



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	20-Oct-15	25-Oct-15			
Rig Bit Number	0100	0200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	644.00	7,022.00			
Log End Depth (MD, ft)	7,022.00	16,353.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	19-Oct-15 01:17	21-Oct-15 04:35			
Drill/Wipe End Date and Time	20-Oct-15 02:29	24-Oct-15 14:54			
Min Inc (deg) @ Depth (MD, ft)	0.16 @ 928.00	87.75 @ 12,036.00			
Max Inc (deg) @ Depth (MD, ft)	80.50 @ 6,955.00	92.90 @ 7,254.00			
Bit TFA(in2) / Bit Type	0.98 / PDC	0.98 / PDC			
Flow Rate (gpm)	587.24	311.43			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Native/Spud Mud	Native/Spud Mud			
Density (ppg) / Viscosity (spqt)	9.83 / 36.00	10.20 / 37.00			
Filtrate CL (ppm)	1,800.00	2,200.00			
pH / Fluid Loss (mptm)	8.80 / 7	8.70 / 7			
PV (cP) / YP (lhf2)	12 / 12.00	12 / 14.00			
% Solids / % Sand	12.00 / 0.05	9.20 / 0.15			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (in F) @ S	175.01 / PDM	217.70 / PDM			

Max Tool Temp (degF) / Source	175.21 / PCM	247.78 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Matt Busche	Matt Busche			
Customer Representative	Johnny Sanchez	Johnny Sanchez			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11342302	11342302			
Insert Serial Number	11055866	11400842			
Date and Time Initialized	18-Oct-15 22:56	20-Oct-15 10:11			
Date and Time Read	20-Oct-15 07:56	25-Oct-15 06:48			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	67.00	67.00			
Software Version	6.33	6.33			
Sub Serial Number	11342302	11342302			
Sonde Serial Number	11062113	11902092			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	257.80	144.00			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	59.92	60.44			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11342302	11342302			
Insert/Sonde Serial Number	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)

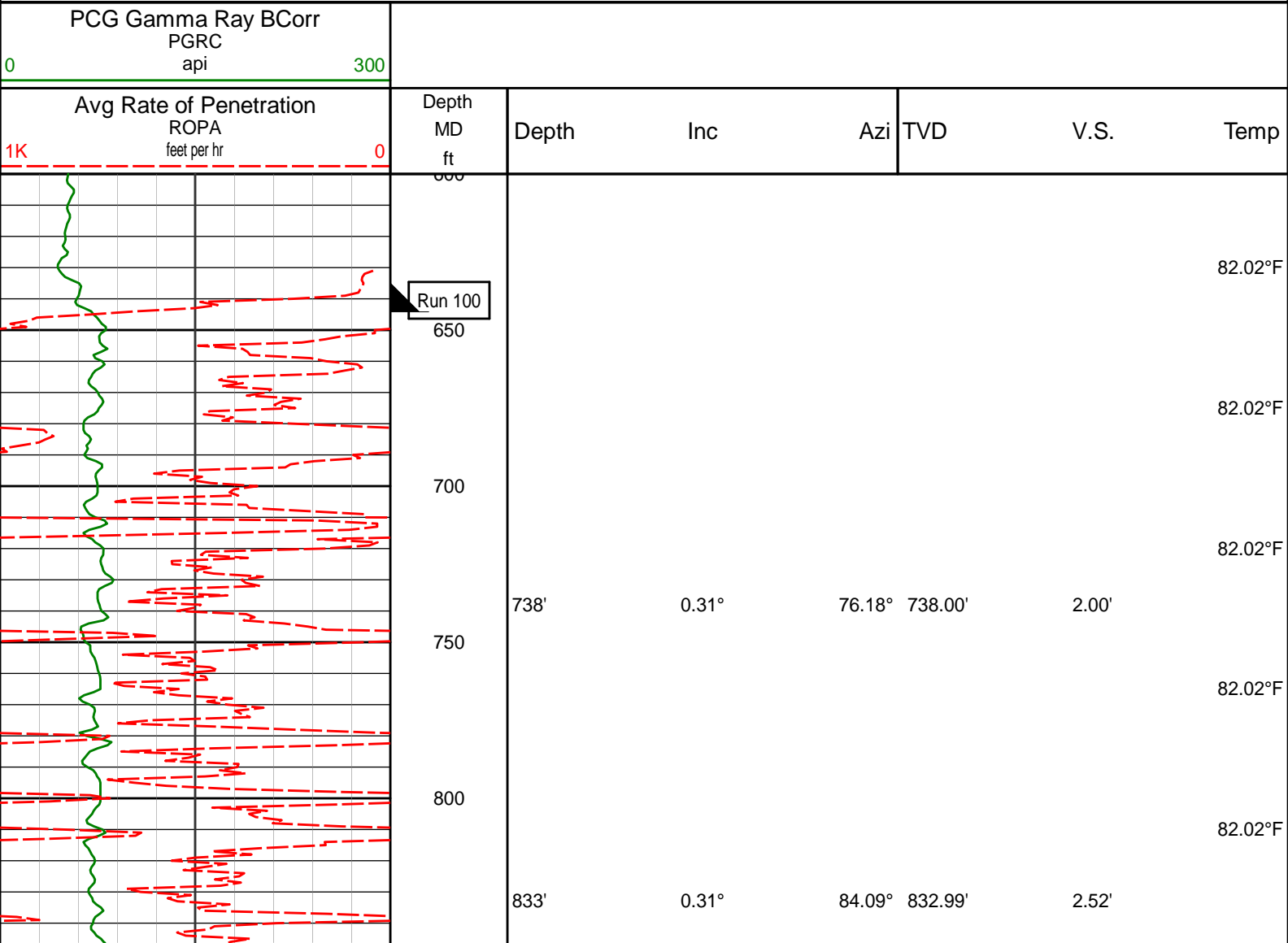
Interval: 0.5 ft

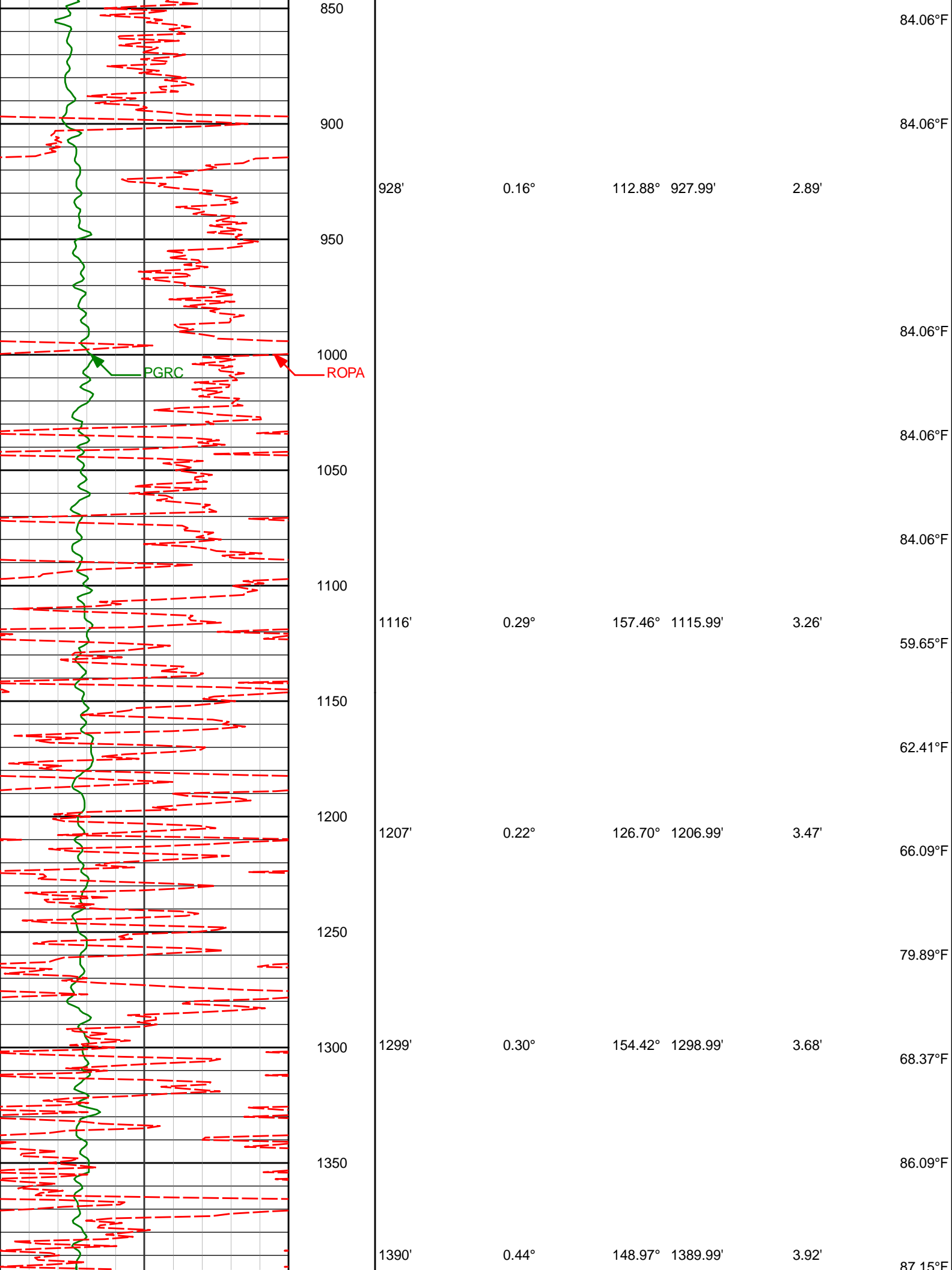
Coercion Distance: 0.6 ft (Gamma Ray)

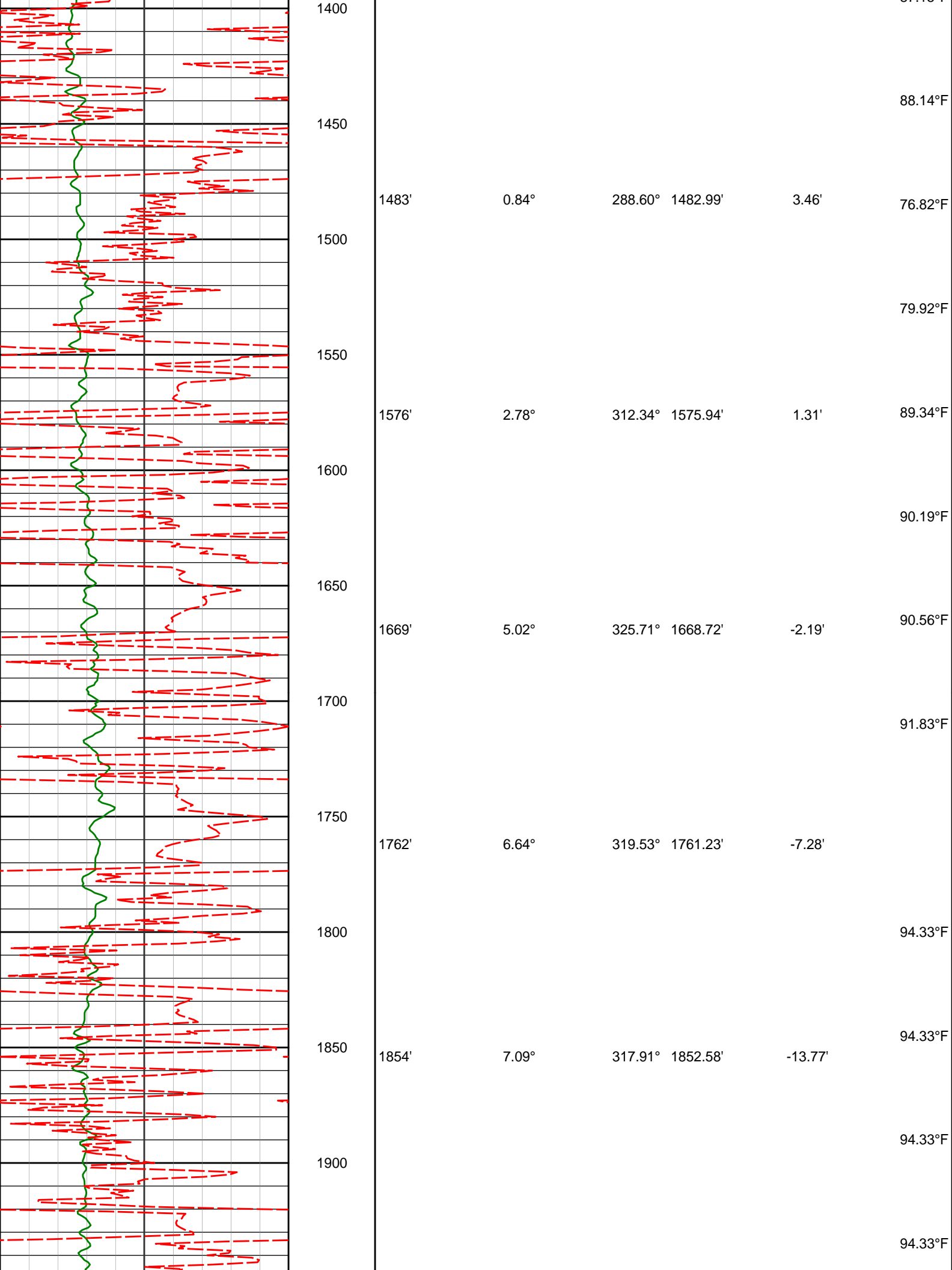
WARRANTY

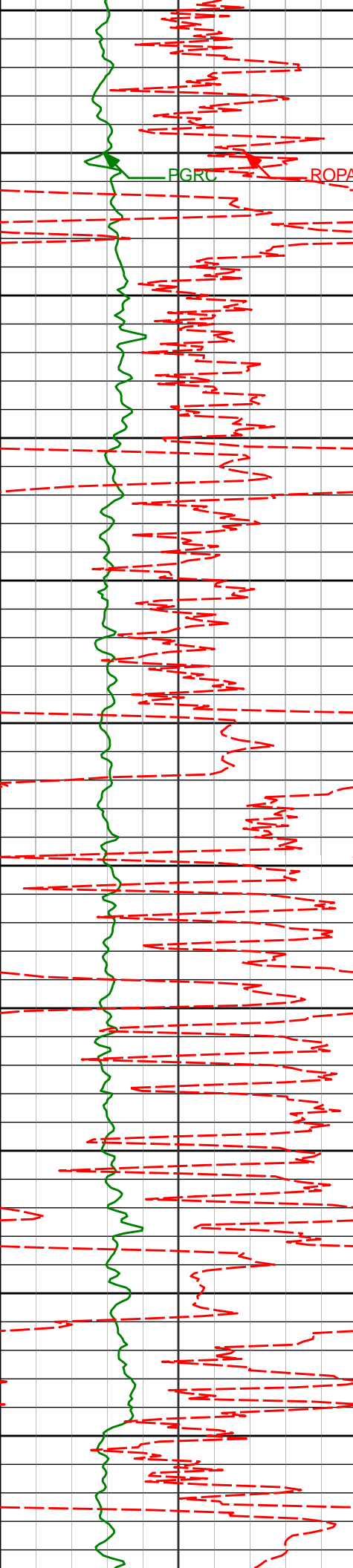
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MD Detail 1:600 Scale





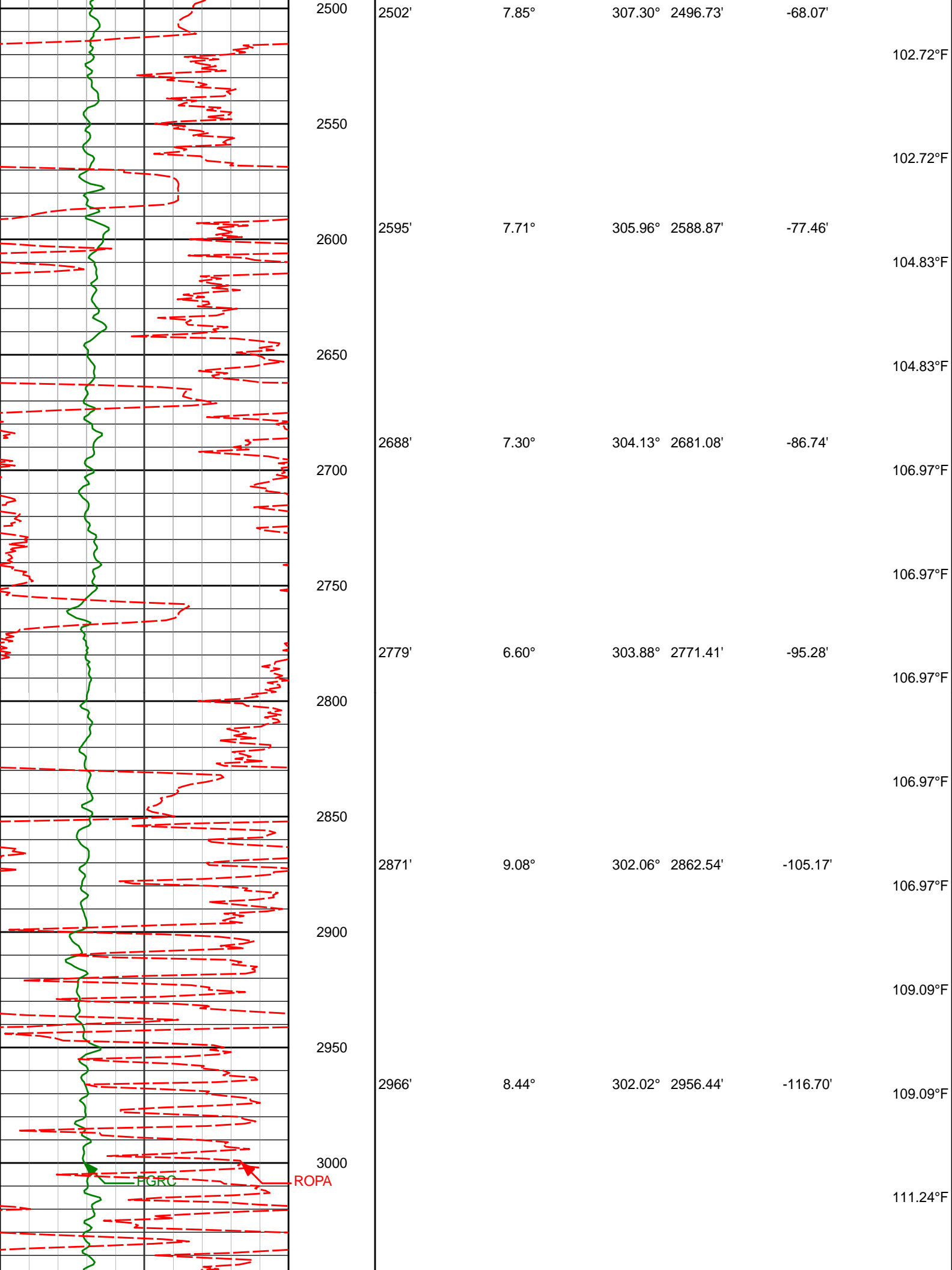


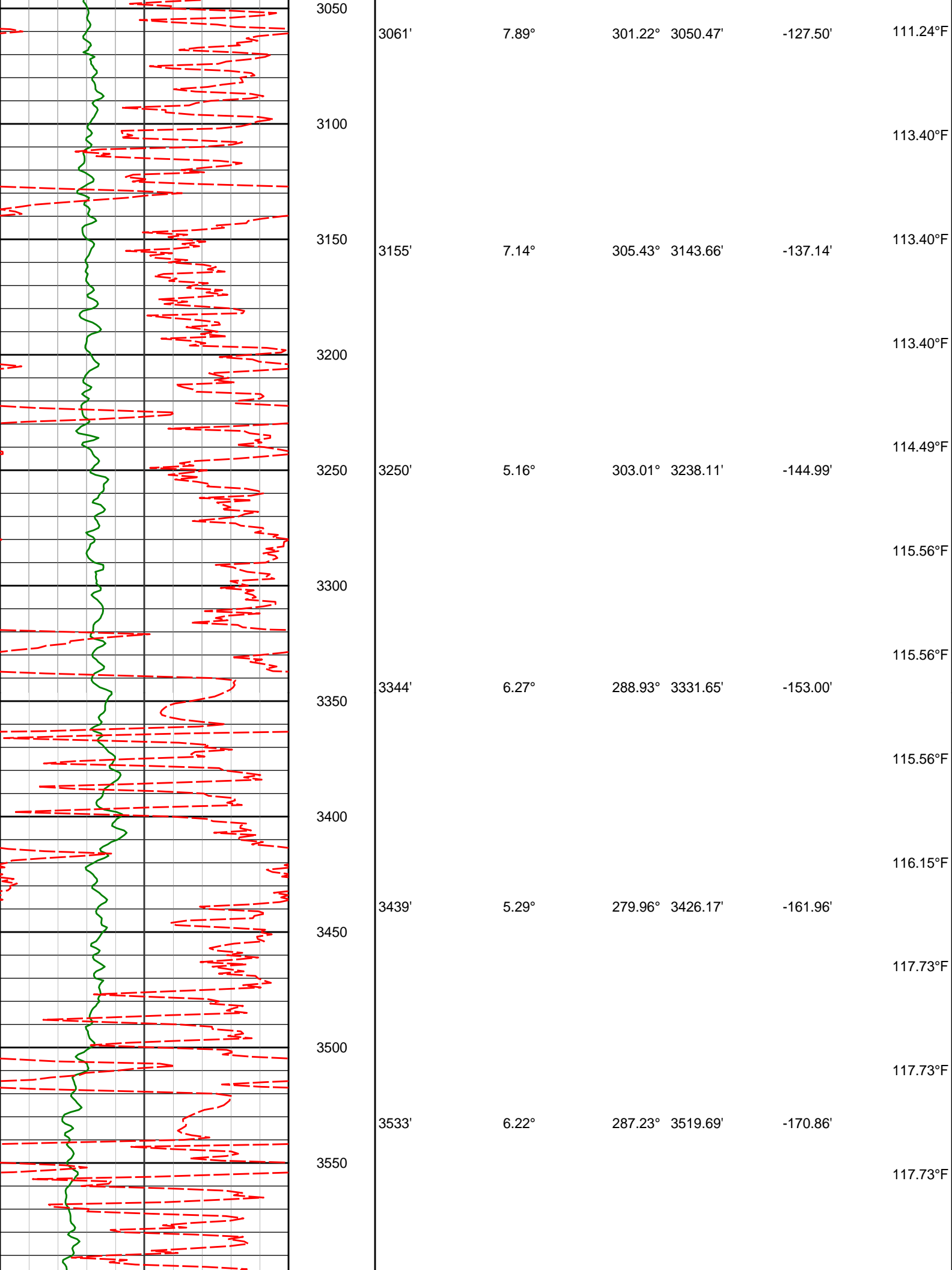


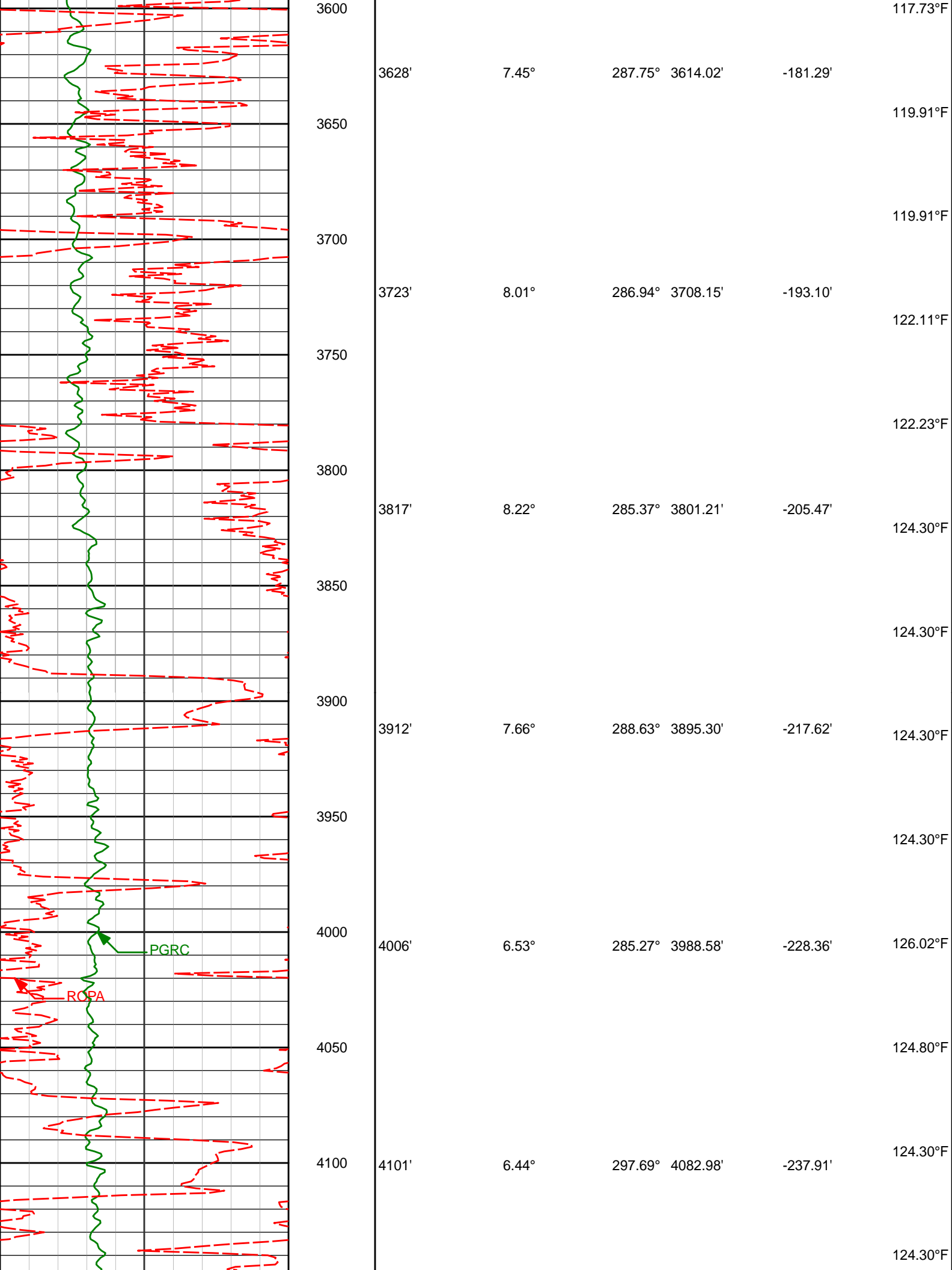
1950
2000
2050
2100
2150
2200
2250
2300
2350
2400
2450

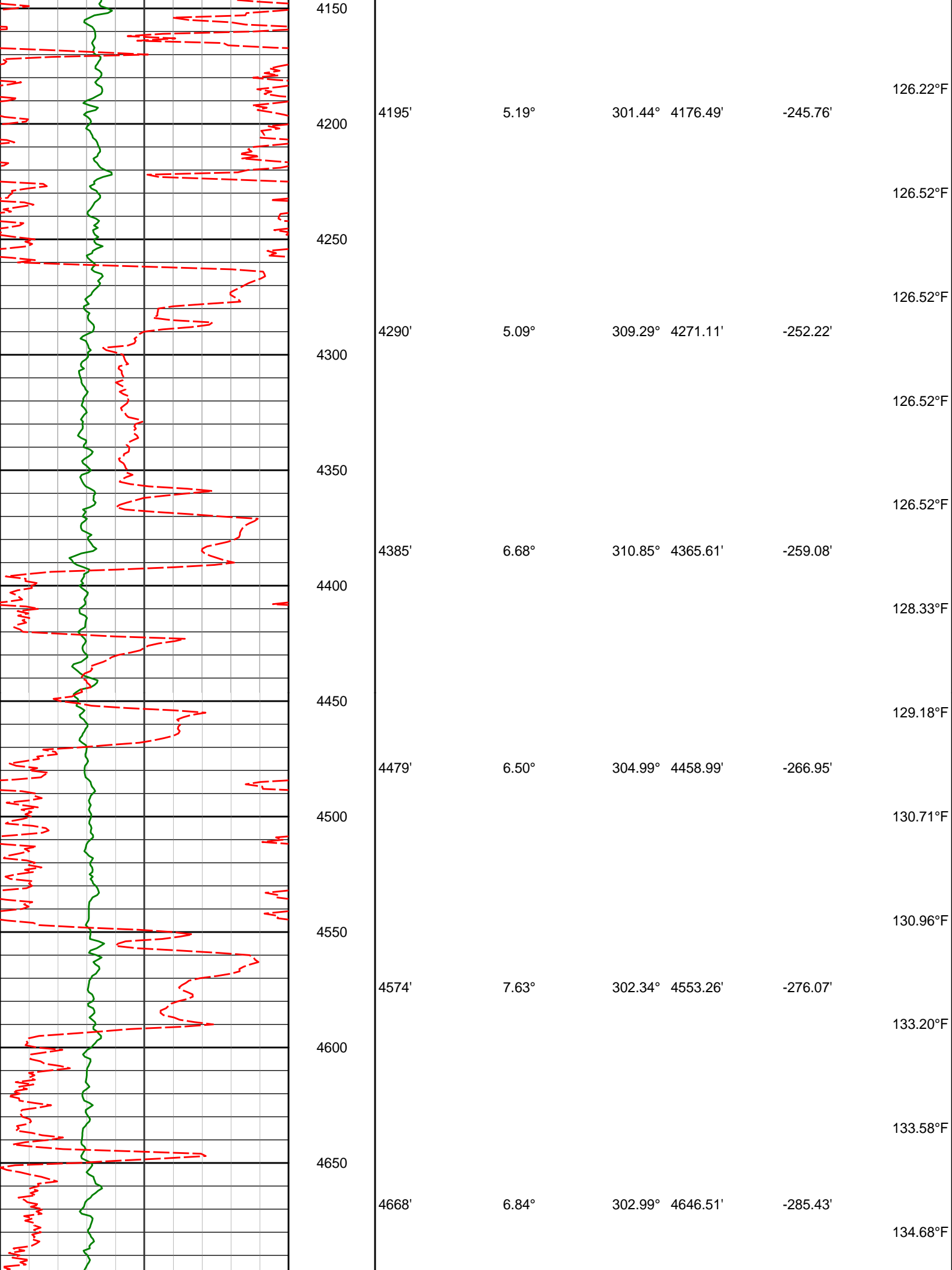
1947'	6.63°	313.02°	1944.91'	-20.80'
2040'	6.36°	310.52°	2037.31'	-27.99'
2224'	6.21°	297.56°	2220.22'	-43.49'
2317'	5.70°	291.68°	2312.72'	-51.84'
2409'	5.02°	287.55°	2404.31'	-59.63'

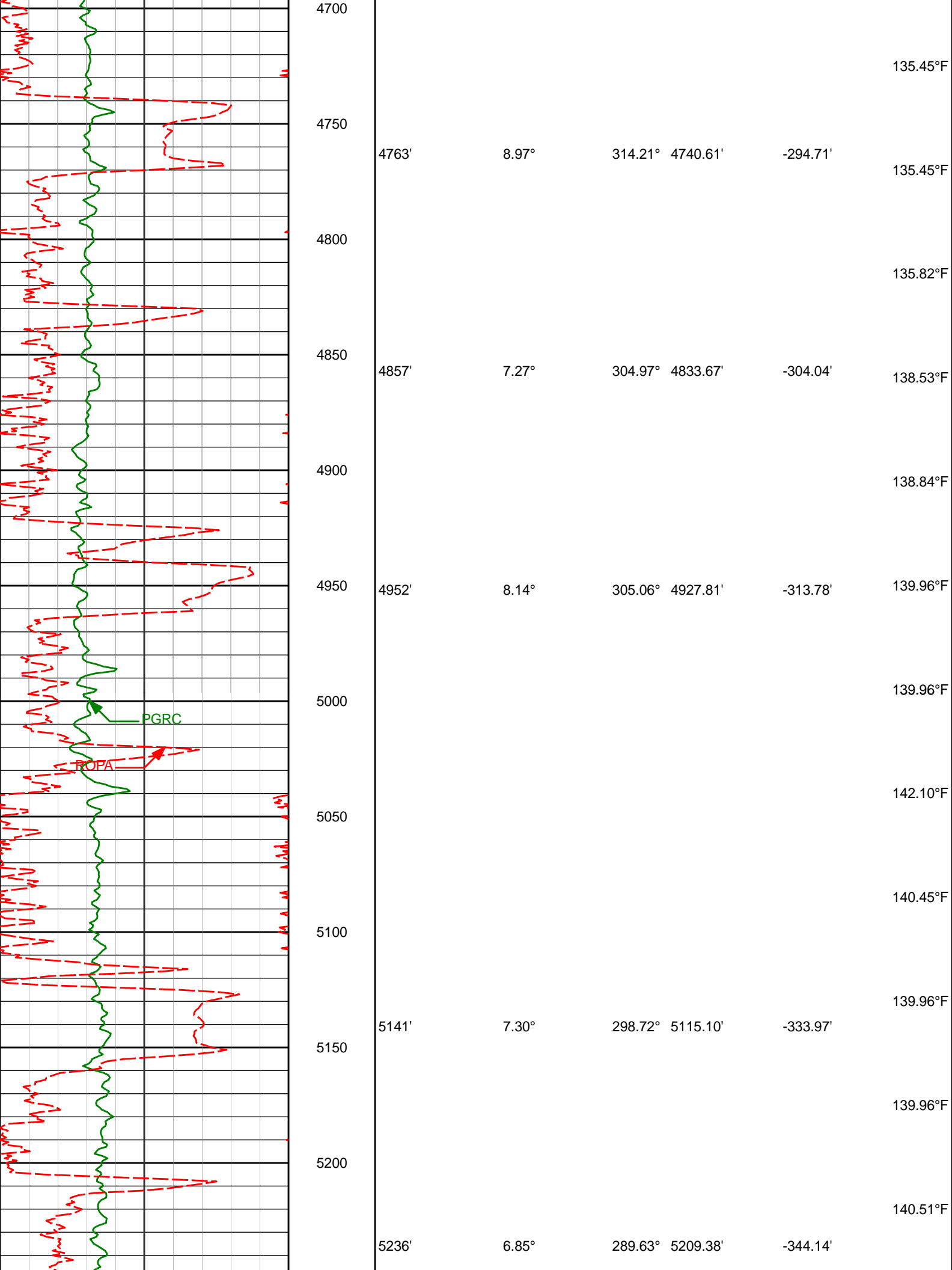
94.33°F
94.33°F
96.42°F
97.83°F
98.51°F
98.51°F
98.51°F
100.62°F
100.62°F
101.00°F
102.17°F
102.72°F

