



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100				
Date run completed	31-May-15				
Rig Bit Number	0100				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (MD, ft)	599.00				
Log End Depth (MD, ft)	7,028.00				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	30-May-15 01:30				
Drill/Wipe End Date and Time	31-May-15 01:40				
Min Inc (deg) @ Depth (MD, ft)	0.18 @ 638.00				
Max Inc (deg) @ Depth (MD, ft)	81.65 @ 6,965.00				
Bit TFA(in2) / Bit Type	0.98 / PDC				
Flow Rate (gpm)	596.67				
Max AV (fpm) / CV (fpm) @ MWD	479.4 / 233.7				
Fluid Type	Native/Spud Mud				
Density (ppg) / Viscosity (spqt)	9.60 / 27.00				
Filtrate CL (ppm)	2,300.00				
pH / Fluid Loss (mptm)	9.60 / 0				
PV (cP) / YP (lhf2)	2 / 3.00				
% Solids / % Sand	2.7 / .40				
% 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	108.00 / PDC				

Max Tool Temp (degF) / Source	163.20 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ 163.20				
Lead MWD Engineer	Cody Wurdeman				
Customer Representative	JW Ewrin				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404299				
Insert Serial Number	11680801				
Date and Time Initialized	29-May-15 10:28				
Date and Time Read	31-May-15 05:55				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	63.00				
Software Version	6.21				
Sub Serial Number	11404299				
Sonde Serial Number	11833212				
Sensor ID Number	N/A				
Toolface Offset (deg)	311.50				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	56.42				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404299				
Insert/Sonde Serial Number	11579761				

REMARKS

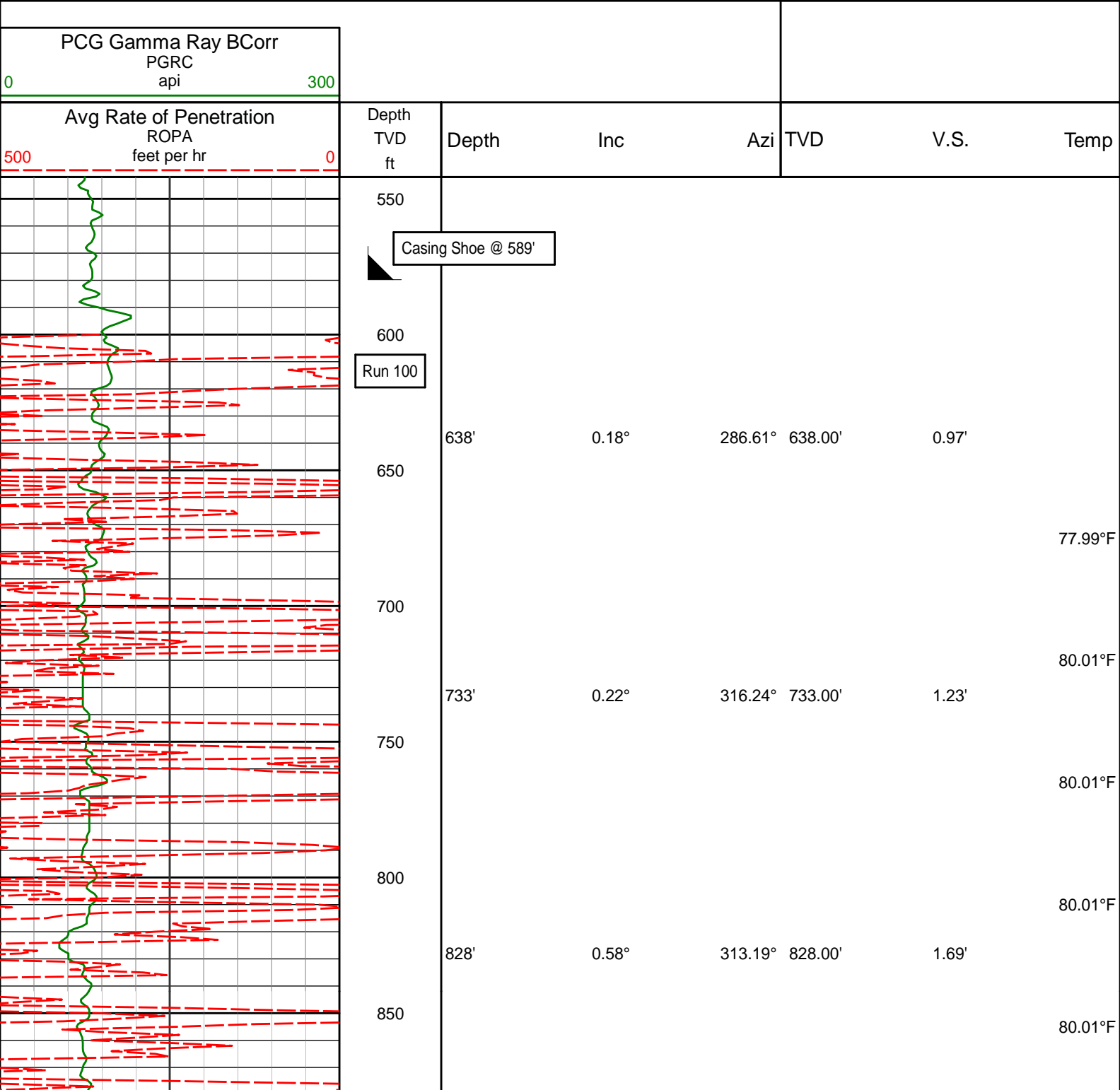
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance 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)

