



1 : 600 / 1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	05-Oct-15	09-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)	638.00	6,890.00			
Log End Depth (MD, ft)	6,890.00	16,120.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	03-Oct-15 23:15	06-Oct-15 08:30			
Drill/Wipe End Date and Time	05-Oct-15 02:00	09-Oct-15 00:15			
Min Inc (deg) @ Depth (MD, ft)	0.13 @ 738.00	87.90 @ 6,972.00			
Max Inc (deg) @ Depth (MD, ft)	86.64 @ 6,822.00	92.28 @ 12,793.00			
Bit TFA(in2) / Bit Type	1.04 / PDC	0.98 / PDC			
Flow Rate (gpm)	586.68	312.44			
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)	8.85 / 26.00	9.75 / 32.00			
Filtrate CL (ppm)	400.00	1,300.00			
pH / Fluid Loss (mptm)	11.60 / 14	9.60 / 6			
PV (cP) / YP (lbf2)	2 / 3.00	8 / 10.00			
% Solids / % Sand	3.8 / .35	6.70 / 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	125.50 / PDC	210.00 / PDC			

Max Tool Temp (degF) / Source	165.58 / PCM	242.28 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Brian Neu	Brian Neu			
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	12396737			
Insert Serial Number	11400842	11400842			
Date and Time Initialized	02-Oct-15 21:50	05-Oct-15 18:17			
Date and Time Read	05-Oct-15 07:28	09-Oct-15 16:19			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	68.00	67.00			
Software Version	6.33	6.33			
Sub Serial Number	11342302	12396737			
Sonde Serial Number	11902092	11902092			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	202.70	100.60			

Gamma Ray Sensor Information

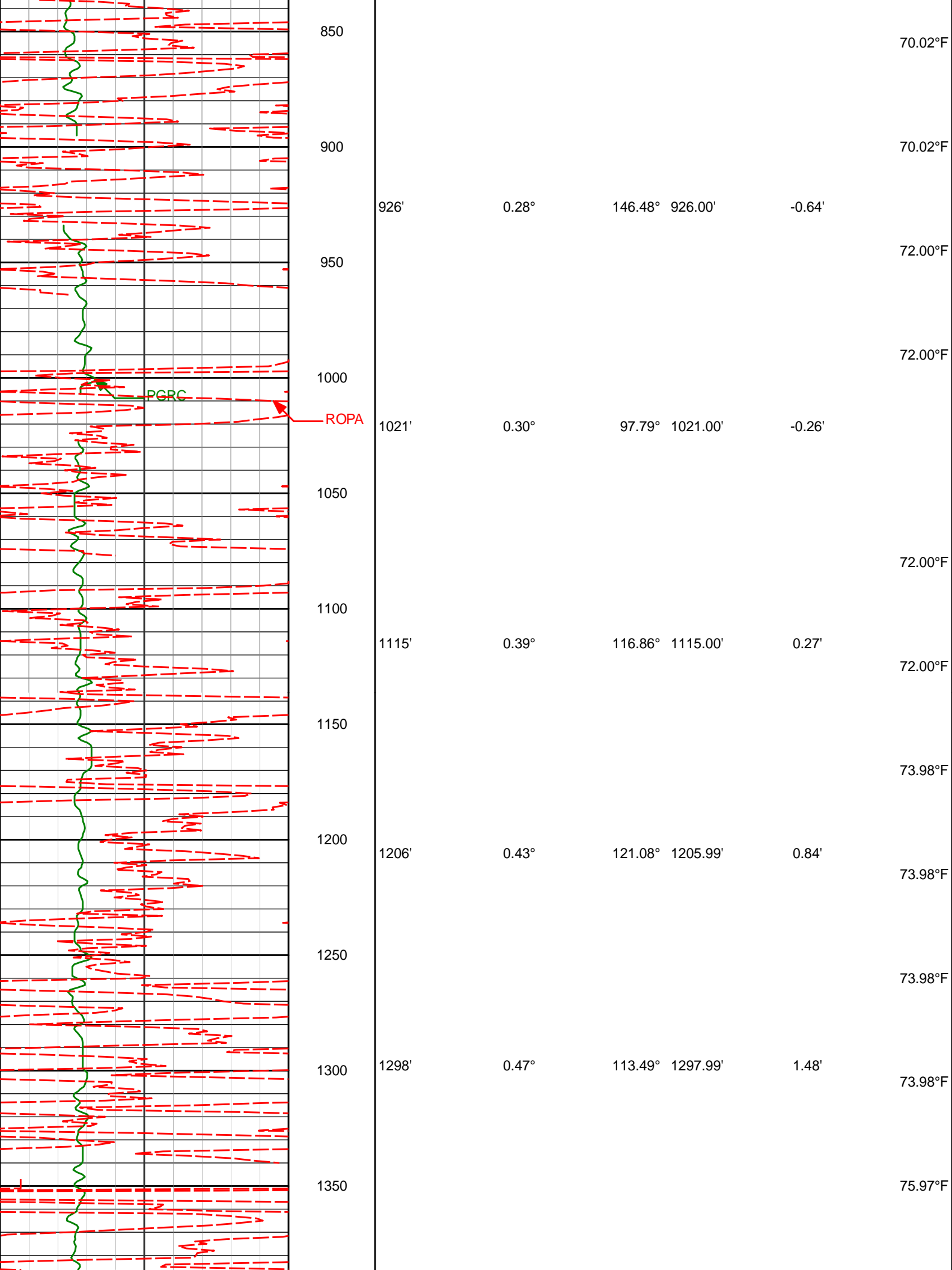
Tool Type	PCG	PCG			
Distance From Bit (ft)	61.08	60.46			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11342302	12396737			
Insert/Sonde Serial Number	11681061	11681061			

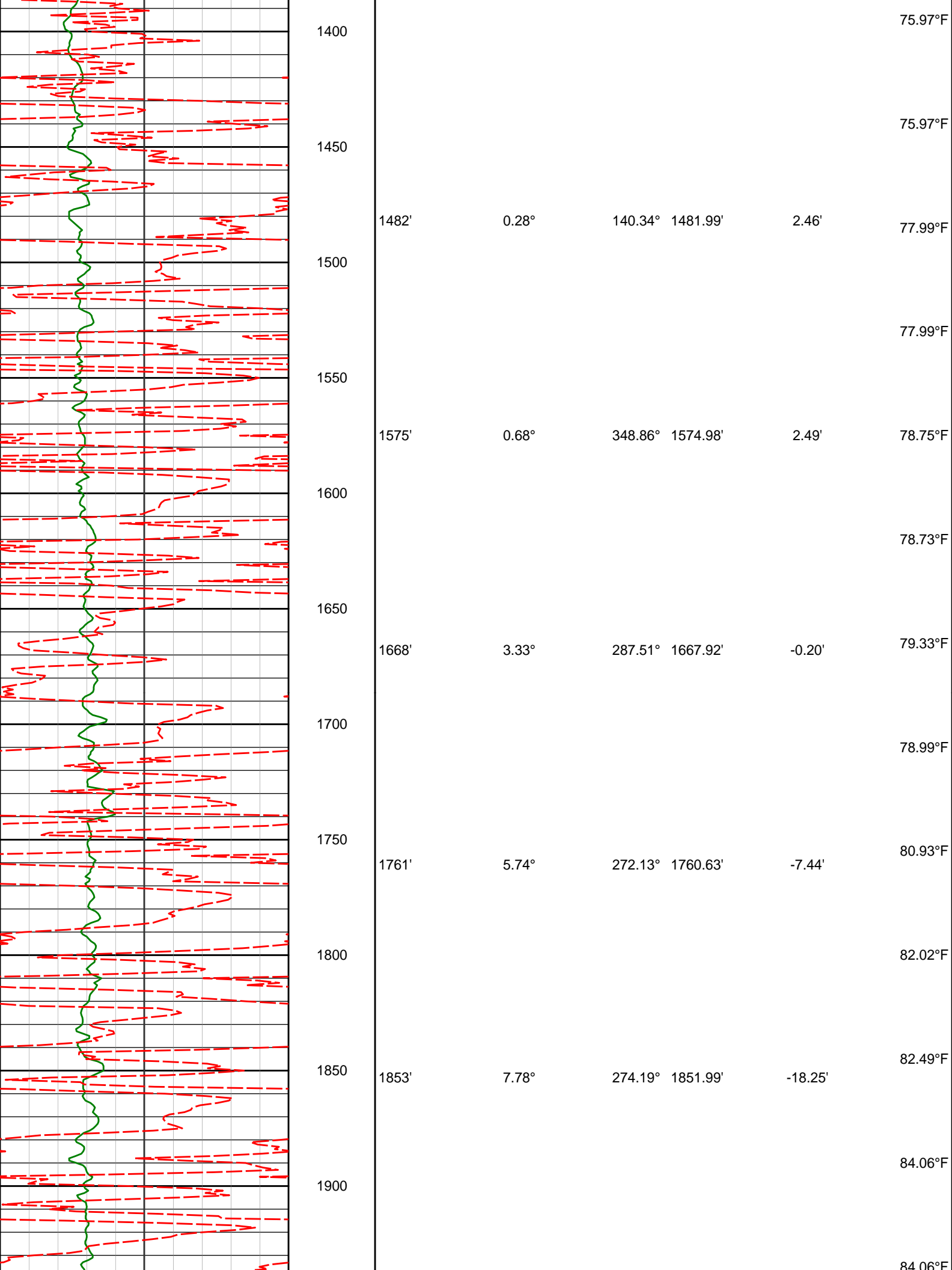
REMARKS

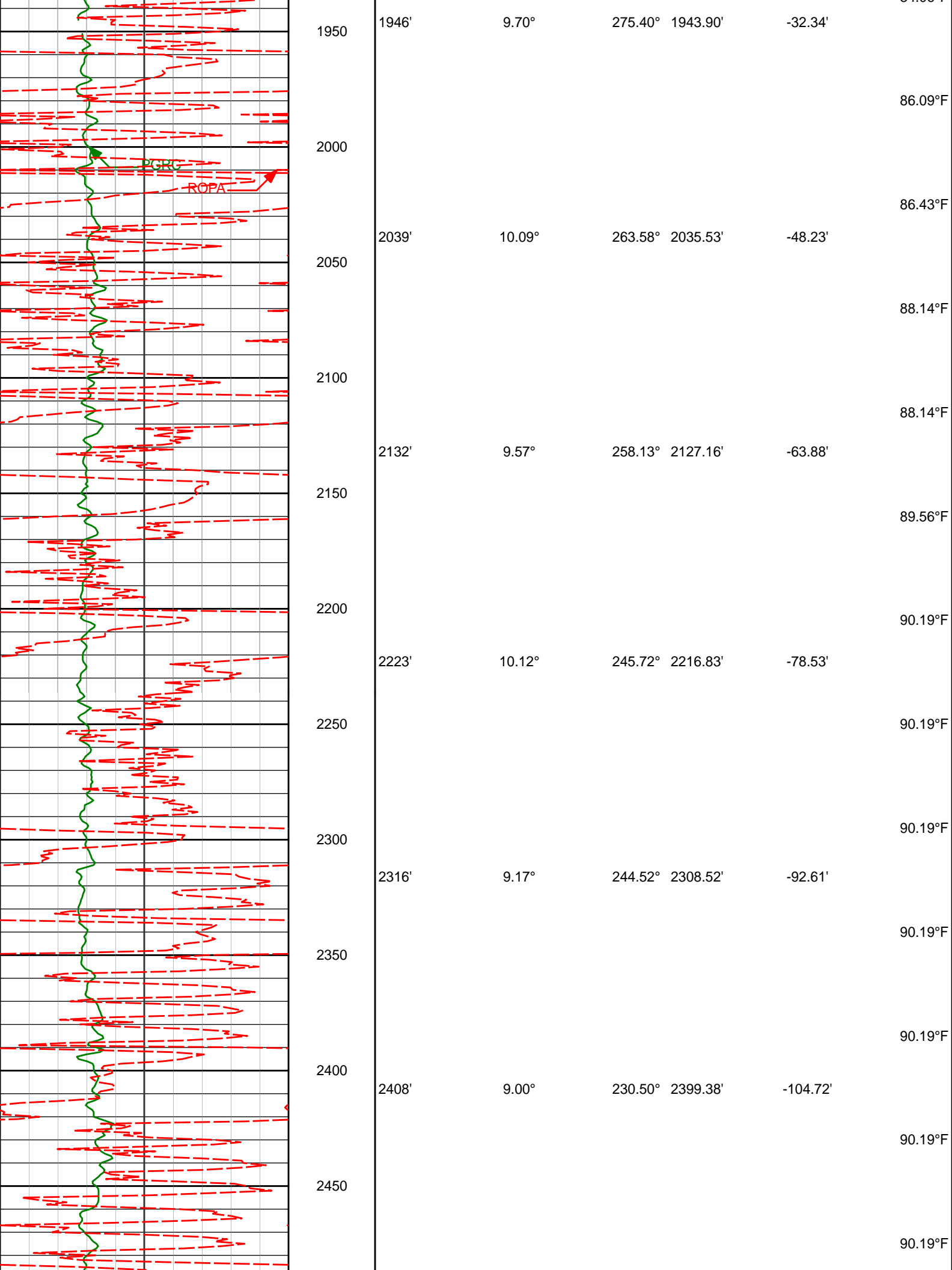
1. All depths are calibrated to driller's pipe tally and are total vertical depth from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. Environmental parameters used in gamma and resistance processing:
Hole Size: 6.125"
Mud Density: 9.9-10.3
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)