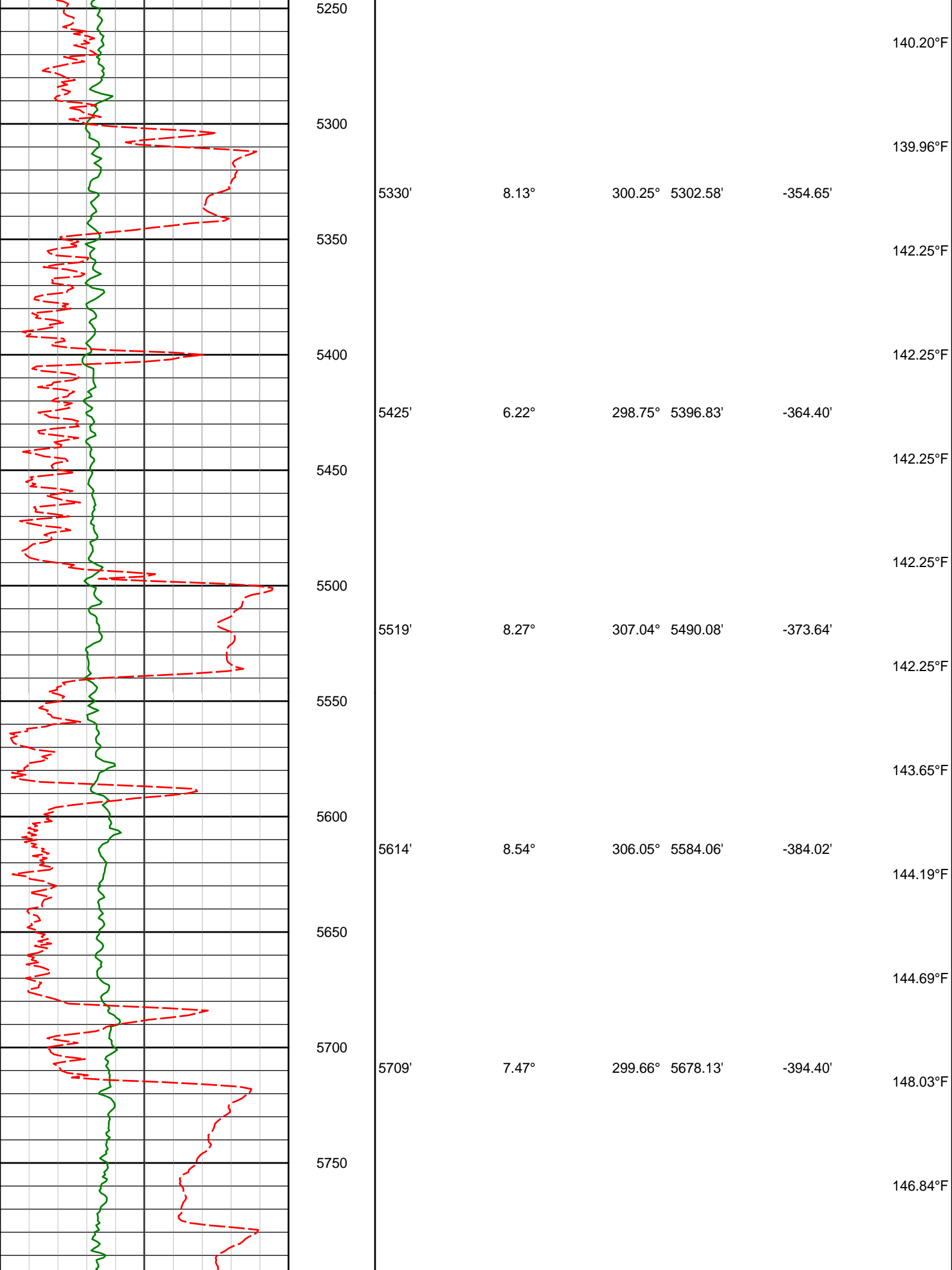


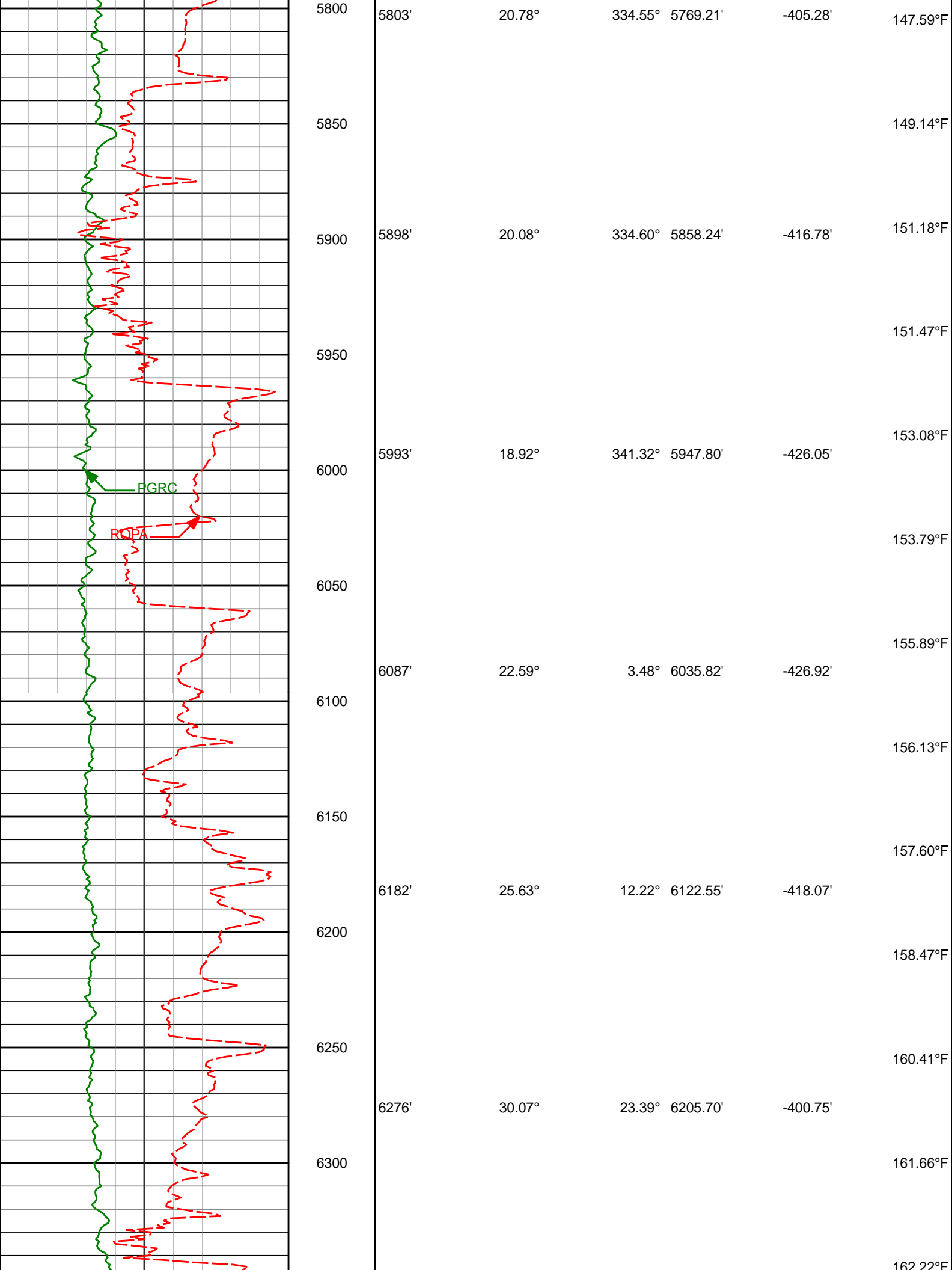


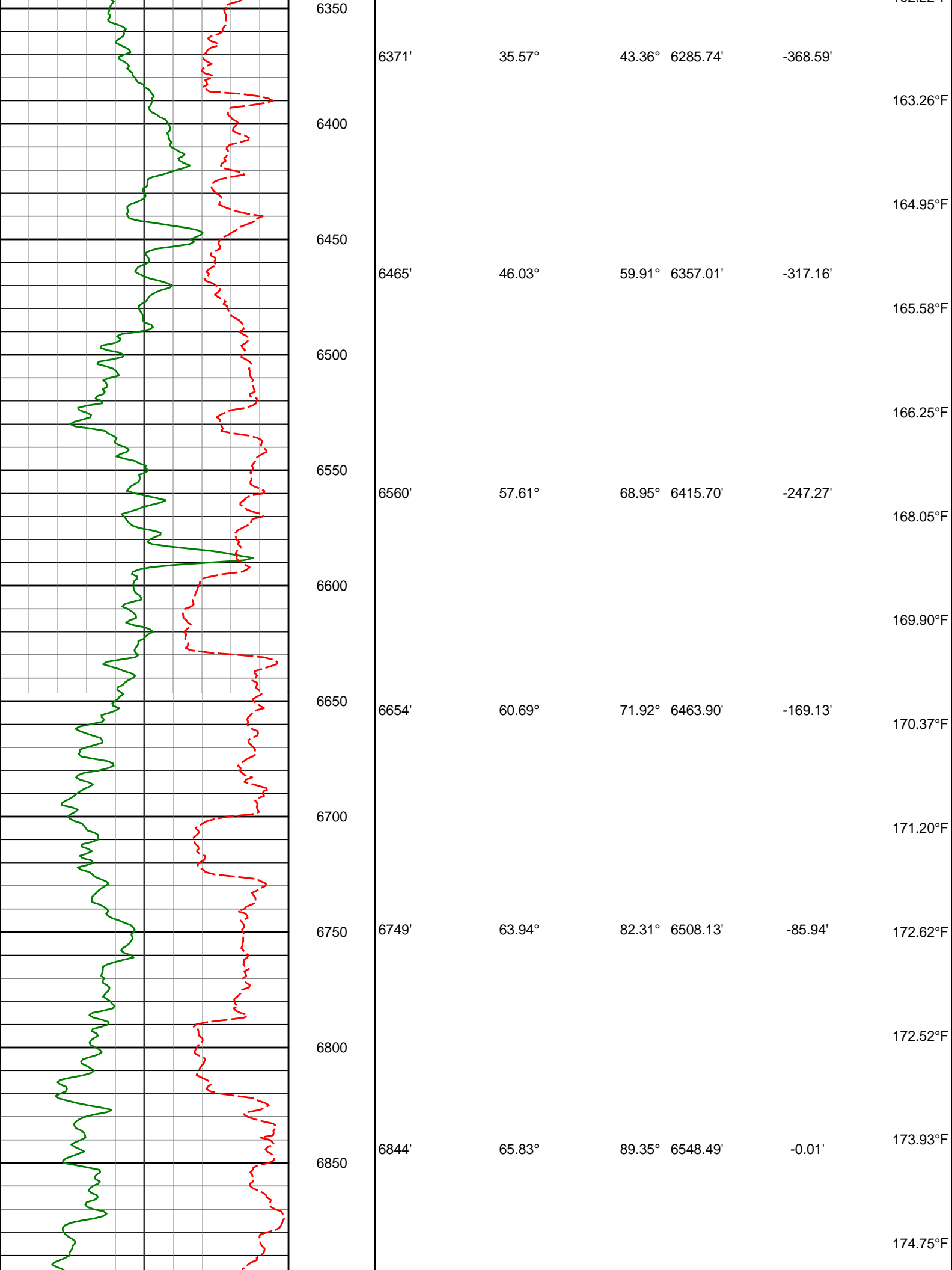


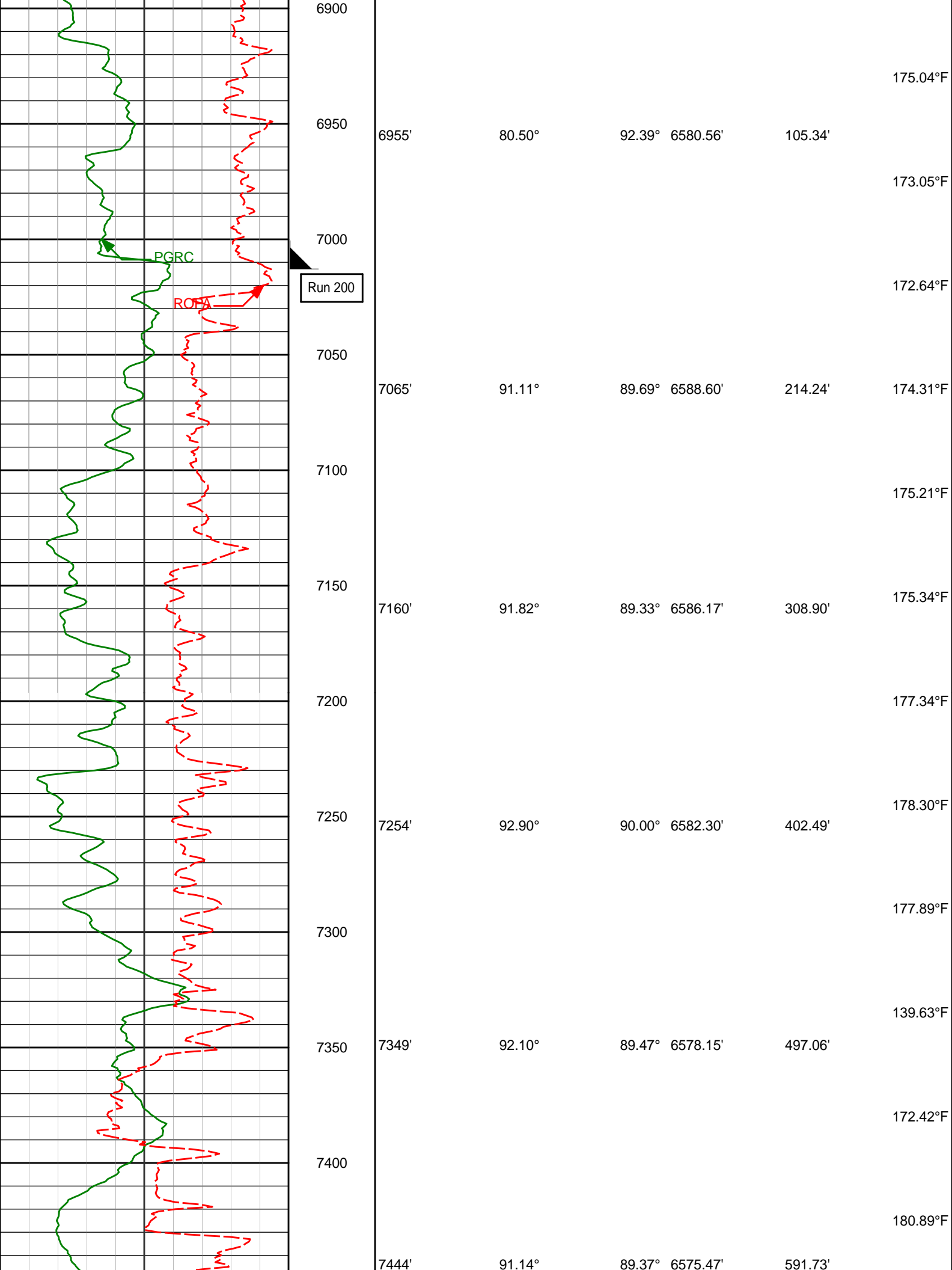


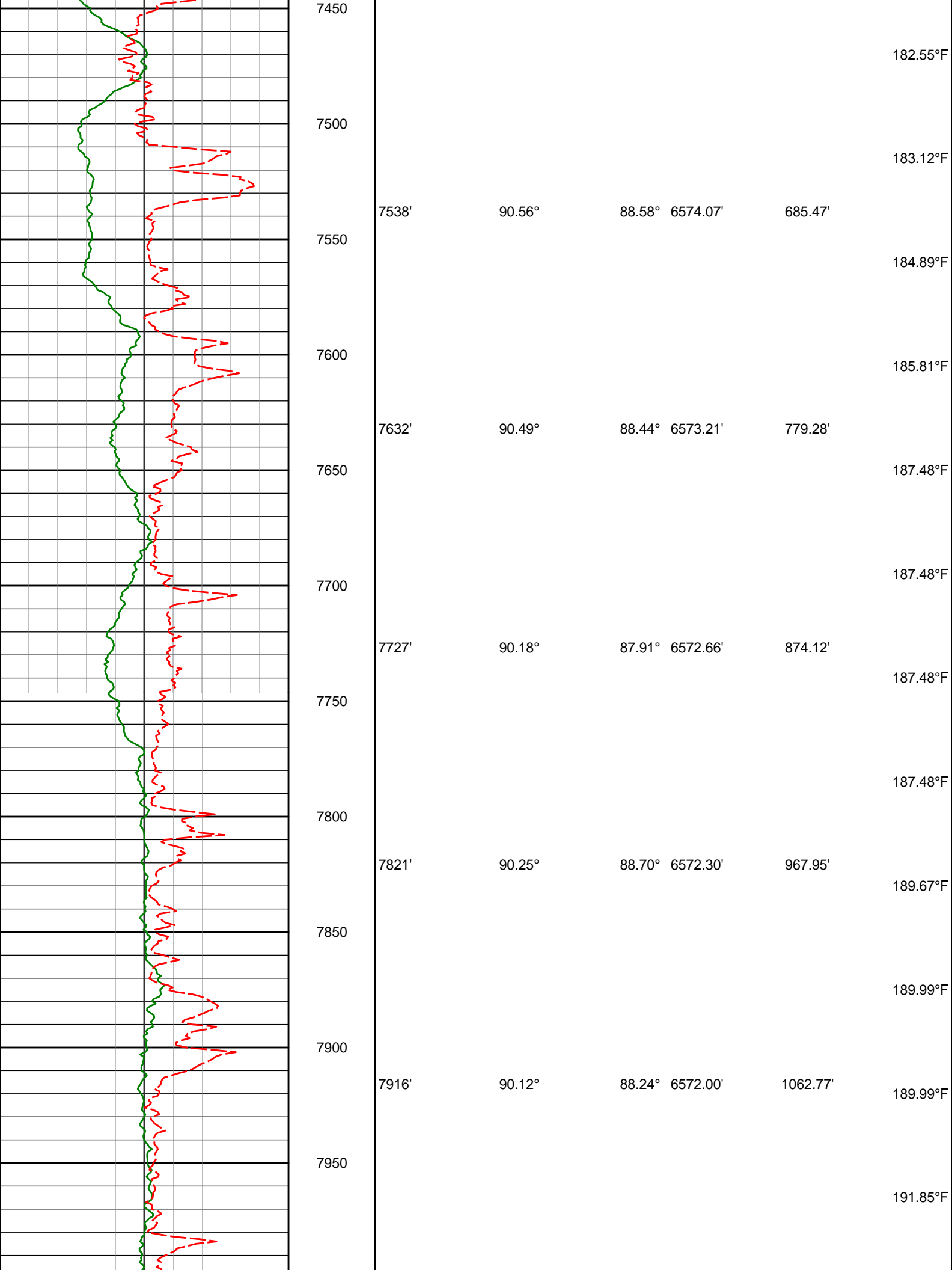


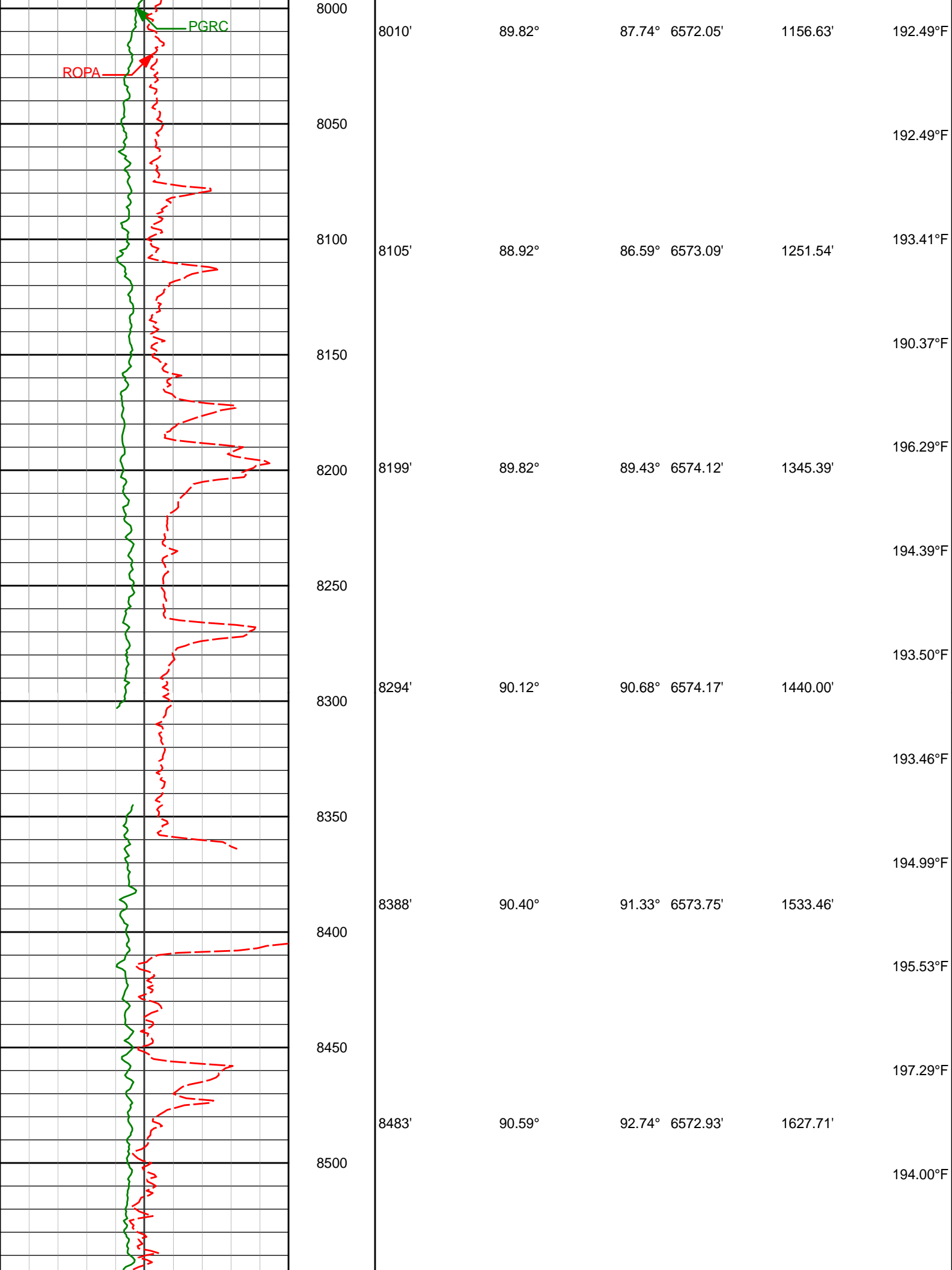


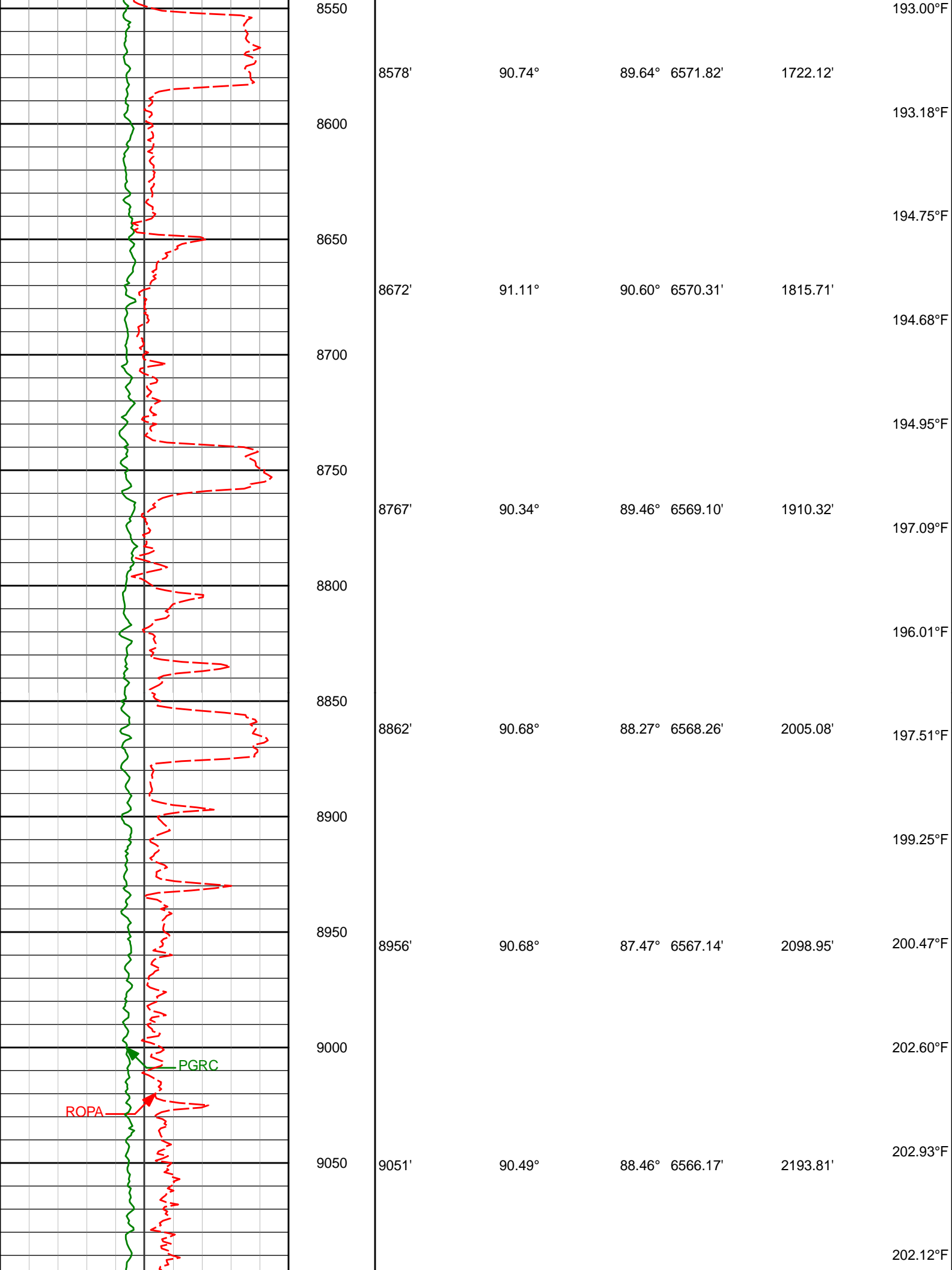


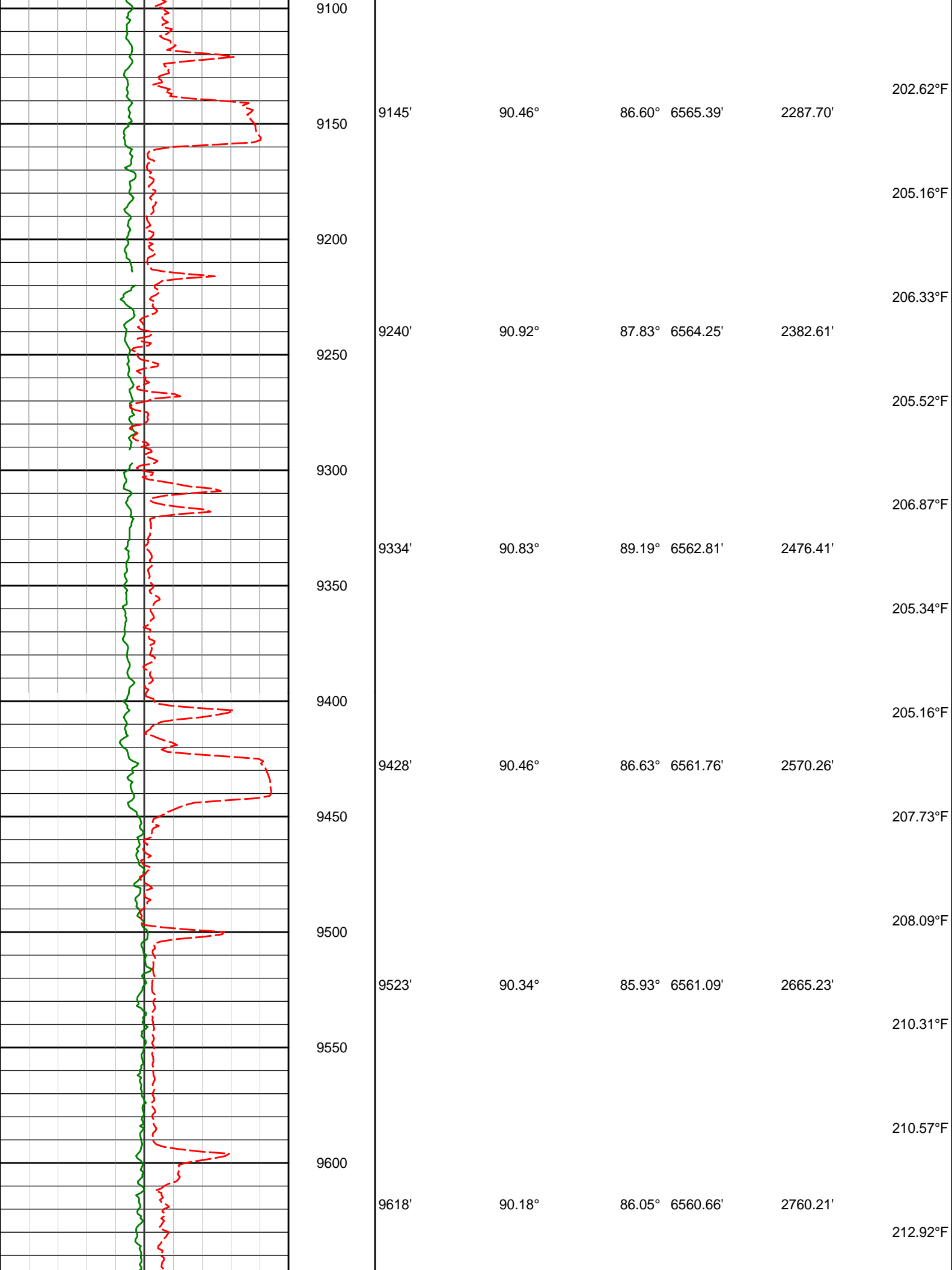


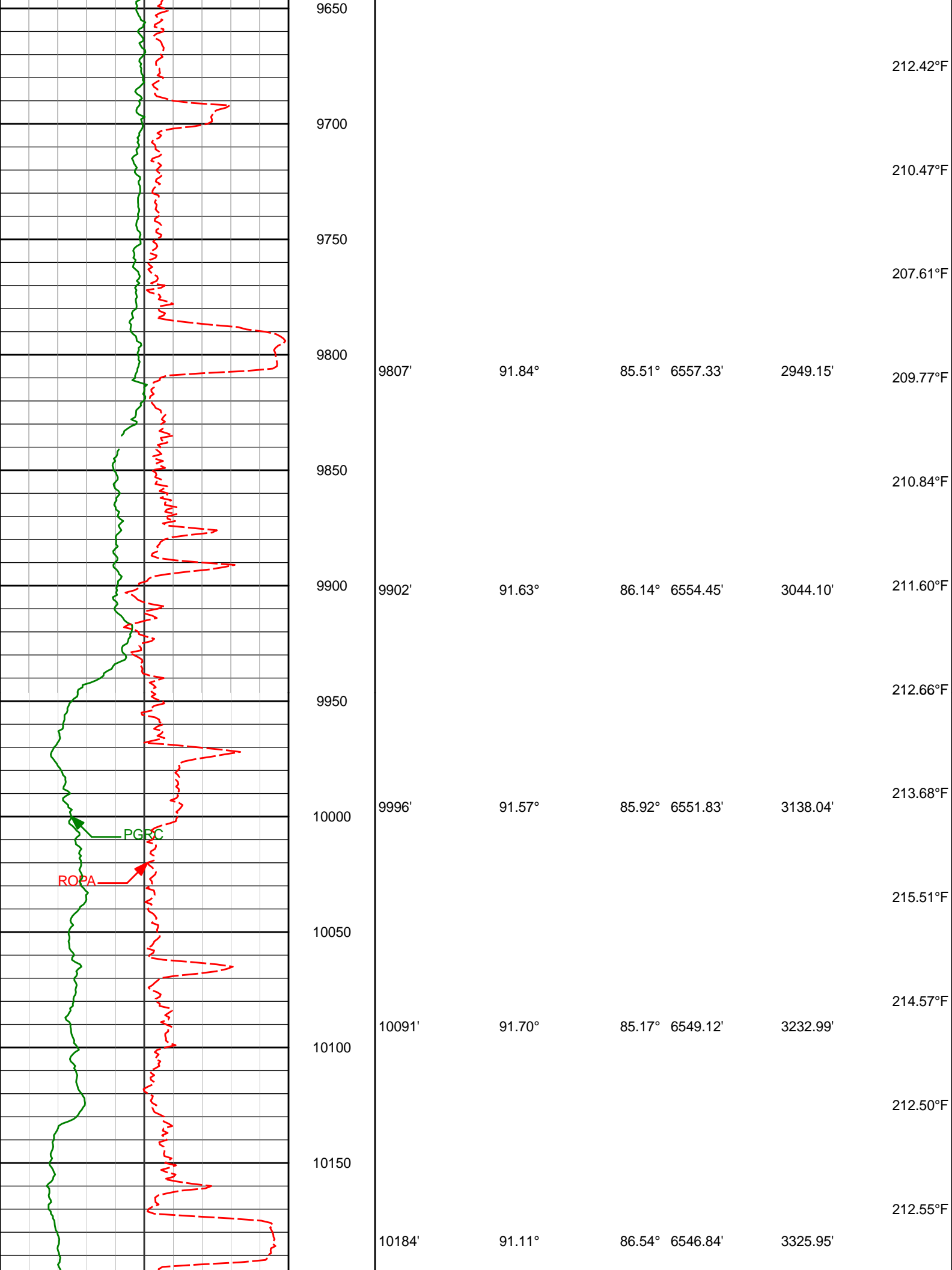


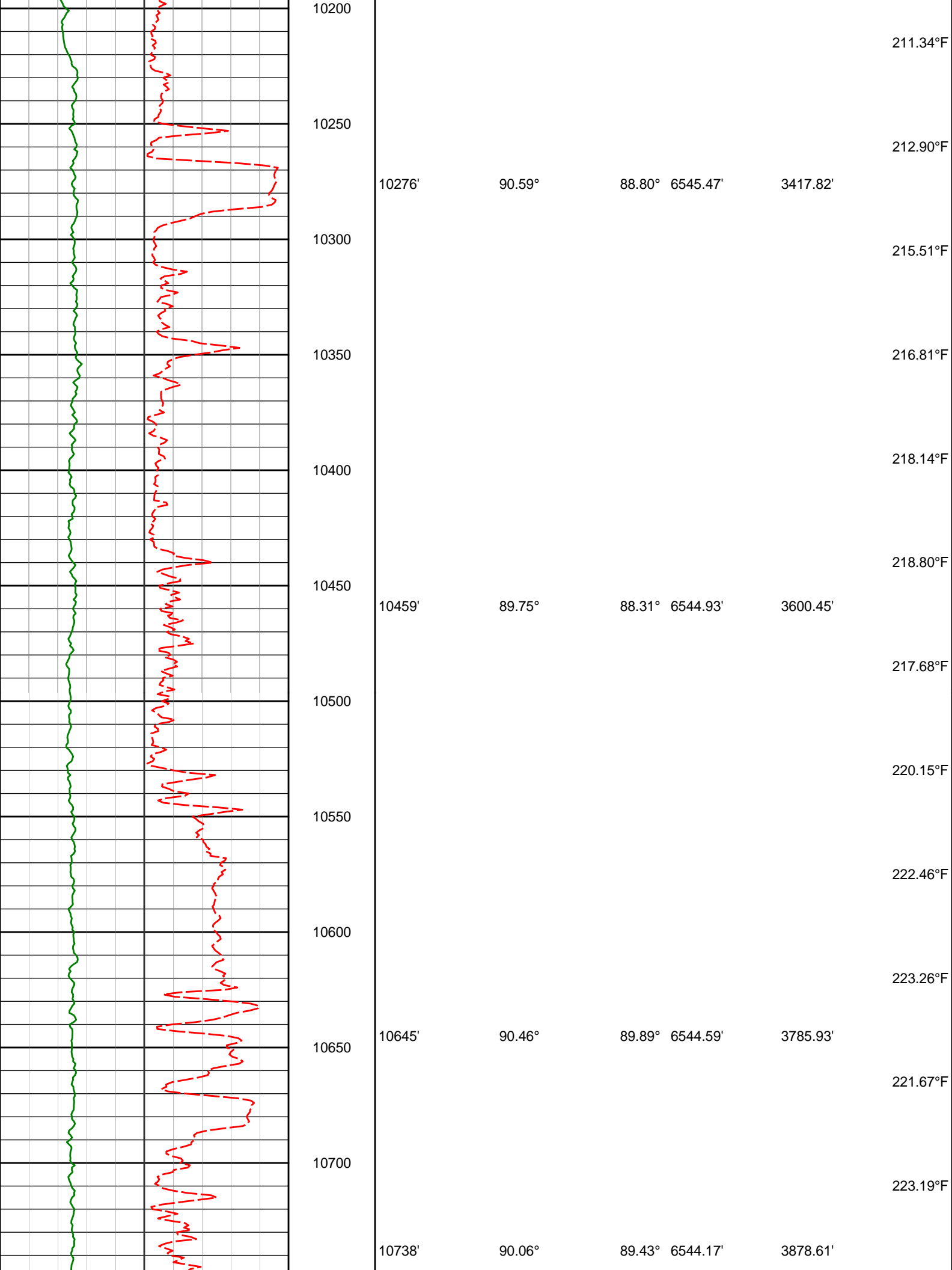


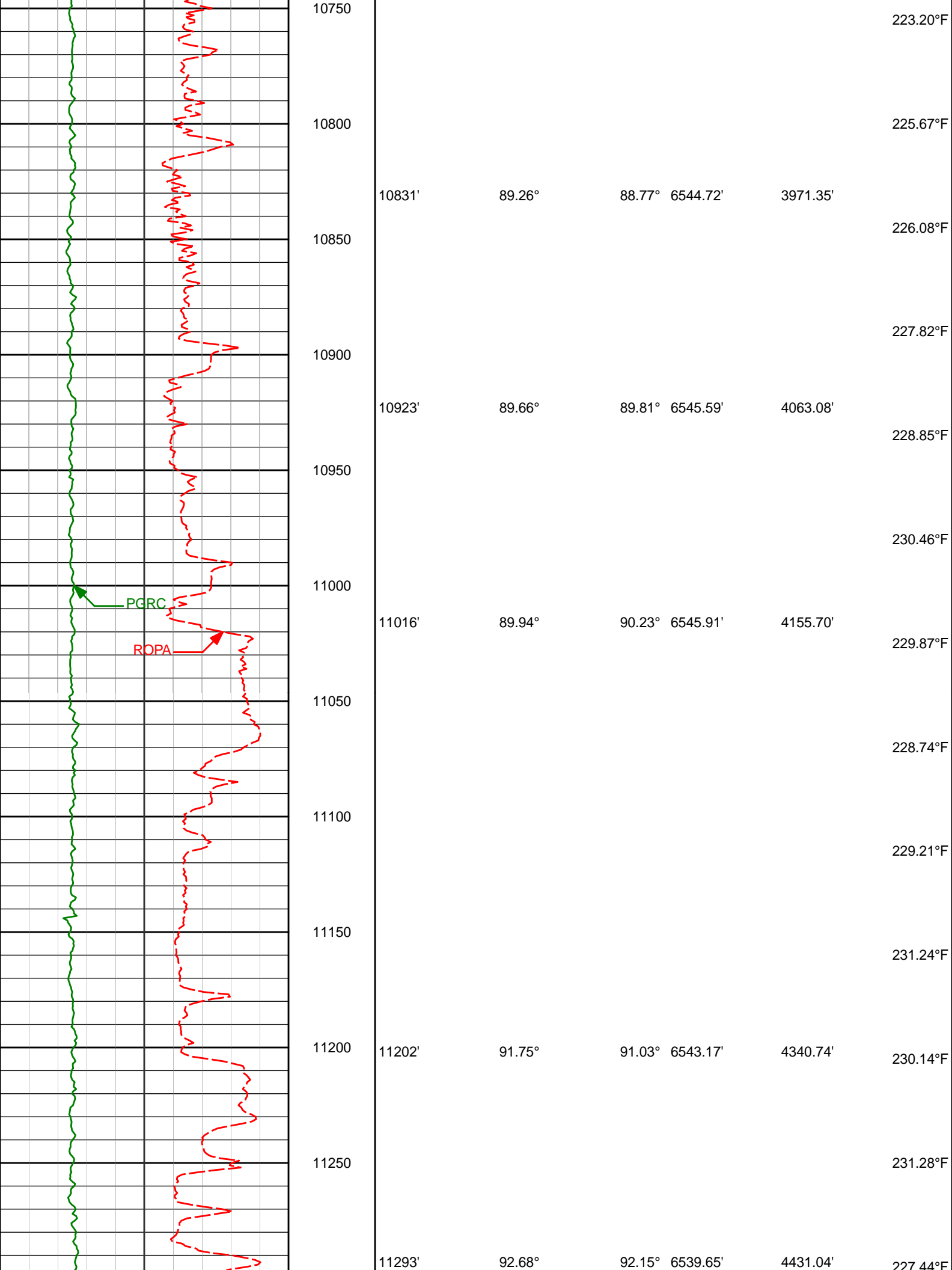


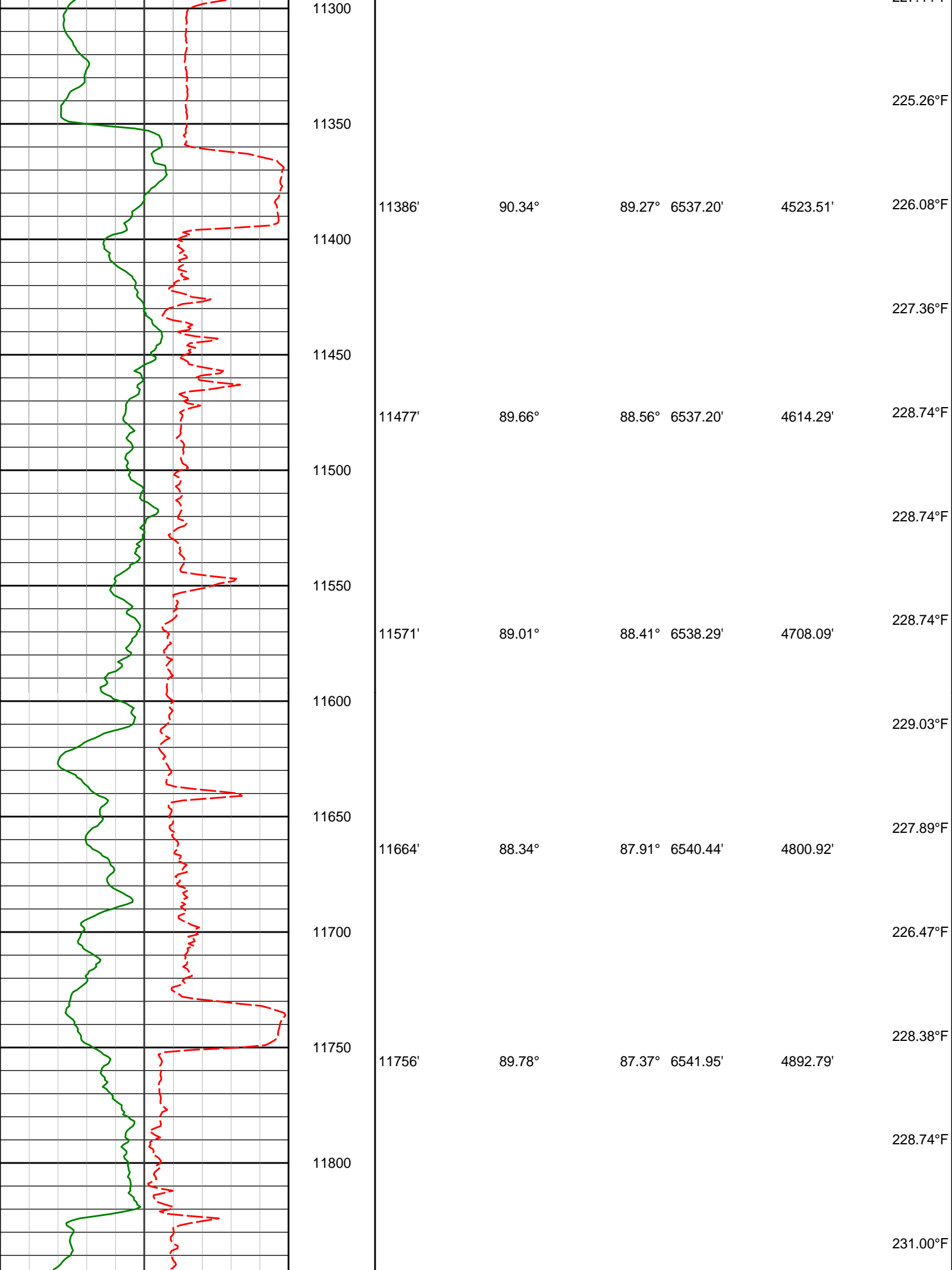


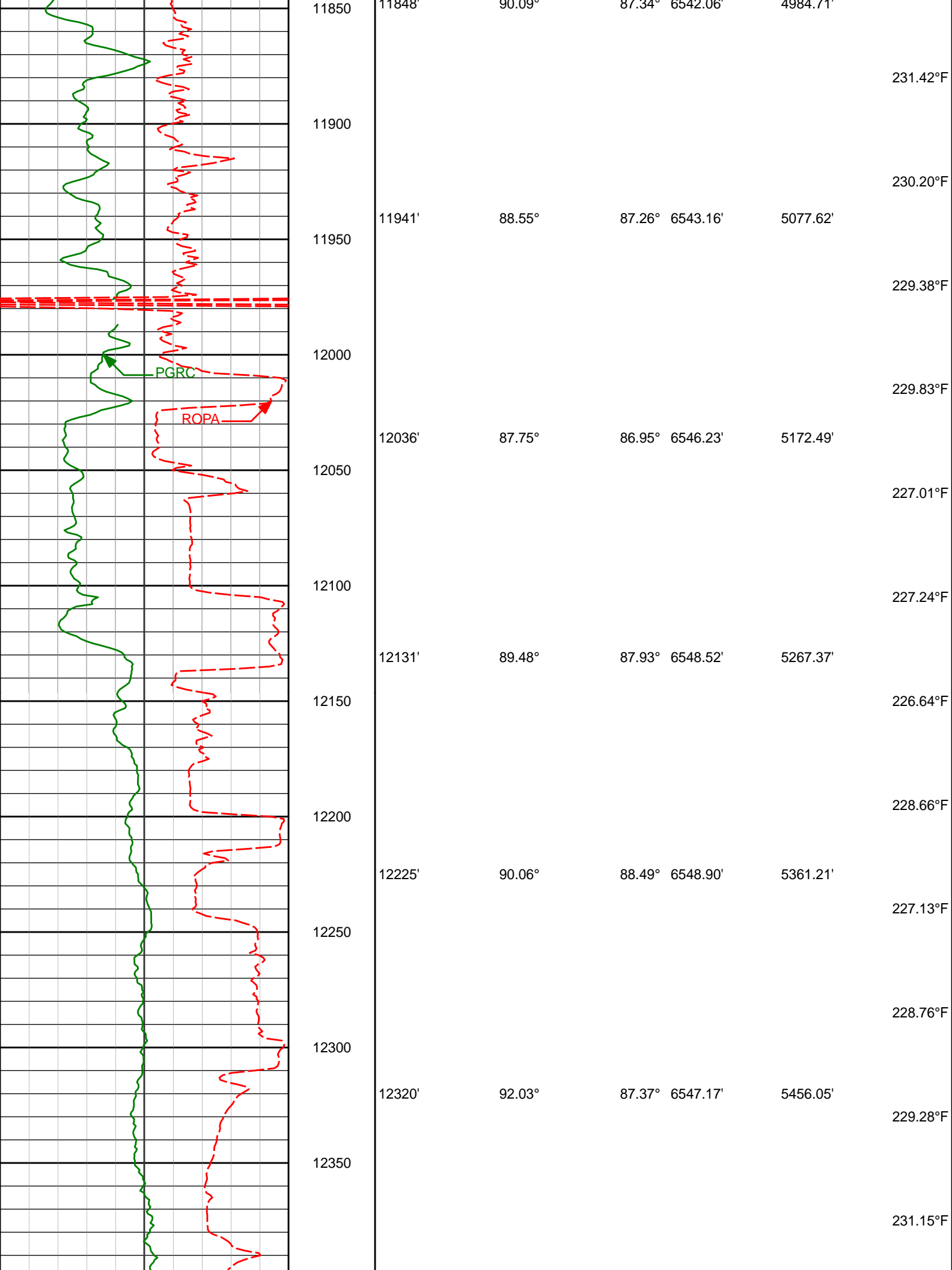


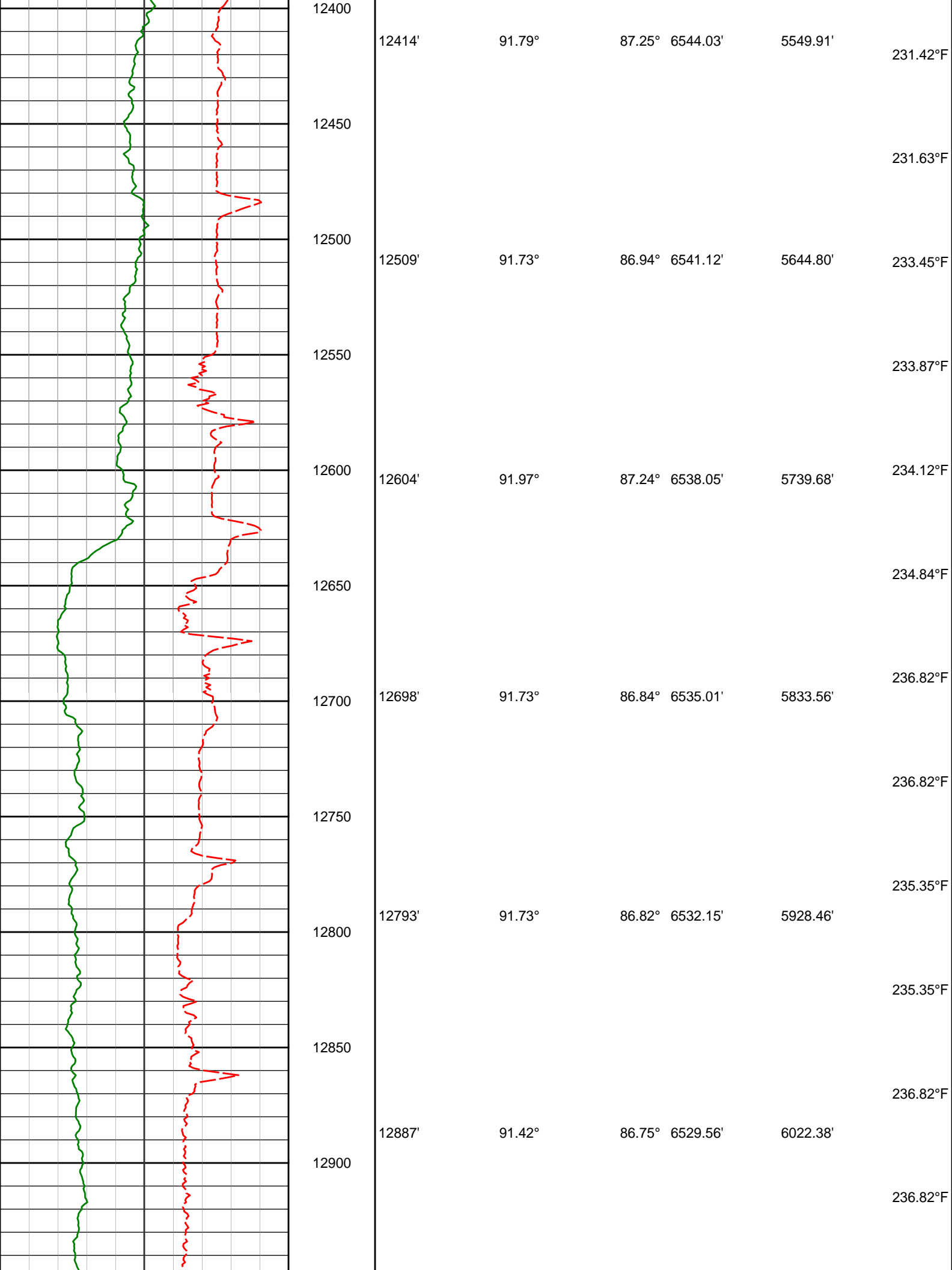


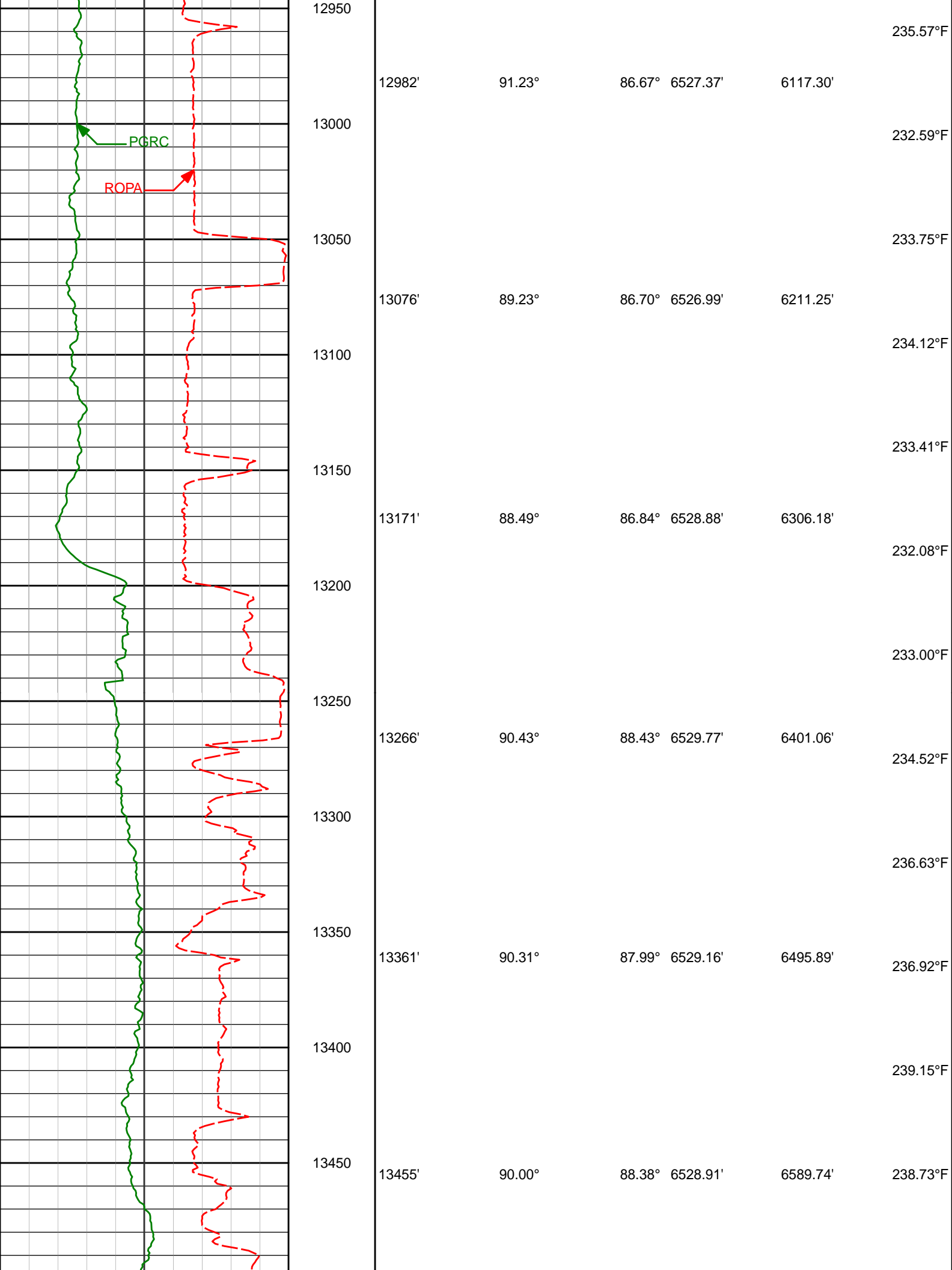


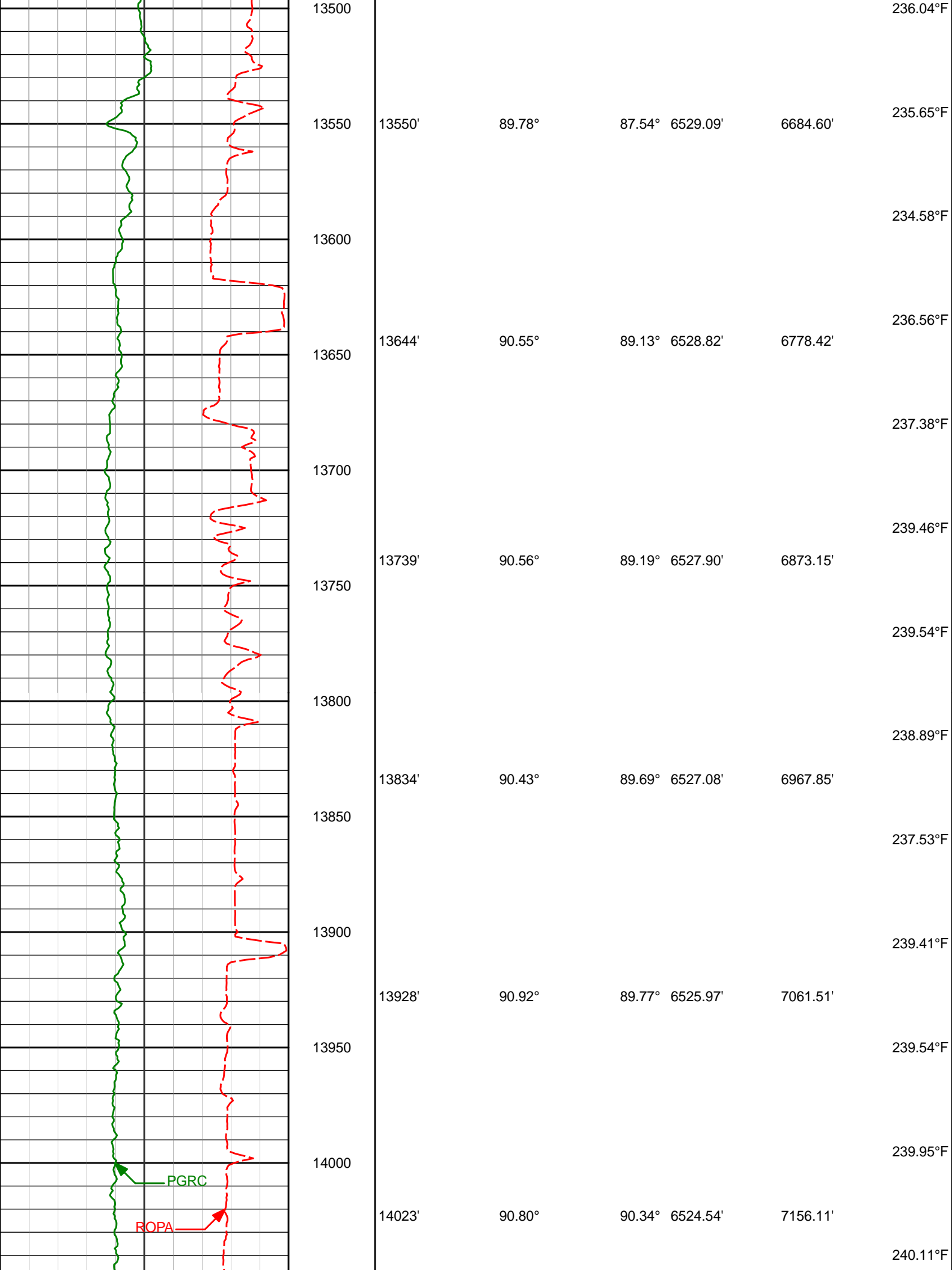


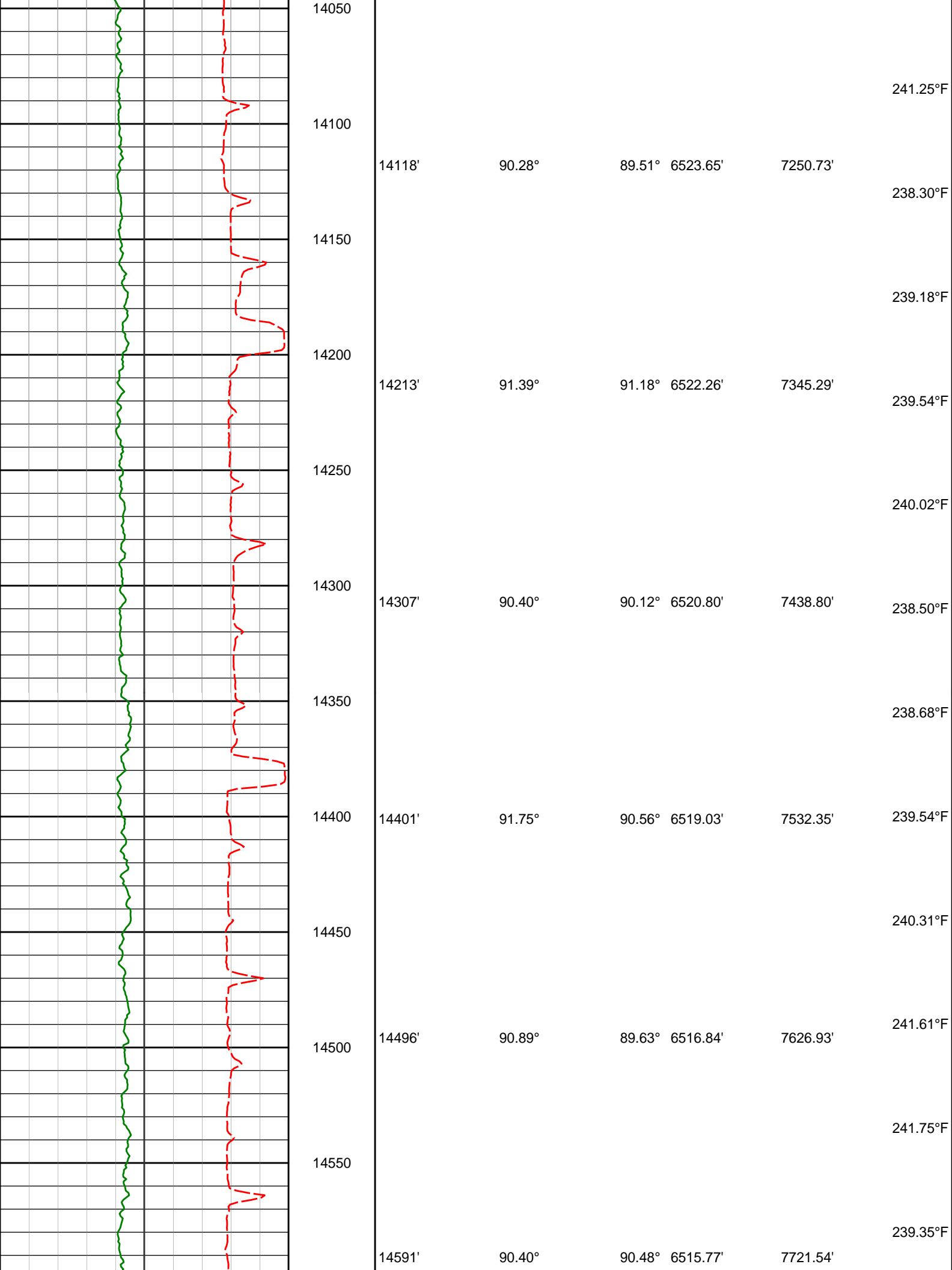


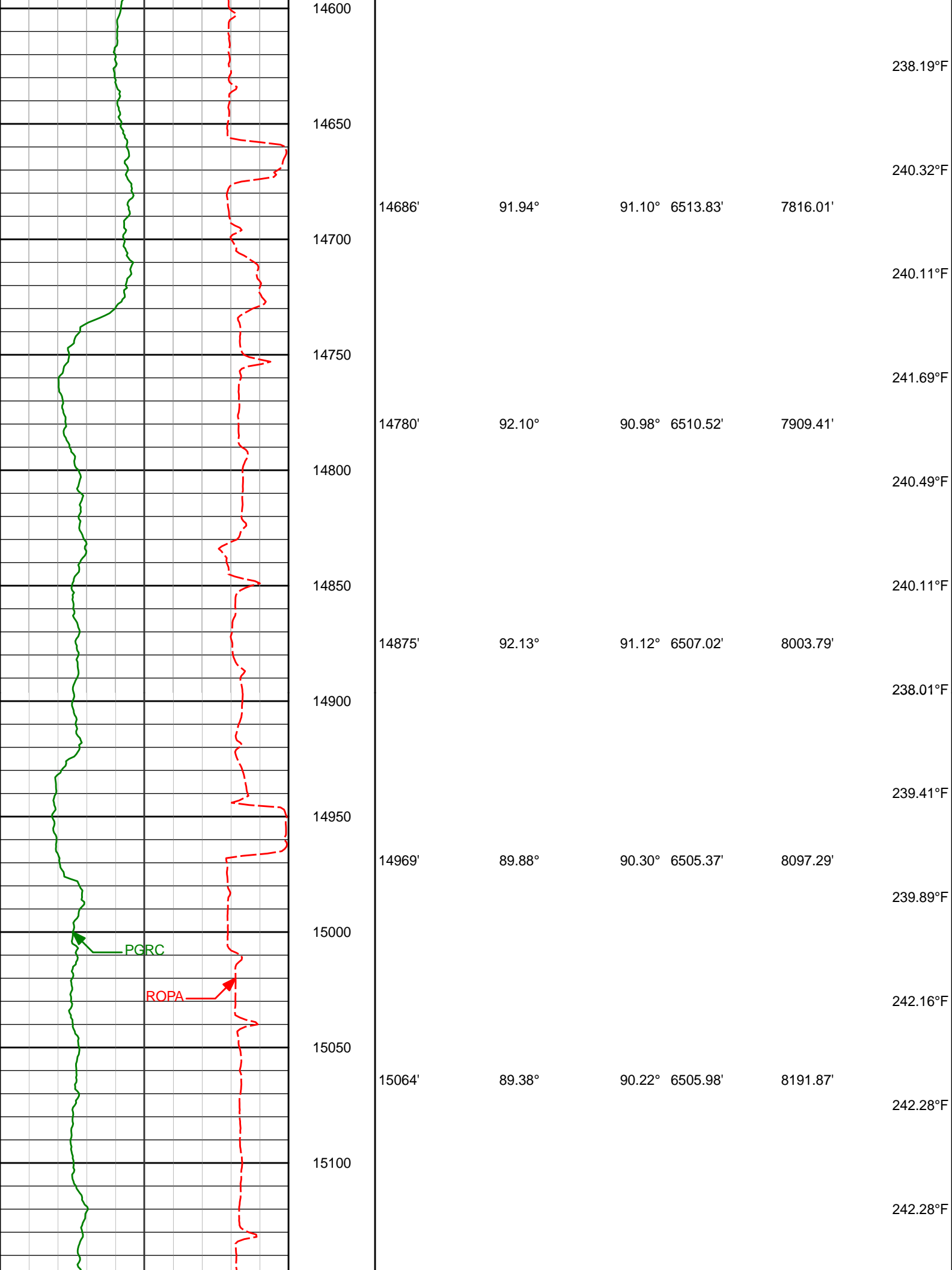


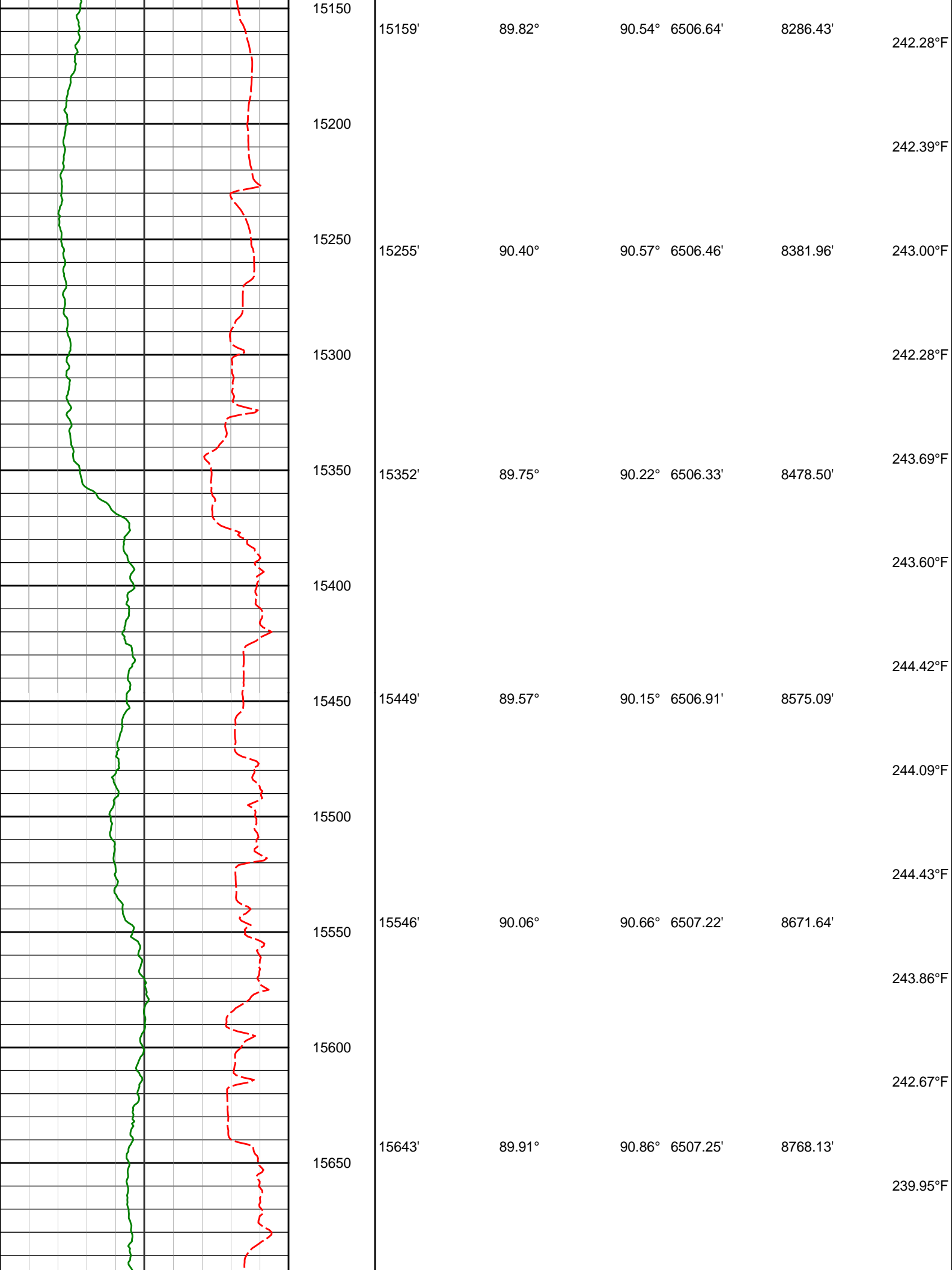


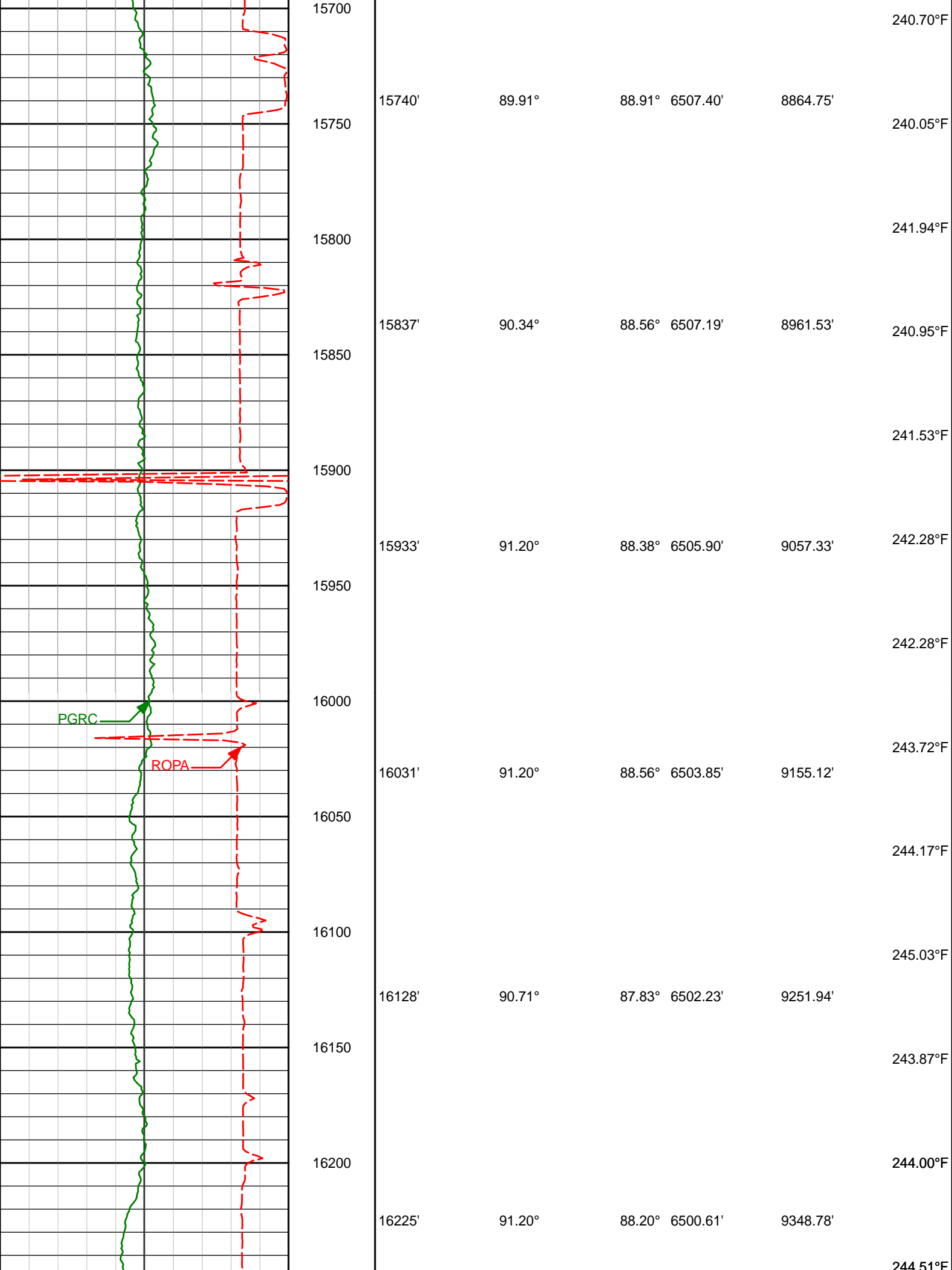


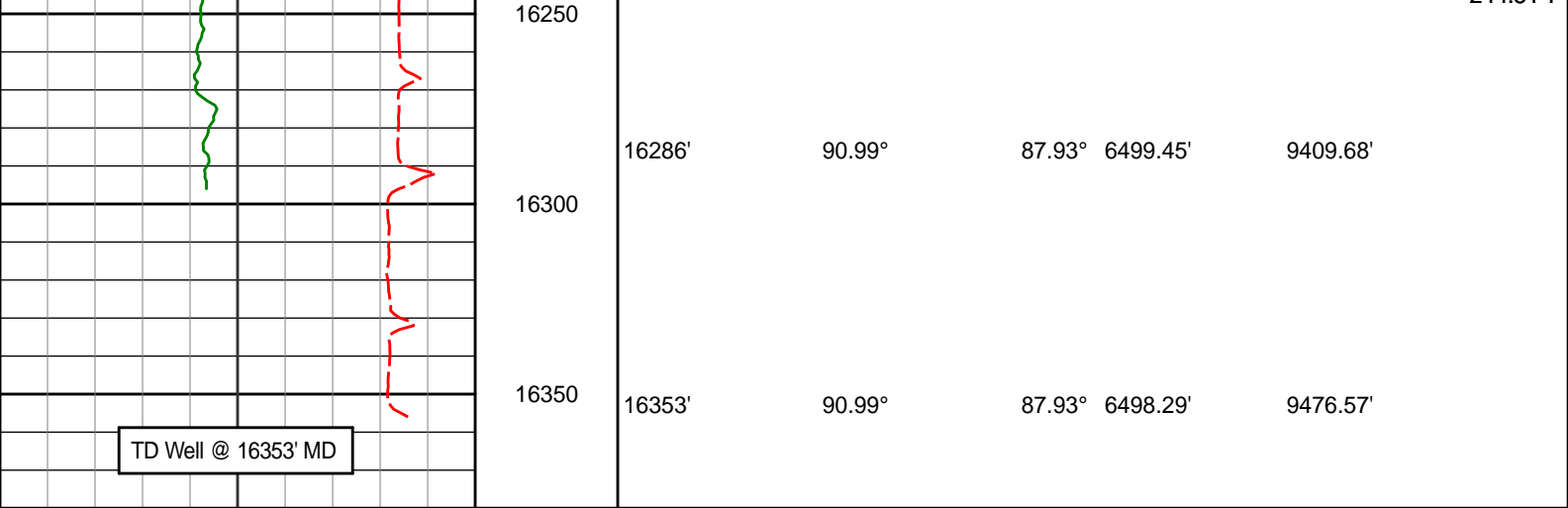






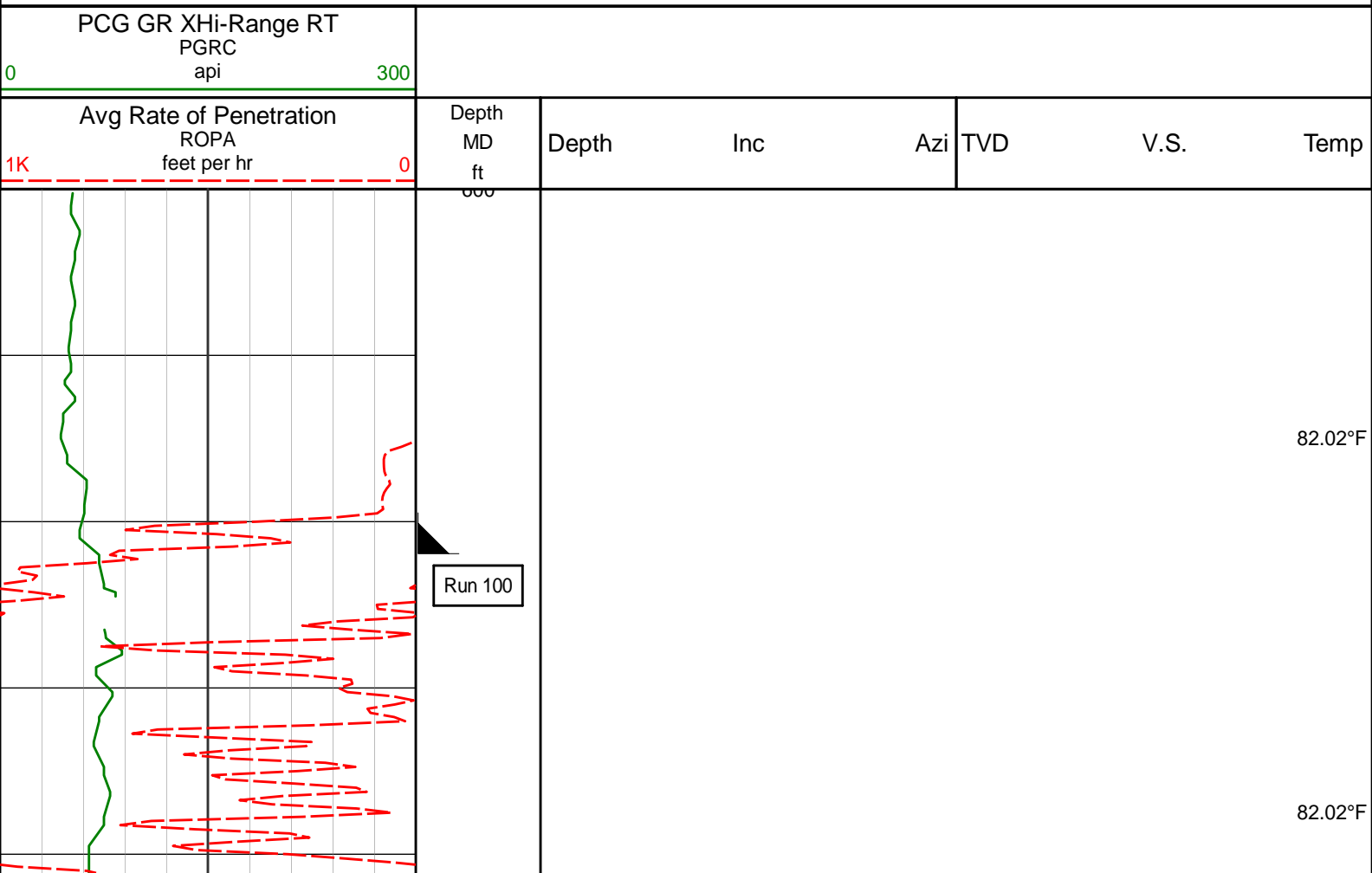






Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0								
PCG Gamma Ray BCorr PGRC api								
0 300								

MD Detail 1:240 Scale





700

738'

0.31°

76.18°

738.00'

2.00'

82.02°F

82.02°F

800

833'

0.31°

84.09°

832.99'

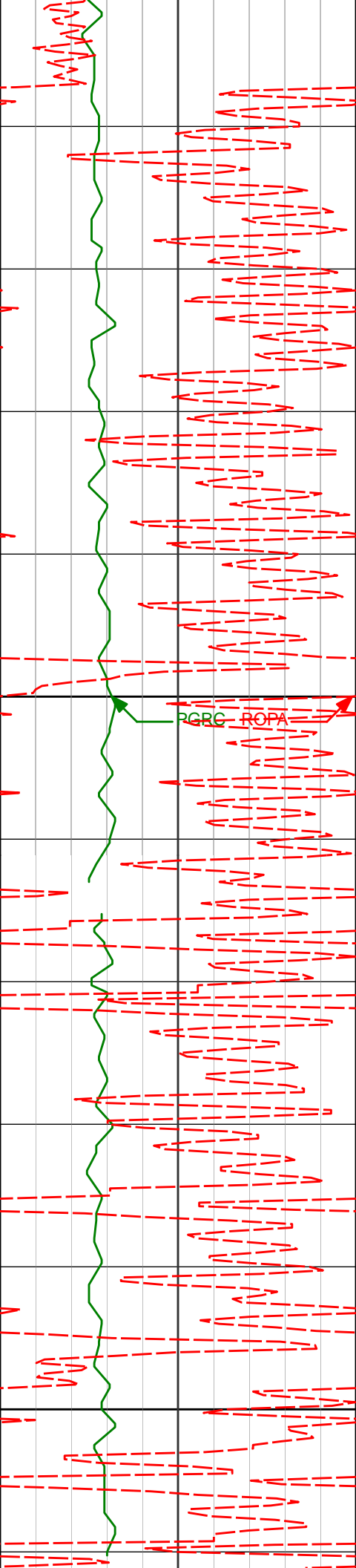
2.52'

82.02°F

84.06°F

900

84.06°F



928'

0.16°

112.88° 927.99'

2.89'

84.06°F

1000

RGRC ROPA

84.06°F

84.06°F

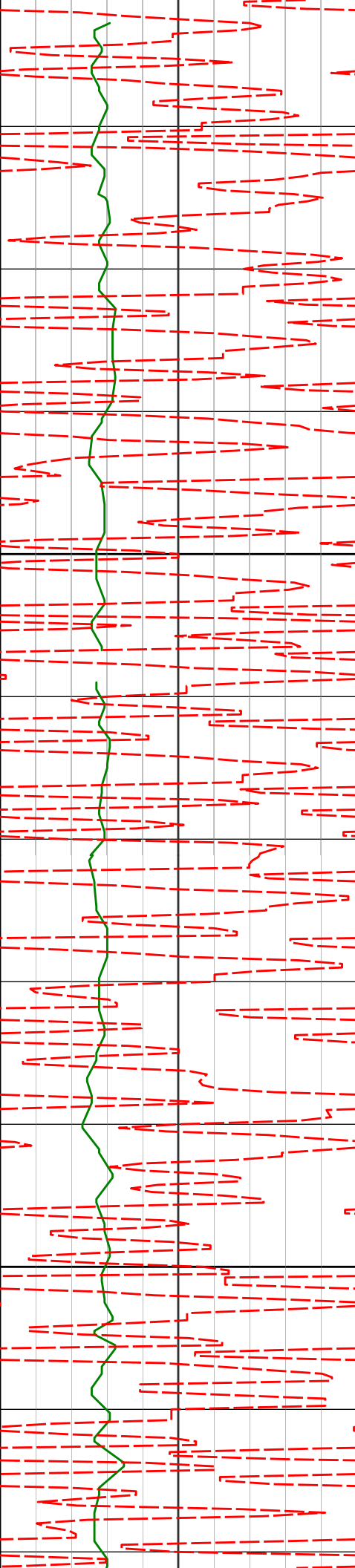
1100

1116'

0.29°

157.46° 1115.99'

3.26'



1200

1207'

0.22°

126.70°

1206.99'

3.47'

1300

1299'

0.30°

154.42°

1298.99'

3.68'

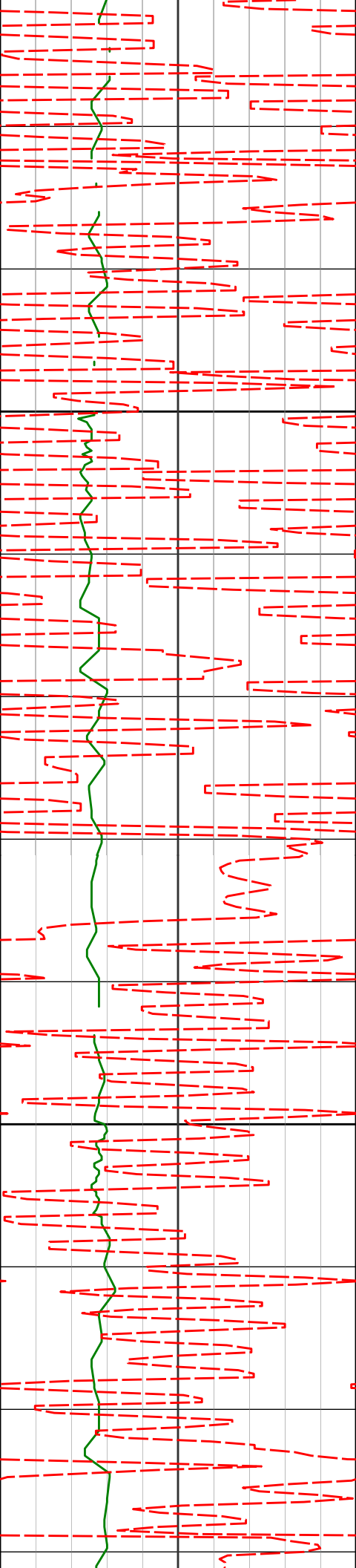
59.65°F

62.41°F

66.09°F

79.89°F

68.37°F



1400

1500

1390'

1483'

0.44°

0.84°

148.97°

288.60°

1389.99'

1482.99'

3.92'

3.46'

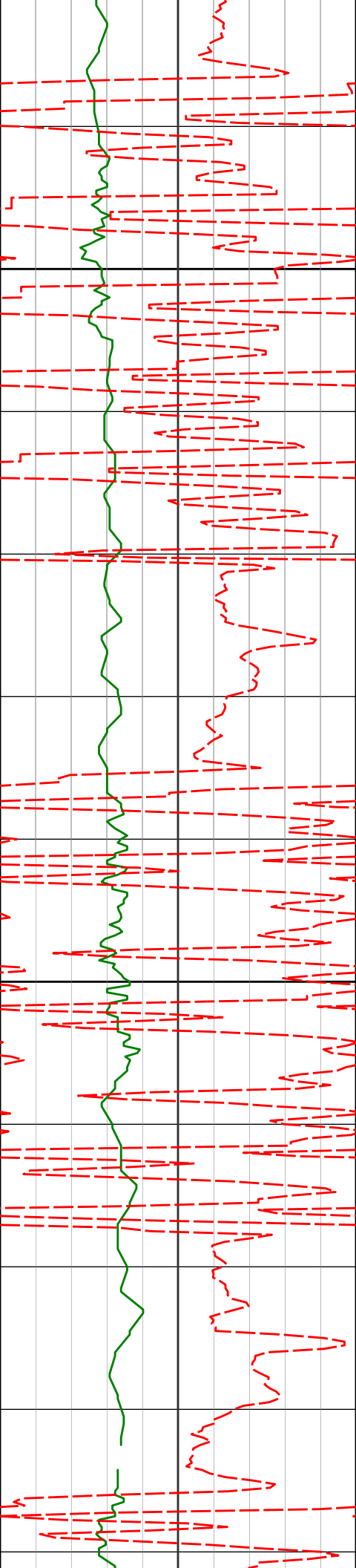
86.09°F

87.15°F

88.14°F

76.82°F

79.92°F



1576'

2.78°

312.34° 1575.94'

1.31'

89.34°F

1600

90.19°F

1669'

5.02°

325.71° 1668.72'

-2.19'

90.56°F

1700

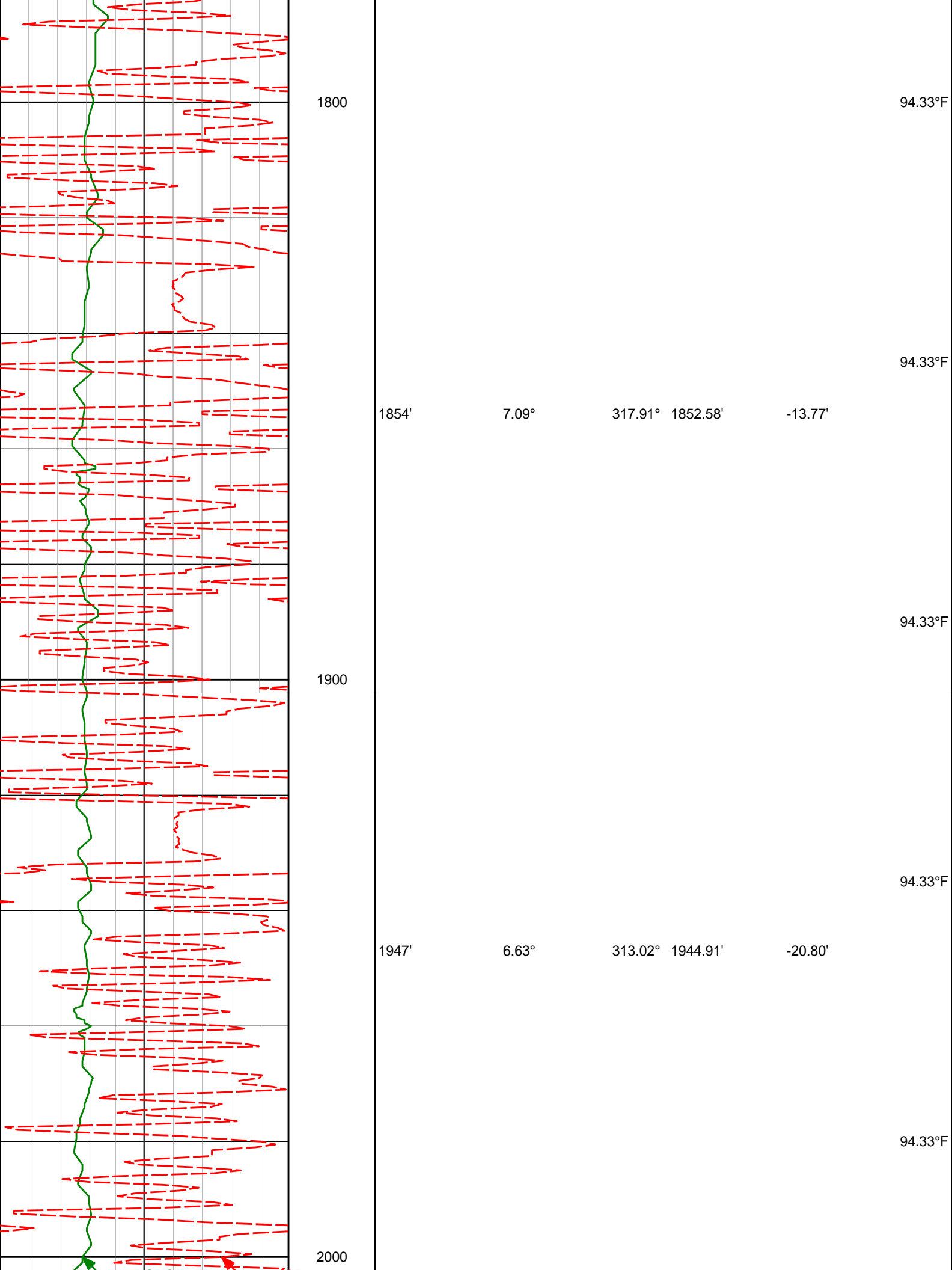