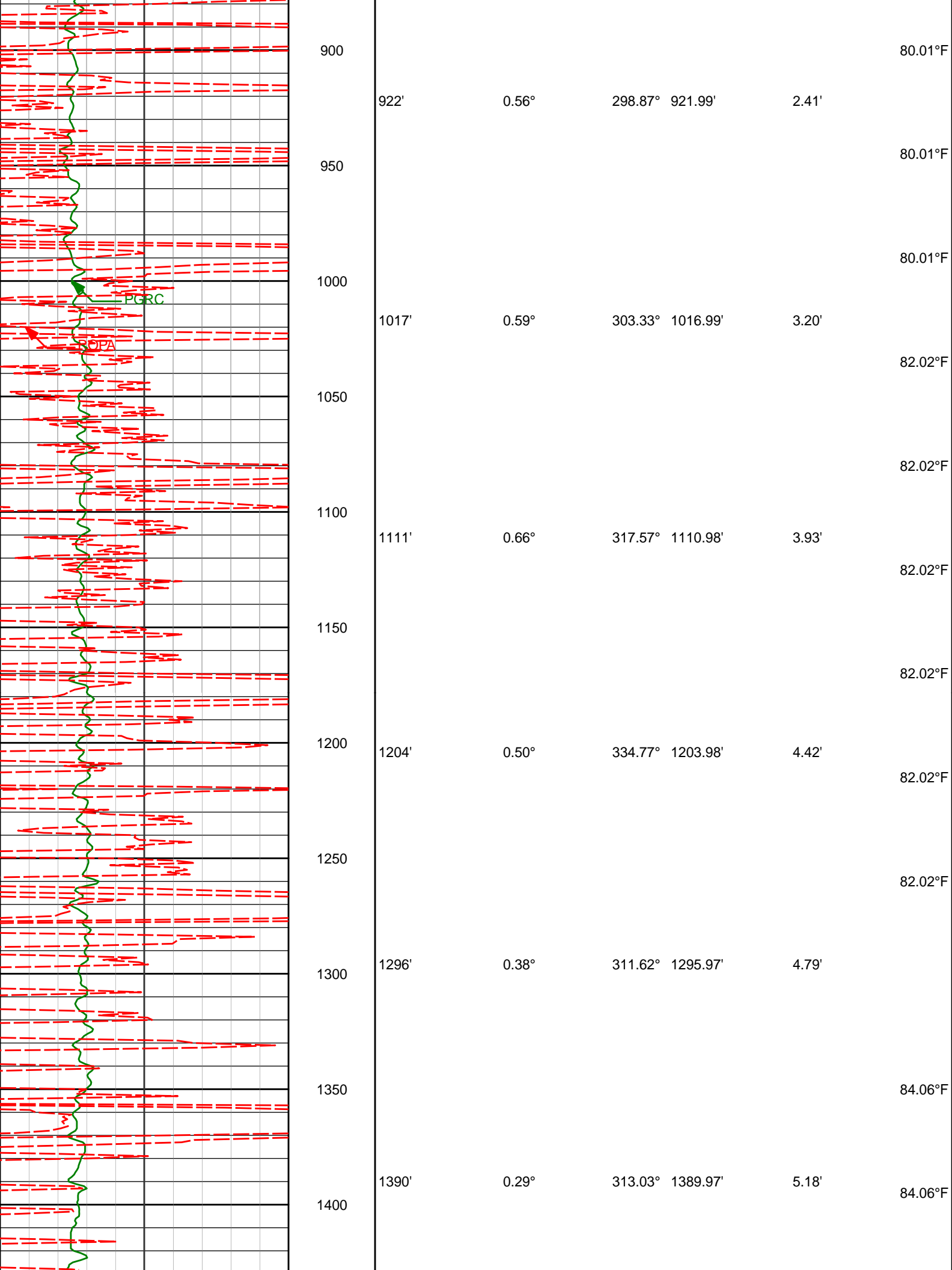
WARRANTY

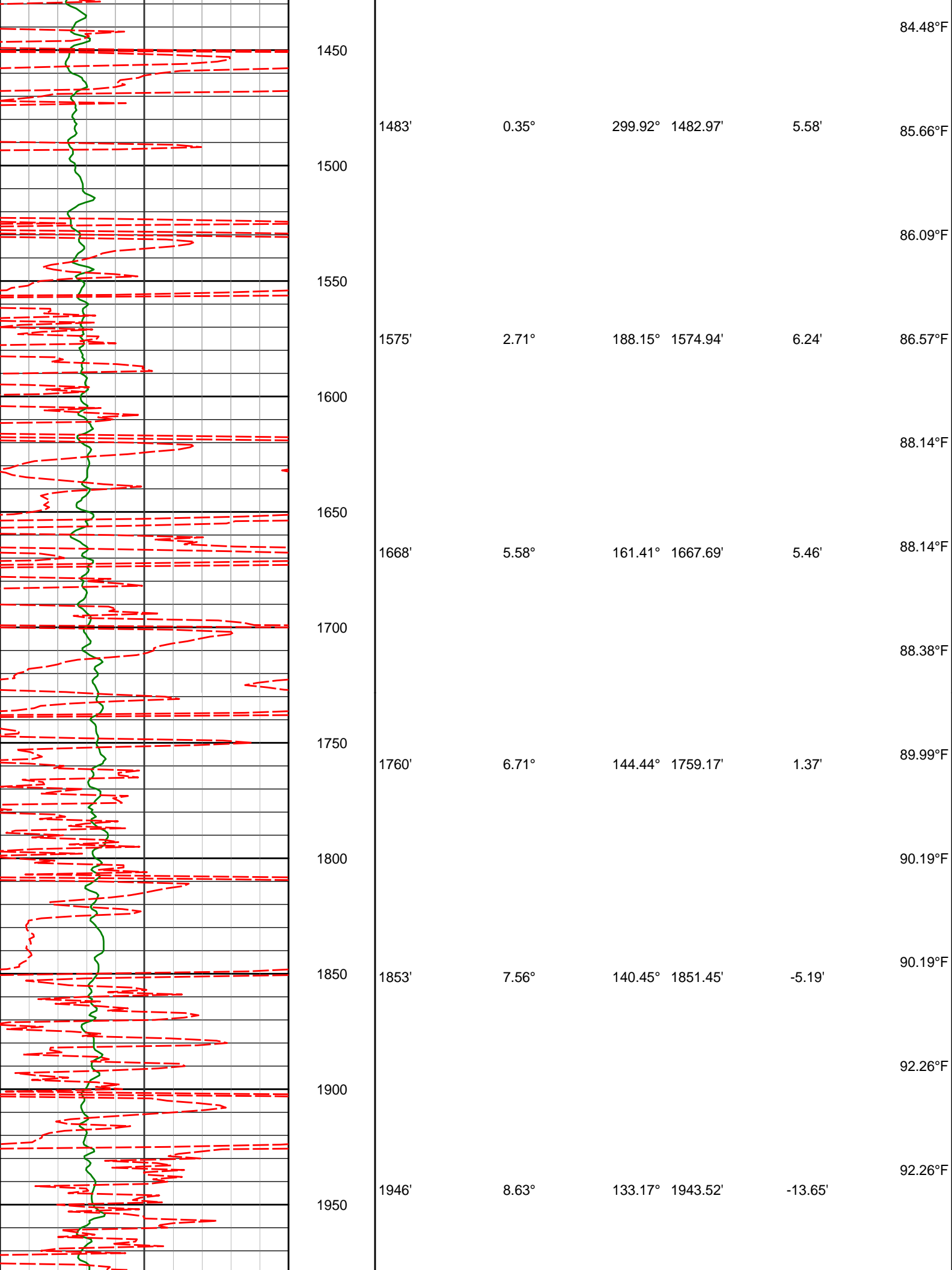
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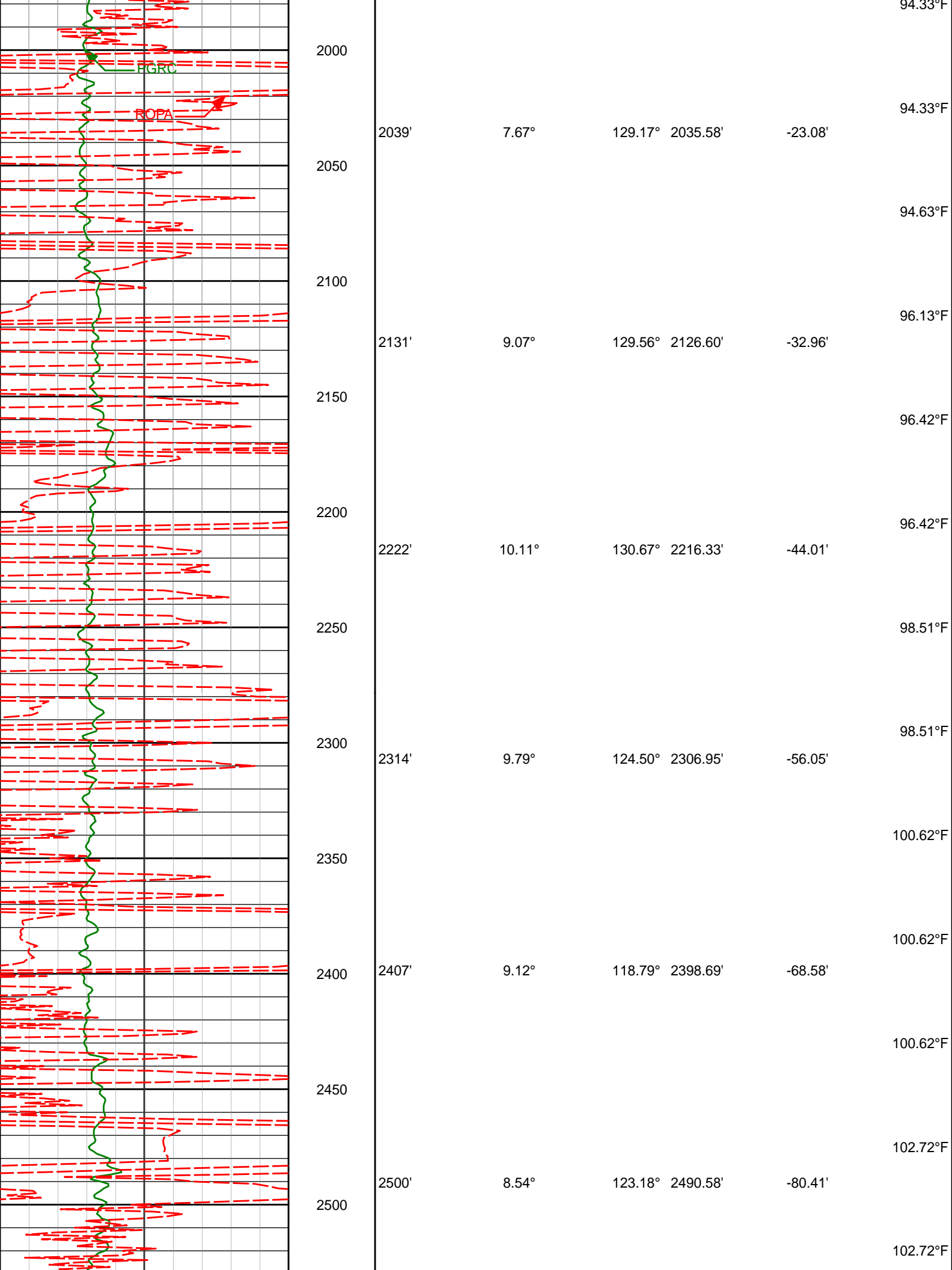
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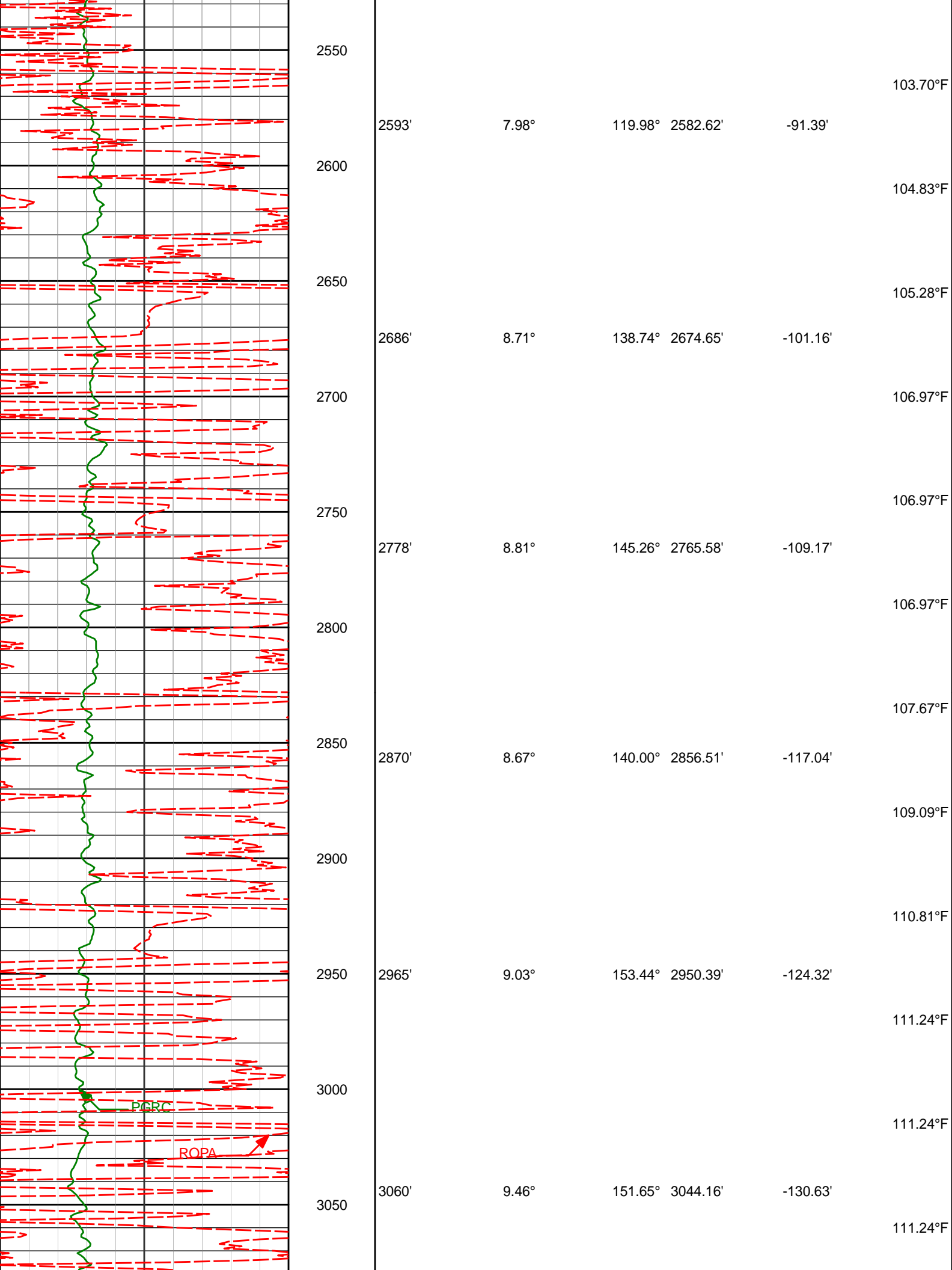
TVD Detail 1:600 Scale