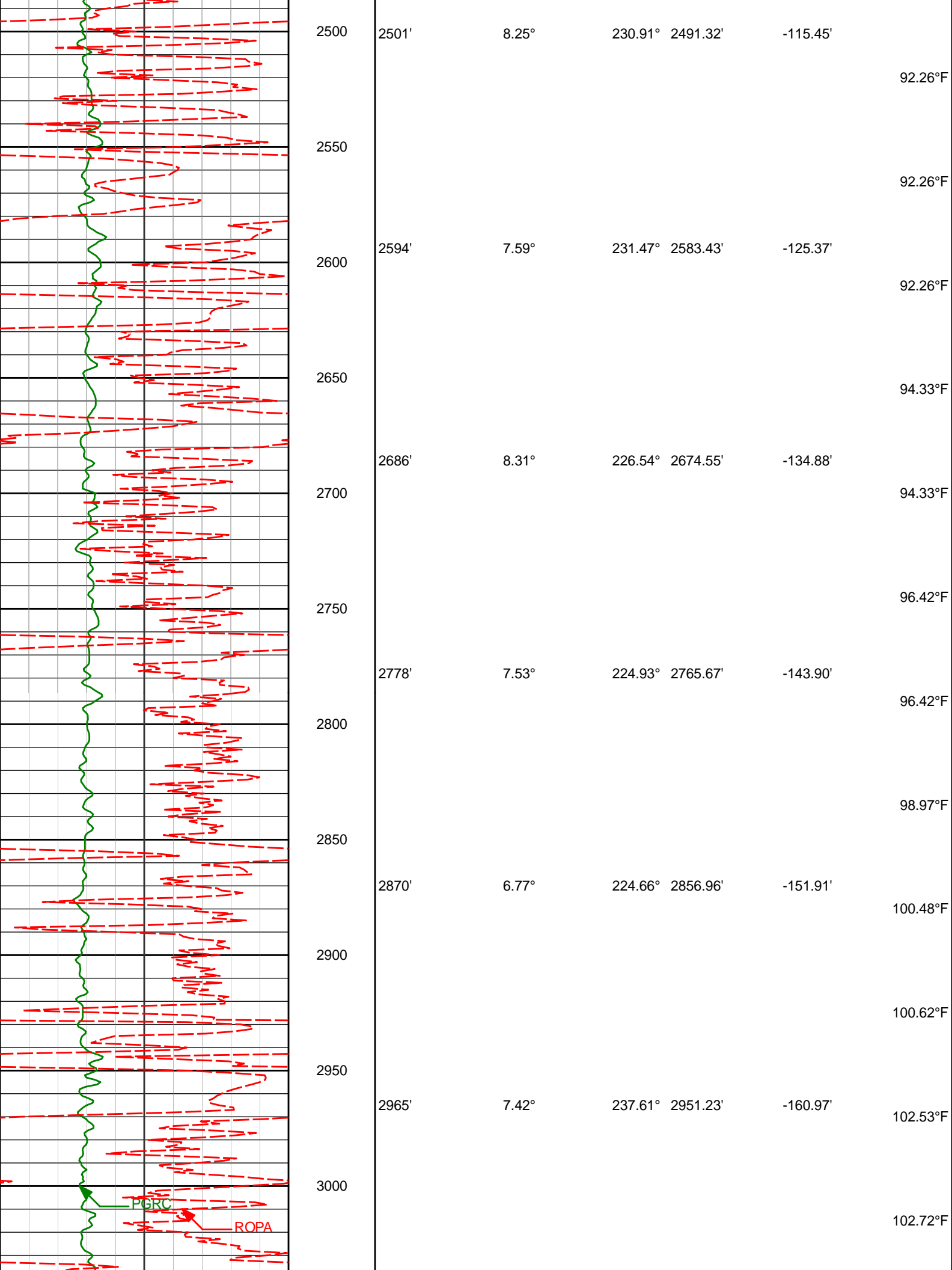
WARRANTY

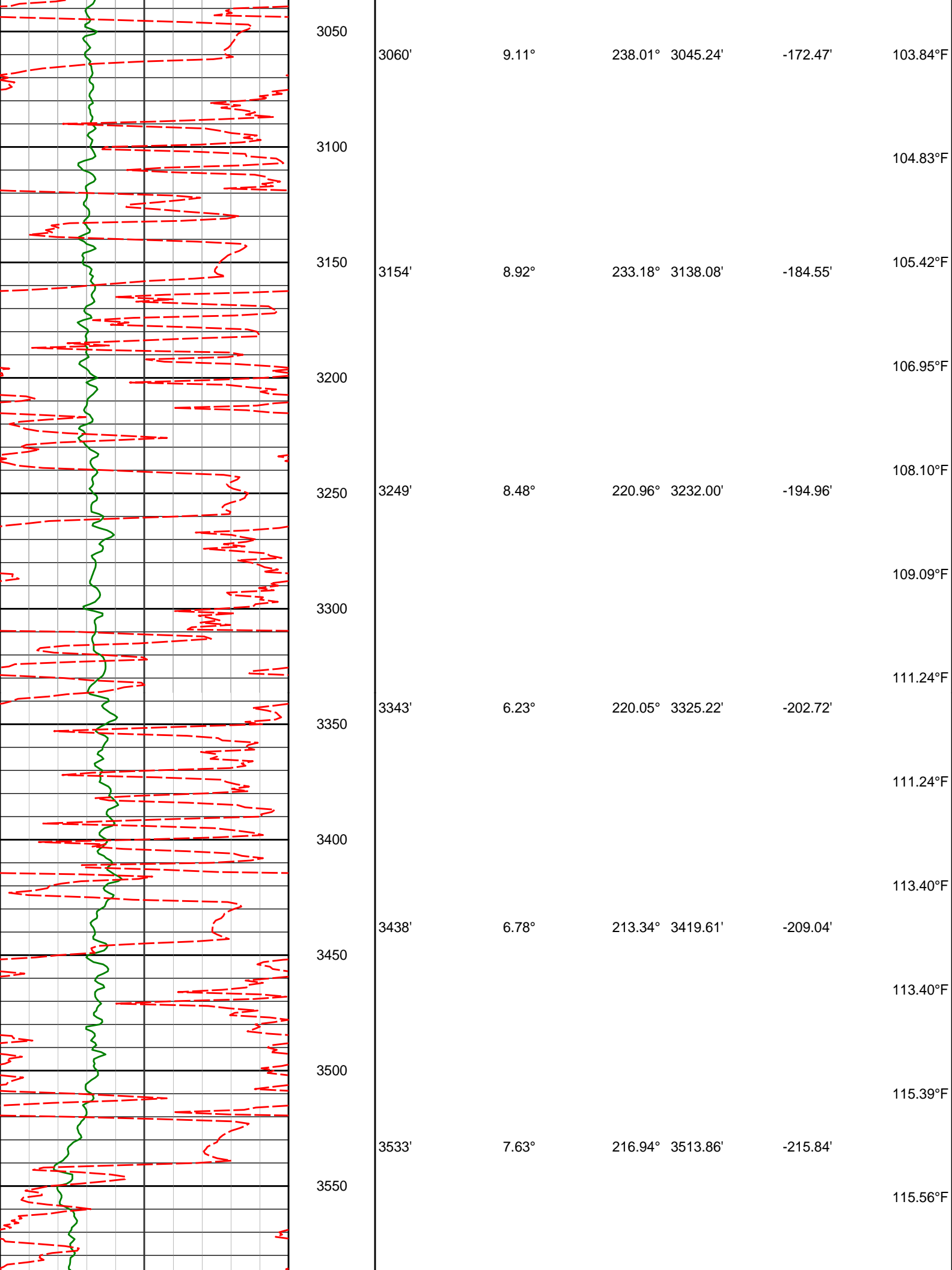
MD Detail 1:600 Scale

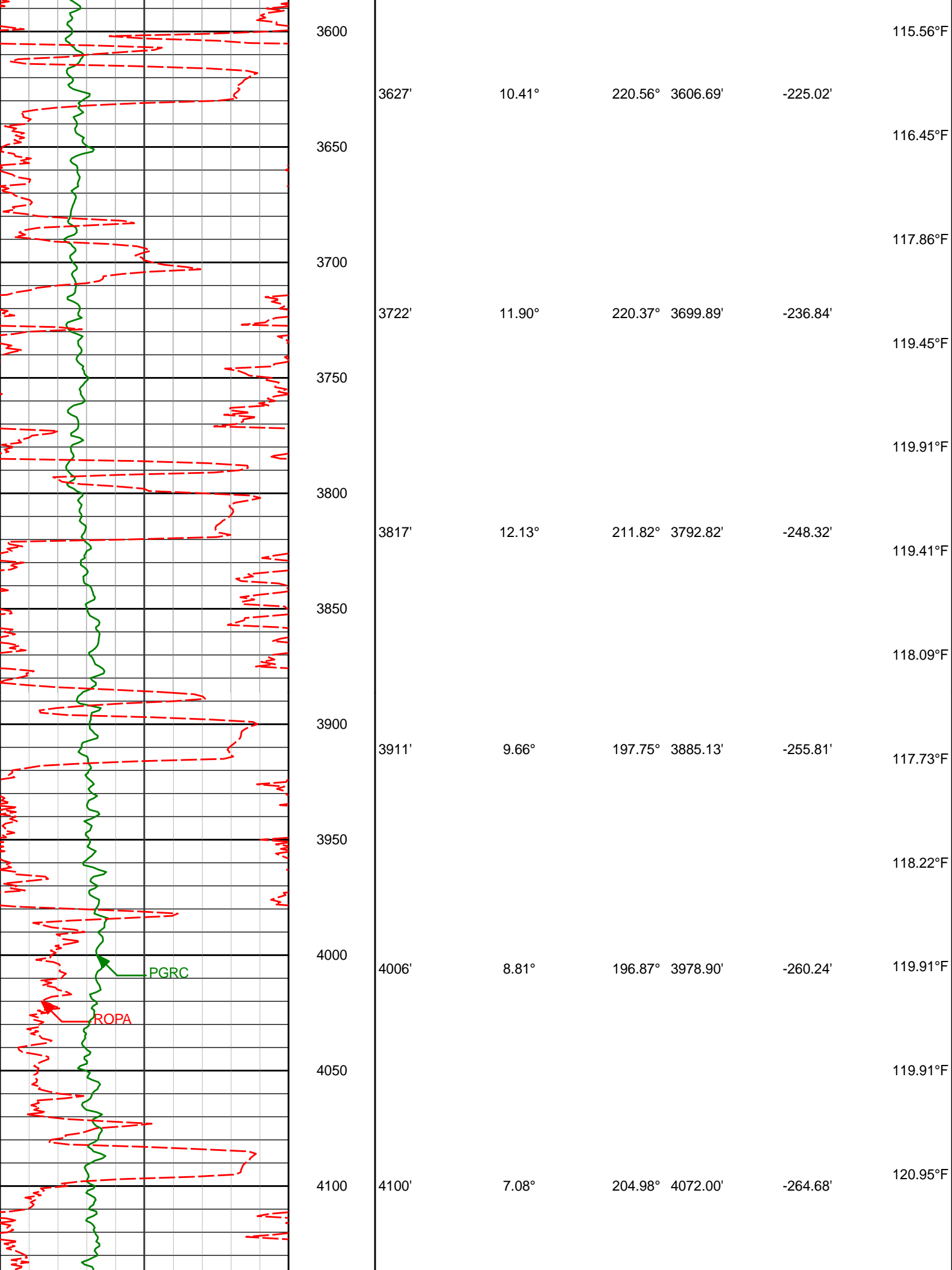


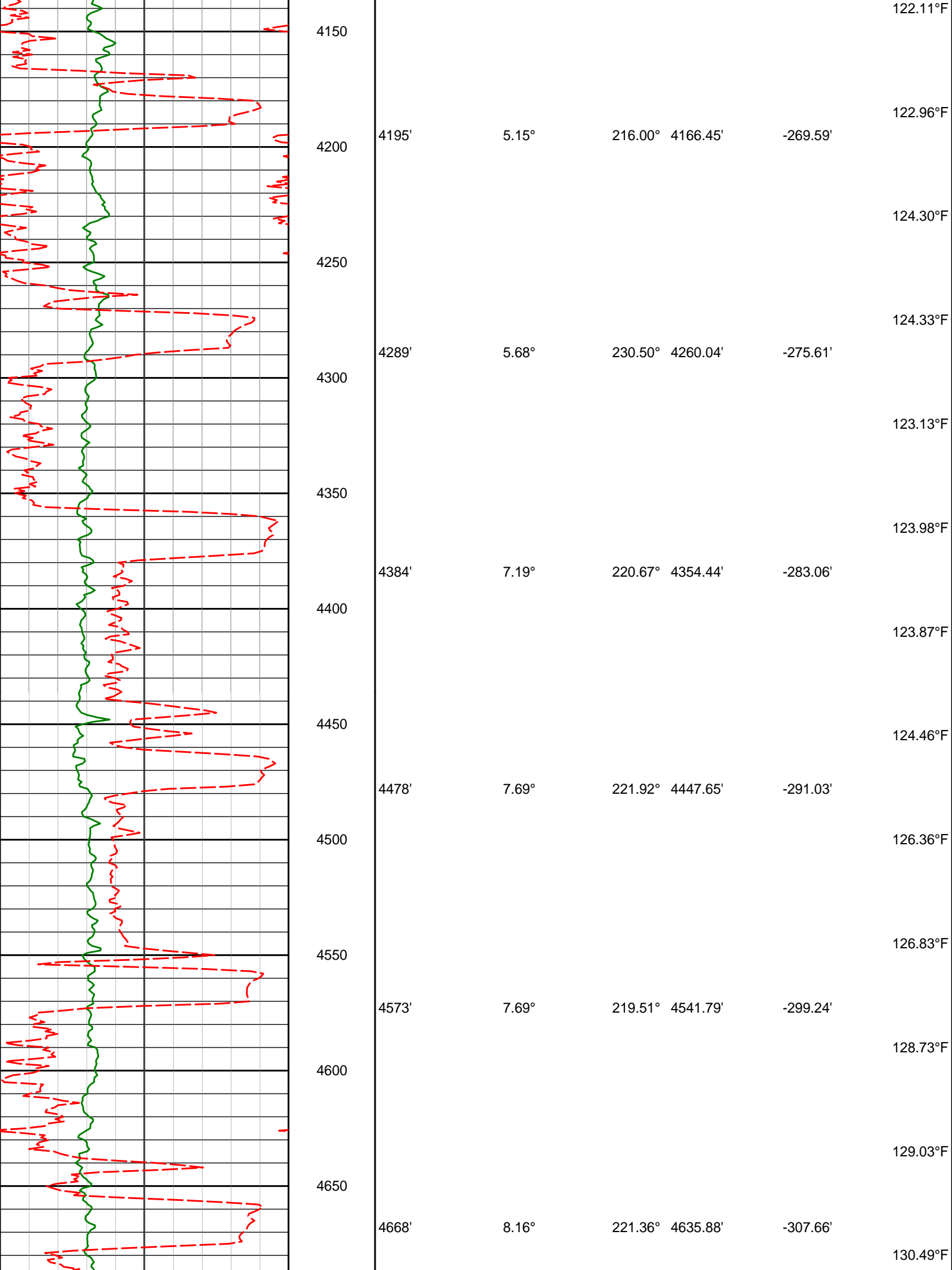


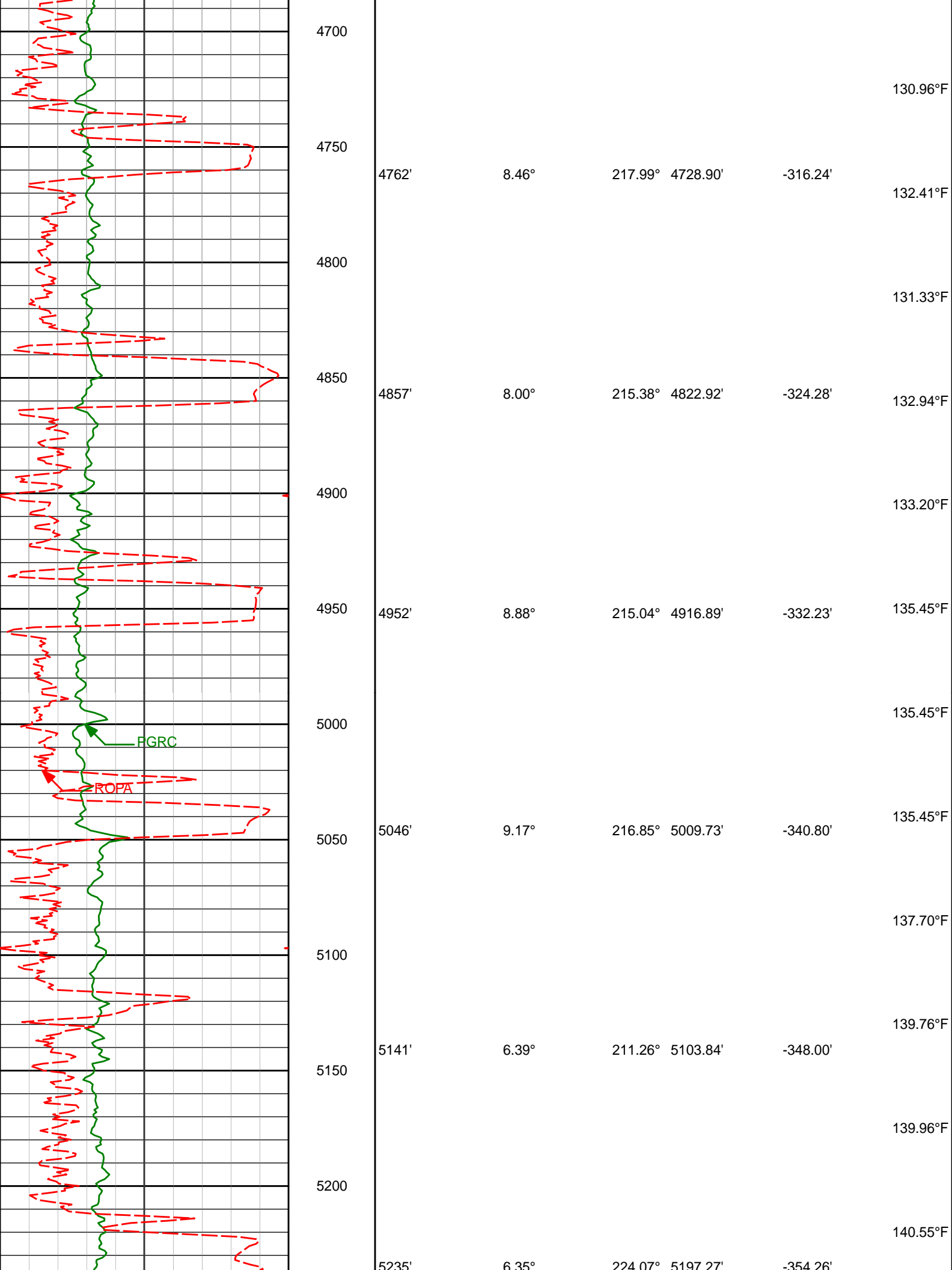


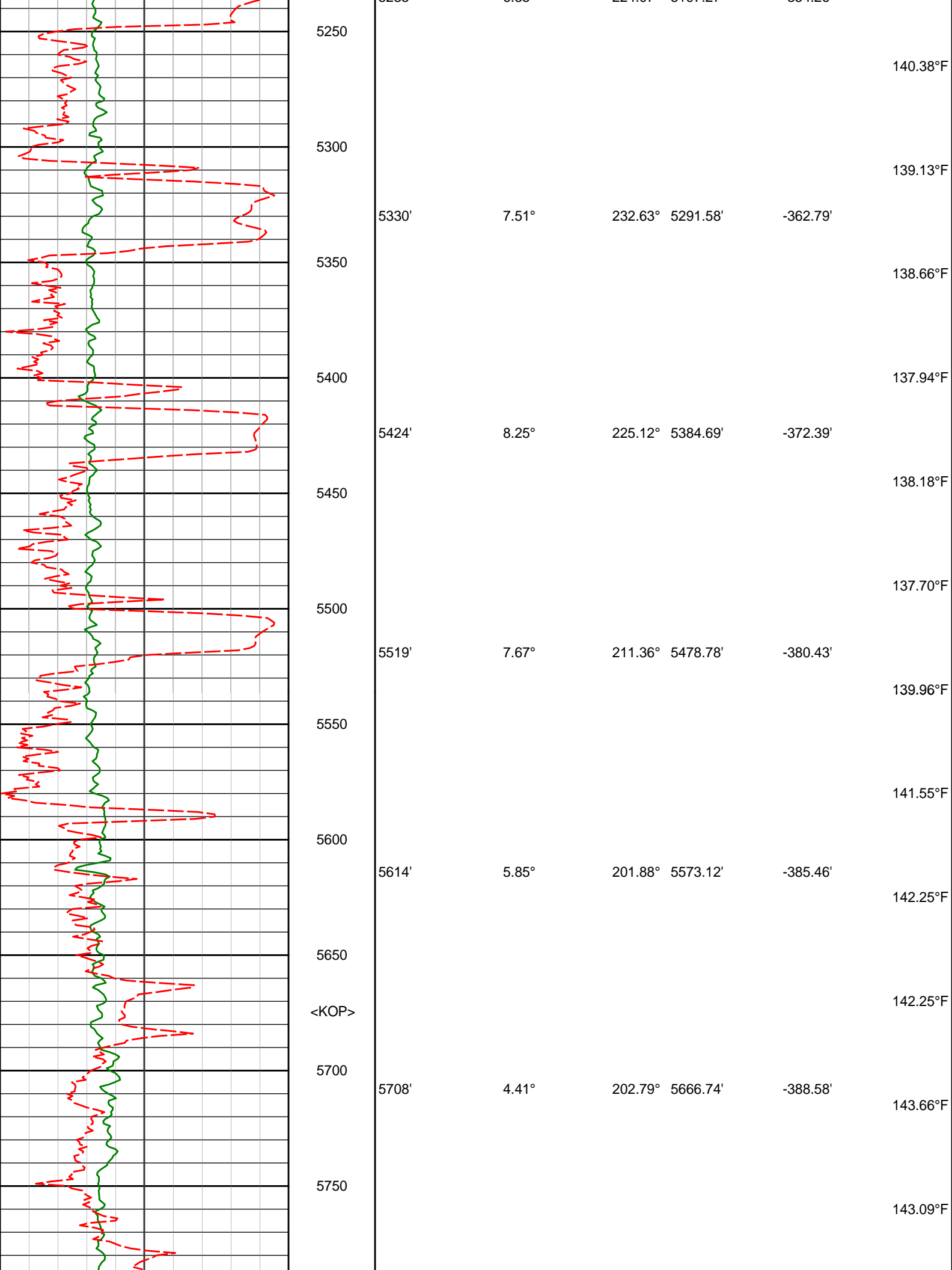


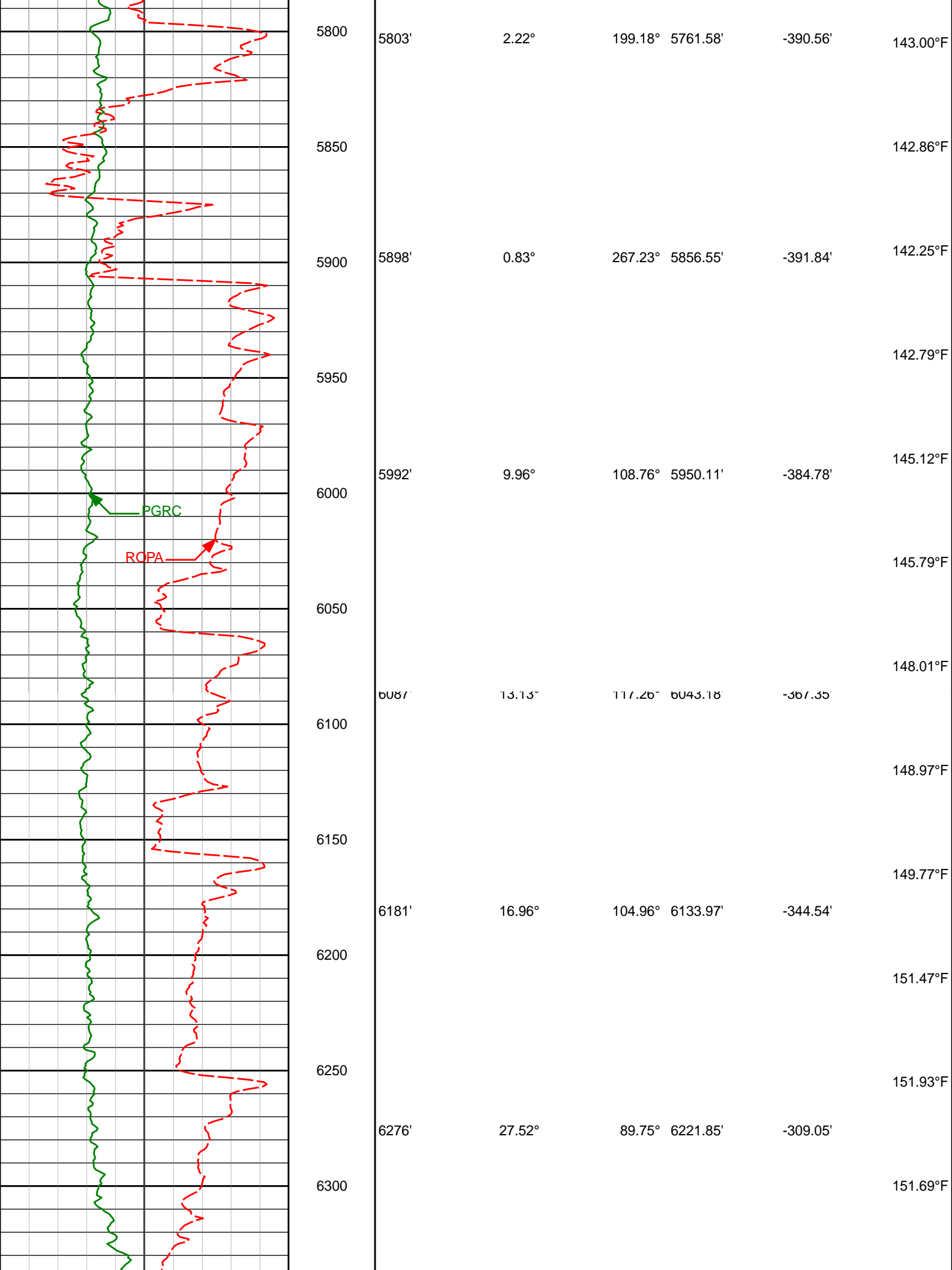


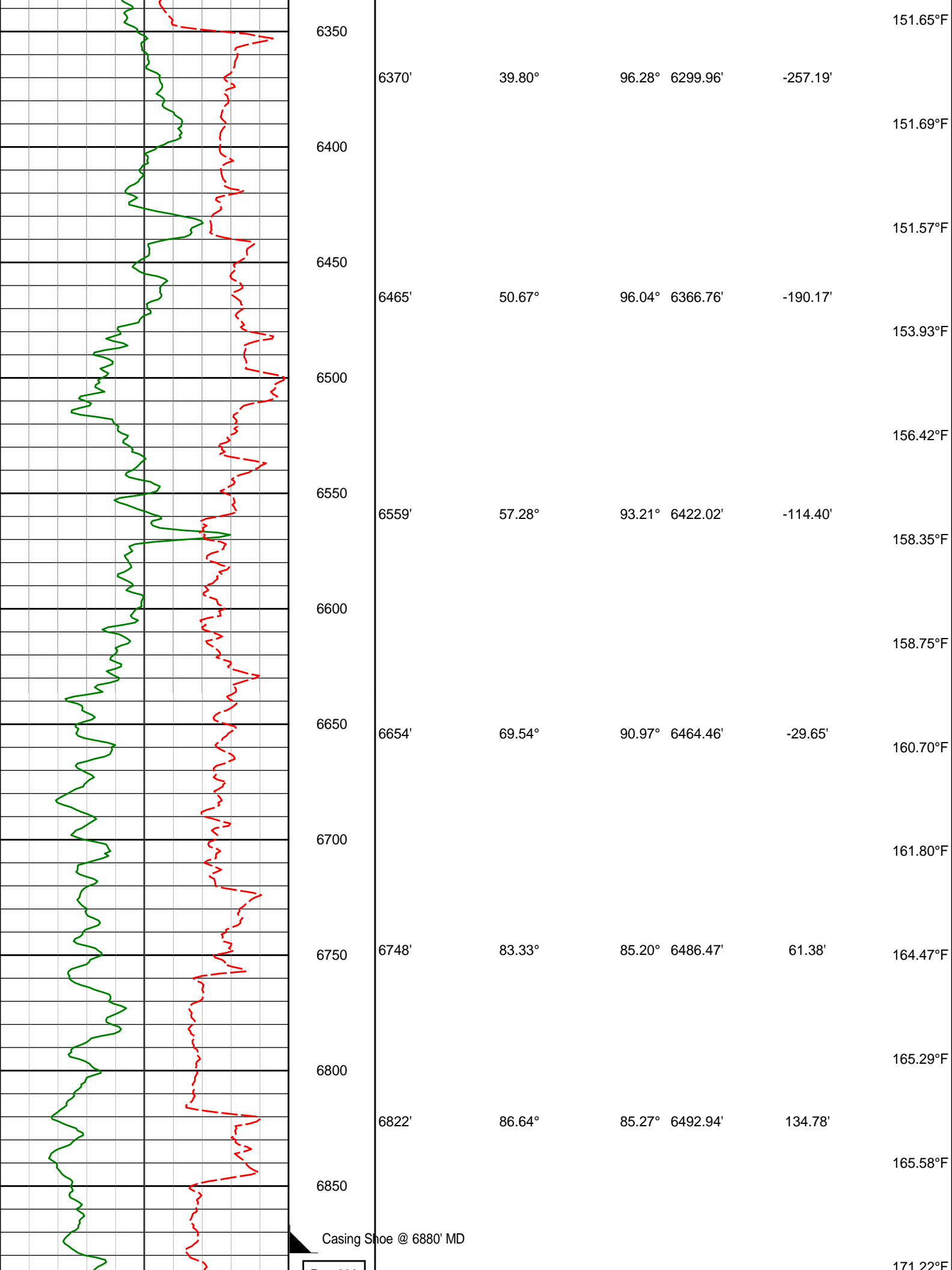


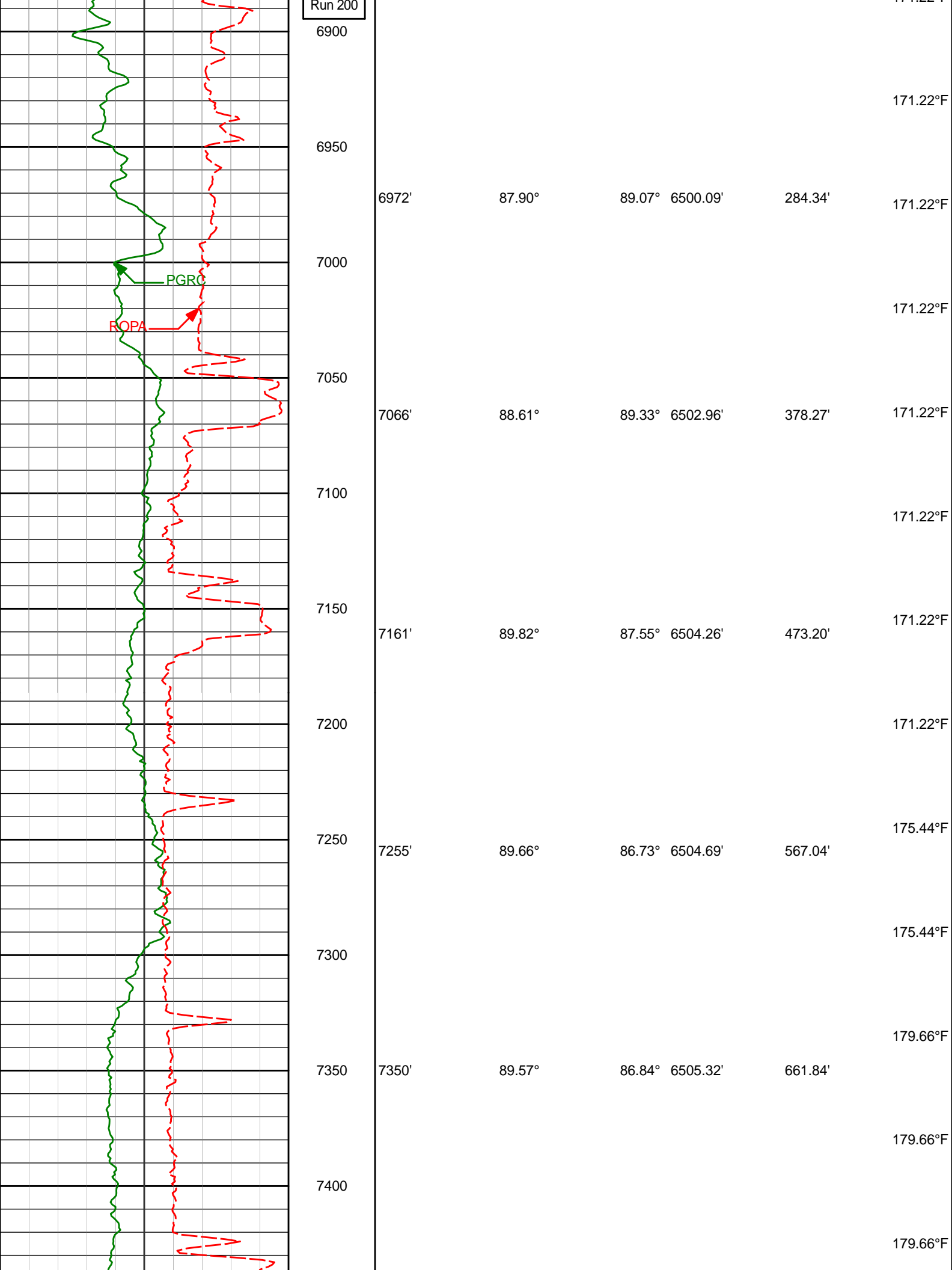


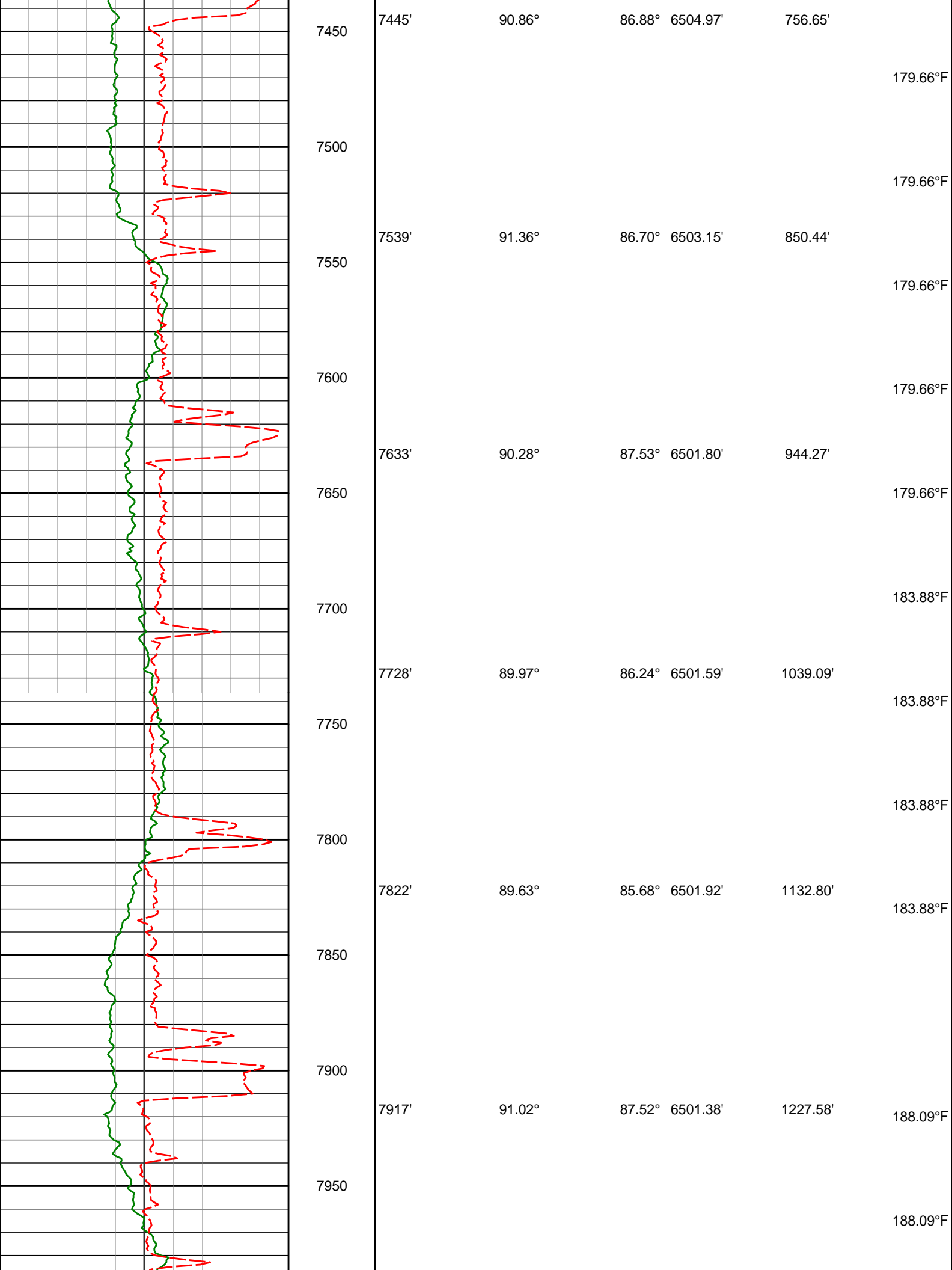


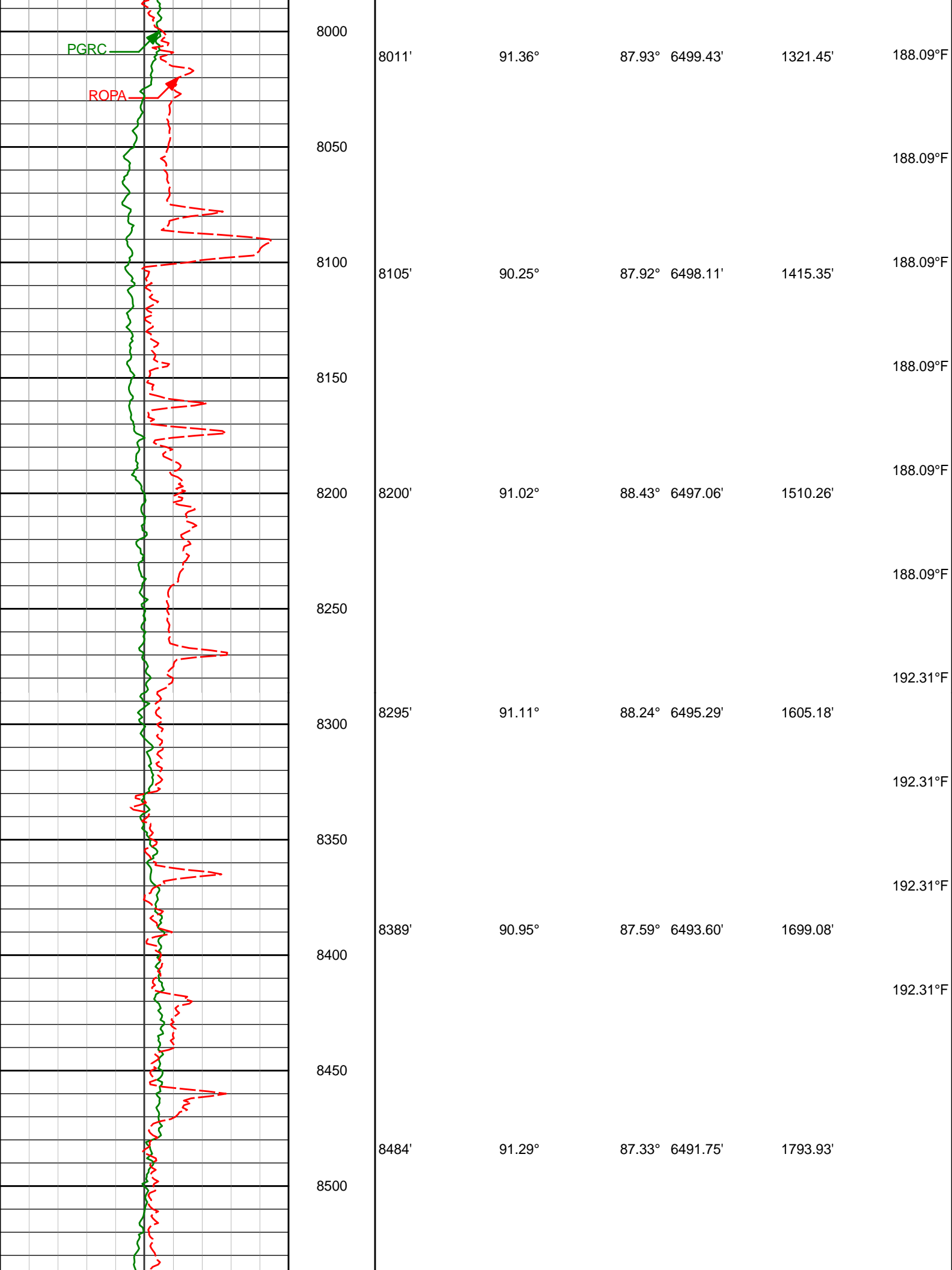


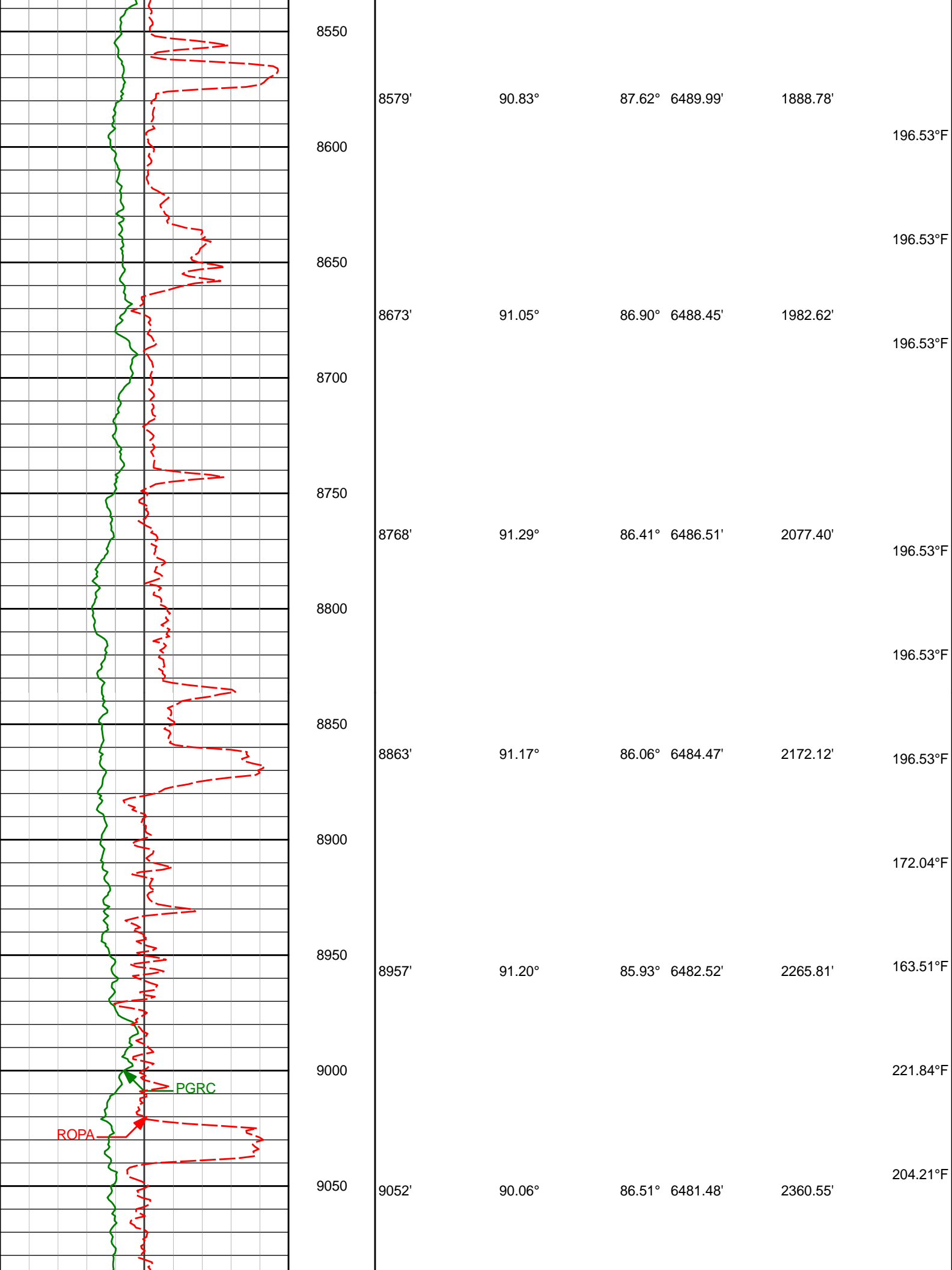


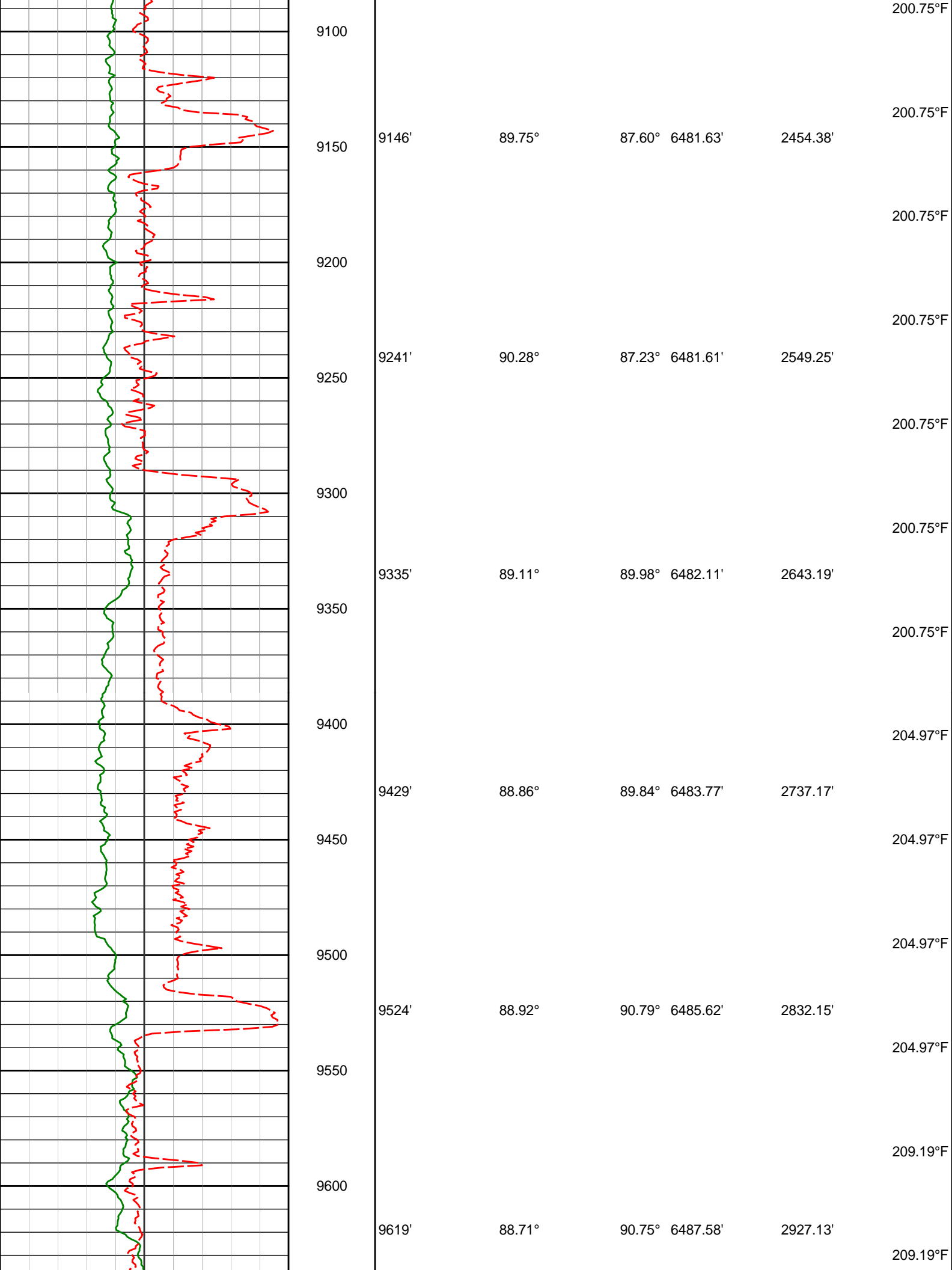


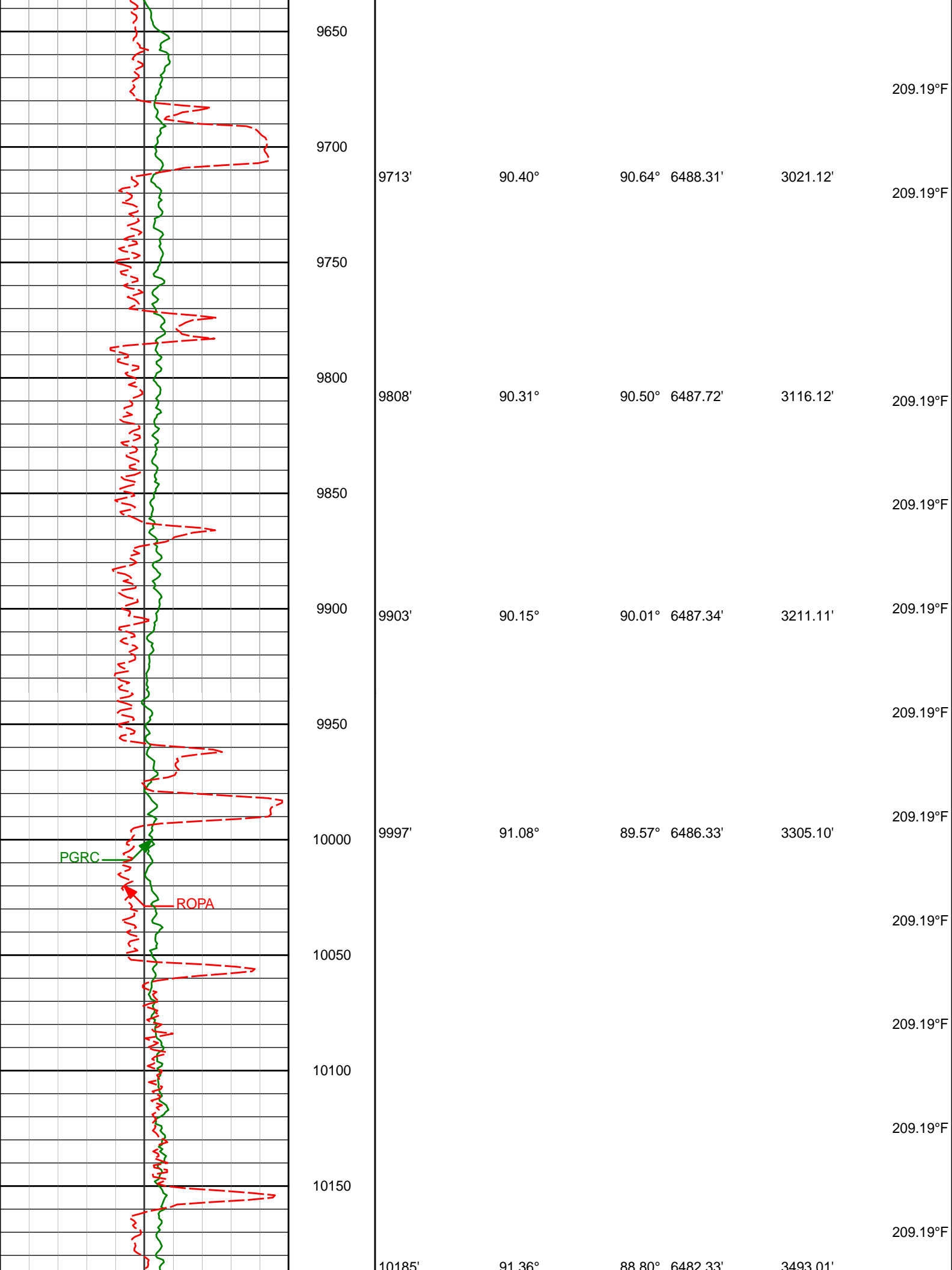


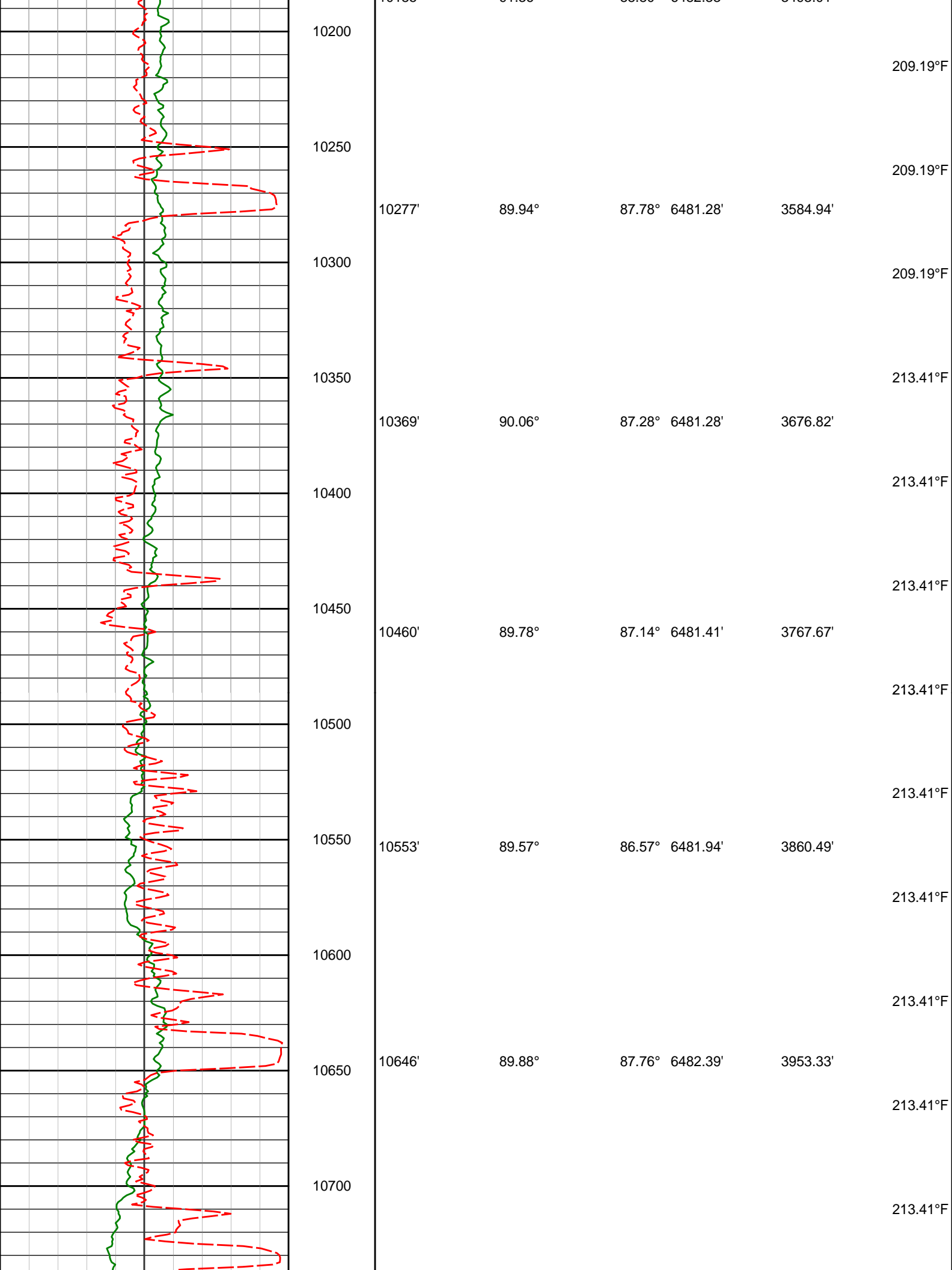


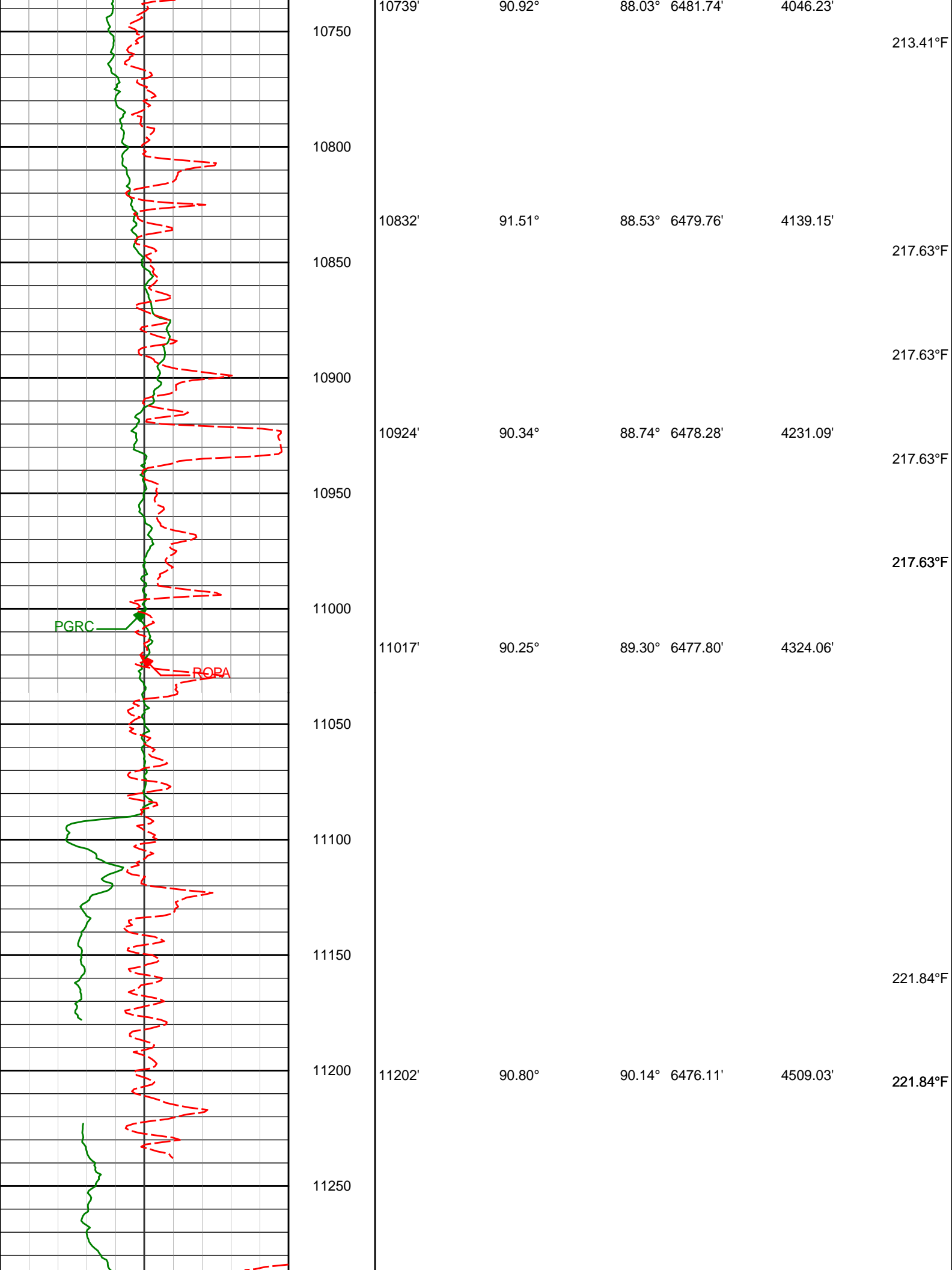


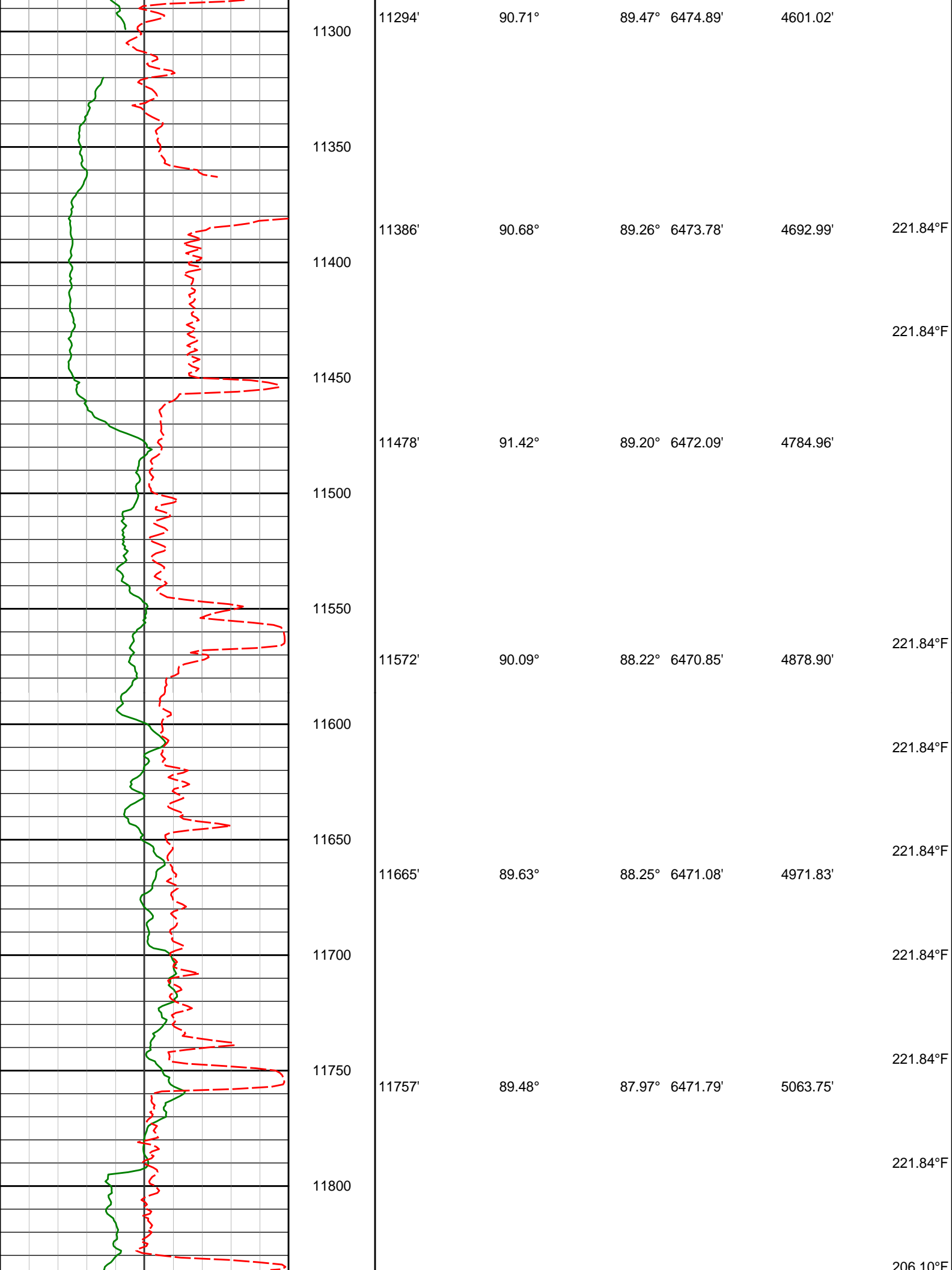


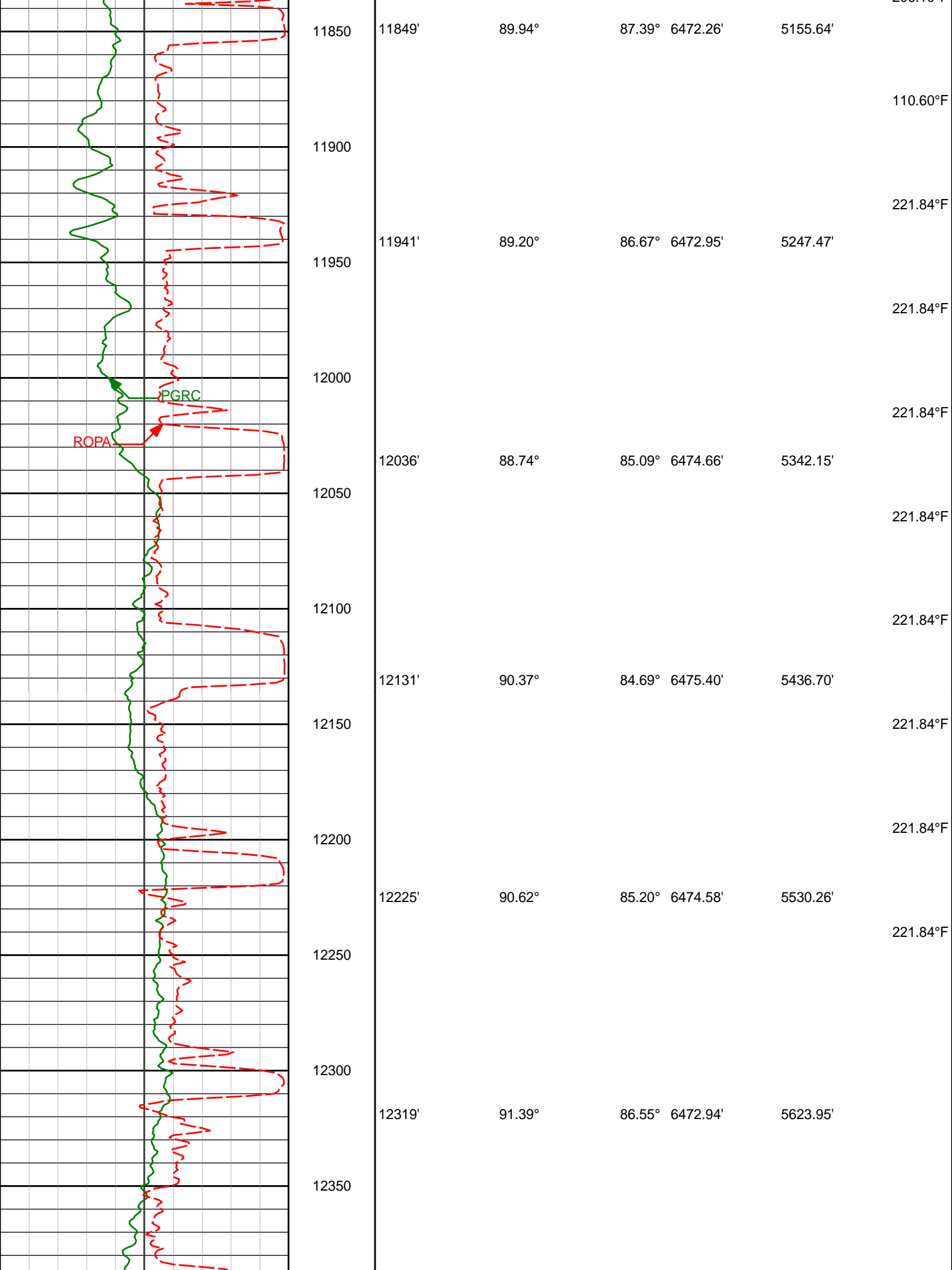


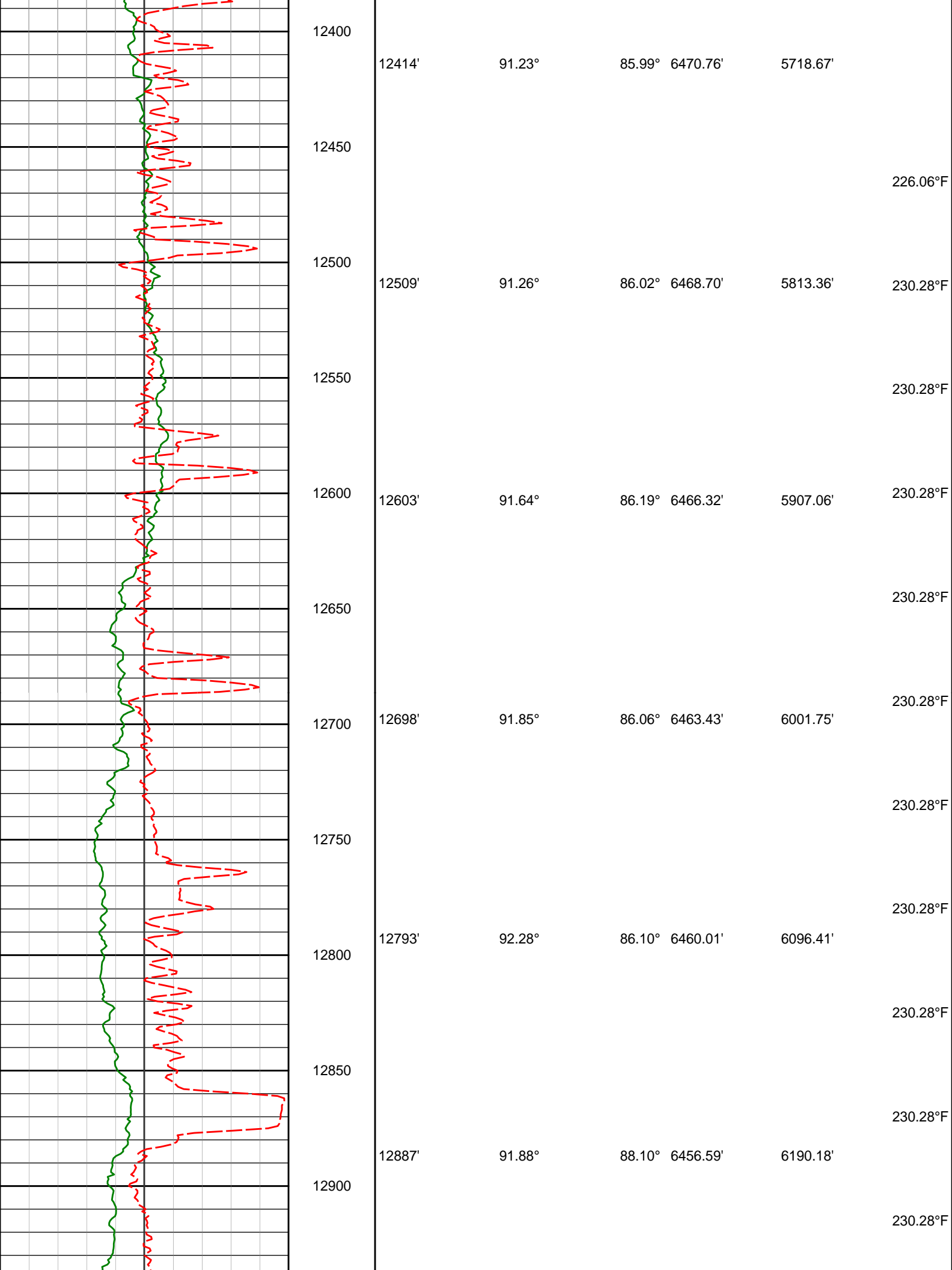


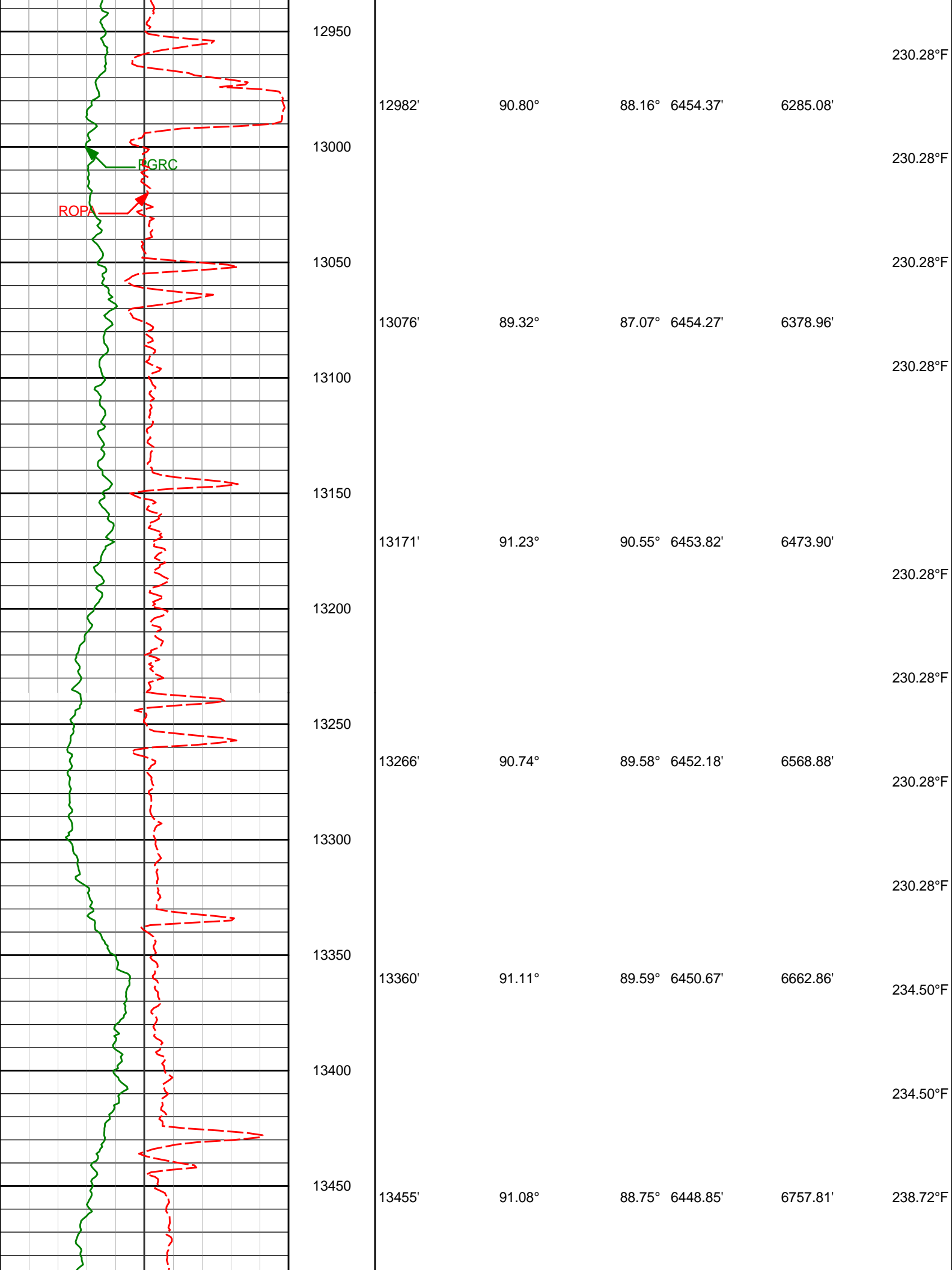


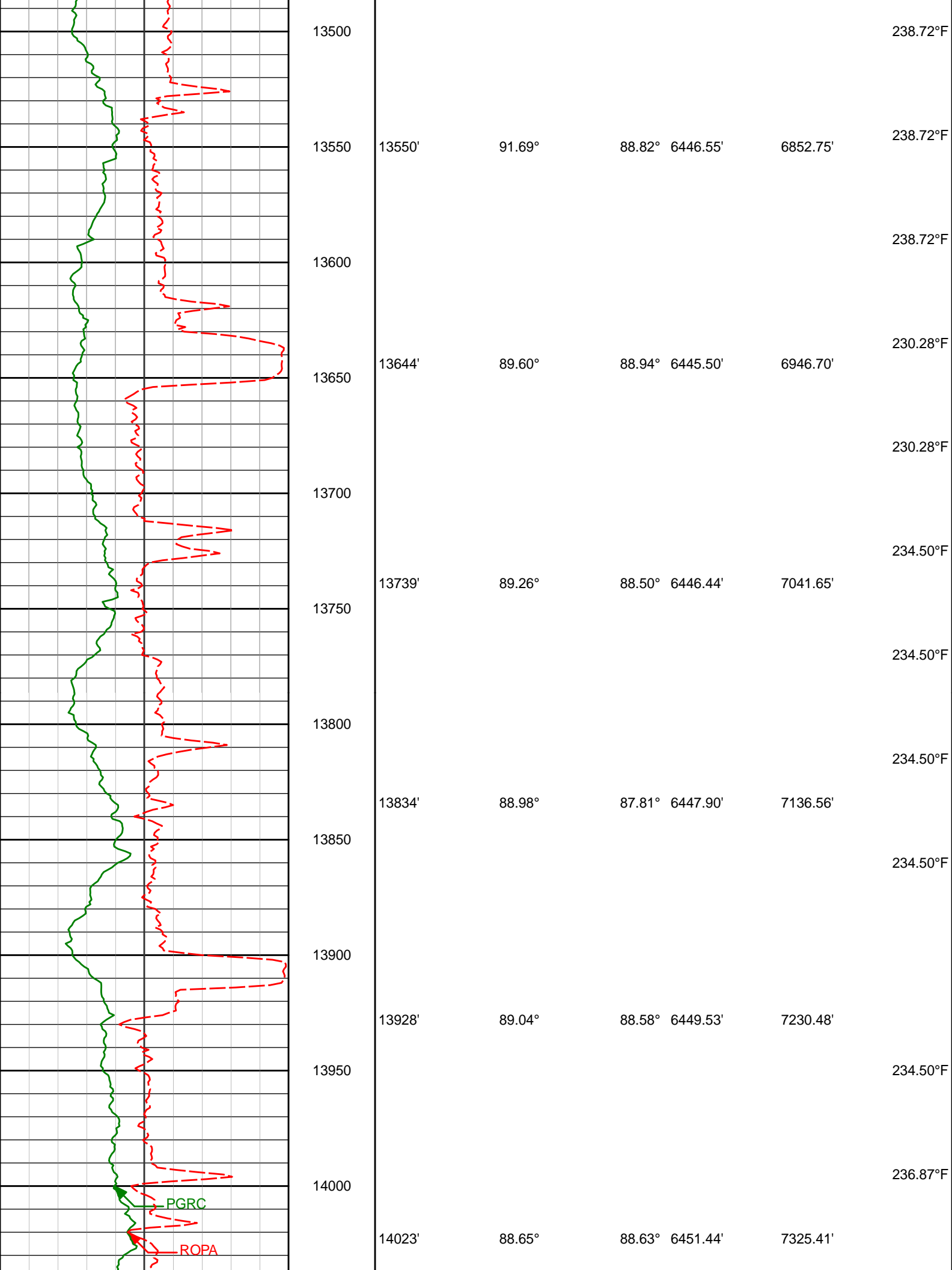


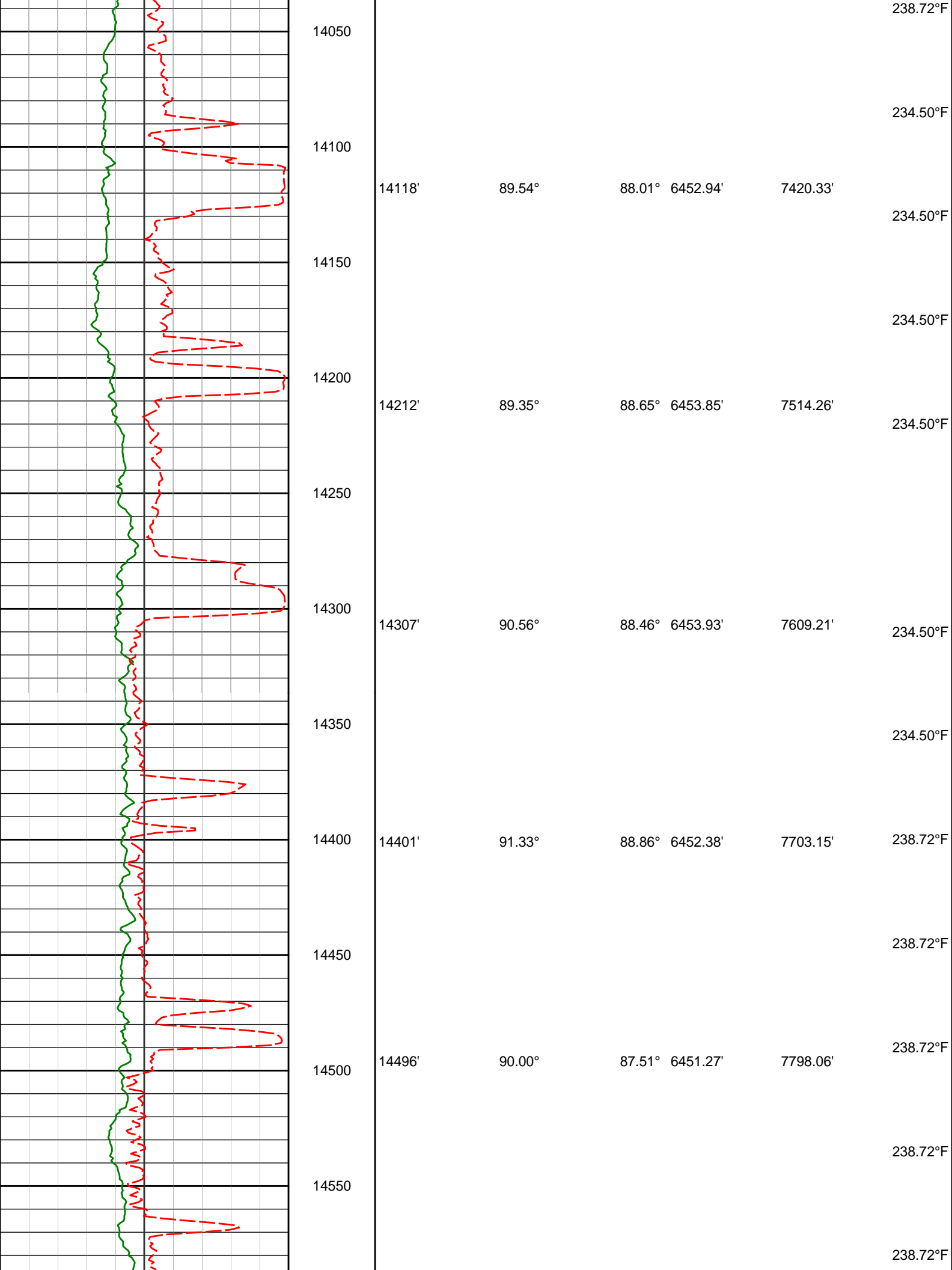


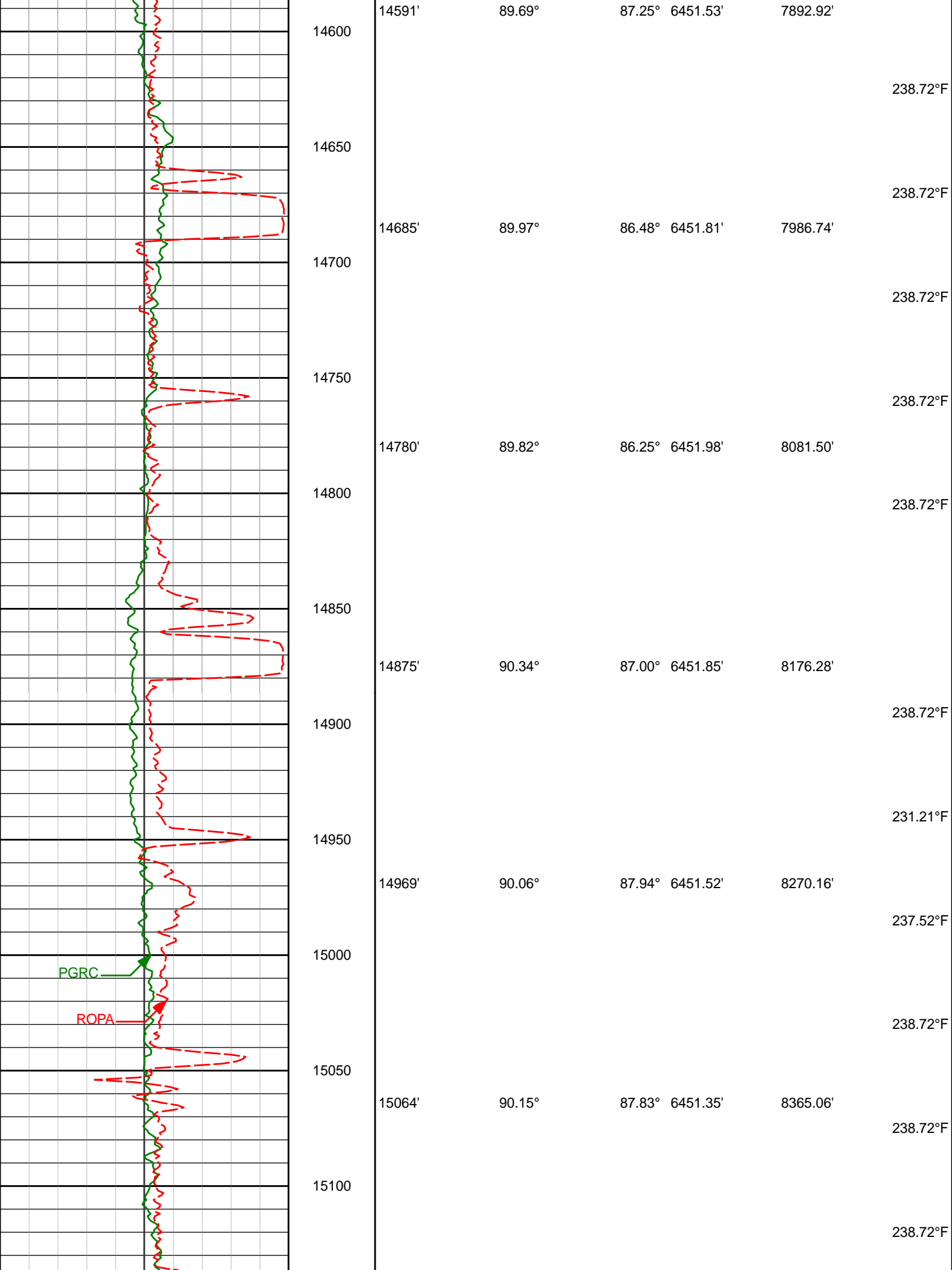


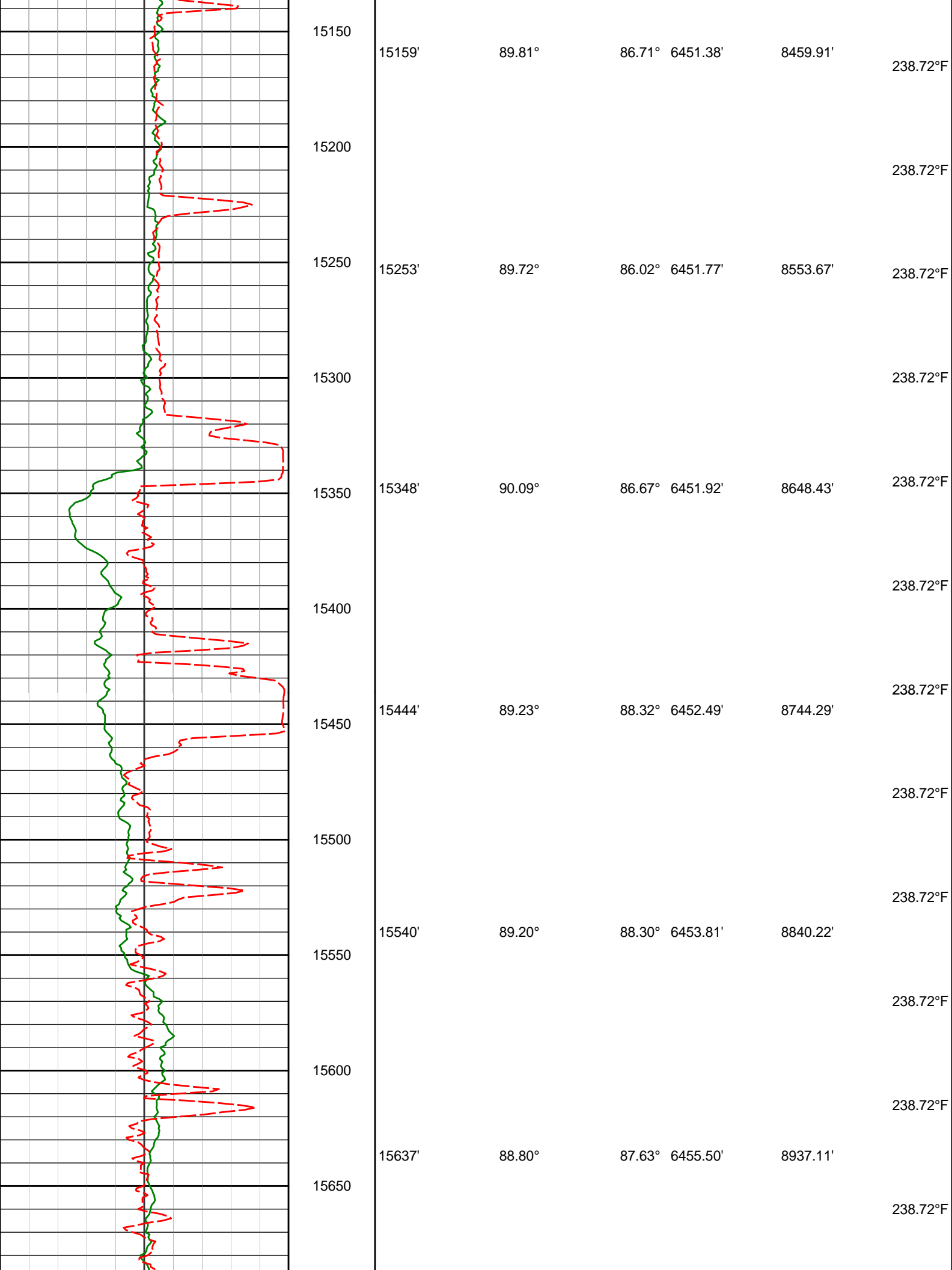


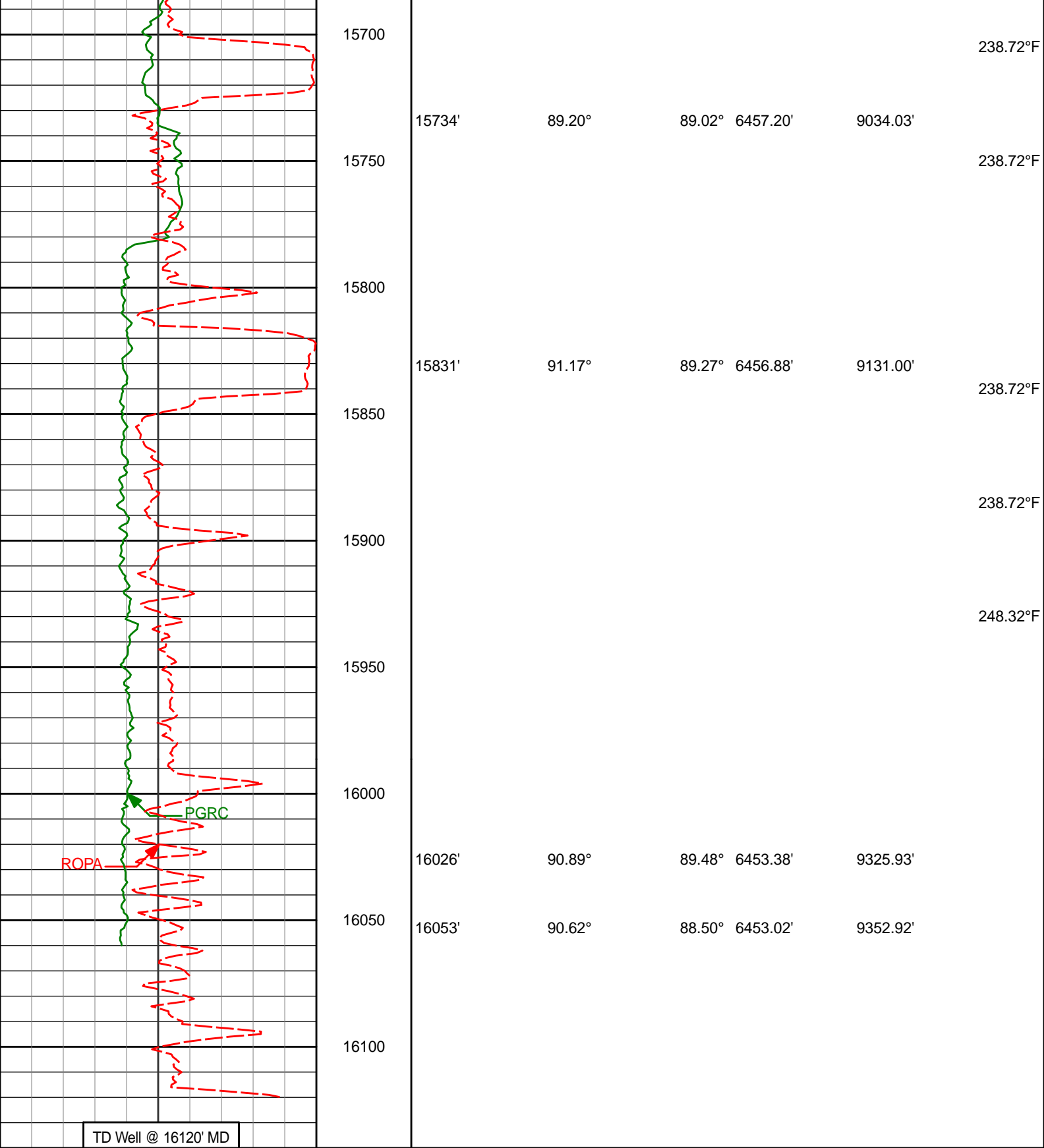








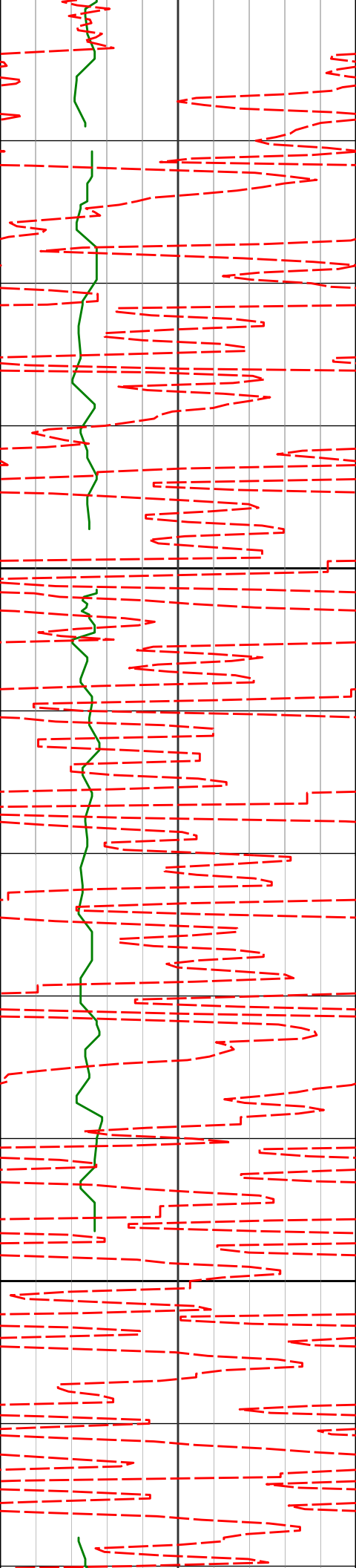




Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp
1K 0								
PCG Gamma Ray BCorr PGRC api								
0 300								

MD Detail 1:240 Scale

PCG GR XHi-Range RT PGRC api							
Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Inc	Azi	TVD	V.S.	Temp
0	300						
1K	0						
		600					66.07°F
		Casing Shoe @ 627' MD					
		Run 100					
							67.26°F
		674'	0.16°	229.95°	674.00'	-0.70'	68.04°F
		700					
							68.04°F



738'

0.13°

234.17° 738.00'

-0.83'

70.02°F

70.02°F

832'

0.17°

150.58° 832.00'

-0.84'

70.02°F

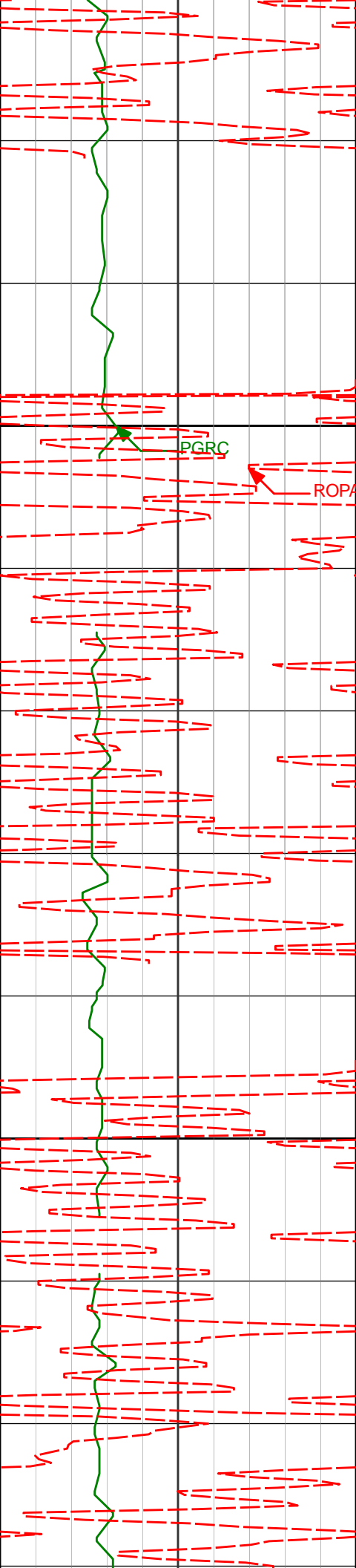
70.02°F

926'

0.28°

146.48° 926.00'

-0.64'



1000

1021'

0.30°

97.79°

1021.00'

-0.26'

1100

1115'

0.39°

116.86°

1115.00'

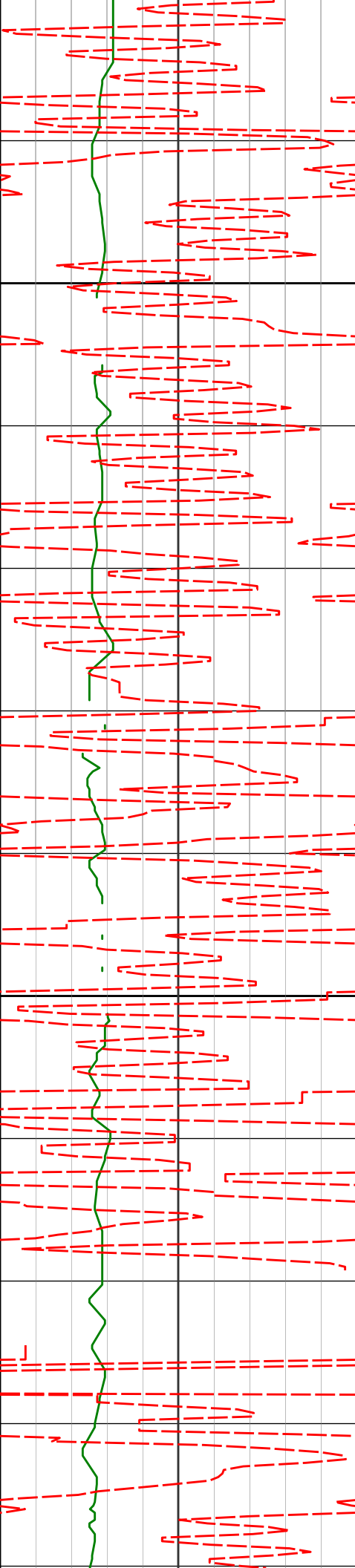
0.27'

72.00°F

72.00°F

72.00°F

72.00°F



1200

1300

1206'

1298'

0.43°

0.47°

121.08°

113.49°

1205.99'

1297.99'

0.84'

1.48'

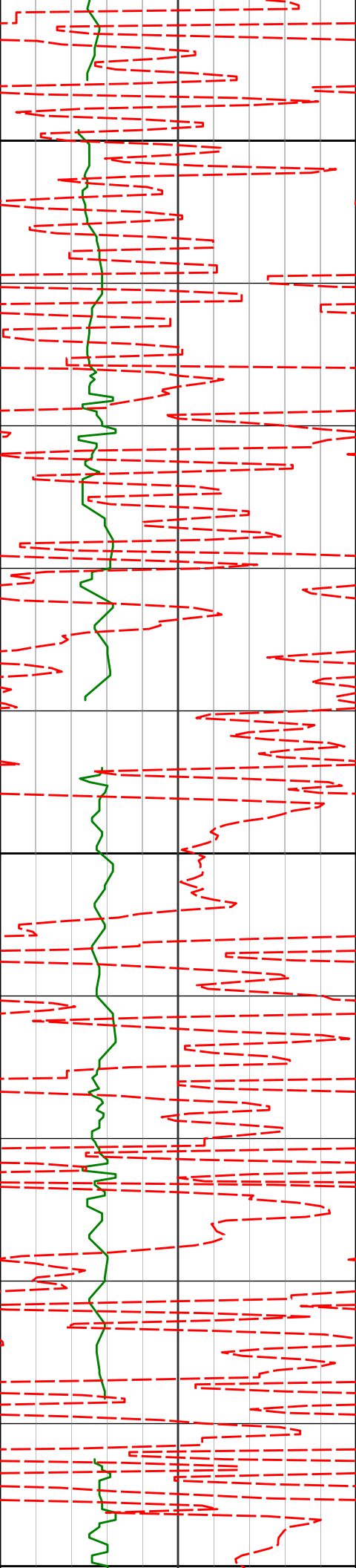
73.98°F

73.98°F

73.98°F

73.98°F

75.97°F



1400

1500

1600

1482'

0.28°

140.34° 1481.99'

2.46'

1575'

0.68°

348.86° 1574.98'

2.49'

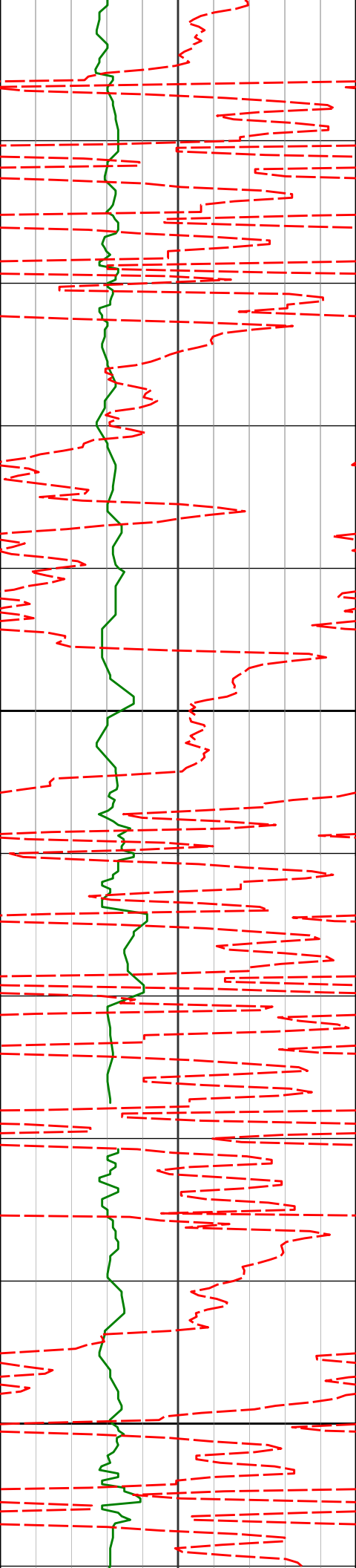
75.97°F

75.97°F

77.99°F

77.99°F