91.83°F

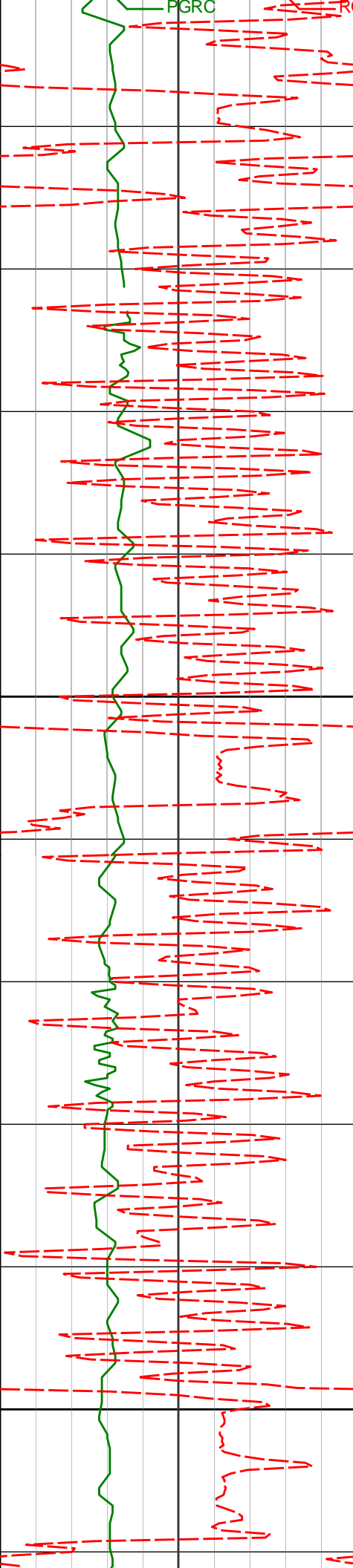
1762'

6.64°

319.53° 1761.23'

-7.28'





2100

2200

2040'

6.36°

310.52° 2037.31'

-27.99'

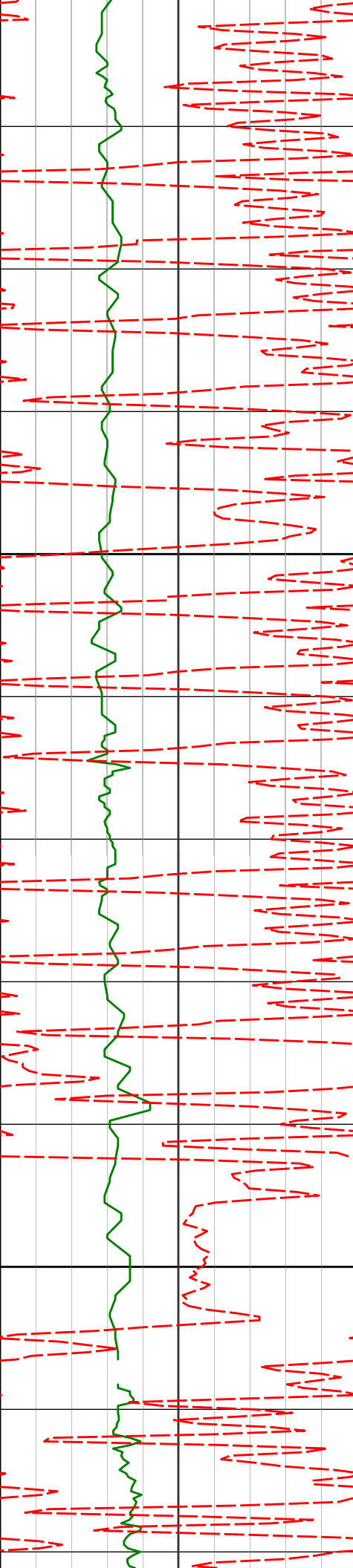
94.33°F

96.42°F

97.83°F

98.51°F

98.51°F



2300

2400

2224'

2317'

2409'

6.21°

5.70°

5.02°

297.56°

291.68°

287.55°

2220.22'

2312.72'

2404.31'

-43.49'

-51.84'

-59.63'

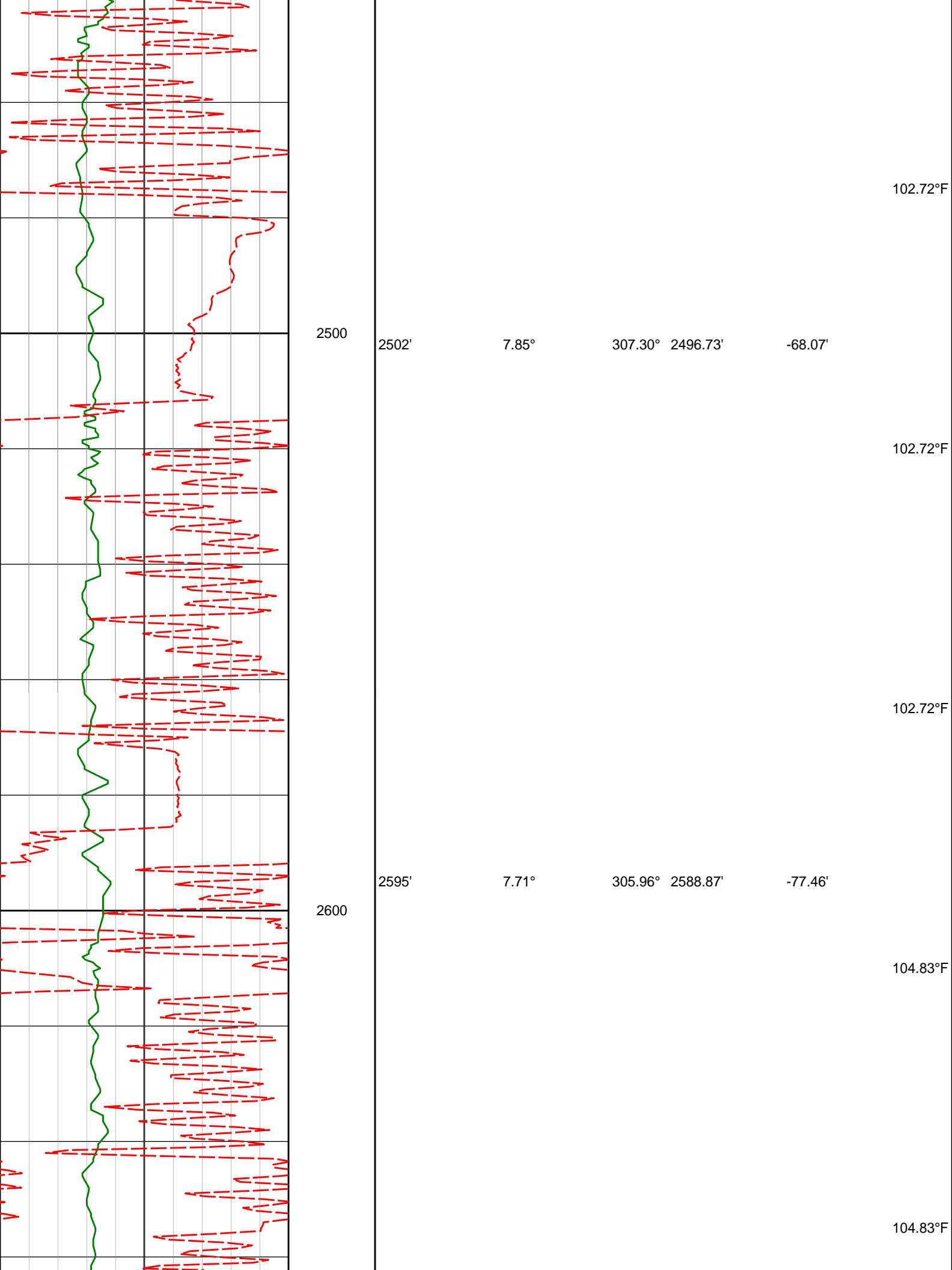
98.51°F

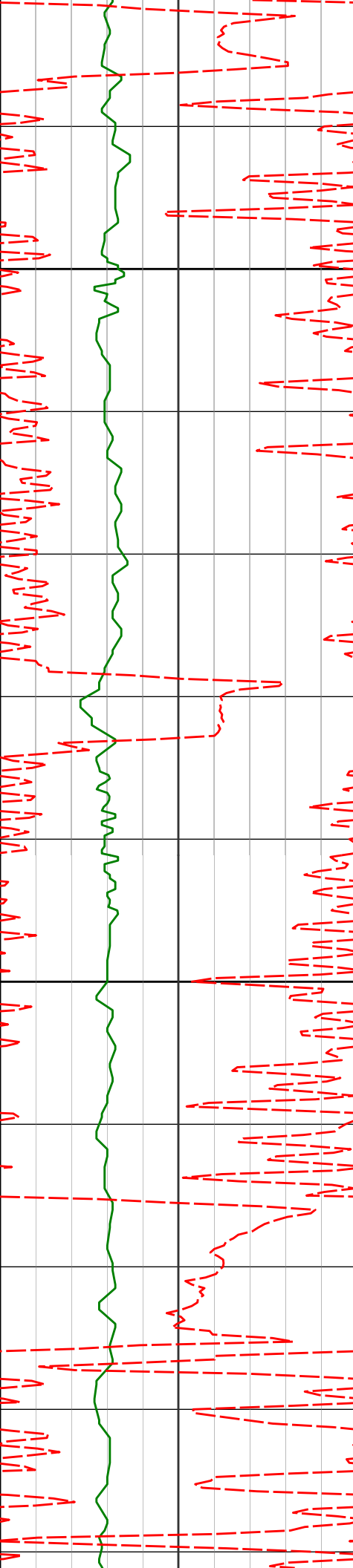
100.62°F

100.62°F

101.00°F

102.17°F





2700

2800

2688' 7.30° 304.13° 2681.08' -86.74'

2779' 6.60° 303.88° 2771.41' -95.28'

2871' 9.08° 302.06° 2862.54' -105.17'

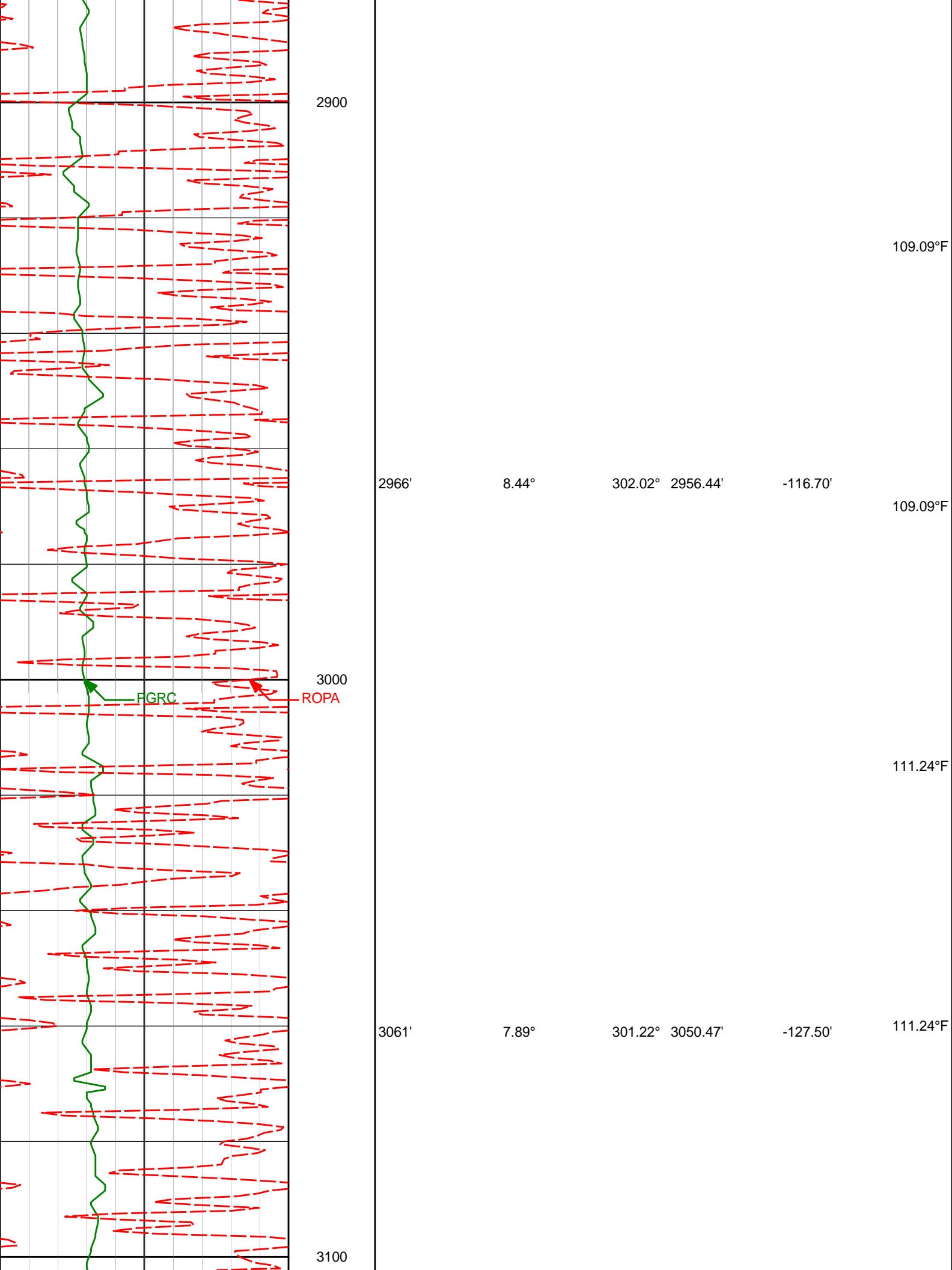
106.97°F

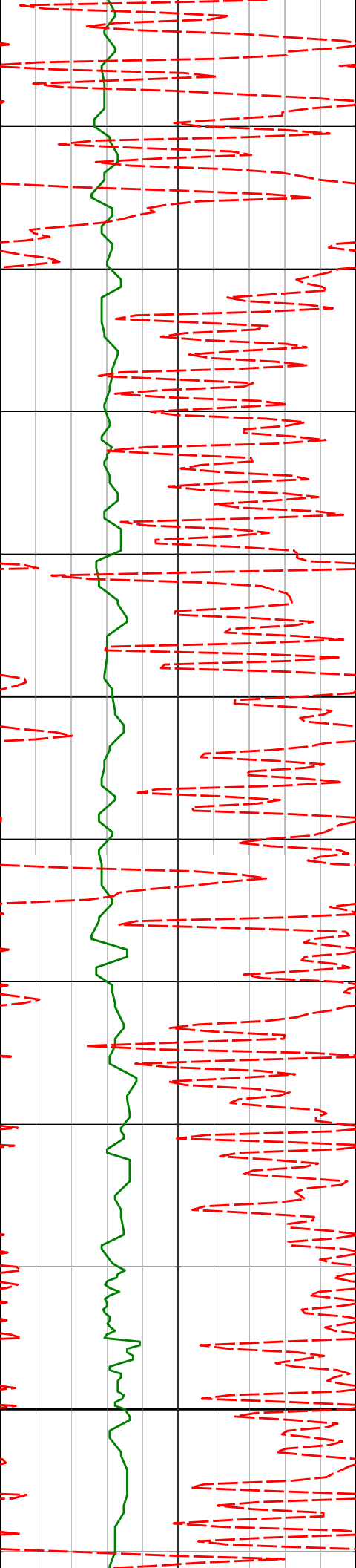
106.97°F

106.97°F

106.97°F

106.97°F





3155'

7.14°

305.43° 3143.66'

-137.14'

3200

3250'

5.16°

303.01° 3238.11'

-144.99'

3300

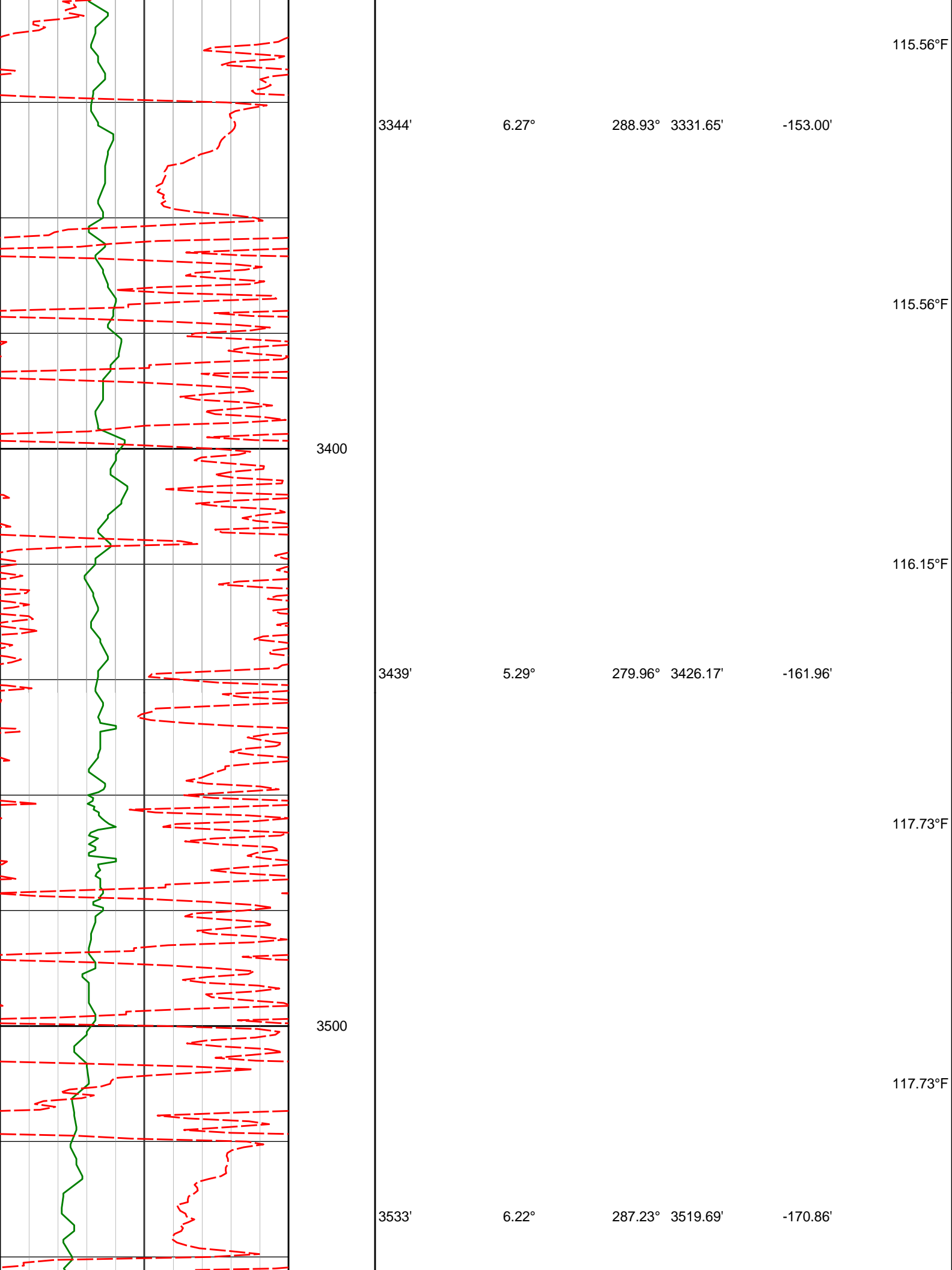
113.40°F

113.40°F

113.40°F

114.49°F

115.56°F





3600

3628'

