



1 : 240

WELL INFORMATION					
MWD Run Number	100	200	300	400	500
Date run completed	12-Aug-16	12-Aug-16	13-Aug-16	15-Aug-16	17-Aug-16
Rig Bit Number	2	3	4	0400	0500
Bit Size (in)	8.500	8.500	8.500	8.500	8.500
Tool Nominal OD (in)	6.750	6.750	6.750	6.750	6.750
Log Start Depth (MD, ft)	1,943.00	5,495.00	5,857.00	6,200.00	12,756.00
Log End Depth (MD, ft)	5,495.00	5,857.00	6,200.00	12,756.00	16,320.00
Drill or Wipe	Drill	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	11-Aug-16 12:00	12-Aug-16 12:30	13-Aug-16 03:00	13-Aug-16 13:00	16-Aug-16 02:00
Drill/Wipe End Date and Time	12-Aug-16 06:00	12-Aug-16 19:00	13-Aug-16 06:00	15-Aug-16 09:00	17-Aug-16 03:30
Min Inc (deg) @ Depth (MD, ft)	0.34 @ 2,027.00	16.15 @ 5,582.00	38.02 @ 5,865.00	89.20 @ 10,121.00	88.56 @ 14,000.00
Max Inc (deg) @ Depth (MD, ft)	11.07 @ 2,689.00	29.88 @ 5,771.00	91.20 @ 6,149.00	92.80 @ 7,000.00	91.97 @ 15,892.00
Bit TFA(in2) / Bit Type	PDC / 1.24	1.24 / PDC	1.24 / PDC	1.50 / PDC	1.50 / PDC
Flow Rate (gpm)	591.91	540.00	550.00	600.00	600.00
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	450.0 / 250.0	N/A / N/A
Fluid Type	Diesel Mud Base	Diesel Mud Base	Diesel Mud Base	Diesel Mud Base	Diesel Mud Base
Density (ppg) / Viscosity (spqt)	9.70 / 61.00	9.60 / 50.00	9.50 / 53.00	9.65 / 48.00	9.70 / 46.00
Filtrate CL (ppm)	35,000.00	30,000.00	29,000.00	15,000.00	35,000.00
pH / Fluid Loss (mptm)	N/A / 14	N/A / 12	N/A / 12	N/A / N/A	N/A / N/A
PV (cP) / YP (lbf2)	19 / 9.00	15 / 7.00	14 / 6.00	17 / 11.00	16 / 11.00
% Solids / % Sand	10.2 / 0	10 / 0	9.30 / 0	11.80 / 0.1	11.50 / 0
% Oil / Oil:Water Ratio	61.00 / 75:25	66.00 / 75:25	66.00 / 75:25	90 / 90:10	68 / 75:25
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Max Tool Temp (in F) / C	456.73 / 236.51	422.22 / 206.23	422.22 / 206.23	322.22 / 161.79	347.73 / 175.96

Max Tool Temp (degF) / Source	153.79 / PCM	160.83 / PCM	160.83 / PCM	236.82 / PCM	247.78 / PCM
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ 160.83	N/A @ N/A	N/A @ N/A	N/A @ N/A
Lead MWD Engineer	Adam Sampson	Adam Sampson	Adam Sampson	Adam Sampson	Adam Sampson
Customer Representative	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez	Johnny Sanchez

SENSOR INFORMATION

REMARKS

- All depths are calibrated to driller's pipe tally and are measured depths from the drillers floor.
- No depth corrections have been made for pipe stretch or compression.
- All data presented is recorded (memory data) unless otherwise stated.
- The following smoothing parameters have been applied to the data:
 

Main Log 1:600 (2"):

(ROPA - Avg Rate of Penetration)

Interval: 1.0 ft, Coercion Distance: 3.0 ft, Gap fill: 5.0 ft

(PGRC - Gamma Ray Cor)

Interval: 1.0 ft, Coercion Distance: 3.0 ft, Gap fill: 5.0 ft

Detail Log 1:240 (5"):

(ROPA - Avg Rate of Penetration)

Interval: 0.5 ft, Coercion Distance: 1.2 ft, Gap fill: 3.0 ft

(PGRC - Gamma Ray Cor)

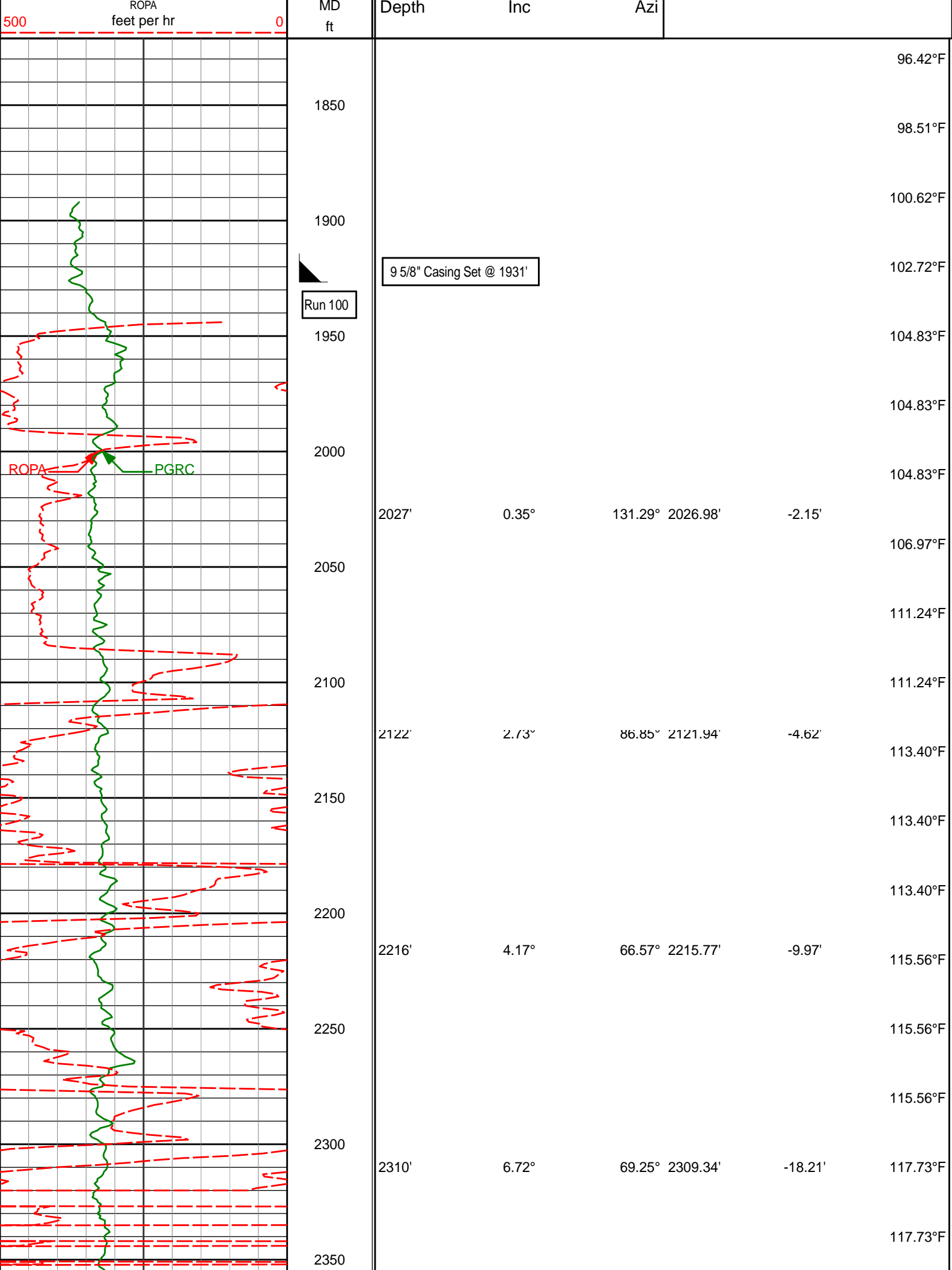
Interval: 0.5 ft, Coercion Distance: 0.6 ft, Gap fill: 3.0 ft
- Surveys corrected by Surcon starting at 2027 ft.

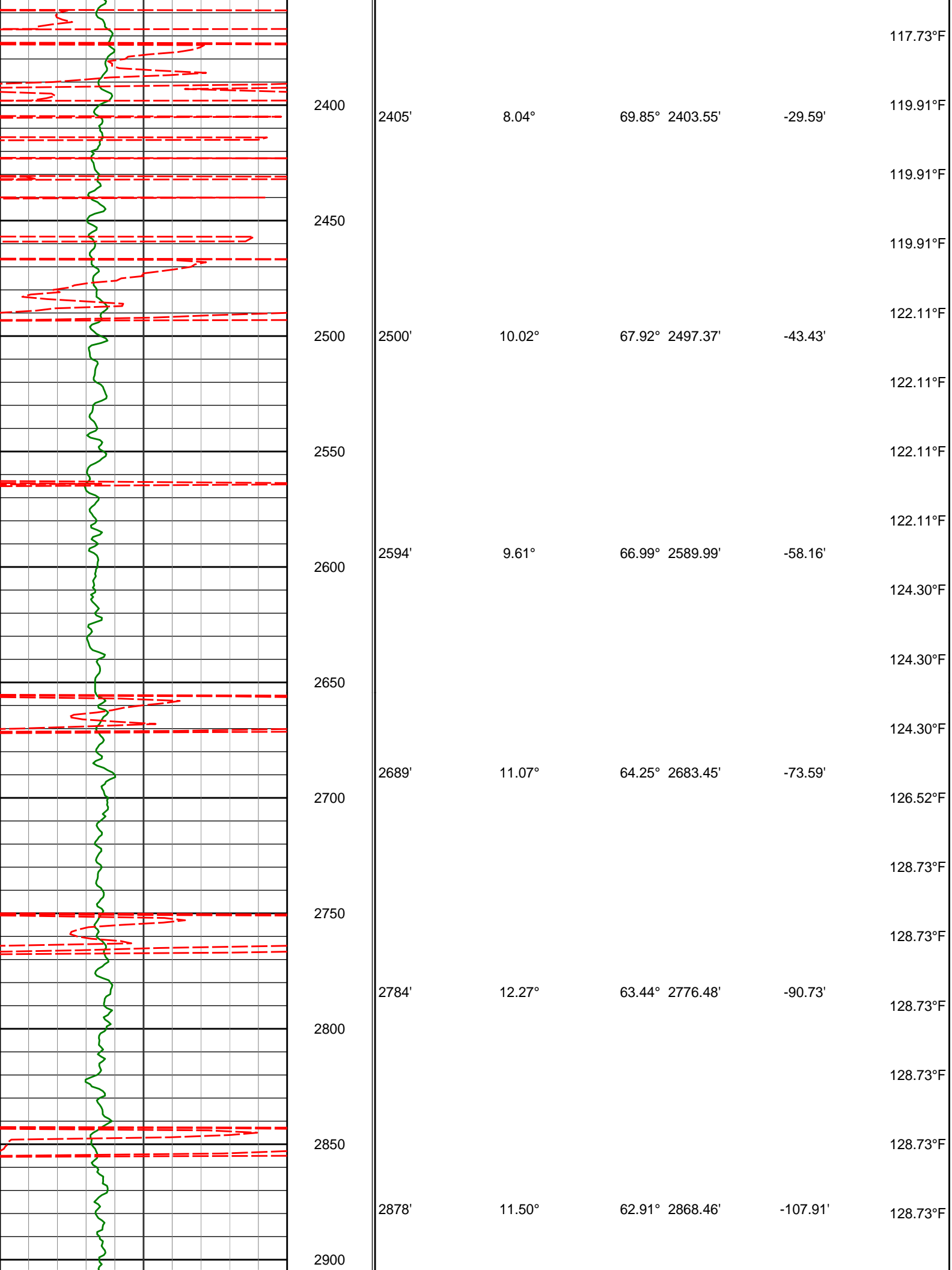
WARRANTY

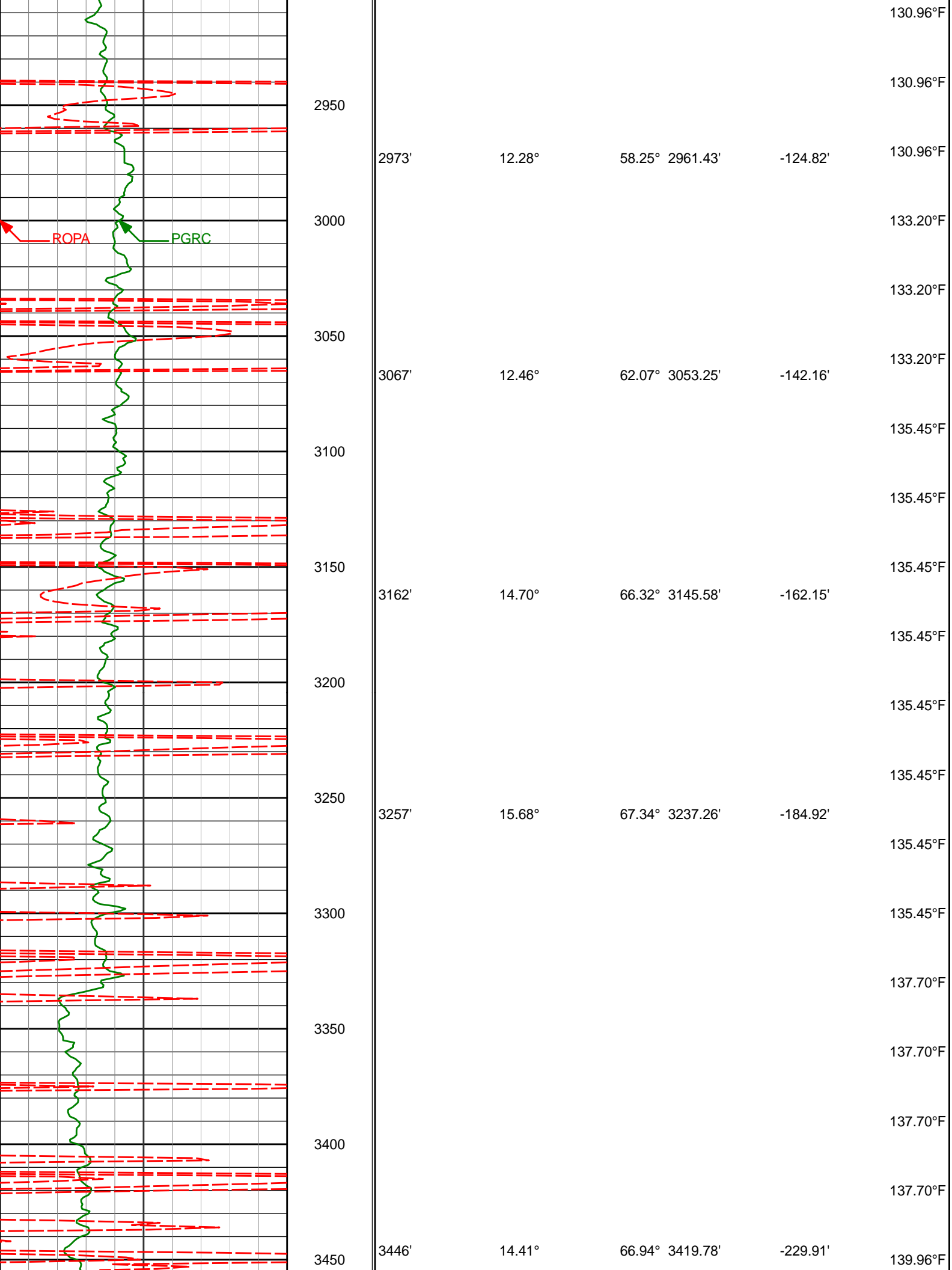
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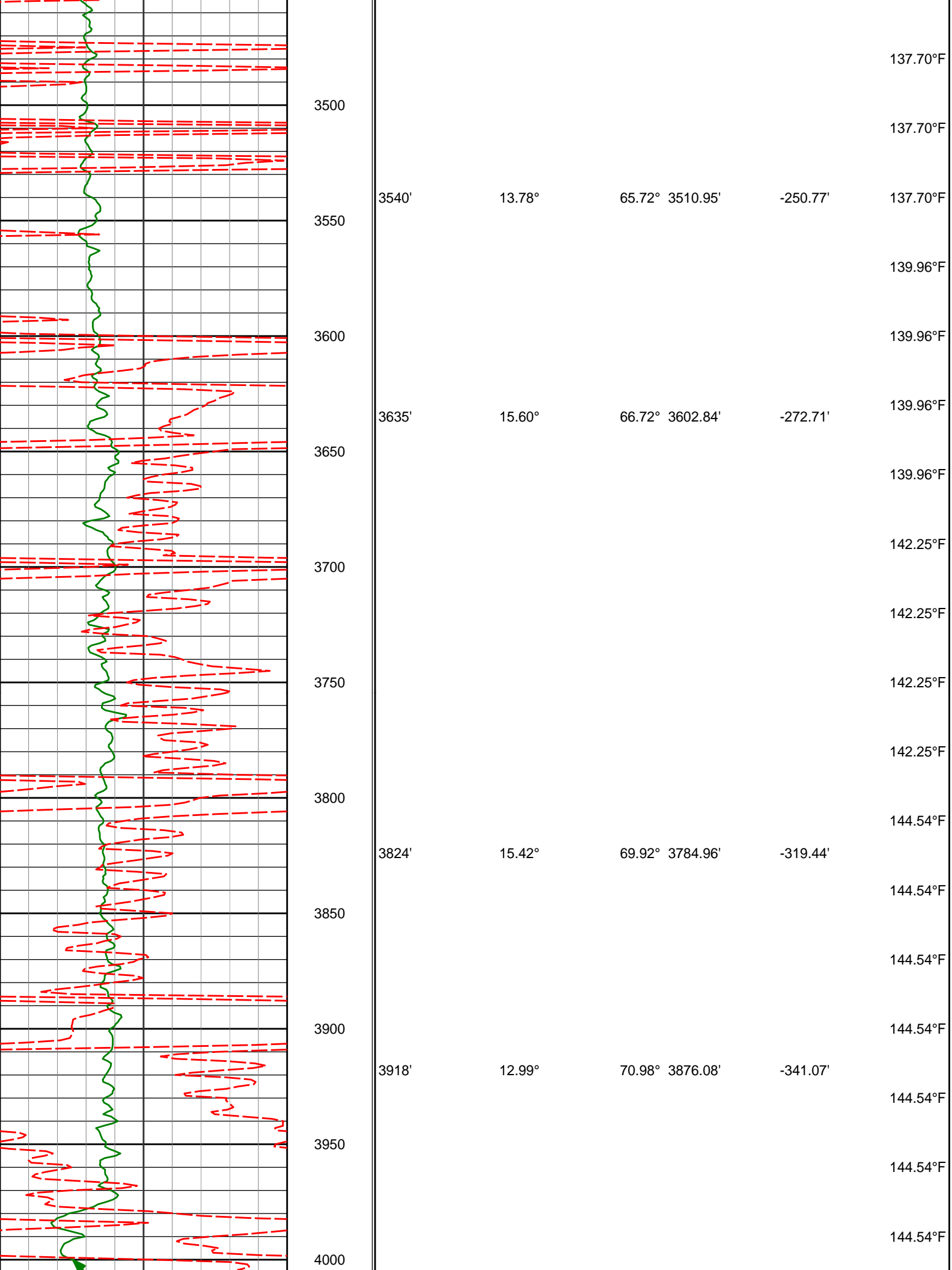
MD Main Log 1:600 Scale

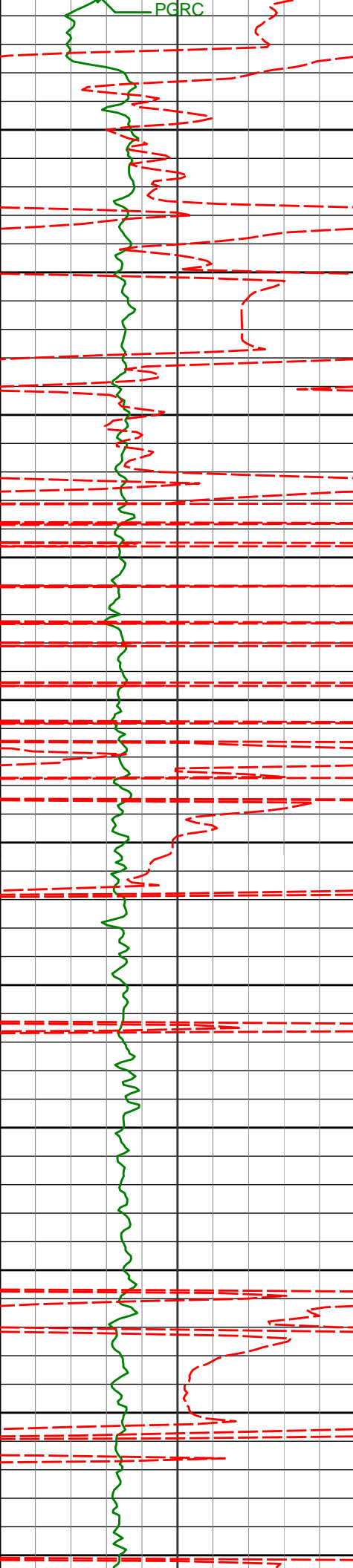
Gamma Ray Cor PGRC api		TVD	V.S.	Temp
0300	Depth			
Avg Rate of Penetration				



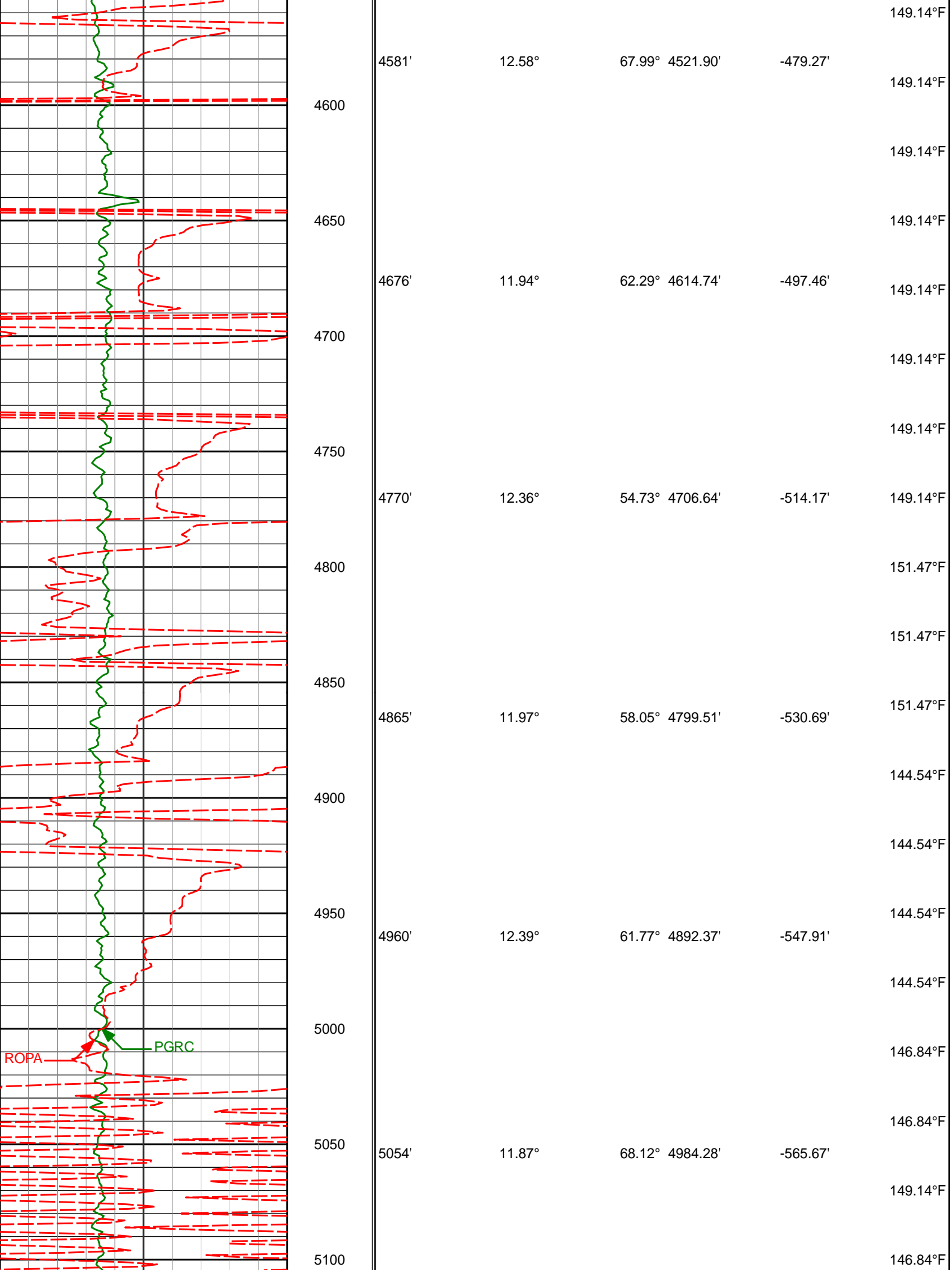




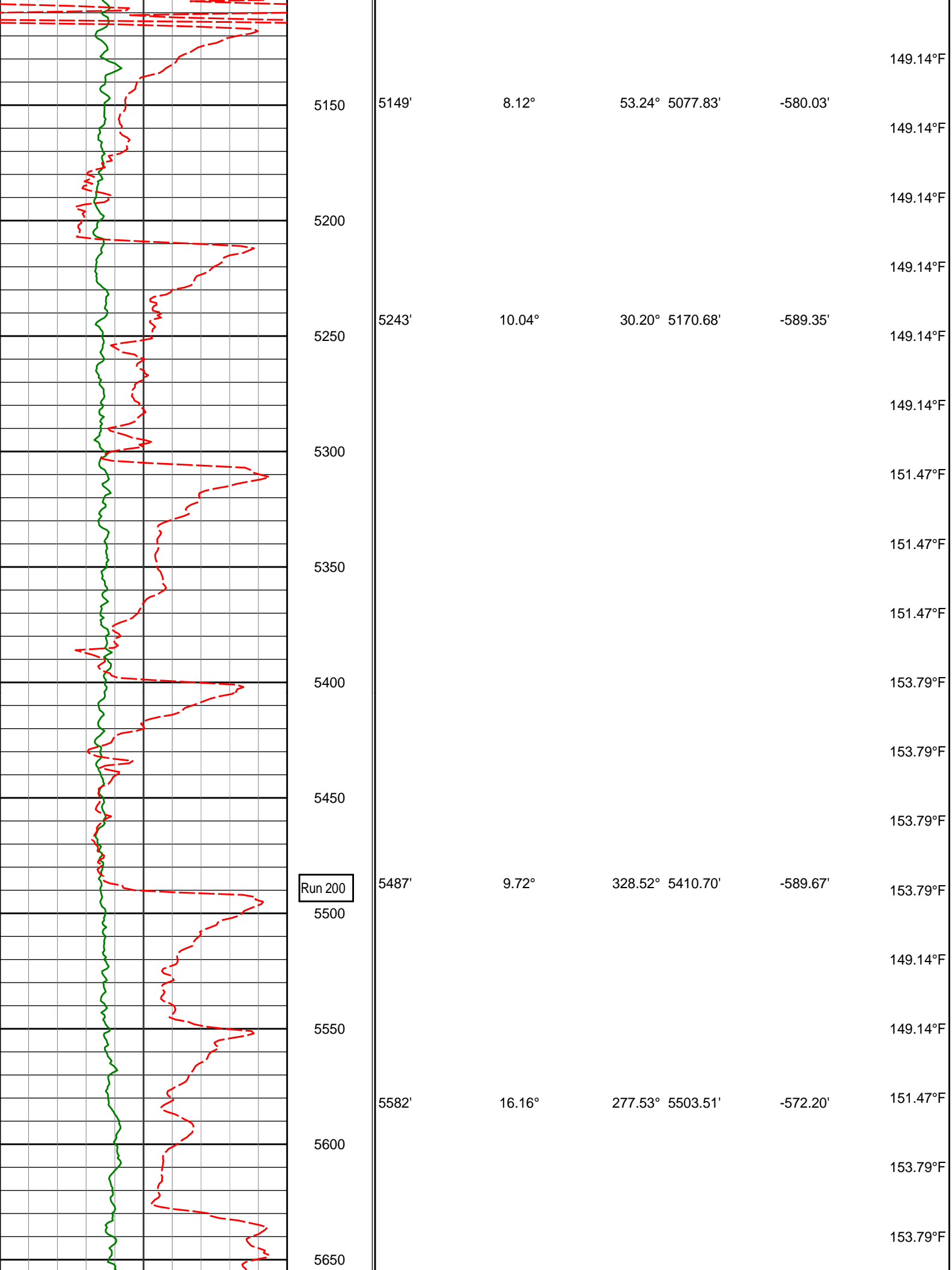


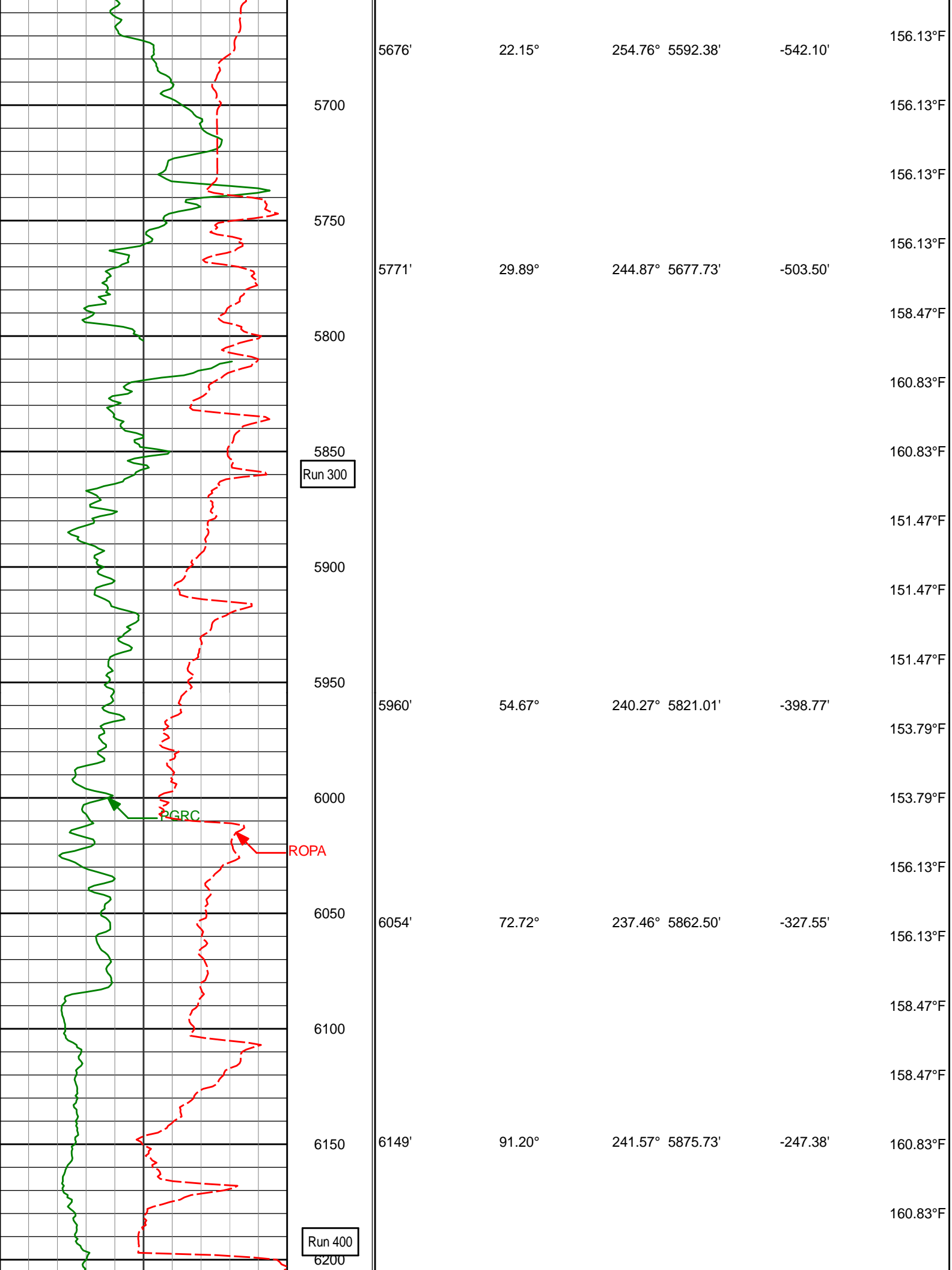


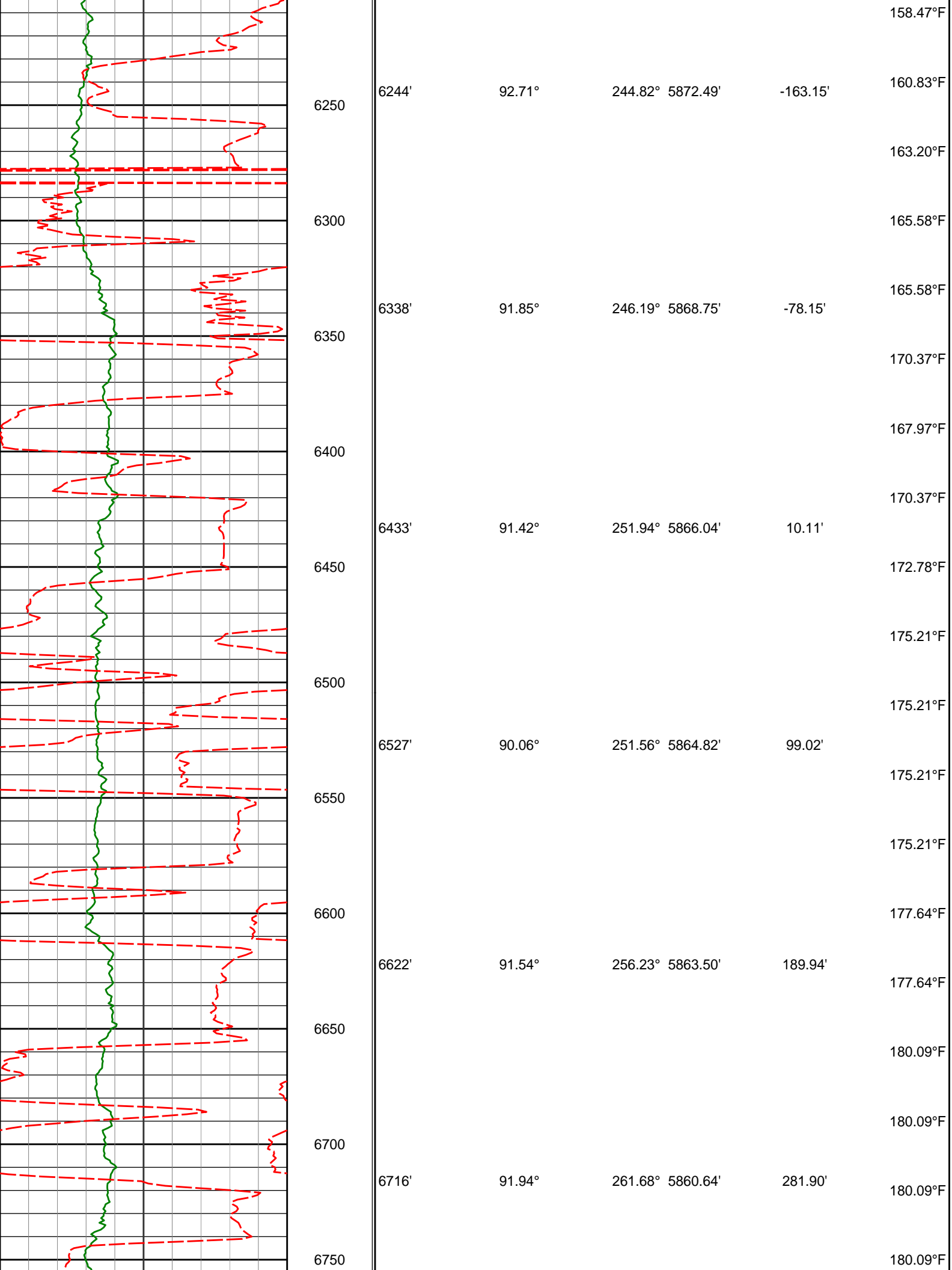
	4013'	12.58°	68.78°	3968.72'	-360.72'	144.54°F
4050						144.54°F
						144.54°F
4100						
	4109'	13.48°	69.20°	4062.25'	-380.84'	144.54°F
						144.54°F
4150						146.84°F
4200	4202'	13.68°	68.49°	4152.65'	-401.11'	146.84°F
						149.14°F
4250						146.84°F
4300	4297'	13.79°	66.55°	4244.93'	-421.84'	146.84°F
						146.84°F
4350						144.54°F
						144.54°F
4400	4391'	12.52°	65.91°	4336.47'	-441.32'	149.14°F
						146.84°F
4450						146.84°F
						146.84°F
4500	4486'	12.61°	67.33°	4429.19'	-460.20'	149.14°F
						149.14°F
4550						

