



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300		
Date run completed	12-Oct-15	13-Oct-15	17-Oct-15		
Rig Bit Number	0200	0300	0400		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	619.00	6,585.00	6,884.00		
Log End Depth (MD, ft)	6,585.00	6,884.00	16,137.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	11-Oct-15 13:49	12-Oct-15 20:30	14-Oct-15 06:08		
Drill/Wipe End Date and Time	12-Oct-15 11:10	13-Oct-15 01:42	17-Oct-15 00:53		
Min Inc (deg) @ Depth (MD, ft)	0.17 @ 5,898.00	57.22 @ 6,654.00	88.46 @ 7,443.00		
Max Inc (deg) @ Depth (MD, ft)	47.09 @ 6,560.00	85.43 @ 6,818.00	92.93 @ 12,508.00		
Bit TFA(in2) / Bit Type	1.21 / PDC	1.04 / PDC	0.98 / PDC		
Flow Rate (gpm)	588.60	466.80	313.41		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A		
Fluid Type	Native/Spud Mud	Native/Spud Mud	Native/Spud Mud		
Density (ppg) / Viscosity (spqt)	9.50 / 27.00	10.60 / 38.00	10.20 / 34.00		
Filtrate CL (ppm)	1,200.00	1,500.00	1,700.00		
pH / Fluid Loss (mptm)	8.10 / 68	9.20 / 7	9.00 / 6		
PV (cP) / YP (lbf2)	2 / 3.00	12 / 12.00	9 / 10.00		
% Solids / % Sand	1.9 / 0.25	11.30 / 0.15	9.7 / 0.05		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Max Tool Temp (degF)	125.50 / PDM	125.50 / PDM	215.00 / PDM		

Max Tool Temp (degF) / Source	165.58 / PCM	165.58 / PCM	245.03 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Matt Busche	Matt Busche	Matt Busche		
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11342302	11342302	12396737		
Insert Serial Number	11055866	11055866	11400842		
Date and Time Initialized	10-Oct-15 21:29	10-Oct-15 21:29	13-Oct-15 15:20		
Date and Time Read	13-Oct-15 06:58	13-Oct-15 08:04	17-Oct-15 12:19		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	68.00	66.00	67.00		
Software Version	6.33	6.33	6.33		
Sub Serial Number	11342302	11342302	12396737		
Sonde Serial Number	11062113	11062113	11902092		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	204.10	25.50	196.60		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	61.07	58.92	60.43		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11342302	11342302	12396737		
Insert/Sonde Serial Number	11293345	11293345	11681061		

REMARKS

1. All depths are calibrated to driller's pipe tally and are measured depths 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: 6.125"

Mud Density: 9.7-10.5ppg

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)

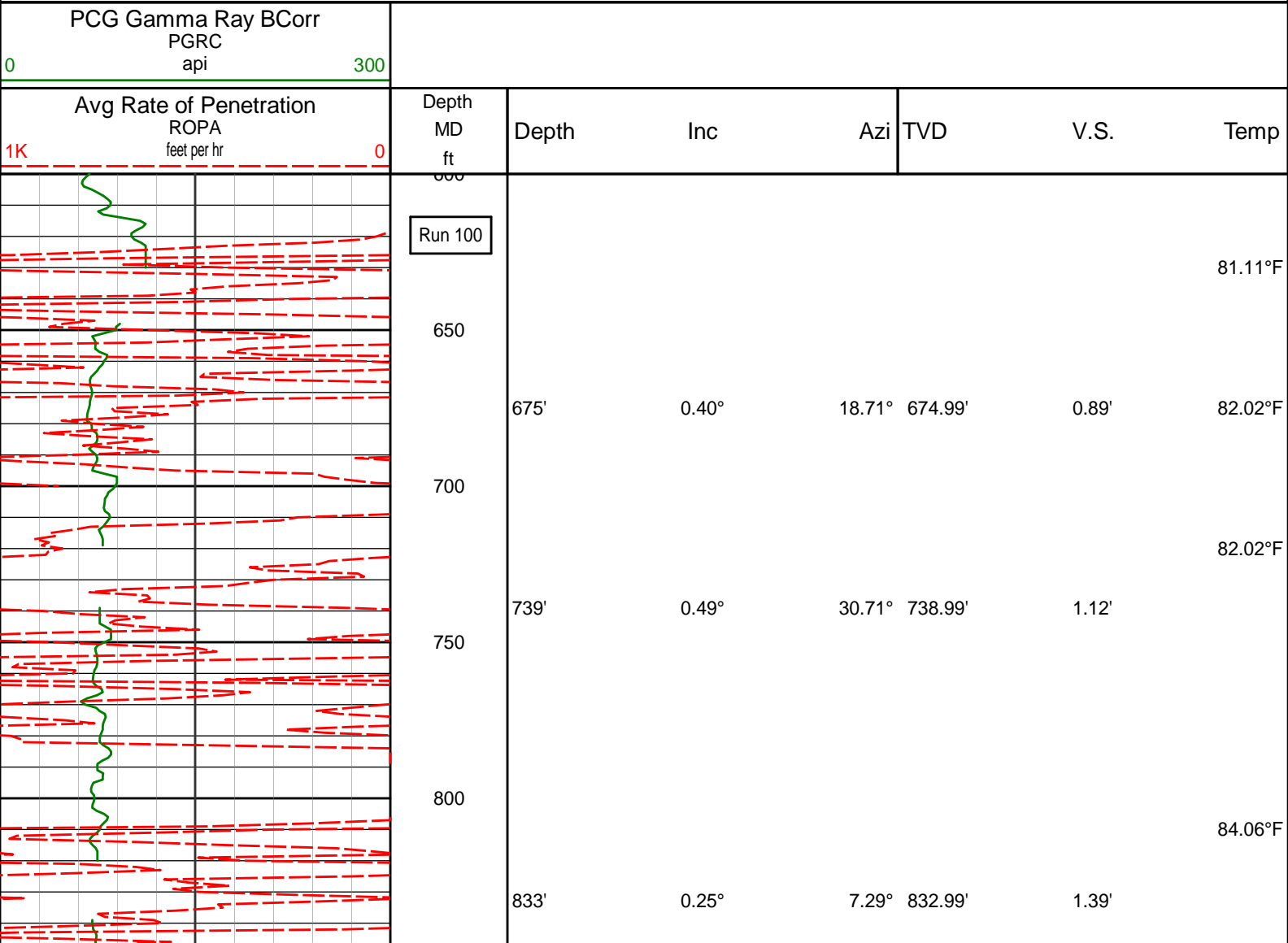
Interval: 0.5 ft

Coercion Distance: 0.6 ft (Gamma Ray)

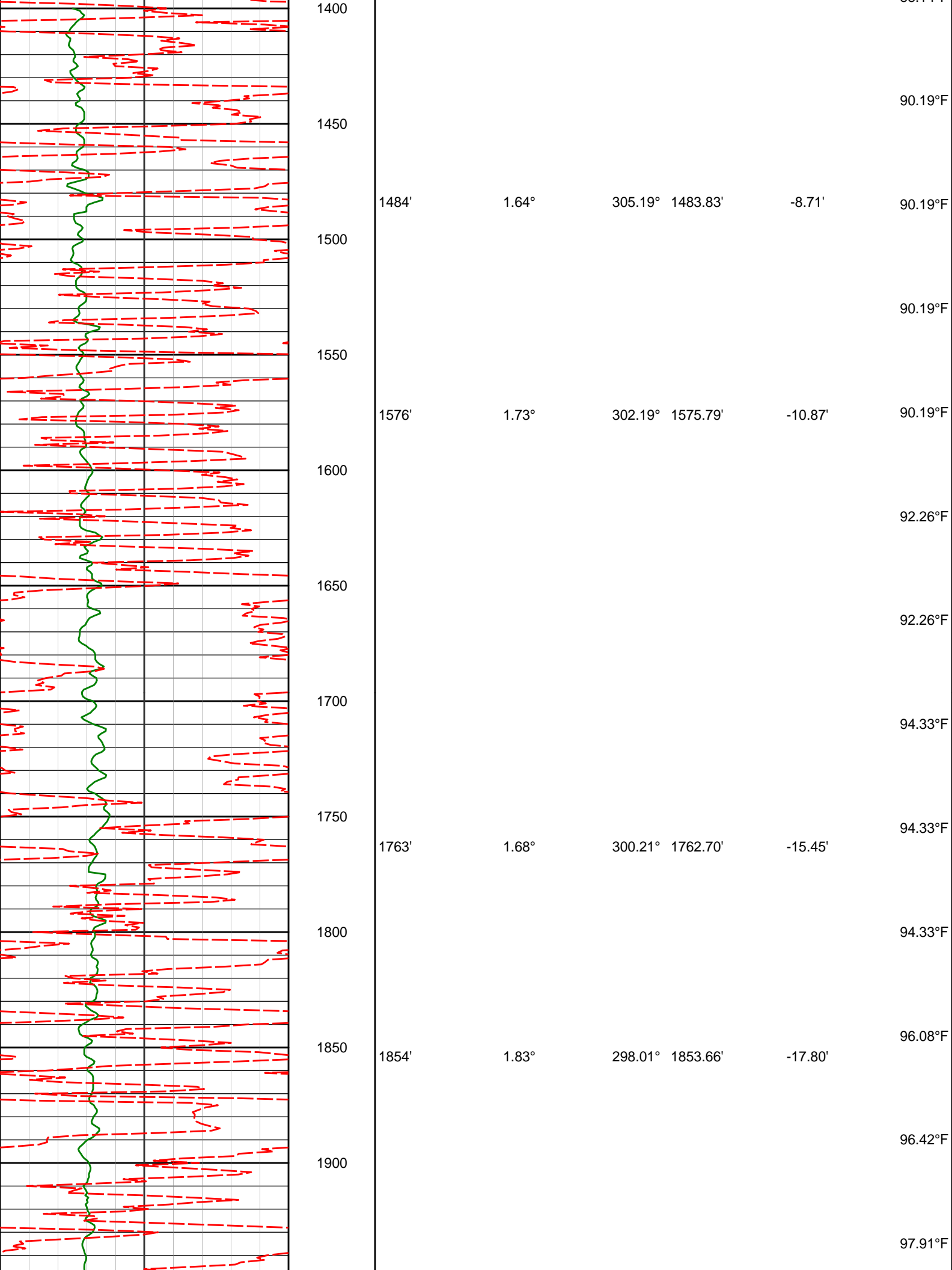
WARRANTY

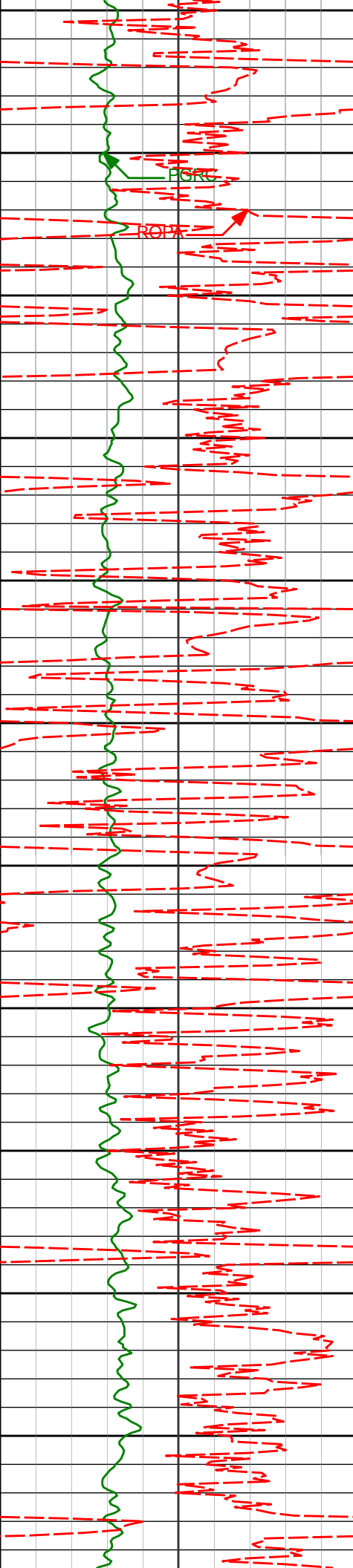
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MD Detail 1:600 Scale









1950
2000
2050
2100
2150
2200
2250
2300
2350
2400
2450

1947
2040'
2133'
2224'
2317'
2409'

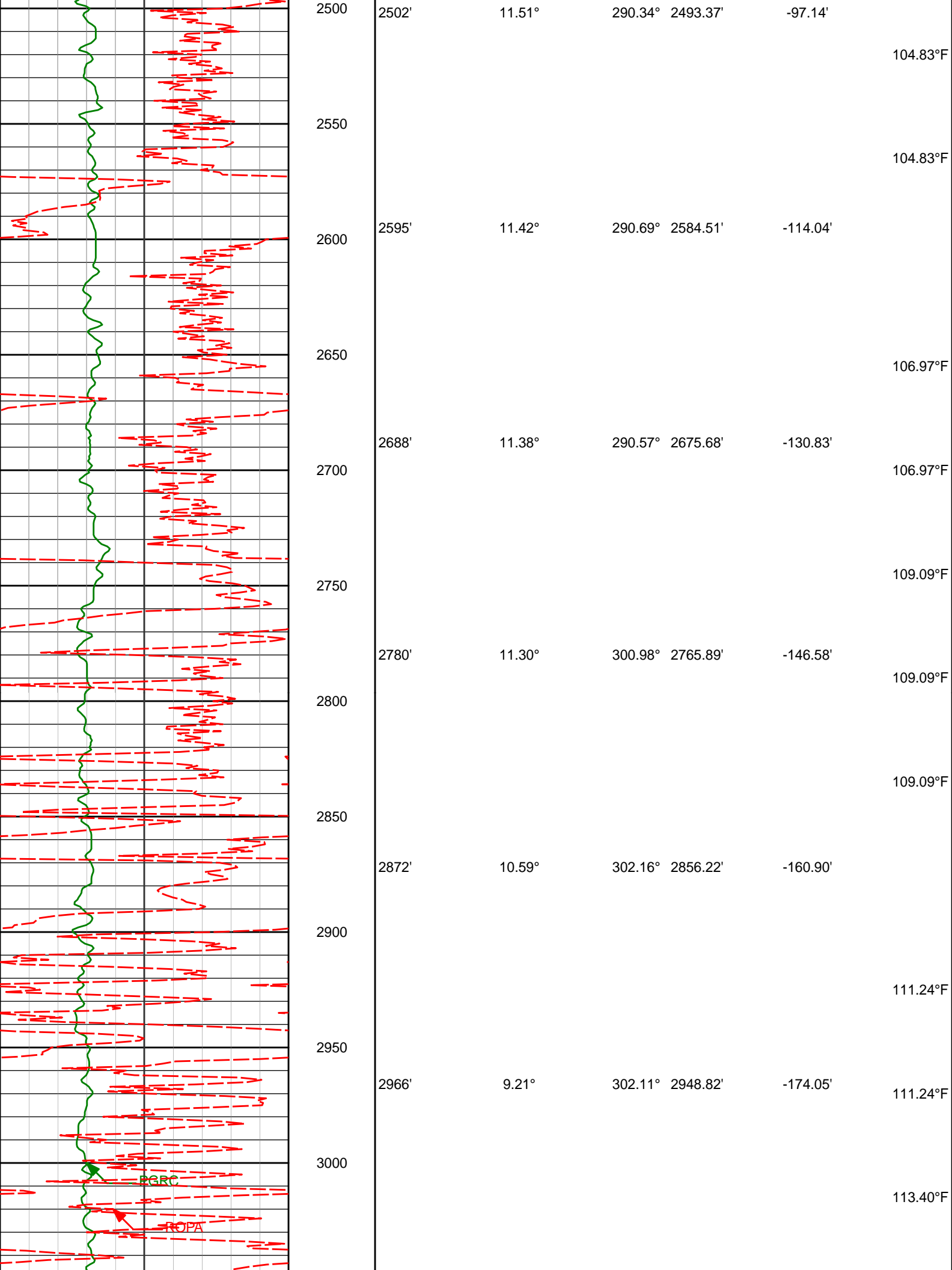
3.69
5.82°
8.40°
11.25°
12.19°
11.62°

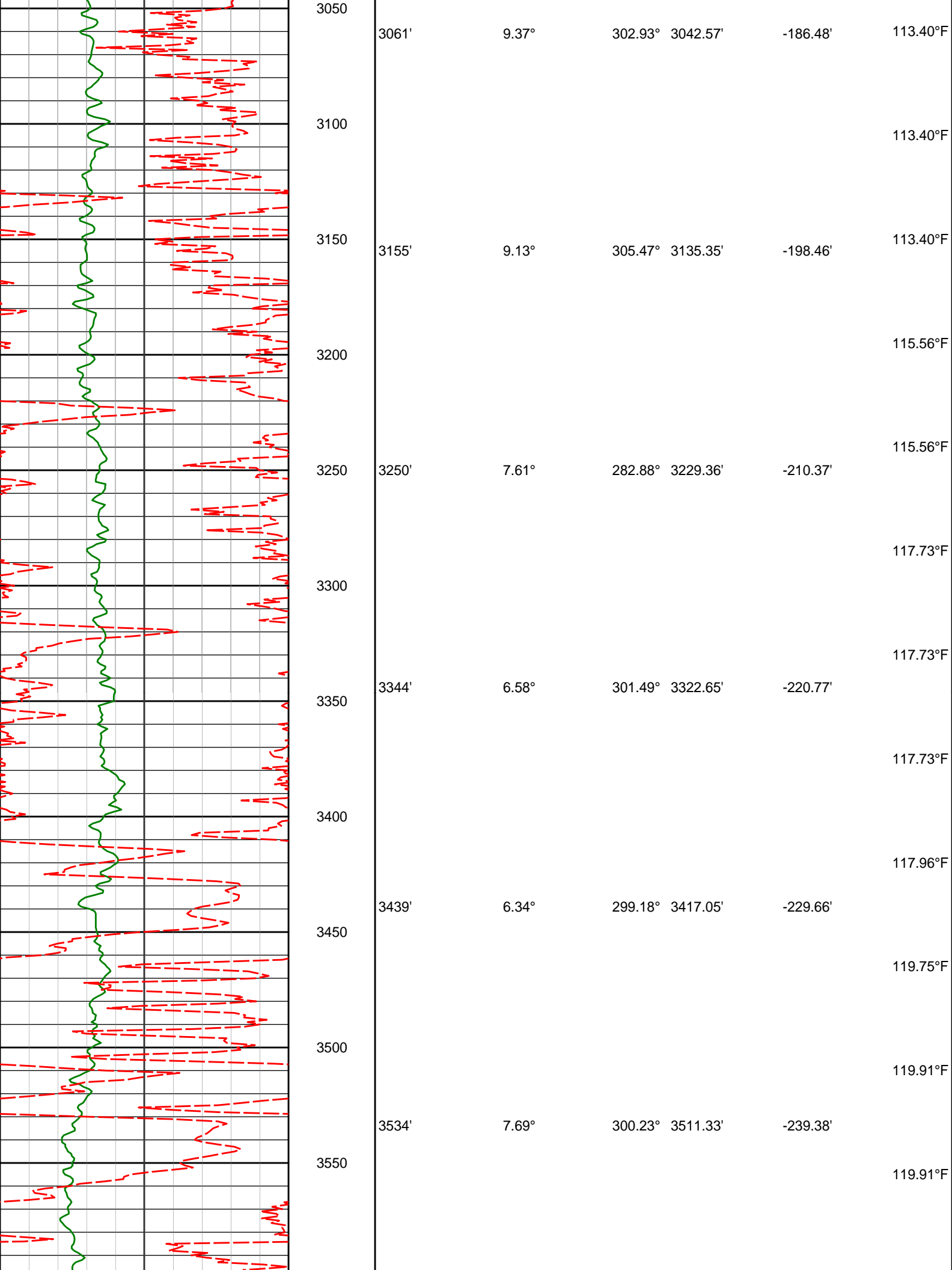
316.43
308.39°
308.98°
305.06°
292.00°
290.67°

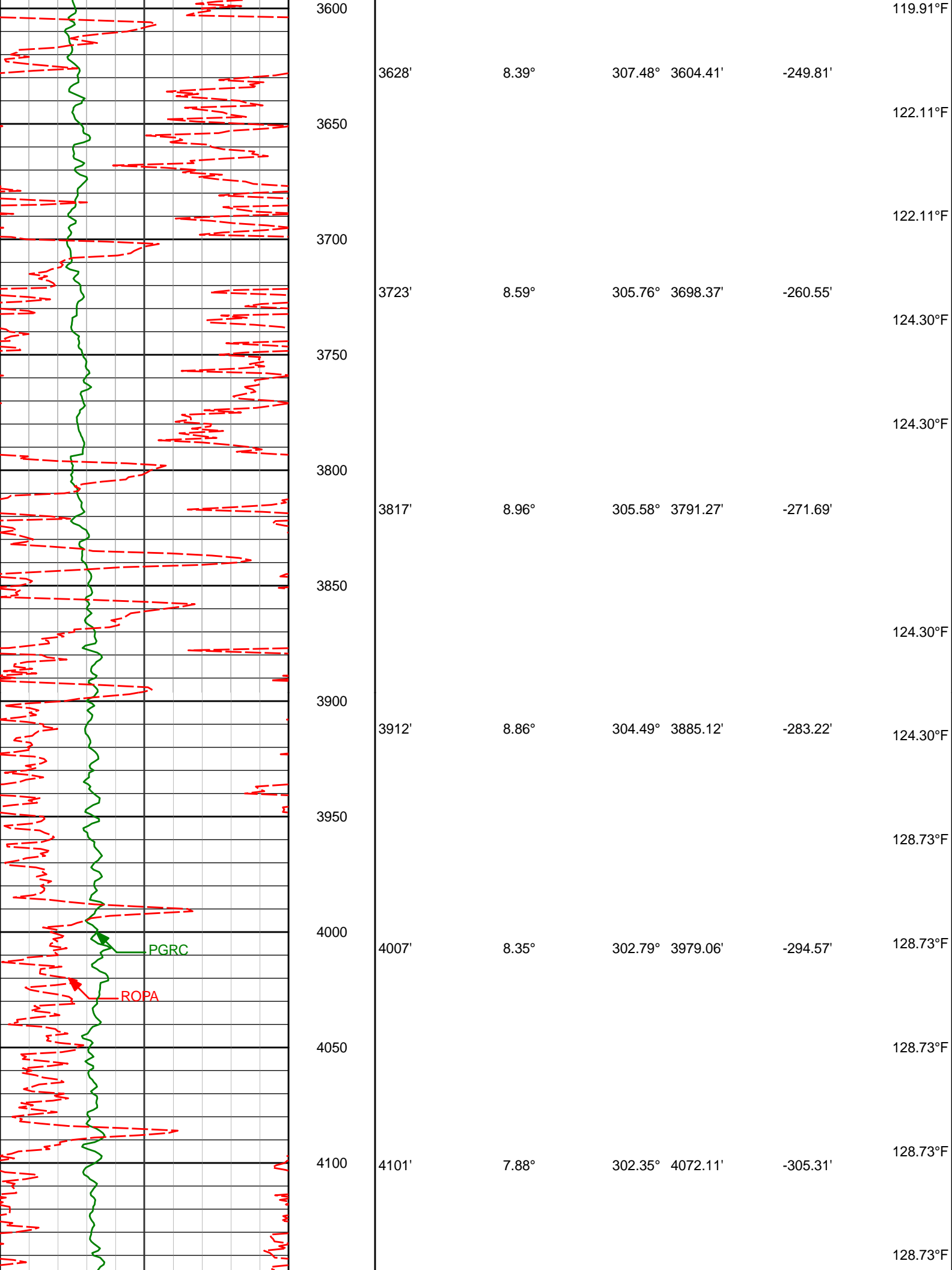
1946.55
2039.23'
2131.50'
2221.16'
2312.24'
2402.26'

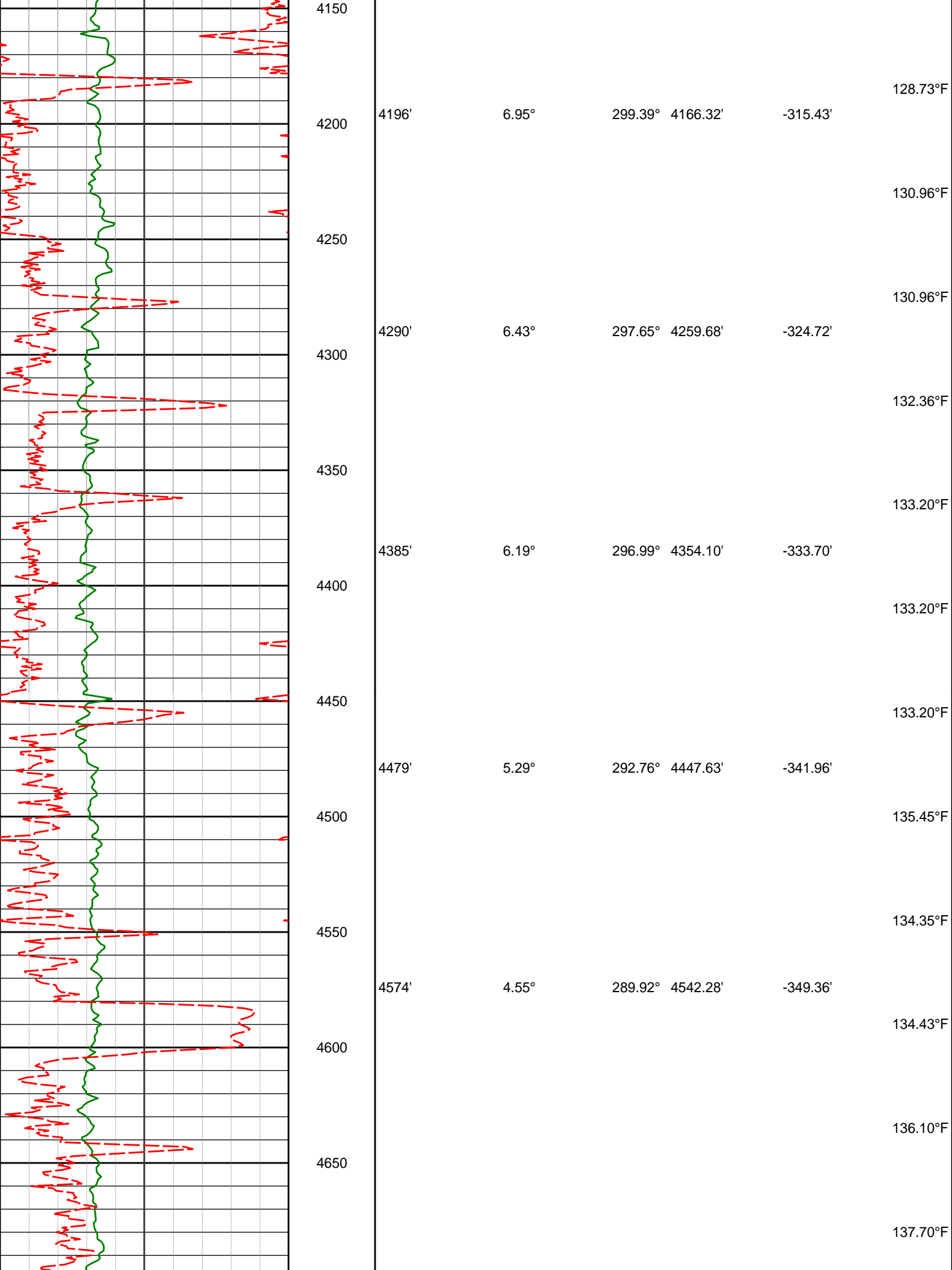
-21.01
-26.46'
-35.00'
-46.87'
-62.85'
-80.09'

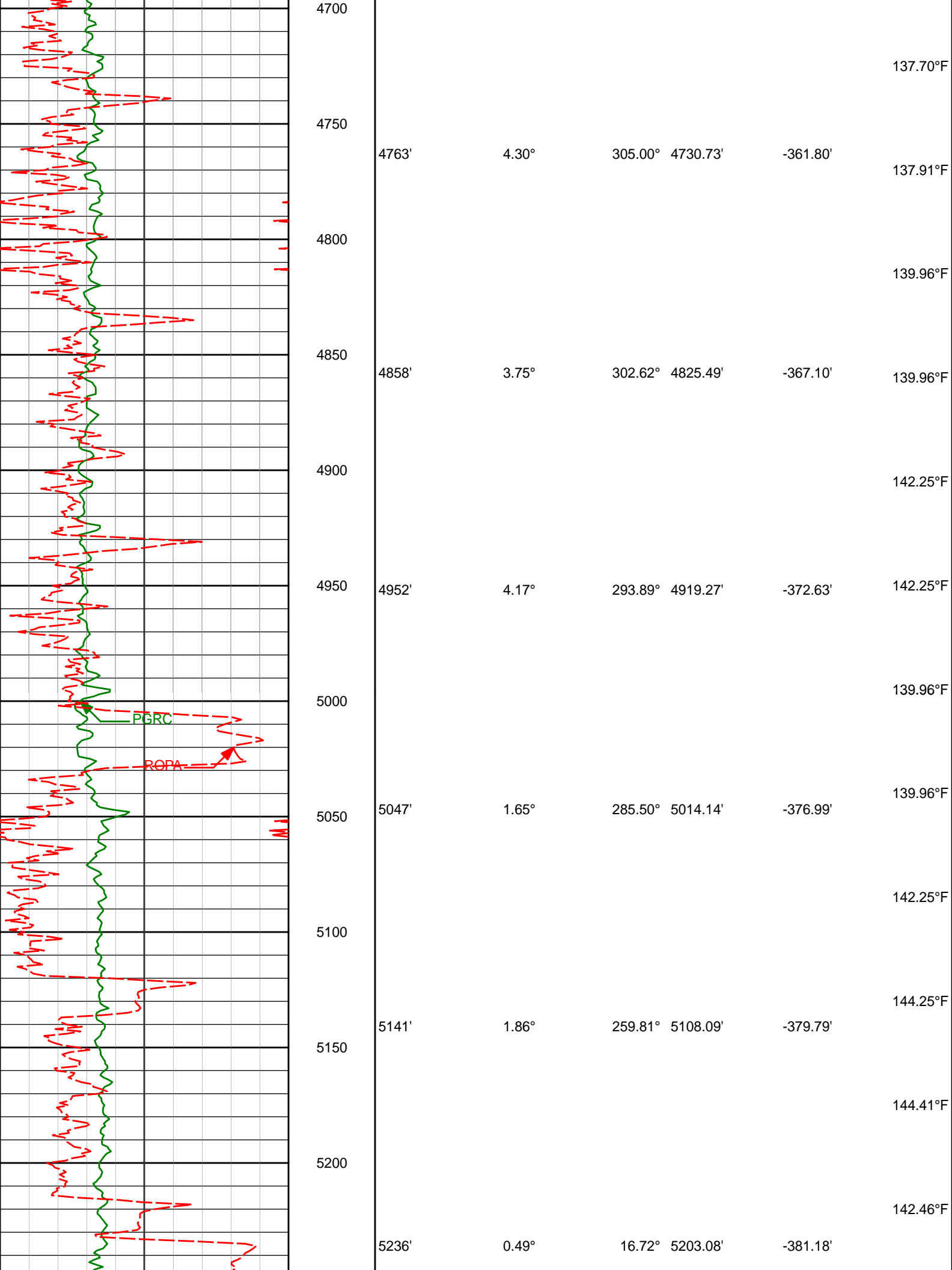
98.51°F
98.51°F
98.51°F
98.51°F
100.03°F
100.62°F
100.62°F
100.62°F
102.72°F
102.72°F
104.83°F