7.45°

287.75°

3614.02'

-181.29'

3700

3723'

8.01°

286.94°

3708.15'

-193.10'

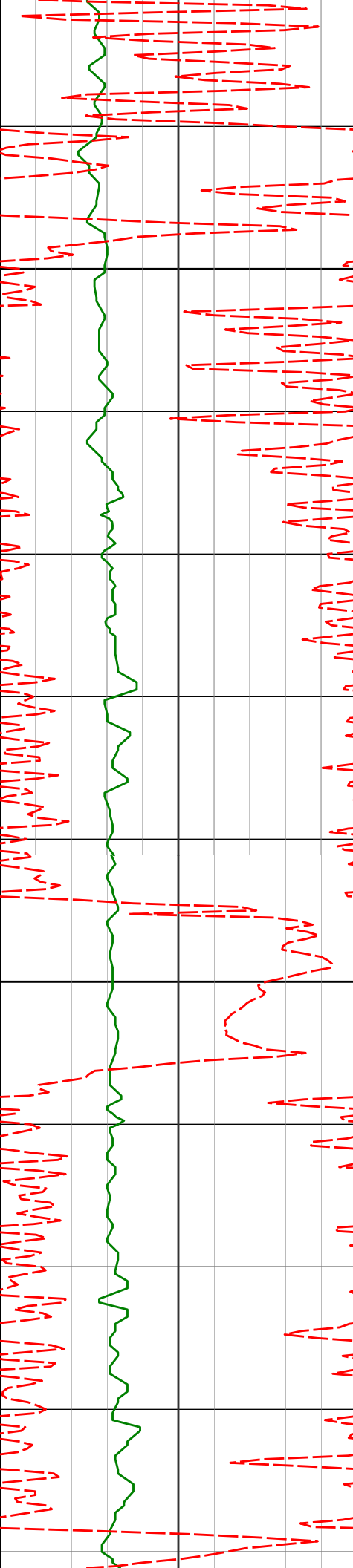
117.73°F

117.73°F

119.91°F

119.91°F

122.11°F



3800

3817'

8.22°

285.37°

3801.21'

-205.47'

122.23°F

124.30°F

124.30°F

3900

3912'

7.66°

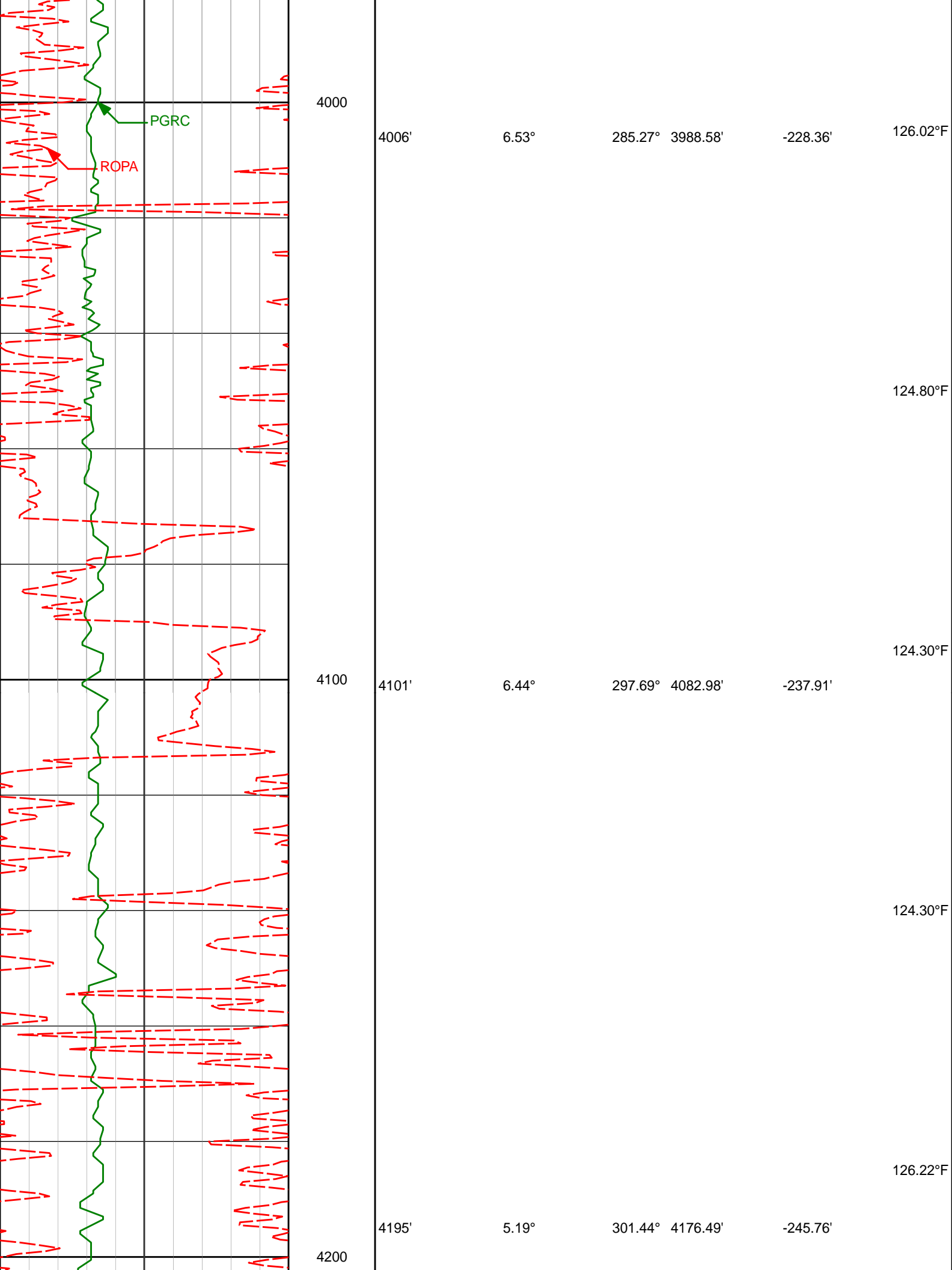
288.63°

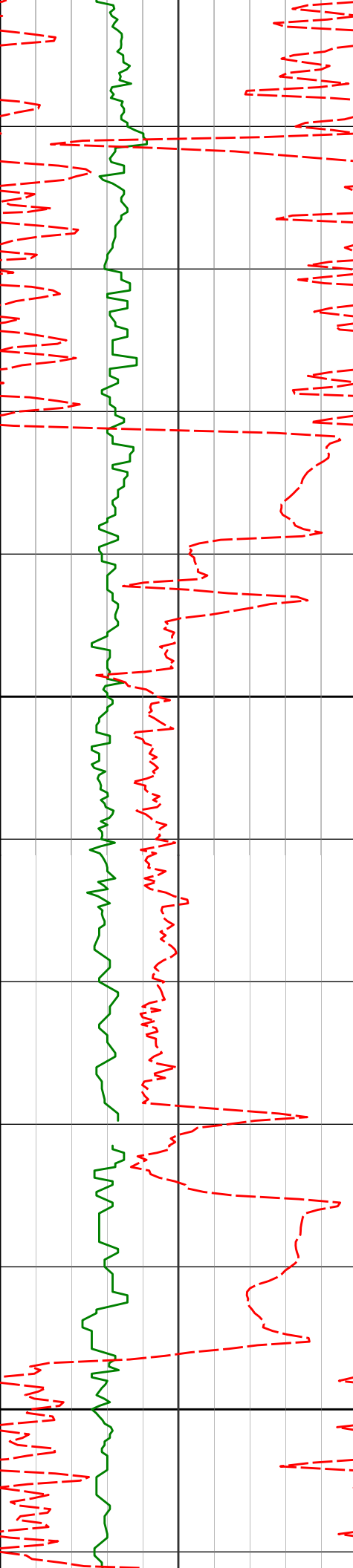
3895.30'

-217.62'

124.30°F

124.30°F





4300

4400

4290'

4385'

5.09°

6.68°

309.29°

310.85°

4271.11'

4365.61'

-252.22'

-259.08'

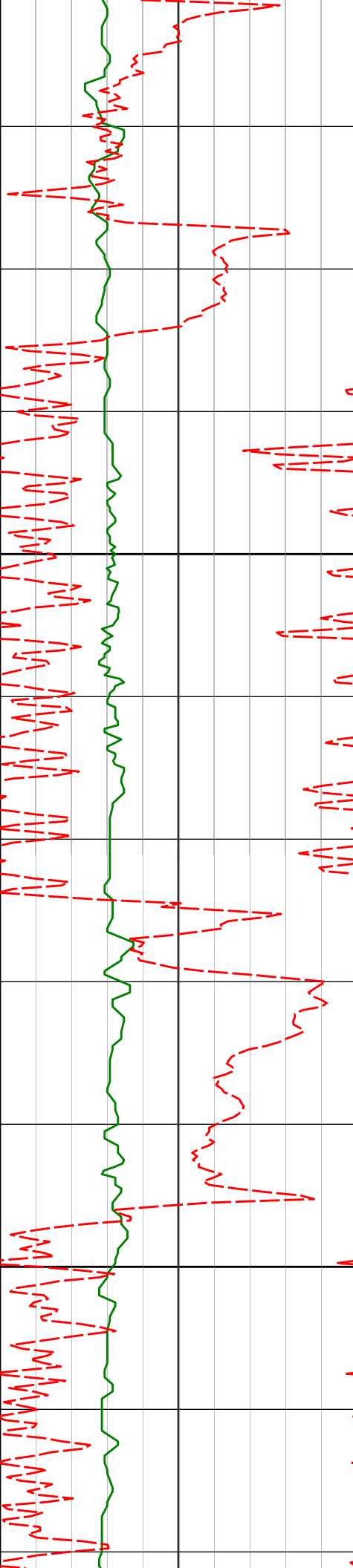
126.52°F

126.52°F

126.52°F

126.52°F

128.33°F



4500

4600

4479'

6.50°

304.99° 4458.99'

-266.95'

4574'

7.63°

302.34° 4553.26'

-276.07'

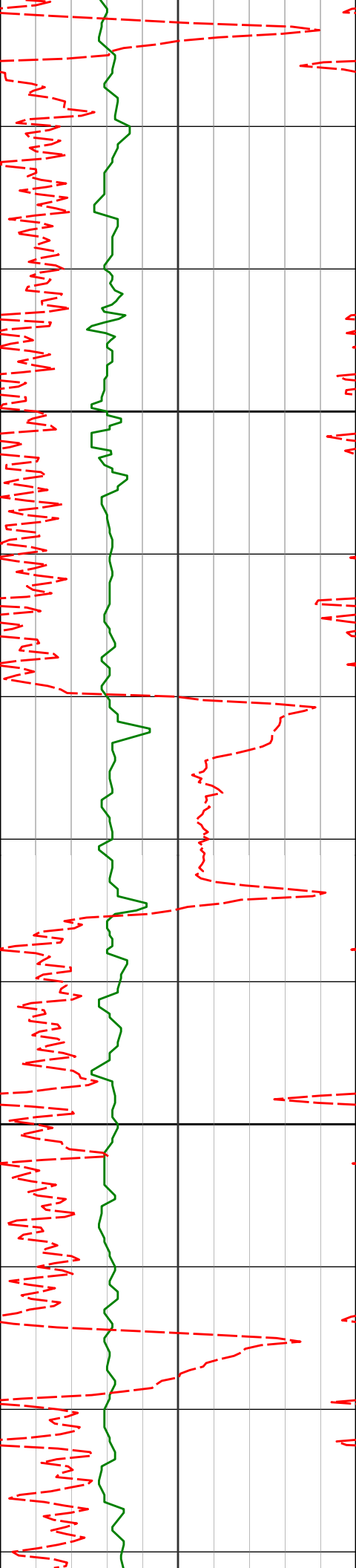
129.18°F

130.71°F

130.96°F

133.20°F

133.58°F



4700

4800

4668'

6.84°

302.99°

4646.51'

-285.43'

134.68°F

135.45°F

4763'

8.97°

314.21°

4740.61'

-294.71'

135.45°F

135.82°F

4857'

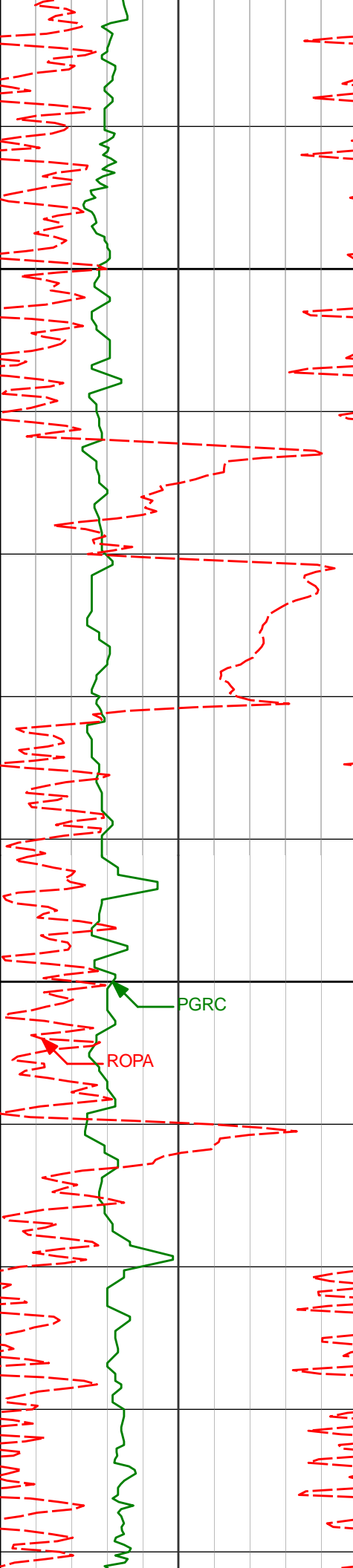
7.27°

304.97°

4833.67'

-304.04'

138.53°F



4900

138.84°F

4952'

8.14°

305.06° 4927.81'

-313.78'

139.96°F

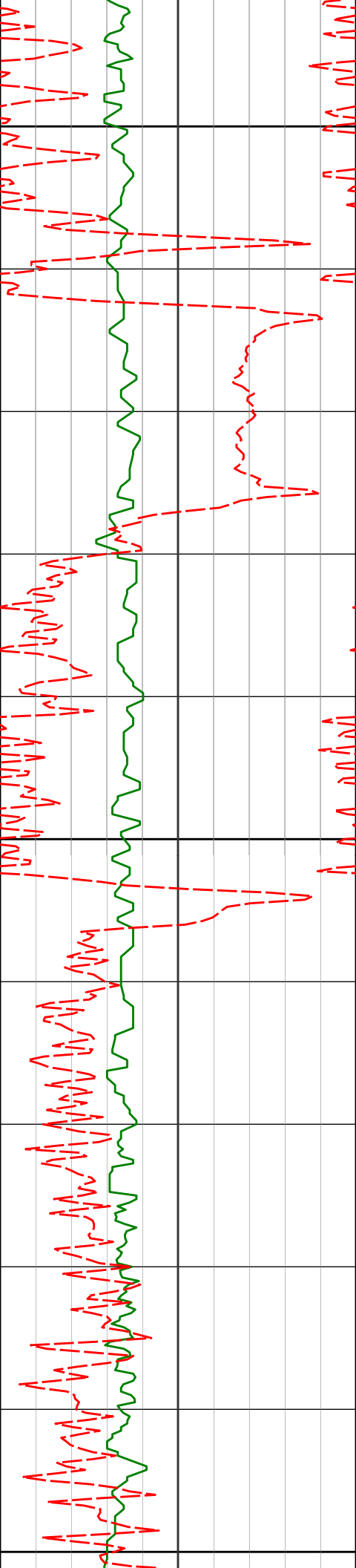
5000

139.96°F

PGRC

ROPA

142.10°F



5100

5141'

7.30°

298.72°

5115.10'

-333.97'

5200

5236'

6.85°

289.63°

5209.38'

-344.14'

5300

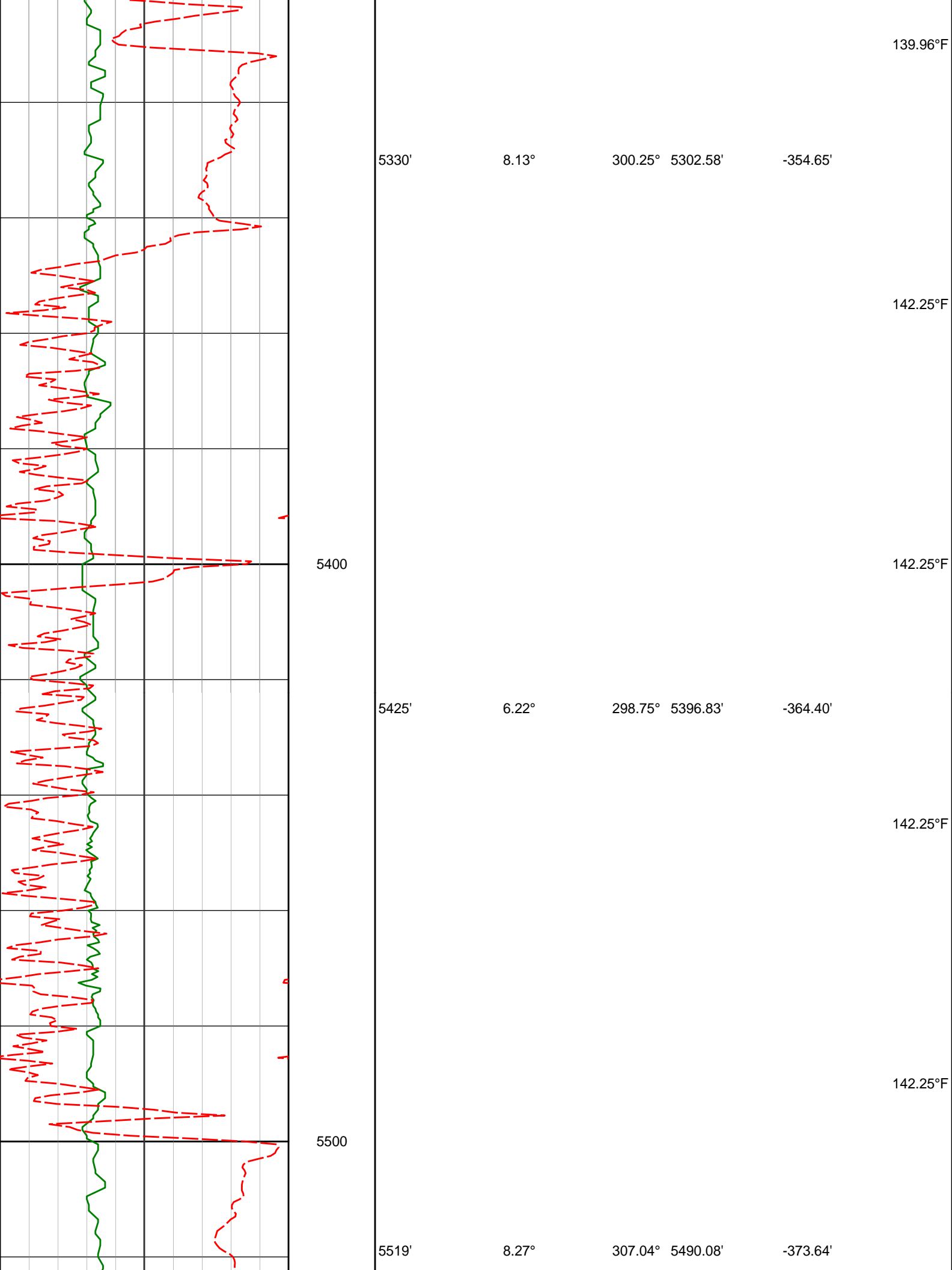
140.45°F

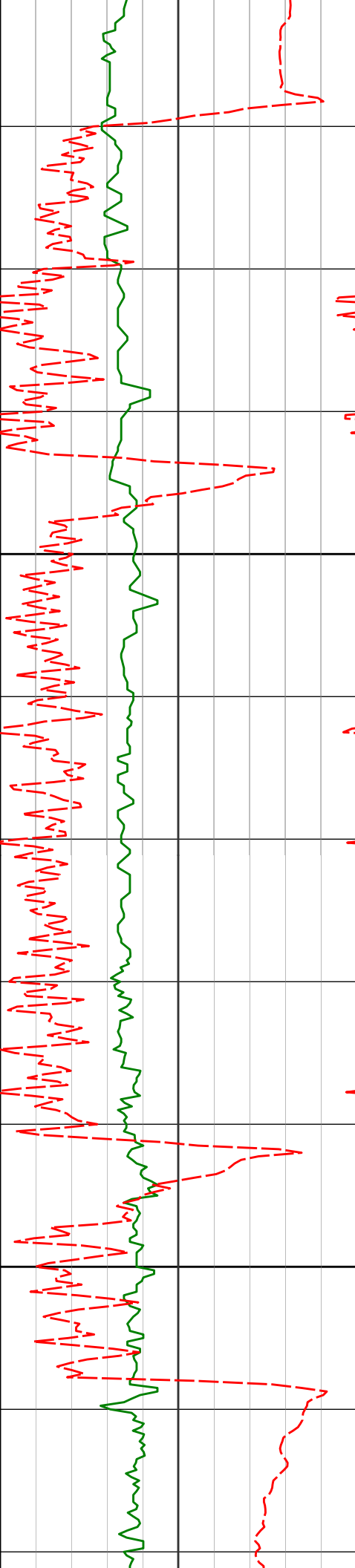
139.96°F

139.96°F

140.51°F

140.20°F





5600

<KOP>

5700

5614'

8.54°

306.05° 5584.06'

-384.02'

5709'

7.47°

299.66° 5678.13'

-394.40'

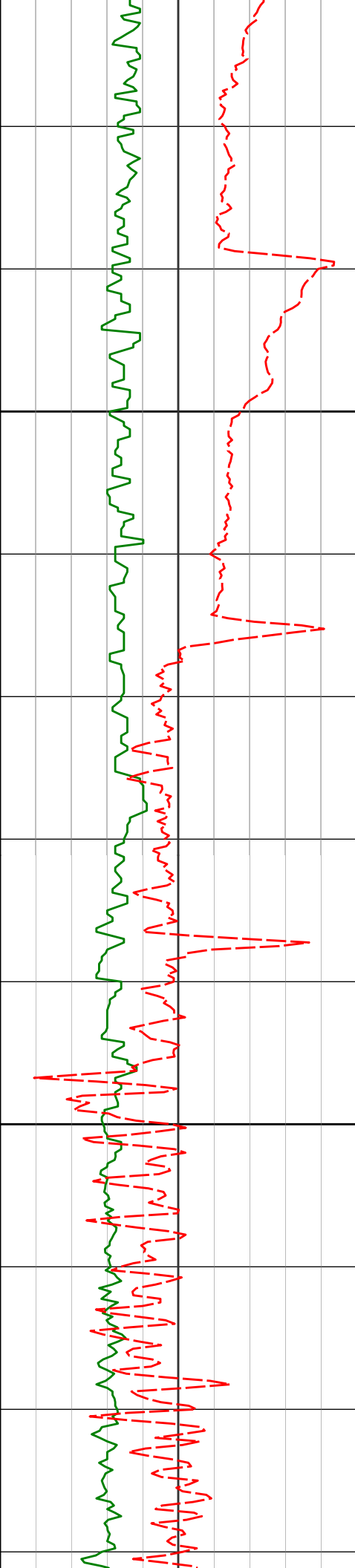
142.25°F

143.65°F

144.19°F

144.69°F

148.03°F



5800

5803'

20.78°

334.55° 5769.21'

-405.28'

146.84°F

147.59°F

149.14°F

5900

5898'

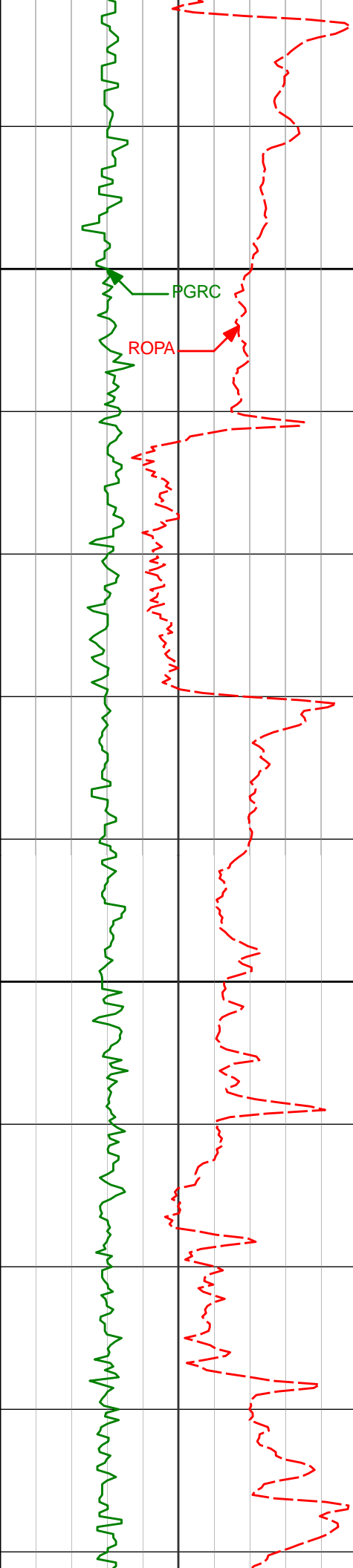
20.08°

334.60° 5858.24'

-416.78'

151.18°F

151.47°F



6000

6100

5993'

18.92°

341.32° 5947.80'

-426.05'

6087'

22.59°

3.48° 6035.82'

-426.92'

6182'

25.63°

12.22° 6122.55'

-418.07'

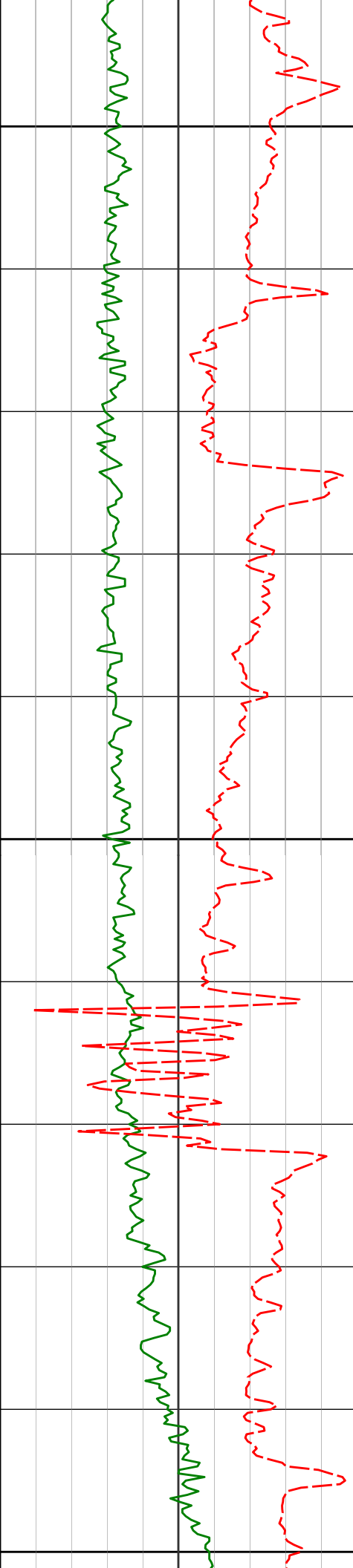
153.08°F

153.79°F

155.89°F

156.13°F

157.60°F

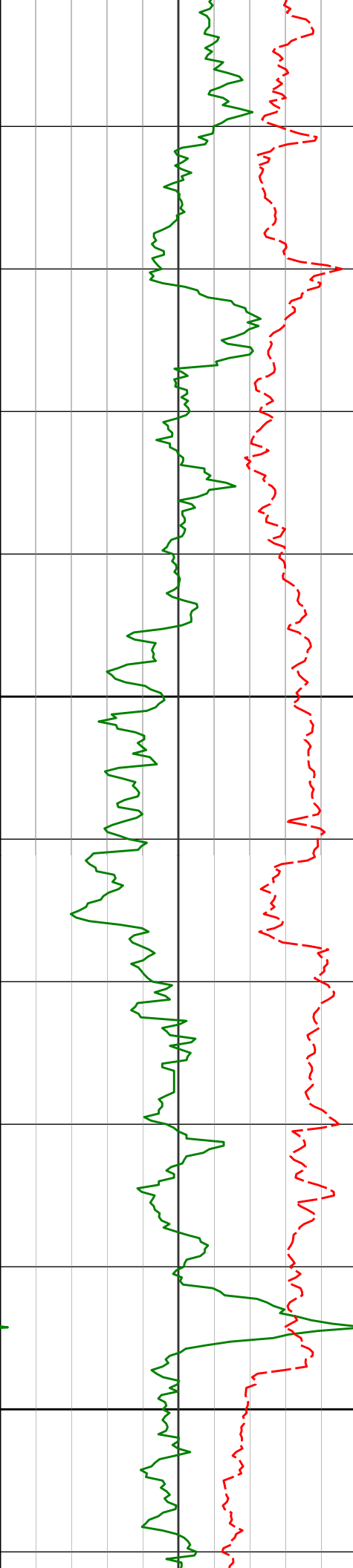


6200

6300

6400

6162	20.65	12.22	6122.55	-416.67
158.47°F				
160.41°F				
6276'	30.07°	23.39°	6205.70'	-400.75'
161.66°F				
162.22°F				
6371'	35.57°	43.36°	6285.74'	-368.59'
163.26°F				



6500

6600

6465'

46.03°

59.91°

6357.01'

-317.16'

164.95°F

165.58°F

166.25°F

6560'

57.61°

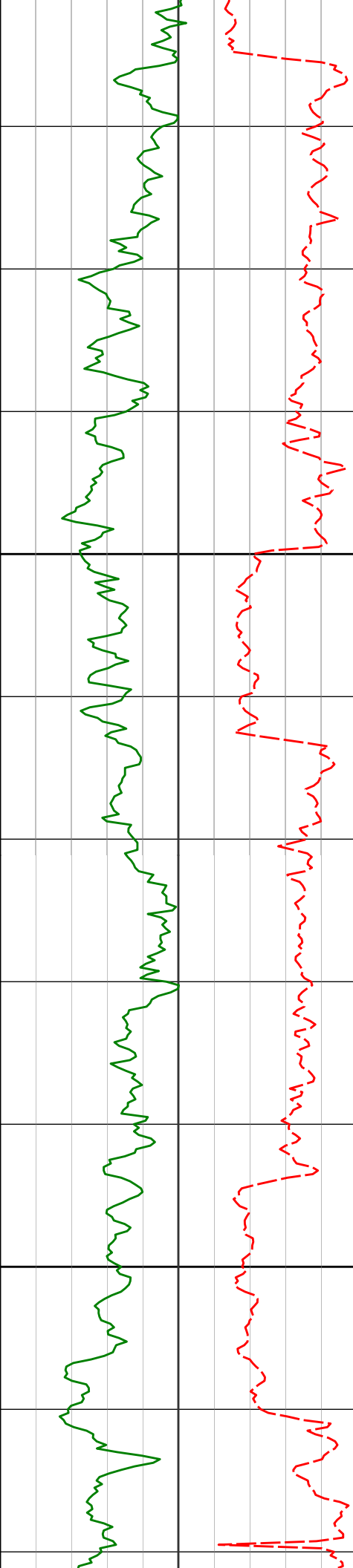
68.95°

6415.70'

-247.27'

168.05°F

169.90°F



6654'

60.69°

71.92°

6463.90'

-169.13'

170.37°F

6700

171.20°F

6749'

63.94°

82.31°

6508.13'

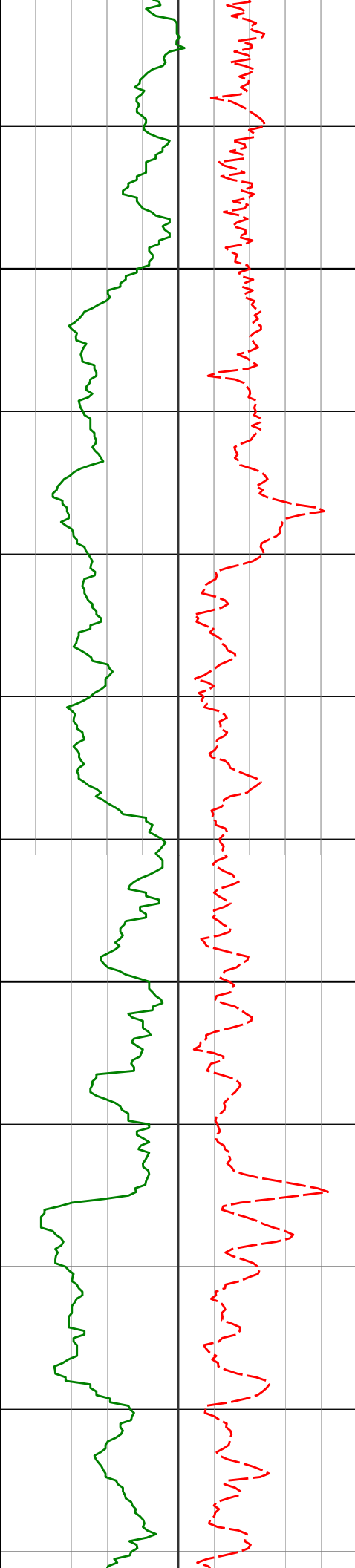
-85.94'

172.62°F

6800

172.52°F

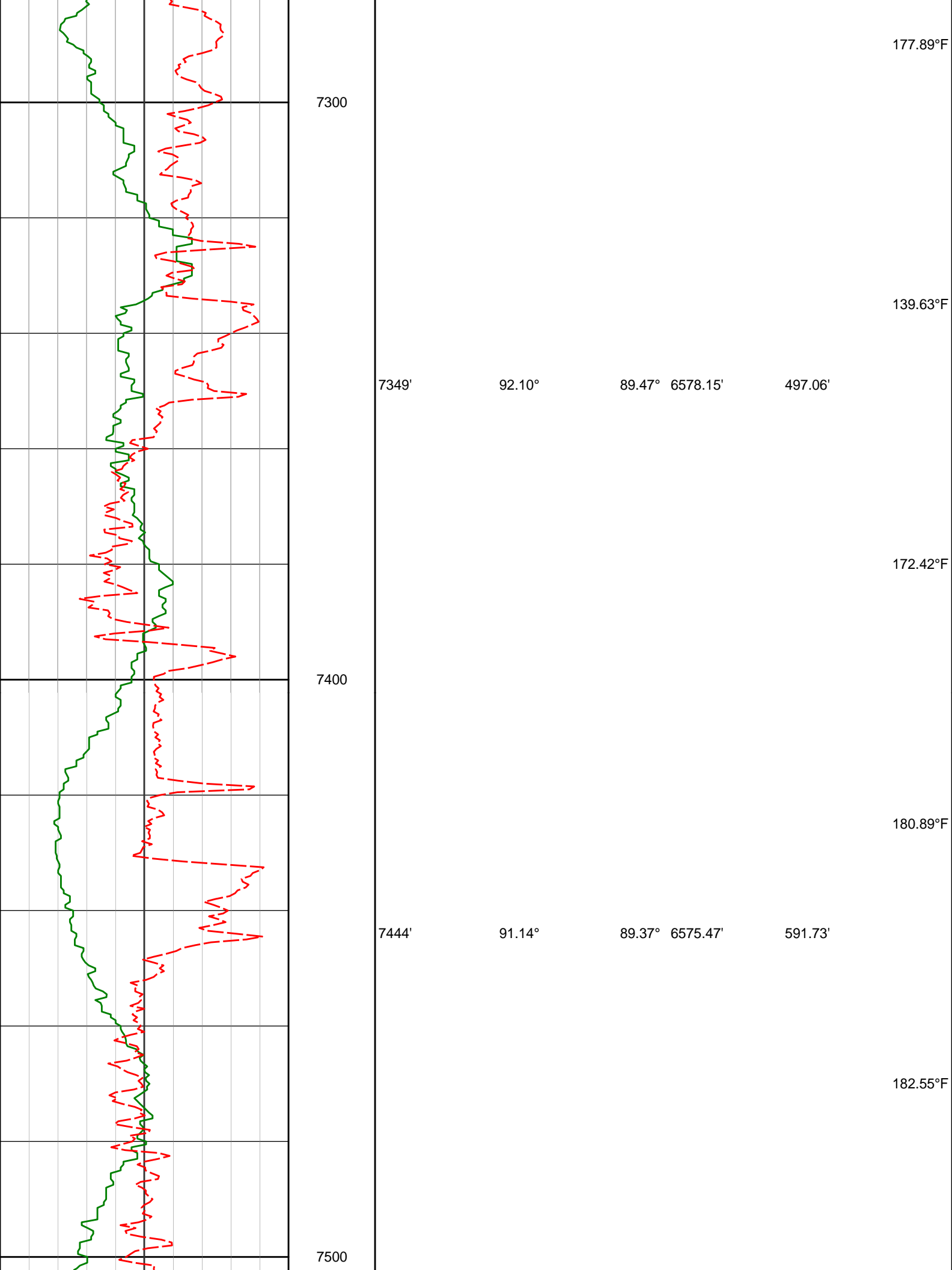
173.93°F

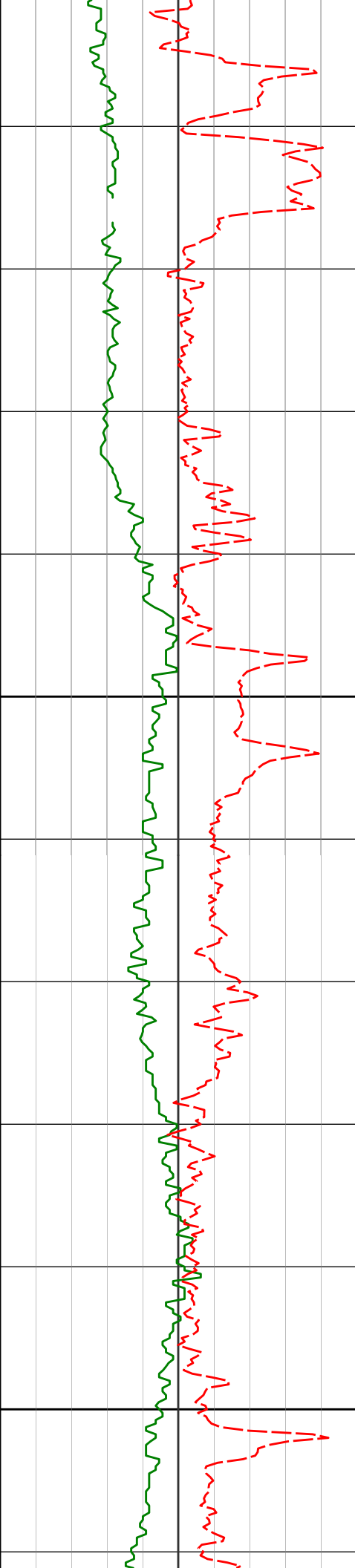


7100

7200

7065'	91.11°	89.69°	6588.60'	214.24'	174.31°F
					175.21°F
					175.34°F
7160'	91.82°	89.33°	6586.17'	308.90'	
					177.34°F
					178.30°F
7254'	92.90°	90.00°	6582.30'	402.49'	





