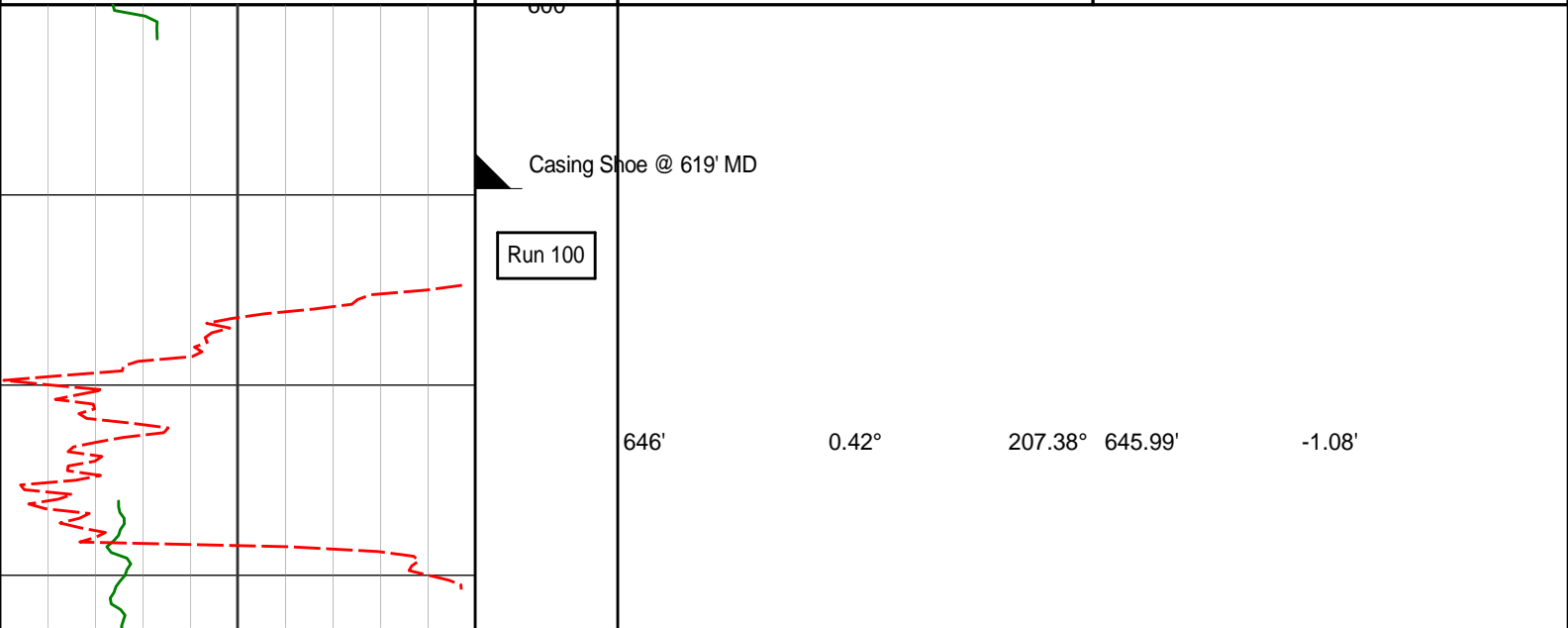
Avg Rate of Penetration ROPA feet per hr	Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0							

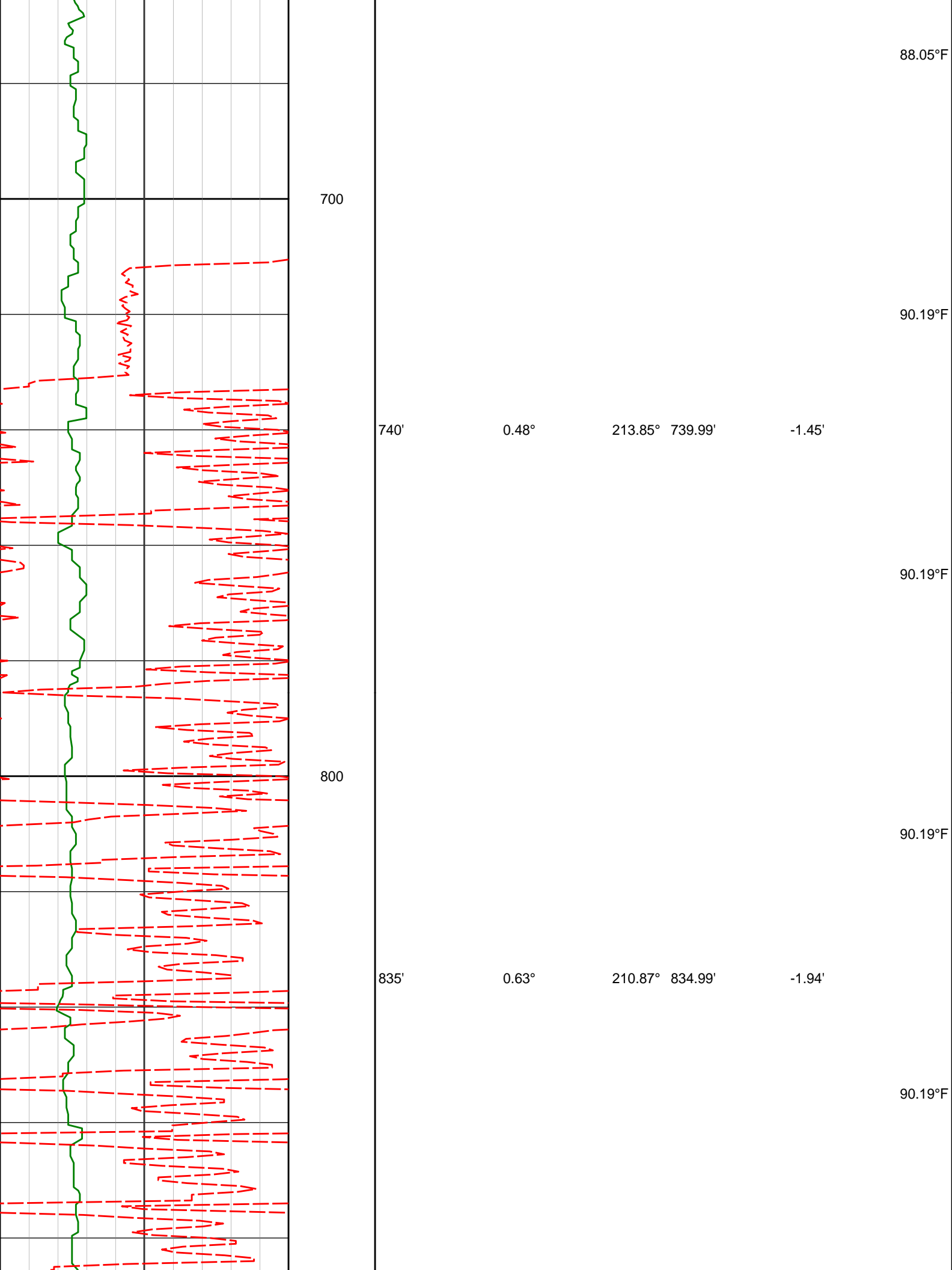
PCG GR XHi-Range RT BCor PGXRC-T api	0 300
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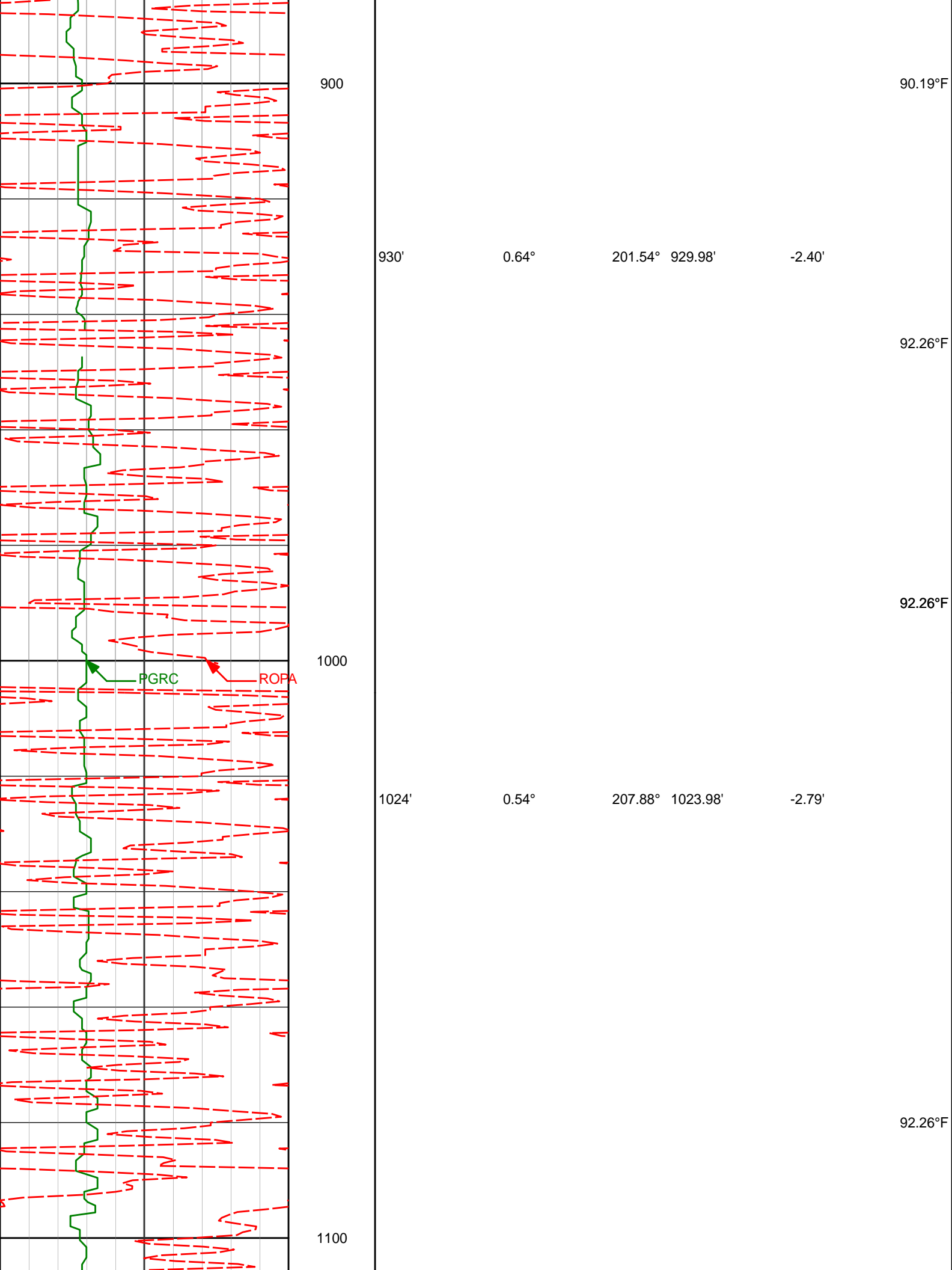
TVD Detail 1:240 Scale