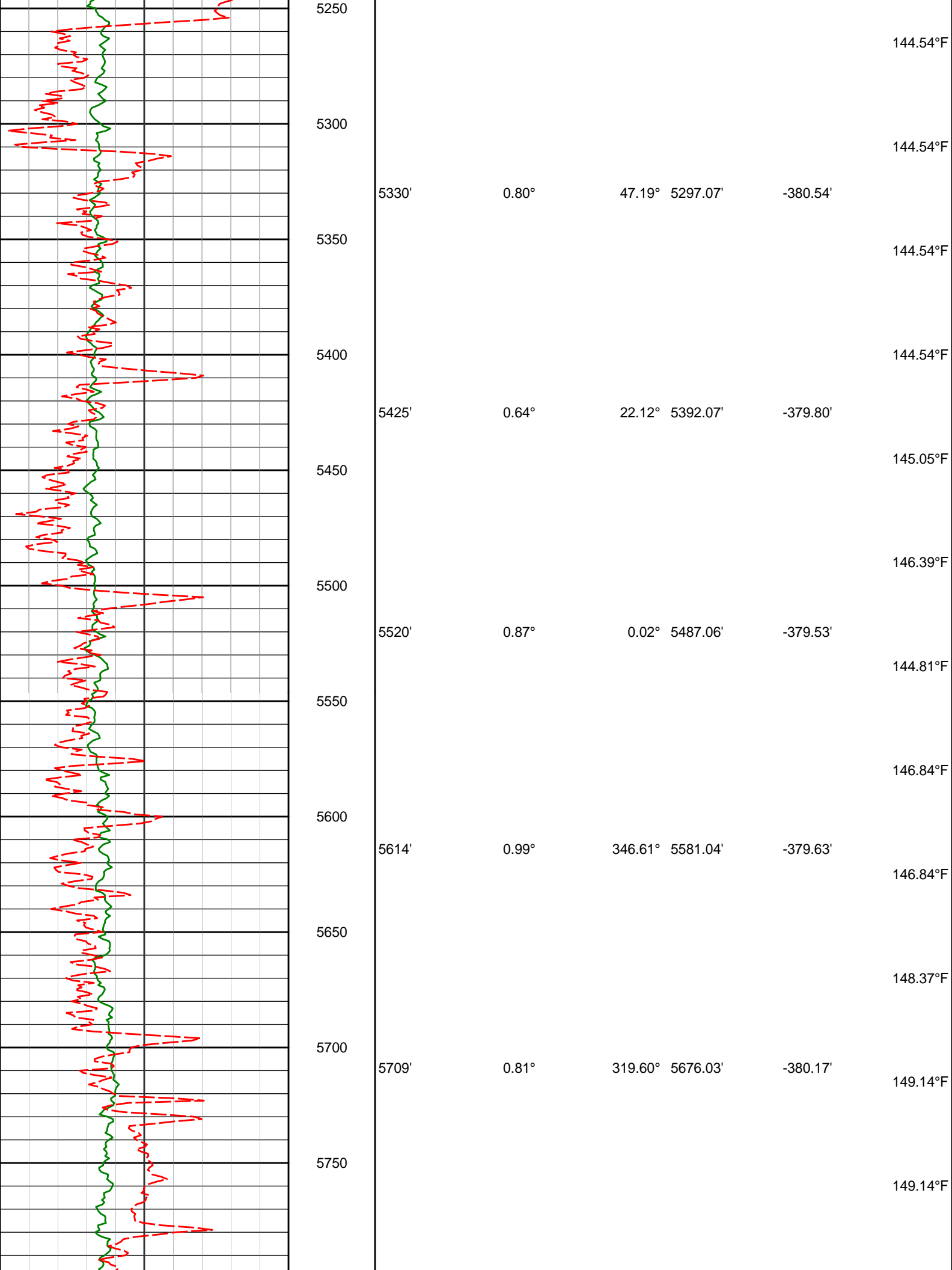


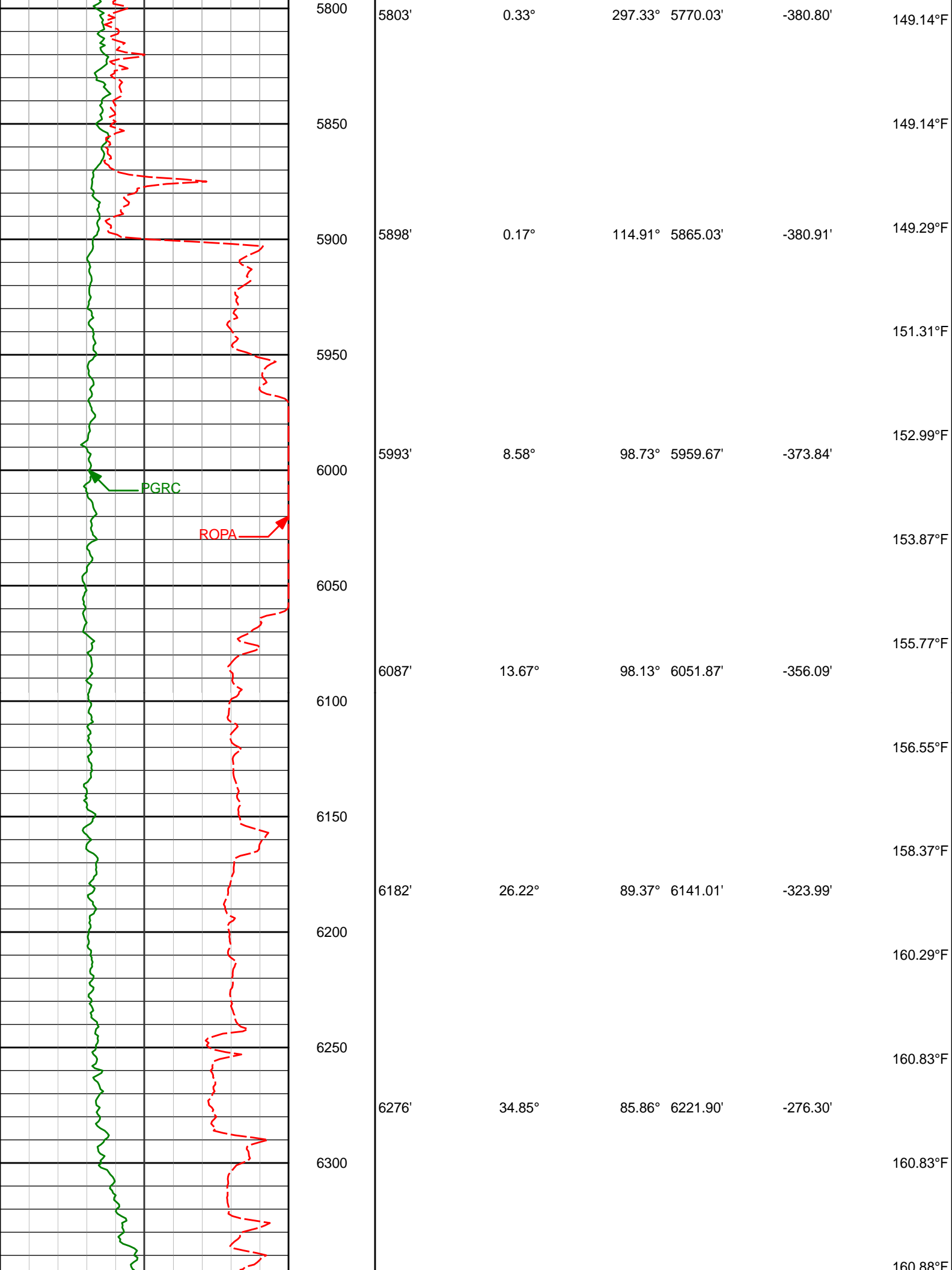


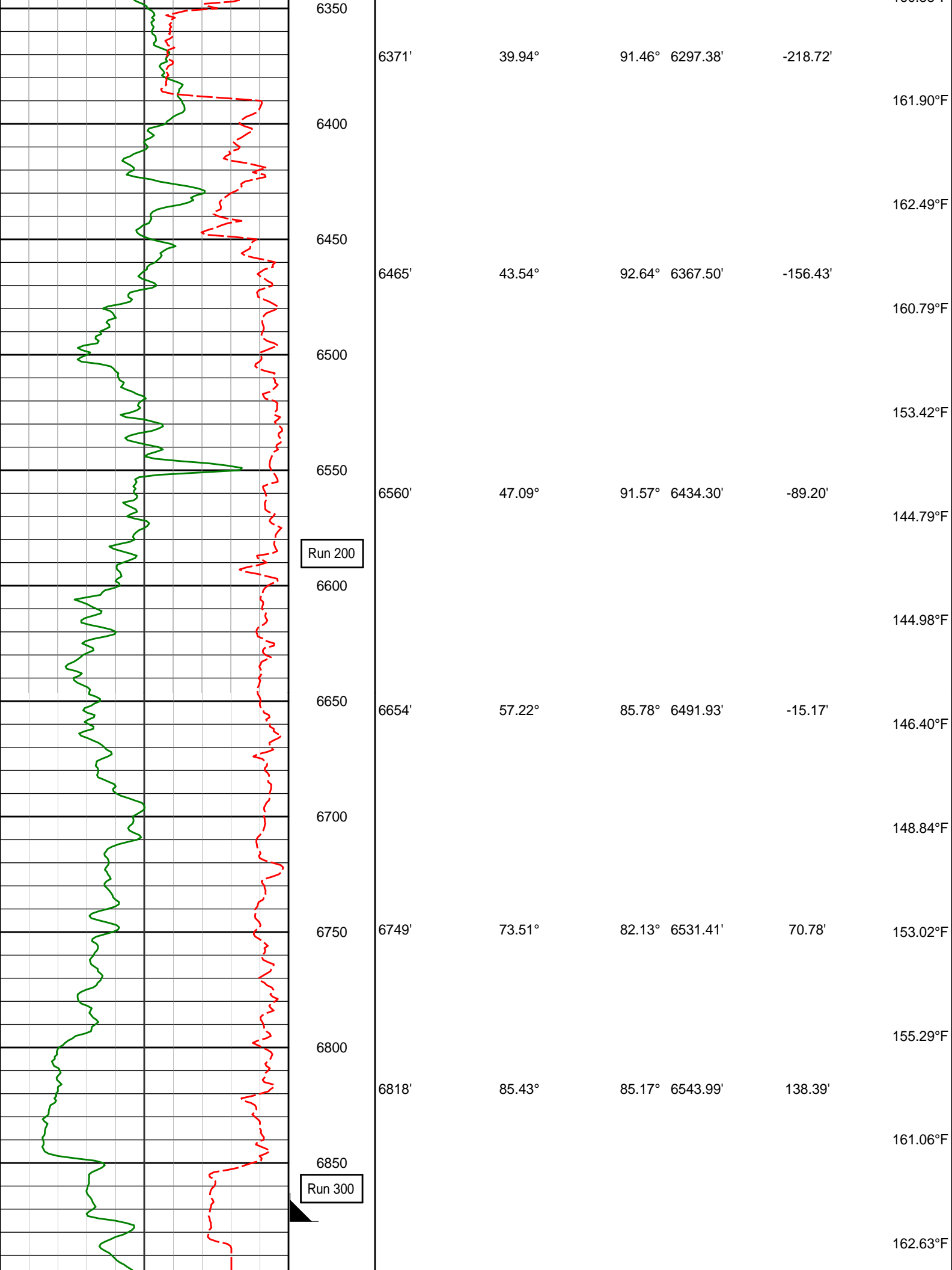


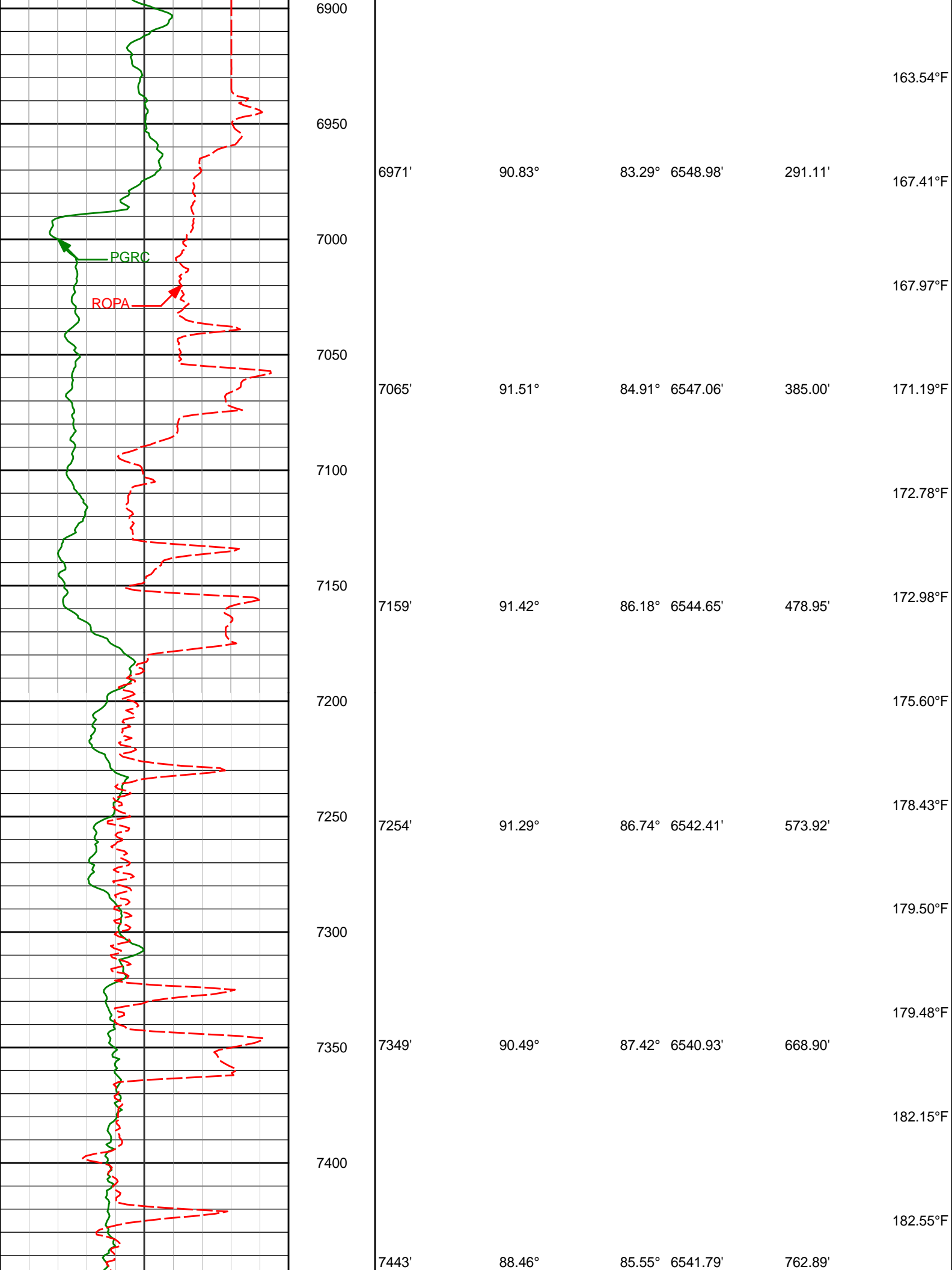


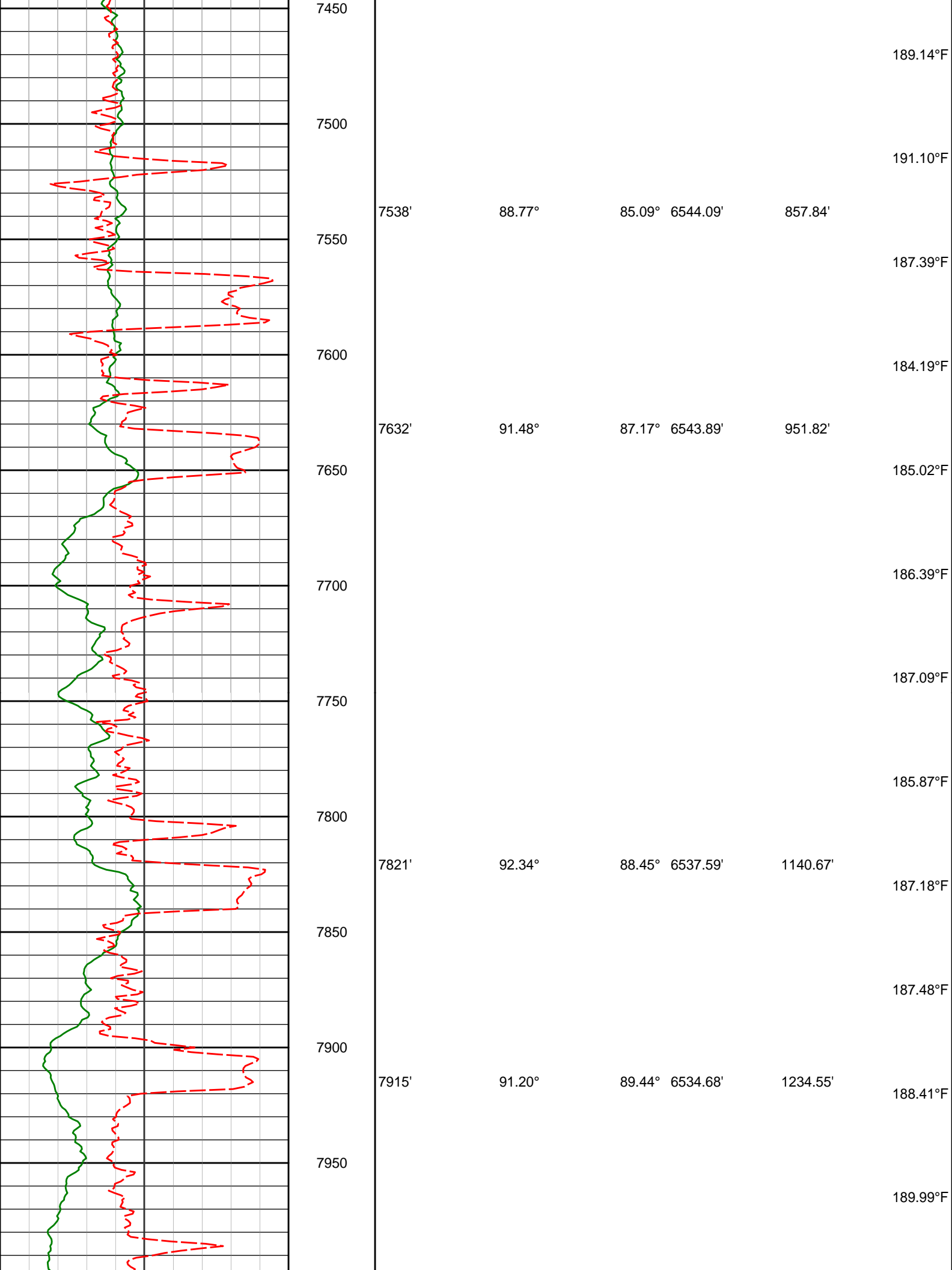


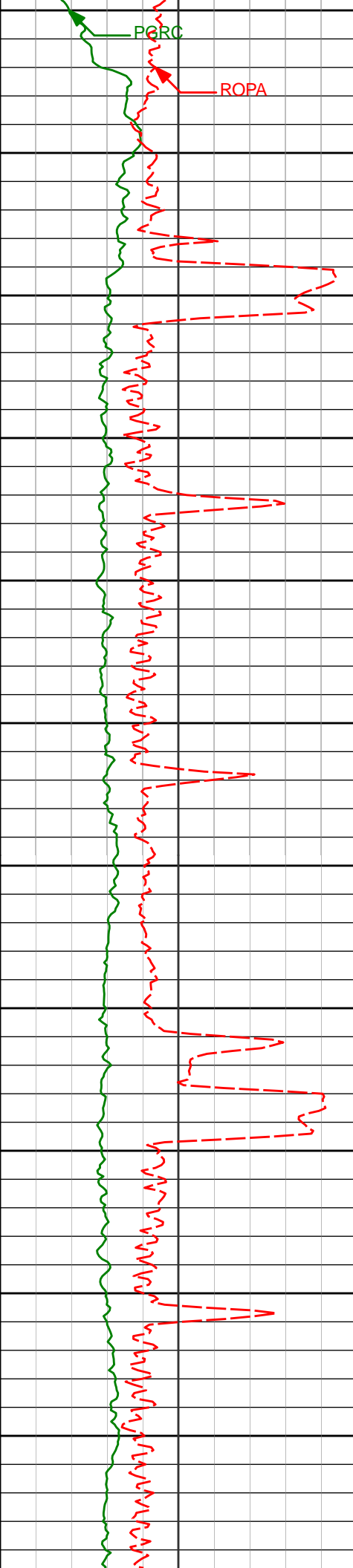




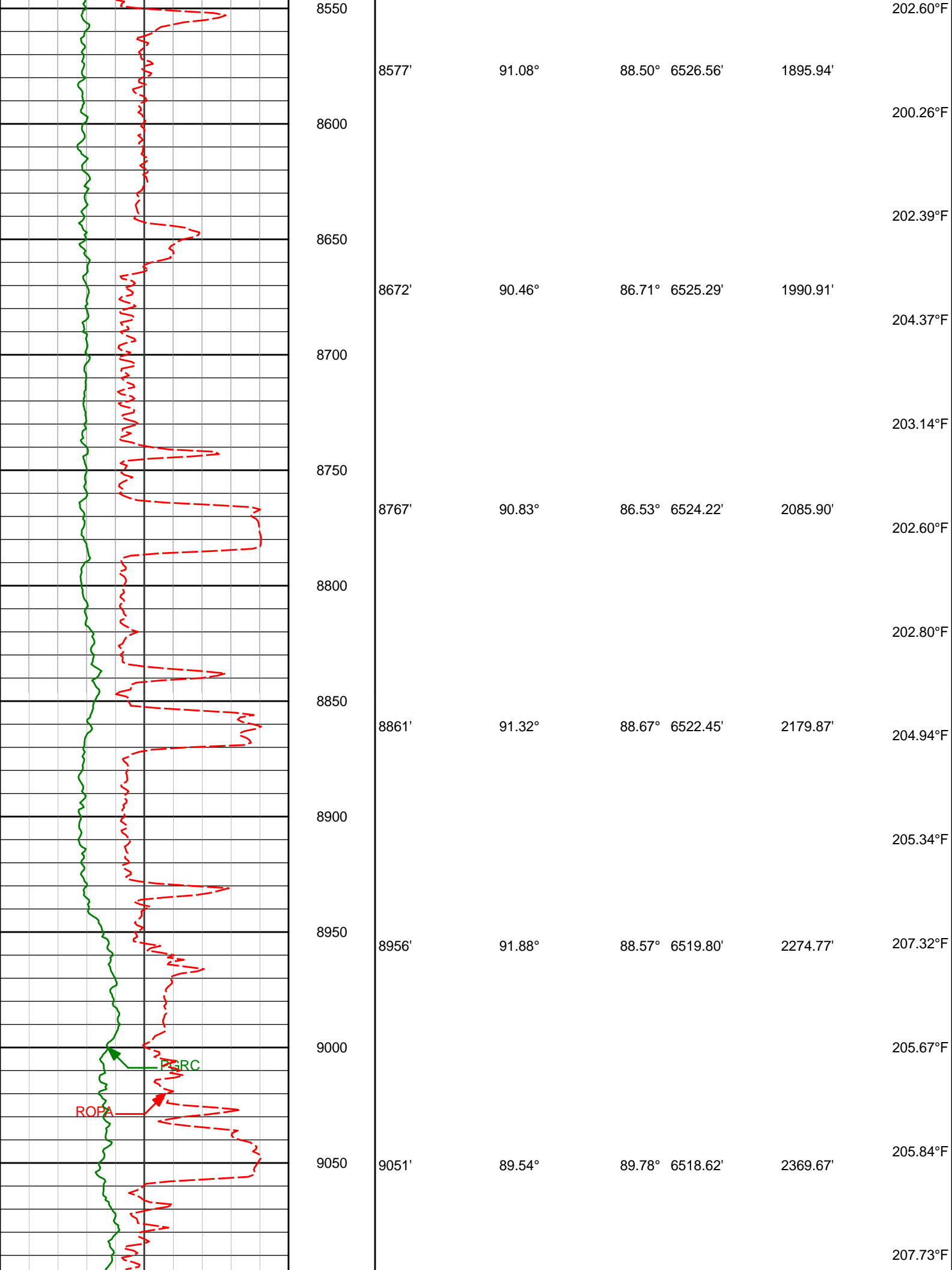


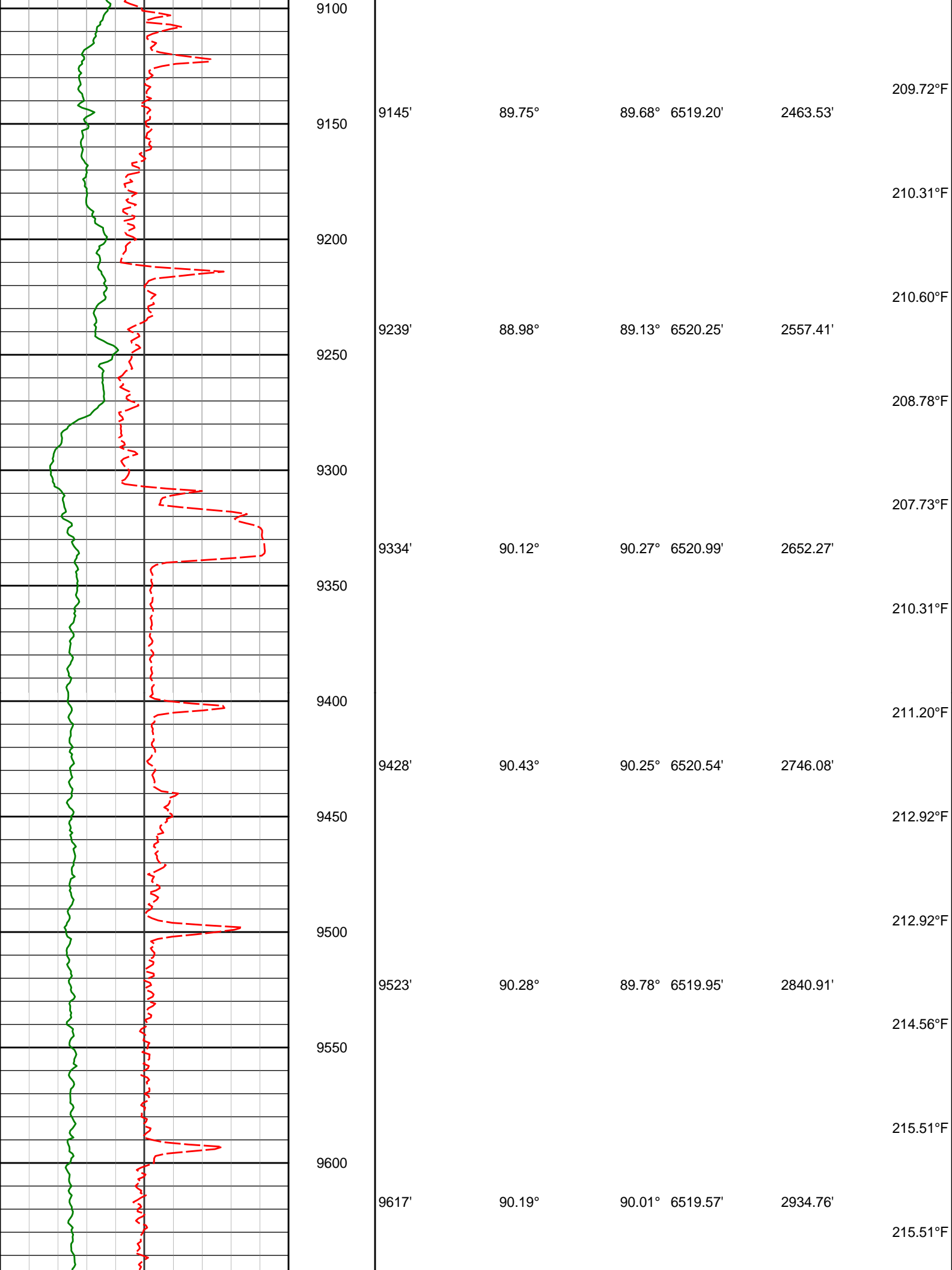


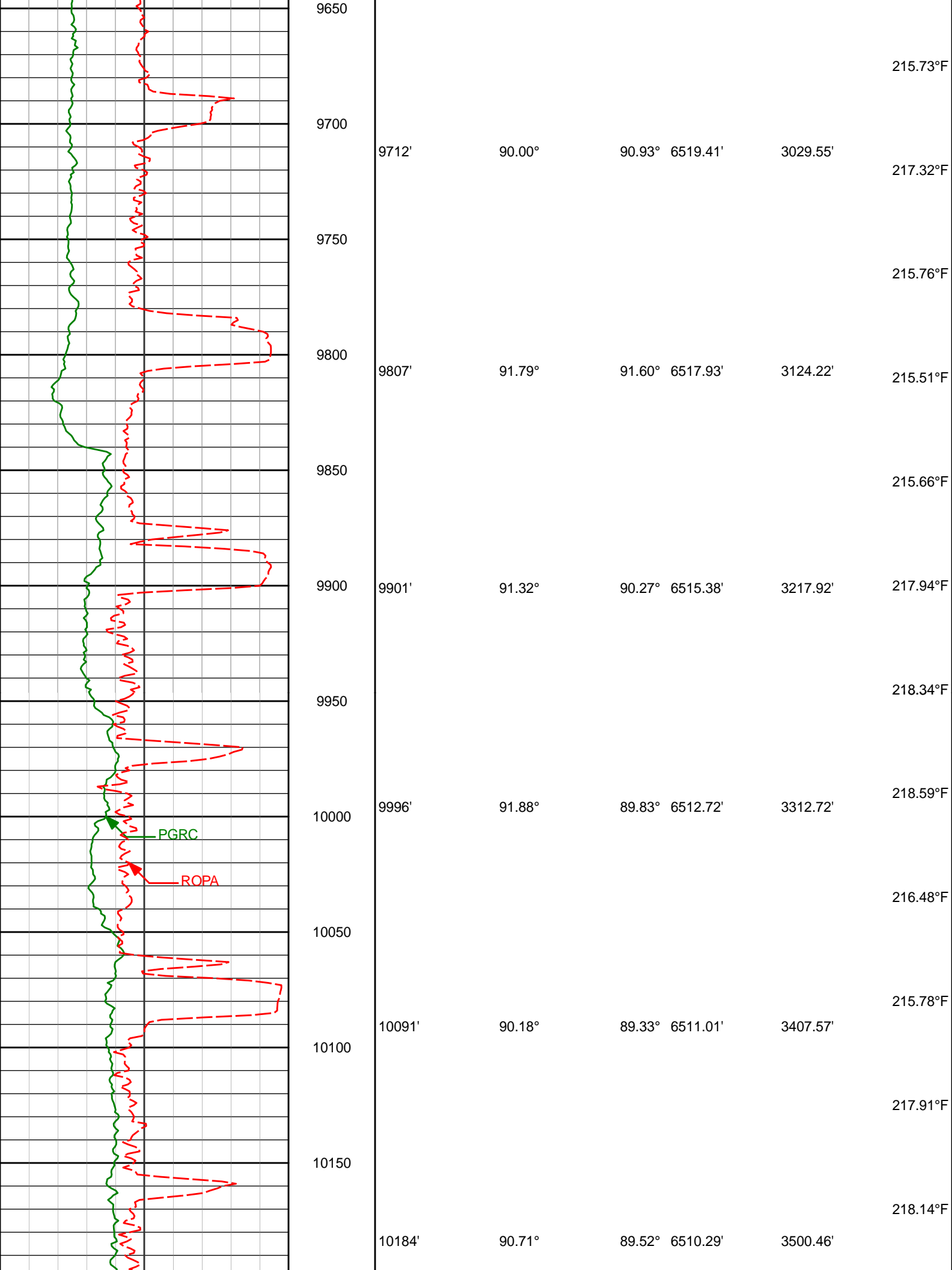


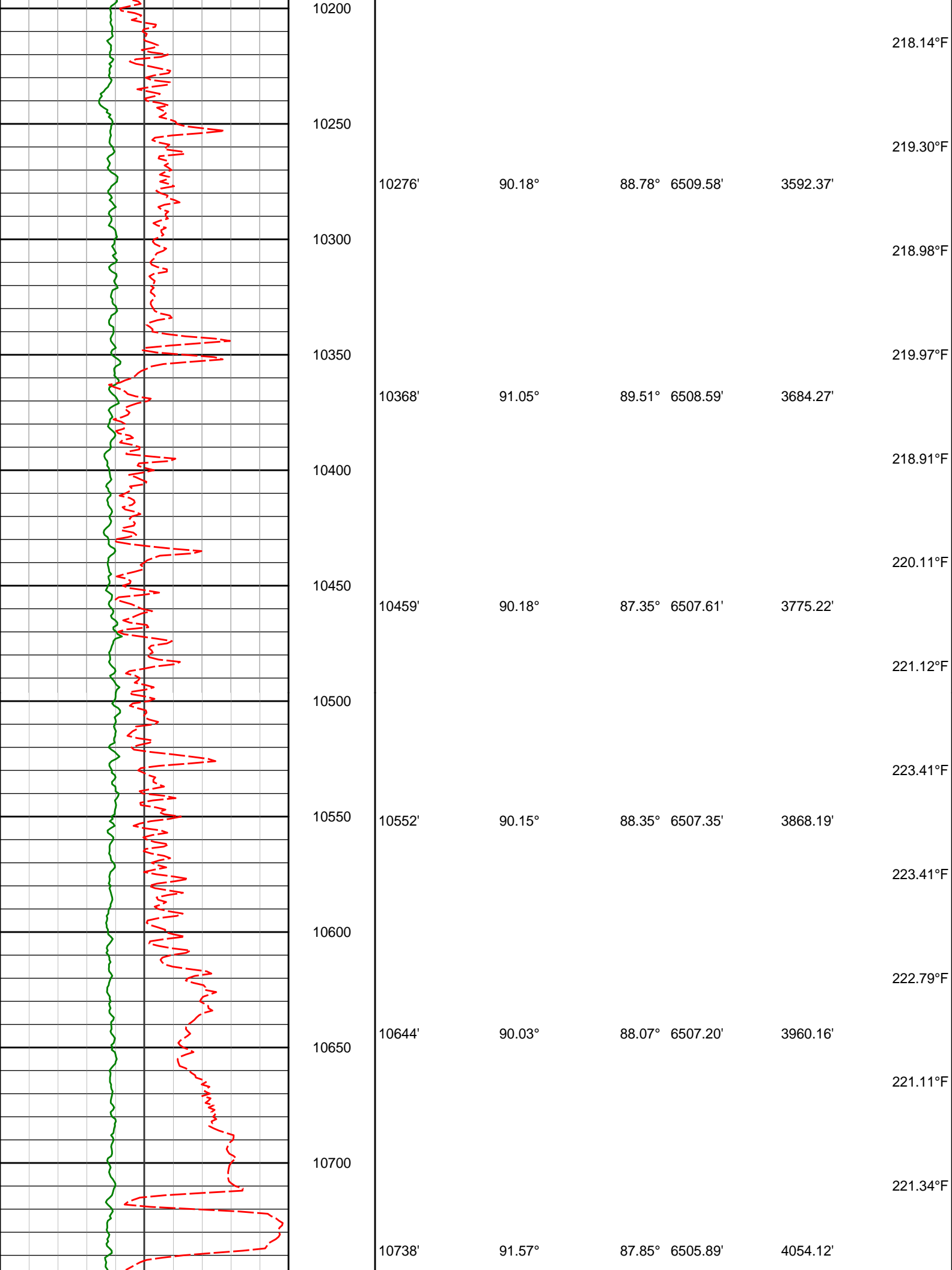


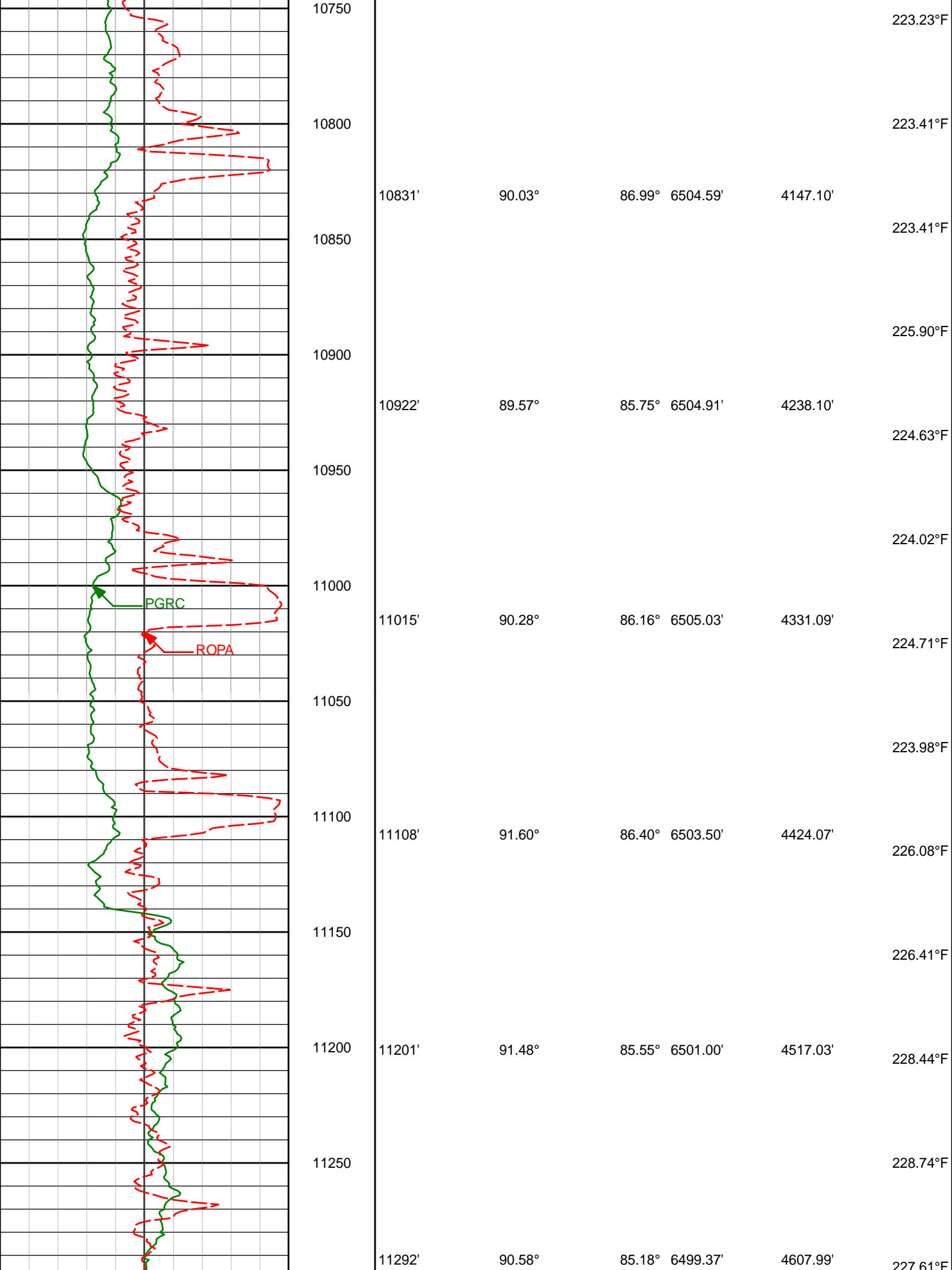
8000	8010'	91.66°	89.62°	6532.31'	1329.40'	191.52°F
8050						190.78°F
8100	8104'	90.43°	89.79°	6530.60'	1423.24'	192.18°F
8150						192.88°F
8200	8199'	90.15°	88.39°	6530.12'	1518.15'	195.37°F
8250						197.51°F
8300	8293'	90.34°	87.80°	6529.71'	1612.12'	197.51°F
8350						197.13°F
8400	8388'	90.68°	89.03°	6528.87'	1707.07'	196.72°F
8450						199.71°F
8500	8483'	90.52°	88.56°	6527.87'	1802.00'	200.05°F
						202.44°F