78.75°F



1650

1700

1800

1668'

3.33°

287.51°

1667.92'

-0.20'

1761'

5.74°

272.13°

1760.63'

-7.44'

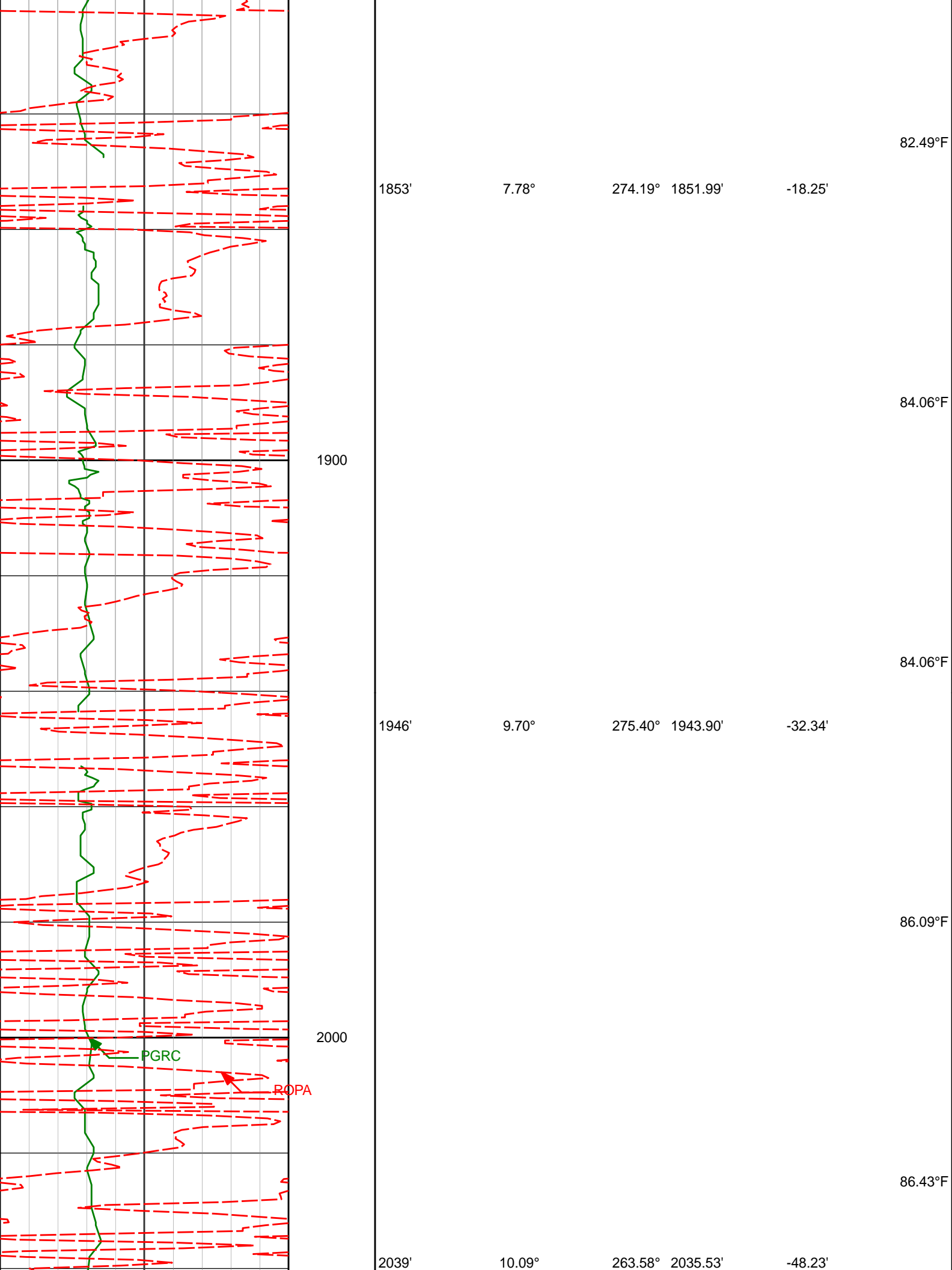
78.73°F

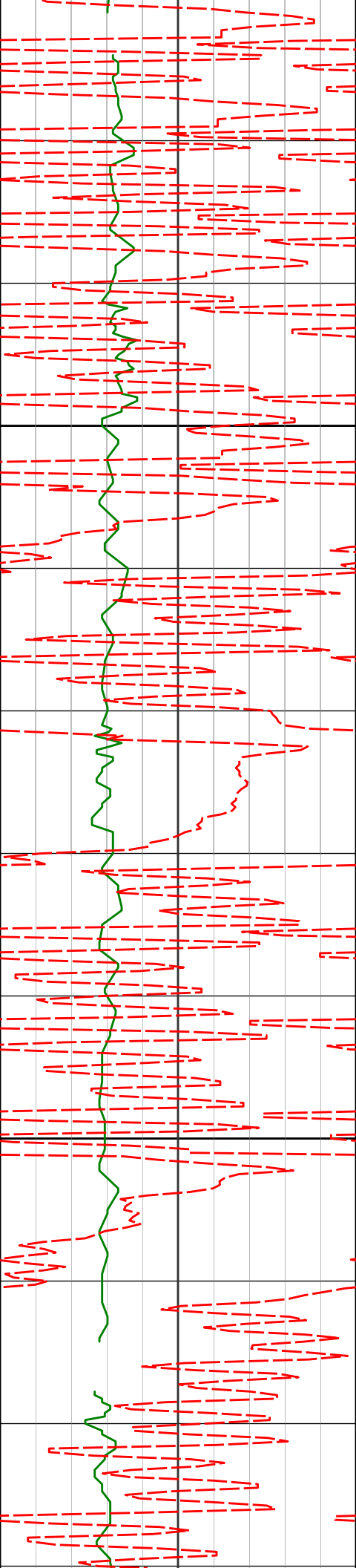
79.33°F

78.99°F

80.93°F

82.02°F





2100

2200

2132'

9.57°

258.13°

2127.16'

-63.88'

2223'

10.12°

245.72°

2216.83'

-78.53'

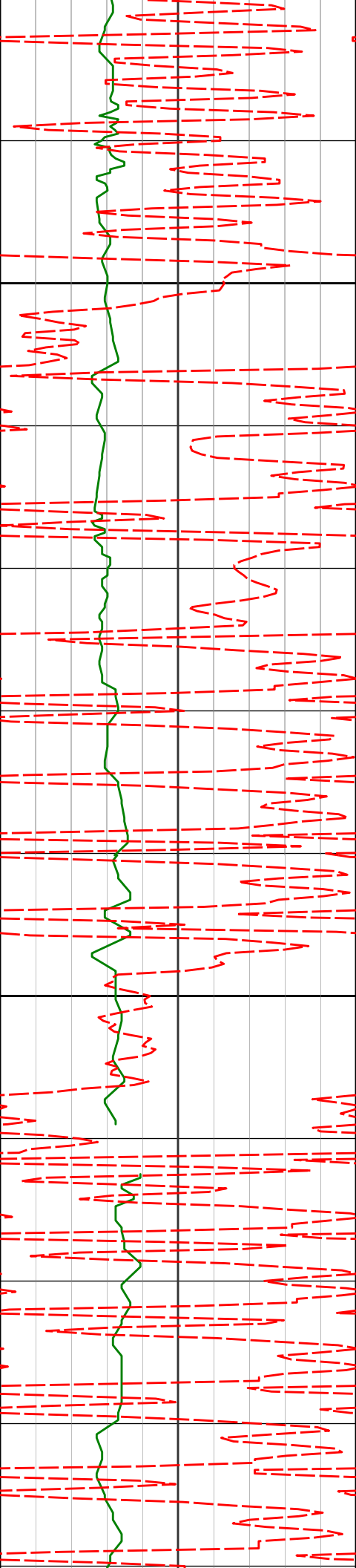
88.14°F

88.14°F

89.56°F

90.19°F

90.19°F



2300

2316'

9.17°

244.52° 2308.52'

-92.61'

90.19°F

90.19°F

90.19°F

2400

2408'

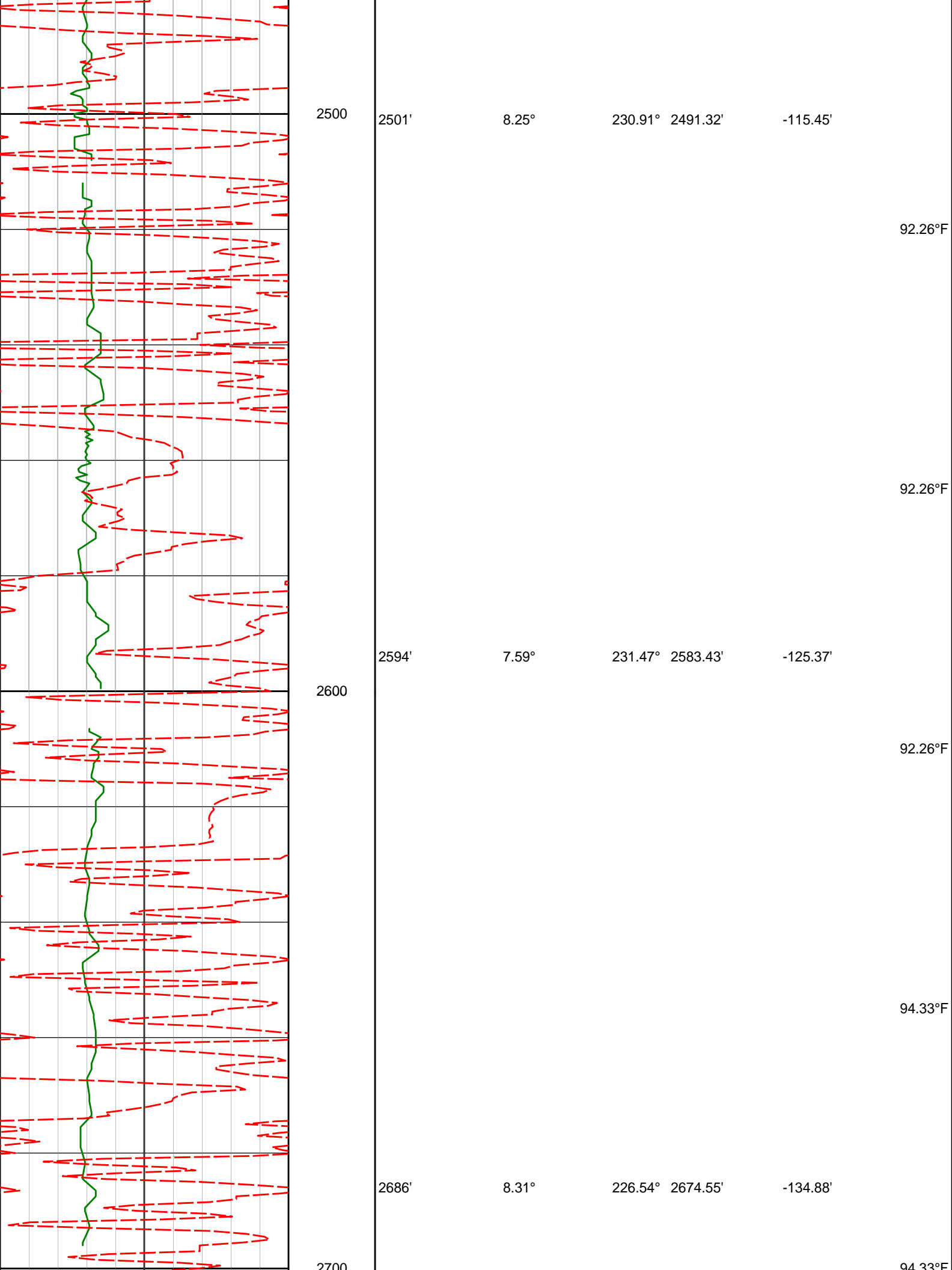
9.00°

230.50° 2399.38'

-104.72'

90.19°F

90.19°F





2700

2800

2900

2778'

2870'

7.53°

6.77°

224.93°

224.66°

2765.67'

2856.96'

-143.90'

-151.91'

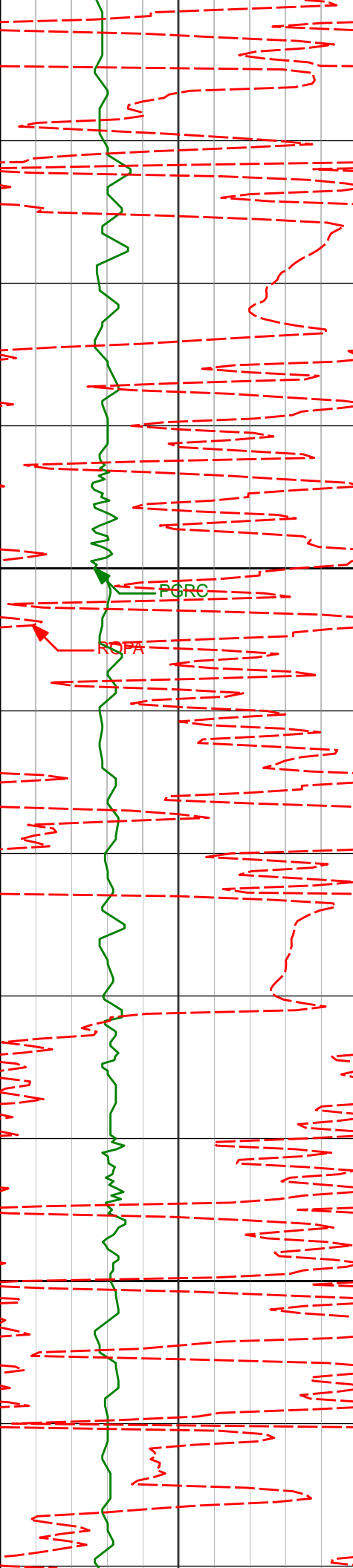
96.42°F

96.42°F

98.97°F

100.48°F

94.33°F



3000

3100

2965'

7.42°

237.61°

2951.23'

-160.97'

100.62°F

102.53°F

102.72°F

3060'

9.11°

238.01°

3045.24'

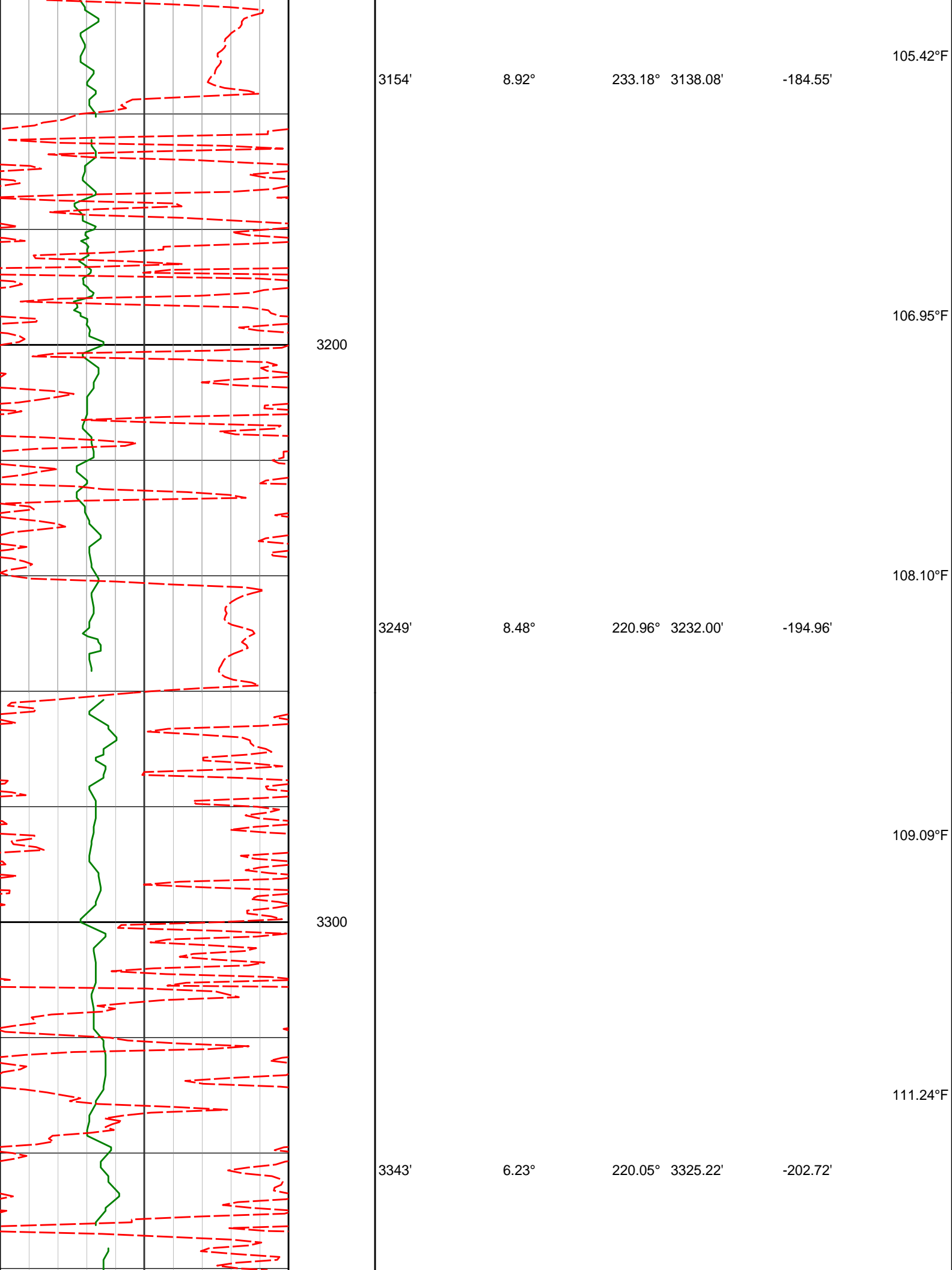
-172.47'

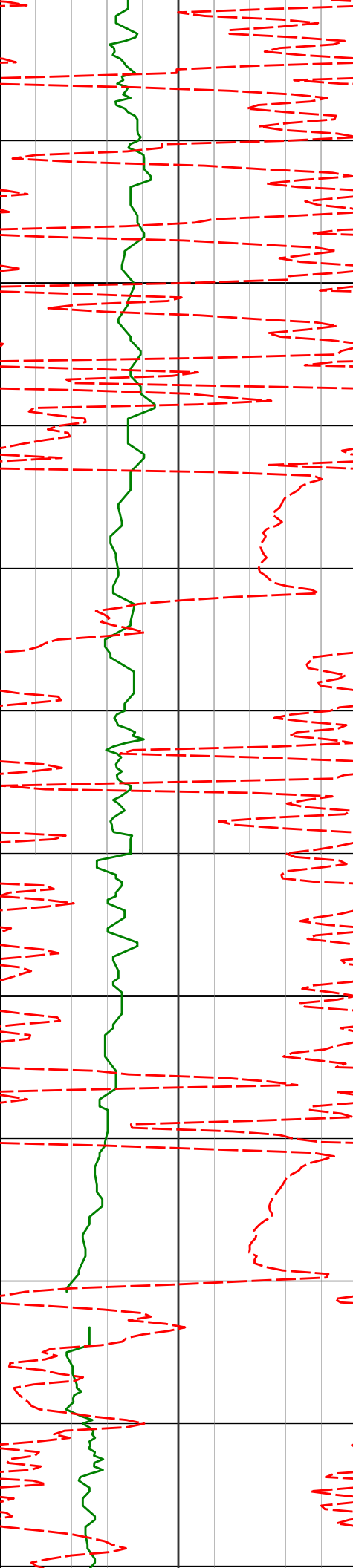
103.84°F

104.83°F

PORC

POPA





3400

3500

3438'

3533'

6.78°

7.63°

213.34°

216.94°

3419.61'

3513.86'

-209.04'

-215.84'