7600

7700

7538'

7632'

90.56°

90.49°

88.58°

88.44°

6574.07'

6573.21'

685.47'

779.28'

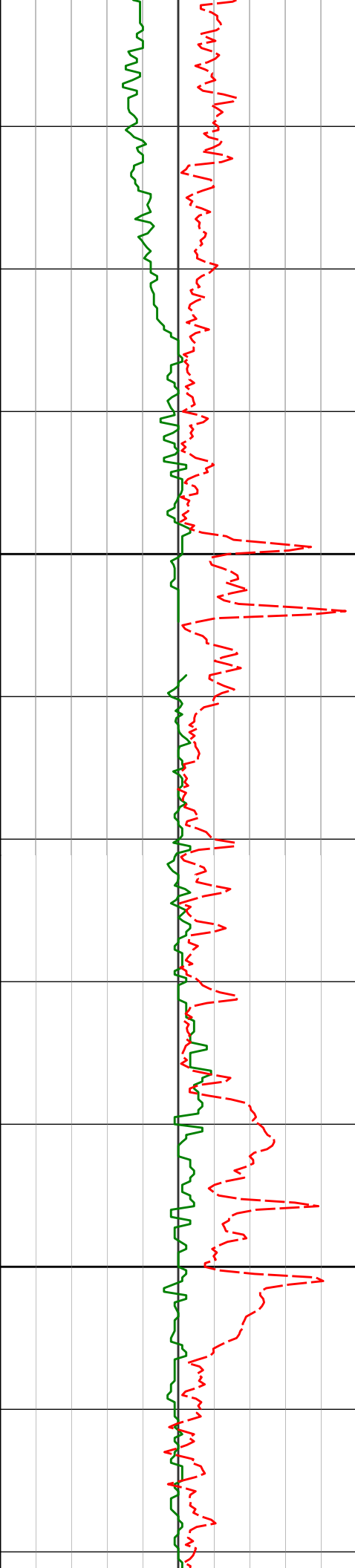
183.12°F

184.89°F

185.81°F

187.48°F

187.48°F



7727'

90.18°

87.91° 6572.66'

874.12'

187.48°F

187.48°F

7800

7821'

90.25°

88.70° 6572.30'

967.95'

189.67°F

189.99°F

7900

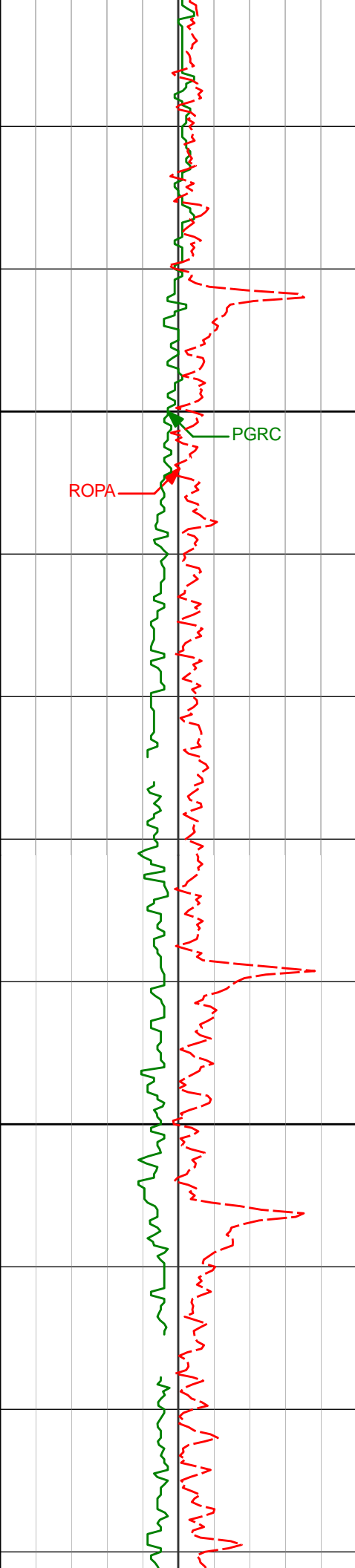
7916'

90.12°

88.24° 6572.00'

1062.77'

189.99°F



8000

8100

8010'

8105'

89.82°

88.92°

87.74° 6572.05'

86.59° 6573.09'

1156.63'

1251.54'

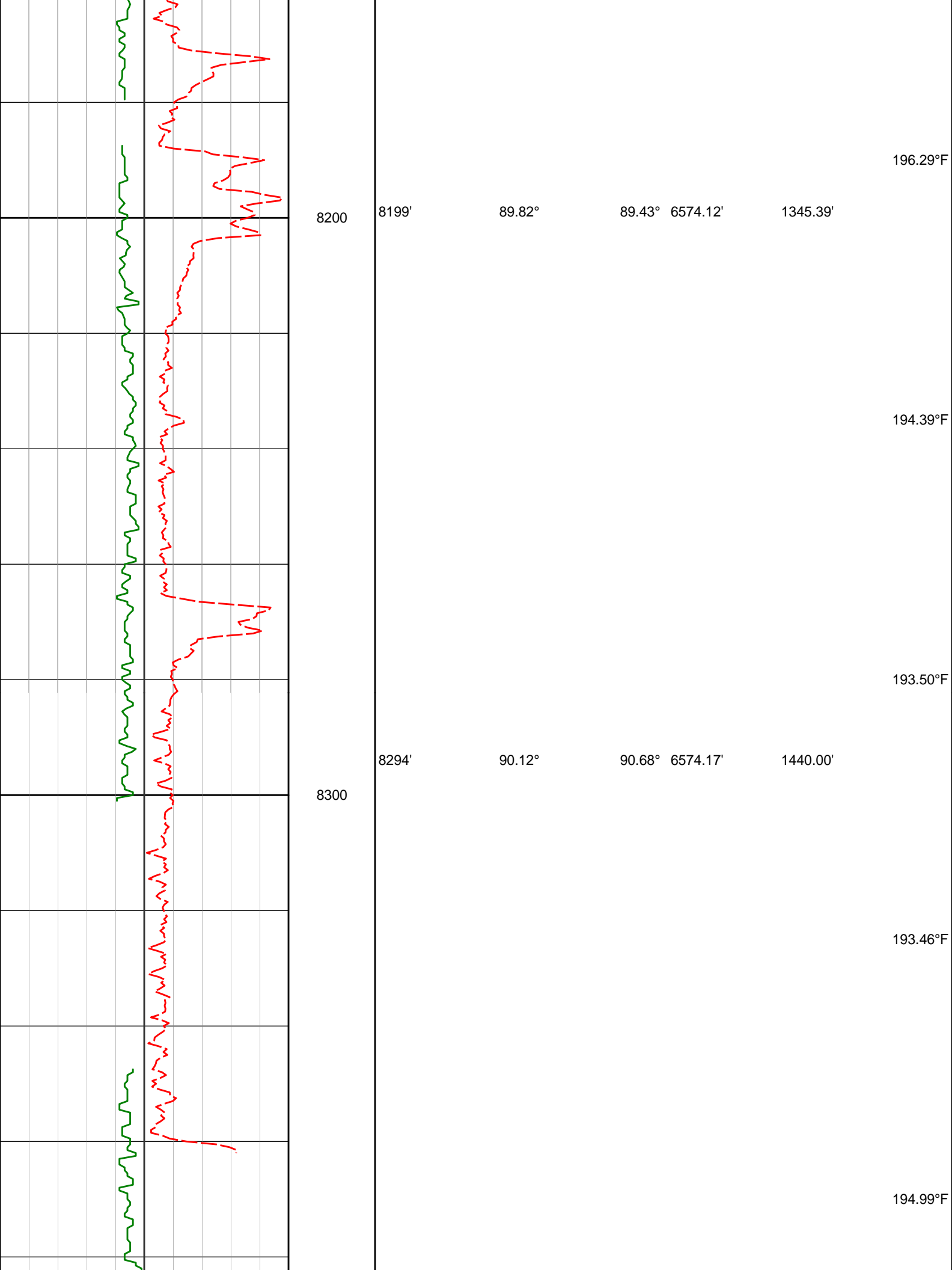
191.85°F

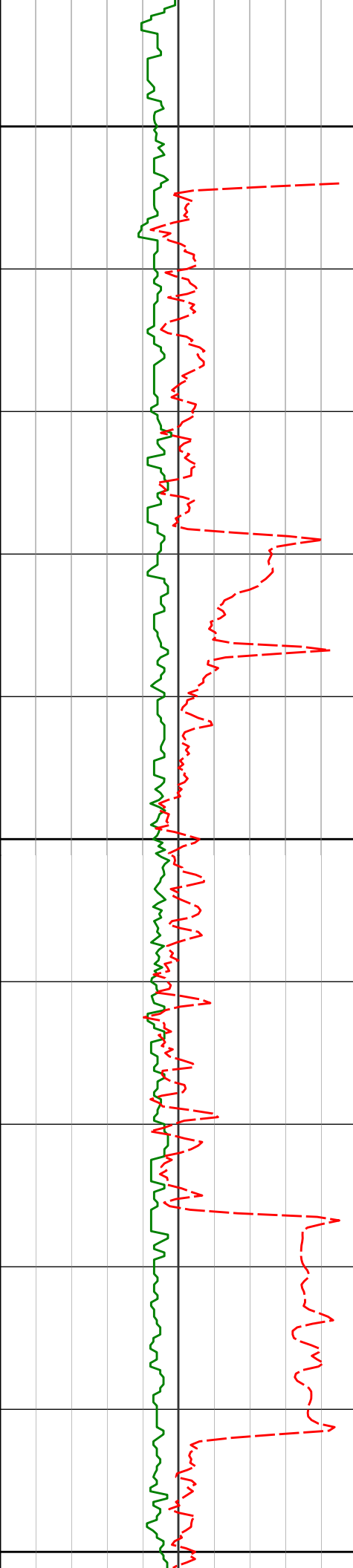
192.49°F

192.49°F

193.41°F

190.37°F





8400

8500

8600

8388'

90.40°

91.33° 6573.75'

1533.46'

8483'

90.59°

92.74° 6572.93'

1627.71'

8578'

90.74°

89.64° 6571.82'

1722.12'

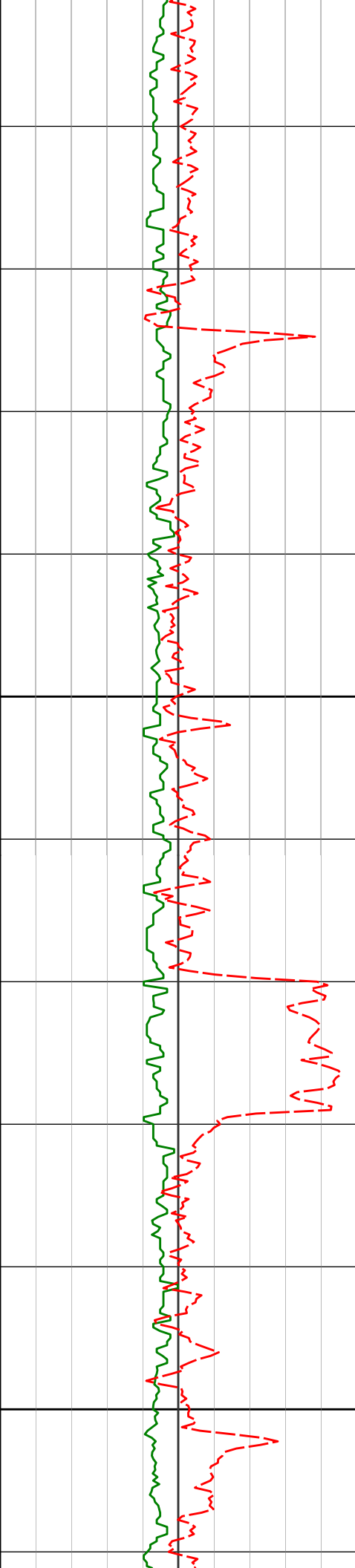
195.53°F

197.29°F

194.00°F

193.00°F

193.18°F



8700

8800

8672'

91.11°

90.60° 6570.31'

1815.71'

194.75°F

194.68°F

194.95°F

8767'

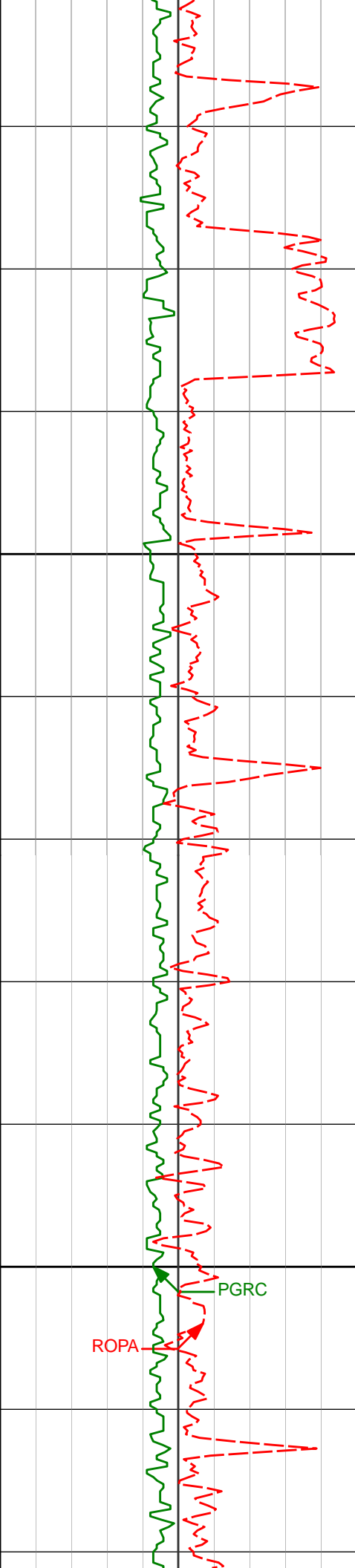
90.34°

89.46° 6569.10'

1910.32'

197.09°F

196.01°F



8900

9000

8862'

90.68°

88.27° 6568.26'

2005.08'

197.51°F

199.25°F

8956'

90.68°

87.47° 6567.14'

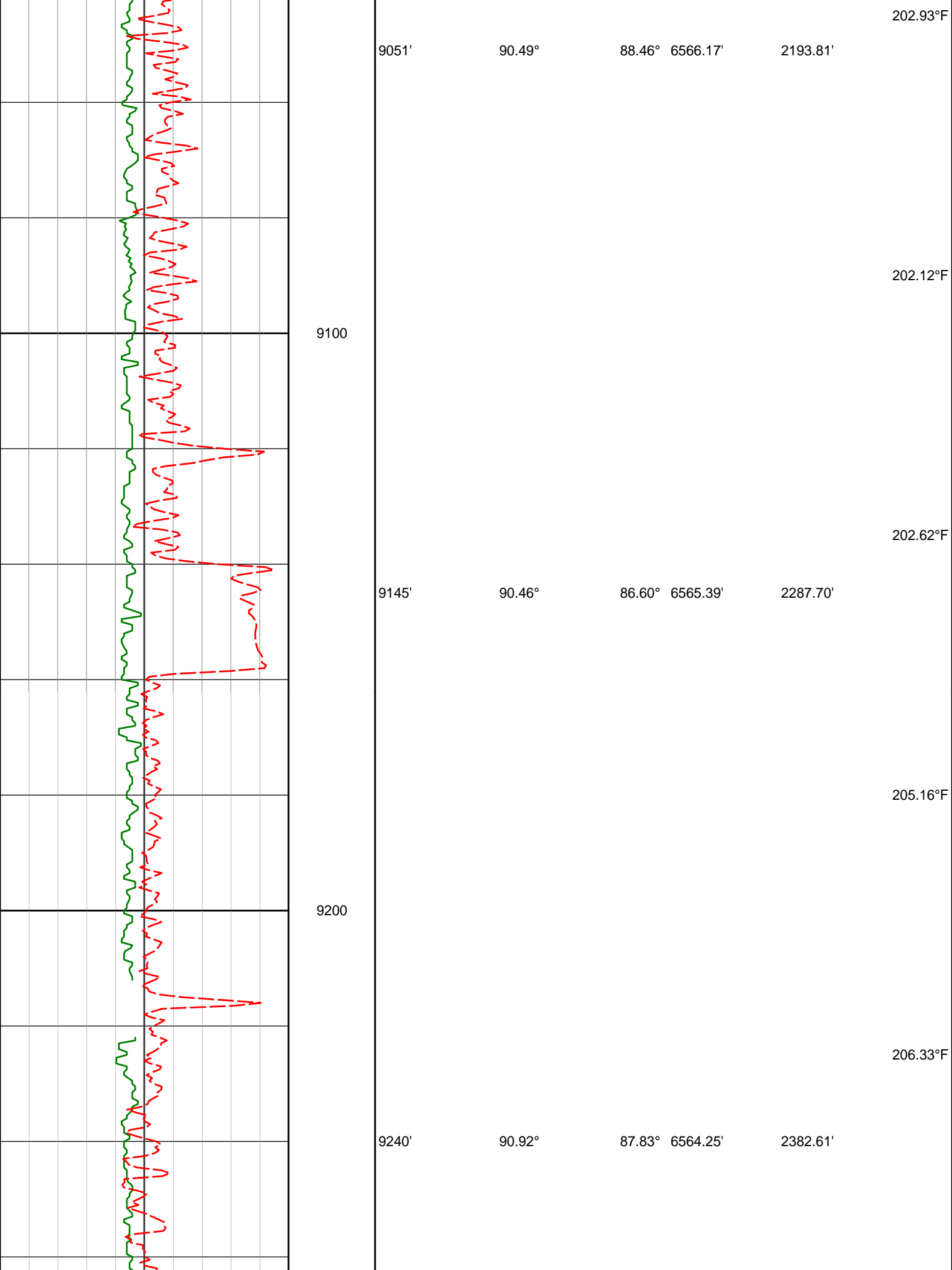
2098.95'

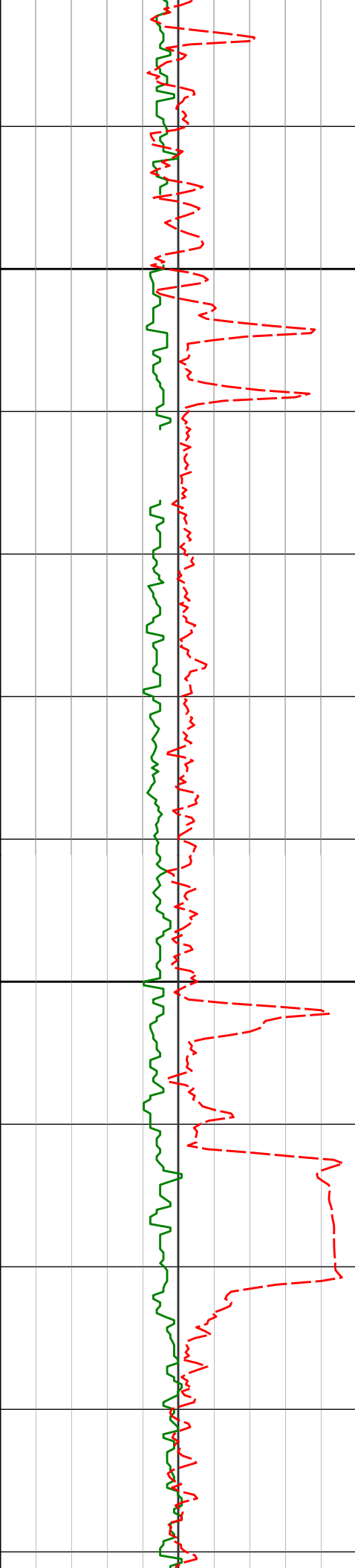
200.47°F

202.60°F

ROPA

PGRC





9300

9334'

90.83°

89.19° 6562.81'

2476.41'

9400

9428'

90.46°

86.63° 6561.76'

2570.26'

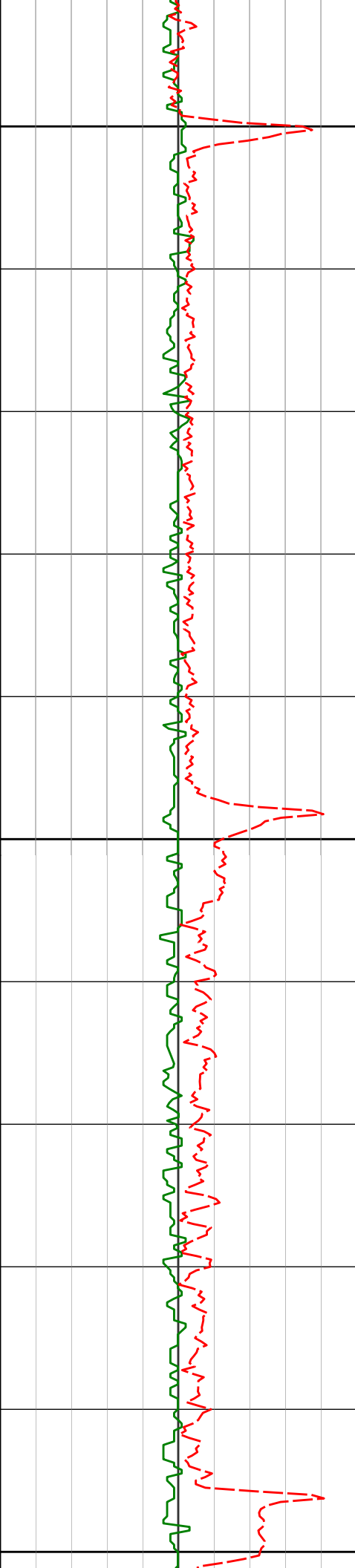
205.52°F

206.87°F

205.34°F

205.16°F

207.73°F



9500

9523'

90.34°

85.93°

6561.09'

2665.23'

208.09°F

210.31°F

210.57°F

9600

9618'

90.18°

86.05°

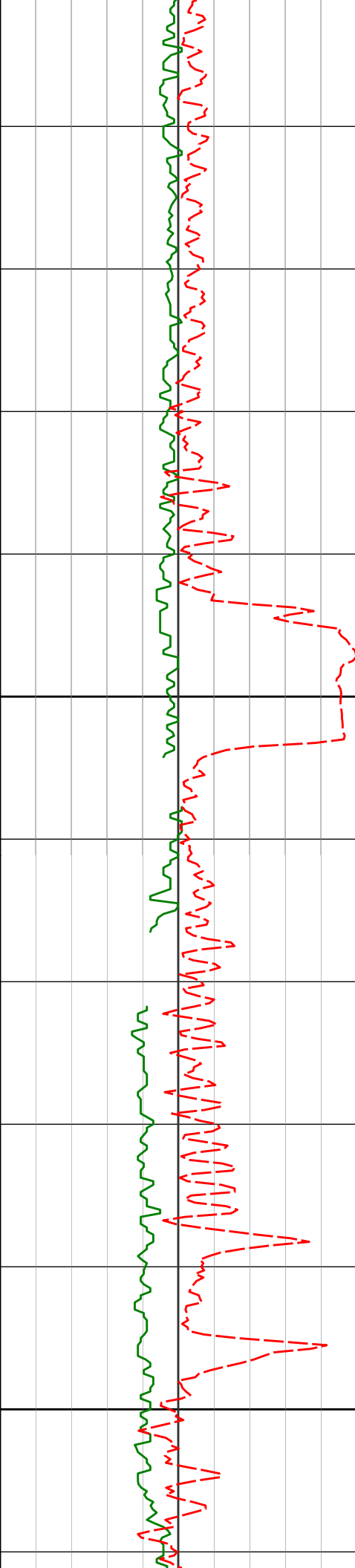
6560.66'

2760.21'

212.92°F

212.42°F

9700



9800

9807'

91.84°

85.51° 6557.33'

2949.15'

209.77°F

210.84°F

9900

9902'

91.63°

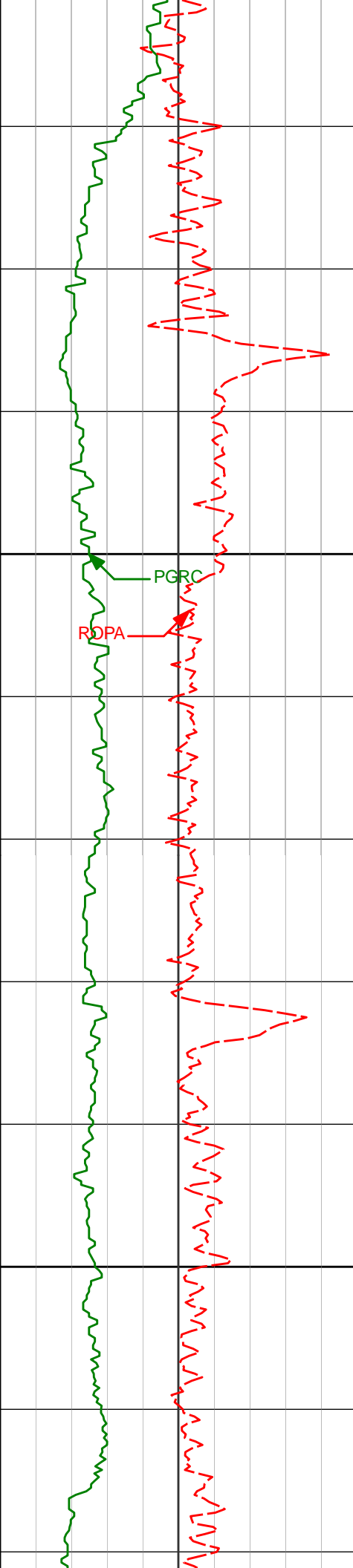
86.14° 6554.45'

3044.10'

211.60°F

210.47°F

207.61°F



10000

10100

9996'

10091'

91.57°

91.70°

85.92° 6551.83'

85.17° 6549.12'

3138.04'

3232.99'

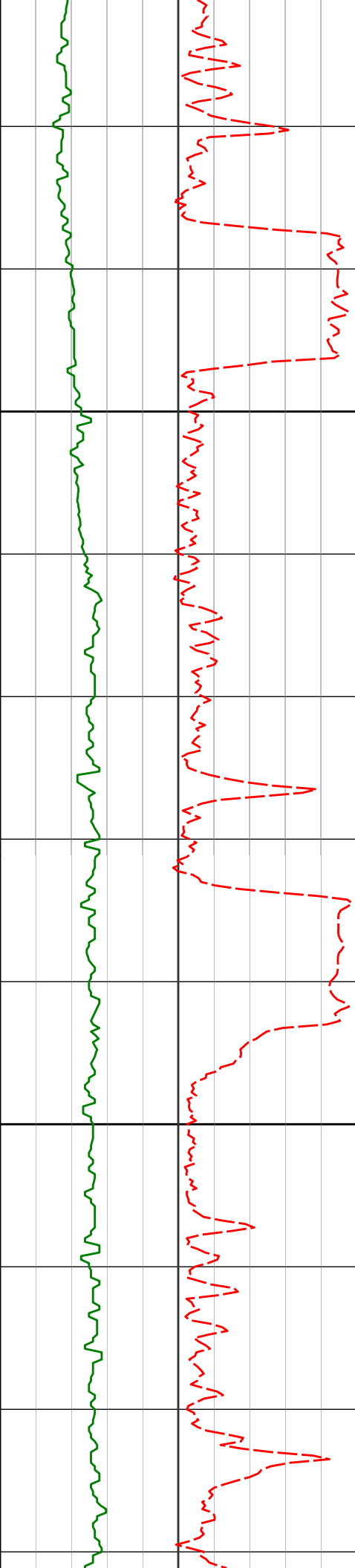
212.66°F

213.68°F

215.51°F

214.57°F

212.50°F



10200

10300

10184'

91.11°

86.54° 6546.84'

3325.95'

10276'

90.59°

88.80° 6545.47'

3417.82'

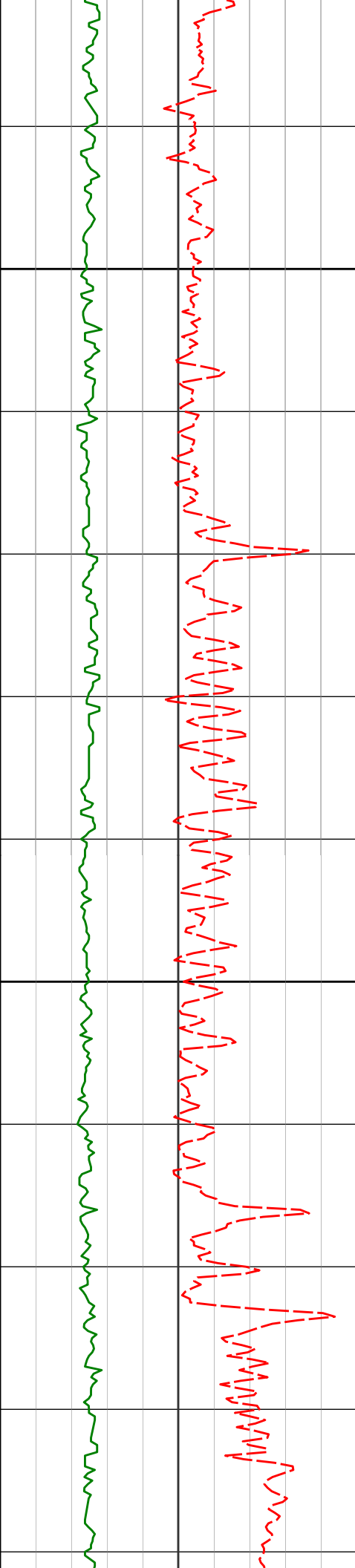
212.55°F

211.34°F

212.90°F

215.51°F

216.81°F



10400

10500

10459'

89.75°

88.31° 6544.93'

3600.45'

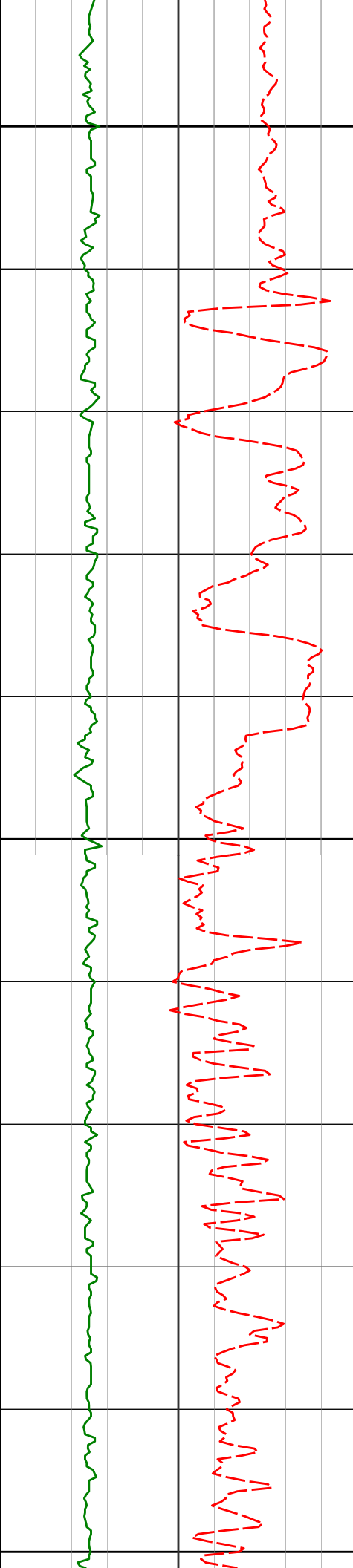
218.14°F

218.80°F

217.68°F

220.15°F

222.46°F



10600

223.26°F

10645'

90.46°

89.89° 6544.59'

3785.93'

221.67°F

10700

223.19°F

10738'

90.06°

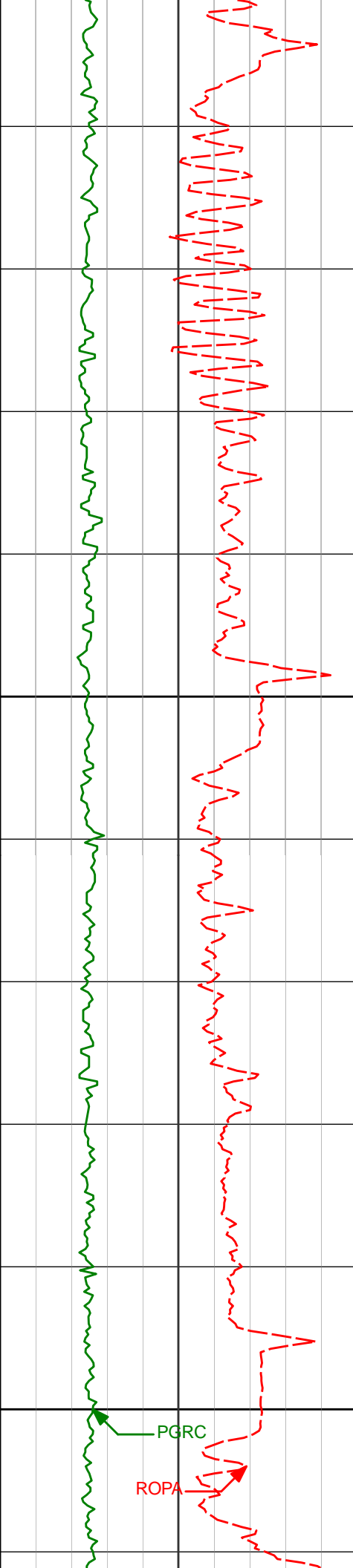
89.43° 6544.17'

3878.61'

223.20°F

10800

225.67°F



10900

11000

10831' 89.26° 88.77° 6544.72' 3971.35'

10923' 89.66° 89.81° 6545.59' 4063.08'

11016' 89.94° 90.23° 6545.91' 4155.70'