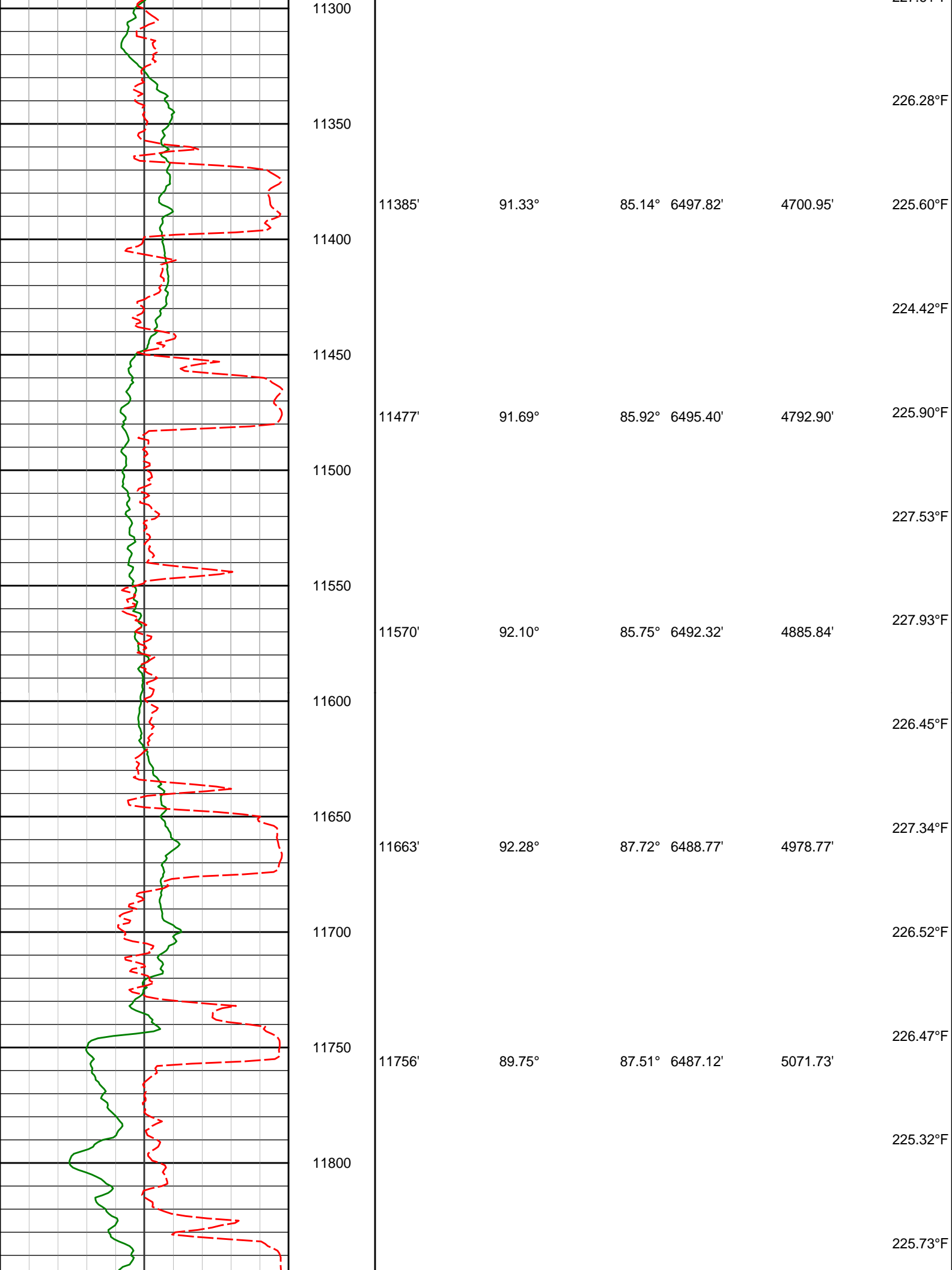


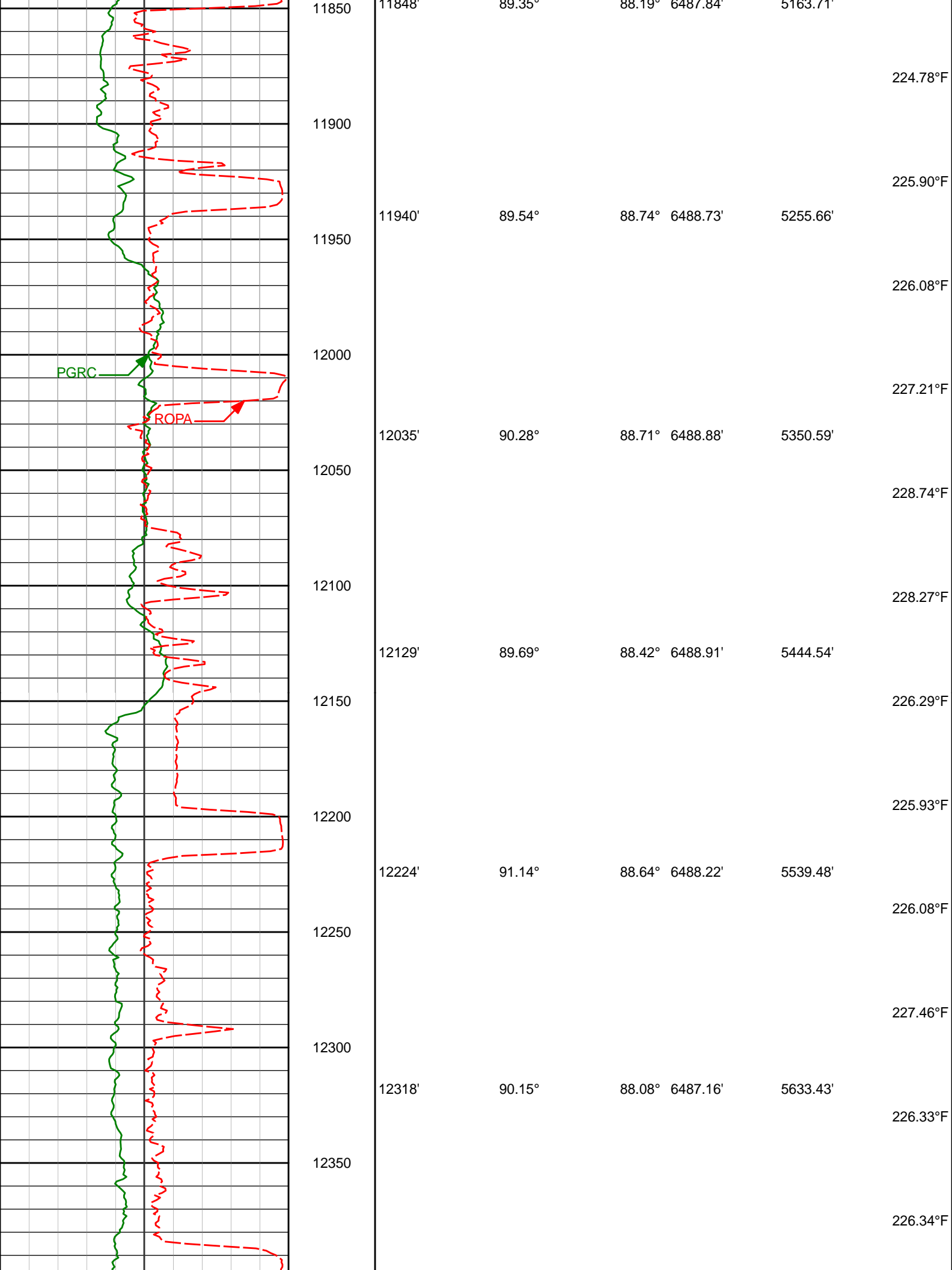


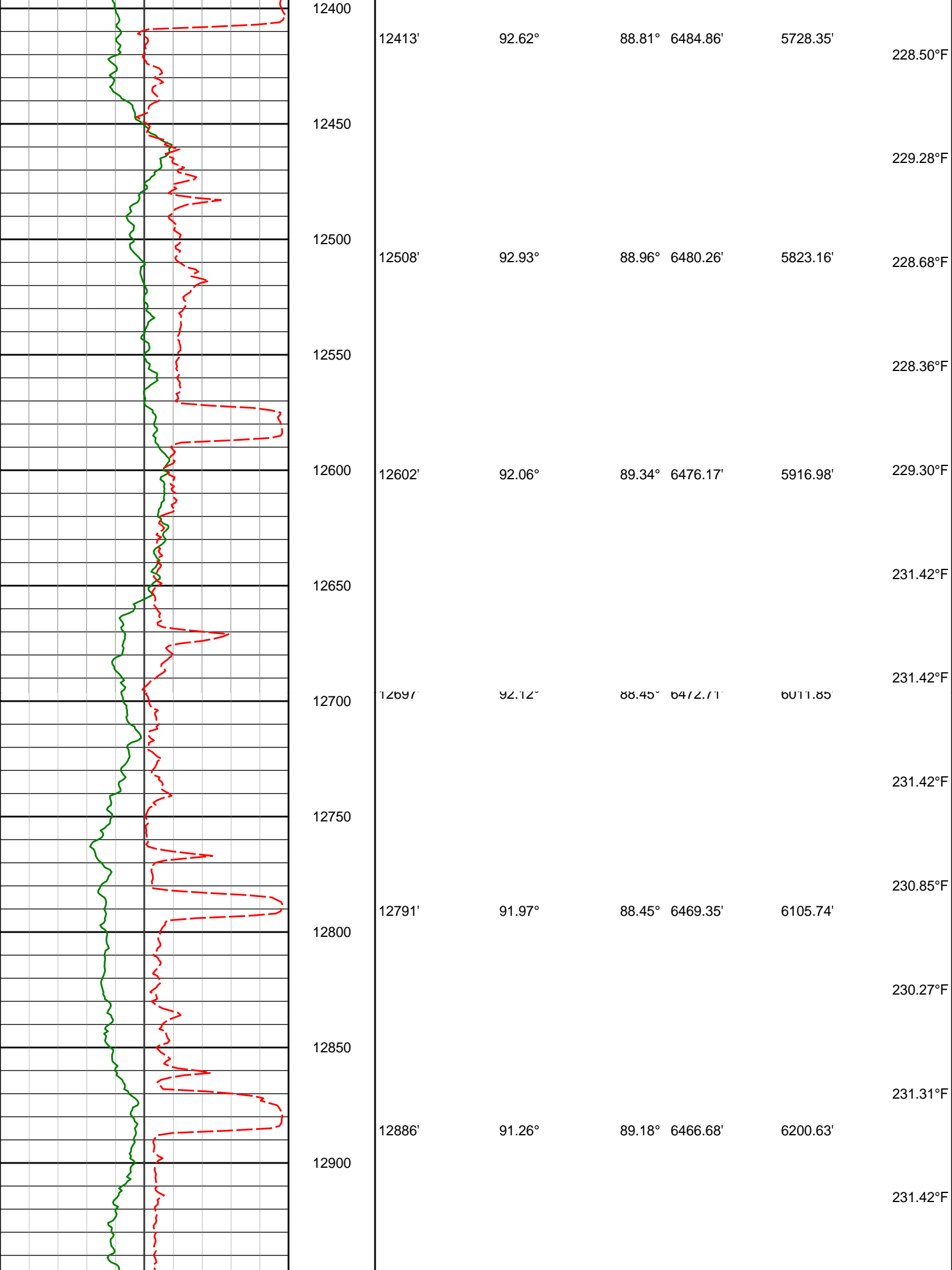


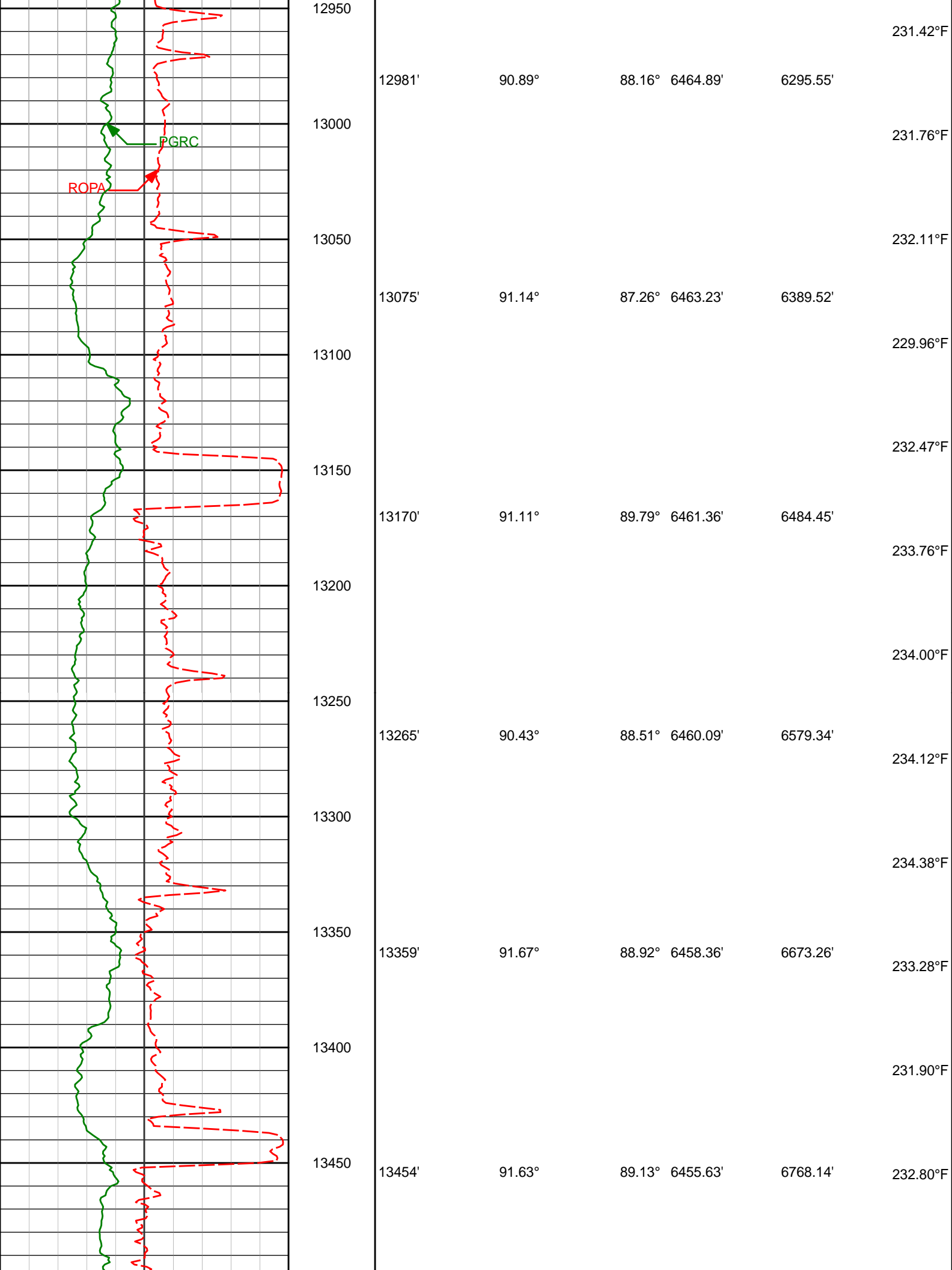


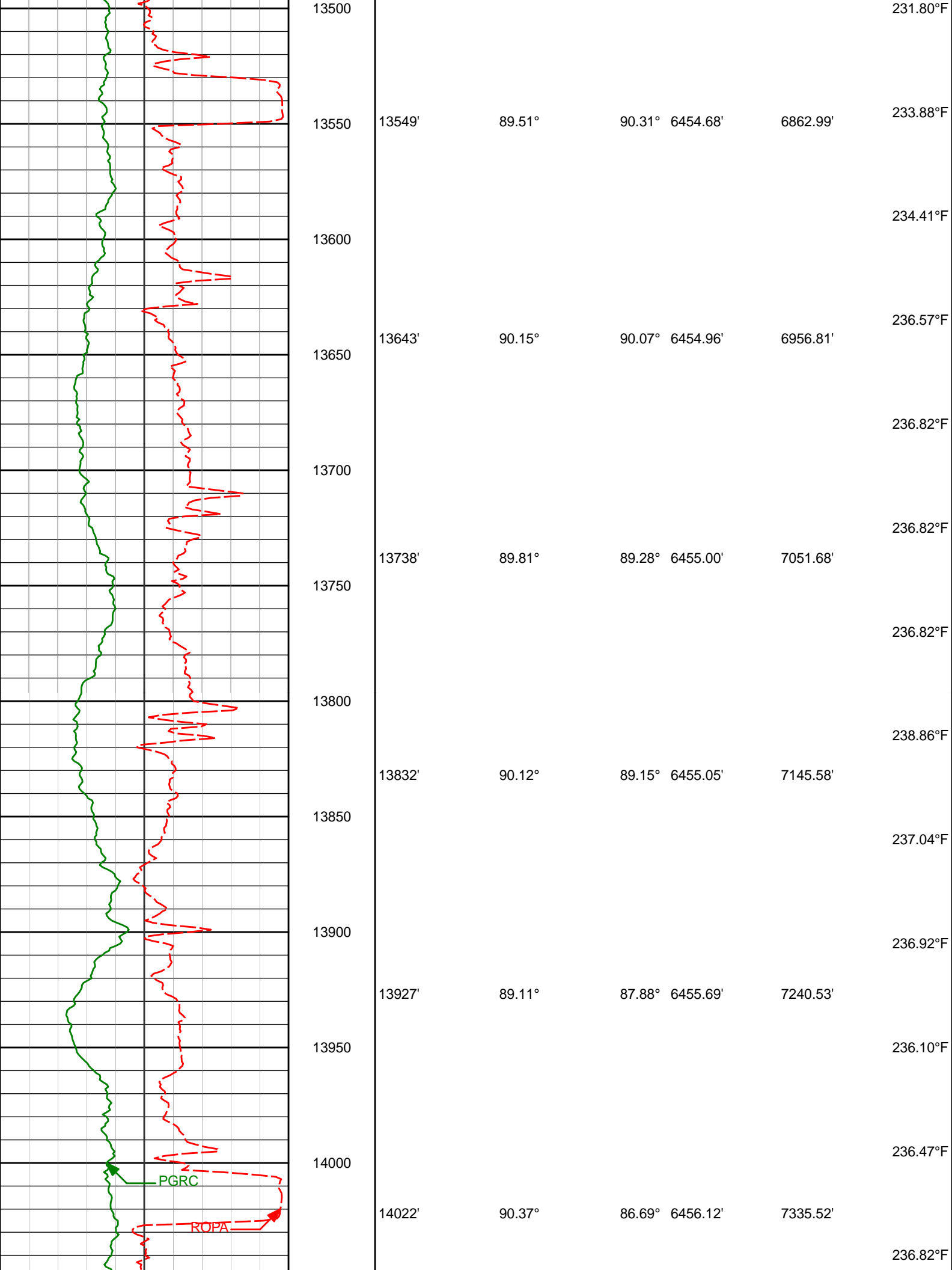


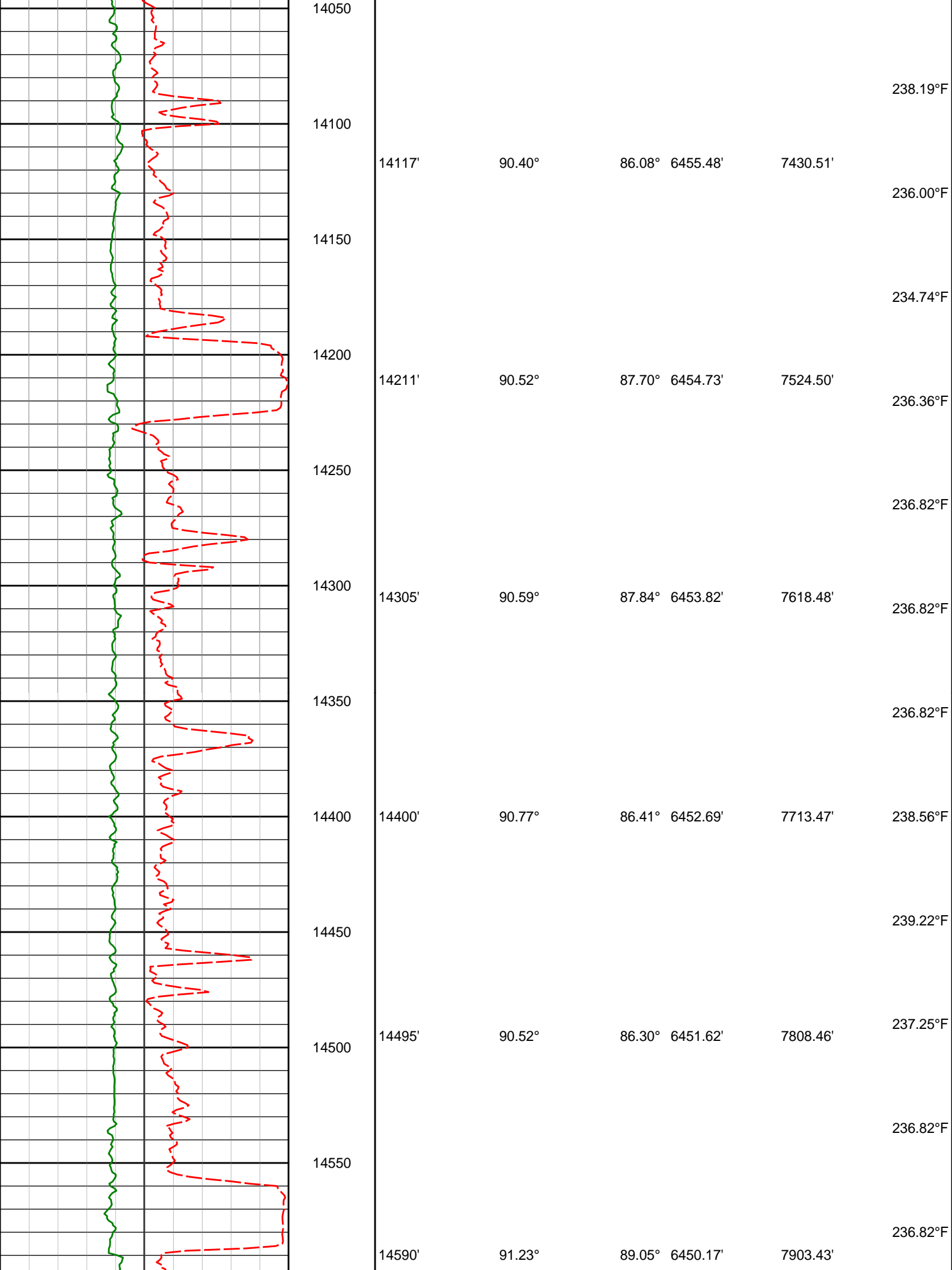


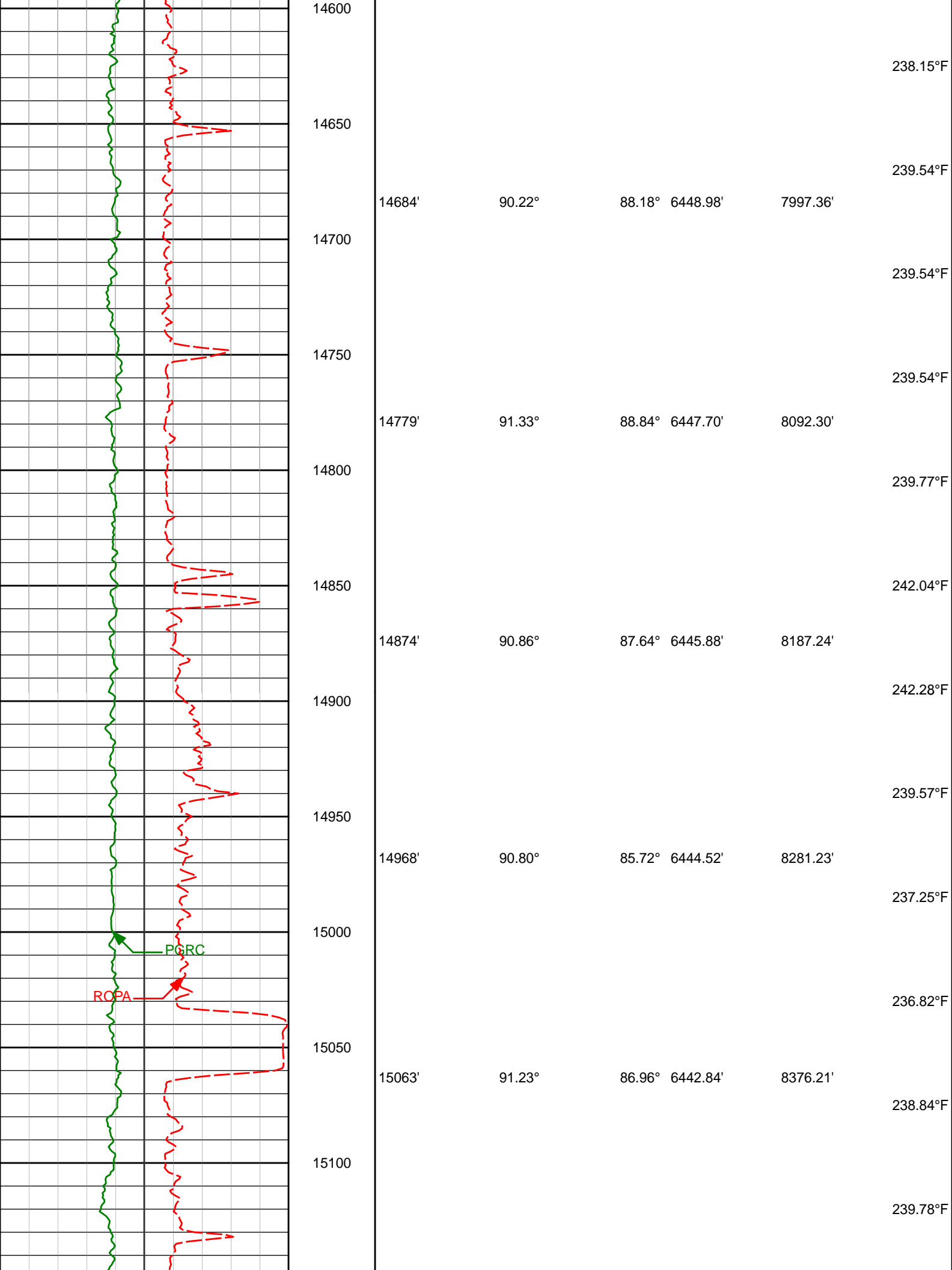


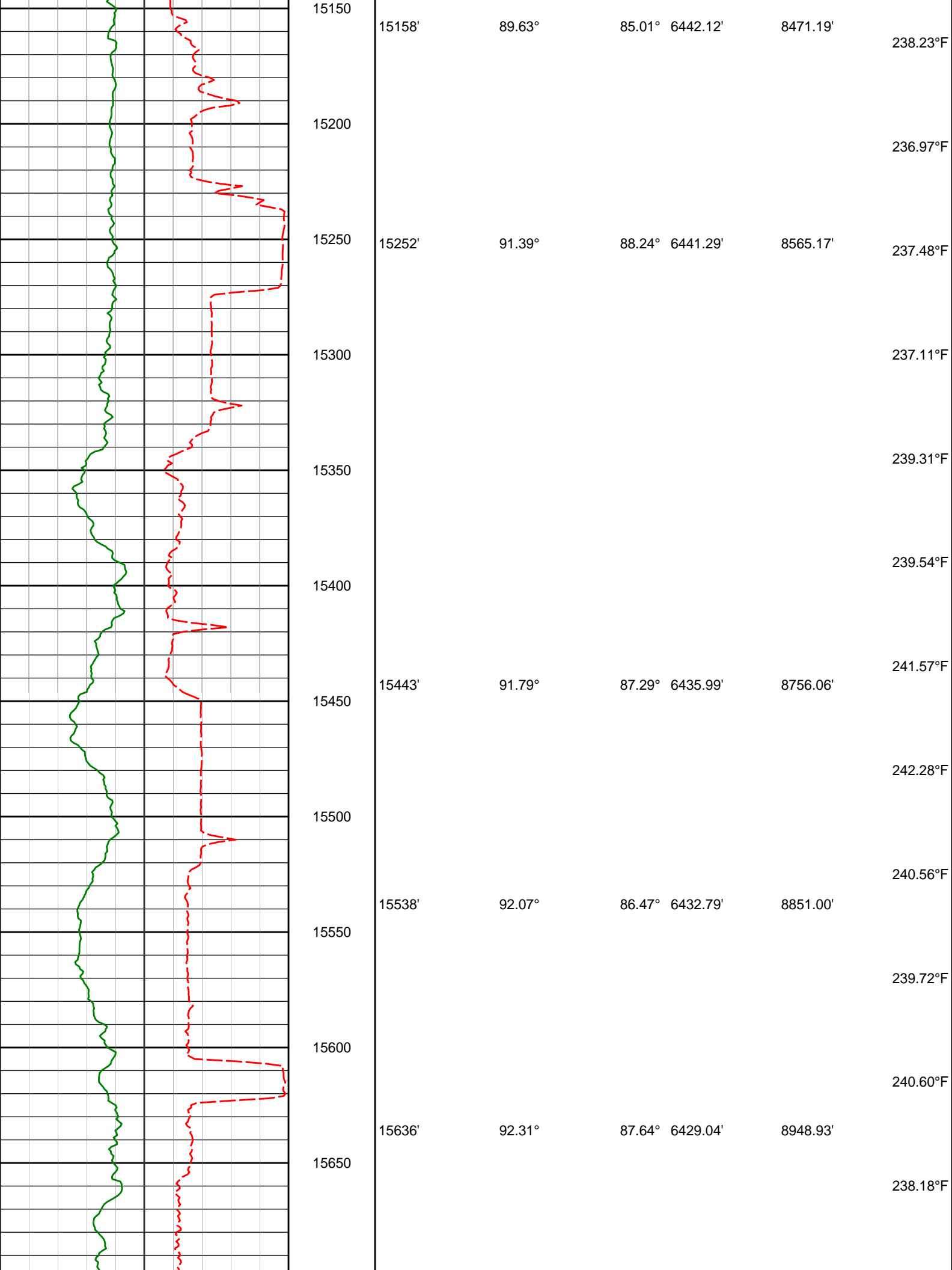


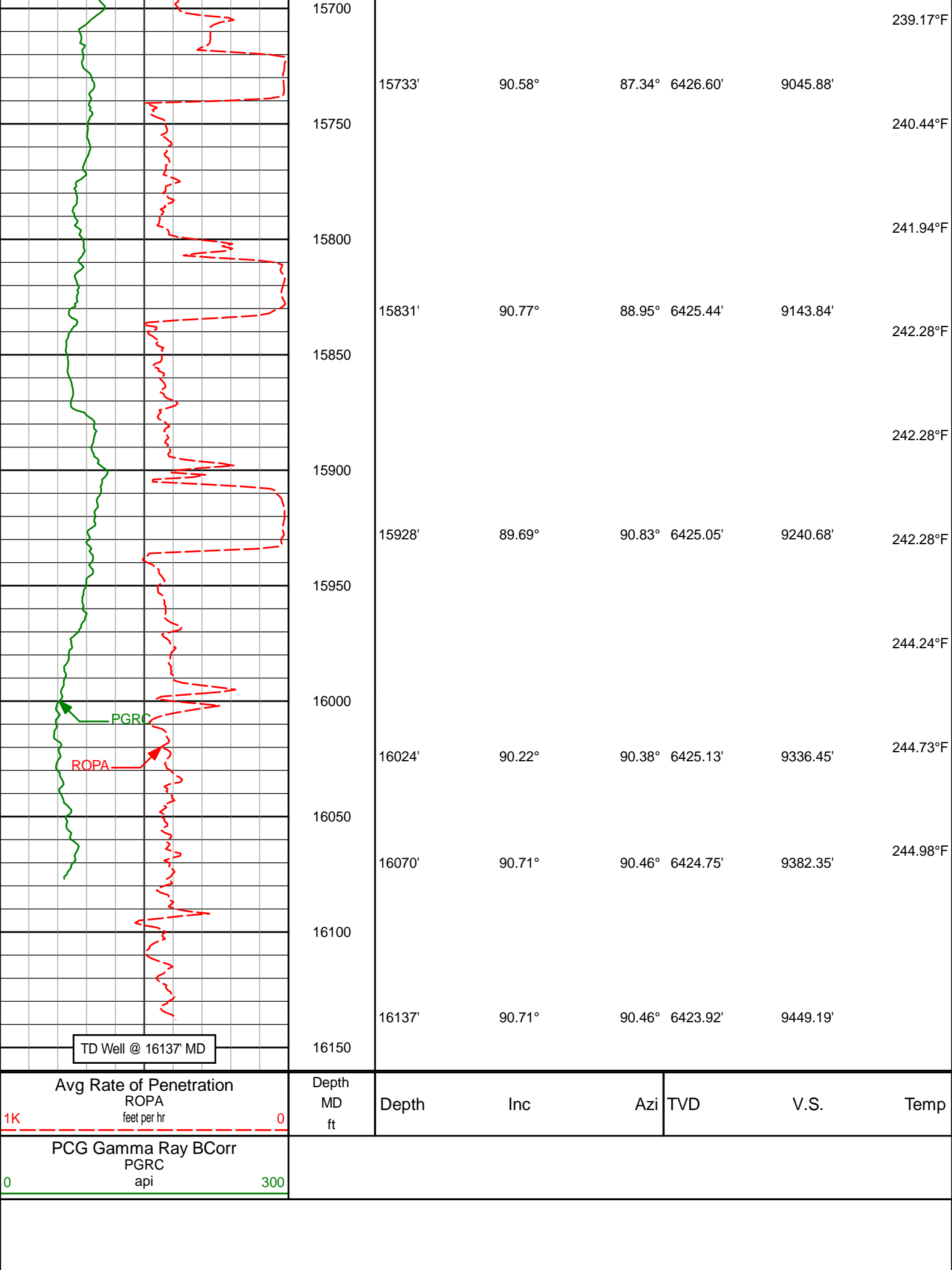




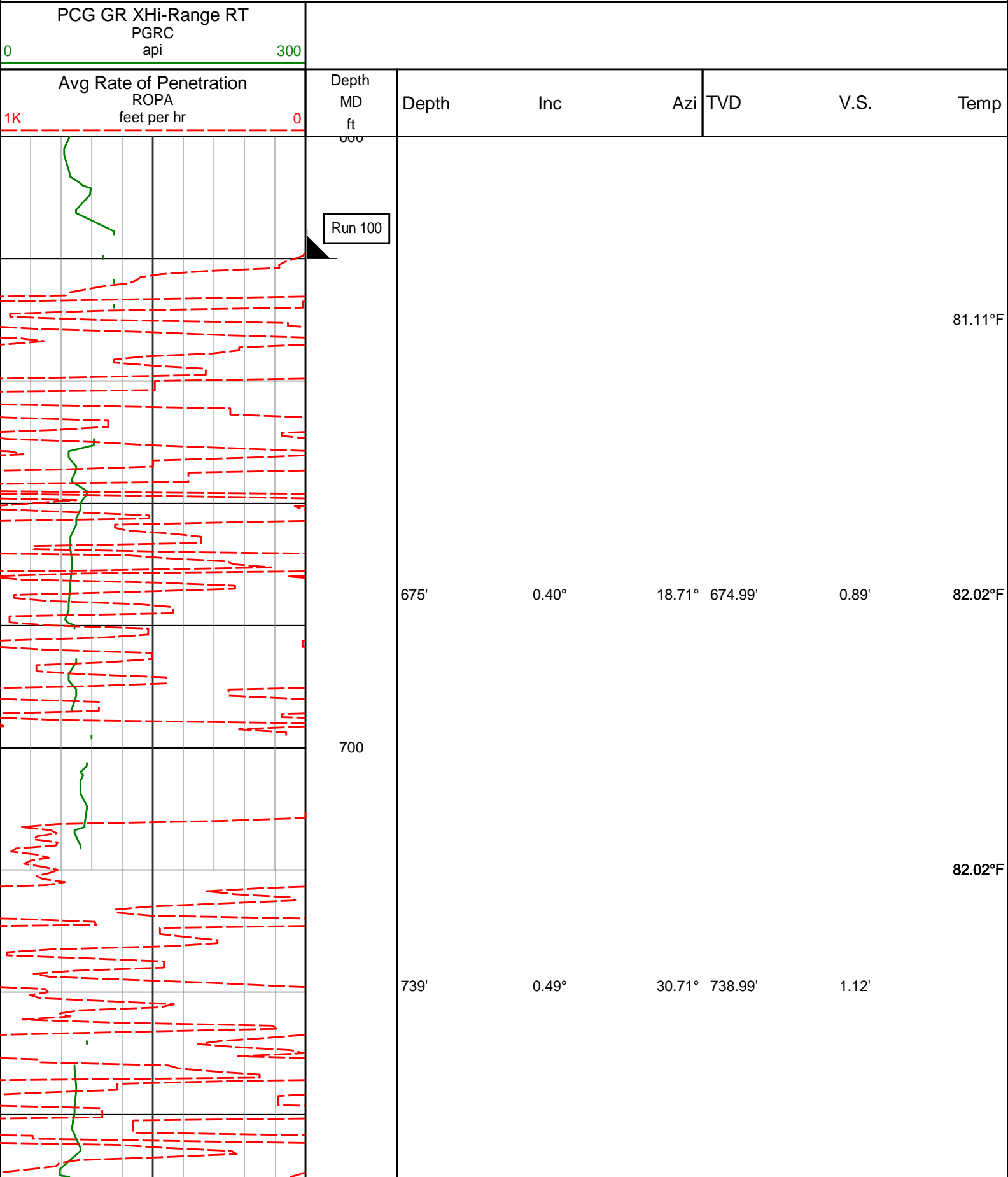


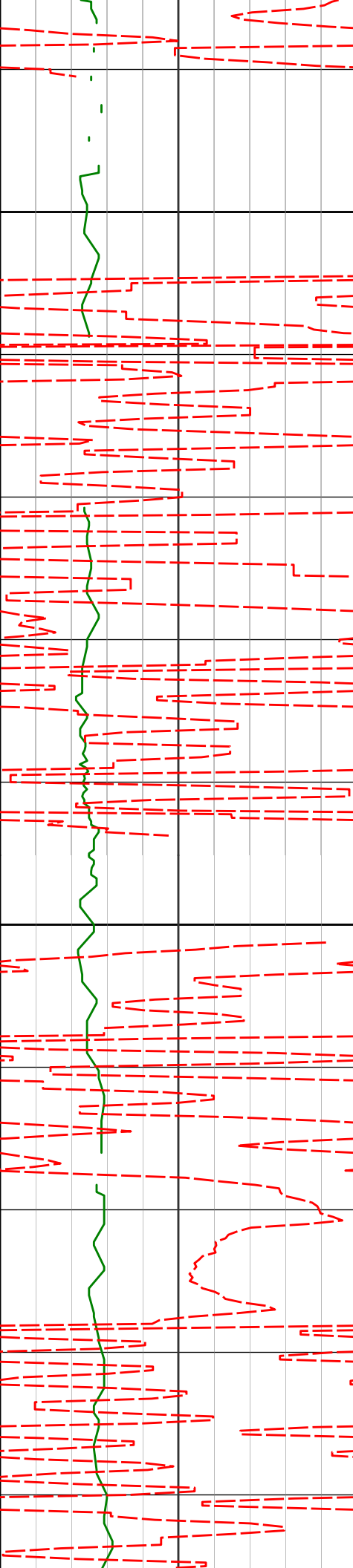






MD Detail 1:240 Scale





800

833'

0.25°

7.29° 832.99'

1.39'

900

928'

0.39°

345.32° 927.99'

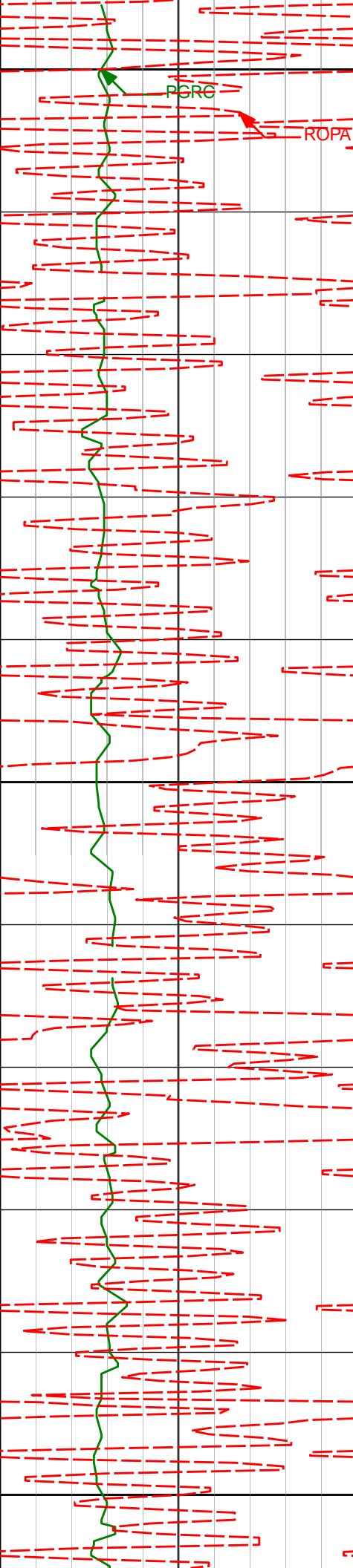
1.36'

84.06°F

84.06°F

84.06°F

86.09°F



POPC

ROPA

1000

1100

1200

1207'