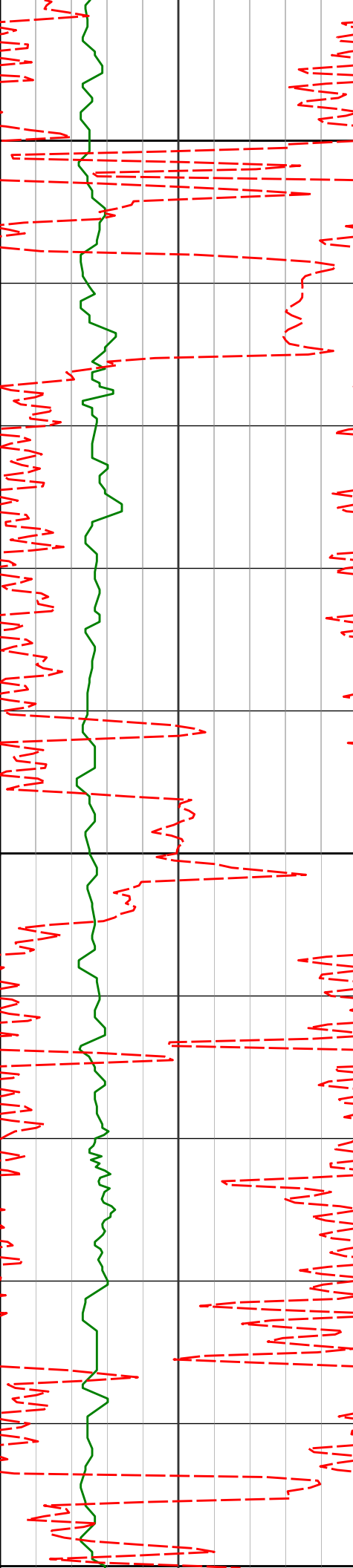
111.24°F

113.40°F

113.40°F

115.39°F

115.56°F



3600

115.56°F

3627'

10.41°

220.56°

3606.69'

-225.02'

116.45°F

3700

117.86°F

3722'

11.90°

220.37°

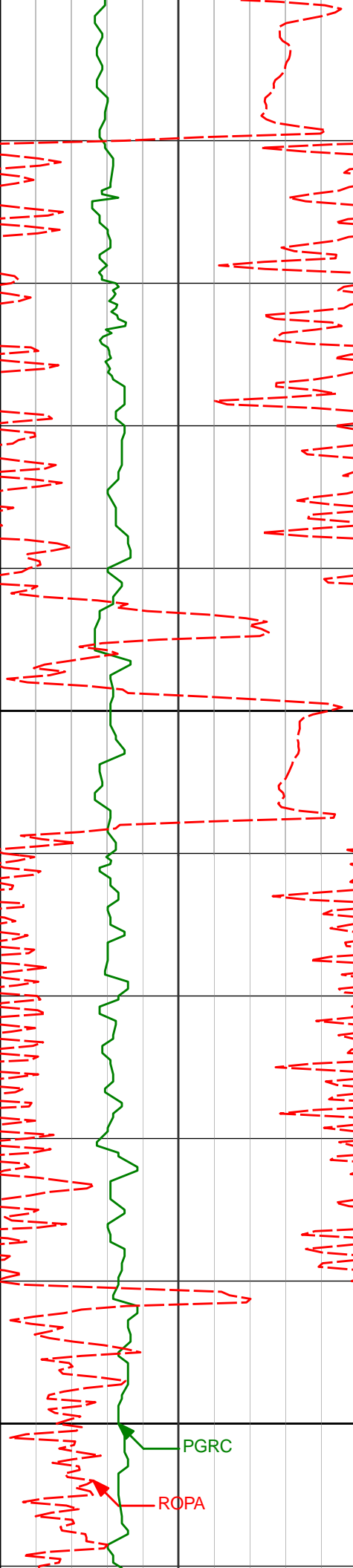
3699.89'

-236.84'

119.45°F

119.91°F

3800



3800
3900
4000

3817'

12.13°

211.82° 3792.82'

-248.32'

119.41°F

118.09°F

3911'

9.66°

197.75° 3885.13'

-255.81'

117.73°F

118.22°F

4006'

8.81°

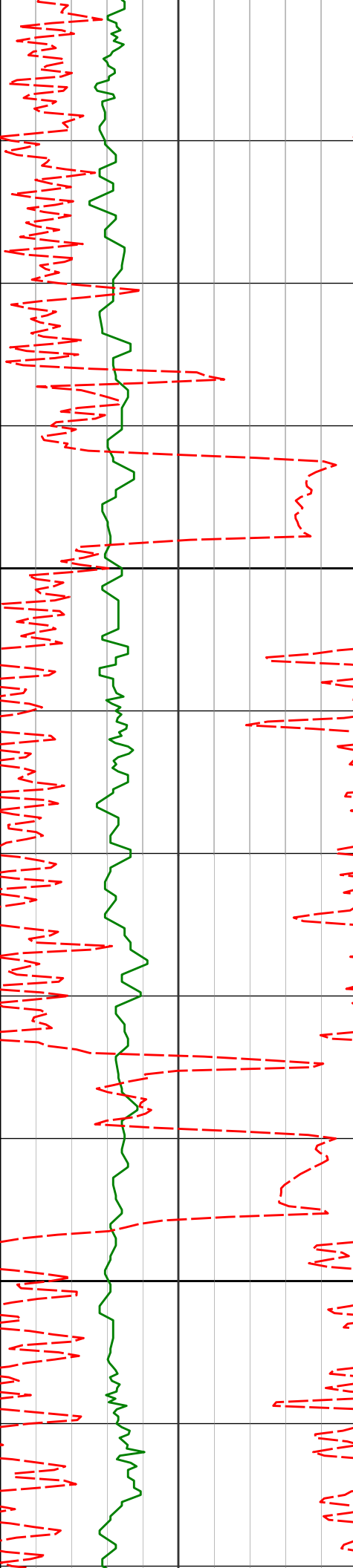
196.87° 3978.90'

-260.24'

119.91°F

PGRC

ROPA



4100

4100'

7.08°

204.98° 4072.00'

-264.68'

4200

4195'

5.15°

216.00° 4166.45'

-269.59'

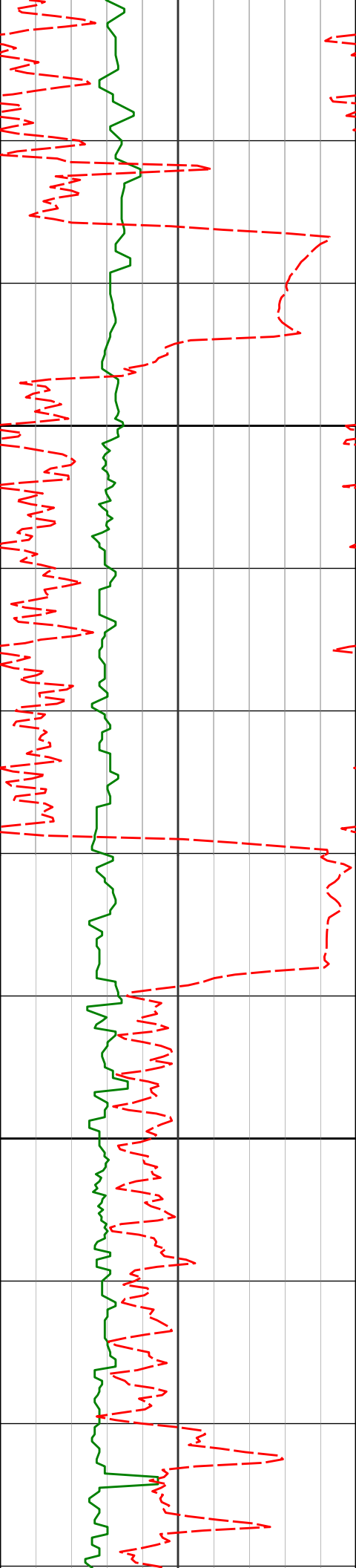
119.91°F

120.95°F

122.11°F

122.96°F

124.30°F



4300

4400

4289'

4384'

5.68°

7.19°

230.50°

220.67°

4260.04'

4354.44'

-275.61'

-283.06'

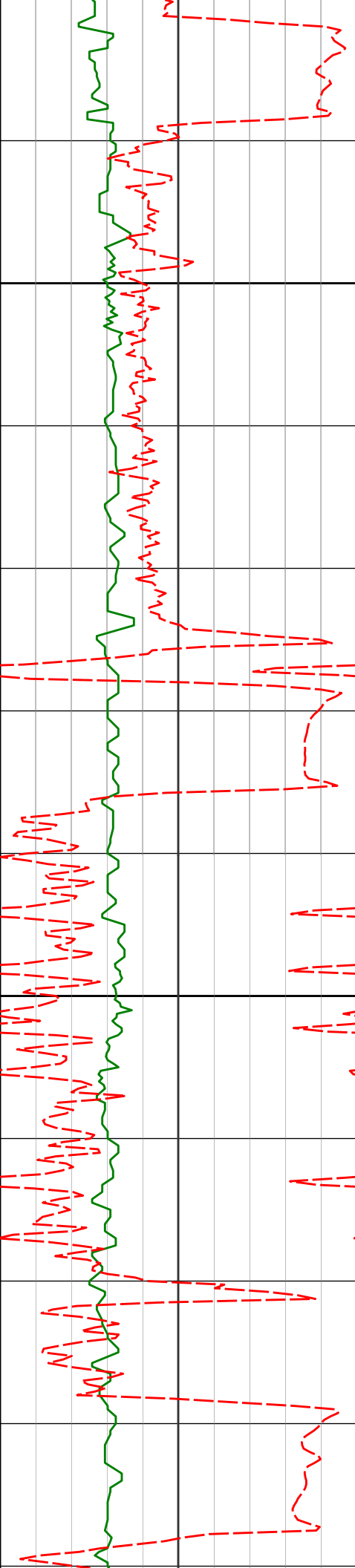
124.33°F

123.13°F

123.98°F

123.87°F

124.46°F



4500

4600

4478'

7.69°

221.92° 4447.65'

-291.03'

4573'

7.69°

219.51° 4541.79'

-299.24'

4668'

8.16°

221.36° 4635.88'

-307.66'

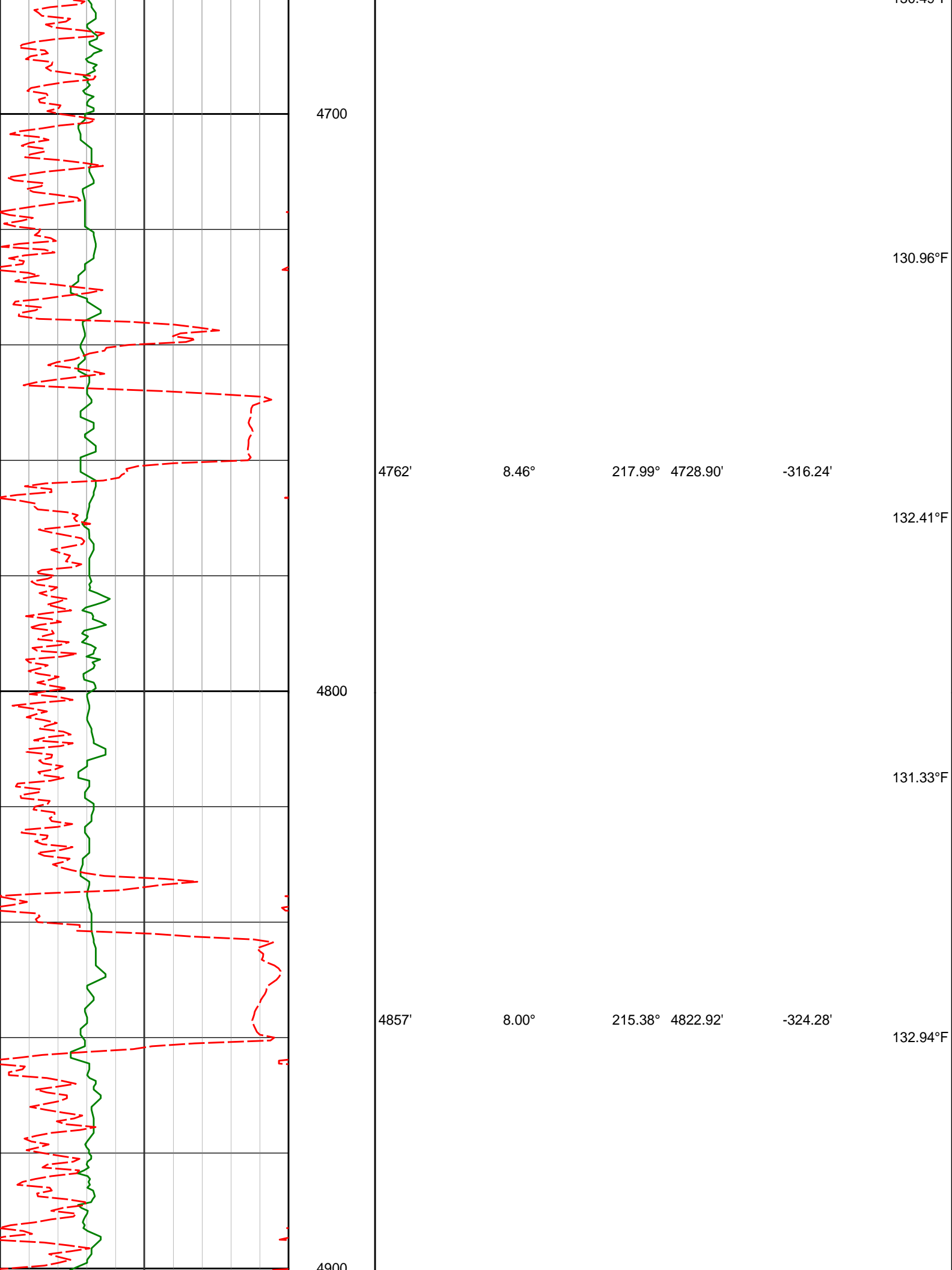
126.36°F

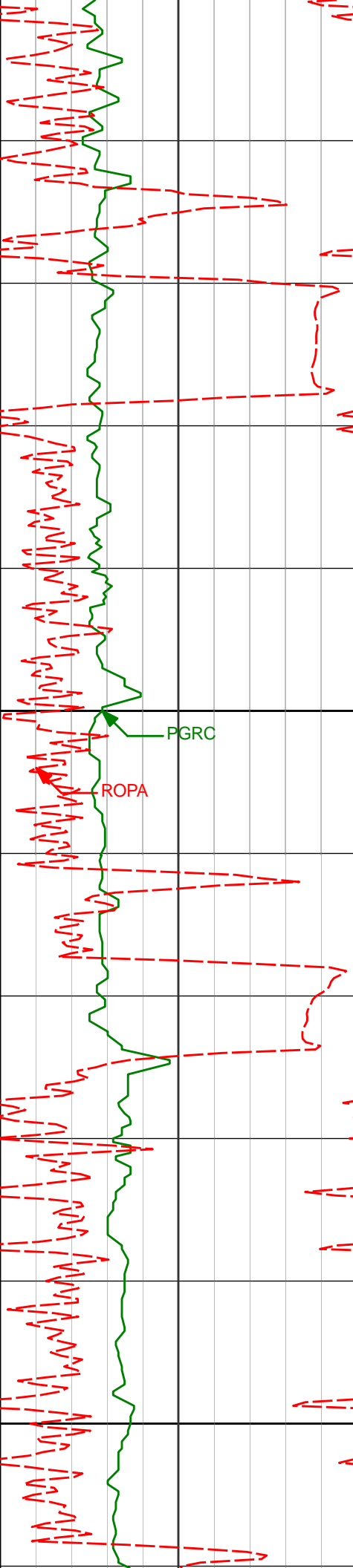
126.83°F

128.73°F

129.03°F

130.49°F





5000

5100

4952'

8.88°

215.04°

4916.89'

-332.23'

135.45°F

135.45°F

135.45°F

5046'

9.17°

216.85°

5009.73'

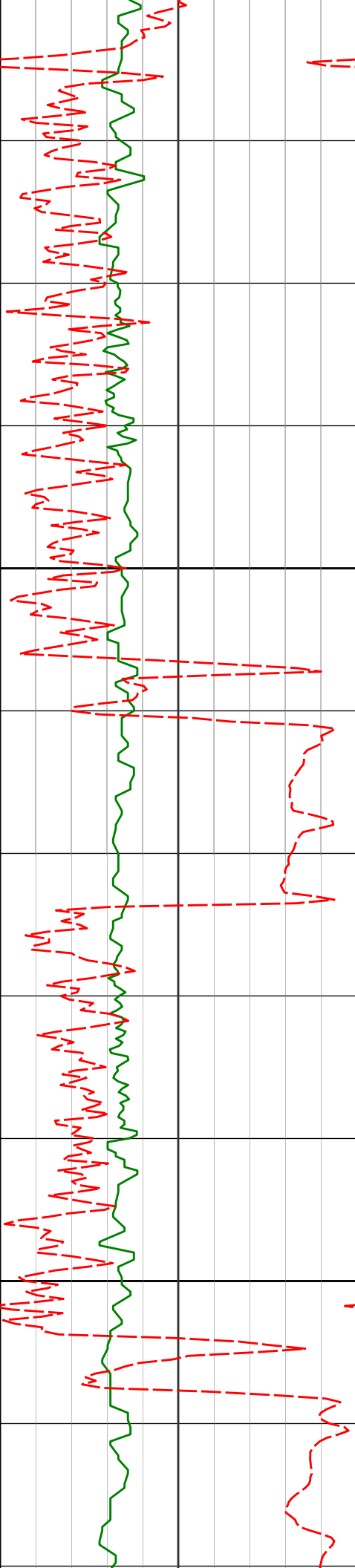
-340.80'

137.70°F

133.20°F

PGRC

ROPA



5200

5300

5141'

6.39°

211.26° 5103.84'

-348.00'

5235'

6.35°

224.07° 5197.27'

-354.26'

5330'

7.51°

232.63° 5291.58'

-362.79'

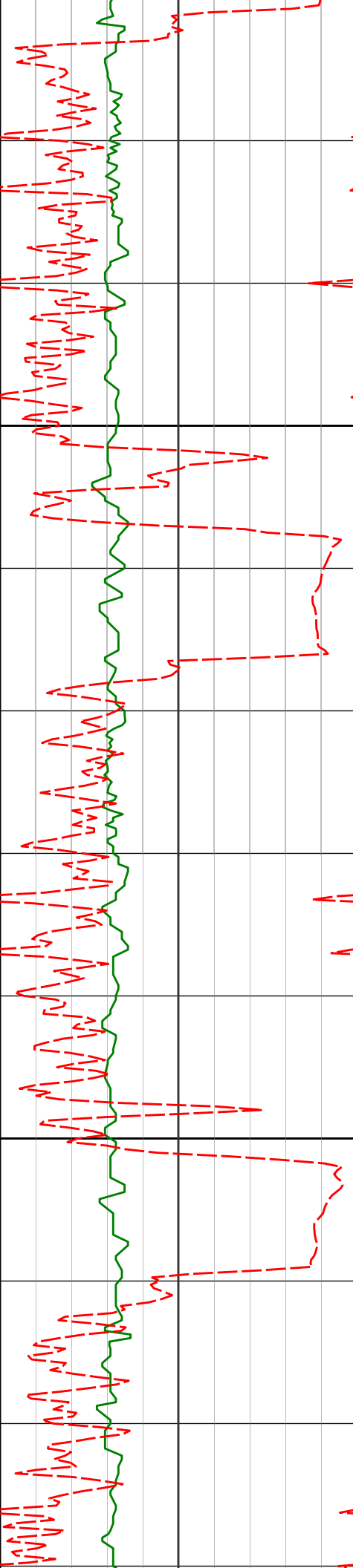
139.76°F

139.96°F

140.55°F

140.38°F

139.13°F



5400

5500

5424'

5519'

8.25°

7.67°

225.12°

211.36°

5384.69'

5478.78'

-372.39'

-380.43'

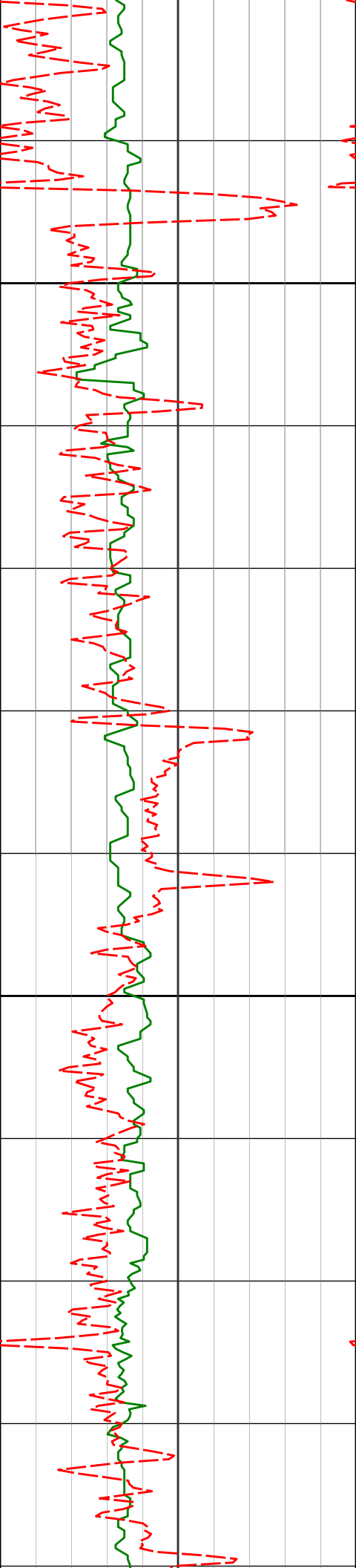
138.66°F

137.94°F

138.18°F

137.70°F

139.96°F



5600

<KOP>

5700

5614'

5.85°

201.88°

5573.12'

-385.46'

5708'

4.41°

202.79°

5666.74'

-388.58'

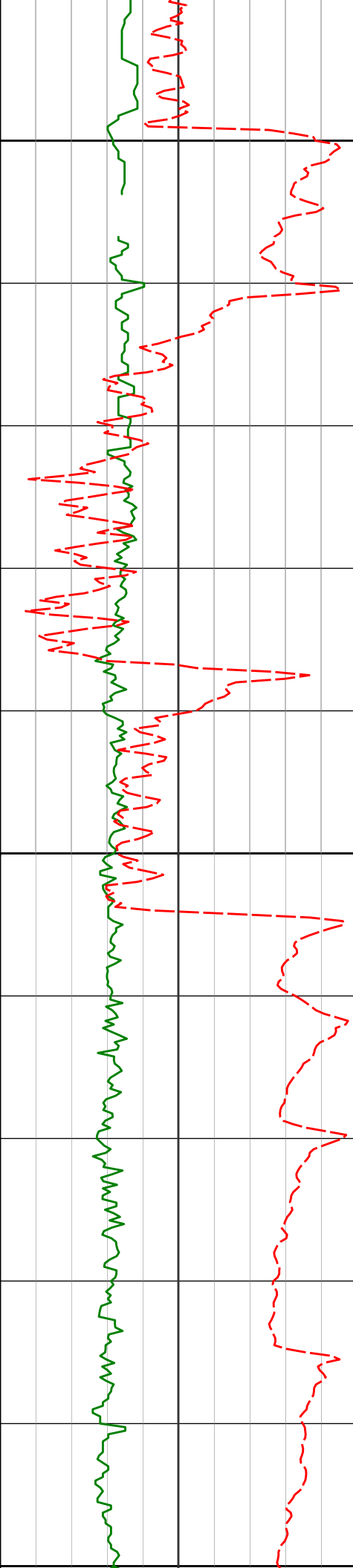
141.55°F

142.25°F

142.25°F

143.66°F

143.09°F



5800

5803'

2.22°

199.18° 5761.58'

-390.56'

143.00°F

5900

5898'

0.83°

267.23° 5856.55'

-391.84'

142.25°F

6000

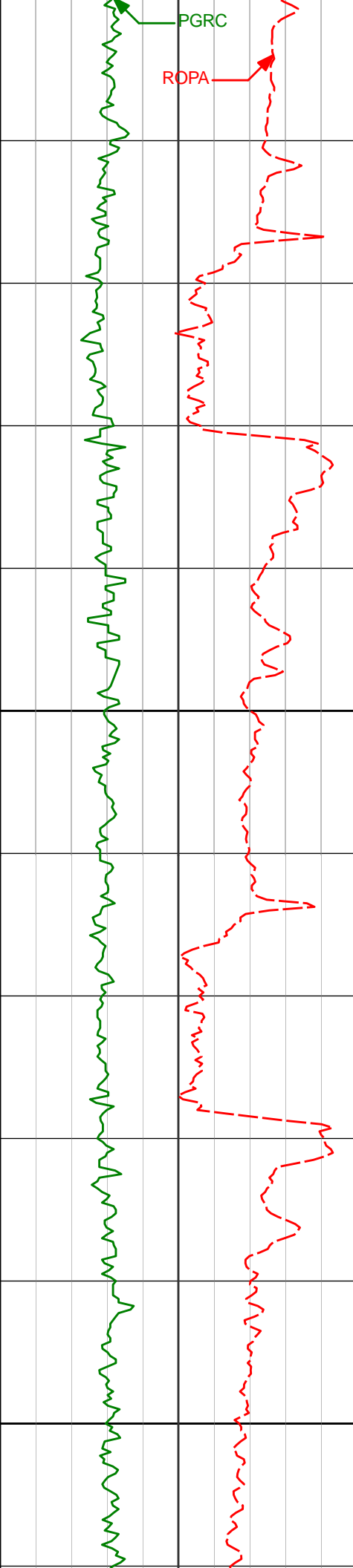
5992'

9.96°

108.76° 5950.11'

-384.78'

145.12°F



6000

145.79°F

148.01°F

6087'

13.13°

117.26° 6043.18'

-367.35'

6100

148.97°F

149.77°F

6181'

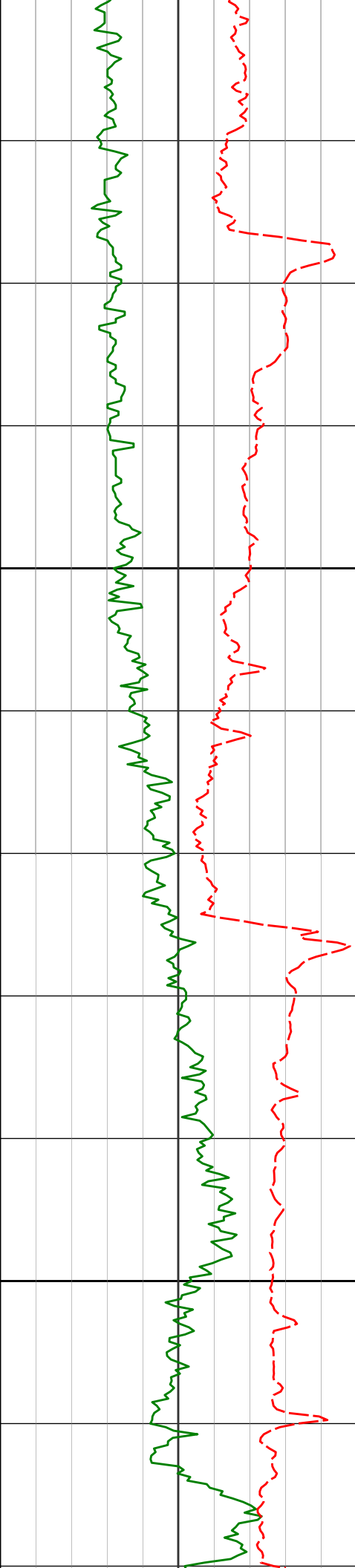
16.96°

104.96° 6133.97'

-344.54'

6200

151.47°F



6276'

27.52°

89.75°

6221.85'

-309.05'

6300

6370'

39.80°

96.28°

6299.96'

-257.19'

6400

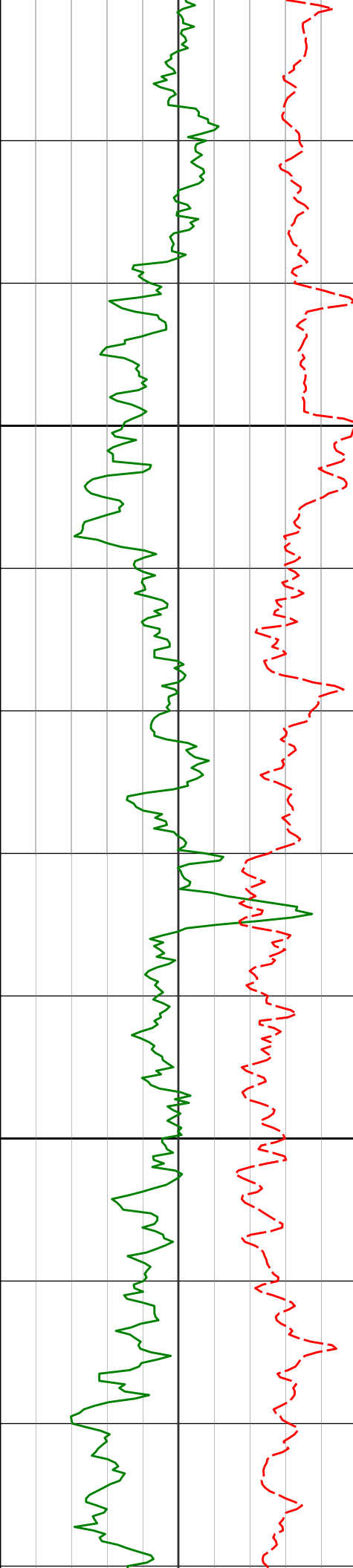
151.93°F

151.69°F

151.65°F

151.69°F

151.57°F



6500

6600

6465'

50.67°

96.04°

6366.76'

-190.17'

153.93°F

156.42°F

6559'

57.28°

93.21°

6422.02'

-114.40'

158.35°F

158.75°F

6654'

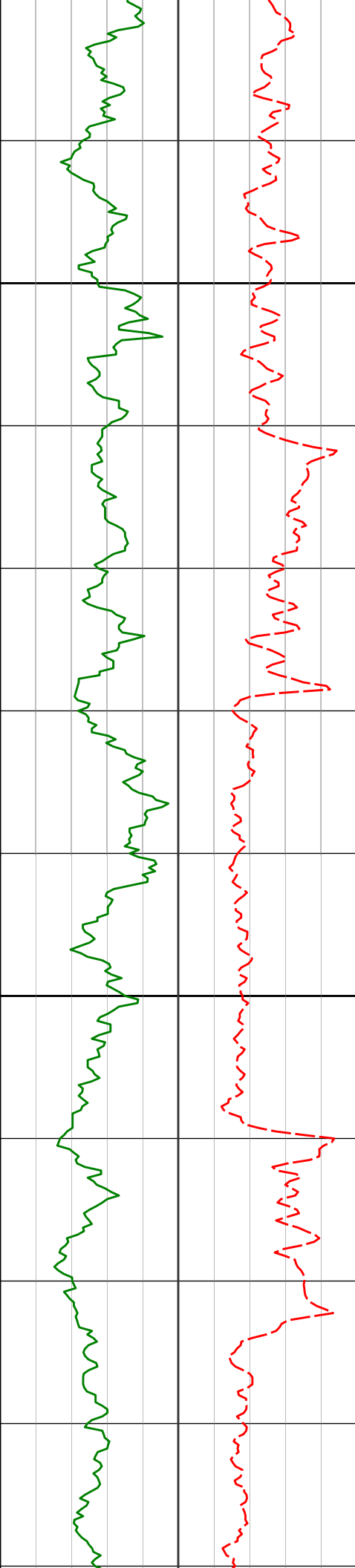
69.54°

90.97°

6464.46'

-29.65'

160.70°F



6700

6748'

83.33°

85.20°

6486.47'

61.38'

164.47°F

6800

6822'

86.64°

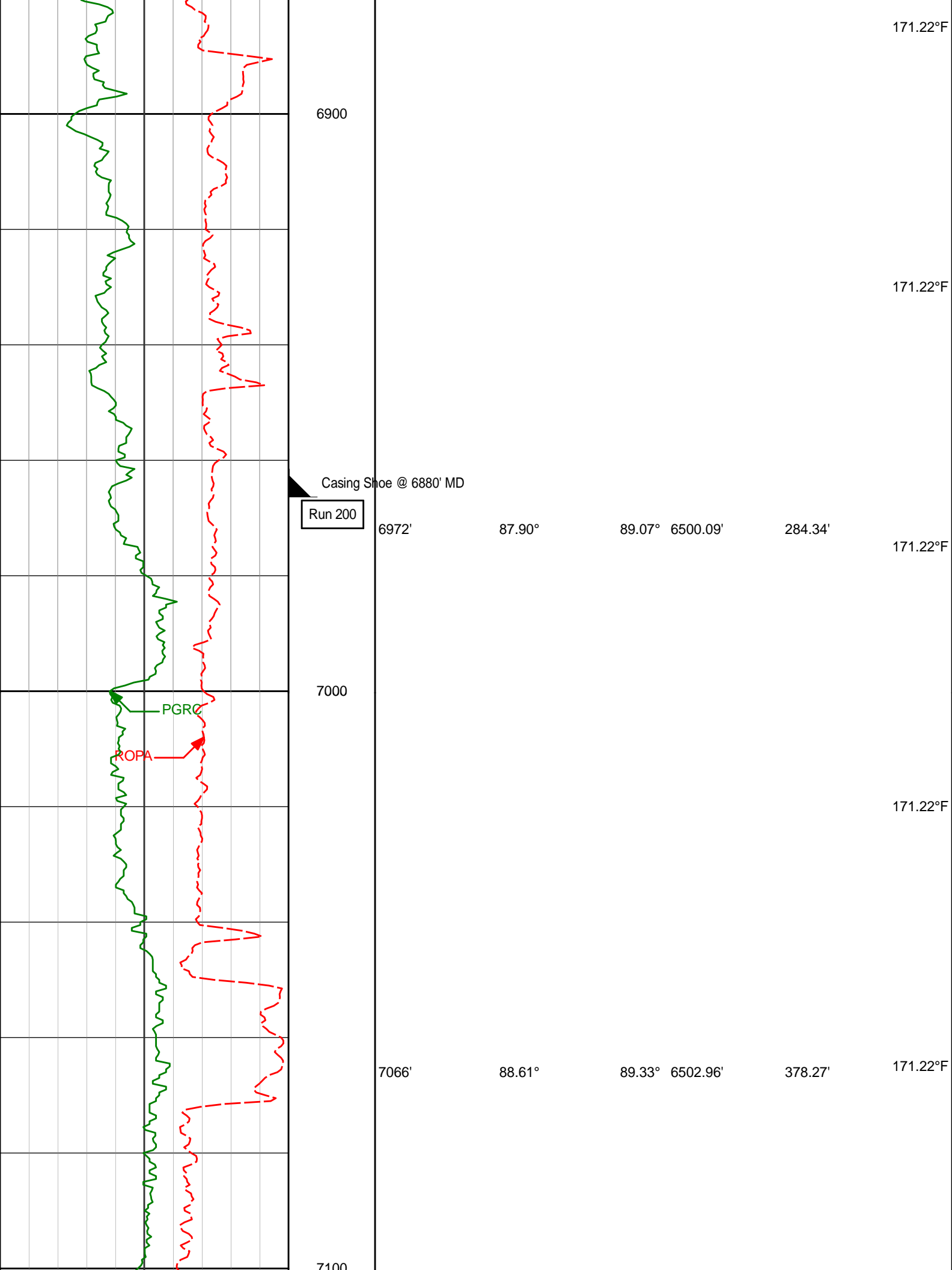
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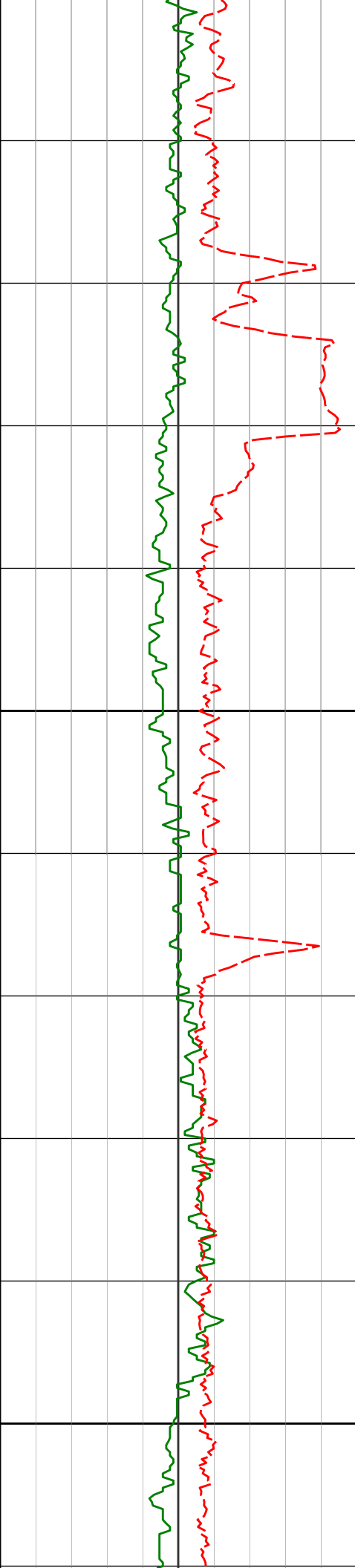
6492.94'

