



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	05-Jul-15	09-Jul-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)	765.00	6,955.00			
Log End Depth (MD, ft)	6,955.00	16,232.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	04-Jul-15 02:00	06-Jul-15 02:00			
Drill/Wipe End Date and Time	05-Jul-15 01:15	08-Jul-15 16:55			
Min Inc (deg) @ Depth (MD, ft)	0.55 @ 5,519.00	86.18 @ 7,068.00			
Max Inc (deg) @ Depth (MD, ft)	83.15 @ 6,890.00	91.97 @ 14,034.00			
Bit TFA(in2) / Bit Type	0.98 / PDC	0.98 / PDC			
Flow Rate (gpm)	593.03	329.33			
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)	10.40 / 28.00	9.35 / 35.00			
Filtrate CL (ppm)	1,600.00	3,600.00			
pH / Fluid Loss (mptm)	10.90 / 33	9.90 / 0			
PV (cP) / YP (lbf2)	4 / 5.00	9 / 10.00			
% Solids / % Sand	2.7 / .5	6.1 / .20			
% 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	168.00 / 168.00	215.00 / 168.00			

Max Tool Temp (degF) / Source	180.09 / PCM	245.03 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ 245.03			
Lead MWD Engineer	Brian Neu	Cody Wurdeman			
Customer Representative	JW Irwin	JW Irwin			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11342292	12301677			
Insert Serial Number	11680771	11680742			
Date and Time Initialized	03-Jul-15 15:08	05-Jul-15 03:29			
Date and Time Read	05-Jul-15 05:37	09-Jul-15 09:28			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	65.00	68.00			
Software Version	6.33	6.33			
Sub Serial Number	11342292	12301677			
Sonde Serial Number	11477975	11062074			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	209.80	209.60			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	58.19	61.34			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11342292	12301677			
Insert/Sonde Serial Number	11120592	11579811			

REMARKS

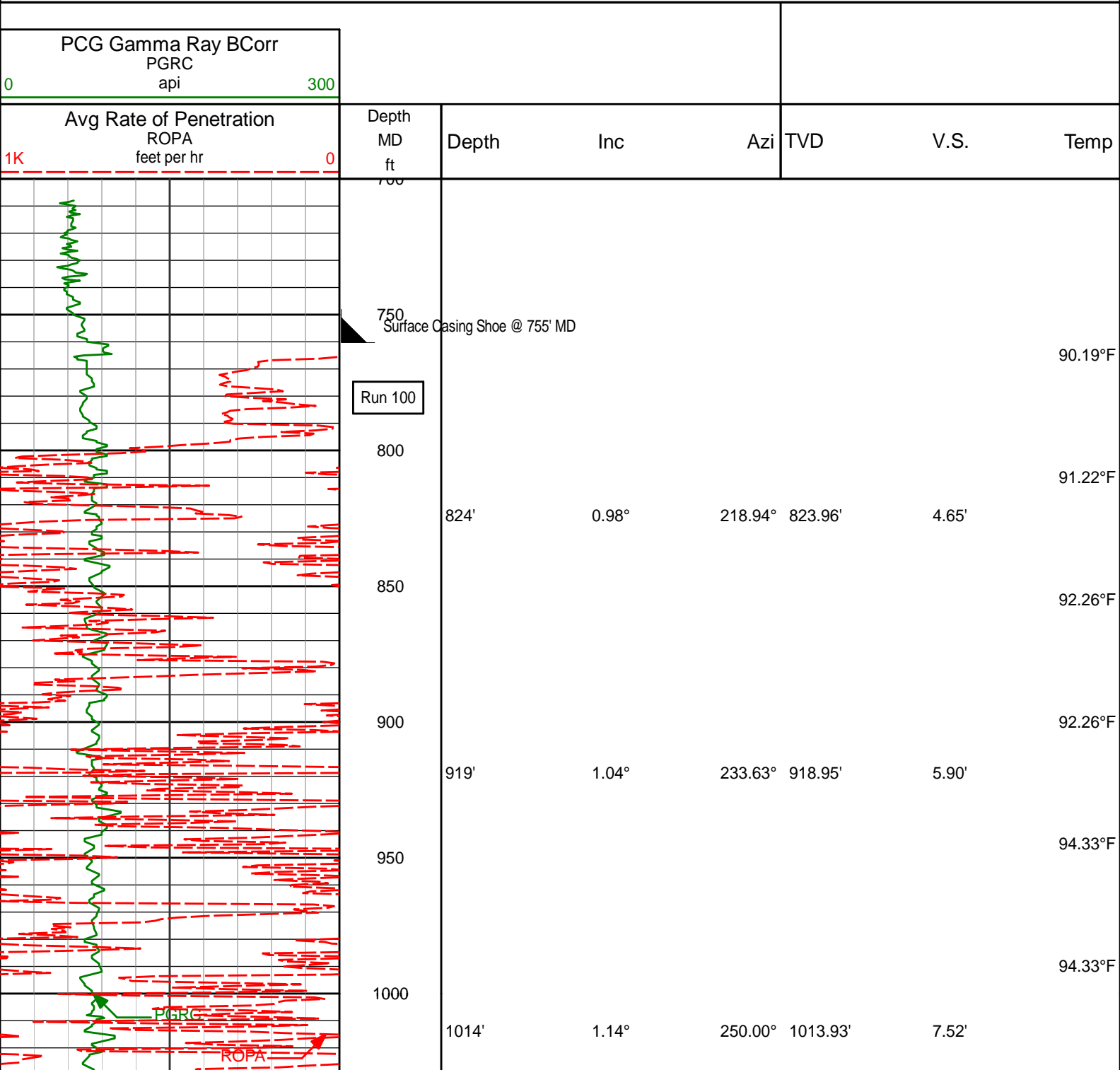
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Any gaps in gamma are due to high ROP.
5. Environmental parameters used in gamma and resistance processing:
Hole Size: 6.125"
Mud Density: 9.9-10.3
6. The following smoothing parameters have been applied to the data:
Interval: 0.5 ft
Coercion Distance: 1.2 ft (ROPA)
Interval: 0.5 ft
Coercion Distance: 0.6 ft (Gamma Ray)

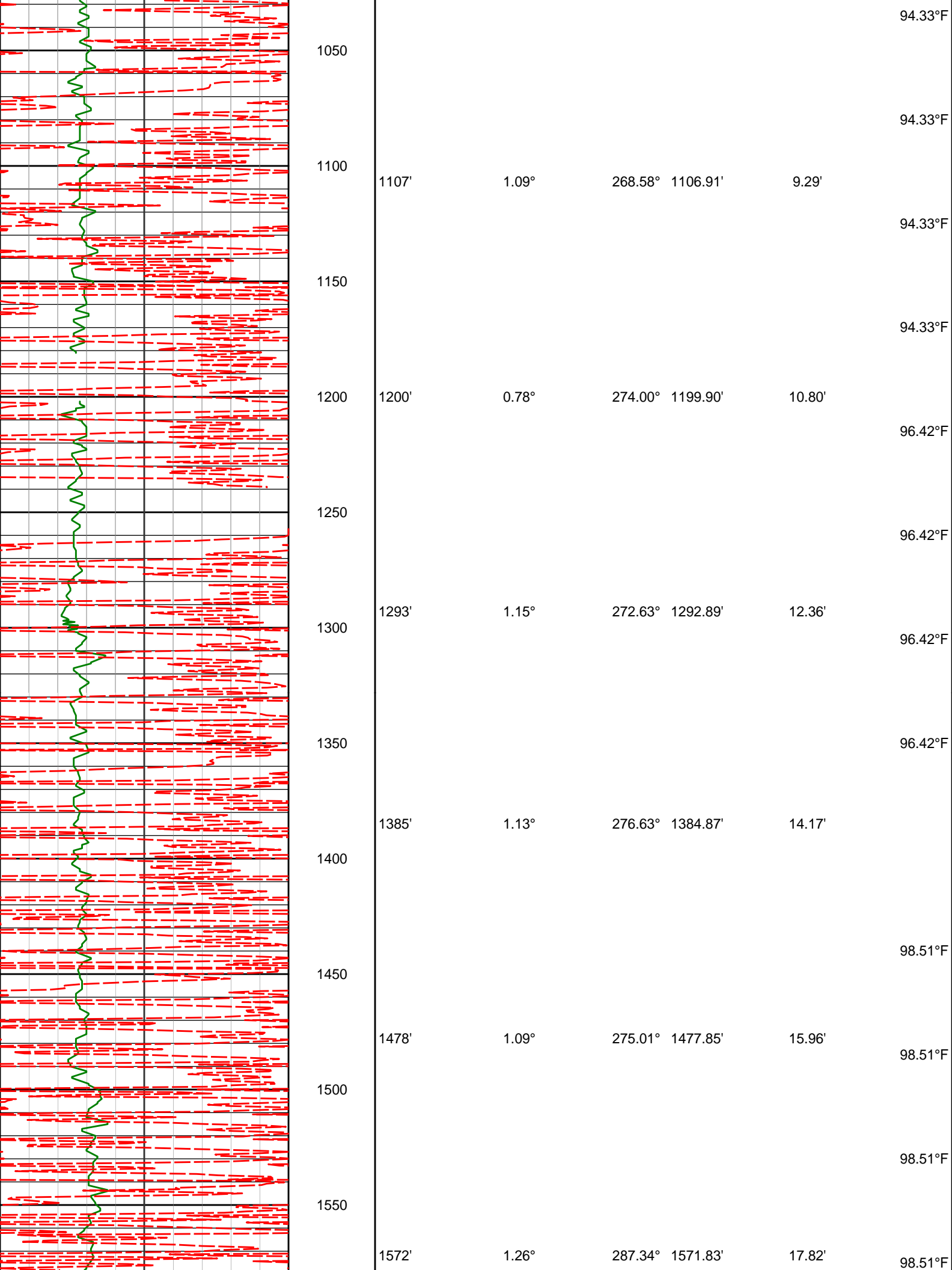
WARRANTY

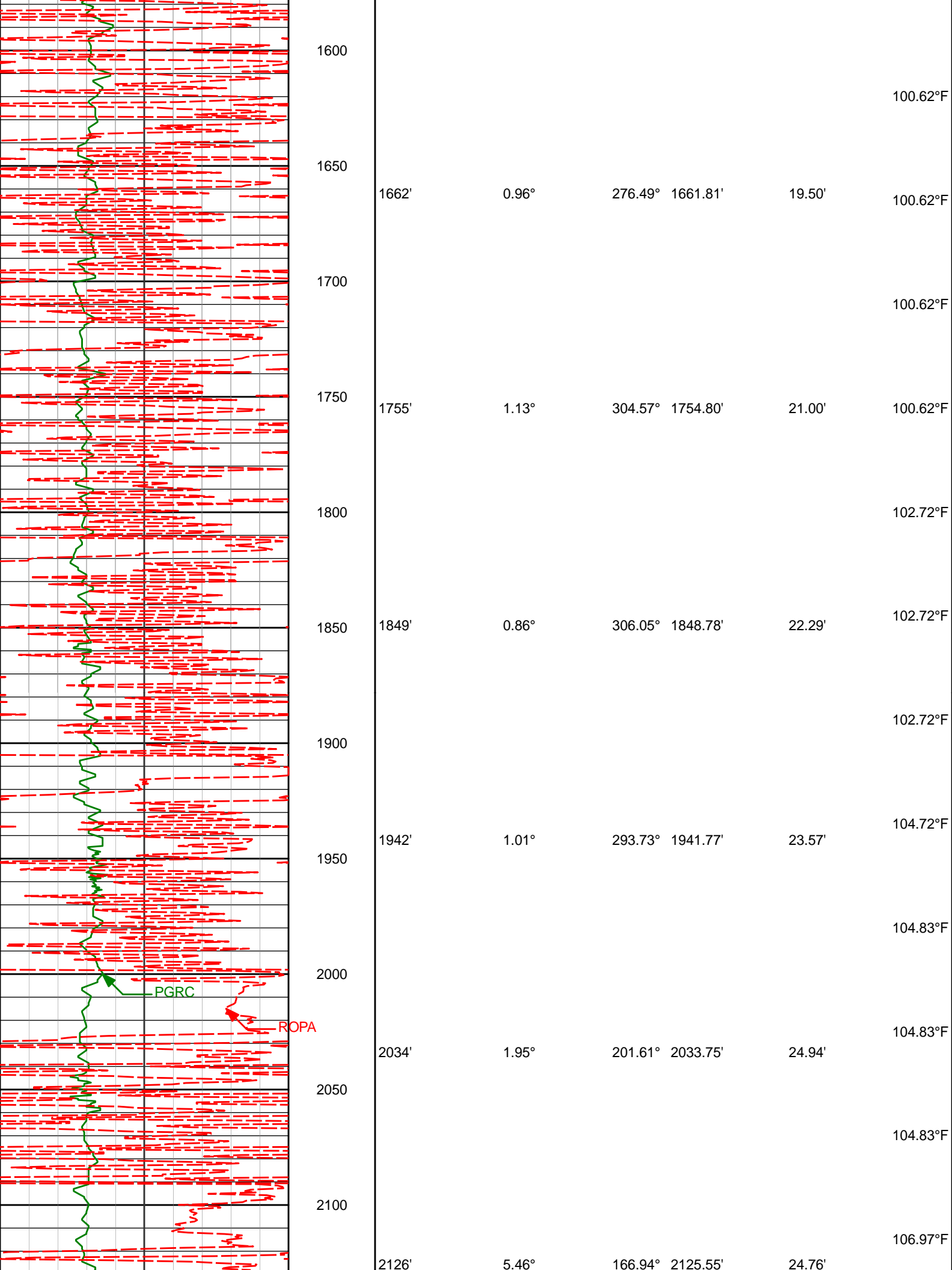
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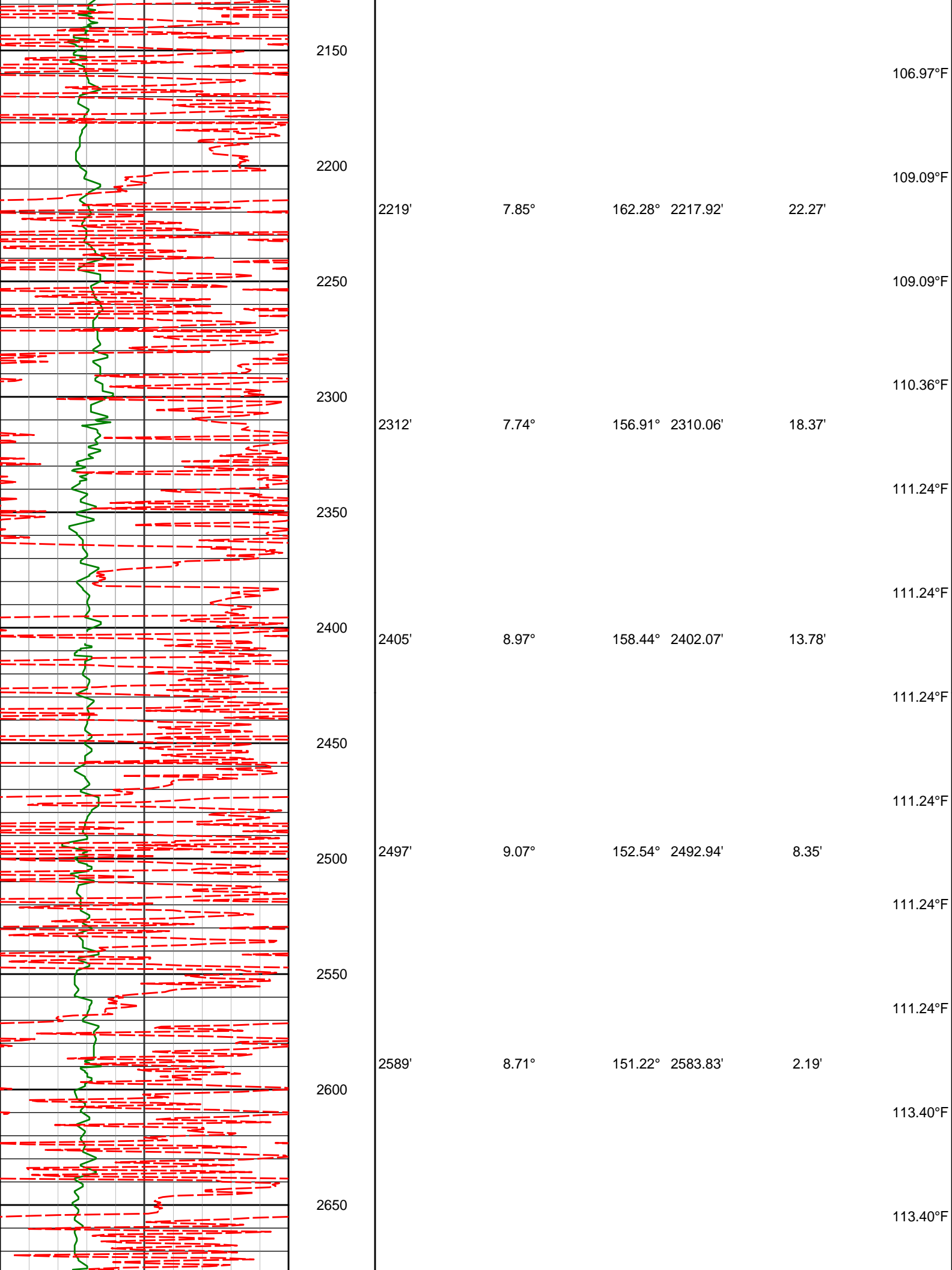
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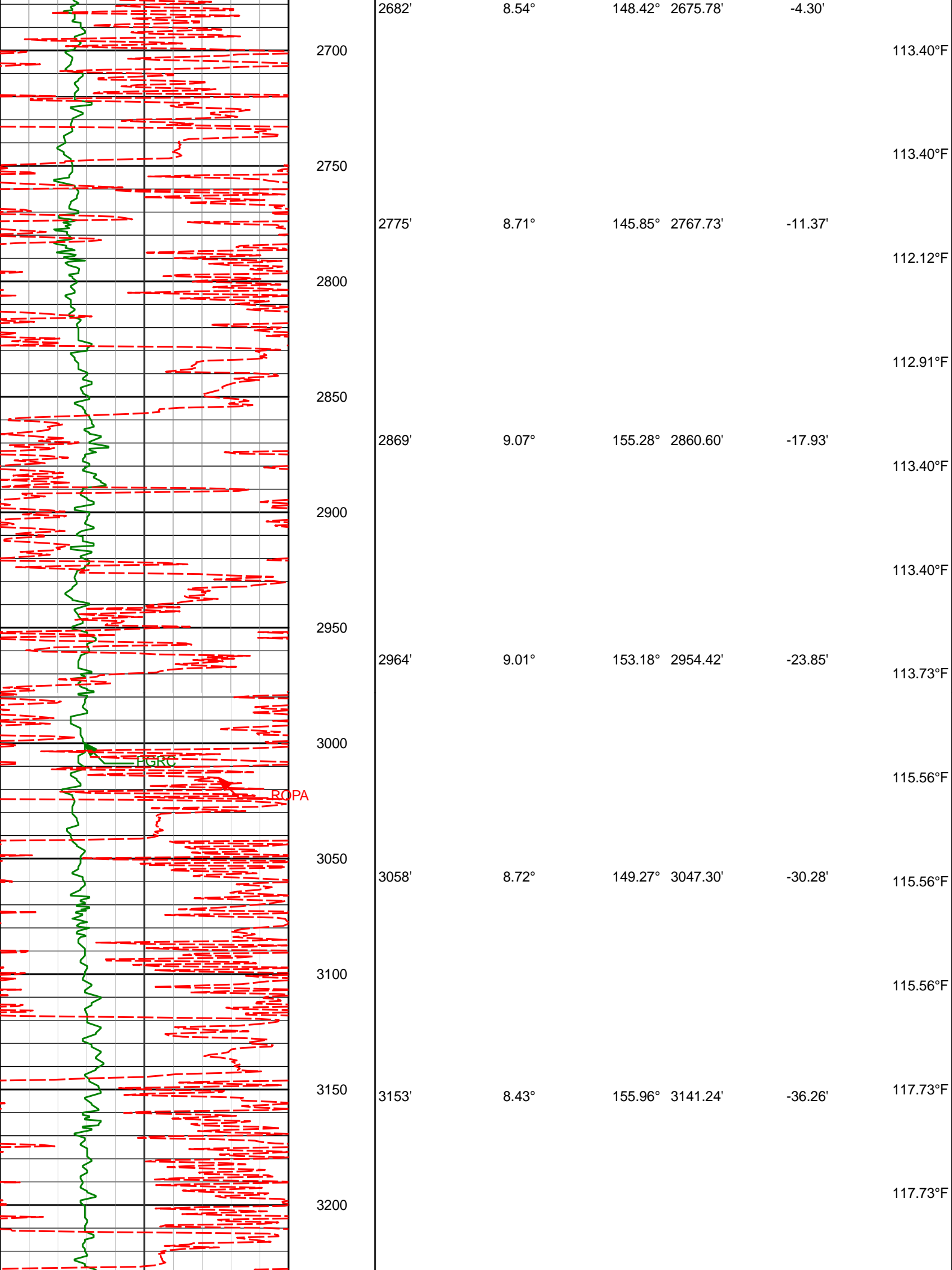
MD Detail 1:600 Scale