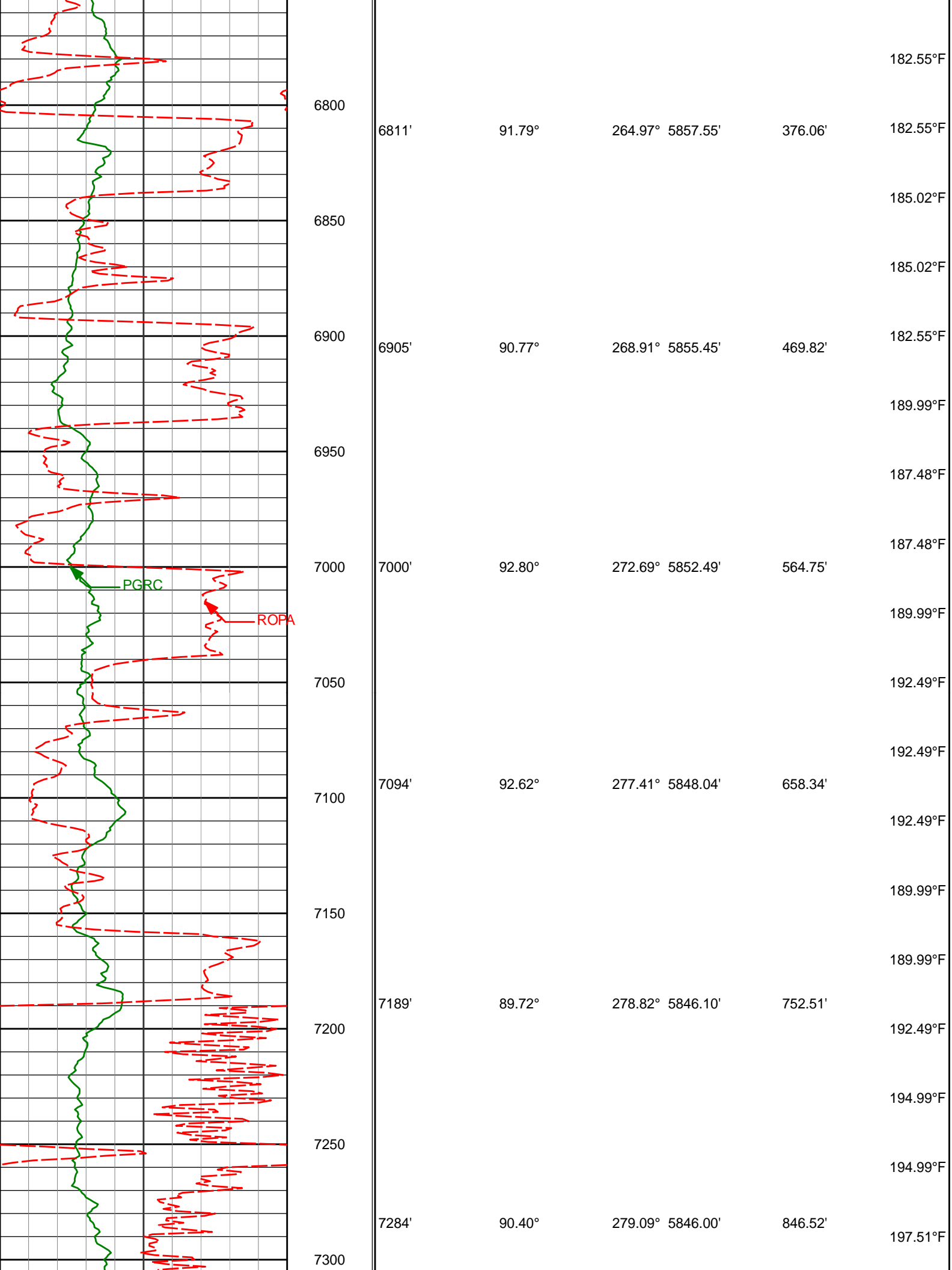


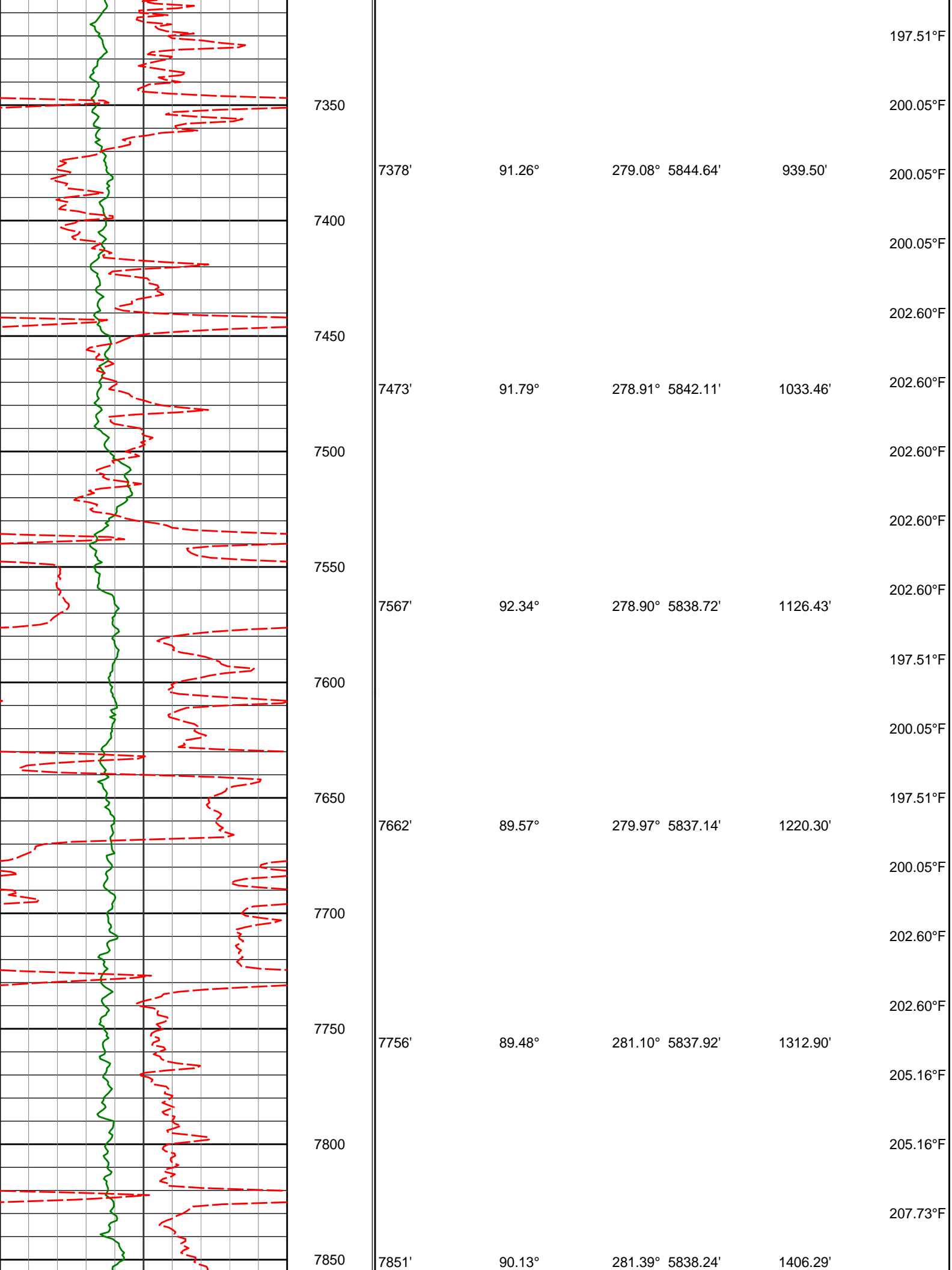


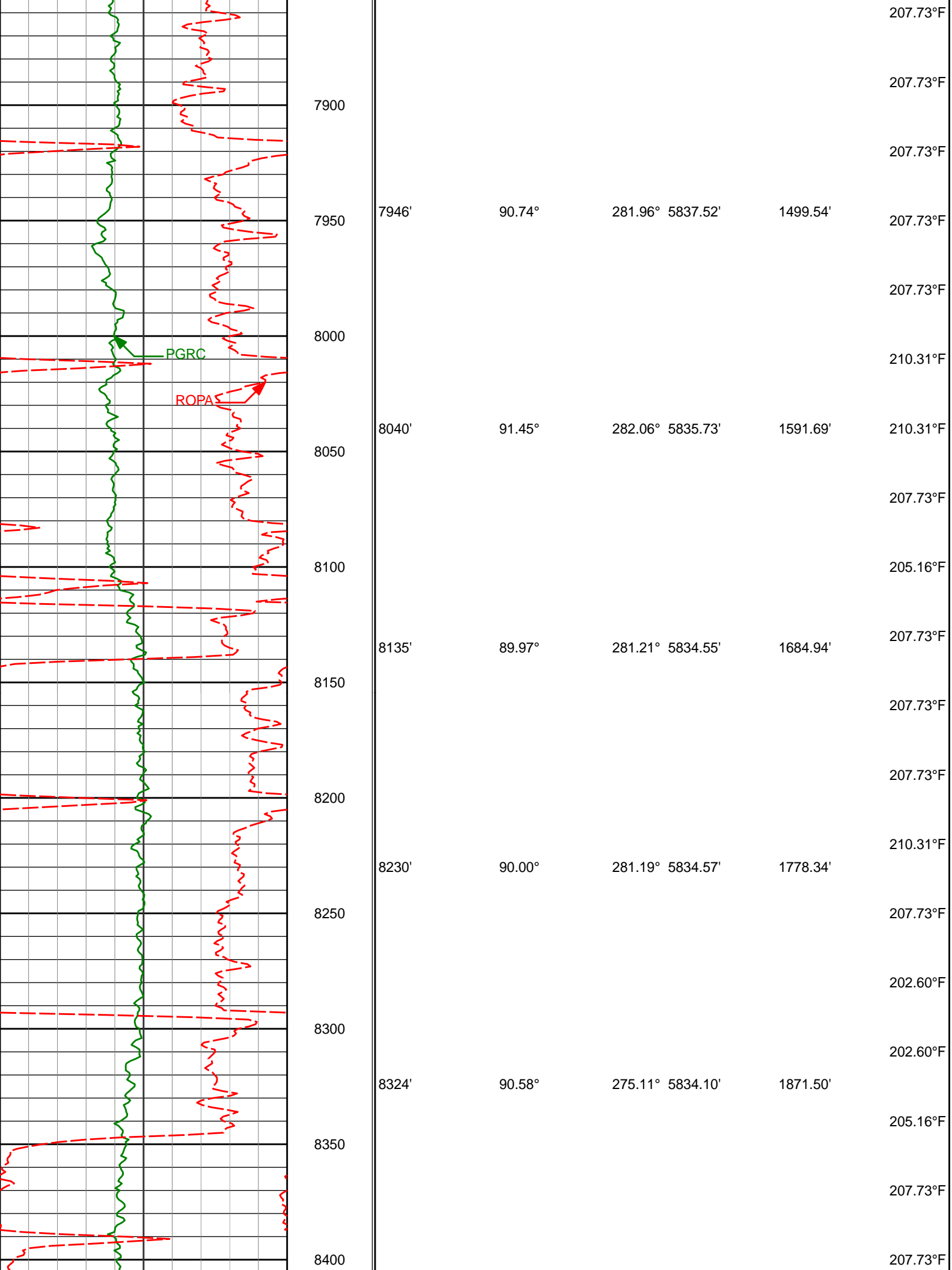


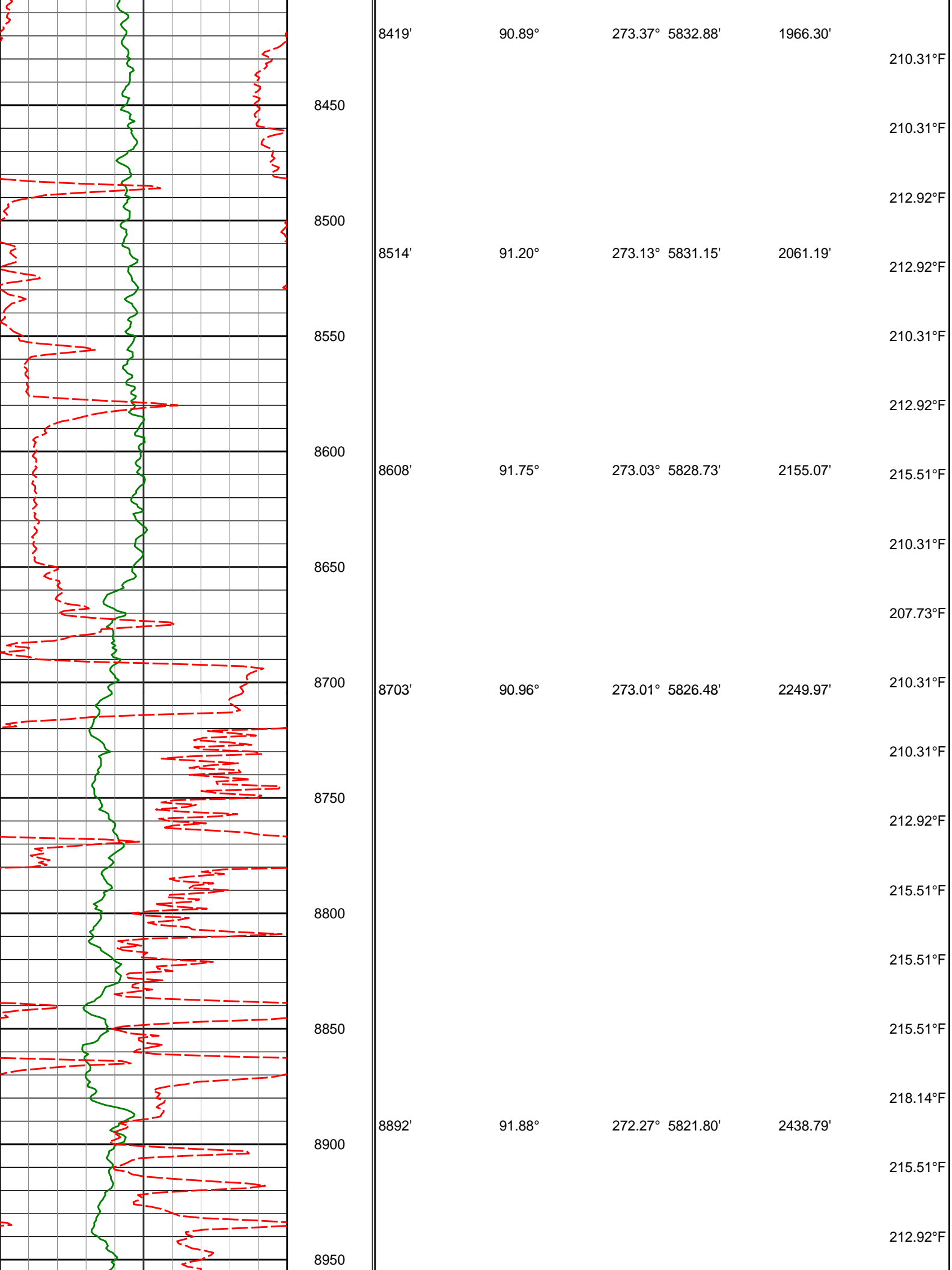


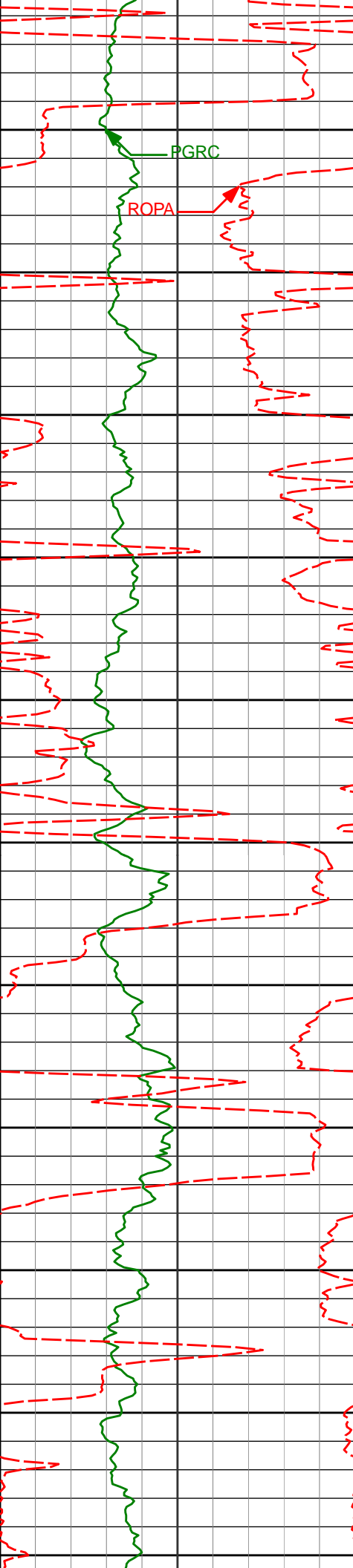






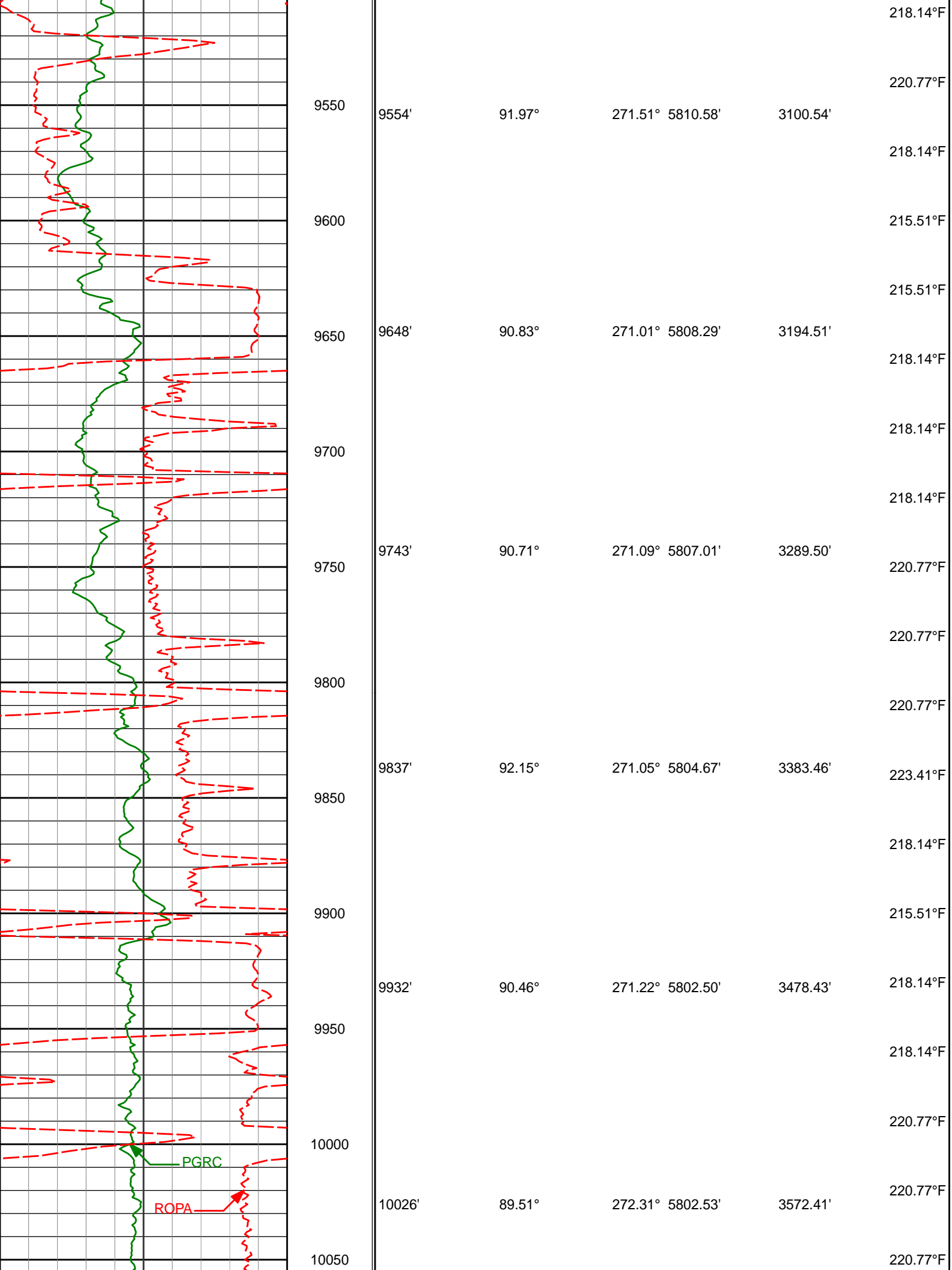


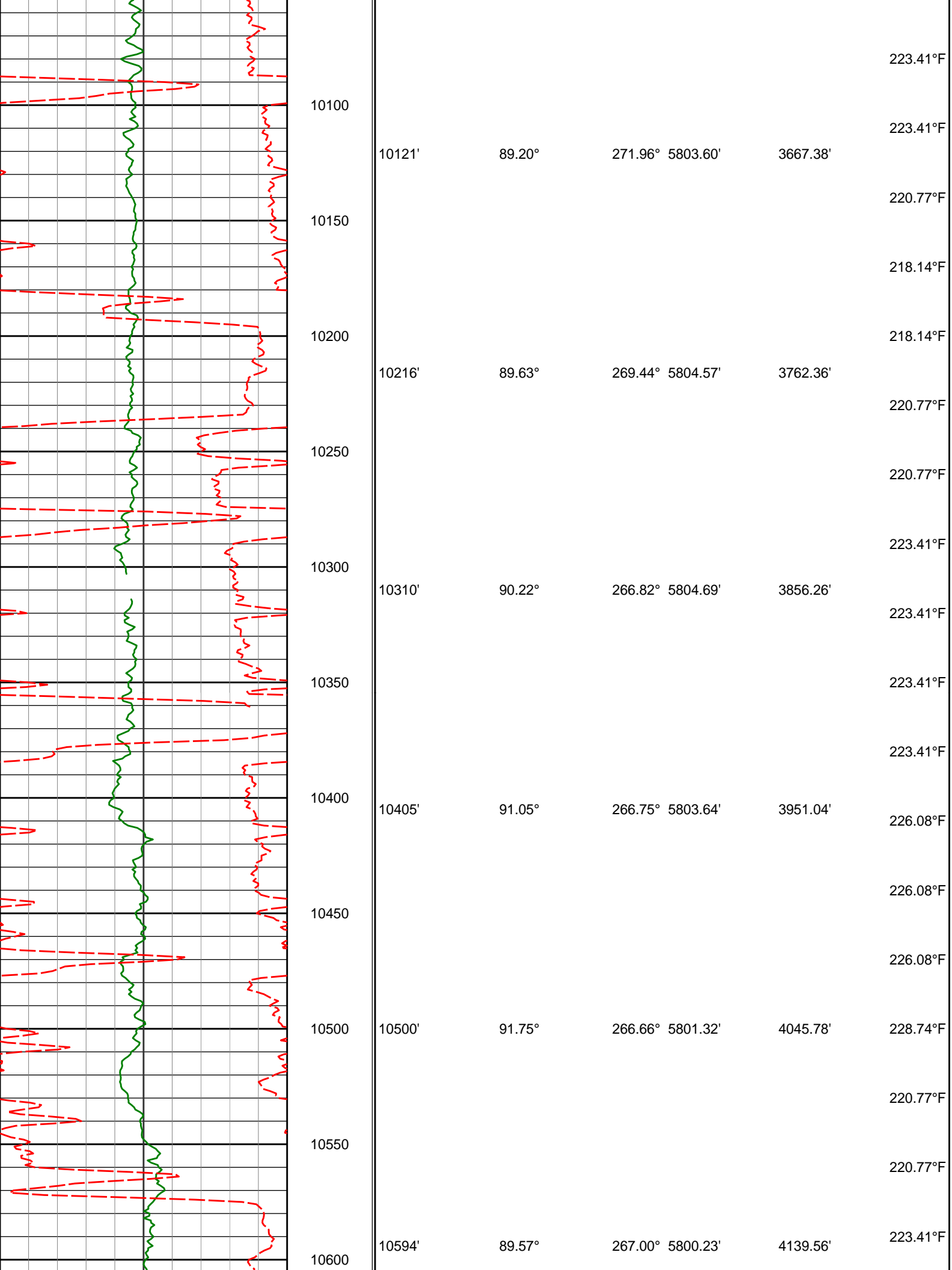


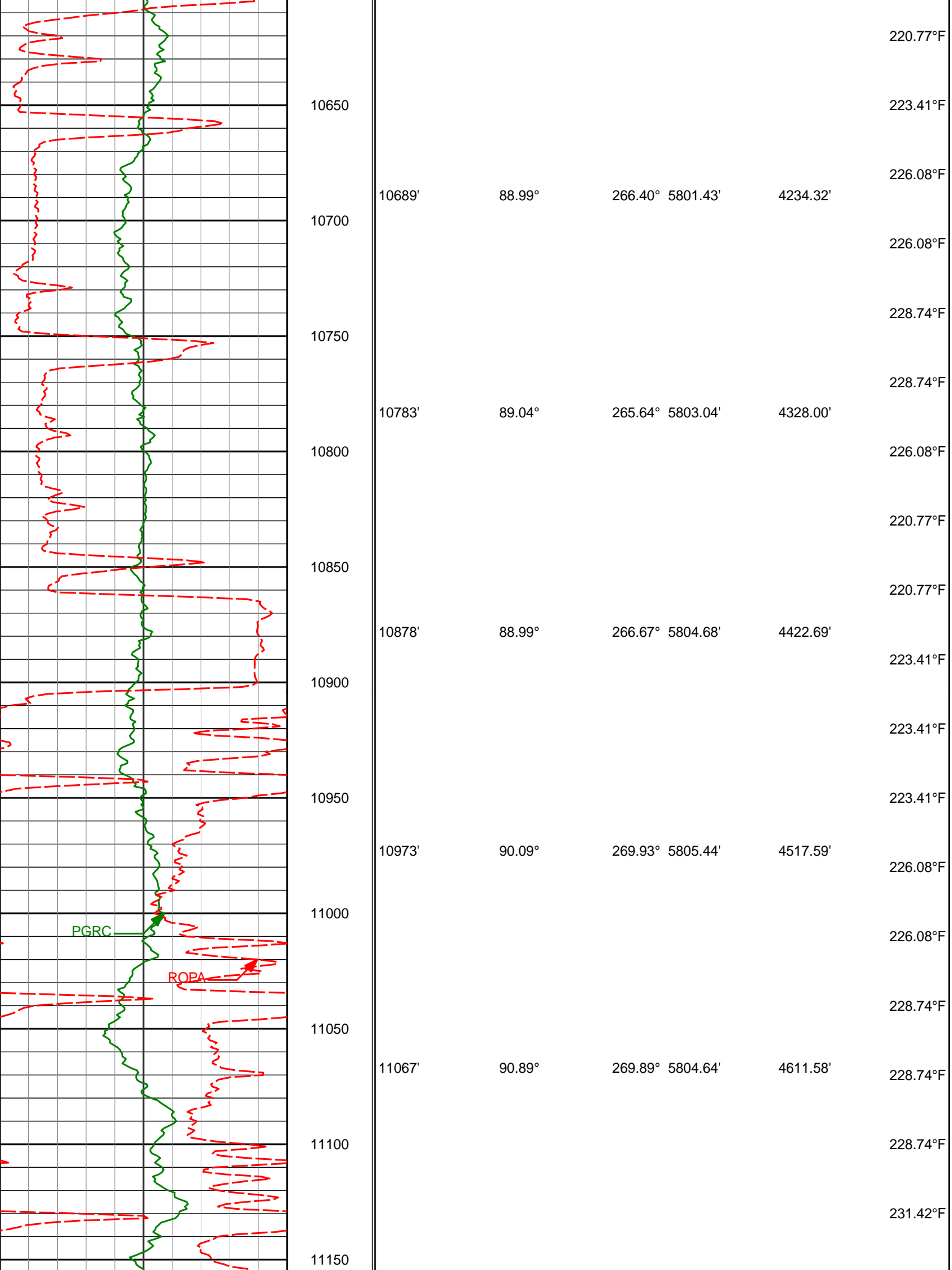


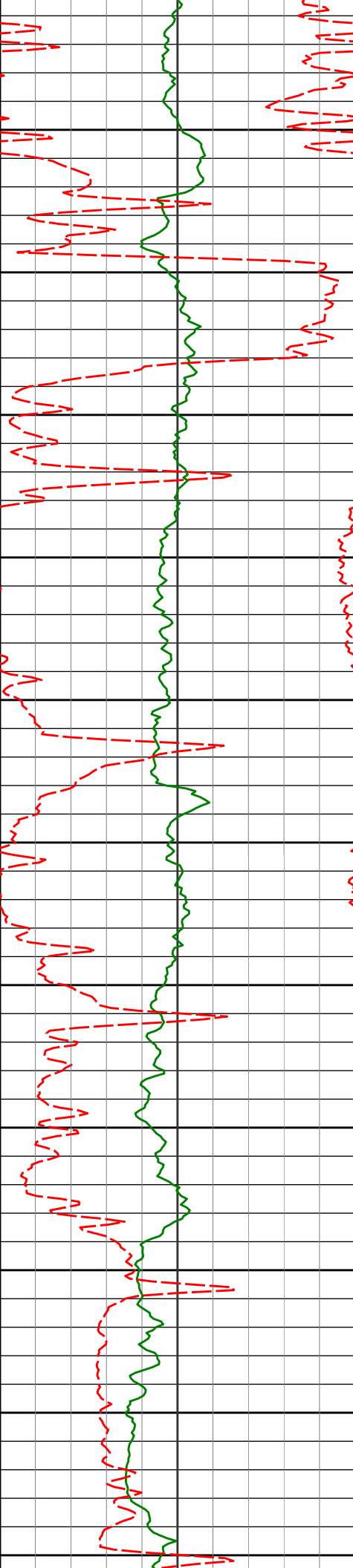
					212.92°F
8986'	90.06°	271.52°	5820.21'	2532.75'	
9000					215.51°F
					212.92°F
9050					215.51°F
					218.14°F
9081'	90.62°	271.32°	5819.64'	2627.74'	
9100					218.14°F
					218.14°F
9150					218.14°F
					218.14°F
9175'	91.94°	271.54°	5817.54'	2721.71'	
9200					212.92°F
					212.92°F
9250					212.92°F
					215.51°F
9270'	91.85°	271.86°	5814.40'	2816.64'	
9300					212.92°F
					212.92°F
9350					215.51°F
					215.51°F
9364'	89.78°	272.09°	5813.06'	2910.60'	
					218.14°F
9400					218.14°F
					218.14°F
9450	90.62°	271.59°	5812.73'	3005.58'	
					218.14°F
9500					