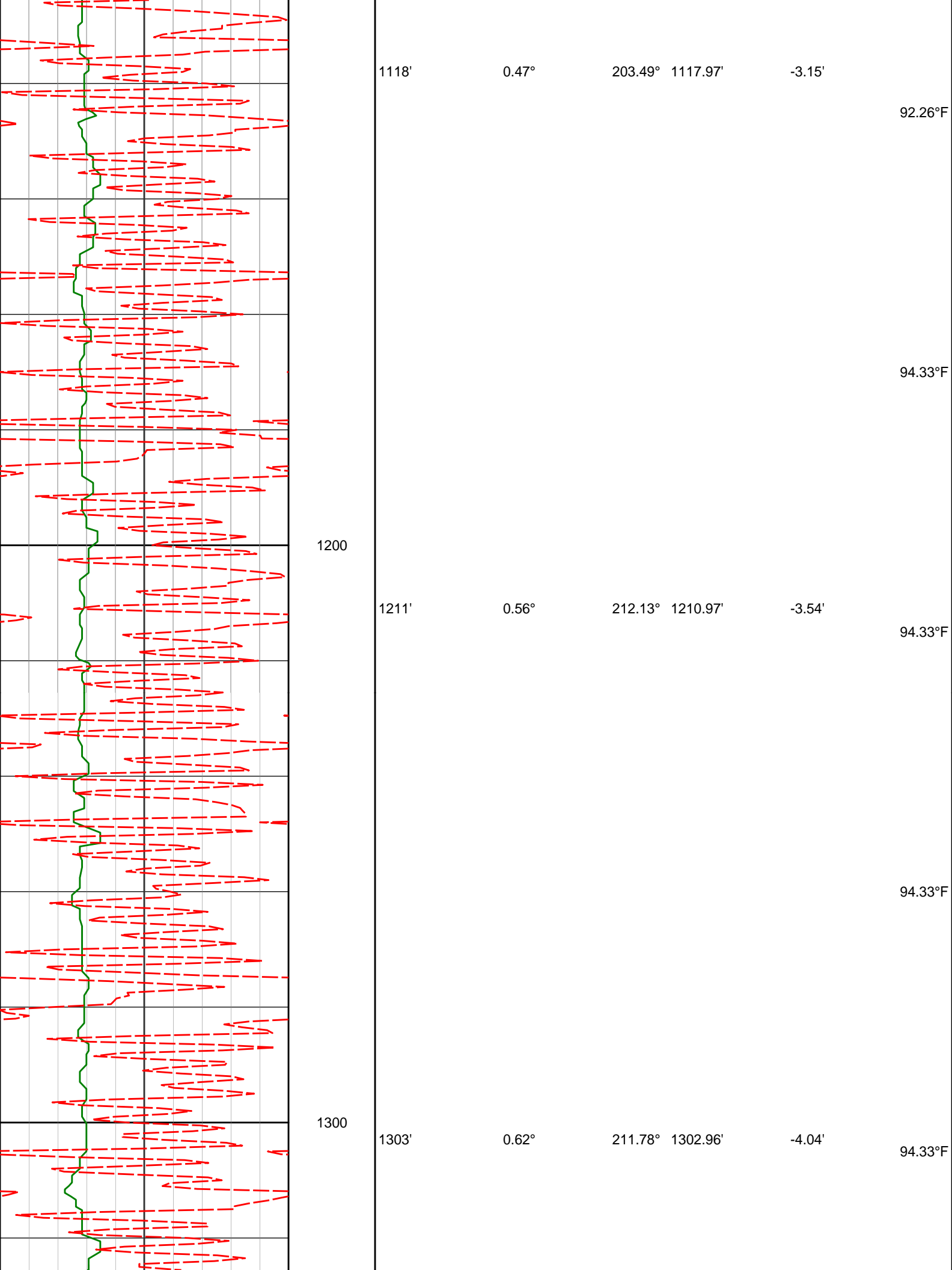
PCG GR XHi-Range RT PGRC api	0 300
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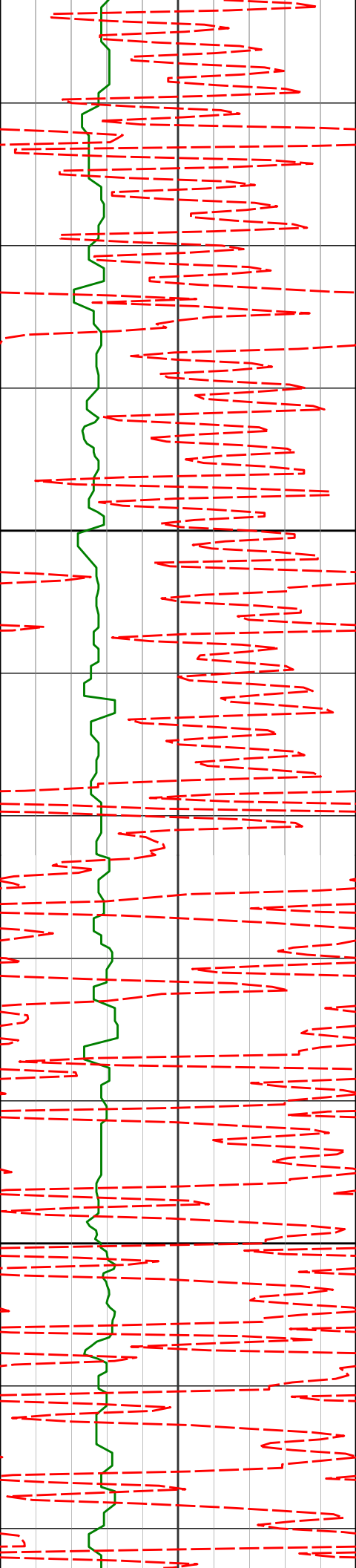
Avg Rate of Penetration ROPA feet per hr	Depth TVD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0							











1400

1500

1397'

1490'

0.74°

0.68°

215.31°

205.78°

1396.96'

1489.95'

-4.65'

-5.23'