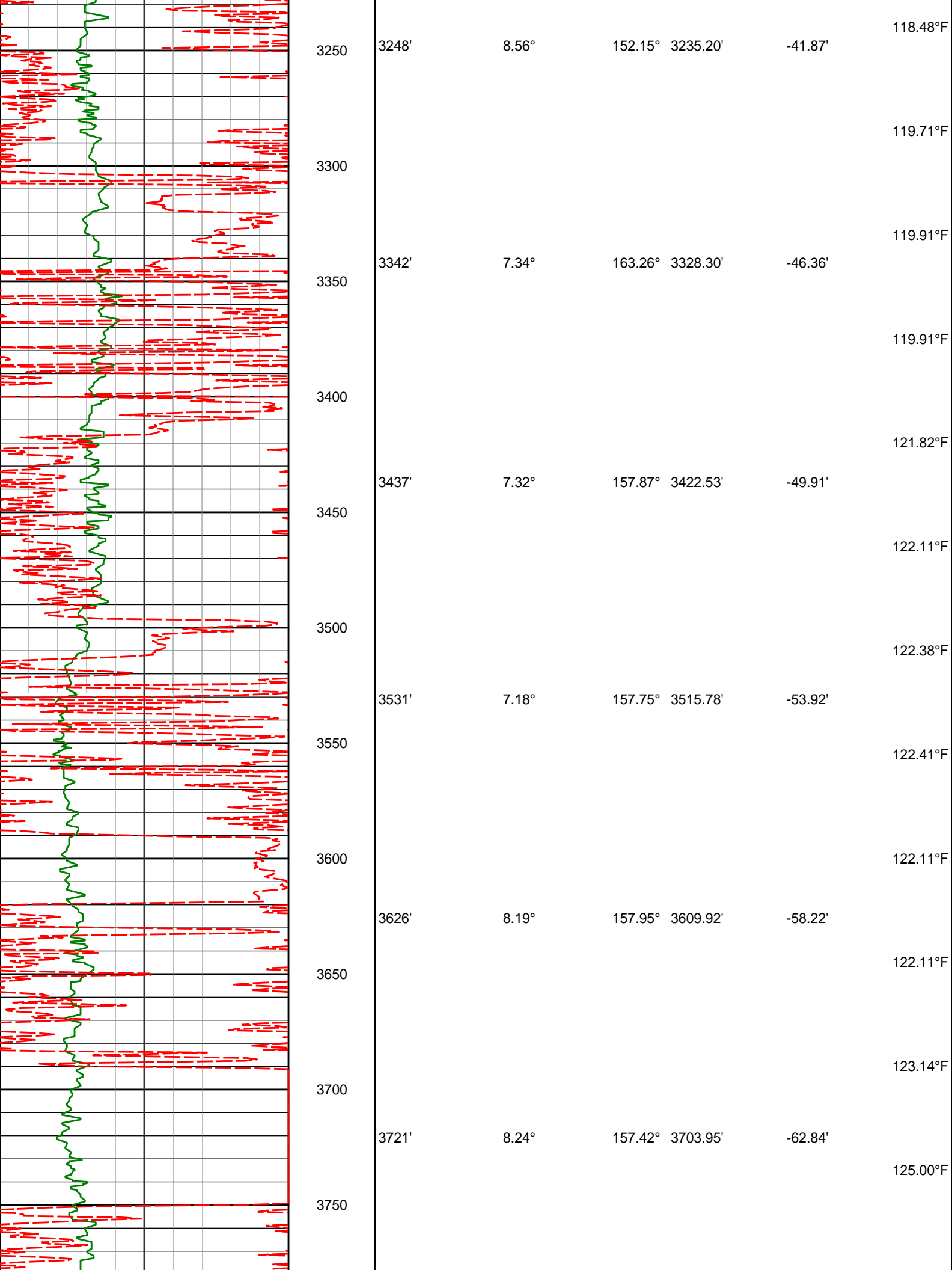


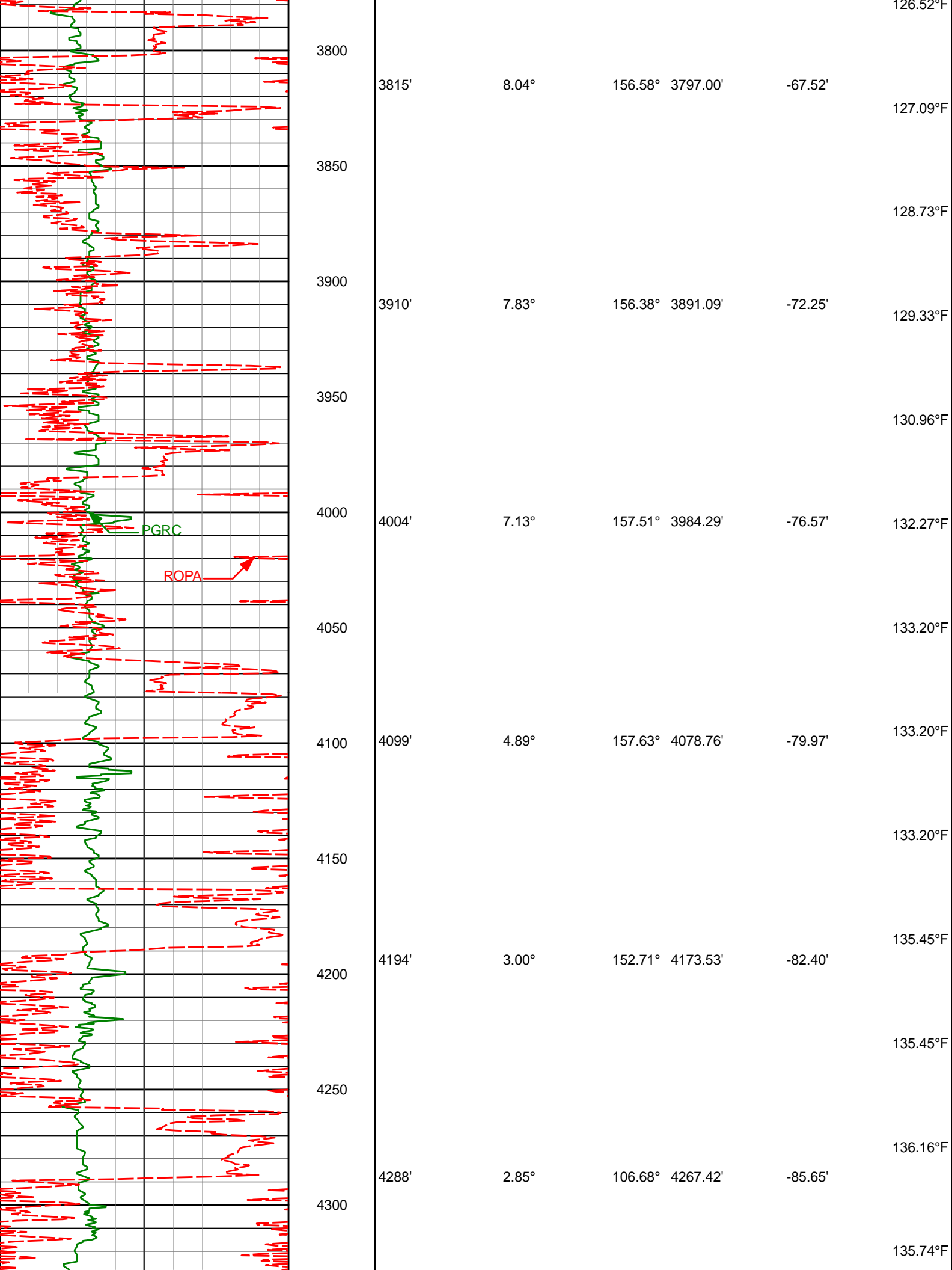


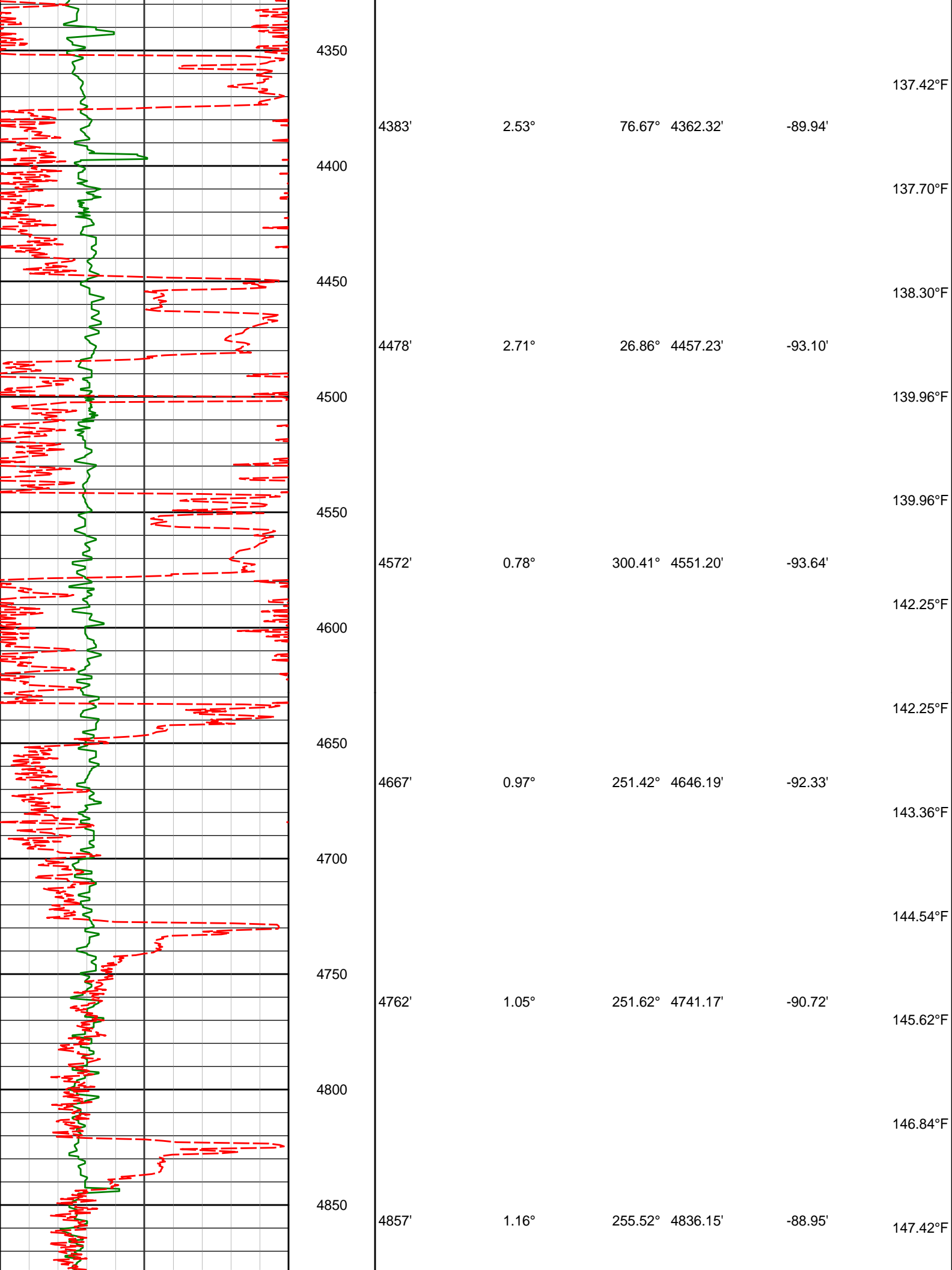


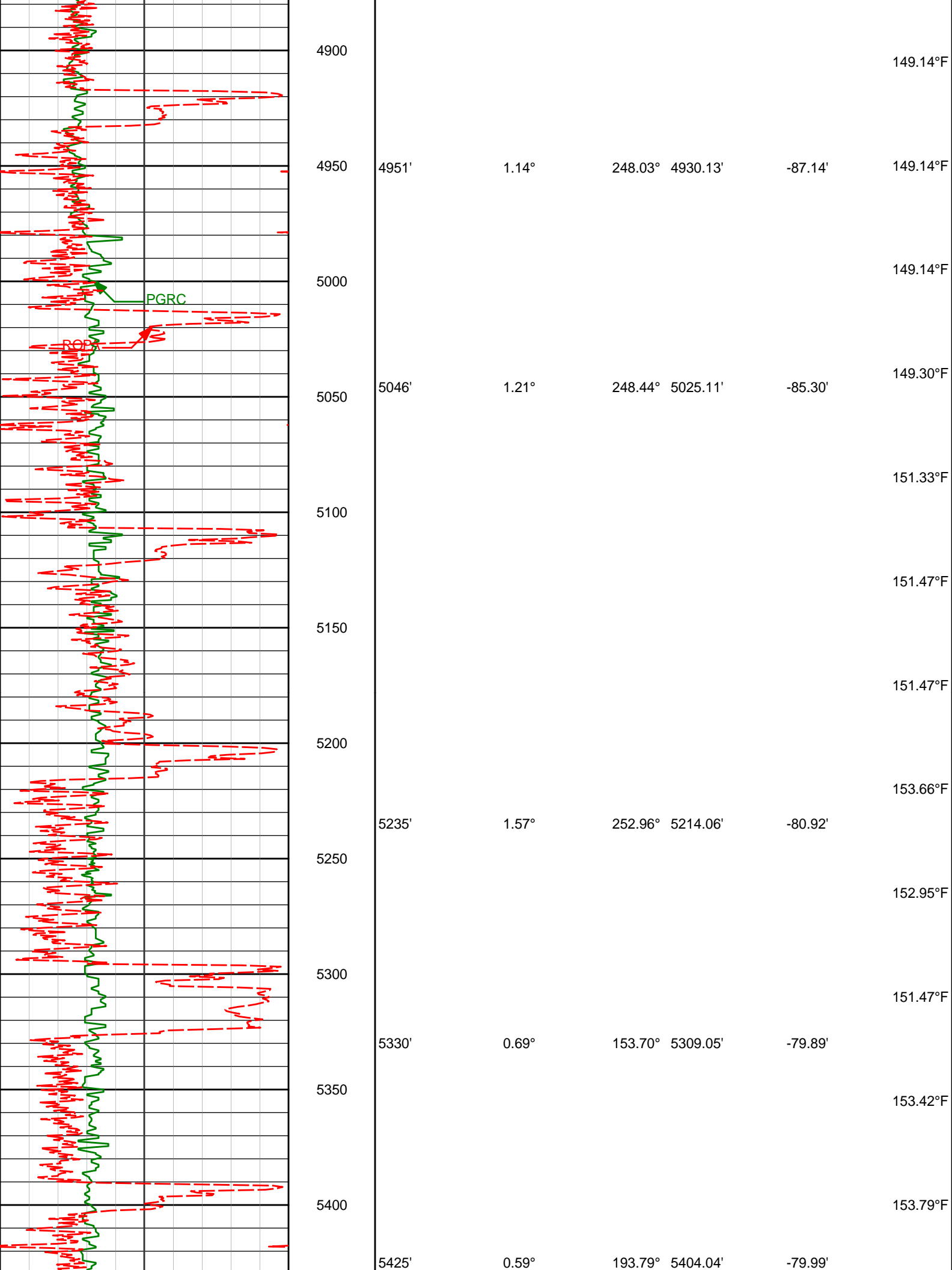


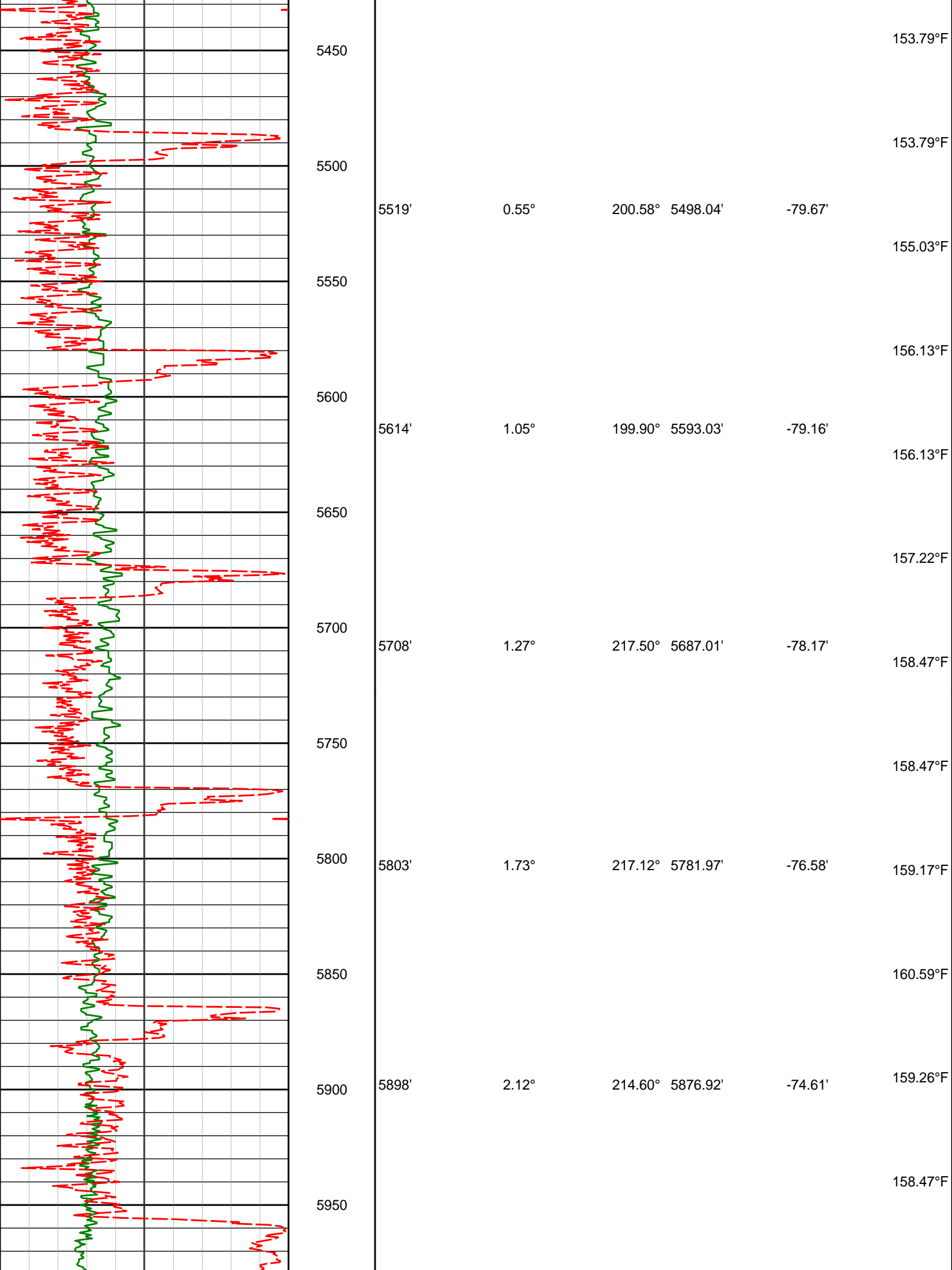


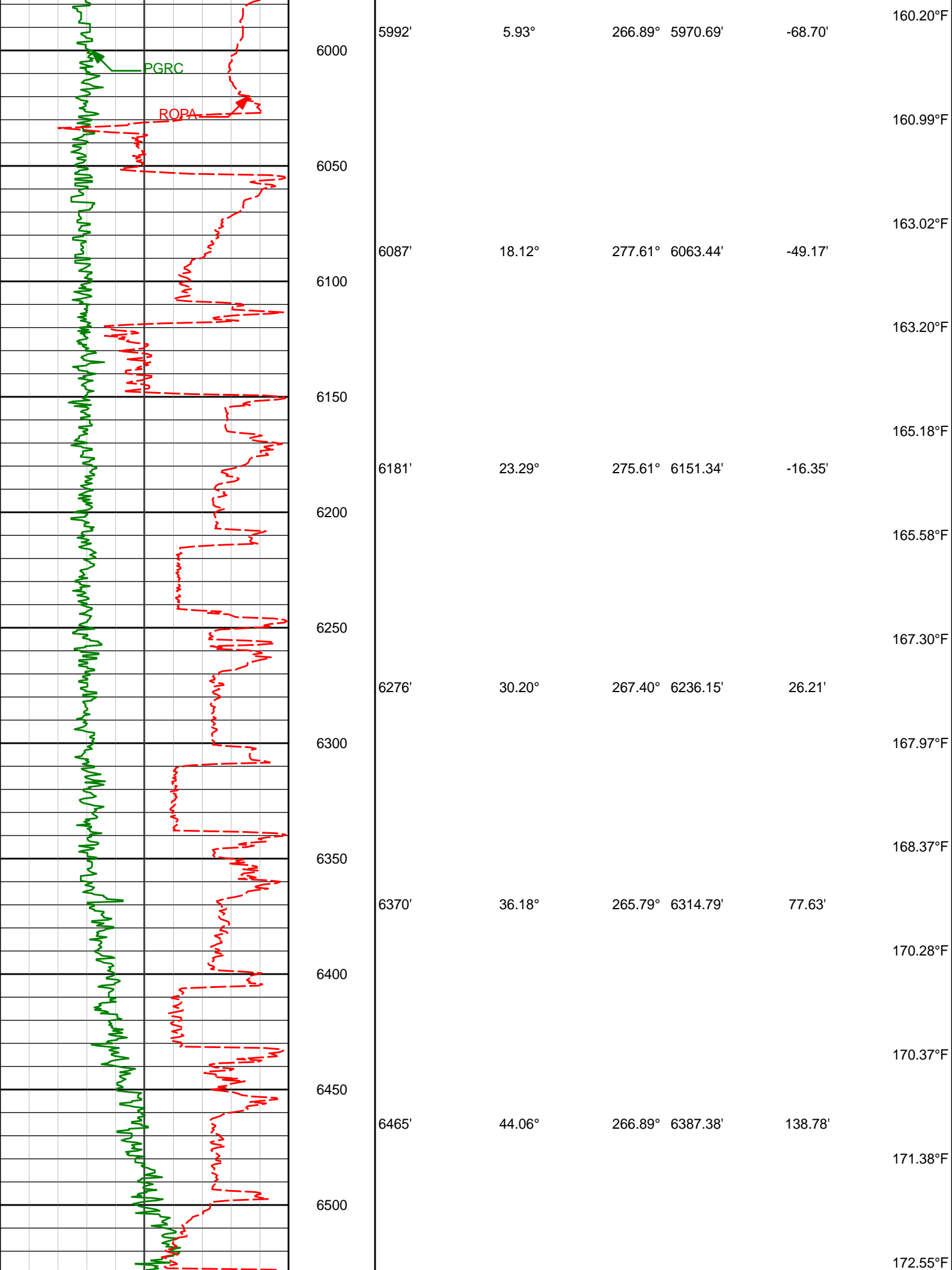


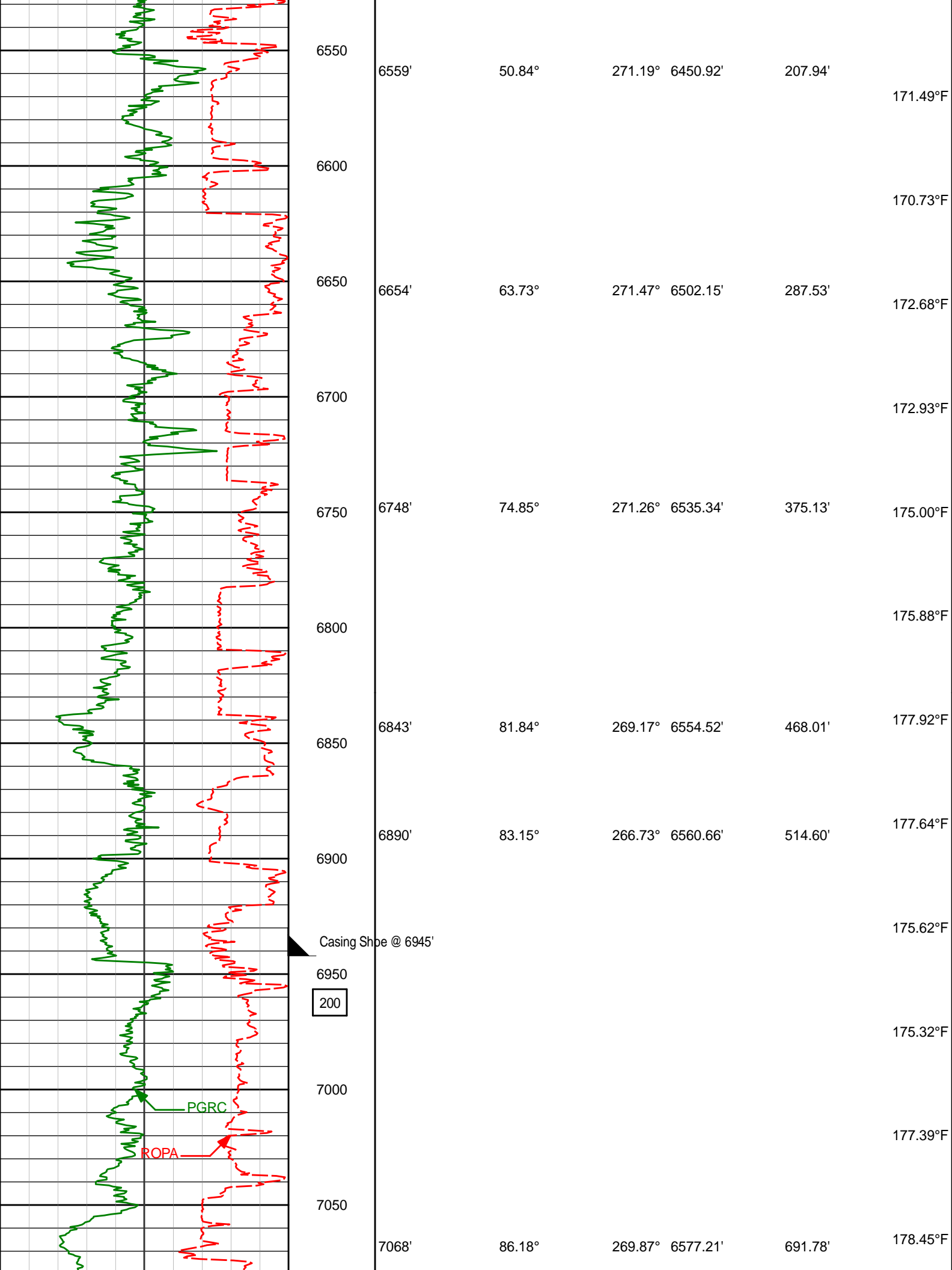


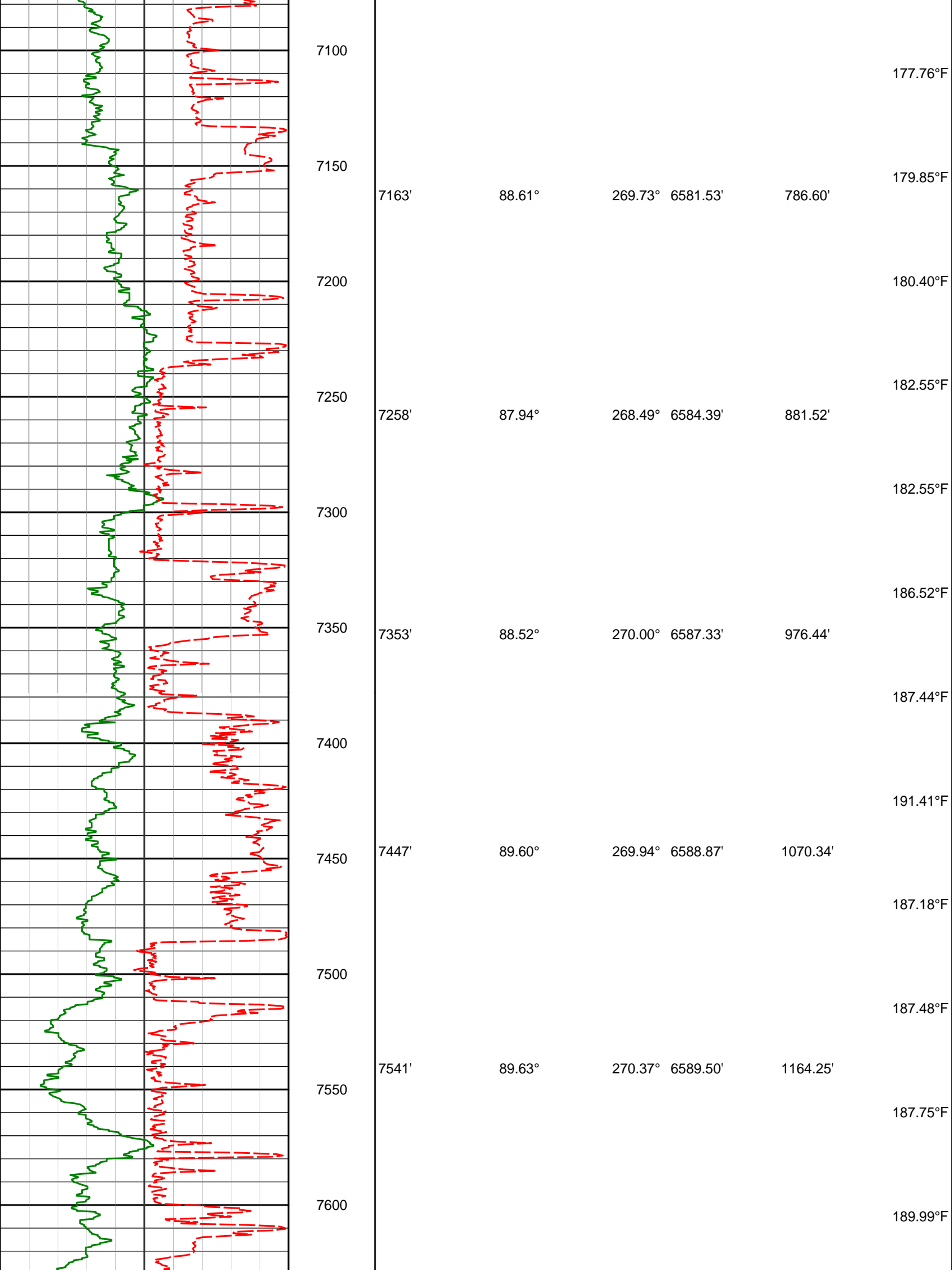


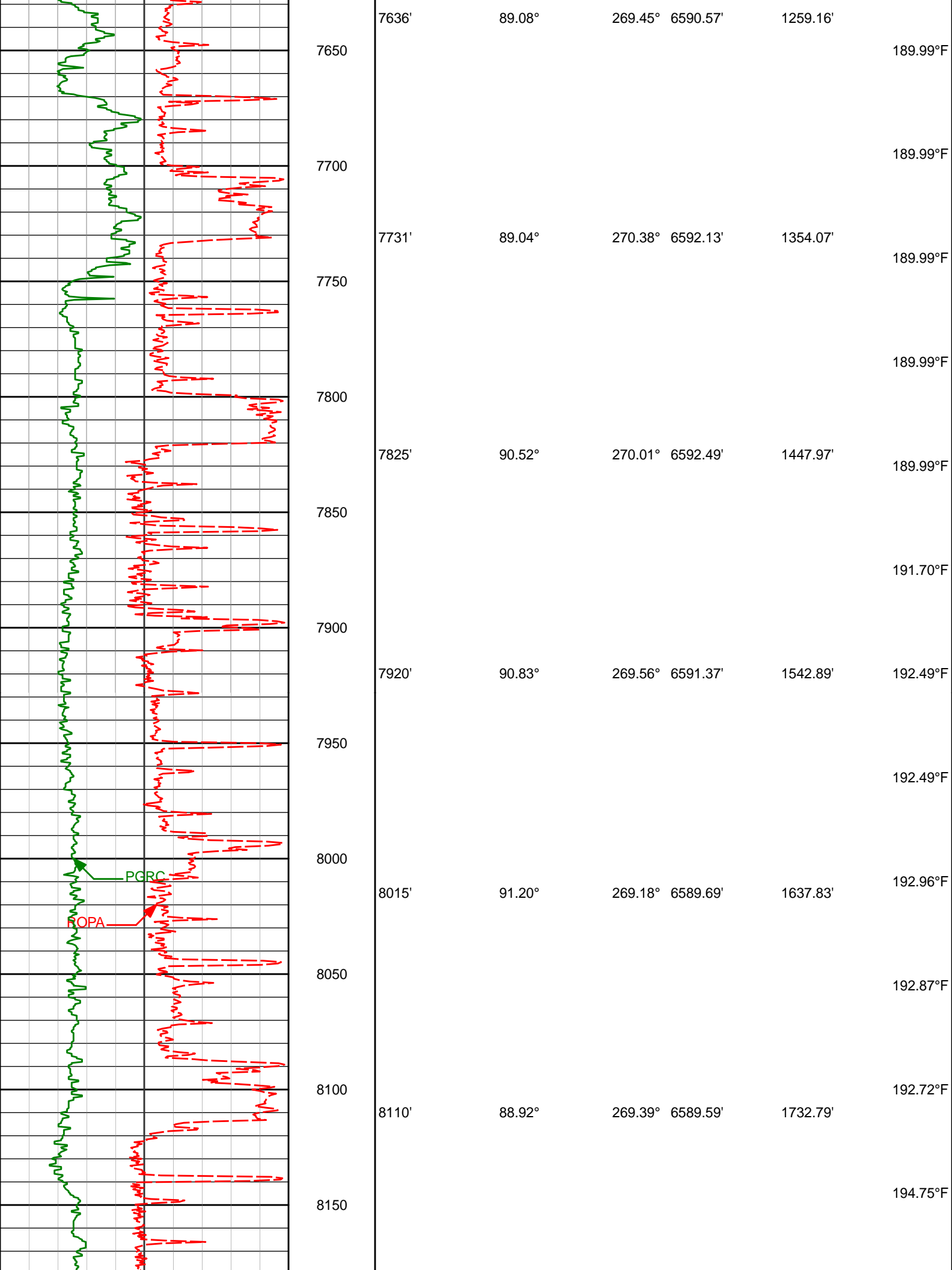


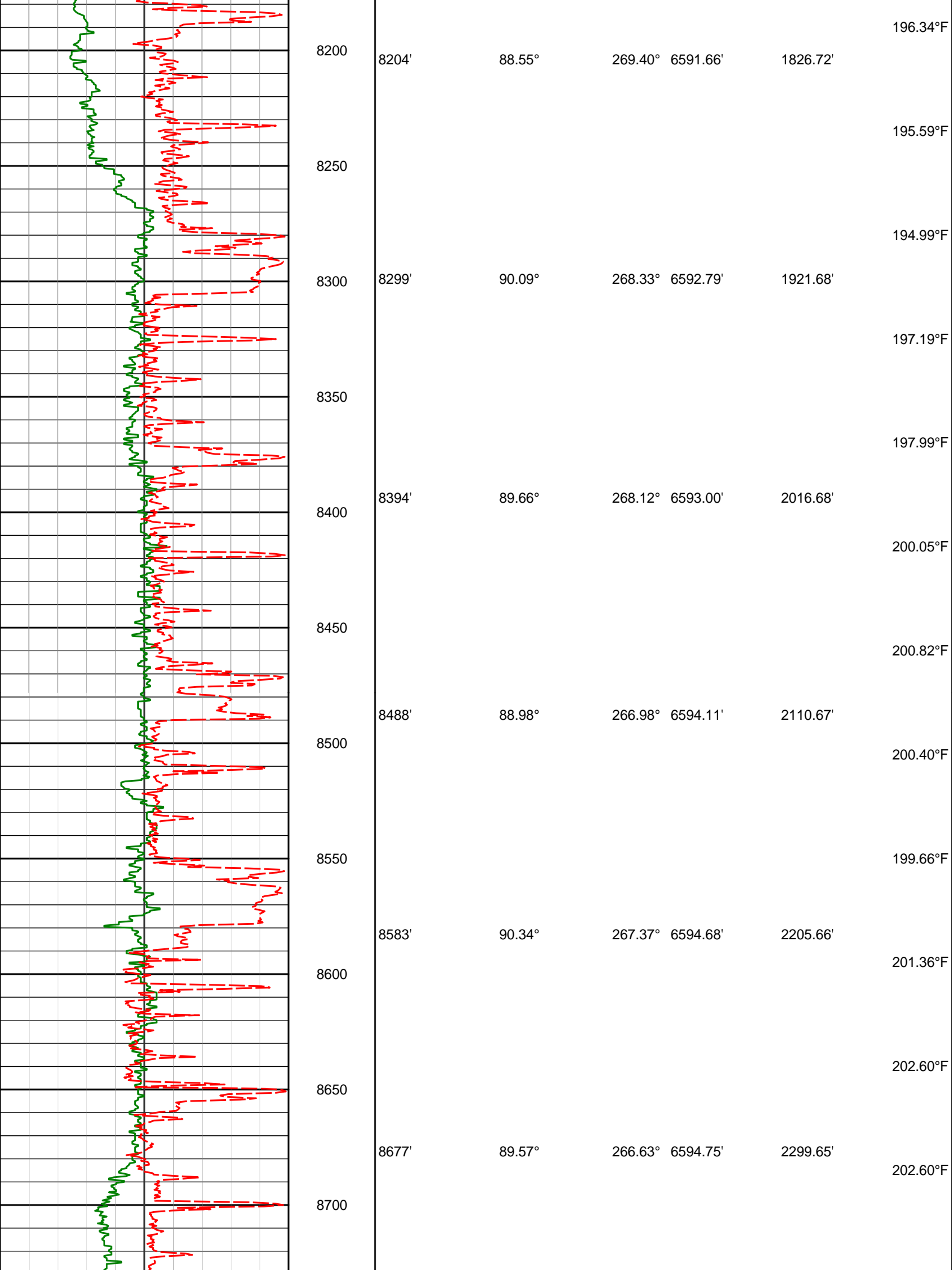


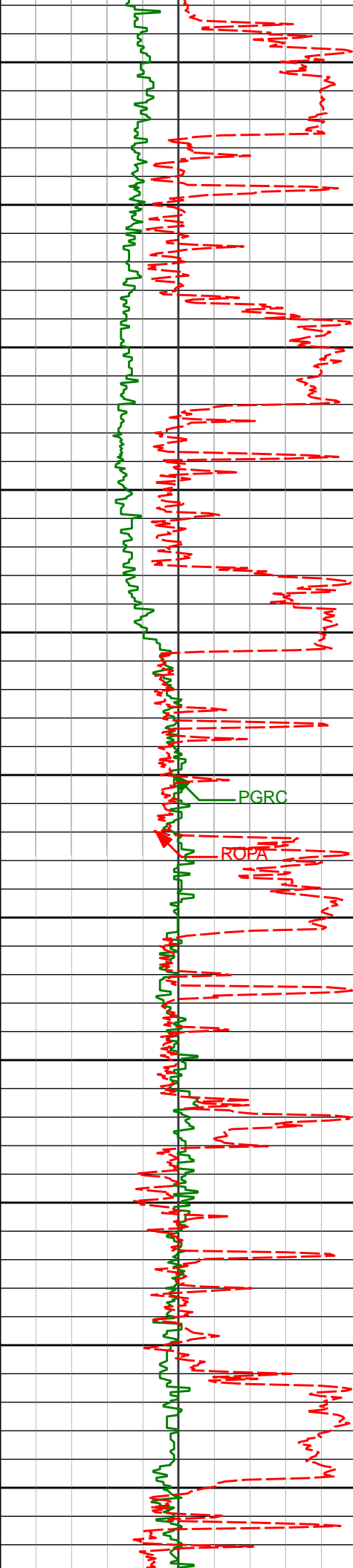




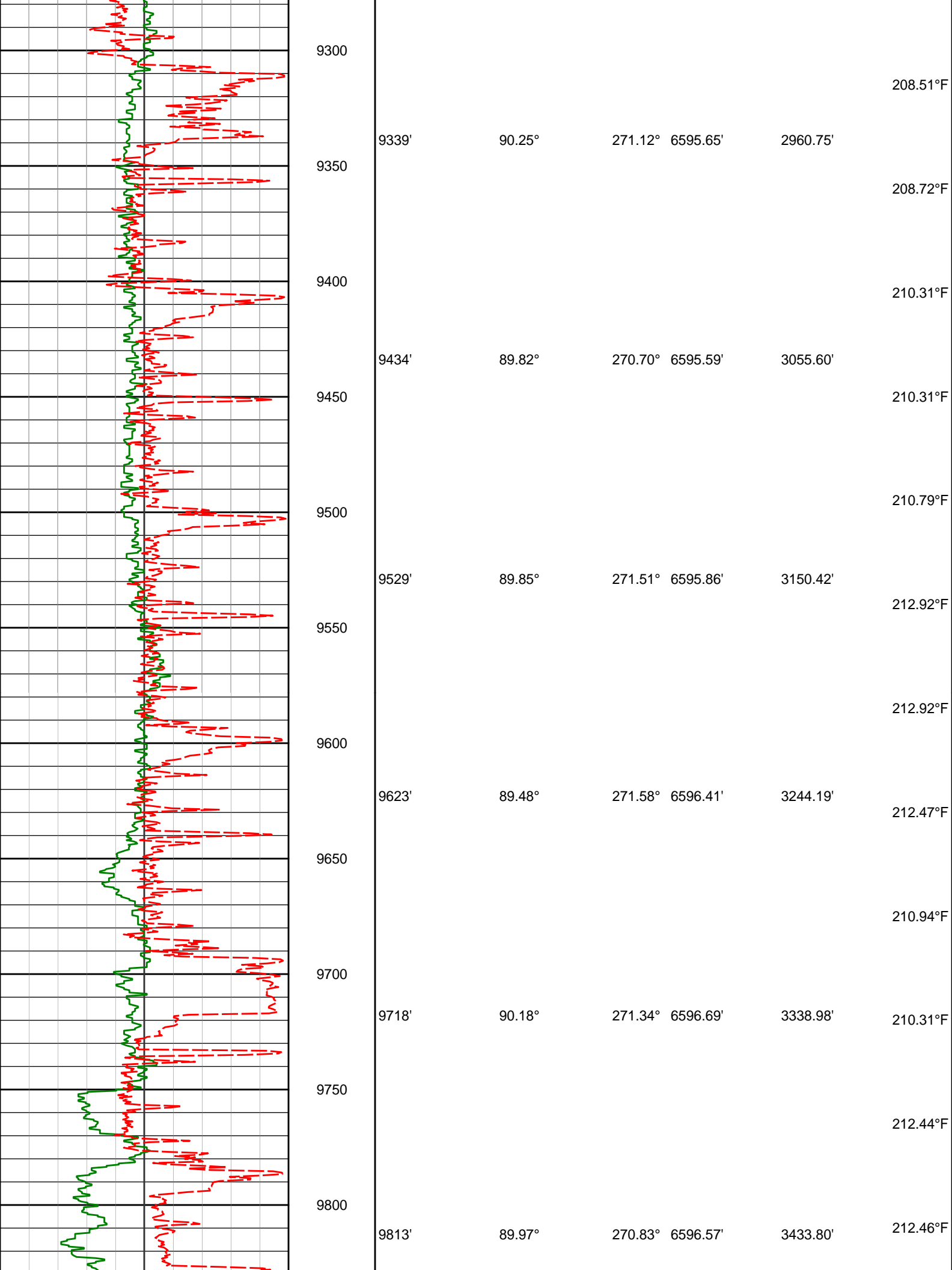


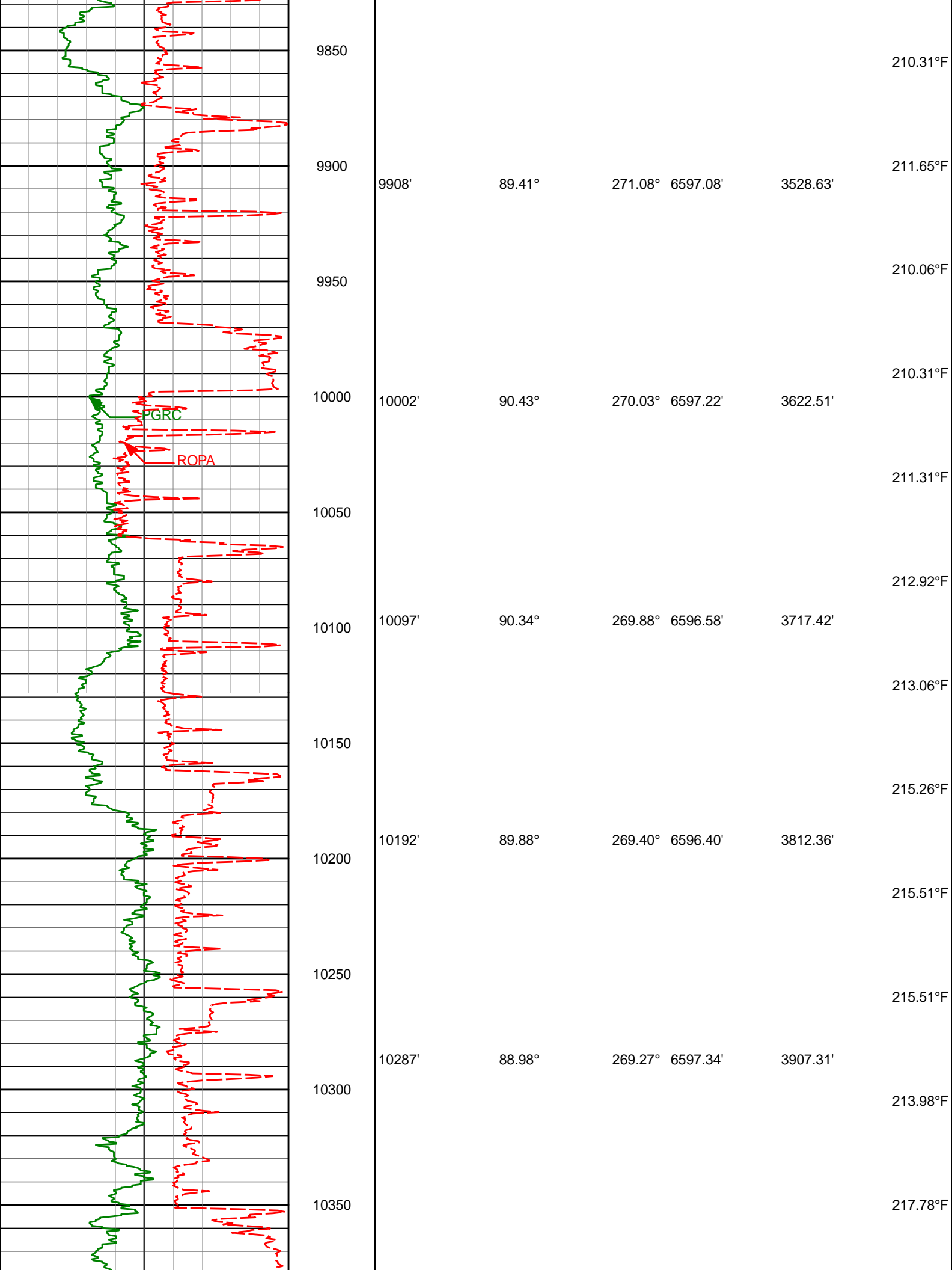


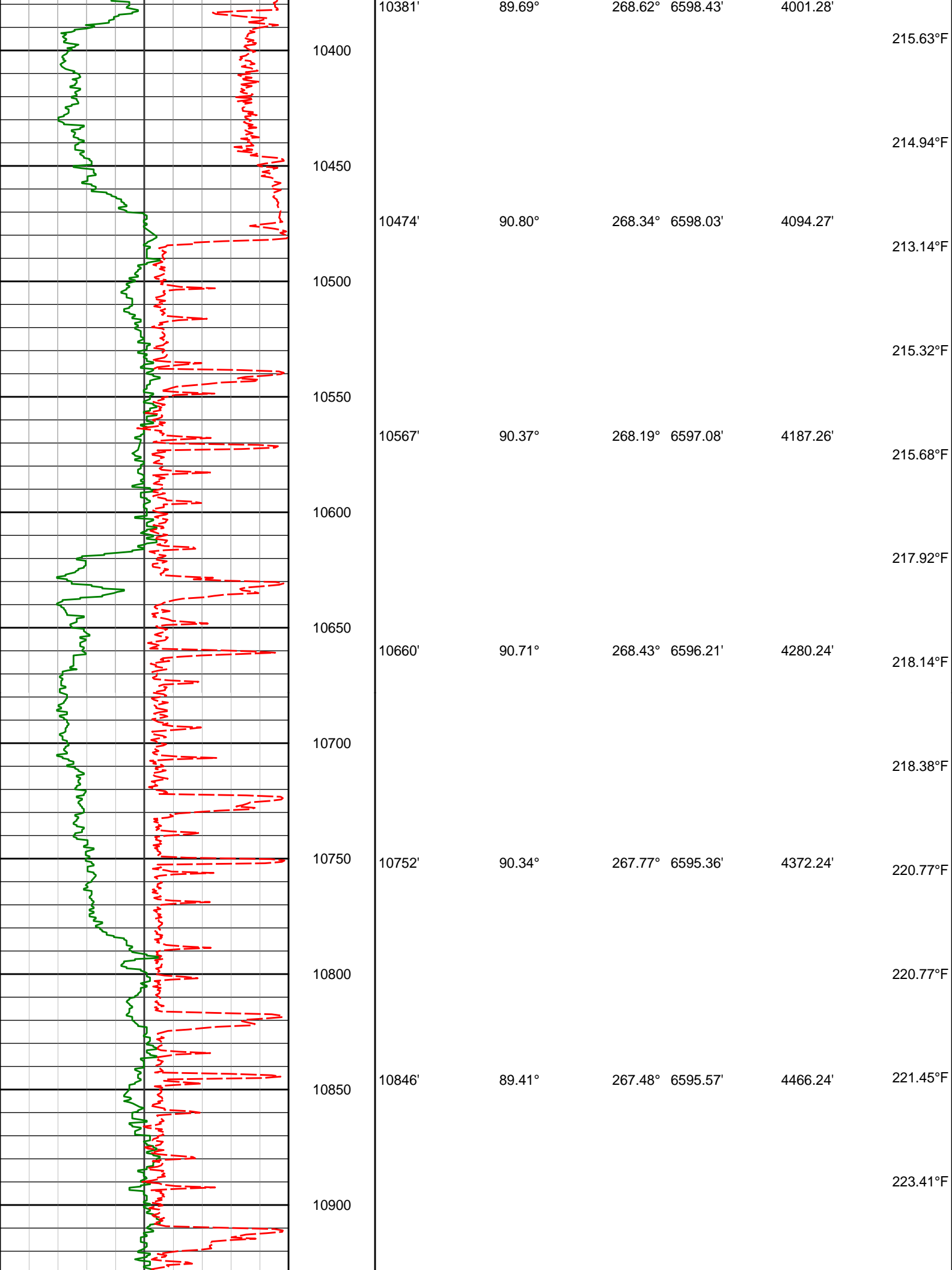


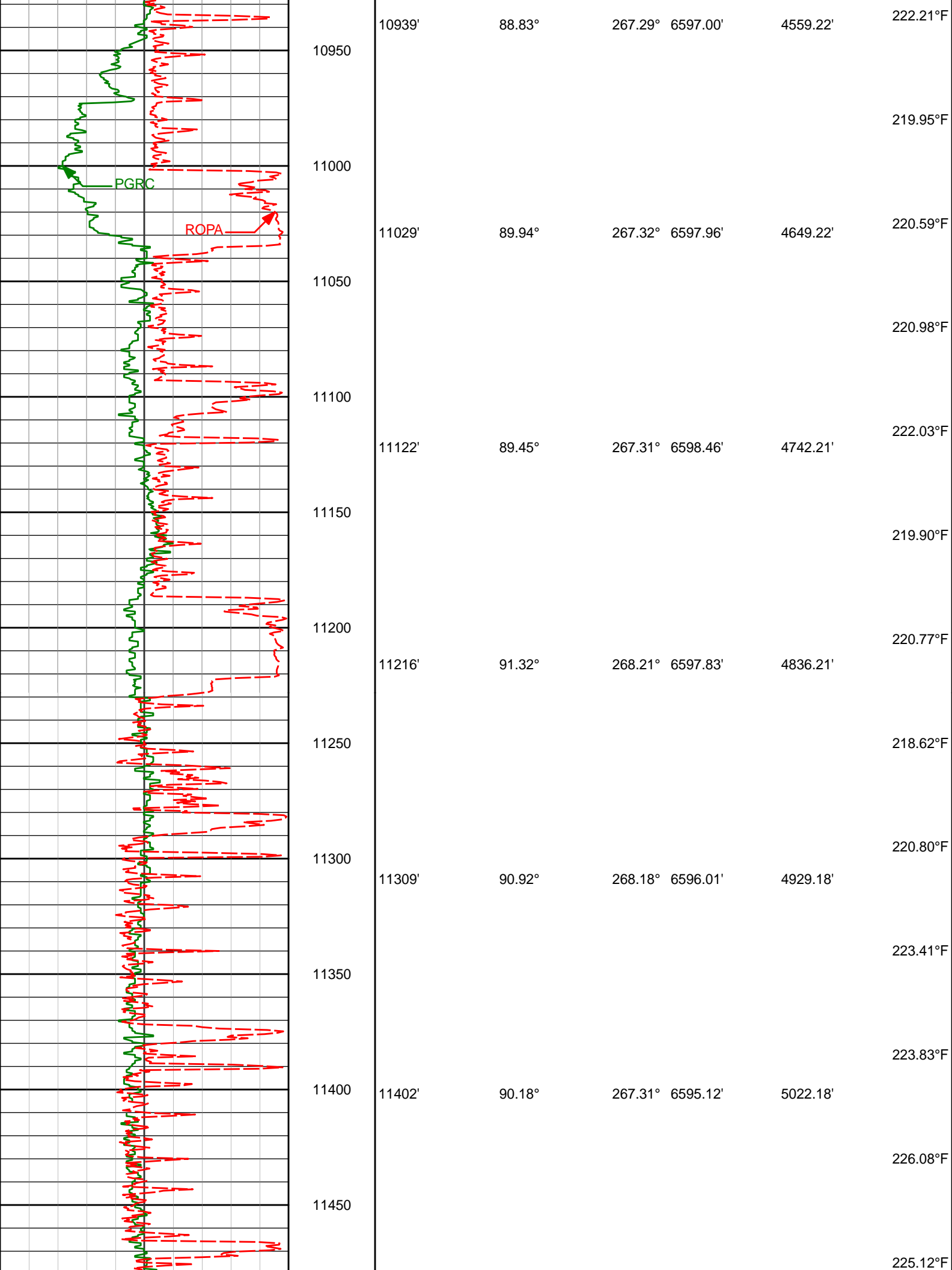


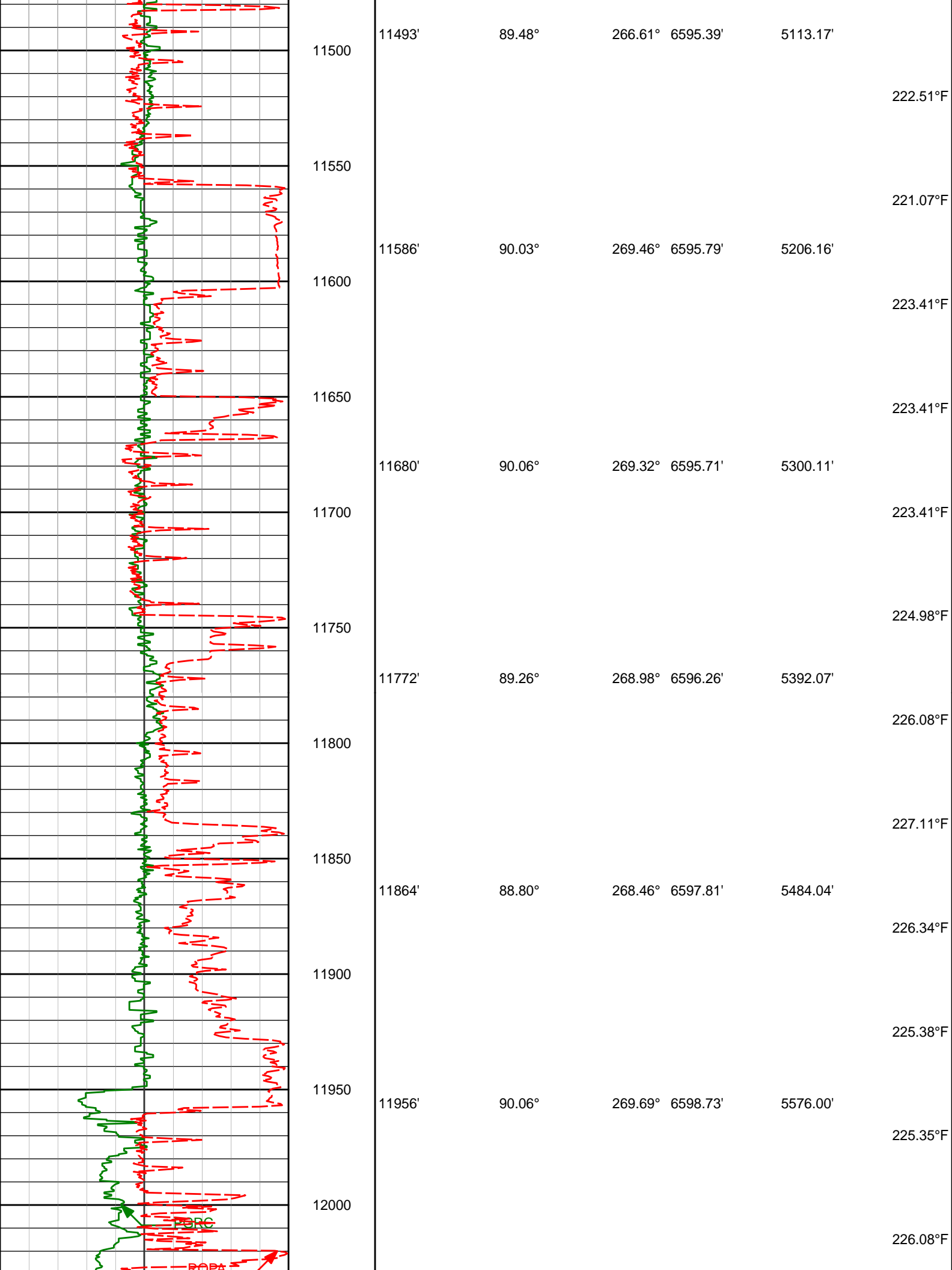
					202.60°F
8772'	89.72°	268.30°	6595.34'	2394.65'	202.60°F
					202.60°F
8866'	89.69°	270.84°	6595.82'	2488.58'	202.60°F
					202.60°F
8961'	91.48°	270.90°	6594.85'	2583.42'	203.49°F
					203.58°F
9056'	89.63°	270.69°	6593.93'	2678.26'	204.68°F
					205.75°F
9150'	88.68°	269.98°	6595.32'	2772.15'	207.51°F
					206.05°F
9245'	90.34°	271.88°	6596.13'	2866.97'	206.68°F
					207.73°F