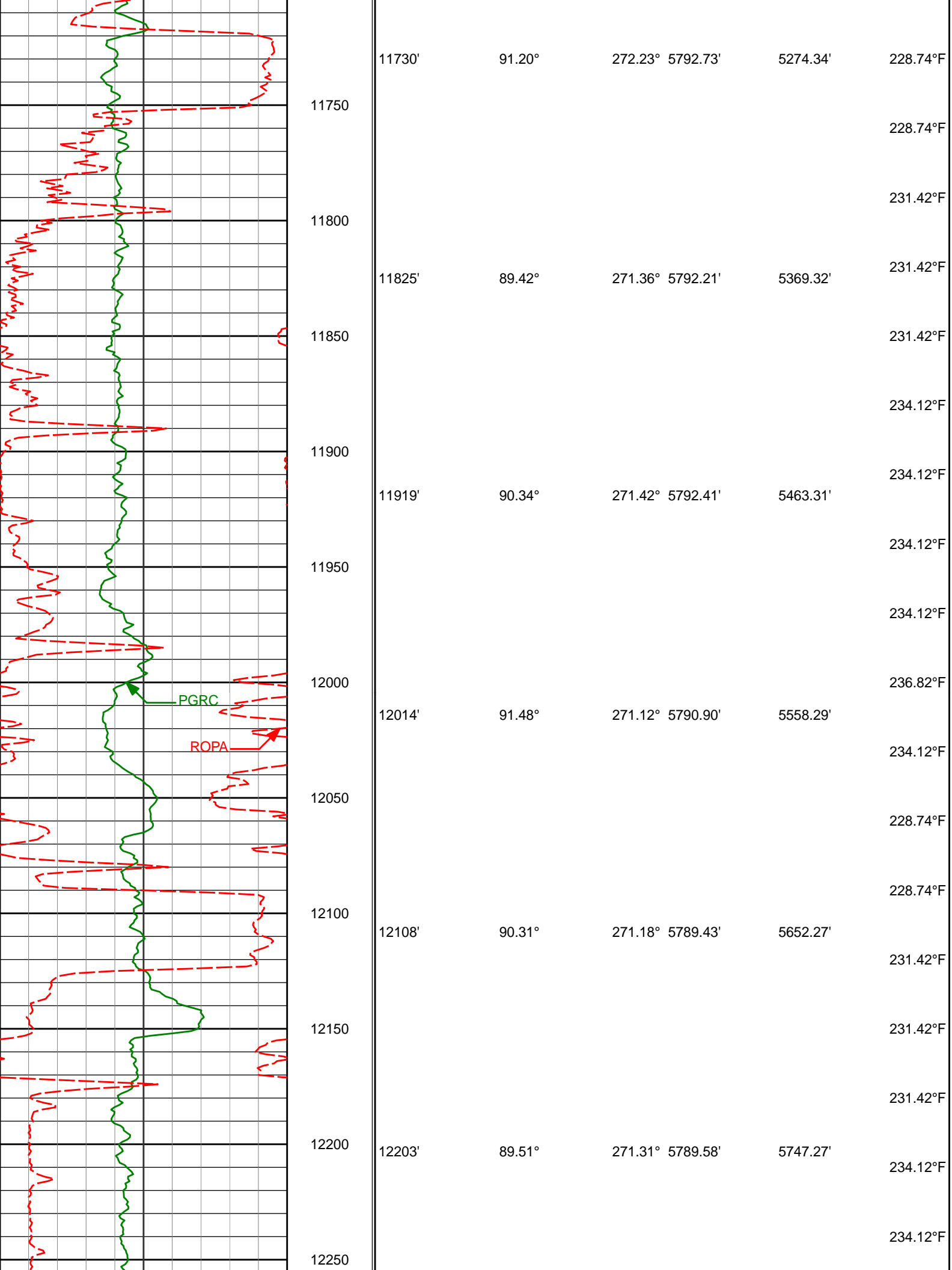


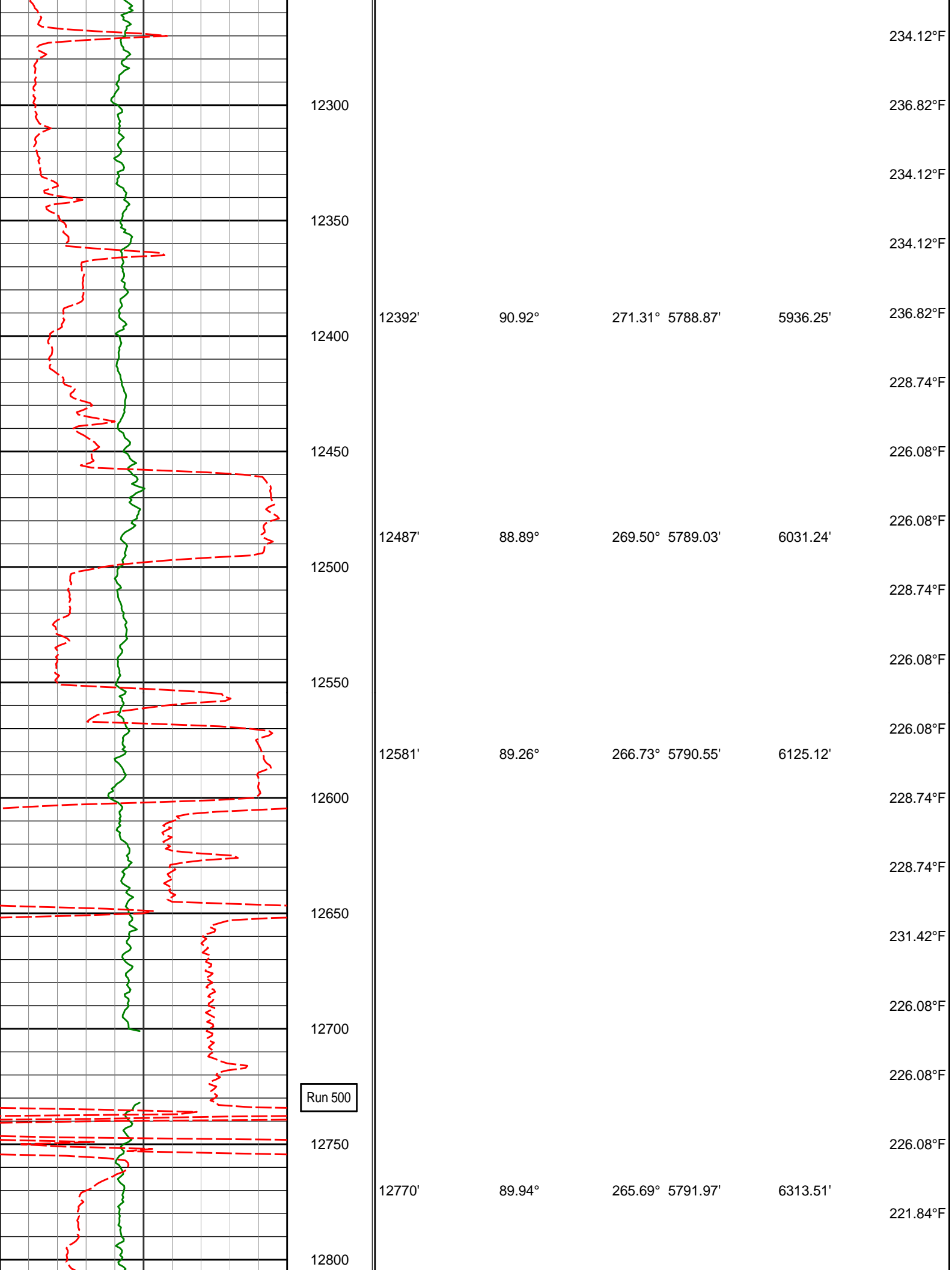


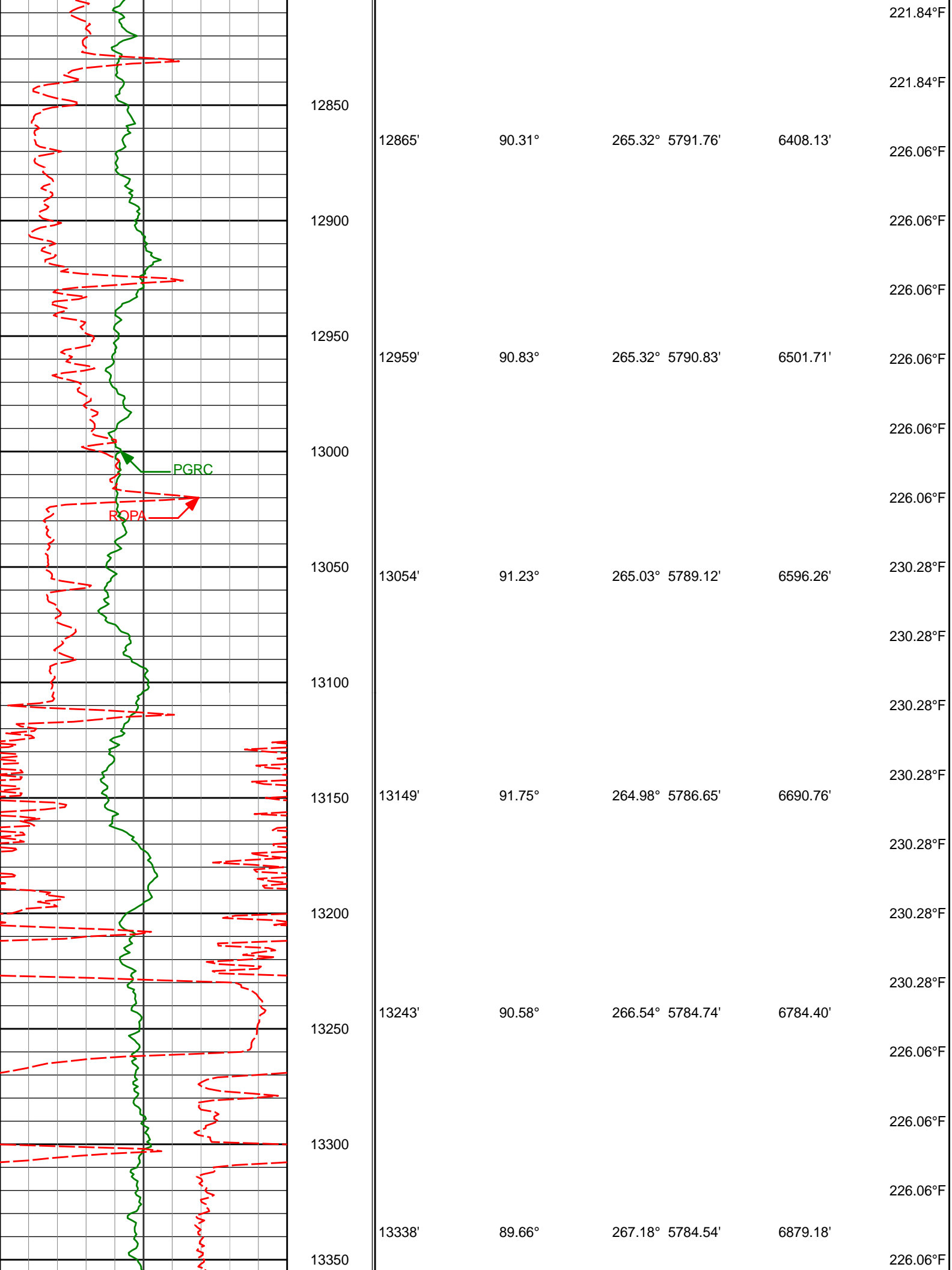


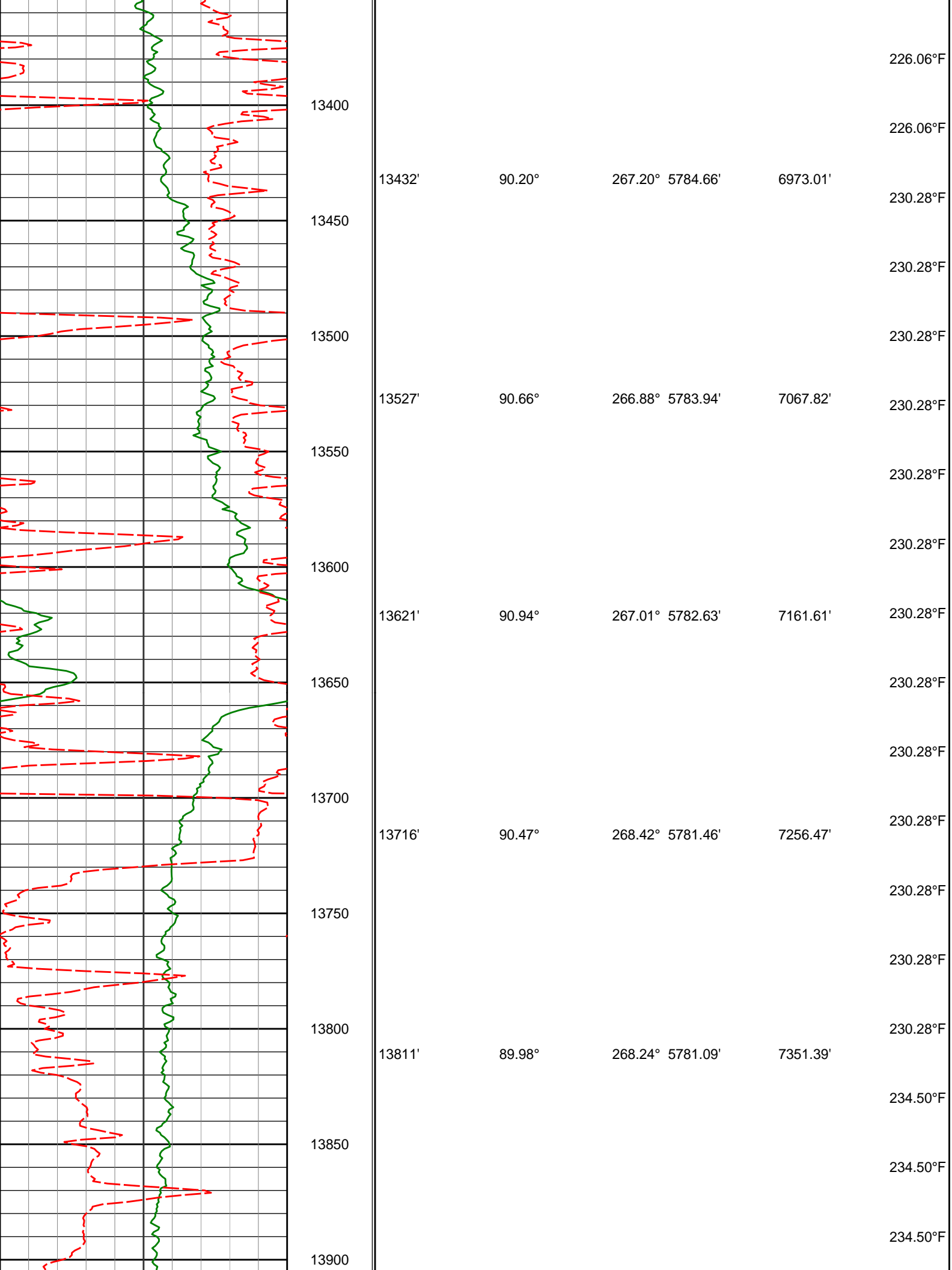


	11162'	91.51°	269.94°	5802.65'	4706.55'	231.42°F
						228.74°F
	11200					223.41°F
						223.41°F
	11250	11257'	91.14°	270.66°	5800.45'	4801.52'
						226.08°F
	11300					228.74°F
						228.74°F
	11350	11351'	89.75°	272.07°	5799.72'	4895.50'
						228.74°F
	11400					228.74°F
						228.74°F
	11450	11446'	90.34°	271.60°	5799.64'	4990.48'
						231.42°F
	11500					231.42°F
						231.42°F
	11550	11541'	91.26°	271.56°	5798.32'	5085.46'
						234.12°F
						234.12°F
	11600					234.12°F
						231.42°F
	11650	11635'	92.16°	271.65°	5795.51'	5179.41'
						228.74°F
	11700					226.08°F

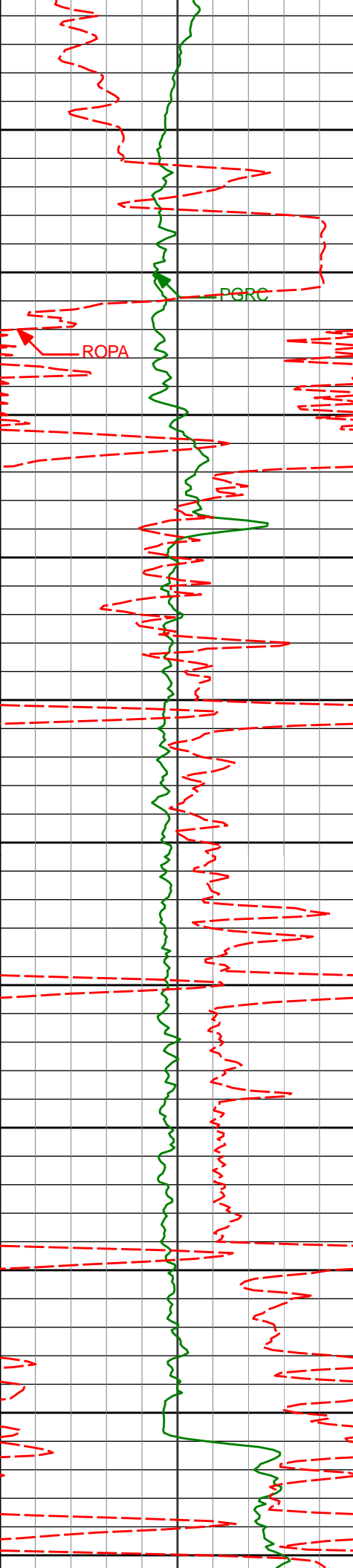




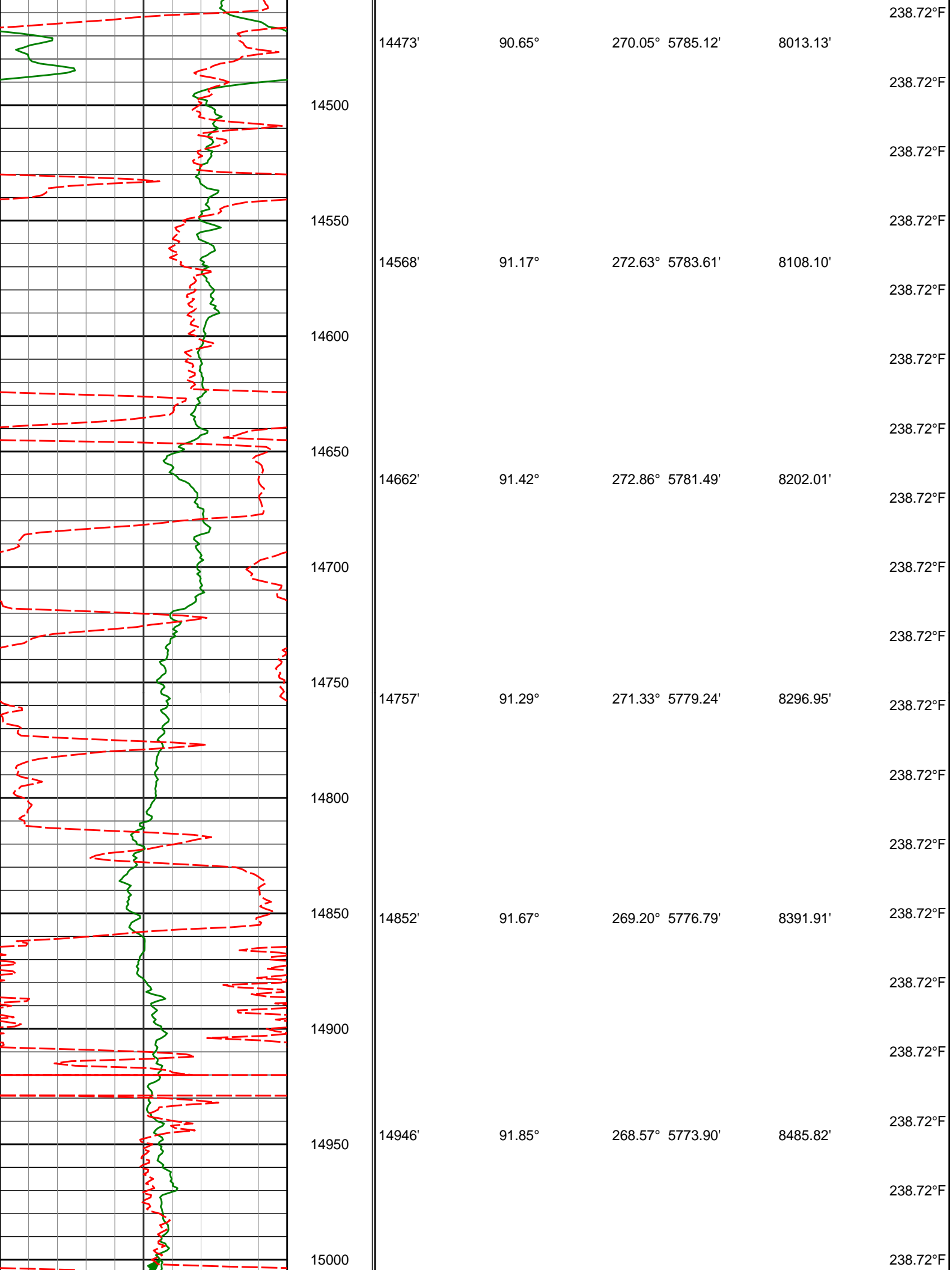


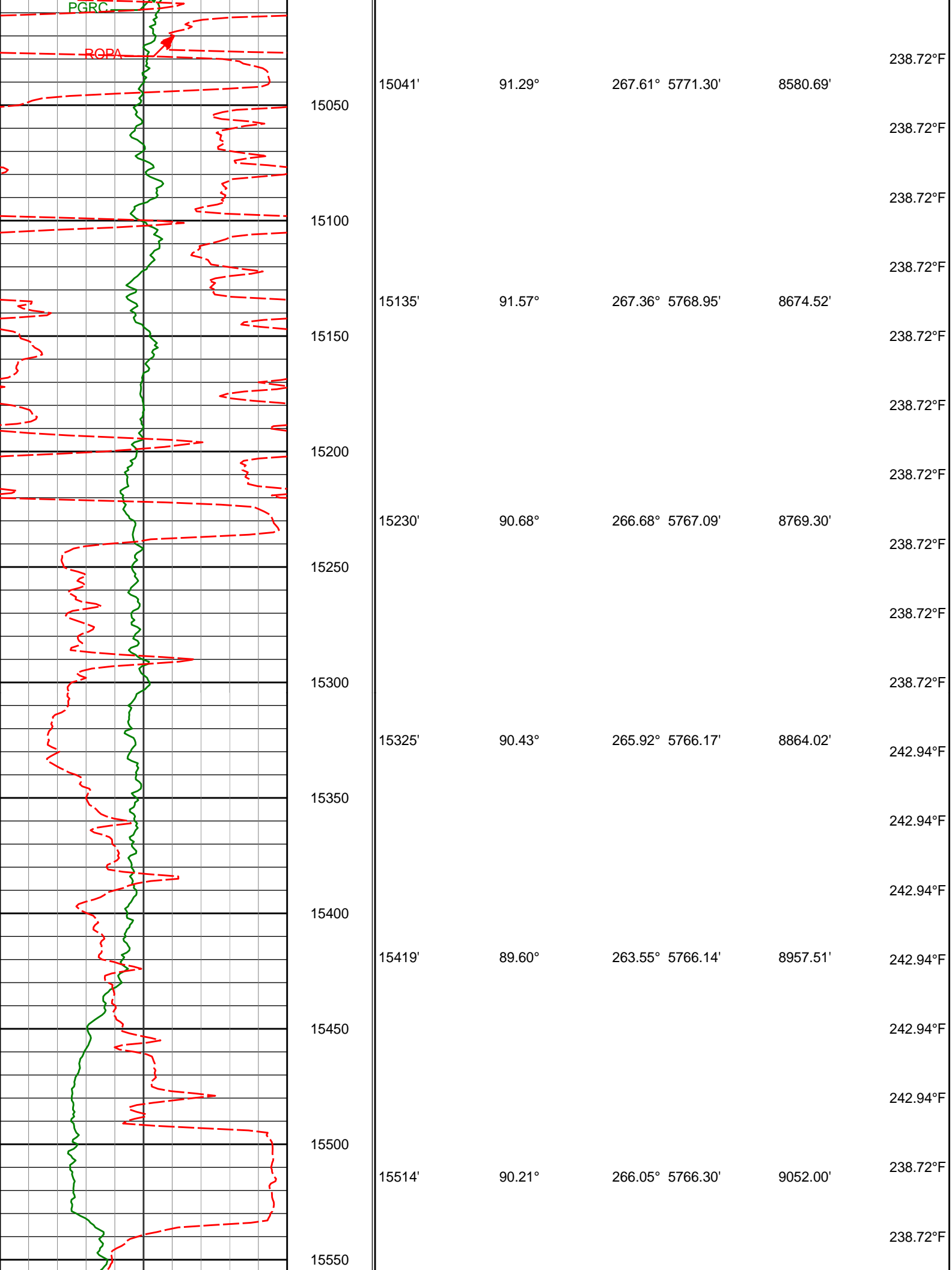


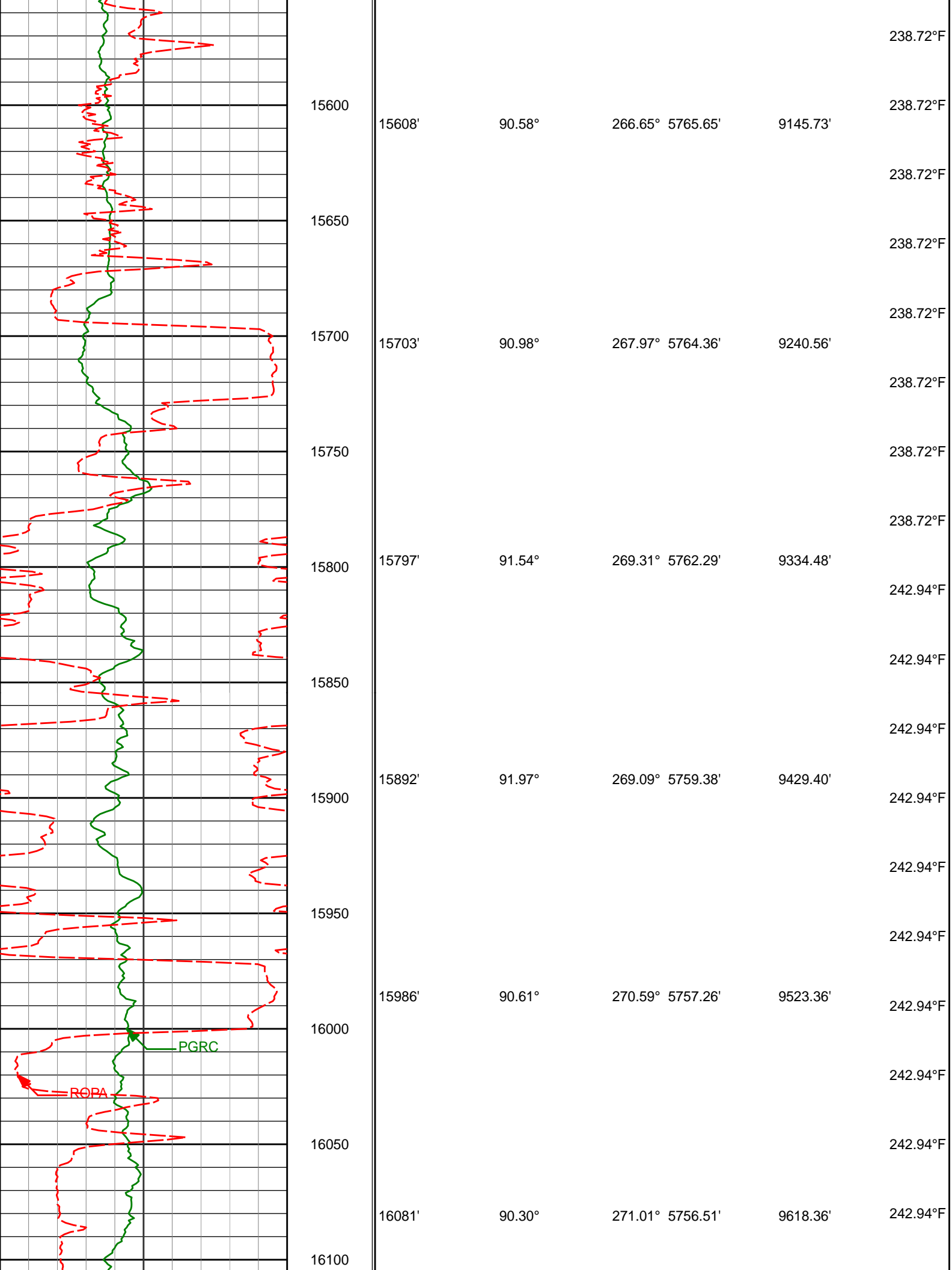


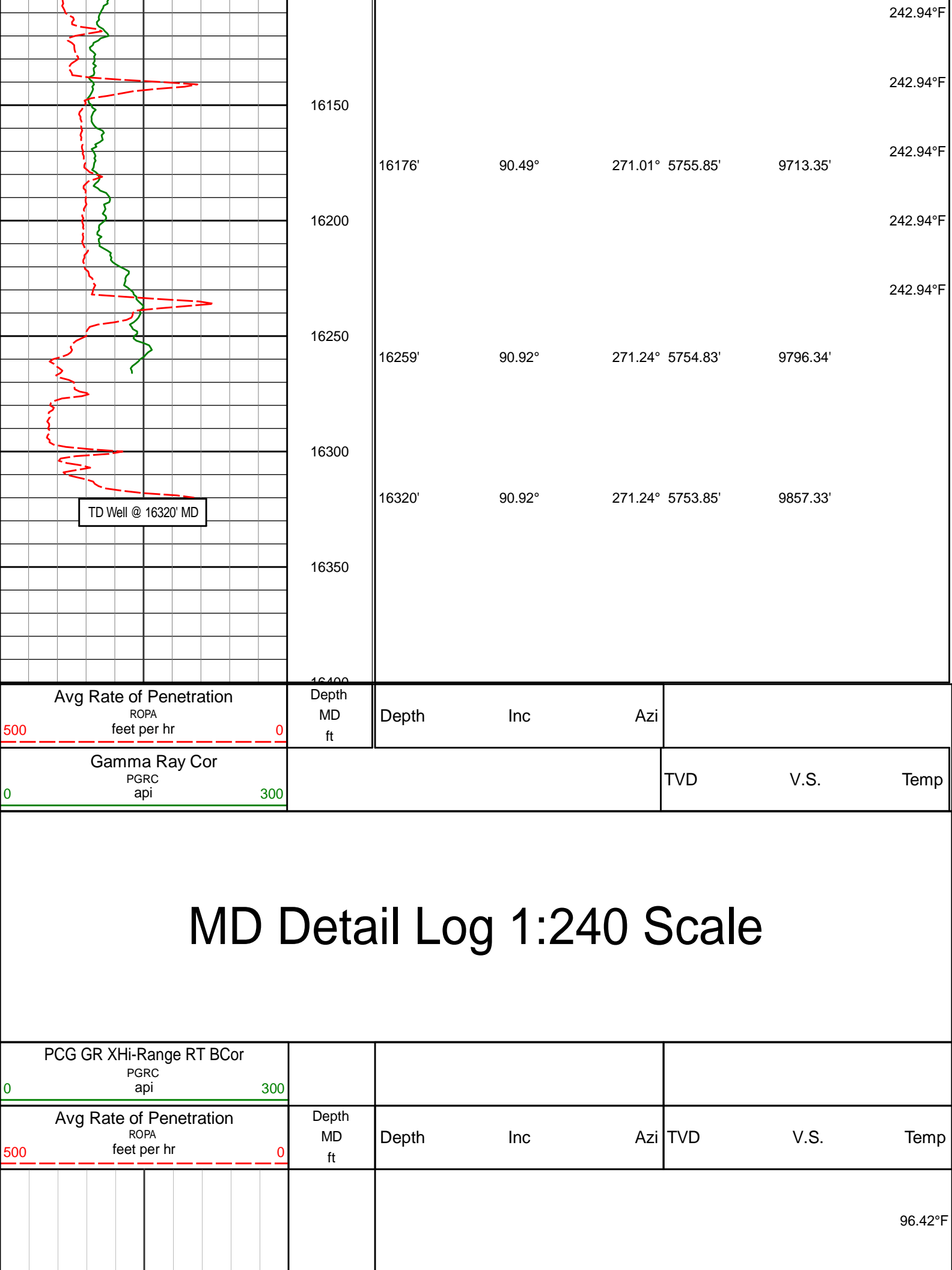


13905	90.19°	267.94°	5780.95'	7445.30'	234.50°F
13950					234.50°F
14000	14000'	88.56°	269.14°	5781.98'	7540.22'
					230.28°F
14050					230.28°F
					230.28°F
14100	14095'	89.11°	269.82°	5783.92'	7635.18'
					234.50°F
					234.50°F
14150					234.50°F
					234.50°F
14200	14189'	89.51°	269.72°	5785.05'	7729.16'
					238.72°F
					238.72°F
14250					238.72°F
					238.72°F
14300	14284'	89.91°	269.97°	5785.53'	7824.15'
					238.72°F
					238.72°F
14350					238.72°F
					238.72°F
14400	14379'	89.97°	269.59°	5785.63'	7919.14'
					238.72°F
					238.72°F
14450					238.72°F







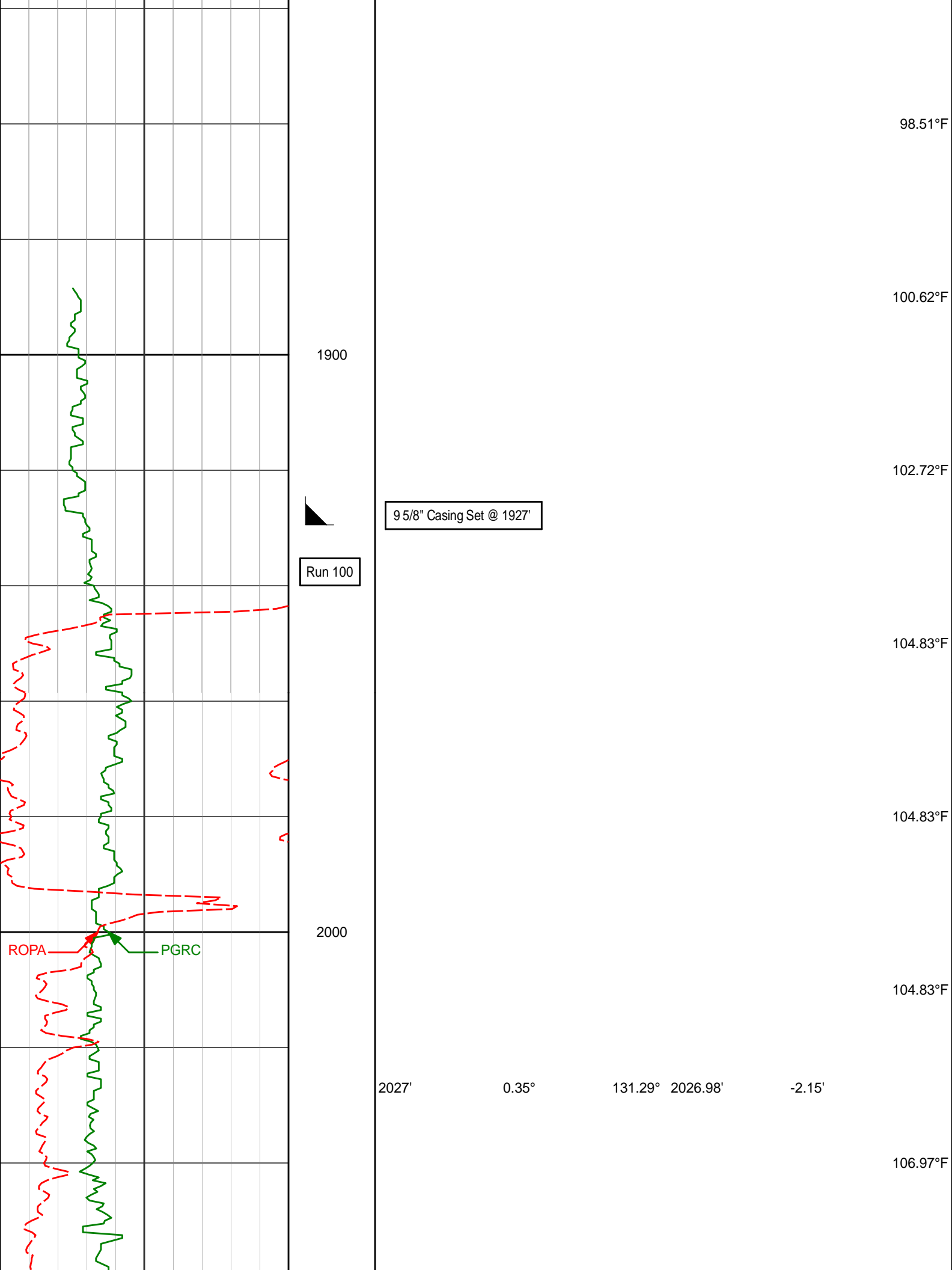


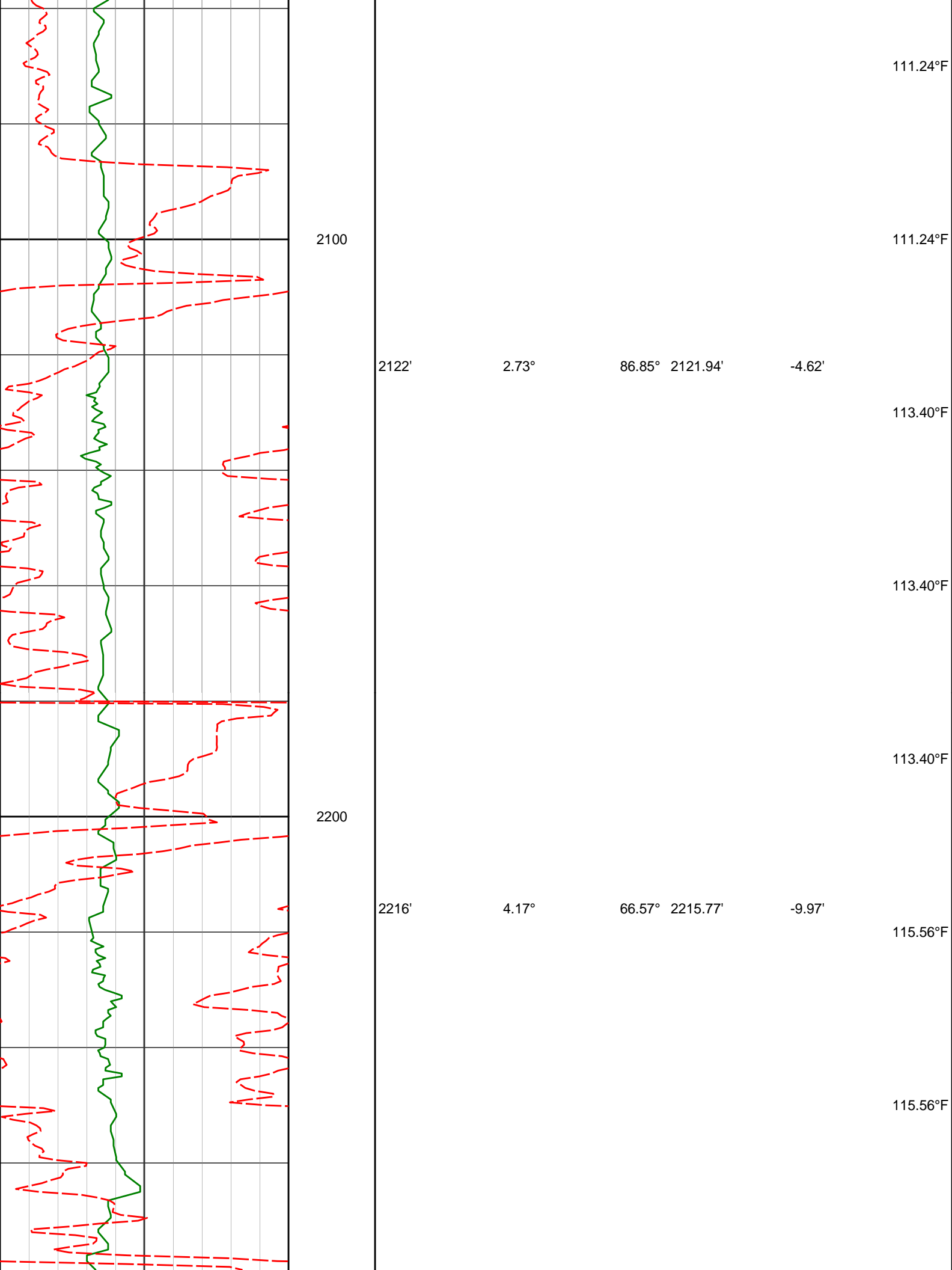
TD Well @ 16320' MD

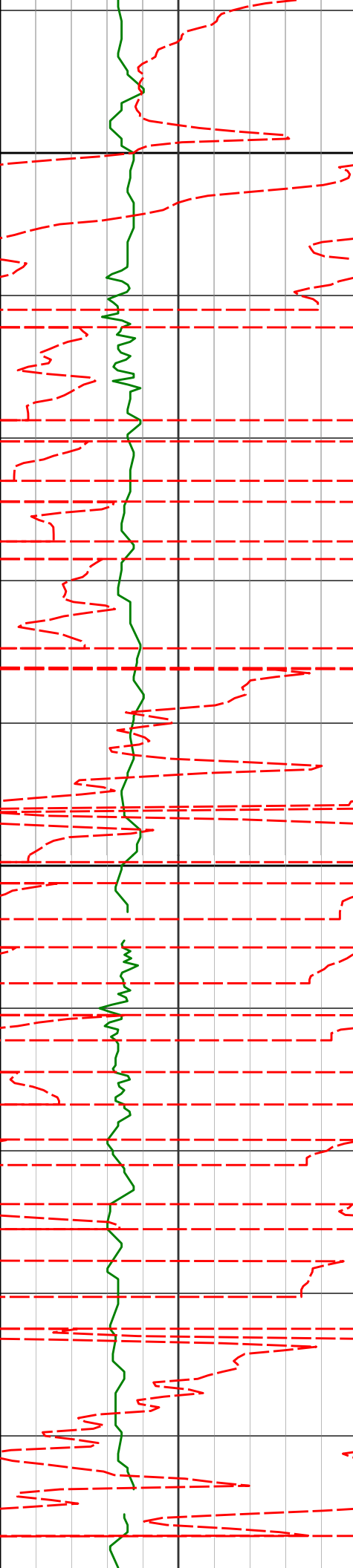
Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Depth	Inc	Azi			
Gamma Ray Cor PGRC api						TVD	V.S.	Temp