1.62°

302.47° 1206.94'

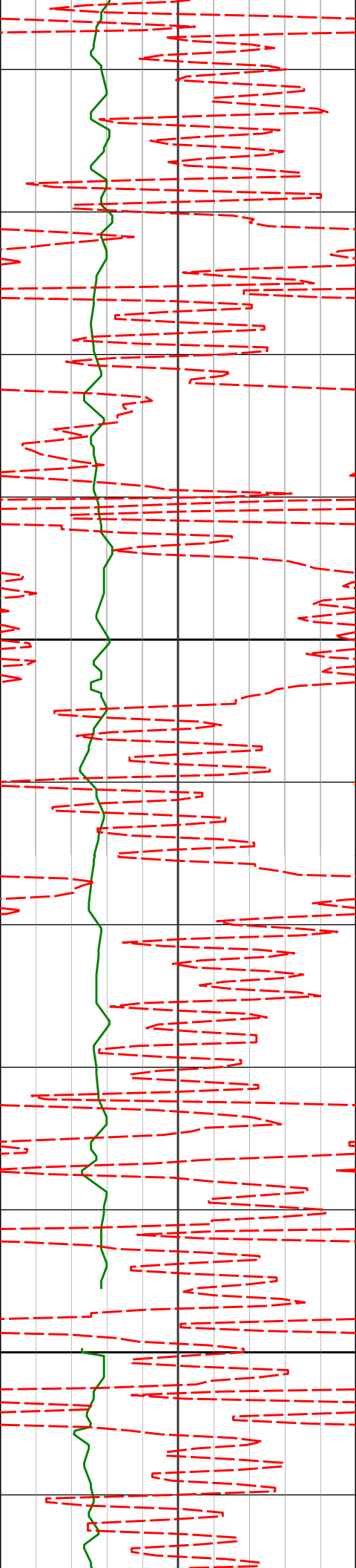
-2.02'

86.09°F

86.09°F

86.09°F

88.14°F



1300

1400

1299'

1.71°

296.82° 1298.90'

-4.26'

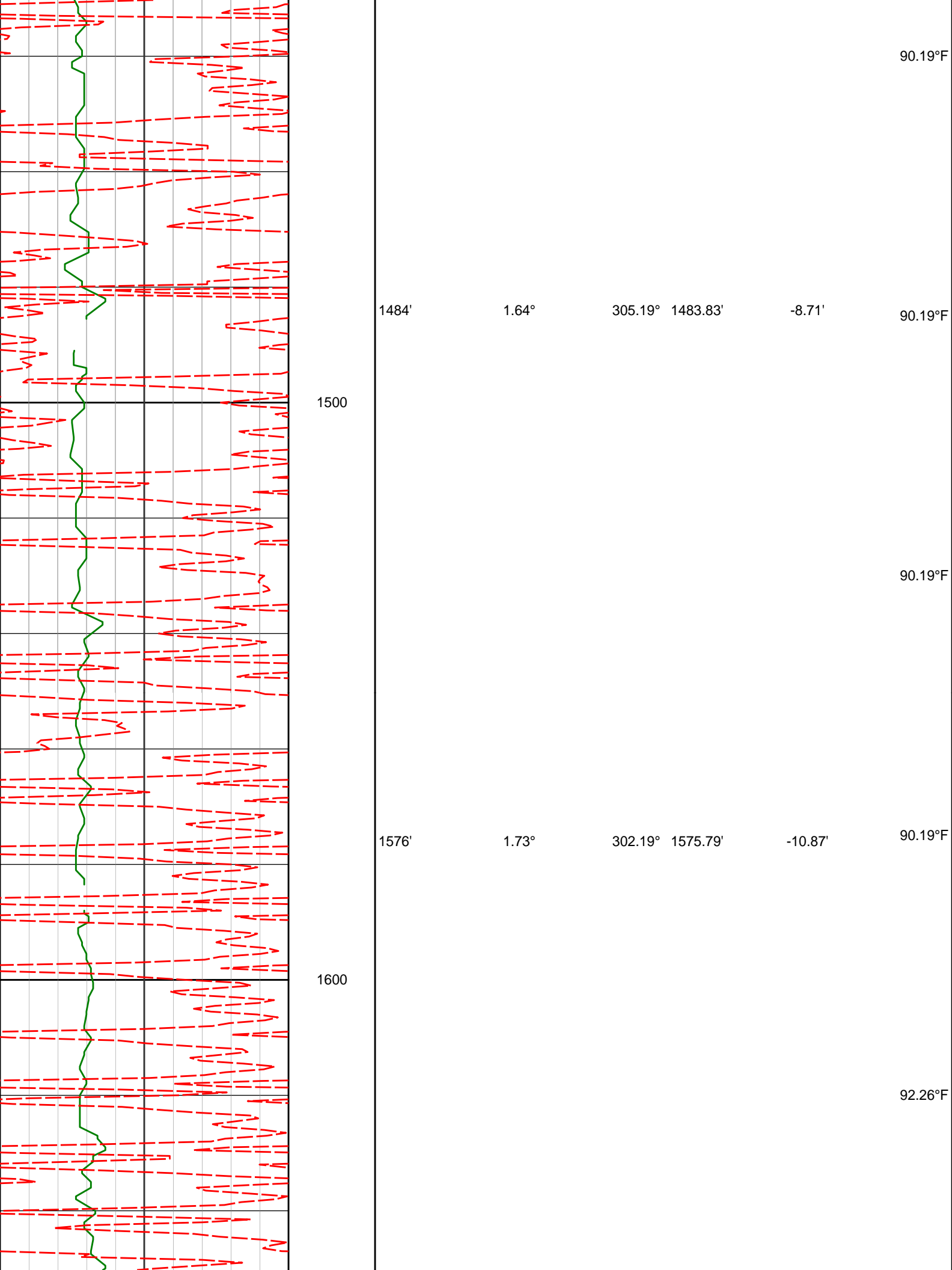
88.14°F

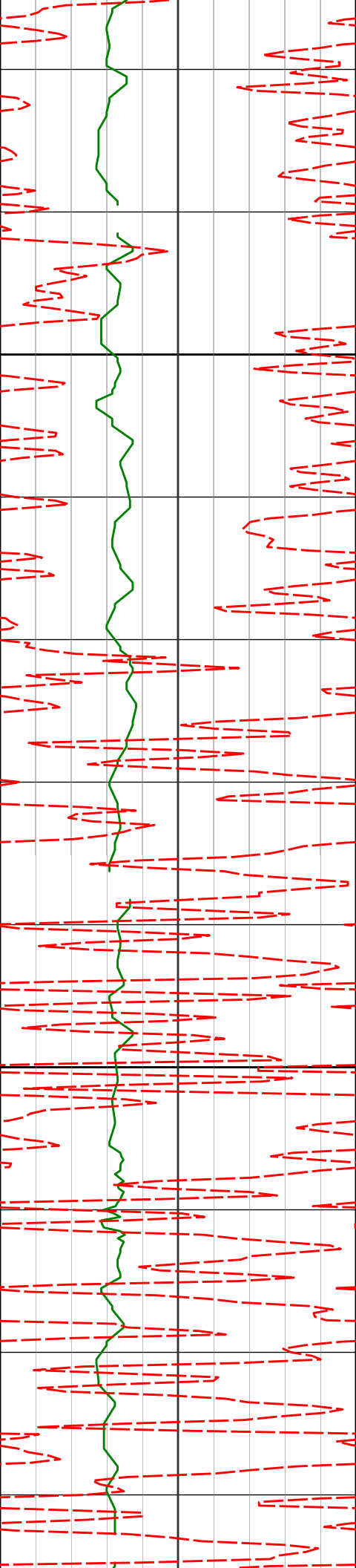
88.14°F

88.14°F

88.14°F

88.14°F





1700

1800

1763'

1854'

1.68°

1.83°

300.21° 1762.70'

298.01° 1853.66'

-15.45'

-17.80'

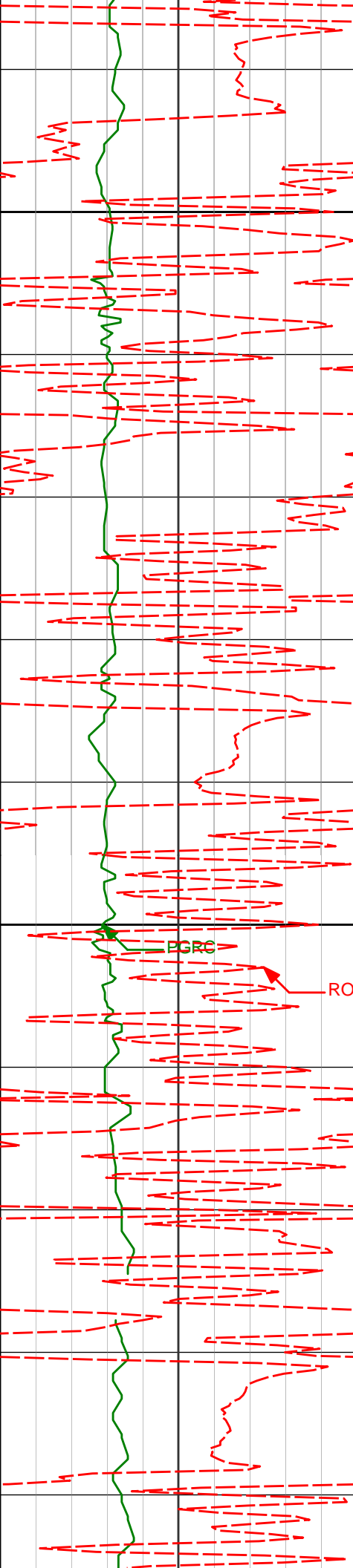
92.26°F

94.33°F

94.33°F

94.33°F

96.08°F



1900

2000

1947'

3.69°

316.43°

1946.55'

-21.01'

2040'

5.82°

308.39°

2039.23'

-26.46'

96.42°F

97.91°F

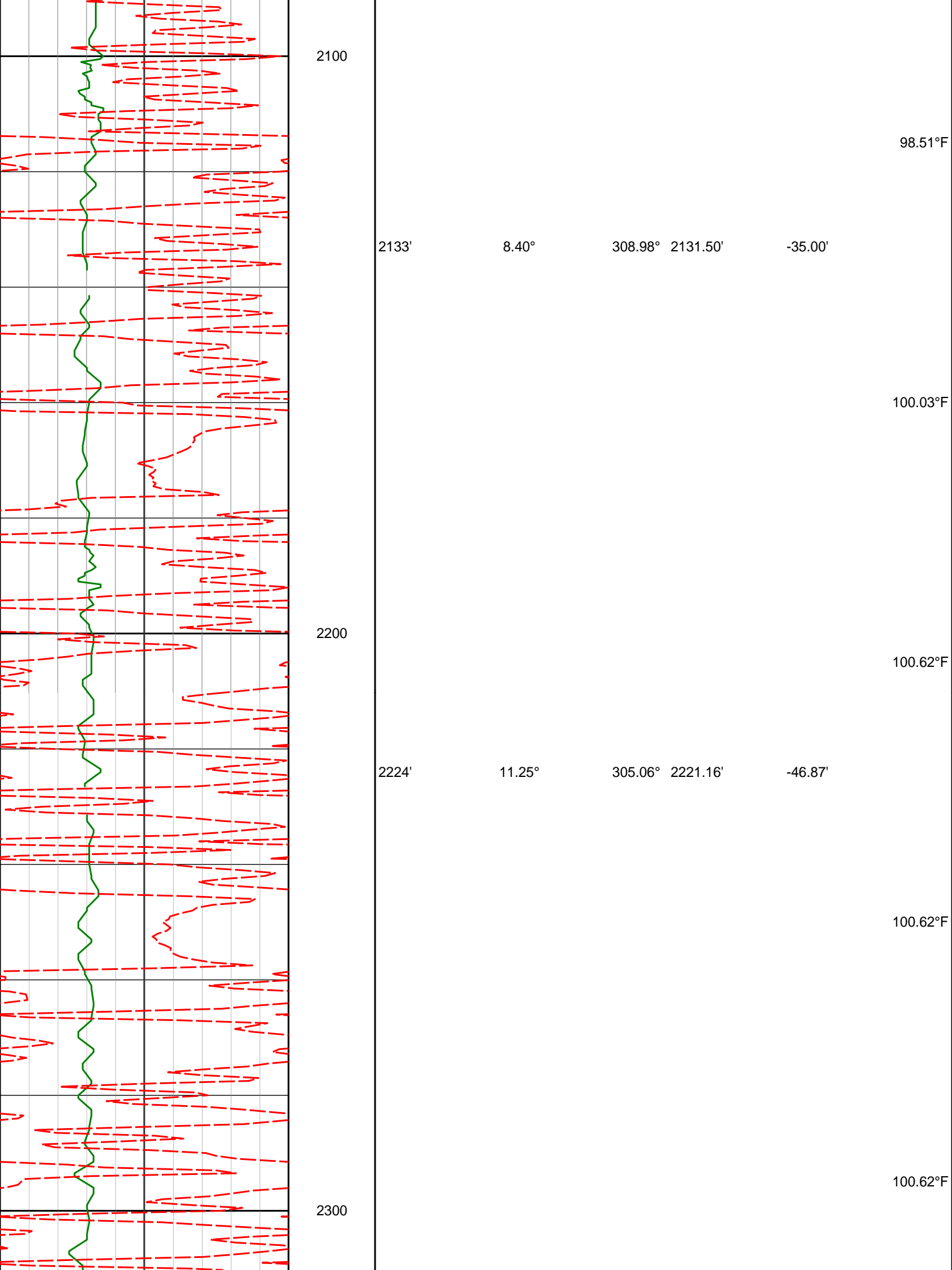
98.51°F

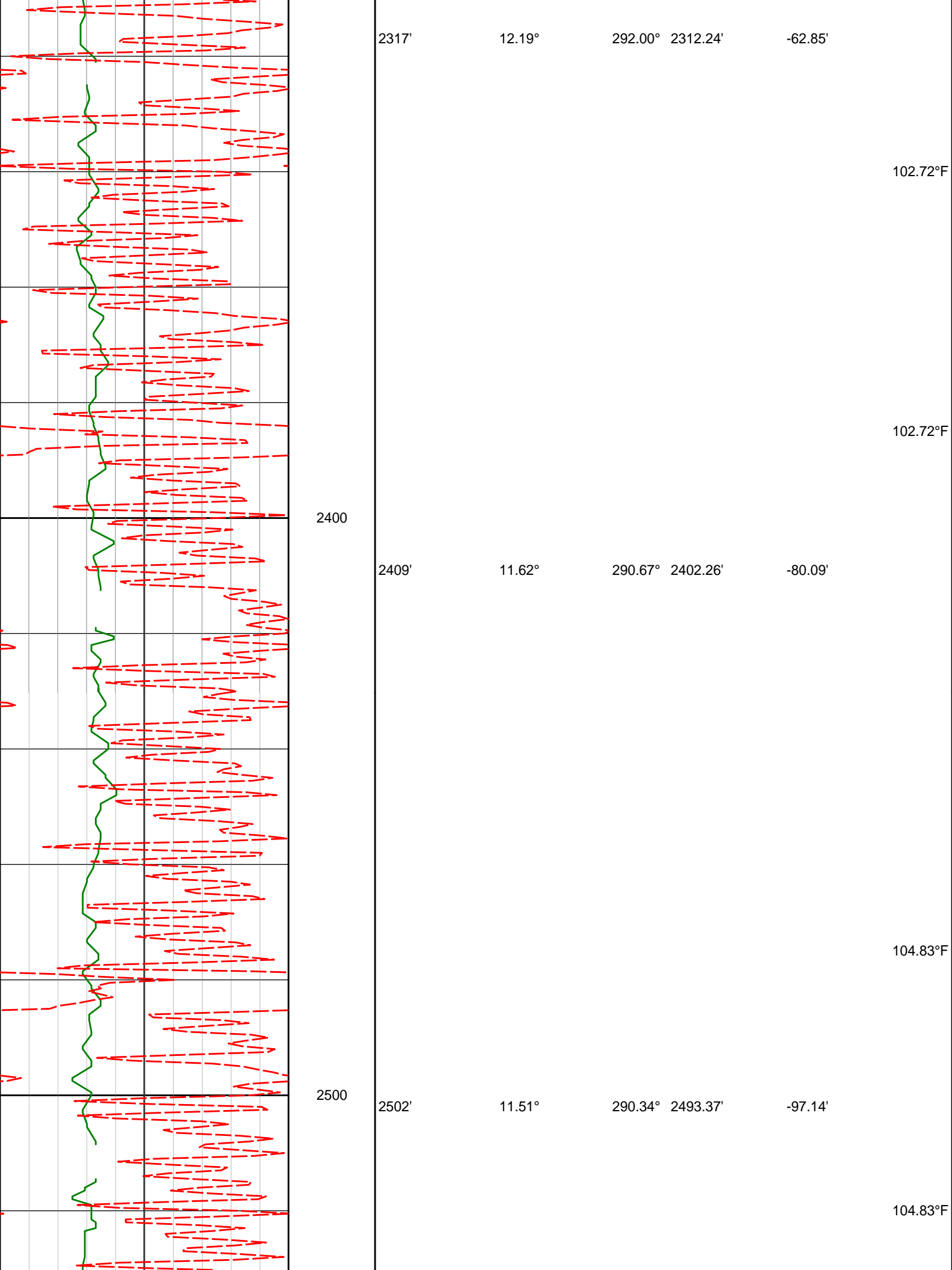
98.51°F

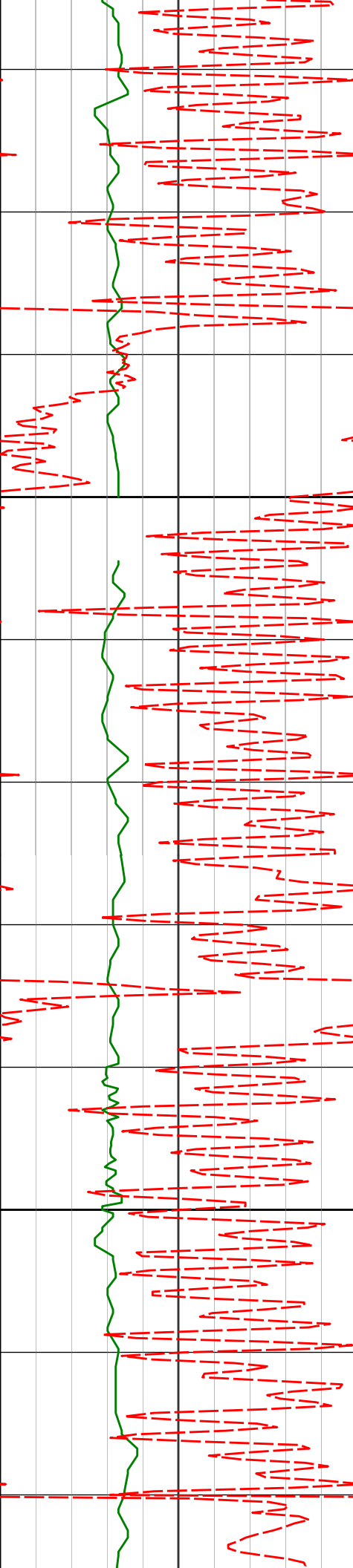
98.51°F

PGRC

ROPA







2600

2700

2595'

11.42°

290.69° 2584.51'

-114.04'

2688'

11.38°

290.57° 2675.68'

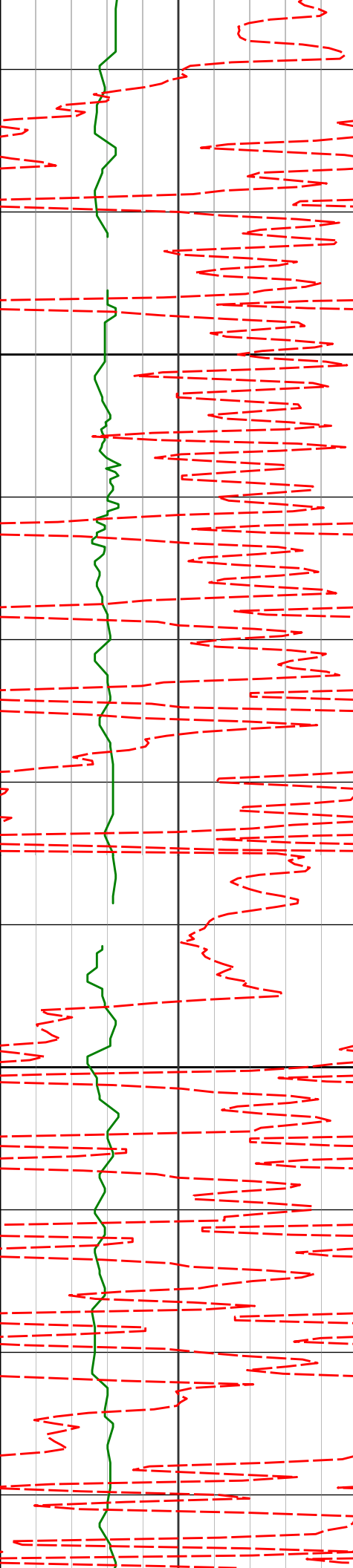
-130.83'

104.83°F

106.97°F

106.97°F

109.09°F



2780'

11.30°

300.98° 2765.89'

-146.58'

2800

2872'

10.59°

302.16° 2856.22'

-160.90'

2900

2966'

9.21°

302.11° 2948.82'

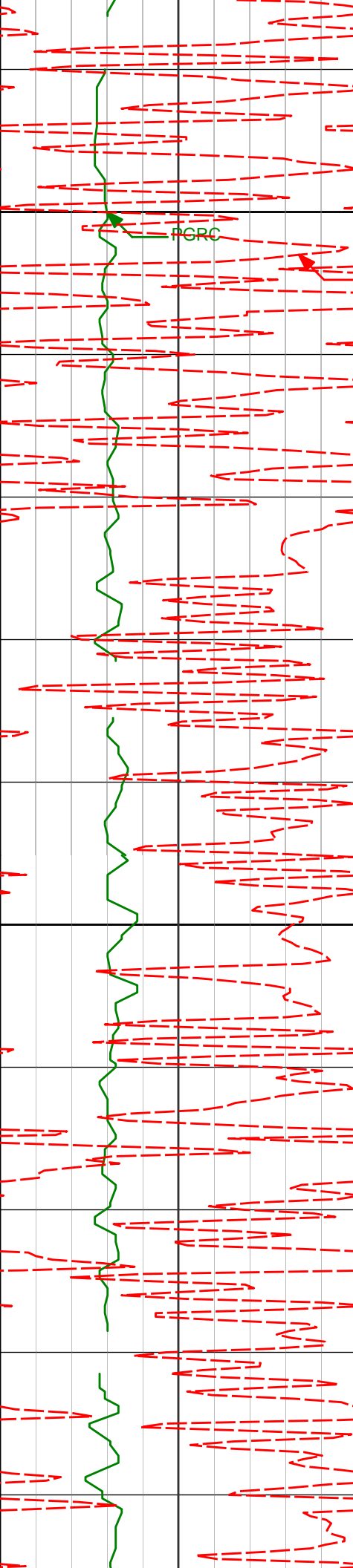
-174.05'

109.09°F

109.09°F

111.24°F

111.24°F



3000

PGRC

ROPA

113.40°F

3061'

9.37°

302.93°

3042.57'

-186.48'

113.40°F

3100

113.40°F

3155'

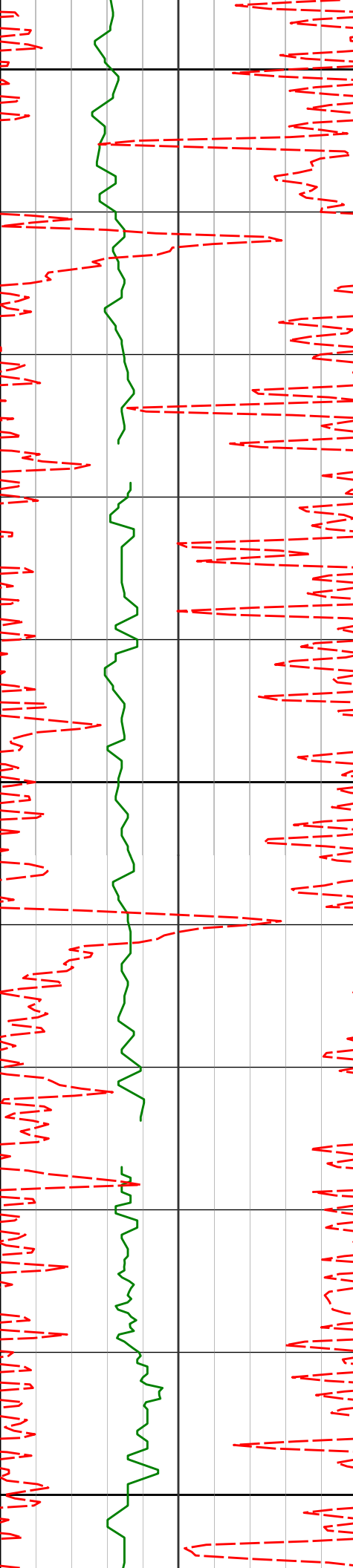
9.13°

305.47°

3135.35'

-198.46'

113.40°F



3200

3250'

3300

3344'

3400

7.61°

282.88°

3229.36'

-210.37'

6.58°

301.49°

3322.65'

-220.77'

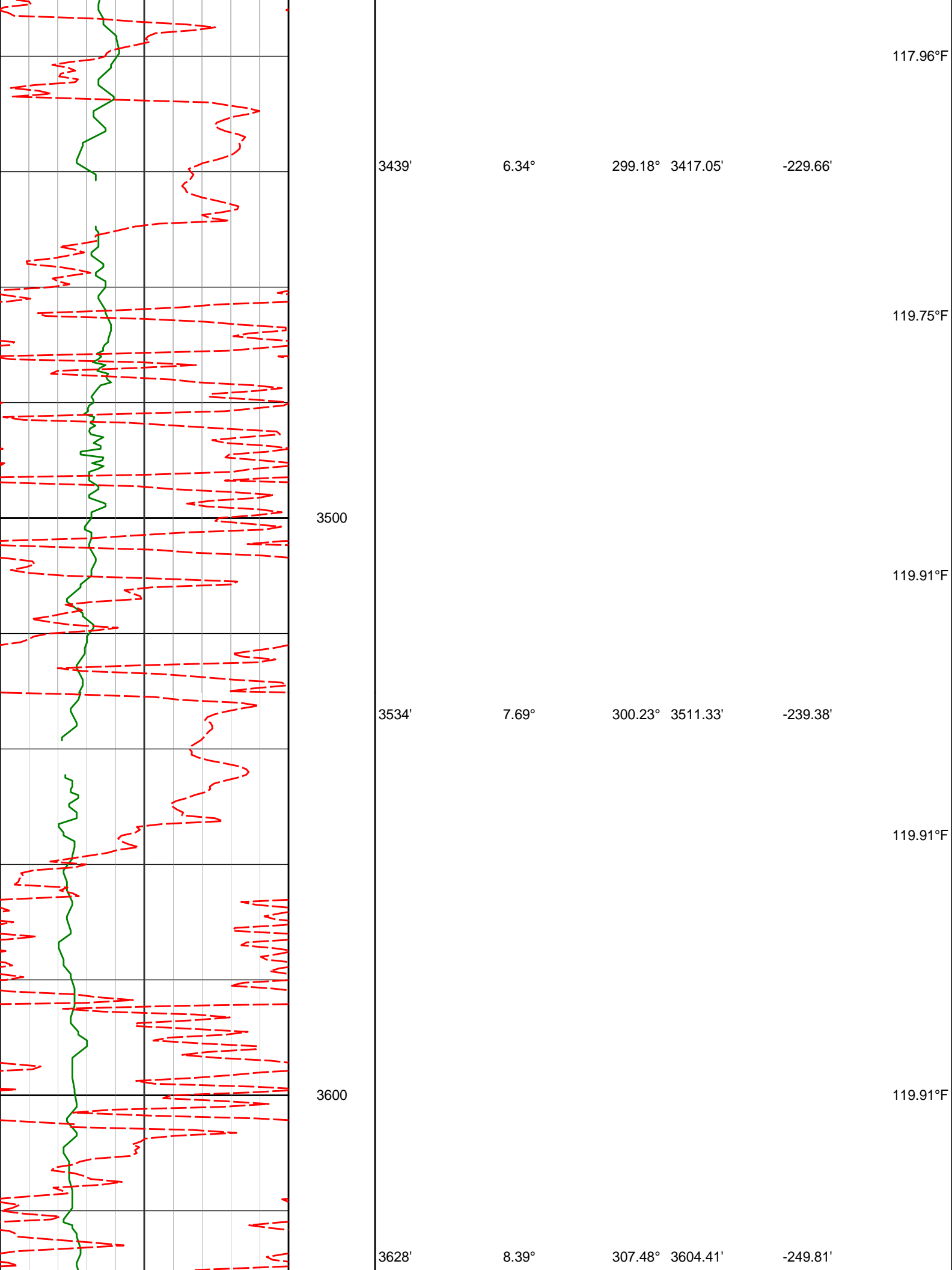
115.56°F

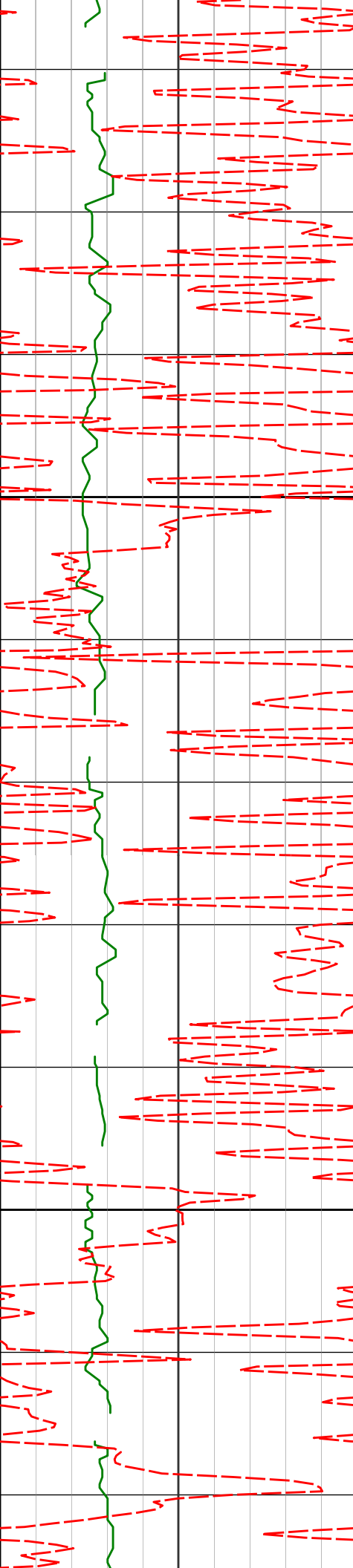
115.56°F

117.73°F

117.73°F

117.73°F





3700

3723'

8.59°

305.76° 3698.37'

-260.55'

122.11°F

122.11°F

124.30°F

124.30°F

3800

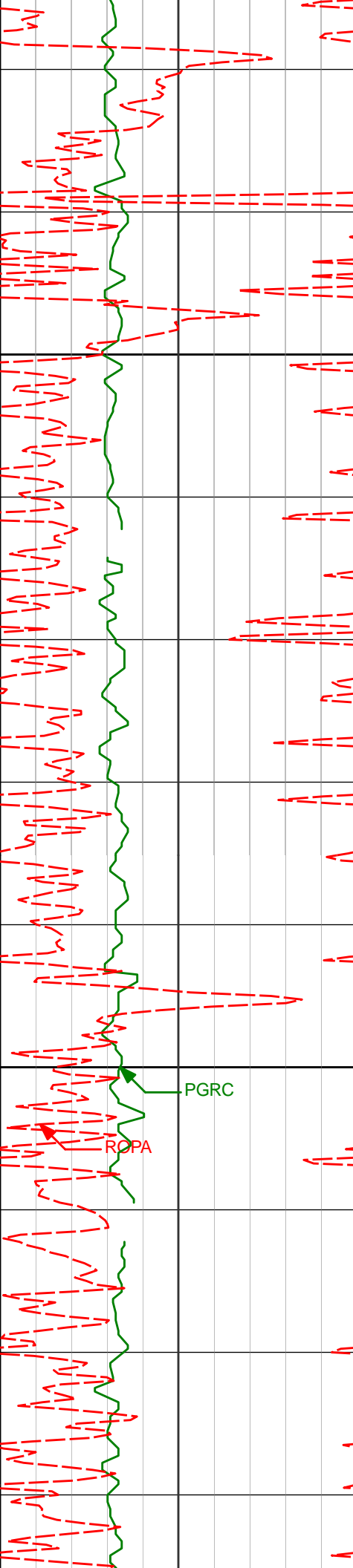
3817'

8.96°

305.58° 3791.27'

-271.69'

3817'



3900

3912'

8.86°

304.49°

3885.12'

-283.22'

124.30°F

124.30°F

128.73°F

4000

4007'

8.35°

302.79°

3979.06'

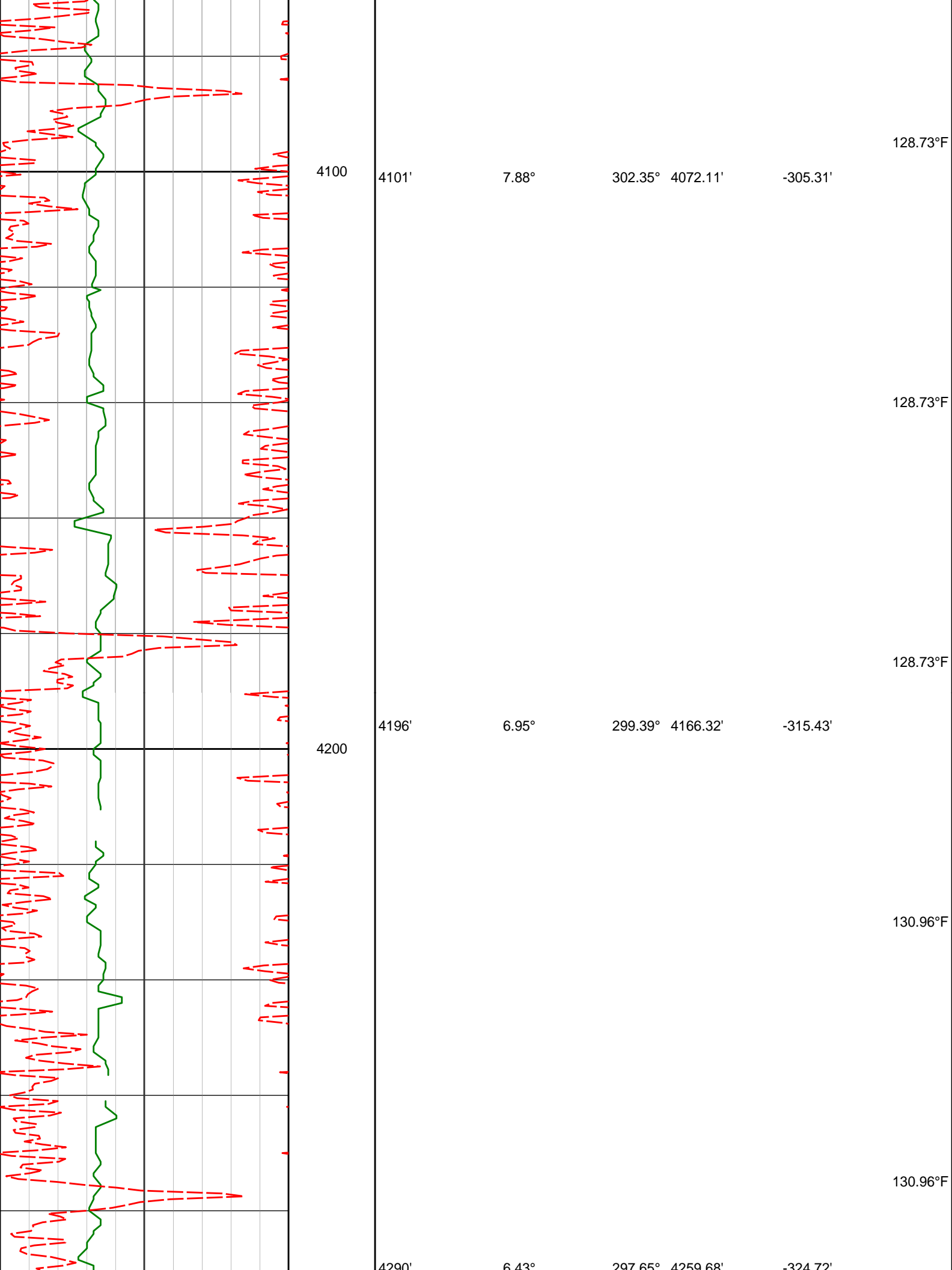
-294.57'