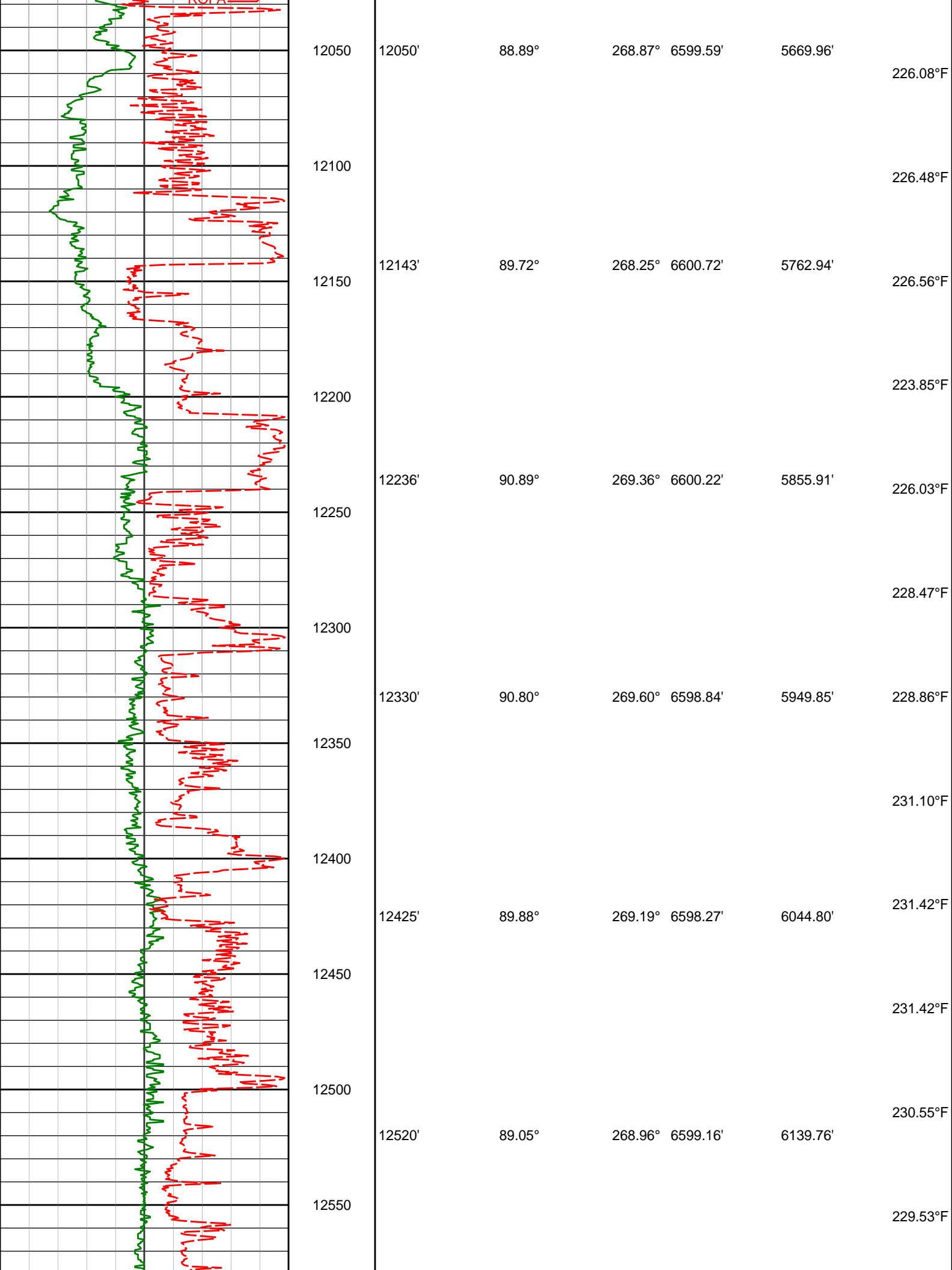


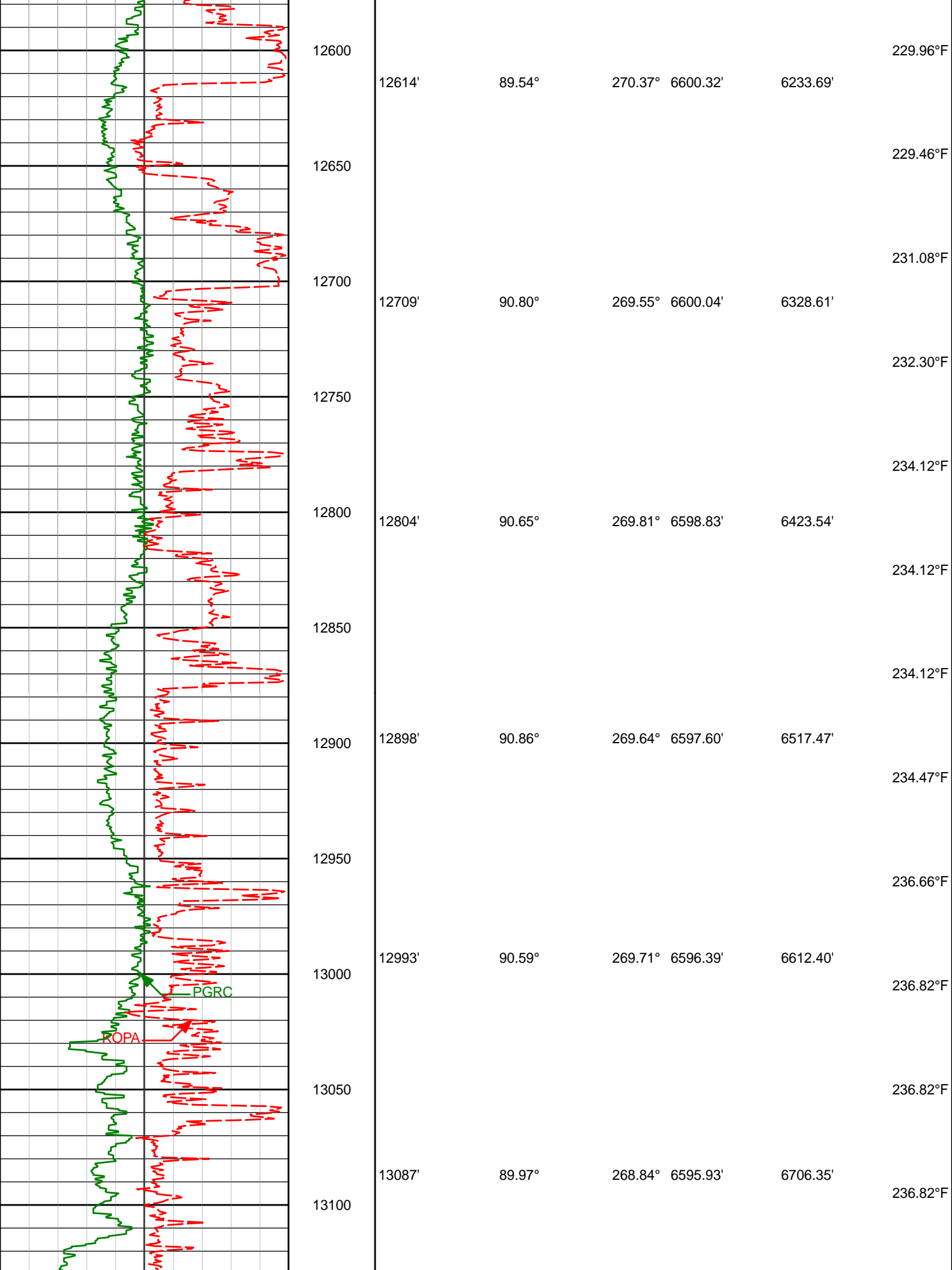


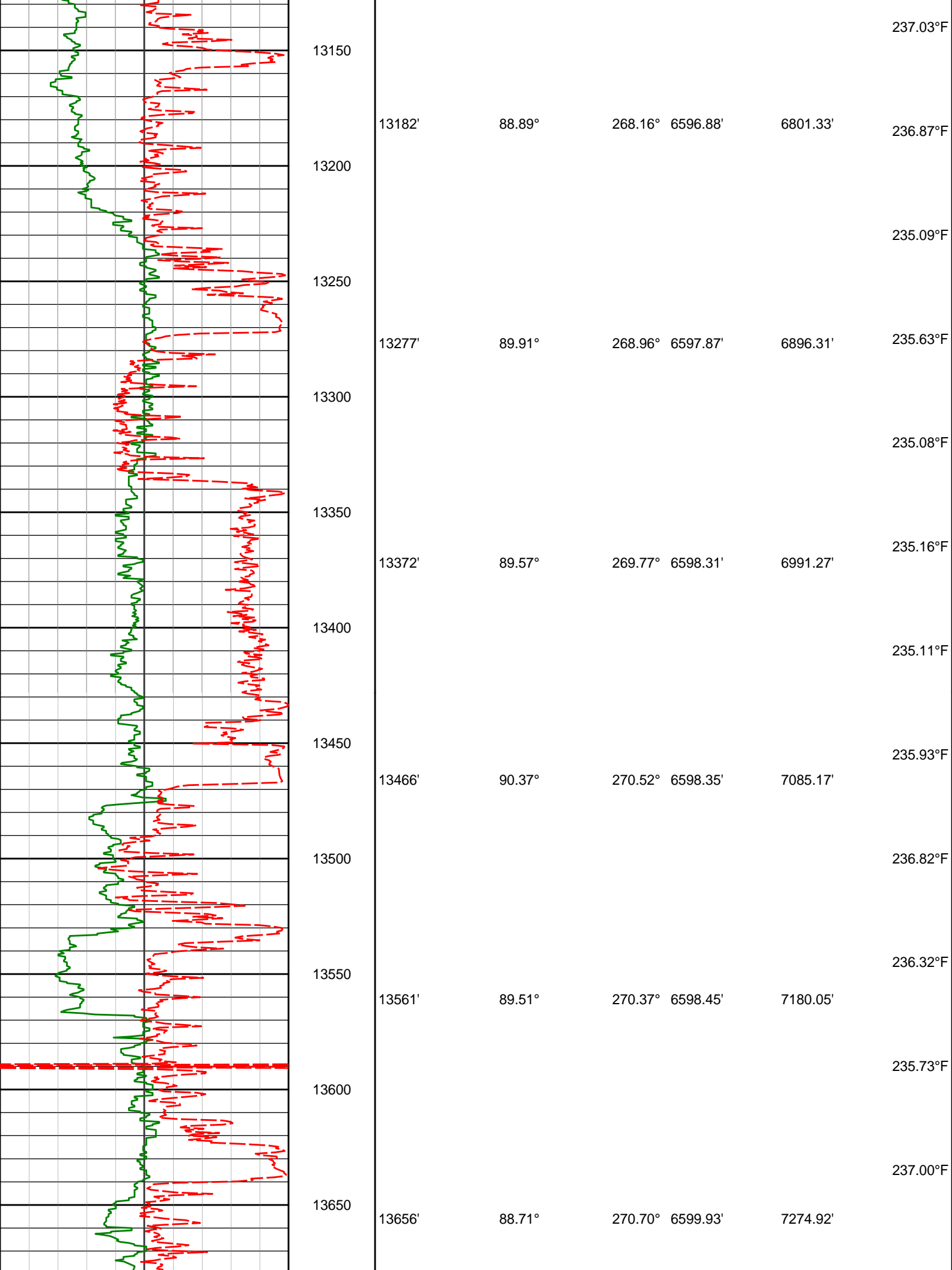


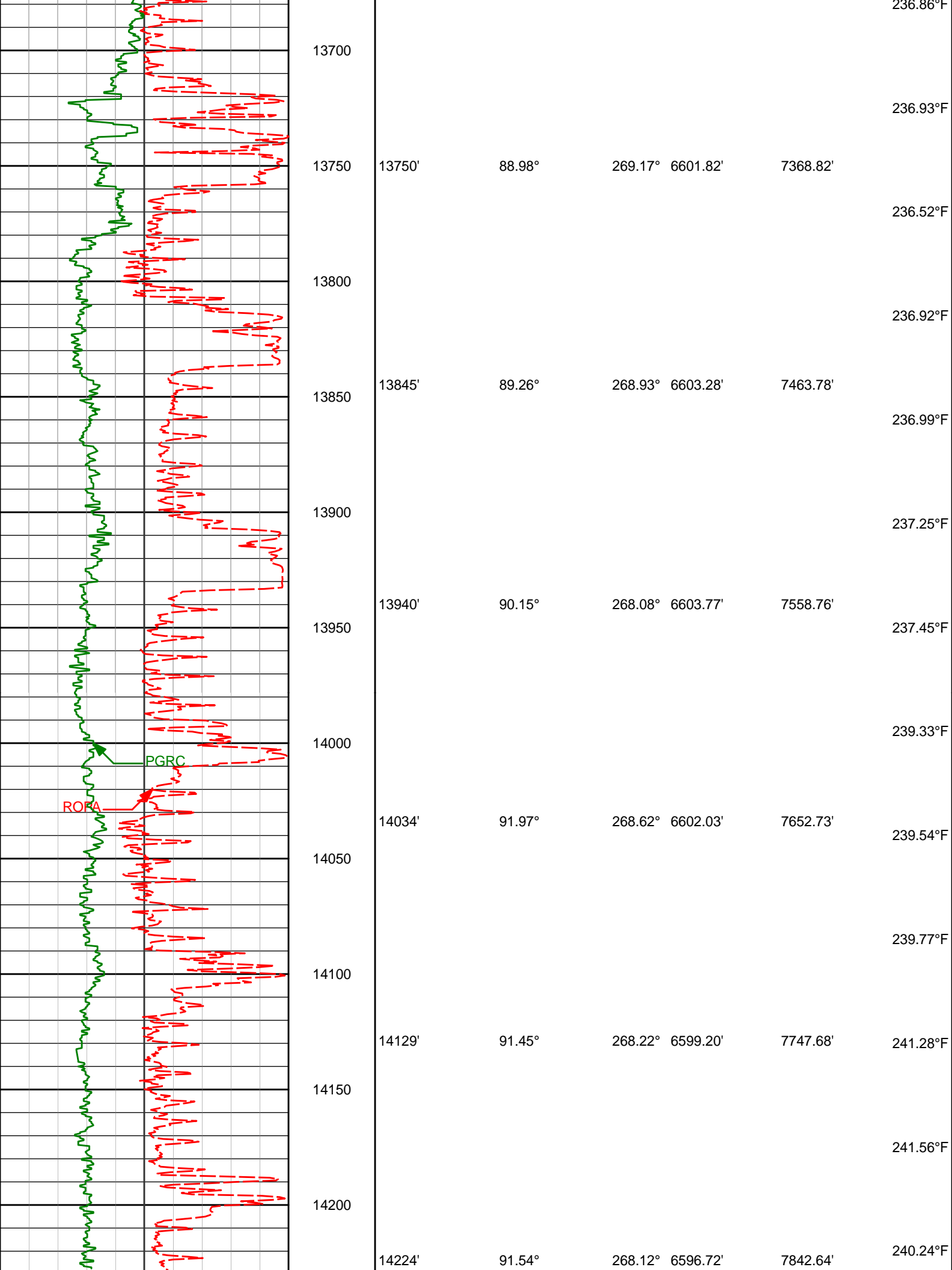


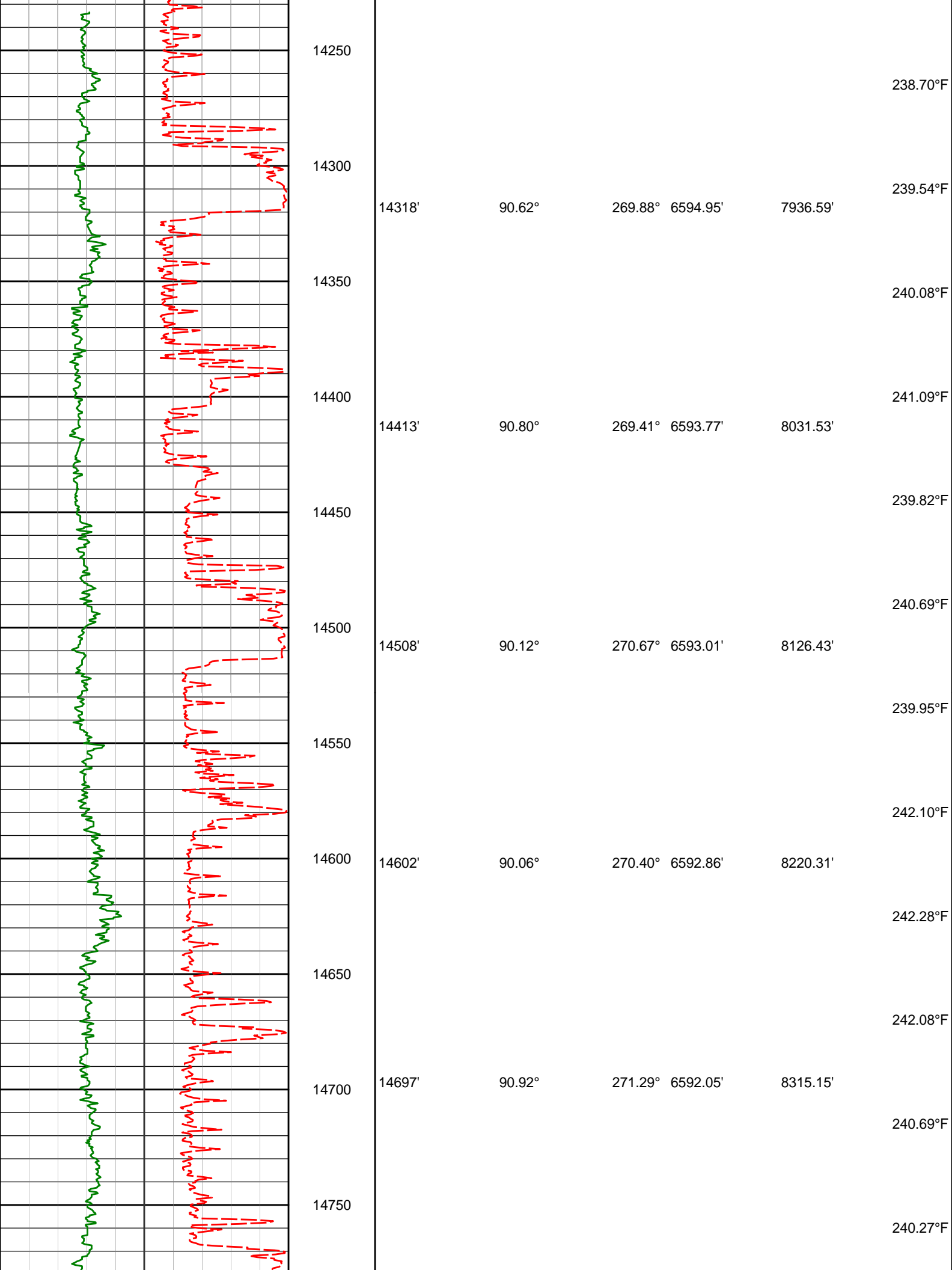


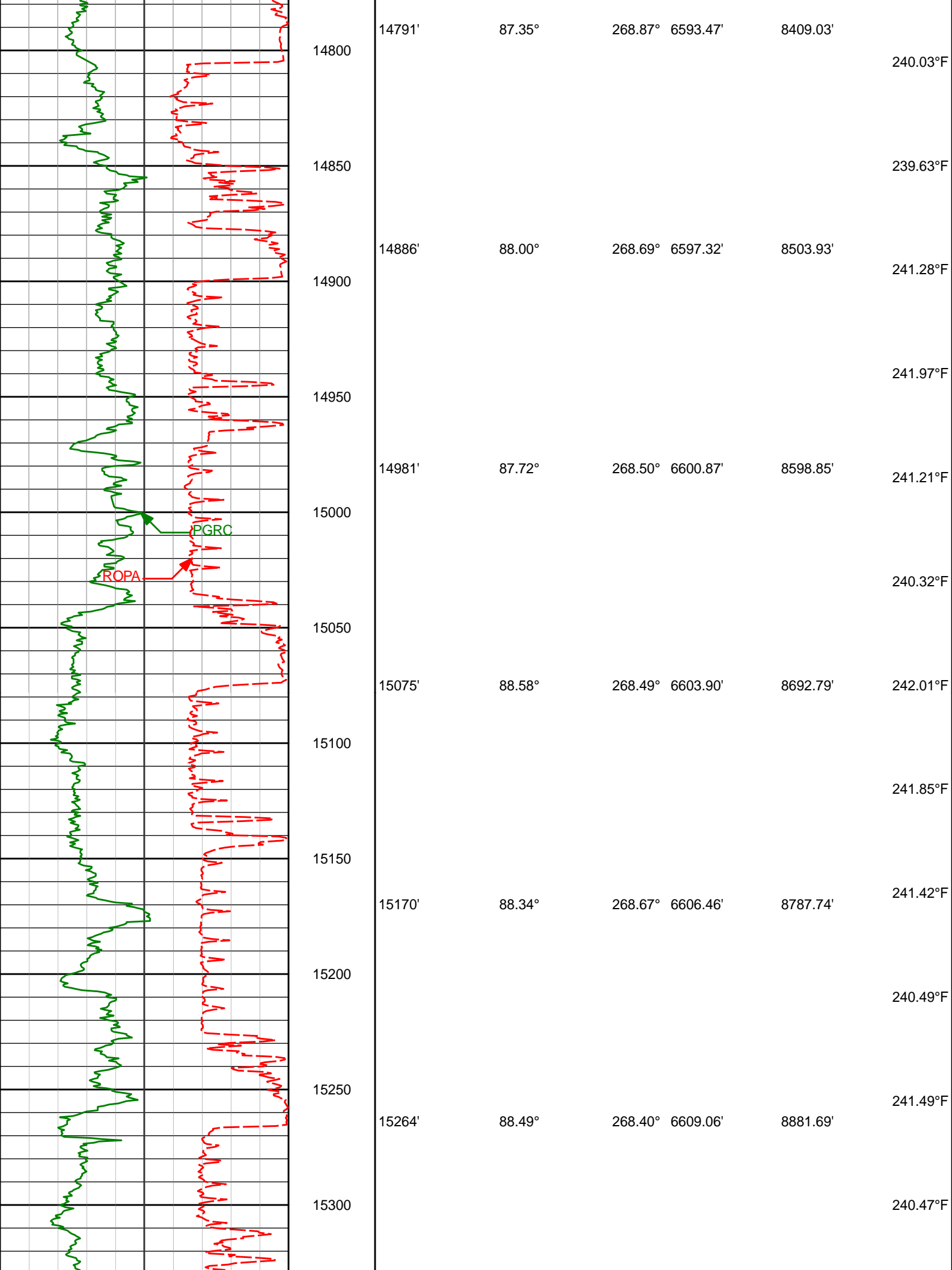


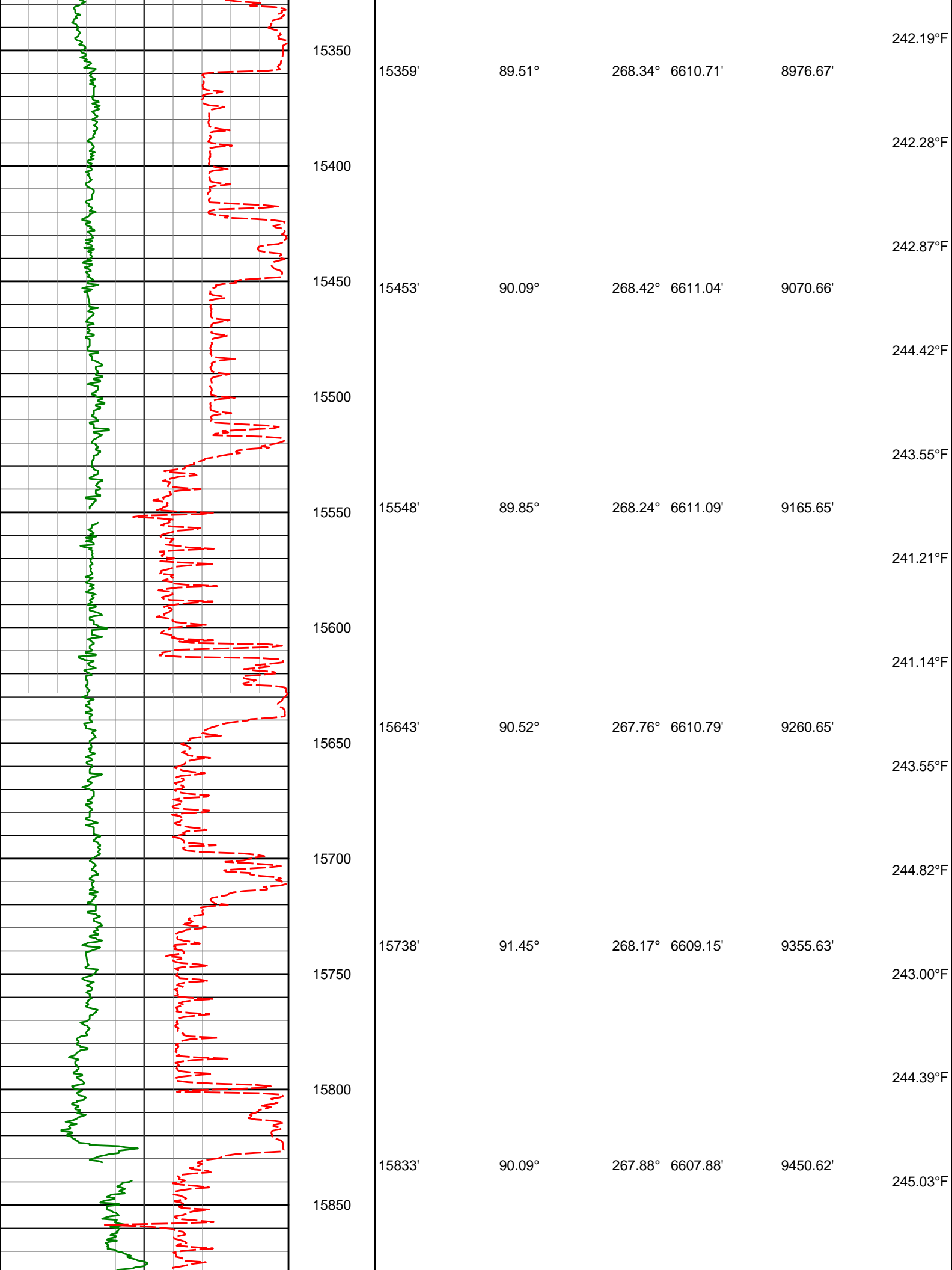


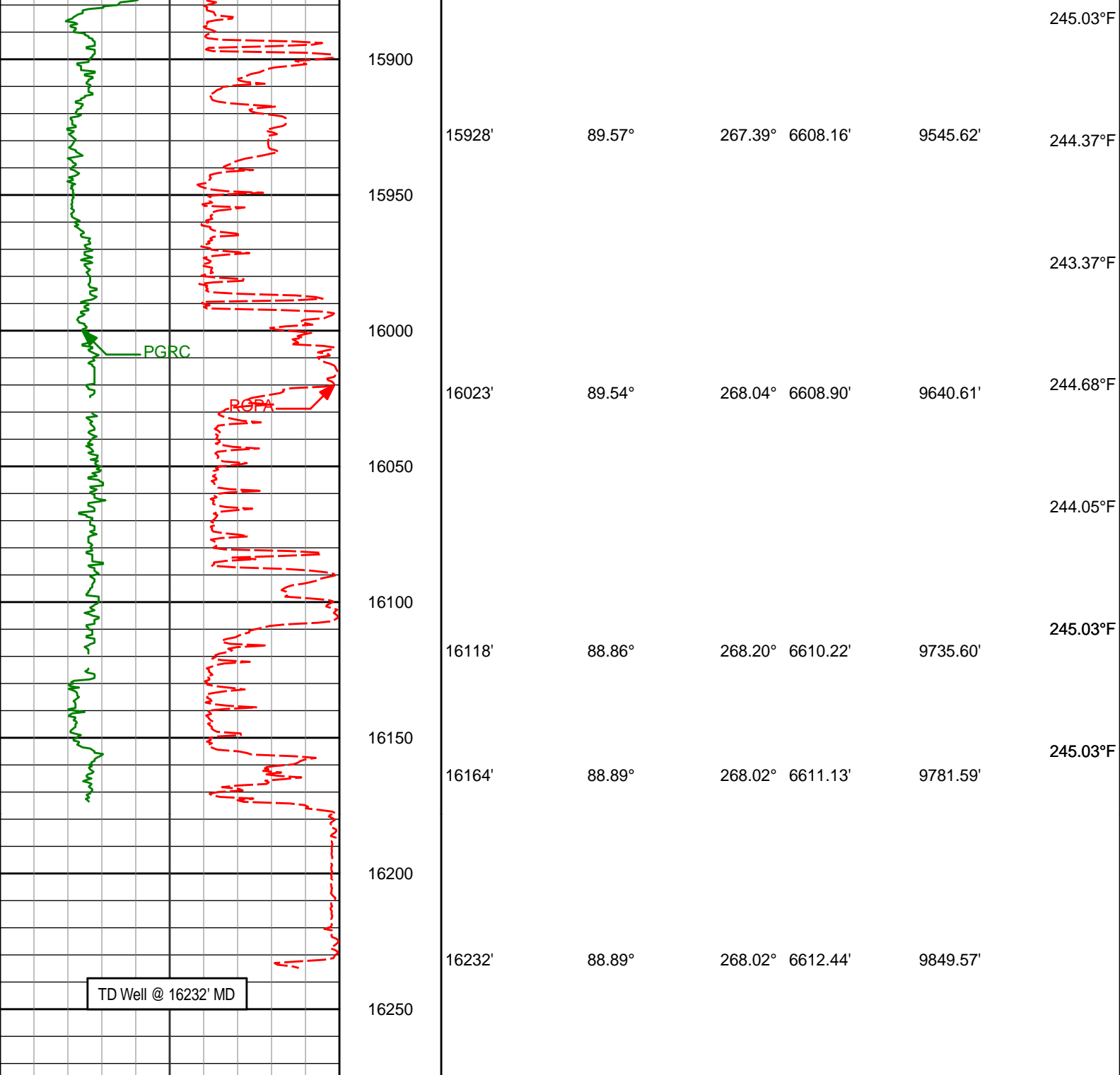






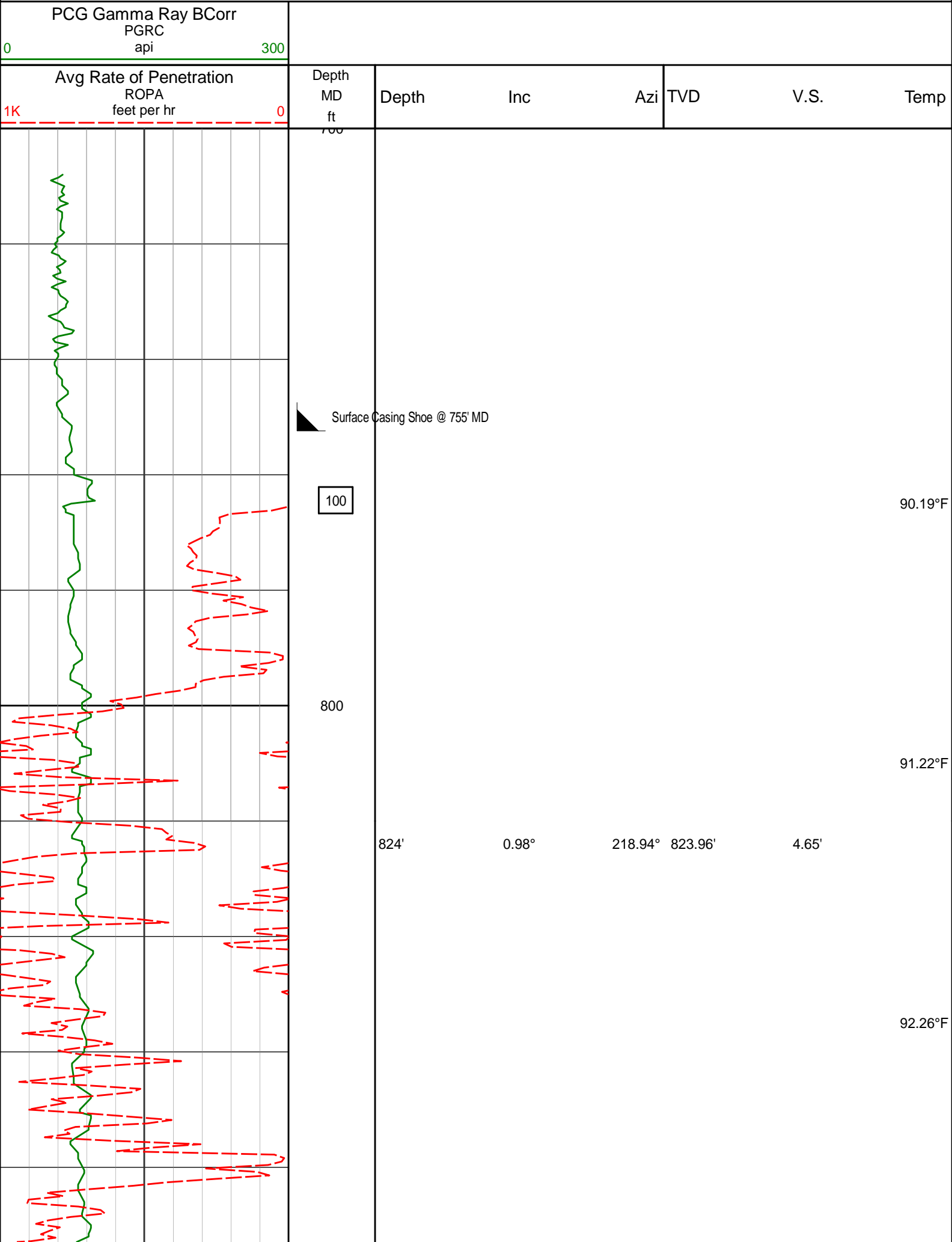


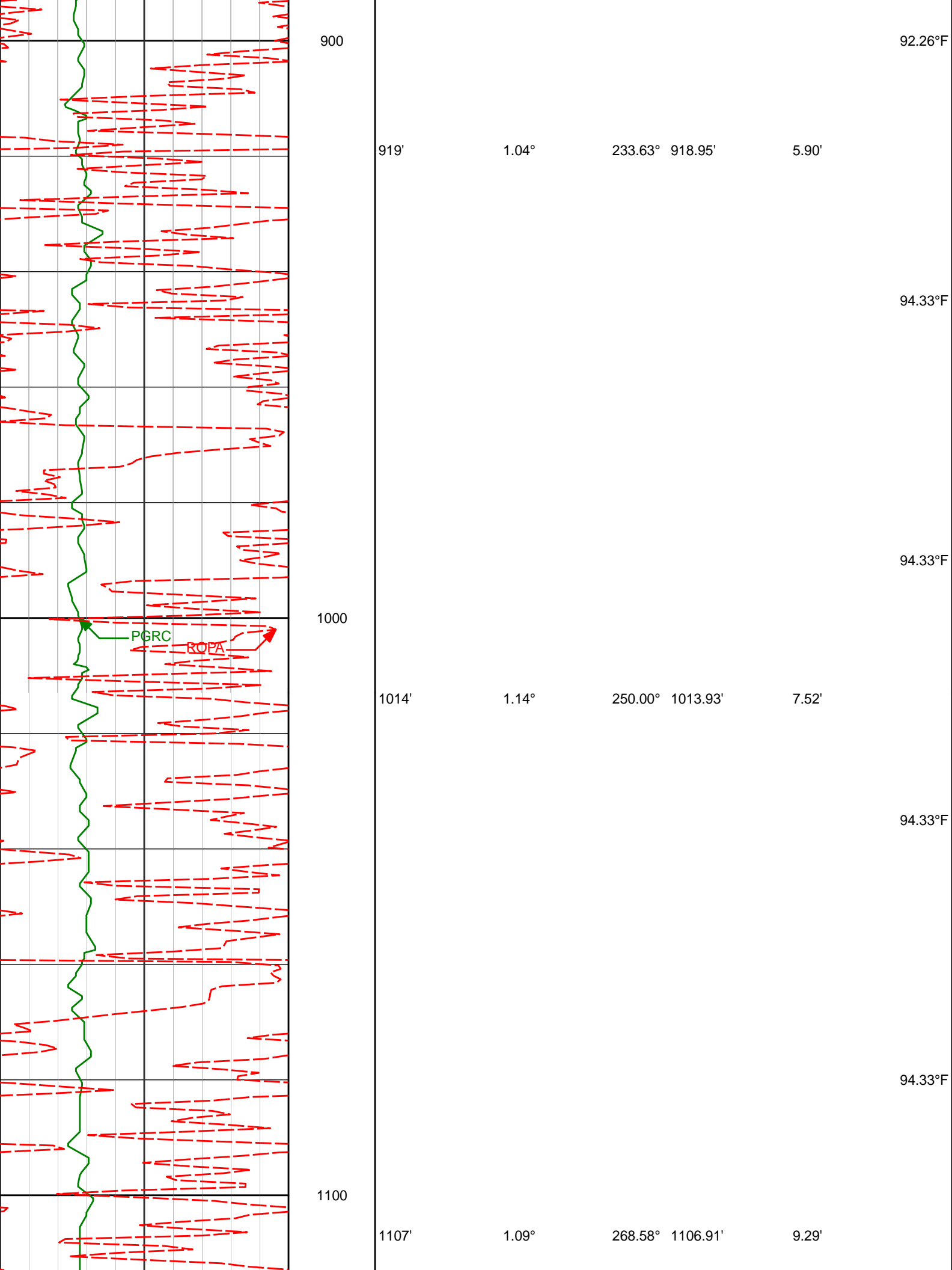


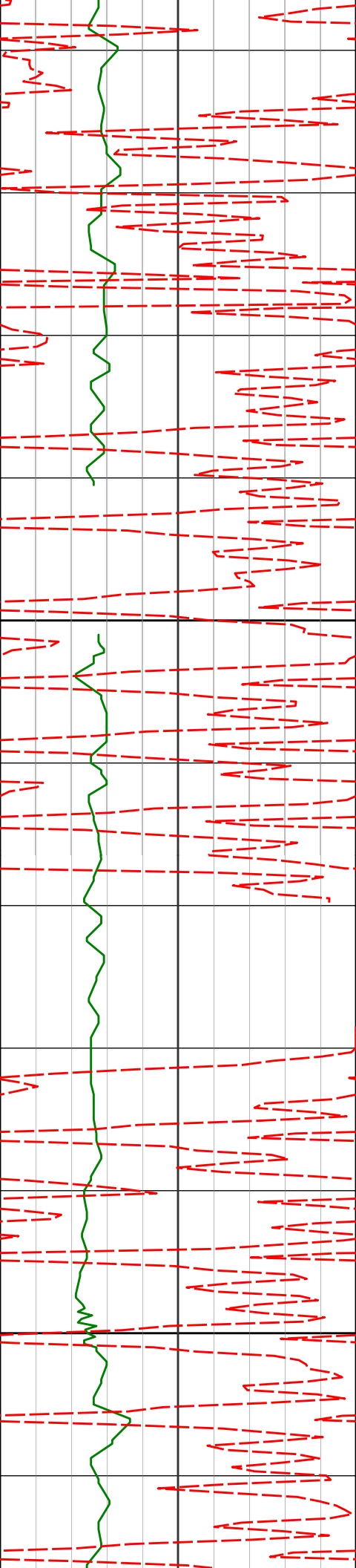


Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp		
1K 0										
PCG Gamma Ray BCorr PGRC api										
0 300										

MD Detail 1:240 Scale







1200

1200'

0.78°

274.00° 1199.90'

10.80'

1300

1293'

1.15°

272.63° 1292.89'

12.36'

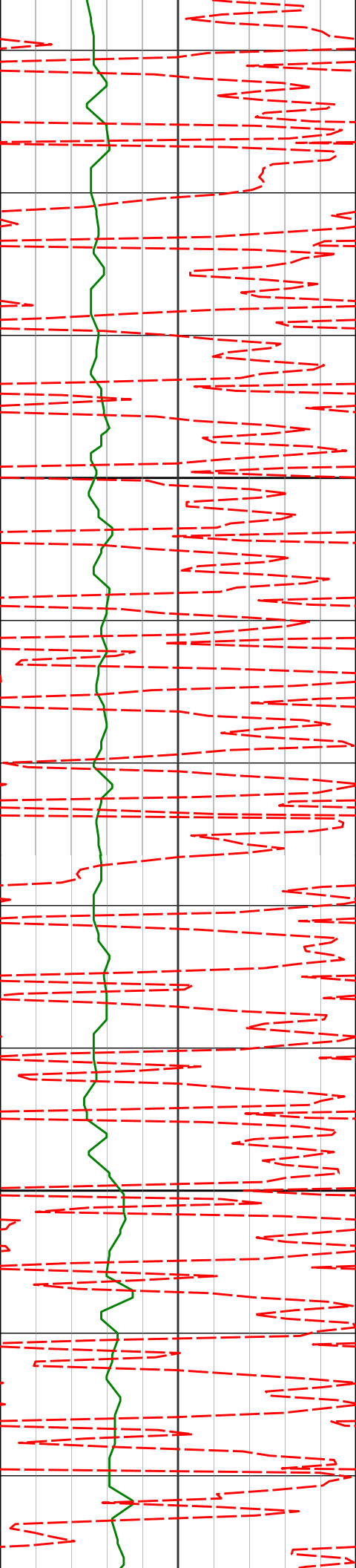
94.33°F

94.33°F

96.42°F

96.42°F

96.42°F



1400

1500

1385'

1.13°

276.63° 1384.87'

14.17'

1478'

1.09°

275.01° 1477.85'