PCG GR XHi-Range RT BCor PGRC api								
Avg Rate of Penetration ROPA feet per hr		Depth MD ft	Depth	Inc	Azi	TVD	V.S.	Temp

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2300

2310'

6.72°

69.25° 2309.34'

-18.21'

117.73°F

117.73°F

117.73°F

2400

2405'

8.04°

69.85° 2403.55'

-29.59'

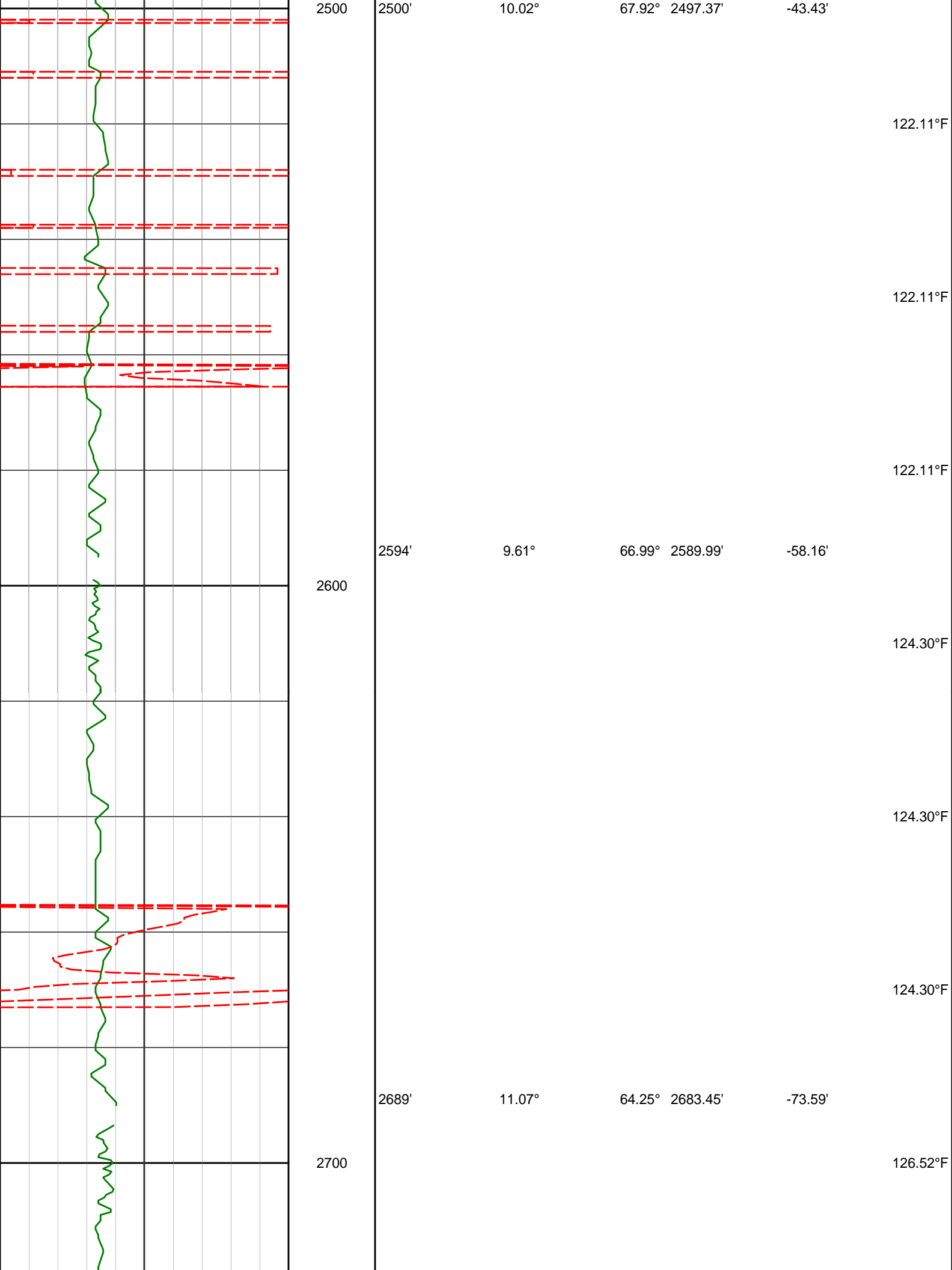
119.91°F

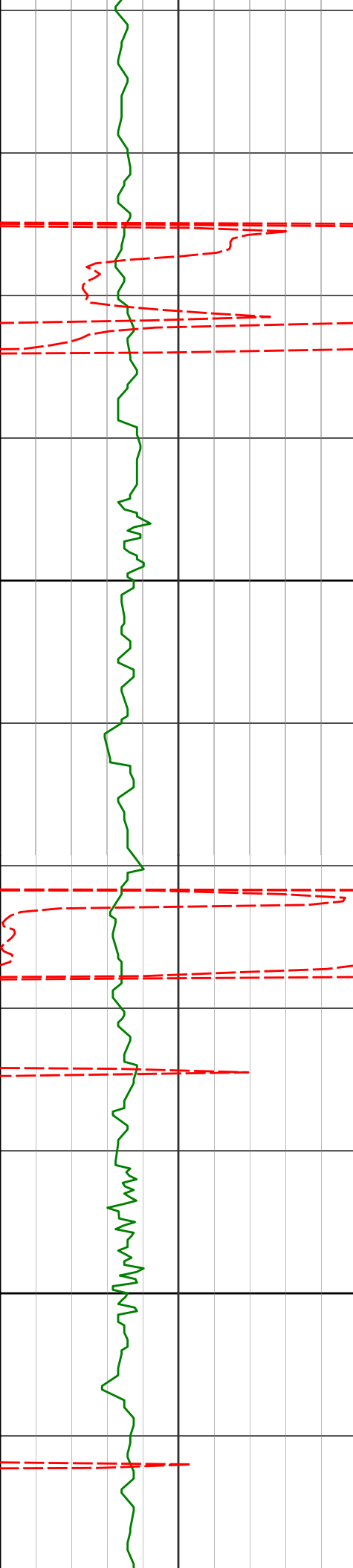
119.91°F

119.91°F

122.11°F







2800

2900

2784'

12.27°

63.44° 2776.48'

-90.73'

2878'

11.50°

62.91° 2868.46'

-107.91'

128.73°F

128.73°F

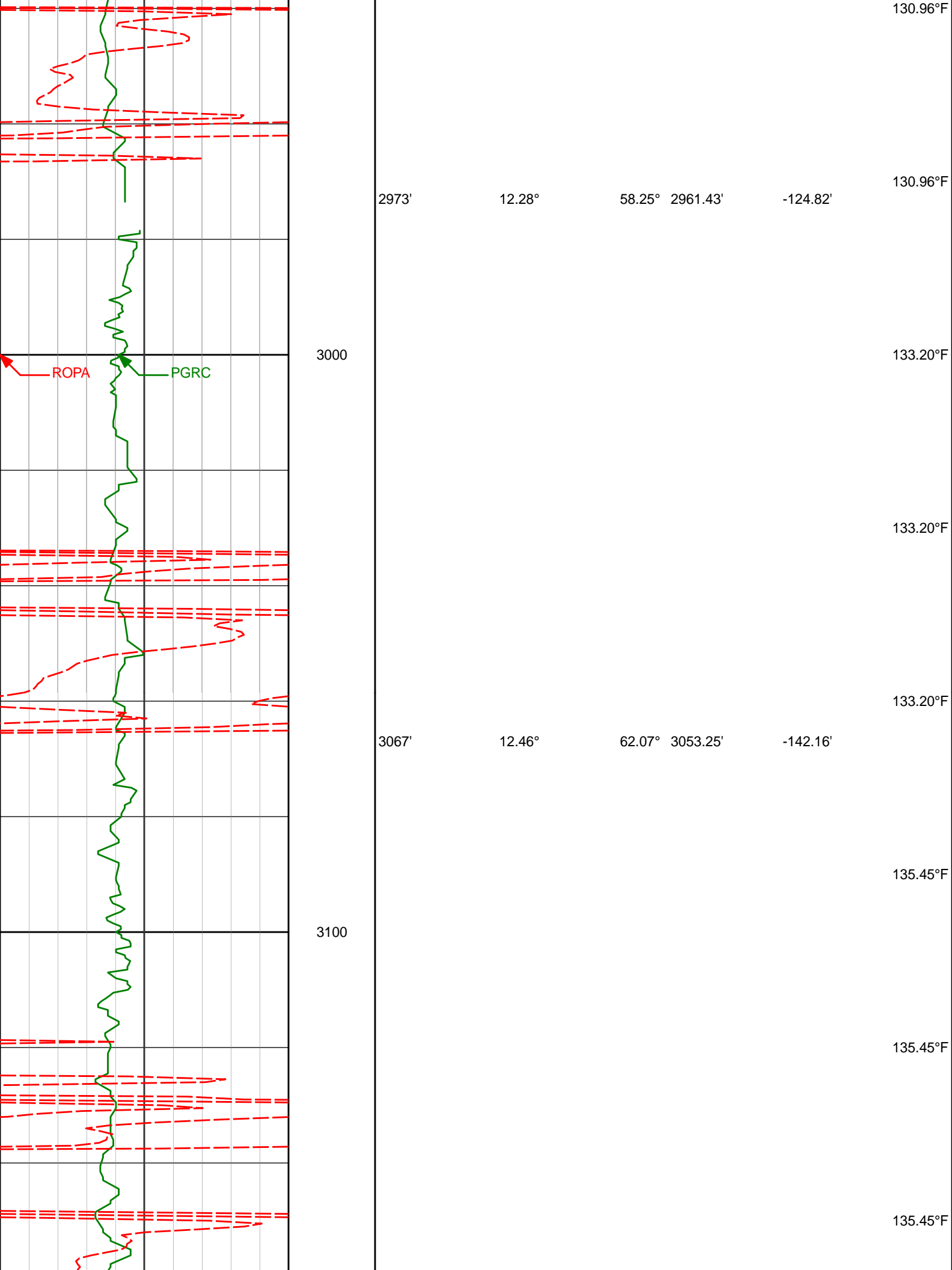
128.73°F

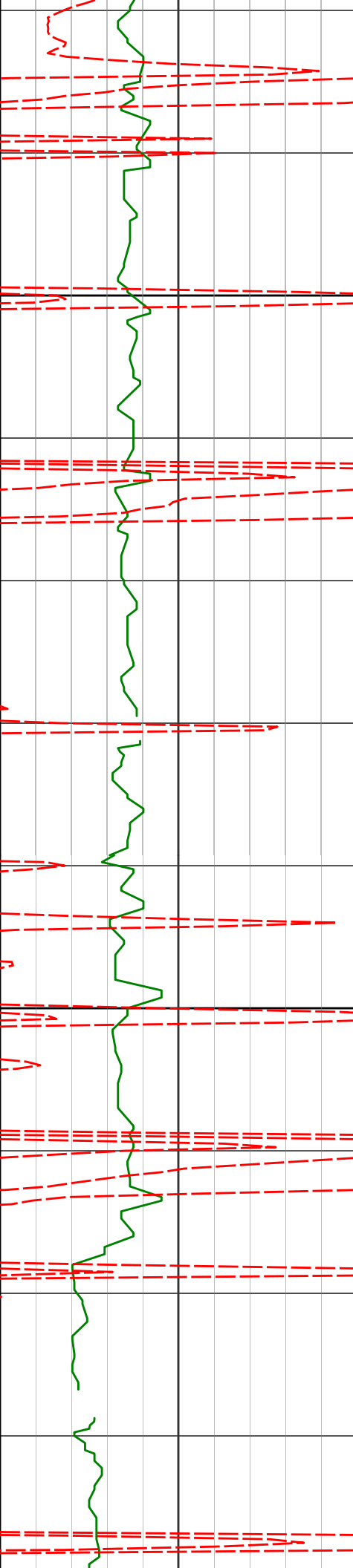
128.73°F

128.73°F

128.73°F

130.96°F





3162'

14.70°

66.32° 3145.58'

-162.15'

3200

135.45°F

135.45°F

135.45°F

3257'

15.68°

67.34° 3237.26'

-184.92'

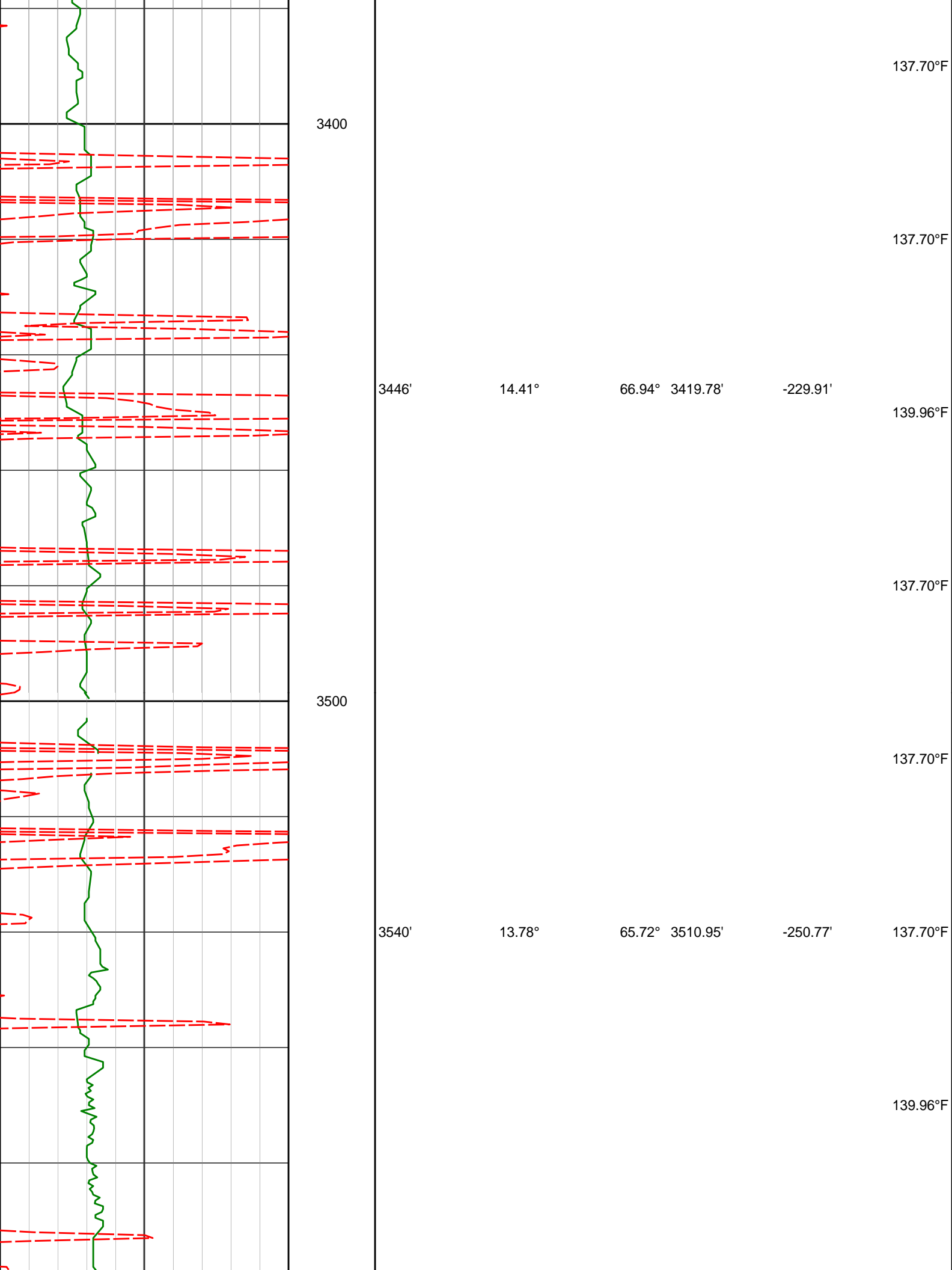
3300

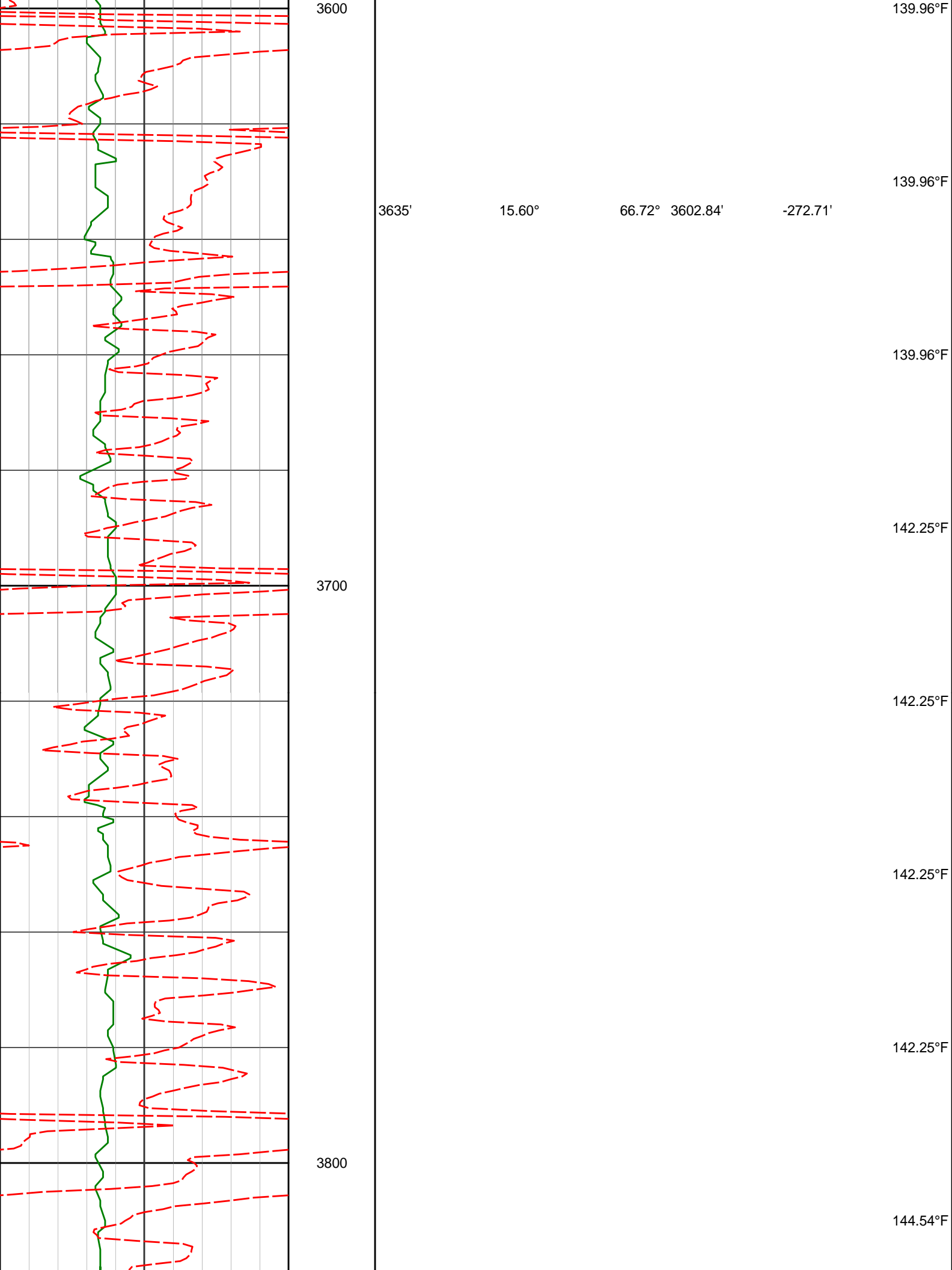
135.45°F

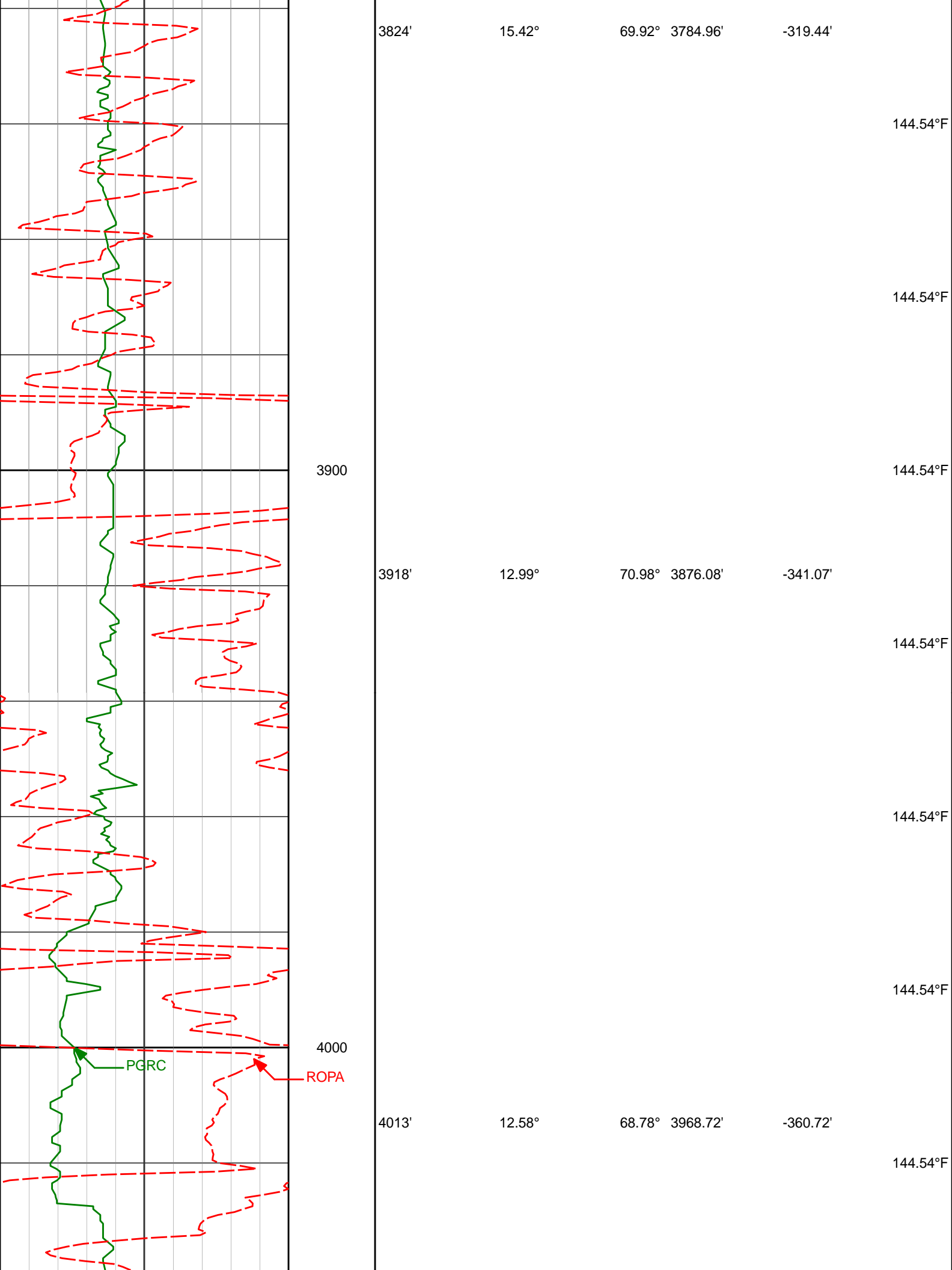
135.45°F

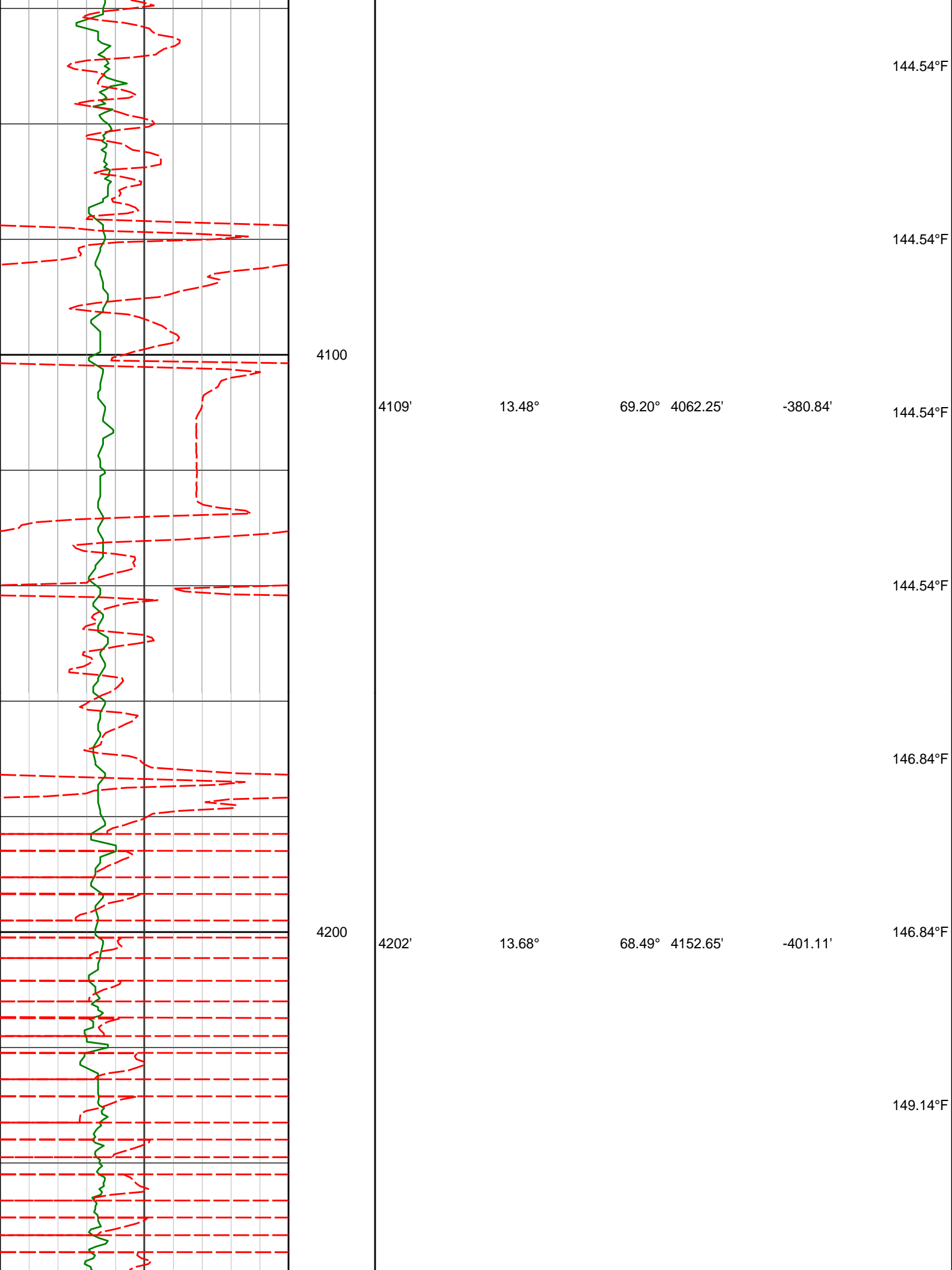
137.70°F

137.70°F

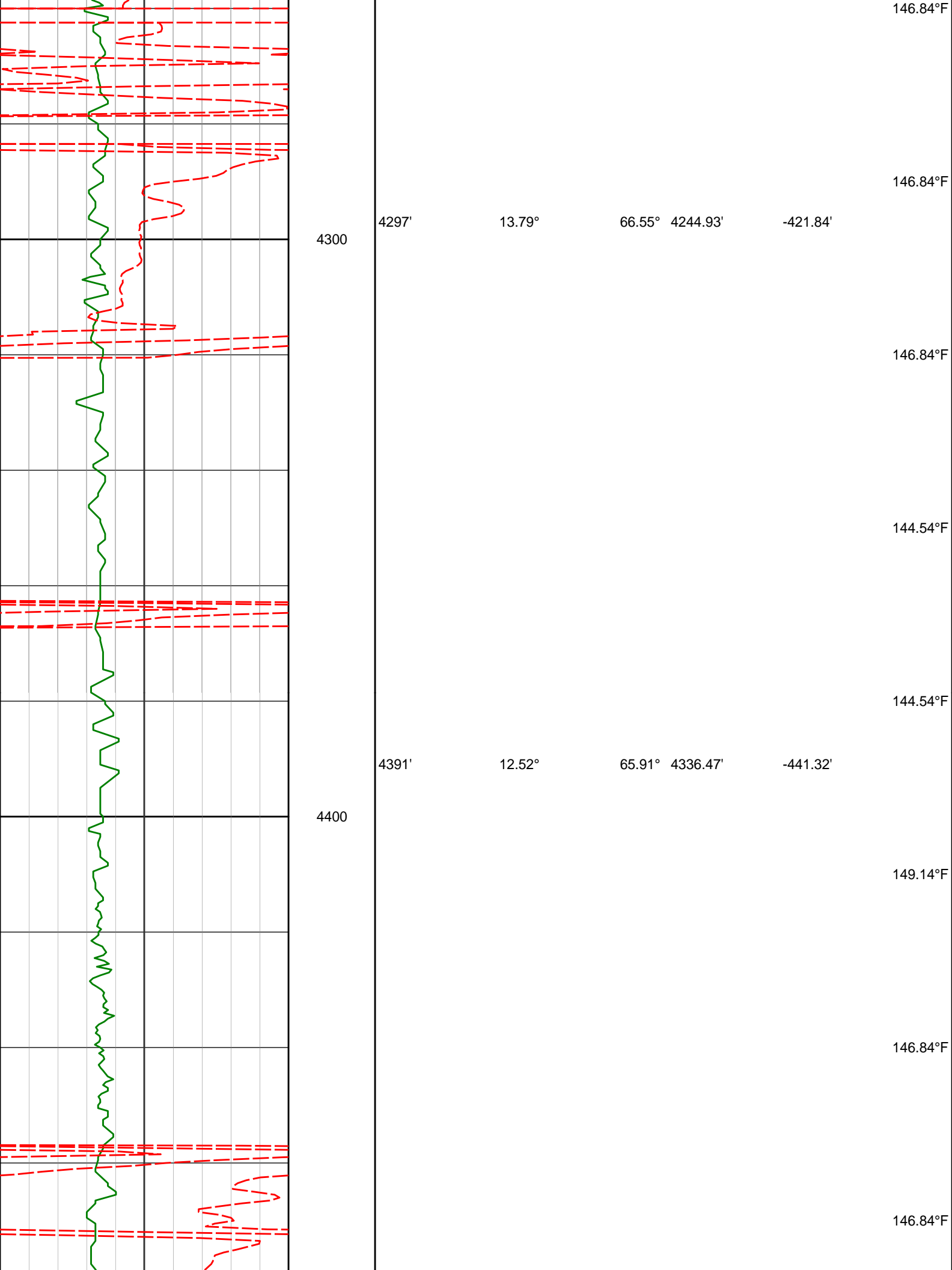


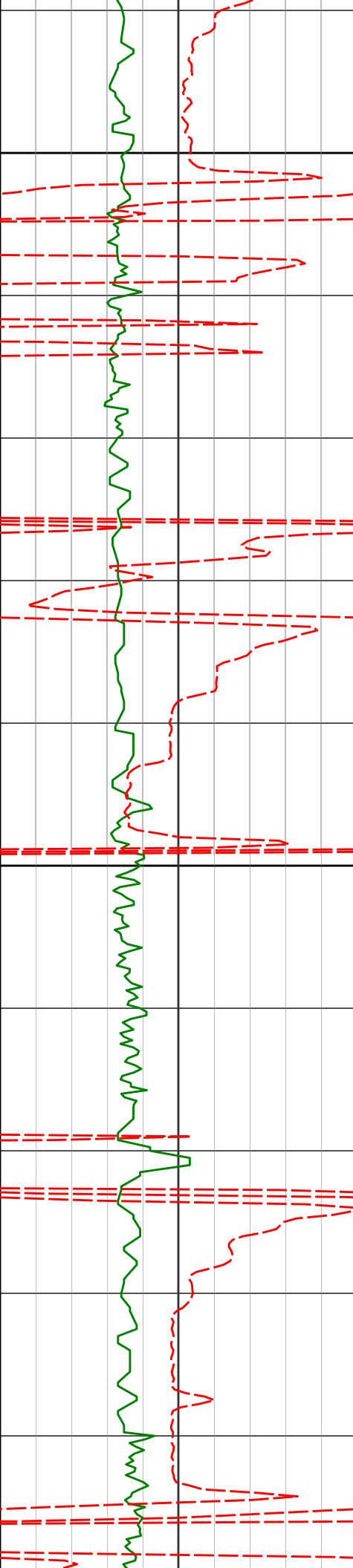












4500

4600

4486'

12.61°

67.33° 4429.19'

-460.20'

149.14°F

149.14°F

149.14°F

4581'

12.58°

67.99° 4521.90'

-479.27'

149.14°F

149.14°F

149.14°F

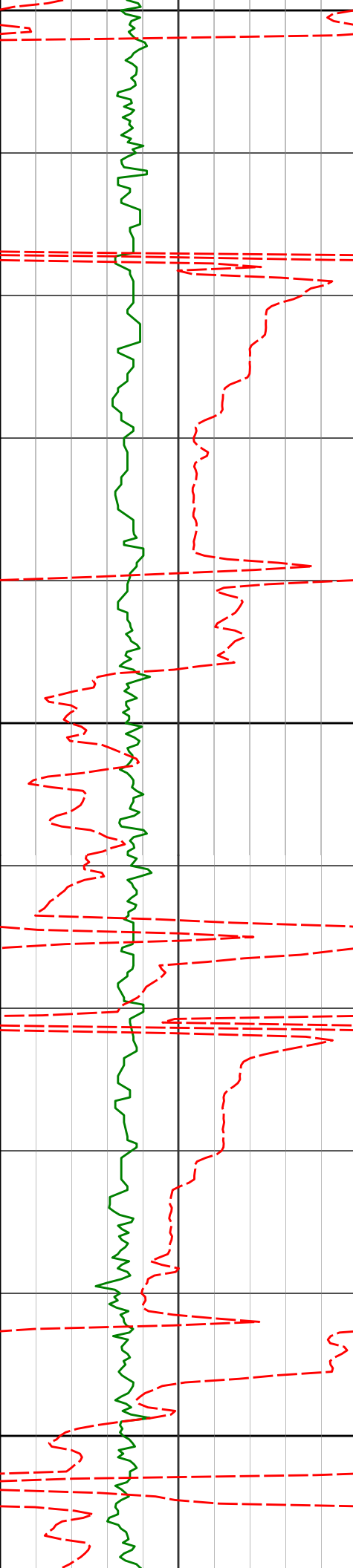
4676'

11.94°

62.29° 4614.74'

-497.46'

149.14°F



4700

149.14°F

149.14°F

4770'

12.36°

54.73° 4706.64'

-514.17'

149.14°F

4800

151.47°F

151.47°F

4865'