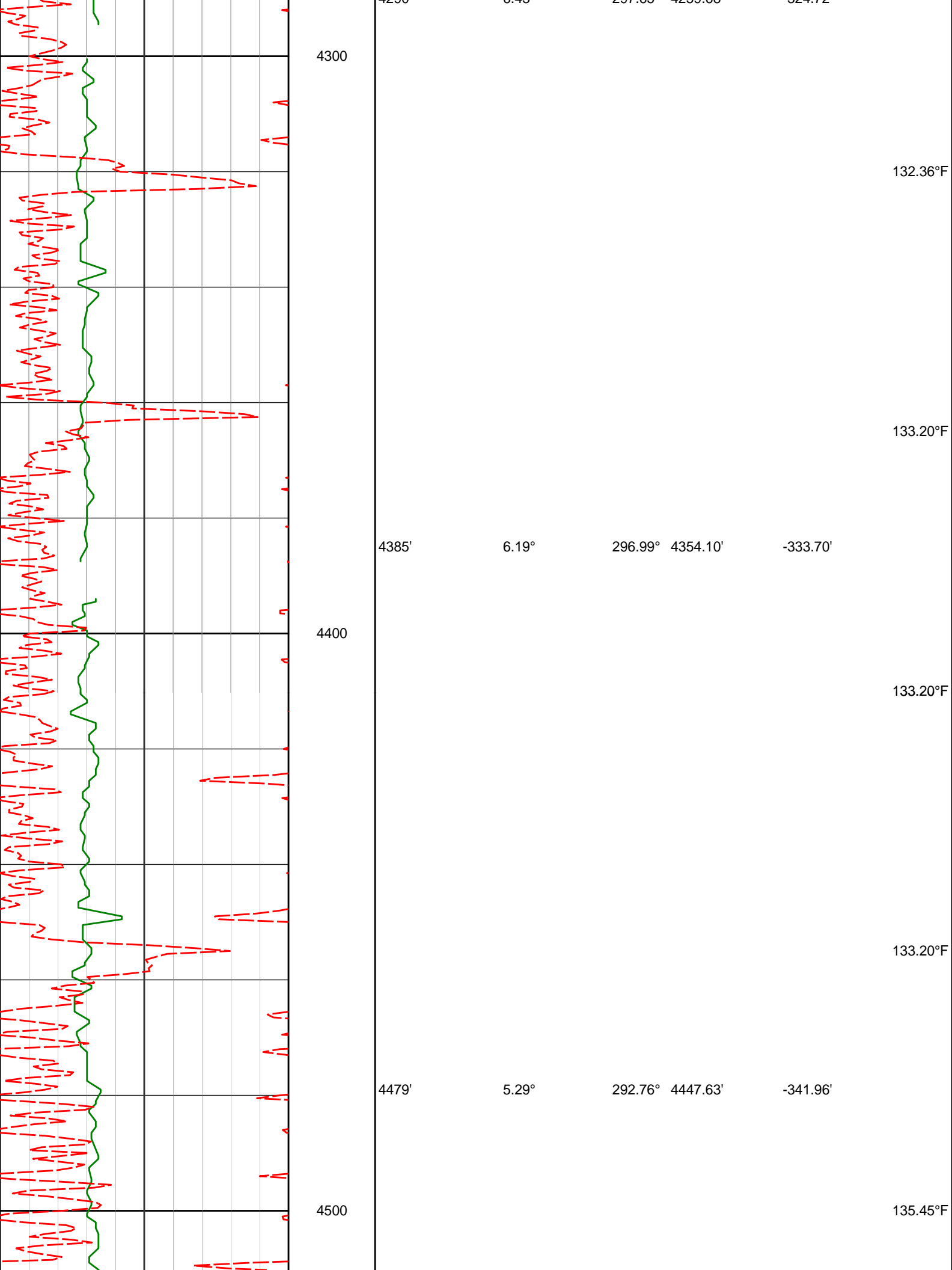
128.73°F

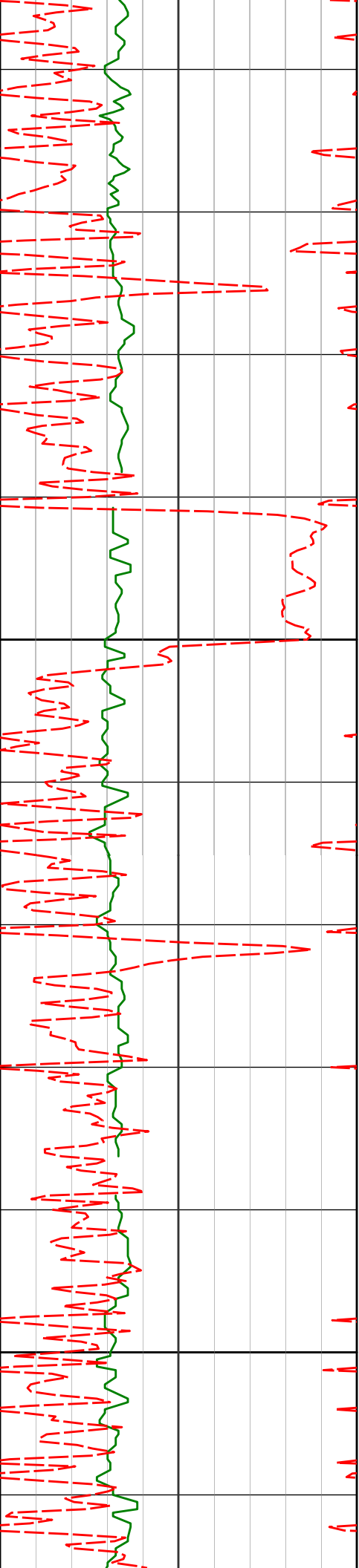
128.73°F

PGRC

ROPA







4574'

4.55°

289.92°

4542.28'

-349.36'

4600

4700

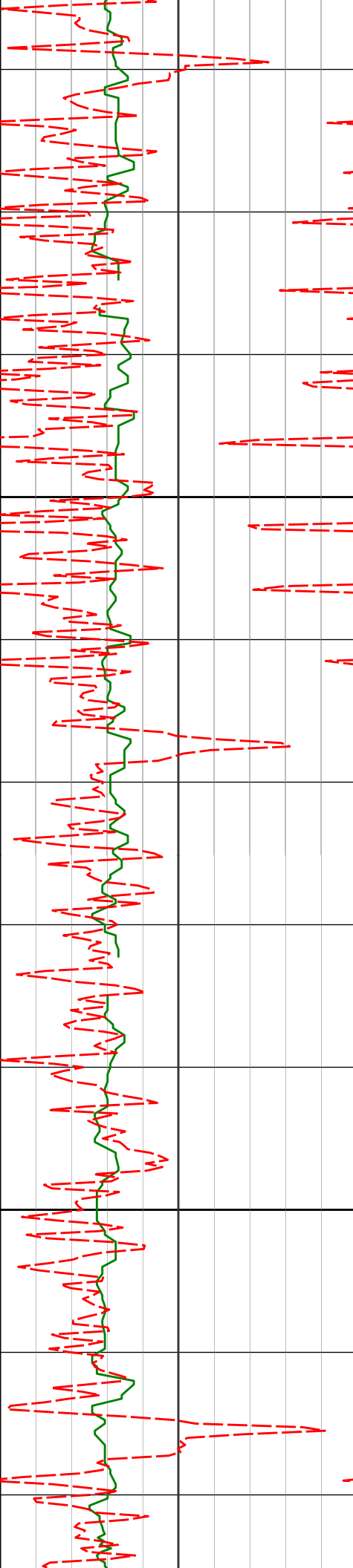
134.35°F

134.43°F

136.10°F

137.70°F

137.70°F



4800

4900

4763'

4.30°

305.00° 4730.73'

-361.80'

137.91°F

139.96°F

4858'

3.75°

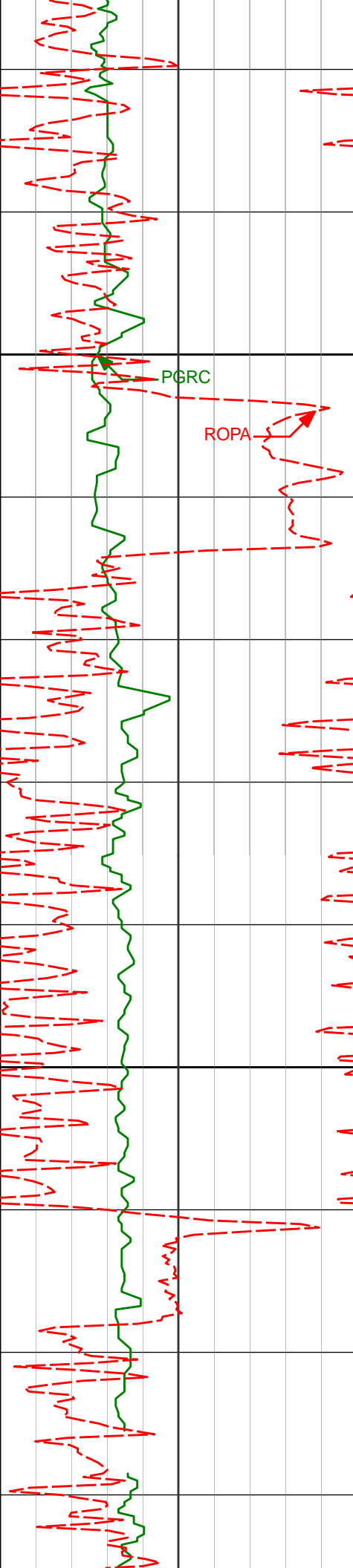
302.62° 4825.49'

-367.10'

139.96°F

142.25°F

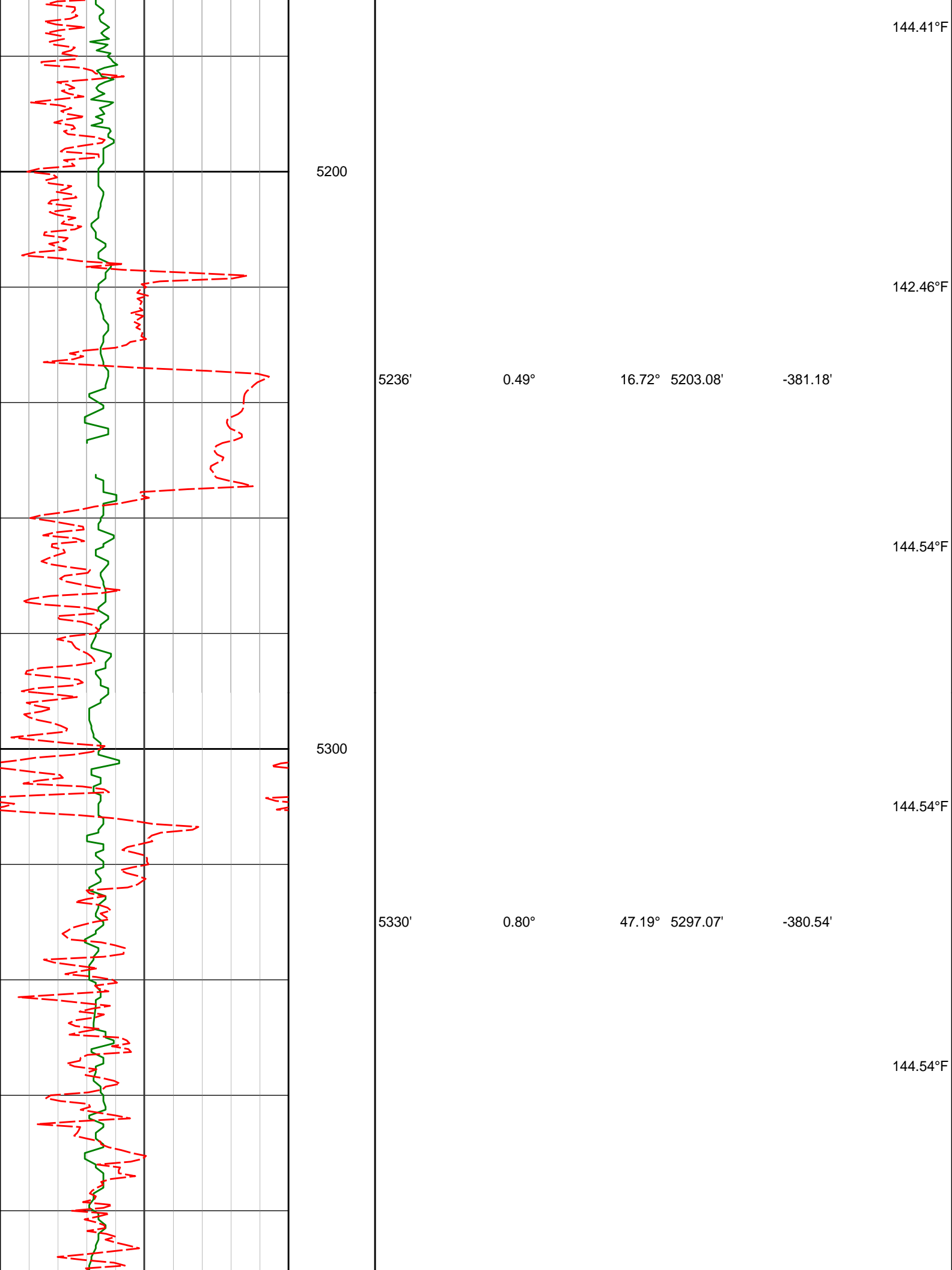
142.25°F

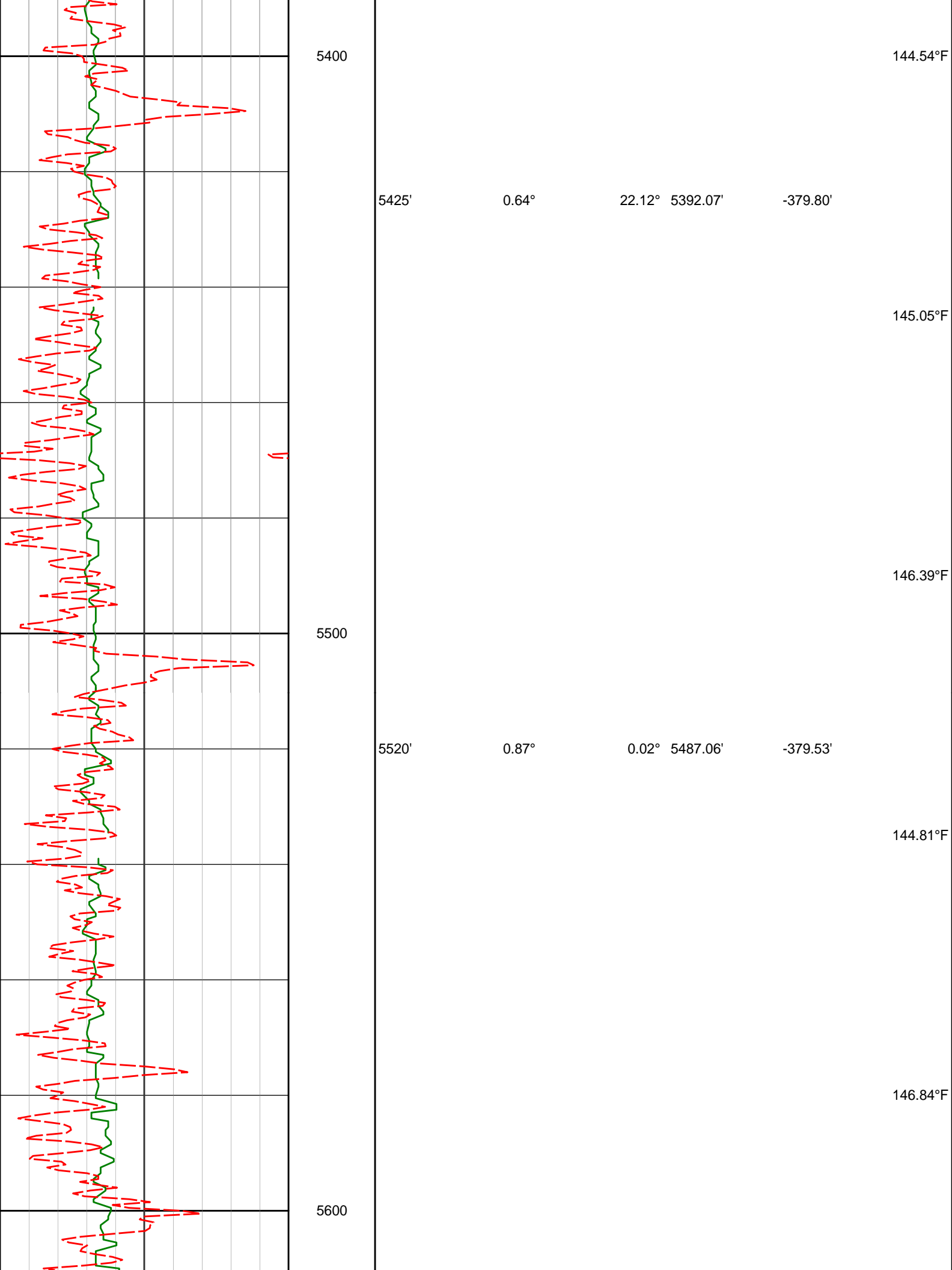


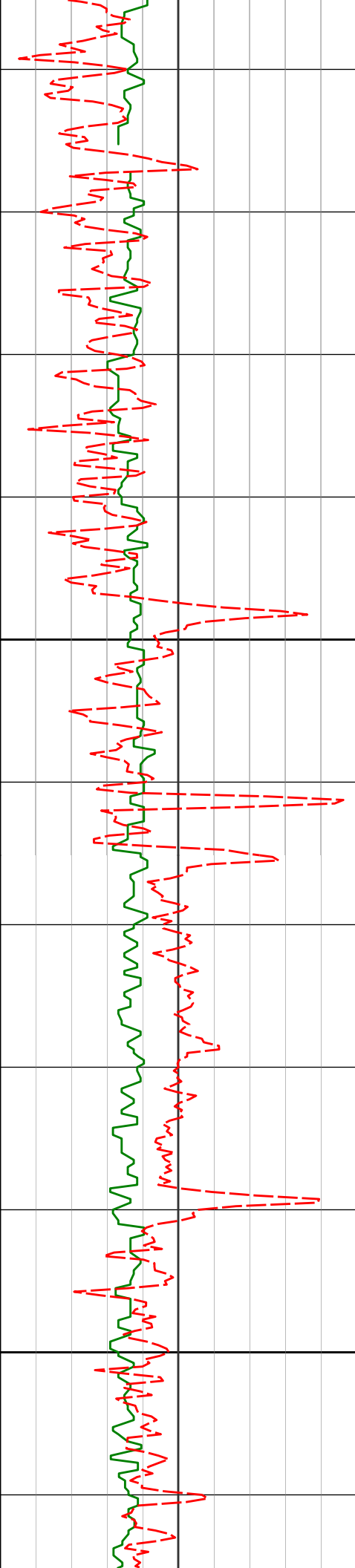
5000

5100

4952'	4.17°	293.89°	4919.27'	-372.63'	142.25°F
					139.96°F
					139.96°F
5047'	1.65°	285.50°	5014.14'	-376.99'	142.25°F
					144.25°F
5141'	1.86°	259.81°	5108.09'	-379.79'	







<KOP>

5700

5800

5614'

0.99°

346.61° 5581.04'

-379.63'

146.84°F

148.37°F

5709'

0.81°

319.60° 5676.03'

-380.17'

149.14°F

149.14°F

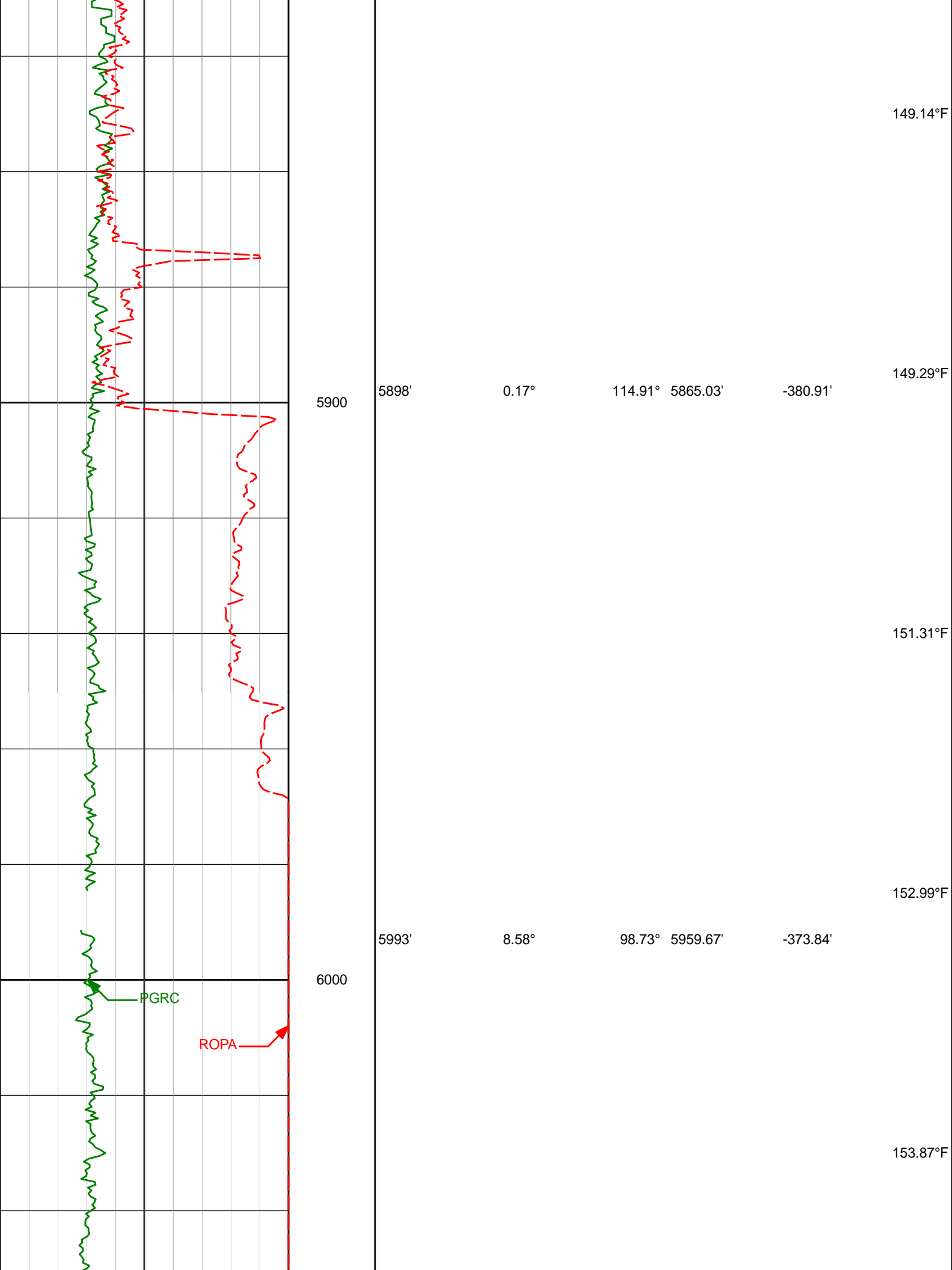
5803'

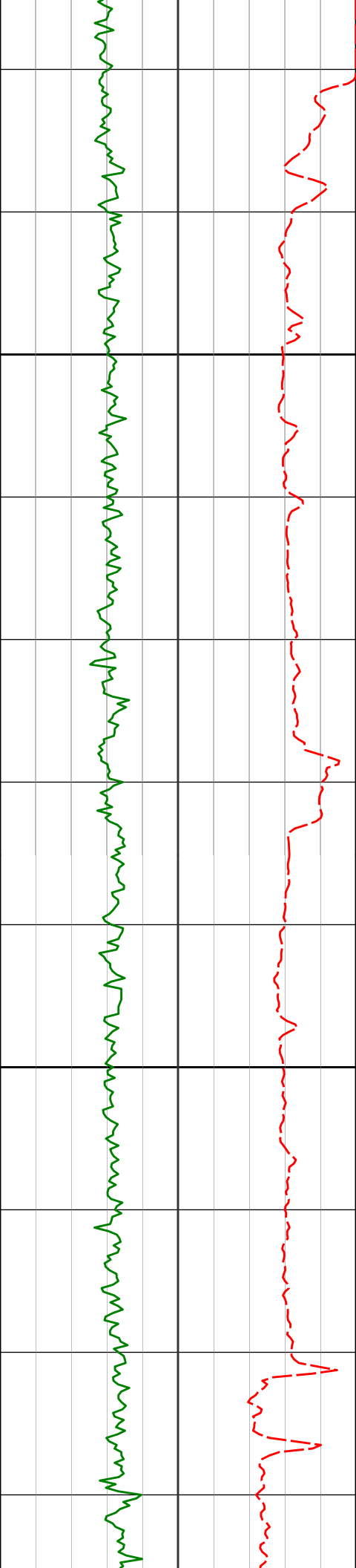
0.33°

297.33° 5770.03'

-380.80'

149.14°F





6100

6200

6087'

13.67°

98.13° 6051.87'

-356.09'

6182'

26.22°

89.37° 6141.01'

-323.99'

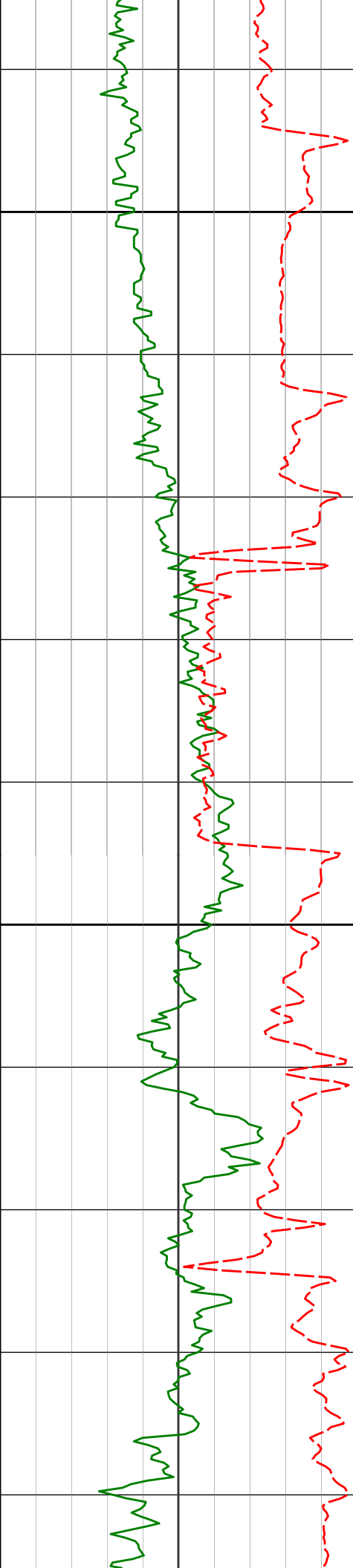
155.77°F

156.55°F

158.37°F

160.29°F

160.83°F



6300

6400

6276'

34.85°

85.86°

6221.90'

-276.30'

6371'

39.94°

91.46°

6297.38'

-218.72'

6465'

43.54°

92.64°

6367.50'

-156.43'

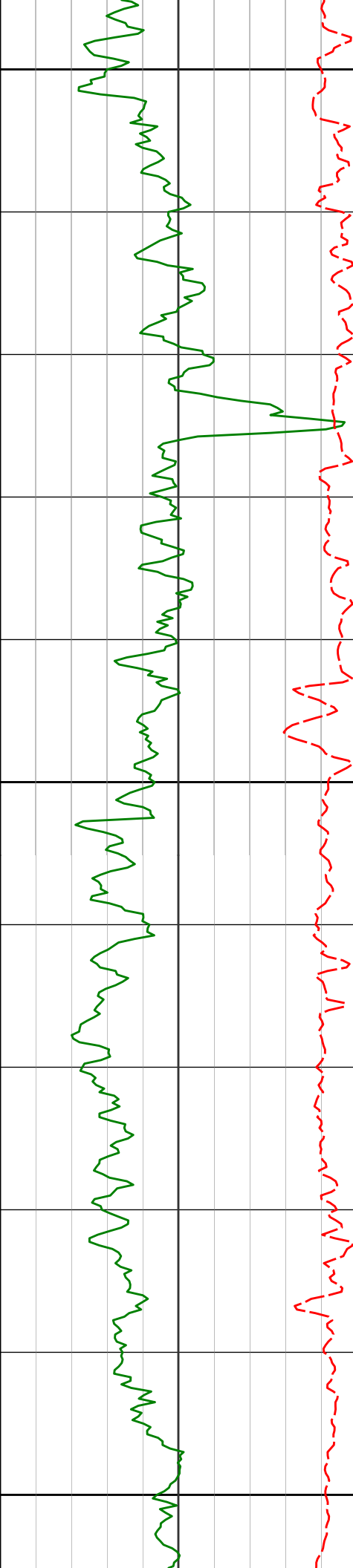
160.83°F

160.88°F

161.90°F

162.49°F

160.79°F



6500

153.42°F

6560'

47.09°

91.57°

6434.30'

-89.20'

Run 200

144.79°F

6600

144.98°F

6654'

57.22°

85.78°

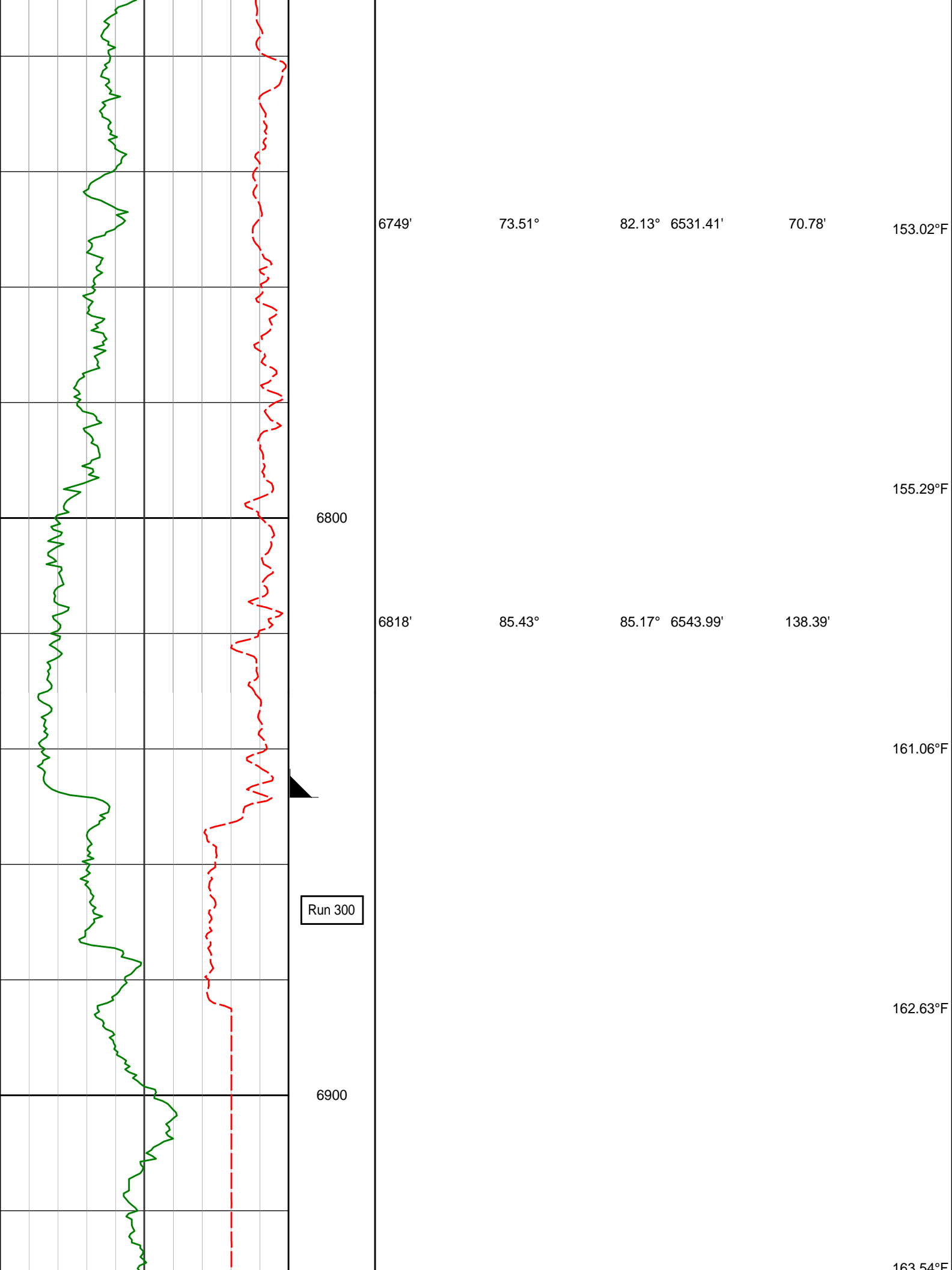
6491.93'

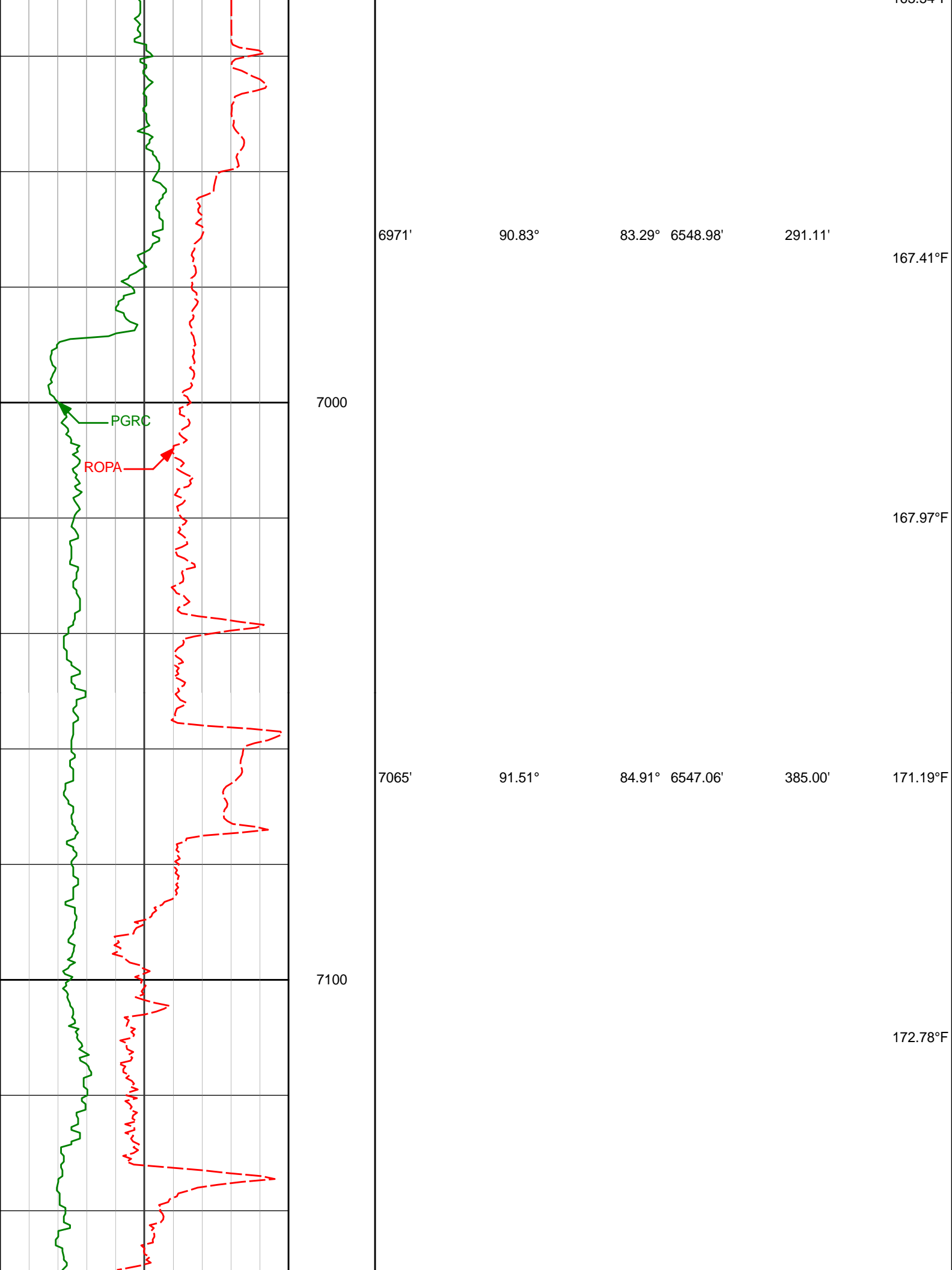
-15.17'