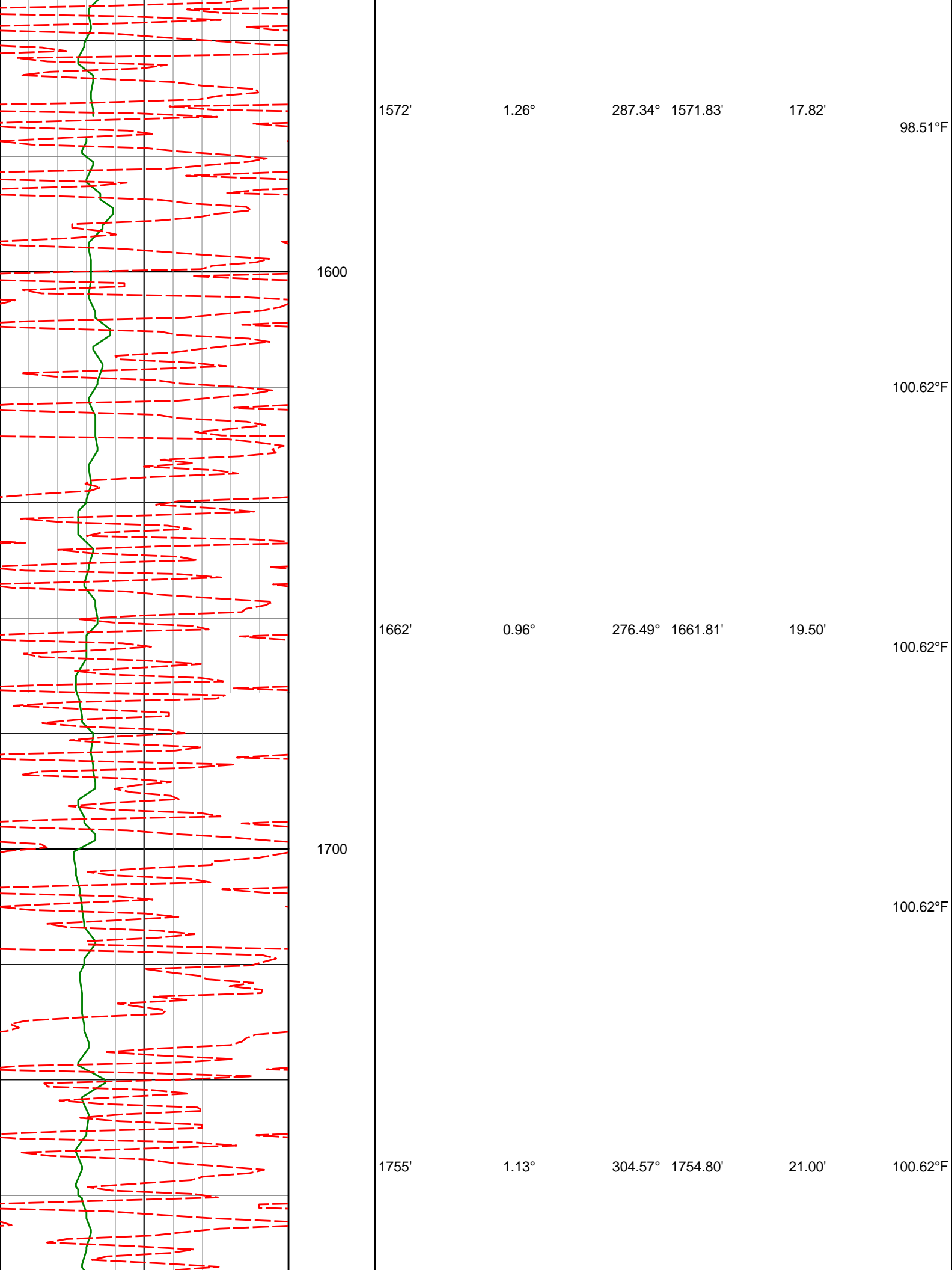
15.96'

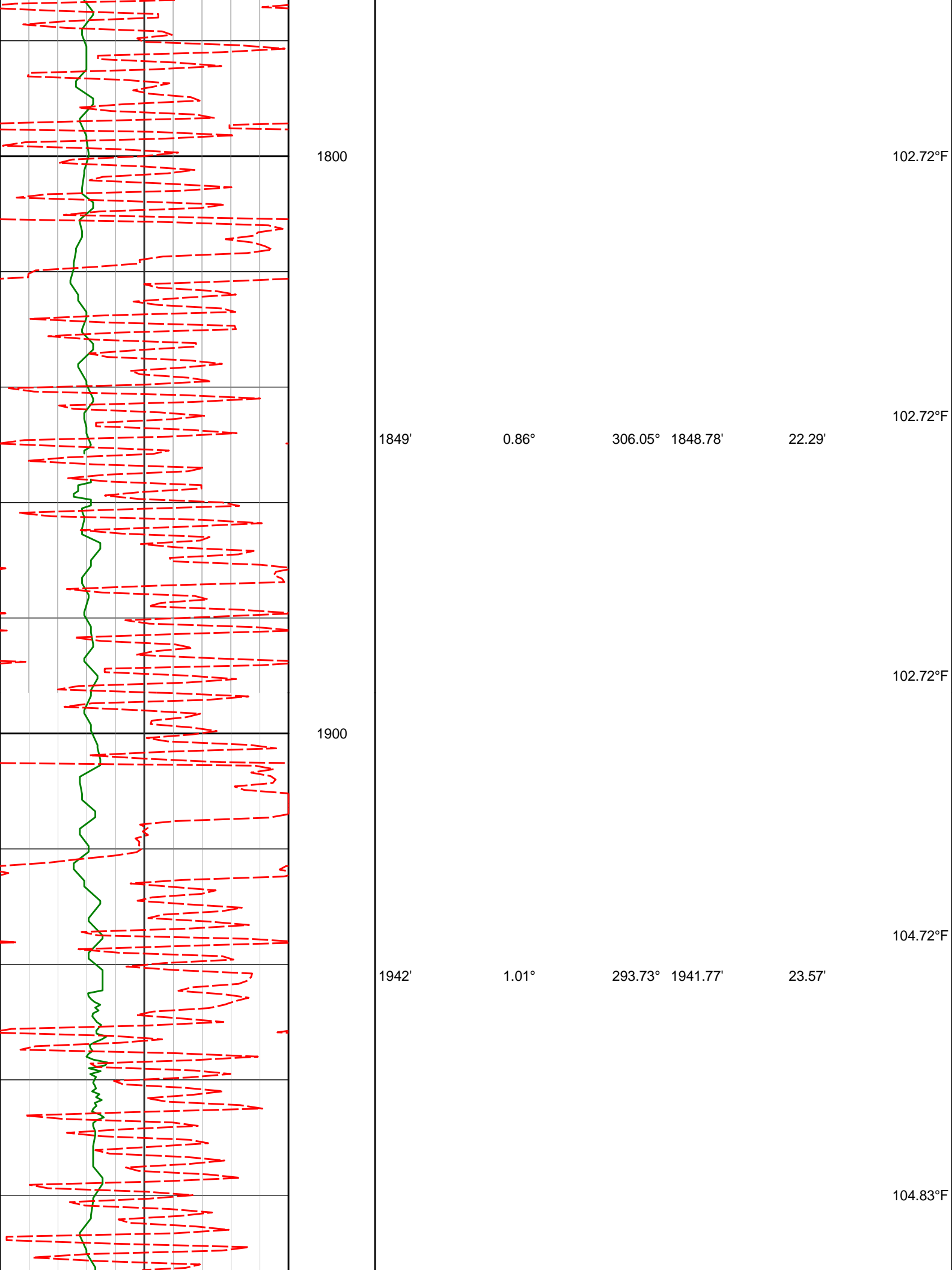
96.42°F

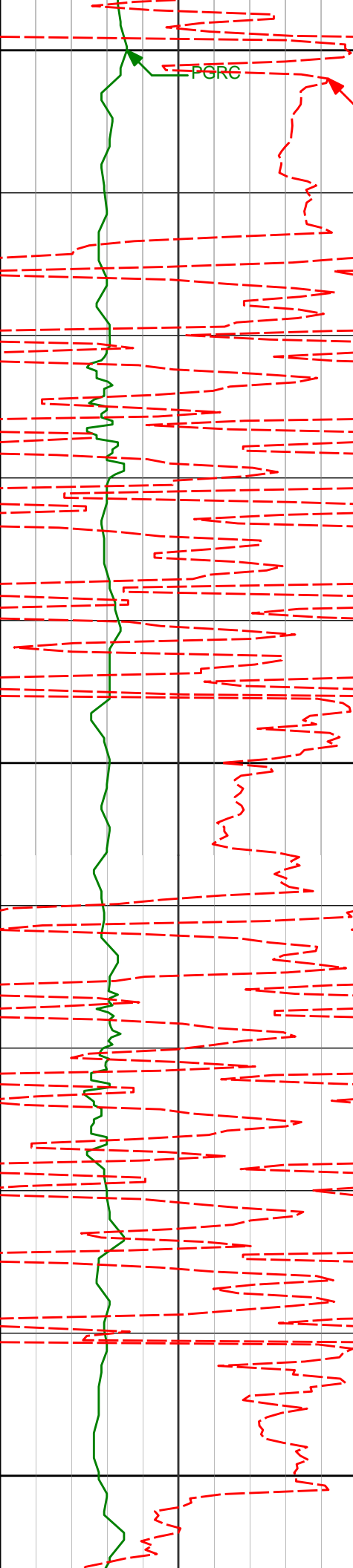
98.51°F

98.51°F

98.51°F







2000

PORC

ROPA

104.83°F

2034'

1.95°

201.61° 2033.75'

24.94'

104.83°F

2100

106.97°F

2126'

5.46°

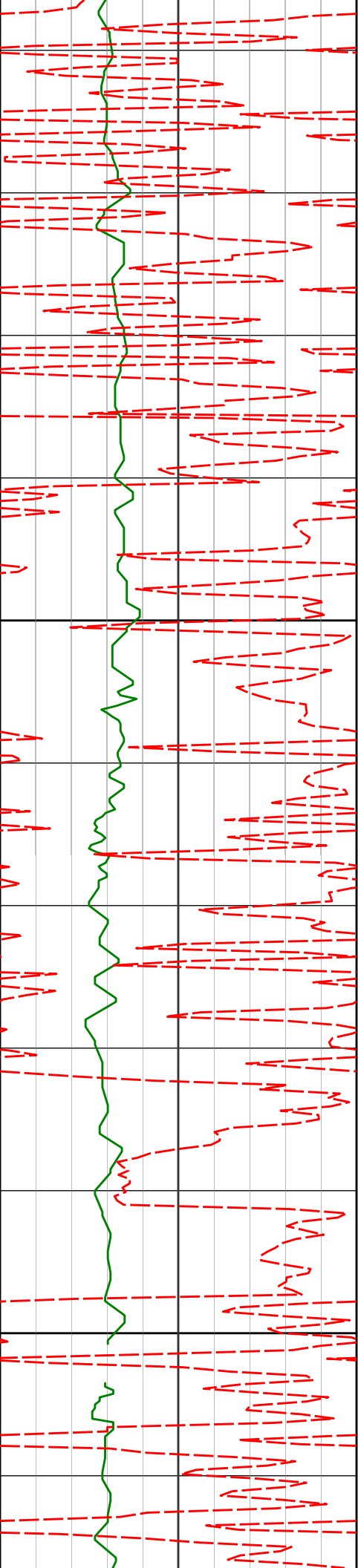
166.94° 2125.55'

24.76'

106.97°F

2200

109.09°F



2219'

7.85°

162.28° 2217.92'

22.27'

109.09°F

110.36°F

2300

2312'

7.74°

156.91° 2310.06'

18.37'

111.24°F

111.24°F

2400

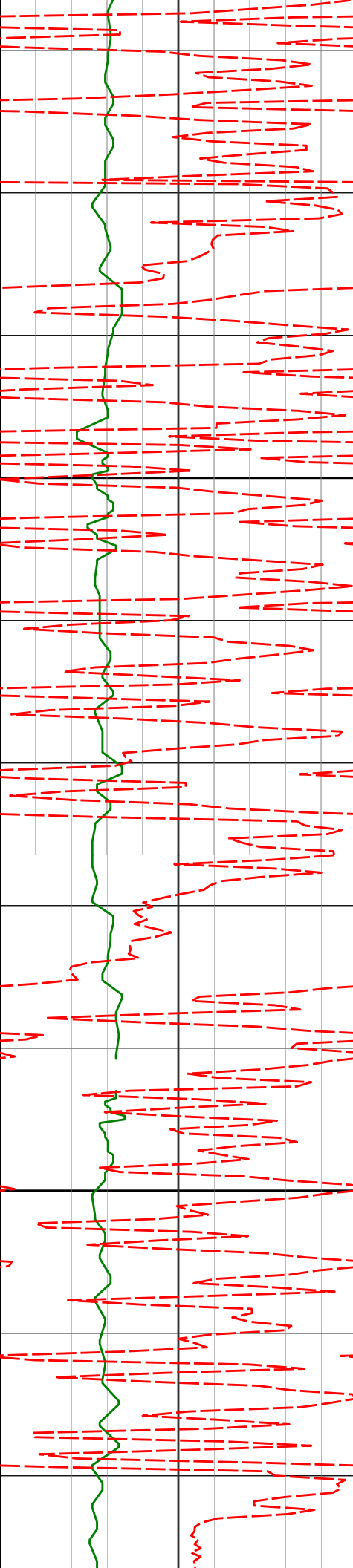
2405'

8.97°

158.44° 2402.07'

13.78'

111.24°F



2500

2600

2497'

9.07°

152.54° 2492.94'

8.35'

2589'

8.71°

151.22° 2583.83'

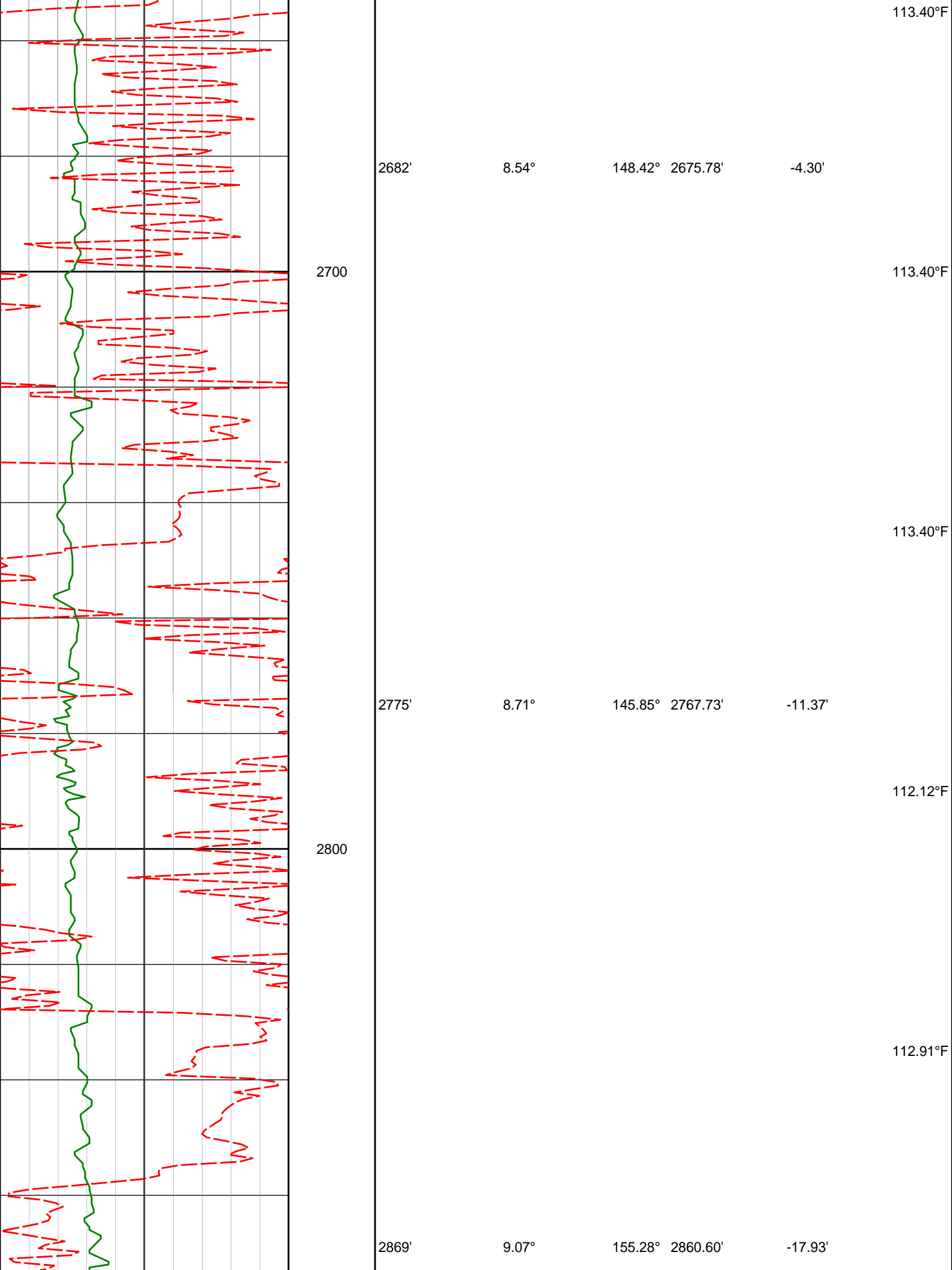
2.19'

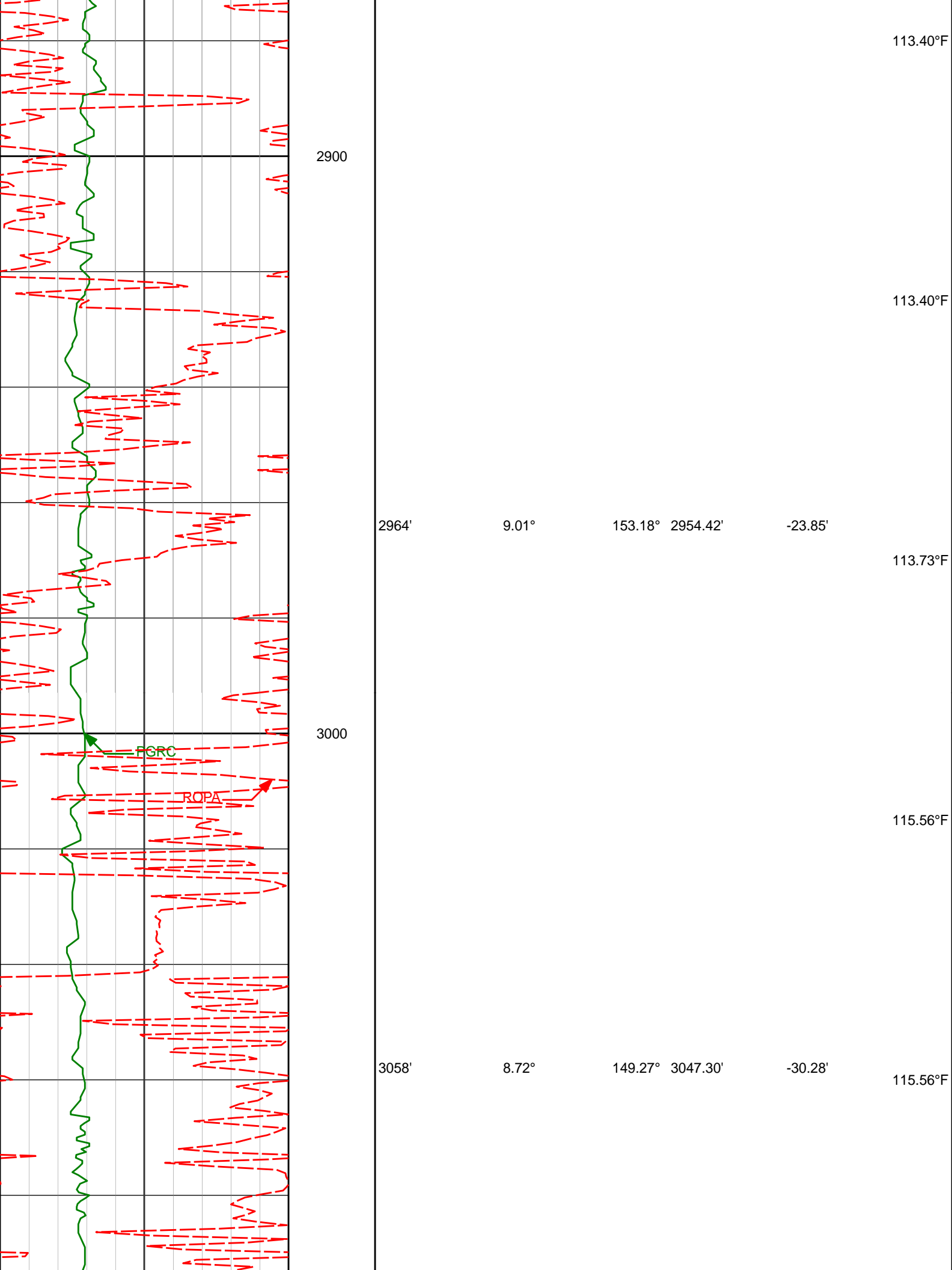
111.24°F

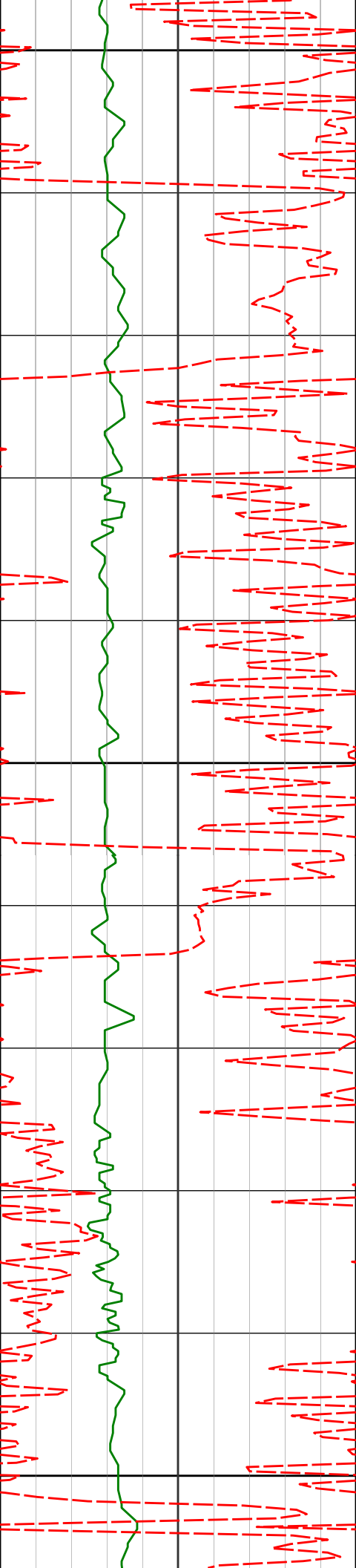
111.24°F

111.24°F

113.40°F







3100

115.56°F

3153'