11.97°

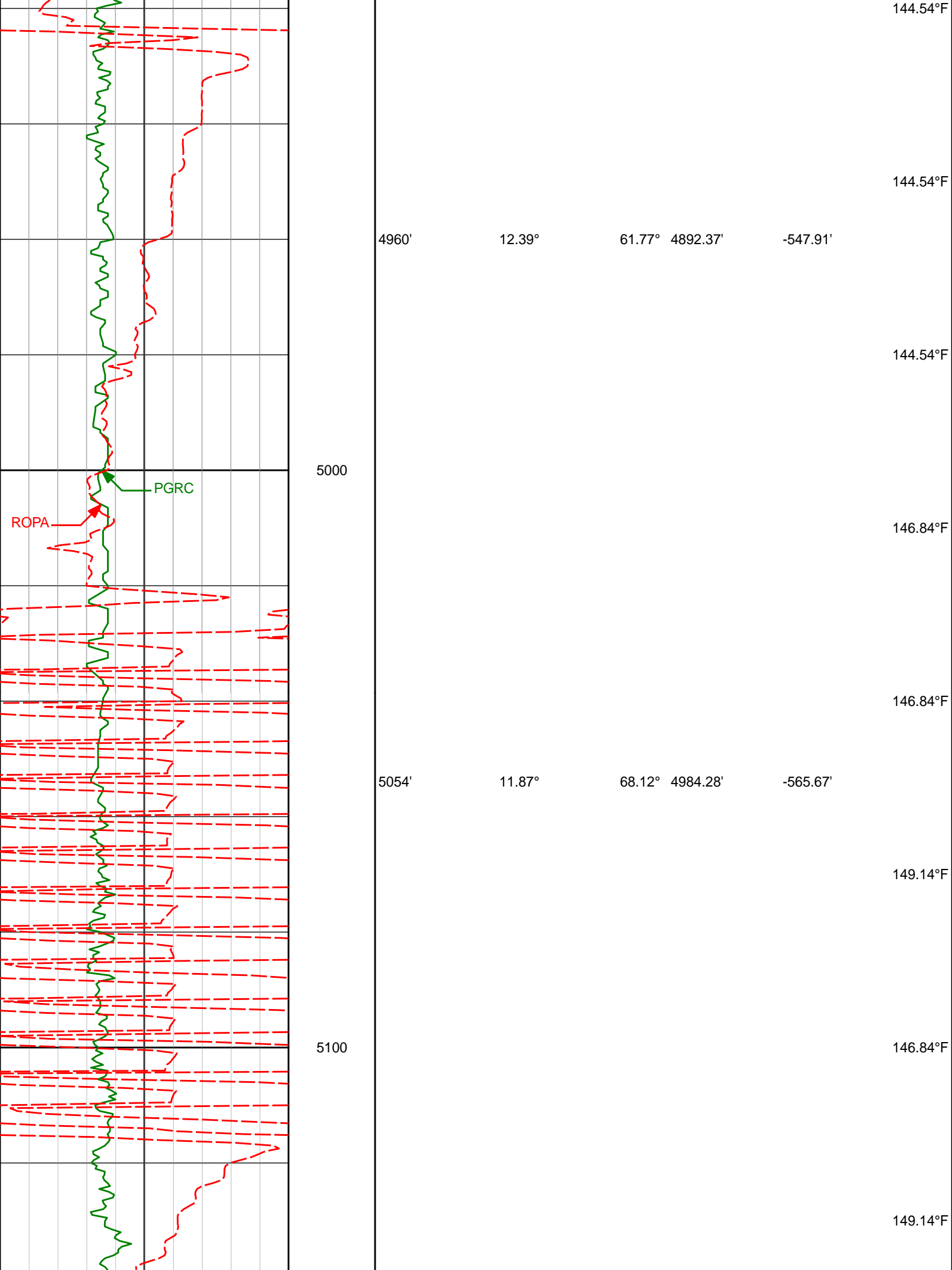
58.05° 4799.51'

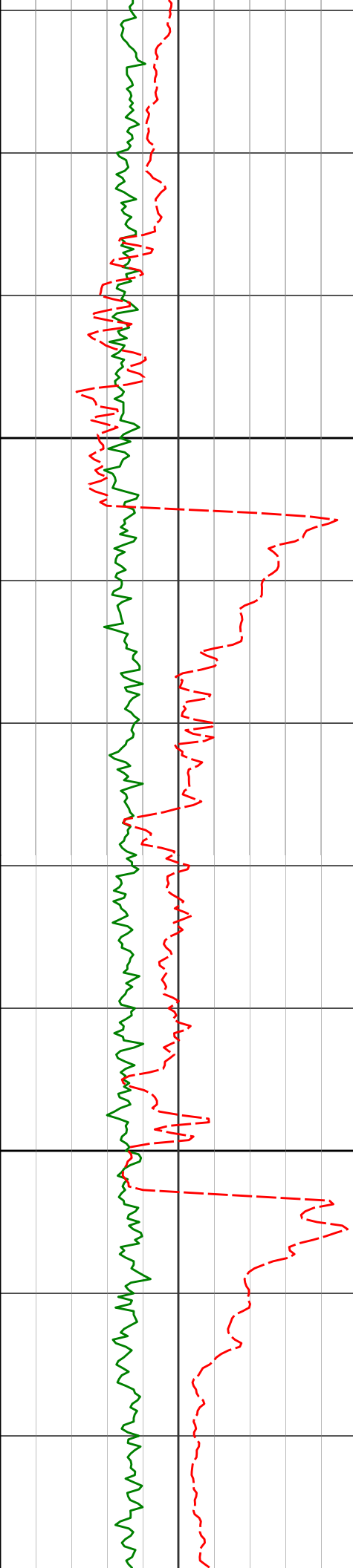
-530.69'

151.47°F

144.54°F

4900





5149'

8.12°

53.24° 5077.83'

-580.03'

149.14°F

149.14°F

5200

149.14°F

5243'

10.04°

30.20° 5170.68'

-589.35'

149.14°F

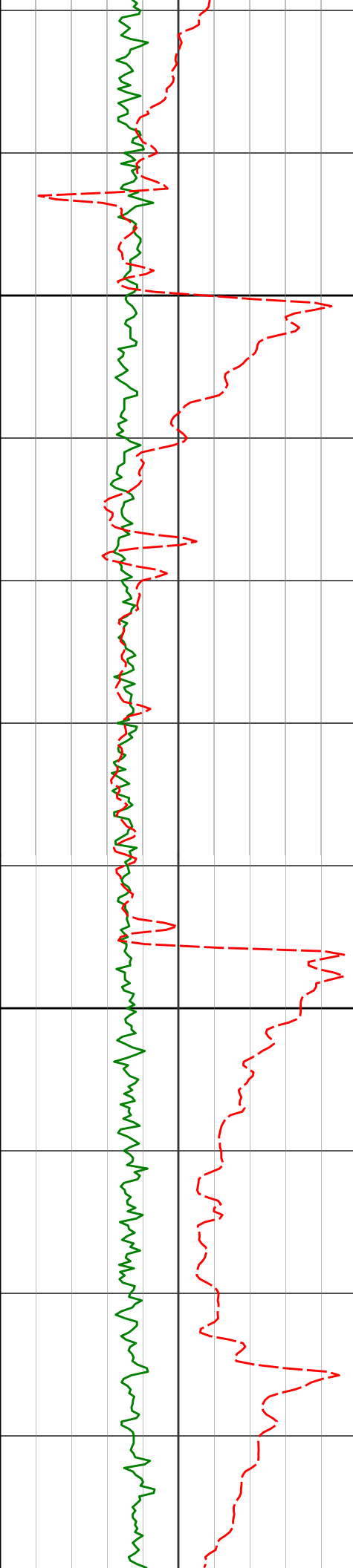
149.14°F

5290

Run 200

151.47°F

151.47°F



5400

5500

5487'

9.72°

328.52°

5410.70'

-589.67'

151.47°F

153.79°F

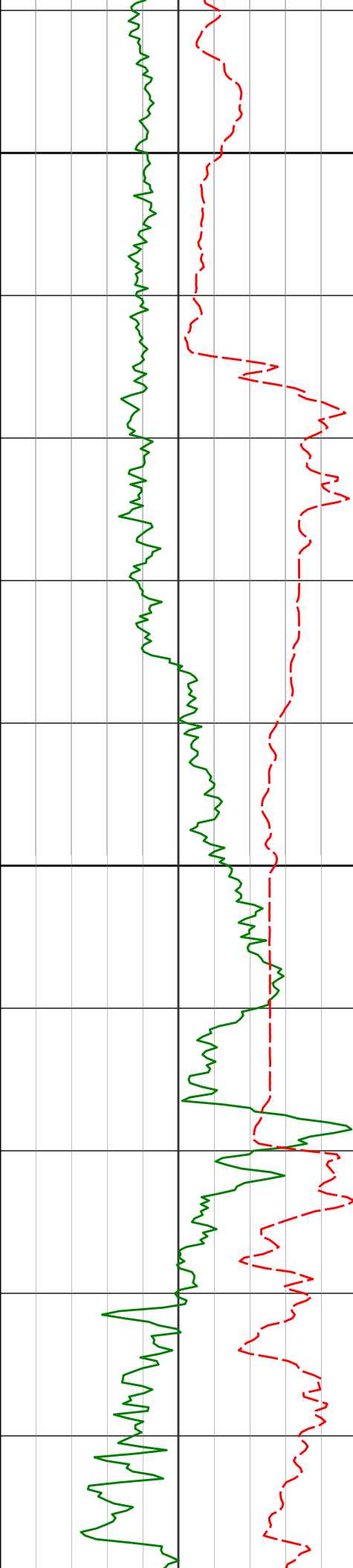
153.79°F

153.79°F

153.79°F

149.14°F

149.14°F



5600

5700

5582'

16.16°

277.53° 5503.51'

-572.20'

151.47°F

153.79°F

153.79°F

156.13°F

5676'

22.15°

254.76° 5592.38'

-542.10'

156.13°F

156.13°F

156.13°F

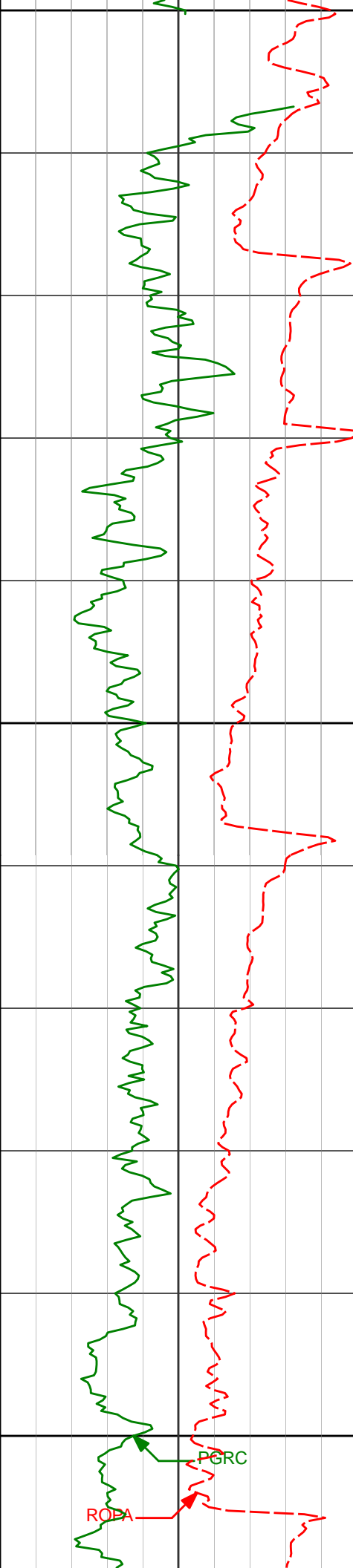
5771'

29.89°

244.87° 5677.73'

-503.50'

158.47°F



Run 300

5800

5900

6000

5960'

54.67°

240.27°

5821.01'

-398.77'

160.83°F

160.83°F

151.47°F

151.47°F

151.47°F

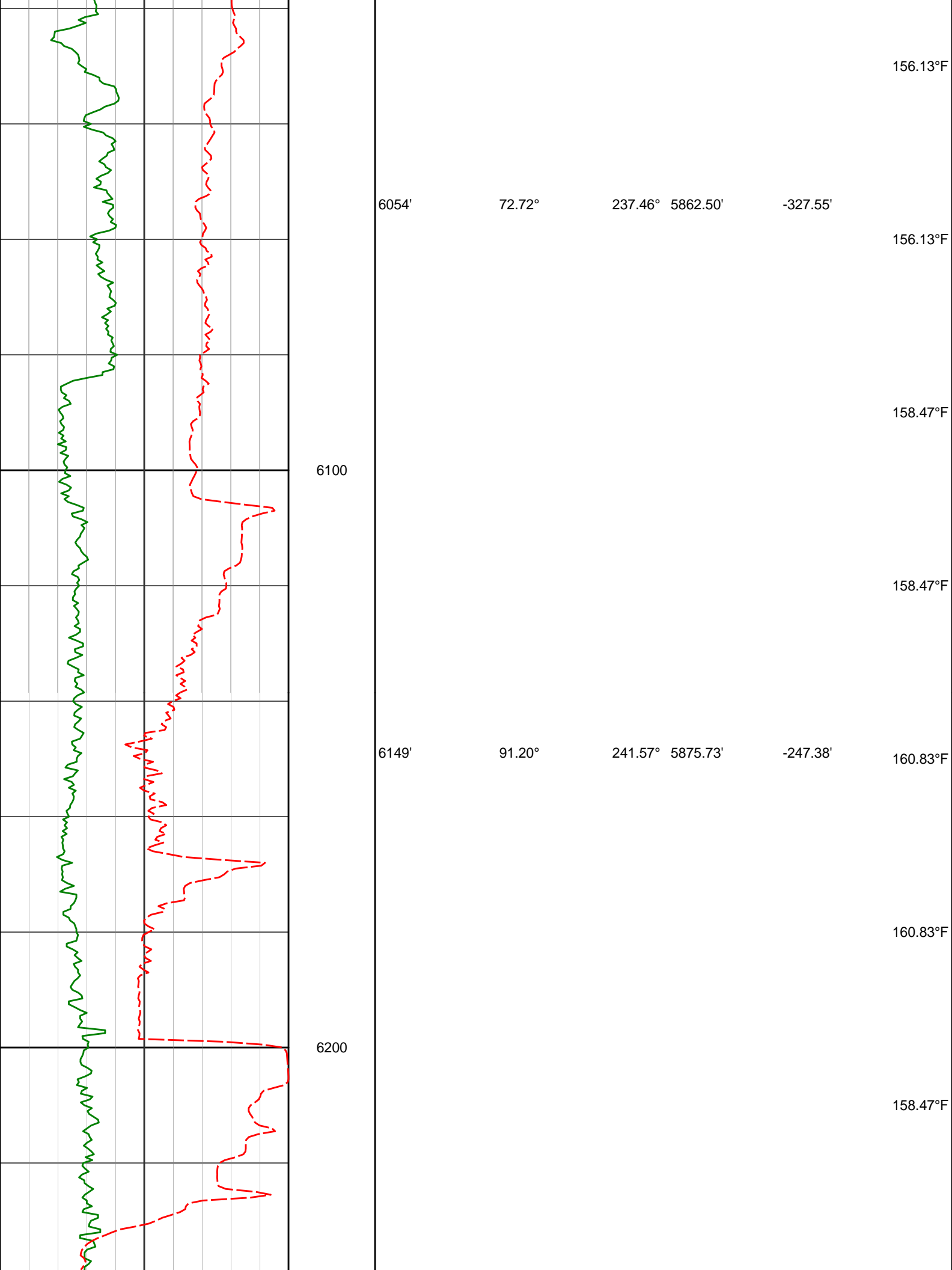
153.79°F

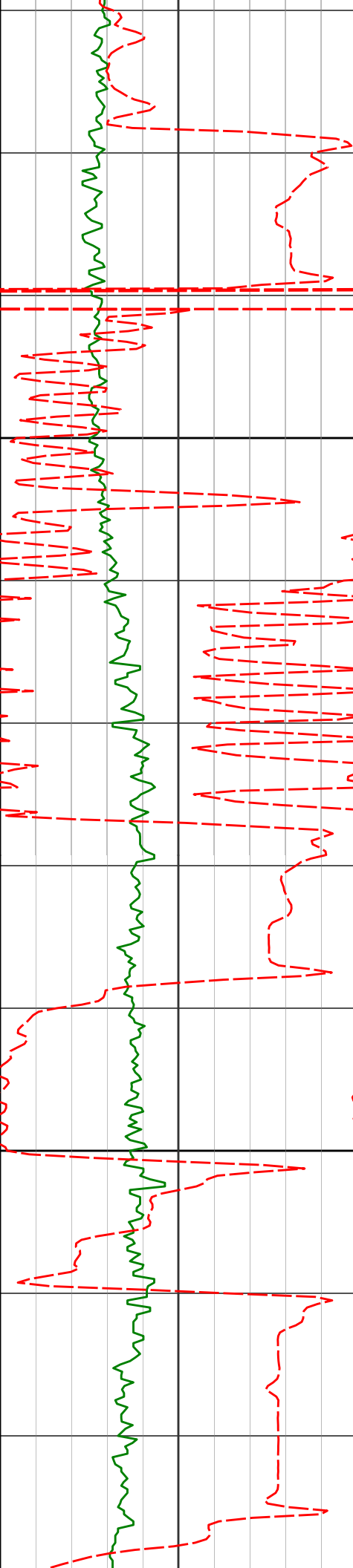
153.79°F

PGRC

ROPA







6300

6400

6244'

92.71°

244.82° 5872.49'

-163.15'

6338'

91.85°

246.19° 5868.75'

-78.15'

6433'

91.42°

251.94° 5866.04'

10.11'

160.83°F

163.20°F

165.58°F

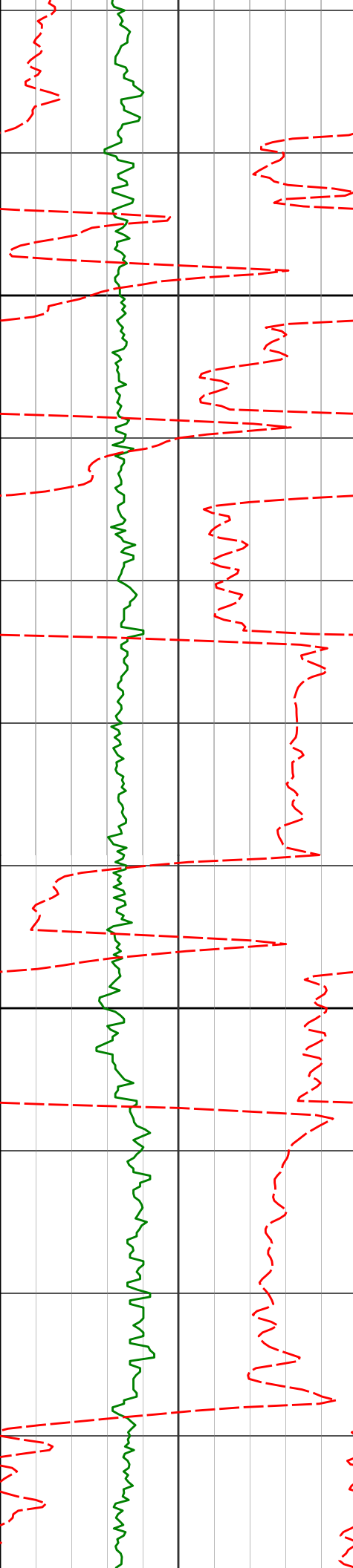
165.58°F

170.37°F

167.97°F

170.37°F

172.78°F



6500

6600

6527'

6622'

90.06°

91.54°

251.56°

256.23°

5864.82'

5863.50'

99.02'

189.94'

175.21°F

175.21°F

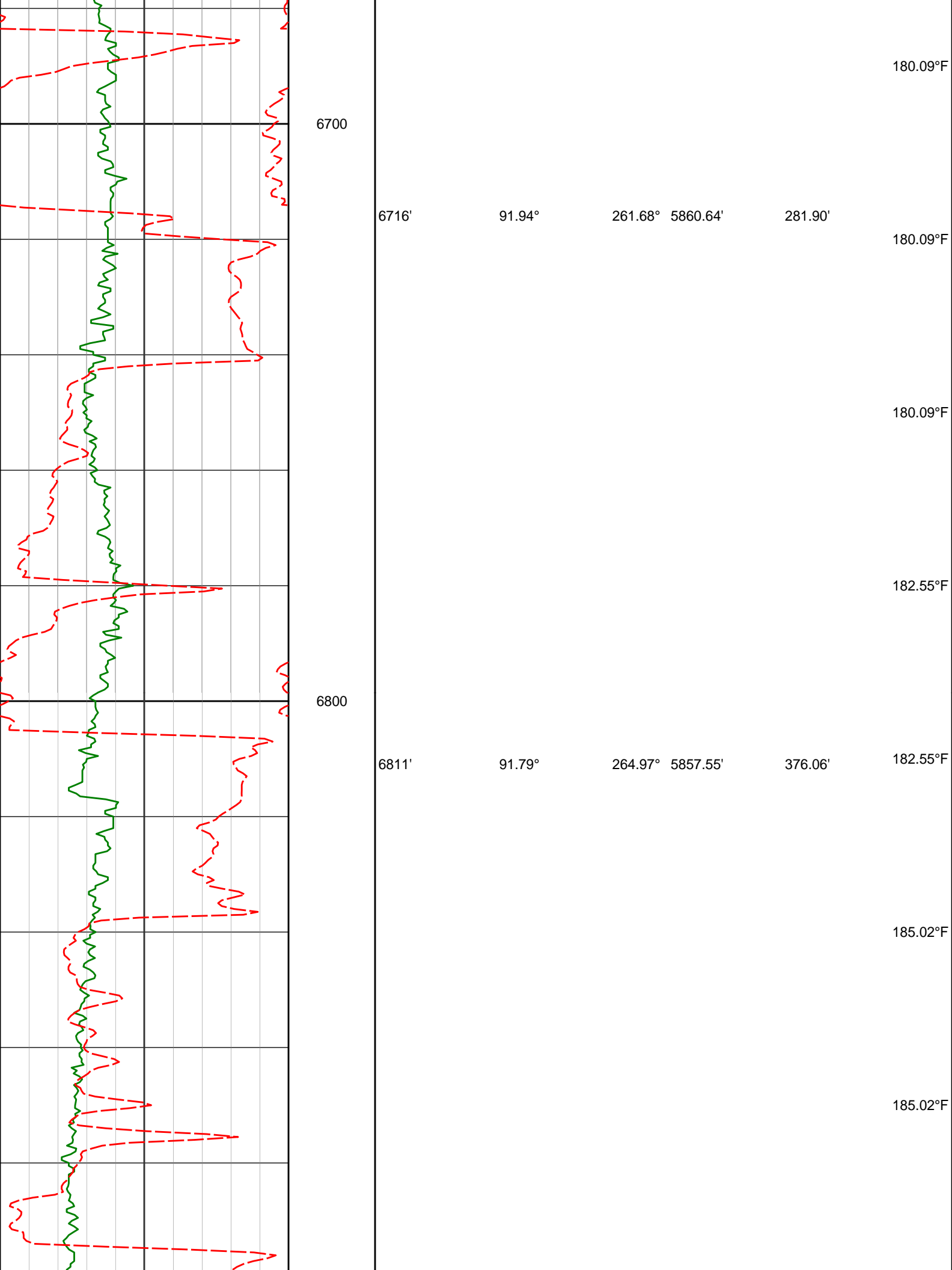
175.21°F

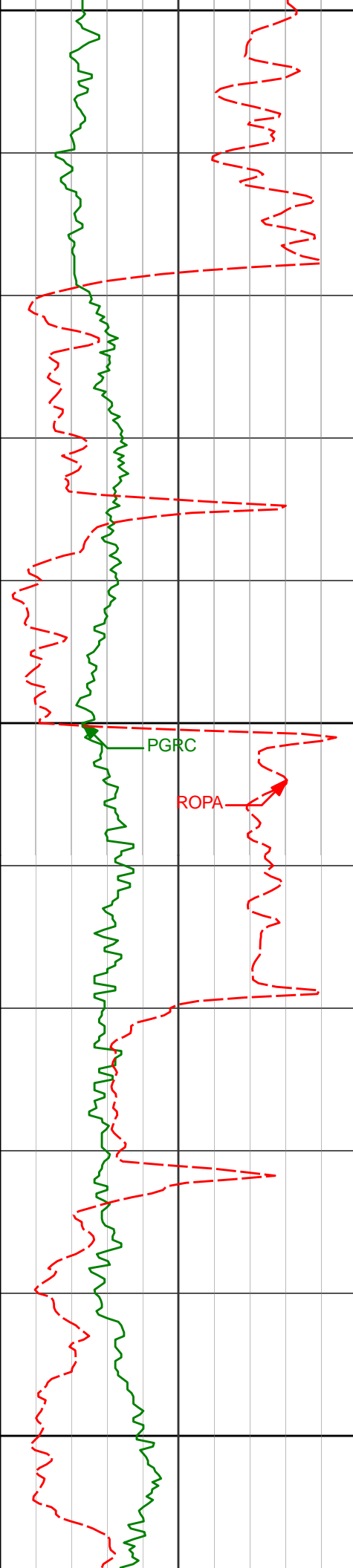
175.21°F

177.64°F

177.64°F

180.09°F





6900

6905'

90.77°

268.91° 5855.45'

469.82'

182.55°F

189.99°F

187.48°F

187.48°F

7000

7000'

92.80°

272.69° 5852.49'

564.75'

PGRC

ROPA

189.99°F

192.49°F

192.49°F

7100

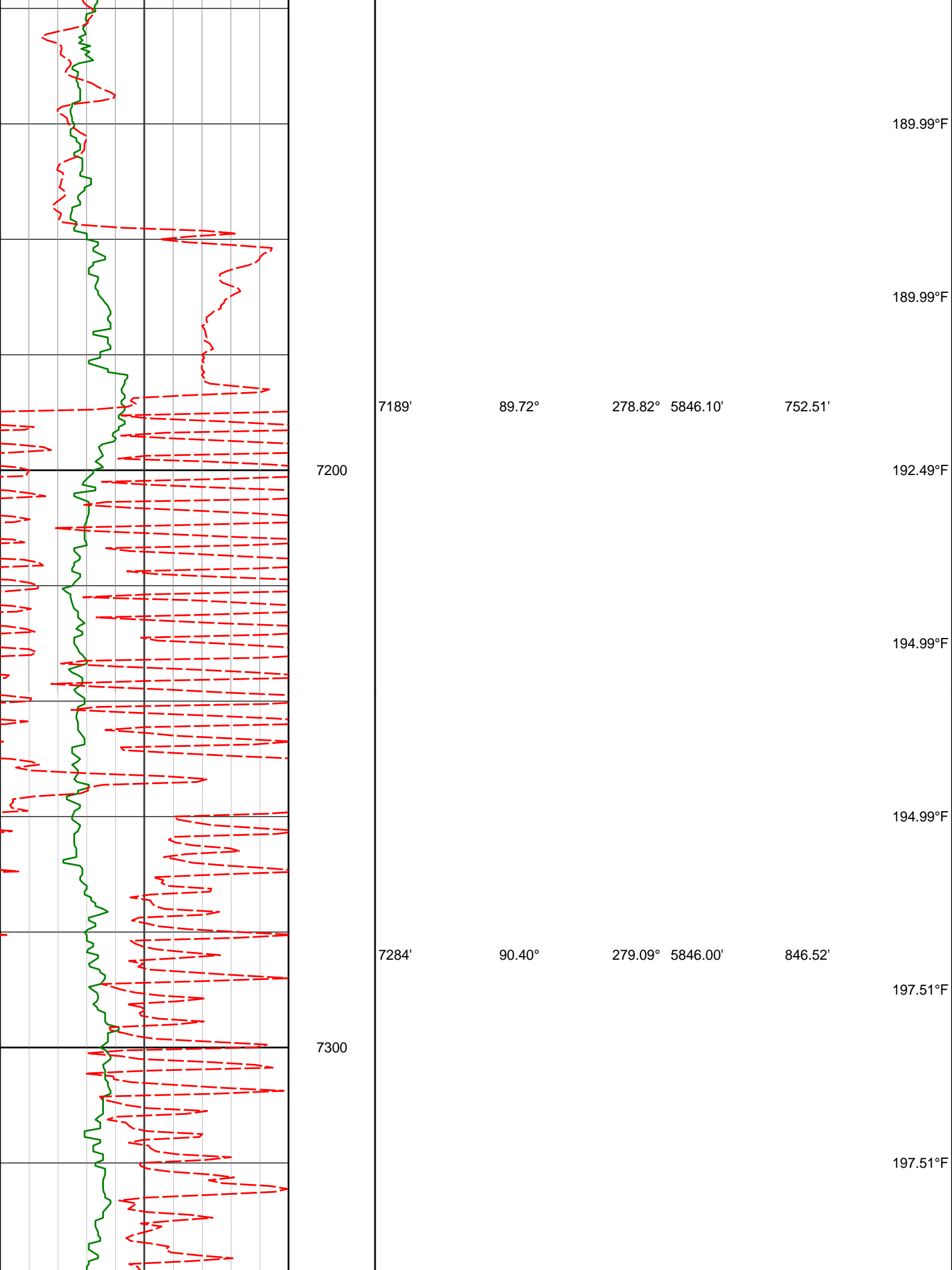
7094'

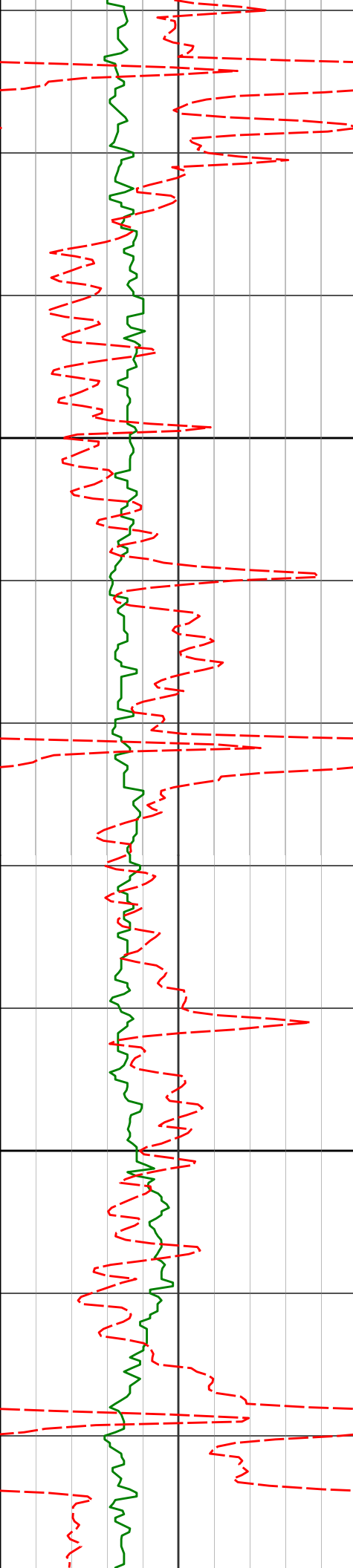
92.62°

277.41° 5848.04'

658.34'

192.49°F





7400

7500

7378'

91.26°

279.08°

5844.64'

939.50'

7473'

91.79°

278.91°

5842.11'

1033.46'

200.05°F

200.05°F

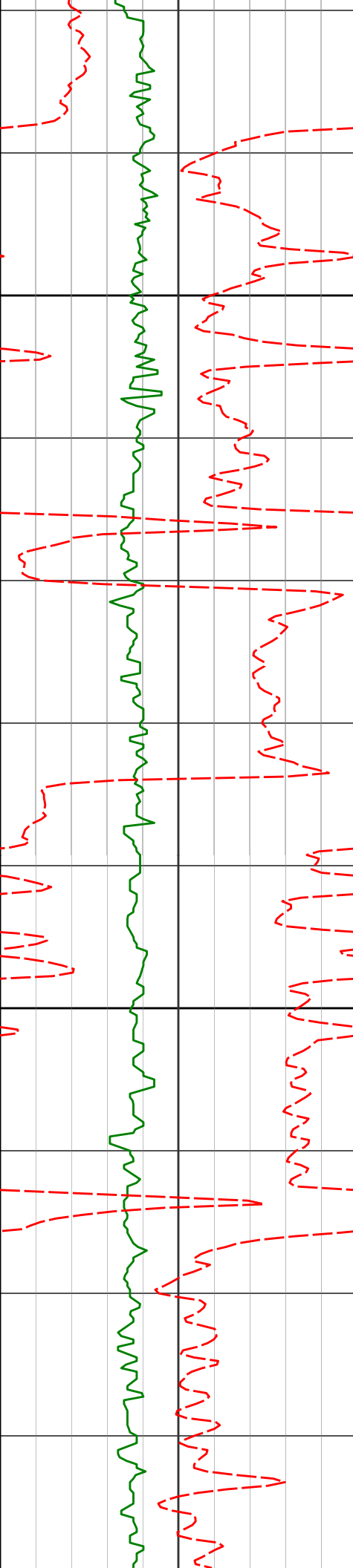
200.05°F

202.60°F

202.60°F

202.60°F

202.60°F



7600

7700

7567'

92.34°

278.90° 5838.72'

1126.43'

7662'

89.57°

279.97° 5837.14'

1220.30'

7756'

89.48°

281.10° 5837.92'

1312.90'

202.60°F

197.51°F

200.05°F

197.51°F

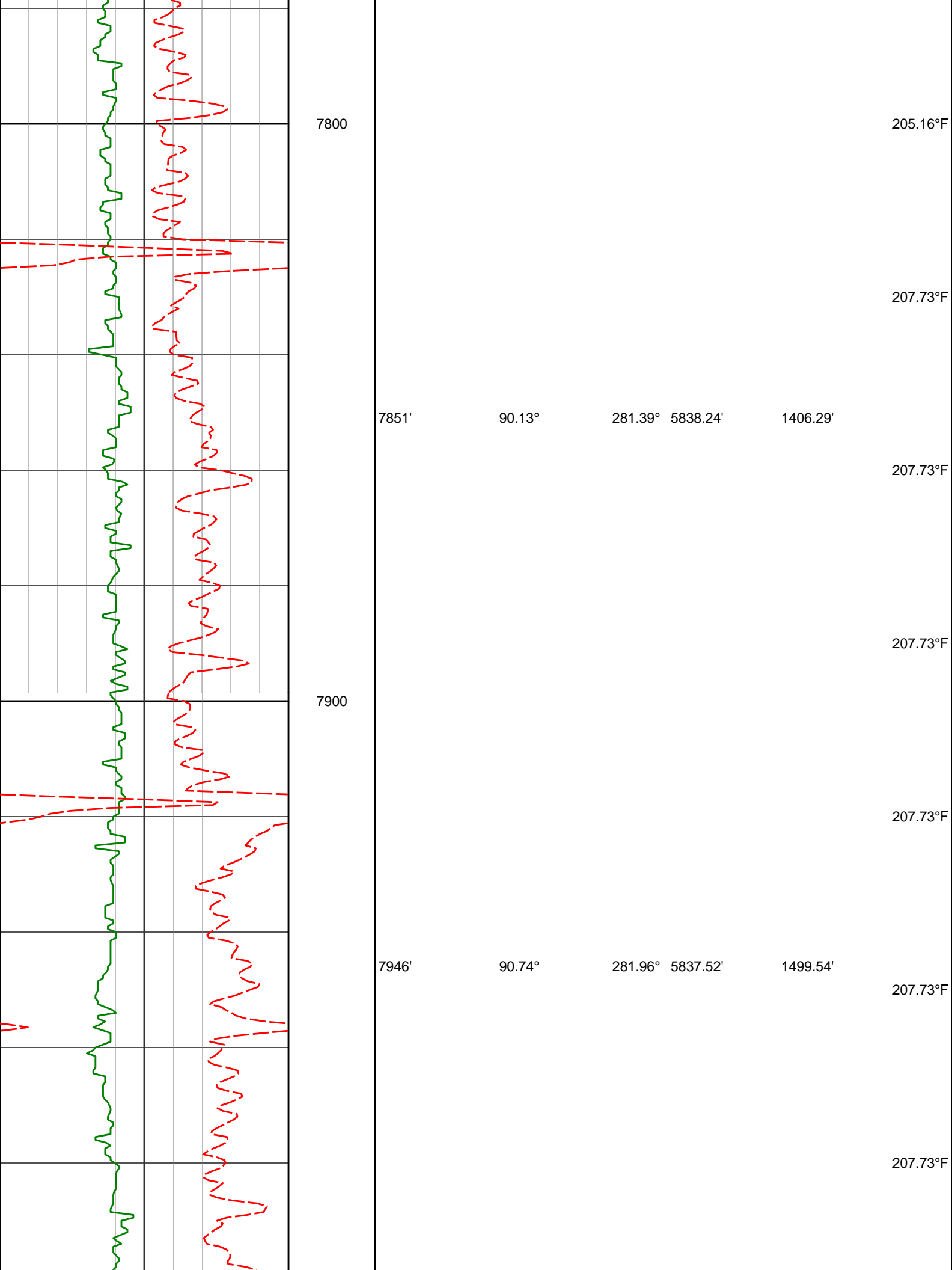
200.05°F

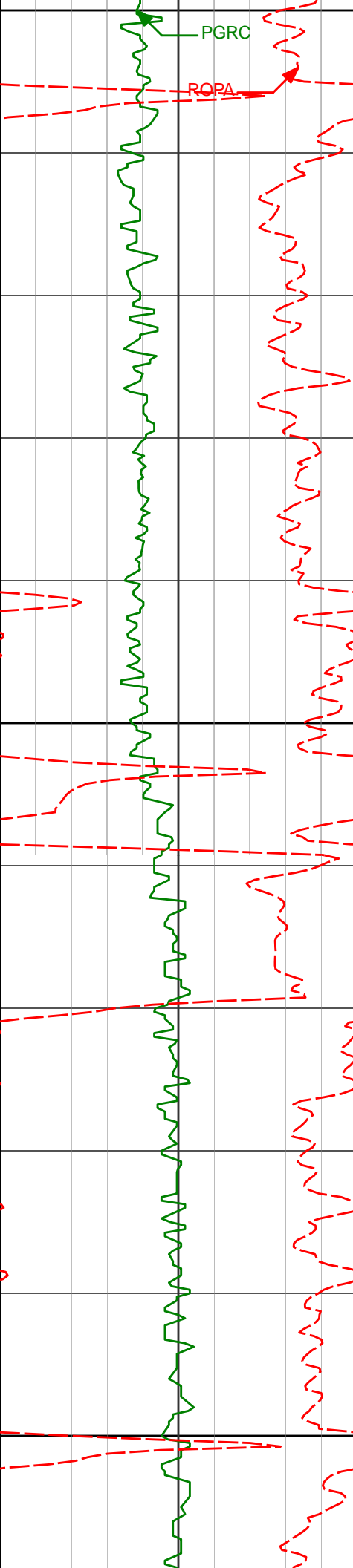
202.60°F

202.60°F

205.16°F







8000

210.31°F

8040'