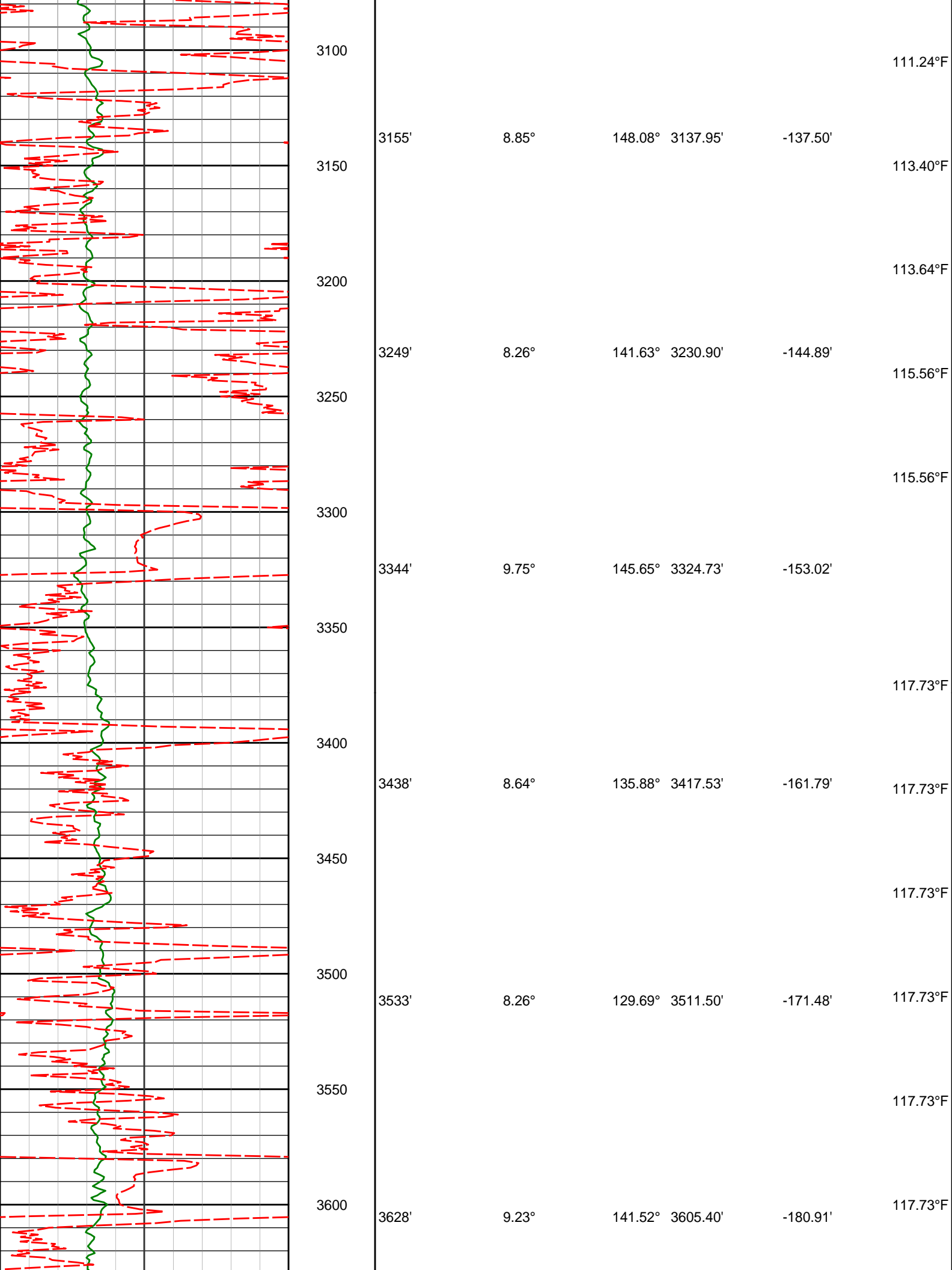


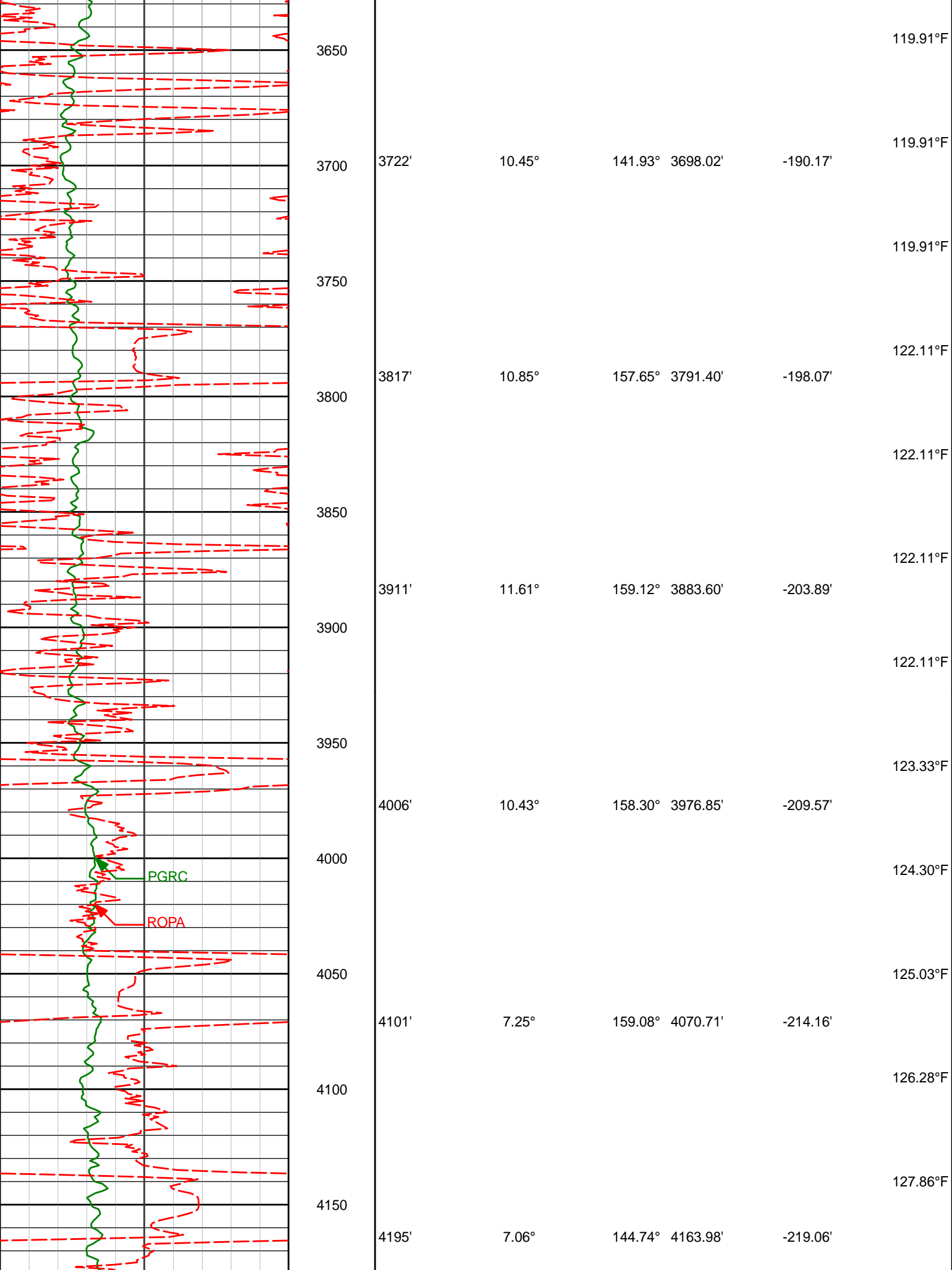


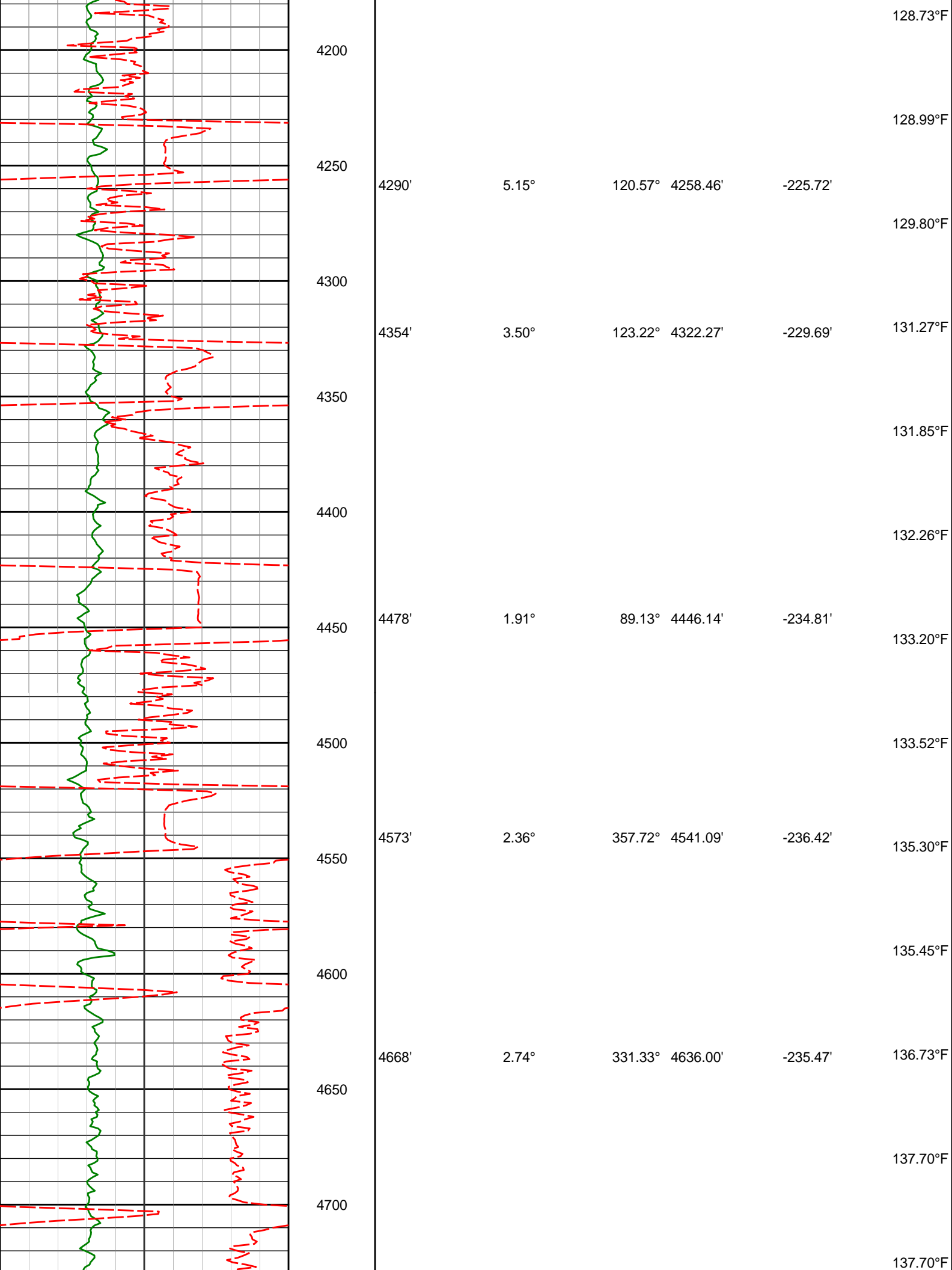


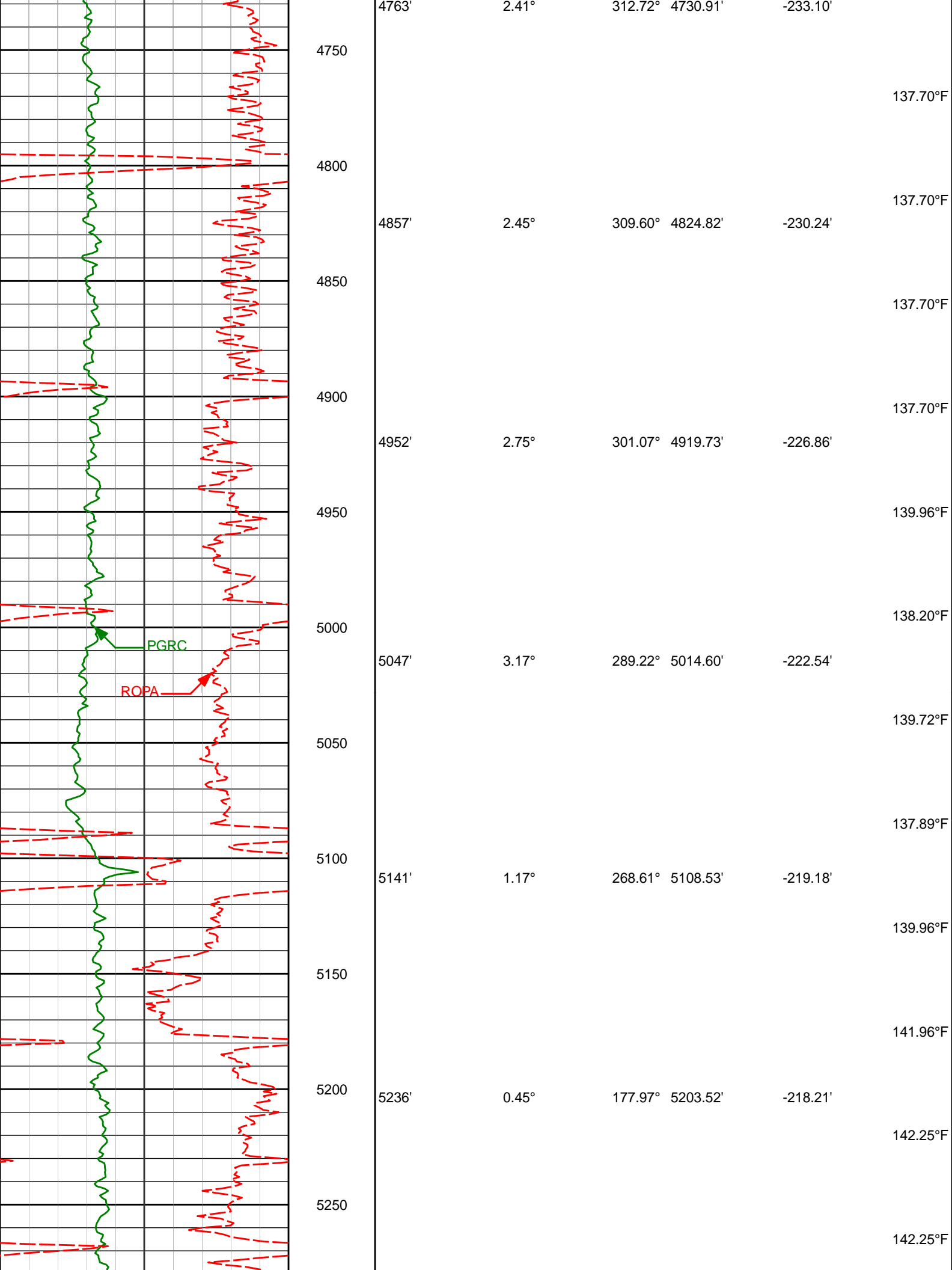


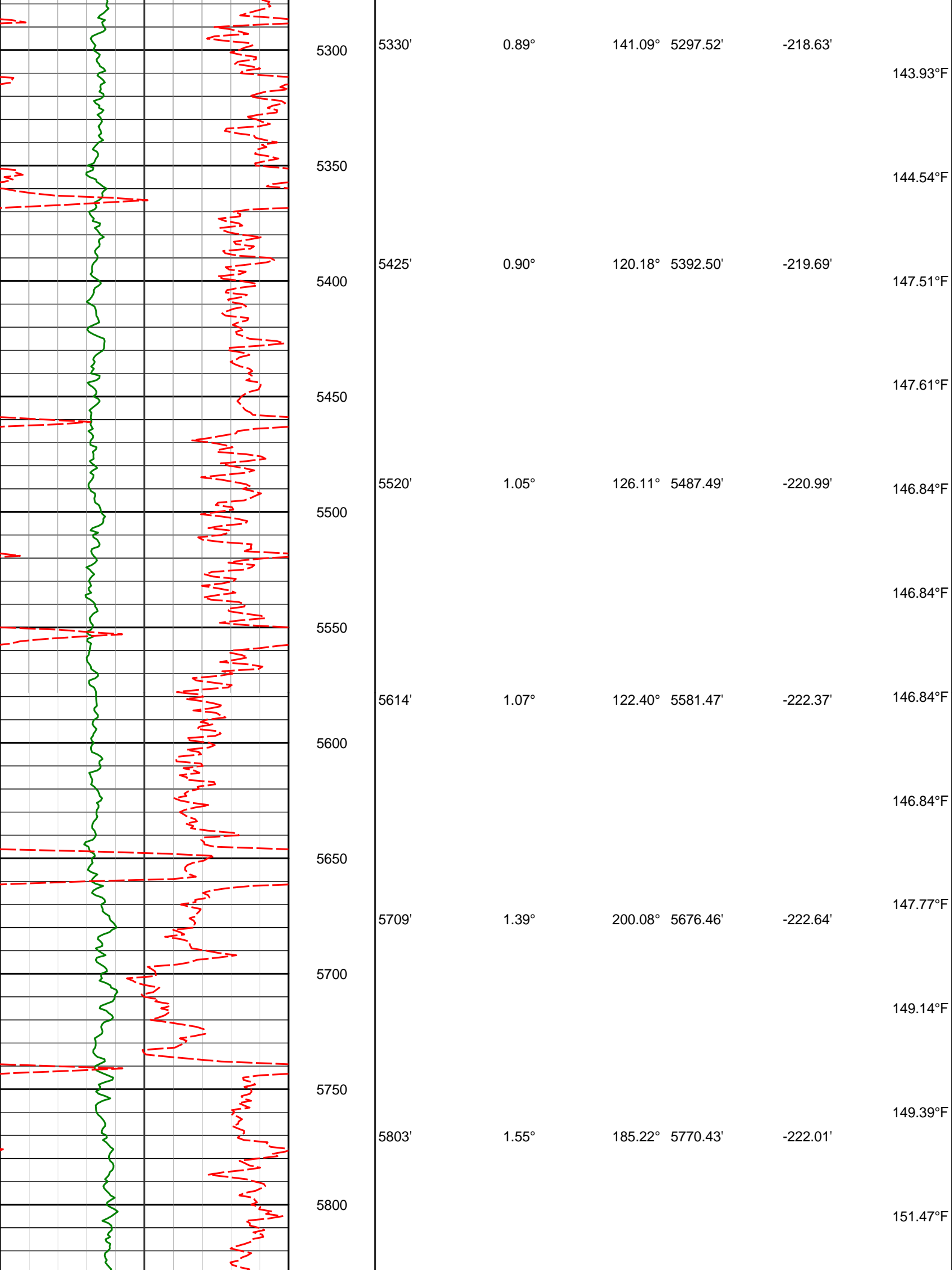


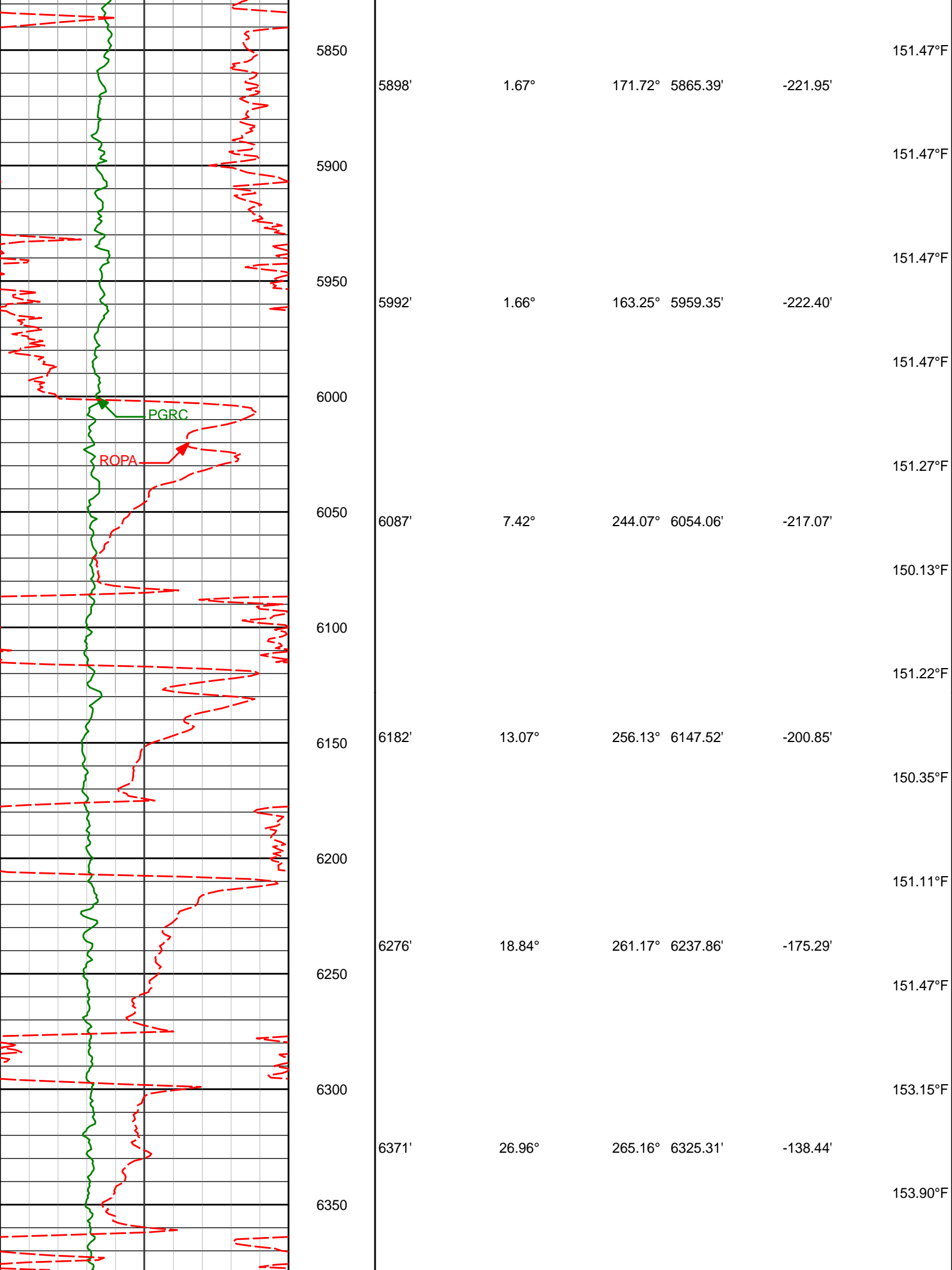


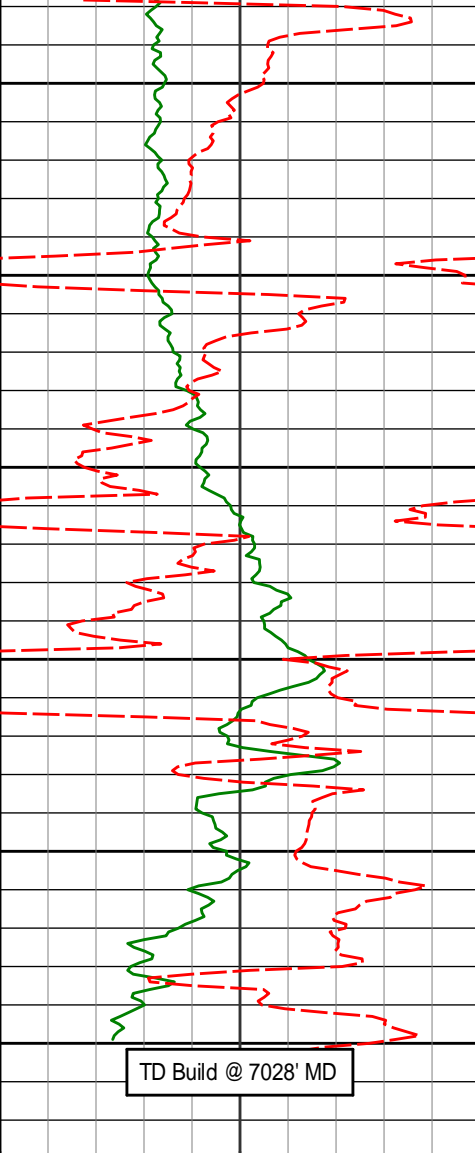











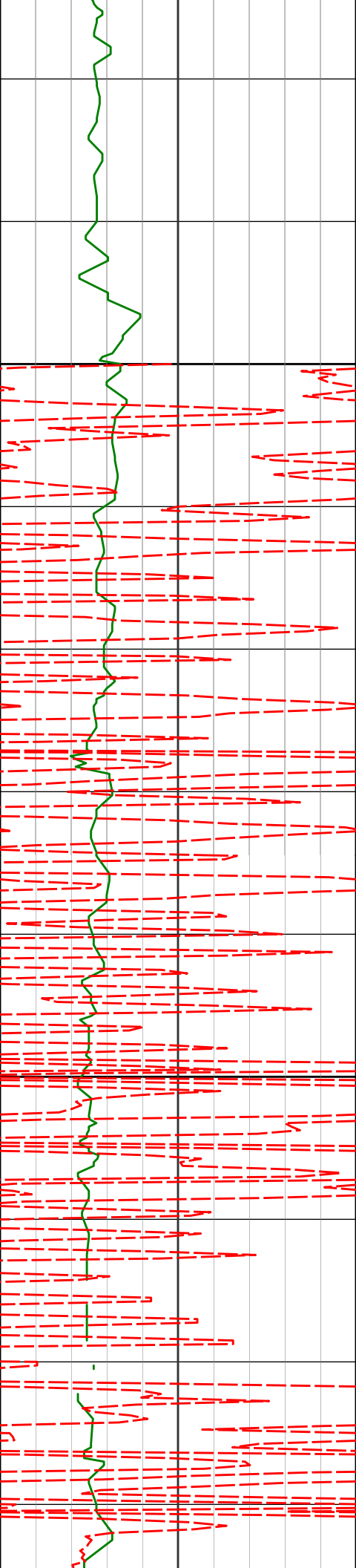


6400	6466'	35.62°	267.35°	6406.42'	-89.16'	156.15°F
6450						156.81°F
6500	6560'	47.53°	268.97°	6476.61'	-26.91'	158.37°F
6550	6655'	57.77°	274.65°	6534.19'	48.16'	160.48°F
6600	6750'	64.33°	273.00°	6580.15'	130.65'	160.68°F
	6844'	70.04°	270.03°	6616.59'	216.98'	161.94°F
6650	6939' 6965'	77.87° 81.65°	267.44° 267.70°	6642.84' 6647.46'	308.15' 333.73'	

<div> <div>Avg Rate of Penetration</div> <div>ROPA</div> <div>feet per hr</div> <div>5000</div> </div>	<div> <div>Depth</div> <div>TVD</div> <div>ft</div> </div>	<div> <div>Depth</div> <div>Inc</div> <div>Azi</div> </div>	<div> <div>TVD</div> <div>V.S.</div> </div>	<div> <div>Temp</div> </div>
<div> <div>PCG Gamma Ray BCorr</div> <div>PGRC</div> <div>api</div> <div>0300</div> </div>				