8.43°

155.96°

3141.24'

-36.26'

117.73°F

3200

117.73°F

3248'

8.56°

152.15°

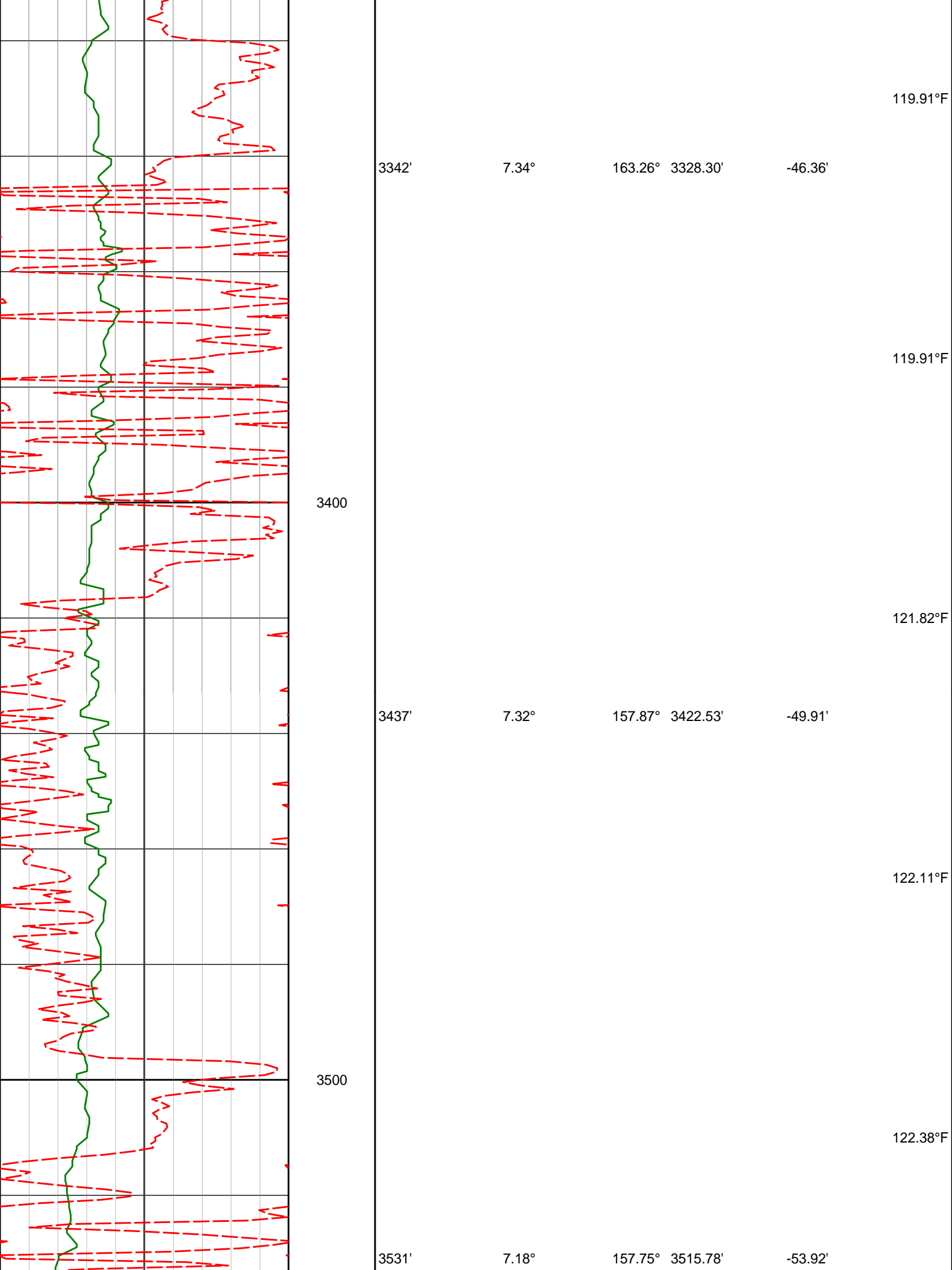
3235.20'

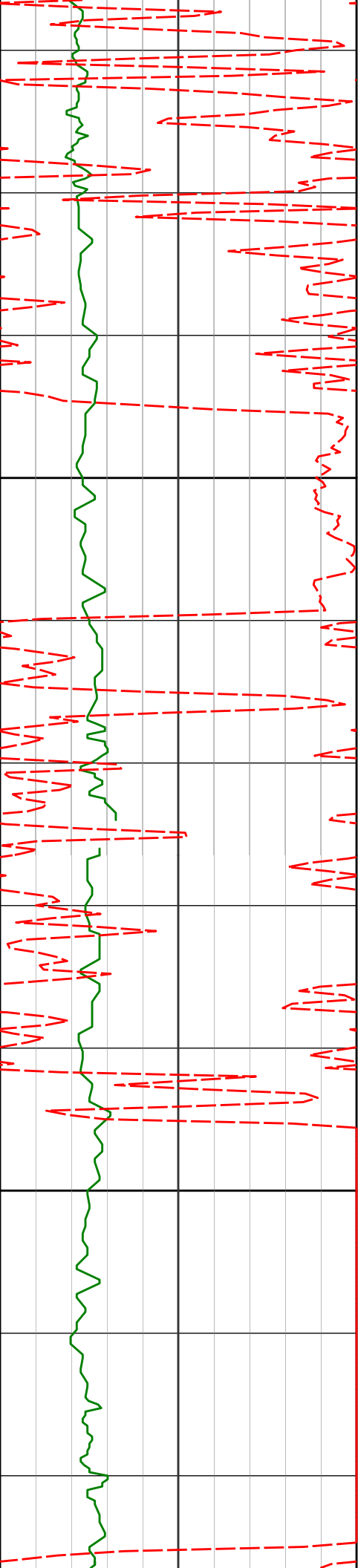
-41.87'

118.48°F

3300

119.71°F





3600

3626'

8.19°

157.95° 3609.92'

-58.22'

3700

3721'

8.24°

157.42° 3703.95'

-62.84'

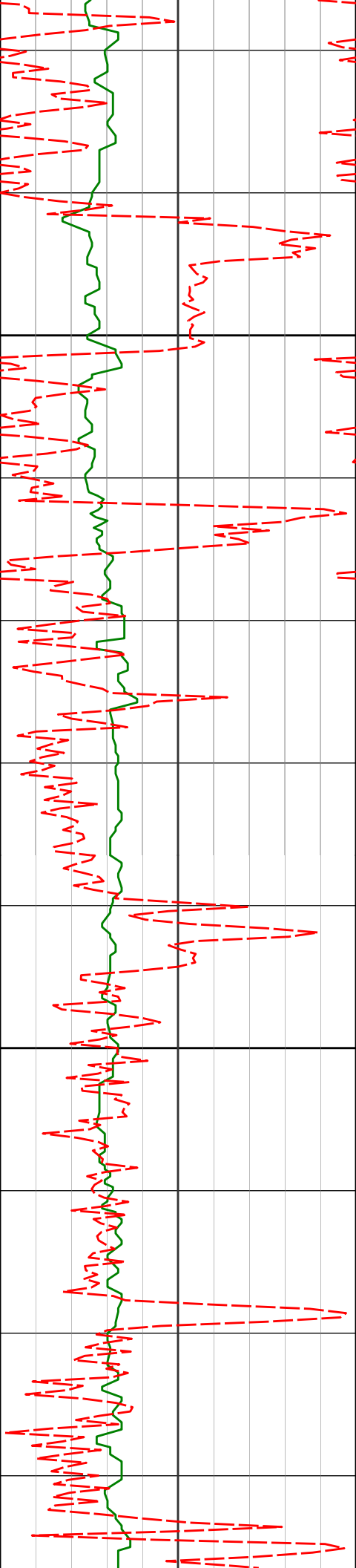
122.41°F

122.11°F

122.11°F

123.14°F

125.00°F



3800

3815'

8.04°

156.58°

3797.00'

-67.52'

126.52°F

127.09°F

128.73°F

3900

3910'

7.83°

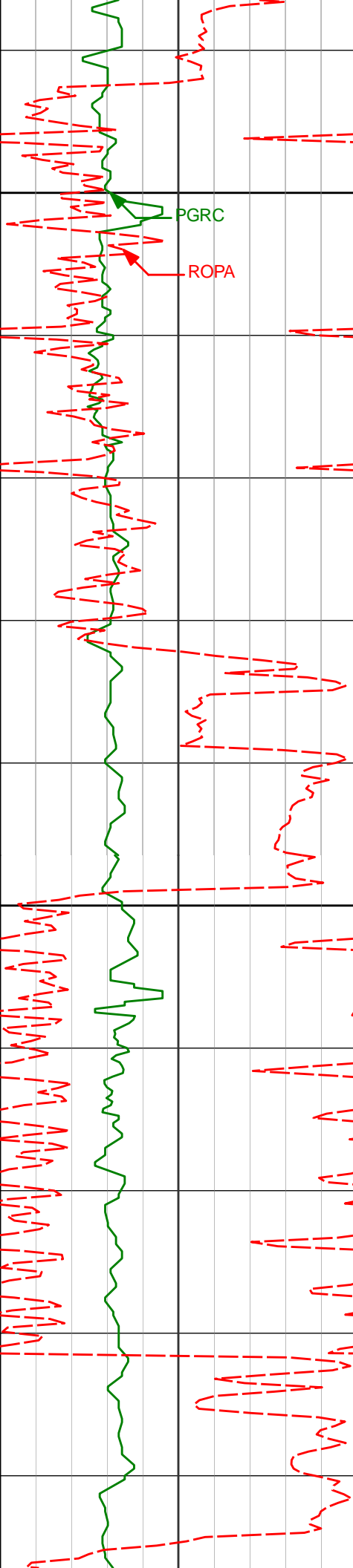
156.38°

3891.09'

-72.25'

129.33°F

130.96°F



4000

4004'

7.13°

157.51° 3984.29'

-76.57'

132.27°F

133.20°F

133.20°F

4100

4099'

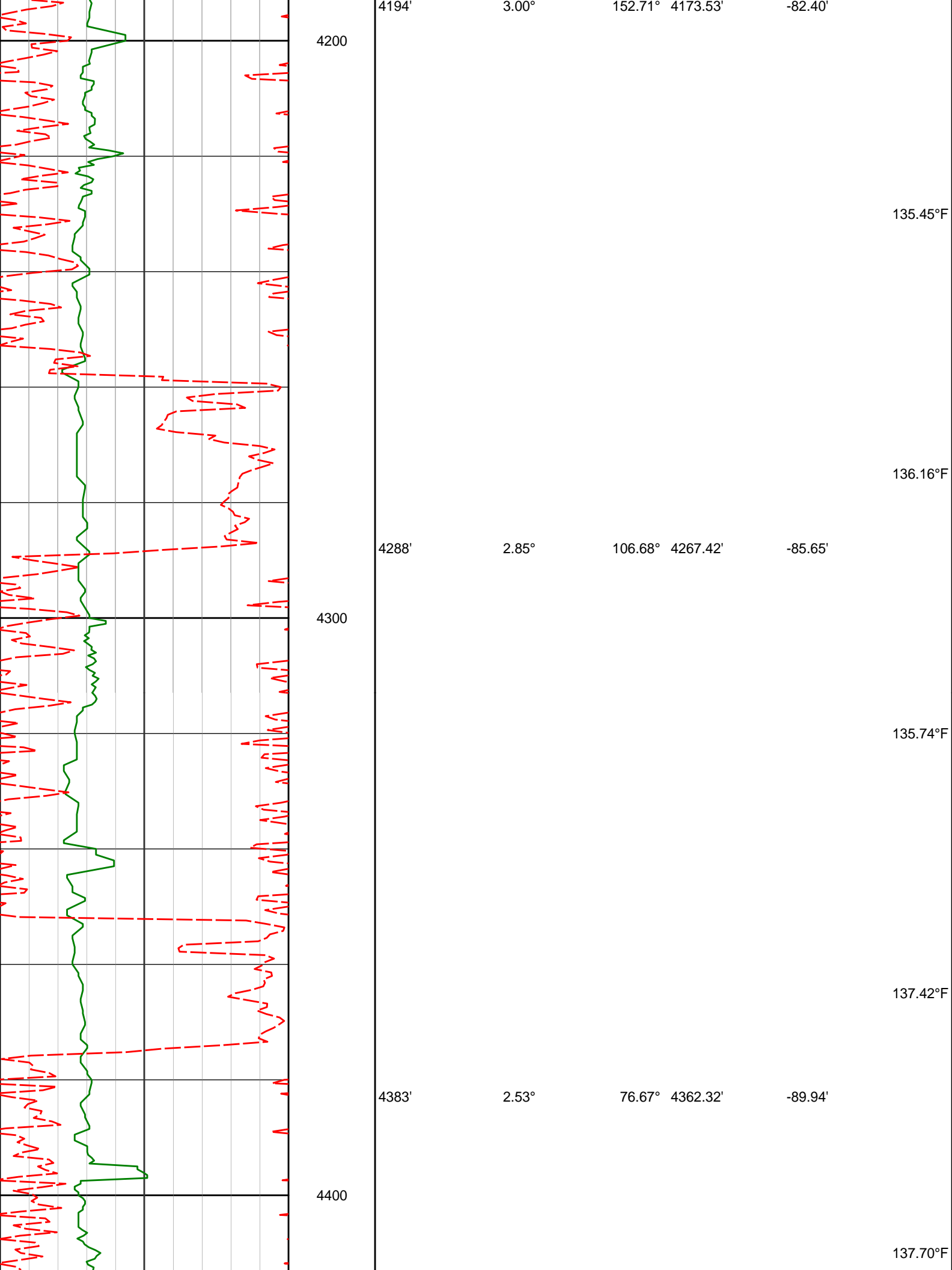
4.89°

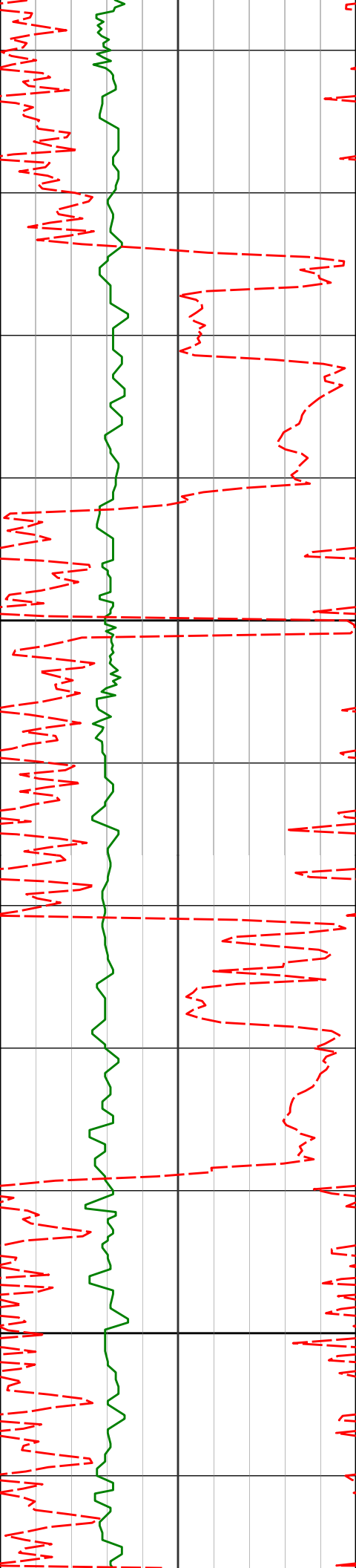
157.63° 4078.76'

-79.97'

133.20°F

135.45°F





4500

4600

4478'

2.71°

26.86°

4457.23'

-93.10'

4572'

0.78°

300.41°

4551.20'

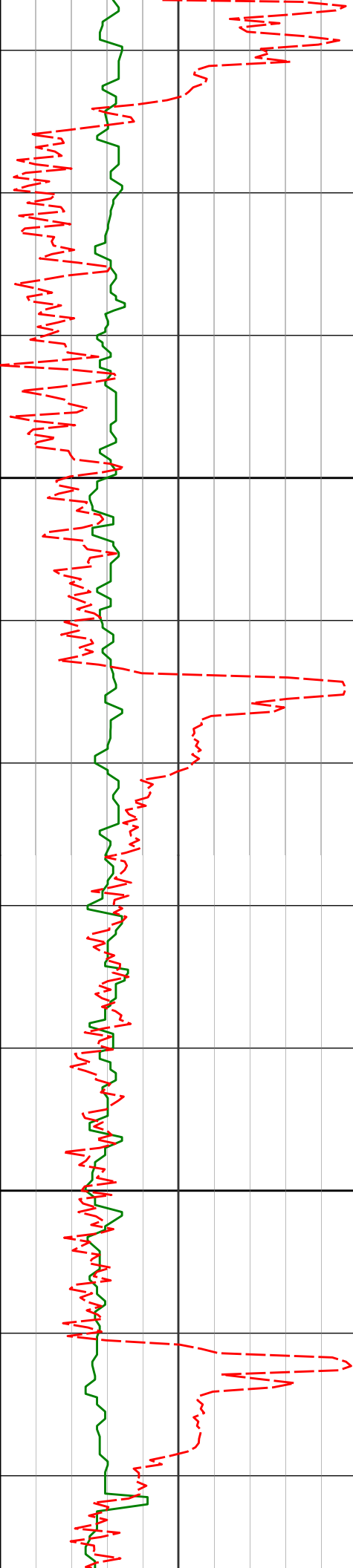
-93.64'

138.30°F

139.96°F

139.96°F

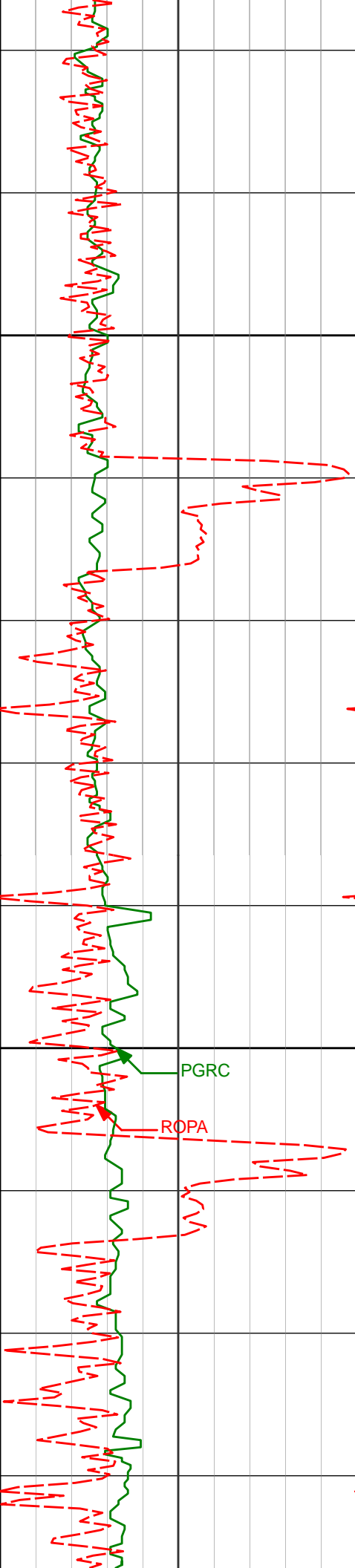
142.25°F



4700

4800

				142.25°F
4667'	0.97°	251.42°	4646.19'	-92.33'
				143.36°F
				144.54°F
4762'	1.05°	251.62°	4741.17'	-90.72'
				145.62°F
				146.84°F



4900

5000

4857'

1.16°

255.52° 4836.15'

-88.95'

147.42°F

4951'

1.14°

248.03° 4930.13'

-87.14'

149.14°F

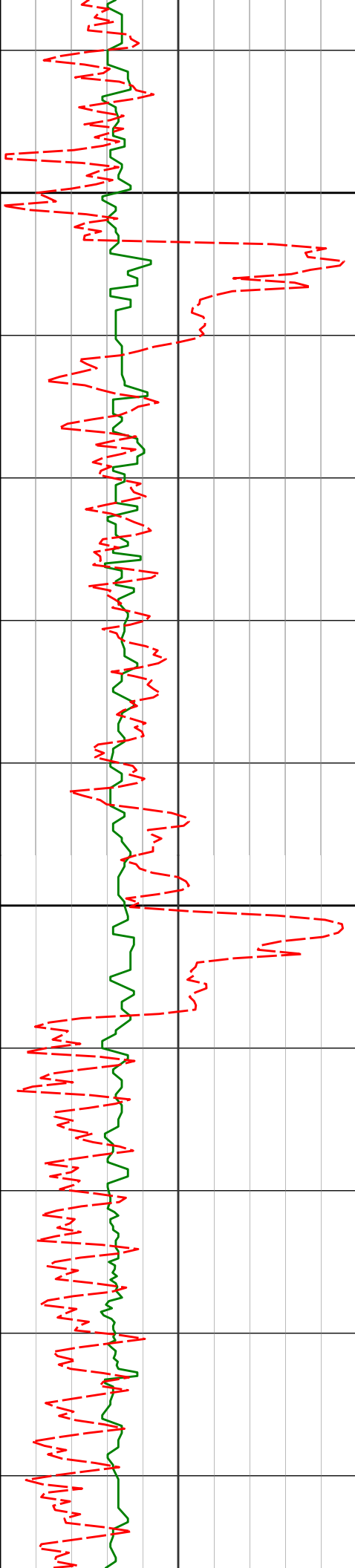
5046'

1.21°

248.44° 5025.11'

-85.30'

149.30°F



5100

5200

151.33°F

151.47°F

151.47°F

153.66°F

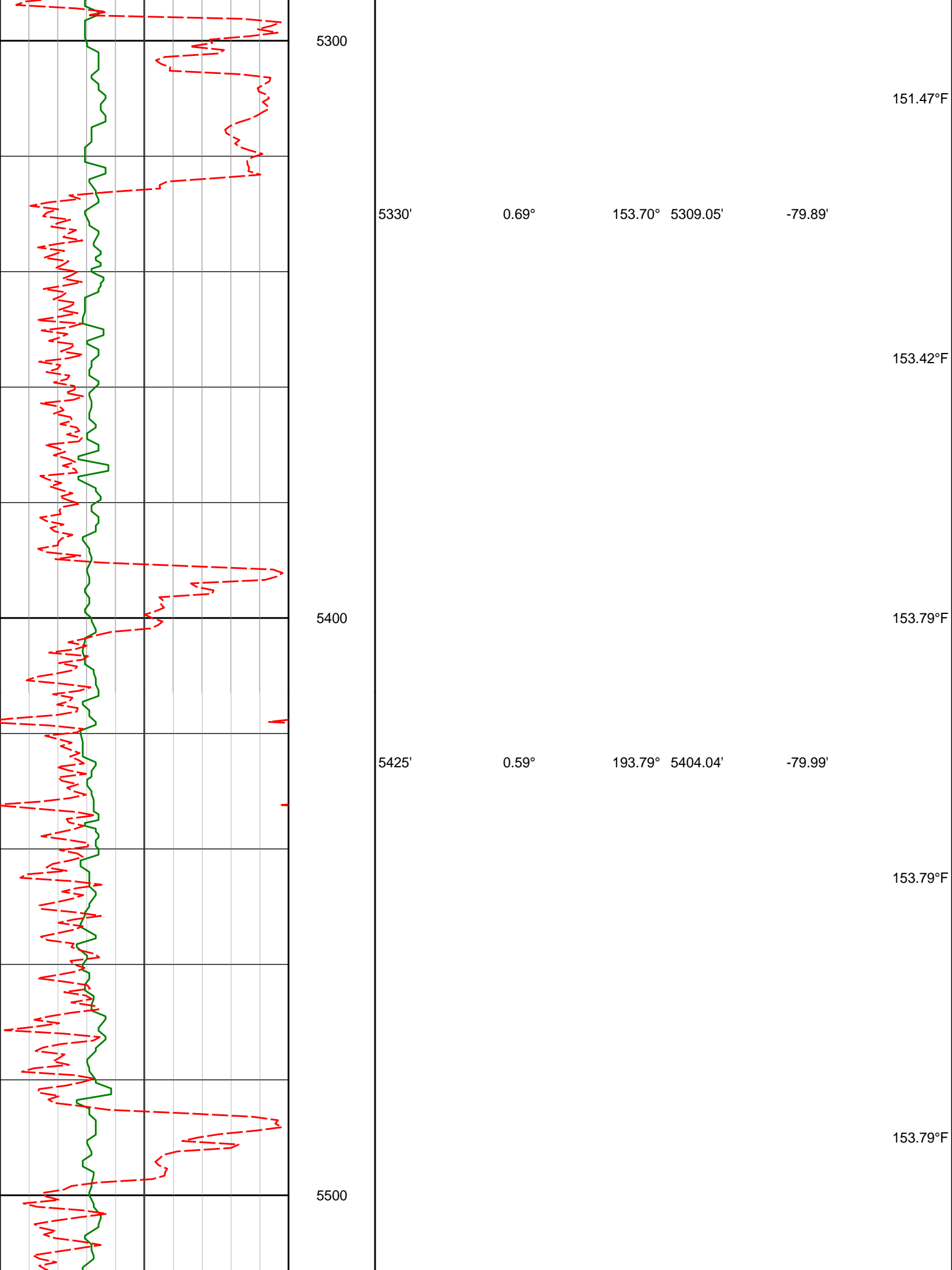
152.95°F

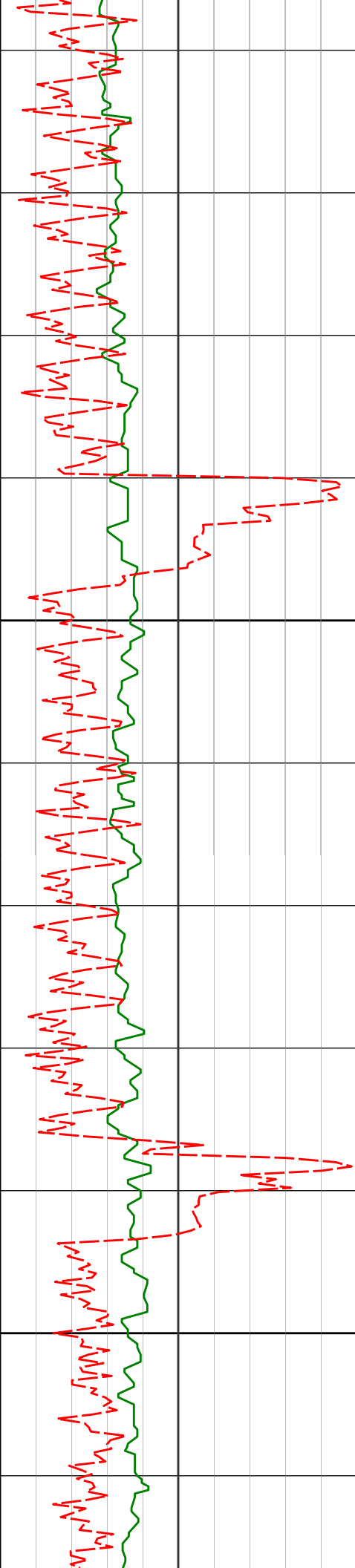
5235'

1.57°

252.96° 5214.06'

-80.92'





5519'

0.55°

200.58° 5498.04'

-79.67'

155.03°F

156.13°F

5600

5614'

1.05°

199.90° 5593.03'

-79.16'

156.13°F

157.22°F

5700

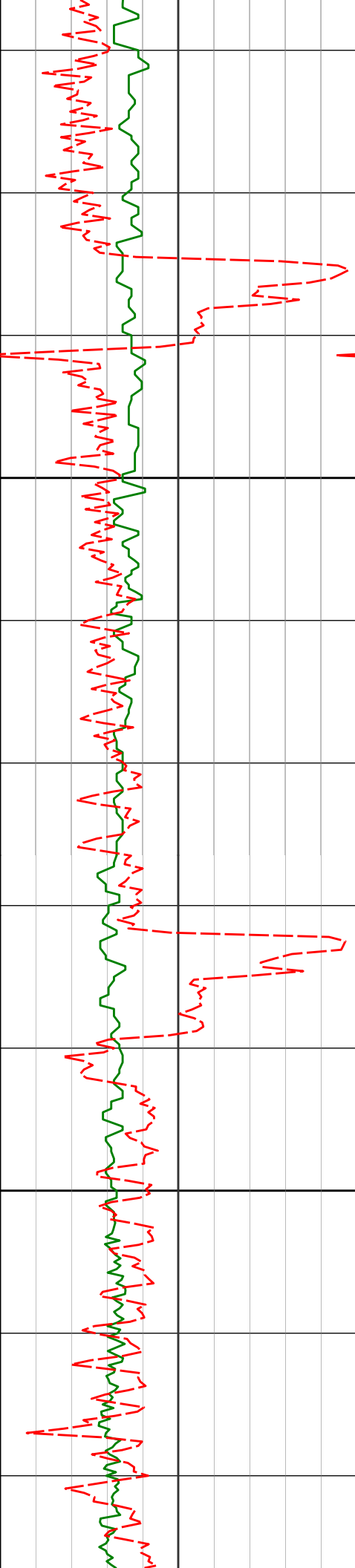
5708'

1.27°

217.50° 5687.01'

-78.17'

158.47°F



5800

5803'

1.73°

217.12° 5781.97'

-76.58'

158.47°F

159.17°F

160.59°F

5900

5898'

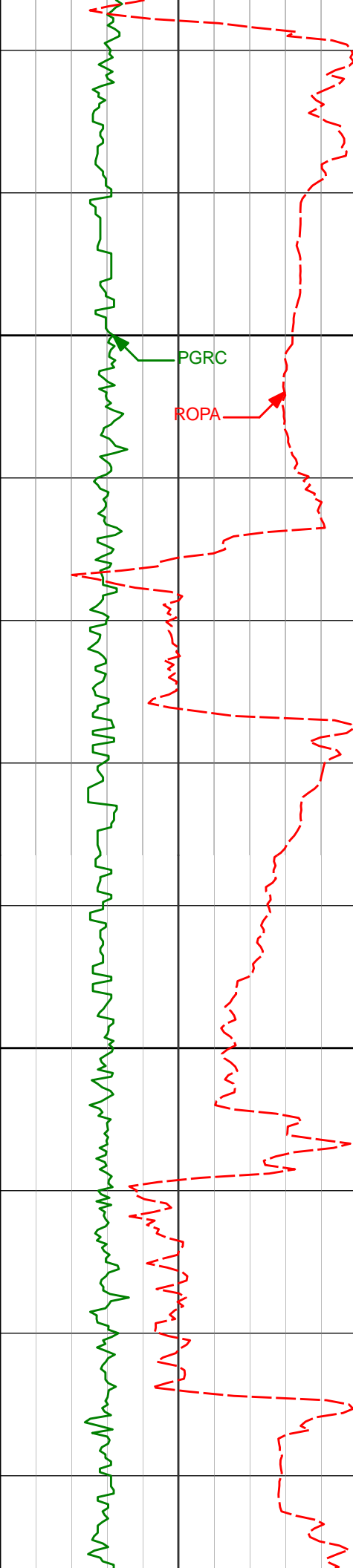
2.12°

214.60° 5876.92'

-74.61'

159.26°F

158.47°F



6000

6100

5992'

5.93°

266.89° 5970.69'

-68.70'

6087'

18.12°

277.61° 6063.44'

-49.17'

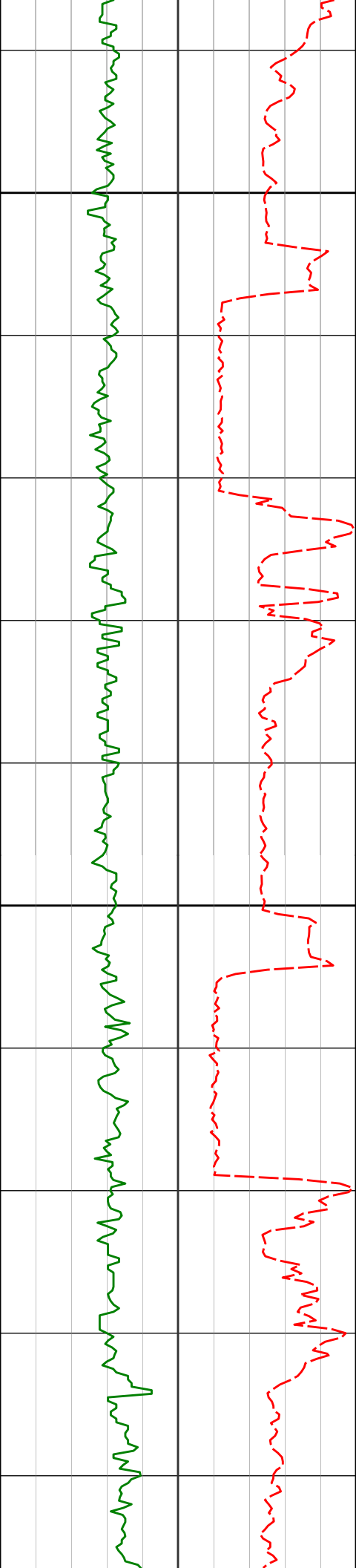
160.20°F

160.99°F

163.02°F

163.20°F

165.18°F



6181'

23.29°

275.61° 6151.34'

-16.35'

6200

165.58°F

300

167.30°F

6276'

30.20°

267.40° 6236.15'

26.21'

6300

167.97°F

168.37°F

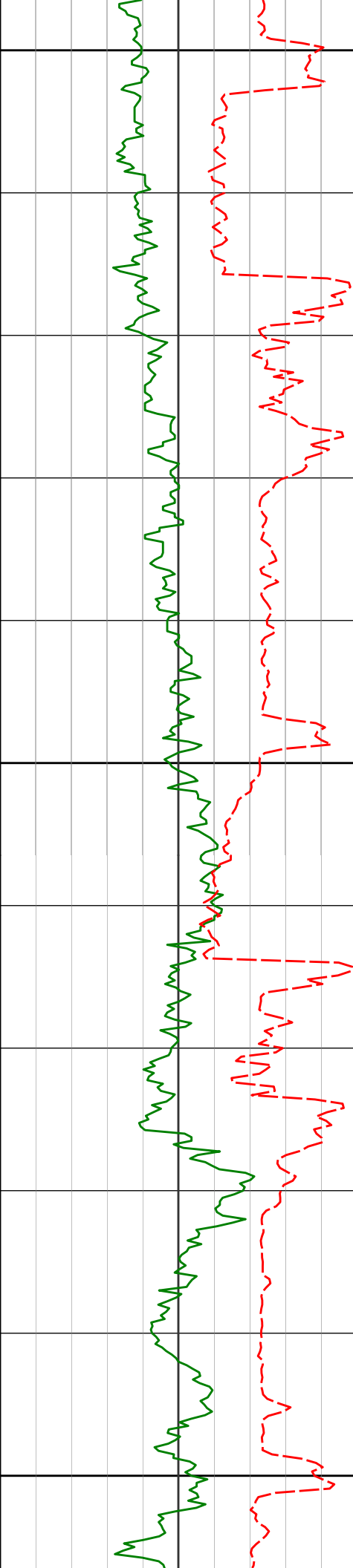
6370'

36.18°

265.79° 6314.79'

77.63'

170.28°F



6400

170.37°F

6465'

44.06°

266.89° 6387.38'

138.78'

171.38°F

6500

172.55°F

6559'