226.08°F

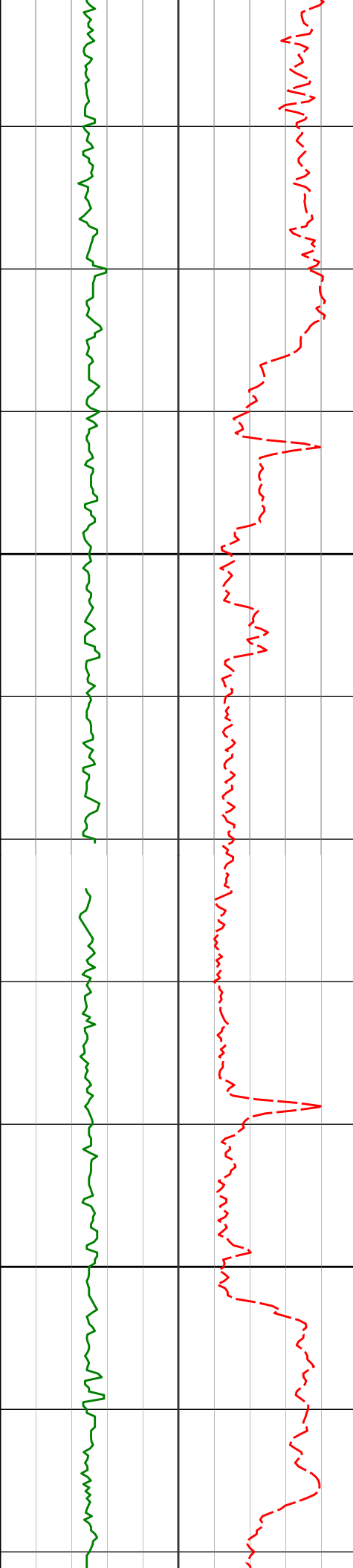
227.82°F

228.85°F

230.46°F

PGRC

ROPA



11100

11200

11202'

91.75°

91.03° 6543.17'

4340.74'

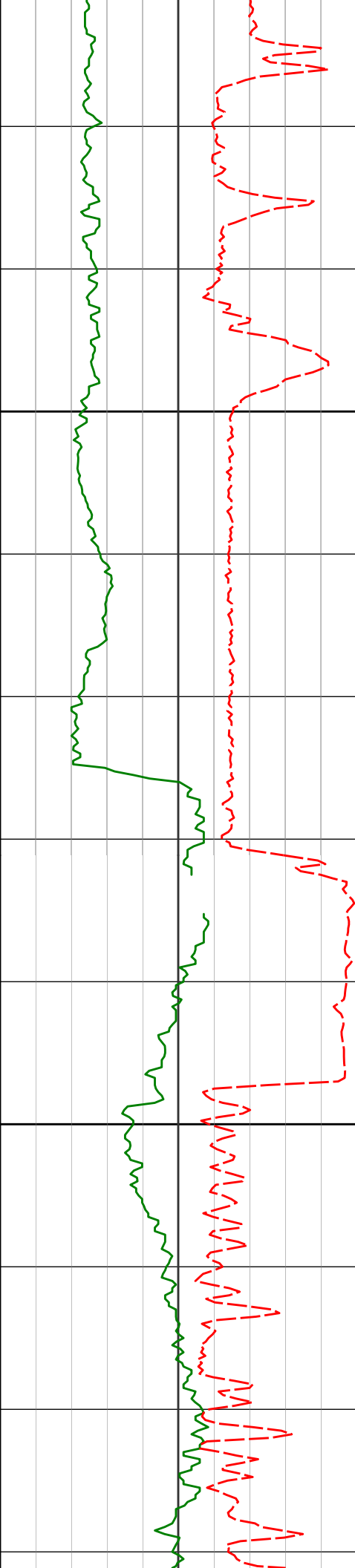
229.87°F

228.74°F

229.21°F

231.24°F

230.14°F



11300

11400

11293'

92.68°

92.15° 6539.65'

4431.04'

227.44°F

231.28°F

225.26°F

11386'

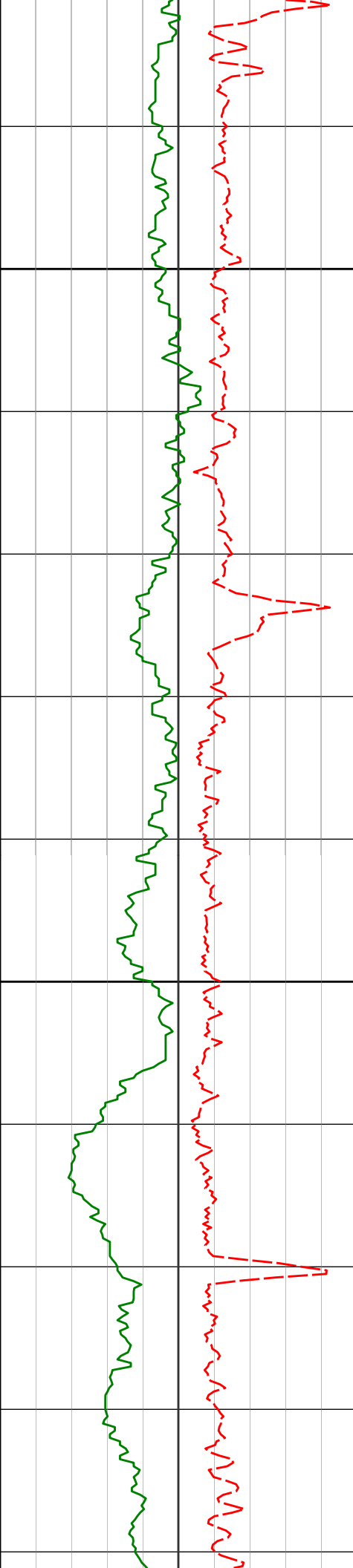
90.34°

89.27° 6537.20'

4523.51'

226.08°F

227.36°F



11477'

89.66°

88.56° 6537.20'

4614.29'

228.74°F

11500

228.74°F

228.74°F

11571'

89.01°

88.41° 6538.29'

4708.09'

11600

229.03°F

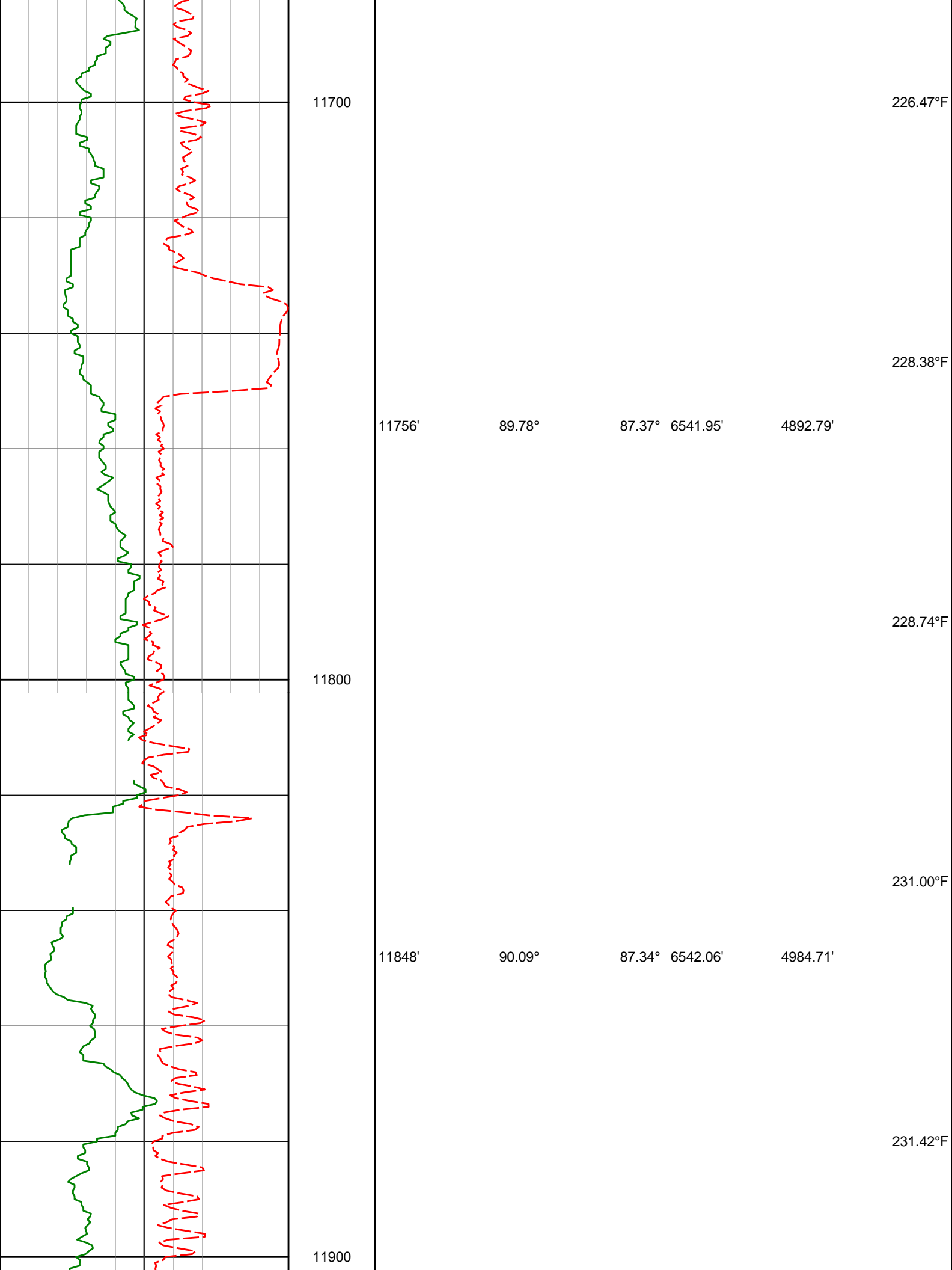
227.89°F

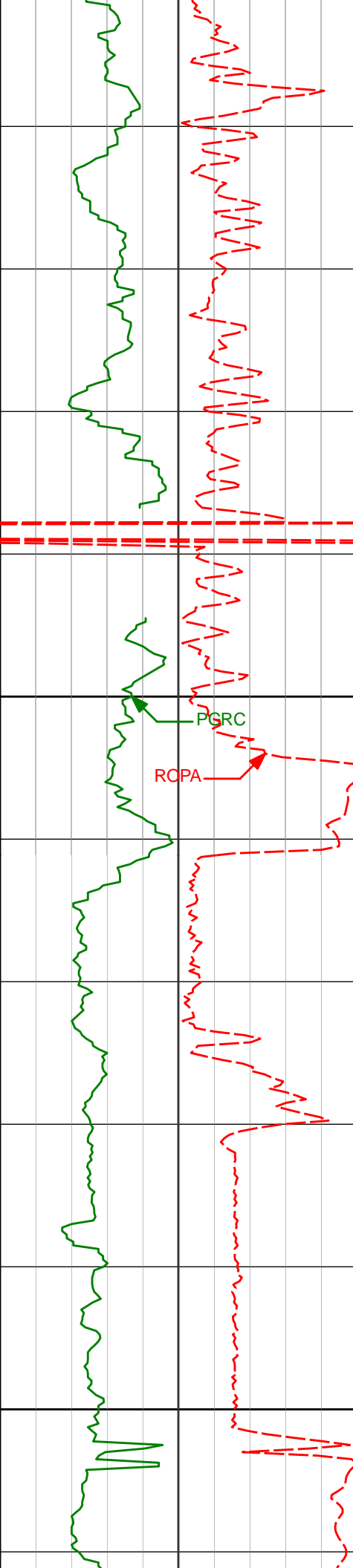
11664'

88.34°

87.91° 6540.44'

4800.92'





12000

12100

11941'

12036'

88.55°

87.75°

87.26°

86.95°

6543.16'

6546.23'

5077.62'

5172.49'

230.20°F

229.38°F

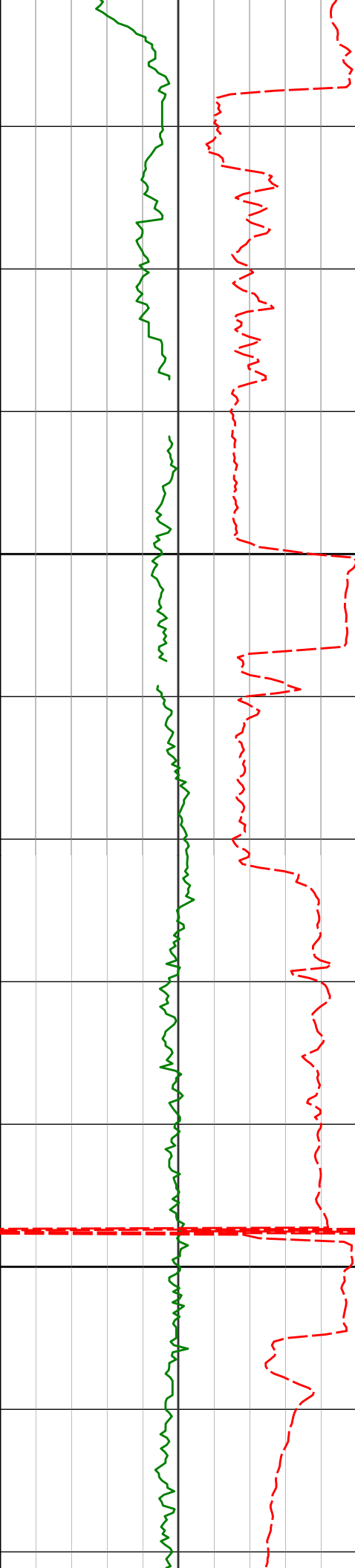
229.83°F

227.01°F

227.24°F

PGRC

RCPA



12200

12300

12131'

89.48°

87.93° 6548.52'

5267.37'

12225'

90.06°

88.49° 6548.90'

5361.21'

12320'

92.03°

87.37° 6547.17'

5456.05'

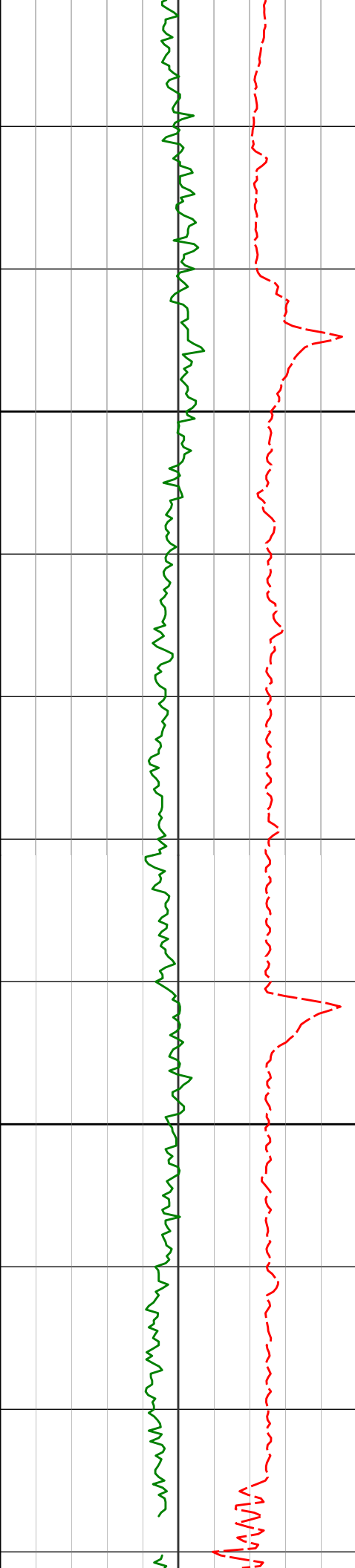
226.64°F

228.66°F

227.13°F

228.76°F

229.28°F



12400

12500

12414'

91.79°

87.25° 6544.03'

5549.91'

12509'

91.73°

86.94° 6541.12'

5644.80'

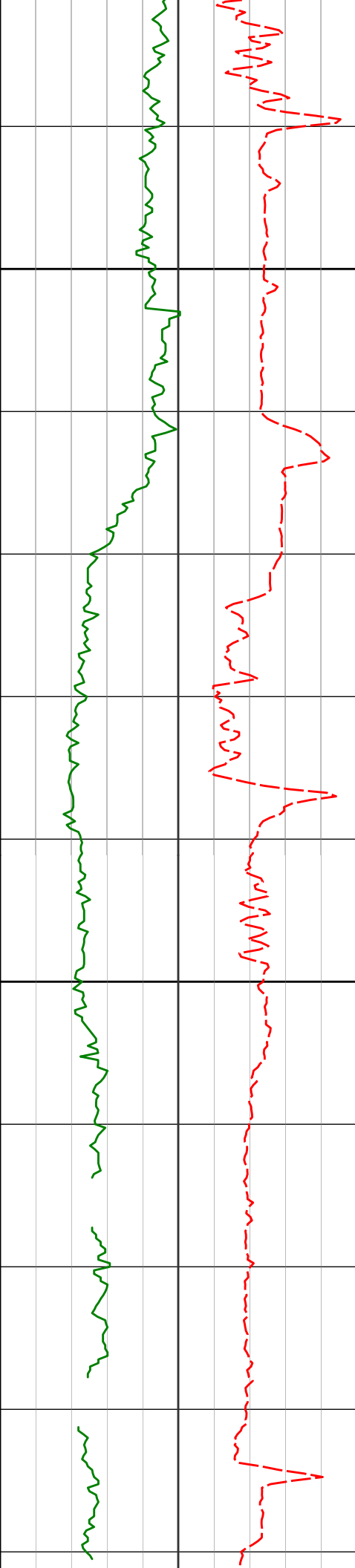
231.15°F

231.42°F

231.63°F

233.45°F

233.87°F



12600

12604'

91.97°

87.24° 6538.05'

5739.68'

234.12°F

234.84°F

236.82°F

12700

12698'

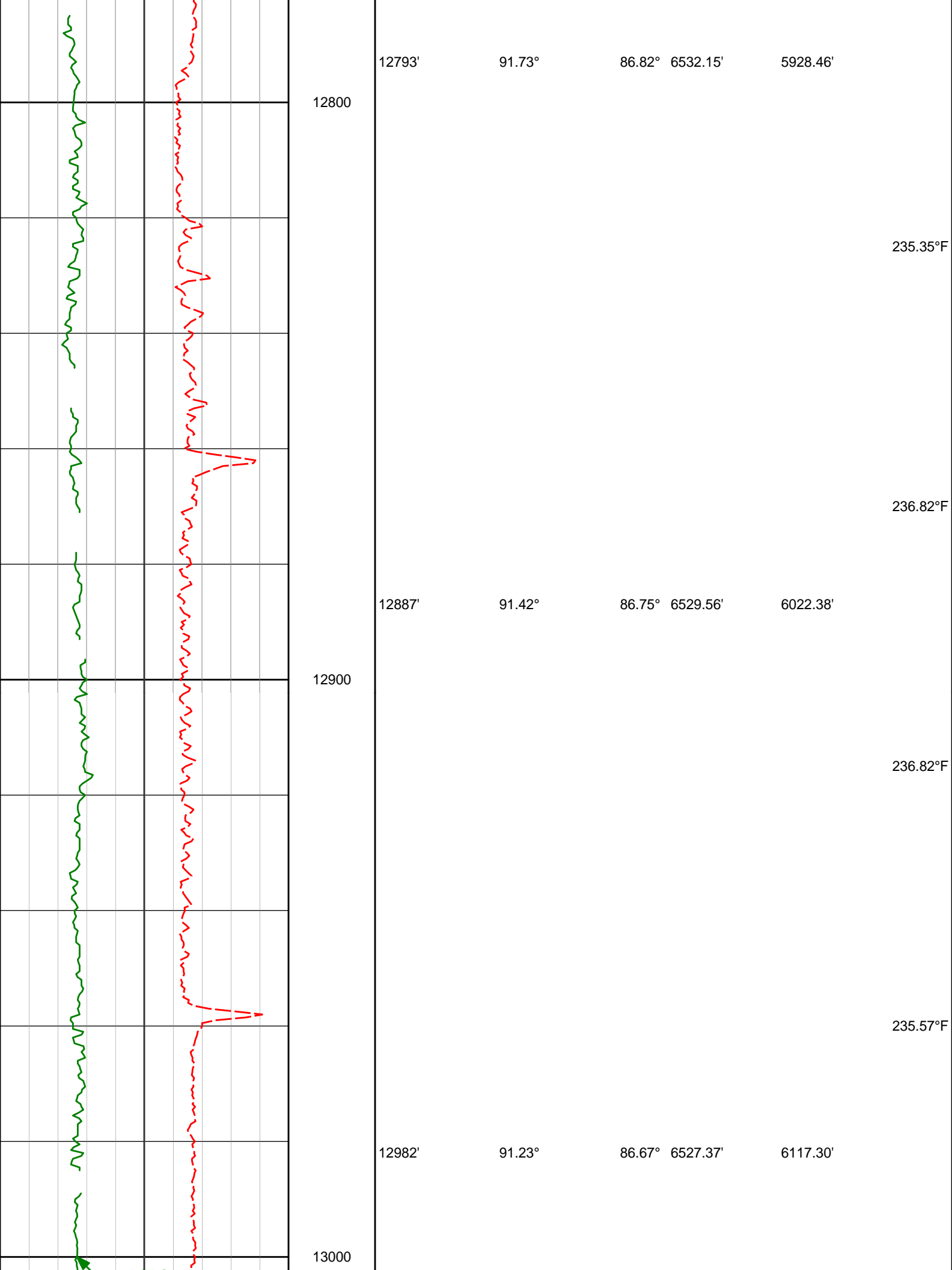
91.73°

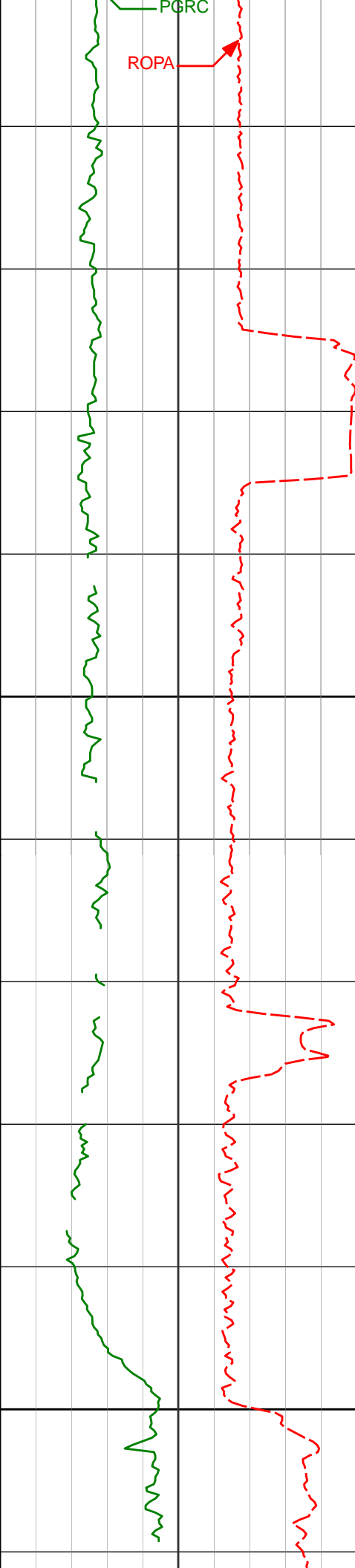
86.84° 6535.01'

5833.56'

236.82°F

235.35°F





13100

13200

13076'

89.23°

86.70° 6526.99'

6211.25'

13171'

88.49°

86.84° 6528.88'

6306.18'

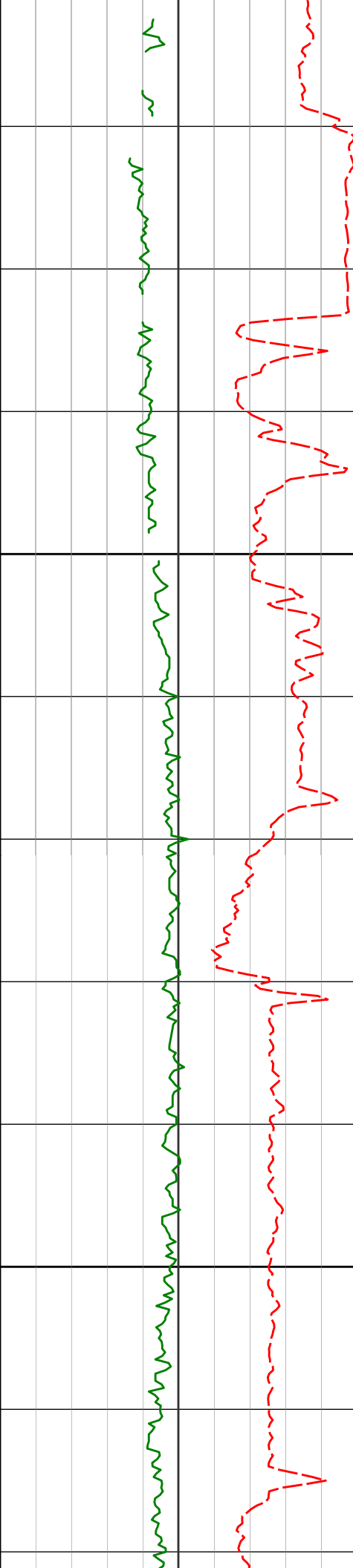
232.59°F

233.75°F

234.12°F

233.41°F

232.08°F



13300

13400

13266'

90.43°

88.43°

6529.77'

6401.06'

13361'

90.31°

87.99°

6529.16'

6495.89'

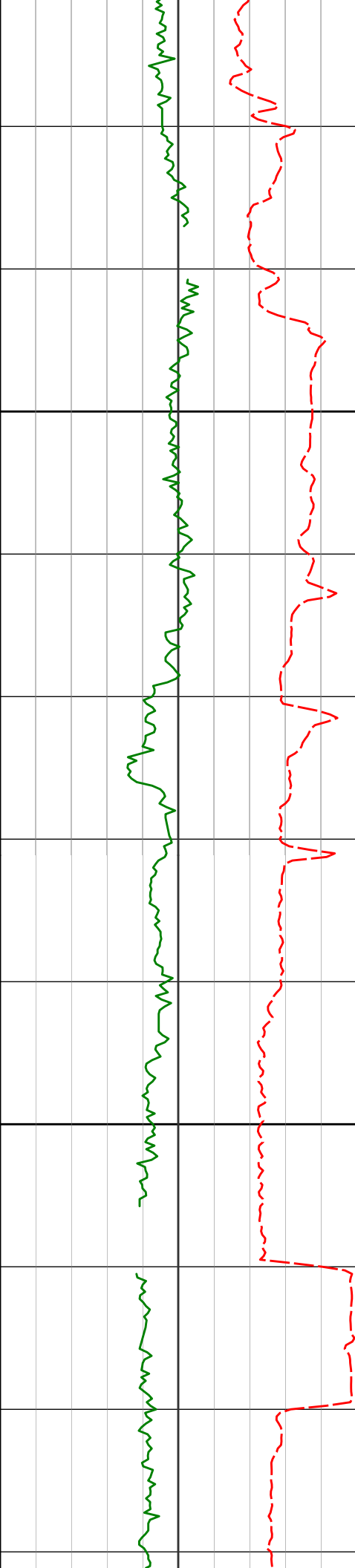
233.00°F

234.52°F

236.63°F

236.92°F

239.15°F



13500

13600

13455'

90.00°

88.38° 6528.91'

6589.74'

238.73°F

13550'

89.78°

87.54° 6529.09'

6684.60'

235.65°F

13644'

90.55°

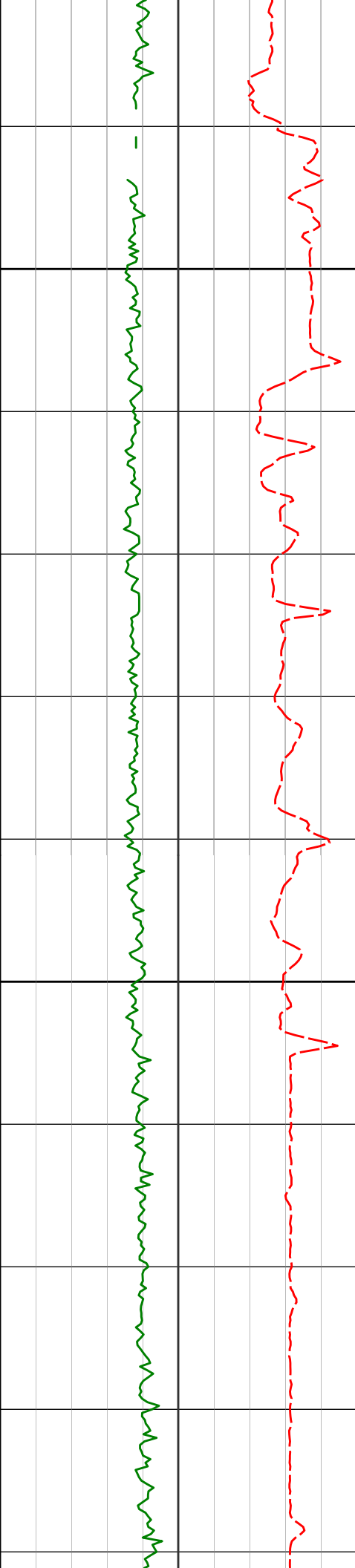
89.13° 6528.82'

6778.42'

236.56°F

234.58°F

236.04°F



13700

13800

13739'

13834'

90.56°

90.43°

89.19° 6527.90'

89.69° 6527.08'

6873.15'

6967.85'

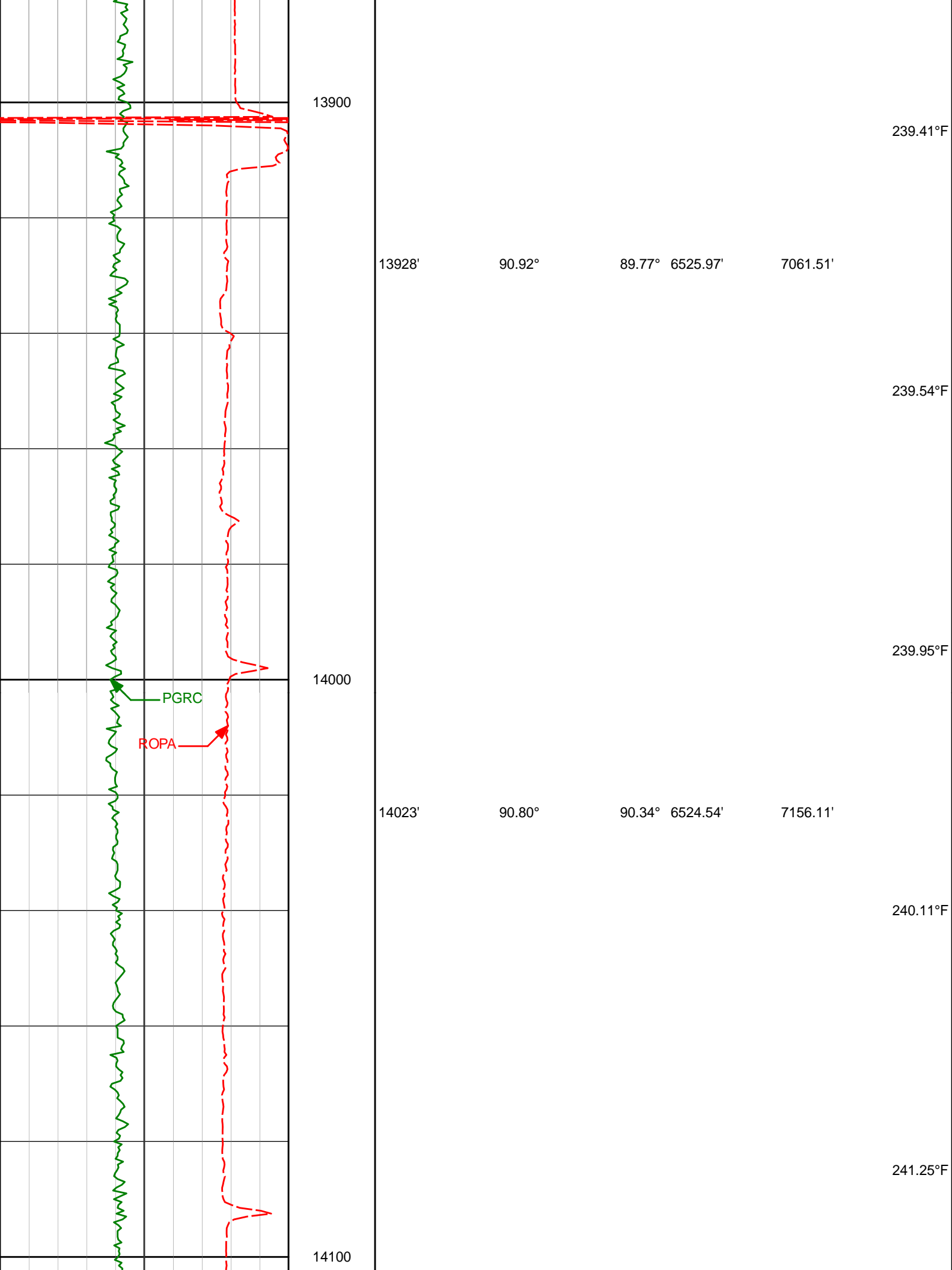
237.38°F

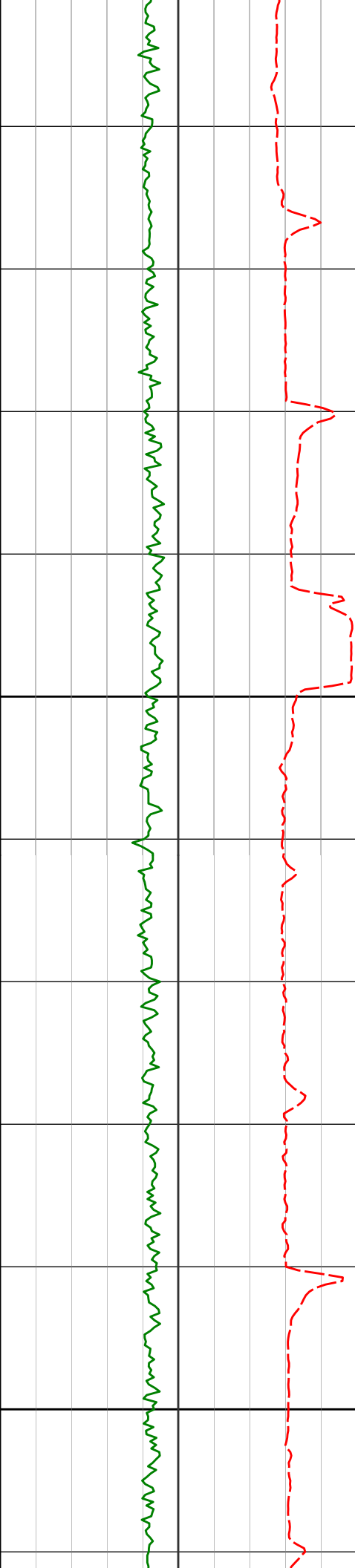
239.46°F

239.54°F

238.89°F

237.53°F





14200

14300

14118'

90.28°

89.51° 6523.65'

7250.73'

238.30°F

239.18°F

14213'

91.39°

91.18° 6522.26'

7345.29'

239.54°F

240.02°F

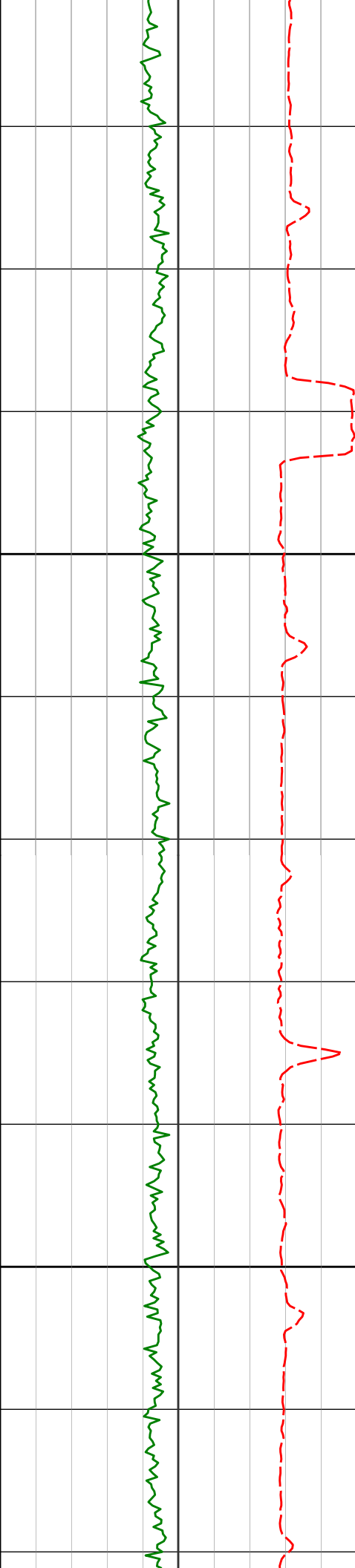
14307'

90.40°

90.12° 6520.80'

7438.80'

238.50°F



14400

14401'

91.75°

90.56°

6519.03'

7532.35'

239.54°F

240.31°F

241.61°F

14500

14496'