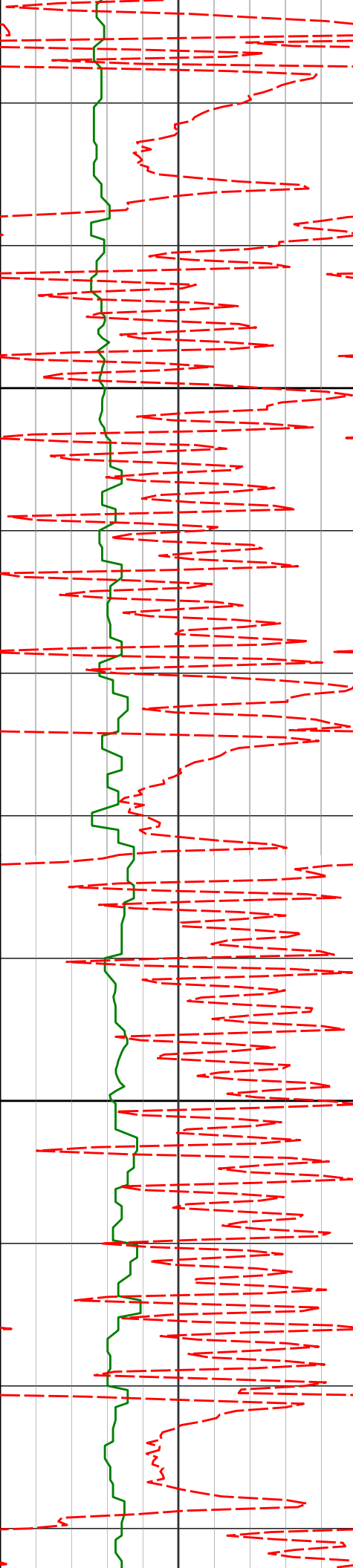
94.33°F

94.33°F

96.42°F

96.42°F

95.21°F



1600

1700

1583'

2.50°

233.63°

1582.91'

-7.09'

1676'

4.43°

232.90°

1675.74'

-11.57'

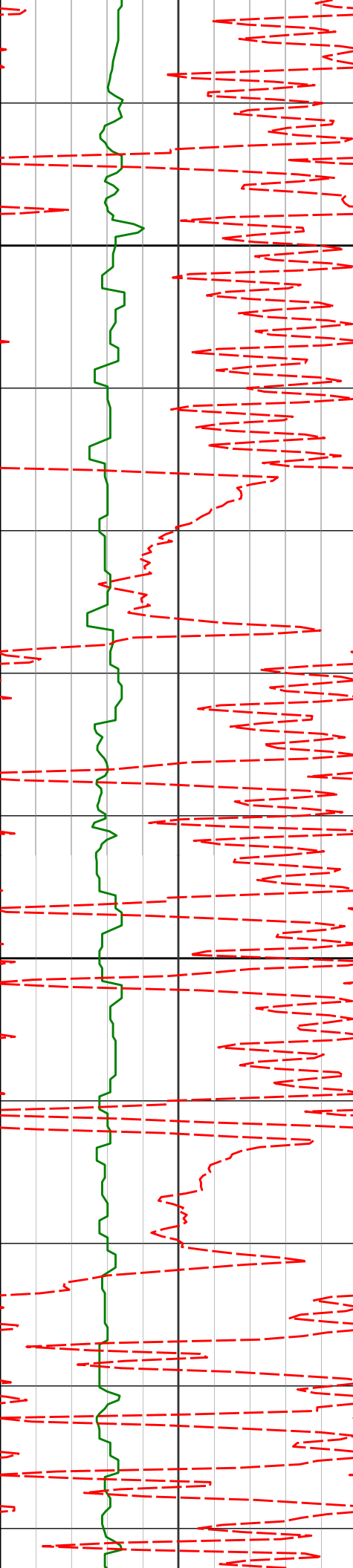
94.33°F

94.33°F

95.40°F

96.42°F

96.42°F



1800

1900

1768'	5.89°	233.84°	1767.36'	-18.20'
1861'	7.82°	232.99°	1859.69'	-27.08'
1953'	9.47°	229.98°	1950.65'	-37.84'

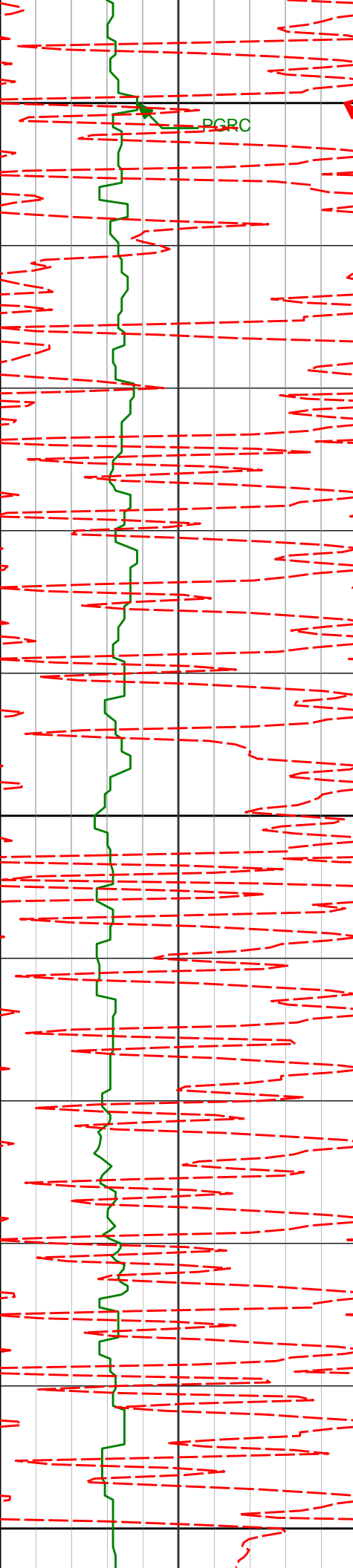
97.91°F

98.51°F

98.51°F

98.51°F

100.62°F



2000

PGRC

ROPA

100.62°F

2047'

8.12°

226.72°

2043.54'

-48.56'

102.72°F

2100

102.72°F

2140'

8.07°

219.28°

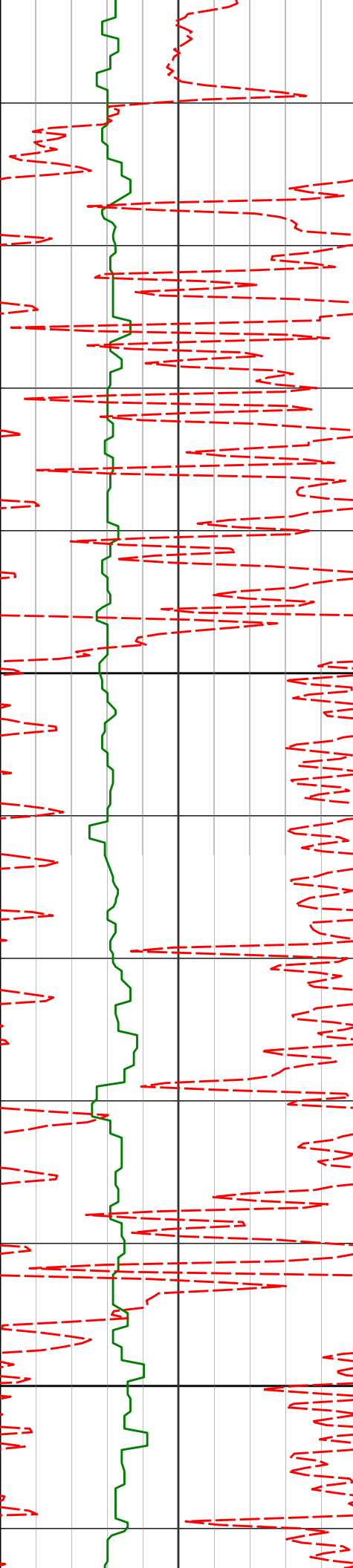
2135.62'

-57.44'

102.72°F

2200

102.72°F



2300

2400

2233'

2326'

2419'

9.71°

8.79°

7.74°

226.79°

223.10°

218.12°

2227.50'

2319.29'

2411.32'

-67.25'

-77.78'

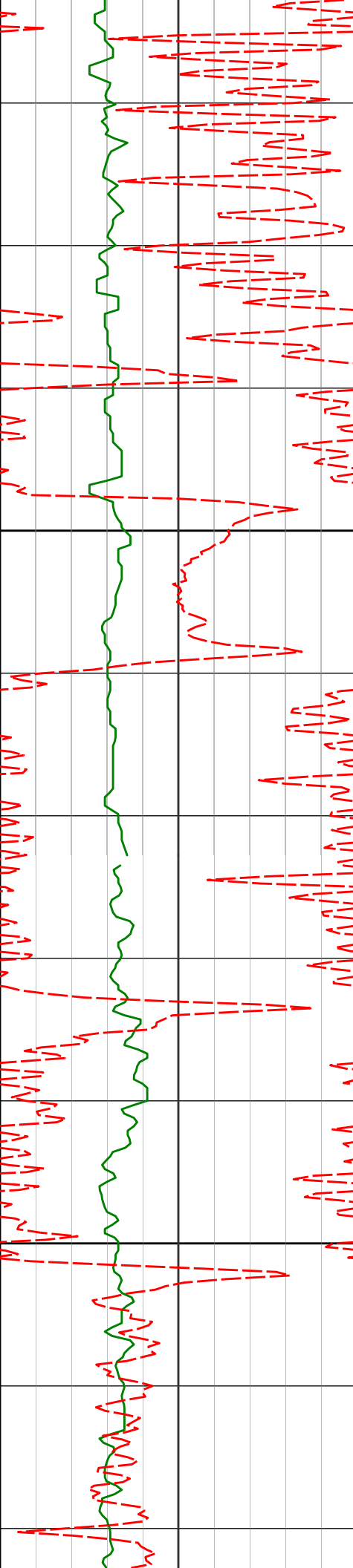
-86.47'