91.45°

282.06° 5835.73'

1591.69'

210.31°F

207.73°F

8100

205.16°F

207.73°F

8135'

89.97°

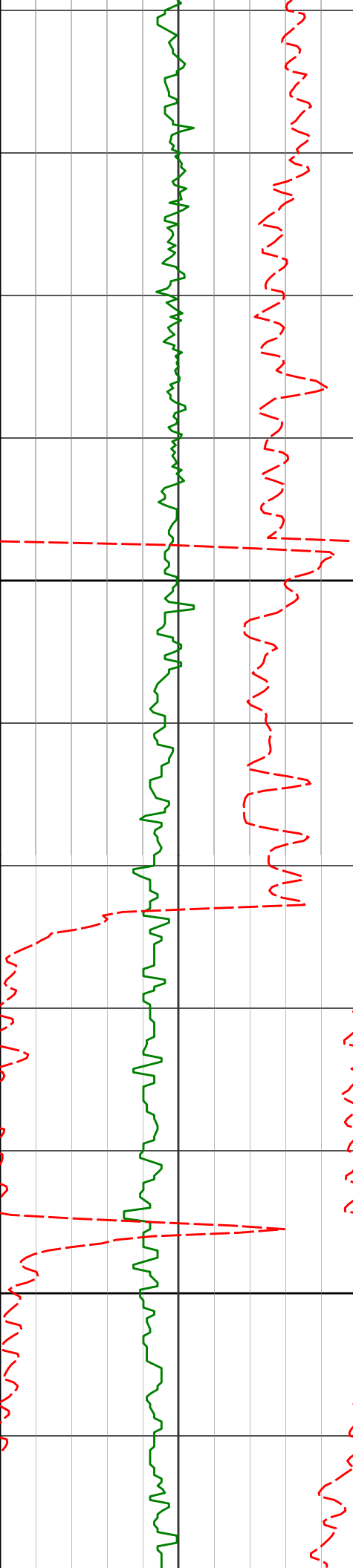
281.21° 5834.55'

1684.94'

207.73°F

207.73°F

8200



8300

8400

8230'

90.00°

281.19° 5834.57'

1778.34'

8324'

90.58°

275.11° 5834.10'

1871.50'

8419'

90.89°

273.37° 5832.88'

1966.30'

210.31°F

207.73°F

202.60°F

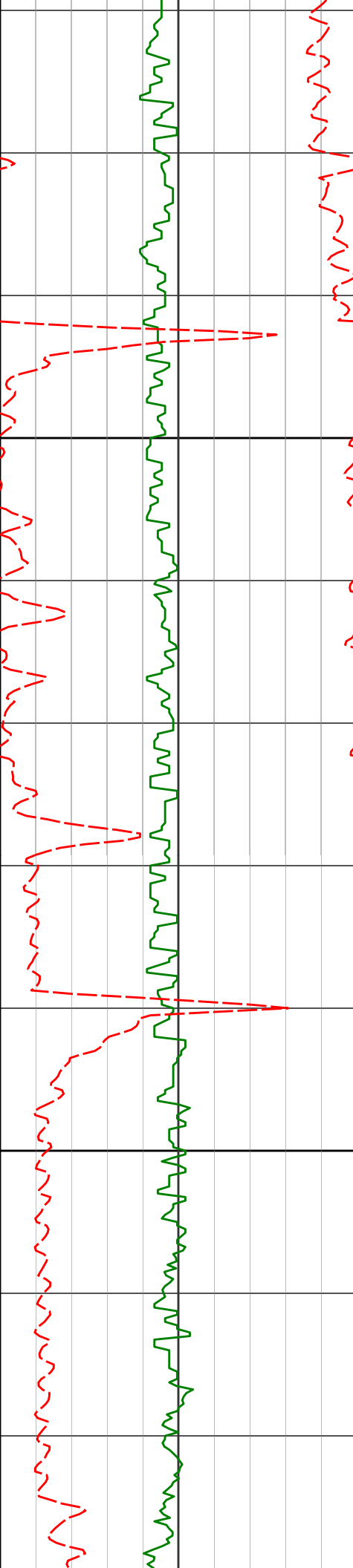
202.60°F

205.16°F

207.73°F

207.73°F

210.31°F



8500

8600

8514'

8608'

91.20°

91.75°

273.13°

273.03°

5831.15'

5828.73'

2061.19'

2155.07'

210.31°F

212.92°F

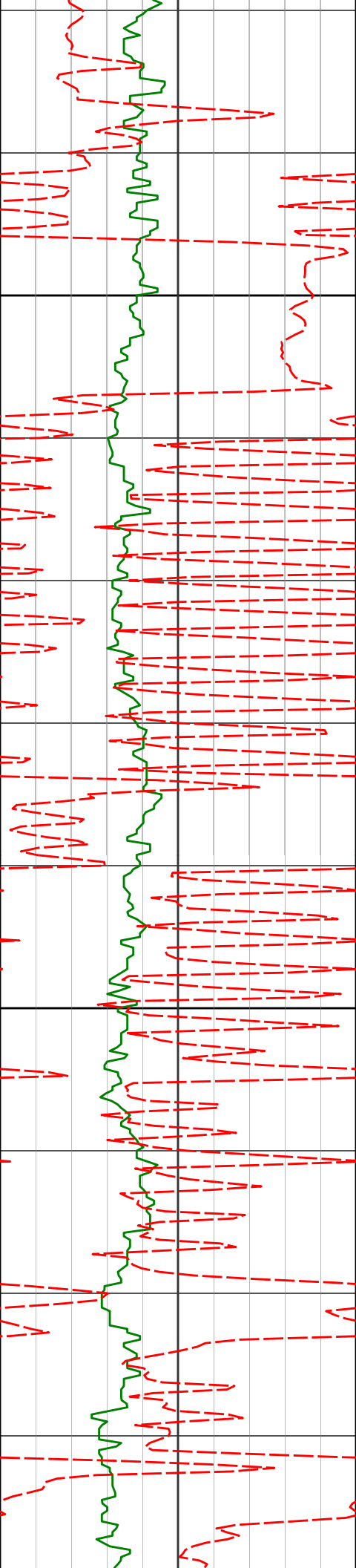
212.92°F

210.31°F

212.92°F

215.51°F

210.31°F



8700

8703'

90.96°

273.01°

5826.48'

2249.97'

210.31°F

210.31°F

212.92°F

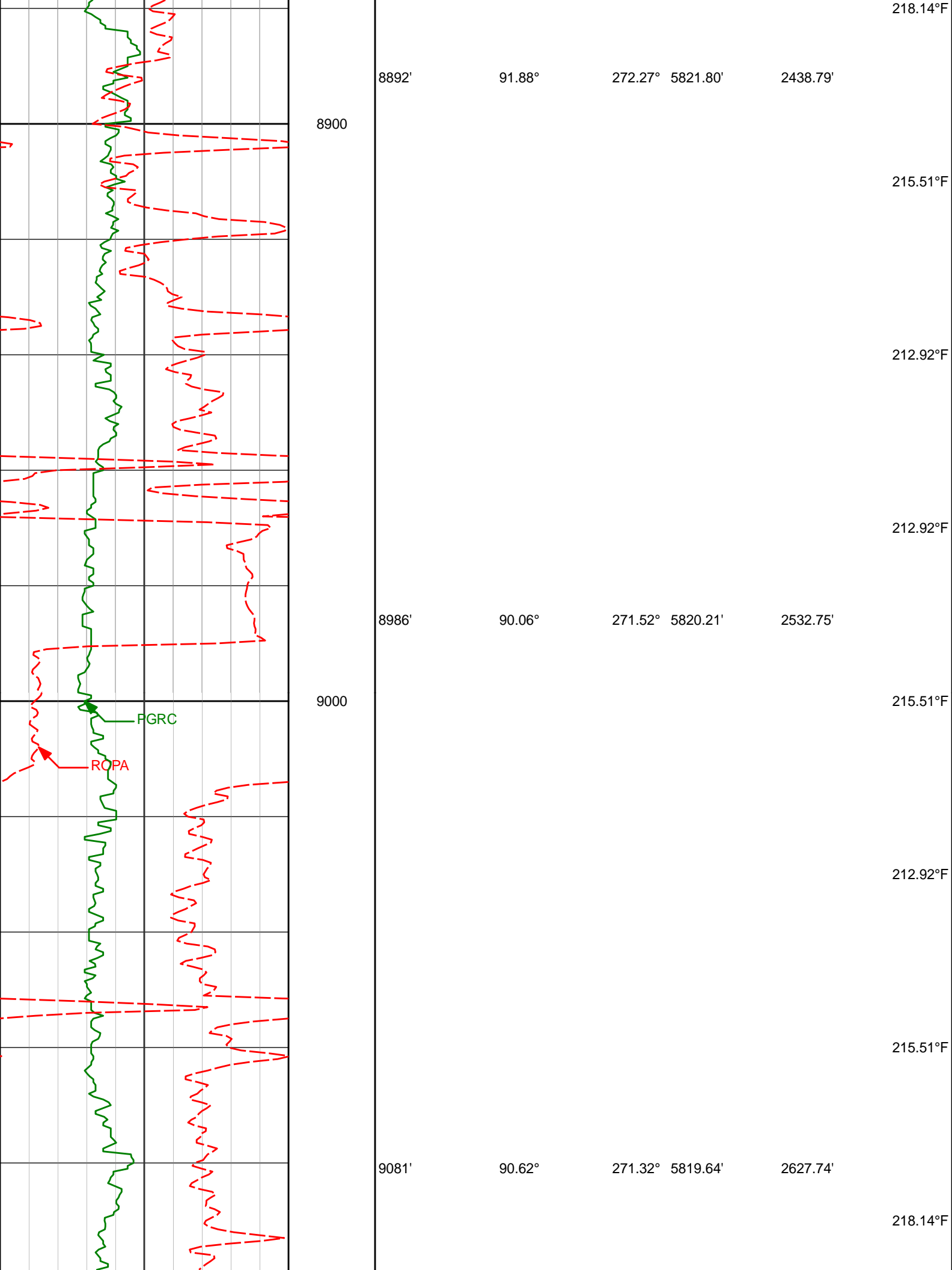
215.51°F

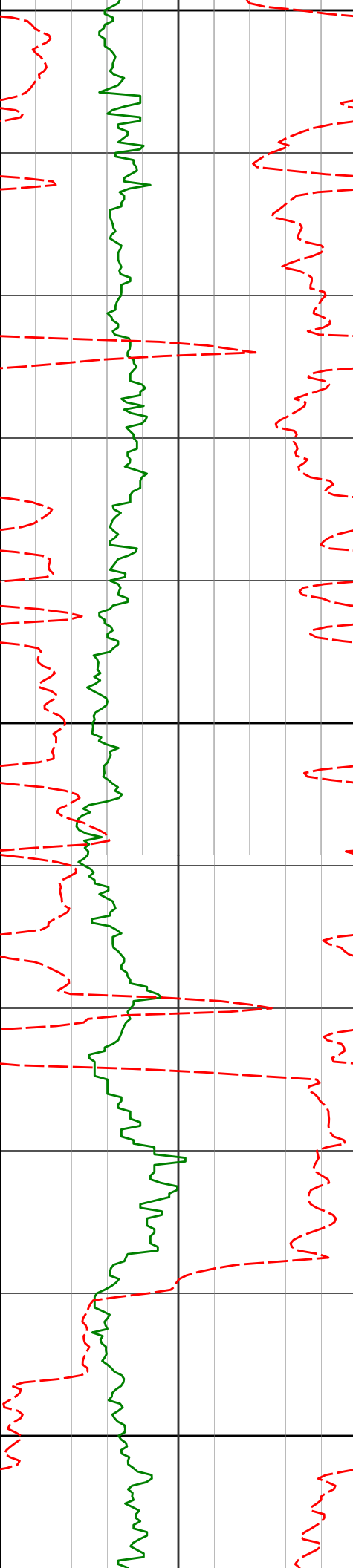
8800

215.51°F

215.51°F

207.73°F





9100

218.14°F

218.14°F

9175'

91.94°

271.54° 5817.54'

2721.71'

218.14°F

9200

212.92°F

212.92°F

9270'

91.85°

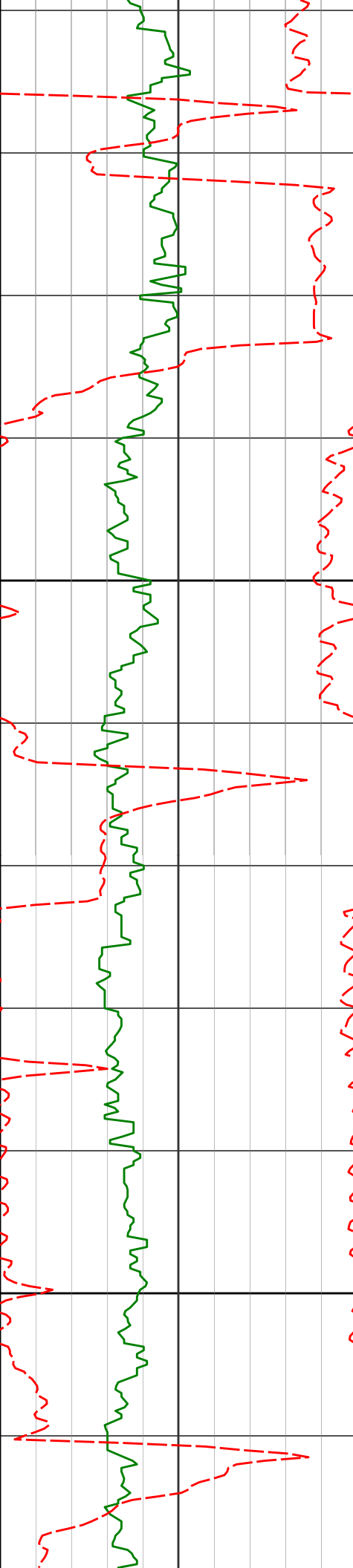
271.86° 5814.40'

2816.64'

215.51°F

9300

212.92°F



9400

9500

9364'

89.78°

272.09° 5813.06'

2910.60'

9459'

90.62°

271.59° 5812.73'

3005.58'

212.92°F

215.51°F

215.51°F

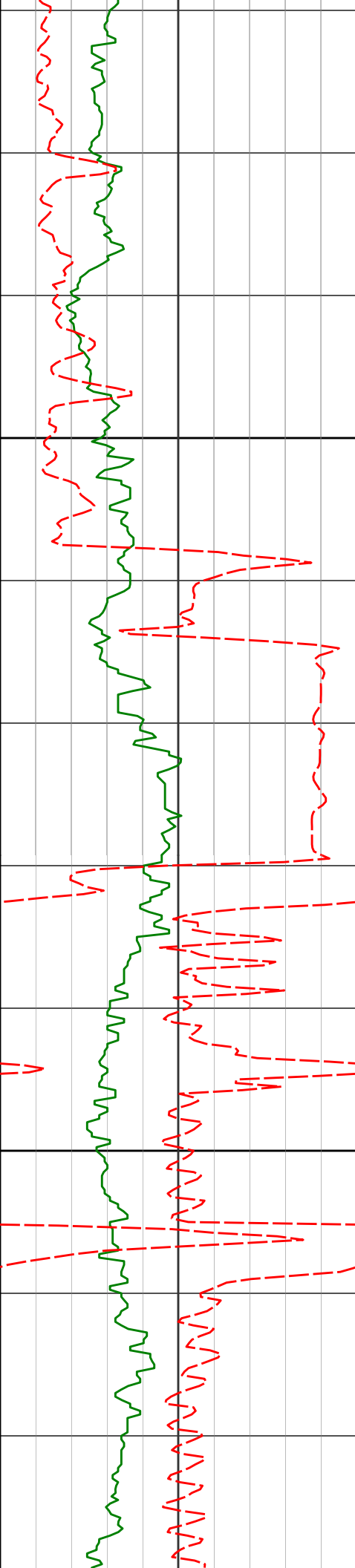
218.14°F

218.14°F

218.14°F

218.14°F





9600

9700

9554'

91.97°

271.51° 5810.58'

3100.54'

9648'

90.83°

271.01° 5808.29'

3194.51'

9743'

90.71°

271.09° 5807.01'

3289.50'

220.77°F

218.14°F

215.51°F

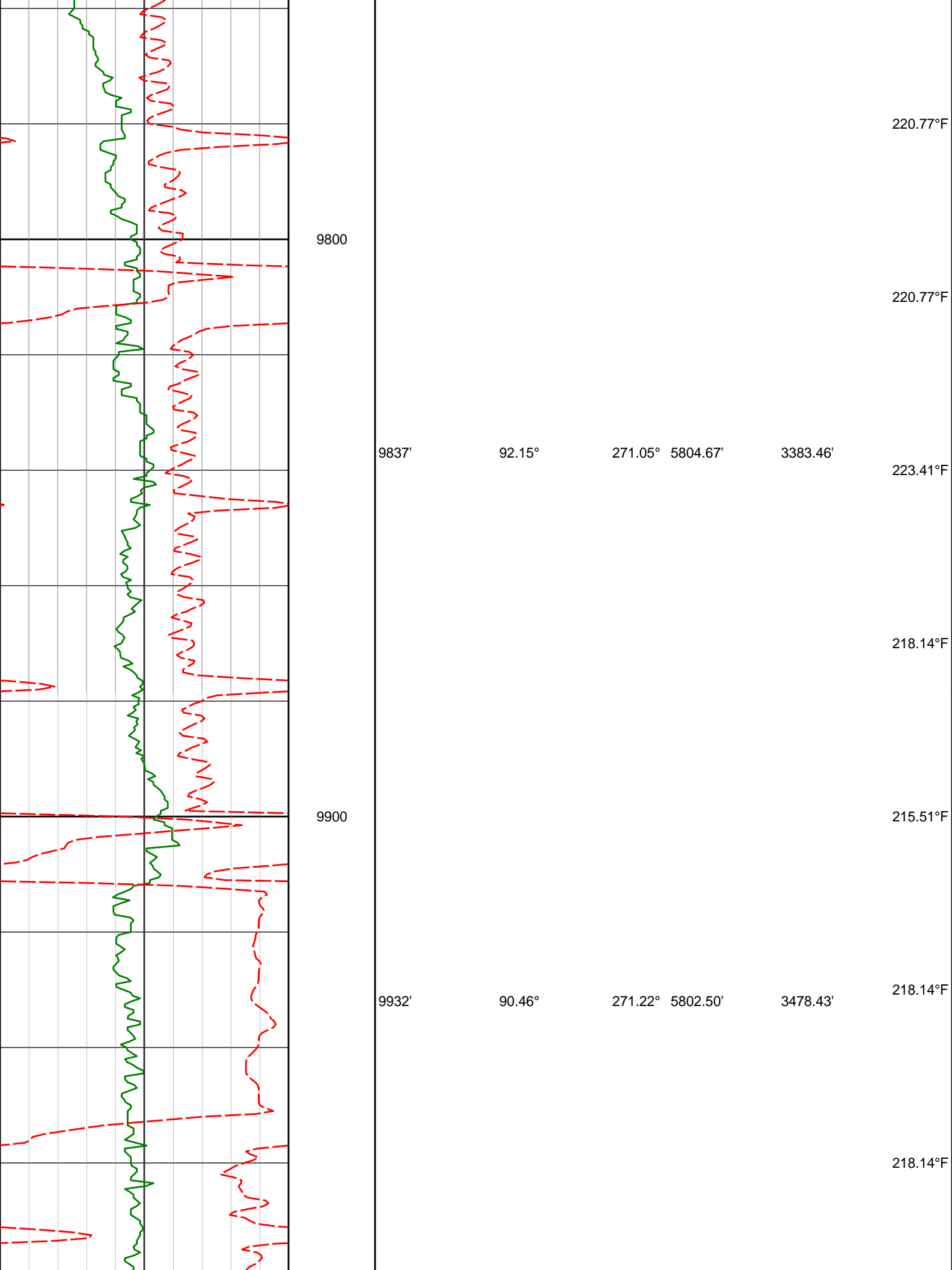
215.51°F

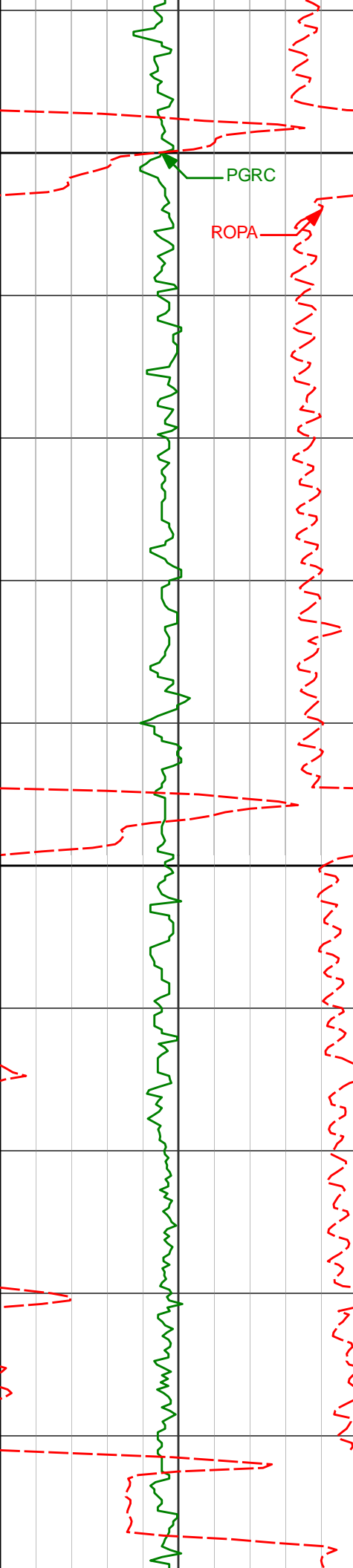
218.14°F

218.14°F

218.14°F

220.77°F





10000

PGRC

ROPA

10100

10026'

89.51°

272.31°

5802.53'

3572.41'

220.77°F

220.77°F

220.77°F

223.41°F

223.41°F

10121'

89.20°

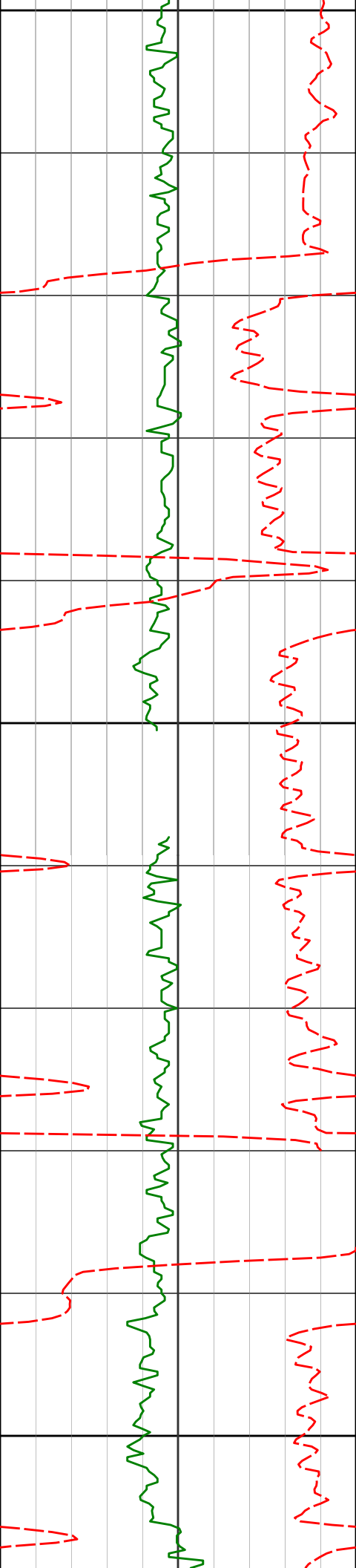
271.96°

5803.60'

3667.38'

220.77°F

218.14°F



10200

10216'

89.63°

269.44° 5804.57'

3762.36'

218.14°F

220.77°F

220.77°F

223.41°F

10300

10310'

90.22°

266.82° 5804.69'

3856.26'

223.41°F

223.41°F

223.41°F

223.41°F

10400

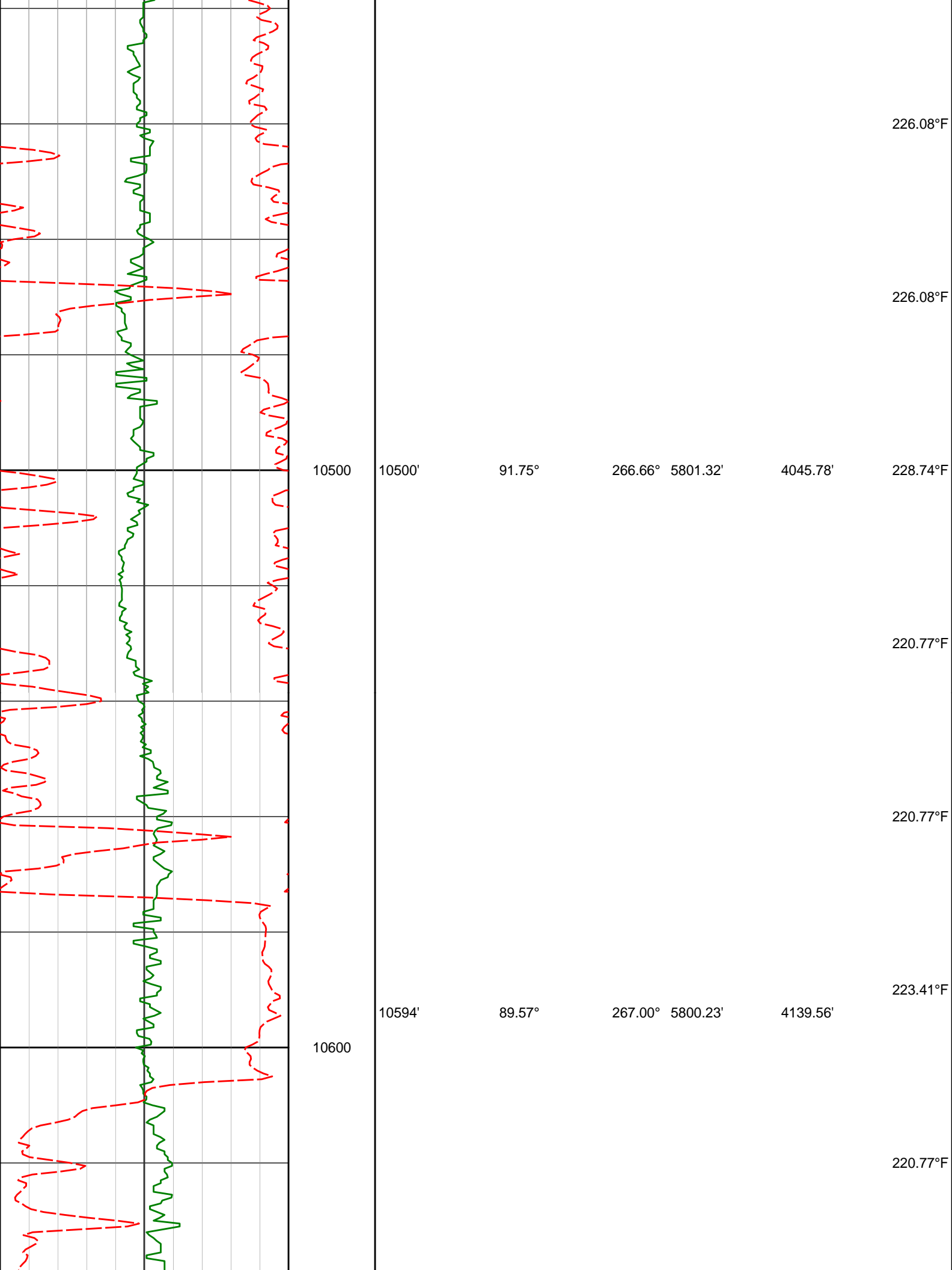
10405'

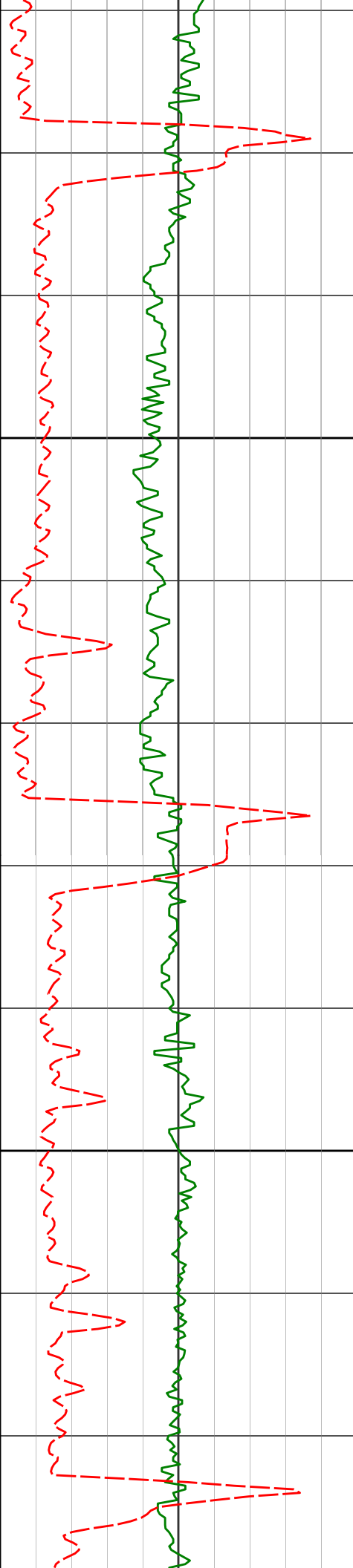
91.05°

266.75° 5803.64'

3951.04'

226.08°F





10700

10800

10689'

88.99°

266.40°

5801.43'

4234.32'

10783'

89.04°

265.64°

5803.04'

4328.00'

223.41°F

226.08°F

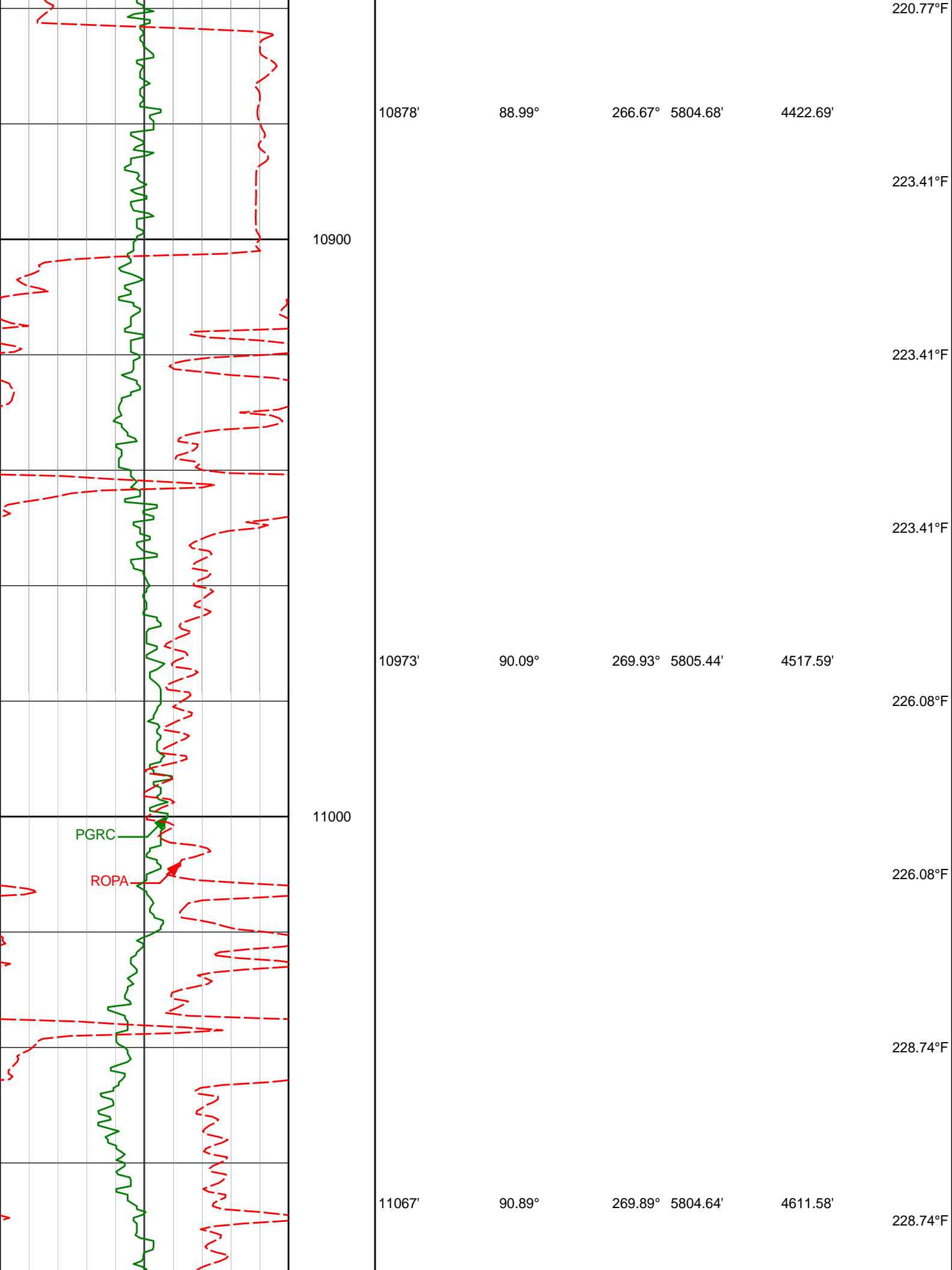
226.08°F

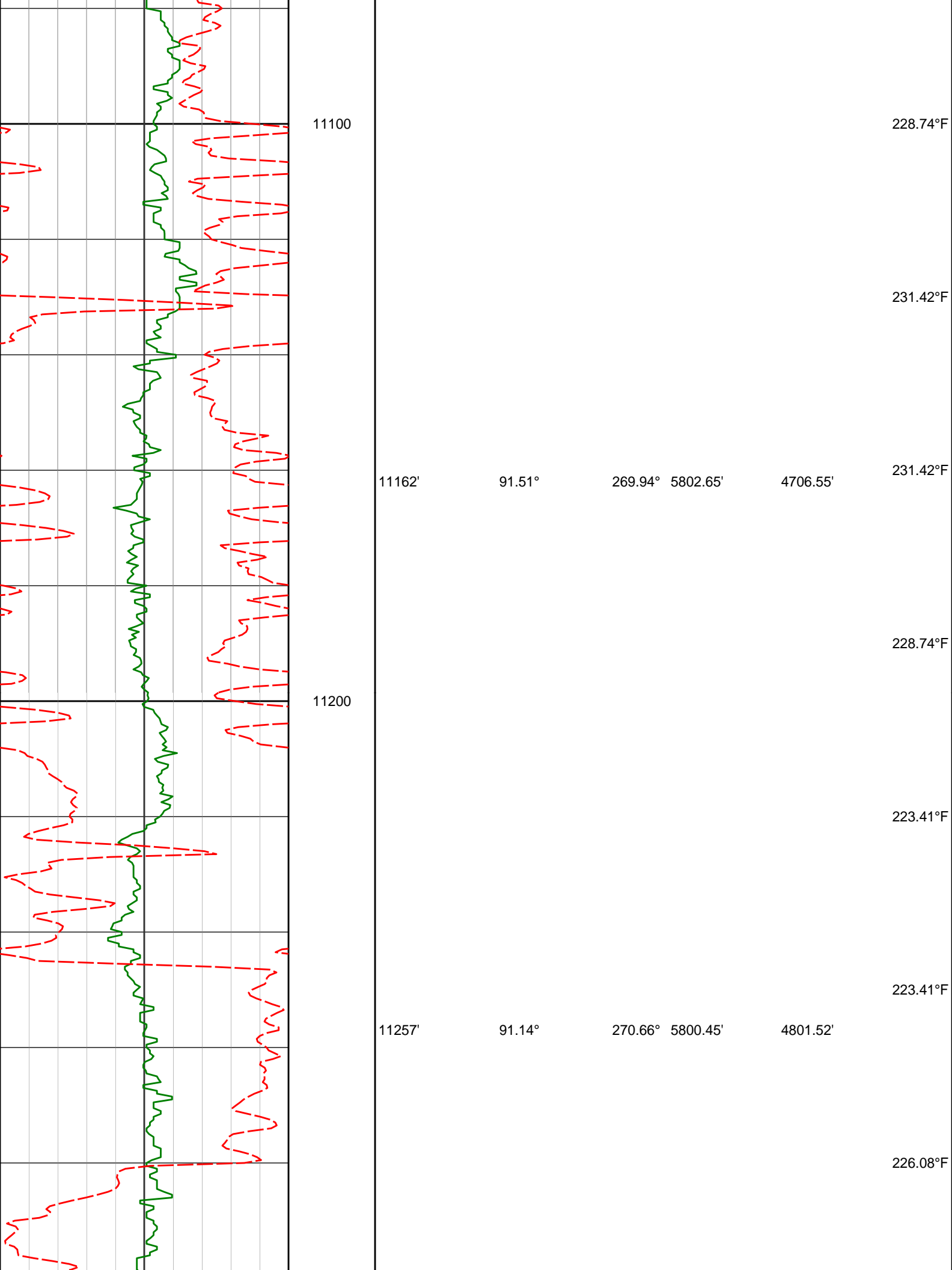
228.74°F

228.74°F

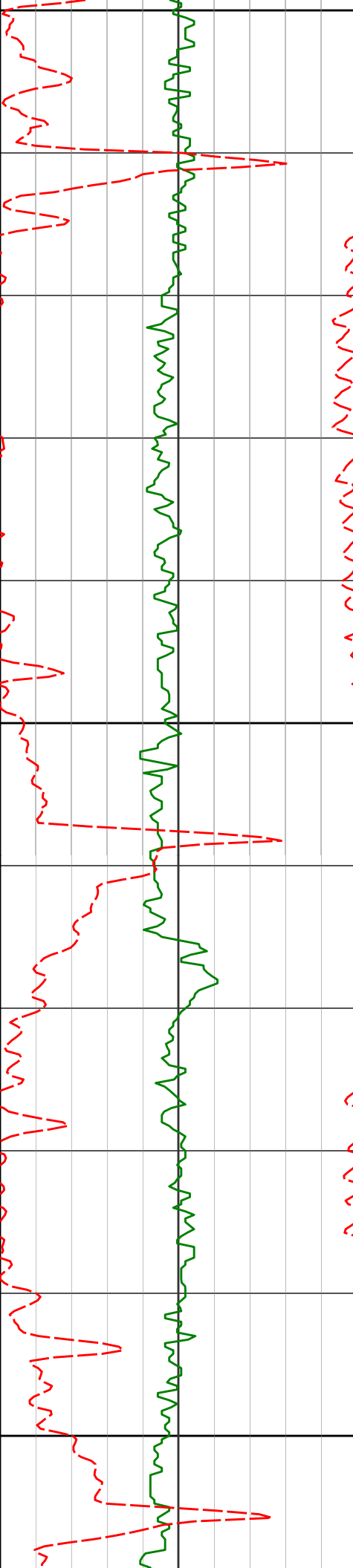
226.08°F

220.77°F









11300

228.74°F

228.74°F

11351'