90.89°

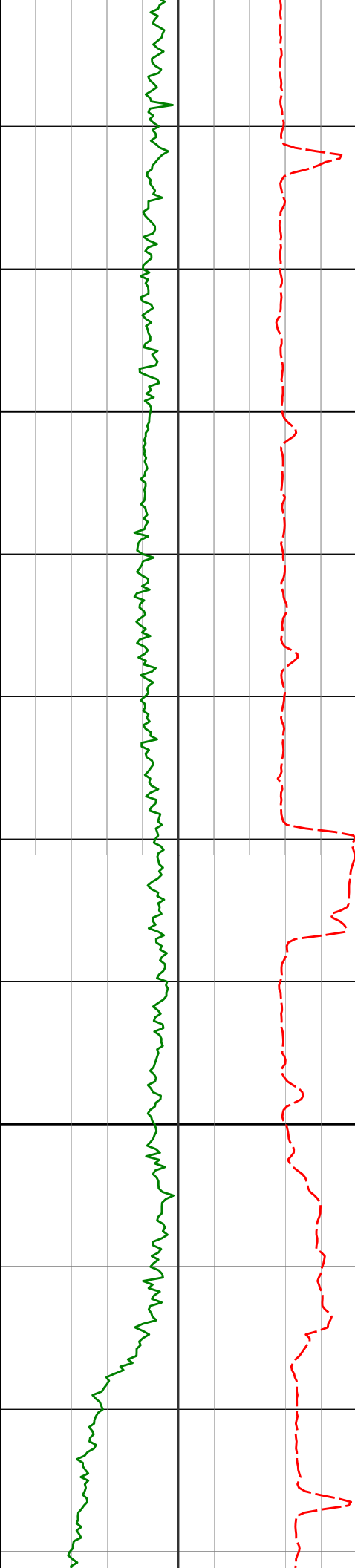
89.63°

6516.84'

7626.93'

241.75°F

238.68°F



14600

14700

14591'

90.40°

90.48° 6515.77'

7721.54'

239.35°F

238.19°F

240.32°F

14686'

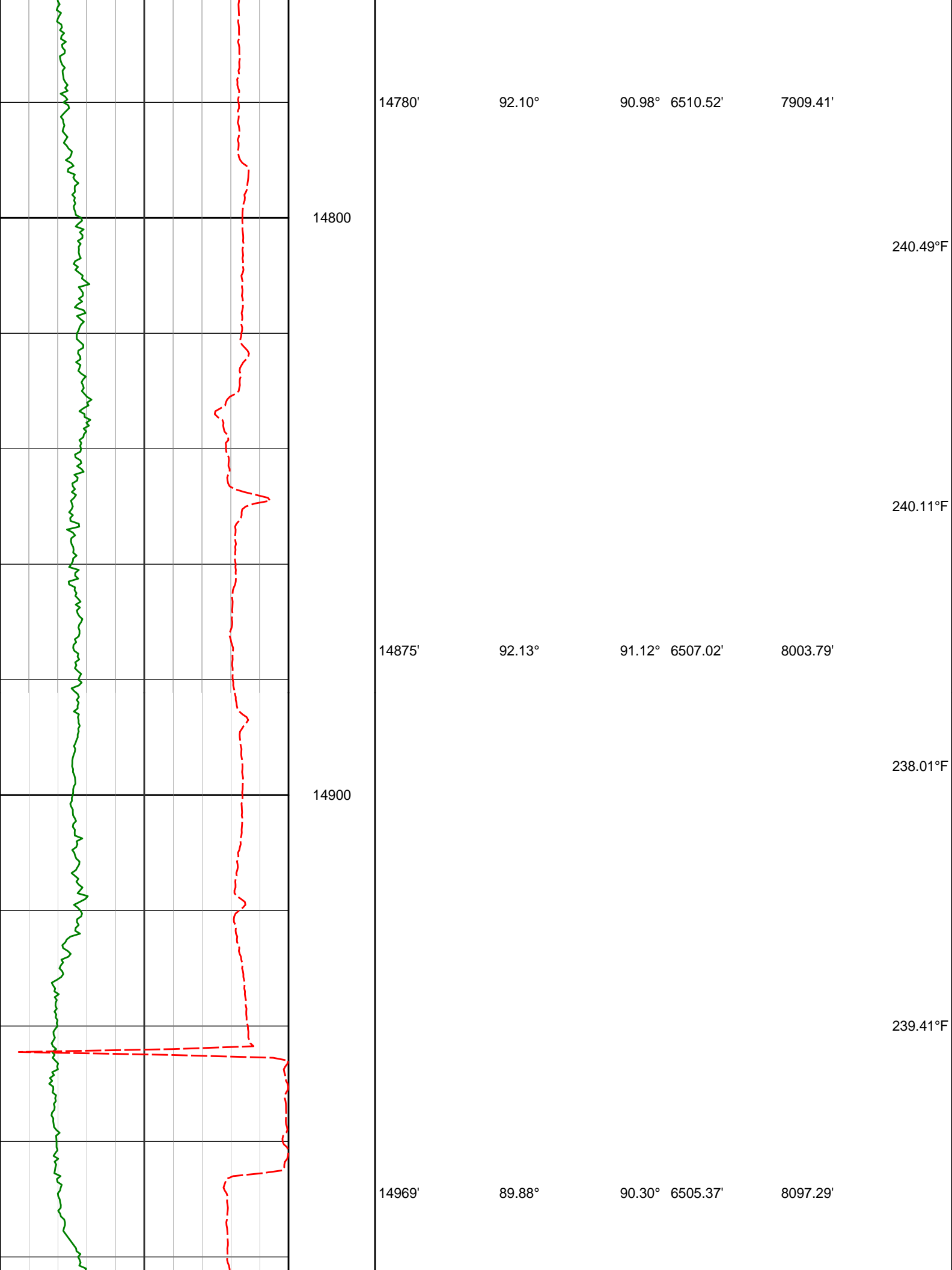
91.94°

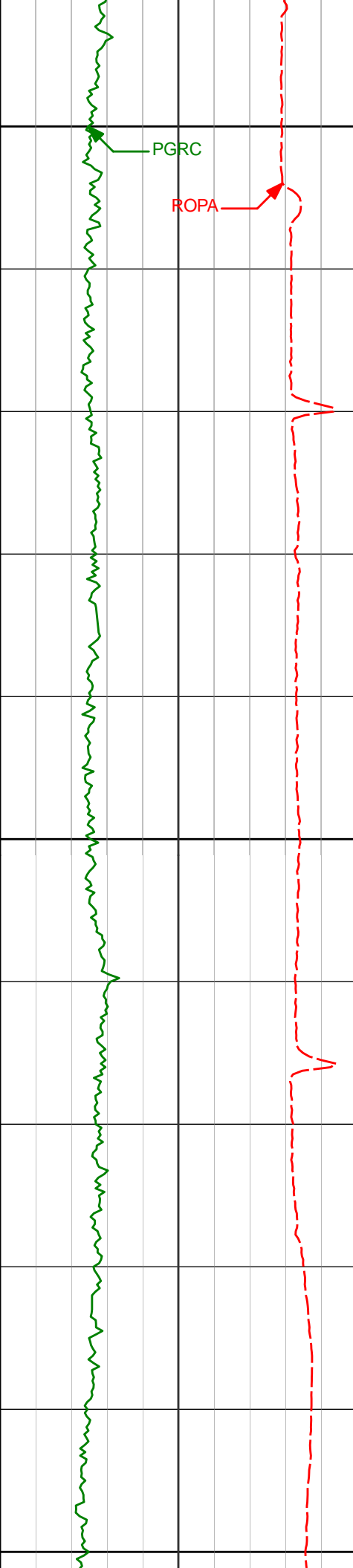
91.10° 6513.83'

7816.01'

240.11°F

241.69°F





15000

PGRC

ROPA

15100

15200

15064'

89.38°

90.22°

6505.98'

8191.87'

15159'

89.82°

90.54°

6506.64'

8286.43'

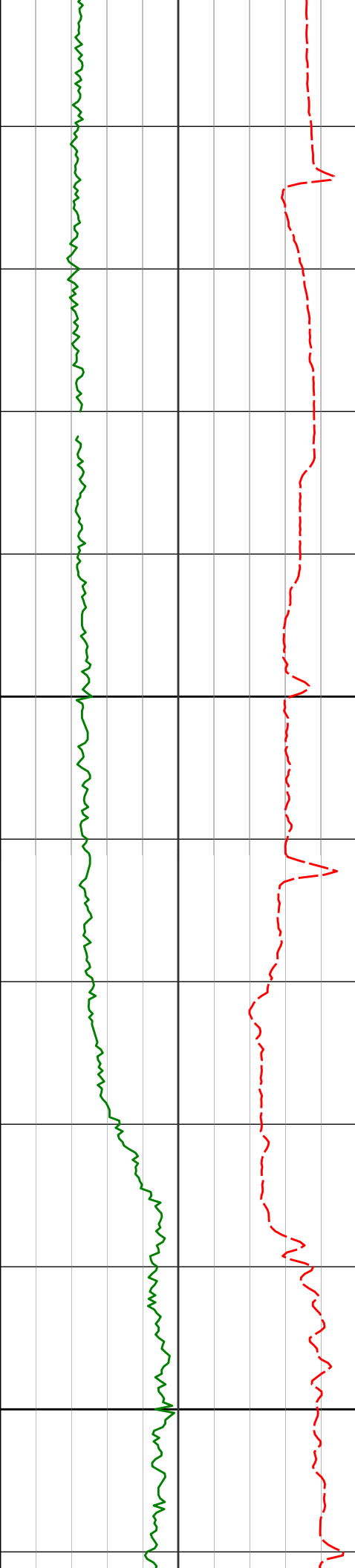
239.89°F

242.16°F

242.28°F

242.28°F

242.28°F



15300

15400

15255'

90.40°

90.57°

6506.46'

8381.96'

243.00°F

15352'

89.75°

90.22°

6506.33'

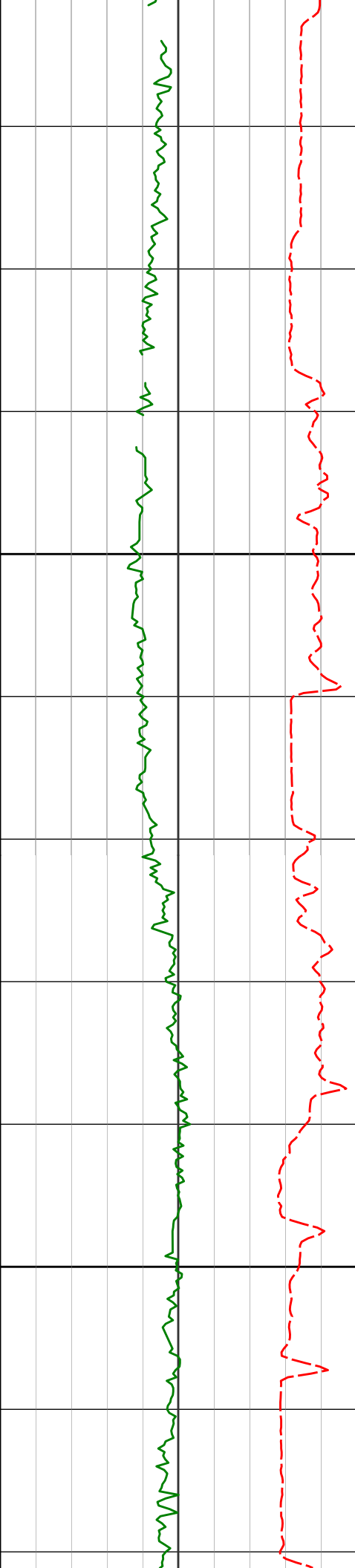
8478.50'

243.69°F

243.60°F

242.39°F

242.28°F



15500

15600

15449'

15546'

89.57°

90.06°

90.15° 6506.91'

90.66° 6507.22'

8575.09'

8671.64'

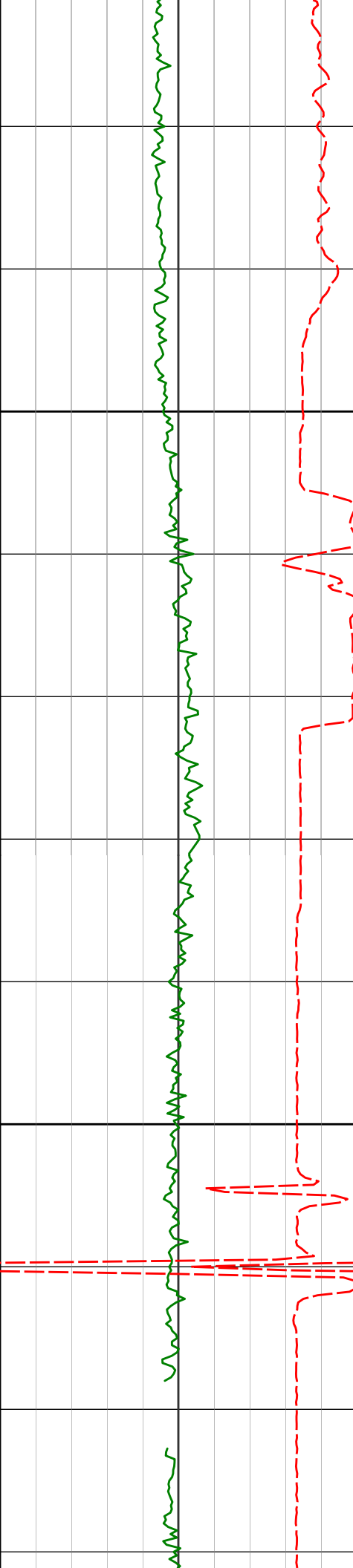
244.42°F

244.09°F

244.43°F

243.86°F

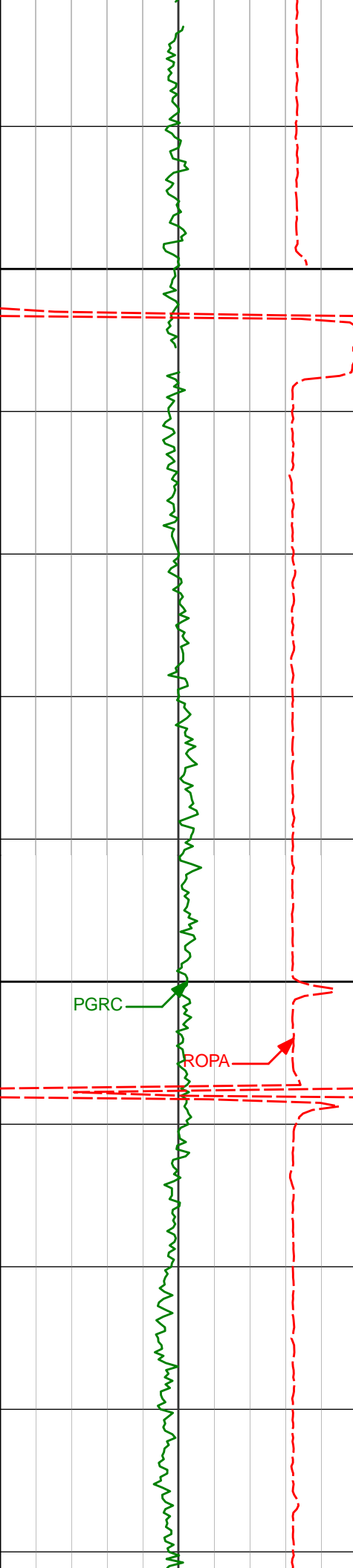
242.67°F



15700

15800

15643'	89.91°	90.86°	6507.25'	8768.13'	239.95°F
					240.70°F
15740'	89.91°	88.91°	6507.40'	8864.75'	240.05°F
					241.94°F
15837'	90.34°	88.56°	6507.19'	8961.53'	240.95°F



15900

15933'

91.20°

88.38° 6505.90'

9057.33'

16000

16031'

91.20°

88.56° 6503.85'

9155.12'

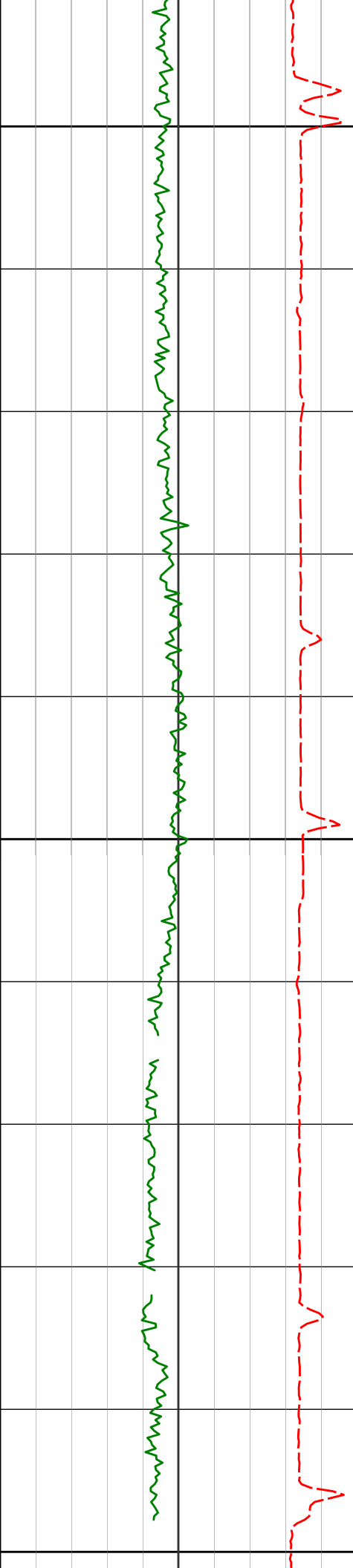
241.53°F

242.28°F

242.28°F

243.72°F

244.17°F



16100

245.03°F

16128'

90.71°

87.83° 6502.23'

9251.94'

243.87°F

16200

244.00°F

16225'

91.20°

88.20° 6500.61'

9348.78'

244.51°F

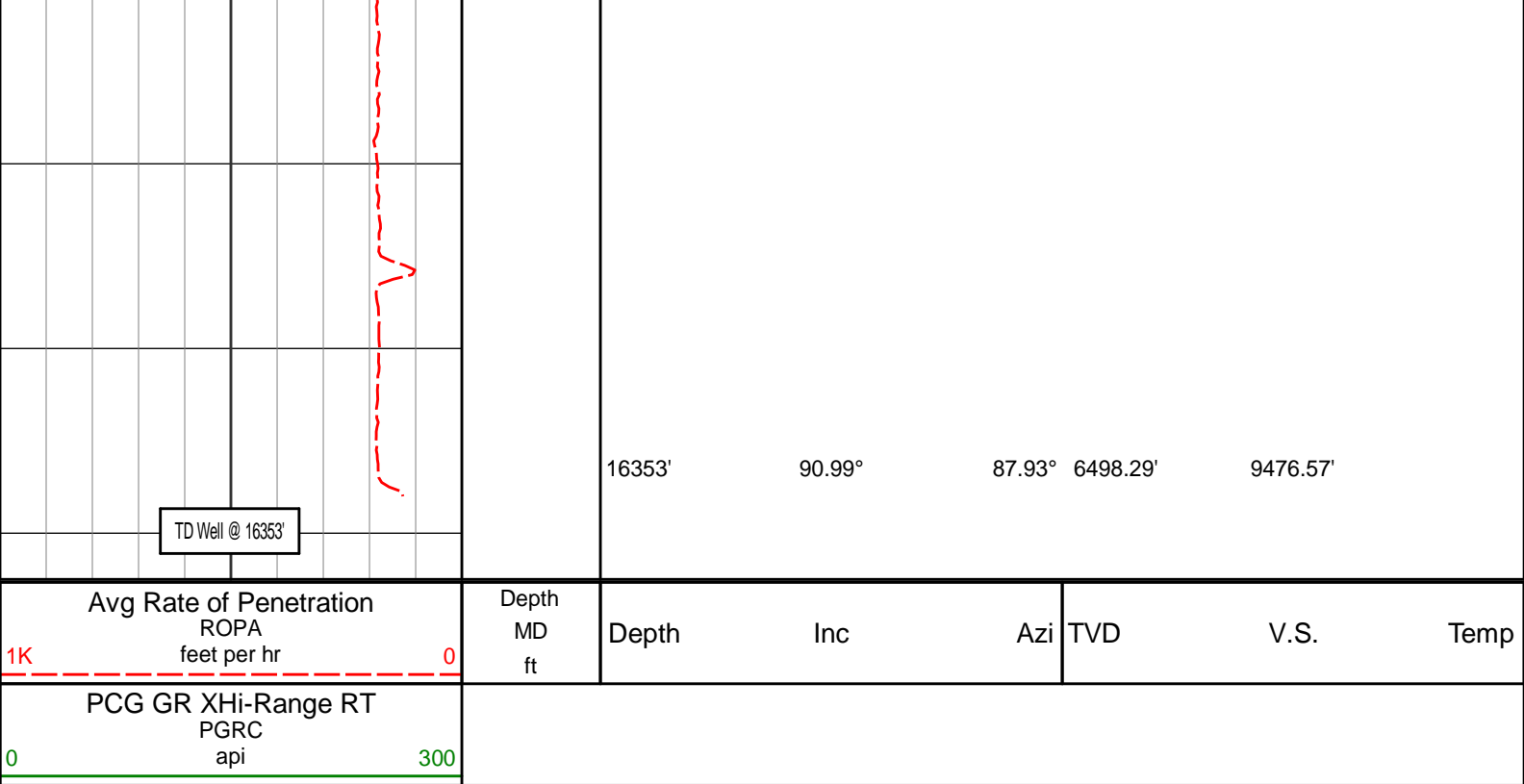
16286'

90.99°

87.93° 6499.45'

9409.68'

16300



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-690
Wattenberg
Weld Colorado
USA
CA-XX-0902771586

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
738.00	0.31	76.18	738.00	0.48 N	1.96 E	2.00	0.04
833.00	0.31	84.09	832.99	0.57 N	2.48 E	2.52	0.05
928.00	0.16	112.88	927.99	0.55 N	2.86 E	2.89	0.20
1116.00	0.29	157.46	1115.99	0.01 N	3.28 E	3.26	0.11
1207.00	0.22	126.70	1206.99	0.31 S	3.51 E	3.47	0.17
1299.00	0.30	154.42	1298.99	0.64 S	3.76 E	3.68	0.16
1390.00	0.44	148.97	1389.99	1.16 S	4.04 E	3.92	0.16
1483.00	0.84	288.60	1482.99	1.25 S	3.58 E	3.46	1.30
1576.00	2.78	312.34	1575.94	0.48 N	1.28 E	1.31	2.19
1669.00	5.02	325.71	1668.72	5.35 N	2.68 W	-2.19	2.58
1762.00	6.64	319.53	1761.23	12.80 N	8.46 W	-7.28	1.87
1854.00	7.09	317.91	1852.58	21.06 N	15.71 W	-13.77	0.53
1947.00	6.63	313.02	1944.91	28.98 N	23.48 W	-20.80	0.80
2040.00	6.36	310.52	2037.31	35.99 N	31.32 W	-27.99	0.42
2224.00	6.21	297.56	2220.22	47.21 N	47.89 W	-43.49	0.77
2317.00	5.70	291.68	2312.72	51.25 N	56.64 W	-51.84	0.85
2409.00	5.02	287.55	2404.31	54.15 N	64.72 W	-59.63	0.85
2502.00	7.85	307.30	2496.73	59.22 N	73.65 W	-68.07	3.82
2595.00	7.71	305.96	2588.87	66.73 N	83.75 W	-77.46	0.25
2688.00	7.30	304.13	2681.08	73.71 N	93.69 W	-86.74	0.51
2779.00	6.60	303.88	2771.41	79.87 N	102.81 W	-95.28	0.77
2871.00	9.08	302.06	2862.54	86.67 N	113.35 W	-105.17	2.71
2966.00	8.44	302.02	2956.44	94.34 N	125.62 W	-116.70	0.67
3061.00	7.89	301.22	3050.47	101.42 N	137.10 W	-127.50	0.59
3155.00	7.14	305.43	3143.66	108.15 N	147.38 W	-137.14	0.99

3250.00	5.16	303.01	3238.11	113.90 N	155.77 W	-144.99	2.10
3344.00	6.27	288.93	3331.65	117.87 N	164.17 W	-153.00	1.89
3439.00	5.29	279.96	3426.17	120.31 N	173.39 W	-161.96	1.40
3533.00	6.22	287.23	3519.69	122.56 N	182.52 W	-170.86	1.26
3628.00	7.45	287.75	3614.02	125.97 N	193.31 W	-181.29	1.30
3723.00	8.01	286.94	3708.15	129.77 N	205.50 W	-193.10	0.59
3817.00	8.22	285.37	3801.21	133.46 N	218.25 W	-205.47	0.33
3912.00	7.66	288.63	3895.30	137.28 N	230.80 W	-217.62	0.76
4006.00	6.53	285.27	3988.58	140.69 N	241.88 W	-228.36	1.28
4101.00	6.44	297.69	4082.98	144.59 N	251.82 W	-237.91	1.48
4195.00	5.19	301.44	4176.49	149.26 N	260.12 W	-245.76	1.39
4290.00	5.09	309.29	4271.11	154.17 N	267.05 W	-252.22	0.75
4385.00	6.68	310.85	4365.61	160.46 N	274.49 W	-259.08	1.69
4479.00	6.50	304.99	4458.99	167.09 N	282.99 W	-266.95	0.74
4574.00	7.63	302.34	4553.26	173.55 N	292.73 W	-276.07	1.24
4668.00	6.84	302.99	4646.51	179.93 N	302.70 W	-285.43	0.85
4763.00	8.97	314.21	4740.61	188.18 N	312.75 W	-294.71	2.75
4857.00	7.27	304.97	4833.67	196.70 N	322.88 W	-304.04	2.27
4952.00	8.14	305.06	4927.81	204.01 N	333.31 W	-313.78	0.91
5141.00	7.30	298.72	5115.10	217.46 N	354.80 W	-333.97	0.63
5236.00	6.85	289.63	5209.38	222.27 N	365.43 W	-344.14	1.27
5330.00	8.13	300.25	5302.58	227.50 N	376.46 W	-354.65	2.00
5425.00	6.22	298.75	5396.83	233.36 N	386.77 W	-364.40	2.02
5519.00	8.27	307.04	5490.08	239.88 N	396.63 W	-373.64	2.45
5614.00	8.54	306.05	5584.06	248.15 N	407.79 W	-384.02	0.32
5709.00	7.47	299.66	5678.13	255.36 N	418.86 W	-394.40	1.47
5803.00	20.78	334.55	5769.21	273.55 N	431.41 W	-405.28	16.21
5898.00	20.08	334.60	5858.24	303.50 N	445.65 W	-416.78	0.74
5993.00	18.92	341.32	5947.80	332.83 N	457.58 W	-426.05	2.66
6087.00	22.59	348.00	6035.82	365.34 N	461.37 W	-426.92	9.15
6182.00	25.63	12.22	6122.55	403.66 N	455.91 W	-418.07	4.93
6276.00	30.07	23.39	6205.70	445.19 N	442.25 W	-400.75	7.27
6371.00	35.57	43.36	6285.74	487.28 N	413.72 W	-368.59	12.72
6465.00	46.03	59.91	6357.01	524.32 N	365.41 W	-317.16	15.93
6560.00	57.61	68.95	6415.70	556.02 N	298.08 W	-247.27	14.28
6654.00	60.69	71.92	6463.90	583.01 N	222.05 W	-169.13	4.25
6749.00	63.94	82.31	6508.13	601.62 N	140.19 W	-85.94	10.26
6844.00	65.83	89.35	6548.49	607.83 N	54.47 W	-0.01	7.00
6955.00	80.50	92.39	6580.56	606.12 N	51.45 E	105.34	13.47
7065.00	91.11	89.69	6588.60	604.14 N	160.97 E	214.24	9.95
7160.00	91.82	89.33	6586.17	604.96 N	255.94 E	308.90	0.84
7254.00	92.90	90.00	6582.30	605.51 N	349.85 E	402.49	1.35
7349.00	92.10	89.47	6578.15	605.94 N	444.76 E	497.06	1.01
7444.00	91.14	89.37	6575.47	606.91 N	539.72 E	591.73	1.02
7538.00	90.56	88.58	6574.07	608.59 N	633.69 E	685.47	1.04
7632.00	90.49	88.44	6573.21	611.03 N	727.65 E	779.28	0.17
7727.00	90.18	87.91	6572.66	614.06 N	822.60 E	874.12	0.65
7821.00	90.25	88.70	6572.30	616.84 N	916.56 E	967.95	0.84
7916.00	90.12	88.24	6572.00	619.37 N	1011.53 E	1062.77	0.50
8010.00	89.82	87.74	6572.05	622.67 N	1105.47 E	1156.63	0.62
8105.00	88.92	86.59	6573.09	627.37 N	1200.34 E	1251.54	1.54
8199.00	89.82	89.43	6574.12	630.63 N	1294.27 E	1345.39	3.17
8294.00	90.12	90.68	6574.17	630.54 N	1389.27 E	1440.00	1.35
8388.00	90.40	91.33	6573.75	628.89 N	1483.25 E	1533.46	0.75
8483.00	90.59	92.74	6572.93	625.52 N	1578.19 E	1627.71	1.50
8578.00	90.74	89.64	6571.82	623.55 N	1673.15 E	1722.12	3.27
8672.00	91.11	90.60	6570.31	623.35 N	1767.14 E	1815.71	1.09
8767.00	90.34	89.46	6569.10	623.30 N	1862.13 E	1910.32	1.45
8862.00	90.68	88.27	6568.26	625.18 N	1957.10 E	2005.08	1.30
8956.00	90.68	87.47	6567.14	628.68 N	2051.03 E	2098.95	0.85
9051.00	90.49	88.46	6566.17	632.05 N	2145.96 E	2193.81	1.06
9145.00	90.46	86.60	6565.39	636.10 N	2239.87 E	2287.70	1.98
9240.00	90.92	87.83	6564.25	640.72 N	2334.75 E	2382.61	1.38
9334.00	90.83	89.19	6562.81	643.16 N	2428.70 E	2476.41	1.45
9428.00	90.46	86.63	6561.76	646.59 N	2522.63 E	2570.26	2.75
9523.00	90.34	85.93	6561.09	652.75 N	2617.42 E	2665.23	0.75
9618.00	90.18	86.05	6560.66	659.39 N	2712.19 E	2760.21	0.21
9807.00	91.84	85.51	6557.33	673.30 N	2900.64 E	2949.15	0.92
9902.00	91.63	86.14	6554.45	680.21 N	2995.34 E	3044.10	0.70
9996.00	91.57	85.92	6551.83	686.72 N	3089.08 E	3138.04	0.24
10091.00	91.70	85.17	6549.12	694.09 N	3183.76 E	3232.99	0.80
10184.00	91.11	86.54	6546.84	700.81 N	3276.48 E	3325.95	1.60
10276.00	90.59	88.80	6545.47	704.55 N	3368.39 E	3417.82	2.52
10459.00	89.75	88.31	6544.93	709.17 N	3551.33 E	3600.45	0.53
10645.00	90.46	89.89	6544.59	713.09 N	3737.30 E	3785.93	0.93

10645.00	90.48	89.89	6544.59	712.09 N	3757.30 E	3783.93	0.93
10738.00	90.06	89.43	6544.17	712.64 N	3830.29 E	3878.61	0.66
10831.00	89.26	88.77	6544.72	714.10 N	3923.28 E	3971.35	1.12
10923.00	89.66	89.81	6545.59	715.24 N	4015.27 E	4063.08	1.21
11016.00	89.94	90.23	6545.91	715.21 N	4108.27 E	4155.70	0.54
11202.00	91.75	91.03	6543.17	713.16 N	4294.23 E	4340.74	1.06
11293.00	92.68	92.15	6539.65	710.64 N	4385.12 E	4431.04	1.60
11386.00	90.34	89.27	6537.20	709.49 N	4478.06 E	4523.51	3.99
11477.00	89.66	88.56	6537.20	711.21 N	4569.05 E	4614.29	1.08
11571.00	89.01	88.41	6538.29	713.70 N	4663.01 E	4708.09	0.71
11664.00	88.34	87.91	6540.44	716.68 N	4755.93 E	4800.92	0.90
11756.00	89.78	87.37	6541.95	720.47 N	4847.84 E	4892.79	1.67
11848.00	90.09	87.34	6542.06	724.72 N	4939.74 E	4984.71	0.34
11941.00	88.55	87.26	6543.16	729.10 N	5032.63 E	5077.62	1.66
12036.00	87.75	86.95	6546.23	733.89 N	5127.46 E	5172.49	0.90
12131.00	89.48	87.93	6548.52	738.14 N	5222.33 E	5267.37	2.09
12225.00	90.06	88.49	6548.90	741.07 N	5316.28 E	5361.21	0.86
12320.00	92.03	87.37	6547.17	744.50 N	5411.20 E	5456.05	2.39
12414.00	91.79	87.25	6544.03	748.91 N	5505.04 E	5549.91	0.29
12509.00	91.73	86.94	6541.12	753.72 N	5599.88 E	5644.80	0.33
12604.00	91.97	87.24	6538.05	758.54 N	5694.70 E	5739.68	0.40
12698.00	91.73	86.84	6535.01	763.40 N	5788.53 E	5833.56	0.50
12793.00	91.73	86.82	6532.15	768.65 N	5883.34 E	5928.46	0.02
12887.00	91.42	86.75	6529.56	773.92 N	5977.16 E	6022.38	0.34
12982.00	91.23	86.67	6527.37	779.37 N	6071.98 E	6117.30	0.22
13076.00	89.23	86.70	6526.99	784.80 N	6165.81 E	6211.25	2.13
13171.00	88.49	86.84	6528.88	790.15 N	6260.64 E	6306.18	0.79
13266.00	90.43	88.43	6529.77	794.07 N	6355.55 E	6401.06	2.64
13361.00	90.31	87.99	6529.16	797.04 N	6450.50 E	6495.89	0.48
13455.00	90.00	88.38	6528.91	800.02 N	6544.45 E	6589.74	0.53
13550.00	89.78	87.54	6529.09	803.40 N	6639.39 E	6684.60	0.91
13644.00	90.55	89.13	6528.82	806.13 N	6733.35 E	6778.42	1.88
13739.00	90.56	89.19	6527.90	807.52 N	6828.33 E	6873.15	0.06
13834.00	90.43	89.69	6527.08	808.45 N	6923.33 E	6967.85	0.54
13928.00	90.92	89.77	6525.97	808.89 N	7017.32 E	7061.51	0.53
14023.00	90.80	90.34	6524.54	808.80 N	7112.31 E	7156.11	0.61
14118.00	90.28	89.51	6523.65	808.93 N	7207.30 E	7250.73	1.03
14213.00	91.39	91.18	6522.26	808.36 N	7302.28 E	7345.29	2.11
14307.00	90.40	90.12	6520.80	807.29 N	7396.26 E	7438.80	1.54
14401.00	91.75	90.56	6519.03	806.73 N	7490.24 E	7532.35	1.51
14496.00	90.89	89.63	6516.84	806.58 N	7585.22 E	7626.93	1.33
14591.00	90.40	90.48	6515.77	806.48 N	7680.21 E	7721.54	1.03
14686.00	91.94	91.10	6513.83	805.17 N	7775.18 E	7816.01	1.75
14780.00	92.10	90.98	6510.52	803.47 N	7869.10 E	7909.41	0.21
14875.00	92.13	91.12	6507.02	801.73 N	7964.02 E	8003.79	0.15
14969.00	89.88	90.30	6505.37	800.57 N	8057.99 E	8097.29	2.55
15064.00	89.38	90.22	6505.98	800.13 N	8152.99 E	8191.87	0.53
15159.00	89.82	90.54	6506.64	799.50 N	8247.99 E	8286.43	0.57
15255.00	90.40	90.57	6506.46	798.57 N	8343.98 E	8381.96	0.60
15352.00	89.75	90.22	6506.33	797.91 N	8440.98 E	8478.50	0.76
15449.00	89.57	90.15	6506.91	797.59 N	8537.98 E	8575.09	0.20
15546.00	90.06	90.66	6507.22	796.91 N	8634.97 E	8671.64	0.73
15643.00	89.91	90.86	6507.25	795.62 N	8731.96 E	8768.13	0.26
15740.00	89.91	88.91	6507.40	795.82 N	8828.96 E	8864.75	2.01
15837.00	90.34	88.56	6507.19	797.96 N	8925.93 E	8961.53	0.57
15933.00	91.20	88.38	6505.90	800.52 N	9021.89 E	9057.33	0.92
16031.00	91.20	88.56	6503.85	803.14 N	9119.83 E	9155.12	0.18
16128.00	90.71	87.83	6502.23	806.19 N	9216.77 E	9251.94	0.91
16225.00	91.20	88.20	6500.61	809.55 N	9313.70 E	9348.78	0.63
16286.00	90.99	87.93	6499.45	811.61 N	9374.65 E	9409.68	0.56
16353.00	90.99	87.93	6498.29	814.03 N	9441.60 E	9476.57	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 84.88 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 16353.00 FEET
IS 9476.63 FEET ALONG 85.07 DEGREES (GRID)