104.83°F

104.83°F

104.83°F

104.83°F



2500

2510'

8.66°

221.14°

2501.39'

-94.72'

2600

2603'

8.36°

215.99°

2593.37'

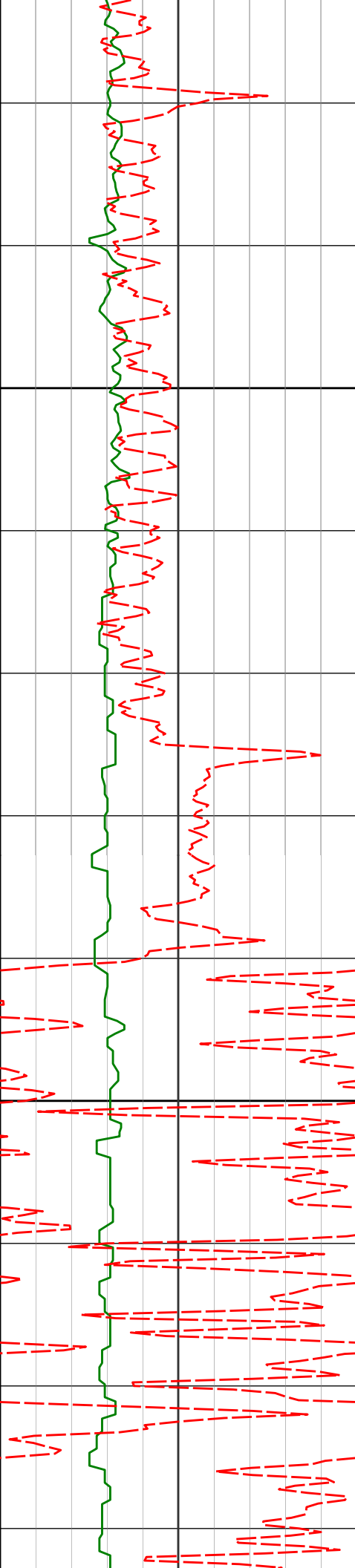
-103.26'

106.97°F

106.97°F

109.09°F

109.09°F



2700

2800

2694'

7.86°

214.10°

2683.46'

-110.60'

2787'

9.81°

226.19°

2775.36'

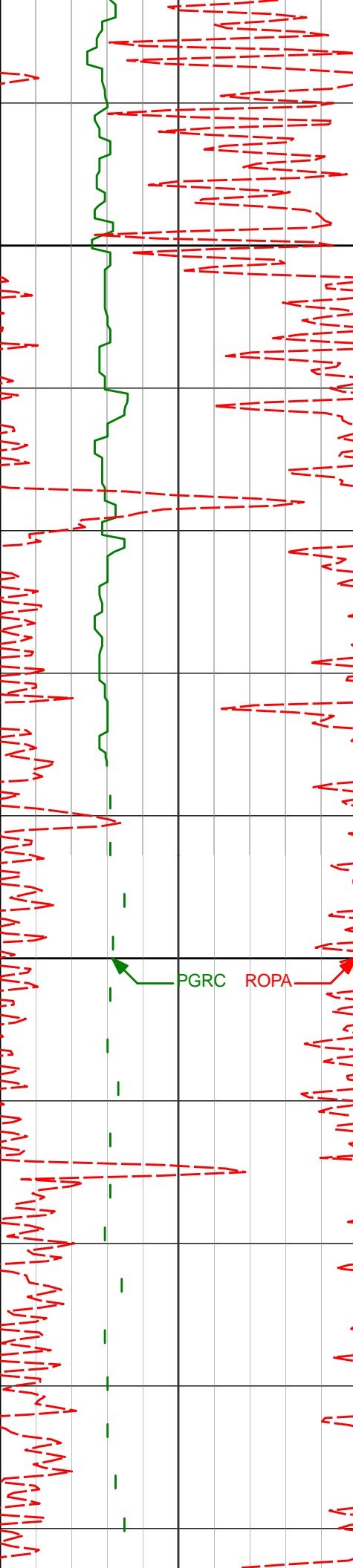
-119.84'

109.09°F

109.71°F

111.24°F

113.40°F



2900

3000

PGRC

ROPA

2880'

9.95°

220.21° 2866.98'

-130.71'

113.40°F

113.40°F

2975'

9.60°

217.64° 2960.60'

-140.80'

113.40°F

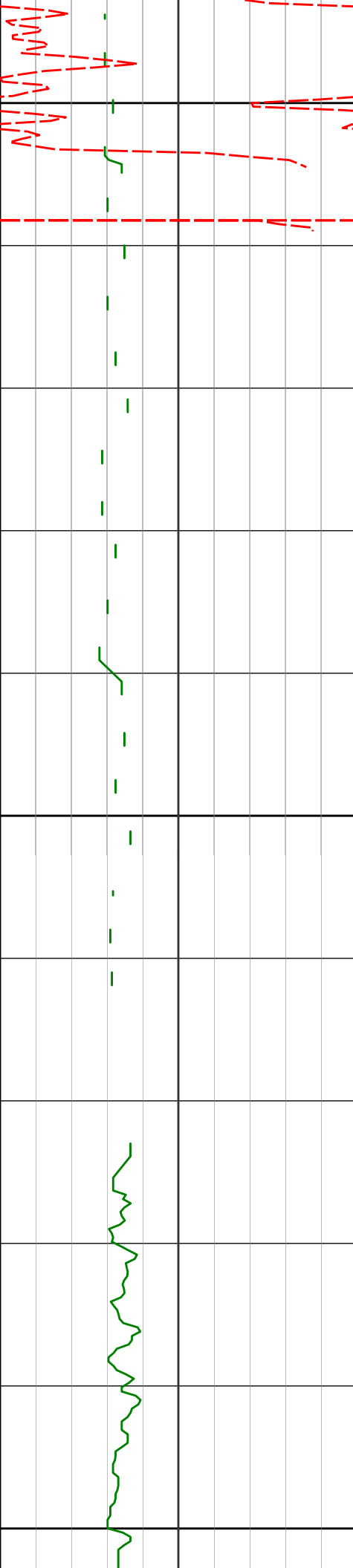
3070'

8.86°

210.55° 3054.38'

-149.31'

111.24°F



3100

111.24°F

3164'

9.81°

225.74°

3147.14'

-158.68'

3200

119.91°F

3259'

8.36°

218.87°

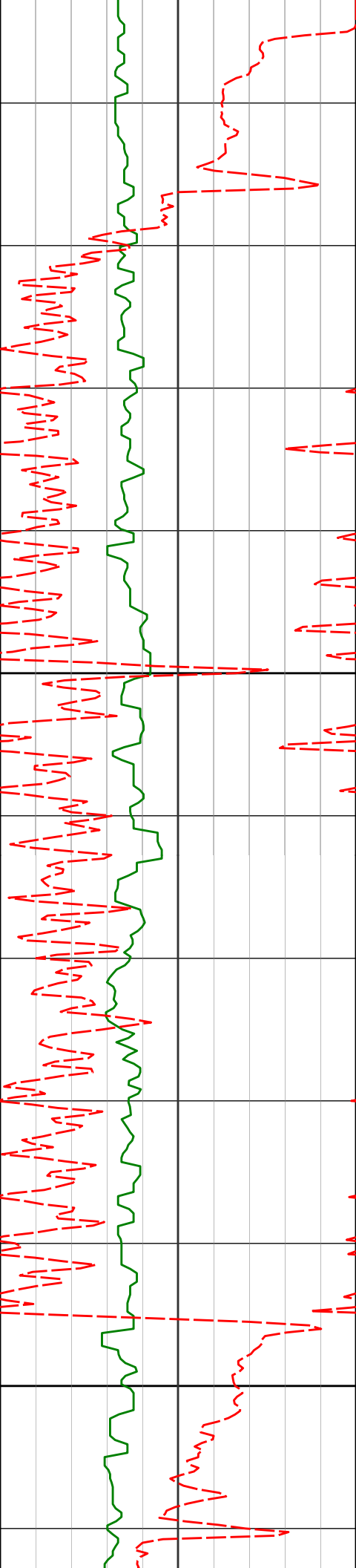
3240.95'

-168.77'

117.65°F

3300

118.95°F



3400

3500

3448'

6.49°

219.68°

3428.36'

-184.14'

3543'

9.11°

227.29°

3522.48'

-193.06'