89.75°

272.07° 5799.72'

4895.50'

228.74°F

11400

228.74°F

228.74°F

11446'

90.34°

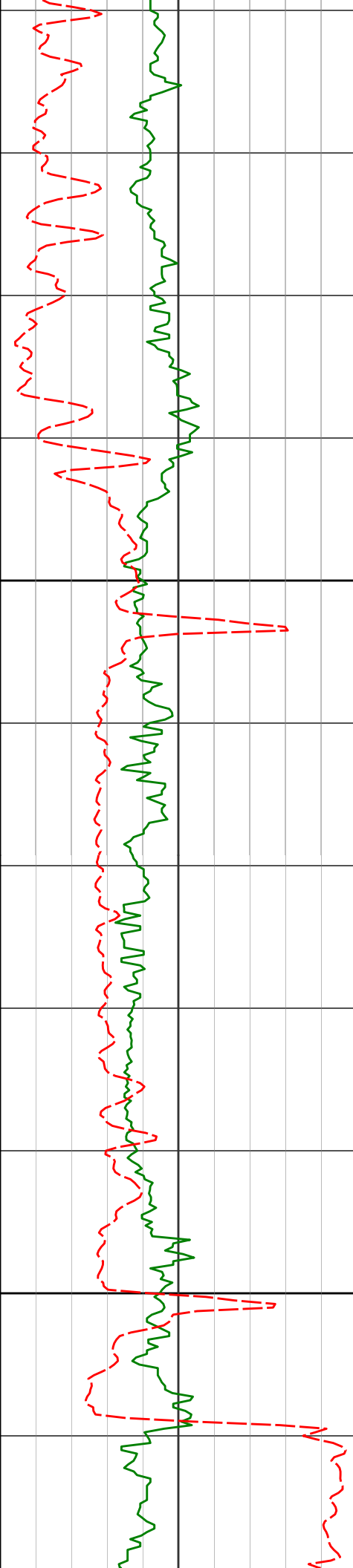
271.60° 5799.64'

4990.48'

231.42°F

231.42°F

11500



11600

11700

11541' 91.26° 271.56° 5798.32' 5085.46'

11635' 92.16° 271.65° 5795.51' 5179.41'

11730' 91.20° 272.23° 5792.73' 5274.34'

231.42°F

234.12°F

234.12°F

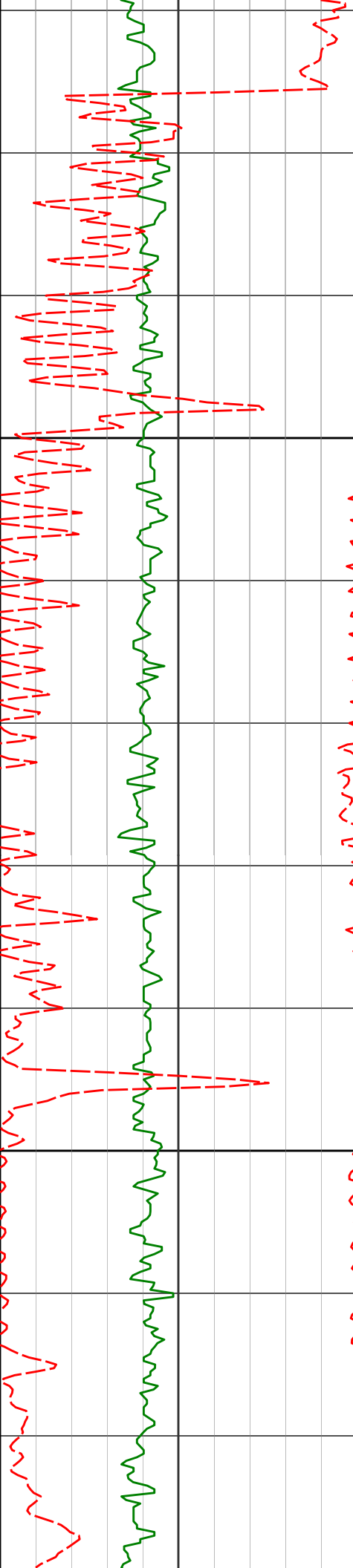
234.12°F

231.42°F

228.74°F

226.08°F

228.74°F



11800

11900

11825'

89.42°

271.36° 5792.21'

5369.32'

11919'

90.34°

271.42° 5792.41'

5463.31'

228.74°F

231.42°F

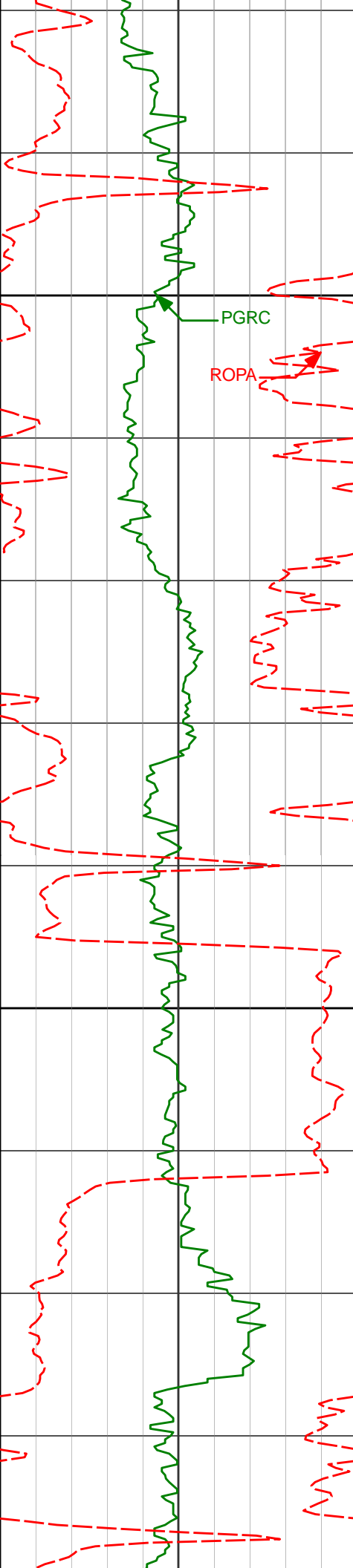
231.42°F

231.42°F

234.12°F

234.12°F

234.12°F



12000

PGRC

ROPA

12100

12014'

91.48°

271.12° 5790.90'

5558.29'

12108'

90.31°

271.18° 5789.43'

5652.27'

234.12°F

236.82°F

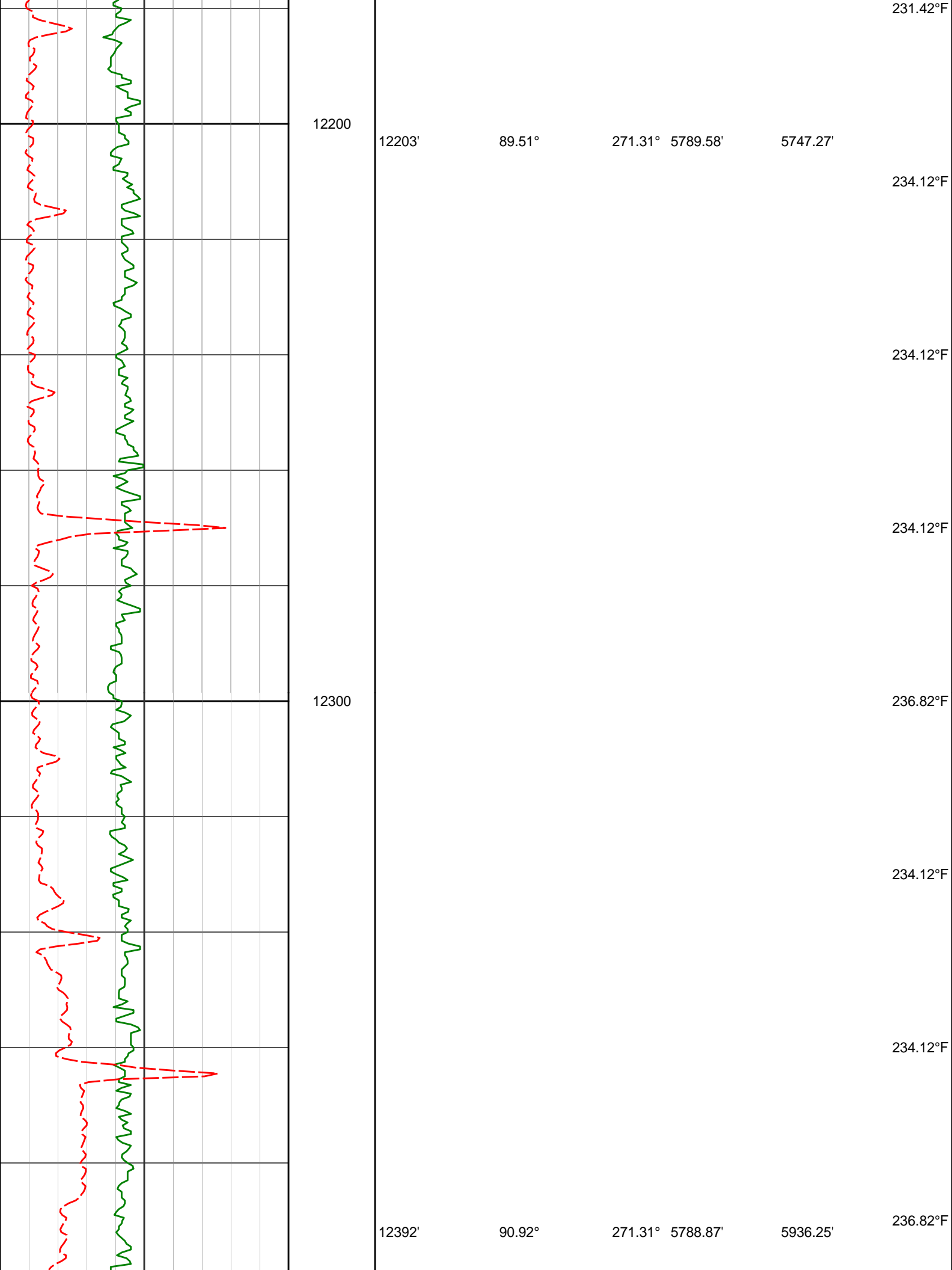
234.12°F

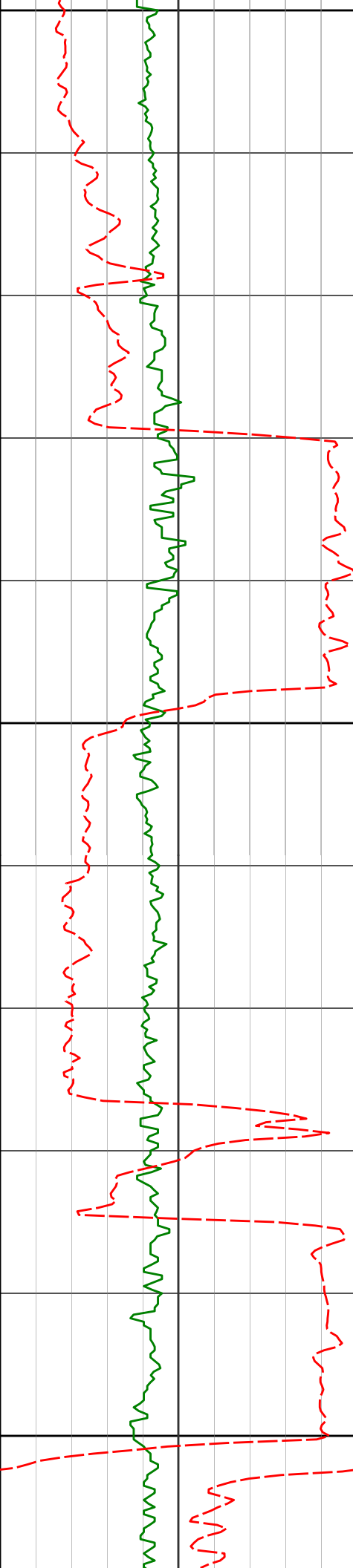
228.74°F

228.74°F

231.42°F

231.42°F





12400

228.74°F

226.08°F

226.08°F

12487'

88.89°

269.50° 5789.03'

6031.24'

12500

228.74°F

226.08°F

226.08°F

12581'

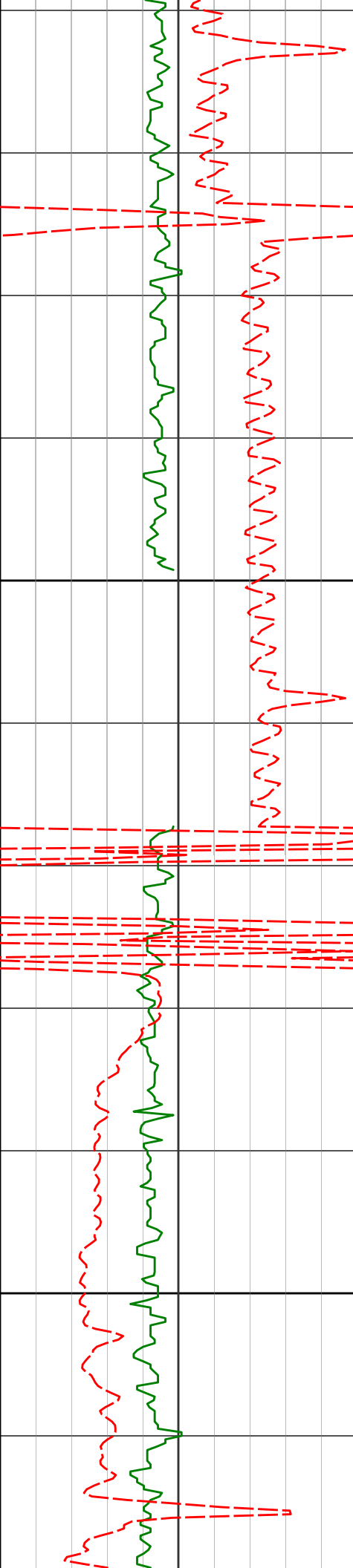
89.26°

266.73° 5790.55'

6125.12'

12600

228.74°F



12700

12800

12770'

89.94°

265.69° 5791.97'

6313.51'

228.74°F

231.42°F

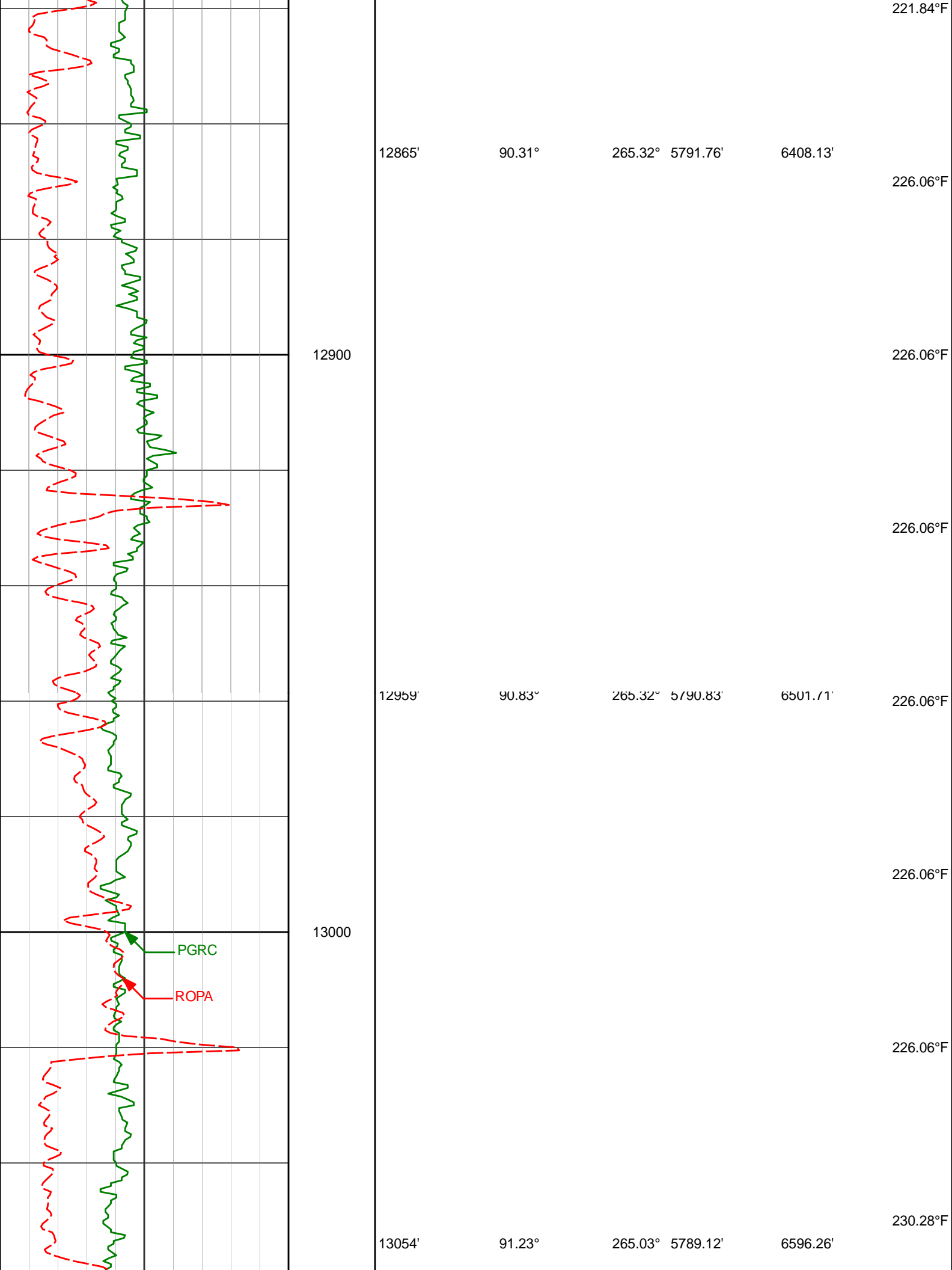
226.08°F

226.08°F

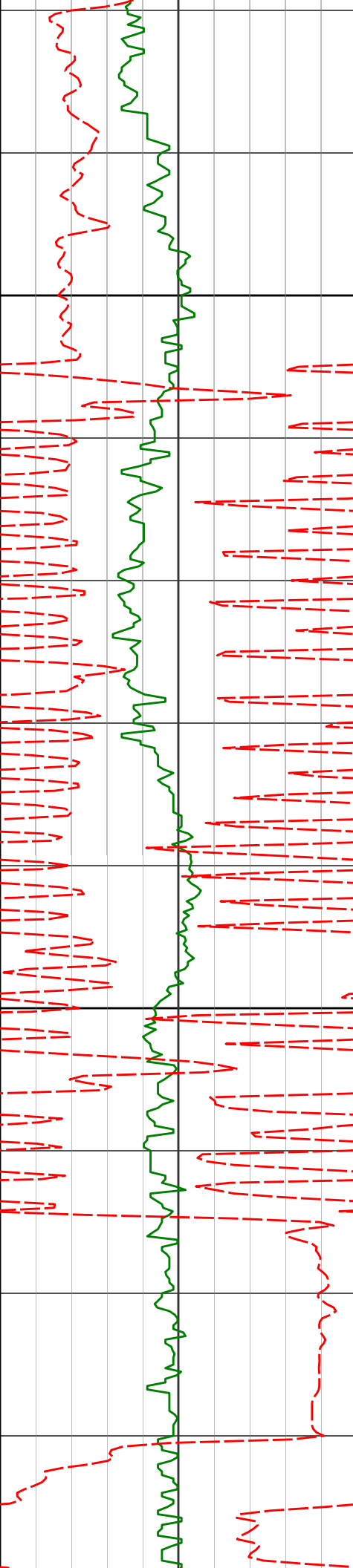
226.08°F

221.84°F

221.84°F







13100

13200

13149'

13243'

91.75°

90.58°

264.98° 5786.65'

266.54° 5784.74'

6690.76'

6784.40'

230.28°F

230.28°F

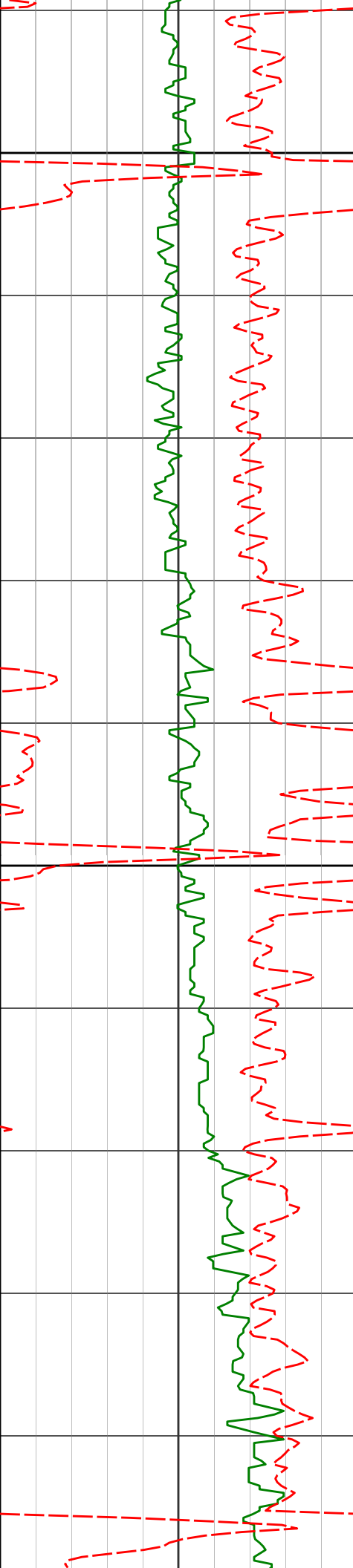
230.28°F

230.28°F

230.28°F

230.28°F

226.06°F



13300

13338'

89.66°

267.18° 5784.54'

6879.18'

13400

13432'

90.20°

267.20° 5784.66'

6973.01'

226.06°F

226.06°F

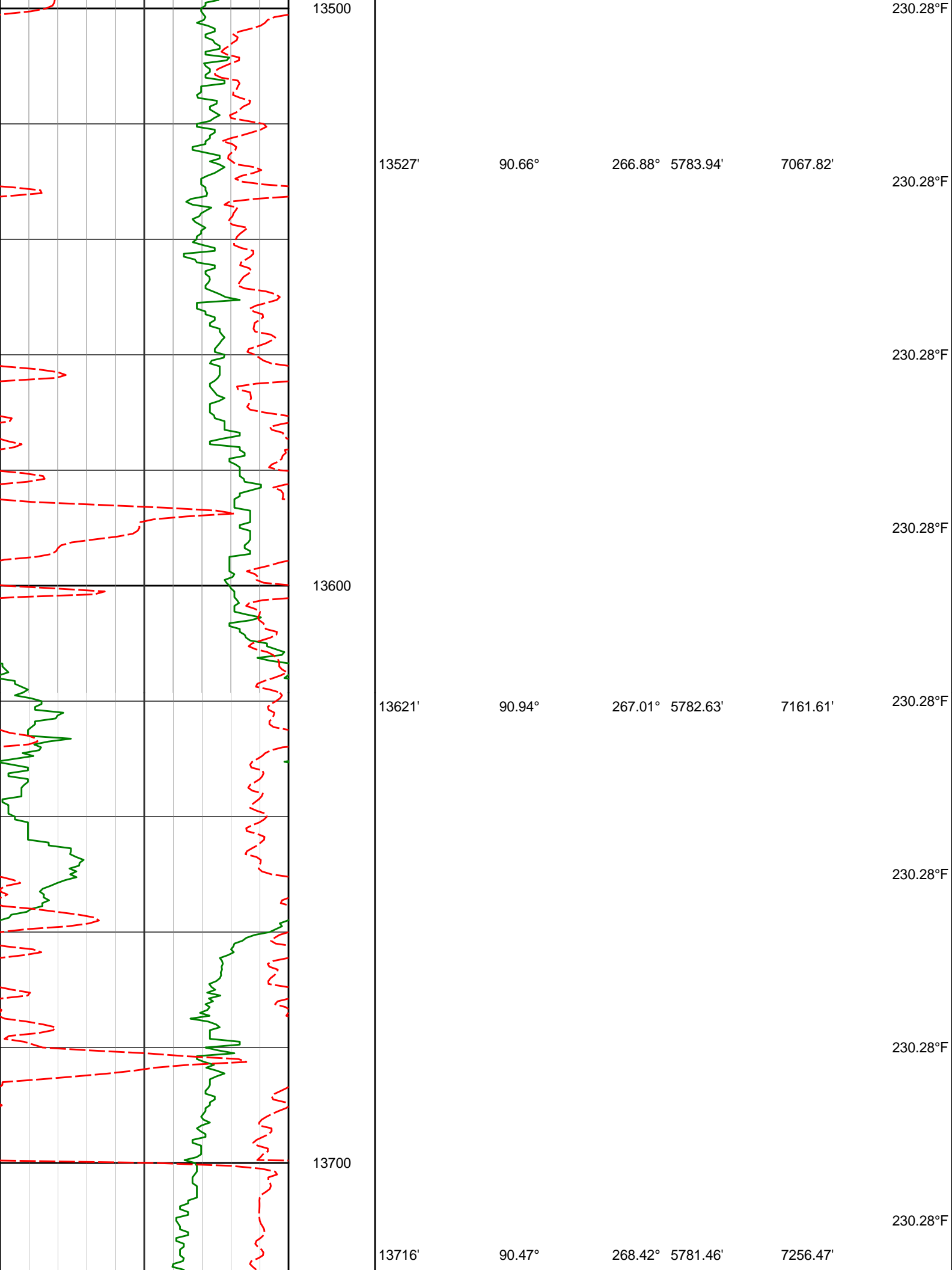
226.06°F

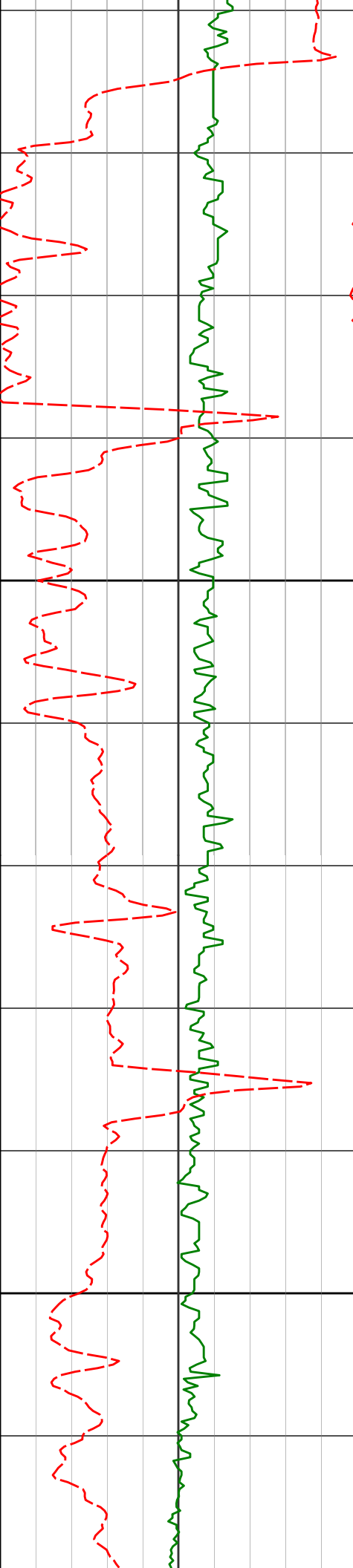
226.06°F

226.06°F

230.28°F

230.28°F





13800

13900

13811'

13905'

89.98°

90.19°

268.24°

267.94°

5781.09'

5780.95'

7351.39'

7445.30'

230.28°F

230.28°F

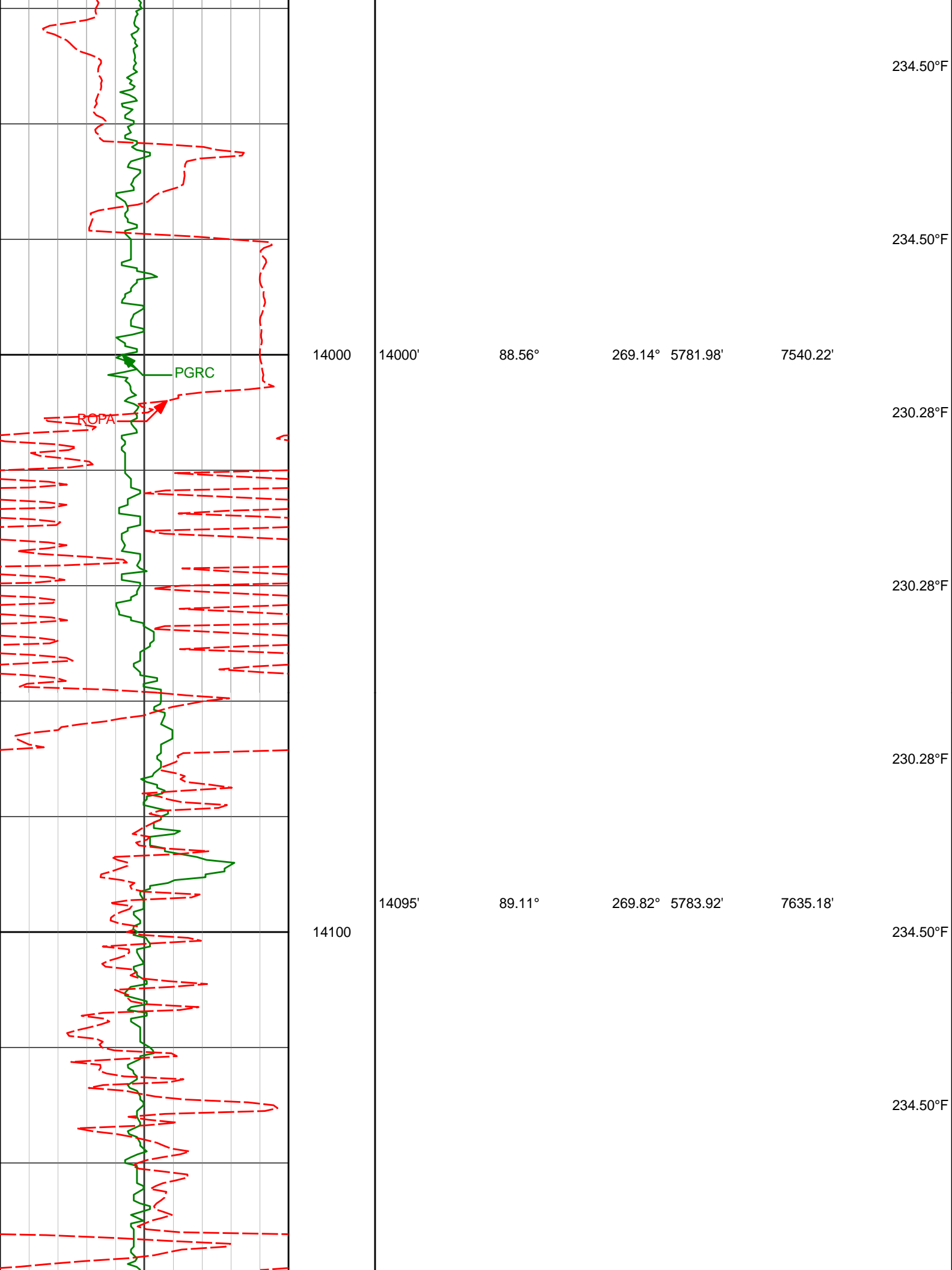
230.28°F

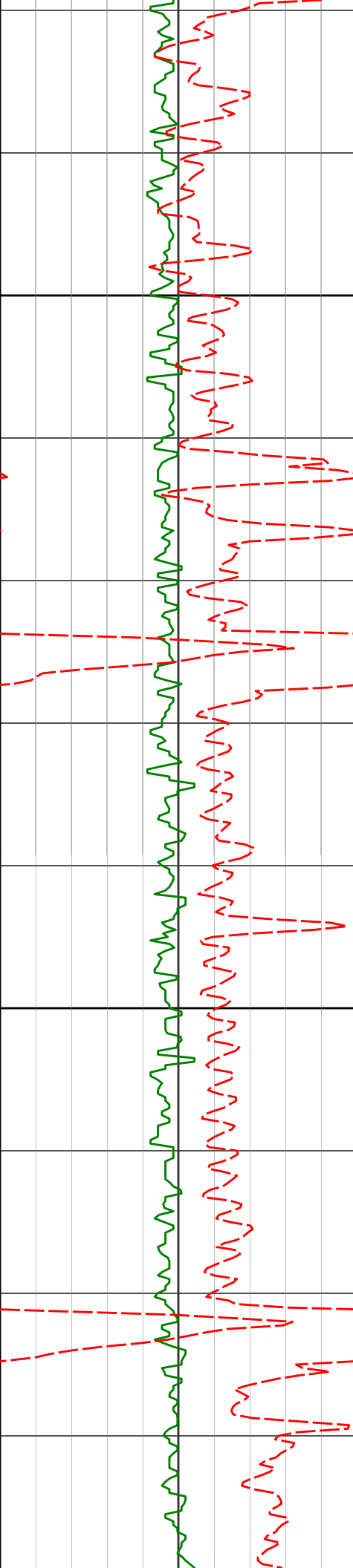
234.50°F

234.50°F

234.50°F

234.50°F





14200

14300

14189'

89.51°

269.72° 5785.05'

7729.16'

238.72°F

238.72°F

238.72°F

238.72°F

14284'

89.91°

269.97° 5785.53'