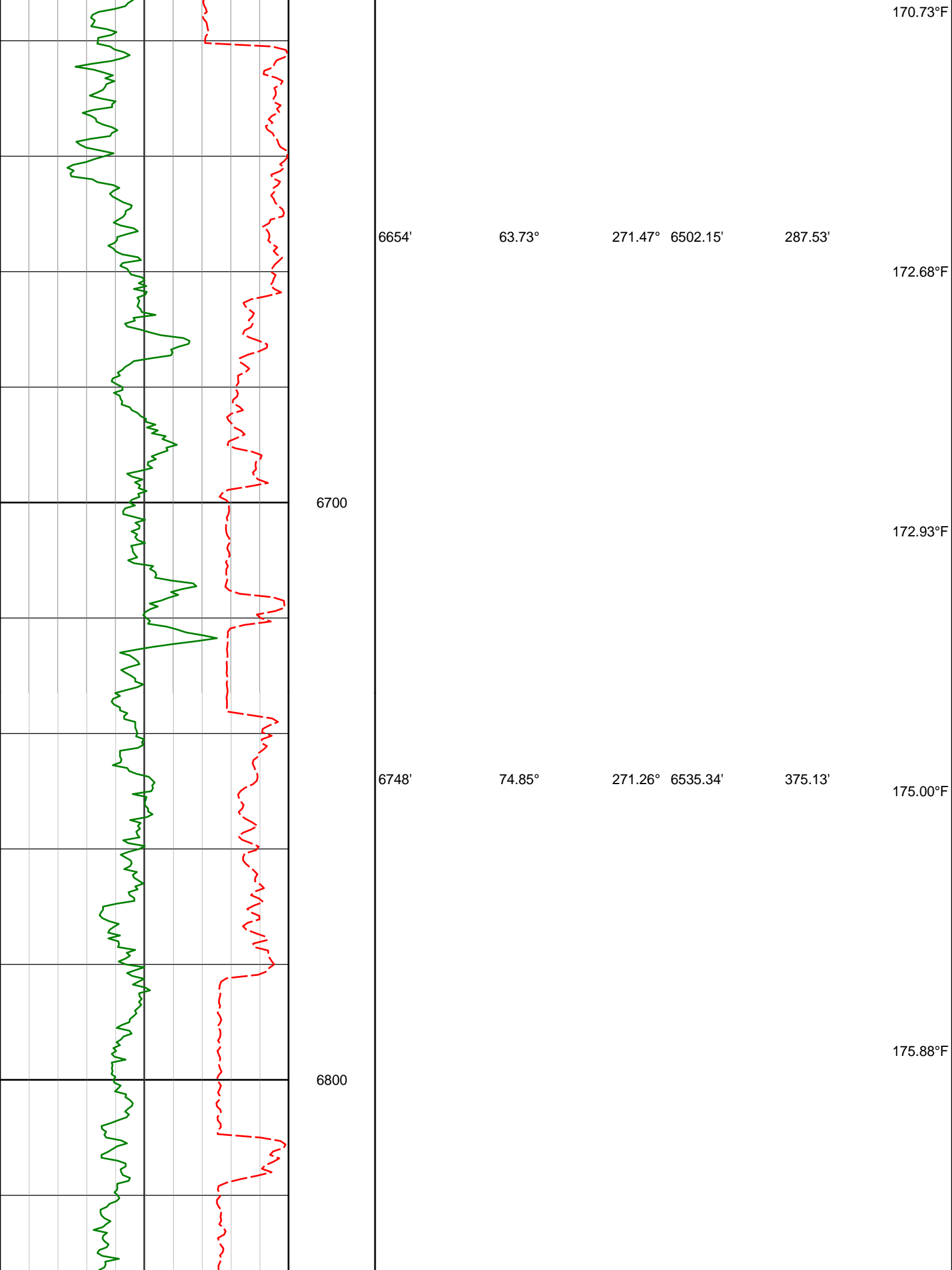
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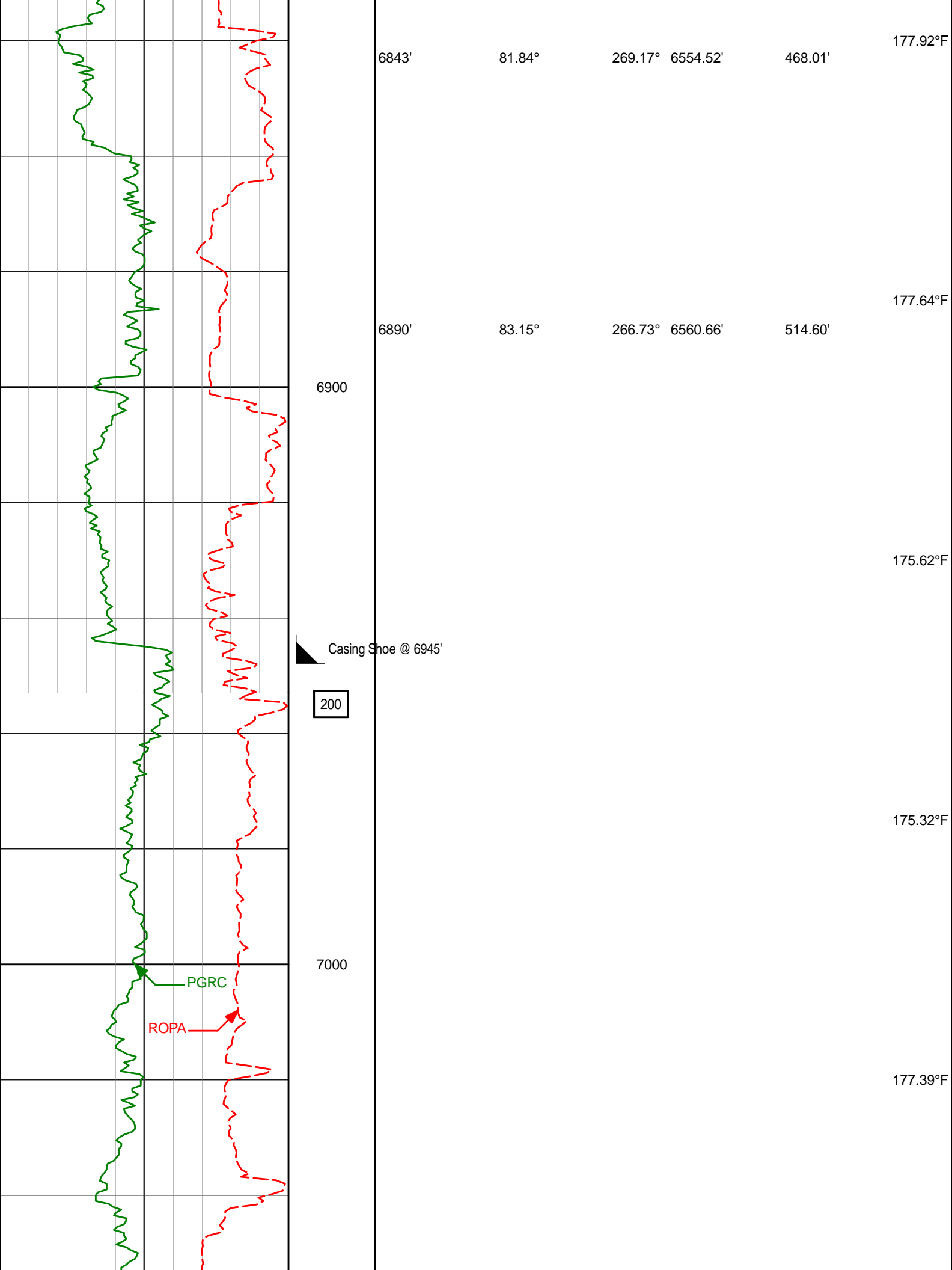
271.19° 6450.92'

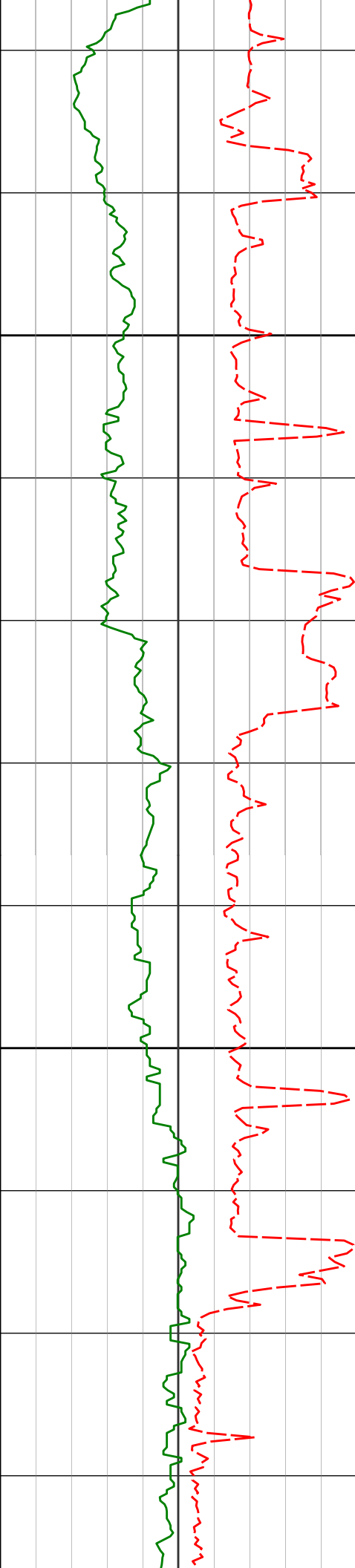
207.94'

171.49°F

6600







7068'

86.18°

269.87° 6577.21'

691.78'

178.45°F

7100

177.76°F

7163'

88.61°

269.73° 6581.53'

786.60'

179.85°F

7200

180.40°F

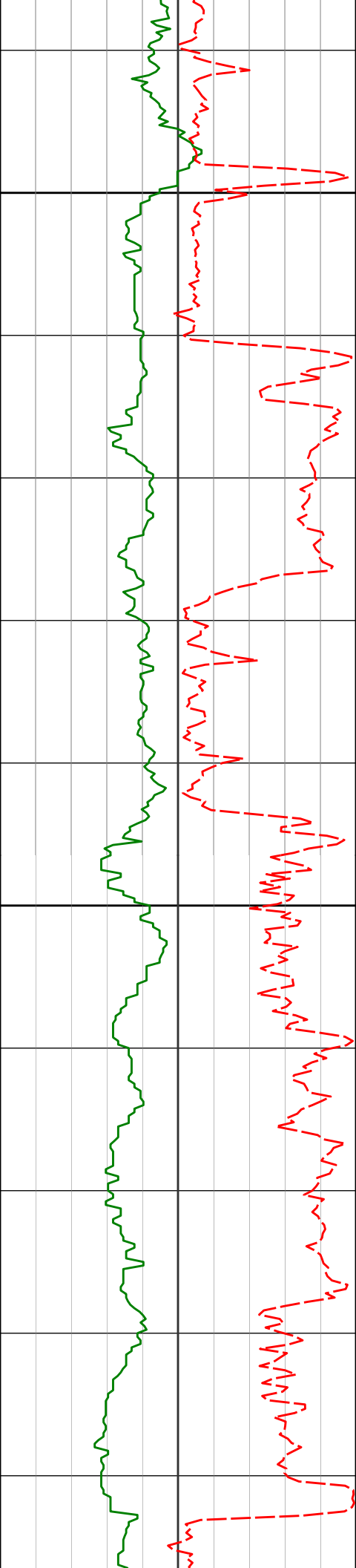
7258'

87.94°

268.49° 6584.39'

881.52'

182.55°F



7300

7400

7353'

7447'

88.52°

89.60°

270.00° 6587.33'

269.94° 6588.87'

976.44'

1070.34'

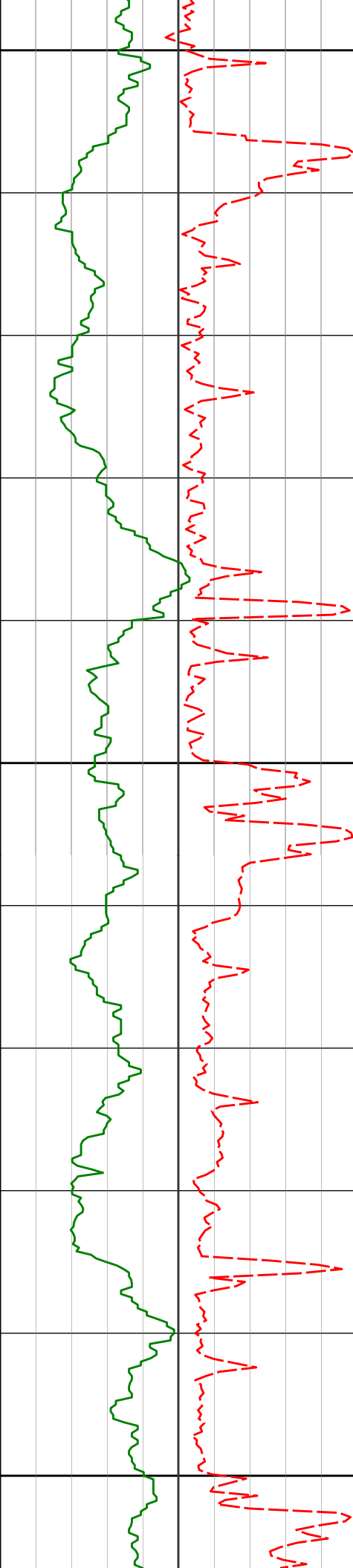
182.55°F

186.52°F

187.44°F

191.41°F

187.18°F



7500

187.48°F

7541'

89.63°

270.37° 6589.50'

1164.25'

187.75°F

7600

189.99°F

7636'

89.08°

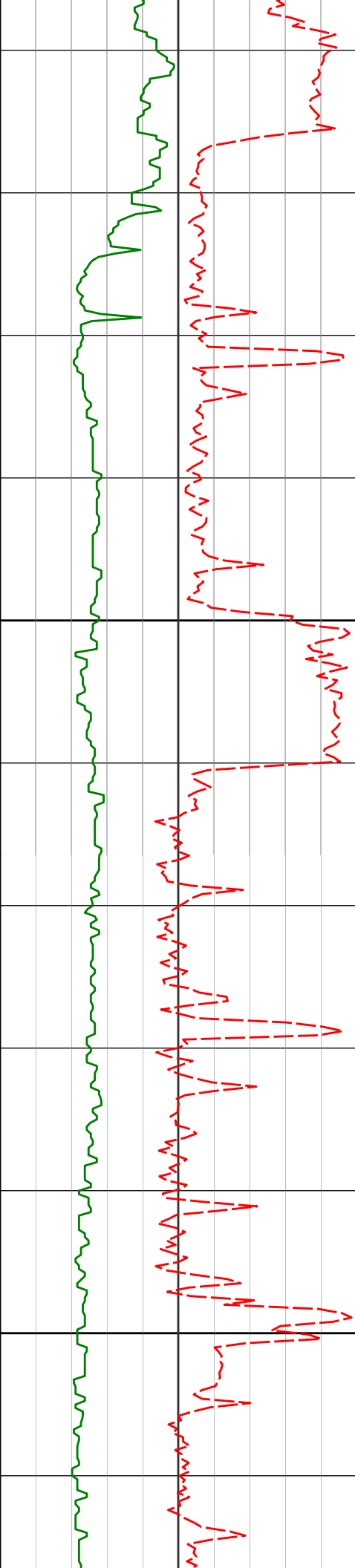
269.45° 6590.57'

1259.16'

189.99°F

7700

189.99°F



7800

7900

7731'

89.04°

270.38° 6592.13'

1354.07'

189.99°F

189.99°F

7825'

90.52°

270.01° 6592.49'

1447.97'

189.99°F

191.70°F

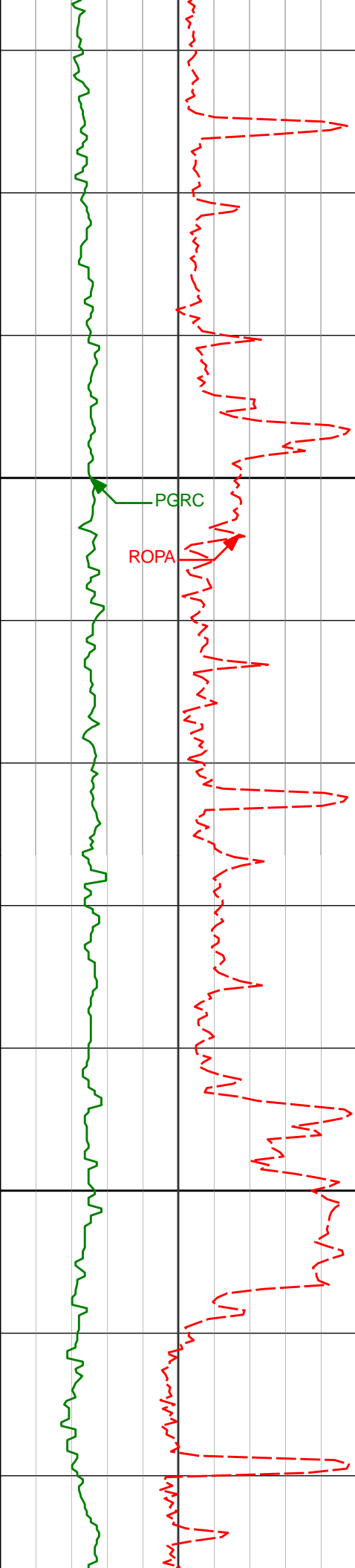
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90.83°

269.56° 6591.37'

1542.89'

192.49°F



8000

PGRC

ROPA

8100

8015'

91.20°

269.18° 6589.69'

1637.83'

192.49°F

192.96°F

192.87°F

192.72°F

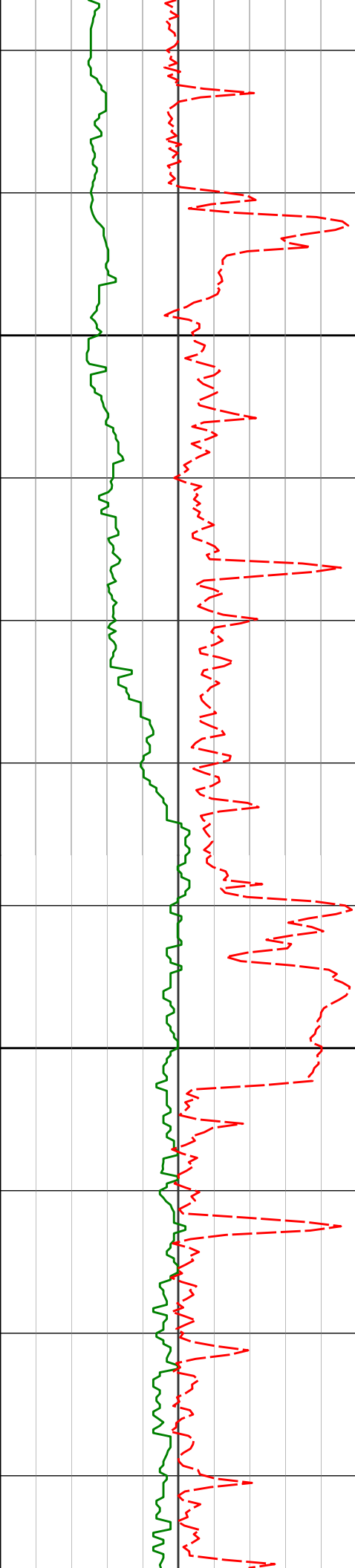
8110'

88.92°

269.39° 6589.59'

1732.79'

194.75°F



8200

8300

8204'

8299'

88.55°

90.09°

269.40° 6591.66'

268.33° 6592.79'

1826.72'

1921.68'

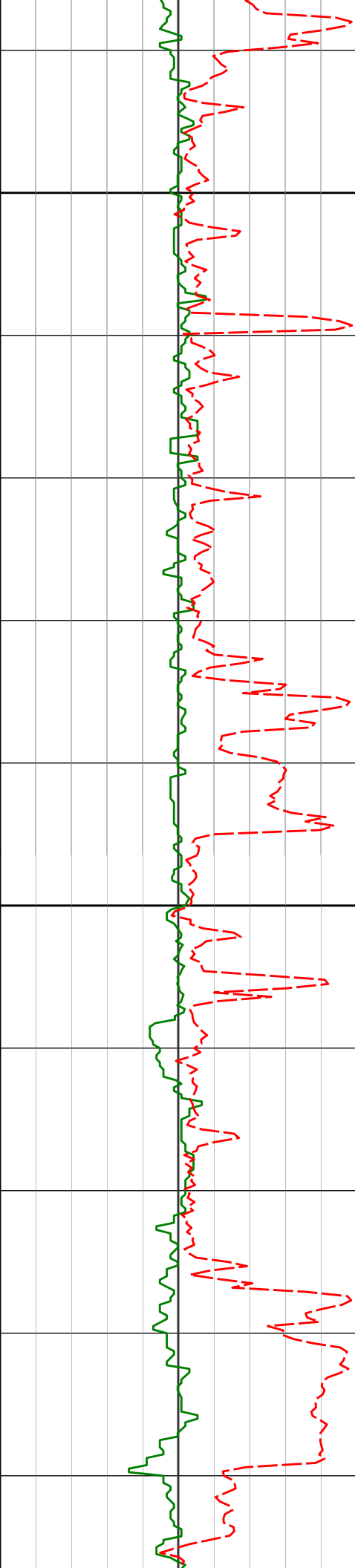
196.34°F

195.59°F

194.99°F

197.19°F

197.99°F



8400

8500

8394'

89.66°

268.12° 6593.00'

2016.68'

8488'

88.98°

266.98° 6594.11'

2110.67'

8583'

90.34°

267.37° 6594.68'

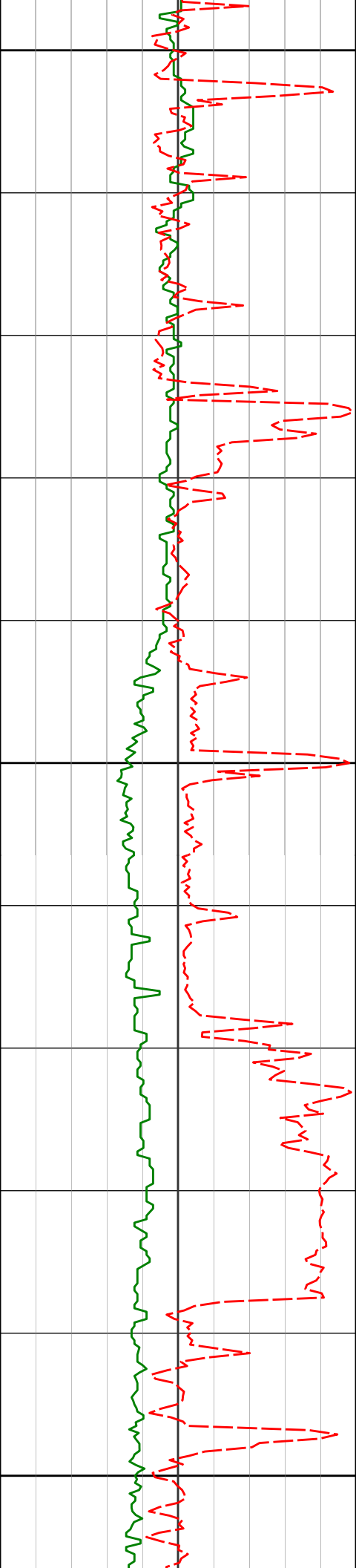
2205.66'

200.05°F

200.82°F

200.40°F

199.66°F



8600

8700

8800

8677'

89.57°

266.63° 6594.75'

2299.65'

8772'

89.72°

268.30° 6595.34'

2394.65'

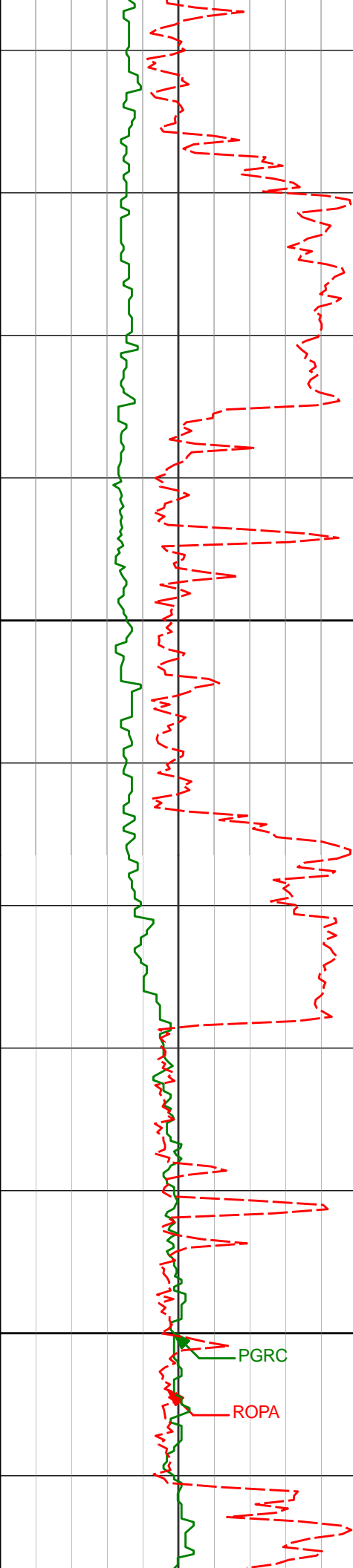
201.36°F

202.60°F

202.60°F

202.60°F

202.60°F



8900

9000

8866'

89.69°

270.84° 6595.82'

2488.58'

202.60°F

202.60°F

203.49°F

8961'

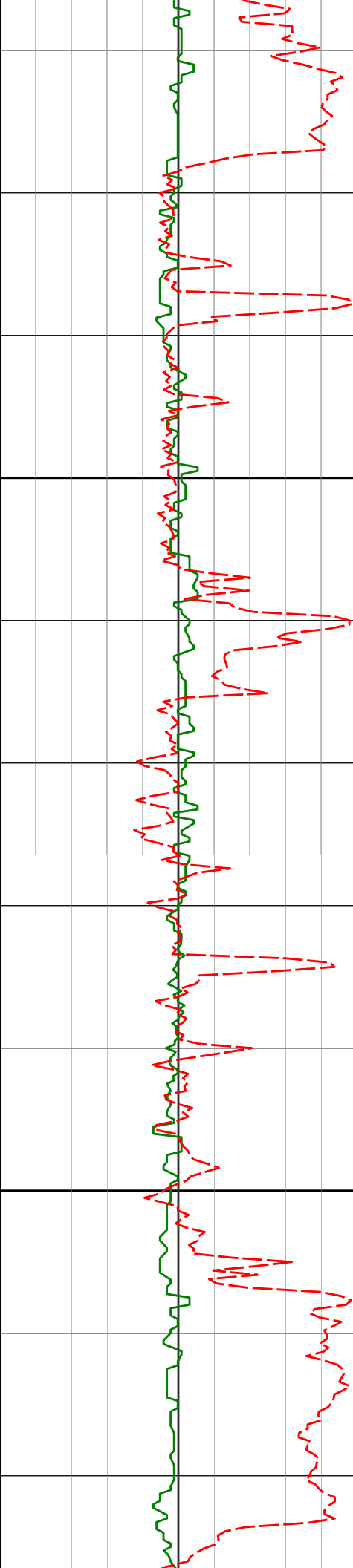
91.48°

270.90° 6594.85'

2583.42'

203.58°F

202.60°F



9100

9200

9056'

89.63°

270.69°

6593.93'

2678.26'

9150'

88.68°

269.98°

6595.32'

2772.15'

9245'

90.34°

271.88°

6596.13'

2866.97'

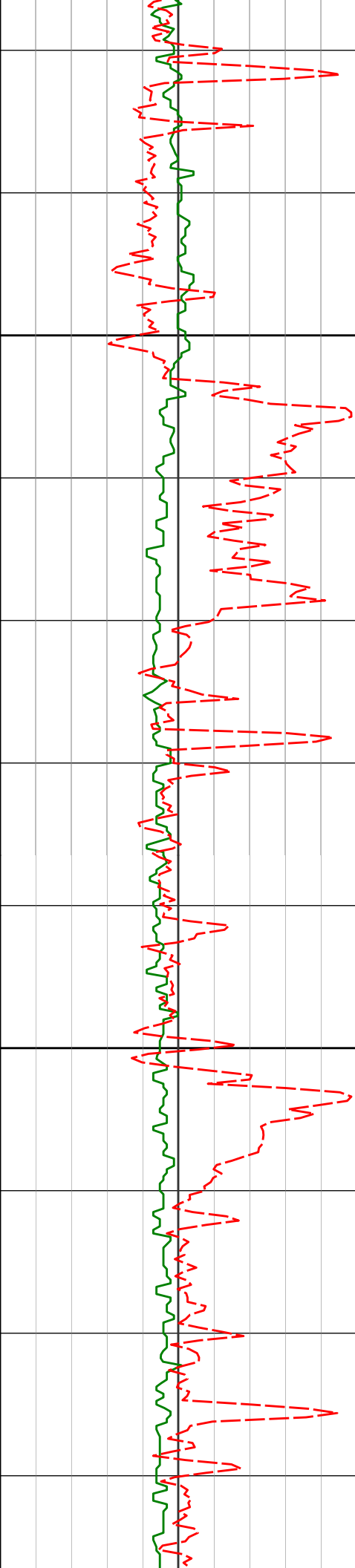
204.68°F

205.75°F

207.51°F

206.05°F

206.68°F



9300

9339'

9400

9434'

90.25°

271.12° 6595.65'

2960.75'

89.82°

270.70° 6595.59'

3055.60'

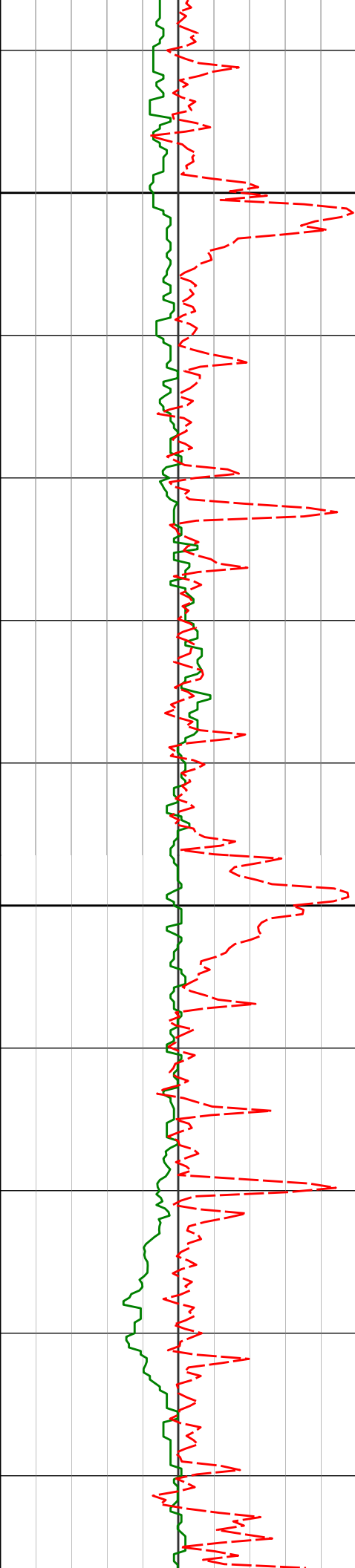
207.73°F

208.51°F

208.72°F

210.31°F

210.31°F



9500

9529'

89.85°

271.51°

6595.86'

3150.42'

210.79°F

212.92°F

212.92°F

9600

9623'

89.48°

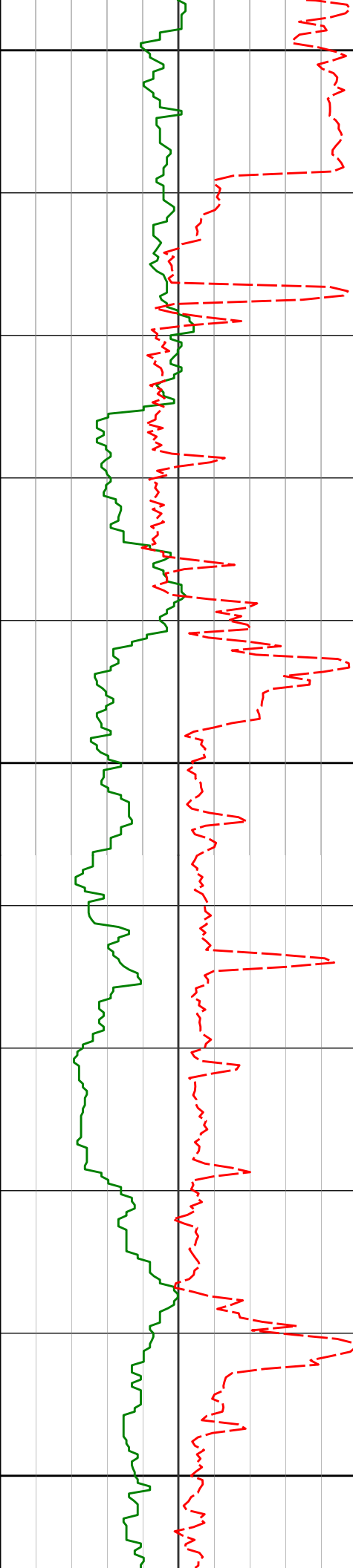
271.58°

6596.41'

3244.19'

212.47°F

210.94°F



9700

9718'

90.18°

271.34° 6596.69'

3338.98'

210.31°F

9800

9813'

89.91°

270.63° 6596.57'

3455.60'

212.46°F

9900

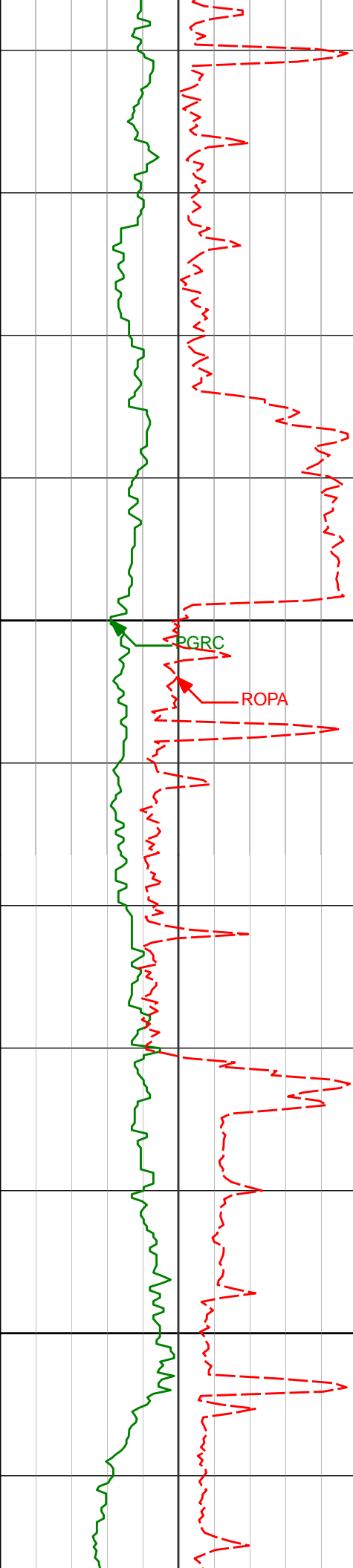
9908'

89.41°

271.08° 6597.08'

3528.63'

211.65°F



10000

10100

10002'

10097'

90.43°

90.34°

270.03° 6597.22'

269.88° 6596.58'

3622.51'

3717.42'

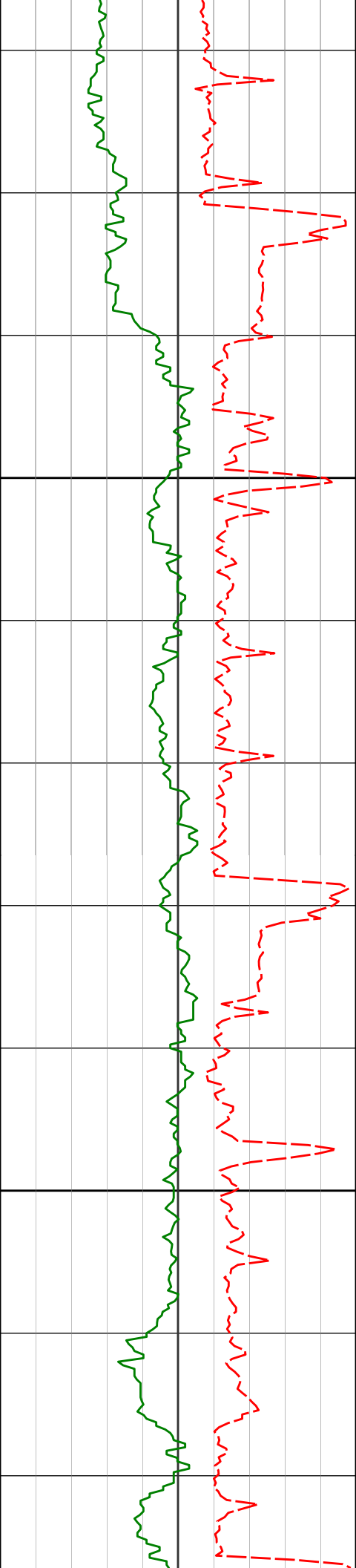
210.06°F

210.31°F

211.31°F

212.92°F

213.06°F



10200

10300

10192'