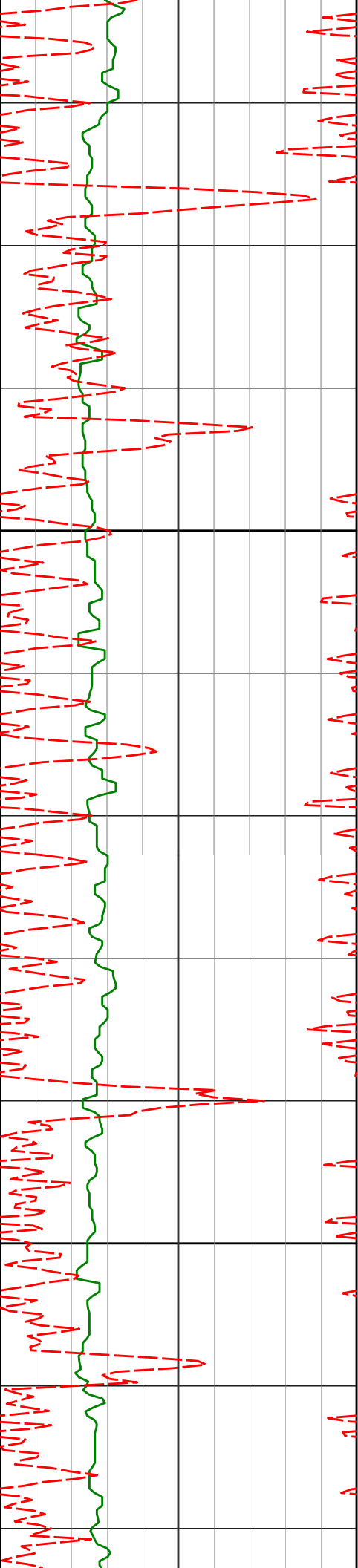
119.91°F

119.91°F

121.88°F

122.11°F

124.30°F



3600

3700

3637'

3732'

10.73°

11.89°

229.59°

228.68°

3615.07'

3708.22'

-205.15'

-219.19'

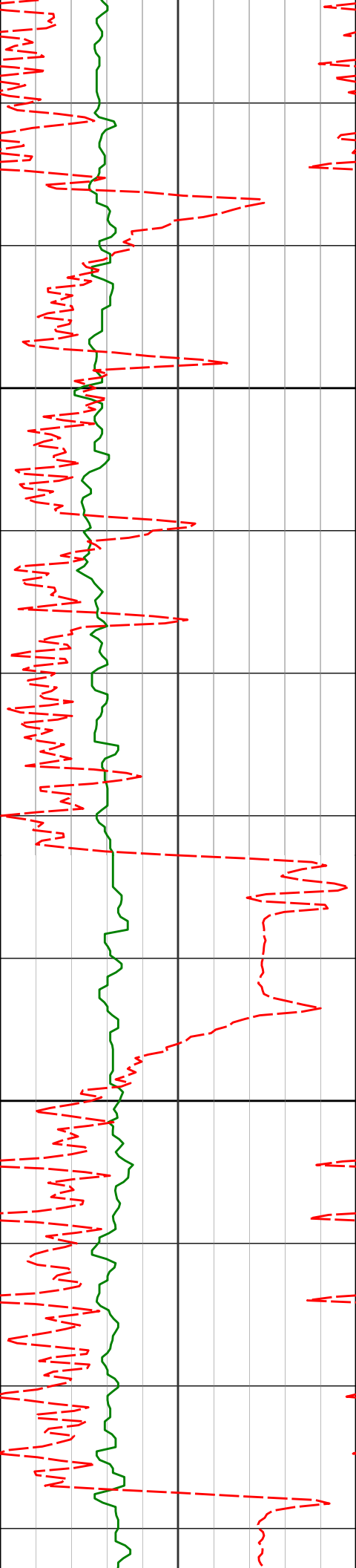
124.30°F

125.61°F

126.52°F

126.52°F

125.62°F



3800

3826'

13.20°

228.28°

3799.98'

-234.42'

124.98°F

124.65°F

125.01°F

3900

3921'

11.55°

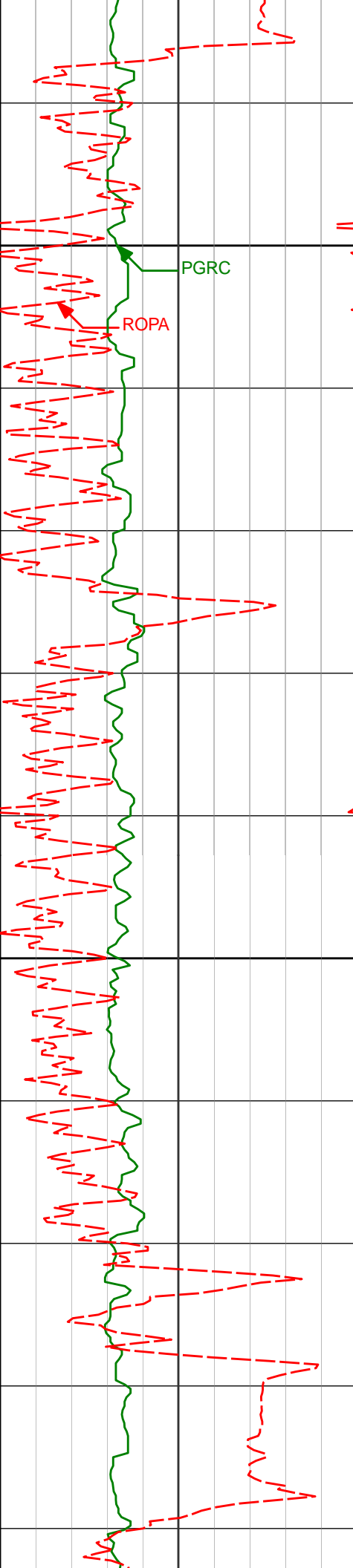
227.62°

3892.77'

-249.50'

126.33°F

126.52°F



4015' 8.86° 229.83° 3985.27' -261.94'

4000

PGRC

ROPA

128.30°F

127.73°F

4110' 7.86° 233.61° 4079.26' -272.73'

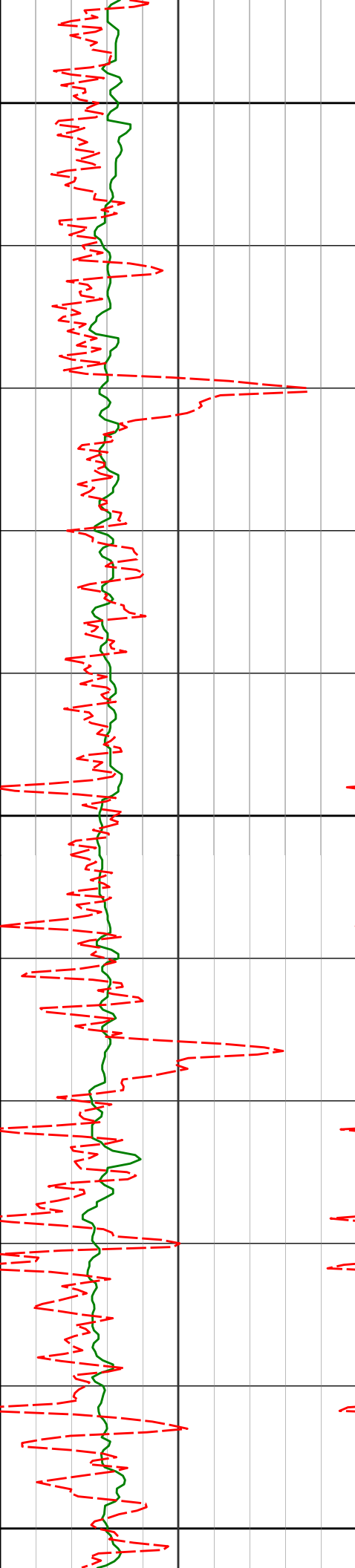
4100

128.28°F

128.73°F

4204' 8.20° 237.18° 4172.34' -283.50'

132.35°F



4200

133.20°F

4299'

8.17°

237.63° 4266.37'

-294.87'

133.20°F

4300

133.55°F

4394'

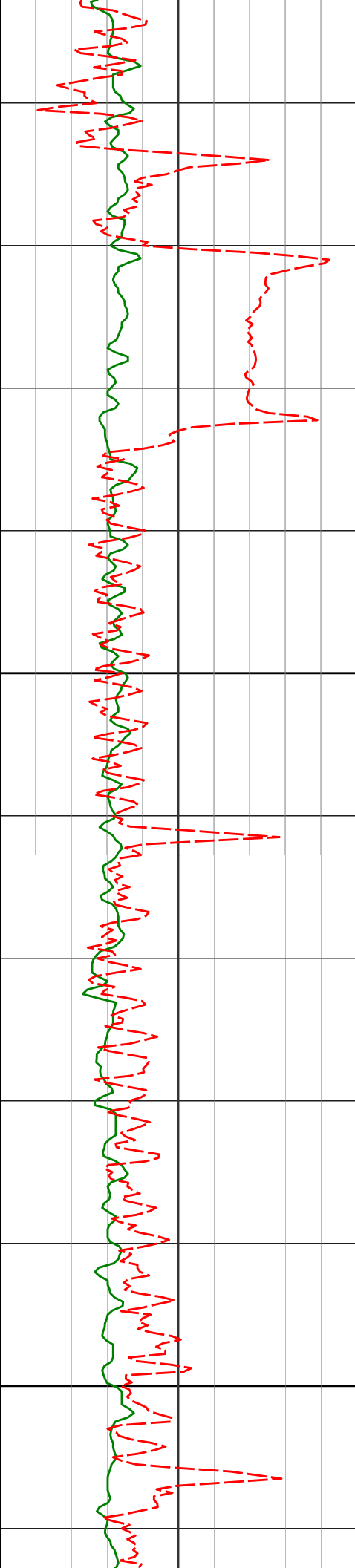
7.47°

240.97° 4360.49'