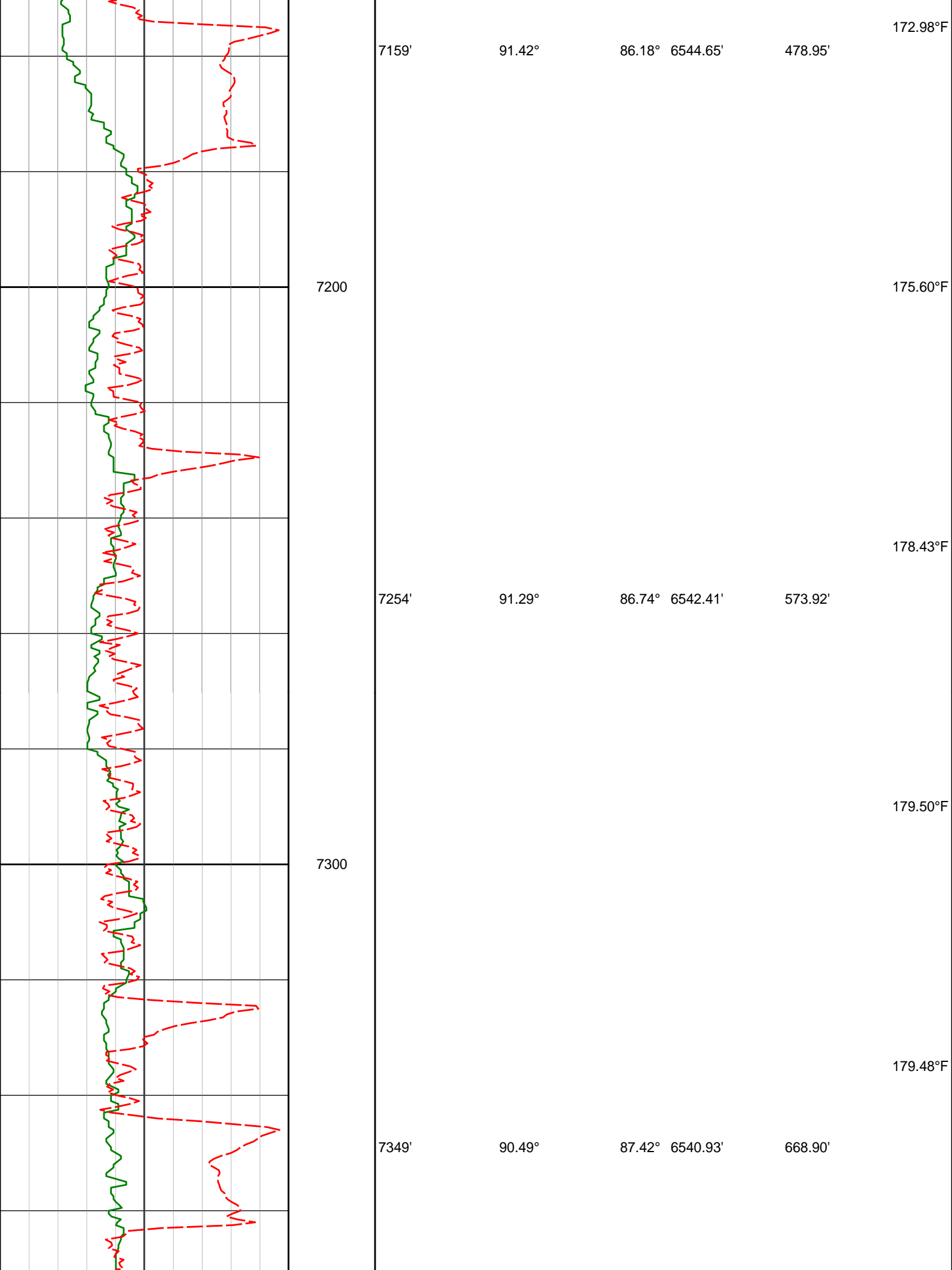
146.40°F

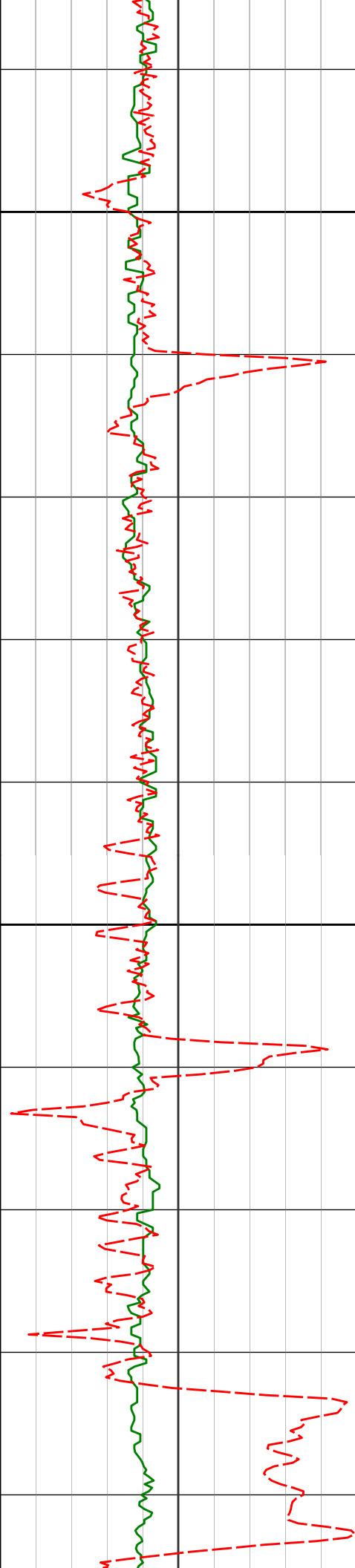
6700

148.84°F









7400

7500

7443'

88.46°

85.55° 6541.79'

762.89'

7538'

88.77°

85.09° 6544.09'

857.84'

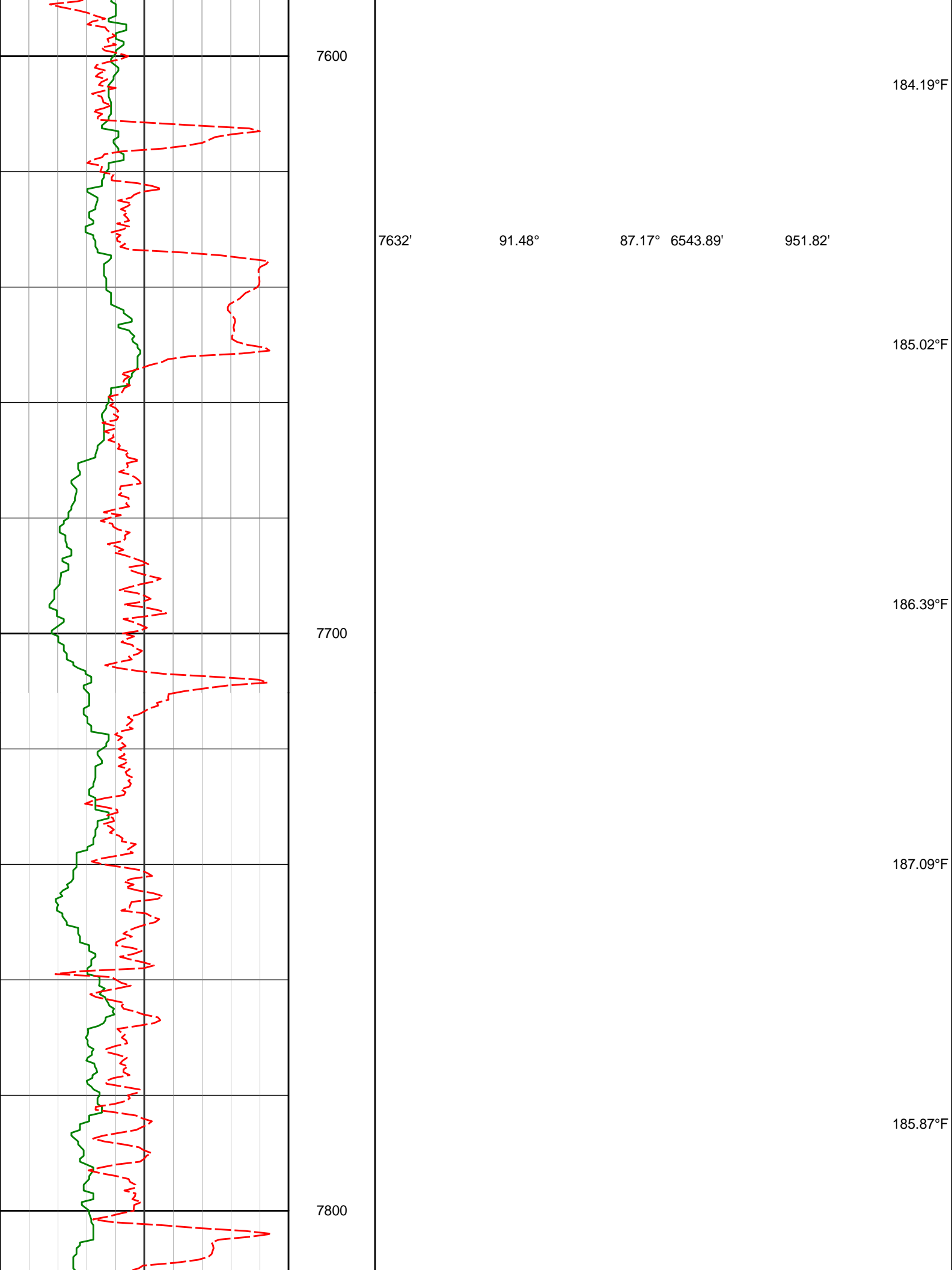
182.15°F

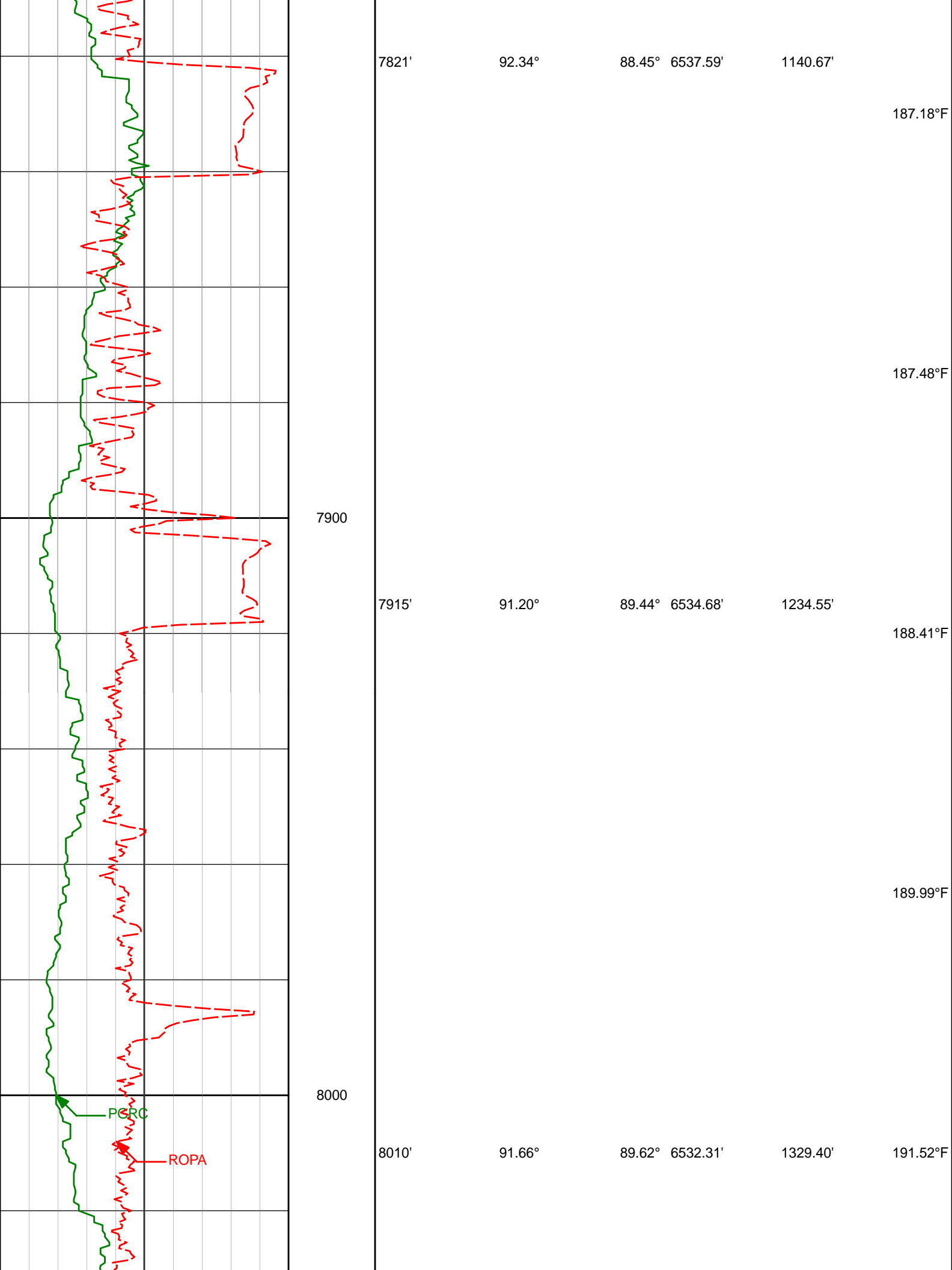
182.55°F

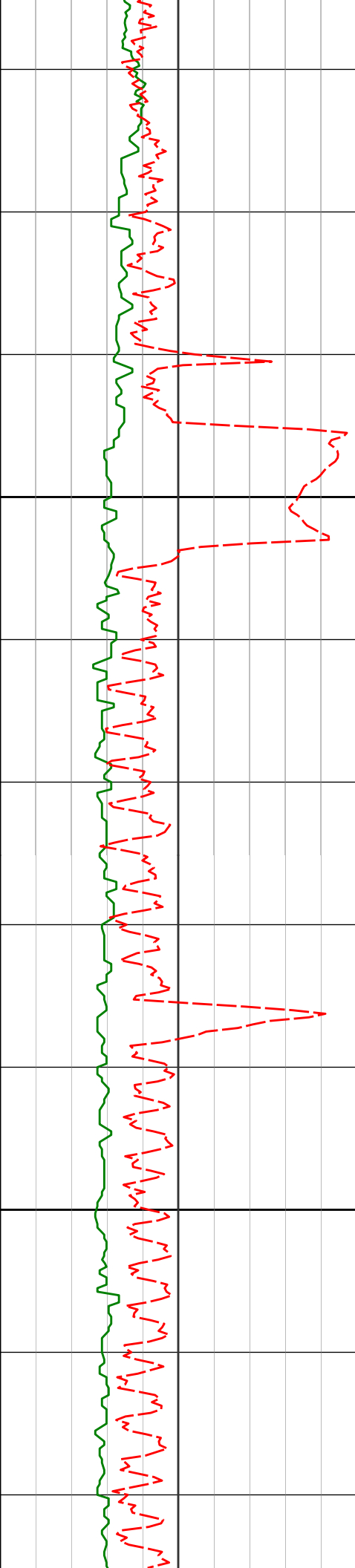
189.14°F

191.10°F

187.39°F







8100

8200

8104'

8199'

90.43°

90.15°

89.79° 6530.60'

88.39° 6530.12'

1423.24'

1518.15'

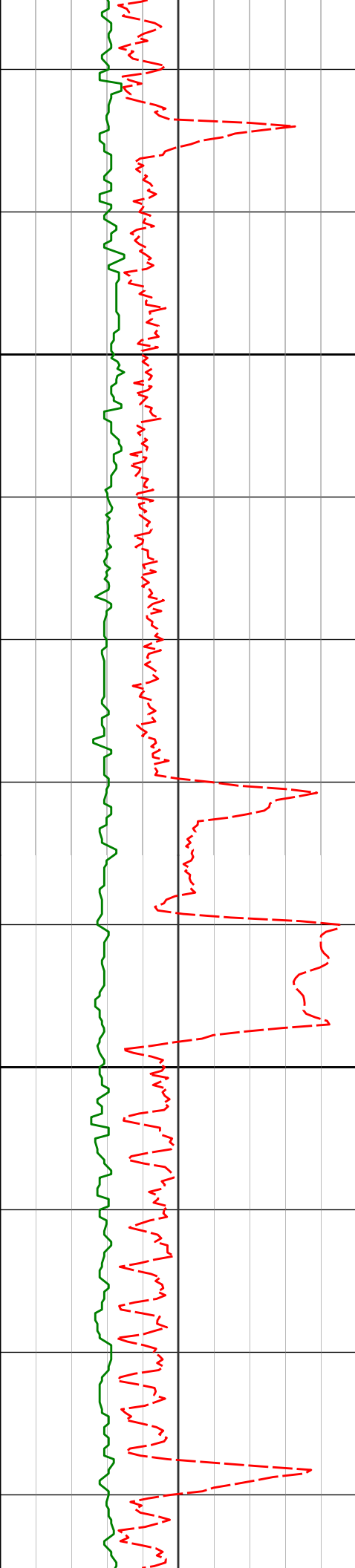
190.78°F

192.18°F

192.88°F

195.37°F

197.51°F



8300

8400

8293'

90.34°

87.80° 6529.71'

1612.12'

8388'

90.68°

89.03° 6528.87'

1707.07'

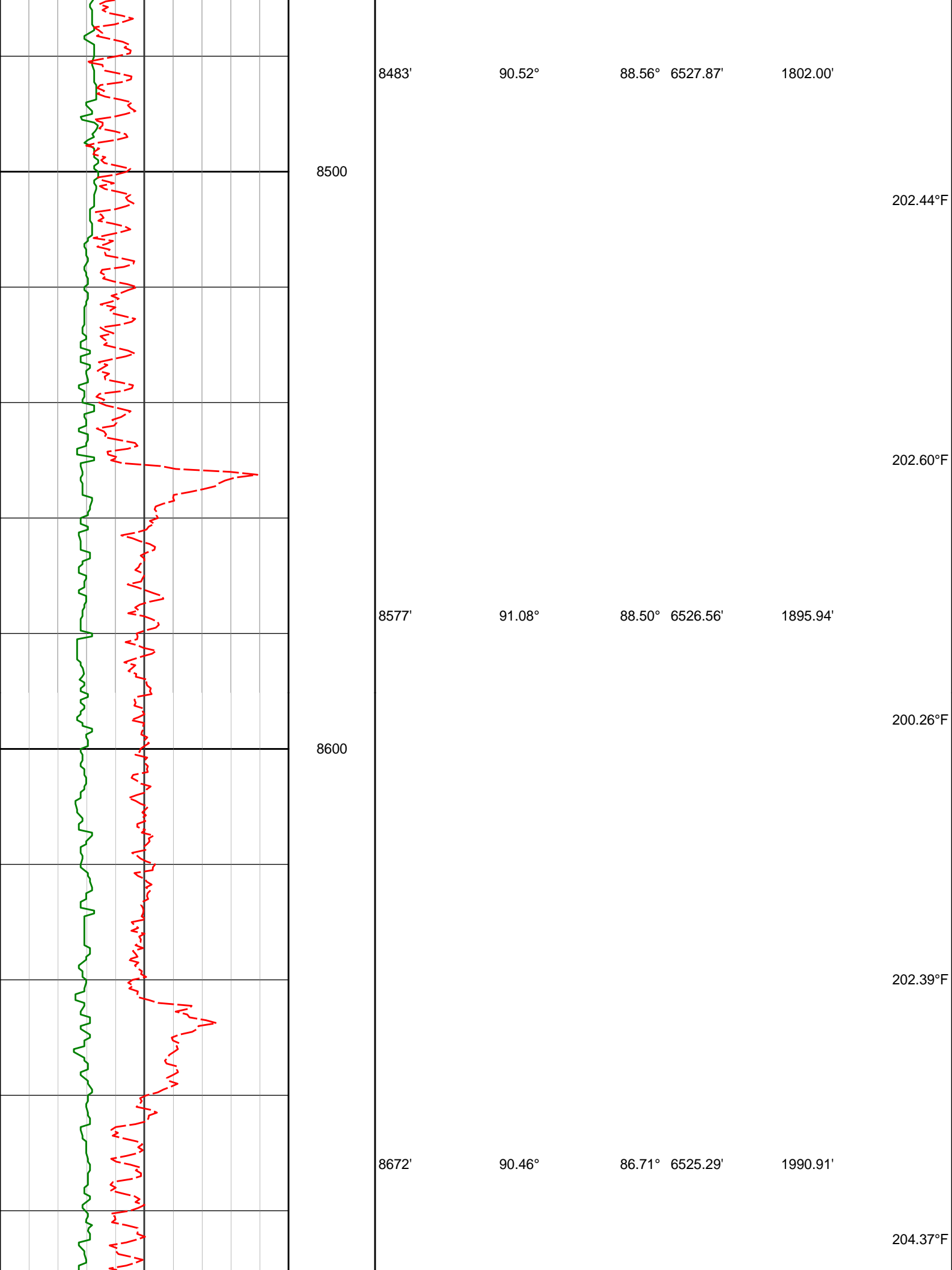
197.51°F

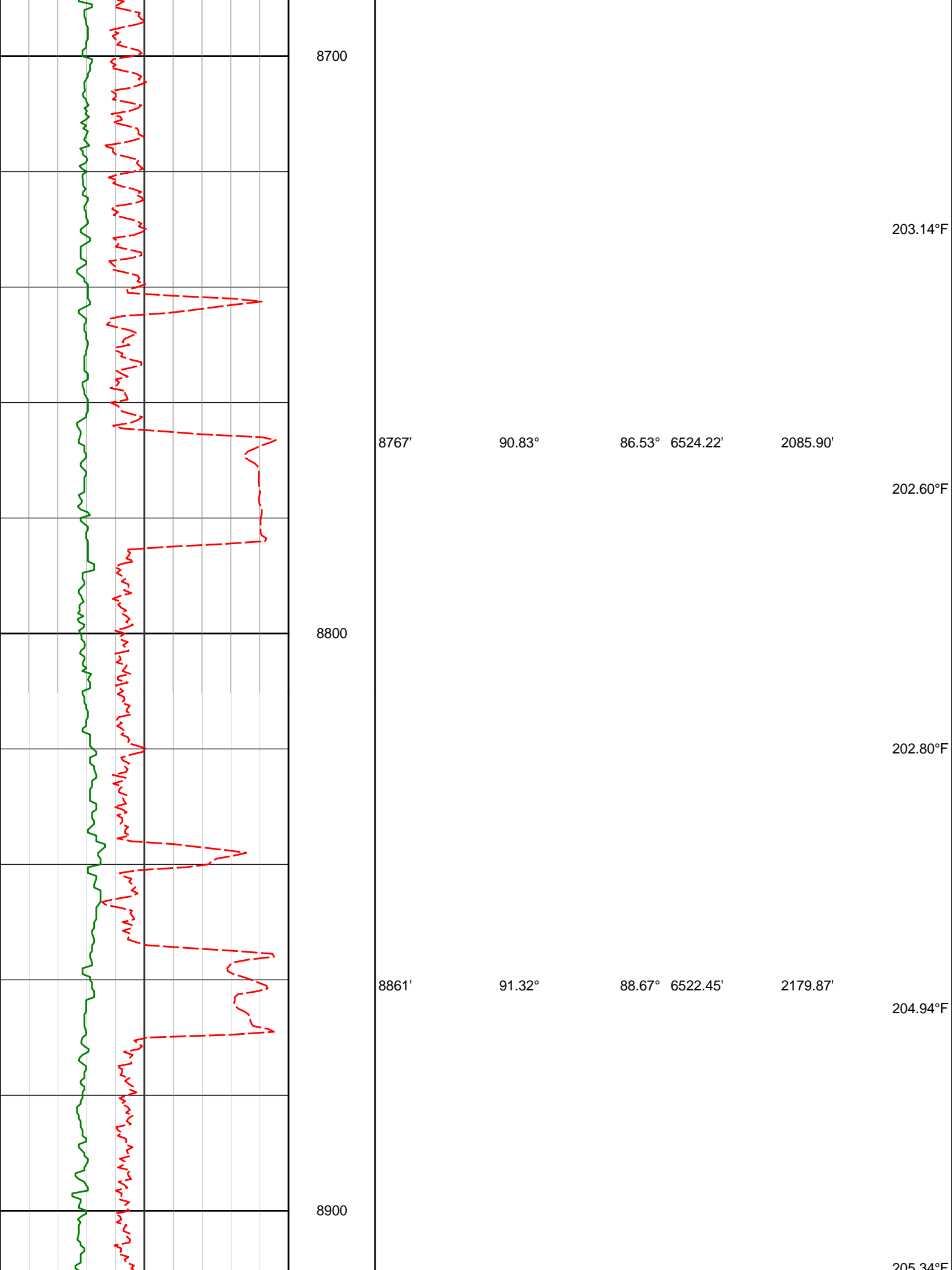
197.13°F

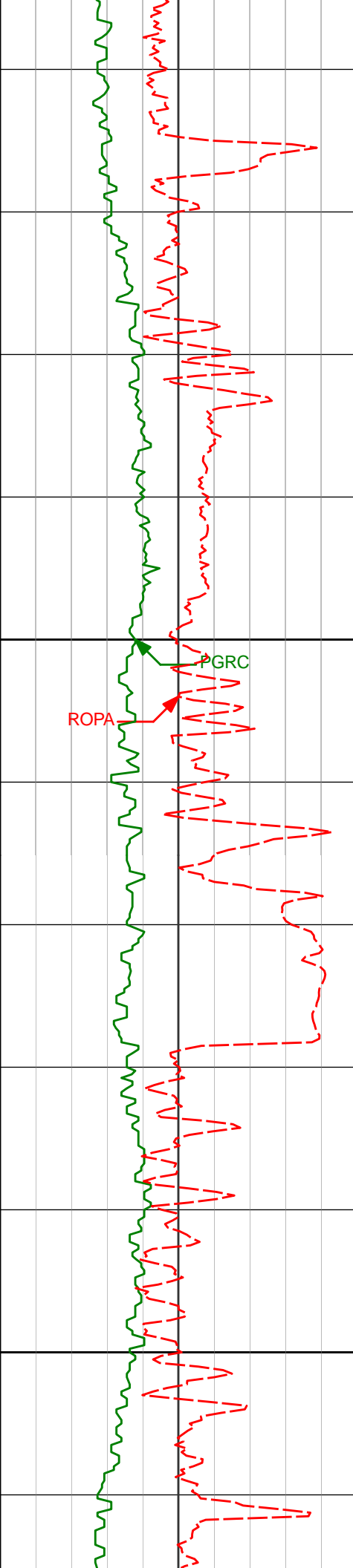
196.72°F

199.71°F

200.05°F







8956'

91.88°

88.57° 6519.80'

2274.77'

207.32°F

9000

205.67°F

ROPA

PGRC

9051'

89.54°

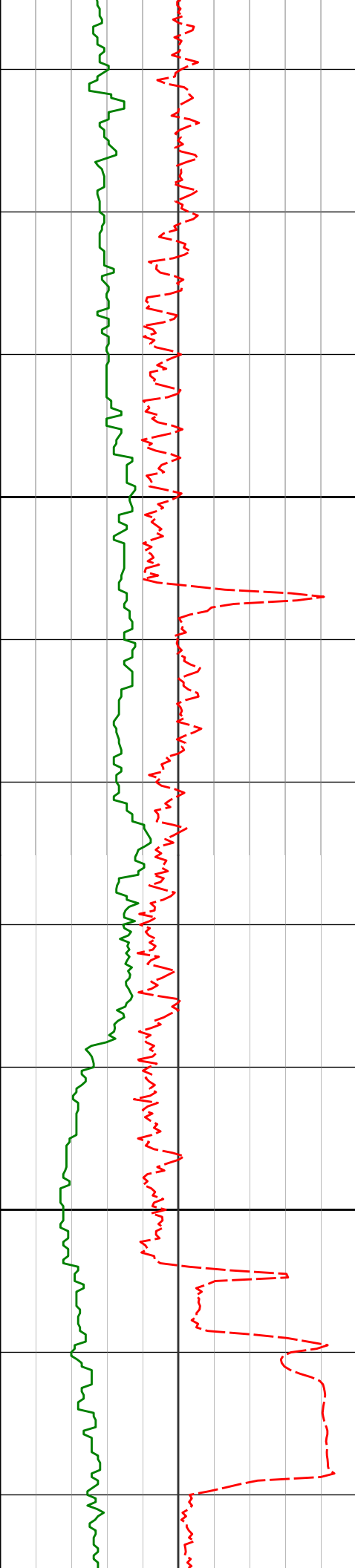
89.78° 6518.62'

2369.67'

205.84°F

9100

207.73°F



9200

9300

9145'

89.75°

89.68° 6519.20'

2463.53'

9239'

88.98°

89.13° 6520.25'

2557.41'

9334'

90.12°

90.27° 6520.99'

2652.27'

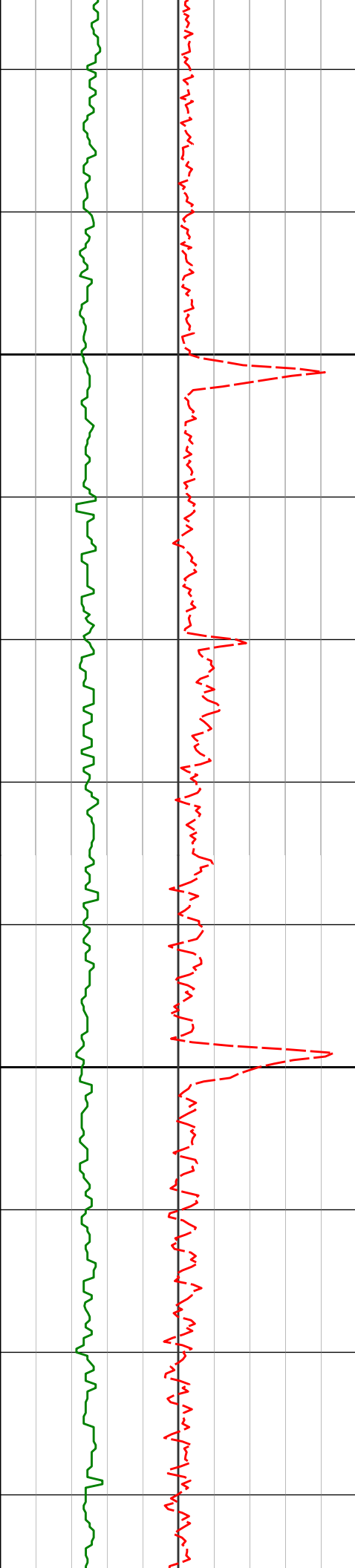
209.72°F

210.31°F

210.60°F

208.78°F

207.73°F



9400

9428'

90.43°

90.25° 6520.54'

2746.08'

9500

9523'

90.28°

89.78° 6519.95'

2840.91'

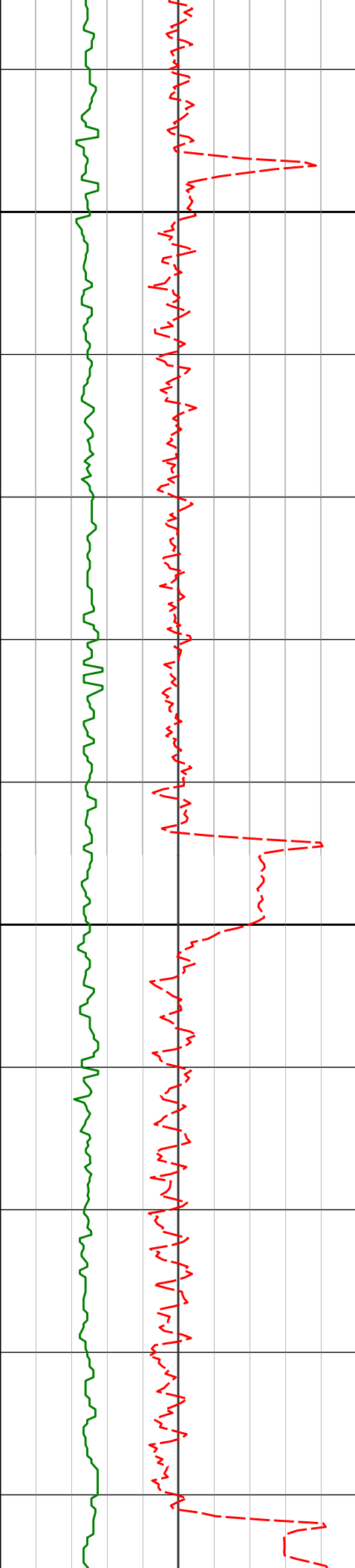
210.31°F

211.20°F

212.92°F

212.92°F

214.56°F



9600

9617'

90.19°

90.01° 6519.57'

2934.76'

215.51°F

215.51°F

215.73°F

9700

9712'

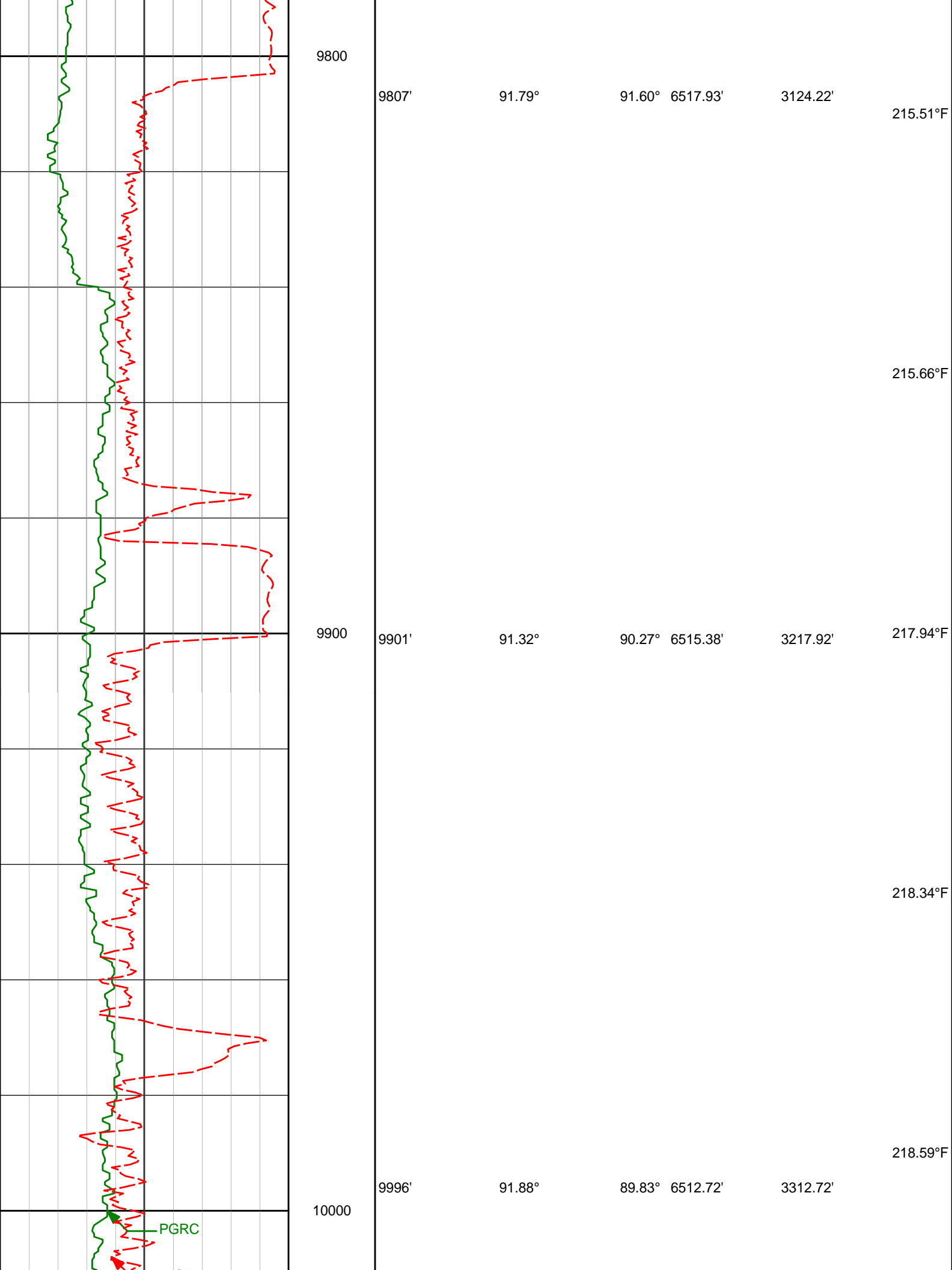
90.00°

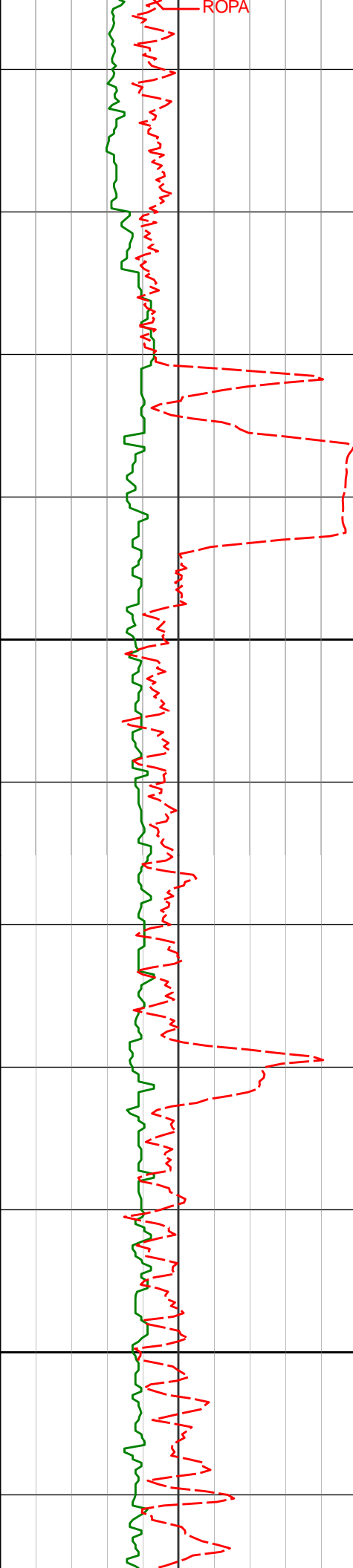
90.93° 6519.41'

3029.55'

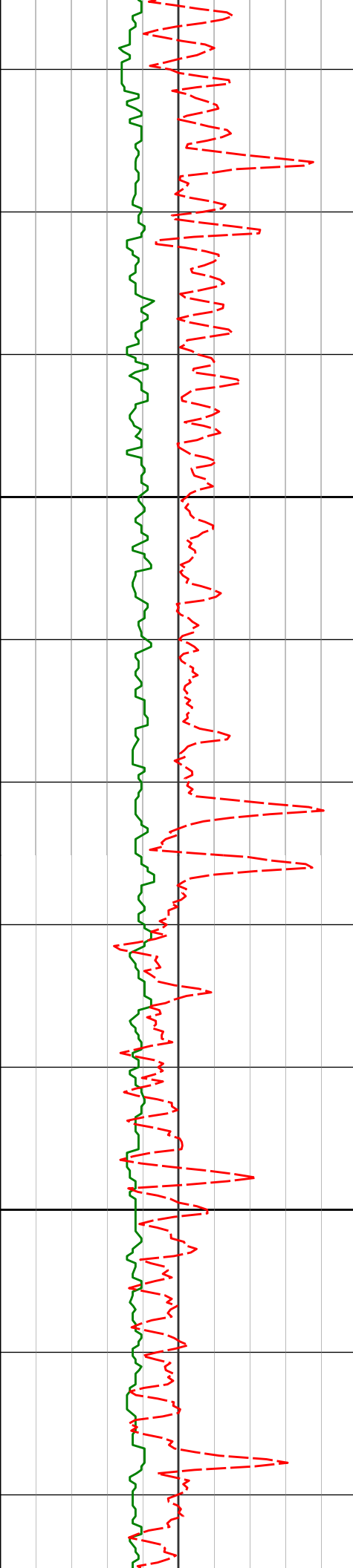
217.32°F

215.76°F





				216.48°F
				215.78°F
10091'	90.18°	89.33°	6511.01'	3407.57'
				217.91°F
				218.14°F
10184'	90.71°	89.52°	6510.29'	3500.46'
10200				
				218.14°F