134.78'

165.29°F

165.58°F





7100

7200

7300

7161'

89.82°

87.55°

6504.26'

473.20'

7255'

89.66°

86.73°

6504.69'

567.04'

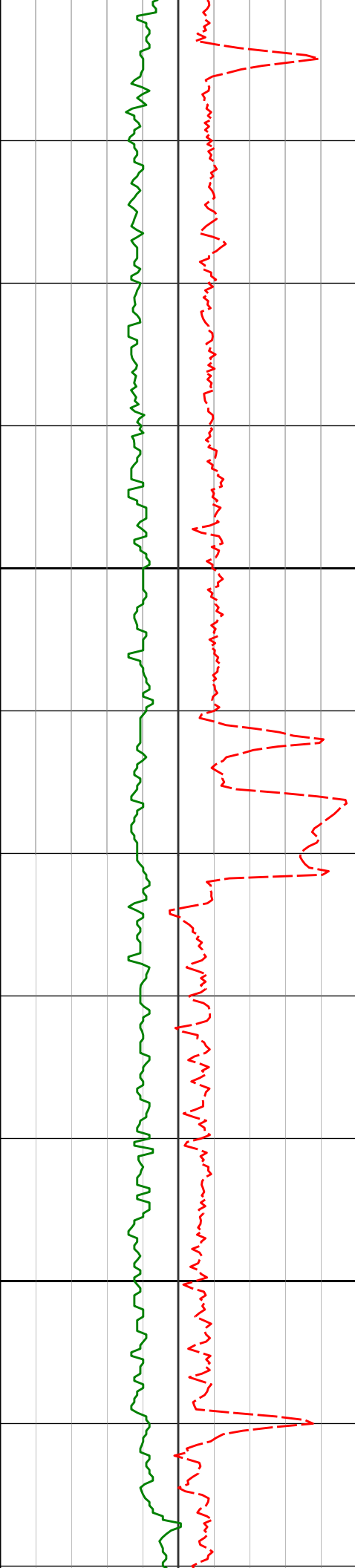
171.22°F

171.22°F

171.22°F

175.44°F

175.44°F



7400

7500

7350'

7445'

7539'

89.57°

90.86°

91.36°

86.84°

86.88°

86.70°

6505.32'

6504.97'

6503.15'

661.84'

756.65'

850.44'

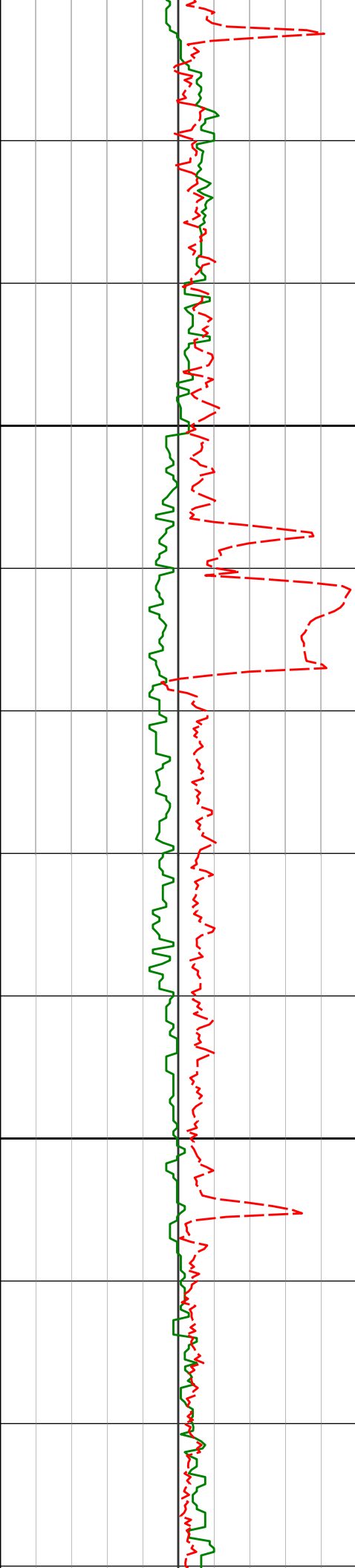
179.66°F

179.66°F

179.66°F

179.66°F

179.66°F



7600

7700

7633'

7728'

90.28°

89.97°

87.53°

86.24°

6501.80'

6501.59'

944.27'

1039.09'

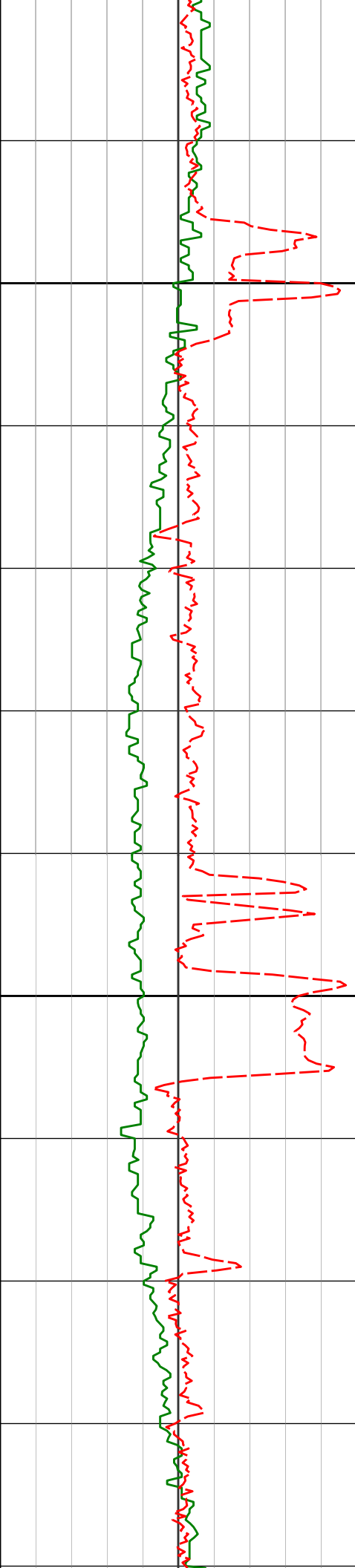
179.66°F

179.66°F

179.66°F

183.88°F

183.88°F



7800

7822'

89.63°

85.68°

6501.92'

1132.80'

183.88°F

183.88°F

7900

7917'

91.02°

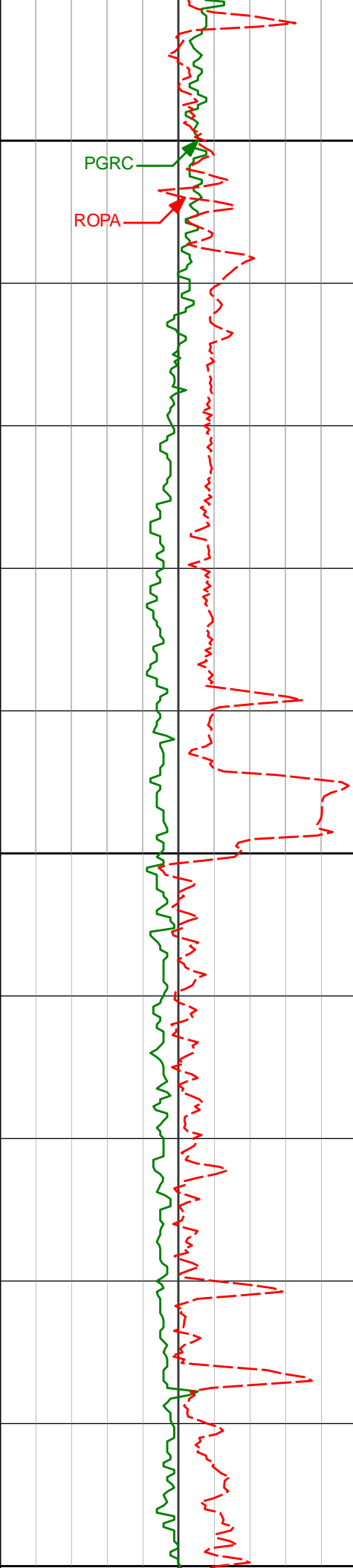
87.52°

6501.38'

1227.58'

188.09°F

188.09°F



8000

8011'

91.36°

87.93° 6499.43'

1321.45'

188.09°F

188.09°F

8100

8105'

90.25°

87.92° 6498.11'

1415.35'

188.09°F

188.09°F

188.09°F

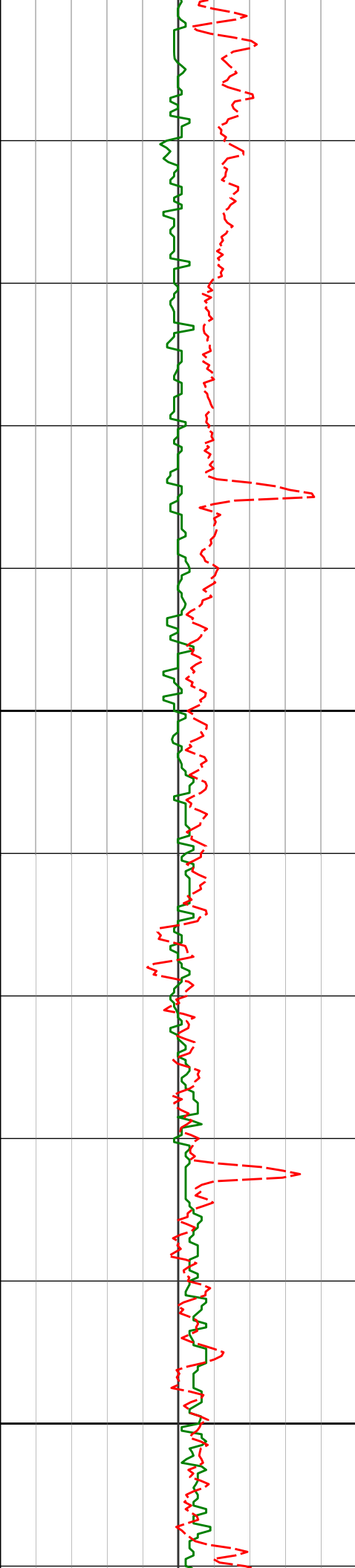
8200

8200'

91.02°

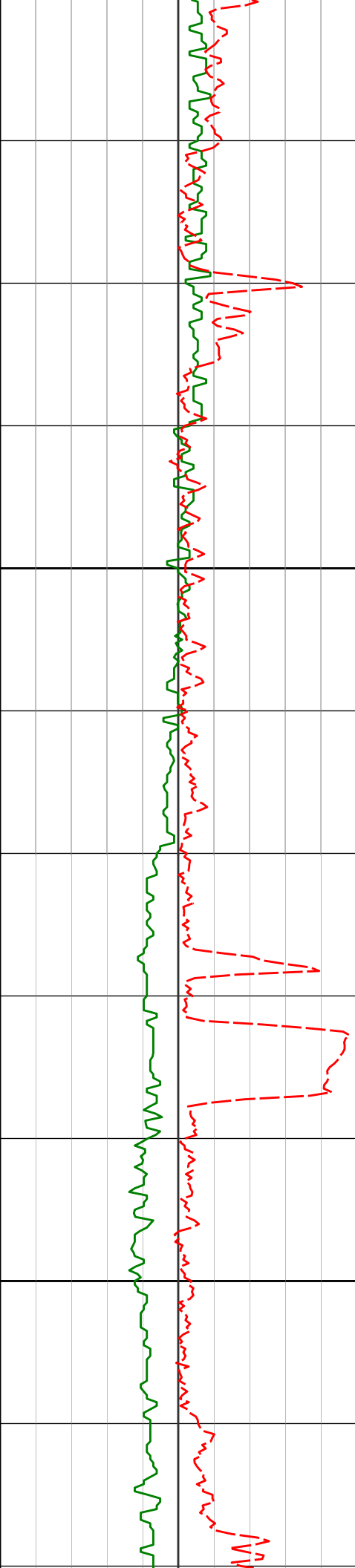
88.43° 6497.06'

1510.26'



8200
8300
8400

8200	91.02°	88.48°	6497.00'	1510.20'	188.09°F
8295'	91.11°	88.24°	6495.29'	1605.18'	192.31°F
8389'	90.95°	87.59°	6493.60'	1699.08'	192.31°F
8400					192.31°F



8484'

91.29°

87.33° 6491.75'

1793.93'

8500

8579'

90.83°

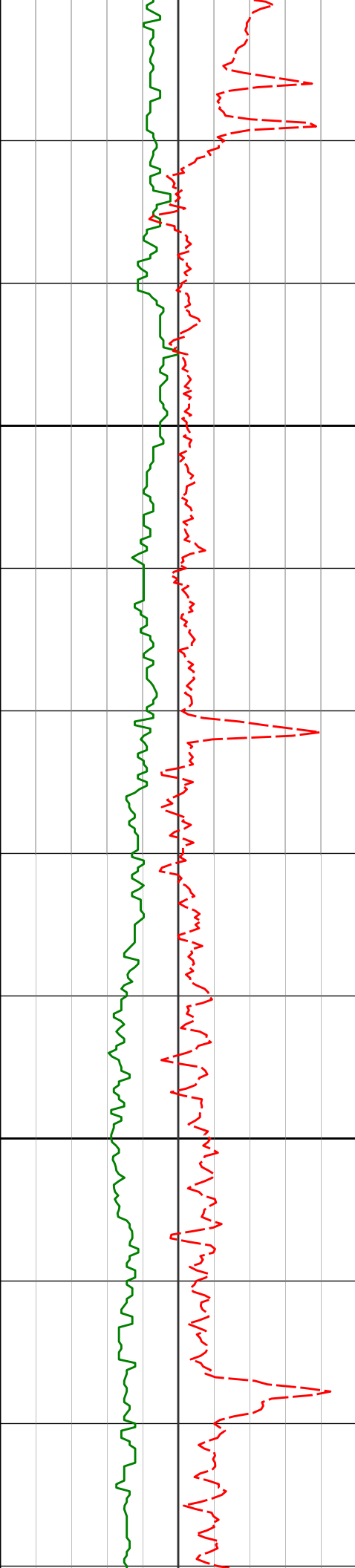
87.62° 6489.99'

1888.78'

8600

196.53°F

196.53°F



8700

8673'

91.05°

86.90° 6488.45'

1982.62'

196.53°F

8768'

91.29°

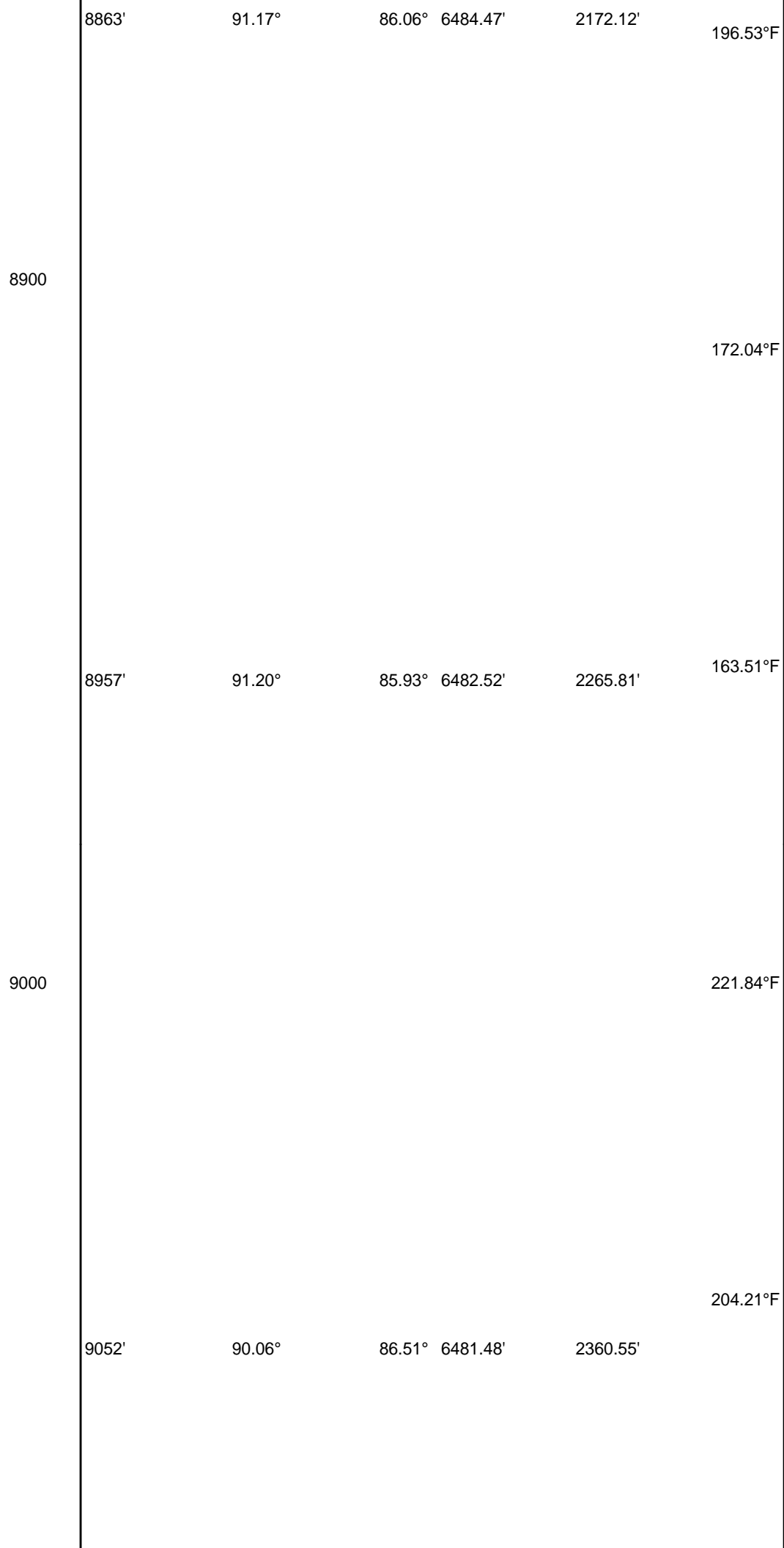
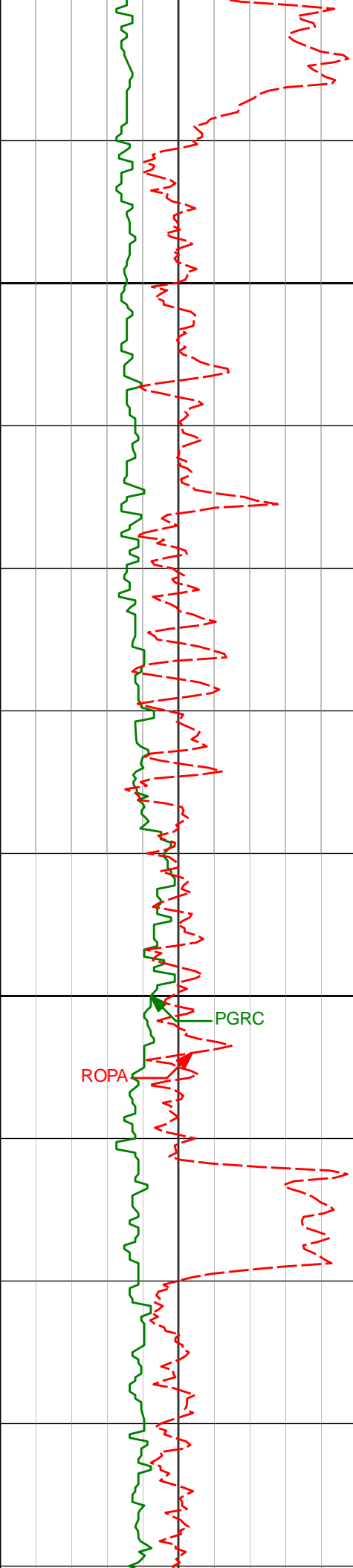
86.41° 6486.51'

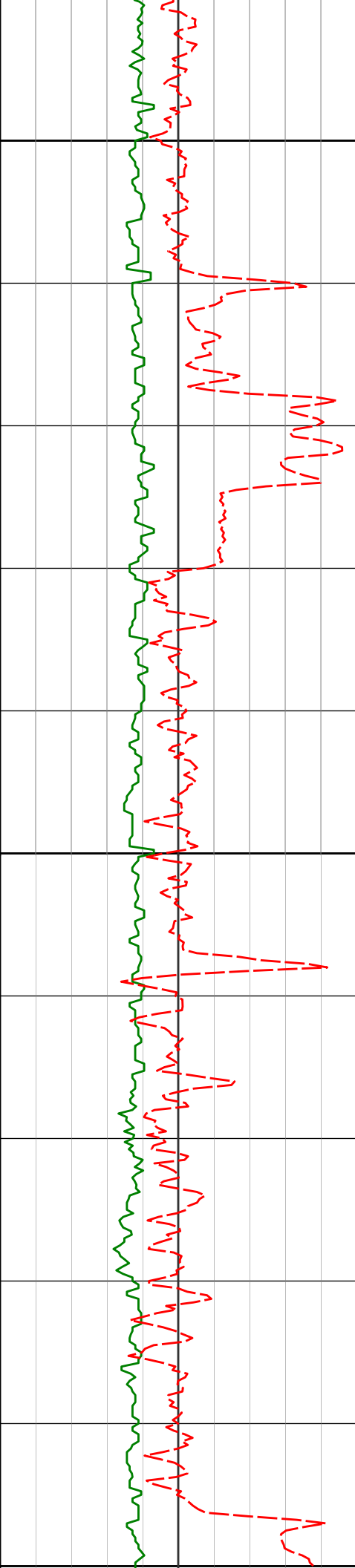
2077.40'

196.53°F

8800

196.53°F





9100

9200

9300

9146'

9241'

89.75°

90.28°

87.60° 6481.63'

87.23° 6481.61'

2454.38'

2549.25'

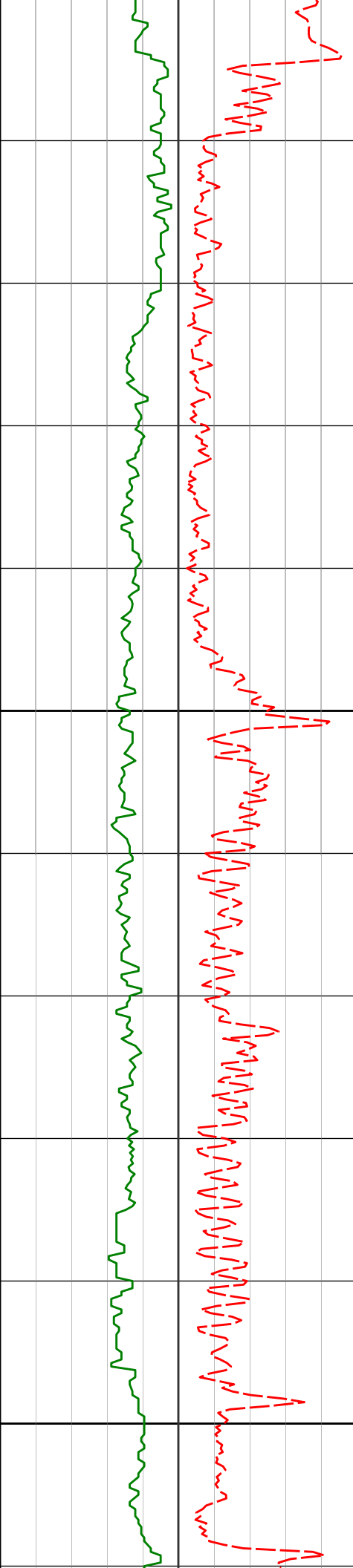
200.75°F

200.75°F

200.75°F

200.75°F

200.75°F



9500

9400

9500

9335'

89.11°

89.98° 6482.11'

2643.19'

9429'

88.86°

89.84° 6483.77'

2737.17'

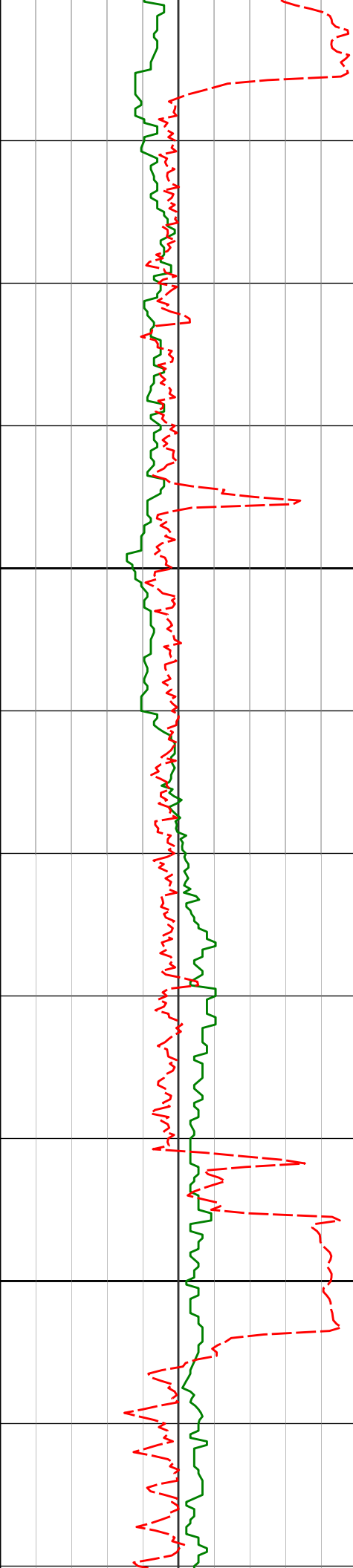
200.75°F

200.75°F

204.97°F

204.97°F

204.97°F



9600

9700

9524'

88.92°

90.79° 6485.62'

2832.15'

204.97°F

209.19°F

9619'

88.71°

90.75° 6487.58'

2927.13'

209.19°F

209.19°F

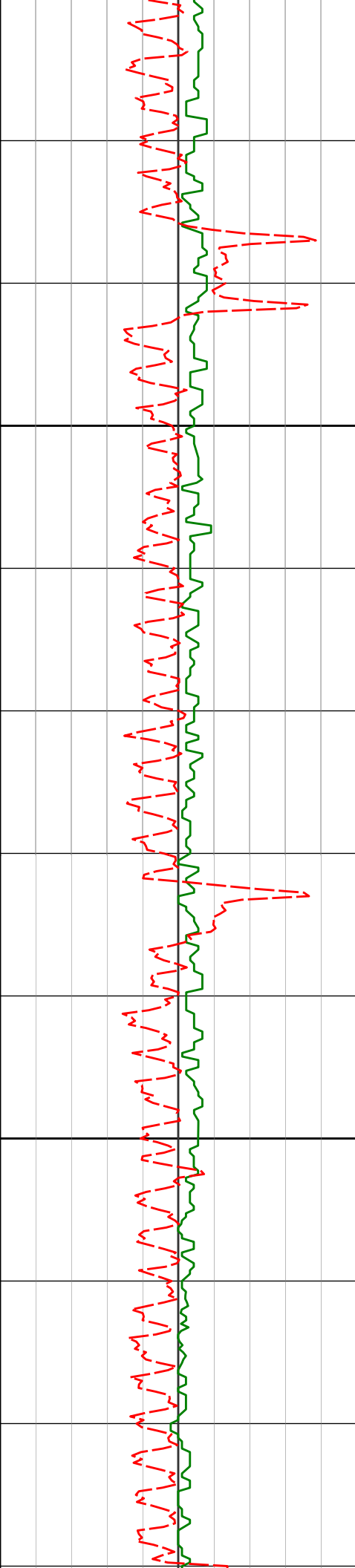
9713'

90.40°

90.64° 6488.31'

3021.12'

209.19°F



9800

9808'

90.31°

90.50° 6487.72'

3116.12'

209.19°F

209.19°F

9900

9903'

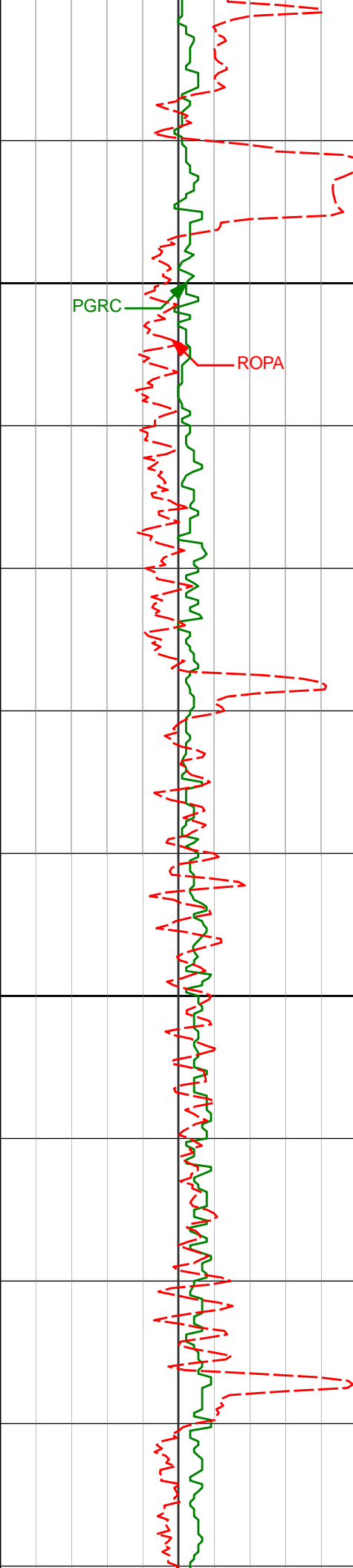
90.15°

90.01° 6487.34'

3211.11'

209.19°F

209.19°F



10000

10100

9997'

91.08°

89.57° 6486.33'

3305.10'

209.19°F

209.19°F

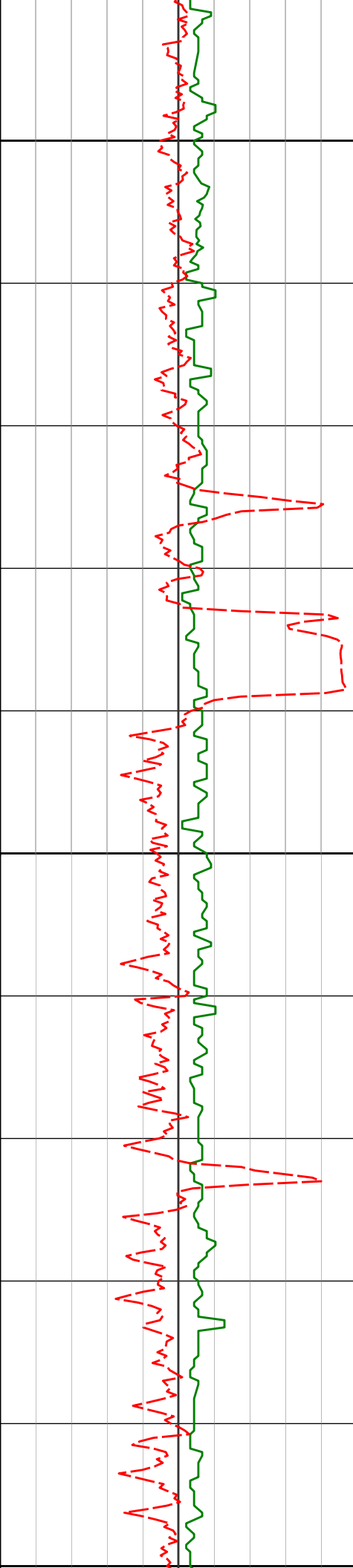
209.19°F

209.19°F

209.19°F

PGRC

ROPA



10200

10300

10400

10185' 91.36° 88.80° 6482.33' 3493.01'

10277' 89.94° 87.78° 6481.28' 3584.94'

10369' 90.06° 87.28° 6481.28' 3676.82'