-305.95'

135.45°F

4400



4500

4600

4488'

8.79°

236.11°

4453.54'

-317.23'

136.04°F

4583'

8.21°

236.12°

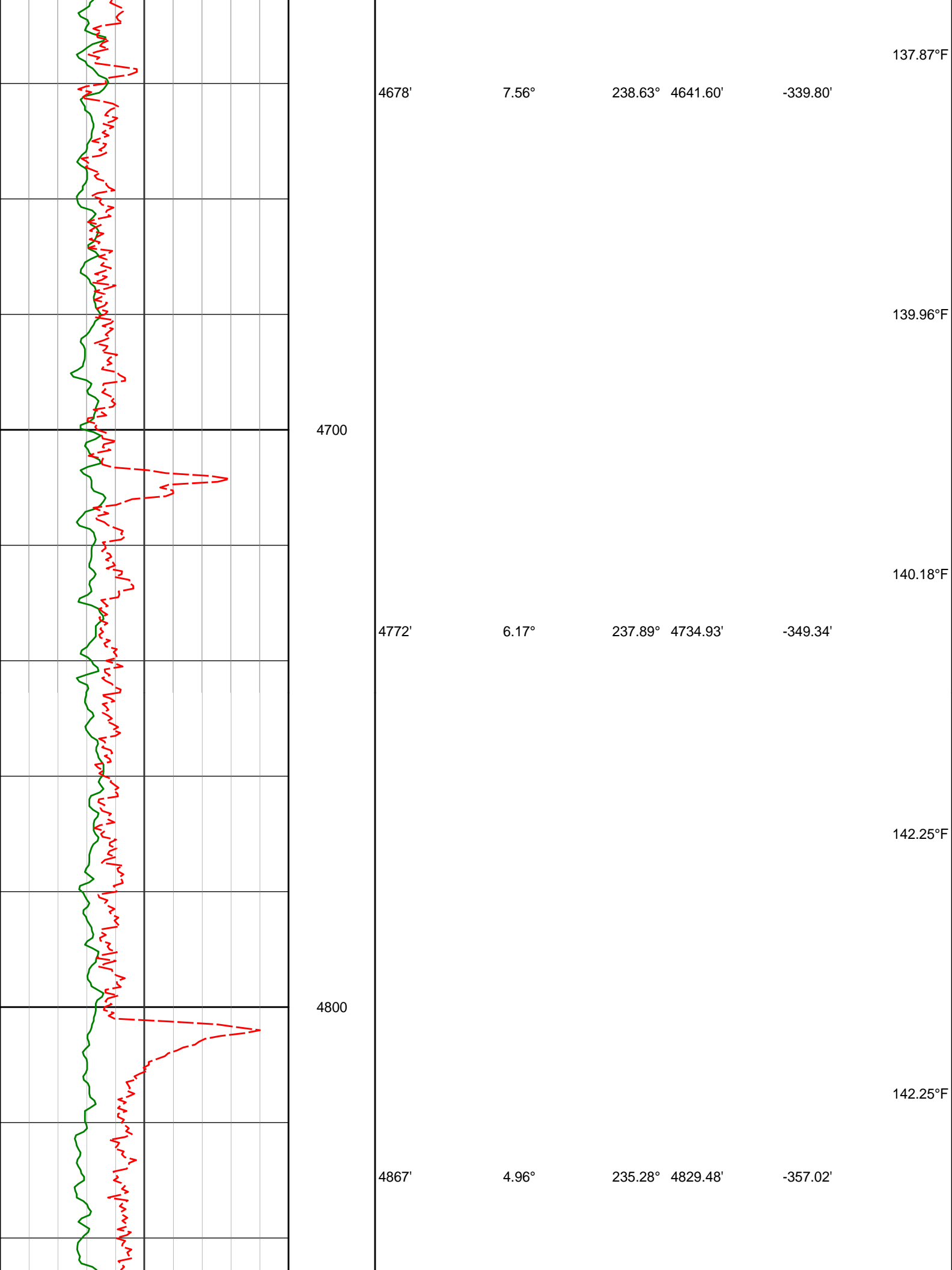
4547.50'

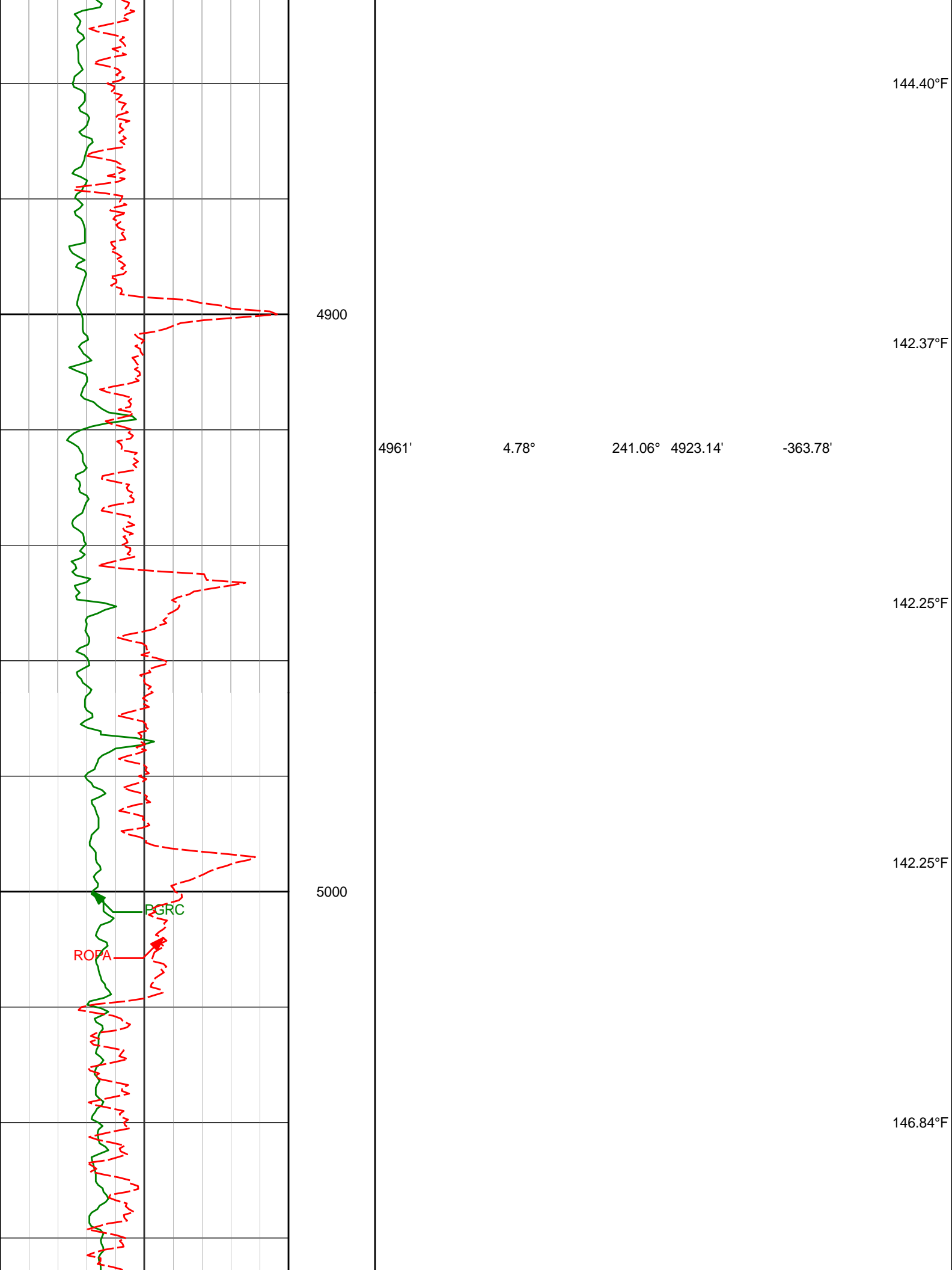
-328.86'

135.74°F

137.70°F

135.45°F







5100

5200

5151'

3.39°

238.74°

5112.65'

-375.49'

5245'

0.95°

256.38°

5206.57'

-378.62'