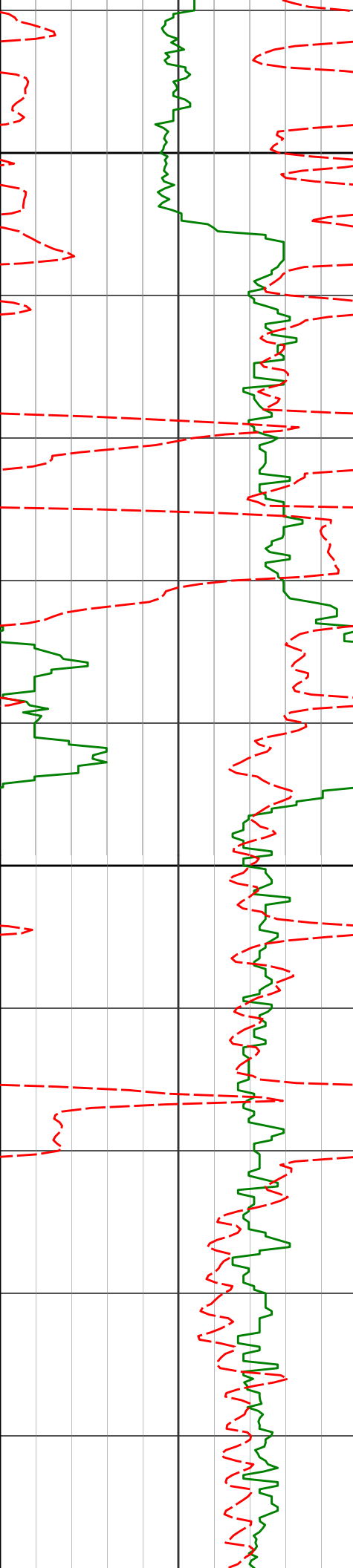
7824.15'

238.72°F

238.72°F

238.72°F

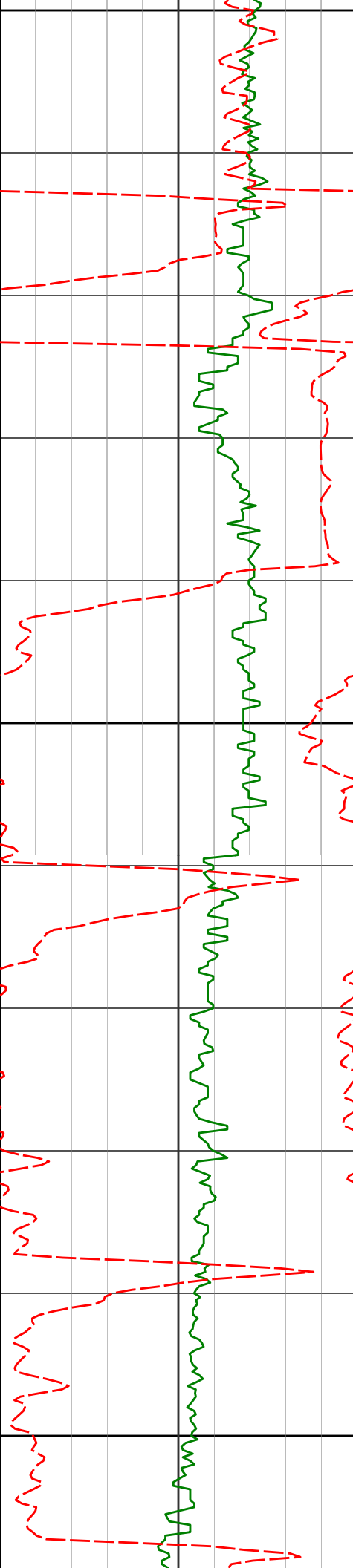
234.50°F



14400

14500

14379	89.97°	269.59°	5785.63	7919.14
				238.72°F
				238.72°F
				238.72°F
14473'	90.65°	270.05°	5785.12'	8013.13'
				238.72°F
				238.72°F
				238.72°F
14568'	91.17°	272.63°	5783.61'	8108.10'
				238.72°F



14600

238.72°F

238.72°F

14662'

91.42°

272.86° 5781.49'

8202.01'

238.72°F

14700

238.72°F

238.72°F

14757'

91.29°

271.33° 5779.24'

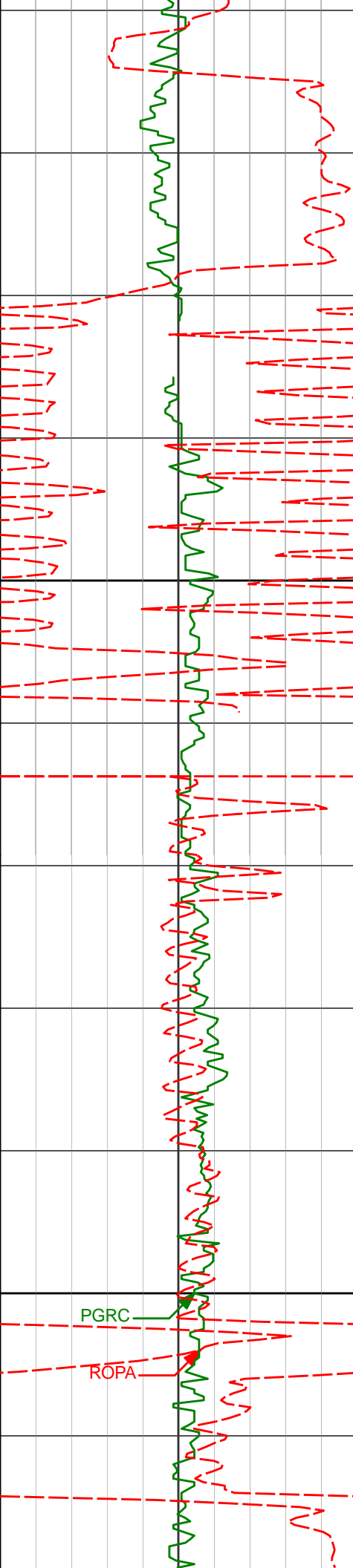
8296.95'

238.72°F

238.72°F

14800





14852'

14900

14946'

15000

14852'	91.67°	269.20°	5776.79'	8391.91'
14946'	91.85°	268.57°	5773.90'	8485.82'

238.72°F

238.72°F

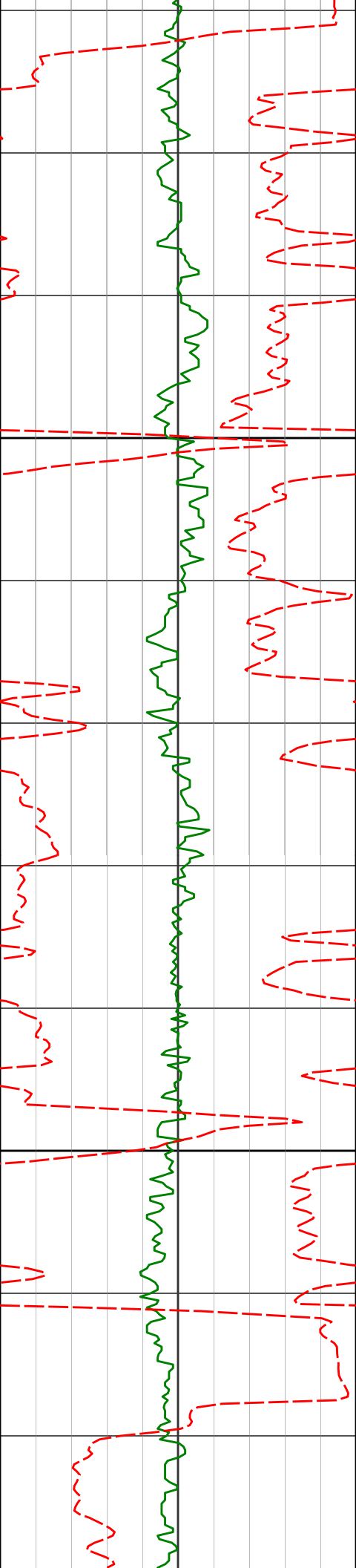
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



15100

15200

15041'

15135'

15230'

91.29°

91.57°

90.68°

267.61° 5771.30'

267.36° 5768.95'

266.68° 5767.09'

8580.69'

8674.52'

8769.30'

238.72°F

238.72°F

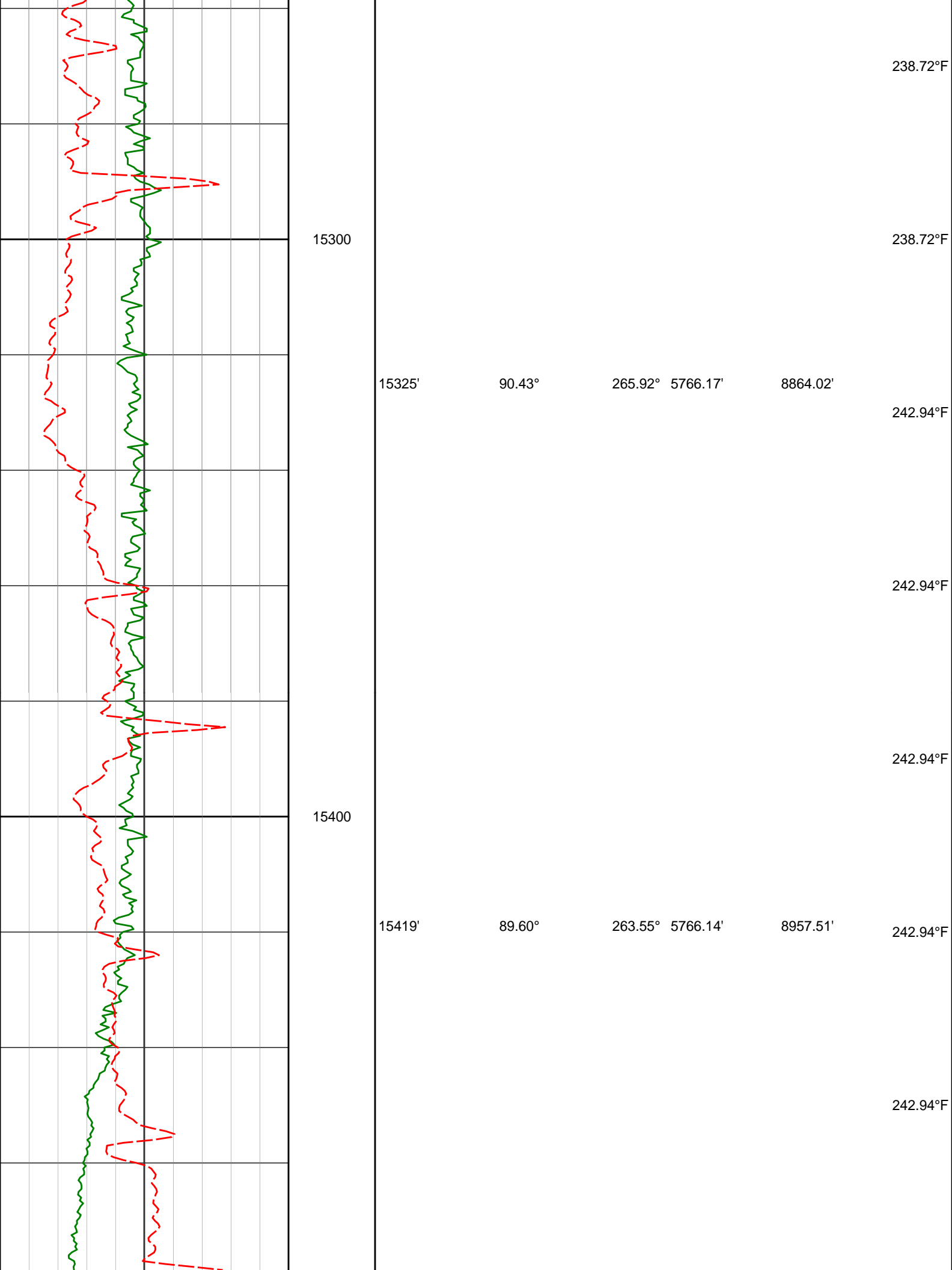
238.72°F

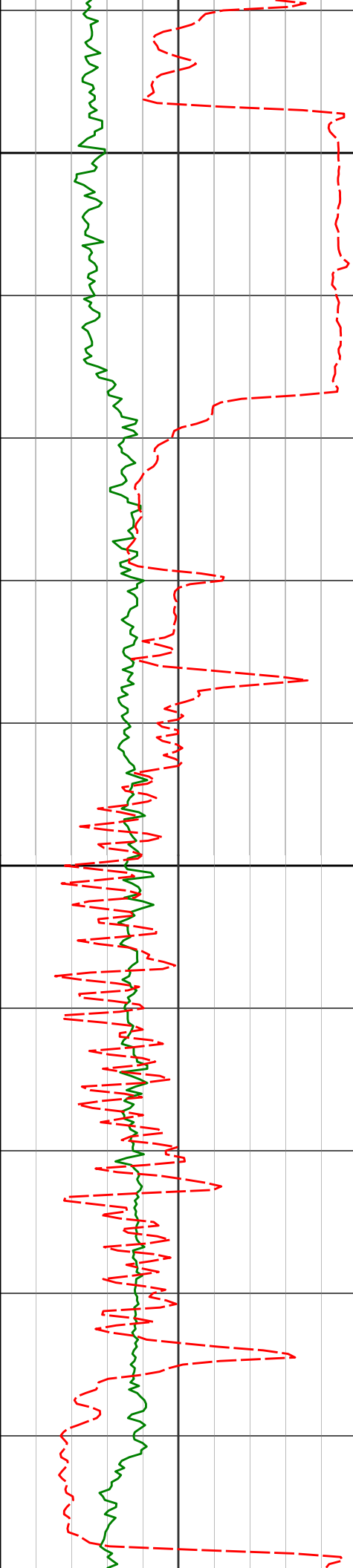
238.72°F

238.72°F

238.72°F

238.72°F





15500

15600

15514'

90.21°

266.05° 5766.30'

9052.00'

15608'

90.58°

266.65° 5765.65'

9145.73'

242.94°F

238.72°F

238.72°F

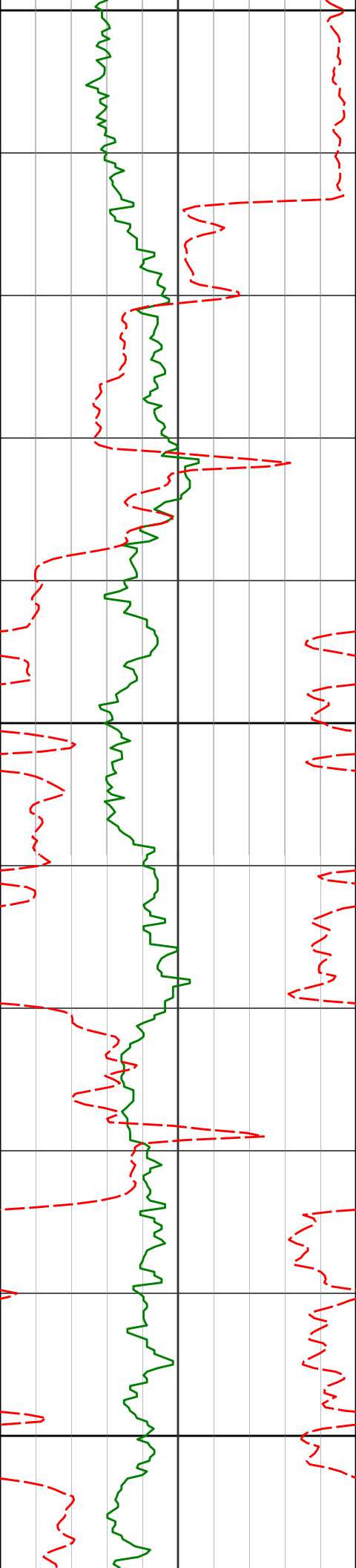
238.72°F

238.72°F

238.72°F

238.72°F

238.72°F



15700

15703'

90.98°

267.97° 5764.36'

9240.56'

238.72°F

238.72°F

238.72°F

15800

15797'

91.54°

269.31° 5762.29'

9334.48'

242.94°F

242.94°F

242.94°F

15900

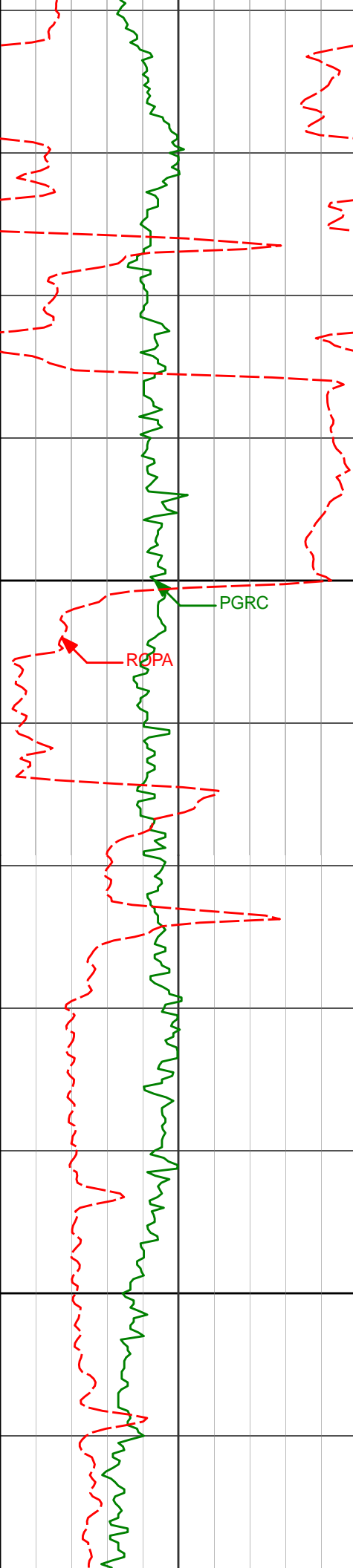
15892'

91.97°

269.09° 5759.38'

9429.40'

242.94°F



16000

16100

15986'

90.61°

270.59° 5757.26'

9523.36'

16081'

90.30°

271.01° 5756.51'

9618.36'

242.94°F

242.94°F

242.94°F

242.94°F

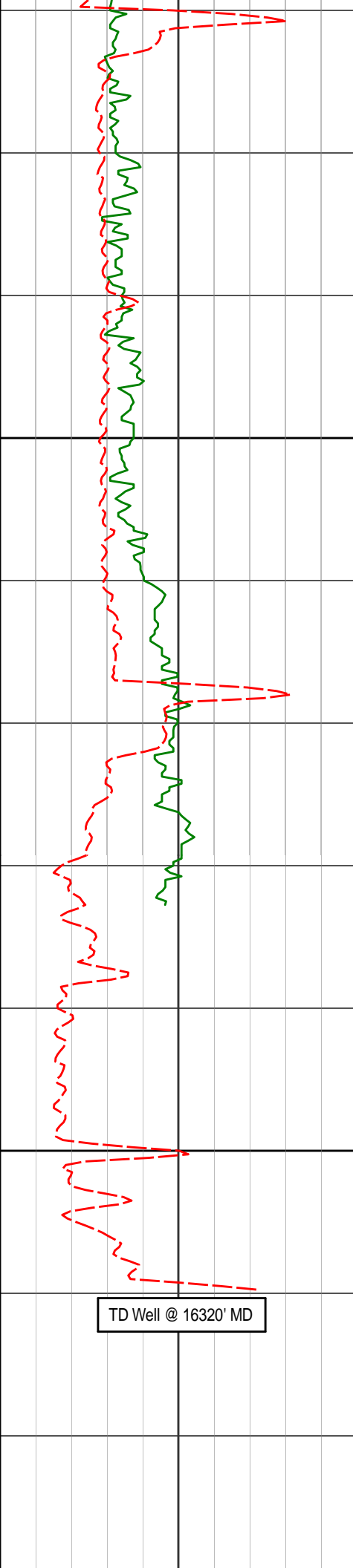
242.94°F

242.94°F

242.94°F

ROPA

PGRC



16200

16300

TD Well @ 16320' MD

16176'

90.49°

271.01° 5755.85'

9713.35'

16259'

90.92°

271.24° 5754.83'

9796.34'

16320'

90.92°

271.24° 5753.85'

9857.33'

242.94°F

242.94°F

242.94°F

242.94°F

[illegible]

# HALLIBURTON

## DIRECTIONAL SURVEY REPORT

**Noble Energy  
Reagan LD06-685  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0903470908**

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
78.00	0.16	150.07	78.00	0.09 S	0.05 E	-0.06	0.21
177.00	0.34	172.89	177.00	0.51 S	0.16 E	-0.17	0.20
271.00	0.34	148.71	271.00	1.02 S	0.34 E	-0.35	0.15
366.00	0.18	127.36	366.00	1.35 S	0.60 E	-0.62	0.19
460.00	0.48	222.40	460.00	1.73 S	0.46 E	-0.48	0.56
555.00	0.11	119.02	554.99	2.07 S	0.27 E	-0.29	0.54
650.00	0.01	288.83	649.99	2.11 S	0.34 E	-0.36	0.13
744.00	0.13	271.90	743.99	2.11 S	0.22 E	-0.25	0.13
839.00	0.20	331.29	838.99	1.96 S	0.04 E	-0.06	0.18
934.00	0.10	334.97	933.99	1.74 S	0.08 W	0.06	0.11
1028.00	0.13	49.44	1027.99	1.59 S	0.03 W	0.01	0.15
1123.00	0.15	21.81	1122.99	1.41 S	0.10 E	-0.11	0.07
1217.00	0.13	8.04	1216.99	1.19 S	0.16 E	-0.17	0.04
1311.00	0.19	79.96	1310.99	1.05 S	0.33 E	-0.34	0.21
1406.00	0.19	91.06	1405.99	1.03 S	0.64 E	-0.65	0.04
1501.00	0.21	221.88	1500.99	1.16 S	0.68 E	-0.69	0.38
1595.00	0.05	103.35	1594.99	1.30 S	0.60 E	-0.62	0.25
1689.00	0.76	154.26	1688.99	1.87 S	0.92 E	-0.94	0.78
1784.00	0.60	162.04	1783.98	2.91 S	1.34 E	-1.38	0.19
1879.00	0.19	134.31	1878.98	3.50 S	1.61 E	-1.65	0.46
1905.00	0.15	107.28	1904.98	3.54 S	1.67 E	-1.71	0.34
2027.00	0.35	131.29	2026.98	3.83 S	2.10 E	-2.15	0.18
2122.00	2.73	86.85	2121.94	3.89 S	4.57 E	-4.62	2.62
2216.00	4.17	66.57	2215.77	2.41 S	9.94 E	-9.97	1.98
2310.00	6.72	69.25	2309.34	0.90 N	18.22 E	-18.21	2.73
2405.00	8.04	69.85	2403.55	5.16 N	29.66 E	-29.59	1.39
2500.00	10.02	67.92	2497.37	10.56 N	43.56 E	-43.43	2.11
2594.00	9.61	66.99	2589.99	16.70 N	58.36 E	-58.16	0.47
2689.00	11.07	64.25	2683.45	23.76 N	73.87 E	-73.59	1.62
2784.00	12.27	63.44	2776.48	32.23 N	91.11 E	-90.73	1.27
2878.00	11.50	62.91	2868.46	40.97 N	108.39 E	-107.91	0.82
2973.00	12.28	58.25	2961.43	50.60 N	125.42 E	-124.82	1.30
3067.00	12.46	62.07	3053.25	60.61 N	142.88 E	-142.16	0.89
3162.00	14.70	66.32	3145.58	70.26 N	162.98 E	-162.15	2.58
3257.00	15.68	67.34	3237.26	80.04 N	185.87 E	-184.92	1.07
3446.00	14.41	66.94	3419.78	99.10 N	231.09 E	-229.91	0.68
3540.00	13.78	65.72	3510.95	108.28 N	252.06 E	-250.77	0.74
3635.00	15.60	66.72	3602.84	117.98 N	274.10 E	-272.71	1.94
3824.00	15.42	69.92	3784.96	136.66 N	321.06 E	-319.44	0.46
3918.00	12.99	70.98	3876.08	144.39 N	342.78 E	-341.07	2.60



4013.00	12.58	68.78	3968.72	151.62 N	362.52 E	-360.72	0.67
4109.00	13.48	69.20	4062.25	159.37 N	382.73 E	-380.84	0.95
4202.00	13.68	68.49	4152.65	167.25 N	403.09 E	-401.11	0.28
4297.00	13.79	66.55	4244.93	175.88 N	423.93 E	-421.84	0.50
4391.00	12.52	65.91	4336.47	184.49 N	443.51 E	-441.32	1.35
4486.00	12.61	67.33	4429.19	192.70 N	462.48 E	-460.20	0.34
4581.00	12.58	67.99	4521.90	200.57 N	481.64 E	-479.27	0.16
4676.00	11.94	62.29	4614.74	209.02 N	499.94 E	-497.46	1.44
4770.00	12.36	54.73	4706.64	219.35 N	516.77 E	-514.17	1.75
4865.00	11.97	58.05	4799.51	230.44 N	533.43 E	-530.69	0.84
4960.00	12.39	61.77	4892.37	240.47 N	550.76 E	-547.91	0.94
5054.00	11.87	68.12	4984.28	248.84 N	568.62 E	-565.67	1.52
5149.00	8.12	53.24	5077.83	256.50 N	583.07 E	-580.03	4.76
5243.00	10.04	30.20	5170.68	267.57 N	592.52 E	-589.35	4.33
5338.00	10.81	8.75	5264.15	283.53 N	598.04 E	-594.69	4.14
5432.00	10.63	344.69	5356.55	300.62 N	597.09 E	-593.54	4.73
5487.00	9.72	328.52	5410.70	309.47 N	593.33 E	-589.67	5.43
5582.00	16.16	277.53	5503.51	318.08 N	575.96 E	-572.20	13.17
5676.00	22.15	254.76	5592.38	315.13 N	545.83 E	-542.10	10.07
5771.00	29.89	244.87	5677.73	300.34 N	507.04 E	-503.50	9.32
5865.00	38.02	239.33	5755.66	275.58 N	460.85 E	-457.60	9.25
5960.00	54.67	240.27	5821.01	241.19 N	401.62 E	-398.77	17.54
6054.00	72.72	237.46	5862.50	197.67 N	329.88 E	-327.55	19.39
6149.00	91.20	241.57	5875.73	150.23 N	249.15 E	-247.38	19.91
6244.00	92.71	244.82	5872.49	107.42 N	164.42 E	-163.15	3.77
6338.00	91.85	246.19	5868.75	68.48 N	78.95 E	-78.15	1.72
6433.00	91.42	251.94	5866.04	34.56 N	9.70 W	10.11	6.07
6527.00	90.06	251.56	5864.82	5.13 N	98.96 W	99.02	1.50
6622.00	91.54	256.23	5863.50	21.21 S	190.20 W	189.94	5.16
6716.00	91.94	261.68	5860.64	39.21 S	282.38 W	281.90	5.81
6811.00	91.79	264.97	5857.55	50.24 S	376.67 W	376.06	3.46
6905.00	90.77	268.91	5855.45	55.26 S	470.50 W	469.82	4.33
7000.00	92.80	272.69	5852.49	53.93 S	565.42 W	564.75	4.51
7094.00	92.62	277.41	5848.04	45.67 S	658.92 W	658.34	5.02
7189.00	89.72	278.82	5846.10	32.26 S	752.94 W	752.51	3.39
7284.00	90.40	279.09	5846.00	17.48 S	846.78 W	846.52	0.77
7378.00	91.26	279.08	5844.64	2.64 S	939.59 W	939.50	0.91
7473.00	91.79	278.91	5842.11	12.21 N	1033.39 W	1033.46	0.59
7567.00	92.34	278.90	5838.72	26.75 N	1126.20 W	1126.43	0.59
7662.00	89.57	279.97	5837.14	42.32 N	1219.89 W	1220.30	3.13
7756.00	89.48	281.10	5837.92	59.51 N	1312.30 W	1312.90	1.21
7851.00	90.13	281.39	5838.24	78.03 N	1405.47 W	1406.29	0.75
7946.00	90.74	281.96	5837.52	97.26 N	1498.50 W	1499.54	0.88
8040.00	91.45	282.06	5835.73	116.81 N	1590.43 W	1591.69	0.76
8135.00	89.97	281.21	5834.55	135.97 N	1683.47 W	1684.94	1.80
8230.00	90.00	281.19	5834.57	154.42 N	1776.66 W	1778.34	0.04
8324.00	90.58	275.11	5834.10	167.74 N	1869.66 W	1871.50	6.50
8419.00	90.89	273.37	5832.88	174.76 N	1964.39 W	1966.30	1.86
8514.00	91.20	273.13	5831.15	180.15 N	2059.22 W	2061.19	0.41
8608.00	91.75	273.03	5828.73	185.20 N	2153.05 W	2155.07	0.59
8703.00	90.96	273.01	5826.48	190.20 N	2247.90 W	2249.97	0.83
8892.00	91.88	272.27	5821.80	198.90 N	2436.63 W	2438.79	0.62
8986.00	90.06	271.52	5820.21	202.01 N	2530.56 W	2532.75	2.09
9081.00	90.62	271.32	5819.64	204.37 N	2625.53 W	2627.74	0.63
9175.00	91.94	271.54	5817.54	206.71 N	2719.48 W	2721.71	1.42
9270.00	91.85	271.86	5814.40	209.53 N	2814.38 W	2816.64	0.35
9364.00	89.78	272.09	5813.06	212.77 N	2908.31 W	2910.60	2.22
9459.00	90.62	271.59	5812.73	215.82 N	3003.26 W	3005.58	1.03
9554.00	91.97	271.51	5810.58	218.39 N	3098.20 W	3100.54	1.42
9648.00	90.83	271.01	5808.29	220.45 N	3192.15 W	3194.51	1.32
9743.00	90.71	271.09	5807.01	222.19 N	3287.12 W	3289.50	0.15
9837.00	92.15	271.05	5804.67	223.95 N	3381.08 W	3383.46	1.53
9932.00	90.46	271.22	5802.50	225.83 N	3476.03 W	3478.43	1.79
10026.00	89.51	272.31	5802.53	228.72 N	3569.98 W	3572.41	1.54
10121.00	89.20	271.96	5803.60	232.26 N	3664.91 W	3667.38	0.49
10216.00	89.63	269.44	5804.57	233.42 N	3759.89 W	3762.36	2.69
10310.00	90.22	266.82	5804.69	230.36 N	3853.83 W	3856.26	2.86
10405.00	91.05	266.75	5803.64	225.03 N	3948.68 W	3951.04	0.88
10500.00	91.75	266.66	5801.32	219.57 N	4043.49 W	4045.78	0.74
10594.00	89.57	267.00	5800.23	214.37 N	4137.33 W	4139.56	2.35
10689.00	88.99	266.40	5801.43	208.90 N	4232.17 W	4234.32	0.88
10783.00	89.04	265.64	5803.04	202.38 N	4325.93 W	4328.00	0.81
10878.00	88.99	266.67	5804.68	196.01 N	4420.70 W	4422.69	1.09
10973.00	90.09	269.93	5805.44	193.19 N	4515.64 W	4517.59	3.62
11067.00	90.89	269.89	5804.64	193.05 N	4609.63 W	4611.58	0.85

11067.00	90.89	269.93	5804.64	193.03 N	4809.63 W	4811.38	0.85
11162.00	91.51	269.94	5802.65	192.91 N	4704.61 W	4706.55	0.65
11257.00	91.14	270.66	5800.45	193.40 N	4799.58 W	4801.52	0.85
11351.00	89.75	272.07	5799.72	195.64 N	4893.55 W	4895.50	2.11
11446.00	90.34	271.60	5799.64	198.68 N	4988.50 W	4990.48	0.79
11541.00	91.26	271.56	5798.32	201.30 N	5083.45 W	5085.46	0.97
11635.00	92.16	271.65	5795.51	203.93 N	5177.38 W	5179.41	0.96
11730.00	91.20	272.23	5792.73	207.15 N	5272.28 W	5274.34	1.18
11825.00	89.42	271.36	5792.21	210.12 N	5367.23 W	5369.32	2.09
11919.00	90.34	271.42	5792.41	212.40 N	5461.20 W	5463.31	0.98
12014.00	91.48	271.12	5790.90	214.51 N	5556.16 W	5558.29	1.24
12108.00	90.31	271.18	5789.43	216.40 N	5650.13 W	5652.27	1.25
12203.00	89.51	271.31	5789.58	218.46 N	5745.10 W	5747.27	0.85
12392.00	90.92	271.31	5788.87	222.78 N	5934.05 W	5936.25	0.75
12487.00	88.89	269.50	5789.03	223.45 N	6029.04 W	6031.24	2.86
12581.00	89.26	266.73	5790.55	220.36 N	6122.96 W	6125.12	2.97
12676.00	89.54	265.99	5791.54	214.33 N	6217.77 W	6219.85	0.83
12770.00	89.94	265.69	5791.97	207.51 N	6311.52 W	6313.51	0.53
12865.00	90.31	265.32	5791.76	200.07 N	6406.23 W	6408.13	0.55
12959.00	90.83	265.32	5790.83	192.40 N	6499.91 W	6501.71	0.55
13054.00	91.23	265.03	5789.12	184.41 N	6594.56 W	6596.26	0.52
13149.00	91.75	264.98	5786.65	176.14 N	6689.16 W	6690.76	0.55
13243.00	90.58	266.54	5784.74	169.19 N	6782.88 W	6784.40	2.07
13338.00	89.66	267.18	5784.54	163.99 N	6877.74 W	6879.18	1.18
13432.00	90.20	267.20	5784.66	159.38 N	6971.62 W	6973.01	0.57
13527.00	90.66	266.88	5783.94	154.47 N	7066.49 W	7067.82	0.59
13621.00	90.94	267.01	5782.63	149.46 N	7160.35 W	7161.61	0.33
13716.00	90.47	268.42	5781.46	145.68 N	7255.26 W	7256.47	1.56
13811.00	89.98	268.24	5781.09	142.91 N	7350.22 W	7351.39	0.55
13905.00	90.19	267.94	5780.95	139.77 N	7444.17 W	7445.30	0.39
14000.00	88.56	269.14	5781.98	137.35 N	7539.13 W	7540.22	2.13
14095.00	89.11	269.82	5783.92	136.49 N	7634.11 W	7635.18	0.92
14189.00	89.51	269.72	5785.05	136.11 N	7728.10 W	7729.16	0.44
14284.00	89.91	269.97	5785.53	135.86 N	7823.10 W	7824.15	0.50
14379.00	89.97	269.59	5785.63	135.49 N	7918.09 W	7919.14	0.40
14473.00	90.65	270.05	5785.12	135.20 N	8012.09 W	8013.13	0.87
14568.00	91.17	272.63	5783.61	137.42 N	8107.05 W	8108.10	2.77
14662.00	91.42	272.86	5781.49	141.92 N	8200.91 W	8202.01	0.36
14757.00	91.29	271.33	5779.24	145.39 N	8295.82 W	8296.95	1.62
14852.00	91.67	269.20	5776.79	145.83 N	8390.78 W	8391.91	2.28
14946.00	91.85	268.57	5773.90	144.00 N	8484.72 W	8485.82	0.70
15041.00	91.29	267.61	5771.30	140.84 N	8579.63 W	8580.69	1.17
15135.00	91.57	267.36	5768.95	136.71 N	8673.51 W	8674.52	0.40
15230.00	90.68	266.68	5767.09	131.77 N	8768.36 W	8769.30	1.18
15325.00	90.43	265.92	5766.17	125.64 N	8863.16 W	8864.02	0.84
15419.00	89.60	263.55	5766.14	117.02 N	8956.75 W	8957.51	2.67
15514.00	90.21	266.05	5766.30	108.41 N	9051.36 W	9052.00	2.71
15608.00	90.58	266.65	5765.65	102.43 N	9145.16 W	9145.73	0.75
15703.00	90.98	267.97	5764.36	97.97 N	9240.05 W	9240.56	1.45
15797.00	91.54	269.31	5762.29	95.74 N	9333.99 W	9334.48	1.54
15892.00	91.97	269.09	5759.38	94.41 N	9428.94 W	9429.40	0.51
15986.00	90.61	270.59	5757.26	94.15 N	9522.91 W	9523.36	2.15
16081.00	90.30	271.01	5756.51	95.48 N	9617.90 W	9618.36	0.55
16176.00	90.49	271.01	5755.85	97.15 N	9712.88 W	9713.35	0.20
16259.00	90.92	271.24	5754.83	98.78 N	9795.86 W	9796.34	0.59
16320.00	90.92	271.24	5753.85	100.10 N	9856.84 W	9857.33	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 270.67 DEGREES (GRID)  
A TOTAL CORRECTION OF 6.91 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16320.00 FEET  
IS 9857.34 FEET ALONG 270.58 DEGREES (GRID)

Surveys from 0' to 1905' are 3rd-Party Gyro surveys.  
Surveys corrected by Surcon starting at 2027' ft.  
Last survey is a straight line projection to the bit at TD.