89.88°

269.40° 6596.40'

3812.36'

10287'

88.98°

269.27° 6597.34'

3907.31'

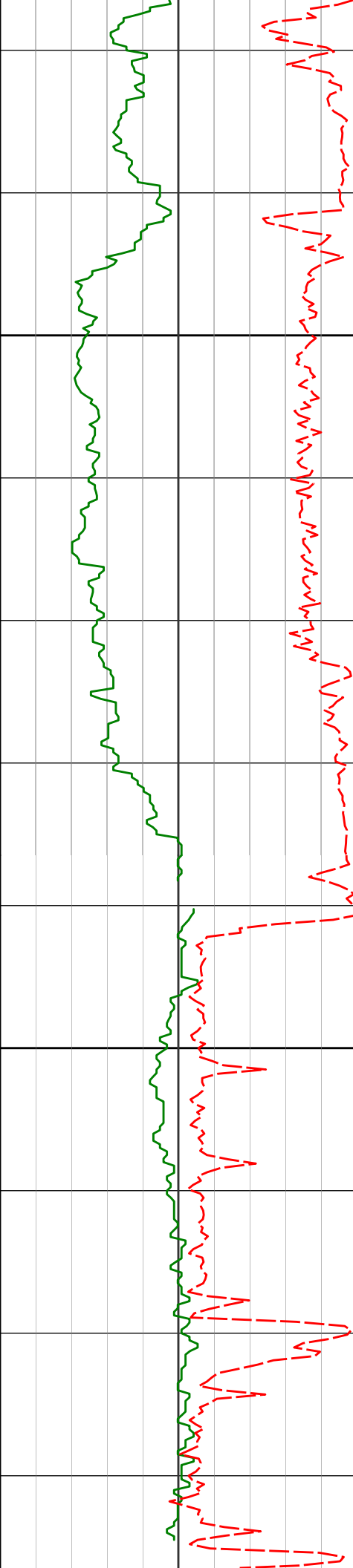
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215.51°F

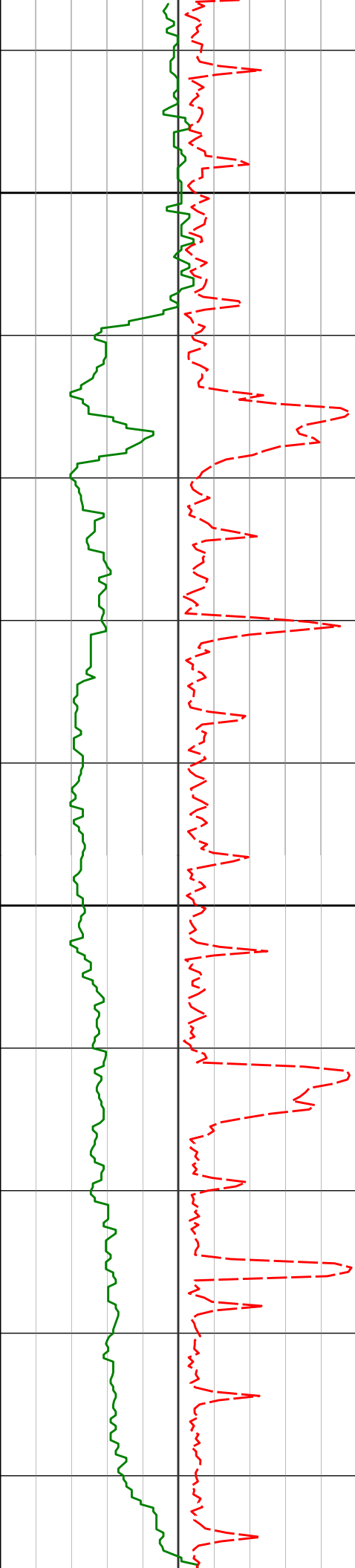
215.51°F

213.98°F

217.78°F



10381'	89.69°	268.62°	6598.43'	4001.28'	215.63°F
10474'	90.80°	268.34°	6598.03'	4094.27'	213.14°F
10567'	90.37°	268.19°	6597.08'	4187.26'	215.32°F



10600

10700

10660'

10752'

90.71°

90.34°

268.43°

267.77°

6596.21'

6595.36'

4280.24'

4372.24'

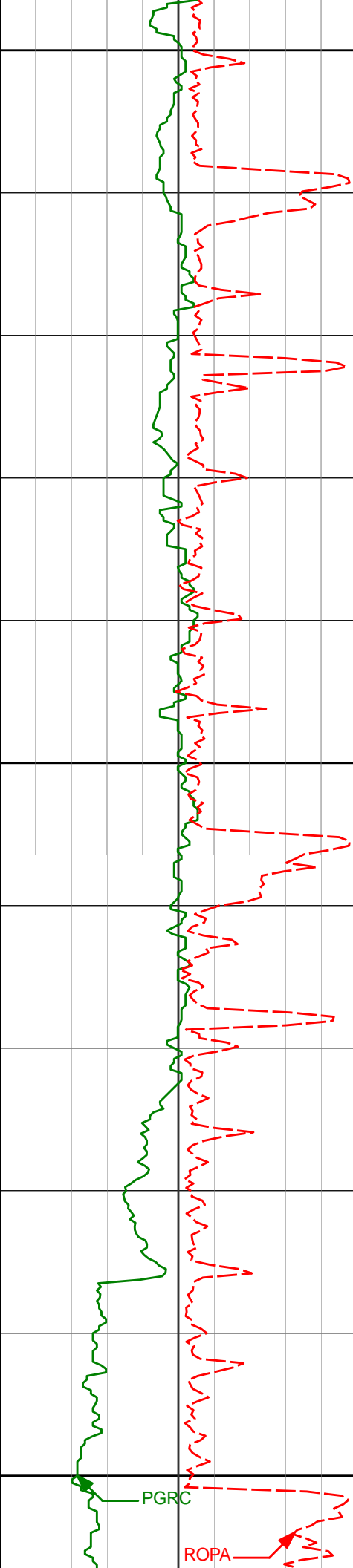
215.68°F

217.92°F

218.14°F

218.38°F

220.77°F



10800

220.77°F

10846'

89.41°

267.48° 6595.57'

4466.24'

221.45°F

10900

223.41°F

10939'

88.83°

267.29° 6597.00'

4559.22'

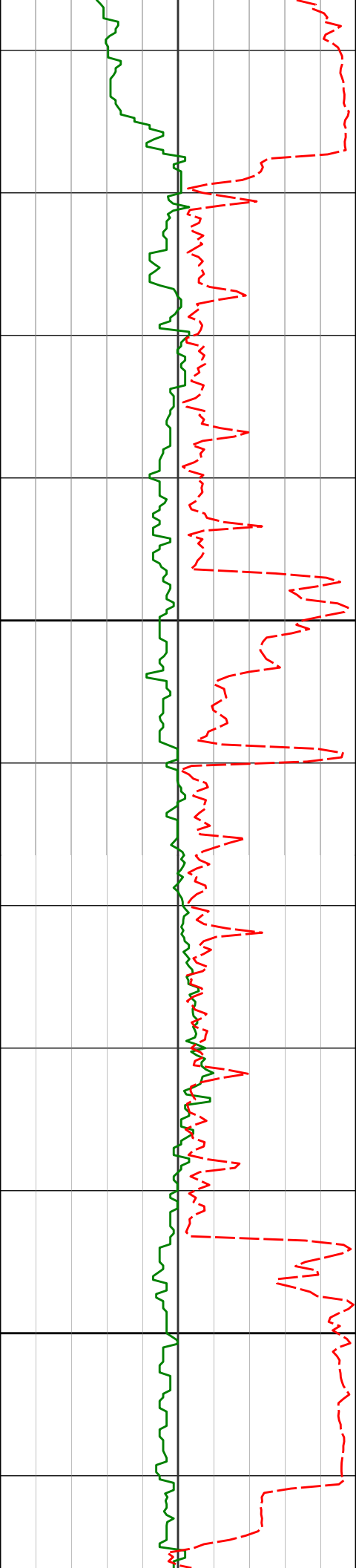
222.21°F

11000

219.95°F

PGRC

ROPA



11100

11200

11029'

89.94°

267.32° 6597.96'

4649.22'

220.59°F

11122'

89.45°

267.31° 6598.46'

4742.21'

222.03°F

11216'

91.32°

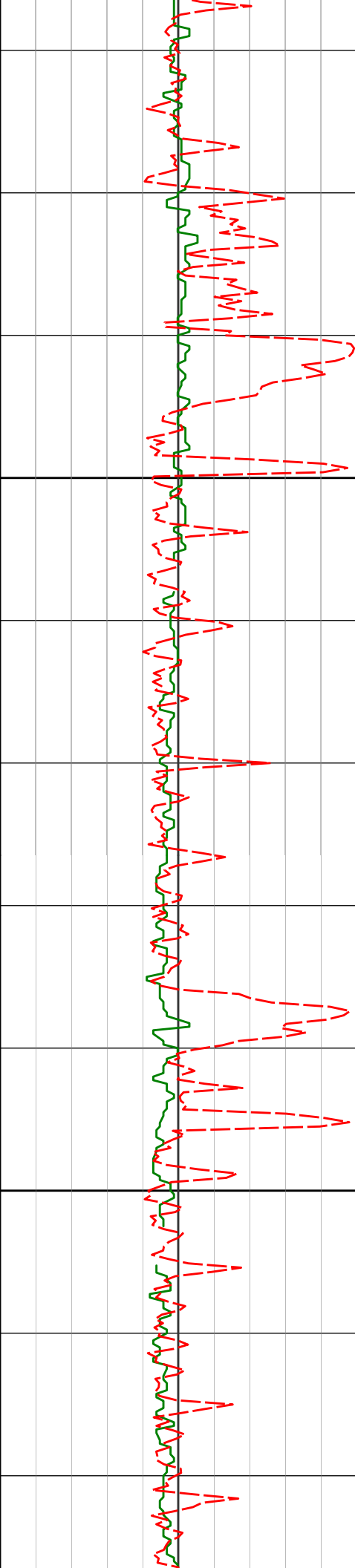
268.21° 6597.83'

4836.21'

220.77°F

220.98°F

219.90°F



11300

11400

11309'

11402'

90.92°

90.18°

268.18° 6596.01'

267.31° 6595.12'

4929.18'

5022.18'

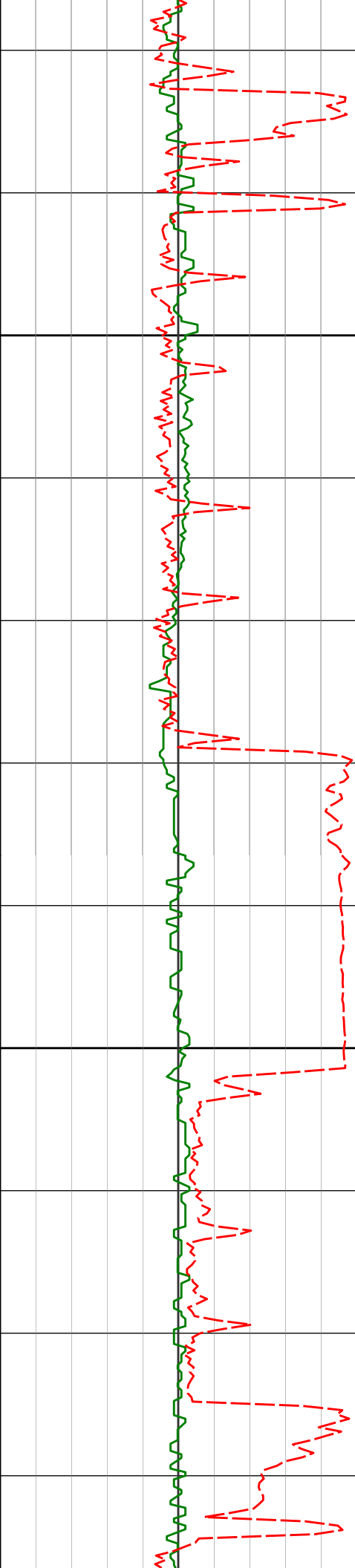
218.62°F

220.80°F

223.41°F

223.83°F

226.08°F



11500

11600

11493'

89.48°

266.61° 6595.39'

5113.17'

11586'

90.03°

269.46° 6595.79'

5206.16'

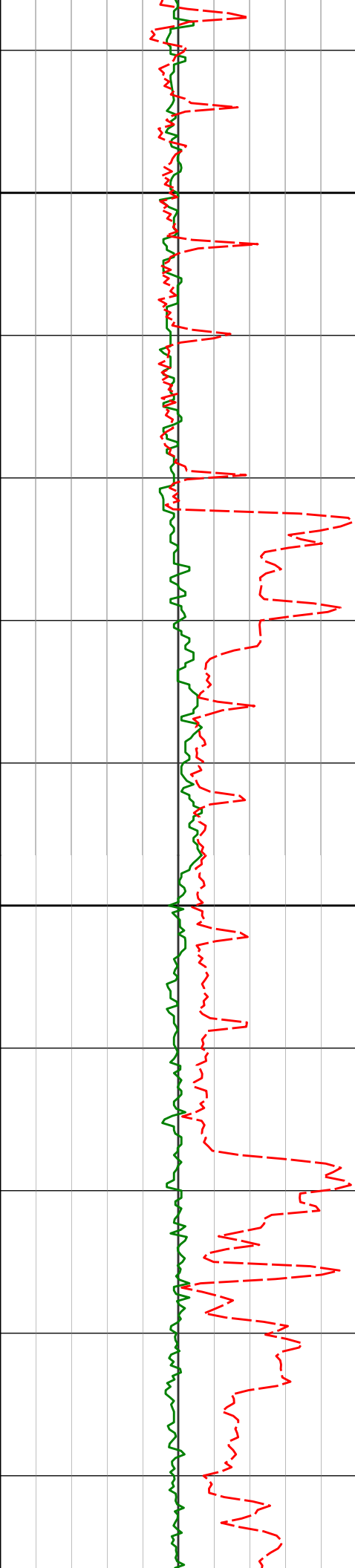
225.12°F

222.51°F

221.07°F

223.41°F

223.41°F



11700

11800

11680'

90.06°

269.32° 6595.71'

5300.11'

11772'

89.26°

268.98° 6596.26'

5392.07'

11864'

88.80°

268.46° 6597.81'

5484.04'

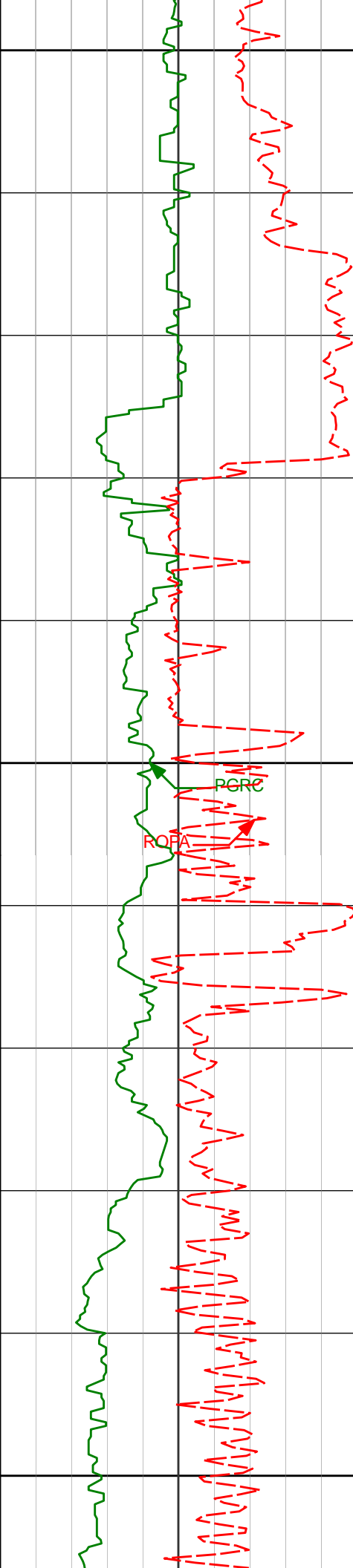
223.41°F

224.98°F

226.08°F

227.11°F

226.34°F



11900

225.38°F

11956'

90.06°

269.69° 6598.73'

5576.00'

225.35°F

12000

ROFA

PCRC

226.08°F

12050'

88.89°

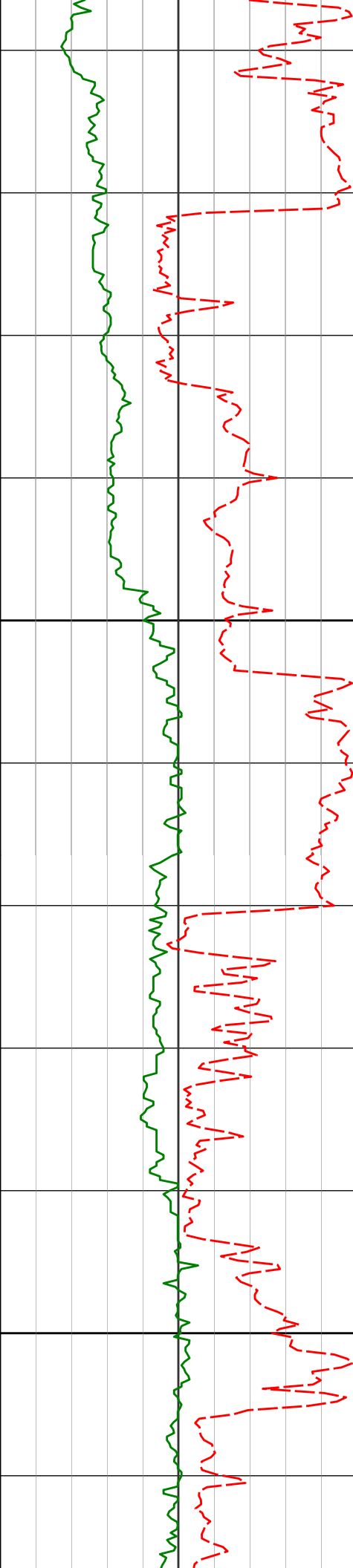
268.87° 6599.59'

5669.96'

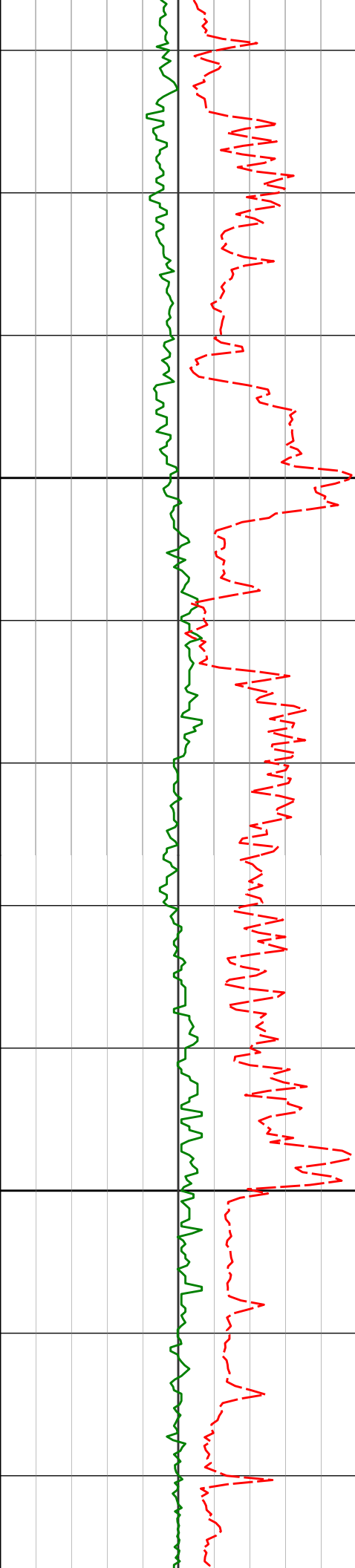
226.08°F

12100

226.48°F



12143'	89.72°	268.25°	6600.72'	5762.94'	226.56°F
12200					223.85°F
12236'	90.89°	269.36°	6600.22'	5855.91'	226.03°F
12300					228.47°F
12330'	90.80°	269.60°	6598.84'	5949.85'	228.86°F



12400

12500

12425'

12520'

89.88°

89.05°

269.19° 6598.27'

268.96° 6599.16'

6044.80'

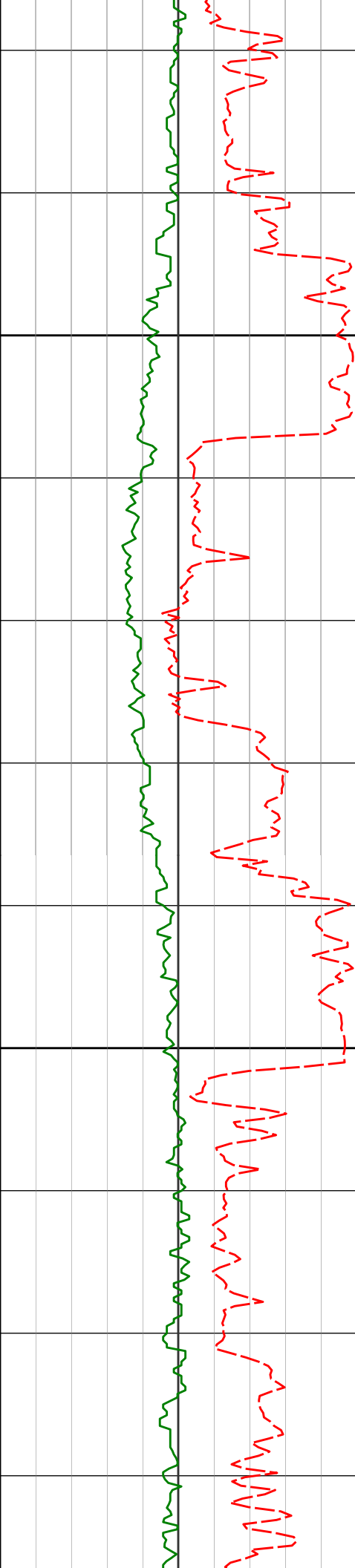
6139.76'

231.10°F

231.42°F

231.42°F

230.55°F



12600

12614'

89.54°

270.37° 6600.32'

6233.69'

12700

12709'

90.80°

269.55° 6600.04'

6328.61'

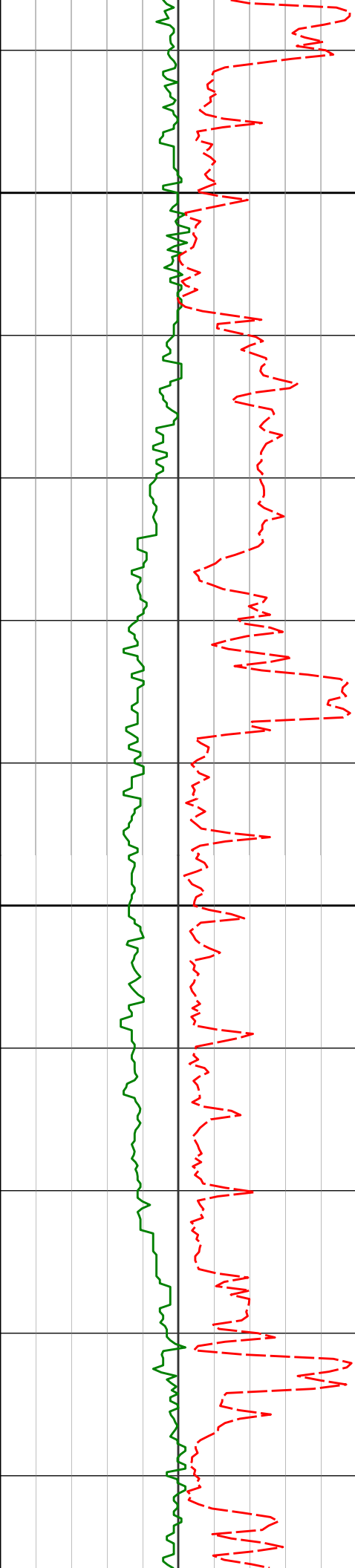
229.53°F

229.96°F

229.46°F

231.08°F

232.30°F



12800

12900

12804'

12898'

90.65°

90.86°

269.81° 6598.83'

269.64° 6597.60'

6423.54'

6517.47'

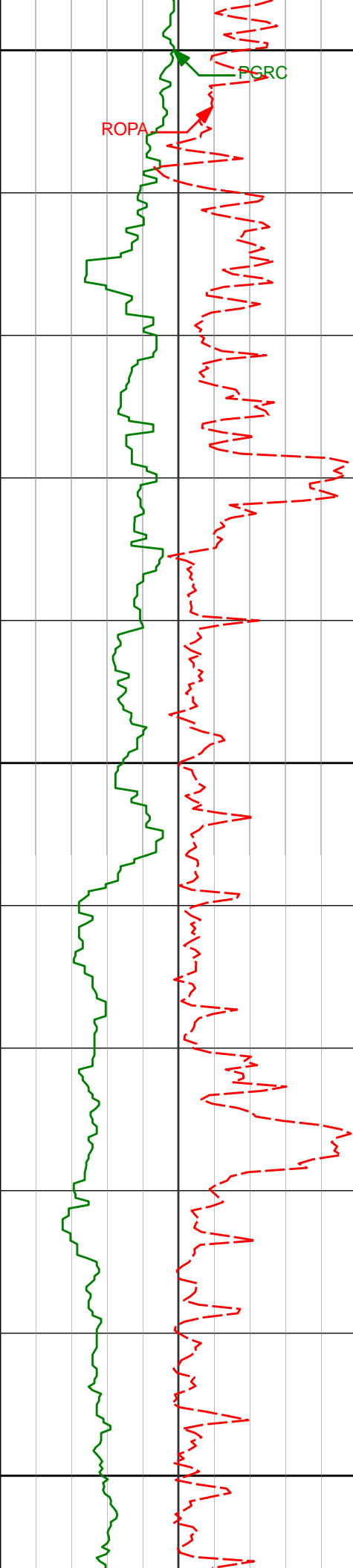
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234.12°F

234.12°F

234.47°F

236.66°F

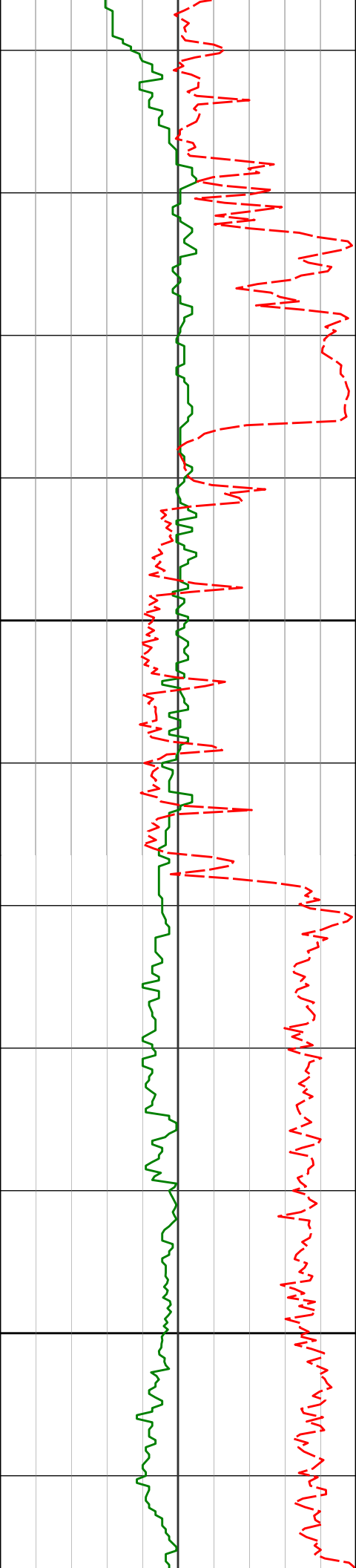


13000

13100

13200

12993	90.39	269.71	6596.39	6612.40	236.82°F
13087'	89.97°	268.84°	6595.93'	6706.35'	236.82°F
13182'	88.89°	268.16°	6596.88'	6801.33'	236.87°F



13300

13400

13277'

89.91°

268.96° 6597.87'

6896.31'

235.09°F

235.63°F

235.08°F

235.16°F

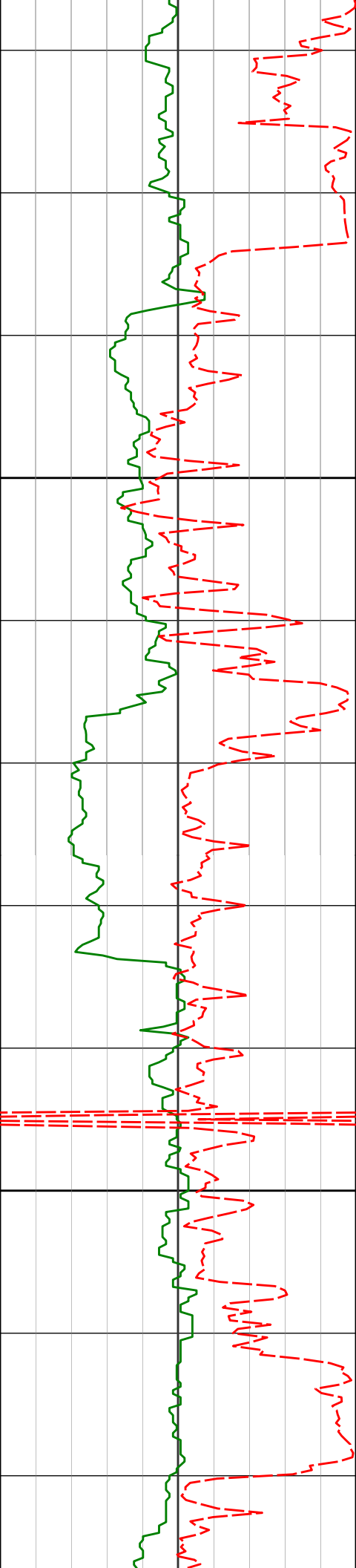
235.11°F

13372'

89.57°

269.77° 6598.31'

6991.27'



13500

13600

13466'

13561'

90.37°

89.51°

270.52° 6598.35'

270.37° 6598.45'

7085.17'

7180.05'

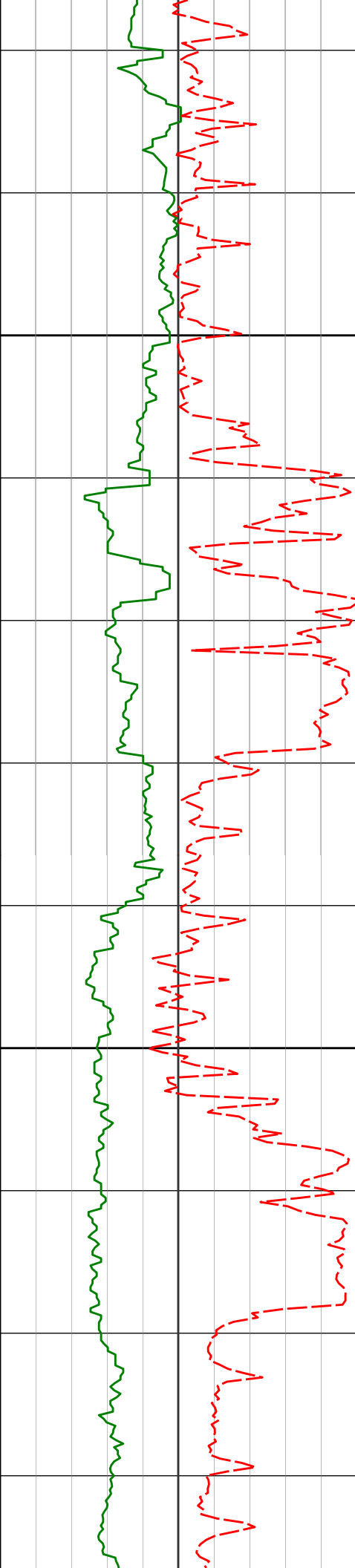
235.93°F

236.82°F

236.32°F

235.73°F

237.00°F



13700

13800

13656'

88.71°

270.70° 6599.93'

7274.92'

236.86°F

236.93°F

13750'

88.98°

269.17° 6601.82'

7368.82'

236.52°F

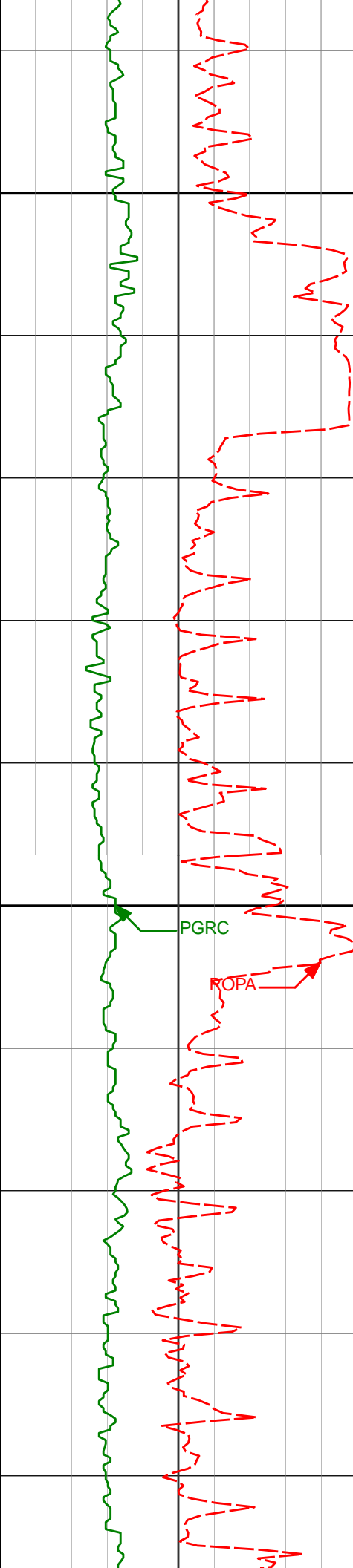
13845'

89.26°

268.93° 6603.28'

7463.78'

236.99°F



13900

237.25°F

13940'

90.15°

268.08° 6603.77'

7558.76'

237.45°F

14000

PGRC

ROPA

239.33°F

14034'

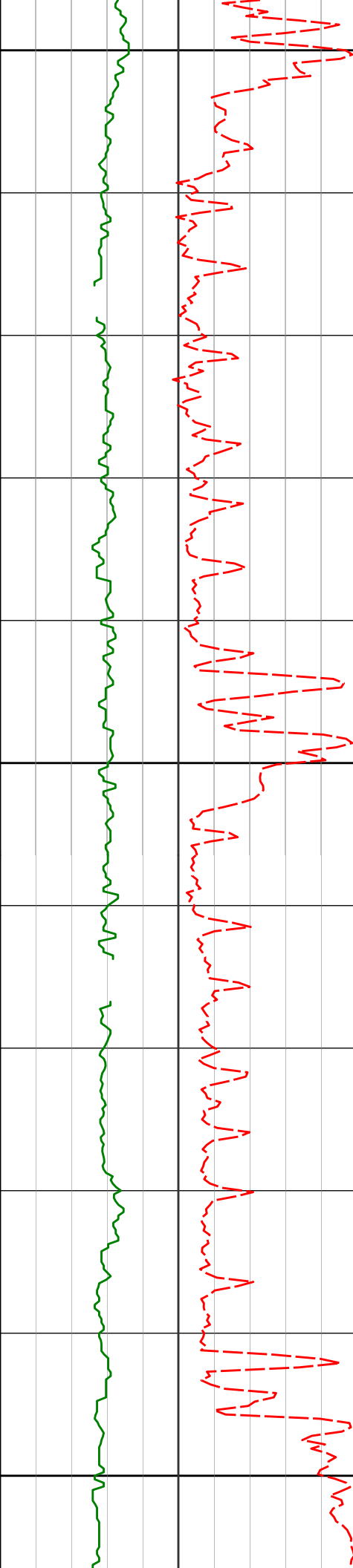
91.97°

268.62° 6602.03'