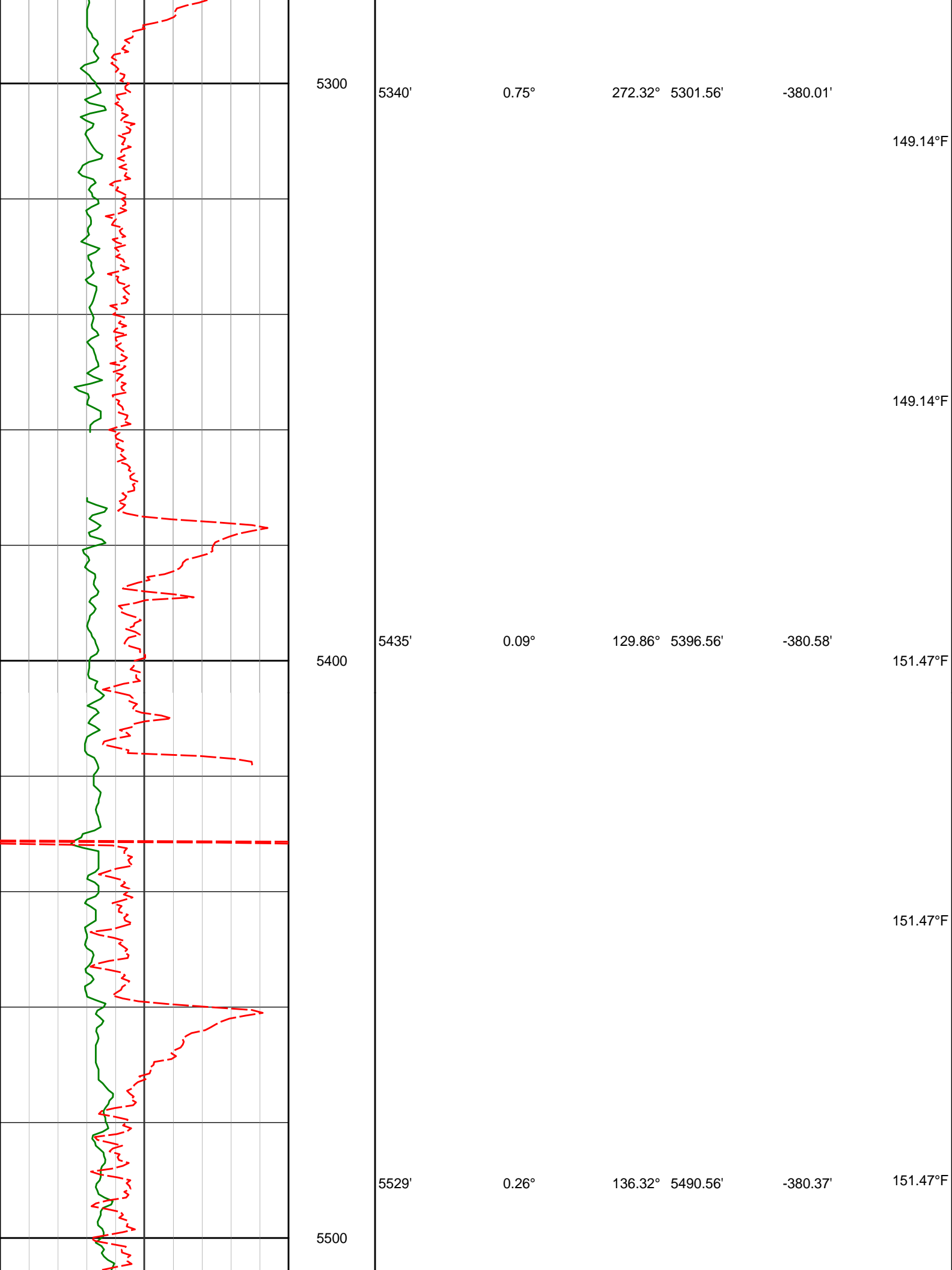
146.84°F

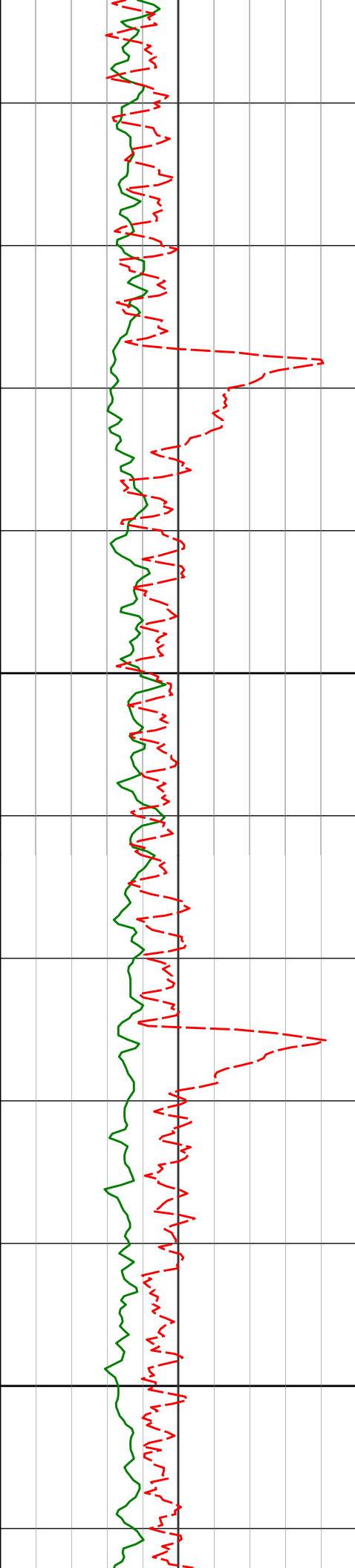
146.38°F

145.24°F

146.84°F

148.57°F





5600

5700

5624'

0.31°

112.16° 5585.56'

-379.98'

151.47°F

151.47°F

151.47°F

151.73°F

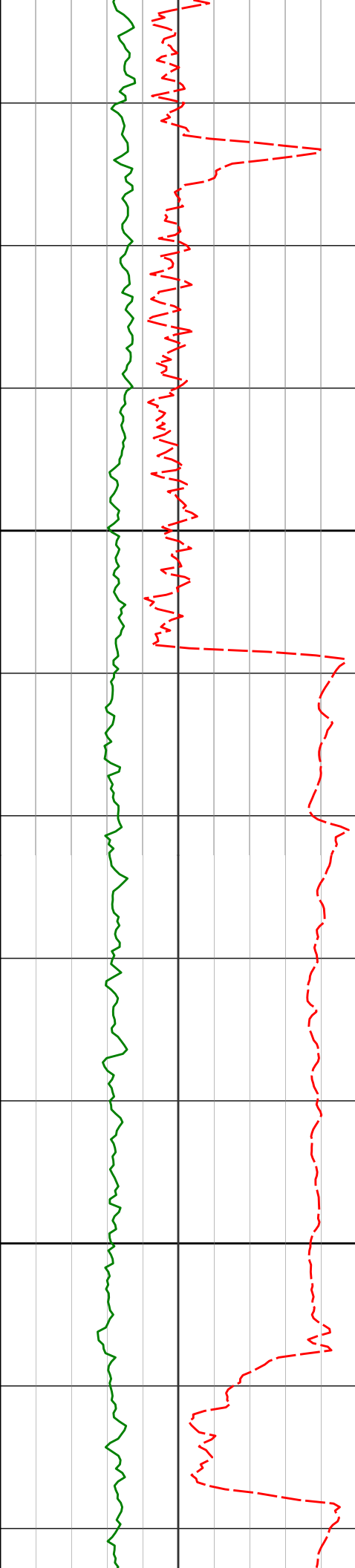
5718'

0.19°

130.72° 5679.56'

-379.63'

153.58°F



5800

5900

5813'

0.36°

339.47° 5774.56'

-379.62'

5908'

6.76°

79.00° 5869.34'

-374.24'