TVD Detail 1:240 Scale

PCG Gamma Ray BCorr PGRC api										0300																																					
Avg Rate of Penetration ROPA feet per hr										5000										Depth TVD ft	Depth			Inc			Azi			TVD			V.S.			Temp											
																																															



Casing Shoe @ 589'

Run 100

600

638'

0.18°

286.61° 638.00'

0.97'

77.99°F

700

80.01°F

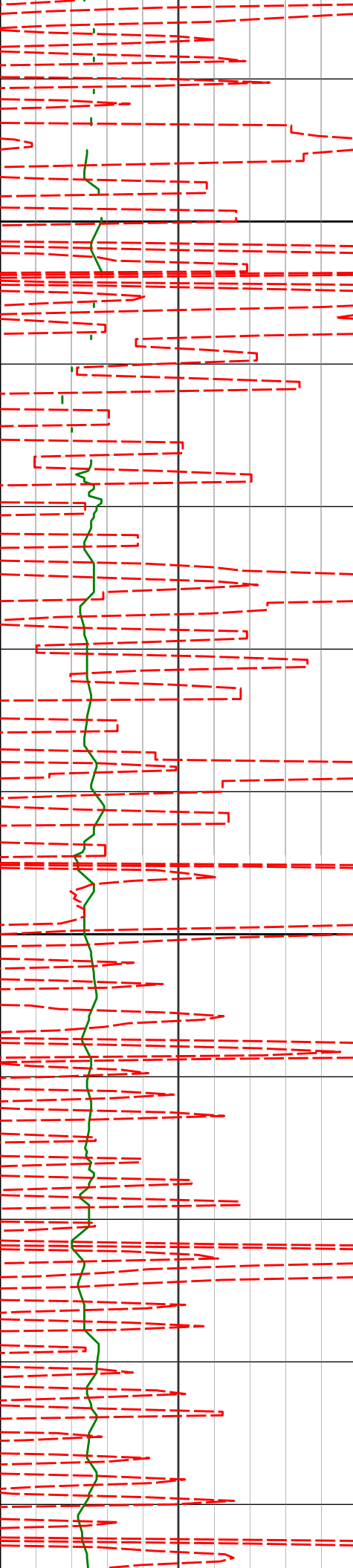
733'

0.22°

316.24° 733.00'

1.23'

80.01°F



800

80.01°F

828'

0.58°

313.19° 828.00'

1.69'

80.01°F

900

80.01°F

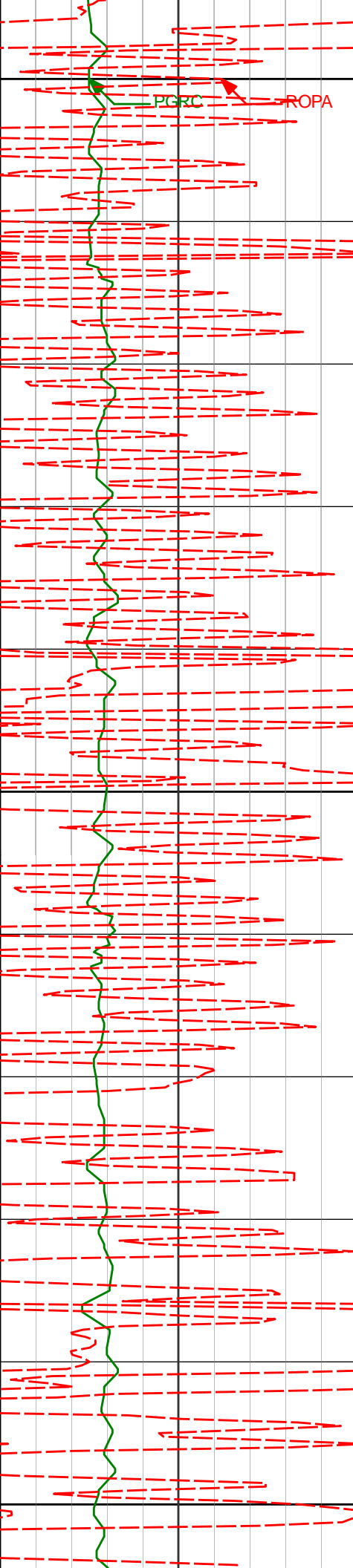
922'

0.56°

298.87° 921.99'

2.41'

80.01°F



1000

PGRC

ROPA

1017'

0.59°

303.33°

1016.99'

3.20'

80.01°F

82.02°F

1100

1111'

0.66°

317.57°

1110.98'

3.93'

82.02°F

82.02°F

1200

1204'

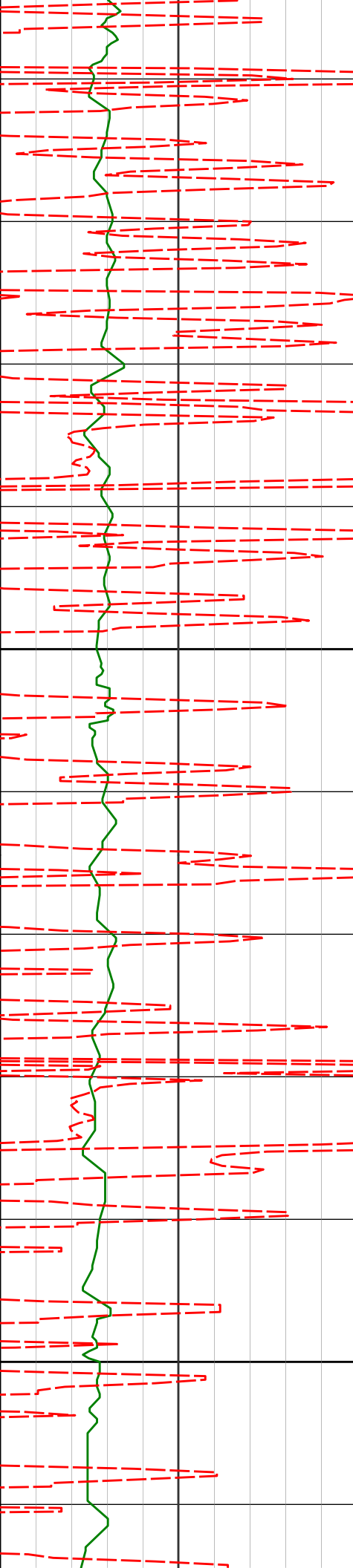
0.50°

334.77°

1203.98'

4.42'

80.01°F



1300

1400

1296'

1390'

0.38°

0.29°

311.62°

313.03°

1295.97'

1389.97'

4.79'

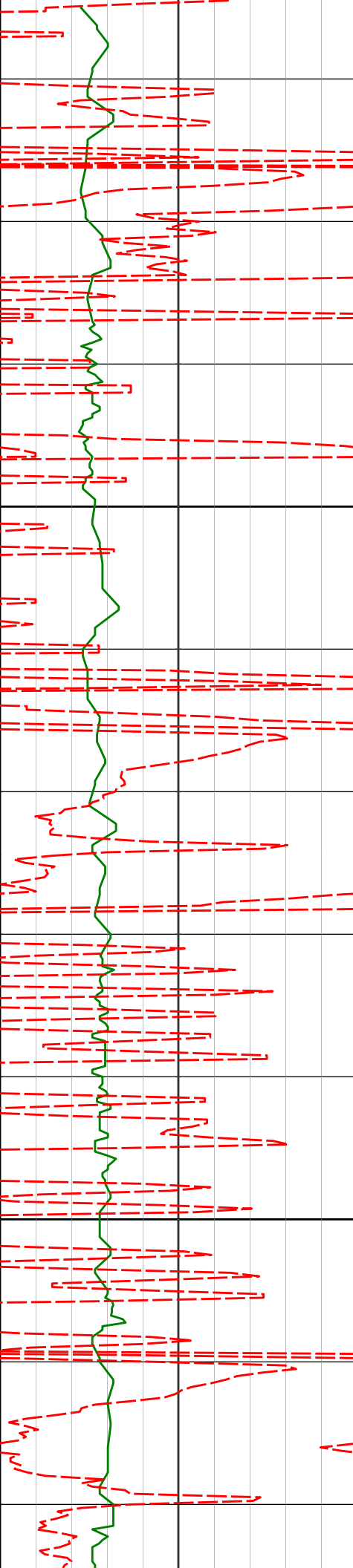
5.18'

82.02°F

82.02°F

84.06°F

84.06°F



1500

1600

1483'

0.35°

299.92°

1482.97'

5.58'

84.48°F

85.66°F

86.09°F

1575'