10300

10400

10276'

90.18°

88.78° 6509.58'

3592.37'

10368'

91.05°

89.51° 6508.59'

3684.27'

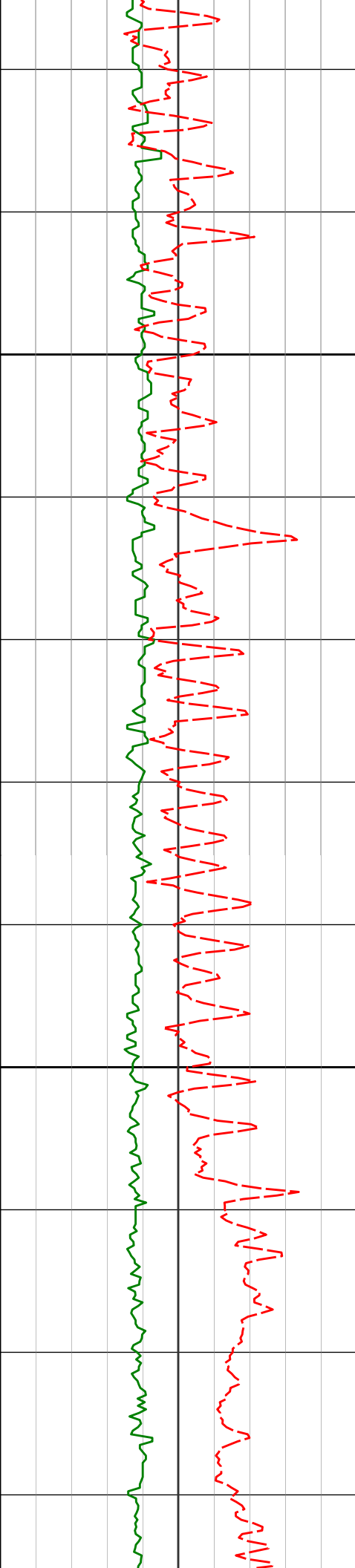
219.30°F

218.98°F

219.97°F

218.91°F

220.11°F



10459'

90.18°

87.35° 6507.61'

3775.22'

10500

221.12°F

223.41°F

10552'

90.15°

88.35° 6507.35'

3868.19'

10600

223.41°F

222.79°F

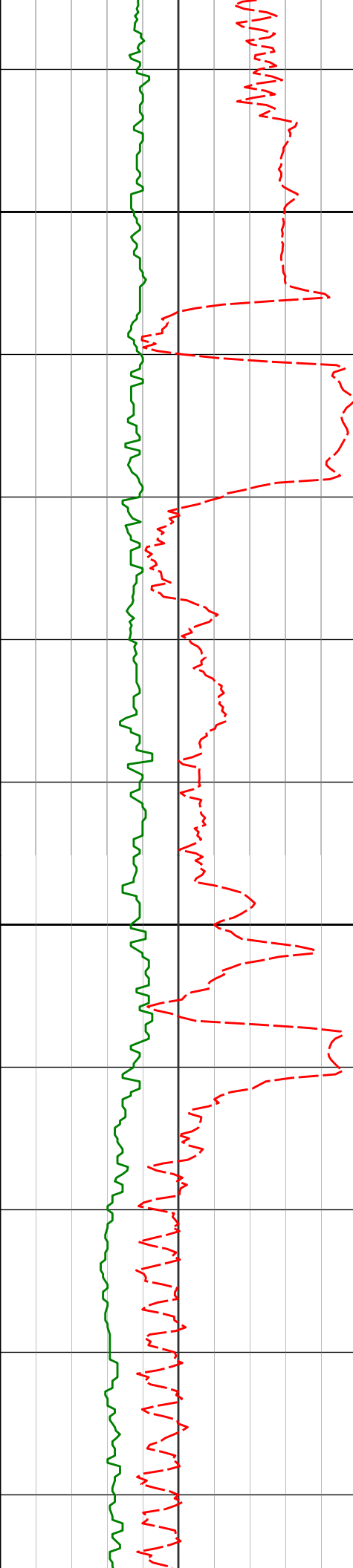
10644'

90.03°

88.07° 6507.20'

3960.16'

221.11°F



10700

221.34°F

10738'

91.57°

87.85° 6505.89'

4054.12'

223.23°F

10800

223.41°F

10831'

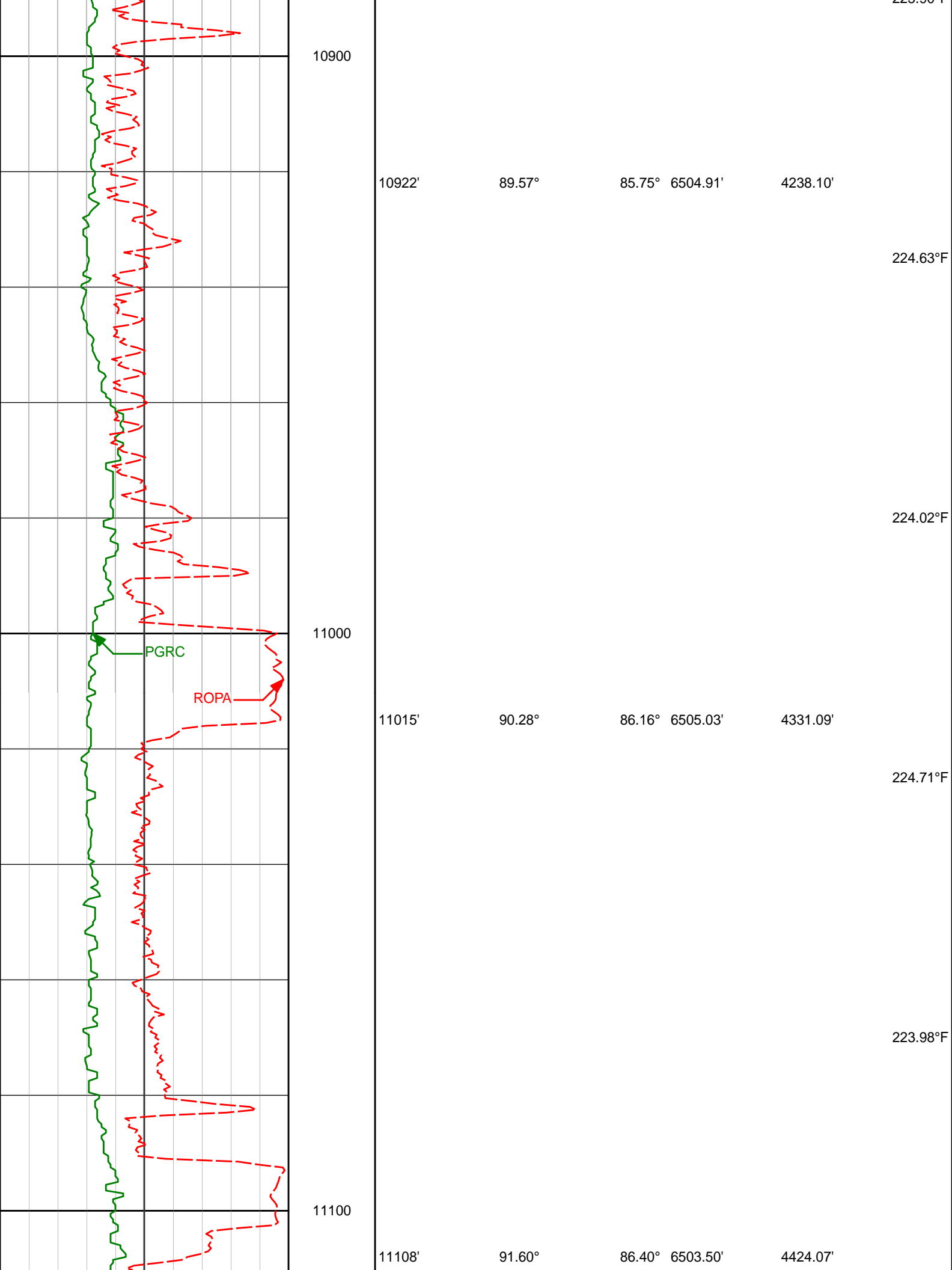
90.03°

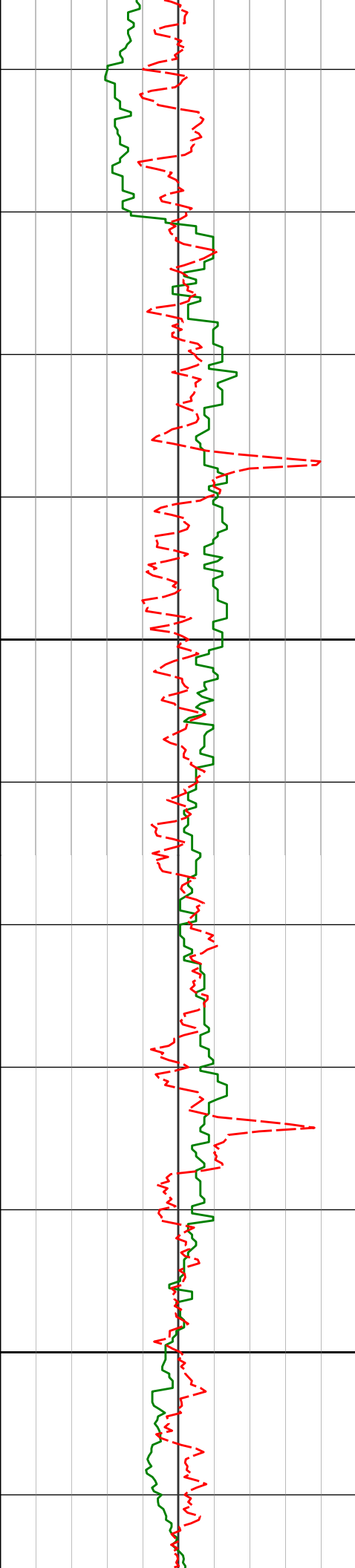
86.99° 6504.59'

4147.10'

223.41°F

225.90°F





11200

11201'

91.48°

85.55° 6501.00'

4517.03'

11300

11292'

90.58°

85.18° 6499.37'

4607.99'

226.08°F

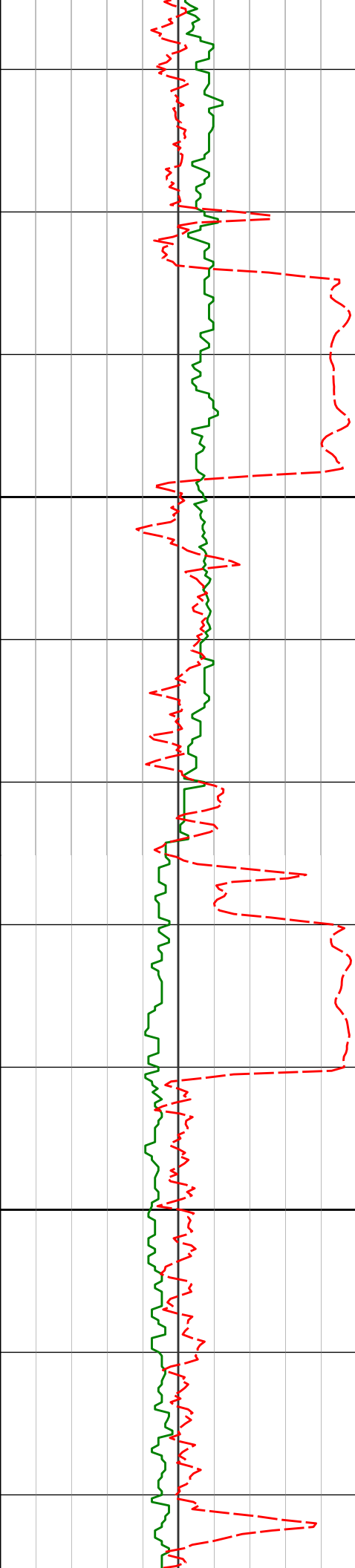
226.41°F

228.44°F

228.74°F

227.61°F

226.08°F



11400

11500

11385'

91.33°

85.14°

6497.82'

4700.95'

225.60°F

11477'

91.69°

85.92°

6495.40'

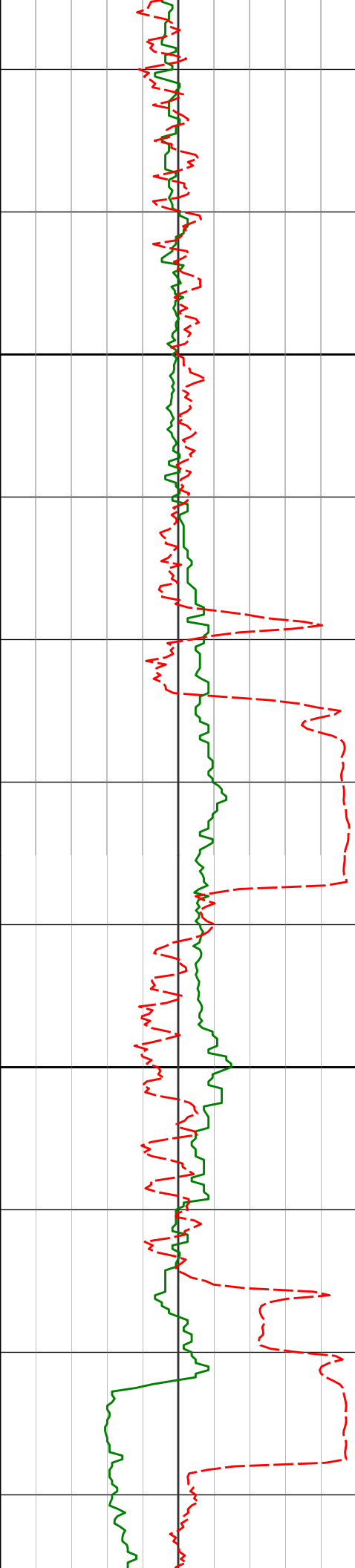
4792.90'

225.90°F

226.28°F

224.42°F

227.53°F



11600

11700

11570'

92.10°

85.75° 6492.32'

4885.84'

227.93°F

11663'

92.28°

87.72° 6488.77'

4978.77'

227.34°F

11756'

89.75°

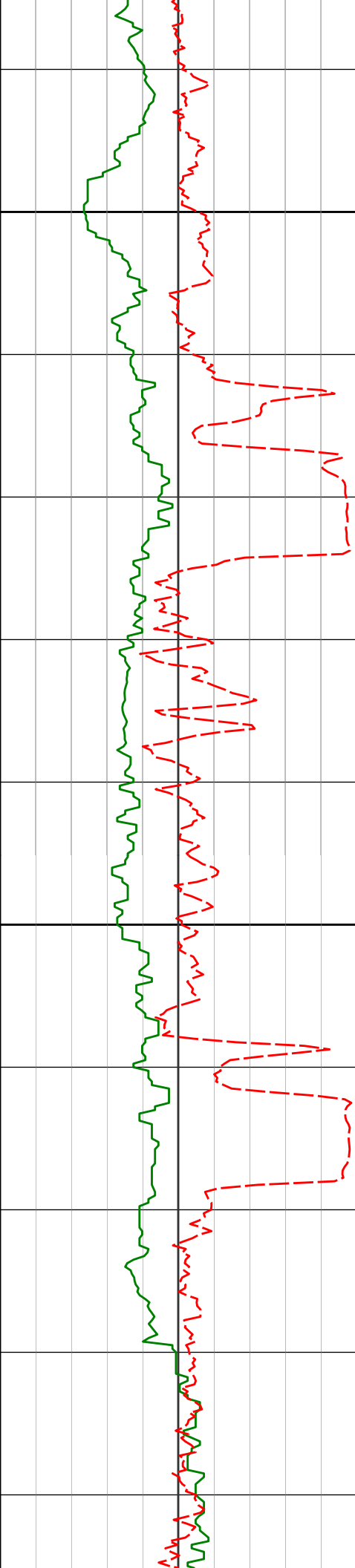
87.51° 6487.12'

5071.73'

226.47°F

226.45°F

226.52°F



11800

11900

11848'

11940'

89.35°

89.54°

88.19°

88.74°

6487.84'

6488.73'

5163.71'

5255.66'

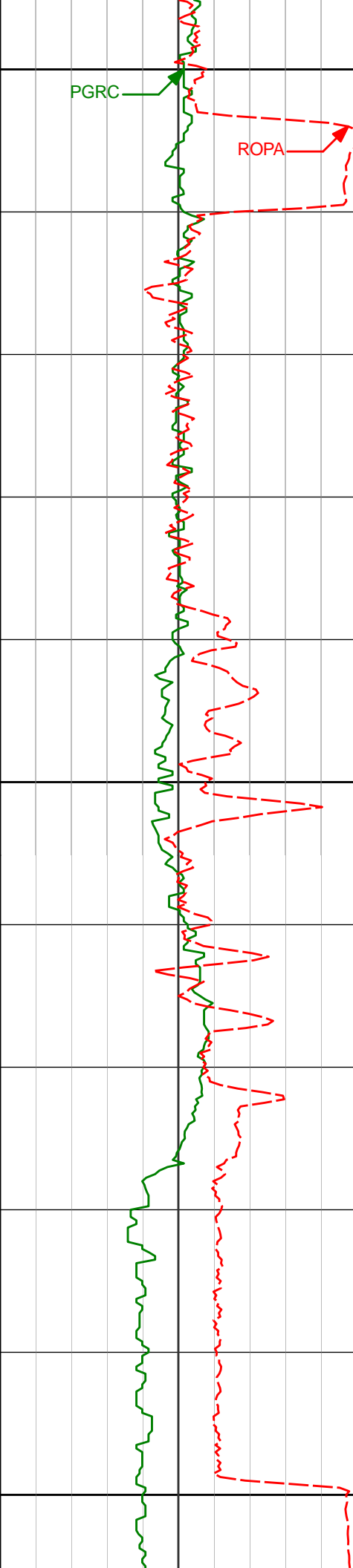
225.32°F

225.73°F

224.78°F

225.90°F

226.08°F



12000

PGRC

ROPA

227.21°F

12035'

90.28°

88.71° 6488.88'

5350.59'

228.74°F

12100

228.27°F

12129'

89.69°

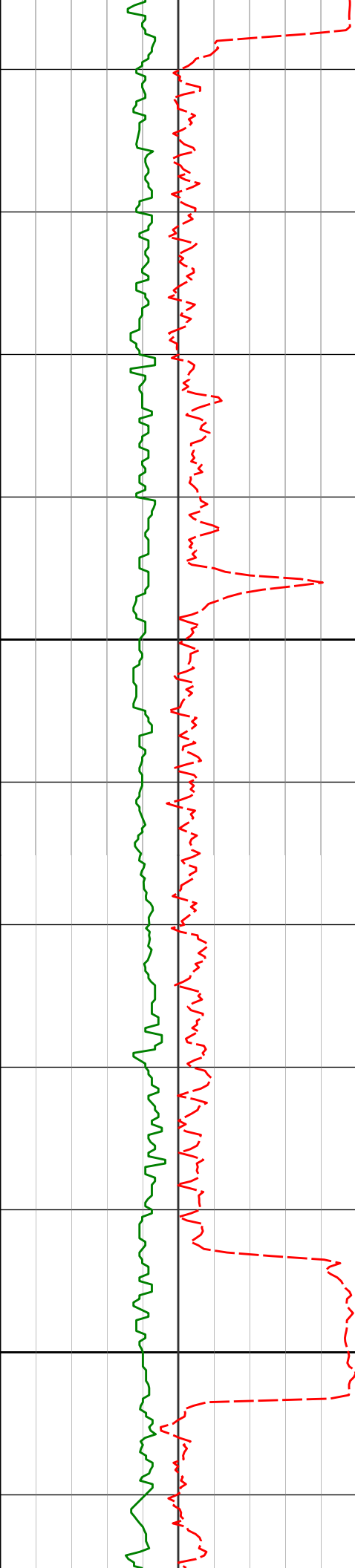
88.42° 6488.91'

5444.54'

226.29°F

12200

225.93°F



12300

12400

12224'

91.14°

88.64° 6488.22'

5539.48'

226.08°F

227.46°F

12318'

90.15°

88.08° 6487.16'

5633.43'

226.33°F

226.34°F

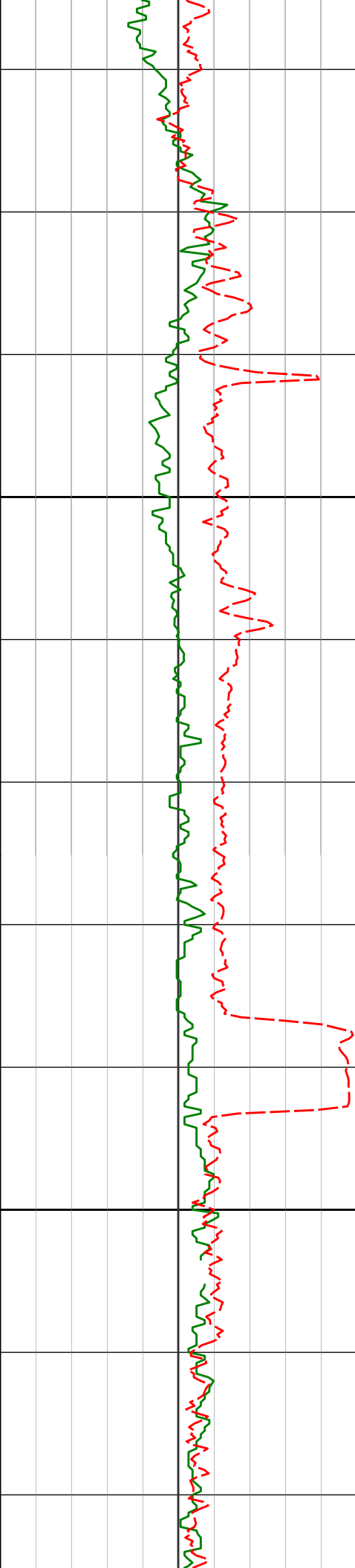
12413'

92.62°

88.81° 6484.86'

5728.35'

228.50°F



12500

12508'

92.93°

88.96° 6480.26'

5823.16'

229.28°F

228.68°F

228.36°F

12600

12602'

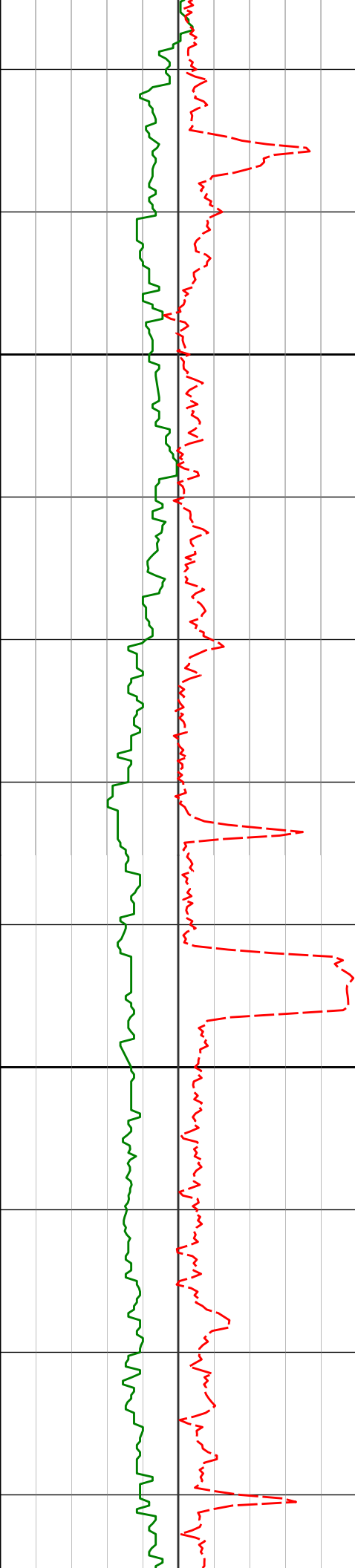
92.06°

89.34° 6476.17'

5916.98'

229.30°F

231.42°F



12700

12800

12697'

12791'

92.12°

91.97°

88.45° 6472.71'

88.45° 6469.35'

6011.85'

6105.74'

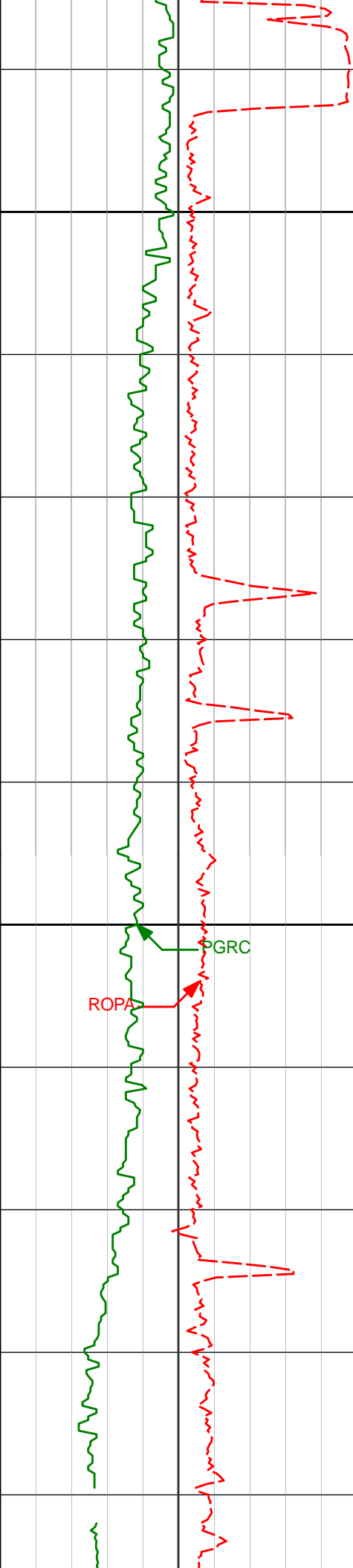
231.42°F

231.42°F

230.85°F

230.27°F

231.31°F



12900

13000

12886'

91.26°

89.18°

6466.68'

6200.63'

231.42°F

231.42°F

12981'

90.89°

88.16°

6464.89'

6295.55'

231.76°F

232.11°F

13075'

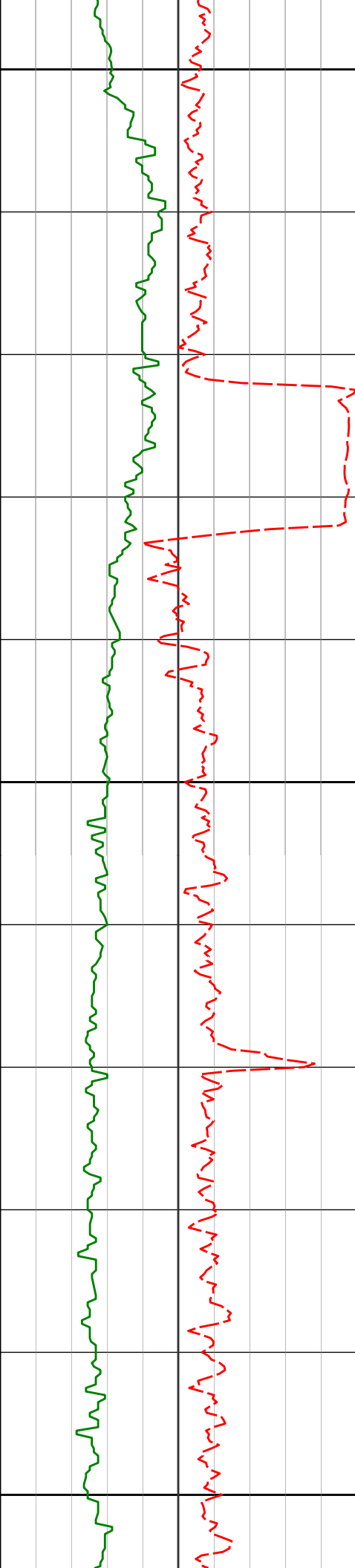
91.14°

87.26°

6463.23'

6389.52'

231.51°F



13100

13200

13300

13170'

13265'

91.11°

90.43°

89.79°

88.51°

6461.36'

6460.09'

6484.45'

6579.34'

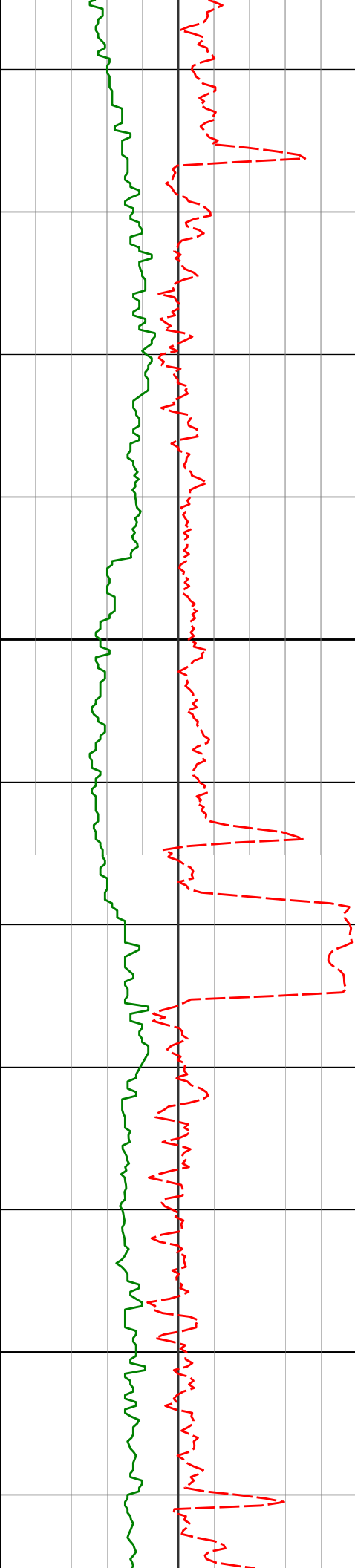
229.96°F

232.47°F

233.76°F

234.00°F

234.12°F



13400

13500

13359'

91.67°

88.92° 6458.36'

6673.26'

13454'

91.63°

89.13° 6455.63'

6768.14'

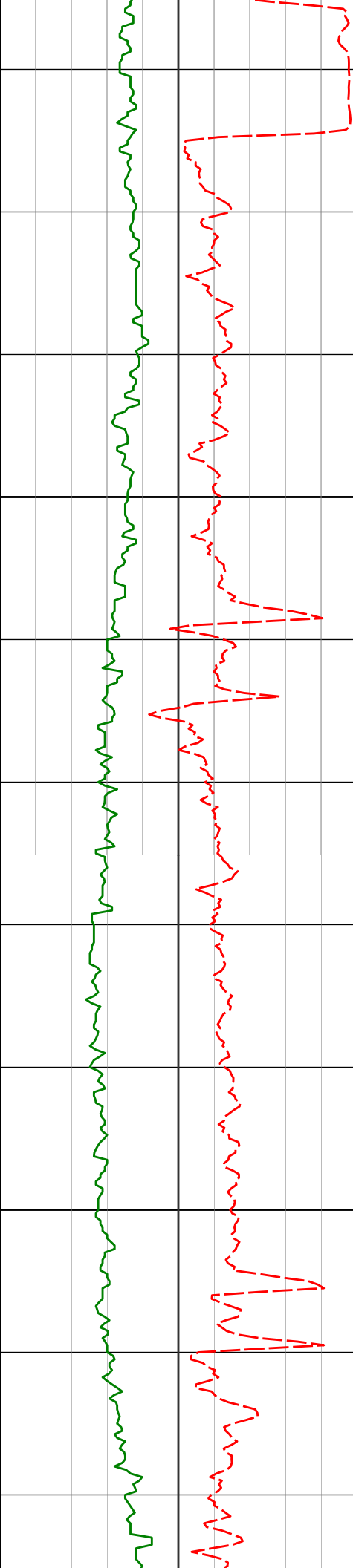
234.38°F

233.28°F

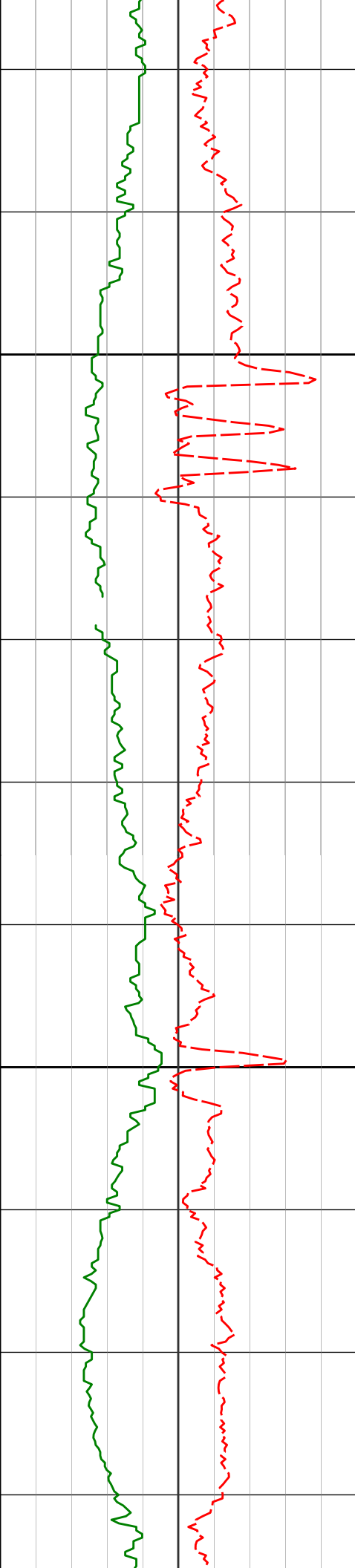
231.90°F

232.80°F

231.80°F



13549'	89.51°	90.31°	6454.68'	6862.99'	233.88°F
13600					
234.41°F					
13643'	90.15°	90.07°	6454.96'	6956.81'	236.57°F
13700					
236.82°F					
13738'	89.81°	89.28°	6455.00'	7051.68'	236.82°F



13800

13900

13832'

13927'

90.12°

89.11°

89.15° 6455.05'

87.88° 6455.69'

7145.58'

7240.53'

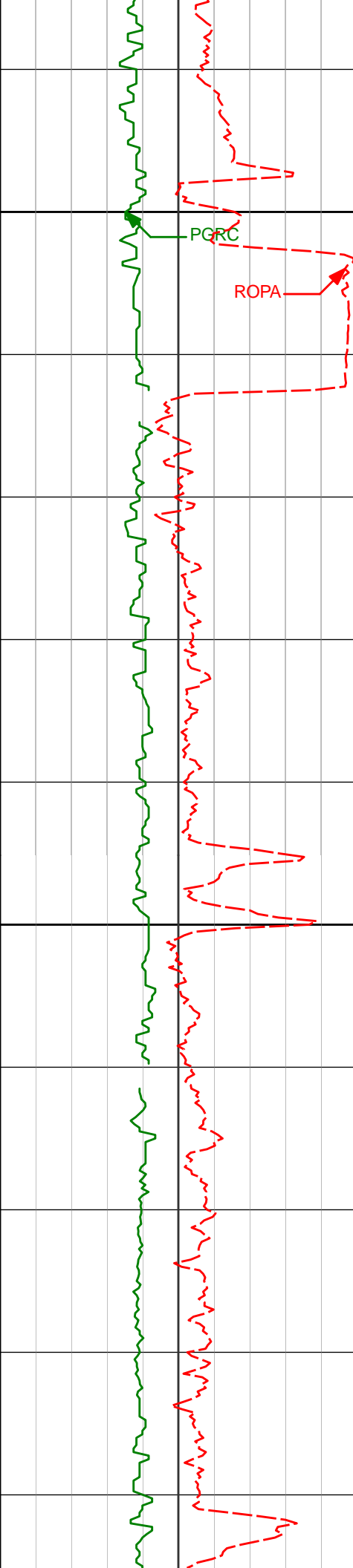
236.82°F

238.86°F

237.04°F

236.92°F

236.10°F



14000

14022'

90.37°

86.69° 6456.12'

7335.52'

14100

14117'

90.40°

86.08° 6455.48'

7430.51'