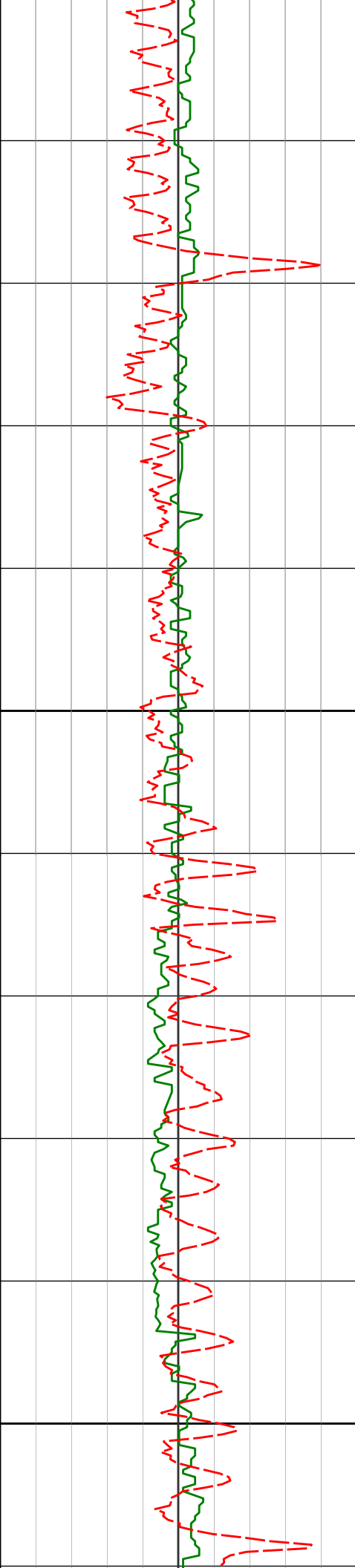
209.19°F

209.19°F

209.19°F

213.41°F

213.41°F



10400

10500

10600

10460'

89.78°

87.14° 6481.41'

3767.67'

10553'

89.57°

86.57° 6481.94'

3860.49'

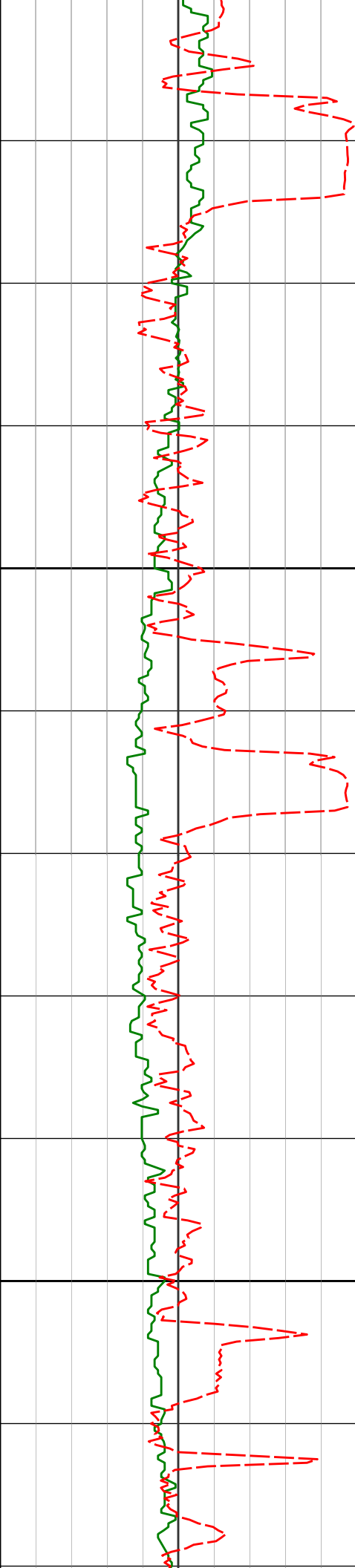
213.41°F

213.41°F

213.41°F

213.41°F

213.41°F



10646'

89.88°

87.76° 6482.39'

3953.33'

213.41°F

10700

213.41°F

10739'

90.92°

88.03° 6481.74'

4046.23'

213.41°F

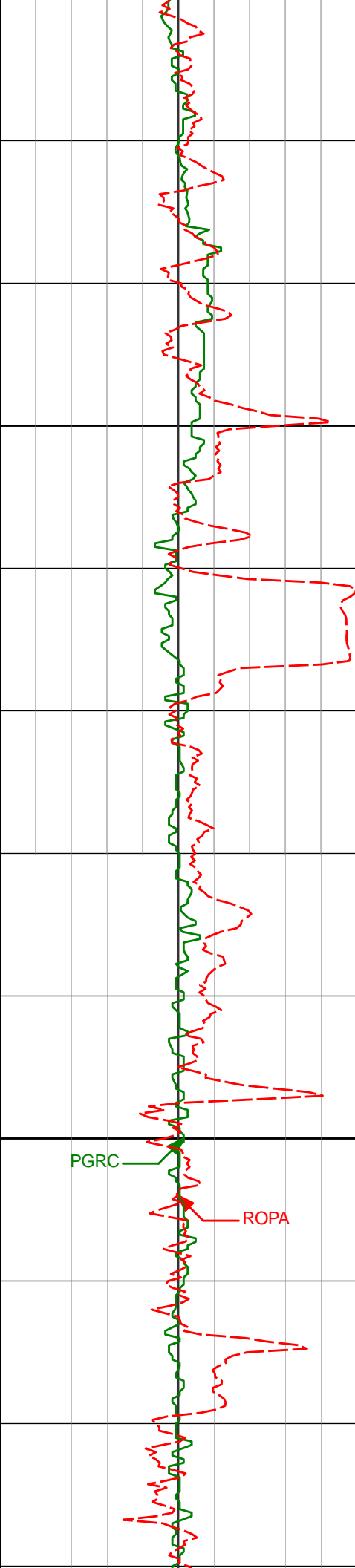
10800

10832'

91.51°

88.53° 6479.76'

4139.15'



10900

10924'

90.34°

88.74° 6478.28'

4231.09'

11000

11017'

90.25°

89.30° 6477.80'

4324.06'

PGRC

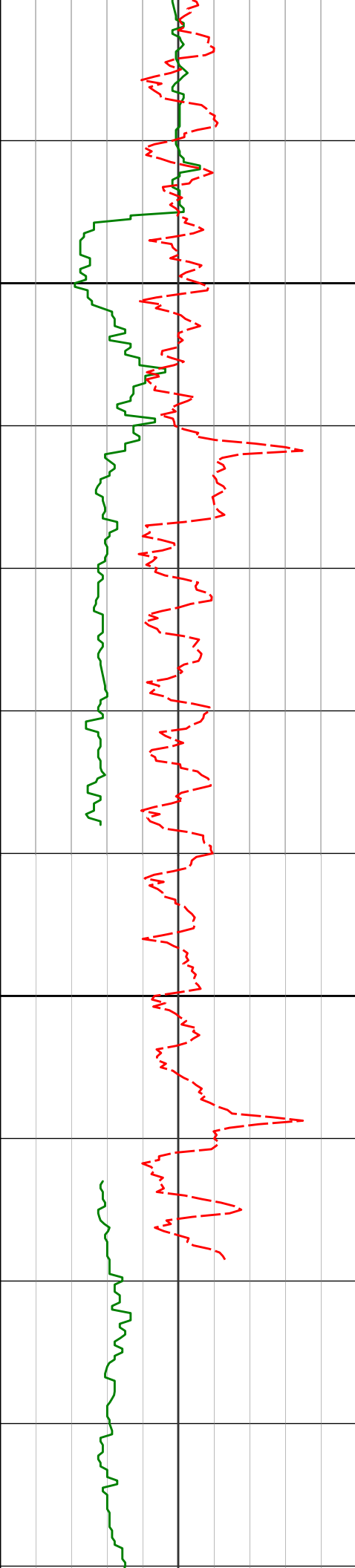
ROPA

217.63°F

217.63°F

217.63°F

217.63°F



11100

11200

11202'

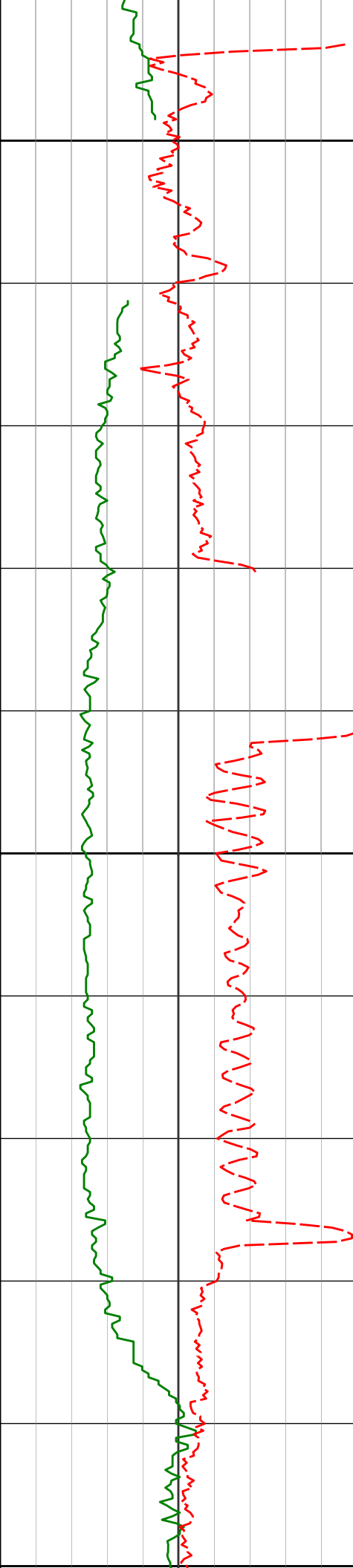
90.80°

90.14° 6476.11'

4509.03'

221.84°F

221.84°F



11300

11400

11500

11294'

90.71°

89.47° 6474.89'

4601.02'

11386'

90.68°

89.26° 6473.78'

4692.99'

221.84°F

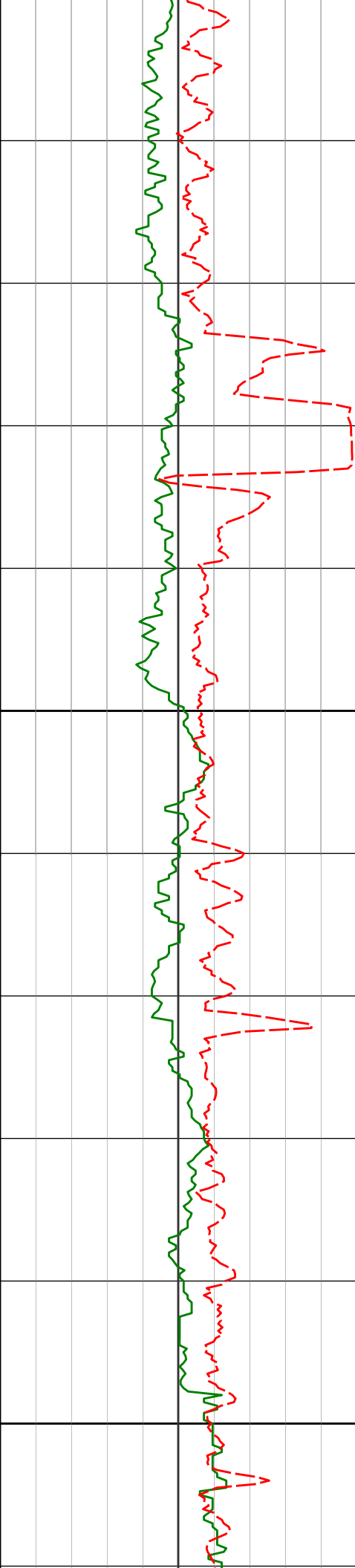
11478'

91.42°

89.20° 6472.09'

4784.96'

221.84°F



11500

11600

11700

11572'

90.09°

88.22° 6470.85'

4878.90'

221.84°F

221.84°F

221.84°F

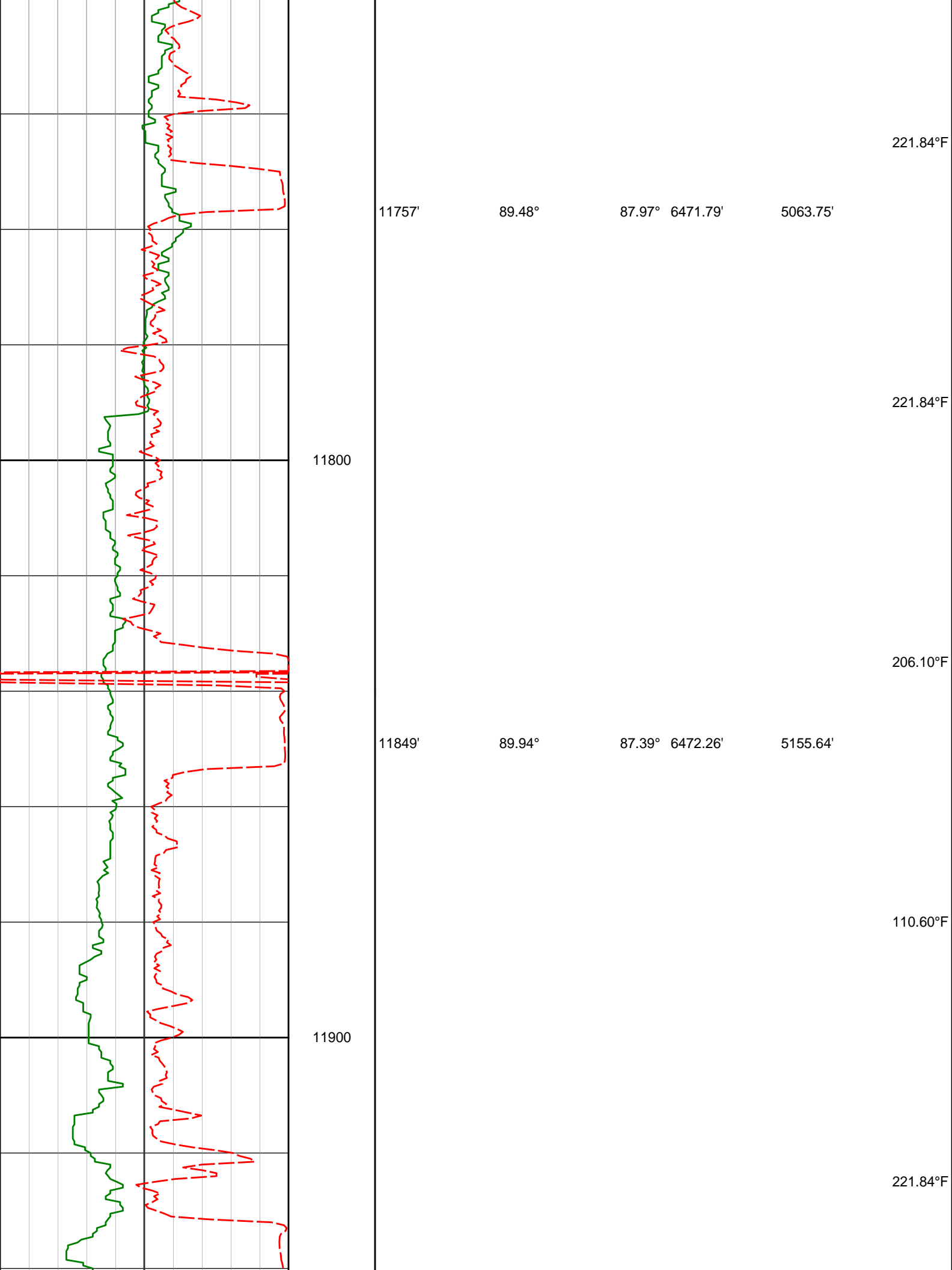
11665'

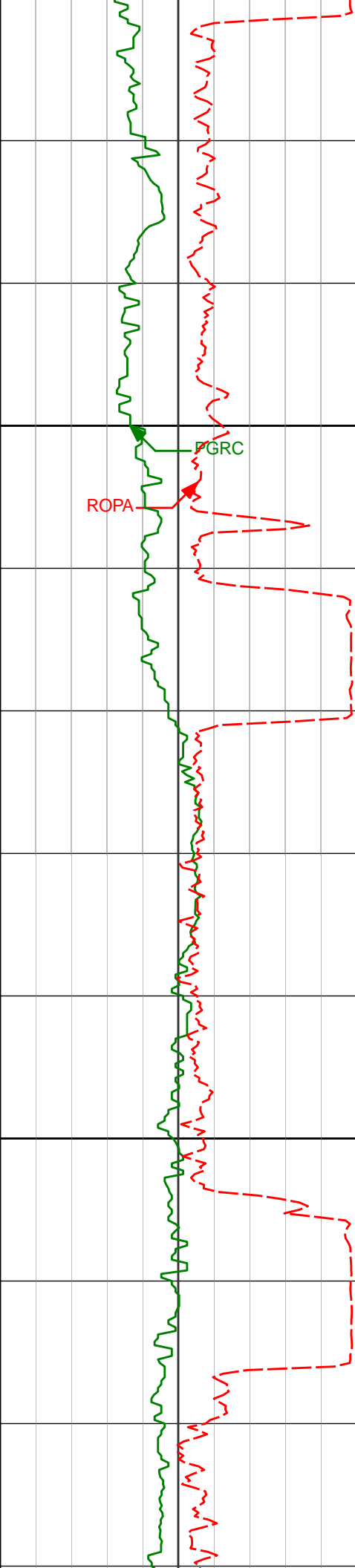
89.63°

88.25° 6471.08'

4971.83'

221.84°F

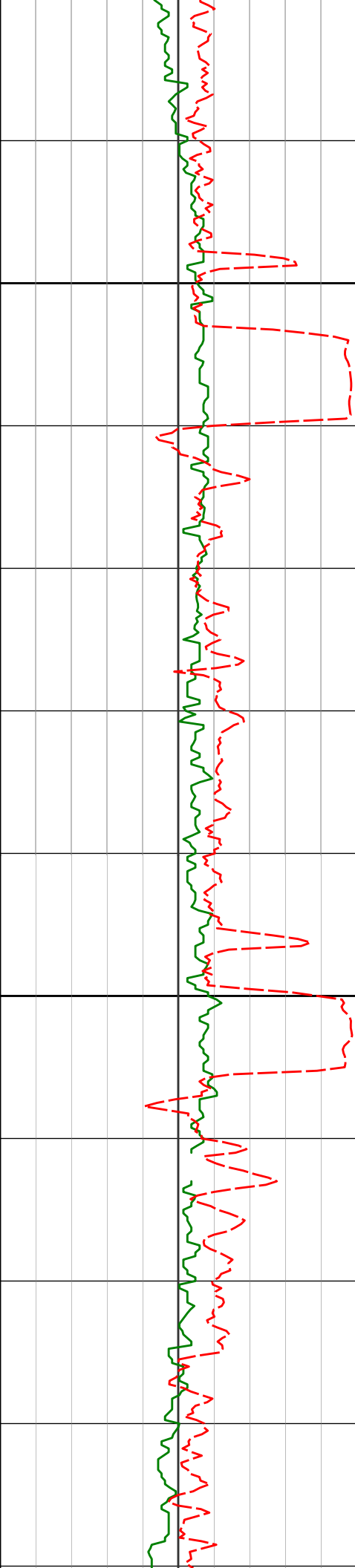




12000

12100

11941'	89.20°	86.67°	6472.95'	5247.47'	221.84°F
12036'	88.74°	85.09°	6474.66'	5342.15'	221.84°F
12131'	90.37°	84.69°	6475.40'	5436.70'	221.84°F



12200

12225'

90.62°

85.20° 6474.58'

5530.26'

221.84°F

221.84°F

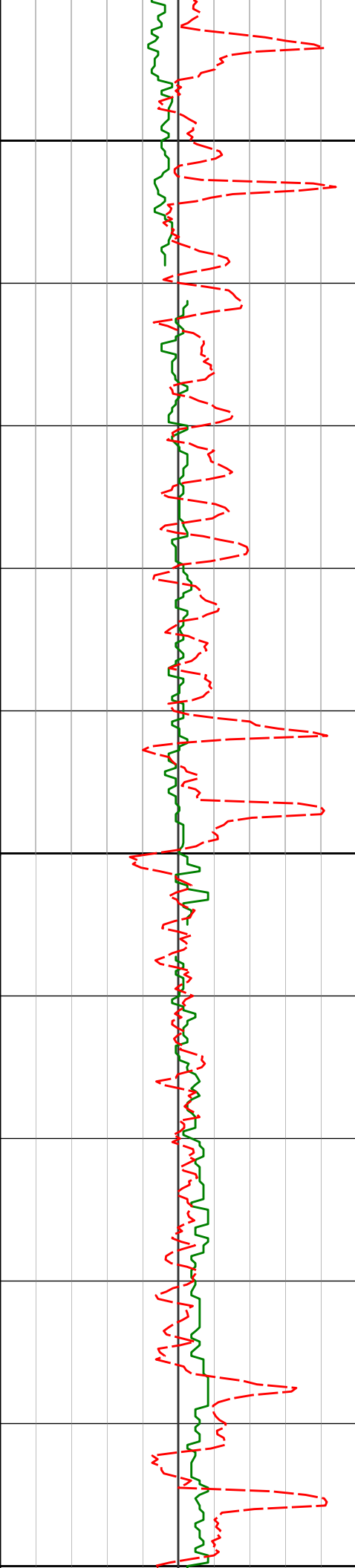
12300

12319'

91.39°

86.55° 6472.94'

5623.95'



12400

12414'

91.23°

85.99° 6470.76'

5718.67'

12500

12509'

91.26°

86.02° 6468.70'

5813.36'

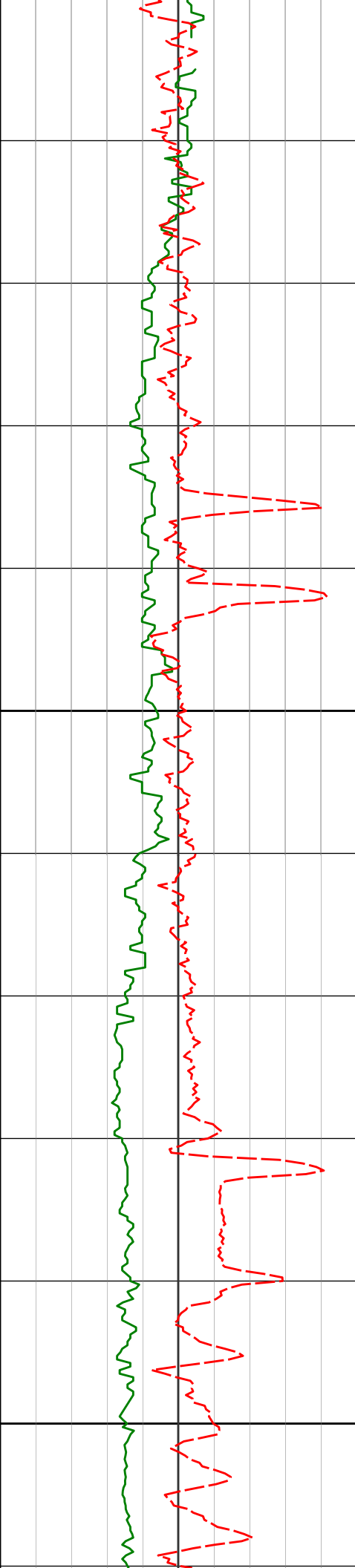
12600

226.06°F

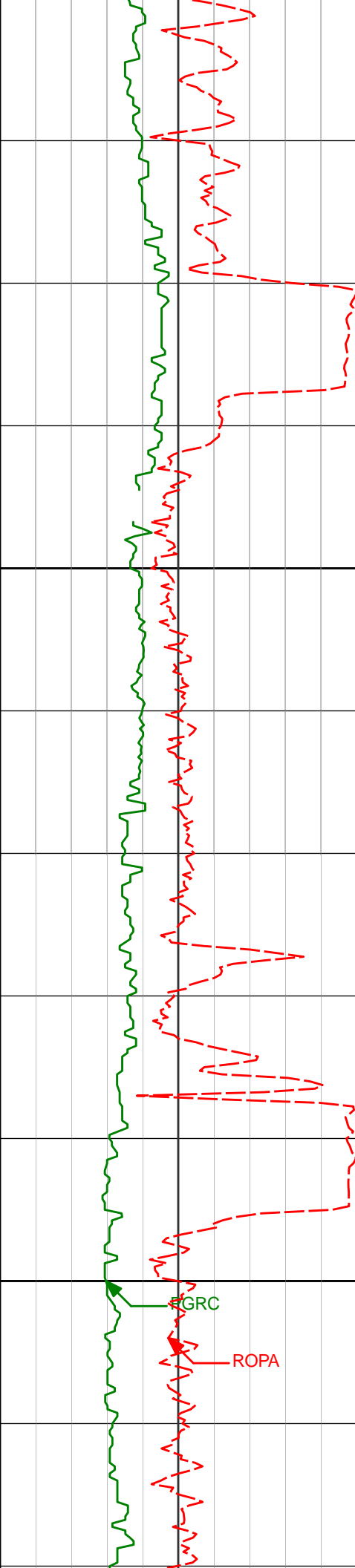
230.28°F

230.28°F

230.28°F



12600	12603'	91.64°	86.19°	6466.32'	5907.06'	230.28°F
						230.28°F
						230.28°F
12700	12698'	91.85°	86.06°	6463.43'	6001.75'	
						230.28°F
						230.28°F
12800	12793'	92.28°	86.10°	6460.01'	6096.41'	



12900

13000

12887'

91.88°

88.10° 6456.59'

6190.18'

12982'

90.80°

88.16° 6454.37'

6285.08'

RGR

ROPA

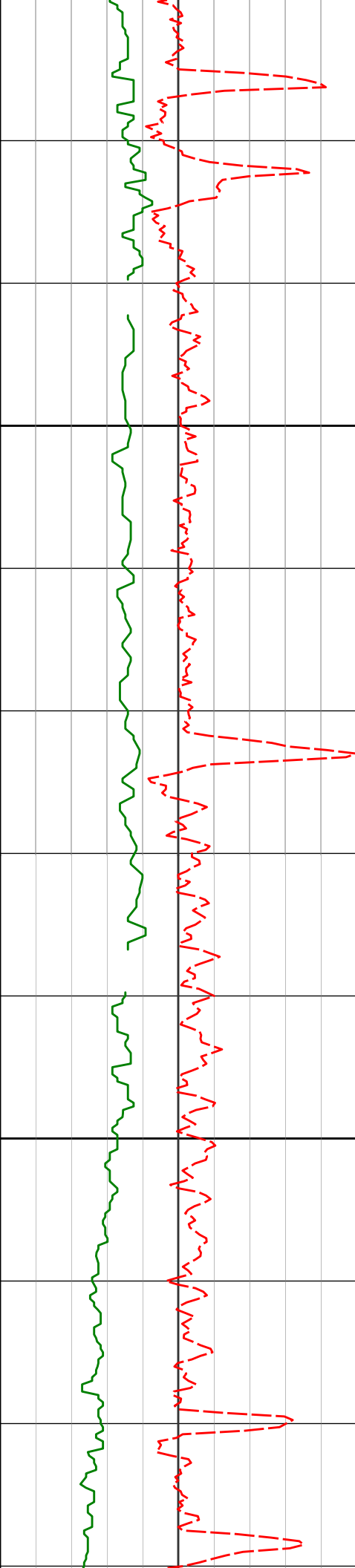
230.28°F

230.28°F

230.28°F

230.28°F

230.28°F



13100

13200

13076'

89.32°

87.07° 6454.27'

6378.96'

13171'

91.23°

90.55° 6453.82'

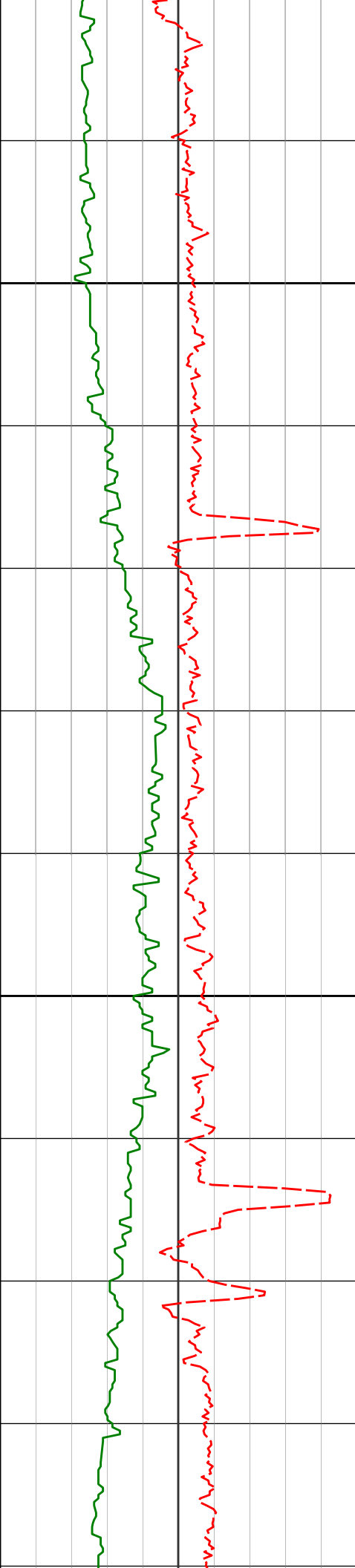
6473.90'

230.28°F

230.28°F

230.28°F

230.28°F



13266'

90.74°

89.58° 6452.18'

6568.88'

230.28°F

13300

230.28°F

13360'

91.11°

89.59° 6450.67'

6662.86'

234.50°F

13400

234.50°F

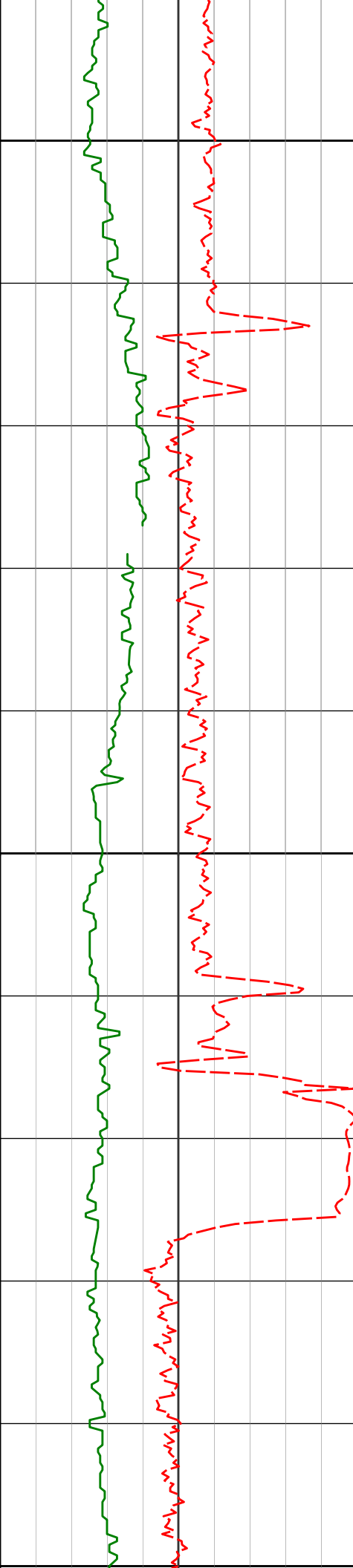
13455'

91.08°

88.75° 6448.85'

6757.81'

238.72°F



13500

238.72°F

13550'

91.69°

88.82°

6446.55'

6852.75'

238.72°F

13600

238.72°F

13644'

89.60°

88.94°

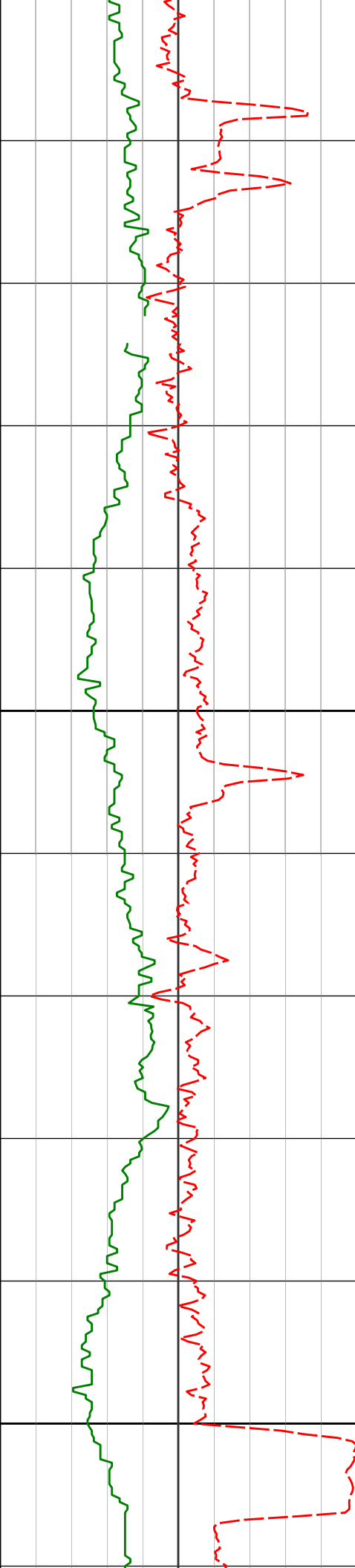
6445.50'

6946.70'

230.28°F

230.28°F

13700



13700

13800

13900

13739'

89.26°

88.50° 6446.44'

7041.65'

13834'

88.98°

87.81° 6447.90'

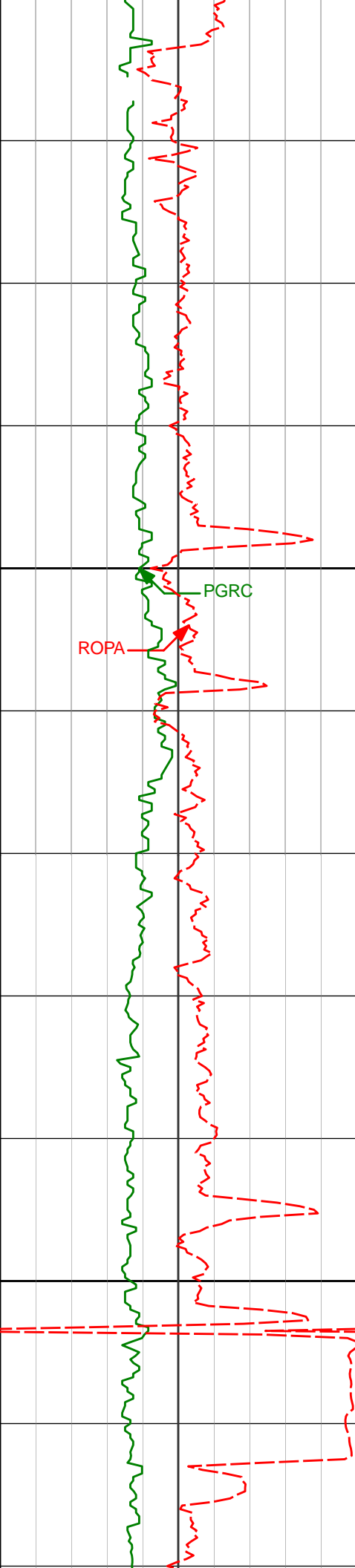
7136.56'