2.71°

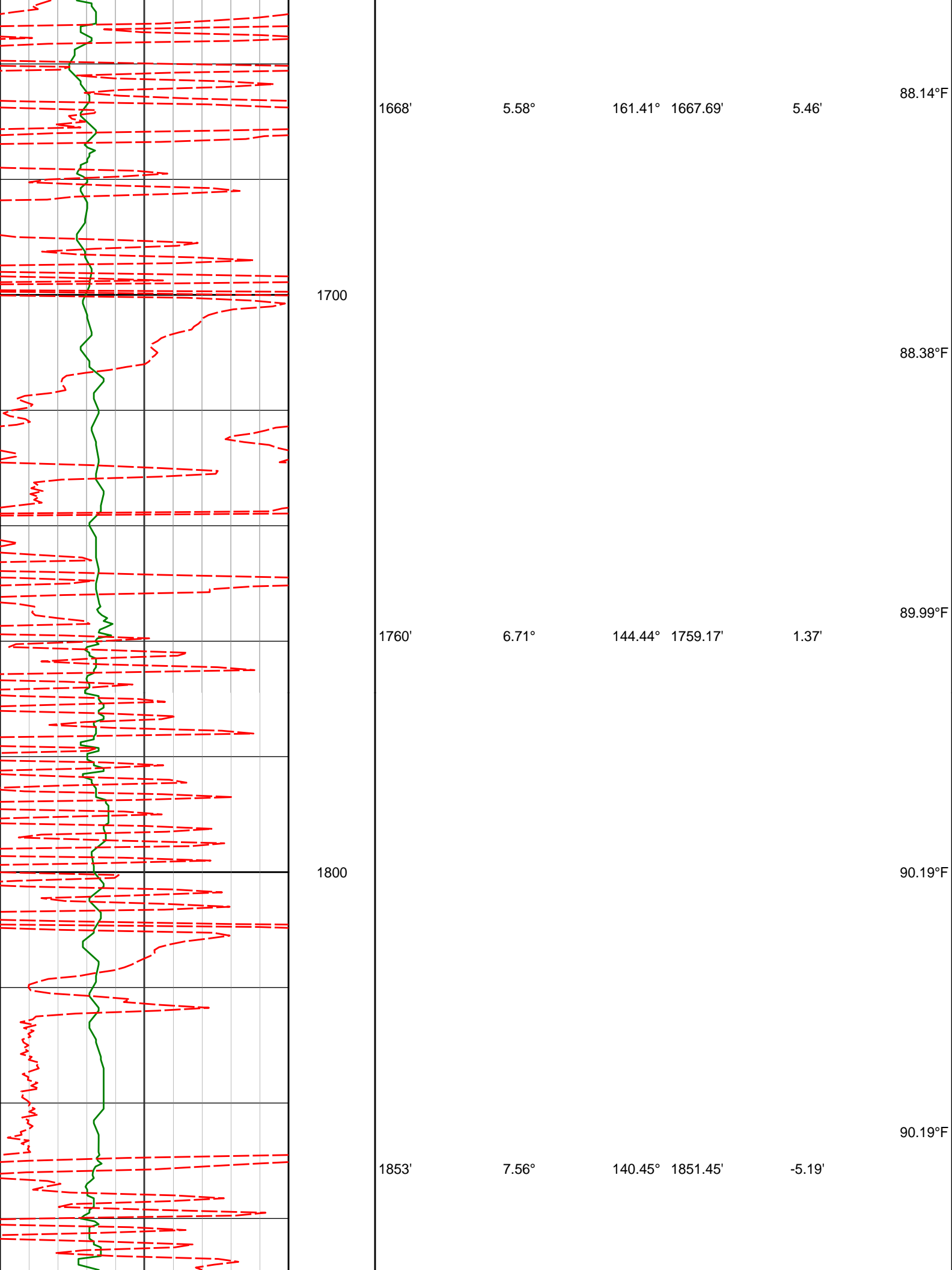
188.15°

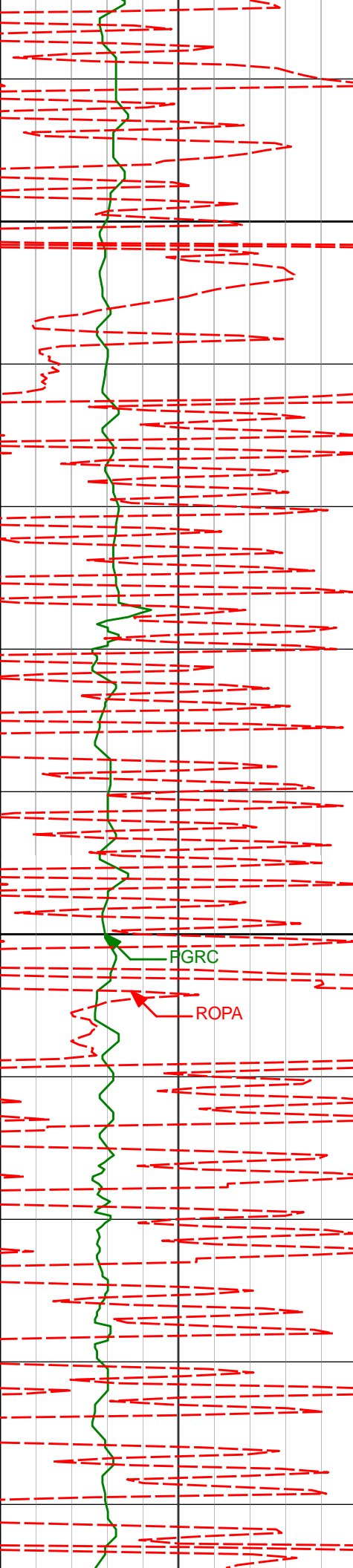
1574.94'

6.24'

86.57°F

88.14°F





1900

92.26°F

92.26°F

1946'

8.63°

133.17°

1943.52'

-13.65'

94.33°F

2000

FGRC

ROPA

94.33°F

2039'

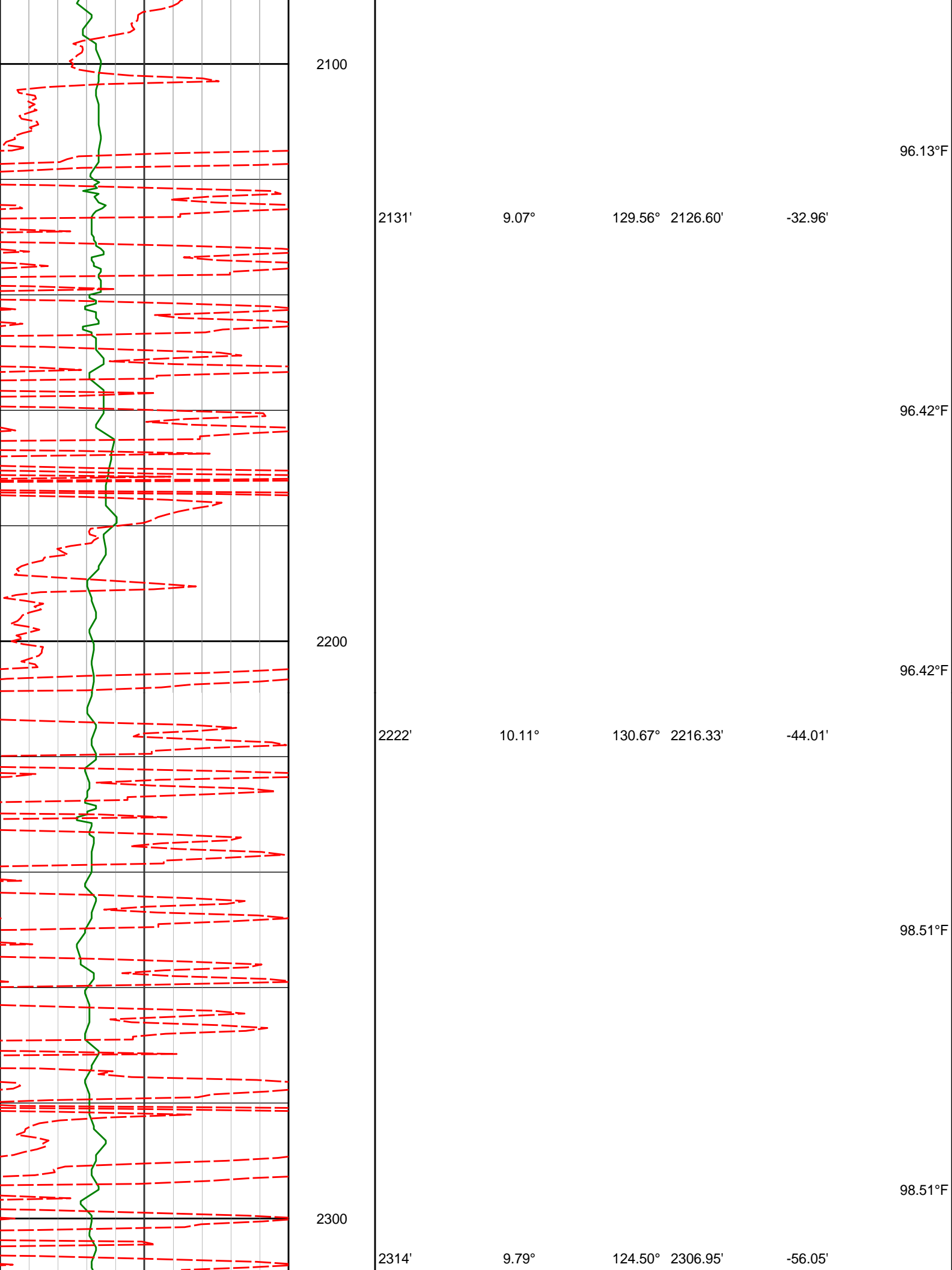
7.67°

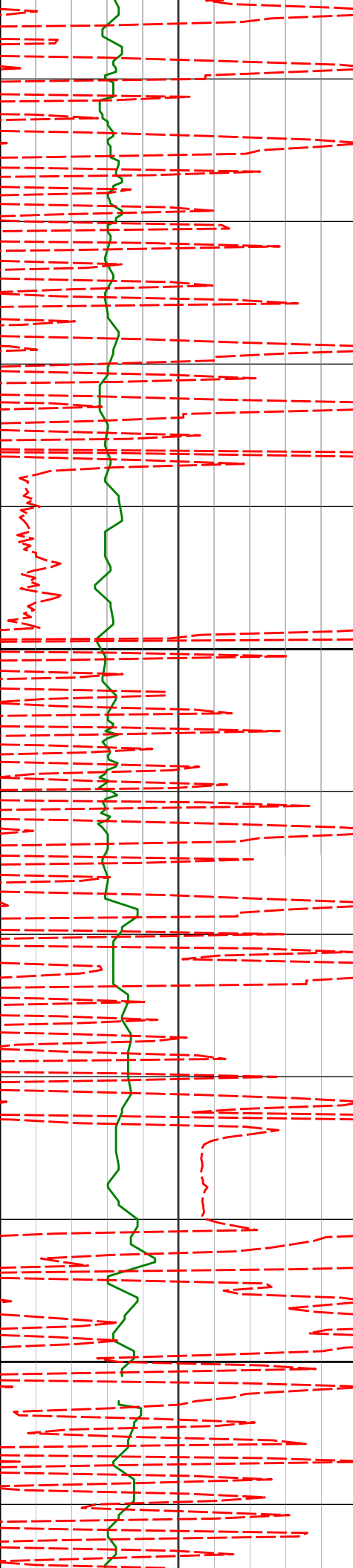
129.17°

2035.58'

-23.08'

94.63°F





2400

2407'

9.12°

118.79°

2398.69'

-68.58'

100.62°F

100.62°F

100.62°F

102.72°F

2500'

8.54°

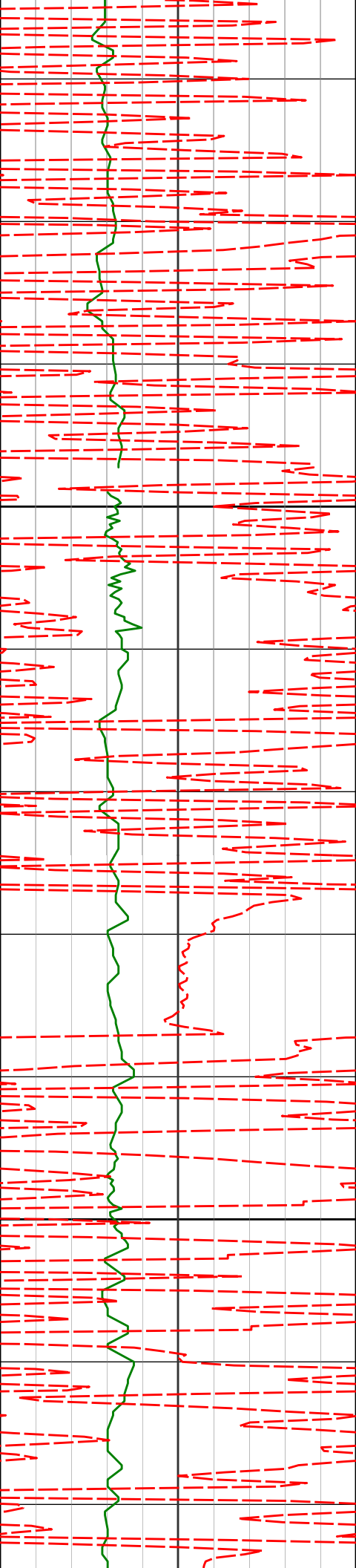
123.18°

2490.58'

-80.41'

2500

102.72°F



2600

2700

2593'

7.98°

119.98°

2582.62'

-91.39'

2686'

8.71°

138.74°

2674.65'

-101.16'

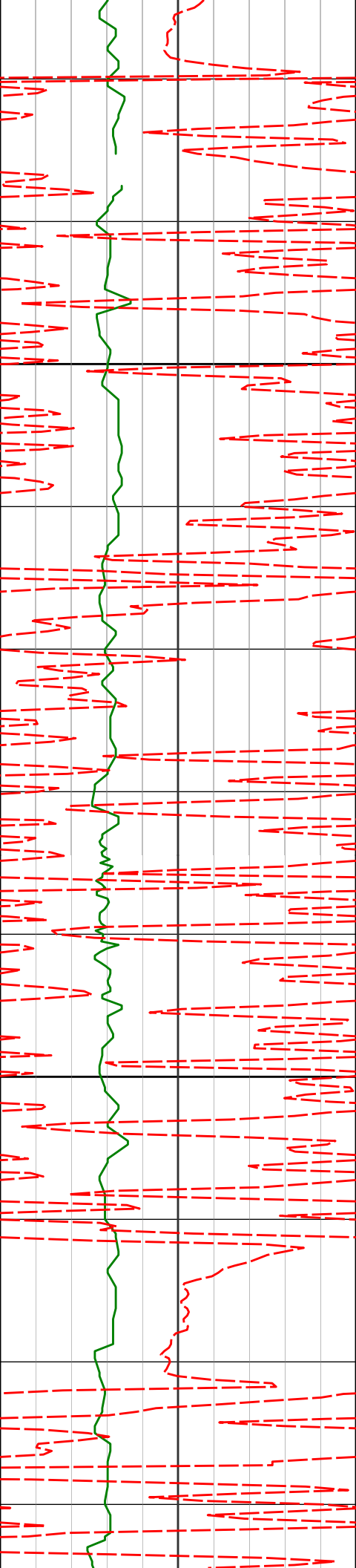
103.70°F

104.83°F

105.28°F

106.97°F

106.97°F



2778'

8.81°

145.26° 2765.58'

-109.17'

2800

106.97°F

107.67°F

2870'

8.67°

140.00° 2856.51'

-117.04'

109.09°F

2900

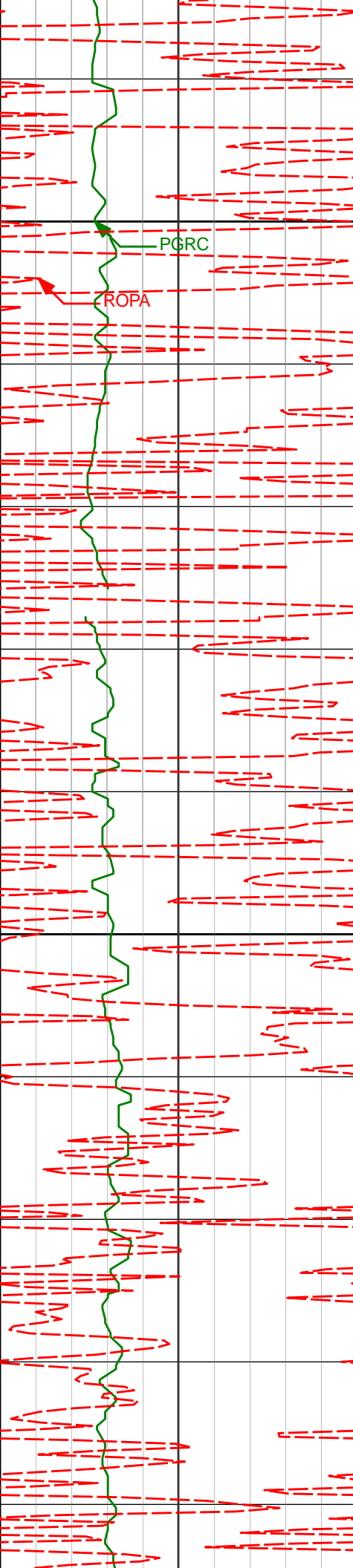
110.81°F

2965'

9.03°

153.44° 2950.39'

-124.32'



3000

PGRC

ROPA

3060'

9.46°

151.65°

3044.16'

-130.63'

111.24°F

111.24°F

111.24°F

3100

111.24°F

3155'