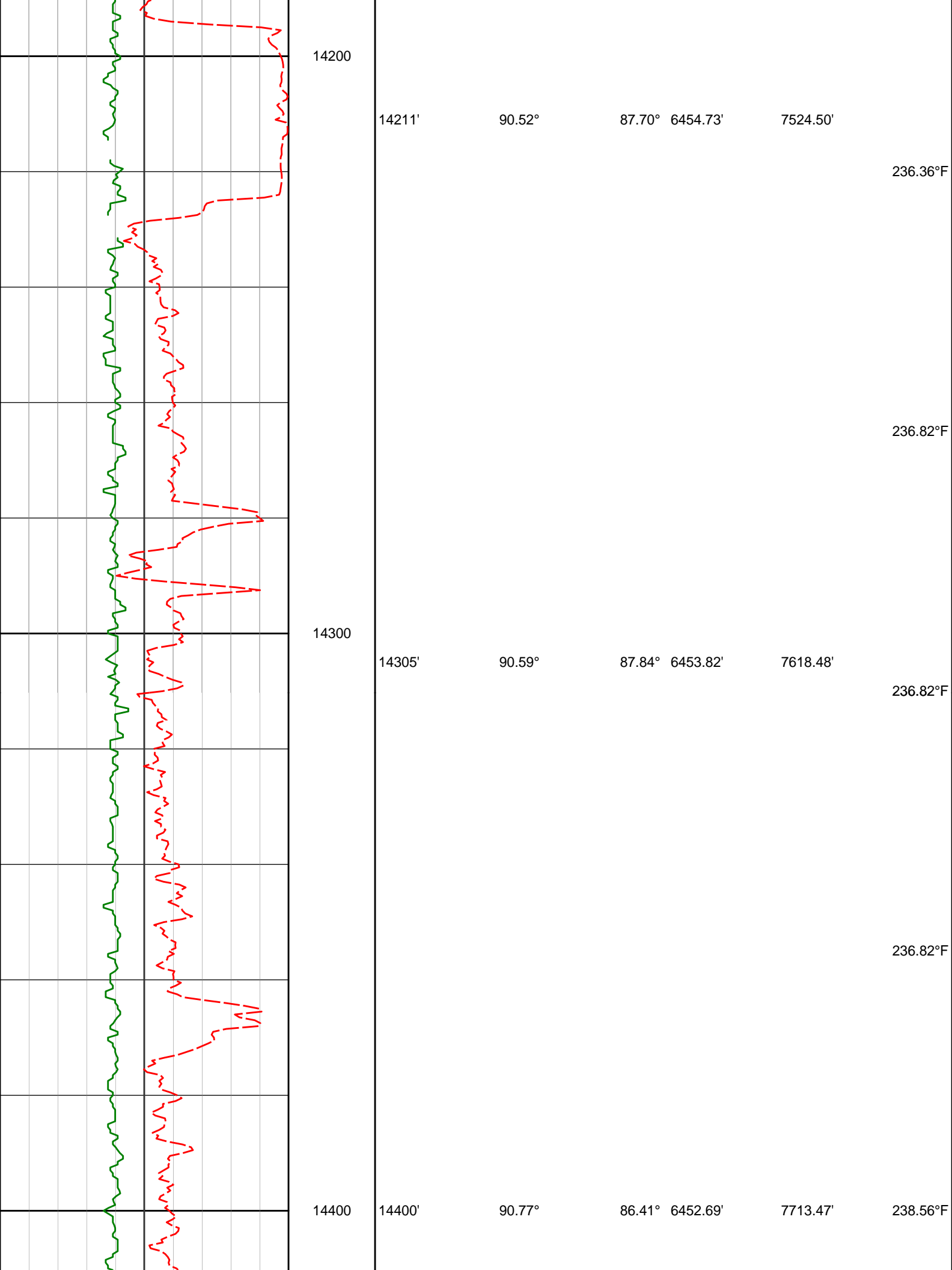
236.47°F

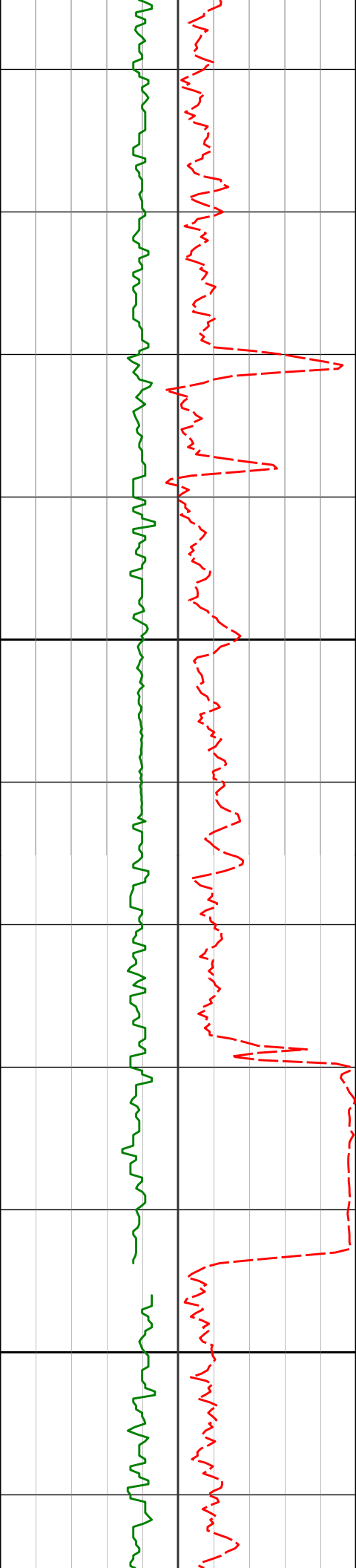
236.82°F

238.19°F

236.00°F

234.74°F





14500

14600

14495'

90.52°

86.30°

6451.62'

7808.46'

239.22°F

237.25°F

236.82°F

236.82°F

14590'

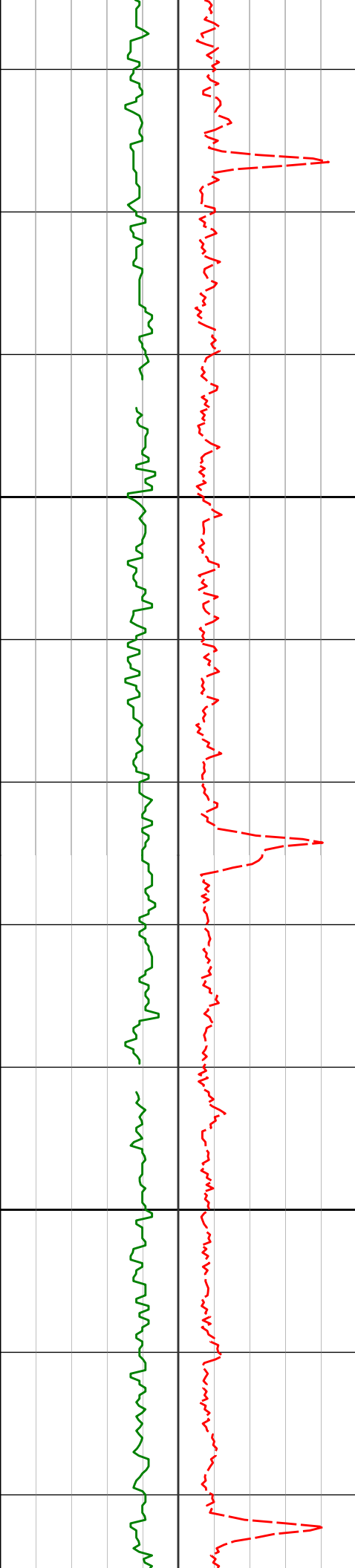
91.23°

89.05°

6450.17'

7903.43'

238.15°F



14700

14800

14684'

90.22°

88.18° 6448.98'

7997.36'

14779'

91.33°

88.84° 6447.70'

8092.30'

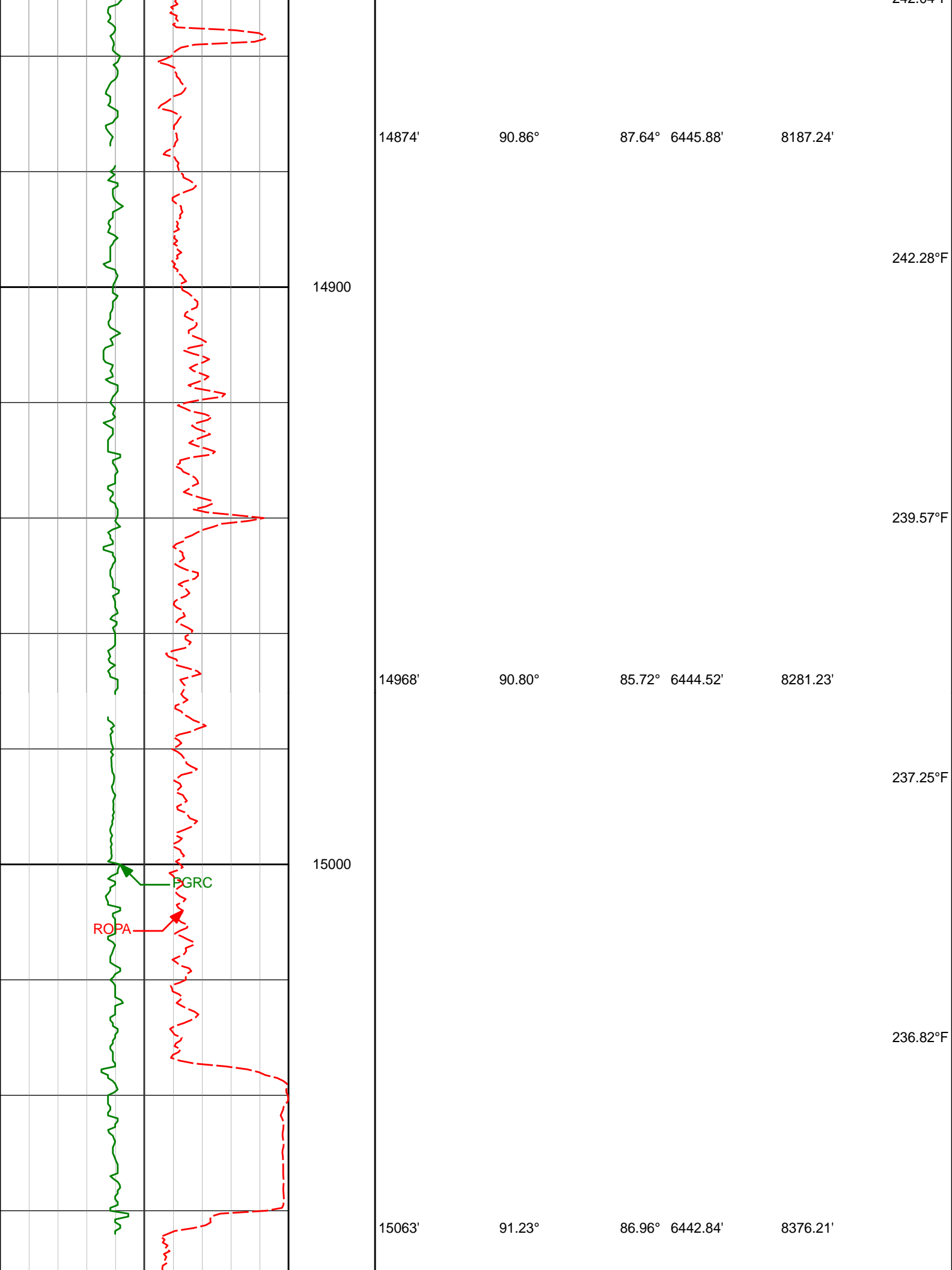
239.54°F

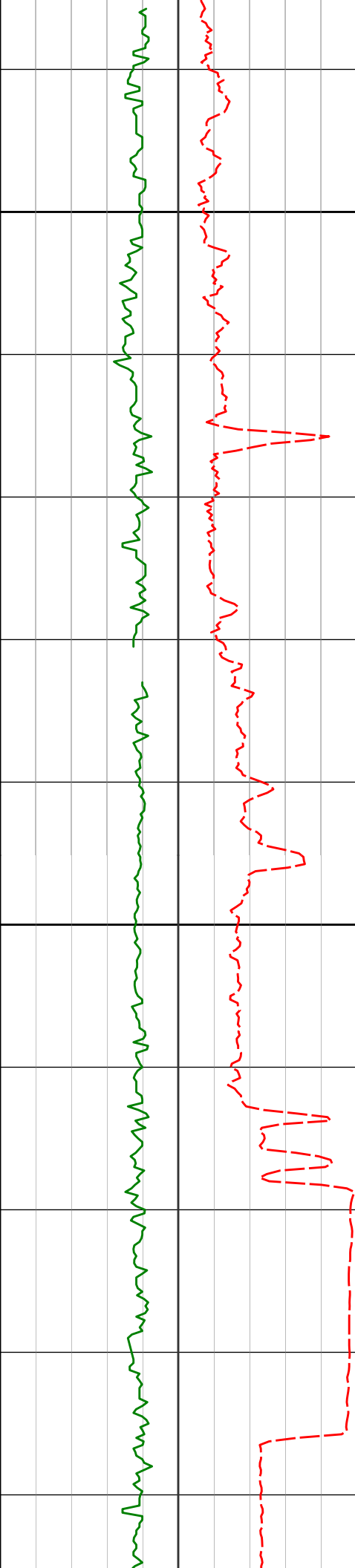
239.54°F

239.54°F

239.77°F

242.04°F





15100

15158'

15200

15252'

89.63°

85.01° 6442.12'

8471.19'

91.39°

88.24° 6441.29'

8565.17'

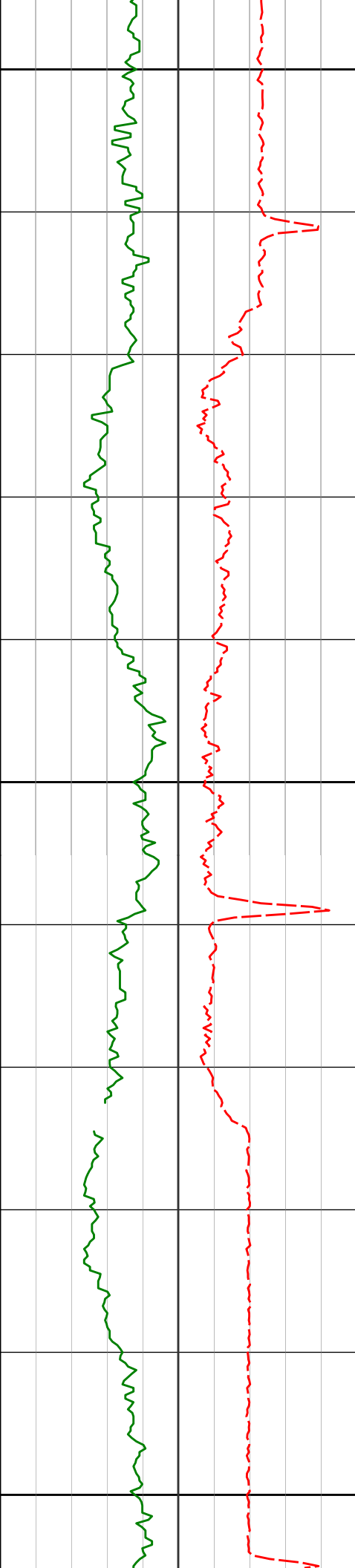
238.84°F

239.78°F

238.23°F

236.97°F

237.48°F



15300

237.11°F

239.31°F

239.54°F

15400

241.57°F

15443'

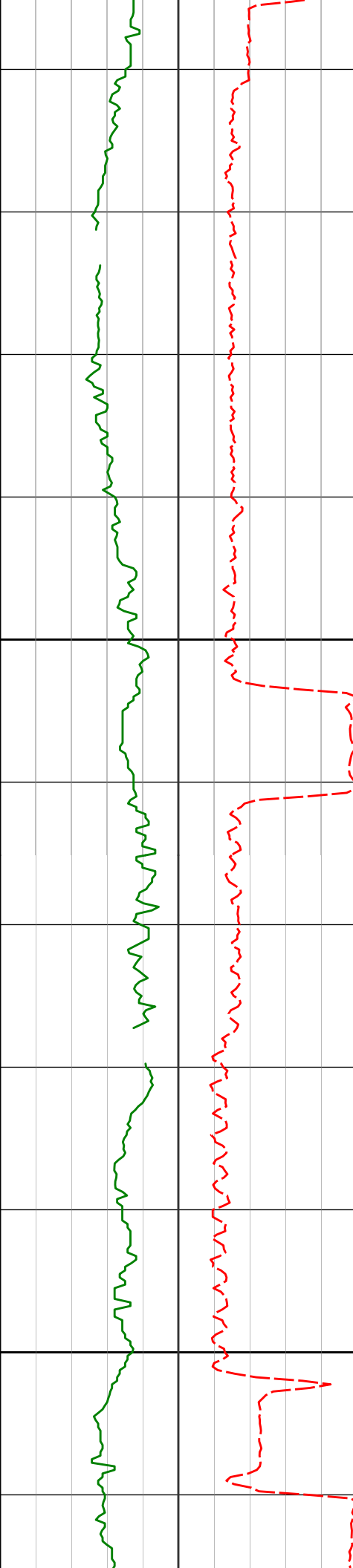
91.79°

87.29° 6435.99'

8756.06'

242.28°F

15500



15600

15700

15538'

92.07°

86.47° 6432.79'

8851.00'

15636'

92.31°

87.64° 6429.04'

8948.93'

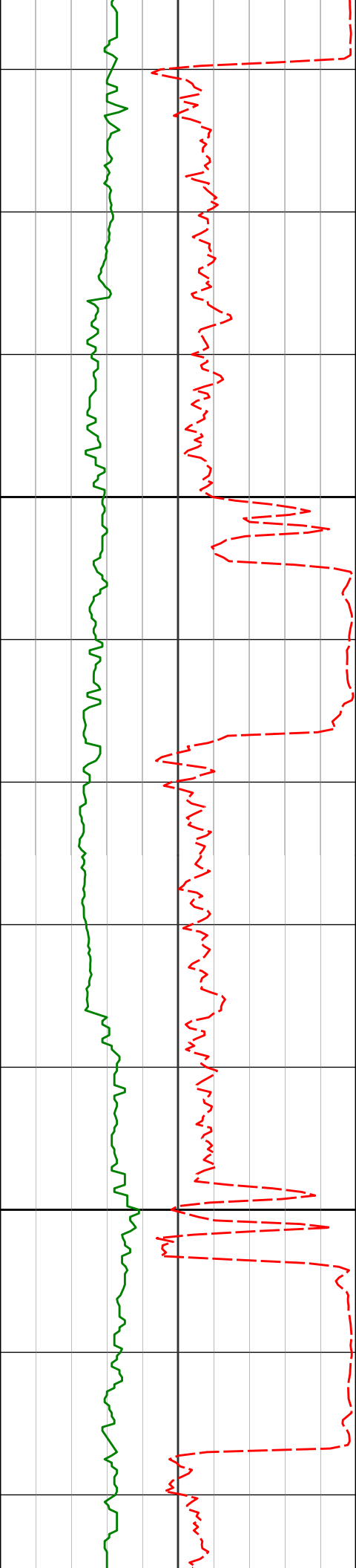
240.56°F

239.72°F

240.60°F

238.18°F

239.17°F



15800

15900

15733'

15831'

15928'

90.58°

90.77°

89.69°

87.34° 6426.60'

88.95° 6425.44'

90.83° 6425.05'

9045.88'

9143.84'

9240.68'

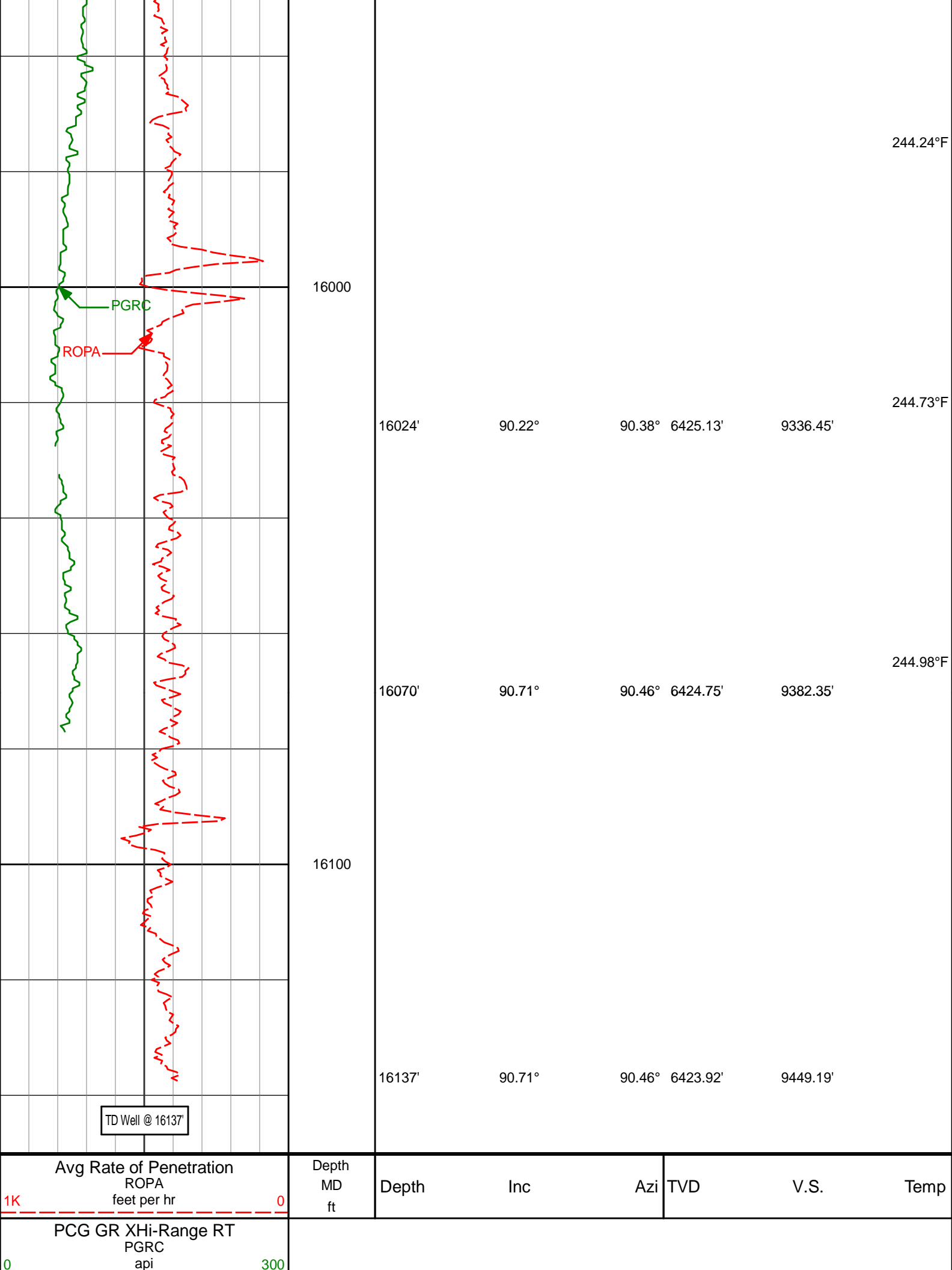
240.44°F

241.94°F

242.28°F

242.28°F

242.28°F



TD Well @ 16137'

Avg Rate of Penetration
ROPA
feet per hr

Depth
MD
ft

Depth

Inc

Azi

TVD

V.S.

Temp

PCG GR XHi-Range RT
PGRC
api

300

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-685
Wattenberg
Weld Colorado
USA

CA-XX-0902771585

Surveys in the Lateral Section have had IFR/MSA Corrections applied.

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
675.00	0.40	18.71	674.99	2.23 N	0.76 E	0.89	0.06
739.00	0.49	30.71	738.99	2.68 N	0.97 E	1.12	0.20
833.00	0.25	7.29	832.99	3.23 N	1.20 E	1.39	0.30
928.00	0.39	345.32	927.99	3.74 N	1.14 E	1.36	0.19
1207.00	1.62	302.47	1206.94	6.76 N	2.42 W	-2.02	0.49
1299.00	1.71	296.82	1298.90	8.08 N	4.74 W	-4.26	0.21
1484.00	1.64	305.19	1483.83	10.85 N	9.36 W	-8.71	0.14
1576.00	1.73	302.19	1575.79	12.35 N	11.61 W	-10.87	0.14
1763.00	1.68	300.21	1762.70	15.23 N	16.37 W	-15.45	0.04
1854.00	1.83	298.01	1853.66	16.58 N	18.81 W	-17.80	0.19
1947.00	3.69	316.43	1946.55	19.45 N	22.18 W	-21.01	2.18
2040.00	5.82	308.39	2039.23	24.55 N	27.94 W	-26.46	2.40
2133.00	8.40	308.98	2131.50	31.75 N	36.92 W	-35.00	2.77
2224.00	11.25	305.06	2221.16	41.03 N	49.36 W	-46.87	3.22
2317.00	12.19	292.00	2312.24	49.93 N	65.89 W	-62.85	3.02
2409.00	11.62	290.67	2402.26	56.83 N	83.57 W	-80.09	0.69
2502.00	11.51	290.34	2493.37	63.37 N	101.03 W	-97.14	0.14
2595.00	11.42	290.69	2584.51	69.84 N	118.34 W	-114.04	0.12
2688.00	11.38	290.57	2675.68	76.32 N	135.54 W	-130.83	0.04
2780.00	11.30	300.98	2765.89	84.15 N	151.77 W	-146.58	2.22
2872.00	10.59	302.16	2856.22	93.29 N	166.65 W	-160.90	0.81
2966.00	9.21	302.11	2948.82	101.88 N	180.33 W	-174.05	1.46
3061.00	9.37	302.93	3042.57	110.13 N	193.27 W	-186.48	0.22
3155.00	9.13	305.47	3135.35	118.62 N	205.77 W	-198.46	0.51
3250.00	7.61	282.88	3229.36	124.39 N	218.04 W	-210.37	3.78
3344.00	6.58	301.49	3322.65	128.59 N	228.70 W	-220.77	2.66
3439.00	6.34	299.18	3417.05	134.00 N	237.92 W	-229.66	0.37
3534.00	7.69	300.23	3511.33	139.75 N	248.00 W	-239.38	1.42
3628.00	8.39	307.48	3604.41	147.09 N	258.87 W	-249.81	1.31
3723.00	8.59	305.76	3698.37	155.46 N	270.13 W	-260.55	0.34
3817.00	8.96	305.58	3791.27	163.82 N	281.78 W	-271.69	0.40
3912.00	8.86	304.49	3885.12	172.27 N	293.83 W	-283.22	0.21
4007.00	8.35	302.79	3979.06	180.14 N	305.65 W	-294.57	0.60
4101.00	7.88	302.35	4072.11	187.29 N	316.83 W	-305.31	0.51
4196.00	6.95	299.39	4166.32	193.59 N	327.34 W	-315.43	1.06
4290.00	6.43	297.65	4259.68	198.82 N	336.96 W	-324.72	0.60
4385.00	6.19	296.99	4354.10	203.61 N	346.23 W	-333.70	0.26
4479.00	5.29	292.76	4447.63	207.59 N	354.74 W	-341.96	1.05
4574.00	4.55	289.92	4542.28	210.57 N	362.32 W	-349.36	0.82
4763.00	4.30	305.00	4730.73	217.18 N	375.17 W	-361.80	0.63
4858.00	3.75	302.62	4825.49	220.90 N	380.70 W	-367.10	0.61
4952.00	4.17	293.89	4919.27	223.94 N	386.42 W	-372.63	0.78
5047.00	1.65	285.50	5014.14	225.70 N	390.90 W	-376.99	2.68
5141.00	1.86	259.81	5108.09	225.80 N	393.70 W	-379.79	0.86
5236.00	0.49	16.72	5203.08	225.92 N	395.10 W	-381.18	2.24
5330.00	0.80	47.19	5297.07	226.75 N	394.51 W	-380.54	0.48
5425.00	0.64	22.12	5392.07	227.69 N	393.82 W	-379.80	0.37
5520.00	0.87	0.02	5487.06	228.91 N	393.62 W	-379.53	0.38
5614.00	0.99	346.61	5581.04	230.41 N	393.81 W	-379.63	0.27
5709.00	0.81	319.60	5676.03	231.72 N	394.43 W	-380.17	0.48
5803.00	0.33	297.33	5770.03	232.35 N	395.10 W	-380.80	0.56
5898.00	0.17	114.91	5865.03	232.42 N	395.21 W	-380.91	0.53
5993.00	8.58	98.73	5959.67	231.28 N	388.06 W	-373.84	8.86
6087.00	13.67	98.13	6051.87	228.64 N	370.13 W	-356.09	5.41

6182.00	26.22	89.37	6141.01	227.28 N	337.89 W	-323.99	13.55
6276.00	34.85	85.86	6221.90	229.45 N	290.25 W	-276.30	9.37
6371.00	39.94	91.46	6297.38	230.64 N	232.63 W	-218.72	6.43
6465.00	43.54	92.64	6367.50	228.38 N	170.11 W	-156.43	3.92
6560.00	47.09	91.57	6434.30	225.91 N	102.62 W	-89.20	3.82
6654.00	57.22	85.78	6491.93	227.88 N	28.57 W	-15.17	11.82
6749.00	73.51	82.13	6531.41	237.12 N	56.98 E	70.78	17.50
6818.00	85.43	85.17	6543.99	244.57 N	124.27 E	138.39	17.81
6971.00	90.83	83.29	6548.98	259.94 N	276.35 E	291.11	3.74
7065.00	91.51	84.91	6547.06	269.60 N	369.83 E	385.00	1.87
7159.00	91.42	86.18	6544.65	276.90 N	463.52 E	478.95	1.35
7254.00	91.29	86.74	6542.41	282.76 N	558.31 E	573.92	0.60
7349.00	90.49	87.42	6540.93	287.60 N	653.17 E	668.90	1.11
7443.00	88.46	85.55	6541.79	293.36 N	746.98 E	762.89	2.94
7538.00	88.77	85.09	6544.09	301.11 N	841.64 E	857.84	0.58
7632.00	91.48	87.17	6543.89	307.45 N	935.41 E	951.82	3.63
7821.00	92.34	88.45	6537.59	314.67 N	1124.16 E	1140.67	0.82
7915.00	91.20	89.44	6534.68	316.40 N	1218.10 E	1234.55	1.61
8010.00	91.66	89.62	6532.31	317.18 N	1313.06 E	1329.40	0.52
8104.00	90.43	89.79	6530.60	317.67 N	1407.04 E	1423.24	1.32
8199.00	90.15	88.39	6530.12	319.17 N	1502.03 E	1518.15	1.50
8293.00	90.34	87.80	6529.71	322.30 N	1595.98 E	1612.12	0.66
8388.00	90.68	89.03	6528.87	324.93 N	1690.93 E	1707.07	1.34
8483.00	90.52	88.56	6527.87	326.92 N	1785.91 E	1802.00	0.52
8577.00	91.08	88.50	6526.56	329.34 N	1879.87 E	1895.94	0.60
8672.00	90.46	86.71	6525.29	333.30 N	1974.77 E	1990.91	1.99
8767.00	90.83	86.53	6524.22	338.91 N	2069.60 E	2085.90	0.43
8861.00	91.32	88.67	6522.45	342.84 N	2163.49 E	2179.87	2.34
8956.00	91.88	88.57	6519.80	345.13 N	2258.43 E	2274.77	0.60
9051.00	89.54	89.78	6518.62	346.50 N	2353.40 E	2369.67	2.77
9145.00	89.75	89.68	6519.20	346.94 N	2447.40 E	2463.53	0.25
9239.00	88.98	89.13	6520.25	347.91 N	2541.39 E	2557.41	1.01
9334.00	90.12	90.27	6520.99	348.41 N	2636.38 E	2652.27	1.70
9428.00	90.43	90.25	6520.54	347.99 N	2730.38 E	2746.08	0.33
9523.00	90.28	89.78	6519.95	347.96 N	2825.38 E	2840.91	0.52
9617.00	90.19	90.01	6519.57	348.13 N	2919.38 E	2934.76	0.26
9712.00	90.00	90.93	6519.41	347.35 N	3014.37 E	3029.55	0.99
9807.00	91.79	91.60	6517.93	345.26 N	3109.33 E	3124.22	2.01
9901.00	91.32	90.27	6515.38	343.72 N	3203.28 E	3217.92	1.50
9996.00	91.88	89.83	6512.72	343.64 N	3298.25 E	3312.72	0.75
10091.00	90.18	89.33	6511.01	344.34 N	3393.22 E	3407.57	1.87
10184.00	90.71	89.52	6510.29	345.27 N	3486.22 E	3500.46	0.61
10276.00	90.18	88.78	6509.58	346.63 N	3578.20 E	3592.37	0.99
10368.00	91.05	89.51	6508.59	348.01 N	3670.18 E	3684.27	1.23
10459.00	90.18	87.35	6507.61	350.50 N	3761.14 E	3775.22	2.56
10552.00	90.15	88.35	6507.35	353.99 N	3854.07 E	3868.19	1.08
10644.00	90.03	88.07	6507.20	356.86 N	3946.03 E	3960.16	0.33
10738.00	91.57	87.85	6505.89	360.21 N	4039.96 E	4054.12	1.65
10831.00	90.03	86.99	6504.59	364.40 N	4132.85 E	4147.10	1.90
10922.00	89.57	85.75	6504.91	370.16 N	4223.66 E	4238.10	1.45
11015.00	90.28	86.16	6505.03	376.72 N	4316.43 E	4331.09	0.88
11108.00	91.60	86.40	6503.50	382.75 N	4409.22 E	4424.07	1.44
11201.00	91.48	85.55	6501.00	389.28 N	4501.96 E	4517.03	0.92
11292.00	90.58	85.18	6499.37	396.63 N	4592.64 E	4607.99	1.07
11385.00	91.33	85.14	6497.82	404.47 N	4685.30 E	4700.95	0.81
11477.00	91.69	85.92	6495.40	411.64 N	4776.99 E	4792.90	0.93
11570.00	92.10	85.75	6492.32	418.39 N	4869.69 E	4885.84	0.48
11663.00	92.28	87.72	6488.77	423.68 N	4962.47 E	4978.77	2.13
11756.00	89.75	87.51	6487.12	427.55 N	5055.36 E	5071.73	2.73
11848.00	89.35	88.19	6487.84	431.00 N	5147.29 E	5163.71	0.86
11940.00	89.54	88.74	6488.73	433.47 N	5239.26 E	5255.66	0.63
12035.00	90.28	88.71	6488.88	435.58 N	5334.23 E	5350.59	0.78
12129.00	89.69	88.42	6488.91	437.94 N	5428.20 E	5444.54	0.70
12224.00	91.14	88.64	6488.22	440.37 N	5523.17 E	5539.48	1.54
12318.00	90.15	88.08	6487.16	443.06 N	5617.12 E	5633.43	1.21
12413.00	92.62	88.81	6484.86	445.64 N	5712.05 E	5728.35	2.71
12508.00	92.93	88.96	6480.26	447.49 N	5806.92 E	5823.16	0.36
12602.00	92.06	89.34	6476.17	448.88 N	5900.82 E	5916.98	1.01
12697.00	92.12	88.45	6472.71	450.71 N	5995.74 E	6011.85	0.94
12791.00	91.97	88.45	6469.35	453.25 N	6089.64 E	6105.74	0.16
12886.00	91.26	89.18	6466.68	455.22 N	6184.58 E	6200.63	1.07
12981.00	90.89	88.16	6464.89	457.42 N	6279.54 E	6295.55	1.14
13075.00	91.14	87.26	6463.23	461.18 N	6373.45 E	6389.52	0.99
13170.00	91.11	89.79	6461.36	463.62 N	6468.39 E	6484.45	2.66

13265.00	90.43	88.51	6460.09	465.03 N	6563.37 E	6579.34	1.53
13359.00	91.67	88.92	6458.36	467.14 N	6657.33 E	6673.26	1.39
13454.00	91.63	89.13	6455.63	468.75 N	6752.28 E	6768.14	0.22
13549.00	89.51	90.31	6454.68	469.22 N	6847.26 E	6862.99	2.55
13643.00	90.15	90.07	6454.96	468.91 N	6941.26 E	6956.81	0.73
13738.00	89.81	89.28	6455.00	469.45 N	7036.26 E	7051.68	0.91
13832.00	90.12	89.15	6455.05	470.73 N	7130.25 E	7145.58	0.36
13927.00	89.11	87.88	6455.69	473.20 N	7225.21 E	7240.53	1.71
14022.00	90.37	86.69	6456.12	477.69 N	7320.10 E	7335.52	1.82
14117.00	90.40	86.08	6455.48	483.68 N	7414.91 E	7430.51	0.64
14211.00	90.52	87.70	6454.73	488.78 N	7508.77 E	7524.50	1.73
14305.00	90.59	87.84	6453.82	492.44 N	7602.69 E	7618.48	0.17
14400.00	90.77	86.41	6452.69	497.21 N	7697.56 E	7713.47	1.52
14495.00	90.52	86.30	6451.62	503.25 N	7792.36 E	7808.46	0.29
14590.00	91.23	89.05	6450.17	507.10 N	7887.26 E	7903.43	2.99
14684.00	90.22	88.18	6448.98	509.37 N	7981.23 E	7997.36	1.42
14779.00	91.33	88.84	6447.70	511.84 N	8076.18 E	8092.30	1.36
14874.00	90.86	87.64	6445.88	514.76 N	8171.12 E	8187.24	1.36
14968.00	90.80	85.72	6444.52	520.20 N	8264.95 E	8281.23	2.04
15063.00	91.23	86.96	6442.84	526.26 N	8359.74 E	8376.21	1.38
15158.00	89.63	85.01	6442.12	532.92 N	8454.49 E	8471.19	2.66
15252.00	91.39	88.24	6441.29	538.45 N	8548.31 E	8565.17	3.91
15443.00	91.79	87.29	6435.99	545.89 N	8739.09 E	8756.06	0.54
15538.00	92.07	86.47	6432.79	551.06 N	8833.89 E	8851.00	0.91
15636.00	92.31	87.64	6429.04	556.09 N	8931.69 E	8948.93	1.22
15733.00	90.58	87.34	6426.60	560.34 N	9028.56 E	9045.88	1.81
15831.00	90.77	88.95	6425.44	563.51 N	9126.50 E	9143.84	1.65
15928.00	89.69	90.83	6425.05	563.70 N	9223.49 E	9240.68	2.24
16024.00	90.22	90.38	6425.13	562.68 N	9319.49 E	9336.45	0.72
16070.00	90.71	90.46	6424.75	562.35 N	9365.49 E	9382.35	1.08
16137.00	90.71	90.46	6423.92	561.81 N	9432.48 E	9449.19	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 86.64 DEGREES (GRID)
A TOTAL CORRECTION OF 7.31 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16137.00 FEET
IS 9449.19 FEET ALONG 86.59 DEGREES (GRID)**

Final survey is a straight line projection to TD.