234.50°F

234.50°F

234.50°F

234.50°F



14000

14100

13928'

89.04°

88.58° 6449.53'

7230.48'

234.50°F

236.87°F

14023'

88.65°

88.63° 6451.44'

7325.41'

238.72°F

234.50°F

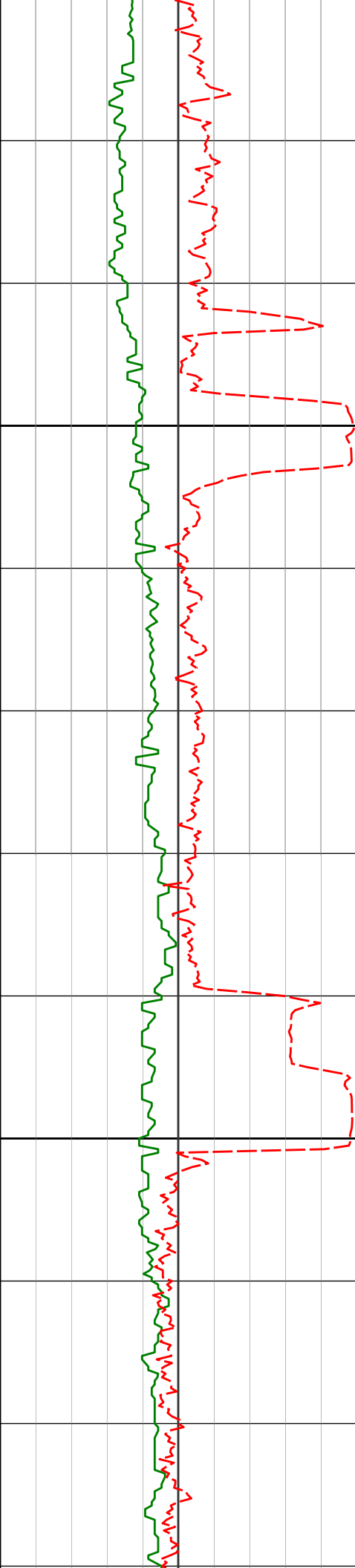
14118'

89.54°

88.01° 6452.94'

7420.33'

234.50°F



14200

14300

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89.35°

88.65° 6453.85'

7514.26'

14307'

90.56°

88.46° 6453.93'

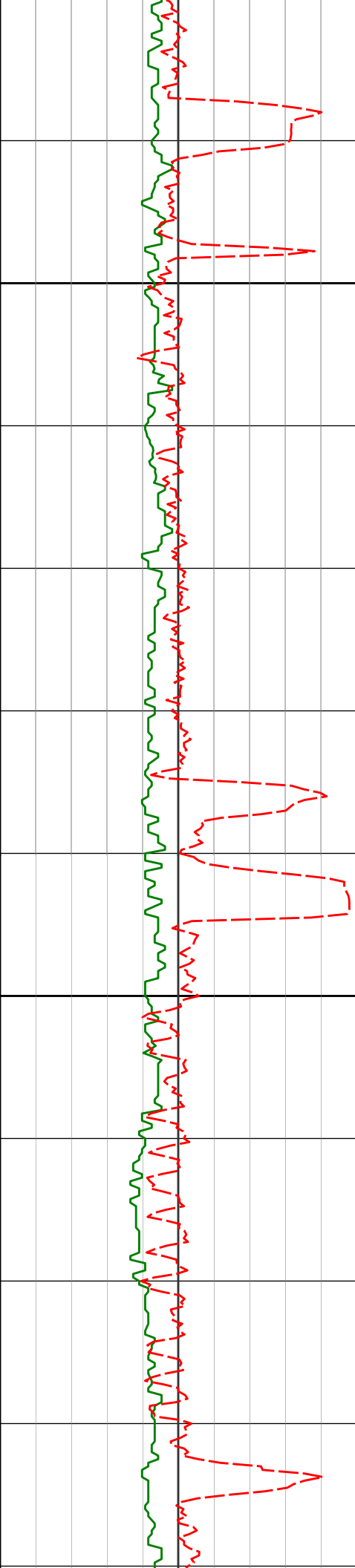
7609.21'

234.50°F

234.50°F

234.50°F

234.50°F



14400

14401'

91.33°

88.86° 6452.38'

7703.15'

238.72°F

238.72°F

238.72°F

14500

14496'

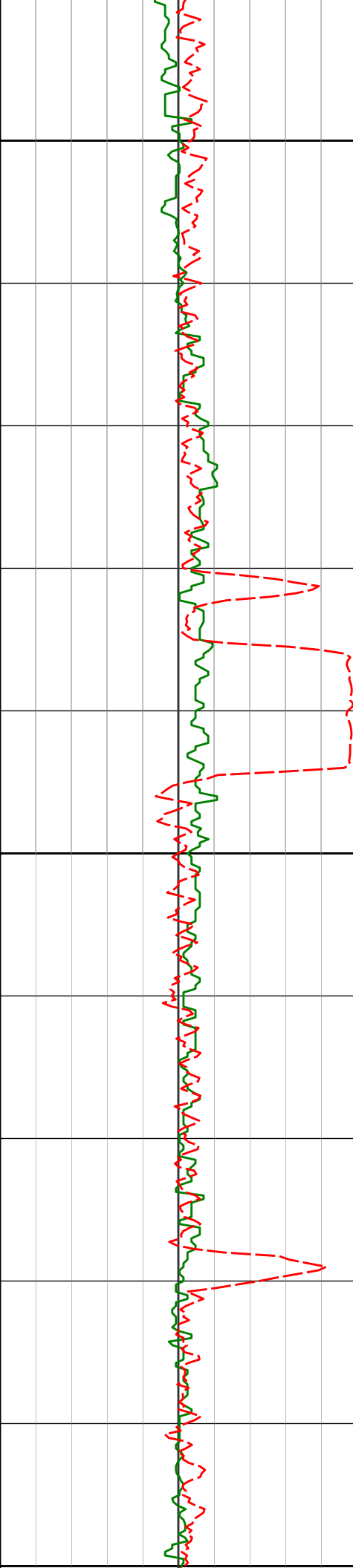
90.00°

87.51° 6451.27'

7798.06'

238.72°F

238.72°F



14600

14700

14800

14591'	89.69°	87.25°	6451.53'	7892.92'
14685'	89.97°	86.48°	6451.81'	7986.74'
14780'	89.82°	86.25°	6451.98'	8081.50'

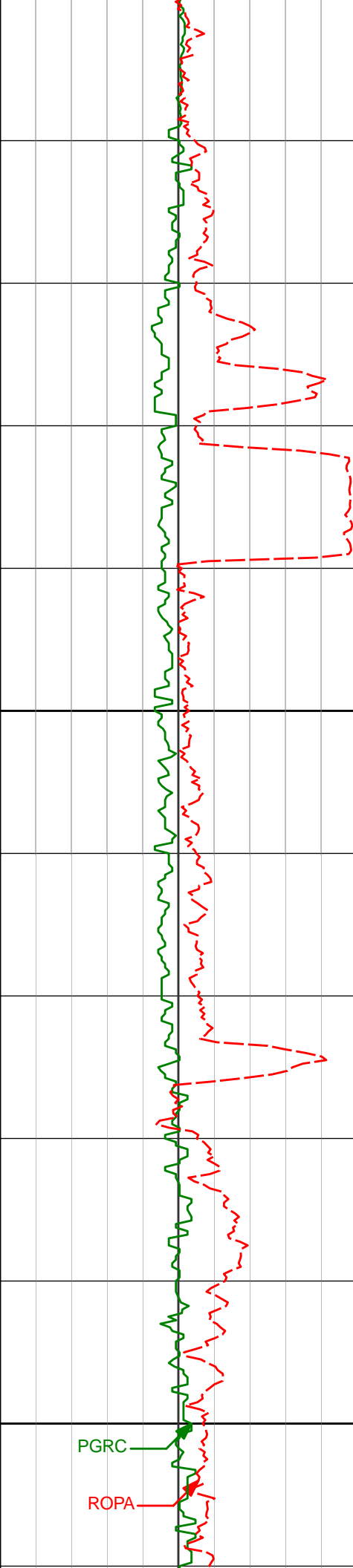
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



14800
14900
15000

PGRC

ROPA

14875'

90.34°

87.00°

6451.85'

8176.28'

14969'

90.06°

87.94°

6451.52'

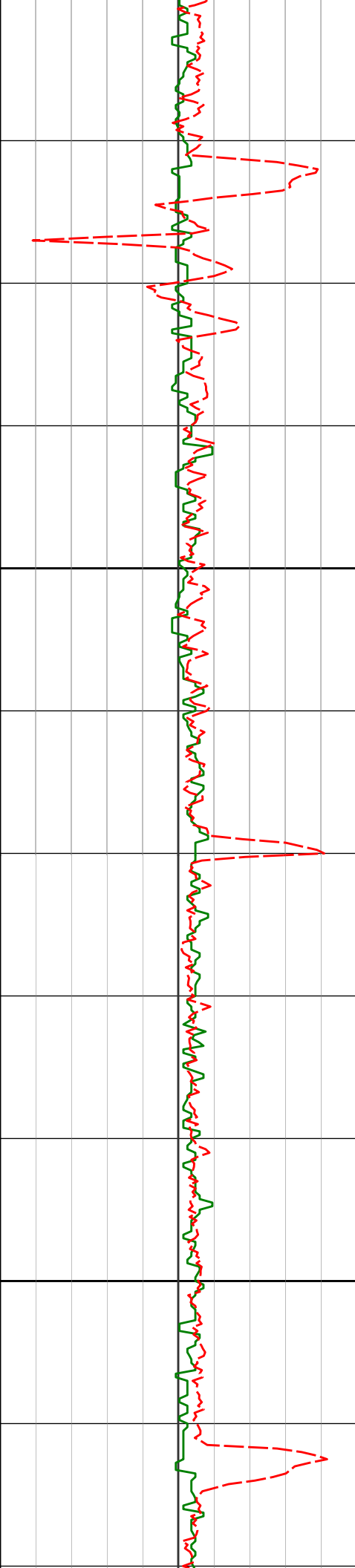
8270.16'

238.72°F

238.72°F

231.21°F

237.52°F



15100

15200

15064'

90.15°

87.83° 6451.35'

8365.06'

15159'

89.81°

86.71° 6451.38'

8459.91'

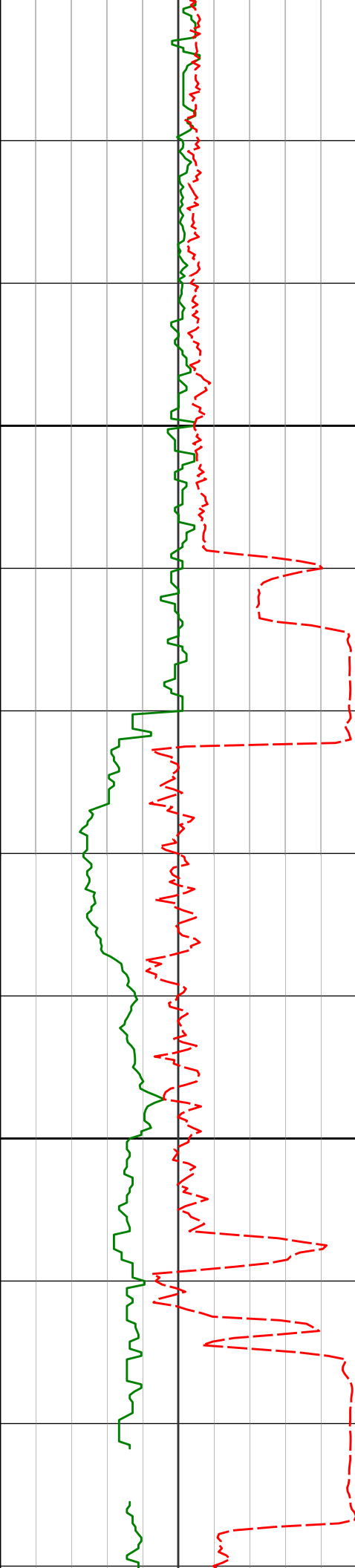
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



15300

15400

15253'

89.72°

86.02° 6451.77'

8553.67'

238.72°F

238.72°F

15348'

90.09°

86.67° 6451.92'

8648.43'

238.72°F

238.72°F

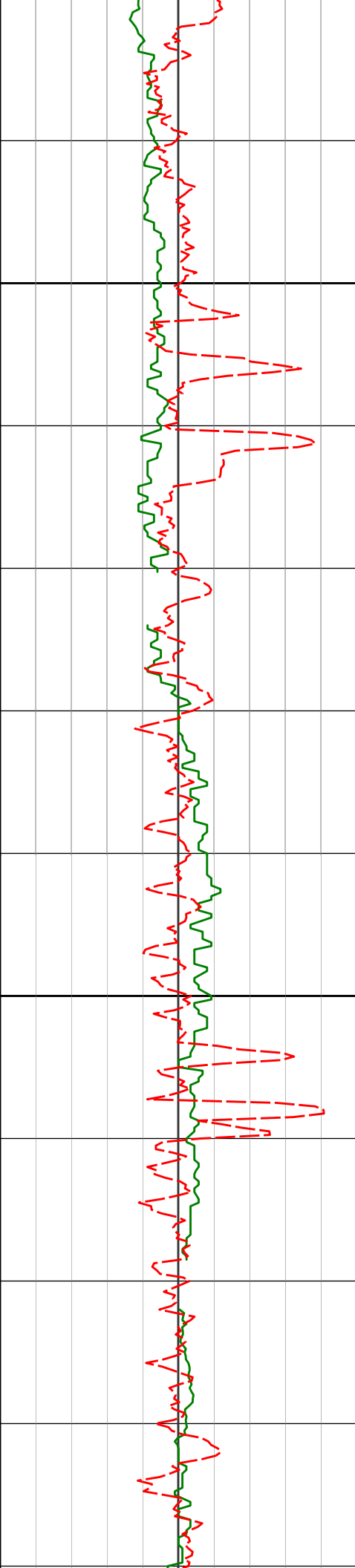
15444'

89.23°

88.32° 6452.49'

8744.29'

238.72°F



15500

15540'

89.20°

88.30° 6453.81'

8840.22'

15600

15637'

88.80°

87.63° 6455.50'

8937.11'

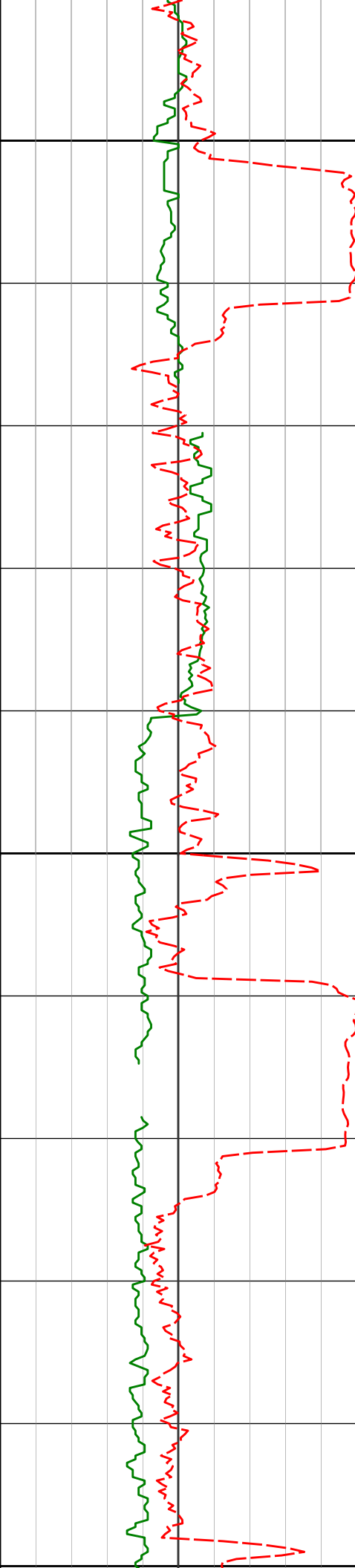
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



15700

15734'

89.20°

89.02° 6457.20'

9034.03'

15800

15831'

91.17°

89.27° 6456.88'

9131.00'

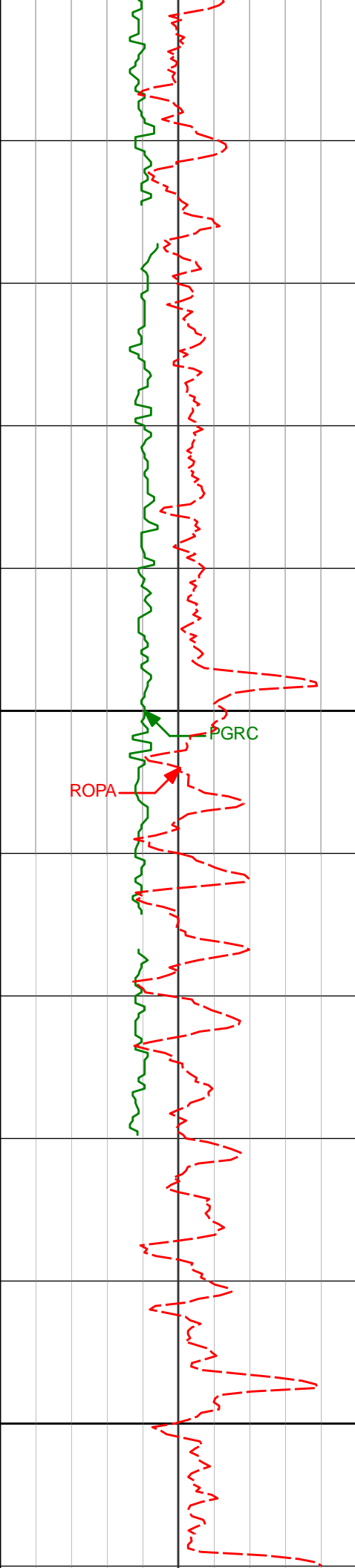
15900

238.72°F

238.72°F

238.72°F

238.72°F



15500

16000

16100

248.32°F

16026'

90.89°

89.48° 6453.38'

9325.93'

16053'

90.62°

88.50° 6453.02'

9352.92'

TD Well @ 16120' MD											
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											

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AE32-675
Wattenburg
Weld Colorado
USA
CA-XX-0902771583
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
674.00	0.16	229.95	674.00	0.59 S	0.71 W	-0.70	0.02
738.00	0.13	234.17	738.00	0.69 S	0.83 W	-0.83	0.05
832.00	0.17	150.58	832.00	0.87 S	0.85 W	-0.84	0.21
926.00	0.28	146.48	926.00	1.18 S	0.65 W	-0.64	0.13
1021.00	0.30	97.79	1021.00	1.42 S	0.27 W	-0.26	0.26
1115.00	0.39	116.86	1115.00	1.59 S	0.25 E	0.27	0.15
1206.00	0.43	121.08	1205.99	1.91 S	0.82 E	0.84	0.06
1298.00	0.47	113.49	1297.99	2.24 S	1.46 E	1.48	0.08
1482.00	0.28	140.34	1481.99	2.88 S	2.44 E	2.46	0.14
1575.00	0.68	348.86	1574.98	2.51 S	2.47 E	2.49	1.00
1668.00	3.33	287.51	1667.92	1.15 S	0.21 W	-0.20	3.30
1761.00	5.74	272.13	1760.63	0.17 S	7.44 W	-7.44	2.87
1853.00	7.78	274.19	1851.99	0.46 N	18.25 W	-18.25	2.24
1946.00	9.70	275.40	1943.90	1.66 N	32.33 W	-32.34	2.07
2039.00	10.09	263.58	2035.53	1.48 N	48.22 W	-48.23	2.22
2132.00	9.57	258.13	2127.16	1.02 S	63.89 W	-63.88	1.15
2223.00	10.12	245.72	2216.83	5.86 S	78.57 W	-78.53	2.40
2316.00	9.17	244.52	2308.52	12.41 S	92.71 W	-92.61	1.04
2408.00	9.00	230.50	2399.38	20.14 S	104.88 W	-104.72	2.41
2501.00	8.25	230.91	2491.32	28.98 S	115.68 W	-115.45	0.80
2594.00	7.59	231.47	2583.43	37.01 S	125.66 W	-125.37	0.72
2686.00	8.31	226.54	2674.55	45.37 S	135.24 W	-134.88	1.08
2778.00	7.53	224.93	2765.67	54.21 S	144.33 W	-143.90	0.88
2870.00	6.77	224.66	2856.96	62.34 S	152.40 W	-151.91	0.82
2965.00	7.42	237.61	2951.23	69.61 S	161.52 W	-160.97	1.81
3060.00	9.11	238.01	3045.24	76.88 S	173.08 W	-172.47	1.78
3154.00	8.92	233.18	3138.08	85.19 S	185.22 W	-184.55	0.83
3249.00	8.48	220.96	3232.00	94.90 S	195.71 W	-194.96	2.00
3343.00	6.23	220.05	3325.22	104.04 S	203.54 W	-202.72	2.40
3438.00	6.78	213.34	3419.61	112.67 S	209.94 W	-209.04	0.99
3533.00	7.63	216.94	3513.86	122.39 S	216.81 W	-215.84	1.02
3627.00	10.41	220.56	3606.69	133.84 S	226.08 W	-225.02	3.01
3722.00	11.90	220.37	3699.89	147.82 S	238.01 W	-236.84	1.57
3817.00	12.13	211.82	3792.82	163.76 S	249.62 W	-248.32	1.89
3911.00	9.66	197.75	3885.13	179.67 S	257.23 W	-255.81	3.84
4006.00	8.81	196.87	3978.90	194.23 S	261.77 W	-260.24	0.91
4100.00	7.08	204.98	4072.00	206.37 S	266.31 W	-264.68	2.18
4195.00	5.15	216.00	4166.45	215.13 S	271.29 W	-269.59	2.37
4289.00	5.68	230.50	4260.04	221.50 S	277.36 W	-275.61	1.56
4384.00	7.19	220.67	4354.44	229.01 S	284.86 W	-283.06	1.96
4478.00	7.69	221.92	4447.65	238.15 S	292.90 W	-291.03	0.56
4573.00	7.69	219.51	4541.79	247.79 S	301.20 W	-299.24	0.34
4668.00	8.16	221.36	4635.88	257.75 S	309.69 W	-307.66	0.56
4762.00	8.46	217.99	4728.90	268.21 S	318.36 W	-316.24	0.61

4762.00	8.48	217.55	4725.95	268.21 S	316.55 W	316.24	0.91
4857.00	8.00	215.38	4822.92	279.10 S	326.49 W	-324.28	0.63
4952.00	8.88	215.04	4916.89	290.49 S	334.52 W	-332.23	0.93
5046.00	9.17	216.85	5009.73	302.43 S	343.18 W	-340.80	0.43
5141.00	6.39	211.26	5103.84	313.01 S	350.47 W	-348.00	3.04
5235.00	6.35	224.07	5197.27	321.21 S	356.80 W	-354.26	1.51
5330.00	7.51	232.63	5291.58	328.76 S	365.39 W	-362.79	1.64
5424.00	8.25	225.12	5384.69	337.25 S	375.05 W	-372.39	1.34
5519.00	7.67	211.36	5478.78	347.47 S	383.17 W	-380.43	2.09
5614.00	5.85	201.88	5573.12	357.37 S	388.28 W	-385.46	2.24
5708.00	4.41	202.79	5666.74	365.15 S	391.46 W	-388.58	1.53
5803.00	2.22	199.18	5761.58	370.25 S	393.48 W	-390.56	2.32
5898.00	0.83	267.23	5856.55	372.02 S	394.77 W	-391.84	2.17
5992.00	9.96	108.76	5950.11	374.68 S	387.74 W	-384.78	11.42
6087.00	13.13	117.26	6043.18	382.26 S	370.37 W	-367.35	3.78
6181.00	16.96	104.96	6133.97	390.70 S	347.62 W	-344.54	5.29
6276.00	27.52	89.75	6221.85	394.19 S	312.16 W	-309.05	12.57
6370.00	39.80	96.28	6299.96	397.40 S	260.32 W	-257.19	13.61
6465.00	50.67	96.04	6366.76	404.61 S	193.36 W	-190.17	11.45
6559.00	57.28	93.21	6422.02	410.66 S	117.63 W	-114.40	7.44
6654.00	69.54	90.97	6464.46	413.66 S	32.90 W	-29.65	13.08
6748.00	83.33	85.20	6486.47	410.48 S	58.16 E	61.38	15.82
6822.00	86.64	85.27	6492.94	404.35 S	131.61 E	134.78	4.47
6972.00	87.90	89.07	6500.09	396.96 S	281.23 E	284.34	2.67
7066.00	88.61	89.33	6502.96	395.65 S	375.18 E	378.27	0.80
7161.00	89.82	87.55	6504.26	393.06 S	470.13 E	473.20	2.27
7255.00	89.66	86.73	6504.69	388.37 S	564.01 E	567.04	0.89
7350.00	89.57	86.84	6505.32	383.04 S	658.85 E	661.84	0.15
7445.00	90.86	86.88	6504.97	377.84 S	753.71 E	756.65	1.36
7539.00	91.36	86.70	6503.15	372.58 S	847.54 E	850.44	0.57
7633.00	90.28	87.53	6501.80	367.84 S	941.41 E	944.27	1.45
7728.00	89.97	86.24	6501.59	362.68 S	1036.27 E	1039.09	1.40
7822.00	89.63	85.68	6501.92	356.06 S	1130.04 E	1132.80	0.70
7917.00	91.02	87.52	6501.38	350.43 S	1224.86 E	1227.58	2.43
8011.00	91.36	87.93	6499.43	346.70 S	1318.77 E	1321.45	0.57
8105.00	90.25	87.92	6498.11	343.29 S	1412.69 E	1415.35	1.18
8200.00	91.02	88.43	6497.06	340.27 S	1507.64 E	1510.26	0.97
8295.00	91.11	88.24	6495.29	337.51 S	1602.58 E	1605.18	0.22
8389.00	90.95	87.59	6493.60	334.09 S	1696.50 E	1699.08	0.71
8484.00	91.29	87.33	6491.75	329.88 S	1791.39 E	1793.93	0.45
8579.00	90.83	87.62	6489.99	325.69 S	1886.28 E	1888.78	0.57
8673.00	91.05	86.90	6488.45	321.20 S	1980.16 E	1982.62	0.80
8768.00	91.29	86.41	6486.51	315.66 S	2074.98 E	2077.40	0.57
8863.00	91.17	86.06	6484.47	309.42 S	2169.75 E	2172.12	0.39
8957.00	91.20	85.93	6482.52	302.86 S	2263.50 E	2265.81	0.14
9052.00	90.06	86.51	6481.48	296.60 S	2358.29 E	2360.55	1.35
9146.00	89.75	87.60	6481.63	291.77 S	2452.16 E	2454.38	1.21
9241.00	90.28	87.23	6481.61	287.48 S	2547.07 E	2549.25	0.68
9335.00	89.11	89.98	6482.11	285.19 S	2641.03 E	2643.19	3.18
9429.00	88.86	89.84	6483.77	285.05 S	2735.01 E	2737.17	0.30
9524.00	88.92	90.79	6485.62	285.57 S	2829.99 E	2832.15	1.00
9619.00	88.71	90.75	6487.58	286.84 S	2924.96 E	2927.13	0.23
9713.00	90.40	90.64	6488.31	287.98 S	3018.95 E	3021.12	1.80
9808.00	90.31	90.50	6487.72	288.93 S	3113.94 E	3116.12	0.18
9903.00	90.15	90.01	6487.34	289.35 S	3208.94 E	3211.11	0.54
9997.00	91.08	89.57	6486.33	289.01 S	3302.93 E	3305.10	1.09
10185.00	91.36	88.80	6482.33	286.33 S	3490.87 E	3493.01	0.44
10277.00	89.94	87.78	6481.28	283.59 S	3582.82 E	3584.94	1.90
10369.00	90.06	87.28	6481.28	279.62 S	3674.73 E	3676.82	0.56
10460.00	89.78	87.14	6481.41	275.20 S	3765.63 E	3767.67	0.34
10553.00	89.57	86.57	6481.94	270.09 S	3858.48 E	3860.49	0.65
10646.00	89.88	87.76	6482.39	265.49 S	3951.37 E	3953.33	1.32
10739.00	90.92	88.03	6481.74	262.08 S	4044.30 E	4046.23	1.16
10832.00	91.51	88.53	6479.76	259.29 S	4137.24 E	4139.15	0.83
10924.00	90.34	88.74	6478.28	257.10 S	4229.20 E	4231.09	1.29
11017.00	90.25	89.30	6477.80	255.50 S	4322.18 E	4324.06	0.61
11202.00	90.80	90.14	6476.11	254.60 S	4507.17 E	4509.03	0.54
11294.00	90.71	89.47	6474.89	254.29 S	4599.16 E	4601.02	0.73
11386.00	90.68	89.26	6473.78	253.27 S	4691.15 E	4692.99	0.23
11478.00	91.42	89.20	6472.09	252.03 S	4783.12 E	4784.96	0.81
11572.00	90.09	88.22	6470.85	249.92 S	4877.09 E	4878.90	1.76
11665.00	89.63	88.25	6471.08	247.05 S	4970.04 E	4971.83	0.50
11757.00	89.48	87.97	6471.79	244.02 S	5061.99 E	5063.75	0.35
11849.00	89.94	87.39	6472.26	240.29 S	5153.91 E	5155.64	0.80
11941.00	89.20	86.67	6472.95	235.53 S	5245.79 E	5247.47	1.12

12036.00	88.74	85.09	6474.66	228.70 S	5340.52 E	5342.15	1.73
12131.00	90.37	84.69	6475.40	220.24 S	5435.14 E	5436.70	1.77
12225.00	90.62	85.20	6474.58	211.96 S	5528.77 E	5530.26	0.60
12319.00	91.39	86.55	6472.94	205.20 S	5622.51 E	5623.95	1.65
12414.00	91.23	85.99	6470.76	199.02 S	5717.28 E	5718.67	0.61
12509.00	91.26	86.02	6468.70	192.40 S	5812.03 E	5813.36	0.04
12603.00	91.64	86.19	6466.32	186.02 S	5905.78 E	5907.06	0.44
12698.00	91.85	86.06	6463.43	179.60 S	6000.52 E	6001.75	0.26
12793.00	92.28	86.10	6460.01	173.11 S	6095.24 E	6096.41	0.45
12887.00	91.88	88.10	6456.59	168.36 S	6189.05 E	6190.18	2.17
12982.00	90.80	88.16	6454.37	165.26 S	6283.97 E	6285.08	1.14
13076.00	89.32	87.07	6454.27	161.35 S	6377.89 E	6378.96	1.96
13171.00	91.23	90.55	6453.82	159.38 S	6472.85 E	6473.90	4.18
13266.00	90.74	89.58	6452.18	159.48 S	6567.83 E	6568.88	1.14
13360.00	91.11	89.59	6450.67	158.80 S	6661.81 E	6662.86	0.39
13455.00	91.08	88.75	6448.85	157.43 S	6756.79 E	6757.81	0.88
13550.00	91.69	88.82	6446.55	155.41 S	6851.74 E	6852.75	0.65
13644.00	89.60	88.94	6445.50	153.58 S	6945.71 E	6946.70	2.23
13739.00	89.26	88.50	6446.44	151.45 S	7040.68 E	7041.65	0.59
13834.00	88.98	87.81	6447.90	148.40 S	7135.62 E	7136.56	0.78
13928.00	89.04	88.58	6449.53	145.44 S	7229.56 E	7230.48	0.82
14023.00	88.65	88.63	6451.44	143.12 S	7324.51 E	7325.41	0.41
14118.00	89.54	88.01	6452.94	140.34 S	7419.45 E	7420.33	1.14
14212.00	89.35	88.65	6453.85	137.60 S	7513.41 E	7514.26	0.71
14307.00	90.56	88.46	6453.93	135.20 S	7608.38 E	7609.21	1.29
14401.00	91.33	88.86	6452.38	133.01 S	7702.34 E	7703.15	0.92
14496.00	90.00	87.51	6451.27	130.00 S	7797.28 E	7798.06	1.99
14591.00	89.69	87.25	6451.53	125.65 S	7892.18 E	7892.92	0.43
14685.00	89.97	86.48	6451.81	120.51 S	7986.04 E	7986.74	0.87
14780.00	89.82	86.25	6451.98	114.49 S	8080.85 E	8081.50	0.29
14875.00	90.34	87.00	6451.85	108.90 S	8175.68 E	8176.28	0.96
14969.00	90.06	87.94	6451.52	104.75 S	8269.59 E	8270.16	1.04
15064.00	90.15	87.83	6451.35	101.24 S	8364.52 E	8365.06	0.15
15159.00	89.81	86.71	6451.38	96.72 S	8459.41 E	8459.91	1.23
15253.00	89.72	86.02	6451.77	90.76 S	8553.22 E	8553.67	0.74
15348.00	90.09	86.67	6451.92	84.70 S	8648.03 E	8648.43	0.79
15444.00	89.23	88.32	6452.49	80.51 S	8743.93 E	8744.29	1.94
15540.00	89.20	88.30	6453.81	77.68 S	8839.88 E	8840.22	0.04
15637.00	88.80	87.63	6455.50	74.23 S	8936.80 E	8937.11	0.80
15734.00	89.20	89.02	6457.20	71.40 S	9033.75 E	9034.03	1.49
15831.00	91.17	89.27	6456.88	69.95 S	9130.73 E	9131.00	2.05
16026.00	90.89	89.48	6453.38	67.82 S	9325.69 E	9325.93	0.18
16053.00	90.62	88.50	6453.02	67.35 S	9352.68 E	9352.92	3.76
16120.00	90.62	88.50	6452.30	65.59 S	9419.65 E	9419.88	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 90.45 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 16120.00 FEET
IS 9419.88 FEET ALONG 90.40 DEGREES (GRID)**

Final survey is a straight line projection to TD.