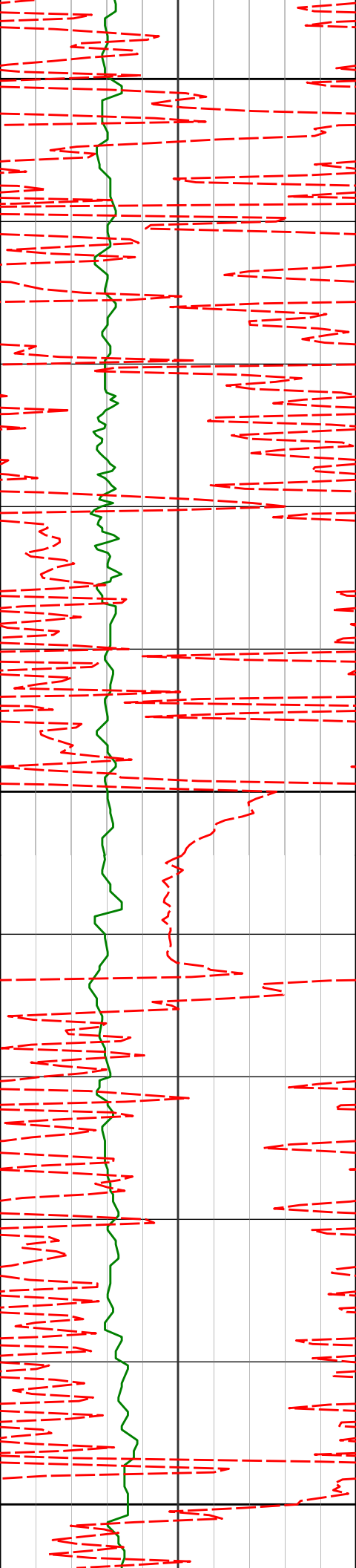
8.85°

148.08°

3137.95'

-137.50'

113.40°F



3200

3249'

8.26°

141.63°

3230.90'

-144.89'

3300

3344'

9.75°

145.65°

3324.73'

-153.02'

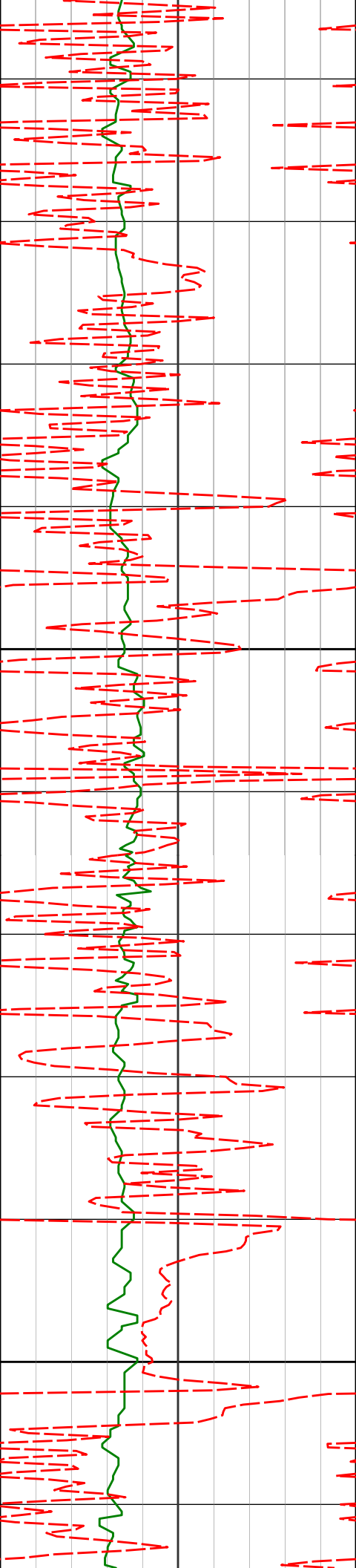
3400

113.64°F

115.56°F

115.56°F

117.73°F



3438'

8.64°

135.88° 3417.53'

-161.79'

117.73°F

3500

3533'

8.26°

129.69° 3511.50'

-171.48'

117.73°F

3600

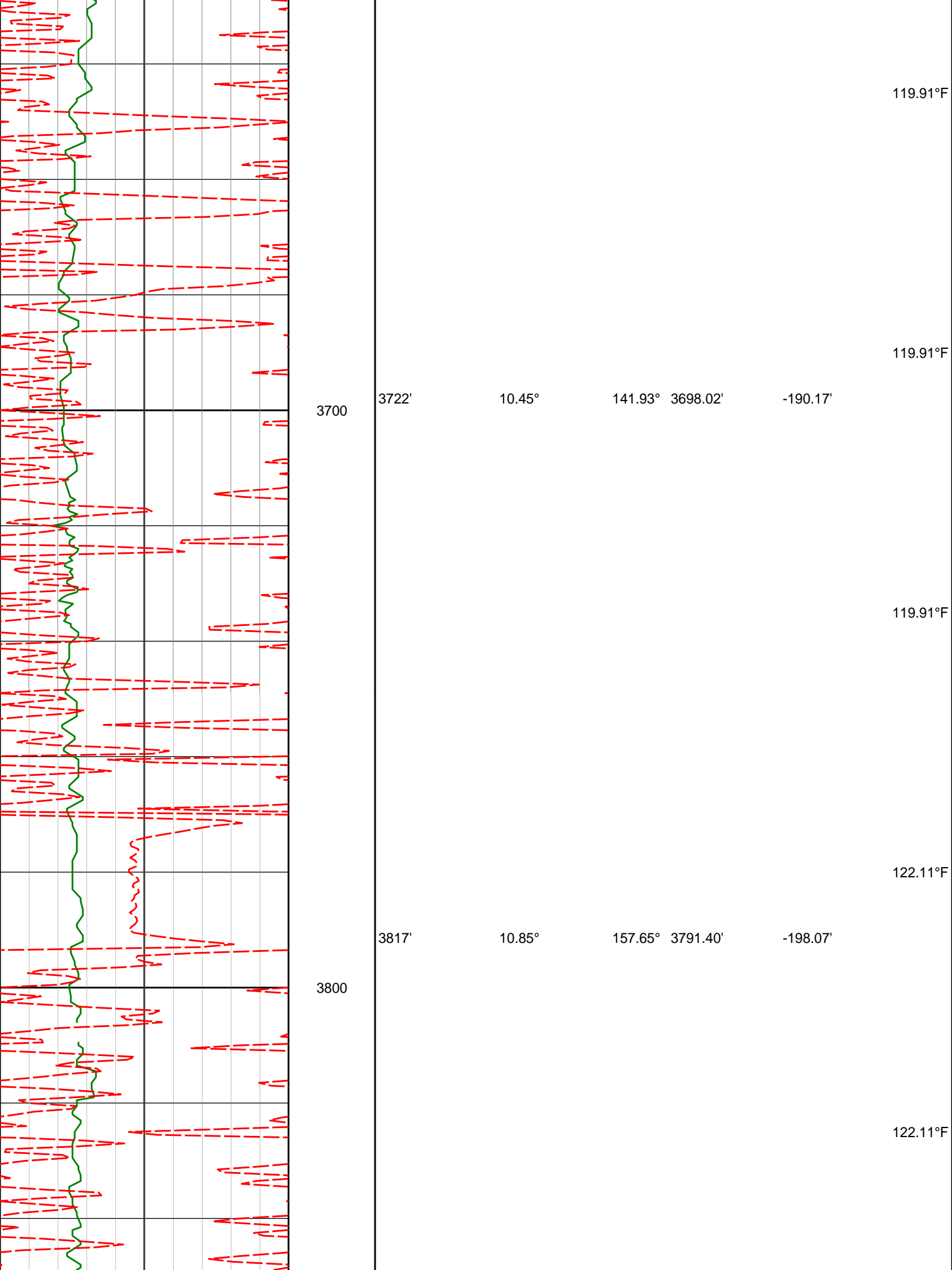
3628'

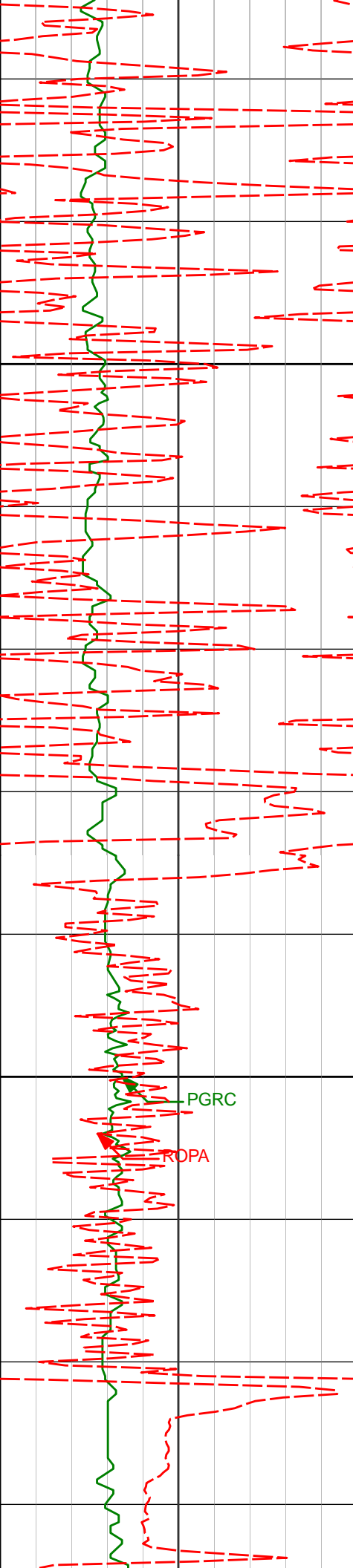
9.23°

141.52° 3605.40'

-180.91'

117.73°F





3900

4000

3911'

11.61°

159.12°

3883.60'

-203.89'

4006'

10.43°

158.30°

3976.85'

-209.57'

PGRC

ROPA

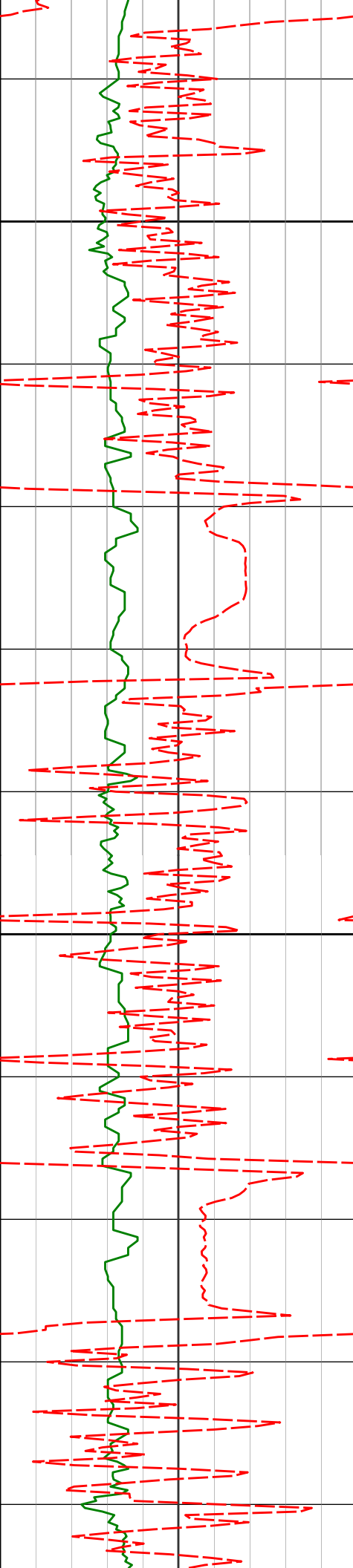
122.11°F

122.11°F

123.33°F

124.30°F

125.03°F



4100

4200

4101'	7.25°	159.08°	4070.71'	-214.16'
4195'	7.06°	144.74°	4163.98'	-219.06'
4290'	5.15°	120.57°	4258.46'	-225.72'