7652.73'

239.54°F

239.77°F



14100

14129'

91.45°

268.22° 6599.20'

7747.68'

241.28°F

14200

14224'

91.54°

268.12° 6596.72'

7842.64'

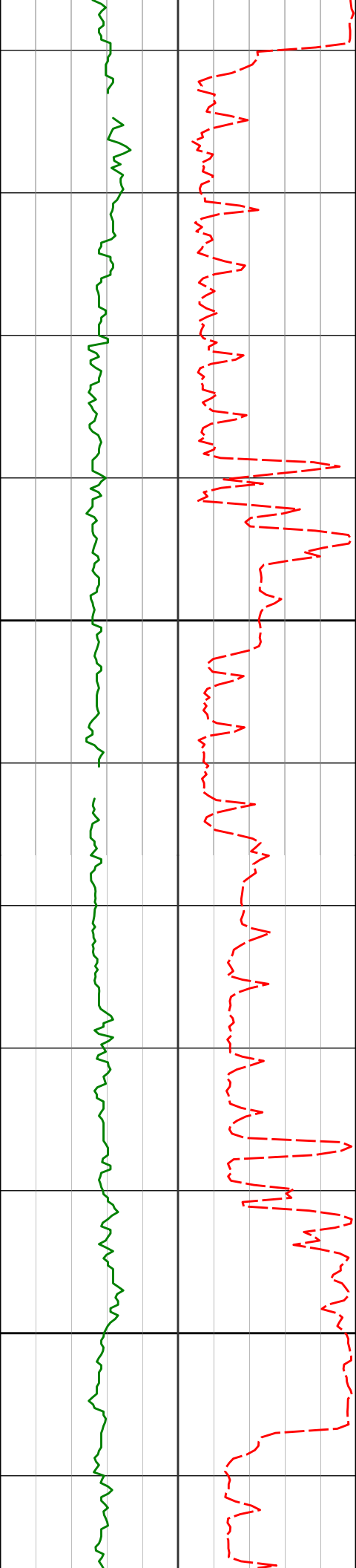
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241.56°F

238.70°F

239.54°F



14318'

90.62°

269.88° 6594.95'

7936.59'

240.08°F

14400

241.09°F

14413'

90.80°

269.41° 6593.77'

8031.53'

239.82°F

14500

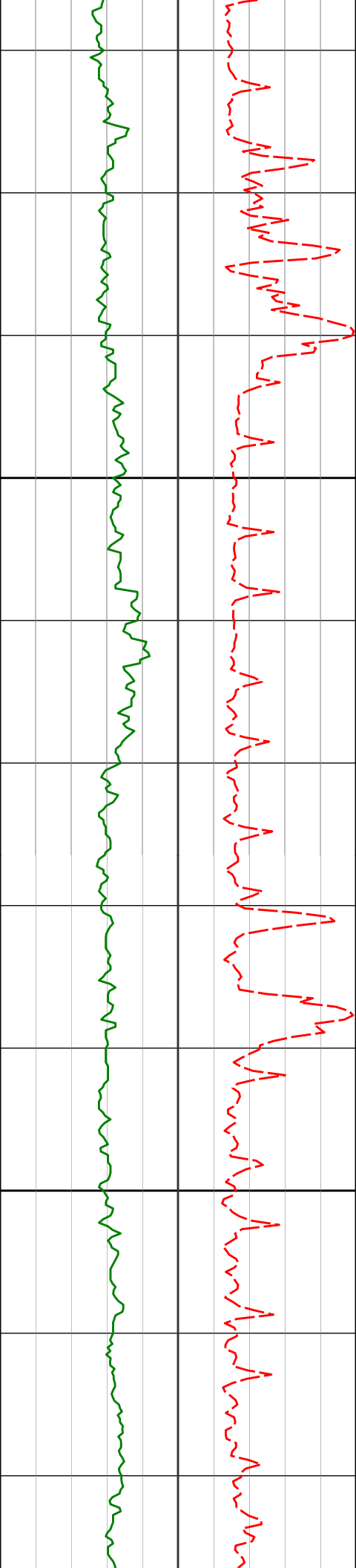
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90.12°

270.67° 6593.01'

8126.43'



14600

14602'

90.06°

270.40° 6592.86'

8220.31'

14700

14697'

90.92°

271.29° 6592.05'

8315.15'

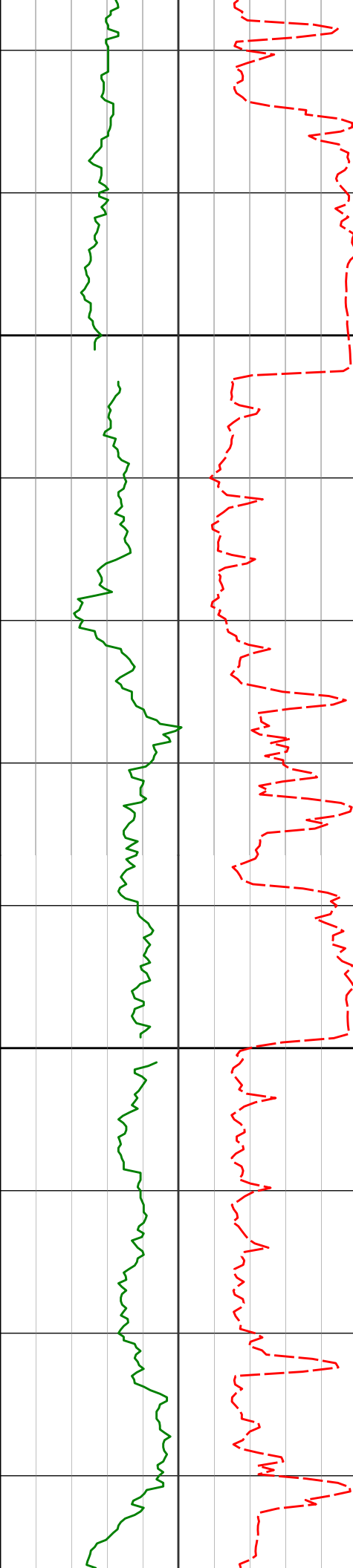
239.95°F

242.10°F

242.28°F

242.08°F

240.69°F



14800

14900

14791'

87.35°

268.87° 6593.47'

8409.03'

14886'

88.00°

268.69° 6597.32'

8503.93'

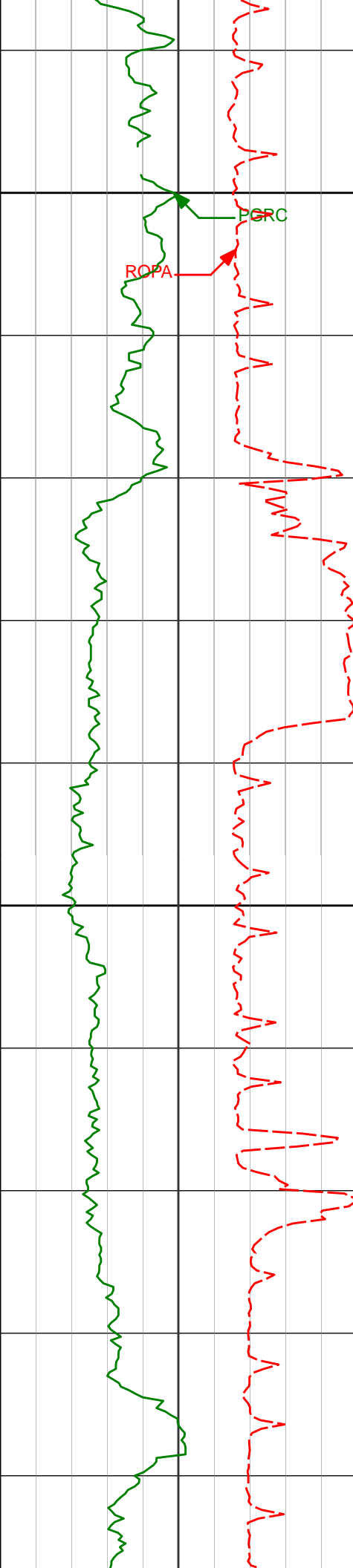
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240.03°F

239.63°F

241.28°F

241.97°F



15000

15100

14981'

87.72°

268.50° 6600.87'

8598.85'

241.21°F

15075'

88.58°

268.49° 6603.90'

8692.79'

242.01°F

15170'

88.34°

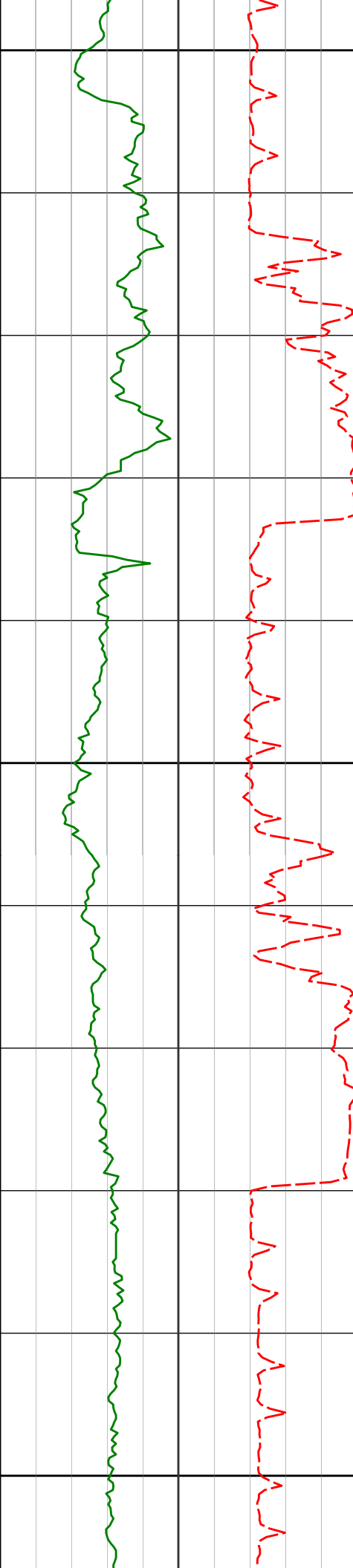
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8787.74'

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240.32°F

241.85°F



15200

240.49°F

241.49°F

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88.49°

268.40° 6609.06'

8881.69'

15300

240.47°F

242.19°F

15359'

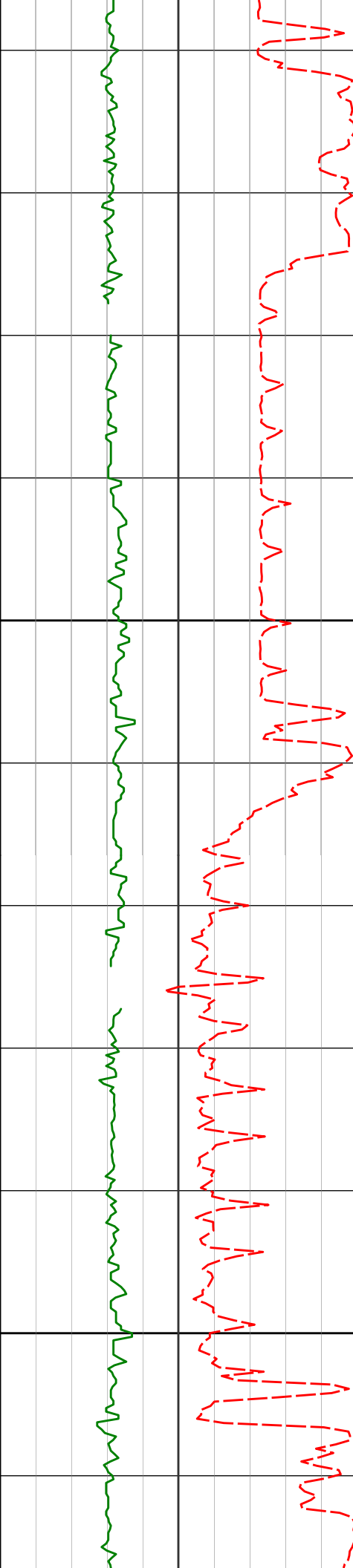
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8976.67'

15400

242.28°F



15500

15600

15453'

15548'

90.09°

89.85°

268.42° 6611.04'

268.24° 6611.09'

9070.66'

9165.65'

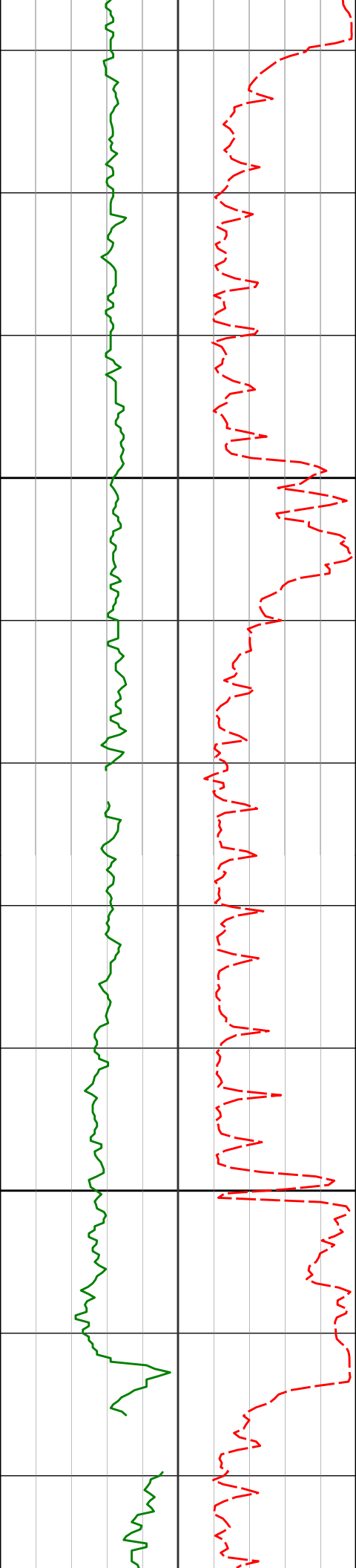
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243.55°F

241.21°F

241.14°F



15643'

90.52°

267.76° 6610.79'

9260.65'

243.55°F

15700

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15738'

91.45°

268.17° 6609.15'

9355.63'

243.00°F

15800

244.39°F

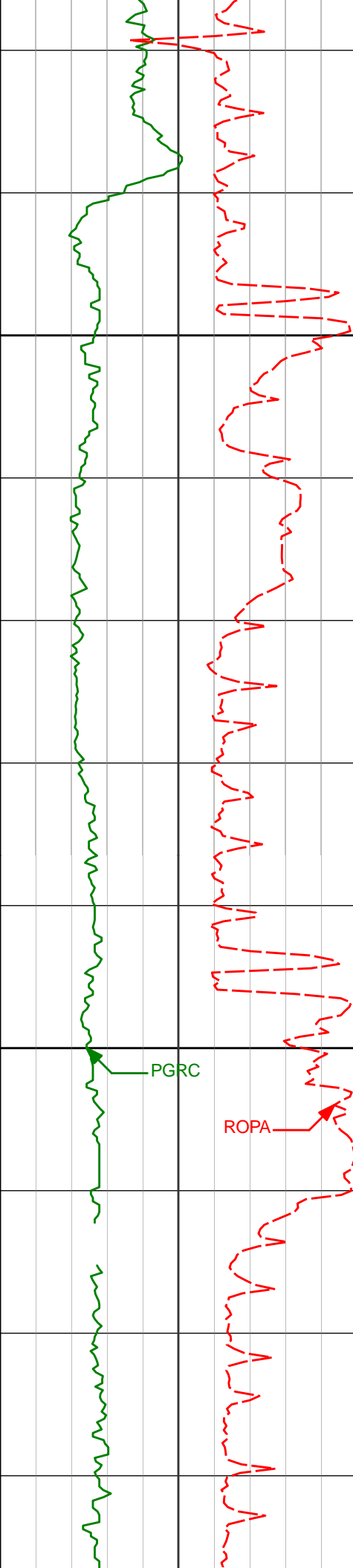
15833'

90.09°

267.88° 6607.88'

9450.62'

245.03°F



15900

15928'

89.57°

267.39° 6608.16'

9545.62'

245.03°F

244.37°F

243.37°F

16000

16023'

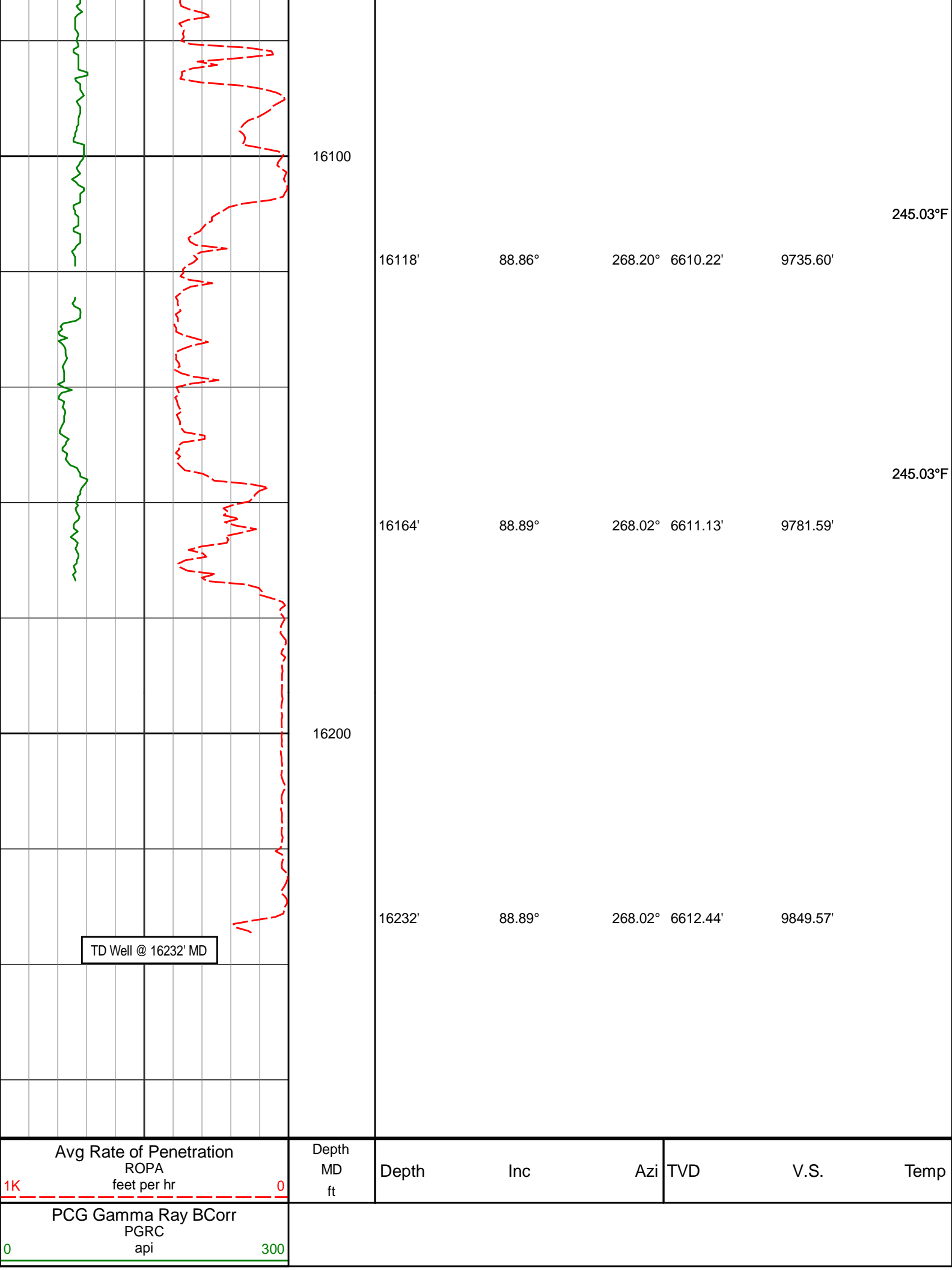
89.54°

268.04° 6608.90'

9640.61'

244.68°F

244.05°F



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
70 Ranch State BB18-615
Wattenburg
Weld Colorado
USA
CA-XX-0902500204

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
824.00	0.98	218.94	823.96	5.47 S	4.42 W	4.65	0.12
919.00	1.04	233.63	918.95	6.62 S	5.63 W	5.90	0.28
1014.00	1.14	250.00	1013.93	7.45 S	7.22 W	7.52	0.34
1107.00	1.09	268.58	1106.91	7.79 S	8.97 W	9.29	0.39
1200.00	0.78	274.00	1199.90	7.77 S	10.48 W	10.80	0.34
1293.00	1.15	272.63	1292.89	7.68 S	12.04 W	12.36	0.40
1385.00	1.13	276.63	1384.87	7.54 S	13.87 W	14.17	0.09
1478.00	1.09	275.01	1477.85	7.35 S	15.67 W	15.96	0.05
1572.00	1.26	287.34	1571.83	6.97 S	17.54 W	17.82	0.32
1662.00	0.96	276.49	1661.81	6.59 S	19.24 W	19.50	0.40
1755.00	1.13	304.57	1754.80	5.98 S	20.77 W	21.00	0.57
1849.00	0.86	306.05	1848.78	5.04 S	22.10 W	22.29	0.29
1942.00	1.01	293.73	1941.77	4.30 S	23.41 W	23.57	0.27
2034.00	1.95	201.61	2033.75	5.43 S	24.73 W	24.94	2.42
2126.00	5.46	166.94	2125.55	11.15 S	24.32 W	24.76	4.36
2219.00	7.85	162.28	2217.92	21.51 S	21.38 W	22.27	2.63
2312.00	7.74	156.91	2310.06	33.32 S	16.99 W	18.37	0.79
2405.00	8.97	158.44	2402.07	45.83 S	11.87 W	13.78	1.34
2497.00	9.07	152.54	2492.94	58.93 S	5.89 W	8.35	1.01
2589.00	8.71	151.22	2583.83	71.47 S	0.80 E	2.19	0.45
2682.00	8.54	148.42	2675.78	83.52 S	7.81 E	-4.30	0.49
2775.00	8.71	145.85	2767.73	95.23 S	15.38 E	-11.37	0.45
2869.00	9.07	155.28	2860.60	107.85 S	22.47 E	-17.93	1.59
2964.00	9.01	153.18	2954.42	121.29 S	28.96 E	-23.85	0.35
3058.00	8.72	149.27	3047.30	133.99 S	35.92 E	-30.28	0.71
3153.00	8.43	155.96	3141.24	146.54 S	42.44 E	-36.26	1.09
3248.00	8.56	152.15	3235.20	159.14 S	48.57 E	-41.87	0.61
3342.00	7.34	163.26	3328.30	171.08 S	53.57 E	-46.36	2.08
3437.00	7.32	157.87	3422.53	182.50 S	57.60 E	-49.91	0.72
3531.00	7.18	157.75	3515.78	193.48 S	62.08 E	-53.92	0.15
3626.00	8.19	157.95	3609.92	205.25 S	66.87 E	-58.22	1.07
3721.00	8.24	157.42	3703.95	217.81 S	72.02 E	-62.84	0.09
3815.00	8.04	156.58	3797.00	230.06 S	77.22 E	-67.52	0.24
3910.00	7.83	156.38	3891.09	242.09 S	82.46 E	-72.25	0.23
4004.00	7.13	157.51	3984.29	253.35 S	87.25 E	-76.57	0.76
4099.00	4.89	157.63	4078.76	262.53 S	91.05 E	-79.97	2.36
4194.00	3.00	152.71	4173.53	268.49 S	93.73 E	-82.40	2.01
4288.00	2.85	106.68	4267.42	271.34 S	97.10 E	-85.65	2.44
4383.00	2.53	76.67	4362.32	271.54 S	101.40 E	-89.94	1.50
4478.00	2.71	26.86	4457.23	269.05 S	104.46 E	-93.10	2.33
4572.00	0.78	300.41	4551.20	266.74 S	104.90 E	-93.64	2.95
4667.00	0.97	251.42	4646.19	266.67 S	103.58 E	-92.33	0.78
4762.00	1.05	251.62	4741.17	267.20 S	102.00 E	-90.72	0.09
4857.00	1.16	255.52	4836.15	267.71 S	100.25 E	-88.95	0.14
4951.00	1.14	248.03	4930.13	268.30 S	98.46 E	-87.14	0.16
5046.00	1.21	248.44	5025.11	269.02 S	96.65 E	-85.30	0.07
5235.00	1.57	252.96	5214.06	270.51 S	92.33 E	-80.92	0.20
5330.00	0.69	153.70	5309.05	271.41 S	91.34 E	-79.89	1.91
5425.00	0.59	193.79	5404.04	272.41 S	91.47 E	-79.99	0.48
5519.00	0.55	200.58	5498.04	273.31 S	91.20 E	-79.67	0.08
5614.00	1.05	199.90	5593.03	274.56 S	90.74 E	-79.16	0.53
5708.00	1.27	217.50	5687.01	276.19 S	89.81 E	-78.17	0.44
5803.00	1.73	217.12	5781.97	278.17 S	88.31 E	-76.58	0.49

5898.00	2.12	214.60	5876.92	280.76 S	86.44 E	-74.61	0.42
5992.00	5.93	266.89	5970.69	282.46 S	80.60 E	-68.70	5.24
6087.00	18.12	277.61	6063.44	280.77 S	60.98 E	-49.17	12.99
6181.00	23.29	275.61	6151.34	277.01 S	27.97 E	-16.35	5.55
6276.00	30.20	267.40	6236.15	276.26 S	14.65 W	26.21	8.23
6370.00	36.18	265.79	6314.79	279.38 S	65.99 W	77.63	6.42
6465.00	44.06	266.89	6387.38	283.23 S	127.03 W	138.78	8.34
6559.00	50.84	271.19	6450.92	284.25 S	196.21 W	207.94	7.96
6654.00	63.73	271.47	6502.15	282.38 S	275.95 W	287.53	13.57
6748.00	74.85	271.26	6535.34	280.29 S	363.71 W	375.13	11.83
6843.00	81.84	269.17	6554.52	279.96 S	456.69 W	468.01	7.67
6890.00	83.15	266.73	6560.66	281.63 S	503.25 W	514.60	5.84
7068.00	86.18	269.87	6577.21	286.87 S	680.36 W	691.78	2.45
7163.00	88.61	269.73	6581.53	287.20 S	775.25 W	786.60	2.56
7258.00	87.94	268.49	6584.39	288.68 S	870.20 W	881.52	1.48
7353.00	88.52	270.00	6587.33	289.93 S	965.14 W	976.44	1.70
7447.00	89.60	269.94	6588.87	289.98 S	1059.13 W	1070.34	1.15
7541.00	89.63	270.37	6589.50	289.72 S	1153.12 W	1164.25	0.46
7636.00	89.08	269.45	6590.57	289.87 S	1248.12 W	1259.16	1.13
7731.00	89.04	270.38	6592.13	290.01 S	1343.10 W	1354.07	0.98
7825.00	90.52	270.01	6592.49	289.69 S	1437.10 W	1447.97	1.62
7920.00	90.83	269.56	6591.37	290.05 S	1532.09 W	1542.89	0.58
8015.00	91.20	269.18	6589.69	291.09 S	1627.07 W	1637.83	0.56
8110.00	88.92	269.39	6589.59	292.28 S	1722.06 W	1732.79	2.41
8204.00	88.55	269.40	6591.66	293.27 S	1816.03 W	1826.72	0.39
8299.00	90.09	268.33	6592.79	295.15 S	1911.00 W	1921.68	1.97
8394.00	89.66	268.12	6593.00	298.10 S	2005.95 W	2016.68	0.50
8488.00	88.98	266.98	6594.11	302.11 S	2099.86 W	2110.67	1.41
8583.00	90.34	267.37	6594.68	306.80 S	2194.74 W	2205.66	1.49
8677.00	89.57	266.63	6594.75	311.72 S	2288.61 W	2299.65	1.14
8772.00	89.72	268.30	6595.34	315.92 S	2383.51 W	2394.65	1.76
8866.00	89.69	270.84	6595.82	316.62 S	2477.50 W	2488.58	2.70
8961.00	91.48	270.90	6594.85	315.18 S	2572.48 W	2583.42	1.89
9056.00	89.63	270.69	6593.93	313.86 S	2667.46 W	2678.26	1.96
9150.00	88.68	269.98	6595.32	313.31 S	2761.45 W	2772.15	1.26
9245.00	90.34	271.88	6596.13	311.77 S	2856.42 W	2866.97	2.66
9339.00	90.25	271.12	6595.65	309.31 S	2950.39 W	2960.75	0.81
9434.00	89.82	270.70	6595.59	307.80 S	3045.38 W	3055.60	0.63
9529.00	89.85	271.51	6595.86	305.97 S	3140.36 W	3150.42	0.85
9623.00	89.48	271.58	6596.41	303.44 S	3234.32 W	3244.19	0.40
9718.00	90.18	271.34	6596.69	301.02 S	3329.29 W	3338.98	0.78
9813.00	89.97	270.83	6596.57	299.22 S	3424.27 W	3433.80	0.58
9908.00	89.41	271.08	6597.08	297.63 S	3519.26 W	3528.63	0.65
10002.00	90.43	270.03	6597.22	296.72 S	3613.25 W	3622.51	1.56
10097.00	90.34	269.88	6596.58	296.80 S	3708.25 W	3717.42	0.18
10192.00	89.88	269.40	6596.40	297.39 S	3803.25 W	3812.36	0.70
10287.00	88.98	269.27	6597.34	298.50 S	3898.23 W	3907.31	0.96
10381.00	89.69	268.62	6598.43	300.23 S	3992.21 W	4001.28	1.02
10474.00	90.80	268.34	6598.03	302.69 S	4085.18 W	4094.27	1.23
10567.00	90.37	268.19	6597.08	305.51 S	4178.13 W	4187.26	0.49
10660.00	90.71	268.43	6596.21	308.25 S	4271.08 W	4280.24	0.45
10752.00	90.34	267.77	6595.36	311.30 S	4363.03 W	4372.24	0.82
10846.00	89.41	267.48	6595.57	315.20 S	4456.95 W	4466.24	1.04
10939.00	88.83	267.29	6597.00	319.44 S	4549.84 W	4559.22	0.66
11029.00	89.94	267.32	6597.96	323.67 S	4639.73 W	4649.22	1.23
11122.00	89.45	267.31	6598.46	328.03 S	4732.63 W	4742.21	0.53
11216.00	91.32	268.21	6597.83	331.70 S	4826.55 W	4836.21	2.21
11309.00	90.92	268.18	6596.01	334.63 S	4919.48 W	4929.18	0.43
11402.00	90.18	267.31	6595.12	338.29 S	5012.41 W	5022.18	1.23
11493.00	89.48	266.61	6595.39	343.12 S	5103.28 W	5113.17	1.09
11586.00	90.03	269.46	6595.79	346.31 S	5196.21 W	5206.16	3.12
11680.00	90.06	269.32	6595.71	347.31 S	5290.21 W	5300.11	0.15
11772.00	89.26	268.98	6596.26	348.67 S	5382.19 W	5392.07	0.94
11864.00	88.80	268.46	6597.81	350.73 S	5474.16 W	5484.04	0.75
11956.00	90.06	269.69	6598.73	352.21 S	5566.14 W	5576.00	1.91
12050.00	88.89	268.87	6599.59	353.39 S	5660.12 W	5669.96	1.52
12143.00	89.72	268.25	6600.72	355.73 S	5753.09 W	5762.94	1.11
12236.00	90.89	269.36	6600.22	357.67 S	5846.06 W	5855.91	1.73
12330.00	90.80	269.60	6598.84	358.52 S	5940.05 W	5949.85	0.27
12425.00	89.88	269.19	6598.27	359.53 S	6035.04 W	6044.80	1.06
12520.00	89.05	268.96	6599.16	361.06 S	6130.02 W	6139.76	0.91
12614.00	89.54	270.37	6600.32	361.61 S	6224.01 W	6233.69	1.59
12709.00	90.80	269.55	6600.04	361.67 S	6319.01 W	6328.61	1.58
12804.00	90.65	269.81	6598.83	362.21 S	6414.00 W	6423.54	0.32

12898.00	90.86	269.64	6597.60	362.66 S	6507.99 W	6517.47	0.29
12993.00	90.59	269.71	6596.39	363.20 S	6602.98 W	6612.40	0.29
13087.00	89.97	268.84	6595.93	364.38 S	6696.97 W	6706.35	1.14
13182.00	88.89	268.16	6596.88	366.87 S	6791.93 W	6801.33	1.34
13277.00	89.91	268.96	6597.87	369.26 S	6886.89 W	6896.31	1.36
13372.00	89.57	269.77	6598.31	370.31 S	6981.88 W	6991.27	0.92
13466.00	90.37	270.52	6598.35	370.07 S	7075.88 W	7085.17	1.17
13561.00	89.51	270.37	6598.45	369.34 S	7170.88 W	7180.05	0.92
13656.00	88.71	270.70	6599.93	368.45 S	7265.86 W	7274.92	0.91
13750.00	88.98	269.17	6601.82	368.56 S	7359.84 W	7368.82	1.65
13845.00	89.26	268.93	6603.28	370.13 S	7454.82 W	7463.78	0.39
13940.00	90.15	268.08	6603.77	372.61 S	7549.78 W	7558.76	1.30
14034.00	91.97	268.62	6602.03	375.32 S	7643.72 W	7652.73	2.02
14129.00	91.45	268.22	6599.20	377.93 S	7738.64 W	7747.68	0.69
14224.00	91.54	268.12	6596.72	380.97 S	7833.56 W	7842.64	0.14
14318.00	90.62	269.88	6594.95	382.61 S	7927.53 W	7936.59	2.11
14413.00	90.80	269.41	6593.77	383.20 S	8022.52 W	8031.53	0.53
14508.00	90.12	270.67	6593.01	383.13 S	8117.51 W	8126.43	1.51
14602.00	90.06	270.40	6592.86	382.25 S	8211.51 W	8220.31	0.29
14697.00	90.92	271.29	6592.05	380.85 S	8306.49 W	8315.15	1.30
14791.00	87.35	268.87	6593.47	380.72 S	8400.46 W	8409.03	4.59
14886.00	88.00	268.69	6597.32	382.74 S	8495.36 W	8503.93	0.71
14981.00	87.72	268.50	6600.87	385.07 S	8590.26 W	8598.85	0.36
15075.00	88.58	268.49	6603.90	387.53 S	8684.18 W	8692.79	0.91
15170.00	88.34	268.67	6606.46	389.89 S	8779.12 W	8787.74	0.32
15264.00	88.49	268.40	6609.06	392.29 S	8873.05 W	8881.69	0.33
15359.00	89.51	268.34	6610.71	394.99 S	8968.00 W	8976.67	1.08
15453.00	90.09	268.42	6611.04	397.65 S	9061.96 W	9070.66	0.62
15548.00	89.85	268.24	6611.09	400.42 S	9156.92 W	9165.65	0.32
15643.00	90.52	267.76	6610.79	403.73 S	9251.86 W	9260.65	0.87
15738.00	91.45	268.17	6609.15	407.11 S	9346.78 W	9355.63	1.07
15833.00	90.09	267.88	6607.88	410.38 S	9441.71 W	9450.62	1.46
15928.00	89.57	267.39	6608.16	414.30 S	9536.63 W	9545.62	0.75
16023.00	89.54	268.04	6608.90	418.09 S	9631.55 W	9640.61	0.68
16118.00	88.86	268.20	6610.22	421.21 S	9726.49 W	9735.60	0.74
16164.00	88.89	268.02	6611.13	422.72 S	9772.46 W	9781.59	0.40
16232.00	88.89	268.02	6612.44	425.07 S	9840.41 W	9849.57	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 267.60 DEGREES (GRID)
A TOTAL CORRECTION OF 7.58 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16232.00 FEET
IS 9849.58 FEET ALONG 267.53 DEGREES (GRID)**

Final survey is a straight line projection to TD.