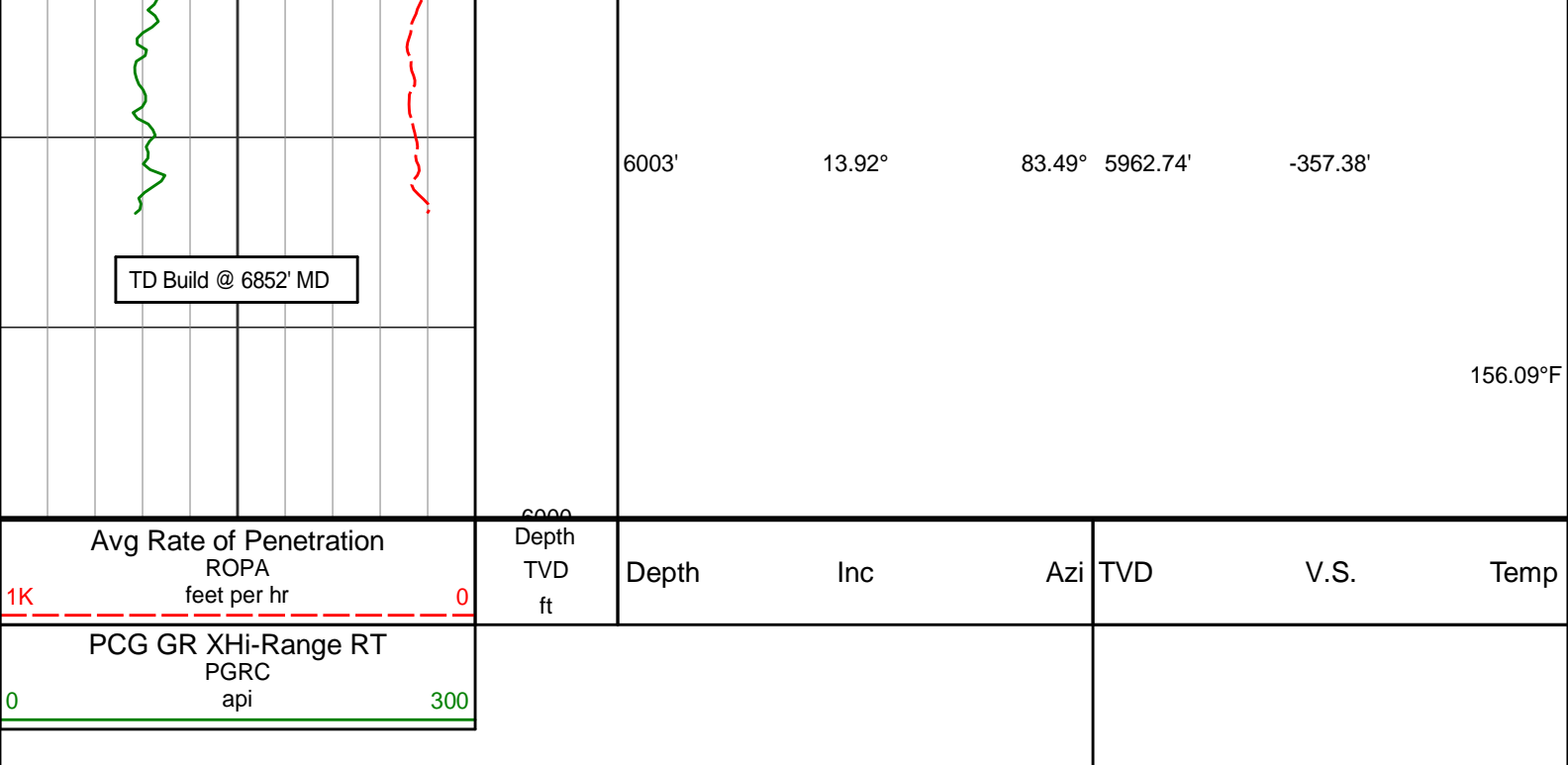
152.46°F

151.47°F

151.51°F

153.09°F

154.27°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-635
Wattenburg
Weld Colorado
USA
CA-XX-0902674373

<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>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
646.00	0.42	207.38	645.99	2.10 S	1.09 W	-1.08	0.06
740.00	0.48	213.85	739.99	2.73 S	1.46 W	-1.45	0.09
835.00	0.63	210.87	834.99	3.51 S	1.95 W	-1.94	0.16
930.00	0.64	201.54	929.98	4.45 S	2.41 W	-2.40	0.11
1024.00	0.54	207.88	1023.98	5.32 S	2.81 W	-2.79	0.12
1118.00	0.47	203.49	1117.97	6.07 S	3.17 W	-3.15	0.08
1211.00	0.56	212.13	1210.97	6.80 S	3.57 W	-3.54	0.12
1303.00	0.62	211.78	1302.96	7.60 S	4.06 W	-4.04	0.07
1397.00	0.74	215.31	1396.96	8.52 S	4.68 W	-4.65	0.14
1490.00	0.68	205.78	1489.95	9.51 S	5.27 W	-5.23	0.14
1583.00	2.50	233.63	1582.91	11.20 S	7.13 W	-7.09	2.07
1676.00	4.43	232.90	1675.74	14.57 S	11.63 W	-11.57	2.08
1768.00	5.89	233.84	1767.36	19.49 S	18.27 W	-18.20	1.60
1861.00	7.82	232.99	1859.69	26.12 S	27.18 W	-27.08	2.07
1953.00	9.47	229.98	1950.65	34.75 S	37.97 W	-37.84	1.86
2047.00	8.12	226.72	2043.54	44.27 S	48.73 W	-48.56	1.53
2140.00	8.07	219.28	2135.62	53.83 S	57.64 W	-57.44	1.13
2233.00	9.71	226.79	2227.50	64.25 S	67.49 W	-67.25	2.16
2326.00	8.79	223.10	2319.29	74.81 S	78.06 W	-77.78	1.18
2419.00	7.74	218.12	2411.32	84.92 S	86.78 W	-86.47	1.36
2510.00	8.66	221.14	2501.39	94.90 S	95.07 W	-94.72	1.11
2603.00	8.36	215.99	2593.37	105.65 S	103.65 W	-103.26	0.88
2694.00	7.86	214.10	2683.46	116.15 S	111.02 W	-110.60	0.62
2787.00	9.81	226.19	2775.36	126.91 S	120.31 W	-119.84	2.89
2880.00	9.95	220.21	2866.98	138.53 S	131.22 W	-130.71	1.11
2975.00	9.60	217.64	2960.60	151.07 S	141.35 W	-140.80	0.58
3070.00	8.86	210.55	3054.38	163.64 S	149.91 W	-149.31	1.43
3164.00	9.81	225.74	3147.14	175.46 S	159.33 W	-158.68	2.80

3259.00	8.36	218.87	3240.95	186.49 S	169.46 W	-168.77	1.91
3448.00	6.49	219.68	3428.36	205.41 S	184.90 W	-184.14	0.99
3543.00	9.11	227.29	3522.48	214.64 S	193.85 W	-193.06	2.96
3637.00	10.73	229.59	3615.07	225.36 S	205.98 W	-205.15	1.77
3732.00	11.89	228.68	3708.22	237.55 S	220.06 W	-219.19	1.24
3826.00	13.20	228.28	3799.98	251.09 S	235.34 W	-234.42	1.40
3921.00	11.55	227.62	3892.77	264.72 S	250.47 W	-249.50	1.74
4015.00	8.86	229.83	3985.27	275.73 S	262.95 W	-261.94	2.90
4110.00	7.86	233.61	4079.26	284.31 S	273.77 W	-272.73	1.20
4204.00	8.20	237.18	4172.34	291.75 S	284.58 W	-283.50	0.64
4299.00	8.17	237.63	4266.37	299.03 S	295.97 W	-294.87	0.07
4394.00	7.47	240.97	4360.49	305.65 S	307.07 W	-305.95	0.88
4488.00	8.79	236.11	4453.54	312.62 S	318.38 W	-317.23	1.58
4583.00	8.21	236.12	4547.50	320.45 S	330.04 W	-328.86	0.61
4678.00	7.56	238.63	4641.60	327.48 S	341.00 W	-339.80	0.78
4772.00	6.17	237.89	4734.93	333.38 S	350.56 W	-349.34	1.47
4867.00	4.96	235.28	4829.48	338.44 S	358.27 W	-357.02	1.30
4961.00	4.78	241.06	4923.14	342.65 S	365.04 W	-363.78	0.56
5151.00	3.39	238.74	5112.65	349.40 S	376.77 W	-375.49	0.74
5245.00	0.95	256.38	5206.57	351.03 S	379.91 W	-378.62	2.66
5340.00	0.75	272.32	5301.56	351.19 S	381.30 W	-380.01	0.33
5435.00	0.09	129.86	5396.56	351.21 S	381.87 W	-380.58	0.87
5529.00	0.26	136.32	5490.56	351.42 S	381.66 W	-380.37	0.18
5624.00	0.31	112.16	5585.56	351.67 S	381.27 W	-379.98	0.13
5718.00	0.19	130.72	5679.56	351.87 S	380.92 W	-379.63	0.15
5813.00	0.36	339.47	5774.56	351.69 S	380.91 W	-379.62	0.56
5908.00	6.76	79.00	5869.34	350.34 S	375.52 W	-374.24	7.18
6003.00	13.92	83.49	5962.74	347.98 S	358.66 W	-357.38	7.58
6097.00	19.06	94.05	6052.86	347.78 S	332.10 W	-330.82	6.31
6192.00	31.33	92.85	6138.66	350.11 S	291.81 W	-290.52	12.93
6287.00	41.88	89.13	6214.83	350.86 S	235.27 W	-233.99	11.35
6381.00	51.34	89.40	6279.33	350.00 S	167.05 W	-165.76	10.07
6476.00	57.76	89.79	6334.40	349.46 S	89.70 W	-88.42	6.77
6571.00	65.49	88.17	6379.52	347.94 S	6.20 W	-4.92	8.27
6665.00	71.82	86.55	6413.72	343.89 S	81.21 E	82.47	6.92
6760.00	78.39	86.76	6438.13	338.54 S	172.82 E	174.05	6.92
6788.00	82.28	86.14	6442.83	336.83 S	200.36 E	201.59	14.06

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 90.21 DEGREES (GRID)
A TOTAL CORRECTION OF 7.57 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6788.00 FEET
IS 391.92 FEET ALONG 149.25 DEGREES (GRID)**

Final survey is a straight line projection to TD.