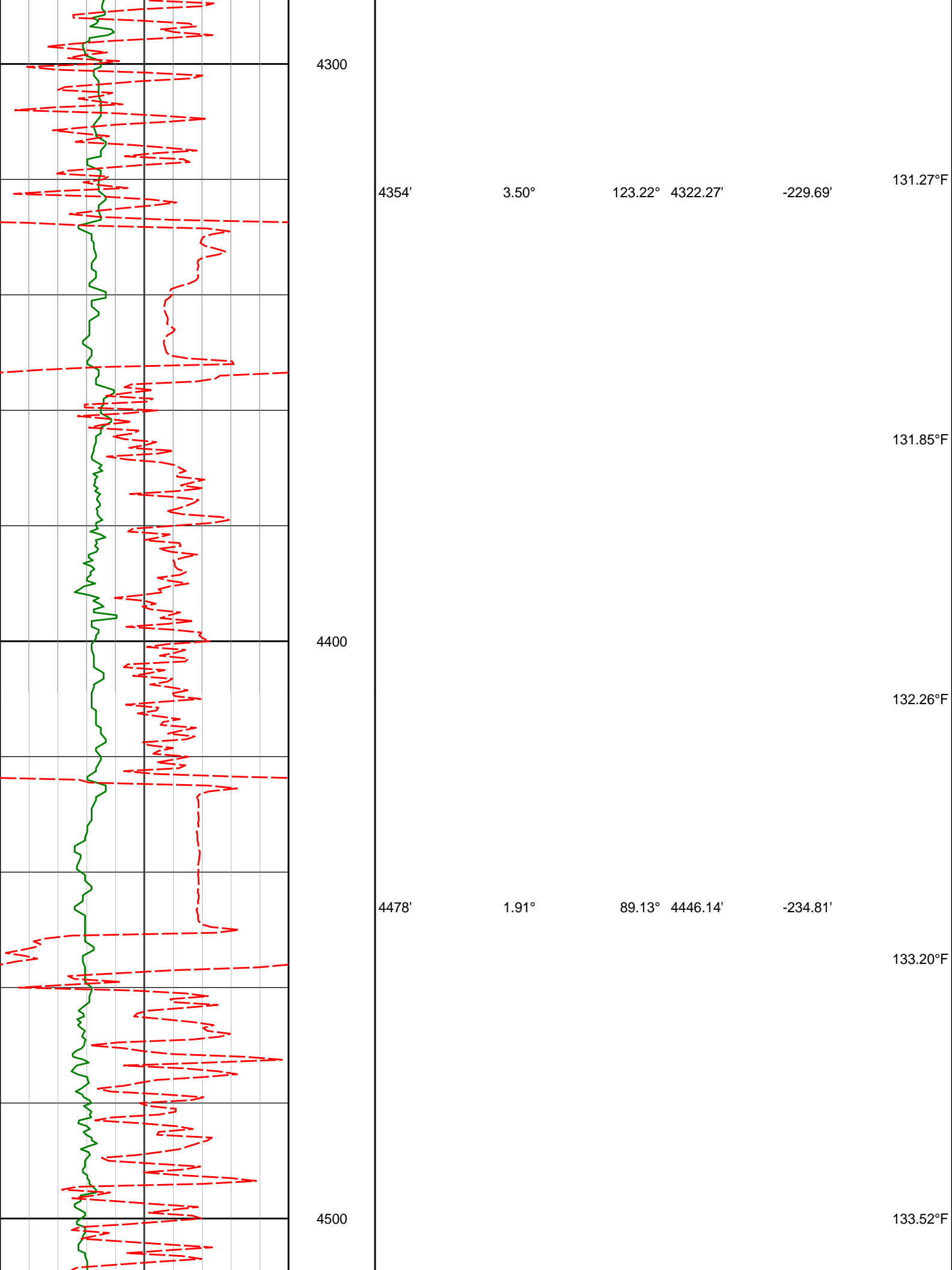
126.28°F

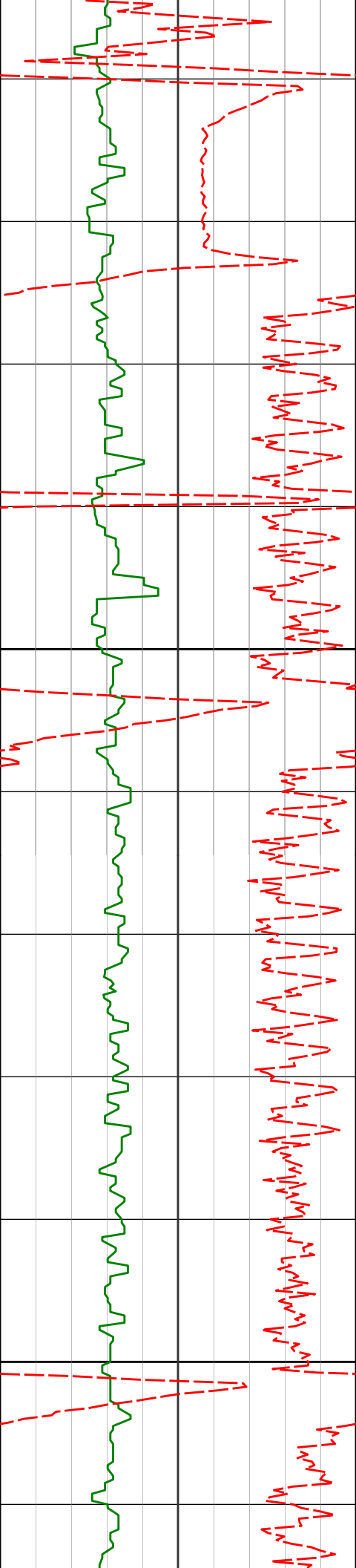
127.86°F

128.73°F

128.99°F

129.80°F





4573'

2.36°

357.72° 4541.09'

-236.42'

135.30°F

4600

135.45°F

4668'

2.74°

331.33° 4636.00'

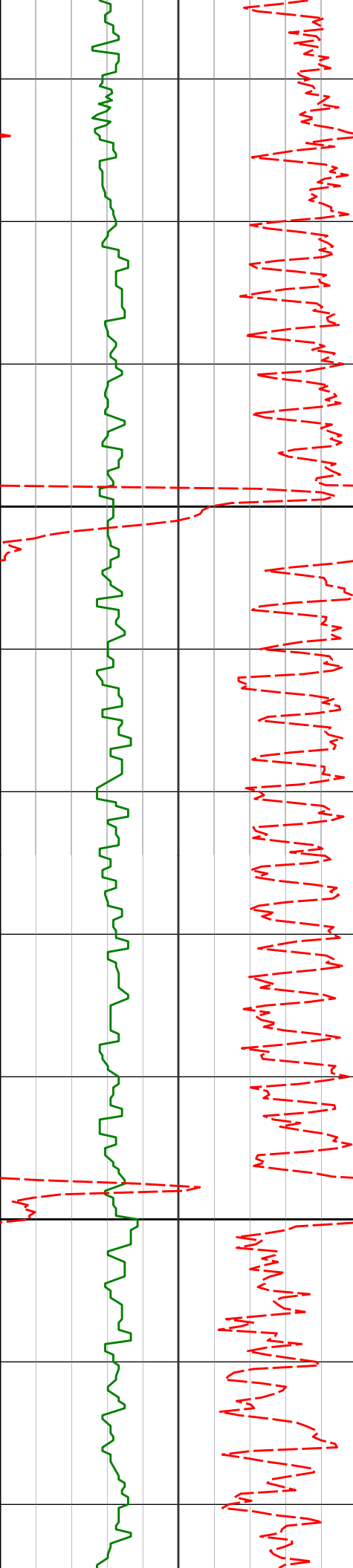
-235.47'

136.73°F

4700

137.70°F

137.70°F



4800

4900

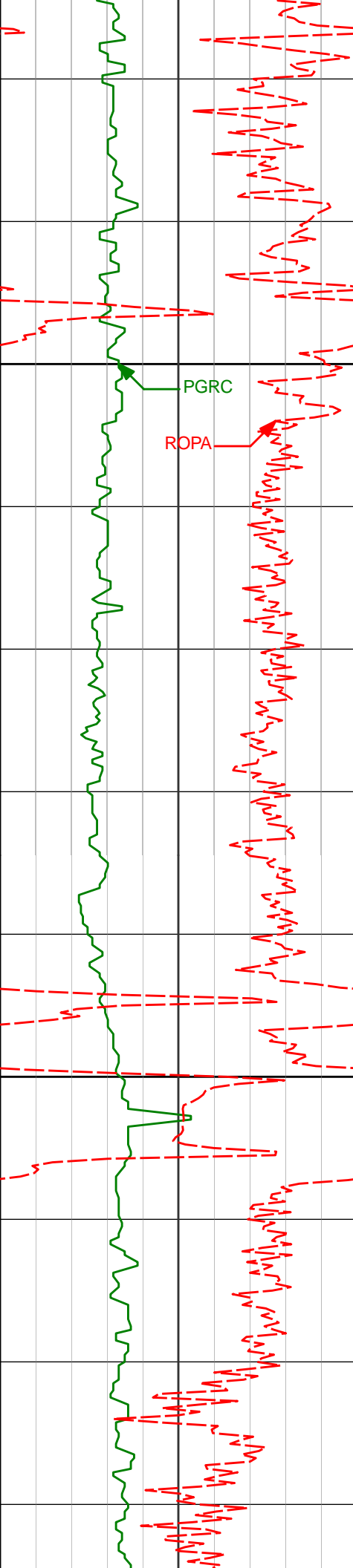
4763'	2.41°	312.72°	4730.91'	-233.10'
4857'	2.45°	309.60°	4824.82'	-230.24'
4952'	2.75°	301.07°	4919.73'	-226.86'

137.70°F

137.70°F

137.70°F

137.70°F



5000

5100

PGRC

ROPA

5047'

3.17°

289.22°

5014.60'

-222.54'

5141'

1.17°

268.61°

5108.53'

-219.18'

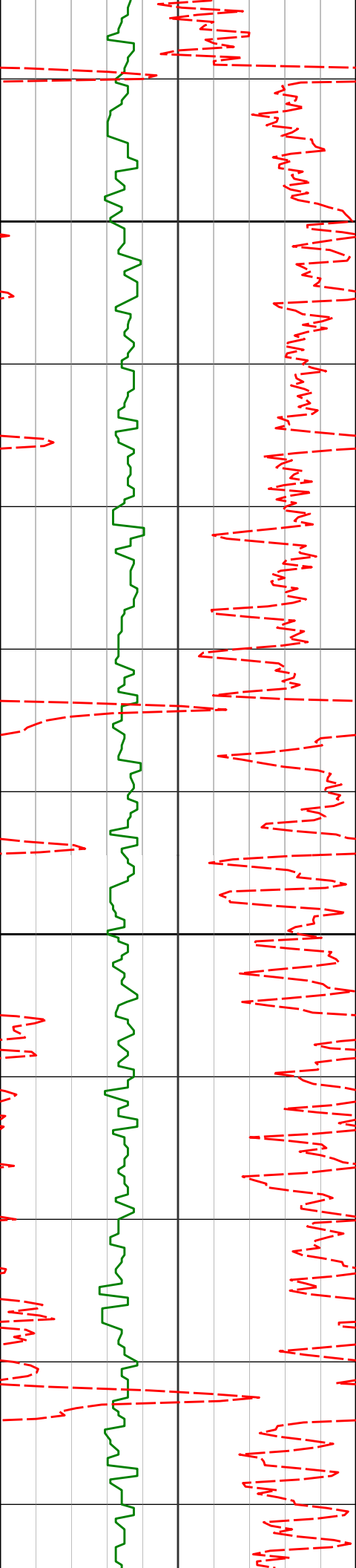
139.96°F

138.20°F

139.72°F

137.89°F

139.96°F



5200

5236'

0.45°

177.97°

5203.52'

-218.21'

141.96°F

142.25°F

142.25°F

5300

5330'

0.89°

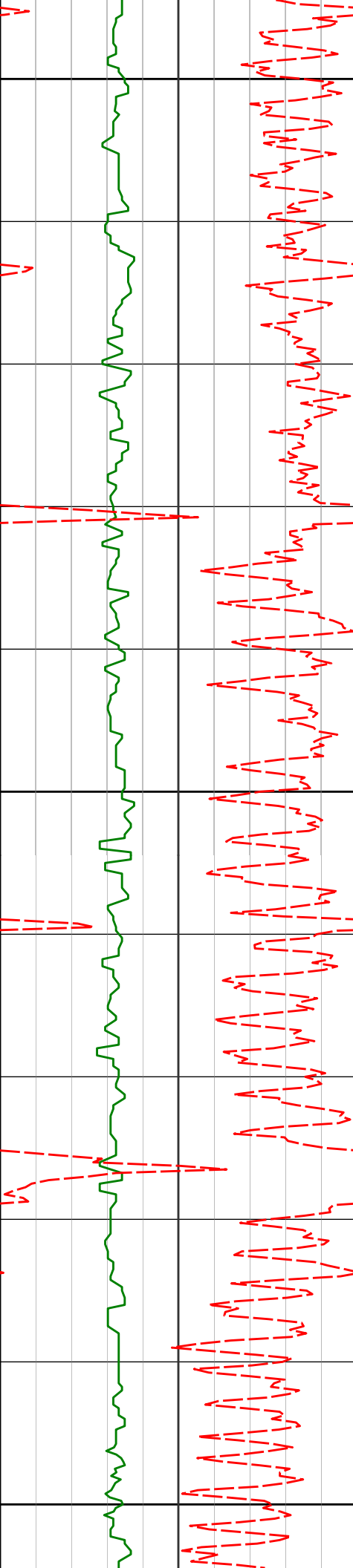
141.09°

5297.52'

-218.63'

143.93°F

144.54°F



5400

5500

5600

5425'

0.90°

120.18° 5392.50'

-219.69'

147.51°F

147.61°F

5520'

1.05°

126.11° 5487.49'

-220.99'

146.84°F

146.84°F

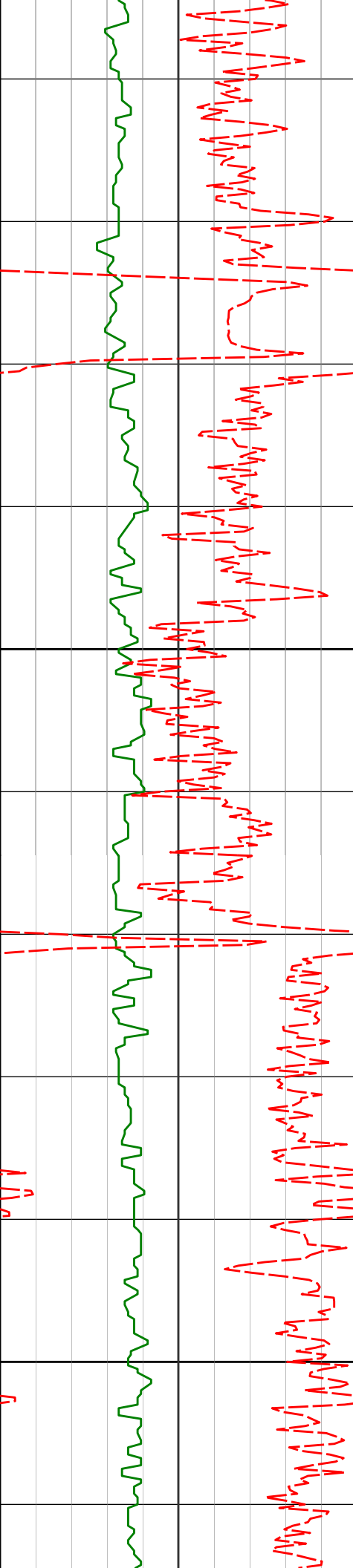
5614'

1.07°

122.40° 5581.47'

-222.37'

146.84°F



5700

5800

5709'

1.39°

200.08° 5676.46'

-222.64'

5803'

1.55°

185.22° 5770.43'

-222.01'

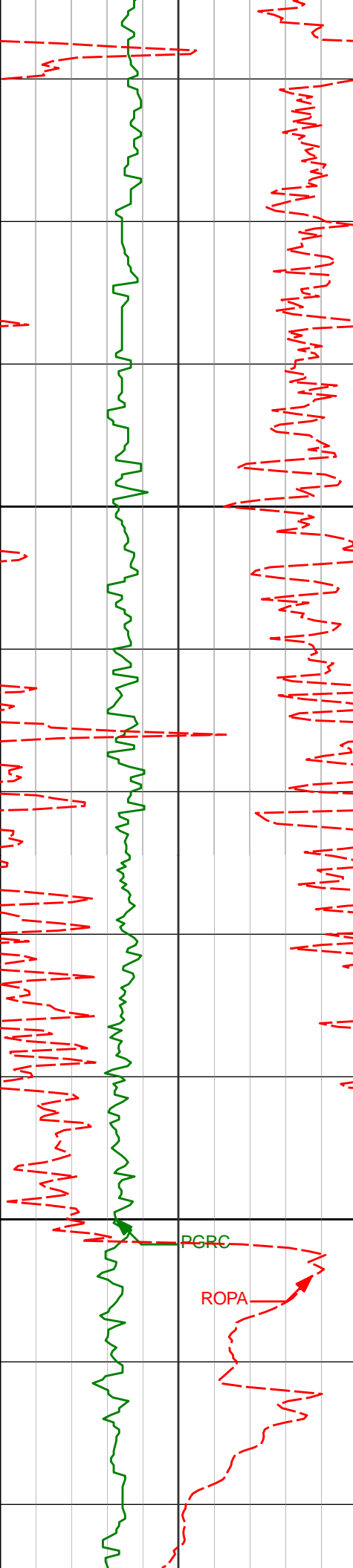
146.84°F

147.77°F

149.14°F

149.39°F

151.47°F



5900

6000

5898'

1.67°

171.72° 5865.39'

-221.95'

151.47°F

151.47°F

151.47°F

5992'

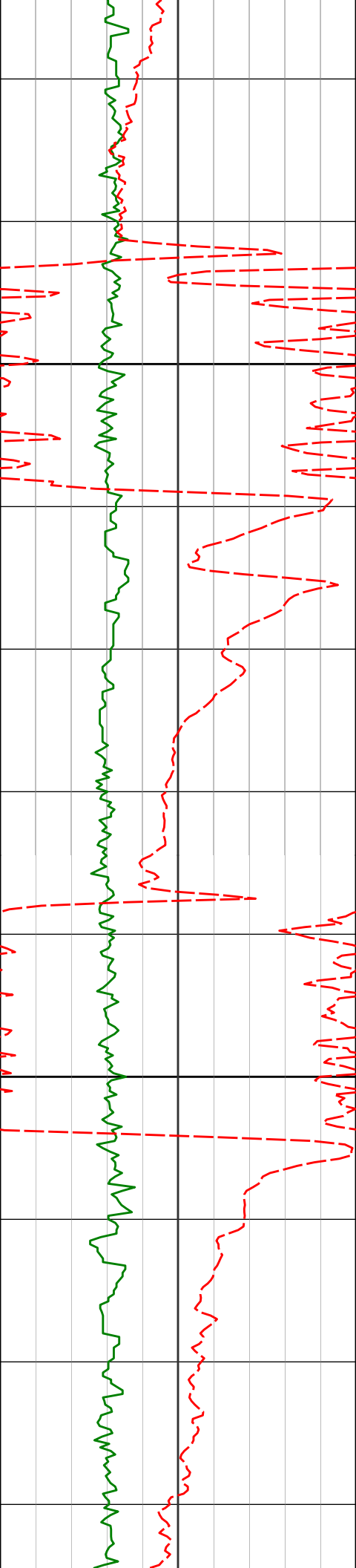
1.66°

163.25° 5959.35'

-222.40'

151.47°F

151.27°F



6087'

7.42°

244.07° 6054.06'

-217.07'

6100

150.13°F

151.22°F

6182'

13.07°

256.13° 6147.52'

-200.85'

150.35°F

6200

151.11°F

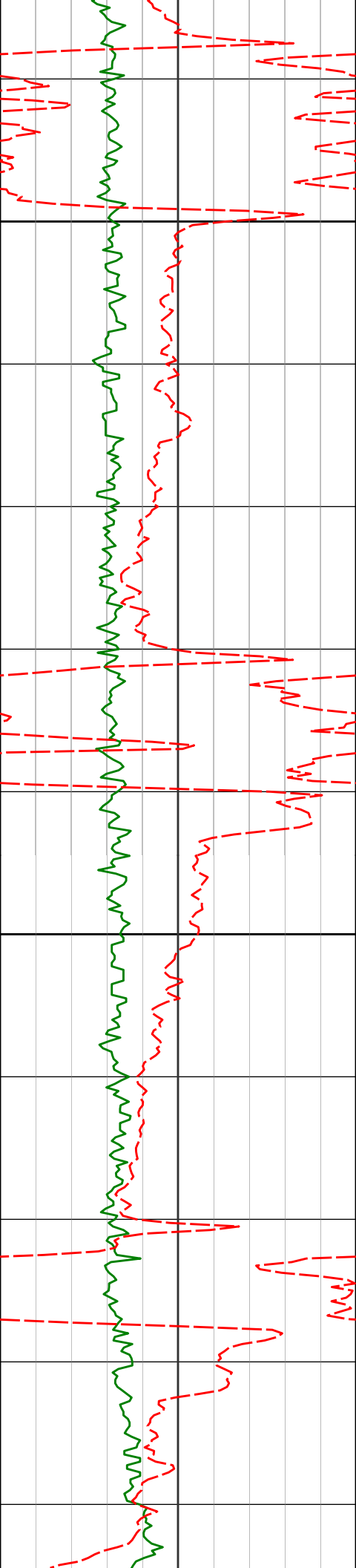
6276'

18.84°

261.17° 6237.86'

-175.29'

151.47°F



6300

6371'

26.96°

265.16°

6325.31'

-138.44'

153.15°F

153.90°F

6400

6466'

35.62°

267.35°

6406.42'

-89.16'

156.15°F

156.81°F

6560'

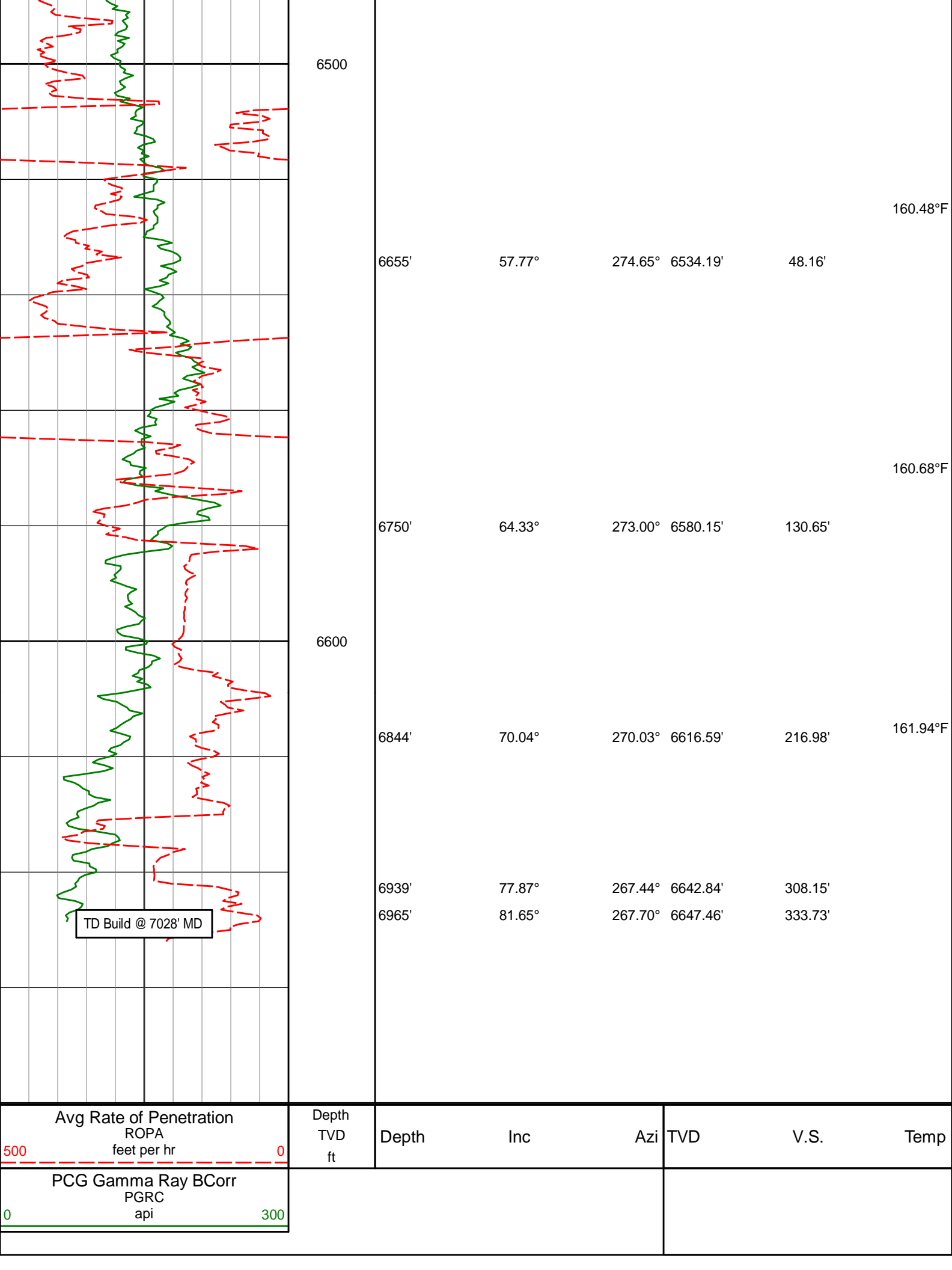
47.53°

268.97°

6476.61'

-26.91'

158.37°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Well Ranch AA11-615
Wells Ranch
Weld Colorado
USA
CA-XX-0902255388

<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
638.00	0.18	286.61	638.00	0.29 N	0.99 W	0.97	0.03
733.00	0.22	316.24	733.00	0.47 N	1.26 W	1.23	0.12
828.00	0.58	313.19	828.00	0.94 N	1.74 W	1.69	0.38
922.00	0.56	298.87	921.99	1.48 N	2.49 W	2.41	0.15
1017.00	0.59	303.33	1016.99	1.98 N	3.31 W	3.20	0.06
1111.00	0.66	317.57	1110.98	2.64 N	4.08 W	3.93	0.18
1204.00	0.50	334.77	1203.98	3.41 N	4.61 W	4.42	0.25
1296.00	0.38	311.62	1295.97	3.97 N	5.01 W	4.79	0.23
1390.00	0.29	313.03	1389.97	4.34 N	5.42 W	5.18	0.09
1483.00	0.35	299.92	1482.97	4.65 N	5.84 W	5.58	0.10
1575.00	2.71	188.15	1574.94	2.63 N	6.39 W	6.24	3.11
1668.00	5.58	161.41	1667.69	3.84 S	5.26 W	5.46	3.64
1760.00	6.71	144.44	1759.17	12.45 S	0.71 W	1.37	2.31
1853.00	7.56	140.45	1851.45	21.59 S	6.34 E	-5.19	1.06
1946.00	8.63	133.17	1943.52	31.08 S	15.33 E	-13.65	1.60
2039.00	7.67	129.17	2035.58	39.77 S	25.23 E	-23.08	1.21
2131.00	9.07	129.56	2126.60	48.27 S	35.58 E	-32.96	1.53
2222.00	10.11	130.67	2216.33	58.04 S	47.16 E	-44.01	1.16
2314.00	9.79	124.50	2306.95	67.73 S	59.73 E	-56.05	1.21
2407.00	9.12	118.79	2398.69	75.76 S	72.72 E	-68.58	1.24
2500.00	8.54	123.18	2490.58	83.09 S	84.95 E	-80.41	0.96
2593.00	7.98	119.98	2582.62	90.10 S	96.32 E	-91.39	0.78
2686.00	8.71	138.74	2674.65	98.62 S	106.56 E	-101.16	3.02
2778.00	8.81	145.26	2765.58	109.64 S	115.17 E	-109.17	1.09
2870.00	8.67	140.00	2856.51	120.75 S	123.64 E	-117.04	0.88
2965.00	9.03	153.44	2950.39	132.90 S	131.58 E	-124.32	2.20
3060.00	9.46	151.65	3044.16	146.44 S	138.62 E	-130.63	0.54
3155.00	8.85	148.08	3137.95	159.51 S	146.19 E	-137.50	0.87
3249.00	8.26	141.63	3230.90	170.94 S	154.21 E	-144.89	1.20
3344.00	9.75	145.65	3324.73	182.93 S	162.98 E	-153.02	1.70
3438.00	8.64	135.88	3417.53	194.57 S	172.38 E	-161.79	2.03
3533.00	8.26	129.69	3511.50	204.05 S	182.60 E	-171.48	1.04
3628.00	9.23	141.52	3605.40	214.37 S	192.59 E	-180.91	2.14
3722.00	10.45	141.93	3698.02	226.98 S	202.54 E	-190.17	1.30
3817.00	10.85	157.65	3791.40	242.03 S	211.25 E	-198.07	3.08
3911.00	11.61	159.12	3883.60	259.05 S	217.99 E	-203.89	0.86
4006.00	10.43	158.30	3976.85	275.98 S	224.57 E	-209.57	1.25
4101.00	7.25	159.08	4070.71	289.57 S	229.89 E	-214.16	3.35
4195.00	7.06	144.74	4163.98	299.83 S	235.34 E	-219.06	1.91
4290.00	5.15	120.57	4258.46	306.76 S	242.39 E	-225.72	3.33
4354.00	3.50	123.22	4322.27	309.29 S	246.50 E	-229.69	2.59
4478.00	1.91	89.13	4446.14	311.34 S	251.74 E	-234.81	1.77
4573.00	2.36	357.72	4541.09	309.36 S	253.24 E	-236.42	3.23
4668.00	2.74	331.33	4636.00	305.42 S	252.08 E	-235.47	1.29
4763.00	2.41	312.72	4730.91	302.07 S	249.52 E	-233.10	0.94
4857.00	2.45	309.60	4824.82	299.45 S	246.53 E	-230.24	0.15
4952.00	2.75	301.07	4919.73	296.98 S	243.01 E	-226.86	0.52
5047.00	3.17	289.22	5014.60	294.94 S	238.57 E	-222.54	0.78
5141.00	1.17	268.61	5108.53	294.11 S	235.16 E	-219.18	2.25
5236.00	0.45	177.97	5203.52	294.50 S	234.21 E	-218.21	1.32
5330.00	0.89	141.09	5297.52	295.44 S	234.68 E	-218.63	0.64
5425.00	0.90	120.18	5392.50	296.40 S	235.79 E	-219.69	0.34
5520.00	1.05	126.11	5487.49	297.28 S	237.14 E	-220.99	0.19
5614.00	1.07	122.40	5581.47	298.26 S	238.58 E	-222.37	0.08

5709.00	1.39	200.08	5676.46	299.83 S	238.93 E	-222.64	1.65
5803.00	1.55	185.22	5770.43	302.17 S	238.42 E	-222.01	0.44
5898.00	1.67	171.72	5865.39	304.82 S	238.51 E	-221.95	0.42
5992.00	1.66	163.25	5959.35	307.49 S	239.10 E	-222.40	0.26
6087.00	7.42	244.07	6054.06	311.50 S	233.97 E	-217.07	7.72
6182.00	13.07	256.13	6147.52	316.76 S	218.01 E	-200.85	6.33
6276.00	18.84	261.17	6237.86	321.64 S	192.68 E	-175.29	6.30
6371.00	26.96	265.16	6325.31	325.82 S	156.00 E	-138.44	8.70
6466.00	35.62	267.35	6406.42	328.92 S	106.81 E	-89.16	9.20
6560.00	47.53	268.97	6476.61	330.81 S	44.58 E	-26.91	12.72
6655.00	57.77	274.65	6534.19	328.17 S	30.75 W	48.16	11.77
6750.00	64.33	273.00	6580.15	322.66 S	113.64 W	130.65	7.07
6844.00	70.04	270.03	6616.59	320.42 S	200.21 W	216.98	6.74
6939.00	77.87	267.44	6642.84	322.48 S	291.41 W	308.15	8.65
6965.00	81.65	267.70	6647.46	323.56 S	316.97 W	333.73	14.57

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 266.95 DEGREES (GRID)
A TOTAL CORRECTION OF 7.38 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6965.00 FEET
IS 452.94 FEET ALONG 224.41 DEGREES (GRID)**

Final survey is a straight line projection to TD.